PVC PRESSURE PIPING SYSTEMS FOR WATER TRANSMISSION

MUNICIPAL SYSTEMS

IPEX CENTURION®

PVC PRESSURE PIPING SYSTEM MANUFACTURED TO AWWA & CSA STANDARDS

- IPEX Centurion® 14" – 60" (350mm – 1,500mm), AWWA C900 and CSA Standards

IPEX by aliaxis

We build tough products for tough environments®

IPEX CENTURION®

14" – 60" (350mm – 1,500mm)

UNMATCHED VERSATILITY & EASE OF INSTALLATION

IPEX Centurion® extends the benefits of Blue Brute to larger diameters of pipe and new applications. The versatility and ease of installation of IPEX Centurion is unmatched – and costly and difficult to install corrosion protection is eliminated. In addition, unlike HDPE or concrete pressure pipe, every length of IPEX Centurion is tested to twice its Pressure Class/Rating.

CORROSION RESISTANT PERFORMANCE

IPEX Centurion systems are resistant to corrosion from aggressive soils and galvanic action.

SUPERIOR HYDRAULICS

The glass-like finish of PVC reduces friction losses and eliminates the tuberculation common in iron pipes. As a result, pumping costs are reduced and water quality is maintained.

BOTTLE-TIGHT JOINTS, REMOVABLE GASKETS

IPEX's patented gasket system not only withstands many times the rated system pressure, but also withstands full vacuum pressures. The unique removable gasket system allows special oil-resistant (nitrile) gaskets to be easily installed when working in contaminated soils.

CAST IRON OUTSIDE DIAMETER (CIOD)

IPEX Centurion systems are manufactured with a cast iron outside diameter (CIOD). This is compatible with waterworks valves, appurtenances and restrainers.

THIRD-PARTY CERTIFICATION

All IPEX municipal systems are third-party certified as applicable. In addition, IPEX Centurion and Blue Brute systems have Factory Mutual approval and Underwriter's Laboratories (ULI and ULC) listings.

EVERY DAY CONSTRUCTION PROJECTS ARE BREAKING GROUND IN SOME OF THE WORLD'S TOUGHEST AND MOST DEMANDING ENVIRONMENTS. CHANCES ARE THAT IPEX BRAND PRODUCTS AND PEOPLE ARE THERE.

Building on this strength is IPEX's dedication to product and service innovation – driven by customer needs. As one of the first to pioneer PVC pipe in North America, our commitment to innovation has led to many industry firsts. IPEX companies continually introduce new or enhanced products that are easier to work with, are longer lasting and deliver greater value to the customer.

IPEX Centurion pipe
can withstand the **pressure**

PRESSURE CLASSES / PRESSURE RATINGS

Water distribution systems normally consist of smaller diameter Blue Brute or Bionax pipe 4" – 12" (100mm – 300mm), where our water transmission systems consist of 14" – 60" (350mm – 1,500mm) Centurion pipe.

CIOD pipes in all these size ranges are referred to as having a Pressure Class by AWWA C900, and a Pressure Rating by CSA B137.3. Both standards include a 2:1 safety factor for pressure.

AWWA Pressure Classes
CSA Pressure Ratings

Dimension Ratio	PSI	kPa
14	305	2,130
18	235	1,620
25	165	1,150
32.5	125	860
41	100	690
51	80	550

IPEX Centurion is a natural choice for **gravity flow lines**

GRAVITY APPLICATIONS

With its pressure rated joints and non-corroding construction, IPEX Centurion is a natural choice for gravity flow lines. When designing any flexible conduit application, the ring deflection should be calculated for the applicable loading conditions. The following table shows the ring deflections for different DRs based on depth of bury and H20 loading. For more information on how to calculate ring deflections for PVC pipe, please refer to the IPEX Technical Manual Volume II: Sewer Piping Systems Design.

ASTM Embedment Material Classification		Density (Proctor) AASHTO T-99	E' psi (kPa)	DR	Depth of Cover													
					ft	1	2	4	6	8	10	15	20	25	30	35	40	45	50
					m	0.3	0.6	1.2	1.8	2.4	3.0	4.6	6.1	7.6	9.1	10.7	12.2	13.7	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
		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
		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

- Deflection values shown include effect of H20 live load and dead load.
- External loading based upon a prism load of soil weight of 120 lbs. per cubic foot (1,900 kg/m3).
- Bedding classifications correspond to ASTM D2321.
- The deflection lag factor is 1.0 for a prism load.
- DR18 & DR 14 deflections have not been shown because they are insignificant in most cases.
- Recommended maximum deflection is 7.5%. Contact IPEX for applications where greater deflections are anticipated.
- n/r – not recommended for H20 live load (ok with dead load)

DIMENSIONS

IPEX Centurion is manufactured with a cast-iron outside diameter (CIOD) so it is compatible with much of the existing older infrastructure of iron pipes. In addition, IPEX Centurion can be field-cut, which means unexpected changes in the field can be accommodated quickly, without having to wait for special custom pieces and shop drawings.

IPEX Centurion Fittings are manufactured using sections of AWWA C900 pipe that are fused or bonded together. Some fittings are overwrapped with a layer of fibre reinforced plastic (FRP). While IPEX Centurion is compatible with iron fittings, IPEX recommends the use of IPEX Centurion fittings exclusively with IPEX Centurion pipe.

Size		PR/PC 80 (DR 51)						PR/PC 100 (DR 41)						PR/PC 125 (DR 32.5)					
		Average ID		Min. Wall Thickness		Average OD		Average ID		Min. Wall Thickness		Average OD		Average ID		Min. Wall Thickness		Average OD	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
14	350	–	–	–	–	–	–	14.6	369.7	0.37	9.5	15.3	388.6	14.4	364.7	0.47	12.0	15.3	388.6
16	400	16.7	423.7	0.36	9.19	17.4	442.0	16.6	420.4	0.43	10.8	17.4	442.0	16.3	414.5	0.54	13.6	17.4	442.0
18	450	18.7	475.9	0.38	9.74	19.5	495.3	18.5	471.1	0.48	12.1	19.5	495.3	18.3	464.8	0.6	15.2	19.5	495.3
20	500	20.8	527.0	0.42	10.8	21.6	548.6	20.5	521.8	0.53	13.4	21.6	548.6	20.3	514.6	0.67	16.9	21.6	548.6
24	600	24.8	629.6	0.50	12.9	25.8	655.3	24.5	623.3	0.63	16.0	25.8	655.3	24.2	615.0	0.8	20.2	25.8	655.3
30	750	30.7	780.9	0.63	15.9	32.0	812.8	30.4	773.2	0.78	19.8	32.0	812.8	30.0	762.8	0.98	25.0	32.0	812.8
36	900	36.8	934.7	0.75	19.1	38.3	972.8	36.4	925.3	0.93	23.7	38.3	972.8	35.9	912.9	1.18	29.9	38.3	972.8
42	1,050	42.6	1,082.8	0.87	22.2	44.5	1,130.3	42.2	1,071.4	1.09	27.5	44.5	1,130.3	41.6	1,056.6	1.37	34.8	44.5	1,130.3
48	1,200	48.7	1,236.2	1.00	25.3	50.8	1,290.3	48.2	1,223.0	1.24	31.5	50.8	1,290.3	47.7	1,211.1	1.56	39.6	50.8	1,290.3
54	1,350	55.3	1,404.6	1.13	28.7	57.6	1,462.0	54.8	1,391.9	1.40	35.7	57.6	1,462.0	54.1	1,374.1	1.77	45.0	57.6	1,462.0
60	1,500	59.2	1,503.2	1.21	30.7	61.6	1,564.9	58.6	1,488.4	1.50	38.1	61.6	1,564.9	–	–	–	–	–	–

Size		PR/PC 165 (DR25)						PR/PC 235 (DR18)						PR/PC 305 (DR14)					
		Average ID		Min. Wall Thickness		Average OD		Average ID		Min. Wall Thickness		Average OD		Average ID		Min. Wall Thickness		Average OD	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
14	350	14.1	357.5	0.61	15.6	15.3	388.6	13.6	345.4	0.85	21.6	15.3	388.6	13.1	333.0	1.09	27.8	15.3	388.6
16	400	16.0	406.6	0.70	17.7	17.4	442.0	15.5	392.9	0.97	24.6	17.4	442.0	14.9	378.8	1.24	31.6	17.4	442.0
18	450	17.9	455.7	0.78	19.8	19.5	495.3	17.3	440.3	1.08	27.5	19.5	495.3	–	–	–	–	–	–
20	500	19.9	504.7	0.86	22.0	21.6	548.6	19.2	487.6	1.20	30.5	21.6	548.6	–	–	–	–	–	–
24	600	23.7	602.9	1.03	26.2	25.8	655.3	22.9	582.5	1.43	36.4	25.8	655.3	–	–	–	–	–	–
30	750	29.4	747.8	1.28	32.5	32.0	812.8	28.4	722.4	1.78	45.2	32.0	812.8	–	–	–	–	–	–
36	900	35.2	895.0	1.53	38.9	38.3	972.8	–	–	–	–	–	–	–	–	–	–	–	–
42	1,050	40.9	1,039.9	1.78	45.2	44.5	1,130.3	–	–	–	–	–	–	–	–	–	–	–	–
48	1,200	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
54	1,350	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
60	1,500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

SURGE PRESSURES

Transient pressures in pipelines occur as a result of the fluid velocity changing over a relatively short time. However it should be noted that for most large diameter pipelines, a formal transient analysis should be carried out by a qualified person in order to fully understand the effects of transients in any given system.

The table on the side shows the surge pressure generated assuming an instantaneous stoppage of a flow moving at 0.3 m/s (1 ft/s).

DR	Surge Pressure	
	psi	kPa
51	10.8	74
41	11.4	79
32.5	12.8	88
25	14.7	101
18	17.4	120
14	19.8	137

SAMPLE SPECIFICATION

General

Pipe must conform to AWWA C900 and be certified to CSA B137.3 "Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications." Pressure Class or Rating of pipe shall be as assigned in the AWWA and CSA standards and all be derived using a Hydrostatic Design Stress of 2,000 psi (13.8 MPa). For pressure applications, each length of pipe must be hydrotested at twice the rating and a short-term pressure test must be conducted once per production run. Pipe to be IPEX Centurion or approved equal.

Fabricated Fittings

Fabricated fittings shall be made from segments of AWWA C900 pipe that are butt-fused or bonded together. Some fittings are over-wrapped with fiberglass-reinforced polyester. The fittings must always meet the pressure/class rating of the pipe system.

Deflecting the Joint

The procedure for offsetting the IPEX gasketed joint is shown below.

1. Make a concentric assembly, but push the spigot into the bell only to a point about 1/2 inch (13mm) short of the reference line (the first reference line if there are two). This incomplete assembly permits more movement of the end of the pipe at the bottom of the bell.

2. Without delay, shift the loose bell end of the assembled length by not more than the following recommended maximum offsets. Use only manual effort.

MAXIMUM RECOMMENDED OFFSETS, TO ACHIEVE MINIMUM CURVE RADIUS BY DEFLECTING A STRAIGHT LENGTH OF PIPE AT THE JOINT (FOR ALL PRODUCTS)

Pipe Size		Max Offset		Angle at One Bell	Resulting Radius of Curvature Using 20ft (6m) Lengths	
in	mm	in	mm			
14 - 60	350 - 1,500	4	100	1.0°	1,146 ft	349 m
Fabricated PVC Fittings (all sizes)		4	100	1.0°*	1,146 ft	349 m

* Bell-by-Bell fittings such as tees and couplings offer a total of 2° deflection per fitting.

Standards

AWWA C900

CSA B137.3

NQ 3624-250

NSF 61

FM 1612
DR 18 is FM approved to 24" (600mm)

UL 1285
DR 18 is listed to 24" (600mm)

DR 25 is listed to 30" (750mm)

SALES AND CUSTOMER SERVICE

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About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the world's largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial process piping systems
- Electrical systems
- Telecommunications and utility piping systems
- Irrigation systems
- Industrial, plumbing and electrical cements

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