ADVANCED PLASTIC INDUSTRIES

ECOTHERM®

Pipes & Fittings
Random Copolymer
Polypropylene (PP-r)

ADVANCED PLASTIC INDUSTRIES

PIPES AND FITTINGS

ECOTHERM® PIPE SYSTEM RANDOM COPOLYMER POLYPROPYLENE (PP-R)

ISO 9001 BUREAU VERITAS Certification

UKAS

MADE IN LEBANON

THE ULTIMATE PIPING SYSTEM

Rusting, corrosion and scale formation are familiar problems of traditional metal piping systems. These negative aspects are the main causes of failure in sanitary installations and have a detrimental effect on the quality of water we consume.

Plastic pipes do not rust or corrode. Their smooth inner surface prevents scale formation.

Heat stabilized Polypropylene Random Copolymer PP-R (type 3) is a designed polymer. It is purposely made to satisfy all demanding criteria of modern building designers and water specialists.

In the recent past, the use of polypropylene pipes (PP-R) for cold and hot water applications grew substantially in Europe, the Middle East and the Gulf region.

The PP-R sanitary pipe system represents a proven, economic, safe and reliable system made entirely of plastic material especially designed to last for the lifetime of the building.

Advanced Plastic Industries s.a.l (API) supplies an extensive range of PP-R pipes and fittings under the trademark **Ecotherm®.**

Ecotherm® pipes are produced according to the general quality and dimensional requirements of ISO 15874, DIN 8077, and DIN 8078.

Raw materials used in the **Ecotherm®** pipe system are certified by the Technologiezentrum Wasser (TZW) to fulfill the KTW guidelines for the hygienic assesment of organic materials in contact with drinking water, and certified by the Süddeutsche Kunststoff-Zentrum (SKZ) to fulfill the technical requirements of DVGW - W 544.

Advanced Plastic Industries dedication to quality, together with our commitment to superior customer service and support, are your assurance of a long-lasting and trouble-free plumbing system.

APPLICATION CLASSES ACCORDING TO EN ISO 15874 - 1

- Class 1 : Hot water supply 60° C
- Class 2 : Hot water supply 70° C
- Class 4 : Underfloor heating & low temperature radiators
- Class 5 : High temperature radiators

FIELDS OF APPLICATION

Ecotherm® pipe systems can be used for:

- Hot and cold water installations
- Drinking water supply
- Radiators connections (moderate temperatures)
- Underfloor heating
- Wall heating
- Cooling systems

MATERIAL CHARACTERISTICS OF PP-R

The main characteristics of a PP-R pipe system are:

- Long life
- Resistance to corrosion
- Resistance to chemicals *
- Taste and odour neutral
- High acoustic insulation
- High thermal insulation
- Low levels of pressure loss
- High impact strength
- High hydrostatic strength under pressure
- Excellent weldability
- Quick and safe installation

* In case of uncertainties, please contact your local distributor or API's technical department.

PHYSICAL PROPERTIES OF PP-R

PROPERTY	TEST	VALUE	UNIT
Melt flow rate 190 °C/ 5.0 kg	ISO 1133	0.5	g / 10 min
Melt flow rate 230 °C / 2.16 kg	ISO 1133	0.3	g / 10 min
Density	ISO 1183	900	kg / m ^{3}
Tensile stress at yield	ISO 527-1 /-2	26.1	MPa
Tensile strain at yield (50mm/min)	ISO 527-2	13.5	%
Elastic modulus	ISO 527-1 /-2	808	MPa
Flexural modulus	ISO 178	850	MPa
Charpy impact strength, notched at : 23 °C 0 °C	ISO 179 / 1eA	 50 5.0	kJ / m ^{2}
Charpy impact strength, un-notched at : 23 °C 0 °C	ISO 179 / 1eU	 No break No break	kJ / m
Shore D hardness	ISO 868	60	
Rockwell hardness	ISO 2039 - 2	50	
Vicat softening temperature	ISO 306	131.3	°C
Specific heat at 20 °C	ISO 11357 - 1	2.0	J / gK
Coeff. of thermal expansion	ISO 11359	1.5 x 10^{-4}	K$_{-1}$
Thermal conductivity	DIN 52612	0.21	W / m °C
Distortion temperature	ISO 75	45.2	°C

** *Data should not be used for specication work.*

LONG TERM BEHAVIOUR OF PP-R

The parameters that determine the long-term resistance of PP-R pipes in general are:

- Mechanical stress = pressure
- Thermal strain = temperature
- Duration of the stress = time

To obtain the hoop stress resulting from the internal pipe pressure, the following formula applies:

$$\sigma = P \times \frac{D-e}{2e}$$

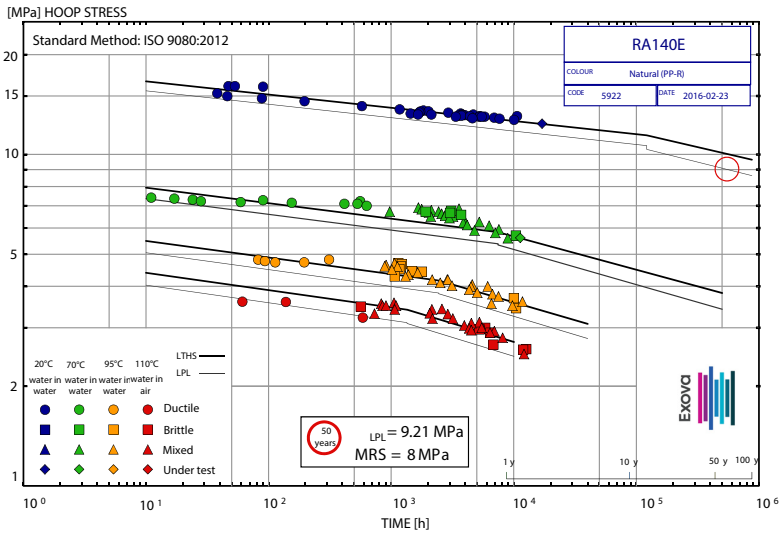
Where, σ = hoop stress, in megapascals;

P = internal pipe pressure, in megapascals;

D = mean pipe outside diameter, in millimeters;

e = minimum pipe wall thickness, in millimeters;

The following creep rupture diagram shows the hydrostatic pressure resistance of EcoTherm® pipes for measured & extrapolated times at different temperatures.



The maximum operating conditions for a Class 1 S 3.2 **Ecotherm®** pipe can be extracted from the corresponding creep rupture diagram, and are presented in the table below according to DIN 8077:

Temperature °C	Duration (Years)	Pressure (Bar)	Safety Factor
20	50	20.4	1.5
30	50	17.2	1.5
40	50	14.5	1.5
50	50	12.2	1.5
60	50	10.2	1.5
70	50	6.7	1.5
80	25	5.1	1.5
95	10	3.4	1.5

* These operating pressures do not apply to pipes exposed to UV radiation.

LPL: Lower Predicted Limit
MRS: Minimum Required Strength
CRS: Categorised Required Strength

Thermal Expansion

When installing pipes for cold and hot water supply, DIN16928 must be observed. When necessary, it is important to compensate for the linear thermal expansion in piping systems.

The pipe length variation is calculated as follows:

$$\Delta L = \alpha \times L \times \Delta T$$

where, ΔL = Length variation in mm
α = Linear expansion coefficient= 0.15 mm/m °C
L = Pipe length in m
ΔT = Temperature variation in °C

Changes in length can be compensated for by a directional change or a compensating arm.

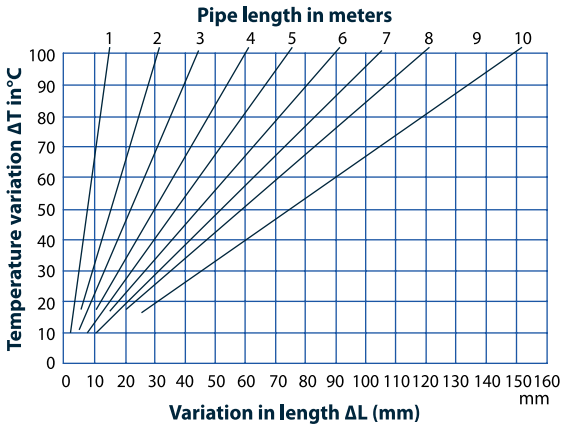
The arm length can be calculated as follows:

$$L_s = K \times \sqrt{D \times \Delta L}$$

where, Ls = arm length in mm
K = Material constant =20 for PP-R according to CEN/TR 12108:2012 (E)
D = Pipe external diameter in mm
ΔL = Length variation in mm

* for further details regarding the design of compensating arms, please consult API's technical handbook or contact your local distributor.

LENGTH VARIATIONS OF ECOTHERM® PIPES



The following table offers recommended support intervals for Ecotherm® pipes in horizontal installations as a function of temperature (°C) and outer diameter (mm):

Difference in temperature ΔT °C	Pipe diameter d(mm)											
	16	20	25	32	40	50	63	75	90	110	125	160
	Maximum support intervals in cm											
0	70	85	105	125	140	165	190	205	220	250	280	300
20	50	60	75	90	100	120	140	150	160	180	200	220
30	50	60	75	90	100	120	140	150	160	180	200	220
40	50	60	70	80	90	110	130	140	150	170	180	200
50	50	60	70	80	90	110	130	140	150	170	180	200
60	50	55	65	75	85	100	115	125	140	160	170	180
70	50	50	60	70	80	95	105	115	125	140	150	170

Note: For vertical pipe installations, the above support intervals may be increased by a 30% average exceeding the values in this table.

SUMMARY OF ECOTHERM®PIPES & FITTINGS (PP-R)

Diameter 20 - 25 - 32 - 40 - 50 - 63 - 75 - 90 - 110

1 - Pipe PP-R SDR 7.4 S3.2

2 - COUPLING

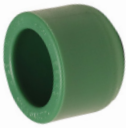
3 - REDUCER

4 - 90º ELBOW

5 - EQUAL TEE

6 - REDUCING TEE

7 - END CAP



8 - OVERCROSS

9 - 90 º BEND

10 - OFFSET BEND

11 - CROSS BEND

12 - GLOBE BODY VALVE

13 - FEMALE THREADED ADAPTOR

14 - MALE THREADED ADAPTOR

15 - MALE THREADED 90^{0}ELBOW

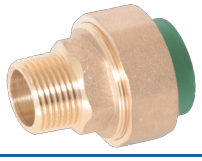
16 - FEMALE THREADED 90^{0} ELBOW

17 - FEMALE THREADED TEE

18 - MALE THREADED TEE

19 - 45^{0}ELBOW

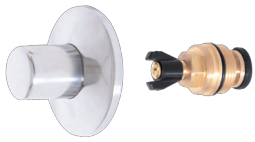
20 - MALE THREADED UNION



21 - FEMALE THREADED UNION

SUMMARY OF ECOTHERM®PIPES & FITTINGS (PP-R)

22 - STOP VALVE ENCASTREE



23 - SHUT-OFF VALVE WITH HANDLE WHEEL - EXPOSED

24 - SHUT-OFF VALVE CHROME HANDLE

25 - PIPE CLAMPS (BLACK & GREEN)

26 - BALL VALVE EXPOSED

27 - EXTENSION KIT

28 - PLASTIC MALE THREADED PLUG

29 - PROTECTION CAP

30 - MALE THREADED PLUG FOR BODY VALVE

31 - FIXED MIXER SUPPORT

1- It is prohibited to use fuel oil in ECOTHERM® pipes made from **PP-R** material.
2- The molding and connection should be made according to **A.P.I.** instructions. In case of misusage, the user will be held responsible.

N.B: For an extended list of products, consult our Technical Handbook v.2 or visit our website at www.api.com.lb