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**Glass fibre reinforced polyethylene
(PE-GF) pipe systems—Part 2:
Pipes**

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Foreword

This Japanese Industrial Standard has been established by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

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JIS K 6799 series consists of the following three parts under the general title “*Glass fibre reinforced polyethylene (PE-GF) pipe systems*”:

Part 1: General

Part 2: Pipes

Part 3: Fittings

Glass fibre reinforced polyethylene (PE-GF) pipe systems—Part 2: Pipes

Introduction

This Japanese Industrial Standard has been established in response to an increasing need both at home and abroad for standardization of glass fibre reinforced polyethylene pipe systems for which demand has been growing in applications on water transport.

1 Scope

This Standard specifies pipes for glass fibre reinforced polyethylene pipe systems which are laid underground and used mainly for transport of liquid materials such as water.

The glass fibre reinforced polyethylene pipe systems are used mainly in the following applications:

- agricultural water;
- power generation facility;
- water treatment facility;
- sewage facility;
- chemical plant.

WARNING Persons carrying out tests by using this Standard should have a thorough knowledge of thermoplastics. It is the responsibility of the user to establish appropriate safety and health practices. This Standard does not purport to address all of the safety problems, if any, associated with its use.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7506 *Gauge blocks*

JIS B 7512 *Steel tape measures*

JIS B 7516 *Metal rules*

JIS B 7721 *Tension/compression testing machines—Calibration and verification of the force-measuring system*

JIS K 6799-1 *Glass fibre reinforced polyethylene (PE-GF) pipe systems—Part 1: General*

JIS K 6814 *Thermoplastics pipes—Thermal reversion test method*

JIS K 6815-1 *Thermoplastics pipes—Determination of tensile properties—Part 1: General test method*

- JIS K 6815-3 *Thermoplastics pipes—Determination of tensile properties—Part 3: Polyolefin pipes*
- JIS K 7100 *Plastics—Standard atmospheres for conditioning and testing*
- JIS K 7112 *Plastics—Methods of determining the density and relative density of non-cellular plastics*
- JIS K 7161-1 *Plastics—Determination of tensile properties—Part 1: General principles*
- JIS K 7171 *Plastics—Determination of flexural properties*
- JIS K 7181 *Plastics—Determination of compressive properties*
- JIS Z 8401 *Guide to the rounding of numbers*
- JIS Z 8703 *Standard atmospheric conditions for testing*
- ISO 1167-1 *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids—Determination of the resistance to internal pressure—Part 1: General method*
- ISO 1167-2 *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids—Determination of the resistance to internal pressure—Part 2: Preparation of pipe test pieces*
- ISO 7510 *Plastics piping systems—Glass-reinforced plastics (GRP) components—Determination of the amounts of constituents*
- ISO 9080 *Plastics piping and ducting systems—Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation*
- ISO 13479 *Polyolefin pipes for the conveyance of fluids—Determination of resistance to crack propagation—Test method for slow crack growth on notched pipes*
- ISO 13954 *Plastics pipes and fittings—Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS K 6799-1** apply.

4 Symbols and abbreviated terms

For the purposes of this Standard, the symbols and abbreviated terms given in **JIS K 6799-1** apply.

5 Classification

Pipes shall be classified by maximum working pressure (PN) and shall be as given in Table 1.

Table 1 Classification of pipes

Classification	PN MPa	SIDR	SDR (informative)
Class 1 pipe	1.4	22	24
Class 2 pipe	1.1	28	30
Class 3 pipe	0.9	35	37

SIDR shall be obtained by Formula (1).

$$\text{SIDR} = \frac{d_i}{t} \dots\dots\dots (1)$$

where, d_i : inside diameter (mm)
 t : pipe wall thickness (mm)

NOTE SDR is obtained by Formula (2).

$$\text{SDR} = \text{SIDR} + 2 \dots\dots\dots (2)$$

6 Manufacturing method

Pipes shall be manufactured by winding extrusion moulding.

7 Materials

Pipe materials shall be in accordance with **JIS K 6799-1**.

8 Pipes

8.1 Appearance and shape

The appearance and shape of pipes shall be as follows:

- a) pipes shall appear smooth on the inside surface and shall be free from cracks, twists and flaws detrimental to use;
- b) pipes shall have a shape of practically perfect circle when visually checked. The word “practical” indicates that the pipe maintains a certain level of watertightness in fittings, flow properties and workability.

8.2 Performance

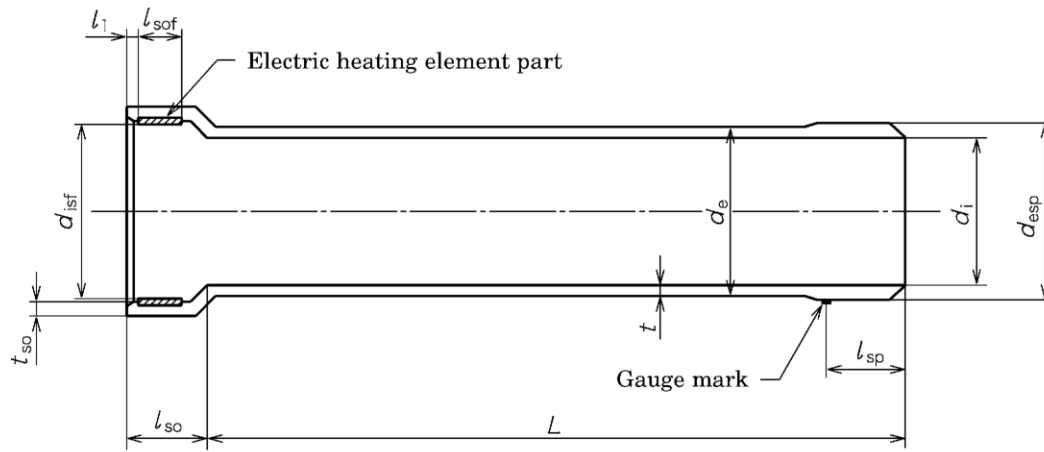
Performance of pipes shall be as given in Table 2.

Table 2 Performance of pipes

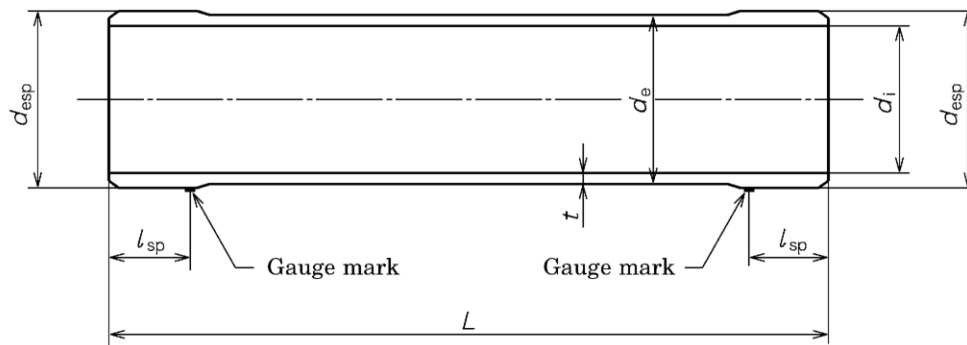
Item		Required performance
Density		1 020 kg/m ³ to 1 120 kg/m ³
Glass fibre addition		19.0 % to 21.0 %
Thermal stability		20 min or more
Tensile strength	Pipe circumferential direction	40 MPa or more
	Pipe longitudinal direction	24 MPa or more
Tension elasticity modulus	Pipe circumferential direction	2 500 MPa or more
	Pipe longitudinal direction	1 300 MPa or more
Bending elasticity modulus	Pipe circumferential direction	2 500 MPa or more
	Pipe longitudinal direction	1 300 MPa or more
Compressive elasticity modulus	Pipe circumferential direction	2 500 MPa or more
	Pipe longitudinal direction	1 300 MPa or more
Thermal longitudinal reversion		Rate of change in length ± 3 %
Minimum required strength		20 MPa or more
Hydrostatic strength		No leakage or damage
Water pressure resistance		No leakage or damage at 3.8 MPa
Peeling		Remaining fused part not shorter than the length at electric heating element part, l_{sof}
Slow crack growth		No leakage or damage
Ring stiffness		Reference ring stiffness given in Table C.3 or more

8.3 Dimensions and dimensional tolerances

The dimensions and dimensional tolerances of pipes shall be determined based on the nominal inside diameter and pipe class as given in Table 3 to Table 5. Examples of the shape of pipes are shown in Figure 1.



a) Type A



b) Type B

Figure 1 Shape of pipes (example)

Table 3 Dimensions and tolerances of pipes

Unit: mm

Inside diameter d_i ^{a)}			Effective length L ^{a)}		Pipe wall thickness t				Outside diameter d_o (informative)		
Nominal inside diameter	Basic dimension	Tolerance	Basic dimension ^{b)}	Tolerance	Class 1 pipe	Class 2 pipe	Class 3 pipe	Tolerance	Class 1 pipe	Class 2 pipe	Class 3 pipe
300	305	± 3.0	5 000	+50 max. –25 min.	15	11	9	+6.0 max.	341	333	329
350	355	± 3.5			17	13	11	0 min.	395	387	383
400	405	± 4.0			19	15	12	+6.5 max.	449	441	435
450	455	± 4.5			22	17	14	0 min.	505	495	489
500	505	± 5.0			24	19	15	+7.0 max.	559	549	541
600	610	± 5.0			29	22	18	0 min.	674	660	652
700	710	± 5.0			33	26	21	+7.5 max.	782	768	758
800	810	± 6.0			38	30	24	0 min.	892	876	864
900	910	± 6.5			42	33	27	+8.0 max.	1 000	982	970
1 000	1 015	± 7.0			47	37	30	0 min.	1 115	1 095	1 081
1 100	1 115	± 8.0	52	41	33	+8.5 max.	1 225	1 203	1 187		
1 200	1 215	± 9.0	56	44	36	0 min.	1 333	1 309	1 293		
1 350	1 370	± 9.5	63	50	40	+9.0 max.	1 502	1 476	1 456		
1 500	1 520	± 10.0	70	55	45	0 min.	1 666	1 636	1 616		
1 650	1 670	± 11.0	77	61	49	+9.5 max.	1 830	1 798	1 774		
1 800	1 825	± 11.5	85	66	54	0 min.	2 001	1 963	1 939		
2 000	2 025	± 12.0	94	73	59	+10.0 max. 0 min.	2 219	2 177	2 149		

Notes

^{a)} The values in the columns of inside diameter and effective length of pipes indicate those obtained from measurements at 23 °C.

^{b)} The basic dimensions for effective length of pipes may be changed by agreement between the interested parties.

Table 4 Socket dimensions and tolerances

Unit: mm

Nominal inside diameter	Socket inside diameter at electric heating element part $d_{\text{st}}^{\text{a)}$			Socket length l_{so}			Length at electric heating element part in socket l_{sof} (minimum)		
	Basic dimension			Basic dimension			Tolerance		
	Class 1 pipe	Class 2 pipe	Class 3 pipe	Class 1 pipe	Class 2 pipe	Class 3 pipe	Class 1 pipe	Class 2 pipe	Class 3 pipe
300	364	364	364	240	240	240	33	24	20
350	416	416	416	240	240	240	37	29	25
400	465	465	465	240	240	240	41	33	27
450	516	516	516	240	240	240	48	37	31
500	575	575	575	240	240	240	52	42	33
600	676	676	676	240	240	240	63	48	40
700	788	788	788	240	240	240	72	57	46
800	892	892	892	240	240	240	82	66	53
900	1 000	994	994	240	240	240	91	72	60
1 000	1 115	1 107	1 107	240	240	240	102	81	66
1 100	1 225	1 206	1 206	240	240	240	113	90	73
1 200	1 333	1 309	1 306	320	240	240	121	96	79
1 350	1 502	1 476	1 468	320	240	240	136	109	88
1 500	1 666	1 636	1 622	320	240	240	151	120	99
1 650	1 830	1 798	1 774	320	320	240	167	133	108
1 800	2 001	1 963	1 939	400	320	240	184	144	119
2 000	2 219	2 177	2 149	400	320	320	203	159	130

Note a) The values in the column of socket inside diameter at electric heating element part of pipes indicate those obtained from measurements at 23 °C.