Hellenic Gas Transmission System Operator S.A.
357-359 Messogion Av., GR 152 31 Halandri
Tel.: 213 088 4000
Fax: 210 674 9504
Email: desfa@desfa.gr

TECHNICAL SPECIFICATION

HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

PNEUMATIC ACTUATORS

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Table of Contents

1 SCOPE

1.1 GENERAL

This Specification covers the minimum requirements for the design, fabrication and supply of Pneumatic Actuators. Pneumatic Actuators are usually used for actuation of process valves in natural gas systems.

1.2 ADDITIONAL INFORMATION

Additional information may be given in the project's requirements, basic design documents and drawings, and should be read in conjunction with this Technical Specification.

Any conflict between requirements of this Technical Specification, basic design documents and drawings, Standards, Material Requisition and Datasheet shall be referred to Owner for clarification before proceeding with fabrication of the subject part.

2 REFERENCES

Items/equipment to be supplied under this Specification shall comply with the requirements of the latest edition of the Codes, Standards, Specifications and Practices as applicable, except if specifically, modified hereafter:

2.1 REFERENCE DOCUMENTS

- Technical Specification DSF-SPC-QAC-005 [Shop Inspection of Equipment and Materials for NGT Project]
- Technical Specification DSF-SPC-MEC-006 [External Painting]

2.2 REFERENCE CODES AND STANDARDS

- 2014/68/EU [Pressure Equipment Directive (PED) of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment Text with EEA relevance]
- 2014/34/EU [Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (recast) Text with EEA relevance (ATEX)]

- 2014/35/EU [Low Voltage Directive (LVD) of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits Text with EEA relevance]
- EN 12954 [Cathodic protection of buried or immersed metallic structures - General principles and application for pipelines]
- EN 60529 [Degrees of protection provided by enclosures (IP code)]
- EN 60947-5-6 [Low-voltage switchgear and control gear - Part 5-6: Control circuit devices and switching elements, DC interface for proximity sensors and switching amplifiers (NAMUR)]
- ANSI/UL 1709 [Rapid Rise Fire Tests of Protection Materials for Structural Steel]
- DVGW/VDE AfK Recommendation No 5 [Cathodic corrosion protection in connection with potentially explosive areas]

3 GENERAL REQUIREMENTS

3.1 OPERATION PERIOD

Actuator shall be able to be operated 1,000 times per year over a period of at least 10 years.

3.2 CONSTRUCTION

Propellant: Gas from the pipeline. The feed lines shall be fitted with above ground valves and manometers.

Alternatively, compressed air may be used.

Actuator: The actuator shall be equipped with a filter and a condensate separator for the incoming gas (air). For ESD & PSD valves gas pneumatic actuators, actuation by natural gas shall be used, through a relevant instrument gas supply system with gas dryers, filters and a reservoir buffer vessel.

Unless otherwise specified the actuator shall be mounted vertically above the valve.

With valves mounted below ground, the actuator shall be above ground. The actuator may not hinder access to the valve's drain, bleed-off or lubrication lines.

Actuators shall be equipped with manual override options. Manual override options might be of simple jackscrew, de-clutchable manual handwheel, or hydraulic type. The actuators of the ESD & PSD valves, shall be equipped with a hydraulically operated manual-override system, independent from the pneumatic actuation, for local open/close operation.

Especially for the small dia. valves (Ø<6”), manual override will be performed with the use of hand wheels.

Actuators shall provide the means for selection and operation in "local" and "remote" modes.

The actuator shall be filled with necessary lubricant for operation, and the construction shall be such that there will be no oil leakage during storage in an unfavorable position.

Spring return diaphragm or double - acting piston actuators shall be selected according to the process data, operating time required, valve size, etc. For the ESD/PSD valves, the double acting piston design shall be selected, as far as their actuators are concerned.

Double acting piston actuators shall require an external volume tank and trip system to achieve the desired failure position. Springs can be added to double-acting piston actuators to provide the required failure mode.

Spring return actuators shall be preferably used in priority for Emergency Shut-Down Valves (ESD). Fail locked actuators shall be selected in cases of a process fluid which should not be disturbed by a supply failure and the valve is not part of the safety process system.

As an exception, fail locked actuators may also be used in cases in which safety is preferred over process continuation, provided that during the case of an

emergency the valve will be driven to its failure position following a man-made decision (operator initiated), either locally or remotely. In this case, a separate buffer vessel must be foreseen, as a reservoir in case of loss of supply pressure. This buffer vessel will be dedicated exclusively to the actuator use.

The actuator shall be sized to meet all control, shut off, and valve leakage requirements. Shut off capabilities should be investigated at conditions of maximum differential pressure. Closing time shall be less than 3 sec.

The actuator shall employ scotch yoke mechanism preferably with 90° rotation with a tolerance of ±3%.

The actuator shall be equipped with inductive (non contact) proximity sensors (ELOT EN 60947-5-6) for open / close signaling.

Additionally, the actuator shall be provided with suitable valve position mechanical indicator.

The actuator housing shall be made of Stainless steel, cast aluminum / aluminum alloy or CS with appropriate corrosion protection.

In particular, for ESD valve applications, materials that shall be used for all moving parts and sliding surfaces which are vital to the trouble - free functionality of the actuator, in case of an emergency, shall be corrosion - resistant.

Reservoir: The buffer vessel that shall be used as a gas/air reservoir in case of loss of supply pressure shall be sized to have a capacity of at least two operating cycles (2 open and 2 close).

It shall be fitted with a safety and a filler valve so that it can be charged in position with a compressor, in case of air supply.

Compressor (compressed air propellant): Compressed air may be derived from either a rotating

or a reciprocating compressor.

3.3 FIRE PROOFING

The actuators meant for ESD valves use shall be protected by an intumescent epoxy coating, or a K-MASS fire proofing system molded directly on the actuator casing with uniform thickness. This method should only be applied at the manufacturer's factory in order for the disassembling and assembling of this system for maintenance reasons to be facilitated. The associate signal cables shall be fire-resistant.

Fire-retardant cables are required for all PSD valves.

Actuator's accessories shall be protected by a K-MASS or intumescent epoxy coating fire proofing system molded directly on the accessories metal enclosure, junction box, cable tray etc.

In any case, fire proofing shall limit the temperature rise of the protected equipment to a maximum of 90°C after at least 15 minutes continuous total exposure to fire with a flame temperature of 1100°C, and a heat flux of 313900 kcal/hr-m^2 (50000 Btn/hr-ft^2), under the test conditions of ANSI/UL 1709.

The Manufacture/Vendor shall verify that the actuator will still remain operable under these conditions.

The fire proofing and heat tracing system should not interfere with the normal performance of the Cathodic Protection system.

3.4 HEAT TRACING

All outdoor installed impulse lines of pneumatic actuators shall be electrically heat traced and insulated to maintain a gas temperature of at least +5° C, when the ambient temperature drops to -20° C. The Joule-Thomson effect should be taken into consideration.

The external insulation of the actuators will be designed in such a way so that it will be easily removable for inspection and maintenance purposes.

3.5 ELECTRICAL PARTS

All electrical devices (actuator control device, proximity sensor, etc.) shall be suitable for use in a hazardous area and in accordance with its classification study. The applicable norm shall be the EU Directive 2014/34/EU ATEX.

Connections and enclosures shall have a minimum protection class of IP 65 (EN 60529), as far as outdoor installations are concerned. For indoor installations, IP 54 protection class can be accepted.

3.6 EQUIPOTENTIAL GROUNDING REQUIREMENTS

The actuator shall be provided with an earthing plate, which in turn must have a permanent electric continuation with the actuator's body (e.g. welded or casted), in order to be used for the equipotential grounding of the actuator.

In the case which the actuator shall be installed to a cathodically protected valve, according to EN 12954, an insulation flange with gasket kit together with the associated electrical internal insulation materials (that may include the actuator’s driving axle down to the valve) shall be provided, in order to achieve a complete electric isolation between the body of the valve and the actuator. Furthermore, the actuator must be equipotentially bonded to the common earthing system.

The above-mentioned insulation materials shall be of high dielectric and electrical resistance that fulfill the requirements of class I according to DVGW/VDE AfK Recommendation No 5. Also, the above-mentioned insulation materials shall be protected via suitable surge protection devices, against any surge / overvoltage event.

3.7 TESTING

The valve and actuator shall, after assembly, undergo an operational test under conditions which shall correspond to the operating ones. The Manufacturer shall record the results from all operational tests which shall perform.

Final acceptance of the valve with the actuator shall take place after the valve has been installed and tested for operation.

3.8 TYPE TEST

The actuator assembly shall be type test approved by an Accredited Inspection Body.

3.9 SURFACE TREATMENT

Not applied to ESD valves actuators. Refer to Tech. Specification DSF-SPC-MEC-006.

3.10 MARKING

A stainless-steel marker plate shall be fixed to the actuator. This marker plate shall indicate all the relevant technical data, including the following:

Manufacturer's name, actuator type and serial number, year of built, contract and item tag numbers.

3.11 INSPECTION AND CERTIFICATION

Inspection will be performed by an Independent Accredited Inspection Body appointed by Owner. Inspection requirements are defined in the following documents.

a. Basic design documents.

b. Tech. Specification DSF-SPC-QAC-005.

c. Relevant project specifications.

d. Inspection clauses of applicable Standards.

3.12 COMPLIANCE WITH THE EU DIRECTIVES

Instrumentation that complies with the "New Approach" directives shall be provided with:

a. A physical CE marking and other information as required by the relevant EU directives.

b. A declaration of conformity which lists all the directives with which the product complies.

c. Any other information specified by the directive, e.g. user instructions.