



شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴	SPECIFICATION FOR ON OFF /SHUTDOWN VALVES (ESD/MOV)							شماره صفحه: ۱ از ۳۲	
	نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری		پروژه
	D03	0006	SP	IN	000	PEDCO	GNRAL		BK



IDC: Inter-Discipline Check
IFC: Issued For Comment
IFA: Issued For Approval
AFD: Approved For Design
AFC: Approved For Construction
AFP: Approved For Purchase
AFQ: Approved For Quotation
IFI: Issued For Information
AB-R: As-Built for CLIENT Review
AB-A: As-Built –Approved

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک																									
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1.0 INTRODUCTION

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.



GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields Company (NISOC)
PROJECT:	Binak Oilfield Development – General Facilities
EPD/EPC CONTRACTOR(GC):	Petro Iran Development Company (PEDCO)
EPC CONTRACTOR:	Joint Venture of : Hirgan Energy – Design & Inspection(D&I) Companies
VENDOR:	The firm or person who will fabricate the equipment or material.
EXECUTOR:	Executor is the party which carries out all or part of construction and/or commissioning for the project.
THIRD PARTY INSPECTOR (TPI):	The firm appointed by EPD/EPC CONTRACTOR(GC) and approved by CLIENT (in writing) for the inspection of goods.
SHALL:	Is used where a provision is mandatory.
SHOULD:	Is used where a provision is advisory only.
WILL:	Is normally used in connection with the action by CLIENT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR.
MAY:	Is used where a provision is completely discretionary.

2.0 SCOPE

The purpose of this specification is to define the main requirements for the design, manufacturing, testing and documentation of On-Off valves (ESDV/MOV) of Binak oilfield (Compressor station/ Extension of manifold and Gas-condensate Pipeline as project work packages). Any deviation from the present specification at any stage of the project shall be subject to CONTRACTOR for approval.

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3.0 NORMATIVE REFERENCES

3.1 LOCAL CODES AND STANDARDS

- IPS-E-IN-100 Engineering Standard for General Instrumentation
- IPS-E-IN-160 Engineering Standard for Control Valves
- IPS-C-IN-100 Construction and Installation. Standard for. General. Instruments Field Inspection, Calibration & Testing of. Instrument and Instrument system
- IPS-C-IN-160 Construction and Installation Standard for Control Valves
- IPS-M-IN-100 Material Standard for Control Valves
- IPS-M-IN-160 Material Standard for Control Valves
- IPS-M-IN-280 Material Standard for Miscellaneous items
- IPS-M-PI-110 Material and equipment standard for valves
- IPS-G-IN-160 Petroleum industry-Safety valves,control valves and peripherals
- IPS-G-IN-200 General Standard for Instrument Air System
- IPS-G-IN-210 General Standard for Instrument Protection
- IPS-E-GN-100 Engineering Standard for Units
- IPS-I-IN-100 Inspection Standard for General Instrument Systems
- IPS-I-IN-115 Periodical Inspection Standard for Instrumentation
- IPS-E-PR-830 Engineering Standard for Process Design of Valves. & Control Valves

3.2 INTERNATIONAL CODES AND STANDARDS

- American National Standards Institute (ANSI)
 - ANSI B16.5 Flanged connections
 - ANSI B16.34 Valves-flanged and butt welding
 - ANSI FCI 70-2 B16.104 Valve Seat Leakage Class
 - ANSI B31.3 Code for pressure piping
- American Petroleum Institute (API)
 - API 6D Pipeline valves
 - API 6F Fire test for valves
 - API 607 Fire test for soft seated quarter turn valves

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API 521

Guide for pressure relief and depressuring system

- International Electrical Commission (IEC)

IEC 60529	Ingress protection for electrical apparatus
IEC-60079-0	Explosive atmospheres
IEC-60079-1	Construction and test; flameproof enclosure of electric apparatus
IEC-60079-8	Classification of maximum surface temperature
IEC-60079-10	Classification of hazardous areas
IEC-61000-4-3	EMI and RFI immunity
IEC-60364	Earthing arrangement

- American Society of Mechanical Engineers (ASME)

ASME SECT.II	Welding rods and electrodes
ASME SECT.VIII	Radiographic examination
ASME SECT.IX	Welding and brazing qualification
ASTM A435	Ultrasonic testing
ASTM 1457	Specification for PTFE moulding and extrusion materials

- International Society of Automation (ISA)

ISA S7.3	Quality Standard for Instrument Air
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- National Association of Corrosion Engineers (NACE)

NACE MR-01.75	Sulfide stress cracking resistance metallic materials for oilfield equipment
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Note: Calculations shall be performed according to:



- Standard method of Vendors for torque evaluation
- ASME Section 8 Division 1 (for pneumatic air tank)

Vendor shall state the additional Codes and Standards if necessary. The latest published issue or amendment shall apply unless otherwise stated.

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3.3 THE REFERENCE DOCUMENTS

Process Basis of Design	BK-GENRL-PEDCO-000-PR-BD-0001
Specification For Instrumentation	BK- GENRL-PEDCO-000-IN-SP-0001
Spec. For Hazardous Area Classification	BK- GENRL-PEDCO-000-SA-SP-0002
Piping & Pipeline Material Specification	BK- GENRL-PEDCO-000-PL-SP-0001
Instrument & Control System Design Criteria	BK-SSGRL-PEDCO-110-IN-DC-0002
Instrument & Control System Design Criteria	BK-PPL-PEDCO-320-IN-DC-0002
Instrument & Control System Design Criteria	BK-GCS-PEDCO-120-IN-DC-0002
Symbol & Legend For PFD and P&ID	BK-SSGRL-PEDCO-110-PR-PI-0001
P&ID - W018S	BK-W018S-PEDCO-110-PR-PI-0001
P&ID - W028	BK-W028-PEDCO-110-PR-PI-0001
P&ID - W0046S	BK-W046S-PEDCO-110-PR-PI-0001
P&ID for Diesel Oil Drum- W0046S	BK-W046S-PEDCO-110-PR-PI-0002
P&ID for Potable Water Tank - W0046S	BK-W046S-PEDCO-110-PR-PI-0003
P&ID - W035	BK-W035-PEDCO-110-PR-PI-0001
P&ID - W008N	BK-W008N-PEDCO-110-PR-PI-0001
P&ID - Extension of Binak B/C Manifold	BK-W007S-PEDCO-110-PR-PI-0001
P&ID - W007S	BK-W007S-PEDCO-110-PR-PI-0002
P&ID for Diesel Oil Drum- W007S	BK-W007S-PEDCO-110-PR-PI-0003
P&ID for Potable Water Tank - W007S	BK-W007S-PEDCO-110-PR-PI-0004
P&ID for Diesel Oil Drum- BK14	BK-BK14-PEDCO-110-PR-PI-0001
P&ID for Potable Water Tank - BK14	BK-BK14-PEDCO-110-PR-PI-0002
P&ID for Diesel Oil Drum- BK12	BK-BK12-PEDCO-110-PR-PI-0001
P&ID for Potable Water Tank - BK12	BK-BK12-PEDCO-110-PR-PI-0002
P&ID for Diesel Oil Drum- BK15	BK-BK15-PEDCO-110-PR-PI-0001
P&ID for Potable Water Tank - BK15	BK-BK15-PEDCO-110-PR-PI-0002
P&ID for Diesel Oil Drum- BK05	BK-BK05-PEDCO-110-PR-PI-0001
P&ID for Potable Water Tank - BK05	BK-BK05-PEDCO-110-PR-PI-0002
Symbol & Legend For PFD and P&ID	BK-PPL-PEDCO-320-PR-PI-0003
P&ID - Gas Pipeline (to Siahmakan G.I. Station)	BK-PPL-PEDCO-320-PR-PI-0001
P&ID - Condensate Pipeline (to Binak PU)	BK-PPL-PEDCO-320-PR-PI-0002
Symbol & Legend For PFD and P&ID	BK-GCS-PEDCO-120-PR-PI-0001
P&ID- Gas Compression Inlet Gas Pipeline (Binak)	BK-GCS-PEDCO-120-PR-PI-0002
P&ID- Gas Compression Inlet Gas Pipeline (Golkhari)	BK-GCS-PEDCO-120-PR-PI-0003
P&ID - Slug Catcher System	BK-GCS-PEDCO-120-PR-PI-0004
P&ID - Gas Compression Inlet Knock Out Drum	BK-GCS-PEDCO-120-PR-PI-0005
P&ID - 1st Stage Gas Compression Suction Drums	BK-GCS-PEDCO-120-PR-PI-0006
P&ID - 1st Stage Gas Compression Compressors	BK-GCS-PEDCO-120-PR-PI-0007
P&ID - 1st Stage Gas Compression Air Coolers	BK-GCS-PEDCO-120-PR-PI-0008
P&ID - 2nd Stage Gas Compression Suction	BK-GCS-PEDCO-120-PR-PI-0009

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Drums	
P&ID - 2nd Stage Gas Compression Compressors	BK-GCS-PEDCO-120-PR-PI-0010
P&ID - 2nd Stage Gas Compression Air Coolers	BK-GCS-PEDCO-120-PR-PI-0011
P&ID - 2nd Stage Gas Compression Discharge Drum	BK-GCS-PEDCO-120-PR-PI-0012
P&ID - Gas Compression Dehydration Package	BK-GCS-PEDCO-120-PR-PI-0013
P&ID - Lean Glycol Storage Tank	BK-GCS-PEDCO-120-PR-PI-0014
P&ID - Instrument & Plant Air System	BK-GCS-PEDCO-120-PR-PI-0015
P&ID - Nitrogen Generation System	BK-GCS-PEDCO-120-PR-PI-0016
P&ID - Close Drain System	BK-GCS-PEDCO-120-PR-PI-0017
P&ID - Corrosion Inhibitor Package	BK-GCS-PEDCO-120-PR-PI-0018
P&ID - Methanol Injection Package	BK-GCS-PEDCO-120-PR-PI-0019
P&ID - LP Flare System	BK-GCS-PEDCO-120-PR-PI-0020
P&ID - Oily Water Sewer	BK-GCS-PEDCO-120-PR-PI-0021
P&ID - Fuel Gas System	BK-GCS-PEDCO-120-PR-PI-0022
P&ID - Diesel Oil System	BK-GCS-PEDCO-120-PR-PI-0023
P&ID - Potable Water System	BK-GCS-PEDCO-120-PR-PI-0024
P&ID - Glycol Sump Drum	BK-GCS-PEDCO-120-PR-PI-0025
Technical Spec. for Safety/Relief Valves	151-GEN-000-IN-DOC-0005-B2




All process data such as pressure, temperature, flow,.. shall be considered as per process reference documents.

3.4 ENVIRONMENTAL DATA

Refer to "Process Basis of Design; Doc. No.BK-GNRAL-PEDCO-000-PR-BD-0001.

4.0 ABBREVIATIONS

- BDV: Blow Down Valve
- ESD: Emergency shut down
- ESDV: Emergency Shut Down Valve
- FAT: Factory Acceptance Test
- GOV: Gas Operated Valve
- MOV: Motor Operated Valve
- SDV: Shutdown Valve
- SOV: Solenoid Valve
- UPS: Uninterruptible Power Supply
- XV: Process actuated on/off valve

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
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5.0 USE OF LANGUAGE

Throughout this specification, the words "will", "may", "should" and "shall" when used, have meaning as follows:

- "will" is used normally in conjunction with a request from CONTRACTOR;
- "may" is used where alternatives are equally acceptable;
- "shall" is used where a provision is mandatory;
- "should" is used where a solution is preferred

6.0 VENDOR RESPONSIBILITY

VENDOR shall be responsible for the correct design and operation of all the provided equipment, the quality of all materials and workmanship, and in compliance with these specifications. Approval of the test by CONTRACTOR SHALL not relieve the VENDOR of responsibility for conforming with the provisions of this specification when the equipment is installed.

6.1 VENDOR'S COMPLIANCE

Vendor shall submit his bid(s) in full compliance with the requirements of the MR and relevant attachments.

Any exceptions or deviations to/from the MR SHALL be clearly stated and quoted in an optional part of the bid, as an alternative.

If no exceptions are specified, CONTRACTOR will intend that the bid is completely in accordance with the MR and relevant documents.

Vendor shall quote separately and comparatively, the alternatives requested in MR by contractor.


VENDOR is requested to include in his proposal the enclosed form "VENDOR'S CERTIFICATE" duly filled in & signed.

Compliance with this requisition in any instance SHALL not relieve the VENDOR of his responsibility to meet the specified conditions.

VENDOR SHALL include in the bid copies of technical forms that will allow, through the proposed model number, a check of technical characteristics of the instruments including the spare parts.

6.2 DATA SHEETS

It is mandatory that project required specification, specified by contractor on project documents, shall be confirmed /filled by the bidders and attached to the bids.

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Bids without CONTRACTOR's required specifications, properly completed/ confirmed by vendor, will be considered technically incomplete and therefore, technically unacceptable.

7.0 GENERAL REQUIREMENTS

7.1 HAZARDOUS AREA CLASSIFICATION

The field electrical equipment, materials and installation methods to be installed in hazardous area shall be suitable for operation in the stated hazardous area zone to IEC 60079-10 as stated in the project documentation. All instrumentation equipment, materials, installation methods and accessories shall comply and fully satisfy the statutory requirements for the area classification identified on the "Hazardous Area Classification".

All analog field instruments for hazardous area installation shall be intrinsically safe, I.S. intrinsically safe protection shall be achieved by means of galvanic separation barriers.

The digital instruments for classified area installation shall be explosion proof type Ex(d).

Devices subject to this specification shall be designed for plant life of at least 20 years.

7.2 ELECTRICAL CERTIFICATION

All electrical apparatus shall be certified to CENELEC for European countries or by the recognized authority in the manufacturer country, i.e.:



PTB	for Germany
BASFEAA	for England
LCIE	for France
CSA	for Canada
INIEX	for Belgium
F.M.	for USA
U.L.	for USA
J.I.S	for Japan
JIS	shall only be accepted subject to CLIENT approval.

7.3 ELECTRICAL HOUSING

All instruments shall be suitable to meet the specified climatic conditions. Instrument enclosures shall be dust-proof and water proof, mechanical protection degree IP-65 minimum to IEC 60529.

Instruments shall have metal housing.

All electrical or electronic equipment shall be supplied by threaded electrical connection ISO M20x1.5.

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7.4 RADIO INTERFERENCE

The instrumentation equipment shall be immune to interference from hand-held radio transceivers in the immediate vicinity with signal strength of up to 30 V/m over the range 20 to 1000 MHz and shall not affect the operation of other equipment.

7.5 ELECTRICAL SUPPLIES

Available electrical power supplies shall be:

- 24 VDC power supply (through command signal)
- 400 VAC, 3 phase power supply(for MOVs, if any)

Where DC power supplies are derived from the above AC power supply by the Vendor, an earth fault monitoring device shall be provided. Earth fault alarm shall be reported to the process control system.

Where Vendor requires a different supply, then the Vendor shall provide all necessary equipment, power supplies, AC/DC distribution and protection, fuses, circuit breakers, earth leakage detection and terminal to interface his equipment with the project electrical distribution equipment.

Battery backup, if necessary to ensure safe running shall be included by Vendor's scope.

8.0 NAME AND TAG PLATES

All name and tag plates shall be designed and supplied by the Vendor.

The plates for indoor or outdoor equipment shall be provided as listed below:

- Plates shall be plastic type with a glossy black laminated surface and opaque white base. Outdoor equipment shall have engraved type, corrosive resistance, stainless steel plate.
- Plates shall be securely fixed at both ends with stainless steel screws.
- Plate's size, characters and character format shall be submitted for CLIENT review and approval.
- English lettering shall be used.

Vendor's mark and name plate shall also be required for each equipment interface console, cabinet and rack containing manufacturer's name, manufacturing date and production number. Material and format shall be the same as other nameplates discussed above.

8.1 ACTUATOR NAMEPLATES

Actuator for each valve shall be furnished with a stainless steel name plate containing the following:

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- Valve tag number
- Vendor's name, model number and serial number
- Maximum working pressure (barg)
- Test pressure (barg)
- Type of hydraulic oil (as applicable)
- Hydraulic oil capacity (as applicable)
- Hazardous area certification
- Power, voltage/pressure and signal range as appropriate

8.2 VALVE NAMEPLATE

Each valve shall have a stainless steel name plate containing the following:

- Valve tag name
- Vendor's name, model number and serial number
- Body and port size
- Body and trim materials
- NACE as required
- Body rating

8.3 HAND WHEEL



Manual handwheel operators should be supplied only on specific request by the project data sheet, or where bypass facilities are not installed. however, no by-pass shall be provided for safety shut-off valves, depressurizing valves, and on some applications where solids suspended in the stream might collect and block the by-pass valve Side-mounted, lockable, screw or gear drive manual operators, continuously connected and operable through an integral declutching mechanism, are preferred.

Handwheels can be supplied with most types of valves. They provide the operator with the means to override the control system and to operate the valve manually. Various designs are available, including those that can stroke the valve in either direction and those that stroke the valve in one direction, relying on the valve spring for the return stroke. Some handwheels are continuously connected. Others use a clutch, pin, or other means of engagement, and must be disengaged when not in use or damage may result.

Clearance also shall be provided for hand wheel operation and maintenance.

8.4 SEAT LEAKAGE CLASSIFICATIONS

Seat Leakage Classifications shall be considered as per ANSI FCI 70-2 B16.104. Valves should be designed as per specific leakage class in project data sheet.

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8.5 UNITS OF MEASUREMENT

Engineering units shall be generally based on the International System (SI). Specifically, the following units of measurement shall be used:

- Dimension mm (inch)
- Mass flow kg/hr
- Volumetric flow m³/hr
- Pressure bar, mbar, mmH₂O
- Viscosity cP
- Temperature °C

9.0 VALVES TECHNICAL SPECIFICATION

9.1 ESD VALVES (ESDV)

9.1.1 GENERAL

ESD valves are used to isolate sections of the facilities, one from another, under emergency conditions. These valves are used for isolation potentially hazardous flows of process fluids from one process system to another, as well as to the plant environment if containment is lost. The specific process conditions will be shown on the individual valve data sheets.



Hydraulic or pneumatic single acting spring return operated actuators shall be used.

ESDV's shall have the following characteristics as a minimum:

- Top entry ball valve
- Actuator to close on air failure
- Manual override, unless specified otherwise
- Fire safe design
- Tight shutoff (ANSI B 16.104, class VI)
- Reset facility, unless specified otherwise

ESD valves shall be designed to open locally and close remotely from the control room through the ESD system. Unless otherwise specified the valves shall be air failure close type.

A 24 VDC signal shall be used to operate normally energized solenoid valve(s) to admit instrument air to valve actuators. The valves shall move to their closed position when the 24 VDC signal is removed.

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9.1.2 VALVES

Unless otherwise specified in the individual data sheets, valves shall be of the type and design as per paragraph "Valve Type and Design" of this specification. Material, size, and class of valves as well as material of trim, bonnet, flange, and etc. of valves shall be according to the document of "Piping & Pipeline Material Specification" (BK- GENRL- PEDCO-000-PL-SP-0001)

9.1.3 ACTUATORS

Actuators shall be sized to fully open and close the valves at the maximum differential pressures and within the time spans as specified in individual data sheets.

Actuators shall be preferably be pneumatic spring return piston type powered by instrument air supply, however in services where high torque requirements of ESD valves preclude the application of pneumatic actuators, double acting hydraulically operated actuators with hydraulic power back may be provided.

Actuators shall be mounted on the valves. The design of the mounting arrangement shall be the responsibility of the valve Vendor.



9.1.4 PARTIAL STROKING VALVE TEST

This test verifies that the main ESDV's are not 'stuck' in the plant normal position by enabling the valves to move 15% of its full travel. This test shall be performed independently of the solenoid valve test and locally only.

Operation of the partial stroking facility shall be key lock protected to prevent unauthorized operation. During the test any ESD action shall override the test.

The Vendor shall fully describe the operation of the test facilities and the means of ensuring that the test procedure cannot force the main valve to its trip position or maintain the valve at 15% which may cause possible damage to the valve.

Upon the initiation of the key test switch, the ESDV shall start to close and when it reaches the predefined percentage of its travel, a limit switch shall send a signal to the pilot of a double pilot valve. This in turn shall cause the ESDV to return to its full open position automatically.

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نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه																			
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9.2 PROCESS ISOLATION VALVES

9.2.1 GENERAL

These valves are used to isolate a section or a line and are controlled by process control logic. The result of the process control logic is closure of valve in accordance with the P&ID and data sheets.

Isolation valves shall be designed to open or close locally or remotely from the control room through the DCS system. Failure position shall be stated on the valve data sheets and P&ID's.

Actuators shall be sized to fully open and close the valves at the maximum differential pressures and within the time spans as specified in the individual data sheets.

9.2.2 VALVES

Isolation valves shall be full bore or reduced bore ball or plug valves according to the piping specification requirements. Unless otherwise specified in the individual data sheets, valves shall be of the type and design as per paragraph "Valve Type and Design" of this specification.

9.2.3 VALVE SIZING

Unless otherwise specified, XV's shall be line size. Care shall be taken to ensure that velocity through the valve body outlet shall not exceed 0.7 Mach.

9.2.4 ACTUATORS

Actuators shall be pneumatic single action type, air to open, spring to close or air to close, spring to open.

9.3 MOTOR OPERATED VALVES (MOV)

9.3.1 GENERAL

Motor operated valves are required for automatic isolation of some equipment in gas treating plant. The specific process conditions will be shown on the individual valve data sheets.

Electric motor actuated valves have to be used for ease of operation of large valves and for remote control of system isolation valves.

The actuators for motor operated valves shall be suitable for operation on 400V 50Hz 3ph and be certified EExd IIB T4. The enclosure classification shall be at least IP65.

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The actuators shall be provided with electrical motor driver, reduction gearing, hand wheels, local start, local stop, local valve position indicator, remote start, remote stop, end of travel limit switches and torque switches.

Actuator sizing shall be based on developing torque sufficient to full open and fully close the valve subjected to a maximum differential pressure as specified on the MOV data sheet. This shall include an allowance for any increase in valve torque due to operational wear.

A hammer blow device shall be provided in each actuator to permit the motor to reach full speed before load is applied.

Actuator shall be equipped with phase discriminator to protect against power supply phase reversal.

Motor could be provided with high temperature protection by providing minimum one thermostat or resistance temperature (RTD) in motor winding per phase for tripping the motor in the event of high winding temperature.

In addition to high temperature protection (thermostats/RTDs), the motor could be equipped with the following protection:

- The motor shall be de-energized in the event of stalling, when attempting to unseat a jammed valve. The stall protection shall be part of the VENDOR standard configurable interlocks provided in the electric actuator. The time of de-energisation shall be adjustable.
- Single phasing protection

A separate terminal block shall be provided on the actuator so that electrical components shall remain sealed and non-exposed during site wiring.

Means shall be provided on the valve actuator for visual local indication of valve stem travel.


The actuator shall be provided with two numbers of 10 mm earthing studs for connection to earth grid.

9.3.2 VALVES

Unless otherwise specified in the individual data sheets, valves shall be of the type and design as per paragraph "Valve Type and Design" of this specification.

9.3.3 VALVE SIZING

Unless otherwise specified, MOV's shall be line size.

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9.4 BLOW DOWN VALVES

9.4.1 GENERAL

Blow down Valves are used for gas compressor station depressurization resulting from selected shutdown levels. Vessels and equipment are depressurized in an emergency to reduce stresses in their metal and to minimize leaks that may occur as a result of mechanical failure.

BDV's shall be initiated either automatically or by command from ESD console for process safeguarding, control and other operational reasons, including maintenance. The valve shall open fully when depressurization is initiated.

BDV's shall have a minimum body size of 2" with tight shutoff (ANSI B16.104, class VI), air volume tanks for larger valves and should be sized for three full open/ closed operations at 3-barg instrument air pressure.

The valves will be on/off; they will normally be fully closed, and open on demand. When closed they will be subject to high differential pressure and must provide tight shutoff. Valves shall be designed to open remotely from the control room. A 24 VDC signal shall be used to operate normally energized solenoid valve(s) to keep valve closed.

9.4.2 REQUIREMENTS

BDV's shall have the following characteristics as a minimum:

- Top entry ball valve
- Actuator to open on power or air failure
- Fire safe design
- Tight shutoff (ANSI B16.104, class VI)
- The valves shall be capable to be used in SIL-3 certified loops.

9.4.3 VALVES

Blow Down valves shall be full bore ball valves sized according to the required blow down flow rate and pressure drop. In case the valve is not exposed to the fire, fire-proofing is not necessary. The details regarding each valve will be provided in the datasheet.

Care shall be taken to ensure that velocity through the valve body outlet shall not exceed 0.7 Mach as this may have detrimental effects on the flare piping.

9.4.4 ACTUATORS

Actuators shall be sized to open and close the valves at the maximum differential pressures and within the time, as specified in individual data sheets. Actuators shall be mounted on

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the valves. The design of the mounting arrangement shall be the responsibility of the valve VENDOR provided ease of access and maintenance.

The actuator shall operate with 3-barg as minimum pressure of instrument air.

10.0 VALVE TYPE AND DESIGN

10.1 GENERAL

Valves shall be in line with piping valve specification as above.

Flow direction shall be permanently and clearly indicated on the valve body.

Face to face or end to end dimensions and tolerances shall conform to ASME B16.10.

Welding end valves material shall be compatible with the matching pipe material for welding purpose and to match relevant pipe grade and wall thickness.

In services where the differential pressure over the valve results in a temperature drop which

Will cause freezing of the stuffing box and ice formation on the stem, extended bonnet shall be provided.

Valves in safety related services should have been fire tested and certification to be provided.

10.2 VALVE BODY

Valve body shall be top entry type, unless otherwise stated on the data sheets.

10.3 VALVE TRIM

Seat rings shall be spring loaded and so designed that line pressure will assist in sealing round the ball.


Valves specified as shut off, shall be in accordance with the requirements of class VI (ANSI B16.104), in either direction at the maximum specified differential pressure.

Valve seating seals shall be designed as double seal.

10.4 VALVE STEM

Valve stem shall be anti-blow out type.

Valve stem extension shall be detachable for easy replacements.

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At least two stem seals shall be provided with facility for injection of secondary sealant and with stainless steel fittings.

Stem seal shall be replaceable while the valve is in closed operation position.

11.0 VALVE MATERIAL

Materials to be used shall be in accordance with project piping material specification. NACE MR0175/ISO 15156 shall be considered where specified in project data sheet and project piping material specification.

Generally for application in sour gas services, as indicated in individual data sheets, material of body, trim and all other wetted metal parts in contact with the sour gas shall meet the requirements of NACE, MR-01-75, latest edition. For other services, the following requirements shall apply as a minimum.

11.1 VALVE BODY

Valve body shall be cast carbon steel, at least to ASTM A216 grade WCB material.

11.2 VALVE TRIM

Valve trim material (including the ball in ball valves) shall be carbon steel at least to ASTM A216 grade WCB with hard chrome or electro less nickel plated, minimum plating thickness of 75 micron.

11.3 VALVE STEM

Stem shall be forged, 13% chromium steel.

12.0 ACTUATORS TECHNICAL SPECIFICATION

12.1 PNEUMATIC ACTUATORS

12.1.1 GENERAL

The following actuators shall be selected for ESDV, SDV, and XV:

- Single acting piston type, spring return (spring to close action for air failure to close valves, and spring to open on air failure to open valves.)
- Double acting piston type.

A single acting type of actuator is preferred. Double acting actuators shall be used when air supply pressure required for single acting type is greater than minimum air header pressure or when valve must remain in position in case of air failure. Then actuator shall be equipped

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with required facilities for partial stroke test.

Short stroke single acting pneumatic piston actuators shall preferably be used on emergency shutdown service.

The actuators shall be powered by instrument air supply. The actuators shall be sized in accordance with the maximum pressure drop specified in the data sheets and the minimum header pressure of 3 bar (g). The actuators shall be able to operate at the maximum air pressure 10 (barg) and shall be tested at 1.5 times of the maximum air supply.

Unless otherwise specified. The maximum valve stroking time to achieve the safety position shall be defined according to size of the body (5 seconds for body until 4", 1 second per inch for body greater than 4").

The maximum acceptable stroke time for size 10" and bigger is 10 Second.

A stroke speed setting facility shall be made available and performed by means of needle valve restricting power actuation fluid.

Accessories (solenoid valve, limit switches...) shall be installed directly on the actuator or on the body of the valve in order to minimize the valve overall time response.

12.1.2 AIR CAPACITY TANK

Unless otherwise specified, all double acting actuators shall be equipped with an air tank manufactured from carbon steel and calculated as per ASME Section 8, Division 1.

The capacity shall be sized to permit 3 valve strokes in case of air failure.

For each valve, the Vendor shall indicate the tank volume.

Small size air capacity tank shall be mounted directly on the valve itself. Other tanks shall be free standing and separate from the valves.

12.1.3 ACCESSORIES

Accessories such as solenoid valves, electrical position switches, pressure pilots, pneumatic relays, etc., shall be supplied and mounted by the valve Vendor.

The other accessories are as follows:

Air filter regulator set

Each valve shall be supplied with a stainless steel filter regulator and pressure gauge fully tubed.

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Limit switches/Position Indicator

- Limit switches shall be preferably magnetic type, hermetically sealed of precious metal compatible for use in hazardous area as per EEx'd' IIB T4 protection Classification. The switch contact rating shall be 110VAC @10Amp.

Mechanically operated switches are not acceptable, except for pneumatic signal. Mercury switches are prohibited. Use of proximity switches shall be subject to CLIENT's approval.

On/Off actuators shall be provided with mechanical position indicator devices matching the two positions of the valve. The mechanical position indicator installation shall be tamper proof and shall be readable from 5 meters distance.

Solenoid Valves

The valve body material shall be AISI 316 stainless steel suitable for the environment and the required service. Disc/seat

shall be resilient to give a tight shut off feature.

Electrical or manual reset will be used as required.

External grounding shall be provided for each solenoid valve.

Coil electric power supply shall be 24 VDC low consumption.

They shall be suitable for use in hazardous area as per EEx'd' IIB T4 protection Classification.

Tubing and fittings

Tubing material will be AISI 316L.

Fittings for air piping will be of AISI 316L compression type, with double ferrule and complete with coupling nuts.



Hand wheel

Where specified on data sheets, a hand wheel shall be side mounted.

Permissive reset push-button (for ESD valves)

Shall be compatible with zone 2 and installed on the front door of the local control station.

These components and all other necessary facilities for the operation of the actuators shall

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form part of one assembly, completely tubed, wired and tested. The assembly shall be housed in a weatherproof AISI 316 housing suitable for the specified hazardous area, and shall only require the connection of instrument air supply and wiring of solenoid valves. All tubing for pneumatic circuits shall be AISI 316 as minimum. Junction boxes shall be stainless steel, weather proof to IP 65 and the cable entry shall be M20x1.5 and cable entry suitable for solenoid valves shall be M20x2.5. Additionally, in hazardous areas, electrical housing and junction boxes shall be explosion proof and all cabling/conduits etc. shall be suitable for explosion proof execution.

12.2 HYDRAULIC ACTUATORS

12.2.1 General

The hydraulic actuators shall be double -acting hydraulic cylinders mounted on the valves.

The cylinder shall be constructed with stainless steel rod, screw, nuts as a minimum. Seals shall be Viton or equivalent.

Hydraulic actuators shall be provided with suitable steel brackets, between the valves and the cylinders. Re-adjustment of the valve stem position in relation to the piston position shall be possible.

Actuator shall be totally enclosed and sealed to give protection to all internal moving part.

The valve Vendor shall supply the relevant opening and closing torques, including the maximum allowance valve shear torque, and travel distances to enable the actuator supplier to select a suitable hydraulic cylinder.

The minimum hydraulic pressure shall be at least 1.3 times of the maximum torque needed for a valve stroke.



The actuator Vendor shall adapt the valve, install the hydraulic actuator to complete, and test the hydraulically operated valve.

A stroke speed setting facility shall be made available and performed by means of needle valve restricting power actuation fluid.

12.2.2 Interconnecting Piping and Accessories

The interconnecting piping shall include all pipes and fittings, separating and isolating valves, couplings, etc.

To minimize the effects of fire and explosion, the hydraulic piping shall comply with the following:

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Pipe, fittings, couplings, valves and other components of the interconnecting piping shall be stainless steel AISI 316L.

All piping shall be supported along its route (maximum distance between supports 3 m).

Couplings shall be of the double-ferrule compression type.

The maximum practicable degree of shop assembly shall be ensured.

12.3 GAS OPERATED ACTUATOR

12.3.1 General

This type of actuator uses the gas from the line to pressurize the transmission oil contained in two tanks/cylinders. The pressurized transmission fluid moves the hydraulic piston. The cylinders shall be coupled to the frame housing of the yoke mechanism. The rotation of the yoke shall be 90° for setting of the open and closed position of the valve. The frame shall be totally weather proof and fitted with a relief valve venting any over-pressure which may occur through the valve stem.

Two 24 VDC solenoid valves shall operate as pilots. Feeding 24 VDC power supply to the solenoid valve, shall open and close the solenoid valve which in turn admits gas to the valve actuator for valve actuation.



The hydraulic cylinders shall be equipped with mechanical stops allowing adjustment of the angular stroke. The piston seals shall consist of bi-directional 'O' ring, protected by PTFE slip on ring. The pistons shall be fitted with sleeves of self-lubricating material for improved efficiency and guiding.

The lower end of the gas over oil tanks shall be fitted with a filter and a unidirectional flow control valve. The filter shall be installed vertically in the lower end of the tank and above the level of any sediments, dirt or scale.

An explosion proof micro switch box shall be installed on the actuator. This shall contain the travel limit switches necessary for signalling the valve position. The power shall be provided externally for the solenoids and limit switches. The box shall have ingress protection to IP65 as a minimum. The micro switch box shall have a local position indicator.

A hydraulic hand pump shall be provided for manual operation of the actuator in case of gas failure. A rotary valve is needed to allow for the selection of the operating mode, i.e. automatic, manual open, manual close, tank equalisation.

Solenoid valves are required for remote operation. These shall be of explosion proof construction. Double configuration shall be used.

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A pressure alarm facility for remote indication shall be provided on the gas inlet piping. Facilities shall be provided for back up nitrogen connection, where stated on the data sheets.

Valves are usually tested with their actuators assembled, and they may be shipped fully assembled. The ball must be aligned with the pipe bore at the fully open position, and the actuator position relative to the valve stem flange marked so that it can be re-aligned accurately at site if the valve and actuator are shipped separately.

12.4 ELECTRICAL ACTUATORS

12.4.1 General

Electrical motor-operated valve (MOV) may be required for process considerations and shall conform to the following:

The actuating unit shall include a 3 phase electric motor (1 phase for small actuator), reduction gearing, limit switches and torque switches, terminals, together with a hand wheel for manual operation with declutching lever and valve position indicator.

The valve and actuator mounting bracket must be capable of withstanding the stall torque of the actuator, with torque and limit switches disconnected.

The degree of protection for all electrical parts shall be in accordance with IP65.

All gearing shall be totally enclosed and continuously lubricated.

All shafts shall be mounted on ball or roller bearings.

Limit switch drive shall be stainless steel.



Power terminals shall be of shut type, segregated by an insulating cover.

Two entrance taps (power cable and position indication) shall be provided. Each tap will be provided with NPT threads according to IEC 60079-1.

Electrical connection sizes shall be defined by the Vendor.

The actuator terminal box shall be double sealed in such a way that when the terminal box cover is removed for the connection of incoming cables the remaining electrical components are still protected by the watertight enclosure. Enclosures shall be in accordance with the electrical classification area.

Two illuminated push-buttons shall be provided for the control of each motor operated valve. Their nameplates shall be marked "OPEN", and "CLOSE" with the colors green and red,

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respectively.

Electrical motor operated valves shall be mounted in the vertical position.

12.4.2 Motor

The motor shall be sufficiently sized to open and close the valve against maximum differential pressure when the voltage to motor terminal is within $\pm 10\%$ of rated voltage of 400 V before starting. Unless otherwise specified, motor rating shall be 400 volts, 3 phase, 50 Hz.

The electric motor and accessories shall be explosion proof, Ex (d) type.

A device shall be provide to ensure that the motor runs in the correct direction of travel with either phase sequence of the 3 phase power supply connected and it shall not be necessary for the Operator to check the phase sequence or to reconnect the 3 phase after the initial connection.

Repositioning or re-orientation of the motor and control box around the centerline of the valve stem shall be possible without the need of additional parts or supports.

The motor shall be protected against single phasing or incorrect phase rotation and also protection against overheating by a thermostat in the motor winding.

12.4.3 Integral Switches

The actuator shall provide both torque and position limitation. An automatic override shall be provided to prevent the torque switches from tripping the motor on initial valve unseating.



Provision shall be made for the addition of extra sets of limit switches in each actuator. Each set shall be adjustable to any point of valve position.

Limit / torque switches shall be furnished integral with the motor actuator and shall be set by the Vendor.

12.4.4 Actuator and Gear Box

The gear box housing shall be either factory greased and sealed for long-life operation or be provided with a sufficient number of grease fittings to ensure proper maintenance.

Where actuators of the non-locking gear type are used, the Vendor shall make provisions to prevent cycling of the motor due to repeated operations of the torque switches, i.e. 'torque switch hammer'.

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12.4.5 Control Functions

The actuator shall have an integral motor starter, local control and lamp indication. Phase discriminator relay shall be provided.

The starter shall include a mechanically and electrically interlocked reversing contactor, with control transformer having a grounded screen between primary and secondary windings.

The common point of contact or coil and secondary winding shall also be grounded, so that any ground fault shall cause contactors to drop out. Terminals for remote controls shall be provided.

Starter components shall be readily accessible for inspection without disconnecting external cables. Internal wiring shall be identified at both ends.

Local push buttons shall be provided for OPEN/CLOSE control of valve, with 3 position lockable selector switch providing LOCAL/OFF/REMOTE positions.

Local indication of CLOSE and OPEN positions shall be provided by means of a dial which is illuminated green and red.

Facilities shall be provided for remote operation and status indication of MOV's.

The actuators shall have a facility to enable them to be connected to a network control system.

12.4.6 Accessories

Each valve shall be provided locally with an indication of valve position as a percentage of full travel.

A hand wheel for manual operation shall also be provided for each actuator. The hand wheel assembly must be designed so that it will automatically disengage from the drive train when the valve has been directed electrically to drive to the opened or closed direction.

13.0 INSPECTION AND TESTS

Inspection and tests shall be performed on all equipment. The procedure shall be in accordance with Vendor's standard practices, to be submitted at least 6 weeks prior to inspection and testing for review and approval.

Tests shall only start after relevant Vendor drawings; test procedure and engineering data are received and approved as the final copies.

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13.1 GENERAL CONDITIONS

Inspections and tests shall be performed by Vendor at his works using his inspection and test facilities.

Cost of performing all inspections and tests (including FAT), supply of necessary personnel and facilities shall be borne by Vendor.

Should the inspections and tests be made at separate locations, due to sound technical reason, the Vendor shall notify the CLIENT in his quotation.

CLIENT inspectors shall be allowed to be involved in each and every stage of inspections and shall be free to request any specify test included in the approved inspection and test procedure, the inspectors shall have access right to all facilities involved in the manufacturing of the equipment purchased under this specification.

13.2 GENERAL INSPECTIONS AND TESTS

Inspection and tests, as detailed here, shall be carried out by Vendor as a minimum.

Each actuator shall be permanently installed on its respective valve, inspected and tested before shipment.

Inspections and tests shall include but not be limited to the following, which shall be carried out by Vendor:

- Visual inspection
- Dimensional check
- Check of welding procedure
- Welding qualification
- Impact and hardness test
- Check of material certificates
- Radiographic, ultrasonic and other applicable nondestructive examination tests
- Pressure tests, high and low pressure leak tests

13.3 SPECIFIC FUNCTIONAL TESTS

13.3.1 ESDV's/BDV's/XV's

After successful completion of pressure tests, each valve shall be operated by the pneumatic operator a number of times to test the satisfactory operation of the valve and actuator combination. Individual test certificate shall be issued.

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Valves shall be caused to closed/opened by de-energizing/energizing the solenoid valve(s).

During the functional tests the correct setting and operation of the following components shall be verified as applicable:

- Solenoid valves
- Limit switches
- Trigger valves
- Hand pump operation

13.3.2 MOV Actuators

Following shall be recorded during the tests:

- Current at max. torque setting
- Torque at max. torque setting
- Flash test voltage
- Actuator output speed or operating time
- Gear ratios for manual or automatic drive
- Closing direction

Inspection shall include stroking the valve from fully closed to fully open position and vice-versa, using the motor operator.

In addition of the above tests, these common tests shall be applied by Vendor:

- Quality control and quality assurance tests
- General inspections to include appearance, structure, dimensions, manufacture finish checks
- Wiring tests



Copies of all Vendor test shall be supplied by Vendor before the CLIENT inspectors start to witness the performance test.

Vendor shall also submit to the CLIENT, the electrical certificates provided by the authorities, for the electrical instruments.

13.4 PERFORMANCE TESTS

13.4.1 General

A Factory Acceptance Test, FAT, shall be carried out prior to the equipment shipment.

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During this test, Vendor shall demonstrate the compliance of the equipment with the approval and finalized documents and shall test each function and task individually.

CLIENT's inspectors will witness the FAT and Vendor shall notify the CLIENT of the scheduled dates 6 weeks prior to actual test as preliminary notice and 15 days prior to actual test as firm notice.

In case the CLIENT waives to witness the FAT in writing, Vendor shall provide the relevant test certificates with all test results.

13.4.2 Visual inspection

Verify that all equipment parts are included with properly identified tag plates and are in full compliance with the related documents.

Check that all documents have been supplied and are consistent with the equipment under test.

Check that the connection and terminations are correct and tightly secured.

13.4.3 Performance test to:

- Check calibrations
- Check functions

13.4.4 Issuance of certificates

The CLIENT will issue a certificate of readiness for shipment of the equipment after completion of the witnessing of the factory acceptance test and reviewing the reports.


VENDOR shall then have the right to properly pack and ship the equipment.

14.0 FACTORY ACCEPTANCE TEST (FAT)

Prior to advising the CONTRACTOR and CLIENT that the equipment is ready for the Factory Acceptance Test (FAT), the VENDOR shall have completed his own 100% in-house test of each cabinet/panel. On successful completion of this, the VENDOR shall then undertake the FAT.

The CONTRACTOR and CLIENT will wish to witness the FAT prior to releasing the equipment for shipment. The VENDOR shall be responsible for conducting the test and providing all necessary facilities, test equipment and personnel.

Factory acceptance test (FAT) shall be performed to demonstrate that the FGS performs as per specification, including any site specific configuration.

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Each different type of input (e.g. fire/gas detectors) shall be tested through use of an actual field/interface device, where practicable. Simulators may be used by the agreement of the Principal.

Each output shall be demonstrated through the simulation of inputs, thus proving logic and outputs.

FAT will be performed against a procedure, provided by Vendor, and subject to Principal approval. Test results shall be accurately recorded, including any simulators used and any ad hoc tests performed.

15.0 COMMISSIONING SUPPORT

VENDOR specialist services will be required during commissioning of the equipment. A comprehensive proposal to provide the required specialists for commissioning support shall form part of VENDOR's scope. Proposal shall include details of the skill and the hourly rates offered.

16.0 SITE SUPERVISION

When specified in the Purchase Order, the VENDOR shall provide representatives to assist the CLIENT during installation, commissioning and initial start-up for all aspects of the equipment.



17.0 PAINTING

All parts and accessories which are not corrosion resistant by choice of material shall be prepared and painted. Painting shall be in accordance with project painting specification BK-GNRAL-PEDCO-000-PI-SP-0006

18.0 DOCUMENTATION

Vendor shall provide documentation for approval as follows:

- Detail drawing of the Actuated valve assembly, including:
- Overall dimensions,
- Face to face dimensions, rating and facing,
- Actuator type and size,
- Accessories, and in particular:
- Solenoid, installation, tubing and wiring,
- Limit switch arrangement, wiring,
- Material of body, trim, etc.
- Weight.
- Drawing of the buffer capacity, including:
- Overall dimension, accessories,
- Capacity, calculation.

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- Recommended spare parts list (start-up, commissioning, 2 years),

19.0 SPARE PARTS AND SPECIAL TOOLS

The VENDOR shall provide lists of recommended spare parts, which shall include the original part numbers with prices for commissioning, start-up and two years operation. All spare parts shall be identified individually.

Spare parts for commissioning and start-up; a qualified and complete list based on PROJECT SPARE PART SUPPLY PROCEDURE (Doc. No. E&D-QC-SP-1).

Spare parts for two years operation; a qualified and complete list based on PROJECT SPARE PART SUPPLY PROCEDURE (Doc. No. E&D-QC-SP-1).

The VENDOR shall be able to provide spares back up and support for the plant life of at least 20 years.

SPIR form shall be approved by CLIENT prior to procurement.

19.1 SPECIAL TOOLS

Special Tools (as option / if any; to be recommended by Vendor)

20.0 PRESERVATION AND PACKING

All necessary precautions shall be taken for adequate protection of the valve, including accessories, during shipment and outdoor storage at their destination. These precautions shall comprise, but not necessarily be limited to the following:

- Before leaving the factory, all openings in the valve body shall be provided with temporary closures to prevent entry of dirt.
- During transport and storage, the valve ends shall be protected with suitable close fitting protectors (e.g. plastic caps) or covers of at least 3 mm thick and securely fastened by an adequate number of bolts.
- Air connections of actuators, positioners and accessories shall be protected by thread protectors;

The stuffing box of valves with a graphite based packing shall be protected against the ingress of water.