

Chemopetrol, a.s.	High pressure piping parts – Technical delivery terms	N 11 158

The standard is binding for all departments of the company and external organizations which order, accept and deliver high pressure pipe elbows, flanges, adapting pieces and lenses.

Departments are obliged to present the standard to all external organizations performing these activities and for which the standard is also binding for.

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1. General provision

1.1 Scope of validity.

This standard applies to high pressure pipe elbows, flanges, adapting pieces and lenses and defines technical regulations for ordering, manufacture, delivery and acceptance. When ordering in Poldi Ocel, s.r.o. Kladno the TPC 204-157/94 applies.

1.2 Terminology

1.2.1 High pressure piping parts are components of the high pressure piping connection of production equipment in the chemical industry.

1.2.2 These parts are used in range of nominal inside diameters and parameters pursuant to respective N standards.

1.3 Method of manufacture is selected by the manufacturer with respect to requested quality of products and its production capacities with the following specification :

1.3.1 The pipe elbows are manufactured from forged or rolled bar steel.

1.3.2 The adapting pieces are forged freely or in swage, only transfer pieces up to DN 30 including with difference of one DN may be manufactured from forged bars.

1.3.3 Flanges and lenses up to DN 30 including may be lathed from rolled bars or forged bars, finally heat treated. Flanges and lenses bigger than DN 45 are forged individually.

1.4 The purchase order must contain the following data:

- a) Name of the product, dimensions and designation as per dimension standard
- b) Number of products
- c) Numeral mark of material with heat treatment status
- d) Operating parameters
- e) Special provisions between the client and the supplier

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2. Technical requirements

2.1 Material

High pressure piping parts are manufactured from steel pursuant to respective N standards or drawings.

2.2 Chemical composition

Steel used for manufacture of the piping parts must be of a chemical composition that complies with respective material data sheets ČSN.

2.3 Mechanical values

2.3.1 Mechanical values determined at the tensile test must comply with ČSN for the respective heat treatment status and given grain flow.

2.3.2 Notch impact strength must comply with the ČSN. What concerns steel grade 12 the values are only informative.

2.3.3 Limitation for transverse and tangential tests

a- Transverse values are determined only upon special request (except for exceptions pursuant to 3.4.3.) specified in the purchase order and transverse values are understood as the values that were taken from the products from dimension min. 60 mm up to 100 mm. What concerns steel grade 15 the values of transverse notch impact strength (KCU 3) are guaranteed for DN 45 adapting pieces as follows:

- Steel grade 15 323 (15 520) 49 J/cm²
- Steel grade 15 423 (15 420) 39,2 J/cm²

b - tangential values are determined only upon special request specified in the purchase order (or in case that product shape does not allow for sampling in longitudinal direction) from dimension min. 100 mm.

2.3.4 Hardness after heat treatment must comply with values pursuant to ČSN.

2.3.5 Creep rupture strength is not tested and if there are values for it in the ČSN, these will be confirmed in the certificate.

2.4 Surface quality

2.4.1 External and internal surface of finished parts must be free of defects that would be a hindrance for use with the following specification:

- a) Metallurgical impurities visible to the naked eye are allowed only if they do not form aggregates. Aggregate is understood as a group of 5 and more inclusions with length exceeding 2 mm and in case their mutual distance is lower than half their length. Individual visible inclusions are admissible up to the length of max. 10 mm.
- b) Large metallurgical impurities or other defects than stipulated in art. 2.4.1 a) are inadmissible. What concerns unfinished surface (bend of elbow) removal of these defects is however allowed by means of grinding so that the grinding depth does not exceed allowed deviation of wall thickness of a pipe of the same DN.

2.4.2 Surface defects of unfinished forgings are allowed to the maximum depth of ¼ margin of manufacture

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2.4.3 Dimensions and roughness of surface of the piping parts must comply with the respective standards and drawings.

2.5 Designation

2.5.1 Pipe elbows, adapting pieces are marked as follows:

- a) Nominal inside diameter
- b) Manufacturer's mark
- c) Heat number/product number (heat number –cover – last two digits)
- d) Number mark of material
- e) Mark of OTK (technical inspection dept.)

In case the final finish of the material is done in a different company, the final product is embossed with the marks mentioned above (a,c,d).

Lens couplings up to DN 30 including, marks as per b, d,e are embossed.

2.5.2 Flanges at the manufacturer are marked as follows:

- a) Manufacturer's mark
- b) Heat number/product number (heat number –cover – last two digits)
- c) Number mark of material
- d) Mark of OTK (technical inspection dept.)

In case the final finish of the material is done in a different company, the final product is embossed with the marks mentioned above (b,c)

2.5.3 Lenses at the manufacturer are marked as follows:

Lenses up to DN 10
 Manufacturer's mark (electrolytically if possible)

Lenses DN 16, 24, 30

- a) Number mark of material
- b) Manufacturer's mark

Lenses DN 45 and bigger

- a) Manufacturer's mark
- b) Heat number/product number (heat number –cover – last two digits)
- c) Number mark of material
- d) Mark of OTK (technical inspection dept.)

In cases, when it is stated in the drawings, radius of lens rounding is also embossed (e.g. R 28).

In case the final finish of forgings is done in a different company, the final product is embossed with the marks mentioned above (b,c is transferred)

2.5.4 During acceptance the acceptance mark is embossed to all taken parts by the responsible employee of the client (customer)

2.5.5 All produced parts may have a combined mark for material and OTK, so called cover mark e.g. (S2) pursuant to N 12 010. Places for embossing are defined b individual drawings.

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3. Testing

3.1 Chemical composition of all parts is tested pursuant to valid ČSN once per heat, on a heat sample taken during casting. In case the heat test of creep limit (material grade 15) is not performed, the manufacturer must guarantee values pursuant to the material data sheet.

3.2 Except for prescribed tests, the client may request performance of confirmation tests upon agreement with the manufacturer:

- a) Random hardness test HB
- b) Spectrometric test
- c) Steel structure test
- d) X-ray test
- e) Crack test (other than the electromagnetic method)

3.3 Pipe elbows

3.3.1 Tensile strength test is performed on one piece from each heat up to 20 tonnes pursuant to ČSN EN 10 002-1 (42 0310) from each next 20 tonnes another tests must be performed. Samples for testing are taken from bars intended for manufacture of elbows, max. 20 mm and it is heat treated together with the elbows. What concerns elbows DN 45 and more, the diameter of sample intended for heat treatment must be approximately equal to the biggest thickness of elbow wall.

3.3.2 Hardness test HB is performed at each finished piece pursuant to ČSN ISO 6506 (42 0371)

3.3.3 Charpy impact test in longitudinal direction is performed in the scope defined by art. 3.3.1. For elbows DN 45 and more from steel grade 15 the test is performed at each product and therefore each piece must have appropriate forged boss.

3.3.4 Inspection of surface and dimensions of each finished piece.

3.3.5 Electromagnetic test for cracks of each finished piece.

3.3.6 Inner overpressure test of each finished product pursuant to respective N standards and ČSN. The value of testing overpressure is given by the drawing or by respective N standards, duration of the test is minimum 15 seconds.

3.3.7 Confirmation tests – the same provisions as in art. 3.2 apply

3.4 Adapting pieces

3.4.1 Tensile strength test is performed on one piece from each heat up to 20 tonnes, from each next 20 tonnes another tests must be performed. Samples for the test are taken from the prolonged part of the product (forged boss) which is separated after the heat treatment.

3.4.2 Charpy impact test in longitudinal direction is performed in the scope defined by art. 3.4.1 In case the shape or dimensions of the product do not allow for preparation of the forged boss, it is necessary to forge a special sample for the test purposes with diameter equal to approximately the biggest thickness of the adapting piece wall, minimum 20 mm, from the same heat as the products and with common heat treatment.

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- 3.4.3 Charpy impact test in transverse direction is performed only for adapting pieces DN 45 and more and only for steel grade 15 at each piece and therefore each piece must have a respective forged boss to prepare test samples from, the same procedure as in art. 3.4.1.
- 3.4.4 Hardness test HB is performed for each finished piece pursuant to ČSN ISO 6506 (42 0371) for the middle part of the adapting piece.
- 3.4.5 Electromagnetic test for cracks of each finished piece.
- 3.4.6 Confirmation tests, the same provisions as in art. 3.2 apply.
- 3.5 Flanges and lenses
 - 3.5.1 Tensile strength test in longitudinal direction is performed in a way that for products up to DN 30 including the samples are taken for the test from heat treated bars intended for manufacture of flanges and lenses. For each order and heat up to 20 tonnes one tensile strength test is prepared. What concerns flanges and lenses of DN 45 and more, for each order and heat up to 20 tonnes a special testing sample is forged and its thickness equals to the thickness of a flange or a lens, however minimum 20 mm, this sample is then heat treated together with the products.
 - 3.5.2 Charpy impact test in longitudinal direction is performed only for flanges and only for steel grade 15 on a specially forged bar as in art. 3.5.1.
 - 3.5.3 Hardness test HB is performed for each finished product pursuant to ČSN ISO 6506 (42 0371) except for lenses and flanges manufactured from bars when the hardness test is performed from each bar at least on two places.
 - 3.5.4 Electromagnetic test for cracks of each finished piece.
 - 3.5.5 Confirmation tests, the same provisions as in art. 3.2 apply.
- 4. Acceptance
 - 4.1 All products are supplied exclusively with acceptance as per groups. The group is formed by products of one order, one heat and if possible of the same or similar DN.
 - 4.2 The manufacturer is obliged to call on the representative of the client minimum ten days before the acceptance date to the acceptance. The manufacturer is recommended to have the receipt of the call confirmed in writing. In case the responsible representative of the client (customer) appears in time, the manufacturer shall perform the prescribed tests and send certificates to the client.
 - 4.3 The manufacturer is obliged to submit detailed lists of individual products prepared for tests to the responsible representative of the client (customer). Sample taking for mechanical tests is performed with presence of the client.
 - 4.4 Acceptance tests with presence of the responsible representative of the client (customer) are performed in line with the table below:

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Product	Steel grade	Tensile test	Charpy impact test longitudinal	Charpy impact test transverse	Surface and dimension inspection
Elbows	12	yes	yes	no	yes
Elbows	15	yes	yes	no	yes
Adapting pieces	12	yes	yes	no	yes
Adapting pieces	15	yes	yes	DN 45 and more	yes
Flanges	12	yes	no	no	yes
Flanges	15	yes	yes	no	yes
Lenses	12	yes	no	no	yes
Lenses	15	yes	no	no	yes

4.5 Duplicate tests

In case some tests do not comply with acceptance test during the acceptance procedure, there are two duplicate tests to be performed instead. In case even one duplicate test fails, the whole product group is excluded from acceptance. The manufacturer has the right to resort or remake the unsatisfactory products and submit them for a new acceptance.

5. Handed over documentation

Before initiation of the acceptance, the manufacturer shall submit the certificate pursuant to ČSN EN 10204 3.1.B containing documentation pursuant to art.3.1 - 3.5.5 to the responsible representative of the client (customer).

6. Packaging and transport

Packaging of finished products and rough products complies with dimensions of products and way of transport. During transport they must be properly secured to avoid their damage. Request for special surface protection and packaging must be agreed with the manufacturer.

7. Amendment – list of quoted standards and documents

ČSN EN 10204
(42 0009)

ČSN EN 10002 -1
(42 0310)

ČSN ISO 6506
(42 0371)

Metallic products - Types of inspection documents

Metallic materials. Part 1.Tensile testing at ambient temperature.

Metallic materials. Brinell hardness test

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