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NATIONAL STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 12243-2005

Replacing GB/T 12243-1989

Spring Loaded Safety Valves

弹簧直接载荷式安全阀

(JIS B 8210: 1994, Steam Boilers and Pressure Vessels –

Spring Loaded Safety Valves, MOD)

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Standardization Administration Committee of the People's Republic of China.

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Foreword

This standard is the revised edition of GB/T 12243-1989 *Spring Loaded Safety Valves*.

This standard was modified on the basis of JIS B 8210 *Steam and Gas Spring Safety Valve* (Japanese Edition, 1994).

The significant differences between this standard and JIS B 8210:1994 are as follows:

-- The previous standard is modified according to the requirements of GB/T 1.1.

-- The normative references are added in this standard according to the requirements of GB/T 1.1-2002.

-- Article 4.5 of JIS B 8210:1994 is deleted in this standard, with reference to the requirements of API Std 527:1991 “Valve Seat Tightness of Pressure Release Valve”.

-- Article 6.2 (flange measurement chart) of JIS B 8210:1994 is deleted in this standard.

The significant changes between this standard and GB/T 12243-1989 are as follows:

-- Major technical contents are modified correspondingly: the requirements of liquid safety valve are added; the tightness requirements and test procedures are modified according to API Std 527: 1991.

-- Pressure scope of application is modified from “nominal pressure PN 0.1~32 MPa” to “set-pressure 0.1 MPa~42.0 MPa”.

-- Malleable iron castings, spheroidal graphite iron castings, and copper alloy castings are added in valve material parts, so the scope of application of this standard in material aspect is enlarged.

-- “Design, material, and structure” is listed as independent Chapter (Chapter 4). It includes previous Chapter 3 “technical requirements”, except the “performance requirements”. At the same time, “performance” is listed as independent Chapter 5.

-- Deviation table of spring work-ring spacing is deleted. For spring ring pitch, the requirements is specified according to the provisions of GB/T 12241 “General Requirements of Safety Valve”.

-- In the Chapter 5 “performance”, for the blowdown of steam power-boiler safety valve, it adds “≤4% set-pressure” as the adopted requirements negotiated by the seller and buyer.

-- In the Chapter 5 “performance” and the Chapter 6 “test and inspection”, the tightness

requirements and test procedures are modified for air and other gas safety valves, and water or other liquid safety valves.

This standard replaces GB/T 12243-1989.

This standard was proposed by the Machinery Industry Association.

This standard shall be under jurisdiction of China valve TCST (SAC/TC 188).

Drafting organizations of this standard: Shanghai Anderson-Greenwood-Crosby valve Co., Ltd.; and Hefei General Machinery Research Institute.

Chief drafting staffs of this standard: Huang Guanyu, Wang Deping, and Wang Xiaojun.

This standard replaces the following previous edition:

-- GB/T 12243-1989.

Spring Loaded Safety Valves

1 Scope

This standard specifies the design, material, structure, performance, test & inspection, marking, lead sealing, and delivery of spring loaded safety valves.

This standard is applicable to steam boilers of which the set-pressure is 0.1 MPa~42.0 MPa, the runner diameter is greater than or equal to 8mm; pressure vessels and pipe safety valves.

2 Normative References

The articles contained in the following documents have become part of this standard when they are quoted herein. For the dated documents so quoted, all the modifications (excluding corrections) or revisions made thereafter shall not be applicable to this Standard. For the undated documents so quoted, the latest editions shall be applicable to this Standard.

GB/T 1239.2 “Cold Coiled Helical Compressions Springs - Technical Specifications”

GB/T 1239.4 “Hot Coiled Helical Springs - Technical Specifications”

GB/T 1239.6 “Design of Helical Springs”

GB/T 9440 “Malleable Iron Castings”

GB/T 12220 “General Purpose Industrial Valves - Marking” (GB/T 12220-1989, idt ISO 5209: 1977)

GB/T 12224 “General Requirements for Industrial Steel Valves”

GB/T 12225 “General Purpose Industrial Valves - Specification of Copper Alloy Castings”

GB/T 12227 “General Purpose Industrial Valves - Specification of Spheroidal Graphite Iron Castings”

GB/T 12228 “General Purpose Industrial Valves - Specifications of Carbon Steel Forgings”

GB/T 12229 “General Purpose Industrial Valves - Specification of Carbon Steel Castings”

GB/T 12230 “General Purpose Industrial Valves - Specifications of Austenitic Steel Castings”

GB/T 12241 “Safety Valve - General Requirements” (GB/T 12241-2005, ISO 4126-1:1991, MOD)

GB/T 12242 “Performance Test Code Pressure Relief Devices”

JB/T 7928 “General Purpose Industrial Valves Delivery Specification”

3 Terms and Definitions

Terms and definitions in GB/T 12241 are applicable to this standard.

4 Design, Material and Structure

Design, material and structure of safety valves shall be in accordance with the general requirements of GB/T 12241.

4.1 General Provisions

4.1.1 Steam safety valves whose set-pressure is larger than 3.0 Mpa; or air or other gas safety valves whose medium temperature is larger than 235°C shall prevent the exhausted medium from directly eroding springs.

4.1.2 In design, safety valve shall be guaranteed to reach the rated discharge even it is damaged partly. When spring is damaged, spare parts such as valve clack shall not fly off the valve body.

4.1.3 Looseness-proof devices must be installed in order to prevent looseness of structures for adjusting spring compression amount.

4.1.4 Fall lift and medium lift safety valves shall be equipped with structure controlling lift height.

4.1.5 Steam safety valve shall be equipped with spanners. When the medium pressure is over 75% of the set-pressure, spanner can be used to lift valve clacks. Spanners shall not block valve actions.

4.1.6 Safety valves with poisonous or combustible media shall be closed type safety valves.

4.1.7 As for safety valves with superimposed back pressure, back pressure balance mechanism shall be installed with regard to the back pressure size and fluctuation situation.

h -- Designed lift height (mm).

4.6.13 The spring deformation amount under the maximum working load shall be less than or equal to 80% of that under the testing load.

4.6.14 The spring deformation amount under the maximum working load shall be less than or equal to 80% of that when the spring rings fold together.

4.7 Material Requirements

4.7.1 Valve body

The materials of steel valve body shall be in accordance with the provisions of GB/T 12228, GB/T 12229 and GB/T 12230. The materials of iron valve body shall be in accordance with the provisions of GB/T 9440 and GB/T 12227. The materials of copper alloy shall be in accordance with the provisions of GB/T 12225. In which, the nominal pressure of malleable iron valve body shall be controlled to be equal to or less than 1.6 MPa, and that of the spheroidal graphite iron and copper alloy valve body shall be controlled to be equal to or less than 2.5 MPa.

4.7.2 Valve seat and valve clack

The corrosion resistance performance of valve seat and valve clack materials shall not be less than that of valve body materials.

4.7.3 Guide sleeve

The guide sleeve materials shall be possessed of favorable wear resistance and corrosion resistance performance.

4.7.4 Spring

Spring materials shall be adopted according to GB/T 1239.6. And it shall be in accordance with the requirements of relevant standards.

5 Performances

5.1 Set-pressure Deviation

5.1.1 The set-pressure limit deviation of pressure vessel and pipeline safety valve shall be in accordance with the provisions of Table 4.

5.1.2 The set-pressure limit deviation of steam boiler safety valve shall be in accordance with the provisions of Table 5.

Table 4 Set-pressure limit Deviation of the Pressure Vessel and Pipeline Safety Valve Unit: MPa

Set-pressure	Blowdown	
	Metal sealing-face	Nonmetal elastic sealing-face
≤0.2	≤0.03	≤0.05
>0.2	≤15% set-pressure	≤25% set-pressure

5.3.3 The blowdown of water or other liquid safety valve shall be in accordance with the provisions of Table 9.

Table 9 Blowdown of the Water or Other Liquid Safety Valves Unit: MPa

Set-pressure	Blowdown
≤0.3	≤0.06
>0.3	≤20% set-pressure

5.4 Lift Height

5.4.1 Lift height of the safety valves: fall lift is greater than or equal to 1/4 of the runner diameter; low lift shall be 1/40～1/20 of the runner diameter; medium lift shall be 1/20-1/4 of the runner diameter.

5.4.2 When the medium pressure rises to the upper limit of the discharge pressure specified in this standard, lift height shall reach the specified design value marked by the valve manufactory.

5.5 Mechanical Characteristics

The actions of the safety valve shall be stable as well as free from frequency hopping, chatter and jamming.

5.6 Sealing

5.6.1 The sealing testing pressure shall be in accordance with the provisions of Table 10.

Table 10 Sealing Testing Pressure Unit: MPa

Applicable media for the safety valve	Sealing testing pressure	
	Set-pressure <0.3	Set-pressure >0.3
Steam	0.03 less than the set-pressure	90% set-pressure or the minimum back-seat pressure (adopt the smaller value)
Air or other gas	0.03 less than the set-pressure	90% set-pressure
Water or other liquid	0.03 less than the set-pressure	90% set-pressure

Normal diameter DN/mm	Maximum allowable leakage rate/(cm^3/h)
<25	10
≥25	10×(DN/25)

5.7 Displacement

The calculation of the safety valve displacement shall be in accordance with the provisions of GB/T 12241.

6 Test and Inspection

6.1 Testing Items

Testing items of the safety valve type test and delivery test shall be in accordance with the provisions of Table 14. In the type approval of newly-designed or design-changed products, type test shall be carried out. Delivery test shall be carried out for each product before delivery.

Table 14 Testing Items of Safety Valve Type Test and Delivery Test

Serial number	Testing items	Type test	Delivery test	Specifications
1	Shell intensity	√	√	According to the provisions of GB/T 12241
2	Sealing	√	√	According to the provisions of 5.6 in this standard
3	Set-pressure	√	√	According to the provisions of 5.1 in this standard
4	Discharge pressure or overpressure	√	-	According to the provisions of 5.2 in this standard
5	Back-seat pressure or blowdown	√	-	According to the provisions of 5.3 in this standard
6	Lift height	√	-	According to the provisions of 5.4 in this standard
7	Mechanical characteristics	√	-	According to the provisions of 5.5 in this standard
8	Displacement or displacement coefficient	√	-	According to the provisions of GB/T 12241

6.2 General Requirements

6.2.1 The delivery test shall be carried out before painting.

6.2.2 Test equipment, instruments and procedures shall be in accordance with the

in accordance with the provisions of Table 15 before the leaking bubbles are counted. And then the leaking bubbles shall be observed and counted under the test pressure for at least 1 minute.

Table 15 The minimum duration of the test pressure

Normal diameter DN/mm	The minimum duration of the test pressure/min
≤50	1
>50-10	2
>100	5

6.3.2.4 Before sealing tests of the water or other liquid safety valve, the set-pressure shall be confirmed. After the inlet pressure is decreased, the coelom at the outlet side of the valve body shall be filled with water until the water spills out naturally. The inlet pressure shall be raised to the sealing test pressure. Under the above pressure, spilled water flow shall be collected and measured for at least 1 minute, namely leakage amount.

6.3.2.5 The sealing test of steam, water or other gas safety valve before delivery may be substituted by air or nitrogen test.

6.3.3 Action performance tests such as set-pressure, discharge pressure or overpressure, back-seat pressure or blowdown, lift height and mechanical characteristics as well as displacement or displacement coefficient test shall be in accordance with the provisions of GB/T 12241 and GB/T 12242.

7 Marking and Lead Sealing

7.1 The marking and lead sealing of the safety valve shall be in accordance with the provisions of GB/T 12220 and GB/T 12241.

7.2 The following contents shall be marked on the nameplate:

-- Name of manufactory (or brand) and date of production;

-- Product name, type and manufacture number;

-- Nominal diameter and runner diameter (or runner area);

-- Nominal pressure and set-pressure;

-- Overpressure or discharge pressure;

-- Lift height;

-- Extreme operating temperature;

-- Rated displacement coefficient or rated displacement of the reference fluid (air: G, steam: S, water: L);

-- Back pressure (if applicable).

8 Delivery

8.1 The delivery of the safety valve shall be in accordance with the provisions of JB/T 7928.

8.2 Each product shall be attached with quality certificate including the following contents:

-- Name of manufacture, brand and date of production;

-- Product name, type and manufacture number;

-- Nominal diameter and runner diameter (or runner area);

-- Nominal pressure and set-pressure;

-- Discharge pressure (or overpressure);

-- Lift height;

-- Applicable media and temperature;

-- Rated displacement coefficient or rated displacement of the reference fluid (air: G, steam: S, water: L);

-- Reference standards;

-- Inspection conclusion and inspection data;

-- Seal of the inspectors, inspection superintendents and the manufactory inspection department.

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