

BIG BRUTE®

M U N I C I P A L S Y S T E M S

BIG BRUTE

Large Diameter Pressure Pipe
14"-48" (350mm-1200mm)

Performance Under Pressure



Big Brute® Large Diameter PVC Pressure Pipe is available in cast iron outside diameters in a variety of pressure ratings for use in many applications. Its innovative design and quality construction guarantees the safe and reliable conveyance of potable water and sewage.

APPLICATIONS

Big Brute pipe is the ideal choice for:

- Distribution Lines
- Transmission Mains
- Force Mains
- Irrigation Systems
- Fire Protection Lines
- Gravity Sewer Mains

ADVANTAGES

Corrosion Proof

Big Brute pipe is immune to naturally corrosive soils, electrochemical action and galvanic corrosion. This ensures lower maintenance costs and longer performance life.

Two Reserves of Strength

Big Brute pipe offers two reserves of strength, long-term and short-term. Pressure ratings are established for long-term sustained pressure applications, incorporating a 2:1 safety factor. Big Brute also handles short-term transient surge pressures equal to 60% greater than the pressure ratings, while maintaining a 2:1 safety factor.

The following long-term and short-term design pressure capacities are available.

High Flow Capacity

Big Brute pipe has a Hazen-Williams friction coefficient of 150, providing high flow capacities. The extremely smooth interior wall eliminates turbulence and prevents scaling produced by hard water. This higher flow capacity can also provide a substantial reduction in pumping costs.

Withstands Vacuum Pressure

Big Brute pipe can easily withstand vacuum pressures of -11 psi (-75 kPa) or 22" of mercury.

Dimension Ratio	Nominal Pressure Rating (2:1 Safety Factor)		Surge Pressure Capacity (2:1 Safety Factor)	
	psi	kPa	psi	kPa
DR51	80	550	128	880
DR41	100	690	160	1105
DR32.5	125	860	200	1375
DR25	165	1140	264	1825
DR18	235	1620	376	2590
DR14	305	2100	488	3360





Tight Joints

The IPEX gasket joint is designed for unequalled performance and ease of installation. The joints can withstand 3.2 times their pressure rating without leakage.

Easy to Handle

Big Brute pipe requires less effort to move and install than conventional pipe. Cutting and bevelling can easily be done onsite using standard tools.

Big Brute pipe also comes with dual insertion marks for easier inspection. Installation is complete when only one insertion mark is visible, making the verification of proper joint assembly a simple process for inspectors.

Each Pipe Tested

Big Brute pipe is hydrostatically tested to two times its pressure rating. This assures the user of total integrity of *every length* of pipe manufactured.

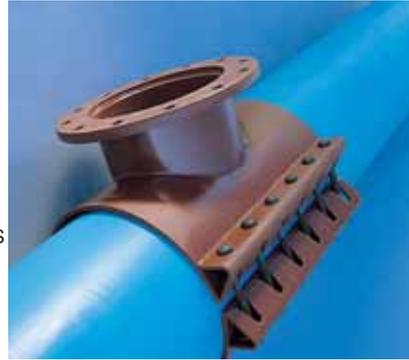


Fabricated Fittings

Fabricated fittings are available for large diameter pipe. They are made from segments of AWWA C905 PVC pipe, butt fused or bonded together and over-wrapped with fibreglass-reinforced polyester. The pressure ratings match the pipe. The fittings are available as meeting the requirements of AWWA C905 and third-party certified to CSA B137.3.

Compatibility

Big Brute pipe has the same outside diameter as cast-ductile-iron pipe. Auxiliary equipment such as restraint devices, tapping saddles, corporation stops and fittings can be easily used with our Big Brute pipe.



STANDARDS

Big Brute pipe meets these standards:



CSA B137.3



AWWA C905
DR51, 41,
32.5, 25 & 18



Factory Mutual Approved
for DR18 to 20" and
DR25 to 24"



UL Listed to 1285,
DR18 to 24" (600mm)
DR25 to 30" (750mm)

NSF-61

Listed by NSF
to Std. 61



Various ASTM
standards



The following tests are performed on Big Brute pipe to ensure the highest quality for our customers:

Dimensional Tests:

Big Brute pipe must pass a series of dimensional checks at 73°F (23°C).

Flattening Tests:

A pipe specimen is placed between two flat parallel plates and compressed until the distance between the plates is 5% of the original outside diameter of the pipe, or the walls of the pipe touch within two to five minutes at uniform loading. There shall be no evidence of splitting. This test exceeds the AWWA C905 requirement.

Hydrostatic Proof Tests:

Each piece of pipe, from 14" to 48" (350mm to 1 200mm), is subjected to a hydrostatic pressure equal to twice its nominal pressure rating for five seconds. This quality assurance test is carried out in compliance with the AWWA C905 standard.

Joint Tests: Joints in axial deflection must maintain a vacuum pressure of -11 psi (-75 kPa) or 22" of mercury, a hydrostatic pressure equal to 2.5 times the pressure rating of the pipe for 60 minutes, and a pressure level equal to the minimal burst pressure. These conditions are set by the ASTM D3139 method in compliance with the AWWA C905 and CSA B137.3 standards.

Short-Term Pressure Tests: Random pieces of IPEX pipe are subjected to a gradual increase in hydrostatic pressure over a specific short-term period (60 to 70 seconds). These tests conform to ASTM D1599 and CSA B137.3.

Dimension Ratio	Minimum Burst Pressure	
	psi	kPa
DR51	255	1 760
DR41	320	2 200
DR32.5	405	2 800
DR25	530	3 600
DR18	752	5 190
DR14	980	6 780

The above pressure ratings are based on a short-term hoop stress of 44.20 MPa (6,400 psi) and are equal to 3.2 times the nominal pressure.

Sustained Pressure Tests: In order to ensure the minimum hydrostatic design basis of at least 4,000 psi (27.58 MPa), testing is carried out in compliance with AWWA C905 and CSA B137.3 standards. When subjected to the hydrostatic pressures below, pipe must show no signs of cracking or leakage. This qualification test is conducted for 1,000 hours.

Dimension Ratio	Minimum Pressure	
	psi	kPa
DR51	168	1 160
DR41	210	1 450
DR32.5	267	1 840
DR25	350	2 420
DR18	495	3 410
DR14	615	4 243





Big Brute is manufactured from a 12454B certified compound, in accordance with the ASTM D1784 standard. The minimum HDB for this CSA certified compound must be no less than 4,000 psi (27.58 MPa). The compound can then be given a hydrostatic design stress, expressed by the following equation:

$$S = \frac{HDB}{F}$$

Where S = design stress
HDB = hydrostatic design basis
F = factor of safety

The design stress is then used to calculate Big Brute pipe's long-term pressure rating in accordance with the International Standards Organization (ISO) equation:

$$P = \frac{2S}{DR-1}$$

where P = long-term pressure rating
S = design stress
DR = outside diameter divided by wall thickness

Example:

The long-term pressure rating for a 16" (400mm) DR25 pipe is calculated as follows:

If OD = 17.4 in. (442mm)
t = .697 in. (17.7mm)
HDB = 4,000 psi (27.58 MPa)
F = 2.0

$$DR = \frac{OD}{t} = \frac{17.4}{.697} = 25$$

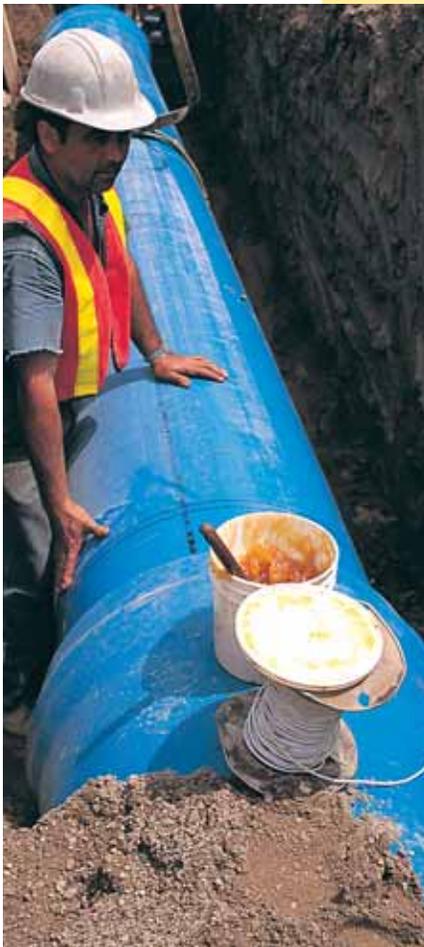
where:
OD = outside diameter
t = wall thickness

To calculate design stress:

$$S = \frac{HDB}{F} = \frac{4000}{2} = 2,000 \text{ psi (13.79 MPa)}$$

To calculate the long-term pressure rating:

$$P = \frac{2S}{DR-1} = \frac{2(2000)}{25-1} = 167 \text{ psi (1.15 MPa)}$$

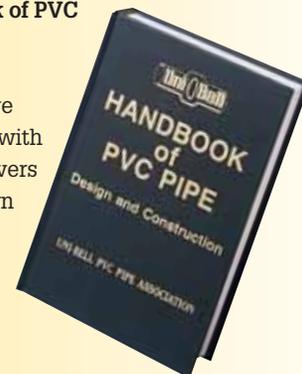


For complete design and installation guidelines:

IPEX Installation Guide of PVC Pressure Pipe and Fittings is available free from your nearest Customer Service Center, IPEX sales representative or distributor.

Uni-Bell handbook of PVC Pipe, Design and Construction

This comprehensive reference manual, with over 470 pages, covers all aspects of design and installation for PVC pipe and fittings.



Available through:

Uni-Bell PVC Pipe Association
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Dallas, Texas, U.S.A. 75234
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FAX (214) 243-3907

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6810 Invader Crescent
Mississauga, Ontario, Canada
L5T 2B6
TEL (905) 670-7676
US TOLL FREE (800) 463-9572
FAX (905) 670-5295

Big Brute for Gravity Flow

Long-term deflection is a design factor to be considered for PVC pipe when used in gravity flow applications. The table below shows the deflection that can be expected for various DRs of pipe in a number of embedment conditions.

A maximum long-term deflection of 7.5% is recommended for PVC pipe in gravity flow applications. This provides a generous safety factor of 4 to 1 against joint leakage. For more information, consult your IPEX representative.

SHORT FORM SPECIFICATIONS

General

Pipe must conform to AWWA C905 and be certified to CSA B137.3 "Rigid Poly (Vinyl Chloride) (PVC) Pipe for Pressure Applications." DR51, 41, 32.5, 25, 18 and 14 pipe must have the following pressure ratings: 80 psi (550 kPa), 100 psi (690 kPa), 125 psi (860 kPa), 165 psi (1 140 kPa), 235 psi (1 620 kPa) and 305 psi (2 100 kPa). For pressure applications, each length of pipe must be hydro-tested at twice the rating and a short-term pressure test must be conducted once per production run. Pipe to be IPEX Big Brute® or approved equal.

Fabricated Fittings

Fabricated fittings shall be made from segments of AWWA C905 pipe that are butt fused or bonded together and over-wrapped with fibreglass-reinforced polyester. The fittings must always meet the pressure rating of the pipe system.



Percent (%) Deflection for Big Brute Pressure Pipe

ASTM EMBEDMENT MATERIAL CLASSIFICATION		DENSITY (PROCTOR) AASHTO T-99	E' psi (kPa)	DR	HEIGHT OF COVER														
					ft. m	1 0.3	2 0.6	4 1.2	6 1.8	8 2.4	10 3.0	15 4.6	20 6.1	25 7.6	30 9.1	35 10.7	40 12.2	45 13.7	50 15.2
Manufactured Granular Angular	CLASS I	90%	3,000 (20 700)	51	n/r	0.5	0.3	0.4	0.4	0.5	0.7	0.9	1.1	1.4	1.6	1.8	2.0	2.3	
				41	n/r	0.5	0.3	0.4	0.4	0.4	0.7	0.9	1.1	1.3	1.6	1.8	2.0	2.2	
				32.5	0.7	0.5	0.3	0.3	0.4	0.4	0.7	0.9	1.1	1.3	1.5	1.7	2.0	2.2	
				25	0.7	0.5	0.3	0.3	0.4	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.9	2.1	
Clean Sand & Gravel	CLASS II	90%	2,000 (13 000)	51	n/r	0.7	0.5	0.5	0.6	0.7	1.0	1.3	1.7	2.0	2.3	2.7	3.0	3.4	
				41	n/r	0.7	0.5	0.5	0.6	0.7	1.0	1.3	1.7	2.0	2.3	2.6	3.0	3.3	
				32.5	1.0	0.7	0.5	0.5	0.5	0.6	1.0	1.3	1.6	1.9	2.2	2.6	2.9	3.2	
				25	1.0	0.7	0.4	0.5	0.5	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	2.9	
	CLASS II	80%	1,000 (7 000)	51	n/r	1.5	1.0	1.1	1.1	1.3	2.0	2.6	3.3	4.0	4.6	5.3	5.9	6.6	
					41	n/r	1.4	1.0	1.0	1.1	1.3	1.9	2.6	3.2	3.8	4.5	5.1	5.8	6.4
					32.5	2.0	1.3	0.9	1.0	1.0	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0
					25	1.7	1.1	0.8	0.8	0.9	1.0	1.6	2.1	2.6	3.1	3.6	4.2	4.7	5.2
Sand & Gravel with Fines	CLASS III	90%	1,000 (7 000)	51	n/r	1.5	1.0	1.1	1.1	1.3	2.0	2.6	3.3	4.0	4.6	5.3	5.9	6.6	
				41	n/r	1.4	1.0	1.0	1.1	1.3	1.9	2.6	3.2	3.8	4.5	5.1	5.8	6.4	
				32.5	2.0	1.3	0.9	1.0	1.0	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	
				25	1.7	1.1	0.8	0.8	0.9	1.0	1.6	2.1	2.6	3.1	3.6	4.2	4.7	5.2	
	CLASS III	85%	500 (3 500)	51	n/r	n/r	1.9	2.0	2.2	2.6	3.8	5.1	6.4	7.7	8.9	10.2	11.5	12.8	
					41	n/r	n/r	1.8	1.9	2.1	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0
					32.5	n/r	2.4	1.6	1.7	1.8	2.1	3.2	4.3	5.3	6.4	7.5	8.5	9.6	10.7
					25	n/r	1.9	1.3	1.3	1.4	1.7	2.5	3.3	4.2	5.0	5.9	6.7	7.5	8.4
Silt & Clay	CLASS IV	85%	400 (2 760)	51	n/r	n/r	2.4	2.5	2.7	3.1	4.7	6.3	7.9	9.4	11.0	12.6	14.1	15.7	
				41	n/r	n/r	2.2	2.3	2.5	2.9	4.4	5.8	7.3	8.8	10.2	11.7	13.1	14.6	
				32.5	n/r	2.8	1.9	2.0	2.2	2.5	3.8	5.1	6.3	7.6	8.9	10.1	11.4	12.7	
				25	n/r	2.1	1.4	1.5	1.6	1.9	2.9	3.8	4.8	5.7	6.7	7.6	8.6	9.5	
	CLASS IV	85%	400 (2 760)	51	n/r	n/r	2.4	2.5	2.7	3.1	4.7	6.3	7.9	9.4	11.0	12.6	14.1	15.7	
					41	n/r	n/r	2.2	2.3	2.5	2.9	4.4	5.8	7.3	8.8	10.2	11.7	13.1	14.6
					32.5	n/r	2.8	1.9	2.0	2.2	2.5	3.8	5.1	6.3	7.6	8.9	10.1	11.4	12.7
					25	n/r	2.1	1.4	1.5	1.6	1.9	2.9	3.8	4.8	5.7	6.7	7.6	8.6	9.5

1. Deflection values shown include effect of H2O live load and dead load.
2. External loading based upon a prism load of soil weight of 120 lbs. per cubic foot (1 900 kg/m³).
3. Bedding classifications correspond to ASTM D2321.
4. The deflection lag factor is 1.0 for a prism load.
5. DR18 deflections have not been shown because they are insignificant in most cases.
6. Recommended maximum deflection is 7.5%.
Contact IPEX for applications where greater deflections are anticipated.
7. n/r - not recommended for H2O live load (ok with dead load)

DIMENSIONS



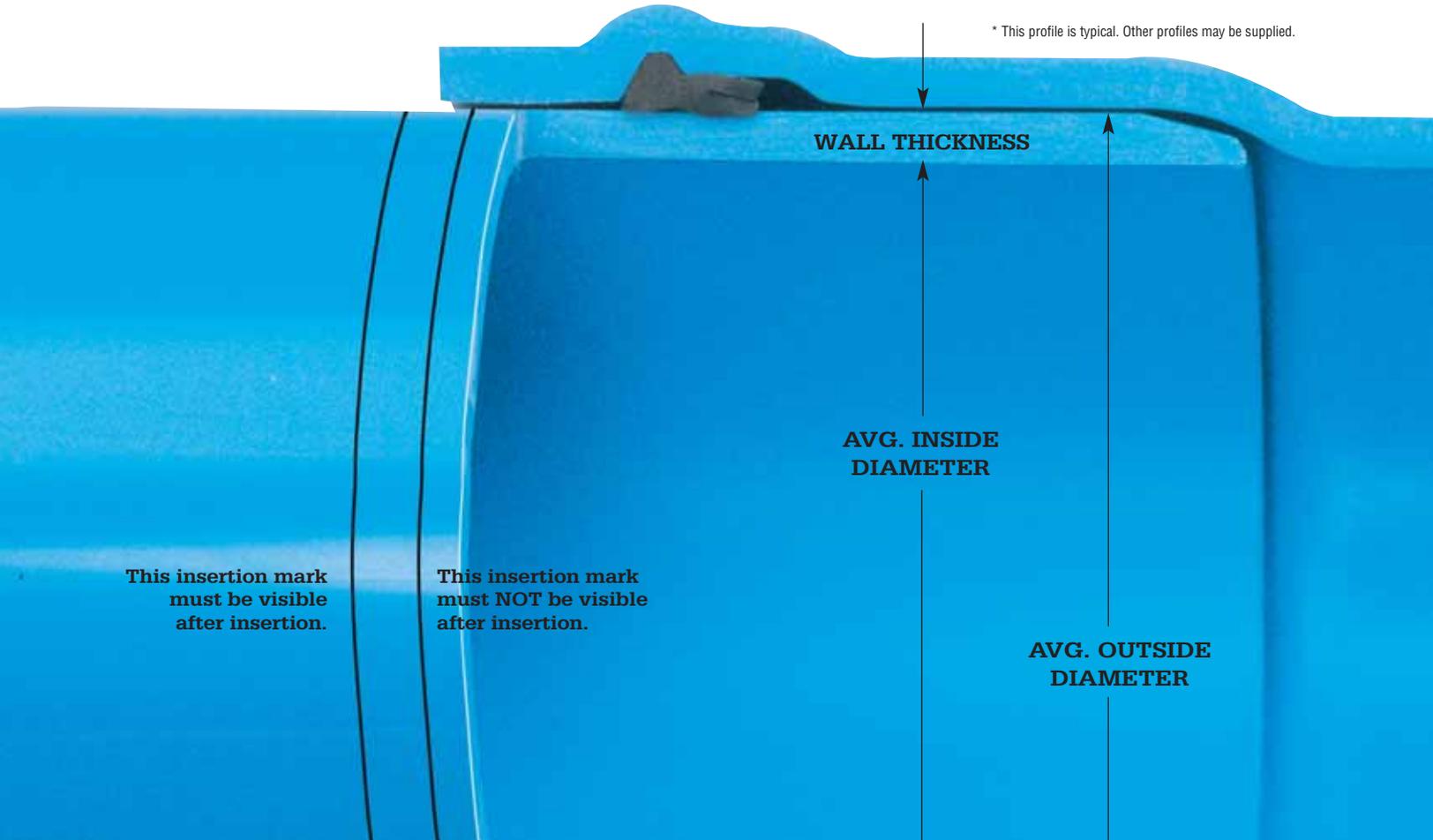
Dimensions in Inches

Nominal Size	Avg. O.D.	Wall Thickness	Avg. I.D.	Nominal Size	Avg. O.D.	Wall Thickness	Avg. I.D.
PR 80 (DR51)				PR 165 (DR25)			
18	19.5	0.38	18.7	14	15.3	0.61	14.1
20	21.6	0.42	20.8	16	17.4	0.70	16.0
24	25.8	0.50	24.8	18	19.5	0.78	17.9
30	32.0	0.63	30.7	20	21.6	0.86	19.9
36	38.3	0.75	36.8	24	25.8	1.03	23.7
42	44.5	0.87	42.6	30	32.0	1.28	29.4
48	50.8	1.00	48.7	36	38.3	1.53	35.2
PR 100 (DR41)				PR 235 (DR18)			
14	15.3	0.37	14.6	14	15.3	0.85	13.6
16	17.4	0.43	16.6	16	17.4	0.97	15.5
18	19.5	0.48	18.5	18	19.5	1.08	17.3
20	21.6	0.53	20.5	20	21.6	1.20	19.2
24	25.8	0.63	24.5	24	25.8	1.43	22.9
30	32.0	0.78	30.4	PR 305 (DR14)			
36	38.3	0.93	36.4	14	15.3	1.09	13.1
42	44.5	1.09	42.2	16	17.4	1.24	14.9
48	50.8	1.24	48.2	PR 125 (DR32.5)			
24	25.8	0.80	24.2	24	25.8	0.80	24.2
30	32.0	0.98	30.0	30	32.0	0.98	30.0
36	38.3	1.18	35.9	36	38.3	1.18	35.9
42	44.5	1.37	41.6	42	44.5	1.37	41.6

Dimensions in Millimetres

Nominal Size	Avg. O.D.	Wall Thickness	Avg. I.D.	Nominal Size	Avg. O.D.	Wall Thickness	Avg. I.D.
PR 80 (DR51)				PR 165 (DR25)			
450	495.3	9.7	475.9	350	388.6	15.5	357.5
500	548.6	10.8	527.0	400	442.0	17.7	406.6
600	655.3	12.8	629.6	450	495.3	19.8	455.7
750	812.8	15.9	780.9	500	548.6	21.9	504.7
900	972.8	19.1	934.7	600	655.3	26.2	602.9
1 050	1 130.3	22.2	1 082.8	750	812.8	32.5	747.8
1 200	1 290.3	25.3	1 236.2	900	972.8	38.9	895.0
PR 100 (DR41)				PR 235 (DR18)			
350	388.6	9.5	369.7	350	388.6	21.6	345.4
400	442.0	10.8	420.4	400	442.0	24.6	392.9
450	495.3	12.1	471.1	450	495.3	27.5	440.3
500	548.6	13.4	521.8	500	548.6	30.5	487.6
600	655.3	16.0	623.3	600	655.3	36.4	582.5
750	812.8	19.8	773.2	PR 305 (DR14)			
900	972.8	23.7	925.3	350	388.6	27.8	333.0
1 050	1 130.3	27.5	1 071.4	400	442.0	31.6	378.8
1 200	1 290.3	31.5	1 223.0	PR 125 (DR32.5)			
600	655.3	20.2	615.0	600	655.3	20.2	615.0
750	812.8	25.0	762.8	750	812.8	25.0	762.8
900	972.8	29.9	912.9	900	972.8	29.9	912.9
1 050	1 130.3	34.8	1 056.6	1 050	1 130.3	34.8	1 056.6

PR = Pressure Rating
Standard laying length is 20' (6.1 metres). Gasket is factory installed into bell groove*.



SALES AND CUSTOMER SERVICE

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About IPEX

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Our products and systems have been designed for a broad range of customers and markets. Contact us for information on:

- Acid waste systems
- PVC, CPVC, PP, FR-PVDF, ABS, PEX and PE pipe and fittings (1/4" to 48")
- Industrial process piping systems
- Double containment systems
- High purity systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- Electrical systems
- Telecommunications and utility piping systems
- Irrigation systems
- PE Electrofusion systems for gas and water

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