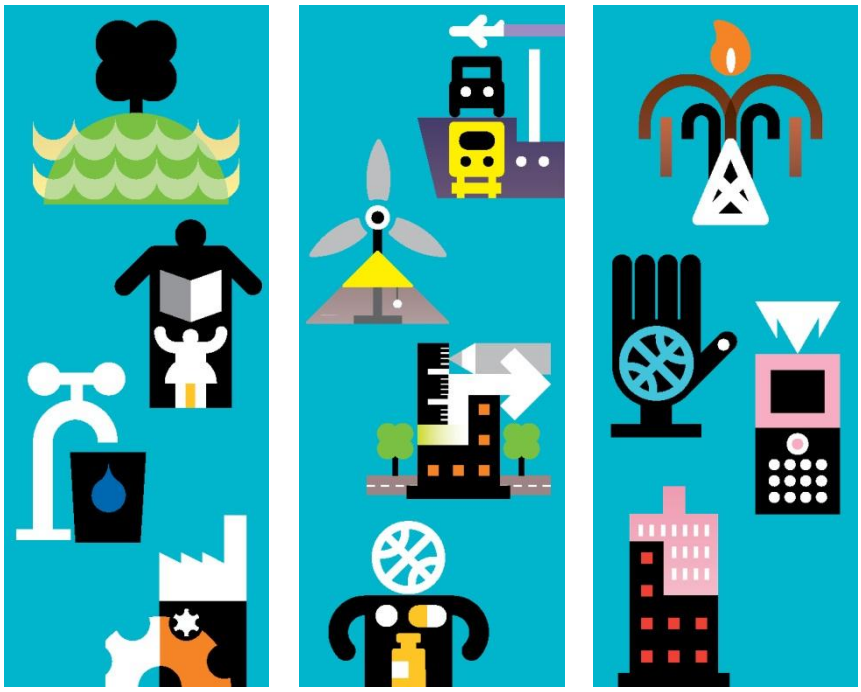

Specification for Electro-Hydraulic Actuator for ROSOV

Modernization of Fuel Farm-IGI Airport,
Shahbad Mohammadpur, New Delhi

December 2014

Delhi Aviation Fuel Facility Private Limited

DAFFPL

Mott MacDonald

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Modernization Of Fuel Farm of Delhi Aviation Fuel Facility Pvt. Ltd. IGI Airport, New Delhi

SPECIFICATIONS **Electro – Hydraulic Actuator For Remote Operated Triple Offset Butterfly Valve (ROSOV)**	**Project No.:322538**
	Reference: Tank Farm Area (ATF)
	No. of Sheets: 19

Job Number	Facility Location Code	Document Number
	Shahbad Mohammadpur, IGI Airport-New Delhi	322538-NSD-08

☐ **Code 1**: Approved and Work may Proceed.

☐ **Code 2:** Revise & Re-submit. Work may Proceed subject to incorporation of comments.

☐ **Code 3:** Revise & Re-Submit. Work should Not Proceed.

☐ **Code 4:** Review Not Required. Work may Proceed.

Approval to proceed shall not be deemed as Acceptance or Clearance of Design, Calculations, Analyses, Test Procedures/Methods, or Selection of Materials by the Contractor. The Contractor shall Not be relieved from full compliance of Contract Requirements and Technical Specifications.

Dated: **Delhi Aviation Fuel Facility Pvt. Ltd.**

Document No.

Rev	**Date**	**Issued For**	**Prepared By:**	**Checked By:**	**Approved By:**	**Approved By:**
			Mott MacDonald Pvt. Ltd.			**Client**

Contents

1 Technical Specifications for Electro – Hydraulic Actuator for ROSOV

1.1 Scope

a. This specification covers the requirements of designing, manufacturing, testing & supply of Fail Safe & Fire Safe Actuator for Remote Operated Shut Off Valve (ROSOV). The actuator shall have local integrated control unit for opening/closing of valves with open/close indication and other essential monitoring and diagnostic indications and controls. It shall have facility for non-intrusive setting of controlling and diagnostics parameters.
b. The actuator controls (close only) & indications (open/close) are also to be provided in a separate flameproof control station I (To be mounted away from actuator outside tank dyke wall by the owner). The actuator shall also have provision for 'Close' from Owner's Control Room PLC/DCS.
c. The Electro Hydraulic Actuator assembly shall be SIL-2 certified and /or capable for Stand Alone to use in SIL-3 applications.
d. The specifications as detailed are minimum requirement and shall be available in the offered actuator model, make and wiring diagram as mentioned in the Actuator Data Sheet.
e. The specification for Actuator shall be read along with specification for Remote Operated Shut Off Valve and this specification together is deemed to cover complete unit of Electro-Hydraulic actuator of ROSOV.
f. Vendor is required to select the Actuator Model Number, rating & various control features as per the requirement of the valve. Accordingly the selected actuator type, model & its control with wiring diagram number, shall ensures the operations of the valves with the desired control.
g. Only one make of the Actuator (for each type, size and rating of the valve) is to be selected and freezed while submitting the offer.

3 Codes and Standards

a. The equipment shall comply with the requirement of latest revision of the following standard issued by BIS (Bureau of Indian Standards) unless specified otherwise:

IS: 9334	Electric Motor Operated Actuators
IS:13947 (Parts – 1, 3, 4 & 5)-2004	Low Voltage Switch Gear
IS: 4722-2001	Rotating Electrical Machines – Specifications
IS: 325-1996	Three-phase inductions Motors
IS: 2148-2004	Flameproof Enclosures for Electrical Apparatus
IS: 4691-2004	Degrees of Protection provided by enclosure for Rotating Electrical Machinery.
EN: 50018-2000	Electrical Apparatus for Potentially Explosive Atmosphere [EEx(d)]
API/EI: RP 500 C	Recommended Practice for Classification of Locations for Electrical Installations at Petroleum facilities classified as Class I, Division 1 & Division 2
IS: 5572-2006	Classification of Hazardous Areas (mines) having Flammable Gases and Vapors for Electrical Installation.
NEMA: 6	Enclosures constructed for either indoor or outdoor use to provide degree of protection to personnel against incidental contact with the enclosed equipment.
IEC: 529	Degree of Protection provided by Enclosures (IP Code)
BS: 5501-1988	Electrical Apparatus for Potentially Explosive Atmospheres
IEC: 60079-2007	Electrical Apparatus to Explosive Gas Atmosphere
IEC: 60529-2004	Classification of degree of protection provided by enclosures (IP codes)
IEC: 60801-1991	Electromagnetic Compatibility of Industrial- Process Management and Control Equipment
IEC: 61508-2010	Functional Safety of Electrical/Electronic/Programmable Electronic Safety Related Systems
IEC: 61511-2010	Functional Safety – Safety Instrumented Systems for the Process Industry Sector.

b. In case of imported equipment, the standard of the country of origin shall be applicable, if these standards are equivalent or more stringent than the applicable Indian Standards.
c. The equipment shall also conform to the provisions of Indian Electricity Rules & Other Statutory Regulations currently in force in the India.
d. In case Indian Standards are not available for any equipment, Standards issued by IEC/BS/VDE/IEEE/NEMA or equivalent agency shall be applicable.
e. In case of any contradictions between various referred Standards /Data Sheets and statutory regulations, the following order of decreasing priority shall govern:

- Statutory regulation.
- Data Sheets and job specifications.
- Codes and Standards.
- Manufacturer's Standards.

f. The actuator & its associated materials/parts shall be designed, manufactured and tested conforming to latest editions of the applicable Indian Standards and /or API/EI RP except where it has been modified and/or supplemented by these specifications.

4 Vendor Requirements

a. The Vendor must provide the actuator of Specified Make only.

b. The Vendor shall provide confirmation of spare part availability from the actuator manufacturer for the next 15 years.

c. The offered Actuator make/Model shall have proven track record for its satisfactory working for at least last 2-3 years.

5 Technical Specifications of Electro – Hydraulic Actuator

a. 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 the positions indicator, limit 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.

b. The actuator unit shall be double sealed type, watertight and dust proof conforming to IP65 minimum. Any electric/electronic part inside the actuator assembly shall be adequately protected and suitable higher rating of degree of protection shall be provided.

c. The body of actuator shall be of anodized aluminium and all piping to be of SS316. All the fittings shall be of Swagelock/Parker only.

d. Enclosure shall be rated explosion proof Ex'd' and suitable for installation in Zone1 IIA/ IIB, Temperature Class T3 electrical area classification. The actuator shall be sized to guarantee valve closure and provide sufficient thrust to position and fully stroked the valve against the maximum differential pressure that may developed under the specified process and /or start-up conditions. Particular attention shall be paid to unbalanced dynamic forces on the valve disc for actuator sizing, the shut-off differential shall be considered at the full differential pressure. The full differential pressure for the actuator sizing shall be assumed as the maximum upstream pressure with the valve fully closed and downstream pressure as the atmosphere.

e. The operating speed for the valve opening & closing rate shall be at approximately at one – 2 seconds per inches size of the valve.

f. Two selector switches (lockable) shall be provided on the actuator, one for Local/Stop/Remote selection and with pad – lockable for each positions and the other for Open, Close & Stop Commands.

g. Electronic "Latching" shall be provided for the torque sensing system to inhibit torque off during unseating or during starting in mid-travel against high inertia loads. A jammed valve protection circuit shall de-energize the motor after a few second, if no movement occurs after a receipt of a signal to Open or Close.

h. A local LCD display shall be provided for monitoring continuous indication of the actuator position.

i. A separately sealed compartment containing segregated power and control terminal shall be provided. Earthing terminal shall be provided at the external of ROSOV.

a. Actuator Torque Requirement

"Actuator Design Torque" shall be based on maximum valve pressure rating ANSI Class #150 at design temperature and additional safety margin of 25% (1.25x). The actuator shall be capable of opening the valve with the maximum differential pressure across the valve (equal to the maximum specified design pressure on one side atmospheric pressure on the other side).

It shall be based on a valve torque teat as defined in API 6D. Appendix-C.

SN	VALVE	ACTUATOR
1	(Start-to-close torque)/(Start-of-stroke torque close)/(open-to-close break torque)	Spring-Start-Torque (SST) A safety margin of 1.25 x shall be applied on top of the valve start-to-close torque. (i.e. 25% more)

2	Running torque	Spring-Running-Torque (SRT) A Safety margin of 1.25x on top of the required valve running torque shall be maintained (i.e. 25% more)
3	Reseat Torque/(Closing torque)/(End-of-stroke torque)	Spring-End-Torque (SET) A safety margin of 1.25x on top of the valve closing torque shall be applied. (i.e. 25% more)

The Bidder shall specify maximum actuator torque. The Bidder shall specify and tabulate in his quotation the required torque figures for each valve and the delivered torque figures by the actuator. The torque values shall be expressed in Newton meter (N-m) and shall be given for the following valve positions:

- Start to open torque (breakaway torque)
- Lowest running torque during opening of the valve.
- End of opening torque (value fully open)
- Start to close torque (breakaway torque)
- Lowest running torque during closing of the valve.
- End of closing torque (reset torque, value fully closed).

Bidder shall mention in the offer the values of the torque for:

- Valve stems shear torque.
- Maximum torque output of actuators.

5.1 Actuator Utility

a. The Actuator shall be suitable for the following valve:

1	Type of Valve	Triple Offset Butterfly valve
2	Size of Valve	Various Sizes
3	Valve Design	As per specific requirement
4	Valve Pressure Rating	As per specific requirement
5	Installation	Outdoor
6	Location of Valve	Tank body valve
7	Location of FLP Control panel	Outside tank dyke wall
8	Location of Owner Control panel	Control building

5.2 General Requirements

5.3 Summary

a. The actuator shall be suitable for continuous operation under specified ambient & service conditions.
b. The vendor shall provide a statement defining the availability, reliability and maintainability of his equipment in relation to the define product life time expectancy.
c. Design of the actuator should be such that inadvertent access to life parts is avoided.
d. Actuator shall be suitable for operating in tropical climate and under the ambient conditions as per specified.
e. The actuator shall be new and specifically produced against the order.
f. The actuator shall be Electro-Hydraulic unit complete with sealed hydraulic, electronic and termination compartment.
g. The actuator shall be fail safe, type. For fail safe operations, the actuator shall utilize internal spring return mechanism for safe position on loss of power supply and /or ESD.

5.4 Area Classification

Actuator and separate control panel shall be suitable for Class-I, Division-I, Gas Group as per API RP 500 C or Class-I, Division-I, Gas Group-IIA/IIB as per BIS 5572 (Indian Standard).

5.5 Marking

The following shall be clearly marked on the name plate of the actuator:

a. Name of the Manufacturer
b. Model number
c. Input voltage
d. Maximum torque (N-M)setting
e. Gross Weight
f. Year of Manufacturing
g. Actuator tag number as per data sheet
h. Hydraulic oil pressure (Normal/Maximum)
i. Hydraulic oil type
j. Area classification

5.6 Enclosures

The actuator enclosure shall be explosion proof and weather proof suitable for mentioned area classification. Actuator enclosure shall be supplied with fireproof jacket for fire safe operations.

The actuator and integrated control panel shall be water tight with double sealing conforming to min IP65 as per IEC529BS5490.

Any Electric/electronic parts inside the actuator assembly shall be adequately protected and suitable higher rating of protection shall be provided.

The actuator and control panel shall have flameproof designation as EEx(d) IIB T3 CENELEC Norm EN50018, BS5501 certified by BASEEFA UK/UL/FM, USA/SIRA Italy.

5.7 Paint Finish

Actuator and Control panel shall be epoxy painted suitable for exposure at location involving salt spray, high humidity, and temp range of -200 C to +700 C.

The epoxy painting shall pass weathering test as per relevant British Standard.

5.8 Electric Motor

a. Actuator shall be suitable for AC supply voltage of Single (230V AC)/ Three Phase (415 volt) ±10% variation at 50 Hz frequency with ±5% variation.
b. The motor shall have Class 'F' insulation with temp rise limited to Class 'B'
c. Motor shall be housed in a totally enclosed non-ventilating type enclosure.
d. The motor shall be provided with stall detection device to stop the motor, if motor operation is inhibited.

5.9 Auxiliary Contacts

a. The Auxiliary switch contacts shall have a minimum rating of 0.25A, 110V DC Non-inductive.

5.10 Torque & Position Limit Settings

a. "Open" and "Close" position limit settings with adjustable selection shall be provided to ensure correct valve travel.
b. The internal pressure shall be continuously monitored to prevent excessive torque.
c. Four limit settings, two at each end of travel for interlocking/indication, shall be provided.

5.11 Wiring and Terminals

All devices provided in the actuator shall be wired up to the terminal block. The contacts for remote operation and indication shall also be wired up to the terminal block. Minimum 10% spare terminals shall be provided for future interlocks. Internal wiring for power & control circuits shall be appropriately sized for ROSOV actuator rating. Each wire shall be identified at both ends using PVC ferrules. The terminal compartment shall be separated from the inner electrical components of the actuators by means of a watertight seal so that the actuator electrical components are protected from the ingress of moisture & foreign materials when terminal cover is removed during installation & maintenance. Different functional PCB's will be slot specific, & non-interchangeable among themselves to facilitate easy trouble shooting and replacement.

Vendor shall be solely responsible for the compatibility of the actuator with the valve and for the selection and sizing of various electrical devices and components in the actuator.

The actuator shall be provided with minimum three adequately sized cable entries viz. one for power cable and two for control cables. However, the actual number of control cable entries in actuator with 2-wire control system shall be provided based on job requirements as specified in data sheets/ specification for control systems for ROSOV Suitable double compression cable glands shall be provided with each actuator for all cable entries and sealing plugs for all control cable entries. The cable glands and plugs shall be made of Nickel-plated brass.

5.12 Conduit Entries

Party shall indicate offered conduit entries in NPT, as per standard design of Actuator & control panel in the enclosed Data Sheet.

5.13 Cable Glands/ Reducers

Double Compression Flame Proof, Explosion Proof & Weather proof Cable Glands with suitable reducers, shall be supplied. Spare entries shall be plugged with Flame proof Weather proof plugs.

5.14 Control Facilities

The control system shall have remote control facility as a standard feature. The remote control circuits shall be powered from internally derived control supply voltage. It shall also have minimum 4 nos. of alarm status contacts indicating the availability of actuator for remote control/indication for monitoring of the following:

- Loss of one or more phases of power supply.
- Loss of control circuit supply.
- Selector switch in local mode
- Local stop push button set to “Off”.
- Any other local fault/abnormal condition.

6 Emergency Shutdown (ESD)

ESD functionality shall be based on de-energized to trip condition. ESD functionality shall be performed on actuation any of the following conditions:

- Actuation of 24V DC remote command signal from Owner's control system. This shall be isolated from control electronics through opto-isolator.
- Loss of main power.
- Loss of hydraulic power.
- Actuation of local/remote push button
- Other conditions as applicable for ESD

ESD functionality shall close the valve even when the selector switch is on local mode.

After an ESD action, normal operation can be restored after normalization of the process and valve opening or closing as the case may be only after resetting the system through the local pushbutton or depending upon the configuration.

6.1 Field Control Unit

The field unit shall be integral to actuator and shall be powered from the actuator power supply. It shall be configurable locally either with pass word protected in-built key pad or hand held remote configurator. No separate power supply shall be provided for operation of field unit. In booth cases, setting of parameters, there will be no opening of covers, and use of any special tools or instruments.

Two separate backlit 3& ½ LCD displays will be provide for indication of actuator parameters and configurations.

The field control unit shall be able to execute the following minimum operational commands:

- Fully Open/Close the vale.
- Emergency Shut Down (Hardwired contacts from Owner's PLC shall be provided for ESD actuation).
- Emergency shutdown (ESD) signal shall over-ride any other signal command.
- Capability of 2-wire communication with Owner's PLC (through master control station as applicable).

6.2 Configuration Tool

a. The actuator shall have inbuilt facility for configuration and setting of safety parameters.
b. If any external setting tool/ device is required for configuration of settings, the same shall be offered with the actuator & FLP control panel. The external tool shall be intrinsically safe for hazardous area operation.
c. One number of such tool per location shall be integral part of the offer and shall be supplied along with the actuator and FLP control panel.
d. In case the configuration and setting is to be done from push buttons, no separate external tool is to be offered.

6.3 Integral Push Button, Selection and Control Devices

The following local control devices shall be provided integral with the MOV actuator:

- Push buttons for 'Open/Close' selector switch shall be provided. OPEN & CLOSE push buttons should be of Green & Red colour respectively. Close operations shall be push type & Open operation shall be Press & Rotate type.
- Local/ off/Remote Selector switch shall be pad-lockable in each position.
- Local continuous position indication from "Valve fully open" to "Valve fully closed" position, which may be of analogue or digital type using mechanical indication/indicating lamps/LEDs.
- Also the ROSOV shall have provision for closing from Local Push button (Proposed to be provided outside dyke wall).

6.4 Torque and Travel Limit Switches

The limit switches shall be preset. The switches shall be provided with requisite number of potential free contacts for valve actuator operation and for indication on remote panels as specified in data sheet. Instead of mechanical torque limit switches, magnetic pulse counter/encoders to measure and control the stroke of actuation may be provided, wherever this feature exists in manufacturer's design.

6.5 Pressure Measurement

Internal Pressure transducer shall be provided for monitoring the internal hydraulic system pressure and provide alarm for potential stall condition of the valve. The signal of pressure shall be in %age of maximum generated system or actual pressure of 4.20mA current signal.

7 Two Wire Control System

MOV shall be suitable for two wire control system. This actuator shall have individual field units connectable to master control station through a single 2 wire cable loop for control and monitoring. The vendor shall indicate the maximum number of field units can be connected to a master station and maximum distance from field unit to master station. The vendor shall also indicate maximum number of control input and control/status output from each field unit that can be handled through 2 wire control system.

The MOVs should either have General Purpose FCU card embedded for communicating to any make of Master Station or the FCU should be compatible for direct communication on 'Open Type International Standard 2 wire serial communication protocol/MMODBUS for serial communications directly. The following signals shall be available at the control room:

- Valve open
- Valve closed
- Actuator fault
- Field unit fault
- Cable fault
- Monitor relay trip
- Thermostat trip
- Local stop selected
- Local Control selected
- Valve Obstructed
- Valve jammed

Remote control function shall be provided to permit the actuator to:

- Open fully.
- Close fully.
- Assume Emergency Shut Down position.

Each field unit /MOV actuator shall be addressable from master control station through unique address code. All the field settable/adjustable parameters of MOV actuator shall be settable from master control room. Similarly all the indication available on the MOV actuators shall be available at the master control station. Full diagnostic feature of MOV shall be available on master control room. Suitable redundancy shall be provided such that in case of fault in the cable, the field unit continues to communicate with the master control room.

7.1 Wiring and Terminals:

All devices provided in the actuator shall be wired up to the terminal block. The contacts for remote operation and indication shall also be wired up to the terminal block. Minimum 10% spare terminals shall be provided for future interlocks. Internal wiring for power and control circuits shall be appropriately sized for ROSOV actuator rating. Each wire shall be identified at both ends using PVC ferrules. The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal so that the actuator electrical components are protected from the ingress of moisture and foreign materials when the terminal cover is removed during installation and maintenance. The different functional PCB's will be slot specific, and non-interchangeable among themselves to facilitate easy trouble shooting and replacement.

Vendor shall be solely responsible for the compatibility of the actuator with the valve and for the selection and sizing of various electrical devices and components in the actuator.

The actuator shall be provided with minimum three adequately sized cable entries viz. one for power cable and two for control cables. However, the actual number of control cable entries in actuator with 2-wire control system shall be provided based on job requirements as specified in data sheets/ specification for control systems for ROSOV Suitable double compression cable glands shall be provided with each actuator for all cable entries and sealing plugs for all control cable entries. The cable glands and plugs shall be made of Nickel-plated brass.

7.2 Requirements for Hazardous Areas:

Hazardous Area Classification and Protection:

Instruments located in hazardous area shall be certified to meet or exceed the electrical hazardous are defined by Area classification.

The actuator accessories used shall be flame proof and suitable for hazardous are of Zone1, Group IIA/IIB, T3 or better for applications. Additionally all valve associated instruments shall be weatherproof to IP65/PI67/IP68 as applicable. Instruments certified for use in the specified hazardous area classification shall be recognized by authority like FM, CENELEC, PTB, BASSEFA, ATEX, CCOE/PESO etc.

Actuators meant for hazardous areas shall meet the requirements of IS2148. IEC 79 or equivalent International Standards. The manufacturer shall provide valid test certificates issue by a recognized independent test house (CIMFR/ Baseefa / LCIE/ UL/ FM or equivalent) for the offered actuators. All indigenous equipment shall conform to Indian standards and shall have been tested and certified by Indian testing agencies. All equipment (indigenous and imported) shall also have valid statutory approvals as applicable for the specified hazardous locations from Petroleum and Explosives Safety Organization (PESO)/CCE or any other applicable statutory authority. All indigenous flameproof equipment shall have valid BIS license and corresponding marking as required by statutory authorities.

Apart from the nameplate indicating the Tag number a separate nameplate shall also be provided on each actuator to indicate the details of the testing agency (CIMER or equivalent), test certificate number with date, statutory approval number with date, approval agency (PESO/ CCE/DGS or equivalent). BIS license number with date, applicable Gas group and Temperature class etc. the nameplate shall be riveted/ fixed with screws and not pasted. In case any of the standard details listed above are embossed on the enclosures, the same need not be repeated.

Actuator units shall be SIL-2 certified and shall be capable for standalone use in SIL-3 applications, having certification conforming to IEC 61508/ IEC 61511 from TUV/Exida or other accredited international agencies.

8 Inspection, Testing and Acceptance

The equipment shall be subjected to inspection by Owner or by any agency authorized by the Owner. Manufacturer shall furnish all necessary information concerning the supply to Owner. During the course of manufacturing the purchaser or his authorized representative shall be free to visit the works and assess the progress of work and the manufacturer shall render him all possible assistance to do so.

Following routine & acceptance tests shall be carried out at the manufacturers' works under his supervision and at his own cost for all the actuators in line with QAP approved by the Owners.

a. Routine Test: Functional and calibration test for torque and limit switches
b. Acceptance Tests:
   - Response time test.
   - Variation of supply voltage.
   - Variation of frequency.
   - Tests for motor (As per relevant IS/IEC).
   - Test on output shaft.
   - Ant other test as applicable.

8.1 Following Tests Shall Be Provided Prior To Shipping

a. Actuator operation, cycle (open-close) each valve with its actuator at least five times, for proper actuator operation. Verify that valve position coincides with position indicators.
b. Opening-closing position.
c. Actuator output speed & Open-Close time.
d. Actuator travel setting.
e. Operational torque test as per API 609. The maximum measured torque shall be less than 75% of the design torque specified by the valve manufacturer for actuator sizing.
f. FAT and SAT for the system.
g. Two weeks' notice shall be given to Owner for witnessing the final testing of the compete assembly to ensure satisfactory operation of the actuators. Type test certificates and BIS license, where applicable, shall be shown to the inspection agency on demand. The certificates and BIS license must be valid at the time of dispatch.

Test certificates of bought-out components shall be shown to the inspection agency on demand.

8.2 Packing and Dispatch

All the equipment shall be divided into multiple sections for protection and ease of handling during transportation. The equipment shall be properly packed for the selected mode of transportation i.e. by ship, rail or trailer. The equipment shall be wrapped in polythene sheets before being placed in crates/cases shall have skid bottoms for handling. Special notations such as 'Fragile', 'This side up', 'Center of Gravity', 'Weight', 'Owner's particulars', 'PO no' etc. shall be clearly and indelibly marked on the packages together with other details as per purchases as purchase order.

The equipment may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains and high ambient temperature

unless otherwise agreed. In order to prevent movement of equipment /components within the crates, proper packing support shall be provided. A set of instruction manuals for erection, testing and commissioning, a set of operation and maintenance manuals and a set of final drawings shall be enclosed in a waterproof cover along with the shipment.

These precautions shall be read in conjunction with similar specifications for valve.

8.3 Spares & Special Tools

a. Vendor shall submit list of standard spares of Actuators along with unit rates with validity for 2 years.
b. Vendor shall submit list of special tools if required for maintenance of actuator along with unit rates with validity of two years.
c. The above shall be submitted in a separate sealed envelope as mentioned in the price bid formats.

8.4 Commissioning Assistance

Vendor shall arrange to depute his commissioning engineer to Fuel Farm of Owner as covered in Purchase Order for supervising commissioning activities of actuators without any extra charges. The representative shall ensure that the actuator is commissioned successfully.

8.5 Warranties

a. Vendor shall provide warranty for the performance of Actuators for 18 months from date of dispatch or 12 months from date of installation, whichever is later.
b. In addition, vendor shall also include comprehensive extended warranty of 3 years commending from the date of expiry of warranty as per clause 8.5 as above.
c. During the entire warranty period as above, the vendor shall carry out the preventive checks (half yearly visits) besides attending to break downs within a period of 72 hours. The scope of the vendor shall also include the spares, tools & tackles etc. visit of service personnel and other traveling/boarding expenses replacement of defective parts free of cost, if any. However, suitable assistance (unskilled labour and lifting tools) if any, required for attending the service/repairs will be provided by the Owner.

9 Data Sheet for Electro-Hydraulic Actuator

9.1 Electro-Hydraulic Actuator For Butterfly Valve Triple Offset, Fail Safe & Fire Safe Butterfly Valve.

Table 9.1: Insert Table Title here

Description		Characteristics
A) SITE CONDITIONS		
1	Altitude of the Location	Less than 1000 meters above Mean Sea Level.
2	Operating Temperature	-2.2° C / 50° C
3	Design Temperature	(-) 5° C to (+) 60° C
4	Average Humidity	Maximum 73%. & Min.25%
5	ROSOV Tag Numbers	It will be intimated after award of contract.
6	Fail Action	Fail to Close
B) SYSTEM CONDITIONS		
7	Valve Type	Triple Offset, High Performance, Metal to Metal Seated, Non-Rubbing, Torque Seated, Double Flanged Ends, Quarter Turn, Anti-Static, Anti-Blow Out Stem Arrangement Butterfly Valve.
8	Nominal Bore	6" to 26" NB (150 mm to 650 mm)
9	Supply Voltage & Frequency	415 ± 10%, 50 Hz ± 5%, 3-Phase AC Electric Power Supply.
10	System Earthing	Solidly Earthed.
11	Location of Installation of Valve/(s)	Above Ground
12	Valve Manufacturing Standard	API/EI 609
C) OPERATING ENVIRONMENT		
13	Area Classification	Zone 1.
14	Gas Group	IIA/IIB.
15	Temperature Class	T3.
16	Construction	Flame Proof Ex (d).
17	Ingress Protection	IP 65.
18	Painting	Epoxy Based.

Description		Characteristics
19	Fire Proofing Required	No.
20	ROSOV Tag No.	It will be intimated after award of contract.
D)	VALVE DUTY, MODE OF CONTROL AND DEVICE FOR CONTROL	
21	Fully Open & Fully Closed	Yes.
22	Partially Open & Partially Closed	No.
23	Control Requirement	Local and Remote for All ROSOVs.
24	Local/Remote/Off Selector Switch On ROSOV Actuator	Required.
25	Compatibility For Interfacing With 2-Wire Control System	Required.
26	Setting Adjustable Parameters Of Actuator (for 2-Wire Control System)	From Field & Remote Through Master Control Station / PLC For 2-Wire Control.
27	Continuous Position Indication:	
a)	Local	Mechanical/Digital Indication Required
b)	Remote – Potentiometer/ Transducer For Remote Continuous Indication	Required in Control Room Through Master Control Station.
c)	Intermediate Travel Limit Switch	Required
d)	Potentials Free Contact For Indication On Remote Panel & Other Interlocks	
i)	For Valve Open Position	Required
ii)	For Valve Closed Position	Required
iii)	For Remote Indication Or Position Of Local/Remote Selector Switch	Required
iv)	For Availability Of ROSOV Actuator Remote Operation (Contact From Monitoring Relay)	Required
v)	Remote Emergency Stop Push Button For Stopping Actuator	Required
vi)	DCS / PLC Interface For Remote Control Indication	Remote Indication Required For All ROSOVs.
vii)	Indication:	
	Open / Close Limit Switches	Required.
	Local Position Indicators / LEDs	Required.

Description		Characteristics
28	Time Of Operation:	
a)	Opening	60 Seconds As Per Design Of Valve.
b)	Closing	1 – 2 Seconds Per Inch Diameter Of The Valve.
29	Make Of ROSOV Electro-Hydraulic Actuator	Preferred Makes: Rotork, Biffi, Auma, Limitorque Or Equivalent.
30	Double Compression Glands & Plugs (For Unused Entries) To Be Supplied With The Actuator	Flame & Weather Proof. Material Of Construction: SS 316L
E) SPECIAL REQUIREMENTS		
53	Safety Integrity Level	SIL3 capable for actuated valve when it is Type A device
54	SIL Certification	IEC 61508
55	Third Party Certification	TUV/EXIDA

General Notes:

1. Process Fluid is Jet A1 Fuel.
2. NA denotes Not Applicable.
3. For Area Classification Zone, Gas Group and Temperature Class as indicated above – Refer IS / IEC Standards.
4. The Owner shall provide Single Point Power Supply to the Actuator as per B) 9 above.
5. The Vendor shall furnish complete data as per this Data Sheet for each Actuator for ROSOV along with the offer.
6. Remote Input Signals for Opening / Closing / Stopping the ROSOV shall be provided through the Momentary Closing of separate Potential Free Contacts in Owner's Panel. Necessary controls, required for running the motor for the complete Opening / Closing sequence of the valve using input signals, shall be provided by manufacturer in the Actuator.

9.2 Vendor Data Requirement for Electro-Hydraulic Actuator for ROSOV

Table 9.2: Insert Table Title here

SN	Description	With Bids	Post Order		Final Docs
			For Review	For Records	
1	Vendor Drawing/ Document Submission Schedule	Yes			Yes
2	List of deviations, if any, to MR Requirements	Yes	Yes	Yes	
3	Data Sheets (duly filled in)	Yes	Yes		Yes
4	G.A and mounting Details of Actuators	Yes			Yes
5	Wiring and Connection Diagrams	Yes		Yes	Yes
6	QA Plan of Vendor	Yes	Yes	Yes	Yes
7	Shop Inspection Plan and Testing Procedure	Yes	Yes	Yes	Yes
8	Test Records			Yes	Yes
9	Type Test Certificates for Flameproof/ Explosion Proof equipment	Yes	Yes		Yes
10	Recommended Maintenance Spares with Prices	Yes			Yes
11	Equipment Storage Procedure				Yes
12	Data Books / Manuals				
a)	Installation Manual and Standard		Yes		Yes
b)	Operating / Maintenance Manual				Yes
c)	Catalogues / Brochures indicating complete Technical Details and Data for Offered Actuator for Evaluation.	Yes	Yes		Yes
13	Details of Fire roofing, if specified in Data Sheet	Yes		Yes	Yes

Notes: The Vendor shall furnish Soft Copy/(ies) of all drawings in AutoCad Version 14.0 and all documents in MS Office 2000, as part of Final Documentation.