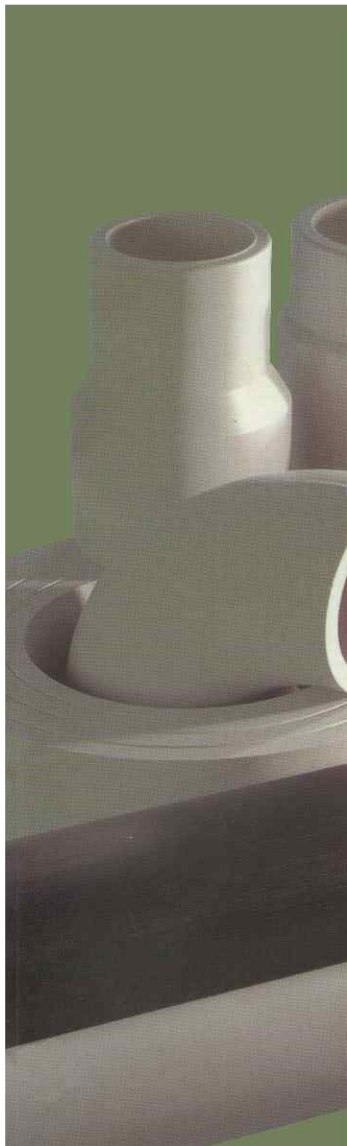




# Polypropylene Piping Systems



ISO 9001 : 2000 &  
ISO 14001 : 2004 COMPANY



# Sangir Plastics P. Ltd.

*Performance. Persistence. Partnership.*

# Sangir Plastics P. Ltd.

## Primary products include:

### Pipes and Fittings in:

- Polypropylene (PPH) per Din 8077
- PP Fire Retardant (PPFR)
- PP Glass Lined (PPGL)
- Polyethylene (PE) per ISO 4427, DIN 8074
- Kynar ® PolyVinylidene Fluoride (PVDF)
- High Impact PolyStyrene (HIPS)

### Specialized Solutions

- Dredging Pipes, Floaters & Belts
- Custom Fabricated PE/PP/PVDF components
- Cable Ducting Pipes
- Garbage Disposal Systems
- Offshore Marine Applications



Sangir Plastics P. Ltd., an ISO 9001 : 2000 & ISO 14001 : 2004 Certified Company, prides itself as a quality manufacturer of thermoplastics piping solutions. A broad array of products includes PP, PPH, Beta Nucleated PP, HDPE, PVDF, PPGL, HIPS, PPFR & PB pipes and fittings & sprinkler irrigation systems. In India, Sangir competes with global leaders in the respective markets and is known for having successfully executed turnkey jobs at the largest companies in the country.

### Infrastructure

The Company is spread over a total area of over 500,000 sq feet, conveniently located in the industrial towns of Vapi, Gujarat & Jaipur, Rajasthan in Western India. The company enjoys quick access to the Western Express Highway and is suitably within close reach of the Mumbai port. The company prides in the loyalty of approximately 200 talented employees, who move in tandem with the leadership of an experienced management team, well qualified in their functional fields. To achieve its quality benchmarks, the company sources its extrusion machinery only from the best suppliers in India and abroad, those equipped with technological superiority and in-house research teams.

### Management Focus and Business Strategy

The Management strives for maximizing customer value. The 4C's of management at Sangir Plastics are unconventionally defined as:

Customer Partnership      Customer Satisfaction  
Customer Value              Customer Loyalty

A continual endeavor to creating and exceeding customer value by partnering from the very beginning, providing maximum satisfaction and ensuring a committed and loyal support in the customers business for future long term relationships.

Sangirs' products are exported to over 15 different countries in 4 continents. Products are widely used in diverse applications handling a range of fluids, slurries & gases at temperatures between -40°C to 140°C.



#### CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

**Sangir Plastics Pvt. Ltd**  
A 1/2212 & 2213, III Phase, GIDC,  
Vapi - 396 195, Gujarat,  
INDIA

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standards:

**BS EN ISO 9001:2000    IS/ISO 9001:2000**

The Quality Management System is applicable to:

**The manufacture of thermoplastic piping systems, related products and accessories.**

Approval Certificate No: MUM/060393

Original Approval: 9 November 2000

Current Certificate: 19 December 2006

Certificate Expiry: 18 December 2009

Issued by: Lloyd's Register Quality Assurance Limited



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The approval is conditional on compliance with the ISO 9001 standard and associated standards and is not intended to be used for any other purpose.  
The approval is conditional on compliance with the ISO 14001 standard and associated standards and is not intended to be used for any other purpose.

### Quality Management System

At Sangir Plastics we set high standards on our own performance. For all activities we undertake, quality requirements are our guiding principle. Our staff checks every phase of the work against our quality systems which is certified according to ISO 9001-2000. Thanks to this internal quality system and our stringent execution procedures we can often achieve considerable time savings on your projects. From our people you may always expect know-how, flexibility and imagination. Sangir Plastics is always glad to assist you in finding a solution to any problem.

At Sangir Plastics we look beyond tomorrow. Nothing is more vulnerable than a leading edge in know-how and technology. We therefore constantly invest in new techniques and systems, but above all, in people. Education and training are essential elements of our company policy. Reliability might sound old-fashioned, but as far as we are concerned it is certainly not out of date.



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# Polypropylene As A Material Of Choice



Various types of commercially available PP includes the following:

## PP- Homopolymer (PP-H):

Produced by a continuous chain of polypropylene units which results in a high stiffness material. Advanced homopolymer types like beta nucleated PP, are widely used to make piping systems.

## PP- Block copolymer (PP-B):

Produced by adding 4-15% ethylene to the polypropylene gives much improved impact strength and considerably lowers the brittle point such that it is well below normal service temperatures i.e. -15°C to -20°C. Material is available in natural & grey colors.

## PP Random Copolymer (PP-R):

Random copolymer PP typically contains between 1 and 7 wt.-% of ethylene molecules and 99 to 93 wt.-% propylene molecules. The ethylene molecules are inserted randomly between the propylene molecules in the polymer chain. Random copolymer polypropylene is a clear, semi-crystalline polymer which exhibits high stiffness, better impact strength and good electrical insulation properties.

## PP Fire retardant (PPFR):

PP is enhanced by additives to limit its oxygen index. Available in V<sub>0</sub>, V<sub>1</sub> & V<sub>2</sub> classifications.

## PP Electro-conductive (PP- Cond):

Also another type of enhanced PP, developed especially for use in antistatic piping system.

## General properties of Polypropylene

Polypropylene (PP) is a thermoplastic from the polyolefin group. PP is a semi-rigid, translucent polymer with good toughness and weather resistance properties. It has low water absorption and is easily moulded to desired shapes. Polypropylene is a largely non-polar, partially crystalline thermoplastic with a crystallinity of 60 to 70%. PP has a density of 0.90 to 0.91 g/cm<sup>3</sup> which is amongst the lowest densities for all plastics. PP has a non-swelling and insoluble surface; and is characterized by its outstanding chemical resistance, high thermal resistance and good fatigue strength.

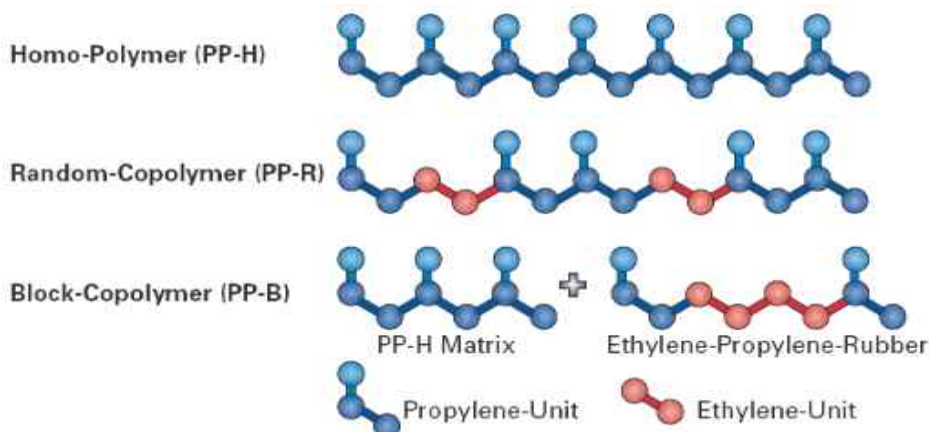
Its superior qualities and cost efficiency makes it a popular material of choice over Polyethylene (PE) and Polyvinyl Chloride (PVC) in industrial uses and also commercial uses. Due to its excellent thermal stability, PP can be used successfully even at 100°C. It shows superior impact strength as compared with PVC. PP is normally available in grey color (RAL 7032) and its high rigidity makes visually pleasing pipe layouts possible and the lower coefficient of expansion makes installation easier.

Polypropylene is generally available in three forms for use in pipelines:

- PP- Homopolymer (PP-H)
- PP-copolymer (PP-C) and
- PP Random Copolymer (PP-R)

Other options in PP include fire retardant grades and electro-conductive grades. PP can also be UV stabilized by use of a stabilizer and can also be produced in black & green colors.

Monomer	Polymer	Formula	Structure
Ethylene	Polyethylene	C <sub>2</sub> H <sub>4</sub>	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{C} = \text{C} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$
Propylene	Polypropylene	C <sub>3</sub> H <sub>6</sub>	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{C} = \text{C} \\   \quad   \\ \text{H} \quad \text{CH}_3 \end{array}$
Butylene	Polybutylene	C <sub>4</sub> H <sub>8</sub>	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{C} = \text{C} \\   \quad   \\ \text{H} \quad \text{C}_2\text{H}_5 \end{array}$



# Polypropylene As A Material Of Choice

## Features and Advantages of use vs. other materials

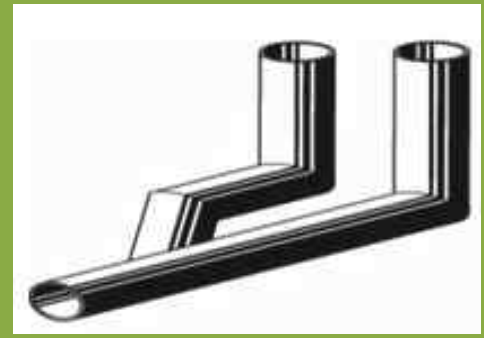
Polypropylene combines all the required favorable properties for modern industrial pipeline constructions, including:

Excellent Chemical Resistance	→	Increases reliability and scope of use
High Impact Strength	→	Better durability
High Thermal Resistance	→	Less vulnerable to weathering
High Stress Crack Resistance	→	Prevents inching growth of cracks
Excellent Fusion Capabilities	→	Ease of installation and movement
Low density, Low weight	→	Quick installation and transportation
Homogenous structure	→	Aesthetically superior pipelines
Good elasticity	→	Reduces number of fittings & eases installation
Non Toxic, Food Grade	→	Can be used in food and pharma industry
Smooth Inner surface	→	Low frictional loss & deposition, increased flow
Good Thermal insulation	→	Excellent for use in hot and cold water systems
Very good fatigue resistance	→	Possesses integral-hinge property
Excellent dielectric properties	→	Safe even under water with no performance loss

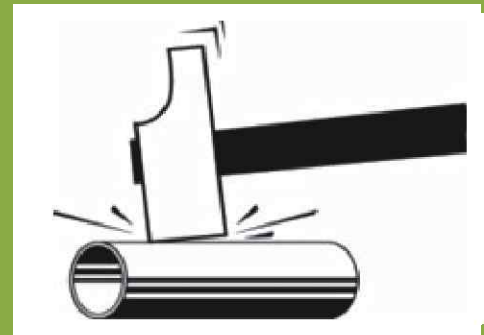
## Technical Properties of Polypropylene

Typical Properties	Method	Value Unit	Specialty Advanced PP		
			Block Co-Poly	Homo	$\beta$ Nucleated Homo
<b>Physical</b>					
Density	ISO 1183	g/cm <sup>3</sup>	0.912	0.900	0.905
Melt flow rate (MFR)	ISO 1133				
(190°C/5.0 kg)		g/10m	0.5	0.5	0.5
(230°C/2.16 kg)		g/10m	0.3	0.3	0.3
(230°C/5.0 kg)		g/10in	1.3	1.3	
<b>Mechanical</b>					
Tensile Modulus (23°C, $\nu = 1$ mm/min, Secant)	ISO 527-1, 2	MPa	1150	1300	1300
Tensile Stress at Yield (23°C, $\nu = 50$ mm/min)	ISO 527-1, 2	MPa	26	30	30
Tensile Strain at Yield (23°C, $\nu = 50$ mm/min)	ISO 527-1, 2	%	11	9	10
Tensile Creep Modulus 1h		MPa	1050	1250	
<b>Impact</b>					
Charpy unnotched impact strength	ISO 179				
(-30°C)		kJ/m <sup>2</sup>	3.2	NoBreak	
(0°C)		kJ/m <sup>2</sup>	8.0	200	
(23°C)		kJ/m <sup>2</sup>	40.0	26	
Charpy notched impact strength	ISO 179				
(-30°C)		kJ/m <sup>2</sup>	85	9.0	5
(0°C)		kJ/m <sup>2</sup>	NoBreak	2.8	
(23°C)		kJ/m <sup>2</sup>	NoBreak	2.2	50
<b>Hardness</b>					
Shore hardness (Shore D (3 sec))	ISO 868	MPa	67	70	
Ball indentation hardness (H 132/30, 358/30)	ISO 2039-1	MPa	54	67	
<b>Thermal</b>					
Heat deflection temperature Unannealed B (0.45 MPa)	ISO 75B-1, 2	°C	73	90	
A (1.80 MPa)	ISO 75A-1, 2	°C	50	54	
Vicat softening temperature (VST/A/50 K/h (10N))	ISO 306	°C			
(VST/B/50 K/h (50 N))		°C	72	90	83
(VST/A/50 K/h (10 N))		°C	48	150	
Melting Temperature	ISO3146	°C	165	165	

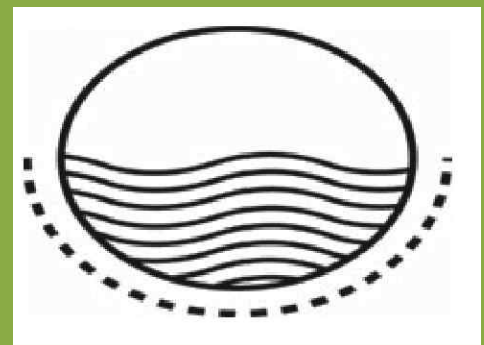
The above are typical values taken from raw material manufacturers of existing grades. These may be subject to change depending on availability of these grades and newer updated technology. Actual values may therefore differ.



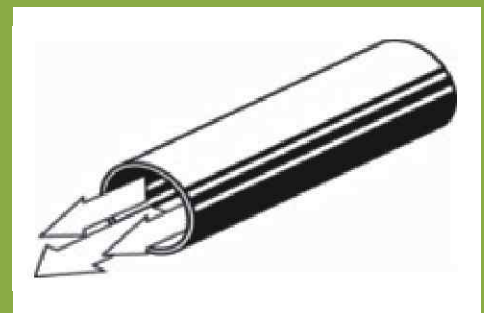
**Prefabrication**  
Fast and cost-saving installation



**Impact Resistant**  
and tough unbreakable



**Poor Heat Conductivity**  
no condensation possible during short periods of cooling



**Smooth Internal Wall**  
low blockage risk due to low deposit/residue effects

# Polypropylene As A Material Of Choice

## Permissible Operating Pressure, Life under various Temp. Conditions

Pipe Series - S	20	16	12.5	8.3	8	5	4	3.2	2.5	2	
Pressure Rating - PN	3.0	3.2	4	6	6.3	10	12.5	16	20	25	
Std. Dimension Ratio - SDR	41	33	26	17.6	17	11	9	7.4	6	5	
Temp. (°C)	Operation period (yrs)	Permissible component operating pressure (bar) <sup>1,2</sup>									
10	1	4.5	5.7	7.1	10.8	11.4	18.0	22.7	28.6	36.0	45.3
	5	4.1	5.2	6.5	9.9	10.4	16.5	20.8	26.2	33.0	41.6
	10	4.0	5.0	6.3	9.6	10.0	15.9	20.1	25.3	31.8	40.1
	25	3.8	4.8	6.0	9.1	9.5	15.2	19.1	24.1	30.3	38.1
	50	3.6	4.6	5.8	8.8	9.2	14.6	18.4	23.2	29.2	36.8
20	100	3.5	4.4	5.6	8.4	8.9	14.1	17.7	22.3	28.1	35.4
	1	3.9	4.9	6.2	9.3	9.8	15.6	19.6	24.7	31.1	39.2
	5	3.5	4.5	5.6	8.5	8.9	14.2	17.9	22.5	28.4	35.7
	10	3.4	4.3	5.4	8.2	8.6	13.6	17.2	21.6	27.3	34.3
	25	3.2	4.1	5.1	7.8	8.1	12.9	16.3	20.5	25.9	32.6
30	50	3.1	3.9	4.9	7.5	7.8	12.4	16.7	19.7	24.9	31.3
	100	3.0	3.7	4.7	7.2	7.5	12.0	16.1	19.0	23.9	30.1
	1	3.3	4.2	5.3	8.0	8.4	13.3	16.8	21.1	26.6	33.5
	5	3.0	3.8	4.8	7.2	7.6	12.1	15.2	19.2	24.1	30.4
	10	2.9	3.6	4.6	6.9	7.3	11.6	14.6	18.4	23.1	29.1
40	25	2.7	3.4	4.3	6.6	6.9	10.9	13.8	17.4	21.9	27.5
	50	2.6	3.3	4.1	6.3	6.6	10.5	13.2	16.6	21.0	26.4
	100	2.5	3.1	4.0	6.0	6.3	10.0	12.7	16.0	20.1	25.3
	1	3.2	4.0	5.1	7.7	8.1	12.9	16.3	20.5	25.8	32.5
	5	2.9	3.6	4.6	7.0	7.3	11.6	14.6	18.4	23.2	29.3
50	10	2.8	3.5	4.4	6.7	7.0	11.1	14.0	17.6	22.2	28.0
	25	2.6	3.3	4.1	6.3	6.6	10.5	13.2	16.6	20.9	26.4
	50	2.5	3.1	4.0	6.0	6.3	10.0	12.6	15.9	20.0	25.2
	100	2.4	3.0	3.8	5.7	6.0	9.6	12.0	15.2	19.1	24.1
	1	2.7	3.4	4.3	6.5	6.8	10.8	13.6	17.2	21.6	27.2
60	5	2.4	3.0	3.8	5.8	6.1	9.7	12.2	15.4	19.3	24.4
	10	2.3	2.9	3.6	5.5	5.8	9.2	11.6	14.6	18.4	23.2
	25	2.1	2.7	3.4	5.2	5.4	8.6	10.9	13.7	17.3	21.8
	50	2.0	2.6	3.3	4.9	5.2	8.2	10.4	13.1	16.5	20.8
	100	1.9	2.4	3.1	4.7	4.9	7.9	9.9	12.5	15.7	19.8
70	1	2.5	3.1	4.0	6.0	6.3	10.0	12.6	15.9	20.1	25.3
	5	2.2	2.8	3.5	5.3	5.6	8.9	11.2	14.1	17.8	22.5
	10	2.1	2.6	3.3	5.1	5.3	8.5	10.7	13.4	16.9	21.3
	25	1.9	2.5	3.1	4.7	5.0	7.9	10.0	12.6	15.8	19.9
	50	1.8	2.3	2.9	4.4	4.6	7.4	9.3	11.7	14.8	18.6
80	1	2.0	2.6	3.2	4.9	5.2	8.2	10.3	13.0	16.4	20.7
	5	1.8	2.2	2.8	4.3	4.5	7.2	9.1	11.5	14.5	18.2
	10	1.7	2.1	2.7	4.1	4.3	6.8	8.6	10.9	13.7	17.2
	25	1.4	1.7	2.2	3.4	3.5	5.6	7.1	9.0	11.3	14.2
	50	1.2	1.5	1.9	2.8	3.0	4.8	6.0	7.6	9.5	12.0
95	1	1.6	2.1	2.6	4.0	4.1	6.6	8.3	10.5	13.2	16.7
	5	1.3	1.7	2.2	3.3	3.5	5.5	7.0	8.8	11.1	13.9
	10	1.1	1.4	1.8	2.8	2.9	4.7	5.9	7.4	9.3	11.8
	25	0.9	1.1	1.4	2.2	2.3	3.7	4.7	5.9	7.5	9.4
(10) <sup>3</sup>	1	1.1	1.4	1.8	2.7	2.9	4.6	5.8	7.3	9.2	11.6
	5	0.7	0.9	1.2	1.8	1.9	3.1	3.9	4.9	6.2	7.8
	(0.6)	(0.8)	(1.0)	(1.5)	(1.6)	(2.6)	(3.3)	(4.1)	(5.2)	(6.6)	

<sup>1</sup>: The above values are adapted from DIN 8077. They have to be adjusted by a reducing co-efficient for every application depending on media temperature, concentration and composition. Also, UV radiation is not assumed in these values. Values are determined using a creep curve with safety coefficient of 1.6 to 1.25.

<sup>2</sup>: Values stated are for standard PP-Homopolymer. However specialty grades of PP may have better features.

<sup>3</sup>: Values in brackets are valid at proof of longer testing periods > 1 year for 110°C tests

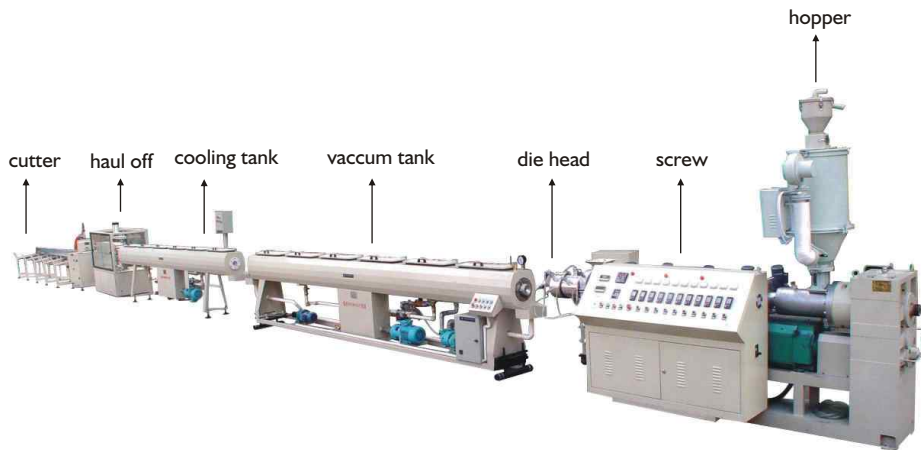


# Process of manufacture of PP Pipes & Fittings

Most plastic pipe systems are made from thermoplastic materials. The production method is basically the same for all thermoplastics – it is a matter of melting the material, shaping and then cooling. Plastic pipes are normally produced by extrusion, whereas fittings are produced by injection or compression moulding.

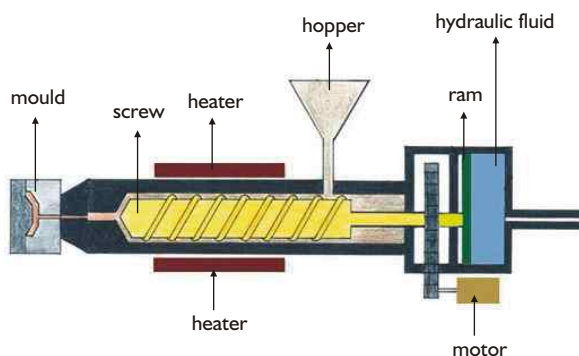
## Extrusion

Pipes made from PP and other thermoplastics are usually manufactured by extrusion. The extrusion process starts by feeding plastic material (pellets, granules, flakes or powders) from a hopper into the barrel of the extruder. The material is gradually melted by the mechanical energy generated by turning screws and by heaters arranged along the barrel. The molten polymer is then forced into a die which shapes the polymer into a pipe which hardens under vacuum in the cooling units. An haul off unit pulls the pipe and to feed it to cutting machine at the end of production line where the manufacturer is free to decide whether to cut the pipe into lengths of any six, twelve or even fifty metres, etc. Highly flexible pipes can be made even longer when coiled on a reel.



## Moulding

Fittings such as elbows, junctions or T-pieces are usually produced by injection-moulding. In injection-moulding, the plastic material is fed from a hopper into the melting section of the injection-moulding machine. After melting, the material is transported forward by the screw and homogenised before being injected into the mould to form the shape of the desired product. In the cooling step, the plastic solidifies. Then the mould is opened and the product is ejected.



## Application of PP Pipes and fittings

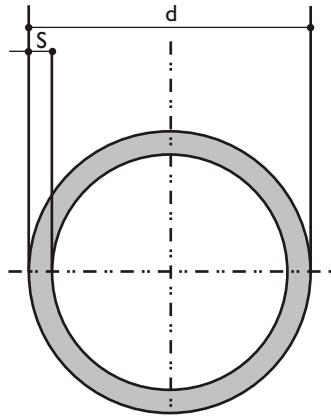
- Acid Filling Stations
- Laboratories
- Automotive Industry
- Nuclear Research Centres
- Chemical Industry
- Paper & Pulp Mills
- Construction (Plumbing)
- Pharmaceutical Industry
- Desalination Plants
- Pickling Lines
- Effluent Treatment/Disposal Plants
- Refineries
- Electroplating Plants
- Textile Mills
- Food and Beverage
- Thermal Baths
- Galvanizing Plants
- Water Purification Plants
- Industrial washing/bleaching lines
- Packaging of Electrical Components

## Typical applications

- Suction and exhaust pipelines.
- Lined Pipings (Mild Steel + PP), (FRP + PP)
- Water, effluent, chemical transport
- Storage tank for chemicals
- Hoods, Fume Ducts



# Product Specifications - Pipes



## Regular Pipes (Plain End)

**Standard:** DIN 8077/78

**Standard Length:** 6 mtrs

**Also Available:** Pipes in Special lengths  
Ventilation pipes  
SDR 33/17/9/5 thicknesses  
Pipes per ASTM / Sch 80 /40  
Flanged Pipes

Outer Diameter		SDR 41		SDR 26		SDR 17.6		SDR 11		SDR 7.4		SDR 6	
		Pressure Rating											
		PN 2.5		PN 4		PN 6		PN 10		PN 16		PN 20	
mm	inches	s	kg/m	s	kg/m	s	kg/m	s	kg/m	s	kg/m	s	kg/m
16	-	-	-	-	-	-	-	-	-	2.2	0.10	2.7	0.11
20	1/2"	-	-	-	-	-	-	1.9	0.11	2.8	0.15	3.4	0.17
25	3/4"	-	-	-	-	-	-	2.3	0.16	3.5	0.23	4.2	0.27
32	1.0"	-	-	-	-	1.8	0.17	2.9	0.26	4.4	0.37	5.4	0.43
40	1.25"	-	-	1.8	0.22	2.3	0.27	3.7	0.41	5.5	0.58	6.7	0.67
50	1.5"	-	-	2.0	0.30	2.9	0.42	4.6	0.64	6.9	0.90	8.3	1.04
63	2"	1.8	0.35	2.5	0.47	3.6	0.66	5.8	1.01	8.6	1.41	10.5	1.65
75	2.5"	1.9	0.44	2.9	0.65	4.3	0.94	6.8	1.41	10.3	2.01	12.5	2.34
90	3"	2.2	0.62	3.5	0.94	5.1	1.33	8.2	2.03	12.3	2.87	15.0	3.36
110	4"	2.7	0.90	4.2	1.37	6.3	1.99	10.0	3.01	15.1	4.30	18.3	5.1
125	5"	3.1	1.18	4.8	1.76	7.1	2.55	11.4	3.91	17.1	5.53	20.8	6.47
140	5"	3.5	1.48	5.4	2.23	8.0	3.20	12.7	4.87	19.2	6.95	23.3	8.12
160	6"	4.0	1.91	6.2	2.92	9.1	4.17	14.6	6.38	21.9	9.4	26.6	10.60
180	7"	4.4	2.38	6.9	3.63	10.2	5.25	16.4	8.07	24.6	11.40	29.0	13.40
200	8"	4.9	2.92	7.7	4.50	11.4	6.5	18.2	9.95	27.4	14.10	33.2	16.50
225	9"	5.5	3.70	8.6	5.65	12.8	8.19	20.5	12.60	30.8	17.90	37.4	20.90
250	10"	6.2	4.63	9.6	6.99	14.2	10.10	22.7	15.50	34.2	22.10	-	-
280	10"	6.9	5.73	10.7	8.72	15.9	12.60	25.4	19.40	38.3	27.60	-	-
315	11"	7.7	7.20	12.1	11.10	17.9	16.0	28.6	24.60	-	-	-	-
355	12"	8.7	9.14	13.6	14.00	20.1	20.30	32.2	31.20	-	-	-	-
400	14"	9.8	11.60	15.3	17.80	22.7	25.70	36.3	39.60	-	-	-	-
450	16"	11.0	14.70	17.2	22.50	25.5	32.50	40.9	50.10	-	-	-	-
500	18"	12.3	18.20	19.1	27.70	28.4	40.20	-	-	-	-	-	-
560	20"	13.7	22.60	21.4	34.70	31.7	50.30	-	-	-	-	-	-
630	24"	15.4	28.60	24.1	44.00	35.7	63.70	-	-	-	-	-	-



For use with MS/SS lined Piping

Outer Diameter		S	kg/m
mm	inches		
29.2	1"	4.0	0.30
44.7	1.5"	4.1	0.50
56	2"	4.5	0.70
81.9	3"	4.5	1.041
107.1	4"	5.3	1.62
164.2	6"	5.7	2.71

Other non standard sizes available on request

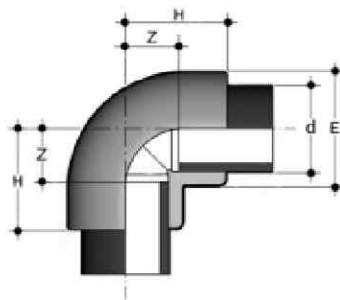
\* dimensions in mm

## Liner Pipes

## Product Specifications - Fittings

Note: Fitting dimensions are subject to change and actual values may vary. Some sizes are subject to availability.

### Moulded Elbows 90°

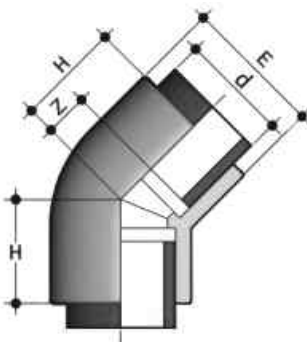


SDR 11-S 5-PN10				
d	E	H	Z	Wt in kgs
20	29.1	27.5	15.5	0.01
25	33.5	32.0	17.5	0.02
32	41.5	37.5	20.0	0.03
40	51.5	47.0	22.0	0.06
50	63.5	51.0	27.5	0.10
63	77.2	65.0	30.0	0.18
75	92.5	78.7	32.7	0.30
90	110.5	84.5	36.6	0.45
110	135.0	90.5	42.6	0.81



Weld Type: Socket

### Moulded Elbows 45°



SDR 11-S 5-PN10				
d	E	H	Z	Wt in kgs
20	27.5	21.0	6.5	0.01
25	33.5	24.5	8.5	0.02
32	42.0	29.0	12.0	0.03
40	51.5	35.5	15.0	0.06
50	63.0	42.5	19.0	0.11
63	79.0	51.0	23.5	0.18
75	92.0	71.0	38.5	0.22
90	113.7	82.5	46.0	0.41
110	135.0	98.7	56.0	0.59



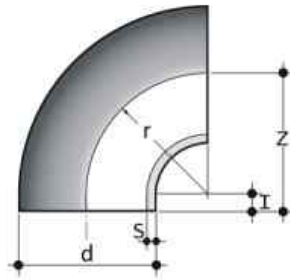
Weld Type: Socket

\* dimensions in mm

Moulded Bends 90°



Weld Type: Butt



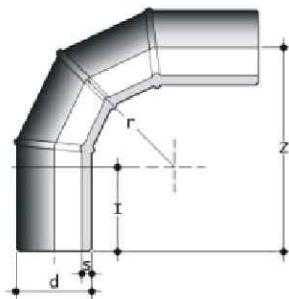
d	r	Z	SDR 17.6-S 8.3-PN6		SDR 11-S 5-PN10	
			S	Wt. in Kgs	S	Wt. in Kgs
20	24	32	-	-	1.9	0.01
25	27	38	-	-	2.7	0.01
32	35	55	-	-	3.0	0.02
40	44	58	-	-	3.7	0.03
50	69	72	-	-	5.5	0.06
63	55	80	-	-	5.8	0.11
75	75	85	-	-	7.0	0.19
90	90	105	-	-	8.2	0.33
110	110	135	-	-	10	0.58
125	125	140	-	-	11.4	0.89
140	140	150	-	-	12.7	1.26
160	160	180	9.1	1.20	14.6	1.70
180	180	200	10.2	1.69	16.4	2.60
200	200	215	11.4	2.30	18.2	3.52
225	225	245	12.8	3.18	20.5	4.90
250	250	275	11.4	5.70	22.7	9.10

Fabricated Bends 90° - Segment Welded



Weld Type: Butt

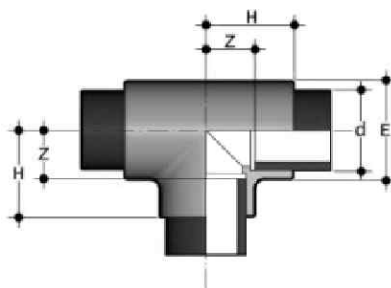
30°, 45°, 60°, 120°, 150° also available



d	Z	l	r	SDR 17-S 8.3-PN6		SDR 11-S 5-PN10	
				S	Wt. in kg	S	Wt. in kg
110	315	150	165	6.3	1.2	10.0	1.8
125	338	150	188	7.1	1.6	11.4	2.5
140	360	150	210	8.0	2.1	12.7	3.3
160	390	150	240	9.1	3.0	14.6	4.6
180	420	150	270	10.2	4.0	16.4	6.2
200	450	150	300	11.4	5.3	18.2	8.1
225	488	150	338	12.8	7.2	20.5	11.0
250	625	250	375	14.2	11.7	22.7	17.9
280	670	250	420	15.9	15.5	25.4	23.9
315	778	300	478	17.9	22.7	28.6	34.9
355	833	300	533	20.1	30.9	32.2	47.5
400	900	300	600	22.7	42.1	36.3	64.8
450	975	300	675	25.5	57.2	40.9	88.1
500	1100	350	750	28.4	80.0	45.5	123.0
560	1190	350	840	31.7	108.1	-	-
630	1295	350	945	35.7	148.0	-	-

\* dimensions in mm

### Moulded Tees Equal

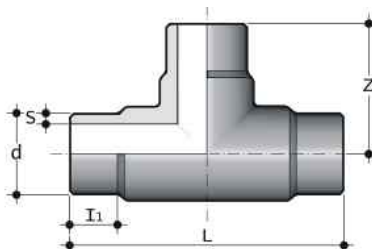


SDR 11-S 5-PN10				
d	E	H	Z	Wt.in Kg
20	27.5	27.5	13.0	0.01
25	33.5	31.5	15.5	0.03
32	41.5	37.0	19.0	0.04
40	52.0	43.0	22.5	0.08
50	64.0	52.0	28.5	0.14
63	79.5	62.5	35.0	0.25
75	92.5	71.0	40.0	0.37
90	110.5	81.5	46.0	0.56
110	134.5	99.5	58.0	0.99



Weld Type: Socket

### Moulded Tees Equal



				SDR 17.6-S 8.3-PN6		SDR 11-S 5-PN10	
D	L	I <sub>1</sub>	Z	S	Wt. in Kg	S	Wt. in Kg
20	50	8	25	-	-	1.9	0.01
25	60	10	30	-	-	2.3	0.02
32	72	12	36	-	-	2.9	0.03
40	88	16	44	-	-	3.7	0.06
50	116	21	58	-	-	4.6	0.11
63	146	24	73	-	-	5.8	0.22
75	170	28	85	-	-	6.8	0.36
90	200	23	100	-	-	8.2	0.61
110	240	43	120	-	-	10.0	1.07
160	320	40	160	9.1	2.24	14.6	3.11
180	380	73	195	10.2	3.09	16.4	4.43
200	430	70	215	11.4	4.36	18.2	6.17
225	480	83	240	12.8	6.03	20.5	8.64
250	550	86	275	14.2	8.65	22.7	12.35



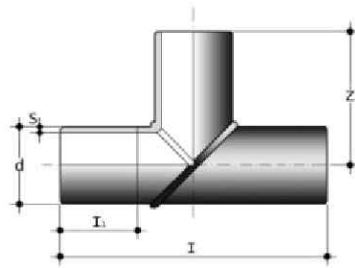
Weld Type: Butt

\* dimensions in mm

Fabricated Tees Equal / Branch 60°



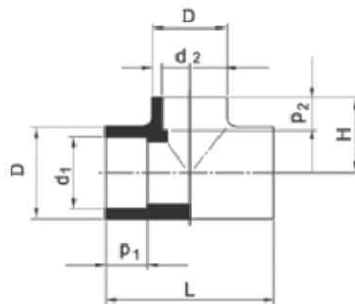
Weld Type: Butt



d	Z	l	r	SDR 17-S 8.3-PN6		SDR 11-S 5-PN10	
				S	Wt. in kg	S	Wt. in kg
225	530	150	265	12.8	10.2	20.5	15.7
250	750	250	375	14.2	13.7	22.7	21.3
280	780	250	390	15.9	17.4	25.4	26.8
315	920	300	460	17.9	23.5	28.6	36.2
355	960	300	480	20.1	33.3	32.2	51.3
400	1000	300	500	22.7	42.3	36.3	65.2
450	1050	300	525	25.5	58.6	40.9	90.3
500	1200	350	600	28.7	75.4	45.5	97.2
560	1260	350	630	31.7	95.2	-	-
630	1330	350	665	35.7	103	-	-



Weld Type: Butt

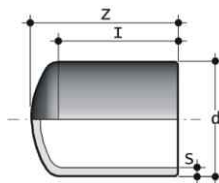


Tees Unequal / Reducing

OD	D <sub>1</sub>	D <sub>2</sub>	P <sub>1</sub>	P <sub>2</sub>	L	SDR 11-S 5-PN10	
						H	Wt. in Kg
25x20	35.1	29.1	17.5	15.5	68.5	32.0	0.04
32x20	43.1	29.1	19.6	15.5	80.5	40.0	0.05
32x25	43.1	35.1	19.6	17.5	80.5	40.0	0.06
40x20	52.2	29.1	21.6	15.5	90.5	45.0	0.08
40x25	52.2	35.1	21.6	17.5	90.5	45.5	0.08
40x32	52.2	43.1	21.6	19.6	91.0	45.0	0.10
50x20	64.2	29.1	23.6	15.5	110.5	52.5	0.16
50x25	64.2	35.1	23.6	17.5	110.5	52.5	0.16
50x32	64.2	43.1	23.6	19.6	107	52.5	0.17
50x40	64.2	52.2	23.6	21.6	107	52.5	0.17
63x25	81.2	35.1	20.1	17.5	128.6	65.0	0.27
63x32	81.3	43.1	28.1	19.6	128.5	64.5	0.27
63x40	81.3	52.2	28.1	21.6	128.6	64.5	0.28
63x50	81.3	64.2	28.1	23.6	128.6	64.6	0.28

\* dimensions in mm

Moulded End Caps

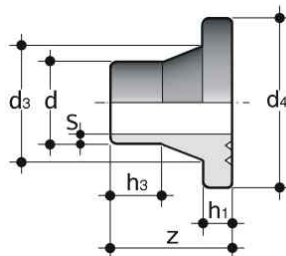


d	Z	I	SDR 17.6 - S 8.3 - PN6		SDR 11 - S 5 - PN10	
			S	Wt. in Kgs	S	Wt. in Kgs
20	45	35	-	-	1.9	0.01
25	52	40	-	-	2.3	0.01
32	58	44	-	-	2.9	0.02
40	67	50	-	-	3.7	0.03
50	75	55	-	-	4.6	0.05
63	85	62	-	-	5.8	0.09
75	95	63	-	-	6.8	0.13
90	110	79	-	-	8.2	0.23
110	127	88	6.3	0.30	10	0.40
125	138	102	7.1	0.40	11.4	0.62
140	144	106	8.0	0.60	12.7	0.82
160	154	109	9.1	0.70	14.6	1.06
180	191	141	10.2	0.75	16.4	1.73



Weld Type: Butt  
Socket Weld End Caps & larger sizes available

Stub Flange / Adaptor

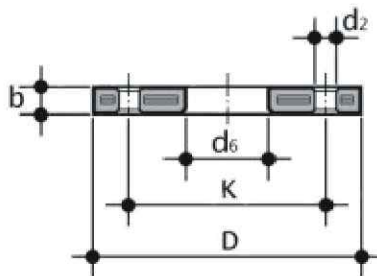
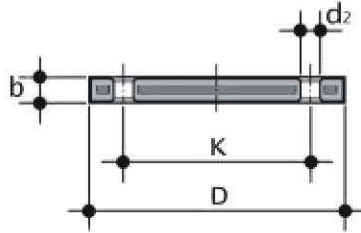


Weld Type: Butt

d	d <sub>3</sub>	d <sub>4</sub>	Z	SDR 17 S-8.3-PN6				SDR 11 S-5-PN10			
				h <sub>1</sub>	h <sub>3</sub>	S	Wt. in Kg	h <sub>1</sub>	h <sub>3</sub>	S	Wt. in Kg
20	26	51	50	-	-	-	-	7	30	2.0	0.01
25	30	58	50	-	-	-	-	9	28	2.3	0.02
32	38	64	50	-	-	-	-	10	27	3.0	0.04
40	44	70	50	-	-	-	-	11	24	3.7	0.06
50	54	81	50	-	-	-	-	12	23	4.5	0.1
63	68	95	50	-	-	-	-	14	16	5.7	0.1
75	78	107	50	-	-	-	-	16	14	6.8	0.2
90	96	126	80	-	-	-	-	17	43	8.2	0.3
110	116	158	80	18	37	6.6	0.3	18	37	10.0	0.4
125	132	158	80	18	42	7.4	0.3	25	35	11.4	0.5
140	155	188	80	18	34	8.3	0.5	25	27	12.7	0.7
160	165	212	80	18	34	9.5	0.6	25	27	14.5	0.9
180	180	212	80	20	30	10.7	0.6	30	20	16.4	0.9
220	232	268	100	24	36	11.9	1.4	32	28	18.2	2.0
225	235	268	100	24	46	13.4	1.2	32	38	20.5	1.8
250	285	320	100	25	35	14.8	2.0	35	25	22.7	2.9
280	291	320	100	25	45	16.6	2.2	35	35	25.5	3.2
315	335	370	100	25	35	18.7	2.5	35	25	28.6	3.6
355	373	430	120	30	50	21.1	3.9	40	40	32.3	5.7
400	427	482	120	33	42	23.7	5.2	46	29	36.4	7.6
450	514	585	120	46	14	26.7	10.1	60	35	40.9	14.2
500	530	585	120	46	24	29.7	12.6	60	25	45.5	16.2
560	615	685	120	50	10	33.2	13.3	60	40	50.9	18.5
630	642	685	120	50	30	37.4	12.6	60	29	57.3	15.3

\* dimensions in mm

Slip On Backing Ring & Blind Flange



Size	Without Steel Inserts					
	ASA 150lbs, ANSI 16.5					
d	d <sub>6</sub>	K	D	b	d <sub>2</sub>	Bolts
20	25	60	90	20	16	4xM14
25	30	70	100	20	16	4xM14
32	40	80	108	20	16	4xM14
40	50	89	118	20	16	4xM14
50	60	99	127	20	16	4xM14
63	73	121	153	20	19	4xM16
75	85	140	178	20	19	4xM16
90	100	152	191	20	19	4xM16
110	120	191	229	22	23	8xM21
125	135	216	254	22	23	8xM21
140	150	216	254	22	23	8xM21
160	170	241	310	24	23	8xM21
180	190	241	310	24	23	8xM21
200	210	299	343	26	23	8xM21
225	235	299	343	26	23	8xM21
250	265	362	406	30	26	12xM24
280	295	362	406	30	26	12xM24
315	330	432	483	30	26	12xM24
355	370	476	534	30	26	12xM24
400	415	540	597	35	29	12xM26
450	465	578	635	35	29	16xM26
500	515	635	700	35	32	16xM30
560	575	692	749	35	35	20xM32
630	645	749	814	35	35	20xM32

Without Steel Inserts					
BS 10 Table D					
d <sub>6</sub>	K	D	b	d <sub>2</sub>	Bolts
25	67	95	20	14	4x1/2"
30	73	102	20	14	4x1/2"
40	83	115	20	14	4x1/2"
50	87	120	20	14	4x1/2"
60	98	134	20	14	4x1/2"
73	115	152	20	14	4x1/2"
85	127	165	20	18	4x1/2"
100	146	184	20	18	8x5/8"
120	178	216	20	18	8x5/8"
135	210	254	20	18	8x5/8"
150	210	254	20	18	8x5/8"
170	235	380	20	18	8x5/8"
190	260	305	20	18	8x5/8"
210	261	305	25	18	8x5/8"
235	292	337	25	18	8x5/8"
265	356	406	30	18	8x5/8"
295	356	406	30	21	12x3/4"
330	406	457	30	21	12x3/4"
370	470	527	30	21	12x3/4"
415	584	676	35	24	12x7/8"
465	584	641	35	24	12x7/8"
515	641	705	35	24	16x7/8"
575	699	762	35	28	16x1"
645	756	825	35	28	16x1"

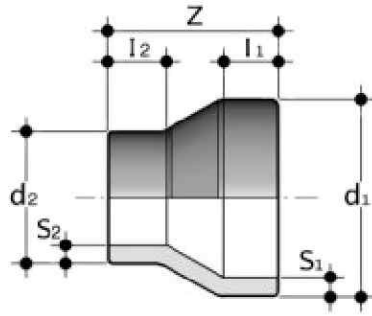
With Steel Inserts					
DIN 2501					
d <sub>6</sub>	K	D	b	d <sub>2</sub>	Bolts
28	65	95	12	14	4xM12
34	75	108	14	14	4xM12
42	85	115	14	14	4xM12
51	100	140	16	18	4xM16
62	110	150	16	18	4xM16
78	125	165	19	18	4xM16
92	145	185	19	18	4xM16
108	160	200	21	18	8xM16
128	180	220	22	18	8xM16
135	180	220	22	18	8xM16
158	210	250	26	18	8xM16
178	240	285	27	22	8xM20
188	240	285	27	22	8xM20
235	295	340	28	22	8xM20
238	295	340	28	22	8xM20
288	350	406	31	22	12xM20
294	350	406	31	22	12xM20
338	400	460	34	22	12xM20
376	460	512	39	22	16xM20
430	515	580	43	26	16xM24
517	620	678	45	26	20xM24
533	620	678	45	26	20xM24
618	725	790	50	30	20xM27
645	725	790	50	30	20xM27

\* dimensions in mm

Table E and Table F also available  
Gaskets available



Concentric Reducers



Weld Type: Butt

SDR 17-S 8.3-PN6 SDR 11-S 5-PN10

d <sub>1</sub>	d <sub>2</sub>	Z	l <sub>1</sub>	l <sub>2</sub>	S <sub>1</sub>	S <sub>2</sub>	S <sub>1</sub>	S <sub>2</sub>
25	20	50	23	25	-	-	2.3	2
32	20	50	22	22	-	-	3	2
32	25	50	21	21	-	-	3	2.3
40	20	50	21	21	-	-	3.7	2
40	25	50	21	22	-	-	3.7	2.3
40	32	50	21	24	-	-	3.7	3
50	25	50	20	20	-	-	4.6	2.3
50	32	50	20	21	-	-	4.6	3
50	40	50	20	24	-	-	4.6	3.7
63	32	60	25	22	-	-	5.8	3
63	40	60	25	24	-	-	5.8	3.7
63	50	60	25	27	-	-	5.8	4.6
75	32	70	30	25	-	-	6.9	3
75	40	70	30	25	-	-	6.9	3.7
75	50	70	30	28	-	-	6.9	4.6
75	63	70	30	33	-	-	6.9	5.8
90	50	80	35	28	-	-	8.2	4.6
90	63	80	35	32	-	-	8.2	5.8
90	75	80	35	36	-	-	8.2	6.9
110	50	90	35	34	6.3	2.8	10	4.6
110	63	90	35	35	6.3	3.6	10	5.8
110	75	90	35	38	6.3	4.3	10	6.9
110	90	90	35	43	6.3	5.1	10	8.2
125	63	100	40	38	7.1	3.6	11.4	5.8
125	75	100	40	39	7.1	4.3	11.4	6.9
125	90	100	40	43	7.1	5.1	11.4	8.2
125	110	100	40	51	7.1	6.3	11.4	10
140	75	110	50	37	8.0	4.3	12.8	6.9
140	90	110	50	39	8.0	5.1	12.8	8.2
140	110	110	50	45	8.0	6.3	12.8	10
140	125	110	50	51	8.0	7.1	12.8	11.4
160	90	120	55	40	9.1	5.1	14.6	8.2
160	110	120	55	44	9.1	6.3	14.6	10
160	125	120	55	48	9.1	7.1	14.6	11.4
160	140	120	55	53	9.1	8.0	14.6	12.8
180	90	130	60	44	10.2	5.1	16.4	8.2
180	110	130	60	45	10.2	6.3	16.4	10
180	125	130	60	47	10.2	7.1	16.4	11.4
180	140	130	60	50	10.2	8.0	16.4	12.8
180	160	130	60	58	10.2	9.1	16.4	14.6
200	140	140	60	48	11.4	8.0	18.2	12.8
200	160	140	60	54	11.4	9.1	18.2	14.6

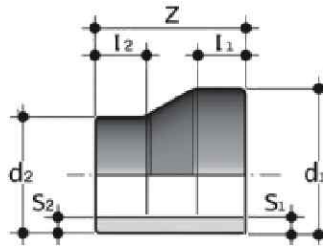
SDR 17-S 8.3-PN6 SDR 11-S 5-PN10

d <sub>1</sub>	d <sub>2</sub>	Z	l <sub>1</sub>	l <sub>2</sub>	S <sub>1</sub>	S <sub>2</sub>	S <sub>1</sub>	S <sub>2</sub>
200	180	140	60	58	11.4	10.2	18.2	16.4
225	140	160	70	58	12.8	8.0	20.5	12.8
225	160	160	70	58	12.8	9.1	20.5	14.6
225	180	160	70	60	12.8	10.2	20.5	16.4
225	200	160	70	60	12.8	11.4	20.5	18.2
250	160	180	75	63	14.2	9.1	22.8	14.6
250	180	180	75	66	14.2	10.2	22.8	16.4
250	200	180	75	72	14.2	11.4	22.8	18.2
250	225	180	75	83	14.2	12.8	22.8	20.5
280	180	200	85	70	15.9	10.2	25.5	16.4
280	200	200	85	72	15.9	11.4	25.5	18.2
280	225	200	85	80	15.9	12.8	25.5	20.5
280	250	200	85	90	15.9	14.2	25.5	22.8
315	200	230	95	85	17.9	11.4	28.7	18.2
315	225	230	95	88	17.9	12.8	28.7	20.5
315	250	230	95	95	17.9	14.2	28.7	22.8
315	280	230	95	107	17.9	15.9	28.7	25.5
355	225	140	57	40	20.2	12.8	32.3	20.5
355	250	130	54	40	20.2	14.2	32.3	22.8
355	280	120	53	40	20.2	15.9	32.3	25.5
355	315	110	53	40	20.2	17.9	32.3	28.7
400	225	160	64	40	22.7	12.8	36.4	20.5
400	250	150	61	40	22.7	14.2	36.4	22.8
400	280	140	60	40	22.7	15.9	36.4	25.5
400	315	120	50	40	22.7	17.9	36.4	28.7
400	355	110	51	40	22.7	20.2	36.4	32.3
450	280	160	65	40	25.6	15.9	41	25.5
450	315	140	55	40	25.6	17.9	41	28.7
450	355	130	57	40	25.6	20.2	41	32.3
450	400	120	60	40	25.6	22.7	41	36.4
500	315	170	71	40	28.4	17.9	45.5	28.7
500	355	150	62	40	28.4	20.2	45.5	32.3
500	400	140	65	40	28.4	22.7	45.5	36.4
500	450	120	60	40	28.4	25.6	45.5	41
560	355	180	75	40	31.8	20.2	51	32.3
560	400	160	68	40	31.8	22.7	51	36.4
560	450	140	62	40	31.8	25.6	51	41
560	500	130	67	40	31.8	28.4	51	45.5
630	400	190	78	40	35.8	22.7	57.3	36.4
630	450	170	72	40	35.8	25.6	57.3	41
630	500	150	67	40	35.8	28.4	57.3	45.5
630	560	130	64	40	35.8	31.8	57.3	51

\* dimensions in mm

# Product Specifications - Fittings

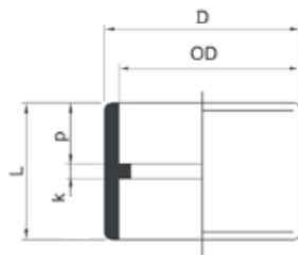
## Eccentric Reducers



Weld Type: Butt

SDR 11-S 5-PN10						
d <sub>1</sub>	d <sub>2</sub>	Z	l <sub>1</sub>	l <sub>2</sub>	S <sub>1</sub>	S <sub>2</sub>
63	32	60	25	22	5.7	2.9
63	50	60	25	24	5.7	4.5
75	50	70	30	25	6.8	4.5
75	63	70	30	25	6.8	5.7
90	50	80	35	28	8.2	4.5
90	63	80	35	32	8.2	5.7
90	75	80	35	36	8.2	6.8
110	63	90	35	34	10	5.7
110	75	90	35	35	10	6.8
110	90	100	35	38	10	8.2
125	90	100	40	38	11.4	8.2
125	110	100	40	39	11.4	10
140	90	110	50	37	12.7	8.2
140	110	110	50	39	12.7	10
140	125	110	50	40	12.7	11.4
160	90	120	54	40	14.5	8.2
160	110	120	45	40	14.5	10
160	140	120	44	40	14.5	12.7
180	140	130	54	40	16.4	12.7
180	160	130	52	40	16.4	14.5
200	140	140	61	40	18.2	12.7
200	160	140	50	40	18.2	14.5
225	160	160	51	40	20.5	14.5
225	180	160	48	40	20.5	16.4
225	200	160	50	40	20.5	18.2

SDR 11-S 5-PN10						
d <sub>1</sub>	d <sub>2</sub>	Z	l <sub>1</sub>	l <sub>2</sub>	S <sub>1</sub>	S <sub>2</sub>
250	160	170	72	40	22.7	14.5
250	200	150	55	40	22.7	18.2
250	225	110	50	40	22.7	20.5
280	200	200	68	40	25.5	18.2
280	225	200	62	40	25.5	20.5
280	250	200	57	40	25.5	22.7
315	200	130	78	40	28.7	18.2
315	225	150	72	40	28.7	20.5
315	250	170	67	40	28.7	22.8
315	280	190	64	40	28.7	25.5
355	225	130	89	40	32.3	20.5
355	250	150	84	40	32.3	22.8
355	280	190	71	40	32.3	25.5
355	315	200	61	40	32.3	28.7
400	250	140	98	40	36.4	22.8
400	280	170	85	40	36.4	25.5
400	315	200	78	40	36.4	28.7
400	355	200	68	40	36.4	32.3
450	315	150	96	40	41	28.7
450	355	190	89	40	41	32.3
450	400	200	75	40	41	36.4
500	355	160	101	40	45.5	32.3
500	400	200	96	40	45.5	36.4
500	450	200	85	40	45.5	41



Larger sizes available with "O" rings



SDR 11-S 5-PN10					
OD	D	K	P	L	Wt. in Kg
20	29.1	4.0	15.5	35.0	0.01
25	35.1	4.0	17.5	39.0	0.02
32	43.1	4.0	19.6	43.2	0.03
40	52.2	4.0	21.6	47.2	0.04
50	64.2	5.8	23.6	53.0	0.07
63	81.3	6.3	28.1	61.5	0.12
75	92.3	6.3	32.6	70.5	0.13
90	113.3	6.3	36.6	79.5	0.30
110	133.4	7.3	42.6	92.5	0.42

## Moulded Sockets

\* dimensions in mm



# Product Specifications

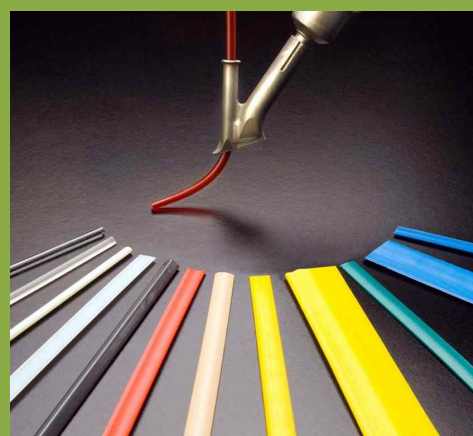
## Profiles

Size(mm) (Round bar OD)	20,25,32,40,45,50,65,75, 90,100,110, 120,125,130,140,150,180,200,225,250
Std. Length	1 mtr. for rods, Custom sizing & length for Square bars
Colors	
Grade	Co/Homo/Block
Shapes	



## Welding Rods

Size(mm)	2, 3, 4, 5
Std. Length	Packing in 3/5/10 kg coils
Colors	
Grade	Co/Homo/Block
Shapes	



## Sheets & Blocks

Thickness	Standard Dimensions
mm	Regular W X L
1, 2, 3, 4, 5	1250 x 2000 mm
	1500 x 2000 mm
	1500 x 3000 mm
	1220 x 2440 mm
	1250 x 10000 mm
	1500 x 10000 mm
	1500 x 10000 mm
6, 8, 10	1250 x 2000 mm
	1500 x 2000 mm
	1500 x 3000 mm
	1220 x 2440 mm
12, 15, 20	1000 x 2000 mm
	1500 x 3000 mm
25, 30, 40, 50	1000 x 2000 mm
mm	Glass Lined - Fabric Backed W X L
2, 3, 4, 5mm	1280 x 10000 mm
	1300 x 10000 mm
	1500 x 3000 mm



\* dimensions in mm

## Services Portfolio



Sangir Plastics has a complete independent team handling on-site installation and commissioning and off-site pre-fabrication work. A dedicated workshop equipped with advanced welding equipment from European companies provides high quality fabricated fittings and custom fabrication jobs in-house. Experience of several years of erection and commissioning jobs at large metallurgy and chemical companies has given the services team exposure to extreme conditions and provided successful orientation towards high quality deliverables.



Sangir is able to take up turnkey jobs which would consist of designing, supplying, installation, erection and commissioning of complete piping systems with guaranteed performance for decades.

Experience: A total combined experience of the services management team exceeds 50 years in the field and the supervisors include among the best available in the country.

### Installations completed in following industries:

- Metallurgy plants
- Chemical Industry
- Fluorochemical industry
- Phosphoric Acid Plants
- Steel Plants
- Chemical Waste Treatment Plants
- Oil manufacturing plants
- Nuclear Power Plants
- Pickling Lines
- Textile Industry
- Effluent Treatment - Marine Outfall



Custom Fabrication jobs undertaken include: Tanks, Vessels, Hoods, Ducts, Lined pipes etc.



# Joining Techniques for PP Pipes & Fittings

Among the techniques used for welding of polypropylene – butt welding, socket welding and extrusion welding are more commercially popular due to the easy portability of the welding machinery.

## Butt Welding

This technique is used for welding pipes made from PE, PP, PVDF etc. The pipes are mounted in the clamps of the butt fusion equipment and checked for initial alignment. The pipe ends are then planed to ensure that they are flat & square. The welding sequence begins when a flat heated plate is positioned between the two pipe ends. The pipes are pushed towards each other until they come into contact with the hot plate and the pressure is increased to give good thermal contact. The pipe ends melt and the interface pressure forces the molten material outwards to form 'weld beads' at the outside and inside pipe surfaces; hence the term 'bead-up' stage. Then the pressure is reduced to a value sufficient only to maintain the pipe in contact with the hot plate. This allows the melt depth to increase without increasing the size of the weld beads. At the end of this 'heat soak' stage, the pipe ends are pulled away from the hot plate. The hot plate is removed, and the two molten pipe ends are pushed together at the same pressure as used during the initial bead-up stage. This causes further growth of the weld bead and is called the 'bead roll over' stage. The pressure is maintained until the weld is fully cooled and joint is ready.

## Socket Welding

The socket fusion technique is also used mainly for PP and PVDF for fabricating process and piping systems. The method involves the use of a socket type fitting and the operation process is generally manual for small sizes. The welding cycle consists of a heating phase and a cooling phase. In socket fusion welding, a socket mounted on a hot plate is used to heat the outside surface of the pipe being welded. On the opposite side of the hot plate, a spigot is used to heat the inside surface of the injection moulded fitting. Both the fitting and pipe are heated for a set 'heating time'. When the heating time is complete, the heated pipe and fitting are removed from the socket and spigot, and the pipe is pushed inside the fitting, producing the weld. Depending on the pipe size, this process is carried out by hand (for sizes up to 50mm OD) or on a mechanical/hydraulic machine, similar to a butt fusion welding machine, (for sizes typically between 63mm and 160mm OD).

## Extrusion Welding

The process involves continuously extruding molten thermoplastic material into a weld preparation on the plastic component or structure which is being joined. The extrusion barrel on the extrusion gun is heated along its length, either by cartridge heaters or hot air. A thermoplastic rod or granule feedstock is fed into the rear of the extrusion barrel and the material is heated as it is drawn through the barrel by the rotating extruder screw. The ejected material is shaped to match the profile being welded, and defines the shape and size of the final weld. At the leading edge, hot air is used to ensure there is sufficient heat in the substrate material to form the weld. Typical welding speeds are 0.5-1.0m/min. Extrusion welding is generally used to weld custom fabrications with sheet, nozzles etc.

Other methods of welding include infrared, bead and crevice free, friction welding depending on the requirements of the application and ultimate use of the manufactured products.



## Installation Details - Support Distances

### Support Distances L for PPH pipes of PN 10 rating (in cms) at

OD	20°C	30°C	40°C	50°C	60°C	70°C	80°C
20	70	67	65	62	60	57	55
25	80	77	75	72	70	67	65
32	95	92	90	87	85	80	75
40	110	107	105	100	95	92	87
50	125	122	120	115	110	105	100
63	145	142	140	135	130	125	120
75	155	150	145	140	135	130	125
90	165	160	155	150	145	140	135
110	185	180	175	170	160	150	140
125	200	195	190	180	170	160	150
140	210	205	200	190	180	170	160
160	225	220	210	200	190	180	170
200	250	240	230	220	210	200	190
225	265	255	245	235	225	215	200
250	280	270	260	250	240	230	215
280	295	285	275	265	255	245	230
315	315	305	295	285	270	260	245
355	355	325	315	300	285	275	260
400	355	345	335	320	305	290	275

For other pressure ratings support distances may be changed as follows:

PN 2.5	-25%
PN6/6.3	-9%
PN16	+7%

For Gases with density  $<0.01 \text{ g/cm}^3$  support distances will be increased by:

PN 6	47%
PN10	30%
PN16	21%

Fluids of higher density, between  $1.0 \text{ g/cm}^3$  to  $1.25 \text{ g/cm}^3$ , reduced by 4%.

## Storage and Transportation of Polypropylene Pipes

### Storage and handling of pipes made from PP, PE have to follow general instructions:

- Pipes can be stored telescopically by storing lower dimension pipes inside larger pipes
- Storage heights should not exceed 1 mtr where pipes are being piled together. Pipes may be stored in wooden/metal rakes with proper insulation to avoid damage to pipe surface
- Unless the pipes have been stabilized for UV – pipes should not be stored under the sun to avoid damage due to radiation. UV-non-stabilized Sangir PP Homo and PP-FR in natural and grey color should therefore be stored inside covered warehouses
- Damages to the surface of the pipe due to dragging or from sharp objects in storage area should be avoided
- Fittings may be stored in separate pigeon hole drums to avoid mixing and exposure to dust/sunlight
- Impact and Bending stresses should be avoided for extremely low temperature situations

### Transportation

- Pipes may travel telescopically however they should be properly aligned parallel to each other
- Care should be taken in extremely cold temperatures to avoid unnecessary bends or stresses during loading
- Material may be loaded into vehicles that have proper covering from sunlight and can hold the Pipes compactly to avoid unnecessary friction and damage during transport
- Larger & heavier pipes should be loaded at the bottom of the cargo then succeeded with lower sizes above
- Coils may be transported telescopically but care should be taken in extreme temperatures



# Chemical Resistance Chart

Substance	Conc. by mass%	Homopolymer Heterophasic Copolymer			Random Copolymer	
		Temp-> 20°C	60°C	100°C	20°C	60°C
Acetic acid	a. 50	+	+	+		
Acetic acid	a. 10	+	+	+	+	
Acetic acid (glacial)	100	+	±	-	+	
Acetic anhydride	100	+		+		
Acetone	100	+	+(b)	+		
Acrylonitrile	100	+	+			
Allyl alcohol	a.96	+	+	+		
Aluminium salts	a.all	+	+	+	+	+
Alums (all types)	a.all	+	+	+	+	
Ammonia	a.30	+	+	+		
Ammonia	a.10	+	+	+	+	
Ammonia, gaseous	100	+	+			
Ammonia, liquid	100	+				
Ammonium acetate	a.all	+	+	+	+	+
Ammonium carbonate	a.all	+	+	+	+	+
Ammonium chloride	a.all	+	+	+	+	+
Ammonium nitrate	a.all	+	+	+	+	+
Ammonium phosphate	a.all	+	+	+	+	+
Ammonium sulphate	a.all	+	+	+	+	+
Amyl acetate	100	±	-	±		
Amyl alcohol	100	+	+	+		
Aniline	100	+	+	+		
Anisole	100	±	±			
Barium salts	a.all	+	+	+	+	+
Benzaldehyde	100	+	+			
Benzaldehyde	a.CS.	+	+			
Benzene	100	±	-	-		
Benzoic acid	100	+	+	+		
Benzoic acid	a.CS.	+	+	+	+	+
Benzyl alcohol	100	+	±	+		
Borax	a.CS.		+	+	+	+
Boric acid	100	+	+	+		
Boric acid	a.CS.	+	+	+	+	
Bromine vapour	high	-	-			
Bromine vapour	Low	±	-	-		
Bromine water	CS.	-	-			
Bromine, liquid	100	-	-			
Butane, gaseous	100	+	+			
Butane, liquid	100	+				
1,4-Butane diol	100	+	+	+		
Butine diol	100	+	+	+		
Butyl acetate	100	±	-	±		
n-Butyl alcohol	100	+	+			
Butyl glycol	100	+	+			
Calcium carbonate	a.CS.	+	+	+	+	+
Calcium chloride	a.CS.	+	+	+	+	+
Calcium hypochlorite	a.all	+	+	+		
Calcium nitrate	a.CS.	+	+	+		
Carbon disulphide	100	±	±			
Carbon tetrachloride	100	-	-			
Chlorine water	CS.	±	-	-		
Chlorine, gas, dry	100	-	-			

Substance	Conc. by mass%	Homopolymer Heterophasic Copolymer			Random Copolymer	
		Temp-> 20°C	60°C	100°C	20°C	60°C
Chlorobenzene	100	±	-	-		
Chloroform	100	±	-	-		
Chlorosulphonic acid	100	-	-			
Chromium salts (di/tribasic)	a.CS.	+	+	+	+	
Chromium trioxide (Chromic acid)	a.CS.	±	-			
Chromium trioxide	a.20	+	±	+		
Citric acid	a.CS.	+	+	+	+	+
Copper salts	a.CS.	+	+	+		
Cresols	100	+	±	+		
Cresols	a.CS.	+	+			
Cyclohexane	100	±	-			
Cyclohexanol	100	+	±	+		
Cyclohexanone	100	+	-	±		
Decahydronaphthaline	100	±	-	-		
Diethylether	100	±	±			
Diisopropylether	100	±	-	±		
Dimethylformamide	100	+	+			
1,4-Dioxan	100	±	±	-	±	
Ethyl acetate	100	±	±	±		
Ethyl alcohol	100	+	+			
Ethyl alcohol	a.96	+	+	+		
Ethyl alcohol	a.50	+	+	+		
Ethyl alcohol	a.10	+	+	+		
Ethyl chloride	100	-(b)	-(b)			
Ethylbenzene	100	±	-	-		
Ethylene chloride	100	±	±			
2-Ethylhexanol	100	+	+			
Formaldehyde	a.40	+	+	+		
Formaldehyde	a.30	+	+	+		
Formaldehyde	a.10	+	+	+		
Formic acid	a.98	+	±	+		
Formic acid	a.85	+	±	+		
Formic acid	a.50	+	±	+		
Formic acid	a.10	+	±	+		
Fructose	a.CS.	+	+	+	+	+
Glucose	a.CS.	+	+	+	+	+
Glycerine		+	+	+	+	
Glycerine	a.all	+	+	+	+	
Glycol	100	+	+	+	+	
Glycol	a.all	+	+	+	+	
n-Heptane	100	±	±	-		
n-Hexane	100	±	±	-		
Hydrobromic acid	50	+	+			
Hydrochloric acid	36	+	+	+		
Hydrochloric acid	10	+	+	+	+	
Hydrofluoric acid	40	+	+	+		
Hydrogen chloride, gas	all	+	+	+		
Hydrogen peroxide	30	+	±	±		
Hydrogen peroxide	3	+	+	+		
Hydrogen sulphide	a.low	+	+	+		
Iron salt	a.CS.	+	+	+	+	+
Isooctane	100	±	±	-		

# Chemical Resistance Chart

Substance	Conc. by mass%	Homopolymer Heterophasic Copolymer			Random Copolymer	
		Temp-> 20°C	60°C	100°C	20°C	60°C
Chlorine, gas, moist	10	±	-	-		
Chlorine, liquid	100	-	-			
Chloroacetic acid	100	+	±			
Lactic acid	a.10	+	+	+	+	+
Magnesium salts	a.CS.	+	+	+	+	+
Menthol	100	+	+			
Mercury	100	+	+	+		
Mercury salts	a.CS.	+	+	+	+	
Methyl acetate	100	+	+(b)	±		
Methyl alcohol	a.50	+	+	+		
Methyl alcohol (methanol)	100	+	+(b)	+		
Methyl ethyl ketone	100	+	±	±		
Methylene chloride	100	±	-			
Morpholine	100	+	+	+		
Naphthaline	100	+				
Nickel salts	a.CS.	+	+	+	+	
Nitric acid	68	-	-	-		
Nitric acid	50	±	-	-		
Nitric acid	25	+	±	±		
Nitric acid	10	+	+	+		
Nitrobenzene	100	+	±	+		
Oleic acid	100	+	+			
Oxalic acid	a.CS.	+	±	+		
Ozone (< 0.5 ppm)	+	±				
Perchloroethylene		(see tetrachloroethylene)				
Phenol	100	+	+	+		
Phenol	a.CS.	+	+	+		
Phosphoric acid	85	+		+		
Phosphoric acid	50	+	+	+		
Phosphoric acid	10	+	+	+	+	
Phosphorus oxychlorid	100	+	±			
Phosphorus pentoxide	100	+				
Phosphorus trichloride	100	+	±			
Phthalic acid	a.50	+	+	+		
Potassium carbonate	a.CS.	+	+	+	+	
Potassium chlorate	a.CS.	+	+	+		
Potassium chloride	a.CS.	+	+	+	+	+
Potassium dichromate	a.CS.	+	+	+	+	
Potassium hydroxide soln	50	+	+	+	+	
Potassium hydroxide soln	25	+	+	+	+	
Potassium hydroxide soln	10	+	+	+	+	
Potassium iodide	a.CS.	+	+	+	+	
Potassium nitrate	a.CS.	+	+	+	+	
Potassium permanganate	a.CS.	+	+	+		
Potassium persulphate	a.CS.	+	+			
Potassium sulphate	a.CS.	+	+	+	+	
Propane, gas	100	+	+			
Propane, liquid	100	+				
Propionic acid	a.50	+	+	+		

± = Limited resistance Noticeable swelling and tensile yield stress is noticeably reduced. Tests should be carried out to confirm suitability in critical cases.

+ = Resistant any swelling is slight with only minor changes to tensile yield stress

- = Not resistant Swelling is severe and tensile yield stress is severely reduced.

CS. = cold saturated solution, b = measured value at boiling point of test substance, a = aqueous solution

Substance	Conc. by mass%	Homopolymer Heterophasic Copolymer			Random Copolymer	
		20°C	60°C	100°C	20°C	60°C
Isopropylalcohol	100	+	+	+		
Lactic acid	a.90	+	+	+		
Lactic acid	a.50	+	+	+		
Propylene glycol	100	+	+	+		
Pyridine	100	±	±	±		
Silver salt	a.CS.	+	+	+	+	
Sodium acetate	a.CS.	+	+	+	+	+
Sodium bisulphite	a.CS.	+	+	+		
Sodium carbonate	a.CS.	+	+	+	+	
Sodium carbonate	a.10	+	+	+	+	+
Sodium chlorate	a.25	+	+	+		
Sodium chloride	a.CS.	+	+	+	+	+
Sodium chlorite	a.5	+	+			
Sodium bicarbonate	a.CS.	+	+	+	+	
Sodium hydroxide	100	+	+	+		
Sodium hydroxide soln.	50	+	+	+	+	
Sodium hydroxide soln.	25	+	+	+	+	
Sodium hydroxide soln.	10	+	+	+	+	+
Sodium hypochlorite	a.13	±	±			
Sodium nitrate	a.CS.	+	+	+	+	
Sodium nitrite	a.CS.	+	+			
Sodium perborate	a.CS.	+	+	+	+	+
Sodium phosphate	a.CS.	+	+	+	+	+
Sodium sulphate	a.CS.	+	+	+	+	+
Sodium sulphide	a.CS.	+	+	+	+	
Sodium sulphite	a.CS.	+	+	+	+	
Sodium thiosulphate	a.CS.	+	+	+	+	
Stearic acid	100	+	+			
Succinic acid	a.CS.	+	+	+	+	
Sulphur	100	+	+	+	+	
Sulphur dioxide	all	+	+	+		
Sulphuric acid	98	±	-	±		
Sulphuric acid	85	+	±	±		
Sulphuric acid	50	+	+	+		
Sulphuric acid	10	+	+	+	+	+
Tartaric acids	a.CS.	+	+	+	+	
Tetrachloroethane	100	±	-	-		
Tetrachloroethylene	100	±	-	-		
Tetrahydrofurane	100	±	-	-		
Tetrahydronaphthaline	100	±	-	-		
Thiophene	100	±	-	±		
Tin(II) chloride	a.CS.	+	+	+	+	
Toluene	100	±	-	-		
Trichloroethylene	100	±	-	-		
Urea	a.CS.	+	+	+	+	
Water	100	+	+	+	+	+
Xylene	100	±	-	-		
Zinc salts	a.CS.	+	+	+	+	



### Partial List of Consultant Registrations/Product Approvals

- Aker Kvaerner Powergas Pvt. Ltd.
- Bureau Veritas Pvt. Ltd.
- Toyo Engineering Pvt. Ltd
- SGS India Pvt. Ltd.
- Indian Register of Shipping
- Certified Engineers India Ltd.
- Dalal & Consultants
- Tata Consulting Engineers Ltd.
- MECON Ltd.
- Lloyds Register of Shipping
- Humphreys and Glasgows
- Larsen and Toubro Ltd.
- TUV Ltd.

### Government bodies

- National Thermal Power Corporation Ltd.
- Gujarat Water Sewerage & Supply Board
- Municipal Corporation of Greater Mumbai Ltd.
- Mahanagar Gas Ltd.
- Neyvile Lignite Ltd.
- Western Coalfields Ltd.
- Singareni Collieries Company Ltd.

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*Performance. Persistence. Partnership.*

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