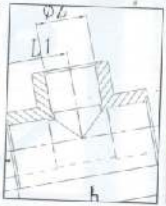


Product Range

AQUA PRIMA™

by TOUTOUNJI

PP-R Type3

www.toutounji.com

50 YEARS GUARANTEE

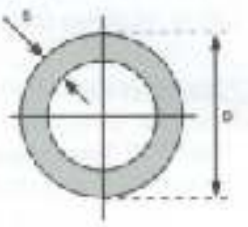
Aqua Prima PP-R Type3 Sanitary Pipes & Fittings

Aqua Prima PP-R Type3 pipes and fittings are manufactured from PP-R Type3 (Polypropylene - Random - Copolymer), which is a high molecular weight polymer and contains specifically designed stabilization package in order to prevent thermal degradation of the raw material during the piping processing and to provide outstanding performance, and chemical resistance during the usage as transferring of hot and cold water and service life of the pipe.

Features of Aqua Prima PP-R Type3 pipes:

- The specific structure of PP-R Type3 material provides the excellent mechanical strength and integrity in combination with good impact behavior and flexibility. More over it possesses a high resistance to slow crack growth, an important characteristics for the long term performance under stress. PPR pipes have 50 years of service life under 25 bar at 20°C.
  - Heat insulating and energy saving. Due to the high coefficient of heat conductivity the pipes have good insulating properties therefore minimizing energy cost by keeping heat inside. This also prevents water inside the pipes from freezing even at 0°C in winter time. In cases of temperatures below 0°C, the flexibility of PP-R Type3 pipes absorbe the volumetric extension of the water frozen inside the pipe.

  Aqua Prima PP-R Type3 pipes fulfil the requirements on materials used for, or component of articles intended to come into contact with food and is in accordance with national and international positive list for drinking water. Aqua Prima PP-R Type3 pipes are hygienic and have no adverse effect on the quality and organoleptic properties (taste & odor) of drinking water.
- For the outdoor usage where the pipes would be prone to UV light, PP-R Type3 pipes could be produced from the PP-R Type3 material containing UV light resistant additives.
- Aqua prima PP-R Type3 pipes exhibit good chemical resistance, too. For instance, fittings and pipes cope with drinking water of any pH-value a significant advantage over certain metal pipes, which start to corrode if pH-value is low.
  - PP-R pipes and fittings give no opportunity of any algae and lime depositions, bacterial growth.
  - Aqua Prima PP-R pipes have no pressure loss inside the tubes because of their smooth and correctly slippery inner wall surfaces.
  - Aqua Prima PP-R Type3 pipes and fittings are quick and easy to join with socket welding that provides homogeneous leak free joints.
- Aqua Prima PP-R pipes are light weight, easy to handle and transport.
- Fast, easy, practical and cost effective installations. Hot and coldwater pipe installation of a flat could be done and ready for usage within (one and half hours).
- Aqua Prima PP-R pipes are appropriate to be used for the installations of richer buildings, since they have pressure resistance to up 25 bar (PN25).
- Aqua Prima PP-R pipes are economical, since they are cost effective and have a long service life.



Nominal Diameter / External Diameter D mm	Wall Thickness S mm
20	3.4
25	4.2
32	5.4
40	6.7
50	8.4
63	10.5
75	12.5
90	15
110	18.4

All the heating and drinking water , sanitary systems should be tested after the installation After the test procedure is over the water in the system must be removed in order to prevent the risk of freezing of the water inside the pipes, in the case water gets frozen inside the pipes ,this will exhibit almost a pressure of 80 bar which is well above the pipe can withstand.To protect the pipe line when the building is not actively used, the main valve should be closed and water inside the pipe should be discharged

Production Range

Aqua Prima PP-R Type3 pipes are produced. 20-160 mm at PN 16.20 and 25 pressure rating, In green colors.

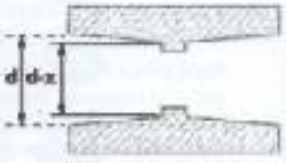
Standards

The PP-R Type3 pipes are produced in compliance with the international standards as given below, to guarantee the quality of the pipes

DIN 8077 PP pipes and dimensions

DIN 8078 PP pipes; general quality requirements and testing.

Superiority and Advantages of PP-R Type3 Fittings:



- The PP-R fittings are produced In compliance with international standards to guarantee the weld quality at the joints, In order to have a leak proof welding at the joints, fittings are manufactured by using high technology and with a special design at a higher cost. For the longer service life of the plumbing systems, the inner side or diameter of the pipe shall not reduce during socket welding for the pressure loss problems and hydraulic flow of the water.

- The other superiority of the Aqua Prima Fittings is resistance of AquaPrima metal inserts fitting to torque. As the Aqua prima metal inserts resist 6 - 7 k gm of torque, In the similar other fittings, metal and plastic parts start to rotate at 3.5 - 4 kgm of applied torque. If the force applied is increased the leakage starts.

Raw Material:

Polypropylene Random Copolymer

Aqua Prima 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 8078	Pressure pipes consisting of Polyethylene metal clamping joint.
DIN 16928	Pipe connections and components layout.
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 18351	Lines within buildings.
DVGW W308	Regulations and requirements for fittings, pipes and drinking water installations.
EnEg.	Law of energy saving.
Heiz-AnlV	Heating plant decree.

Laboratory Operations and 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 unit temperature and time. This helps us obtain information on the possible behavior of the material in the extruder. The quality Standard for this test is ISO 1133.

2) **High Precision Balance:** Using this balance, the weight of the material which was passed from the MFI device is determined 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 according to the ISO 1183 standard.

3) **Pendulum Impact (Izod-Charpy) Test Device:** With this device, the amount of 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 different loads with sudden impacts. The standards applied for this test are TS 1004, TS 1005, ISO 179 and ISO 180.

4) **Tensile-Compression Test Device**: Using this device, we obtain information 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 R527 standard is applied.

5) **Hallow 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) **Microtome 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 fibrous structure of the material. The aim of this test is to secure for the material to have a homogeneous infrastructure. If the fibre'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 held 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 a 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.

Technical Specifications

Production Sizes and Tolerances ***DIN 8077 / July 1990***

External Diameter of mm	Tolerance Limit mm	Wall thickness s mm	Thickness tolerance mm	Approximate unit weight Kg/m
20	+0.3	3.4	+0.6	0.152
25	+0.3	4.2	+0.7	0.247
32	+0.3	5.4	+0.8	0.405
40	+0.4	6.7	+0.9	0.631
50	+0.5	8.3	+1.1	0.975
63	+0.6	10.5	+1.3	1.568
75	+0.7	12.5	+1.5	2.208
90	+0.9	15.0	+1.7	3.175
110	+1.0	18.3	+2.1	4.742

Table 1

Physical Properties

Property	Iso Method	Units	Value
Density at 23°C	ISO R 1183	g/cm3	0.95
Melt flow index			
MFI 190°C/5 kg	ASTM D 1238	g/10 dak	0.70
MFI 190°C/2.16 kg	ISO R 1133	g/10 dak	0.2 ± 0.45
MFI 190°C/5 kg	DIN 53 735	g/10 dak	0.3 ± 1.2
Fusion point		°C	140

Table 2

Thermal Properties

Property	Test Method	Units	Value
Thermal Conductivity (10 - 60°C)	DIN 52612	W/m.k	0.24
Specific Heat 20°C	C	kJ/kg.k	2.0
Coefficient to linear thermal expansion (0 - 110°C)	DIN 53 752	K-1	1.51.5x 10 - 4
Under Weight Deformation temperature	ASTM D 648		
1.8N/mm2	ISO 75	°C	44
0.45N/mm2	DIN 53461	°C	72
Breaking temperature	ASTm D 746	°C	12
Vicat Softening point	AsTMD 1525		
(1Kg)		ISO 306	°C 120
(5Kg)	Din 30 460	°C	69

Table 3

Mechanical Properties

property	Test method	Units	value
Flow strength limit at 23°c Speed of pulling : 50 mm/min 100 mm/min	ISO R 527 (sample No1)	N/mm² N/mm²	34 33
Extension flow limit at 23°c Speed of pulling : 50 mm/min 100 mm/min		% %	13.5 10
Break strength at 23°c Speed of pulling : 50 mm/min 100 mm/min	DIN 53 455 (sample No1)	N/mm² N/mm²	21.5 34
Extension break out 23°c Speed of pulling : 50 mm/min 100 mm/min		% %	> 400 >400
elasticity module at 23°c	ASTM D 790	N/mm²	670
Bend module at 23°c	DIN 53 447	N/mm²	780
Shore D hardness	ASTM D 785 ISO R 868 DIN 53 505		60
2D D impact strenght (notched) at 23°c at 0°c	ISO R 180 ASTM D 256	j/m2 j/m2	22.5 6.5
CHARPY impact strength (notched) at 23°c at 0°c	DIN 53 453 ISO R 179/1eA	kj/m2 kj/m2	20 3.5
CHARPY impact strength unnotched at 23°c at 0°c	DIN 53 453 ISO R 179	kj/m2 kj/m2	No break
impact strength at 0°c	DIN 3678 Part 2		No break

Table 4

Operating life time

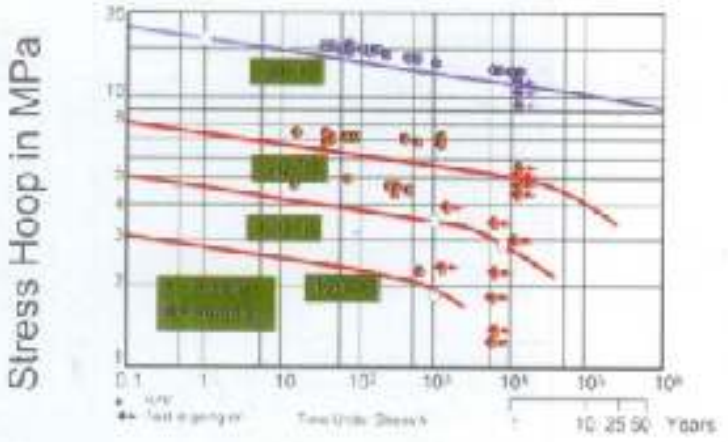
	PN 16		PN 20		PN 25	
Temp in °c	bar	years	bar	years	bar	years
20°	12.8	50	20.8	50	32.5	50
40°	6,2	50	10,1	50	23,0	50
60°			12,5	50	14,3	50
80°			7,5	25	9,2	20
95°			5,9	10	7,2	10

Table 5

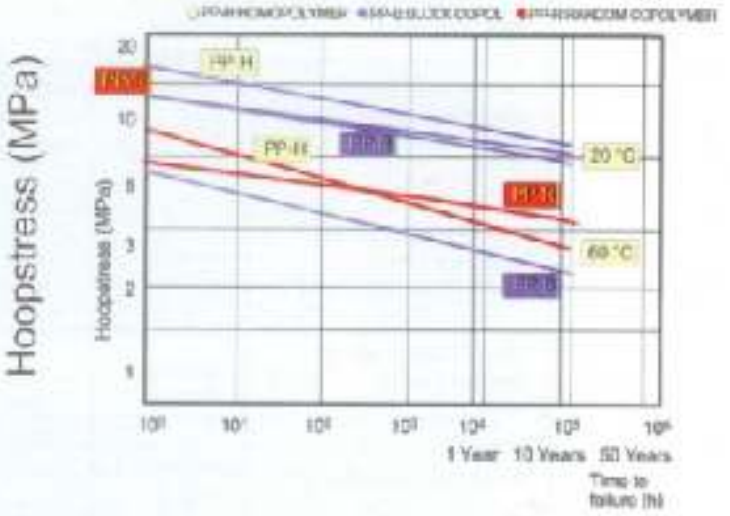
Note : For higher temperature and pressure please consult the technical department

The duration expressed in years means in the way of continuous perfect value

Break Strength for PP-R Pipes According to DIN 8078



The Comparison of the Failure Time (h) and The Design Stress (MPa) for the PP Pressure Pipes at 20°C and 60°C



Hydrostatic Pressure, P

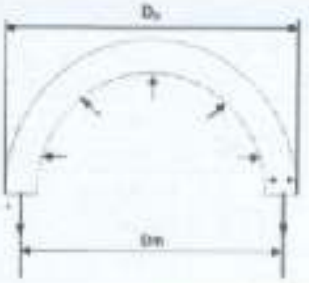


Figure 2

$$\sigma \times 2 \times S = P \times Dm$$

$$Dm = Do - S$$

$$\sigma = P \frac{(Do - S)}{2S}$$

σ : Design stress
P : Working Pressure (Mpa)
D_o : External Diameter (mm)
S : Thickness

Calculation of Thermal Expansion in PP-R Pipes

Expansion of the polypropylene pipes are relatively higher and linear expansion coefficient is 11 times greater than metal pipes. That's why in installations this expansion character must be taken into consideration.

Linear expansion coefficient of Aqua Prima pipes; Temperature is between 30-90°C The expansion ΔL (is calculated through the following formula:

$\Delta L = \lambda \times L \times \Delta T$ ΔL= Linear expansion in mm

λ= Linear expansion coefficient = $\frac{mm}{mK}$

TPG pipe (Average Value) λ= 0.183 $\frac{mm}{mK}$

L = Pipe length in mm
ΔT = Temperature difference K or °C

ΔT = Difference of temperature between hot water and ambience temperature in K or °C

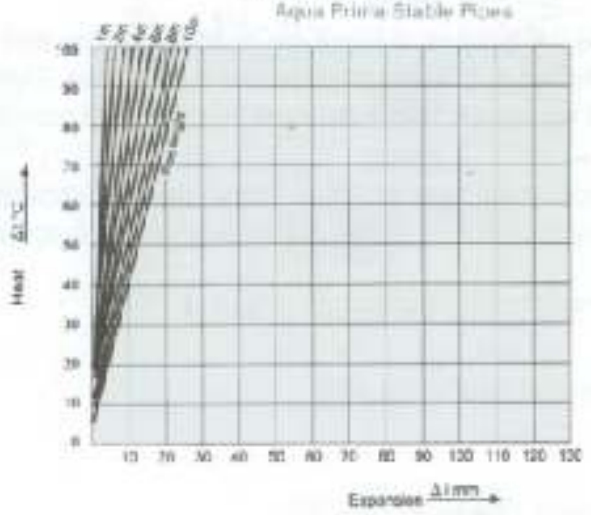
Example:
- Pipe temperature at the first installation is +16°C and pipe length is 8m.
- Minimum pipe temperature (for cold water) +9°C
- Maximum pipe temperature (for hot water) +70°C

1. Difference between pipe temperature at the first installation and minimum pipe temperatured ΔT_1 = 16-9 = 7°C
2. Difference between pipe temperature at the first installation and maximum pipe temperature ΔT_2 = 70 -16 = 54°C

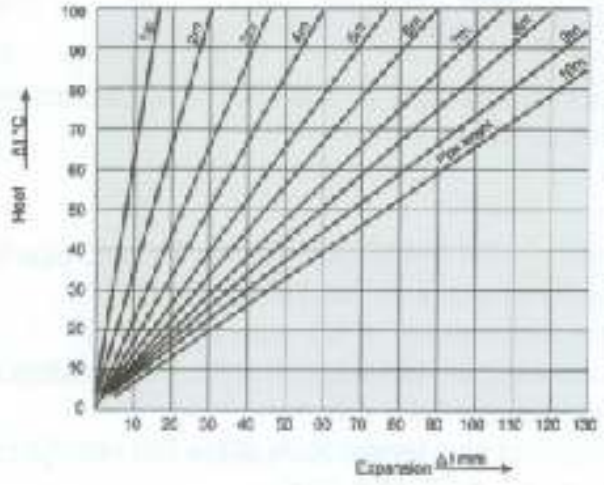
Expansion of pipe for ΔT_1
L_1 =8m x 7°C x 0.183mm/m°C = 10.2mm
Expansion of pipe for ΔT_2
L_2 = 8m x 54°C x 0.183mm/m°C = 79.0mm

Expansion Graphics for Various

Thermal Expansion Graphics for Aqua Prima Stable Pipes



Thermal Excansion Graphics for Unstable Pipes

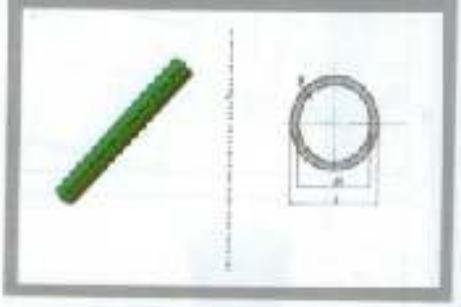


Hot water temperature : 95°C
Cold water temperature : 20°C
temperature difference T : 75°C
Expansion in one meter stable pipe can be neglected.
Expansion in one meter unstable pipe is 9 mm.
important notice: Expansions of the stable plastic pipe and steel pipe are very close to each other.

Product Range

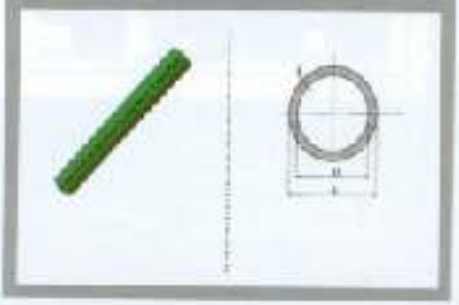
In accordance with requirments of our customers polypropilene (PPR) pipes and fittings are produced in green color. According to DIN 8077, 8078

AQUA PRIMA PP-R Pipe (PN 16)



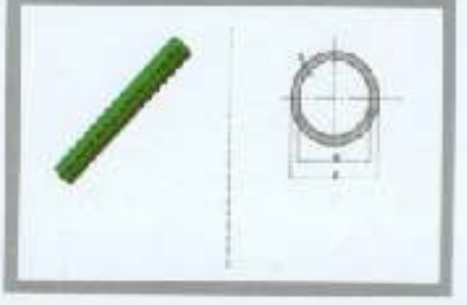
Code	d	D	s
17400001	20	14.4	2.8
17401001	25	18.0	3.5
17402001	32	23.0	4.5
17403001	40	28.8	5.6
17404001	50	36.2	6.9
17405001	63	45.6	8.7
17406001	75	54.2	10.4
17407001	90	65.0	12.5
17408001	110	79.6	15.2

AQUA PRIMA PP-R Pipe (PN 20)



Code	d	D	s
17400002	20	13.2	3.4
17401002	25	16.6	4.2
17402002	32	21.2	5.4
17403002	40	26.6	6.7
17404002	50	33.2	8.3
17405002	63	42.0	10.5
17406002	75	50.0	12.5
17407002	90	60.0	15.0
17408002	110	73.2	18.4

AQUA PRIMA PP-R Pipe (PN 25)

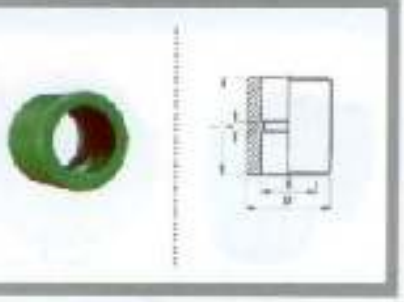


Code	d	D	s
17400003	20	12.0	4.0
17401003	25	15.0	5.0
17402003	32	19.2	6.4
17403003	40	24.0	8.0
17404003	50	30.0	10.0
17405003	63	37.8	12.6
17406003	75	45.0	15.0
17407003	90	54.0	18.0
17408003	110	66.0	22.0

N.B: We can produce PPR pipes and fittings in any color upon client requests.

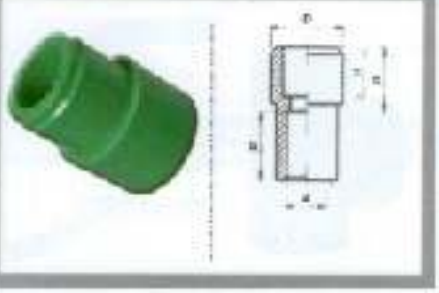
Code	d	D	l	Z
17420102	20	27.2	32	3
17421102	25	33.5	35	3
17422102	32	43.7	39	3
17423102	40	51.6	44	3
17424102	50	67.7	50	3
17425102	63	86.5	58	3
17426102	75	92.8	64	4
17427102	90	119.9	71	5
17428102	110	130.0	79	5

AQUA PRIMA Coupler



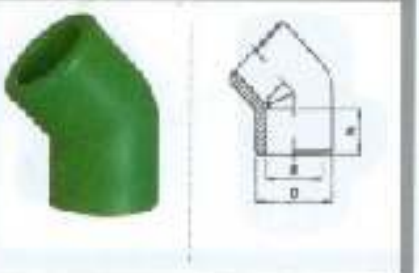
Code	d	D	L_1	L_2	L_3
17480102	20	25	16.0	23.1	16.0
17481102	20	32	18.1	20.5	23.1
17482102	25	32	18.1	18.5	18.1
17483102	25	40	20.5	18.5	26.9
17484102	32	40	20.5	19.1	26.0
17485102	32	50	23.5	22.5	30.4
17486102	40	50	23.5	22.7	31.2
17487102	40	63	27.4	25.5	43.8
17488102	50	63	27.4	24.0	42.0
17489102	50	75	28.1	38.0	34.8
17473102	63	75	27.5	25.0	46.0
17474102	63	90	33.0	25.0	28.0
17475102	75	90	33.0	35.5	35.5
17477102	90	110	37.0	39.0	42.0

AQUA PRIMA Reducer



Code	d	D	h
17440102	20	26.5	14.5
17441102	25	33.7	16.0
17442102	32	41.4	18.0
17443102	40	53.3	23.5
17444102	50	66.3	25.0
17445102	63	83.5	29.0
17446102	75	96.0	44.2
17447102	90	108.5	48.5
17448102	110	127.0	56.5

AQUA PRIMA Elbow 45°

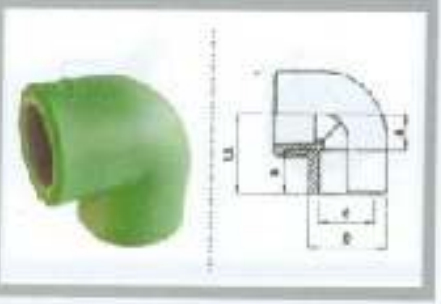


N.B: All fittings are (PN 25).

Product Range

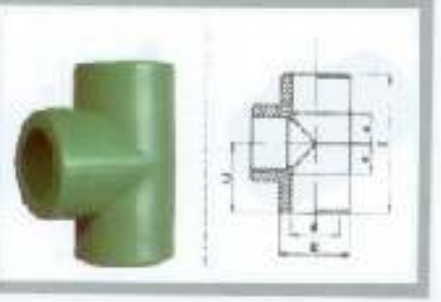
In accordance with requirments of our customers polypropylene (PPR) pipes and fittings are produced in green color. According to DIN 8077, 8078

AQUA PRIMA Elbow 90°



Code	d	D	L1	L2	L3
17430102	20	27.5	26.8	14.5	11.5
17431102	25	35.1	33.6	16.8	17.7
17432102	32	42.8	35.8	18.0	17.0
17433102	40	51.8	41.6	20.5	21.0
17434102	50	58.4	51.7	23.5	28.2
17435102	63	87.5	63.2	27.6	35.6
17436102	75	102.8	72.6	30.0	42.6
17437102	90	118.9	92.0	33.0	59.0
17438102	110	138.8	105.2	37.6	64.2

AQUA PRIMA Equal Tee



Code	d	D	L1	h	z
17450102	20	27.0	25.5	14.5	11.5
17451102	25	33.5	29.5	16.0	17.7
17452102	32	43.5	37.6	18.0	17.3
17453102	40	52.0	42.8	20.5	21.3
17454102	50	68.0	52.2	23.5	28.2
17455102	63	86.7	64.4	27.6	35.6
17456102	75	101.5	71.8	30.0	42.6
17457102	90	118.9	92.0	33.0	59.0
17458102	110	138.2	94.0	37.6	64.2

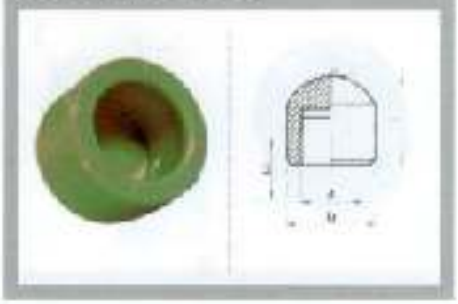
AQUA PRIMA Reduced Tee

Code	d	D	L1	h	z
17560102	25	35.5	26	56.6	19.3
17561102	32	43.5	26	71.6	19.3
17562102	32	43.5	25	71.6	24.1
17563102	40	52.0	26	85.6	19.3
17564102	40	52.0	28	85.6	24.1
17565102	40	52.0	32	85.6	30.1
17567102	50	68.0	40	104.6	30.3
17568102	50	68.0	25	104.6	24.1
17569102	50	68.0	32	104.6	31.1
17559102	63	86.7	25	125.8	19.3
17569112	63	86.7	25	125.8	24.1
17569122	63	86.7	32	125.8	31.1
17569132	63	86.7	40	125.8	38.9

N.B: We can produce PPR pipes and fittings in any color upon client requests.

Code	d	D	l
17460102	20	29.3	27.3
17461102	25	34.9	31.8
17462102	32	43.7	37.9
17463102	40	52.3	37.8
17464102	50	64.7	43.0
17465102	63	83.5	48.2
17466102	75	99.6	52.0

AQUA PRIMA End Cap

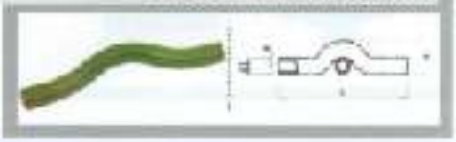


Code	d	D	l	h
17413302	20	31.5	3.4	48
17414302	25	31.5	4.2	58

AQUA PRIMA Cross-Over with coupling ends

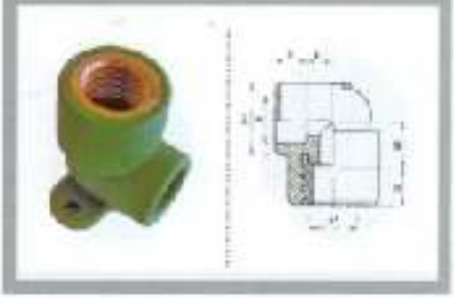
Code	d	D	l	h
17414102	20	31.5	3.4	48
17415102	25	31.5	4.2	58

AQUA PRIMA Cross-Over



Code	d	D	l	R"
17493102	20	29.9	20	1/2"
17494102	25	43.5	25	1/2"
17495102	25	52.0	25	3/4"

AQUA PRIMA Flush Wall Bracket Mounted



N.B: All fittings are (PN 25).

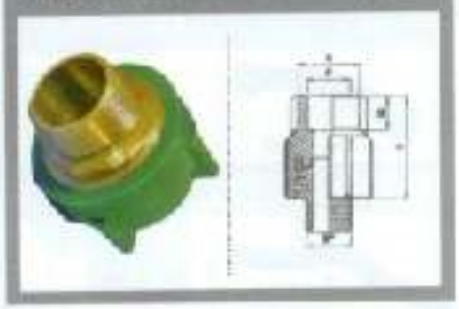
Product Range

In accordance with requirements of our customers polypropylene (PPR) pipes and fittings are produced in green color, According to DIN 8077, 8078

AQUA PRIMA Brass Female Adaptor

Code	d	D	l	l1	R"
17510102	20	26.1	43.5	14.5	1/2"
17511102	25	35.6	46.4	16.0	1/2"
17512102	25	35.1	46.4	16.0	3/4"
17513102	32	44.0	49.8	18.0	1"
17514102	40	54.1	55.2	20.5	1 1/4"
17515102	50	63.2	55.4	22.5	1 1/2"
17516102	63	63.2	58.6	24.4	2"

AQUA PRIMA Brass Male Adaptor



Code	d	D	l	l1	R"
17520102	20	28.1	43.5	14.5	1/2"
17521102	25	35.3	46.3	16.0	3/4"
17522102	25	35.8	46.4	16.0	1/2"
17523102	32	44.8	49.8	18.0	1"
17524102	40	56.1	55.2	20.1	1 1/4"
17525102	50	56.3	52.4	22.1	1 1/2"
17526102	63	66.2	55.7	22.3	2"

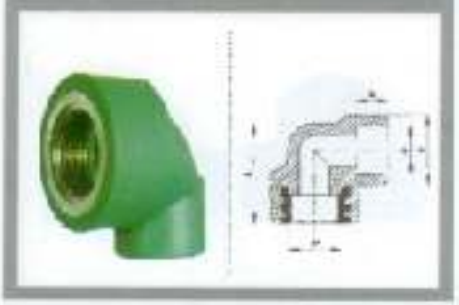
AQUA PRIMA Transition Joint Hexagon Female (Brass Unvalced - Screwable)

Code	D	R"
41110338	20	1/2"
41110339	25	3/4"
41110340	32	1"
41110344	40	1 1/4"
41110345	50	1 1/2"
41110346	63	2"

N.B. We can produce PPR pipes and fittings in any color upon client requests.

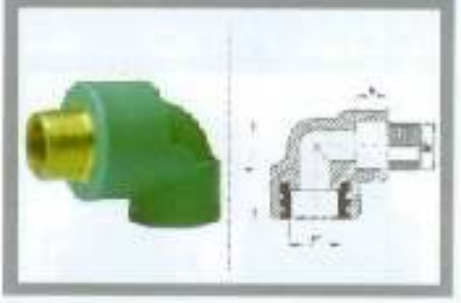
AQUA PRIMA Brass Elbow Female 90°

Code	d	D	h	IR"	
17492102	20	31.5	14.5	50.3	1/2"
17491102	25	34.5	16.5	54.3	1/2"
17493102	25	34.5	16.5	54.3	3/4"



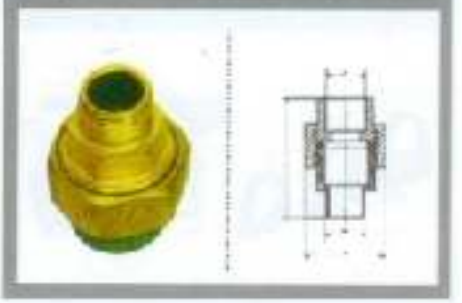
AQUA PRIMA Brass Elbow Male 90°

Code	d	D	h	IR"	
17490102	20	31.5	14.5	50.3	1/2"
17499102	25	34.5	16.5	54.3	1/2"
17499132	25	34.5	16.5	54.3	3/4"



AQUA PRIMA Transition Joint Hexagon Male (Brass Unwelded - Screwable)

Code	D	R"
41110835	20	1/2"
41110836	25	3/4"
41110837	32	1"
41110841	40	1 1/4"
41110842	50	1 1/2"
41110843	63	2"

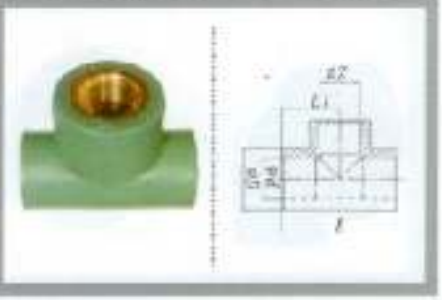


N.B: All fittings are (PN 25)

Product Range

In accordance with requirments of our customers polypropylene (PPR) pipes and fittings are produced in green color, According to DIN 8077, 8078

AQUA PRIMA Brass Tee Female

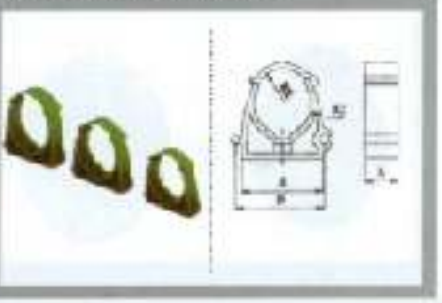


Code	d	D	h	l	R"
17500102	20	28.8	27.15	31.65	1/ 2"
17501102	25	35.3	37.30	31.85	1/ 2"
17502102	25	34.9	37.00	32.15	3/ 4"

AQUA PRIMA Brass Tee Male

Code	d	D	h	l	R"
17504102	20	28.8	27.15	31.65	1/ 2"
17505102	25	35.3	37.30	31.85	1/ 2"
17506102	25	34.9	37.00	32.15	3/ 4"

AQUA PRIMA Pipe Clips

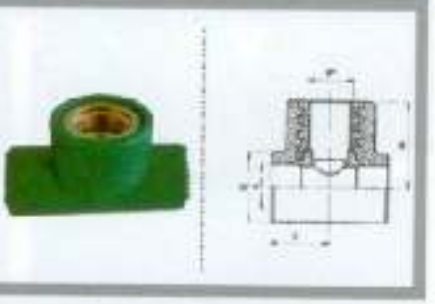


Code	o	d	D	h	l	R"
17470102	20	21.65	34.40	14.50	11.50	13.00
17471102	25	28.70	38.75	14.85	12.50	12.50
17472102	32	45.55	47.90	15.75	16.00	15.75

N.B: We can produce PPR pipes and fittings in any color upon client requests.

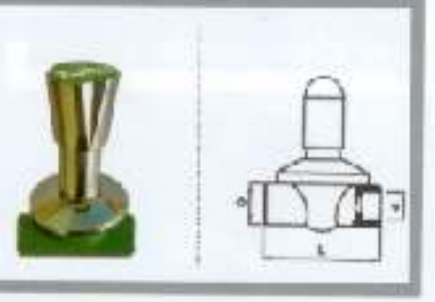
Code	d	D	l
17533102	20	29.0	69.2
17533102	25	35.6	87.9

AQUA PRIMA Tee Valve



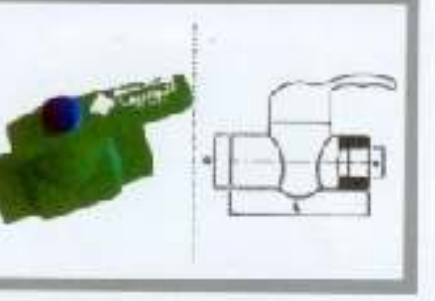
Code	d	D	l
17540102	20	29.6	58.2
17541102	25	35.6	87.9

AQUA PRIMA Chromed Valve



Code	d	D	l
17542102	20	27.5	67
17543102	25	36.2	102
17544102	32	42.3	90

AQUA PRIMA Ball Valve



N.B: All fittings are (PN 25).

Product Range

In accordance with requirments of our customers polyproplene (PPR) pipes and fittings are produced in green color, According to DIN 8077, 8078

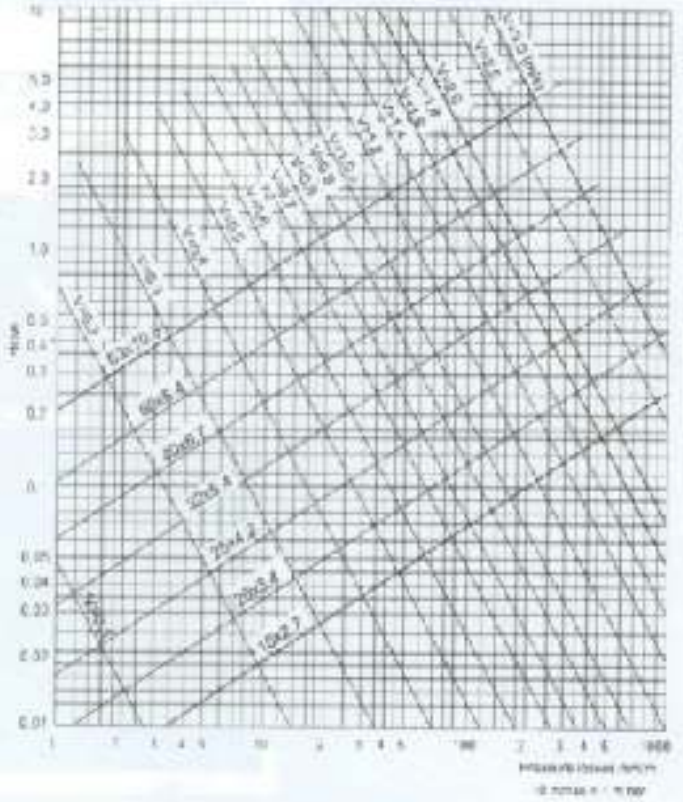
AQUA PRIMA Welding Machine	Code	Type
	10000002	Single 20 32 mm unit

AQUA PRIMA Pipe Scissors	Code	Type
	10000004	Usable for pipes until 32mm dia.

Complete Welding Set	Code	Type
	10000001	Complete Set

N.B: We can produce PPR pipes and fittings in any color upon client requests.

plain pipe pressure loss occurred in 50 meters long pipe used in a normal flat



PP-R PIPES

Ø Fitting Diameter	16 20 25	32 40	50 63	≥63
Type	Resistance Coefficient			
	1,5	1,0	0,6	0,5
	2,0	1,7	1,1	0,8
			0,3	
			1,5	
Pipe entry			0,5	
Pipe exit			1,0	

Table 7 : these values can be used in calculating the resistance of fittings . the average value % 3-5 must be added to the total pressure lost .

Dimensions of connection pieces for taps

Taps (water source)	Debi l/s	average flow rate m/s	flow	Annular recess
Filtered installation				
Head with filter DN 15	0,15	1,41	1,0	16
Side filtered head DN 15	0,06	0,47	1,0	16
Head with filter DN 20	0,18	1,77	1,0	16
Head with filter DN 25	0,31	—	1,0	20
Bath basins				
Mixed water valve DN15	0,15	1,41	1,0	16
Mixed water valve DN20	0,4	1,57	1,0	25
Mixed water valve DN25	1,0	2,36	1,0	32
Toilets				
Siphon DN 15	0,7	1,65	1,2	32
Siphon DN 20	1,0	2,36	1,2	32
Siphon DN 25	1,0	2,36	1,2	32
Siphon case DN 15	0,13	1,25	0,5	16
Toilet (flux valve)				
Siphon DN 15	0,3	1,84	1,2	20
Siphon case DN 15	0,13	1,25	0,5	16
Bide				
Mixed water valve DN15	0,07	0,66	1,0	16
Hospital outlet				
Mixed water valve DN15	0,12	1,13	1,0	16
Siphon DN 20	1,0	2,36	1,2	32
Outlets				
Flow valve DN 15	0,12	1,13	1,0	16
Mixed water valve DN15	0,12	1,13	1,0	16
Sinks				
Mixed water valve DN15	0,07	0,66	1,0	16
Mixed water valve DN20	0,02	1,18	1,0	16
Sinks				
Flow valve DN 15	0,07	0,66	0,5	16
Mixed water valve DN15	0,07	0,66	1,0	16
Flow values without extra flow resistance				
DN 15	0,3	1,84	0,5	20
DN 20	0,5	1,97	0,5	25
DN 25	1,0	2,36	0,5	32
Mixed water valve DN15	0,15	1,41	1,0	16
Mixed water valve DN 20	0,30	1,84	1,0	20
Dish washing machine	0,15	1,41	1,0	20
Washing machine	0,25	1,53	1,0	20
Gas and electric boiler				
9 kw	0,07	0,65	1,0	16
12 kw	0,1	0,99	1,0	16
18 kw	0,15	1,41	1,0	16
21 kw	0,17	1,61	1,0	16
24 kw	0,2	1,89	1,0	16
33 kw	0,3	1,84	1,0	20
Electro thermosiphon DN15		1,84		
Low pressure		1,41	1,0	16
Electro thermosiphon DN15	0,15	1,41	0,05	16

Table 10 : For the armature not available in this table , see the list in DIN 1988 standard .For the hot water producing appartatus (water heaters, etc.) the instructions of the producer must be taken into considertion.

Installation/ Project Design

PP-R pipes can be installed on or in the walls. The unit weights of these pipes and fittings are 17 times less than metal pipes, Installation of PP-R pipes is more practical, easier, quicker, cleaner and cheaper.
If these pipes are layed in open area, in the project designing stage, an axial motion compensation must be calculated and considered.
In case the direction of expansion can not be directed into one way then free bending pieces or pieces with shape must be used. In the sleeve joint points plastic units must be used in order not to make any damage on the pipe surface.

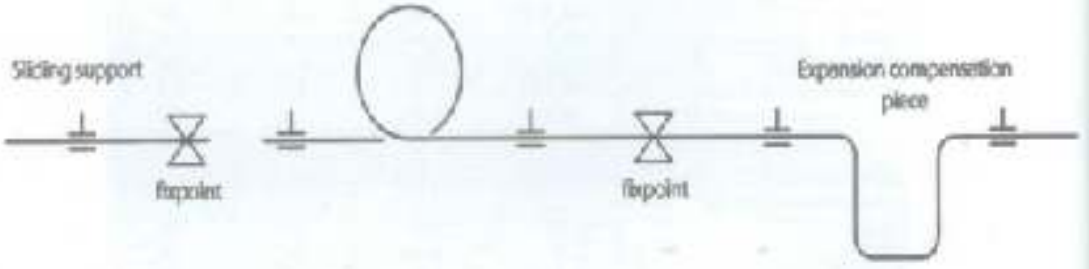


Figure 3 Compensation of expansion in pipe line.

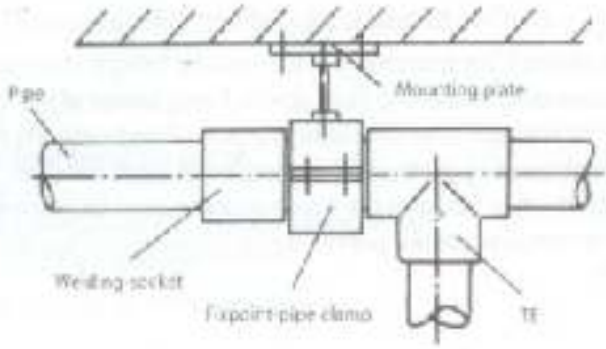
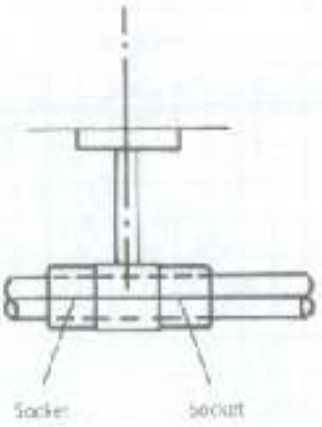


Figure 4



In the figures the application of fixed points are presented.When forming the fixed points, the extra forces like Weight of the pipe, circulation in the medium and the additional loads which cause linear expansion in the pipe length must be considered .

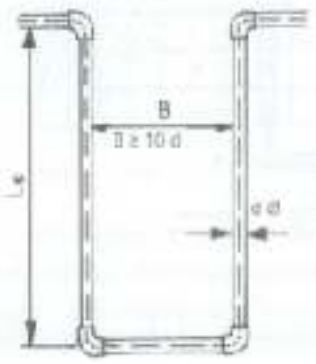


Figure 5 Example for an expansion compensation for PP-R pipes and fittings

Figure 6 Sliding support

Fixed supports prevent any movement of the pipe by fixing it at some points. Fittings are used in creating fixed points. Fixing power of the fixed supports must be stronger than the sliding supports. Fixed supports must not be installed at bending parts and the direction changes must be done in the pipe itself. In between the fixed supports some arrangements must be done to compensate any potential elongation or shrinkage in the pipe length.

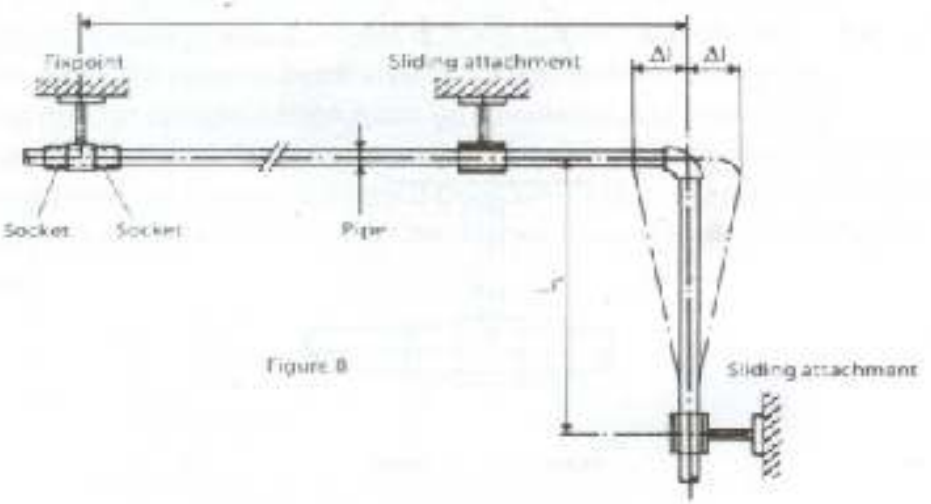


Figure 8

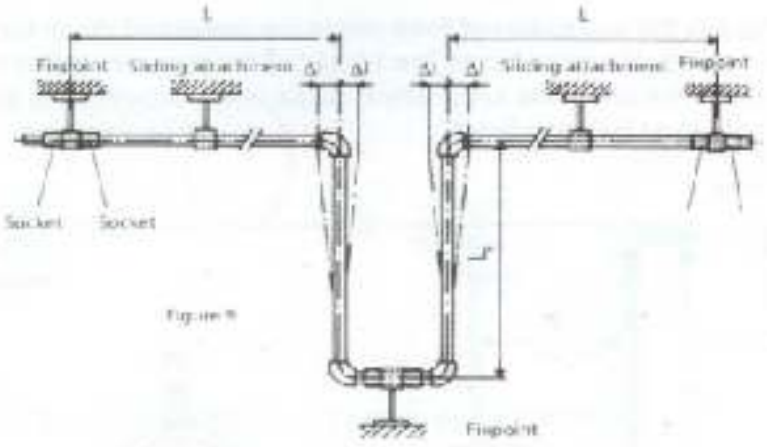


Figure 9

Figure 8 and 9 show the effect of elongation or shrinkage in pipe length and its compensation.

For having enough elasticity, in application the length of bending side of the pipe is important. this can be calculated as follows.

Ls =k. √d. ΔL
in the formula
Ls =Length of free bending piece
L = length of pipe
k = constant coefficient for dizayn pipes = 30
ΔL = elongation or shrinkage in mm
d = Outside diameter of TPG pipe in mm

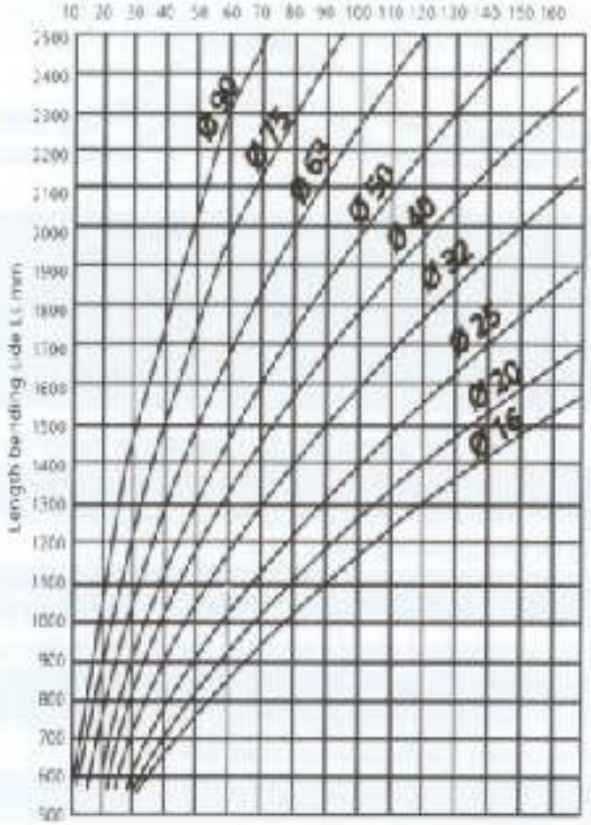


Figure 7: Length bending side (Ls) depending on extension

Expansion or shrinkage compensation arrangements can be installed in buildings very easily . for making one expansion loop as in fig .5 ,Four elbows will be enough . the necessary length of free bending piece (Ls) can easily be calculated from the formula above or by using the figure 7. (see above)

Welding Technique

For straight pipes having length more than 6 meters, to compensate the expansion an expansion piece must be used. Crossover should be used at the junctions of the laid pipes. For crossover piece (figure 10) 20 mm, 25 mm and 32 mm sizes are available.

Figure 10

The quality of each installation system ultimately depends on the tightness, stability and lifetime of its connections. The homogeneous connection of Aqua Prima pipes by fusion welding by means of welding sockets gives us an absolutely safe pipe connection and guarantees utmost operational safety.
It takes only a few seconds to make a connection by fusion welding process. After a couple of minutes, the welded joints cool down sufficiently and can be fully loaded. Using the welding device heat the cut pipe and join it with the heated fittings. Then put both parts straight together, without twisting. All done. Simply with little effort and perfect result. The welding process is that safe because the properly heated parts of polypropylene creates a homogeneous connection.

Guidelines for Welding Process

1. Choose the proper heating piece and mount it on the welding machine.
2. Switch the welding device on. Control lamp and switch lamp will light.
3. When ready, the control lamp gets off, then it means that welding temperature (260 °C +/- 10 °C) has been reached.
4. Place the pipe end and the piece to be welded on the welding machine properly.
5. If welding devices, pipes and fittings are dirty, clean them with a cloth and alcohol-water solution.
6. When heated up after a few seconds, remove the pipe and form piece from welding machine and connect the two heated end applying a little pressure without twisting. Let it cool down for a few seconds.

The processing times, like heating, fusion and cooling, are shown in the table below. Please keep in mind, that different pipe diameters need different processing times. The welded unions have to be kept in a tight condition during the cooling down.

Guidelines for welding Aqua Prima PP-R pipes and fittings **(according to guideline 2207 part 11)**

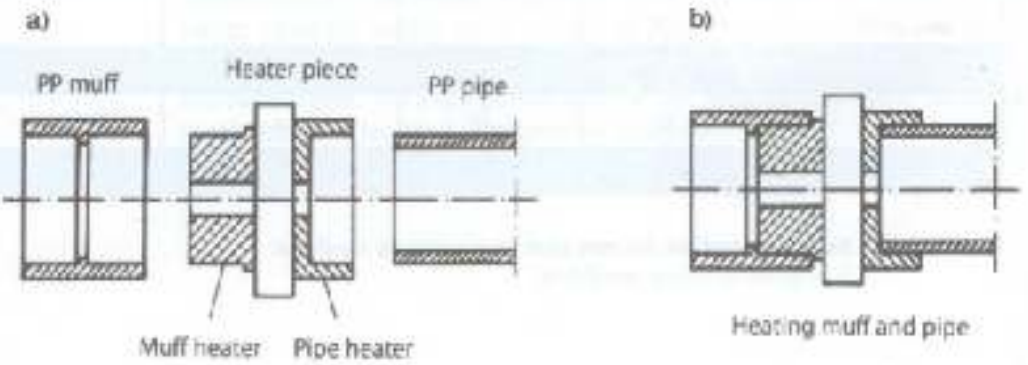
Outer diameter of pipe (in mm)	Heating up (sec.)	Processing (sec.)	cooling period (min.)	DVS 2207
20	5	4	2	Manual
25	7			Welding
32	8			Machine
40	12	6	4	
50	18			
63	24	8	6	Welding
75	30	10	8	Machine
90				

Important: **Before operation, be sure that your welding machine is in good working condition.**

Mounting of Pipes and Fittings

After cutting the pipe to the desired length, you can make all connections by fusion welding machines economically and easily. Since PP-R pipes are light and flexible, their transportati and installation is easier.
Under the tough conditions at site, the system proves its quality for top safety level, Aqua Prima installation system is using advanced techniques without giving up habitual parts like tees and fitting which, by means of the fusion welding process make your installation just like one piece, from basement to roof. The reliability of the Installation of the pipes depends on the quality of the sub-materials and the perfection of welding operation. Perfect quality and high efficiency with Aqua Prima products are your keys to success.
There are two main connection methods ;

a) Threaded fittings
Its connection method is the same as in galvanized pipe installation.
b) The Connection realised by fusion welding
b.1.) Two edges of pipes and fittings are heated by welding machine and connected to each other.
b.2) In this system electrofusion technique is done by using the right fittings which was produced for this purpose.
The principle of muff welding is shown in the figure, as below.



When necessary polypropylene pipes can be bent by heating but the pipes should not be put on flame. Heating should be done by hot air blowing device.
To bend the pipes, they should be heated up to 140 °C Advised minimum radius for bending are shown in table 13. Support clamp on the horizontally installed pipes depends on spans, raw material of pipes, thickness, weight of full pipe and the temperature of the system. The ideal support clamp is shown in figure 12. The same system is also advised for the vertically installed pipes.

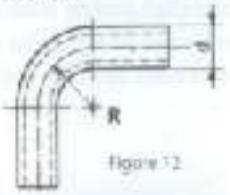


Figure 12

d	Spans between wall support clamp according heat cm						
mm	20°c	30°c	40°c	50°c	60°c	70°c	80°c
20	80	75	70	70	65	60	60
25	85	85	85	80	75	75	70
32	100	95	90	85	80	75	70
40	110	110	105	100	95	90	85
50	125	120	115	110	105	100	95
63	140	135	130	125	120	115	105
75	155	155	140	135	130	125	120
90	170	160	155	150	145	140	135
110	185	180	170	165	160	155	150

Table 12 Spans between wall support clamp for PP-R pipes

Pipe d	Bend radius, min. dR = 8 x d
20	160
25	200
32	256
40	320
50	400
63	500
75	600
90	720
110	880

Table 13 Bending radius for PPR pipes

Application in the network chimney

Taking into consideration the fact that by the passage of time the pipes may expand linearly, in making the connections at the apartment entries from the column shaft in the network outlet a precaution must be taken using one of the following techniques:

1) This connection can be installed at a separate distance from the wall.

2) The hole for the entry to the apartment may be done larger.

3) A branch is used to enter the apartment.

Pressure Measurement

DIN 1988 standard requires the application of pressure tests for the drinking water systems. The test pressure must be minimum 1.5 times greater than the working pressure. Because of the nature of the material, our pipes normaly undergo an expansion upon application of pressure. The test results can also be affected by the difference in the temperatures of the pipe and the medium. A temperature change of 10°C leads to a pressure change of about 0.5 bar up to 1.00 bar. There fore the possible constant temperature must be supplied in the test medium of synthetic pipes.

The pressure test is performed in 3 steps being preliminary test, main test and final test. For the preliminary test a pressure which is 1.5 times higher than the possible working pressure is applied and this is repeated two times in 30 minutes with intervals of 10 minutes. After a test period of 30 minutes, the test pressure must not be dropped more than 0.6 bar and no leak must occur.

Main test must follow the preliminary test. Test time is two hours, in doing so the test pressure taken from the preliminary test must not be fallen more than 0.2 bar.

After completion of the above mentioned tests, comes the final test which has to be done under a test pressure of 10 bar and 5 bar in the intervals of 15 minutes. Between the respective test courses, pressure has to be removed.

No leakage must be observed at any point of installation being tested. Measurement has to be done using a manometer, wich permits a perfect reading of 0.1 bar pressure change. the manometer is to be positioned at the deepest point of the installation . A record of the pressure test has to be prepared and signed by the ordered and contractor with statment of place and date .

Control Schedule

Start of the test:_____ End_____Test period Contractor : _____

Client : _____

Place : _____ Date : _____

Insulation

Pipes must have the following insulating thickness of a ply connect on a thermal conductivity
λ = 0.035 W/mK:
Nominal Pipe Diameter Insulation thickness
⩽20 20mm.
Ø 22-Ø 35 30mm.
Ø 40-Ø 100 as pipe diameter
Ø>100 100mm
The insulating thickness of a ply can be reduced, because of the Insulation characteristic of the Aqua Prima pipes:

See table 14

Pipe external diameter	Suitable insulation thickness for λ= 0.035w / m.k	Extra insulation thickness to be added to Aqua Prima pipes	
		λ = 0,035 w / mK	λ =0,04 w /mk
20x3.4	20mm	18.2mm	22.7mm
25x4.2	30 mm	27.5mm	34.7 mm
32x5.4	30mm	27.3mm	34.5 mm
40x6.7	40 mm	35.5 mm	45.1mm
50x8.4	50mm	45.7 mm	57.7 mm
63x10.5	63 mm	57.5 mm	72.9 mm
75x12.5	75 mm	68.5mm	86.1 mm
90x15	85 mm	77.2mm	97.3 mm
110x18.4	97mm	87.2mm	109.1 mm

Table 14


SITE PLAN
MAIN
AQUA PRIMA
اكوابريما
PPR. TYPE 3
BATHROOM
DINNING ROOM
15'X13'
PANTRY

Resistance of PP-R pipe to different chemicals

Following material	Concentration	Resistance 20°C	Resistance 60°C	Resistance 100°C
Adipic acid	TR	●	●	–
[illegible] acid	H	●	●	–
Aluminium [illegible] Sulphate	GL	●	●	–
Aluminium chloride	GL	●	●	–
Aluminium Sulphate	GL	●	●	–
Aqua regia (HCL/HNO3)	75%/25%	○	○	○
Amyl [illegible]	TR	●	●	–
Amyl alcohol	TR	●	●	●
Amyl acetate	TR	●	–	–
Ammonium solution	[illegible]	●	●	–
Ammonium (gas)	TR	●	●	–
Ammonium (liquid)	TR	●	–	–
Ammonium acetate	GL	●	●	–
Ammonium fluoride	L	●	●	–
Ammonium phosphate	GL	●	●	●
[illegible]	GL	●	●	–
Ammonium Chloride	GL	●	●	–
Ammonium Nitrate	GL	●	●	●
Ammonium Sulphate	GL	●	●	●
Ammonium Sulphide	GL	●	●	–
Aniline	TR	●	●	–
Aniline [illegible] hydrate	GL	●	●	–
Anisol	TR	●	●	–
[illegible]	TR	●	○	●
Antifreeze	H	●	●	●
Antimony (III) Chloride	90%	●	●	–
Acid [illegible]	TR	○	○	●
Acid [illegible]	TR	●	–	–
[illegible]	TR	●	●	–
Acetic acid	TR	●	●	○
Acetic acid	40%	●	●	–
Acetic acid and vinegar essence	50%	●	●	●
Acetic acid anhydride	TR	●	–	–
Acetic acid ethyl ester	TR	●	●	○
Acetic acid [illegible]	TR	●	●	–
Acid [illegible]	40%	●	●	–
Acid arsenic	[illegible]	●	●	–
Acid [illegible]	[illegible]	●	●	●
Acid Glycol	10%	●	●	–
Acid Hydrobromic	[illegible]	●	●	–
Acid Hydro[illegible]	[illegible]	●	●	–
Acid Hydrocyanic (Hydrocyanide)	TR	●	●	–
Acid [illegible]	TR	●	●	–
Acetone	TR	●	–	–
[illegible] ([illegible] gas)	[illegible]	●	●	–
Copper chloride	GL	●	●	–
Copper nitrate	[illegible]	●	●	●
Copper cyanide	GL	●	●	–
Copper sulphate	GL	●	●	–
Beer	H	●	●	–
Barium hydroxide	GL	●	●	●
Barium Salts	GL	●	●	●
Benzaldehyde	GL	●	●	–
Benzyl Alcohol	TR	●	●	–
Benzyl Chloride	TR	●	–	–
Benzine Benzene Mixture	[illegible]	●	○	○
Benzine (Aliphatic [illegible])	L	●	–	–
Benzene	TR	●	○	○
[illegible]	H	●	●	●
Borax (Sodium tetraborate)	L	●	●	–
Boric Acid	GL	●	●	●

Following material	Concentration	Resistance 20°C	Resistance 60°C	Resistance 100°C
Bromine (Bromine Water)	GL	●	○	○
Bromine	TR	○	○	○
Vapor Bromine	[illegible]	●	○	○
[illegible]	TR	●	○	○
Butyl glycol ([illegible])	[illegible]	●	●	–
Butyl glycol	TR	●	●	–
Butyl phenol	GL	●	–	–
Butyl[illegible]	TR	○	–	–
Butyl phthalate	TR	●	●	●
Butyl [illegible]	TR	●	–	–
Butanol (Butyl alcohol)	TR	●	●	●
Butanediol 1,2,4	TR	●	●	–
Butene (2) - diol (1,4)	TR	●	●	–
Butin (2) - diol (1,4)	TR	●	–	–
Mercury	[illegible]	●	●	–
Mercury salts	GL	●	●	–
[illegible]	[illegible]	●	●	–
[illegible] oil	H	●	●	–
Zinc Salts	GL	●	●	–
[illegible]	TR	●	○	○
[illegible]	L	●	●	–
[illegible]	[illegible]	●	●	●
[illegible]	GL	●	●	–
Sea water	H	●	●	●
1,2-[illegible]	TR	●	●	–
[illegible]	GL	●	●	○
[illegible]	TR	●	–	–
Diethyl ether	TR	●	●	–
[illegible] acid	GL	●	●	–
[illegible]	TR	●	●	–
[illegible]	TR	●	○	○
[illegible]	TR	●	●	–
[illegible]	TR	●	○	–
Dichloroacetic acid	TR	●	–	–
Dichloroacetic acid	[illegible]	●	●	–
Dichloroacetic acid methyl ester	TR	●	●	–
[illegible]	TR	●	–	–
[illegible]	TR	●	–	–
Dimethylamin (Gas)	100%	●	–	–
N,N-Dimethyl Formamide	TR	●	●	–
Di-n-Butyl ether	TR	●	○	○
1,4 Dioxane (Diethylene dioxide)	TR	●	●	–
Dioctyl phthalate (DOP)	TR	●	●	–
Fuel oil	H	●	●	–
Natural Gas	TR	●	–	–
Apple Acid	L	●	●	–
Apple [illegible]	H	●	●	●
Apple wine ([illegible])	H	●	●	–
[illegible]	L	●	●	–
Ethanol	TR	●	●	●
Ethanol [illegible]	[illegible]	●	–	–
Ethyl [illegible]	TR	●	●	○
Ethyl [illegible]	TR	●	●	–
Ethylene glycol	TR	●	●	●
Ethylene [illegible]	TR	●	–	–
Ethylene oxide (Liquid)	TR	○	–	–
Ethylene [illegible] (gas)	TR	○	○	○
[illegible]	TR	●	●	–
[illegible] acid	TR	●	●	–
[illegible]	[illegible]	●	–	–
[illegible]	H	●	●	–

Table 15

Resistance of PP-R pipe to different chemicals

Following materials	Concentration	Resistance 20°C	60°C	100°C
[illegible]	H	●	●	-
[illegible] acid	TR	○	-	-
[illegible]	32%	●	●	-
[illegible] acid	40%	●	●	-
Formaldehyde	GL	●	●	-
Formic acid	10%	●	●	●
Formic acid	85%	●	●	○
[illegible]	GL	●	●	-
[illegible]	TR	●	-	-
[illegible]	TR	●	-	-
Phosphoric acid	85%	●	●	●
[illegible]	TR	●	●	-
[illegible]	H	●	●	-
[illegible]	L	●	●	●
[illegible]	TR	●	●	○
[illegible] oil	H	●	●	○
Glucose	20%	●	●	●
Glucose (grape sugar)	20%	●	●	●
Glycerine	TR	●	●	●
Silver nitrate	GL	●	●	●
Silver salts	GL	●	●	○
[illegible]	TR	●	●	●
[illegible]	H	●	○	○
[illegible]	TR	●	●	○
[illegible] (1:2.5)	TR	●	●	○
[illegible]	TR	●	-	○
Hydrogen	TR	●	●	-
Hydrogen [illegible]	TA	●	●	-
Hydrogen [illegible]	TR	●	●	-
Hydrogen [illegible]	TR	●	●	-
Hydrogen peroxide	30%	●	○	-
Hydrogen sulphide gas	TR	●	●	-
Hydroquinone	L	●	-	-
Hydrochloric acid [illegible]	20%	●	●	-
Hydrochloric acid [illegible]	21-30%	●	○	○
[illegible]	12%	●	●	-
Coconut alcohol	TR	●	○	-
Coconut oil	TR	●	-	-
[illegible] oil	TR	●	●	-
[illegible]	TR	●	○	-
[illegible]	TR	●	○	-
Isopropanol (propanol-2)	TR	●	●	●
[illegible]	TR	●	●	●
[illegible]	20%	●	●	○
Gelatine	L	●	●	●
[illegible]	TR	○	○	○
Tin(II) chloride	GL	●	●	-
Tin(IV) chloride	GL	●	●	-
Calcium hydroxide	L	●	-	-
Calcium hypochlorite	GL	●	●	●
Calcium [illegible]	GL	●	●	●
Calcium chloride	GL	●	●	-
Calcium nitrate	GL	●	●	-
[illegible]	H	●	-	-
Carbon dioxide (gas)	All	●	●	-
Carbon dioxide (liquid)	All	●	●	-
Carbon monoxide	All	●	●	-
Carbon sulphide	TR	○	○	○
[illegible] acid	20%	●	-	-
[illegible] acids	TR	●	●	-
Coal tar oil	H	●	○	○

Following material	Concentration	Resistance 20°C	60°C	100°C
Amber acid	GL	●	●	-
[illegible] oil	H	●	●	●
Chlorine	GL	●	○	○
Chlorine (dry gas)	TR	○	○	○
Chlorine (wet gas)	0.5%	●	-	-
Chlorine (wet gas)	12%	○	○	○
Chlorine (liquid)	TR	○	○	○
Chloral	TR	●	●	-
Chloral hydrate	TR	●	○	○
Chloramine	L	●	-	-
Chlorine acetic acid	L	●	●	-
Chlorine acid	1%	●	○	○
Chlorine acid	10%	●	○	○
Chlorine acid	20%	●	○	○
Chlorine benzene	TR	○	-	-
Chlorine (ethyl chloride)	TR	○	○	○
[illegible]	TR	●	●	-
[illegible]	All	●	●	-
Chloroform	TR	●	○	○
[illegible]	≤90%	●	-	-
Chromic acid	40%	●	●	○
Chromic acid sulphuric acid / water	15/35/50%	○	○	○
Croton aldehyde	TR	●	-	-
Xylene	TR	●	○	○
Acetate lead	GL	●	●	○
Sulphur dioxide (gas)	TR	●	●	-
Sulphur dioxide (liquid)	All	●	●	-
Sulphur dioxide (residual gas)	All	●	●	-
Sulphur dioxide (residual gas)	All	●	●	-
Lactic acid	90%	●	●	-
Linseed oil	H	●	●	●
Mineral water	H	●	●	●
Magnesium hydroxycarbonate	GL	●	○	○
Magnesium chloride	GL	●	●	●
Magnesium sulphate	GL	●	●	●
Magnesium salts	GL	●	●	○
Machine oil	TR	●	●	○
[illegible]	All	●	-	-
[illegible]	10%	●	○	-
Menthol	TR	●	●	-
Methylamine	32%	●	-	-
Methyl acetate	TR	●	●	-
Methyl bromide	TR	○	○	○
Methylene chloride	TR	○	○	○
Methyl ethyl ketone	TR	●	●	-
Methyl chloride	TR	○	○	○
Methanol	TR	●	●	-
Methanol	5%	●	●	○
[illegible] acid	5%	●	●	●
[illegible] acid	50-100%	○	○	○
[illegible]	TR	●	○	○
Fruit juice	H	●	●	○
Fruit [illegible]	H	●	-	-
Corn oil	TR	●	○	-
Engine oil	TR	●	○	-
Oil of peppermint	TR	●	-	-
Nickel salt	GL	●	●	-
Liquid ammonia	GL	●	●	-
[illegible]	All	●	●	-
Liquid glucose	All	●	●	-
Nitric acid	10%	●	○	-

Table 16

Following material	Concentration	Resistance 20°C	Resistance 60°C	Resistance 100°C
Nitric acid	10-16%	◐	○	○
Nitric acid	>20%	○	○	○
Nitro benzol	TR	●	◐	–
Oxygen	TR	●	–	–
Octil crezol	TR	●	○	–
Ozon	0.5ppm	●	◐	–
Coton oil	TR	●	●	–
Parafin emulsion	H	●	●	–
Parafin oil	TR	●	●	○
Perchloric acid	20%	●	●	–
Perchloroetylene	TR	◐	◐	–
Petroleum	TR	●	◐	–
Petroleum ether	TR	●	◐	–
Picric acid	SL	●	–	–
Piridin	TR	◐	◐	–
Potassium bromate	10%	●	–	–
Potassium bromit	GL	●	–	–
Potassium dicromat	GL	●	●	–
Potassium chlorid	GL	●	●	–
Potassium hekzacyano ferrat	GL	●	●	–
Potassium hydrogen carbonate	GL	●	●	–
Potassium hydroxide	50%	●	●	●
Potassium iodür	GL	●	●	–
Potassium carbonate	GL	●	●	–
Potassium chlorate	GL	●	●	–
Potassium chloride	GL	●	●	–
Potassium chromate	GL	●	●	–
Potassium nitrate	GL	●	●	–
Potassium permanganat	GL	●	○	–
Potassium perchlorate	10%	●	●	–
Potassium peroxide sulphate	GL	●	●	–
Potassium cyanide	L	●	●	–
Potassium sulphate	GL	●	●	–
Propan gas	TR	●	–	–
Propanol (I) propyl alcohol	TR	●	●	–
Propargil alcohol	7%	●	●	–
Propionic acid	>50%	●	●	–
Propene glycol	TR	○	○	○
Liquid brom methyl brom	TR	○	–	–
Butyl (liquid)	TR	●	–	–
Cyclohexane	TR	●	○	–
Cyclohexanone	TR	◐	○	○
Silicone emulsion	H	●	●	●
Silicone oil	H	●	●	–
Silicic acid	TR	●	●	●
Vinegar (wine)	H	●	●	–
Citric acid	H	●	●	●
Sodium Carbonate	H	●	●	●
Soybean oil	50%	●	●	●
Sodium acetate	TR	●	◐	–
Sodium benzoat	36%	●	●	–
Sodium borate-hydrogen peroxide	GL	●	●	–
Sodium dicromat	GL	●	●	●
Sodium Phosphate	H	●	●	●

Following material	Concentration	Resistance 20°C	Resistance 60°C	Resistance 100°C
Sodium hexametaphosphate	L	●	●	–
Sodium hydrogen carbonate	GL	●	●	●
Sodium hydrogen sulphide	GL	●	●	–
Sodium hydrogen sulphite	L	●	–	–
Sodium hydroxide	60%	●	●	●
Sodium hypochlorite	15%	●	–	–
Sodium hypochlorite	20%	◐	◐	○
Sodium carbonate	50%	●	●	◐
Sodium chlorate	GL	●	●	–
Sodium chloride	VL	●	●	●
Sodium chloride	2-20%	●	◐	○
Sodium nitrate	GL	●	●	–
Sodium nitrite	L	●	●	–
Sodium perborate				
Sodium silicat	L	●	●	–
Sodium sulphate	GL	●	●	–
Sodium suphite	GL	●	●	–
sodium sulphide	40%	●	●	●
Sodium tetraborate	L	●	●	–
Sodium thiosulfate	GL	●	●	–
Pure water	H	●	●	●
Alil alcohol (propen (2) ol (1))	96%	●	●	–
Hidrobromasit	48%	●	◐	○
Sulphuric acid	10%	●	●	●
Sulphuric acid	10-80%	●	●	–
Sulphuric acid	80%-TR	◐	○	–
Fuming Sulphuric acid		○	○	○
Sulphuric acid (residue gas)	All	●	●	–
Sulphur chloride	TR	○	○	○
Milk	H	●	●	●
Milk [illegible]	62%	●	●	●
Alum	GL	●	●	–
Wine acid	12%	●	●	–
Wine	H	●	●	–
Wine vinegar	H	●	●	–
Sugar treacle	H	●	●	●
Cane sugar	H	●	●	–
Test benzine	TR	●	◐	○
Tetra ethyl lead	TR	●	–	–
Tetrahydrofurane	TR	◐	–	–
Tetraline	TR	○	○	○
Tetrachloroethane	TR	◐	○	○
Tetrachloroetylene	TR	◐	◐	–
Tetrachlormetan	TR	○	○	○
Tiner oil	TR	○	○	○
Thiophidene	TR	●	◐	–
Urea	GL	●	●	○
Vaseline oil	TR	●	◐	○
Vinyl acetate	TR	●	◐	–
Vinilide chlorid	TR	◐	–	–
Oil acid	TR	●	●	–
Oils (animal and vegetable)	TR	●	●	–
Arachis oil	TR	●	●	–
Olive oil	TR	●	●	●

Table 17

Certificates


Ministry of Trade & Industry
Egyptian Organization for Standardization & Quality
وزارة التجارة والصناعة
الهيئة المصرية العامة للمواصفات والجودة
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Standard(s)
Date of Issue
Validity
president of EOS


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أكوابريما


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