# PPR-C PIPES AND FITTINGS

## TECHNICAL DATA SHEET

## SYSTEM DESCRIPTION

**PWP** is a comprehensive system and application used for transporting water and other fluid. It is also used for pressurized warm and cold water in all residential, commercial and industrial installations.

## Possible uses of PWP systems:

The PWP installation system fulfils a variety of demands. It is suitable for
Universal use in new buildings, Refurbishment, Repairs.

- In drinking water installations for cold and hot water pipes in residential buildings, hospitals, hotels, office, buildings, schools, etc., for example:
    - Service connections
    - Boiler connections
    - Water distributing systems
    - Rising lines
    - Floor-level distribution

- Fittings as well as piping networks for:
    - Rainwater systems
    - Outside pipe laying
    - Compressed air systems
    - Agriculture and horticulture
    - Industries, for example the transportation of aggressive media (acids, alkaline solutions, etc.), taking into account its resistance to chemical agents
    - Heating installations
    - Shipbuilding

## PWP system is not suitable for:

- Industrial gases
- Flammable liquids and gases

## SYSTEM MATERIALS

PWP pipes and fittings are made with a material called polypropylene which is used extensively in food and medical industries because of its safe properties

For more than 30 years, Polypropylene Random Copolymer (PP-R) has been applied successfully for hot and cold water applications in countries worldwide.
A random copolymer grade of polypropylene called PP-R 80 was especially developed for engineering applications with certain stringent requirements**.**
PP-R 80 is characterized by excellent physical and chemical properties even at elevated temperatures.

The physical and chemical properties have been chosen to meet the specific demands of drinking water systems.

## Benefits of PP-R:

- Service life according to tests performed under ISO 15874
- No contact corrosion when exposed to iron particles
- Taste and odor neutral
- Bacteriologically neutral
- Fast and easy installation
- Entire plastic systems available
- Good chemical resistance
- Low tendency to incrustations

## Pipes and fittings

All pipes and fittings of the PWP system are made of PP- R, with only high-quality raw materials being used. This raw material is equipped with high-grade stabilizers. The stabilizer package protects the polymer from oxidation, which may occur.

Pipes and fittings are designed to withstand constant temperatures up to 70°C.The service life expectancy depends on the installed system pressure and pressure changes. Even though the service life expectancy of the pipes is more than 50 years, a permanent temperature rise from 70 to 90°C will accordingly reduce the operational life of the pipe.

## Fittings

The PP-R-metal connection of the PWP fittings excels by its leak proofness and resistance to torsion. This connection withstands decades of operational loads without any difficulty. Thanks to the specific geometry of their inserts, which are made of high-grade brass, the molded parts meet the highest safety standards and guarantee safe laying.

The metal threads of the PWP brass components meet the requirements of the DIN EN 10226standard and
are manufactured from high-quality brass.

# SYSTEM REQUIREMENTS

## 4.1 Standards and regulations

The following standards and guidelines are relevant for planning, design and operating drinking water installation systems in Germany and have to be observed.

### 4.1.1 Planning of drinking water installation systems

| | |
|---|---|
| EnEV | German Energy Saving Regulation |
| DIN 1988 | Technical Regulations on Drinking Water Installations |
| DIN EN 806 | Technical Regulations on Drinking Water Installations |
| DIN 2000 | Guidelines on the Requirement on Drinking Water, Planning, Laying, Operation and Maintenance of Supply Systems |
| DIN 4109 | Sound Protection in Structural Engineering |
| DIN 4102 | Fire Prevention |
| DVS 2207 | Welding of Thermoplastics |
| DVS 2208 | Machinery and Appliances for Welding Thermoplastics |

### 4.1.2 System-specific standards

| | | |
|---|---|---|
| DIN EN ISO 15874 | Parts 1-7 | Plastics piping systems for hot and cold water installations – Polypropylene (PP) |
| | Part 1 | General information |
| | Part 2 | Pipes |
| | Part 3 | Fittings |
| | Part 5 | Fitness for purpose of the system |
| | Part 7 / TS | Conformity Assessment |
| DIN 8077 | | Polypropylene Pipe Systems, Dimensions |
| DIN 8078 | | Polypropylene Pipe Systems<br>General Quality Requirements, Testing |
| DIN EN ISO 21003 | Parts 1-7 | Multilayer Composite Pipe Systems for Hot and Cold Water Installations within Buildings |

DIN standards are similar to ISO standards. The ISO standards are valid all over the world, while DIN standards only apply in Germany. ISO stands for the International Standardization Organization, which is an Association of Standards Organizations of more than 150 countries. Lately, no clear dividing line between Standards seems to exist. For example, an ISO standard can be directly transferred to a DIN standard, or a German standard can be filed with the international committee as a pre-standard, which is why parallelisms exist between standards.

## 4.2 Terms used

### 4.2.1 Standard dimension ratio

SDR is an index in use for the classification of plastic pipes, which describes the ratio between a pipe's outer diameter and its wall thickness.

SDR = 2 ・S + 1  SDR ≈Da/s

S = pipe series number s
= wall thickness
Da = outer diameter

### 4.2.2 Pipe series number S

The nominal pipe series number is a dimensionless index, which is used for the calculation of the wall thickness of pipes.

The following equation is used for the calculation of the pipe series number S: S = (SDR – 1)/2

Example: PWP Normal Pipe SDR 6 = S 2.5
PWP Fittings SDR 5 = S 2

### 4.2.3 Nominal pressure (PN)

The abbreviation PN (nominal pressure) indicates a reference value that is representative for a pipe system. This reference value was used in the first plastic pipe standards (for example, DIN 8077 -1974/1989) and was based on a safety factor of 2.0. The maximum working pressure of 20 bar, 16 bar, 10 bar only refers to a service life of 50 years at a working temperature of 20 °C. However, the maximum working pressure is lower for higher temperatures.

This circumstance frequently leads to confusion.

For an exact pipe classification under various operating conditions, newer versions of the respective standards (DIN 8077 – 1999 or EN ISO 15874 – 2003) therefore only state the pipe series S or the diameter-wall thickness ratio SDR.

## 4.3 Requirements on pipe systems

Standards on the various products (for PP-R: EN ISO 15874), as well as the most recent standard on multilayer pipes (DIN EN IS0 21003) have introduced the term “classification of operating conditions”.

The requirements made on pipe systems over their operating time according to ISO 15874 have been defined for classes of application and are indicated in Table 1.

All systems that comply with the conditions as stated in Table 1 must be suitable for conveying cold water at20 °C and an admissible working pressure of 10 bar over a period of 50 years.

Only water or treated water may be used as heat transmitter in heating systems.

### 4.3.1 Table 1 - system life against low and high water temperature

.1 Permissible Working Pressures (Bars)/1.25 Safety Factor)

| | | **PWP Normal PipeSDR 11 ISO S5** | **PWP Normal PipeSDR 7.4 ISO S3.2** | **PWP Normal PipeSDR 6 (ISO S2.5)** | **PWP Stabipipe SDR 5 (ISO S** |
|---|---|---|---|---|---|
| *Years of Service* | Temperature | PN10 | PN16 | PN20 | PN25 |
| *1 Years* | 10°C | 21.1 | 33.4 | 42.0 | 52.9 |
| | 20°C | 18.1 | 28.6 | 36.0 | 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 | 7.8 | 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 | 50A |
| | 20°C | 16.9 | 26.8 | 33.8 | 42.2 |
| | 30°C | 14.4 | 22.8 | 28.7 | 36.1 |
| | 40°C | 12.1 | 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 |
| *10 Years* | 10°C | 19.3 | 30.6 | 38.5 | 48.5 |

| | | | | | |
|---|---|---|---|---|---|
| | 20°C | 16.4 | 26.1 | 32.8 | 41.3 |
| | 30 °C | 13.9 | 22.0 | 27.7 | 34.9 |
| | 40 °C | 11.8 | 18.7 | 23.6 | 29.7 |
| | 50 °C | 9.9 | 15.7 | 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 | 38.9 |
| | 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 | NIA | NIA | NIA | NIA |
| *75 Years* | 10°C | 17.7 | 28.1 | 35.4 | 44.5 |
| | 20 °C | 15.0 | 23.8 | -29.3 | 37.7 |
| | 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 | NIA | NIA | NIA | NIA |
| | 70°C | NIA | NIA | NIA | NIA |
| | 80 °C | NIA | NIA | NIA | NIA |
| | | | | | |

TABLE 1.2: Permissible Working Pressures (Bars)/1.25 Safety Factor)

| | | | **PWP Normal PipeSDR 7.4 ISO S3.2** | **PWP Normal Pipe SDR 6 (ISO S2.5)** | **PWP Stabi Pipe SDR 5 (ISO S2)** |
|---|---|---|---|---|---|
| *Service Condition* | Temperature | Years of Service | PN16 | PN20 | PN25 |
| | | 5 | 11.33 | 14.27 | 17.07 |
| | 75°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 | 13.86 |
| *Constant service* | 80°C | 10 | 10.16 | 12.80 | 13.06 |
| *Temperature 70°C* | | 25 | 8.84 | 11.14 | 13.72 |
| *incl. 30 days per* | | 42.5 | 7.77 | 9.79 | 10.17 |
| *year at...* | | 5 | 9.85 | 12.45 | 13.32 |
| | 85°C | 10 | 9.42 | 11.87 | 12.22 |
| | | 25 | 8.05 | 10.14 | 11.06 |

| | | | | | |
|---|---|---|---|---|---|
| | | 37.5 | 7.29 | 9.18 | 9.88 |
| | | 5 | 9.04 | 11.39 | 11.74 |
| | 90℃ | 10 | 8.69 | 10.94 | 12.12 |
| | | 25 | 7.03 | 8.86v | 9.91 |
| | | 35 | 6.48 | 8.16 | 8.86 |
| | | 5 | 11.20 | 14.11 | 15.90 |
| | 75℃ | 10 | 10.77 | 13.57 | 14.50 |
| | | 25 | 9.19 | 10.05 | 13.70 |
| | | 45 | 7.97 | 11.58 | 12.80 |
| *Constant service* | | 5 | 10.14 | 10.05 | 15.80 |
| *Temperature 70°C incl.* | 80℃ | 10 | 9.96 | 13.12 | 15.40 |
| *60 days per year at...* | | 25 | 8.38 | 10.56 | 13.20 |
| | | 40 | 7.47 | 9.41 | 11.60 |
| | | 5 | 9.55 | 12.03 | 15.78 |
| | 85℃ | 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℃ 10 | 10 | 7.75 | 9.76 | 12.90 |
| | | 25 | 6.20 | 7.81 | 10.48 |
| | | 30 | 5.92 | 7.46 | 8.45 |
| | | 5 | 11.12 | 14.02 | 14.73 |
| | 75 ℃ | 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* | 80 ℃ | 10 | 9.80 | 12.35 | 15.50 |
| *C incl. 90 days* | | 25 | 7.97 | 10.05 | 12.71 |
| *per year at...* | | 37.5 | 7.21 | 9.09 | 11.52 |
| *Service Condition* | | 5 | 9.37 | 11.81 | 15.15 |
| | 85℃ | 10 | 8.51 | 10.72 | 14.20 |
| | | 25 | 6.81 | 8.58 | 12.16 |
| | | 32.5 | 6.37 | 8.03 | 11.40 |
| | | 5 | 8.41 | 10.59 | 11.30 |
| | 90 ℃ | 10 | 7.11 | 8.96 | 10.45 |
| | | 25 | 5.69 | 7.17 | 9.22 |