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**Crosslinked polyethylene (PE-X) pipe
fittings**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Cross Linked Polyethylene Pipe Association (JXPA)/The Japan Plastics Industry Federation (JPIF)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently **JIS K 6770: 2011** is replaced with this Standard.

However, **JIS K 6770: 2011** may be applied in the **JIS** mark certification based on the relevant provisions of Article 19 Clause 1, etc. of the Industrial Standardization Law until March 21, 2017.

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Crosslinked polyethylene (PE-X) pipe fittings

Introduction

This Japanese Industrial Standard has been prepared based on the first edition of ISO 15875-3 published in 2003 with some modifications of the technical contents. The last revision was made in 2011, and the revision at this time is to follow the ordinance of the Ministry of Health, Labour and Welfare in describing the criteria for leaching.

The portions given sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with the explanations is given in Annex JD.

1 Scope

This Standard specifies pipe fittings (hereafter referred to as “fittings”) for jointing crosslinked polyethylene (PE-X) pipes (hereafter referred to as “pipes”) specified in JIS K 6769, to be mainly used for the conveyance of water at a temperature of 95 °C or lower. Crosslinked polyethylene pipe fittings for water supply are covered by JIS K 6788.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 15875-3 : 2003 *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X) — Part 3 : Fittings* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21-1.

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 0251 Limit gauges for metric screw threads

JIS B 0253 Gauges for taper pipe threads

JIS B 0254 Limit Gauges for Parallel Pipe Threads

JIS B 7502 Micrometer callipers

JIS B 7507 Vernier, dial and digital callipers

JIS K 6769 Crosslinked polyethylene (PE-X) pipes

JIS K 6788 Crosslinked polyethylene (PE-X) pipe fittings for water supply

JIS K 6796 Pipes and fitting made of crosslinked polyethylene (PE-X) — Estimation of the degree of crosslinking by determination of the gel content

NOTE : The corresponding International Standard cites EN 579, which is identical with ISO 10147. This Standard cites JIS K 6796 which corresponds to ISO 10147.

JIS K 6900 Plastics — Vocabulary

JIS K 8271 Xylene (Reagent)

JIS S 3200-1 Equipment for water supply service — Test methods of hydrostatic pressure

JIS S 3200-7 Equipment for water supply service — Test methods of effect to water quality

JIS Z 8703 Standard atmospheric conditions for testing

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in JIS K 6900, and the following apply.

3.1 mechanical fitting

fitting whose water-tightness is secured either by tightening nuts, bands, sleeves and others after inserting pipes into fittings or by using O-rings and others

3.2 electrofusion fitting

insertable, fusion-bonded fitting which is equipped with heating elements such as electric heating wire

It excludes heat-fusion fitting which is fusion-bonded by heating fittings and pipes with a jointing tool having built-in heating elements such as electric heating wire.

3.3 gel content

rate of mass of gel portion (the residue of a sample when extracted by xylene given in JIS K 8271) to that of a sample before extraction

3.4 ordinary temperature

the temperature of $(20 \pm 15) ^\circ\text{C}$, which is based on the standard temperature of $20 ^\circ\text{C}$ specified in JIS Z 8703 and the tolerance of grade 15 ($\pm 15 ^\circ\text{C}$) specified in 3.1 of JIS Z 8703

4 Classification and symbols

Fittings and their symbols shall be classified by the connection type and applicable pipe specified in JIS K 6769, as given in Table 1.

Table 1 Classification and symbols of fittings

Classification	Connection type of fittings	Symbol of classification	Applicable pipe
Class M	Mechanical	XM	Class M PN10
			Class M PN15
		XMND	Class M ND PN10
			Class M ND PN15
Class E	Electrofusion	XE	Class E

5 Performance

The performance of fittings shall be tested in accordance with 9.3 to 9.11, and comply with the requirements in Table 2.

Table 2 Performance of fittings

Item of performance		Performance	Classification of fittings	Applicable clause
Air-tightness ^{a)}		Neither leakage nor any other defects.	Classes M and E	9.3
Water-tightness		Neither leakage nor any other defects.		9.4
Pressure resistance		Neither leakage nor any other defects.		9.5
Negative pressure resistance		Neither suction of air (or water) nor other defects.		9.6
Hot internal-pressure creep resistance		Neither leakage nor any other defects.		9.7
Pull-out		Neither pull-out nor other defects.		9.8
Compression peeling		Rate of peeling length at the fusion joint is not more than 15 %.	Class E	9.9
Leaching ^{b)}	Turbidity	As specified in the Ordinance of the Ministry of Health and Welfare No.14 of 1997. Attached Table 1, "the criteria for leachate of water supply implement installed anywhere except the end of water supply facilities or leachate of water supply pipe".	Applicable to moulded portion of crosslinked polyethylene	9.10
	Chromaticity			
	Organics [total organic carbon (TOC)]			
	Odour			
	Taste			
	Loss of residual chlorine	1 mg/l or under		
	Leaching specified in JA 4.2	As specified in the Ordinance of the Ministry of Health and Welfare No.14 of 1997. Attached Table 1, "the criteria for leachate of water supply implement installed anywhere except the end of water supply facilities or leachate of water supply pipe".	Applicable to portions except crosslinked polyethylene	
Gel content		65 % or over	Class E	9.11
Notes ^{a)} Air-tightness applies to fittings manufactured by casting, except those manufactured by continuous casting.				
^{b)} The test temperature for leaching shall be 95 °C. Obtain the difference from the blank test value to determine the performances of leaching except odour and taste.				

6 Appearance

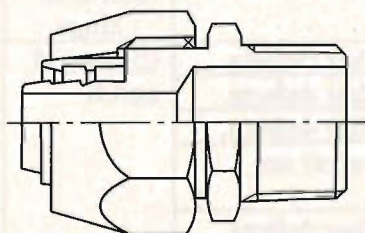
The appearance of fittings shall be as follows.

- a) When viewed without magnification, the internal and external surfaces of Class M fittings shall be smooth, and free from blowholes, flashes, cracks, fissures, flaws and other surface defects detrimental to use.
- b) When viewed without magnification, the internal and external surfaces of Class E fittings, except built-in heating wire, shall be smooth, and free from fissures, flaws and other surface defects detrimental to use. In resin portions, the different colours shall be used for distinction between crosslinked layer and non-crosslinked layer.

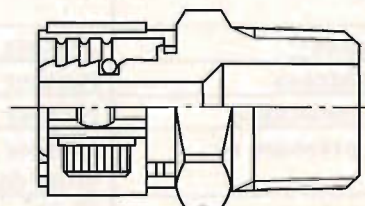
7 Structure and shape

The examples of structure and shape of fittings are shown in Figures 1 and 2.

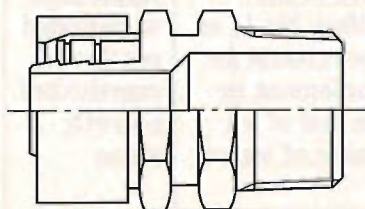
The structure and shape not specified in Figures 1 and 2 are permitted when they satisfy the requirements in clauses 5 and 6.



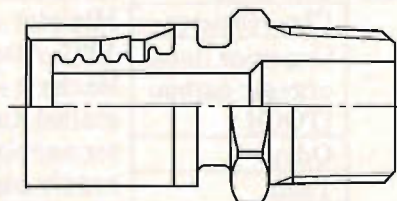
a) Fitting used to secure water-tightness by tightening a pipe with a nut and a ring



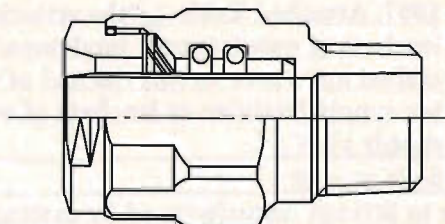
b) Fitting used to secure water-tightness with an O-ring by tightening a pipe with a band and a ring



c) Fitting used to secure water-tightness by tightening a pipe with a sleeve and a ring



d) Fitting used to secure water-tightness by tightening a pipe with a sleeve



e) Fitting used to secure water-tightness with an O-ring by fixing a pipe with a holding ring

Figure 1 Structure and shape of Class M fitting joint (example)

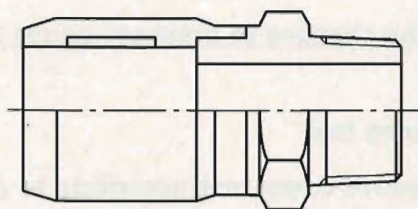


Figure 2 Structure and shape of Class E fitting joint (example)

8 Materials

The materials of fittings shall be strong and durable enough to withstand normal use and working. The materials used for the part in contact with water shall not adversely affect the water quality.

9 Test method

9.1 Appearance, structure and shape

The appearance, structure and shape of fittings shall be viewed without magnification.

9.2 Dimensions

Condition the fittings for 1 h or longer at ordinary temperature for Class M or at $(23 \pm 2) ^\circ\text{C}$ for Class E, and measure the dimensions by using micrometer calliper specified in JIS B 7502, vernier, dial or digital calliper specified in JIS B 7507, gauges for taper pipe threads specified in JIS B 0253, limit gauges for parallel pipe threads specified in JIS B 0254, limit gauges for metric screw threads specified in JIS B 0251, or other equipment with an accuracy at least equivalent thereto.

9.3 Air-tightness test

In order to check the air-tightness of fittings, seal both ends of metallic part by an appropriate method, apply a pressure of 0.6 MPa to the inside for 5 s or longer by using air of ordinary temperature, and visually examine for leakage and other defects.

9.4 Water-tightness test

Carry out water-tightness test in accordance with JIS S 3200-1 by jointing a pipe of length at least 250 mm to the fitting. The test pressure shall be 0.02 MPa, and the test duration shall be 2 min.

9.5 Hydrostatic test

Carry out hydrostatic test in accordance with JIS S 3200-1 by jointing a pipe of length at least 250 mm to the fitting. The test pressure shall be 2.5 MPa, and the test duration shall be 2 min.

9.6 Negative pressure resistance test

In order to check the resistance of fittings to negative pressure, joint a pipe of length at least 250 mm to the fitting, reduce the pressure inside the fitting down to -54 kPa ,