ASTRAL SILENCIO™
High Density Low Noise System

ASTRAL® PIPES

FLUSH SHHH!!

DRAINAGE ON SILENT MODE

GERMAN TECHNOLOGY MADE IN INDIA

The Complete Low Noise System

<10DB@2lps

NOTES

INDEX

ASTRAL INDIA'S PROGRESSIVE PIPE COMPANY

ASTRAL INDIA'S PROGRESSIVE PIPE COMPANY

Astral Poly Technik Limited was established in 1996 with the aim to manufacture pro-India plumbing and drainage systems for the Indian market. While serving the plumbing needs of millions of houses, the company adds extra mileage to India's developing real estate fraternity. Our contribution to the plumbing industry in the form of being pro-innovative bears the hallmark of unbeaten quality. Astral Poly Technik Limited is equipped with production facilities at Santej & Dholka (Gujarat), and Hosur (Tamil Nadu) to manufacture Plumbing systems, Drainage systems, Agriculture and Electrical Conduit Pipes with all kinds of necessary fittings.

We are also known as pro- customers' company as we serve with an intention of taking excellence to new heights. Through our quality products and services we have also achieved the benchmark of being Pro-India Company in numerous ways.

PRO-EXPERTISE

We are the pioneers of CPVC pipes in India. With over 17 years of expertise in this area, we have led the development of what is now the world's largest market for CPVC pipe and fittings.

PRO-LEADERSHIP

We are one of the leading company in the plumbing industry with a turnover close to $ 263.37 million; with a network spanning 800 distributors and 25,000 dealers across India.

PRO-TRUST

Our most important commitment is to our customer.

PRO-FUTURE

Beyond manufacturing, we have invested in the industry by training more than 70,000 plumbers every year in India. We believe this training equips them in making their future sustainable.

PRO-ACHIEVEMENT

We are the first Indian piping company to introduce triple layer low noise drainage system.

PRO-LEARNING

We have full-fledged Research and Development division to constantly improve, innovate and to engineer new developments. This division has a fully integrated product development environment that encompasses the development process all the way from conceptual design of products to manufacturing.

PRO-EXCELLENCE

We constantly strive to upgrade processes and materials and to incorporate international developments in the plumbing industry to benefit their customers.

PRO-EMPOWERMENT

The best quality piping materials may cause problems if the installations are not carried out correctly. Therefore, we empower our users with updated product catalogues, technical manuals, installation literatures, audio- visual presentations and plumbing guides.

PRO-INNOVATION

We always think of our customer when working on innovative products and we make conscious effort to supply them with the best. We seek to deliver innovative product designs and improvements, new technologies and a fully integrated manufacturing system that assure quality.

PRO-EXPLORERS

We have acquired UK based Bond IT and India based Resinova Chemie Ltd. in efforts to expand our business visions into other categories. With a plan to establish a strong presence in this category, we have deployed cutting edge technology and a talented work force.

Therefore, at Astral we are proud to support the pro-India spirit. So, be a part of this initiative by putting your trust in us.

INNOVATIONS & RECOGNITIONS

- First to introduce CPVC piping system in India (1999)
- First to launch lead free uPVC piping system in India (2004)
- Corp Excel- National SME Excellence Award (2006)
- First to get NSF Certification for CPVC piping system in India (2007)
- First to launch lead free uPVC column pipes in India (2012)
- Enterprising Entrepreneur of the year Award 2012-13
- Business Standard Star SME of the year Award (2013)
- Inc. India Innovative 100 for Smart Innovation under category of "Technology" (2013)
- India's Most Promising Brand Award (2014)
- Value Creator Award during the first ever Fortune India Next 500 (2015)
- India's Most Trusted Brand Award (2015)
- India's Most Trusted Pipe Brand Award (2016)
- ET Inspiring Business Leaders of India Award (2016)
- India's Most Attrective Pipe Brand Award (2016)
- Fortune India 500 Company (2016)

BUSINESS PARTNERS

SEKISUI

Sekisui Inc. was established in 1947 in order to run general plastic business in Japan. In 1948 changed the company name to Sekisui Chemical Co. Ltd. Sekisui began producing CPVC some 40 years ago in 1974. Its CPVC is high-quality, stable product achieved as a result of the sophisticated technologies and quality controls that Sekisui has accumulated over that long history.

SPEARS®

SPEARS® broad product line offers a complete selection of 1/8" through 12" injection molded fittings and fabricated fittings through 48", many specialty products, and a full complement of manual and mechanically actuated thermoplastic valves in a variety of types, sizes, and configurations.

IPS

IPS Corporation is a leading manufacturer of plumbing and roofing products, solvent cements, and adhesives for residential, commercial, and industrial use.

SUBSIDIARIES

RESINOVA an ASTRAL company

Manufacturing wide range of adhesives and sealants for maintenance and repair applications, product range includes specialized construction chemicals.

bond it - UK an ASTRAL company

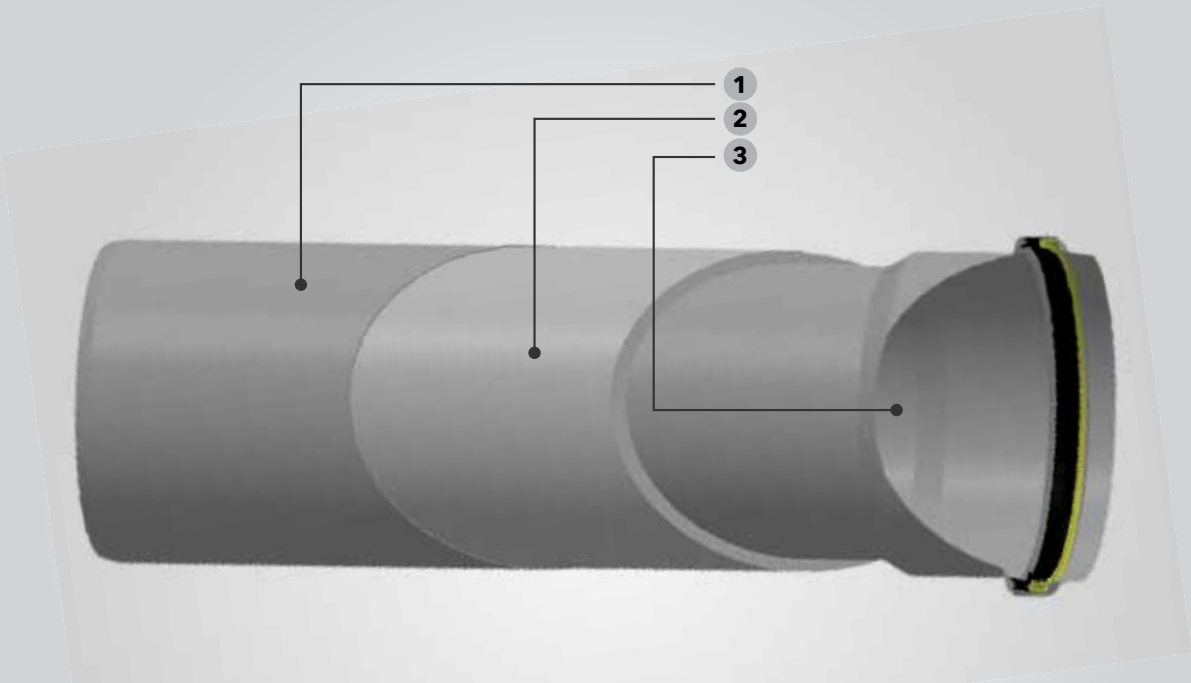
Manufacturer sealants, adhesives, building chemicals, waterproofing products, roofing compounds, polyurethanes, adhesive tapes and ceramic tile adhesives.

bond it - USA an ASTRAL company

Seal IT Services Limited, a UK based subsidiary of the Astral Poly Technik Ltd. has entered into U.S. market by acquiring silicone tape business of Rowe Industries Inc., USA.

ASTRAL SILENCIO – THE COMPLETE LOW NOISE SYSTEM

The unique ASTRAL low noise system is a top quality product made of mineral-reinforced polypropylene. This base material provides excellent mechanical and acoustic properties to Astral SILENCIO. The system is made with high molecular structure, which enables absorption of airborne sound as well as structure borne sound. Astral SILENCIO is suitable for hot and cold waste water and also full fill all requirements for non-pressurized waste water piping as laid down in DIN EN 12056 and DIN 1986-100. The sound-insulating drainage system ASTRAL SILENCIO is suitable for gravity drainage system. The pipe dimensions in accordance with pipes and fittings of the same nominal diameter without the need for special transition/adaptor pieces. Astral SILENCIO can be installed in a fraction of time to connect CI pipe. ASTRAL SILENCIO is having Push-fit socket joint. Universal compatibility with the PVCu, PP, PE & other piping system without special adapters. The outstanding features of ASTRAL SILENCIO is our 3 layer construction and adaption of each individual layer to its respective requirement.



1

External Layer - PP
The tough protective shell of the pipe. Sturdy and highly impact resistant.

2

Middle Layer - Mineral Reinforced PP :
Mineral-reinforced plastic, provides very high stability and establishes a superior noise insulating effect.

3

Internal Layer - PP
Provides a superior flow performance with its smooth structure. It is resistant against high water temperatures.

THE RAW MATERIAL

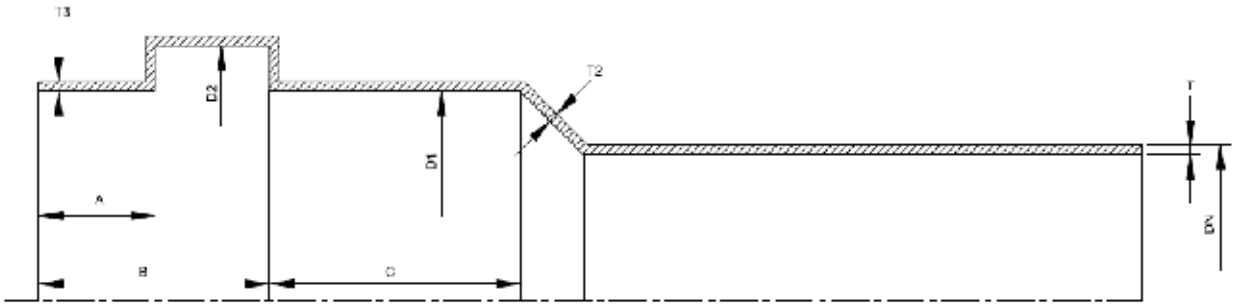
- Astral SILENCIO polypropylene mineral resin compound has been carefully designed to provide both excellent acoustic and mechanical properties.
- Astral SILENCIO is having molecular density 1.9 gm/cm3 which is the highest in the industry which significantly improves the sound dampening properties of waste water drainage system.
- Our compound offers superior ring stiffness and impact resistance which are essential for a drainage and sewage piping system.
- Apart from unique properties Astral SILENCIO is durable, corrosion-resistant and able to withstand the chemical attack of all kinds of aggressive waste waters.
- The smooth surface characteristics of Astral SILENCIO prevent scaling and incrustation.

ASTRAL SILENCIO
TECHNICAL SPECIFICATIONS

ASTRAL SILENCIO is a complete, low noise, SWR system produced from mineral reinforced polypropylene with a high molecular density of 1.9m. With SILENCIO's ability to handle both hot water and chemicals we offer both flexibility and reliability. ASTRAL SILENCIO can be installed in a fraction of the time it takes to connect cast iron pipe. With our innovative push-fit gasket ASTRAL SILENCIO fulfills all the requirements for non-pressured waste water piping in DIN EN 12056 and DIN 1986-100. Color - Light Grey RAL 7035

TECHNICAL SPECIFICATIONS		
PROPERTY	UNIT	VALUzE
Material	mineral-reinforced polypropylene	
Colour	Light grey	
Area of application	Drainage pipes in building and above ground installation	
Densitzy	g/cm3	1.9
Elongation@break	%	30
Tensile strength	N/mm2	16.8
Modulus of elasticity	N/mm2	3800
Coefficient of linear expansion	Mm/mk	0.09
Ring stiffness	KN/ M2	21
Fire resistancy		DIN 4102 EN 13501-1:D - s2,d1 B2 normal inflammability
MFR	gm / 10 mini	2.1
Application Environment	Waste water with ph 2-12	
Operating Temparature	Water Temp. upto 95 °C (Intermittent) or 90 °C (continuous)	
Pipe marking	Astral SILENCIO, nominal diameter, production year, quality mark, approval, material, control mark, fire classification.	
Life Expectancy	50 years	

PIPE DIMENSIONS			
NOMINAL OUTSIDE DIAMETER DN	MEAN OUTSIDE DIAMETER		WALL THICKNESS (MM)
	MIN	MAX	
50	50.0	50.3	4.0
75	75.0	75.3	4.5
110	110.0	110.4	5.3
160	160.0	160.5	5.3
200	200.0	200.6	6.2



NOMINAL OUTSIDE DIAMETER DN (MM)	WALL THICKNESS T (MM)	WALL THICKNESS T2 (MM)	WALL THICKNESS T3 (MM)	INSIDE DIAMETER OF SOC. D1	INSIDE DIAMETER OF BENDING D2	NECK OF SOC. A	LENGTH OF BENDING AND NECK B	LENGTH BEYOND BENDING C
50	4.0	4.0	3.4	50.5 + 0.8	59.6 + 1.0	12.0	20.0	30.5
75	4.5	4.5	3.8	75.5 + 0.8	84.5 + 1.0	11.0	20.0	33.0
110	5.3	5.3	4.5	110.5 + 0.8	120.3 + 1.0	13.0	23.0	35.5
160	5.3	5.3	4.5	160.8 + 1.0	173.8 + 1.2	11.0	24.5	43.5
200	6.2	6.2	5.2	200.8 + 1.0	214.0 + 1.4	12.5	27.0	51.0

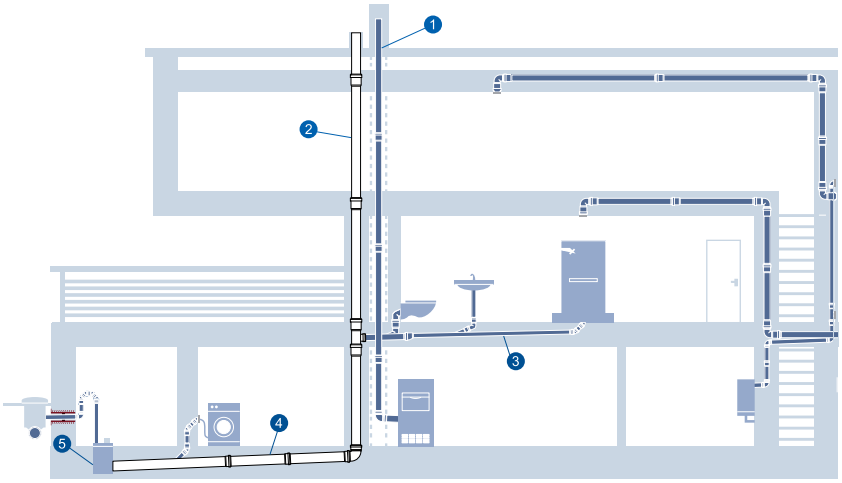
SEALING

The elastomeric seal is made from TPE rubber in conformity with DIN EN 10 204:2004.

FIELDS OF APPLICATION

The pipes, fittings and seals can be operated continuously at 90°C (and up to 95°C for brief periods). They are suitable for the drainage of chemically aggressive waste water with a pH value of 2 (acidic) to 12 (basic). The pipe connections are leak-proof up to an internal excess water pressure of 1 bar (10 m water column).

The system is designed for residential and commercial soil and waste water installations in (multiple storey) buildings and can be installed as:



1. **Rain Stack Pipe**
2. **Soil Pipe**
3. **Waste Drain Pipe**
4. **Underground Pipe to Inspection Chamber**
5. **Inspection Chamber**

BELOW GROUND APPLICATION

Astral SILENCIO can also be used underground as far as the main sewer connecting point. Supported by the DIN EN 12056 and DIN 1986-100 waste water norms, it is possible to install a complete and secure waste water removal system right up to the main drain cleaning access point or the main sewage connecting point.

RESIDENTIAL AND NON-RESIDENTIAL

Owing to its excellent sound-absorbing properties, Astral SILENCIO is widely used wherever noise protection to DIN 4109 is specified, i.e. in:

• Hospitals • Hotels • Schools • Libraries • Office buildings • Highrise apartment

The noise is not only generated by external, but also by internal sources in the building. Astral SILENCIO sound-insulating pipe systems are designed to ensure a comfortable environment. The maximum detectable flow noise is less than the noise generated by the walking on the floor with shoes.

COMMERCIAL KITCHENS AND ABATTOIRS

Astral SILENCIO is suitable for the removal and drainage of fat-containing waste water from commercial kitchens and abat¬toirs. Scaling and incrustation are unable to form, due to the smoothness of the pipe surfaces.

FOG (fat, oil, grease) containing waste water is transported by means of collecting pipes and below-ground piping located far from grease-trap facilities, auxiliary heating is recommended to keep the fat liquid. The temperature must not be permanently higher than 70°C.

FOOD-PROCESSING AND CHEMICAL INDUSTRIES

Astral SILENCIO pipes and fittings are resistant to media containing lactic acid (at concentrations up to 90%) at liquid temperatures up to on 60°C.

UNIQUE FEATURES

1 **DOOR FITTINGS :** Provided additional inner door cap along with threaded door cap to maintain flow without blockage.

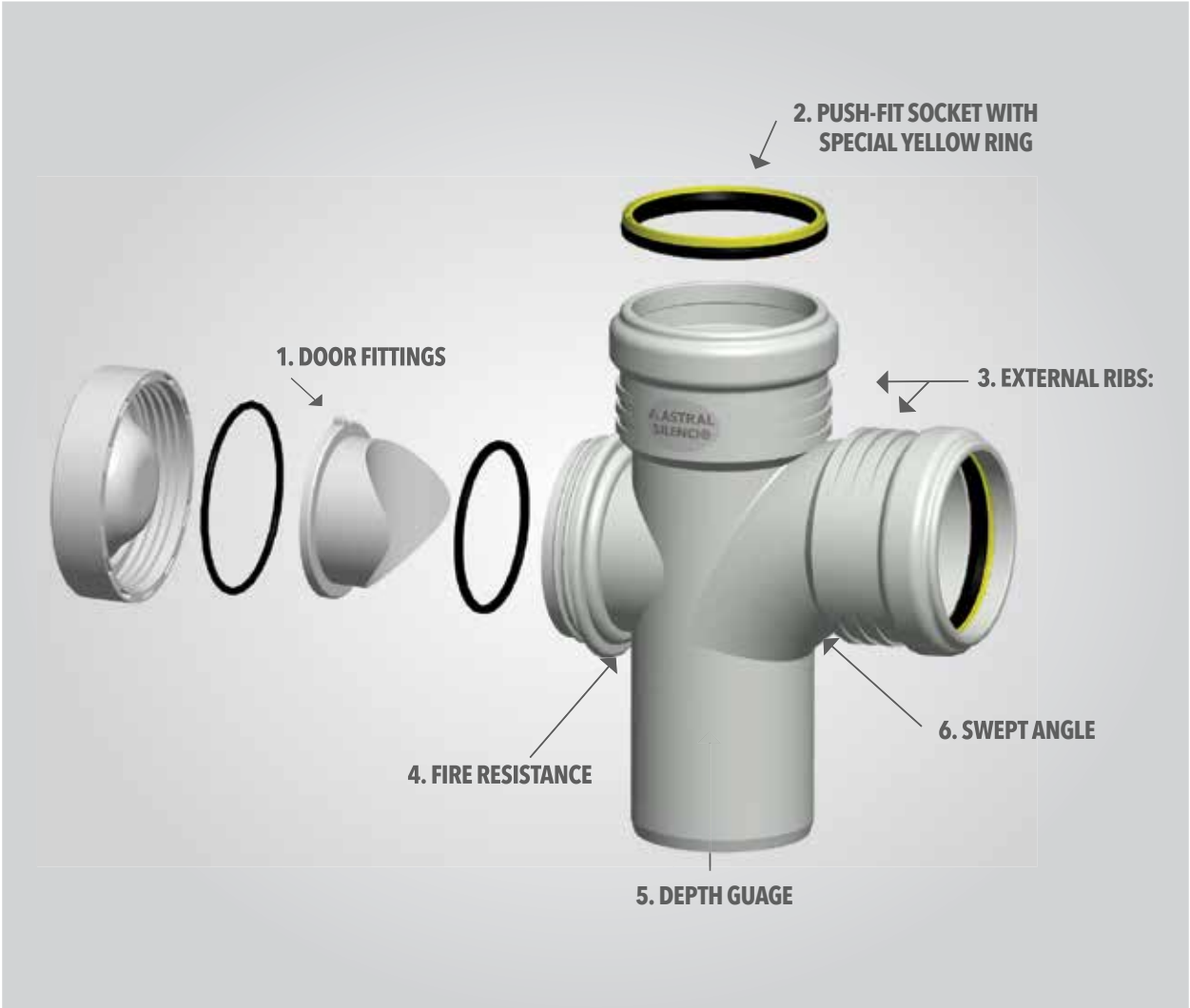
2 **PUSH-FIT SOCKET WITH SPECIAL YELLOW RING :** The Push-Fit socket is fitted with a yellow ring made with German Technology that guarantees hydraulic tightness and free movement of the pipe caused by expansion/contraction.

3 **EXTERNAL RIBS:** Produced on the outer side of the socket, ribs provide extra strength.

4 **FIRE RESISTANCE :** As per class B1. Higher class resistance compared to traditional piping system.

5 **DEPTH GUAGE :** Stopper provided at spigot area to indicate right depth fitment with thermal expansion for prevent pipe bending.

6 **SWEPT ANGLE :** Designed with swept angle for better flow and less chance of blockage.



ADVANTAGES

OUTSTANDING NOISE-INSULATION VALUES

Excellent soundproofing performance measured in the Fraunhofer laboratory compliance with EN 14366, equal to <10dB with a flow rate of 2 l/s

EASY INSTALLATION

Without the use of any special tools and the push fit joining method installation of ASTRAL SILENCIO is simple, quick and efficient. No solvent cement needed.

HIGH IMPACT RESISTANCE, EXTREMLY TOUGH

ASTRAL SILENCIO products show high impact resistance at extremely harsh temperature as low as -20°C

AS STRONG AS METAL

It is a very good alternative to cast and ductile iron.

CHEMICAL RESISTANCE

ASTRAL SILENCIO can handle the waste liquid with pH value from 2 to 12. It has a high resistance to the most common chemical substances and its material naturally prevents the accumulation of deposits inside the pipe.

RESISTANCE TO HOT WATER LIQUID

Hot water resistance (short term: 95° C / long term: 90° C), low linear expansion

SMOOTH INNER SURFACE

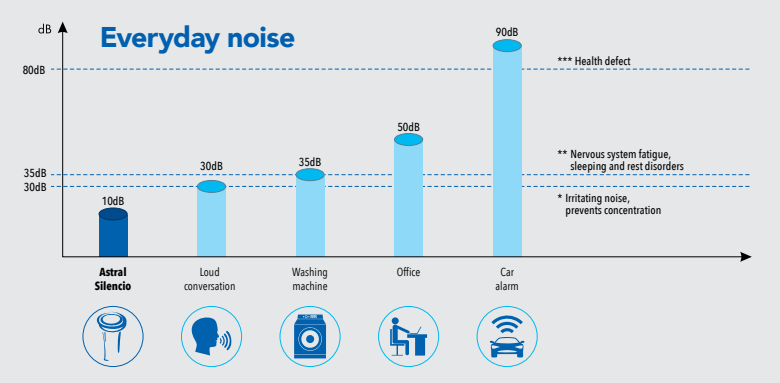
Superior flow characteristics, less chance of blockage.

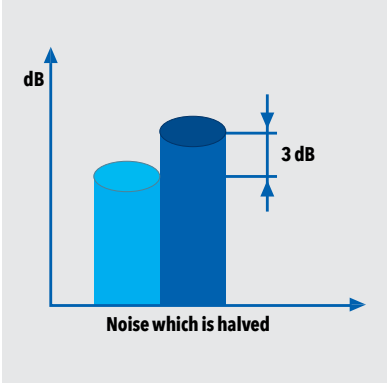
ACOUSTICS

WHAT IS NOISE?

Noise can be described as unwanted sound. In relation to sound, noise is not necessary random.

Comparing everyday noise

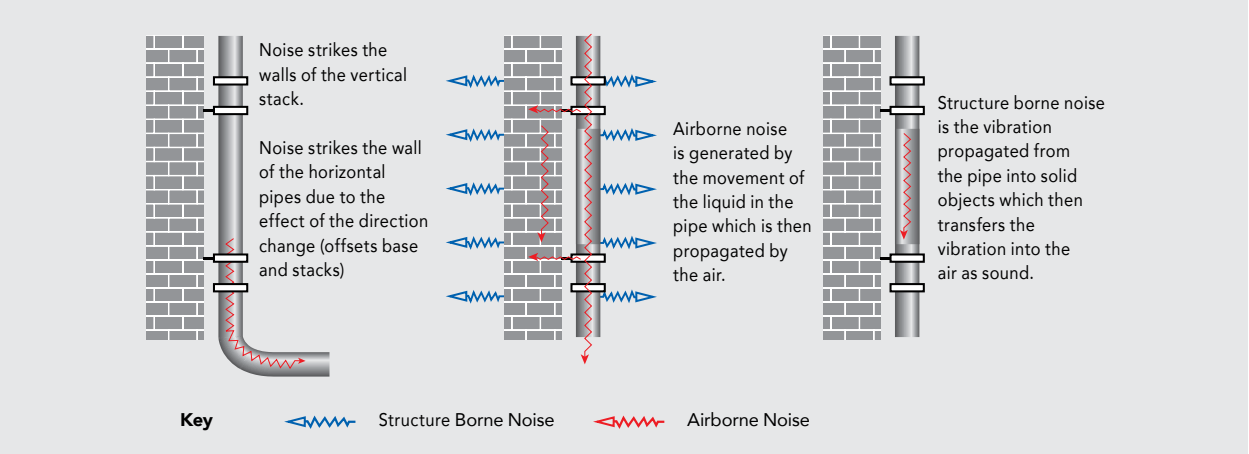




SOUND DEVELOPMENT IN THE WASTE WATER PIPE

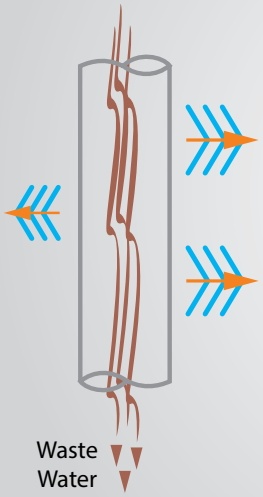
Impact and flow noises are responsible for airborne and structure borne sounds developing at piping wall. The type and intensity of these pipe vibrations depend on a variety of factors, such as the mass of the pipe, the pipe material and its inner damping. The biggest problem with the buildings plumbing drainage is with the transfer of structure borne sound at the point of pipe fixing. When developing a sound-insulating drainage water system, both types of noise distribution must be taken into account.

A differentiation is made between airborne and structure borne noise, depending on the propagation medium



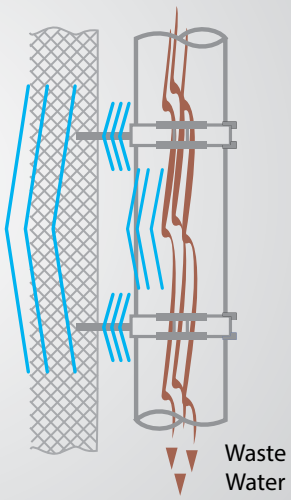
Airborne noise

Airborne noise is present if the noises of a sound source are transferred directly through the air to human ears.



Structure-borne noise

With structure borne noise, the sound transfers through a solid body. This body vibrates and passes the vibration to the human ears as airborne noise.



SOUND-INSULATION REQUIREMENTS

There are currently two important bodies of rules for sound insulation in residential buildings:

- DIN 4109 (Sound insulation in buildings – Requirements and verifications, issued November 1989)

- VDI guideline 4100 (Sound insulation in residential buildings – Criteria for planning and assessment, issued September 1994)

DIN 4109

Building drainage systems are to be planned under observance of DIN 4109. DIN 4109 defines the requirements for rooms in unknown living areas which must be insulated. These include:

- Bedrooms
- Living areas
- Classrooms
- Workspace (offices, treatment rooms, conference rooms etc.)

There are no requirements for your own living area. Max. 30 dB(A) is stipulated for water installations (water supply and sewer pipe systems together). This standard contains requirements for sound insulation with the goal of insulating people in living space from stresses from sound transmission.

A sound-insulation level is required which must be maintained to protect against health risks from sound.

VDI GUIDELINE 4100

VDI guideline 4100 represents more stringent sound-insulation requirements. It defines three sound-insulation levels and differentiates between apartments in multistorey apartment blocks, semi-detached houses and row houses and, in contrast to DIN 4109, also takes your living space into consideration water supply and sewer pipe systems together.

SOUND INSULATION LEVEL	APARTMENTS IN MULTISTOREY APARTMENT BLOCK	APARTMENTS IN SEMIDETACHED HOUSES AND ROW HOUSES	YOUR OWN LIVING AREA
I	30 dB (A) (purs. to DIN 4109)	30 dB (A) (purs. to DIN 4109)	30 dB (A)
II	30 dB (A)	25 dB (A)	30 dB (A)
III	25 dB (A)	20 dB (A)	30 dB (A)

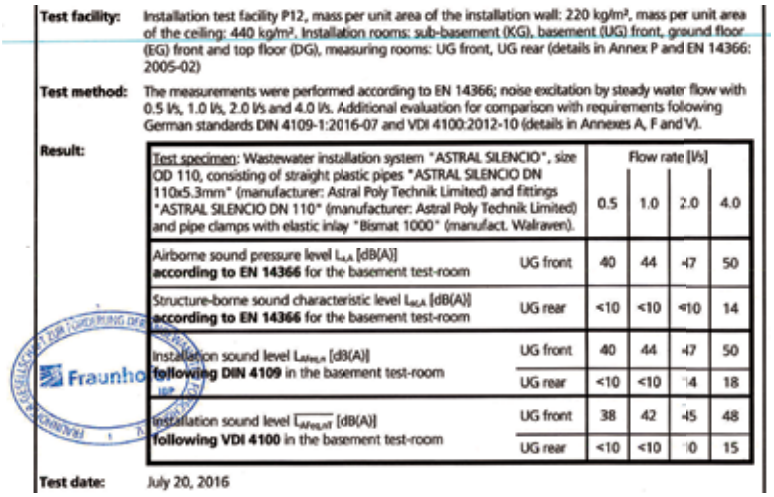
Sound-insulation requirements pursuant to VDI guideline 4100

SOUND INSULATION BY ASTRAL SILENCIO

The excellent sound protection properties of Astral SILENCIO are primarily attributed to its thick-walled design as well as special molecular structure and the high density of 1.9 g/cm3 of the Astral SILENCIO material. This property enables Astral SILENCIO to absorb airborne sound as well as mechanical vibrations.

The measurements in this test were performed following German standard DIN EN14366 and DIN 52 219:1993-07; noise excitation by stationary water flow with 0.5 l/s, 1.0 l/s, 2.0 l/s., 3.0 l/s and 4.0 l/s.

To actually determine real noise emission of the pipe system into a room requires a more dynamic test set up.



Test facility: Installation test facility P12, mass per unit area of the installation wall: 220 kg/m², mass per unit area of the ceiling: 440 kg/m². Installation rooms: sub-basement (KG), basement (UG) front, ground floor (EG) front and top floor (DG), measuring rooms: UG front, UG rear (details in Annex P and EN 14366: 2005-02)

Test method: The measurements were performed according to EN 14366; noise excitation by steady water flow with 0.5 l/s, 1.0 l/s, 2.0 l/s and 4.0 l/s. Additional evaluation for comparison with requirements following German standards DIN 4109-1:2016-07 and VDI 4100:2012-10 (details in Annexes A, F and V).

Result:

Test specimen: Wastewater installation system "ASTRAL SILENCIO", size OD 110, consisting of straight plastic pipes "ASTRAL SILENCIO DN 110x5.3mm" (manufacturer: Astral Poly Technik Limited) and fittings "ASTRAL SILENCIO DN 110" (manufacturer: Astral Poly Technik Limited) and pipe clamps with elastic inlay "Bismat 1000" (manufact. Walraven).

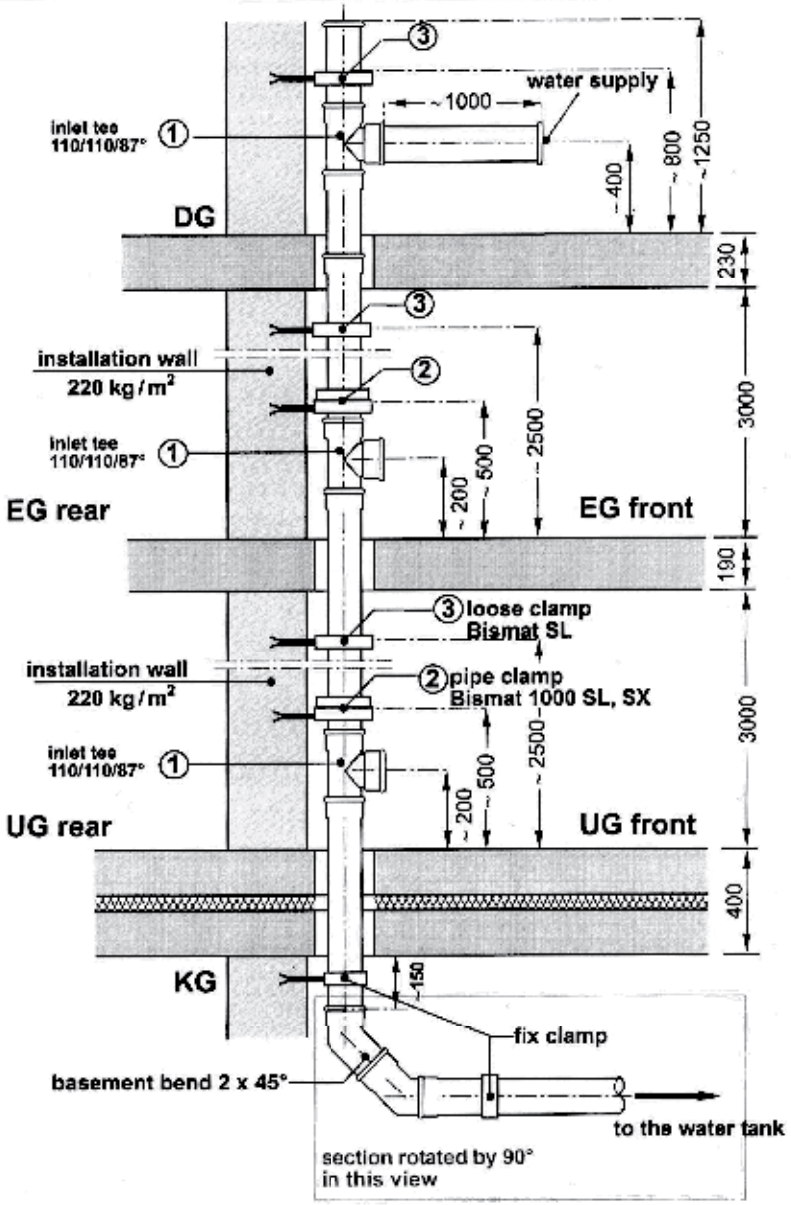
		Flow rate [l/s]			
		0.5	1.0	2.0	4.0
Airborne sound pressure level L_{AF} [dB(A)] **according to EN 14366** for the basement test-room	UG front	40	44	47	50
Structure-borne sound characteristic level $L_{eq,A}$ [dB(A)] **according to EN 14366** for the basement test-room	UG rear	<10	<10	<10	14
Installation sound level $L_{AFeq,n}$ [dB(A)] **following DIN 4109** in the basement test-room	UG front	40	44	47	50
	UG rear	<10	<10	14	18
Installation sound level $\overline{L_{AFeq,nT}}$ [dB(A)] **following VDI 4100** in the basement test-room	UG front	38	42	45	48
	UG rear	<10	<10	10	15

Test date: July 20, 2016

TEST RESULTS

Detailed results
Client: Astral Poly Technik Limited, Ahmedabad-380059, India

P-BA 161/2016e
figure 4



Installation plan of the test set-up in the test facility.

Test specimen: Wastewater installation system "ASTRAL SILENCIO", size OD 110, consisting of straight plastic pipes "ASTRAL SILENCIO DN 110x5.3mm" (manufacturer: Astral Poly Technik Limited) and fittings "ASTRAL SILENCIO DN 110" (manufacturer: Astral Poly Technik Limited) and pipe clamps with elastic inlay "Bismat 1000" (manufacturer: Walraven).

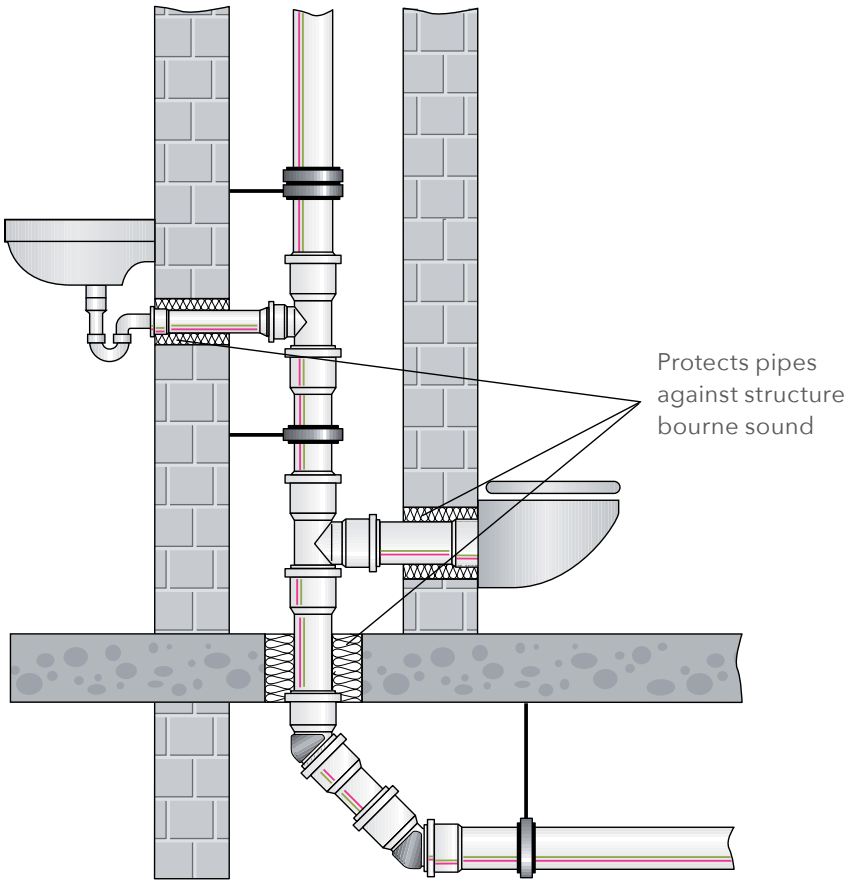
Fraunhofer IBP

The test was carried out in a laboratory, accredited according to DIN EN ISO/IEC 17025:2005 by DAkkS. The accreditation certificate is D-PL-11140-11-01.

ACOUSTIC PLUMBING DESIGN

Astral SILENCIO while installing high-performance sound-insulating waste water piping systems it is still necessary to consider how effectively the system can be sound-isolated. This applies to the waste water discharge system as a whole, including its points of contact with the building structure (pipe brackets and clamps, the running of pipework through walls and ceilings, mortar droppings bet¬ween pipes and wall surfaces, etc.)

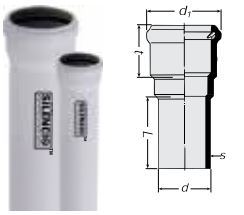
When planning pipe installation, waste water discharge pipes should not be allowed to run inside the walls separating living areas. The attachment of waste water discharge pipes to partition walls in living areas should only be carried out under application of special noise protection measures. DIN 4109 requires that single-skin walls to which, or in which, water installations or equipment (i.e. waste water pipes) are to be attached must have an area-related mass of at least 220 kg/ sq.m. Walls having an area-related mass of less than 220 kg/ sq.m may only be used where prior testing has demonstrated that the walls exhibit acceptable properties with respect to the transmission of noise.



PIPES

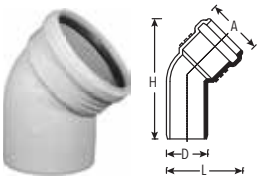
Dim. DN	Article No.	d (mm)	d1 (mm)	s (mm)	t (mm)	L (mm)
50	M241270305	50	68	4.0	51	3000
75	M241270307	75	94	4.5	53	3000
110	M241270309	110	130	5.3	60	3000
160	M241270312	160	184	5.3	68	3000
200*	M241270314	200	227	6.2	78	3000

* Plain End - Trading Item



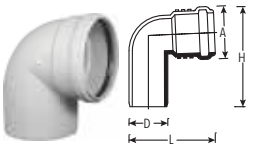
BEND 45°

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
50	M242001105	68	146	91	4.2	56
75	M242001107	94	173	119	5.2	36
110	M242001109	130	209	158	5.5	16
160	M242001112	184	263	214	5.6	10
200	M242001114	227	307	262	6.2	04



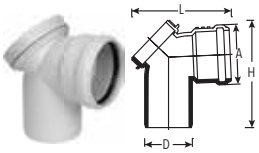
BEND 87.5°

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
50	M242001205	68	129	111	4.2	64
75	M242001207	94	161	136	5.2	33
110	M242001209	130	205	176	5.5	12
160	M242001212	184	273	230	5.6	09
200	M242001214	227	323	283	6.2	03



DOOR BEND 87.5°

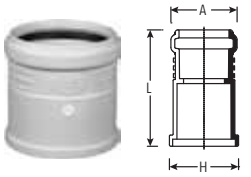
Dim. DN	Article No.	A (mm)	H(mm)	L (mm)	C (mm)	W.T.	Std. Pkt.
75	M242001307	94	168	156	95	5.2	24
110	M242001309	130	213	199	130	5.5	--
160	M242001312	184	273	230	130	5.6	07



COMPENSATOR COUPLER

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
50	M242004105	68	71	119	4.2	70
75	M242004107	94	95	123	5.2	48
110	M242004109	130	132	127	5.5	24
160	M242004112	184	185	152	5.6	16

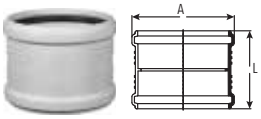
All compensator sockets are pre-assembled with collars and sealing rings.



COUPLER

Dim. DN	Article No.	A (mm)	L (mm)	W.T.	Std. Pkt.
200	M242001614	227	173	6.2	06

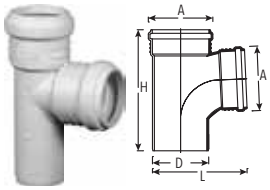
Connecting element between pipes as well as between pipes and fittings.



TEE (SWEPT)

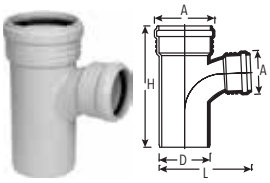
Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
50*	M242000105	68	175	115	4.2	40
75	M242000207	94	222	161	5.2	20
110	M242000909	130	270	210	5.5	10
160	M242000912	184	345	281	5.6	04
200	M242000914	227	417	353	6.2	01

* No Swept



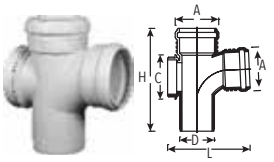
REDUCER TEE (SWEPT)

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
110x75	M242004229	130x94	262	209	5.5	09
160x110	M242004231	184x130	311	271	5.6	05



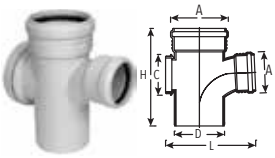
DOOR TEE (SWEPT)

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	C (mm)	W.T.	Std. Pkt.
75	M242001007	94	222	178	95	5.2	15
110	M242001009	130	270	230	130	5.5	07
160	M242001012	184	345	297	130	5.6	04



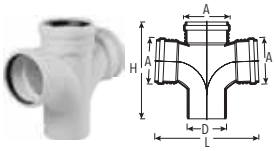
REDUCER DOOR TEE (SWEPT)

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	C (mm)	W.T.	Std. Pkt.
110x75	M242004329	130x94	257	229	130	5.5	09
160x110	M242004331	184x130	311	287	130	5.6	05



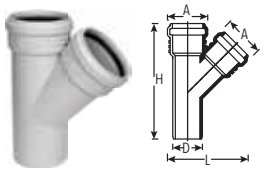
DOUBLE TEE (SWEPT)

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
110	M242005409	130	270	290	5.5	06



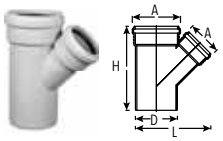
SINGLE Y

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
50*	M242001905	68	195	135	4.2	32
75	M242001907	94	241	182	5.2	16
110	M242001909	130	301	244	5.5	09
160	M242001912	184	392	338	5.6	04
200	M242001914	227	461	419	6.2	01



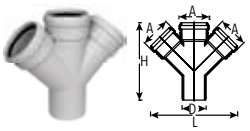
REDUCER SINGLE Y

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
110x75	M242002129	130x94	255	218	5.5	12
160x110	M242002131	184x130	321	299	5.6	04



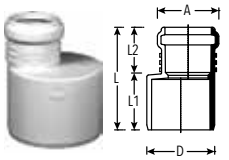
DOUBLE Y

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
75	M242002307	94	241	270	5.2	12
110	M242002309	130	301	358	5.5	08



REDUCER

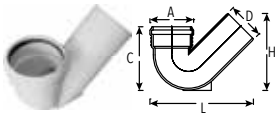
Dim. DN	Article No.	A (mm)	L (mm)	L1 (mm)	L2 (mm)	W.T.	Std. Pkt.
75x50	M242004837	68	113	63	50	5.2	52
110x50	M242004844	68	138	88	50	5.5	40
110x75	M242004829	94	139	84	55	5.5	36
160x110	M242004831	130	196	136	60	5.6	18
200x110	M242004846	130	198	138	60	6.2	12
200x160	M242004847	184	202	131	71	6.2	12



P TRAP

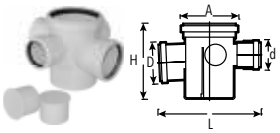
Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	C (mm)	W.T.	Std. Pkt.
110x110	M242003509	130	229	308	190	5.5	12

With rectangular access lid.



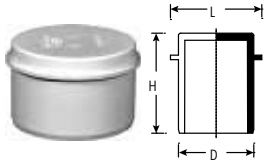
MULTY FLOOR TRAP

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	D (mm)	d (mm)	W.T.	Std. Pkt.
110	M242003209	127	164	223	91	66	5.5	12



END PLUG

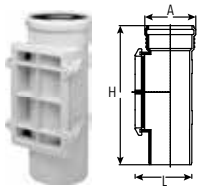
Dim. DN	Article No.	H (mm)	L (mm)	W.T.	Std. Pkt.
50	M242002905	66	60	4.2	100
75	M242002907	69	84	5.2	60
110	M242002909	74	119	5.5	46
160	M242002912	52	175	5.6	20
200	M242002914	60	216	6.2	12



ACCESS PIPE RE

Dim. DN	Article No.	A (mm)	H (mm)	L (mm)	W.T.	Std. Pkt.
110	M242005309	130	356	148	5.5	06
160	M242005312	184	400	200	5.6	04
200	M242005314	227	480	240	6.2	01

With rectangular access lid.



COMPENSATOR RUBBER RING

Dim. DN	Article No.	Std. Pkt.
50	RM06510050	As Required
75	RM06510075	As Required
110	RM06510110	As Required
160	RM06510160	As Required

PP SHIELD SEALING RING

Dim. DN	Article No.	Std. Pkt.
50	RM06590009	As Required
75	RM06590075	As Required
110	RM06590110	As Required
160	RM06590160	As Required
200	RM06590200	As Required

BRACKETS / CLAMPS

Dim. DN	Article No.	Std. Pkt.
75	T 3 NC WR	As Required
110	T 4 NC WR	As Required
160	T 6 NC WR	As Required

Bracket / Clamp with ruber insert

SAFETY CLIP FOR SOCKET PLUG

Dim. DN	Article No.	Std. Pkt.
75	SC75	As Required
110	SC110	As Required
160	SC160	As Required

Bracket / Clamp with ruber insert

CONNECTION FROM CAST-IRON TO SILENCIO

Dim. DN	Article No.	Std. Pkt.
75	9112421	As Required
110	9112422	As Required
160	9112423	As Required

+ On Demand Trading Item

FIRE PROTECTION COLLAR TYPE MB-90+

Dim. DN	Article No.	Std. Pkt.
56/70	9112530	As Required
90/100	9112532	As Required

+ On Demand Trading Item

RUBBER LUBRICANT

Dim. DN	Article No.	Std. Pkt.
100 GRM	S TINS-100	As Required
250 GRM	S TINS-250	As Required
500 GRM	S TINS-500	As Required

ASTRAL SILENCIO SOVENT

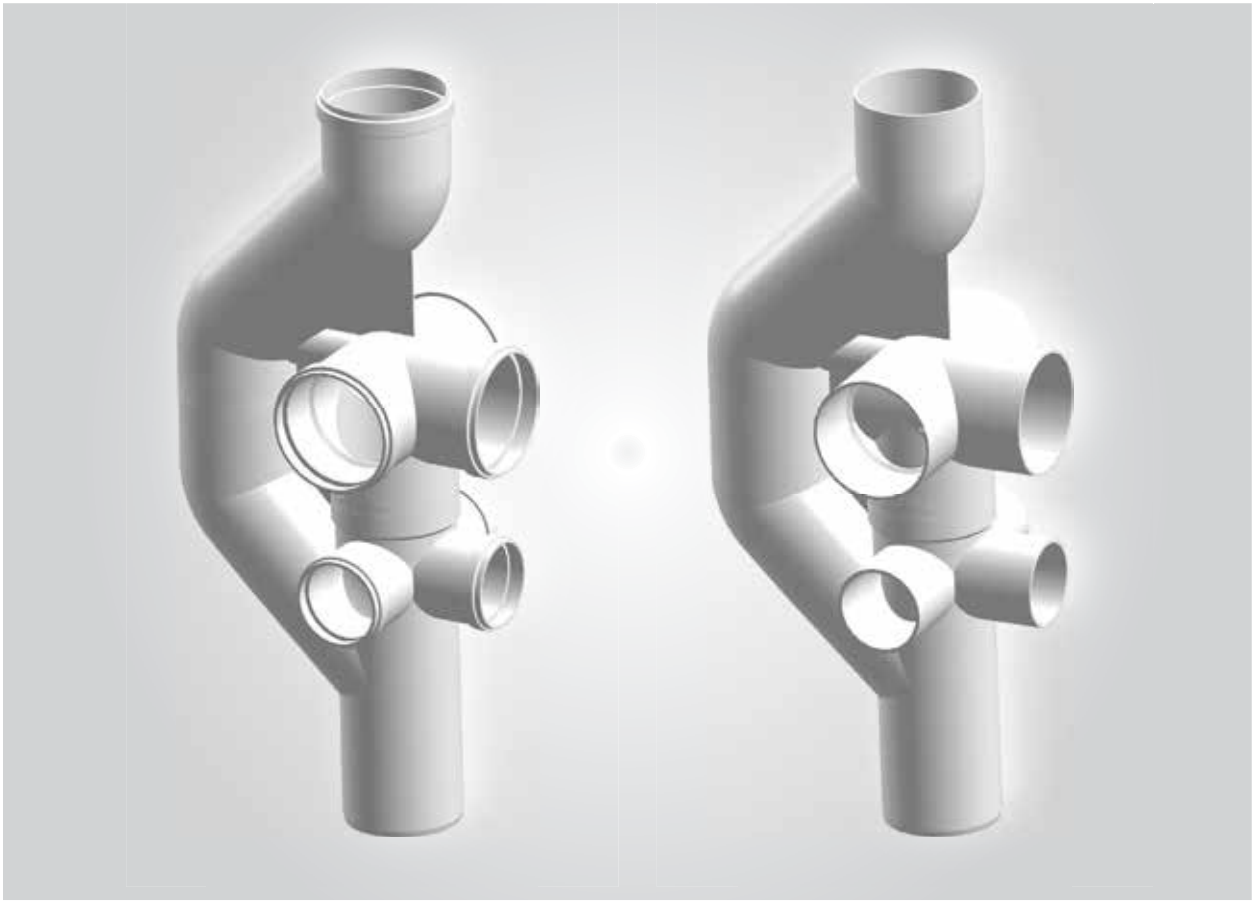
The most important aim to develop this Silencio sovent is to increase the performance of a soil and waste drainage system and eliminate the separate vent stack. This is the ideal solution in high-rise buildings where the simultaneous usage of sanitary fixtures can be intensive.

This innovative waste system guarantees excellent ventilation of the waste stack and branches on each floor, limiting pressure fluctuations in the system, which will avoid the syphonage of traps.

This system also offers significant advantages and money savings thanks to the possibility of constructing single stacks of a 110 mm diameter with a draining capacity that is more than double that of systems with primary ventilation.

Function of the Astral Silencio Sovent

- The design of the Sovent will maintain the air circulation in the stack ensuring smooth water flow from branches.
- The Astral Silencio Sovent acts as a velocity breaker for fast flowing water, reducing the impact on fittings.



CLEANING AND MAINTENANCE

CLEANING THE WASTE PIPE SYSTEM

Installing access pipes enables mechanical cleaning of the waste pipe system.

SOCKET PLUG

The socket plug can be used to plug-off the pipe ends if they are not in use. The socket plug is to be used together with the securing clip to ensure a safe and tight jointing.

FLOOR TRAP

The highly functional Floor Trap design by ASTRAL compiled with low noise system.

SEAL CONSTRUCTION

The proven seal construction gives not only the top inlet but on all branch inlet and outlet to perform with the reliability, and maintain its functionality.

BAFFLE PARTITION

Baffle construction is air tight at all working condition of trap. Specially designed inspection plug enables to access the area under the baffle in order to inspect and clean this area.

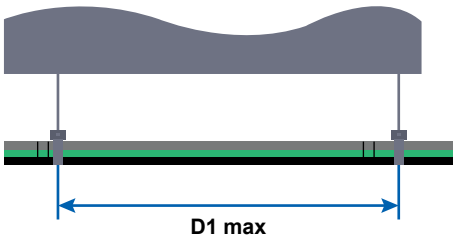
END PLUG

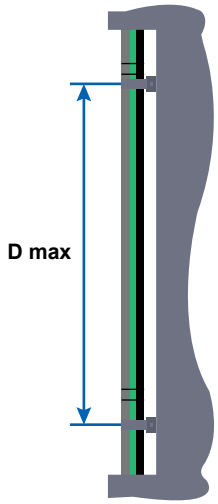
These blind plugs are easy to mount to the inlets of the Floor Trap and secure a leakage free sealing of unused connections to the Floor Trap.

SUPPORT SPACING DISTANCES

MAXIMUM DISTANCES BETWEEN THE BRACKETS FOR HORIZONTAL AND VERTICAL INSTALLATION, AS BELOW

Pipe DN (external diameter)	Max. brackets distance for Horizontal installing – D1 Max Mtr	Max. brackets distance for Vertical installing - D Max Mtr
Ø 50	0.80	1.50
Ø 75	1.10	2.00
Ø 110	2.00	2.00
Ø 160	2.00	2.00
Ø 200	2.40	2.00





INSTALLATION AND JOINTING

PIPE CUTTING

Pipes can be cut to size using standard pipe cutters or saws. Astral SILENCIO can be cut simply with a professional pipe cutter or saw. Make sure that the cut is at a 90° angle on the pipe axis. Remove any burrs, cutting residues, sharp edges, and clean the pipe end.

For connections to Astral SILENCIO fittings or sockets bevel the pipe end – do not chamfer

PUSH-FIT JOINTS WITHOUT COMPENSATOR SOCKET

To cope with variations in length due to thermal factors in between connections of pipe and fitting, with maximum pipe length of 3 meters, a maximum 10 mm slid out of the sleeve has to be considered.

For push-fit connections between fittings no variations in length due to thermal factors have to be considered, and it is therefore possible to slot the fittings completely.

The push-fit coupling is done as follows:

- Check the position and the condition of the lip seal in the coupler channel. If necessary, clean the fitting and the gasket
- Clean the push-fit end of the pipe and the fitting
- Apply a thin uniform layer of ASTRAL lubricant on the end of the coupling. Do not use oil or grease!
- Place the end into the coupler and push in firmly
- Slide the pipe, not the fitting, 10 mm out of the coupling

When positioning pipes vertically, to avoid slipping and the elimination of the dilatation space of 10 mm, fix the individual pipes with collars immediately after assembly.

JOINTS WITH THE COMPENSATOR SOCKET

The Astral SILENCIO compensator socket is used to connect two pipes as well as a pipe and fitting where compensation for axial movement is required. For conventional plastic soil and waste pipe systems the expansion margin is created by mar¬king and withdrawing the pipe to the expansion length. This is not required for Astral SILENCIO, as the compensator socket adapts to temperature changes in the system. This doesn't only save working time, but also gives additional technical security to the system.

STEPS FOR JOINING COMPENSATOR SOCKET

STEPS FOR JOINING COMPENSATOR SOCKET

When making the connection with the compensator socket the following instruction rules should be adhered to:

1. Pull the expansion collar from the compensator socket.
2. Push the expansion collar over the pipe end.
3. Apply lubricant inside compensator socket of fitting. Never use oil or grease.
4. Apply and distribute lubricant evenly on outside of elastomeric compensator collar.
   Push fitting over compensator collar to full insertation depth.
5. Check final position of compensator collar. Ensure pipe end is flush with gasket tip.

Note: · When installed vertically, please ensure that the collar/gasket end is facing down. · Clean un-chamfered pipe end.

*) Never use oil or grease! **) For insertion depth for pipe with collar into the compensator socket,

FIXATION

In principle Astral SILENCIO soil and waste systems should be installed tension free and with free lateral allowance for temperature compensation. Use sound absorbing brackets, dimensionally compatible to the pipe diameter. The pipe brackets should have inserts of corrugated rubber and be fixed to the wall using screws and plastic plugs*. For pipe systems in which inner-pressures can arise, the joints have to be secured to prevent them from sliding apart and deviating from the centre axis.

The ASTRAL safety clips prevent the joints from sliding apart. Alternatively the fixing brackets can be arranged appropriately to achieve the same effect.

*) Metal plugs can be used, but will lead to disadvantageous sound emission.

FIXING BRACKET

The fixed bracket creates a fixed point in the pipe system. With fixed brackets the pipe or fitting cannot be moved through the bracket after the screws are tightened (no lon¬gitudinal movement is possible). In order to prevent sliding down of the vertical stack, each individual pipe length must be secured on one point by a fixed bracket. Fittings or groups of fittings must always be secured as fixed points. Also every horizontally installed pipe should always be fixed with one fixed bracket. All remaining pipe brackets – in the vertical as well as in the horizontal installation – must be sliding brackets. The prescribed bracket distances should not be exceeded.

SLIDING BRACKET

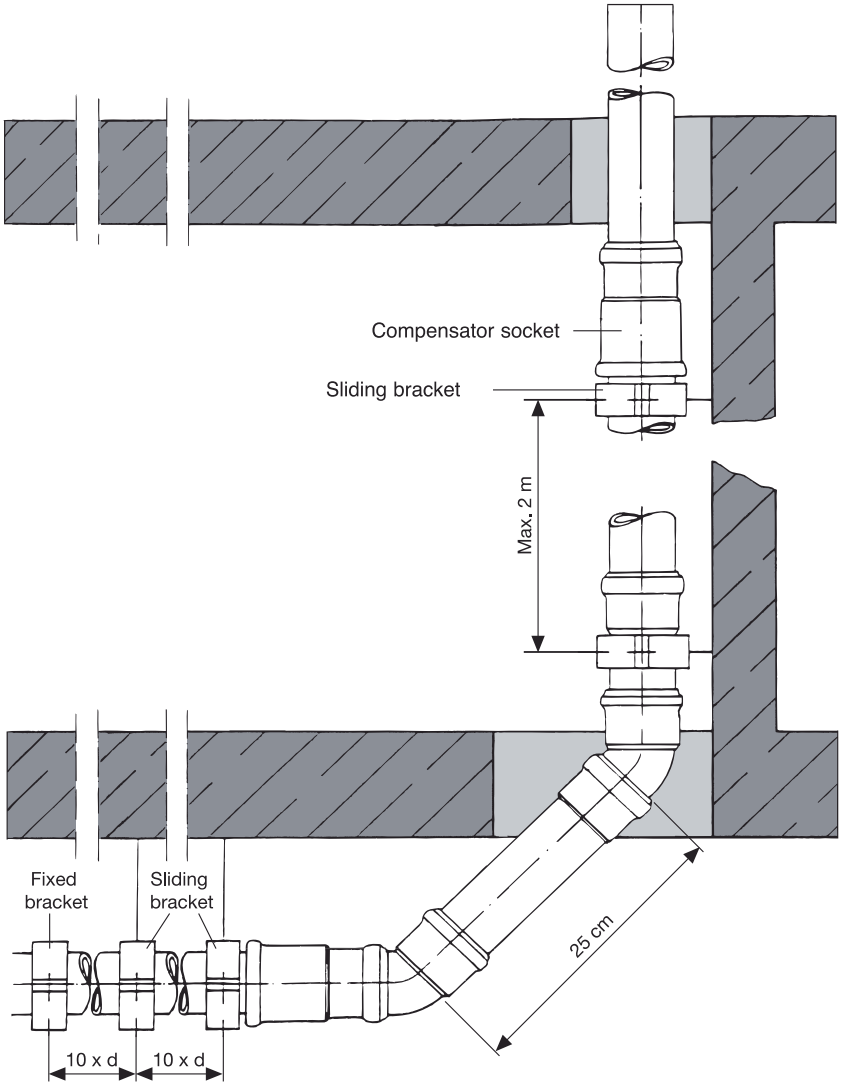
By using sliding brackets the pipe can still be moved through the bracket after the screws are tightened (longitudinal move¬ment is possible once installed).

ARRANGEMENTS OF THE BRACKETS

During installation of Astral SILENCIO pipes, the following should be considered:

- In case of horizontal installation, the pipe bracket distances are 10 x the outside of the pipe. This becomes, in case of vertical pipe installation, depending on outside diameter, 1-2 metres.
- Generally pipe brackets should not be installed in impact areas (eg diameter reductions and changes of directions in the system).
- Pipe brackets to be fixed to building materials with high specific area weight.
- For stack pipes in open mounting shafts and high rooms (storey height over 2,5 metres) it is advised to use one fixed bracket and one sliding bracket per pipe length.
- The fixed bracket must be installed directly above the fitting at the bottom of the pipe end. The sliding bracket must be installed at a distance of maximum of 2 metres above the fixed bracket.

- In multiple storey buildings (from 3 storeys and more) the stack pipes of DN 100 or bigger must be secured by additional fixing (stack pipe support) against slidingz. In this case we advise using the Astral SILENCIO socketed short length with a fixed bracket. Stack segments with fittings or short pipes are to be secured in such short distances with pipe brackets, so that they cannot slide apart.



In exceptional cases, where connecting elements other than the compensator socket are used (eg double socketed slee¬ve), per maximum allowable pipe length (3 metres), one fixed bracket and one sliding bracket should be installed in line with the illustrations shown on this page. The double socketed sleeves are to be fixed.

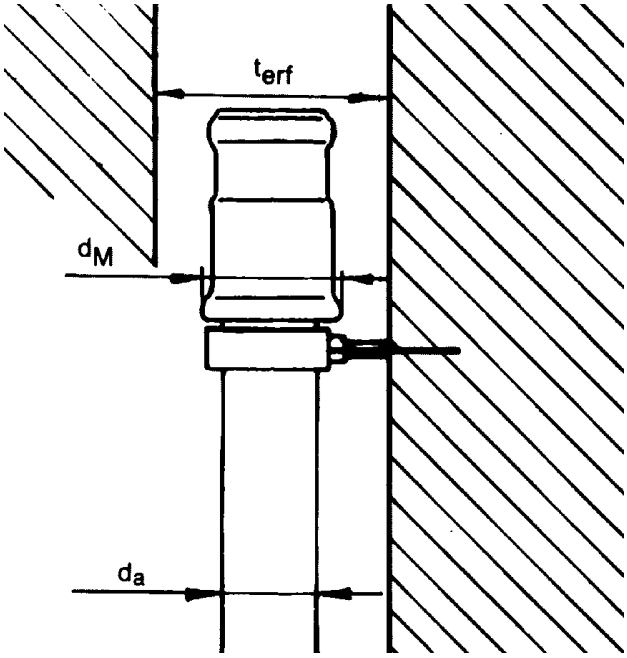
Pipes should be limited by heat insulating the source; eg. central heating pipes as well as hot tap water pipes. Pipe and shaft dimensions are to be taken from table below.

DN (mm)	OD of pipe da (mm)	OD of socket dm (mm)	Min. required spacing* (mm)
50	50	68	125
75	75	95	155
110	110	130	190
160	160	184	244
200	200	228	288

* The stated depths are not including pipe crossings

Space requirements for Astral SILENCIO pipes DN 50 – DN 200 mm.

FIGURE 2

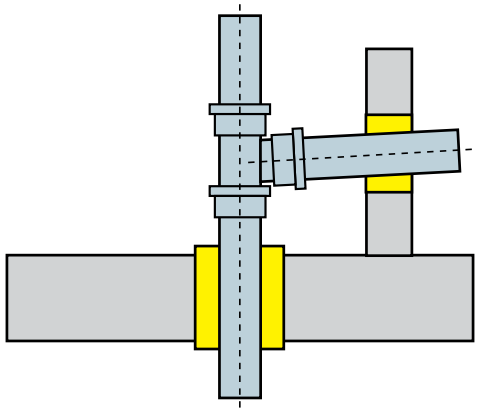


INSTALLATION IN CONCRETE

Astral SILENCIO pipes and fittings can be casted in concrete. Thermal induced lateral movements have to be dealt with, according to previous instructions. Pipes and fittings must be secured properly in order to prevent lateral movement during casting of the concrete. Close the annular gap between pipe and socket with sealing tape to prevent ingress of mortar in the sealing ring.

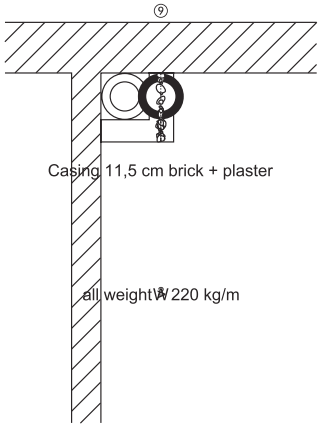
FLOOR CROSSINGS

Floor crossings should be made leak resistant and sound absorbent. In the case of the floor being concreted, Astral SILENCIO pipes and fittings should be protected by using a protection sleeve or heat insulating wrapping material.



ROOF DRAINAGE PIPES

Roof drainage pipes projected through living, sleeping and working rooms can be installed as pictured in figure X. The specific area weight of the casting should be at least equal to the wall and preferably for both at least 220 kg/m2. Although the formation of condensation on the outside of Astral SILENCIOpipes is less than on metallic pipes, it is recommended to insulate the pipes and fittings.



BELOW-GROUND PIPING AND COLLECTOR PIPES

Below-ground piping is normally connected to downpipes or directly into waste water facilities located at basement level. Such piping is normally to be found buried within the confines of the building or below the foundations.

Collecting pipes are installed above-ground and used to collect waste water from downpipes or other connecting pipework.

FIRE PROTECTION

FIRE BEHAVIOR CLASSIFICATION

Fire behavior of construction materials, e.g. piping systems and isolation materials, have been defined in fire classification classes as per DIN 4102-1. Construction materials are classified as combustible and non-combustible materials. According to DIN 4102-1 and EN 13501-1, PP, and thus Astral SILENCIO, is listed as B2 (normally flammable).

Criteria	Old Classification as per DIN 4102-1	New European classification according to DIN EN 13501-1		
		Additional criteria		
Non-combustible	A1	A1		
	A2	A2	s1	d0
Non-readily	B1	B	s1	d0
ignitable	B2	C	s1	d0
(low flame spread)	B3	A2	s2/s3	d0
		B	s2/s3	d0
		C	s2/s3	d0
		A2	s1	d1/d2
		B	s1	d1/d2
		C	s1	d1/d2
		A2	s3	d2
		B	s3	d2
		C	s3	d2
Normally		D	s1/s2/s3	d0
ignitable		E	-	d0
(normal fire		D	s1/s2/s3	d2
behavior)		E	-	d2
Readily ignitable		F	-	-

Table 13: Fire behavior classification according to DIN 4102-1 and DIN EN 13501-1.

In line with European standardization, the fire classification classes as per DIN 4102-1 are translated into the European DIN EN 13501. The accreditation is based on the standardized Single-burning-Item-Test (SBI) in conformity with DIN EN 13823.

FIRE RESISTANCE CLASSIFICATION

The fire resistance classification provides the fire resistance duration of a specific construction material.

Fire resistance classification	Fire resistance duration in minutes
F30	≥ 30 = fire retardant
F60	≥ 60 = high fire retardant
F90	≥ 90 = fire resistant
F120	≥ 120 = high fire resistant
F180	≥ 180 = extreme fire resistant

Table 14: Fire resistance classification.

Possible additions to these fire resistance classes, e.g. z.B. F90 A or F90 AB, can be explained as follows:

A made of non-combustible materials

B made of combustible materials

AB in principle made of non-combustible materials

ASTRAL FIRE PROTECTION CONCEPT

Astral Fire Protection Collar is in practice the best available solution. The Astral Fire Protection Collar fully seal the wall or ceiling corridor in case of fire, due to special fire protection material which strongly expands by increased temperature.

The Fire Protection Collar (for Astral SILENCIO) is especially for sloped piping, suitable up to 45 degrees, and applicable for passages by sleeved pipes or fittings. In practice the collar is suitable to seal off almost any possible configuration.

Of course, the Fire Protection Collar and the Fire Protection Tape have been tested and approved by DIBT.

FIRE PROTECTION COLLAR

- For wall and ceiling crossings
- Suitable for pipes with or without sockets and fittings
- Also suitable for angled passages (up to 45 degrees)
- Approved for ceiling installation
- Applicable for Astral SILENCIO from DN50 – 200.
- Fire classification F90

ASSEMBLY INSTRUCTIONS

When the system is applied to a fire-resistant vertical (wall) or horizontal installation (floor) which separated a fire-risk area, only one Fire Protection collar is required. If the system is applied to a fire resistant vertical (wall) or horizontal (floor) installation which separated two fire-risk areas, use a Fire Protection collar on both sides.

HOLE

Drill a circular hole into the wall or floor with a diameter of 2 mm greater than the external diameter of the plastic pipe to be used.

INSTALLING THE PIPE

Insert the PVC, PP, PE etc. pipe in the hole and clean the part the collar is to be applied to.

Closing and sealing against fumes and gas

If there are any gaps between the pipe and the wall, seal these using putty or intumescent strips according to the thickness, to prevent the passage of fumes in the event of a fire.

CLEANING THE PIPE

The expansion of the intumescent material in the collar com¬pletely closes the plastic pipes by a mechanical action. If the pipes are very dirty or have mortar residues, this may delay the action. Clean the surface of the plastic pipe in the point of installation of the fire protection collars.

NB: the fire protection collar can only prevent the passage of fire if it is properly installed

PRECAUTIONS

In the case of contact of the intumescent material with the eyes, wash delicately with soap and water. Keep out of the reach of children.

INSTALLATION MANUAL ASTRAL FIRE PROTECTION COLLAR

Astral is a new fire protection sleeve designed for use with Astral domestic waste water removal piping systems according to DIN 4102-11. It is suitable for use on piping with external diameters of up to 200 mm and is able to provide a secure seal for use in all conceivable installation situations:

- Right-angled wall and ceiling penetration
- Lightly-constructed partition walls
- Angled wall and ceiling penetration to 45˚
- For sealing over pipe collars (to 45˚)
- For installation under ceilings and in front of walls
- Installation flush with ceiling surface

INSTALLATION INSTRUCTION

Thez fire collar provides fire resistant sealing for wall and ceiling installation of the Astral SILENCIO acoustic insulation systems and other selected Astral soil and waste systems.

GENERAL RECOMMENDATIONS

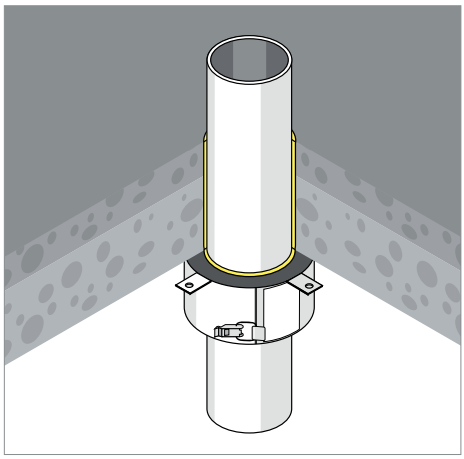
(1) Positioning of the collars:
on both sides of a wall; on one side under/in a ceiling (see figure 37).

(2) Wall & ceiling types:
at least 10 cm thick solid concrete, aerated concrete and sand-lime brick walls as well as light dividing walls (stud walls: both sides clad with 12.5 mm plasterboard) and solid concrete and aerated concrete ceilings at least 15 cm thick.

(3) Structural acoustic insulation:
the acoustic insulation mat provided must be wrapped around the pipe where it passes through the wall or ceiling.

(4) Joint sealing between pipe and wall/ceiling:
to be packed to the full thickness of the wall or ceiling using mineral materials such as concrete, cement or plaster.

FIGURE 3



Installation of fireproofing collar on ceiling

TYPES OF INSTALLATION

Ceiling installation

Minimum requirements of the ceiling: min. 150 mm thick concrete ceiling.

FLUSH/STRAIGHT CEILING INSTALLATION

Wrap insulating mat around the pipe.

Open the collar and position it around the pipe, whilst hooking in the push-in fastening. Bend or angle the collar mounting tabs. Then install the collar flush with the ceiling. Fill the remaining ceiling gap with cement or concrete.

Hold the collar firmly against the ceiling and mark the positions of the mounting holes.

Rotate the collar and drill the holes.

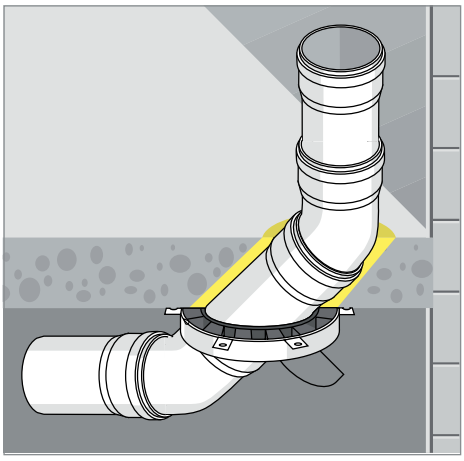
Insert plugs and fix the collar using screws and washers. (Mounting the collar using the washers, plugs and screws provided).

Angled ceiling installation

Wrap insulating mat around the pipe.

Open the collar and position it around the pipe, whilst hooking in the push-in fastening. Fill the remaining gap with cement or concrete.

FIGURE 4



Installation of fireproofing
(only for installation on ceiling)

Hold the collar firmly against the ceiling and mark the positions of the mounting holes.

Rotate the collar and drill the holes.

Insert plugs and fix the collar using screws and washers. (Mounting the collar using the washers, plugs and screws provided).

Installation distances between fire protection collars eg. to external systems.

The distance to external, tested systems (inspected and approved) must be at least 50 mm between partitioned sections. If two Astral feedthroughs are installed next to each other, the distance between the pipes must be at least 100 mm in the case of special partitioned sections (sloping pipes, partition via sleeve/socket or for ceiling installations). In the case of straight pipes without sleeve/ socket in the partition area, the collar casings can adjoin each other (distance 0 mm).

Wall installation

Minimum wall specifications: wall must be at least 100 mm thick, made from concrete, aerated concrete, lime sandstone or lightweight partition walls (two-layer panelling on both sides with 12.5 mm plasterboard panels and mineral wool infill). The pipe must be clamped on both sides at a distance of ≤ 50 cm. For wall feedthroughs, a collar should always be fitted on both sides of the wall.

NOTE

The presented data, especially recommendations for the pro¬cessing and use of our products are based on our knowledge and experience. Due to differences in material and working conditions that are outside the scope of our influence, we recommend that sufficient internal trials be conducted in each case to ensure the suitability of our product to the intended method and processing purposes. No liability will be accepted either on the basis of these instructions or from an oral advice, unless we are accused of gross negligence or deliberate malice.

Overview of possible installation situations:

FLOOR TRAP

The highly functional Floor Trap completes the existing Astral SILENCIO range. The Astral SILENCIO Floor Trap has unique features such as an air tight baffle construction and the incorporation of proven Astral SILENCIO seals. The Astral SILENCIO Floor Trap can be directly applied within the Astral SILENCIO soil and waste system design. In the design of the Astral SILENCIO Floor Trap, 50 years of Astral knowledge has been integrated from both a functional instal-lation as well as a hydraulic perspective.

Important aspects in the designing process were:

- Knock-out prevention
- SBR seals
- Absorb/correct installation mistakes
- Durability
- Resistance to difficult installation circumstances

BENEFITS SEAL CONSTRUCTION

The already proven Astral SILENCIO seal construction is included in not only the top inlet but on all inlets and even on the outlet. This seal construction gives the Floor Trap the same perfor¬mances/reliability as the already established Astral SILENCIO fittings and pipes and gives maximum freedom in installing this Floor Trap.

BAFFLE CONSTRUCTION

The baffle construction is air tight under all circumstances. The high tolerances during production guarantee the func¬tionality during the installed life time. A specially designed inspection plug enables to access the area under the baffle in order to inspect and clean this area. The Floor Trap volume is designed in such a way that a maximal discharge capacity is reached.

BLIND PLUGS

In case not all the inlets are used two PP-blind plugs are added to the Floor Trap. These blind plugs are easy to mount to the inlets of the Floor Trap and secure a leakage free sealing of unused connections to the Floor Trap.

QUALITY REQUIREMENTS

The Astral SILENCIO Floor Trap complies with the respective standard EN1455 (EN1451 for the pipes). The seals comply with standard EN 681-1.

WARRANTY CERTIFICATE

Valid for the following areas of application: ASTRAL SILENCIO .

- Noise-insulated above-ground drainage.
- Highly noise-insulated above-ground drainage.

In line with our corporate philosophy, top tube and moulding quality includes the subsequent guarantee for in-company manufactured product ASTRAL SILENCIO Programmes. In addition to any legal warranty and damage claims, upon the agreement of ASTRAL PIPES general terms of business, the company undertakes the following.

GUARANTEE

ASTRAL assumes worldwide liability for damages, resulting from manufacturing errors, material defects, deficiencies caused by incorrect storage, laying and installation instructions, the lack of the characteristics expressly guaranteed by ASTRAL, or damages caused by ASTRAL through the use of products covered by this guarantee. This liability shall be valid for a period of 5 years from the date of manufacture and encompass: 1. The free delivery to the place of employment of the replacement parts required for the repair of the damage, as well as 2. The necessary removal and installation costs, including the expenses incurred for the restoration of the object to its original condition, up to a sum of XXXXXXXX per occurrence of damage. Pursuant to this declaration ASTRAL provides this guarantee to its contractual partners when 1. Laying was completed by trained personnel from a licensed sanitary plumping company in connection with installation as contractually intended and all the technical regulations valid at the Atime of completion were observed; 2. The contractual partner proves that only ASTRAL original parts were employed and that these were not combined with products of any other origin; 3. the contractual partner proves that the cause of damage did not relate to parts subject to natural wear and tear, to external mechanical damage, or other external influences on the product; 4. It can be proven that at the time of laying all the current storage, laying, installation and application stipulations were observed in full; 5. All the measures necessary for damage minimization were initiated immediately, 6. The occurrence of damage was reported to ASTRAL without delay and under all circumstances within seven days of the identification of the damage, complete with information concerning the related facts and circumstances; 7. Prior to repair work, ASTRAL is given an opportunity to determine and appraise the damage itself or through a third party; 8. All the parts relating to the claim are kept for the investigation of the damage occurrence and are provided to ASTRAL upon request; 9. The production and installation dates can be evidenced in the appropriate form by the contractual partner; 10. The contractual partner presents the related delivery documentation to ASTRAL.

PIPE AND FITTING & RUBBER SEALING RING

PIPE AND FITTING

The specifications are used for the initial orientation of the chemical resistance of the material (not of the possible influence of the corrosive agent) and cannot simply be applied to all usage scenarios. Mechanical behaviour can be impaired in cases where tension and the presence of chemicals occur simultaneously (tension-fracture corrosion).

RUBBER SEALING RING

The types of rubber used generally exhibit quite good chemical resistance, but components of esters, ketones and aromatic and chlorinated hydrocarbons in sewer water expand heavily, which can lead to damage of the connection.

If in doubt, we recommend testing the suitability of the pipe, fitting and seal material in existing systems or have them checked in a laboratory. Contact our applications department if necessary.

TABLE LEGEND

r = resistant, cr = conditionally resistant, nr = not resistant, - = not tested

Regent	Concentr, %	Temp. °C	RAU-PP
2-Propen-1-ol	96	20	r
	96	60	r
Acetaldehyde + acetic acid	90/10	20	–
Acetaldehyde, aqueous	40	40	r
Acetaldehyde, concentrated	100	20	–
Acetate ether	100	20	–
Acetic acid, aqueous	up to 25	40	r
	up to 25	60	r
	25–60	60	r
	80	40	r
Acetic acid, concentrated	95	40	–
Acetic anhydride	100	20	r
	100	40	cr
	100	60	cr
Acetone	100	20	r
	100	60	r
Acetone, aqueous	traces	20	r
Acronal dispersions	com. avail.	20	–
Acronal solutions	com. avail.	20	–
Acrylic acid ethyl ester	100	20	–
Adipic acid, aqueous	saturated	20	r
	saturated	60	–
Aluminium chloride	diluted	40	r
	diluted	60	r
	saturated	60	r
Aluminium sulfate, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Alums, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Ammonia, gas	100	60	r
Ammonia, liquid	100	20	r
Ammonium chloride, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Ammonium uoride, aqueous	up to 20	20	r
	up to 20	60	r
Ammonium hydroxide	warm sat.	40	r
	warm sat.	60	r
Ammonium nitrate, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Ammonium sulfate, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Ammonium sul de, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r

Regent	Concentr, %	Temp. °C	RAU-PP
Aniline hydrochloride, aqueous	saturated	20	r
	saturated	60	r
Aniline, aqueous	saturated	20	r
	saturated	60	r
Aniline, pure	100	20	r
	100	60	r
Animal glue	custom. co	20	r
	custom. co	60	r
Anthraquinonesulfonic acid, aqueosuspension 30			r
Antiformin, aqueous	2	20	–
Antimony chloride, aqueous	90	20	r
Arsenic acid, aqueous	diluted	40	r
	diluted	60	r
	80	40	r
	80	60	r
Beef tallow emulsion, sulphonated	com. avail.	20	–
Beer	com. avail.	20	r
Beer colourinzzg agent	com. avail.	60	r
Benzaldehyde, aqueous	0,1	60	–
Benzene	100	20	cr
Benzoic acid, aqueous	any	20	r
	any	40	r
	any	60	r
Bisulphite solution, w/ SO	warm sat.	50	r
Bleaching liquour, containing 12.5 % active chlorine	usage conc.	40	–
	usage conc.	60	cr
Borax, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Boric acid, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Brandy	com. avail.	20	r
Bromine fumes	minimal	20	nr
Bromine, liquid	100	20	nr
Butadiene	100	60	–
Butane, gaseous	50	20	r
Butanediol	up to 100	20	–
Butanediol, aqueous	up to 10	20	r
	up to 10	40	r
	up to 10	60	r
Butanol	up to 100	20	r
	up to 100	40	r
	up to 100	60	cr
Butyl acetate	100	20	cr
Cider	com. avail.	20	r

Regent	Concentr, %	Temp. °C	RAU-PP
Citric acid, aqueous	up to 10	40	r
	up to 10	60	r
	saturated	60	r
Clophene	com. avail.	20	–
	com. avail.	60	–
Coconut fat alcohol	100	20	r
	100	60	cr
Copper uoride, aqueous	2	50	r
Copper sulfate, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Cresol, aqueous	up to 90	45	–
Crotonaldehyde	100	20	r
Cyclohexanol	100	20	r
Cyclohexanone	100	20	r
Cyclohexanone	100	20	r
Densodrin W	com. avail.	60	–
Dextrin, aqueous	saturated	20	r
	18	60	r
Diethylether	100	20	cr
Diglycol acid, aqueous	30	60	r
	saturated	20	r
Dimethyl sulfate, aqueous	up to 50	20	r
	up to 50	40	r
	100	40	–
	100	60	–
Dimethylamine, liquid	100	30	–
Disulfuric acid	10	20	nr
Ethanol (fermentation mash)	common	40	r
	common	60	–
Ethanol, aqueous	any	20	r
	96	60	r
Ethanol, denatured (with 2 % tolulene)	96	20	cr
Ethanol+ acetic acid (fermentation mash)	common	20	r
Ethyl acetate	100	20	cr
	100	60	nr
Ethylene chloride	100	20	nr
Ethylene oxide, liquid	100	20	–
Exhaust gas, w/COH	any	60	r
Exhaust gas, w/ HF	traces	60	r
Exhaust gas, w/ NOX	traces	60	r
	higher	60	–
Exhaust gases, w/S O7H	lower	20	–
	higher	20	nr
Exhaust gases, w/SOH, moist	any	60	r
Exhaust gases, w/ HCl	any	60	r
Exhaust gases, w/ SO	lower	60	r

Regent	Concentr, %	Temp. °C	RAU-PP
	50	50	–
Fatty acids	100	60	cr
Ferric chloride, aqueous	up to 10	40	r
	up to 10	60	r
	saturated	60	r
Fertilizer salts, aqueous	up to 10	40	r
	up to 10	60	r
	saturated	60	r
Fluorsilicic acid, aqueous	up to 32	60	–
Formaldehyde, aqueous	diluted	40	r
	diluted	60	r
	40	30	r
Formic acid	100	20	r
	100	60	cr
Formic acid, aqueous	up to 50	40	r
	50	60	r
Frigen	100	20	cr
Fruit pulp	custom. conc	20	r
Glucose, aqueous	saturated	20	r
	saturated	60	r
Glycerine, aqueous	any	60	r
Glycine, aqueous	10	40	r
Glycol, aqueous	com. avail.	60	r
Glycolic acid, aqueous	37	20	r
Hexantriol	com. avail.	60	r
Hydrobromic acid, aqueous	up to 10	40	r
	up to 10	60	r
	48	60	r
Hydrochloric acid, aqueous	up to 30	40	r
	up to 30	60	r
	over 30	20	r
	over 30	60	r
Hydro uoric acid, aqueous	up to 40	20	r
	40	60	r
	60	20	r
	70	20	r
Hydrogen	100	60	r
Hydrogen peroxide, aqueous	up to 30	20	r
	up to 20	50	r
Hydrogen phosphide	100	20	–
Hydrogen sul de, dry	100	60	r
Hydrogen sul de, aqueous	warm sat.	40	r
	warm sat.	60	r
Hydrosul te, aqueous	up to 10	40	r
	up to 10	60	r
Hydroxylamine sulfate, aqueous	up to 12	35	r
Lactic acid, aqueous	up to 10	40	r
	up to 10	60	r
	90	60	r

Regent	Concentr, %	Temp. °C	RAU-PP
Lead acetate, aqueous	warm sat.	50	r
Butylene, liquid	100	20	–
Butylphenol	100	20	r
Butynediol	up to100	40	–
Butyric acid, aqueous	20	20	r
	concentr.	20	r
Calcium chloride, aqueous	diluted	40	r
	diluted	60	r
	saturated	60 r	
Calcium nitrate, aqueous	50	40	r
Carbolineum, aqueous	usage conc.	20	–
Carbon dioxide, aqueous under	saturated	20	–
8 atmospheric pressures			
Carbon dioxide, dry	100	60	r
Carbon dioxide, moist	any	40	r
	any	60	r
Carbon disul de	100	20	cr
Carbon tetrachloride, technical	100	20	nr
Caustic potash solution,			
aqueous	up to 40	40	r
	up to 40	60	r
	50/60	60	r
Caustic soda, aqueous	up to 40	40	r
	up to 40	60	r
	50/60	60	r
Chloramine, aqueous	diluted	20	–
Chloric acid, aqueous	1	40	–
	1	60	–
	10	40	–
	10	60	–
	20	40	–
	20	60	–
Chlorine water	saturated	20	cr
Chlorine, gaseous, dry	100	20	nr
Chlorine, gaseous, moist	0,5	20	nr
	1	20	nr
	5	20	nr
Chlormethyl	100	20	–
Chloroacetic acid (mono)	100	40	r
	100	60	–
Chloroacetic acid (mono)			
aqueous	85	20	r
Chlorosulfonic acid	100	20	nr
Chromic acid, aqueous	up to 50	40	–
	up to 50	60	cr
Chromic acid/Sulphuric acid/			
Water	50/15/35	40	nr
	50/15/35	60	nr
	diluted	40	r
	diluted	60	r
	saturated	60	r
Lead tetraethyl	100	20	r
Magnesium chloride, aqueous	diluted	40	r
	diluted	60	r
	saturated	60 r	
Magnesium sulfate, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Maleic acid, aqueous	saturated	40	r
	saturated	60	r
	35	40 r	
Malic acid, aqueous	1	20	r
Mersol D	custom. conc	40.	–
Methanol	100	40	r
	100	60	r
Methyl amine	32	20	r
Methylene chloride	100	20	nr
Milk	com. avail.	20	r
Mixed acid	48/49/3	20	nr
(Sulfuric acid/Nitric acid/Water)	48/49/3	40	nr
	50/50/0	20	nr
	50/50/0	40	nr
	10/20/70	50	cr
	10/87/3	20	nr
	50/31/19	30	nr
Molasses	custom. conc	20	r
	custom. conc	60	r
Molasses wort	custom. conc	60	r
Mowilith D	com. avail.	20	–
Nekal, BX, aqueous	diluted	40	–
	diluted	60	–
Nickel sulfate, aqueous	diluted	40	r
	diluted	60	r
	saturated	60 r	
Nicotine compounds, aqueous	usage conc.	20	–
Nicotine, aqueous	usage conc.	20	–
Nitric acid, aqueous	up to 30	50	r
	30/50	50	nr
	98	20	nr
	98	60	nr
Nitrous gasses	concentr.	20	r
	concentr.	60	–
Oils and greases	com. avail.	60	cr
Oleic acid	com. avail.	60	cr
Oleum vapour	lower	20	cr
	higher	20	nr
Oxalic acid, aqueous	diluted	40	r
	diluted	60	r

Regent	Concentr, %	Temp. °C	RAU-PP
	saturated	60	r
Oxygen	any	60	–
Ozone	100	20	cr
	10	30	r
Palm kernel oil acid	100	60	–
Paraf n emulsions	com. avail.	20	–
	com. avail.	40	–
Perchloric acid, aqueous	up to 10	40	r
	up to 10	60	r
	saturated	60	–
Petrol	100	60	nr
Petrol-benzene mixture	80/20	20	cr
Phenol, aqueous	up to 90	45	r
	1	20	-
Phenylhydrazine	100	20	cr
	100	60	–
Phenylhydrazine hydrochloride, aqueous	saturated	20	–
	saturated	60	–
Phosgene, aqueous	100	20	nr
Phosgene, gaseous	100	20	cr
	100	60	cr
Phosphoric acid, aqueous	up to 30	40	r
	up to 30	60	r
	40	60	r
	80	20 r	
	80	60 r	
Phosphorous pentoxide	100	20	r
Phosphorous trichloride	100	20	r
Photographic developers	com. avail.	40	r
Photographic emulsions	any	40	–
Photographic xers	com. avail.	40	r
Picric acid, aqueous	1	20	r
Potash, aqueous	saturated	40	–
Potassium borate, aqueous	1	40	r
	1	60	r
Potassium bromate, aqueous	up to 10	40	r
	up to 10	60	r
Potassium bromide, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Potassium chlorate, aqueous	1	40	r
	1	60	r
Potassium chloride, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Potassium chromate, aqueous	40	20	r
Potassium cyanide, aqueous	up to 10	40	r
	up to 10	60	r

Regent	Concentr, %	Temp. °C	RAU-PP
	saturated	60	r
Potassium dichromate, aqueous	40	20	r
Potassium ferrocyanide	diluted	40	r
Potassium ferrocyanide, aqueous	diluted	60	r
	saturated	60	r
Potassium nitrate, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Potassium permanganate, aqueous	up to 6	20	r
	up to 6	40	r
	up to 6	60	r
	up to 18	40	–
Potassium persulfate, aqueous	diluted	40	r
	diluted	60	r
	saturated	40 r	
	saturated	60 r	
Propane, gaseous	100	20	–
Propane, liquid	100	20	–
Propargyl alcohol, aqueous	7	60	r
Pure acetic acid	100	20	r
	100	40	r
Ramasite	com. avail.	20	–
	com. avail.	40	–
Roaster gases, dry	any	60	r
Seawater	–	40	r
	–	60	r
Silicic acid, aqueous	any	60	r
Silver nitrate, aqueous	up to 8	40	r
	up to 8	60	r
Soap solution, aqueous	concentrated	20	r
	concentrated	60	r
Soda, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Sodium benzoate, aqueous	up to 10	40	r
	up to 10	60	r
	36	60	r
Sodium chlorate, aqueous	up to 10	40	r
	up to 10	60	r
	saturated	60	r
Sodium chlorite, aqueous	50	20	r
	diluted	60	nr
Sodium hydrosul te, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Sodium hypochlorite, aqueous	diluted	20	r
Sodium sul de, aqueous	diluted	40	r

Regent	Concentr, %	Temp. °C	RAU-PP
	diluted	60	r
	saturated	60	r
Spirits	com. avail.	20	r
Starch syrup	custom. conc	60	r
Starch, aqueous	any	40	r
	any	60	r
Stearic acid	100	60	cr
Sulphur dioxide, aqueous under 8 atmospheric pressures	saturated	20	–
Sulphur dioxide, liquid	100	-10	–
	100	20	r
	100	60	r
Sulphur dioxide,	moist and		
	aqueousany	40	r
	50	50	r
	any	60	r
Sulphur dixode, dry	any	60	r
Sulphuric acid, aqueous	up to 40	40	r
	up to 40	60	r
	70	20	r
	70	60	cr
	80-90	40	cr
	96	20	r
	96	60	nr
Table salt, aqueous	diluted	40	r
	diluted	60	r
	saturated	60 r	
Tallow	100	20	r
	100	60	r
Tanigan extra A, aqueous	any	20	–
Tanigan extra B, aqueous	any	20	–
Tanigan extra D, aqueous	saturated	40	–
	saturated	60	–
Tanigan F, aqueous	saturated	60	–
Tanigan U, aqueous	saturated	40	–
	saturated	60	–
Tanning extracts, cellul.	common	20	r
Tanning extracts, natural	common	20	r
Tartaric acid, aqueous	up to 10	40	r
	up to 10	60	r
	saturated	60	r
Thionyl chloride	100	20	nr
Tin (II) chloride, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Toluene	100	20	nr
Trichloroethylene	100	20	nr
Triethanolamine	100	20	r
Trilone	com. avail.	60	–
Trimethylolpropane, aqueous	up to 10	40	–
	up to 10	60	–
	com. avail.	40	r
	com. avail.	60	r
Urea, aqueous	up to 10	40	r
	up to 10	60	r
	33	60	r
Urine	normal	40	r
	normal	60	r
Vinegar (wine vinegar)	com. avail.	40	r
	com. avail.	50	r
	com. avail.	60	r
Vinyl acetate	100	20	r
Water	100		r
	100		r
Wax alcohol	100	60	cr
Wine, red and white	com. avail.	20	r
Xylene	100	20	nr
Yeast wort	custom. con	40	r
	custom. con	60	r
Zinc chloride, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r
Zinc sulphate, aqueous	diluted	40	r
	diluted	60	r
	saturated	60	r

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