



تكنولوجيا
ألمانية

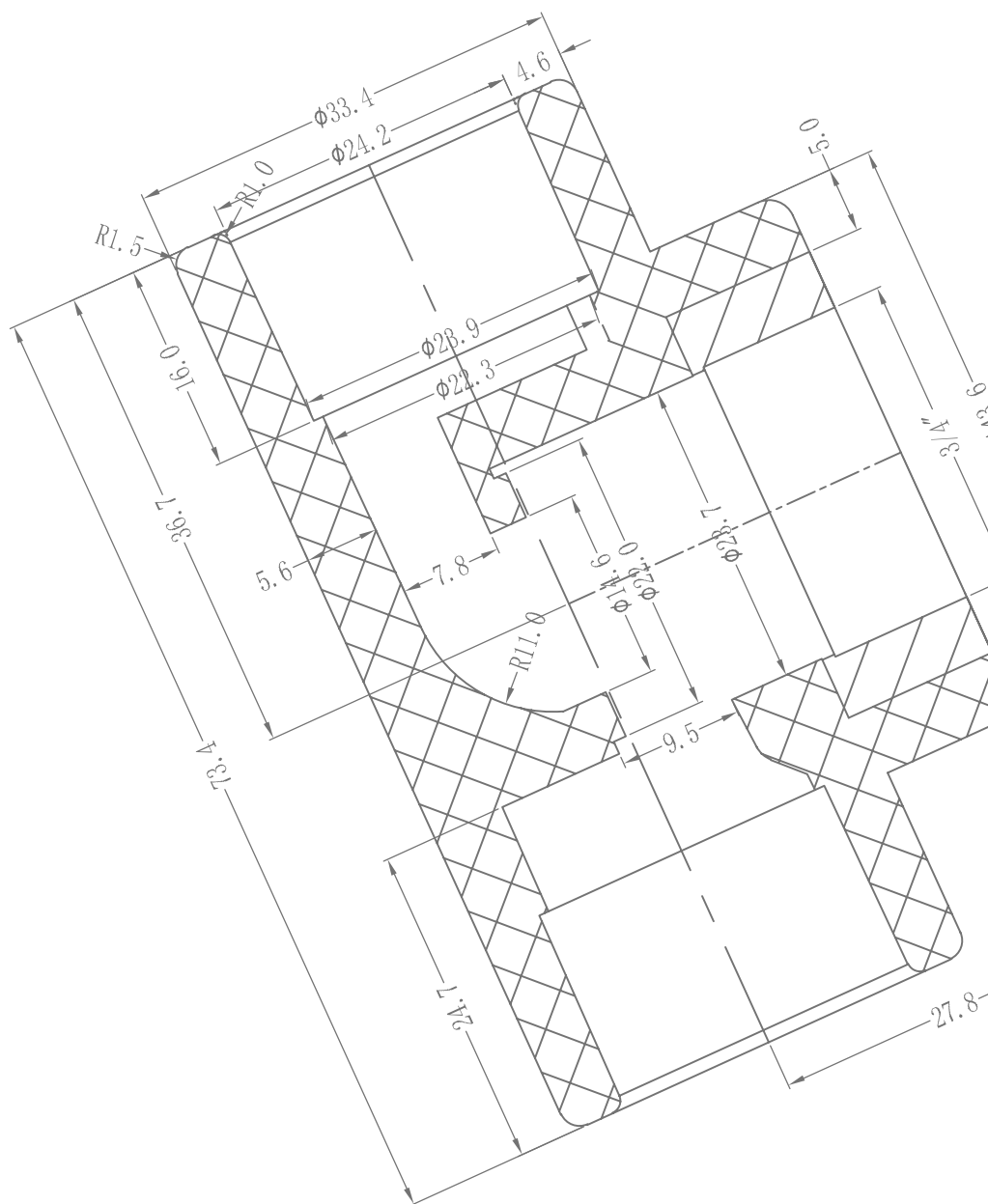


صنع في
السعودية



جرين ابل
GREEN APPLE

TECHNICAL PPR PIPES & FITTING



تكنولوجيا ألمانية



**صنع في
السعودية**



GREEN APPLE

PPR
PIPES & FITTING

SAVE YOUR FUTURE
Leading in water supply

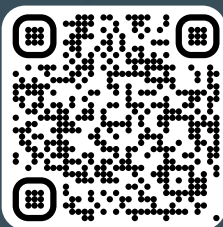
PP-R Piping Systems

Pipes, Fittings, Valves, Unions,
Cutting Tools, Welding Equipment,
Welding Devices & More





► Contact Information



شركة الرياض جرين ابل للصناعة - المصنع : مدينة الفوزان الصناعية - الرياض - المملكة العربية السعودية
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LEADING IN WATER SUPPLY

Riyadh Company Green Apple for Industry is one of the largest companies established in 2021

Riyadh Company Green Apple for Industry « Green Apple » is one of the most modern factories in the Kingdom of Saudi Arabia and the Gulf region and is an important national industry tributary on this area, also makes a direct contribution to meet local market needs of this item, where its products have achieved great success and gained acceptance excellent in Saudi Arabia and the Gulf states in addition to some Arab countries.

Our technology offer solutions for residential housing as well as commercial buildings and underground construction, for unique customer requirements, Green Apple has created a custom project department staffed by engineers and computer draftsmen to develop and design solutions for all your needs



GREEN APPLE



PPR
PIPES & FITTING





QUALITY CERTIFICATES



GREEN APPLE

Certificate of Registration



This is to certify that Quality Management System of

RIYADH COMPANY GREEN APPLE FOR INDUSTRY

RIYADH, SAUDI ARABIA - JABAL ALI - AL FOZAN INDUSTRIAL CITY -
FACTORY NO.324 - SECTOR NO.29 - SCHEME NO.3768 - KINGDOM OF SAUDI ARABIA

is in accordance with the requirements of the following standard

ISO 9001:2015
(Quality Management System)

SCOPE

MANUFACTURING OF PLASTIC PP-R/PP-RCT PIPING & FITTING SYSTEMS,
UPVC PIPING & FITTING SYSTEMS, PVC FOAM CORE PIPING SYSTEMS

Certificate Number : SCK/ROG/22/96/3806

Initial Registration Date : 29-Dec-2022
1st Surveillance Date : 29-Nov-2023
2nd Surveillance Date : 29-Nov-2024
Certificate Expiry Date : 28-Dec-2025

To verify certificate, visit at :
www.sckcerts.com
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Director



Accreditation No. 01234 - 01234 is not an ISO 9001:2015 certification. It is a certification of the conformity of the certificate holder to the requirements of the standard. The certificate holder is not responsible for the accuracy of the information provided in the certificate. The certificate holder is not responsible for the accuracy of the information provided in the certificate. The certificate holder is not responsible for the accuracy of the information provided in the certificate.

Certificate of Registration



This is to certify that Environmental Management System of

RIYADH COMPANY GREEN APPLE FOR INDUSTRY

RIYADH, SAUDI ARABIA - JABAL ALI - AL FOZAN INDUSTRIAL CITY -
FACTORY NO.324 - SECTOR NO.29 - SCHEME NO.3768 - KINGDOM OF SAUDI ARABIA

is in accordance with the requirements of the following standard

ISO 14001:2015
(Environmental Management System)

SCOPE

DEAL IN PLASTIC PP-R/PP-RCT PIPING & FITTING SYSTEMS, UPVC PIPING
& FITTING SYSTEMS, PVC FOAM CORE PIPING SYSTEMS

Certificate Number : SCK/ROG/22/96/3807

Initial Registration Date : 29-Dec-2022
1st Surveillance Date : 29-Nov-2023
2nd Surveillance Date : 29-Nov-2024
Certificate Expiry Date : 28-Dec-2025

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Certificate of Registration



This is to certify that Occupational Health & Safety Management System of

RIYADH COMPANY GREEN APPLE FOR INDUSTRY

RIYADH, SAUDI ARABIA - JABAL ALI - AL FOZAN INDUSTRIAL CITY -
FACTORY NO.324 - SECTOR NO.29 - SCHEME NO.3768 - KINGDOM OF SAUDI ARABIA

is in accordance with the requirements of the following standard

ISO 45001:2018
(Occupational Health & Safety Management System)

SCOPE

DEAL IN PLASTIC PP-R/PP-RCT PIPING & FITTING SYSTEMS, UPVC PIPING
& FITTING SYSTEMS, PVC FOAM CORE PIPING SYSTEMS

Certificate Number : SCK/ROG/22/96/3808

Initial Registration Date : 29-Dec-2022
1st Surveillance Date : 29-Nov-2023
2nd Surveillance Date : 29-Nov-2024
Certificate Expiry Date : 28-Dec-2025

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GREEN APPLE

WARRANTY



نموذج شهادة ضمان منتجات مصنع جرين آبل



MANUFACTURING STANDARDS

• SASO - ISO - 15874 - 1 / 2014	Plastics piping systems for hot and cold water Part 1 : General
• SASO - ISO - 15874 - 2 / 2019	Plastics piping systems for hot and cold water Part 2 Pipe
• SASO - ISO - 15874 - 3 / 2022	Plastics piping systems for hot and cold water Part 3 : Fitting
• DIN 8076	Pressure Pipes in Thermoplastics Joining to Metal Fittings Dimensions
• DIN 8077	(PP) - Polypropylene Pipes: Dimensions
• DIN 8078	(PP) Pipes, Type 1, 2, & 3 General Quality Requirements & Testing
• DIN 16962	Pipe joints & their Pipes Under Pressure: Manufacture and Test
• DIN 16960	Welding of thermoplastic materials: principles
• DVS 2207	Welding Thermoplastic Materials, PP Type 1 & 2, Pipes and Fittings
• DVS 2208	Tools & Equipment for Welding Thermoplastic Materials
• DVS 2203	Testing Welded Thermoplastic Joints
• DIN 1988	Pipes for Drinking Water in Buildings Technical STD
• DIN 4725	Underfloor Heating with Hot Water Concepts • Thermal Testing
• DIN 4726	Plastic Pipes for Hot Water Underfloor Heating, Required Properties
• DIN 4728	Polypropylene Pipes for Hot Water Underfloor Heating, Special

GREEN APPLE FIELDS OF APPLICATIONS



**Portable Water
Application**



**Under Floor
Heating Systems**



**Connection
Heating & Cooling**



Wall Heating



**Home Plumbing
Hot & Cold Water**



**Ceiling
Heating & Cooling**



**Fire Protection
Sprinklers Systems**



**Industrial
Floor Heating**



**Chilled Water
Technology**



**Sports Floor
Heating & Cooling**



**District Heating
Pipeline Systems**



**Chemical
Transport**



**Compressed
Air Systems**



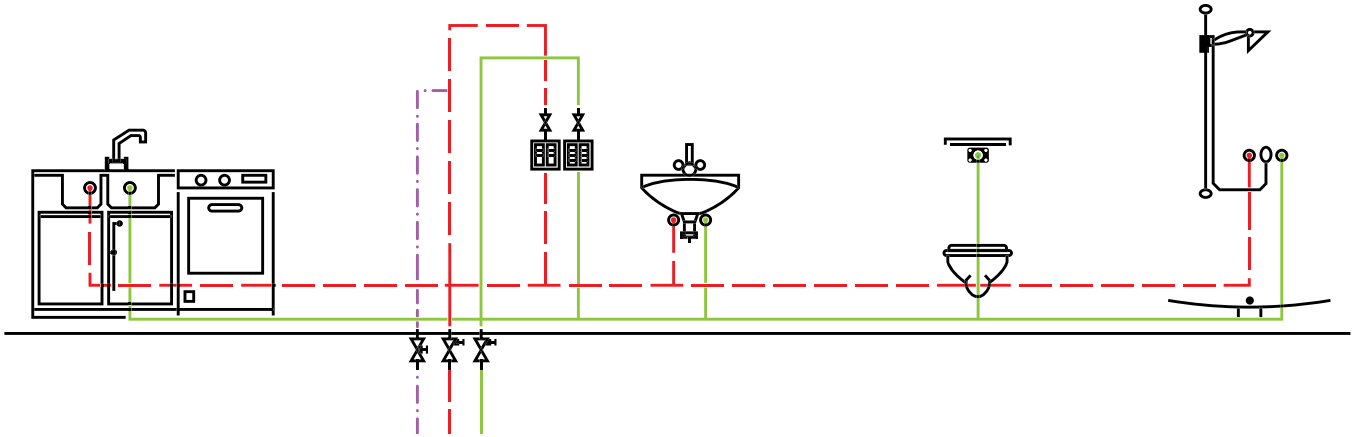
**Application In
the Field of Ship Building**



**Swimming
Pool Technology**

- Industrial Systems Like Conveying Compressed Air Pressure, Aggressive Fluids Like Acids and Alkaline Solutions.
- Water Purifying / Pharmaceutical Plants for Clean Water
- Chilled Water Circuit for Refrigeration Units and Chillers.
- Lines For Conveying Liquid Food Products - Food Grade.
- Hot And Cold-Water Supplying Pipes.
- Portable Water Pipe Networks for Cold and Hot Water Installations I.E., In Residential Buildings, Hospitals, Hotels, Office and School Buildings, Ship Buildings Etc.
- Radiator Heating Pipes, Room Heating System, Underfloor Heating Pipes.
- Pipe Networks for Rainwater Utilization Systems.
- Pipes For Agriculture Use & Horticulture Use.

GREEN APPLE FIELDS OF APPLICATIONS



Properties of Green Apple PPR Pipe & Fitting

- Enormous Durability Thanks to High-Quality Materials and Processing
- Homogeneous Connection Guarantees High Operational Reliability
- High Demands for Hygiene Guarantee Perfect Water Quality.
- Good Thermal Load Capacity, Therefore High Operational Reliability
- High Chemical Resistance Guarantees High Durability.
- Minor Flow Noise Makes Living Highly Comfortably.
- High Dimensional Accuracy and Low Weight, Therefore Time- And Cost-Saving Pipe Laying.

Possible uses

The Green Apple Installation System Fulfills a Variety of Demands Made on Supply Lines. It Is Suitable for Universal Use In:

- New Buildings
- Refurbishment
- Repairs

Green Apple is not suitable for:

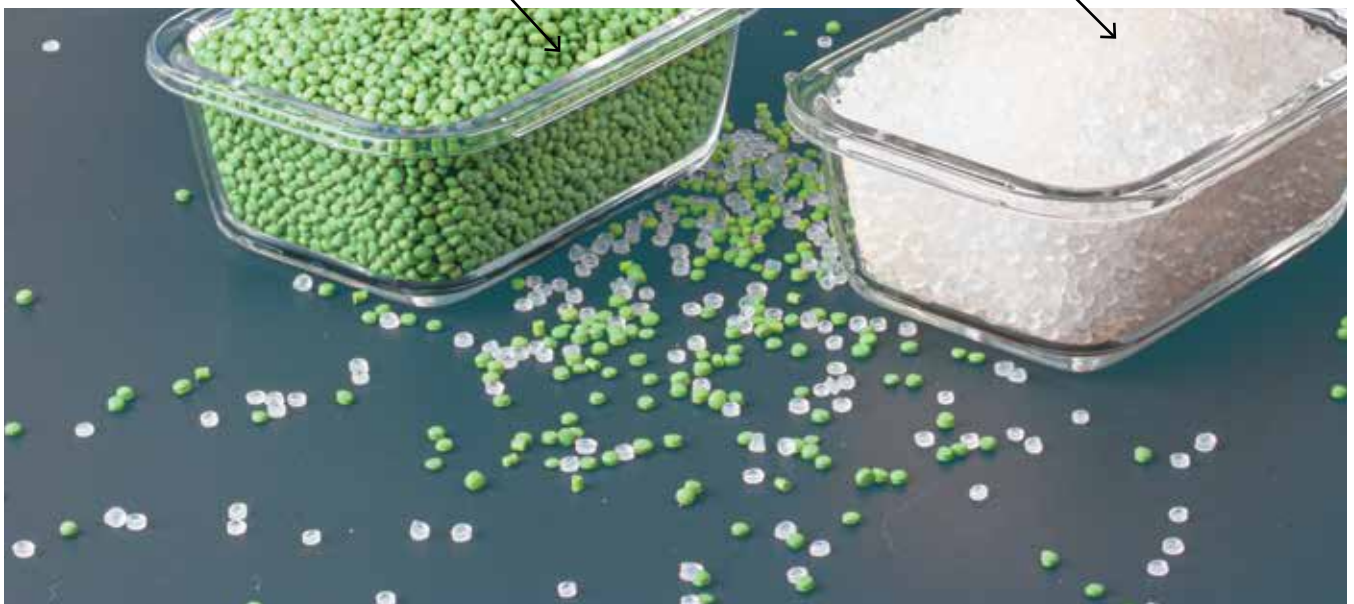
- Industrial Gases
- Flammable Liquids and Gases

BASIC RAW MATERIALS

Polypropylene Random Copolymer (SABIC PP-R)

This Random Copolymer Has a High Molecular Weight with Special Designed Properties Required for High Demanding Pressure Pipes. It Is Highly Heat Stabilized and Especially Formulated for Extraction Resistance. This Grade with Long Service Life Is Used for The Manufacturing of Cold and Hot Water Pipes and Fittings for Transport of Drinking Water. This Grade Fulfills the Requirements in EN ISO 15874, ISO 3213, DIN 8078 And DIN 8077. It Also Complies with German Regulations for Materials in Contact with Water Intended for Human Consumption (BGA Requirements and KTW Recommendations).

- Polypropylene Random Copolymer (PP-R)
- Green Masterbatch



PPR - RAW MATERIALS TECHNICAL data sheet (TDS)

Property		Test Method	Unit	Value
Viscosity J Average molecular weight		ISO 1191 Solution Viscosity C= 0.001 g/cm3	Cm3 / g	420 500.0
Density at 23°C		ISO 1183	g / cm ³	0.898
Melt Flow Rate	MFR 230 / 2.16	ISO 1133 Condition 12	g / 10 min	0.3
	MFR 190 / 5	ISO 1133 Condition 18	g / 10 min	0.5
	MFR 230 / 5	ISO 1133 Condition 20	g / 10 min	1.5
Crystalline Melting Temperature		DIN 53736 B2	°C	150 - 154
Tensile Stress At Yield		ISO 527	N / mm ²	23
Tensile Strength At Break		Speed 50 mm / min	N / mm ²	40
Elongation at Break		Test Specimen 1B	%	> 50
Ball Indentation Hardness		ISO 2039 T1 (132N)	N / mm ²	43
Flexural Stress at 3.5%		DIN 53452	N / mm ²	20
Outer Fiber Strain				
Modulus of Elasticity		ISO 178	N / mm ²	800
Shear Modulus	- 10°C	ISO 537 Method A	N / mm ²	1100
	0°C		N / mm ²	770
	10°C		N / mm ²	500
	20°C		N / mm ²	370
	30°C		N / mm ²	300
	40°C		N / mm ²	240
	50°C		N / mm ²	180
	60°C		N / mm ²	140
	80°C		N / mm ²	100
Mechanical Strength Properties		DIN 8078		No failure
Determined By Impact Strength at 0°C				
Impact Strength	RT	ISO 179 / 1 eU	Kj / m ²	No failure
(Charpy)	0°C		Kj / m ²	No failure
	-10°C		Kj / m ²	No failure
Notched Impact Strength	RT	ISO 179 / 1 eA	Kj / m ²	20
(Charpy)	0°C		Kj / m ²	4
	-10°C		Kj / m ²	3
Coefficient Of Linear Thermal Expansion		VDE 0304 Part 1 & 4	K - 1	1.5 x 10 ⁻⁴
Thermal Conductivity at 20°		DIN 52612	W / mK	0.24
Specific Heat at 20°C		Adiabatic Calorimeter	Kj / Kg K	2

PPR Pipes & Fittings Hot & Cold-Water Systems :

Made Of the Compound PP-R Due to Its Remarkable Properties Of Mechanical Resistance, Inertia to Chemical Aggression Impact Strength, Corrosion Resistance and Higher Working Temperature. PP-R Has the General Properties of Low Density, Good Balance of Stiffness to Toughness Low Tendency to Stress Cracking and Is Easy to Process and Installation.



GREEN APPLE

BRASS PPR FITTING INSERTS TECHNICAL SPECIFICATIONS



BEST QUALITY BRASS PPR FITTING INSERTS

Green Apple Brass Inserts For PP-R Pipes And Fittings, Are Made According to EN 10226 RP, And Are Approved for Use in Water Supply. Our Brass PPR Fitting Inserts Best Quality from Trusted and Reputable Sources.

What is PPR

(Polypropylene Random Copolymer PP-R) is a thermoplastic polyolefin which is processed into pipes & fittings with superior chemical & physical properties.

Why We Need PPR

They Are the Best Carriers of High-Pressure Portable Water (Both Hot and Cold) In Domestic as Well as In Industrial Applications (Chemicals & Compressed Air Lines) In Terms of Excellent Quality & Price.

When We Need PPR

When Long Term Performance Under Adverse Conditions Without Deviation in The Standards Are Required, High Escrow Is Needed.

Where we need PPR

Areas Of Advanced Piping / Hot Water / Water Tight Systems / Corrosion Resistance / No Encrustation Tendency / Noise Dampening Plastic Material / Long Term Pressure Resistance Applications / Chemical Resistance/ No Leakage During Its Lifetime.



PURE WATER

SYSTEM REQUIREMENTS

Terms used

Standard Dimension Ratio

SDR Is an Index in Use for The Classification of Plastic Pipes, Which Describes the Ratio Between a Pipes Outer Diameter and Its Wall Thickness.

$$SDR = 2.S + 1$$

$$SDR \approx \frac{d_a}{s}$$

S = pipe series number

s = wall thickness

da = outer diameter

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:

$$S = \frac{SDR - 1}{2}$$

Example: Green Apple Pipe SDR 6 = S 2.5

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 Or EN ISO 15874 - 2014) Therefore Only State the Pipe Series S Or the Diameter-Wall Thickness Ratio SDR.

PP CHEMICAL RESISTANCE (1)

Environment	Conc. %	Temperature		
		20°C	60°C	100°C
Acetic acid (glacial)	97	A	B (80° C)	-
Acetic acid	50	A	A (80° C)	-
Acetic acid	40	A	-	-
Acetic acid	10	A	A	-
Acetone	100	A	A	-
Acetophenone	100	B	B	-
Acriflavine (2 % solution in H2O)	2	A	A	- (80° C)
Acrylic emulsions		A	A	-
Aluminum chloride		A	A	-
Aluminum fluoride		A	A	-
Aluminum sulfate		A	A	-
Alums (all types)		A	A	-
Ammonia (aqueous)	30	A	-	-
Ammonia gas (dry)		A	A	-
Ammonium carbonate	Satd.	A	A	-
Ammonium chloride	Satd.	A	A	-
Ammonium fluoride	20	A	A	-
Ammonium hydroxide	10	A	A	-
Ammonium metaphosphate	Satd.	A	A	-
Ammonium nitrate	Satd.	A	A	-
Ammonium persulfate	Satd.	A	A	-
Ammonium sulfate	Satd.	A	A	-
Ammonium sulfide	Satd.	A	A	-
Ammonium thiocyanate	Satd.	A	A	-
Amyl acetate	100	B	C	-
Amyl alcohol	100	A	B	-
Amyl chloride	100	C	C	-
Aniline	100	A	A	-
Anisole	100	B	B	-
Antimony chloride		A	A	-
Aviation fuel (115145/ octane)	100	B	C	-
Aviation turbine fuel	100	B	C	-
Barium carbonate	Satd.	A	A	-
Barium chloride	Satd.	A	A	-
Barium hydroxide		A	A	-
Barium sulfate	Satd.	A	A	-
Barium sulfide	Satd.	A	A	-
Beer		A	A	-
Benzene	100	B	C	C
Benzoic acid	A	A	-	-
Benzyl alcohol		A	A (80° C)	-
Bismuth carbonate	Satd.	A	A	-
Borax		A	A	-
Boric acid		A	A	-
Brine	Satd.	A	A	-
Bromine liquid	100	D	-	-
Bromine water	(a)	C	-	-
Butyl acetate	100	C	C	-
Butyl alcohol	100	A	A	-
Calcium carbonate	Stad.	A	A	-
Calcium chlorate	Satd.	A	A	-
Calcium chloride	50	A	A	-
Calcium hydroxide		A	A	-
Calcium hypochlorite bleach	20(a)	A	B	-
Calcium nitrate		A	A	-
Calcium phosphate	50	A	-	-

Environment	Conc. %	Temperature		
		20°C	60°C	100°C
Calcium sulfite		A	A	-
Carbon dioxide (dry)		A	A	-
Carbon dioxide (wet)		A	A	-
Carbon disulfide	100	B	C	-
Carbon monoxide		A	A	-
Carbon tetrachloride	100	C	C	C
Carbonic acid		A	A	-
Castor oil		A	-	-
Cetyl alcohol	100	A	-	-
Chlorine (gas)	100	D	D	-
Chlorobenzene	100	C	C	-
Chloroform	100	C	D	D
Chlorosulfonic acid	100	D	D	D
Chrome alum		A	A	-
Chromic acid	80(a)	A	-	-
Chromic acid	50(a)	A	A	-
Chromic acid	10(a)	A	A	-
Chromic/sulfuric acid		D	D	-
Cider		A	A	-
Citric acid	10	A	A	-
Copper chloride	Satd.	A	A	-
Copper cyanide	Satd.	A	A	-
Copper fluoride	Satd.	A	A	-
Copper nitrate	Satd.	A	A	-
Copper sulfate	Satd.	A	A	-
Cottonseed oil		A	A	-
Cuprous chloride	Satd.	A	A	-
Cyclohexanol	100	A	B	-
Cyclohexanone	100	B	C	-
Decalin	100	C	C	C
Detergents	2	A	A	A
Developers (photographic)		A	A	-
Dibutyl phthalate	100	A	B	D
Dichloroethylene	100	A	-	-
Diethanolamine	100	A	A	-
Diisooctyl phthalate	100	A	A	-
Emulsifiers		A	A	-
Ethanolamine	100	A	A	-
Ethyl acetate	100	B	B	-
Ethyl alcohol	96	A	A (80° C)	-
Ethyl chloride	100	C	C	-
Ethylene dichloride	100	B	-	-
Ethylene glycol		A	A	-
Ethylene oxide	100	B (10° C)	-	-
Ethyl ether	100	B	-	-
Fatty acids (C6)	100	A	A	-
Ferric chloride	Satd.	A	A	-
Ferric nitrate	Satd.	A	A	-
Ferric sulfate	Satd.	A	A	-
Ferrous chloride	Satd.	A	A	-
Ferrous sulfate	Satd.	A	A	-
Fluorosilicic acid		A	A	-
Formaldehyde	40	A	A	-
Formic acid	100	A	-	-
Formic acid	10	A	A	-
Fructose		A	A	-
Fruit juices		A	A	-

PP CHEMICAL RESISTANCE (2)

Environment	Conc. %	Temperature		
		20°C	60°C	100°C
Furfural	100	C	C	-
Gas liquor		C	-	-
Gasoline	100	B	C	C
Gearbox oil	100	A	B	-
Gelatin		A	A	-
Glucose	20	A	A	-
Glycerin	100	A	A	A
Glycol		A	A	-
Hexane	100	A	B	-
Hydrobromic acid	50(a)	A	A	-
Hydrobromic acid	30(a)	A	B	D
Hydrobromic acid	20	A	A (80° C)	-
Hydrobromic acid	10	A	A (80° C)	B
Hydrobromic acid	2	A	A	A
5050- HCl-HNO3	(a)	B	D (80° C)	-
Hydrofluoric acid	40	A	-	-
Hydrofluoric acid	60(a)	A	A (40° C)	-
Hydrogen chloride gas (dry)	100	A	A	-
Hydrogen peroxide	30	A	-	D
Hydrogen peroxide	10	A	B	-
Hydrogen peroxide	3	A	-	-
Hydrogen sulfide		A	A	-
Hydroquinone		A	A	-
Inks		A	A	-
Iodine tincture		A	-	-
Isocetane	100	C	C	-
Isopropyl alcohol	100	A	A	-
Ketones		A	-	-
Lactic acid	20	A	A	-
Lanolin	100	A	A	-
Lead acetate	Satd.	A	A	-
Linseed oil	100	A	A	-
Lubricating oil	100	A	B	-
Magenta dye (Aqueous solution)	2	A	A some staining	-
Magnesium carbonate	Satd.	A	A	-
Magnesium chloride	Satd.	A	A	-
Magnesium hydroxide	Satd.	A	A	-
Magnesium nitrate	Satd.	A	A	-
Magnesium sulfate	Satd.	A	A	-
Magnesium sulfite	Satd.	A	A	-
Meat juices		A	A	-
Mercuric chloride	40	A	A	-
Mercuric cyanide	Satd.	A	A	-
Mercurous nitrate	Satd.	A	A	-
Mercury	100	A	A	-
Methyl alcohol	100	A	A	-
Methylene chloride	100	A	-	-
Methyl ethyl ketone	100	A	B	-
Milk and its products		A	A	A
Mineral oil	100	A	B	-
Molasses		A	A	-
Motor oil	100	A	B	-
Naphthalene	100	A	A	A
Nickel chloride	Satd.	A	A	-
Nickel nitrate	Satd.	A	A	-
Nickel sulfate	Satd.	A	A	-
Nitric acid	fuming	D	D	D

Environment	Conc. %	Temperature		
		20°C	60°C	100°C
Nitric acid	70(a)	C	D	-
Nitric acid	60	A	D (80° C)	-
Nitric acid	10	A	A	A
5050- HNO3-HCl	(a)	B	D (80° C)	-
5050- HNO3-H2SO4	(a)	C	D (80° C)	-
Nitrobenzene	100	A	A	A
Oleic acid		A	B	B
Oleum		-	-	-
Olive oil	100	A	A	A
Oxalic acid (aqueous)	50	A	B	B
Paraffin	100	A	B	B
Paraffin wax	100	A	A	A
Petrol	100	B	C	C
Petroleum ether (boiling point 100°-140° C)	100	C	C	-
Phenol	100	A	A	-
Phosphoric acid	95	A	A	-
Plating solutions, brass		A	A	-
Plating solutions, cadmium		A	A	-
Plating solutions, chromium		A	A	-
Plating solutions, copper		A	A	-
Plating solutions, gold		A	A	-
Plating solutions, indium		A	A	-
Plating solutions, lead		A	A	-
Plating solutions, nickel		A	A	-
Plating solutions, rhodium		A	A	-
Plating solutions, silver		A	A	-
Plating solutions, tin		A	A	-
Plating solutions, zinc		A	A	-
Potassium bicarbonate	Satd.	A	A	-
Potassium borate	1	A	A	-
Potassium bromate	10	A	A	-
Potassium bromide	Satd.	A	A	-
Potassium carbonate	Satd.	A	A	-
Potassium chlorate	Satd.	A	A	-
Potassium chloride	Satd.	A	A	-
Potassium chromate	40	A	A	-
Potassium cyanide	Satd.	A	A	-
Potassium dichromate	40	A	A	-
Potassium ferri-/ferrocyanide		A	A	-
Potassium fluoride		A	A	-
Potassium hydroxide	50	A	A	-
Potassium hydroxide	10	A	A	A
Potassium nitrate	Satd.	A	A	-
Potassium perborate	Satd.	A	A	-
Potassium perchlorate	10	A	A	-
Potassium permanganate	20	A	A	-
Potassium sulfate		A	A	-
Potassium sulfide		A	A	-
Potassium sulfite		A	A	-
Propyl alcohol	100	A	A	-
Pyridine	100	A	-	-
Silicone oil	100	A	A	-
Soap solution (concentrated)		A	A	-
Sodium acetate		A	A	-
Sodium bicarbonate	Satd.	A	A	-
Sodium bisulfate	Satd.	A	A	-
Sodium bisulfite	Satd.	A	A	-

PP CHEMICAL RESISTANCE (3)

Environment	Conc. %	Temperature		
		20°C	60°C	100°C
Sodium borate		A	A	-
Sodium bromide oil solution		A	A	-
Sodium carbonate	Satd.	A	A	-
Sodium chlorate	Satd.	A	A	-
Sodium chloride	Satd.	A	A	A
Sodium chlorite	2	A	A (80° C)	-
Sodium chlorite	5	A (80° C)	A	-
Sodium chlorite	10	A (80° C)	A	-
Sodium chlorite	20	A (80° C)	A	-
Sodium cyanide	Satd.	A	A	-
Sodium dichromate	Satd.	A	A	-
Sodium ferricyanide	Satd.	A	A	-
Sodium ferrocyanide	Satd.	A	A	-
Sodium fluoride	Satd.	A	A	-
Sodium hydroxide	50	A	A	-
Sodium hydroxide	10	A	A	A
Sodium hypochlorite	20	A	B	B
Sodium nitrate		A	A	-
Sodium nitrite		A	A	-
Sodium silicate		A	A	-
Sodium sulfate	Satd.	A	A	-
Sodium sulfide	25	A	A	-
Sodium sulfite	Satd.	A	A	-
Stannic chloride	Satd.	A	A	-
Stannous chloride	Satd.	A	A	-
Starch		A	A	-
Sugars and syrups		A	A	-
Sulfamic acid		A	A (80° C)	-
Sulfates of Calcium and magnesium	Satd.	A	A	-
Sulfates of potassium and sodium	Satd.	A	A	-
Sulfates of potassium and sodium	Sulfur	A	A	-
Sulfur		A	A	-
Sulfuric acid	98(a)	C	-	D
Sulfuric acid	60	A	B (80° C)	-
Sulfuric acid	50	A	B	-
Sulfuric acid	10	A	A	A
5050- H2SO4/HNO3	(a)	C	D (80° C)	-
Tallow		A	A	-
Tannic acid	10	A	A	-
Tartaric acid		A	A	-
Tetrahydrofuran	100	C	C	C
Tetralin	100	C	C	C
Toluene	100	C	C	-
Transformer oil	100	A	C	-
Trichloroacetic acid	10	A	A	-
Trichloroethylene	100	A	A (80° C)	-
Turpentine	100	C	C	C
Urea		A	A	-
Urine		A	A	-
Water (distilled, soft,hard and vapor)		A	A	A
Wet chlorine gas		-	D (70° C)	-
Whiskey		A	A	A
White Paraffin	100	A	B (80° C)	-
White spirit	100	B	C	-
Wines		A	A	-
Xylene	100	C	C	C

Environment	Conc. %	Temperature		
		20°C	60°C	100°C
Yeast		A	A	-
Zinc chloride	Satd.	A	A	-
Zinc oxide		A	A	-
Zinc sulfate	Satd.	A	A	-

(a) May Produce Cracking in Material Under Stress

This chart shows the chemical resistance of polypropylene resin under static conditions and not under pressure.

Note: the user is advised to carry out his/her own tests to determine the suitability of polypropylene in a particular environment.

A = Negligible Effect

The Material Should Be Suitable for All Applications Where These Environmental Conditions Exist.

B = Limited Absorption or Attack

The Material Should Be Suitable for Most Applications But The User Is Advised To Carry Out His/her Own Tests To Determine The Suitability Of Polypropylene In A Particular Environment.

C = Extensive Absorption and/or Rapid Permeation

The Material Should Be Suitable for Applications Where Only Intermittent Service Is Involved, Or Where the Swelling Produced Has No Detrimental Effect on The Part. The User Should Carry Out His/her Own Tests to Determine the Suitability of Polypropylene in A Particular Environment.

D = Extensive Attack

The Specimen Dissolves or Disintegrates. Polypropylene Is Not Recommended.

Note:

This Table Should Be Used Only as A Guide. Polypropylene Subjected to Mechanical Stress May Behave Different and Show Different Result. For Any Doubts We Recommend to Contact the Green Apple Quality Assurance Management.

PPR VS OTHER PRODUCTS

PROPERTIES	PP-R	GI	COPPER	PE	CPVC	ALUMINIUM
Service Life (Years)	50 Years Plus	2 - 5 Years	10 - 25 Years	20 - 30 Years	20 - 30 Years	20 - 30 Years
Temperature Resistance	Very Good	Excellent	Excellent	Good	Good	Poor
Food Grade	Excellent - Hygienic	Non-Hygienic	Non-Hygienic	Good	Non- Hygienic	Non-Hygienic
Heat Loss	Very Negligible	Very High	Very High	Moderate	Moderate	High
Chemical Resistance	Excellent	Very Weak	Weak	Good	Good	Weak
Maximum Safe working Temp "C"	100	High	High	80	80	High
Easiness in Repair/ Maintenance	Easy/Nil	Huge Cost	Huge Cost	Expensive	Expensive	Very Expensive
Corrosion / Abrasion Resistance	Excellent	Very Low	Very Low	Good	Moderate	Good
Friction Factor	Very Low	High	High	Low	Low	Moderate
Reliability	Very Good	Poor	Ok/Expensive	Average	Average	Moderate
Joint Reliability/ Leak Proof (Max:100, Mn:0)	100	0 - 50	0 - 50	0 - 80	0 - 80	0 - 50
Joining Method	Simple Heat Fusion	Conventional	Conventional	Butt Fusion	Special Solvent Chemical	O - Ring
Joining Skill	Very Simple & even unskilled labour can do this job easily"	Needs Skilled Labour	Needs Skilled Labour	Needs Skilled Labour	Needs Special Attention & Skilled Labour	Needs Special Attention & Skilled Labour
Joining Time	Few Seconds	Few Hrs	Few Hrs	Few Min	Few Min	Few Min
Joining Life Commissioning	Immediate	24 Hours	24 Hours	Few Hrs	24 Hours	Immediate
Easiness in Fittings	Very Easy	Difficult	Difficult	Easy	Easy	Ok
Laying (Easiest =100& Hardest =0)	100	0 - 50	0 - 50	0 - 80	0 - 80	0 - 50
Electrical Conductivity	Nil	More	More	Nil	Nil	More



GREEN APPLE

QUALITY FIRST

Green Apple Quality Assurance Systems (QAS)



QUALITY FIRST

Green Apple Quality Assurance Systems (QAS)

1.1 (QAS) Standards

1.2 System Control

1.3 Internal Control

1.4 Testing and Accepting

1.5 Incoming raw material

1.6 In-Process Inspection

1.7 Process Control

1.8 Final Inspection

1.9 External Control

1.10 Guarantee

1.11 Certificates



1.1 (QAS) Standards

Plastic piping system for hot and cold-water installations - Polypropylene (pp)	
ISO 15874 Part 1 Part 2 Part 3 Part 5 Part 7	General
	Pipes
	Fittings
	Fitness for purpose of the system
	Recommendations for the assessment of conformity
DIN 8077 DIN 8078 DIN 16962 DIN 16928	Polypropylene (PP) pipes - PP-H, PP-B, PP-R, PP-RCT - dimensions
	Polypropylene (PP) pipes - PP-H, PP-B, PP-R, PP-RCT - general quality requirements and testing
	Pipe joints and components for pressure systems of Polypropylene (PP)
	Pipes of Thermoplastic Materials, Pipe Joints, Elements for Pipes, Laying; General Directions
DVGW W544 W534 W270	Plastic pipe systems for drinking water - pipes
	Plastic pipe systems for drinking water - fittings
	Assessment of microbiological growth
DVS 2207 - 11 DVS 2208 - 1	Socket welding, butt-welding and electrofusion welding of Polypropylene pipes and components
	Machines and tools for the welding of Polypropylene pipes and components
ISO 7 / EN 10226 EN - ISO 228	Pipe threads where pressure tight joints are done on the thread
	Pipe threads where pressure tight joints are not made on the threads



1.2 System Control

The Production of Green Apple Superior Quality Piping System Calls for The Regulation and Control of All Areas of The Operations. All Results Are Documented and Archived:

- Testing and accepting incoming goods
- Process control
- In-process inspection
- Final inspection tests

Regulations For the Quality Control of Green Apple Sanitary Piping System Include:

- guidelines
- working sheets
- Supervisory Regulations

These Standards and Guidelines Feature the Minimum Requirements for Internal Control.

Conformance To the Superior Quality Standards Is Verified Through Independent Authorities, By Internal Audits and Laboratory Tests. Green Apple Highest Quality Standard Is Controlled.

This Is Reflected in Our Internal Quality Standards and Procedures, Which Are Illustrated by The Constant Quality of Our Products.

1.3 Internal Control

A Team of Highly Trained and Qualified QC Engineers, Equipped with A State of Art Laboratory, Ensures That All Tests Are Carried Out in Compliance with Our Quality Control Policies, Which Includes:

- Testing all raw material
- Measuring and inspecting our production equipments
- Auditing
- our production procedures
- A final inspection for the quality of our finished products
- All internal quality audits are documented and archived in accordance with the highest standard quality control policies

1.4 Testing and Accepting Incoming material are

All incoming raw material are carefully inspected, to ensure that the raw material conforms with the set requirements. Goods that have not been tested do not get released for production.

1.5 incoming raw material

The incoming raw material is tested according to DIN EN ISO 1133.

1.6 In-Process Inspection

The Quality Plan Requires That All Inspections Are Carried Out at The Beginning as Well as During Production. As Production Starts All Relevant Data Are Checked by The Quality Assurance Department.

Pre-production Samples Are Tested by the laboratory

- technicians for: Surface finish
- Dimensional accuracy
- Data from extrusion and injection molding machine
- The product is only released if optimal test results are achieved

1.7 Process Control

We Have an Extensive Quality Control Process in The Field of Extrusion and Injection. This Enables Constant Observation and Control of Production. This Ensures That Only Perfect Quality Products Are Packed and Stored. All Data Received During Production Is Studied and Analyzed, In Details.

1.8 Final inspection

QC Requires That Inspections and Tests Are Carried Out on All Finished Products. The Results Are All Documented. Finished Products Are Only Released to Storage When All Tests and Inspections Have Conformed to The Authorized Procedures and Specifications. The Final Inspection Test Includes a Time Laps Procedure. This Measures the Usability of The Products in Their Field of Application, As Well As Removing Production Weaknesses. These Inspections Are the Method for Quality Assurance During Production and For Design Tests. The Results Document the System Quality and Serve to Optimize the Manufacturing Process.

The final inspection covers the following procedures:

- Dimensional control
- Surface finish
- Measurement of the melt flow index
- Impact bending test
- Heat reversion test
- Homogeneity of the material
- Behavior under long period of stress

1.9 External Control

External Supervision Consists of Measuring the Fixed Scope at Fixed Intervals. The Respective Supervising Institutions Appoint the Appropriate Authorized Inspection Organization to Carry Out External

Supervision. Inspection Includes:

- External tests of products
- Internal audit of Green Apple quality assurance system and test procedures
- Calibration of the test equipment
- Hygienic toxicity tests

1.10-Guarantee

When Green Apple Components Are Correctly Installed and Used, The Trouble Free and Satisfactory Operation of The Installed System Can Be Expected on The Long Run. Should A Fault Ever Occur, However, Our After Sales Service Is Ready to Help You.

1.11 Certificates

Product Liability Insurance

The Quality Control Department Affixes a Label on The Final Product (GA-QF-QC406 QC - Products According to Standards (PASSED)

Mechanical Characteristics of Tubular Test Pieces Fitting (TS EN ISO 15874 - 3)

Characteristic	Requirement	Test parameters for the individual tests PPR					Test method
Resistance To internal Pressure	No Failure During the Test Period	Hydrostatic Stress (Map)	Test Temp. (C°)	Test Period (h)	Number of test pieces	Hydrostatic Stress (Map)	ISO 1167 - 1 ISO 116 7- 3
		16.0	20	1	3	Hydrostatic Stress (Map)	
		3.5	95	1000	3	Hydrostatic Stress (Map)	

Mechanical Characteristics of Pipes (TS EN ISO 15874 - 2)

Characteristic	Requirement	Test parameters for the individual tests PPR					Test method
Resistance To internal Pressure	No Failure During the Test Period	Hydrostatic Stress (Map)	Test Temp. (C°)	Test Period (h)	Number of test pieces	Test Pressure (Bar)	ISO 1167 - 1 ISO 116 7- 2
		16.0	20	1	3	64	
		4.3	95	22	3	17.2	
		3.8	95	165	3	15.2	
		3.5	95	1000	3	14	

Physical And Chemical Characteristics of Pipes (TS EN ISO 15874 - 2)

Characteristic	Requirement	Test parameters		Test method
		Parameter	Value	
Longitudinal reversion	≤ %2	Test temperature PPR Duration of exposure for: en ≤ 8 mm 8mm ≤ en ≤ 16mm en > 16mm Number of test pieces	135 °C 1 h 2 h 4 h 3	Method B of ISO 2505 (oven test)
Thermal stability by hydrostatic pressure testing	No bursting during the test period	Test temperature Hydrostatic stress Test period Number of test pieces	110 °C 1,9 MPa 8760 h 1	ISO 1167 - 1 ISO 1167 - 2
Impact resistance	≤ %10	Test temperature Number of test pieces	0 °C 10	ISO 9854 - 1 ISO 9854 - 2
MFI (Raw material)	≤ 0,5g /10 min	Test temperature Mass Number of test pieces	230 °C 2,16 kg 3	ISO 1133- 1
MFI (Pipe)	%30 maximum difference compared with compound from the same batch	Test temperature Mass Number of test pieces	230 °C 2,16 kg 3	ISO 1133 - 1

PIPE DIMENSION AND TOLERANCES ACCORDING TO DIN 8077 SDR 11 (PN10)

Outside Ø mm.	Tolerance mm.	Thickness mm.	Tolerance mm.	Inside Ø mm.	In" inches
20	+ 0.3 / - 0	1.9	+0.3/-0	16.20	½"
25	+ 0.3 / - 0	2.3	+0.4/-0	20.40	¾"
32	+ 0.3 / - 0	2.9	+0.4/-0	26.20	1"
40	+ 0.4 / - 0	3.7	+0.5/-0	32.60	1 ¼"
50	+ 0.5 / - 0	4.6	+0.6/-0	40.80	1 ½"
63	+ 0.6 / - 0	5.8	+0.7/-0	51.40	2"
75	+ 0.7 / - 0	6.8	+0.8/-0	61.40	2 ½"
90	+ 0.9 / - 0	8.2	+1.0/-0	73.60	3"
110	+ 1.0 / - 0	10.0	+1.1/-0	90.00	4"
125	+ 1.2 / - 0	11.4	+1.3/-0	102.20	5"

SDR 7.4 (PN16)

Outside Ø mm.	Tolerance mm.	Thickness mm.	Tolerance mm.	Inside Ø mm.	In" inches
20	+ 0.3 / - 0	2.8	+0.4/-0	14.00	½"
25	+ 0.3 / - 0	3.5	+0.5/-0	18.00	¾"
32	+ 0.3 / - 0	4.4	+0.6/-0	23.20	1"
40	+ 0.4 / - 0	5.5	+0.7/-0	29.00	1 ¼"
50	+ 0.5 / - 0	6.9	+0.8/-0	36.20	1 ½"
63	+ 0.6 / - 0	8.6	+1.0/-0	45.80	2"
75	+ 0.7 / - 0	10.3	+1.2/-0	54.40	2 ½"
90	+ 0.9 / - 0	12.3	+1.4/-0	65.40	3"
110	+ 1.0 / - 0	15.1	+1.7/-0	79.80	4"
125	+ 1.2 / - 0	17.1	+1.9/-0	90.80	5"

SDR 6 (PN20)

Outside Ø mm.	Tolerance mm.	Thickness mm.	Tolerance mm.	Inside Ø mm.	In" inches
20	+ 0.3 / - 0	3.4	+0.5/-0	13.20	½"
25	+ 0.3 / - 0	4.2	+0.6/-0	16.60	¾"
32	+ 0.3 / - 0	5.4	+0.7/-0	21.20	1"
40	+ 0.4 / - 0	6.7	+0.8/-0	26.60	1 ¼"
50	+ 0.5 / - 0	8.3	+1.0/-0	33.40	1 ½"
63	+ 0.6 / - 0	10.5	+1.2/-0	42.00	2"
75	+ 0.7 / - 0	12.5	+1.4/-0	50.00	2 ½"
90	+ 0.9 / - 0	15.0	+1.7/-0	60.00	3"
110	+ 1.0 / - 0	18.3	+2.0/-0	73.40	4"
125	+ 1.2 / - 0	20.8	+2.2/-0	83.40	5"

OPERATING LIFE ACCORDING TO DIN 8077 (SF=1,5)

Temperature (C°)	Years of Service	PN10	PN16	PN20
		Pipe Series (S)		
		5	3,2	2,5
		Standard Dimension Ratio (SDR)		
		11	7,4	6
Allowable Operating Pressure (Bar)				
10	1	17,5	27,8	35,1
	5	16,5	26,2	33,0
	10	16,1	25,6	32,2
	25	15,6	24,7	31,1
	50	15,2	24,1	30,3
20	1	15,0	23,7	29,9
	5	14,1	22,3	28,1
	10	13,7	21,7	27,4
	25	13,2	21,0	26,4
	50	12,9	20,4	25,7
30	1	12,7	20,2	25,4
	5	11,9	18,9	23,8
	10	11,6	18,4	23,2
	25	11,2	17,7	22,3
	50	10,9	17,2	21,7
40	1	10,8	17,1	21,6
	5	10,1	16,0	20,2
	10	9,8	15,5	19,6
	25	9,4	15,0	18,8
	50	9,2	14,5	18,3
50	1	9,1	14,5	18,2
	5	8,5	13,5	17,0
	10	8,2	13,1	16,5
	25	7,9	12,6	15,9
	50	7,7	12,2	15,4
60	1	7,7	12,2	15,4
	5	7,1	11,3	14,3
	10	6,9	11,0	13,9
	25	6,6	10,5	13,3
	50	6,4	10,2	12,9
70	1	6,5	10,3	12,9
	5	6,0	9,5	12,0
	10	5,8	9,2	11,6
	25	5,0	8,0	10,0
	50	4,2	6,7	8,5
80	1	5,4	8,6	10,8
	5	4,8	7,6	9,6
	10	4,0	6,4	8,1
	25	3,2	5,1	6,5
95	1	3,8	6,1	7,6
	5	2,6	4,1	5,2

THERMAL EXPANSION IN PPR PIPES

PPR pipes have an expansion coefficient that is much higher than the metal pipes. So, this characteristic should be taken into consideration during installations.

Calculation of thermal expansion is as follows:

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

where

ΔT = The difference between environmental temperature and water temperature in Kelvin degrees (K) or Celsius (°C).

ΔL = Variation of length in mm.

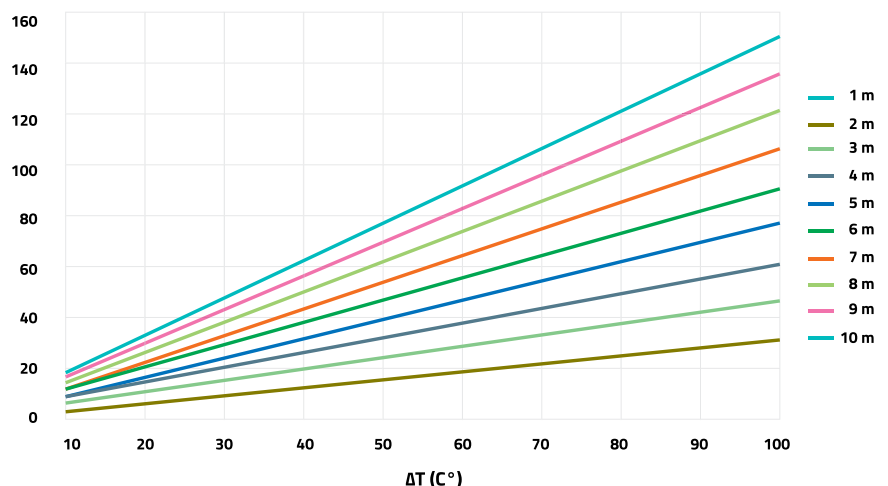
L = Initial length of the pipe in m.

α = Coefficient of linear thermal expansion.

The value of α is $1,5 \times 10^{-4}$ (K-1) for PPR pipes .

Pipe Length L (m.)	Linear Expansion ΔL (mm.)									
	Temperature Difference ΔL (°C)									
	10	20	30	40	50	60	70	80	90	100
1	1.5	3	4.5	6	7.5	8	10.5	12	13.5	15
2	3	6	9	12	15	18	21	24	27	30
3	4.5	9	13.5	18	22.5	27	21.5	36	40.5	45
4	6	12	18	24	30	36	42	48	54	60
5	7	15	22.5	30	37.5	45	52.5	60	67.5	75
6	9	18	27	36	45	54	63	72	81	90
7	10.5	21	31.5	42	52.5	63	73.5	84	94.5	105
8	12.5	24	36	48	60	72	84	96	108	120
9	13.5	27	40	54	67.5	81	94.5	108	121.5	135
10	15	30	45	60	75	90	105	120	135	150

Thermal Expansion of the Standard PP-R Pipe



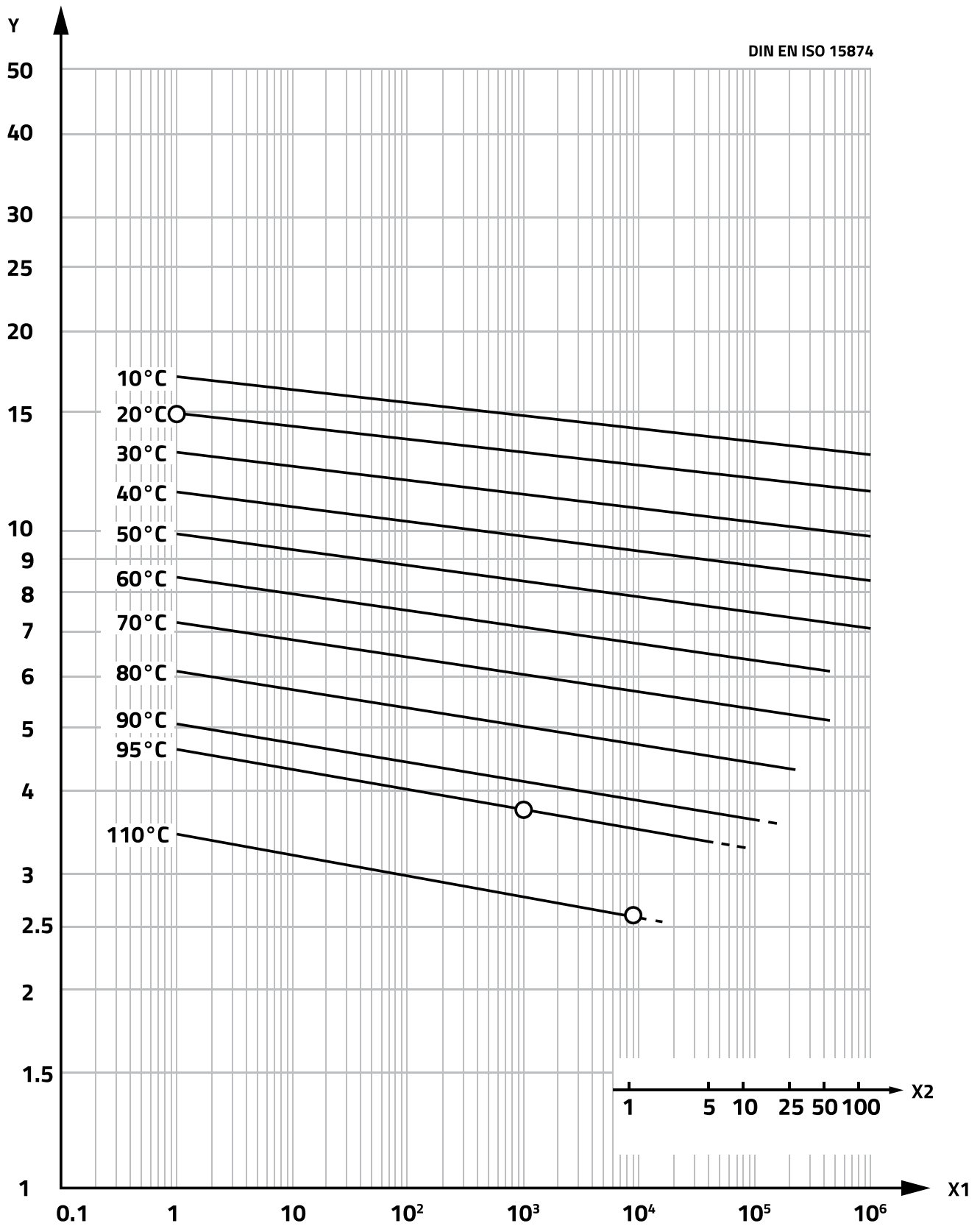
Example; at 70 °C for 8m PPR pipe, $\Delta L = ?$

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

$$\Delta L = 8000 \text{ mm} \times 70 \times 0.00015$$

$$\Delta L = 84 \text{ mm}$$

REFERENCE CURVES FOR EXPECTED STRENGTH OF PP-R



Key

X1 time, t_1 , to fracture, in hours

X2 time, t_2 , to fracture, in years

Y = hoopstress, α , in megapascal

PRESSURE LOSS PIPES

Pressure loss PP-R pipes SDR 6 with water temperature at 10° C

Flow rate		Ø	Ø	Ø	Ø	Ø	Ø	Ø
l/s	kg/h	16x2.7	20x3.4	25x4.2	32x6.7	40x6.7	50x8.4	63x10.5
	70	10 0.22	2 0.14	0.9 0.09	Head loss in mm c.a./m Average speed in m/s			
	140	33 0.44	8 0.29	3 0.18	1 0.11			
0.05	180	52 0.57	13 0.37	4 0.23	2 0.14			
	220	73 0.70	19 0.45	6 0.28	2 0.17			
	290	118 0.92	30 0.59	10 0.37	4 0.23	1.5 0.15	0.5 0.09	
0.1	360	164 1.11	42 0.71	15 0.45	6 0.28	2 0.18	0.7 0.11	
	340	234 1.36	61 0.88	21 0.55	8 0.34	3 0.22	1.07 0.14	0.33 0.09
	510		83 1.04	29 0.66	11 0.40	4 0.26	1.44 0.16	0.45 0.10
	580		104 1.18	37 0.75	14 0.46	5 0.29	1.8 0.19	0.56 0.12
	655		129 1.34	45 0.84	18 0.54	6 0.33	2.2 0.21	0.7 0.13
0.2	730		156 1.49	55 0.94	22 0.58	7.5 0.37	2.69 0.24	0.84 0.15
	830		290 1.65	69 1.07	27 0.66	9 0.42	3.3 0.27	1 0.17
	900		353 1.83	85 1.20	33 0.74	11 0.47	4.1 0.30	1.3 0.19
0.3	1080			110 1.39	43 0.85	15 0.54	5.3 0.35	1.6 0.22
	1280			149 1.65	59 1.01	20 0.64	7.1 0.41	2.2 0.26
0.4	1430			270 1.85	71 1.13	24 0.72	8 0.46	2.7 0.29
	1605				87 1.27	30 0.81	10 0.52	3.4 0.32
0.5	1805				107 1.43	36 0.91	13 0.58	4.2 0.36
	2005				135 1.55	44 1.01	15 0.65	5 0.40
0.6	2155				172 1.70	50 10.8	17 0.69	5.7 0.43
	2330				200 1.8	57 1.17	20 0.75	6.5 0.47
0.7	2530				225 1.98	66 1.27	23 0.82	7.6 0.51
	2705					74 1.36	26 0.87	8.5 0.54
0.8	2880					83 1.45	29 0.93	9.5 0.58
	3005					89 1.51	31 0.97	10 0.61
0.9	3255					103 1.63	36 1.05	11 0.66

Flow rate		Ø	Ø	Ø	Ø	Ø	Ø	Ø
l/s	kg/h	32x5.4	40x6.7	50x8.4	63x10.5	75x10.5	90x12.5	110x15.2
1.0	3600		143 1.8	43 1.16	14 0.73	7.9 0.5	2.8 0.35	
1.2	4320		198 2.16	59 1.40	19 0.87	9.2 0.61	3.9 0.42	
1.3	4680			66 1.49	22 0.93	10.6 0.66	4.5 0.46	
1.4	5040			76 1.62	25 1.01	12.1 0.71	5.1 0.50	
1.6	5760			114 1.85	32 1.16	15.3 0.81	6.4 0.57	
1.8	6480			141 2.08	40 1.32	18.8 0.92	7.9 0.64	
2.0	7200			170 2.31	48 1.46	22.7 1.02	9.5 0.71	3.7 0.48
2.2	7920				57 1.60	26.9 1.12	11.3 0.78	4.4 0.52
2.4	8640				66 1.74	31.4 1.22	13.1 0.85	5.1 0.57
2.6	9360				76 1.88	36.1 1.32	15.1 0.95	5.9 0.62
2.8	10080				87 2.02	41.2 1.43	17.3 0.99	6.7 0.67
3.0	10800				1113 2.17	46.6 1.53	19.5 1.06	7.5 0.71
3.5	12600				149 2.53	61.4 1.78	25.7 1.24	9.9 0.83
4.0	14400					77.9 2.04	32.6 1.14	12.6 0.95
4.5	16200					96.2 2.29	40.2 1.59	15.5 1.07
5.0	18000					116.2 2.55	48.5 1.77	18.7 1.19
6.0	21600					161.1 3.06	67.2 2.12	25.9 1.43
7.0	25200						88.6 2.48	34.2 1.66
8.0	28800						112.7 2.83	43.4 1.90
9	32400						139.3 3.18	53.6 2.14
10	36000							64.8 2.38
11	39600							77 2.61
12	43200							90.0 2.85
13	46800							104.0 3.09
15	50400							71.9 2.75
17	54000							92.1 3.11



GREEN APPLE

GREEN APPLE PP-R PIPES





GREEN APPLE

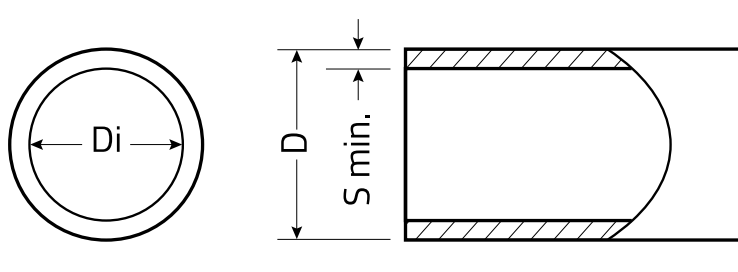


GREEN APPLE
SAFE AND HEALTHY



Green Apple PPR Pipe PN 20 SDR 6 - S 2,5

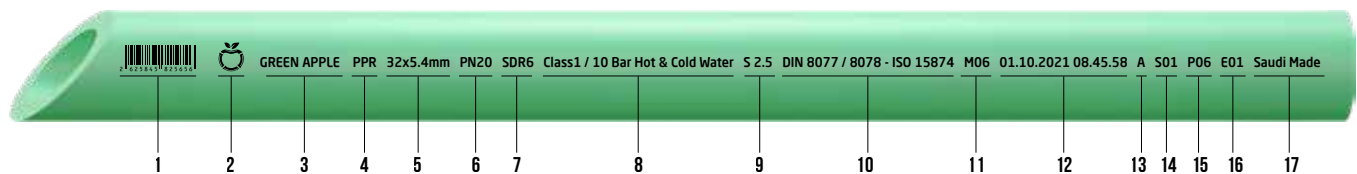
- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078



Barcode	D	Di	S min.	Pack. Pipe / Bag	Weight (kg/m)
6287039280014	20	13,2	3,4	30	0,172
6287039280021	25	16,6	4,2	25	0,266
6287039280038	32	21,2	5,4	15	0,434
6287039280045	40	26,6	6,7	10	0,671
6287039280052	50	33,2	8,3	6	1,04
6287039280069	63	42,0	10,5	4	1,65
6287039280076	75	50,0	12,5	4	2,34
6287039280083	90	60,0	15,0	2	3,36
6287039280090	110	73,2	18,3	2	5,01

Length pipe 5.8m or as per Request.

Marking Green Apple PP-R pipes



1	Barcode	10	International Standards
2	Logo	11	Opacity
3	trade Mark	12	Production line Number
4	Materials	13	Date & time of manufacture
5	Nominal Outside Diameter & Nominal Wall thickness	14	Shift
6	Nominal Pressure	15	Production Supervisor
7	Standard Dimension Ratio	16	Production Operator
8	Application Class	17	Quality Engineer
9	Pipe Series	18	Origin Country





GREEN APPLE

GREEN APPLE PP-R FITTING





GREEN APPLE

- Cross over
- Long End Plug
- Tee
- Elbow 90°
- Elbow 45°
- Socket
- Cap
- Reducing bush
- Reducing tee
- Union
- Metal union with PP-R nut (Female thread)
- Metal union with PP-R nut (Male thread)
- Adaptor socket (Male thread)
- Adaptor socket (Female thread)
- Elbow bracket 90° (Female thread)
- Double Battery Connection
- Tee 90° (Female thread)
- Hexagonal Transition Piece with Male Thread
- Hexagonal Transition Piece with Female Thread
- Chrome Plated Valve
- Butterfly Valve
- Plastic Ball Valve



PPR - TEE – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging / Carton
6287039280229	20	50	250
6287039280236	25	50	150
6287039280243	32	25	75
6287039280250	40	10	50
6287039280267	50	6	24
6287039280274	63	4	16
6287039280281	75	3	9
6287039280298	90	1	6
6287039280304	110	1	3

PPR - ELBOW 90° – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package/ Bag	Packaging / Carton
6287039281059	20	100	400
6287039281066	25	50	200
6287039281073	32	30	120
6287039281080	40	15	75
6287039281097	50	8	40
6287039281103	63	4	16
6287039281110	75	4	12
6287039281127	90	1	6
6287039281134	110	1	6

PPR - ELBOW 45° – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package/ Bag	Packaging / Carton
6287039281141	20	100	400
6287039281158	25	75	225
6287039281165	32	50	150
6287039281172	40	25	75
6287039281189	50	10	50
6287039281196	63	5	25
6287039281202	75	4	12
6287039281219	90	1	6
6287039281226	110	1	6

PPR – SOCKET – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package/ Bag	Packaging / Carton
6287039280137	20	100	500
6287039280144	25	100	300
6287039280151	32	50	200
6287039280168	40	25	100
6287039280175	50	15	60
6287039280182	63	10	40
6287039280199	75	6	24
6287039280205	90	4	16
6287039280212	110	2	6

PPR – END CAP – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package/ Bag	Packaging / Carton
6287039280373	20	100	500
6287039280380	25	150	450
6287039280397	32	70	280
6287039280403	40	25	150
6287039280410	50	20	80
6287039280427	63	15	60
6287039280434	75	5	40
6287039280441	90	4	20
6287039280458	110	2	10

PPR – REDUCING BUSH – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package/ Bag	Packaging / Carton
6287039280533	25 x 20	100	400
6287039281233	32 x 20	50	250
6287039280540	32 x 25	50	250
6287039280557	40 x 25	30	150
6287039280564	40 x 32	25	100
6287039280571	50 x 25	25	100
6287039280588	50 x 32	25	100
6287039280595	63 x 32	15	60
6287039280601	63 x 40	15	60
6287039280618	63 x 50	10	40

PPR – REDUCING TEE – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package/ Bag	Packaging / Carton
6287039280472	25 x 20	50	150
6287039280489	32x 25	25	100
6287039280496	40 x 25	12	60
6287039280502	40 x 32	12	60
6287039280519	50 x 25	6	30
6287039280526	50 x 32	6	30

PPR – UNION – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package/ Bag	Packaging/ Carton
6287039280311	20	50	200
6287039280328	25	50	150
6287039280335	32	25	75
6287039280342	40	25	50
6287039280359	50	5	25
6287039280366	63	3	12

PPR - CROSS OVER PIPE PN 20



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging / Carton
6287039280106	20	50	250
6287039280113	25	25	125
6287039280120	32	15	75

PPR - PLUG FOR PRESSURE TESTS – 28 × ½" PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	D (mm)	R	Package / Bag	Packaging / Carton
6287039280465	28	½"	50	200

ADAPTOR SOCKET WITH PP-R NUT (MALE THREAD) – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package/ Bag	Packaging/ Carton
6287039280816	20 x ½"	30	120
6287039280823	20 x ¾"	25	100
6287039280830	25 x ½"	30	120
6287039280847	25 x ¾"	25	100
6287039280854	32 x ¾"	20	40

ADAPTOR SOCKET (FEMALE THREAD) – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package/ Bag	Packaging / Carton
6287039280762	20 x ½"	30	120
6287039280779	20 x ¾"	25	100
6287039280786	25 x ½"	30	120
6287039280793	25 x ¾"	25	100
6287039280809	32 x ¾"	25	50

ELBOW BRACKET 90° (FEMALE THREAD) – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging / Carton
6287039280861	20 x ½"	25	100
6287039280878	25 x ½"	30	90
6287039280885	25 x ¾"	25	75
6287039280892	32 x ½"	20	40
6287039280908	32 x ¾"	20	40
6287039280915	32 x 1"	20	40

PPR 25 × ½ " DOUBLE BATTERY CONNECTION – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging / Carton
6287039280694	25 x ½"	5	20

PPR Tee 90° (FEMALE THREAD) – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging / Carton
6287039280700	20 x ½ "	25	200
6287039280717	25 x ½ "	25	75
6287039280724	25 x ¾ "	20	60
6287039280731	32 x ½ "	10	30
6287039280748	32 x ¾ "	10	30
6287039280755	32 x 1"	15	30

HEXAGONAL TRANSITION PIECE WITH MALE THREAD– PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging / Carton
6287039280991	32 x 1"	10	30
6287039281004	40 x 1¼ "	5	20
6287039281011	50 x 1½ "	3	15
6287039281028	63 x 2 "	2	10
6287039281035	90 x 3 "	1	4

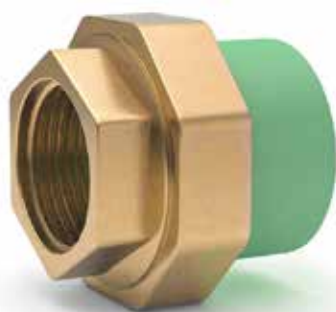
HEXAGONAL TRANSITION PIECE WITH FEMALE THREAD – PN25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging/ Carton
6287039280946	32 x 1"	10	30
6287039280953	40 x 1¼ "	5	15
6287039280960	50 x 1½ "	5	15
6287039280977	63 x 2 "	2	10
6287039280984	90 x 3 "	1	4

METAL UNION WITH PP-R NUT (FEMALE THREAD) – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging/ Carton
6287039280939	32 x 1"	10	30

METAL UNION WITH PP-R NUT (MALE THREAD) – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	G (mm)	Package / Bag	Packaging / Carton
6287039280922	32 x 1"	1 ½"	10	30

ACCORDING TO THE CUSTOMERS REQUEST PN 25– PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

BUTTERFLY VALVE – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging / Carton
6287039280656	25	5	30
6287039280663	32	5	20

PLASTIC BALL VALVE– PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging/ Carton
6287039280670	25	5	30
6287039280687	32	5	20

MAIN CONNECTOR WATER BATTERY PN 25 – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging / Carton
--	25	10	30
--	32	10	10

CHROME PLATED VALVE – PN 25



- **Material** : PP-R
- **Color** : Green
- **Standards** : DIN EN ISO 15874
DIN 8077 / 8078

Barcode	d (mm)	Package / Bag	Packaging/ Carton
6287039280632	25 × ¾"	1	10
6287039280649	32 × 1"	1	10



GREEN APPLE

GREEN APPLE

WELDING TECHNOLOGY



WELDING TECHNOLOGY

The Green Apple pipe work is coupled by socket fusion. The welded pipes and fittings have a longitudinally overlapping connection.

The heating of the pipes ends and fitting faucets is done by a heating element with bushes. After the necessary welding temperature is reached, the joining process is done. The pipe and fitting faucets diameters, as well as the respective heating bush diameters, are matched to build up the necessary pressure during the jointing process.

The heating element is electrically heated it complies with DVS Directive 2208 part 1 in construction and accuracy.

Pipe Ø	Heating-Up Time (Sec)	Processing Time (Sec)	Cooling-Down Time (min.)	Welding Depth (mm)
20	5	4	2	14
25	7	4	2	15
32	8	6	4	17
40	12	6	4	18
50	18	6	4	20
63	24	8	6	26
75	30	8	6	29
90	40	8	6	32
110	50	10	8	35
125	60	10	8	41

• **Note:** If welding is to be carried out outdoors when the temperature is below 5° C, the heating up time in acc. with DVS 2207 Part 11 should be increased by 50 %.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

SOCKET WELDING MACHINE WORKING STEPS WELDING TOGETHER



Socket welding machine equipped with movement slides on which prismatic clamps are placed to allow an automatic self-centering of any kinds of pipes and fittings. The socket welding machine is delivered in a metal transport box.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9

Select the pipe/fittings diameter (Fig. 1) and adjust the position of the slides (Fig. 2).

Slide the pipe and fitting at the same time into the heating tools (Fig. 6) up to the stop.

Press the fitting into the clamping tool up to the stop and fix it (Fig. 3).

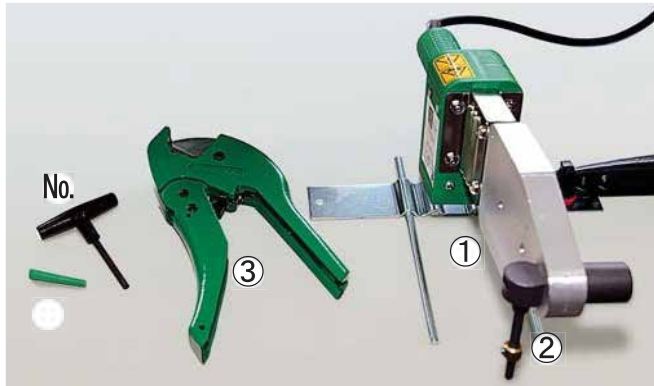
Hold this position for the heating-up time acc. After the heating-up time is reached move the slide back, move out the welding plate and join the pipe and fitting rapidly together (Fig. 7, 8, 9) moving the slide up to the stop.

Adjust the stop to hold the fitting. Align the pipe axially into the fitting (Fig. 4).

Check the welding plate temperature and adjust it if necessary. Move the welding plate between pipe and fitting (Fig. 5).

Remove the welding joint after the end of the cooling time from the clamping jaws.

HOLE REPAIR IN CASE OF DAMAGED PIPE



In case a Green Apple Pipe is damaged, it is possible to be repaired, using a special tool, mounted on the welding device with a special repair patch.

Note: The repaired part can work again under pressure.

Tool set hole repair:

- 1 - Hand welding machine Imbus key
- 2 - Welding tool for repairing plug Repairing plug
- 3 - Pipe cutter



Figure 1



Figure 2



Figure 3



Figure 4

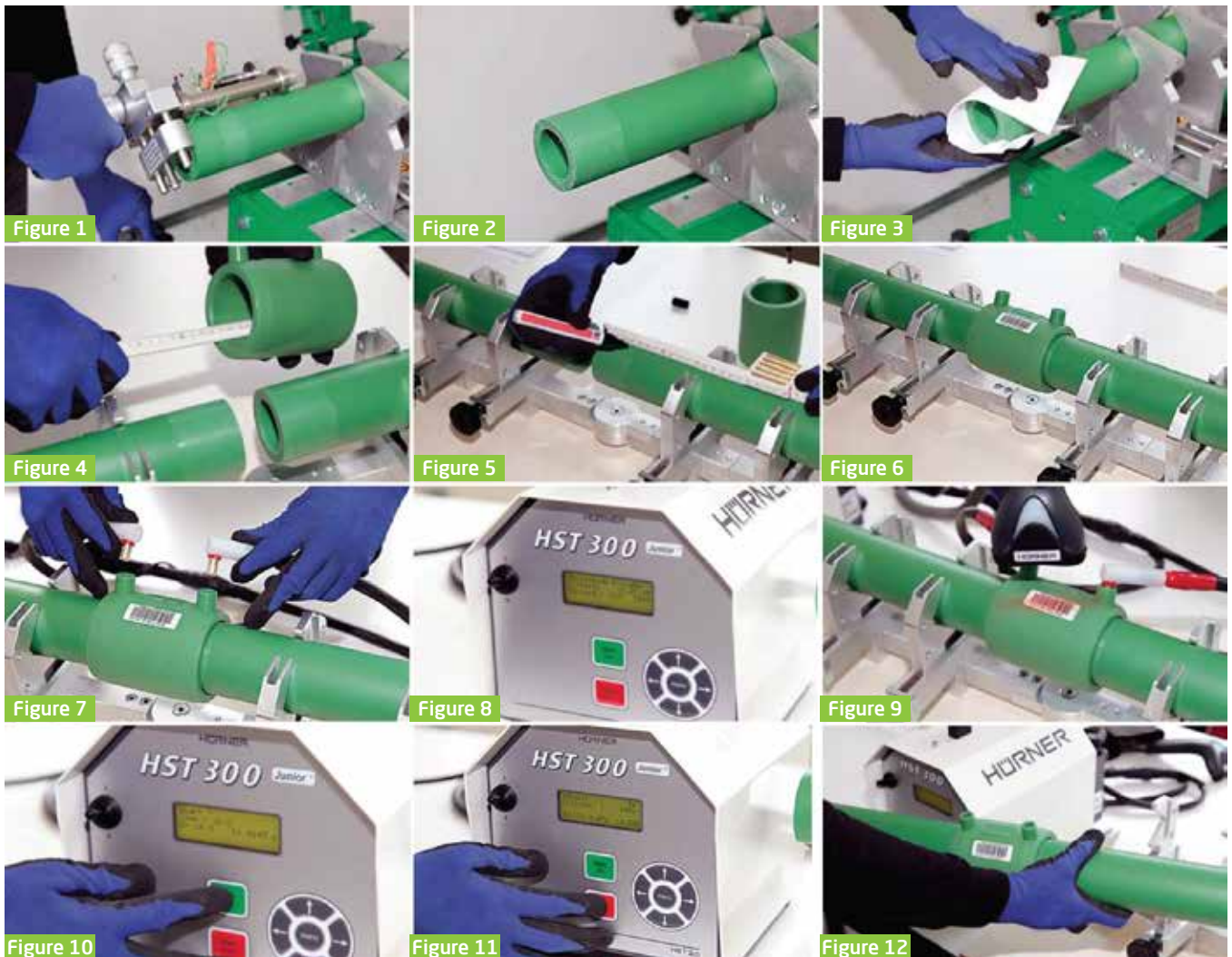


Mark the degree of the push-in depth (wall thickness) on the repair plug (Fig. 1). Distance tool to be fixed according to the wall thickness of the pipe and tighten the screw. Heat up the borehole and the welding plugs with the repair set for 15 seconds (Fig. 2).

After removing the welding device, set in the repair plug precisely without twisting it (Fig. 3). After a cooling time of 5 minutes, remove the protruding end of the repair plug (Fig. 4).

ELECTROFUSION WELDING WITH ELECTROFUSION

- 1 - Electrofusion socket
- 2 - Electrofusion machine
- 3 - Scanner



Cut the pipe properly in rectangularly position. Afterwards remove the oxidation layer in the welding area. Use a hand scraper or a rotary scraper

(Fig. 1). Once the surface is scraped properly

(Fig. 2) clean the pipe surface and the inside coupler with absorbent, lint-free and non-dyed paper

(Fig. 3). Mark the depth of the coupler

(Fig. 4 and 5). Slide in the coupler up to the marked position on the pipe. It's recommended to secure the pipe against dislocation, e.g., with a pipe clamp

(Fig. 6). Connect the cables to the contact pins of the coupler

(Fig. 7) and start welding process

(Fig. 8). You can neither insert the data manually acc. to the data mentioned on the barcode label of the socket or you can use the barcode reader

(Fig. 9). Afterwards proceed with the welding following the steps mentioned on the welding machine

(Fig. 10 and 11). At the end of the welding cycle

(Fig. 12) waits for the cooling time. After the cooling time you can stress the electrofusion joint to the permissible operation pressure.

BUTT WELDING

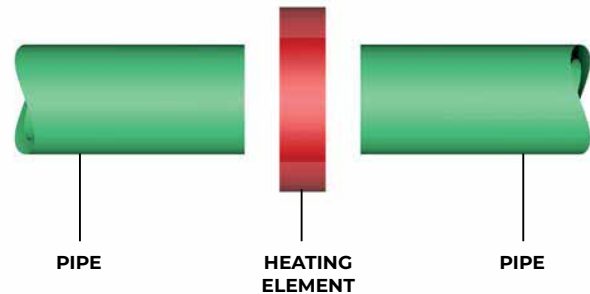
The welding machines
is suitable for butt welding of pipes or fittings made of
PP-R
from dia = 90 mm up dia = 250 mm



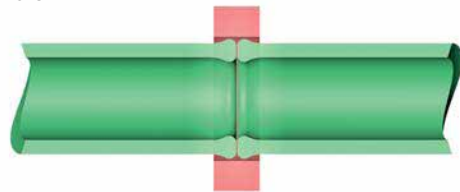
The butt welding machine with heating element includes:

- Basic machine with movable slide
- Heating element
- Hydraulic aggregate
- Electrical planning tool
- Flexible hydraulic hoses
- Metal box for electrical heating elements and planning tool.

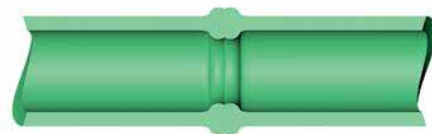
PREPARATION



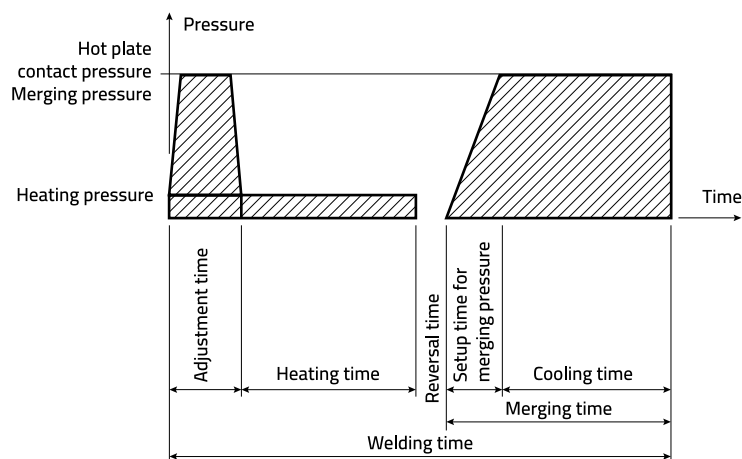
HEATING UP



FINISHED CONNECTION



Process steps in heated tool butt welding



INSTALLATION

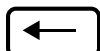
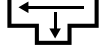
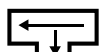
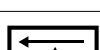
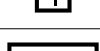
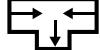
Pressure Loss PP-R Pipes SDR 6 With Water Temperature At 10°C

Flow rate		Ø	Ø	Ø	Ø	Ø	Ø	Ø
l/s	kg/h	16x2.7	20x3.4	25x4.2	32x6.7	40x6.7	50x8.4	63x10.5
	70	10 0.22	2 0.14	0.9 0.09	Head loss in mm c.a./m Average speed in m/s			
	140	33 0.44	8 0.29	3 0.18	1 0.11			
0.05	180	52 0.57	13 0.37	4 0.23	2 0.14			
	220	73 0.70	19 0.45	6 0.28	2 0.17			
	290	118 0.92	30 0.59	10 0.37	4 0.23	1.5 0.15	0.5 0.09	
0.1	360	164 1.11	42 0.71	15 0.45	6 0.28	2 0.18	0.7 0.11	
	340	234 1.36	61 0.88	21 0.55	8 0.34	3 0.22	1.07 0.14	0.33 0.09
	510		83 1.04	29 0.66	11 0.40	4 0.26	1.44 0.16	0.45 0.10
	580		104 1.18	37 0.75	14 0.46	5 0.29	1.8 0.19	0.56 0.12
	655		129 1.34	45 0.84	18 0.54	6 0.33	2.2 0.21	0.7 0.13
0.2	730		156 1.49	55 0.94	22 0.58	7.5 0.37	2.69 0.24	0.84 0.15
	830		290 1.65	69 1.07	27 0.66	9 0.42	3.3 0.27	1 0.17
	900		353 1.83	85 1.20	33 0.74	11 0.47	4.1 0.30	1.3 0.19
0.3	1080			110 1.39	43 0.85	15 0.54	5.3 0.35	1.6 0.22
	1280			149 1.65	59 1.01	20 0.64	7.1 0.41	2.2 0.26
0.4	1430			270 1.85	71 1.13	24 0.72	8 0.46	2.7 0.29
	1605				87 1.27	30 0.81	10 0.52	3.4 0.32
0.5	1805				107 1.43	36 0.91	13 0.58	4.2 0.36
	2005				135 1.55	44 1.01	15 0.65	5 0.40
0.6	2155				172 1.70	50 10.8	17 0.69	5.7 0.43
	2330				200 1.8	57 1.17	20 0.75	6.5 0.47
0.7	2530				225 1.98	66 1.27	23 0.82	7.6 0.51
	2705					74 1.36	26 0.87	8.5 0.54
0.8	2880					83 1.45	29 0.93	9.5 0.58
	3005					89 1.51	31 0.97	10 0.61
0.9	3255					103 1.63	36 1.05	11 0.66

Flow rate		Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
l/s	kg/h	32x5.4	40x6.7	50x8.4	63x10.5	75x10.5	90x12.5	110x15.2	125x20.8
1.0	3600		143 1.8	43 1.16	14 0.73	7.9 0.5	2.8 0.35		
1.2	4320		198 2.16	59 1.40	19 0.87	9.2 0.61	3.9 0.42		
1.3	4680			66 1.49	22 0.93	10.6 0.66	4.5 0.46		
1.4	5040			76 1.62	25 1.01	12.1 0.71	5.1 0.50		
1.6	5760			114 1.85	32 1.16	15.3 0.81	6.4 0.57		
1.8	6480			141 2.08	40 1.32	18.8 0.92	7.9 0.64		
2.0	7200			170 2.31	48 1.46	22.7 1.02	9.5 0.71	3.7 0.48	
2.2	7920				57 1.60	26.9 1.12	11.3 0.78	4.4 0.52	
2.4	8640				66 1.74	31.4 1.22	13.1 0.85	5.1 0.57	
2.6	9360				76 1.88	36.1 1.32	15.1 0.95	5.9 0.62	3.1 0.48
2.8	10080				87 2.02	41.2 1.43	17.3 0.99	6.7 0.67	3.6 0.51
3.0	1080				1113 2.17	46.6 1.53	19.5 1.06	7.5 0.71	4.1 0.55
3.5	12600				149 2.53	61.4 1.78	25.7 1.24	9.9 0.83	5.3 0.64
4.0	14400					77.9 2.04	32.6 1.14	12.6 0.95	6.7 0.73
4.5	16200					96.2 2.29	40.2 1.59	15.5 1.07	8.3 0.82
5.0	18000					116.2 2.55	48.5 1.77	18.7 1.19	10.0 0.92
6.0	21600					161.1 3.06	67.2 2.12	25.9 1.43	13.9 1.10
7.0	25200						88.6 2.48	34.2 1.66	18.3 1.28
8.0	28800						112.7 2.83	43.4 1.90	23.2 1.46
9	32400						139.3 3.18	53.6 2.14	28.7 1.65
10	36000							64.8 2.38	34.7 1.83
11	39600							77 2.61	41.1 2.01
12	43200							90.0 2.85	48.1 2.20
13	46800							104.0 3.09	55.6 2.38
15	50400								71.9 2.75
17	54000								92.1 3.11

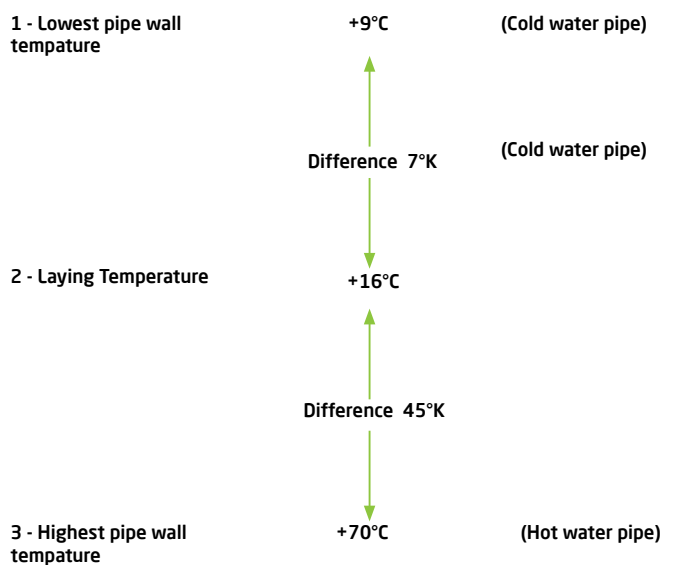
PRESSURE LOSS FITTING

Linear Deformation under Heat Influence.

Description	Symbol	Coefficient of resistance (r)
Coupling pipe		0.25
90° Elbow		2.00
45° Elbow		0.60
Identical 90° Tee		1.80
Reduced 90° Tee		3.60
Identical 90° Tee		1.30
Reduced 90° Tee		2.60
Identical 90° Tee		4.20
Reduced 90° Tee		9.00
Identical 90° Tee		2.20
Reduced 90° Tee		5.00
Male threaded 90° Tee		0.80
Concentric reduction pipe up 2 dim.		0.55
Concentric reduction pipe up 3 dim.		0.85
Male threaded joint		0.40
Reduced Male threaded joint		0.85
Male threaded elbow		2.20
Reduced male threaded		3.50

The calculation of the linear deformation is based on the laying temperature.
The following example gives you an idea of how to calculate.

Example for a pipe length of 5.8 m :



To 1. Shortening of the pipe: $5.8 \text{ m} \times 7^\circ \times 0,03 = 1,218 \text{ mm}$

To 3. Extension of the pipe: 5.8 m x 54 x 0,039,396 mm



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