Gas Industry Standard

GIS/VA1:2019

Specification for

Fluid Powered Actuators for Two Position (Open/Closed) Quarter Turn Valves

Contents

Foreword

Gas Industry Standards (GIS) are revised, when necessary, by the issue of new editions. Users should ensure that they are in possession of the latest edition. Contractors and other users external to Gas Transporters should direct their requests for copies of a GIS to the department or group responsible for the initial issue of their contract documentation.

Comments and queries regarding the technical content of this document should be directed in the first instance to the contract department of the Gas Transporter responsible for the initial issue of their contract documentation.

This standard calls for the use of procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Compliance with this engineering document does not confer immunity from prosecution for breach of statutory or other legal obligations.

Mandatory and non-mandatory requirements

For the purposes of a GIS the following auxiliary verbs have the meanings indicated:

can indicates a physical possibility;

may indicates an option that is not mandatory;

shall indicates a GIS requirement;

should indicates best practice and is the preferred option. If an alternative method is used then a suitable and sufficient risk assessment needs to be completed to show that the alternative method delivers the same, or better, level of protection.

Disclaimer

This engineering document is provided for use by Gas Transporters and such of their contractors as are obliged by the terms of their contracts to comply with this engineering document. Where this engineering document is used by any other party, it is the responsibility of that party to ensure that the engineering document is correctly applied.

Brief history

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1. Scope

1.1 This Gas Industry Standard specifies the requirements for fluid powered actuators, to be supplied with or without control systems, for use with two position (open/closed) quarter turn valves manufactured to the requirements of GIS/V6. The Standard is sub divided into two parts:

1) PART A – GENERAL
2) PART B – TYPE TESTING

1.2 This standard applies to actuators of the following types:

a) Direct gas operation.
b) Combined gas/hydraulic operation.
c) Direct hydraulic operation from an external source.
d) Direct hydraulic operation by manual hand pump.

2. Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2.1 Regulations

ATEX 94/9/EC, *Equipment and protective systems intended for use in potentially explosive atmospheres.*

CDM, *Construction (Design and Management) Regulations, 2015.*

DSEAR, *The Dangerous Substances and Explosive Atmospheres Regulations of 2002*

PED 2014/68/EU, *Design, manufacture and conformity assessment of pressure equipment and assemblies with a maximum allowable pressure PS greater than 0,5 bar.*

2.2 British and European standards

BS EN 286-1, *Simple unfired pressure vessels designed to contain air or nitrogen. Pressure vessels for general purposes.*

PAS 5308-1, *Control and instrumentation cables. Specification for polyethylene insulated cables.*

PAS 5308-2, *Control and instrumentation cables. Specification for PVC insulated cables,*

BS 5467, *Electrical cables. Thermosetting insulated, armoured cables of rated voltages 600/1000 V and 1900/3300 V for fixed installations. Specification.*

PD 5500, *Specification for unfired fusion welded pressure vessels*

BS EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories.*

BS EN 10226-2, *Pipe threads where pressure tight joints are made on the threads. Taper external threads and taper internal threads. Dimensions, tolerances and designation*

BS EN 50288-7, *Multi-element metallic cables used in analogue and digital communication and control-Part 7: Sectional specification for instrumentation and control cables.*

BS EN 60079-0, *Explosive atmospheres. Equipment, General requirements.*

BS EN 60079-1, *Explosive atmospheres. Equipment protection by flameproof enclosures "d"*

BS EN 60079-7, *Explosive atmospheres. Equipment protection by increased safety "e".*

BS EN 60079-11, *Explosive atmospheres. Equipment protection by intrinsic safety "i".*

BS EN 60079-14, *Explosive atmospheres. Electrical installations design, selection and erection*.

BS EN 60529, *Degrees of protection provided by enclosures (IP code).*

BS EN 61386-1, *Conduit systems for cable management. General requirements.*

BS EN ISO 80079-36, *Explosive atmospheres. Non-electrical equipment for explosive atmospheres. Basic method and requirements*

2.3 Engineering Equipment and Materials Users Association (EEMUA) document

101, Lifting points - *a design guide.*

2.4 Gas Industry Standards

GIS/DAT12, *Aluminium based light metals and paints in potentially hazardous areas.*

GIS/V6, S*teel valves for use with natural gas at normal operating pressures above 7 bar for sizes above DN15.(supplemrentary to EN 13942).*

GIS/V8, *Specification for valves (25 mm nominal size and below) for instrumentation and control purposes.*

2.5 Gas Transporter Specifications

*/SP/E/28, *Specification for the design of pressure regulating installations with inlet pressures not exceeding 100 bar.*

*/SP/PA/10, *Technical specification for new and maintenance painting at works and site for above ground pipeline and plant installations.*

*/PM/PT/1, *Management Procedure For Pressure Testing Pipework, Pipelines, Small Bore Pipework And Above Ground Austenitic Stainless Steel Pipework*.

*/SP/PV3, *Technical specification for pressure vessels manufactured to BS 5500 in carbon, ferritic alloy and austenitic stainless steels + Amendment no.1 (January 1995).*

*/SP/EL/13, *Specification for Earthing.*

- Gas Transporters will each have their own specifications normally in the referenced format */SP/XX/No, where * is replaced by the Gas Transporters reference e.g. T for National Grid, or SGN, WWU etc. followed by the specification initials and number reference.

2.6 Institution of Gas Engineers and Managers Standards

IGEM/SR/25, *Hazardous area Classification of Natural Gas Installations*

IGEM/TD/1 Supplement 1, *Handling, transport and storage of steel pipe, bands and fitting*

IGEM/TD/13, *Pressure regulating installations for Natural Gas, Liquefied Petroleum Gas and Liquefied Petroleum Gas/Air.*

NOTE

Where no date is shown, the latest edition of each standard and specification shall apply.

3. Terms and definitions

For the purposes of this document, the following definitions apply.

3.1

Actuator

Includes all ancillary equipment specified in the completed GIS/VA/1: Part A data sheet.

3.2

Contractor

The person, firm or company with whom a Gas Transporter enters into a contract to which this standard applies, including the Contractor's personal representatives, successors and permitted assigns.

3.3

FAT

Factory Acceptance Test

3.4

Grade level

A suitable standing surface which enables an easy access and view of the field equipment for monitoring and operation.

3.5

PVC

Polyvinyl Chloride

3.6

SAT

Site Acceptance Test

3.7

SIL

Safety Integrity Level

3.8

SIS

Safety Instrumented System

3.9

SWDS

Safe Working Design Study

3.10

XLPE

Cross linked polyethylene.

PART A – GENERAL

4. Field of Application

4.1 Actuators manufactured to the requirements of this standard shall be suitable for use in Zone 1 areas with Group II A gases as a minimum, and shall comply with the DSEAR, ATEX and PED regulations and be appropriately certified. The purchaser will specify whether they will accept self-certification or require independent certification.

4.2 The actuators and all their accessories, as specified on the data sheet (see Annex A), shall be suitable for external installation in an exposed external situation at coastal and inland sites throughout the UK in all prevailing weather conditions.

4.3 The actuators shall function over an ambient temperature range of -20°C to 60°C.

4.4 Actuators shall be supplied complete with all accessories (e.g. pressure reducers, relief valves, filters) and the complete control system, necessary to comply with the requirements of this standard, as specified on the data sheet (see Annex A).

4.5 The actuators shall be supplied complete with all mounting bolts, lifting lugs, locating lugs, dowels, adapter plates and any other fittings necessary to make them ready for assembly on to the associated valve.

4.6 The actuators shall be supplied so that the connections, instrumentation and controls, including junction boxes and terminations are accessible from finished site ground level, without the need for temporary and/or permanent access platforms. The height and orientation of the valve stem / interface is specified on the data sheet (see Annex A, Section One, line 19 and 20).

4.7 Where the actuators are to be installed in compressor sites, there may be other specifications which takes precedence over GIS/VA1.

5. Data Sheet

5.1 This standard shall be read in conjunction with the completed data sheet (see Annex A) relevant to the particular enquiry or order.

6. Design – General

6.1 The means of operating the actuator shall be as follows and as specified on the data sheet (see Annex A, Section One, line 21):

a) direct gas operation,

   i) with hand wheel manual override

   ii) with hydraulic manual override

or

b) combined gas and hydraulic operation in which gas pressure is transferred either directly or indirectly to a hydraulic system (see Annex C for further details), or
c) direct hydraulic operation from an external source, or
d) Direct hydraulic operation by manual hand pump.

The Contractor shall identify on the data sheet (see Annex A, Section Three, line 52) which type is being offered.

6.2 The Contractor shall provide, at the time of tendering, three sets of the following information:

a) Completed data sheets.
b) General arrangement drawings showing outline dimensions including mounting details, relative positions of auxiliary equipment and the weight of all equipment (actuator and attachments).
c) Control schematic and wiring diagrams.
d) Certificates for all electrical equipment.

6.3 Gas Transporters shall approve the design, materials and manufacturing procedures of the actuator and control system in accordance with Part B of this standard.

Once a particular design has received approval, any changes in design, materials or manufacture shall be notified and approval in writing shall be obtained before the modified actuator and control system is tendered or supplied. The relevant approval tests shall be repeated when performance is considered to be affected.

Where changes are proposed, the requirements specified in 6.2 and 6.4 shall be supplied to the Gas Transporter for approval.

6.4 When specified on the data sheet (see Annex A, Section One, line 25), the Contractor should supply the following indicative additional information at the time of tendering:

a) Detailed sectional arrangement drawings showing all parts with reference numbers and materials identified.
b) Recommendations for installation of the actuator.
c) Maintenance and operating instructions (including details of any lubricants required).
d) Volume of gas consumed per stroke of valve (scm).
e) Full parts list and recommended spares.
f) Design drawings and relevant calculations for pressure containing parts and principal parts only.
g) Fabrication details.

6.5 Documentation for pressure vessels associated with the actuator shall be in accordance with 6.14.

6.6 Parts of the actuator housing, including any gearbox, which can inadvertently become pressurized, shall either be designed to withstand the pressure, or have a suitable reseating pressure relieving device fitted.

6.7 The Contractor shall provide any pressure regulation and relief valves necessary to ensure that the maximum design pressure of the equipment is not exceeded. Provision shall be made for the attachment of gauges for the setting up and ongoing maintenance of regulators. Parts of the actuator housing that can inadvertently become pressurized shall be either designed to withstand the pressure or a suitable relieving device shall be fitted.

Where pressure relief devices are fitted and have routine maintenance periods specified, these shall be mounted in a positions such that they are easily accessible and removable, if so required for maintenance.

The Contractor shall supply any filtering or gas pre-treatment devices necessary to ensure correct operation of the actuator.

6.8 The design shall be suitable for operation with the power source supplied in the pressure range specified on the data sheet (see Annex A, Section One, line 4).

6.9 The maximum torque output of the actuator, measured at the valve stem, shall be less than the maximum stem torque permitted by the valve manufacturer.

Where the power and/or hand pump systems could provide a torque in excess of the maximum permitted stem torque, over torque protection shall be provided by means of pressure relief devices. Where mechanically coupled devices are employed, over torque protection shall be provided by means of a readily accessible shear pin, clutch or key. Any key between the actuator and valve shall not be considered for this purpose.

6.10 Where a hydraulic system is used, the system shall be so designed that there is no loss of fluid when the valve is operated. The Contractor shall indicate any such losses on the data sheet (see Annex A, Section Three, line 64).

The actuator shall be so designed that at the end of its stroke, all hydraulic and/or pneumatic pressure is released unless it is established that pressure has to be sustained to maintain valve position.

Hydraulic systems shall be fitted with suitable bleed plugs to release trapped air. The plug design

shall be such that it will release pressure before complete removal. Manual indent types are not permitted.

6.11 A robust positively mounted mechanical indicator shall be fitted such that an operator at grade level can clearly view the position of the valve under all operational conditions.

6.12 The actuator shall be fitted with mechanical stops. For nominal valve sizes above 100 mm, the actuator shall have adjustable stops. Where specified on the data sheet (see Annex A, Section One, line 23) non-adjustable stops are acceptable for nominal valve sizes of 100 mm and below.

6.13 Actuator parts requiring lubrication shall be provided with facilities for periodic lubricant injection. The recommended period between lubrication shall be stated by the Contractor on the data sheet (see Annex A, Section Three, line 58).

6.14 Where a gas-over-oil tank is used, or where a gas storage reservoir is specified on the data sheet (see Annex A, Section One, line 15), it shall comply with the requirements of either:

a) PD 5500 and */SP/PV/3, or
b) BS EN 286: Part 1 if air or nitrogen is specified as the operating medium on the data sheet (see Annex A, Section One, line 3).

6.15 It is the responsibility of the Contractor to ensure that the actuator supplied is suitable in all respects, for both the operational requirement and for assembly with the specified valve by reference to the valve contractor specifications.

6.16 The actuator shall be certified in accordance with PED 2014/68/EU.

6.17 The actuator assembly shall mechanically comply with BS EN ISO 80079-36.

6.18 Electrical equipment and enclosures shall have an approved standard of weather protection in accordance with Table 1.

TABLE 1 - Approved standard of weather protection for electrical equipment

Equipment	BS EN 60529 Index of Protection (minimum)
Externally mounted	IP 65
Mounted in cabinet	IP 54
Cabinet	IP 55

6.19 The design of the actuator mounting shall be such that the complete assembly will form a rigid unit giving a positive drive under all conditions with no possibility of free movement between the valve body and the operating mechanism.

6.20 All locating keys included in the actuator or in any attachments shall be so fitted as to render them positively located in any actuator attitude.

6.21 All mounting bolts, adaptor plates, key and key engagement, etc., shall be designed to transmit the maximum torque available from the actuator.

6.22 The Contractor shall supply details of the mounting showing clearly the length of the key or spline engagement. The design shall ensure that adequate engagement is maintained between the valve and actuator, including any stem extension.

6.23 The actuator shall be removable from the valve without any disturbance to the valve. The stem drive keys, where supplied, shall be drilled and tapped to facilitate removal without detriment to their function.

Where specified on the data sheet (see Annex A, Section One, line 24), two keyways, diametrically opposed, shall be provided.

6.24 Lifting lugs shall be supplied and comply with the requirements of EEMUA Document 101.

7. Electrical requirements

7.1 General

7.1.1 All electrical equipment to be used shall have been designed for operation from a 24 V (-15% to +20%) dc supply unless otherwise stated in the data sheet (see Annex A, Section One, line 22), and shall be continuously rated at the maximum of the range. The Contractor shall not earth either pole of the 24 V dc wiring.

Barriers required for intrinsically safe circuits shall be supplied or specified by the Gas Transporter.

7.1.2 All electrical equipment supplied shall be certified in accordance with Directive 94/9/EC (ATEX) as Group II, Category 2 equipment and be in accordance with BS EN 60079 Parts 0, 1, 7 and 11. The equipment shall be installed to comply with the requirements of BS EN 60079-14 for Group IIA Gases in a Zone 1 hazardous area. Gas Transporters will indicate on the data sheet (see Annex A, Section Two, line 37) whether the installation requires flameproof equipment Ex (d) or is intrinsically safe requiring equipment to Ex (i) or increased safety Ex (e). Subject to approval junction boxes only may be Ex (e) or Ex (d) systems.

7.1.3 The standard to which the equipment has been certified (if other than BS EN 60079 Part 0) shall be notified to the Gas Transporter by the Contractor using the data sheet (see Annex A, Section Three, lines 66 and 67).

7.1.4 Where limit switches are specified on the data sheet (see Annex A, Section Two, line 36), they shall be fitted with a minimum of one set of changeover contacts which shall be used to indicate 'end of travel' at the open and closed positions.

Switches shall be rated for 5 A at 24 V dc non-inductive, except where intrinsically safe systems are specified when the limit switches shall be designed and manufactured for switching the low energy intrinsically safe circuits.

7.1.5 Where external installation is specified on the data sheet (see Annex A, Section Two, line 34), all equipment shall be of an approved weatherproof type, unless it is mounted within a weatherproof enclosure in accordance with Table 1.

7.1.6 All cable entry points shall be tapped 20 mm or 25 mm ISO thread, as specified on the data sheet (see Annex A, Section Two, line 44), to BS EN 61386-1 or fitted with a minimum number of reducing adapters. Where flameproof equipment has been specified only one appropriately certified reducing adapter is permitted in any cable entry point.

7.1.7 All glands shall be compatible with the cable and its selection shall be in accordance with the IP rating as per its application. Consideration shall also be given to special requirements such as fire protection.

7.1.8 All unused cable entries shall be fitted with weatherproof stopper plugs. Where flameproof equipment has been specified, the stopper plugs shall be appropriately certified.

7.1.9 All items of electrical equipment shall be earth bonded in accordance with */SP/EL/13.

7.2 Cabling and wiring - general

7.2.1 All cabling and wiring shall be adequately supported to prevent chafing and mechanical damage occurring. All cabling shall be terminated at a minimum number of junction boxes compatible with the required certification.

7.2.2 Self-adhesive cable ties shall not be permitted.

7.2.3 All cable entries should be bottom entry and terminals should be readily accessible. All cables subject to wind/rain shall be terminated in such a manner to provide a drip loop.

7.2.4 All wiring shall be installed to facilitate easy removal of components.

7.2.5 Cabling shall be installed to comply with 7.1.2.

7.2.6 Where external cabling is used (without conduit), cables shall be type XLPE single wire armoured, black PVC sheathed manufactured to BS 5467. Cables should be constructed with the use of extruded bedding.

Power cables shall be suitably sized for the duty required; individual cores shall be of multi-strand construction and not less than 1.5 mm² cross-sectional area.

Control wiring shall be of multistrand construction and comply with BS EN 50288-7 or PAS 5308: Part 1 or Part 2.

Intrinsically safe circuits, galvanized steel wire armouring shall have an overall PVC light blue colour sheath and comply with BS 5467.

7.2.7 Where applicable, the installation shall comply with the requirements of BS EN 60079.

7.2.8 Cables of different hazardous area protection concepts shall be segregated by at least 50mm.

7.3 Cabling and wiring – external

7.3.1 All cables shall be adequately supported and secured along their length (typically supported every 300 mm) with suitable cable clips, particular attention being paid to the minimum internal radius of the bends. Termination of the cables shall be by means of glands suitable for the equipment/installation and include correctly sized PVC over sheaths. All glands shall fully maintain the appropriate certification specified on the data sheet (see Annex A, Section Two, line 37).

7.3.2 Where conduits are used in a defined hazardous area as per ATEX requirements, they shall be of an approved flameproof type, complying with the appropriate flameproof certification and should be installed with the minimum number of joints. Pulled bends shall be used in lieu of fittings wherever possible. Fittings with inspection covers shall not be used.

7.4 Cabling and wiring – internal

7.4.1 Where standard components (e.g. solenoids) are supplied with internal wiring, the contractor/supplier should give the Gas Transporter prior notice of tagging and colours used.

7.4.2 Where multistrand terminations of conductors are used, they shall be insulated crimp compression type fittings and comply with the type of protection being used. Terminations shall be made using the correct crimping tool.

7.4.3 All wiring should be of sufficient length to allow re-termination at least twice.

7.4.4 Wiring terminal identification shall correspond to details supplied by the Gas Transporter at the time of the order.

7.4.5 All wiring shall be identified using ferrules containing black lettering on a coloured background. Split ferrules shall not be used.

7.4.6 Terminal blocks shall be of non-pinch screw type and designed for accepting crimp terminations.

These terminal blocks shall be manufactured from shatterproof materials.

8. Design Operation

8.1 When specified on the data sheet (see Annex A, Section One, line 15), the storage reservoir(s) shall be provided to enable the actuator to complete at least three number of operations or as specified on the data sheet (see Annex A, Section One, line 16), assuming the reservoir supply is isolated. One operation is defined as a quarter turn of the valve.

8.2 The Contractor shall ensure that the actuator supplied for a particular valve is capable of delivering at least 1.25 times the maximum torque required to operate the valve at the required valve operating pressures and differential pressures specified on the data sheet (see 6.9 and Annex A, Section One, lines 11 to 14 inclusive). This level of torque should also be sufficient to cover the attached valve break and running torques.

8.3 When stating the values of the maximum differential pressure, careful consideration shall be given to the maximum operating pressure of the pipeline in which the valve and actuator are to be

installed and to the differential pressures that may be experienced when operating the valve under emergency conditions as well as during planned activities (see Annex A, Section One, line 12). The maximum differential pressure for design purposes on block valve sites is the maximum operating pressure minus the minimum operating pressure of the pipeline. The actuator shall be provided with a means of manual operation such that one person can operate the actuator under the conditions specified in 8.2.

The manual operation may be achieved by:

a) hand wheel
   Or
b) Hydraulic hand pump.

The maximum force to be applied at the rim of the hand wheel or at the end of the operating lever shall not exceed 350 N. Suitable means shall be provided to prevent unauthorized site operation.

8.4 When the requirement for a specific operating time is specified on the data sheet (see Annex A), the actuator shall be sized to operate within the limits specified on the data sheet. OR if the valve requirement is for ESD (Emergency Shutdown) as identified on the Data sheet (see Annex A, Section One, line 17), then the valve shall close within 1 sec response time for each 25mm of valve diameter e.g. 150mm diameter valve = 6 seconds.. The Contractor shall state the actual time of operation in the data sheet (see Annex A, Section Three, line 59 and 60).

8.5 Where adjustable speed controls are provided, they shall be of a design that prevents the adjusting screw from being fully removed and shall be fitted with locknuts or equivalent devices.

8.6 The actuator shall be capable of being operated and serviced in the attitude specified on the data sheet (see Annex A, Section One, line 19 and 20).

9. Control Types

9.1 The actuator may be of the piston, vane or similar type and shall be designed to remain in the selected position, either open or closed, until the alternative position is selected.

9.2 Where an actuator receives a command to Open or Close, this operation shall be undertaken upon loss of that signal. The actuator shall work in an autonomous manner.

9.3 The actuator shall operate using one of the following modes, and as specified on the data sheet (see Annex A, Section One, lines 26 and 27):

a) Type A - On initiation of the open or close command, the valve shall move directly towards the desired position under all conditions and states of the valve.
b) Type B - On initiation of the open or close command, the valve shall move directly to the desired position after completion of the current operation when in an intermediate position.
c) Type C - On initiation of the close command, the valve shall move directly to the closed position and shall remain closed until being manually reset locally.
d) Type D - Spring return to either open or closed position on removal of holding signal (see Annex A, Section One, line 27).

9.4 Local or local/remote selection shall be provided as specified on the data sheet (see Annex A, Section Two, line 35).

9.5 When specified on the data sheet (see Annex A, Section One, line 30), the control equipment shall be supplied in accordance with clause 11.

10. Materials

10.1 The actuator materials shall be capable of working with the power source specified on the data sheet (see Annex A, Section One, line 3).

10.2 Hydraulic fluid shall be compatible with the materials of construction. Hydraulic fluids in contact with natural gas shall be such that they do not form emulsion or sludge.

10.3 Any valve used on the actuator control system shall comply with the requirements of the applicable Gas Industry Standard GIS/V6 GIS/V8.

10.4 In the selection of materials, service conditions are such that unimpaired performance is required to be maintained even though the actuator may be operated only annually.

10.5 Cognisance should be paid to the risks of using light metal alloys in hazardous areas. Any light metal alloys used shall comply with the requirements of GIS/DAT12, for fixed apparatus in Zone 1 hazardous areas. Vent and bleed systems shall not be constructed using light metal materials such as aluminium, magnesium and titanium or their alloys.

10.6 All labels shall be made from non-corrodible material and shall be affixed using non-adhesive means.

11. Control cabinets and Control systems for fluid powered actuators

11.1 General

11.1.1 The provision of a control cabinet shall be specified on the data sheet (see Annex A, Section Two, line 39).

11.2 Cabinet design

11.2.1 The cabinet shall be designed to enclose all controls and equipment, including solenoids, gas regulators, relief valves, hydraulic relief valves, speed controls, remote/local isolation valves, main isolation valve and hand pump. Sealed items such as gas motors and gas hydraulic bottles may be mounted externally on the cabinet. Any exceptions to this shall be authorised by the Gas Transporter in writing.

11.2.2 The cabinet shall be constructed of stainless steel or other non-corrodible material and be weatherproof to BS EN 60529, level IP 55 as a minimum. The internal equipment shall be mounted with suitable stiffening members. Where the cabinet is constructed of sheet stainless steel, a minimum thickness of 2 mm shall be used. The cabinet shall be free of any sharp edges or burrs and non-functional protrusions.

11.2.3 The doors shall be lockable and fitted with a manual stay to retain in at least the 90° open position. Fittings shall be provided to hold the door in the closed position. A lock configuration suitable for a 12 mm shank padlock shall be provided. Hinge pins and door fittings shall be non-corrodible.

11.2.4 Cabinets shall be provided with lifting lugs and these shall be arranged such that it does not cause instability during the lift and affect the cabinet integrity.

11.3 Cabinet mounting

11.3.1 The cabinet shall be mounted either directly on the actuator or adjacent to the actuator, as specified on the data sheet (see Annex A, Section Two, line 40), at a distance not greater than 2 m, or as otherwise specified on the data sheet (see Annex A, Section Two, line 41). The control cabinet shall always be located such that the operator is able to carry out all functions from grade level. Consideration should be made to the outputs from the design study to ensure safe access and egress.

11.3.2 Where the cabinet is mounted separately from the actuator, at a height to give optimum position for operation of the hand pump, suitable floor mounting steelwork shall be provided which shall be sufficiently rigid to prevent undue movement. The steelwork may be extended to provide support for vent pipes as specified in 11.5.

11.3.3 The cabinet mounting shall be constructed of stainless steel.

11.4 General cabinet ventilation

11.4.1 General cabinet ventilation shall be provided by means of vents and drains each of 175 mm^2 open area and at the rate of one vent and one drain for each 0.75 m of cabinet width. The

vents and drains shall be designed to exclude insects.

11.5 Venting

11.5.1 All items that vent or bleed shall be separately piped to exhaust outside of the cabinet.

11.5.2 Vents (such as from gas motors, relief valves, tanks and cylinders) shall vent vertically upwards at a minimum height of 3 m above ground level or 1.45 m above the top of the cabinet, whichever is the greater. Such vents shall be fitted with vent flaps. Vent pipes shall be adequately supported. Due regard shall be paid to the optimum height of the hand pump in order for the operator to work from grade level.

11.5.3 Bleed holes shall be weatherproof and designed to exclude insects. All other vents and bleeds shall be piped above the top of the cabinet and zoned in accordance with IGEM/SR/25, fig 5 or 6, as appropriate. Such vents shall be terminated with a weatherproof trap designed to exclude insects.

11.6 Vent flaps

11.6.1 Vent flaps shall be designed with a positive bias to close. Bearings shall be maintenance free. The flap face shall be totally covered with a suitable non-metallic material to preclude metal-to-metal contact when the flap closes. A suitable non-metallic buffer shall be provided in the open position.

11.6.2 The flap shall be electrically bonded to the vent pipe with stainless steel braiding.

11.6.3 Total exclusion of rainwater shall be ensured using a lip around the circumference of the flap.

11.7 Interlocks

11.7.1 Mechanical interlocks shall be provided to ensure that when the cabinet door/doors are shut, all controls shall be in the correct position for remote control, unless otherwise specified on the data sheet (see Annex A, Section Two, line 42). Suitable interfering devices, mounted on the door, are acceptable.

11.8 Access

11.8.1 The equipment shall be so designed that individual items of equipment can be removed via the cabinet door(s) without removal of other equipment. Equipment may be grouped together to form removable modules.

11.9 External connections

11.9.1 Piping - Items to be connected to on site should be grouped together and shall be threaded to BS EN 10226-2 (female).

11.9.2 Electrical cabling - A suitable length of cable shall be provided, unless otherwise specified on the data sheet (see Annex A, Section Two, line 45), and wired into the cabinet for connection to the actuator (see 11.3.1). Where the cable passes through the cabinet, it shall be provided with a suitable weatherproof gland plate.

11.10 Wiring diagram

11.10.1 The wiring diagram for the system shall be as specified on the data sheet (see Annex A, Section Two, line 43).

11.11 Control system

11.11.1 Pipework and Fittings

a) Control system pipework and fittings should comply with the requirements of */SP/E/28.
b) On existing installations, stainless steel tube and compression fittings should be selected to ensure compatibility and interchangeability with existing site fittings (see Annex A, Section Two, lines 31 and 32).
c) On new installations, stainless steel tube and compression fittings should be metric O.D. sizes and compression fittings should be of the twin ferrule type fittings (see

Annex A, Section Two, lines 31 and 32).

d) Compression fittings from different manufacturers shall not be mixed.

11.11.2 Remote signal disablement

a) Adequate protection shall be provided for personnel using the actuator on local control. This may be achieved by isolation of the cabinet from remote signals either by a remote/local selector switch or by a disabling switch operated by opening of the cabinet door(s). Local indication shall indicate remote or local control mode.
b) If a remote/local selector is used, it shall be interlocked in accordance with 11.7.

11.11.3 Over pressure protection (General)

Systems shall be so designed that no item of equipment can receive a pressure in excess of its rated working pressure. Where regulators are used to reduce pressure, relief valves shall be provided to protect any downstream equipment not capable of accepting the full inlet pressure. Such relief valves shall have a capacity in excess of the fault capacity of the regulator. When determining the number of safety devices required, reference should be made to section 8 of IGEM/TD/13. The maximum power source pressure of the gas shall be as specified on the data sheet (see Annex A, Section One, line 4).

11.11.4 Over pressure protection (Hydraulic)

Hydraulic over-torque relief valves shall not vent to atmosphere but shall form part of a closed system.

11.11.5 Power Gas Isolation

The power gas isolation valve shall be of a type that can be locked in the closed position.

11.12 Test connections

An adequate number of gauge and connection points shall be provided to permit the setting and testing of regulators and relief valves.

11.13 Labels

11.13.1 All labels shall be manufactured from non-corrodible material, rigid and permanently fixed using non-adhesive means in the required position.

11.13.2 A label specifying operating instructions together with a layout diagram shall be affixed to the inside of the door. Labels identifying all the items of equipment specified in the operating instructions shall be provided on or adjacent to the equipment.

All connections shall have labels identifying their function.

11.13.3 A label shall be affixed to the cabinet providing the following details:

a) Manufacturer.
b) Year of supply.
c) Actuator type to be controlled.
d) Pressure settings for relief valves and regulators.
e) Unique Gas Transporter identification number.

12. Inspection and test

12.1 General

The tests specified in 12.3, 12.4 and 12.5 and all inspection performed at the Contractor's works shall be carried out on all actuators and the results shall be recorded. The Contractor shall ensure that all inspection activities, including final inspection, have been formally planned and actioned prior to the request for Gas Transporter inspection/release.

The Contractor shall provide a Factory Acceptance Test (FAT) procedure and schedule for review and agreement by the Gas Transporter. The FAT shall not take place until the agreement is received from the Gas Transporter.

The Contractor shall provide a Site Acceptance Test (SAT) procedure and schedule for review and agreement by the Gas Transporter. The SAT shall not take place until the agreement is received from the Gas Transporter.

12.2 Documentation

The Contractor shall obtain all materials tests and hazardous area electrical certification for the actuator and its associated equipment and shall make the certification available for examination prior to the time of inspection. All tests shall be recorded and certified on suitable test certificates, which shall be supplied as part of the release documentation.

12.3 Works pressure test

All pressure containing components, Including pipework and fittings, shall be tested to 1.5 times maximum design pressure. Test pressure shall be maintained for 30 min, during which time there shall be no loss in pressure or visible signs of leakage. Care shall be taken when selecting the pressure medium in case the residue affects the storage or functioning of the component.

Gas control systems that cannot be satisfactorily evacuated and dried of hydraulic fluid shall not be subjected to a hydrostatic pressure test but shall be pneumatically pressure tested in accordance with */PM/PT/1.

Individual parts subjected to pressure in service but not fully tested after assembly shall be pressure tested prior to assembly.

When carrying out pressure tests, care shall be taken to avoid excessive pressure differentials across components not designed to withstand them or that the requirements of individual design codes are not exceeded.

All relief valve and regulator pressure settings shall be checked and recorded.

12.4 Works electrical test

All wiring shall be checked for insulation, polarity and continuity between terminals, using approved instruments.

An approved megohmmeter operating at 500 V shall be used to measure the insulation resistance. This resistance shall not be less than 1 MΩ.

Insulation tests shall be carried out with conductors disconnected from instruments or equipment susceptible to damage from the test voltage specified above, care being taken to discharge the cable to earth before reconnecting.

12.5 Works operational test

The Contractor shall carry out static torque tests for each direction of operation at maximum and minimum power source pressures to ensure compliance with the values indicated on the data sheet (see Annex A, Section Three, line 4).

All control functions, local and remote, shall be proved to function correctly in accordance with the requirements of this standard.

13. Painting

13.1 All actuator components, excluding grease nipples, injection points and gearbox/housing pressure relief vents, exposed to the atmosphere shall be painted in accordance with */SP/PA/10. Other painting systems and materials may be proposed to the Gas Transporter for consideration and subjected to an appropriate trial and approval. Stainless steel components, pipework and enclosures shall not be painted. Information/data plates shall be lightly greased and not painted.

14. Marking and Transport

14.1 All equipment supplied in accordance with this standard shall be suitably and individually identified on a non-corrodible nameplate(s) permanently attached to the actuator.

14.2 The information to be given to identify the items shall be as follows:

a) Relevant Gas Transporter order number, or Gas Transporter unique identifier where advised.
b) Designation GIS/VA1 (or other abbreviation agreed with a Gas Transporter).
c) Contractor's name.
d) Model number.
e) Serial number.
f) Year of manufacture.
g) Weight of equipment.
h) Make, type and size of matching valve.
i) Maximum operating pressure of the power source.
j) Maximum torque at working pressure (see g) above).
k) Hazardous area approval authority, classification and certificate numbers
l) Type of hydraulic oil (where appropriate).

14.3 All actuators shall be individually identified. Small associated components (e.g. nuts, bolts and washers) shall be suitably bagged and tagged and the packaging securely attached to the actuator.

14.4 Each separate item of equipment, or package of items, shall bear a stainless steel tag impressed or embossed with letters and numerals not less than 6 mm high giving the following information:

a) Equipment or tag number.
b) Gas Transporter purchase order number and lot number.
c) Package number and total number of packages.
d) Serial Number
e) Weight of package.
f) Make and size of valve for which supplied.
g) Any other information specified in the order as being required.

Tags shall be secured to loose items of equipment with stainless steel wire and to wooden packing cases with nails or tacks.

14.5 Prior to transport, all flanged openings shall be protected with steel or wooden covers secured by not less than two bolts. Plugs or caps shall be used to protect open screwed connections.

14.6 All unpainted surfaces, excluding Exd flamepaths which should be protected with an approved non-hardening grease / compound, such as flange faces, threads, etc., shall be protected with an approved rust preventative compound of a type that is easily removable at site by washing with an approved solvent. Guidance on the approved rust preventative compound and removal solvent may be obtained by reference to IGEM/TD1: Supplement 1.

14.7 Equipment shall be packed to ensure protection from damage caused by handling and/or from weather when stored in the open at site for a period of up to three months. Details of preservation procedure shall be supplied, together with recommendations for extended storage, should this prove necessary.

15. Ergonomics

15.1 Valve actuator operation and maintenance shall be ergonomically designed in line with relevant industry standards and/or best available industry practices.

16. Health & Safety requirements

16.1 General

16.1.1 The Contractor that develops the design to meet this standard, is designated as the Principal Designer under the CDM Regulations.

16.1.2 The Contractor shall identify hazards, mitigate risks and provide information on an ongoing basis from the outset; and this shall be demonstrable.

16.1.3 The Contractor shall cooperate and communicate with Engineers (Designers) and the (CDM Principal Designer) and shall be pro-active to ensure matters of health, safety and environment are considered, risks mitigated and issues and provisions communicated.

16.2 Safe working design study (SWDS)

16.2.1 The Contractor shall review each item of equipment, including instrumentation, forming part of the complete actuator and control system to ensure that all operational, inspection and maintenance activities are fully considered.

16.3 Safety integrity level (SIL) target setting

16.3.1 Safety Integrity Level assessment should be conducted on all Safety Instrumented Systems (SIS) associated with the actuator and control system. The Vendor is to provide all specific Probability of Failure on Demand (PFD) data supporting certification for the actuator and control equipment required to demonstrate the SIL target within Annex A, Section Two, line 48.

16.3.2 All possible hazards shall be identified and the SIL targets defined by a Gas Transporter for the unprotected risk, assigned against safety, security of supply, financial and environmental.

17. Reliability & Availability

17.1 The actuator and control systems should be designed to provide high reliability, resilience and integrity.

17.2 The loss of any one sub-system, control module or component should have a localised effect only and should not result in a failure of the actuator and control systems which should continue to operate. Where possible single point failures shall be avoided.

17.3 The Contractor shall determine, provide and document the following, together with their effects on the overall availability of the actuator and control systems

a) Recommended planned maintenance of the actuator and control systems
b) The reliability of the actuator and control systems and the associated Mean Time Between Failures (MTBF).

PART B - TESTING

18. Type Testing

18.1 General

18.1.1 The type testing specified in this section is additional, and supplementary, to the inspection and tests specified in Part A of this standard.

19. Type Test Sheets

19.1 This part of the standard shall be read in conjunction with the completed Type Test sheets, i.e. the test requirements summarised in Section One and the test results summarised in Section Two of Annex B.

20. Test Facilities

20.1 The test facilities shall be accredited to BS EN ISO/IEC 17025.

21. Submission of Actuators for Type Testing

21.1 A detailed type test procedure in accordance with this standard shall be submitted for the actuator being tested, by the Contractor, to the Gas Transporter prior to commencement of testing.

21.2 Prior to type testing, the Contractor shall ensure that the actuator has been designed, manufactured and tested in accordance with Part A of this standard. All documentation and certification required by that standard shall be supplied.

22. Selection of Sizes for testing

22.1 The size of actuators for type testing shall be selected by the Gas Transporter. The testing shall be carried out by the Contractor and witnessed by the Gas Transporter, or by an independent laboratory accredited to BS EN ISO/IEC 17025:2000.

22.2 Approval of one size of actuator in a particular range of actuators of the same type does not necessarily confer approval of the whole range.

23. Pre-Test Documentation

23.1 The following documents shall be submitted to the Gas Transporter in a complete documentation package, prior to commencement of type testing:

a) All relevant pre-submission correspondence.
b) Full documentation as required by VA1: Part A, 6.2, 6.4 and 12.1.
c) The agreed type test schedule (see 19.1).

24. Confirmation of data

24.1 Checks shall be made to ensure that the actuator supplied complies with the certification, documentation and installation requirements applicable to it.

24.2 The results of the type testing shall be compared with the requirements of Part A of this standard, its completed standard data sheet and the published actuator specification.

24.3 Any deviation found during the type testing shall result in the tests being suspended and the Gas Transporter shall be informed for a decision on whether the tests should be recommenced or terminated.

25. Materials Testing

25.1 Gas Transporters require materials testing of the actuator to ensure that the materials fully comply with the certification supplied. Such tests may require the actuator parts to be tested to destruction.

26. Visual Inspection

26.1 The actuator shall be checked visually against the drawings and literature supplied, in accordance with Part A of this standard. A close examination of the construction details shall be carried out. Areas likely to present maintenance problems shall be reported to the Gas Transporter.

27. Dimension Inspection

27.1 Outline dimensions, including mounting arrangements, shall be checked against the drawings and literature supplied in accordance with Part A of this standard.

28. Assembly and Commissioning

28.1 The actuator shall be assembled on to a test rig and commissioned in accordance with the documentation as required by Part A of this standard.

28.2 With no resistance torque applied to the actuator, all control functions shall be checked for correct operation.

29. Static Torque Tests

29.1 Static output torque using power source pressure

29.1.1 The static output torque at the actuator quarter turn output shaft shall be measured in both operating directions at the 0° and 90° positions and intermediate measurements at 15° intervals. Following this, the static output torque shall be measured at the extremities of the available travel, with the limit stops and limit switches prevented from functioning.

The tests shall be carried out at the maximum and minimum power source pressures (see Annex A, Section One, line 4).

The maximum static output torque shall also be measured at the power source relief valve set pressure.

29.1.2 The following measurements shall be taken and recorded during the tests specified in 29.1.1:

a) Static output torque measured at the quarter turn output shaft.
b) Actuator quarter turn output shaft angular position.
c) Power source pressure.
d) Actuator hydraulic pressure (where applicable).
e) Any other measurements as specified on the data sheet.

29.1.3 The following information shall be presented graphically:

a) Measured static output torque (see 29.1.2 a) versus angular position (see 29.1.2 b).
b) Measured static output torque (see 29.1.2. a) versus angular position (see 29.1.2 b)
Predicted static output torque

29.1.4 The following information shall be tabulated:

a) Measured static output torque (see 29.1.2 a) versus power source pressure (see 29.1.2 c).
b) Measured static output torque (see 29.1.2. a) versus power source pressure (see 29.1.2 c).
Predicted static output torque

29.2 Static output torque using hand pump if fitted

29.2.1 The force at the end of the hand pump lever shall be measured at the same positions and intervals as specified in 29.1.1 while producing the associated maximum static output torque as measured in 29.1.1.

29.2.2 The maximum static output torque shall be measured at 350 N lever force and/or at the hydraulic system relief valve set pressure.

29.2.3 The measurements taken and recorded during the tests specified in 29.2.1 and 29.2.2 shall include:

a) Static output torque.
b) Angular position.
c) Hand pump lever force.
d) Actuator hydraulic pressure.

29.2.4 The static output torque versus angular position information shall be presented graphically.

29.2.5 The following information shall be tabulated:

a) Measured static output torque versus hand pump lever force.
b) Hand pump lever force versus actuator hydraulic pressure.

29.3 Static output torque using hand wheel if fitted

29.3.1 A force of 350N shall be applied to the hand wheel rim and the static output torque at the quarter turn output shaft shall be measured at the same positions and intervals as specified in 29.1.1.

29.3.2 The measurements taken and recorded during the tests specified in 29.2.1 shall include:

a) Static output torque measured at the quarter turn output shaft.
b) Actuator quarter turn output shaft angular position.
c) Hand wheel rim force (constant 350 N).
d) Other measurements as required by the Gas Transporter.
e) Any other measurements as specified on the data sheet.

29.3.3 The static output torque (see 29.3.2 a)) versus angular position (see 29.3.2 b)) information shall be presented graphically and in tabular form.

30. Operation Tests

30.1 Operation using power source

30.1.1 The time of operation in both directions shall be recorded at the maximum and minimum power source pressures (see Annex A, Section One, line 4) and, where applicable, intermediate pressures, and operated at various resistance torques from zero to 80% of the minimum value of the maximum measured static output torque curve (see 29.1.3).

Sufficient torque settings shall be chosen to produce the graphs specified in 30.1.3.

30.1.2 Measurements taken and recorded during the tests specified in 30.1.1 shall include:

a) Operating time.
b) Operational resistance torque.
c) Power source pressure.
d) Other measurements as specified on the data sheet.

30.1.3 Graphs of operating time/operational resistance torque for each power source pressure shall be produced.

30.2 Manual operation

30.2.1 The number of strokes of the hand pump or revolutions of the hand wheel required to operate the actuator in both operating directions shall be measured using a resistance torque equal to 80% of the minimum value of the maximum measured static output torque curve (see 29.1.3 a)).

31. Dynamic Tests

31.1 Dynamic life test

31.1.1 Dynamic life tests shall be carried out at a torque of at least 80% of the minimum value of the maximum measured static output torque curve at maximum power source pressure, the actuator shall be operated through 500 cycles (open/close) with the maximum power source pressure.

The following information shall be recorded continuously during testing:

a) Actuator fluid pressure.
b) Cycle time.
c) Output torque, measured at the quarter turn output shaft.
d) Power source pressure.
e) Actuator quarter turn output shaft angular position

Additionally, every 25 cycles, a graph of output torque (see 31.1.1 c) versus angular position (see 31.1.1 e) shall be produced and, where applicable, oil levels shall be checked.

31.1.2 Any deviation in the above parameters being monitored during the dynamic life test shall be investigated.

31.2 Examination

All moving parts and sliding surfaces shall be inspected, both visually and dimensionally, before and after the dynamic tests, and details shall be recorded.

32. Reservoir Tests

32.1 Where the actuator is supplied with a gas storage reservoir, it shall be capable of operating the actuator through at least three number of complete cycles or as specified on the data sheet (see Annex A, Section One, line 16) against the maximum operating torque, without topping-up the reservoir.

The following information shall be recorded:

a) Reservoir pressure.
b) Actuator operating pressure (where different from a) above).
c) Operating torque.
d) The time for the operating cycle to be completed.

33. Body Relief Valve Test

33.1 The pressure relief device fitted to the actuator body or gearbox shall be tested to determine the pressure at which it will operate and it's repeatability at this pressure set-point is to be demonstrated as1 initial and 2 repeatability.

34. Mechanical Stop Test

34.1 The limit switches shall be prevented from operating and the actuator shall be stalled against the mechanical stops at the power source relief valve pressure. This procedure shall be repeated using the hand pump up to the hydraulic relief valve setting. Following the tests, an inspection shall be made and any damage reported.

35. Anti-Rotation Tests

35.1 The Contractor shall demonstrate that the actuator cannot be driven from the valve spindle.

36. Environmental Tests

36.1 The whole actuator shall be subjected to dust, water and low temperature tests in that order. The test specified in 36.4 shall be applied immediately after 36.3. Cleaning or drying shall not be allowed.

36.2 A dust test shall be carried out in accordance with BS EN 60529 and the Index of Protection specified in Part A of this standard for the item.

36.3 A water test shall be carried out in accordance with BS EN 60529 and the Index of Protection specified in Part A of this standard for the item.

36.4 A low temperature test shall be carried out with an exposure to an ambient temperature of -20 °C. The actuator shall be allowed to reach a surface temperature of -20 °C and this shall then be maintained for a minimum period of 24 h. The actuator shall then be tested to the requirements of 29.1 and 29.2 at the positions of maximum and minimum output torque and the operational test specified in clause 30.

37. Reporting and Documentation

37.1 The reported results of type testing shall be submitted to the Gas Transporter in a complete documentation package containing the following as a minimum;

a) All pre-submission correspondence.
b) Any modifications arising during the type test.
c) Fully completed data sheets.
d) Complete parts list assembly and detail drawings.
e) The agreed type test schedule.
f) Results of approval testing, listing any exceptions or deviations.

38. Variants

38.1 A contractor may only propose variants to this standard where the text indicates that variants would be considered by the Gas Transporter.

Annex - A Standard Data Sheet for Valve Actuators to VA1: Part A

SECTION ONE – TO BE COMPLETED BY THE GAS TRANSPORTER

1 Gas Transporter enquiry/order No …….. Lot No ……

2 Actuator manufacturer …… Identification No ……

3 Power source (see 9.4) Natural Gas ☐
Nitrogen ☐
Hydraulic Fluid ☐
Other ……..

4 Power source pressure (see 6.8 & 11.11.3): Maximum …… bar Minimum ….. bar

5 Valve manufacturer

6 Valve order no (if known)

7 Valve type Ball ☐ Plug ☐ Other

8 Valve nominal bore ……mm

9 Valve rating (Class 600, 300 or 150) ……

10 Valve breakaway torque …….. Nm Valve running torque …… Nm

11 Maximum valve operating pressure (see 8.2) …….. bar

12 Maximum differential at maximum valve operating pressure (see 8.2) ……. bar

13 Minimum valve operating pressure (see 8.2) …….. bar

14 Maximum differential at minimum valve operating pressure (see 8.2) ……. bar

15 Gas storage reservoir required (see 6.14 & 8.1) Yes ☐ No ☐

16 Number of valve operations required (see 8.1) ……

17 ESD (Emergency Shut Down) valve and therefore time to fully close to be no greater than 1 sec for each 25mm of valve diameter (see 8.4) Yes ☐

OR

18 Process valve Time of operation to close Maximum …… s Minimum …… s

First Issue	Date	By	Rev	Date	By	Rev	Date	By	rev	By	
Order /Enquiry					Title			Plant/Project			
Data sheet number		Sheet	….	of	……						

SECTION ONE - CONTINUED

19 Position of valve stem (see 4.6 & 8.6) Horizontal ☐ Vertical ☐

45º above horizontal ☐ Other ……

AND

Height of valve stem extension (4.6 & 8.6) …….. mm

20 Position of Pipeline (see 4.6 & 8.6) Horizontal ☐ Vertical ☐

45º above horizontal ☐ Other ……

21 Operating type (see 6.1) Direct gas with hand wheel manual override ☐

Direct gas with hydraulic manual override ☐ Gas/Hydraulic ☐ External Hydraulic ☐

Direct hydraulic with manual hand pump ☐ Contractors option …….. ☐

22 Electrical power supply other than 24V (7.1.1) ☐

Specify Voltage and Range limits ☐ Phase ☐

Wires ☐ Hz ☐

23 Non-adjustable stops permitted for valves 100 mm and below (see 6.12) Yes ☐

No ☐

24 Two keyways required (see 6.22) Yes ☐ No ☐

25 Additional documentation required (see 6.4) Yes ☐ No ☐

26 Control type (see 9.3) A ☐ B ☐ C ☐ D ☐

27 If type D (see 9.3) Open ☐ Close ☐

28 Position of valves on loss of motive power (Freeze, Open or Close ……

29 Position of valves on loss of control signal (Freeze, Open or Close) ……

30 Control system to be supplied by contractor (see 9.5) No ☐ Yes ☐

First Issue	Date	By	Rev	Date	By	Rev	Date	By	rev	By	
Order / Enquiry				Title				Plant / Project			
Data sheet number			Sheet	……	of	……					

SECTION ONE - CONCLUDED

31	Stainless Steel Tube and Compression Fittings (see 11.11.1)	Metric	☐	Imperial	☐
32	Stainless Steel Compression Fittings (see 11.11.1)	Single ferrule	☐	Twin Ferrule	☐

33 Other general requirements ……..

……...

First Issue	Date	By	Rev	Date	By	Rev	Date	By	rev	By	
Order / Enquiry				Title				Plant / Project			
Data sheet number			Sheet	…….	of	……					

SECTION TWO – TO BE COMPLETED BY THE GAS TRANSPORTER IF ELECTRICAL EQUIPMENT OR CONTROL SYSTEM IS REQUIRED

34	External installation (see 7.1.5)	Yes	☐	No	☐
35	Control type required (see 9.4)	Local	☐	Local/Remote	☐
36	Limit switches required (see 7.1.4)	Yes	☐	No	☐
37	Electrical equipment (see 6.2d, 7.1.2 & 7.3.1)			Flameproof Ex (d)	☐
				Intrinsically safe Ex (i)	☐
				Increased safety Ex (e)	☐
38	Separate solenoids for open & closed control required	Yes	☐	No	☐
39	Cabinet enclosed controls (see 9.5 & 11.1)	Yes	☐	No	☐
40	Cabinet mounted on actuator (see 11.3.1)	Yes	☐	No	☐
41	Specify distance of actuator to control cabinet (see 11.3.1)	..... m			
42	Position of interlocks. (see 11.7)	.....			
43	Wiring diagram drawing number (see 11.10)	.....			
44	Thread required at cable entry (see 7.1.6)	20 mm	☐	25mm	☐
45	Interconnecting cabling required (see 11.9.2)	Yes	☐	No	☐
46	Actuator Finish	.....			
47	Gland Certification requirements	.....			
48	SIL Target requirements (see 16.3)	.....			
49	SAT & Commissioning required	Yes	☐	No	☐
50	Other requirements	.....			
		.....			

First Issue	Date	By	Rev	Date	By	Rev	Date	By	rev	By	
Order/Enquiry				Title				Plant/Project			
Data sheet Number				Sheet	....	of	....				

SECTION THREE – TO BE COMPLETED BY THE CONTRACTOR

51 Contractors designation ……

52 Operating type (see 6.1) Direct gas with hand wheel manual override ☐

Direct gas with hydraulic manual override ☐ Gas Hydraulic ☐ External Hydraulic ☐

Manual Hydraulic ☐ Contractors option …….. ☐

53 Maximum torque capability (see 6.9 and 8.2) …….

54 Torque at power pressure (data sheet line 4) (see 12.5.1) Max ……Nm Min …..Nm

55 Valve breakaway torque ….. Nm Valve running torque …… Nm

56 Valve operating torque at pipeline pressure (see 8.2) Max ……Nm Min …..Nm

57 Valve maximum permitted stem torque (see 6.9): ……Nm

58 Recommended period between lubrication (see 6.13) ……..

59 Actual time of Actuator Operation, fully open to fully closed (see 8.4) ……..s

60 Actual time of Actuator Operation, fully closed to fully open (see 8.4) ……..s

61 Time to charge the system from empty ……..s

62 Number of storage reservoirs ……..

63 Type of hydraulic fluid (see 6.10) ……..

64 Type of hydraulic fluid (see 6.10) …… ml Or None ☐

65 Does the type of protection fully comply with data sheet line 37? Yes ☐ No ☐

If No, state differences ……

66 Electrical certification (see 7.1.2) ……..

67 Standard other than BS EN 60079 Part 0 (see 7.1.3): Specify ……

68 Competent certifying authority (see 7.1.3) Specify ……

First Issue	Date	By	Rev	Date	By	Rev	Date	By	rev	By	
Order/Enquiry				Title				Plant/Project			
Data sheet number			Sheet	…	of	…					

Annex - B Type Test Requirements for Fluid Powered Actuators to VA1: Part B

SECTION ONE –TO BE COMPLETE BY THE GAS TRANSPORTER

Gas Transporter order No .....

Unique Identifier .....

VA1:Part B data sheet No .....

Manufacturer: .....

TYPE A ☐ TYPE B ☐ TYPE C ☐ TYPE D ☐

(see VA1:PartA)

Size/|Designation .....

First Issue	Date	By	Rev	Date	By	Rev	Date	By	rev	By

Test No	Item	Clause Ref	Additional information
1	Pre Test Documentation	23	
2	Confirmation Of Data	24	
3	Visual Inspection	26	
4	Dimensional Inspection	27	
5	Assembly And Commissioning	28	
6	Torque Test. Powered	29.1	
7	Torque Test. Pup/Hand wheel	29.2 / 29.3	
8	Operation Test.Powered	30.1	
9	Manual Operation Test	30.2	
10	Dynamic Life Tests	31.1	
11	Examination	31.2	
12	Reservoir Tests	32	
13	Body Relief Valve Test	33	
14	Mechanical Stop Test	34	
15	Anti-Rotation Tests	35	
16	Environmental Tests	36	
17	Additional Tests	-	
18	Report	37	

SECTION TWO –TO BE COMPLETE BY THE TEST ENGINEER

Gas Transporter order No **……**

Unique Identifier ……

VA1:Part B data sheet No ……

Manufacturer: ……

TYPE A ☐ TYPE B ☐ TYPE C ☐ TYPE D ☐

Size/|Designation **……**

Section One issue

Test No	Clause Ref	Acceptance		Remarks / Reference
		Yes	No	
1	23			
2	24			
3	26			
4	27			
5	28			
6	29.1			
7	29.2 / 29.3			
8	30.1			
9	30.2			
10	31.1			
11	31.2			
12	32			
13	33			
14	34			
15	35			
16	36			
17	-			
18	37			

Testing Authority ……..

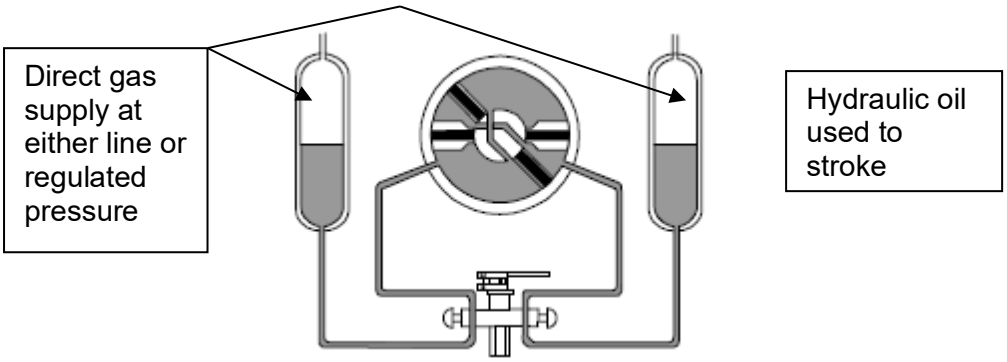
Test Engineers remarks:

Date: ……

Test Engiineers Name …… Signed ……

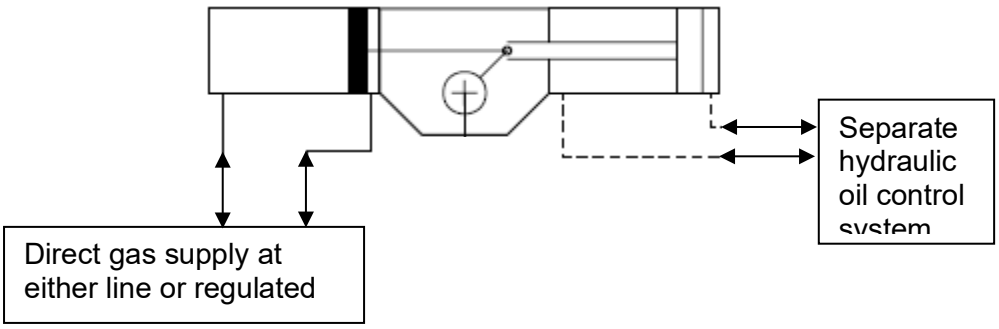
Annex - C Gas Over Oil and Gas/Hydraulic Actuators

C.1 Gas over Oil operation – (Directly)



This method applies direct gas pressure onto the oil being stored in the reservoirs, therefore, forcing the oil through the actuator controls to stroke the actuator. This system will also incorporate a manual override in the form of a manual hand pump installed in the normal hydraulic circuit. Some systems have a 3rd reservoir, which is used only for the purpose of storing gas pressure in the event of a gas supply being lost.

C.2 Direct Gas with hydraulic manual override operation – (Indirectly)



This method only applies direct gas pressure onto the pneumatic cylinder side of the actuator to stroke the actuator. This method of operation is used during normal modes of operation. However there is a separate hydraulic manual override control system that will, in the event of gas pressure being lost, provide an alternative method of stroking the actuator.