

# TYTON® Z+ DUCTILE IRON PIPE SYSTEMS FLANGE CLASS RRJ DN100-750

For Potable Water, Raw Water,  
Sewer and Aggressive Fluids



## THE BENEFITS OF DUCTILE IRON

Flange Class (FLCL) TYTON Ductile Iron pipe is specially manufactured with thicker walls to allow machining and screw threading attachment of flanges.

With allowable operating pressures beginning at 4.4MPa (PN44) Flange Class Ductile Iron Pipes are relied upon for heavy duty performance under extreme load.



DN 100-750

## TYTON XCEL Z+

TYTON XCEL is synonymous with the introduction of pressure class DI Pipe into Australia. Efficiency gains and cost savings are achieved without sacrificing the time proven superior performance capabilities associated with ductile iron.

### Lining Options

The standard lining is a centrifugally spun cement mortar lining made up of Type SR (Sulphate Resisting) cement.

An additional Seal Coat applied to the cement lining surface is available as an option to inhibit the leaching of lime where very aggressive, soft waters of low hardness (total alkalinity <30mg/L) or high dissolved CO<sub>2</sub> are being conveyed.

**For the conveyance of potable water,  
recycled water & raw water**

## TYTON XTREME Z+

TYTON XTREME incorporates a highly wear resistant Calcium Aluminate Cement (CAC) mortar lining.

This lining protects the internal surface from corrosion, tuberculation and bacteriogenic acid attack when conveying aggressive fluids common in sewage and wastewater pipelines. Perfectly watertight & prevents root ingress.

### For the conveyance of wastewater including:

- Gravity & Pressure Sewer effluent
- Domestic waste waters
- Mining slurries & process water
- Fluids between pH4 and pH12

## Z+ ZINC/ALUMINIUM/RARE EARTH ALLOY & SYNTHETIC RESIN COATING

Z+ is a modern, highly effective Active Corrosion protection layer made up of Zinc, Aluminium and Rare Earths. Applied at 400g/m<sup>2</sup>, Z+ is twice the density required by AS2280 for Zinc and is finished with 100µm average synthetic resin layer.

Active protection means the pipe continues to be protected in the case of superficial damage to the external coating.

Z+ gives you the opportunity to take advantage of a factory applied corrosion protection system which will extend the life of your pipeline and reduce on site handling by eliminating the requirement for polyethylene sleeving.

## THE Z+ ADVANTAGE

Z+ Provides for exceptional pipeline performance and durability.

Pipe life increased to 3 times that of standard zinc coated pipe.

Suitable for more than 95% of the most frequently encountered ground types.

Soil assessment must be carried out to ensure resistivity is greater than 500 ohm.cm prior to sleeveless installation.

Speak to us about soil assessment options where required.

## TYTON XCEED Z+

When it comes to highly aggressive fluids Polyurethane (PU) is the lining which simply exceeds all expectation.

TYTON XCEED's PU lining is applied in accordance with EN15655 and has an average thickness of 1300-1500µm.

### For the conveyance of potable water, wastewater & sewer including:

- Very soft water (hardness less than 1mg/L) combined with extremely long residence times
- Mineral water, i.e. water whose chemical specifications must remain unchanged between the pipeline inlet and outlet
- Aggressive conveyants including septic sewage, high CO<sub>2</sub>, chlorides, sulphates & brine

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For Potable Water, Raw Water and  
Sewerage Rising Mains Applications



NOMINAL SIZE	Symbol	Units	100	150	200	225	250	300	375	450	500	600	750	
KEY METRICS	Nominal pressure	PN	Nom	FLCL	FLCL	FLCL	FLCL	FLCL	FLCL	FLCL	FLCL	FLCL	FLCL	
	Mean external diameter	$\varnothing_y$	mm	122	177	232	259	286	345	426	507	560	667	826
	Effective laying length	$L_e$	m	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
	Joint defelection	°	deg	3.5	3.5	3.5	3.5	3.5	2.5	2.5	2.5	2.5	2.5	1
UNLINED PIPE	Mean internal diameter	DI	mm	107	162	215	242	267	326	405	483	536	641	796
	Pipe barrel mass per metre	$m_b$	kg/m	18.8	28.2	42.1	47.2	58.8	71.3	98.4	129.4	143.3	186.9	271.2
	Pipe mass including socket	$M_s$	kg	107	178	237	297	329	440	553	723	868	1,165	1,607
SOCKET	Socket mass	S	kg	4.3	5.9	8.6	10.4	11.3	13.4	23.7	27.7	30.3	35.6	60.8
DI WALL THICKNESS	Nominal	t	mm	7.4	7.5	8.5	8.5	9.6	9.6	10.7	11.8	11.8	12.9	15.1
	Minimum	a	mm	6.0	6.0	7.0	7.0	8.0	8.0	9.0	10.0	10.0	11.0	13.0
CEMENT MORTAR LINED PIPE	Mean internal diameter	$D_c$	mm	98	153	206	233	258	317	396	474	527	632	785
	Nominal CML thickness	$t_{c\ nom}$	mm	5	5	5	5	5	5	5	5	5	5	6
	Minimum CML thickness	$t_{c\ min}$	mm	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4.5
	Pipe barrel mass per metre	$m_l$	kg/m	22.3	33.5	49.2	55.2	67.7	82.2	112.0	145.7	161.3	208.5	304.0
THEORETICALLY RATED PRESSURES	Pipe mass including socket and CML	$M_l$	kg	131	197	289	325	397	482	662	858	950	1,224	1,793
	Allowable operating pressure	AOP	MPa	14.48	9.82	8.71	7.78	8.06	6.65	6.04	5.63	5.09	4.70	4.48
	Maximum allowable operating pressure	MAOP	MPa	17.38	11.79	10.45	9.33	9.67	7.98	7.25	6.76	6.11	5.63	5.37
	Allowable site test pressure	ASTP	MPa	18.10	12.28	10.89	9.72	10.07	8.31	7.55	7.04	6.36	5.87	5.60
STRUCTURAL & HYDRAULIC PROPERTIES	Burst pressure	BURST	MPa	43	29	26	23	24	20	18	17	15	14	13
	Transform wall thickness	$t_t$	mm	7.05	7.10	8.10	8.10	9.15	9.15	10.20	11.25	11.25	12.30	14.50
	Celerity of mean CML bore	c	m/s	1,322	1,272	1,248	1,229	1,232	1,197	1,176	1,160	1,138	1,119	1,107
	Barrel ring stiffness	$S_D$	kN/m/m	3,239	1,027	668	475	510	286	209	165	122	94	81
FREIGHT	Buckling pressure	P	kPa	34,165	10,840	7,043	5,008	5,375	3,013	2,201	1,743	1,285	989	851
	Pipes (lined) per truck	P/T	n	180	110	82	68	60	46	36	24	24	12	8
WATER MASS	Kilos per truck	$n \times M_l$	kg	23,620	21,653	23,710	22,109	23,821	22,173	23,835	20,592	22,796	14,688	14,347
	Mass of water contained in pipe	$m_w$	kg/m	8	18	33	43	52	79	123	177	218	314	484
MASS FULL	Mass of pipe full of water	$M_f$	kg/m	31	53	84	100	122	163	239	327	385	529	798
	Moment = $wL^2/8$ for simply supported beam over ELL	$M_b$	kNm	1.22	2.11	3.35	3.97	4.85	6.51	9.52	13.04	15.34	21.06	31.81
BENDING MOMENT AND FOS AGAINST FLEXURAL YIELD	$y = DE/2$	y	mm	61	89	116	130	143	173	213	254	280	334	413
	$I = n/64 (D_o^4 - D_i^4)$	I	mm <sup>4</sup>	3.69E+06	1.18E+07	3.13E+07	4.40E+07	6.76E+07	1.20E+08	2.56E+08	4.82E+08	6.54E+08	1.22E+09	2.74E+09
	$\sigma = My/I$ Note max $M = 3wL^2/8$	$\sigma_y$	MPa	60	47	37	35	31	28	24	21	20	17	14
	FOS = Yield stress / Working stress	FOS	$\eta$	5.0	6.0	8.1	8.6	9.7	10.7	12.6	14.6	15.2	17.4	20.9

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## CERTIFICATIONS

AS/NZS2280 – Ductile Iron Pipes & Fittings  
Licence No. - WMK26514 SMK26514  
AS4020 – Testing for use in contact with drinking water  
EN15655.1 - Polyurethane lining of pipes and fittings

