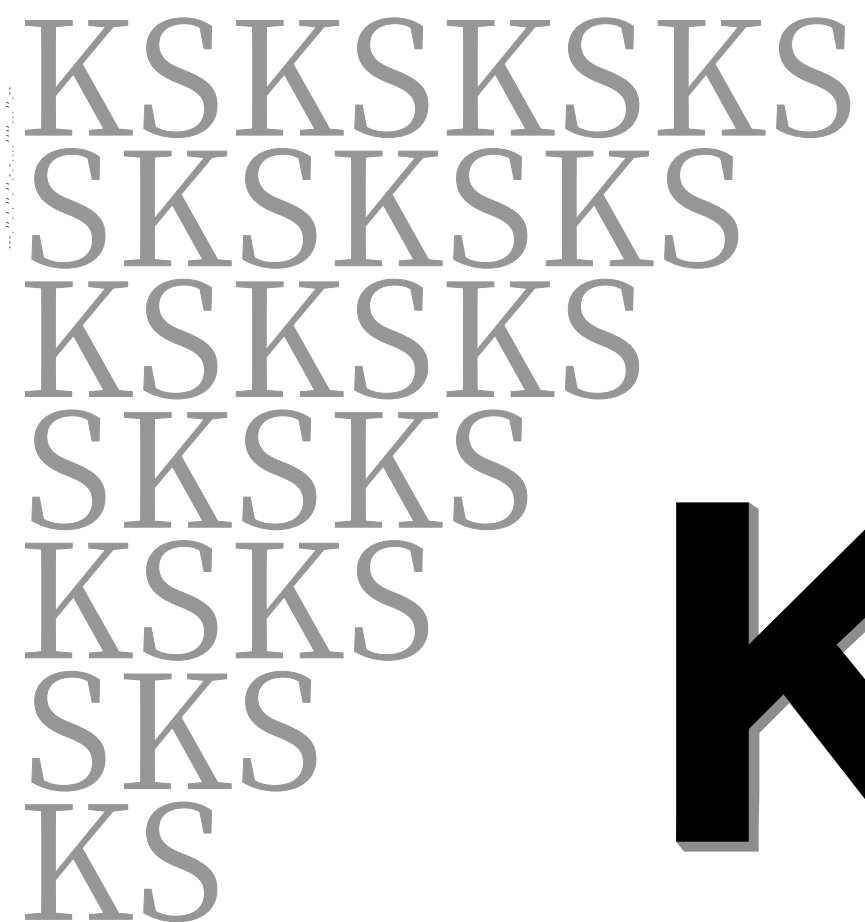




KS D 9202



Polyethylene Composite Pressure Aluminum Pipe

KS D 9202 : 2003

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Polyethylene Composite Pressure Aluminum Pipe

1. Application Scope This standard regulates Polyethylene Composite Pressure Aluminum Pipe⁽¹⁾ (hereafter called 'Pipes') that are used for cold water and hot water (90°C or less), for drinking water and gas piping.

Note ⁽¹⁾ Polyethylene Composite Pressure Aluminum Pipe refers to pipe that is formed by Polyethylene Resin adhesion on Aluminum Pipe.

Note : 1. Aluminum Pipe Quality shall follow the Appendix of this standard.

2. Polyethylene Resin Quality shall follow Appendix.

3. Adhesive Resin Quality shall follow Appendix.

4. Units and values in { } are of the past unit system.

2. Referenced Standards The following standards are quoted in this standard and thus, form a part of the standard. Their latest versions shall apply.

KS A 0006 Standard Conditions for Testing Environment

KS A 3151 Random Sampling Method

KS D 0001 Steel Inspection General Rules

KS D 1873 Aluminum & Aluminum Alloy Analysis Method

KS D 6701 Aluminum & Aluminum Alloy Plate & Assembly

KS M 3408 Polyethylene Pipe for Water Supply

KS M 3416 Non-bridging Polyethylene(PE) Pipe for Cold and Hot Water Piping

KS M ISO 1872—2 Plastic—Polyethylene (PE) Molding & Extrusion Material—Part II : Test Sample Manufacturing & Property Measurement

3. Types Pipe Types shall follow Table 1.

Table 1 Pipe Types

Types	Welding Method	Pipe Structure	Reference
Type 1	Butt	PE ⁽²⁾ or PE—RT ⁽³⁾ /Al Alloy/PE or PE—RT	Exterior Layer/
Type 2		PE or PE—RT/Al Alloy/XPE ⁽⁴⁾ or PE—RT	Middle Layer/
Type 3	Overlap	PE or PE—RT/Al Alloy/PE or PE—RT	Interior Layer
Type 4		PE or PE—RT/Al Alloy/XPE or PE—RT	

Note ⁽²⁾ PE is a thermal processed plastic of milk white color obtained from ethylene polymer processing and has relative weight less than 1. Polyethylene used in this standard refers to resin used for potable water supply at 40°C or less and its quality shall satisfy the Appendix.

(³) PE—RT refers to Non-Bridging Polyethylene Resin that satisfies specifications of KS M 3416 with much enhanced Thermal Creep Properties than regular Polyethylene.

(4) XPE refers to increased Molecular Weight through three-dimensional chemical combination (bridging) through special means among molecules.

Note : For potable water piping Type 1 and Type 3 shall apply. For hot water and bath water supply Type 2 and Type 4 shall apply.

4. Pipe Structure & Nomenclatures Pipe Structure & Nomenclatures are as in Figure 1.

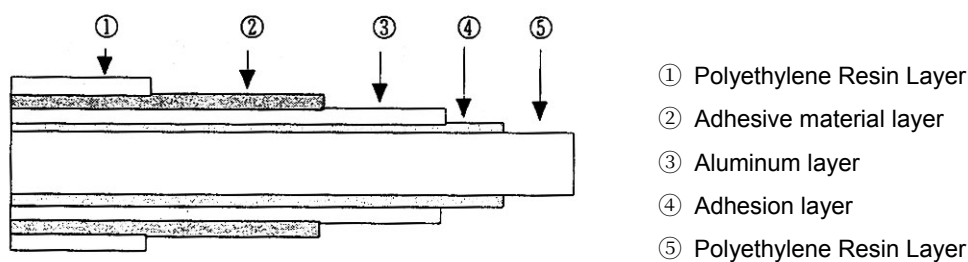


Figure 1 Structure & Nomenclatures

5. Manufacturing Method

5.1 The interior and exterior pipes shall consist of Polyethylene Resin with Polyethylene Polymer as the main ingredient and manufactured using Extrusion or other methods.

5.2 Aluminum Pipes shall be manufactured using Butt Welding or Overlap Welding.

5.3 Polyethylene Composite Pressure Pipes shall have adhesive resin sprayed on both interior and exterior surfaces with Aluminum Pipe at center so that Polyethylene Pipe and Aluminum Pipe are adhered.

6. Mechanical Properties

6.1 Elongation Breaking Load Pipes shall be tested according to 10.2 and the results shall satisfy Table 2.

Table 2 Elongation Breaking Load

Types Symbol	Nominal Diameter(mm)	Elongation Breaking Load(N)
Type 1, Type 2	16	2 058 or greater
	20	2 352 or greater
	26	2 352 or greater
	32	2 744 or greater
Type 3, Type 4	16	2 300 or greater
	20	2 500 or greater
	26	2 500 or greater
	32	2 500 or greater

6.2 Breaking Water Pressure Pipes shall under tests of 10.3 and measure their Breaking Pressure. Measured Breaking Strength Pressures shall be according to Table 3.

Table 3 Minimum Breaking Water Pressure

Type Nomenclature	Nominal Diameter mm	Breaking Water Pressure (MPa)	
		23±2°C	80°C
Type 1, Type 2	16	8.8 or greater	4.4 or greater
	20	7.9 or greater	3.9 or greater
	26	6.9 or greater	3.4 or greater
	32	5.9 or greater	3.4 or greater
Type 3, Type 4	16	6.0 or greater	—
	20	5.0 or greater	—
	26	4.0 or greater	—
	32	4.0 or greater	—

6.3 Thermal Internal Pressure Creep Pipes shall under test of 10.4 for Leakage or Damage.

6.4 Heating Deformation Pipes shall undergo tests of 10.5 and ensure that Length Variation be ± 1 % or less.

6.5 Adhesive Strength

6.5.1 Type 1, Type 2 Adhesive Strength Test of Aluminum Layer and Exterior Polyethylene Layer of manufactured pipes shall be done according to 10.6.1 and their values shall be 1.8N/mm^2 { 0.18 kgf/mm^2 } or greater.

6.5.2 Type 3, Type 4 Adhesive Strength Test of Aluminum Layer and Exterior Polyethylene Layer of manufactured pipes shall be done according to 10.6.2 and they shall not peel off.

6.6 Layer Separation Pipes shall undergo test of 10.7 and no layer separation shall occur (for Type 1 and Type 2 only.)

6.7 Welding Line Pipes shall undergo test of 10.8 and shall not experience any parting or tearing (for Type 1 and Type 2 only.)

7. Leaching Test Pipes shall have leaching tests of 10.9 and the results shall satisfy specifications of Table 4.

Table 4 Leaching Test

Test Item Types	Turbidity	Chromaticity	Potassium Permanganate Consumption mg/L	Residual Chloride Reduction mg/L		Odor & Taste
				Room Temperature	$90\pm 2^\circ\text{C}$	
Type 1, Type 2 Type 3, Type 4	0.5 or less	1.0 or less	2.0 or less	0.7 or less	1.0 or less	No abnormality

8. Outward Appearance

- a) Polyethylene resin shall be adhered well to both exterior and interior surfaces of aluminum.
- b) Both interior and exterior surfaces of pipe shall be smooth, have no harmful defects for use, lengthwise lines, cracks, or twisted areas. Pipe shall contain no harmful defects such as air pockets, air bubbles or non-uniformity.

9. Dimensions & Tolerances

9.1 Dimension Dimensions & Tolerances shall follow Table 5.