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JAPANESE INDUSTRIAL STANDARD

Steam boilers and pressure vessels — Spring loaded safety valves

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Steam boilers and pressure vessels — Spring loaded safety valves

B 8210-1994

1. Scope This Japanese Industrial Standard specifies the spring loaded safety valves for steam and spring loaded safety valves for gas (hereafter, when no particular distinction of uses for steam or gas is required, referred to as "safety valves") of direct operation type by cylindrical coil spring. However, those given in the following are not included.

(1) Those to be used for releasing the pressure of liquid

(2) Those of under 0.1 MPa {1 kgf/cm^2} and over 42.9 MPa {429 kgf/cm^2} in set pressure

(3) Those of particular construction for vehicles and the like

(4) Those of similar to the unloader to be used for pressure regulation

(5) Those of less than 15 mm in seat diameter

Remarks 1. The standards cited in this Standard are given in Attached Table 1.

2. The International standard corresponding to this Standard is given in the following:

ISO 4126 Safety valves — Part 1: General requirements

3. The units and numerical values given in { } in this Standard are based on the traditional units, and are appended for informative reference.

2. Definitions For the main terms used in this Standard, the definitions in JIS B 0100 apply, and the rest of the terms are as follows:

(1) safety valve The valve which has functions to automatically actuate when the pressure of inlet side of the valve increases to a predetermined pressure, to open the valve disc and discharge the fluid (steam or gas); and when the pressure decreases to the prescribed value, to close the valve disc again.

Remarks 1. The valve having the capability of discharging the certified capacity.

2. The valves to be used for the purpose of securing the safety mainly of the generating equipments of steam or gas, pressure vessels, pipings, etc.

(2) lift safety valve Safety valve of which lift is $\frac{1}{40}$ or over to under $\frac{1}{4}$ the seat diameter, and the seat flow area (curtain area) becomes the minimum among the flow areas when the valve disc is opened.

(3) full bore safety valve Safety valve which is capable of obtaining such a lift where the seat flow area becomes sufficiently larger than the area of the throat of the nozzle in the lower portion than the contacting face of the valve disc and the valve seat.

(4) start-to-discharge pressure; start-to-leak pressure The pressure at the inlet side when an extremely small outflow of fluid is detected at the outlet side as the pressure of inlet side increases.

Remarks: The extremely small quantity of fluid, in this case, is the outflow when it is detected by visual inspection or sound detection for steam, and by sound detecting, soap water and the like for gas. It is not the outflow due to valve seat leakage.

(5) opening pressure The pressure at the inlet side when the safety valve performs popping.

Remarks 1. This is also called "popping pressure".

2. "Popping" means the action to blow out the inside fluid when the lift of the safety valve increases instantaneously.

(6) set pressure The opening pressure or start-to-discharge pressure determined in the design.

(7) closing pressure The pressure at the inlet side when the valve disc contacts again with the valve seat due to decrease of the pressure at the inlet, namely the pressure at the inlet side when the lift becomes zero.

Remarks: This is also called "reseating pressure".

(8) blow down The difference between the opening pressure and the closing pressure or the difference between the start-to-discharge pressure and the closing pressure.

(9) over pressure A pressure increase over the set pressure of a safety valve.

(10) allowable over pressure The allowable pressure over the set pressure of a safety valve.

(11) coefficient of discharge The ratio of an actual relieving capacity to the theoretical relieving capacity to be used in calculating the relieving capacity of a safety valve, and it is the coefficient to which the frictional resistance and the like of the fluid passing through the safety valve are taken into consideration.

(12) certified coefficient of discharge The coefficient of discharge to be applied to the certified capacity.

(13) flow rating pressure The pressure at the inlet side when calculating the certified capacity of a safety valve, and it is the sum of the set pressure and the allowable over pressure.

(14) back pressure The pressure at the outlet side of a safety valve, and it consists of the built-up back pressure and the superimposed back pressure.

(15) built-up back pressure That pressure at the outlet side of a safety valve generated due to the flow at the outlet side when the safety valve starts to blow.

(16) superimposed back pressure The pressure existing at the outlet side before a safety valve starts to blow, and it is introduced into the outlet side of the safety valve from other sources.

(17) theoretical relieving capacity The relieving capacity calculated on the assumption that there is no resistance of the fluid passing through a safety valve, its flow rate coefficient is one, and ideal gas of constant specific heat which changes isentropically blows out.

(18) certified capacity; rated relieving capacity The relieving capacity guaranteed for individual safety valve, and of which value is calculated by theoretical relieving capacity × certified coefficient of discharge × 0.9.

Remarks: The theoretical relieving capacity shall be in accordance with JIS B 8225.

(19) lift The amount of travel of a valve disc in the axial direction from the closed position to the opened position during blowing out of a safety valve.

(20) rated lift The lift in the design at which the certified capacity is obtained.

(21) seat diameter The inside radius of the contacting surface of the valve disc with the valve seat.

Remarks: Refer to Annex Attached Fig. 1.

(22) throat diameter; bore diameter The inside diameter of the narrowest portion of the nozzle from the intake opening of the fluid to the valve seat surface.

Remarks: Refer to Annex Attached Fig. 1.

(23) throat area; bore area The flow area corresponding to the throat diameter.

(24) seat flow area The 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.

Remarks: This is also called "curtain area".

(25) effective discharge area The flow area of the portion which determines the flow rate passing through the safety valve, and which is the area to be used for calculating the certified capacity.

Remarks: Refer to Annex Attached Fig. 1.

3. Classification of safety valves The safety valves shall be classified as given in the following according to the lift types, nominal diameters, joint types and nominal pressures.

(1) Classification according to lift types The lift types of safety valve shall be classified into the lift type or full bore type.

(2) Classification according to nominal diameters The nominal diameter of the safety valve shall be that of the inlet side, and shall generally be in accordance with the nominal diameter specified in JIS B 2001.

(3) Classification according to joint types The joint types of the safety valve shall be classified into the flange type, screw-in type, or welding type according to the joint types at the inlet side.

(4) Classification according to nominal pressures The nominal pressure of safety valve shall be classified by the manufacturer.