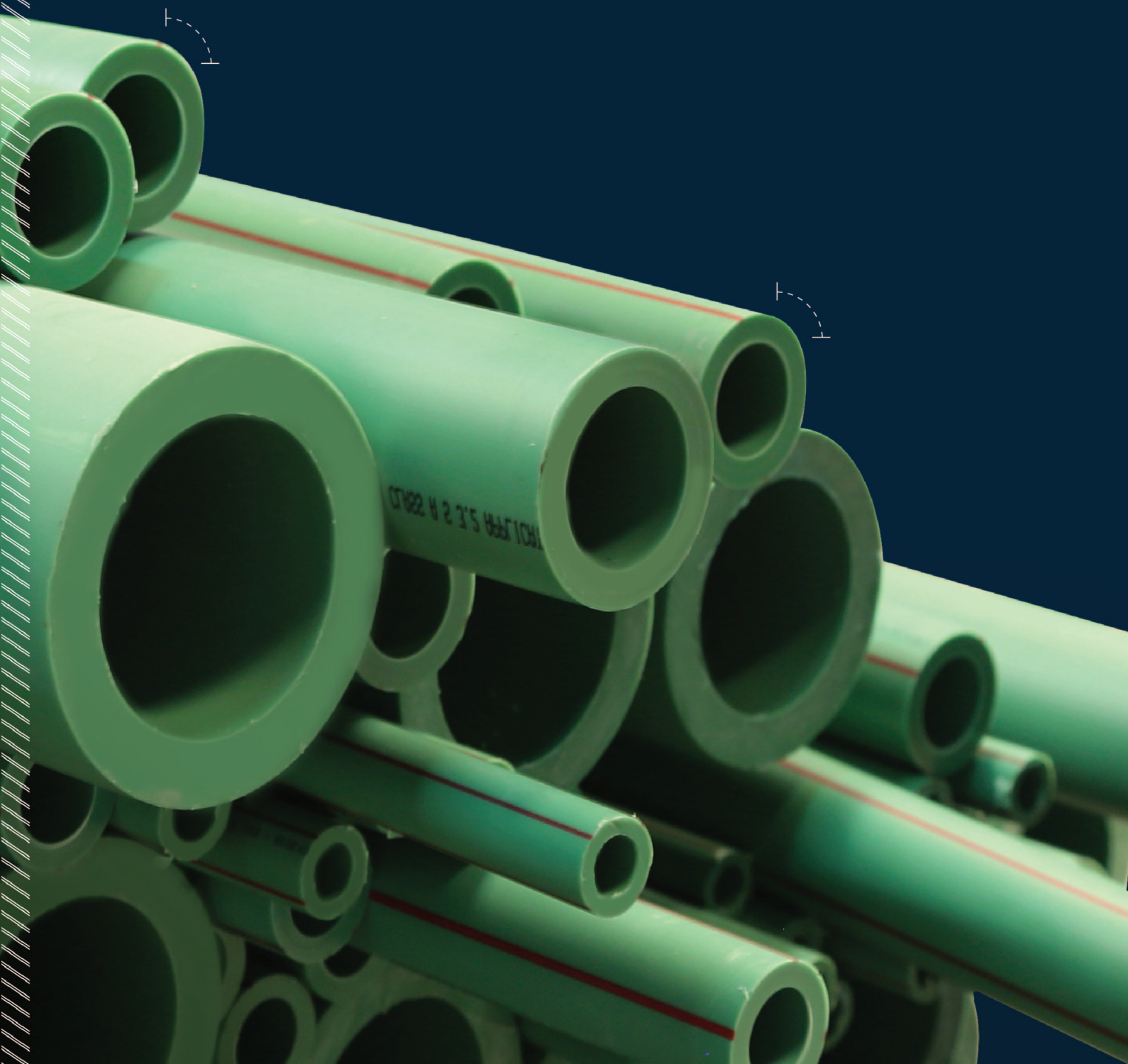




PP-RCT

ApiTherm PIPE SYSTEM

Pipes & Fittings





PIPES AND FITTINGS

APITHERM® PIPE SYSTEM IN POLYPROPYLENE RANDOM (PP-RCT)



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 influence 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 pipe 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 trouble free 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-RCT pipes and fittings under the trademark **Apitherm®**.

Apitherm® pipes are produced according to the general quality requirements of EN-ISO 15874 and strictly adhere to the dimensional requirements if EN-ISO 15874 and DIN 8077.

Raw materials used in the **Apitherm®** pipe system are certified by the Gelsenkirchen Hygiene Institute to fulfill the KTW requirements for drinking water, and certified by Süddeutsche Kunststoff Zenturn (SKZ) to fulfill the hydrostatic strength requirements in EN-ISO 15874.

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 1-15874

- Class 1 : Hot Water Supply 60° C
- Class 2 : Hot Water Supply 70° C
- Class 4 : Heating and Low temperature radiators
- Class 5 : High Temperature radiators.

FIELDS OF APPLICATION

Apitherm® pipe systems can be used for :

- Hot and cold water installation
- Drinking water supply
- Radiators connections
- Floor heating
- Wall heating
- Cooling systems

MATERIAL CHARACTERISTICS OF PP-RCT

The main characteristics of PP-RCT 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

On top of that PP-RCT exclusively offers the following traits compared to other materials:

- Enhanced Crystalline Structure
- High Temperature radiators
- Improved temperature resistance
- Better Impact Resistance
- Long Lasting

PHYSICAL PROPERTIES OF PP-RCT

Description*	Typical Value**	Unit	Test Method
Density	905	Kg/m ³	ISO 1183
Melt Flow Rate (230oC/2.16 Kg)	0.3	g/10 min	ISO 1133
Tensile Stress at Yield (50 mm/min)	25	MPa	ISO 2-527
Tensile Strain at Yield (50 mm/min)	10	%	ISO 2-527
Modulus of Elasticity in Tension (1 mm/min)	900	MPa	ISO 527
Charpy Impact Strength, notched (+23°C)	40	KJ/m ²	ISO 1/179eA
Charpy Impact Strength, notched (0°C)	4	KJ/m ²	ISO 1/179eA
Charpy Impact Strength, notched (-20°C)	2	KJ/m ²	ISO 1/179eA
Mean Linear Thermal Coefficient of Expansion from 0oC to 70oC	1.5	*10 ⁻⁴ K ⁻¹	DIN 53752
Thermal Conductivity	0.24	WK ⁻¹ m ⁻¹	DIN 52612 Part 1
Surface Resistance	>10 ¹²	Ohm	DIN 53482/VDE 0303 Part 2

* Measured on standard moulded specimens.

** Data should not be used for specification work.

LONG TERM BEHAVIOUR OF PP-RCT

The parameters that determine the long-term resistance of PP-RCT 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 :

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

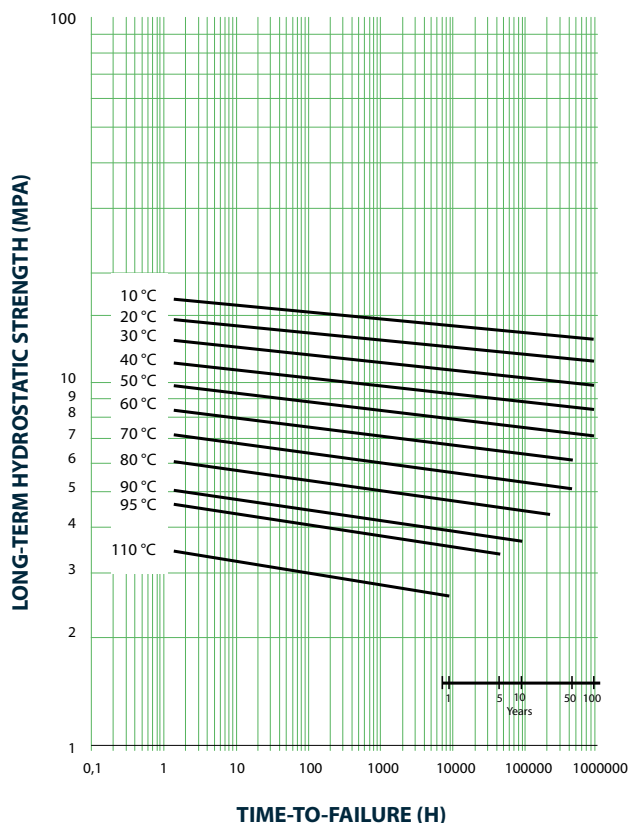
Where σ = hoop stress

P = internal pipe pressure

D = external pipe diameter

e = wall thickness of the pipe

The creep rupture diagram shows the behaviour of PP-RCT pipes under long-term pressure at different temperatures.



By extrapolating from the creep rupture diagram the hoop stress (σ) corresponding to the different temperatures, the maximum operating conditions for a Class 1 S 2,5 Apitherm[®] pipe will be the following :

COMPARATIVE PERMISSIBLE OPERATING PRESSURES BETWEEN PP-R 80 AND PP-RCT

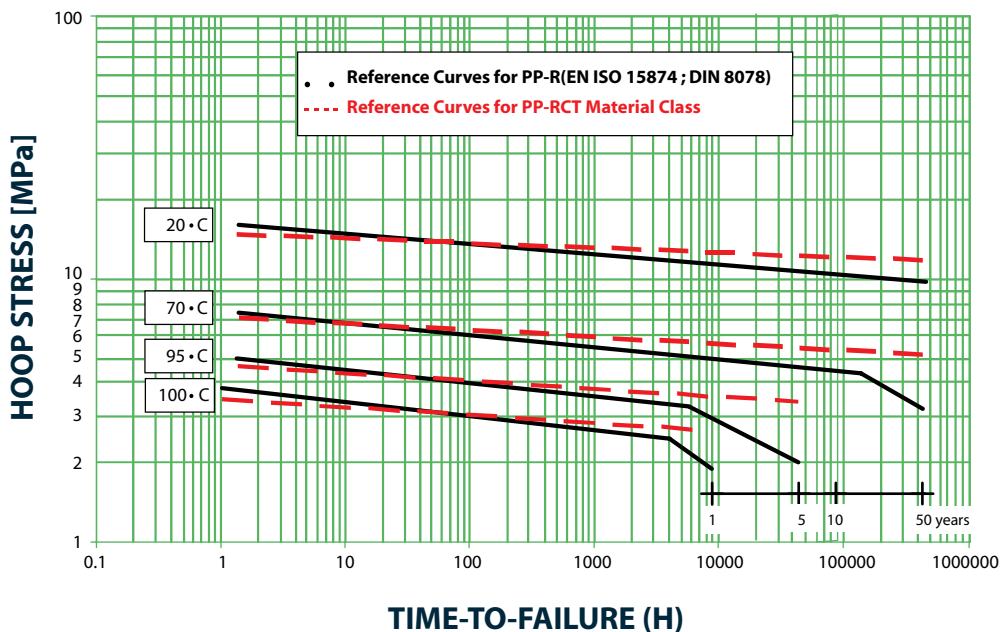
ACCORDING TO EN ISO 1587 AND DIN 80777

TEMPERATURE IN °C		S 4 SDR 9		S 3,2 SDR 7,4		S 2,5 SDR 6		S 2 SDR 5	
	OPERATING TIME (YEAR)	PP-R	PP-RCT	PP-R	PP-RCT	PP-R	PP-RCT	PP-R	PP-RCT
20	10	17,2	19,9	21,7	25,1	27,4	31,6	34,5	39,8
	25	16,6	19,6	21,0	24,6	26,4	31,0	33,3	39,1
	50	16,2	19,3	20,4	24,3	25,7	30,6	32,4	38,5
40	10	12,3	14,7	15,5	18,6	19,6	23,4	24,7	29,5
	25	11,9	14,4	15,0	18,2	18,8	22,9	23,7	28,9
	50	11,5	14,2	14,5	17,9	18,3	22,6	23,1	28,4
60	10	8,7	10,6	11,0	13,4	13,9	16,8	17,5	21,2
	25	8,4	10,4	10,5	13,1	13,3	16,5	16,7	20,7
	50	8,1	10,2	10,2	12,8	12,9	16,2	16,2	20,4
70	10	7,3	8,9	9,2	11,2	11,6	14,1	14,6	17,8
	25	6,3	8,7	8,0	10,9	10,0	13,8	12,7	17,4
	50	5,3	8,5	6,7	10,7	8,5	13,5	10,7	17,0
80	10	5,1	7,4	6,4	9,3	8,1	11,7	10,2	14,8
	25	4,1	7,2	5,1	9,1	6,5	11,4	8,1	14,4
95	5	3,2	5,6	4,1	7,1	5,2	8,9	6,5	11,3

* $S = (SDR - 1) / 2$

These Pressures do not apply for pipes exposed to UV radiations (acc to: EN ISO 15874)
(Safety factor = 1.5)

COMPARATIVE LONG TERM BEHAVIOUR BETWEEN PP80- AND PP-RCT



SERIES VS SDR FOR PP-R 80 AND PP-RCT

REQUIRED PIPE SERIES FOR PP-R AND PP-RCT FOR APPLICATION CLASS 2 (HOT WATER SUPPLY 700 C) AND CLASS 5 (HIGH TEMPERATURE RADIATORS)

Operating Pressure(bar)	Class 2		Class 5	
	PP-R 80	PP-RCT	PP-R 80	PP-RCT
4	S 5 SDR 11	S 6.3 SDR 13.6	S 3.2 SDR 7.4	S 6.3 SDR 13.6
6	S 3.2 SDR 7.4	S 5 SDR 11	S 3.2 SDR 7.4	S 4 SDR 9
8	S 2.5 SDR 6	S 4 SDR 9	S 2 SDR 5	S 3.2 SDR 7.4
10	S 2 SDR 5	S 3.2 SDR 7.4	---	S 2.5 SDR 6

$$S = (SDR - 1) / 2$$

According to EN ISO 15874

DESIGN AND INSTALLATION

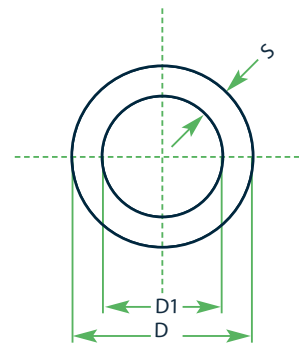
1 PIPE DIMENSIONS

(ACCORDING TO EN ISO 15874) AND VERIFIED BY



(A-523)

S = wall thickness
D = pipe diameter
D1 = internal diameter



APITHERM® PIPE CLASS 2 S 3.2 (PP-RCT).

D mm	S mm	D1 mm	weight kg/m
20	2.8	14.4	0.148
25	3.5	18.0	0.230
32	4.4	23.2	0.370
40	5.5	29.0	0.575
50	6.9	36.2	0.896
63	8.6	45.8	1.410
75	10.3	54.4	2.010
90	12.3	65.4	2.870
110	15.1	79.8	4.300
125	17.1	90.8	5.530
160	21.9	116.2	9.040

APITHERM® PIPE CLASS 5 S 2.5 (PP-RCT).

D mm	S mm	D1 mm	weight kg/m
20	3.4	13.2	0.176
25	4.2	16.6	0.270
32	5.4	21.2	0.444
40	6.7	26.6	0.686
50	8.3	33.4	1.037
63	10.5	42.0	1.689
75	12.5	50.0	2.340
90	15.0	60.0	3.360
110	18.3	73.4	5.010
125	20.8	83.4	6.470

* Apitherm® pipes Class 5 S 2.5 (dim 90 and above) will be available upon customer request

2 THERMAL EXPANSION

When installing pipes for cold and hot water supply, DIN 16928 must be observed. The linear expansion of the pipes as a function of temperature must be allowed for.

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

However, changes in length can be compensated for by a directional change or a compensating arm.

The arm length can be calculated as follows:

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

where LS = arm length in mm

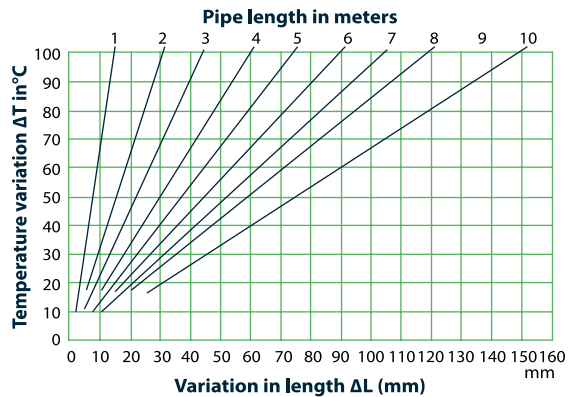
K = Material constant = 15 for PP-RCT

D = Pipe diameter in mm

ΔL = Length variation in mm

The tables shown give details about length variations together with the necessary span between supports when water service pipes are being laid horizontally.

LENGTH VARIATIONS OF APITHERM® PIPES



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



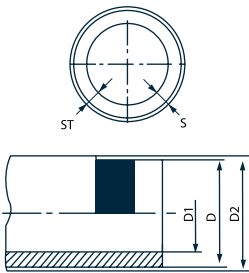
APITHERM® ALU-PIPE (UV RESISTANT)

FOR RISERS & EXPOSED INSTALLATIONS (PLUMBING & HEATING)

I- Fields of application:

Apitherm® Alu-pipe is best used in transporting Hot & Cold water in risers & exposed installations.

- Manufactured : According to EN-ISO 15874
- The external layers have thicknesses compliant with EN-ISO 15874 amendments.



S : wall PP-r thickness
 ST: Total thickness (including aluminum layer)
 D1: Internal diameter
 D: Outer PP-r diameter
 D2: Total diameter (including aluminum layer).

Alu-pipe Class 2 tested Class 5

(Alu-pipe)®		Outer Diameter	Total Diameter	Wall PP-RCT Thickness	Internal Diameter	(s) Total	Water content	Weight
ND	Meters Per Bundle	D mm	D ₂ mm	S mm	D ₁ mm	ST mm	L/m	KG/m
20 mm	100	20	21.9	2.8	14.4	3.75	0.163	0.210
25 mm	100	25	27.1	3.5	18.0	4.55	0.254	0.290
32 mm	60	32	34.1	4.4	23.2	5.55	0.425	0.466
40 mm	40	40	42.3	5.5	29.0	6.75	0.660	0.701
50 mm	28	50	52.3	6.9	36.2	8.00	1.029	1.054
63 mm	16	63	65.3	8.6	45.8	9.80	1.646	1.573
75 mm	12	75	77.3	10.3	54.4	11.50	2.323	2.190

II- Thermal Expansion

The linear expansion of Apitherm® Alu-pipe is calculated using the formula shown below :

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

where ΔL = Length variation in mm

α = Linear expansion coefficient = 0.03mm/m °C

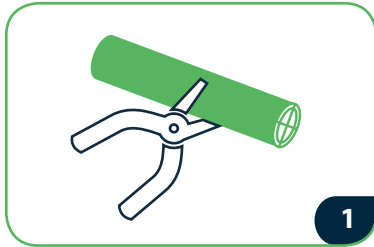
L = Pipe length in m

ΔT = Temperature variation

III- Support Intervals for Apitherm® Alu-pipe :

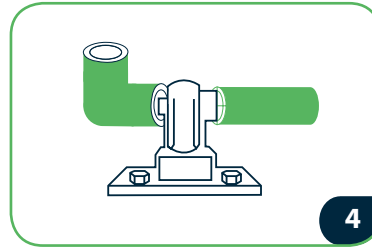
Difference in temperature ΔT °C	Pipe external \emptyset						
	20	25	32	40	50	63	75
0	155	170	195	220	245	270	285
20	120	130	150	170	190	210	220
30	120	130	150	170	190	210	220
40	110	120	140	160	180	200	210
50	110	120	140	160	180	200	210
60	100	110	130	150	170	190	200
70	90	100	120	140	160	180	190

WELDING OPERATIONS



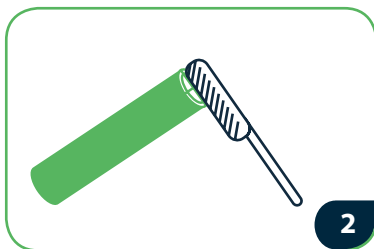
Cut the pipe perpendicular to its axis.

1



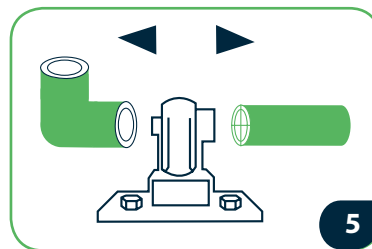
Heat the pipe and the fitting at the same time.

4



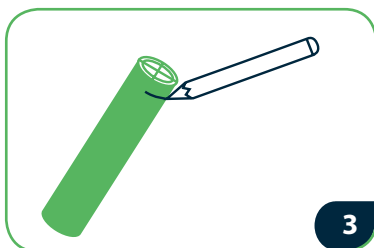
Smooth the side of the pipe you want to weld.

2



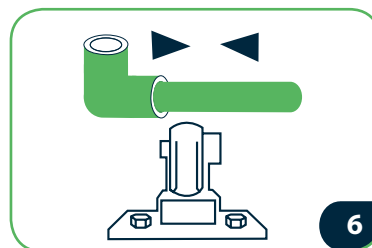
When heated, remove the pipe and the fitting from the welding device.

5



Mark the welding depth on the pipe.

3

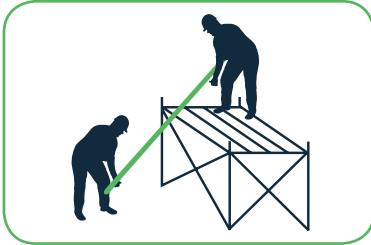


Within the allowed time interval, connect the pipe and the fitting (do not turn).

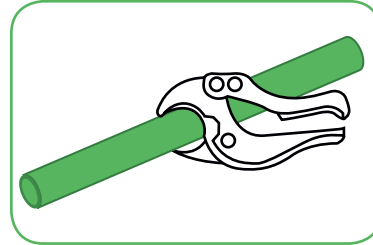
6

D mm	Depth of welding	Heating s	Processing s	Cooling min
20	14.5	5	4	2
25	16.0	7	4	2
32	18.0	8	6	4
40	20.5	12	6	4
50	23.5	18	6	4
63	27.5	24	6	6
75	31.0	30	8	8
90	35.5	40	8	8
110	41.5	50	10	8
125	42.0	60	10	8

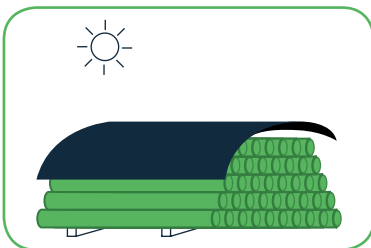
INSTRUCTIONS AND PRECAUTIONS



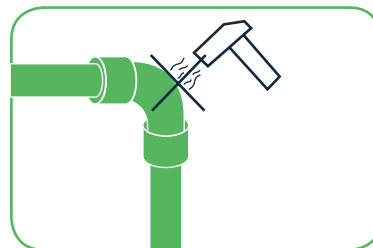
Handling must be done with care.



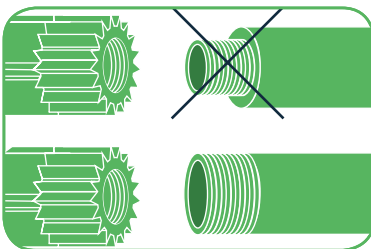
Use tools that are able to perform clean and perpendicular cuts.



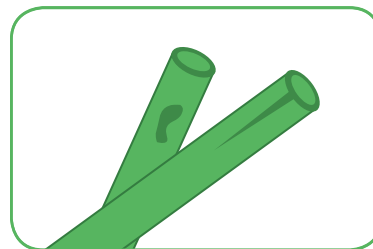
Do not expose pipes to UV radiations. Keep the pipes sheltered from sun.



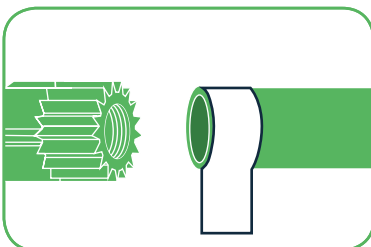
Avoid shocks particularly when working at cold temperatures.



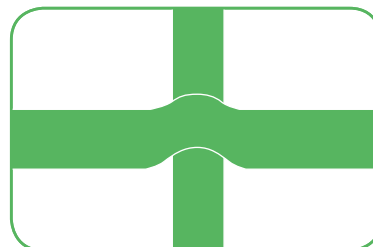
It is recommended not to use conical threads.



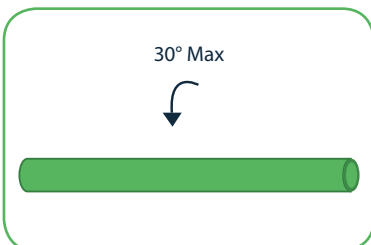
Do not use damaged pipes.



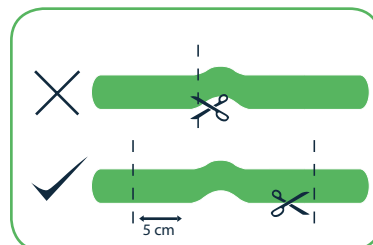
Wrap with teflon or similar tape.



In case of overlap of two pipes, use an over cross or a cross bend.



Maximum rotation of 30° within the first 3 seconds of welding if alignment is needed.



Do not cut the overcross on the bending, keep a distance of 5 cm (max) from the edge when needed.

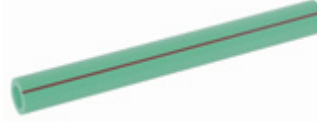
SUMMARY OF APITHERM® PIPES & FITTINGS (PP-RCT)

Diam 20 - 25 - 32 - 40 - 50 - 63 - 75 - 90 - 110 - 12

1 - Pipe PP-RCT Class 2 S 3.2



2 - Pipe PP-RCT Class 5 S 2.5



3 - Alu-pipe PP-RCT (PE coated)



4 - Coupling



5 - Reducer



6 - 90° Elbow



7 - 45° Elbow



8 - 90° Elbow Male/Female



9 - 90° bend



10 - Equal Tee



11 - Reducing Tee



12 - Cap



13 - Over Cross Class2



14 - Over Cross Class5



15 - Female Threaded Adaptor



16 - Male Threaded Adaptor



17 - Female Threaded 90° Elbow (slim design)



18 - Male Threaded 90° Elbow



19 - Female Threaded 90° Tee



20 - Male Threaded 90° Tee



21 - Body Valve



SUMMARY OF APITHERM® PIPES & FITTINGS (PP-RCT)

22 - Stop Valve Encastrée



23 - Shutt of Valve with handle Wheel, Exposed



24 - Shutt of valve Chromed handle



25 - Ball Valve Encastrée Complete



26 - Ball Valve Exposed



27 - Extension Kit



28 - Plastic Male Threaded Plug



29 - Flange Adaptor



30 - Female Threaded Elbow With Fixing Brackets



31 - Offset Bend Class 2



32 - Offset Bend Class 5



33 - Male Threaded Union



34 - Fixed Mixer Support



35 - Male Threaded Plug for Body Valves



36 - Protection Cap



37 - Electro-fusion Socket



38 - Hole Patch



39 - Cross Bend



NEW

40 - Clips for Pipes (Black & Green)



NEW

41 - Welding Saddle



NEW

42 - Male Thread for Exposed Ball Valve



NEW

1- It is prohibited to use fuel oil in APITHERM® pipes made out of **PP-R** materials.

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 **www.api.com.lb**

GUARANTEE

OUR PRODUCT

Advanced Plastic Industries (API) hereby pledges that only genuine, virgin granules of polypropylene (PP-R 80 Type3 &/or PP-RCT) raw material has been used in producing its pipe system (**Apitherm**®).

OUR TERMS OF GUARANTEE

For Local Market: (50 + 15 years)

I- Advanced Plastic Industries hereby guarantees its polypropylene pipe system (**Apitherm**®) for 50 years against faulty material.

II- Advanced Plastic Industries hereby guarantees its polypropylene pipe system (**Apitherm**®) for 15 years against faulty installation.

This guarantee begins at the end of the installation only when and after the system has been submitted to and passed the required pressure tests.

For Export Market: (15 years)

I- Advanced Plastic Industries hereby guarantees its polypropylene pipe system (**Apitherm**®) for 15 years against faulty material.

This guarantee begins at the end of the installation only when and after the system has been submitted to and passed the required pressure tests.

SCOPE OF THE GUARANTEE

All material damages and personal injuries caused by defective (**Apitherm**®) pipes and/or fittings are guaranteed up to the maximum amount of U.S.D.\$150,000.00.

This guarantee shall come into effect only provided:

1. Our instructions for installation and welding procedures have been strictly followed.
2. Proof that only genuine (**Apitherm**®) products or products approved and supplied by API have been used.
3. Within 14 days of discovery of fault, a written advice is received by API .

The Guarantee is not applicable under the following conditions:

1. Damage to product caused by accident, fire, floods or acts of God.
2. Failure of the product if it is used for other than its intended purpose.
3. If working conditions are different than those prescribed by API .
4. If incidental defects were present and recognized at the time of installation but not reported to API .
5. If components are installed with components manufactured by other parties, the warranty applies to the (**Apitherm**®) components only.
6. If goods are purchased from other than API Appointed Distributor.



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