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**Unplasticized poly(vinyl chloride)
(PVC-U) pipes**

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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 PVC Pipe and Fittings Association (JPPFA)/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 6741:2007** is replaced with this Standard.

However, **JIS K 6741:2007** 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 October 19, 2017.

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Unplasticized poly(vinyl chloride) (PVC-U) pipes

Introduction

This Japanese Industrial Standard has been prepared based on the first editions of **ISO 1452-1** and **ISO 1452-2** published in 2009, the second edition of **ISO 3633** published in 2002, and the second edition of **ISO 4435** published in 2003 with some modifications of the technical contents including addition of requirements concerning product dimensions and performance and their test methods that are widely used in Japan.

Sidelines or dotted underlines indicate changes from the corresponding International Standards. A list of modifications with explanations is given in Annex JB.

1 Scope

This Standard specifies the unplasticized poly(vinyl chloride) (PVC-U) pipes and impact-resistant unplasticized poly(vinyl chloride) (PVC-U) pipes (hereafter referred to as pipes) used mainly for piping to convey general fluids. Among these pipes, however, the unplasticized poly(vinyl chloride) (PVC-U) pipes for water supply are specified in **JIS K 6742**.

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

ISO 1452-1:2009 *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure—Unplasticized poly(vinyl chloride) (PVC-U)—Part 1: General*

ISO 1452-2:2009 *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure—Unplasticized poly(vinyl chloride) (PVC-U)—Part 2: Pipes*

ISO 3633:2002 *Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings—Unplasticized poly(vinyl chloride) (PVC-U)*

ISO 4435:2003 *Plastics piping systems for non-pressure underground drainage and sewerage—Unplasticized poly(vinyl chloride) (PVC-U)* (overall evaluation: MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards 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. For standards with the year indication, only the editions of the indicated year shall be applied and the revisions (including amendments)

made thereafter shall not be applied. For those without the indication of the year, the most recent edition (including amendments) shall be applied.

JIS B 7502 Micrometers

JIS B 7507 Vernier, dial and digital callipers

JIS K 6353 Rubber goods for water works

JIS K 6742 Unplasticized poly(vinyl chloride) (PVC-U) pipes for water supply

JIS K 6814 Thermoplastics pipes—Thermal reversion test method

NOTE : Corresponding International Standard: ISO 2505:2005 *Thermoplastics pipes—Longitudinal reversion—Test method and parameters* (MOD)

JIS K 6815-1:2002 Thermoplastics pipes—Determination of tensile properties—Part 1: General test method

NOTE : Corresponding International Standard: ISO 6259-1:1997 *Thermoplastics pipes—Determination of tensile properties—Part 1: General test method* (IDT)

JIS K 6815-2:2002 Thermoplastics pipes—Determination of tensile properties—Part 2: Pipes made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) and high-impact poly(vinyl chloride) (PVC-HI)

NOTE : Corresponding International Standard: ISO 6259-2:1997 *Thermoplastics pipes—Determination of tensile properties—Part 2: Pipes made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) and high-impact poly(vinyl chloride) (PVC-HI)* (IDT)

JIS K 6816 Thermoplastics pipes and fittings—Test method for Vicat softening temperature

NOTE : Corresponding International Standard: ISO 2507-1:1995 *Thermoplastics pipes and fittings—Vicat softening temperature—Part 1: General test method* (MOD)

JIS K 6900 Plastics—Vocabulary

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

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 9852 Unplasticized poly(vinyl chloride) (PVC-U) pipes—Dichloromethane resistance at specified temperature (DCMT)—Test method

- ISO 18373-1 *Rigid PVC pipes—Differential scanning calorimetry (DSC) method—Part 1: Measurement of the processing temperature*
- EN 744:1995 *Plastics piping and ducting systems—Thermoplastics pipes—Test method for resistance to external blows by the round-the-clock method*
- EN 1053 *Plastics piping systems—Thermoplastics piping systems for non-pressure applications—Test method for watertightness*
- EN 1054 *Plastics piping systems—Thermoplastics piping systems for soil and waste discharge—Test method for airtightness of joints*
- EN 1055:1996 *Plastics piping systems—Thermoplastics piping systems for soil and waste discharge inside buildings—Test method for resistance to elevated temperature cycling*
- EN 1277 *Plastics piping systems—Thermoplastics piping systems for buried non-pressure applications—Test method for leaktightness of elastomeric sealing ring type joints*
- EN 1411 *Plastics piping and ducting systems—Thermoplastics pipes—Determination of resistance to external blows by the staircase method*

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 design pressure

maximum hydrostatic pressure, including water hammer, under normal service condition to which a pipe is subjected in service

3.2 type inspection

an inspection to judge whether the quality of a product satisfies all the characteristics stated in the design

3.3 delivery inspection

an inspection performed at the delivery of a product to judge whether the quality of the product satisfies all the required characteristics

4 Classification and symbols

The classification and symbols of pipes are shown in Table 1.

Table 1 Classification and symbols of pipes

Classification	Symbols
Unplasticized poly(vinyl chloride) (PVC-U) pipes	VP, VM, VU
Impact-resistant unplasticized poly(vinyl chloride) (PVC-U) pipes	HIVP
Unplasticized poly(vinyl chloride) (PVC-U) pipes for soil and waste discharge inside buildings ^{a)}	IDVP
Unplasticized poly(vinyl chloride) (PVC-U) pipes for buried drainage and sewerage ^{a)}	ISVP
Unplasticized poly(vinyl chloride) (PVC-U) pipes for water supply and for drainage and sewerage under pressure ^{a)}	IWVP
Note ^{a)} Types of pipes specified in the corresponding International Standards.	

When the pipes are used for pressurized conveyance passage of piping, the design pressure for each pipe classification (symbol) shall be 0 MPa to 1.0 MPa for VP and HIVP, 0 MPa to 0.8 MPa for VM, 0 MPa to 0.6 MPa for VU and 0 MPa to 1.0 MPa for IWVP supposing that the fluid is water.

IDVP and ISVP are for non-pressure use and their design pressure shall be 0 MPa.

5 Performance

The pipes shall satisfy the performance requirements given in Table 2.

Table 2 Performance

Performance item	Requirement	Symbol of applicable pipe	Applicable test subclause
Tensile strength at yield MPa	45 min.	VP, VM, VU	9.1.1
	40 min.	HIVP	
Pressure resistance	No damages.	VP, HIVP, VM, VU	9.1.2
Joint part pressure resistance ^{a)}	No leakage.	VP, HIVP, VM, VU	9.1.3
Flattening resistance	No fissures or cracks.	VP, HIVP, VM, VU	9.1.4
Impact resistance	"No abnormalities" ^{b)}	HIVP	9.1.5
Vicat softening temperature °C	76 min.	VP, HIVP, VM, VU	9.1.6
	79 min.	IDVP, ISVP	
	80 min.	IWVP	
Watertightness	No leakage.	IDVP	9.1.7
Airtightness	No leakage.	IDVP	9.1.8
Elevated temperature cycling efflux mm	No leakage. Deflection for ND50 or under: ≤3 Deflection for over ND50: ≤0.05 × outside diameter	IDVP	9.1.9

Table 2 (concluded)

Performance item	Requirement	Symbol of applicable pipe	Applicable test subclause
Flat sealing performance MPa	At water pressure of 0.005 and 0.05: no leakage Under atmospheric pressure of -0.03: -0.027 max.	ISVP	9.1.10
Bending sealing performance MPa	At water pressure of 0.005 and 0.05: no leakage Under atmospheric pressure of -0.03: -0.027 max.	ISVP	9.1.11
Hot internal pressure creep property	No damages.	ISVP, IWVP	9.1.12
Resistance to external blows (rotation method) %	Impact resistance (TIR) at 0 °C: 10 max.	IDVP, ISVP, IWVP	9.1.13
Resistance to external blows (staircase method) ^{c)} m	50 % breakage height at 0 °C: 1 min. Breakage at 0.5 m or under: there shall not be more than one.	IDVP, ISVP	9.1.14
Thermal longitudinal reversion %	Extension and contraction in axial direction: 5 max.	IDVP, ISVP, IWVP	9.1.15
Dichloromethane resistance ^{d)}	No corrosion.	IDVP, ISVP, IWVP	9.1.16
Differential scanning calorimetry (DSC) ^{d)} °C	B-onset (maximum processing temperature): 185 min.	IWVP	9.1.17
Notes ^{a)} The specified joint part pressure resistance shall apply to the pipes having the rubber ring type socket or adhesion socket for pressurized conveyance, and for these pipes, the pressure resistance test may be replaced with this joint part pressure resistance test. ^{b)} To be judged according to the criteria given in JA.4. ^{c)} Applicable to the pipes intended to be used in areas where installation is usually carried out at temperatures below -10 °C. ^{d)} For IWVP, either dichloromethane resistance or differential scanning calorimetry (DSC), whichever is selected, shall be tested.			

6 Appearance and shape

6.1 Appearance

The pipes shall be smooth in outer and inner surfaces and free from defects detrimental to use such as flaws and fissures.

6.2 Shape

The pipe shall have a practically right-circular cross-section and be straight, and its end surfaces shall be square to its axis.

The pipe ends may be processed into sockets. In this case, the socket shall be the rubber ring type socket equipped with the rubber ring for pressurized conveyance and non-pressurized conveyance and the adhesion type socket. The insert part joined to the socket may be chamfered as necessary.

7 Dimensions and tolerances

7.1 Outside diameter and wall thickness of pipes, and their tolerances

The outside diameter and wall thickness of pipes, and their tolerances shall be in accordance with Table 3 for VP, HIVP, VM and VU, and Table 4 for IDVP, ISVP and IWVP.

Table 3 Outside diameter and wall thickness of VP, HIVP, VM and VU, and their tolerances

Unit: mm

Nominal diameter	VP, HIVP					VM				VU			
	Outside diameter			Wall thickness	Informative	Outside diameter		Wall thickness	Informative	Outside diameter		Wall thickness	Informative
	Basic dimension	Tolerance on max. and min. outside diameter ^{a)}	Tolerance on mean outside diameter ^{b)}	Min.	Approx. inside diameter	Mass per metre (kg) ^{c)}		Min.	Tolerance on mean outside diameter ^{b)}	Approx. inside diameter	Mass per metre (kg) ^{c)}	Basic dimension	Tolerance on mean outside diameter ^{b)}
						VP	HIVP						
13	18.0	± 0.2	± 0.2	2.2	13	0.174	0.170	—	—	—	—	—	—
16	22.0			2.7	16	0.256	0.251	—	—	—	—	—	—
20	26.0				20	0.310	0.303	—	—	—	—	—	—
25	32.0			3.1	25	0.448	0.439	—	—	—	—	—	—
30	38.0	± 0.3			31	0.542	0.531	—	—	—	—	—	—
40	48.0			3.6	40	0.791	0.774	—	—	—	—	48.0	± 0.2
50	60.0	± 0.4		4.1	51	1.122	1.098	—	—	—	—	60.0	—
65	76.0	± 0.5	± 0.3		67	1.445	1.415	—	—	—	—	76.0	± 0.3
75	89.0			5.5	77	2.202	2.156	—	—	—	—	89.0	—
100	114.0	± 0.6	± 0.4	6.6	100	3.409	3.338	—	—	—	—	114.0	± 0.4
125	140.0	± 0.8	± 0.5	7.0	125	4.464	4.371	—	—	—	—	140.0	± 0.5
150	165.0	± 1.0		8.9	146	6.701	6.561	—	—	—	—	165.0	—
200	216.0	± 1.3	± 0.7	10.3	194	10.129	9.913	—	—	—	—	216.0	± 0.7
250	267.0	± 1.6	± 0.9	12.7	240	15.481	15.157	—	—	—	—	267.0	± 0.9
300	318.0	± 1.9	± 1.0	15.1	286	21.962	21.504	—	—	—	—	318.0	± 1.0
350	—	—	—	—	—	—	—	370.0	± 1.2	339	24.378	370.0	± 1.2
400	—	—	—	—	—	—	—	420.0	± 1.3	385	31.294	420.0	± 1.3
450	—	—	—	—	—	—	—	470.0	± 1.5	431	39.267	470.0	± 1.5
500	—	—	—	—	—	—	—	520.0	± 1.6	477	47.930	520.0	± 1.6
600	—	—	—	—	—	—	—	—	—	—	—	630.0	± 3.2

Notes ^{a)} Tolerance on maximum or minimum outside diameter is the permitted deviation of the measured maximum or minimum value of the outside diameter at any cross-section of the pipe (maximum or minimum outside diameter) from the basic dimension.

^{b)} Tolerance on mean outside diameter is the permitted deviation of either of the following from the basic dimension: the measurement of pipe circumference at any cross-section divided by the circular constant, 3.142; or the mean of the measurements of the outside diameter (mean outside diameter) obtained in two directions at an equal interval at any cross-section.

^{c)} Mass per metre is calculated by assuming the density of VP, VM, and VU to be 1.43 g/cm³, and that of HIVP to be 1.40 g/cm³, with the pipe dimension being taken as the basic dimension.

Table 4 Outside diameter and wall thickness of IDVP, ISVP and IWVP, and their tolerances

Unit: mm

Nominal diameter	IDVP			ISVP			IWVP		
	Mean outside diameter ^{a)}		Mean wall thickness ^{b)}	Mean outside diameter ^{a)}		Mean wall thickness ^{b)}	Mean outside diameter ^{a)}		Wall thickness Tolerance
	Min.	Tolerance		Min.	Tolerance		Min.	Tolerance	
ND32	32.0	+0.2	3.0	3.0	+0.5		32.0	+0.2	1.6 +0.4
ND40	40.0								
ND50	50.0								
ND63	63.0								
ND75	75.0	+0.3					63.0	+0.3	3.0 +0.6
ND80	80.0								
ND82	82.0								
ND90	90.0								
ND100	100.0		3.2				90.0	+0.3	4.3 +0.7
ND110	110.0								
ND125	125.0								
ND140	140.0	+0.4							
ND160	160.0		3.6				160.0	+0.6	6.2 +0.9
ND180	180.0								
ND200	200.0	+0.5							
ND225	—	—							
ND250	250.0	+0.5	4.9				250.0	+0.8	9.6 +1.2
ND280	—	—							
ND315	315.0	+0.6							
ND355	—	—							
ND400	—	—	6.2				315.0	+1.0	12.1 +1.5
ND450	—	—							
ND500	—	—							
ND560	—	—							
ND630	—	—	12.3				630.0	+1.9	24.1 +2.7

NOTE : For dimensional requirements, see **ISO 3633** for IDVP, **ISO 4435** for ISVP in and **ISO 1452-2** for IWVP.

Notes ^{a)} Mean outside diameter is the value of the measurement of the outer circumference of a pipe in any cross-section divided by 3.142.

^{b)} Mean wall thickness is the mean value of thickness measurements at four points at equal intervals in any cross-section of the pipe.