

NAZWA ZAMIERZENIA BUDOWLANEGO	BUDOWA NOWEJ INSTALACJI ETYLENOWEJ WRAZ Z INSTALACJAMI TOWARZYSZĄCYMI NA TERENIE ORLEN S.A. Z SIEDZIBĄ W PŁOCKU
NUMER I NAZWA ZADANIA INWESTYCYJNEGO	ZADANIE 22019/9/003 „Intensyfikacja produkcji Olefin w Płocku – OSBL zakres K003 (Infrastruktura dla kompleksu Olefin III)”
INWESTOR	ORLEN S.A. UL. CHEMIKÓW 7, 09-411 PŁOCK, POLSKA
WYKONAWCA	KONSORCJUM NAFTOREMONT-NAFTOBUDOWA SP. Z O.O., POLIMEX MOSTOSTAL S.A., KTI POLAND S.A.
BIURO PROJEKTOWE	KTI POLAND S.A.
WBS	6000 – DOKUMENTY OGÓLNE ORLEN-SPV (wspólnie)
OBIEKT	RUROCIĄGI NADZIEMNE
BRANŻA	ORUROWANIA
TYTUŁ DOKUMENTACJI	TECHNICAL SPECIFICATION FOR VALVES WYMAGANIA TECHNICZNE DLA ARMATURY

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1. GENERAL

1.1 Definition of term

The term Customer / Engineering Company as used herein shall encompass, such terms as "Buyer", "Purchaser", "Customer" etc.

The term "SUPPLIER" as used herein shall encompass such terms as "Seller", "Vendor", "Manufacturer", Bidder", Subcontractor", etc.

1.2 Scope

This specification covers minimum technical requirements for procurement of ordinary valves, such as Gate, Globe, Check, Butterfly and Ball valves to be used for the 32170 PROJECT.

1.3 Reference Documents

✓ 2014/68/EU (PED)	European Community Pressure Equipment Directive
✓ API	American Petroleum Institute
✓ ASTM	American Society for Testing and Material
✓ ANSI	American National Standard Institute
✓ ASME	American Society Mechanical Engineers

Editions and/or issue dates of Codes, Standards and Specifications shall be the latest, unless otherwise specified.

1.4 Material

Valves used in wet H₂S services are called "SOUR SERVICE". Materials specified are identified with the ASTM reference added with "NACE".

All materials in SOUR SERVICE shall at least follow requirements of NACE standard MR0103 and MR0175 / ISO 15156. All components shall be hardness tested.

2. TECHNICAL REQUIREMENTS OF SUPPLY

2.1 Marking

- 2.1.1 The valves shall be supplied CE marked according of the Pressure Equipment Directive 2014/68/EU (PED).

Required documents provided by the Manufacturer:

- ✓ declaration of compliance with relevant EU directives,
- ✓ certificate of conformity issued by a third party,
- ✓ inspection documents for structural elements of at least type 3.1 in accordance with PN-EN 10204,
- ✓ operating instructions, if required

- 2.1.2 Marking shall be according to MSS-SP 25.

As minimum:

- ✓ the mark of the manufacturer of the casting or forging and the mark of the manufacturer carrying out machining, assembly and testing of the valves,
- ✓ material,
- ✓ nominal or permissible pressure,
- ✓ highest/lowest allowable temperature,

- ✓ nominal diameter,
- ✓ type number,
- ✓ manufacturer number or serial number,
- ✓ year of production,
- ✓ CE marking, if required.

- 2.1.3 In addition, the Supplier shall permanently attach to each valve a stainless steel valve tag with the Purchaser's identification (KTI Poland Identification code) stamped or engraved on the tag. The height of the alpha-numeric identification number shall be a minimum of 4.8 mm. Any part packaged separately from valve shall have a second tag with the same information.
- 2.1.4 Valves for "Hydrogen service" and "Oxygen service" to be furnished completely degreased, cleaned and internally dried. Identification to be stamped on KTI Poland Identification code metallic tag.
- 2.1.5 The marking and tagging shall be legible and conspicuous.
- 2.1.6 Stainless steel wire used to attach the valve tag shall be permanently attached to the handwheel or yoke or gland bolting.
- 2.1.7 All valves having a preferred direction of flow shall have their bodies legibly marked with an arrow cast on the valve body.
- 2.1.8 Stamping or engraving shall not infringe on the minimum required wall thickness of the valve.

2.2 External Protection and Shipment

- 2.2.1 Valves shall be protected by painting, according to the documents: 32170-PIP-6000-STD-2380-01.
- 2.2.2 Unless otherwise specified, the following measures to prevent corrosion and mechanical damage during transportation shipment and storage shall be performed:

✓ Packing:

- All valves shall be packed in the closed position except of ball valves, which shall be packed in the full open position. Where check valves have internal blocks or packing to prevent the flapper from moving during shipment, this fact must be stated on a large, bright red, warning tag, securely and prominently attached to each valve so protected.
- Valves shall be shipped in a manner that will prevent any damage during transportation.

✓ Rust Preventive:

- Threaded parts shall be protected with grease.
- Machined surfaces shall be coated with a removable varnish, strippable products, or protected with grease.
- Rust preventive shall not be detrimental to welding.
- Unless otherwise specified, these protections shall be suitable for not less than 12 months of outdoor storage.

✓ End Protection:

- Butt-welding end – Wood or heavy duty plastic cap cover belted or wired.

- Plain and/or Socket welding end – Heavy duty plastic cap.
- Threaded end – Heavy duty plastic plug with lubricant.
- Flanged end – Wood or heavy duty plastic cover using at least three bolts or wiring through at least four bolt holes. End protectors to be used on flange facing shall not be smaller than the flange outside diameter.

2.2.3 Protection shall be of such design that the valves cannot be installed without complete removal of the protective device.

2.3 General Requirements

2.3.1 All valves shall meet the requirements of the Pressure Equipment Directive (PED) 2014/68/EU.

2.3.2 Unless otherwise specified, steel valves shall conform to ASME B16.34. However, all materials, design and fabrication of valves, including examination and testing shall be in accordance with the minimum requirements and limitations of ASME B31.3, or otherwise specified in the Valve Purchase Description. This includes any maximum temperature limitation for a material or rule governing the use of a material at the minimum temperature. In addition to these codes and standards, the valves shall conform to the applicable standards as shown in the Valve Purchase Description.

2.3.3 Use of asbestos is strongly forbidden in any parts of the valves.

2.3.4 Fabrication standards:

Unless otherwise specified, design and manufacturing shall be in accordance with:

Gate valves:

- ✓ API 602, BS 5352, API 600, API 6D

Globe valves:

- ✓ BS 1873, BS 5352 ASME B16.34

Check valves:

- ✓ API 602, ASME B16.34

Ball valves:

- ✓ API 6D, API 608, BS 5351

Butterfly valves

- ✓ API 609

2.3.5 Valve Pressure-Temperature ratings and minimum wall thickness shall be in accordance with ASME B16.34 or the referenced Code or Standard in the valve description.

2.3.6 Face-to-face, end-to-end, and center-to-face dimensions of flanged and butt-weld valves shall be in accordance with ASME B16.10, unless otherwise specified. Butt-weld end pressure-seal bonnet valves shall conform to the short pattern dimensions.

- 2.3.7 Butterfly valves face-to-face dimensions shall be in accordance with API 609, unless otherwise specified.
- 2.3.8 Non-metallic parts and elements which usually include such items as sleeves, seats and packing shall be suitable for the service and as agreed upon between the SUPPLIER and KTI Poland. Temperature limitations shall be marked on the nameplates.
- 2.3.9 Butterfly valves shall be of such a design to allow the disc to open inside on the connecting flanges.
- 2.3.10 For ball valves, unless otherwise specified, bore shall be standard (reduced bore).
- 2.3.11 All welded attachments to valves shall be considered as a part of the valve assembly and shall be subject to all applicable design, fabrication, material, examination, inspection, and testing requirements.
- 2.3.12 Flange facing finish on flanged valves shall adhere to requirements as set forth in ASME B16.5, unless otherwise specified.
- 2.3.13 Flanged Ends shall be cast or forged integrally with the valve body.
- 2.3.14 End and bonnet flanges shall be cast or forged integrally with the valve body. Conversion of butt weld end design (API 600, ASME B16.34) to flanged end design by welding on flanges is not permitted without written acceptance by Purchaser.
- 2.3.15 Globe valves and check valves specified to API 600 mean that the valve shall meet all the applicable requirements.
- 2.3.16 All valves and valve operators shall be designed for outdoor installation. Stuffing boxes and gearboxes shall be designed against ingress of water and dust.
- 2.3.17 All valves, as required, shall be provided with adequate lifting lugs/eyes to facilitate installing in both vertical and horizontal direction, suitably distributed around the center of gravity, to ensure a stable safe lifting operation.
- 2.3.18 Unless otherwise specified, Flanged End connections shall be in accordance with the following standards:
- ✓ Flanges 24" and smaller shall conform dimensionally to ASME B16.5
 - ✓ Flanges 26" and larger shall conform dimensionally to ASME B16.47 Series B.
- 2.3.19 Butterfly Lug-type valves shall be delivered with full length threaded bolt holes. Where recessed tapped holes are necessary because the body design does not allow through bolting, SUPPLIER shall include, in his quotations, the required bolting. This data shall also be shown on SUPPLIER's drawings.

- 2.3.20 Socket Weld Ends shall be in accordance with ASME B16.11:
- 2.3.21 Ends of threaded valves shall be FNPT and tapped in accordance with ASME B1.20.1 and B16.11.
- 2.3.22 The operating levers or handles on ball valves shall indicate, by their position, whether the valve is open or closed. The open position shall be indicated when the lever or handle points in a direction parallel to the flow through the valve. In addition, it shall be impossible to reverse the indicating position inadvertently during re-assembly of the valve.
- 2.3.23 Lever operated valves shall be capable of being locked with padlocks in the full open and full closed positions.
- 2.3.24 Lever operated valve are to be fitted with stops at the full open and full closed positions to prevent the ball from moving through more than 90 degrees. These stops shall be in the form of raised bosses, integrally cast or forged with the valve, or welded to the valve body. Removable stops and/or spring loaded pins which drop into holes at the open or closed positions are not permitted.
- 2.3.25 Lever in butterfly valves shall be equipped with provisions to prevent movement of the disc from the desired set position during normal operating conditions. Normal operating conditions include throttling services.
- 2.3.26 The ball valves shall be capable of withstanding the maximum differential pressure, in either flow direction, as per the appropriate class.
- 2.3.27 An integral ball/stem design for floating ball design is not acceptable.
- 2.3.28 Ball valves shall have adequate provision for body cavity pressure relief. Trunnion mounted ball valves shall have self-relieving seats unless otherwise indicated. Floating ball valves shall have pressure relief through the soft seats when specifically designed for this feature.
- 2.3.29 Ball valves specified as "Reduced Bore" shall be of "Single Reduced Bore" style.
- 2.3.30 Ball valves shall be fire safe and anti-static design:
- ✓ Three piece body valves using external connector bolting are not permitted.
 - ✓ "O-ring" body gasket cannot be used without addition a second fire resistant gasket.
 - ✓ Valves shall incorporate an anti-static feature that ensure electrical continuity between stem and body of valve 2" and smaller, or between ball, stem and body of larger valves.
- 2.3.31 Valves with butt weld ends shall have their ends bored to suit the pipe wall thickness stated on the Valve Purchase Description and prepared in accordance with ASME B16.34 and ASME B16.25. Ends shall be internally machined to match if required. Internal machining to match the pipe wall thickness stated on the Valve Purchase

Description shall be done in the welded on pup-piece and not in the cast steel valve body.

- 2.3.32 Valves with welding ends shall be designed so welding and Post Weld Heat Treatment (PWHT) of the valve in line can be done without removing internals and without causing damage to valve internals.
- 2.3.33 Gate / Globe Valves shall be Rising Stem type, unless otherwise specified.
- 2.3.34 All valve handwheels, including those on gear operators, shall be permanently marked "open" or "close" with an arrow indicating the direction of rotation.
- 2.3.35 Manually operated valves shall not require a force exceeding 360 N on the hand wheel or lever (wrench) to operate the valve.
- 2.3.36 The operating levers or handles on butterfly valves shall indicate, by their position, whether the valve is open or closed. The open position shall be indicated when the lever or handle points in a direction parallel to the flow through the valve. In addition, it shall be impossible to reverse the indicating position inadvertently during re-assembly of the valve.
- 2.3.37 Hand-wheel diameter shall not exceed the face-to-face or end-to-end length of the valve or 1000 mm whichever is smaller, unless otherwise agreed. Length of wrenches shall not exceed twice the face-to-face length of the relevant valves.
- 2.3.38 Gate / Globe valves shall normally be actuated by gear operator for the below sizes, unless otherwise specified:
- ✓ gate valves (class 150) – 14" and above,
 - ✓ gate valves (class 300) – 12" and above,
 - ✓ gate valves (class 600) – 10" and above,
 - ✓ globe valves (class 150) – 14" and above,
 - ✓ globe valves (class 300) – 12" and above,
 - ✓ globe valves (class 600) – 6" and above.
- Gear to valve assembly shall conform to ISO 5210.
- 2.3.39 Ball valves and Butterfly valves shall normally be actuated by gear operator for the below sizes, unless otherwise specified:
- ✓ class 150 - 10" and above,
 - ✓ class 300 - 6" and above,
- Gear to valve assembly shall conform to ISO 5211.
- 2.3.40 Gear operators shall be capable of rotate 90°.
- 2.3.41 Gear operators shall be supplied complete with handwheel and position indicator.

- 2.3.42 Gear operators for butterfly valves shall be of a design and so installed that normal valve operation is not impaired and there is no possibility of turning the disc, past the 90 degrees full open or full closed position.
- 2.3.43 Gear operated valves shall be provided with an enclosed weather proof gear operator that shall include protective closures for rising stems and a hand-wheel that is self-locking in any position.
- 2.3.44 Gear operators shall be fitted with easily accessible grease fitting to enable the lubricant to be renewed while the valve is in service. The SUPPLIER's data book shall include the name and type of lubricant used.
- 2.3.45 Gearboxes shall be bevel or worm gear style.
- 2.3.46 Gear operators shall be of a design and so installed that normal valve operation is not impaired.
- 2.3.47 Gear boxes directly mounted on the stem stuffing-box shall be provided with an atmospheric air vent to prevent pressure built up in the gearbox housing due to stem leakage. Atmospheric vent shall be designed to prevent ingress of water and dirt.
- 2.3.48 Valves requiring auxiliary connections or taps shall be bossed, if required, and drilled, and plugged in accordance with ASME B16.34. Valves shall not be tapped unless specified on the Requisition.
- 2.3.49 All threaded openings shall be plugged with solid, round, or square head plugs of wrought material having the same nominal composition as the body. Plugs shall not be made from cast material.
- 2.3.50 Valve stems/shafts shall be blow-out proof. "Blow-out proof" shall mean that no portion of the stem or shaft can be ejected from the valve due to internal pressure from the following causes:
- ✓ failure of the stem, shaft, stem-to-disc attachment, shaft-to-disc attachment or stem-to-ball attachment;
 - ✓ removal of the stem nut from the yoke;
 - ✓ removal of the packing gland;
 - ✓ removal of the handle.
- Valve stems shall be designed such that the weakest link is outside of the pressure boundary.
- 2.3.51 Where "Extended Stem" is specified, the stem extension length is the distance between the center line of the valve and the center line of the hand wheel or lever.
- 2.3.52 For Extended Stem & Underground services specified valves, the stem & external protection pipe shall be provided with gaskets at the connection points to prevent ingress of water and dirt in the protection pipe.

- 2.3.53 All globe valves shall be permanently marked with a flow arrow indicating the direction of flow. Arrows shall preferably be cast or forged in the valve body (Low stress stamping shall not affect the pressure rating).
- 2.3.54 Gate and globe valves shall be OS&Y unless otherwise specified.
- 2.3.55 Swing check valves and Dual plate check valves shall have retainer-less design, unless otherwise specified.
- 2.3.56 Replaceable valve seats shall provide complete tightness inside the body without requiring sealing compound or gaskets.
- 2.3.57 Valves that for safety reasons must be secured in the open or closed position (Lockout/Tagout) should be adapted to the **LOTO** system.
- 2.3.58 The valves will be work in Explosion Hazard Zones.
At least required declaration that valves can work in Explosion Hazard Zone and their construction do not have own source of ignition.
- 2.3.59 Body material
- ✓ Free machining steel shall not be used.
 - ✓ Unless otherwise specified, all austenitic stainless steel materials (300 series) shall be furnished in a solution annealed condition. Repairs, if any, shall be made prior to solution annealing.
 - ✓ Casting material (5Cr-1/2Mo) shall be normalized and tempered.
- 2.3.60 Trim material
- ✓ Material of trim is specified in Material Request Summary.
 - ✓ Copper and copper alloys with copper content greater than 60% shall not be permitted for all valves specified with Monel trim.
- 2.3.61 Stem Packing material
- ✓ Unless otherwise specified, valve stem packing shall be flexible graphite with braided graphite filament end rings in accordance with the Manufacturer's Standard. Graphite material shall be chloride free, i.e. leachable chloride shall be less than 100 ppm. Graphite packing material shall contain a corrosion inhibitor.
 - ✓ Design and material selection for stem packing shall be selected to meet fugitive emissions in compliance with local environmental regulations.
 - ✓ Graphite material used shall be suitable for service temperatures between minus 29 °C and 538 °C, unless otherwise specified.

- ✓ TFE, PTFE, RPTFE based material used shall be suitable for service temperatures between minus 29 °C and 204 °C.

2.3.62 Bonnet and Cover Gaskets material

- ✓ Bonnet gaskets shall be Manufacturer's Standard (non-asbestos), unless otherwise specified.
- ✓ Metallic and nonmetallic bonnet and cover gaskets shall have corrosion resistance equal, at least, to that of the body and bonnet material.
- ✓ Unless otherwise specified, the bonnet and cover gaskets shall be suitable for the following temperatures:
 - Solid metal: same temperature rating as body and bonnet materials.
 - Spiral wound metal with filler: same temperature as body and bonnet materials.
 - TFE, PTFE, RPTFE based material used shall be suitable for service temperatures between minus 29 °C and 204 °C.
- ✓ Sealing surface of pressure seal gaskets for carbon and low alloy steel valves shall be coated to prevent corrosion and subsequent leakage.

2.3.63 Bonnet, Cap and Body Bolting material

- ✓ Bolting shall be in accordance with the standard to which the valve is manufactured, unless otherwise specified.
- ✓ In maintenance manual, Manufacturer shall indicate the torque data for bolt-up the body bonnet-assembly.

2.3.64 Carbon and Stainless Steel Valves shall be suitable for a maximum continuous operating temperature of 425 °C.

2.3.65 Low Alloy Steel Valves (5Cr-1/2Mo) shall be suitable for a maximum continuous operating temperature of 538 °C.

2.3.66 Supplier shall furnish special tools and appurtenance necessary for the installation, maintenance and/or operation of valves covered by the specification, if any.

3. INSPECTION AND TESTING

3.1 General Requirements

- 3.1.1 All valves prepared for KTI POLAND 's inspection shall have passed a preliminary inspection made by the Manufacturer's Quality Control.
- 3.1.2 The Supplier shall provide Certificates as evidence for all examination, inspection and testing.
- 3.1.3 Examination, testing, inspection and acceptance criteria shall be in accordance with ASME B31.3, and other codes and standards referred to in the requisition.
- 3.1.4 Each valve shall be given both an in-process and final inspection by the Manufacturer.
- 3.1.5 All shop drawings of valves requiring inspection shall be available to the Purchaser's inspector at the time of the inspection. Surfaces shall not be painted nor the valve shipped until the inspection is complete.
- 3.1.6 The following inspection documents shall be supplied according to EN 10204:
 - ✓ Material certificates:
 - 3.1 – for body and bonnet and for stem 2" and above and for bolting of diameter 2" and above
 - 2.2 – for all other metallic part in contact with fluid and for stem lower than 2" and bolting of diameter lower than 2"
 - 2.1 – for all other parts
 - ✓ Test certificates
 - 3.1 – pressure tests and non-destructive tests
 - 2.1 – functional test

3.2 Material Inspection

- 3.2.1 Chemical and mechanical characteristics, hydraulic tests and recorder diagrams of heat treatment, if any, shall be according to those provided in the relevant Codes, Standards and/or Specifications.
- 3.2.2 The KTI POLAND Inspectors has the right to carry out any check test in order to verify the certified values in any case of doubt or dispute concerning the results obtained.
- 3.2.3 Should the results not be according to specification, test costs shall be at vendor's charge.
- 3.2.4 PMI test: Positive material identification test to be performed at vendor's works on pressure containing parts i.e. body & bonnet / cover of alloy steel, stainless steel valves. However for stainless steel valves PMI test is to be performed on stem also. The extent of PMI examination will be 100%.

3.3 Dimensional Inspection

- 3.3.1 Tolerances in dimensions shall be according to the relevant Codes, Standards and Specifications.

3.4 Pressure Testing

- 3.4.1 As a minimum, all valves shall be pressure tested in accordance with API Standard 598, unless otherwise specified in the standard to which they are manufactured.
- 3.4.2 Prior to pressure testing, all internal valve components shall be cleaned. External surfaces shall be unpainted and free of scale, weld spatter and other foreign matter.
- 3.4.3 Valves shall be operated (open/close) several times before to pass the required closure tests.
- 3.4.4 Each valve shall be subjected to a shell pressure test.
- 3.4.5 Resilient seated valves shall show no leakage during the low pressure seat test.
- 3.4.6 Pressure testing shall not be conducted through a connection in the bonnet of the valve.
- 3.4.7 The type or style of valve stem packing (or seals) used during pressure testing shall be the same as that specified to be supplied with the valve.
- 3.4.8 New gaskets shall be installed in valve bonnets and covers that were opened for any reason during the course of testing.
- 3.4.9 Any valve gland packing or stem seal that leaked during testing shall be replaced with new material following thorough drying of the gland and packing cavity. Shell and seat hydrostatic testing shall be repeated for these valves.
- 3.4.10 The test fluid used for hydrostatic testing shall be an emulsion of water with a water soluble oil to prevent rust. The chloride content of the test fluid shall not exceed 50 ppm weight. The chloride content shall not exceed 30 ppm for stainless steel valves, but shall not exceed 5 ppm when component to be tested is a stainless steel for which drying operation cannot be properly secured.
- 3.4.11 No mechanical operation shall be carried out after test execution, unless to re-test the valves.
- 3.4.12 After testing, all components specially valve body cavities, are to be thoroughly dried prior to preparation for packing and shipping.

3.5 Impact Testing

- 3.5.1 Tests for all wall thickness shall be according to the specification for the concerned material and PED 2014/68/EU Annex 1 Para 7.5 . Impact tests may be executed on specially made test pieces from the same heat/batch, which are simultaneously subjected to the same heat treatment as the base material.

The test temperature is – 29 °C, and the minimum average impact energy shall be minimum 27J rupture energy (for standard size specimens 10 mm x 10 mm) for each kind of material.

- 3.5.2 All materials used for the manufacture of pressure equipment shall be supplied with their relevant certification (EN 10204 3.1, 3.2) affirming compliance with a specification as indicated in the Pressure Equipment Directive 2014/68/EU, Annex I article 4.1, 4.2, 4.3 and 7.5, taking into account a minimum design temperature of minus 29°C.

This temperature shall be confirmed in writing by Supplier and stated onto the valve's drawings in case of order award. If required by Supplier's Notified Body, any Impact Test must be included in Supplier's offer and test details shall be given (i.e. test temperature, minimum energy values, etc.)

- 3.5.3 All the valves shall be considered belonging to the category III.

The SUPPLIER shall indicate in the bid the module selected for the Conformity Assessment Procedure and the Notify Body involved in this.

- 3.5.4 In case that manufacturer has Certificate of Conformity in compliance with PED 2014/68/EU (annex I, article 4.1, 4.2, 4.3, 7.5) for delivered goods, he is required to declare following text:

“Valves are suitable to use for temperature of minus 29°C”

- 3.5.5 In case that manufacturer doesn't have Certificate of Conformity in compliance with PED 2014/68/EU (annex I, article 4.1, 4.2, 4.3, 7.5) for delivered goods, he is required to declare result of Impact tests at temperature of -29°C (min. 27J rupture energy for standard size specimens 10 mm x 10 mm) for each kind of material.

3.6 Casting Quality

- 3.6.1 When cast steel valves are supplied, the purchaser wishes to secure steel casting quality to avoid late rejection of numerous castings, damaged castings during hydrotesting, or plant start-up and subsequent delivery delays, the Supplier's Quotation shall include following information:

- ✓ Listing of qualified foundries being proposed for all valves within Supplier's Scope.
- ✓ Supplier foundry Qualification Procedure and latest foundry Shop Survey Report.
- ✓ QC documents, which guarantee that every prototype, pilot or sample casting of each foundry has been 100% radiographed per pattern/material and meets the ASME 16.34, Appendix I, Acceptance Criteria.
- ✓ QC documents which guarantees that each foundry executes random (minimum 1 every year / hundred pieces) in-house radiographic examinations on volumetric defects for each pattern/material as per ASME 16.34, Appendix I.

- 3.6.2 In case no proof can be submitted regarding random radiographic in-house production checks for volumetric defects as per ASME 16.34, Appendix I:

Per foundry production, inspection lots shall be defined to be radiographed. The valve manufacturer shall submit his inspection lot proposal. Depending on the foundry experience this shall be 1% considering the total amount of valves and all casting variables as size, rating, material and valve type. All these radiographs shall meet the acceptance criteria of ASME 16.34, Appendix I.

3.7 Radiographic, PT, MT Examination

- 3.7.1 The extent of the radiographic examination and the criteria of acceptance for welded pressure seams shall be according to the requirements of codes mentioned in the material requisition and ANSI B31.3. The more restrictive shall prevail.

- 3.7.2 Butt welded pressure seams on welded constructions and butt weld end cast valves (all rating) shall be 100% RX.

- 3.7.3 When nipples welded on socket ends are required, 100% PT or MT shall be performed.

- 3.7.4 Body, bonnet/cover of cast steel valves in “hydrogen service” shall be radiographic examined for volumetric defects as per ASME 16.34, Appendix I.

Per foundry production, inspection lots shall be defined to be radiographed. The valve manufacturer shall submit his inspection lot proposal. Depending on the foundry

experience this shall be 5% considering the total amount of valves and all casting variables as heat number, size, rating and valve type.

- 3.7.5 Hard facing by weld deposit: PT examination may be required by the KTI POLAND Inspector.

3.8 Additional Requirements due to Services

3.8.1 Caustic Service

- ✓ The geometry of the valve internals shall be designed such that crevices and stagnant zones are avoided.
- ✓ Material selection for wetted parts shall be suitable for caustic.
- ✓ Valves shall not be provided with welds. If valves of welded construction are offered the welds shall be stress relieved before final machining and assembly of the valve.
- ✓ Metal seats shall be integral or welded-in. Threaded seats are not acceptable.
- ✓ Valves shall not have soft iron bonnet gaskets.
- ✓ Copper and copper bearing alloys used in the manufacture of these valves shall not be permitted in contact with the flowing medium.
- ✓ Valves shall be supplied with Bonnet Safety Shields.

3.8.2 Hydrogen Service

- ✓ Valves specified for use in hydrogen service have metallurgy in compliance with API 941.
- ✓ The geometry of the valve internals shall be designed such, that crevices and stagnant zones are avoided.
- ✓ Metal seats shall be integral or welded-in. Threaded seats are not acceptable.
- ✓ Graphite type valve packing and bonnet gasket shall be designed for the (Hydrogen Service) application and shall provide leak tightness for hydrogen service.
- ✓ After hydrotesting all water shall be completely removed and valve bodies shall be dried until all traces of water have been removed.
- ✓ Pressure containing parts (e.g. body, bonnet/cover) of cast steel valves shall be radiographic examined for volumetric defects as per ASME 16.34 , Appendix I, in accordance with the requirements of para.9.3.

3.8.3 Sour Service (NACE)

- ✓ The requirements of NACE MR0103 and MR0175 / ISO 15156 shall be met when Sour Service is specified. All components shall be hardness tested.

3.8.4 Fire Water A/G (Above Ground) Service

- ✓ Fire Water A/G Service specified valves shall be UL/FM approved.

3.8.5 Potable Water Service

- ✓ Valves shall be suitable for potable water. Material shall meet local requirements for potable water - All valves for potable water shall have National Institute of Public Health-National Institute of Hygiene (PZH) certificate or equivalent.

4. PERMISSIBLE SUBSTITUTIONS

As a rule, alternative materials to those specified in the requisition are not acceptable; if any, vendor shall give evidence by writing of such substitutions in advance to obtain prior KTI POLAND's approval.

5. DOCUMENTATION

Supplier of valves will deliver at least following documentation:

- ✓ User manual.
- ✓ Instruction of maintenance, assembly and exploitation.
- ✓ Technical passport.

Documentation will be provided in paper version (3 pcs) and electronic version, in editable PDF format.