Plastics Industry Pipe Association of Australia Limited ACN 086 511 686

Industry Guidelines

RESISTANCE OF PLASTICS PIPES AND FITTINGS TO WATER AND WASTEWATER CHEMICALS

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Pipelines Integrity For a Cleaner Environment

Disclaimer

In formulating this guideline PIPA has relied upon the advice of its members and, where appropriate, independent testing.

Notwithstanding, users of the guidelines are advised to seek their own independent advice and, where appropriate, to conduct their own testing and assessment of matters contained in the guidelines, and to not rely solely on the guidelines in relation to any matter that may risk loss or damage.

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RESISTANCE OF PLASTICS PIPES AND FITTINGS TO WATER AND WASTEWATER CHEMICALS

In conjunction with the Water Services Association of Australia (WSAA), PIPA has prepared this Guideline to address the resistance of non-metallic pipe and components to chemicals commonly used in water and wastewater systems. The guideline only considers chemical concentration and temperature. In some cases the influence of applied stresses can affect the chemical resistance and under these conditions pre-testing of the pipe or fitting under the actual working conditions may be required for critical applications.

Plastics pipe systems are often sealed by elastomeric materials at joints and hence they have been included.

The Guideline does not purport to be a comprehensive table of chemicals, and for chemicals not listed reference should be made to the manufacturer.

The information in this document was based largely on the information contained in ISO/TR 10358 – Plastic pipes and fittings – combined chemical resistance classification table. Other reference material used included “The UPVC Pipelines Design Textbook” (Iplex 1993), “Plastics Technical Manual” (George Fischer 1996) and “Engineering Materials” (6th Edition, Prentice Hall 1999).

Resistance Of Plastics Pipes And Fittings To Water And Wastewater Chemicals

		Non Metals																	
		ABS		PE[2]		PVC		PP		FRP[1]		TEFLON®		EPDM		NBR		VITON®	
		20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C
Chemical	**Ammonia Gas (dry)**	A	A	A	A	A	A	A	A	A A	- A	A	A	A	B	A	A	X	X
	Ammonia Liquid	B	C	A	A	C	X	A	A	X X	X X	A	A	A	B	A	B	X	X
	Ammonia solution 25%	A	B	A	A	A	A	A	A	X A	X X	A	A	A	A	C	X	X	X
	Aluminium Sulphate	A	A	A	A	A	A	A	A	A A	A A	-	-	A	B	A	A	A	A
	Chlorine Gas (dry, <150ppm H2O)	C	X	X	X	A	C	X	X	A A	C A	A	A	X	X	X	X	A	A
	Chlorine Gas (wet, >150ppm H2O)	X	X	X	X	C	X	X	X	X A	X A	A	A	X	X	X	X	A	A
	Chlorine Liquid	X	X	X	X	C	X	X	X	X C	X C	A	A	X	X	X	X	A	A
	Chlorinated Water (<5ppm)	A	C	A	C	A	B	A	C	A A	A A	A	A	A	A	A	B	A	A
	Chlorinated Water (up to 3500ppm)	B	C	C	X	A	B	A	C	A A	X A	A	A	B	C	X	X	A	A
	Chlorine Dioxide	C	X	X	X	B	C	X	X	X A	X B	A	A	X	X	X	X	A	A
	Citric Acid (up to 50%)	A	A	A	A	A	A	A	A	A A	A A	A	A	A	A	A	A	A	A
	Fluosilicic Acid (25%)	A	C	A	A	A	A	A	C	C A	X C	A	A	C	X	C	X	X	X
	Ferric Chloride (42% aqueous)	X	X	A	C	A	C	A	A	A A	A A	A	A	A	A	A	A	A	A

Chemical		ABS		PE[2]		PVC		PP		FRP[1]		TEFLON®		EPDM		NBR		VITON®	
		20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C	20°C	60°C
	Ferric Sulphate (45 %aqueous)	C	X	A	C	A	C	A	A	A A	A A	A	A	A	A	A	A	A	A
	Hydrochloric Acid (30%)	A	C	A	A	A	A	A	C	B A	X C	A	A	A	C	X	X	A	C
	Lime water (25% calcium hydroxide)	A	A	A	A	A	A	A	A	A A	B A	A	A	A	C	A	-	A	-
	Magnesium Hydroxide	A	A	A	A	A	A	A	A	C A	X A	A	-	A	-	A	-	A	-
	Ozone	X	X	C	X	A	A	-	-	- -	- -	-	-	A	-	-	-	A	-
	Potassium Permanganate (25%)	X	X	X	X	A	A	A	A	A A	X A	A	A	A	A	C	X	A	A
	Sodium bisulphate	A	A	A	A	A	A	A	A	A A	A A	A	A	A	A	A	A	A	A
	Sodium Fluoride (4% saturated)	A	A	A	A	A	A	A	A	- A	- A	-	-	-	-	A	C	-	C
	Sodium Hydroxide (25%)	A	A	A	A	A	A	A	A	X A	X B	-	-	A	-	A	-	A	-
	Sodium Hydroxide (50%)	A	C	A	A	A	A	A	A	X A	X C	A	A	A	C	C	X	X	X
	Sodium Hypochlorite (12.5%)	A	X	B[3]	X	A	B	B	C	X B	X B	-	-	A	-	C	X	A	-
	Sodium Silicate (20 – 40 %)	A	A	A	A	A	A	A	A	C A	C A	A	A	A	A	A	A	A	A
	Sulphuric Acid (98%)	X	X	A	X	A	C	X	X	X X	X X	A	A	X	X	X	X	A	A

Key:
A – Excellent resistance under normal conditions
B – Good resistance (some softening / degradation may occur over time)
C – Conditional/limited resistance (consult specialist)
X – Not recommended

\- No Data

Notes:
[1] – top / bottom figure refers to polyester / vinylester resin.
[2] – Polyethylene materials for PE pipes, fabricated storage tanks and rotational moulded tanks.
[3] - PE resistance to sodium hypochlorite is rated "B" based on continual long-term immersion at a strength of 12.5% hypochlorite. Intermittent use at a lower concentration can be rated "A