

Advanced Piping Systems



www.almatherm.almanit.com

Introduction



35 years expertise in the line of sanitary fittings

Fully recyclable product; neither toxic nor otherwise harmful substances are used in its manufacture and/or application.

Plumber Friendly product; Nobody understands plumbing distributions better than those who work with them every day - the plumbers.

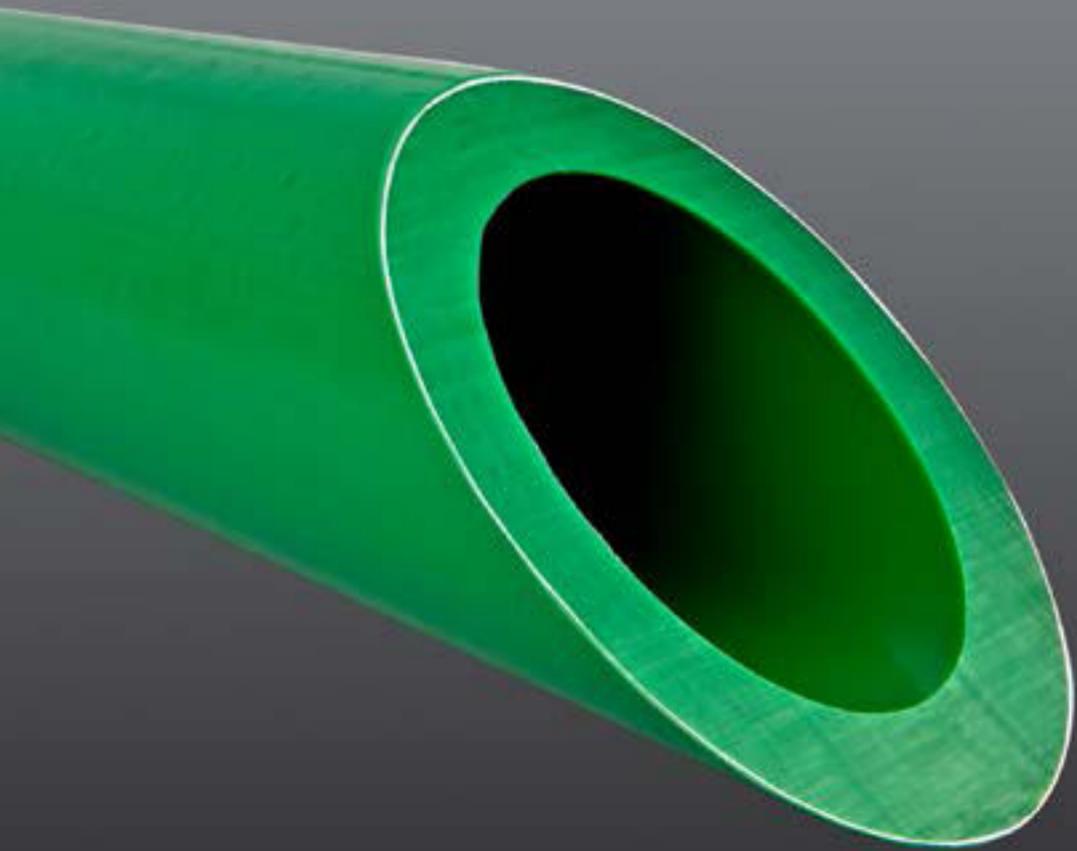
ALMATHERM Pipes & Fittings is a subsidiary company of almanit sanitary gmbh in Hamburg - Germany. We are specialized in supplying piping products and fittings for plastic piping systems of pressure and hot water (heating) distribution. Our main products are PP-R Fittings, PP-R Pipes, PP-R Stabi pipes with aluminum layer and PP-R Fiberglass composite pipes.

Our production and inspection is effected strictly according to Germany & European standards. For our PPR system production, we only use the highest-quality materials, such as BOREALIS granulates with high molecular weight and highly heat stabilized; Colour: gray/green. The material is in compliance with the recommendations of KTW, the German Federal Public Health Department (BGA). ALMATHERM pipes and fittings are in accordance to DVGW test standards, the German Technical and Scientific Association for Gas and Water. Problematic spots like plastic-metal transitions are handles without compromise - we use metal components manufactured from highest quality brass tubes and rods from Germany.

ALMATHERM PPR Pipes and fittings offer a comprehensive system for water and other fluids. We built on reliability which is crucial both for implementation companies and end users. We use only technologies that have been proven to be effective in practice.

SYSTEM CHARACTERISTICS AND BENEFITS

1. Plastic piping for interior hot and cold water distribution systems in buildings and floor & central heating systems.
2. Meeting all health requirements.
3. No corrosion and/or encrustation.
4. Exceptionally long service life while preserving high utility value.
5. Trouble - free operations with less noise.
6. Less friction losses than with traditional materials.
7. Less weight than with traditional materials.
8. Quick, easy and clean installation works
9. Resistance in aggressive environments.



ADVANCED PIPING SYSTEMS

Intended Uses

For interior hot and cold water distribution systems in buildings and floor & central heating systems:

PN 10 - cold water distribution and floor heating systems

PN 16 - higher pressure cold water distribution and DHW systems at lower pressures

PN 20 - hot water distribution systems, central heating

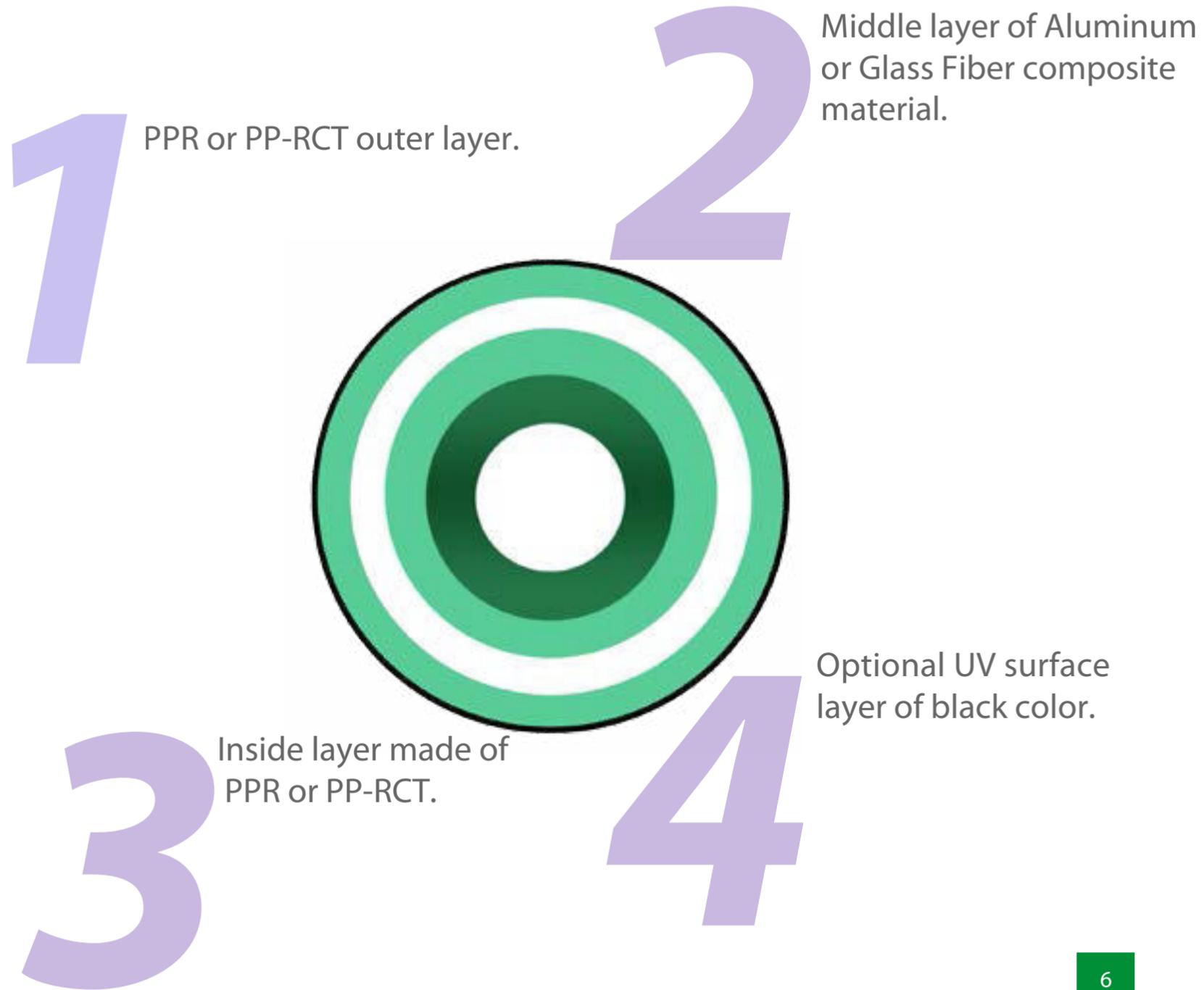
**A comprehensive wide
range of fittings and
accessories**



Varstile Piping Solutions;

- * **PPR Pipes**
- * **PP-RCT Pipes**
- * **STABI Pipes**
- * **FASER Pipes**

new Pipe generations



APPLICATION FIELDS

Water treatment plants & distribution network, Solar water heating systems, Water treatment plants & distribution network.

Industries such as Chemical plants, Petroleum & Gas plants, Oil plants, Mineral water plants, Water treatment plants, Sugar Manufacturing plants etc.

TECHNICAL SPECIFICATIONS

Material - statistical polypropylene copolymer (random - copolymer) for injection moulding and extrusion processes with excellent welding ability; nickel - plated brass fittings:

Manufacturing process - pipes are produced by extrusion, while fittings by injection moulding

Shapes - pipe lengths or coils

Assembly/fixing - the product range covers all needs for interior water distribution systems and heating system routes

Transitions for other pipe materials - implemented by threaded connections (i.e. by combined couplings) or flange connections

Coupling - standard method is poly fusion welding or by electro fitting

Surface finish - Elements are in gray and green colour without any finish, Separate metal elements - brass, alternatively nickel plated, Black identification printing on the surface.

PHYSIC - CHEMICAL PROPERTIES

Specific weight - 0.9 kg/m³

Thermal expansion coefficient - for ALMATHERM PPR pipes 0.15mm/Mk

Thermal conductivity 0.22 W/mK, fire rating - Class C3

Resistance against chemicals - PPR piping systems are intended mainly for water distribution (drinking, cold, hot, irrigation, etc.) - it is also possible to use the system for other media, in which case their concrete use is governed by DIN 8078 Bb 1 - possible to consult the manufacturer.

FEATURES & QUALITY CONSIDERATIONS

PP-R Pipes- suitable for cold and hot distribution systems covering the pressure rating PN10, PN16 and PN20.

PP-RCT Pipes- a new generation of material that enables to achieve the same or better pressure and thermal endurance with lesser thickness. The flow cross-section is higher by 20% compared to PPR Pipes.

STABI Pipes - very low thermal expansion (abt. 75% less linear expansion) with high stiffness

FASER Pipes - low thermal expansion (abt. 70% less linear expansion) with high stiffness

Qualitary considerations - PPR pipes and fittings are available in the market at different price levels. Through the naked eye, customers can not verify quality aspects which would help them to justify difference in price. The deciding factor in the PPR pipes and fittings manufacturing process is the use of correct/pure raw materials. To reduce production costs, some manufacturers tend to:

- + use PP-B and/or PP-H granulates as alternative to original PPR Type 3 granulates.
- + use PP / PE blends (obsolete generation and second generation) as alternative to original PPR Type 3 granulates.
- + include a high percentage of recycling material with original PPR granulates.

Products manufactured by using non-proper and/or low quality raw material has a great effect on quality of end products:

- + pipes and pipe fittings are no longer consisting with PPR material properties and characteristics.
- + has a direct impact on the welding quality (example: the melting point of PPR material is 140°C, that of PP-B material is about 160°C) - welding conditions become different so that the welding quality is easy to grasp. This is due to the fact that two kinds of crystalline materials used in the PP blend mix have varying melting degrees.
- + the cooling rate is different in the welding process due to the different shrinkage rates which leads then to stress concentration.
- + when the raw material is mixed with a number of recycling industrial waste plastic granulates, the pipes & fittings produced could be toxic and thus not suitable for long-term use to transport drinking water.
- + smell and black smoke appears during the welding process.
- + the life span of such pipes and fittings is rather short. Leakage problems will properly start within first few months of regular function. The repair and replacement costs in case of occupied residential units will be much higher.

Environment Friendly Products

The environmentally friendly material polypropylene PP-R used in our production is 100% recyclable and can be ground, melted and reutilised for various applications. Heavy metals such as nickel and chrome have a negative impact on our environment and thus are not used in our products. PP-R material does not react with nor affect portable water. Also there are no polluting substances either in its processing nor at time of disposal. This ensures drinking water to remain hygienic and safe for daily use.

The most important property PP-R raw material is its high resistance against heat and chemical effects. Thanks to this resistance, our ALMATHERM Pipes and Fittings are used successfully in the cold and hot water piping systems.

**Environment matters... secure
and hygienic potable water for
your personal use.**



The monomer structure of the PP-R raw material forms a random chain, thus not allowing any biological substance to be present in its body. It does not allow taste and/or smell formation. It has high resistance against chemical substances, and is corrosion resistant with zero health risks due to it being a poor conductor of electricity.

Quality Standards

ALMATHERM pipes and fittings are produced from Polypropylene Random Copolymer Type 3 as raw material having low melt flow rate, high molecular weight and good flexibility. This raw material is recommended for the production of pressure pipes including potable water transfer lines, hot and cold water transfer lines, floor heating and also for chemical industry applications. Good long term pressure resistance and easy processing and installation technique give cold and hot water systems made of PP-R pipes an advantage as alternative to the traditional systems.

Polypropylene Copolymer type 3 corresponds to German DIN standards:

- a- DIN 8077 Dec. 1997 PP Pipe Dimensions
- b- DIN 8078 April 1996 PP Pipes General Quality Requirements and Testing.

Standards Applied in Production:

- E-DIN 1988 Drinking water lines in premises.
- DIN 8078 PP Pipes general quality requirements and testing.
- DIN 8076 Pressure pipes consisting of Polyethylene metal clamping joint.
- DIN 16928 Pipe connections and components layout.
- BS 4991 Specification for propylene copolymer pressure pipe
- BS 6920 Testing to WRAS Requirements
- DVS 2207 Welding regulations for plastic pipes.
- DVS 223 Testing of welding connections of thermoplastic plastics.
- DIN 16962 Pipe joints and components for pressure pipes of polypropylene.
- DVS 2208 Machines and devices for welding of plastic pipes.
- DIN 4109 Sound insulation in building construction.
- VOB Part C Installation work of gas, water and sewage.
- DIN 18381 Lines within buildings.
- DVGW W308 Regulations and requirements for fittings, pipes & drinking water installations.

Thermal Conductivity:

the thermal conductivity of the pipes and fittings shall not exceed 0,24 W/mK at 20°C for water.

Fire classification:

ALMATHERM PP-R Pipes & Fittings comply and are classified under the requirements of the fire classification B2 (Normally inflammable) according to DIN 4102.



Certificates



Frequently Asked Questions (FAQ)

Q: Which is raw material is used to produce ALMATHERM PPR Pipe system?

A: PPR Pipe system are produced out of Polypropylene random copolymer referred to as Type III PPR (commonly known as PP-R). This raw material is obtained by cracking petroleum where by propane-monomer polymerizes with polypropylene co monomer to form Polypropylene random co polymer. ALMATHERM PPR pipe system is manufactured using granulates from Borealis RA130E being one of the best PPR raw material supplier's worlds wide. The RA130E is approved for the production of pipes & fittings according to the DIN 8078 & DIN 16962 standards.

Q: How are the Pipes and fittings manufactured using this raw material?

A: The PPR-raw material is a thermoplastic resin and is supplied in granules pre-colored. This raw material is transformed in to finished product by a rise in temperature, which plastizes the material, allowing the pipe to be produced by means of extrusion, and fittings by moulding.

Q: What do PPR Type 1, Type 2 and Type 3 refer to? What are the differences between them??

A: Plastic Pipes get more resistant as they are developed. The first produced polypropylene's structure was consisting of propylene molecules. This was called Type 1 Polypropylene Homopolymer. Later propylene molecules with mixed sequences have been added into the propylene molecules. This was called Type 2 Polypropylene Block Copolymer. Later the Type 3 product have been obtained, which has a structure including ethylene molecules regularly sequenced among the propylene molecules. Today, because of the features they posses, Type 2 and Type 3 are widely used. Type 2 is used only at cold water networks. It is not resistant to hot fluids. Type 3 could be used at hot water since it is resistant to hot fluids.

Q: Are ALMATHERM pipes UV resistant?

A: ALMATHERM PPR regular pipes and fittings are having sufficient UV stability in order to protect from UV rays. However it is not advisable to use those pipes & fittings under direct sunlight continuously. For out door installation of pipelines it is recommended to make an acrylic paint coating on pipes or protect it from direct sunlight by giving shelter covering or installing in a duct.

Q: Is insulation necessary for hot water applications?

A: Normally it is not obligatory for the plumbers; to make the insulation since the thermal conductivity of PPR piping systems is lower compared to metal piping systems (0,24 W/mK). However for centralized heating systems, to prevent heat loss and isolate the pipelines from other utilities, it is advisable to insulate these lines. The required thickness of insulation is quite lower as compared with conventional line.

Q: How can we connect ALMATHERM products to other metal systems?

A: ALMATHERM PPR system can be connected to other metal systems easily by a flange or a metal adaptor in accordance to BS 6920.

Q: What are DIN Standards?

A: Deutsches Institut für Normung (DIN) is a German institute for standardization, it is a technical and scientific association recognized by the German government as the national standards body representing German interests at International and European levels. DIN provides a forum in which representatives from the manufacturing industries, consumer organization, commerce, the trades, service industries, science technical inspectorates, and government may discuss and define their specific standardization requirements and to record the result as German standards.

Q: What are the production standards of ALMATHERM PPR?

A: Following main standards are used for the production of ALMATHERM pipes and fittings:

- DIN 8077 Polypropylene Pipes, Dimensions
- DIN 8078 Polypropylene Pipes, General Quality Requirements and Testing
- DIN 16962 Pipe Joints and Elements for Polypropylene Pressure Pipes
- DIN 1988 PART 2 Drinking Water Supply Systems, Materials, Components, appliances, Design and Installation
- DIN 16928 Pipe Joints and Elements for Pipes, Laying-General Directions
- BS 6700 Design, Installation, Testing and Maintenance of Services Supplying Water for Domestic Use within Buildings and their Cartilages
- DVS 2207 Welding of Thermoplastics
- DVS 2208 Welding Machines and Devices for Thermoplastics

Q: What is the service life (life span) of ALMATHERM PPR piping system for the different pressure groups?

A: PPR pipes have a service life of 50 years according to DIN Standards for in house applications. To have detailed information for different temperatures and pressure rates, please refer to our product catalogue.

Q: Are ALMATHERM PPR pipes used for drinking water? Are they hygienic /healthy??

A: PPR products can safely be used for drinking water. ALMATHERM PPR products have got International Approvals as well as the approvals in many sales territories.

Q: What does PN stands for, and what does it mean to be PN-10, PN-16 and PN-20?

A: PN stands for Nominal Pressure, it is numerical designation used for reference purpose related to mechanical characteristics of the component of a piping system. A PN-20 Pipe means the pipe can withstand pressure Up to 20 bars.

Q: Why are ALMATHERM fittings categorized under PN-25?

A: ALMATHERM fittings can with stand temperature above 95°C and pressure up to 25 kg/cm², hence categorized under PN-25.

Q: How are the pipes categorized as PN-10, PN-16 and PN-20 match with the SDR (Standard dimension rate) of the conventional pipes?

A: A PPR Pipe with wall thickness of OD / SDR is matched as the equivalent PPR Pipe for a SDR Pipe. For example a PN-10 pipe is regarded as equivalent to SDR 11 because; PN-10 pipe of 20mm OD has the thickness approx. of $20/11=1,80$. The PN-10 160 mm has thickness approx. of $160/11 = 14,55$. Like wise SDR 9 is matched as PN-12, SDR 7.4 as PN-16, the SDR 6 as PN-20 and the SDR 5 as PN-25.

Q: What is the intended use of different classes of Pipes?

A: PN 10 - Cold water distribution and floor heating systems PN 16 - Higher pressure cold water distribution and Domestic Hot Water systems at lower pressure PN 20 - Hot water distribution systems, central.

Q: What should be done if somebody accidentally drills a hole on the pipe?

A: If it is a nail or a drill hole (10.5 mm deep max) you may use "ALMATHERM PPR Hole Repair Kit" to repair the hole on the pipe. If the damaged part of the pipe is not concealed yet (before the pressure test is conducted), the recommended procedure is to cut out that part and replace it by a new part through normal welding of a socket.

Q: Should any precaution be taken for the installations at low temperatures?

A: At lower temperature of 0°C and below, the flexibility of PPR pipes reduces and the impact strength also reduces. This makes pipes more prone to mechanical damages against impact loads. To avoid the damages at low temperature, it is advisable to insulate the pipe lines.

Q: Does ALMATHERM PPR piping system burn?

A: ALMATHERM pipes and fittings have combustion point 330°C & burning point 360°C. These conform to B2 (Normally inflammable) class fire requirements of normal combustibility according to DIN 4102. On fire, PPR pipes & fittings emits carbon dioxide and water, other than this, carbon monoxide gas, molecular hydrocarbon and oxidation product of these are also emitted in proportion to the availability of oxygen, even if the fire is incomplete, the materials emitted are less poisonous than wood or fire from conventional pipe system in similar condition.

Q: How can the PPR pipes & fittings joined together?

A: The process of jointing PPR pipes and fittings is very simple and results in inseparable water joint. It is carried out using a simple welding machine that melts the internal surface of the fittings and the external surface of the pipe at 270°C, so that the material of the pipe and the fitting will be melded together. Since the pipes and fittings are produced from the same material, the connection usually comes as homogenous.

Q: Can the pipes alignment be adjusted after the welding process?

A: Alignment up to 5 degree relative to the axis of the pipe can be done immediately after jointing.

Q: How is the pipe cutting recommended?

A: It is advised to use sharp cutting tools to cut the pipe with no burrs, ALMATHERM provides cutting tools of sizes 20-40, 20-63, 50-110 & 160mm.

Q: How is the size of pipes and fittings measured?

A: Pipes size is measured by mm (millimetre) of its Outer Dia, PPR fittings are measured by mm (millimetre) of inner dia and Metal threaded fittings threaded side size is measured in inches.

Q: Which is the metal used in manufacturing of ALMATHERM Threaded fittings?

A: ALMATHERM threaded fittings are manufactured using heat treated 57 grade brass materials and the threading are made according to British Standards for threading.

Q: Is the connecting of a PPR pipe to a conventional pipes system using threading method recommended?

A: Connecting of pipes using threading method is not highly recommended, as this type of joining cannot be guaranteed against leakage for 50 years.

Q: How can the stressing of pipe be avoided?

A: Possible linear thermal expansion/contraction needs to be taken care during designing and installing. Stressing of pipes can be avoided by providing flexible free length and proper supporting.

Q: Is joining of pipe & fittings using the glues recommended?

A: Its is not recommended as the connection using glue cannot provide 50 years guarantee against leakage. Also it intakes the demerits of glue connecting like termite attack thus requiring frequent maintenance which in turn might effect hygienicness and long life of the piping system.

Q: How is pressure testing recommended?

A: Before any pipe are filled or cemented in concealed application the pipes are to be hydrostatically tested for any pressure loss or leak. The testing shall be done by loading the line, which is closed at all ends with end caps and pipe plugs, with water and pressured up to 25 bar pressure in PN-16 and PN-20 pipes and up to 15 bar pressure for PN-10 pipes at room temperature. The pressure shall be maintained at least for 8 hours to check any pressure drop. The same shall be repeated to confirm the minute chances of any leakage. In the event of any considerable pressure drop the particular area of leakage has to be identified and redone.

LABORATORY OPERATIONS & TEST DEVICES

1-MFI (Melt Flow Index) Test Device :

This device is used in simulating the material's flow behavior before being processed in the extruder. This device gives us information regarding the flow rate of the material in the unit temperature and time. This helps us to have information on the possible behavior of the material in the extruder. The quality Standard for this test is ISO 1133.

2- Precise Balance :

Using this balance, the weight of the material which was passed from MFI device is determined according to the standard ISO 1183 separately in the air and in the liquid whose density is known. After having these weight figures, the material's density is determined by using the specific density formula.

3- Izod-Charpy Test Device :

With this device, the amount of the energy absorption and the possible applicable force on the unit area are determined by using free falling method using materials having different weights. By doing this test, we obtain information regarding material's behavior at the different loads with sudden impacts. The standards applied for this test are TS 1004, TS 1005, ISO 179 and ISO 180.

4- Pulling-Pressing Test Device :

Using this device, we obtain information's about the maximum load strength, elasticity module (the maximum force strength per unit area), maximum tension, elongation in percentage, deformation, elongation at break point, tension at break point etc. of the product. By means of these tests we can make forecasts on the possible behavior of the material in the working conditions. In these tests ISO R 527 standard is applied.

5- Hollow Die Punch (Sampling Device):

This device is used for the preparation of the sample which will be tested in the pulling test device. The sample is prepared in accordance with Standard No. ISO 527.

6- Shore (Hardness Device):

This device is used for the determination of the material's hardness. When we apply load on the sample, if the material is too soft then it will be pressed like paper while if it is too hard then it will be broken. For this reason the hardness value of the product must be within the range of the values mentioned in the Standard No. DIN 53505.

7- Microtom Device :

This is a device used to cut small pieces which can be monitored under microscope for the purpose of inspecting the infrastructure of the material.

8- Microscope Image System :

This is a system used for monitoring the fibro structure of the material. The aim of this test is to secure for the material to have a homogeneous infrastructure. If the fibro's image is not in the linear form then it means that there is a mistake either in the production stage or in the quality of the raw material itself.

9- Furnace-Deep Freezer:

These devices are used for shock cooling or heating. In certain intervals of time impact test is applied on the material which is hold in the furnace or deep freezer and its behavior is monitored at different test temperatures.

10- Furnace :

This device is used in thermal strength test. The aim of this test is to monitor whether the length of the material exceeds more than 3 % when applied to a certain temperature for certain time. This test is important because at considerably higher temperatures the material expands and elongates but at low temperatures it shrinks. But after application of higher or lower temperatures, the material does not return fully to its normal sizes in the normal temperature. This character leads to a change from round shape to oval shape in the close pipe systems. The standard applied for this test is TS 5450.

11- Pressure Test:

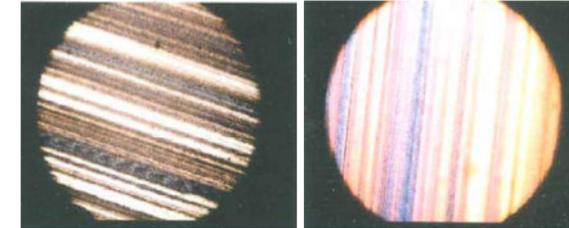
For the pipes produced according to the Standard TS 5439, to monitor the strength of the pipes to the pressure, a pressure test is applied under 100h (at 20 °C), and 165 and 1000h (at 80 °C). The standards used for this test are ISO 4427 (for PE 100), ISO 4437 (for PE 80) and TSE 10827.

12- Momentum Strength Test:

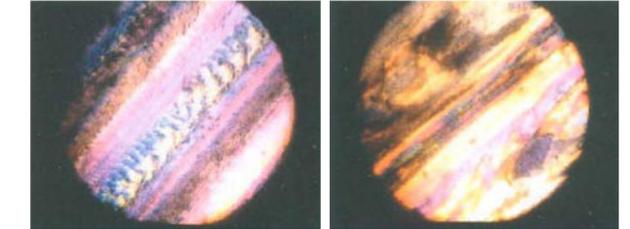
In addition to the leak test also strength test is applied with the aim of testing the harmonical work of the metal fittings with the plastic. In order to be able to apply a 95 °C temperature to the pipe it must resist to a 4 kgm momentum.

13- Cross-link Ratio Determination Test:

To monitor the success of the cross linking in the PEX pipes, a test is done according to the Standard TSEN 579. The material must have a minimum cross link ratio of 75% (for PE-Xa), 65% (for PE-Xb) and 60% (for PE-Xc and PE-Xd).



Good Fibro-Structures



Bad Fibro-Structures

Production Sizes and Tolerances in accordance with DIN 8077 / December 1997:

External Diameter d mm	Tolerance limit mm	Wall thickness S mm	Thickness tolerance mm	Approximate unit weight kg/m
16	+ 0.3	2.7	+ 0.5	0.110
20	+ 0.3	3.4	+ 0.6	0.172
25	+ 0.3	4.2	+ 0.7	0.266
32	+ 0.3	5.4	+ 0.8	0.434
40	+ 0.4	6.7	+ 0.9	0.671
50	+ 0.5	8.3	+ 1.1	1.040
63	+ 0.6	10.5	+ 1.3	1.650
75	+ 0.7	12.5	+ 1.5	2.340
90	+ 0.9	15.0	+ 1.7	3.360
110	+ 0.9	18.3	+ 2.1	5.010
125	+ 1.2	20.8	+ 2.3	6.470

Operating life time in accordance with DIN 8078 / April 1996:

Temperature (°C)	Life (y)	Design stress (MPa)
20	50	9.5
40	50	6.8
60	50	4.7
70	50	3.2
80	25	2.5
95	5	1.85

Physical Properties:

Property	Test Method	Unit	Value
Density at 23°C	ISOR 1183	g/cm ³	0.90
Melt flow index MFI 190°C/5 kg	ASTM D 1238	g/10dak.	0.70
MFI 230°C/2.16kg	ISOR 1133	g/10dak.	0,2-0,45
MFI 230°C/5 kg	DIN 53 735	g/10dak.	0,6+1,2
Fusion point		°C	146

Properties	Test Method	Unit	Value
Strength at flow limit at 23°C Speed of pulling: 50 mm/minute 100 mm/minute	ISO R 527 (Sample No 1)	N/mm ²	22
		N/mm ²	23
Extension at flow limit at 23 °C Speed of pulling: 50 mm/minute 100 mm/minute	ISO R 527 (Sample No 1)	%	17
		%	18
Break strength at 23°C Speed of pulling: 50 mm/minute 100 mm/minute	DIN 53455 (Sample No 1)	N/mm ²	35
		N/mm ²	34
Extension of break out at 23°C Speed of pulling: 50 mm/minute 100 mm/minute	DIN 53455 (Sample No 1)	%	>500
		%	>500
Elasticity module at 23°C	ASTM D 790	N/mm ²	670
Bend module at 23°C	DIN 53 447	N/mm ²	185
Shore D hardness	ASTM D 740 ISO R 868, DIN 53 505		65
IZO D impact strength (notched)at 23°C at 0°C	ISO R 180 ASTM D 256	j/m ²	105
		j/m ²	30
CHARPY impact strength (notched)at 23°C at 0°C	DIN 53 453 ISOR 179	kj/m ²	15
		kj/m ²	35
CHARPY impact strength (unnotched)at 23°C at 0°C	DIN 53 453 ISO R 179	kj/m ²	No break
		kj/m ²	
Impact strength, at 0°C	DIN 8078 Part 2		No break



almanit sanitary gmbh . Papenstrasse 23 . 22089 Hamburg . Germany
Tel.: +49 40 2513347 . Fax: +49 40 2513681 . Email: info@almanit.com