

FUGRO TECHNICAL SERVICES LIMITED

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REPORT ON uPVC PIPES AND FITTINGS

Client : Unique Engineering (HK) Ltd.
Project : Testing of uPVC Pipe and Fitting
Client Ref. : --
Report No. : 130489ST150055

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REPORT ON uPVC PIPE AND FITTING**Information Supplied by Client**

Client : Unique Engineering (HK) Ltd.
Project : Testing of uPVC Pipe and Fitting
Location : No. 158 Chenggong Road, Kunshan City, Jiangsu Province, China
Sample Description : 8 Inch and 16 inch, Imperial (inch)-sized uPVC Pipes and Fittings
- 90 degree short bends
Manufacturer : KUNSHAN SHIE YU VALVE CO., LTD.
Country of Origin : Taiwan / China

Laboratory Information

Lab. Sample I.D. : ST150055
Date Received : 02 February 2015
Date Test Started : 02 February 2015
Date Test Completed : 04 February 2015
Test Method : BS EN ISO 1452-2 : 2009 and BS EN ISO 1452-3 : 2010

Test Result**1.0 Dimensions**

Type	Nominal Size (inch)	Mean Outside Diameter (mm)			Tolerance for out-of-roundness(mm)		Wall Thickness (mm)	
		Measured	Requirement d_{nom}		Measured	Requirement	Measured	Requirement (e)
			Min.	Max.				
Pipe	8	219.12	218.8	219.4	1.00	max. 2.2	12.70	12.6 - 14.5
Pipe	16	406.50	405.9	406.9	2.00	max. 4.2	23.90	23.4 - 27

Type	Nominal Size (inch)	Mean inside diameter of socket at midpoint of socket length			Socket Length (mm)	
		Measured	Requirement d_{im}		Measured	Requirement L(min.)
			Min.	Max.		
Bend	8	219.40	219.00	219.40	115.50	min. 115.50
Bend	16	406.50	NA	406.90	215.00	min. 209.00

Type	Nominal Size (inch)	Wall Thickness (mm)		Tolerance for out-of-roundness (mm) at the inside midpoint of the socket length	
		Measured	Requirement (e)	Measured	Requirement
Bend	8	12.70	≥ 12.6	0.20	± 0.44
Bend	16	23.90	≥ 23.4	0.60	± 0.81

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2.0 Impact Strength

Type	Nominal Size (Inch)	Medium Level M			Result of Strikes		Result
		Mass of falling weight (kg)	Fall Height (m)	Impact Energy (Nm)	Total No. of Blows	No. of failure	TIR
Pipe	8	2.5	1.8	44	25	0	< 10%
Pipe	16	3.2	2.0	63	25	0	< 10%

Remark : The falling weight impact test is designed solely for testing pipes in S series, this classification cannot be applied to imperial (inch) - sized pipes.

3.0 Resistance to Internal Pressure (Short-Term Strength)

Type	Nominal Size (Inch)	No. of Specimens	Test Parameters	Result
Pipe	8	3	Temperature : 20°C Test period : 1 hr Type of test : water in water Testing Pressure : 51.5 bar for 8" products 52.5 bar for 16" products	No failure
Pipe	16	3		No failure
Bend	8	3		No failure
Bend	16	3		No failure

4.0 Longitudinal Reversion

Type	Nominal Size (Inch)	No. of Specimens	Test Parameters	Requirement	Result
Pipe	8	3	Test period : 240 min. for thk $e > 16\text{mm}$; 120 min. for thk $8\text{mm} < e \leq 16\text{mm}$; Test temperature : $150 \pm 2^\circ\text{C}$	Maximum 5%	1.30%
Pipe	16	3			1%

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5.0 Vicat Softening Temperature (VST)

Type	Nominal Size (Inch)	No. of Specimens	Test Parameters	Measured Temperature Range	Requirement
Pipe	8	3	Test pieces for pipes and fittings : 20mm x 50mm x 4mm	84 - 86°C	>= 80°C for pipe >= 74°C for fitting
Pipe	16	3		84 - 86°C	
Bend	8	3		78 - 79°C	
Bend	16	3		78 - 79°C	

6.0 Effects of heating

Type	Nominal Size (Inch)	No. of Specimens	Test Parameters	Requirement	Requirement
Bend	8	3	Test Period : 60 min. for thk 10 mm < e <= 20mm ; 140min. for thk 20mm < e <= 30mm; Test Temperature : 150±2°C	No blisters or signs of weld-line splitting. No surface damage in the area of any injection point shall penetrate deeper than 50% of the wall thickness at that point. Outside the area of any injection point no surface damage shall occur	No failure
Bend	16	3			No failure

7.0 Summary of Results

Dimensions : As shown in Section 1
Impact Strength : Satisfactory at medium level, test is applicable solely for S series
Short-Term Hydrostatic pressure test : Satisfactory
Longitudinal Reversion : Satisfactory
Vicat Softening Temperature : Satisfactory
Effect of Heating : Satisfactory

Remarks : 1.) The results of the report relate only to the samples tested.
2.) The test configuration is shown in the photographs on page 4 of this report.

Checked by : Igor Date : 31 MAR 2015 Certified by : Chan Chun Wai Ivan Date : 31 MAR 2015
Manager (Product Testing Laboratory)

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8.0 Photographs



Test Configuration
(Impact Strength Test)



Test Configuration
(Impact Strength Test)



Test Configuration
(Longitudinal Reversion Test)
8 Inch Pipe



Test Configuration
(Longitudinal Reversion Test)
16 Inch Pipe



Test Configuration
(Vicat Softening Temperature)



Test Configuration
(Effects of Heating)



Test Configuration
(Hydrostatic Pressure Test)
8 Inch Pipe



Test Configuration
(Hydrostatic Pressure Test)
16 Inch Pipe

**** End of Report ****