

Safety Technical Supervision Regulation for Safety Valves

Article 1

This Regulation is formulated in accordance with *Regulations on Safety Supervision of Special Equipment* (hereinafter referred to as Safety Regulations) in order to ensure safe operation of boilers, pressure vessels and pressure pipelines.

Article 2

This Regulation is applicable to the safety valves attached to boilers, pressure vessels and pressure pipelines stipulated in the Safety Regulations with maximum working pressure no less than 0.02MPa.

Refer to Appendix A for the relevant terms of safety valves.

Article 3

The material, design, manufacture, inspection, installation, service, inspection and repair of safety valves shall strictly be subject to this Regulation.

Refer to Appendix B for the safety technical requirements of safety valves.

Article 4

The manufacturers of safety valves shall obtain the special equipment manufacture license. The General Administration of Quality Supervision, Inspection and Quarantine of P. R. China (hereinafter referred to as AQSIQ) administrates the licensing to manufacturers at home and abroad, and is responsible for the issuance of the manufacture license. The manufacture license is valid for four years. The manufacturers who obtain the manufacture license shall apply the “license mark” and the license serial number on its products in accordance with Appendix B of TSG D2001-2006 *Rules for Manufacture of Pressure Pipeline Parts*.

Manufacture Licensing of safety valve is classified into level A and level B. AQSIQ is responsible for the acceptance, review and approval of foreign and domestic applicants of level A manufacturers; AQSIQ authorize quality & technical supervision bureaus of provinces, autonomous regions and municipalities (hereinafter referred to as provincial quality & technical supervision organs) to be in charge of the acceptance, review and approval of applicants of Level B manufactures within their own jurisdictions.

The procedures for manufacture licensing of safety valves include application, acceptance, product trial manufacture, type test, assessment & appraisal, review and approval, and license issuance. Refer to relevant stipulations for the specific licensing procedures. The trial product shall represent the level applied.

Refer to Appendix C for the requirements on safety valve manufacture licensing. If

safety valve parts are subject to manufacture licensing, the manufacturer shall obtain the special equipment manufacture license according to the requirements of relevant safety technical regulations.

Article 5

The manufacturer shall manufacture the trial product and have the type test if one of the following cases occurs.

- (1) Before the manufacture of a new product or start to manufacture again after suspending manufacture for over 1 year.
- (2) Major changes occurred to the product structure or technology which will affect the safety performance of the product
- (3) Required by manufacture licensing
- (4) Some problems exist for the safety performance, and required by provincial quality & technical supervision organs

Refer to Appendix D for the content and requirements of type test for safety valves.

Article 6

After the application is being accepted, the safety valve manufacturer shall manufacture the trial products according to the technical and quantity requirements for assessment & appraisal and type test, and invite the safety valve type test institutes published by AQSIQ to conduct the type test in accordance with Appendix D.

The procedures for type test of safety valves include invitation and acceptance, design review, sampling, inspection and testing, issuance of type test report and license.

Article 7

The inspection organizations of in-service safety valves shall have technical responsible persons, technicians, inspection devices and inspection place that are suitable for the inspection.

The end users of safety valves may conduct the inspection by themselves if condition permits. The end users of safety valves who have no ability to inspect safety valves by themselves can commission the inspection to inspection and testing organizations that have relevant qualifications.

If the end users of safety valve conduct the inspection by themselves, they shall submit the inspection report to inspection and testing organizations that are in charge of the safety valves.

The personnel, who are responsible for the maintenance, overhaul, and inspection of safety valves shall hold special equipment operator license.

Refer to Appendix E, F, and G for the inspection method of safety valves.

Article 8

AQSIQ is responsible for the interpretation of this Regulation.

Article 9

This Regulation shall become effective as of Jan. 1, 2007.

Appendix A**Glossary****A1 Safety valve**

A valve which automatically, without the assistance of any force other than that of the fluid concerned, discharges a rated amount of the fluid so as to prevent the predetermined safe pressure being exceeded, and which is designed to re-close to prevent the further discharge of fluid after normal pressure conditions of service have been restored.

A2 Direct loaded safety valve

A safety valve in which the load of the fluid pressure underneath the valve disc is opposed only by direct mechanical loading such as a weight, a lever and weight, or a spring.

A3 Balanced safety valve

A balanced valve incorporates a means of minimizing the effect of backpressure on the operational characteristics of the valve (set pressure, reseal pressure and discharge).

A4 Pilot operated safety valve

The operation is initiated and controlled by the fluid discharged from a pilot valve, which is a direct loaded safety valve itself.

A5 Assisted safety valve

A safety valve which, by means of a powered assistance mechanism (such as air pressure, hydraulic pressure, electromagnetism etc.) can be lifted at a pressure below the set pressure.

A6 Set pressure

Set pressure is the predetermined pressure at which direct loaded safety valves commence to lift under operating conditions. It is the measured gauge pressure at the inlet of valve. Under such pressure, and under regulated operating condition, the medium pressure which opens the valve balances with the force holding the disc to the seat.

A7 Set pressure difference

Set pressure difference is the deviation of set pressures of multiple commencements.

A8 Cold differential test pressure

The inlet static pressure at which a valve commences to lift at the testing rig. This pressure includes corrections for service condition, such as backpressure or temperature.

A9 Relieving pressure

Relieving pressure is set pressure plus overpressure.

A10 Rated relieving pressure

Rated relieving pressure is the upper limit of relieving pressure specified by the applicable code or regulation.

A11 Overpressure

Overpressure is pressure incensement over the set pressure of a safety valve, usually expressed as a percentage of set pressure.

A12 Reseating pressure

Reseating pressure is the inlet static pressure when the lift becomes zero, at which the disc touches again with the seat.

A13 Blowdown

Blowdown is the difference between set pressure and reseating pressure, usually expressed as a percentage of set pressure or MPa if the set pressure is less than 0.3 MPa.

A14 Backpressure

Backpressure is the gauge pressure on the outlet side. It is the sum of built-up backpressure and superimposed backpressure.

A15 Built-up backpressure

Built-up backpressure is the gauge pressure built up at the outlet side by blowing.

A16 Superimposed backpressure

Superimposed backpressure is the gauge pressure on the outlet side of the valve before action. It is generated by other pressure source in the discharging system.

A17 Leak test pressure

Leak test pressure is the specified inlet pressure at which leakage test between the disc and seat is performed.

A18 Lift

Lift is the travel of the disc away from the closed position.

A19 Flow area

Flow area is the minimum cross sectional area between the valve inlet to the closing seal surface, it is used for the calculation of theoretical flow capacity without any obstruction.

A20 Flow diameter

Flow diameter is the diameter corresponding to the flow area.

A21 Curtain area

Curtain area is the area of the cylindrical or conical discharge opening between the seating surfaces created by the lift of the disk above the seat.

A22 Lever

Levers enable the safety valve to be lifted manually. It uses outer force to decrease the load of spring to keep the safety valve closed.

A23 Theoretical flowing capacity

Theoretical flowing capacity is the calculated mass flow from an orifice having a cross sectional area equal to the flow area of the safety valve without regard to flow losses of the valve. It is expressed by amount or volume of fluid.

A24 Coefficient of discharge

Coefficient of discharge is the ratio of actual to the theoretical discharge capacity.

A25 Certified coefficient of discharge

Certified coefficient of discharge is the product of coefficient of discharge multiplies derated coefficient (0.9)

A26 Rated relieving capacity

Rated relieving capacity is that portion of the measured relieving capacity permitted by applicable code or regulation to be used as a basis for the application of a pressure relieving device. It can be either of the following:

- (1) The actual flowing capacity multiplies derated coefficient (0.9);
- (2) The theoretical flowing capacity multiplies coefficient of discharge, then multiplies derated coefficient (0.9);
- (3) The theoretical flowing capacity multiplies certified coefficient of discharge.

A27 Chatter

Safety valve disc abnormally and fast moves up and down with the disc touching the seat.

A28 Flutter

Safety valve disc abnormally and fast moves backwards and forwards without the disc touching the seat.

A29 Resistance

Safety valve disc has jams during opening or closing.

Appendix B**Safety Technical Requirement for Safety Valves****B1 Material****B1.1 Pressure Components and Spring Material**

The safety valve pressure components and spring materials shall meet relative safety technical standards and table B-1.

Table B-1

No.	Standard No.	Standard Name
1	GB/T 699-1999	High quality carbon structural steel
2	GB/T 1220-1992	Stainless steel bars
3	GB/T 1221-1992	Heat-resisting steel bars
4	GB/T 1222-1984	Spring steel
5	GB/T 3077-1999	Alloy structure steels
6	GB/T 4357-1989	Carbon spring steel wires
7	GB/T 4423-1992	Wrought copper and copper alloys--Drawn rods and bars
8	GB/T 5218-1999	Alloy spring steel wires
9	GB/T 12225-2005	General purpose industrial valves-Specification of copper alloy castings
10	GB/T 12228-1989	General purpose industrial valves - Specification of carbon steel forgings
11	GB/T 12229-2005	General Purpose industrial valves-Specification of carbon steel castings
12	GB/T 12230-2005	General purpose industrial valves-Specification of stainless steel castings
13	GB/T 13808-1992	Wrought copper and copper alloys--Extruded rods and bars
14	GB/T 15008-1994	Corrosion-resisting alloy bars
15	GB/T 18983-2003	Oil-hardened and tempered steel wire for mechanical springs
16	YB/T 11-1983	Stainless steel wire for mechanical springs
17	TB/T 5103-1993	Oil-hardened and tempered carbon steel wire for mechanical springs
18	TB/T 5104-1993	Oil-hardened and tempered Si-Mn alloy wire for mechanical springs
19	TB/T 5136-1993	V-Cr alloy steel wire for valves
20	JB/T 5263-2005	Specification of steel casting for electric plant valves
21	JB/T 7248-1994	Specification of low-temperature steel casting for valves

When materials not listed in Table B-1 are to be used, application examples must be registered with the General Administration of Quality Supervision Inspection and

Quarantine of the People' Republic of China (AQSIQ) after the recognition of the type test institute.

The pressure components material of safety valves shall be suitable for the working medium, maximum working pressure, maximum and minimum working temperature, to guarantee the operation of safety valves.

As for safety valves spring materials, the selection shall fully consider the effect of working medium and temperature. Spring shall use corrosion-resisting materials or paint (plate) a layer of corrosion-resisting materials on the surface of spring. For the springs used for high or low temperature applications, the impact on spring distortion and springs material creep or cold brittleness must be taken into account.

B1.2 Disc and seat materials

Safety valve disc and seat materials must resist impact and corrosion, cast iron material is not allowed. For safety valves of higher technical parameter, hard corrosion-resisting material is recommended for the seal surface.

B1.3 Guide surface materials

Safety valve guide surface (including guide sleeve and skirt, the surface between spindle guide and guide sleeve) shall use corrosion-resisting materials, and the surface shall be wear-resisting and hard enough to prevent block.

B1.4 Welding connected component materials

The carbon amount in the welding connected component materials for safety valves shall be no more than 0.25%.

B2 Structure and Design

B2.1 Safety valves performance

Safety valves performance must meet related requirement in this Regulation as well as other national standards or industrial standards. When foreign standards are used, the original standards and their mandarin translation version shall be registered with AQISQ.

B2.2 Safety valves inlet & outlet nominal diameter

Safety valves inlet and outlet nominal diameters shall meet relevant standards.

The nominal diameters for liquid application safety valves shall be 15mm at least.

B2.3 Safety valves rating pressure

Safety valves rating pressure shall be set as per related standards and consider valve materials, working temperature and set pressure.

B2.4 Lever

Safety valves used in steam or high temperature hot water system shall be direct-loaded type and shall have reliable easing lever.

For safety valves designed with easing lever, when the inlet pressure of safety valves is greater than 75% of set pressure, the disc shall be able to be lifted by easing lever from the seat, and after the foreign force is removed, the easing lever shall not be stuck and the disc can return to the seat successfully.

B2.5 Device preventing weight from moving

Weighted safety valves shall be fitted with the device which prevents weight from moving.

B2.6 Power source and connection

Safety valves with auxiliary power unit must have reliable power source and connection.

B2.7 Fix of the seat

Safety valve seat must be reliably fixed onto the body without looseness.

B2.8 Guide device

For reliable operation and seal performance, safety valves shall be fitted with guide device for movement parts. The guide device shall consider temperature factors such as heat expansion and cold contraction.

B2.9 Screw connection

When the inlet and outlet of safety valve are connected by screw, the working surface of the spanner shall be considered to avoid damage to safety valve components when screwing down.

B2.10 Welding process qualification

When safety valves have welded connections, or when the seal surface uses surfacing alloy materials, the welding process shall be qualified.

B2.11 Looseness preventing device

In order to avoid the device adjusting spring compression amount (such as adjusting screw) become loose and randomly change the adjusted state, safety valves must be fitted with looseness preventing device.

B2.12 Lead seal

Safety valve external adjustment shall have lead seal parts, so it can be lead sealed after adjustment. After dismantling, re-installation and commissioning, the external adjustment shall be lead sealed again. The lead seal must be destroyed before the adjustment.

B2.13 Drain holes

Safety valve body design shall try to minimize the medium deposits effect. Safety valves for steam and liquid applications must set drain holes at the bottom of built-up below the seat seal surface.

The drain hole diameter shall be no less than 9.5mm for safety valves with nominal diameter larger than 65mm. The drain hole diameter shall be no less than 6.5mm for safety valves with nominal diameter equal to or less than 65mm.

B2.14 Flow area

Safety valves flow area shall be large enough for maximum discharge capacity. Outlet discharging area must be larger than or equal to the inlet area and meet certain requirement to prevent relieving back pressure from affecting safety valve performance.

B2.15 Spring

Safety valve springs shall meet the follows:

- (1) It is recommended to use cylindrical spiral compression spring;
- (2) Safety valve structure shall be able to prevent the discharged medium's corrosive impact on the spring, especially the hot corrosive fluids;
- (3) Spring design shall ensure that spring distortion at safety valve fully open state is within 20%-80% of the maximum spring distortion. The design maximum spring cut stress shall be no more than 80% of the rated stress.

B2.16 Special requirement for bellow safety valves

Bellow safety valves shall meet the following requirement:

- (1) Bonnet shall be fitted with a discharge hole, ensuring bellows inner chamber is connected to atmosphere. This hole shall be connected by pipe to safe places to avoid the hazards of flammable or corrosive medium due to leakage of bellows.
- (2) Bellows design shall be able to bear the maximum outlet back pressure of safety valves and materials shall be suitable for the working medium and temperature.

B2.17 Design documentations

B2.17.1 Design documentation contents

Safety valves design documentations shall be compiled as per this Regulation and relevant standards. When compiling the design documentations, it shall consider to ensure the normal operation as well as the best practice of safety valves. The design documentations shall at least contain:

- (1) Design task sheet;
- (2) Calculation sheet;
- (3) General and components drawings;
- (4) Installation, maintenance and inspection information.

B2.17.2 Design task sheet

Shall at least contain:

- (1) Safety valves type;

- (2) Safety valves manufacture standards (if enterprise standards are used, it shall be reviewed by the type test institute);
- (3) Safety valves materials;
- (4) Safety valves operation conditions (medium, pressure, temperature, etc);
- (5) Safety valves inspection, test, and acceptance inspection standards.

B2.17.3 General drawings

Safety Valves general drawings shall contain front profile and necessary side view, detailed view as well as the following items:

- (1) Safety valve design, manufacture and acceptance inspection regulations or related standards;
- (2) Safety valve model;
- (3) Safety valve nominal pressure;
- (4) Set pressure;
- (5) Back pressure;
- (6) Working medium;
- (7) Working temperature;
- (8) Flow diameter;
- (9) Lift;
- (10) Rated relieving pressure;
- (11) Blowdown (or re-seating pressure);
- (12) Guide device;
- (13) Safety valve inside nominal diameter;
- (14) Installation size and maximum profile size;
- (15) Part list and materials.

The general drawing shall be signed by design, check and approval persons.

B3 Manufacture

B3.1 General requirement

B3.1.1 Raw materials and semi-finished products

Raw materials and semi-finished articles shall meet relevant standards required by drawings or technical documentations, and shall be accompanied by quality certificates.

B3.1.2 Parts machining

Safety valve parts machining must meet the requirement of design documentations. There shall be process card and quality tracing records for parts machining, assembly and test.

The internal and external surface of castings shall be clean, free of corrosion and rust, no falling off of oxide.

B3.1.3 Springs

B3.1.3.1 Coils distance

The distances between spring coils shall be uniform.

B3.1.3.2 Force pressure treatment

To ensure long time stable operation, springs shall have prestressing treatment and meet the following:

- (1) Springs are pressed to the touching circle length from the free length 3 times at the room temperature, stay and loose for 10 minutes, then check the free length residual deformation. It shall not exceed 0.5% of free length.
- (2) For springs with the same specifications and in the same heat treatment furnace, measure the deformation (or stiffness) under certain load, the deviation shall be no more than 10%.

B3.1.3.3 Macro Quality

Springs are not allowed to have defects such as crack, hairline and inclusions or other defects affecting the operation. NDT shall be done if necessary.

B3.1.3.4 Quality certification

Springs manufacturer shall provide spring performance test report, heat treatment report and quality certificate for each spring. NDT report shall be provided too when safety valve manufacturers request. Every spring must be tested and accepted before it is installed onto the safety valve.

B3.1.4 Metal bellows

Shall meet the following:

- (1) Welds shall have no defects such as cracks, inclusions, porosity or over-burning.
- (2) Bellow manufacturer shall supply the quality certificates.

B3.2 Delivery inspection

B3.2.1 Inspection items

Each safety valve shall be inspected as per the following items. Only qualified products can be delivered to customers.

- (1) Pressure (hydraulic strength) test and outlet gastight test of closed safety valve;
- (2) Set pressure adjustment;
- (3) Seal tightness test;
- (4) Inspection items that manufacturer agreed with customers.

B3.2.2 Pressure (hydraulic strength) test

Shall be as follows:

- (1) Safety valve pressure test shall be done before painting;
- (2) For seal surface of closed safety valve seat, pressure (hydraulic strength) test to safety valve inlet side body shall be performed. The minimum test pressure shall be 1.5 times of the nominal pressure of the safety valve;
- (3) For safety valve discharging to atmosphere, or safety valve with back pressure

only produced when relieving, it is not required to run pressure (hydraulic strength) test at outlet relieving side.

- (4) When safety valves are imposed of additional back pressure or installed in the closed discharging system, it is required to run pressure (hydraulic strength) test at outlet relieving side and the test pressure shall be 1.5 times of the maximum back pressure;
- (5) Pressure test holding time shall be as per GB/T 12241-2005 *Safety Valve – General Requirement*, and macro inspection shall be performed to body, bonnet surface and joints. Pressure test is qualified if there is no deformation, cracks or leakage during test.

B3.2.3 Gastight test

Closed safety valves, after assembly, shall carry out gastight test. Gastight test shall meet following requirement:

- (1) Test is only carried out at the body outlet discharging side. Pressure shall be the maximum back pressure and no less than 0.2MPa;
- (2) Test shall last 3 minutes, leakage not allowed;
- (3) Take care during test, and hold for certain time after reaching test pressure before checking air tightness.

B3.2.4 Set pressure adjustment

Shall meet the following:

- (1) Adjustment shall be carried out on special test rigs. The test fluids shall meet requirements of B3.2.6;
- (2) Adjustment shall be done at least 3 times, the measured deviation shall not exceed $\pm 3\%$ of set pressure or other stipulations in related safety technical regulations;
- (3) Back pressure and temperature shall be taken into consideration during adjustment on test rigs.

B3.2.5 Tightness test

Tightness test between safety valve disc and seat shall be carried out after set pressure adjustment. Tightness test shall be as follows:

- (1) Test medium shall meet B3.2.6;
- (2) See Appendix F for tightness test methods of air or other gas safety valves. See GB/T 12243-2005 *Spring Direct Load Safety Valve* for tightness test of liquids (water) or steam safety valves.
- (3) For closed safety valves, parts such as cap, etc shall be equipped for tightness test;
- (4) Tightness test shall meet GB/T 12243.

B3.2.6 Test medium

Test medium for safety valves shall meet following requirement:

- (1) For steam safety valves, test shall be done with steam. When test device capacity is limited, air can be used for test and it shall be commissioned on the operation equipment;

- (2) For air or other gas safety valves, test can be done with air. The air storage vessel shall be no less than 1m^3 ;
- (3) For liquid safety valves, test can be done with water.
After test with water, water shall be removed by blowing or drying. For austenitic stainless steel safety valves, the chlorine content in water shall be no more than 25mg/L .

B3.2.7 Test records and reports

The entire original test data shall be filed, and treated and calculated to produce the test reports.

B3.3 Test device

Manufacturer must have safety valve test equipment and meet the following requirement:

- (1) Test device shall meet the requirement of safety valves design specification and test requirements. Its test capacity shall be not lower than that of adjustment device;
- (2) Measurement instrument and equipment used for test shall meet the metering requirement in existing national regulations. The measuring scope and accuracy of measurement instrument and equipment shall be selected according to the measured value and their allowable deviations. The measurement instrument and equipment shall be calibrated regularly.
- (3) Pressure measurement instrument deviation shall be no more than 0.5% of the instrument measuring range, the measured pressure shall be within 1/2 to 2/3 of the measuring range, and the location for pressure measurement shall ensure it is the static pressure of the medium.
- (4) The resolution of instrument measuring safety valve lift shall be no less than 0.02mm.

B3.4 Mark

B3.4.1 Mark contents

Safety valve nameplates or the external surface of safety valve body shall have the following obvious mark contents, and the product number shall be permanent sign on safety valve body:

- (1) Safety valve manufacture license number and symbol;
- (2) Manufacturer name;
- (3) Safety valve model;
- (4) Manufacture date and product number;
- (5) Nominal pressure;
- (6) Nominal diameter;
- (7) Flow diameter or flow area;
- (8) Set pressure;
- (9) Body materials;
- (10) Rated coefficient of discharge or certified flowing capacity to certain fluid.

B3.4.2 Nameplate materials and fixing

Nameplate shall be made by corrosion-resisting materials, and fixed on body or bonnet external surface.

B3.4.3 Delivery documents

For each delivered safety valve, manufacturer shall provide the following documents:

- (1) Quality documents;
- (2) Safety valve simplified drawings and material lists;
- (3) Installation, maintenance and test manual;
- (4) Related documents by contract between manufacturer and customers.

B3.4.4 Quality documents

Safety valve quality documents shall contain at least:

- (1) Manufacture license number;
- (2) Manufacturer name;
- (3) Product name;
- (4) Safety valve model;
- (5) Product number;
- (6) Manufacture date;
- (7) Nominal diameter;
- (8) Flow diameter or flow area;
- (9) Nominal pressure;
- (10) Set pressure (Cold differential test pressure);
- (11) Relieving pressure;
- (12) Lift;
- (13) Blowdown (or re-seating pressure);
- (14) Applicable temperature;
- (15) Applicable medium;
- (16) Body materials;
- (17) Back pressure (when applicable);
- (18) Rated coefficient of discharge or certified flowing capacity to certain fluid;
- (19) Manufacture standards;
- (20) Test reports for delivery;
- (21) Other special requirement;
- (22) Inspector signature and manufacturer inspection stamp.

B3.4.5 Product manufacturing files

For each delivered safety valve, manufacturer shall file the following documents for inspection:

- (1) Drawings;
- (2) Materials quality documents;
- (3) Quality records during manufacturing;
- (4) Delivery test reports.

B3.5 Shipment and storage

B3.5.1 Shipment

Safety valve shipment shall meet the following:

- (1) Before safety valves delivery, the entire external surface except flanges must be painted (except corrosion-resisting materials), flanges shall be oil sealed to prevent corrosion.
- (2) Screw holes shall be protected by plugs. The temporary plugs shall be obviously differentiated with the permanent metal plug;
- (3) Safety valve inlet and outlet flanges shall be covered by protections, to prevent flanges from damage due to transportation as well as debris entering;
- (4) Safety valves shall be packed in box, and always kept erect during transportation without sloshing. Overturning during transportation is forbidden.

B3.5.2 Storage

Safety valve storage conditions shall be as follows:

- (1) Safety valves shall be placed erectly inside the room, inlet, outlet and ventilation holes shall be blocked with covers;
- (2) Surrounding environment shall not contain harmful gases to cause safety valves corrosion.

B4 Installation

B4.1 Installation location

The installation location of safety valve shall meet the following requirement:

- (1) The safety valve must be installed vertically on equipment or pipe;
- (2) Generally, the safety valve shall be installed near the protected equipment, and the installation place is easy for maintenance and check;
- (3) The steam safety valve shall be installed on the highest position of drum or header, or the highest place in the gas space above the liquid level of the protected equipment;
- (4) The liquid safety valve shall be installed under the normal liquid level.

B4.2 Inlet and outlet pipe

The inlet and outlet pipe of safety valve shall meet the following requirement:

- (1) The inlet pipe diameter shall be no less than the safety valve inlet diameter. If one common inlet pipe is used for several safety valves, the section area of the inlet pipe shall be no less than the total inlet section areas of all the safety valves;
- (2) The outlet pipe diameter shall be no less than the safety valve outlet diameter, and the outlet pipe must be connected to a safe place;
- (3) If the silencer is installed on the outlet pipe, it must have enough flow area to avoid the high back pressure influencing the safety valve normal action and discharging;
- (4) Usually, stop valves are not allowed to be installed on the inlet and outlet pipes of the safety valve. If the stop valves must be installed, lead seal must be provided

and locked on the full open position. The pressure rating of the stop valves is required to be consistent with that of safety valve inlet and outlet pipes. The nominal diameters of the stop valve inlet and outlet shall be no less than that of the safety valve inlet and outlet flanges.

B4.3 Check before installation

Before installation, the visual inspection, set pressure and seal test shall be performed. Other performance tests shall be done if there are special requirements.

B5 Service

B5.1 Selection

The selection of safety valve shall meet the following requirements:

- (1) The safety valves shall use clean, none-granule and low viscosity fluids;
- (2) Full lift safety valves can use gas, steam or liquid medium and low lift safety valves usually use liquid medium. The closed safety valves must be used for poisonous or flammable medium.

B5.2 Daily maintenance

The daily repair and maintenance of the safety valves shall be done as follows:

- (1) The safety valves user shall often check the seal performance of the safety valves and pipe connections;
- (2) After safety valves start for operation, it shall be checked for abnormal situations, and records shall be made;
- (3) If the safety valve abnormal conditions (leakages or other malfunctions) are found in the operation, it shall be repaired or replaced immediately;
- (4) During boiler operation, the safety valve manual discharge test shall be regularly carried out. This test is also required when the boiler is re-started after shut down.

B6 Periodical inspection

B6.1 Online inspection and test

B6.1.1 The definition of online inspection and test and personnel requirement

Online inspection and test means the online checking and testing of safety valve (the safety valves installed on the equipment, under pressure or not under pressure). The people for online inspection and test shall have professional trainings of equipment operation, online test, equipment usage and on-site problems handling, and hold special equipment operation personnel certificates.

B6.1.2 Inspection contents

Online inspection includes:

- (1) Whether the safety valve is correctly installed;
- (2) Whether the documents for safety valves are complete (nameplate, quality certificates, installation number, inspection records and reports);
- (3) Whether the lead seal of safety valve outside adjustment facilities is in good condition;

- (4) Whether there are factors influencing the safety valve normal function;
- (5) When stop valves must be fitted, the stop valves lead seals for the safety valve inlet and outlet shall be in good condition and at the normal full open locations;
- (6) Whether there is leakage;
- (7) Whether there is corrosion on the safety valve outside surface;
- (8) The release hole for bellows shall be open and clean;
- (9) The lever action is effective and in the proper position;
- (10) The external ancillaries of the safety valves are complete and normal.

B6.1.3 Inspection methods

Online inspection methods are as follows:

- (1) Use the protected system and its pressure for test;
- (2) Use other pressure sources for test;
- (3) Use auxiliary device for test.

B6.1.4 The basic requirements for inspection

Online inspection shall meet the following basic requirements:

- (1) Before online inspection, check the safety valves according to B6.1.2;
- (2) During online inspection, the inspection organization must make feasible inspection program, and make material and technical preparation;
- (3) During online inspection, the technical director of the user must be present on site. The procedure must be stopped immediately when there is evidence for abnormal operation conditions, and measures must be taken to ensure safety;
- (4) Pay attention to harm due to high temperature, noise and medium leakage during online inspection;
- (5) The online inspection facilities must ensure the safety valve basic performance requirement;
- (6) Online inspection and testing records must be made and put into files.

B6.2 Offline inspection

Offline inspection means under offline status, the safety valves are removed from the equipment and checked.

B6.2.1 The condition of offline inspection

The safety valves must be offline checked under the following conditions:

- (1) The safety valves verification validity period has expired;
- (2) The safety valves have malfunction or abnormal performance during operation;
- (3) The safety valves are removed from the protected equipment.

B6.2.2 Inspection contents

Offline inspection includes the following contents, for item (1), (5) and (6) disassemble, replacement and assemble shall be carried out:

- (1) Dismantle the safety valve from protected equipment;
- (2) Visual inspection;
- (3) Inspection the set pressure;

- (4) Disassemble the safety valves, clean and inspect its components;
- (5) Repair and replace components;
- (6) Reassemble the safety valves;
- (7) Adjust the set pressure;
- (8) Check seat, gasket and seal;
- (9) Complete records.

B6.2.3 The basic requirements for inspection

Offline inspection shall meet the following basic requirements:

- (1) Before the safety valves inspection and repair, if the equipment is in operation, the precautionary actions shall be taken to ensure the protected equipment safety and to prevent the accidents due to the remaining poisonous, combustible medium inside the body and the connecting parts;
- (2) Before offline inspection, the records of abnormal situations for each safety valve during online operation since last inspection must be collected;
- (3) Each safety valve dismantled from the protected equipment shall have an identifying label showing the equipment number, working location number, set pressure, and last inspection date;
- (4) If the safety valves are to be removed, plans must be made to minimize the offline time and the safety precautions must be taken on the process pipelines.

B6.2.4 Handling

The operation must be stopped and safety valve replaced under the following situations, the safety valves having the problems from (1) to (5) must be rejected:

- (1) The seal surface between disc and seat damaged, and cannot be repaired;
- (2) The guide parts corroded seriously, and cannot be repaired;
- (3) The adjustment rings corroded seriously, and cannot adjust;
- (4) The spring corroded, and cannot be used;
- (5) Lack of ancillaries, and cannot get;
- (6) Historical records lost;
- (7) Selection incorrect.

B6.3 Verification

B6.3.1 Verification period

The safety valve verification period shall meet the following requirements:

- (1) The safety valves shall be verified regularly, normally at least once a year. If the safety technical supervision regulation has requirement, follows the requirement;
- (2) The safety valve shall be verified again after dismantling, repair or its components are replaced.

B6.3.2 Verification period prolongation

The safety valve verification period can be properly prolonged when meeting the following requirements and the prolonged time limit shall meet the safety technical regulation:

- (1) The historical records are clear to manifest the safety valve can operate reliably on the protected equipment;
- (2) The process conditions of the protected equipment run stably;
- (3) The safety valve internal component materials are not corroded;
- (4) The Safety valve online inspection and testing meet the operation requirements;
- (5) The emergency precaution is complete.

For equipment required to continuously operate for more than 1 year, the safety valve verification period can be properly prolonged according to the real operation conditions of the same equipment, the equipment manufacturing quality and the safety precautions for production, as well as the requirement of this Regulation.

B7 Technical files

The safety valve manufacturer, end user and inspection organization shall establish the safety valve technical files.

B7.1 Manufacturer's files

The manufacturer's files content shall meet B3.4.5 of this Regulation.

B7.2 End user's technical files

The safety valve end user's technical files shall include:

- (1) The quality certification documentation, installation and maintenance instruction, inspection documentation from the safety valve manufacturer;
- (2) The safety valve periodical inspection records and reports;
- (3) The approval documentation for prolonging verification period;
- (4) Safety valve daily operation and maintenance records;
- (5) Safety valve malfunction and accident records.

B7.3 The technical files from the maintenance, repair and inspection organizations

The technical files from the maintenance, repair and inspection organizations shall include the safety valve maintenance and repair records, periodical inspection records and reports. When the safety valves are discarded as useless, there shall be the relative record files.

Appendix C

Requirements for Safety Valve Manufacture Licensing

C1 Safety valves manufacture licensing items

See table C-1.

Table C-1 Safety valves manufacture licensing items

Licensing Items		Product range	Limit range of product
Category (name)	Level		
Safety valve	A1	Various safety valve	Product name, specification
	A2	Various safety valve with nominal pressure less than 10.0MPa	
	B	(1) The nominal pressure less than 1.6MPa and the operation temperature higher than or equal to -20℃ for nontoxic and non-combustible gas (including steam) medium safety valve (2) Highest operation temperature lower than or equal to the boiling point of liquid medium safety valve	

Note:

- (1) Manufacture licensing level A can cover level B, level A1 can cover level A2.
- (2) According to the manufacture condition and the demo product supplied, some safety valve manufacture items can be restricted, for example, low temperature safety valve with degree lower than -20℃.

C2 Safety valves manufacture licensing requirements

C2.1 Legal qualification

The safety valve manufacturer shall have corporation legal person status or have legally registered in local government.

C2.2 Registered capital and employees

See table C-2.

Table C-2 Registered capital and employees for safety valve manufacturer

Registered capital and full-time employees	Licensing grade		
	A1	A2	B
Registered capital	≥3M RMB	≥2M RMB	≥1M RMB
Full-time employees	≥60	≥40	≥30

C2.3 Professional personnel

C2.3.1 Quality control system responsible person

The safety valve manufacturer shall have quality control system responsible persons for design, process, material, physical and chemical examination, welding, NDT, heat treatment, inspection etc.

C2.3.2 Technician

See table C-3.

Table C-3 Technician proportion and specialty

Technician Proportion and specialty	Licensing level		
	A1	A2	B
Technician proportion	≥10% of total employees	≥8% of total employees	≥6% of total employees
Technician specialty	No less than 3 professionals of chemical mechanics, hydrodynamics and mechanics	No less than 2 professionals of chemical mechanics, hydrodynamics and mechanics	No less than 1 professionals of hydrodynamics and mechanics

C2.3.3 Inspector

C2.3.3.1 NDT examiner

See table C-4.

Table C-4 NDT examiner number

Licensing level	A1	A2	B
Number	2 persons each for MT and PT Level II	1 person for PT Level II	As per production requirement

C2.3.3.2 Physical and chemical examination person

Level A1 and A2 manufacturer shall have 1 physical and chemical examination person at least.

C2.3.4 Welder

Level A1 and A2 manufacturer shall have at least 1 welder with qualified certificates, and Level B manufacturer shall decide whether certified welder is needed according to production requirement.

C2.4 Production condition

C2.4.1 Area of workshop

See table C-5 for the production workshop construction area requirement.

Table C-5 Production workshop construction area

Licensing level	A1	A2	B
Construction area	≥1400mm ²	≥900mm ²	≥600mm ²

C2.4.2 Production process

Safety valve manufacturing shall include the production process such as rough and raw material purchase and inspection, surface treatment (rough casting, acid cleaning),

cryogenic treatment (low temperature safety valves), spring scroll and treatment, seal surface surfacing welding, heat treatment before and after welding, NDT, stem quenching, machining (lathe, mill, grind, drill), lapping, assembly, test and final inspection.

Of the above production processes, spring scroll, NDT, spring heat treatment and safety valve surface treatment for Level A2 and B manufacturers can be sub-contracted.

C2.4.3 Manufacture equipment

See table C-6.

Table C-6 Main manufacture equipment

Licensing level	Main manufacture equipment
A1	Cutting machine meeting production requirement, no less than 6 digital control machine tools, machining equipment (lathe, milling machine, grinder, driller etc) meeting machining requirement, spring heat treatment equipment and spring pre-stress treatment equipment meeting manufacturing requirement, at least 1 plasma bead welding machine, 2 welding machines, pre-heat and post-heat treatment machines before and after welding required for bead welding of hard alloy, surface treatment machine, 2 seal surface lapping machines
A2	Cutting machine meeting production requirement, no less than 3 digital control machine tools, machining equipment (lathe, milling machine, grinder, driller etc) meeting machining requirement, 2 welding machines for surfacing welding process, pre-heat and post-heat treatment machines before and after welding required for bead welding of hard alloy, 1 seal surface lapping machine
B	Machining equipment (lathe, milling machine, grinder, driller etc) meeting machining requirement, welding machine required by production needs

C2.5 Testing method

C2.5.1 Physical-chemical examination device

See table C-7.

Table C-7 Physical-chemical examination device

Licensing level	Physical-chemical examination device
A1	Quantitative chemical composition analysis device which can analyze more than 10 elements such as C, Si, Mn, S, P, Cr, Mo, Ni, Ti, V etc, spectrum qualitative analysis device, at least 1 sclerometer (test HB,HRC)
A2	At least 1 sclerometer (test HB, HRC)
B	According to production needs

C2.5.2 Inspection and testing device

See table C-8.

Table C-8 Inspection and testing device

Device name	Licensing level		
	A1	A2	B
Safety valve testing device	Testing device for delivery test, and testing device for safety valve action performance and discharge test	Testing device for delivery test	
Thickness measurement device	1 ultrasonic thickness gauge, and special callipers for measuring thickness		Special callipers for measuring thickness
Safety valve low temperature testing device	Set pressure test and air-tight testing equipment under low temperature medium condition		/
Pressure source for testing	Gas source pressure meeting testing requirement		
Test pressure pump	At least 1 pump, meeting the product highest test pressure		
Spring testing machine	Meeting the requirement of spring performance test		
Pressure gauge	2 pressure gauges for one testing system, one gauge precision shall be above grade 0.5 and measurement range covers the product pressure range		

C2.5.3 Process equipment and storage condition

There shall be molds such as lathe, milling, grinding, drilling, etc which satisfy the requirement of product machining, welding tools (such as rotation machine), gas storage vessel for air-tightness test, and liquid nitrogen storage vessel (for low temperature test).

Note: (1) For sub-contracted or purchased raw material, components, production process or inspection, the work quality and product quality shall still be the responsibility of the manufacturer to the end user;

(2) When NDT is subcontracted by the safety valve manufacturer, the subcontractor shall have NDT qualification or capability;

(3) The manufacturer shall establish, implement and continually improve safety valve manufacturing quality management system, and formulate the quality management system documents according to the requirement of special equipment manufacture quality control system and the manufacturer's specific situation.

Appendix D

Safety Valve Type Test

D1 Type Test Items, Content and Requirements

Type test of safety valve includes design review and sample inspection and testing.

D1.1 Design Review

Design review includes design document review and manufacture process document review.

D1.1.1 Design Document Review

Content and requirements of design document review:

- (1) The completeness of design drawings and design calculation sheets;
- (2) The selection and the source of design data, such as design parameter, shall meet the relevant requirements. The calculation method shall be correct; it shall be verified if necessary.
- (3) The structure design, which can influence the product's safety performance, shall meet requirements of technical regulations and standards.

Note: If the structure type or the calculation method of product is not available in relevant safety technical regulations or standards, the manufacturer shall explain the product working theory or the design calculation method in the design calculation sheet submitted for review.

- (4) The regulation and standard in design document shall meet related standards.
- (5) The material selection of main parts, such as body, bonnet, rod, disc, and seat shall meet related standards.
- (6) The technical requirements for seal surface welding and other welding shall be complete.
- (7) The related technical requirements and heat treatment shall meet the requirements of technical process.
- (8) If NDE is required, the examining method and location shall meet the related requirements.

D1.1.2 Manufacture Process Document Review

The content and requirements of document review for manufacture process are as follows:

- (1) The completeness of manufacture process document
- (2) The working procedures of main process shall meet the related manufacture requirements.
- (3) The WPS and welding process shall meet practical needs.
- (4) Heat treatment process shall meet related standards.
- (5) The completeness of inspection and testing items.
- (6) The acceptance requirements of inspection and testing meet the related standards.

D1.2 Sample Inspection and Testing

The content and requirements of sample inspection and testing are as follows:

- (1) Appearance quality meets the related requirements
- (2) Sample's mark meets the related regulations
- (3) The quality of the raw material, including chemical compositions and

mechanical property shall meet related requirements.

- (4) Qualified pressure (hydraulic strength) test
- (5) Qualified leak test
- (6) Acting functions, including set pressure, relieving pressure, re-seating pressure, lift, and mechanical property shall meet related regulations.
- (7) Discharge capacity test and discharge coefficient test meet the requirements.
- (8) For low-temperature medium safety valve, set pressure test and leak test shall be conducted in low-temperature condition.

D2 the Safety Valve Type Test Range

The type test range of safety valve with the same name and type or with the same structure and function (including materials when necessary) is as follows:

- (1) $DN^* \leq 2 DN$;
- (2) $PN^* < 1.6MPa$ when $PN < 1.6MPa$;
- (3) $PN^* < 10MPa$ when $1.6MPa \leq PN < 10MPa$;
- (4) $PN^* \leq PN$ when $PN \geq 10MPa$.

Notes: PN and DN refer to sample's nominal pressure and nominal diameter respectively. PN^* , DN^* refer to the covered range of products' nominal pressure and nominal diameter respectively.

D3 Sampling Rules for Type Test of Safety Valve

Two samples with different specification (usually with the combination of big diameter and low pressure, small diameter and high pressure) are randomly selected from the sample base pool by name and type (structure) for type test. Usually, the sample base pool shall have no less than 5 samples.

If the type test is not qualified, samples shall be doubled for re-test.

D4 Type Test Method of Safety Valve

The type test method of safety valve shall meet the requirements in Appendix B and GB/T 12242-2005, *Performance Testing Requirements for Pressure Releasing Facilities*.

For low-temperature medium safety valve, the method of set pressure test and leak test conducted in low-temperature conditions is in Appendix H.

D5 Judgement and Handling of Type Test Results

D5.1 Judgement Rules

The type test is qualified when the design review and the sample inspection of safety valve result meet the requirements in Appendix B.

D5.2 Review Result Handling

D5.2.1 Design Review

After design review, the type test institute shall communicate with the manufacturer timely. If the design document or manufacture process document doesn't meet the requirements, the type test institute shall notice the rectification requirements to the manufacturer in writing and confirm the rectification.

D5.2.2 Inspection and Testing

For the same inspection or testing item, if one of the samples fails, re-inspection or re-testing are allowed. If all the samples pass the re-inspection or re-testing, then, it is judged the sampled inspection or testing item is qualified, otherwise, not qualified.

D6 Other Requirements of Type Test

The type test plan, sampling and marking, testing staff, testing facilities and site, testing record, the acceptance of inspection data for manufacture, supervision on testing, sample management, etc. shall meet this Regulation and also the requirements in Attachment A of *Rules on Type Test of Pressure Pipeline Components*, TSG D7002-2006.

D7 Sum-up of Safety Valve Type Test, Report and Certificate

After the type test, the type test institute shall issue special equipment type test report (see Appendix D-1) as well as type test certificate of special equipment (see Appendix D-2) if the type test is qualified.

Generally, the type test report and type test certificate are in triplicate, one kept in manufacturer, one in type test institute, and one used for licensing application.

The type test institute shall fill Summary Form of Safety Valve Type Test annually (see Appendix D-3), and reported to AQSIQ.

Appendix D-1

Report No.

Special Equipment Type Test Report

Product Type: Safety Valve

Product Name: Spring-loaded Safety Valve

Product Model : _____

Applicant: _____

Manufacturer: _____

Type Test Category: New Structure, First Time Manufacture

(Name of the type test institute)

Notice

1. The report is the conclusion of safety valves type test, which is formally required in *Safety Technical Supervision Regulations for Safety Valves*.
2. The report is required to be printed, or written by pen or signature pen with clear writing. The report loses effect if altered.
3. The report is required to have signatures of the inspector, the review person and the approval person as well as the approval number and inspection stamp of type test institute. The inspection stamp shall be applied at the perforation.
4. The report is made in triplet, one for applicant, one for type test institute, one for dealing with relevant licensing.
5. The report is effective only for the samples.
6. If the applicant disagrees with the report, the applicant shall contact the type test institute with written comments within 15 workdays after receiving the report.

Type test institute address:

Post Code:

Tel:

Contents

Safety Valve Type Test Conclusion	Page
1. Sample Specification	Page
2. Sample Structure	Page
3. Design Review	Page
4. Sample Inspection and Test	Page

Safety Valves Type Test Result

Report No. _____

Applicant Name			
Manufacturer Name			
Manufacturer Address			
Designer Address			
Product name		Sample model	
Design date		General drawing number	
Product number/batch		Sampling date	
Sample base quantity		Sampling amount	
Sampling unit			
Type test basis:	(The applied inspection and testing method, acceptance standard, and manufacture standard)		
Design review comments:			
Inspection and test conclusion:			
Remarks:			
Test responsible person: Date:			The approval number given by the type test institute: (Stamp of the type test institute) Year Month Date
Review person: Date:			
Approval person: Date:			

1. Sample Specification

			Report No.
No.	Item	Units	Value
1	Nominal diameter	mm	
2	Nominal pressure (pressure level)	MPa	
3	Flow diameter or flow area	mm/mm ²	
4	Applicable medium	/	
5	Applicable temperature	°C	
6	Set pressure (cold differential test pressure)	MPa	
7	Rated relieving pressure	MPa	
8	Lift	mm	
9	Blowdown ((or re-seating pressure)	MPa	
10	Rated coefficient of discharge or certified flowing capacity to certain fluid	Kg/h	
11	Valve material		
12	Disc & seat material		
13	Spring (bellows) material		

2. Sample Structure

Report No.:

Structure type:

Sample photo:

3. Design Review

Report No.:

Manufacture code /standard			Design standard and code	
No.	Design review items and content		Review result	Remarks
1	Design documents review	(1)Design document		
2		(2)Design data		
3		(3)Design calculation		
4		(4)Design of structure		
5		(5)Standard & code applied		
6		(6) Material for main parts		
7		(7)Welding		
8		(8)Technical requirements		
9		(9)Heat Treatment		
10		(10)NDE test		
11	Manufacture process document inspection	(1)Manufacture process documents		
12		(3) Working instructions		
13		(3) WPS and welding process		
14		(4) Heat treatment		
15		(5) Inspection & test items		
16		(6) Acceptance requirements of inspection & test		
Conclusion:				
Reviewed by:		Date:	Approved by:	Date:

Appendix D-2

**Type Test Certificate of Special Equipment
(Safety Valve)**

Certificate No.: TSX ××××××××××××

Name of Manufacturer:

Address of Manufacturer:

Name of Product:

Product Model:

Type Test Report No.:

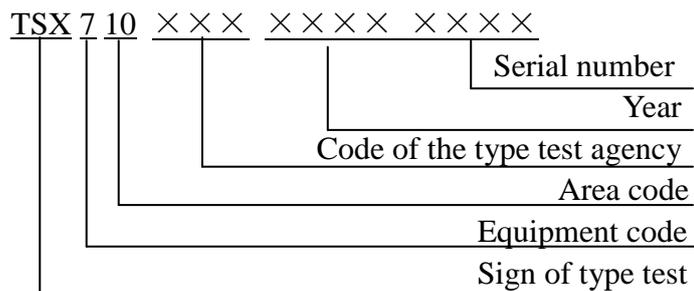
This is to certify the type test of the product meets the requirements of *Technical Safety Supervision Regulation for Safety Valves*. The certificate covers the following product models:

(Name of Type test institute, Seal)

Date:

Annotation:**Explanation on Certificate Number of Special Equipment Type Test**

1. Numbering of Type Test Certificate of Special Equipment



2. Explanation on Sign and Number

2.1 “TSX”

TSX is the sign for special equipment type test.

2.2 Special Equipment Code

According to the Special Equipment Catalogue published by AQSIQ, the first number of safety valve code is “7”.

2.3 Area Code

Area code refers to the area code of the address of the department in charge of safety supervision administration of special equipment who approves the type test institute. The type test institute approved by AQSIQ is denoted by “10”.

2.4 Type Test Institute Code

The code refers to the serial number of the approved type test institute of special equipment, published and numbered by AQSIQ. The code is denoted by three Arabic numerals.

2.5 Year

The year when the type test report is issued, the code is denoted by four Arabic numerals.

2.6 Serial Number

It refers to the serial number of Type Test Certificate approved by type test institute, it is denoted by four Arabic numerals. The number shall have English letter if it exceed 9999, for example, 10099 shall be numbered as A099.

Appendix D-3

Summary Form of Safety Valve Type Test

(Can be printed horizontally)

Type test institute (stamp): Person in charge: Report date: Serial number:

No.	Manufacturer	Product Name (Type)	Product Model	Product Parameters	Report Number	Date of Issuance

Appendix E

Safety Valve Verification and Repair

E1 Verification Equipment

E1.1 Safety valve verification equipment composition

The safety valve verification equipment is composed of verification rig, air source and pipeline etc (reference to appendix G).

E1.2 Verification air source

Shall meet the following requirements:

- (1) Air compressors can be fitted, or with several gas cylinders in parallel connection or other type of air source;
- (2) The gas storage vessel shall be equipped, and the volume shall be suitable for safety valves verification, no less than 1m³;
- (3) If the pressure of air source is higher than the design pressure of the gas storage vessel, the reliable pressure reducing device must be installed between the air source and gas storage vessel.

E1.3 Verification medium

Shall meet the following requirements:

- (1) The testing medium shall be steam for steam safety valves. When the testing device is limited, the testing medium can be air instead of steam if the safety valve can be commissioned after installation;
- (2) The test can use air for air or other gas medium safety valves;
- (3) The test can use water for liquid safety valves.

E1.4 Verification rig and verification instrument

Shall meet the following requirements:

- (1) The verification rig shall be equipped with the testing vessel having enough volume;
- (2) Two pressure gauges with the same parameter shall be installed on the inspection rig. The pressure gauges precision shall be no lower than grade 1.0 and the range shall be 1.5~3 times of the testing pressure of the safety valve. The pressure gauges must be calibrated regularly, and the calibration interval shall be six months.
- (3) For measuring of disc opening and closing, there must be automatic measuring and recording instrument.

E2 Verification interval and items

E2.1 Verification interval

The safety valves verification interval shall be according to B6.3.1 and B6.3.2.

E2.2 Verification items

The verification items and contents for safety valves shall meet the following regulations:

- (1) The verification items for safety valves include set pressure and leak test, and reseating pressure as well if condition permits. The set pressure test shall be conducted no less than 3 times, and for each time the test must achieve the qualification requirements of this Regulation and the relative standards.
- (2) The impact of the backpressure, the medium, and temperature difference between inspection and normal operation shall be taken into account, and give necessary correction for the safety valve set pressure and leak test pressure;
- (3) The safety valve set pressure shall be tested according to this Regulation and the product certificate, nameplate, the related standards, working conditions after inspection and repair.

E3 Verification methods

E3.1 Check before verification

Before verification, the safety valves shall be cleaned, checked for appearance, and then dismantled for checking all the components. If defects such as damage, corrosion, distortion are found in the disc and seat seal surface, guide, spring, or stem, the components shall be repaired or replaced. The safety valves shall be discarded if crack is found on the body, disc and seat sticking together, spring corroded and distorted severely, or components damaged heavily and unable to be repaired.

E3.2 Set pressure verification

Slowly increase the safety valve inlet pressure, after the pressure reaches 90% of the set pressure, the pressure increasing speed shall be no more than 0.01MPa/s. When the disc opens or the continuous testing medium discharging is seen or heard, the safety valve inlet pressure can be considered as the set pressure. When the set pressure is less than or equal to 0.5MPa, the allowable deviation between the actually measured set pressure and the required set pressure is ± 0.015 MPa; when the set pressure is higher than 0.5MPa, the allowable deviation is $\pm 3\%$ of the set pressure.

E3.3 Leak test

After the set pressure passes the inspection, the safety valve inlet pressure shall be lowered down and adjusted for leak test. When the set pressure is less than or equal to 0.3MPa, the leak test pressure shall be 0.03MPa lower than the set pressure. When the set pressure is more than 0.3MPa, the leak test pressure is 90% of the set pressure.

When the leak test medium is gas, the leakage rate can be expressed by the numbers of leaking bubbles for the closed safety valves. The required testing devices and testing methods shall follow the requirements in Appendix F, qualification standard shall meet GB/T 12243 or other safety technical regulations. For open bonnet safety valves, not hearing gas leakage in certain period of time then the leak test can be regarded as qualified.

When the leak test medium is water, the testing methods and requirements shall meet

GB/T 12243.

E4 Verification record, lead seal and report

Safety valve verification shall be recorded, lead sealed, and reports shall be issued according to the following requirements:

- (1) During verification, the inspectors shall record the relative verification data on time (see Appendix E-1);
- (2) After verification, the safety valves shall be lead sealed again timely, so as to prevent some status changing. The code identification of the verification organization is on one side of the lead seal and the code identification of the inspector on the other side.
- (3) A tag must be put on the lead seal, on which there are verification organization name and code, verification number, installed equipment number, set pressure as well as next inspection date.
- (4) For qualified safety valves, the verification reports shall be issued (see Appendix E-2), according to the requirements of the verification organization's quality management system.

Appendix E-1**Safety Valve Verification Record**

No.

End user			
Equipment code		Required set pressure	MPa
Working medium		Safety valve model	
Nominal diameter	mm	Seat diameter	mm
Manufacturer			
Manufacturer Licensing No.		Pressure range	MPa to MPa
Product No.		Delivery date	
Verification method		Verification No.	
Verification medium		Verification medium temperature	℃
Check and verification			
Appearance check			
Check after dismantle			
Test times	First	Second	Third
Actual set pressure	MPa	MPa	MPa
Leak test pressure	MPa	MPa	MPa
Verification conclusion		Verification validity	
Remarks:			
Inspector:	date:	Verification report No.:	

Appendix E-2

Safety Valve Verification Report

Report No.

End user			
End user address			
Contact		Telephone:	
Equipment code		Installation location	
Safety valve type	<input type="checkbox"/> Spring loaded <input type="checkbox"/> Pilot operated <input type="checkbox"/> Weighted	Safety valve model	
Working pressure	MPa	Working medium	
Required set pressure	MPa	Applied standard	
Verification method		Verification medium	
Set pressure	MPa	Leak test pressure	MPa
Inspection conclusion			
Maintenance and repair description:			
Verification date		Next verification date	
Inspector:	date:	(Inspection organization authorized No.)	
Approval:	date:	(Special stamp of inspection organization) Date	

Note: if the end user verify safety valves by itself, the inspection organization authorized No. is not required, and the inspection special stamp can be the stamp (or special stamp) of the relative department of the end user.

Appendix F**Recommended Method for Leak Test with Air as the Test Medium**

F1 Test Device

Install a leakage collection tube on the safety valve relieving outlet (shown in Diagram F-1) for the measurement of leakage rate. The collection end of the tube shall be upright to the safety valve outlet. The other end of the tube shall submerge 12.5mm into the water and the tube end shall be parallel with the water surface.

F2 Test Medium

The test medium is air or nitrogen gas in normal atmospheric temperature.

F3 Arrangement of the Test

The safety valve shall be put on end on the rig; the outlet shall be arranged like in Table F-1. All the opening of the safety valve such as the cap, relieving opening and outlet shall be blocked out.

F4 Pressure for Leak Test

The pressure for leak test shall be subject to standards.

F5 Inspection of Leakage

The inspection of leakage shall meet the below requirements:

- (1) Before the inspection of leakage, the adjustment of the set pressure of the safety valve shall be finished and all the joints of the safety valve are inspected for leakage.
- (2) The pressure holding time is shown in Table F-1

Table F-1 Pressure Holding Time for Leak Test

Nominal Diameter DN (mm)	Holding Time (min)
≤50	≥1
65~125	≥2
≥150	≥5

- (3) The time for inspection of leakage shall be no less than 1 minute.

Diagram F-2 is applicable for direct leakage rate inspection, but usually is applied for high leakage rate inspection.

Appendix H

Recommended Method for Low Temperature Test

H1 Test Device

Shall meet the following requirements

- (1) The testing devices include testing rig, piping and storage tank with certain volume of low temperature medium (liquid nitrogen or other low temperature evaporation medium)(see Diagram H-1). The volume of storage tank shall be suitable for the gas consumption of the tested safety valve.
- (2) Two pressure gauges of the same parameter shall be equipped for the testing rig, and one of the gauge precision shall be no lower than grade 0.5, and its pressure range shall be 1.5 to 3 times of the testing pressure of the safety valve. The pressure gauge must be calibrated regularly.

H2 Test item

Safety valve low temperature test items include set pressure and leak test. The set pressure test shall be conducted no less than 3 times, and for each time the test must reach the set pressure and within the scope of the allowable deviation.

H3 Test method

H3.1 Set pressure test

Connect the safety valve to the testing vessel through the joint tray, and to cool the safety valve with liquid nitrogen or other low temperature evaporation medium. When the safety valve is fully cooled down, close the low temperature stop valve on the liquid nitrogen storage tank and then close the stop valve of the joint tray connecting the testing vessel to evaporate the low temperature medium and let the pressure rise, observe safety valve set pressure and whether the safety valve disc can be re-seated.

Safety valve set pressure test shall meet the stipulated set pressure and be within the scope of the allowable deviation in GB/T 12243.

H3.2 leak test

After the safety valve commence operating, open the stop valve on the joint tray connecting the testing vessel to discharge pressure, when the pressure reaches 70% of the safety valve set pressure, close the stop valve to let the low temperature medium in the piping to evaporate and pressure to rise. To maintain the internal pressure of the tested vessel at 90% of the set pressure by the stop valve and observe if there is leaking at the outlet of the safety valve.

There shall be no leakage for leak test.