

2012

**MUFLE**  
PASSION FOR DRAINAGE

**MufleDrain**  
GENERAL CATALOGUE

**W**ATER CONVEYING  
SYSTEMS





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For further updates please check the site [www.mufle.com](http://www.mufle.com) periodically

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# Mufle carries the water anywhere



The fast and safe drainage of rain water has always been one of the biggest problems in man's history, especially with the current climatic changes which make it more and more important in terms of security.

To the rain water must be added all the liquids deriving from the industry which must be quickly removed and collected into the suitable purification plants.

**MufleSystem**, leader in the **linear drainage system in HD-PE, in stainless steel** and in the **punctual drainage**, is specialized in water conveying system towards collection lines or points and offers innovative solutions and designs for water drainage.

The drainage products of MufleSystem decrease the environmental impact and are certified according to high quality standards.

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# Why to choose MufleSystem?

## Because MufleSystem means **SPEARHEAD**:

MufleSystem introduced the new system for linear water drainage in 1996 and obtained a great success still growing on up to nowadays, bringing a change into the old traditional system in concrete with starting the use of High Density Polyethylene not only in the Italian market but also in the European market.

With this new system in HD-PE we became during the recent years the market leader in the field of linear water drainage channels and for all dealers involved in this business activity.

## Because MufleSystem means **IMPROVEMENTS and UPDATES**:

As specialized manufacturer in the linear drainage channels sector, we are not afraid of improvement, we think on the contrary that it is necessary and is implied in the products development.

Improvement means innovation and market leadership and this is the reason why it is very important for us, even if it requires huge investments in terms of financial resources and research.

The catalogue restyling introduces the new FUNNEL system for wide application areas, the SLOPE products with the innovative

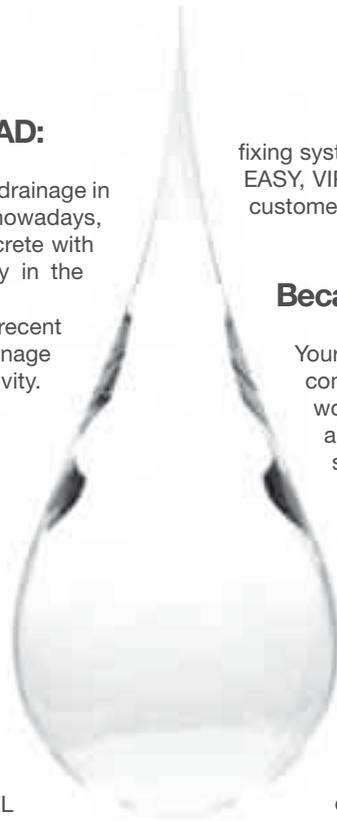
fixing system and the dimensions 150/40 and 200/40 for the models EASY, VIP and WING, showing our attention to novelties and to our customers requirements.

## Because MufleSystem means **SAFETY**:

Your safety is a very important value especially for our company and for the industrial sector where we are working. For this reason we choose to test each product and each organization/ production procedure by the specialized institute IGQ (Institute Quality Guarantee) in order to obtain the certification for your guarantee.

## Because MufleSystem means **TEAM WORK**:

Nowadays MufleSystem has a sale network comprising 60 agencies all over the Italian territory. Its participation to all the most important Exhibitions abroad has increased its products distribution and export sales, establishing its own representative offices in all the European Union countries.



# The Mission

## THE MISSION

Our company identity has been created on the experience and professionalism of our people and allows us to achieve the leadership in product's innovation and draining systems for liquids convoy, mainly for meteoric and industrial waters.

The careful company management and the continuous analysis of markets' and Clients' increase the value of every project and ensure a constant capital return to the shareholders but also guarantee a fair and consistent relationship with all our business partners.

## THE VISION

In order to become a leader company both for clients and competitors, MufleSystem srl pursues to reach a sustainable and profitable market niche through a constant products' and services' innovation.



# Corporate certifications

## CERTIFICATION ISO 9001 : 2008

MufleSystem was awarded the Certificate of Compliance with Standard EN ISO 9001:2000 by the Italian Quality Assurance Institute IGQ (No. 2B45) for its “design, manufacture and commercial distribution of drainage systems, manhole covers and gratings marked Mufle – Commercial distribution of products for the building industry”.

The Standards ISO 9000 set forth a series of regulations to be met in order to rationalise work, meet customers’ expectations, maintain and improve the quality system.

The Certificate makes it possible for the Company to cut mistakes and boost its organisation structure by carefully defining its corporate procedures, from resource management to product manufacture, including the definition of responsibilities and the analysis and improvement of its processes.

All processes are handled on a systematic and organic basis in order to increase customer satisfaction and ensure working consistency in the production of goods.

MufleSystem decision to obtain the Certification made it possible to achieve major results such as: systematic nature, method, system soundness, spurs to improvement, customer satisfaction, better internal and external relationships.



A high-angle photograph of a cobblestone street. A dark shadow of a person is cast across the stones. In the lower right corner, a bright red umbrella is partially visible. A black drainage grate runs diagonally across the middle of the frame. A blue graphic overlay is positioned in the upper right, containing the text 'MUFLEDRAIN' and 'WATER CONVEYING SYSTEMS'.

# MUFLEDRAIN

WATER CONVEYING SYSTEMS

Thanks to the **wide range** of channels and the different types of covering gratings, the MufleDrain system makes it possible to meet **all** drainage **requirements** in the civil and industrial sectors.

Today it is even **cheaper and more efficient** thanks to the new male-female coupling system, designed to let you lay the channels with utmost **SIMPLICITY** with **preassembled gratings!**

The words “Certified Product” should give rise to two questions: Which features were certified? Who certified them? These words do not show a general quality with the product but the presence of something more (well-defined and verifiable) than in the competing products.

The steps taken to certify a product aim to inform the customer of some major peculiar features that make our products stand out from products from the same category.

To certify a product means highlighting its explicit and implicit features and stating the Company’s commitment to a continuous search for standards able to ensure higher and higher quality requirements. Certified products result from continuous improvement based on well-defined quality standards and continuous monitoring by an independent Certifier.

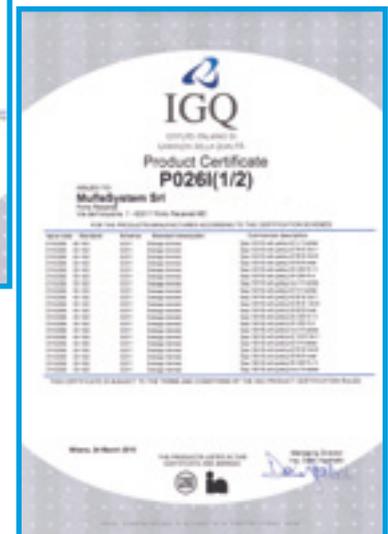
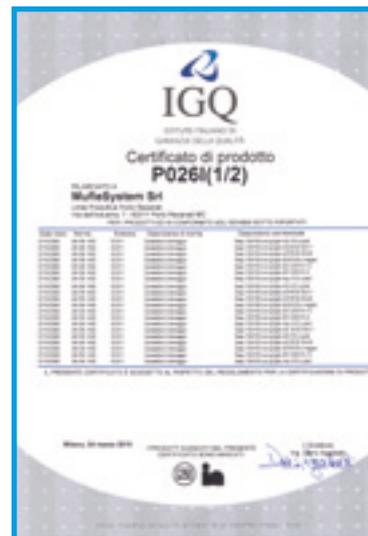
In short we can say that product certification means that the Company has voluntarily chosen to enter into a trust-based agreement with its customers in order to assure them its products have specified **SAFETY** and quality features.

Said requirements are summarised in the European Directive 89/106 EEC, transposed in Italy with a Decree by the President of the Italian Republic (No. 246/93) aimed to ensure the free movement of construction products and the lifting of all national protectionist barriers in EU countries.

## The CE Mark :

- shows that the product underwent conformity assessment procedures;
- ensures the product complies with all applicable EU requirements imposed on the manufacturer;
- can be affixed only when all audits have been completed;
- entitles the product to be marketed, to move freely and to be used on the EC territory;
- must be affixed by the manufacturer;
- is made up of the letters CE and, should a notified body take part in the production audit phase, of the identification number of said body or bodies;
- must be visible, readable, indelible, and must be affixed on the product directly.

## THE CE MARK



Certain types of products bear the CE Mark to show that they meet or are compliant with all the applicable European Union Directives. In order to be marketed in the countries belonging to the European Economic Area (EEA) the laws require the products to bear the Mark. The symbol CE stands for “Conformité Européenne” and shows that the product complies with the essential requirements specified by Directives on safety, public health and protection of consumers.

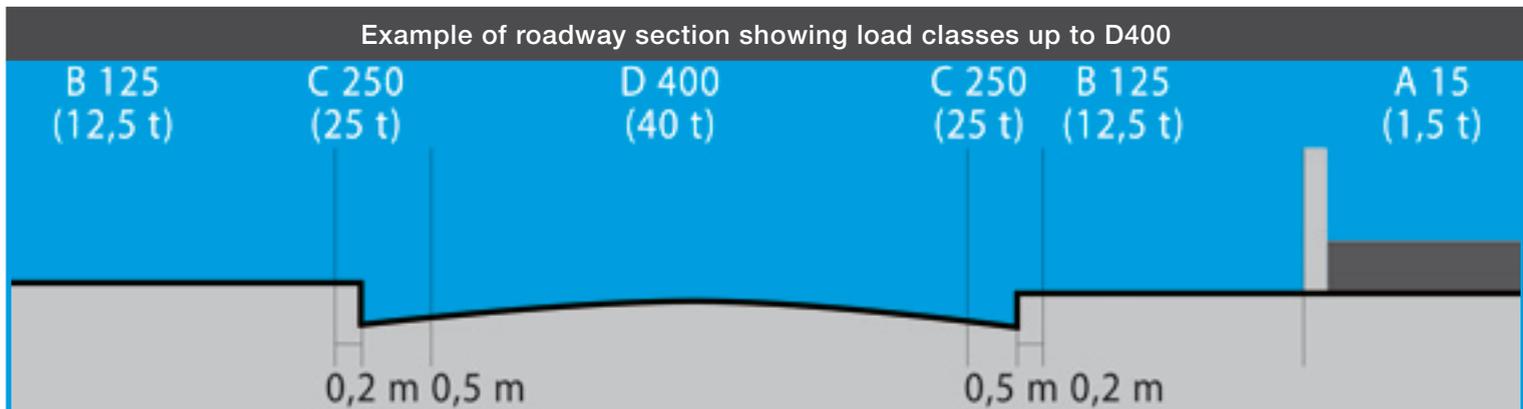
European Standard EN 1433 is aimed to define the “terminology, classification, test, design, marking and conformity assessment requirements of linear drainage channels to collect and carry surface water as installed in areas subject to pedestrian and/or vehicular traffic”.

MufleSystem’s HD-PE drainage channels and the relevant gratings and covers (made of galvanised/stainless steel or ductile iron) are certified according to Standard EN 1433 on “Drainage Channels for Pedestrian and Vehicular Areas”.

The certificate, issued by the Italian Quality Assurance Institute IGQ, is a guarantee for the final customer that the products are manufactured with high-quality manufacturing processes (either carried out in-house or outside) and comply with the reference specifications.

This also ensures that the regular checks specified by Standard EN 1433 are carried out, since MufleSystem continuously performs load tests on its products in its own in-house laboratory, as well as physical and chemical analyses on polyethylene, metallographic analyses and tensile tests on iron in external certified laboratories.

	<b>Class A1</b>	Areas which can only be used by pedestrians and cyclists, green areas.
	<b>Class B125</b>	Footways, pedestrian areas and comparable areas, private car parks and parking decks.
	<b>Class C250</b>	Road side areas (kerbs) stretching maximum 0.5 m into the carriageway and maximum 0.2 m into the footway.
	<b>Class D400</b>	Carriageways of roads (pedestrian streets included), hard shoulders and parking areas for all types of road vehicles.
	<b>Class E600</b>	Areas subject to high loads such ports, industrial areas and areas where goods are unloaded.
	<b>Class F900</b>	Areas subject to very high loads such as airports and areas where containers are unloaded.



All polymers made of hydrocarbons with the formula  $C_nH_{2n}$  and double bond are defined as POLYOLEFINS. This group includes, among others, polyethylene (PE) and polypropylene (PP). They are the result of ethylene polymerisation ( $CH^2=CH^2$ ).

The following techniques are currently used for the industrial production of PE:

- high-pressure polymerisation;
- medium/low-pressure polymerisation;

based on which different types of PE are produced:

1. High-density polyethylene (HD-PE)
2. Low-density polyethylene (LD-PE)
3. High-molecular-weight polyethylene (HMW-PE)
4. Ultra-high-molecular-weight polyethylene (UHMW-PE)
5. Linear-low-density polyethylene (LLD-PE)

HD-PE (High Density) is little branched polyethylene (PM=200,000/400,000 g/mol) with crystallinity 60/80% and high density (0.942-0.965 g/cm<sup>3</sup>).

LD-PE (Low Density) is much more branched than HD-PE (PM=600,000 g/mol), its crystallinity ranging from 40% to 50% and density from 0.915 to 0.935 g/cm<sup>3</sup>.

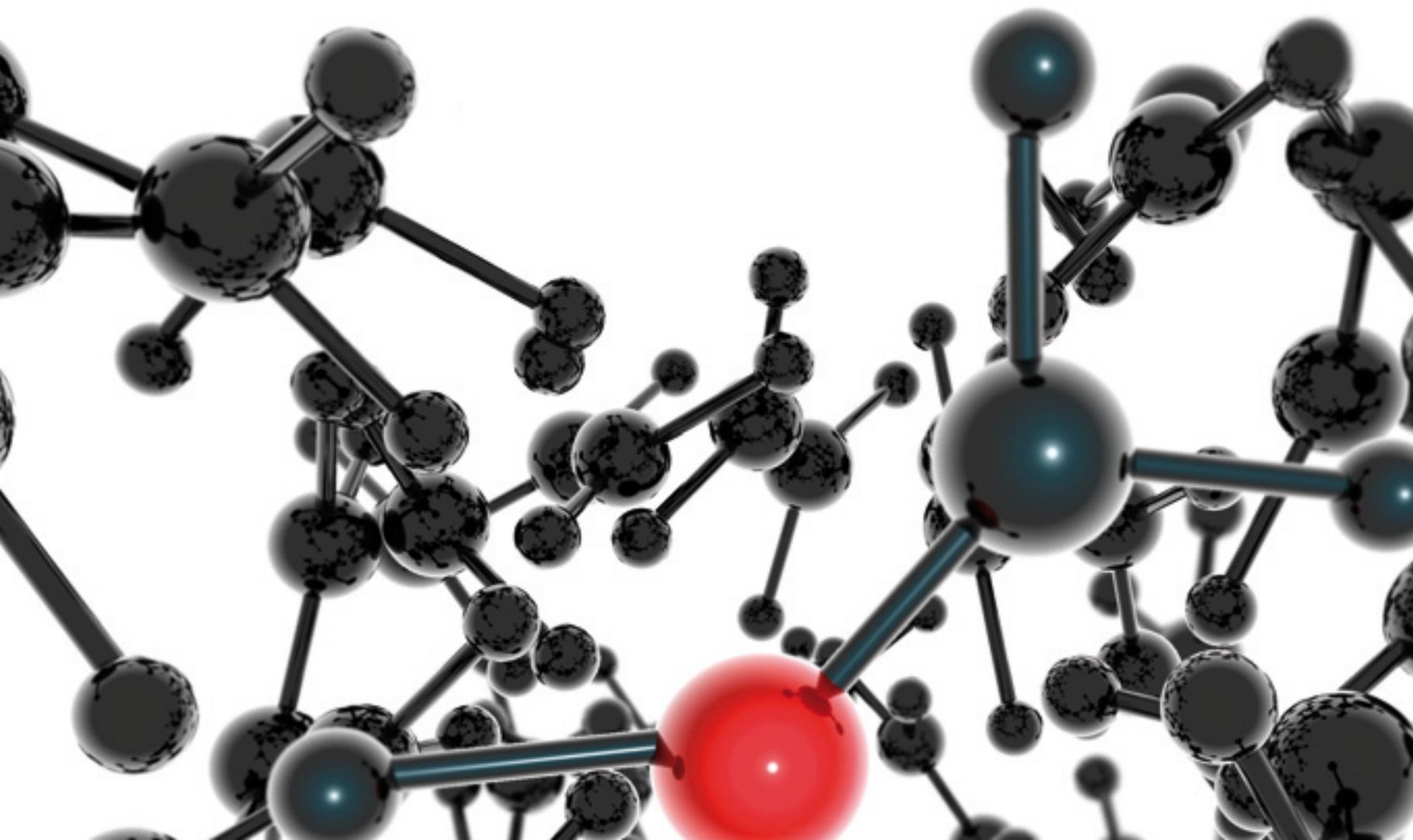
HMW-PE (High Molecular Weight), UHMW-PE (Ultra High Molecular Weight) e l'LLD-PE (Linear Low Density) sono tipi di polietilene "speciali" Weight) and LLD-PE (Linear Low Density) are "special"

types of polyethylene used to manufacture very technical items. The characteristics of PE all depend on three key factors: the branching of the structure, crystallinity and above all density. Intermolecular forces change according to branching: higher intermolecular forces - and consequently excellent rigidity and hardness values (Table 1) - correspond to less branched arrangements such as in HD-PE.

A high percentage of crystallinity such as in HD-PE ensures the material has more mechanical resistance, high resilience (resistance to shocks) values, high elongation-at-break values, good behaviour against friction and wear - without making it too fragile. A completely crystalline polymer would be too fragile to be used as a plastic material because the amorphous areas (non-crystalline areas) give it toughness, i.e. make it able to bend without breaking (Table 2).

A high density value such as in HD-PE affects tensile stress (which increases in an almost linear way), water absorption, permeability to water vapour, oxygen, carbon dioxide and a number of odorous and aromatic substances. The above shows that HD-PE is a material that ensures excellent **ROBUSTNESS**.

PE withstands water, saline solutions, acids, alkalis, alcohol and petrol. It is soluble in all organic solvents up to 60°C. These characteristics increase in proportion to density. That is why HD-PE is used to manufacture oil and fuel containers according to DIN 16904. The formation of cracks due to internal stresses brought about by contact with surface-active agents decreases as density increases too (Tables 1 and 2). So HD-PE is very **VERSATILE** and can be used in chemically aggressive environments.



An assessment of the behaviour following exposure to bad weather carried out through usual laboratory methods (DIN 53386, 53387, 53388) shows that the physical and mechanical characteristics of HD-PE do not change over time, unlike PP (whose aging is faster). Nevertheless, the assessment sequence in said artificial methods can differ from the sequence calculated in outdoor use: it is not possible to have results from practical tests on the exposure of products to the external environment for a long enough period of time, since plastic materials have only recently been used in the construction industry. We can nevertheless infer that HD-PE is a **LONG-LASTING** material.

MufleSystem's MufleDrain channels are made from HD-PE because the combination of the three key factors (branching of the structure, crystallinity and density) - as can be inferred from the above and as shown in Tables 1 and 2 - ensures the best performance for the finished product.

The HD-PE used by MufleSystem is a regenerated/regranulated material with the addition of a black master that gives the finished product its classical black colour (sky-blue, grey and other colours can be achieved with masters of a different RAL). The addition is needed to prevent the "photo-oxidation" of PE, which is unstable when exposed to UV radiation.

The resulting product has the same characteristics as the virgin material. As they are thermoplastic materials (i.e. they can be modelled several times, which means they can be easily re-formed and re-moulded - unlike the resins, which are thermosetting materials, i.e. they cannot be melted again after being formed for the first time), POLYOLEFINS can be reworked through regeneration and/or regranulation. This makes it possible to derive new reusable "raw material" from scraps and household waste, with the advantage of contributing to the protection of the environment and saving remarkably on energy resources thanks to complete **RECYCLABILITY**.

Suffice it to say that about 7% of household and industrial waste results from discarded plastic materials: worldwide yearly production of plastic materials amounts to 250 million tons, i.e. a per-capita consumption of 1-10 kg. In Germany alone plastic waste amounts to about 3 million tons/year, while in Italy plastic waste due to empty bottles amounts to 200,000 tons/year.

HD-PE is odourless, tasteless and physiologically harmless.

All the above-mentioned characteristics are stable for short-term uses where maximum allowed temperatures range from 80 to 120°C in HD-PE (e.g. asphaltting), while the range is 60 to 95°C for long-term uses. In higher temperatures softening (in normal conditions the product is not jeopardised) and then liquefaction are experienced.

Minimum temperatures for use are around -50°C.

PE is not self-extinguishing and it is classified as HB by American Underwriters Laboratories, i.e. a 3 mm-thick test piece burns at a speed of 7 mm/min, although the addition of suitable retarders makes it possible to create a PE mixture with an extinguishing degree up to V0 (the highest degree possible).

Thanks to the addition HD-PE can be put to **SPECIAL USES**. The HD-PE used to mould the MufleDrain channels has well-defined characteristics - compliance being ensured by the Quality Mark MufleSystem received from IGQ and by the relevant Product Certification according to Standard EN 1433.

**TABLE 1**

Dependence of chemical, physical and mechanical properties of POLYOLEFINS, on density and molecular structure				
STRUCTURAL PARAMETERS	DENSITY g/cm <sup>3</sup>		MOLECULAR STRUCTURE	
Threshold values	0,900	0,970	considerably branched	linear
Crystallisation degree	+/-	+/+	-/-	+/+
Fluidity Index	o	o	o	o
Workability	+	-	+	-
Tensile strength and bending strength	→		→	
Elongation at break	←		←	
Rigidity and hardness	→		→	
Shock resistance	←		→	
Resistance to stress-induced cracks	→		→	
Crystal melting field and heat deformation temperature	→		→	
Cold breaking temperature	→		→	
Chemical resistance and resistance to solvents	→		→	
Resistance to gas and vapour diffusion	→		→	

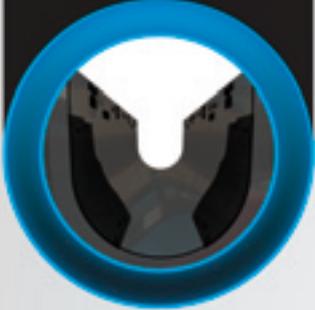
+ -: high or low values °: no special effects → : positive effect increasing in the direction of the arrow

**TABLE 1**

Summary of main characteristics of POLYOLEFINS					
STRUCTURAL PARAMETERS	UNIT	LD-PE	PE-HD	PP-H	PP-R
Density	g/cm <sup>3</sup>	0,916-0,920	0,940-0,960	0,900-0,915	0,895-0,900
Elasticity modulus E (DIN 53457)	MPa	200-400	600-1400	1300-1800	600-1200
Tensile strength (DIN 53455)	N/mm <sup>2</sup>	8/23	18/35	21/37	21/37
Elongation (DIN 53455)	%	C.a. 20	C.a. 8-12	C.a. 8-18	C.a. 12-18
Melting point	°C	105-118	126-135	162-168	135-155
Thermal expansion coefficient	mm/°C	20x12 <sup>-5</sup>	20x12 <sup>-5</sup>	15x12 <sup>-5</sup>	15x12 <sup>-5</sup>
Dielectric constant at 100 Hz	-	2,3	2,4	2,3	2,3
Water absorption at 23°C	%	< 0,05	< 0,05	< 0,20	< 0,20

### EXTRA SLICK

The smooth waterproof surface lets the water flow quickly away and is easy to clean, thus preventing the formation of putrescible residues.



### STRONG GRIP

The special geometry of the external structure translates into high steadiness and improves the anchoring of concrete to HD-FE.



### EASY TO CONNECT

The preassembled drain outlets on the sides and the bottom are easy to open and permit quick connection to the sewer system.



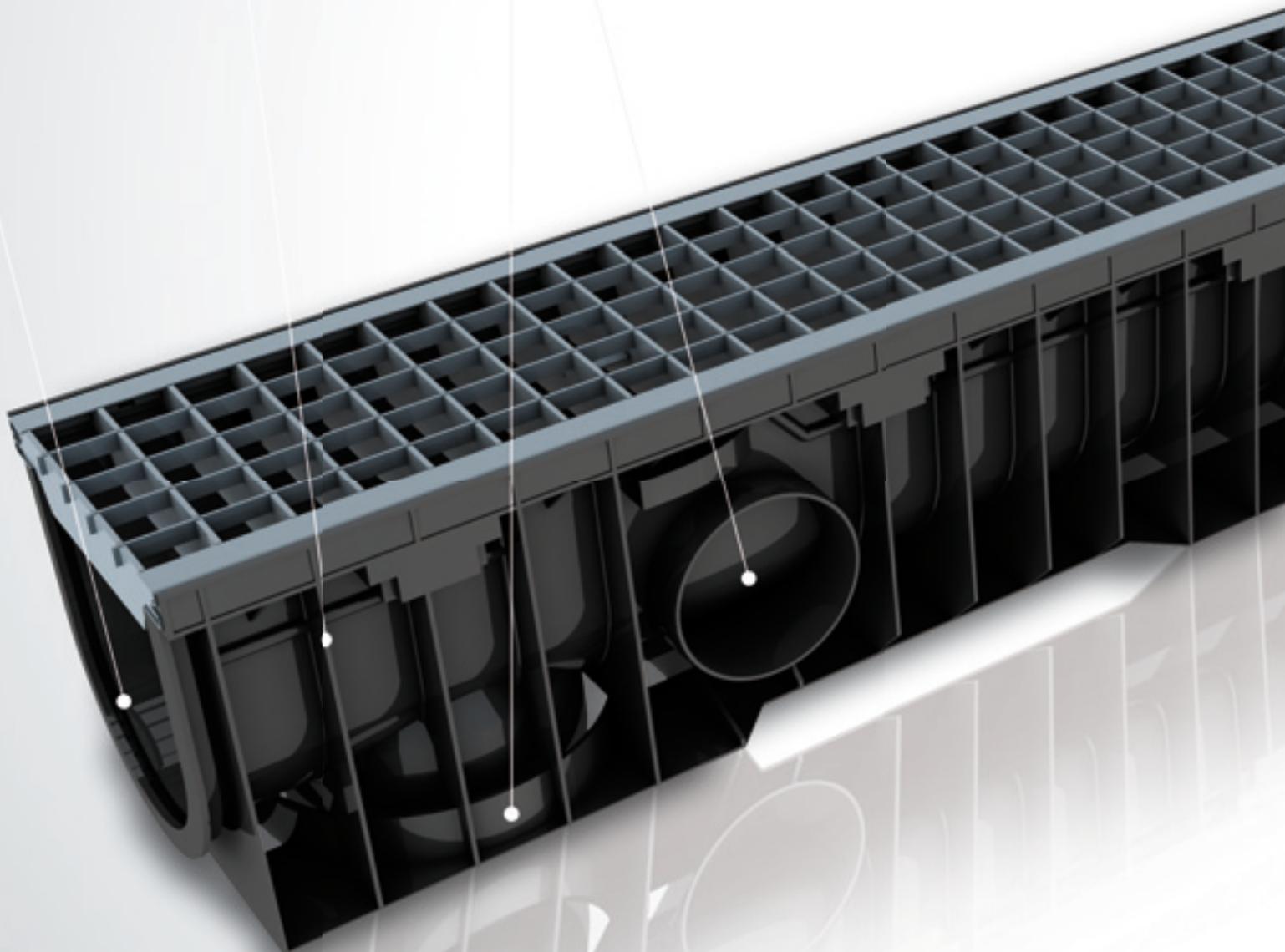
### STACKABLE - EASY TO CARRY

The special design makes it possible to optimise palletisation, thus taking up less warehouse space and allowing easy carriage and shipping.



### LIGHTWEIGHT

It is much more lightweight than traditional concrete systems, even when systems with preassembled gratings are to be handled.



### LOW PRICE

Its very low weight permits easy quick installation. Installation costs are reduced, **since no machines** are needed to install the system.



### SAFETY

MulleDrain products undergo strict quality checks in all processing stages. They are all certified EN 1433 and marked CE.



### RECYCLABILITY

Completely made from recycled HD-PE (which can be recycled again), MulleDrain channels are eco-friendly products par excellence.



### EASY TO ASSEMBLE

MulleDrain channels can be installed with **preassembled gratings** through a convenient coupling system!



### FIRE-RETARDANT

The addition of suitable retarders to the HD-PE mixture makes it possible to manufacture channels which are highly resistant to fire.



### VERSATILE

HD-PE makes it possible to use the channels to **drain aggressive liquids** too, because it withstands saline solutions, acids, alkalis, alcohol and fuels.



### LONG LIFE

HD-PE is slowly affected by deteriorating agents such as air, light, wind, dust, atmospheric pollutants, microorganisms, peculiar environments.



### STURDY

HD-PE has high mechanical resistance and it withstands shocks, temperature changes, friction, wear and tear. As a consequence **no material gets lost** during carriage or installation.



MufleDrain channels are characterised by a special geometry on the external surface consisting in walls with stiffening ribs. There are 21 equidistant primary ribs meeting on a fl at supporting surface and 12 shorter secondary ribs, all of them perpendicular to the upper edge.

This solution makes the channel highly **STABLE** and allows a number of benefits:

- It makes the finished piece stiff and resistant to compression and torsional stresses, thus permitting the use of small thicknesses. This translates into remarkable benefits, since the product saves energy (less raw material and smaller processing time) and is easy to handle, **LIGHTWEIGHT, CHEAP and EASY TO CARRY**;
- It minimises the effects of the differentiated thermal expansions. The thermal expansions in the HD-PE and concrete used for the prop during installation are very different in that the relevant "coefficients" differ by approximately 2 orders of magnitude (HD-PE =  $20 \times 10^{-5}$  mm/°C; concrete =  $14 \times 10^{-6}$  mm/°C). When the temperature is very low (below 0) there is no such problem, although the concrete castings must be able to withstand frost and thaw cycles to avoid dangerous cracks. If the channels are exposed to sunrays and subject to temperature changes during the day, dangerous differentiated elongation phenomena may take place. The structure of the channel lets the concrete penetrate between the different ribs and wrap each of them completely, acting as an "obstacle" to differentiated expansion. At the end of the casting process the plastic material will make up just a tiny percentage of the cement.
- It prevents the floating effect of the channel during the casting process. The weight of the concrete resting on the flat supporting surface acts as a counterbalance in order to prevent the channel from moving. The passage of the concrete is also ensured between the supporting surface and the restraining internal surface by special openings, thus making the casting more compact.
- It improves the anchoring between concrete and HD-PE thanks to the large surface available for adherence.

The external geometry of the MufleDrain channels is also characterised by their **EASY CONNECTION** to the sewer system thanks to preinstalled easy-to-open drains on the sides and the bottom. As a consequence the water has several outlets close to one another and does not need high speed to reach them. The channel has a storage capacity that can be useful in the event of large flows, although the main role it plays is that of

temporary container for the water to be disposed of through one or two round-section PVC pipes. The pipes will be connected to the channel drains and will discharge the water into either the sewer system or any other final receiving body. The water flow that a channel is able to handle depends on the number of drains opening up as well as on their sections (see table on page 318 of Technical Manual).

Thanks to said operating principle there is no need to use internally-inclined channels to increase the speed of the water flow.

This operation has several benefits, because:

- during installation all MufleDrain channels can be used without distinction - they are not numbered based on the inclination;
- unlike inclined channels, long drainage lines can be made up - the former must comply with manufacturing limits reducing the length of the stretches to approximately 30 metres;
- it is not necessary to increase the grave volume according to the slope;
- they are safer from the hydraulic point of view in that the water has several outlets - not only one outlet at the end of the line - which might get clogged up.

The inner section of the MufleDrain channels was designed in order to achieve a very high draining performance. That is why we chose a U shape: it has a perfectly round bottom for fl at walls. This unquestionably allows the following benefits:

- greater self-cleaning effect by preventing the formation of deposits of solid bodies (sometimes putrescible), which would dangerously reduce the drainage section;
- increase in water flow speed.

Also, the internal surface is perfectly smooth thanks to the high value of the roughness coefficient of HD-PE, which further improves the **EASY FLOWING of the water**.

## The FLAT System: (pg. 21)



- it supports 3 load classes: A15, B125, C250 in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which needs no strengthening frame
- it has a wide usable section for drainage and uses lightweight gratings with optimised sizes
- it has a small size thanks to its flat bottom to which a convenient drain gate can be screwed, if needed. The drain gate is available in two different versions: Ø 100 and Ø 110
- it comprises 4 different types of gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron. The new FLAT Clip makes it possible to fix the rung gratings quickly and safely with neither nuts nor bolts
- it is supplemented with different fixing systems, which are ideal for all requirements: the classic tie- rod, the practical FLAT clip and the simple locking system using a protrusion inside the channel. This locking system does not fix the grating to the channel
- it is ideal whenever there is little installation space such as in underground car parks or parking decks, flat roofs, terraces
- it is ideal whenever high-quality aesthetic finishes are to be achieved, since the gratings rest directly on the channel's contact surface, thus covering it completely
- it comes complete with drain boxes
- the range is made up of 2 channels with 1 width and 2 heights: 100/55 and 100/80



## The EASY System: (pg. 32)

- it supports 3 load classes: A15, B125, C250 in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which needs no strengthening frame
- it comprises 4 different types of gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron
- it is supplemented with a whole series of L-shaped longitudinal- slot gratings in class C250. They are not fixed to the channel but use a linking system hooks and holes
- it is equipped with the classic fixing system through the tie-rods and for the 40 height channels the practical angles will be used
- it is ideal for household and civil uses, pedestrian areas, private car parks, footways, canalisation systems in roads and parking areas
- it is ideal whenever high - quality aesthetic finishes are to be achieved, since the gratings rest directly on the channel's contact surface, thus covering it completely
- it comprises channels with small dimensions (h 40, h 55 and h 80) ideal for installations on industrial indoor paving and floors
- It includes models with small sizes (H 55 and H 80), thanks to their small

- sizes and flat bottom, it is possible to screw a practical outlet available in 2 versions Ø 100 and Ø 110
- it comes complete with drain boxes with siphon
- the range is made up of 6 channels with 3 widths and 2 heights each: 100/55, 100/80, 100/100, 100/160, 150/40, 150/100, 150/160, 200/40, 200/100, 200/160

## The SKIP System: (pg. 69)



- it supports 3 load classes: A15, B125, C250 in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE which has a 20 mm high toe board and needs no strengthening frame
- grating protection is ensured by the HD-PE edge
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it has a wide usable section for drainage and uses lightweight gratings with optimised sizes
- it comprises a wide range of different gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel, ductile iron and HD-PE. A HD-PE blind cover is available too. The new SKIP clip makes it possible to fix the rung and HD-PE gratings quickly and safely with neither nuts nor bolts
- it has a small size thanks to its flat bottom to which a convenient drain gate can be screwed, if needed. The drain gate is available in two different versions: Ø 100 and Ø 110
- it is supplemented with different fixing systems, which are ideal for all requirements and range from the classic tie-rod to a simple locking system using a protrusion inside the channel. The locking system does not fix the grating to the channel. Either the tie-rod or the Clip system should be used for steady fixing
- it is ideal for residential areas, sport facilities, private car parks
- it comes complete with drain boxes
- the range is made up of 2 channels with 1 width and 2 heights: 100/55 and 100/80

## The VIP System: (pg. 84)



- it supports 3 load classes: A15, B125, C250 in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which has a 20 mm-high toeboard and needs no strengthening frame
- grating protection is ensured by the HD-PE edge
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises a wide range of different gratings (slots, square mesh, anti-heel mesh) made of galvanized steel, stainless steel, ductile iron and HD-PE. A HD-PE solid top cover is available too

- it is supplemented with a whole series of L-shaped longitudinal- slot gratings in class C250. They are not fixed to the channel but use a linking system hooks and holes. They are equipped also with drain boxes and inspection elements
- it comes equipped with a classic tie- rod fixing system and a convenient side coupling system through a tab inside the HD-PE gratings
- it is ideal for civil uses, pedestrian areas, private car parks, footways, canalisation systems in parking areas, sport facilities, synthetic tracks, athletics grounds
- it comprises channels with small dimensions (h 40, h 55 and h 80) ideal for installations on industrial indoor paving and floors
- it includes models with small sizes (H 55 and H 80), thanks to their small sizes and flat bottom, it is possible to screw a practical outlet available in 2 versions Ø 100 and Ø 110
- it comes complete with drain boxes with siphon
- the range is made of 11 channels with 3 widths and 6 heights: 100/55, 100/80, 100/100, 100/160, 150/40, 150/100, 150/160, 200/40, 200/100, 200/160, 200/250
- the range is supplemented with the VIP channel with length 1.5 m and usable dimensions 300 x 300 mm. Designed to drain large surfaces



## The SMART System: (pg. 133)

- it supports 2 load classes (B125, C250) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame in galvanized steel or stainless steel.
- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was designed to withstand any deformation due shearing or torsional stress
- it is wearproof and very solid thanks to the frame, which ensures a 2.4 mm-thick drive-over edge and a 1.2 mm - thick contact surface
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises 3 different types of gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron
- it comes equipped with a classic tie-rod fixing system
- it is ideal for private car parks, footways, canalisation systems in roads and parking areas, transversal canalisation systems (road crossings) with low-speed vehicular traffic (max 15 Km/h – in this case the system can support D400 - class gratings, although not in compliance with Standard EN 1433)
- it includes models with small sizes (H 55 and H 80) which are perfect for installation into covered industrial pavings whenever the channel edge needs to be protected during polishing
- there are 2 heights 100/55 and 100/55 available, thanks to their small dimensions and flat bottom, it is possible to screw a practical outlet available in 2 versions Ø 100 and Ø 110
- it comes complete with drain boxes with siphon

- the range is made up of 8 channels with 3 widths and 4 heights: 100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160



## The SLOPE System: (pg. 163)

- it supports 4 load classes from C250 to F900 according to EN 1433
- it is made up of a HD-PE channel with a strengthening frame in galvanized steel or stainless steel
- the range can be enlarged with the possibility of assembling the “Slope drainage frame”
- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was designed to withstand any deformation due shearing or torsional stress
- it ensures a higher protection against wearing and it is stronger thanks to its frame with a 4 mm thick edge subject to traffic and a 2 mm thick contact surface
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises 3 different types of gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron
- the fixing system for the grating is guaranteed by the innovative system “hook lock”. The kit tie-rods could be added for the E 600
- for a better anchoring between concrete and channel a kit of 8 clamps is available on request.
- it is ideal for private car parks, footways, canalization systems in road and parking areas, transversal canalization systems (road crossing) with middle- speed vehicular traffic petrol stations, industrial and docks areas
- it includes models with small sizes (h 55 and h 80) which are perfect for installation into covered industrial pavings whenever the channel edge needs to be protected during polishing
- it includes models with small sizes (H 55 and H 80), thanks to their small sizes and flat bottom, it is possible to screw a practical outlet available in 2 versions Ø 100 and Ø 110
- it comes complete with drain boxes with siphon
- the range is made up of 9 channels with 3 widths and 5 heights: 100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160, 200/250



## The WING System: (pg. 192)

- it supports 4 load classes: C250, D400, E600, F900, in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame in galvanized steel or stainless steel.

- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was Designed to withstand any deformation due shearing or torsional stress
- it is wearproof and very solid thanks to the frame, which ensures a 4 mm - thick drive-over edge and a 2 mm - thick contact surface in compliance with Standard EN 1433 on classes subject to heavy loads
- Since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises a wide range of standard gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron, as well as galvanised-steel and ductile iron blind covers, and a cover specially designed for composting systems
- It is supplemented with a whole series of L- and T-shaped longitudinal-slot gratings in class D400. They are not fixed to the channel but use a linking system hooks and holes. They are equipped also with drain boxes
- it comes complete with an innovative grating for draining asphalt in D400 which has slots in the upper and side sections in order to receive the liquids from the road surface - both surface liquids and liquids absorbed by the draining asphalt
- it has tie-rod and screw fixing systems
- it is ideal for medium-to-heavy uses, exhibition areas, parking decks, road carriageways, parking areas, service areas, industrial areas, ports and airports, areas where containers are (un)loaded
- it includes models with small sizes (H 55 and H 80) which are perfect for installation into covered industrial paving whenever the channel edge needs to be protected during polishing
- these models H 55 and H 80 thanks to their small sizes and flat bottom, allow to screw a practical outlet available in 2 versions Ø 100 and Ø 110
- It comes complete with drain boxes with siphon
- the range is made up of 11 channels with 3 widths and 6 heights: 100/55, 100/80, 100/100, 100/160, 150/40, 150/100, 150/160, 200/40, 200/100, 200/160, 200/250
- the range is supplemented with the WING channel with cast - iron strengthening frame - length 1.5 m and usable dimensions 300 x 300 mm. Designed to drain large surfaces



## The PLUS System: (pg. 248)

- it supports 4 load classes: C250, D400, E600, F900, in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame in galvanized steel or stainless steel
- it is supplemented with a galvanised or stainless steel en-bloc frame equipped with 8 external clamps (4 each side) for anchoring it to the concrete and 2 spacers ensuring steadiness against torsional deformation
- it is wearproof and very solid thanks to the frame, which ensures a 4 mm-thick drive-over edge and a 2 mm - thick contact surface in compliance with Standard EN 1433 on classes subject to heavy loads

- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises a wide range of standard gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron, as well as steel and ductile iron blind covers, and a cover specially designed for composting systems
- it comes complete with an innovative grating for draining asphalt in D400 which has slots in the upper and side sections in order to receive the liquids from the road surface - both surface liquids and liquids absorbed by the draining asphalt
- it has tie-rod and screw fixing systems
- it is ideal for heavy uses, road carriageways, road crossings with high-speed vehicular traffic (trucks included), service areas, industrial areas, ports and airports, areas where containers are (un)loaded
- it includes models with small sizes (H 55 and H 80) which are perfect for installation into covered industrial paving whenever the channel edge needs to be protected during polishing
- these models H 55 and H 80 thanks to their small sizes and flat bottom, allow to screw a practical outlet available in 2 versions Ø 100 and Ø 110
- it comes complete with drain boxes with siphon
- the range is made up of 8 channels with 3 widths and 4 heights: 100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160



## The FUNNEL System: (pg. 286)

- the new system of linear drainage FUNNEL assures a quick and safe rainwater collection, that falls down into the big surfaces, and improves the aesthetic impact of the traditional systems
- it is equipped with a series of ductile iron cones and related upper gratings
- these cones can be installed through a Ø 110 coupling to a bottom outlet (2 cones for each meter) with a changeable diameter from 250 to 1200, that assures the high performance
- flexibility and quick installation: the FUNNEL is supplied with 6 meters long bars. The easy connection among the bars is assured through the coupling and sealing rings
- high hydraulic performance: for the collected water there is one outlet every half meter, in this way, from an hydraulic point view the system will be not falling into crisis
- reliability: the system has been designed according to the standards of the EN 1433.
- it is suitable for heavy loads in extended wide areas like highways, logistic centers, docks and airports areas from load classes D400 alla F900
- it comes complete with drain boxes.
- the range is made of 13 pipes with different diameters: ø250, ø315, ø350, ø400, ø465, ø500, ø580, ø630, ø700, ø800, ø930, ø1000, ø1200
- the FUNNEL is a patented system.



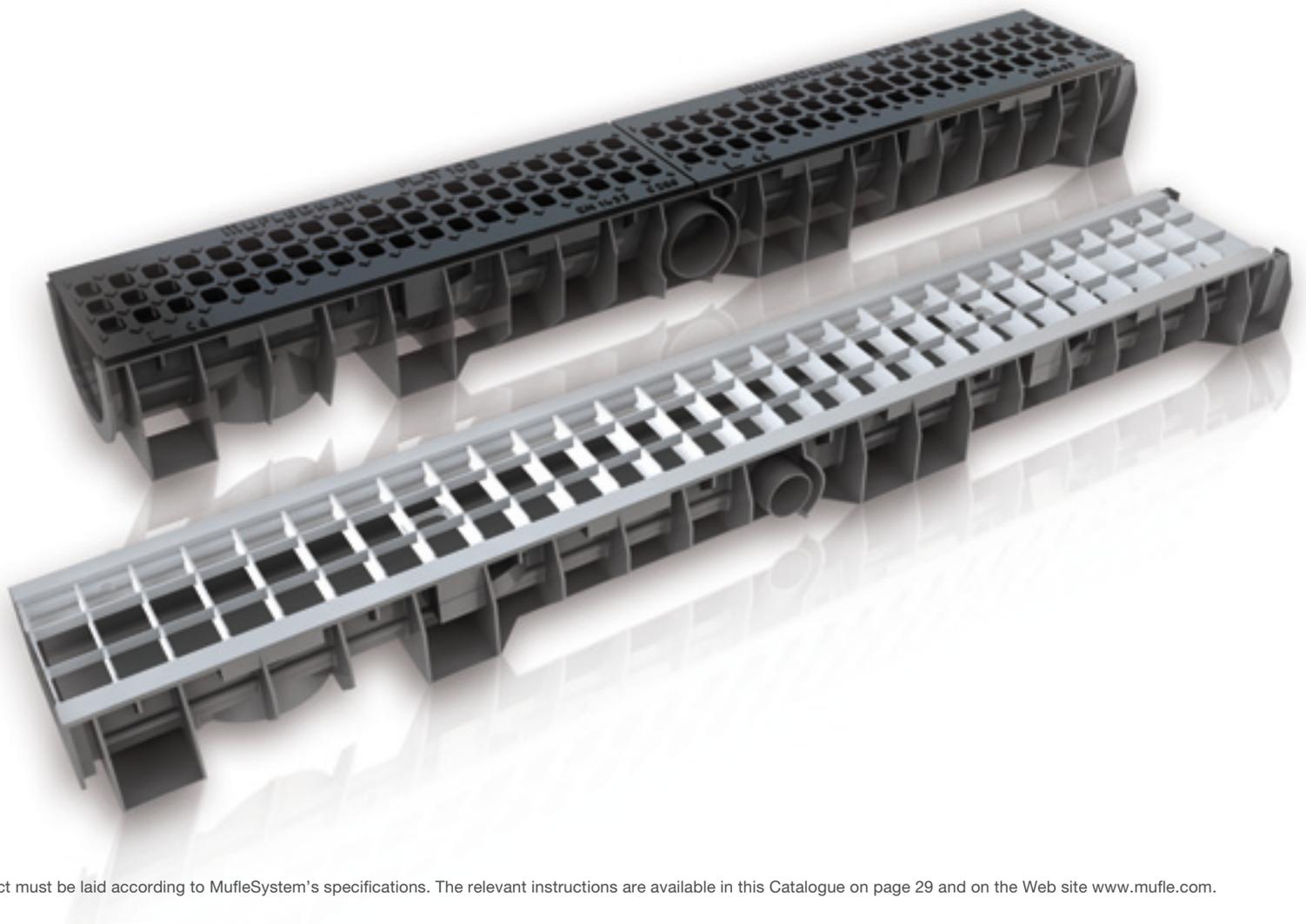
A51 tangenziale est  
E 33 A1 BOLOGNA  
E 47 A7 GENOVA  
MILANO   
Linate   




# FLat

The system:

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which needs no strengthening frame
- it has a wide usable section for drainage and uses lightweight gratings with optimised sizes
- it has a small size thanks to its flat bottom to which a convenient drain gate can be screwed, if needed
- it comprises 4 different types of gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron
- it is supplemented with different fixing systems, which are ideal for all requirements and range from the classic tie-rod to a simple locking system using a protrusion inside the channel
- it is ideal whenever there is little installation space such as in underground car parks or parking decks, flat roofs, terraces
- it is ideal whenever high-quality aesthetic finishes are to be achieved, since the gratings rest directly on the channel's contact surface, thus covering it completely
- it comes complete with drain boxes with siphon
- the range is made up of 2 channels with 1 width and 2 heights (100/55 and 100/80)



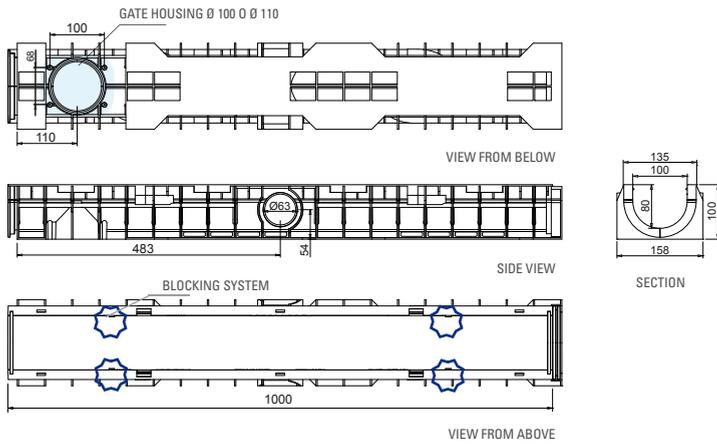


100

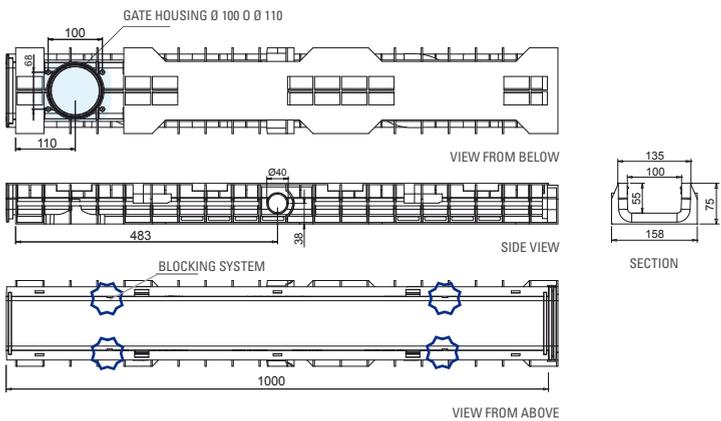


# CHANNELS

**FLAT  
100**



FLAT 100/80								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
706000		PE-HD	1000 x 158 x 100	1000 x 100 x 80	1,60	69,28	6,92	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110



FLAT 100/55								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
706001		PE-HD	1000 x 158 x 75	1000 x 100 x 55	1,40	54,44	5,44	side 2 x Ø 40 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).  
 N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



A 15

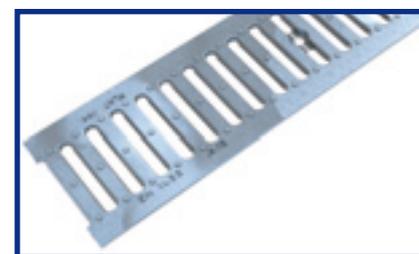
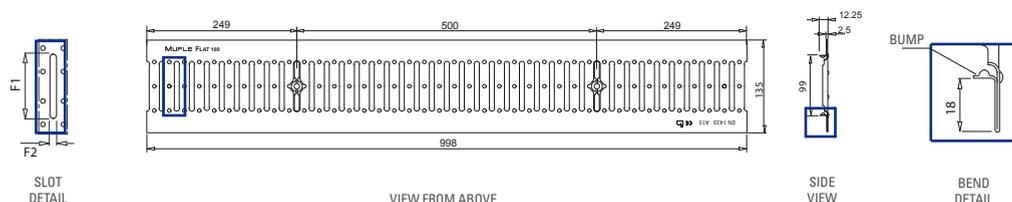
**FLAT  
100**

## APPLICATIONS OF GALVANISED STEEL

Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces

## APPLICATIONS OF STAINLESS STEEL

Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces  
Kitchens in hospitals, restaurants and similar facilities



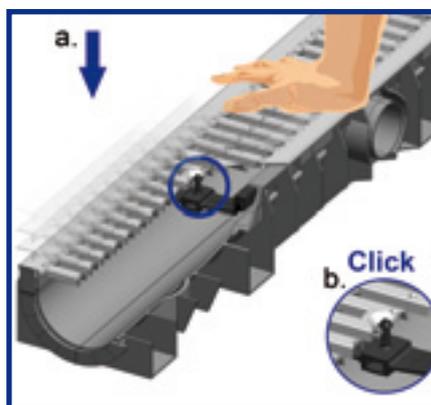
### SLOTTED GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	clip	protrusion (no fixing) <sup>4</sup>
506110		galvanised steel DX51D <sup>3</sup>	998 x 135 x 2,5	1,30	2,35	83,0 x 8,5			
506111		pickled stainless steel AISI 304 <sup>2</sup>							
506112		galvanised steel DX51D <sup>3</sup>	498 x 135 x 2,5	0,65	1,175				
506113		pickled stainless steel AISI 304 <sup>2</sup>							

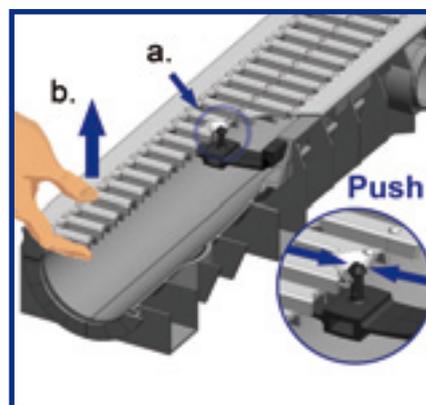
#### GRATING ASSEMBLY BY MEANS OF CLIPS

- Place the grating on the channel. Match the head of the FLAT clips with the special holes on the grating;
- Press by hand on the grating until it gets completely hooked.



#### DISASSEMBLY OF THE GRATING

- Press slightly on the head of the FLAT clips until the grating gets unhooked;
- Lift it out.



The FLAT clip makes it possible to fix the FLAT rung gratings quickly and safely with neither nuts nor bolts!!!

2- Classification according to American Standard ASTM.

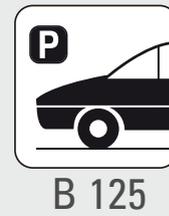
3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

4- SHooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steadyfixing.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



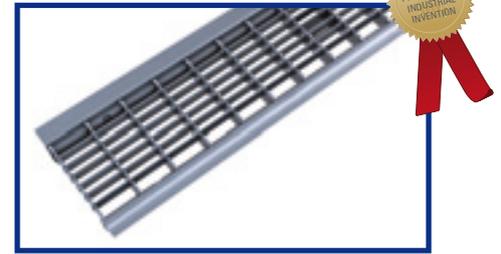
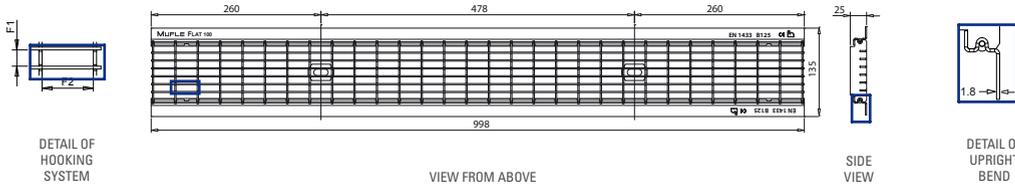
**flat  
100**

## APPLICATIONS OF GALVANISED STEEL

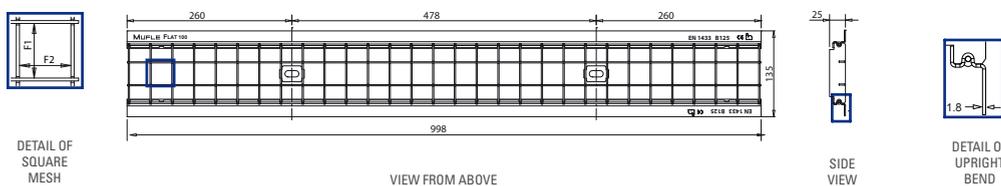
Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



ANTI-HEEL MESH GRATING								25 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	protrusion (no fixing) <sup>4</sup>	
506102		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 135 x 1,8	3,30	7,05	10,2 x 32,2			
506106		pickled stainless steel AISI 304 <sup>2</sup>							
506104		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 135 x 1,8	1,65	3,525				
506108		pickled stainless steel AISI 304 <sup>2</sup>							



SQUARE MESH GRATING								25 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	protrusion (no fixing) <sup>4</sup>	
506103		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 135 x 1,8	2,80	7,10	34,2 x 32,2			
506107		pickled stainless steel AISI 304 <sup>2</sup>							
506105		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 135 x 1,8	1,40	3,55				
506109		pickles stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

4- Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



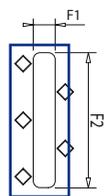
# GRATINGS



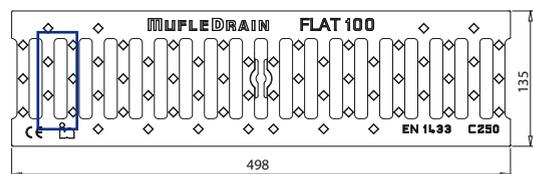
**FLAT  
100**

## APPLICATIONS OF DUCTILE IRON

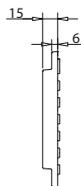
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



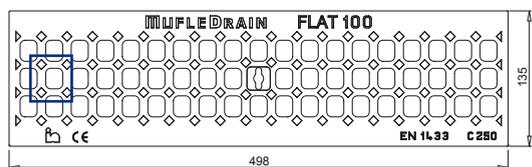
### SLOTTED GRATING 13 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE cm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
506100		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 135 x 6	3,50	1,90	13,0 x 80,0		up to Class C250 as per Standard EN 1433



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



### MESH GRATING



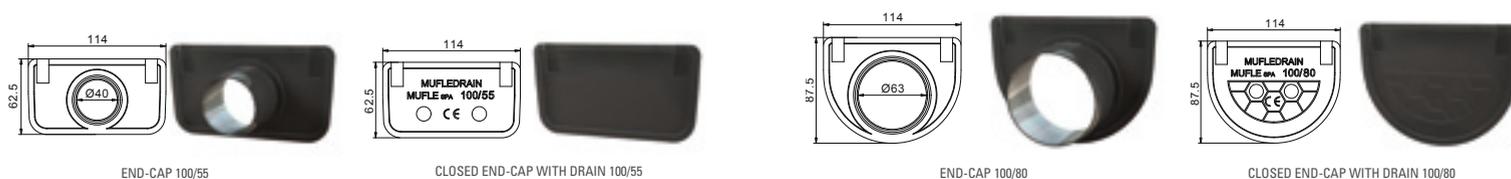
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE cm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
506101		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 135 x 7	3,30	2,15	21,0 x 17,0		up to Class C250 as per Standard EN 1433

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



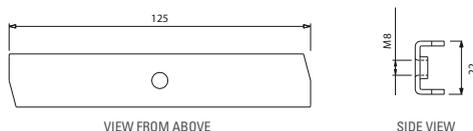
# ACCESSORIES

**FLAT  
100**



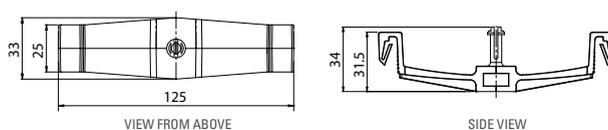
## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
700500		end-cap with drain	PE-HD	100/55	1 x Ø 40
700508		closed end-cap	PE-HD	100/55	-
700501		end-cap with drain	PE-HD	100/80	1 x Ø 63
700509		closed end-cap	PE-HD	100/80	-



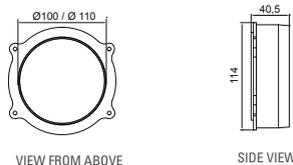
## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
500412		galvanised steel	FLAT galvanised steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500413		stainless steel	FLAT stainless steel	M8 x 40 TBL combi stainless steel	2 tie-rods + 2 screws
500414		black galvanised steel	FLAT ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws



## KIT CLIP

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	KIT FOR 1 ml
511212		PE-HD	FLAT slotted galvanised steel - stainless steel	2 clip



## KIT OUTLET + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR CHANNELS	DIAMETER mm	KIT FOR 1 ml
506114		PE-HD	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		PE-HD	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

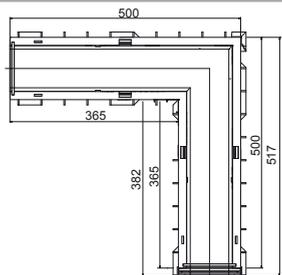
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES

**FLAT  
100**

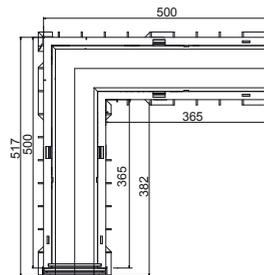
## LEFT CORNER



## FLAT 100

CODE	PRICE €	MODEL
706100		100/80
706101		100/55

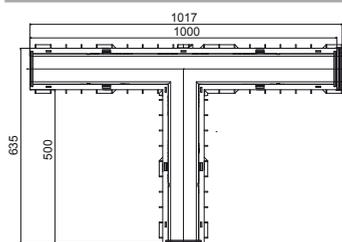
## RIGHT CORNER



## FLAT 100

CODE	PRICE €	MODEL
706102		100/80
706103		100/55

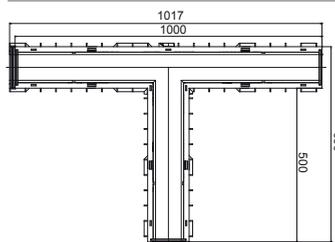
## LEFT TI



## FLAT 100

CODE	PRICE €	MODEL
706104		100/80
706105		100/55

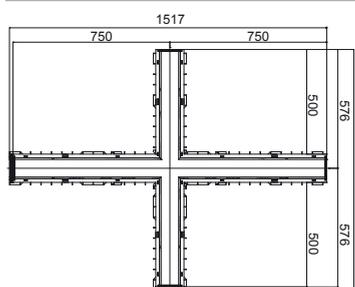
## RIGHT TI



## FLAT 100

CODE	PRICE €	MODEL
706106		100/80
706107		100/55

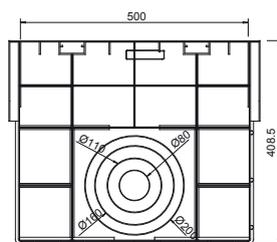
## CROSS



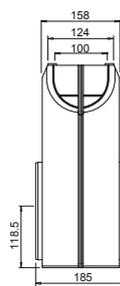
## FLAT 100

CODE	PRICE €	MODEL
706108		100/80
706109		100/55

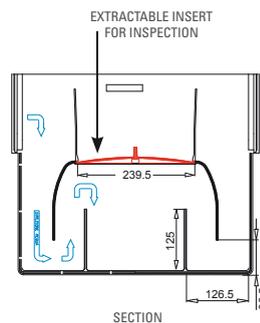
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

## FLAT 100

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
706002		PE-HD	500 x 124 x 408,5	500 x 100 x 400	158	118,5	2,50	2 x Ø 80; 2 x 110 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



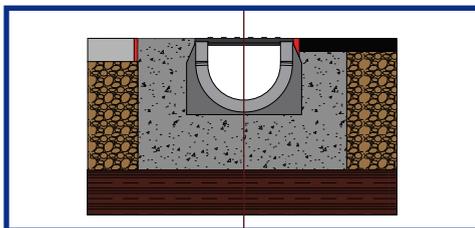
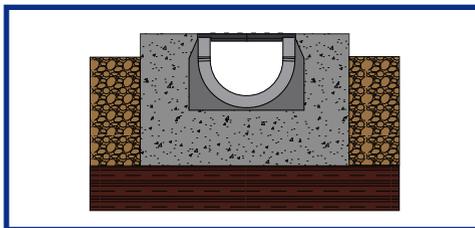
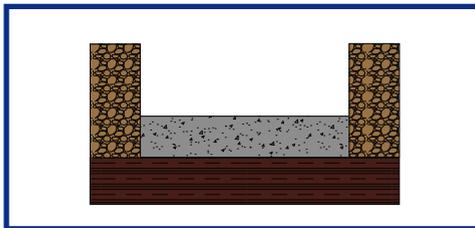
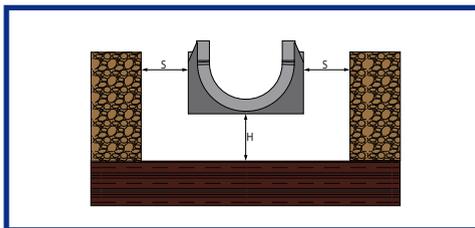
## “For all the drainage channels the manufacturer shall supply written instructions for general installation” (Ref. § 7.17 EN 1433)

The installation instructions enclosed in the present technical section are given only as an example in order to supply the main guide lines to the final fitter.

Any particular installation must be evaluated/agreed between MufleSystem srl and the project maker.

The correct installation is necessary to guarantee the proper loads resistance of the drainage system (channel and grating) to static and dynamical traffic which is subjected to.

The correct installation involves a longer operational length of the drainage system itself as well as its better hydraulic function.



**NEW FEATURE:**  
The channels can be installed with preassembled gratings through male-female coupling.

### Step 1

#### HOLE SIZE

The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the Summary Table. In this step make sure the underlying layer is suitable to the load it is expected to support.

### Step 2

#### CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. In case that cycles of loading and unloading are often (for example: periodic transit of vehicles) or the loads are particular heavy (E600 - F900), we recommended to reinforce the concrete base with an electro-welded net or with or beaded mouldings Ø 8 with mesh 15x15 cm. At this stage it is needed to arrange possible slopes of the drainage line.

### Step 3

#### CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet and block them at basis in order to avoid any floating or misalignment during the concrete casting for the side prop.

Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation.

As well as the step 2, also for the side prop concrete arrange the reinforcement.

### Step 4

#### FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane.

## Recommendations for installation

1. In case that channels watertightness is requested, MufleSystem is purposely recommending the use of a bituminous silicone sealant “SHELL TIXOPHALTE”: after carrying out the side prop, apply a thin and homogeneous sealant strip on each slot between the channels and the following one (clean the eventual exceeding sealant). It is strongly advised not to apply the strips of “SHELL TIXOPHALTE” inside the slots in the female joint of the channels before coupling them. Eventually a through and long- lasting guarantees to avoid any leakages can be obtained by welding the joints; this requires welding machines and experienced technicians.
2. While carrying out the phase 2 and 3, protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.
3. In case the drainage line is subjected to horizontal loads (for example concrete casting for industrial paving, private car parks and parking decks), it is necessary to arrange effective expansion joints for both direction, parallel and perpendicular to the channels. These joints shall be placed according to the norm standards in force and shall not be placed close to drainage line.
4. In case the drainage line shall be installed on roofs or terraces, it is obligatory to arrange a waterproof sheet according to specific projects.



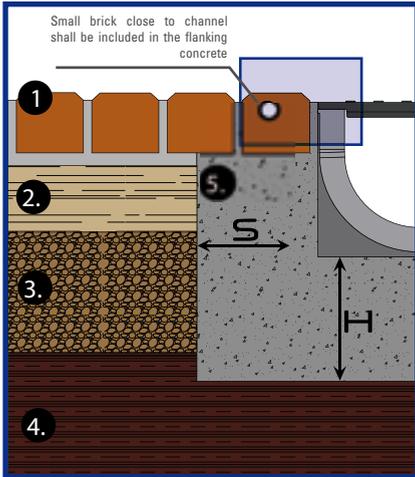
N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.



# INSTALLATION

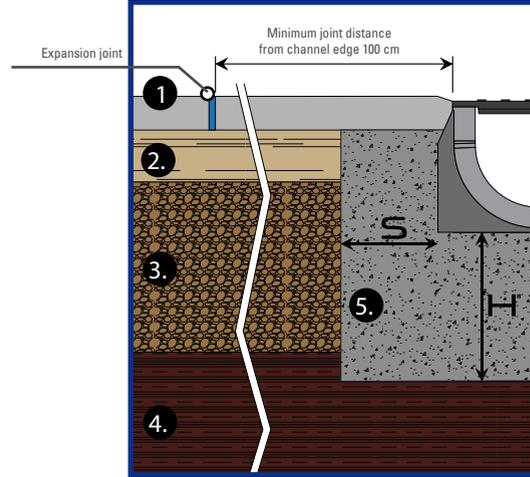
flat

## Case 1 Flooring (A15-B125-C250)



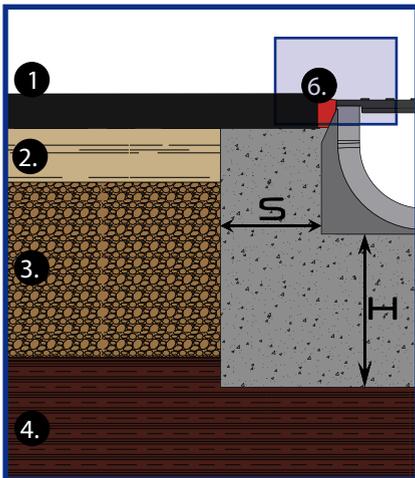
1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

## Case 2 Concrete flooring (A15-B125-C250)

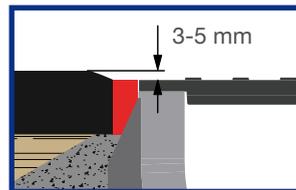


1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Expansion joint

## Case 3 Asphalt (A15-B125-C250)



1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Safety joint (if required)



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

### SUMMARY TABLE

Load class (EN 1433)		A 15	B 125	C 250
Applicable load (EN 1433)	kN	15	125	250
Minimum height H of concrete laying bed	mm	100	100	150
Minimum thickness S of the concrete fl anking	mm	100	100	150
Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30
Concrete compression strength class' (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.  
 N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



## SPECIFICATIONS

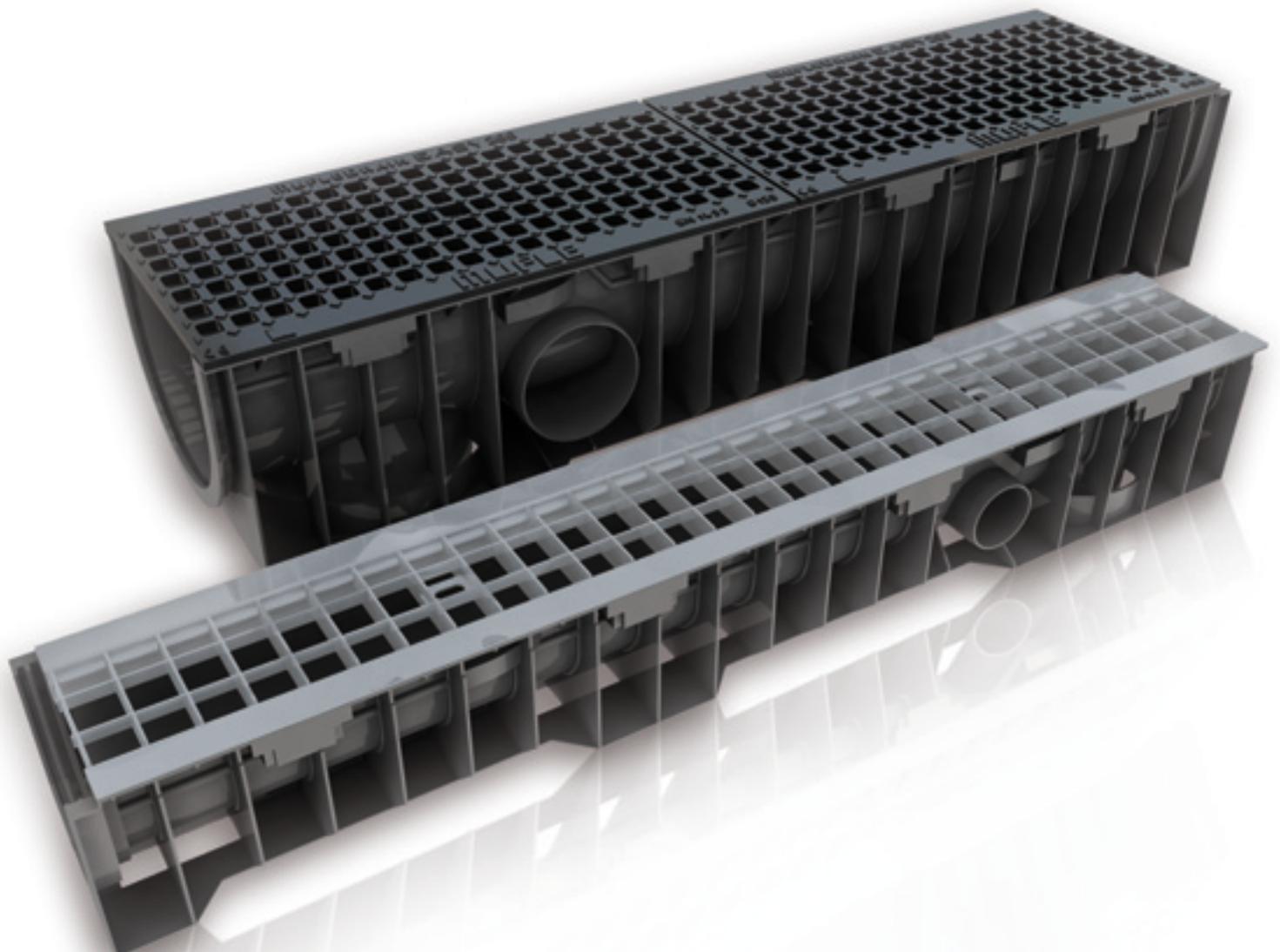
FLAT

1. Supply and installation of MufleDrain FLAT type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 side drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have 2 protrusions on each side of the internal walls in order to ensure the gratings can be locked in place. The channel will have the following dimensions: length 1.000 mm, internal net gap 100 mm, internal height \_\_\_ mm.
2. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain FLAT drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot width 13 mm, length 498 mm, width 135 mm.
3. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain FLAT drainage channel with bar fixing system, load class C250 according to EN 1433-2004, length 498 mm, width 135 mm.
4. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain FLAT drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 998 mm, width 135 mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 11 mm in the anti-heel mesh.
5. Supply and installation of galvanised (stainless) steel rung covering gratings for MufleDrain FLAT drainage channels with bar fixing system (Clip), load class A15 according to EN 1433-2004, length 998 mm, width 135 mm. A similar grating will be available upon request with length 498 mm.
6. Supply and installation of HD-PE end cap for MufleDrain drainage channel with coupling system into the special channel housing.
7. Supply and installation of HD-PE open cap with drainage hole diameter \_\_\_mm for MufleDrain drainage channel with coupling system into the special channel housing.
8. Supply and installation of MufleDrain FLAT type HD-PE drain box with siphon for MufleDrain FLAT drainage channels, with external stiffening ribs and male-female coupling system. The top of the built-in siphon in the drain box shall be detachable in order to allow the cleaning. The drain box will have 2 preformed outlets with diameter until 200 mm. The sizes of the drain box shall be length 500 mm, internal net gap \_\_\_\_\_ mm, internal height 400 mm.

# easy

The system:

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which needs no strengthening frame
- it comprises 4 different types of gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron
- it is supplemented with a whole series of L-shaped longitudinal- slot gratings in class C250 equipped also with drain boxes
- it comes equipped with a classic tie-rod fixing system
- it is ideal for household and civil uses, pedestrian areas, private car parks, footways, canalisation systems in roads and parking areas
- is ideal whenever high-quality aesthetic finishes are to be achieved, since the gratings rest directly on the channel's contact surface, thus covering it completely
- it comes complete with drain boxes with siphon
- the range is made up of 10 channels with 3 widths and 5 heights (100/55, 100/80, 100/100, 100/160, 150/40, 150/100, 150/160, 200/40, 200/100, 200/160, 200/250)



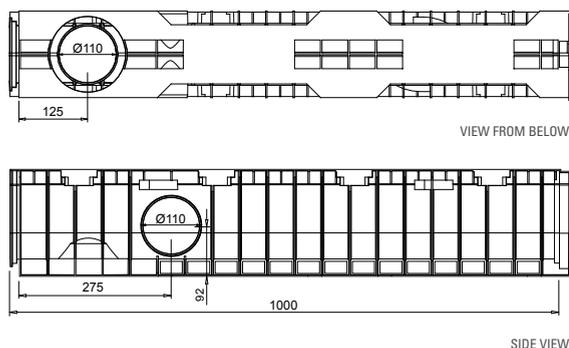


100

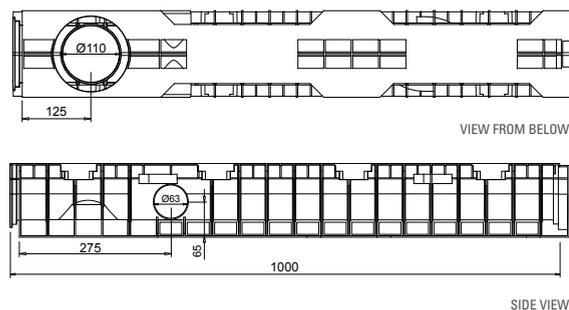


# CHANNELS

**easy  
100**



EASY 100/160								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
700000		PE-HD	1000 x 158 x 194	1000 x 100 x 160	2,40	145,28	14,52	side 2 x Ø 110 bottom 1 x Ø 110



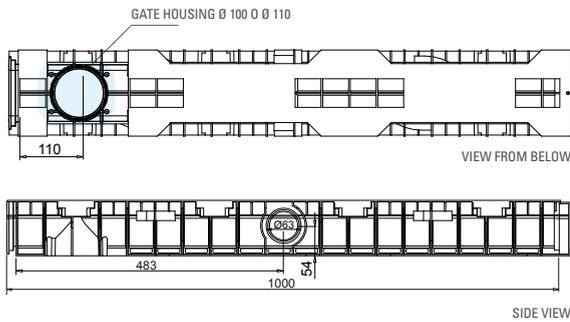
EASY 100/100								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
700001		PE-HD	1000 x 158 x 134	1000 x 100 x 100	1,90	89,56	8,95	side 2 x Ø 63 bottom 1 x Ø 110

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

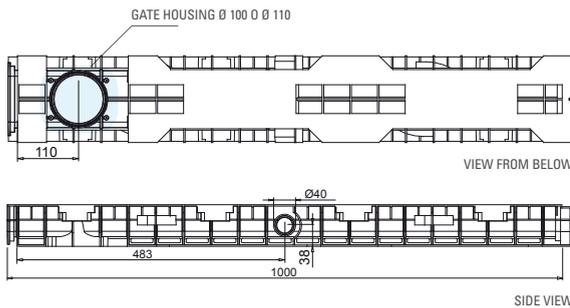


# CHANNELS

**easy  
100**



EASY 100/80								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
700006		PE-HD	1000 x 158 x 100	1000 x 100 x 80	1,60	69,28	6,7	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110



EASY 100/55								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
700007		PE-HD	1000 x 158 x 75	1000 x 100 x 55	1,40	54,44	5,50	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).  
 N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



A 15

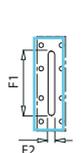
**easy  
100**

## APPLICATIONS OF GALVANISED STEEL

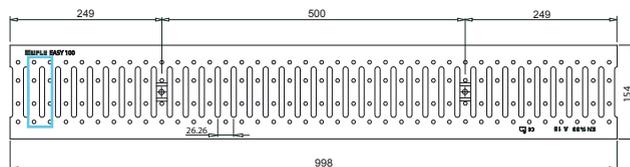
Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces

## APPLICATIONS OF STAINLESS STEEL

Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces  
Kitchens in hospitals, restaurants and similar facilities



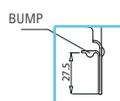
SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW

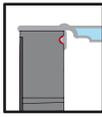


BEND DETAIL



## SLOTTED GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	bugna
500109		galvanised steel DX51D <sup>3</sup>	998 x 154 x 2,5	1,80	2,68	83,0 x 8,5		
500111		pickled stainless steel AISI 304 <sup>2</sup>						
500170		galvanised steel DX51D <sup>3</sup>	498 x 154 x 2,5	0,90	1,34			
500172		pickled stainless steel AISI 304 <sup>2</sup>						

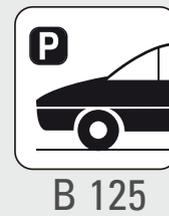
2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



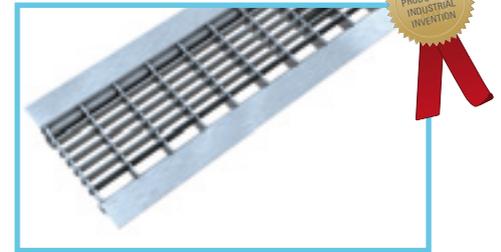
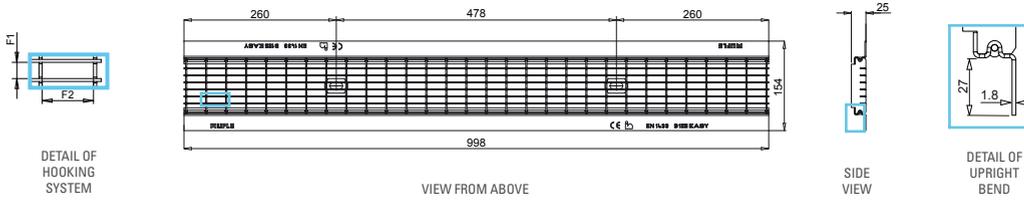
**easy  
100**

## APPLICATIONS OF GALVANISED STEEL

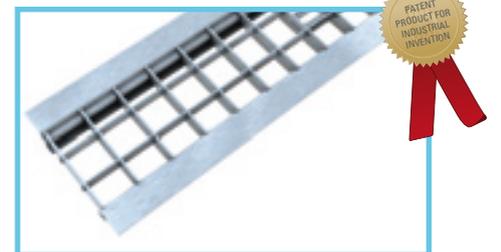
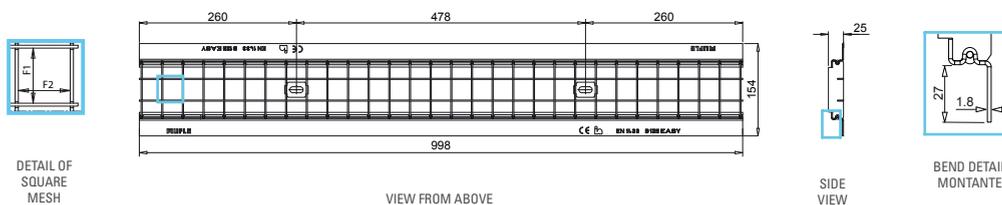
Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



ANTI-HEEL MESH GRATING								25 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
500105		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 154 x 1,8	3,90	6,66	10,2 x 32,2		up to Class C250 as per Standard EN 1433	
500104		pickled stainless steel AISI 304 <sup>2</sup>							
500166		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 154 x 1,8	1,95	3,33				
500165		pickled stainless steel AISI 304 <sup>2</sup>							

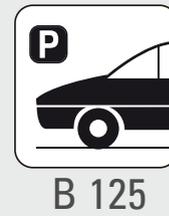


SQUARE MESH GRATING								25 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
500106		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 154 x 1,8	3,30	9,50	34,2 x 32,2		up to Class C250 as per Standard EN 1433	
500108		pickled stainless steel AISI 304 <sup>2</sup>							
500167		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 154 x 1,8	1,65	4,75				
500169		pickled stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.  
5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



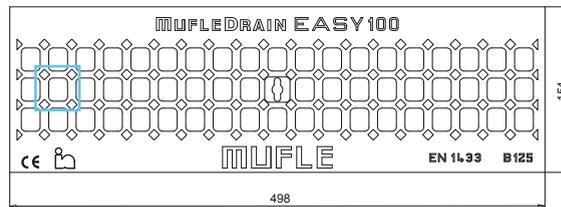
**easy  
100**

## APPLICATIONS OF DUCTILE IRON

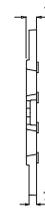
Pavements  
Lay-bys and private car parks



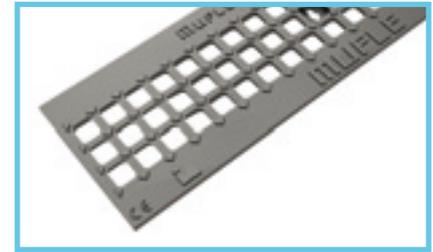
SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								 13 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 X F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
500143		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 154 x 7	3,00	2,15	21,5 x 17,5		up to class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1653 (2009).



# SLOTTED GRATING T

TYPE C 250  
MIDDLE  
DRIVEWAY

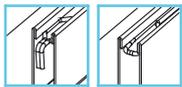
easy  
100

### APPLICATIONS OF GALVANISED STEEL

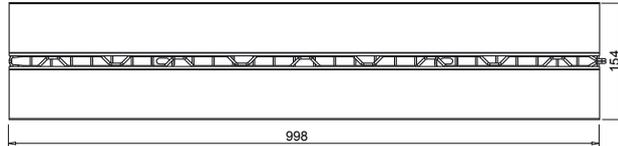
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements

### APPLICATIONS OF STAINLESS STEEL

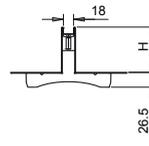
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements



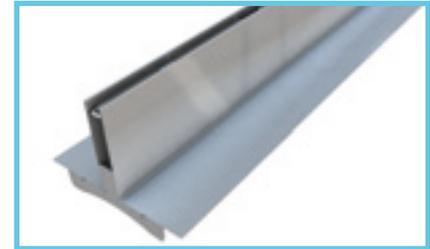
DETAIL OF HOOKING SYSTEM<sup>8</sup>



VIEW FROM ABOVE



SIDE VIEW



## T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
500206		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 154 x 106,5	80	4,80	1,80	998 x 18
500218		pickles stainless steel AISI 304 <sup>2</sup>					
500207		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 154 x 146,5	120	5,90	1,80	
500243		pickles stainless steel AISI 304 <sup>2</sup>					

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

8- Hooking System between the gratings through hooks and holes.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

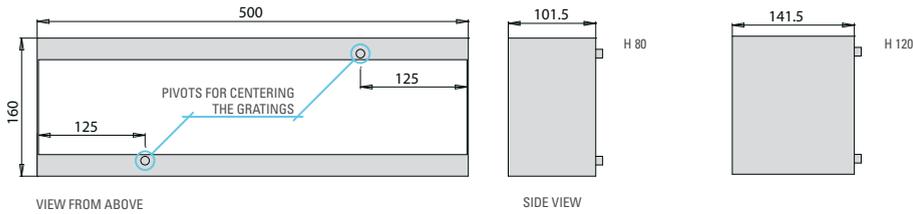


# INSPECTION ELEMENT FOR T-SHAPED GRATING

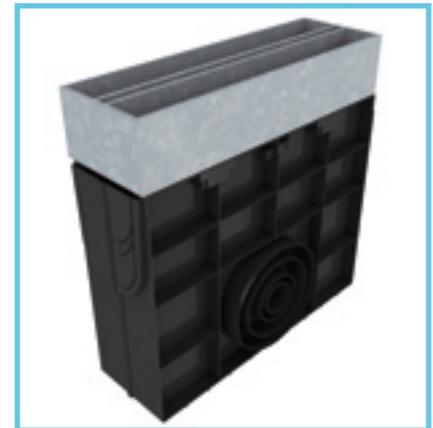
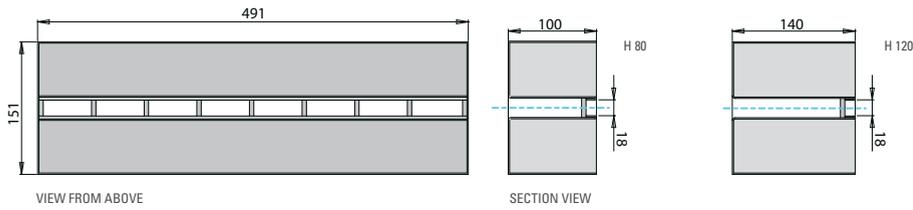
TYPE C 250  
MIDDLE  
DRIVEWAY

**EASY  
100**

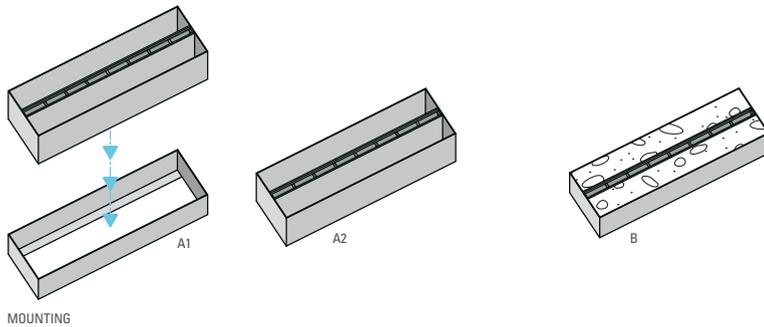
## CONTAINMENT TANK



## INSPECTION GRATING



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 44 for the details of the drain box with siphon.



## INSPECTION ELEMENT FOR T-SHAPED GRATING - EASY 100

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500219		hot galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 160 x 101,5	491 x 18	1,8	5,70
500231		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 160 x 101,5	491 x 18	1,8	5,30
500220		hot galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 160 x 141,5	491 x 18	1,8	7,70
500232		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 160 x 141,5	491 x 18	1,8	7,10

## HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



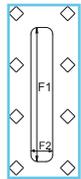
# GRATINGS



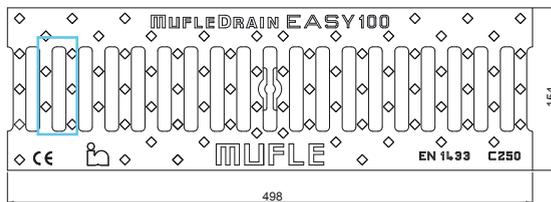
**easy  
100**

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT DETAIL



VIEW FROM ABOVE



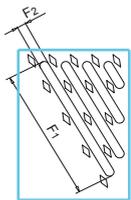
SIDE VIEW



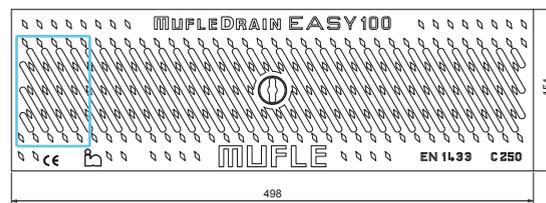
### SLOTTED GRATING 13 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
500144		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 154 x 7	4,20	2,10	80,0 x 13,0		up to Class C250 as per Standard EN 1433



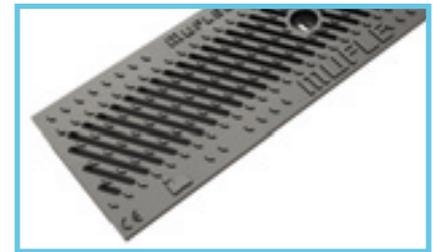
SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



### SLOTTED GRATING 6 mm



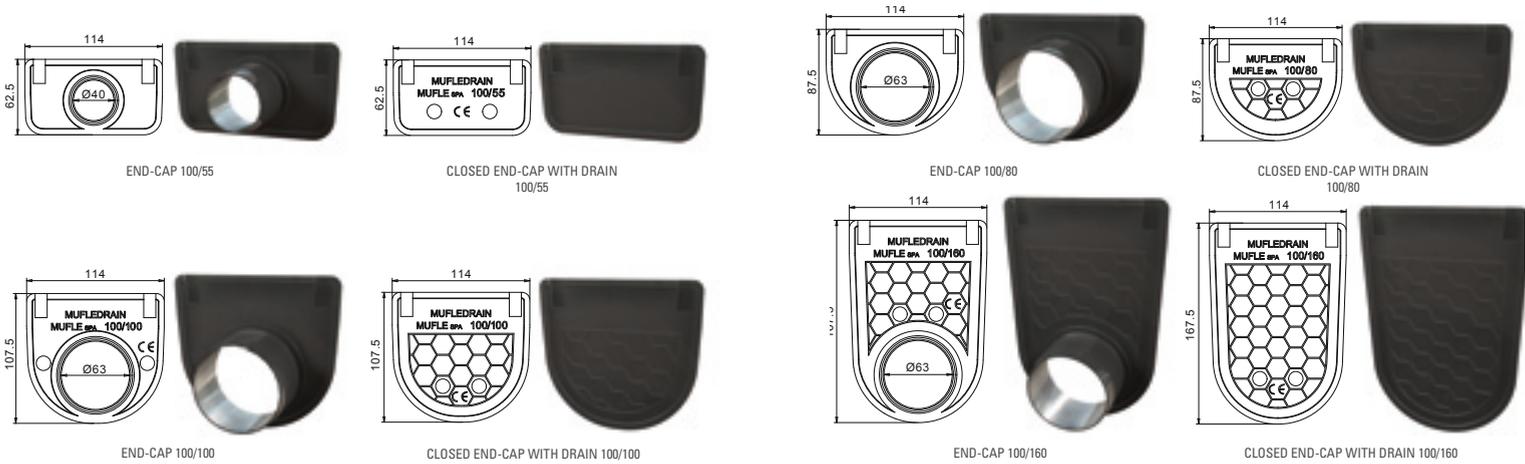
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
500146		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 154 x 7	3,90	1,90	91,5 x 6,0		up to Class C250 as per Standard EN 1433

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



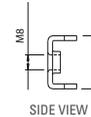
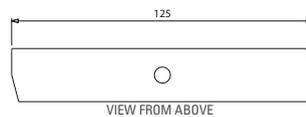
# ACCESSORIES

**EASY  
100**



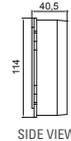
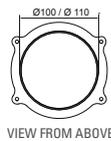
## END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
€					
700500		end-cap with drain	PE-HD	100/55	1 x Ø 40
700508		closed end-cap	PE-HD	100/55	-
700501		end-cap with drain	PE-HD	100/80	1 x Ø 63
700509		closed end-cap	PE-HD	100/80	-
700502		end-cap with drain	PE-HD	100/100	1 x Ø 63
700510		closed end-cap	PE-HD	100/100	-
700503		end-cap with drain	PE-HD	100/160	1 x Ø 63
700511		closed end-cap	PE-HD	100/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
€					
500412		galvanised steel	EASY galvanised steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500413		stainless steel	EASY stainless steel	M8 x 40 TBL combi stainless steel	2 tie-rods + 2 screws
500414		black galvanised steel	EASY ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws



## KIT OUTLET + SCREWS

CODE	PRICE	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
€					
				mm	
506114		PE-HD	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		PE-HD	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE	VALID FOR CHANNELS	FAMILIES
€			
700526		from 100/100 to 100/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self-cleaning ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



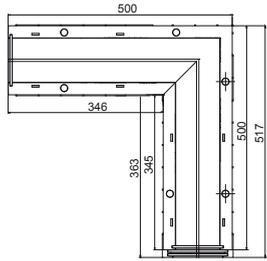
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**easy  
100**

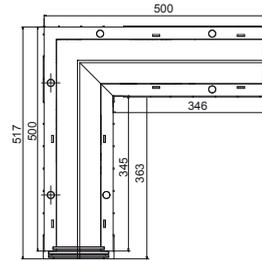
## LEFT CORNER



## EASY 100

CODE	PRICE €	MODEL
700100		100/160
700101		100/100
700143		100/80
700144		100/55

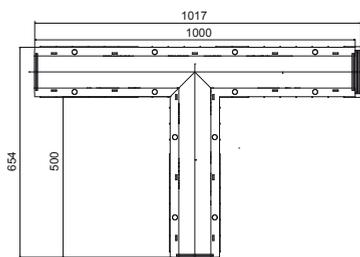
## RIGHT CORNER



## EASY 100

CODE	PRICE €	MODEL
700106		100/160
700107		100/100
700145		100/80
700146		100/55

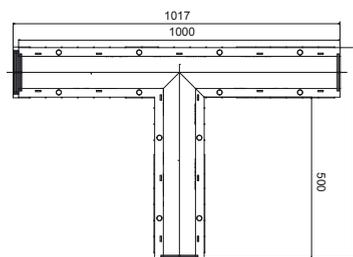
## LEFT TI



## EASY 100

CODE	PRICE €	MODEL
700112		100/160
700113		100/100
700147		100/80
700148		100/55

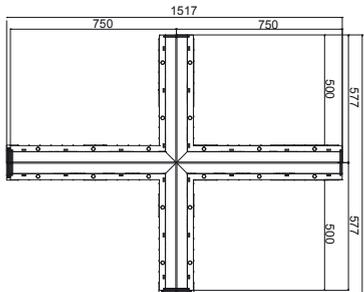
## RIGHT TI



## EASY 100

CODE	PRICE €	MODEL
700118		100/160
700119		100/100
700149		100/80
700150		100/55

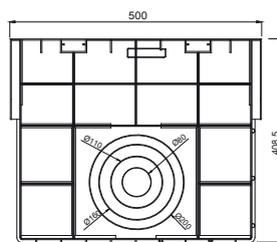
## CROSS



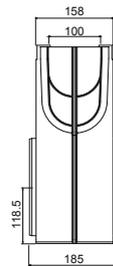
## EASY 100

CODE	PRICE €	MODEL
700124		100/160
700125		100/100
700151		100/80
700152		100/55

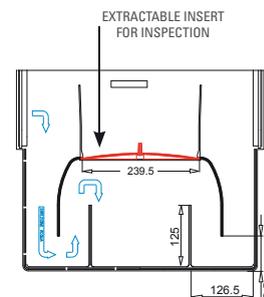
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

## EASY 100

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
700008		PE-HD	500 x 158 x 407	500 x 100 x 400	185	118,5	2,50	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

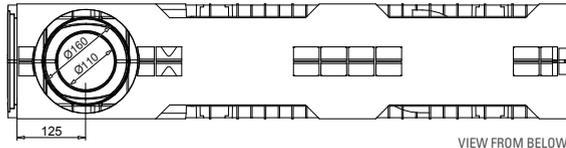


150

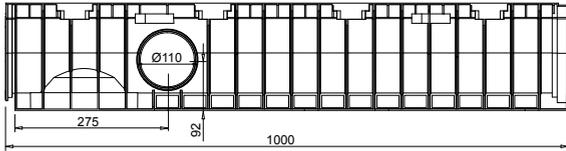


# CHANNELS

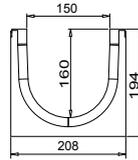
**easy  
150**



VIEW FROM BELOW



SIDE VIEW

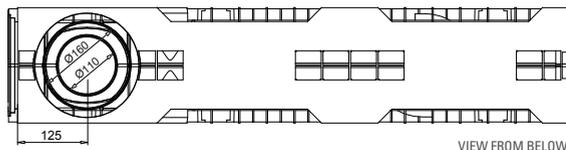


SECTION

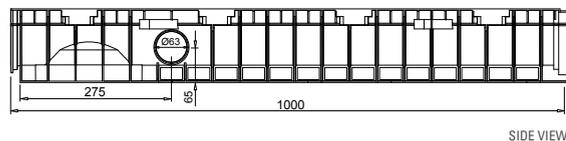


## EASY 150/160

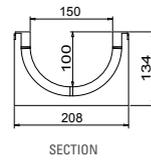
CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
700002		PE-HD	1000 x 208 x 194	1000 x 150 x 160	2,85	213,04	21,30	side 2 x Ø 110 bottom 1 x Ø 110; 1 x Ø 160



VIEW FROM BELOW



SIDE VIEW

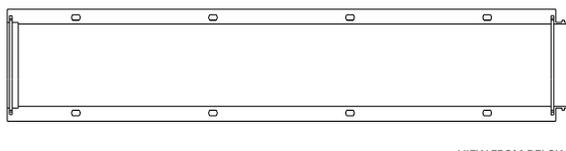


SECTION

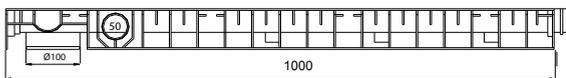


## EASY 150/100

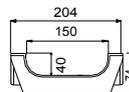
CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
700003		PE-HD	1000 x 208 x 134	1000 x 150 x 100	2,30	127,32	12,73	side 2 x Ø 63 bottom 1 x Ø 110; 1 x Ø 160



VIEW FROM BELOW



SIDE VIEW



SECTION



## EASY 150/40<sup>16</sup>

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
500004		PE-HD	1000 x 204 x 74	1000 x 150 x 40	1,90	56,50	5,65	side 2 x Ø 50 bottom 1 x Ø 100

16- For the channels 150/40 and 200/40 the grating will be supplied already with holes and the fixing system will be through kit angles. For the item codes please see the price list.  
N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



A 15

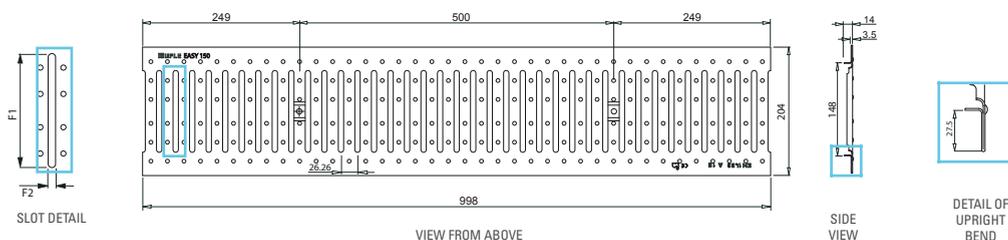
**easy  
150**

## APPLICATIONS OF GALVANISED STEEL

Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces

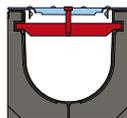
## APPLICATIONS OF STAINLESS STEEL

Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces  
Kitchens in hospitals, restaurants and similar facilities



### SLOTTED GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
500123		galvanised steel DX51D <sup>3</sup>	998 x 204 x 3,5	3,30	4,20	130,0 x 8,5		up to Class C250 as per Standard EN 1433
500124		pickled stainless steel AISI 304 <sup>2</sup>						
500184		galvanised steel DX51D <sup>3</sup>	498 x 204 x 3,5	1,65	2,10			
500185		pickled stainless steel AISI 304 <sup>2</sup>						

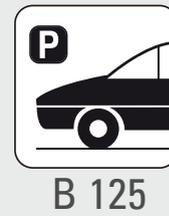
2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



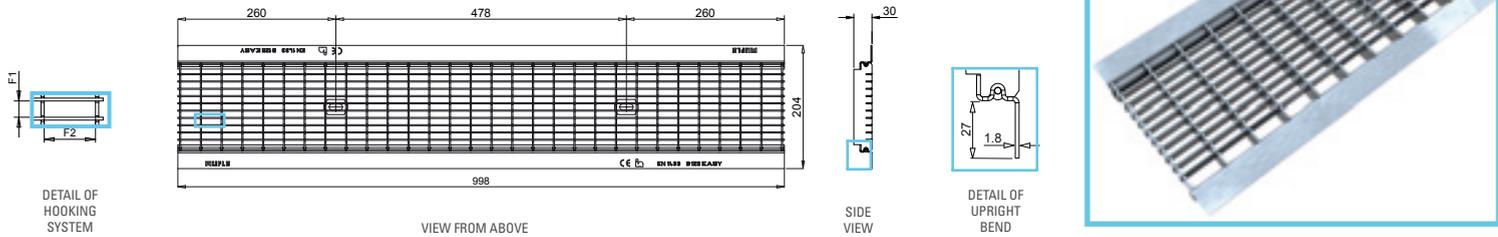
**easy  
150**

## APPLICATIONS OF GALVANISED STEEL

Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

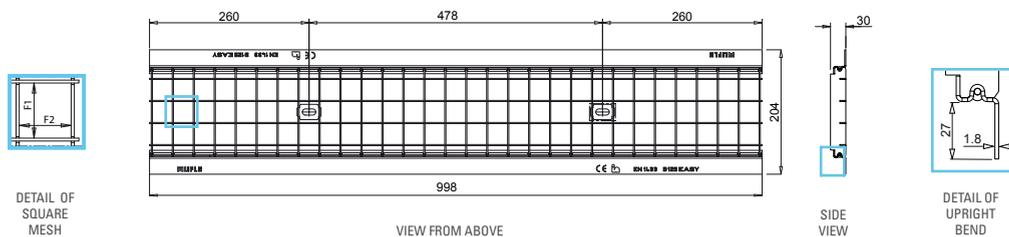
Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



### ANTI-HEEL MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
500117		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 204 x 1,8	5,40	10,50	10,2 x 32,2		up to Class C250 as per Standard EN 1433
500119		pickled stainless steel AISI 304 <sup>2</sup>						
500178		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 204 x 1,8	2,70	5,25			
500180		pickled stainless steel AISI 304 <sup>2</sup>						



### SQUARE MESH GRATING

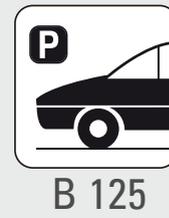


CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
500120		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 204 x 1,8	4,60	12,77	34,2 x 32,2		up to Class C250 as per Standard EN 1433
500122		pickled stainless steel AISI 304 <sup>2</sup>						
500181		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 204 x 1,8	2,30	6,38			
500183		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.  
5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



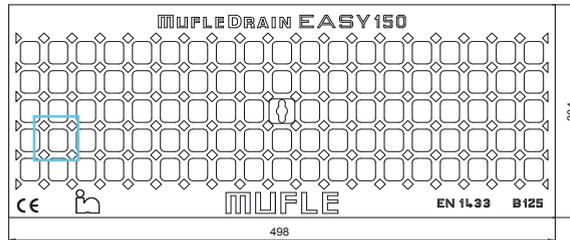
**easy  
150**

## APPLICATIONS OF DUCTILE IRON

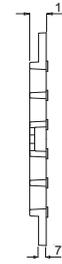
Pavements  
Lay-bys and private car parks



SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								15 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
500149		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 204 x 7	4,70	3,58	21,5 x 17,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SLOTTED GRATINGS T

TYPE C 250  
MIDDLE  
DRIVEWAY

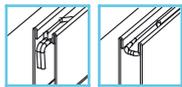
**easy  
150**

### APPLICATIONS OF GALVANISED STEEL

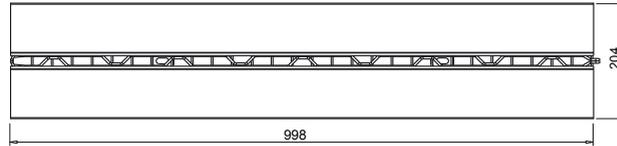
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq$  40 km/h)  
Areas not subjected to dock movements

### APPLICATIONS OF STAINLESS STEEL

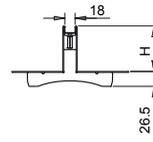
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq$  40 km/h)  
Areas not subjected to dock movements



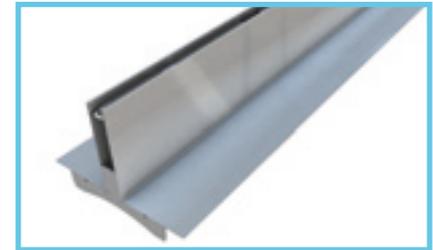
DETAIL OF  
HOOKING  
SYSTEM<sup>8</sup>



VIEW FROM ABOVE



SIDE VIEW



## T-SHAPED GRATING

CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	HEIGHT OF SLOTS H	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2
	€		mm	mm	kg	dm <sup>2</sup>	mm
500208		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 204 x 106,5	80	5,60	1,80	998 x 18
500244		pickled stainless steel AISI 304 <sup>2</sup>					
500209		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 204 x 146,5	120	6,60	1,80	
500245		pickled stainless steel AISI 304 <sup>2</sup>					

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

8- Hooking System between the gratings through hooks and holes.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

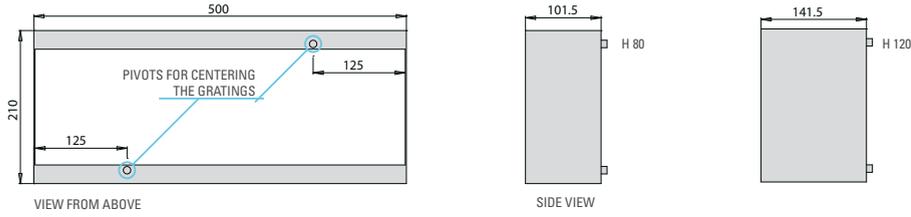


# INSPECTION ELEMENT FOR T-SHAPED GRATING

TYPE C 250  
MIDDLE  
DRIVEWAY

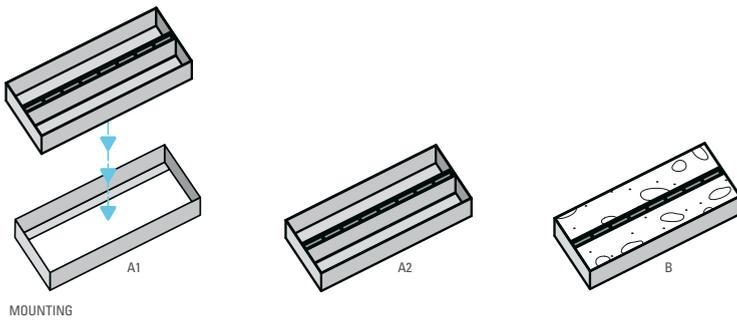
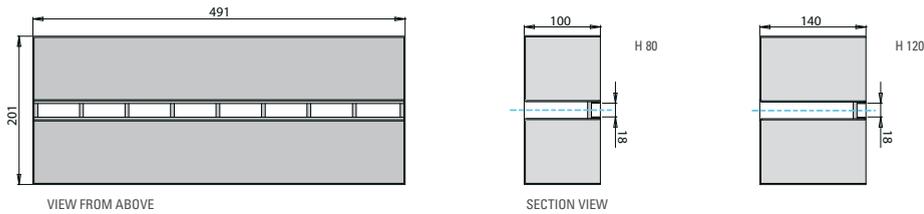
**EASY  
150**

## CONTAINMENT TANK



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 54 for the details of the drain box with siphon.

## INSPECTION GRATING



### INSPECTION ELEMENT FOR T-SHAPED GRATING - EASY 150

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500221		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 210 x 101,5	491 x 18	1,8	6,40
500233		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 210 x 101,5	491 x 18	1,8	5,90
500222		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 210 x 141,5	491 x 18	1,8	8,20
500234		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 210 x 141,5	491 x 18	1,8	7,70

### HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



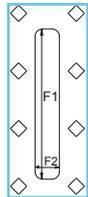
# GRATINGS



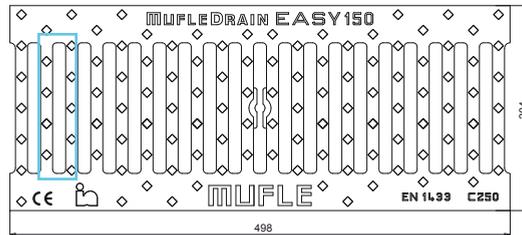
**easy  
150**

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT DETAIL

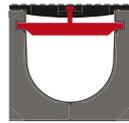


VIEW FROM ABOVE



SIDE VIEW



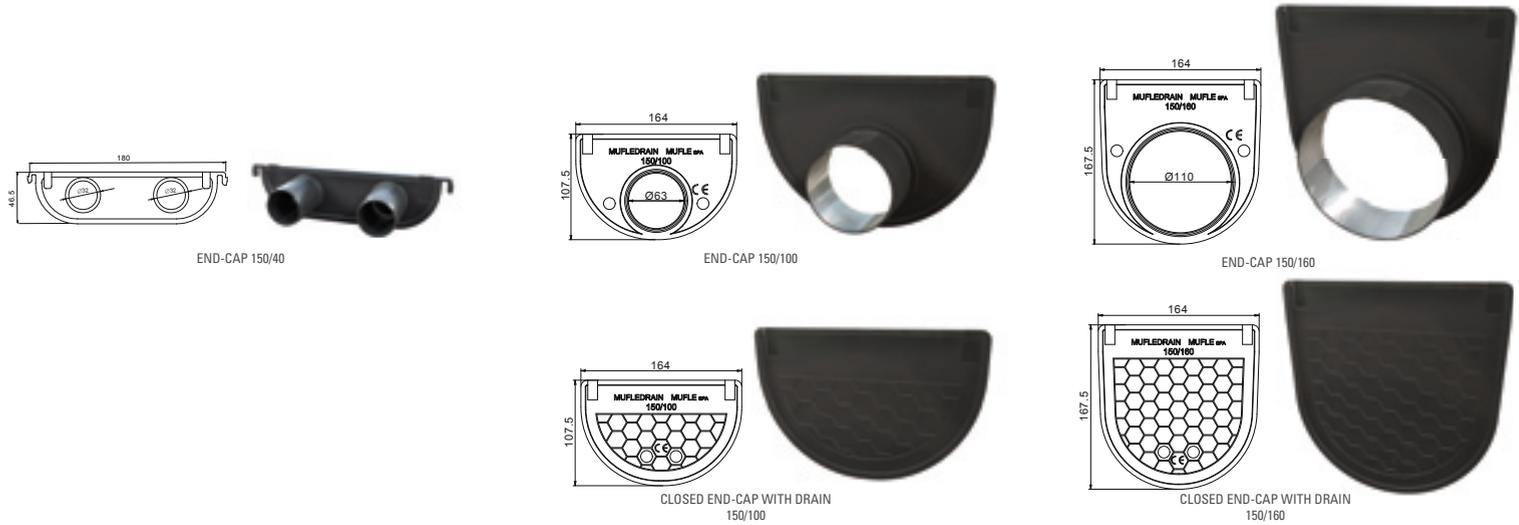
SLOTTED GRATING 13 mm								20 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 X F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
500151		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 204 x 7	5,50	3,38	130,0 x 13,0		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



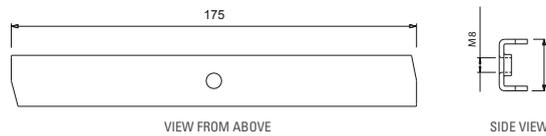
# ACCESSORIES

**easy  
150**



## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS mm
500518		closed end-cap with preinstalled drain	PE-HD	150/40	2 x Ø 32
700504		end-cap with drain	PE-HD	150/100	1 x Ø 63
700512		closed end-cap	PE-HD	150/100	-
700505		end-cap with drain	PE-HD	150/160	1 x Ø 110
700513		closed end-cap	PE-HD	150/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
500415		galvanised steel	EASY galvanised steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500416		stainless steel	EASY stainless steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500417		black galvanised steel	EASY ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws



## KIT ANGLE + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	VALID FOR CHANNELS	KIT FOR 1ml
500400		galvanised steel	EASY galvanised steel	EASY 100/40	4 angle + 4 screws
500401		stainless steel	EASY stainless steel		4 angle + 4 screws
500402		black galvanised steel	EASY ductile iron		8 angle + 8 screws

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700517		from 150/100 to 150/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



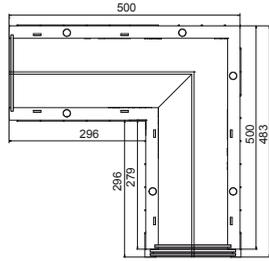
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**easy  
150**

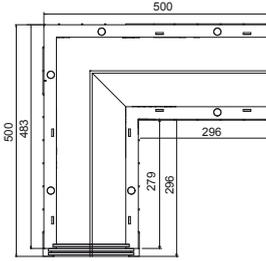
## LEFT CORNER



## EASY 150

CODE	PRICE €	MODEL
700102		150/160
700103		150/100
500305		150/40

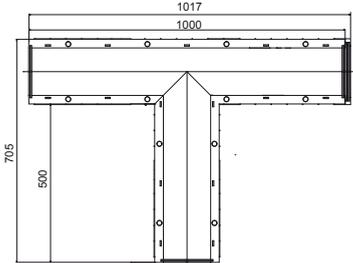
## RIGHT CORNER



## EASY 150

CODE	PRICE €	MODEL
700108		150/160
700109		150/100
500314		150/40

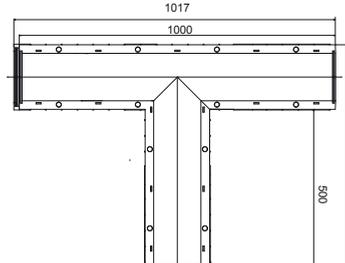
## LEFT TI



## EASY 150

CODE	PRICE €	MODEL
700114		150/160
700115		150/100
500323		150/40

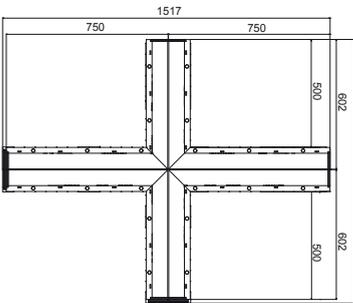
## RIGHT TI



## EASY 150

CODE	PRICE €	MODEL
700120		150/160
700121		150/100
500332		150/40

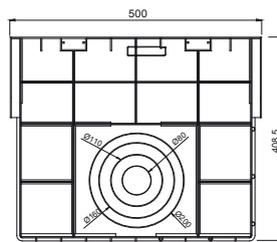
## CROSS



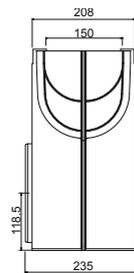
## EASY 150

CODE	PRICE €	MODEL
700126		150/160
700127		150/100
500341		150/40

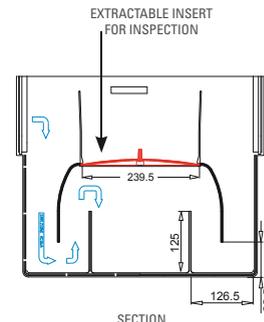
## DRAIN BOX WITH SYPHON<sup>9</sup>



FRONT VIEW



SIDE VIEW



SECTION

## EASY 150

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
700009		PE-HD	500 x 208 x 407	500 x 150 x 400	235	118,5	2,78	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

9- The drain box Easy, Vip and Wing 150 and 200 are not prearranged to be connected to the correspondent channels Easy, Wing and Vip 150/40, 200/40  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

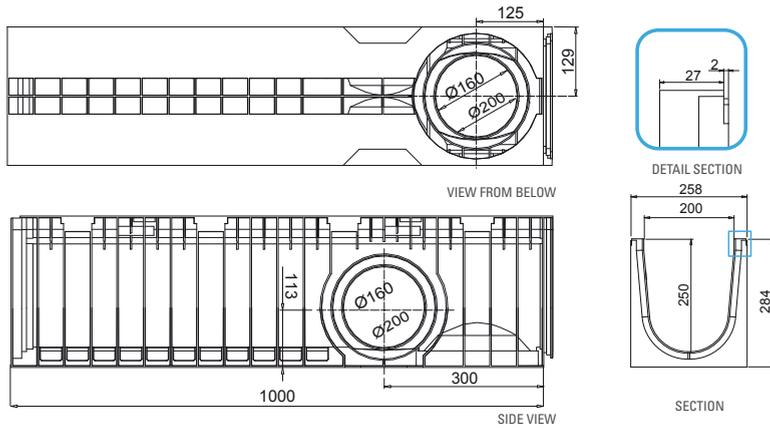


am

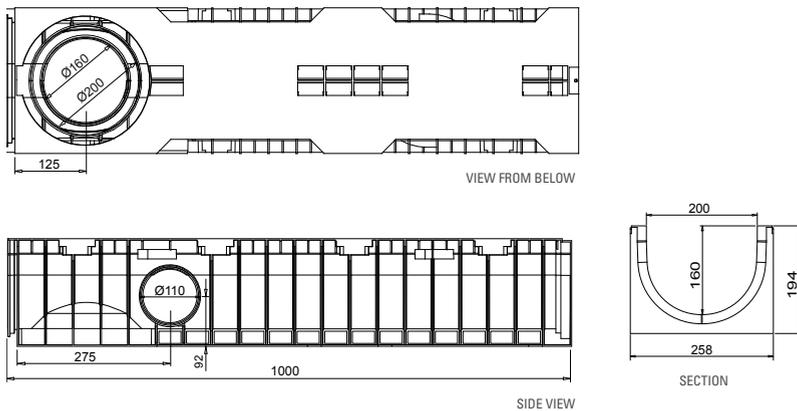


# CHANNELS

**easy  
200**



EASY 200/250								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	dm <sup>2</sup>	dm <sup>3</sup>	mm
500013		PE-HD	1000 x 258 x 284	1000 x 200 x 250	4,60	430,00	43,00	side 2 x Ø 160; 2 Ø 200 bottom 1 x Ø 160; 1 x Ø 200



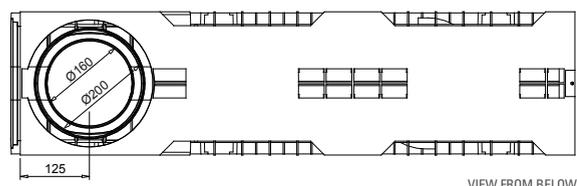
EASY 200/160								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	dm <sup>2</sup>	dm <sup>3</sup>	mm
700004		PE-HD	1000 x 258 x 194	1000 x 200 x 160	3,25	275,87	27,58	side 2 x Ø 110 bottom 1 x Ø 200; 1 x Ø 160

16- For the channels 150/40 and 200/40 the grating will be supplied already with holes and the fixing system will be through kit angles. For the item codes please see the price list.  
 N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.

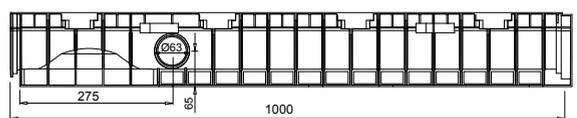


# CHANNELS

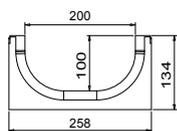
**easy  
200**



VIEW FROM BELOW



SIDE VIEW

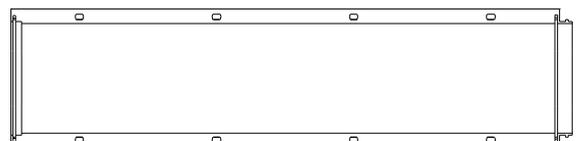


SECTION

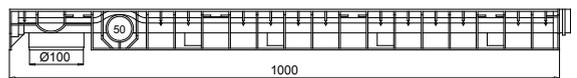


## EASY 200/100

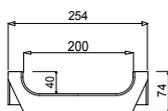
CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
700005		PE-HD	1000 x 258 x 134	1000 x 200 x 100	2,65	178,73	17,87	side 2 x Ø 63 bottom 1 x Ø 200; 1 x Ø 160



VIEW FROM BELOW



SIDE VIEW



SECTION



## EASY 200/40<sup>16</sup>

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
500007		PE-HD	1000 x 254 x 74	1000 x 200 x 40	2,10	76,50	7,65	side 2 x Ø 50 bottom 1 x Ø 100

16- For the channels 150/40 and 200/40 the grating will be supplied already with holes and the fixing system will be through kit angles. For the item codes please see the price list.  
N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



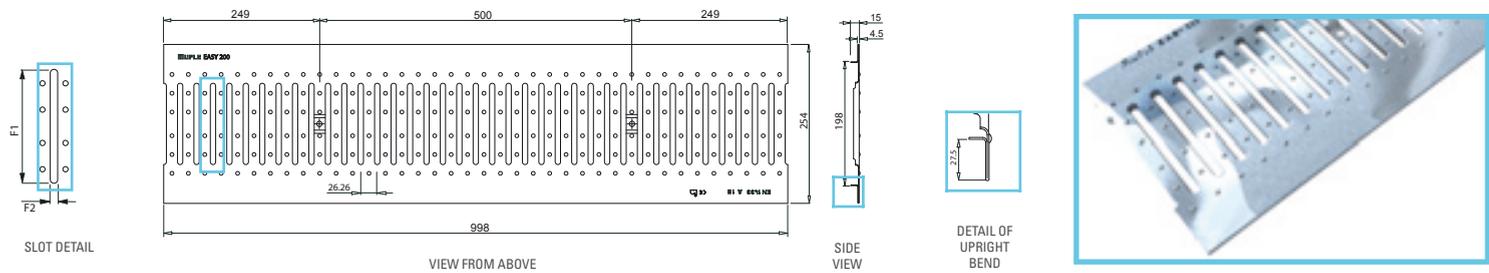
# GRATINGS



**easy  
200**

## APPLICATIONS OF GALVANISED STEEL

- Green areas and parks
- Pedestrian areas and/or cycle lanes
- Sports facilities
- Terraces

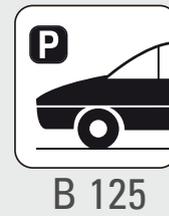


SLOTTED GRATING								15 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 X F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
500135		galvanised steel DX51D <sup>3</sup>	998 x 254 x 4,5	5,20	4,20	130,0 x 8,5		up to Class C250 as per Standard EN 1433	
500196		galvanised steel DX51D <sup>3</sup>	498 x 254 x 4,5	2,60	2,10				

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



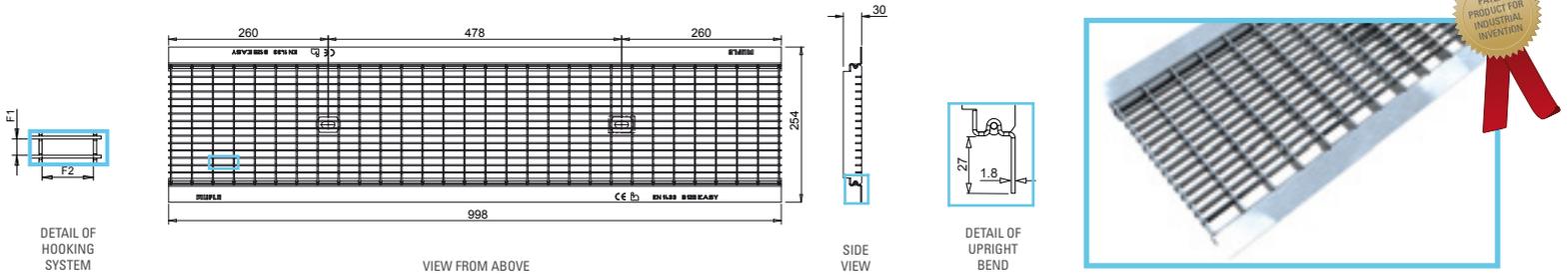
**easy  
200**

## APPLICATIONS OF GALVANISED STEEL

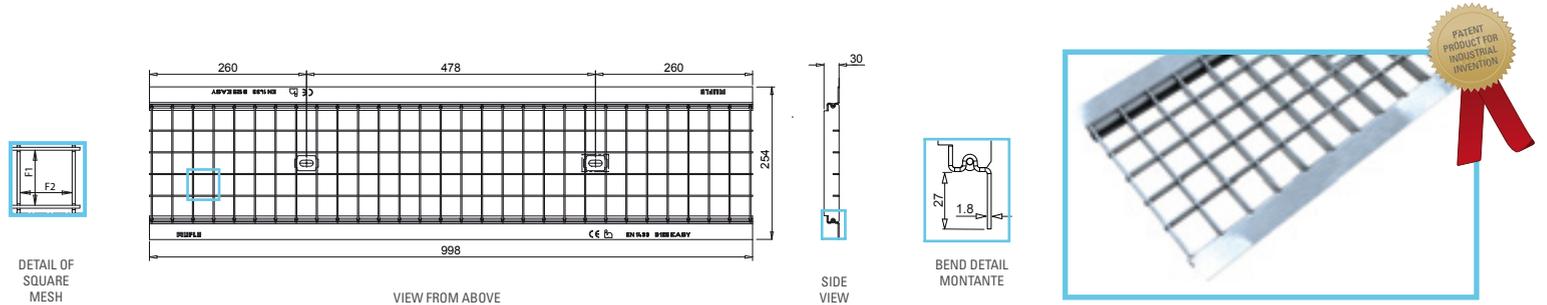
Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



ANTI-HELL MESH GRATING								30 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
500131		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 254 x 1,8	6,60	14,00	10,2 x 32,2		up to Class C250 as per Standard EN 1433	
500132		pickled stainless steel AISI 304 <sup>2</sup>							
500192		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 254 x 1,8	3,30	7,00				
500193		pickled stainless steel AISI 304 <sup>2</sup>							

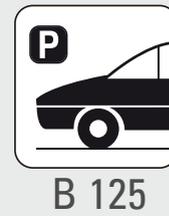


SQUARE MESH GRATING								30 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
500133		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 254 x 1,8	5,20	16,00	34,2 x 32,2		up to Class C250 as per Standard EN 1433	
500134		pickled stainless steel AISI 304 <sup>2</sup>							
500194		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 254 x 1,8	2,60	8,00				
500195		pickled stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.  
5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



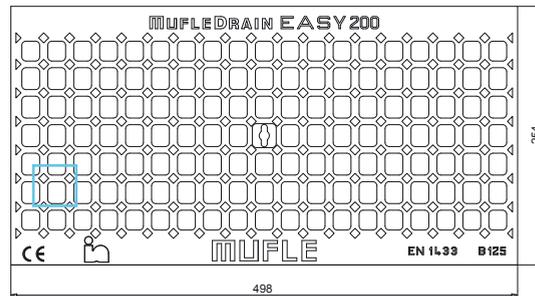
**easy  
200**

## APPLICATIONS OF DUCTILE IRON

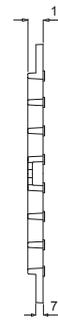
Pavements  
Lay-bys and private car parks



SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								 15 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 X F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
500154		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 254 x 7	5,85	5,00	21,5 x 17,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SLOTTED GRATINGS T

TYPE C 250  
MIDDLE  
DRIVEWAY

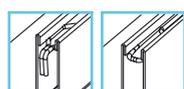
**easy  
200**

## APPLICATIONS OF GALVANISED STEEL

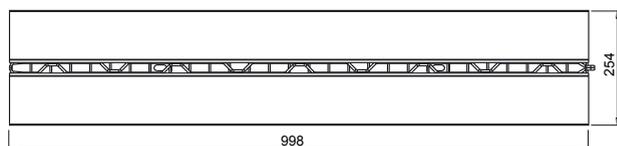
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements

## APPLICATIONS OF STAINLESS STEEL

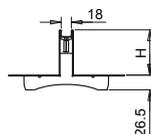
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements



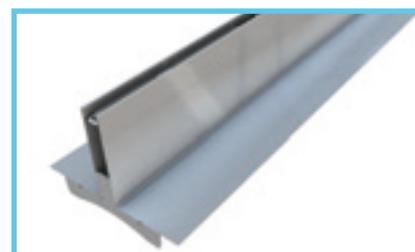
DETAIL OF  
HOOKING  
SYSTEM 8<sup>8</sup>



VIEW FROM ABOVE



SIDE VIEW



### T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
500210		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 254 x 106,5	80	6,30	1,80	998 x 18
500246		pickled stainless steel AISI 304 <sup>2</sup>					
500211		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 254 x 146,5	120	7,40		
500247		pickled stainless steel AISI 304 <sup>2</sup>					

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

8- Hooking System between the gratings through hooks and holes.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

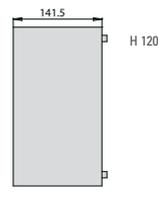
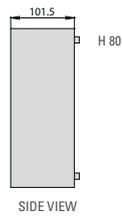
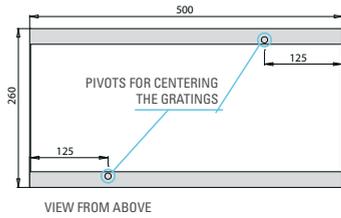


# INSPECTION ELEMENT FOR T-SHAPED GRATING

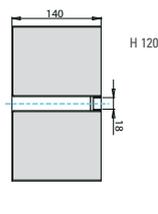
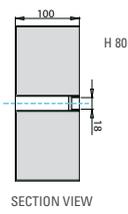
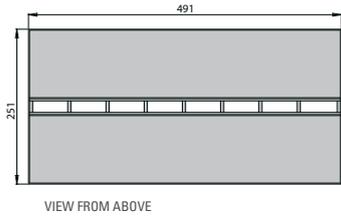
TYPE C 250  
MIDDLE  
DRIVEWAY

**easy  
200**

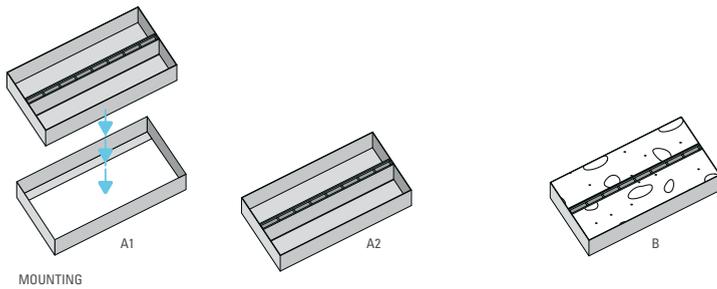
## CONTAINMENT TANK



## INSPECTION GRATING



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 64 for the details of the drain box with siphon.



### INSPECTION ELEMENT FOR T-SHAPED GRATING - EASY 200

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500223		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 260 x 101,5	491 x 18	1,8	6,90
500235		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 260 x 101,5	491 x 18	1,8	6,40
500224		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 260 x 141,5	491 x 18	1,8	9,00
500236		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 260 x 141,5	491 x 18	1,8	8,30

### HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



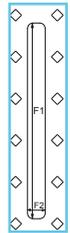
# GRATINGS



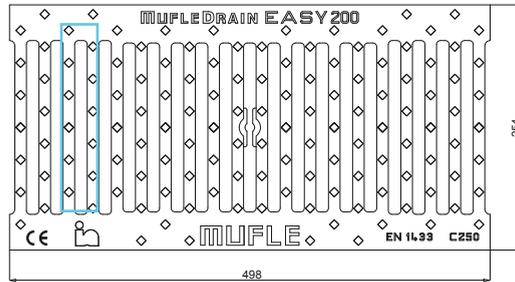
**easy  
200**

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT DETAIL



VIEW FROM ABOVE

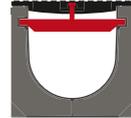


SIDE VIEW



### SLOTTED GRATING 13 mm



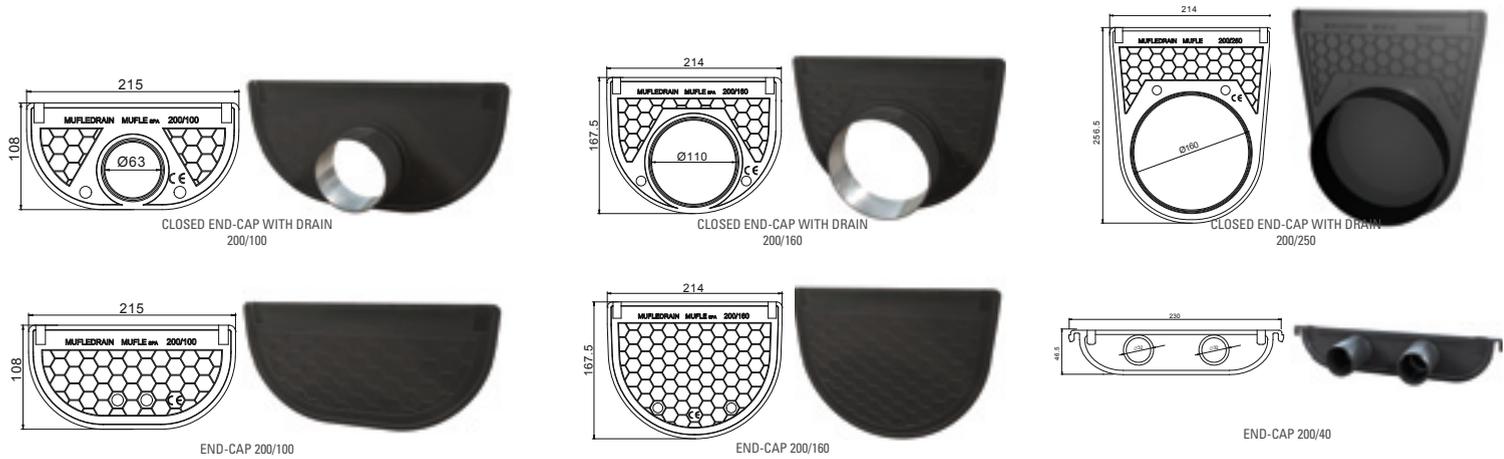
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
500155		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 254 x 7	7,20	4,68	180,0 x 13,0		up to Class C250 as per Standard EN 1433

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



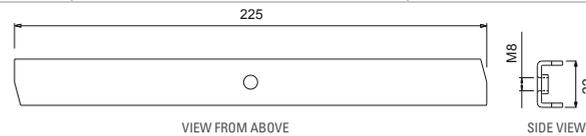
# ACCESSORIES

**easy  
200**



## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
500521		end-cap with drain	PE-HD	200/40	2 x Ø 32
700506		end-cap with drain	PE-HD	200/100	1 x Ø 63
700514		closed end-cap	PE-HD	200/100	-
700507		end-cap with drain	PE-HD	200/160	1 x Ø 110
700515		closed end-cap	PE-HD	200/160	-
502416		closed end cap with preformed outlet	PE-HD	200/250	1 x Ø 160



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
500418		galvanised steel	EASY galvanised steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500419		stainless steel	EASY stainless steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500420		black galvanised steel	EASY ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws



## CORNER KIT + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	VALID FOR CHANNELS	KIT FOR 1ml
500400		galvanised steel	EASY galvanised steel	EASY 100/40	4 angle + 4 screws
500401		stainless steel	EASY stainless steel		4 angle + 4 screws
500402		black galvanised steel	EASY ductile iron		8 angle + 8 screws

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700518		from 200/160 to 200/250	VIP - SLOPE - WING
700519		from 200/100 to 200/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



N.B. Sizes and weights are subject to usual manufacturing tolerance values.

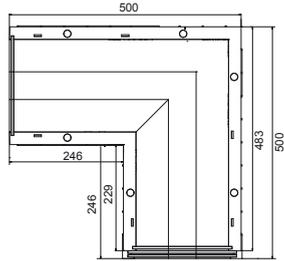


# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**easy  
200**

## LEFT CORNER

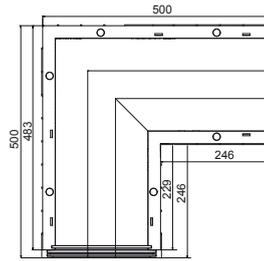
## EASY 200



CODE	PRICE €	MODEL
700153		200/250
700104		200/160
700105		200/100
500308		200/40

## RIGHT CORNER

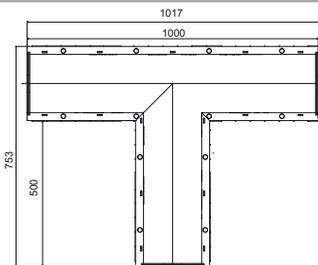
## EASY 200



CODE	PRICE €	MODEL
700154		200/250
700110		200/160
700111		200/100
500317		200/40

## LEFT TI

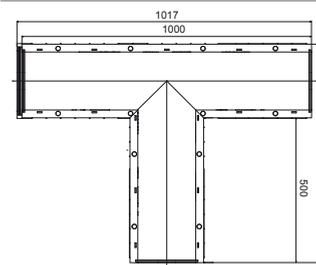
## EASY 200



CODE	PRICE €	MODEL
700155		200/250
700116		200/160
700117		200/100
500326		200/40

## RIGHT TI

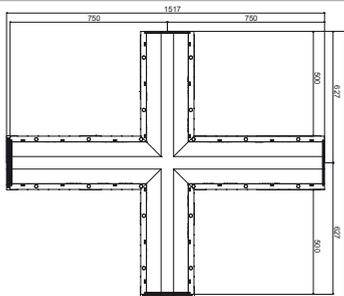
## EASY 200



CODE	PRICE €	MODEL
700156		200/250
700122		200/160
700123		200/100
500335		200/40

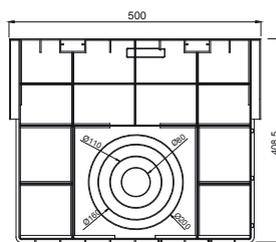
## CROSS

## EASY 200

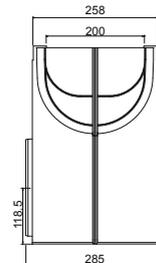


CODE	PRICE €	MODEL
700157		200/250
700128		200/160
700129		200/100
500344		200/40

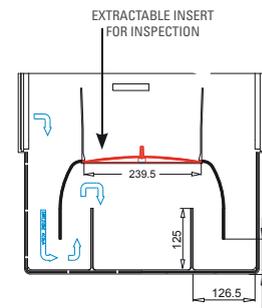
## DRAIN BOX WITH SYPHON<sup>9 - 17</sup>



FRONT VIEW



SIDE VIEW



SECTION

## EASY 200

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
700010		PE-HD	500 x 258 x 407	500 x 200 x 400	285	118,5	3	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

9- The drain box Easy, Vip and Wing 150 and 200 are not prearranged to be connected to the correspondent channels Easy, Wing and Vip 150/40, 200/40

17- The drain box Easy, Vip, Smart, Slope and Wing 200 are not prearranged to be connected to the correspondent channels EASY, VIP, SMART, SLOPE and WING 200/250

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION

**easy**

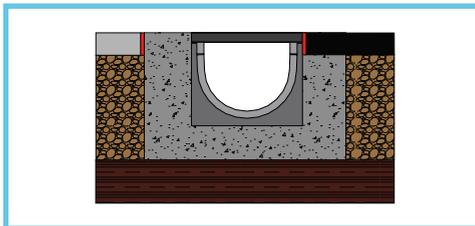
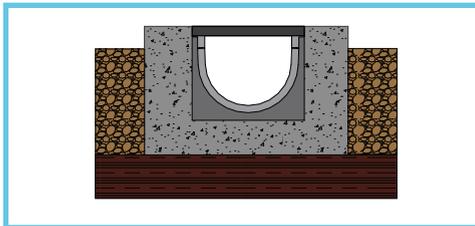
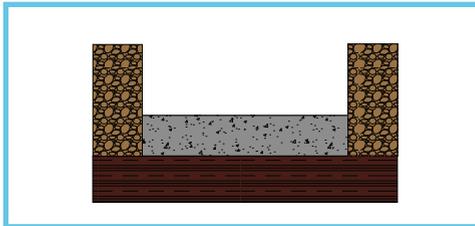
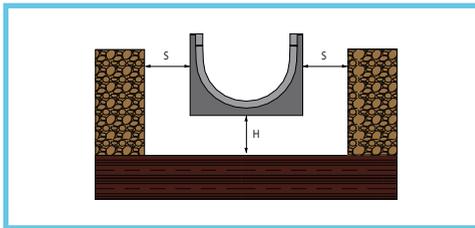
## “For all the drainage channels the manufacturer shall supply written instructions for general installation” (Ref. § 7.17 EN 1433)

The installation instructions enclosed in the present technical section are given only as an example in order to supply the main guide lines to the final fitter.

Any particular installation must be evaluated/ agreed between MufleSystem srl and the project maker.

The correct installation is necessary to guarantee the proper loads resistance of the drainage system (channel and grating) to static and dynamical traffic which is subjected to.

The correct installation involves a longer operational length of the drainage system itself as well as its better hydraulic function.



**NEW FEATURE:**  
The channels can be installed with preassembled gratings.

### Step 1

#### HOLE SIZE

The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the Summary Table. In this step make sure the underlying layer is suitable to the load it is expected to support.

### Step 2

#### CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. In case that cycles of loading and unloading are often (for example: periodic transit of vehicles) or the loads are particular heavy (E600 - F900), we recommended to reinforce the concrete base with a electro-welded net or with or beaded mouldings Ø 8 with mesh 15x15 cm. At this stage it is needed to arrange possible slopes of the drainage line.

### Step 3

#### CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet and block them at basis in order to avoid any floating or misalignment during the concrete casting for the side prop.

Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation.

As well as the step 2, also for the side prop concrete arrange the reinforcement.

### Step 4

#### FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane.

## Recommendations for installation

1. In case that channels watertightness is requested, MufleSystem is purposely recommending the use of a bituminous silicone sealant “SHELL TIXOPHALTE”: after carrying out the side prop, apply a thin and homogeneous sealant strip on each slot between the channels and the following one (clean the eventual exceeding sealant). It is strongly advised not to apply the strips of “SHELL TIXOPHALTE” inside the slots in the female joint of the channels before coupling them. Eventually a through and long- lasting guarantees to avoid any leakages can be obtained by welding the joints; this requires welding machines and experienced technicians.
2. While carrying out the phase 2 and 3, protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.
3. In case the drainage line is subjected to horizontal loads (for example concrete casting for industrial paving, private car parks and parking decks), it is necessary to arrange effective expansion joints for both direction, parallel and perpendicular to the channels. These joints shall be placed according to the norm standards in force and shall not be placed close to drainage line.
4. In case the drainage line shall be installed on roofs or terraces, it is obligatory to arrange a waterproof sheet according to specific projects.



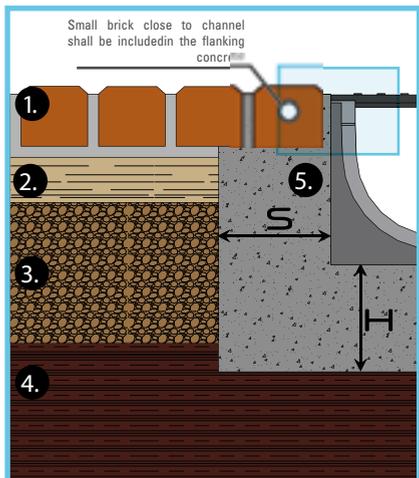
N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.



# INSTALLATION

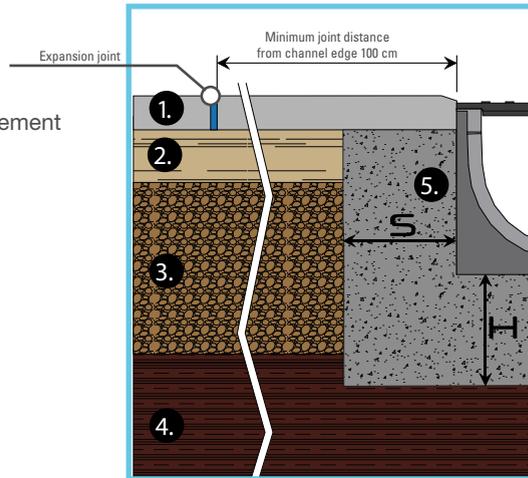
**easy**

## Case 1 Flooring (A15-B125-C250)



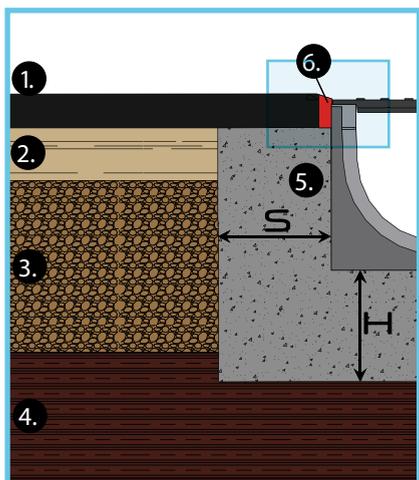
1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

## Case 2 Concrete flooring (A15-B125-C250)

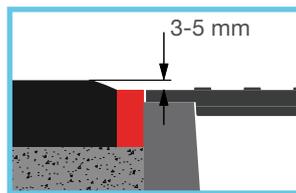


1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Expansion joint

## Case 3 Asphalt (A15-B125-C250)



1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Safety joint (if required)



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes

### SUMMARY TABLE

Load class (EN 1433)		A 15	B 125	C 250
Applicable load (EN 1433)	kN	15	125	250
Minimum height H of concrete laying bed	mm	100	100	150
Minimum thickness S of the concrete flanking	mm	100	100	150
Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30
Concrete compression strength class (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.

N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

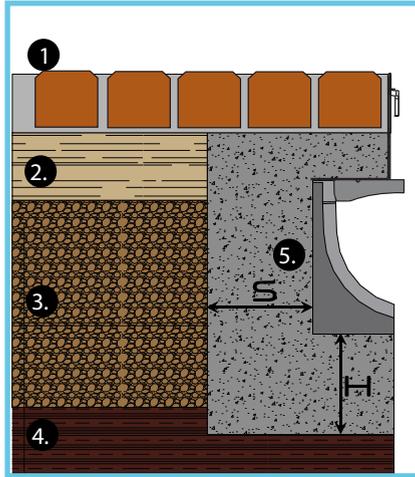
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION SLOTTED GRATING LONGITUDINALE

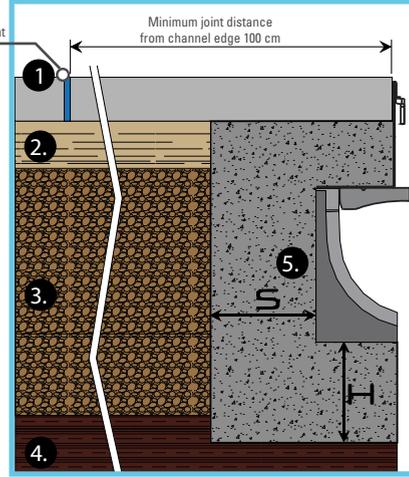
**easy**

**Case 1**  
Flooring  
(A15-B125-C250)



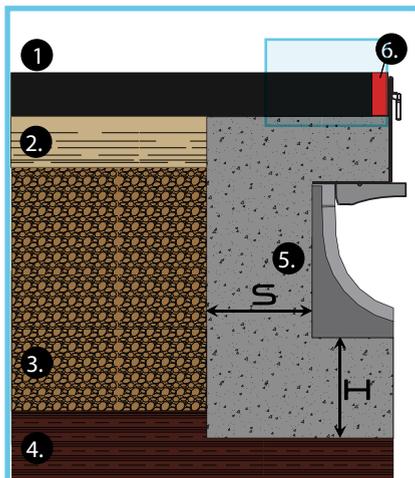
1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

**Case 2**  
Concrete flooring  
(A15-B125-C250)



1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Expansion joint

**Case 3**  
Asphalt  
(A15-B125-C250)



1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Safety joint (if required)

This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

## SUMMARY TABLE

Load class (EN 1433)		A 15	B 125	C 250
Applicable load (EN 1433)	kN	15	125	250
Minimum height H of concrete laying bed	mm	100	100	150
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Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30
Concrete compression strength class (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

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## SPECIFICATIONS

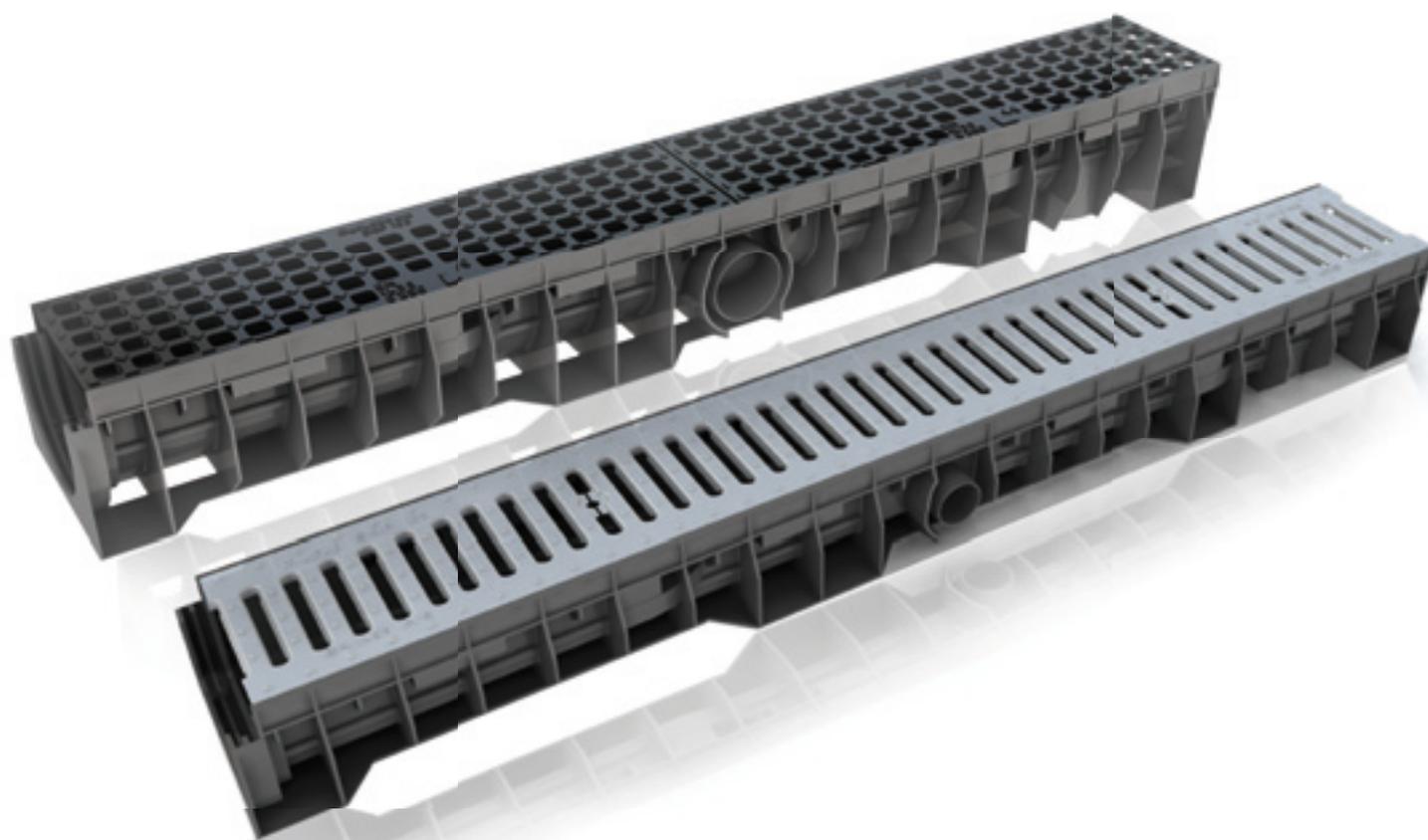
**easy**

1. Supply and installation of MufleDrain EASY type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap \_\_\_mm, internal height \_\_\_ mm.
2. Supply and installation of MufleDrain EASY type HD-PE drainage channel with external stiffening ribs and male- female coupling system allowing the assembly between one channel and the next with the relevant pre- assembled gratings. The channel will have 2 side drainage diaphragms at pre- determined points and a prearranged 100 (110) mm diameter bottom outlet that can be fixed through 4 screws. . The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1000 mm, internal net gap 100 mm, internal height \_\_\_\_ mm.
3. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain EASY drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot width 13mm, length 498mm, width \_\_\_mm.
4. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain EASY drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6mm, length 498mm, width 154 mm.
5. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain EASY drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 498 mm, width \_\_\_mm.
6. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain EASY drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 998 mm, width \_\_\_mm. A similar grating will be available upon request with length 498mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 11 mm in the anti-heel mesh.
7. Supply and installation of galvanised (stainless) steel rung covering gratings for MufleDrain FLAT drainage channels with bar fixing system, load class A15 according to EN 1433- 2004, length 998 mm, width \_\_\_mm. A similar grating will be available upon request with length 498mm.
8. Supply and installation of T-shaped longitudinal-slot gratings made from galvanised (stainless) steel for MufleDrain EASY drainage channels with male-female coupling system between one grating and the next, load class A15 according to EN 1433-2004, length 998mm, width \_\_\_ mm, height of "T" \_\_\_mm.
9. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.
10. Supply and installation of HD-PE open cap with drainage hole diameter \_\_\_mm for MufleDrain drainage channel with coupling system into the special channel housing.
11. Supply and installation of HD-PE boxes with siphon for MufleDrain EASY drainage channels with external stiffening ribs and coupling system. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 542mm, net gap \_\_\_ mm, internal height 400 mm.
12. Supply and installation of inspection elements for MufleDrain EASY T-shaped gratings in galvanized (stainless) steel for MufleDrain EASY drain boxes with siphon. Every inspection element will be made of an external containment tank self- centered on bottom drain box with siphon and of an inspection element to be placed inside the containment tank that can be also pulled out after installation. Load classes until C250. The sizes of drain boxes shall be length 500 mm, width \_\_\_\_ mm, height \_\_\_\_ mm.

# SKIP

## The system:

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which has a 20 mm high toe board and needs no strengthening frame
- it has a wide usable section for drainage and uses lightweight gratings with optimised sizes
- it comprises a wide range of different gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel, ductile iron and HD-PE. A HD-PE blind cover is available too.
- it is supplemented with different fixing systems, which are ideal for all requirements and range from the classic tie-rod to a simple locking system using a protrusion inside the channel
- grating protection is ensured by the HD-PE edge
- it comes equipped with a convenient drain gate, which minimises its size
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it is ideal for residential areas, sport facilities, private car parks.
- it comes complete with drain boxes with siphon
- the range is made up of 2 channels with 1 width and 2 heights (100/55 and 100/80)



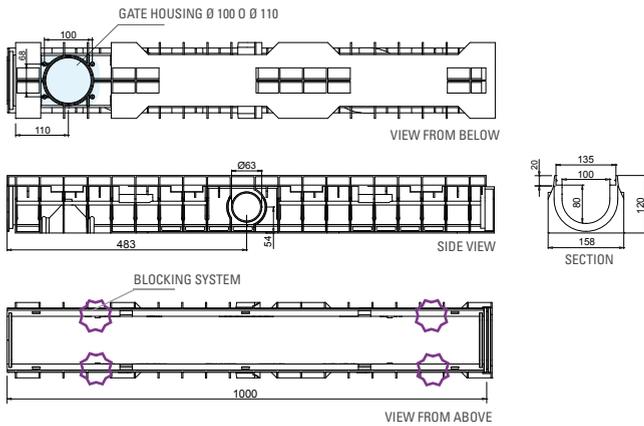


100



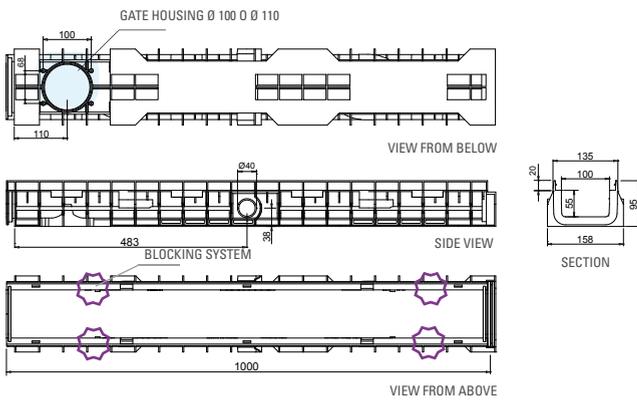
# CHANNELS

**skip  
100**



## SKIP 100/80

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
707000		PE-HD	1000 x 158 x 120	1000 x 100 x 80	1,75	69,28	6,92	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110



## SKIP 100/55

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
707001		PE-HD	1000 x 158 x 95	1000 x 100 x 55	1,55	54,44	5,44	side 2 x Ø 40 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).  
 N.B. Waterproofing: in order to ensure the waterproofness of channels, a bituminous adhesive sealant should be used by heat-sealing the channel joints it makes sure there will be no leakages for a very long time. For further information please contact MufleSystem's Technical Department.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



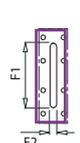
**skip  
100**

## APPLICATIONS OF GALVANISED STEEL

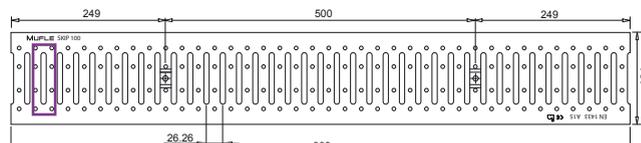
Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces

## APPLICATIONS OF STAINLESS STEEL

Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces  
Kitchens in hospitals, restaurants and similar facilities



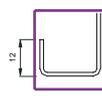
SLOT DETAIL



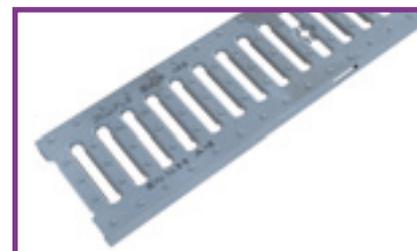
VIEW FROM ABOVE



SIDE VIEW



BEND DETAIL



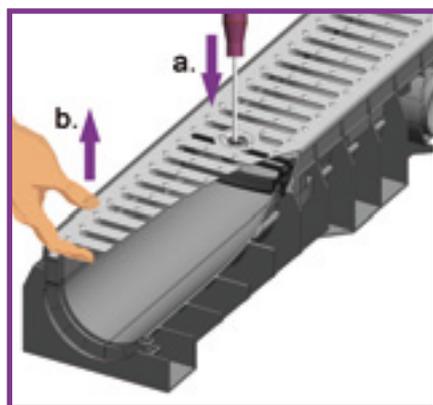
## SLOTTED GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	clip	protrusion (no fixing) <sup>4</sup>
507122		galvanised steel DX51D <sup>3</sup>	998 x 124 x 20	1,30	2,35	83,0 x 8,5			
507123		pickled stainless steel AISI 304 <sup>2</sup>							
507124		galvanised steel DX51D <sup>3</sup>	498 x 124 x 20	0,65	1,175				
507125		pickled stainless steel AISI 304 <sup>2</sup>							

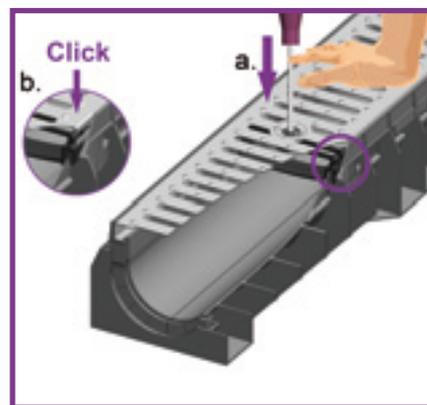
### RATING ASSEMBLY BY MEANS OF CLIPS

- Place the grating on the channel. Match the slots on the back to the hooks of the SKIP clips. Use a screwdriver to apply pressure on the bar;
- Introduce the grating with one hand until it is completely hooked.



### DISASSEMBLY OF THE GRATING

- Use a screwdriver to apply pressure on the SKIP clip until it is released;
- Lift it out.



The SKIP clip makes it possible to fix the rung and PE-HD SKIP gratings quickly and safely with neither nuts nor bolts.

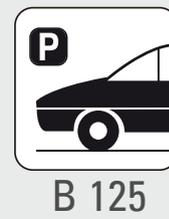
2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

4- Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing. N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



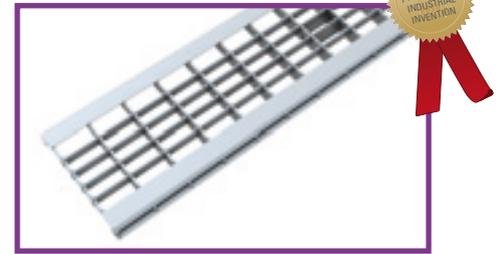
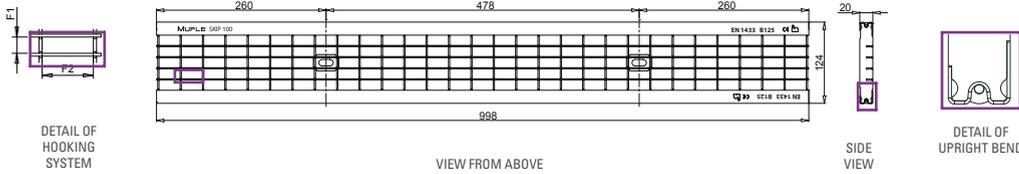
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## APPLICATIONS OF GALVANISED STEEL

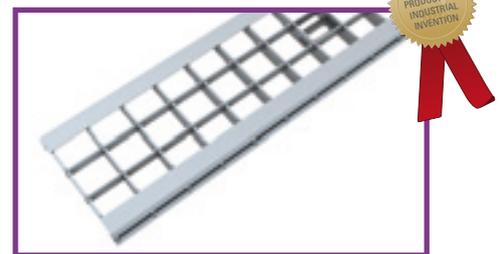
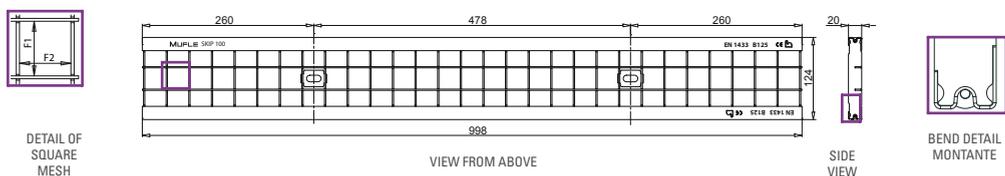
Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



ANTI-HEEL MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	protrusion (no fixing) <sup>4</sup>	
507104		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 124 x 20	2,90	7,19	15,2 x 32,2			
507112		pickled stainless steel AISI 304 <sup>2</sup>							
507106		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 124 x 20	1,45	3,60				
507116		pickled stainless steel AISI 304 <sup>2</sup>							



SQUARE MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	protrusion (no fixing) <sup>4</sup>	
507105		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 124 x 20	2,60	7,50	32,2 x 32,2			
507114		pickled stainless steel AISI 304 <sup>2</sup>							
507107		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 124 x 20	1,30	3,75				
507118		pickled stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

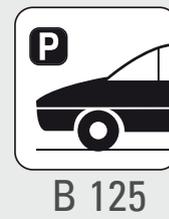
4- Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



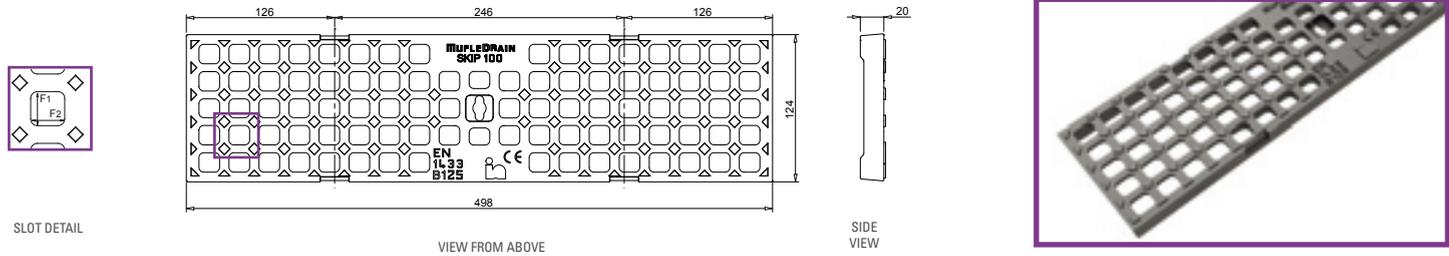
# GRATINGS



**skip  
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## APPLICATIONS OF DUCTILE IRON

Pavements  
Lay-bys and private car parks



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
507100		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 124 x 20	2,90	2,40	17,5 x 16,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



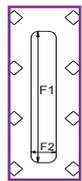
# GRATINGS



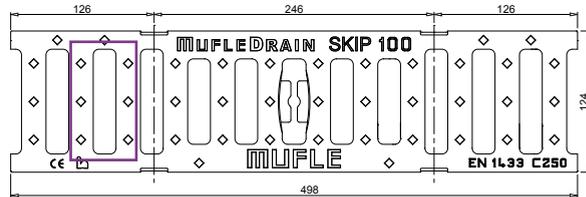
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## APPLICATIONS OF DUCTILE IRON

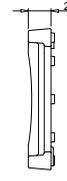
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT DETAIL



VIEW FROM ABOVE



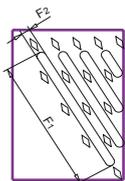
SIDE VIEW



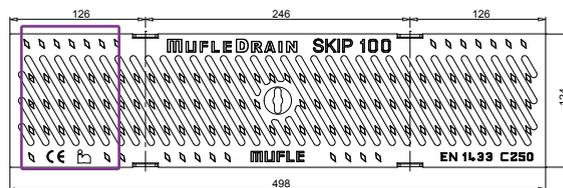
### SLOTTED GRATING 20 mm



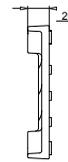
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
507102		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 124 x 20	3,00	1,96	92,0 x 20,0		up to Class C250 as per Standard EN 1433



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



### SLOTTED GRATING 6 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
507101		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 124 x 20	3,10	1,87	95,0 x 6,0		up to Class C250 as per Standard EN 1433

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



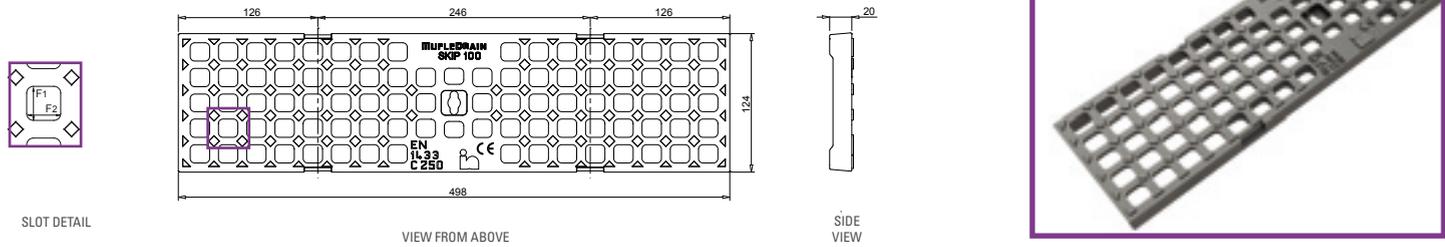
# GRATINGS



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## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
507103		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 124 x 20	3,60	2,40	16,5 x 17,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



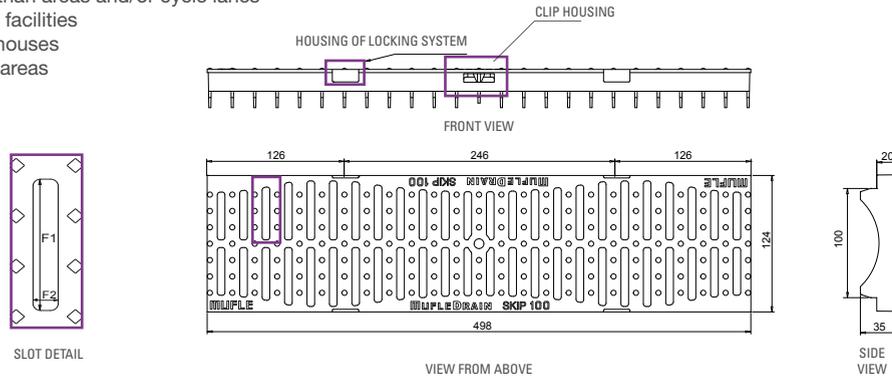
# GRATINGS



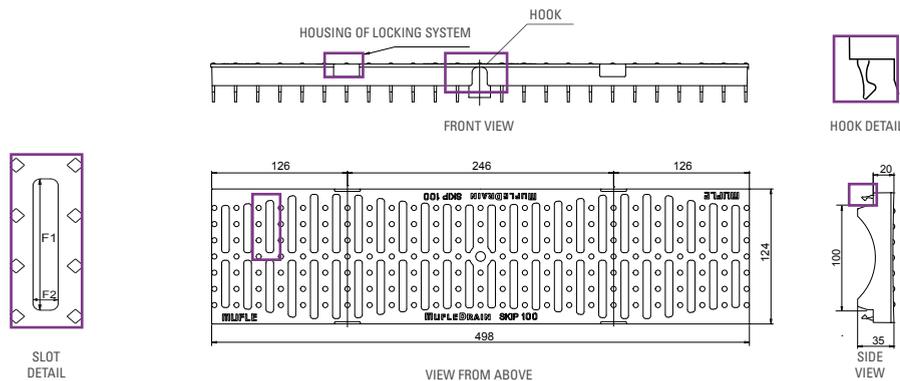
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## APPLICATIONS OF HD-PE

- Residential and condominium areas
- Pedestrian areas and/or cycle lanes
- Sports facilities
- Greenhouses
- Green areas



SLOTTED GRATING 7 mm							35 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm <sup>2</sup>	mm	clip	protrusion <sup>4</sup>
507121		HD-PE black	498 x 124 x 20	0,32	16,05	54,0 x 7,0		



SLOTTED GRATING 7 mm WITH HOOKS							35 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm <sup>2</sup>	mm	protrusion <sup>4</sup>	hook
507126		HD-PE black	498 x 124 x 20	0,32	16,05	54,0 x 7,0		



SKIP HD-PE gratings cannot be certified because Standard EN 1433 does not yet provide for specific tests for plastic-material gratings. The tests carried out by Mufle showed that SKIP HD-PE gratings can be defined as "Walk-Over".

4- Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing. N.B. Sizes and weights are subject to usual manufacturing tolerance values.



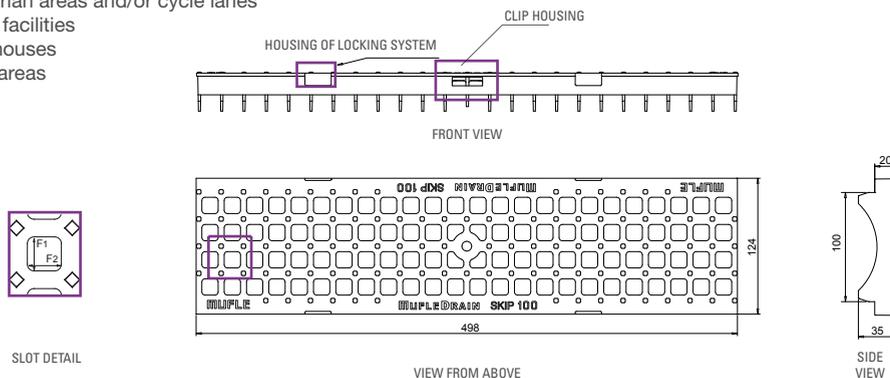
# GRATINGS

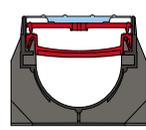
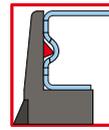


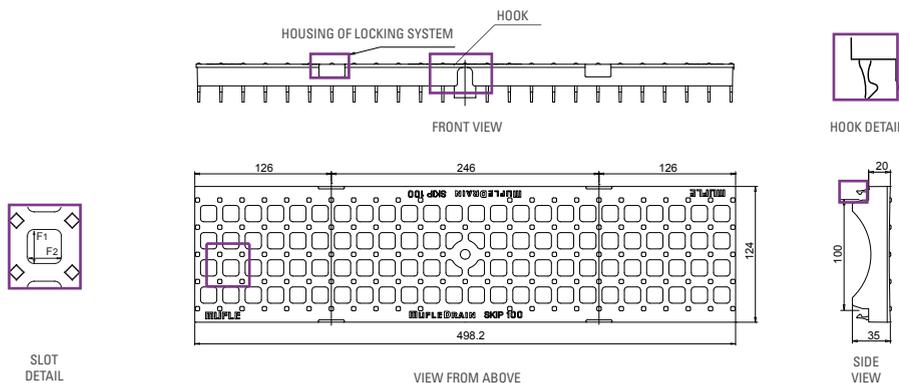
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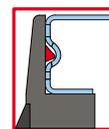
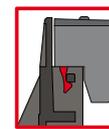
## APPLICATIONS OF HD-PE

- Residential and condominium areas
- Pedestrian areas and/or cycle lanes
- Sports facilities
- Greenhouses
- Green areas



SQUARE MESH GRATING							 35 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm <sup>2</sup>	mm	clip	protrusion <sup>4</sup>
507120		HD-PE black	498 x 124 x 20	0,33	20,505	15,0 x 15,0		



SQUARE MESH GRATING WITH HOOKS							 35 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm <sup>2</sup>	mm	protrusion <sup>4</sup>	hook
507127		HD-PE black	498 x 124 x 20	0,33	20,505	15,0 x 15,0		



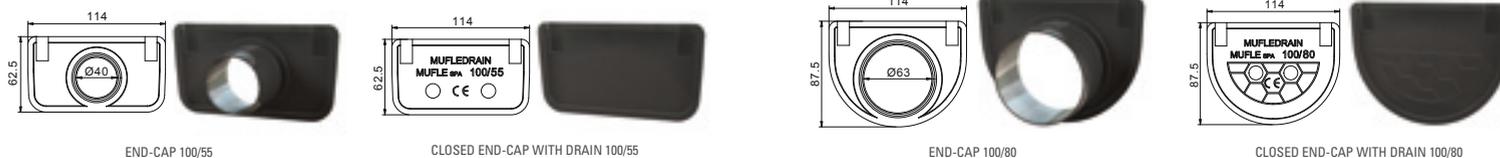
SKIP HD-PE gratings cannot be certified because Standard EN 1433 does not yet provide for specific tests for plastic-material gratings. The tests carried out by Mufle showed that SKIP HD-PE gratings can be defined as "Walk-Over".

4- Hooking system using a protrusion inside the channel. The blocking system does not fix the grating to the channel. Either the tie-rod or the clip system should be used for steady fixing. N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# ACCESSORIES

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END-CAP 100/55

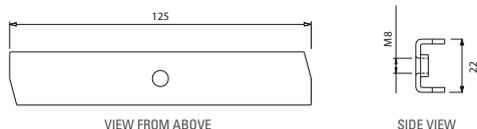
CLOSED END-CAP WITH DRAIN 100/55

END-CAP 100/80

CLOSED END-CAP WITH DRAIN 100/80

## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
700500		end-cap with drain	PE-HD	100/55	1 x Ø 40
700508		closed end-cap	PE-HD	100/55	-
700501		end-cap with drain	PE-HD	100/80	1 x Ø 63
700509		closed end-cap	PE-HD	100/80	-



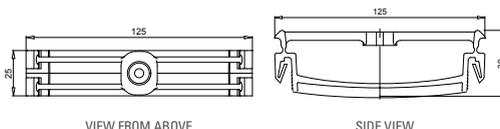
VIEW FROM ABOVE

SIDE VIEW



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
500421		galvanised steel	SKIP galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	SKIP stainless steel	M8 x 55 TBL combi stainless steel	2 tie-rods + 2 screws
500423		black galvanised steel	SKIP ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws



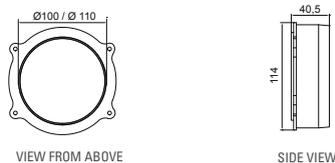
VIEW FROM ABOVE

SIDE VIEW



## KIT CLIP

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	KIT FOR 1 ml
510212		PE-HD	SKIP galvanised steel - inox - PE-HD	2 clip



VIEW FROM ABOVE

SIDE VIEW



## KIT OUTLET + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR CHANNELS	DIAMETER mm	KIT FOR 1 ml
506114		PE-HD	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		PE-HD	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

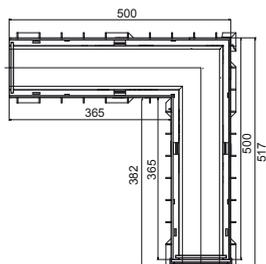
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES

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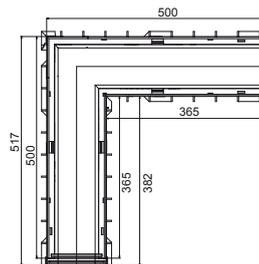
## LEFT CORNER



## SKIP 100

CODE	PRICE €	MODEL
707100		100/80
707101		100/55

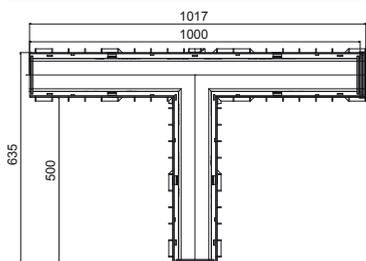
## RIGHT CORNER



## SKIP 100

CODE	PRICE €	MODEL
707102		100/80
707103		100/55

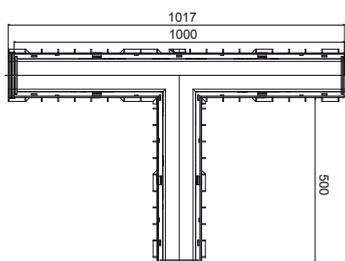
## LEFT TI



## SKIP 100

CODE	PRICE €	MODEL
707104		100/80
707105		100/55

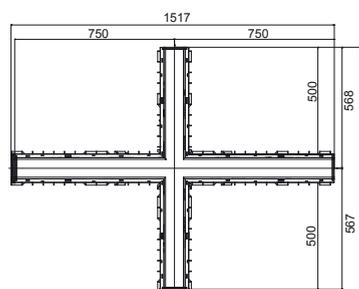
## RIGHT TI



## SKIP 100

CODE	PRICE €	MODEL
707106		100/80
707107		100/55

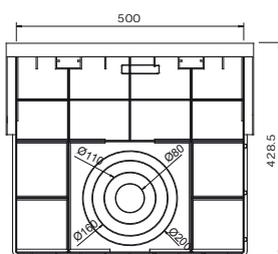
## CROSS



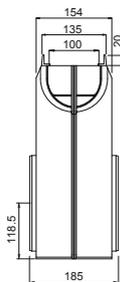
## SKIP 100

CODE	PRICE €	MODEL
707108		100/80
707109		100/55

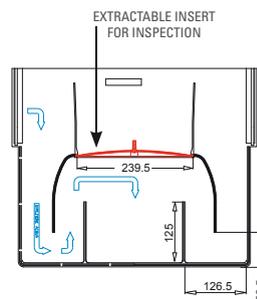
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

## SKIP 100

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
707002		PE-HD	500 x 135 x 428,5	500 x 100 x 400	158	118,5	2,68	2 x Ø 80; 2 x Ø 110; 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION



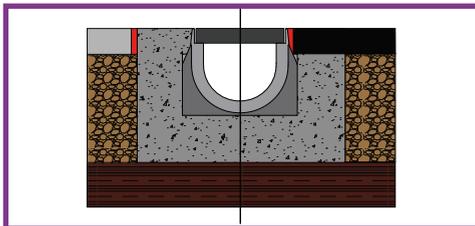
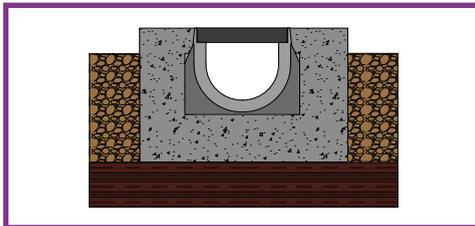
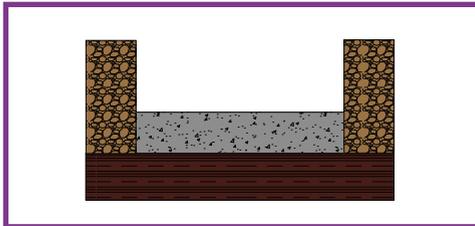
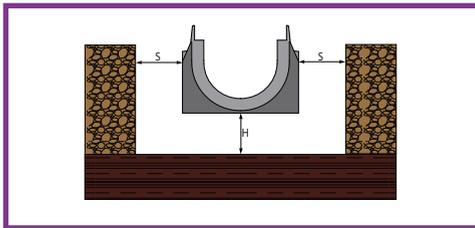
## “For all the drainage channels the manufacturer shall supply written instructions for general installation” (Ref. § 7.17 EN 1433)

The installation instructions enclosed in the present technical section are given only as an example in order to supply the main guide lines to the final fitter.

Any particular installation must be evaluated/ agreed between MufleSystem srl and the project maker.

The correct installation is necessary to guarantee the proper loads resistance of the drainage system (channel and grating) to static and dynamical traffic which is subjected to.

The correct installation involves a longer operational length of the drainage system itself as well as its better hydraulic function.



**NEW FEATURE:**  
The channels can be installed with preassembled gratings

### Step 1

#### HOLE SIZE

The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the Summary Table. In this step make sure the underlying layer is suitable to the load it is expected to support.

### Step 2

#### CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. In case that cycles of loading and unloading are often (for example: periodic transit of vehicles) or the loads are particular heavy (E600 - F900), we recommended to reinforce the concrete base with a electro-welded net or with or beaded mouldings Ø 8 with mesh 15x15 cm. At this stage it is needed to arrange possible slopes of the drainage line.

### Step 3

#### CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet and block them at basis in order to avoid any floating or misalignment during the concrete casting for the side prop.

Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation.

As well as the step 2, also for the side prop concrete arrange the reinforcement.

### Step 4

#### FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane.

## Recommendations for installation

1. In case that channels watertightness is requested, MufleSystem is purposely recommending the use of a bituminous silicone sealant “SHELL TIXOPHALTE”: after carrying out the side prop, apply a thin and homogeneous sealant strip on each slot between the channels and the following one (clean the eventual exceeding sealant). It is strongly advised not to apply the strips of “SHELL TIXOPHALTE” inside the slots in the female joint of the channels before coupling them. Eventually a through and long- lasting guarantees to avoid any leakages can be obtained by welding the joints; this requires welding machines and experienced technicians.
2. While carrying out the phase 2 and 3, protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.
3. In case the drainage line is subjected to horizontal loads (for example concrete casting for industrial paving, private car parks and parking decks), it is necessary to arrange effective expansion joints for both direction, parallel and perpendicular to the channels. These joints shall be placed according to the norm standards in force and shall not be placed close to drainage line.
4. In case the drainage line shall be installed on roofs or terraces, it is obligatory to arrange a waterproof sheet according to specific projects.



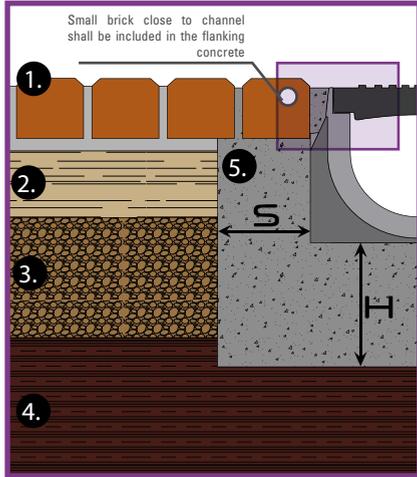
N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.



# INSTALLATION

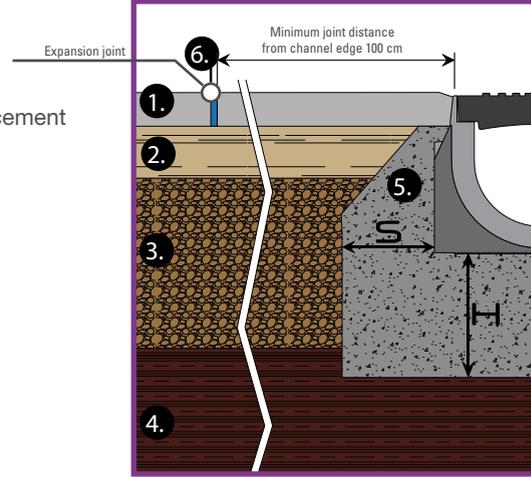
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## Case 1 Flooring (A15-B125-C250)



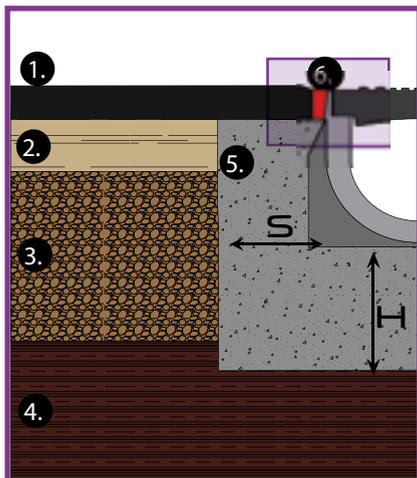
1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

## Case 2 Concrete flooring (A15-B125-C250)

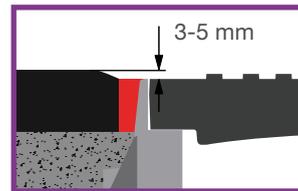


1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Expansion joint

## Case 3 Asphalt (A15-B125-C250)



1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

### SUMMARY TABLE

Load class (EN 1433)		A 15	B 125	C 250
Applicable load (EN 1433)	kN	15	125	250
Minimum height H of concrete laying bed	mm	100	100	150
Minimum thickness S of the concrete flanking	mm	100	100	150
Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.

N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



## SPECIFICATIONS

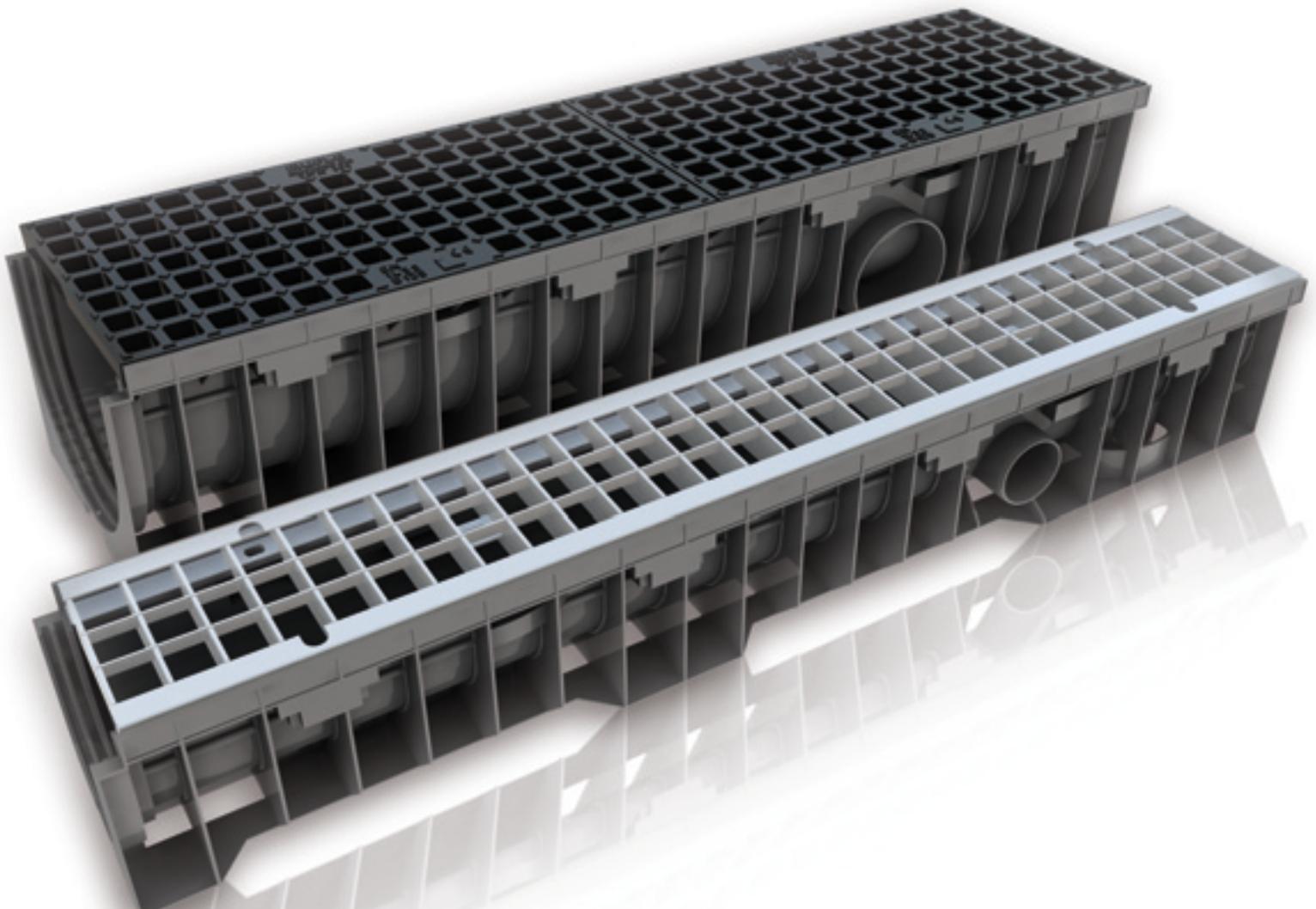
skip

1. Supply and installation of MufleDrain SKIP type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 side drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. HD-PE upper profile with height not smaller than 20 mm. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have 2 protrusions on each side of internal walls of the upper profile in order to ensure the gratings can be locked in place. The channel will have the following dimensions: length 1,000 mm, internal net gap 100 mm, internal height \_\_\_ mm.
2. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SKIP drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot width 20 mm, length 498mm, width 124 mm.
3. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SKIP drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6mm, length 498 mm, width 124 mm.
4. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain SKIP drainage channels with bar fixing system, load class B125 (C250) according to EN 1433-2004, length 498 mm, width 124 mm.
5. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain SKIP drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 998 mm, width 124 mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 15 mm in the anti-heel mesh.
6. Supply and installation of galvanised (stainless) steel rung covering gratings for MufleDrain SKIP drainage channels with bar fixing system (CliP), load class A15 according to EN 1433-2008, length 998 mm, width 124 mm. A similar grating will be available upon request with length 498 mm.
7. Supply and installation of drive-over covering gratings with HD-PE 7-mm slot for MufleDrain SKIP drainage channels with clip fixing system (protrusion), length 498 mm, width 124 mm.
8. Supply and installation of drive-over covering gratings with HD-PE 7 mm slot equipped with hook blocking system for MufleDrain SKIP drainage channels, length 498 mm, width 124 mm.
9. Supply and installation of drive-over covering gratings with HD-PE square mesh for MufleDrain SKIP drainage channels with Clip fixing system (protrusion), length 498 mm, width 124 mm.
10. Supply and installation of drive-over covering gratings with HD-PE square mesh equipped with hook blocking system for MufleDrain SKIP drainage channels, width 124 mm.
11. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.
12. Supply and installation of HD-PE open cap with drainage hole diameter \_\_\_mm for MufleDrain drainage channel with coupling system into the special channel housing.
13. Supply and installation MufleDrain SKIP type HD-PE drain box with siphon for MufleDrain SKIP drainage channels, with external stiffening ribs and male- female coupling system. The top of the built-in siphon in the drain box shall be detachable in order to allow the cleaning. The drain box will have 2 preformed outlets with diameter until 200 mm. The sizes of the drain box shall be length 500 mm, internal net gap \_\_\_\_\_ mm, internal height 400 mm.



The system:

- it supports 3 load classes (A15, B125, C250) in compliance with Standard EN 1433
- it is made up of a channel - entirely made from HD-PE - which has a 20 mm - high toeboard and needs no strengthening frame
- grating protection is ensured by the HD-PE edge
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises a wide range of different gratings (with rungs, slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel, ductil iron and HD-PE. A HD-PE blind cover is available too
- it is supplemented with a whole series of L-shaped longitudinal- slot gratings in class C250 equipped also with drain boxes
- it comes equipped with a classic tie-rod fixing system and a convenient side coupling system through a tab inside the HD-PE gratings
- it is ideal for civil uses, pedestrian areas, private car parks, footways, canalisation systems in parking areas, sport facilities, synthetic tracks, athletics grounds
- it comes complete with drain boxes with siphon
- the range is made up of 11 channels with 3 widths and 6 heights (100/55, 100/80, 100/100, 100/160, 150/40, 150/100, 150/160, 200/40, 200/100, 200/160, 200/250)
- the range is supplemented with the VIP channel with length 1.5 m and usable dimensions 300 x 300 mm. Designed to drain large surfaces



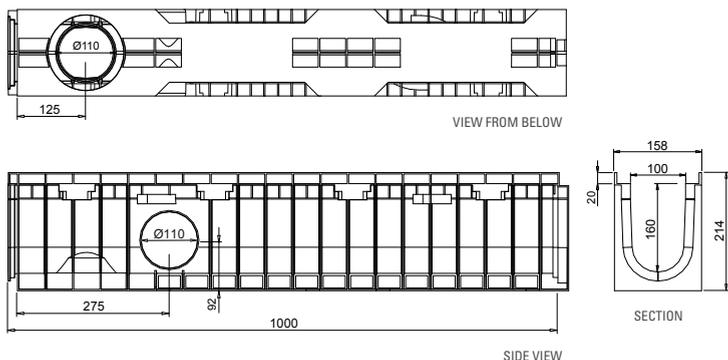


100

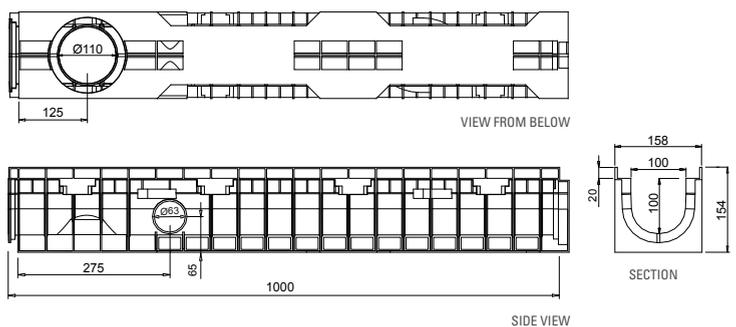


# CHANNELS

VIP  
100



VIP 100/160								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
702000		PE-HD	1000 x 158 x 214	1000 x 100 x 160	2,55	145,28	14,52	side 2 x Ø 110 bottom 1 x Ø 110



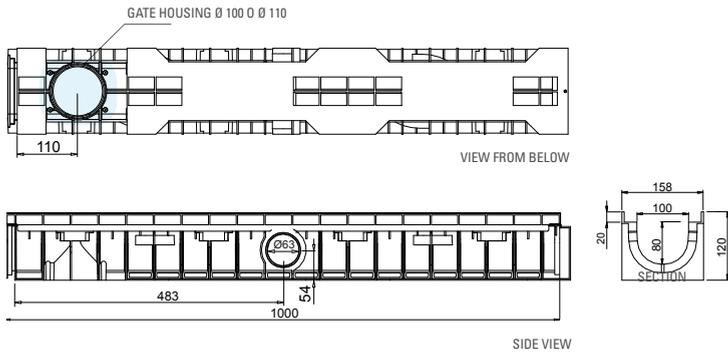
VIP 100/100								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
702001		PE-HD	1000 x 158 x 154	1000 x 100 x 100	2,05	89,56	8,95	side 2 x Ø 63 bottom 1 x Ø 110

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

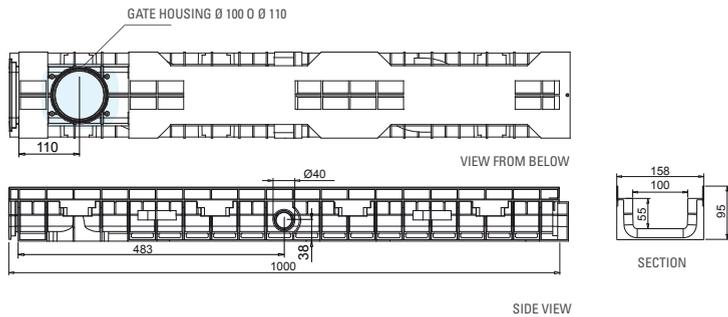


# CHANNELS

VIP  
100



VIP 100/80								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	SECTION DRAINAGE	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
702009		PE-HD	1000 x 158 x 120	1000 x 100 x 80	1,60	69,28	6,92	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110



VIP 100/55								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	SECTION DRAINAGE	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
702010		PE-HD	1000 x 158 x 95	1000 x 100 x 55	1,40	54,44	5,44	side 2 x Ø 40 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).  
 N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



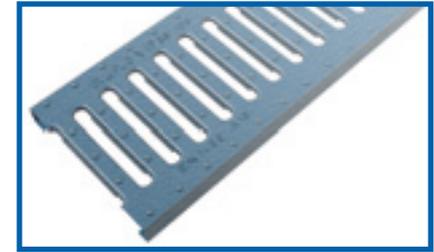
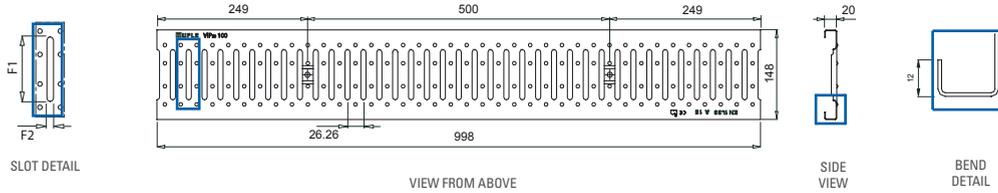
VIP  
100

## APPLICATIONS OF GALVANISED STEEL

Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces

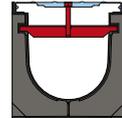
## APPLICATIONS OF STAINLESS STEEL

Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces  
Kitchens in hospitals, restaurants and similar facilities



## SLOTTED GRATING

20 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502128		galvanised steel DX51D <sup>3</sup>	998 x 148 x 20	1,60	2,68	83,0 x 8,5		up to Class C250 as per Standard EN 1433
502129		pickled stainless steel AISI 304 <sup>2</sup>						
502140		galvanised steel DX51D <sup>3</sup>	498 x 148 x 20	0,80	1,34			
502141		pickled stainless steel AISI 304 <sup>2</sup>						

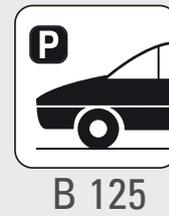
2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



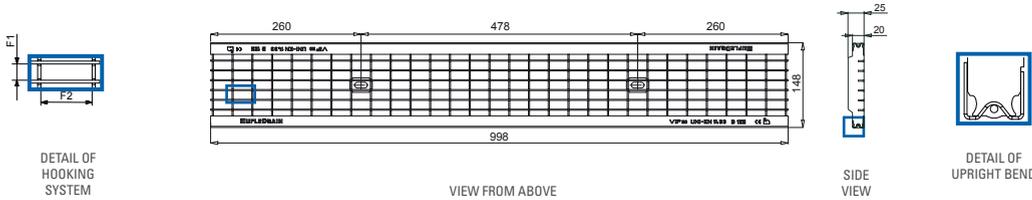
VIP  
100

## APPLICATIONS OF GALVANISED STEEL

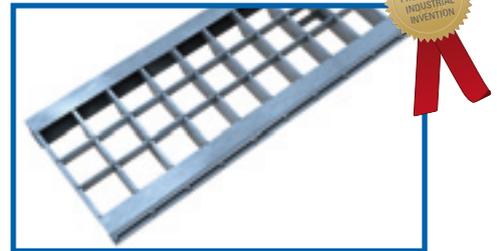
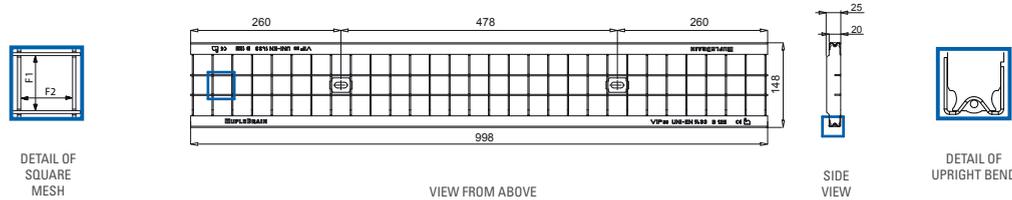
Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



ANTI-HELL MESH GRATING								25 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502126		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 20	3,60	8,82	15,2 x 32,2		up to Class C250 as per Standard EN 1433	
502150		pickled stainless steel AISI 304 <sup>2</sup>							
502138		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 20	1,80	4,41				
502162		pickled stainless steel AISI 304 <sup>2</sup>							



SQUARE MESH GRATING								25 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 X F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502127		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 20	2,90	9,00	32,2 x 32,2		up to Class C250 as per Standard EN 1433	
502157		pickled stainless steel AISI 304 <sup>2</sup>							
502139		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 20	1,45	4,50				
502163		pickled stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



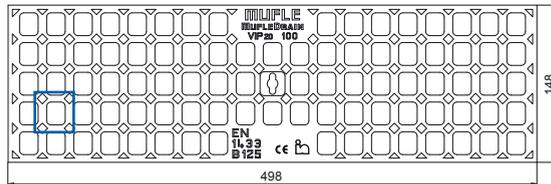
VIP  
100

## APPLICATIONS OF DUCTILE IRON

Pavements  
Lay-bys and private car parks



SLOT DETAIL

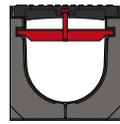


VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502112		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 20	3,40	3,31	21,5 x 17,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



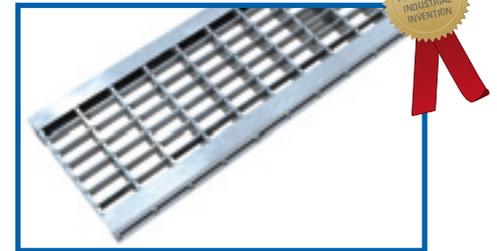
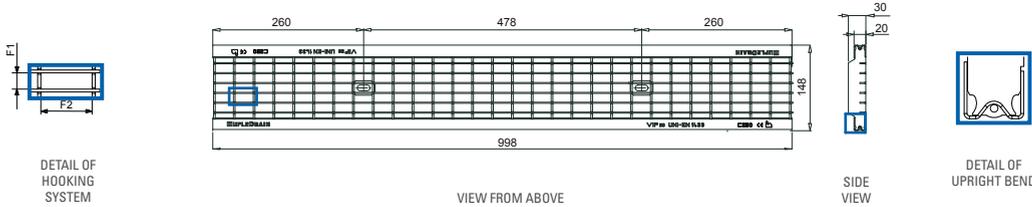
VIP  
100

## APPLICATIONS OF GALVANISED STEEL

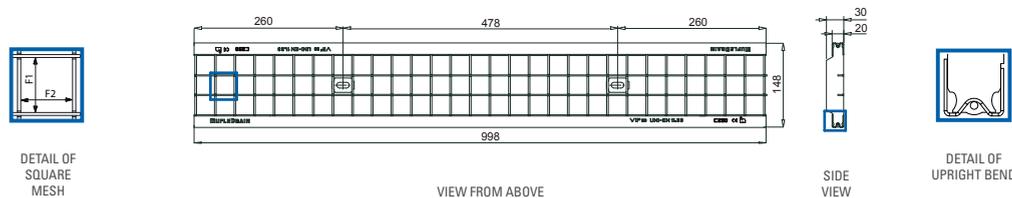
Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks

## APPLICATIONS OF STAINLESS STEEL

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks  
Areas with low-load transit in food factories  
Areas with low-load transit in chemically aggressive environments



ANTI-HELL MESH GRATING								30 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502152		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 20	5,10	8,82	15,2 x 31,2		up to Class C250 as per Standard EN 1433	
502175		pickled stainless steel AISI 304 <sup>2</sup>							
502169		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 20	2,55	4,41				
502187		pickled stainless steel AISI 304 <sup>2</sup>							



SQUARE MESH GRATING								30 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502151		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 20	4,60	8,50	31,2 x 31,2		up to Class C250 as per Standard EN 1433	
502174		pickled stainless steel AISI 304 <sup>2</sup>							
502168		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 20	2,30	4,25				
502188		pickled stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



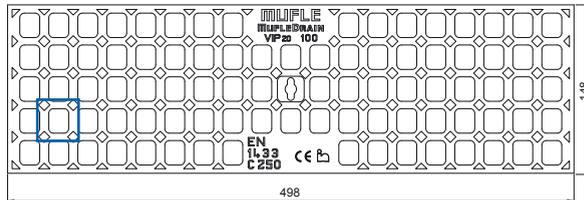
VIP  
100

## APPLICATIONS OF DUCTILE IRON

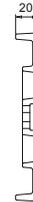
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502115		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 20	3,80	3,31	21,5 x 17,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



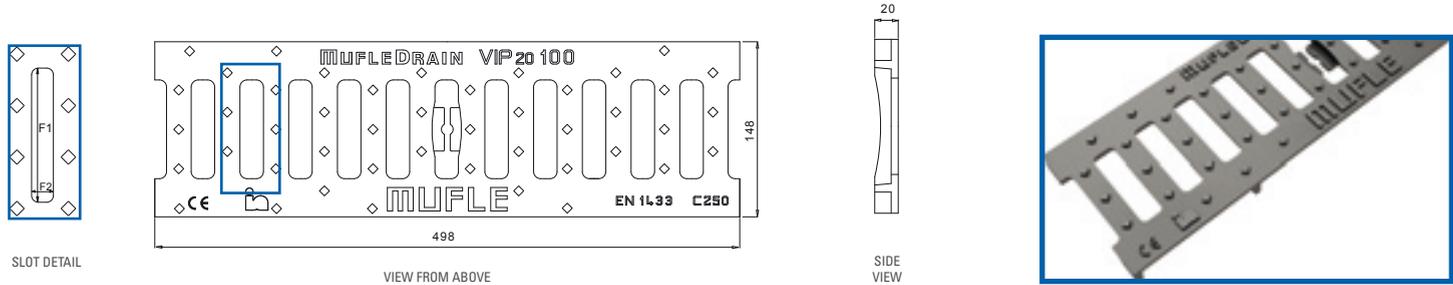
# GRATINGS



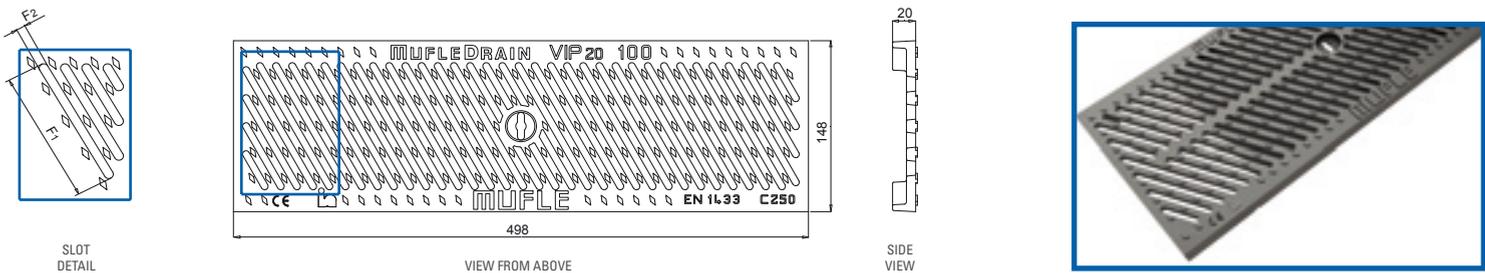
VIP  
100

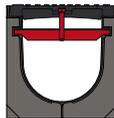
## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOTTED GRATING 20 mm								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502113		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 20	3,60	1,97	82,0 x 20,0		up to Class C250 as per Standard EN 1433	



SLOTTED GRATING 6 mm								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502114		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 20	4,00	2,10	91,5 x 6,0		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SLOTTED GRATING L

TYPE C 250  
MIDDLE  
DRIVEWAY

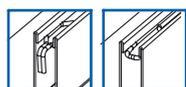
VIP  
100

## APPLICATIONS OF GALVANISED STEEL

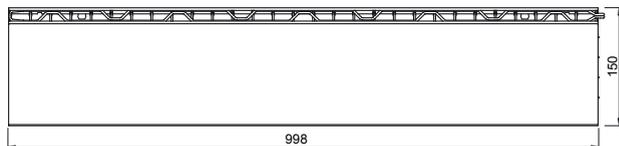
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq$  40 km/h)  
Areas not subjected to dock movements

## APPLICATIONS OF STAINLESS STEEL

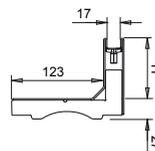
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq$  40 km/h)  
Areas not subjected to dock movements



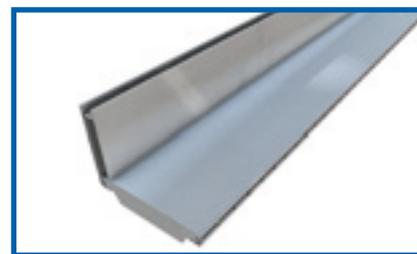
DETAIL OF HOOKING  
SYSTEM 8<sup>8</sup>



VIEW FROM ABOVE



SIDE VIEW



## L-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
500212		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 150 x 107	80	9,20	1,80	998 x 18
500248		pickled stainless steel AISI 304 <sup>2</sup>					
500213		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 150 x 147	120	10,50		
500249		pickled stainless steel AISI 304 <sup>2</sup>					

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

8- Hooking System between the gratings through hooks and holes.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

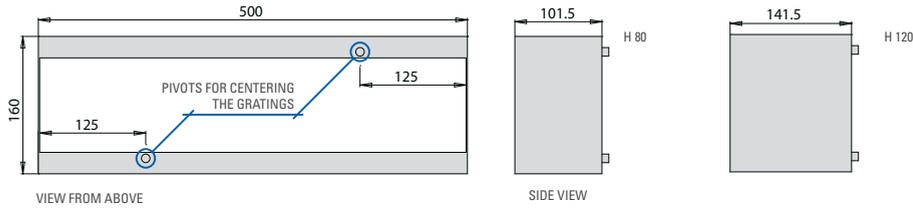


# INSPECTION ELEMENT FOR L-SHAPED GRATING

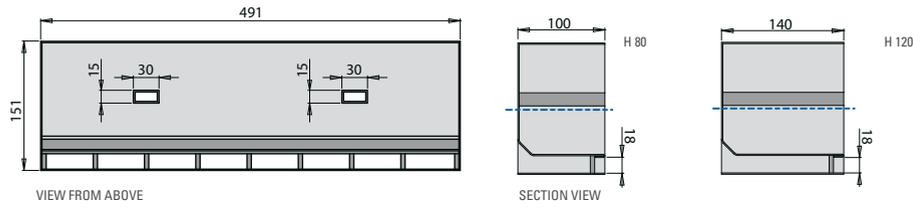
TYPE C 250  
MIDDLE  
DRIVEWAY

VIP  
100

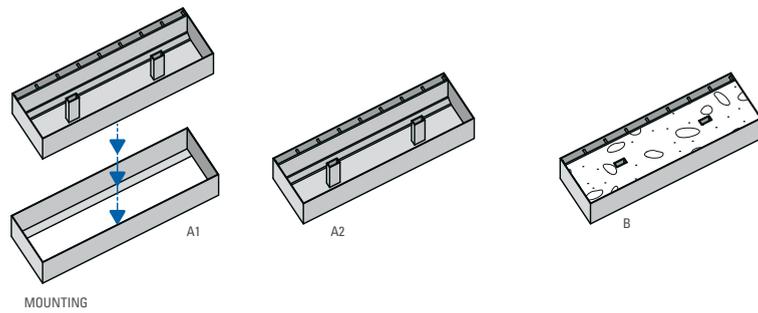
## CONTAINMENT TANK



## INSPECTION GRATING



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 44 for the details of the drain box with siphon.



## INSPECTION ELEMENT FOR L-SHAPED GRATING - VIP 100

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500225		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 160 x 101,5	491 x 18	1,8	5,30
500237		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 160 x 101,5	491 x 18	1,8	4,90
500226		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 160 x 141,5	491 x 18	1,8	7,00
500238		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 160 x 141,5	491 x 18	1,8	6,50

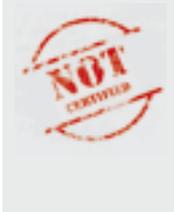
## HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		acciaio DD11 (1.0332) <sup>5</sup> zincato a caldo	710 x 180	-	-	0,65

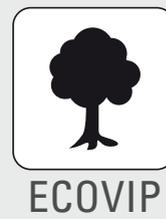
2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



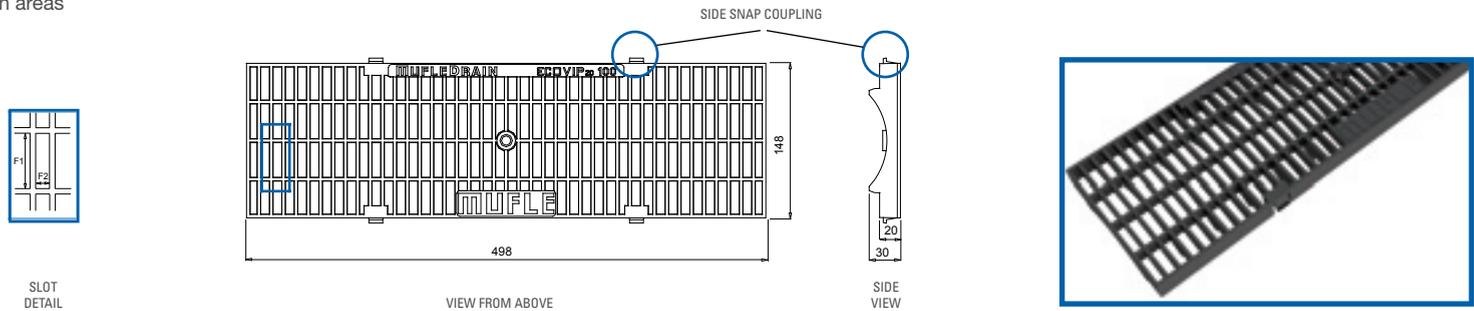
# GRATINGS



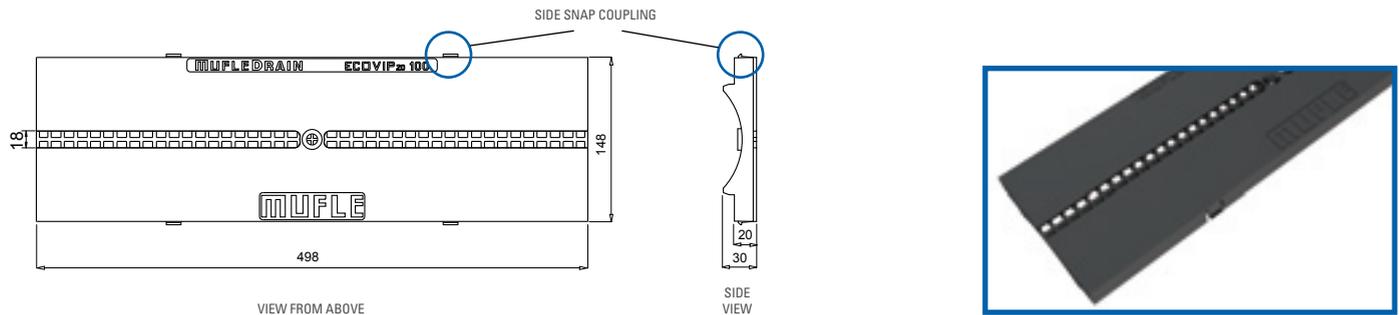
VIP 100

## APPLICATIONS OF HD-PE

- Residential and condominium areas
- Pedestrian areas and/or cycle lanes
- Sports facilities
- Greenhouses
- Green areas

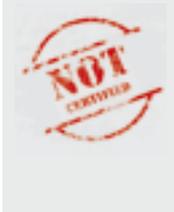


DRIVEWAY GRATING								30 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	DIMENSIONS OF SLOT	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	side block <sup>10</sup>	
502103		HD-PE black	498 x 148 x 20	0,38	3,80	34,0 x 8,5			



LONGITUDINAL SLOTTED DRIVEWAY GRATING								30 mm	
CODE	PRICE	MODEL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	DIMENSIONS OF SLOT	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	side block <sup>10</sup>	
502149		PE-HD <sup>12</sup> black	498 x 148 x 20	0,60	0,50	498 x 18,0			

10- Coupling system using a tab inside the grating.  
 12- Photoengraved anti-slip surface finish.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



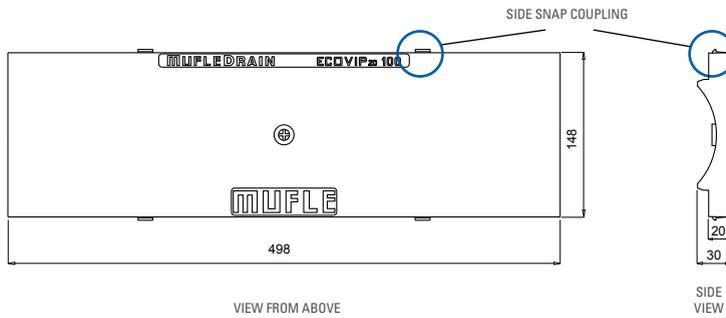
# SOLID TOP COVERS



# VIP 100

### APPLICATIONS OF GALVANISED STEEL

Cable passageway  
Passageway for water and/or heat systems



### DRIVEWAY SOLID TOP COVER



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM	
					tie-tod	side block <sup>10</sup>
502100		HD-PE <sup>12</sup> black	498 x 148 x 20	0,50		



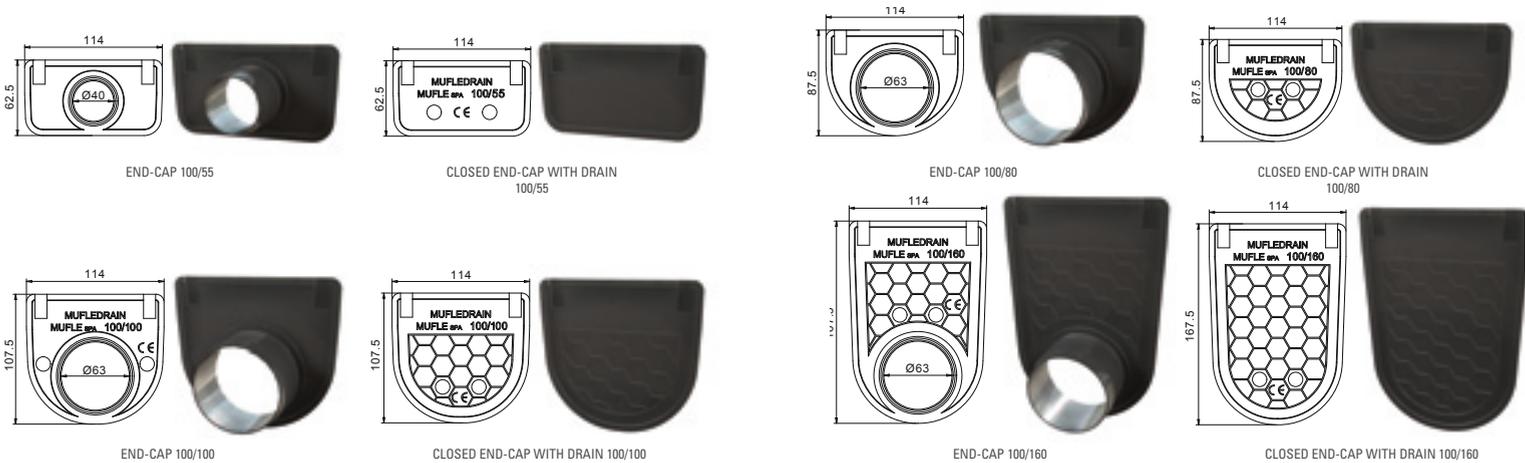
Ecovip solid top covers and gratings cannot be certified because Standard EN 1433 does not yet provide for specific tests for plastic-material gratings. The tests carried out by Mufle showed that Ecovip 100 solid top covers and gratings can be defined as "Car Drive-Over".

10- Coupling system using a tab inside the grating.  
12- Photoengraved anti-slip surface finish.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



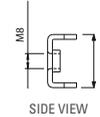
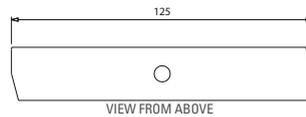
# ACCESSORIES

VIP  
100



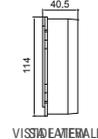
## END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
€					
700500		end-cap with drain	PE-HD	100/55	1 x Ø 40
700508		closed end-cap	PE-HD	100/55	-
700501		end-cap with drain	PE-HD	100/80	1 x Ø 63
700509		closed end-cap	PE-HD	100/80	-
700502		end-cap with drain	PE-HD	100/100	1 x Ø 63
700510		closed end-cap	PE-HD	100/100	-
700503		end-cap with drain	PE-HD	100/160	1 x Ø 63
700511		closed end-cap	PE-HD	100/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
€					
500421		galvanised steel	VIP galvanised steel - PE-HD	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	VIP stainless steel	M8 x 55 TBL combi stainless steel	2 tie-rods + 2 screws
500423		black galvanised steel	VIP ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws



## KIT OUTLET + SCREWS

CODE	PRICE	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
€					
				mm	
506114		PE-HD	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		PE-HD	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE	VALID FOR CHANNELS	FAMILIES
€			
700526		from 100/100 to 100/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self-cleaning ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



N.B. Sizes and weights are subject to usual manufacturing tolerance values.

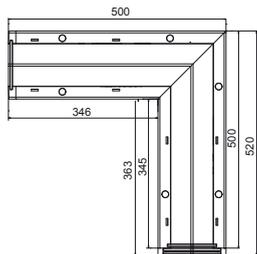


# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

VIP  
100

## LEFT CORNER

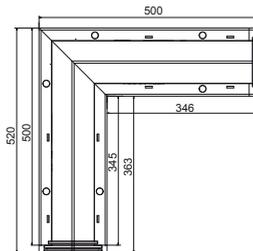
VIP 100



CODE	PRICE €	MODEL
702100		100/160
702101		100/100
702130		100/80
702131		100/55

## RIGHT CORNER

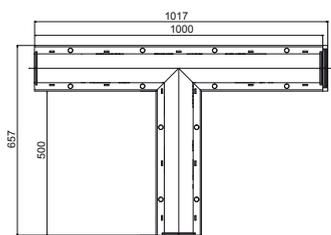
VIP 100



CODE	PRICE €	MODEL
702106		100/160
702107		100/100
702132		100/80
702133		100/55

## LEFT TI

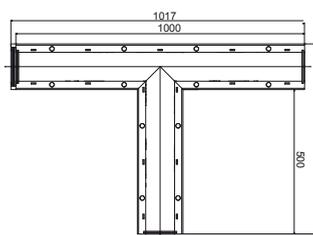
VIP 100



CODE	PRICE €	MODEL
702112		100/160
702113		100/100
702134		100/80
702135		100/55

## RIGHT TI

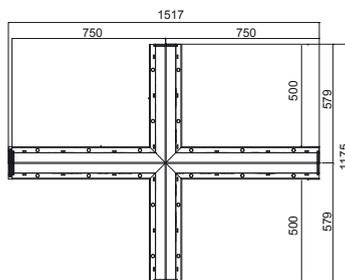
VIP 100



CODE	PRICE €	MODEL
702118		100/160
702119		100/100
702136		100/80
702137		100/55

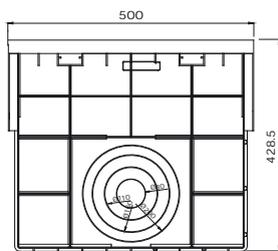
## CROSS

VIP 100

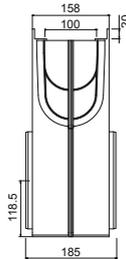


CODE	PRICE €	MODEL
702124		100/160
702125		100/100
702138		100/80
702139		100/55

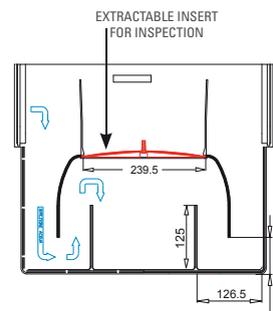
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

VIP 100

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
702006		PE-HD	500 x 158 x 427	500 x 100 x 400	185	118,5	2,60	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

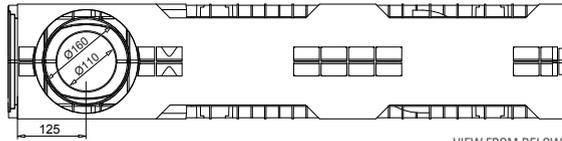


# 150

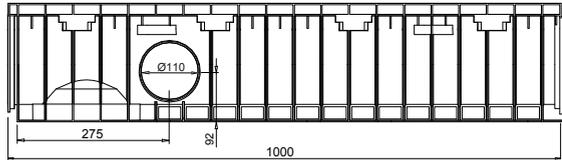


# CHANNELS

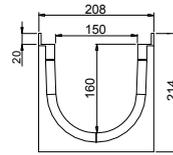
VIP  
150



VIEW FROM BELOW



SIDE VIEW

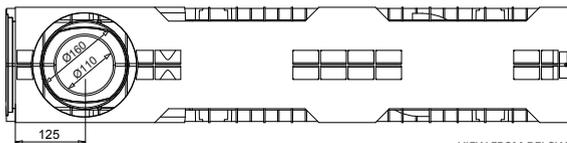


SECTION

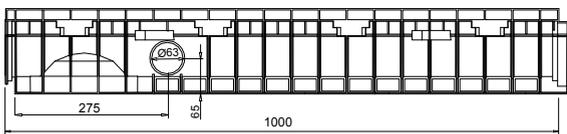


## VIP 150/160

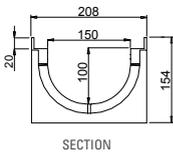
CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	SECTION DRAINAGE cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN OUTLETS mm
702002		PE-HD	1000 x 208 x 214	1000 x 150 x 160	3,00	213,04	21,30	side 2 x Ø 110 bottom 1 x Ø 110; 1 x Ø 160



VIEW FROM BELOW



SIDE VIEW

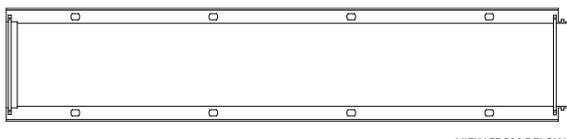


SECTION

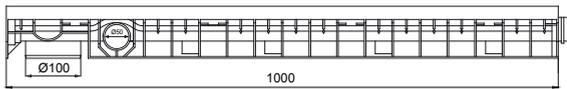


## VIP 150/100

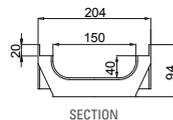
CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN OUTLETS mm
702003		PE-HD	1000 x 208 x 154	1000 x 150 x 100	2,45	127,32	12,73	side 2 x Ø 63 bottom 1 x Ø 110; 1 x Ø 160



VIEW FROM BELOW



SIDE VIEW



SECTION



## VIP 150/40

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN OUTLETS mm
502004		PE-HD	1000 x 204 x 94	1000 x 150 x 40	2,00	56,50	5,65	side 2 x Ø 50 bottom 1 x Ø 100

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



A 15

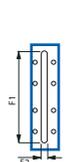
VIP  
150

## APPLICATIONS OF GALVANISED STEEL

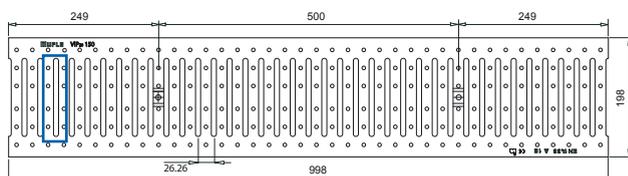
Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces

## APPLICATIONS OF STAINLESS STEEL

Green areas and parks  
Pedestrian areas and/or cycle lanes  
Sports facilities  
Terraces  
Kitchens in hospitals, restaurants and similar facilities



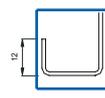
SLOT DETAIL



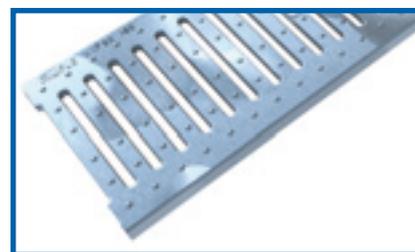
VIEW FROM ABOVE



SIDE VIEW



BEND DETAIL



## SLOTTED GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502132		galvanised steel DX51D <sup>3</sup>	998 x 198 x 20	2,90	4,20	130,0 x 8,5		up to Class C250 as per Standard EN 1433
502133		pickled stainless steel AISI 304 <sup>2</sup>						
502144		galvanised steel DX51D <sup>3</sup>	498 x 198 x 20	1,45	2,10			
502145		pickled stainless steel AISI 304 <sup>2</sup>						

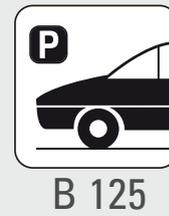
2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



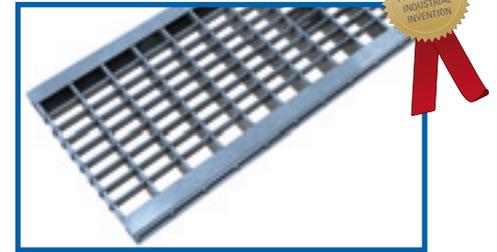
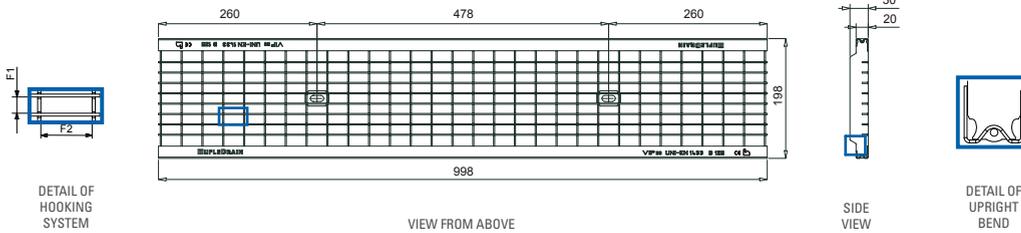
VIP  
150

## APPLICATIONS OF GALVANISED STEEL

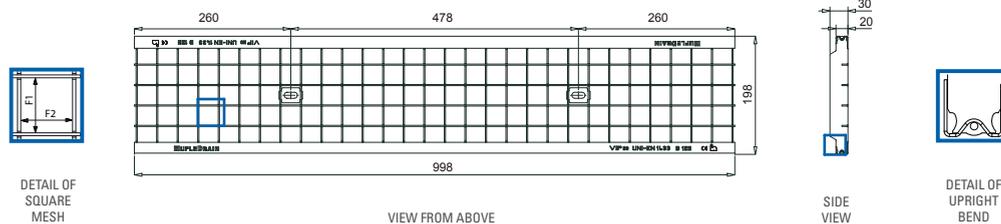
Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



ANTI-HELL MESH GRATING								30 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
502130		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 20	5,00	13,08	15,2 x 32,2		up to Class C250 as per Standard EN 1433	
502158		pickled stainless steel AISI 304 <sup>2</sup>							
502142		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 20	2,50	6,54				
502164		pickled stainless steel AISI 304 <sup>2</sup>							

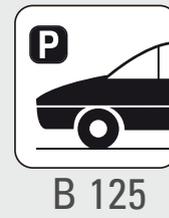


SQUARE MESH GRATING								30 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
502131		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 20	4,10	13,74	32,2 x 32,2		up to Class C250 as per Standard EN 1433	
502159		pickled stainless steel AISI 304 <sup>2</sup>							
502143		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 20	2,05	6,73				
502165		pickled stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.  
5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



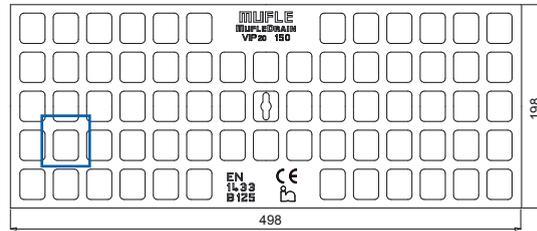
VIP  
150

## APPLICATIONS OF DUCTILE IRON

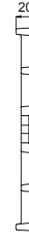
Pavements  
Lay-bys and private car parks



SLOT DETAIL

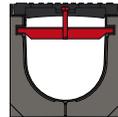


VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502118		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 20	4,90	3,77	29,0 x 24,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



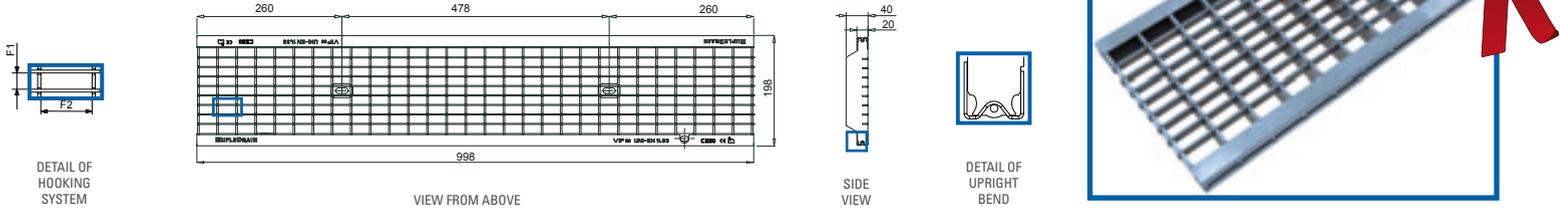
VIP  
150

## APPLICATIONS OF GALVANISED STEEL

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks

## APPLICATIONS OF STAINLESS STEEL

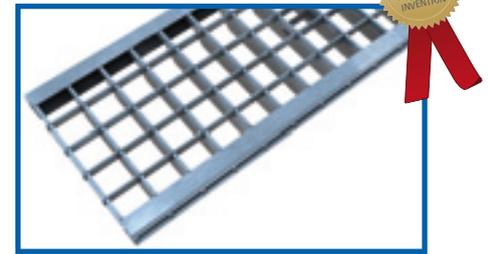
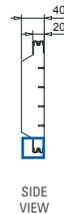
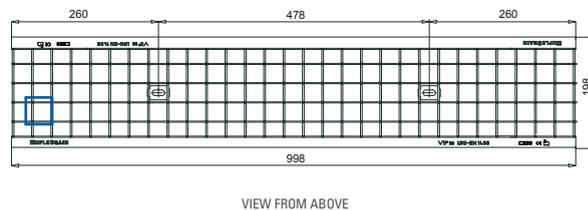
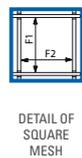
Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks  
Areas with low-load transit in food factories  
Areas with low-load transit in chemically aggressive environments



### ANTI-HELL MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502154		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 20	7,50	13,08	15,2 x 31,2		up to Class C250 as per Standard EN 1433
502177		pickled stainless steel AISI 304 <sup>2</sup>						
502171		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 20	3,75	6,54			
502190		pickled stainless steel AISI 304 <sup>2</sup>						



### SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502153		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 20	7,00	13,47	31,2 x 31,2		up to Class C250 as per Standard EN 1433
502176		pickled stainless steel AISI 304 <sup>2</sup>						
502170		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 20	3,50	6,73			
502189		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



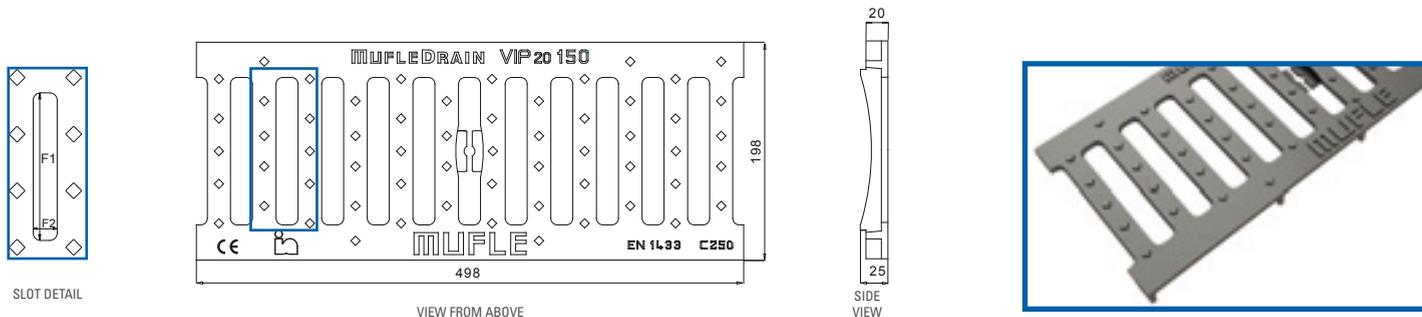
# GRATINGS



VIP  
150

## APPLICATIONS OF DUCTILE IRON

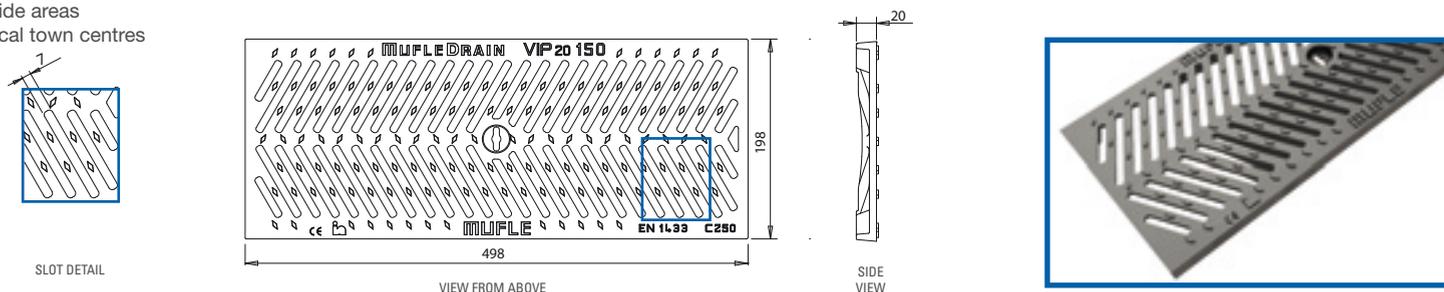
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOTTED GRATING 20 mm								25 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502120		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 20	5,20	3,16	132,0 x 20,0		up to Class C250 as per Standard EN 1433	

## APPLICATIONS OF DUCTILE IRON

- Parking
- Parking decks
- Kerb side areas
- Historical town centres



SLOTTED GRATING 7 mm								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing <sup>11</sup>	
502196		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 20	6,00	3,00	81,0 x 7,0		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
 11- No fixing system is forecasted for the channel 150/40 and 200/40  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SLOTTED GRATINGS L

TYPE C 250  
MIDDLE  
DRIVEWAY

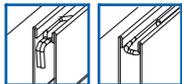
VIP  
150

## APPLICATIONS OF GALVANISED STEEL

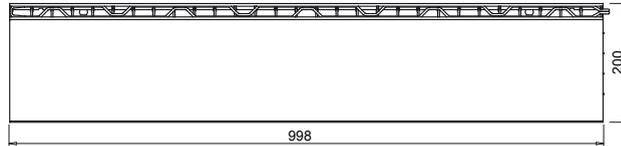
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements

## APPLICATIONS OF STAINLESS STEEL

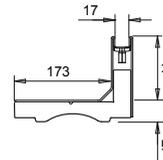
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements



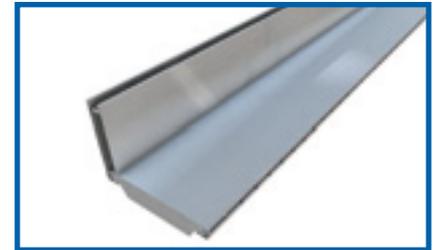
DETAIL OF HOOKING  
SYSTEM 8<sup>o</sup>



VIEW FROM ABOVE



SIDE VIEW



## L-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
500214		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 200 x 112	80	7,16	1,80	998 x 18
500250		pickled stainless steel AISI 304 <sup>2</sup>					
500215		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 200 x 152	120	8,22		
500251		pickled stainless steel AISI 304 <sup>2</sup>					

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

8- Hooking System between the gratings through hooks and holes.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

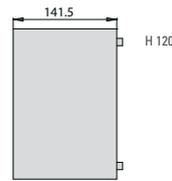
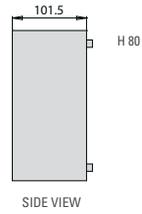
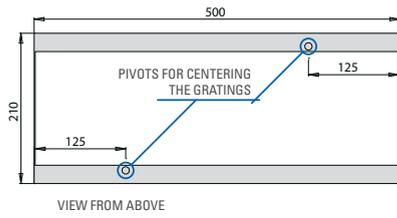


# INSPECTION ELEMENT FOR L-SHAPED GRATING

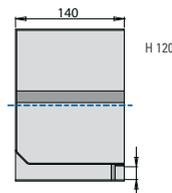
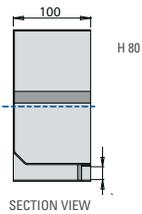
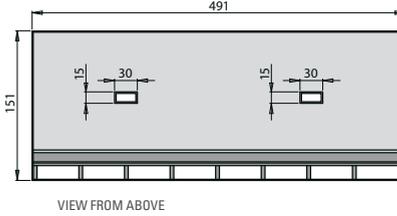
TYPE C 250  
MIDDLE  
DRIVEWAY

VIP  
150

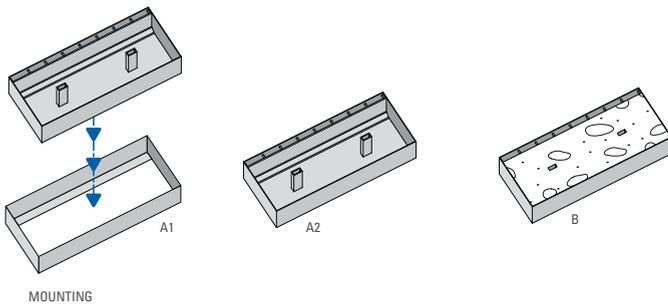
## CONTAINMENT TANK



## INSPECTION GRATING



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 54 for the details of the drain box with siphon.



## INSPECTION ELEMENT FOR L-SHAPED GRATING - VIP 150

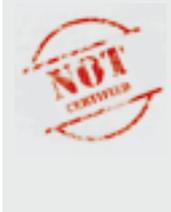
CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500227		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 210 x 101,5	491 x 18	1,8	5,90
500239		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 210 x 101,5	491 x 18	1,8	5,50
500228		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 210 x 141,5	491 x 18	1,8	7,70
500240		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 210 x 141,5	491 x 18	1,8	7,10

## HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

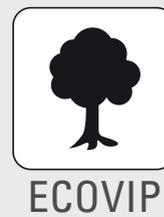
CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



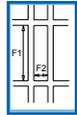
# GRATINGS AND SOLID TOP COVERS



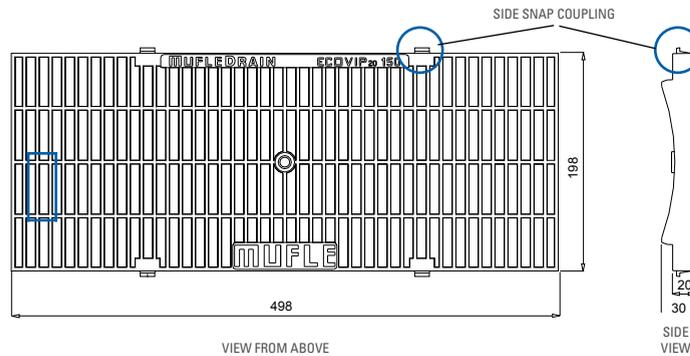
VIP 150

## APPLICATIONS OF HD-PE

- Residential and condominium areas
- Pedestrian areas and/or cycle lanes
- Sports facilities
- Greenhouses
- Green areas



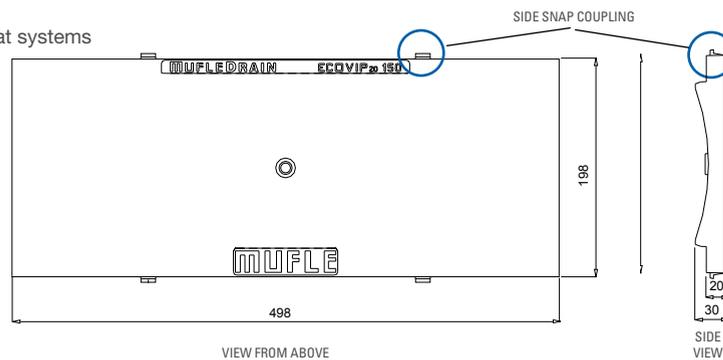
SLOT  
DETAIL



PEDESTRIAN GRATING								30 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	side block <sup>10</sup>	
502104		HD-PE black	498 x 198 x 20	0,68	5,80	46,5 x 8,5			

## APPLICATIONS OF GALVANISED STEEL

- Cable passageway
- Passageway for water and/or heat systems



PEDESTRIAN SOLID TOP COVER						30 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM		
	€		mm	kg	tie-tod	side block <sup>10</sup>	
502101		PE-HD <sup>12</sup> black	498 X 198 x 20	0,86			



Ecovip solid top covers and gratings cannot be certified because Standard EN 1433 does not yet provide for specific tests for plastic-material gratings. The tests carried out by Mufle showed that Ecovip 150 solid top covers and gratings can be defined as "Walk-Over".

10- Coupling system using a tab inside the grating.  
 12- Photoengraved anti-slip surface finish.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.

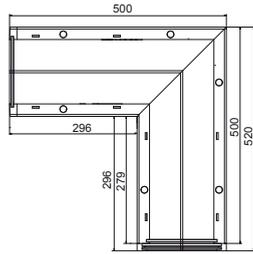


# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

VIP  
150

## LEFT CORNER

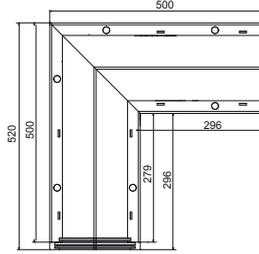
## VIP 150



CODE	PRICE €	MODEL
702102		150/160
702103		150/100
502205		150/40

## RIGHT CORNER

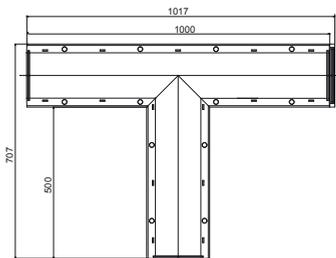
## VIP 150



CODE	PRICE €	MODEL
702108		150/160
702109		150/100
502214		150/40

## LEFT TI

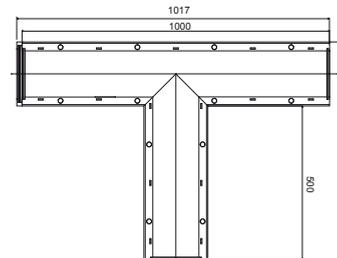
## VIP 150



CODE	PRICE €	MODEL
702114		150/160
702115		150/100
502223		150/40

## RIGHT TI

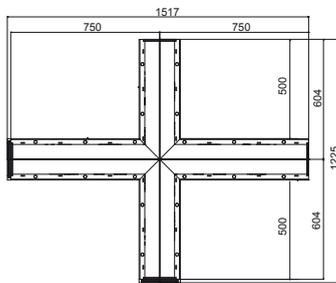
## VIP 150



CODE	PRICE €	MODEL
702120		150/160
702121		150/100
502232		150/40

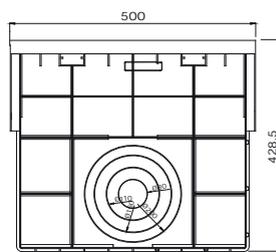
## CROSS

## VIP 150

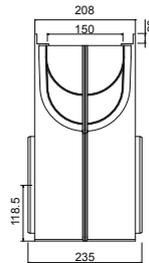


CODE	PRICE €	MODEL
702126		150/160
702127		150/100
502241		150/40

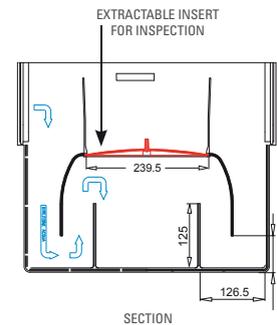
## DRAIN BOX WITH SYPHON<sup>9</sup>



FRONT VIEW



SIDE VIEW



SECTION

## VIP 150

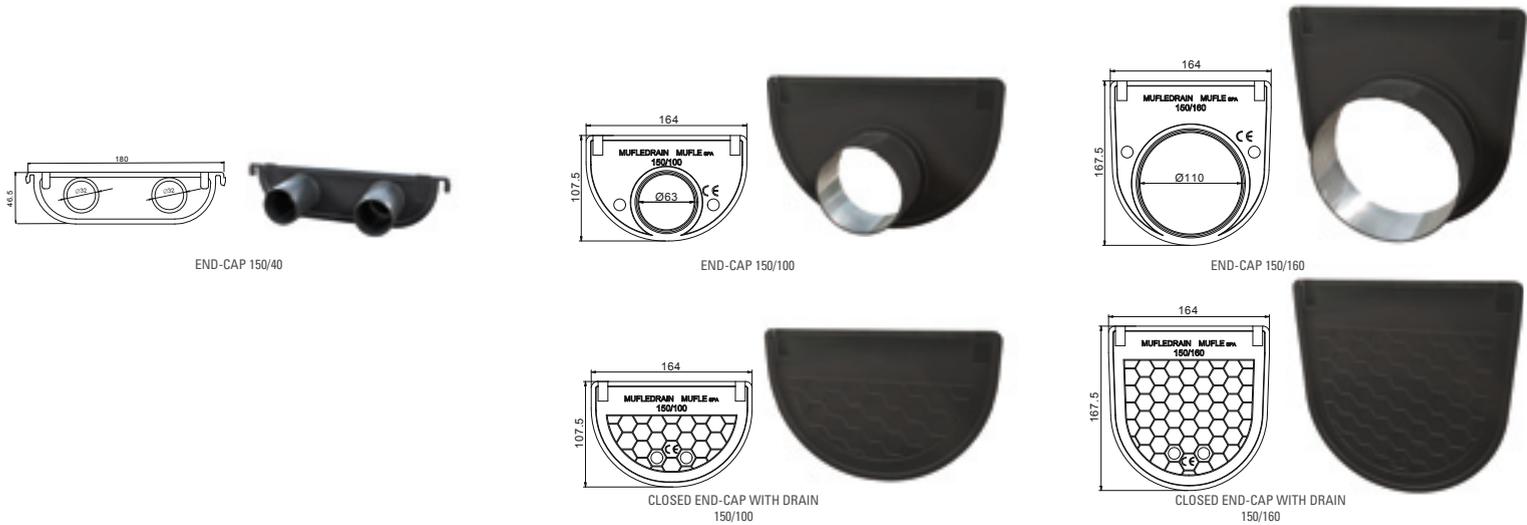
CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
702007		PE-HD	500 x 208 x 427	500 x 150 x 400	235	118,5	2,90	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

9- The drain box Easy, Vip and Wing 150 and 200 are not prearranged to be connected to the correspondent channels Easy, Wing and Vip 150/40, 200/40  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



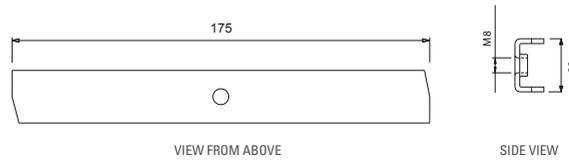
# ACCESSORIES

VIP  
150



## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS mm
500518		closed end cap with preformed outlet	PE-HD	150/40	2 x Ø 32
700504		end-cap with drain	PE-HD	150/100	1 x Ø 63
700512		closed end-cap	PE-HD	150/100	-
700505		end-cap with drain	PE-HD	150/160	1 x Ø 110
700513		closed end-cap	PE-HD	150/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
500424		galvanised steel	VIP galvanised steel - PE-HD	M8 x 40 TBL combi	2 tie-rods + 2 screws
500425		stainless steel	VIP stainless steel	M8 x 40 TBL combi	2 tie-rods + 2 screws
500426		black galvanised steel	VIP ductile iron	M8 x 40 black with hexagonal head	2 tie-rods + 2 screws

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700517		from 150/100 to 150/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



N.B. Sizes and weights are subject to usual manufacturing tolerance values.

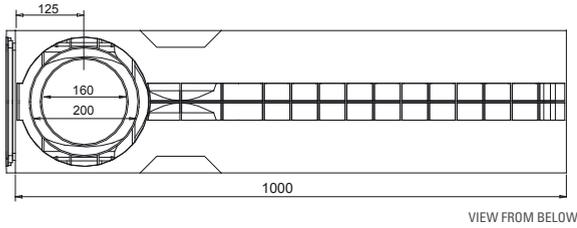


200

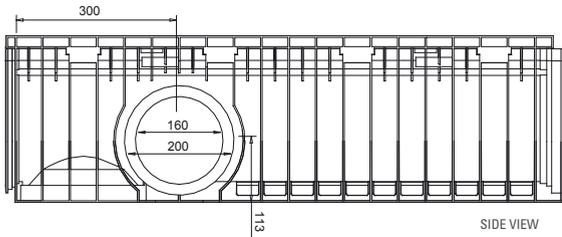


# CHANNELS

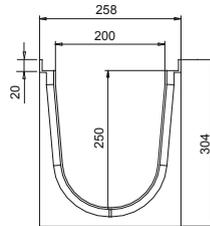
VIP  
200



VIEW FROM BELOW



SIDE VIEW

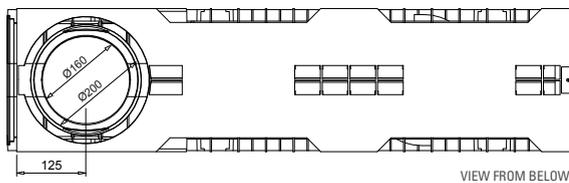


SECTION

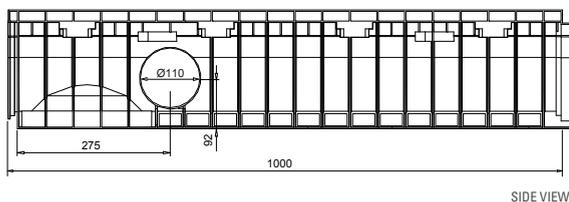


## VIP 200/250

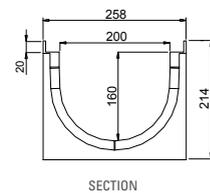
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
502042		PE-HD	1000 x 258 x 304	1000 x 200 x 250	4,50	430,00	43,00	side 2 x Ø 200; 2 x Ø 160 bottom 1 x Ø 200; 1 x Ø 160



VIEW FROM BELOW



SIDE VIEW



SECTION



## VIP 200/160

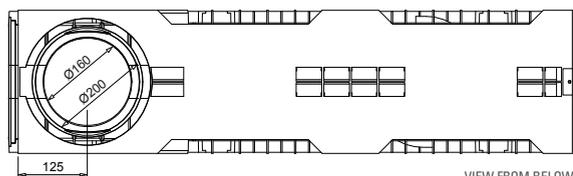
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
702004		PE-HD	1000 x 258 x 214	1000 x 200 x 160	3,40	275,87	27,58	side 2 x Ø 110 bottom 1 x Ø 160; 1 x Ø 200

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

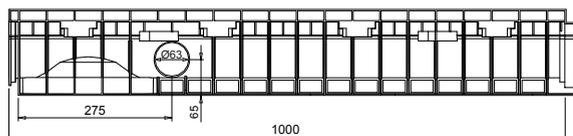


# CHANNELS

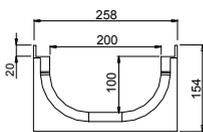
VIP  
200



VIEW FROM BELOW



SIDE VIEW

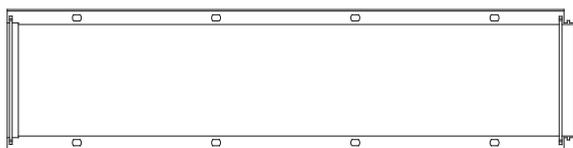


SECTION

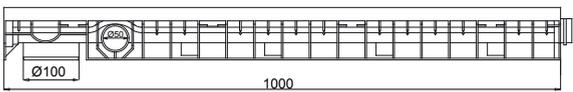


## VIP 200/100

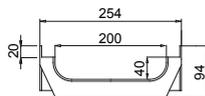
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
702005		PE-HD	1000 x 258 x 154	1000 x 200 x 100	2,80	178,63	17,86	side 2 x Ø 63 bottom 1 x Ø 160; 1 x Ø 200



VIEW FROM BELOW



SIDE VIEW



SECTION



## VIP 200/40

CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	CAPACITY	PREINSTALLED DRAIN
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
502007		PE-HD	1000 x 254 x 94	1000 x 200 x 40	2,20	76,50	7,65	side 2 x Ø 50 bottom 1 x Ø 100

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



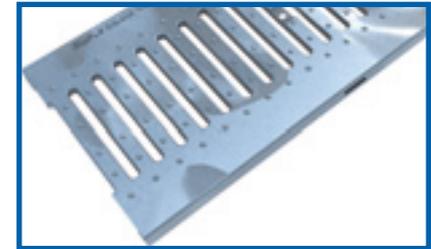
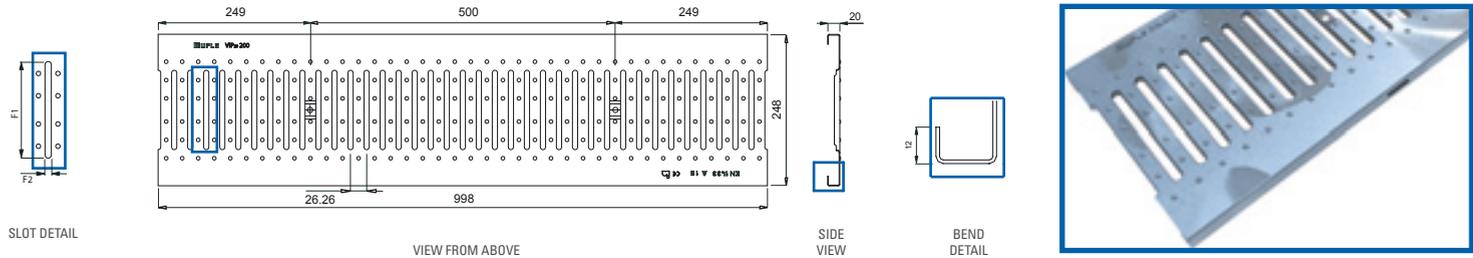
# GRATINGS

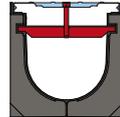


VIP  
200

## APPLICATIONS OF GALVANISED STEEL

- Green areas and parks
- Pedestrian areas and/or cycle lanes
- Sports facilities
- Terraces

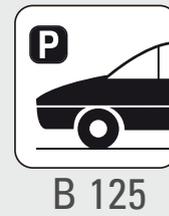


SLOTTED GRATING								20 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
502136		galvanised steel DX51D <sup>3</sup>	998 x 248 x 20	4,80	4,20	130 x 8,5		up to Class C250 as per Standard EN 1433	
502148		galvanised steel DX51D <sup>3</sup>	498 x 248 x 20	2,40	2,10				

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).  
 N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



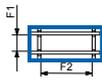
VIP  
200

## APPLICATIONS OF GALVANISED STEEL

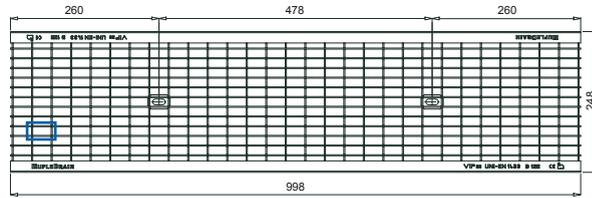
Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

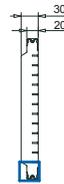
Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



DETAIL OF  
HOOKING  
SYSTEM



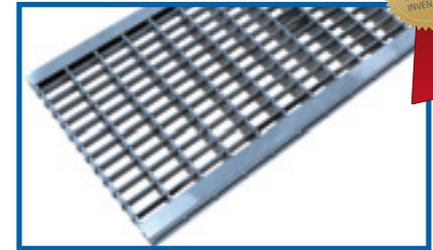
VIEW FROM ABOVE



SIDE  
VIEW



DETAIL OF  
UPRIGHT  
BEND



PATENT  
PRODUCT FOR  
INDUSTRIAL  
INVENTION

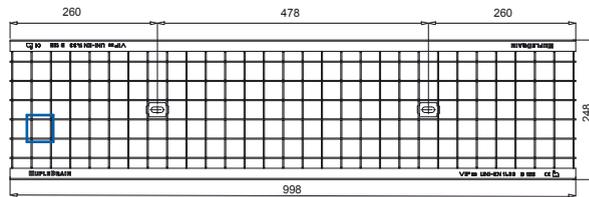
## ANTI-HELL MESH GRATING



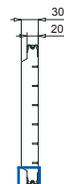
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502134		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 20	6,20	16,98	15,2 x 32,2		up to Class C250 as per Standard EN 1433
502160		pickled stainless steel AISI 304 <sup>2</sup>						
502146		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 20	3,10	8,49			
502166		pickled stainless steel AISI 304 <sup>2</sup>						



DETAIL OF  
SQUARE  
MESH



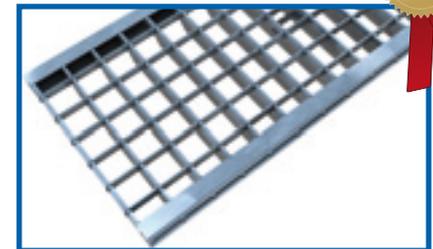
VIEW FROM ABOVE



SIDE  
VIEW



DETAIL OF  
UPRIGHT  
BEND



PATENT  
PRODUCT FOR  
INDUSTRIAL  
INVENTION

## SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502135		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 20	5,20	18,00	32,2 x 32,2		up to Class C250 as per Standard EN 1433
502161		pickled stainless steel AISI 304 <sup>2</sup>						
502147		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 20	2,60	9,00			
502167		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



B 125

VIP  
200

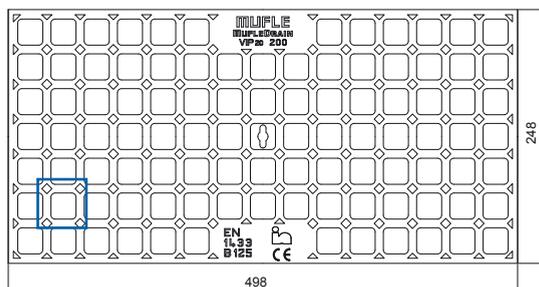
## APPLICATIONS OF DUCTILE IRON

Pavements

Lay-bys and private car parks



SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502122		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 20	6,25	6,12	25,5 x 24,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



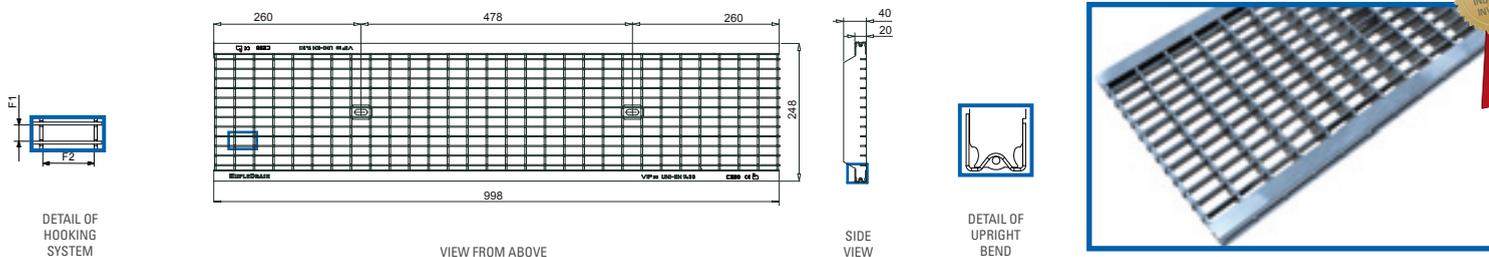
VIP  
200

## APPLICATIONS OF GALVANISED STEEL

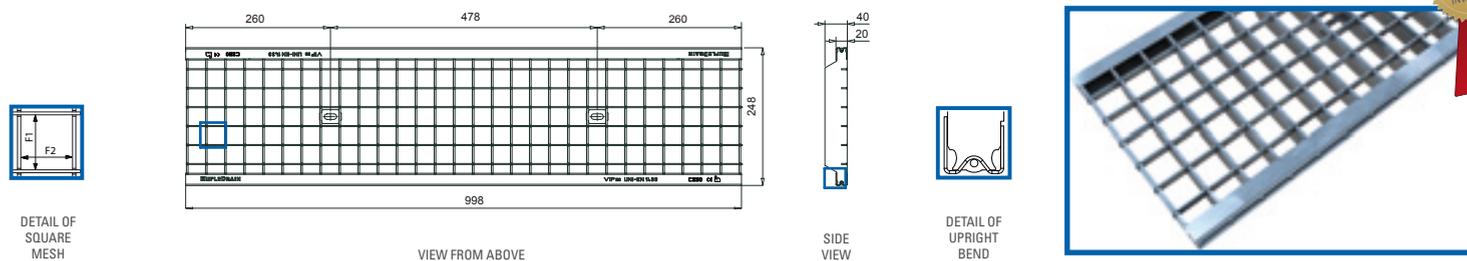
Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks

## APPLICATIONS OF STAINLESS STEEL

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks  
Areas with low-load transit in food factories  
Areas with low-load transit in chemically aggressive environments



ANTI-HELL MESH GRATING								40 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
502156		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 20	9,50	16,98	15,2 x 31,2		up to Class C250 as per Standard EN 1433	
502179		pickled stainless steel AISI 304 <sup>2</sup>							
502173		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 20	4,75	8,49				
502192		pickled stainless steel AISI 304 <sup>2</sup>							



SQUARE MESH GRATING								40 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	no fixing	
502155		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 20	8,70	18,00	31,2 x 31,2		up to Class C250 as per Standard EN 1433	
502178		pickled stainless steel AISI 304 <sup>2</sup>							
502172		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 20	4,35	9,00				
502191		pickled stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.  
5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



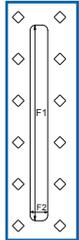
# GRATINGS



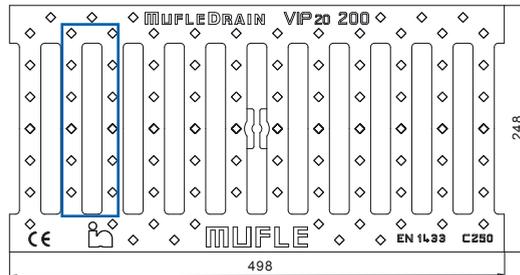
VIP  
200

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT DETAIL



VIEW FROM ABOVE



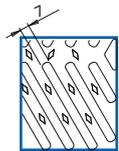
SIDE VIEW



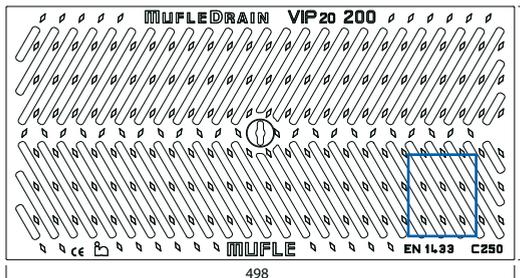
SLOTTED GRATING 20 mm								25 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502124		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 20	7,00	4,32	180,0 x 20,0		up to Class C250 as per Standard EN 1433	

## APPLICATIONS OF DUCTILE IRON

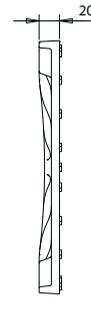
- Parking
- Parking decks
- Kerb side areas
- Historical town centres



SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



SLOTTED GRATING 7 mm								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing <sup>11</sup>	
502195		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 20	7,70	4,00	107,0 x 7,0		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).

11- It is orecasted no fixing system for the channel 150/40 and 200/40.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SLOTTED GRATINGS L

TYPE C 250  
MIDDLE  
DRIVEWAY

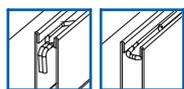
VIP  
200

## APPLICATIONS OF GALVANISED STEEL

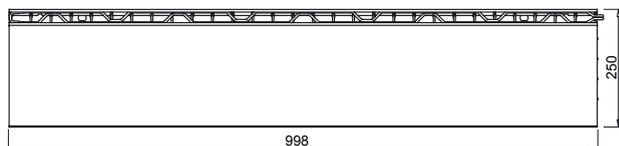
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements

## APPLICATIONS OF STAINLESS STEEL

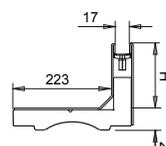
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements



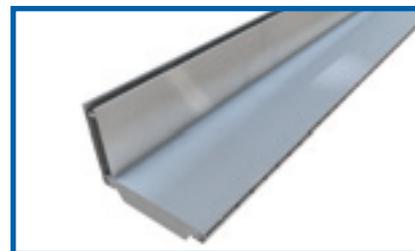
DETAIL OF HOOKING SYSTEM<sup>8</sup>



VIEW FROM ABOVE



SIDE VIEW



## L-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
500216		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 250 x 112	80	8,34	1,80	998 x 18
500252		pickled stainless steel AISI 304 <sup>2</sup>					
500217		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 250 x 152	120	9,39		
500253		pickled stainless steel AISI 304 <sup>2</sup>					

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

8- Hooking System between the gratings through hooks and holes.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

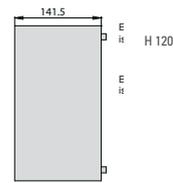
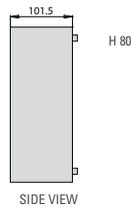
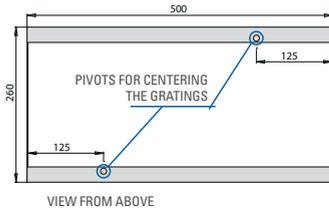


# INSPECTION ELEMENT FOR L-SHAPED GRATING

TYPE C 250  
MIDDLE  
DRIVEWAY

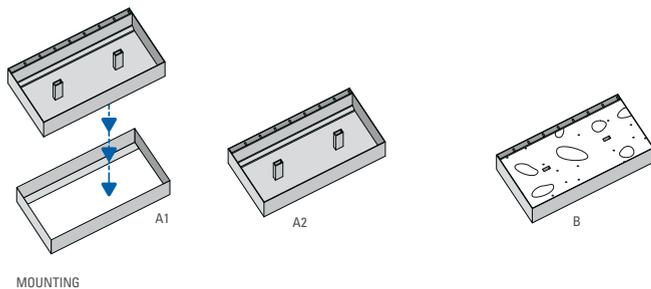
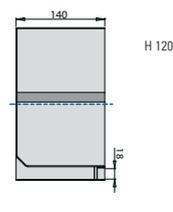
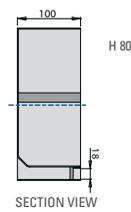
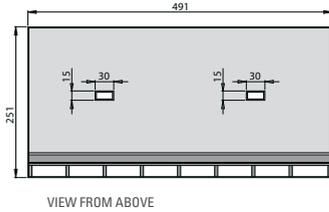
VIP  
200

## CONTAINMENT TANK



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 64 for the details of the drain box with siphon.

## INSPECTION GRATING



## INSPECTION ELEMENT FOR L-SHAPED GRATING VIP 200

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500229		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 260 x 101,5	491 x 18	1,8	6,60
500241		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 260 x 101,5	491 x 18	1,8	6,10
500230		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 260 x 141,5	491 x 18	1,8	8,40
500242		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 260 x 141,5	491 x 18	1,8	7,80

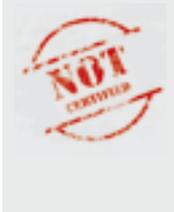
## HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

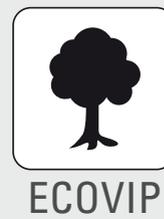
2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



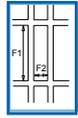
# GRATINGS AND SOLID TOP COVERS



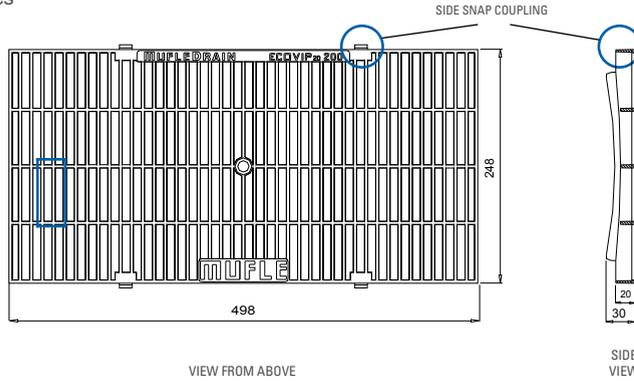
VIP 200

## APPLICATIONS OF HD-PE

- Residential and condominium areas
- Pedestrian areas and/or cycle lanes
- Sports facilities
- Greenhouses
- Green areas



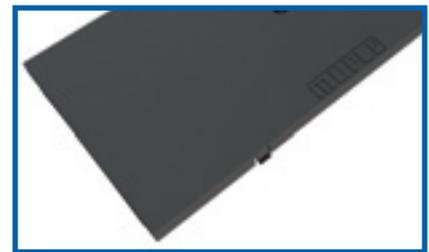
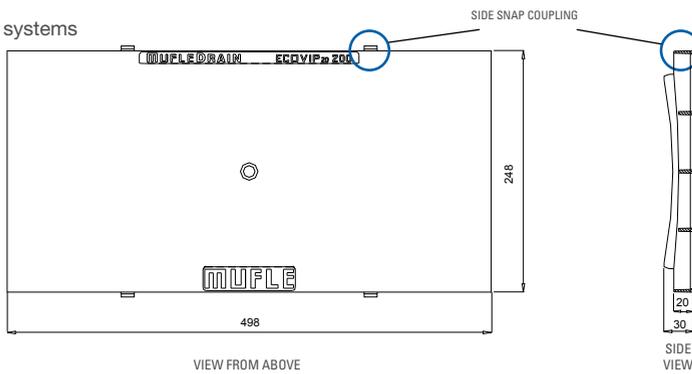
SLOT DETAIL



PEDESTRIAN GRATING								30 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	DIMENSIONS OF SLOT	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	side block <sup>10</sup>	
502106		HD-PE black	498 x 248 x 20	0,78	7,80	58,5 x 8,5			

## APPLICATIONS OF GALVANISED STEEL

- Cable passageway
- Passageway for water and/or heat systems



PEDESTRIAN SOLID TOP COVER						30 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM		
	€		mm	kg	tie-tod	side block <sup>10</sup>	
502102		PE-HD <sup>12</sup> black	498 x 248 x 20	0,88			



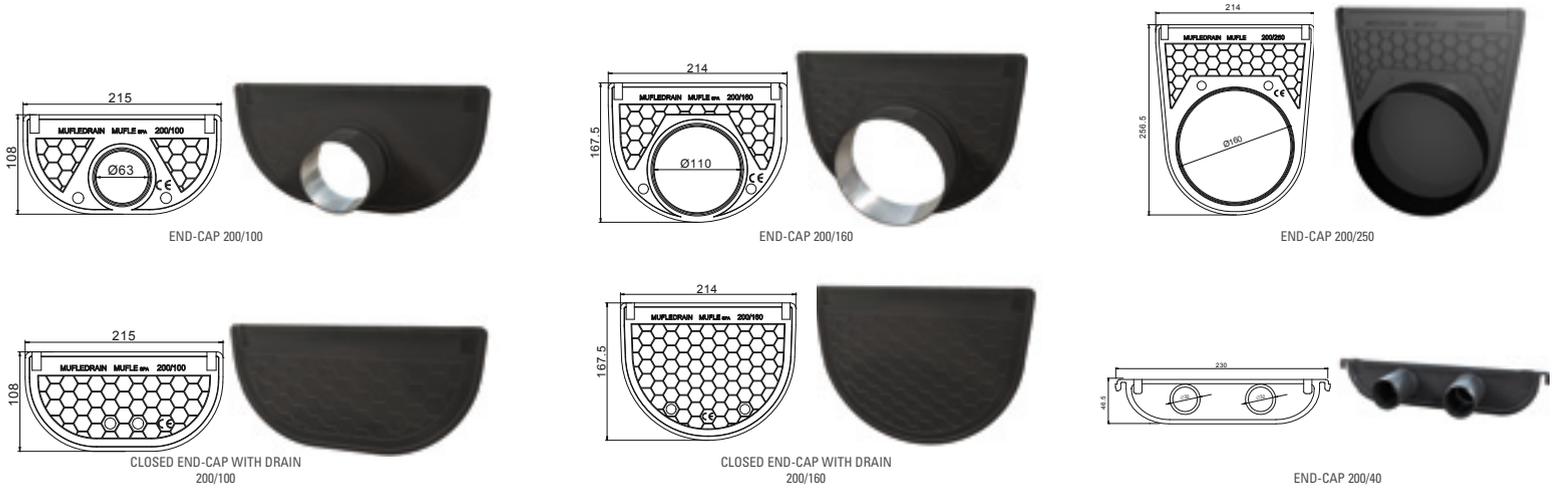
Ecovip solid top covers and gratings cannot be certified because Standard EN 1433 does not yet provide for specific tests for plastic-material gratings. The tests carried out by Mufle showed that Ecovip 200 solid top covers and gratings can be defined as "Walk-Over".

10- Coupling system using a tab inside the grating.  
 12- Photoengraved anti-slip surface finish.  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



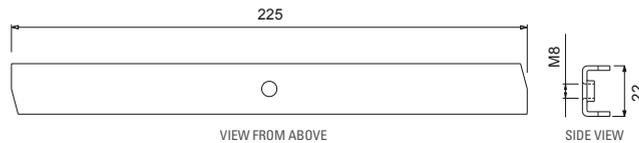
# ACCESSORIES

VIP  
200



## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
500521		end-cap with drain	PE-HD	200/40	2 x Ø 32
700506		end-cap with drain	PE-HD	200/100	1 x Ø 63
700514		closed end-cap	PE-HD	200/100	-
700507		end-cap with drain	PE-HD	200/160	1 x Ø 110
700515		closed end-cap	PE-HD	200/160	-
502416		closed end cap with preformed outlet	PE-HD	200/250	1 x Ø 160



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1 ml
500427		galvanised steel	VIP galvanised steel - PE-HD	M8 x 55 TBL combi	2 tie-rods + 2 screws
500428		stainless steel	VIP stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500429		black galvanised steel	VIP ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700518		from 200/160 to 200/250	VIP - SLOPE - WING
700519		from 200/100 to 200/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channels are typically recognised by structured increases in channel depths towards a nominated outlet along a specific drainage channel run/length.



N.B. Sizes and weights are subject to usual manufacturing tolerance values.

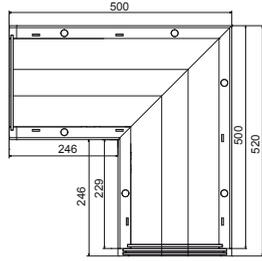


# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

VIP  
200

## LEFT CORNER

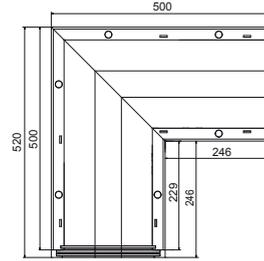
VIP 200



CODE	PRICE €	MODEL
502246		200/250
702104		200/160
702105		200/100
502208		200/40

## RIGHT CORNER

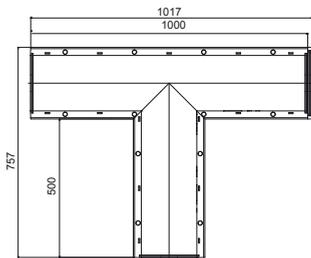
VIP 200



CODE	PRICE €	MODEL
502245		200/250
702110		200/160
702111		200/100
502217		200/40

## LEFT TI

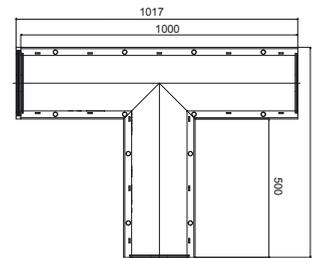
VIP 200



CODE	PRICE €	MODEL
502247		200/250
702116		200/160
702117		200/100
502226		200/40

## RIGHT TI

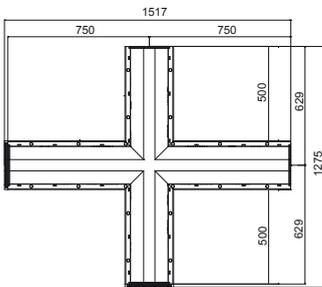
VIP 200



CODE	PRICE €	MODEL
502248		200/250
702122		200/160
702123		200/100
502235		200/40

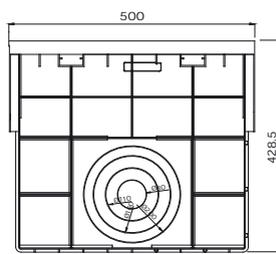
## CROSS

VIP 200

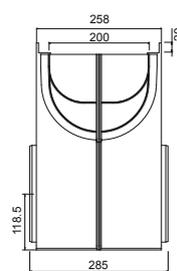


CODE	PRICE €	MODEL
su richiesta		200/250
702128		200/160
702129		200/100
502244		200/40

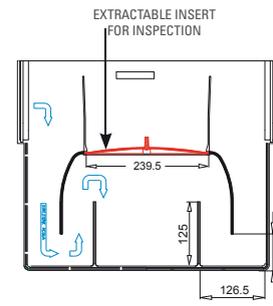
## DRAIN BOX WITH SYPHON<sup>9-17</sup>



FRONT VIEW



SIDE VIEW



SECTION

VIP 200

CODE	PRICE €	MATERIAL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
702008		PE-HD	500 x 258 x 427	500 x 200 x 400	285	118,5	3,10	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

9- The drain box Easy, Vip and Wing 150 and 200 are not prearranged to be connected to the correspondent channels Easy, Wing and Vip 150/40, 200/40  
17- The drain box Easy, Vip, Smart, Slope and Wing 200 are not prearranged to be connected to the correspondent channels EASY, VIP, SMART, SLOPE and WING 200/250  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

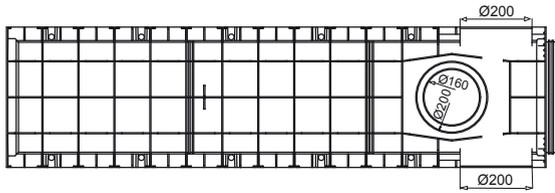


300

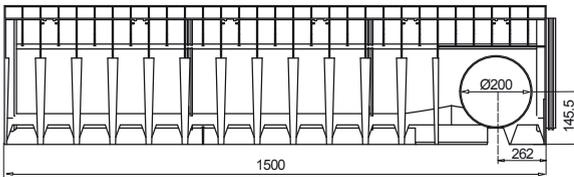


# CHANNELS

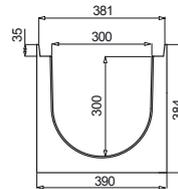
VIP  
300



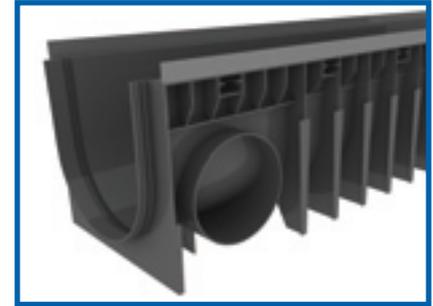
VIEW FROM BELOW



SIDE VIEW



SECTION



VIP 300/300								
CODE	PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	INTERNAL DIMENSIONS L x l x h	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN OUTLETS
	€		mm	mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
502018		PE-HD	1500 x 390 x 384	1500 x 300 x 300	9,30	796,00	79,60	side 2 x Ø 200 bottom 1 x Ø 160; 1 x Ø 200

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



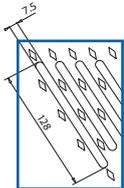
# GRATINGS



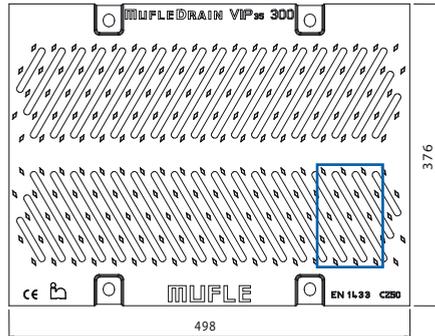
VIP  
300

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



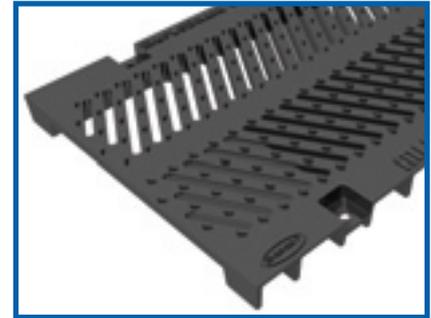
DETAIL OF  
HOOKING  
SYSTEM



VIEW FROM ABOVE



SIDE  
VIEW

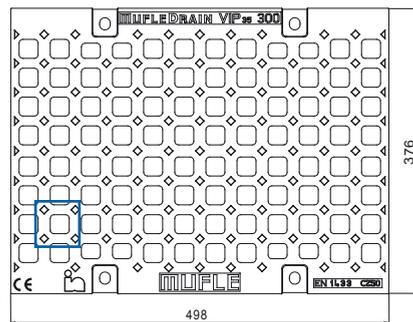


### SLOTTED GRATING 7 mm

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
503176		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 376 x 35	19,50	3,5	128,0 x 7,5	



SLOT DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



### MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
503117		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 376 x 35	16,50	5,96	25,0 x 25,0	

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

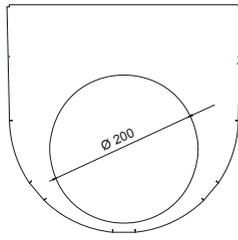
6- Classification according to Standard EN 1563 (2009).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

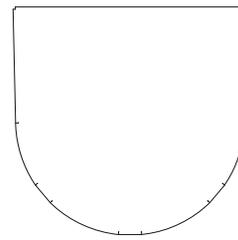


# ACCESSORIES

VIP  
300



END-CAP 300/300



CLOSED END-CAP WITH DRAIN 300/300



## END CAPS

CODE	PRICE €	MATERIAL	TYPE END-CAP	PREINSTALLED DRAIN OUTLETS mm
503411		galvanised steel	closed end-cap 300/300	–
503412		galvanised steel e PVC	end-cap with drain 300/300	1 x Ø 200



## KIT NUTS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	NUT	KIT FOR 1,5ml
503310		black galvanised steel	VIP ductile iron	Blind hexagonal M10 with spherical cap	12 nuts + 12 washer <sup>13</sup>

Special Pieces, Corners, Ti, Crosses for VIP35 are available upon request. For further information please contact our Technical Department.

13- Screws are included in the channel.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION



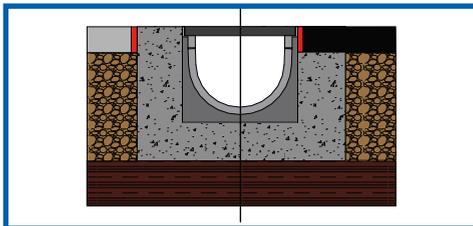
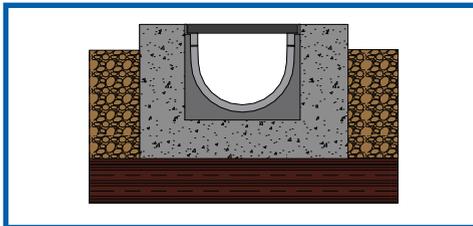
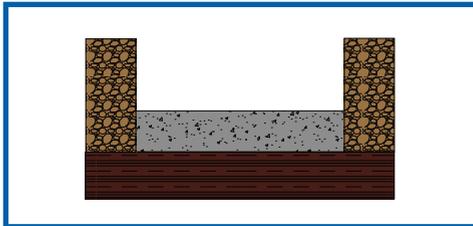
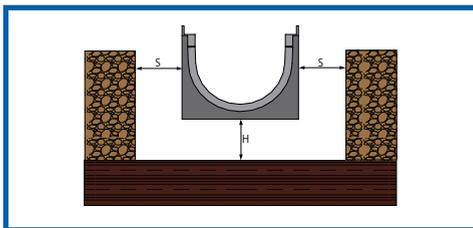
## “For all the drainage channels the manufacturer shall supply written instructions for general installation” (Ref. § 7.17 EN 1433)

The installation instructions enclosed in the present technical section are given only as an example in order to supply the main guide lines to the final fitter.

Any particular installation must be evaluated/ agreed between MufleSystem srl and the project maker.

The correct installation is necessary to guarantee the proper loads resistance of the drainage system (channel and grating) to static and dynamical traffic which is subjected to.

The correct installation involves a longer operational length of the drainage system itself as well as its better hydraulic function.



**NEW FEATURE:**  
The channels can be installed with preassembled gratings.

### Step 1 HOLE SIZE

The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the Summary Table. In this step make sure the underlying layer is suitable to the load it is expected to support.

### Step 2 CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. In case that cycles of loading and unloading are often (for example: periodic transit of vehicles) or the loads are particular heavy (E600 - F900), we recommended to reinforce the concrete base with a electro-welded net or with or beaded mouldings Ø 8 with mesh 15x15 cm. At this stage it is needed to arrange possible slopes of the drainage line.

### Step 3 CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet and block them at basis in order to avoid any floating or misalignment during the concrete casting for the side prop.

Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation.

As well as the step 2, also for the side prop concrete arrange the reinforcement.

### Step 4 FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane.

## Recommendations for installation

1. In case that channels watertightness is requested, MufleSystem is purposely recommending the use of a bituminous silicone sealant “SHELL TIXOPHALTE”: after carrying out the side prop, apply a thin and homogeneous sealant strip on each slot between the channels and the following one (clean the eventual exceeding sealant). It is strongly advised not to apply the strips of “SHELL TIXOPHALTE” inside the slots in the female joint of the channels before coupling them. Eventually a through and long- lasting guarantees to avoid any leakages can be obtained by welding the joints; this requires welding machines and experienced technicians.
2. While carrying out the phase 2 and 3, protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.
3. In case the drainage line is subjected to horizontal loads (for example concrete casting for industrial paving, private car parks and parking decks), it is necessary to arrange effective expansion joints for both direction, parallel and perpendicular to the channels. These joints shall be placed according to the norm standards in force and shall not be placed close to drainage line.
4. In case the drainage line shall be installed on roofs or terraces, it is obligatory to arrange a waterproof sheet according to specific projects.



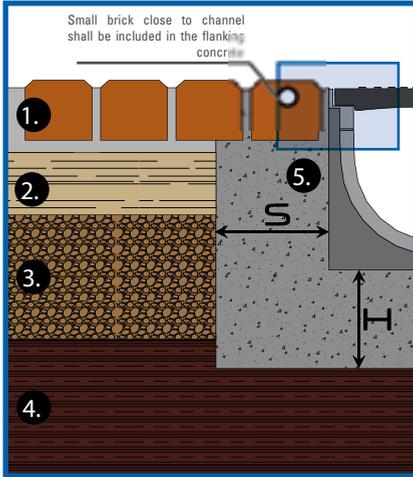
N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.



# INSTALLATION

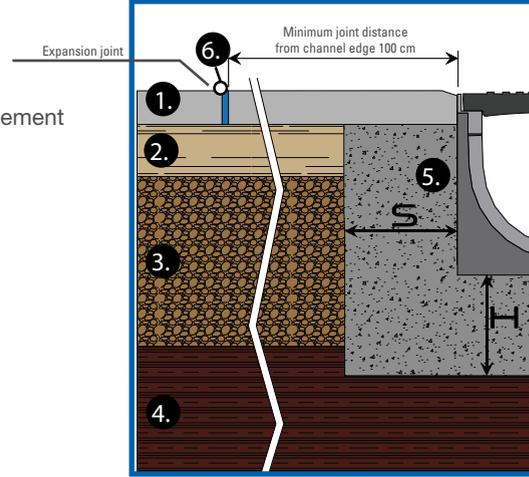


## Case 1 Flooring (A15-B125-C250)



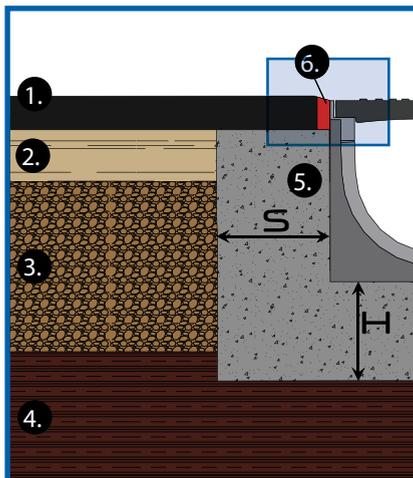
1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

## Case 2 Concrete flooring (A15-B125-C250)

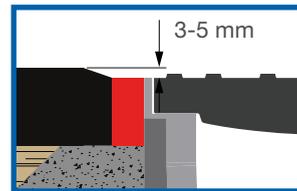


1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Expansion joint

## Case 3 Asphalt (A15-B125-C250)



1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Safety joint (if required)



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

### SUMMARY TABLE

Load class (EN 1433)		A 15	B 125	C 250
Applicable load (EN 1433)	kN	15	125	250
Minimum height H of concrete laying bed	mm	100	100	150
Minimum thickness S of the concrete flanking	mm	100	100	150
Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.

N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

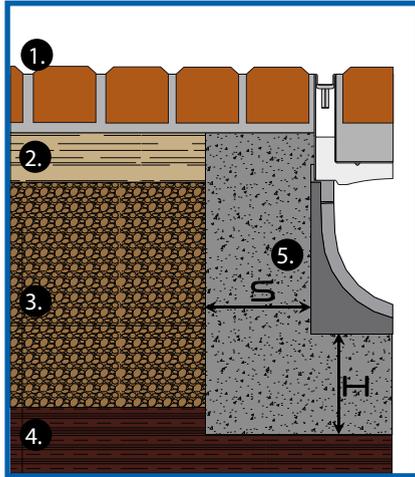
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION SLOTTED GRATING LONGITUDINALE

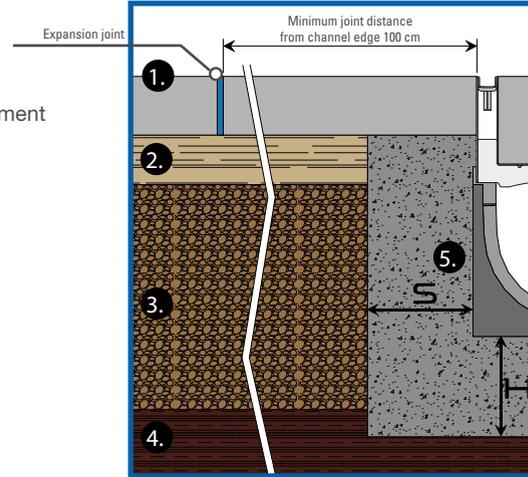


## Case 1 Flooring (A15-B125-C250)



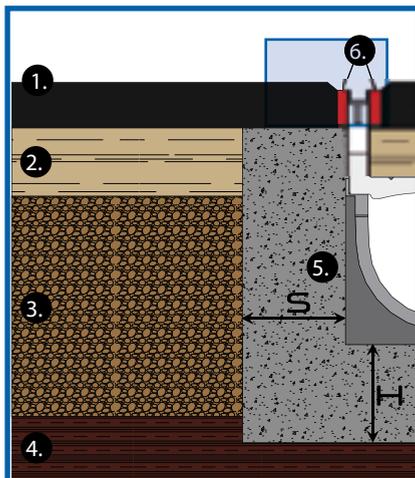
1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

## Case 2 Concrete flooring (A15-B125-C250)



1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Expansion joint

## Case 3 Asphalt (A15-B125-C250)



1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Safety joint (if required)

This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

### SUMMARY TABLE

Load class (EN 1433)		A 15	B 125	C 250
Applicable load (EN 1433)	kN	15	125	250
Minimum height H of concrete laying bed	mm	100	100	150
Minimum thickness S of the concrete fl anking	mm	100	100	150
Concrete compression strength class (EN 206-1)		C 20/25	C 25/30	C 25/30
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.

N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIFICATIONS

VIP

1. Supply and installation of MufleDrain VIP (VIP 300) type HD-PE drainage channels with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. HD-PE upper profile with height not smaller than 20 mm (35 mm). The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm (1,500 mm), internal net gap \_\_\_mm (300 mm), internal height \_\_\_ mm.
2. Supply and installation of MufleDrain VIP type HD-PE drainage channel with external stiffening ribs and male- female coupling system allowing the assembly between one channel and the next with the relevant pre- assembled gratings. The channel will have 2 side drainage diaphragms at pre- determined points and a prearranged 100 (110) mm diameter bottom outlet that can be fixed through 4 screws.. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1000 mm, internal net gap 100 mm, internal height \_\_\_ mm.
3. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain VIP drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot width 20 mm, length 498 mm, width \_\_\_mm.
4. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain VIP drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6 mm, length 498 mm, width 148 mm.
5. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain VIP drainage channels with bar fixing system, load class C250 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 7 mm, length 498 mm, width\_\_\_mm.
6. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain VIP drainage channels with bar fixing system, load class B125 (C250) according to EN 1433-2004, length 498 mm, width \_\_\_mm (148 mm).
7. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain VIP drainage channels equipped with screw fixing slots and bar fixing plate, load class C250 according to EN 1433-2008, length 998 mm, width \_\_\_mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 15 mm in the anti-heel mesh.
8. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain VIP 300 drainage channels with nut fixing system, load class C250 according to EN 1433-2004, length 748 mm, width 376 mm.
9. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain VIP 300 drainage channels with nut fixing system, load class C250) according to EN 1433-2008, length 498 mm, width 376 mm.
10. Supply and installation of galvanised (stainless) steel rung covering gratings for MufleDrain VIP drainage channels with bar fixing system, load class A15 according to EN 1433-2008, length 998 mm, width \_\_\_mm. A similar grating will be available upon request with length 498 mm.
11. Supply and installation of drive-over HD-PE covering gratings for MufleDrain VIP drainage channels with bar fixing system or elastic coupling system, length 498 mm, width \_\_\_mm.
12. Supply and installation of drive-over HD-PE covering gratings with longitudinal slot for MufleDrain VIP drainage channels with bar fixing system or elastic coupling system, length 498 mm, width 148 mm.
13. Supply and installation of drive-over HD-PE covers for MufleDrain VIP drainage channels with bar fixing system or elastic coupling system, length 498 mm, width \_\_\_mm.
14. Supply and installation of L-shaped longitudinal- slot gratings made form galvanized steel for MufleDrain VIP drainage channels with male- female coupling system between one grating and the next, load class C250 according to EN 1433-2004, length 998 mm, width \_\_\_\_\_ mm, height of "L" \_\_\_\_\_ mm.
15. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.
16. Supply and installation of HD-PE open cap with drainage hole diameter \_\_\_mm for MufleDrain drainage channel with coupling system into the special channel housing.
17. Supply and installation of (open) end cap made from galvanised steel (galvanised steel and PVC tube) for MufleDrain drainage channel with coupling system into the special channel housing.
18. Supply and installation of HD-PE boxes with siphon for MufleDrain VIP drainage channels with external stiffening ribs and coupling system. HD-PE upper profile with height not smaller than 20 mm. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 542 mm, net gap \_\_\_ mm, internal height 400 mm.
19. Supply and installation of inspection elements for MufleDrain VIP L-shaped gratings in galvanized (stainless) steel for MufleDrain VIP drain boxes with siphon. Every inspection element will be made of an external containment tank self- centered on bottom drain box with siphon and of an inspection element to be placed inside the containment tank that can be also pulled out after installation. Load classes until C250. The sizes of drain boxes shall be length 500 mm, width \_\_\_\_\_ mm, height \_\_\_\_\_ mm.

# smart

## The system:

- it supports 2 load classes (B125, C250) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was designed to withstand any deformation due shearing or torsional stress
- it is wearproof and very solid thanks to the frame, which ensures a 2.5 mm - thick drive-over edge and a 1.2 mm - thick contact surface
- since the edge shows the exact dimensions for the paving, easy and accurate installation is ensured
- it comprises 3 different types of gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron
- it comes equipped with a classic tie-rod fixing system and a convenient drain gate
- it is ideal for private car parks, footways, canalisation systems in roads and parking areas, transversal canalisation systems (road crossings) with low - speed vehicular traffic (max 15 km/h – in this case the system can support D400 - class gratings, although not in compliance with Standard EN 1433)
- it includes models with small sizes (H 55 and H 80) which are perfect for installation into covered industrial pavings whenever the channel edge needs to be protected during polishing
- it comes complete with drain boxes with siphon
- the range is made up of 8 channels with 3 widths and 4 heights (100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160)



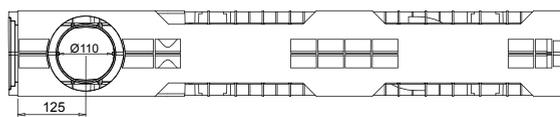


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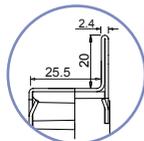


# CHANNELS

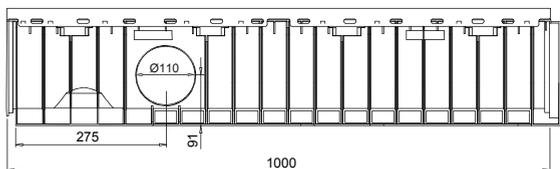
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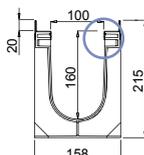
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

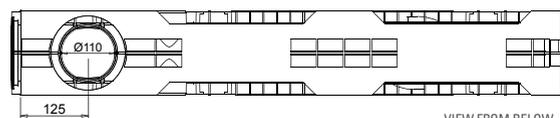


SECTION

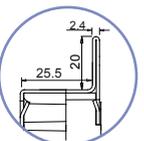


## SMART 100/160

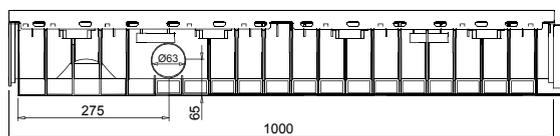
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm	
701000		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 215	1000 x 100 x 160	4,10	145,28	14,52	side bottom <sup>1</sup>	2 x Ø 110 1 x Ø 110
701008		stainless steel AISI 304 <sup>2</sup>								



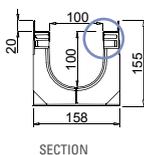
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION



## SMART 100/100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm	
701001		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 155	1000 x 100 x 100	3,60	89,56	8,95	side bottom <sup>1</sup>	2 x Ø 63 1 x Ø 110
701009		stainless steel AISI 304 <sup>2</sup>								

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

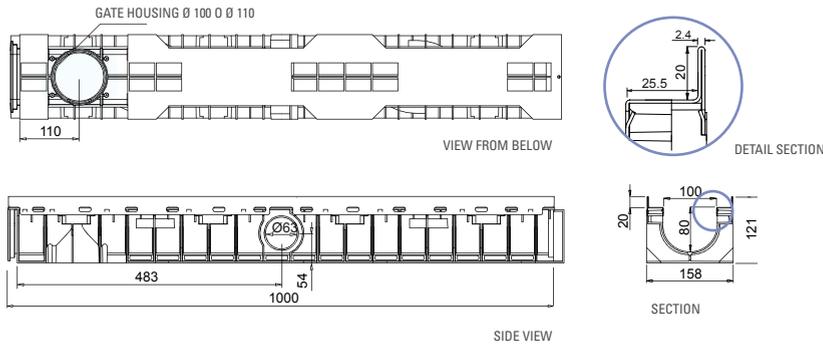
N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

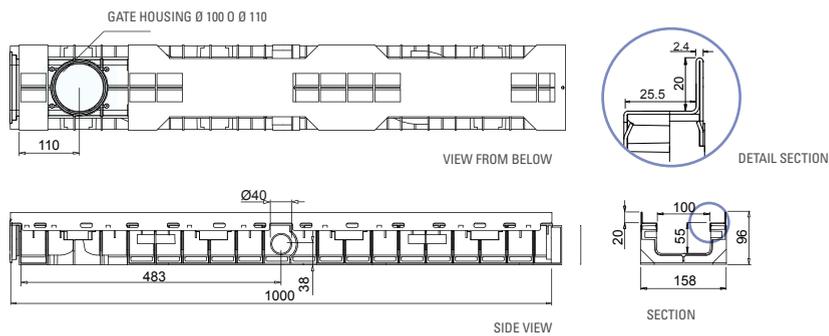


# CHANNELS

smart  
100



SMART 100/80									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
701002		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 121	1000 x 100 x 80	3,30	69,28	6,92	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110
701010		stainless steel AISI 304 <sup>2</sup>							



SMART 100/55									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
701003		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 96	1000 x 100 x 55	3,10	54,44	5,44	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110
701011		stainless steel AISI 304 <sup>2</sup>							

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

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N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



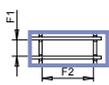
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## APPLICATIONS OF GALVANISED STEEL

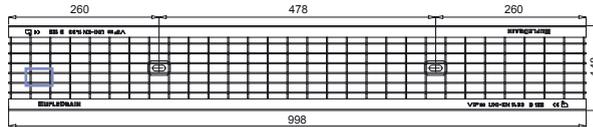
Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



DETAIL OF  
HOOKING  
SYSTEM



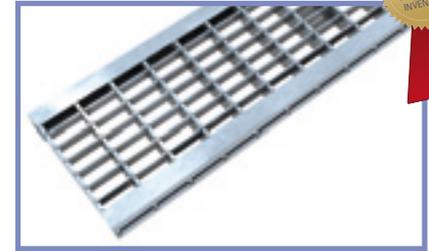
VIEW FROM ABOVE



SIDE  
VIEW

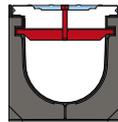


DETAIL OF  
UPRIGHT  
BEND



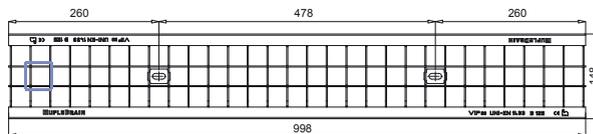
## ANTI-HELL MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502126		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 20	3,60	8,82	15,2 x 32,2		up to Class C250 as per Standard EN 1433
502150		pickled stainless steel AISI 304 <sup>2</sup>						
502138		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 20	1,80	4,41			
502162		pickled stainless steel AISI 304 <sup>2</sup>						



DETAIL OF  
SQUARE  
MESH



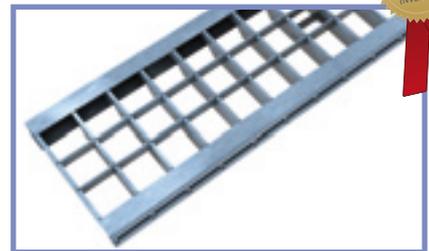
VIEW FROM ABOVE



SIDE  
VIEW



DETAIL OF  
UPRIGHT  
BEND



## SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502127		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 20	2,90	9,00	32,2 x 32,2		up to Class C250 as per Standard EN 1433
502157		pickled stainless steel AISI 304 <sup>2</sup>						
502139		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 20	1,45	4,50			
502163		pickled stainless steel AISI 304 <sup>2</sup>						

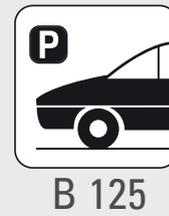
2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



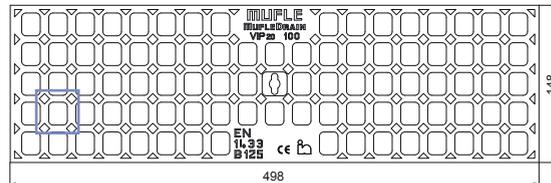
**smart  
100**

## APPLICATIONS OF DUCTILE IRON

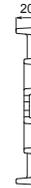
Pavements  
Lay-bys and private car parks



SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502112		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 20	3,40	3,31	21,5 x 17,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



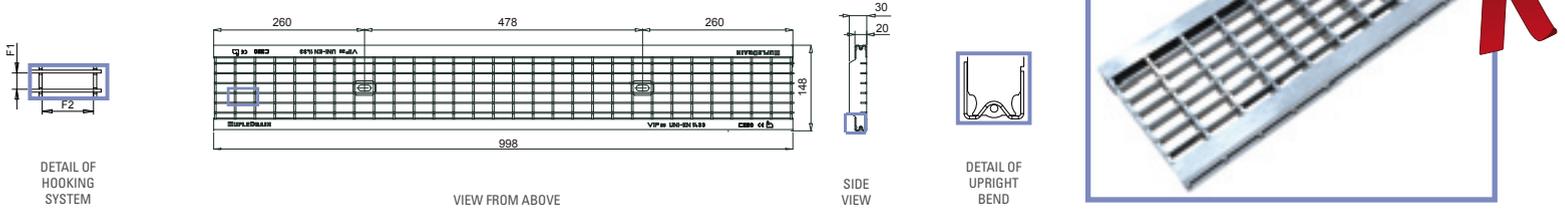
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## APPLICATIONS OF GALVANISED STEEL

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks

## APPLICATIONS OF STAINLESS STEEL

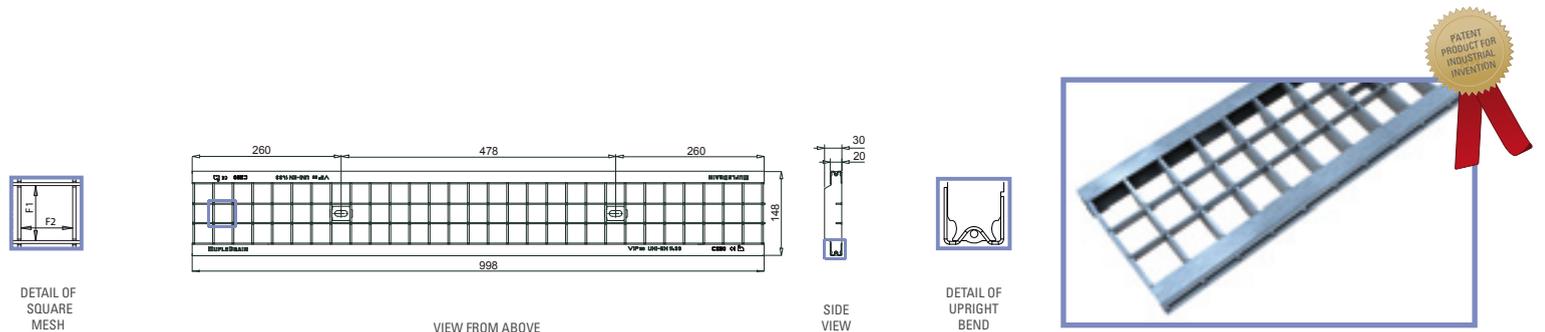
Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks  
Areas with low-load transit in food factories  
Areas with low-load transit in chemically aggressive environments



### ANTI-HELL MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502152		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 20	5,10	8,82	15,2 x 31,2		up to Class C250 as per Standard EN 1433
502175		pickled stainless steel AISI 304 <sup>2</sup>						
502169		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 20	2,55	4,41			
502187		pickled stainless steel AISI 304 <sup>2</sup>						



### SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502151		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 20	4,60	8,50	31,2 x 31,2		up to Class C250 as per Standard EN 1433
502174		pickled stainless steel AISI 304						
502168		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 20	2,30	4,25			
502188		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



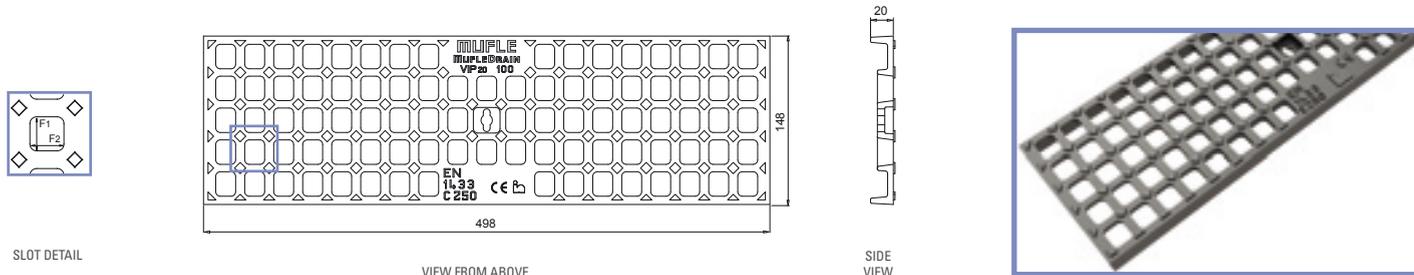
# GRATINGS



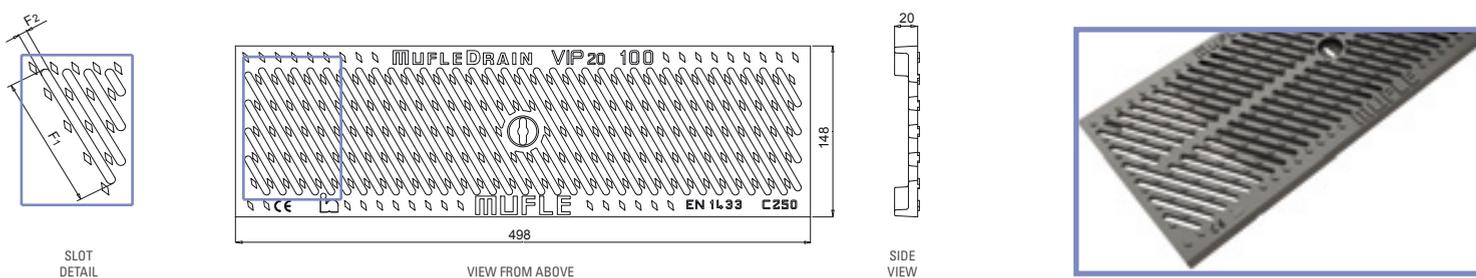
smart  
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## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502115		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 20	3,80	3,31	21,5 x 17,5		up to Class C250 as per Standard EN 1433	



SLOTTED GRATING 6 mm								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502114		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 20	4,00	2,10	91,5 x 6,0		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



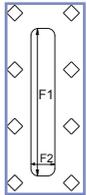
# GRATINGS



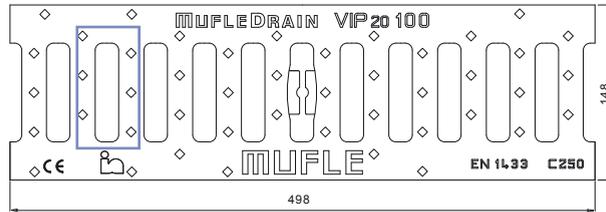
smart  
100

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT  
DETAIL



VIEW FROM ABOVE

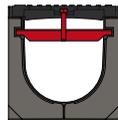


SIDE  
VIEW



### SLOTTED GRATING 20 mm

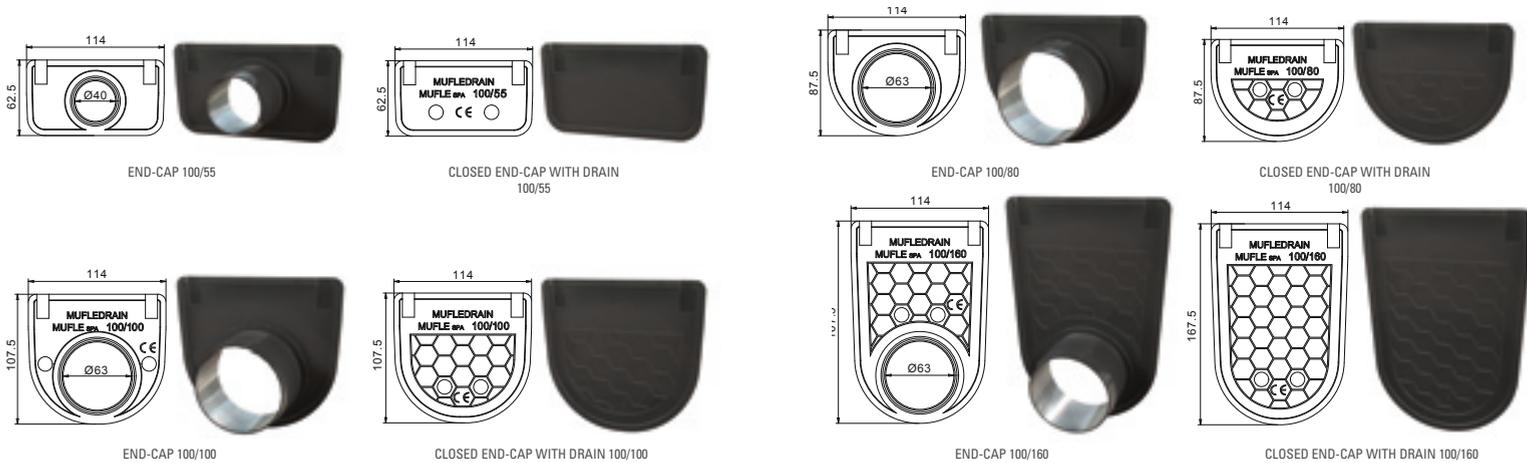


CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT Kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502113		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 20	3,60	1,97	82,0 x 20,0		up to Class C250 as per Standard EN 1433



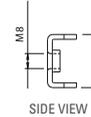
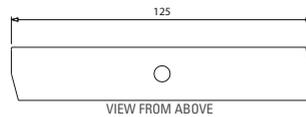
# ACCESSORIES

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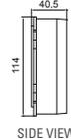
## END CAPS

CODE	PRICE	TIPO	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
€					
700500		end-cap with drain	PE-HD	100/55	1 x Ø 40
700508		closed end-cap	PE-HD	100/55	-
700501		end-cap with drain	PE-HD	100/80	1 x Ø 63
700509		closed end-cap	PE-HD	100/80	-
700502		end-cap with drain	PE-HD	100/100	1 x Ø 63
700510		closed end-cap	PE-HD	100/100	-
700503		end-cap with drain	PE-HD	100/160	1 x Ø 63
700511		closed end-cap	PE-HD	100/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
€					
500421		galvanised steel	SMART galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	SMART stainless steel	M8 x 55 TBL combi stainless steel	2 tie-rods + 2 screws
500423		black galvanised steel	SMART ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws



## KIT OUTLET + SCREWS

CODE	PRICE	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
€					
				mm	
506114		PE-HD	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		PE-HD	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE	VALID FOR CHANNELS	FAMILIES
€			
700526		from 100/100 to 100/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self-cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



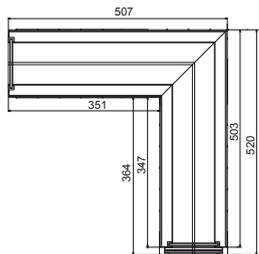
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**smart  
100**

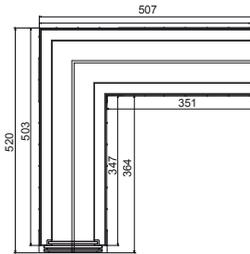
## LEFT CORNER



## SMART 100

CODE	PRICE €	MODEL
701100		100/160
701101		100/100
701102		100/80
701103		100/55

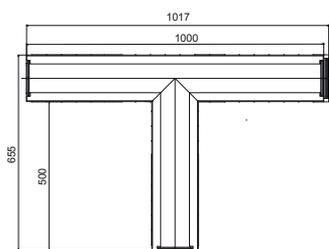
## RIGHT CORNER



## SMART 100

CODE	PRICE €	MODEL
701108		100/160
701109		100/100
701110		100/80
701111		100/55

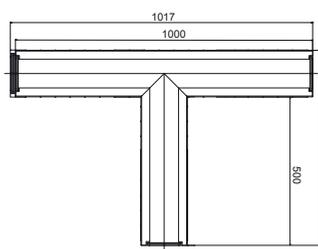
## LEFT TI



## SMART 100

CODE	PRICE €	MODEL
701116		100/160
701117		100/100
701118		100/80
701119		100/55

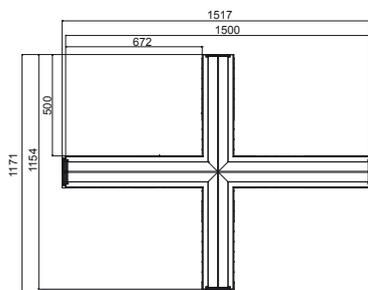
## RIGHT TI



## SMART 100

CODE	PRICE €	MODEL
701124		100/160
701125		100/100
701126		100/80
701127		100/55

## CROSS

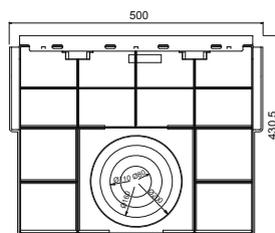


## SMART 100

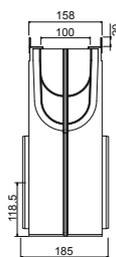
CODE	PRICE €	MODEL
701132		100/160
701133		100/100
701134		100/80
701135		100/55

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

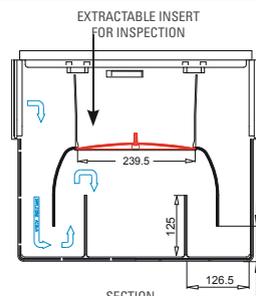
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

## SMART 100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
701016		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 158 x 434	500 x 100 x 400	185	118,5	3,35	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
701019		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 158 x 434	500 x 100 x 400	185	118,5	3,35	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

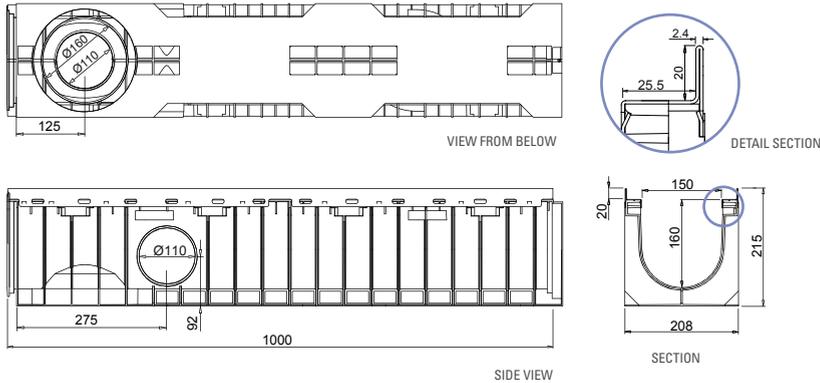


150



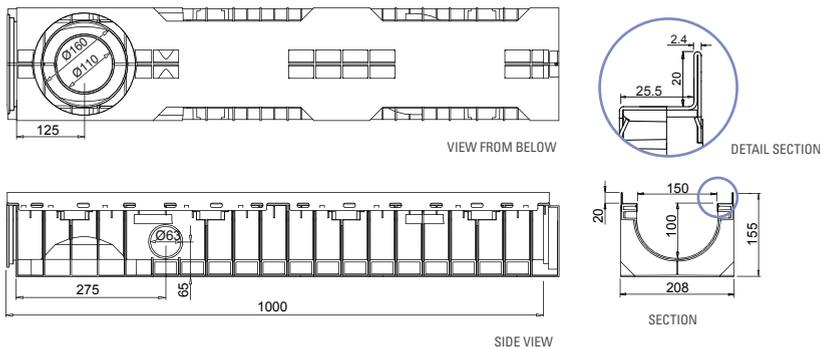
# CHANNELS

smart  
150



## SMART 150/160

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
701004		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 208 x 215	1000 x 150 x 160	4,55	213,04	21,30	side 2 x Ø 110 bottom 1 x Ø 110; 1 x Ø 160
701012		stainless steel AISI 304 <sup>2</sup>							



## SMART 150/100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
701005		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 208 x 155	1000 x 150 x 100	4,00	127,32	12,73	side 2 x Ø 63 bottom 1 x Ø 110; 1 x Ø 160
701013		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

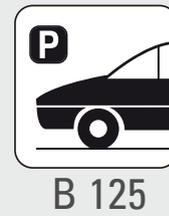
3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



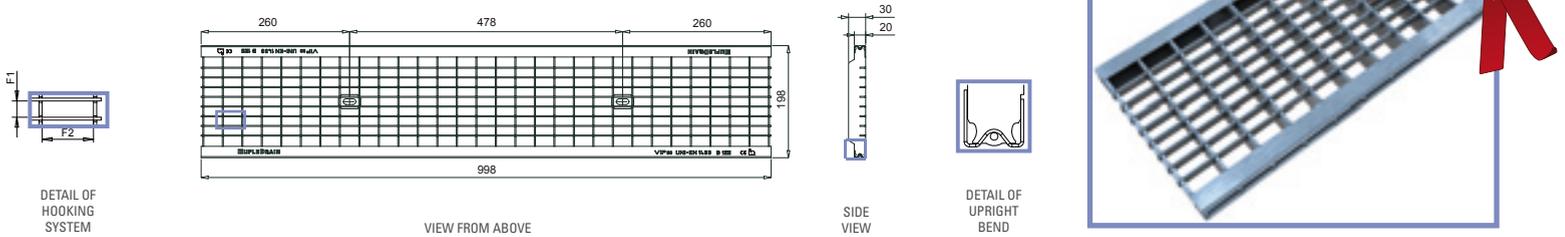
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## APPLICATIONS OF GALVANISED STEEL

Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

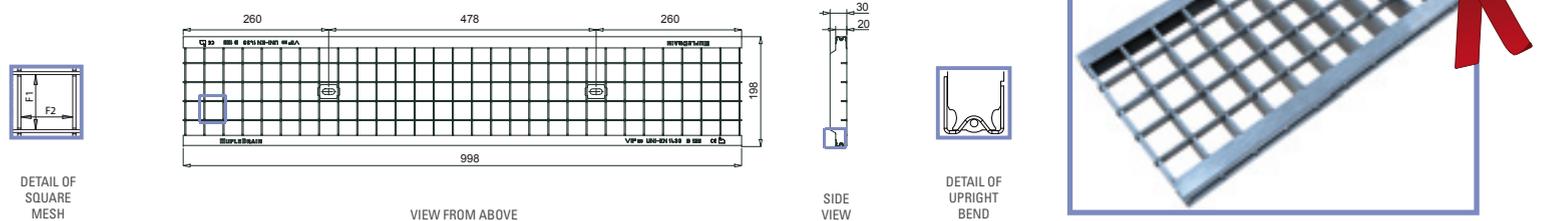
Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



### ANTI-HELL MESH GRATING

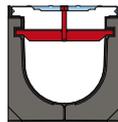


CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502130		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 20	5,00	13,08	15,2 x 32,2		up to Class C250 as per Standard EN 1433
502158		pickled stainless steel AISI 304 <sup>2</sup>						
502142		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 20	2,50	6,54			
502164		pickled stainless steel AISI 304 <sup>2</sup>						



### SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502131		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 20	4,10	13,74	32,2 x 32,2		up to Class C250 as per Standard EN 1433
502159		pickled stainless steel AISI 304 <sup>2</sup>						
502143		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 20	2,05	6,87			
502165		pickled stainless steel AISI 304 <sup>2</sup>						

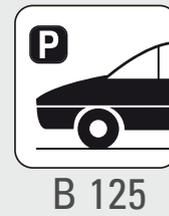
2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



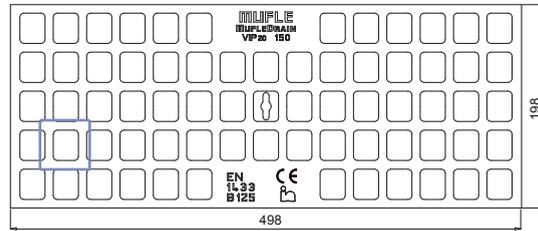
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150

## APPLICATIONS OF DUCTILE IRON

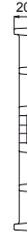
Pavements  
Lay-bys and private car parks



SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502118		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 20	4,90	3,77	29,0 x 24,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



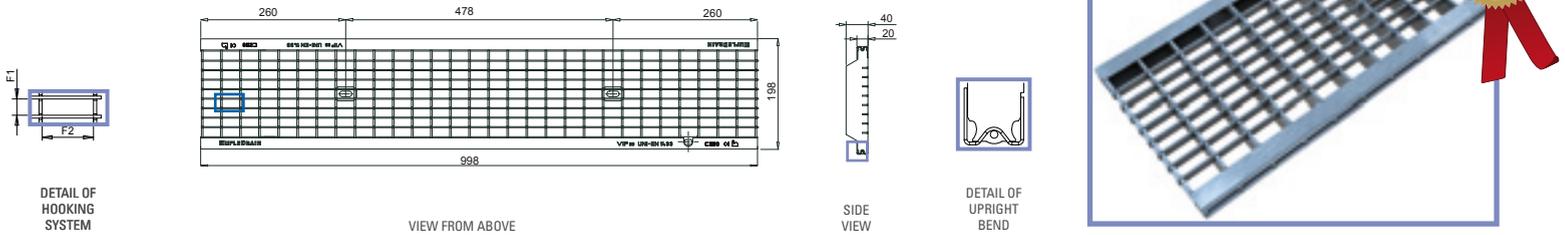
smart  
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## APPLICATIONS OF GALVANISED STEEL

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks

## APPLICATIONS OF STAINLESS STEEL

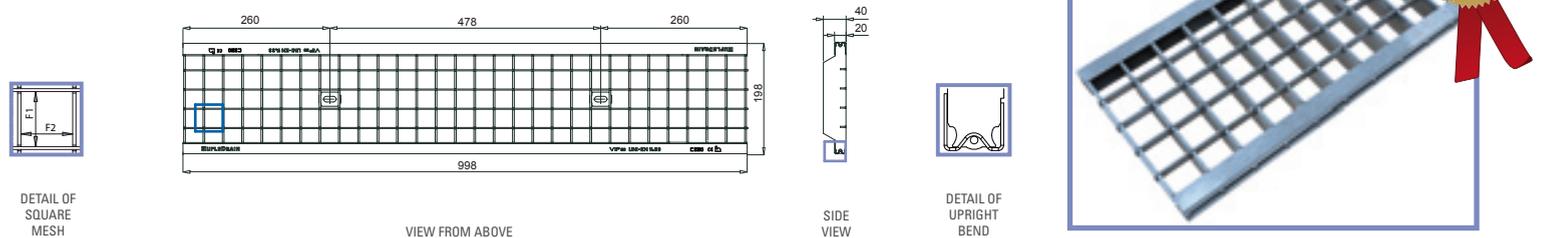
Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks  
Areas with low-load transit in food factories  
Areas with low-load transit in chemically aggressive environments



### ANTI-HEEL MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502154		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 20	7,50	13,08	15,2 x 31,2		up to Class C250 as per Standard EN 1433
502177		pickled stainless steel AISI 304 <sup>2</sup>						
502171		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 20	3,75	6,54			
502190		pickled stainless steel AISI 304 <sup>2</sup>						



### SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502153		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 20	7,00	13,47	31,2 x 31,2		up to Class C250 as per Standard EN 1433
502176		pickled stainless steel AISI 304 <sup>2</sup>						
502170		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 20	3,50	6,73			
502189		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



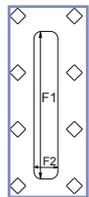
# GRATINGS



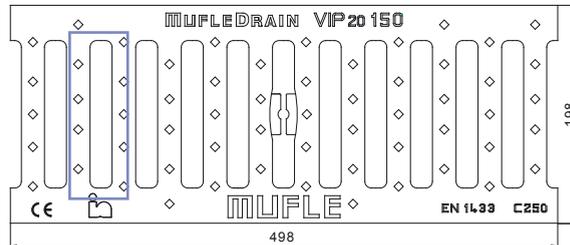
smart  
150

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT  
DETAIL



VIEW FROM ABOVE



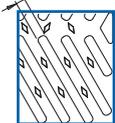
SIDE  
VIEW



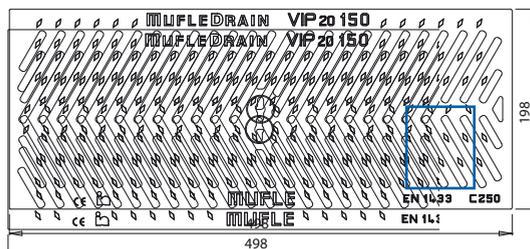
SLOTTED GRATING 20 mm								25 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502120		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 20	5,20	3,16	132,0 x 20,0		up to Class C250 as per Standard EN 1433	

## APPLICATIONS OF DUCTILE IRON

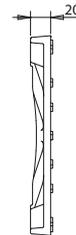
- Parking
- Parking decks
- Kerb side areas
- Historical town centres



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



SLOTTED GRATING 7 mm								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing <sup>11</sup>	
502196		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 20	6,00	3,00	81,0 x 7,0		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).

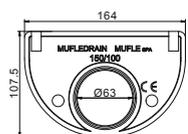
11- It is forecasted no fixing system for the channel 150/40 and 200/40.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

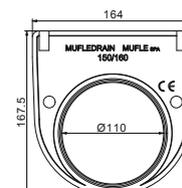


# ACCESSORIES

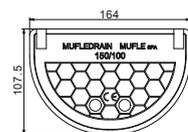
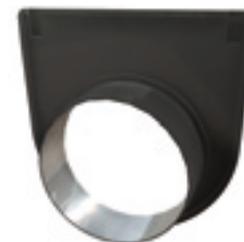
smart  
150



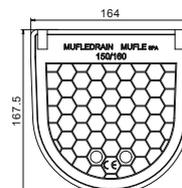
END-CAP 150/100



END-CAP 150/160



CLOSED END-CAP WITH DRAIN 150/100

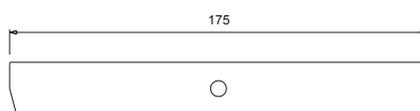


CLOSED END-CAP WITH DRAIN 150/160



## END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
	€				
700504		end-cap with drain	PE-HD	150/100	1 x Ø 63
700512		closed end-cap	PE-HD	150/100	-
700505		end-cap with drain	PE-HD	150/160	1 x Ø 110
700513		closed end-cap	PE-HD	150/160	-



VIEW FROM ABOVE



SIDE VIEW



## KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
	€				
500424		galvanised steel	SMART galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500425		stainless steel	SMART stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500426		black galvanised steel	SMART ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE	VALID FOR CHANNELS	FAMILIES
	€		
700517		from 150/100 to 150/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



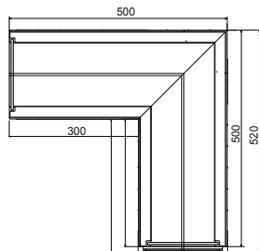
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**smart  
150**

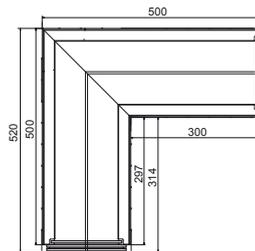
## LEFT CORNER



## SMART 150

CODE	PRICE €	MODEL
701104		150/160
701105		150/100

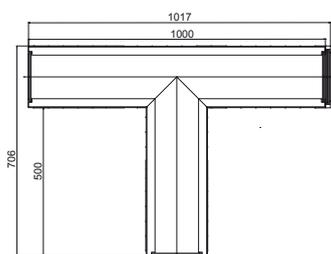
## RIGHT CORNER



## SMART 150

CODE	PRICE €	MODEL
701112		150/160
701113		150/100

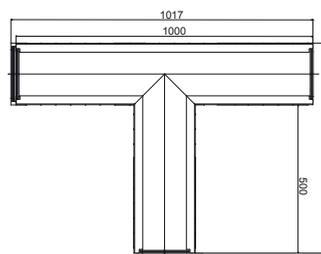
## LEFT TI



## SMART 150

CODE	PRICE €	MODEL
701120		150/160
701121		150/100

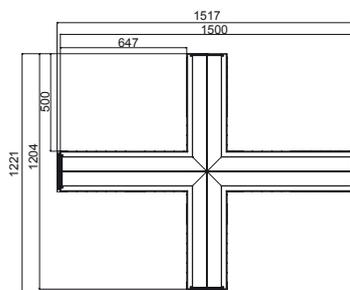
## RIGHT TI



## SMART 150

CODE	PRICE €	MODEL
701128		150/160
701129		150/100

## CROSS

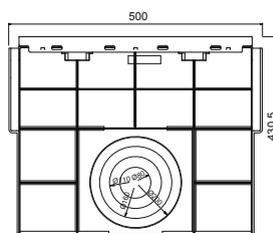


## SMART 150

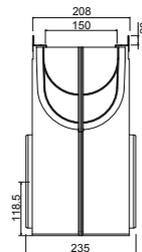
CODE	PRICE €	MODEL
701136		150/160
701137		150/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

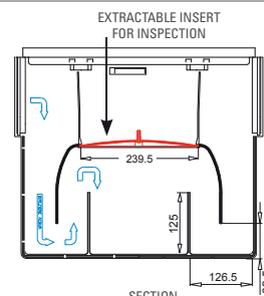
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

## SMART 150

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
701017		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 208 x 427	500 x 100 x 400	185	118,5	3,70	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
701020		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 208 x 427	500 x 100 x 400	185	118,5	3,70	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

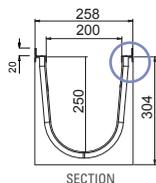
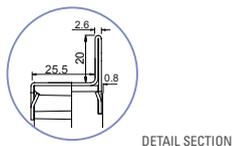
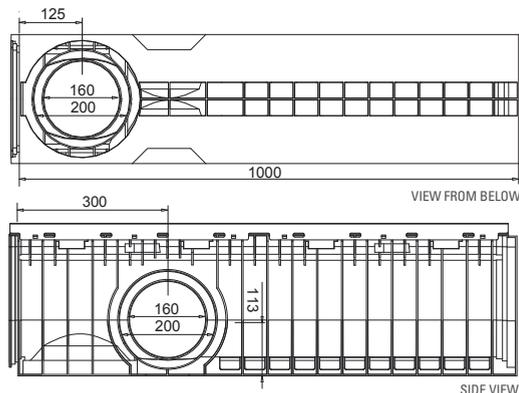


200



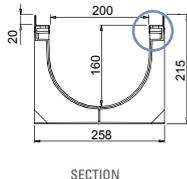
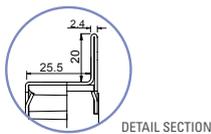
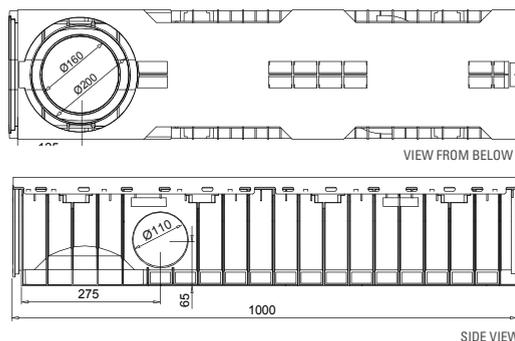
# CHANNELS

smart  
200



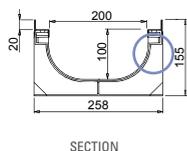
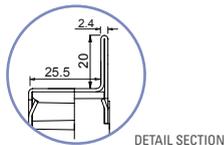
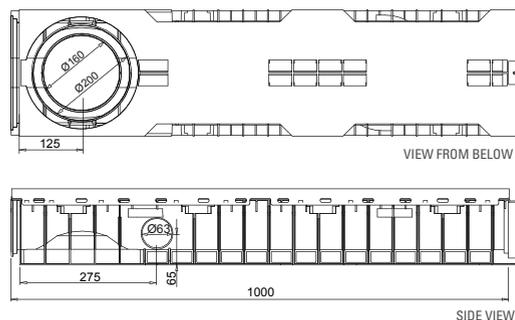
## SMART 200/250

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
701022		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 304	1000 x 200 x 250	6,3	430,00	43,00	side 2 x Ø 160; 2 x Ø 200 bottom 1 x Ø 160; 1 x Ø 200
701023		stainless steel AISI 304 <sup>2</sup>							



## SMART 200/160

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
701006		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 215	1000 x 200 x 160	4,95	275,87	27,58	side 2 x Ø 110 bottom 1 x Ø 160; 1 x Ø 200
701014		stainless steel AISI 304 <sup>2</sup>							



## SMART 200/100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
701007		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 155	1000 x 150 x 100	4,35	178,73	17,87	side 2 x Ø 63 bottom 1 x Ø 160; 1 x Ø 200
701015		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

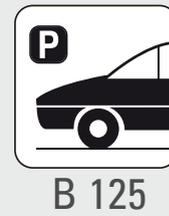
3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



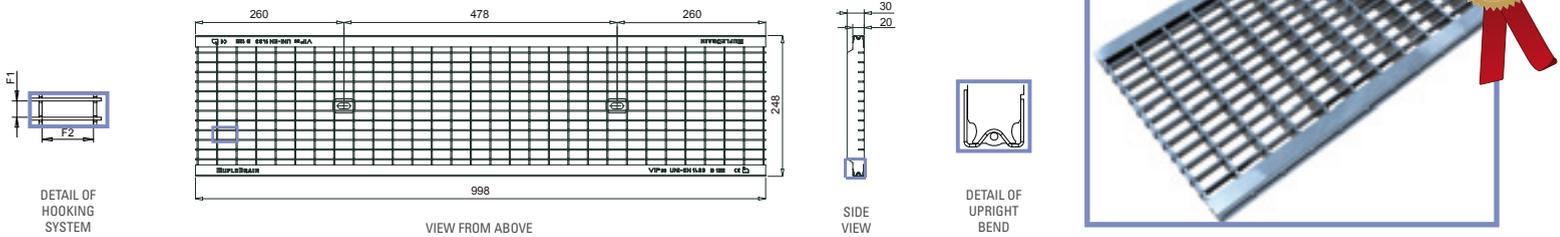
smart  
200

## APPLICATIONS OF GALVANISED STEEL

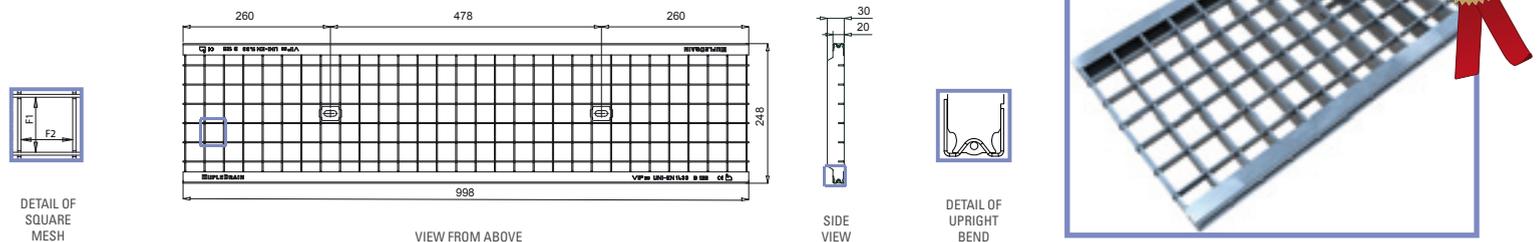
Pavements  
Lay-bys and private car parks

## APPLICATIONS OF STAINLESS STEEL

Pavements  
Lay-bys and private car parks  
Food factories  
Chemically aggressive environments



ANTI-HELL MESH GRATING								30 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502134		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 20	6,20	16,98	15,2 x 32,2		up to Class C250 as per Standard EN 1433	
502160		pickled stainless steel AISI 304 <sup>2</sup>							
502146		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 20	3,10	8,49				
502166		pickled stainless steel AISI 304 <sup>2</sup>							



SQUARE MESH GRATING								30 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502135		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 20	5,20	18,00	32,2 x 32,2		up to Class C250 as per Standard EN 1433	
502161		pickled stainless steel AISI 304 <sup>2</sup>							
502147		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 20	2,60	9,00				
502167		pickled stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



**smart  
200**

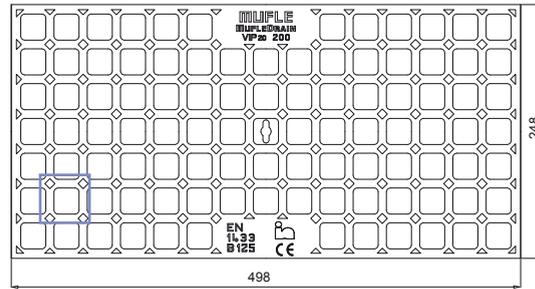
B 125

## APPLICATIONS OF DUCTILE IRON

Pavements  
Lay-bys and private car parks



SLOT DETAIL

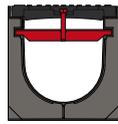


VIEW FROM ABOVE



SIDE VIEW



MESH GRATING								20 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							tie-tod	no fixing	
502122		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 20	6,25	6,12	25,5 x 24,5		up to Class C250 as per Standard EN 1433	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



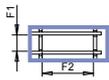
smart  
200

## APPLICATIONS OF GALVANISED STEEL

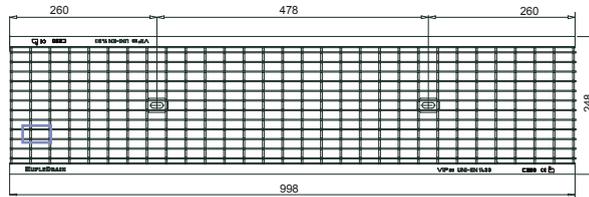
Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks

## APPLICATIONS OF STAINLESS STEEL

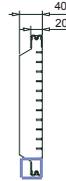
Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks  
Areas with low-load transit in food factories  
Areas with low-load transit in chemically aggressive environments



DETAIL OF  
HOOKING  
SYSTEM



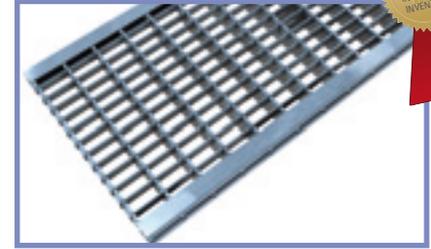
VIEW FROM ABOVE



SIDE  
VIEW



DETAIL OF  
UPRIGHT  
BEND



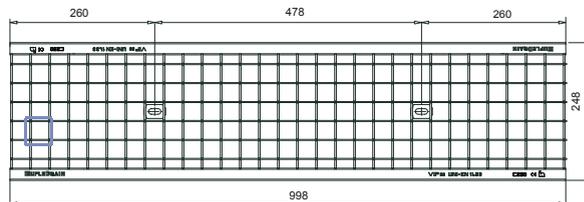
## ANTI-HELL MESH GRATING



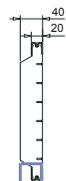
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502156		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 20	9,50	16,98	31,0 x 15,0		up to Class C250 as per Standard EN 1433
502179		pickled stainless steel AISI 304 <sup>2</sup>						
502173		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 20	4,75	8,49			
502192		pickled stainless steel AISI 304 <sup>2</sup>						



DETAIL OF  
SQUARE  
MESH



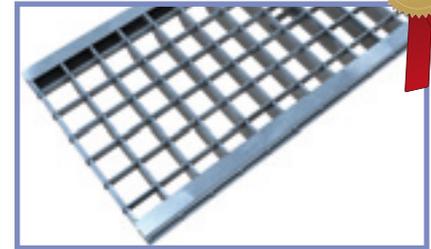
VIEW FROM ABOVE



SIDE  
VIEW



DETAIL OF  
UPRIGHT  
BEND



## SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502155		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 20	8,70	18,00	31,0 x 31,0		up to Class C250 as per Standard EN 1433
502178		pickled stainless steel AISI 304 <sup>2</sup>						
502172		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 20	4,35	9,00			
502191		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



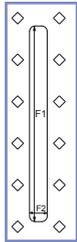
# GRATINGS



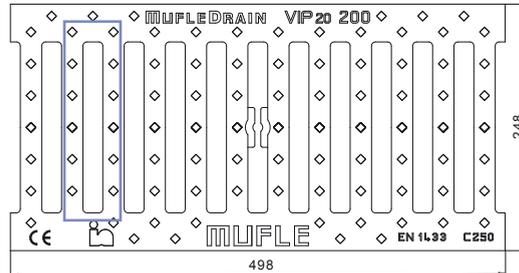
smart  
200

## APPLICATIONS OF DUCTILE IRON

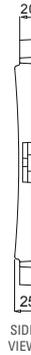
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOT DETAIL



VIEW FROM ABOVE

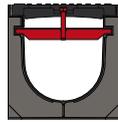


SIDE VIEW



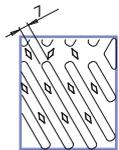
### SLOTTED GRATING 20 mm



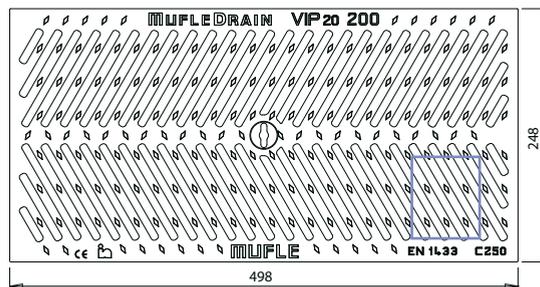
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing
502124		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 20	7,00	4,32	180,0 x 20,0		up to Class C250 as per Standard EN 1433

## APPLICATIONS OF DUCTILE IRON

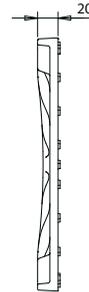
- Parking
- Parking decks
- Kerb side areas
- Historical town centres



SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



### SLOTTED GRATING 7 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	no fixing <sup>11</sup>
502195		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 20	7,70	4,00	107,0 x 7,0		up to Class C250 as per Standard EN 1433

6- Classification according to Standard EN 1563 (2009).

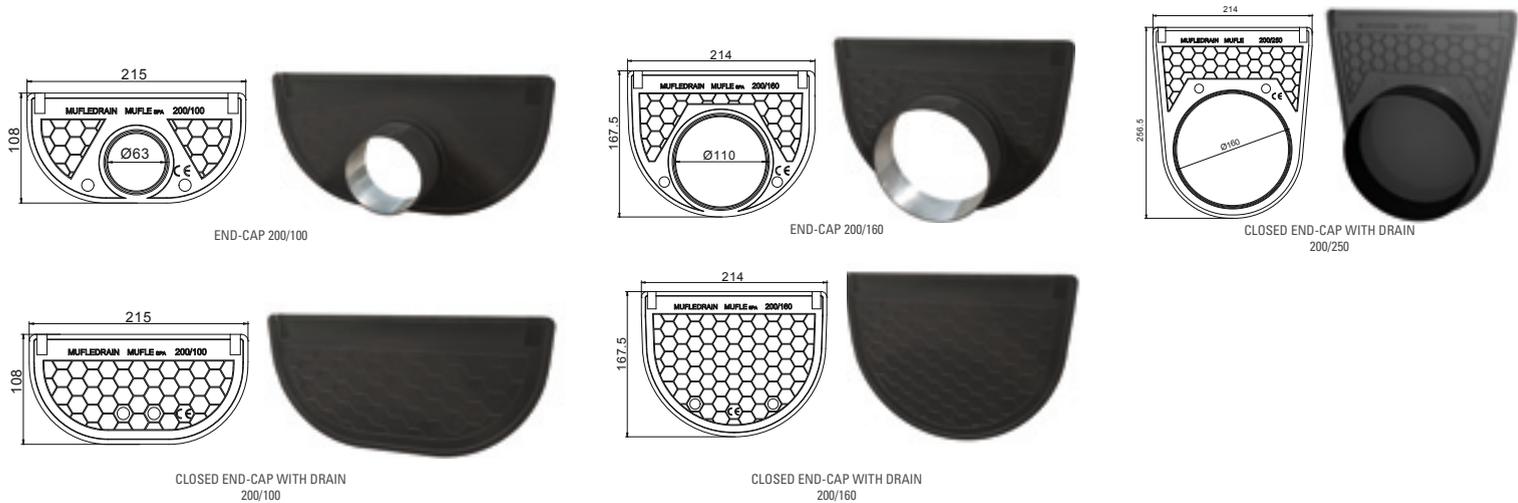
11- It is forecasted no fixing system for the channel 150/40 and 200/40.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



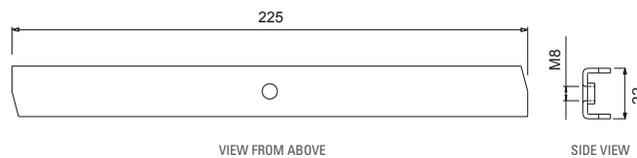
# ACCESSORIES

smart  
200



## END CAPS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
700506		end-cap with drain	PE-HD	200/100	1 x Ø 63
700514		closed end-cap	PE-HD	200/100	-
700507		end-cap with drain	PE-HD	200/160	1 x Ø 110
700515		closed end-cap	PE-HD	200/160	-
502416		closed end cap with preformed outlet	PE-HD	200/250	1 x Ø 160



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
500427		galvanised steel	SMART galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500428		stainless steel	SMART stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500429		black galvanised steel	SMART ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700518		from 200/160 to 200/250	VIP - SLOPE - WING
700519		from 200/100 to 200/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



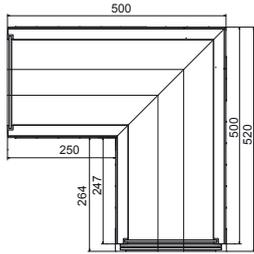
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**smart  
200**

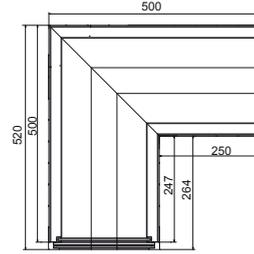
## LEFT CORNER



## SMART 200

CODE	PRICE €	MODEL
701142		200/250
701106		200/160
701107		200/100

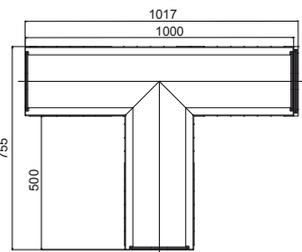
## RIGHT CORNER



## SMART 200

CODE	PRICE €	MODEL
701143		200/250
701114		200/160
701115		200/100

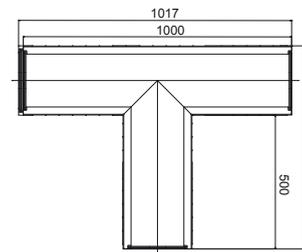
## LEFT TI



## SMART 200

CODE	PRICE €	MODEL
701144		200/250
701122		200/160
701123		200/100

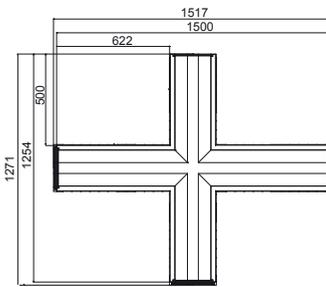
## RIGHT TI



## SMART 200

CODE	PRICE €	MODEL
701145		200/250
701130		200/160
701131		200/100

## CROSS

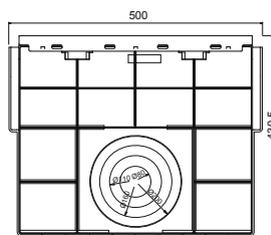


## SMART 200

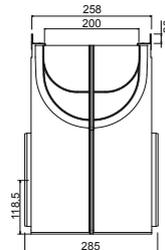
CODE	PRICE €	MODEL
701146		200/250
701138		200/160
701139		200/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

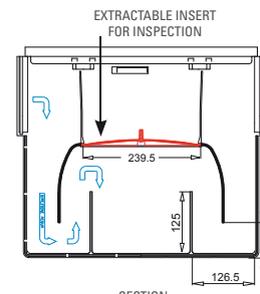
## DRAIN BOX WITH SYPHON<sup>17</sup>



FRONT VIEW



SIDE VIEW



SECTION

## SMART 200

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN OUTLETS mm
701018		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 258 x 427	500 x 200 x 400	285	118,5	3,85	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
701021		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 258 x 427	500 x 200 x 400	285	118,5	3,85	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

17- The drain box Easy, Vip, Smart, Slope and Wing 200 are not prearranged to be connected to the correspondent channels EASY, VIP, SMART, SLOPE and WING 200/250  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

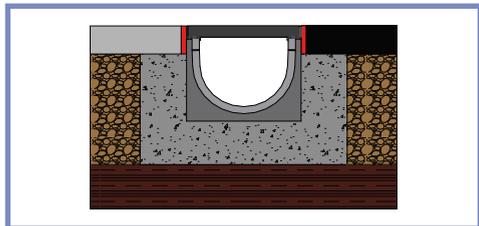
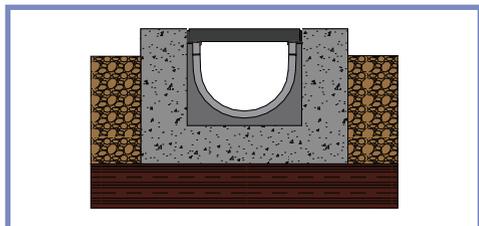
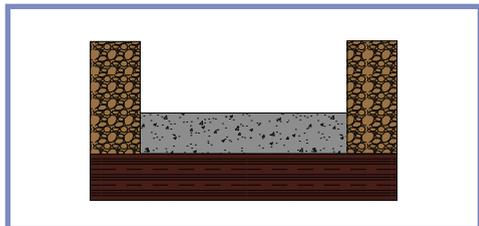
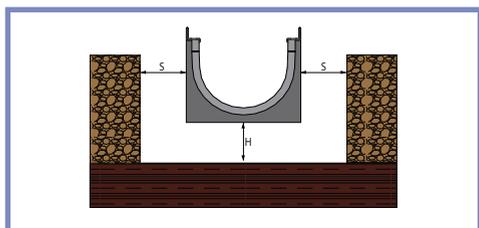
## “For all the drainage channels the manufacturer shall supply written instructions for general installation” (Ref. § 7.17 EN 1433)

The installation instructions enclosed in the present technical section are given only as an example in order to supply the main guide lines to the final fitter.

Any particular installation must be evaluated/ agreed between MufleSystem srl and the project maker.

The correct installation is necessary to guarantee the proper loads resistance of the drainage system (channel and grating) to static and dynamical traffic which is subjected to.

The correct installation involves a longer operational length of the drainage system itself as well as its better hydraulic function.



**NEW FEATURE:**  
The channels can be installed with preassembled gratings.

### Step 1

#### HOLE SIZE

The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the Summary Table. In this step make sure the underlying layer is suitable to the load it is expected to support.

### Step 2

#### CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. In case that cycles of loading and unloading are often (for example: periodic transit of vehicles) or the loads are particular heavy (E600 - F900), we recommended to reinforce the concrete base with a electro-welded net or with or beaded mouldings Ø 8 with mesh 15x15 cm. At this stage it is needed to arrange possible slopes of the drainage line.

### Step 3

#### CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet and block them at basis in order to avoid any floating or misalignment during the concrete casting for the side prop.

Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation.

As well as the step 2, also for the side prop concrete arrange the reinforcement.

### Step 4

#### FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane.

## Recommendations for installation

- In case that channels watertightness is requested, MufleSystem is purposely recommending the use of a bituminous silicone sealant “SHELL TIXOPHALTE”: after carrying out the side prop, apply a thin and homogeneous sealant strip on each slot between the channels and the following one (clean the eventual exceeding sealant). It is strongly advised not to apply the strips of “SHELL TIXOPHALTE” inside the slots in the female joint of the channels before coupling them. Eventually a through and long- lasting guarantees to avoid any leakages can be obtained by welding the joints; this requires welding machines and experienced technicians.
- While carrying out the phase 2 and 3, protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.
- In case the drainage line is subjected to horizontal loads (for example concrete casting for industrial paving, private car parks and parking decks), it is necessary to arrange effective expansion joints for both direction, parallel and perpendicular to the channels. These joints shall be placed according to the norm standards in force and shall not be placed close to drainage line.
- In case the drainage line shall be installed on roofs or terraces, it is obligatory to arrange a waterproof sheet according to specific projects.



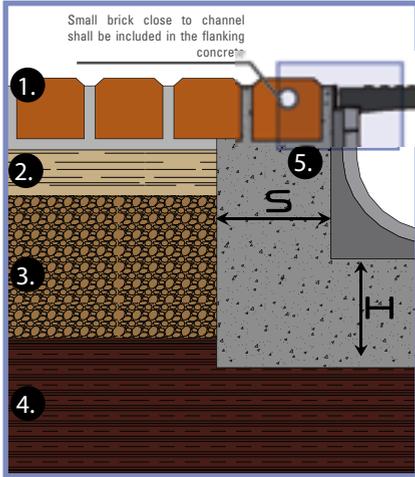
N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.



# INSTALLATION

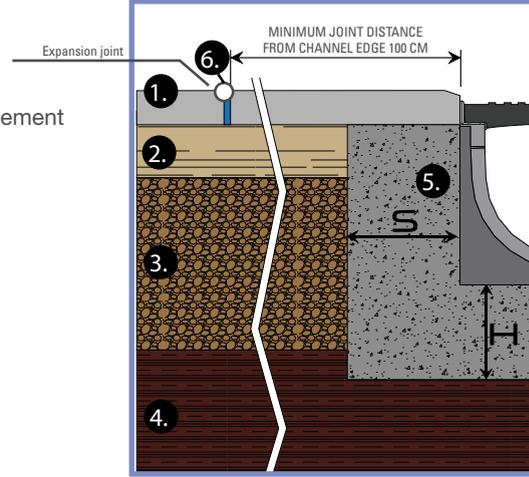
smart

**Case 1**  
Flooring  
(A15-B125-C250-D400<sup>14</sup>)



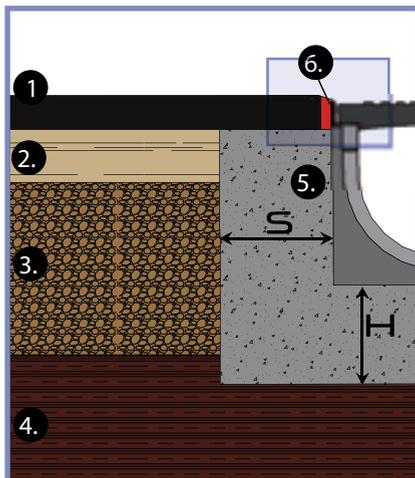
1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

**Case 2**  
Concrete flooring  
(A15-B125-C250-D400<sup>14</sup>)

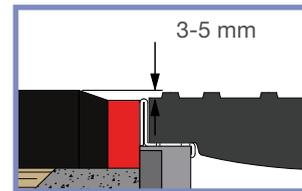


1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Expansion joint

**Case 3**  
Asphalt  
(A15-B125-C250-D400<sup>14</sup>)



1. Flooring
2. Lower bed layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Safety joint (if required)



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

## SUMMARY TABLE

Load class (EN 1433)		B 125	C 250
Applicable load (EN 1433)	kN	125	250
Minimum height H of concrete laying bed	mm	100	150
Minimum thickness S of the concrete flanking	mm	100	150
Concrete compression strength class (EN 206-1)		C 25/30	C 25/30
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.

N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



## SPECIFICATIONS

smart

1. Supply and installation of MufleDrain SMART type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. Galvanised (stainless) steel upper profile, 2.4 mm-thick drive-over edge, 1.2 mm-thick contact surface with height not smaller than 20 mm, connection through prearranged coupling to the channel structure. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap \_\_\_mm, internal height \_\_\_ mm.
2. Supply and installation of MufleDrain SMART type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 side drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. Galvanised (stainless) steel upper profile, 2.4 mm-thick drive-over edge, 1.2 mm-thick contact surface with height not smaller than 20 mm, connection through prearranged coupling to the channel structure. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000mm, internal net gap 100 mm, internal height \_\_\_ mm.
3. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SMART drainage channels with bar fixing system, load class C250 according to EN 1433-2008, slot width 20 mm, length 498 mm, width \_\_\_mm.
4. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SMART drainage channels with bar fixing system, load class C250 according to EN 1433-2008, slot inclined 30° to the longitudinal axis, width 6 mm, length 498 mm, width 148 mm.
5. Supply and installation of ductile cast-iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SMART drainage channels with screw fixing system, load classes C250 according to EN 1433-2008 with 7 mm slot 30° inclined with respect to longitudinal axis, length 498 mm, width \_\_\_\_ mm.
6. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 with mesh for MufleDrain SMART drainage channels with bar fixing system, load class B125 (C250) according to EN 1433-2004, length 498 mm, width \_\_\_mm (148 mm).
7. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain SMART drainage channels with bar fixing system, load class B125 according to EN 1433-2004, length 998 mm, width \_\_\_mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 33 x 33 mm in the square mesh and 33 x 15 mm in the anti-heel mesh.
8. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.
9. Supply and installation of HD-PE open cap with drainage hole diameter \_\_\_mm for MufleDrain drainage channel with coupling system into the special channel housing.
10. Supply and installation of HD-PE boxes with siphon for MufleDrain SMART drainage channels with external stiffening ribs and coupling system. Galvanised (stainless) steel upper profile, 2.4 mm-thick drive-over edge, 1.2 mm-thick contact surface with height not smaller than 20 mm, connection through prearranged coupling to the gully structure. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 534 mm, net gap \_\_\_ mm, internal height 400 mm.

# SLOPE

The system:

- it supports 4 load classes (C250, D400, E600, F900) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- **News:** the range can be enlarged with the possibility of assembling the **“Slope Drainage frame”**
- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was designed to withstand any deformation due shearing or torsional stress
- it is wearproof and very solid thanks to the frame, which ensures a 2.5 mm - thick drive-over edge and a 1.2 mm - thick contact surface
- easy and accurate installation is ensured
- it comprises 3 different types of gratings (with slots, anti-heel mesh, square mesh) made from galvanised steel, stainless steel and ductile iron.
- the fixing system for the grating is guaranteed by the innovative system hook- lock, the fixing system through the kit tie rods is necessary for the E600 grating
- for a better anchoring between concrete and channel a kit 8 clamps is available on request
- it comes equipped with a classic tie-rod fixing system and a convenient drain gate available in two versions Ø 100 e Ø 110
- it is ideal for private car parks, footways, canalisation systems in roads and parking areas, road crossings with moderate speed vehicular traffic
- it includes models with small sizes (H 55 and H 80) which are perfect for installation into covered industrial pavings whenever the channel edge needs to be protected during polishing
- it comes complete with drain boxes with siphon
- the range is made up of 9 channels with 3 widths and 5 heights (100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160, 200/250)



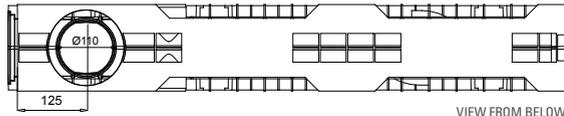


100

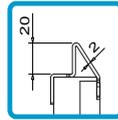


# CHANNELS

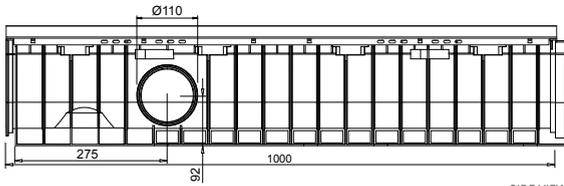
**SLOPE  
100**



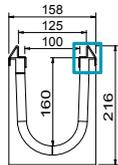
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

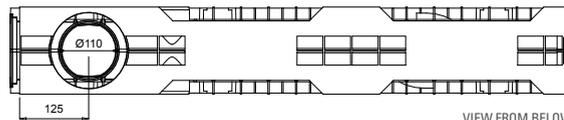


SECTION

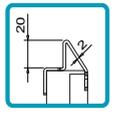


## SLOPE 100/160

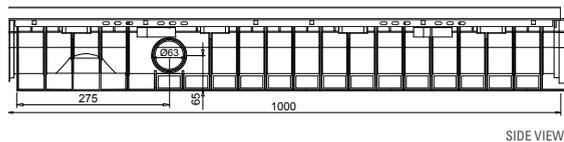
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm	
709022		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 216	1000 x 100 x 160	5,00	145,28	14,52	side bottom <sup>1</sup>	2 x Ø 110 1 x Ø 110
709008		stainless steel AISI 304 <sup>2</sup>								



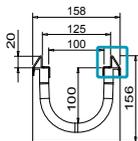
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION



## SLOPE 100/100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm	
709023		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 156	1000 x 100 x 100	4,50	89,56	8,95	side bottom <sup>1</sup>	2 x Ø 63 1 x Ø 110
709009		stainless steel AISI 304 <sup>2</sup>								

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

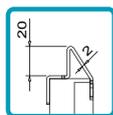
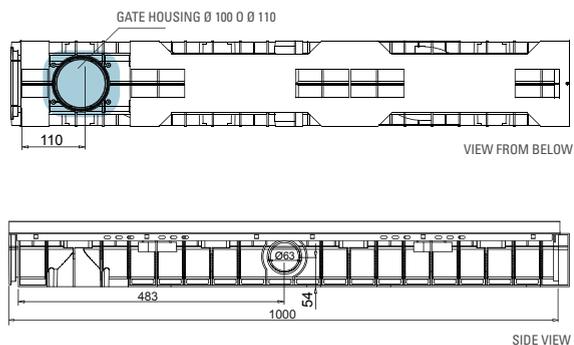
N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

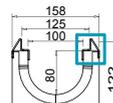


# CHANNELS

**SLOPE  
100**



DETAIL SECTION

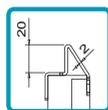
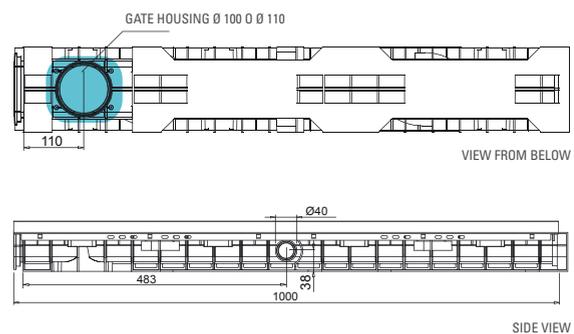


SECTION

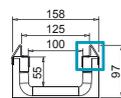


## SLOPE 100/80

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
709025		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 122	1000 x 100 x 80	4,20	69,28	6,92	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110
709011		stainless steel AISI 304 <sup>2</sup>							



DETAIL SECTION



SECTION



## SLOPE 100/55

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
709024		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 97	1000 x 100 x 55	4,00	54,44	5,44	side 2 x Ø 40 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110
709010		stainless steel AISI 304 <sup>2</sup>							

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



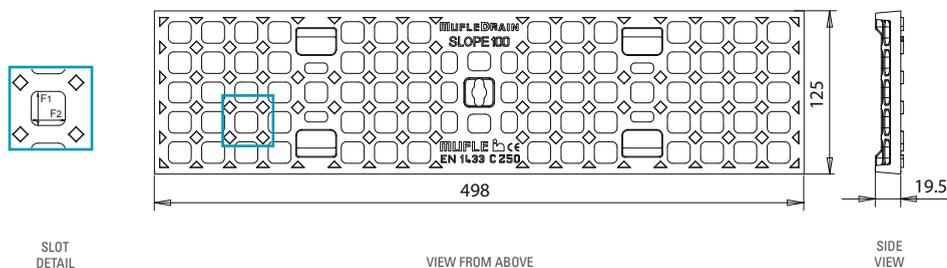
# GRATINGS



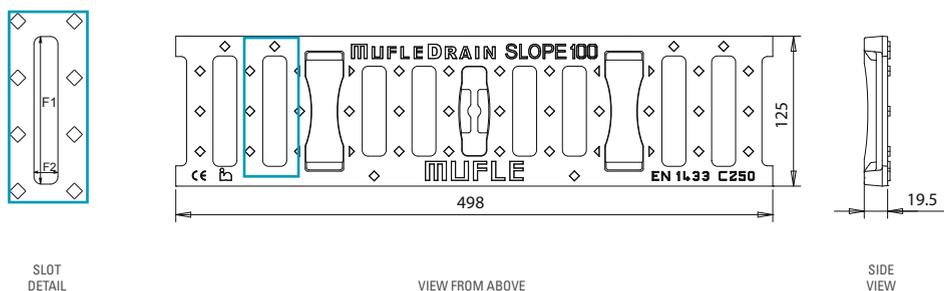
**SLOPE  
100**

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SQUARE MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	hook lock
509109		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 125 x 19,5	3,40	2,60	16,5 x 17,5	



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	hook lock
509100		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 125 x 19,5	2,80	2,70	93 x 21	

2- Classification according to American Standard ASTM.  
 5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
 6- Classification according to Standard EN 1563 (2009).  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



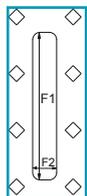
# GRATINGS



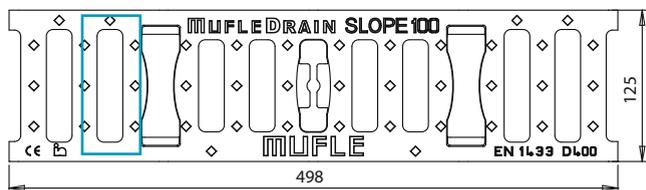
**SLOPE  
100**

## APPLICATIONS OF DUCTILE IRON

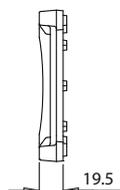
- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



SLOT  
DETAIL

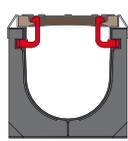


VIEW FROM ABOVE



SIDE  
VIEW



SLOTTED GRATING 20 mm							 19,5 mm
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	hook lock
509103		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 125 x 19,5	3,00	2,10	93 x 21	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



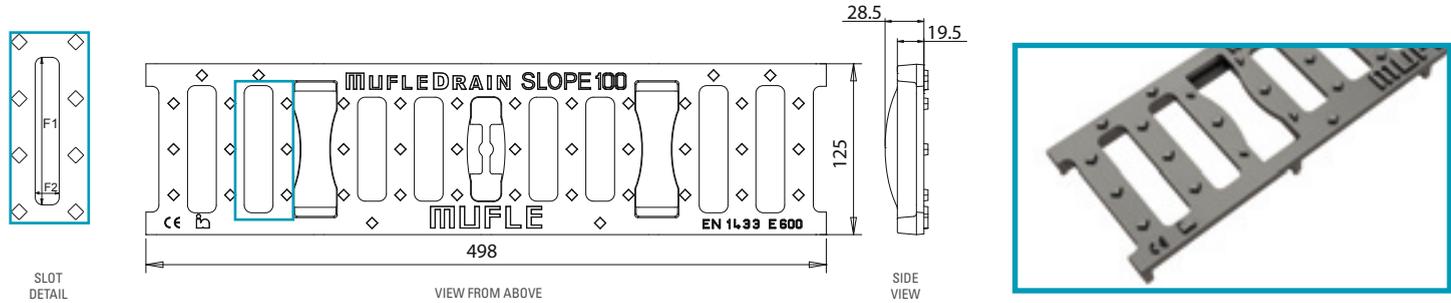
**SLOPE  
100**

## APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic

Industrial areas with passage of forklift trucks (high axle loads)

Underpasses



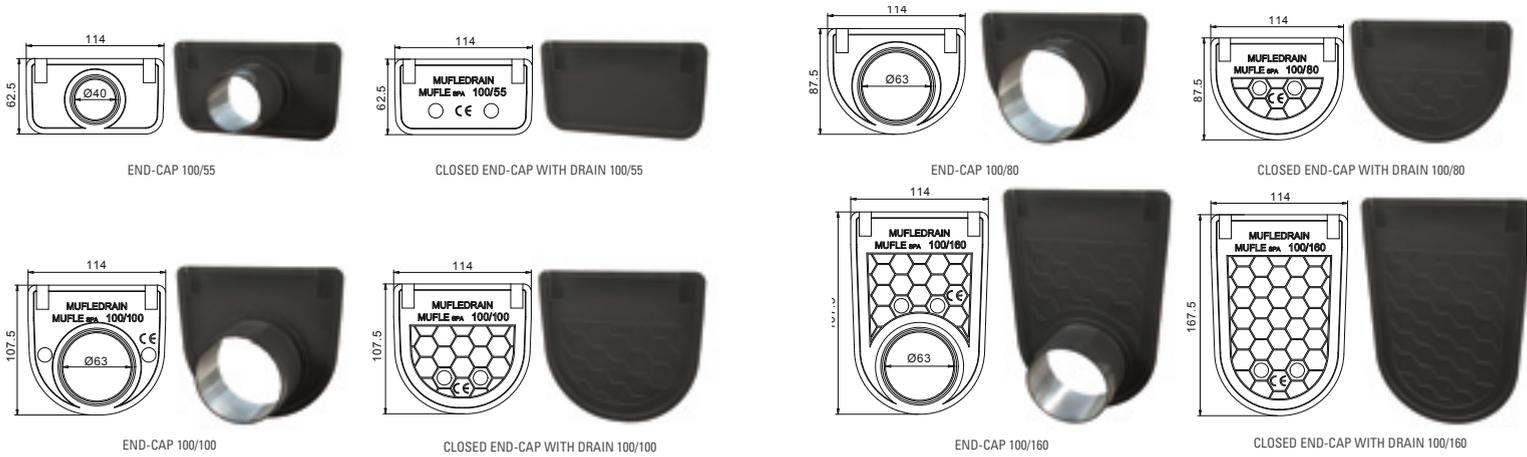
SLOTTED GRATING 20 mm							28,5 mm
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	hook lock + tie-tod
509106		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 125 x 19,5	3,30	2,10	93 x 20	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



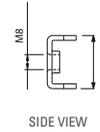
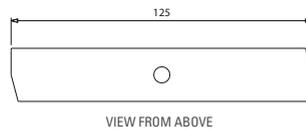
# ACCESSORIES

**SLOPE  
100**



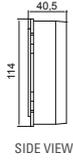
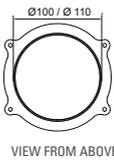
## END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
€					
700500		end-cap with drain	PE-HD	100/55	1 x Ø 40
700508		closed end-cap	PE-HD	100/55	-
700501		end-cap with drain	PE-HD	100/80	1 x Ø 63
700509		closed end-cap	PE-HD	100/80	-
700502		end-cap with drain	PE-HD	100/100	1 x Ø 63
700510		closed end-cap	PE-HD	100/100	-
700503		end-cap with drain	PE-HD	100/160	1 x Ø 63
700511		closed end-cap	PE-HD	100/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
€					
500421		galvanised steel	SLOPE galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	SLOPE stainless steel	M8 x 55 TBL combi stainless steel	2 tie-rods + 2 screws
500423		black galvanised steel	SLOPE ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws



## KIT OUTLET + SCREWS

CODE	PRICE	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
€					
					mm
506114		PE-HD	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		PE-HD	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

## KIT 8 CLAMPS FOR ANCHORING

CODE	PRICE	MATERIAL	KIT FOR 1 ml
€			
509300		galvanised steel	Kit 8 clamps for anchoring g/s

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE	VALID FOR CHANNELS	FAMILIES
€			
700526		from 100/100 to 100/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



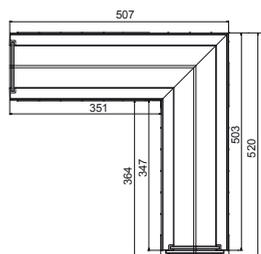
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**SLOPE  
100**

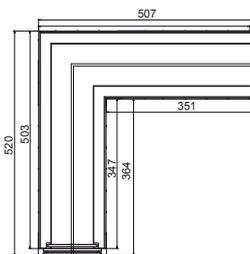
## LEFT CORNER



## SLOPE 100

CODE	PRICE €	MODEL
709100		100/160
709101		100/100
709102		100/80
709103		100/55

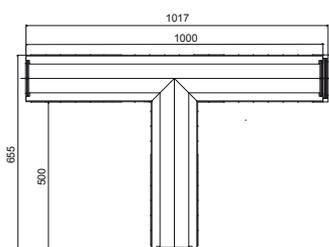
## RIGHT CORNER



## SLOPE 100

CODE	PRICE €	MODEL
709108		100/160
709109		100/100
709110		100/80
709111		100/55

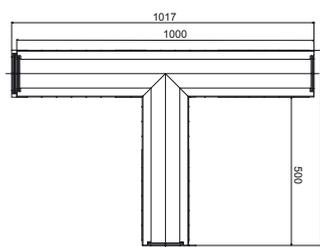
## LEFT TI



## SLOPE 100

CODE	PRICE €	MODEL
709116		100/160
709117		100/100
709118		100/80
709119		100/55

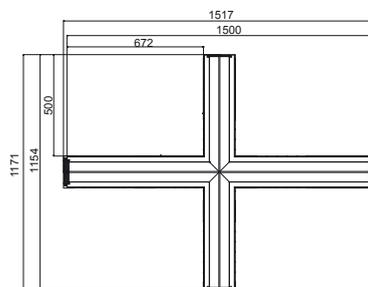
## RIGHT TI



## SLOPE 100

CODE	PRICE €	MODEL
709124		100/160
709125		100/100
709126		100/80
709127		100/55

## CROSS

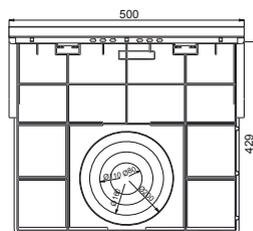


## SLOPE 100

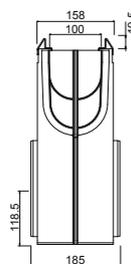
CODE	PRICE €	MODEL
709132		100/160
709133		100/100
709134		100/80
709135		100/55

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

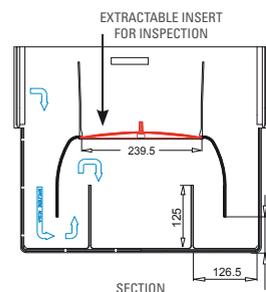
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

## SLOPE 100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
709030		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 158 x 429	500 x 100 x 400	185	118,5	3,90	2 x Ø 80; 2 x Ø 110; 2 x Ø 160; 2 x Ø 200
709017		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 158 x 429	500 x 100 x 400	185	118,5	3,90	2 x Ø 80; 2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

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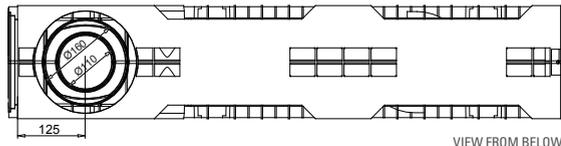


# 150

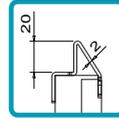


# CHANNELS

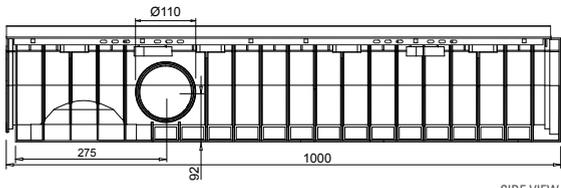
**SLOPE  
150**



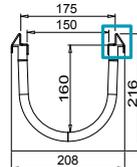
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

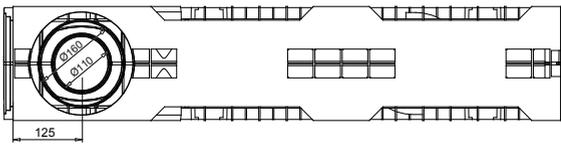


SECTION

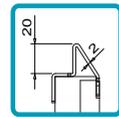


## SLOPE 150/160

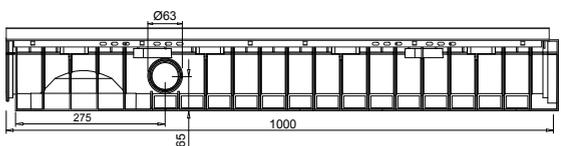
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
709026		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 208 x 216	1000 x 150 x 160	5,45	213,04	21,30	side 2 x Ø 110 bottom 1 x Ø 110; 1 x Ø 160
709012		stainless steel AISI 304 <sup>2</sup>							



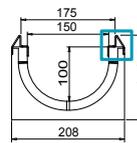
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION



## SLOPE 150/100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
709027		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 208 x 156	1000 x 150 x 100	4,90	127,32	12,73	side 2 x Ø 63 bottom 1 x Ø 110; 1 x Ø 160
709013		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



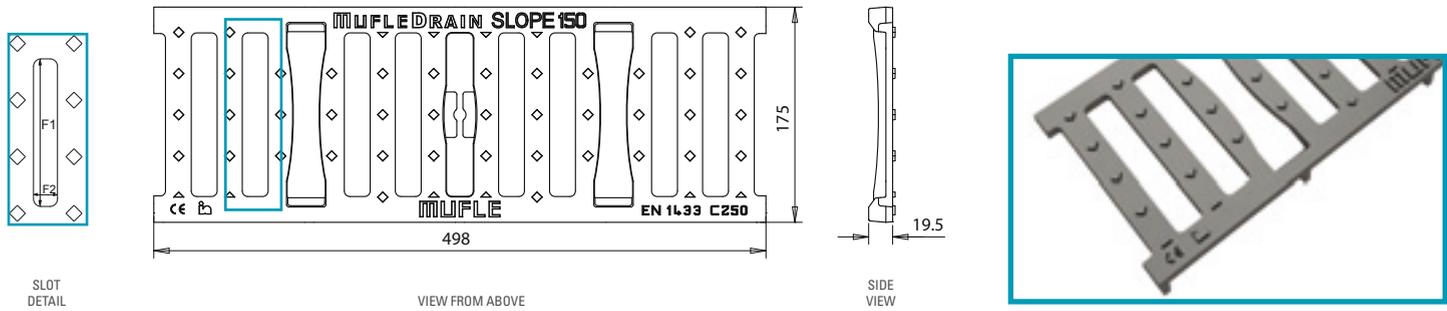
# GRATINGS

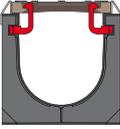


**SLOPE  
150**

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	hook lock
509101		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 175 x 19,5	3,90	3,90	133 x 21	

2- Classification according to American Standard ASTM.  
 5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
 6- Classification according to Standard EN 1563 (2009).  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



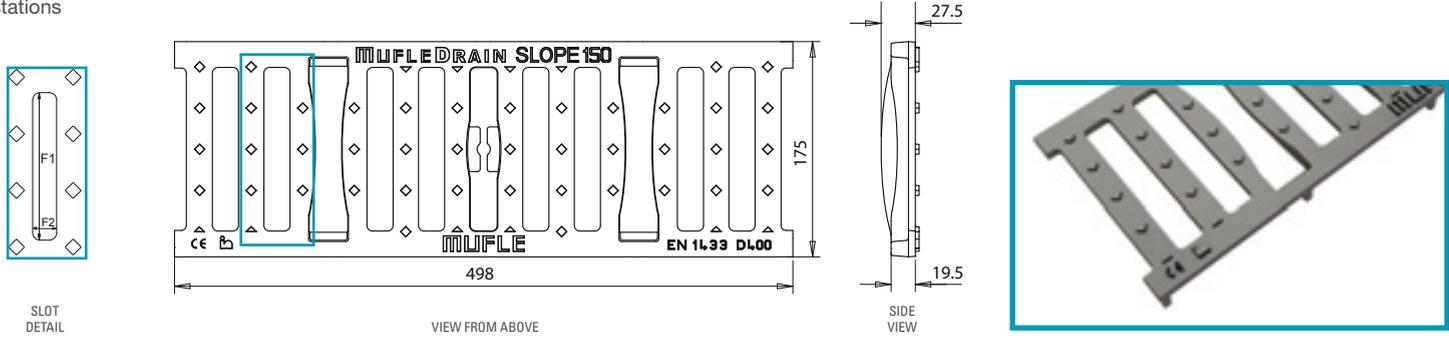
# GRATINGS



**SLOPE  
150**

## APPLICATIONS OF DUCTILE IRON

- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



### SLOTTED GRATING 20 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM hook lock
509104		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 175 x 19,5	4,50	5,00	133 x 21	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



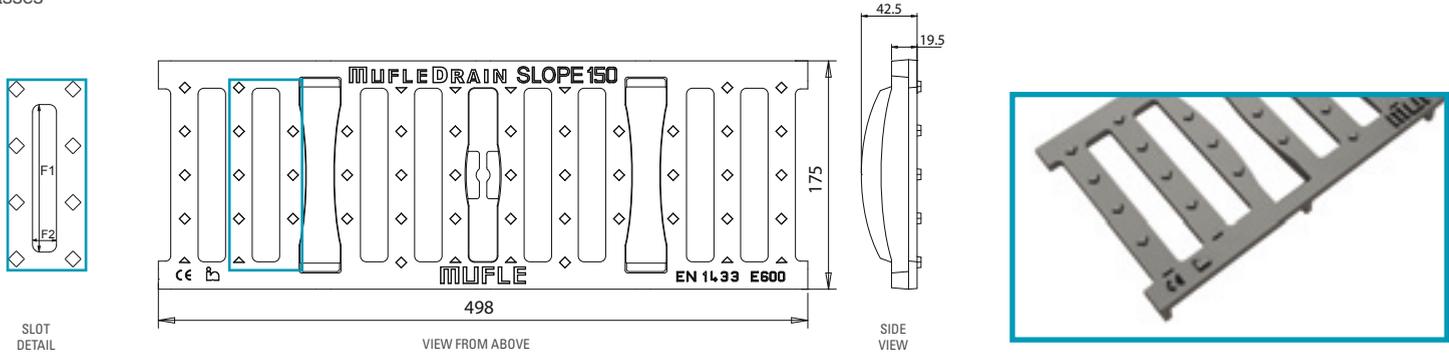
**SLOPE  
150**

## APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic

Industrial areas with passage of forklift trucks (high axle loads)

Underpasses



### SLOTTED GRATING 20 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM hook lock + tie-tod
509107		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 175 x 19,5	6,00	3,29	132 x 20	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



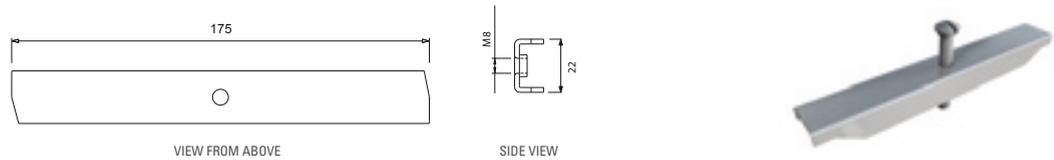
# ACCESSORIES

**SLOPE  
150**



## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
700504		end-cap with drain	PE-HD	150/100	1 x Ø 63
700512		closed end-cap	PE-HD	150/100	-
700505		end-cap with drain	PE-HD	150/160	1 x Ø 110
700513		closed end-cap	PE-HD	150/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
500424		galvanised steel	SMART galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500425		stainless steel	SMART stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500426		black galvanised steel	SMART ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws

## KIT CLAMPS FOR ANCHORING

CODE	PRICE €	MATERIAL	KIT FOR 1 ml
509300		galvanised steel	Kit 8 clamps for anchoring g/s



## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700517		from 150/100 to 150/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



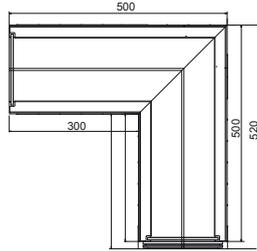
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**SLOPE  
150**

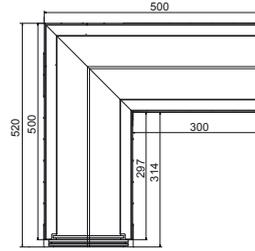
## LEFT CORNER



## SLOPE 150

CODE	PRICE €	MODEL
709104		150/160
709105		150/100

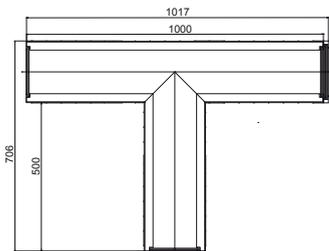
## RIGHT CORNER



## SLOPE 150

CODE	PRICE €	MODEL
709112		150/160
709113		150/100

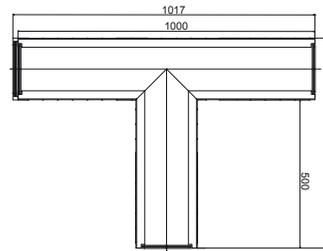
## LEFT TI



## SLOPE 150

CODE	PRICE €	MODEL
709120		150/160
709121		150/100

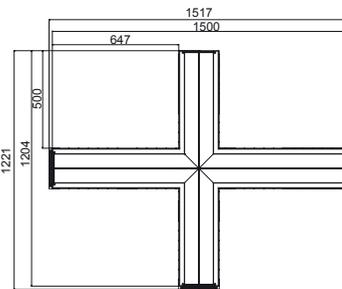
## RIGHT TI



## SLOPE 150

CODE	PRICE €	MODEL
709128		150/160
709129		150/100

## CROSS

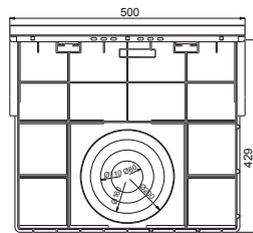


## SLOPE 150

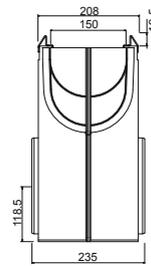
CODE	PRICE €	MODEL
709136		150/160
709137		150/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

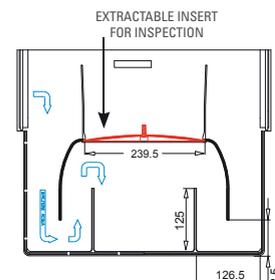
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

## SLOPE 150

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
709031		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 208 x 429	500 x 100 x 400	185	118,5	4,20	2 x Ø 80; 2 x Ø 110; 2 x Ø 160; 2 x Ø 200
709019		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 208 x 429	500 x 100 x 400	185	118,5	4,20	2 x Ø 80; 2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

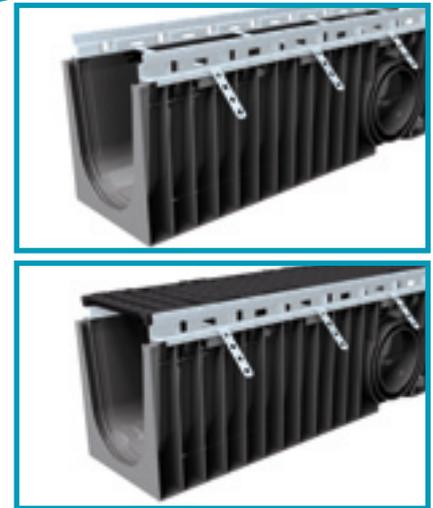
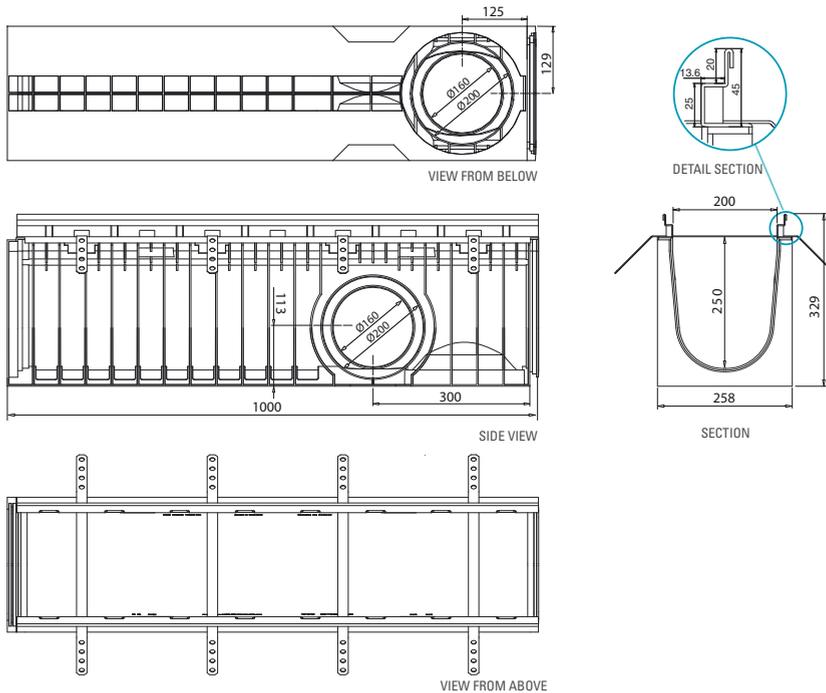


nm



# SLOPE DRAINAGE CHANNEL

**SLOPE  
200**



## SLOPE FRAME FOR DRAINING ASPHALT

This product has been conceived in order to receive and to flow the liquids from the road surface absorbed by the draining asphalt which the modern highways and large- scale roads have been paved with.

The **Slope drainage frame** is completely realized in galvanized steel of 2 mm thickness and replaced the standard Slope frame. The total height is 45 mm that is equivalent to the thickness of standard wearing course: 20 mm are needed for inserting the grating that is the same used for standard Slope frame; 21 mm is the height of the vertical wall, that, duly drilled, receives the water flow from the asphalt layer. The structure of vertical wall has been realized in order to assure the resistance to vehicles traffic crossing over (D400 loading class according to EN 1433). The SLOPE drainage system is certified by the third part IGQ up to the D400 load class and its CE declaration of conformity is available.

The system is equipped with **8 clamps** (4 per each side) in galvanized steel for a better anchoring between concrete and channel and for centering the grating and joining it perfectly to the frame. The grating is assembled to channel with fixing system through **tie-rods**.

\* The channel can be realized in flame- retardant polyolefin on request.

DRAINING SLOPE 200/250										
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	DRAINAGE SECTION SIDE HOLES	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	cm <sup>2</sup>	dm <sup>3</sup>	mm
709035		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 329	1000 x 200 x 250	8,00	430,00	86,2	43,00	side 2 x Ø 160; 2 x Ø 200 bottom 1 x Ø 160; 1 x Ø 200

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

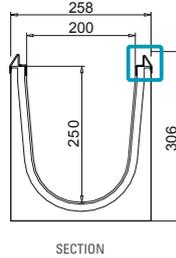
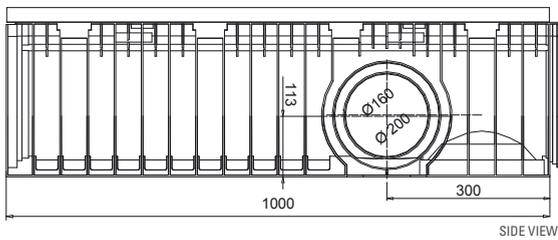
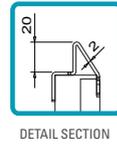
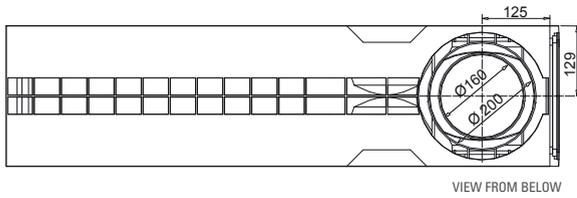
N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



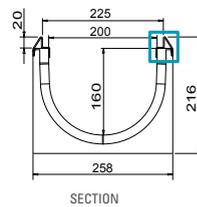
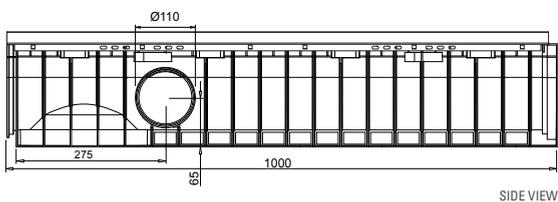
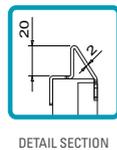
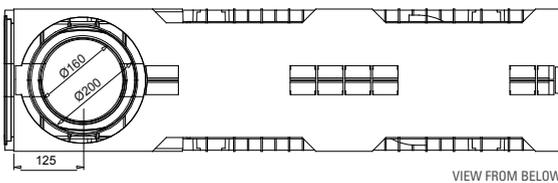
# CHANNELS

**SLOPE  
200**



## SLOPE 200/250

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
709033		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 306	1000 x 200 x 250	7,30	430,00	43,00	side 2 x Ø 160; 2 x Ø 200 bottom 1 x Ø 160; 1 x Ø 200
709034		stainless steel AISI 304 <sup>2</sup>							



## SLOPE 200/160

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
709028		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 216	1000 x 200 x 160	5,85	275,87	27,58	side 2 x Ø 110 bottom 1 x Ø 160; 1 x Ø 200
709014		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

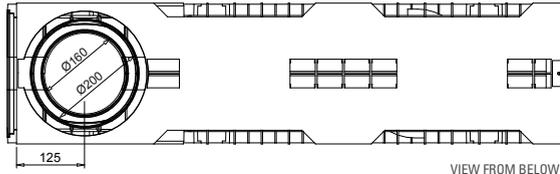
N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

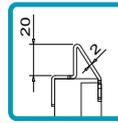


# CHANNELS

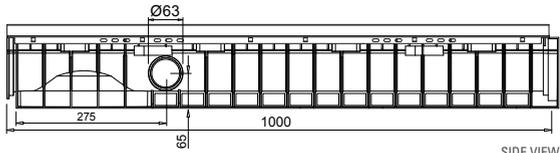
**SLOPE  
200**



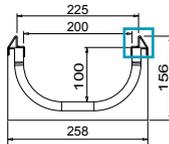
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION



## SLOPE 200/100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT Kg	DRAINAGE SCETION cm <sup>2</sup>	CAPACITY	PREINSTALLED DRAIN mm
709029		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 156	1000 x 200 x 100	5,25	178,73	17,87	side 2 x Ø 63 bottom 1 x Ø 160; 1 x Ø 200
709015		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



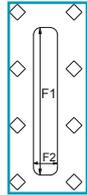
# GRATINGS



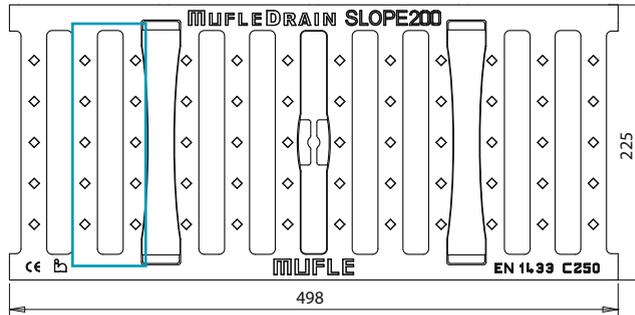
**SLOPE  
200**

## APPLICATIONS OF DUCTILE IRON

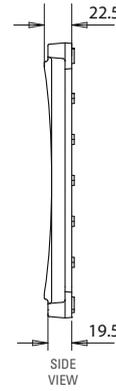
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



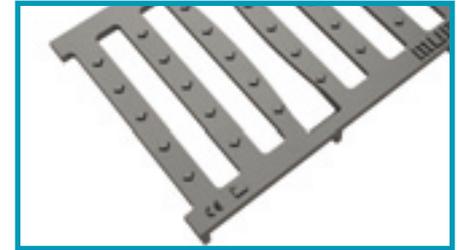
SLOT  
DETAIL

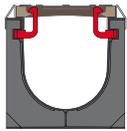


VIEW FROM ABOVE



SIDE  
VIEW



SLOTTED GRATING 20 mm								22,5 mm	
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM		
							hook lock	tie-tod	
509102		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 225 x 19,5	5,00	4,00	183 x 21		 For Slope drainage channel only	

2- Classification according to American Standard ASTM.  
 5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
 6- Classification according to Standard EN 1563 (2009).  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



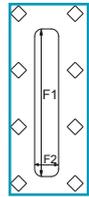
# GRATINGS



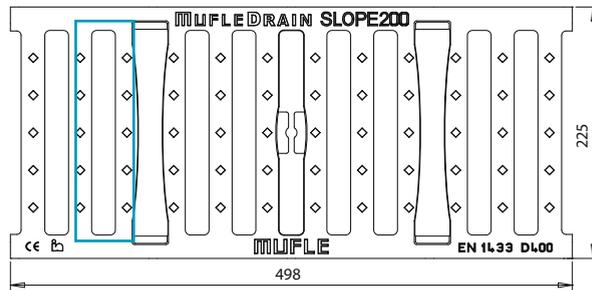
**SLOPE  
200**

## APPLICATIONS OF DUCTILE IRON

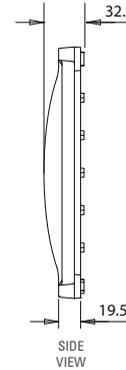
- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



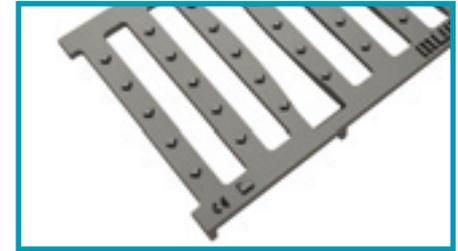
SLOT  
DETAIL



VIEW FROM ABOVE

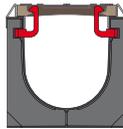


SIDE  
VIEW



### SLOTTED GRATING 20 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							hook lock	tie-tod
509105		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 225 x 19,5	6,40	4,50	183 x 21		 For Slope drainage channel only

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



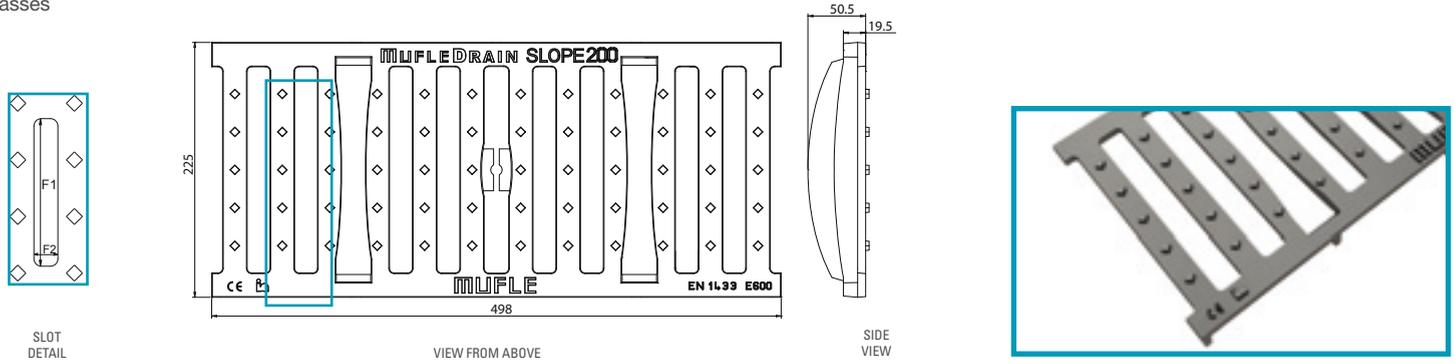
**SLOPE  
200**

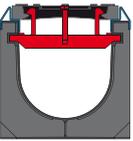
## APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic

Industrial areas with passage of forklift trucks (high axle loads)

Underpasses



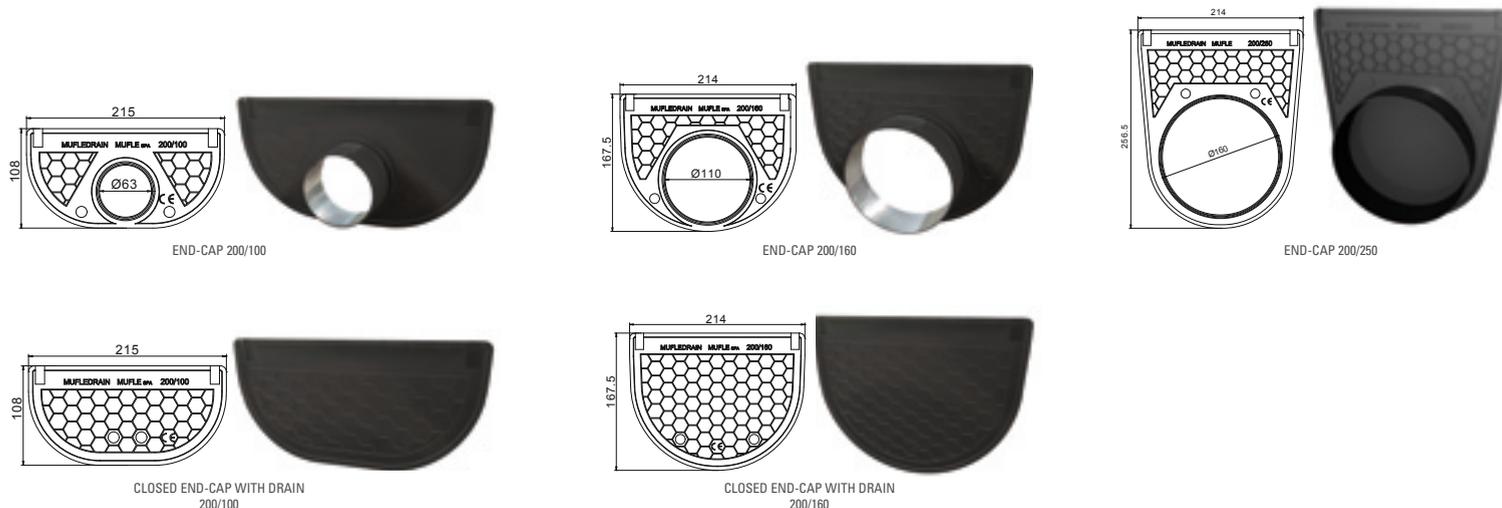
SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	hook lock + tie-tod
509108		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 225 x 19,5	7,70	4,50	182 x 20	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



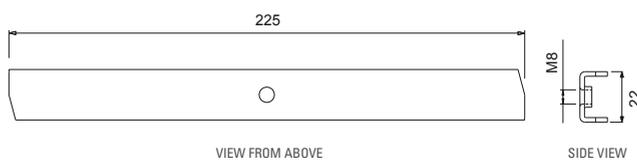
# ACCESSORIES

**SLOPE  
200**



## END CAPS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
700506		end-cap with drain	PE-HD	200/100	1 x Ø 63
700514		closed end-cap	PE-HD	200/100	-
700507		end-cap with drain	PE-HD	200/160	1 x Ø 110
700515		closed end-cap	PE-HD	200/160	-
502416		closed end cap with preformed outlet	PE-HD	200/250	1 x Ø 160



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
500427		galvanised steel	SLOPE galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500428		stainless steel	SLOPE stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500429		black galvanised steel	SLOPE ductile iron	M8 x 55 black with hexagonal head	2 tie-rods + 2 screws
500430		black galvanised steel	SLOPE ductile iron + Draining Frame	M8 x 90 black with hexagonal head	2 tie-rods + 2 screws

## KIT CLAMPS FOR ANCHORING

CODE	PRICE €	MATERIAL	KIT FOR 1 ml
509300		galvanised steel	Kit 8 clamps for anchoring g/s



## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700518		from 200/160 to 200/250	VIP - SLOPE - WING
700519		from 200/100 to 200/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



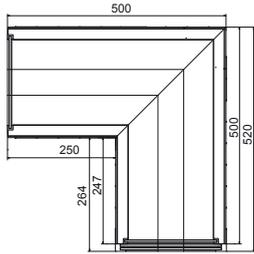
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**SLOPE  
200**

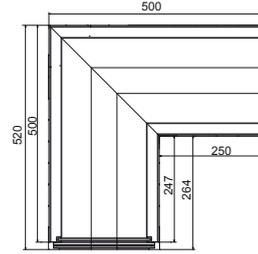
## LEFT CORNER



## SLOPE 200

CODE	PRICE €	MODEL
709140		200/250
709106		200/160
709107		200/100

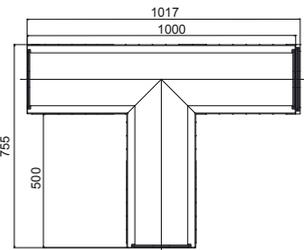
## RIGHT CORNER



## SLOPE 200

CODE	PRICE €	MODEL
709141		200/250
709114		200/160
709115		200/100

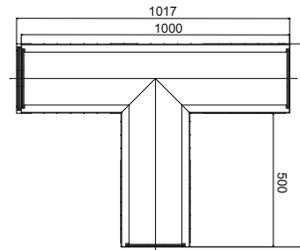
## LEFT TI



## SLOPE 200

CODE	PRICE €	MODEL
709142		200/250
709122		200/160
709123		200/100

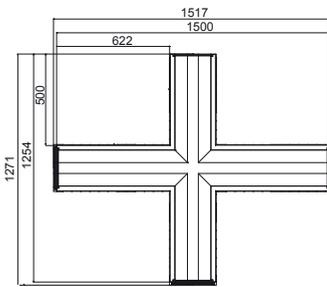
## RIGHT TI



## SLOPE 200

CODE	PRICE €	MODEL
709143		200/250
709130		200/160
709131		200/100

## CROSS

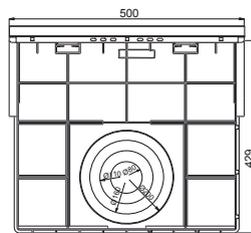


## SLOPE 200

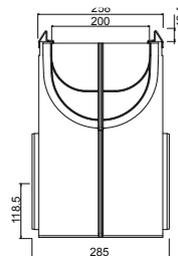
CODE	PRICE €	MODEL
709144		200/250
709138		200/160
709139		200/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

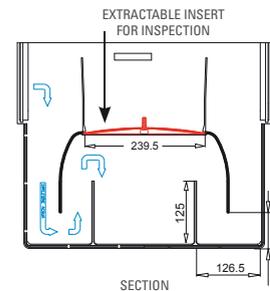
## DRAIN BOX WITH SYPHON<sup>17</sup>



FRONT VIEW



SIDE VIEW



SECTION

## SLOPE 200

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
709032		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 258 x 429	500 x 200 x 400	285	118,5	4,60	2 x Ø 80; 2 x Ø 110; 2 x Ø 160; 2 x Ø 200
709021		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 258 x 429	500 x 200 x 400	285	118,5	4,60	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

17- The drain box Easy, Vip, Smart, Slope and Wing 200 are not prearranged to be connected to the correspondent channels EASY, VIP, SMART, SLOPE and WING 200/250  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

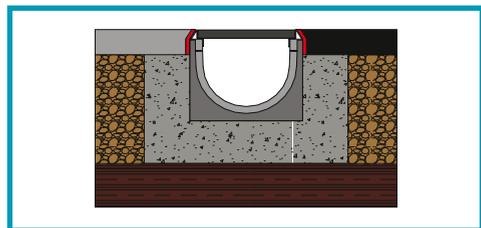
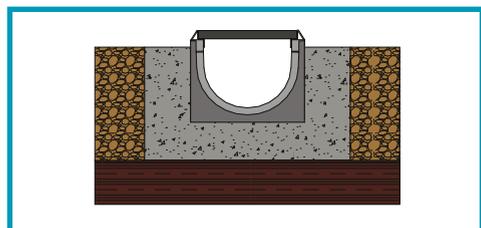
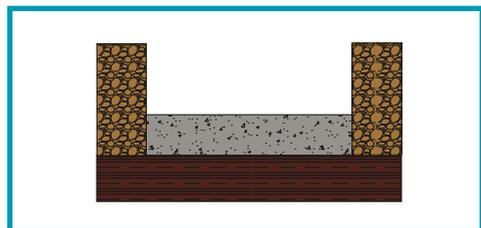
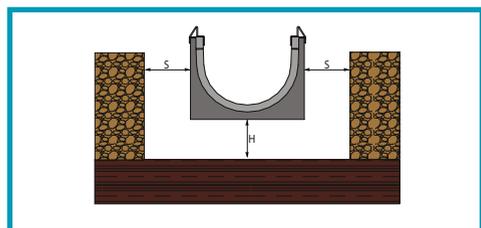
## “For all the drainage channels the manufacturer shall supply written instructions for general installation” (Ref. § 7.17 EN 1433)

The installation instructions enclosed in the present technical section are given only as an example in order to supply the main guide lines to the final fitter.

Any particular installation must be evaluated/ agreed between MufleSystem srl and the project maker.

The correct installation is necessary to guarantee the proper loads resistance of the drainage system (channel and grating) to static and dynamical traffic which is subjected to.

The correct installation involves a longer operational length of the drainage system itself as well as its better hydraulic function.



**NEW FEATURE:**  
The channels can be installed with preassembled gratings

### Step 1

#### HOLE SIZE

The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the Summary Table. In this step make sure the underlying layer is suitable to the load it is expected to support.

### Step 2

#### CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. In case that cycles of loading and unloading are often (for example: periodic transit of vehicles) or the loads are particular heavy (E600 - F900), we recommended to reinforce the concrete base with a electro-welded net or with or beaded mouldings Ø 8 with mesh 15x15 cm. At this stage it is needed to arrange possible slopes of the drainage line.

### Step 3

#### CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet and block them at basis in order to avoid any floating or misalignment during the concrete casting for the side prop.

Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation.

As well as the step 2, also for the side prop concrete arrange the reinforcement.

### Step 4

#### FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane.

## Recommendations for installation

1. In case that channels watertightness is requested, MufleSystem is purposely recommending the use of a bituminous silicone sealant “SHELL TIXOPHALTE”: after carrying out the side prop, apply a thin and homogeneous sealant strip on each slot between the channels and the following one (clean the eventual exceeding sealant). It is strongly advised not to apply the strips of “SHELL TIXOPHALTE” inside the slots in the female joint of the channels before coupling them. Eventually a through and long- lasting guarantees to avoid any leakages can be obtained by welding the joints; this requires welding machines and experienced technicians.
2. While carrying out the phase 2 and 3, protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.
3. In case the drainage line is subjected to horizontal loads (for example concrete casting for industrial paving, private car parks and parking decks), it is necessary to arrange effective expansion joints for both direction, parallel and perpendicular to the channels. These joints shall be placed according to the norm standards in force and shall not be placed close to drainage line.
4. In case the drainage line shall be installed on roofs or terraces, it is obligatory to arrange a waterproof sheet according to specific projects.



N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

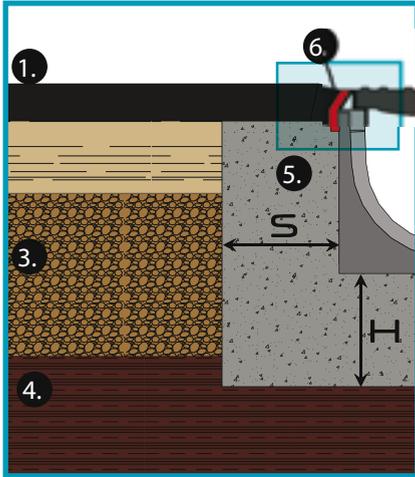


# INSTALLATION

**SLOPE**

## Case 1

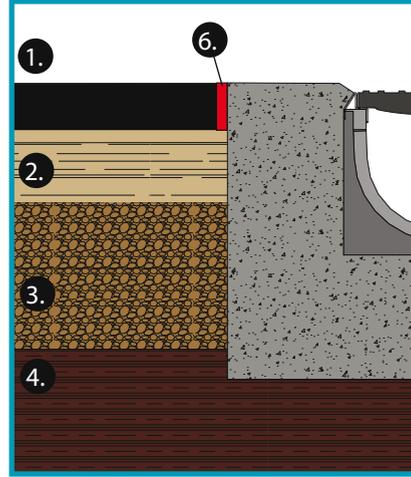
Asphalt  
(C250)



1. Sheet asphalt
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint

## Case 2

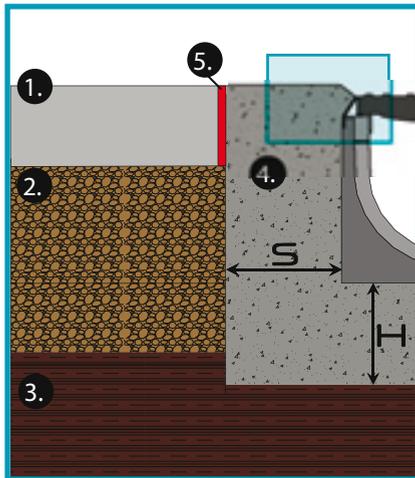
Asphalt  
(D400)



1. Sheet asphalt
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint

## Case 3

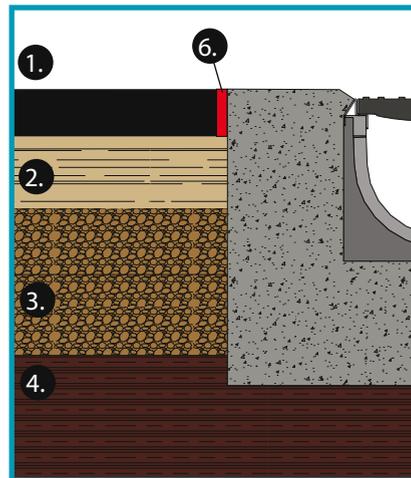
Concrete screed for streets and roads  
(da C250 a D400)



1. Concrete flooring
2. Bearing layer
3. Subfloor
4. Concrete reinforcement layer
5. Expanded joint

## Case 4

Flooring  
(C250)



1. Flooring
2. Lower layer
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer

This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- use class S4 (EN 206-1) and stone aggregate with maximum diameter 8mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

### SUMMARY TABLE

Load class (EN 1433)		C 250	D 400	E 600
Applicable load (EN 1433)	kN	250	400	600
Minimum height H of concrete laying bed	mm	150	200	200
Minimum thickness S of the concrete fl anking	mm	150	200	200
Concrete compression strength class (EN 206-1)		C 25/30	C 25/30	C 30/37
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 35/45 XF4

7- If concrete can be affected by frost and thaw cycles.

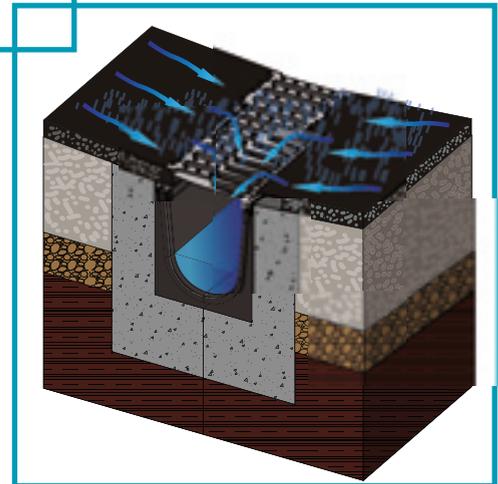
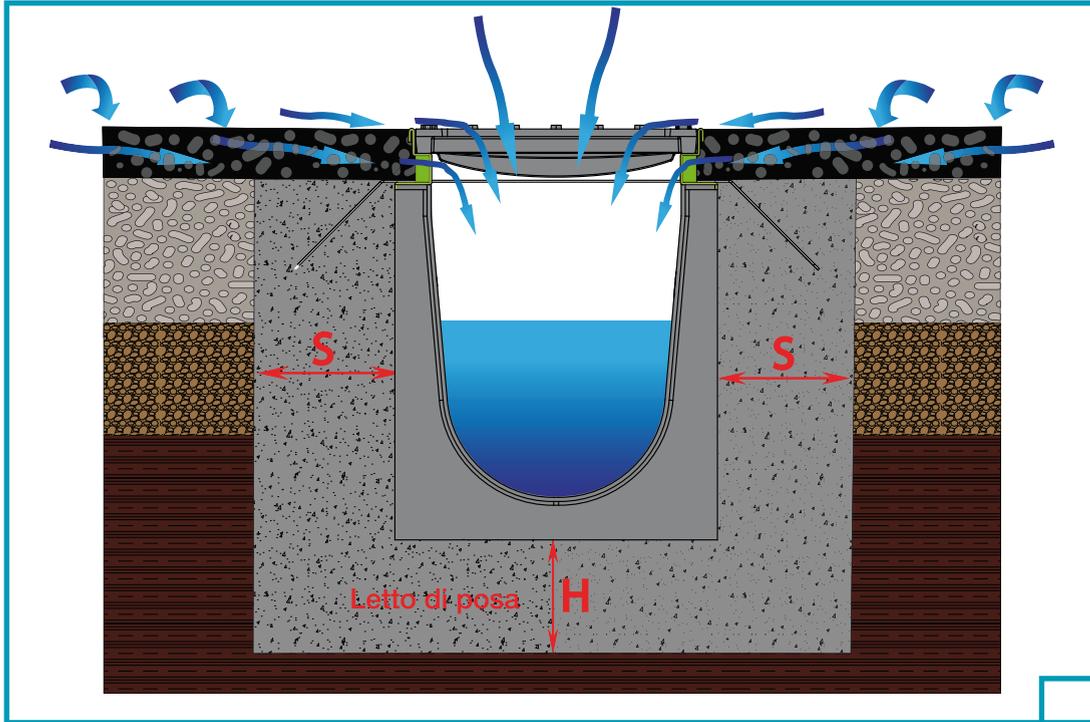
N.B. Muflesystem reserves the right to modify the technical characteristics on this document without prior notice, these are only informative data that can be changed in the development of our products range.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION SLOPE FRAME FOR DRAINING ASPHALT

**SLOPE**



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- use class S4 (EN 206-1) and stone aggregate with maximum diameter 8mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

## SUMMARY TABLE

Load class (EN 1433)		C 250	D 400
Applicable load (EN 1433)	kN	250	400
Minimum height H of concrete laying bed	mm	150	200
Minimum thickness S of the concrete flanking	mm	150	200
Concrete compression strength class (EN 206-1)		C 25/30	C 25/30 <sup>15</sup>
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.

15- If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.

N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIFICATIONS

**SLOPE**

1. Supply and installation of MufleDrain SLOPE type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. Galvanised (stainless) steel upper profile, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 20 mm, connection through prearranged coupling to the channel structure. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap \_\_\_mm, internal height \_\_\_ mm
2. Supply and installation of MufleDrain SLOPE type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 side drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. Galvanised (stainless) steel upper profile, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 20 mm, connection through prearranged coupling to the channel structure. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000mm, internal net gap 100 mm, internal height \_\_\_ mm.
3. Supply and installation of MufleDrain SLOPE type HD-PE drainage channel with external stiffening ribs and male- female coupling system allowing the assembly between one channel and the next with the relevant pre- assembled gratings. The channel will have 3/4 drainage diaphragms at pre- determined points. Galvanized (stainless) steel upper profile, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not lower than 20 mm, connection through prearranged coupling to the channel structure. The channel is equipped with 8 hooks for the fixing system hook – lock that are pre-installed and cannot be dismantled. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1000 mm, internal net gap \_\_\_\_\_ mm, internal height \_\_\_\_\_ mm.
4. Supply and installation of MufleDrain SLOPE type HD-PE drainage channel with external stiffening ribs and male- female coupling system allowing the assembly between one channel and the next with the relevant pre- assembled gratings. The channel will have 2 side drainage diaphragms at pre- determined points and a prearranged 100 (110) mm diameter bottom outlet that can be fixed through 4 screws. Galvanized (stainless) steel upper profile, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not lower than 20 mm, connection through prearranged coupling to the channel structure. The channel is equipped with 8 hooks for the fixing system hook – lock that are pre-installed and cannot be dismantled. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1000 mm, internal net gap 100 mm, internal height \_\_\_\_\_ mm.
5. Supply and installation of MufleDrain SLOPE type HD-PE drainage channel that is characterized by a special geometry on the external surface consisting in wall with stiffening ribs. There are 21 equidistant primary ribs meeting on a flat surface and 12 shorter secondary ribs, all of them perpendicular to the upper edge. The male-female coupling system allows the assembly between one channel and the next with the relevant pre- assembled gratings. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. Galvanized (stainless) steel upper profile, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not lower than 45 mm. The profile will be shaped in order to let the grating fit in and its flat wall, that, duly drilled, allows the water absorbed by the drainage wearing surface of road asphalt to flow into the channel. This drainage wall shall be high not lower than 25 mm and shall be properly flanked in order to avoid crushing under loads. Every channel will be equipped with 2 profiles as above- described, one per each side, while the drainage section assured by side holes of frames shall be not lower than 86 cm<sup>2</sup>. The frames shall be fixed to the channel through 4 tie-rods, 4 nuts and 4 lock washers to avoid unscrewing and make the whole system "channel + frame" solid and monolithic. The channel shall be equipped with 8 clamps, that, once made the concrete side flanking, will serve as reinforcement for the whole system. The channel complies with the essential requirements specified by the EN 1433-2008 and is applied with the CE- mark. The channel dimensions will be the following: length 1.000 mm, internal net gap 200 mm, internal height 250 mm.
6. Supply and installation of ductile with mesh GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SLOPE drainage channels with "hook-lock" fixing system, load class C250 (D400) according to EN 1433-2008, slit width 20 mm, length 498 mm, width 125 mm.
7. Supply and installation of ductile with mesh GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SLOPE drainage channels with "hook-lock" fixing system, load class C250 (D400) according to EN 1433-2008, with mesh, length 498 mm, width 125 mm.
8. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain SLOPE drainage channels with "hook-lock" fixing system + bar, load class E 600 according to EN 1433-2008, slit width 20 mm, length 498 mm, width \_\_\_mm.
9. Supply and installation of HD-PE open cap with drainage hole diameter \_\_\_mm for MufleDrain drainage channel with coupling system into the special channel housing.
10. Supply and installation of HD-PE open cap with drainage hole diameter \_\_\_mm for MufleDrain drainage channel with coupling system into the special channel housing.
11. Supply and installation of HD-PE boxes with siphon for MufleDrain SLOPE drainage channels with external stiffening ribs and coupling system. Galvanised (stainless) steel upper profile, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 20 mm, connection through prearranged coupling to the gully structure. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 534 mm, net gap \_\_\_ mm, internal height 400 mm.

# WING

The system:

- it supports 4 load classes (C250, D400, E600, F900) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- it is very compact, since the frame is perfectly anchored to the channel body. The frame is made from materials able to resist corrosion due to contact with the surrounding environment and the gratings. The anchoring system was designed to withstand any deformation due shearing or torsional stress
- it is wearproof and very solid thanks to the frame, which ensures a 4 mm - thick drive-over edge and a 2 mm - thick contact surface in compliance with Standard EN 1433 on classes subject to heavy loads
- it comprises a wide range of standard gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron, as well as galvanised-steel and ductile iron blind covers, and a cover specially designed for composting systems
- it comes complete with an innovative grating for draining asphalt in D400 which has slots in the upper and side sections in order to receive the liquids from the road surface - both surface liquids and liquids absorbed by the draining asphalt
- it has tie-rod and screw fixing systems; and a convenient drain gate
- it is ideal for medium-to-heavy uses, exhibition areas, parking decks, road carriageways, parking areas, service areas, industrial areas, ports and airports, areas where containers are (un)loaded
- it comes complete with drain boxes with siphon
- the range is made up of 11 channels with 3 widths and 6 heights (100/55, 100/80, 100/100, 100/160, 150/40, 150/100, 150/160, 200/40, 200/100, 200/160, 200/250)
- the range is supplemented with the WING channel with ductile iron strengthening frame - length 1.5 m and usable dimensions 300 x 300 mm. Designed to drain large surfaces



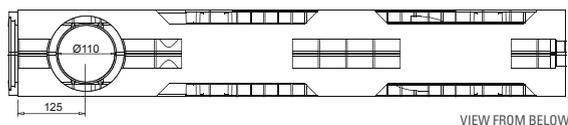


100

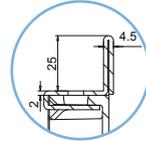


# CHANNELS

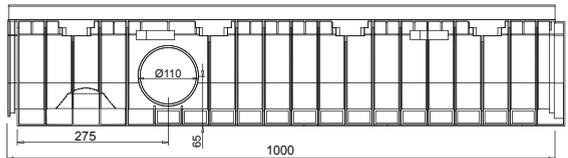
WING  
100



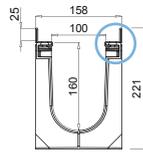
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

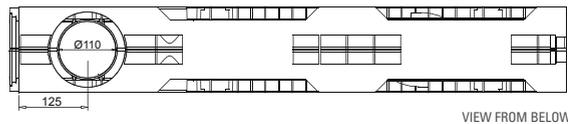


SECTION

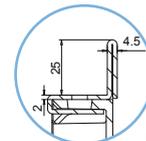


## WING 100/160

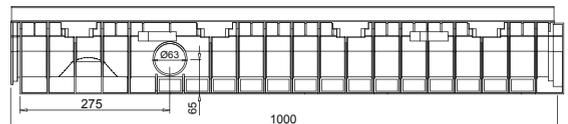
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm	
703000		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 221	1000 x 100 x 160	4,90	145,28	14,52	side bottom <sup>1</sup>	2 x Ø 110 1 x Ø 110
703008		stainless steel AISI 304 <sup>2</sup>								



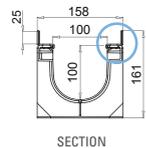
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION



## WING 100/100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm	
703001		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 161	1000 x 100 x 100	4,40	89,56	8,95	side bottom <sup>1</sup>	2 x Ø 63 1 x Ø 110
703009		stainless steel AISI 304 <sup>2</sup>								

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

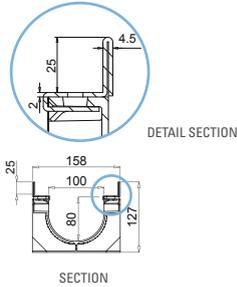
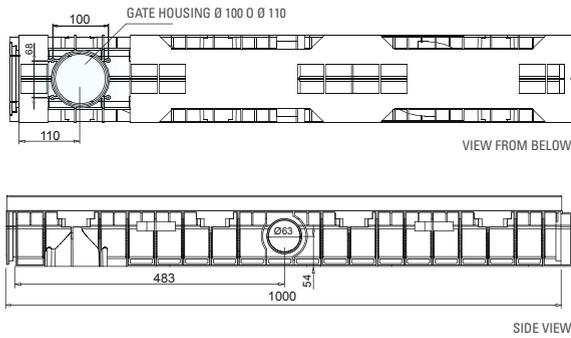
N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

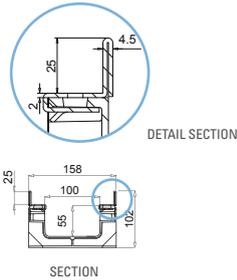
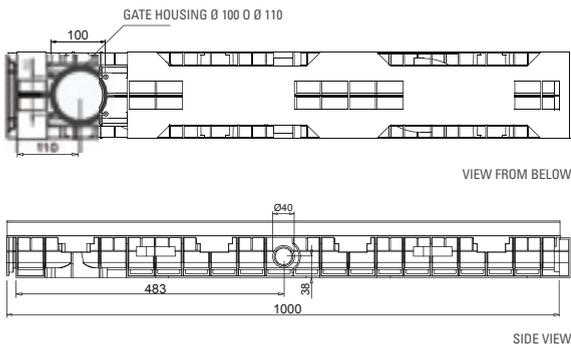


# CHANNELS

WING  
100



WING 100/80									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
703002		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 127	1000 x 100 x 80	4,10	69,28	6,92	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110
703010		stainless steel AISI 304 <sup>2</sup>							



WING 100/55									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
703003		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 102	1000 x 100 x 55	3,90	54,44	5,44	side 2 x Ø 40 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110
703011		stainless steel AISI 304 <sup>2</sup>							

1- For drainage purposes use the drain gate with outlet kit (available in two versions Ø100 and Ø110).

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



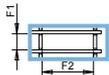
WING  
100

## APPLICATIONS OF GALVANISED STEEL

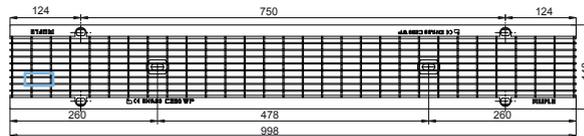
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks

## APPLICATIONS OF STAINLESS STEEL

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks
- Areas with low-load transit in food factories
- Areas with low-load transit in chemically aggressive environments



DETAIL OF  
HOOKING  
SYSTEM



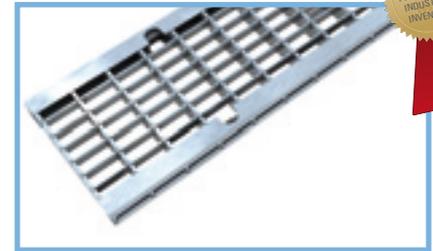
VIEW FROM ABOVE



SIDE  
VIEW



DETAIL OF  
UPRIGHT  
BEND



PATENT  
PRODUCT FOR  
INDUSTRIAL  
INVENTION

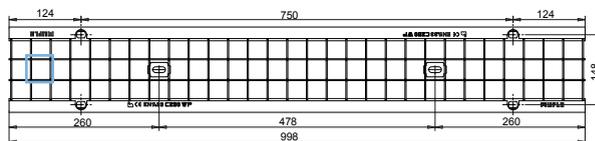
## ANTI-HELL MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503121		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 25	5,50	8,30	10,2 x 31,2		
503122		pickled stainless steel AISI 304 <sup>2</sup>						
503149		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 25	2,75	4,15			
503150		pickled stainless steel AISI 304 <sup>2</sup>						



DETAIL OF  
SQUARE  
MESH



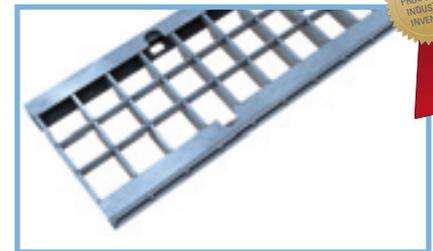
VIEW FROM ABOVE



SIDE  
VIEW



DETAIL OF  
UPRIGHT  
BEND



PATENT  
PRODUCT FOR  
INDUSTRIAL  
INVENTION

## SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503123		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 25	4,80	9,38	34,2 x 31,2		
503124		pickled stainless steel AISI 304 <sup>2</sup>						
503151		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 25	2,40	4,69			
503152		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



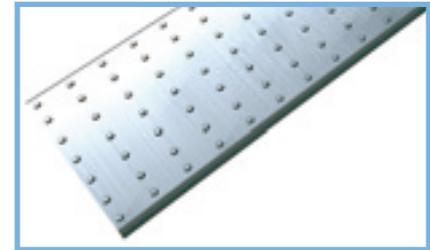
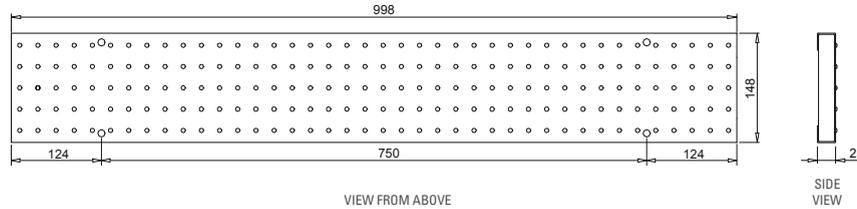
# GRATINGS AND SOLID TOP COVERS



WP  
100

## APPLICATIONS

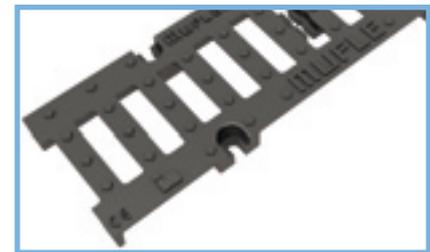
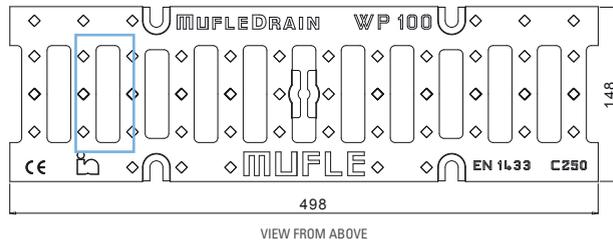
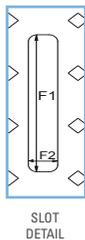
Cable passageway  
Passageway for water and/or heat systems



SOLID TOP COVER						
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM	
	€		mm	kg	screw	
503101		hot dip galvanised steel DX51D <sup>3</sup>	998 x 148 x 25	3,00		

## APPLICATIONS OF DUCTILE IRON

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503108		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 X 148 x 25	4,65	1,94	82,0 x 20,0	

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

6- Classification according to Standard EN 1563 (2009).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



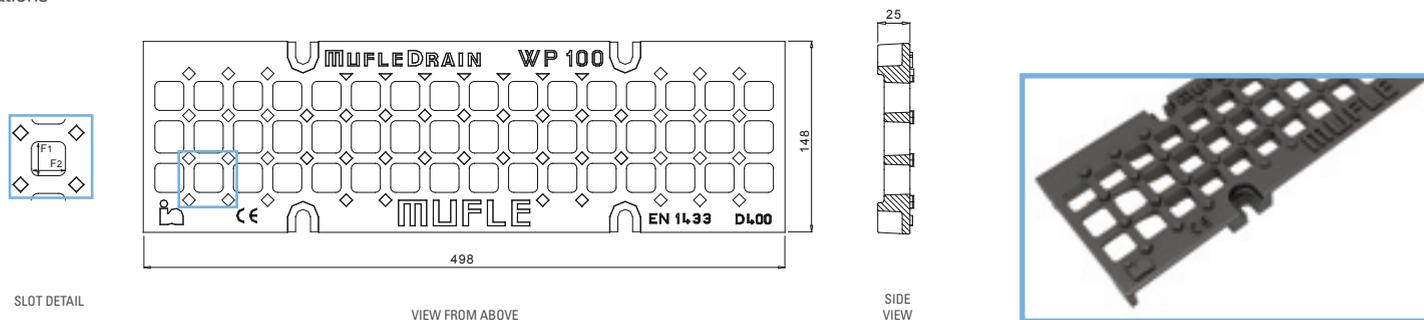
# GRATINGS

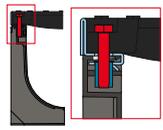


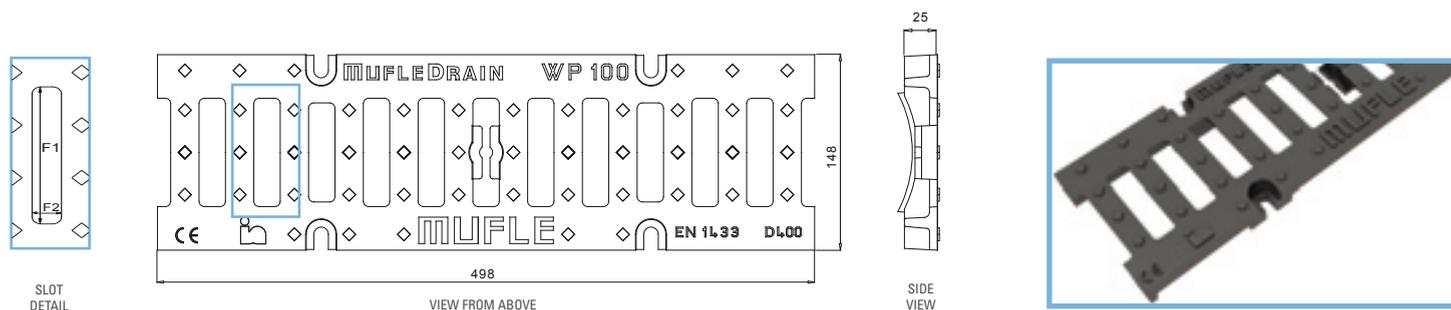
WP 100

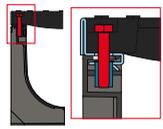
## APPLICATIONS OF DUCTILE IRON

- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503182		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	4,80	2,43	22,5 x 22,5	



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503109		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	4,75	1,94	82,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



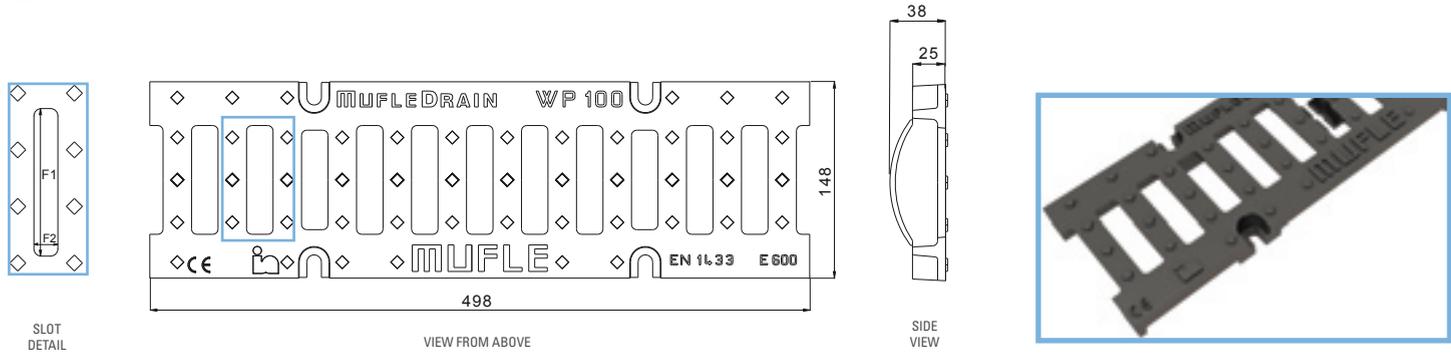
# GRATINGS

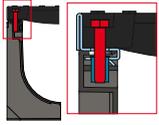


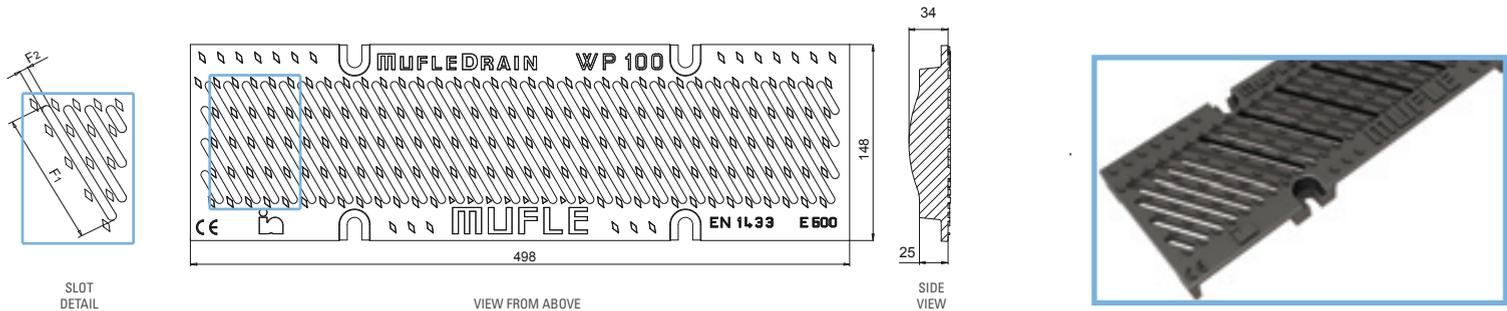
WP 100

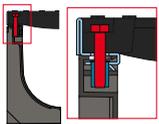
## APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic  
 Industrial areas with passage of forklift trucks (high axle loads)  
 Underpasses



SLOTTED GRATING 20 mm							 38 mm
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503110		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	5,10	1,94	82,0 x 20,0	



SLOTTED GRATING 6 mm							 34 mm
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503418		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	4,90	2,13	105,5 x 6,0	

6- Classification according to Standard EN 1563 (2009).  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



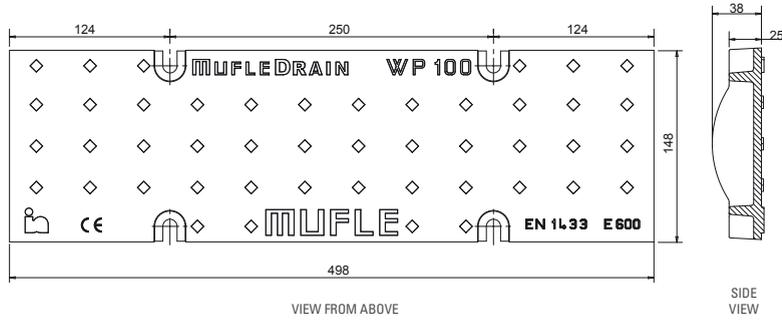
# SOLID TOP COVERS



WING  
100

## APPLICATIONS

Cable passageway  
Passageway for water and/or heat systems



SOLID TOP COVER					
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM
	€		mm	kg	screw
503105		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	6,00	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

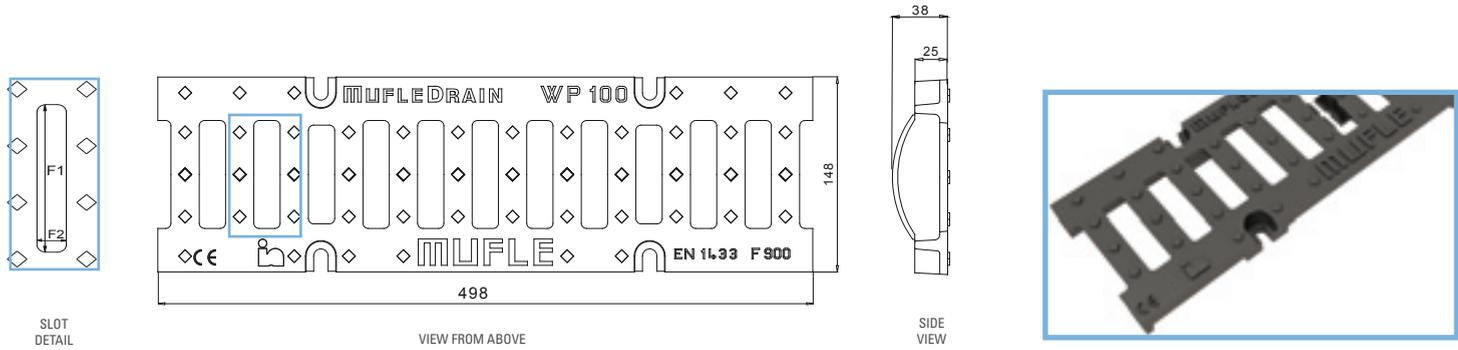


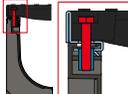
# GRATINGS



WP 100

## APPLICATIONS OF DUCTILE IRON Port and airport areas



SLOTTED GRATING 20 mm							 38 mm
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503173		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	6,30	1,94	82,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SLOTTED GRATINGS

TYPE D 400  
MIDDLE  
DRIVEWAY

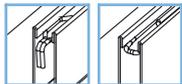
WING  
100

## APPLICATIONS OF GALVANISED STEEL

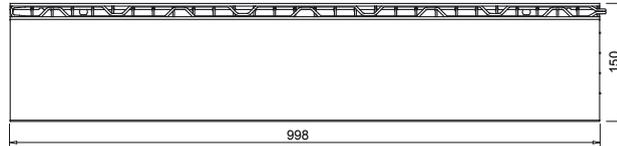
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements

## APPLICATIONS OF STAINLESS STEEL

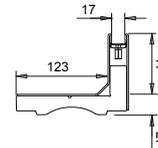
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements



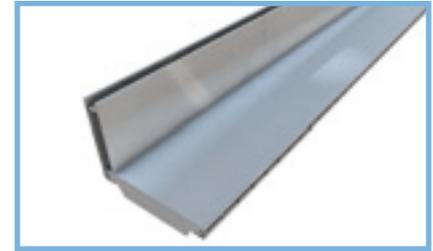
DETAIL OF HOOKIN F  
SYSTEM<sup>8</sup>



VIEW FROM ABOVE

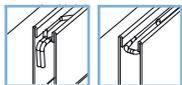


SIDE VIEW

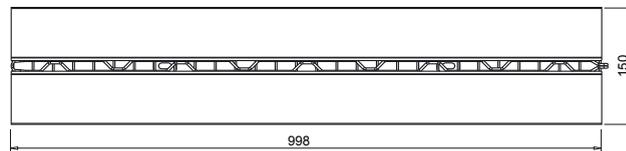


## L-SHAPED GRATING

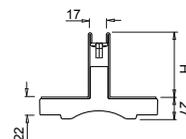
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
503192		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 150 x 107	80	8,50	1,80	998 x 18
503431		pickled stainless steel AISI 304 <sup>2</sup>					
503193		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 150 x 147	120	9,50		
503432		pickled stainless steel AISI 304 <sup>2</sup>					



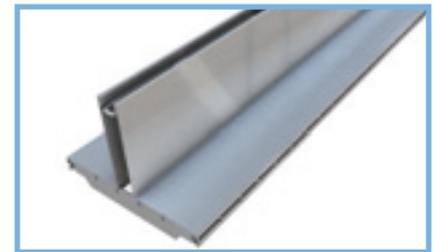
DETAIL OF HOOKIN F  
SYSTEM<sup>8</sup>



VIEW FROM ABOVE



SIDE VIEW



## T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
503186		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 150 x 107	80	7,40	1,80	998 x 18
503419		pickled stainless steel AISI 304 <sup>2</sup>					
503187		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 150 x 147	120	8,80		
503420		pickled stainless steel AISI 304 <sup>2</sup>					

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

8- Hooking System between the gratings through hooks and holes.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

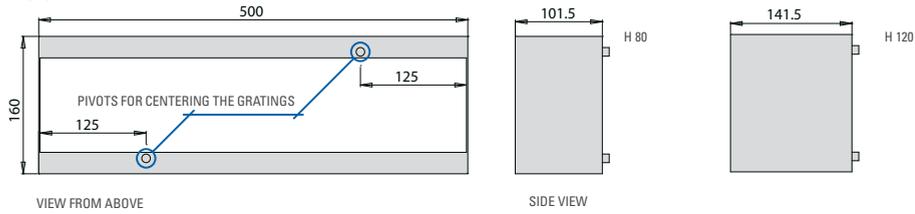


# INSPECTION ELEMENT FOR L-SHAPED GRATING

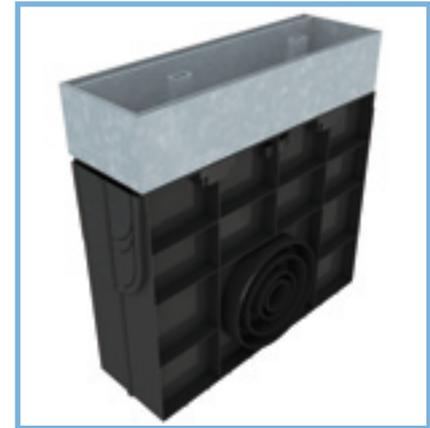
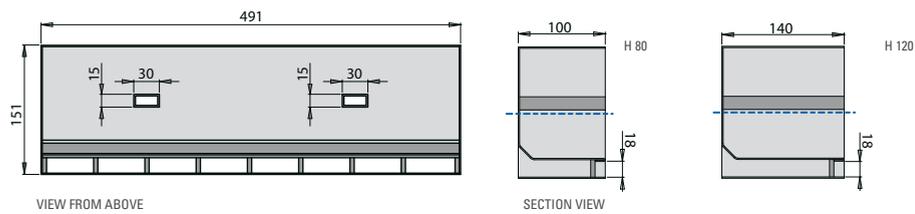
TYPE D 400  
MIDDLE  
DRIVEWAY

WING  
100

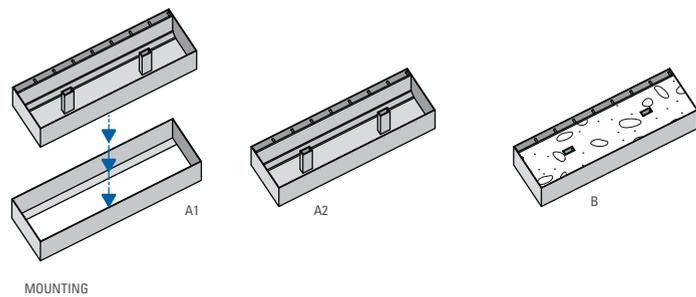
## CONTAINMENT TANK



## INSPECTION GRATING



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 44 for the details of the drain box with siphon.



## INSPECTION ELEMENT FOR L-SHAPED GRATING - WING 100

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500225		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 160 x 101,5	491 x 18	1,8	5,70
500237		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 160 x 101,5	491 x 18	1,8	5,30
500226		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 160 x 141,5	491 x 18	1,8	7,70
500238		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 160 x 141,5	491 x 18	1,8	7,10

## HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

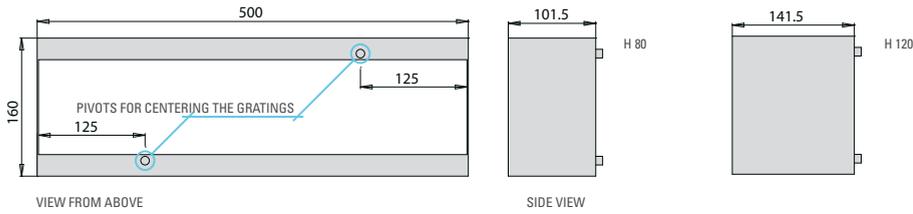


# INSPECTION ELEMENT FOR T-SHAPED GRATING

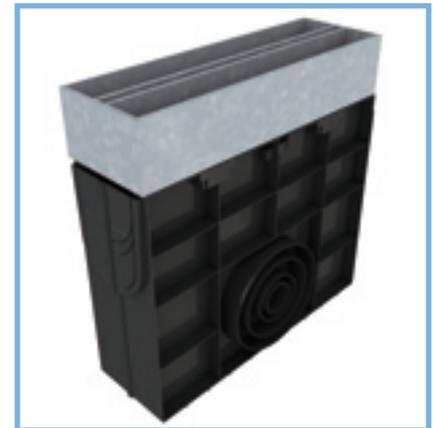
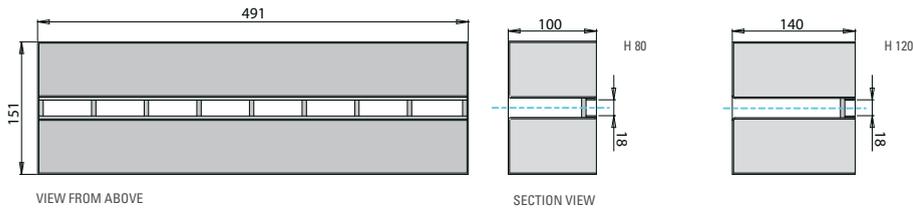
TYPE D 400  
MIDDLE  
DRIVEWAY

WING  
100

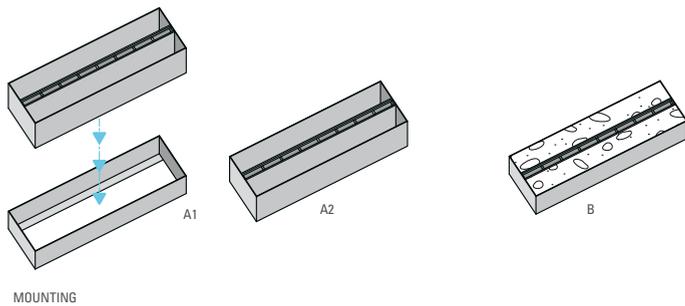
## CONTAINMENT TANK



## INSPECTION GRATING



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 44 for the details of the drain box with siphon.



### INSPECTION ELEMENT FOR T-SHAPED GRATING - WING 100

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500219		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 160 x 101,5	491 x 18	1,8	5,30
500231		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 160 x 101,5	491 x 18	1,8	4,90
500220		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 160 x 141,5	491 x 18	1,8	7,00
500232		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 160 x 141,5	491 x 18	1,8	6,50

### HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

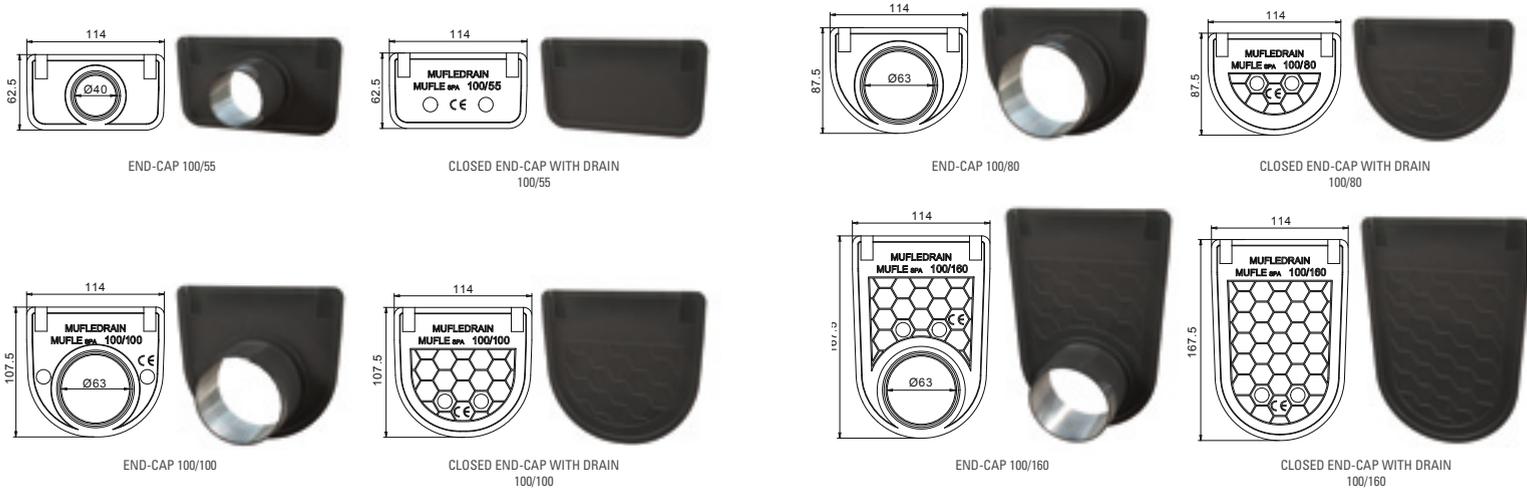
5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



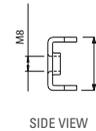
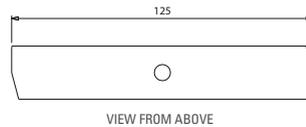
# ACCESSORIES

WING  
100



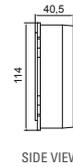
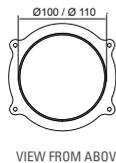
## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR GRATINGS	PREINSTALLED DRAIN OUTLETS
					mm
700500		end-cap with drain	PE-HD	100/55	1 x Ø 40
700508		closed end-cap	PE-HD	100/55	-
700501		end-cap with drain	PE-HD	100/80	1 x Ø 63
700509		closed end-cap	PE-HD	100/80	-
700502		end-cap with drain	PE-HD	100/100	1 x Ø 63
700510		closed end-cap	PE-HD	100/100	-
700503		end-cap with drain	PE-HD	100/160	1 x Ø 63
700511		closed end-cap	PE-HD	100/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
500421		galvanised steel	WING galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	WING stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



## KIT OUTLET + SCREWS

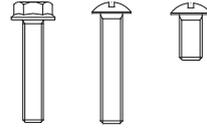
CODE	PRICE €	MATERIAL	VALID FOR CHANNELS	DIAMETER mm	KIT FOR 1 ml
506114		PE-HD	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		PE-HD	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# ACCESSORIES

WING  
100



## KIT SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
503312		black galvanised steel	WING ductile iron	M8 x 40 black with flanged hexagonal head	8
503313		galvanised steel	WING galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	WING stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover WING	M8 x 40 TBL combi	4

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700526		from 100/100 to 100/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



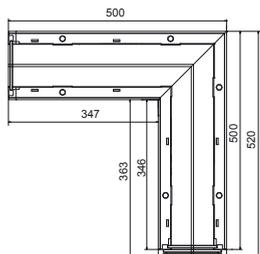
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

WING  
100

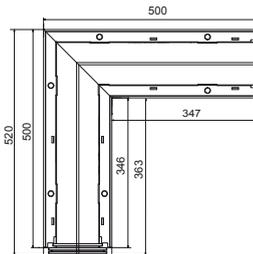
## LEFT CORNER



## WING 100

CODE	PRICE €	MODEL
703100		100/160
703101		100/100
703102		100/80
703103		100/55

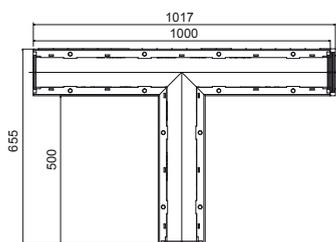
## RIGHT CORNER



## WING 100

CODE	PRICE €	MODEL
703108		100/160
703109		100/100
703110		100/80
703111		100/55

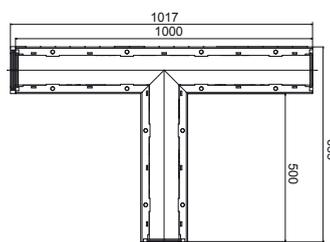
## LEFT TI



## WING 100

CODE	PRICE €	MODEL
703116		100/160
703117		100/100
703118		100/80
703119		100/55

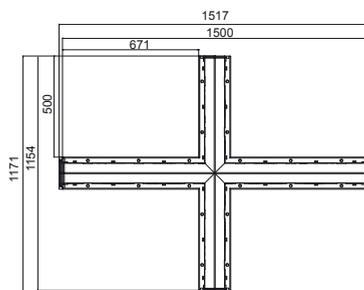
## RIGHT TI



## WING 100

CODE	PRICE €	MODEL
703124		100/160
703125		100/100
703126		100/80
703127		100/55

## CROSS

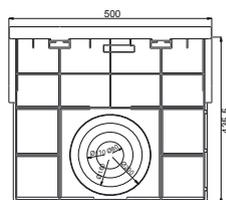


## WING 100

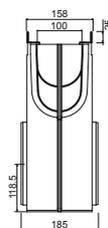
CODE	PRICE €	MODEL
703132		100/160
703133		100/100
703134		100/80
703135		100/55

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

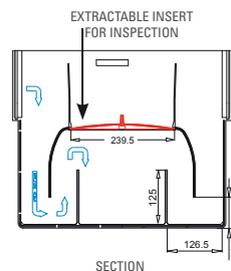
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

## WING 100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
703016		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 158 x 434	500 x 100 x 400	185	118,5	3,75	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
703019		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 158 x 434	500 x 100 x 400	185	118,5	3,75	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

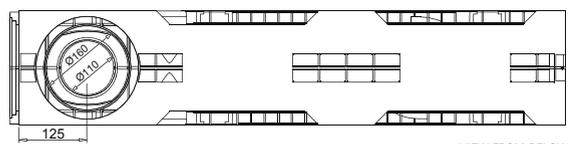


150

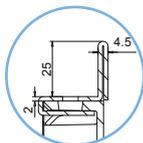


# CHANNELS

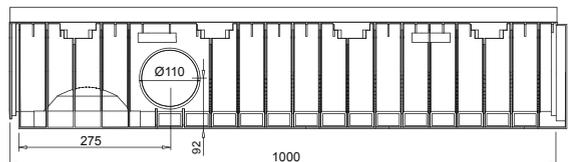
WING  
150



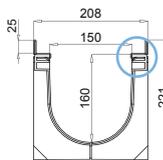
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

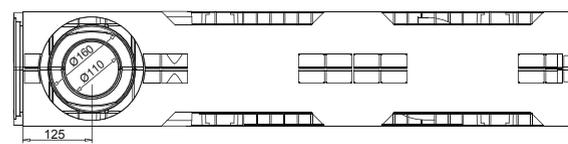


SECTION

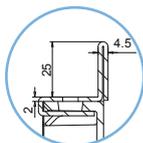


## WING 150/160

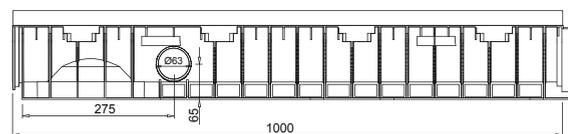
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
703004		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 208 x 221	1000 x 150 x 160	5,35	213,04	21,30	side 2 x Ø 110 bottom 1 x Ø 110; 1 x Ø 160
703012		stainless steel AISI 304 <sup>2</sup>							



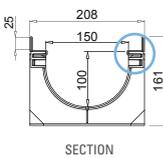
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

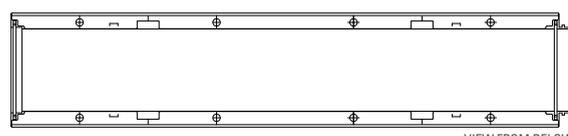


SECTION

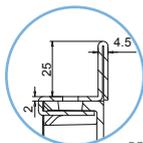


## WING 150/100

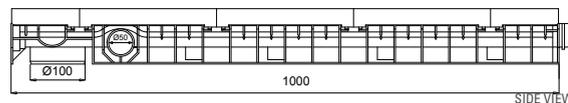
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
703005		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 208 x 161	1000 x 150 x 100	4,80	127,32	12,73	side 2 x Ø 63 bottom 1 x Ø 110; 1 x Ø 160
703013		stainless steel AISI 304 <sup>2</sup>							



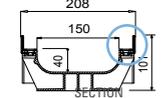
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION



## WING 150/40

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
503008		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 208 x 101	1000 x 150 x 40	4,70	56,50	5,65	side 2 x Ø 50 bottom 1 x Ø 100
503009		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



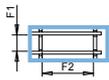
WING  
150

## APPLICATIONS OF GALVANISED STEEL

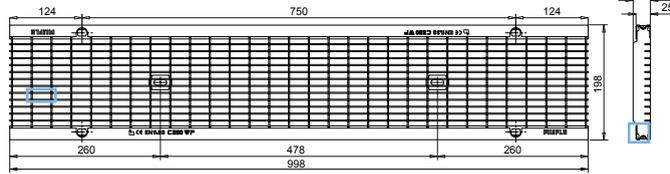
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks

## APPLICATIONS OF STAINLESS STEEL

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks
- Areas with low-load transit in food factories
- Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM

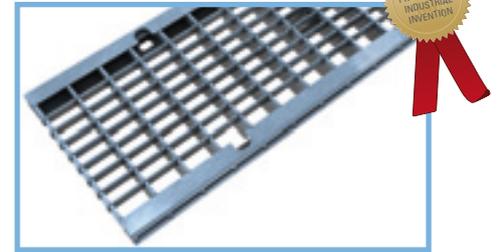


VIEW FROM ABOVE

SIDE VIEW



DETAIL OF UPRIGHT BEND



PATENT PRODUCT FOR INDUSTRIAL INVENTION

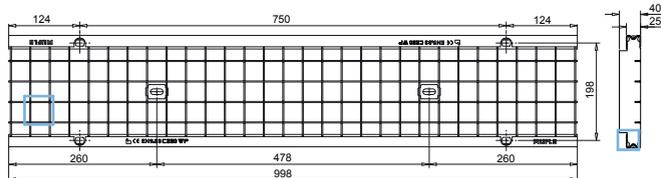
## ANTI-HELL MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503125		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 25	8,40	11,64	10,2 x 31,2		
503126		pickled stainless steel AISI 304 <sup>2</sup>						
503153		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 25	4,20	5,82			
503154		pickled stainless steel AISI 304 <sup>2</sup>						



DETAIL OF SQUARE MESH

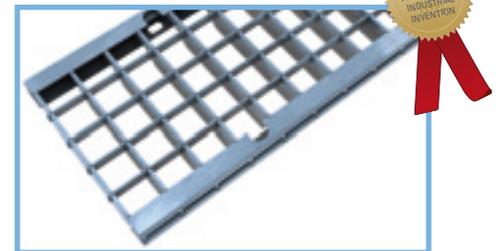


VIEW FROM ABOVE

SIDE VIEW



DETAIL OF UPRIGHT BEND



PATENT PRODUCT FOR INDUSTRIAL INVENTION

## SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503127		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 25	7,30	12,94	34,2 x 31,2		
503128		pickled stainless steel AISI 304 <sup>2</sup>						
503155		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 25	3,65	6,47			
503156		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



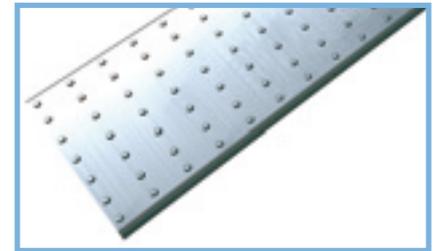
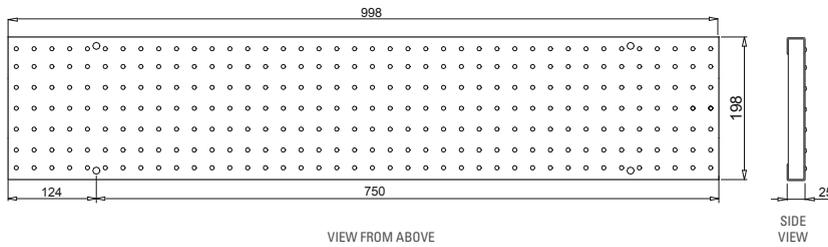
# GRATINGS AND SOLID TOP COVERS



WING  
150

## APPLICATIONS

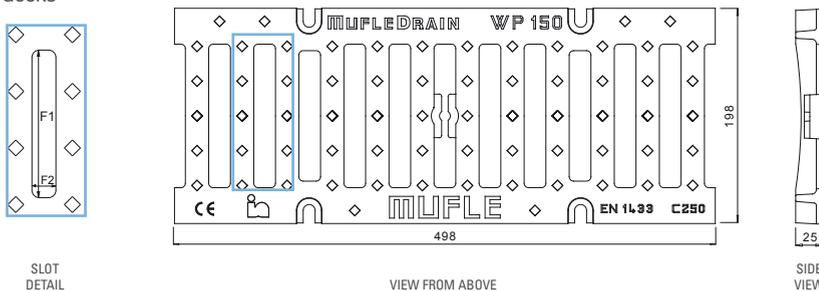
Cable passageway  
Passageway for water and/or heat systems



SOLID TOP COVER						
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM	
	€		mm	kg	screw	
503102		galvanised steel DX51D <sup>3</sup>	998 x 198 x 25	4,20		

## APPLICATIONS OF DUCTILE IRON

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503111		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 198 x 25	5,90	3,12	132,0 x 20,0	

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

6- Classification according to Standard EN 1563 (2009).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



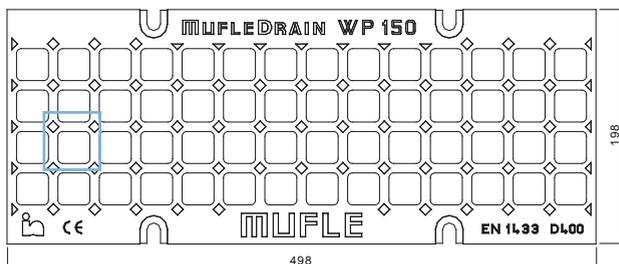
WING  
150

## APPLICATIONS OF DUCTILE IRON

- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



SLOT  
DETAIL



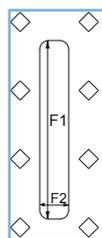
VIEW FROM ABOVE



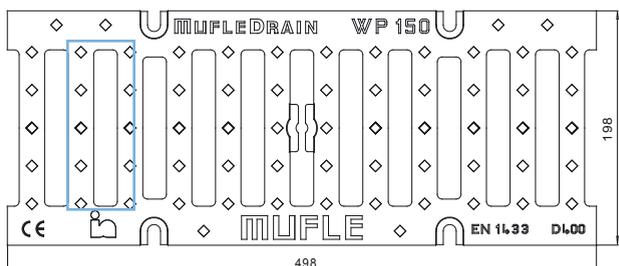
SIDE  
VIEW



MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503183		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 198 x 25	7,20	4,08	27,0 x 27,0	



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503112		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 198 x 25	7,10	3,12	132,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



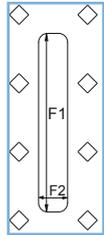
# GRATINGS



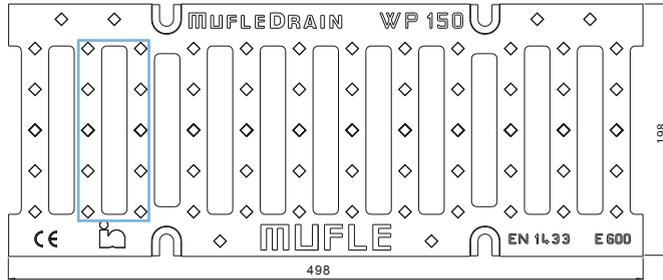
WING  
150

## APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic  
Industrial areas with passage of forklift trucks (high axle loads)  
Underpasses



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



### SLOTTED GRATING 20 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503113		GJS 500/76 ductile iron water based paint coated	498 x 198 x 25	7,80	3,12	132,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



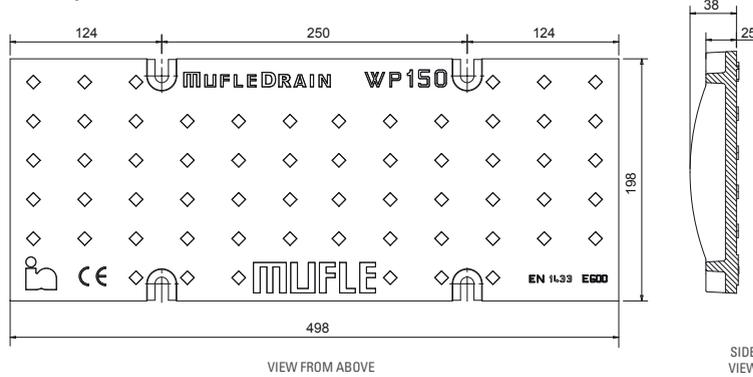
# SOLID TOP COVERS



WING  
150

## APPLICATIONS

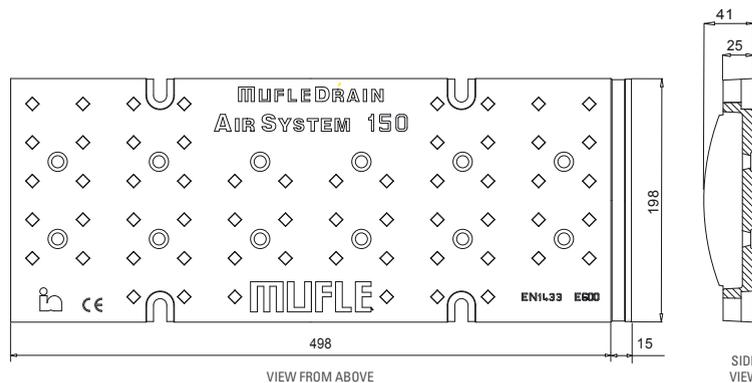
Cable passageway  
Passageway for water and/or heat systems



SOLID TOP COVER					
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM
	€		mm	kg	screw
503106		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 25	10.60	

## APPLICATIONS

Waste composting systems



SOLID TOP COVER AIR SYSTEM					
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM
	€		mm	kg	screw
503100		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 25	10.50	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

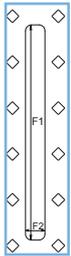


# GRATINGS

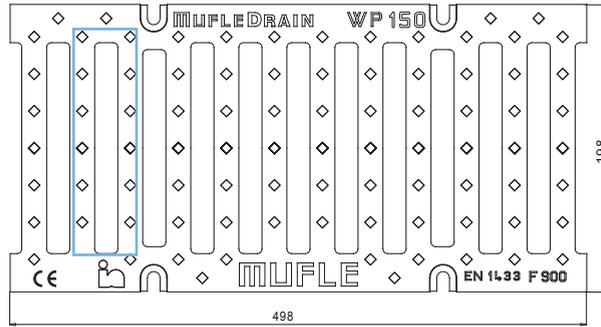


WING  
150

## APPLICATIONS OF DUCTILE IRON Port and airport areas



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



### SLOTTED GRATING 20 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	WEIGHT kg	FIXING SYSTEM screw
503174		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 25	8,70	3,12	132,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SLOTTED GRATINGS

TYPE D 400  
MIDDLE  
DRIVEWAY

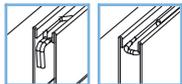
WING  
150

## APPLICATIONS OF GALVANISED STEEL

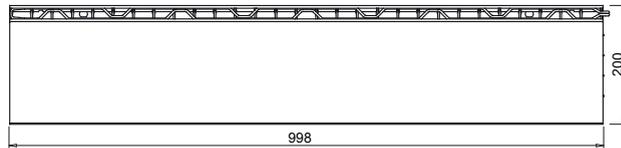
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements

## APPLICATIONS OF STAINLESS STEEL

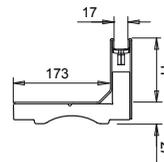
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements



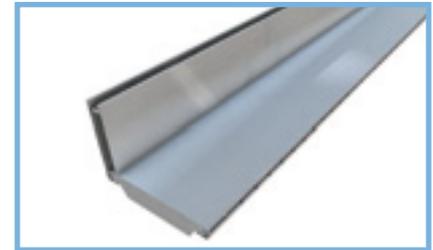
DETAIL OF HOOKIN F SYSTEM<sup>8</sup>



VIEW FROM ABOVE

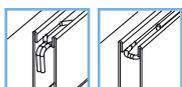


SIDE VIEW

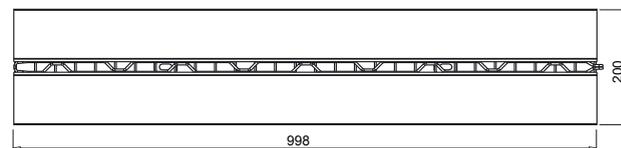


## L-SHAPED GRATING

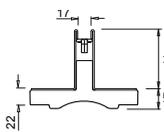
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
503194		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 200 x 112	80	9,63	1,80	998 x 18
503433		pickled stainless steel AISI 304 <sup>2</sup>					
503195		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 200 x 152	120	11,10		
503434		pickled stainless steel AISI 304 <sup>2</sup>					



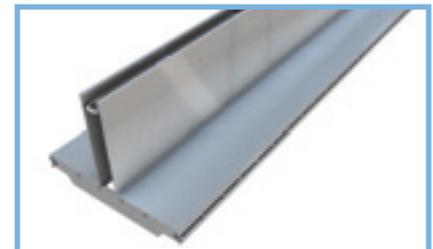
DETAIL OF HOOKIN F SYSTEM<sup>8</sup>



VIEW FROM ABOVE



SIDE VIEW



## T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
503188		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 200 x 112	80	9,10	1,80	998 x 18
503421		pickled stainless steel AISI 304 <sup>2</sup>					
503189		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 200 x 152	120	10,51		
503422		pickled stainless steel AISI 304 <sup>2</sup>					

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

8- Hooking System between the gratings through hooks and holes.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

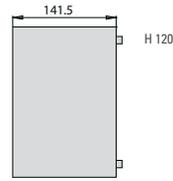
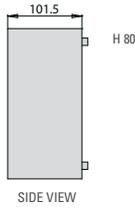
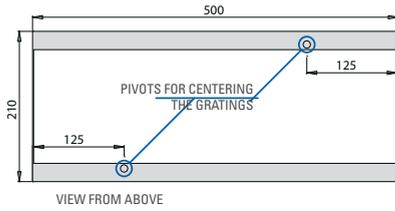


# INSPECTION ELEMENT FOR L-SHAPED GRATING

TYPE D 400  
MIDDLE  
DRIVEWAY

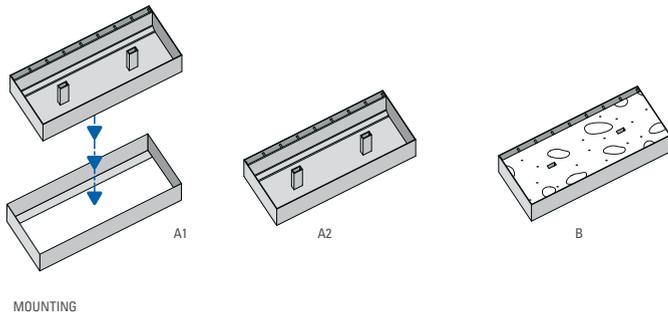
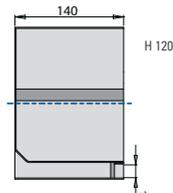
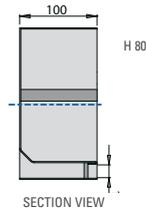
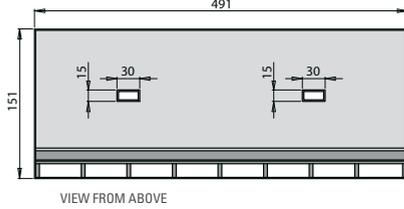
WING  
150

## CONTAINMENT TANK



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 54 for the details of the drain box with siphon.

## INSPECTION GRATING



## INSPECTION ELEMENT FOR L-SHAPED GRATING - WING 150

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500227		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 200 x 101,5	491 x 18	1,8	5,90
500239		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 200 x 101,5	491 x 18	1,8	5,50
500228		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 200 x 141,5	491 x 18	1,8	7,70
500240		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 200 x 141,5	491 x 18	1,8	7,10

## HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

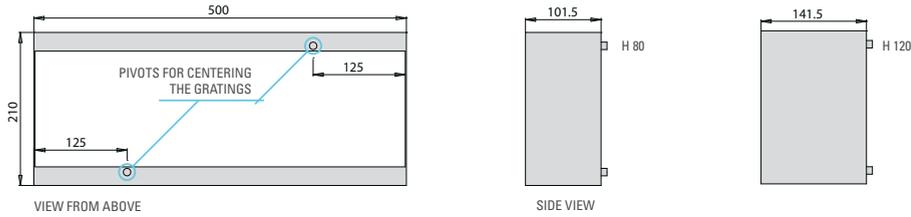


# INSPECTION ELEMENT FOR T-SHAPED GRATING

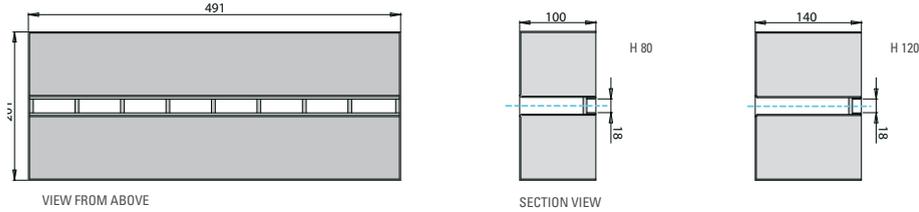
TYPE D 400  
MIDDLE  
DRIVEWAY

WING  
150

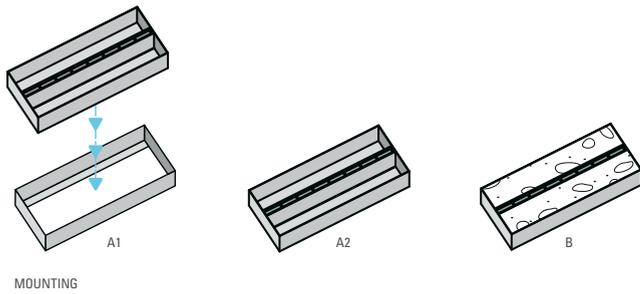
## CONTAINMENT TANK



## INSPECTION GRATING



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 54 for the details of the drain box with siphon.



## INSPECTION ELEMENT FOR T-SHAPED GRATING - WING 150

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500221		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 210 x 101,5	491 x 18	1,8	6,40
500233		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 210 x 101,5	491 x 18	1,8	5,90
500222		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 210 x 141,5	491 x 18	1,8	8,20
500234		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 210 x 141,5	491 x 18	1,8	7,70

## HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

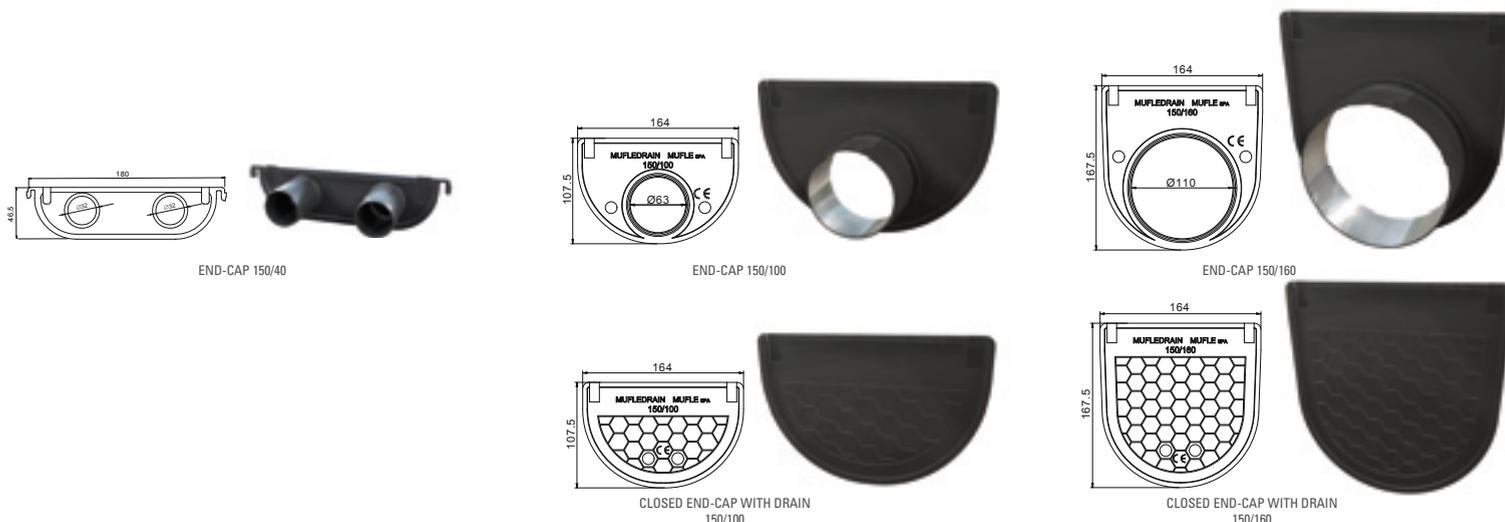
5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



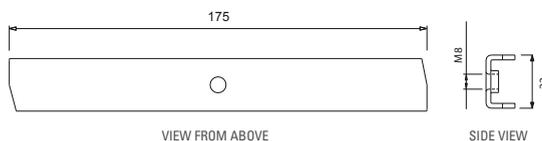
# ACCESSORIES

WING  
150



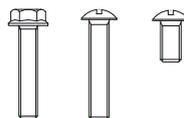
## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAINS mm
500518		closed end-cap with preinstalled drain	PE-HD	150/40	2 x Ø 32
700504		end-cap with drain	PE-HD	150/100	1 x Ø 63
700512		closed end-cap	PE-HD	150/100	-
700505		end-cap with drain	PE-HD	150/160	1 x Ø 110
700513		closed end-cap	PE-HD	150/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
500424		galvanised steel	WING galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500425		stainless steel	WING stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



## KIT SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
503312		black galvanised steel	WING ductile iron	M8 x 40 black with fl angled hexagonal head	8
503313		galvanised steel	WING galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	WING stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover WING	M8 x 40 TBL combi	4

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700517		from 150/100 to 150/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



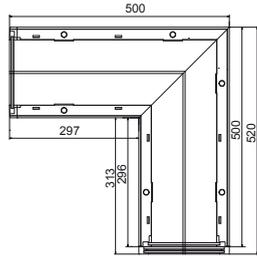
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

WING  
150

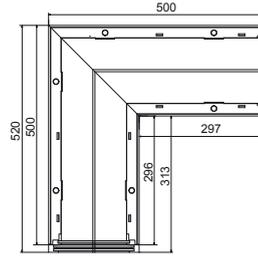
## LEFT CORNER



## WING 150

CODE	PRICE €	MODEL
703104		150/160
703105		150/100
503205		150/40

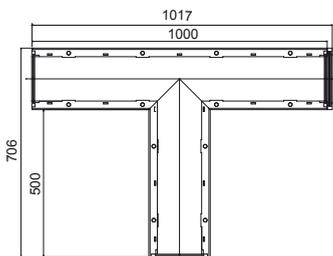
## RIGHT CORNER



## WING 150

CODE	PRICE €	MODEL
703112		150/160
703113		150/100
503214		150/40

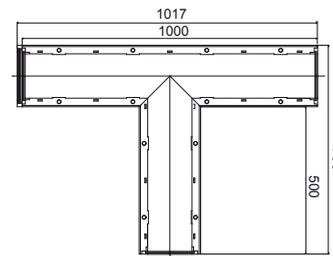
## LEFT TI



## WING 150

CODE	PRICE €	MODEL
703120		150/160
703121		150/100
503223		150/40

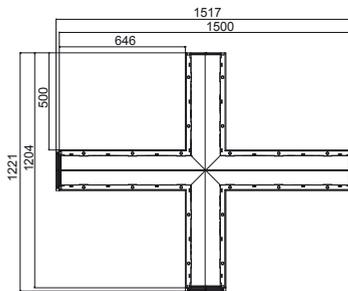
## RIGHT TI



## WING 150

CODE	PRICE €	MODEL
703128		150/160
703129		150/100
503232		150/40

## CROSS

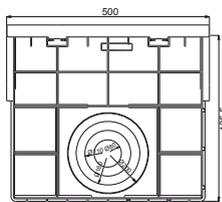


## WING 150

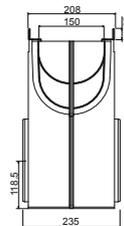
CODE	PRICE €	MODEL
703136		150/160
703137		150/100
503241		150/40

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

## DRAIN BOX WITH SYPHON<sup>9</sup>



FRONT VIEW



SIDE VIEW



SECTION

## WING 150

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
703017		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 208 x 434	500 x 150 x 400	235	118,5	4,00	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
703020		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 208 x 434	500 x 150 x 400	235	118,5	4,00	2 x Ø 80; 2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

9- The drain box Easy, Vip and Wing 150 and 200 are not prearranged to be connected to the correspondent channels Easy, Wing and Vip 150/40, 200/40

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

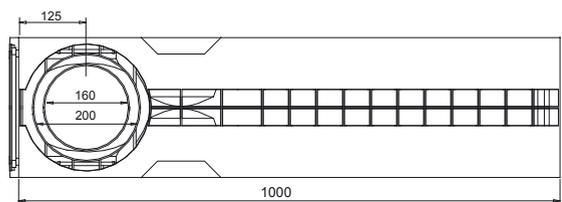


200

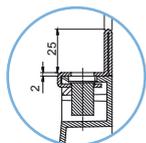


# CHANNELS

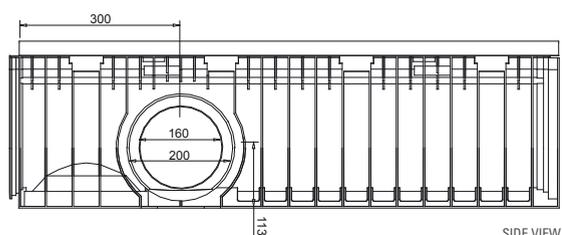
WING  
200



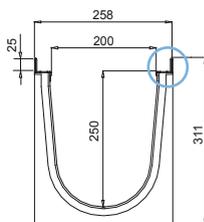
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW

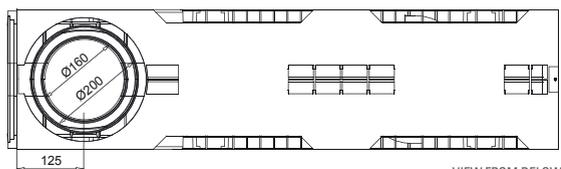


SECTION

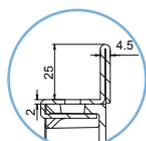


## WING 200/250

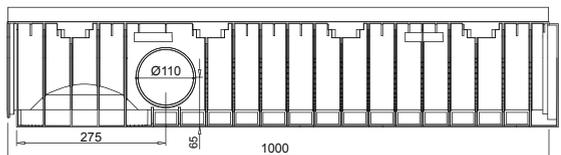
CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
503025		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 311	1000 x 200 x 250	7,50	430,00	43,00	side 2 x Ø 200; 2 x Ø 160 bottom 1 x Ø 200; 1 x Ø 160
503028		stainless steel AISI 304 <sup>2</sup>							



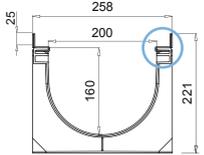
VIEW FROM BELOW



DETAIL SECTION



SIDE VIEW



SECTION



## WING 200/160

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
703006		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 221	1000 x 200 x 160	5,75	275,87	27,58	side 2 x Ø 110 bottom 1 x Ø 160; 1 x Ø 200
703014		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

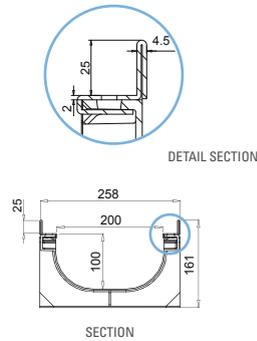
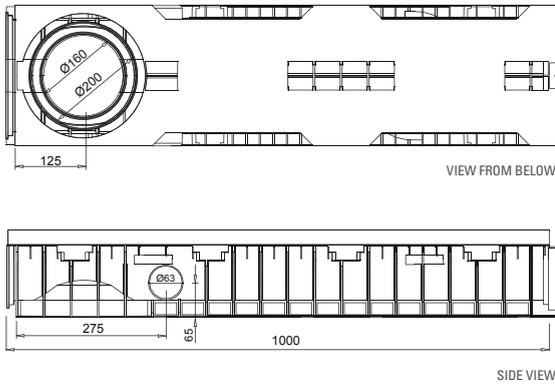
N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

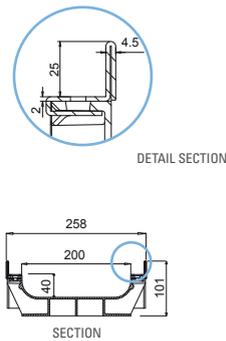
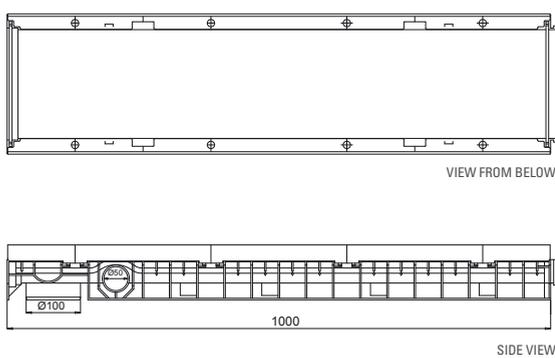


# CHANNELS

WING  
200



WING 200/100									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
703007		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 161	1000 x 200 x 100	5,15	178,73	17,87	side 2 x Ø 63 bottom 1 x Ø 160; 1 x Ø 200
703015		stainless steel AISI 304 <sup>2</sup>							



WING 200/40									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
503014		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 101	1000 x 200 x 40	4,70	76,50	7,65	side 2 x Ø 50 bottom 1 x Ø 100
503015		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



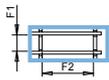
WING  
200

## APPLICATIONS OF GALVANISED STEEL

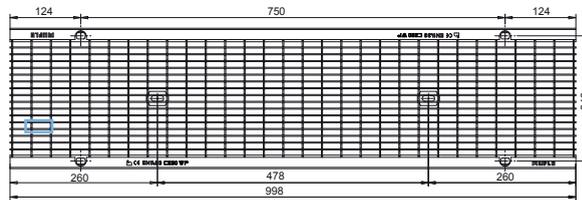
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks

## APPLICATIONS OF STAINLESS STEEL

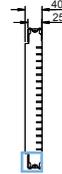
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks
- Areas with low-load transit in food factories
- Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



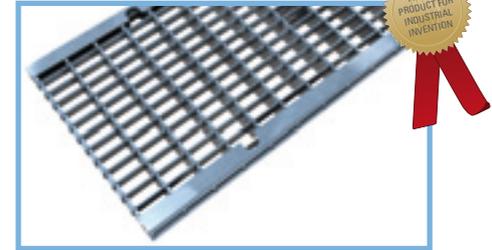
VIEW FROM ABOVE



SIDE VIEW



DETAIL OF UPRIGHT BEND



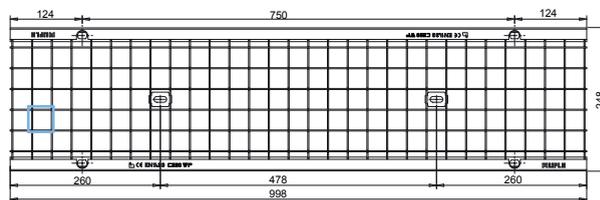
## ANTI-HELL MESH GRATING



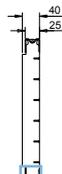
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503129		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 25	10,30	15,50	10,2 x 31,2		
503130		pickled stainless steel AISI 304 <sup>2</sup>						
503157		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 25	5,15	7,75			
503158		pickled stainless steel AISI 304 <sup>2</sup>						



DETAIL OF SQUARE MESH



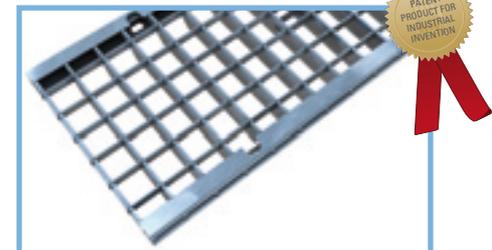
VIEW FROM ABOVE



SIDE VIEW



DETAIL OF UPRIGHT BEND



## SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503131		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 25	9,10	17,13	34,2 x 31,2		
503132		pickled stainless steel AISI 304 <sup>2</sup>						
503159		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 25	4,55	8,57			
503160		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



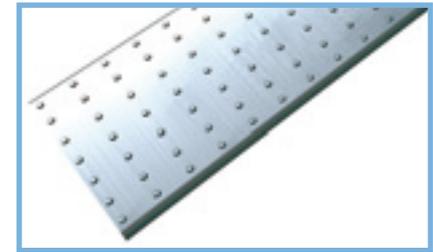
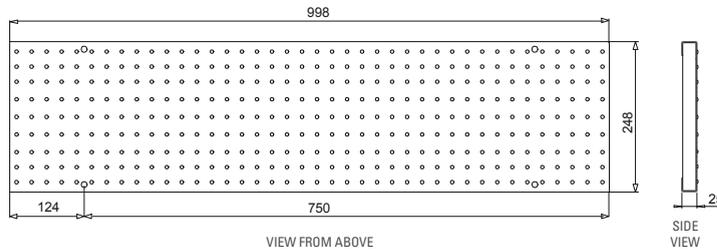
# GRATINGS E SOLID TOP COVERS



WING  
200

## APPLICATIONS

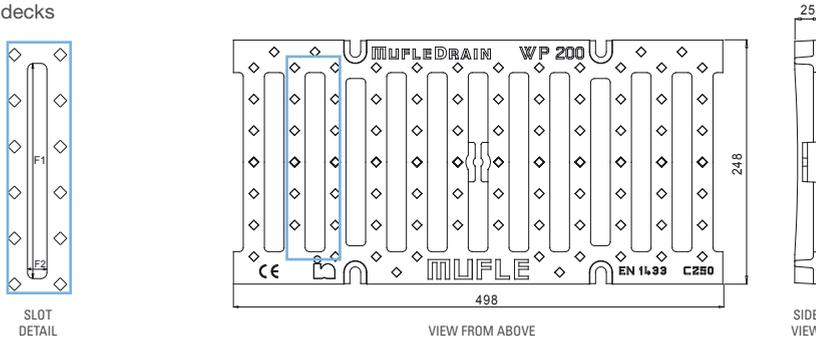
Cable passageway  
Passageway for water and/or heat systems



SOLID TOP COVER						
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM	
	€		mm	kg	screw	
503103		galvanised steel DX51D <sup>3</sup>	998 x 248 x 25	6,20		

## APPLICATIONS OF DUCTILE IRON

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503114		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	7,00	4,32	182,0 x 20,0	

3- Classification according to Standard EN 10142 (ed. 2002) and symbolic designation according to EN 10027-1 (-2) (ed. 2006).

6- Classification according to Standard EN 1563 (2009).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



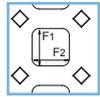
# GRATINGS



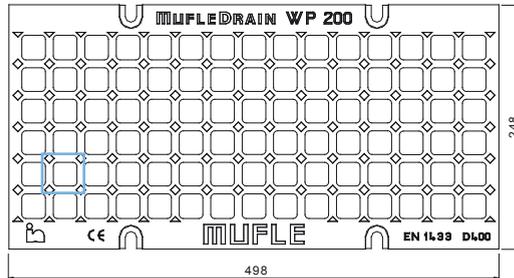
WING  
200

## APPLICATIONS OF DUCTILE IRON

- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



SLOT  
DETAIL



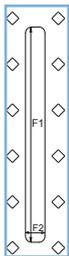
VIEW FROM ABOVE



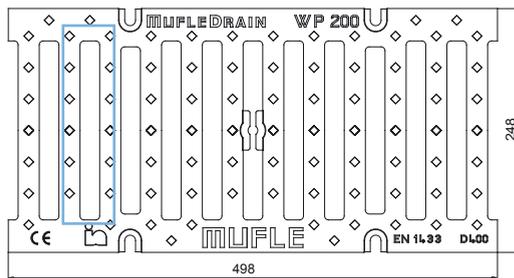
SIDE  
VIEW



MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503184		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 248 x 25	8,60	5,18	24,0 x 24,0	



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503115		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 248 x 25	8,20	4,32	182,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



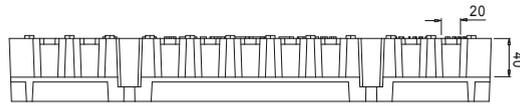
# DRAINING ASPHALT GRATING



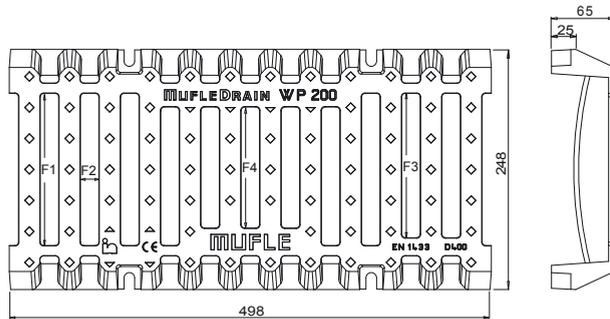
WING  
200

## APPLICATIONS OF DUCTILE IRON

Road carriageways with draining asphalt



FRONT VIEW



VIEW FROM ABOVE



SIDE VIEW



DRAINING ASPHALT GRATING							65 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM	
	€		mm	kg	dm <sup>2</sup>	mm	screw	
503181		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	11,50	top 4,08 side 1,44	F1 x F2 = 180,0 x 20,0 F3 x F2 = 150,0 x 20,0 F4 x F2 = 126,0 x 20,0  side 40,0 x 20,0 (18,9 x side)		

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



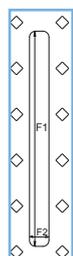
# GRATINGS AND SOLID TOP COVERS



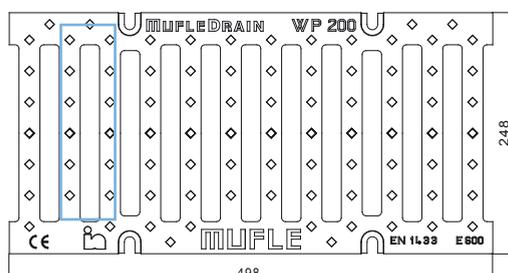
WING  
200

## APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic  
Industrial areas with passage of forklift trucks (high axle loads)  
Underpasses



SLOT  
DETAIL



VIEW FROM ABOVE



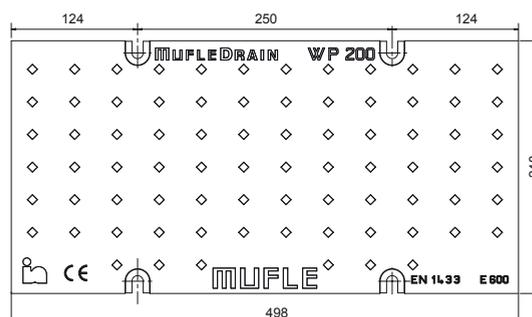
SIDE  
VIEW



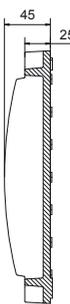
SLOTTED GRATING 20 mm							45 mm
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503116		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	9,70	4,32	180,0 x 20,0	

## APPLICATIONS

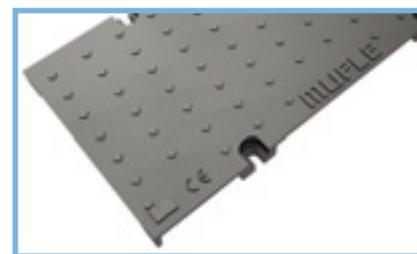
Cable passageway  
Passageway for water  
and/or heat systems



VIEW FROM ABOVE



SIDE  
VIEW



SOLID TOP COVER						45 mm
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM	
	€		mm	kg	screw	
503107		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	12,00		

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



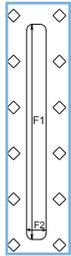
# GRATINGS



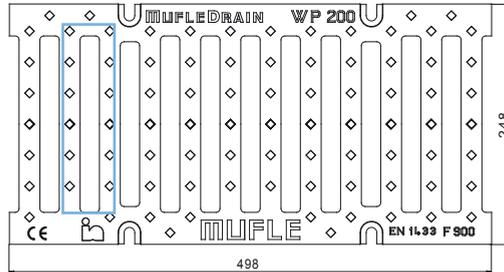
WING  
200

## APPLICATIONS OF DUCTILE IRON

Port and airport areas



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



### SLOTTED GRATING 20 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503175		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	10,50	4,32	182,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL GRATINGS

TYPE D 400  
MIDDLE  
DRIVEWAY

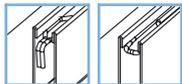
WING  
200

## APPLICATIONS OF GALVANISED STEEL

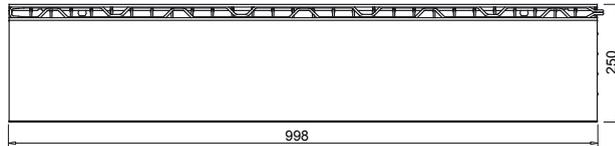
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements

## APPLICATIONS OF STAINLESS STEEL

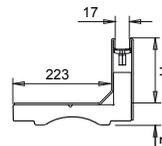
Low visual impact drainage in public and private places:  
Pedestrian areas  
Private car parks or multi-level car parks  
Roads subjected to middle loads (urban speed  $\leq 40$  km/h)  
Areas not subjected to dock movements



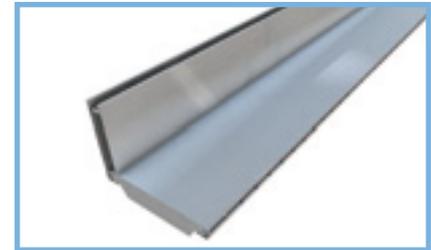
DETAIL OF HOOKING SYSTEM<sup>8</sup>



VIEW FROM ABOVE

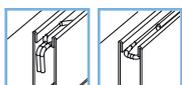


SIDE VIEW

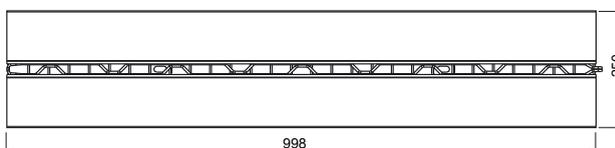


## L-SHAPED GRATING

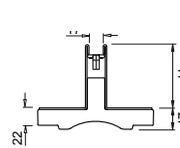
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
503196		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 250 x 112	80	11,30	1,80	998 x 18
503435		pickled stainless steel AISI 304 <sup>2</sup>					
503197		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 250 x 152	120	12,64		
503436		pickled stainless steel AISI 304 <sup>2</sup>					



DETAIL OF HOOKING SYSTEM<sup>8</sup>



VIEW FROM ABOVE



SIDE VIEW



## T-SHAPED GRATING

CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	HEIGHT OF SLOTS H mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm
503190		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 250 x 112	80	11,64	1,80	998 x 18
503423		pickled stainless steel AISI 304 <sup>2</sup>					
503191		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 250 x 152	120	13,05		
503424		pickled stainless steel AISI 304 <sup>2</sup>					

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

8- Hooking System between the gratings through hooks and holes.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

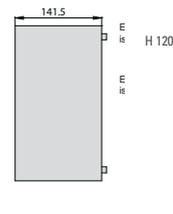
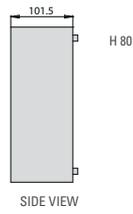
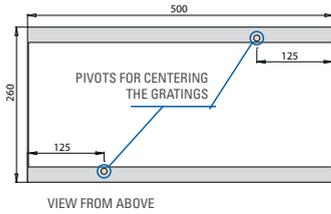


# INSPECTION ELEMENT FOR L-SHAPED GRATING

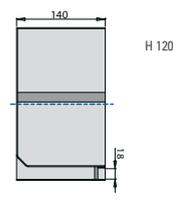
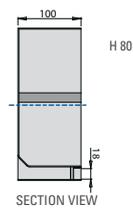
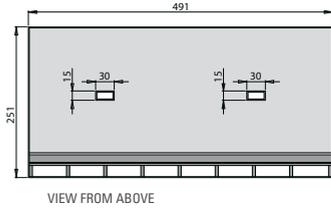
TYPE D 400  
MIDDLE  
DRIVEWAY

WING  
200

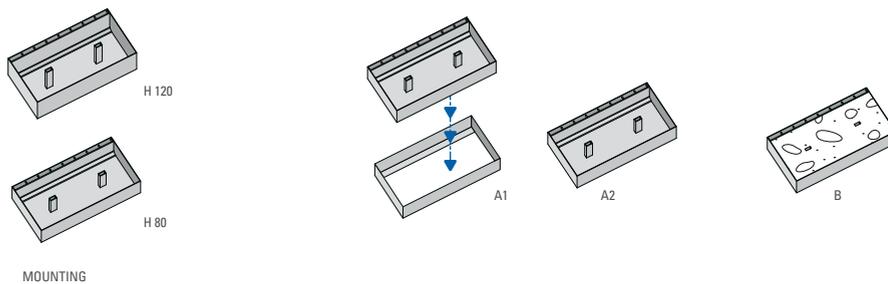
## CONTAINMENT TANK



## INSPECTION GRATING



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 64 for the details of the drain box with siphon.



## INSPECTION ELEMENT FOR L-SHAPED GRATING - WING 200

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500229		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 260 x 101,5	491 x 18	1,8	6,60
500241		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 260 x 101,5	491 x 18	1,8	6,10
500230		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 260 x 141,5	491 x 18	1,8	8,40
500242		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 260 x 141,5	491 x 18	1,8	7,80

## HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

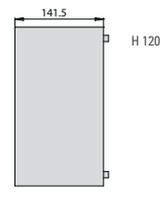
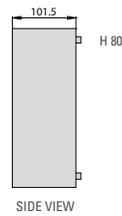
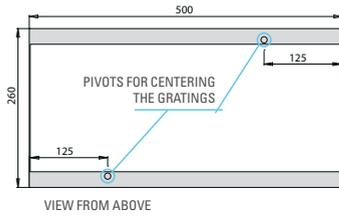


# INSPECTION ELEMENT FOR T-SHAPED GRATING

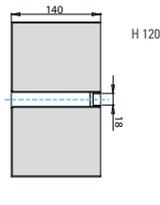
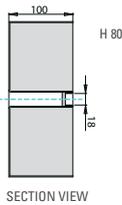
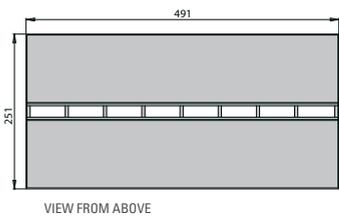
TYPE D 400  
MIDDLE  
DRIVEWAY

WING  
200

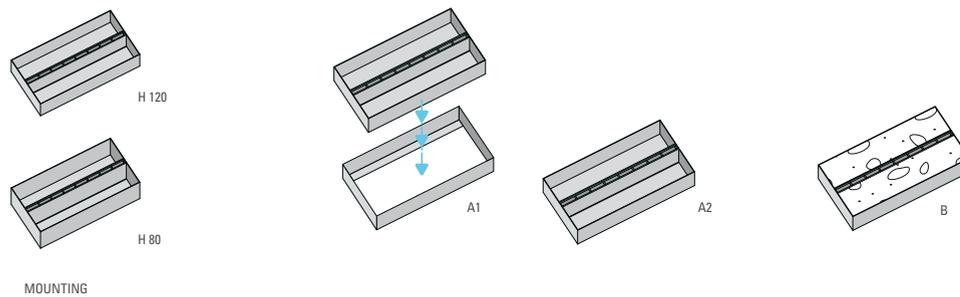
## CONTAINMENT TANK



## INSPECTION GRATING



The inspection element for the T-shaped gratings shall be assembled together with the drain box with siphon EASY in HD-PE as showed in the picture. Please see page 64 for the details of the drain box with siphon.



## INSPECTION ELEMENT FOR T-SHAPED GRATING - WING 200

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500223		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H80 500 x 260 x 101,5	491 x 18	1,8	6,90
500235		pickled stainless steel AISI 304 <sup>2</sup>	H80 500 x 260 x 101,5	491 x 18	1,8	6,40
500224		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	H120 500 x 260 x 141,5	491 x 18	1,8	9,00
500236		pickled stainless steel AISI 304 <sup>2</sup>	H120 500 x 260 x 141,5	491 x 18	1,8	8,30

## HOOK FOR TAKING OFF THE GRATING INSPECTION ELEMENT

CODE	PRICE €	MATERIAL	VOLUME L x l x h mm	SLOT DIMENSIONS mm	DRAINAGE SURFACE mm	WEIGHT TOTALE kg
500254		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	710 x 180	-	-	0,65

2- Classification according to American Standard ASTM.

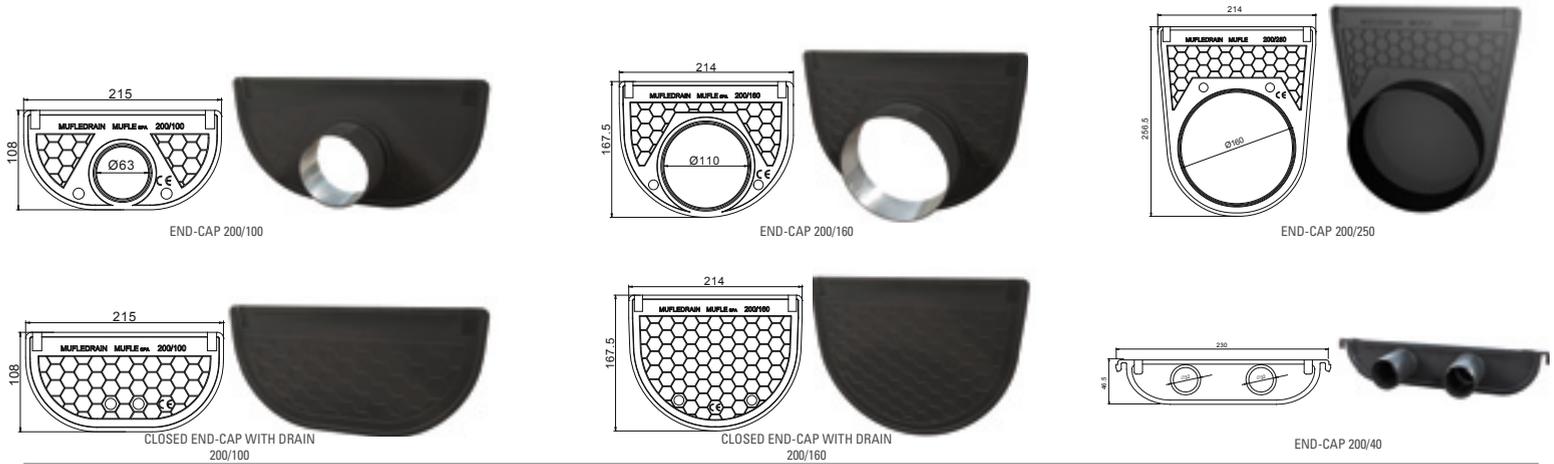
5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



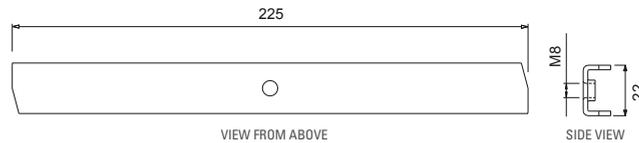
# ACCESSORIES

WING  
200



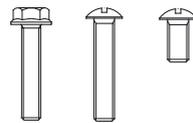
## END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
€					
500521		end-cap with drain	PE-HD	200/40	2 x Ø 32
700506		end-cap with drain	PE-HD	200/100	1 x Ø 63
700514		closed end-cap	PE-HD	200/100	-
700507		end-cap with drain	PE-HD	200/160	1 x Ø 110
700515		closed end-cap	PE-HD	200/160	-
502416		closed end-cap with preinstalled drain	PE-HD	200/250	1 x Ø 160



## KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
€					
500427		galvanised steel	WING galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500428		stainless steel	WING stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



## KIT SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
€					
503312		black galvanised steel	WING ductile iron	M8 x 40 black with fl angled hexagonal head	8
503313		galvanised steel	WING galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	WING stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover WING	M8 x 40 TBL combi	4

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE	VALID FOR CHANNELS	FAMILIES
€			
700518		from 200/160 to 200/250	VIP - SLOPE - WING
700519		from 200/100 to 200/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



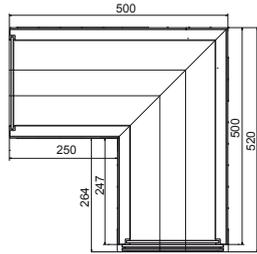
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

WING  
200

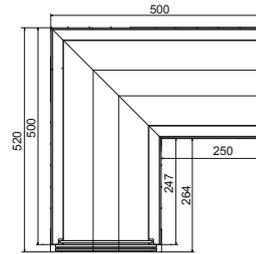
## LEFT CORNER



## WING 200

CODE	PRICE €	MODEL
503245		200/250
703106		200/160
703107		200/100
503208		200/40

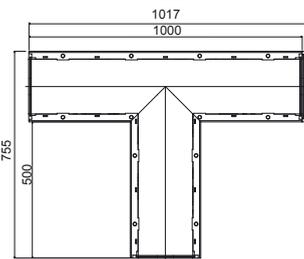
## RIGHT CORNER



## WING 200

CODE	PRICE €	MODEL
503246		200/250
703114		200/160
703115		200/100
503217		200/40

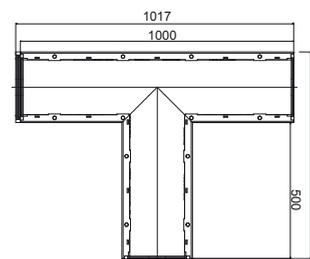
## LEFT TI



## WING 200

CODE	PRICE €	MODEL
on request		200/250
703122		200/160
703123		200/100
503226		200/40

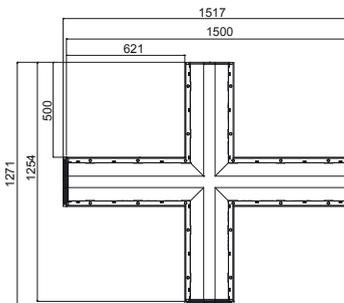
## RIGHT TI



## WING 200

CODE	PRICE €	MODEL
on request		200/250
703130		200/160
703131		200/100
50323 5		200/40

## CROSS

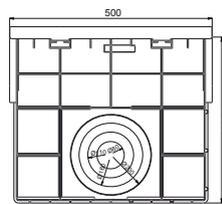


## WING 200

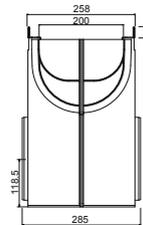
CODE	PRICE €	MODEL
on request		200/250
703138		200/160
703139		200/100
503244		200/40

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

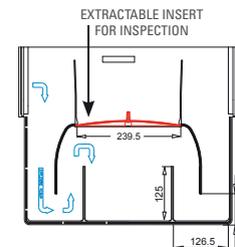
## DRAIN BOX WITH SYPHON<sup>9-17</sup>



FRONT VIEW



SIDE VIEW



SECTION

## WING 200

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
703018		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 258 x 434	500 x 200 x 400	285	118,5	4,20	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
703121		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 258 x 434	500 x 200 x 400	285	118,5	4,20	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

9- The drain box Easy, Vip and Wing 150 and 200 are not prearranged to be connected to the correspondent channels Easy, Wing and Vip 150/40, 200/40.

17- The drain box Easy, Vip, Smart, Slope and Wing 200 are not prearranged to be connected to the correspondent channels EASY, VIP, SMART, SLOPE and WING 200/250

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

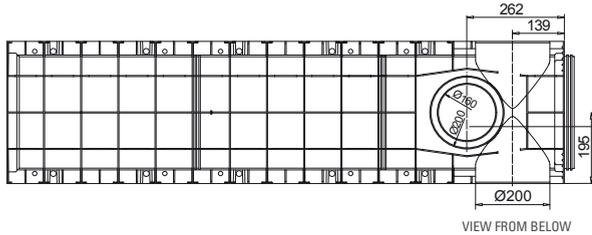


300

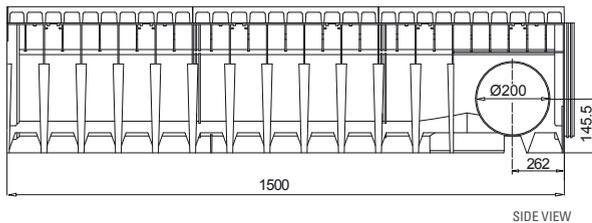


# CHANNELS

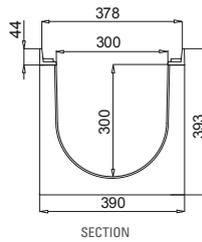
WING  
300



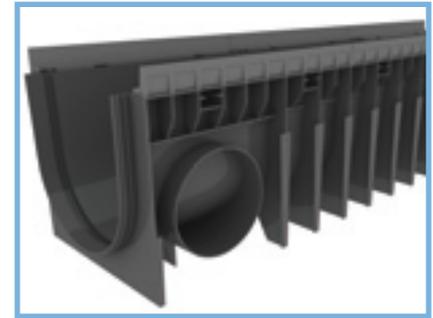
VIEW FROM BELOW



SIDE VIEW



SECTION



## WING 300/300

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
503018		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	PE-HD	1500 x 390 x 393	1500 x 300 x 300	20,90	796,00	79,60	side 2 x Ø 200 bottom 1 x Ø 160; 1 x Ø 200

6- Classification according to Standard EN 1563 (2009).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



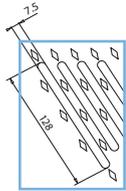
# GRATINGS



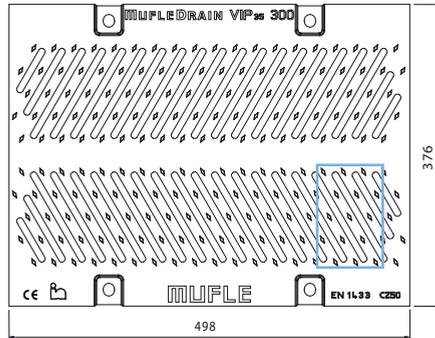
WING  
300

## APPLICATIONS OF DUCTILE IRON

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks



DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE



SIDE VIEW



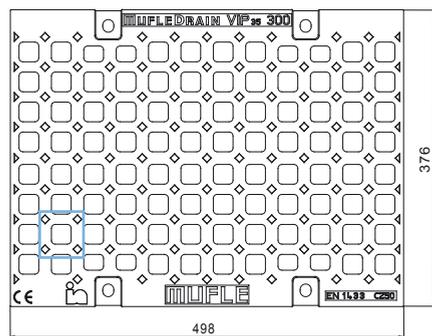
## SLOTTED GRATING 7 mm



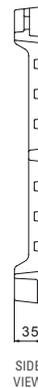
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
503176		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 376 x 35	19,50	3,5	128,0 x 7,5	



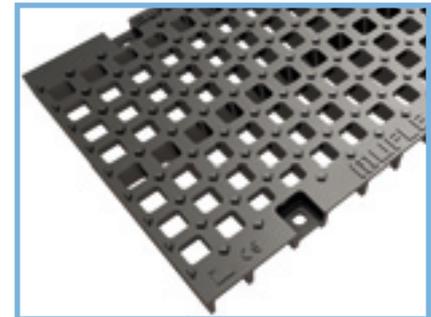
SLOT DETAIL



VIEW FROM ABOVE



SIDE VIEW



## MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM nut
503117		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 376 x 35	16,50	5,96	25,0 x 25,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



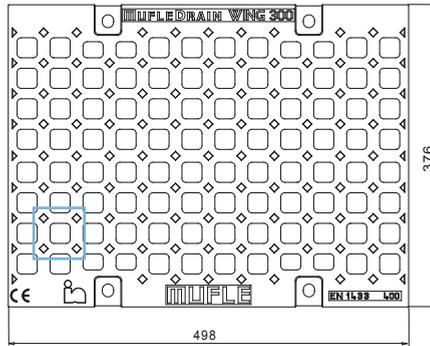
WING  
300

## APPLICATIONS OF DUCTILE IRON

- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



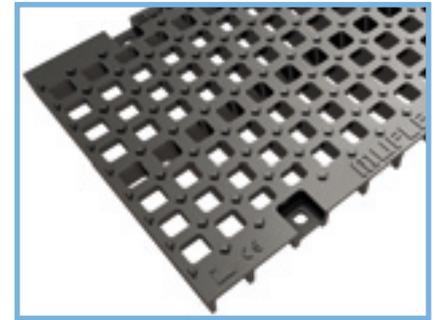
SLOT DETAIL

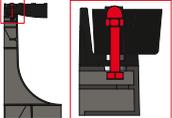


VIEW FROM ABOVE



SIDE VIEW



MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	nut
503118		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 376 x 35	18,70	5,96	25,0 x 25,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS E SOLID TOP COVERS



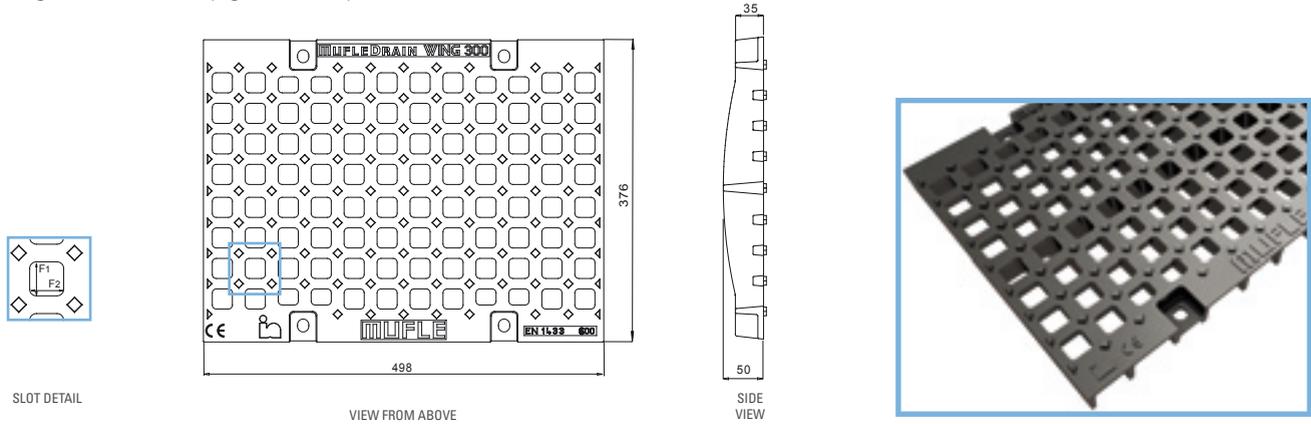
WING  
300

## APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic

Industrial areas with passage of forklift trucks (high axle loads)

Underpasses

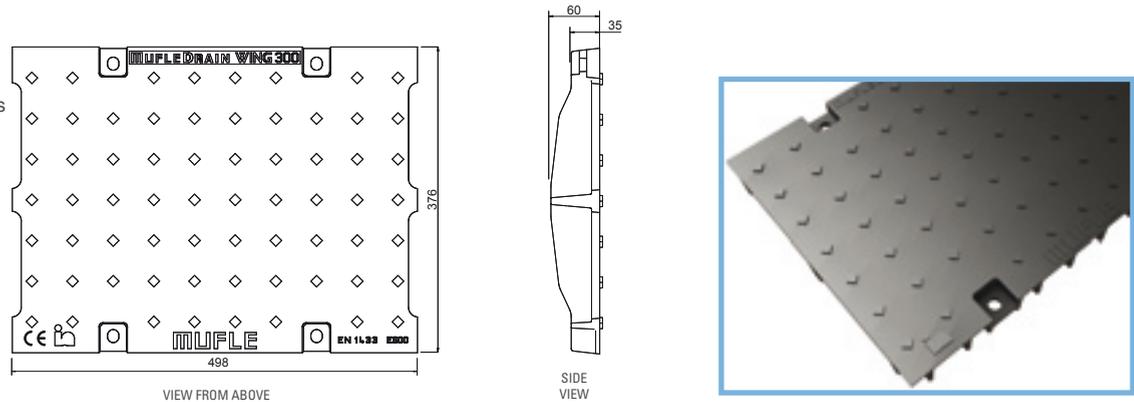


MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	nut
503119		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 376 x 35	21,50	5,96	25,0 x 25,0	

## APPLICATIONS

Cable passageway

Passageway for water and/or heat systems



SOLID TOP COVER					
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM
	€		mm	kg	nut
503104		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 376 x 35	26,00	

6- Classification according to Standard EN 1563 (2009).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

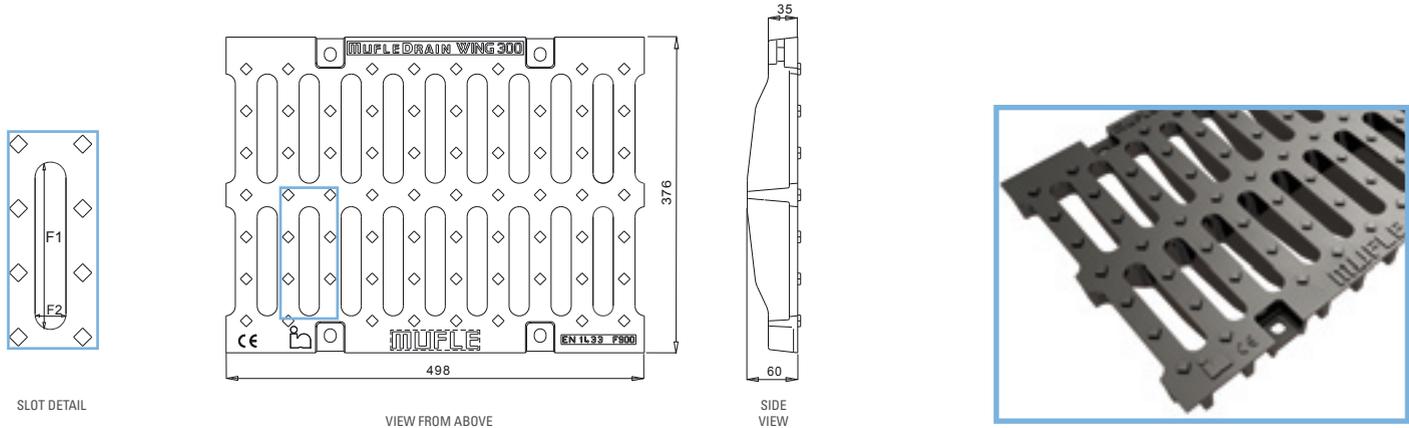


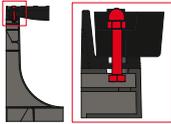
# GRATINGS



WING  
300

## APPLICATIONS OF DUCTILE IRON Port and airport areas



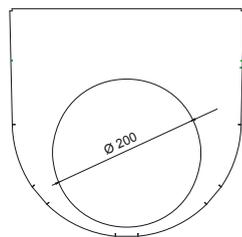
SLOTTED GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	nut
503120		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 376 x 35	27,50	8,50	130,0 x 24,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

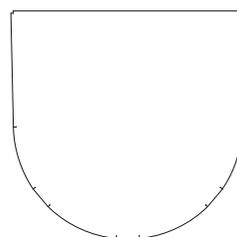
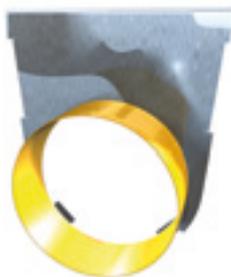


# ACCESSORIES

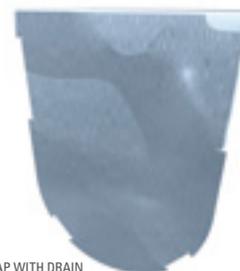
**WING  
300**



END-CAP 300/300



CLOSED END-CAP WITH DRAIN  
300/300



## END CAPS

CODE	PRICE €	MATERIAL	TYPE END-CAP	PREINSTALLED DRAIN OUTLETS mm
503411		galvanised steel	closed end-cap 300/300	–
503412		galvanised steel e PVC	end-cap with drain 300/300	1 x Ø 200



## KIT NUTS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	NUT	KIT FOR 1,5ml
503310		black galvanised steel	WING ductile iron	Blind hexagonal M10 with spherical cap	12 nuts + 12 washer <sup>13</sup>

Special Pieces, Corners, Ti, Crosses for WING 300 are available upon request. For further information please contact our Technical Department.

13- Screws are included in the channel.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



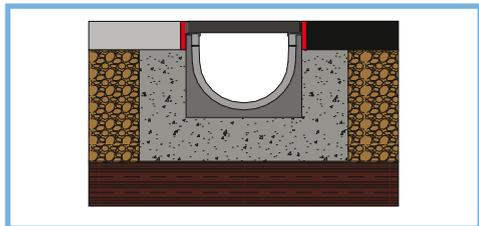
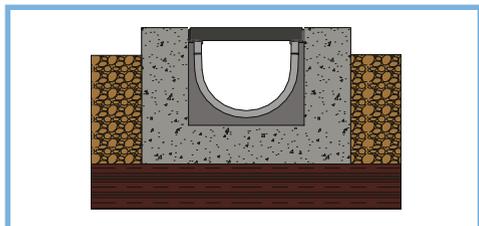
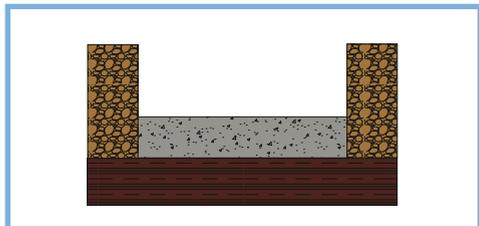
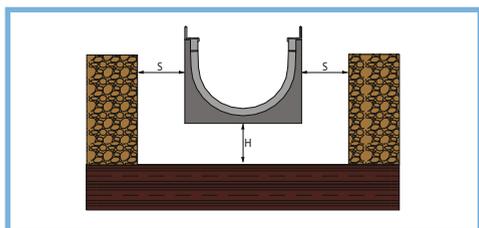
## “For all the drainage channels the manufacturer shall supply written instructions for general installation” (Ref. § 7.17 EN1433)

The installation instructions enclosed in the present technical section are given only as an example in order to supply the main guide lines to the final fitter.

Any particular installation must be evaluated/ agreed between MufleSystem srl and the project maker.

The correct installation is necessary to guarantee the proper loads resistance of the drainage system (channel and grating) to static and dynamical traffic which is subjected to.

The correct installation involves a longer operational length of the drainage system itself as well as its better hydraulic function.



**NEW FEATURE:**  
The channels can be installed with preassembled gratings.

### Step 1

#### HOLE SIZE

The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the Summary Table. In this step make sure the underlying layer is suitable to the load it is expected to support.

### Step 2

#### CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. In case that cycles of loading and unloading are often (for example: periodic transit of vehicles) or the loads are particular heavy (E600 - F900), we recommended to reinforce the concrete base with a electro-welded net or with or beaded mouldings Ø 8 with mesh 15x15 cm. At this stage it is needed to arrange possible slopes of the drainage line.

### Step 3

#### CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet and block them at basis in order to avoid any floating or misalignment during the concrete casting for the side prop.

Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation.

As well as the step 2, also for the side prop concrete arrange the reinforcement.

### Step 4

#### FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane.

## Recommendations for installation

1. In case that channels watertightness is requested, MufleSystem is purposely recommending the use of a bituminous silicone sealant “SHELL TIXOPHALTE”: after carrying out the side prop, apply a thin and homogeneous sealant strip on each slot between the channels and the following one (clean the eventual exceeding sealant). It is strongly advised not to apply the strips of “SHELL TIXOPHALTE” inside the slots in the female joint of the channels before coupling them. Eventually a through and long- lasting guarantees to avoid any leakages can be obtained by welding the joints; this requires welding machines and experienced technicians.
2. While carrying out the phase 2 and 3, protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.
3. In case the drainage line is subjected to horizontal loads (for example concrete casting for industrial paving, private car parks and parking decks), it is necessary to arrange effective expansion joints for both direction, parallel and perpendicular to the channels. These joints shall be placed according to the norm standards in force and shall not be placed close to drainage line.
4. In case the drainage line shall be installed on roofs or terraces, it is obligatory to arrange a waterproof sheet according to specific projects.



N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed

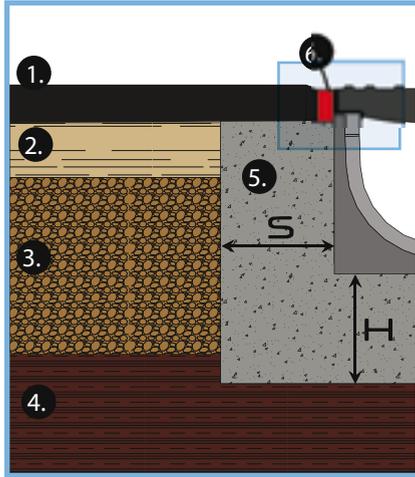


# INSTALLATION

WING

## Case 1

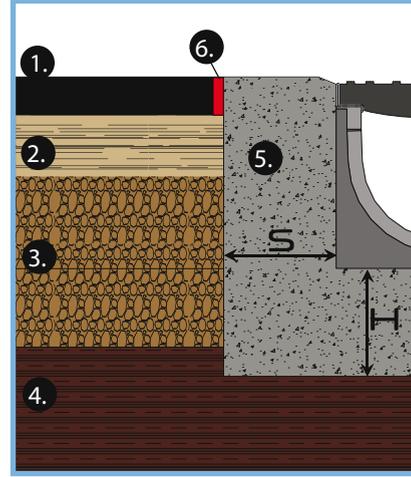
Asphalt  
(C250)



1. Sheet asphalt
2. Lower layer (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint

## Case 2

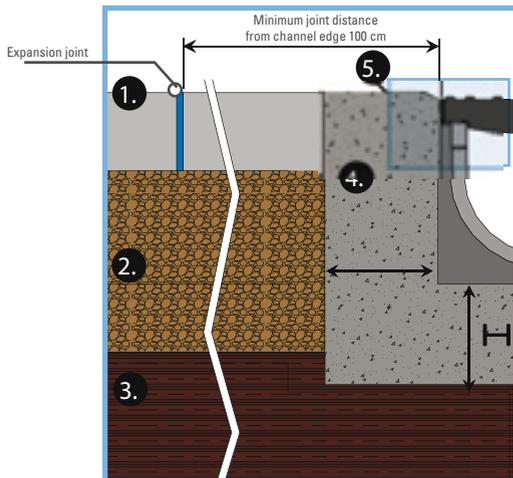
Asphalt  
(D400-E600-F900)



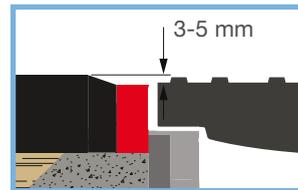
1. Sheet asphalt
2. Lower layer (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint

## Case 3

Concrete screed for streets and roads  
(from C250 to F900)



1. Concrete flooring
2. Bearing layer
3. Subfloor
4. Concrete reinforcement layer
5. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

## SUMMARY TABLE

Load class (EN 1433)		C 250	D 400	E 600	F 900
Applicable load (EN 1433)	kN	250	400	600	900
Minimum height H of concrete laying bed	mm	150	200	200	250
Minimum thickness S of the concrete flanking	mm	150	200	200	250
Concrete compression strength class (EN 206-1)		C 25/30	C 25/30 <sup>15</sup>	C 30/37	C 35/45
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 35/45 XF4	C 40/50 XF4

7- If concrete can be affected by frost and thaw cycles.

15- If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.

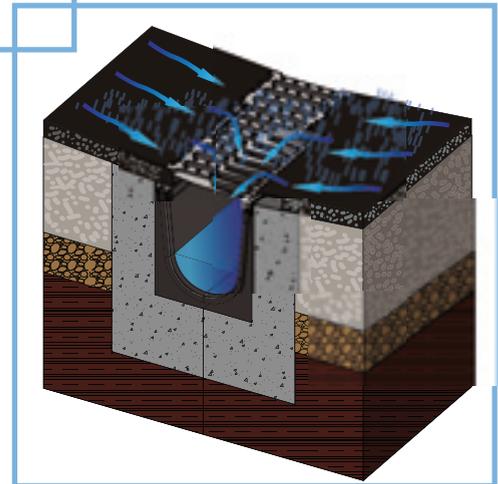
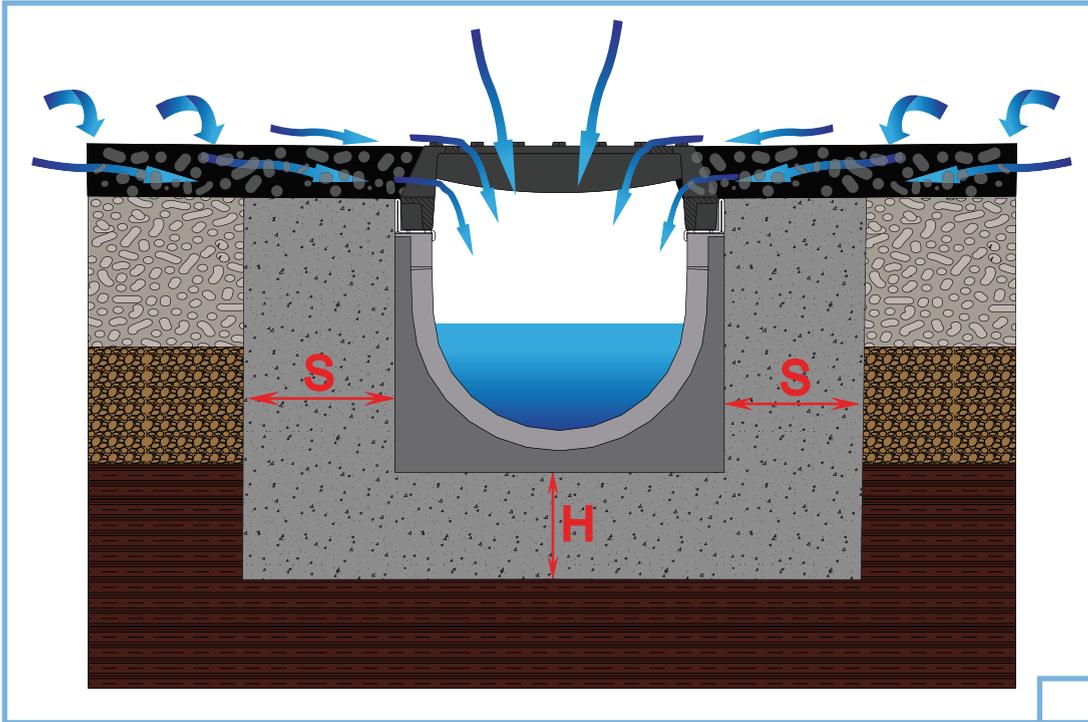
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N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION OF DRAINING ASPHALT GRATING WING 200

WING



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

## SUMMARY TABLE

Load class (EN 1433)		D 400
Applicable load (EN 1433)	kN	400
Minimum height H of concrete laying bed	mm	200
Minimum thickness S of the concrete fl anking	mm	200
Concrete compression strength class (EN 206-1)		C 25/30 <sup>15</sup>
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.

15- If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.

N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

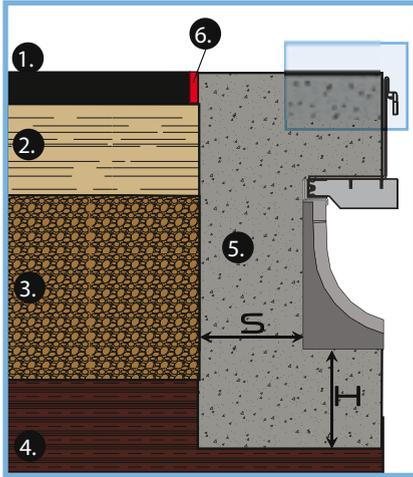


# INSTALLATION OF DRAINING ASPHALT GRATING WING 200

WING

## Case 1

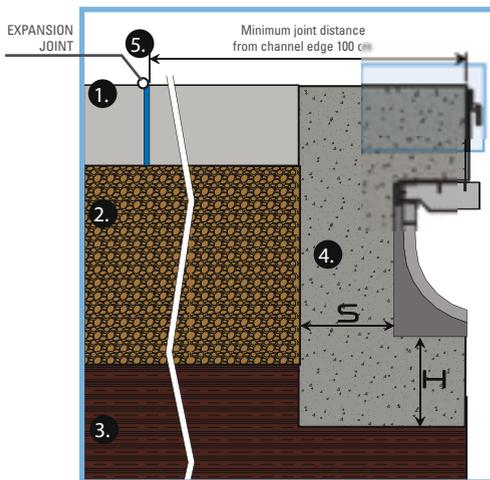
Asphalt  
(from B125 to D400)



1. Sheet asphalt
2. Strato di allettamento
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Safety joint (if required)

## Case 2

Concrete flooring  
(from B125 to D400)



1. Concrete flooring
2. Bearing layer
3. Subfloor
4. Concrete reinforcement layer
5. Expansion joint

This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

### SUMMARY TABLE

Load class (EN 1433)		B 125	C 250	D 400
Applicable load (EN 1433)	kN	125	250	400
Minimum height H of concrete laying bed	mm	100	150	200
Minimum thickness S of the concrete fl anking	mm	100	150	200
Concrete compression strength class (EN 206-1)		C 25/30	C 25/30	C 25/30 <sup>15</sup>
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.

15- If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.

N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIFICATIONS

WING

1. Supply and installation of MufleDrain WING type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. Galvanised (stainless) steel upper profile equipped with M8 threaded insert to which a screw can be secured to fix the gratings, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 25 mm, connection through prearranged coupling to the channel structure. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap \_\_\_mm, internal height \_\_\_ mm.
2. Supply and installation of MufleDrain WING type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. Galvanised (stainless) steel upper profile equipped with M8 threaded insert to which a screw can be secured to fix the gratings, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 25 mm, connection through prearranged coupling to the channel structure. The internal surface of the channel will be perfectly smooth and have a low roughness coefficient to allow water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000mm, internal net gap 100 mm, internal height \_\_\_ mm.
3. Supply and installation of MufleDrain WING type HD-PE drainage channel with external stiffening ribs and male-female channel coupling system. The channel will have 4 drainage diaphragms at pre-determined points. Ductile cast-iron upper profile equipped with M10 screw to which a nut can be secured to fix the gratings, 6 mm-thick drive-over edge, 9 mm-thick contact surface with height not smaller than 35 mm, connection through a nut and bolt system to the channel structure. The channel will have the following dimensions: length 1,500mm, internal net gap 300mm, internal height 300 mm.
4. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain WING drainage channels with screw fixing system, load class C250 (D400, E600, F900) according to EN 1433-2008, slot width 20 mm, length 498 mm, width \_\_\_mm.
5. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain WING drainage channels with screw fixing system, load class D400 according to EN 1433-2008, square mesh, length 498 mm, width \_\_\_mm.
6. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain WING drainage channels with screw fixing system, load class E600 according to EN 1433-2008, slot inclined 30° to the longitudinal axis, width 6mm, length 498mm, width 148 mm.
7. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain WING 300 drainage channels with nut fixing system, load class C250 according to EN 1433-2008, length 498 mm, width 376 mm.
8. Supply and installation of ductile cast- iron GJS 500/7 mesh gratings according to EN 1563-2004 for MufleDrain WING 300 drainage channels with nut fixing system, load classes C250 (D400, E600) according to EN 1433-2008, length 748 mm, width 376 mm.
9. Supply and installation of ductile iron covering gratings for MufleDrain WING drainage channels with nut fixing system, load class F900 according to EN 1433-2008, slot length 24 mm, length 748 mm, width 376 mm.
10. Supply and installation of ductile iron GJS 500/7 blind covers according to EN 1563-2008 with mesh for MufleDrain WING drainage channels with screw fixing system, load class E600 according to EN 1433-2004, length 498 mm, width \_\_\_mm.
11. Supply and installation of ductile iron GJS 500/7 blind covers according to EN 1563-2004 with mesh for MufleDrain WING drainage channels with nut fixing system, load class E600 according to EN 1433-2004, length 498 mm, width 376 mm.
12. Supply and installation of ductile iron GJS 500/7 perforated cover Air System according to EN 1563-2004 for composting systems with slots for screw fixing. The cover will have 12 holes (Ø 10) to allow the passage of the air needed for composting. The holes will have a truncated-cone section with the smaller base upwards in order to prevent any clogging due to residues. The load class of the cover will be E600 according to EN 1433-2008, usable length 500 mm, width 198 mm.
13. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain WING drainage channels equipped with screw fixing slots, load class C250 according to EN 1433-2008, length 998 mm, width \_\_\_mm. A similar grating will be available upon request with length 498 mm. The dimensions will be 30 x 30 mm in the square mesh and 30 x 10 mm in the anti-heel mesh.
14. Supply and installation of T-shaped longitudinal-slot gratings made from galvanised steel for MufleDrain WING drainage channels with male-female coupling system between one grating and the next, load class D400 according to EN 1433-2008, length 998 mm, width \_\_\_ mm, height of "T" \_\_\_mm.
15. Supply and installation of L-shaped longitudinal-slot gratings made from galvanised steel for MufleDrain WING drainage channels with male-female coupling system between one grating and the next, load class D400 according to EN 1433-2008, length 998mm, width \_\_\_ mm, height of "L" \_\_\_mm.
16. Supply and installation of galvanised steel blind cover for MufleDrain WING drainage channels with screw fixing system, load class C250 according to EN 1433-2004, length 998 mm, width \_\_\_mm. A similar cover will be available upon request with length 498 mm.
17. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.
18. Supply and installation of HD-PE open cap with drainage hole diameter \_\_\_mm for MufleDrain drainage channel with coupling system into the special channel housing.
19. Supply and installation of (open) end cap made from galvanised steel (galvanised steel and PVC tube) for MufleDrain drainage channel with coupling system into the special channel housing.



## SPECIFICATIONS

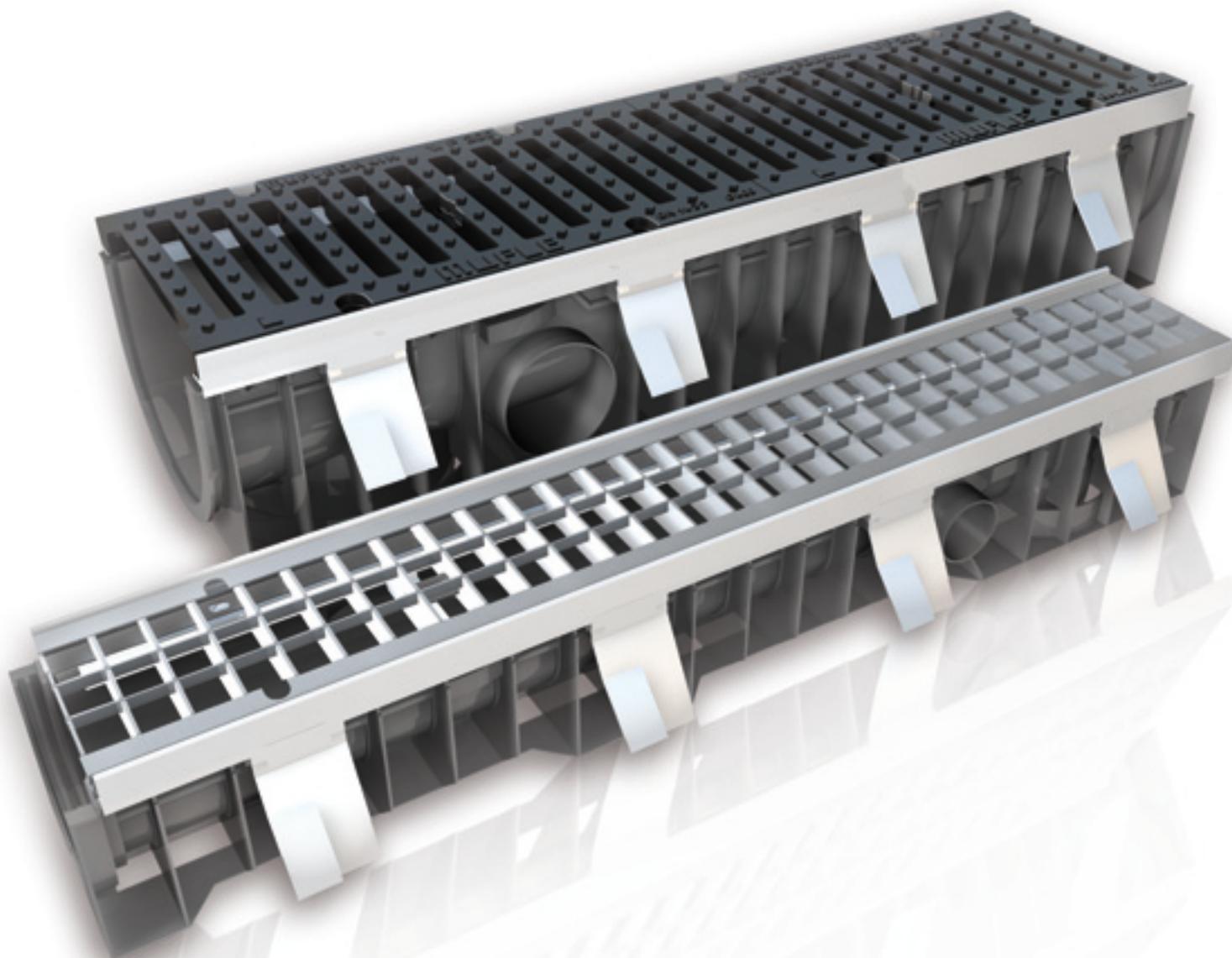
WING

20. Supply and installation of HD-PE boxes with siphon for MuffleDrain WING drainage channels with external stiffening ribs and coupling system. Upper profile of HD-PE with height not smaller than 20 mm. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 500 mm. The gully dimensions will be as follows: length 542 mm, net gap \_\_\_ mm, height 400 mm.
21. Supply and installation of inspection elements for MuffleDrain WING T-shaped gratings in galvanized (stainless) steel for MuffleDrain WING drain boxes with siphon. Every inspection element will be made of an external containment tank self-centered on bottom drain box with siphon and of an inspection element to be placed inside the containment tank that can be also pulled out after installation. Load classes until C250. The sizes of drain boxes shall be length 500 mm, width \_\_\_\_\_ mm, height \_\_\_\_\_ mm.
22. Supply and installation of inspection elements for MuffleDrain WING L-shaped gratings in galvanized (stainless) steel for MuffleDrain WING drain boxes with siphon. Every inspection element will be made of an external containment tank self-centered on bottom drain box with siphon and of an inspection element to be placed inside the containment tank that can be also pulled out after installation. Load classes until C250. The sizes of drain boxes shall be length 500 mm, width \_\_\_\_\_ mm, height \_\_\_\_\_ mm.

# PLUS

## The System:

- it supports 4 load classes (C250, D400, E600, F900) in compliance with Standard EN 1433
- it is made up of a HD-PE channel with a strengthening frame
- it is supplemented with a galvanised or stainless steel en-bloc frame equipped with 8 external clamps (4 each side) for anchoring it to the concrete and 2 spacers ensuring steadiness against torsional deformation
- it is wearproof and very solid thanks to the frame, which ensures a 4 mm - thick drive-over edge and a 2 mm - thick contact surface in compliance with Standard EN 1433 on classes subject to heavy loads
- it comprises a wide range of standard gratings (with slots, square mesh, anti-heel mesh) made from galvanised steel, stainless steel and ductile iron, as well as steel and ductile iron blind covers, and a cover specially designed for composting systems
- it comes complete with an innovative grating for draining asphalt in D400 which has slots in the upper and side sections in order to receive the liquids from the road surface - both surface liquids and liquids absorbed by the draining asphalt
- it has tie-rod and screw fixing systems; and a convenient drain gate
- it is ideal for heavy uses, road carriageways, road crossings with high-speed vehicular traffic (trucks included), service areas, industrial areas, ports and airports, areas where containers are (un)loaded
- it comes complete with drain boxes with siphon
- the range is made up of 8 channels with 3 widths and 4 heights (100/55, 100/80, 100/100, 100/160, 150/100, 150/160, 200/100, 200/160)



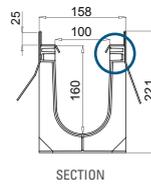
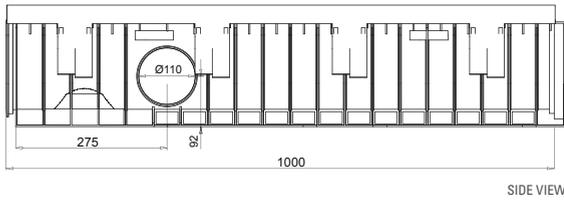
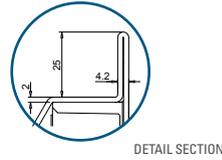
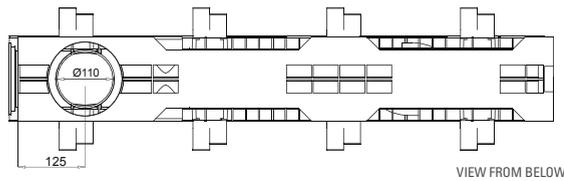


100



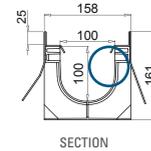
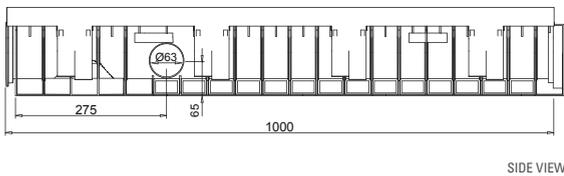
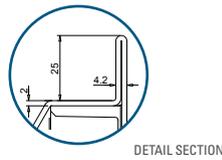
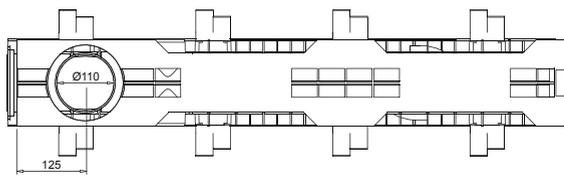
# CHANNELS

**PLUS  
100**



## PLUS 100/160

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm	
704000		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 221	1000 x 100 x 160	6,40	145,28	14,52	side bottom <sup>1</sup>	2 x Ø 110 1 x Ø 110
704008		stainless steel AISI 304 <sup>2</sup>								



## PLUS 100/100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm	
704001		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 161	1000 x 100 x 100	5,90	89,56	8,95	side bottom <sup>1</sup>	2 x Ø 63 1 x Ø 110
704009		stainless steel AISI 304 <sup>2</sup>								

1- For drainage purposes use the drain gate with outlet kit (available in two version Ø100 and Ø100).

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

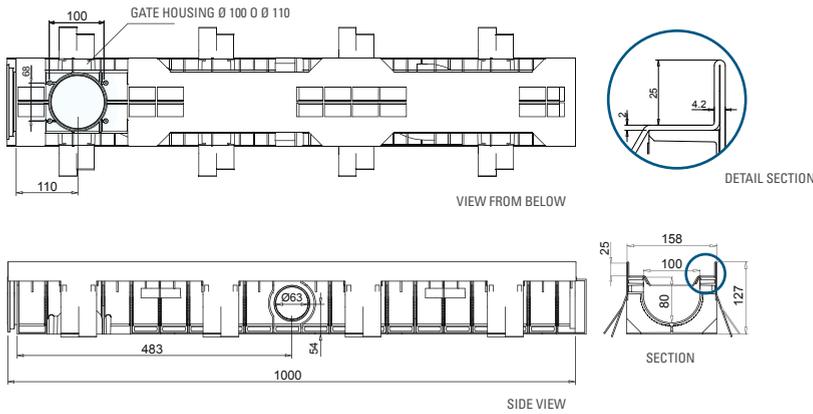
N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

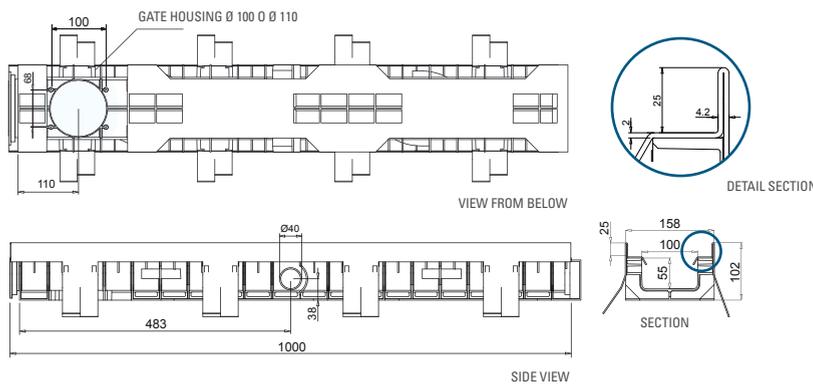


# CHANNELS

**PLUS  
100**



PLUS 100/80									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
704002		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 127	1000 x 100 x 80	5,60	69,28	6,92	side 2 x Ø 63 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110
704010		stainless steel AISI 304 <sup>2</sup>							



PLUS 100/55									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
704003		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 158 x 102	1000 x 100 x 55	5,40	54,44	5,44	side 2 x Ø 40 bottom <sup>1</sup> 1 x Ø 100; 1 x Ø 110
704011		stainless steel AISI 304 <sup>2</sup>							

1- For drainage purposes use the drain gate with outlet kit (available in two version Ø100 and Ø100).

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



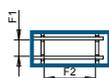
**PLUS  
100**

## APPLICATIONS OF GALVANISED STEEL

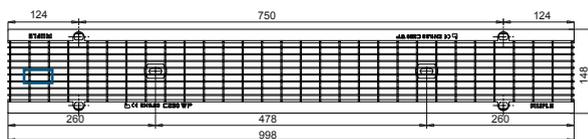
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks

## APPLICATIONS OF STAINLESS STEEL

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks
- Areas with low-load transit in food factories
- Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



VIEW FROM ABOVE



SIDE VIEW



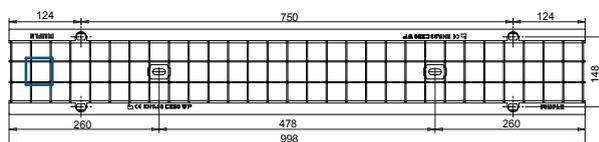
DETAIL OF UPRIGHT BEND



ANTI-HELL MESH GRATING								30 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	screw	
503121		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 25	5,50	8,30	10,2 x 31,2			
503122		pickled stainless steel AISI 304 <sup>2</sup>							
503149		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 25	2,75	4,15				
503150		pickled stainless steel AISI 304 <sup>2</sup>							



DETAIL OF SQUARE MESH



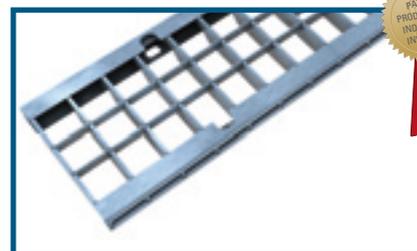
VIEW FROM ABOVE



SIDE VIEW



DETAIL OF UPRIGHT BEND



SQUARE MESH GRATING								30 mm	
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM		
	€		mm	kg	dm <sup>2</sup>	mm	tie-tod	screw	
503123		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 148 x 25	4,80	9,38	34,2 x 31,2			
503124		pickled stainless steel AISI 304 <sup>2</sup>							
503151		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 148 x 25	2,40	4,69				
503152		pickled stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.  
5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



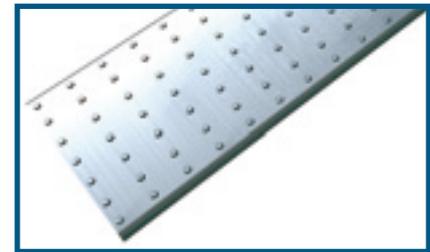
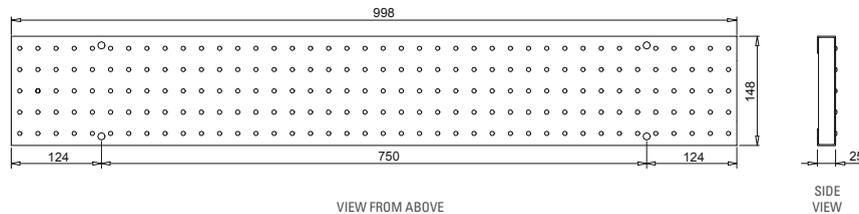
# GRATINGS AND SOLID TOP COVERS



**PLUS  
100**

## APPLICATIONS

Cable passageway  
Passageway for water and/or heat systems



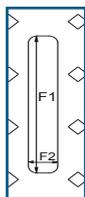
### SOLID TOP COVER



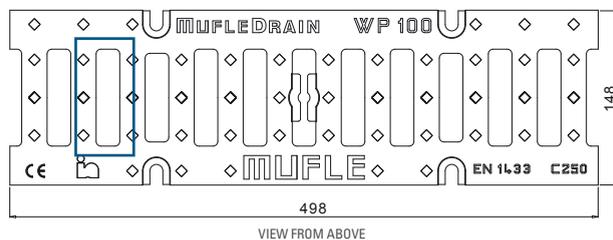
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	FIXING SYSTEM screw
503101		galvanised steel DX51D <sup>3</sup>	998 x 148 x 25	3,00	

## APPLICATIONS OF DUCTILE IRON

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks



SLOT  
DETAIL



SIDE  
VIEW



### SLOTTED GRATING 20 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503108		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	4,65	1,94	82,0 x 20,0	

3 - Classificazione secondo la norma EN 10142 (ed. 2002) e designazione simbolica conforme alla EN 10027-1 (-2) (ed. 2006).  
6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



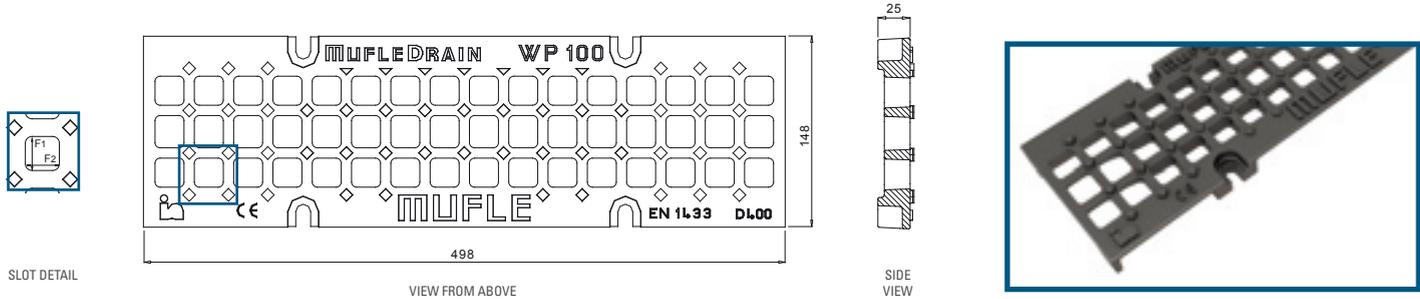
# GRATINGS



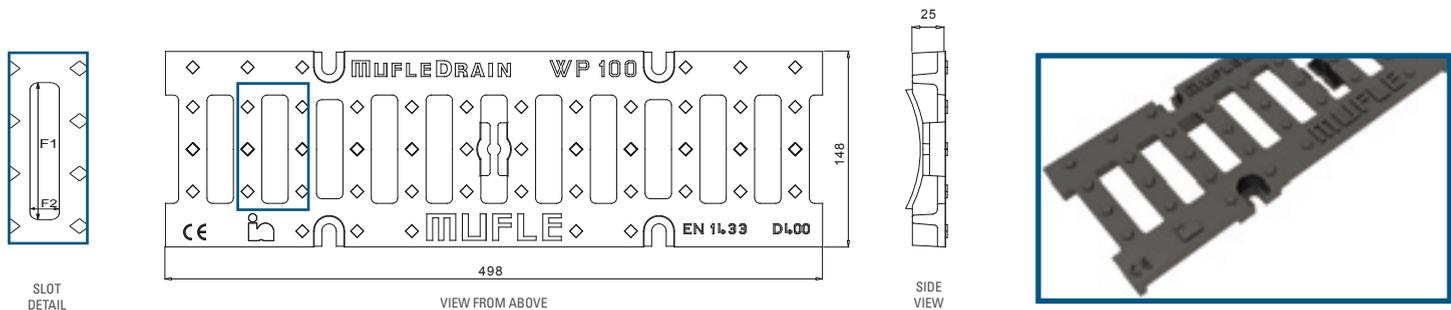
**PLUS  
100**

## APPLICATIONS OF DUCTILE IRON

- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503182		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	4,80	2,43	22,5 x 22,5	



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503109		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	4,75	1,94	82,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



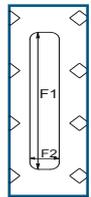
**PLUS  
100**

## APPLICATIONS OF DUCTILE IRON

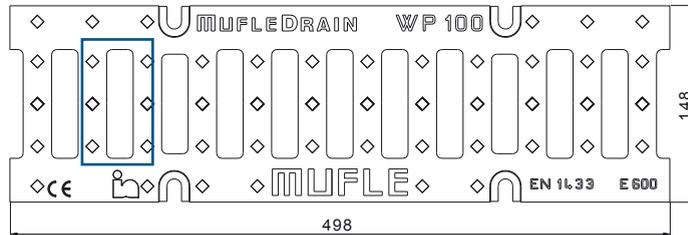
Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic

Industrial areas with passage of forklift trucks (high axle loads)

Underpasses



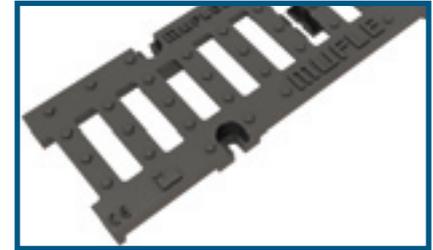
SLOT  
DETAIL



VIEW FROM ABOVE



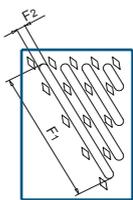
SIDE  
VIEW



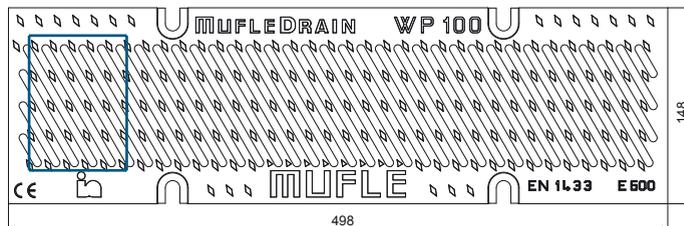
### SLOTTED GRATING 20 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM
503110		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	5,10	1,94	82,0 x 20,0	



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



### SLOTTED GRATING 6 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM
503418		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	4,90	2,13	105,5 x 6,0	

6- Classification according to Standard EN 1563 (2009).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



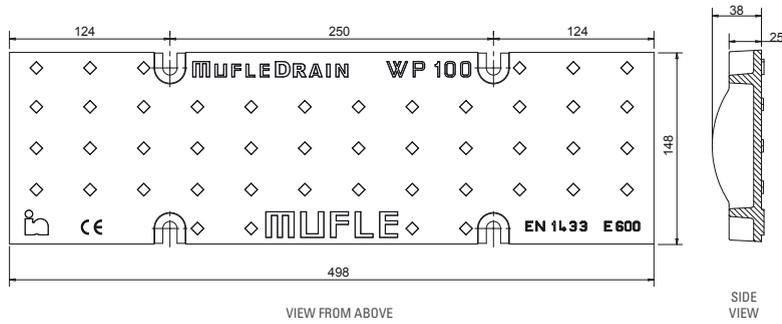
# SOLID TOP COVERS

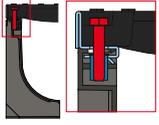


**PLUS  
100**

## APPLICATIONS

Cable passageway  
Passageway for water and/or heat systems



SOLID TOP COVER					
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM
	€		mm	kg	screw
503105		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 148 x 25	6,00	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

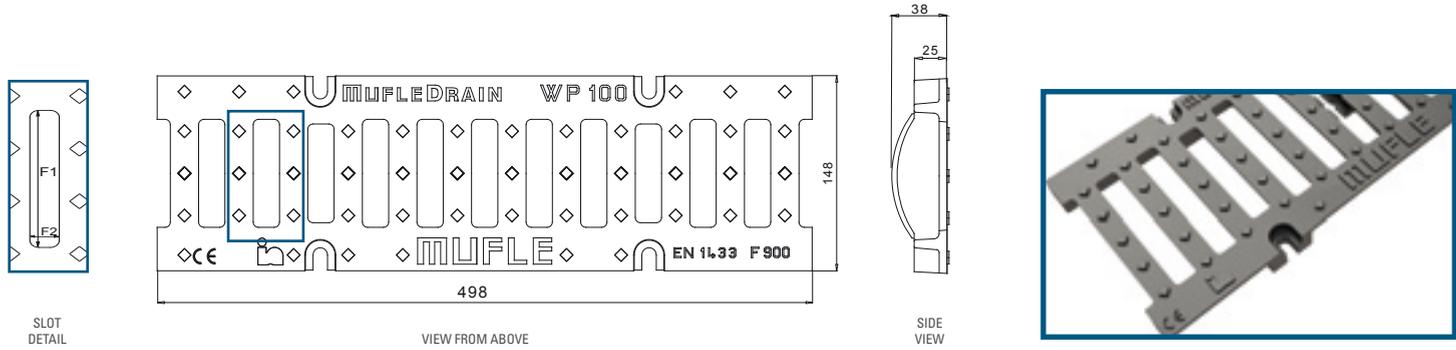


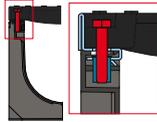
# GRATINGS



**PLUS  
100**

## APPLICATIONS OF DUCTILE IRON Port and airport areas



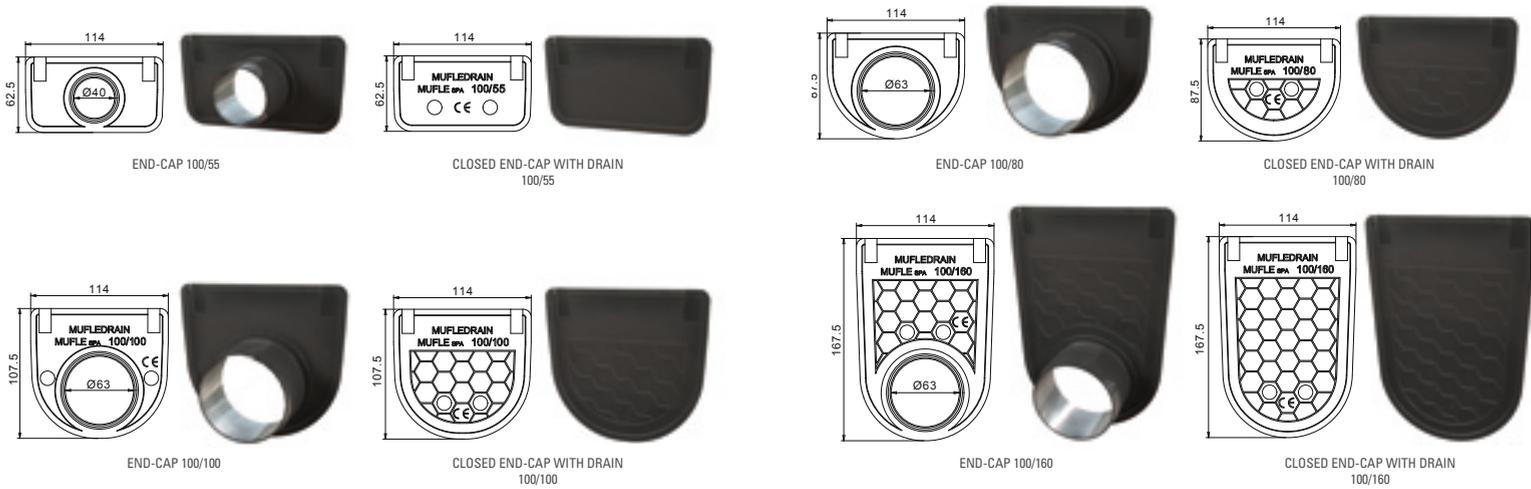
SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503173		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 148 x 25	6,30	1,94	82,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



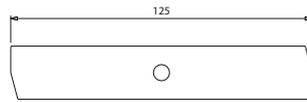
# ACCESSORIES

**PLUS  
100**

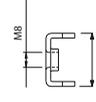


## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR GRATINGS	PREINSTALLED DRAIN OUTLETS
					mm
700500		end-cap with drain	PE-HD	100/55	1 x Ø 40
700508		closed end-cap	PE-HD	100/55	-
700501		end-cap with drain	PE-HD	100/80	1 x Ø 63
700509		closed end-cap	PE-HD	100/80	-
700502		end-cap with drain	PE-HD	100/100	1 x Ø 63
700510		closed end-cap	PE-HD	100/100	-
700503		end-cap with drain	PE-HD	100/160	1 x Ø 63
700511		closed end-cap	PE-HD	100/160	-



VIEW FROM ABOVE

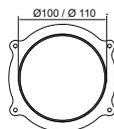


SIDE VIEW

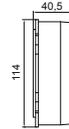


## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
500421		galvanised steel	WING galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500422		stainless steel	WING stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



VIEW FROM ABOVE



SIDE VIEW



## KIT OUTLET + SCREWS

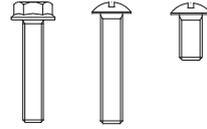
CODE	PRICE €	MATERIAL	VALID FOR CHANNELS	DIAMETER	KIT FOR 1 ml
				mm	
506114		PE-HD	100/55 - 100/80	Ø 100	1 outlet Ø 100 + 4 screws
506115		PE-HD	100/55 - 100/80	Ø 110	1 outlet Ø 110 + 4 screws

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# ACCESSORIES

**PLUS  
100**



## KIT SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
503312		black galvanised steel	PLUS ductile iron	M8 x 40 black with fl angled hexagonal head	8
503313		galvanised steel	PLUS galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	PLUS stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover PLUS	M8 x 40 TBL combi	4

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700526		from 100/100 to 100/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



N.B. Sizes and weights are subject to usual manufacturing tolerance values.

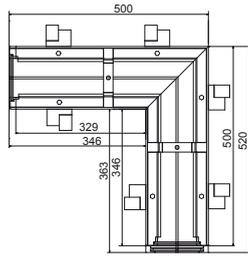


# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**PLUS  
100**

## LEFT CORNER

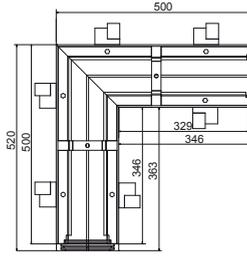
PLUS 100



CODE	PRICE €	MODEL
704100		100/160
704101		100/100
704102		100/80
704103		100/55

## RIGHT CORNER

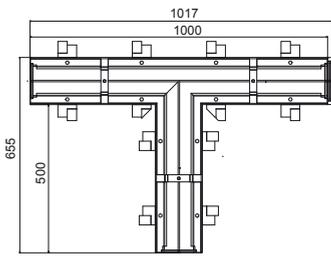
PLUS 100



CODE	PRICE €	MODEL
704108		100/160
704109		100/100
704110		100/80
704111		100/55

## LEFT TI

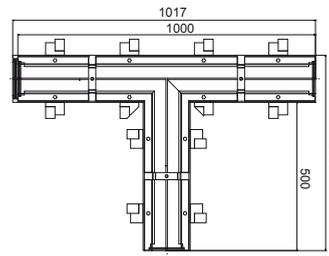
PLUS 100



CODE	PRICE €	MODEL
704116		100/160
704117		100/100
704118		100/80
704119		100/55

## RIGHT TI

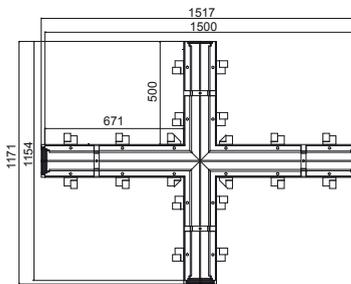
PLUS 100



CODE	PRICE €	MODEL
704124		100/160
704125		100/100
704126		100/80
704127		100/55

## CROSS

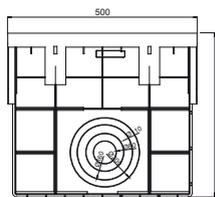
PLUS 100



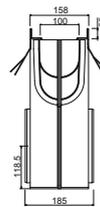
CODE	PRICE €	MODEL
704132		100/160
704133		100/100
704134		100/80
704135		100/55

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

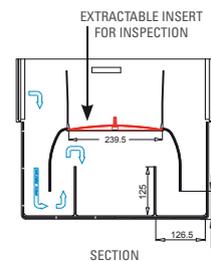
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

PLUS 100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
704016		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 158 x 434	500 x 100 x 400	185	118,5	4,34	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
704019		stainless steel AISI 304*	PE-HD	500 x 158 x 434	500 x 100 x 400	185	118,5	4,34	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

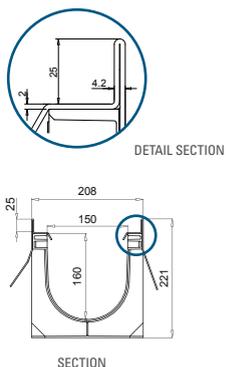
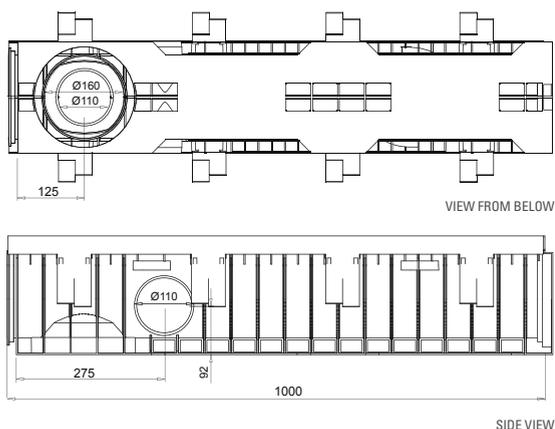


# 150

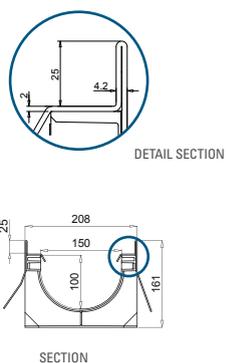
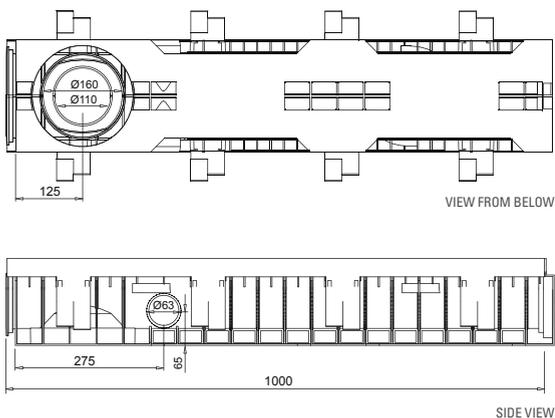


# CHANNELS

**PLUS  
150**



PLUS 150/160									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
704004		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 208 x 221	1000 x 150 x 160	6,89	213,04	21,40	side 2 x Ø 110 bottom 1 x Ø 110; 1 x Ø 160
704012		stainless steel AISI 304 <sup>2</sup>							



PLUS 150/100									
CODE	PRICE	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS	INTERNAL DIMENSIONS	WEIGHT	DRAINAGE SECTION	CAPACITY	PREINSTALLED DRAIN
	€			L x l x h mm	L x l x h mm	kg	cm <sup>2</sup>	dm <sup>3</sup>	mm
704005		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 208 x 161	1000 x 150 x 100	6,44	127,32	12,80	side 2 x Ø 63 bottom 1 x Ø 110; 1 x Ø 160
704013		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



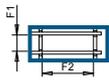
**PLUS  
150**

## APPLICATIONS OF GALVANISED STEEL

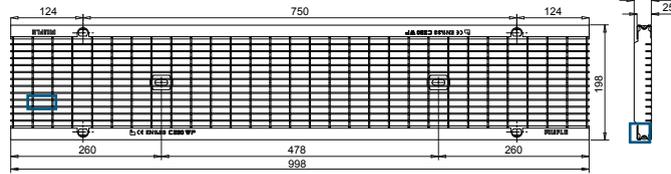
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks

## APPLICATIONS OF STAINLESS STEEL

- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks
- Areas with low-load transit in food factories
- Areas with low-load transit in chemically aggressive environments



DETAIL OF  
HOOKING  
SYSTEM

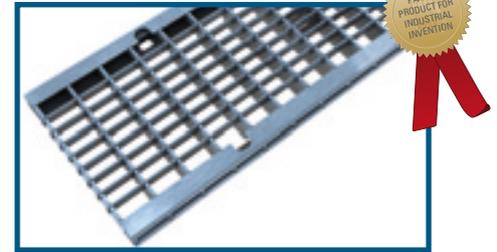


VIEW FROM ABOVE

SIDE  
VIEW



DETAIL OF  
UPRIGHT  
BEND



PATENT  
PRODUCT FOR  
INDUSTRIAL  
INVENTION

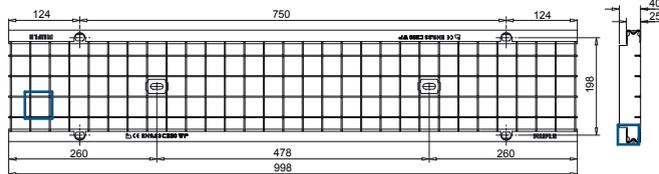
## ANTI-HELL MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503125		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 25	8,40	11,64	10,2 x 31,2		
503126		pickled stainless steel AISI 304 <sup>2</sup>						
503153		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 25	4,20	5,82			
503154		pickled stainless steel AISI 304 <sup>2</sup>						



DETAIL OF  
SQUARE  
MESH

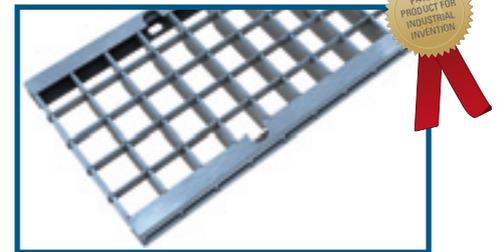


VIEW FROM ABOVE

SIDE  
VIEW



DETAIL OF  
UPRIGHT  
BEND



PATENT  
PRODUCT FOR  
INDUSTRIAL  
INVENTION

## SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503127		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 198 x 25	7,30	12,94	34,2 x 31,2		
503128		pickled stainless steel AISI 304 <sup>2</sup>						
503155		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 198 x 25	3,65	6,47			
503156		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



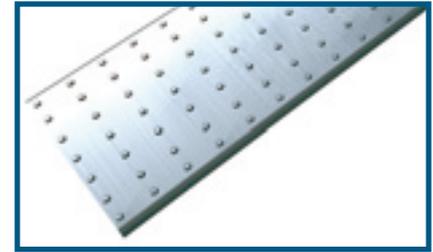
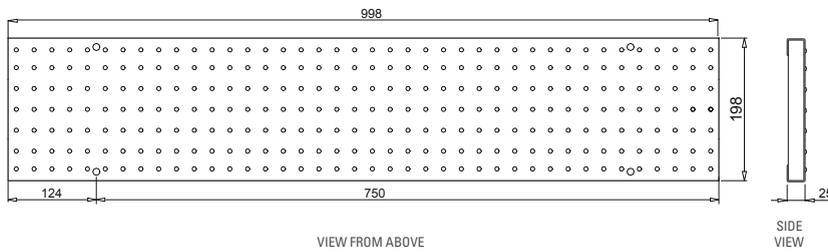
# GRATINGS AND SOLID TOP COVERS



**PLUS  
150**

## APPLICATIONS

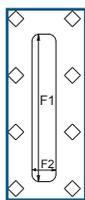
Cable passageway  
Passageway for water and/or heat systems



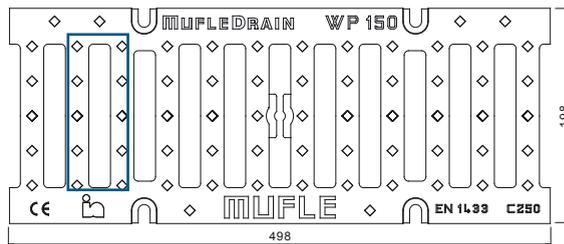
SOLID TOP COVER						
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM	
	€		mm	kg	screw	
503102		hot dip galvanised steel DX51D <sup>3</sup>	998 x 198 x 25	4,20		

## APPLICATIONS OF DUCTILE IRON

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks



SLOT  
DETAIL



VIEW FROM ABOVE

SIDE  
VIEW



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503111		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 198 x 25	5,90	3,12	132,0 x 20,0	

3- Classification according to Standard EN 10142 (2002) and sybolic designation according to EN 10027-1 (-2) (2006).

6- Classification according to Standard EN 1563 (2009).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



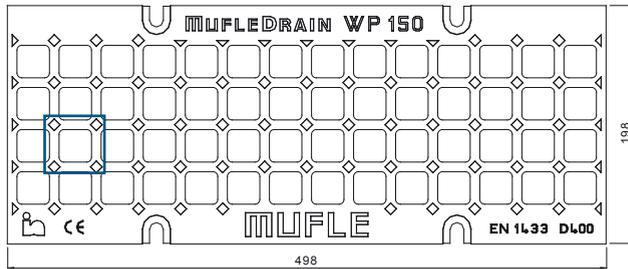
**PLUS  
150**

## APPLICATIONS OF DUCTILE IRON

- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



SLOT  
DETAIL



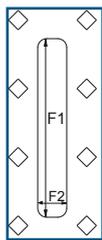
VIEW FROM ABOVE



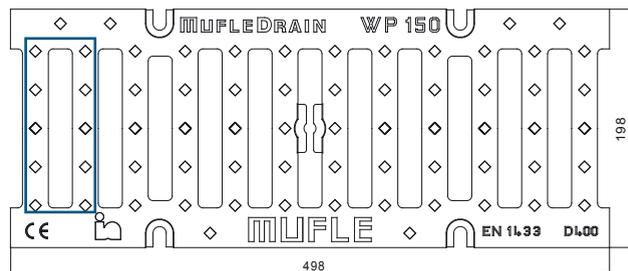
SIDE  
VIEW



MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503183		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 198 x 25	7,20	4,08	27,0 x 27,0	



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	DRAINAGE SURFACE	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	dm <sup>2</sup>	screw
503112		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 198 x 25	7,10	3,12	132,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



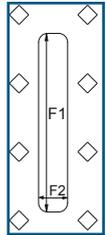
# GRATINGS



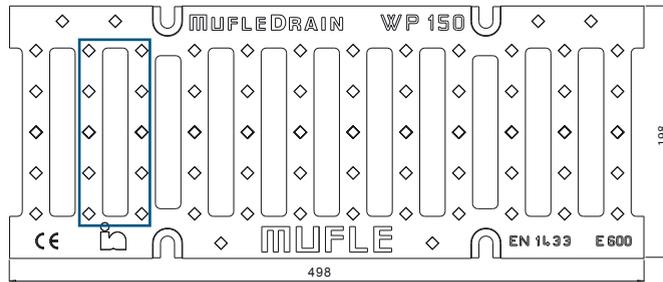
**PLUS  
150**

## APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic  
 Industrial areas with passage of forklift trucks (high axle loads)  
 Underpasses



SLOT  
DETAIL



VIEW FROM ABOVE

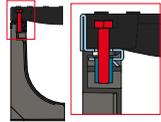


SIDE  
VIEW



### SLOTTED GRATING 20 mm



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503113		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 198 x 25	7,80	3,12	132,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
 N.B. Sizes and weights are subject to usual manufacturing tolerance values.



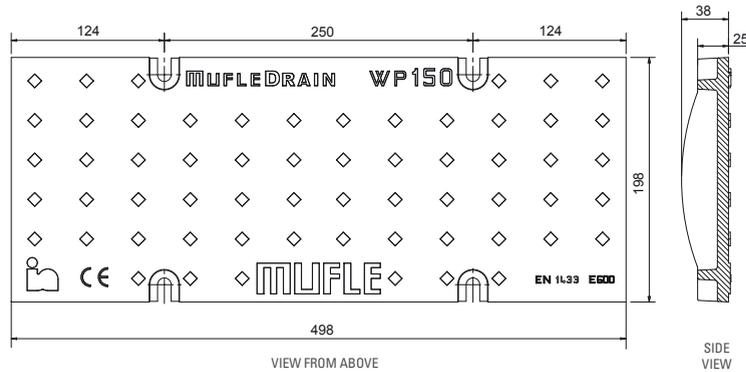
# SOLID TOP COVERS



**PLUS  
150**

## APPLICATIONS

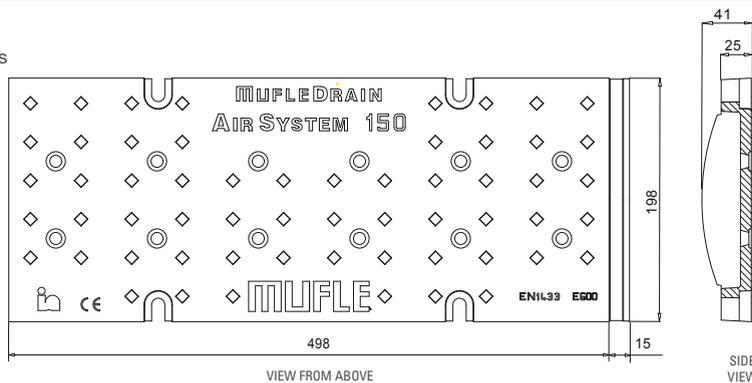
Cable passageway  
Passageway for water and/or heat systems



SOLID TOP COVER					
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM
	€		mm	kg	screw
503106		GJS 500/76 ductile ironwater based paint coated	498 x 198 x 25	10,60	

## APPLICATIONS

Waste composting systems



SOLID TOP COVER AIR SYSTEM					
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM
	€		mm	kg	screw
503100		GJS 500/76 ductile ironwater based paint coated	498 x 198 x 25	10,50	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

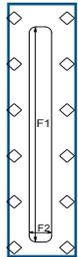


# GRATINGS

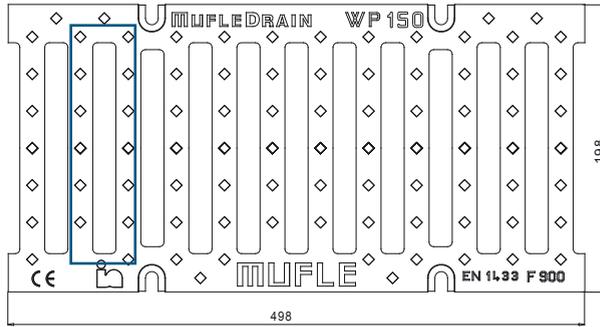


**PLUS  
150**

## APPLICATIONS OF DUCTILE IRON Port and airport areas



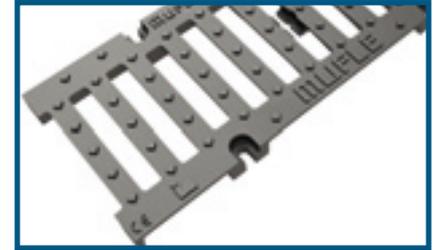
SLOT  
DETAIL



VIEW FROM ABOVE

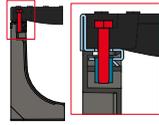


SIDE  
VIEW



### SLOTTED GRATING 20 mm



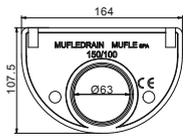
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM screw
503174		GJS 500/76 ductile iron water based paint coated	498 x 198 x 25	8,70	3,12	132,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

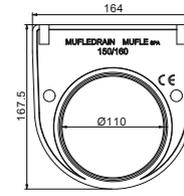


# ACCESSORIES

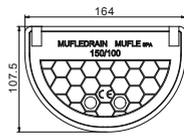
**PLUS  
150**



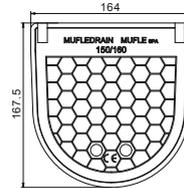
END-CAP 150/100



END-CAP 150/160



CLOSED END-CAP WITH DRAIN  
150/100

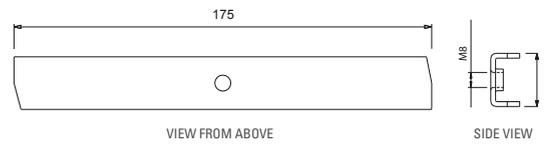


CLOSED END-CAP WITH DRAIN  
150/160



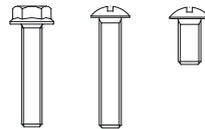
## END CAPS

CODE	PRICE €	TYPE	MATERIAL	VALID FOR CHANNELS	PREINSTALLED DRAIN
700504		end-cap with drain	PE-HD	150/100	1 x Ø 63
700512		closed end-cap	PE-HD	150/100	-
700505		end-cap with drain	PE-HD	150/160	1 x Ø 110
700513		closed end-cap	PE-HD	150/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
500424		galvanised steel	WING galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500425		stainless steel	WING stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



## KIT SCREWS

CODE	PRICE €	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
503312		black galvanised steel	WING ductile iron	M8 x 40 black with flanged hexagonal head	8
503313		galvanised steel	WING galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	WING stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover WING	M8 x 40 TBL combi	4

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE €	VALID FOR CHANNELS	FAMILIES
700517		from 150/100 to 150/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self-cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



N.B. Sizes and weights are subject to usual manufacturing tolerance values.

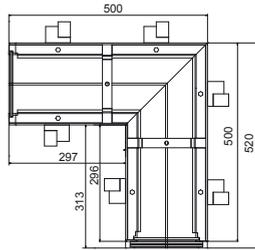


# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**PLUS  
150**

## LEFT CORNER

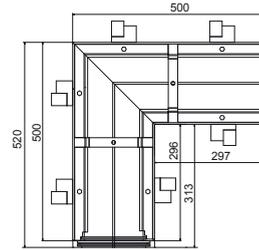
PLUS 150



CODE	PRICE €	MODEL
704104		150/160
704105		150/100

## RIGHT CORNER

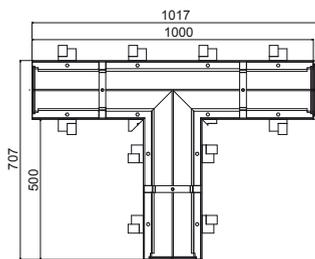
PLUS 150



CODE	PRICE €	MODEL
704112		150/160
704113		150/100

## LEFT TI

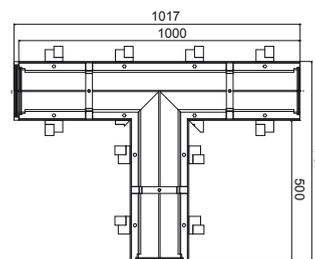
PLUS 150



CODE	PRICE €	MODEL
704120		150/160
704121		150/100

## RIGHT TI

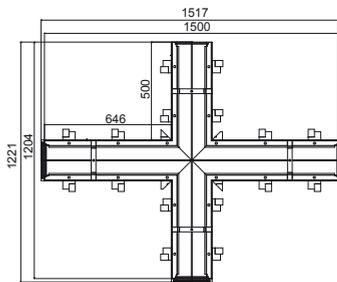
PLUS 150



CODE	PRICE €	MODEL
704128		150/160
704129		150/100

## CROSS

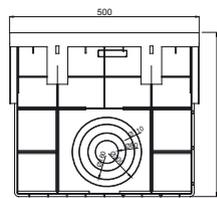
PLUS 150



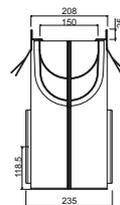
CODE	PRICE €	MODEL
704136		150/160
704137		150/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

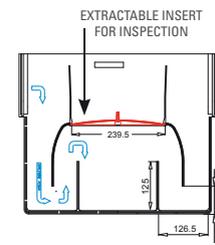
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

PLUS 150

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
704017		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 208 x 434	500 x 150 x 400	235	118,5	4,62	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
704020		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 208 x 434	500 x 150 x 400	235	118,5	4,62	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification in according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

3- Classification according to American Standard ASTM.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.

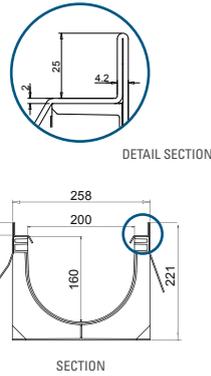
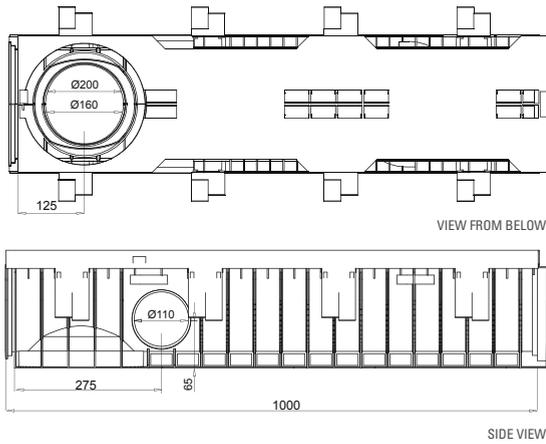


200



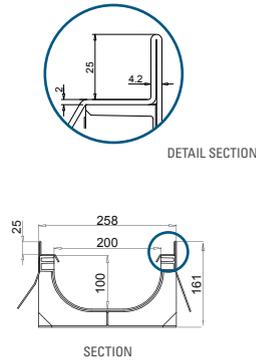
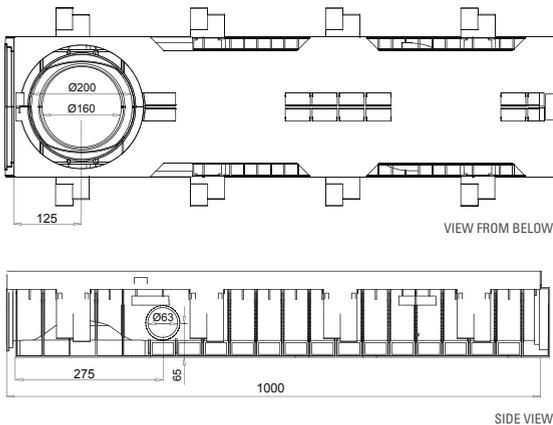
# CHANNELS

**PLUS  
200**



## PLUS 200/160

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
704006		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 221	1000 x 200 x 160	7,33	275,87	27,90	side 2 x Ø 110 bottom 1 x Ø 160; 1 x Ø 200
704014		stainless steel AISI 304 <sup>2</sup>							



## PLUS 200/100

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF CHANNEL	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SECTION cm <sup>2</sup>	CAPACITY dm <sup>3</sup>	PREINSTALLED DRAIN mm
704007		galvanised steel DX51D <sup>3</sup>	PE-HD	1000 x 258 x 161	1000 x 200 x 100	6,73	178,73	17,90	side 2 x Ø 63 bottom 1 x Ø 160; 1 x Ø 200
704015		stainless steel AISI 304 <sup>2</sup>							

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Waterproofing: in order to ensure the channels are waterproof, a bituminous adhesive sealant should be used. Heat-sealing the channel joints makes sure there will be no leakages through said joints for a very long time. For further information please contact MufleSystem's Technical Department.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



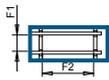
**PLUS  
200**

## APPLICATIONS OF GALVANISED STEEL

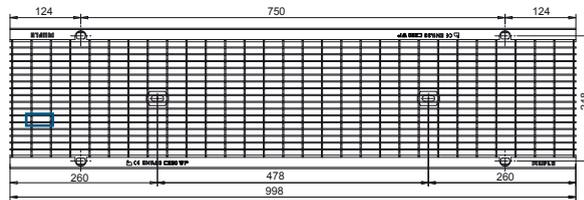
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks

## APPLICATIONS OF STAINLESS STEEL

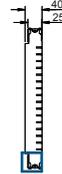
- Kerbs
- Historical town centres (slow traffic)
- Parking areas
- Parking decks
- Areas with low-load transit in food factories
- Areas with low-load transit in chemically aggressive environments



DETAIL OF HOOKING SYSTEM



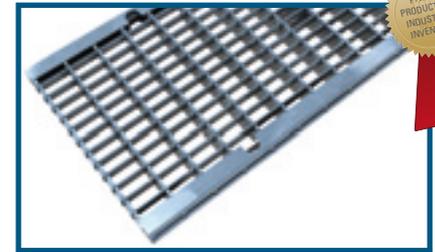
VIEW FROM ABOVE



SIDE VIEW



DETAIL OF UPRIGHT BEND



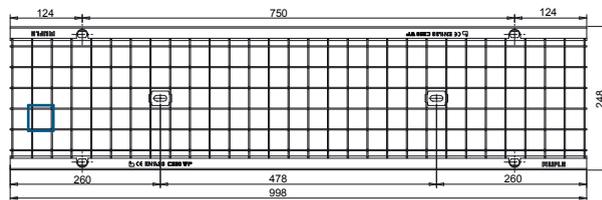
## ANTI-HELL MESH GRATING



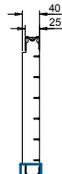
CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503129		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 25	10,30	15,50	10,2 x 31,2		
503130		pickled stainless steel AISI 304 <sup>2</sup>						
503157		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 25	5,15	7,75			
503158		pickled stainless steel AISI 304 <sup>2</sup>						



DETAIL OF SQUARE MESH



VIEW FROM ABOVE



SIDE VIEW



DETAIL OF UPRIGHT BEND



## SQUARE MESH GRATING



CODE	PRICE €	MATERIAL	DIMENSIONS L x l x h mm	WEIGHT kg	DRAINAGE SURFACE dm <sup>2</sup>	OPENINGS F1 x F2 mm	FIXING SYSTEM	
							tie-tod	screw
503131		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	998 x 248 x 25	9,10	17,13	34,2 x 31,2		
503132		pickled stainless steel AISI 304 <sup>2</sup>						
503159		hot dip galvanised steel DD11 (1.0332) <sup>5</sup>	498 x 248 x 25	4,55	8,57			
503160		pickled stainless steel AISI 304 <sup>2</sup>						

2- Classification according to American Standard ASTM.

5- Classification according to Standard EN 10111 (2008) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



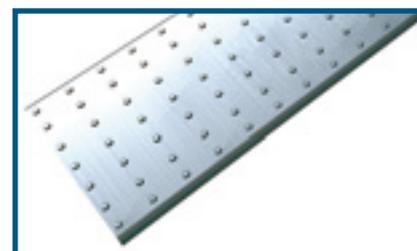
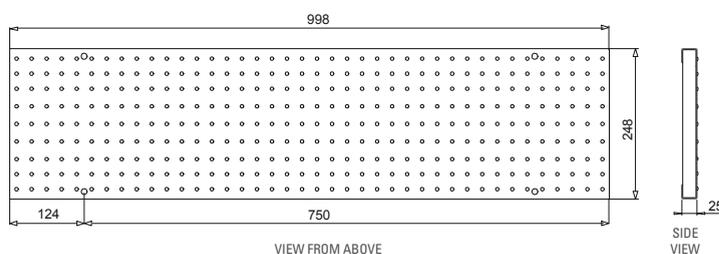
# GRATINGS AND SOLID TOP COVERS



**PLUS  
200**

## APPLICATIONS

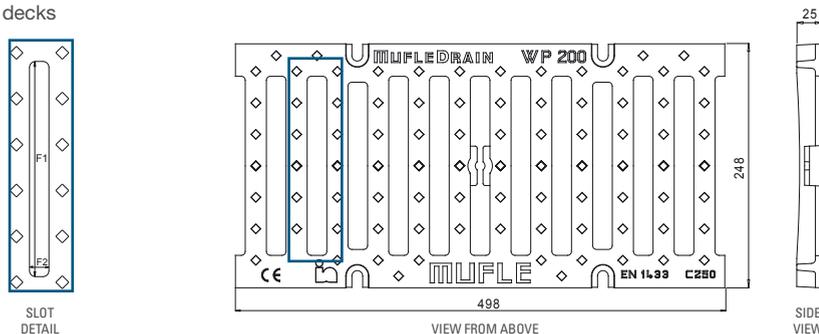
Cable passageway  
Passageway for water and/or heat systems



SOLID TOP COVER						
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM	
	€		mm	kg	screw	
503103		hot dip galvanised steel DX51D <sup>3</sup>	998 x 248 x 25	6,20		

## APPLICATIONS OF DUCTILE IRON

Kerbs  
Historical town centres (slow traffic)  
Parking areas  
Parking decks



SQUARE MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503114		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	7,00	4,32	182,0 x 20,0	

3 - Classificazione secondo la norma EN 10142 (ed. 2002) e designazione simbolica conforme alla EN 10027-1 (-2) (ed. 2006).  
6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# GRATINGS



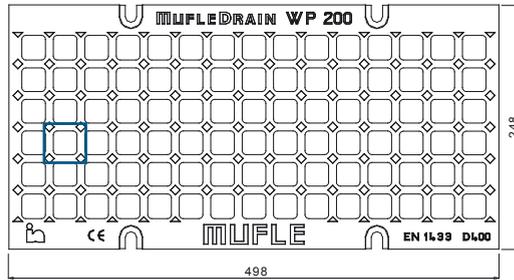
**PLUS  
200**

## APPLICATIONS OF DUCTILE IRON

- Road carriageways (not transversal)
- Hard shoulders
- Lay-bys with thick and heavy-goods traffic
- Petrol stations



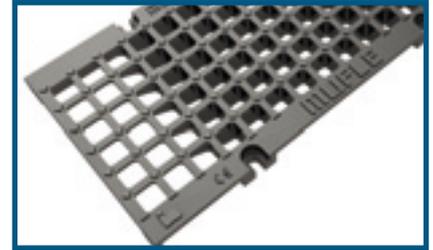
SLOT  
DETAIL



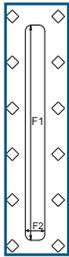
VIEW FROM ABOVE



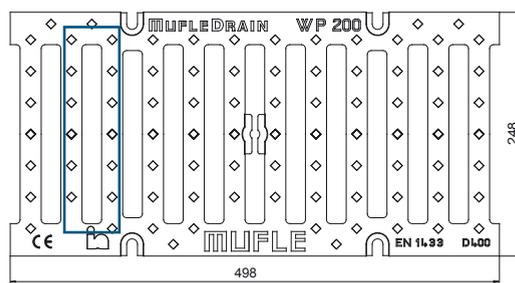
SIDE  
VIEW



MESH GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503184		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	8,60	5,18	24,0 x 24,0	



SLOT  
DETAIL



VIEW FROM ABOVE



SIDE  
VIEW



SLOTTED GRATING 20 mm							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503115		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	8,50	4,32	182,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



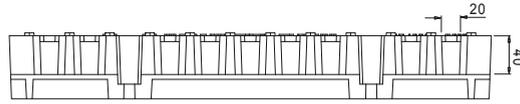
# DRAINING ASPHALT GRATING



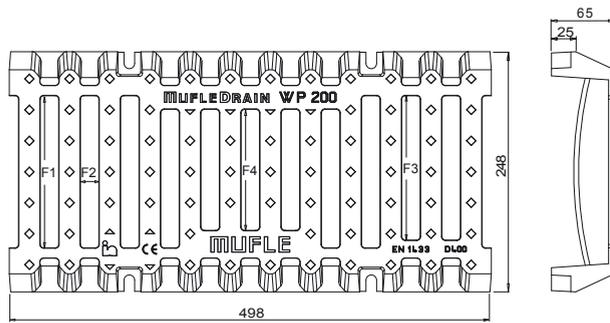
**PLUS  
200**

## APPLICATIONS OF DUCTILE IRON

Road carriageways with draining asphalt



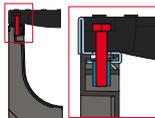
FRONT VIEW



VIEW FROM ABOVE

SIDE VIEW



DRAINING ASPHALT GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503181		GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 X 248 x 25	11,50	top 4,08 side 1,44	F1 x F2 = 180,0 x 20,0 F3 x F2 = 150,0 x 20,0 F4 x F2 = 126,0 x 20,0  side 40,0 x 20,0 (18,9 x side)	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



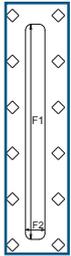
# GRATINGS AND SOLID TOP COVERS



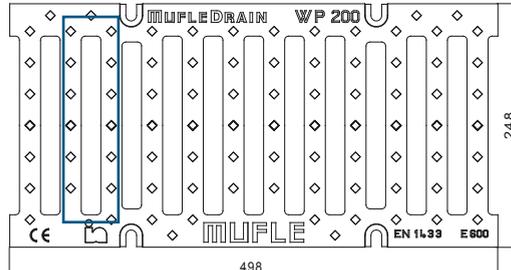
**PLUS  
200**

## APPLICATIONS OF DUCTILE IRON

Transversal canalisation systems in carriageways of roads with thick and heavy-goods traffic  
Industrial areas with passage of forklift trucks (high axle loads)  
Underpasses



SLOT  
DETAIL

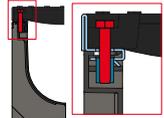


VIEW FROM ABOVE



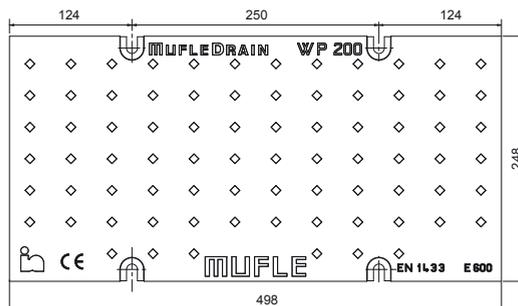
SIDE  
VIEW



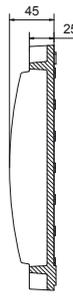
SLOTTED GRATING 20 mm							 45 mm
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503116		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	9,70	4,32	180,0 x 20,0	

## APPLICATIONS

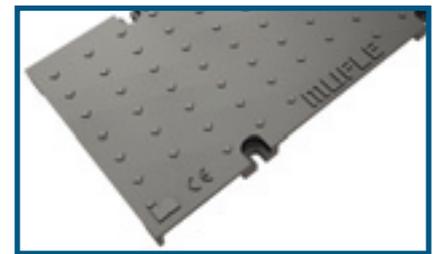
Cable passageway  
Passageway for water  
and/or heat systems

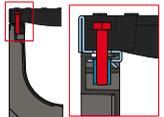


VIEW FROM ABOVE



SIDE  
VIEW



SOLID TOP COVER						 45 mm
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	FIXING SYSTEM	
	€		mm	kg	screw	
503107		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	12,00		

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

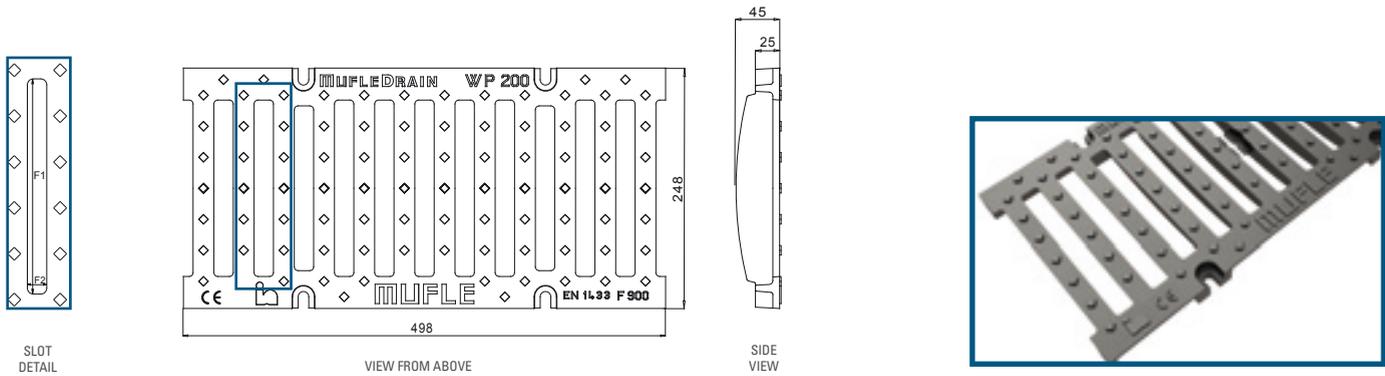


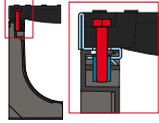
# GRATINGS



**PLUS  
200**

## APPLICATIONS OF DUCTILE IRON Port and airport areas



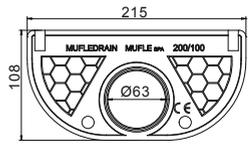
SLOTTED GRATING							
CODE	PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
	€		mm	kg	dm <sup>2</sup>	mm	screw
503175		GJS 500/7 <sup>6</sup> ductile iron water based paint coated	498 x 248 x 25	10,50	4,32	182,0 x 20,0	

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.

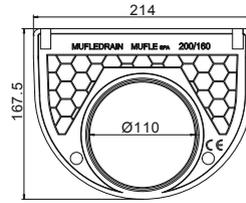


# ACCESSORIES

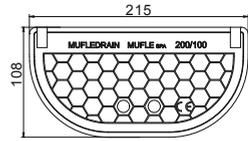
**PLUS  
200**



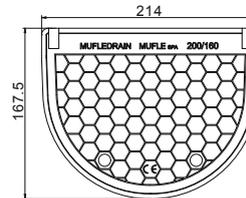
END-CAP 200/100



END-CAP 200/160



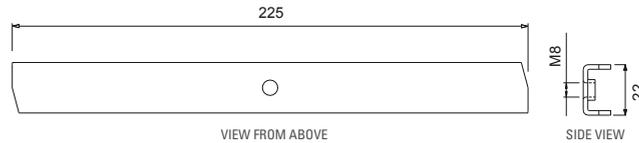
CLOSED END-CAP WITH DRAIN  
200/100



CLOSED END-CAP WITH DRAIN  
200/160

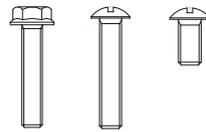
## END CAPS

CODE	PRICE	TYPE	MATERIAL	VALID FOR GRATINGS	PREINSTALLED DRAIN OUTLETS
€					mm
700506		end-cap with drain	PE-HD	200/100	1 x Ø 63
700514		closed end-cap	PE-HD	200/100	-
700507		end-cap with drain	PE-HD	200/160	1 x Ø 110
700515		closed end-cap	PE-HD	200/160	-



## KIT TIE-ROD + SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
€					
500427		galvanised steel	PLUS galvanised steel	M8 x 55 TBL combi	2 tie-rods + 2 screws
500428		stainless steel	PLUS stainless steel	M8 x 55 TBL combi	2 tie-rods + 2 screws



## KIT SCREWS

CODE	PRICE	MATERIAL	VALID FOR GRATINGS	SCREW	KIT FOR 1ml
€					
503312		black galvanised steel	PLUS ductile iron	M8 x 40 black with fl angled hexagonal head	8
503313		galvanised steel	PLUS galvanised steel	M8 x 20 TBL combi	4
503314		stainless steel	PLUS stainless steel	M8 x 20 TBL combi	4
503315		galvanised steel	galvanised steel solid top cover PLUS	M8 x 40 TBL combi	4

## CONNECTOR FOR STEP-SLOPE

CODE	PRICE	VALID FOR CHANNELS	FAMILIES
€			
700518		from 200/160 to 200/250	VIP - SLOPE - WING
700519		from 200/100 to 200/160	EASY - VIP - SMART - SLOPE - WING - PLUS

Utilising Mufle's distinctive step connector system, it is possible to connect drainage channels of differing heights to create greater efficiencies in hydraulic velocity and channel capacity. These efficiencies create benefits in increased drainage performance, outlet number reduction for longer continuous drainage runs, increased self cleansing ability and lower installation costs. Stepped channel are typically recognised by structured increases in neutral channel depths towards a nominated outlet along a specific drainage channel run/length.



N.B. Sizes and weights are subject to usual manufacturing tolerance values.

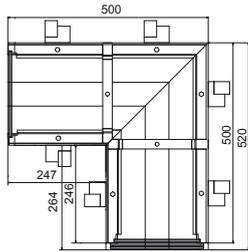


# SPECIAL PIECES AND DRAIN BOX WITH SYPHON

**PLUS  
200**

## LEFT CORNER

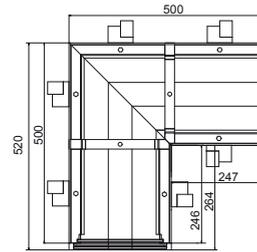
PLUS 200



CODE	PRICE €	MODEL
704106		200/160
704107		200/100

## RIGHT CORNER

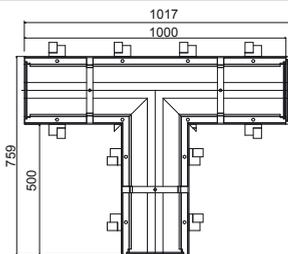
PLUS 200



CODE	PRICE €	MODEL
704114		200/160
704115		200/100

## LEFT TI

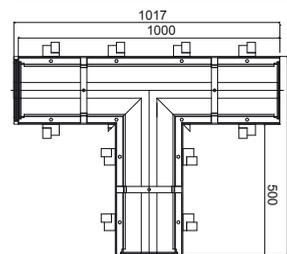
PLUS 200



CODE	PRICE €	MODEL
704122		200/160
704123		200/100

## RIGHT TI

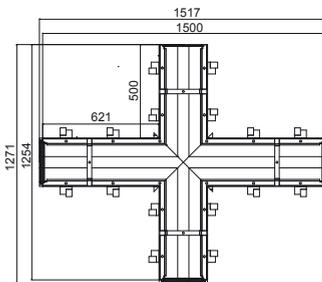
PLUS 200



CODE	PRICE €	MODEL
704130		200/160
704131		200/100

## CROSS

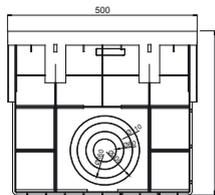
PLUS 200



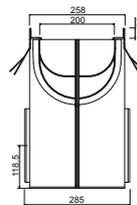
CODE	PRICE €	MODEL
704138		200/160
704139		200/100

Special pieces, corners, Ti, crosses in stainless steel are available upon request. For further information please contact our Technical Department.

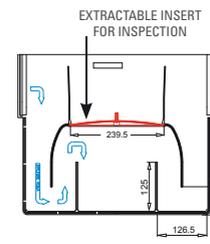
## DRAIN BOX WITH SYPHON



FRONT VIEW



SIDE VIEW



SECTION

PLUS 200

CODE	PRICE €	MATERIAL OF FRAME	MATERIAL OF OUTLET	EXTERNAL DIMENSIONS L x l x h mm	INTERNAL DIMENSIONS L x l x h mm	MAXIMUM LARGE mm	HEIGHT OF OUTLETS mm	WEIGHT kg	PREINSTALLED DRAIN mm
704018		galvanised steel DX51D <sup>3</sup>	PE-HD	500 x 258 x 434	500 x 200 x 400	285	118,5	4,84	2 x Ø 110; 2 x Ø 160; 2 x Ø 200
704021		stainless steel AISI 304 <sup>2</sup>	PE-HD	500 x 258 x 434	500 x 200 x 400	285	118,5	4,84	2 x Ø 110; 2 x Ø 160; 2 x Ø 200

2- Classification according to American Standard ASTM.

3- Classification according to Standard EN 10142 (2002) and symbolic designation according to EN 10027-1 (-2) (2006).

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION

# PLUS 200

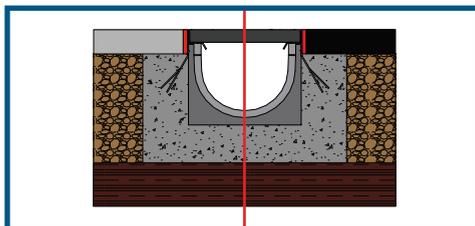
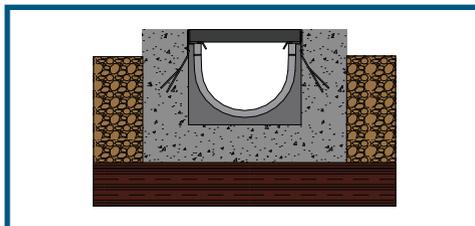
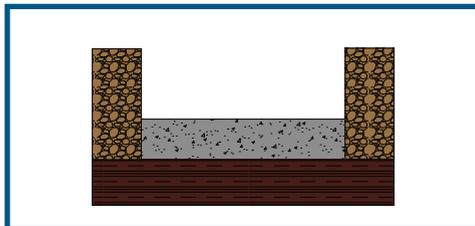
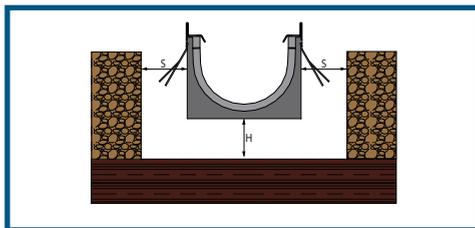
## “For all the drainage channels the manufacturer shall supply written instructions for general installation” (Ref. § 7.17 EN1433)

The installation instructions enclosed in the present technical section are given only as an example in order to supply the main guide lines to the final fitter.

Any particular installation must be evaluated/ agreed between MufleSystem srl and the project maker.

The correct installation is necessary to guarantee the proper loads resistance of the drainage system (channel and grating) to static and dynamical traffic which is subjected to.

The correct installation involves a longer operational length of the drainage system itself as well as its better hydraulic function.



**NEW FEATURE:**  
The channels can be installed with preassembled gratings.

### Step 1

#### HOLE SIZE

The hole needed to lay the MufleDrain channel must allow not only for the size of the channel and the drain piping but also for adequate space for the base H and the side concrete props S. The dimensions to be followed are shown in the Summary Table. In this step make sure the underlying layer is suitable to the load it is expected to support.

### Step 2

#### CONCRETE BASE

Cast the concrete base H up to the height specified, allowing for any inclination in the drainage line. In case that cycles of loading and unloading are often (for example: periodic transit of vehicles) or the loads are particular heavy (E600 - F900), we recommended to reinforce the concrete base with a electro-welded net or with or beaded mouldings Ø 8 with mesh 15x15 cm. At this stage it is needed to arrange possible slopes of the drainage line.

### Step 3

#### CHANNEL ARRANGEMENT

Lay the channels starting from the flow outlet and block them at basis in order to avoid any floating or misalignment during the concrete casting for the side prop.

Allow for the drains required and build the side prop S up to the maximum height allowed by the final coating. Shape it according to the needs based on the drawing. Introduce and fix the grating required beforehand in order to prevent any deformation of the channel due to the thrust of concrete and to speed up installation.

As well as the step 2, also for the side prop concrete arrange the reinforcement.

### Step 4

#### FINAL COATING

When applying the final coating, make sure its upper profile reaches up to minimum 3/5 mm above the grating's flow plane.

## Recommendations for installation

1. In case that channels watertightness is requested, MufleSystem is purposely recommending the use of a bituminous silicone sealant “SHELL TIXOPHALTE”: after carrying out the side prop, apply a thin and homogeneous sealant strip on each slot between the channels and the following one (clean the eventual exceeding sealant). It is strongly advised not to apply the strips of “SHELL TIXOPHALTE” inside the slots in the female joint of the channels before coupling them. Eventually a through and long- lasting guarantees to avoid any leakages can be obtained by welding the joints; this requires welding machines and experienced technicians.
2. While carrying out the phase 2 and 3, protect the gratings with a PVC film so that no final cleaning must be carried out to remove any concrete residues.
3. In case the drainage line is subjected to horizontal loads (for example concrete casting for industrial paving, private car parks and parking decks), it is necessary to arrange effective expansion joints for both direction, parallel and perpendicular to the channels. These joints shall be placed according to the norm standards in force and shall not be placed close to drainage line.
4. In case the drainage line shall be installed on roofs or terraces, it is obligatory to arrange a waterproof sheet according to specific projects.



N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed

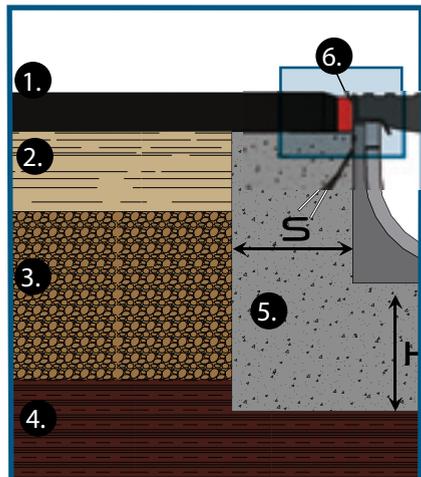


# INSTALLATION

PLUS

## Case 1

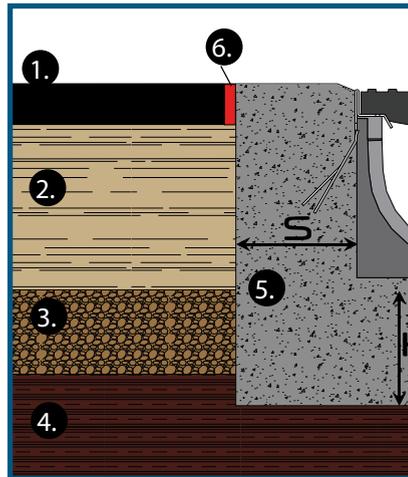
Asphalt  
(C250)



1. Sheet asphalt
2. Lower layer (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Safety joint (if required)

## Case 2

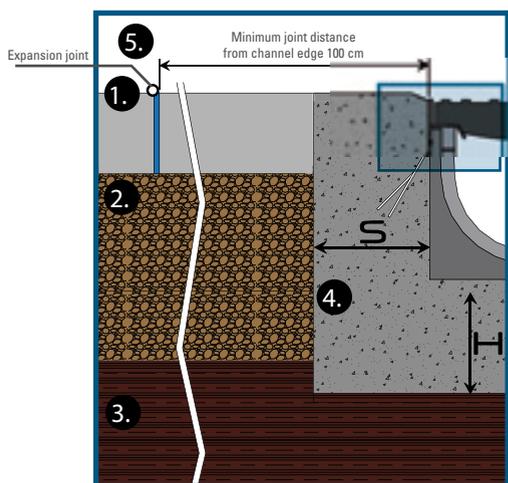
Asphalt  
(D400-E600-F900)



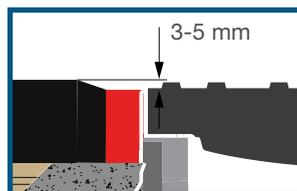
1. Sheet asphalt
2. Lower layer (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Safety joint (if required)

## Case 3

Concrete screed for streets and roads  
(da C250 a F900)



1. Sheet asphalt
2. Strato Inferiore (binder)
3. Bearing layer
4. Subfloor
5. Concrete reinforcement layer
6. Bitumen joint



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

## SUMMARY TABLE

Load class (EN 1433)		C 250	D 400	E 600	F 900
Applicable load (EN 1433)	kN	250	400	600	900
Minimum height H of concrete laying bed	mm	150	200	200	250
Minimum thickness S of the concrete flanking	mm	150	200	200	250
Concrete compression strength class (EN 206-1)		C 25/30	C 25/30 <sup>15</sup>	C 30/37	C 35/45
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 30/37 XF4	C 35/45 XF4	C 40/50 XF4

7- If concrete can be affected by frost and thaw cycles.

15- If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.

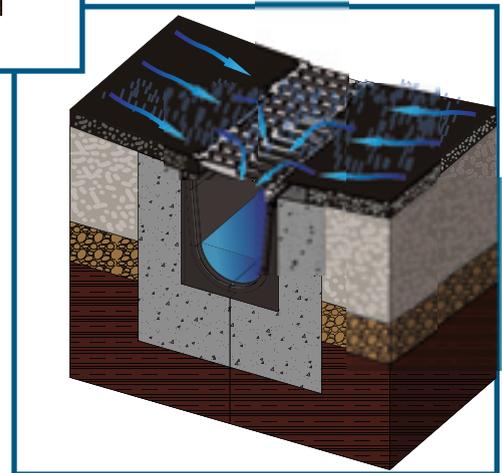
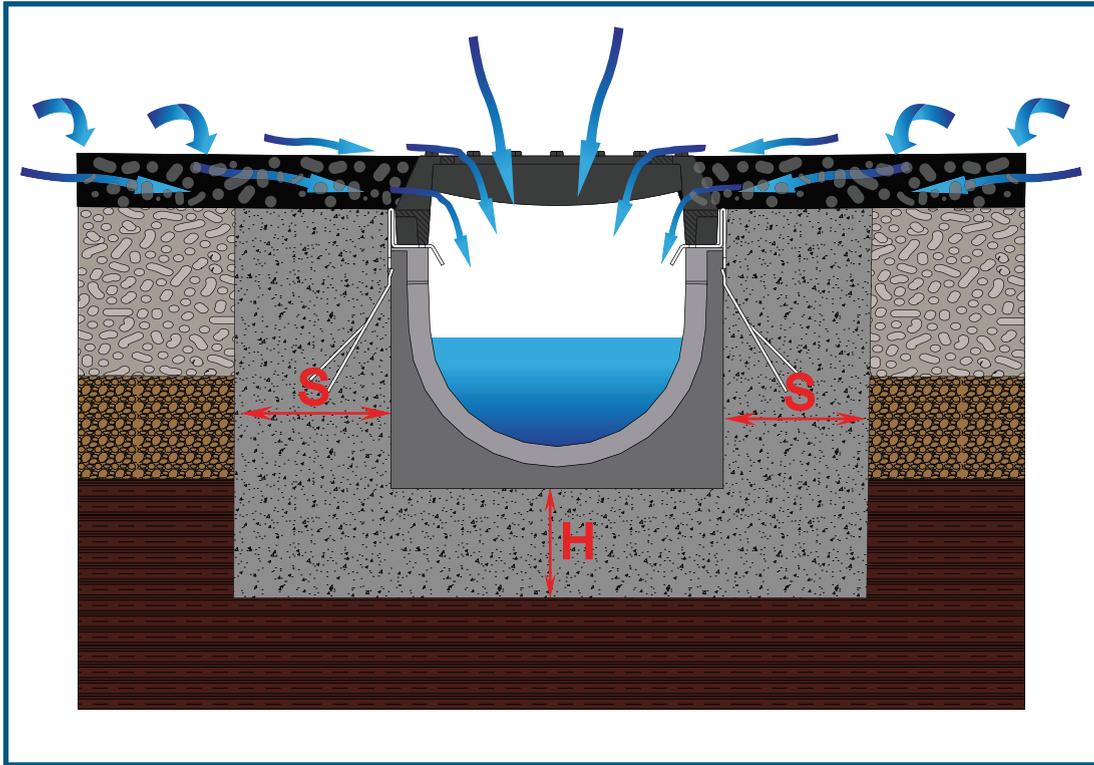
N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION OF DRAINING ASPHALT GRATING PLUS 200

PLUS



This Sheet is only aimed to give advice on the installation of channels mod. MufleDrain. In any case, always:

- check the carrying capacity characteristics of the underlying layer
- we recommend using Class S4 concrete (EN 206-1) and stone aggregate with maximum diameter 8 mm.
- comply with the height of the installation surface and the thickness of the prop as specified according to the load classes.

## SUMMARY TABLE

Load class (EN 1433)		D 400
Applicable load (EN 1433)	kN	400
Minimum height H of concrete laying bed	mm	200
Minimum thickness S of the concrete flanking	mm	200
Concrete compression strength class (EN 206-1)		C 25/30 <sup>15</sup>
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4

7- If concrete can be affected by frost and thaw cycles.

15- If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



## SPECIFICATIONS

PLUS

1. Supply and installation of MufleDrain PLUS type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 3/4 drainage diaphragms at pre-determined points. Galvanised (stainless) steel upper profile equipped with M8 threaded insert to which a screw can be secured to fix the gratings, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 25 mm, connection through prearranged coupling to the channel structure. Four clamps on each side are anchored to the profile - to be buried in the propping concrete. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap \_\_\_mm, internal height \_\_\_ mm.
2. Supply and installation of MufleDrain PLUS type HD-PE drainage channel with external stiffening ribs and male-female coupling system allowing the assembly between one channel and the next with the relevant pre-assembled gratings. The channel will have 2 side drain diaphragms at pre-determined points and it will be designed to house a HD-PE drain gate (diameter 100 mm - 110 mm) on the bottom through 4 screws. Galvanised (stainless) steel upper profile equipped with M8 threaded insert to which a screw can be secured to fix the gratings, 4 mm-thick drive-over edge, 2 mm-thick contact surface with height not smaller than 25 mm, connection through prearranged coupling to the channel structure. Four clamps on each side are anchored to the profile - to be buried in the propping concrete. The channel surface will be perfectly smooth and have a low roughness coefficient to allow the best water flow. It will also be perfectly water-tight and devoid of any connection points with the outside. The channel will have the following dimensions: length 1,000 mm, internal net gap \_\_\_mm, internal height \_\_\_ mm.
3. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain PLUS drainage channels with screw fixing system, load class C250 (D400, E600, F900) according to EN 1433-2008, slot width 20 mm, length 498 mm, width \_\_\_mm.
4. Supply and installation of ductile iron GJS 500/7 square-mesh covering gratings according to EN 1563-2004 with mesh for MufleDrain PLUS drainage channels with screw fixing system, load class D400 according to EN 1433-2008, length 498 mm, width \_\_\_mm..
5. Supply and installation of ductile iron covering gratings for MufleDrain PLUS drainage channels with screw fixing system, class load D400 according to EN 1433-2004. The gratings will have top slots as well as side grooves as a continuation of the main slots in order to let the water collected by draining asphalt flow into the channel below. At the end of the installation the side grooves will be thoroughly filled with asphalt so that an observer will not be able to see them. The dimensions of the gratings will not be smaller than: length 498 mm, width 248 mm, overall height 65mm (of which 25mm recessed into the steel frame of the channel and 40 mm available to spread the draining asphalt), width of top slots 20 mm, dimensions of side slots 20 x h40 mm.
6. Supply and installation of ductile iron GJS 500/7 covering gratings according to EN 1563-2004 for MufleDrain PLUS drainage channels with screw fixing system, load class E600 according to EN 1433-2004, slot inclined 30° to the longitudinal axis, width 6 mm, length 498 mm, width 148 mm.
7. Supply and installation of ductile iron GJS 500/7 blind covers according to EN 1563-2004 with mesh for MufleDrain PLUS drainage channels with screw fixing system, load class E600 according to EN 1433-2008, length 498 mm, width \_\_\_mm.
8. Supply and installation of ductile iron GJS 500/7 perforated cover Air System according to EN 1563-2004 for composting systems with slots for screw fixing. The cover will have 12 holes (Ø 10) to allow the passage of the air needed for composting. The holes will have a truncated-cone section with the smaller base upwards in order to prevent any clogging due to residues. The load class of the cover will be E600 according to EN 1433-2004, usable length 500 mm, width 198 mm.
9. Supply and installation of galvanised (stainless) steel square-mesh or anti-heel covering gratings for MufleDrain PLUS drainage channels equipped with slots for screw fixing, load class C250 according to EN 1433-2004, length 998 mm, width \_\_\_mm. A similar grating will be available upon request with length 498mm. The dimensions will be 30 x 30 mm in the square mesh and 30 x 10 mm in the anti-heel mesh.
10. Supply and installation of galvanised steel blind cover for MufleDrain PLUS drainage channels with screw fixing system, load class C250 according to EN 1433-2004, length 998 mm, width \_\_\_mm. A similar cover will be available upon request with length 498mm.
11. Supply and installation of HD-PE end caps for MufleDrain drainage channel with coupling system into the special channel housing.
12. Supply and installation of HD-PE open cap with drainage hole diameter \_\_\_mm for MufleDrain drainage channel with coupling system into the special channel housing.
13. Supply and installation of HD-PE boxes with siphon for MufleDrain PLUS drainage channels with external stiffening ribs and coupling system. Galvanised (stainless) steel upper profile with height not smaller than 25 mm, connection through prearranged coupling to the gully structure. Two clamps on each side are connected to the profile - to be buried in the propping concrete. The upper section of the siphon built in the gully may be removed in order to allow inspection and cleaning work. The gully will have preformed drains on both sides with diameter up to 200 mm. The gully dimensions will be as follows: length 542 mm, net gap \_\_\_ mm, height 400 mm.

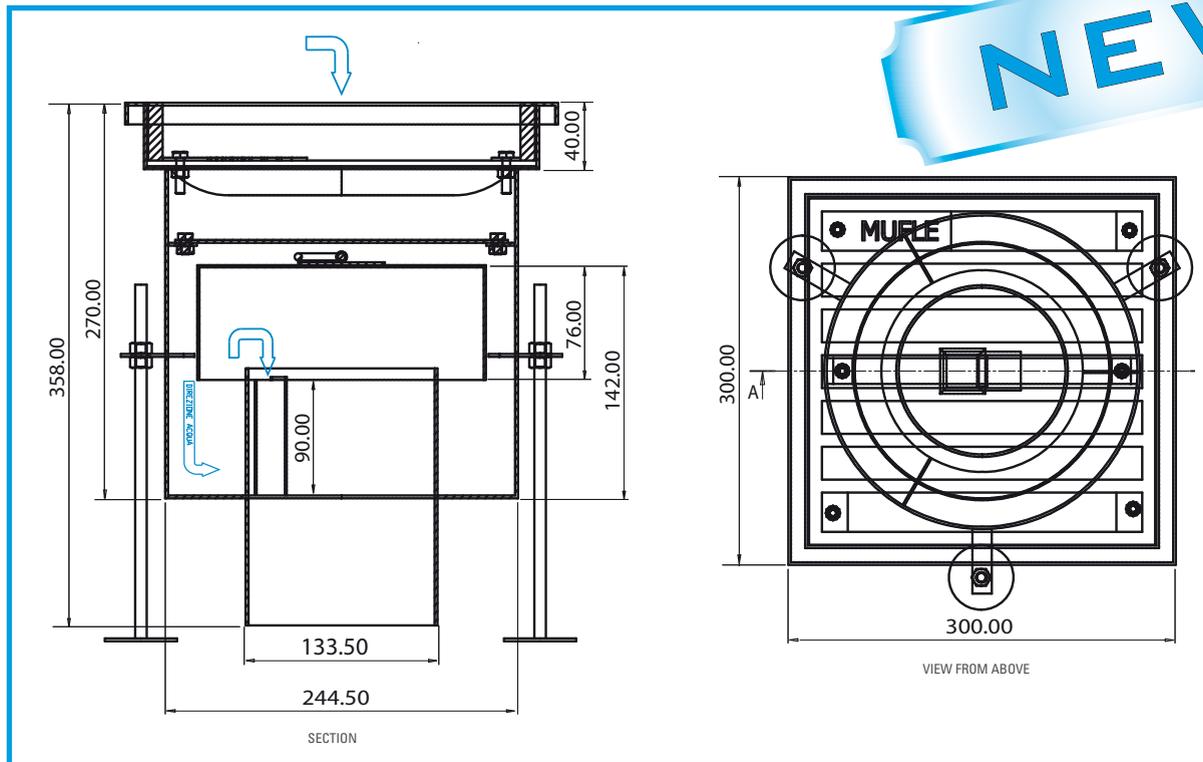
# HIGHWAY SIPHON DRAIN BOX



D 400

RainWay

**NEW**



The **siphon drain box in stainless steel AISI 304** (AISI 316 on request) has been conceived from the need to **install a high performance point drainage element in road and highway application where the water flow to be collected is not so high but high quality and safety standards are required.** Overall dimensions of the siphon drain box are 300 x 300 x 270 mm, the body is circular and the siphon bell diameter is around 250 mm. The grating, also in stainless steel AISI 304 (AISI 316 on request), is realized with longitudinal bars of dimensions 10 x 40 mm; the realized grating has slots for water drainage of dimensions 248 x 22.5 mm and is car driveway. It can be fixed to the siphon drain box body through 4 screws M8 x 12 type also in stainless steel. The drain box is equipped with **siphon**: the stainless steel cover is based on 3 supports placed at 120 degrees, forming a U-section together with the outlet pipe, that enters into the drain box for 90 mm. This U-section creates an hydraulic cap and avoids the bad odors to come up thanks to the residual water stagnancy in its loop. The main feature of the siphon drain box is not only to avoid bad odors coming from below parts to upper parts, but also **to avoid flames spread and in case of fire caused by inflammable liquids poured into the product.** A screwed plate fixes the cover, called "flame block", and makes it stable. In the siphon drain box a stainless steel net has been fixed so that leaves and impurities remain inside, avoiding that the siphon clogs and the whole system falls into crisis. Thanks to 3 adjustable feet the siphon drain box could be leveled at the end of works. The stainless steel used for manufacturing the RAINWAY drain box is subject to a pickling procedure and the finishing is 2B type (standard): on request it could be subject also to a shot-blasting procedure in order to obtain a better aesthetical result. The total weight of the siphon drain box is around 16,5 Kg.



## HIGHWAY SIPHON DRAIN BOX RAINWAY

CODE	PRICE	MATERIAL	FRAME	HEIGHT OFF BELL	DIAMETER OF BELL	UOTLET DIAMETER EST/INT	HEIGHT OF OUTLET	HEIGHE OF SIPHON	GRATING SEAT	GRATING L X L X h	GRATING SLOTS	WEIGHT	GRATING FIXING
	€		mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	
567473		acciaio inox AISI 304 <sup>2</sup>	300 x 300	270	244,5	133/129	90	142	270 x 270	268 x 268 x 40	248 x 22,5	16,50	4 viti M8 in acciaio inox AISI 304 <sup>2</sup>

2- Classification according to American Standard ASTM.  
N.B. Le dimensioni ed i pesi sono soggetti alle normali tolleranze di fabbricazione.

# FUNNEL

The "FUNNEL" is a **"high performance"** drainage system where a ductile iron **"grating"** collects rainwater from the surface and, through a ductile iron **"cone"**, conveys it into the HD-PE **"pipe"** with calculated diameter. Pipes are available with external diameter from  $\varnothing 250$  to  $\varnothing 1200$ .

The system guarantees:

- **flexibility and quick installation:** the FUNNEL is supplied with 6 meters long bars. The easy connection among the bars is assured through the coupling and sealing rings.
- **reliability:** the system has been designed according to the standards of the EN 1433.
- **inspections:** it is possible to inspect the system every 50 cm, simply pulling out the gratings.
- **high hydraulic performance:** guarantees the collection and disposal of huge water flows due to a  $\varnothing 110$  outlet every 50 cm.
- is a **patented system**.





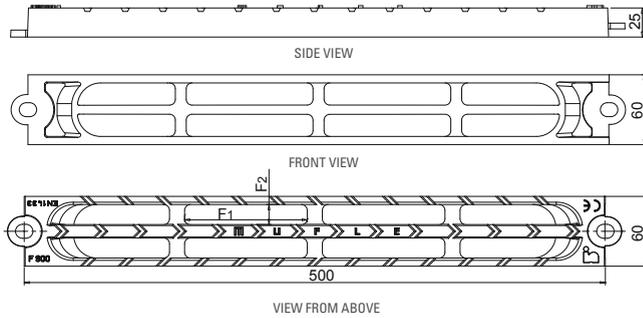
# ELEMENTS FOR COLLECTED WATER

from D 400  
to F 900

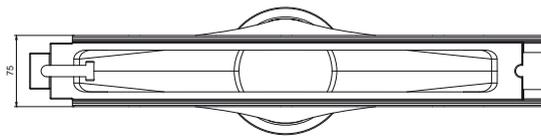
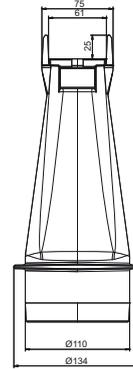
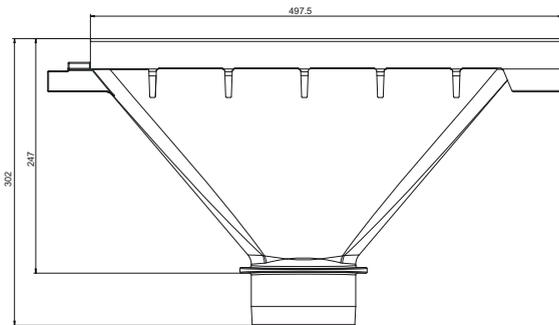
**FUNNEL**

## APPLICATIONS

Highways  
Logistic Centers  
Docks  
Airport Areas



GRATINGS						
PRICE	MATERIAL	DIMENSIONS L x l x h	WEIGHT	DRAINAGE SURFACE	OPENINGS F1 x F2	FIXING SYSTEM
€		mm	kg	cm <sup>2</sup>	mm	
	GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	500 x 60 x 25	2,80	13,85	105,5 x 17,0	nut



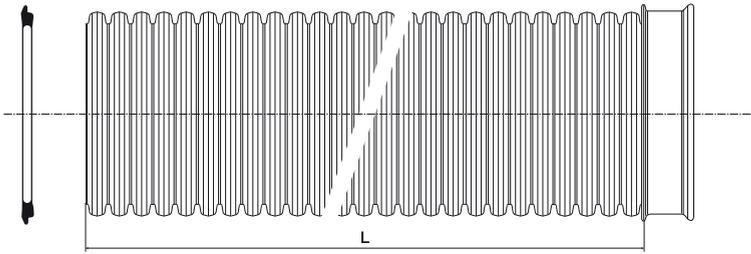
CONES					
PRICE	MATERIAL	EXTERNAL DIMENSIONS L x l x h	WEIGHT	OUTLET DIMENSIONS	FIXING SYSTEM
€		mm	kg	mm	
	GJS 500/7 <sup>6</sup> ductile ironwater based paint coated	498 x 75 x 300	10,00	ø110	nut

6- Classification according to Standard EN 1563 (2009).  
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



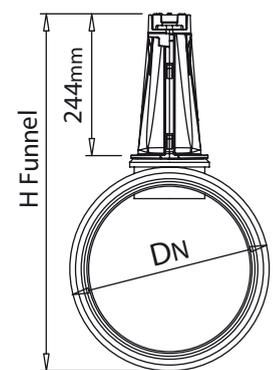
# PIPES - MANHOLES COVERS - MOULDED TEE

**FUNNEL**



The **pipe** is a high density co- extruded twin wall pipe, smooth internally and externally corrugated with stiffness class SN8 kN/m<sup>2</sup> (on request it is possible the class SN 16 kN/m<sup>2</sup>).

CORRUGATED PIPES IN HD-PE													
DN mm	250	315	350	400	465	500	580	630	700	800	930	1000	1200
DI mm	218	273	300	344	400	427	500	533	600	690	800	853	1025
H* mm	494	559	594	644	709	744	824	874	944	1044	1174	1244	1444



\* Total funnel height (pipe + cone + grating).

The **manholes** are independent components which can be installed on line ensuring the inspection of the line itself. The possibility of realizing the custom made manholes for pipes together with the already existing wide range of manholes with molded base allows us to change both the inferior pipe diameter and the line direction.



EXAMPLE OF MANHOLE WITH MOULDED BASE



EXAMPLE OF MANHOLE FOR PIPES

The **moulded tee** can be used as manhole for straight on lining.

Our technical office stays at your full disposal for any suggestion about the suitable manhole to be used (in particular with ref. to diameter, number and position of insert jointing, height) and about its installation.



N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# HYDRAULIC PERFORMANCE



According to the literature, if the filling percentage of the sewage pipe is fixed to 70%, the water flow rates showed in table "A" a resulting from the slope changes. According to the water flow rate to be drained, it is possible to determine the maximum number of FUNNELS that can be connected to the sewage pipes. The table "B" shows by way of example the values obtained by a water flow rate Q equal to 0.465 l/sec. per meter (calculated for a width of drainage surface equal to 10 meters, with a pluviometric curve  $h = 27 \times t^{0.2}$ , with run-off time  $t_c = 300$  sec. coefficient of outflow  $\alpha = 0,85$ ). If a sewage pipe with a 250 diameter with 0,25% slope is used, it is possible to connect 56 meters of FUNNEL system, before the water falls into the collector or the pipe diameter is increased.

N.B. It is necessary to verify that the water speed has a figure ranging from 0,4-3,0 (m/s).  
Our technical department stays at your full disposal for further information about the calculations ref. table "B".

**Table A**

Water Flow rate with filling percentage equal to 70% [l/s]

Diameters [mm]		Sewage pipes SLOPE									
DN	DI	0,05%	0,10%	0,15%	0,20%	0,25%	0,30%	0,35%	0,40%	0,45%	0,50%
250	218	12,1	17,0	20,9	24,1	27,0	29,5	31,9	34,1	36,2	38,1
315	273	22,0	31,1	38,0	43,9	49,1	53,8	58,1	62,1	65,9	69,4
350	300	28,2	39,9	48,9	56,5	63,1	69,2	74,7	79,9	84,7	89,3
400	344	40,7	57,5	70,5	81,4	91,0	99,6	107,6	115,1	122,0	128,6
465	400	60,8	86,0	105,3	121,6	136,0	149,0	160,9	172,0	182,5	192,3
500	427	72,4	102,4	125,4	144,8	161,9	177,3	191,5	204,8	217,2	228,9
630	533	130,8	184,9	226,5	261,5	292,4	320,3	346,0	369,9	392,3	413,5
800	690	260,3	368,1	450,9	520,6	582,1	637,6	688,7	736,3	780,9	823,2
1000	853	458,2	684,1	793,7	916,5	1024,7	1296,1	1212,4	1296,1	1374,7	1449,1
1200	1025	747,9	1057,7	1295,4	1495,7	1672,3	1831,9	1978,7	2115,3	2243,6	2365,0

**Table B**

Example of calculation of maximum number of "FUNNELS" (m) to be connected for Q = 0,465 l/s

Diameter [mm]		Sewage pipes SLOPE									
DN	DI	0,05%	0,10%	0,15%	0,20%	0,25%	0,30%	0,35%	0,40%	0,45%	0,50%
250	218	25	36	44	51	57	63	68	73	77	81
315	273	47	66	81	94	105	115	124	133	141	149
350	300	60	85	105	121	135	148	160	171	182	191
400	344	87	123	151	174	195	214	231	247	262	276
465	400	130	184	226	261	292	320	345	369	392	413
500	427	155	219	269	311	347	381	411	439	466	491
630	533	280	397	486	561	628	688	743	794	842	888
800	690	559	791	968	1118	1250	1370	1479	1582	1677	1769
1000	853	984	1392	1705	1969	2201	2411	2605	2784	2953	3113
1200	1025	1606	2272	2783	3213	3593	3936	4251	4545	4820	5081



# INSTALLATION

**FUNNEL**

The following installation instructions and the relative drawings are given only as an example not considering any peculiarities of the installation site or soil characteristics, or morphology and position of any possible slope. Any particular installation must be suggested by the project maker.

## Step 1

Dig the trench according to the requested dimensions (according to load classes and pipe diameter), indicating the right slope of the project.

## Step 2

Place the stakes blocking the pipes with bended hook head and realized with 8 Ø steel rods with the following height: 20 cm ground depth + 10 cm concrete laying bed + pipe half- diameter. These stakes shall be positioned in pairs at such a distance that the pipe can be easily placed in between and the hook head can be placed in the middle of the pipe.

The distance between a pair of stakes shall be not higher than 100 cm.

## Step 3

On the bottom trench cast the concrete bed of 10 cm height at least, where the pipe shall be laid down. This bedding layer shall be perfectly flat, otherwise the whole system performance can be compromised (it is recommended the use of topographic instruments in the job site).

Pay particular attention to avoiding pipe shocks that could damage it.

## Step 4

Position the pipes (6 meters barrels, already perforated every 50 cm distance for connection to the ductile iron cones of Funnel, already welded half coupling with seals) and connect them among each other through coupling system and EPDM gaskets: the end parts to be connected should be perfectly clean (see the picture on the side). The 110Ø holes existing in the pipes should be turned on the upper part and aligned perfectly.

Fix the pipe by rolling around the iron wire that will be blocked to the stakes heads as described in the step 2.

Pay particular attention to avoiding pipe shocks that could damage it.

## Step 5

Align and level properly. Build the flanking around the pipe, using a resistance class C25/30 concrete for the same height of the internal diameter. Pay attention to avoid that the concrete shouldn't fall down into the pipe itself (in case of installation areas subjected to heavy traffic, a pipe reinforcement around through electro- welded net 8 Ø with mesh 20x20 is required).

This operation should be done with extreme attention filling the trench for the following steps in order to avoid the pipe floating and to keep under control its alignment (if it is necessary use the topographic instrument for guaranteeing the maximum accuracy).

## Step 6

After 3 hours at least, start the assembly of ductile iron FUNNEL cones inserting them in relative gaskets (it is advised to lubricate them in order to make the inserting easier). The cones are provided with coupling system in order to be jointed solidly one to each other and to guarantee the perfect alignment.

## Step 7

Build the flanking around the cones using a concrete with an appropriate resistance class according to the load class (from D400 to F900). The above mentioned concrete shall be reinforced with electro- welded 10 Ø and mesh 15x15 in double layer according to specific drawings. Please build the flanking up to a height lower than the volume of ductile iron cone itself. Fill the trench for the following steps in order to straighten the cones and avoid eventual misalignment. All technical information necessary for the concrete coating of the flanking are indicated in the table "C".

## Step 8

Complete the installation according to the requirements or with a road paving or with special paving (according to specific drawings). In case that the paving is 20 mm thick minimum and is realized with proper resistance class concrete and reinforcement according to the project, it is allowed to continue with the same paving up to the ductile iron cone extrados. On the contrary (paving lower than 20 mm) it is necessary to build a regular flanking as per our previous step nr 7.

In case it is necessary to make watertight the gap between the paving and the ductile iron cone, please use a wooden template to be positioned close to the cone. This template will be removed for being replaced with a bicomponent and elastic concrete mortar for watertightness use.

The users of the FUNNEL products are responsible for the installation instructions control. For any further information we kindly ask you to contact our technical department.

### Notes

- a) The quotation of the final surface layer should be higher of about 3mm than the upper grating's profile.
- b) In case of special paving with concrete, it is necessary to foresee expansion joints for both directions in order to absorb the horizontal shocks.
- c) In order to protect the ductile iron FUNNEL gratings during the concrete casting and to prevent them to get dirty and the residues of polymer concrete to fall into the pipe through the cone, we advise to cover them with plastic protections until they will be taken away after the end of the works.

Therefore the concrete with Constituency Class S4 (EN 206-1) is recommended and the rock aggregate will have to be made of stones with a maximum diameter of 8 mm. In case of intensive and frequent stress equip the concrete around the FUNNEL with stretches of electrowelded mesh and/or steel rods.

## SUMMARY TABLE

Load class (EN 1433)		D 400	E 600	F 900
Applicable load (EN 1433)	kN	400	600	900
Minimum height H of concrete laying bed	mm	200	200	250
Minimum thickness S of the concrete flanking <sup>18</sup>	mm	200	200	250
Concrete compression strength class (EN 206-1)		C 25/30 <sup>15</sup>	C 30/37	C 35/45
Concrete compression strength class <sup>7</sup> (EN 206-1)		C 30/37 XF4	C 35/45 XF4	C 40/50 XF4

7- If concrete can be affected by frost and thaw cycles.

15- If installation is in road crossings subject to heavy traffic (especially trucks), Class C30/37 concrete should be used.

18- In any case the thickness S will never be lower to (DN/2 + X mm), with X=100mm for class of load D400 and X=200mm for classes of load E600 and F900.

N.B. MufleSystem srl reserves the right to change the technical characteristics herein specified without prior notice. Said technical characteristics are given for information purposes only and are subject to changes as our products are developed.

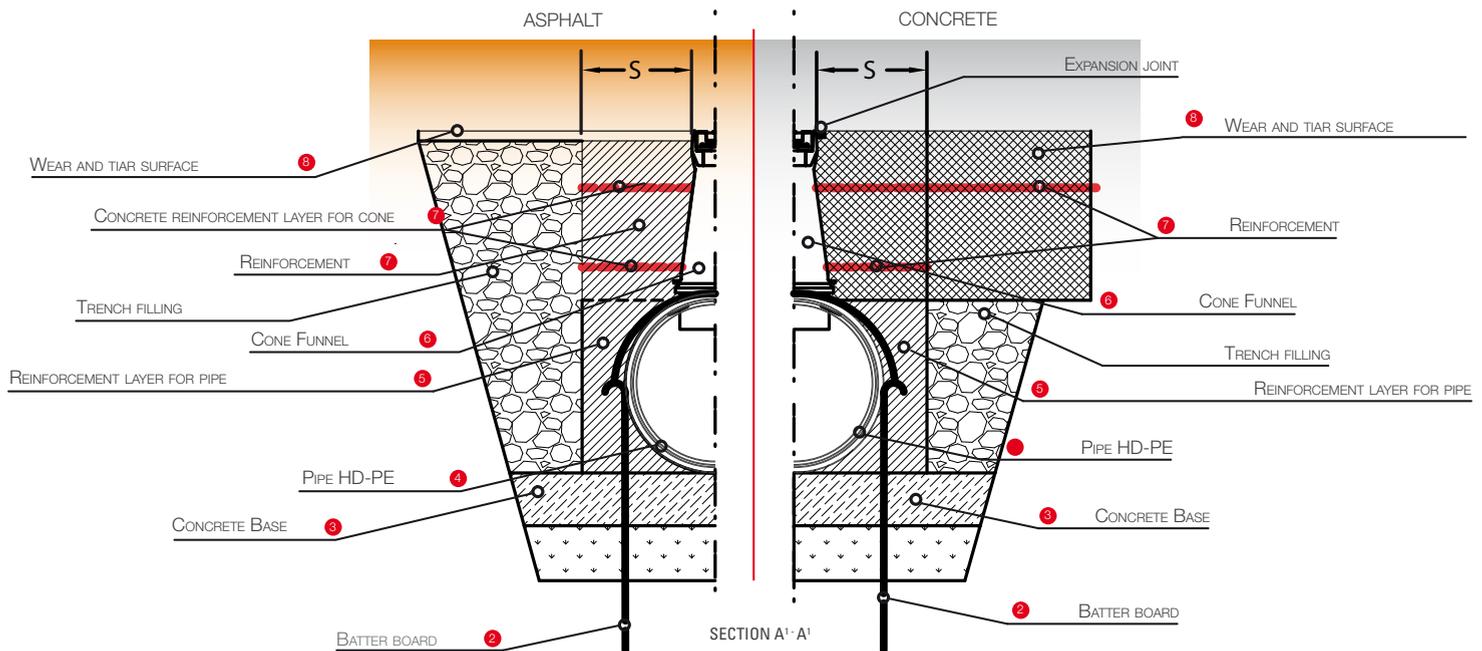
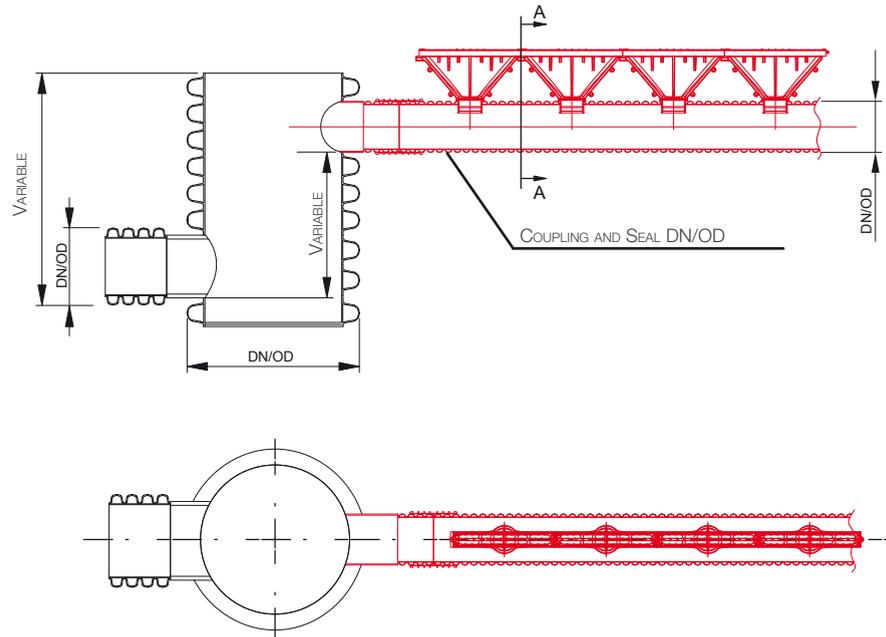
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION WITH ONE OUTLET ONLY AT THE END OF DRAINAGE LINE

## Case 1: without extensions

**FUNNEL**



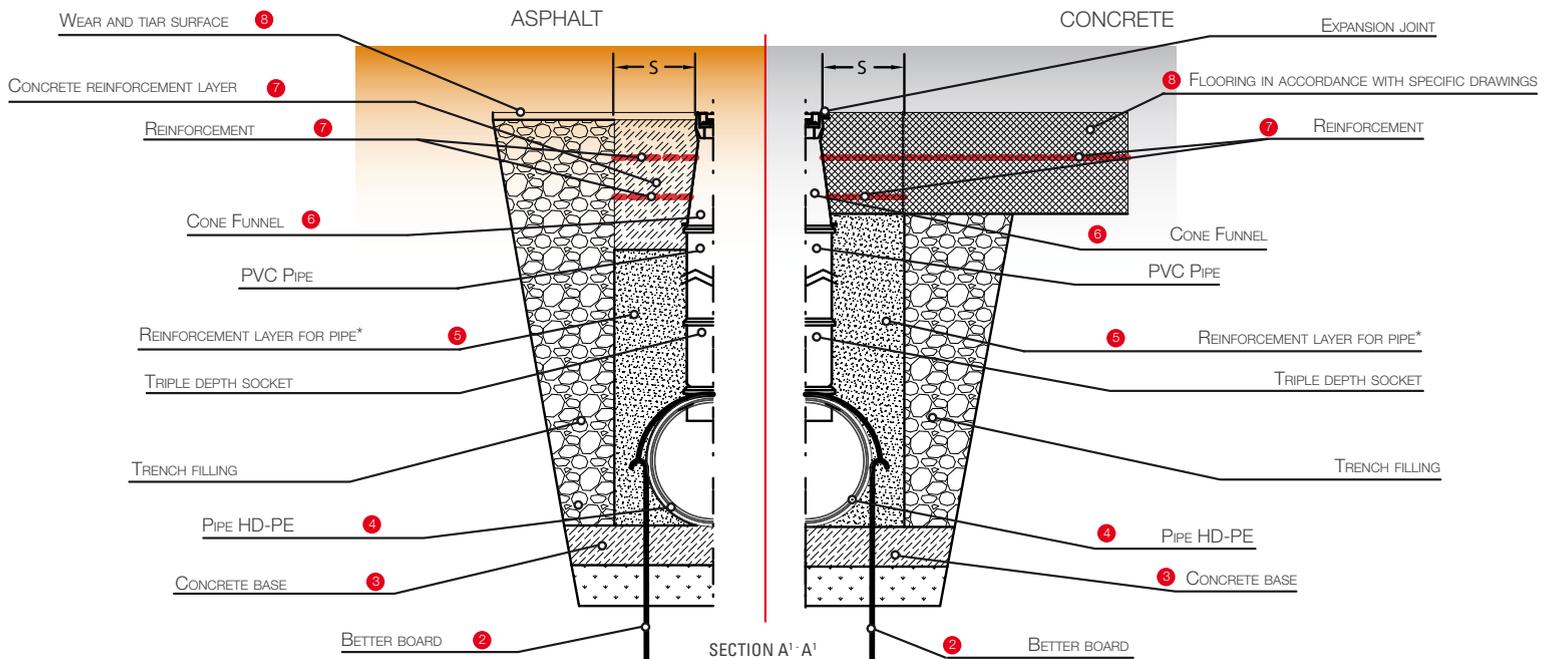
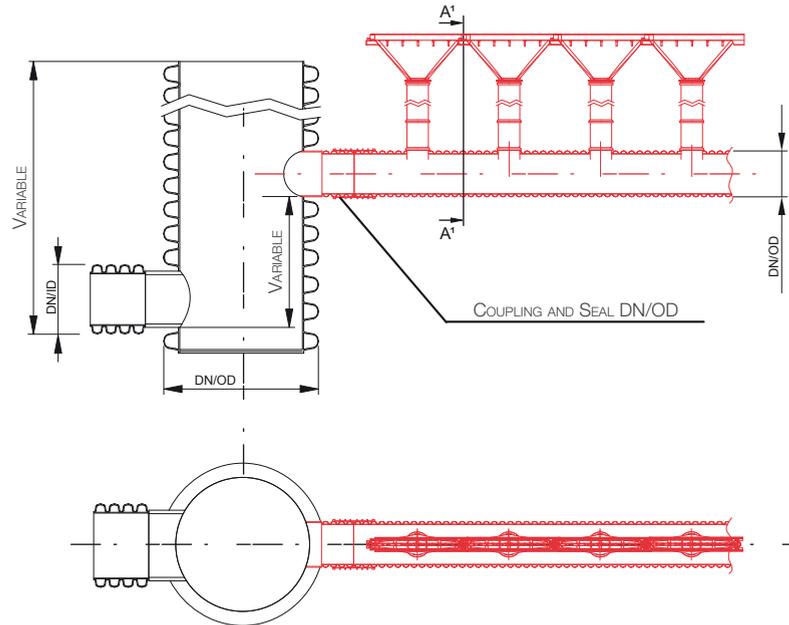
N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION WITH ONE OUTLET ONLY AT THE END OF DRAINAGE LINE

## Case 2: with extensions

**FUNNEL**



The best condition for an easy installation of the FUNNEL is that the slope of the pipe and the slope of the finished paving are the same. In case that it doesn't happen, due to the ground morphology or due to choices that cannot be modified according to the project, we recommend the use of "extensions" to compensate the difference of quotations.

The measurement and preparation of the single extensions will have to be executed in the job site. The extension is composed by:

- a triple depth socket that has to be inserted directly into the hole of  $\varnothing 110$  positioned in the corrugated pipe, that guarantees by itself a supplementary height of about 13cm.
- a possible additional pipe as the one used in sewage system in PVC or in similar material to be cut on measure to cover the failing distance (the pipe can be "welded half coupling" type or "smooth" that could be realized "welded half coupling" in the job site after having warmed it).

If the triple depth socket is enough, it will be possible to plan to insert the ductile iron cone directly on it.

If the height to be covered is lower than 13cm of the triple depth socket, it will be necessary to cut it on measure before inserting it.

At the end, in case that the height to be covered is higher than 13 cm of the triple depth socket, the fragment of pipe will be inserted on it and therefore the ductile iron cone will be assembled to the pipe.

In case that the height of the extension is lower than 25cm, it will be needed to make the concrete coating of the flanking of "pipe + extension" with C25/30 class concrete up to a height of 5/10cm below the head of the extension.

In case that the height of the extension is higher than 25cm, it will be needed to make the concrete coating of the flanking of "pipe + extension" with a concrete mixture at 6% up to a height of 5/10cm below the head of the extension.

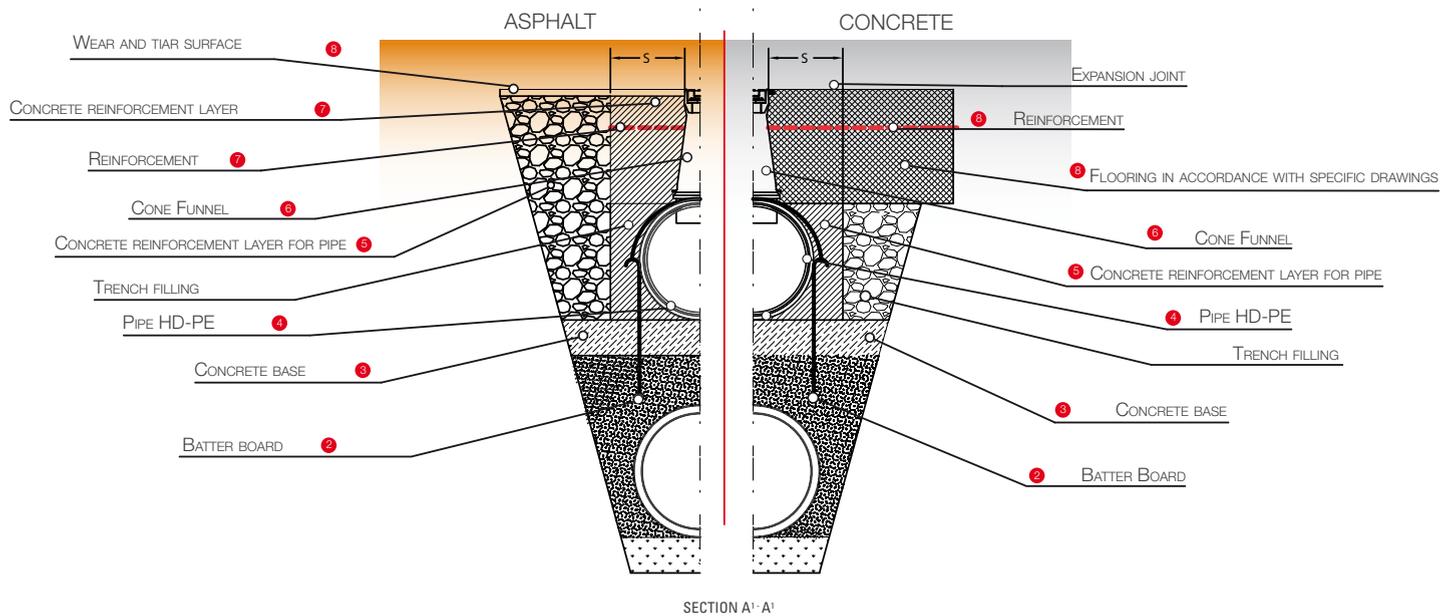
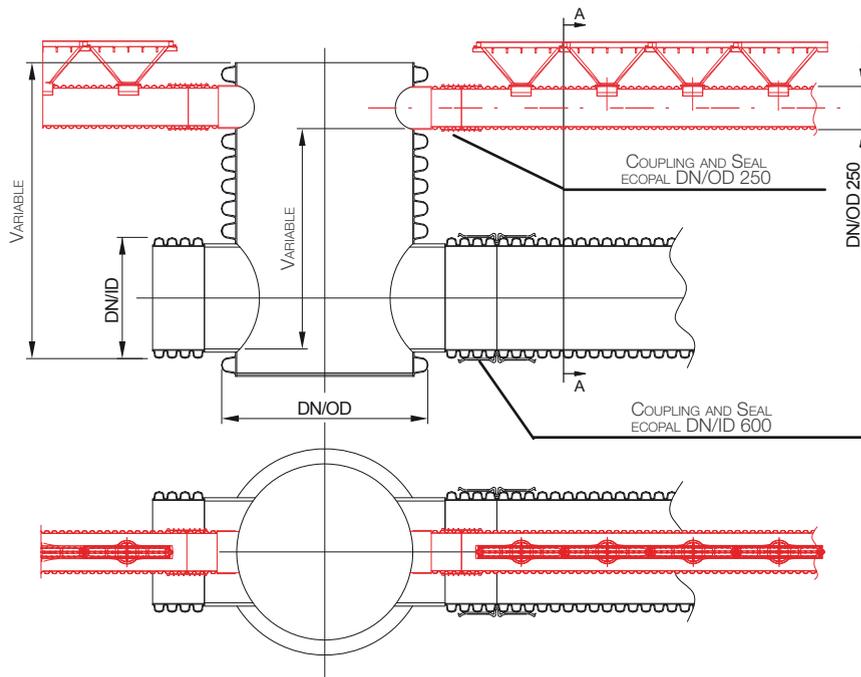
In order to ensure the alignment of all extensions, it is necessary to lay a wire on the whole line length in order to guarantee the right position.

N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# INSTALLATION WITH "N" OUTLETS CONNECTED BY PIPE

**FUNNEL**



N.B. Sizes and weights are subject to usual manufacturing tolerance values.



# SPECIFICATIONS

**FUNNEL**

**1.** Supply and installation of the drainage system “Mufl eDrain FUNNEL” equipped with 3 units:

a. high density polyethylene co- extruded twin wall pipe, smooth internally and externally black corrugated for not under pressure underground sewer ducts with stiffness class SN4 (8) kN/m<sup>2</sup> and with jointing by HD-PE coupling and EPDM lip seal. This pipe has a diameter calculated according to the water flow rate so that the filling percentage will be not superior to 70% and is equipped with 110 Ø holes with 500mm pitch. Each hole will be provided with a EPDM gasket;

b. As above mentioned in the point A, the “Funnel” conveys into the pipe the water collected from the surface and is manufactured in ductile iron EN GJS 500/7 according to the EN 1563-2004; the funnels can be connected through male- female coupling system; the funnel shall be realized with one casting in order to assure one monolithic piece; in the upper part there will be a proper seat for the grating, realized by two 20 mm high frames coming from the same casting. The funnel has been designed with a proper seat for a M10 stainless steel screw in order not to let the screw rotate while fixing the gratings through nuts referred to in point C. The funnel body must be equipped with an inferior round part of a 56mm height and of a 110 Ø for direct connection to corrugated pipes that collect water as a sewage pipe referred to in point A.

Pipe dimensions must be the following ones: standard length 500 mm, total height 300 mm, height after connection to the sewage pipe 244 mm, upper width 75 mm.

c. Slotted grating in ductile iron GJS 500/7 according to EN 1563-2004 for water drainage, to be positioned in the “funnel” seat referred to in point B; the gratings shall be fixed to the “funnel” through a M10 stainless steel nut to be screwed to the screw shank sticking out from the under part; the gratings are equipped on both short sides with 2 elliptic eyelets. The eyelets will be positioned staggered so that the upper eyelet of one grating is placed on the lower one of the previous grating while applying the gratings to the “funnel”; the screw shank will be pushed through the 2 eyelets and the nut will be screwed on. The grating shall be in F900 load class with rectangular slot and will be marked with the CE marking and with all the markings according to the EN 1433-2008. The sizes of grating shall be the following: standard length 498 mm, standard width 60 mm.

# TECHNIK

MUFLEDRAIN TECHNICAL MANUAL

MUFLEDRAIN

TECHNIK



The collection and disposal of surface water from either meteoric precipitation or agricultural and industrial processes have always played a major role in man's activities. This need has been increasing considerably over the last few years because of climatic changes and morphological changes in the territory.

The MufleDrain drainage system is an ideal solution in that it combines the technical features required by designers and the practical and cheap installation required by installers. This Technical Manual is intended to help the designer make up a versatile and efficient drainage system. For this purpose general designing criteria concerning the calculation of water flow capacity and the construction of concrete supports needed to install drainage channels are described

## Punctual and linear drainage systems

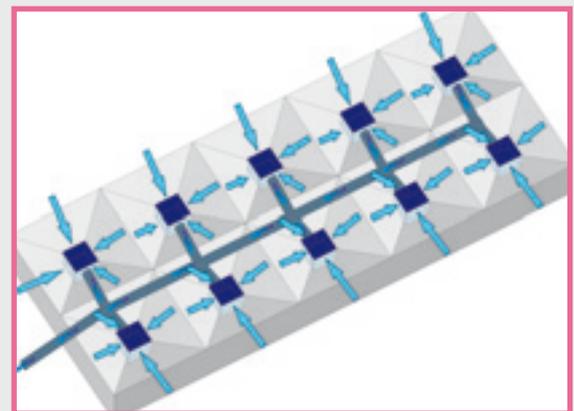
In order to dispose of surface water (either from meteoric events or urban/industrial waste) on a waterproof surface or a soil with poor drainage, you need to design and construct a suitable collection and disposal system that makes it possible to channel liquids into a final receptacle. Current solutions are of two different kinds:

1. Punctual drainage;
2. Linear drainage.

### PUNCTUAL DRAINAGE

At predetermined points in the area concerned buried boxes are installed on which a collection grating equipped with a suitable containment frame (cover) will be placed. In this way the drainage area is divided into different subareas, each having the relevant containment frame as its disposal point. All the subareas shall have 4 inclinations in order to convey the liquids into the collection point. All the boxes shall be connected to each other through a thick network of buried pipes leading into the final receptacle. This type of drainage has disadvantages from the technical and construction points of view as well as from the economic point of view:

- difficult designing due to the complex subdivision of the area into subareas and difficult assignment of different inclinations to each of them;
- difficult designing of correct inclinations;;
- difficult construction of the buried piping network and consequently expensive work;
- considerable depth at which the boxes are to be laid;
- difficult and expensive maintenance due to the inaccessibility of the drain pipes, which make the whole system useless if they get clogged with solid material;
- uncomfortable road conditions because the area is characterised by rises once the work has been completed;
- large presence of boxes and gratings in valuable architectural areas which may not look very nice.



### LINEAR DRAINAGE

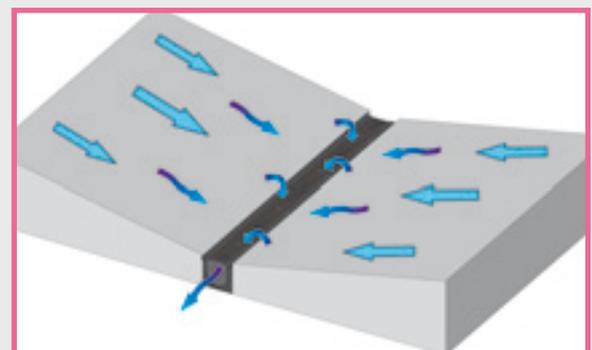
Prefabricated drainage channels to be buried are used. Continuous stretches as long as a few hundred metres can be made up with them. The system is equipped with a proper covering system by means of gratings.

Rainwater is made to flow into the channels, which will collect it with the gratings and convey it to the final receptacle simply by connecting the drain points in the channels to a single properly-sized pipe. So there is no need for a thick network of buried pipes to convey the water.

The system can be positioned according to the natural inclination of the ground. If there is no such inclination, the drainage area can be given a single inclination.

A number of benefits are available with this system:

- easy designing;
- easy construction;
- cheaper product;
- higher operating reliability thanks to the reduced presence of buried pipes (smaller clogging risk);
- very easy maintenance and cleaning work;
- aesthetical compatibility with any application environment.



## RESISTANCE OF HD-PE TO CHEMICAL SUBSTANCES

DESCRIPTION	%	DESCRIPTION	%	DESCRIPTION	%
Amyl acetate		Picric acid	1% aqueous	Beer	
Ammonium acetate		Propionic acid		Sodium disulphate	
Butyl acetate	pure	Prussic acid	50%	Sodium disulphite	10%
Methyl acetate	pure	Hydrosulphuric acid		Borax	
Lead acetate		Sulphuric acid		Potassium borate	
Sodium acetate		Sulphuric acid, aqueous		Potassium bromate	10% aqueous
Wine vinegar		Sulphuric acid, aqueous	80% aqueous	Sodium bromate	saturated, cold
Acetone		Sulphurous acid	40%	Potassium bromide	aqueous
Fatty acids	pure	Stearic acid		Sodium bromide	
Bath acids	700 mg.	Succinic acid	pure	Butadiene	pure
Acetic acid	50%	Tannic acid		Butandiol	10%
Dichloroacetic acid	50%	Tartaric acid, aqueous		Butanol - aqueous	
Trichloroacetic acid	50%	Trichloroacetic acid		Ammonium carbonate	50%
Adipic acid		Mineral water		Sodium carbonate	
Arsenic acid	80%	Hydrogen peroxide		Cyanide	
Benzoic acid		Drinking water, chlorinated	10%	Potassium cyanide	
Watery boric acid		Acrylonitrile		Cyclohexane	
Hydrobromic acid	50%	Allyl alcohol		Cyclohexanol	
Butyric acid	pure	Amyl alcohol	96%	Cyclohexanone	pure
Hydrocyanic acid		Benzyl alcohol		Potassium chlorate	
Citric acid	10%	Ethyl alcohol	pure	Sodium chlorate	
Hydrochloric acid	10% aqueous	Ethyl alcohol+Acetic acid	96%	Sodium chlorite	diluted, aqueous
Chloroacetic acid (mono)	50%	Furfuryl alcohol		Chlorine-Ethanol	
Chromic acid	50% aqueous	Fat alcohol, Coconut oil		Aniline chlorhydrate	saturated, aqueous
Dichloroacetic acid	50%	Methyl-alcohol	pure	Aluminium chloride	10%
Trichloroacetic acid	pure	Propargyl alcohol		Ammonium chloride	10%
Diglycolic acid	30%	Acetic aldehyde	7%	Antimony chloride	90%
Hydrofluoric acid	40% aqueous	Crotonic aldehyde	pure	Lime chloride	
Siliconfluoric acid	32%	Chromic alum	pure	Calcium chloride	
Formic acid		Starch, aqueous		Magnesium chloride	
Phosphoric acid, aqueous	85%	Ammonia		Potassium chloride	
Phosphoric acid, aqueous	30%	Acetic anhydride		Copper chloride	
Phthalic acid		Carbon dioxide	pure	Sodium chloride	
Glycolic acid	37%	Sulphyric anhydride		Tin chloride	
Lactic acid	10%	Auto Anti-freeze liquid		Zinc chloride	
Maleic acid		Photographic fixers		Ferric chloride	
Malic acid	1%	Benzaldehyde	normal	Cresol - aqueous	90% aqueous
Nitric acid	6.3%	Petrol (Gasoline)		Potassium chromate	aqueous, saturated, cold
Oleic acid	pure	Sodiumbenzoate		Sodium chromate	diluted, aqueous
Oleic acid		Sodium bicarbonate		Dextrose - aqueous	
Oxalic acid, aqueous		Potassium bichromate		Synthetic detergents	5% aqueous
Acid for accumulators	80% aqueous	Carbon dioxide		Diisobutyl ketone	pure
Perchloric acid, aqueous	70% aqueous	Sulphur dioxide		Dimethylamine - liquid	

The substances related below have no influence on the HD-PE at a temperature of 60°, in some cases the maximum concentration is shown. For other substances and/or temperatures and concentrations consult our Technical Office.

RESISTANCE OF HD-PE TO CHEMICAL SUBSTANCES					
DESCRIPTION	%	DESCRIPTION	%	DESCRIPTION	%
Dimethylformamide		Isoctane		Hydrogen peroxide	90% aqueous
Dioxan		Isopropanol	aqueous	Potassium, Sodium persulphate	
Distillations generally		Lanoline		Petroleum	pure
Distilled wine	pure	Milk		Pyridine	
Paraffin emulsion	pure	Yeast	pure	Sodium pyrosulphite	aqueous
Photographic emulsions		Liqueurs		Potash	saturated cold 90%
Tannic vegetable extracts		Jam			aqueous
Petroleum ether		Molasses		Caustic potash	50%
Ethylenediamine	pure	Mercury		Propane	pure, liquido
Acetic acid ethyl ester	700 mg.	Metilamina		Photographic developers	normal
Mono chlorate	50%	Acetic acid methyl ester		Kitchen salt	
Phenol	50%	Diclorate		Silver, barium salts	
Potassium ferricyanide	50%	Acetic acid methyl ester		magnesium, mercury, nickel,	
Fertilisers (salts)		Monochlorate	32% aqueous	copper, zinc	
Ammonium fluoride	80%	Methyl ethy ketone		Starch syrup	
Copper fluoride		Sulphurphosphoric mixture		Sugar syrup	
Sodium fluoride	50%	Morpholine		Butyl sebacate	pure
Formaldehyde	pure	Must of Molasses		Cider	
Formamide		Fermented must	pure	Sodium silicate	
Ammonium phosphate	10%	Movilit d	30%	Soda	
Potassium phosphate	10% aqueous	Naphtalene		Caustic soda	10%
Sodium phosphate	50%	Ammonium nitrate		Aluminium sulphate	
Tributylphosphate	50% aqueous	Silver nitrate		Aluminium, potassium sulphate	50%
Phosphur chlorate	50%	Calcium /potassium nitrate	normal	Ammonium sulphate	10%
Petrol (gasoline)	pure	Copper/sodium nitrate	pure	Hydroxylamine sulphate	
Glycerine	30%	Sodium nitrite	saturated aqueous	Potassium sulphate	
Glycol	40% aqueous	Nitrobenzene	50%	Sodium sulphate	
Butylene glycol	32%	Nitrotoluene		Sodium sulphite	
Ethylene glycol		N-propanol	aqueous	Ammonium sulphide	
Propylene glicole	85%	Vegetable oils and greases	saturated cold	Sodium sulphide	
Glycine	30%	Lubricating oils	pure	Soap solutions	
Glucose		Mineral oils	pure	Fruit juices	
Chloral hydrate	37%	Coconut, linseed, corn oils		Surfactants	
Hydrazine hydrate	10%	Olive oil		Lead tetraethyl	pure
Hydrogen		Palm oil		Sodium thiosulphate	
Sodium hydrosulphate	1%	Paraffin oil		Tricresyl phosphate	
Ammonium hydroxide	6.3%	Silicone oil		Triethanolamine	
Barium hydroxide	pure	Urine		Urea	30%
Calcium hydroxide		Sodium oxalate		Wine, white and red	
Potassium iodide		Propylenic oxide		Grape sugar	
Sodium iodide	80% aqueous	Phosphurous pentoxide			
Calcium hypochlorate	70% aqueous	Potassium perchlorate	aqueous		
I-propanol	1% aqueous	Potassium permanganate	saturated cold		

The substances related below have no influence on the HD-PE at a temperature of 60°, in some cases the maximum concentration is shown. For other substances and/or temperatures and concentrations consult our technical office.

## Introduction

This Manual is meant as a simple practical guide as well as a convenient technical support to all those who are faced with the problems involved in designing and installing a surface drainage system.

Surface drainage systems make it possible to collect, channel and dispose of all the water that may accumulate on a given surface. The water can be of meteoric type, i.e. originating from atmospheric precipitation or from human activities connected with industry, construction, agriculture etc.

During the phases involved in the design of a surface drainage system, a clear distinction has to be made between open-air surfaces and covered surfaces.

While the former, comprising roads, squares, gardens etc., require knowledge and analysis of the data related to atmospheric precipitation; the latter include areas used for industrial production. In covered surfaces the drainage system will predominantly have to dispose of liquids deriving from work processes, which sometimes are chemically aggressive.

The project of a drainage network starts therefore from the general data of the surface to be drained (type, nature and size) and the knowledge of the flow rates of the liquids to be drained.

In the case of covered areas such as industrial buildings, the volume and nature of the liquids to be disposed of depend on the type of industrial processes that are carried out. As a consequence the discharge flow data will have to be supplied by the client.

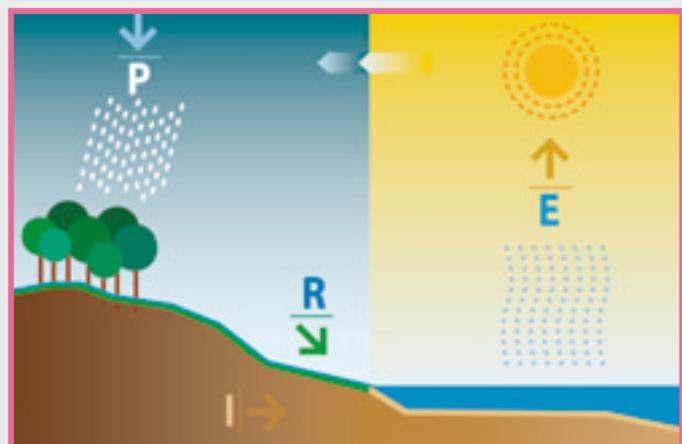
For open-air sites, on the contrary, the volume of water runoff is determined by studying the meteorological data. That is why a few simple hydrologic concepts about rainfall, historical data and the relevant statistical processing are shown below.

## The water or hydrologic cycle

The hydrologic cycle is the path the water follows from the oceans through the atmosphere and the ground until it returns to the oceans. In spite of the fact that such a cycle - generated by solar energy - is quite complex, the process of water circulation can be represented as follows (Fig.1) :

- the water evaporates from the oceans surfaces, forming clouds;
- the clouds, driven by the winds even for long distances, give rise to precipitations in the form of rain, snow and hailstones;
- the most precipitations fall over the sea and the rest on the emersed land;
- a certain quantity of that water re-evaporates directly, another part is withheld by the vegetation and then given back to the atmosphere through the plants' evaporation or transpiration, and another part reaches the ground and flows on the surface until it reaches the sea. The remaining part filters into the ground, thus feeding underground water tables: in this way it returns to the sea too.

1. HYDROLOGIC CYCLE



P stands for atmospheric rainfall;

E is the water that evaporates from the ground, vegetation etc.;

R is the surface streaming;

I is the water that filters into the ground.

Therefore the water balance can be expressed through the following relationship:

$$P = E + R + I$$

## Rainfall and pluviometric measurements

The quantity of falling water P is measured in rainfall height and is expressed in mm. That is, the height of the layer of water that would rest on the ground, supposing evaporation, surface streaming and evapotranspiration to be zero. This measurement is obtained from the volume of water fallen on a horizontal plane in a given area. One millimetre of rainfall means that an area of one square metre is covered by a 1-millimetre-thick layer of water for a total volume of one litre. Consequently:

$$P \text{ (mm)} = \frac{\text{Volume}}{\text{Area}} = \frac{1 \text{ litro}}{1 \text{ m}^2} = \frac{\frac{1}{1000} \text{ m}^3}{1 \text{ m}^2} = \frac{1}{1000} \text{ m} = 1 \text{ mm}$$

The ratio between the precipitation height P and the precipitation duration t defines the average intensity of precipitation I expressed in mm/h:

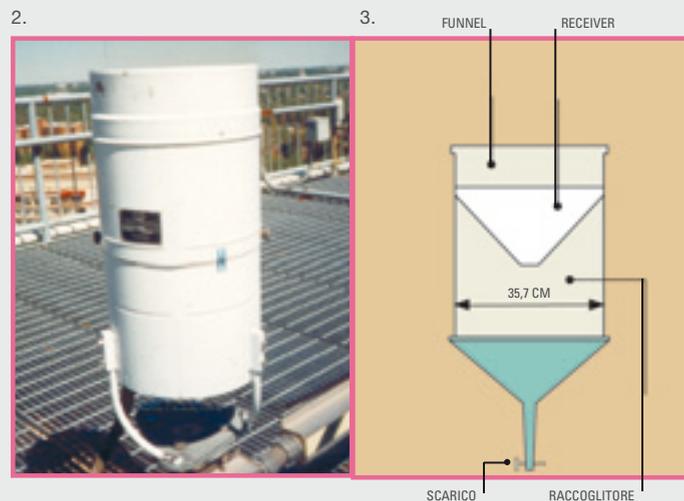
$$I \left[ \frac{\text{mm}}{\text{h}} \right] = \frac{P}{t}$$

The measurement of the precipitation is carried out with a Pluviometer or Pluviograph. The pluviometer is a simple funnel-shaped receptacle with dimensions such that each litre of water corresponds to 10 mm of rain.

$$\text{Superficie} = \pi \cdot r^2 = 3,14 \cdot \left[ \frac{0,357 \text{ m}}{2} \right]^2 = 0,1 \text{ m}^2$$

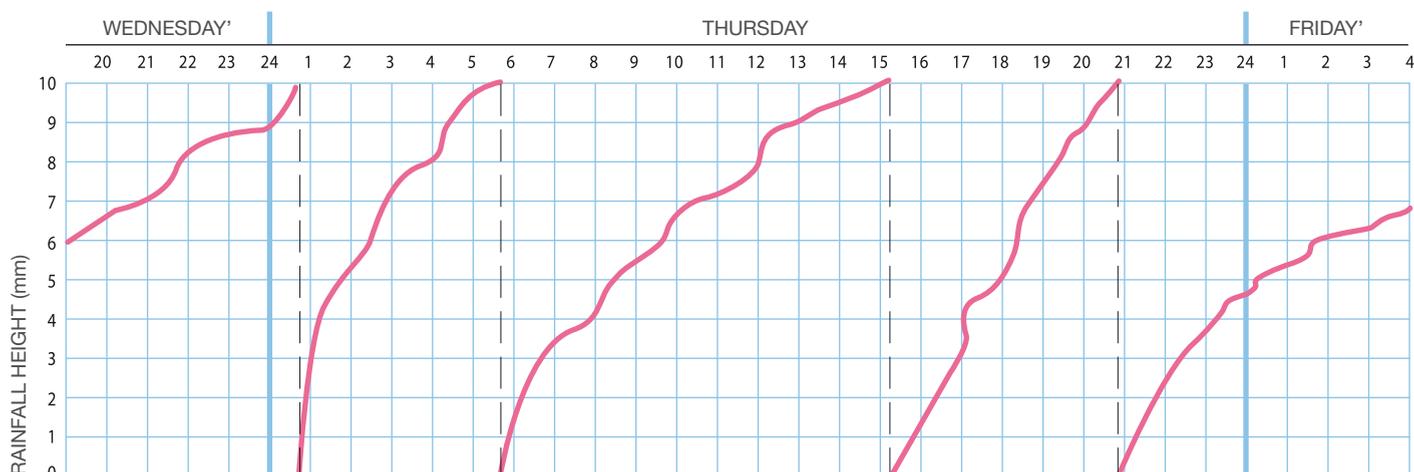
⇒ 1 lt d'acqua = 10 mm di pioggia

The water height is taken every 24 hrs, thus obtaining the rainfall height in the previous 24 hrs. The pluviograph is a more complex system, which directly provides a diagram showing the rainfall height instant by instant (pluviogram - 4). The stations equipped with pluviographs are particularly important as they make it possible to derive data for intervals smaller than 24 hrs (Figures 2-3).



There is a wide network of monitoring stations all over Italy that supply a series of pluviometric data (rainfall height, average intensity of precipitation, rainy days etc.). This data is collected and published annually by the Hydrographic Service or other bodies such as Istat.

## Example of pluviogram



## Processing pluviometric data

### CONCENTRATION TIME $T_C$

Clearly the volume of the water flow to be drained does not depend only on the precipitation but also on its duration. If the precipitation has height  $P$  and duration  $t$  (with average intensity  $P/t$ ) and occurs over the entire draining area, the maximum volume is reached when contributions from all the parts making up the surface reach the runoff section.

This time interval is defined as concentration time  $t_{ct}$  is simply the time that the most distant drop of water takes to reach the end of the drainage system.

Based on this, when processing the pluviometric data, it is necessary to consider the precipitation according to concentration time in order to determine maximum capacity.

For example, in drainage systems that serve relatively small surface areas, concentration time ranges from few minutes to dozens of minutes. Therefore brief and intense precipitations (showers of rain) should be analysed with maximum duration of 1 hour.

### EQUATIONS OF PLUVIOMETRIC POSSIBILITY

The processing of the pluviometric data supplied by a monitoring station consists in looking for the mathematical relationship between the height of precipitation  $P$  and its duration  $t$ :

$$P = P(t)$$

Obviously, from the statistical point of view, its reliability depends on the amount of data available. Consequently the observation period must be long enough. It is believed that an observation period not smaller than 30/35 years can provide valid statistical results, although in some case observations not older than 10 years have to be used.

The many observations available have made it possible to see that, as time passes, rainfall diminishes. So the relationship we are looking for is of exponential type and can be expressed as follows:

$$P = a t^n$$

Where  $P$  and  $t$  are usually expressed in mm and hours respectively. The parameters dimensionless  $n$  and  $a$  ( $\text{mm} \cdot \text{h}^{-n}$ ) are characteristic of a curve and can be determined from time to time as they depend on the pluviometric characteristics of the area where the monitoring station is located. The exponent  $n$  is obviously less than the unit.

Such relationships are called pluviometric possibility equations. They define curves on the Cartesian plane ( $P, t$ ) known as pluviometric possibility indication curves.

### RETURN TIME $T_R$ AND PROBABILITY OF NOT EXCEEDING THE CONCERNED

In order to determine the functional link between the precipitation height, its duration and the probable frequency with which such height can occur, the relationship becomes:

$$P(T_r) = a(T_r) t^{n(T_r)}$$

Where  $T_r$  is the so-called return time, that is the time poeriod in which the meterological event will on average be equalled or exceeded; it more simply defines the probability that the considered event is not exceeded; this probability results from the Gumbel distribution.

Generally speaking low values of return time (2 to 10 years) are used to measure a drainage system for meteorological water.

### STATISTIC ANALYSIS OF THE PRECIPITATIONS

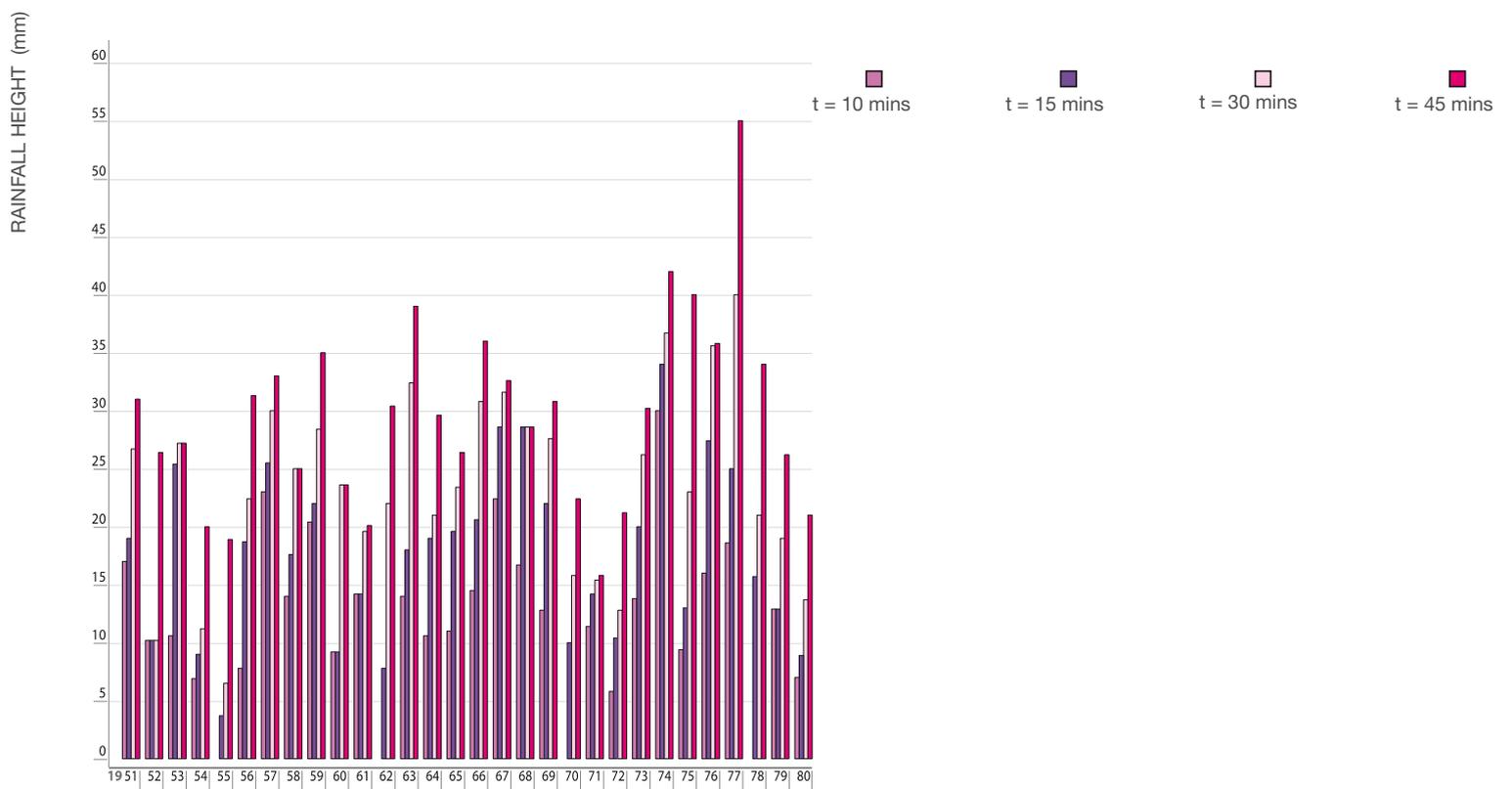
It is supposed that the maximum brief and intense precipitation values recorded by a theoretical pluviometric station  $X$  for a certain number of years  $Y$  are available.

By ordering this data, a table with a number of lines equal to the observation years  $Y$  and a number of columns equal to the lengths of observation (10, 15, 30 and 45 minutes) is obtained.

BRIEF AND INTENSE PRECIPITATIONS RECORDED IN A THEORETICAL PLUVIOGRAPHIC STATION

DURATION	t = 10 min	t = 15 min	t = 30 min	t = 45 min
OBSERVATION YEAR	Rainfall height P (mm)			
1951	17	19	26.7	31
1952	10.2	10.2	10.2	26.4
1953	10.6	25.4	27.2	27.2
1954	6.9	9	11.2	20
1955	0	3.7	6.5	18.9
1956	7.8	18.7	22.4	31.3
1957	23	25.5	30	33
1958	14	17.6	25	25
1959	20.4	21	28.4	35
1960	9.2	8.2	23.6	23.6
1961	14.2	14.2	19.6	20.1
1962	0	7.8	22	30.4
1963	14	18	32.4	39
1964	10.6	19	21	29.6
1965	11	19.6	23.4	26.4
1966	14.5	20.6	30.8	36
1967	22.4	28.6	31.6	32.6
1968	16.7	28.6	28.6	28.6
1969	12.8	22	27.6	30.8
1970	0	10	15.8	22.4
1971	11.4	14.2	15.4	15.8
1972	5.8	10.4	12.8	21.2
1973	13.8	20	26.2	30.2
1974	30	34	36.7	42
1975	9.4	13	23	40
1976	16	27.4	35.6	35.8
1977	18.6	25	40	55
1978	0	15.7	21	34
1979	12.9	12.9	19	26.2
1980	7	8.9	13.7	21

Rainfall Histogram



For each duration interval the mean value  $m_t$  and the standard deviation  $\sigma_t$  of the recorded values are calculated:

STATISTICS	DURATION			
	t = 10 min	t = 15 min	t = 30 min	t = 45 min
	t = 0,167 hours	t = 0,25 hours	t = 0,5 hours	t = 0,75 hours
Mean value $m_t$	12,60	18,21	24,21	29,90
Standard deviation $\sigma_t$	7,018	7,535	8,234	8,375

At this point reference is made to the Gumbel probability distribution to process the statistics:

$$G(P_t) = e^{-e^{-y}}$$

where  $y$  (called reduced variable) is given by:

$$y = \frac{P_t - M_t}{S_t}$$

with:

$$M_t = m_t - 0,577 \sigma_t$$

mean value of the reduced variable

$$S_t = 0,779 \sigma_t$$

standard deviation of the reduced variable.  
So you will get:

STATISTICS	DURATION			
	t = 10 min	t = 15 min	t = 30 min	t = 45 min
	t = 0,167 ore	t = 0,25 ore	t = 0,5 ore	t = 0,75 ore
Mean value $M_t$	5,47	5,86	6,48	6,52
S.Q.M. $S_t$	8,55	13,87	19,41	25,07

Knowing that the probability of not exceeding the event is expressed according to the return time:

$$G(P_t) = \frac{Tr - 1}{Tr}$$

and processing the Gumbel expression, you get:

$$P_t(Tr) = M_t - S_t \ln \left[ \ln \left( \frac{Tr}{Tr-1} \right) \right]$$

In this way, having set a return period  $Tr$ , it is possible to establish the corresponding maximum value of precipitation  $P$  for each time period  $t$ , that is the precipitation height that occurs, on average, every  $Tr$  years.

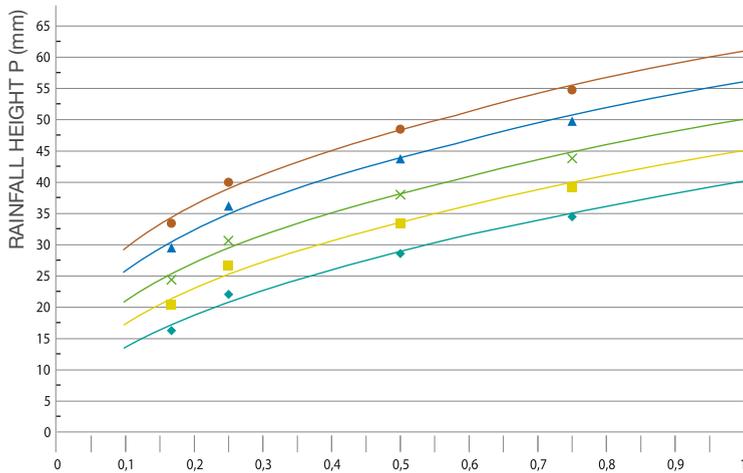
DURATION RETURN TIME $Tr$	DURATION			
	t = 10 min	t = 15 min	t = 30 min	t = 45 min
	t = 0,167 hours	t = 0,25 hours	t = 0,5 hours	t = 0,75 hours
5 years	16,75	22,66	29,13	34,85
10 years	20,86	27,06	34,00	39,75
20 years	24,79	31,28	38,67	44,45
50 years	29,89	36,74	44,71	50,52
100 years	33,70	40,84	49,24	55,08

By placing the values obtained for each return period  $Tr$  into the plane  $(P;t)$  it is possible to plot equation regression curves

$$P(Tr) = a (Tr)^{t^{(Tr)}}$$

which represent the pluviometric possibility curves we were looking for.

PLUVIOMETRIC POSSIBILITY CURVES (DURATION T < 1 HOUR)



Return Time  
Tr = 5 years

$$P(5) = 40,417t^{0,4652}$$

$$R^2 = 0,9775$$

Return Time  
Tr = 20 years

$$P(20) = 50,111t^{0,3737}$$

$$R^2 = 0,9820$$

Return Time  
Tr = 10 years

$$P(10) = 45,325t^{0,4113}$$

$$R^2 = 0,9803$$

Return Time  
Tr = 50 years

$$P(50) = 56,370t^{0,3375}$$

$$R^2 = 0,9834$$

Return Time  
Tr = 100 years

$$P(100) = 61,091t^{0,3166}$$

$$R^2 = 0,9841$$

The values of the coefficients a and n, obtained by varying the return period Tr for precipitations of less than 1 hr, are shown in the table opposite.

The correlation coefficients of the regressions performed R<sup>2</sup> are shown in the last column.

RETURN TIME Tr	a (mm•h <sup>-n</sup> )	n	CORRELATION COEFFICIENT R <sup>2</sup>
5 years	40,717	0,4652	0,9775
10 years	45,325	0,4113	0,9803
20 years	50,111	0,3737	0,9820
50 years	56,370	0,3375	0,9834
100 years	61,091	0,3166	0,9841

Tyrrhenian side of central Italy, Adriatic side of central Italy, Southern Italy, Sardinia.

Subsequent statistical processing made it possible to determine the following relationships for durations t < 1 hour.

EQUATIONS OF PLUVIOMETRIC POSSIBILITY

$P(Tr = 5) = 37,23 t^{0,423}$
$P(Tr = 10) = 42,84 t^{0,405}$
$P(Tr = 20) = 49,13 t^{0,396}$
$P(Tr = 50) = 56,81 t^{0,383}$
$P(Tr = 100) = 64,57 t^{0,375}$

AVERAGE PRECIPITATION INTENSITY I

Apart from obtaining the heights of precipitation that occur on average every Tr years for every rainfall duration t, it is obviously possible to also derive the corresponding average precipitation intensity (I) from pluviometric possibility equations.

$$\text{Consequently } \left( \frac{\text{mm}}{\text{h}} \right) = \frac{P}{t} = \frac{at^n}{t} = at^{(n-1)}$$

EQUATIONS OF NATIONAL PLUVIOMETRIC POSSIBILITY

Clearly enough, to follow this procedure is extremely complex and articulated. And it is also difficult to collect a sufficient amount of pluviometric data regarding the drainage system area.

For these reasons we have tried to concentrate our resources on the search for pluviometric possibility equations that could have general validity, i.e. those that could be used for every area on the Italian territory.

The study started from the geographical distribution of the pluviometric data available. We analysed the precipitation as distributed in the areas that have historically shown homogeneity: Northern Italy,

RETURN TIME TR	a (mm•h <sup>-n</sup> )	n
5 anni	37,23	0,423
10 anni	42,84	0,405
20 anni	49,13	0,396
50 anni	56,81	0,383
100 anni	64,57	0,375

The application of these equations speeds up the calculation operations but it involves an approximation of about 10 %. Therefore for special projects where accuracy is required, it is advisable to try and find the equation of the local pluviometric possibility.

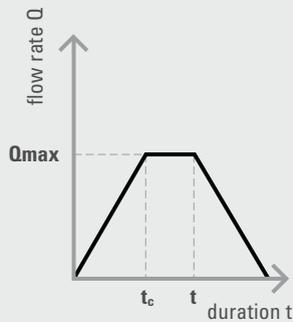
## Calculating maximum runoff capacity

The most popular method to calculate the flow rate resulting from a given precipitation is the kinematic method, also known as the rational method.

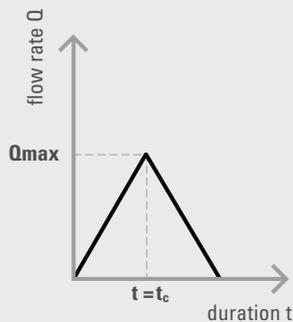
It is especially applicable to draining surfaces that are not too extensive and it is very suitable when designing drainage lines.

### FLOOD HYDROGRAPH ACCORDING TO THE KINEMATIC METHOD

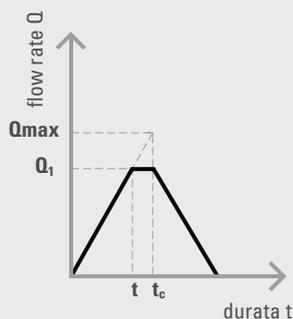
#### Case A ( $t > t_c$ )



#### Case B ( $t = t_c$ )



#### Case C ( $t < t_c$ )



According to this method the condition of maximum flow rate is reached when the precipitation lasts for the same time as the critical rain, that is the concentration time:

$$t(Q_{\max}) = t_c \text{ critical duration}$$

$$I(t(Q_{\max})) = I_{cr} \text{ critical intensity}$$

The calculation relationship called kinematic formula is:

$$Q_{\max} = \phi A I_{cr}$$

where:

A is the area of the draining surface;

$I_{cr}$  is the critical intensity;

$\phi$  is the flow coefficient

(dimensionless size of which is discussed further on).

Knowing that: 
$$I_{cr} = \frac{P}{t_c} = \frac{at_c^n}{t_c} = at_c^{(n-1)}$$

Therefore: 
$$Q_{\max} = \phi A at_c^{(n-1)}$$

### RUNOFF COEFFICIENT $\phi$

At this point it is important to underline that not all the precipitation water that flows onto a surface contributes to calculating the volume to be drained. Some of this water will be absorbed by the ground - the more permeable the draining surface, the greater this amount will be.

Bituminous conglomerate or concrete pavings are much less permeable than a garden.

The fraction of water that contributes to the calculation of runoff capacity - to be collected by the drainage network - is given by the runoff coefficient  $\phi$ , which will obviously depend on the type of surface.

### VALUES OF RUNOFF COEFFICIENT $\phi$

Types of surfaces	Runoff coefficient $\phi$
Roofs and terraces	0,90 - 0,95
Concrete paving	0,90
Asphalt paving	0,85 - 0,90
Stone and brick paving with cemented connections	0,80
Stone and brick paving with non cemented connections	0,60
Gardens, lawns, woods	0,40
City areas completely built up	0,70 - 0,90
City areas averagely built up	0,50 - 0,70
City areas slightly built up	0,40 - 0,50

You will actually find situations in which the draining surface is made up of surface portions of different types, therefore having different runoff coefficients. In such cases it is enough to calculate the weighed average of the runoff coefficients for the various areas.

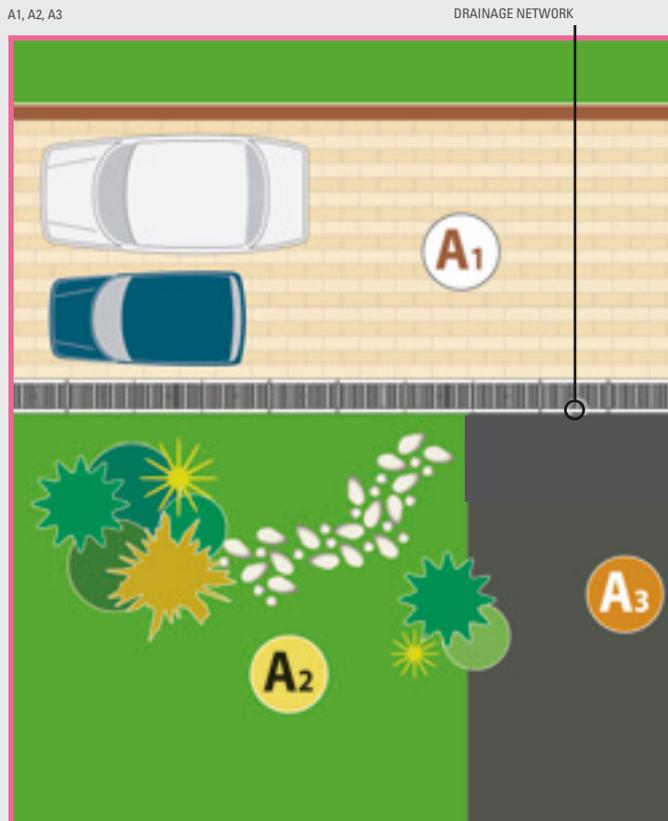
## EXAMPLE

**A1** Brick surface  
area = A1  
runoff coefficient =  $\phi_1$

**A2** Grassy surface  
area = A2  
runoff coefficient =  $\phi_2$

**A3** Asphalted surface  
area = A3  
runoff coefficient =  $\phi_3$

$$\phi = \frac{\sum A_i \phi_i}{\sum A_i} = \frac{A_1 \phi_1 + A_2 \phi_2 + A_3 \phi_3}{A_1 + A_2 + A_3}$$



## CALCULATING CONCENTRATION TIME $t_c$

Concentration time - see definition above - depends on the average inclination, type and size of the contributing surfaces. To determine its value is not that easy.

A lot of empiric formulas exist in books that, based on experience, have no general validity and may even cause considerable inaccuracy. The following expression makes it possible to calculate the concentration time of a drainage surface as used in road construction. It is suitable to our cases:

$$t_c \text{ (sec)} = \left[ \frac{26^n \left( \frac{L}{K} \right)^{0,6}}{i^{0,3} a^{0,4}} \right] \left( \frac{1}{0,6 + 0,4n} \right)$$

where:

**L (m)** is the width of the surface (perpendicular to the drainage line);  
**i (%)** is the average incline of the surface;

**a (mh<sup>-n</sup>)** and **n** are the parameters of the equation for the pluviometric possibility for a set return time;

**K (m<sup>1/3</sup>/s)** is a coefficient that depends on the type of surface.

SURFACE	K
Asphalt	50 - 75
Bricks	20 - 30
Grass	2 - 2,5

The value of concentration time for very small surfaces is normally in the order of a few minutes and is in no way comparable to effective rainfall time, even if brief and intense. To assume said values would mean to overestimate the flow rates. It can be a precautionary measure if generally valid pluviometric possibility equations are used.

Given the difficulty in accurately calculating concentration time, we propose a direct method of calculation that is user-friendly and applicable in the designing stages. The method, which is based on Mufle's wide experience in different areas in Italy and in the most varied situations, makes it possible to define the unitary maximum flow rate, i.e. by linear metre of drainage system, for a fixed return time  $T_r$  through the following formula:

$$q \left( \frac{m^3}{h} \right) = FL^p$$

where:

**L (m)** is the width of the surface (perpendicular to the drainage line);  
**F e P** are two parameters that depend on the runoff coefficient, the average inclination of the surface and coefficients a and n for a given return time. These values can be derived from the tables on pages 307 and 308, which are valid for return times of 5 and 10 years respectively. You are advised to select the return time  $T_r$  using the following criterion:

5 years	Pedestrian areas, terraces, large squares, green zones and car parks
10 years	Road draining, access to car parks, industrial estates and airport areas

# CALCULATION FLOW RATES

Technik

Tr = 5 years												
PARAMETER F												
INCLINE i	RUNOFF COEFFICIENT											
	0,4	0,45	0,5	0,55	0,6	0,65	0,70	0,75	0,80	0,85	0,90	0,95
0,1%	0,0138	0,0289	0,0458	0,0645	0,0852	0,108	0,1332	0,1608	0,1912	0,2246	0,2611	0,301
0,5%	0,0181	0,0377	0,0589	0,0818	0,1067	0,1335	0,1625	0,1938	0,2274	0,2636	0,3026	0,3444
1,0%	0,0204	0,0422	0,0656	0,0907	0,1175	0,1463	0,1771	0,21	0,2451	0,2825	0,3224	0,3649
1,5%	0,0219	0,0451	0,0699	0,0963	0,1244	0,1543	0,1862	0,22	0,256	0,2941	0,3346	0,3775
2,0%	0,023	0,0473	0,0731	0,1004	0,1295	0,1603	0,1929	0,2275	0,264	0,3027	0,3435	0,3867
2,5%	0,0239	0,049	0,0756	0,1038	0,1336	0,1651	0,1983	0,2334	0,2705	0,3095	0,3506	0,394
3,0%	0,0247	0,0505	0,0778	0,1066	0,137	0,1691	0,2029	0,2384	0,2758	0,3152	0,3566	0,4
3,5%	0,0253	0,0518	0,0797	0,1091	0,14	0,1726	0,2068	0,2427	0,2804	0,3201	0,3616	0,4052
4,0%	0,0259	0,053	0,0814	0,1113	0,1427	0,1756	0,2102	0,2465	0,2845	0,3243	0,3661	0,4098
4,5%	0,0265	0,054	0,0829	0,1132	0,145	0,1784	0,2133	0,2499	0,2881	0,3282	0,3701	0,4138
5,0%	0,0269	0,0549	0,0843	0,115	0,1472	0,1809	0,2161	0,2529	0,2914	0,3316	0,3736	0,4175
5,5%	0,0274	0,0558	0,0855	0,1166	0,1492	0,1831	0,2187	0,2557	0,2944	0,3348	0,3769	0,4208
6,0%	0,0278	0,0566	0,0867	0,1182	0,151	0,1853	0,221	0,2583	0,2972	0,3377	0,3799	0,4239
6,5%	0,0282	0,0573	0,0878	0,1196	0,1527	0,1872	0,2232	0,2607	0,2998	0,3404	0,3827	0,4268
7,0%	0,0285	0,058	0,0888	0,1209	0,1543	0,1891	0,2253	0,263	0,3022	0,3429	0,3853	0,4294
7,5%	0,0289	0,0587	0,0898	0,1221	0,1558	0,1908	0,2272	0,2651	0,3044	0,3453	0,3878	0,4319
8,0%	0,0292	0,0593	0,0907	0,1233	0,1572	0,1924	0,229	0,2671	0,3065	0,3475	0,3901	0,4342
8,5%	0,0295	0,0599	0,0915	0,1244	0,1585	0,194	0,2308	0,2689	0,3086	0,3496	0,3923	0,4364
9,0%	0,0298	0,0605	0,0924	0,1254	0,1598	0,1954	0,2324	0,2707	0,3105	0,3516	0,3943	0,4385
9,5%	0,0301	0,061	0,0931	0,1265	0,161	0,1968	0,234	0,2724	0,3123	0,3535	0,3963	0,4405
10,0%	0,0303	0,0615	0,0939	0,1274	0,1622	0,1982	0,2354	0,274	0,314	0,3554	0,3981	0,4424

Tr = 5 years												
PARAMETER P												
INCLINE i	RUNOFF COEFFICIENT											
	0,4	0,45	0,5	0,55	0,6	0,65	0,70	0,75	0,80	0,85	0,90	0,95
0,1%	0,7134	0,709	0,7046	0,7002	0,6959	0,6915	0,6872	0,6829	0,6787	0,6745	0,6703	0,6661
0,5%	0,7589	0,755	0,7511	0,7472	0,7433	0,7395	0,7357	0,7319	0,7281	0,7243	0,7206	0,7168
1,0%	0,7793	0,7757	0,772	0,7684	0,7648	0,7612	0,7576	0,754	0,7505	0,7469	0,7434	0,7399
1,5%	0,7916	0,788	0,7846	0,7811	0,7776	0,7742	0,7707	0,7673	0,7639	0,7605	0,7571	0,7537
2,0%	0,8003	0,7969	0,7936	0,7902	0,7868	0,7835	0,7802	0,7768	0,7735	0,7702	0,7669	0,7637
2,5%	0,8072	0,8039	0,8006	0,7973	0,7941	0,7908	0,7876	0,7843	0,7811	0,7779	0,7747	0,7715
3,0%	0,8129	0,8097	0,8064	0,8032	0,8	0,7968	0,7937	0,7905	0,7873	0,7842	0,7811	0,7779
3,5%	0,8177	0,8146	0,8114	0,8082	0,8051	0,802	0,7989	0,7958	0,7927	0,7896	0,7865	0,7834
4,0%	0,8219	0,8188	0,8157	0,8126	0,8095	0,8065	0,8034	0,8003	0,7973	0,7943	0,7912	0,7882
4,5%	0,8256	0,8226	0,8195	0,8165	0,8135	0,8104	0,8074	0,8044	0,8014	0,7984	0,7954	0,7925
5,0%	0,829	0,826	0,823	0,82	0,817	0,814	0,811	0,8081	0,8051	0,8022	0,7992	0,7963
5,5%	0,832	0,8291	0,8261	0,8231	0,8202	0,8172	0,8143	0,8114	0,8085	0,8055	0,8026	0,7998
6,0%	0,8348	0,8319	0,8289	0,826	0,8231	0,8202	0,8173	0,8144	0,8115	0,8087	0,8058	0,8029
6,5%	0,8374	0,8345	0,8316	0,8287	0,8258	0,8229	0,8201	0,8172	0,8144	0,8115	0,8087	0,8059
7,0%	0,8398	0,8369	0,834	0,8312	0,8283	0,8255	0,8227	0,8198	0,817	0,8142	0,8114	0,8086
7,5%	0,842	0,8392	0,8363	0,8335	0,8307	0,8279	0,8251	0,8223	0,8195	0,8167	0,8139	0,8112
8,0%	0,8441	0,8413	0,8385	0,8357	0,8329	0,8301	0,8273	0,8246	0,8218	0,819	0,8163	0,8135
8,5%	0,846	0,8433	0,8405	0,8377	0,835	0,8322	0,8294	0,8267	0,824	0,8212	0,8185	0,8158
9,0%	0,8479	0,8451	0,8424	0,8397	0,8369	0,8342	0,8315	0,8287	0,826	0,8233	0,8206	0,8179
9,5%	0,8497	0,8469	0,8442	0,8415	0,8388	0,8361	0,8334	0,8307	0,828	0,8253	0,8226	0,82
10,0%	0,8513	0,8486	0,8459	0,8432	0,8405	0,8379	0,8352	0,8325	0,8298	0,8272	0,8245	0,8219

Tr = 10 years												
PARAMETER F												
INCLINE i	RUNOFF COEFFICIENT											
	0,4	0,45	0,5	0,55	0,6	0,65	0,70	0,75	0,80	0,85	0,90	0,95
0,1%	0,0278	0,0396	0,0531	0,0684	0,0857	0,1053	0,1272	0,1519	0,1795	0,2246	0,2451	0,2837
0,5%	0,0432	0,0606	0,0799	0,1011	0,1246	0,1504	0,1787	0,2098	0,2438	0,2636	0,3218	0,3662
1,0%	0,0522	0,0727	0,0952	0,1196	0,1463	0,1753	0,2068	0,2411	0,2782	0,2825	0,3618	0,4088
1,5%	0,0583	0,0809	0,1054	0,132	0,1607	0,1918	0,2253	0,2615	0,3004	0,2941	0,3875	0,4359
2,0%	0,0631	0,0873	0,1134	0,1415	0,1718	0,2044	0,2394	0,277	0,3173	0,3027	0,4068	0,4563
2,5%	0,0671	0,0926	0,12	0,1494	0,181	0,2148	0,251	0,2897	0,3311	0,3095	0,4224	0,4727
3,0%	0,0705	0,0971	0,1256	0,1562	0,1888	0,2236	0,2608	0,3005	0,3428	0,3152	0,4357	0,4866
3,5%	0,0735	0,1012	0,1306	0,1621	0,1957	0,2314	0,2695	0,3099	0,353	0,3201	0,4472	0,4987
4,0%	0,0763	0,1048	0,1351	0,1674	0,2018	0,2384	0,2772	0,3184	0,362	0,3243	0,4574	0,5094
4,5%	0,0788	0,1081	0,1392	0,1723	0,2074	0,2447	0,2841	0,326	0,3702	0,3282	0,4666	0,519
5,0%	0,0811	0,1111	0,143	0,1768	0,2125	0,2504	0,2905	0,3329	0,3777	0,3316	0,475	0,5277
5,5%	0,0832	0,1139	0,1465	0,1809	0,2173	0,2558	0,2964	0,3394	0,3846	0,3348	0,4827	0,5358
6,0%	0,0852	0,1166	0,1497	0,1848	0,2217	0,2608	0,3019	0,3453	0,391	0,3377	0,4899	0,5432
6,5%	0,0871	0,1191	0,1528	0,1884	0,2259	0,2654	0,3071	0,3509	0,397	0,3404	0,4966	0,5501
7,0%	0,0889	0,1214	0,1557	0,1918	0,2298	0,2698	0,3119	0,3562	0,4027	0,3429	0,5028	0,5567
7,5%	0,0906	0,1237	0,1584	0,195	0,2335	0,274	0,3165	0,3611	0,408	0,3453	0,5087	0,5628
8,0%	0,0922	0,1258	0,161	0,1981	0,237	0,2779	0,3208	0,3658	0,413	0,3475	0,5143	0,5686
8,5%	0,0938	0,1278	0,1635	0,201	0,2404	0,2817	0,325	0,3703	0,4178	0,3496	0,5196	0,5741
9,0%	0,0953	0,1297	0,1659	0,2038	0,2436	0,2853	0,3289	0,3746	0,4224	0,3516	0,5247	0,5793
9,5%	0,0967	0,1316	0,1682	0,2065	0,2467	0,2887	0,3327	0,3787	0,4268	0,3535	0,5295	0,5843
10,0%	0,0981	0,1334	0,1704	0,2091	0,2496	0,292	0,3363	0,3826	0,4309	0,3554	0,5341	0,5891

Tr = 10 years												
PARAMETER P												
INCLINEi	RUNOFF COEFFICIENT											
	0,4	0,45	0,5	0,55	0,6	0,65	0,70	0,75	0,80	0,85	0,90	0,95
0,1%	0,7349	0,7334	0,7318	0,73	0,7281	0,726	0,7237	0,7214	0,7188	0,7162	0,7134	0,7106
0,5%	0,7256	0,7271	0,7284	0,7296	0,7306	0,7314	0,7322	0,7327	0,7331	0,7334	0,7335	0,7335
1,0%	0,7216	0,7243	0,7269	0,7294	0,7317	0,7338	0,7358	0,7377	0,7394	0,7409	0,7424	0,7437
1,5%	0,7193	0,7228	0,7261	0,7293	0,7323	0,7352	0,7379	0,7406	0,743	0,7454	0,7476	0,7497
2,0%	0,7176	0,7216	0,7255	0,7292	0,7328	0,7362	0,7395	0,7426	0,7456	0,7485	0,7513	0,7539
2,5%	0,7164	0,7208	0,725	0,7291	0,7331	0,737	0,7407	0,7442	0,7477	0,751	0,7542	0,7573
3,0%	0,7153	0,72	0,7246	0,7291	0,7334	0,7376	0,7416	0,7456	0,7494	0,753	0,7566	0,76
3,5%	0,7144	0,7194	0,7243	0,729	0,7336	0,7381	0,7425	0,7467	0,7508	0,7547	0,7586	0,7623
4,0%	0,7137	0,7189	0,724	0,729	0,7338	0,7386	0,7432	0,7476	0,752	0,7562	0,7603	0,7643
4,5%	0,713	0,7185	0,7238	0,729	0,734	0,739	0,7438	0,7485	0,7531	0,7575	0,7619	0,7661
5,0%	0,7124	0,7181	0,7236	0,7289	0,7342	0,7393	0,7444	0,7493	0,754	0,7587	0,7633	0,7677
5,5%	0,7119	0,7177	0,7234	0,7289	0,7343	0,7397	0,7449	0,75	0,7549	0,7598	0,7645	0,7692
6,0%	0,7114	0,7173	0,7232	0,7289	0,7345	0,74	0,7453	0,7506	0,7557	0,7608	0,7657	0,7705
6,5%	0,7109	0,717	0,723	0,7289	0,7346	0,7402	0,7458	0,7512	0,7565	0,7617	0,7667	0,7717
7,0%	0,7105	0,7167	0,7229	0,7288	0,7347	0,7405	0,7462	0,7517	0,7572	0,7625	0,7677	0,7728
7,5%	0,7101	0,7165	0,7227	0,7288	0,7348	0,7407	0,7465	0,7522	0,7578	0,7633	0,7686	0,7739
8,0%	0,7098	0,7162	0,7226	0,7288	0,7349	0,741	0,7469	0,7527	0,7584	0,764	0,7695	0,7749
8,5%	0,7094	0,716	0,7224	0,7288	0,735	0,7412	0,7472	0,7531	0,7589	0,7647	0,7703	0,7758
9,0%	0,7091	0,7158	0,7223	0,7288	0,7351	0,7414	0,7475	0,7535	0,7595	0,7653	0,7711	0,7767
9,5%	0,7088	0,7156	0,7222	0,7288	0,7352	0,7416	0,7478	0,7539	0,76	0,7659	0,7718	0,7775
10,0%	0,7085	0,7154	0,7221	0,7287	0,7353	0,7417	0,7481	0,7543	0,7605	0,7665	0,7725	0,7783

## Calculation example

The general characteristics of the area are the basis of proper drainage line projects. You should be able to infer said characteristics either from project drawings or - should they be unavailable - from a detailed description of the place as provided by the client.

The following are required:

- Typology of ground (flat, steep, on a bend etc).
- Nature of ground (asphalt, paved, green, mixed etc.).
- Geometry of ground (length x width, inclination).
- Any peculiarities such as the presence of flat roofs pouring water onto the area concerned, the typology of liquids to be drained into the channel, any constraints due to limited space or unavoidable positions of the final drain, the presence of purification plants etc.

Designing does not consist only in **determining the rain flow rates** and the **drain outlet diameters** to be connected to the drainage line, but also in choosing the **model of channel**, the type of **grating** and the relevant **load class**. This list must include another essential aspect, i.e. you need to know in advance:

- the usage destination of the area (parking lot, airport area, underground rooms, areas for industrial processing etc).

The first distinction to be made is between covered and open-air surfaces to be drained.

Covered areas are used for industrial processing and the water to be disposed of may be polluted by chemicals (even dangerous chemicals). You need to know their typology and concentration in order to be sure about their compatibility with HD-PE (ASVOX stainless-steel drainage channels should be used if compatibility is low), the type of vehicles travelling through the area and the quantity of liquids to be drained in order to determine the size of the channels and the number of drain outlets that need opening up.

As concerns open-air areas, there are many more possibilities - see the following case just as an example.

PARKING AREA IN A COMMERCIAL CENTRE WITH SELF-LOCKING PAVEMENT	
Area to be drained A	5.000 m <sup>2</sup>
Type of ground	FLAT
Nature	80% self-locking pavement, 20% green area
Geometry	L=100m, l=50m
Average inclination i	2,5 %
Peculiarities	The parking area has a boundary wall on three sides

As the ground is flat and you can choose the position of the drainage line, you may want to place it along the short side (50 metres) and to give the surface an average inclination of 2.5%.

As this is a car park in a commercial centre, return time  $T_r$  can be assumed to be = 5 years. The calculation formula on page

257 and the tables on pages 264-265 - with values  $\phi = 0.55$  (calculated as shown on page 263) and  $i = 2.5 \%$  in the table for  $T_r = 5$  years - make it possible to find that:

$$F = 0,1038$$

$$P = 0,8082$$

Consequently, unitary runoff capacity will be:

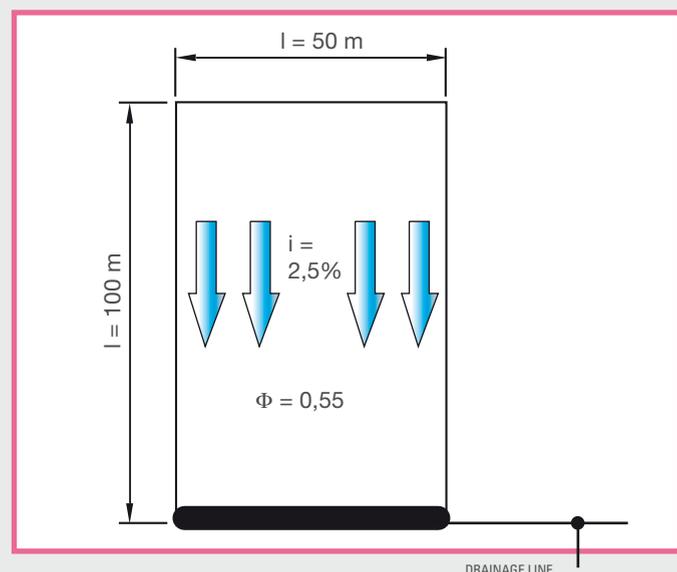
$$q = 0,1038 \cdot 100^{0,8082} = 4,29 \text{ (m}^3\text{/h)} = 1,19 \text{ litres/sec}$$

To determine the total capacity to be drained, just multiply value "q" by the width of the surface. Therefore:

$$Q = q \times l = 1,19 \text{ (l/sec} \times \text{m)} \times 50 \text{ (m)} = \mathbf{59.5 \text{ l/sec}}$$

The water shall be collected through channels perpendicular to the drainage direction and installed along the whole length of the parking area (l) upstream, as determined at the beginning.

Assuming that the line is installed very close to the boundary wall, we recommend using a MufleDrain channel mod. VIP<sub>20</sub> 150/160 with its ductile iron drainage grating mod. VIP<sub>20</sub> 150 class B125 with a square mesh. This choice is due to the low inclination of the ground (there is no risk of water growing too fast and bypassing the grating), to the fact that the gratings will not be driven over (installation very close to the wall) and to the fact that it is a self-locking parking area. The choice of a square mesh matches the aesthetical appearance of the environment. As there are no height constraints, the higher grating should be used in order to have more storage capacity and consequently more safety. For further details on the choice of the grating, please see the following page. Have collected the rainwater, you need to open up a proper number of drain outlets to be connected to each other by means of a PVC round-section pipe connected to the sewer system. In this example, the preinstalled drain outlets on the side of the channel with diameter 110 mm can be opened up. By giving the pipe an inclination of 1% you are able to dispose of about 9.9 l/sec per drain outlet. So 6 of them should be opened up: 1 every 83 metres approximately. In practical terms, we recommend opening up 8 drain outlets (1 every 6 metres approximately) in order to consider any load losses, clogging and other risk factors.



DRAINAGE LINE

## Calculating drainage capacity of gratings and drainage into the sewer system

Having determined the volume of water to be drained (as shown in the example on page 309), it is essential to select the type of grating from those available for the MufleDrain System channel that is capable of meeting the load and drainage characteristics required. The first test to be carried out on the gratings is resistance to the load required. An extract from Standard EN 1433 about the load class to be used in all situations of pedestrian and vehicular traffic is shown on page 13 of MufleDrain's Catalogue. Having identified the type and load class to be used, select the channel to be installed according to absorption capacity per ml as shown in the table below, taking into account possible obstacles such as leaves and residues. MufleDrain channels are available in 4 inner widths: 100, 150, 200, 300 mm. In special cases such as having to drain large flow rates in short stretches or with fast flowing water on the grating, two parallel drainage lines (recommended distance 50-100 cm) should be installed instead of a single wider line.

CHARACTERISTICS OF GRATINGS		ABSORPTION OF GRATING BASED ON CHANNEL WIDTH			
Type of grating	Class of load	154	204	254	
		(litres per second per linear metre)			
Run grating 	A15	3,4	4,0	4,6	
Mesh grating 	B125 C250	9,0	13,0	17,0	
Ductile ductile iron grating 	C250 D400 E600 F900	4,5	7,3	10,0	
HD-PE grating 	Walkable-Driveable	7,5	10,5	13,5	

NOTE: This table only lists some gratings from the MufleDrain range as an example. For further information please contact our Technical Department (address: tecnico@mufle.com).

## Flow capacity of PVC round pipes

Before installing the channel selected you need to determine the sizes of the drain outlets to be connected to the drainage line for the sewer system. The flow rates of round PVC pipes normally used in the building industry are shown below. Although the flow rate changes according to the inclination, to avoid load losses and the presence of any residues either drain outlets with a large diameter or several outlets should be used. The MufleDrain channel is equipped with a series of pre-installed drain outlets that speed up connection.

Incline	Ø Pipe				
	100	110	125	160	200
	(litre for second)				
0,5 %	5,0	6,5	9,8	15,9	34,3
1,0 %	7,6	9,9	13,9	22,5	48,5
1,5 %	9,2	11,0	17,0	27,5	59,4
2,0 %	10,7	12,1	19,6	31,7	68,6
3,0 %	13,1	15,8	24,0	38,9	84,1
5,0 %	16,9	20,3	31,0	50,2	108,5
10,0 %	23,9	28,7	43,8	71,1	153,4



NOTE: The table of drain outlets that can be applied to channels and boxes is available in the Catalogue.

## Introduction

MufleSystem gives instructions on how to install its channels in compliance with Standard EN 1433 for type-M channels. Dimensions H and S of the installation bed and props are specified together with the concrete class to be used, the details on the reinforcement framework (if any) and advice on proper installation. This information is shown in the Catalogue for each product family.

## Underlying layer and propping

The underlying layer has the function of absorbing and distributing the stresses from the surface without giving way - this would jeopardise the functionality of the water channelling system (fig. 1). For this reason it must be suitably prepared and tamped in order to achieve a bearing capacity suitable to the load classes specified.

Owing to the loads applied the pavings (road, industrial or airport pavings) are subjected to compression and bending traction stresses. They may also break due to fatigue owing to the effects brought about by the cyclical action of the loads (repeated passage of vehicles).

(FIG. 1) • MUFLE DRAIN INSTALLATION UNDERLYING LAYER

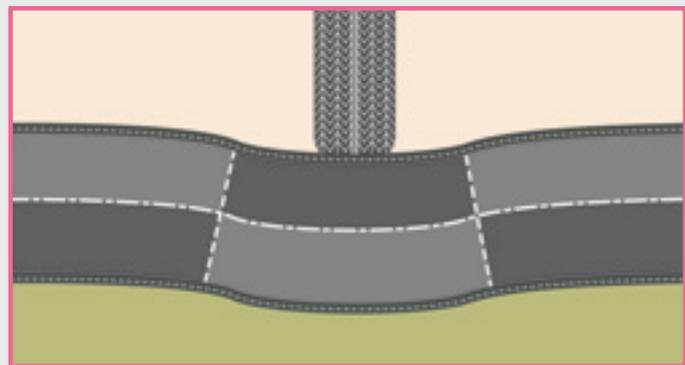


## Concrete

### COMPRESSION STRENGTH $R_{ck}$

The concrete used for the channels' installation bed and props needs to be resistant enough to withstand the above-mentioned stresses due to the paving (fig. 2). Although concrete has high compression strength [ $R_{ck}$ ], it has poor resistance to bending traction [ $F^{ctm}$ ] (around 10% of  $R_{ck}$ ): as this is directly proportional to  $R_{ck}$ , high compression-strength concrete should be used to oppose tensile stresses. When tensile stresses are very high (load classes E 600, F 900) a lightweight reinforcement framework should be used (electrowelded mesh or  $\varnothing 8$  rods with spacing 15 cm).

(FIG. 2) • STRESSES INDUCED IN THE PAVING



A = STRETCHED ZONE  
B = COMPRESSED ZONE

## CONSISTENCY CLASS

The special geometry of the external side surfaces of the channels, made up of anti-torsion ribs and pre-arranged drains (for improved adhesion between concrete and polyethylene), the presence of a reinforcement framework (if any), and the little thickness of the installation layer and props make installation quite difficult.

\*(FIG. 3) • FENOMENI DI SEGREGAZIONE



For this reason we recommend using a type of concrete that, when fresh, has high fluidity without causing segregation phenomena in the components (fig. 3).

Thanks to these characteristics the concrete is able to move easily inside the formwork as far as the least accessible areas. It is important to be able to achieve the right compactness in the concrete and to fill the slits completely and with no difficulty, i.e. by means of ordinary vibration means used on all building sites. It is advisable therefore to use concrete with a class of consistency S4 (fluid) or better even S5 (superfluid) (UNI 9858, Ministry Guideline of LL.PP.) measured with Abrams' cone method (UNI 9418).

Consistency Class S5 is necessary where, for very heavy loads, reinforcement framework is provided for in the concrete used for installation.

## MAXIMUM DIAMETER $D_{max}$ OF STONE AGGREGATE

The special geometry also requires a suitable maximum dimension or Maximum Diameter  $D_{max}$  in the stone aggregate.

\*(FIG. 4) • MAXIMUM DIAMETER  $D_{MAX}$



To let the concrete reach the least accessible areas we recommend

using stone aggregate with Maximum Diameter  $D_{max}$  of 15 mm (fig.4).

Fluidity of concrete		
Consistency Classes	Cone slump (mm)	Name
S1	10 ÷ 40	Damp
S2	50 ÷ 90	Plastic
S3	100 ÷ 150	Semifluid
S4	160 ÷ 210	Fluid
S5	>210	Superfluid

## WATERPROOFNESS

Concrete is basically made up of a mixture of cement paste and stone aggregate. Each material has internal micro and macro cavities. Therefore it would not be correct to consider concrete a waterproof material in the real sense of the term. Standard UNI 9858 defines waterproofness as resistance against penetration of water (UNI 7699). According to this Standard a mixture is suitable to make waterproof concrete when the result of water penetration gives a maximum value smaller than 50 mm and average values smaller than 20 mm. Furthermore the water/cement ratio must not exceed 0,55.

Please note that Standard UNI 7699, mentioned in UNI 9858, only specifies water permeability; it does not provide for the measurement of waterproofness of water under pressure. If this measurement is needed reference to ISO 7031 or DIN 1048 should be made. Following these rules, concrete which is almost waterproof will show (28 days after being laid) the following waterproofness value:

$$\text{Darcy coefficient} \rightarrow k=1 \cdot 10^{-11} \text{ [m/s]}$$

i.e. it should have maximum waterproofness of 20 mm under maximum pressure 7 bars.

In practical terms, if waterproof concrete is needed, it is necessary to reduce the number and sizes of the internal cavities, as well as their connections especially with the external environment. This can be achieved with:

- low w/c ratio ( 0.4 - 0.5 recommended);
- adequate dose of cement (300 - 400 kg/m<sup>3</sup>);
- good fluidity and resistance to segregation so as to achieve adequate compacting of the cement;
  - accurate drying and protection of the casting.

WATERPROOFNESS OF CONCRETE		
Ratio a/c	Penetration of the water	Average penetration of the water
< 0,55	<50 mm	< 20 mm

## DURABILITY

The useful life of a drainage system also depends on the durability of the concrete in which it is set.

Durability of a concrete structure means the ability to last over time while ensuring the function for which it was designed.

Contrary to what is often thought, concrete is not an indestructible material but one that deteriorates more or less quickly over time. For this reason you will need to analyse the deterioration phenomena and how they become apparent in order to increase the durability of concrete.

There are two main degenerative causes affecting concrete durability:

- The aggression due to substances present in the surrounding environment;
- The permeability of the mixture.

The causes of aggression and deterioration due to the external environment are subdivided as follows:

- Chemical
- Physical
- Mechanical

Generally such actions do not occur individually, but there are several causes that contribute to the deterioration of the material, even though it is always possible to detect the main cause that triggered the whole process.

Deterioration shows more or less strongly and quickly according to the permeability or porosity of concrete: a very porous material lets the aggressive agents reach the innermost tissue thus starting and spreading the degradation process much more easily and quickly.

CAUSES OF AGGRESSION		
Chemical	Physical	Mechanical
Sulphatic attack	Ice-Thawing	Shocks
Carbon dioxide action	Hydrometric variations	Erosion
Chloride action	Hydration heat	Abrasion
Alkali action	Fire	
Industrial chemical agent action		

This clearly shows how essential it is to make virtually waterproof cement conglomerate that is able to oppose the penetration of aggressive agents. To this end, we recommend carefully assessing which actions of deterioration will take place during the usage period and using concrete that is able to oppose such actions. Special attention should be paid to the mixing, laying and drying processes.

The standards of reference are as follows: UNI 9858 "Concrete. Performance, production, laying and principles of conformity", UNI 8981 "Durability of concrete construction and handwork", Ministry Guideline of LL. PP., UNI EN 206-1 "Concrete. Specification, performance, production and conformity". Some schematic information on the most frequent degenerative processes is outlined below together with how to oppose them.

## DRAINAGE SYSTEMS TO BE USED IN THE ADRIATIC COASTAL AREA: SENSITIVITY TO ALKALI

It has been seen that in the stone aggregate of the Adriatic coast there can be particular types of amorphous silica, opal and chalcedony which can react with the alkali in the cement thus giving rise to disruptive phenomena that take place through a network of cracks and small surface craters (pop-out) even over quite a long time.

Phenomena of this type can get under way in industrial pavings or along roads where de-icing salt is used. Possible solutions to prevent deterioration are as follows:

- To use stone aggregate not sensitive to alkali (Standard UNI 8520/22)
- Use of pozzolanic or blast furnace cement.



## DRAINAGE SYSTEMS TO USE IN VERY COLD CLIMATES: FROST AND THAW CYCLES

The alternate action of frost and thaw cycles can bring about disruptive phenomena caused by the penetration of water into the concrete pores. When the water freezes, its volume increases thus generating internal pressure that can cause cracks and crumbling. In order to prevent this type of degeneration:

- Use an aerating additive that develops air as microbubbles able to mitigate freezing stresses;
- Use frost-proof stone aggregate (Standard UNI 8520/20);
- Reduce concrete porosity.

## DRAINAGE SYSTEMS TO BE USED WHERE SULPHATES ARE PRESENT

Sulphates - found in the water and in the ground - can react with the concrete mixture thus giving rise to swelling and expansion phenomena that can cause the progressive disruption of concrete even after some time.

In such cases, once the presence of sulphates has been ascertained, we recommend:

- Using sulphate-resistant cement;
- Using the least permeable concrete possible.

### RESISTANCE TO FATIGUE

The plastic channel buried in a suitably made cement body can suffer breakage caused by concrete fatigue as a result of the repetitive action of the loads over time. The reasons behind this kind of fracture can be outlined as follows:

- The possible presence of microcracks, defects and cavities mainly located in the cement paste-stone aggregate interface makes the cement matrix weaker due to internal bleeding and the accumulation of calcium hydroxide crystals. Such microcracks can be emphasised by shrinkage and thermal changes (frost and thaw);
- The application of cyclic stresses higher than 50-60% of static-induced breaking stress causes the microcracks in the structure to expand and branch off;
- The increase in microcracks brings about the collapse by fatigue of the concrete matrix and consequently of the channel.

According to the above, we can say that the breaking of concrete due to fatigue occurs only when induced stress exceeds a certain value defined as Fatigue Limit.

If the material is subjected to compression stresses, this limit is equal to 60% of the resistance. It is 50% if breaking by fatigue is caused by bending tensile stresses.

Clearly enough, it is hardly ever possible to determine with sufficient accuracy the number of load cycles (vehicle passages etc.) before the collapse.

The problem can be solved by adopting a security factor  $S$  equal to 2. In this way, as the maximum tensile stresses affecting the concrete are equal to the Fatigue Limit (50% of resistance), breaking by fatigue cannot occur over an infinite number of passages

Apart from the number of passages, as a rough estimate during the design stage, a security factor ranging between 1,4 and 2,0 according to the type of load can be assumed.

### NOTE

Please see the Sheet at the end of each Chapter about the specific installation of the different product lines.





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