

eustream, a.s



CROSS-CONNECTING VTL GAS PIPELINE POLAND – SLOVAKIA

PART „CSN“

**TENDER DOCUMENTATION FOR SELECTION OF
CONTRACTORS FOR REALISATION OF THE CS
WITHOUT ES4/5**

SPECIFICATION OF BALL VALVES OVER DN300

ILF Beratende Ingenieure GmbH

Werner-Eckert-Straße 7, 81829 Munich
Germany



Phone: +49 - (0)89 - 25 55 94 - 0
Fax: +49 - (0)89 - 25 55 94 - 144
E-mail: info.muc@ilf.com



REVISION

| | | | | | |
|------|------------|--|----------|---------|----------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 2 | 25.09.2018 | APV - modification of name document; splitting of valves - plug and ball valve | Team | Pěník | Foltín |
| 1 | 10.08.2018 | APV | Team | Pěník | Foltín |
| 0 | 31.07.2018 | IFA | Team | Pěník | Foltín |
| Rev. | Date | Issued, Modification | Prepared | Checked | Approved |

Content Contributed by

| Company | | Remarks |
|--------------------------------|---|---------|
| ILF Beratende Ingenieure GmbH |  | |
| GasOil Technology a. s. Poprad |  | |

| CONTENTS | | PAGE |
|----------|---|------|
| 1 | PURPOSE OF SPECIFICATION | 4 |
| 2 | ABBREVIATIONS | 4 |
| 3 | MANDATORY STANDARDS | 4 |
| 3.1 | Standards and normative regulations | 4 |
| 3.2 | Related regulations | 6 |
| 4 | UNITS | 6 |
| 5 | MATERIALS | 6 |
| 5.1 | Material certification | 7 |
| 5.2 | Change of material | 7 |
| 6 | QA/QC AND TESTING | 7 |
| 6.1 | Selection of test samples | 8 |
| 7 | VALVES | 8 |
| 7.1 | Transported medium | 8 |
| 7.2 | Installation of valves | 8 |
| | Design | 8 |
| 7.3 | requirements | 8 |
| 7.4 | Dimensions and tolerances | 10 |
| 7.5 | Surface passive corossion protection | 10 |
| 7.5.1 | Above ground design | 10 |
| 7.5.2 | Underground design: | 10 |
| 7.6 | Tests of ball valves | 11 |
| 7.7 | Marking of valves | 11 |
| 7.8 | PACKAGING | 12 |
| 7.9 | Acceptance / taking over of ball valves in the production plant | 12 |
| 7.10 | Documentation | 13 |
| 8 | ACTUATORS | 13 |
| 8.1 | Installation of actuators | 13 |
| 8.2 | Construction`s requirements | 14 |
| 8.2.1 | Hydro-pneumatic Actuators (HPO) | 14 |
| 8.2.2 | Electro Actuators | 15 |
| 8.3 | Surface protection | 15 |
| 8.4 | Special provision | 16 |

1 PURPOSE OF SPECIFICATION

This document specified minimum requirements of designing, ordering, manufacturing, inspection, testing, preparation for transporting and guarantees of delivery and installation ball valves \geq DN 30 for the PROJECT „Cross-Connecting VTL Gas Pipeline Poland – Slovakia“. All specified requirements are same for all potential suppliers of tender.

2 ABBREVIATIONS

| | |
|--------|---|
| API | American Petroleum Institute |
| ASME | American Society of Mechanical Engineers |
| ATEX | Certifikát zo skúšobne o nevýbušnom vyhotovení |
| DC | Direct Current (jednosmerný prúd) |
| DIN | Deutsches Institut für Normung |
| DN | Nominal diameter |
| EC | European Commission |
| EEC | European Energy Commission |
| EHS | European Economic Community |
| EN | European Standard |
| ESD | Emergency shutdown system |
| BV | Ball Valve |
| HPO | hydro-pneumatic actuator |
| ISO | International Organization for Standardization |
| KCV | CHarpy V-notch test |
| CS | Compressor Station |
| MPSVaR | The Ministry of Labour, Social Affairs and Family |
| SP | Spare parts |
| XRI | X-ray inspection |
| SHMU | Slovak Hydrometeorological Institute |
| SI | International System of Units |
| SPEC | Standard Performance Evaluation Corporation |
| EUS | Eustream a.s. |
| SR | Slovak republic |
| STN | Slovak Technical Standard |
| TDP | Technical delivery conditions |
| NG | Natural Gas |
| Z.z. | Codex |

3 MANDATORY STANDARDS

3.1 Standards and normative regulations

All equipment will be manufactured and delivered in accordance with the standards valid in the SR and the EU.

Other standards may be used, but they must be agreed with the CUSTOMER in advance. Mandatory required standards are:

- STN EN 12583 - Systémy zásobovania plynom - Kompresorové stanice, požiadavky na prevádzku
- STN CR 954 - Bezpečnosť strojov, bezpečnostné časti riadiacich systémov.
- STN EN ISO 12100 – Bezpečnosť strojov. Základné termíny, všeobecné zásady konštruovania strojov
- STN EN 1594 - Systémy zásobovania plynom. Plynovody pre max. prevádzkový tlak nad 16 bar. Požiadavky na prevádzku.
- STN EN 1503-1 Armatúry. Materiál na telesá, veká a kryty. Časť 1: Ocele špecifikované v európskych normách.
- STN EN 1503-2 Armatúry. Materiál na telesá, veká a kryty. Časť 2: Ocele nešpecifikované v európskych normách.
- STN EN 60079-10 Elektrické zariadenia do výbušných plynových atmosfér. Časť 10: Určovanie priestorov s nebezpečenstvom výbuchu.
- STN 03 8332 Ochrana proti korózii. Skúšanie páskových izolácií a zmršťovacích materiálov z plastov.
- STN 03 8332/Z1 - Ochrana proti korózii. Skúšanie páskových izolácií a zmršťovacích materiálov z plastov.
- STN 03 8374 - Zásady protikoróznej ochrany podzemných kovových zariadení.
- STN 03 8376 - Zásady stavby oceľových potrubí uložených v zemi. Kontrolné merania z hľadiska ochrany proti korózii.
- STN 38 6405 - Plynové zariadenia, zásady prevádzky.
- STN EN 12068 – Katodická ochrana. Vonkajšie organické povlaky na ochranu proti korózii v zemi alebo; vo vode uložených oceľových potrubí a používané pri pôsobení katodickej ochrany. Páskové a zmršťovacie materiály
- STN EN ISO 6520-1 - Zváranie a príbuzné procesy. Klasifikácia chýb zvarových spojov kovových materiálov. Časť 1: Tavné zváranie (ISO 6520-1:1998).
- STN EN ISO 6520-2 - Zváranie a príbuzné procesy. Klasifikácia chýb v kovových materiáloch. Časť 2: Tlakové zváranie (ISO 6520-2:2001).
- STN EN ISO 5817 - Zváranie. Tavné zvárané spoje ocelí, niklu, titánu a ich zliatin (okrem spojov zváraných lúčom). Úrovně kvality (ISO 5817: 2003).
- STN EN 10290 - Oceľové rúry a tvarovky na pobrežné a príbrežné potrubia. Vonkajšie tekuté polyuretánové povlaky.
- STN EN 10289 - Oceľové rúry a tvarovky na pobrežné a príbrežné potrubia. Vonkajšie tekuté epoxidové povlaky.
- STN EN 10288 - Oceľové rúry a tvarovky pre pobrežné a príbrežné potrubia. Vonkajšie dvojvrstvé povlaky na základe pretláčaného polyetylénu.
- STN EN ISO 3183 - Oceľové rúry na potrubné dopravné systémy (ISO 3183:2012)
- STN EN ISO/IEC 17050:2004 Posudzovanie zhody. Vyhlásenie dodávateľa o zhode
- STN EN ISO 2409:1997 Náterové látky. Mriežková skúška
- STN EN ISO 2808:2000 Náterové látky. Stanovenie hrúbky náteru
- STN EN ISO 4624:2004 Náterové látky. Od trhovú skúšku príľnavosti
- STN EN ISO 12944-2:2001 Náterové látky. Protikorózna ochrana oceľových konštrukcií ochrannými náterovými systémami
- STN EN ISO 8501-1:2002 Príprava oceľových podkladov pred aplikáciou náterových látok a podobných výrobkov. Vizuálne posudzovanie čistoty povrchu, časť 1: Stupne korózie a stupne prípravy nenatretých oceľových podkladov po celkovom odstránení predchádzajúcich náterov
- DIN 30670 Ochrana vonkajších povrchov oceľových rúr a tvaroviek polyetylénom
- ASME B 16.5: Prírubby a prírubové spoje – od 12“ do 24“.
- ASME B 16.9 Priemyselne vyrábané fittingy z uhlíkových ocelí zvárané na tupo.
- Technicko-dodacie predpisy EUS na guľové uzávery
- Technicko-dodacie predpisy EUS na pohony

3.2 Related regulations

- Smernica Európskeho parlamentu a Rady 2004/17/ES z 31. marca 2004 o koordinácii postupov obstarávania subjektov pôsobiach v odvetviach vodného hospodárstva, energetiky, dopravy a poštových služieb.
- Smernica 93/38/EHS zo 14. júna 1993 (OJ L 199 z 9,8,1993) o verejnom obstarávaní v odvetviach vodného hospodárstva, energetiky, dopravy a telekomunikácií.
- Smernica 98/37/EC Strojné zariadenia.(číslo novely 98/79/EC) z 22.6.1998 Európskeho parlamentu a Rady, týkajúca sa strojných zariadení
- Smernica Rady 73/23/EEC (číslo novely 93/68/EEC) z 19.2.1973 týkajúca sa elektrických zariadení určených pre používanie v rámci určitých limitov napätia
- Smernica 94/9/EC Európskeho parlamentu a Rady z 23.3.1994 týkajúca sa zariadení a ochranných systémov určených na použitie v potenciálne výbušnej atmosfére (ATEX)
- Smernica 89/336/EEC (číslo novely 92/31/EEC, 93/68/EEC) týkajúca sa elektromagnetickej kompatibility
- Smernica 97/23/EC Európskeho parlamentu a Rady z 29.5.1997 týkajúca sa tlakových zariadení
- Zákon č. 251/2012 Z.z. o energetike a o zmene niektorých zákonov.
- Zákon č. 133/2013 Z.z. o stavebných výrobkoch a o zmene a doplnení niektorých zákonov.
- Zákon č. 314/2001 Zb. o ochrane pred požiarimi v znení neskorších predpisov.
- Zákon č. 24/2006 Z.z. o posudzovaní vplyvov na životné prostredie a o zmene a doplnení niektorých zákonov
- Zákon č. 264/1999 Z.z. o technických požiadavkách na výrobky a o posudzovaní zhody v znení neskorších predpisov
- 508/2009 Z.z. Vyhláška MPSVaR SR z 1.9.2014 ktorou sa ustanovujú podrobnosti na zaistenie bezpečnosti a ochrany zdravia pri práci s technickými zariadeniami...
- 436/2008 Z.z. Nariadenie vlády SR z 1. októbra 2011, ktorým sa ustanovujú podrobnosti o technických požiadavkách a postupoch posudzovania zhody na strojové zariadenia.
- Interné predpisy eustream, a.s.

4 UNITS

Numbers, units and symbols will be in accordance with the international SI system, except for:

- The Fortress (Strength) will be in megapascals [MPa]
- The pressure will be in megapascals [MPa] or bars [Bar] (for design, operating and test pressure)
- Dimensions of valves will be in millimeters [mm]

5 MATERIALS

All materials used for manufacture must be identical to this specification.

In the case of application of other material for the full equipment or part than this specification specified vendor could select the other material. This material shall have at least the same or better mechanical properties as the material specified this specification. Selected materials for the manufacturing of equipments shall comply with this specification

5.1 Material certification

For materials and equipments where the certificates are required, the SUPPLIER have to provide the certificates of the materials used. The products will be marked so that the product will be identified unambiguously to certificate. Change of material

5.2 Change of material

If the SUPPLIER intends to change the material of the ordered product, he has to inform the CUSTOMER at least 3 weeks in advance. Alternatively, the change of material is only possible after the CUSTOMER has agreed. Inspection of quality and testing

6 QA/QC AND TESTING

The SUPPLIER must have a quality management system according to EN ISO 9001.

The SUPPLIER is fully responsible for the QA/QC of work and quality in accordance with the terms and conditions agreed in the CONTRACT. The SUPPLIER shall provide the required quality control system for staff, laboratories, necessary facilities and all the equipment necessary for sampling, the performance of agreed quality assurance tests, facilities and activities.

Prior to approval of the quality program, the CUSTOMER may ask the SUPPLIER for a demonstration of the pre-testing with this demonstration convince of the quality and performance of the tests and quality approval system.

The CUSTOMER reserves the right to participate in the tests.

The CUSTOMER reserves the right to have additional tests. Additional tests are at the CUSTOMER's discretion /cost if the test results meet the provisions of this specification. The additional tests shall not affect the normal process of production. Additional tests are at the SUPPLIER's discretion / cost if the results do not meet the provisions of this Specification.

The SUPPLIER must exclude from supply all equipment that does not meet the requirements of this specification.

The CUSTOMER, his authorized representative and independent Third Party shall have always access to all premises in which production and testing will take place.

All tests will be performed in accordance with the standards specified in this specification or in the specification. In the case of a required test whose procedure is not standardized, it is possible to use the procedure used by the SUPPLIER if it is agreed in CONTRACT.

The SUPPLIER shall notify the CUSTOMER of the date of production and final tests at least 14 days in advance. If authorized representative Third Party is not present despite the timely invitation, the SUPPLIER may dispatch the ordered products without having to be handled by the CUSTOMER. The presence of the authorized representative during the test does not affect the SUPPLIER's liability and guarantees.

The CUSTOMER may take samples and perform tests independently of the SUPPLIER at his own expense. If the results of these tests show that the SUPPLIER is untrustworthy, the ordering authority has ordered the SUPPLIER or an independent laboratory to re-test or perform additional tests. In this case, the costs of repeat or additional tests will be at the SUPPLIER's cost.

6.1 Selection of test samples

All samples to be tested will be taken at random. It is recommended to use statistical sampling methods, based on the principle that all individual production elements may be selected for testing with the same probability.

7 VALVES

Ball valves shall be made of materials which enable them to function properly under the conditions for which they are intended (temperatures, pressures, medium and external and corrosive conditions of their installation). Ball valves must be designed to withstand maximum pressure from the operating medium or vibration loads..

The materials of all parts of ball valves used for gas pipelines shall be in accordance with EN 1594, EN 1503-1 and EN 1503-2.

The use of steel with a minimum yield strength of less than 360 MPa may be used for manufacturing of the ball valves end their parts (except for welding ends) if they meet the other specified requirements of EN 1594 for chemical composition, strength, Charpy impact test and weldability.

7.1 Transported medium

Transported medium is natural gas with content of mechanical solid partic max. 100g/m³, with max. dimension of particles up to 5 mm in a volume sample of natural gas..

- content of carbon disulphide $\leq 5 \text{ mg/m}^3$
- total content of sulphur $\leq 100 \text{ mg/m}^3$
- total mercaptan $\leq 15 \text{ mg/m}^3$
- content of nitrogen dioxide $\leq 2\%$

7.2 Installation of valves

Valves will work in the environmental conditions – EX -Zone 2 according to STN EN 60079-10

Valves must be fully reliable and safety also at vibrations of the pipeline system, of which it will be a part. Effective value of vibration speed measured in frequency range 6 - 50 Hz is maximum 4 mm/s.

7.3 Design requirements

- Full-bore valves with ability to open it at full differential pressure without any damage of any of its part.
- Vendor warranty shall be at least 3 years.
- Valve must have manual and automatic control (if it is required by CUSTOMER), and in the case of CUSTOMER's requirement it shall be prepared for installation of the actuator (the type will be specified by the CUSTOMER).
- Valve must be equipped by systems „Double Block and Bleed“ and „Double Piston Effect“
- Valve must have anti-static design (works in EX-Zone 2)
- Valve must be resistant to fire in accordance with STN EN ISO 10497 and certified in accordance with STN ISO 14313 Annex A5.
- The body – full welded design is required

- The ball in the valve shall be supported in bearings.
- Ball valve connection - welding ends , or in the case of special requirement of CUSTOMER must have connection with flanges.
- The valves shall be supplied with the support
- The wall thickness calculation on the welded end shall comply with EN 1954
- The safety factor for calculating of the welding ends is 2.15

Valves shall be equipped by the following sealing systems:

- primary sealing - „metal to metal“;
- secondary sealing - soft sealing element;
- tertiary sealing - emergency sealing system (injection of lubricant).
- Valve must be equipped, in the shaft area, by the sealing system „anti-blow-out“ at least with double sealing .
- System must enable a replacement of the sealing element in full operation of the pipeline, in which the ball valve is installed.
- The sealing system of the shaft must enable the additional sealing by means of the emergency sealing system (injection of the lubricant).

Welding connection ends

At welding ends of the ball valve the weldability with pipeline material, which is specified in specification shall be ensured.

Material properties of connecting ends

- At steel the weldability must be guaranteed, at ambient temperature of 0°C without heat treatment.
- Yield strength of welded on ends $R_e \geq 360$ MPa.
- Ratio between the yield strength and tensile shall not exceed value 0,9.
- Sharpy impact test KCV from 3 tests at -20 °C:
 - average value min. 40 J
 - value of any test must not be lower than 30 J;
 - the test will be done for the basic material in accordance with STN EN ISO 148-1 and for the weld joint in accordance with STN EN ISO 9016.

The materials used for the manufacturing of valve shall meet the criteria specified in the eustream technical delivery conditions for the ball valve.

Venting and draining piping:

- Ball valve must be equipped with draining and venting piping ($\phi = 1''$ for GU/ Ball valve up to DN 400 , $\phi = 2''$ from DN 500 up to DN 1000) for venting / draining of ball interspace and pressurizing ball interspace from both sides of the ball valve. Each of these piping must be equipped with two valves, from which at least one is the ball valve equipped with hand lever.
- Ball valve must be equipped with piping for a seat system with additional sealing.
- Ball valve must be equipped with piping with ball valves, which will enable pressurisation of ball inter space from both sides of the ball valve.
- Piping for draining, venting, additional sealing of seats, and pressurisation of ball inter a space must be made of stainless steel and for underground design it must be brought a 100 mm height approximately of under the flange of the ball valve actuator.
- All piping of the ball valve (draining, venting, additional sealing of seats, and pressurisation of ball) must be designed , that in the most possible way it will copy the shape of the ball valve, and must be fixed to the ball valve body.

7.4 Dimensions and tolerances

Ball Valve are delivered with dimensions specified in the purchase order.

The CUSTOMER specified the dimensions and material of the pipeline into which the ball valve will fit in. For ball valve, the SUPPLIER shall provide strength calculation and dimensional drawing of the ball valve to CUSTOMER for approval. The drawing must show the main dimensions, tolerances, details of geometry, and the used ending materials used.

Shaping of welding ends of the ball valves:

- bevelling at welding ends: 1,5 mm + 0,5 mm
- taper for the weld: 30° + 5°
- slope edge from inside of welding end: max. 15°
- tolerances of separation cut from normal line to pipe axis must not exceed 0,005 D max. however 1,6 mm;
- geometry of welding ends must ensure proper X-Ray test of assembly welds at welding of the ball valve on the gas pipeline.

7.5 Surface passive corrosion protection

7.5.1 Above ground design

Ball valves will have protected surface against corrosion by protective paint with guaranteed service life "H" (at least 15 years).

The corrosive aggression of the "C3 - C4" environment shall be considered.

The surface coat must be stabilized against UV radiation and the color shade will be specified by the CUSTOMER. Welding ends in width 150 mm must be protected only by temporal protective paint, which must not influence the weldability of the ball valve with pipeline in the terrain.

Technological process / approach for coating of valve:

- surface degreasing
- the preparation of the surface is prior Sa 2½ stage (if, for safety or technological reasons, it is not possible to prepare the surface for the Sa 2½ stage, the preparation of the surface to stage St 3 shall be done)
- removal of dust and abrasive residue;
- applying a first layer of a base epoxy coating at a thickness of 100 microns dry coating;
- applying a second layer of a basic epoxy coating at a thickness of 100 microns μm dry coating;
- application of a top-of-the-line polyurethane coating in a thickness of 80 microns (μm) dry coating;
- the total thickness of the coating system is min. 280 micrometers (μm);

7.5.2 Underground design:

Ball valves will be protected on surface against corrosion by anti-corrosive polyurethane coat in accordance with standard STN EN 10290 (resp. DIN 30677) with minimal thickness of the protective layer 2,5 mm. Its porosity-free status will be verified by electric spark test (holiday test) with voltage 25 kV.

Welding on ends must be protected in width 150 mm by temporal protective paint, which must not influence the weldability of the ball valve with pipeline on site.

7.6 Tests of ball valves

All tests must have an inspection certificate 3.2 in accordance with EN 10204. All non-destructive testing activities must be carried out by qualified and competent personnel certified according to STN EN ISO 9712 grade 2.

The following tests will be performed on the valves:

- Pneumatic body test
- Hydrostatic body test
- Functional test
- Double Block & Bleed (DN 300 to DN 1000)
- Double Piston Effect (DN 300 to DN 1000)
- Tightness test of seat
- Welding tests
 - all welds shall be X ray tested according to STN EN ISO 17636-1 and evaluated according to STN EN ISO 10675 (2017) level 1
 - in places where this is not possible, the welds are subjected to an ultrasonic test according to STN EN ISO 17640 (2011) and evaluated according to STN EN ISO 11666 (2011) level 2
 - in a place where one of the above tests can not be made, the magnetic-pulver method according to STN EN ISO 17638 (2010) is permitted and evaluated according to grade 1 of STN EN ISO 23278
 - in the welding area of stainless steel materials and the connection of stainless steel material with black material (C steel), a capillary method according to STN EN ISO 3452-1 is to be used according to grade 1 STN EN ISO 23277 (2010)
 - all weldings are subjected to 100 visual inspection according to STN EN ISO 17637 (2017)
- The welding ends are subjected to an ultrasonic test according to Class 3 of STN EN 10228-3, at a width of 25 mm from the welding end..
- Test (measurement) of the detaching moment - measurement of detaching moment by torque wrench (The test procedure is described in TDP eustream (TA.W.24.02.15) for ball valves)
- Test of time for resetting of the valve
- Tests of actuator function (if the delivery is with the actuator) (The test procedure is described in TDP eustream (TA.W.24.02.15) for ball valves)
- Inspections of ball valves dimensions
 - length
 - height
 - internal diameter
 - connecting dimensions of the ball valve
 - geometry of welding ends
 - deviation of ends from rectangularity.
- Visual inspection
 - surface of the ball and movable /traveling parts
 - inspection of surface the body, welds, and welding ends
 - inspection of marking of parts of the valve (material) and the nameplate

More details are described in TDP eustream a.s.(TA.W.24.02.15)

7.7 Marking of valves

The ball valve must be equipped by identification label / nameplate in Slovak language, which must contain the following data:

- trade mark of SUPPLIER;

- identification / production number of the ball valve
- number of the purchase order
- standard and grade of the material at welding ends
- maximal operational pressure
- nominal diameter
- type of the ball valve
- manufacturing year
- mass
- name and thickness of protective coat or paint

In the case that the ball valve will be delivered with the actuator, also this must be equipped by the label / nameplate, which must contain at least the following data:

- trade mark of the SUPPLIER;
- type of the actuator
- control voltage
- identification / production number of the actuator
- torque of the actuator
- mass

The standard SUPPLIER's label / nameplate subject of approval by the CUSTOMER.

7.8 PACKAGING

Ball valve must be packed in non-returnable factory packing, in order to prevent its damaging during transportation or decreased functional abilities. The price of the packaging is included in the price of the ball valve..

Welding ends must be packed and blinded, in order to prevent water and impurities penetration into the ball valve. Edges of welding ends must be protected by tape against eventual damages

7.9 Acceptance / taking over of ball valves in the production plant

The CUSTOMER reserves the right to participate in the output inspection of the ball valve

In the framework of the acceptance procedure the ball valve is submitted to the inspection of dimensions according to the drawing agreed by the CUSTOMER, inspection of the documentation completeness, and the following final testing.

The following rules are applied for participation of the authorised persons of the CUSTOMER

- date of final tests will be announced by the SUPPLIER to the CUSTOMER at least 14 days in advance;
- if in spite of an early call no authorised person of the CUSTOMER takes part at final tests, the SUPPLIER is authorised to dispatch the ball valve without acceptance of the CUSTOMER;
- presence of the representative of the CUSTOMER at tests does not have influence on responsibility and guarantees of the SUPPLIER;
- the SUPPLIER will prepare the ball valve for testing in the state, in which this will be dispatched including the actuator, with exception of anticorrosive paints and packaging;
- during tests it is not possible to utilise means of emergency additional sealing of seats or the shaft;
- small mechanical damages found out during the acceptance can be repaired only in the extent of the standard STN EN 14141 item 5.4;

- in the case that the ball valve not satisfies tests, the producer has duty to announce it to the CUSTOMER with technical clarification of the defect. After this clarification and elimination of defects he can prepare the ball valve for revision of acceptance test ;
- one ball valve can be submitted to the final acceptance test maximum 2 times. If the ball valve does not satisfy the requirements of the final tests at the first test and also at the repeated test, the CUSTOMER will not accept this ball valve and the SUPPLIER must replace it by other ball valve.

The list of the final ball valve`s tests is showed in Appendix 1 TDP eustream no. TA.W.24.02.15.

7.10 Documentation

All documentation will be processed in Slovak (eventually English) language.

Part of the ball valve supply must be a documentation that contains at least one:

- the assembly drawing of the ball valve (with the actuator, with main dimensions and their tolerances) approved by the CUSTOMER;
- list of used material for main parts, including their certifications and heat treatment processing;
- detail geometry of welding ends; welding ends must be documented certification
- material certifications of all pressure parts of the ball valve with corresponding chemical and mechanical values in accordance with the standard STN EN 10204 item 3.2; (Third Party level)
- certificate of quality and completeness of the product;
- certification on performance of non-destructive tests and their results
- final certificate on successful performance of final testing procedure signed by representatives of the CUSTOMER
- protocol on measurement of thickness and electric spark test of the protective coat (holiday test);
- certificate on suitability to use the device in defined environment Zone 2, if is not specified otherwise
- certificate „fire safe“
- verification on certification of the ball valve in the European Union
- SIL 2 certificate to EN 61 508 for ball valves included in the ESD system
- general instructions for maintenance and operation of the ball valve and the actuator in Slovak language – must also contain safe locking of ball valve in the closed position
- protocols from RTG tests.

8 ACTUATORS

Actuators are to be made of materials that enable them to function properly under the conditions for which they are intended (temperatures, pressures, medium and external and corrosive conditions of their installation). Actuators must be designed to withstand vibration loads as specified in the specifications and in this document. The materials of all parts of the actuators must be in accordance with STN EN 1594.

8.1 Installation of actuators

Actuators which will be operated in Zone 2 according to STN EN 60 079-10 are specified in the specification.

The actuators must be fully reliable and safe even when vibrating the piping system they will be part of. An effective vibration speed value measured in the frequency range of $6 \div 50$ Hz is a maximum of 4 mm/s.

8.2 Construction`s requirements

The actuator`s SUPPLIER must dispose a quality management system in accordance with EN ISO 9001.

The technical design of the actuators are specified in the order.

8.2.1 Hydro-pneumatic Actuators (HPO)

Basic data and design:

- the closing time is given in the specification
- According to API SPEC 6D
- Actuator fixed on the body of Ball Valve
- According to the CUSTOMER`s specification with remote control
- With remote control of the BV position, especially of the end position of the valve and line break
- With remote fault signalisation
- With the mechanical signalisation of the BV position on the axis of the control pin;
- with the possibility to reset the ball by help of the manual pump
- According to the requirement „high pilot a low pilot“
- According to the requirement the reserve pressure tank (s) – reserve for three emergency re-settings of the ball
- Fail Save position for actuator included in the ESD system
- Without a need of maintenance (at maximum oil quality check, 1 x annually)
- Simple technical solution for setting the end positions by the position of the ball
- Separate hydraulic circuit from the pneumatic circuit – separate hydro-cylinder and gas cylinder with the exclusion of the possibility to mix both media
- Use of biologically removable oil
- Device allowing the control of the torque of ball valve actuator designed as modular system with the possibility of additional equipment for driving-in and driving-out the seats
- the actuator working medium is listed in the list of materials for a given actuators
- select the connection dimensions according to the type of ball shutter. For hydro-pneumatic actuation, if the gas is taken from the ball valve, the supply pipes are included
- the operating voltage is 230 V DC or 24 V DC eventually other
- in all type of construction the possibility of local control by mechanical pulses
- pressure vessels that are part of the actuator must be designed, built, tested and certified in accordance with PED 14/68 / EC. The documentation must be included.

Driving medium:

- natural gas
- operating pressure max. 8,4 MPa(g) or 7,25 MPa(g) in HPS (Border metering station) and 7,25 MPa(g) in TU (Block valve station) and KS01(Compressor station 01)
- operating temperature from 10° C to 70° C
- The content of mechanical particles max. 100g/m³ with the maximum size of particles up to 5 mm in the volume sample of natural gas.

8.2.2 Electro Actuators

Basic data and design:

- the closing time is given in the specification
- according to API SPEC 6D
- actuator fixed direct on the body of ball valve
- according to the CUSTOMER's specification with remote control;
- possibility to select of control local/remote and remote signalizations;
- With remote signalisation of ball valve position (positioner), especially of the end position of the valve (limit switches)
- With remote signalization – signals in relation to failure
- with visual mechanical signalisation of the ball valve position on the axis of the movement;
- Simple technical solution for setting the end positions by the position of the ball (synchronisation of position)
- motor-driven voltage 3 x 400 V AC
- in the case of power failure, the possibility of manually adjusting the spheres by mechanical transmission
- transparent and simple scheme of connection
- torque sensors and limit switch
- possibility of showing the local position of the ball or the possibility of remote positioning (as required)
- shaft torque, electrical and thermal protections of motor built-in directly in actuator;
- in all designs the possibility of local control by mechanical trigger = vo všetkých prevedeniach možnosť miestneho ovládania mechanickým impulzom
- Fail Save position for actuator included in the ESD system
- construction solution of actuator shall be approved by ball valve SUPPLIER and shall be certified for the the application in EU.

8.3 Surface protection

The paint will be selected by the CUSTOMER according to the SUPPLIER's offer. Paint according to CUSTOMER requirements.

Final technical / As-built documentation

All documentation will be in English and Slovak language.

A part of delivery shall be technical documentation including :

- Certificate on quality and completeness of the product;
- Material certificates of components used, mainly of the pressure part materials
- Certificate on suitability of the equipment to be used in the specified environment conditions, for operation with the defined medium
- SIL 2 certificate to EN 61 508 for actuators integrated into the ESD system
- electric connection / wiring diagram
- Hydraulic diagram
- Dimensional drawing
- indication of: weight of the actuator, minimum and maximum torque, connection size, period of the actuator operation at the prescribed torque, the volume of oil tank, stroke of the hydraulic cylinder
- minimum and maximum oil pressure in the system
- bill of material
- recommended spare parts for 4 years of operation
- The operating and maintenance manual of the actuator (in Slovak language).

8.4 Special provision

- presence of the technicians of the BV and actuator SUPPLIER's during pre-commissioning and commissioning
- presence of the CUSTOMER's technicians during acceptance testing of the ball valve and actuators (FAT)

PREKLAD