SECTION - C

TECHNICAL SPECIFICATIONS OF STORES AND DRAWINGS.

Technical Specifications of Type I and Type II Electropneumatic Control Valve for Helium Gas Services and Type III and Type IV Electropneumatic Control Valve for Nitrogen Services

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CONTROL VALVES SPECIFICATIONS

1. ELECTRO-PNEUMATIC CONTROL VALVE TYPE - I

Valve Size	:	DN 20
Quantity	:	2 Nos.
Tag No.	:	CS, CR
Fluid Service	:	GHe
Type	:	Globe
Operating Temp.	:	55K
Maximum Temp.	:	310K
Operating pressure	:	16.0 bar (a)
Operating Mass flowrate	:	~13 g/s
Max. Mass Flow Rate	:	~18 g/s
Allowable pressure Drop	:	~25 mbar
Hydraulic Pressure test	:	≥ 40 bar
Valve pattern	:	Straight Body
Valve Body Material	:	SS304L / SS316L
Stem, Plug & Seat	:	SS304L / SS316L
Mounting	:	Supported at the bottom of valve Body
End Connection	:	Butt Welded Type
Stem Extension	:	As per BS 6364
Stem Sealing	:	Bellow Seal
Valve Body Insulation	:	Vacuum Jacketed
Valve Action	:	Fail to Close
Actuator	:	Pneumatic Diaphragm
Air Filter& Regulator	:	Required to supply air to actuator
Positioner	:	Electropneumatic Signal (Valve Positioner)
Signal	:	4-20 mA
Valve travel	:	0-100% linear
Air Supply	:	5.5 – 6.0 bar(g)
Leak tightness across body subassembly:		≤1x10 $^{-6}$ mbar l/s (with helium gas at Room Temperature)
Leak tightness across seat	:	≤1x10 $^{-4}$ mbar l/s (with helium gas at Room Temperature)
Required Test Cycles for Bellows	:	10,000

2. ELECTRO-PNEUMATIC CONTROL VALVE TYPE - II

Valve Size	:	DN 20
Quantity	:	4 Nos.
Tag No.	:	CL1S, CL1R, CL2S, CL2R
Fluid Service	:	GHe
Operating Temp.	:	55K
Maximum temp.	:	310K
Operating pressure	:	16.0 bar (a)
Operating Mass flowrate	:	~7 g/s
Max. Mass Flow Rate	:	~9 g/s
Allowable pressure Drop	:	~25 mbar
Hydraulic Pressure test	:	≥40 bar
Valve pattern	:	Straight Body
Valve Body Material	:	SS304L / SS316L
Stem, Plug & Seat	:	SS304L / SS316L
Mounting	:	Supported at the bottom of valve Body
End Connection	:	Butt Welded Type
Stem Extension	:	As per BS 6364
Stem Sealing	:	Bellow Seal
Valve Body Insulation	:	Vacuum Jacketed
Valve Action	:	Fail to Close
Actuator	:	Pneumatic Diaphragm

Air Filter& Regulator	:	Required to supply air to actuator
Positioner	:	Electropneumatic Signal (Valve Positioner)
Signal	:	4-20 mA
Valve travel	:	0-100% linear
Air Supply	:	5.5 – 6.0 bar(g)
Leak tightness across body subassembly:		≤1x10 $^{-6}$ mbar l/s (with helium gas at Room Temperature)
Leak tightness across seat	:	≤1x10 $^{-4}$ mbar l/s (with helium gas at Room Temperature)
Required Test Cycles for Bellows	:	10,000

3. ELECTRO-PNEUMATIC CONTROL VALVE TYPE - III

Valve Size	:	DN 10
Quantity	:	2 Nos.
Fluid Service	:	LN2
Operating Temp.	:	-193 °C (80K)
Maximum Temp.	:	310K
Operating pressure	:	3.0 bar (a)
Operating Mass flowrate	:	~15 g/s
Max. Mass Flow Rate	:	~21 g/s
Allowable pressure Drop	:	~25 mbar
Hydraulic Pressure test	:	≥40 Bar
Valve pattern	:	Straight Body
Valve Body Material	:	SS304L / SS316L
Stem, Plug & Seat	:	SS304L / SS316L
Mounting	:	Supported at the bottom of valve Body
End Connection	:	Butt Welded Type
Stem Extension	:	As per BS 6364
Stem Sealing	:	Bellow Seal
Valve Body Insulation	:	Vacuum Jacketed
Valve Action	:	Fail to Close
Actuator	:	Pneumatic Diaphragm
Air Filter& Regulator	:	Required to supply air to actuator
Positioner	:	Electropneumatic Signal (Valve Positioner)
Signal	:	4-20 mA
Valve travel	:	0-100% linear
Air Supply	:	5.5 – 6.0 bar(g)
Leak tightness across body subassembly:		≤1x10 $^{-6}$ mbar l/s (with helium gas at Room Temperature)
Leak tightness across seat	:	≤1x10 $^{-4}$ mbar l/s (with helium gas at Room Temperature)
Required Test Cycles for Bellows	:	10,000

4. ELECTRO-PNEUMATIC CONTROL VALVE TYPE - IV

Valve Size	:	DN 10
Quantity	:	4 Nos.
Fluid Service	:	LN2
Operating Temp.	:	-193 °C (80K)
Maximum Temp.	:	310K
Operating pressure	:	3.0 bar (a)
Operating Mass flowrate	:	~8 g/s
Max. Mass Flow Rate	:	~11 g/s
Allowable pressure Drop	:	~25 mbar
Hydraulic Pressure test	:	≥40 Bar
Valve pattern	:	Straight Body
Valve Body Material	:	SS304L / SS316L
Stem, Plug & Seat	:	SS304L / SS316L
Mounting	:	Supported at the bottom of valve Body

End Connection	:	Butt Welded Type
Stem Extension	:	As per BS 6364
Stem Sealing	:	Bellow Seal
Valve Body Insulation	:	Vacuum Jacketed
Valve Action	:	Fail to Close
Actuator	:	Pneumatic Diaphragm
Air Filter& Regulator	:	Required to supply air to actuator
Positioner	:	Electropneumatic Signal (Valve Positioner)
Signal	:	4-20 mA
Valve travel	:	0-100% linear
Air Supply	:	5.5 – 6.0 bar (g)

Leak tightness across body subassembly: ≤1x10 $^{-6}$ mbar l/s (with helium gas at Room Temperature)

Leak tightness across seat : ≤1x10 $^{-4}$ mbar l/s (with helium gas at Room Temperature)

Required Test Cycles for Bellows : 10,000

5. SPARE PARTS FOR SERVICE

- Seal set for Valve Type I, II, III & IV.....2 set / Each valve Type

  Vendor should provide separate price for seal set for each valve type

INSTALLATION CONDITION

The vendor / Manufacturer of the valve has to deliver detailed procedures for mounting / dismounting the valve. The vendor has to provide installation and maintenance manual.

MARKING

Following Marking have to be written clearly on the valve either by engraving or any other means which is indelible and not separable.

(i) Name of vendor / Manufacturer
(ii) Serial Number
(iii) Nominal Diameter
(iv) Material
(v) Any other details (Like Nominal Operating pressure, references no. etc)

QUALITY ASSURANCE AND TESTS FOR VALVES

All control specifications are described in the specification table.

Following tests should be carried out and test certificates should be submitted to IPR before shipment of the valve. After IPR approval, Dispatch clearance will be given.

The following test should be carried out as a part of acceptance criteria

1. Material test certificates
   Vendor should provide material test certificates for Valve body material, stem, Plug and seat.

2. Hydraulic Pressure test
   The valve body should be tested for hydraulic pressure of ≥ 40 bar with water at Room temperature for all valve types.

3. Thermal shock test at LN2 temperature (77K) (3 cycles)

4. Helium leak tightness test :
   Leak tightness across body subassembly should be ≤1x10 $^{-6}$ mbar l/s when tested with Helium gas at room temperature for all valve types.
   Leak tightness across valve seat from upstream to downstream should be ≤1x10 $^{-4}$ mbar l/s when tested with helium gas at room temperature.
   The leak tightness should be checked at service operating pressure as per applicable standards

5. Functional test (Calibration and Hysteresis)

6. Certificate for test cycles of bellows

DOCUMENTATION

The vendor / Manufacturer should supply following documents along with the valve

1. The general assembly drawing, including all the components with detailed part list indicating the used materials
2. The material test certificates.
3. The dimensional controls certificates.
4. Test certificates (Hydraulic pressure test, Helium leak test, Calibration)
5. The documentation for assembly, dismounting and maintenance.
6. The operating and maintenance manuals

SCOPE OF SUPPLY

1. Valves as per Specifications

Type	Nos. of Valves
I	02
II	04
III	02
IV	04

2. Documentation
3. Minimum accessories for spare parts of Valve as describe above with separate price

TECHNICAL COMPLIANCE STATEMENT

Technical Compliance form of Electropneumatic control valves
Type I, II, III and IV

Specifications	IPR Requirement	Vendor's Specification
Valve Size	Type **I** –DN20 Type **II**-DN20 Type **III**-DN10 Type **IV**-DN10	
Quantity	Type **I** –2 nos. Type **II**-4 nos. Type **III**-2 nos. Type **IV**-4 nos.	
Fluid Service	Type **I & II** – GHe Type **III & IV**- LN2	
Operating Temperature	Type **I & II** –55K Type **III & IV**-80K	
Maximum Temperature	310 K for Type **I, II, III and IV**	
Operating Pressure	Type **I & II** –16 bar (a) Type **III & IV**-3.0 bar (a)	
Max. Mass FlowRate	Type **I** – ~18 g/s for GHe Type **II**- ~9 g/s for GHe Type **III**- ~21 g/s for LN2 Type **V**- ~11 g/s for LN2	
Allowable pressure drop across valve	~25 mbar for Type **I, II, III and IV**	
Hydraulic Pressure Test	≥ 40 Bar for Type **I, II, III and IV**	
Valve Pattern	Straight Body for all types	
Valve Body Material	SS304L / SS316L for all types	
Stem, Plug and seat	SS304L / SS316L for all types	
Mounting	Supported at the Bottom of valve Body for all types	
End Connection	Butt Welded Type for all types	
Stem Length	As per BS 6364 for all types	
Stem Sealing	Bellow Seal for all types	
Valve Body Insulation	Vacuum Jacketed for all types	
Valve Action	Fail to Close for all types	
Actuator	Pneumatic diaphragm for all types	
Positioner	Electropneumatic Signal (Valve Positioner) for all types	
Signal	4 to 20 mA for all types	
Valve Travel	0 to 100% Linear for all types	
Air Supply	5.5 to 6.0 BarG for all types	
Leak tightness across body subassembly	$1x10^{-6}$ mbar l/s for all types	
Leak tightness across seat	$1x10^{-4}$ mbar l/s for all types	
Required Test cycles for Bellows	10,000 for all types	

AUTHORIZED SINGATORY

OFFICIAL SEAL

DATE :-