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U. P. V. C

EGYPT THERM

Egypt Therm
PP-R

## Egyptian German for Modern Pipes & Supplies


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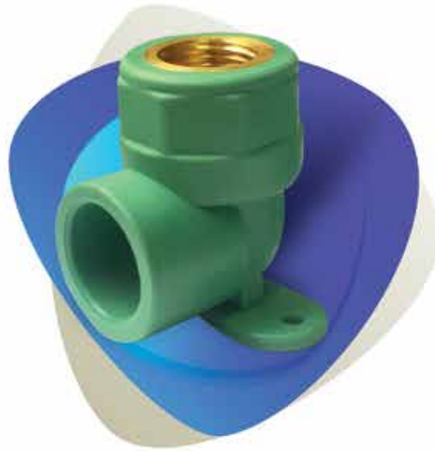


# Certificates




# About Egypt Therm

**Egypt Therm** for modern water systems manufacturing is an Egyptian shareholding company, which has been established in 2010 applying the latest german technological innovations in our manufacturing process.

**Egypt Therm** is fully cerified by owning a membership cerificate in Champer Of Chemical Industries, National Research Center, and Housing and Bulding National Research Center, in addition to committing of carrying out all the required tests constantly on all its products.

**Our Vision** is that we aspire to position ourselves among the top PPR pipe manufacturing regionally while committing to make Egypt Therm a synonym to quality, price, safety and reliability to establish a circle of trust forevery client.

**Egypt Therm** is a proud Egyptian product with german technology, has a massive production capacity that enables us to deliver in a very short time period with the best quality and cometing price.

**Egypt Therm** has a well trained quality assurance department that assure that our products comply the german standards according to DIN 8078, DIN 8077, DIN 16962 P5, Plus giving a warranty on all our systems for 50 years.

## Features of Egypt Therm PPR Pipes and fittings

Poly propylene is a thermoplastic addition polymer made from the combination op propylene monomers. It's used in variety of applications to include packaging for consumer prodicts, plastic parts for various industries including the automotive industry.

### Advanteges

The reliability and durability of the pipeline system directly depends on the quality, and properties of the basic substance. The invention of poly propylene random copolymer (PPR-C) was the result of the unique research, which make it the best selection for pressurized water and heating systems. Long life.

Deposits and corrision don't build up on the surface, having direct contact with water. The internal pipe size doesn't reduce over time, preserving the purity of water.

The **Egypt Therm** PPR material is absolutely non-toxic and chemical resistant (inert), and therefore doesn't affect the quality of the pipeline water, and absolutely has no rust release.
Widespread use polupropylene pipelines, resistance to changing conditions.

**Egypt Therm** PPR endures high pressure and temperature drops. Due to the elasticity of the material, an important advantage of polypropylene pipes is an follows: water in the poly propylene pipes may freeze without destroying them.

If water freezes in polypropylene pipes and fittings, they are not destroyed, but only slightly increase in size and come back to the previos size after thawing.
**Egypt Therm** PPR pipeline water supply system can withstand a certain amount of freezing/ thawing. Basic normative document on polypropylene indicates that is possible to do. Low heat loss.

**Egypt Therm** PPR systems are economical-to-operate, and their heat conductivity is much lower as copmared with the metal pipes (heat economy up to 35%). Noise & vibration damping capacity Egypt Therm PPR Systems maintain noise suppression much better as compared to the metal pipeline.

Convenient & fast installation. Installation of Egypt Therm PPR pipes and fittings requires minimal skills, time and effort. Fusion welding method allows to ensure a long-life tight join for only a few seconds.

Low cost, good value for money factor is achieved due to the low cost of low materials and technological ease of installation. Furthermore, the durability of polypropylene plumbing compares favourably with metal plumbing (about 5 times).



# Certificates




# U.P.V.C Products

| Super Tee 87.5 | |
|---|---|
| Size | Code |
| 3” | 111070 |

| Super Tee door 87.5 | |
|---|---|
| Size | Code |
| 4” | 111071 |

| Elbow 45º With Door | |
|---|---|
| Size | Code |
| 6 ” | 1115619 |

| Floor Drain (7 CM) | |
|---|---|
| Size | Code |
| 1.5 x 2 ” | 111620 |
| 2 x 2 ” | 111621 |
| 3 x 2 ” | 111622 |

| Floor Drain (10 CM) | |
|---|---|
| Size | Code |
| 1.5 x 2 ” | 111623 |
| 3 x 2 ” | 111624 |
| 1.5 x 3 ” | 111625 |
| 2 x 2 ” | 111626 |

| Floor Drain (Super) | |
|---|---|
| Size | Code |
| 1.5 x 2 ” | 111627 |



**Egypt Therm** PPR Pipes are light and easily moved and transported, therefore the handling charges are reduced. They are wasy to install, and safe for the health (no risk to get an injury), so that the total cost of the installation islower than when you use pipes and fittings made of other materials, (carbon steel, cooper, PVC, and etc..).

1. **Egypt Therm** PPR, used in the pipes and fittings manufacture, is tested to elevated temperatures and chemicals, It is durable and more stable than other materials, which are used in the field.

2. The absence of rust, corrosion, decomposition, decay, dirt, bacteria and calcareous deposits in the pipes and fittings prevents the internal pipe size reducion, and thus, their capacity is not reduced over time,

3. Then since polyoropylene is not corrosive material. there is no electrochemical or abrasive reacion or wear. Plastic pipes can be easily attached to the fittings, they are widely used for different purposes; their installation requires minmal time and effort.

4. **Egypt Therm** PPR exhibits high stability to wide range of organic and inorganic compunds. Due to smooth inner surface it is not subject to the action of timescale, theraby, the internal pipe size remains constant.

## Why Egypt Therm PPR System:

**Chemical Resistance**
Diluted bases and acids don’t react readily with polypropylene, which makes it good choice for containers of such liquids, such as cleaning agents and more.

**Elasticity and Toughness**
Polypropylene will act with elasticity over a certain rang of deflection (like all materials), but it will also experience plastic deformation early on in the deformation process, so it generally considered a tough material, so it is not elastically.

**Resistance to stress and pressure**
Polypropylene retains its shape after a lot of torsion, bending and flexing

**Insulation**
Polypropylene has a very high resistance to electricity and is very useful for electronic components.

**Transmissivity**
Although Polypropylene can be made transparent

**Conclusion**
Egypt Therm PPr (is the most competitive material for conditions as compared to copper, steel, and other polymeric materials. Besides, its random copolymer family is the most suitable for cold and hot water supply systems (drinking water, heating, process pipelines, etc..)

## Product Describtion

**Polypropyelene random copolymer**

For PPR pipes and fittings (pressure pipes Systems)

**Egypt Therm** is a specially designed polypropylene random copolymer (PPR, Natural colored) that features excellent long-term hydrostatic pressure resistance and heat stability, It's suitable for hot&cold water supply pipes and fittings as well as radiator connecting pipes. It's the outcome of HYOSUNG's integrated polymerization and crystalization technology with advanced PP manufacturing process technique.

## Characteristics

**Typical Application** Hot & cold water supply pipes and fittings / radiator connecting pipes

**Features** Excellent long-term hydrostatic pressure resistance and hewat stability (PPR 125, MRS 12.5 MPa, CRS 3.3 MPa) / Excellent stiffness and impact strength balance / chemical stability / Environment-friendly / Enhanced processability

**Compliance** The pipes produced with Egypt Therm PPR complies with the hydrostatic pressure requirements according to DIN 8078, and ISO/DIS 15874. It complies with the requirements of NSF/ANSI 14, FDA 21 CFR 177.1520 and (EU) No 10/2011 for food contact. This product corresponds to the DVGW W270/KTW guidelines and GB/T17219 - 1998 for drinkingwater system.

## Typical Properties

| Resin Properties | Method | Value | Value |
|---|---|---|---|
| Melt Index(230°C, 2.16kg) | ASTM D1238 | **0.25** | g/10min |
| Density | ASTM D792 | **0.90** | g/cm$^3$ |
| tensile Strenght at Yield | ASTM D638 | **270** | kg/cm$^3$ |
| Flexural Modulus | ASTM D790 | **9,000** | kg/cm$^3$ |
| Notched Izod Impact Strenght(23°C / -10°C) | ASTM D256 | **N.B / 5.0** | kg.cm / cm |
| Rockwell Hardness | ASTM D785 | **75** | R-Scale |
| Heat Deflection Temperature | ASTM D648 | **90** | °C |
| Vicat Softening Point | ASTM D1525 | **130** | °C |
| Mean Coefficient of Linear Thermal Expansion(0°C -80°C) | Dilatometer | **1.5*10$^{-4}$** | kg$^{-1}$ |

The values listed above are typical values for refence purpose only and shall not be construed as specifications.

## Storage and Handling

This product should be stored in dry condition at temperature below 40°C and protected from UV - light. When condensation is visible or can be expected, pre-drying is recommended. (Drying condition: 80~100°C/2~4 jours at air cerculated condition)



# U.P.V.C Products

| Cap | |
|---|---|
| **Size** | **Code** |
| 3/4 ” | 111595 |
| 1 ” | 111596 |
| 1.5 ” | 111597 |
| 2 ” | 111598 |
| 3 ” | 111599 |
| 4 ” | 111600 |

| Clean out | |
|---|---|
| **Size** | **Code** |
| 2 ” | 111601 |
| 3 ” | 111602 |
| 4 ” | 111603 |
| 6 ” | 111604 |

| Air Vent | |
|---|---|
| **Size** | **Code** |
| 2 ” | 111605 |
| 3 ” | 111607 |
| 4 ” | 111608 |

| Rain Drain | |
|---|---|
| **Size** | **Code** |
| 3 ” | 111609 |
| 4 ” | 111610 |

# U.P.V.C Products

| Reducing Tee With Door | |
|---|---|
| Size | Code |
| 3/2 ” | 111584 |
| 4/2 ” | 111585 |
| 3/4 ” | 111586 |
| 6/4 ” | 111587 |

| Cross Tee | |
|---|---|
| Size | Code |
| 3” | 111588 |
| 4” | 111589 |

| Cross Tee Sweep | |
|---|---|
| Size | Code |
| 3” | 111590 |
| 4” | 111591 |

| Axial Bush | |
|---|---|
| Size | Code |
| 4/3” | 111592 |

| Syphon | |
|---|---|
| Size | Code |
| 4” | 111594 |



## Process Guidelines

**Polypropyelene random copolymer**

For PPR pipes and fittings (pressure pipes Systems)

The actual extrusion conditions will depend on the type of equipment and the SDR of pipes produced. The below Conditions may be used as guidelines for this material

| | |
|---|---|
| **Cylinder feeding zone** | 160-180°C |
| **Cylinder meltingzone** | 180-210°C |
| **Cylinder mixing zone** | 180-220°C |
| **Head** | 180-220°C |
| **Die** | 180-220°C |
| **Melt temperature** | 200-220°C |
| **Cooling temperature** | 20-30°C |

## Disclaimer

All information, including product characteristics, applications and properties are for reference purpose only and shall not be construed as specifications, Before using this product, customers shouls carfuly review the instrucions for use of the product to determine whether the product suitable for customer’s particular purpose, the customer is responsible for the appropriate, safe and legal use, processing and handling ofthis product, Egypt Therm assumes no legal responsibility or liability for the contents of this document. We reserve the right to change the contents of this document without prior notice. The document is copy righted by Egypt Therm. Egypt Therm is a registered trademark owned or used by Egypt Therm.

# **Physical** Properties

| Typical value | Test Method | Main Value | Unit |
|---|---|---|---|
| **PHYSICAL PROPERTIES** | | | |
| Dinsity 23 °C | ISO 1183 | 0.895 | g / cm2 |
| Vicat softening Temperature (0.98 n) | ISO 306 | 130 | C° |
| **RHEOLOGY** | | | |
| Melt Mass Flow Rate MFR (230 °C/2.16 KG) | ISO 1133 | 0.3 | g/10 min |
| **MECHANICAL PROPERTIES** | | | |
| Tensile modules (1mm/min) | ISO 527 - 1.2 | 900 | MPA |
| Tensile srtess yield (50mm/min) | ISO 527 - 1.2 | 27 | MPA |
| Tensile srtess yield (50mm/min) | ISO 527 - 1.2 | 13 | % |
| Charpy impact strength At 23 °C | ISO 179/1eu | N.B | KJ/M2 |
| Charpy impact strength At 20 °C | ISO 179/1eu | 30 | KJ/M2 |
| Charpy impact strength Notched at 23 °C | ISO 179/1eu | 38 | KJ/M2 |
| Charpy impact strength Notched at 20 °C | ISO 179/1eu | 2 | KJ/M2 |
| **THERMAL PROPERTIES** | | | |
| Heat deflection (Temperature 0.45 mpa"HTD/b') | ISO 75 - 1.2 | 88 | °C |
| Mean coefficient 0f linear (Thermal Expanstion 0:11 °C) | Din 53752 | $1.5 \times 10^{-4}$ | $K^{-1}$ |
| Thermal conductivity | Din 52612 | 0.23 | $K^{-1}\,m^{-1}$ |
| **ELECTRICAL PROPERTIES** | | | |
| Surface resistance | Din 53482 | $>10^{13}$ | ohm. cm |



# **U.P.V.C** Products

**Tee 45°**

| Size | Code |
|---|---|
| 3/4 " | 111555 |
| 1 " | 111556 |
| 1.5 " | 111557 |
| 2 " | 111558 |
| 3 " | 111559 |
| 4 " | 111560 |
| 6 " | 111561 |

**Tee 90°**

| Size | Code |
|---|---|
| 3/4 " | 111562 |
| 1 " | 111563 |
| 1.5 " | 111564 |
| 2 " | 111565 |
| 3 " | 111566 |
| 4 " | 111567 |
| 6 " | 111568 |

**Reducing**

| Size | Code |
|---|---|
| 3/2 " | 111569 |
| 4/2 " | 111570 |
| 3/4 " | 111578 |
| 6/4 " | 111579 |

**Tee 90° With Door**

| Size | Code |
|---|---|
| 2 " | 111580 |
| 3 " | 1115871 |
| 4 " | 111582 |
| 6 " | 111583 |

**Tee Reducing**

| Size | Code |
|---|---|
| 3/2" | 111060 |
| 4/2" | 111061 |
| 3/4" | 111062 |
| 6/4" | 111063 |

# U.P.V.C Products

| Elbow 90º | |
|---|---|
| Size | Code |
| 3/4 ” | 111535 |
| 1 ” | 111536 |
| 1.5 ” | 111537 |
| 2 ” | 111538 |
| 3 ” | 111539 |
| 4 ” | 111540 |
| 6 ” | 111541 |

| Elbow 45º | |
|---|---|
| Size | Code |
| 3/4 ” | 111542 |
| 1 ” | 111543 |
| 1.5 ” | 111544 |
| 2 ” | 111545 |
| 3 ” | 111546 |
| 4 ” | 111547 |
| 6 ” | 111548 |

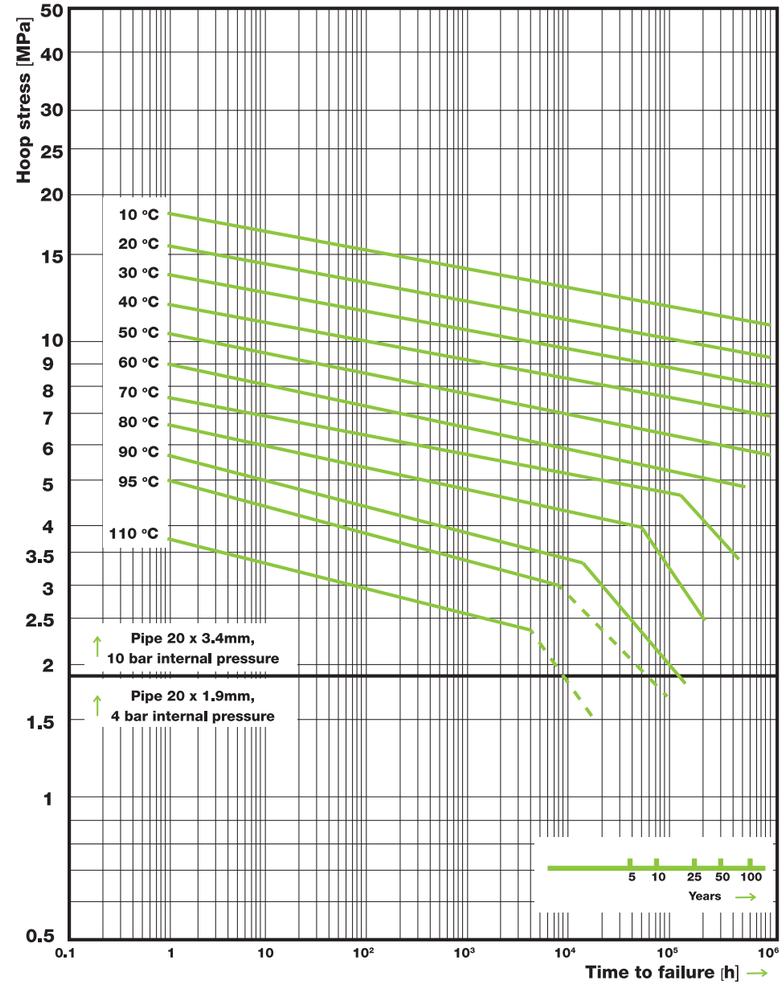
| Elbow 90º With Door | |
|---|---|
| Size | Code |
| 2 ” | 111549 |
| 3 ” | 111550 |
| 4 ” | 111551 |
| 6 ” | 111552 |

| Female Threaded Elbow | |
|---|---|
| Size | Code |
| 1.5 ” | 111553 |
| 2 x 1.5 ” | 111554 |



# Behavior PP-R Pipe

According to DIN 8078 the service life of PP-R pipe depends on the time the internal hoop stress is subjected to a specific temperature, Hoop stress is given as follows:




$$\delta = \frac{p \times (d-s)}{20xs}$$

**Where**

**δ = Hoop Stress (N/mm² or MPa)**
**P = Internal Pressure (Bar)**
**d = Outer Diameters of Pipe (mm)**
**S = Wall Thickness of pipe (mm)**

# Operating & Working Pressure

## Permissible Operating Pressure

**Projected Service Life**
The following table provides more detailed ingormation with regards to the permissible pressure at various temperatures.

These values arederived fom the Hoop Stress Chart and formula. Under normal working pressures and conditions, the average service life ofsuitable PP-R pipes at least 50 Years.

**Example :**
A PN 10, cold water pipe, transporting water at temperature of 30 °C can last for more than 50 years under normal conditions with an operating pressure of 11.1 Bars or 161 P.S.I.

A PN 20, cold water pipe, transporting water at temperature of 70 °C can last for more than 50 years under normal conditions with an operating pressure of 8.5 Bars or 123 P.S.I.

**SDR "Standard Dimention Ratio"** = Diameter/Wall Thickness Ratio [d/e] **s**=Pipes Series
**Index from ISO 4065**) < /p>

### Table 1.1 Permissible Working Pressure (For Potable Water)

| (Bars)/1.25 Safety factor | | EgyTec Standard Pipe SDR 11 - 55 | EgyTec Standard Pipe SDR 7.4 - S3.2 | EgyTec Standard Pipe SDR 6 - S2.5 | EgyTec Standard Pipe SDR 5 - S2 |
|---|---|---|---|---|---|
| | | Nominal pressure class | | | |
| Years of service | temperature | PN10 | PN16 | PN20 | PN25 |
| 1 Year | 10 °C | 21.1 | 33.4 | 42.0 | 52.9 |
| | 20 °C | 18.1 | 28.6 | 63.0 | 45.3 |
| | 30 °C | 15.3 | 24.3 | 30.6 | 38.5 |
| | 40 °C | 12.9 | 20.5 | 25.8 | 32.5 |
| | 50 °C | 11.0 | 17.5 | 22.0 | 27.7 |
| | 60 °C | 9.3 | 14.7 | 18.5 | 23.3 |
| | 70 °C | 7.3 | 12.4 | 15.6 | 19.6 |
| | 80 °C | 6.5 | 10.4 | 13.1 | 16.4 |
| | 95 °C | 4.6 | 7.3 | 9.2 | 11.6 |
| 5 Years | 10 °C | 20.0 | 31.6 | 39.8 | 20.1 |
| | 20 °C | 16.9 | 26.8 | 33.8 | 42.2 |
| | 30 °C | 14.4 | 22.8 | 28.7 | 36.1 |
| | 40 °C | 21.1 | 19.2 | 24.2 | 30.5 |
| | 50 °C | 10.2 | 16.2 | 20.4 | 25.7 |
| | 60 °C | 8.6 | 13.7 | 17.2 | 21.7 |
| | 70 °C | 7.2 | 11.4 | 14.3 | 18.0 |
| | 80 °C | 5.7 | 9.1 | 11.5 | 14.4 |
| | 95 °C | 3.0 | 4.8 | 6.1 | 7.6 |



# U.P.V.C Products

| UPVC Pipes | |
|---|---|
| PP-R Fitting | Code |
| ¾" | 111507 |
| 1" | 111510 |
| 1.5 " | 111511 |
| 2 " | 111512 |
| 3" | 111508 |
| 4" | 111509 |
| 6" | 111513 |


| Coupling | |
|---|---|
| Fitting | Code |
| 3/4 " | 111516 |
| 1 " | 111517 |
| 1.5 " | 111518 |
| 2 " | 111519 |
| 3 " | 111520 |
| 4 " | 111521 |
| 6 " | 111522 |

| Bush | |
|---|---|
| Fitting | Code |
| 2" x 1.5" | 111523 |
| 3" x 2" | 111524 |
| 4" x 1.5" | 111525 |
| 2" x 4" | 111526 |
| 3" x 4" | 111527 |
| 4" x 6" | 111528 |

| Female Threaded coupling | |
|---|---|
| Fitting | Code |
| 1.5" | 111529 |
| 2" x 1.5" | 111530 |

# Unit Conversation Table

**Table 12** Speed Units

| Meter/Second | Meter/minute | Kilometer/hour | Foot/second | Foot/minute | Miles/hour |
|---|---|---|---|---|---|
| m/s | m/min | km/h | Ft/s | Ft/min | mi/h |
| 1 | 59.988 | 3.599712 | 3.28084 | 196.8504 | 2.237136 |
| 0.01667 | 1 | 0.060007 | 0.054692 | 3.281496 | 0.037293 |
| 0.2778 | 16.66467 | 1 | 0.911417 | 54.68504 | 0.621477 |
| 0.3048 | 18.28434 | 1.097192 | 1 | 60 | 0.681879 |
| 0.00508 | 0.304739 | 0.018287 | 0.016667 | 1 | 0.011365 |
| 0.447 | 26.81464 | 1.609071 | 1.466535 | 87.99213 | 1 |

**Table 13** Torgue units

| Newtown meter | Kilogram force meter | Foot Pound | Inch Pound |
|---|---|---|---|
| Nm | kgfm | ft/b | in/b |
| 1 | 0.101972 | 0.737561 | 8.850732 |
| 9.80665 | 1 | 7.233003 | 86.79603 |
| 1.35582 | 0.138225 | 1 | 12 |
| 0.112985 | 0.011521 | 0.083333 | 1 |

**Table 14** Dynamic Viscosity Units

| Centipoise* | Poise | Pound/foot |
|---|---|---|
| Cp | poise | Lb/ (ft.s) |
| 1 | 0.01 | 0.000672 |
| 100 | 1 | 0.067197 |
| 1488.16 | 14.8816 | 1 |

**Table 15** Kinematic Viscosity Units

| Centistoke* | Stoke | Foot squares/second | Meter square/second |
|---|---|---|---|
| cs | st | $ft^2/s$ | $m^2/s$ |
| 1 | 0.01 | 0.000011 | 0.000001 |
| 100 | 1 | 0.001076 | 0.0001 |
| 92903 | 929.03 | 1 | 0.092903 |
| 1000000 | 10000 | 10.76392 | 1 |

**Table 16** Temperature Conversion Formulas

| Degree Celsius (°C) | (°F - 32) x 5/9 |
|---|---|
| | (K - 273.15) |
| Degree Fehrenheit (°F) | (°C x 9/5) + 32 |
| | (1.8 x K) - 459.67 |
| Kelvin (K) | (°C + 273.15) |
| | (°F + 459.67) / 1.8 |



# Operating & Working Pressure

## Continued

| (Bars)/1.25 Safety factor | | EgyTec Standard Pipe SDR 11 - 55 | EgyTec Standard Pipe SDR 7.4 - S3.2 | EgyTec Standard Pipe SDR 6 - S2.5 | EgyTec Standard Pipe SDR 5 - S2 |
|---|---|---|---|---|---|
| | | Nominal pressure class | | | |
| Years of service | temperature | PN10 | PN16 | PN20 | PN25 |
| 10 Years | 10 °C | 19.3 | 30.6 | 38.5 | 48.5 |
| | 20 °C | 16.4 | 26.1 | 32.5 | 41.3 |
| | 30 °C | 13.9 | 22.0 | 27.5 | 34.9 |
| | 40 °C | 11.8 | 18.7 | 23.6 | 29.7 |
| | 50 °C | 9.9 | 15.5 | 19.7 | 24.9 |
| | 60 °C | 8.3 | 13.2 | 16.6 | 20.8 |
| | 70 °C | 7.0 | 11.1 | 14.0 | 17.6 |
| | 80 °C | 4.8 | 7.6 | 9.6 | 12.0 |
| | 95 °C | 2.6 | 4.0 | 5.1 | 6.4 |
| 25 Years | 10 °C | 18.7 | 29.6 | 37.3 | 46.9 |
| | 20 °C | 16.0 | 25.3 | 31.8 | 40.1 |
| | 30 °C | 13.4 | 21.3 | 26.8 | 33.7 |
| | 40 °C | 11.3 | 18.0 | 22.6 | 28.5 |
| | 50 °C | 9.6 | 15.2 | 19.1 | 24.1 |
| | 60 °C | 8.0 | 12.6 | 15.9 | 20.0 |
| | 70 °C | 6.1 | 9.6 | 12.1 | 15.2 |
| | 80 °C | 3.8 | 6.1 | 7.6 | 9.6 |
| 50 Years | 10 °C | 18.2 | 28.8 | 36.3 | 45.7 |
| | 20 °C | 15.5 | 24.5 | 30.9 | 38.3 |
| | 30 °C | 13.1 | 20.7 | 26.1 | 32.9 |
| | 40 °C | 11.0 | 17.5 | 22.0 | 27.7 |
| | 50 °C | 9.3 | 14.7 | 18.5 | 23.3 |
| | 60 °C | 7.7 | 12.1 | 15.3 | 19.2 |
| | 70 °C | 5.1 | 8.1 | 10.2 | 12.8 |
| | 80 °C | N/A | N/A | N/A | N/A |
| 100 Years | 10 °C | 17.7 | 28.1 | 35.4 | 44.5 |
| | 20 °C | 15.0 | 23.8 | 29.3 | 37.5 |
| | 30 °C | 12.8 | 20.2 | 25.5 | 32.1 |
| | 40 °C | 21.3 | 16.9 | 21.3 | 26.9 |
| | 50 °C | 8.9 | 14.2 | 17.8 | 22.5 |
| | 60 °C | N/A | N/A | N/A | N/A |
| | 70 °C | N/A | N/A | N/A | N/A |
| | 80 °C | N/A | N/A | N/A | N/A |

# Operating & Working Pressure

## Table 1.2 Permissible Working Pressure

(For Hot Water & Heating Installations) ... Continued

| (Bars)/1.25 Safety factor | | EgyTec Standard Pipe SDR 11 - 55 | EgyTec Standard Pipe SDR 7.4 - S3.2 | EgyTec Standard Pipe SDR 6 - S2.5 | EgyTec Standard Pipe SDR 5 - S2 |
|---|---|---|---|---|---|
| Nominal pressure class | | | | | |
| Years of service | temperature | PN10 | PN16 | PN20 | PN25 |
| | | 5 | 11.33 | 14.27 | 17.07 |
| Constant service temperature 70 °C incl.30 days per year at,,, | 57 °C | 10 | 10.95 | 13.79 | 15.20 |
| | | 25 | 9.32 | 11.74 | 15.00 |
| | | 45 | 8.08 | 10.18 | 14.40 |
| | | 5 | 10.72 | 13.50 | 13.88 |
| | 80 °C | 10 | 10.16 | 12.80 | 13.06 |
| | | 25 | 8.84 | 11.14 | 11.72 |
| | | 42.5 | 7.77 | 9.79 | 10.17 |
| | | 5 | 9.85 | 12.42 | 13.32 |
| | | 37.3 | 9.42 | 11.87 | 12.22 |
| | | 25 | 8.05 | 10.14 | 11.06 |
| | | 37.3 | 7.29 | 9.18 | 9.88 |
| | | 5 | 9.04 | 11.39 | 11.74 |
| | 90 °C | 10 | 8.69 | 10.94 | 12.12 |
| | | 25 | 7.03 | 8.86 | 9.91 |
| | | 35 | 6.48 | 8.16 | 8.86 |
| | | 5 | 11.20 | 14.11 | 15.90 |
| | 75 °C | 10 | 10.77 | 13.57 | 14.50 |
| | | 25 | 9.19 | 11.58 | 13.70 |
| Constant service temperature 70 °C incl.60 days per year at,,, | | 45 | 7.97 | 10.05 | 12.80 |
| | | 5 | 10.41 | 13.12 | 15.80 |
| | 80 °C | 10 | 9.96 | 12.54 | 15.40 |
| | | 25 | 8.38 | 10.56 | 13.20 |
| | | 40 | 7.47 | 9.41 | 11.60 |
| | | 5 | 9.55 | 12.03 | 15.78 |
| | 85 °C | 10 | 9.14 | 11.52 | 15.30 |
| | | 25 | 7.31 | 9.22 | 13.30 |
| | | 35 | 6.73 | 8.48 | 11.20 |
| | | 5 | 8.76 | 11.04 | 14.90 |
| | 90 °C | 10 | 7.75 | 9.76 | 12.90 |
| | | 25 | 6.20 | 7.81 | 10.48 |
| | | 30 | 5.92 | 7.46 | 8.45 |



# Unit Conversation Table

**Table 8** Volume Gas Flow units

| Normal meter cube/hour | Standard Cubic feet/hour | Standard Cubic feet/minute |
|---|---|---|
| $Nm^3/hr.$ | Scfh | Scfm |
| 1 | 35.31073 | 0.588582 |
| 0.02832 | 1 | 0.016669 |
| 1.699 | 59.99294 | 1 |

**Table 9** Mass Flow units

| Kilogram/hour | Pound/hour | Kilogram/second | Ton/hour |
|---|---|---|---|
| kg/h | lb/hour | kg/s | t/h |
| 1 | 2.204586 | 0.000278 | 0.001 |
| 0.4536 | 1 | 0.000126 | 0.000454 |
| 3600 | 7936.508 | 1 | 3.6 |
| 1000 | 2204.586 | 0.277778 | 1 |

**Table 10** High pressure units

| Bar | Pound/square Inch | Kilopascal | Mega Pascal | Kilogram force/ centimeter square | Millimeter of mercury | Atmospheres |
|---|---|---|---|---|---|---|
| Bar | Psi | K Pa | Mpa | Kg f /$cm^2$ | Mm Hg | Mm Hg |
| 1 | 14.50326 | 100 | 0.1 | 1.01968 | 750.0188 | 750.0188 |
| 0.06895 | 1 | 6.895 | 0.006895 | 0.070307 | 51.71379 | 51.71379 |
| 0.01 | 0.1450 | 1 | 0.001 | 0.01020 | 7.5002 | 7.5002 |
| 10 | 14.03 | 1000 | 1 | 10.197 | 7500.2 | 7500.2 |
| 0.9807 | 14.22335 | 98.07 | 0.09807 | 1 | 735.5434 | 735.5434 |
| 0.001333 | 0.019337 | 0.13333 | 0.000133 | 0.00136 | 1 | 1 |
| 1.013 | 14.69181 | 101.3 | 0.1013 | 1.032936 | 759.769 | 759.769 |

**Table 11** Low pressure units

| Meter of Water | Foot of Water | Centimeter of mercury | Inches of mercury | Inches of water | Pascal |
|---|---|---|---|---|---|
| $MH_2O$ | Ft $H_2O$ | Cm Hg | In Hg | In $H_2O$ | Pa |
| 1 | 3.280696 | 7.356339 | 2.896043 | 39.36572 | 9806 |
| 0.304813 | 1 | 2.242311 | 0.882753 | 11.9992 | 2989 |
| 0.135937 | 0.445969 | 1 | 0.39368 | 5.351265 | 1333 |
| 0.345299 | 1.13282 | 2.540135 | 1 | 13.59293 | 3386 |
| 0.025403 | 0.083339 | 0.186872 | 0.073568 | 1 | 249.1 |
| 0.000102 | 0.000335 | 0.00075 | 0.000295 | 0.004014 | 1 |

# Unit Conversation Table

**Table 4** Volume units

| Centimeter Cube | Meter Cube | Liter | Inch Cube | Foot Cube | US gallons | Imperial gallons | US barrel (oil) |
|---|---|---|---|---|---|---|---|
| $cm^3$ | $m^3$ | ltr | $in^3$ | $ft^3$ | us gal | imp.gal | us brl |
| 1 | 0.000001 | 0.001 | 0.061024 | 0.000035 | 0.000264 | 0.00022 | 0.000006 |
| 1000 000 | 1 | 1000 | 61024 | 35 | 264 | 220 | 6.29 |
| 1000 | 0.001 | 1 | 61 | 0.035 | 0.264201 | 0.22 | 0.00629 |
| 16.4 | 0.000016 | 0.016387 | 1 | 0.0000579 | 0.004329 | 0.003605 | 0.000103 |
| 28317 | 0.028317 | 28.31685 | 1728 | 1 | 7.481333 | 6.229712 | 0.178127 |
| 3785 | 0.003785 | 3.79 | 231 | 0.13 | 1 | 0.832701 | 0.02381 |
| 4545 | 0.004545 | 4.55 | 277 | 0.16 | 1.20 | 1 | 0.028593 |
| 158970 | 0.15897 | 159 | 9701 | 6 | 42 | 35 | 1 |

**Table 5** Mass units

| Grams | Kilograms | Metric tonnes | Short ton | Long ton | Pounds | Ounces |
|---|---|---|---|---|---|---|
| g | kg | tonne | sh-ton | L-ton | lb | oz |
| 1 | 0.001 | 0.000001 | 0.000001 | 9.84-07 | 0.002205 | 0.035273 |
| 1000 | 1 | 0.001 | 0.001102 | 0.000984 | 2.204586 | 35.27337 |
| 1000 000 | 1000 | 1 | 1.102293 | 0.984252 | 2204.586 | 35273.37 |
| 907200 | 907.2 | 0.9072 | 1 | 0.892913 | 2000 | 32000 |
| 1016000 | 1016 | 1.016 | 1.119929 | 1 | 2239.859 | 35837.74 |
| 45306 | 0.4536 | 0.000454 | 0.0005 | 0.000446 | 1 | 16 |
| 28 | 0.02835 | 0.000028 | 0.000031 | 0.000028 | 0.0625 | 1 |

**Table 6** Density units

| Gram/milliliter | Kilogram/meter cube | Pound/foot cube | Pound/inch cube |
|---|---|---|---|
| g/ml | $kg/m^3$ | $lb/ft^3$ | $lb/in^3$ |
| 1 | 1000 | 62.42197 | 0.036127 |
| 0.001 | 1 | 0.062422 | 0.000036 |
| 0.01602 | 16.02 | 1 | 0.000579 |
| 27.68 | 27680 | 1727.84 | 1 |

**Table 7** Volumetric Liquid Flows units

| Liter/second | Liter/minute | Meter cube/hour | Foot cube/minute | Foot cube/hour | Us gallons/minute | US barrels oil/day |
|---|---|---|---|---|---|---|
| L/sec | L/min | $M^3/hr$ | $ft^3/min$ | $ft^3/hr$ | gal/min | Us/brl/d |
| 1 | 60 | 3.6 | 2.119093 | 127.1197 | 15.85037 | 543.4783 |
| 0.016666 | 1 | 0.06 | 0.035317 | 2.118577 | 0.264162 | 9.057609 |
| 0.277778 | 16.6667 | 1 | 0.588637 | 35.31102 | 4.40288 | 150.9661 |
| 0.4719 | 28.31513 | 1.69884 | 1 | 60 | 7.479791 | 2564674 |
| 0.007867 | 0.472015 | 0.02832 | 10.01667 | 1 | 0.124689 | 4.275326 |
| 0.06309 | 3.785551 | 0.227124 | 0.133694 | 8.019983 | 1 | 43.28804 |
| 0.00184 | 0.110104 | 0.006624 | 0.003899 | 0.2339 | 0.029165 | 1 |



# Unit Conversation Table

## Continued

| (Bars)/1.25 Safety factor | | EgyTec Standard Pipe SDR 11 - 55 | EgyTec Standard Pipe SDR 7.4 - S3.2 | EgyTec Standard Pipe SDR 6 - S2.5 | EgyTec Standard Pipe SDR 5 - S2 |
|---|---|---|---|---|---|
| | | Nominal pressure class | | | |
| Years of service | temperature | PN10 | PN16 | PN20 | PN25 |
| | | 5 | 11.12 | 14.02 | 14.73 |
| | 75 °C | 10 | 10.62 | 13.38 | 13.80 |
| | | 25 | 8.99 | 11.33 | 12.40 |
| | | 45 | 7.80 | 9.82 | 11.20 |
| | | 5 | 10.23 | 12.90 | 16.10 |
| Constant service temperature 70 °C incl. days per year at,,, | 80 °C | 10 | 9.80 | 12.35 | 15.50 |
| | | 25 | 7.97 | 10.05 | 12.71 |
| | | 37.5 | 7.21 | 9.09 | 11.52 |
| | | 5 | 9.37 | 11.81 | 15.15 |
| | 85 °C | 10 | 8.51 | 10.72 | 14.20 |
| | | 25 | 6.81 | 8.58 | 12.16 |
| | | 37.3 | 6.37 | 8.03 | 11.40 |
| | | 5 | 8.41 | 10.59 | 11.30 |
| | 90 °C | 10 | 7.11 | 8.96 | 10.45 |
| | | 25 | 5.69 | 7.17 | 9.22 |

# Behavior PP-R Pipe

## Hygiene & Health Concerns

PPR Pipes are manufactured with health concerns in mind. The connection of pipes does not require any additives such as cement solvent, fluxes or solder. To ensure the safety of people who come in contact with consume the portable water, the following are strictly adhered to : DIN 1988 part 2 Drinking water Supply Systems Materials Components Applications Design and Installation.

## Sound Insulation

Copared to metalic pipes, PPR pipes do not need further insulation to decrease the dicibel level when water flows at relatively high speeds. The reason is simple . Metals transmit noises quicker and louder than plastic. Hence, whistling noises that result from the water hammer effect are non-exixtent.

## Advantages of Using PPR Pipes&Fittings

In comparison to either one of the conventional piping systems (metal or plastic), the ppr pipe has the following advantages that make it the system of the new millenium:

- It is safe for human health.
- It is resistant to rust and corrison.
- Rupture-free.
- It has high resistance to acids and chlorides.
- High-pressure tolerance and rating
- Speed and ease of fusion technology
- Extensive reduction in money, time and labor.
- No scaling.
- Noise-free at high flow tares.
- Light-weight.





**Table 1** Multiples and Submultibles of SL units

| Prefix | Symbol | Multiplying Factor | |
|---|---|---|---|
| exa | E | $10^{18}$ | 1 000 000 000 000 000 000 |
| peta | P | $10^{15}$ | 1 000 000 000 000 000 |
| tera | T | $10^{12}$ | 1 000 000 000 000 |
| giga | G | $10^{9}$ | 1 000 000 000 |
| mega | M | $10^{6}$ | 1 000 000 |
| kilo | k | $10^{3}$ | 1 000 |
| hecto* | h | $10^{2}$ | 100 |
| deca* | da | 10 | 10 |
| deci* | d | $10^{-1}$ | 0.1 |
| centi | c | $10^{-2}$ | 0.01 |
| milli | m | $10^{-3}$ | 0.001 |
| micro | u | $10^{-6}$ | 0.000 001 |
| nano | n | $10^{-9}$ | 0.000 000 001 |
| pico | p | $10^{-12}$ | 0.000 000 000 001 |
| femto | f | $10^{-15}$ | 0.000 000 000 000 001 |
| atto | a | $10^{-18}$ | 0.000 000 000 000 000 001 |

**Table 2** Length units

| Millimeters | Centimeters | Meters | Kilometers | Inches | Feet | Yards | Miles |
|---|---|---|---|---|---|---|---|
| mm | cm | m | km | in | ft | yd | mi |
| 1 | 0.1 | 0.001 | 0.000001 | 0.03937 | 0.003281 | 0.001094 | 6.21e-07 |
| 10 | 1 | 0.01 | 0.00001 | 0.393701 | 0.032808 | 0.010936 | 0.000006 |
| 1000 | 100 | 1 | 0.001 | 39.37008 | 3.28284 | 1.093613 | 0.000621 |
| 1000000 | 100000 | 1000 | 1 | 39370.08 | 3280.84 | 1093.613 | 0.621371 |
| 25.4 | 2.45 | 0.0254 | 0.000025 | 1 | 0.083333 | 0.027778 | 0.000016 |
| 304.8 | 30.48 | 0.3048 | 0.000305 | 12 | 1 | 0.333333 | 0.000189 |
| 914.4 | 91.44 | 0.9144 | 0.0000914 | 36 | 3 | 1 | 0.000568 |
| 1609344 | 160934.4 | 1609.344 | 1.609344 | 63360 | 5280 | 1760 | 1 |

**Table 3** Area units

| Millimeter Square | Centimeter Square | Meter Square | Inch Square | Foot Square | Yard Square |
|---|---|---|---|---|---|
| $mm^2$ | $cm^2$ | $m^2$ | $in^2$ | $ft^2$ | $yd^2$ |
| 1 | 0.01 | 0.000001 | 0.00155 | 0.000011 | 0.000001 |
| 2 | 1 | 0.0001 | 0.155 | 0.001067 | 0.00012 |
| 1 000 000 | 10000 | 1 | 1550.003 | 10.76391 | 1.19599 |
| 645.16 | 6.4516 | 0.000645 | 1 | 0.006944 | 0.000772 |
| 92903 | 929.0304 | 0.092903 | 144 | 1 | 0.11111 |
| 836127 | 8361.274 | 0.836127 | 1296 | 9 | 1 |

# Glossary

## POLYVINYL CHLORIDE PLASTICS
Plastics obtained by the polymerization of vinyl chloride. The addition of various ingredients, such as stabilizers, colorants, lubricants and fillers enhance the process-ability and performance.

## POROSITY
A term describing a plastic part that has many visible voids.

## PRESSURE RATING
The maximum presuure at which a plastinc part can safely function withput failing.

## QUICK BURST
A term used to describe the amount of internal presuure required to burst a pipe or fitting when the pressure is built up over 60-70 second interval of time.

## REINFORMED PLASTIC
A plastic with high strength fillers imbedded in the composition, causing some mechanical properties to be superior to those of the base resin.

## RESIN
A solid or pesudo-solid organic material, often having a high molecular weight, which exhibits a tendency to flow when subjected to stress. It usually has a softening or melting range and usually fractures accordingly.

## RUNNER
The secondary feed channel in an ijection mold that runs from the inner end of the spruce to the cavity gate. Also the solidfield piece of plastic, which forms in the feed channel when the injection's molded part, cools down.

## SAMPLE
A small part or portion of a material or product intended to be represintative of the whole.

## SCHEDULE
A pipe sizing system for the outside diameter and wall thickness dimensions which was launched by the iron pipe industry, as the diameter increases, the presuure rating decreases for any given schedule of pipe.

## SELF-EXTINGUISHING
A term describing a plastic material that stops burning when the source of ignition is removed.

## SHRINK MARK
A depression in the surface ofa molded plastic part where it has retracted from the mold.

## SOFTENING POINT
The temperature at which a plastic changes from rigid to soft.

## SOLVENT
A medium into which substance is dissolved.

## SOLVENT CEMENT
An adhesive consisting of plastic dissolved into a solvent and used to bond plastic surfaces.

## SOLVENT CEMENTING
Using a solvent cement to make a pipe joints.

## SPECIFIC GRAVITY
The ratio of the mass of a material to the mass of an equal volume of water.

## SPRUE
The primary feed channel that runs from the outer face of an injection mold to the runner or the gate.



# Chemical Tables

| Hostile Environment | Concentration | Chemical resistance | | |
|---|---|---|---|---|
| | | 20°C | 60°C | 100°C |
| 1,2 diamlnthanol | TP | Rs | Rs | -- |
| 2 - n itrotoluene | TP | Rs | TR | -- |
| I - ICL/$HMO_3$ | %75 / %25 | NR | NR | NR |
| adipinic acid | TP | Rs | Rs | -- |
| nitric gas | all | Rs | Rs | -- |
| nitric acid | %10 | Rs | TR | NR |
| nitric acid | %10 - 50 | TR | NR | NR |
| nitric acid | >%50 | NR | NR | NR |
| battery acid | V | Rs | Rs | -- |
| acrylonitrile | TP | Rs | TR | -- |
| ally alcohol | 96% | Rs | Rs | -- |
| deluted | AS | Rs | Rs | -- |
| aldehy de | AS | Rs | Rs | -- |
| amber acid | TP | Rs | Rs | Rs |
| amyl alcohol | AS | Rs | Rs | -- |
| ammonia acid | TP | Rs | Rs | -- |
| ammonia gas | TP | Rs | Rs | -- |
| ammonia liquid | TP | Rs | -- | -- |
| acetic acid anhydride | TP | Rs | CR | -- |
| aniline | TP | Rs | CR | -- |
| anone | TP | CR | NR | NR |
| anone (cyclohexanone) | V | Rs | Rs | Rs |
| antifreeze | TP | CR | -- | -- |
| acetaldhyde | TP | Rs | Rs | -- |
| acetaphenone | TP | CR | -- | -- |
| amyle acetate | AS | Rs | Rs | butyl |
| ammonium acetate | TP | CR | NR | NR |
| acetate | AS | Rs | Rs | Rs |
| sodium acetate | TP | Rs | Rs | -- |
| acetone | 35% | Rs | Rs | -- |
| natrium benzoate | TP | R | NR | NR |
| benxol | AS | Rs | Rs | Rs |
| sodium bicarbonate | AS | Rs | Rs | -- |
| potassium bisulphate | HD | Rs | Rs | -- |
| potassium dichromate | AS | Rs | Rs | -- |
| butanediol | TP | Rs | Rs | -- |
| butantriol (1,2,4) | TP | Rs | Rs | -- |
| butylene, liquid | TP | CR | -- | -- |
| butylene glycol | TP | Rs | -- | -- |
| butylene glycol | 10% | Rs | CR | butyl |
| alcohol | TP | Rs | CR | CR |

# Chemical Tables

| Hostile Environment | Concentration | Chemical resistance | | |
|---|---|---|---|---|
| | | 20°C | 60°C | 100°C |
| natrium benzoate | %35 | Rs | RS | -- |
| benzol | TP | R | NR | NR |
| sodium bicarbonate | AS | RS | RS | Rs |
| potassium bisulphate | AS | RS | RS | -- |
| potassium bisulphate | HD | RS | -- | -- |
| potassium dichromate | AS | RS | RS | -- |
| butanediol | TP | RS | RS | -- |
| butantriol (1,2,4) | TP | RS | RS | -- |
| butylene, liquid | TP | CR | -- | -- |
| butylene glycole | TP | RS | -- | -- |
| butylene glycole | %10 | RS | CR | butyl |
| alcohol | TP | RS | CR | CR |
| butylene phenol | AS | RS | -- | -- |
| butylene phenol | TP | HC | -- | -- |
| butine (2) diol (1,4) | TP | RS | -- | -- |
| liquid paraffin | TP | RS | CR | -- |
| fixing agent vat | V | RS | RS | -- |
| wines | V | RS | RS | -- |
| vinyl acetate | TP | RS | YC | -- |
| tartaric acid | %10 | RS | RS | -- |
| wine vinegar | V | RS | RS | Rs |
| distilled water | V | RS | RS | RS |
| air | TP | RS | RS | RS |
| wax | V | RS | CR | -- |
| hexane | TP | RS | CR | -- |
| hexane triol (1,2,6) | TP | RS | RS | -- |
| heptane | TP | RS | CR | HC |
| hydrazine hydrate | TP | RS | -- | -- |
| natrium hydrate | %60 | RS | RS | RS |
| potassium hydrogen carbonate | AS | RS | RS | -- |
| barium hydroxide | AS | RS | RS | RS |
| potassium hydroxide | %50 | RS | RS | RS |
| aniline hydrochloride | AS | RS | RS | -- |
| hydrochloride | AS | RS | RS | RS |
| hydrochloride | TP | RS | CR | - |
| calcium hypocloride | HD | RS | -- | -- |
| sodium hypocloride | %20 | NR | NR | NR |
| sodium hypochlorite | %10 | RS | -- | -- |
| sodium hypochlorite | %20 | CR | CR | NR |
| hydroxiacetic acid | %30 | RS | CR | -- |
| glycrin | TP | RS | Rs | RS |
| glucose | %20 | RS | RS | RS |
| town gas | V | RS | -- | -- |
| diamenthanol | TP | RS | -- | -- |
| tar oil | H | RS | NR | NR |
| dextrin | HD | RS | RS | -- |
| dihexyl fatalat | TR | RS | CR | -- |
| diglycolic acid | AP | RS | RS | -- |
| diesel oil | V | RS | CR | -- |
| di-iso-octyl fatalat | TP | RS | CR | -- |
| di-iso-propyl ether | TP | CR | NR | -- |
| dimenthyl amine | %100 | RS | -- | -- |



# Glossary

## FORMING
A process in which the shape of plastic pieces such as sheets, rods or tubes are changed to desired configuration.

## FORMULATION
The combination of ingredients used to make a finished plastic product, Also see “Compound”.

## FUSE
To join together plastic parts by softening the material with heat or solvents.

## GATE
The constriction in the flow channel between the runner and and the mold cavity in an injection mold.

## GLASS TRANSITION
The reversible change in an amorphus polymer from a vascous condition to a hard and relatively brittle one, and vice versa.

## GLASS TRANSITION TEMPERATURE
The approximate midpoint of the temperature range over which the glass transition takes place.

## GUEST
A piece used to give additional size or strength to a plastic part at particular location.

## HARDNESS
A measure of a material’s ability to resist indentation.

## HEAT RESISTANCE
The ablilty of a material to withstand the effects of exposure to a high temperature.

## HOOP STRESS
The circumferential stress imposed on a pipe wall when exposed to an internal pressure load. Usually expressed in PSI.

## IMPACT STRENGTH
A measure of a plastic part’s ability to withstand the effects of dropping and/or striking. There are two commonly used test methods, Notched Izod and tup. Notched Izod uses a pendulum type machine to strike a notched specimen. Up testing uses a falling weight (tup) to strike a pipe or fitting specimen.

## INJECTION MOLDING
The process used to form a shape by forcing a heated plastic, in a fluid state and under pressure, into the cavity of a closed mold.

## ISO EQUATION
The equation which shows the relationship between stress, presure and dimensions of a pipe.

## JOINT
The point where the pipe and its fitting or two seperate pipes are connected together.

## LIGHT STABILITY
A feature of a plastic which allows it to retain it’s original color and physical properties when exposed to sun or artificial light.

## LIGHT TRANSMISSION
The amount of light which a plastic will allow to pass through.

## LONGITUDINAL STRESS
A tensile or compressive force placed upon the long axis  of a plastic part.

## LUBRICANT
Any substance which reduces the friction between moving solid surfaces.

# Glossary

## MODULUS
A term used to describe the load required to cause specified percentage of elongation. It's usually expressed in PSI or kilos per square centimeter.

## MONOMER
A low-molecular-weight substance whose molecules can react with other molecules to form a polymer.

## NON-FLAMABLE
Incapable of igniting.

## OLEFIN PLASTICS
A group of plastics based on polymers made by polymerization or copolymerization of olefins with other monomers, with the olifens being at least 50% of the weight. For example polypropylene, polyethelene and polybutylene.

## ORGANIC CHEMICAL
Any chemical that contains carbon.

## PLASTIC
A material that contains as an essential ingredient one or more organic polymeric substances of large moleculers meight. It is solid in it's finished state and, at some stage in it's manufacturing process into finished articles, can be shaped by flow.

## PLASTICITY
The properity of plastics, which allwows them to be formed, without rupture, continously and permanently by the application of a force, which exceeds the yield value of the material.

## PLASTICIZER
A substance incorporated into a plastic to increase it's workability, flexibility, or dispensability.

## PLASTIC PIPE
A hollow cylinder of a plastic material in which the wall thickness is usually small compared to the diameter, and in which the inside and outside walls are essentially concentric.

## POLYBUTYLENE PLASTICS
Plastics based on polymers with butane as the sole monomer.

## POLYBUTYLENE PLASTICS
Plastics based on polymers with ethylene as the sole monomer.

## POLYMER
A product formed by the chemical reaction of the addition of a large number of small molecules which have the ability to combine and reach high molecular weights.

## POLYMERIZATION
A chemical reaction in which the molecules of monomers are linked together to form polymers.

## POLYOLEFIN PLASTICS
Plastics based on polymers with olefin as the sole monomer.

## POLYPROPYLENE PLASTICS
Plastics based on polymers with propylene as the sole monomer.

## POLYSTYRENE PLASTICS
A polymer prepared by the polymerization of styrene as the solo monomer.



# Chemical Tables

| Hostile Environment | Concentration | Chemical resistance | | |
|---|---|---|---|---|
| | | 20°C | 60°C | 100°C |
| dimethylformamide | TP | Rs | Rs | -- |
| di-n-butyl ether | TP | Cr | -- | -- |
| di-n-onyl fatalat | TP | Rs | CR | -- |
| dioane, | TP | CR | CR | -- |
| sulfur dioxide | all | Rs | Rs | -- |
| sulfur dioxide, gas | TP | Rs | Rs | -- |
| sulfur dioxide, fluid | all | Rs | Rs | -- |
| carbon dioxide, gas | all | Rs | Rs | -- |
| carbon dioxide, fluid | all | Rs | Rs | -- |
| dioctyl fatalat | TP | Rs | CR | -- |
| dichlorobenzene | TP | CR | -- | -- |
| dichloracetic acid | TP | CR | -- | -- |
| dichloracetic acid | 50% | Rs | Rs | -- |
| dichlorethelyne (1, 1-1, 2) | TP | Yc | -- | -- |
| diethyl amine | TP | Rs | -- | -- |
| diethyl ether | TP | Rs | CR | -- |
| leaven | all | Rs | -- | -- |
| gelatin | HD | Rs | Rs | Rs |
| fatty acids >C4 | TP | Rs | CR | -- |
| potassium iodide | AS | Rs | Rs | -- |
| carbolineum | V | Rs | -- | -- |
| ammonium carbonate | GL | Rs | Rs | -- |
| potassium carbonate | GL | Rs | Rs | -- |
| calcium carbonate | GL | Rs | Rs | Rs |
| sodium carbonate | 50% | Rs | Rs | CR |
| carbonimonoxide | all | Rs | Rs | -- |
| carbonsulphide | TP | HC | HC | HC |
| caustic soda | 60% | Rs | Rs | Rs |
| alum | TP | Rs | Rs | -- |
| oxygen | TP | Rs | -- | -- |
| fatty acid | 20% | Rs | -- | -- |
| acid acetanhydride | 40% | Rs | Rs | -- |
| coconut oil | TP | Rs | -- | -- |
| coconut fat spirit | TP | Rs | YC | -- |
| cognac | V | Rs | Rs | -- |
| strach solution | all | Rs | Rs | -- |
| strach syrup | all | Rs | Rs | -- |
| cresol | 90% | Rs | Rs | -- |
| cresol | >90% | Rs | -- | -- |
| silicotfluorine acid | 32% | Rs | Rs | -- |
| fluorosilicic acid | 32% | Rs | Rs | -- |
| silicic acid | all | Rs | Rs | -- |
| xylol, xylene | TP | CR | NR | NR |
| corn oil | TP | Rs | CR | -- |
| citric acid | LD | Rs | Rs | Rs |
| molasses | V | Rs | Rs | Rs |

# Followed Standard

## According to:

DIN 8077 polypropylene Pipes and 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, Material Components, Appliance Design Installation

BS 6400 Design Installation, Testing and MAintainance of Services Supplying Water of Domestic Use within Buildings and their Curilages

DVS 2207 Welding of Thermoplastic

DVS 2208 Welding Machines and Devices for Thermoplastic

ES 3703 Part 1 2002 Polypropylene Pipe dimensions and testing

## What are DIN Standards

Deutsches Inistitute Fur Normung (DIN) is a German institute for standardizaion. It is a technical and scientific  associaition recognized by the german government as the National Standard body representing German interests at International and European levels.

DIN provides a forum where representatives from the manufacturing industries, consumer organizations, commerce, trades, and service industries, science and technical inspectorates as well as the government can gather to discuss and define their specific satandardization requirements and their results as german standards.

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

PN stands for Norminal Pressure. It is a numercial designation used for referencing purposes related to mechanical characteristics of the components of piping system.

## Why are categorized under PN-25 Types

Fittings can withstand any temperature above 95°C and pressure tp to 25kg/cm$^2$. Hence, they are categorized uner PN-25



# Glossary

**CURE**
To change the properties of a polymer to a stablle and usable final state by the use of chemical agents, heat or radiation.

**DEFLECTION TEMPERATURE (HEAT DISTORTION)**
The temperature which will cause a plastic specimen to deflect a certain distance when specified load is applied.

**DEGRADATION**
A determantal change in the chemical structure, physical properties or appearence of a plastic.

**DELAMINATION**
The seperation of the layers of material in laminate.

**DETERIORATION**
A permanent change in the physical properties of a plastic piece evidenced by impaiment of these properties.

**DIELECTRIC STRENGTH**
The force required to drive an electric current through a specific thickness of a material.

**DIFUSION**
The movement of gas or liquid particles or molecules in a body of fluid through or into medium and away from the main body of fluid.

**DIMENSION STABILITY**
The capability ofg a plastic part to maintain its original shape and dimensions under conditions of use.

**ELASTICITY**
The property of a plastic that allows it to return to its original dimensions after deformation.

**ELASTIC LIMIT**
The load point at which a material will not return to it's original shape and size after the load has been released.

**ELASTOMER**
A substance which when stretched to approximately twice it's length, at room temperature, will quickly return to its original length when the stressing load is relieved.

**ELECTRICAL PROPERTIES**
The resistance of a plastic to the passage of electricity.

**ELONGATION**
The lengthening of a material to an extent under tension without failing.

**ENVIRONMENTAL STRESS CRACKING**
Cracks which develop when a plastic part is subjected to incompatible chemicals or put under stress.

**EXTRUSION**
The process used to continously form a shape by forcing a heated or unheated plastic through a shapeing orifice (die).

**FILLER**
A relatively inert material added to a plastic to modify it's strength, permanence, working properties and other qualities, or merely to lower costs,

**FLEXURAL STRENGTH**
The measure of a meteials's ability to withstand a specified deformation under a beam load (bending) at 73°F. Normally expressed in PSI.

# Glossary

### STABILIZER
An ingredient added to a plastic compound to inhibit or slow down any undesirable changes in the materials.

### STANDARD DIMENSION RATIO (SDR) PIPE
A type of pipe in which the dimension raios are contrast for any given class. Unlike “schedule” pipe, as the diameter increases the pressure rating remains contrast for any given class of pipe.

### STIFFNESS FACTOR
A term describing the degree of flexibility of a piece of pipe when subjected to an external load.

### STRESS-CRACK
An external or internal crack in a plastic caused by tensile stresses less than its short-time mechanical strength.

### SUSTAINED PRESSURE TEST
A test in which a plastic part is subjected to a constant internal pressure load for 1000 hours.

### TEAR STRENGHT
A measure of material’s ability resist tearing.

### TENSILE STRENGTH
The measure of a plastic ability to resist a stretching force. It requires rupturing a test specimen. It is normally exspressed in the PSI.

### THERMAL CONDUCTIVITY
A measure of a plastic’s ability to conduct heat.

### THERMAL CONTRACTION
The decrease in length of a plastic part due to a change in temperature.

### THERMAL EXPANSION
The decrease in length of a plastic part due to a change in temperature.

### THERMALASTICS
A group of plastics which having been cured by heat, chemicals, or other mean, are substantially infusible and insoluble. They are permanently hardened.

### VINYL CHLORIDE PLASTICS
Plastics based on polymers or copolymers of vinyl chloride with other monomers, with the vinyl chloride being the greatest amount by weight.

### VISCOSITY
A term describing a material’s resistance to flow.

### VOLATILE
A properity of liquids in which they pass away by evapourating.

### WELD LINE (KNIT LINE)
A term used to describe a mark on a molded plastic part formed by the union of two or more streams of plastic flowing together.

### YIELD POINT
The point at which a plastic material will not withstand a stretching force.It will continue to elongate with no increase in load after reaching the point.



# Followed Standard

### How are pipes categorized as PN-10, PN-16, Pn-20 & PN-25?
It is done by matching them with the SDR (Standard Dimension Ratio) conventional pipes. A PPR-C Pipe with a wall thickness of OD / SDR is matched as equivalent of a PPr-C Pipe for a SDR Pipe.

PN-10 is regarded as the equilavent of SDR 11 because the PN 10 Pipe of 20 mm OD has an approximate thickness of 20/11=1.8
PN-10 160 mm has an approximate thickness of 160/11=14.55 Likewise, SDR 9 is matched with PN-12, SDR 7.4 with PN -16, SDR 6 with PN-20 and SDR 5 as PN-25.

### How are the PPR Pipes & Fittings joinend together?
The process of joining the PPR Pipes & Fittings is very simple and result in inseparable water joints.
It’s carried out by using a simple welding machine that melts the internal surface ofthe fittings and the external surface of the pipe at 270°C to the point of melding. Since the pipes and fittings are produced from the same material, the connection is homogenous.

### Can the pipe’s alignment be adjusted after the welding process?
Any alighnment up to 5 degrees relative to the axis of the pipe can be adjusted immediatly after jointing.

### How are the sizes of the pipes and fittings measured?
A pipe’s size is obtained by measuring its Outer Diameter (OD) in millimeters (mm).
As for the PPR fittings, they are obtained by measuring Inner Diameter (ID) also in millimeters (mm).
And the metal threaded fittings are measured in inches(”).

### How can stressing of the pipe be avoided?
Possible linear thermal expansion and contraction needs to be taken care of during designing and installing. Stressing of the pipe can be avoided by providing flexible length and propper supporting.

### Why is the joining of pipes without using sockets not recommended?
TYhis is because such joining results in blockage or reduction in the inner diameter are the joining point. Hence, itsrecommended to avoid it as it can affect the functioning of the entire system.

### Is joining the pipes & fittings using glue recommended?
It’s not recommended because glue can’t stop the pipes from leaking. It resimbles a termite attack and requires frequent maintainance, thus affecting the pipe’s hygiene and shelf-life.

### Which method of pressure testing is recommended?
Before any pipes are filled or cemented in concealed application, they are to be hydrostatically tested for any pressure loss or leakage. Start y closing all ends of the pipe with end caps and pipe plugs. Then proceed with loading water and pressure in the closed pipes up to 25 Bar pressure in PN-16, PN-20 and PN-25 pipes, and up to 15 Bar pressure for PN-10, and PN-12 at room temperature.
The pressure should maintained for at least 8 hours to check for any drop in pressure and pepeated to dismiss the minute chance of any leakage. In the event of any considerable pressure drop, the particular area of leakage has to be identified and redone.

# Manual Pipe Welding

- Place the welding machine onto suitable carrier. Heating elements must be fastened using hexagon key.

  Switch the welding machine on, in order to preheat it.

  Cut the pipe to the wanted length using pipe shears (Art. 025) or pipe cutter (Art. 030) vertically in relation to the pipe's axis.

  Pipe's ends must be cut straight. Sharp ends, unevenness, or scrapings on pipes must be removed by appropriate tools (Art. 036 ,035).

- If you are working with STABI pipes, then the aluminum layer should be removed at each end with STABI peeling tool (Art. 041).

  *One end of STABI pipe must be pushed into the peeling tool and, by turning it, aluminum layer will be peeled to the border-line of the peeling tool, which represents the depth of future welding.*

  *If knives on the peeling tool were correctly placed, after the aluminum layer is peeled off, STABI pipe should be as hard to insert into a welder as regular pipe.*

- Pipes and fittings, together with the welding machine, must be clean and dry. Before welding they should be checked and, if necessary, cleaned with hard paper napkins without fibers or with a clean cloth.

- Welding machine's socket and spigot length has to be marked on the pipe.

  *Working temperature of a welding machine is °260C which has to be controlled. According to the general guidelines for manual welding, control of working temperature has to be performed with measurement device which has a display with actual temperature reading. Such devices have to insure temperature measurement up to °360C and have to have high measurement precision.*

- Insert the end of the pipe inside of welding machine socket's female part evenly and without rotating. At the same time attach the fitting on the welding machine spigot's male part, also evenly and without rotating.

- After prescribed heating time, pull the pipe and fitting out of socket and spigot and immediately, without rotating, push the pipe evenly into fitting up to the fitting border line, in order to cover the marked length on the pipe. After few seconds, the pipe and fitting are welded together.

  *Pipe must not be pushed into the fitting too deep as this could cause deformation of the pipe and, in extreme cases, deformed pipe could block the passage of water. Welding time for fittings corresponds to heating time.*
  *During this time position of the fitting can be corrected. Correction is limited to positioning of pipes and fittings into alignment. Bending of elements is not permitted. After the end of welding time, junction must not be corrected again.*

- **The result of the pipe and fitting's merging (fusion) is a union of Egypt Therm installation system fittings.**

  **This is an unexampled jointing technique with lifetime guarantee!**



# Glossary

## ABRASION RESISTANCE
The mesure of a materials ability to withstand erosion when subjected to rubbing, scraping, wearing, scouring, etc.

## AGING
The act oreffect or exposed materials to an envoronment for a long period of time.

## ANTIOXIDANT
A substance added to a plastic compound to to retard degradation due to contact with air (Oxygen).

## BEAM LOADING
The process of applying a specified force (load) to a piece of pipe that is supported at two points. It is usually expressed in pounds per the distance between the center of the suports.

## BLEED-END
A term used to describe a pipe end which has been enlarged to have the same inside dimensions as a fittings socket. Is acts as a coupling when joining pipes.

## BLISTER
An undesirable air or gas bubble (bump) on the surface of a plastic part.

## BOND
To attach by the use of an adhesive.

## BURST STRENGTH
The maximum amount of internal presuure a piece of pipe or a fitting will withstand before breaking.

## CHEMICAL RESISTANCE
The ability of a plastic to withstand the effects of chemicals at various concentrations and temperature.

## COLD FLOW
A change in the shape or dimensions of a plastic part when subjected to a load (weight or pressure) at room temperature.

## COMPOUND
The mixture of of ingredients, consisting of a plastic resin and specified additives, used to manufacture a plasti cpart.

## CONDESATION
A chemical reaction involving the combination of two or more molecules that result in the elimination of a simple molecule, such as water and the formation of a more complix compound of  greater molecular weight.

## COPOLYMER
The product formed by the simultaneous polymerization of two or more polymerizes chemicals (monomers).

## CREEP
The dimensional change, beyond the intial elastic elongation caused by the application of a load, over a specified peroid of time. It is normally expressed in inches per unit of time.

# **PP-R** Products

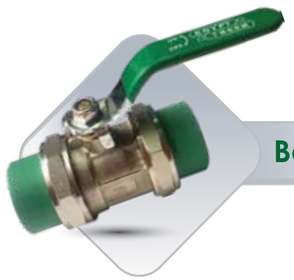
## **Concealled** Valve

| PP-R fitting | code |
|---|---|
| 20 x 3/4" | 113401 |
| 25 x 3/4" | 113402 |
| 32 x 3/4" | 113403 |

PN 25

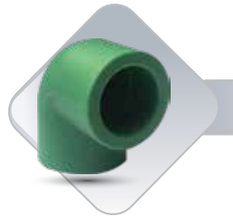
## **Plug for** pressure Test

| PP-R fitting |
|---|
| 1/2" |



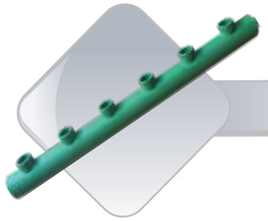
## **Ball** Valve

| PP-R fitting | Code |
|---|---|
| 20 x 1/2" | 11520 |
| 25 x 3/4" | 11521 |
| 32 x 1 " | 11522 |
| 50 x 1 1/2" | 11523 |
| 63 x 2" | 11524 |
| 75 x 2 1/2" | 11525 |
| 90 x 3 " | 11526 |



## **Elbow 90˚**

| PP-R fitting | code |
|---|---|
| 20 | 112701 |
| 25 | 112702 |
| 32 | 112703 |
| 40 | 112705 |
| 50 | 112706 |
| 63 | 112707 |
| 75 | 112708 |
| 90 | 112709 |
| 110 | 112710 |



## **Battery**

PN 20

| PP-R fitting | Code |
|---|---|
| 25 x 50 | 11520 |
| 25 x 50 M. | 11521 |
| 32 x 50 | 11522 |
| 3/4 x 50 M. | 11523 |
| 3/4 x 50 F. | 11524 |
| 63 x 25 | 11525 |
| 63 x 25 M. | 11526 |
| 32 x 63 | 11527 |
| 3/4 x 63 M. | 11528 |
| 3/4 x 63 F. | 11529 |

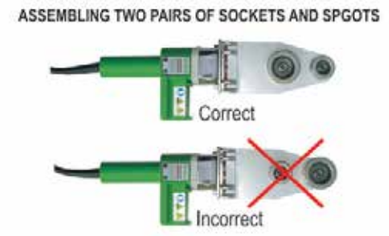


# **Instructions** & Warmings

**1. Fusion welder**

Check carefully if fusion welder you use is in good working condition; it must be preheated to the working temperature of °260C (°5±C) for any diameter of pipes and/or under any conditions.

Do not weld in windy areas (especially when it's cold) because the wind can cause heat variation on the fusion welder. Sometimes, these temperature variations can have values over °50C in relation to the exact working temperature and the thermostat cannot keep up the working temperature.




**2. Fixed and free points**

While fixing the pipe line, number of support points and their type depends on the material the pipe is made of, dilatation, compensation value, future working conditions (combination of pressure and temperature) and type of assembly. Pipelines are fixed with combination of fixed and free points with a presumed length change of the pipe due to dilatation.

Fixed points divide the pipeline into sections in which length dilatation can occur; dilatation must not be prevented on the parts of the pipeline where there are fittings.

Free points enable pipe dilatation (stretching), without disrupting the pipe's axis. Dosed points are achieved using adequate pipe clips (for example Art.001 Jointed pipe clip). Different pipe sections are held on the wall with help of pipe joints. Distance between those pipe clips (support points) depends on future working conditions and pipe weight (together with the fluid which they distribute).

**DISTANCE BETWEEN SUPPORT POINTS (cm)**

Following table shows recommended distances between support points:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **25** | 85 | 85 | 85 | 80 | 75 | 75 | 70 |
| **32** | 100 | 95 | 95 | 90 | 85 | 75 | 75 |
| **40** | 110 | 110 | 105 | 100 | 95 | 90 | 85 |
| **50** | 125 | 120 | 115 | 110 | 105 | 100 | 90 |
| **63** | 140 | 135 | 130 | 125 | 120 | 115 | 105 |
| **75** | 155 | 150 | 145 | 135 | 130 | 115 | 115 |
| **90** | 165 | 160 | 155 | 150 | 145 | 125 | 125 |
| **110** | 190 | 180 | 170 | 170 | 160 | 140 | 130 |

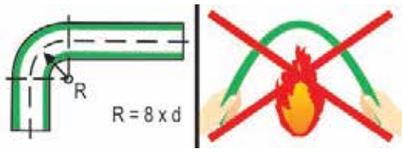
**3. Cross-overs**

In pipe installations, a pipe must often cross over another pipe. Cross overs are suitable for bridging over in such cases.

**4. Bending**

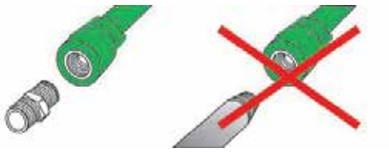
Cold bending may be used when bending radius is minimum 8 times larger than pipe's diameter, and with smaller curves the part of the pipe that is going to be bent should be pre-heated by warm air stream (for example by warm air from hair-drier).

**Use of flame is strictly prohibited.**




**5. Threaded joints**

Jointing must be made only by using identical male and female threads (see DIN 2999). It is not recommendable to use conical thread with transition joints of female cylindrical thread.



**6. Sealing**

In order to secure efficient sealing of installation system, we recommend wraping the thread with an adequate quantity of Teflon or similar tape **Do not apply too much tape.**

### 7. Transport and assembly

As a consequence of careless handling during working phases, different cuts and damages can occur on **Egypt Therm** pipe surfaces. In order to avoid such dangerous situations, handle the pipes with adequate caution and try to secure them from damaging. **Never install damaged pipe or a fitting.**

### 8. Low temperatures

When temperature drops down to °0C or lower, PP-R **Egypt Therm** pipes and fittings become brittle, so it is recommendable to handle them with special care in all working phases (special attention is needed when cutting pipes).


### 9. UV - rays

**Egypt Therm** pipes and fittings are equipped with UV stabilizer, which makes storing out in the open possible, but despite such stabilizer, it is not recommended to store the pipes in the open for longer than 6 months.

**It is recommended to store PP-R pipes in a way that they are not exposed to UV rays without adequate protection.**

### 10. Storage

**Egypt Therm** pipes need to be stored carefully and protected from direct exposure to sunlight. Pipes must not be piled in stacks higher than 1,5 m.

## Recommendations

### Jointing of PP-R pipes and galvanized metal pipes

When jointing PP-R pipe to a galvanized metal pipe, it is recommended to use male threaded transition fitting, in a way that an extra metal fitting, such as coupling, is placed between pipe and fitting.

**Usage of PP-R female threaded transition fitting for jointing PP-R and metal pipes is not recommended.**

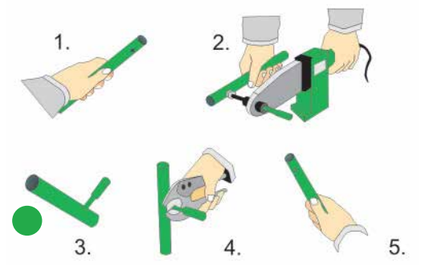
### Jointing of PP-R elements with valves

To accomplish connection between PP-R pipe and fittings with metal valves, PP-R male threaded transition fittings should always be used.

**Avoid jointing PP-R female threaded transition fittings and metal conical threaded nipples.**

### Fixing the holes

In case that PP-R pipe is pierced, it is possible to fix it using special tools (repair welding sockets) and PP-R pins for pipe repair (Art. 885).



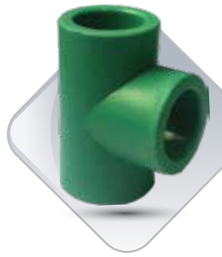



# PP-R Products

## Coupling

PN 25

| PP-R fitting | code |
|---|---|
| 20 | 112101 |
| 25 | 112102 |
| 32 | 112103 |
| 40 | 112105 |
| 50 | 112106 |
| 63 | 112107 |
| 75 | 112108 |
| 90 | 112109 |
| 110 | 112910 |



## Equal Tee

PN 25

| PP-R fitting | code |
|---|---|
| 20 | 112101 |
| 25 | 112102 |
| 32 | 112103 |
| 40 | 112105 |
| 50 | 112106 |
| 63 | 112107 |
| 75 | 112108 |
| 90 | 112109 |
| 110 | 112910 |

## End Cap

PN 25

| PP-R fitting | code |
|---|---|
| 20 | 112101 |
| 25 | 112102 |
| 32 | 112103 |
| 40 | 112104 |
| 50 | 112105 |
| 63 | 112106 |
| 75 | 112107 |
| 90 | 112108 |
| 110 | 112109 |

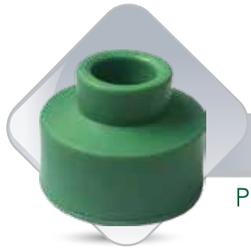
## 2 Side union welding

| PP-R fitting | code |
|---|---|
| 20 x ½" | 111601 |
| 25 x ½" | 111602 |

## Reducing Elbow

| PP-R fitting | code |
|---|---|
| 20 x 25 | 111601 |
| 20 X 32 | 111602 |
| 25 x 32 | 111603 |

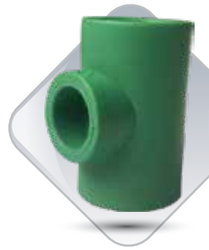
# **PP-R** Products



## **Reduction**

PN 25

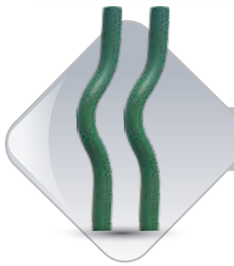
| PP-R fitting | code |
|---|---|
| 20 X 25 | 113001 |
| 20 X 32 | 113002 |
| 25 X 32 | 113003 |
| 20 x40 | 113004 |
| 25x 40 | 113005 |
| 32 x 40 | 113006 |
| 20 X 50 | 113009 |
| 25 X 50 | 113010 |
| 32 X 50 | 113014 |
| 40 x 50 | 113013 |
| 20 x 63 | 113015 |
| 25 x 63 | 113016 |
| 32 X 63 | 113017 |
| 50 X 63 | 113018 |
| 50 X 75 | 113019 |
| 63 X 75 | 113020 |
| 63 x 90 | 113021 |
| 75 x 90 | 113022 |
| 63 x 110 | 113023 |
| 75 x 110 | 113024 |
| 90 x 110 | 113024 |



## **Reduceing** Tee

PN 25

| PP-R fitting | code |
|---|---|
| 20 x 25 | 112401 |
| 20 x 32 | 112402 |
| 25 x 32 | 112403 |
| 25 x 40 | 112404 |
| 32 x 40 | 112405 |
| 20 x 50 | 112406 |
| 25 x 50 | 112409 |
| 32 x 50 | 112410 |
| 20 x 63 | 113705 |
| 25 x 63 | 113706 |
| 32 x 63 | 113707 |
| 50 x 63 | 113708 |
| 50 x 75 | 113711 |
| 63 x 75 | 113712 |
| 75 x 90 | 113713 |



## **Cross** over

| PP-R fitting | code |
|---|---|
| 20 | 112601 |
| 25 | 112602 |

## **Cross over** with socket

| PP-R fitting | code |
|---|---|
| 20 | 112607 |
| 25 | 112608 |



# **Change in PP-R** Pipe Length

Polypropylene pipes have a higher thermal expansion rate and greater flexibility than metals. This fact should be taken into consideration when designing water supplying systems; especially if pipes in hot water supplying and heating systems are not reinforced with metal layers. The linear expansion of PPR pipes is calculated according to the following formula:

$$\triangle L = \varepsilon . L . \triangle T$$

Where:

$\triangle L$ — The Change in Lenght of pipe, (mm)
$\varepsilon$ — The coefficient of linear expansion;
$L$ — The original lenght of pipe, (m)
$\triangle T$ — Temperature difference, ($^{o}C$)

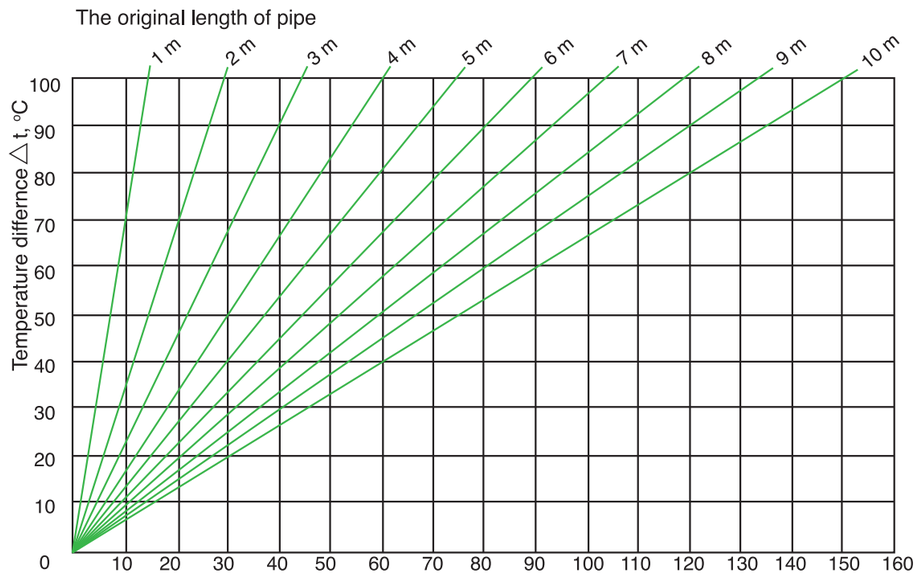
For non-reinforced pipes, the coefficient of thermal expansion is 0.15 mm/m $^{o}C$, while for reinforced pipes, the coefficient is 0.03 mm/m $^{o}C$.

For example, on the segment of a non reinforced pipeline of 6.5 m length, the probable temperature varies from 20 $^{o}C$ to 75 $^{o}C$ . Therefore, the legnth variation will be 0.15 mm/m $^{o}C$ .
m ● 6.5 ● 55 $^{o}C$ = 54mm,

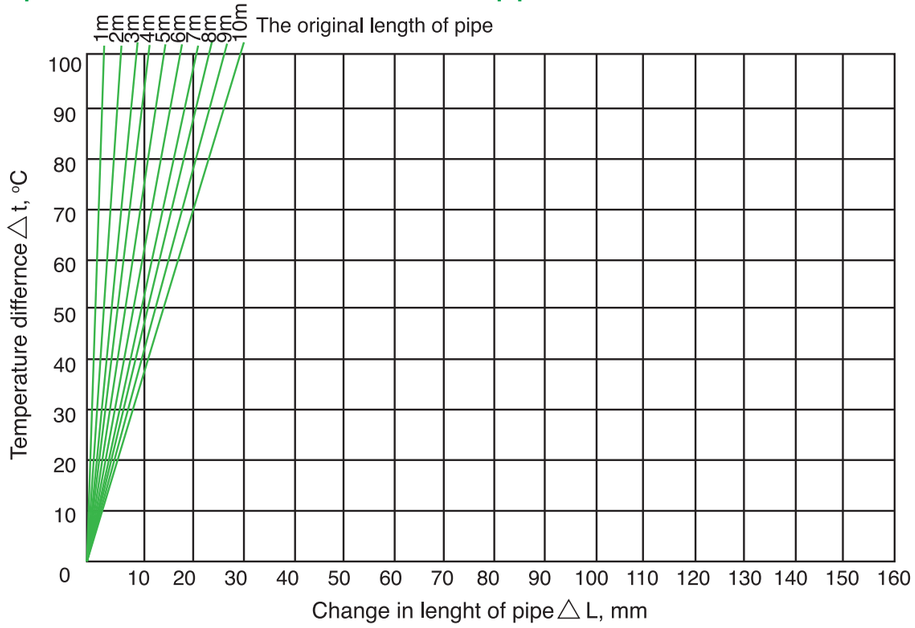
The amount of pipe thermal expansion may also determined by monograms (see Pictures 1 & 2). Tthermal expansion of water supplying systems can be accomodated in the pipe bends. In case the thermal compensation is not sufficient, square expansion compensators are equipped (see Pictures 3 & 4).

# Change in PP-R Pipe Length

**Pic 1 : monogram for thermal expansion determination of PN 10, PN 20 pipe.**




**Pic 2 : monogram for thermal expansion determination of reinforced PN 25 pipe**



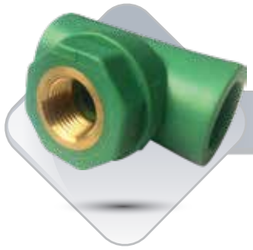



# PP-R Products

**Wall Mount** Elbow F.

PN 25

| PP-R fitting | Code |
|---|---|
| 20 x ½" | 111501 |
| 20 x ½" | 111502 |
| 25 x ¾" | 111503 |
| 32 x ¾" | 111504 |
| 32 x 1" | 111505 |



**Transition F.** Tee

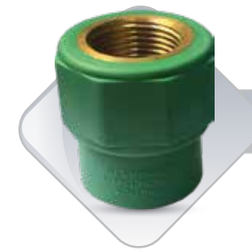
PN 25

| PP-R fitting | Code |
|---|---|
| 20 x ½" | 110301 |
| 25 x ½" | 110302 |
| 25 x ¾" | 110303 |
| 32 x ¾" | 110311 |
| 32 x 1" | 110304 |

**Adaptor M.**

PN 25

| PP-R fitting | Code |
|---|---|
| 20 x ½" | 110201 |
| 25 x ½" | 110202 |
| 25 x ¾" | 110203 |
| 32 x ¾" | 110205 |
| 32 x 1" | 110204 |
| 50 x 1½" | 110206 |
| 63 x 2" | 110207 |
| 75 X 2.5" | 110208 |
| 90 X 3" | 110209 |
| 110 X 4" | 1102010 |



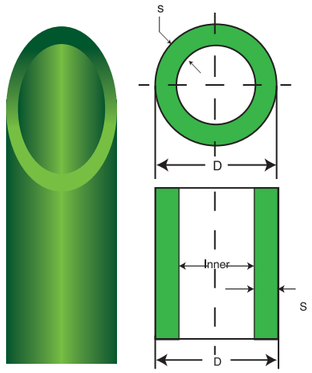
**Adaptor F.**

PN 25

| PP-R fitting | Code |
|---|---|
| 20 x ½" | 110101 |
| 25 x ½" | 110102 |
| 25 x ¾" | 110103 |
| 32 x ¾" | 110105 |
| 32 x 1" | 110104 |
| 50 x 1½" | 110106 |
| 63 x 2" | 110107 |
| 75 X 2.5" | 110108 |
| 90 X 3" | 110109 |
| 110 X 4" | 1101010 |

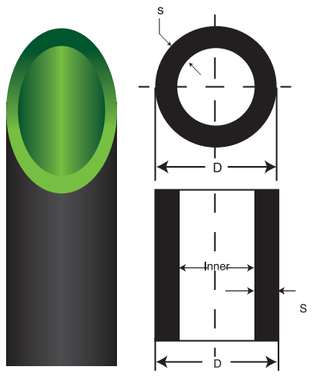
# Change in PP-R
## Pipe Length

| PP-R pipes | Code |
|---|---|
| 20 mm | 11105 |
| 25 mm | 11106 |
| 32 mm | 11107 |
| 40 mm | 11108 |
| 50 mm | 11109 |
| 63 mm | 11110 |
| 75 mm | 11111 |
| 90 mm | 11112 |
| 110 mm | 11113 |



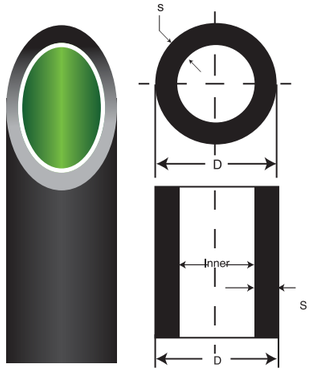

PN - 10 , PN - 16 , PN - 20

| PP-R pipes | Code |
|---|---|
| 20 mm | 11114 |
| 25 mm | 11115 |
| 32 mm | 11116 |
| 40 mm | 11117 |
| 50 mm | 11118 |
| 63 mm | 11119 |
| 75 mm | 11120 |
| 90 mm | 11121 |
| 110 mm | 11122 |




PN - 16 , PN - 20

| PP-R pipes | Code |
|---|---|
| 20 mm | 11123 |
| 25 mm | 11124 |
| 32 mm | 11125 |
| 40 mm | 11126 |
| 50 mm | 11127 |
| 63 mm | 11128 |
| 75 mm | 11129 |
| 90 mm | 11130 |
| 110 mm | 11131 |




PN - 16 , PN - 20



Change in PP-R
Pipe Length

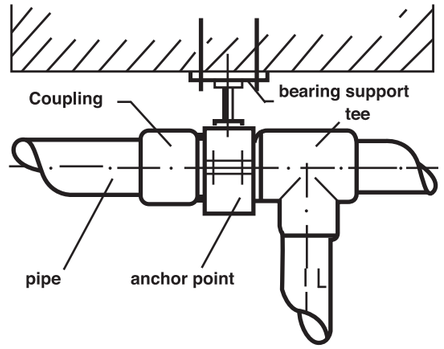
## Linear Thermal Expansion

Some of the supports are fixed as anchor points.

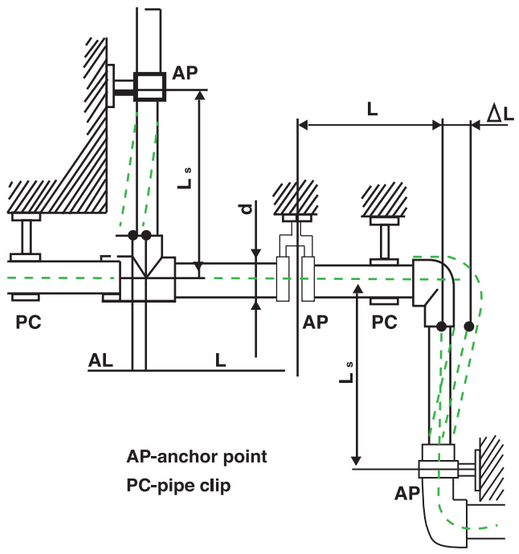
They direct pipe movement through pipe clips to the expansion compensators.

Any pipe clip used in conjuction with a polypropelene system should allow for free axail pipe movement in order to control it's thermal movement and afford lateral restraint.

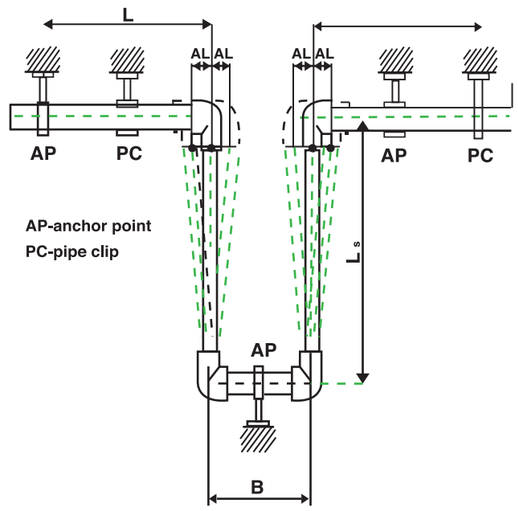
The Direction of the p[ipe movement can be then controlled by the use of the anchor points at strategic positions. An anchor point can fix two couplings, or a coipling and a tee, at both sides of the pipe. Don't try to fix the anchor support by pressing the pipe.




Pic 3 :
Thermal expansion compensation on PPR pipeline




Pic 4 :
Square expansion compensator



# **Change in PP-R** Pipe Length

The necessary length of the flexible pipe segment of the compensator LS (see Pictures 3&4)

can be calculated by the following formula:

$$LS = C\sqrt{dx\triangle L}$$

**Where,**

LS - Curve arm's length (mm).

C - Contrast (25 ~ 30).

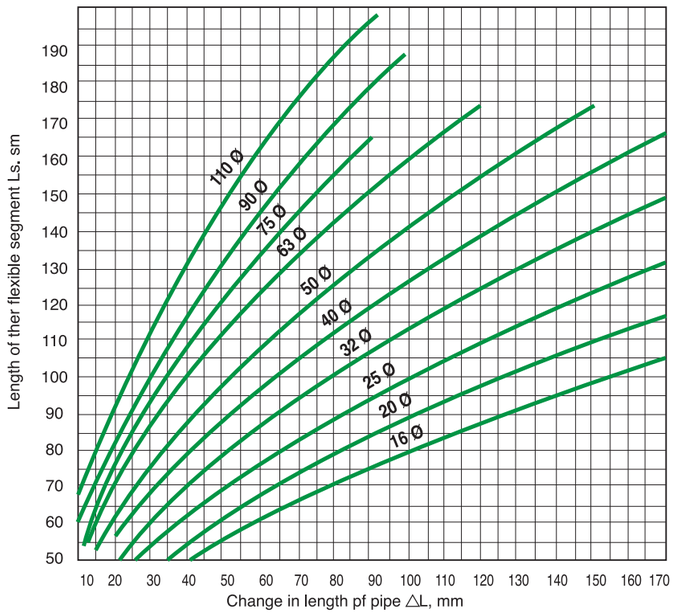
d - Outer diameter of the pipe.

△L - The change in the pip's length.

Additional accomodation of the thermal movements of the pipe can be gained by it's stressing in the desired direction.

To accomodate the pressured pipe segment, the flexible segment LS can be made 30% shorter.

The accomodation of PPR pipe extension can be gained by the preliminary bending of the pipes and installing them in a wavy way on the solid support, which should be wide enough to let the pipeline bend when the temperature changes.




**Pic 5 : Monogram for the flexible segment «LS»**

Length determination to prepare a free flexible loop you have to calculate the length of the free flexibble segment "LS" with the help of the formula as explained in free flexible pipe segment (Expansion Arm)

The minimum width (B) between two arms of the loop = 10 times the outside diameter of the pipe.



# **Brass** Spec

The alloy of the brass insert that Egypt Therm uses in its products is made according to EN-12449, that ensures the safety of the user's health in regards to drinking water.

Also, the design of the brass inserts give very high fixation between Brass and PP-R materials to prevent any leakage that can cause damages.

Finally, by the use of italian barss we can produce and offer a product of both high quality and high safety, because our mission is to build a circle of trust for every client.

Featured

- Corrosion Resistance.
- Impact Resistance.
- Dimensional accuracy.
- Can withstand high pressure for more than fifty years.
- Non-toxic.
- Optimal endurance.
- Moisture Resistance.
- Sturdiness.

# product specification

## Material

POLYPROPYLENE RANDOM COPOLYMER (PPR-C)

## Standards & Regulations

Manufactured According to
DIN 8077 : POLYPROPYLENE Pipe dimensions
DIN 8078 : POLYPROPYLENE Pipe general quality requirements testing & chemical resistance of pipes and fittings
DIN 16962/pt1: pipe joints assemblies and fittings for type 1&2 POLYPROPYLENE pressure pipes
DIN 4726 & 4728
ASTM D254,638, 790, 1238
EN 113, 527, 180 & 179
Full range of pipes and fittings available from nominal diameters (20mm up to 160 mm) available in (single layer, multi-layer fiberglass, multi-layer UV, multi-layer UV & fiberglass)

## Bends produced by

segment inserts for butt welding dimensions.
ISO9001 - 2015: quality management system.
Working Temperature: up to 95°C
Working Pressure: PPR PIPES - 10, 16, 20 & 25 bar, PPR FITTINGS - 25 bar.

## Range

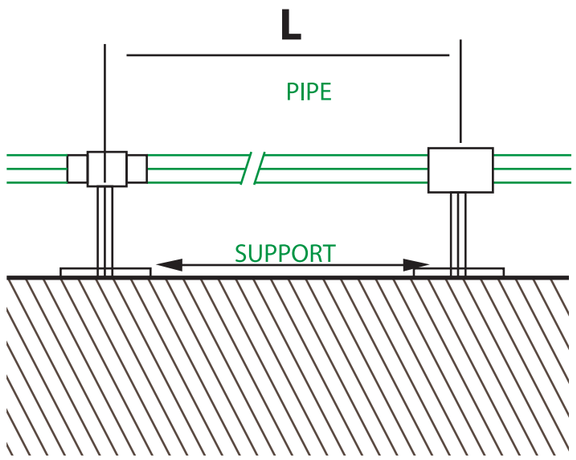
PN10-20 to 160 mm (for cold application)
PN10-20 to 160 mm (higher pressure hot and cold water)
PN10-20 to 160 mm (higher pressure hot and cold water & all relevant plain)
PN10-20 to 160 mm (higher pressure hot and cold water & all relevant plain)
Available in maltilayer (Fiber glass & UV & UV Fiber glass)
All Fittings are PN-25 (Higher Pressure Hot and Cold Water) & all relevant plain & Threaded Fittings).

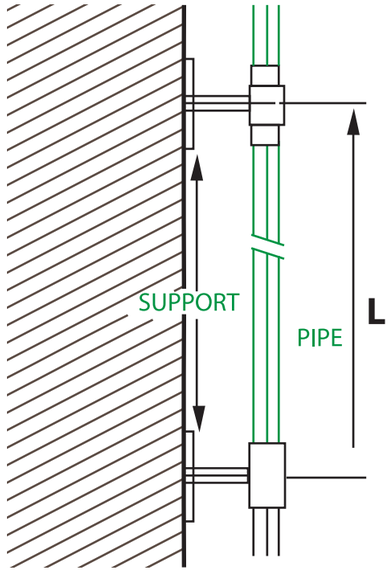


# Spacing Distance Betweebn Supports

| PIPE DIA. mm | Horizontal clamp spacing distance 'I' according to change in temperatures, In cm | | | | | | |
|---|---|---|---|---|---|---|---|
| | 20°C | 30°C | 40°C | 50°C | 60°C | 70°C | 80°C |
| 20 | 65 | 63 | 61 | 60 | 58 | 53 | 48 |
| 25 | 75 | 75 | 70 | 68 | 66 | 61 | 56 |
| 32 | 90 | 88 | 86 | 83 | 80 | 75 | 70 |
| 40 | 110 | 110 | 105 | 100 | 95 | 90 | 85 |
| 50 | 125 | 120 | 115 | 110 | 105 | 100 | 90 |
| 63 | 140 | 135 | 130 | 125 | 120 | 115 | 105 |
| 75 | 155 | 150 | 145 | 135 | 130 | 125 | 115 |
| 90 | 165 | 160 | 155 | 145 | 140 | 130 | 120 |
| 110 | 175 | 175 | 170 | 165 | 155 | 145 | 135 |

| PIPE DIA. mm | Vertical clamp spacing distance 'I' according to change in temperatures, In cm | | | | | | |
|---|---|---|---|---|---|---|---|
| | 20°C | 30°C | 40°C | 50°C | 60°C | 70°C | 80°C |
| 20 | 85 | 82 | 78 | 78 | 75 | 69 | 62 |
| 25 | 98 | 96 | 91 | 88 | 86 | 79 | 73 |
| 32 | 117 | 114 | 112 | 108 | 104 | 98 | 91 |
| 40 | 143 | 143 | 137 | 130 | 124 | 117 | 111 |
| 50 | 163 | 156 | 150 | 143 | 137 | 130 | 117 |
| 63 | 182 | 176 | 169 | 163 | 156 | 150 | 137 |
| 75 | 202 | 195 | 189 | 167 | 169 | 163 | 150 |
| 90 | 215 | 208 | 202 | 189 | 182 | 169 | 156 |
| 110 | 228 | 228 | 215 | 215 | 202 | 189 | 176 |

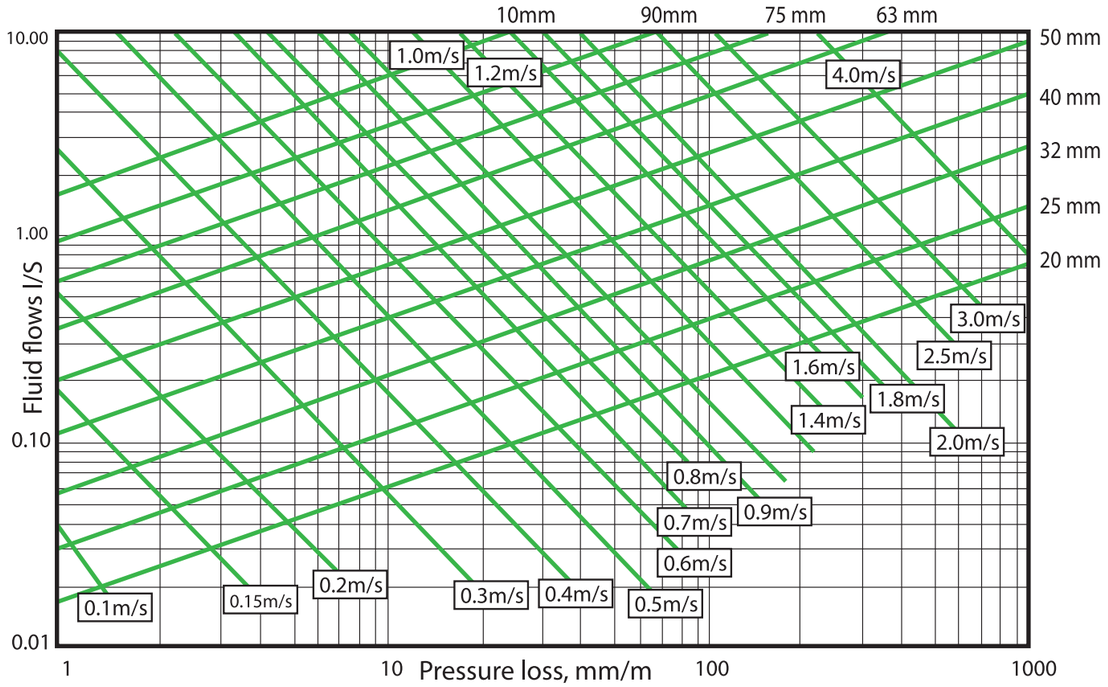


# Hydraulic Design

Pipeline Hydraulic Design is the estimation of the total pressure loss transported liquids, which occures as a result of hydraulic resitance in the pipes as wellas sharp bends and diameter changes in fittings and hardware. Hydraulic pressure loss in the pipe can be calculated according to monograms, see Picture 6.7 and 8.

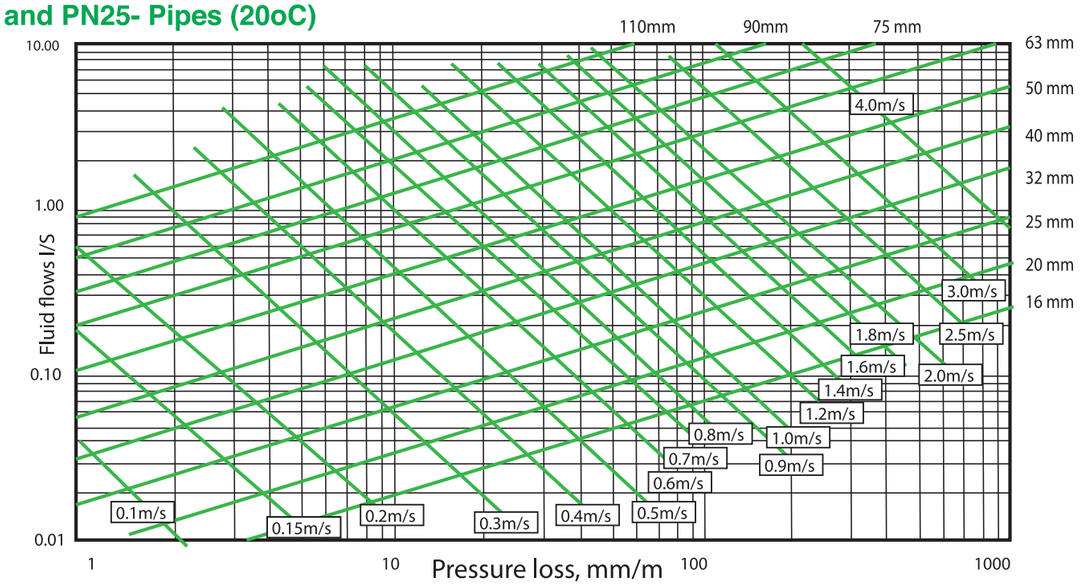
**Pic 6 :Monogram for cold water supply hydraulic design of PPR PN10-Pipes (20°C)**






Spacing Distance
Betweebn Supports

**Pic 7 : Monogram for cold water supply hydraulic design of PPR PN20 and PN25- Pipes (20oC)**




**Pic 8 : Monogram for hot water supply hydraulic design of PPR PN20 and PN25- Pipes (60oC)**