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Foreword

This Japanese Industrial Standard has been 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 Japan Boiler Association (JBA)/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 8210**:2009 is replaced with this Standard.

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Safety devices for protection against excessive pressure—Safety valves

Introduction

This Japanese Industrial Standard has been prepared based on **ISO 4126-1**:2013 (Edition 3) and its Amendment 1:2016, and **ISO 4126-7**:2013 (Edition 2) and its Amendment 1:2016. Some of the technical contents of the International Standards have been modified to bring them into accordance with needs and circumstances unique to Japan. The amendments to the International Standards have been compiled into this Standard.

The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JB.

1 Scope

This Standard specifies requirements for full bore safety valves with a set pressure of 0.1 MPa (gauge pressure)[1)] and above and with a throat diameter of 7 mm and above, and curtain area restricted safety valves with a valve seat opening diameter of 15 mm and above. This Standard is not applicable to pilot-operated safety valves, or those safety valves used for pressure vessels for refrigeration.

This is a product standard, and is not applicable to applications of safety valves.

Note [1)] Pressure requirements in this Standard are given in either absolute pressure or gauge pressure, whichever is appropriate for the particular requirement. Absolute pressures are given in Pa, with the indication "(absolute)" attached after the unit where clear distinction is necessary. All gauge pressures are given in Pa with the indication "(gauge)" attached after it.

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

ISO 4126-1:2013 *Safety devices for protection against excessive pressure—Part 1: Safety valves* and Amendment 1:2016

ISO 4126-7:2013 *Safety devices for protection against excessive pressure—Part 7: Common data* and Amendment 1:2016 (Overall evaluation: 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 0100 *Glossary of terms for valves*

JIS B 0203 *Taper pipe threads*

JIS B 0403 *Castings—System of dimensional tolerances and machining allowances*

JIS B 0405 *General tolerances—Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

JIS B 2001 *Nominal size and bore of valves*

JIS B 2220 *Steel pipe flanges*

JIS B 2239 *Cast iron pipe flanges*

JIS B 2240 *Copper alloy pipe flanges*

JIS B 8201 *Stationary steel boilers—Construction*

JIS B 8225 *Safety valves—Measuring methods for coefficient of discharge*

JIS B 8226-2 *Bursting disc safety devices—Part 2: Combination with safety valve*

JIS B 8227 *Sizing of safety valves for gas/liquid two-phase flow*

JIS B 8265 *Construction of pressure vessel—General principles*

JIS B 8267 *Construction of pressure vessel*

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

JIS G 5501 *Grey iron castings*

JIS G 5502 *Spheroidal graphite iron castings*

JIS G 5705 *Malleable iron castings*

JIS H 5120 *Copper and copper alloy castings*

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

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

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

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS B 0100**, and the following apply.

3.1

safety valve

valve which automatically, without the assistance of any energy other than that of the fluid concerned, discharges a quantity of the fluid so as to prevent a predetermined safe pressure from being exceeded, and which is designed to re-close and prevent further flow of fluid after normal pressure conditions of service have been restored

NOTE 1 The valve can be characterized either by pop action (rapid opening) or by opening in proportion (not necessarily linear) to the increase in pressure over the set pressure.

NOTE 2 Safety valves are classified into pilot-operated valves and valves with other mechanisms; the safety valves defined in **3.2** to **3.4** all fall under the category of the latter.

3.2

direct loaded safety valve

safety valve in which the loading due to the fluid pressure underneath the valve disc is opposed only by a direct mechanical loading device such as a weight, lever and weight, or spring [2)]

Note [2)] A safety valve using a spring as a loading device is referred to as the spring loaded safety valve.

3.3

assisted safety valve

safety valve which, by means of a powered assistance mechanism, may additionally be lifted at a pressure lower than the set pressure and will, even in the event of failure of the assistance mechanism, comply with all the requirements for safety valves given in this Standard

3.4

supplementary loaded safety valve

safety valve which has, until the pressure at the inlet to the safety valve reaches the set pressure, an additional force which increases the sealing force

NOTE This additional force (supplementary load), which may be provided by means of an extraneous power source, is reliably released when the pressure at the inlet of the safety valve reaches the set pressure. The amount of supplementary loading is so arranged that if such supplementary loading is not released, the safety valve will attain its certified capacity at a pressure not greater than 1.1 times the maximum allowable pressure of the equipment to be protected.

3.5

curtain area restricted safety valve

safety valve of which the lift is 1/40 or over to and excluding 1/4 the seat diameter, and of which the seat flow area (curtain area) is the smallest of all flow areas with the valve disc opened

3.6

full bore safety valve

safety valve capable of obtaining a lift where the seat flow area becomes sufficiently larger than the area of the throat

3.7

set pressure

predetermined pressure at which a safety valve under operating conditions commences to open

NOTE It is the gauge pressure measured at the valve inlet at which the pressure forces tending to open the valve for the specific service conditions are in equilibrium with the forces retaining the valve disc on its seat.

It is a pressure value prescribed in designing of a valve, which then is verified by type tests or product inspection to be within a permissible range.

3.8

maximum allowable pressure (PS)

the maximum set pressure for the equipment, which is specified by the manufacturer of the pressure equipment

3.9

overpressure

pressure increase over the set pressure

NOTE Overpressure is usually expressed as a percentage of the set pressure.

3.10

reseating pressure; closing pressure

value of the inlet static pressure at which the disc re-establishes contact with the seat or at which the lift becomes zero

3.11

cold differential test pressure (CDTP)

inlet static pressure at which a safety valve is set to commence to open on the test bench

NOTE This test pressure includes corrections for service conditions, e.g. back pressure and/or temperature.

3.12

relieving pressure; flow rating pressure

the inlet side pressure at the time of calculating the discharge capacity of a safety valve, which is the sum of the set pressure and the overpressure

NOTE For calculating the certified capacity, the sum of set pressure and allowable overpressure is used.

3.13

relieving temperature

the inlet side temperature at the time of calculating the discharge capacity of a safety valve

3.14

opening pressure; popping pressure

pressure at the inlet side when the safety valve rapidly opens (pops)

NOTE Pop action means the action of the safety valve to blow out the inside fluid when the lift increases instantaneously.

3.15

start-to-discharge pressure; start-to-leak pressure

inlet side pressure when the pressure increase at the inlet side has caused a minor volume of outflow to be detected at the discharge side

NOTE A minor volume of outflow, in this case, is such an outflow as clearly detectable by vision or hearing, in the case of steam, and by hearing or by means such as applying a soap water over the exit outlet within the allowable limit of start-to-discharge pressure, in the case of gas and liquid. It does not include the outflow due to valve seat leakage.

3.16

back pressure

pressure that exists at the outlet of a safety valve as a result of the pressure in the discharge system

NOTE The back pressure is the sum of the superimposed and built-up back pressures.

3.17

built-up back pressure

pressure existing at the outlet of a safety valve caused by flow through the valve and the discharge system

3.18

superimposed back pressure

pressure existing at the outlet of a safety valve at the time when the device is required to operate

NOTE It is the result of pressure in the discharge system from other sources.

3.19

balanced bellows

device which minimizes the effect of back pressure on the set pressure and/or the operation of a safety valve

3.20

blowdown

difference between set and reseating pressures

When using the opening pressure or start-to-discharge pressure and reseating pressure measured in the product inspection, blowdown may be the difference between opening pressure and reseating pressure or between start-to-discharge pressure and reseating pressure.

NOTE Blowdown is normally stated as a percentage of set pressure (start-to-discharge pressure or opening pressure, when using the measured opening pressure or start-to-discharge pressure) except where the measured opening pressure or start-to-discharge pressure is less than 0.3 MPa (gauge), in which case the blowdown is expressed in MPa.

3.21

lift

actual travel of the valve disc away from the closed position

3.22

flow area

minimum cross-sectional flow area (see Figure JA.1) between inlet and seat which is used to calculate the theoretical discharge capacity (see Annex A) and certified capacity with no deduction for any obstruction

3.23

throat area; bore area

flow area calculated using the throat diameter

3.24

seat flow area; curtain area

flow area of the cylindrical or conical shaped opening between the valve disc and the valve seat surface obtained by the lift of the valve disc

3.25

flow diameter

diameter corresponding to the flow area

3.26

seat diameter

inside diameter of the contact face of the valve disc with the valve seat (see Figure JA.1)

3.27

throat diameter; bore diameter

inside diameter of the flow at its narrowest portion from the fluid intake opening to the valve seat surface (see Figure JA.1)

3.28

theoretical discharge capacity

calculated capacity expressed in mass or volumetric units of a theoretically perfect nozzle having a cross-sectional flow area equal to the flow area of a safety valve

3.29

coefficient of discharge

value of actual flowing capacity (from tests) divided by the theoretical flowing capacity (from calculation)

3.30

certified de-rated coefficient of discharge

coefficient to be used for the calculation of certified capacity, which is the product of coefficient of discharge and de-rated coefficient