KAWSAR کوثر

PPR-C PIPES & FITTINGS

An Innovative Piping System for Hot and Cold Water

Quality, Durability Reliability
For Life Time

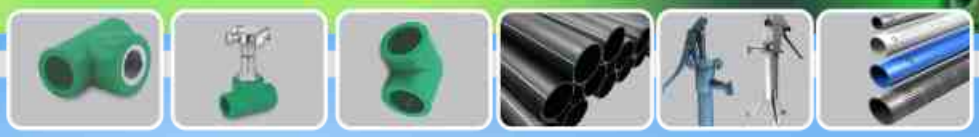
MOODY INTERNATIONAL · Pakistan Standards

Manufactures According To

UL · DIN · ASTM INTERNATIONAL · NEMA · BSI British Standards

KAWSAR
PPR-C PIPES & FITTINGS

کوثر



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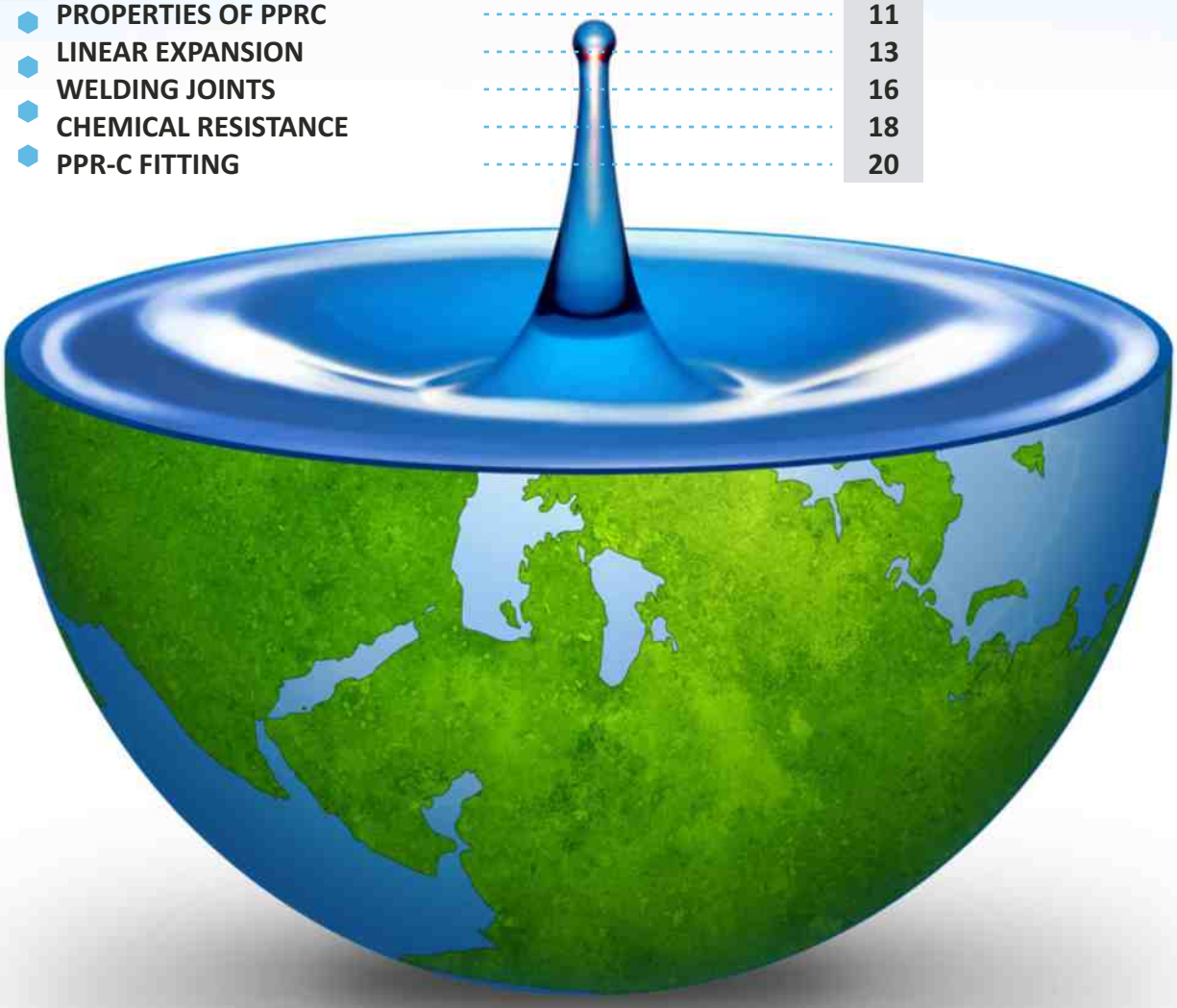

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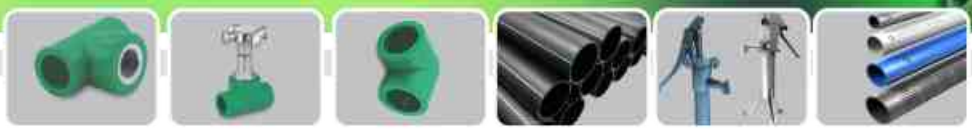


INTRODUCTION

Kawsar has established in 1994 as a manufacturer for water Hand Pumps. Kawsar started its regular production of plastic Polyvinyl Chloride PVC Pressure and non-Pressure pipe system for cold and potable water and other industrial uses from March 2004.After Achievement in PVC Kawsar Now Started PPR-C, HDPE pipes & Fitting with Advance Technology. We aim to set standards in every field we enter. Customer focus, quality and innovation are reflected in every aspect of our business. Our strength lies in pre-empting customer expectations and product demands. KAWSAR today is a hallmark of trust and reliability. This is why KAWSAR employs are highly skilled and experienced labor, KAWSAR utilizes the most advanced technology on its production line and retains the modern management system.

As a group, we have commitment to high ethical business valves, quality of products, committed deliveries and competitive pricing. These are the factor which has taken us to the path of success achieving great heights and we are confident to achieve further heights in the times to come with the new setup. Kawsar has highly qualified staff and has experienced staff about `12 year .

We believe that our strength lies in delighting our customers. That is why, providing quality products backed by superior technical support services, is the KAWSAR promise to all our valued customers.

Besides its unique place in the Pakistan plastic and Hand Pumps industry, KAWSAR products are being exported to various other countries

BEST EXPORTER AWARDS TROPHY

CERTIFICATIONS

In our quest to lead by example, our joint efforts have led KAWSAR to ISO 9001:2000 Certification and accreditation for supreme product performance and quality by the Pakistan Standard Institute (PSI) and Pakistan Engineering Council.

100% Food Grade Material

CERTIFIED COMPANY
MOODY INTERNATIONAL ISO 9000:2008

Pakistan Standards

Manufactures According To International Standards

UL DIN ASTM INTERNATIONAL Standards Worldwide NEMA BSI British Standards

KAWSAR کوثر

ISO 9001-2000

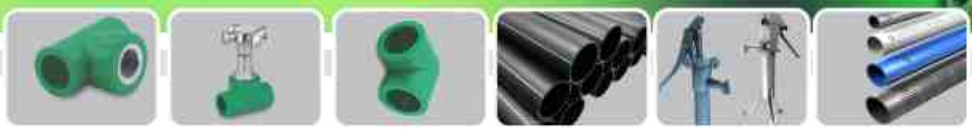
CERTIFIED COMPANY

APPROVED BY

PSI	Pakistan Standards Institution (Govt. of Pakistan)
LGRD	Local Govt. of Rural Development Dept (NWFP)
SGS	Societe General DE Surveillance
WMD	Water Management Deptt. Govt. of NWFP, Punjab
PSQCA	Pakistan Standard & Quality Control Authority
PHED	Public Health Engineering Deptt. Govt. of NWFP.
ISO	International Standards Organization

ENLISTED WITH

DACCAR	Danish Committee for Aid to Afghan Refugee
SCA	Swedish Committee for Afghanistan
IRC	International Rescue Committee
UNDP	United National Development Program
UNICEF	United Nations Children Emergency Fund for Pakistan and Afghanistan
ICRC	International Committee of the Red Cross
QC	Qatar Charity
QRC	Qatar Red Crescent
SRSP	Sarhad Rural Support Programme



QUALITY POLICY

Kawsar total quality control perceptive is taken as a principal while performing the mission. Our main policy is to provide the present and future needs and demands of our customers in the most economical way and on time. In all our processes, we adopt in the principle of customer oriented understanding.

Aim for improvement full participation of our staff. In this process management, our main goal is to continuously improve our production and to respond the demands of our customers, personals and suppliers.

OUR MISSION

To increase the number of pleased and trusted customers in our sector by satisfying them from our quality.

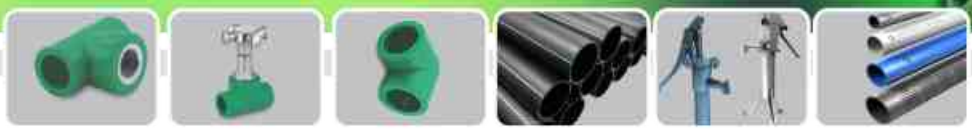
OUR VISION

To be committed to the miss on of being the symbol of trust and contentment in the plastic and fittings market, KAWSAR proceeds to this targets as being the leader in the domestic market. And being a under rental and permanent supplier in the international market.

WHY KAWSAR?

Being one of the best firms in the country in manufacturing sector of PVC, PPRC, HDPE Pipes and Fittings, Kawsar Gives at most of the importance to the Quality control and:

1. Uses the most appropriate material
2. Has the most advanced high technology
3. Has well qualified technical Staff and Experienced Labor
4. Produces Pipes in compliance with the International Standards.
5. Has Well equipped laboratory which is round the clock busy to control the Quality at each stage of production



QUALITY CONTROL

QUALITY CONTROL DEPARTMENT

Our company has a quality control department under the supervision of Quality Manager to ensure quality at all levels. The quality control department works round the clock to synchronize with shift system of the plant..

RAW MATERIAL QUALITY CONTROL.

All types of Raw material from our supplier are subject to input quality control test . Before Production Samples chosen from raw material for Test being carried out obtain suitable for Production approval.

PROCESS QUALITY CONTROL

To assure quality of the PPR-C Pipes during production process and finish product, Quality Control department ensures that materials used in the manufacturing process are in strict compliance with the end users' requirement and the end product is in conformity with the applicable international standards.

EXTENSIVE QUALITY CONTROL

Kawsar pipe undergoes numerous quality control tests, including regular measurements of critical dimensions, tests for extrusion quality, pipe flattening, burst pressure, impact resistance, joint integrity, and hydrostatic soundness , Melt Flow rate, Internal Hydrostatic Pressure Resistance (ICPR), Longitudinal Reversion (Heat Reversion) , Tensile Strength This ensures optimum quality, reliability and long-term strength.

THIRD-PARTY INSPECTION

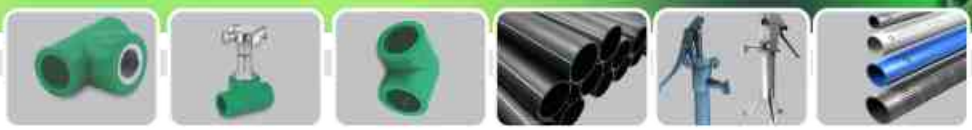
Independent inspection provides added assurance that Kawsar PPR- C pipe meets applicable standards and specifications. This is done through unannounced plant audits, verification of materials, procedures and test equipment, as well as through random sampling and testing of pipe and materials.

HIGH QUALITY AND PERFORMANCE STANDARDS

The quality and performance of PPR- C pipe are assured by a wide array of tough standards,

control tests and independent certifications

Kawsar PPR-C Pipes maintain the quality of the products as per the revised and the latest standard ISO 9001/ which also is in line with the international standards DIN 8077 & 8078, DIN 16962, DIN 16972 on product quality



PPRC INTRODUCTION

KAWSAR PPRC PIPES & FITTINGS is a versatile, and comprehensive system for water and other fluid delivery, is used in applications of pressurized warm or cold water in all modern residential, commercial, and industrial applications. The creative solutions provided by KAWSAR in its product base renders it a leader in the construction industry.

A random copolymer grade of polypropylene called PPRC was especially developed for engineering applications with certain stringent requirements. PPRC is characterized by excellent physical and chemical properties even at elevated temperatures. Compression strength, elasticity, corrosion, chemical and heat resistance are just some of these properties. Kawsar PPRC piping system has proven its high resilience even at the most extreme conditions

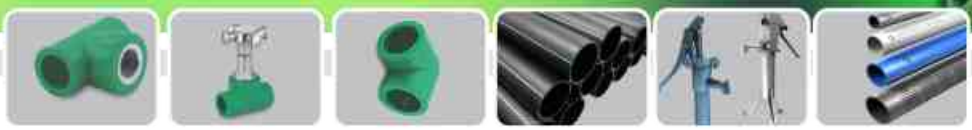
RELATED STANDARDS APPLIED IN PPRC SYSTEM

MATERIAL-SPECIFIC STANDARDS

DIN 8077	Polypropylene, Dimensions.
DIN 8078	Polypropylene pipes, General Quality Requirements and Testing
DIN 16962	Pipe Joint Assemblies and fittings for polypropylene Pressure Pipes

OTHER APPLICABLE STANDARDS AND REGULATIONS:

E-DIN 1988	Drinking Water Lines in Premises
DIN 16928	Pipe Connections and Components Layout
DVS 2207	Welding of Thermoplastics
DVS 2208	Welding Machine and devices for Thermo-plastics.
DIN 4109	Sound Insulation in Building Construction.
DIN 18381	Installation work of Gas, water and severage.
VOB Part C	Lines within buildings.
DVGW W308	Regulations and requirements for fittings, Pipes and Drinking Water Installations.
EnEg	Law of Energy Saving.



APPLICATIONS

- Rainwater Utilization Systems
- Compressed-air Plants
- Swimming Pool Facilities
- Agriculture And Horticulture
- Geothermal Recovery
- Transport Of Aggressive Fluids (acids, Chemicals Etc.)
- Liquid Food Industry
- Pharmaceutical Industry
- For Cold And Hot Water Installations
- Residential Buildings, Hospitals, Hotels, Office And
- School Buildings, Ship Buildings, Sports Facilities
- House Connection, Boiler Connection,
- Water Distribution, Riser,
- High Rise (conventional Water Point Connection.

ADVANTAGES

- Resistance Against Chemicals
- Smell and Taste Neutrality
- High Impact Rate
- Heat And Sound Insulating Characteristics
- Very Good Welding Properties
- Sanitized
- Resistant to high temperature (95 degrees)
- No Insulation required.
- Heat preservation and energy saving.
- High Flow : Smooth interior surface results

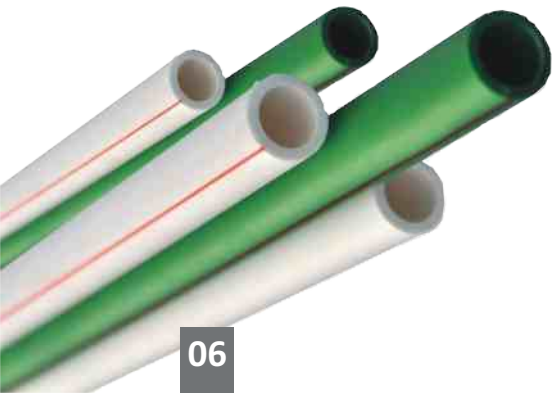
  no friction giving high flow.
- High durability with minimum 50 years life span.
- Health : Hygienic and low bacterial growth.

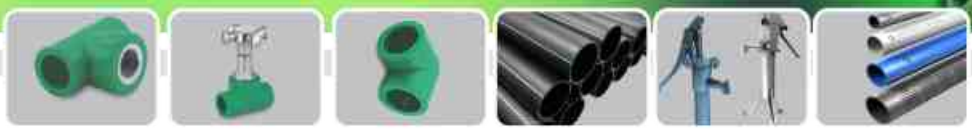
POTABLE WATER PIPE NETWORKS

Potable water is one of the best controlled commodity goods. The domestic supply system should influence the water on its way up to the taps as little as possible.

Choosing the right domestic water pipe system and its material is of decisive importance.

Kawsar Piping system is suitable for all different qualities of potable water.





PPR-C RAW MATERIAL

Kawsar pipes & fittings are made with a material called PPRC (polypropylene random copolymer), which is used extensively in food and medical industries because of its safe properties.

Characteristics of raw material used in manufacturing.

Raw materials of polypropylene are grouped within 3 classes as to their characteristics.

Type 1: PP-H (Polypropylene Ho polymer)

Type 2: PP-B (Polypropylene Block Copolymer)

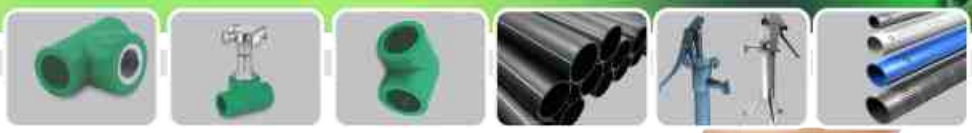
Type 3: PP-R (Polypropylene Random Copolymer)

Type-3 raw material is superior to others as to the resistance to temperature, pressure and chemical materials. The most important property of this raw material is high resistance against heat and chemical effects. Thanks to this resistance, Kawsar PPRC Pipe and Fittings produced from PP-R raw material are used successfully in the cold and hot water piping systems. , It does not allow any biological substance to be present in its body and so this provides Kawsar PPRC Pipe and Fittings produced from PP-R raw material with superior properties of non-color, taste and smell formation.

Due to these characteristics, for manufacturing of KAWSAR PPRC pipes & fittings, Type-3 Raw Material is used.

PPRC - MATERIAL PROPERTY :

Property	Value for PPR	Property	Value for PPR
Density at 23° C	0.91 gm/cm^3	Surface Resistance	$>10^{12}$ ohm
Mean Coefficient of linear thermal expansion	$1.5.10^{-4}$ K^1	Melt Index 230° C/2.16 kg	0.25-0.30gm/10 min
		Shore Hardness-D	65
Thermal conductivity	0.23 $W.K^{-1}m^{-1}$	Vicat Soften Point VST/A/50	132° C



PPR-C ENVIRONMENTAL FRIENDLY

PRIME ECOLOGICAL ADVANTAGES OF PPR-C

- PVC free
- Longevity
- Recyclable
- Free from heavy metals that are hazardous to health (e.g. Cu, pb, N)

ENVIRONMENTAL PROTECTION

Kawsar PPR-C pipe system feature not only a long service life, but also excellent environmental and social compatibility. Since its inception, Kawsar has always placed emphasis on the fact that its products and manufacturing processes should not pollute our sensitive ecosystems and ensured development of fully recyclable materials Kawsar PPR-C pipe systems fulfill ecological standards, which are demanded today.

The environmentally friendly raw material is used for manufacture of Kawsar PPR-C pipe system. To ensure its environmental compatibility, all contained additives (color pigments and stabilizers) are extensively tested, not only by Kawsar own laboratory, but also by prominent independent laboratories

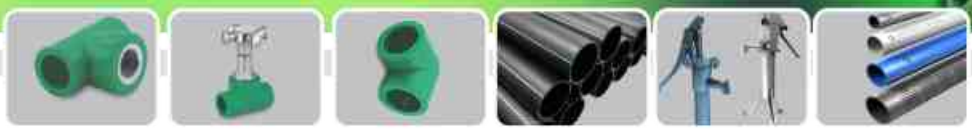
The Environmentally friendly material, Kawsar PPR-C piping system is recyclable and can be ground melted and reutilized for various applications e.g. motor-protections, wheel linings, laundry baskets and other kinds of plastic materials. There are no polluting substances either in its processing or in its disposal..

The environmentally friendly and hygienically enhanced, potable water pipe system, made by Kawsar is physiologically and microbiologically harmless Hygienic and low bacterial growth. The technical suitability of Kawsar PPR piping system has been evident all over.

Kawsar has always emphasized on its philosophy, that ecological and economic interests should not be contradictory, neither during production and sales, nor in the application product.

In domestic applications, the extrapolated service life of Kawsar PPR-C pipes is more than 100 years. Peak temperatures of 100°C arising from short disruptions are unproblematic. To ascertain approximate working life of Kawsar PPR-C pipe system, permanent temperature and pressure has to be calculated

Approved by the PSQCA, PAKISTAN HEALTH DEPARTMENT etc., puts Kawsar PP-R pipes & fittings as the best selection



RANGE OF PRODUCTS

Range	DIN 8077 & 8078					
Pipe	SDR 11/ PN- 10		SDR 7.4/ PN-16		SDR 6/ PN-20	
OD (mm)	Thickness	Mass kg/mtr.	Thickness	Mass kg/mtr.	Thickness	Mass kg/mtr.
16	-	-	2.2	0.095	2.7	0.110
20	1.9	0.107	2.8	0.148	3.4	0.172
25	2.3	0.164	3.5	0.230	4.2	0.266
32	2.9	0.267	4.4	0.370	5.4	0.434
40	3.7	0.412	5.5	0.575	6.7	0.671
50	4.6	0.638	6.9	0.896	8.3	1.040
63	5.8	1.010	8.6	1.410	10.5	1.650
75	6.8	1.420	10.30	2.010	12.5	2.340
90	8.2	2.030	12.30	2.870	15.0	3.360
110	10.0	3.010	15.1	4.300	18.3	5.010

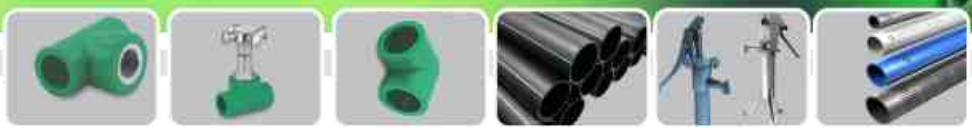
The following table shows the operating conditions related to pressure and temperature as a basis for pipe and pipe connections. These figures refer to potable water installations based on a theoretical life of 50 years.

PPR PIPES / Diameter

PRODUCT CODE	*DIMENSION mm*	*Inch*
KPP20	20	½"
KPP25	25	3/4"
KPP32	32	1"
KPP40	40	1 1/4"
KPP50	50	1 1/2"
KPP63	63	2"
KPP75	75	2 1/2"
KPP90	90	3"
KPP110	110	4"

Working Pressure	Temperature	Annual working hours
bar	C°	h/a
0 to 10 transient	to 25*	8760
0 to 10 transient	to 60	8710
	to 85	50

*Reference temperature for the creep rupture strength at 20°

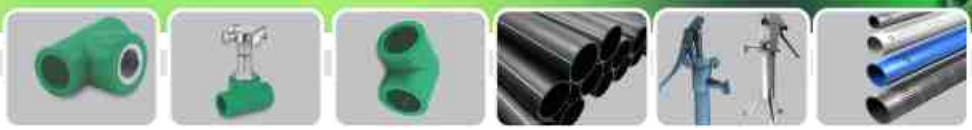


SERVICE LIFE & WORKING PRESSURE

Value	Service	Pipe Series		
Temp	Life	SDR 11/ PN-10	SDR 7.4/ PN-16	SDR 6/ PN -20
0°	Yrs.	Allowable working pressure Bar SF		
10°	50	18.2	28.8	36.3
	100	17.7	28.1	35.4
20°	50	15.5	24.5	30.9
	100	15.0	23.8	29.9
30°	50	13.1	20.7	26.1
	100	12.8	20.2	25.5
40°	50	11.0	17.5	22.0
	100	10.7	16.9	21.3
50°	50	9.3	14.7	18.5
	100	8.9	14.2	17.8
60°	25		12.6	15.90
	50	7.7	12.1	15.30
70°	25	6.1	9.6	12.1
	50	5.1	8.1	10.2
80°	10	4.8	7.6	9.6
	25	3.8	6.1	7.6
95°	5	3.0	4.8	6.1
	10	2.6	4.0	5.1

COMPARISON OF PPRC PIPES WITH CONVENTIONAL PIPE SYSTEMS

Pipe Property	G.I. Pipe	Copper Pipe	PPRC Pipe
Service life	5-10 Years	50 Years	50 Years
Resistance to High Temperature	Good	Good	Good
Hygienic Property	Bad	Common	Good
Recyclable and No Pollution	No	No	Yes
Pipe Furring	Yes	Yes	No
Corrosion Resistant	Bad	Bad	Good
Installation	Hard	Hard	Easy
Price	Low	High	Common
Reliability	Common	Common	Good



PROPERTIES OF PPRC PIPES

PPRC PIPE

The raw materials of PPRC pipes are PP3 and aluminum foil. Their biggest advantage is that they are lighter and more hygienic than metal pipes. They are used in all central heating and hot water installations. The aluminum layer can be peeled with its special equipment and can be joint to articulation components in short time.

1.1-Properties of PPRC Pipes

- Polypropylene pipes are resistant to chemicals. They work in acidic and basic environments.
- Polypropylene pipes do not rust or corrode. The inner surface of polypropylene pipes is smooth and the particles in the fluid cannot stick to the pipe walls and constrictions in time are out of question.
- Polypropylene pipes are not mossed do not allow bacterial growth.
- Polypropylene pipes are completely hygienic, Polypropylene pipes are flexible and do not break.
- Polypropylene pipes are easy to lay. They reduce project costs by saving labor and time.
- Polypropylene pipes are light; they are transported and stored easily.
- Polypropylene pipes do not react to materials like cement or lime in flush mounted applications, there is no need for special insulating material on the pipe.
- Polypropylene pipes are resistant to high temperature, they can be used safely under 95°C
- temperature in heating installations.
- Working life of polypropylene pipes is 50 years. This can rise up to 100 years..
- They do not have wastage; they are laid without any wastage.

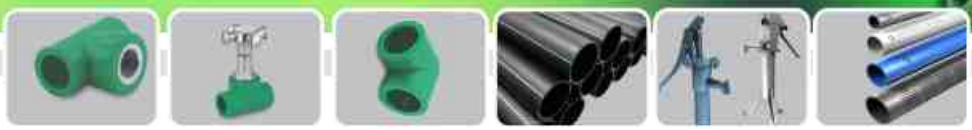
UV resistance

Normal PPR-C pipes and fitting should not be installed (without protection) where subject to UV-radiation. All Kawsar PPR-C pipes and fittings are UV-stabilized and can be used for out door applications.

FIRE PROTECTION

The extent of the preventive measures depends on the kind of installation. Kawsar PPR-C -pipes and fittings comply with the requirements of the fire classification B2 DIN 4102 (normal inflammable). Compared to natural products like wood, cork, wool, Kawsar piping system does not produce any gas toxicity. Therefore, in case of fire, there is no risk of dioxin emissions.

Modulas of elasticity	**800 N/mm2**	**Heat deflection temp HDTA**	**49° C**
		Melting Range	140°- 150°



PHYSICAL PROPERTIES

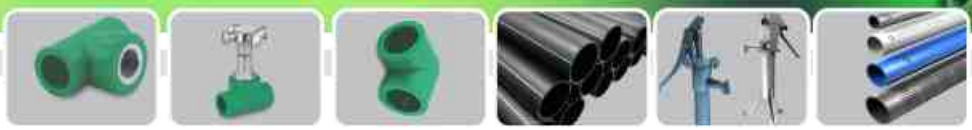
PROPERTY	TEST METHOD	UNITS	VALUE
Density, at 23o C	ISO R 1183	g/cm3	0.897
Melt Flow Index MFI 190o C/5Kg MFI 230o C/2.16Kg MFI 230o C/5Kg	ISO R 1133	g/10min g/10min g/10min	0.50 0.30 1.30
Viscosity	ISO 1191 ISO 1628 T3	cm3 /g	420-430

THERMAL PROPERTIES

PROPERTY	TEST METHOD	UNITS	VALUE
Thermal Conductivity	DIN 52612	W/m.K	0.24
Specific heat, at 23_oC	Calorimeter	KJ/Kg.K	2.0
Coefficient of linear expansion	DIN 53752	mm/MoC	$1.5x10^{-4}$
VICAT Softening Point	ISO 306	°C	132
Melting Temperature Range	ISO 3146	°C	140-150

MECHANICAL PROPERTIES

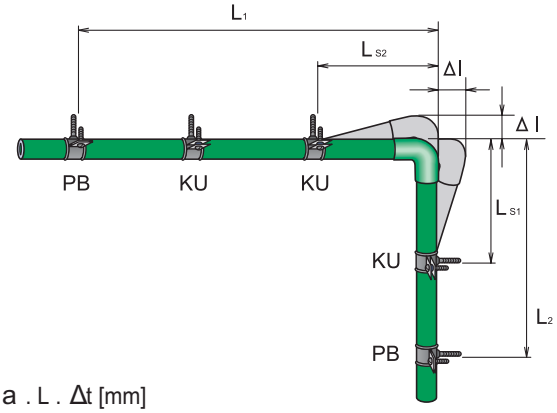
PROPERTY	TEST METHOD	UNITS	VALUE
Tensile Stress at Yield (50mm/minute)	ISO 527-1,2	MPa	24
Tensile Strain at Yield (50mm/minute	ISO 527-1,2	%	10
Tensile Modules (Secant)	ISO 527-1,2	MPa	850
Flexural Modules	ASTM D 790	MPa	850
Tear Strength	ISO 527	MPa	40
Elongation at Tear	ISO 527	%	800
Shore D Hardness	DIN 53 505	-	65
Pipe Friction Factor	-	-	0.007
CHARPY Impact Strength 23oC			
0oC			
-30oC			



LINEAR EXPANSION

Linear expansion and contraction

The difference of temperature during installation and under service conditions, i.e. a medium flows through the system at a different temperature to that prevailing during the installation period, results in linear changes – expansion or contraction.



$\Delta l = a \cdot L \cdot \Delta t$ [mm]

a is thermal coefficient of expansion [mm/m °C], for KAWSAR PPR design purposes a = 0,12 for KAWSAR stabi respectively a = 0,05

L design distance (distance of two neighbouring points in the line) [m]

Δt installation and service temperature difference [°C]

$L_S = k \cdot \sqrt{(D \cdot \Delta l)}$ [mm]

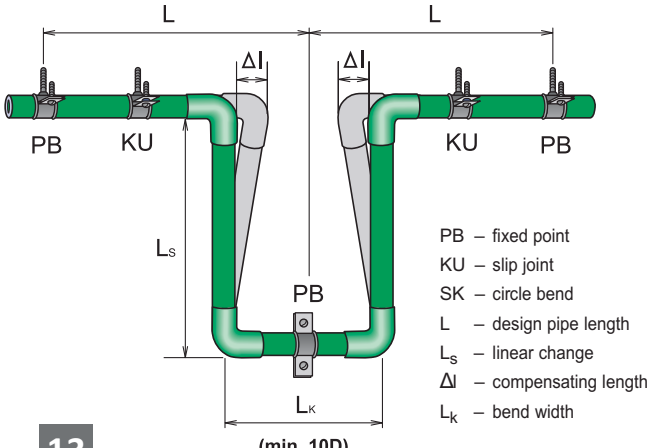
k material constant, for PPR k =30

D pipe outside diameter [mm]

Δl linear change [mm] calculated from the formula shown above

If pipeline linear changes are not compensated in a suitable way i.e. if the pipes can not contract and expand, additional thrust and tensile forces are concentrated in the pipes shortening thus their service life.

expansion U-bend



$L_k = 2 \cdot \Delta l + 150$ [mm] and also $L_k = 10.d$

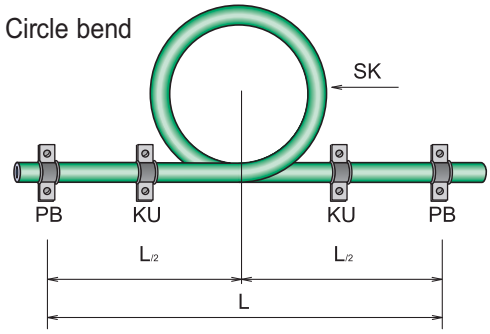
Under condition: L_k = (min.10.d)

In polypropylene applications material flexibility is used for linear compensations. Pipe bends are also used for these purposes.

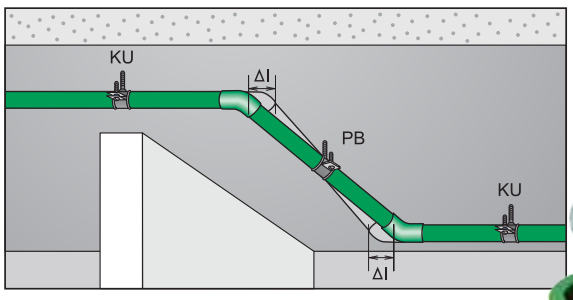
A suitable compensation technique is the one where the pipeline is deflected perpendicularly to the original route and a free compensating length (marked as L_s) is left at the normal line. The value of L_s compensating length will depend on calculated route extension (shortening), pipe material and diameter.

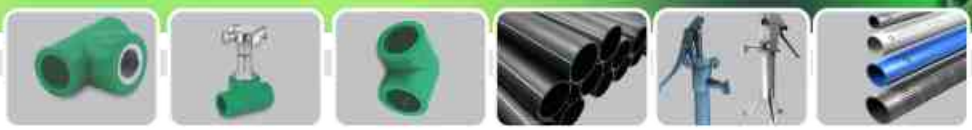
Table of circle bend installation

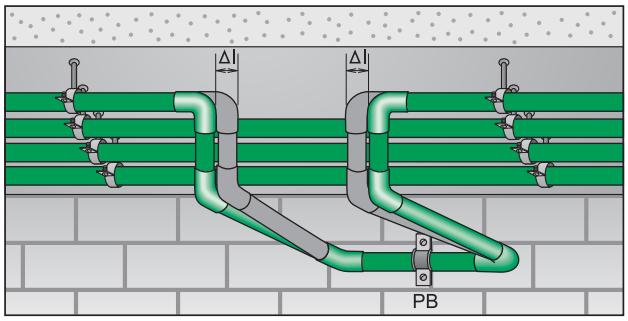
pipe diametr [mm]	distances of all fixed L-points [m]	
	STABI	PPR
16	24	8
20	27	9
25	30	10
32	36	12
40	42	14



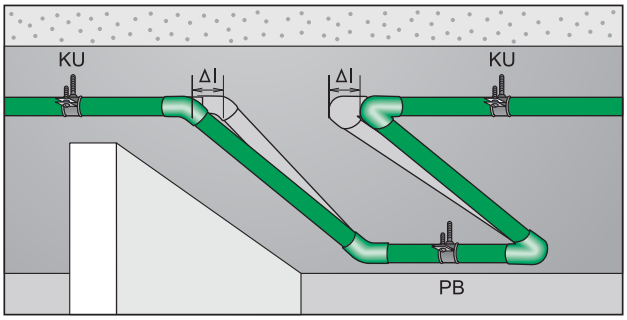
An example of compensations by change of path







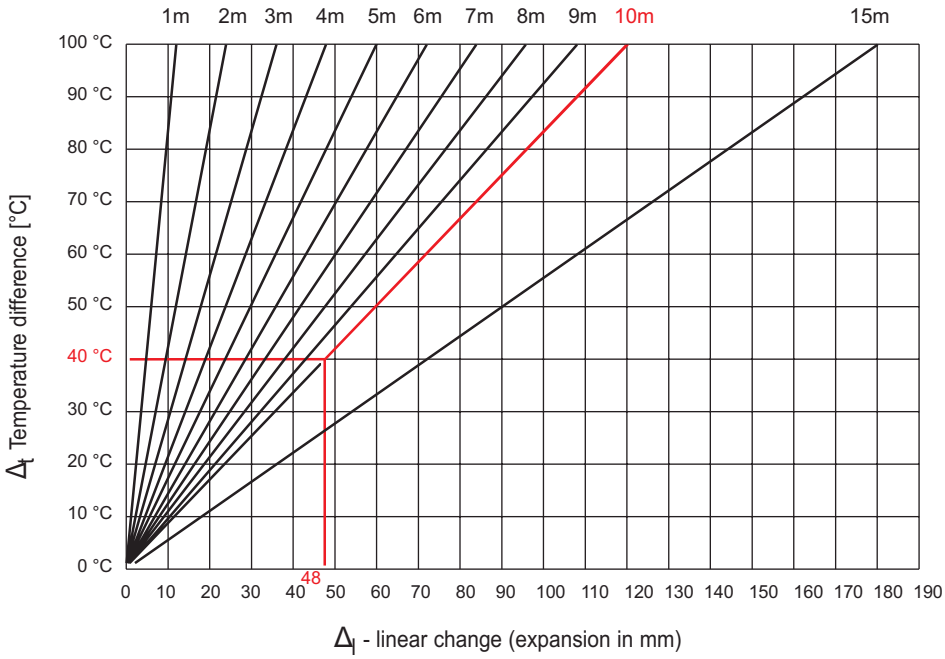
By changing the height of the pipeline.



Expansion U-bend.

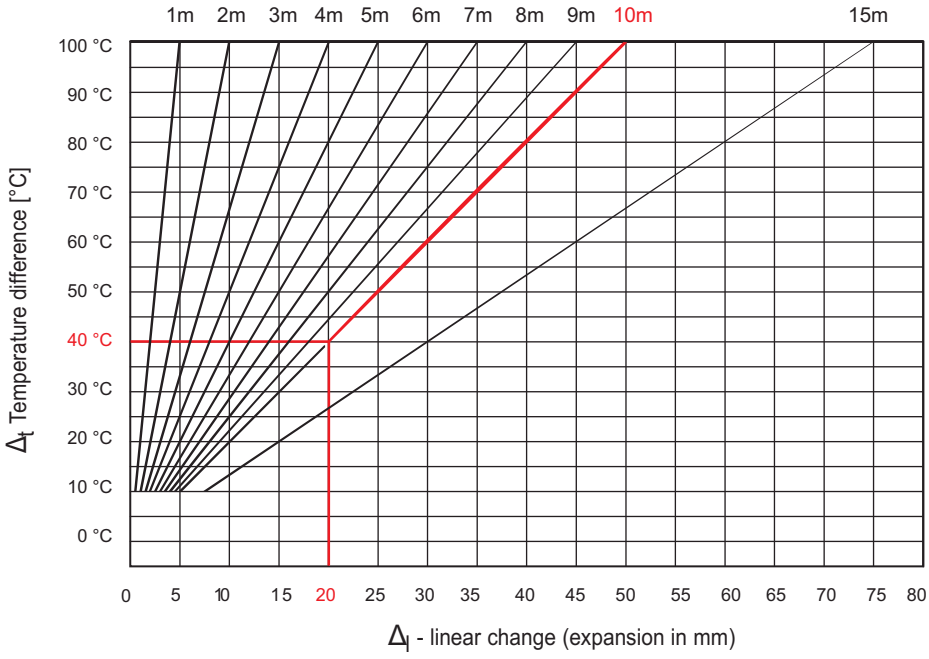
Linear expansion
KAWSAR PPR piping

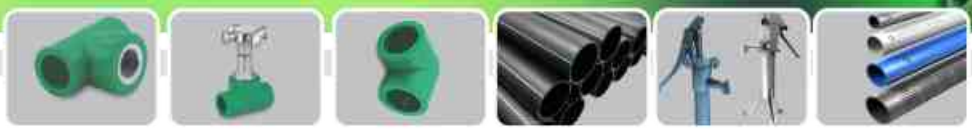
Examples:
L = 10 m
Δ_t = 40 °C



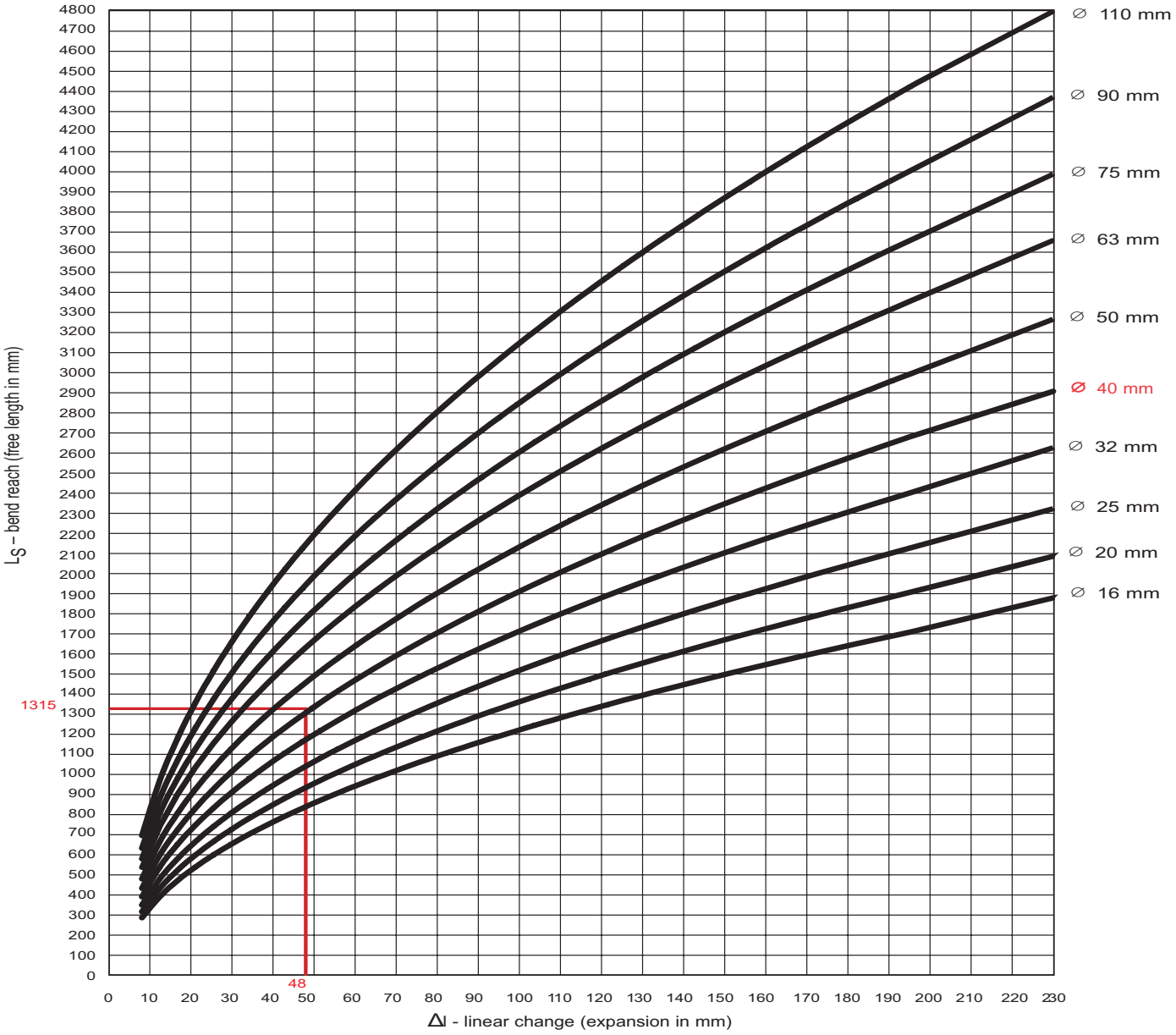
Linear expansion
KAWSAR PPR STABI
piping

Examples:
L = 10 m
Δ_t = 40 °C



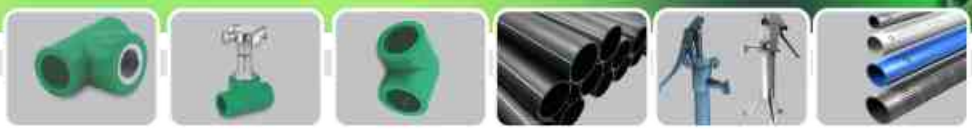


Determination of L_s – compensating length
Examples for pipe ⌀ 40



GOOD WELDING JOINTS

Pipe Diameter (MM)	Welding Depth (MM)	Heating Time (Sec.)	Welding Time (Sec.)	Cooling Time (Sec.)
20	14	5	4	2
25	15	7	4	2
32	16.5	8	6	4
40	18	12	6	4
50	20	18	6	4
63	24	24	8	6
75	26	30	8	8
90	29	40	8	8
110	32.5	50	10	8
160	41	70	15	12



WELDING JOINTS

In socket fusion, you are heating the outside of the pipe and fusing it to the inside of the fitting. This creates a large joining surface with no leak path, so proper connections will never leak or blow off. You must use the properly sized welding heads for a proper fusion.

1

Insert the pipe and fitting into the iron.
Pushing both sides at the same time helps
hold the iron steady.

2

Stop the pipe when you hit the mark
Over-insertion will cause a restriction in
the pipe and lower performance.

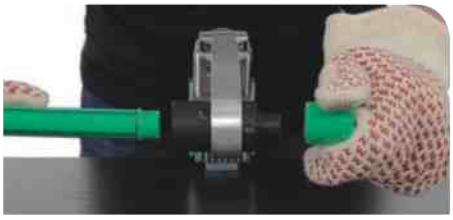
3

Stop the fitting when you reach the stopline
Tapered heads will offer little
resistance until just before the stop.

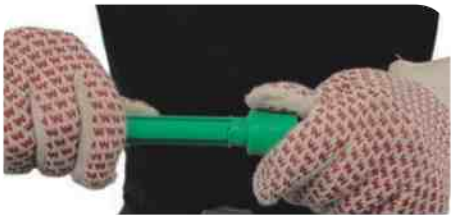
4

Observe the heating time
A bead will form and become shiny as the
fusion nears readiness.

5



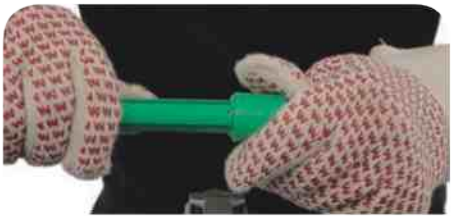
Remove fitting and pipe from welding heads.
Use a clamped stand or an extra hand to
hold the iron in place.



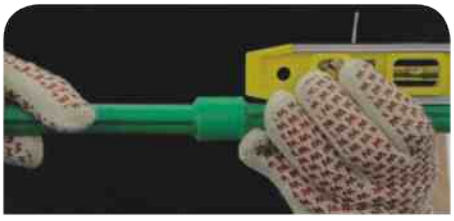
6

Immediately* insert the pipe into the fitting.
Push the pipe until the rings meet within the
welding time.

7



Once the rings meet, you will have 5 to
15 seconds to make adjustments to the
alignment, depending on the pipe size.

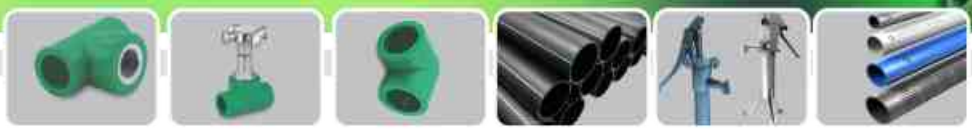


8

Align the pipe and observe cooling time. You
may need to provide full support for at least 1/4
of the cooling time.

Do not touch the face of the pipe to the edge of the fitting. This flattens the beads and can cause an improper connection.

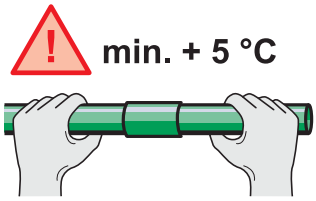
*You will normally have 5-10 seconds to begin joining the connection after you remove it from the iron. This time will vary with pipe size and conditions.
Waiting too long will let the pipe surface cool and make fusion impossible.



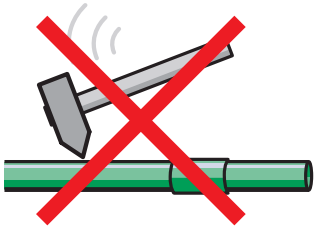
ASSEMBLY REGULATIONS

1. General

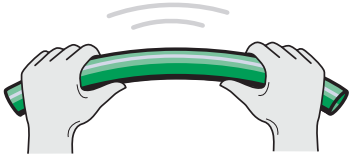
Only components not damaged or contaminated, either during storage or transport, may be used for installation works.



A minimum temperature level for plastic piping installation is, with regard to welding, +5 °C. At lower temperatures it is difficult to provide working conditions for high quality pipe joints.

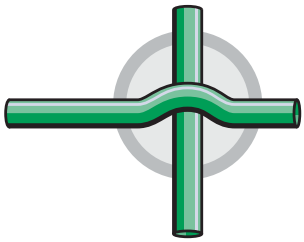


Components of plastic piping systems must be during their transport and installation protected against impact, falling, blow or any other mechanical damage.



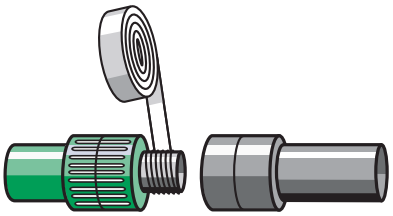
Pipe bending should be done at +15 °C. For pipes of diameter range 16 – 32 mm aminimum bending radius equals to eight diameters (D).

Components must not be exposed to open fire.

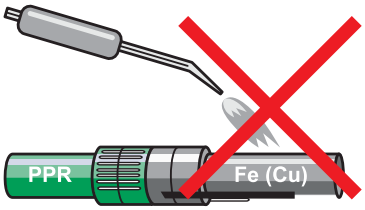


Pipeline crossings are made with the use of components specially designed for this purpose.

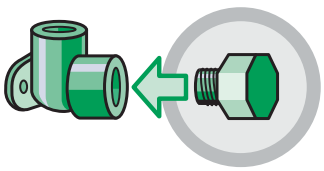
Joining of plastic parts is done by polyfusion welding, or by the use of electric fittings and butt welding techniques. Ahigh-quality homogeneous joint is the result. An exact working process and appropriate tools must be used in joining procedures. It is not recommended to weld KAWSAR components together with other brands (for reason of demand of warranty).



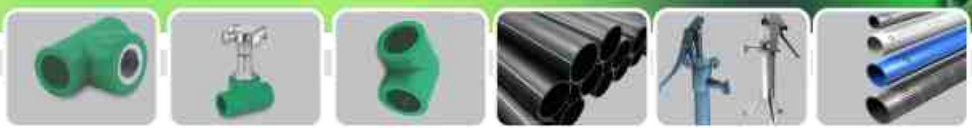
Threaded fittings must be used for screw-type joints. Thread-cutting directly to plastic components is not allowed. Threads are sealed with aspecial Teflon tape or sealing compounds.



If beyond a combined pipe fitting the line continues in form of metal piping then no welding or brazing is allowed in places close to this point because of potential hazard of heat transfer to the fitting.



If elbows for wall mounting or wall mounting groups are to be closed before draining fittings are fixed (such as during pressure tests, etc.) then plastic pipe closers would serve best to this purpose.

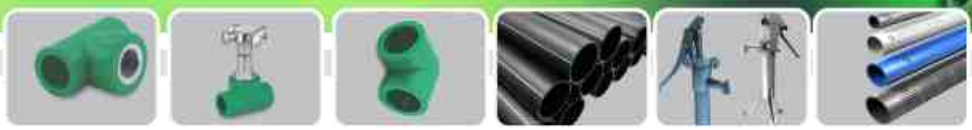


CHEMICAL RESISTANCE

Due to their special material properties, Kawsar PPR-C pipes and fittings are generally chemical resistant. However Kawsar transition elements with brass inserts may not be suitable for all media. For industry application of Kawsar pipes, it is advisable to use Kawsar socket welded type flange coupling.

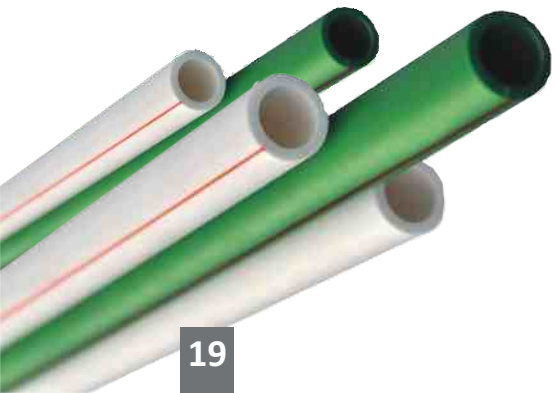
	Conc %	Temperature 20°	60°	100°
Acetone	TR	+	+	
Acetic acid (glacial acetic acid)	TR	+		-
Acetic acid. hydr.	50	+	+	•
Acetic acid anhydride	TR	+		
Alum	GL	+	+	
Alum of all kinds, hydr.	all	+	+	
Ammonia, gaseous	TR	+	+	
Ammonia, hydr.	conc.	+	+	
Ammoniumacetate	GL	+	+	
Ammonium carbonate	GL	+	+	
Ammonium cloride	GL	+	+	
Ammonium nitrate	GL	+	+	+
Ammonium phosphate	GL	+	+	+
Ammonium sulphate	GL	+	+	+
Amylalchol, pure	TR	+	+	+
Aniline	TR	•	•	
Apple juice	H	+	+	+
Antifreezing solution(motor vehicles)	H	+	+	+
Batterie acid		+	+	
Barium salts	GL	+	+	+
Butyl acetete	TR	•	-	
Bichromate of potash	GL	+	+	
Benzaldehyde	GL	+	+	
Benzine	H	•	-	-
Benzoic acid	GL	+	+	
Benzene	TR	•	-	-
Beer	H	+	+	+
Bleaching solution	20	•	•	-
Borax	L	+	+	
Boric acid	GL	+	+	+
Bromine, liquid	TR	-	-	-
Bromine, vapours	all	•	-	-
Bromine water	GL	•	-	-
Bromine gas	TR	+	+	
Butyl acetete				
Balcumcloride	GL	+	+	+
Calcium cloride	GL	+	+	+
Calcium nitrate	GL	+	+	
Castor oil	GL	+	+	
Carbon Tetrachloride	TR	-	-	-
Citric acid. hydr.	VL	+	+	+
Carbonumdisulphide	TR	-	-	-
Coconut oil	TR	+		

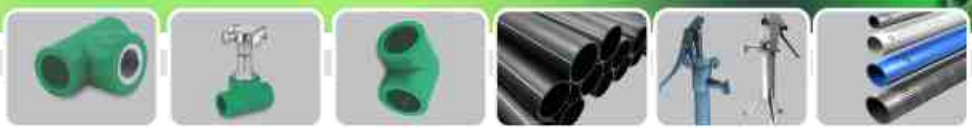
	Conc %	Temperature 20°	60°	100°
Cresol	90	+	+	
Corn oil	TR	+	•	
Caustic potash solution	50	+	+	+
Chlor, liquid	TR	-	-	-
Caustic soda solution	TR	-	-	-
Chlorine, gaseous wet	1	-	-	-
Chlorobenzene	TR	•		
Chloride of lime	all	+	+	
	TR	•	-	-
Chlorosulphonic acid	TR	-	-	-
Chlorine water	GL	•	-	-
Chromic sulphuric acid		-	-	-
Cyclohexane	TR	+		
Cyclohexanol	TR	+	•	
Cyclohexanone	TR	•	-	-
Dekahydronaphtaline	TR	•	-	-
Detergent	VL	+	+	
Dibutyl phthalate	TR	•	-	-
Diesel oil	H	+	•	
Diethylether	TR	+	•	
1.4-Dioxane	TR	•	•	
Ethyl acetate	TR	+	•	-
Ether				
Ethyl benzene	TR	•	-	-
Ethyl chloride	TR	-	-	-
Formaldehyde, hydr.	40	+	+	
Formic acid		+	•	
	85	+	•	-
	10	+	+	•
Fruit juices	H	+	+	+
Fuel oil	H	+	•	
Glycerine	TR	+	+	+
Heptane	TR	+	•	
Hydrogen chloride, gaseous	TR	+	+	
Hydrofluoric acid solution	40	+	+	
Hydrogen sulphide	TR	+	+	
	TR	+	+	
Hydrogen peroxide, hydr.	30	+	•	
Hydrochloric acid, hydr.	upto20	+	+	
	20-36	+	•	
Iso-octane	TR	+	•	-
Jodine solution	H	+	•	
LANLIN*	H	+	•	



	Conc %	Temperature 20°	60°	100°
Linsend oil	H	+	+	+
Lactic acid	90	+	+	
Magnesium salts	GL	+	+	
Mercury	TR	+	+	
Mercury salts	GL	+	+	
Menthanol	TR	+	•	
Menthanol	TR	+	+	
Methylene chloride	TR	•	-	-
Methyl ethylketorn	TR	+	•	
Methyl ethyketone	TR	+	•	
Milk	H	+	+	+
Motor oil (motor vehicles)	TR	+	•	
Nitric acid, hydr.	10	+	•	-
Nickle salts, hydr.	GL	+	+	
Oleum	TR	-	-	-
Olive oil	TR	+	+	•
Oleic acid	GL	+	•	-
Oxalic	GL	+	+	•
Ozone	0.5ppm	+	•	
Paraffin	H	+	+	
Paraffin oil	TR	+	•	-
Pine needle oil	H	+	•	
Peanut oil	TR	+	+	
Petroleum jelly	TR	+	•	
Perchlorethylene				
Petroleum ether	TR	+	•	
Petroleum	TR	+	•	
Peppermint oil	TR	+		
Phenol(hydr. phase)	5	+	+	
Phosphoric acid	85	+	+	+
Photographic developer	H	+	+	
Propane, gaseous	TR	+	•	
Pyridine(potassium hydroxide)	TR	•	•	
Potassium carbonate (potash)	GL	+	+	
Potassium chlorate	GL	+	+	
Potassium chloride	GL	+	+	
Potassium iodide	GL	+	+	
Potassium nitrate, hydr.	GL	+	+	
Potassium permanganate	GL	+	-	
Potassium persulphate	GL	+	+	
Sodium carbonate	50	+	+	•
Sodium chlorate	GL	+	+	
Sodium chloride	VL	+	+	+

	Conc %	Temperature 20°	60°	100°
Sodium chlorite, hydr.	2-20	+	•	-
Sodium hydrochlorite, hydr.	10	+		
Sodium nitrate	GL	+	+	
Sodium nitrite	G	+	+	
Sodium phosphate	GL	+	+	+
Sodium sulphate	GL	+	+	
Sodium sulphide	GL	+	+	
Sodium sulphite	40	+	+	+
Sodium thiosulphate	GL	+	+	
Sulphur acid, hydr.	TR	+	+	
Succinic acid, hydr.	GL	+	+	
Sulphuric acid, hydr.	80-TR	•	-	
	10-80	+	+	
	10	+	+	+
Sea Water	H	+	+	+
Silver salts	GL	+	+	
Silicon oil	TR	+	+	+
Sodium carbonate (soda)	50	+	+	•
Soybean oil	TR	+	•	
Stannous chloride	GL	+	+	
Starch solution, hydr.	all	+	+	
Sugar sirup	H	+	+	
Turpentine oil	TR	-	-	-
Turpentine oil	TR	-	-	-
Turpentine substitute	TR	+	•	-
Tetrachloroethane	TR	•	-	-
Tetracloroethylene (Perchlorethylen)	TR	•	•	
Tetrahydrofurane	TR	•	-	-
Tetrahydronaphtelene (Tetralin)	TR	-	-	-
Toluene	TR	•	-	
Transformer oil	TR	•	-	
Trichloroethylene	TR	-	-	-
Tricresyl phosphate	TR	+	•	
Trioctyl phosphate	TR	+		
Tartaric acid, hydr.	10	+	+	
Urea, hydr.	GL	+	+	
Vinegar	H	+	+	+
Water	H	+	+	+
Wine	H	+	+	+
Xylene	TR	•	-	-
Zinc salts, hydr.	GL	+	+	





KAWSAR PPR-C FITTINGS

Male Threaded Elbow

Female Threaded Elbow

Elbow 90°

Elbow with Hub

Elbow 45°

Female Threaded Elbow

Male Threaded Elbow

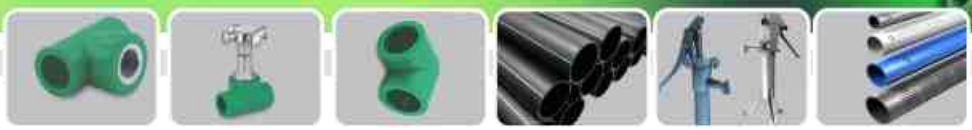
Cross Tee

Male Threaded Tee

Female Threaded Tee

Tee

Tee with Hub



Reducing Tee

Socket / Coupling

Y Filter Wall

Female Threaded Socket

Reduce Socket

Male Threaded Socket

Female Threaded Union

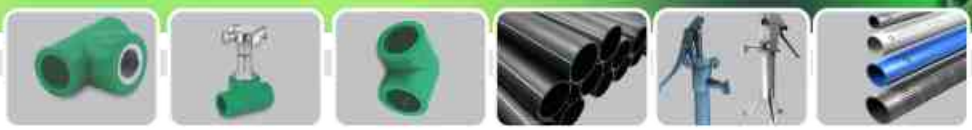
Female Threaded Socket

Male Threaded Socket

Plug to Plug Union

Male Threaded Socket

Female Threaded Socket



Wall Clip

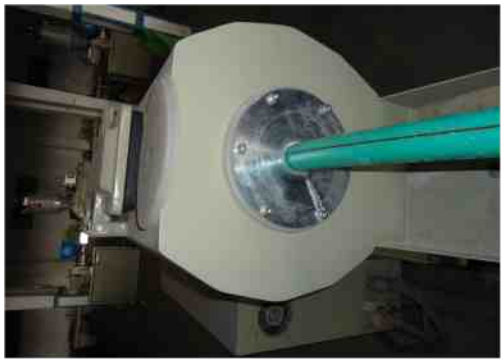
End Cap

Stop Valve

Plug Cap

Coupling With Hub

Bal Valve



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