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Construction of pressure vessel —General principles

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Health, Labour and Welfare and 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 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 B 8265** : 2008 is replaced with this 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 or utility model right which have technical properties. The relevant Ministers and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, or utility model right which have the said technical properties.

Construction of pressure vessel —General principles

1 Scope

1.1 Applicable pressure vessels

This Japanese Industrial Standard applies to the construction and fixtures of pressure vessels with the design pressure of less than 30 MPa.

The pressure vessels refer to vessels which retain pressure or contain fluid generating pressure, or to those which retain external pressure (hereafter referred to as "pressure vessels"). However, pressure vessels given in **a)** to **f)** below are excluded.

NOTE : The pressure, unless otherwise specified, means gauge pressure.

a) Those within the scope of other Japanese Industrial Standards [1)]

b) Those made of non-metallic materials

c) Those used for atomic energy

d) Those with riveted or soldered structure

e) Those exposed to direct fire

f) Those with special structures [2)] or for special applications [3)]

Notes [1)] Examples are shown below.

Example 1 JIS B 8267 *Construction of pressure vessel*

Example 2 JIS B 8266 *Alternative standard for construction of pressure vessels*

Example 3 JIS B 8201 *Stationary steel boilers — Construction*

Example 4 JIS B 8240 *Construction of pressure vessels for refrigeration*

Example 5 JIS B 8241 *Seamless steel gas cylinders*

Example 6 JIS B 8248 *Cylindrical layered pressure vessels*

Example 7 JIS B 8501 *Welded steel tanks for oil storage*

[2)] Such as those with complicated shapes, flat-bottom cylindrical tanks for low temperature and tanks with membrane structure.

[3)] Pressure sections of rotating or reciprocating machines such as oil or water pressure machines, pumps, compressors, turbines, internal combustion engines, water or pneumatic pressure cylinders.

1.2 Scope of pressure vessels

1.2.1 Scope of pressure vessels shall include the main body [shells, end plates and nozzle stubs (nozzles) directly connected to them] and the sections shown in **a)** to **c)** below :

a) fixing sections to the piping,

1) to the first circumference joint (excluding the welded joint), for welded joints;

2) to the first screwed joint, for screwed joints;

3) to the first flange surface, for bolted flanged joints;

b) sections to the welded joint, in case the fixtures are welded directly onto the pressured sections;

c) sections to the cover plate subjected to pressure such as manhole and hand hole (including welded joints, bolts and nuts and gaskets).

1.2.2 Valves may be included in the scope of pressure vessels.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For standards indicated below, only the editions of the indicated year shall be applied and any revisions (including amendments) made thereafter shall not be applied.

JIS B 0190 : 2010 *Glossary of terms used in construction of pressure vessels*

JIS B 2220 : 2004 *Steel pipe flanges*

JIS B 2239 : 2004 *Cast iron pipe flanges*

JIS B 2240 : 2006 *Copper alloy pipe flanges*

JIS B 2241 : 2006 *Aluminium alloy pipe flanges*

JIS B 2290 : 1998 *Vacuum technology—Flange dimensions*

JIS B 8210 : 2009 *Safety devices for protection against excessive pressure—Direct spring loaded safety valves for steam and gas service*

JIS B 8226 : 2000 *Bursting discs and bursting disc assemblies*

JIS B 8266 : 2006 *Alternative standard for construction of pressure vessels*

JIS B 8285 : 2010 *Welding procedure qualification test for pressure vessels*

JIS G 0404 : 2010 *Steel and steel products—General technical delivery requirements*

JIS G 0581 : 1999 *Methods of radiographic examination for steel castings*

JIS G 0582 : 2004 *Ultrasonic examination for steel pipes and tubes*

JIS G 0801 : 2008 *Ultrasonic testing of steel plates for pressure vessels*

JIS G 3101 : 2010 *Rolled steels for general structure*

JIS G 3103 : 2007 *Carbon steel and molybdenum alloy steel plates for boilers and pressure vessels*

JIS G 3106 : 2008 *Rolled steels for welded structure*

JIS G 3114 : 2008 *Hot-rolled atmospheric corrosion resisting steels for welded structure*

JIS G 3115 : 2010 *Steel plates for pressure vessels for intermediate temperature service*

JIS G 3116 : 2010 *Steel sheet, plates and strip for gas cylinders*

JIS G 3118 : 2010 *Carbon steel plates for pressure vessels for intermediate and moderate temperature services*

JIS G 3119 : 2007 *Manganese-molybdenum and manganese-molybdenum-nickel alloy steel plates for boilers and pressure vessels*

JIS G 3120 : 2009 *Manganese-molybdenum and manganese-molybdenum-nickel alloy steel plates quenched and tempered for pressure vessels*

JIS G 3126 : 2009 *Carbon steel plates for pressure vessels for low temperature service*

JIS G 3127 : 2005 *Nickel steel plates for pressure vessels for low temperature services*

JIS G 3131 : 2010 *Hot-rolled mild steel plates, sheet and strip*

JIS G 3201 : 2008 *Carbon steel forgings for general use*

JIS G 3202 : 2008 *Carbon steel forgings for pressure vessels*

JIS G 3203 : 2008 *Alloy steel forgings for pressure vessels for high-temperature service*

JIS G 3204 : 2008 *Quenched and tempered alloy steel forgings for pressure vessels*

JIS G 3205 : 2008 *Carbon and alloy steel forgings for pressure vessels for low-temperature service*

JIS G 3206 : 2008 *High strength chromium-molybdenum alloy steel forgings for pressure vessels under high-temperature service*

JIS G 3214 : 2009 *Stainless steel forgings for pressure vessels*

JIS G 3452 : 2010 *Carbon steel pipes for ordinary piping*

JIS G 3454 : 2007 *Carbon steel pipes for pressure service*

JIS G 3455 : 2005 *Carbon steel pipes for high pressure service*

JIS G 3456 : 2010 *Carbon steel pipes for high temperature service*

JIS G 3457 : 2005 *Arc welded carbon steel pipes*

JIS G 3458 : 2005 *Alloy steel pipes*

JIS G 3459 : 2004 *Stainless steel pipes*

JIS G 3460 : 2006 *Steel pipes for low temperature service*

JIS G 3461 : 2005 *Carbon steel boiler and heat exchanger tubes*

JIS G 3462 : 2009 *Alloy steel tubes for boiler and heat exchanger*

JIS G 3463 : 2006 *Stainless steel boiler and heat exchanger tubes*

JIS G 3464 : 2006 *Steel heat exchanger tubes for low temperature service*

JIS G 3467 : 2006 *Steel tubes for fired heater*

JIS G 3468 : 2004 *Large diameter welded stainless steel pipes*

JIS G 3601 : 2002 *Stainless-clad steels*

JIS G 3602 : 2004 *Nickel and nickel alloy clad steels*

JIS G 3603 : 2005 *Titanium clad steels*

JIS G 3604 : 2004 *Copper and copper alloy clad steels*

JIS G 4051 : 2009 *Carbon steels for machine structural use*

JIS G 4053 : 2008 *Low-alloyed steels for machine structural use*

JIS G 4107 : 2010 *Alloy steel bolting materials for high temperature service*

JIS G 4108 : 2010 *Alloy steel bars for special application bolting materials*

JIS G 4109 : 2008 *Chromium-molybdenum alloy steel plates for boilers and pressure vessels*

JIS G 4110 : 2008 *High strength chromium-molybdenum and chromium-molybdenum-vanadium alloy steel plates for pressure vessels under high-temperature service*

JIS G 4303 : 2005 *Stainless steel bars*

JIS G 4304 : 2010 *Hot-rolled stainless steel plate, sheet and strip*

JIS G 4305 : 2010 *Cold-rolled stainless steel plate, sheet and strip*

JIS G 4311 : 2007 *Heat resisting steel bars*

JIS G 4312 : 1991 *Heat-resisting steel plates and sheets*

JIS G 4901 : 2008 *Corrosion-resisting and heat-resisting superalloy bars*

JIS G 4902 : 1991 *Corrosion-resisting and heat-resisting superalloy plates and sheets*

JIS G 4903 : 2008 *Seamless nickel-chromium-iron alloy pipes*

JIS G 4904 : 2008 *Seamless nickel-chromium-iron alloy heat exchanger tubes*

JIS G 5101 : 1991 *Carbon steel castings*

JIS G 5102 : 1991 *Steel castings for welded structure*

JIS G 5111 : 1991 *High tensile strength carbon steel castings and low alloy steel castings for structural purposes*

JIS G 5121 : 2003 *Corrosion-resistant cast steels for general applications*

JIS G 5122 : 2003 *Heat-resistant cast steels and alloys for general applications*

JIS G 5131 : 2008 *High manganese steel castings*

JIS G 5151 : 1991 *Steel castings for high temperature and high pressure service*

JIS G 5152 : 1991 *Steel castings for low temperature and high pressure service*

JIS G 5201 : 1991 *Centrifugally cast steel pipes for welded structure*

JIS G 5202 : 1991 *Centrifugally cast steel pipes for high temperature and high pressure service*

JIS G 5526 : 1998 *Ductile iron pipes*

JIS G 5527 : 1998 *Ductile iron fittings*

JIS H 3100 : 2006 *Copper and copper alloy sheets, plates and strips*

JIS H 3250 : 2010 *Copper and copper alloy rods and bars*

JIS H 3300 : 2009 *Copper and copper alloy seamless pipes and tubes*

JIS H 3320 : 2006 *Copper and copper alloy welded pipes and tubes*

JIS H 4000 : 2006 *Aluminium and aluminium alloy sheets, strips and plates*

JIS H 4040 : 2006 *Aluminium and aluminium alloy rods, bars and wires*

JIS H 4080 : 2006 *Aluminium and aluminium alloys extruded tubes and cold-drawn tubes*

JIS H 4090 : 2006 *Aluminium and aluminium alloy welded pipes and tubes*

JIS H 4100 : 2006 *Aluminium and aluminium alloy extruded shape*

JIS H 4140 : 1988 *Aluminium and aluminium alloy forgings*

JIS H 4301 : 2009 *Lead sheets and plates and hard lead sheets and plates*

JIS H 4311 : 2006 *Lead and lead alloy tubes for common industries*

JIS H 4551 : 2000 *Nickel and nickel alloy plate, sheet and strip*

JIS H 4552 : 2000 *Nickel and nickel alloy seamless pipes and tubes*

JIS H 4553 : 1999 *Nickel and nickel alloy bars*

JIS H 4600 : 2007 *Titanium and titanium alloys—Sheets, plates and strips*

JIS H 4630 : 2007 *Titanium and titanium alloys—Seamless pipes*

JIS H 4631 : 2006 *Titanium and titanium alloy tubes for heat exchangers*

JIS H 4635 : 2006 *Titanium and titanium alloy welded pipes*

JIS H 4650 : 2007 *Titanium and titanium alloys—Rods and bars*

JIS H 5120 : 2009 *Copper and copper alloy castings*

JIS H 5121 : 2009 *Copper alloy continuous castings*

JIS H 5202 : 2010 *Aluminium alloy castings*

JIS H 5302 : 2006 *Aluminium alloy die castings*

JIS Z 2242 : 2005 *Method for Charpy pendulum impact test of metallic materials*

JIS Z 2305 : 2001 *Non-destructive testing—Qualification and certification of personnel*

JIS Z 2320-1 : 2007 *Non-destructive testing—Magnetic particle testing—Part 1 : General principles*

JIS Z 2320-2 : 2007 *Non-destructive testing—Magnetic particle testing—Part 2 : Detection media*

JIS Z 2320-3 : 2007 *Non-destructive testing—Magnetic particle testing—Part 3 : Equipment*

JIS Z 2343-1 : 2001 *Non-destructive testing—Penetrant testing—Part 1 : General principles—Method for liquid penetrant testing and classification of the penetrant indication*

JIS Z 3060 : 2002 *Method for ultrasonic examination for welds of ferritic steel*

JIS Z 3080 : 1995 *Methods of ultrasonic angle beam examination for butt welds of aluminium plates*

JIS Z 3081 : 1994 *Methods of ultrasonic angle beam examination for welds of aluminium pipes and tubes*

JIS Z 3082 : 1995 *Methods of ultrasonic examination for T type welds of aluminium plates*

JIS Z 3104 : 1995 *Methods of radiographic examination for welded joints in steel*

JIS Z 3105 : 2003 *Methods of radiographic examination for welded joints in aluminium*

JIS Z 3106 : 2001 *Methods of radiographic examination for welded joints in stainless steel*

JIS Z 3107 : 2008 *Methods of radiographic examination for titanium welds by X-ray*

JIS Z 3121 : 1993 *Methods of tensile test for butt welded joints*

JIS Z 3122 : 1990 *Methods of bend test for butt welded joint*

JIS Z 3801 : 1997 *Standard qualification procedure for manual welding technique*

ISO 3183 : 2007 *Petroleum and natural gas industries—Steel pipe for pipeline transportation systems*

ASME B16.5 : 1996 *Pipe flanges and flanged fittings*

ASME B16.9 : 1993 *Factory-made wrought buttwelding fittings*

ASME B16.11 : 1991 *Forged fittings, socket-welding and threaded*

ASME B16.15 : 1985 *Cast copper alloy threaded fittings*

ASME B16.24 : 1991 *Cast copper alloy pipe flanges and flanged fittings*

ASME B16.28 : 1986 *Wrought steel buttwelding short radius elbows and returns*

ASME B16.47 : 1996 *Large diameter steel flanges : NPS 26 through NPS 60*

ASME Section II : 1998 (including 1998 Addenda) *Boiler and pressure vessel code —Materials*

ASME Section VIII Division 1 : 1998 (including 1998 Addenda) *Boiler and pressure vessel code—Rules for construction of pressure vessels*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS B 0190** and the following apply :

3.1 calculated thickness

thickness required for calculation of strength

3.2 thickness

generic term for nominal thickness and actual thickness

3.3 nominal thickness

nominal dimensions of thickness of such as shells, plates and pipes

3.4 pressure section

section of a pressure vessel which retains the pressure exceeding 0 MPa on the inner or outer surface, or which consists of a strengthened member subjected to loads generated by pressure

The following **a)** and **b)** are not included:

a) sections in the inside of a vessel not directly provided for the purpose of retaining pressure (a baffle, a guide pipe, etc.)

b) sections other than the strengthened member, such as a lining and a plating that are applied to the pressure section