

Unipetrol RPA, s.r.o. Technical Services	Valves and safety relief valves for high pressure equipment. Technical delivery terms.	N 11 153

The standard is binding for all departments of the company and external organizations which order, accept and supply valves and safety relief valves for high pressure equipment.

The departments are obliged to present the standard to all external organizations performing these activities for them, and for whom the standard is also binding

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1. General provisions

1.1 Scope of validity.

This standard apply to ordering, acceptance and supply of valves, high-pressure safety relief valves used in high pressure equipment at hydrogenation, synthesis and similar processes in the chemical industry. The standards specifies provisions of ČSN 13 3060 with focus on high pressure valves with junction piece for a lens joint and of Government Decree No. 26/2003 Coll. determining technical requirements for pressure equipment. This standard serve as an instrument for ordering and acceptance of high pressure valves and high pressure safety relief valves.

1.2 Ordering

1.2.1 The order must contain the following technical data:

- a) Number of valves and safety relief valves of the same type
- b) Type of valve and safety relief valve together with a number of respective dimension standard
- c) Nominal inside diameter
- d) Technical parameters the valve and safety relief valve must be qualified for
- e) Notice, that the this standard applies for supply of the valves
- f) Special provisions between the client and the manufacturer (supplier)

1.3 Manufacturing method.

Individual components of bodies of valves, safety relief valves and flanges are manufactured from forgings that are drop-forged or open-die forged. Final shape of finished forged components is given by the manufacturing method. (final shape of open-die forged components may differ from the shapes of drop-forged method). Valves and safety relief valves are supplied with machined surface.

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1.4 Valve and safety relief valve designation

Except for potential shape designation that is stipulated in the respective standards, the designation is by embossing:

- 1.4.1 Manufacturer of valve body forgings:
- Forging manufacturer's mark
 - Number mark of the material
 - Heat number/forging number, identical with the material certificate number
 - Mark of OTK, year of manufacture, number of order (cover)
- 1.4.2 Finished valve is designated on the body with designation by the technical inspection dept. :
- Nominal inside diameter
 - Valve manufacturer's mark
 - Number mark of the material (transferred)
 - Heat number/forging number (transferred)
 - Valve serial number
 - Flow direction, arrow
 - Mark of OTK

Designation of material of small-sized components may be executed by cover marks upon agreement of the consumer with the manufacturer.

Designation of the manufacturer on the safety relief valve body and on the identification tag is pursuant to ČSN EN ISO 4126 – 1, art. 10 and ČSN EN ISO 4126 – 4, art. 10

2. Technical requirements

2.1 Quality of steel

Bodies, valve flanges and safety relief valves are manufactured from steel pursuant to respective N-standards of the company or in accordance with the manufacture drawings. Limit of the highest permitted operational pressure and temperature, as well as nominal inside diameter of individual types of valves and safety relief valves are provided in the dimension standards of the respective valves and safety relief valves.

2.2 Surface of valves and safety relief valves

Valves and safety relief valves are fitted with external primer coating, except for functional areas and in places of embossed marks only after their acceptance. The marks are framed with white colour. Respective dimension N-standards of the company and technical delivery terms apply for flanges of these valves and safety relief valves and their technical delivery terms.

3. Testing

3.1 Valve and safety relief valve body tests

3.1.1 Test sample taking

- For small forgings (up to 1000kg) as independently forged testing samples that must be forged from bars, billets or ingots from which the forgings were

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manufactured. Testing samples must nominally show the same total forging effect and have the same equal diameter, as a nominal cross-section of the forging that they represent.

- b) From prolonged parts of the forging having the diameter or cross-section approximately same as the nominal cross-section of the forgings in the course of heat treatment.
- c) From spare forgings
- d) Individual testing samples or spare forgings must be heat treated with the batch they represent
- e) For forgings with potential weight exceeding 1000kg, it is necessary to take testing samples pursuant to point 3.1.1 b) or c)

3.1.2 Preparation of testing bodies

Direction of the testing bodies must be:

- a) Across the fibre direction, fibre direction is determined by etching or forging procedure

3.1.3 Tests of material of valve and safety relief valve body are documented with:

- a) Certification of chemical analysis of heat test
- b) Tensile test pursuant to ČSN EN 10002-1 (42 0310) executed on one testing body taken from each testing sample
- c) Charpy impact test pursuant to ČSN EN 10045-1 executed on three testing bodies taken from each testing sample
- d) Mechanical properties at increased temperature must be documented by the supplier to the client in a way determined by parts 1 and 2 of ENV 22605, that the forging repeatedly reached the values determined for the respective steel at increased temperature, or if there is lack of values available, a test pursuant to art. 11.2 b) of the ČSN EN 10222-1 must be performed for each steel heat.
- e) Inspection of surface and dimensions
- f) Electromagnetic test pursuant to ČSN EN 10228-1

3.2 Test of finished valves and safety relief valves

3.2.1 test of closing valves

- a) pressure strength and leak test using kerosene pursuant to ČSN 13 3060, part 2, art. 21-23. Testing pressure of valves as per respective standards for the period of four minutes.
- b) Pressure test of a flap by kerosene pursuant to ČSN 13 3060, part 2, art.30-32. Testing pressure of valves is equal to the highest permitted pressure
- c) Pressure test of a flap by gas (air, nitrogen) pursuant to ČSN 13 3060, part 2, art.36-38,11,41-42. Testing pressure of valves is equal to the highest permitted pressure for the respective scope of operating temperatures.
- d) Inspection of component dimensions and external inspection pursuant to ČSN 13 3060 part 2 art.5
- e) Assessment after tests pursuant to ČSN 13 3060 part 2 art.48-49

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3.2.2 Tests of back pressure valves are performed pursuant to art. 3.2.1 a,b,c,d,e. During flap leak tests, the leaks are permitted upon agreement of the client with the manufacturer.

3.2.3 Tests of safety relief valves and bypass valves are performed pursuant to art. 3.2.1 a , d, c and furthermore what concerns safety relief valves pursuant to ČSN 134309-2, art. 5 and ČSN EN ISO 4126-1 and 4, art. 6 and 7.

3.2.3.1 Opening pressure test

What concerns safety relief valves, the opening pressure by 10% higher (15% at small inside diameters) than the operational one is usually selected. What concerns bypass valves, the test for pressure difference 4,5 MPa (45bar) is performed.

3.2.4 Tests of control valves is performed in line with art, 3.2.1 a,d,e.

3.2.5 Level gauge and precipitator tests are performed in line with art. 3.2.1 a,d,c.

3.3 Confirmation tests

At acceptance of valves and safety relief valves, the responsible representative of the client may ask for the following confirmation tests upon agreement with the manufacturer:

- a) Random hardness test
- b) Spectrometric test (PMI)
- c) Material structure test
- d) Radiography test
- e) Crack test using different methods than the electromagnetic one

3.3.1 In case the manufacturer does not have convenient testing equipment, the tests are performed somewhere else upon agreement with the client.

4. Acceptance and delivery

4.1 Valve and safety relief valve bodies are delivered with acceptance as per groups. A group consists of valve and safety relief valve bodies of the same shape and nominal inside diameter, which were manufactured from the same heat.

4.2 The manufacturer is obliged to inform the client (consumer) in time, latest 10 days before the test date about preparedness of the valve and safety relief valve bodies or finished valves and safety relief valves for testing and acceptance. In case the client's representative does not appear in time, the manufacturer performs the tests without his presence.

4.3 The manufacturer is obliged to submit the responsible client's representative a detailed list of all products prepared for acceptance.

4.4 What concerns valve and safety relief valve bodies the test according to art. 3.1.3.b,c are performed with presence of the responsible client's representative. Other tests are performed through OTK of the valve manufacturer.

4.4.1 When performing the tests according to art. 3.1.3 b,c the OTK documents with results of the test according to art. 3.1.3 a,b,e,f are submitted to the responsible client's representative.

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4.5 When performing tests in accordance with art. 3.2.1 the OTK documents with results of the test according to art. 3.1.3 7 are submitted to the responsible client's representative.

4.5.1 Type and scope of acceptance material tests is defined in chapter 3.1

4.5.2 Acceptance tests prescribed in 3.2.1 are performed for each valve and safety relief valve.

4.6 In case any of the tests prescribed for individual groups fails, there must be two tests carried out for that one. In case one of the other tests fails, the whole respective group is excluded from the delivery.

4.7 For a new acceptance, the manufacturer has the right to submit valve and safety relief valve bodies of those groups that did not pass even the repeated tests as a new accepted group, however after a new heat treatment.

4.8 Valves and safety relief valves that did not pass the prescribed tests must not be used for the prescribed purpose.

4.9 There is a CE marking placed on each pressure equipment or set that meets the requirements of the government decree No. 26/2003 Coll. including conformity assessment, and each pressure equipment or set receives its Declaration of Conformity.

5. Handed-over documentation

5.1 For each individual handed over piece of valve or safety relief valve, a complete material and testing documentation must be handed over pursuant to ČSN 13 3060-4 for valves and pursuant to ČSN 13 4309-2 Annex C1 and C2 for safety relief valves.

5.2 Other accompanying technical documentation as a draft of set, technical description and operating instructions will be provided by the manufacturer for each handed over piece, if this technical documentation is ordered separately. Prior to the acceptance the manufacturer shall submit documentation in compliance with ČSN EN 10204 (42 0009) to the responsible employee of the client.

6. Packaging, protection and transport

Packaging method, protection of valves and safety relief valves and transport pursuant to ČSN 13 3060 part 3 art.1-5 and ČSN 13 4309-2, art. 12. Prior to dispatch, the functional areas without painting must be preserved in an appropriate manner to be protected against corrosion.

7. Testing of high pressure valves and safety relief valves prior to putting into operation

7.1 The respective user (maintainer) is obliged to ensure execution of functional leak test of flaps for all new high pressure valves from warehouse, while the oxygen valves must undergo degreasing as well.

7.2 Inspection, setting of safety relief valve

Each safety relief valve must be adjust and tested prior to implementation by a facility having respective authorization for these activities – pursuant to N 11 005, art. 8.6.

8. Amendment – list of quoted standards and documents

ČSN 13 3060 part 1 - 3 Industrial valves, Technical delivery code

ČSN 13 3060 – 4 Industrial valves, Technical delivery code– part: 4 Documentation of valve

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ČSN EN 10002 -1 (42 0310) Metallic materials - Tensile testing, Part 1: Method of test at ambient temperature
 ČSN EN 10045-1 (42 0381) Metallic materials - Charpy impact test. Part 1, Test method (V and U notches)
 ČSN EN 10222-1 (42 0290) Steel forgings for pressure purposes, Part 1, General requirements for open die forgings
 ENV 22605-1* Steel products for pressure purposes; derivation and verification of elevated temperature properties; part 1: yield or proof stress of carbon and low alloy steel products
 ENV 22605-2* Steel products for pressure purposes; derivation and verification of elevated temperature properties; part 2: proof stress of austenitic steel products
 ČSN EN 10228-1 (01 5039) Non-destructive testing of steel forgings, Part 1, Magnetic particle test
 N 11 005 Operating rules of pressure equipment
 N 16 456 Safety relief valves for the highest relief pressure of 37 MPa
 ČSN 13 4309-2 Industrial valves, Safety relief valves, Part 2, Technical requirements
 ČSN EN ISO 4126-1 (13 4310) Safety devices for protection against excessive pressure, Part 1, Safety relief valves
 ČSN EN ISO 4126-4 (13 4310) Safety devices for protection against excessive pressure, Part 4, Pilot-operated safety relief valves
 ČSN EN 10204 (42 0009) Metallic products - Types of inspection documents
 Government Decree No. 26/2003 Coll. Determining technical requirements for pressure equipment.

* not implemented in the ČSN standard system yet

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