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JIS K 6775-1 : 2005
(JPIF/GPA/JGA/JSA)

**Polyethylene pipe-fittings for the
supply of gaseous fuels—
Part 1: Heatfusion fittings**

ICS 75.200; 83.140.30

Reference number : JIS K 6775-1 : 2005 (E)

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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 The Japan Plastic Industry Federation (JPIF)/Gas Polyethylene pipe-fittings Association (GPA)/The Japan Gas Association (JGA)/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 6775-1 : 1998** is replaced with this Standard.

This revision has been made based on **ISO 8085-1:2001** *Polyethylene fittings for use with polyethylene pipes for the supply of gaseous fuels—Metric series—Specifications—Part 1: Fittings for socket fusion using heated tools* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

JIS K 6775 series consists of the following 3 parts under the general title “*Polyethylene pipe-fittings for the supply of gaseous fuels*”:

Part 1: Heatfusion fitting

Part 2: Spigot fittings

Part 3: Electrofusion fittings

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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	1
3 Classification	3
4 Definitions and symbol.....	4
4.1 Definitions of dimensions.....	4
4.2 Definitions of material.....	6
4.3 Definitions related to characteristics of material.....	6
4.4 Definitions related to service conditions	7
5 Quality	7
5.1 Material	7
5.2 Characteristics of fittings	11
6 Dimensions	12
6.1 The 1st class dimensions	12
6.2 The 2nd class dimensions	13
7 Test methods	15
7.1 Test pieces	15
7.2 Dimension	22
7.3 Appearance and shape	23
7.4 Density test	23
7.5 Melt mass flow-rate test	23
7.6 Thermal stability test.....	23
7.7 Volatile content test.....	23
7.8 Water content test.....	23
7.9 Carbon-black content test	23
7.10 Carbon-black dispersion test	23
7.11 Pigment dispersion test.....	24

7.12	Test of tensile yield stress	25
7.13	Test of resistance to gas constituents	25
7.14	Charpy impact strength test	26
7.15	Outdoor exposure test	26
7.16	Accelerated weathering test	26
7.17	Full scale test	26
7.18	S4 test	26
7.19	Notch-type internal-pressure creep test	26
7.20	Full notch tensile creep test (FNCT)	26
7.21	Full notch tensile fatigue test (FNFT)	26
7.22	Fusion-bonding compatibility test	27
7.23	Internal-pressure creep test	27
7.24	Tensile elongation test	28
7.25	Reversibility test on heating	28
8	Technical file	29
9	Inspection	29
9.1	Type inspection	29
10	Expression of numerical value of test results	30
11	Marking	30
12	Packaging and packing	31
Annex A (normative)	Formulae for calculating dimensions of each part of fitting	33
Annex 1 (informative)	Comparison table between JIS and corresponding International Standard	35

Polyethylene pipe-fittings for the supply of gaseous fuels— Part 1: Heatfusion fittings

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 8085-1** *Polyethylene fittings for use with polyethylene pipes for the supply of gaseous fuels—Metric series—Specifications—Part 1: Fittings for socket fusion using heated tools* published in 2001 with some modifications of the technical contents.

The portions given sidelines or dotted underlines are the matters in which the contents of the original International Standard have been modified. A list of modifications with the explanations is given in Annex 1.

1 Scope This part of **JIS K 6775** specifies the requirements for polyethylene heatfusion fittings intended to be used with polyethylene pipes and fittings for the supply of town gas and liquefied petroleum gas.

In addition, it specifies some general properties of the material from which these fittings are made.

This part of **JIS K 6775** also specifies requirements for dimensions and performance of such fittings.

It is applicable to heatfusion fittings (hereafter referred to as “fittings”) designed to be fusion-jointed to polyethylene pipes conforming to **JIS K 6774** (hereafter referred to as “pipes”), and to spigot fittings conforming to **JIS K 6775-2**.

Remarks 1 For the use of the fittings, direct sunshine and fire shall be taken into consideration. Further, sufficient considerations shall be taken concerning fusion-bonding condition, fusion-bonding compatibility of fittings, etc.

2 The International Standard corresponding to this Standard is as follows.

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**.

ISO 8085-1:2001 *Polyethylene fittings for use with polyethylene pipes for the supply of gaseous fuels—Metric series—Specifications—Part 1: Fittings for socket fusion using heated tools* (MOD)

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. If the indication of the year of publication is given to these referred standards, only the edition of the indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply. The normative references without the indication of the year of publication apply only to the most recent editions (including amendments).

JIS B 7502 *Micrometer callipers*

JIS B 7503 *Dial gauges*

JIS B 7507 *Vernier, dial and digital callipers*

JIS K 2231 *Liquid paraffin*

JIS K 6774 *Polyethylene pipes for the supply of gaseous fuels*

Remarks : **ISO 4437:1997** *Buried polyethylene (PE) pipes for the supply of gaseous fuels—Metric series—Specifications* is equivalent to the said standard.

JIS K 6775-2 *Polyethylene pipe-fittings for the supply of gaseous fuels—Part 2: Spigot fittings*

JIS K 6812 *Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds*

Remarks : **ISO 18553:2002** *Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds* is identical with the said standard.

JIS K 6813 *Polyolefin pipes and fittings—Determination of carbon black content by calcination and pyrolysis—Test method and basic specification*

Remarks : **ISO 6964:1986** *Polyolefin pipes and fittings—Determination of carbon black content by calcination and pyrolysis—Test method and basic specification* is identical with the said standard.

JIS K 6814-1 *Thermoplastics pipes—Longitudinal reversion—Part 1: Determination methods*

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 6900 *Plastics—Vocabulary*

JIS K 6922-1 *Plastics—Polyethylene (PE) moulding and extrusion materials—Part 1: Designation system and basis for specifications*

Remarks : **ISO 1872-1:1993** *Plastics—Polyethylene (PE) moulding and extrusion materials—Part 1: Designation system and basic for specifications* is equivalent to the said standard.

JIS K 6922-2 *Plastics—Polyethylene (PE) moulding and extrusion materials—Part 2: Preparation of test specimens and determination of properties*

JIS K 7111 *Plastics—Determination of Charpy impact strength*

JIS K 7112 *Plastics—Methods of determining the density and relative density of non-cellular plastics*

Remarks : **ISO 1183 (all parts)** *Plastics—Methods for determining the density and relative density of non-cellular plastics* is equivalent to the said standard.

JIS K 7161 *Plastics—Determination of tensile properties Part 1: General principles*

JIS K 7162 *Plastics—Determination of tensile properties Part 2: Test conditions for moulding and extrusion plastics*

JIS K 7210 *Plastics—Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*

Remarks : **ISO 1133**:1997 *Plastics—Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics* is identical with the said standard.

JIS K 8105 *Ethylene glycol*

JIS K 8839 *2-Propanol*

JIS K 8858 *Benzene*

JIS K 8891 *Methanol*

JIS Z 8401 *Guide to the rounding of numbers*

JIS Q 9001 *Quality management systems—Requirements*

Remarks : **ISO 9001**:1994 *Quality systems—Model for quality assurance in design, development, production, installation and servicing* is identical with the said standard.

ISO 1167:1996 *Thermoplastics pipes for the conveyance of fluids—Resistance to internal pressure—Test method*

ISO 9356:1989 *Polyolefin pipe assemblies with or without jointed fittings—Resistance to internal pressure—Test method*

ISO 13477:1997 *Thermoplastics pipes for the conveyance of fluids—Determination of resistance to rapid crack propagation (RCP)—Small-scale steady-state test (S4 test)*

ISO 13478:1997 *Thermoplastics pipes for the conveyance of fluids—Determination of resistance to rapid crack propagation (RCP)—Full-scale test (FST)*

ISO 13479:1997 *Polyolefin pipes for the conveyance for fluids—Determination of resistance to crack propagation—Test method for slow crack growth on notched pipes (notch test)*

3 Classification The fittings are classified by junction shape as given in table 1.
The example of combined fitting of socket junction and saddle junction is shown in figure 1.

Table 1 Classification by junction shape

Type	Junction shape
Socket type fitting	Fittings of a junction shape having a tapered inner peripheral surface
Saddle type fitting	Fittings of a junction shape having a saddle-backed junction shape having the same curvature as the basic diameter of outside diameter of pipe

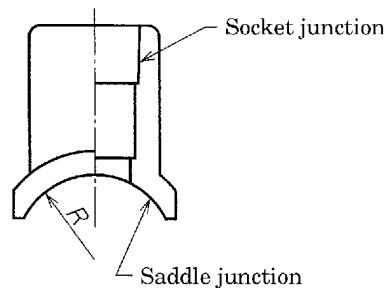


Figure 1 Example of socket type fitting and saddle type fitting

4 Definitions and symbol For the purposes of this Standard, the definitions given in **JIS K 6900** and the following definitions and symbols apply.

4.1 Definitions of dimensions

4.1.1 Definitions of dimensions for the 1st class The dimensions and symbols for the 1st class are shown in figure 2.

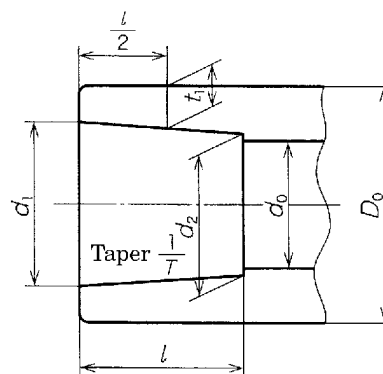


Figure 2 Symbols related to dimensions of socket type fitting junction (1st class)

- a) **nominal dimension** the nominal dimension of pipes to be connected to fittings
- b) **mean inside diameter** the average of at least two inside diameters measured at the position of equal intervals to each other on the vertical plane to the axis of pipe
- c) **mean inside diameter of the socket mouth** d_1 the mean inside diameter at the plane of the mouth of the socket fitting
- d) **mean inside diameter of the most inner part of taper** d_2 the mean inside diameter at the most inner part of taper, that is, apart from the plane of the mouth by the length l at taper part
- e) **minimum bore** d_0 the minimum diameter of the flow channel through the body of the socket fitting
- f) **mean outside diameter** D_0 the mean value of outside diameter in four positions at equal intervals (45°) to each other at the optional cross-section, which is vertical to the pipe axis, of fitting or the measured value of circumference divided by the circular constant, 3.142

- g) **length at taper part** l the length of taper-shaped part
- h) **thickness** t_1 the thickness at the centre of tapered part
- i) **socket taper** $1/T$ the tangent value of angle ($^\circ$) at the vertex of triangle in the longitudinal cross-section of a cone constituted of the mean inside diameter, of the inlet part of taper, d_1 , the mean inside diameter at the most inner part of taper, d_2 , and the length of tapered part, l
- j) **standard dimension ratio** SDR the ratio of the standard outer diameter of pipe to be used, D , to the basic thickness thereof, t

$$SDR = D/t$$

4.1.2 Definitions of dimensions for the 2nd class The dimensions and symbols for the 2nd class are shown in figure 3.

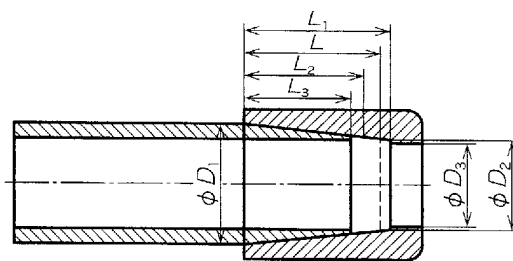


Figure 3 Symbols related to dimensions of socket type fitting junction (2nd class)

- a) **nominal diameter of a fitting** d_n the nominal diameter of a fitting is taken as the nominal diameter of the corresponding pipe series
- b) **nominal wall thickness of a fitting** e_n the nominal wall thickness of a fitting is taken as the nominal wall thickness of the corresponding pipe series
- c) **mean inside diameter** the mean of at least two inside diameters measured at right angles to each other in transverse planes
- d) **out-of-roundness of a socket** maximum inside diameter minus the minimum inside diameter of the socket, measured in the same plane, parallel to the plane of the mouth
- e) **maximum out-of-roundness of a socket** the maximum value of the out-of-roundness between the plane of the mouth and a plane separated from it by a distance L (socket reference length)
- f) **socket taper** included angle at the vertex of the triangle corresponding to the longitudinal cross-section of a cone based on the mean socket-mouth diameter, the mean socket-root diameter and the reference length of the socket
- g) **standard dimension ratio of a fitting** SDR quotient of the nominal outside diameter and the nominal wall thickness

$$SDR = \frac{d_n}{e_n}$$

- h) **wall thickness of a fitting E** wall thickness at any point of the body of the fitting which could be subjected to the full stress induced by the pressure of the gas in the piping system
- i) **mean inside diameter of the socket mouth D_1** the mean diameter of the circle at the intersection of the extension of the socket with the plane of the socket mouth
- j) **mean inside diameter of the socket root D_2** the mean diameter of the circle in a plane parallel to the plane of the mouth and separated from it by a distance L which is the reference length of the socket
- k) **minimum bore D_3** the minimum diameter of the flow channel through the body of the fitting
- l) **reference socket length L** the theoretical minimum socket length used for calculation purposes
- m) **actual length of the socket from mouth to shoulder L_1** the actual length of socket from mouth to shoulder
- n) **heated length of the fitting L_2** the length of penetration of the heated tool into the socket
- o) **insertion depth L_3** the depth⁽¹⁾ of penetration of the heated pipe end into the socket

Note (1) L_3 is also the depth of the “depth gauge” tool used in normal socket fusion jointing practice.

4.2 Definitions of material

- a) **virgin material** material in a form such as granules or powder which has not been previously processed and to which no reprocessable material has been added
- b) **own reprocessable material** material prepared from clean unused rejected pipes, fittings, valves, and trimmings from their production, and which will be reprocessed by the same manufacturer
- c) **compound** uniformly kneaded or mixed compound of material resin and such additives as antioxidant, pigments, stabilizer, which are necessary for application and manufacturing of components conforming to this specification

Compounds are classified into coloured compound and master batch compound.

- 1) **coloured compound** kneaded compound of material resin, pigments and additives
- 2) **master batch compound** compound prepared by mixing, with or without kneading, master batch material with high concentration of pigments which contains other suitable additives and uncoloured material with no pigments which contains other suitable additives

4.3 Definitions related to characteristics of material

- a) **lower confidence limit of the predicted hydrostatic strength** σ_{lcl} quantity with the dimensions of stress, in unit of MPa, which can be considered as a property of the material and represents the 97.5 % lower confidence limit of the mean long-term hydrostatic strength at 20 °C for 50 years determined by pressurizing internally with water
- b) **overall service (design) coefficient** c overall coefficient with a value greater than 1, which takes into consideration the service conditions as well as properties of the components of a piping system
In case of gas service, it is the value not less than 2.0.
- c) **minimum required strength** MRS the value selected from σ_{lcl} values shown in JIS K 6774 Annex 1 in unit of MPa
- d) **melt mass flow-rate** MFR amount of thermoplastic material which will be extruded during a specified interval under specified conditions

4.4 Definitions related to service conditions

maximum operating pressure MOP maximum effective pressure⁽²⁾ of the gas in a piping system, expressed in MPa, which is allowed in continuous use

It takes into account the physical and the mechanical characteristics of the components of the piping system.

Note (2) MOP is given by the following formula.

$$MOP = \frac{2 \times MRS}{c \times (SDR - 1)}$$

5 Quality

5.1 Material

5.1.1 Technical data The technical data concerning the materials supplied by the fitting manufacturer shall be available to the purchaser. Any change in the choice of materials affecting the quality shall require a fresh confirmation of mechanical characteristics of fittings in accordance with table 4.

5.1.2 Compound The compound from which the fitting is produced shall be polyethylene or ethylene copolymer which shall be made by adding only those additives necessary for the manufacture and end use of fittings conforming to this specification and for their fusion-jointing. When coloured compound is employed, additives shall be uniformly dispersed.

5.1.3 Reprocessable material If reprocessable material is generated from manufacturer's own production of fitting conforming to this specification, it may be used for the manufacture of the products consisting of the same material. Fittings may be manufactured from reprocessable material and mixture of reprocessable material and virgin material.

5.1.4 Classification Compounds are classified by MRS shown in table 2.

Table 2 Classification of compounds

Type	σ_{1el} (20 °C, 50 years, 97.5 %) MPa	MRS MPa
PE 80	8.00 or over up to and incl. 9.99	8.0
PE 100	10.00 or over up to and incl. 11.19	10.0

The classification shall be submitted by the manufacturer in accordance with **JIS K 6774 Annex 1**.

5.1.5 Characteristics of compound The characteristics of compound from which the fitting is manufactured shall conform to the requirements in table 3, when tested according to clause 7.

Table 3 Characteristics of compound

Test items	Test condition	Requirements	Applicable subclause
Density ⁽³⁾	Laboratory temperature 23 °C ± 2 °C Laboratory humidity (50 ± 5) %	0.930 g/cm ³ min.	7.4
Melt mass flow rate ⁽⁴⁾	Test temperature 190 °C ± 1 °C Load 49.03 N	± 20 % of presented value by manufacturer	7.5
Thermal stability ⁽⁵⁾	Test temperature 200 °C ± 0.5 °C	Over 20 min	7.6
Volatile content	Test temperature 105 °C ± 2 °C	350 mg/kg max.	7.7
Water content ⁽⁶⁾	Karl Fischer method	300 mg/kg max.	7.8
Carbon black content ⁽⁷⁾	Thermal decomposition temperature 550 °C ± 50 °C Firing temperature 900 °C ± 50 °C	2.0 % min., 2.5 % max.	7.9
Carbon black dispersion ⁽⁷⁾	Observation by microscope	3 max.	7.10
Pigment dispersion ^{(5) (8)}	Observation by microscope	3 max.	7.11
<u>Tensile yield stress</u>	<u>Test rate 200 mm ± 20 mm per minute</u>	<u>17.7 MPa min.</u>	7.12
Resistance to gas constituents	<u>Immersion in liquid paraffin, and 2-methyl-2-propanethiol, mixture of liquid paraffin, methanol, 2-propanol and ethylene glycol</u>	<u>Mass changing rate ± 1 mg/cm²</u>	7.13
	<u>Immersion in mixed liquid of benzene and methanol</u>	<u>Mass changing rate ± 2 mg/cm²</u>	
	<u>Test rate 200 mm ± 20 mm per minute</u>	<u>Changing rate of tensile yield stress ± 12 %</u>	
<u>Charpy impact strength</u>	<u>Test temperature 23 °C ± 2 °C</u>	<u>9.8 kJ/m² min.</u>	7.14

Table 3 Characteristics of compound (continued)

Test items			Test condition	Requirements	Applicable subclause
Weathering ⁽⁹⁾	Outdoor exposure test ⁽¹⁰⁾	Thermal stability test	Test temperature 200 °C ± 0.5 °C	Over 20 min ⁽¹²⁾	7.6
		Hot internal pressure creep test	Test temperature 80 °C + 1 °C Test time 165 h	No crack or other defects ⁽¹³⁾ .	7.23
			Type		
	PE 80		4.6 MPa		
	PE 100	5.5 MPa			
Tensile elongation test	Test temperature 23 °C ± 2 °C	350 % min.	7.24		
Test piece thickness mm	Test rate mm/min				
$t, e_n \leq 5$	100				
$5 < t, e_n \leq 12$	50				
$t, e_n > 12$	25				
Accelerated weathering test ⁽¹¹⁾	Tensile elongation test	Test temperature 23 °C ± 2 °C	350 % min.	7.24	
		Test piece thickness mm			Test rate mm/min
		$t, e_n \leq 5$			100
		$5 < t, e_n \leq 12$			50
		$t, e_n > 12$			25
Resistance to rapid crack propagation ⁽¹⁴⁾	Full scale test	Test temperature 0 °C – 1.5 °C	Limit pressure $MOP \times 1.5$ min.	7.17	
	S4 test	Test temperature 0 °C – 2 °C	Limit pressure $MOP/2.4 - 0.072$ min. ⁽¹⁵⁾	7.18	
Resistance to slow crack growth ⁽¹⁶⁾	Notch type internal pressure creep test	Test temperature 80 °C ± 1 °C Test time 165 h	No fracture.	7.19	
		Type			Internal pressure (for SDR11)
		PE 80			0.8 MPa
	PE 100	0.92 MPa			
	Full notch tensile creep test	Test temperature 80 °C ± 1 °C	No fracture.	7.20	
Nominal stress					Test time
4.9 MPa					10 h
3.9 MPa	18 h				
Full notch tensile fatigue test	Test temperature 80 °C ± 1 °C	No fracture.	7.21		
				Nominal stress	Number of repetitions
				4.9 MPa	2 400 turns
				3.9 MPa	5 300 turns

Table 3 Characteristics of compound (concluded)

Test items		Test condition		Requirements	Applicable subclause
Fusion-bonding compatibility ⁽¹⁷⁾	Tensile yield stress test	Test rate 200 mm ± 20 mm per minute		17.7 MPa min.	7.12
	Charpy impact test	Test temperature 23 °C + 2 °C		6.9 kJ/m² min.	7.14
	Internal pressure creep test	Hot internal pressure creep test		No crack or other defects ⁽¹³⁾ .	7.23
	Full notch tensile creep test	Test temperature 80 °C ± 1 °C		No fracture.	7.20
		Nominal stress	Test time		
4.9 MPa		5 h			
3.9 MPa	9 h				
Full notch tensile fatigue test	Test temperature 80 °C ± 1 °C		No fracture.	7.21	
	Nominal stress	Number of repetitions			
	4.9 MPa	1 100 turns			
3.9 MPa	2 900 turns				

Notes ⁽³⁾ The density shall be the value of uncoloured material.

⁽⁴⁾ In the case of master batch system, the uncoloured material shall be used.

⁽⁵⁾ In the case of master batch system, the sample in which master batch compound has been mixed shall be used.

⁽⁶⁾ It is applicable only when the characteristics of volatile component is not satisfied.

⁽⁷⁾ It is applicable only to black compound.

⁽⁸⁾ It need not to apply to black compound.

⁽⁹⁾ For weathering test, carry out either outdoor exposure test or accelerated weathering test. This test need not be carried out for black compound.

⁽¹⁰⁾ After the exposure by 3.5 GJ/m² or more of radiation energy, carry out each test (see **7.15**)

⁽¹¹⁾ After the exposure for 600 h, carry out the test (see **7.16**).

⁽¹²⁾ The test piece shall be prepared after scraping to remove the outside surface of pipes.

⁽¹³⁾ It is applicable only to brittle fracture. When elongation fracture is observed within specified test time, lower stress may be chosen. The test time in this case is obtained by making use of the line passing test time point corresponding to circumference stress shown in table 12.

⁽¹⁴⁾ It is applicable only to the material of extrusion moulding.

(In case of $MOP > 0.01$ MPa and 250 mm or more of outside diameter, or in case of $MOP > 0.4$ MPa and 90 mm or more of outside diameter.)

⁽¹⁵⁾ When the requirements do not conform, the full scale test shall be carried out.

- (16) For the test of resistance to slow crack growth, any test shall be satisfiable, among notch-type internal-pressure creep test, full notch tensile creep test, or full notch tensile fatigue test.
- (17) When the evaluation of fusion-bonding compatibility test is needed, the agreement between the parties concerned with delivery can appoint the fusion-bonding compatibility test. For the fusion-bonding compatibility test, any test shall be satisfiable, tensile yield stress test, Charpy impact test and internal-pressure creep test. Internal-pressure creep test can be superseded by either full notch tensile creep test, or full notch tensile fatigue test.

5.2 Characteristics of fittings

5.2.1 Mechanical characteristics of fittings The mechanical characteristics of fittings shall be tested in accordance with clause 7 and shall conform to the requirements in table 4.

For the test, the pipe conformed to **JIS K 6774** shall be used. The fusion-bonding tools and fusion-bonding conditions for preparing of test pieces may be determined subject to the agreement between the parties concerned with delivery.

Table 4 Mechanical characteristics of fittings

Test items		Test condition		Characteristics	Applicable subclause
Internal-pressure creep	Ordinary temperature internal pressure creep test	Test temperature 20 °C ⁺³ ₋₁ °C Test time 100 h		No crack or other defects.	7.23
		Type	Circumferential stress		
		PE 80	9.0 MPa		
		PE 100	12.4 MPa		
	Hot internal pressure creep test	Test temperature 80 °C ± 1 °C Test time 165 h		No crack or other defects ⁽¹³⁾ .	
		Type	Circumferential stress		
		PE 80	4.6 MPa		
		PE 100	5.5 MPa		
	Long term hot internal pressure creep test	Test temperature 80 °C ± 1 °C Test time 1 000 h		No crack or other defects.	
		Type	Circumferential stress		
		PE 80	4.0 MPa		
		PE 100	5.0 MPa		

5.2.2 Physical characteristics of fittings The physical characteristics of fittings shall be tested in accordance with clause 7 and shall conform to the requirements in table 5.

Table 5 Physical characteristics of fittings

Test items	Test condition	Characteristics	Applicable subclause
Thermal stability	Test temperature 200 °C ± 0.5 °C	Over 20 min	7.6
Melt mass flow rate	Test temperature 190 °C ± 1 °C Load 49.03 N	Less than 20 % ⁽¹⁸⁾ of changing rate by manufacture	7.5
Reversibility on heating ⁽¹⁹⁾	Test temperature 110 °C ± 2 °C Immersion time 1 h	Changing rate in outside diameter and length ± 5 % Change in angle ± 5°	7.25

Note ⁽¹⁸⁾ This is the changing rate of the value measured by the manufacturer of fittings to the measured value of compound, and calculate it by the following formula.

$$R = \frac{F_1 - F_0}{F_0} \times 100$$

where, R : changing rate by manufacture (%)
 F_0 : measured value of *MFR* for compound (g/10 min)
 F_1 : measured value of *MFR* for fittings (g/10 min)

Note ⁽¹⁹⁾ The reversibility test on heating may be executed according to Method B in **JIS K 6814-1**.

5.2.3 General requirements for fittings General requirements for fittings are as follows:

- Fittings having a different type of junction** When fittings have different type of junction, they shall conform to the respective standards.
- Appearance of fittings** When fittings are checked with eyes, the inside and outside surfaces shall be smooth, clean and free from scoring, cavities and other surface defects which might badly affect characteristics of fittings.
- Appearance of joints** When inside and outside surfaces of the pipe and fitting of fusion-boding jointing are checked with eyes, melt exudation from fusion-bonding jointing portions shall not exceed the fitting thickness except the range where the fitting manufacturer allows.

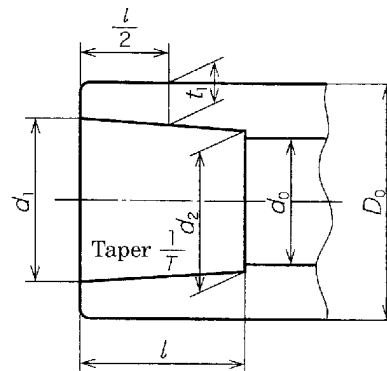
6 Dimensions The dimensions of socket type junction are classified into the dimension of the 1st class and the 2nd class, and the dimensions and tolerance are as follows.

The dimensions of fittings are measured in accordance with **7.2**. Dimensions shall also be calculated by the formula shown in Annex A.

6.1 The 1st class dimensions The dimensions and tolerance of socket type junction are in accordance with table 6. The class for applicable pipe is No. 1 (*SDR11*).

The d_2 and D_0 in table 6 are shown as reference and not a provision.

Table 6 Dimensions and tolerance for junction of socket type fittings



Unit: mm

Nominal dimension	$d_0^{(20)}$	d_1	Tolerance of $d_1^{(21)}$	t_1	Tolerance of $t_1^{(22)}$	l	Tolerance of l	$1/T$	d_2 (informative)	D_0 (informative)
20	20	26.10	± 0.20	5.4	-0.15	22			25.7	37
25	26	33.00	± 0.20	6.2	-0.20	24			32.6	46
30	33	41.00	± 0.25	7.1	-0.20	25			40.6	56
40	38	46.90	± 0.25	8.0	-0.25	28	± 2	$1/57$	46.4	63
50	48	58.80	± 0.30	9.9	-0.30	30			58.3	79
75	71	87.60	± 0.35	14.6	-0.45	36			87.0	118
100	91	112.50	± 0.35	18.8	-0.55	41			111.8	152

Notes ⁽²⁰⁾ Dimension d_0 shall be the minimum value, and the maximum value thereof shall not exceed d_2 .

⁽²¹⁾ The tolerance of dimension d_1 means the difference between the dimension d_1 measured according to 7.2 and the dimension d_1 in table 6.

⁽²²⁾ The plus side of tolerance for dimension t_1 is not limited.

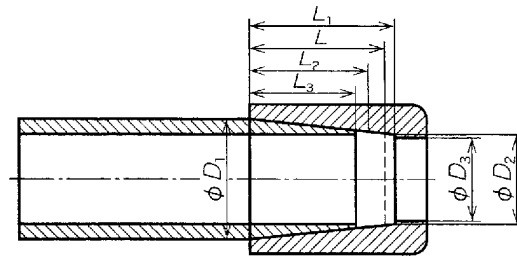
For the variable part of thickness, the shape shall gradually be varied to prevent the stress concentration (for example, as rounding, etc.).

6.2 The 2nd class dimensions

6.2.1 Dimension of socket type junction The socket type shall be classified into the following two types.

- Type A** No external peeling of the pipe shall be carried out. The measured value of D_1 shall be greater than or equal to that of D_2 .
- Type B** The outside surface of the pipe peeled in accordance with the manufacturer's instructions. The measured value of D_1 shall be greater than or equal to that of D_2 .

Table 7 Dimensions and tolerance for junction of socket type fittings



Type A fitting

Unit: mm

Nominal diameter	Mean inside diameter				Out-of-roundness of D_1 and D_2	Standard length of socket	Minimum inside diameter
	Inserted mouth D_1		Position distance L D_2				
	Min.	Max.	Min.	Max.			
d_n					Max.	L	D_3
16	15.20	15.50	15.10	15.40	0.40	13.30	9.00
20	19.20	19.50	19.00	19.30	0.40	14.50	13.00
25	24.10	24.50	23.90	24.30	0.40	16.00	18.00
32	31.10	31.50	30.90	31.30	0.50	18.10	25.00
40	39.10	39.50	38.80	39.20	0.50	20.50	31.00
50	49.00	49.50	48.70	49.20	0.60	23.50	39.00
63	62.00	62.50	61.60	62.10	0.60	27.40	49.00
75	74.30	74.80	73.00	73.50	1.00	30.00	59.00
90	89.30	89.90	87.90	88.50	1.00	33.00	71.00
110	109.40	110.00	107.70	108.30	1.00	37.00	87.00

Type B fitting

Unit: mm

Nominal diameter	Mean inside diameter				Out-of-roundness of D_1 and D_2	Standard length of socket	Minimum inside diameter
	Inserted mouth		Position distance L				
	D_1		D_2				
d_n	Min.	Max.	Min.	Max.	Max.	L	D_3
16	15.00	15.30	14.95	15.25	0.40	13.30	9.00
20	19.20	19.50	19.00	19.30	0.40	14.50	13.00
25	24.10	24.50	23.90	24.30	0.40	16.00	18.00
32	31.10	31.50	30.90	31.30	0.50	18.10	25.00
40	39.05	39.45	38.80	39.20	0.50	20.50	31.00
50	48.95	49.45	48.70	49.20	0.60	23.50	39.00
63	61.90	62.40	61.60	62.10	0.60	27.40	49.00
75	73.50	74.20	73.45	73.95	1.00	31.00	59.00
90	89.60	89.20	88.25	88.85	1.00	35.50	71.00
110	108.45	109.05	108.05	108.65	1.00	41.50	87.00

6.2.2 Wall thickness of socket type fittings E

- a) **General** Fittings and associated fusion joints shall be in accordance with table 4. Any changes in wall thickness inside the body of the fitting shall be gradual in order to prevent the stress concentration.

- b) **Relationship between fitting and pipe wall thickness** The wall thickness of fitting E shall be larger than or equal to the nominal thickness of the corresponding pipe e_n at every part of the fitting located at a distance beyond $2L_1/3$ from any entrance face of the fitting.

6.2.3 Out-of roundness of socket type fittings When a fitting leaves the manufacturer's production site, the maximum out-of-roundness of the socket type fitting shall not exceed $0.015 d_n$.

6.2.4 Other dimensions The overall dimensions or mounting dimensions, etc. shall be as specified in the manufacturer's technical file.

7 Test methods

7.1 Test pieces The preparation method and conditioning of test piece shall be as follows:

- a) The fittings for testing and the material for testing (hereafter referred to as "samples") shall be taken, by an appropriate method, from the lot on which the quality of fittings and material are able to be regarded as same.
- b) Test plate shall be prepared using sample according to the method specified in clause 3 of **JIS K 6922-2**. The thickness of the sample plate shall be $4 \text{ mm} \pm 0.2 \text{ mm}$. The thickness of sample plate for test of resistance to gas constituents shall be $2 \text{ mm} \pm 0.2 \text{ mm}$.
- c) The preparation method and conditioning of test piece to be used for the test of fittings and material shall be in accordance with table 8. For the melt mass flow rate test, volatile content test and water content test, granular samples shall be used.