



Offshore Design Section
Engineering Services
ISO – 9001:2008

**FUNCTIONAL
SPECIFICATION FOR
“Actuator for SDV
(Topside)”**

Spec. No.	3512
Rev. No.	00
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FOR
ACTUATOR FOR SDV
(TOP-SIDE)

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1.0 SCOPE OF THIS DOCUMENT:

- 1.1 This functional specification describes the essential design considerations for the selection of Topside Actuator for Shut Down Valves.

2.0 REFERENCE DOCUMENTS:

2.1 Reference Documents and Specifications:

- a) Instrumentation Design Criteria
- b) Basic Bid Work
- c) Project P & IDs
- d) Process Design Criteria

3.0 SCOPE OF SUPPLY:

- 3.1.1 The quantity to be supplied and installed shall be as per the requirements indicated in the Bid Documents.
- 3.1.2 The vendor shall be responsible for selection of the Actuator suitable for its intended application. All activities including procurement of all required accessories for appropriate functioning of the actuator is part of the scope. Other activities such as tagging, packing, testing & calibration, preparation for shipment, along with accessories, spares and assistance where required for its installation & commissioning at site.

4.0 TOP-SIDE VALVE ACTUATOR:

4.1 General:

- 4.1.1 Actuators shall be compact (within valve dimensions), pneumatically / Electro- hydraulically/Hydraulically operated for Quarter Turn ball valve. Type of actuator shall be as per specified in the bid documents.
- 4.1.2 Actuators shall be selected to achieve Fail Safe Condition of the valve as specified in Process documents like P&IDs, Process design basis etc. in the bid document.
- 4.1.3 It shall be supplied with end travel adjustment integral within actuator end caps and it shall have Over-travel Protection of min. +/- 3o in both directions.
- 4.1.4 Suitable for harsh marine environment. Actuator shall be epoxy painted suitable for exposure at location involving salt spray, high humidity & temperature range and be as per Protective Coating specification - FS 2005 Protective coating.
- 4.1.5 Detachable side-mounted hand-wheels (upto 6”) and appropriately mounted Hydraulic pump (above 6”) shall be provided for manual override for each actuator.
- 4.1.6 Local Position Indicator shall be provided as an integral part of the actuator to indicate Open /Close/Intermediate position of the valve.
- 4.1.7 Proximity type Switches shall be provided for remote position indication (Open /Close) at control room (DCS / RTU etc.).



- 4.1.8 Partial stroke testing (PST) facility from DCS shall be provided for all the critical shutdown valves in the Process Platforms unless otherwise specified in the Project scope of work. PST shall be achieved by providing Smart position transmitter. Feedback signal (for actual valve position) from smart position transmitter shall be made available at control room (DCS / RTU/HPU etc.). The test data shall be logged and signature analysis report shall be generated from the system for preventive maintenance. For well-head platform manual type PST shall be provided for all the critical shutdown valves unless otherwise specified in the Project scope of work.
- 4.1.9 Where the noise level in actuator is expected to go above 85dB , Attenuator / silencer shall be provided by vendor as a part of actuator accessories.
- 4.1.10 Proximity switches and all electrical accessories shall be Explosion proof to Exd suitable for Class 1, Zone I , Group C & D as per Instrument Design Criteria.
- 4.1.11 SIL rated Actuator shall be provided wherever specified in Bid documents. SIL certification shall be from accredited agency as TUV, EXIDA , SIRA etc.
- 4.1.12 Actuator design and configuration shall be such as to ensure smooth valve operation without imparting any residual lateral loads on the valve stem so as to ensure balanced torque on the valve stem.
- 4.1.13 Time required to attain close position for the valve shall be 1 sec/inch and for Opening of valve upto 12” : 1 sec/inch and above 12”: 2sec/inch. Vendor to give the detailed information regarding time to open /close along with the sizing calculations for acceptance.
- 4.2 Pneumatic Actuators:**
- 4.2.1 Pneumatic Actuators shall be compact, spring return. It shall have proven design for offshore installation.
- 4.2.2 Actuator shall be provided with the Pneumatic connection of 1/2” NPTF for Instrument Air / Gas.
- 4.2.3 Actuator shall be provided with Filter regulator, Pressure Gauges (for Air/ Gas Supply, Output and Input signal) etc.
- 4.2.4 Volume bottle shall be provided wherever required and It shall be sized for min 4 strokes (4 cycle) of the valve.
- 4.2.5 Actuator enclosure shall be weatherproof to min IP 65.
- 4.2.6 Pneumatic Actuator shall be sized for supply pressure of air / gas 5.5 kg/cm² , Supply pressure is available in the range 5.5 to 9.5 Kg/cm²
- 4.3 Electro-Hydraulic Actuators :**
- 4.3.1 It shall have compact size, low power consumption / energy efficient, local & remote control facilities.
- 4.3.2 The actuator shall be provided with electro-hydraulic unit complete with sealed hydraulic, electronic and termination compartment.



- 4.3.3 Each actuator unit shall include the motor, hydraulic pump, hydraulic manifold, accumulator, in-built safety system, pressure sensor indication of hydraulic oil pressure along with position indicators, limit/proximity switches, electrical & hydraulic controls, terminal box etc. as a self-contained unit. The actuator shall be sized to provide adequate torque and/ or thrust to ensure the complete intended travel of the valve under the extreme operating conditions.
- 4.3.4 The hydraulic fluid used for operating the actuators shall be bio-degradable oil (DTE- 11) with requisite addition of biocide and shall have a cleanliness level of NAS1638, Class-6. The actuator shall be supplied filled with hydraulic fluid.
- 4.3.5 Actuator and its control panel enclosure shall be weatherproof to min IP 65 and explosion proof Ex(d).
- 4.3.6 Two selector switches (lockable) shall be provided on the actuator, one for Local/Stop/Remote selection, and with pad-lockable for each position and the other for Open, Close and Stop Commands.
- 4.3.7 Electric Motor specification shall be as per Electrical FS 4008.
- 4.4 Hydraulic Actuators :**
- 4.4.1 Actuators shall be designed for operation by hydraulic fluid at pressures ranging from 70 kg/Cm² (g) normal to 105 Kg/Cm² (g) maximum from Hydraulic Power Unit
- 4.4.2 All pressure and load carrying components in the actuator shall be designed to withstand the maximum output torque from the actuator without affecting the valve performance.
- 4.4.3 Open-Close Status indication of Valve shall be made available on HPU panel through limit switches / proximity switches installed on the valve actuators.
- 4.4.4 Connection shall be provided for the hydraulic fluid supply to the actuator and exhaust hydraulic fluid return to the surface. Hydraulic fluid connections shall be ¾” / 3/8”
- 4.4.5 The hydraulic fluid used for operating the actuators shall be bio-degradable oil (DTE- 11) with requisite addition of biocide and shall have a cleanliness level of NAS1638, Class-6. The actuator shall be supplied filled with hydraulic fluid.
- 4.4.6 Actuator enclosure shall be weatherproof to min IP 65.
- 4.4.7 Accumulator shall be provided wherever required and It shall be sized for min 4 strokes (4 cycle) of the valve.
- 4.5 Actuator Torque Requirement:**
- 4.5.1 Actuator Torque Safety factor shall not be less than 1.25 times the torque requirements of the valve under maximum pressure drop across the valve for sizing of actuator.
- 4.5.2 It shall be based on a valve torque test as defined in API 6D, Appendix-C.



4.5.3 Vendor shall mention in the offer the values of the torque for –

- Maximum Valve stem torque.
- Maximum torque output of actuators.

4.5.4 Actuator Torque Sizing Analysis Chart for valve & selected actuator shall be furnished along with the Purchase specification.

4.6 Testing:

4.6.1 Actuator shall be passed through Visual and Dimensional inspections, Hydrostatic pressure Test ,Functional Test ,torque and operating time, ,Temperature Test, life Cycle /Endurance Test , Performance test , Scaling , leakage Test (as per Fugitive Emission test), cleanliness tests as per API 6A ,EN 15714 - 2009 : part 1 to 5.

4.6.2 Partial Stroke Testing (wherever specified) shall be as a part of testing of the actuator.

4.6.3 Tests mentioned in the above standards shall be carried at vendor's premises and assembly test along with valve shall be carried out in Valve vendor's premises.

4.6.4 Test reports or certificates shall be submitted along with supply.

4.7 Installation and Design Requirements

4.7.1 Mounting of the actuator on the valve shall be direct without loss of performance and it shall be easily detachable from the valve.

4.7.2 Actuator shall be inherently designed to prevent/relieve the accidental pressure build up in the actuator.

4.7.3 Automatic /Self Purging facility shall be provided so that air/gas pocket in the actuator can be eliminated.

4.7.4 Threading connections shall be NPT as per B 2.1 and flange connections as per ANSI B 16.5/ANSI B 16.47.

4.8 Material:

4.8.1 Material shall be suitable for harsh offshore environment (marine applications).

4.8.2 Materials of all parts and seals shall be compatible with the medium used specially when gas is used as a medium. For sour gas , wetted parts shall be compliant to NACE standard MR-01-75.

4.8.3 Spring shall be corrosion resistant, cadmium plated nickel or equivalent.

4.8.4 MOC for all the system sub-components including tubing & fittings, Filter regulator etc. shall be min SS316 and shall be as per relevant FS.

4.8.5 Material of hand-wheel shall be same as that of the material of actuator body .

4.9 Documentation:



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- 4.9.1 Vendor shall provide copies of test certificates, conformity test reports , Test report on operation of actuators including on demand if the request is made prior to the time of testing.
- 4.9.2 SIL certificate shall be submitted along with the PS. wherever SIL actuators are supplied.
- 4.9.3 Complete details of Gas/Air/ hydraulic circuit with complete sequencing, sizing of volume bottle / accumulator shall be submitted for company's review.



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ANNEXURE – I

TYPICAL DATA SHEET – ACTUATOR FOR SDV AND ITS ACCESSORIES

A	Actuator		C	Pilot Valve	
i.	Type		i.	Type	
ii.	Type of Supply		ii.	Mounting	
iii.	Supply Pressure	Min/Nor/Max/Desg	iii.	No. of ways	
iv.	Connection Size		iv.	Body MOC	
v.	Tubing Size		v.	Internal MOC	
vi.	Type of Manual Override		vi.	Pneumatic Connection size	
vii.	Enclosure Class		vii.	Reset	
viii.	Painting		viii.	Operating Pressure	Min/Nor/Max/Desg
ix.	Double Block and bleed		ix.	operating Temp	Min/Nor/Max/Desg
x.	Mechanical Stops		x.	Bug Screen	
xi.	Position Indicator		xi.	Make and model	
xii.	MOC		E	Solenoid Valve	
xiii.	PST		i.	Area of classification	Class 1 zone 1 Grp C & D T3
xiv.	Make and Model		ii.	Enclosure class	IP 65 & Exd
			iii.	Style of coil	
B	Valve Position switch (open and close)		iv.	Coil insulation class	
i.	Type		v.	Electrical connection & size	
ii.	Rating and contact		vi.	Reset type	
iii.	Enclosure	IP 65 & Exd	vii.	Body and enclosure MOC	
iv.	Area of classification	Class 1 zone 1 Grp C & D T3	viii.	Power consumption	
v.	Housing material		ix.	Make and model	
vi.	Cable entry		F	Other	
vii.	Tag No.		i.	AFR	As per FS 3606
viii.	Make and Model				
C	Smart Positioner				
i.	Output				
ii.	Communication type				
iii.	MOC				
iv.	Area of classification				
v.	Certification				
NOTE:-					
VENDOR SEAL AND SIGNATURE					