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1.0 SCOPE

1.1 This Practice defines the requirements for linear motion control valves, rotary motion control valves, actuators, and accessory equipment.

1.2 Any deviation from this Practice must be approved by the procedure described in RP 0-1-3 .

1.3 An asterisk (*) indicates that a decision by the Owner or Owner's Engineer is required, or that additional information is furnished by the Purchaser.

1.4 A revision bar indicates all changes made to this Revision.

2.0 REFERENCES

The latest edition of the following standards and publications are referred to herein, and shall be used with this Practice.

STANDARDS AND PUBLICATIONS

BP Oil Refining Practices

RP 0-1-3	Deviations to BP Oil Refining Practices
RP 5-1-2	Piping Layout
RP 5-2-1	Selection of Piping Components and Materials
RP 5-2-2	Flanges, Gaskets and Bolting
RP 5-3-1	Valve Design and Selection Criteria
RP 5-3-15 DS	Control Valves, Actuators and Accessories Data Sheet
RP 13-2-1	Material Requirements for Aggressive Environmental Services
RP 13-3-1	Supplemental Requirements for Metallic Materials
RP 13-4-1	Material Hardness Requirements
RP 16-1-1	Control Systems
RP 16-1-2	Supplemental Requirements for Control Systems

ANSI/FCI

B16.104	Quality Control Standard for Control Valve Seat Leakage (FCI 70-2)

STANDARDS AND PUBLICATIONS (CONTINUED)

ANSI/ISA Standards

S75.01	Flow Equations for Sizing Control Valves
S75.03	Face-to-Face Dimensions for Flanged Globe-Style Control Valve Bodies (ANSI Classes 125, 150, 250, 300, and 600)
S75.04	Face-to-Face Dimensions for Flangeless Control Valve (ANSI Classes 150, 300, and 600)
S75.05	Control Valve Terminology
S75.07.1987	Laboratory Measurement of Aerodynamic Noise Generated by Control Valves
S75.16	Face-to-Face Dimensions for Flanged Globe-Style Control Valve Bodies (ANSI Classes 900, 1500, and 2500)
S75.19	Hydrostatic Testing of Control Valves

NFPA Standard

70	National Electric Code

API Standards

Publ 941	Steel For Hydrogen Service At Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants
Spec 6A	Specification for Valves and Wellhead Equipment

ASME/ANSI Standards

B16.34	Valves – Flanged And Buttwelding End

ASTM

A216	Specification for Steel Coatings, Carbon Suitable for Fusion Welding for High-Temperature Service

NACE Standard

MR0175	Sulfide Stress Corrosion Cracking Resistance Metallic Materials for Oil Field Equipment.

3.0 DEFINITIONS

3.1 Aggressive Environmental Service (AES) – Process services which result in material degradation such as cracking, scaling, blistering, and severe pitting and/or corrosion. Examples of such services are hydrogen service, wet hydrogen sulfide, cyanides, caustic, amine, and hydrofluoric acid. AES process fluids are defined in RP 13-2-1 .

3.2 Free Machining Steels – Those which contain any of the following elements in the quantities shown:

1. Greater than 0.06% phosphorous
2. Greater than 0.06% sulfur
3. Intentional lead additions in excess of 0.05%
4. Intentional selenium additions in excess of 0.05%

3.3 Hydrogen Rich Service – A service defined as a combination of hydrogen partial pressure and temperature at or below the curve for carbon steel per Figure 1 of API Publication 941, latest edition, and with a hydrogen partial pressure greater than 100 psia.

3.4 Hydrogen Service – A service defined as a combination of hydrogen partial pressure and temperature above the curve for carbon steel per Figure 1 of API Publication 941, latest edition.

3.5 Inspector – A BP Oil Company appointed engineer or inspector.

3.6 Manufacturer – The recipient of a direct or indirect purchase order for materials and/or equipment. In this context, a direct order is one issued to a manufacturer by a contractor or the Owner. An indirect order is one issued to a manufacturer by a vendor (recipient of a direct order) for materials, fabricated components, or subassemblies.

3.7 Owner – BP Company.

3.8 Owner's Engineer – A BP Company appointed engineer.

3.9 Purchaser – The party placing a direct purchase order. The purchaser is the Owner's designated representative.

4.0 VALVE SELECTION

*__4.1__ Unless otherwise specified by the Owner's Engineer, control valves for process liquid, and high pressure steam and gases should have globe bodies. Globe valves should be single seated, cage guided.

4.2 Large volume flows and high shut-off differential pressures should be controlled by full bore ball valves or characterized ball valves.

4.3 Large volume flows at lower differential pressures should be controlled by butterfly valves or by eccentric rotating plug valves.

4.4 Angle valves may be used where it is necessary to prevent the accumulation of solids, and on erosive or flashing service.

4.5 The action of each valve on failure of its control signal or operating medium shall be chosen with regard to safe operation and shut down of the appropriate process equipment.

4.6 When control valves and accessories are installed in locations susceptible to seismic disturbances, all components shall be shown to be strong enough to sustain the anticipated stresses and to function normally after the disturbances have passed.

4.7 All valves shall be supplied with indicating devices which show the position of the inner valve and of any handwheel mechanism. All electrical/electronic equipment shall be suitable for installation in a Class 1, Group D, Division II area unless a more stringent classification prevails.

4.8 Self-acting valves may be used for local, fixed gain control of utilities, such as fuel systems.

4.9 Control valves in HF acid service shall be globe body with stem or stem guided design. Cage guided valves and rotary control valves shall not be used in HF service.

4.10 All control valve terminology shall comply with ANSI/ISA-75.05.

*__4.11__ The Control Valve Data Sheet, RP 5-3-15 DS , shall be completed by the Owner's Engineer prior to the purchase of all control valves.

4.12 A permanent side-mounted handwheel (integral or clamped-on) shall be fitted to control valves where alternative by-pass arrangements are not provided by:

1. Manual block and by-pass,

2. Duplicate parallel control valves where manual control is considered impracticable.

NOTE: A top-mounted handwheel may be used for applications in which a side-mounted handwheel is not available for the valve/actuator design.

5.0 VALVE CHARACTERISTICS

5.1 An adequate allocation of pressure drop across the control valve, and the choice of valve characteristics should ensure a linear relation between valve positions and the controlled variable over the entire operating range. For flows varying with square of the pressure drop, equal percentage trim results in a linear relationship. The standard trim shall be equal percentage.

5.2 For pumped circuits, at least 10 psi or 15% of the total dynamic pressure drop excluding the control valve pressure differential at design flow shall be allocated to the control valve.

5.3 When 50% or more of the dynamic pressure drop is to be sustained by the control valve, this valve should have a linear characteristic; otherwise it should be fitted with equal percentage trim.

6.0 VALVE SIZING

6.1 The size of control valves shall be calculated from the rates of flow and pressure drops using design conditions. Control valves should not be required to work outside the limits of 10% to 90% of their stroke. Capacity should be calculated at minimum, normal, and maximum rates using ANSI/ISA S75.01. Valve data sheets shall show the required valve flow coefficient (Cv) at each condition and the coefficient at valve maximum opening.

*__6.2__ Unless otherwise specified by the Owner's Engineer, a control valve shall be selected such that its maximum valve capacity is 130% to 150% of design for linear trim and 150% to 200% for equal percentage trim.

6.3 The effect of reduced inlet and outlet pipe sizes shall be taken into account when sizing control valves.

*__6.4__ The choice of valves for flashing duty, two phase flow and fluid conditions likely to encounter cavitation shall be subject to approval by the Owner's Engineer.

6.5 Where control required is greater than the normal range, two valves in parallel may be used.

7.0 MATERIALS

***7.1** Valve body material selection shall be in accordance with: RP 5-2-1 and RP 5-3-1 ; ASME/ANSI B16.34; and the additional requirements of this Practice. Unless otherwise specified by the Owner's Engineer, standard trim shall be 316 SS. Trim selection for all control valves in erosive service and steam letdown service shall be specified by the Owner's Engineer.

7.2 Spiral wound gaskets in accordance with RP 5-2-2 shall be used for the body to bonnet flanged joint.

*__7.3__ Valves in hydrocarbon, H2S, or other toxic or emission control service shall have a packing system design to control emissions to below 500 ppm. Valve packing shall be teflon or graphite per the manufacturer's standard for services under 450°F. Valve stem packing materials for services above 450°F shall be graphite per the manufacturer's standard. The valve stem packing design shall be subject to the approval of the Owner's Engineer.

*__7.4__ Bonnet bolting material will be specified by the Owner's Engineer, and shall be of the same material specification as bolting used for connecting piping, see RP 5-2-2 .

7.5 Austenitic stainless steel valves (body and bonnet) shall conform to the following:

1. Unless otherwise specified on the Valve Data Sheet; trim, packing box, packing flange, and packing box studs shall be of the same nominal chemistry as the body except that CoCr-A shall be provided for seating surfaces when specified, and is always an acceptable alternative for seating surfaces.

2. Bonnet bolting material shall be strain hardened; and of the same nominal chemistry as the body unless otherwise specified for through-bolted bonnet flanges.

7.6 17-4PH stainless steel is an acceptable substitute for 13 Cr valve stems when the valve design temperature is less than 1000°F and the heat treatment is per RP 13-3-1 .

7.7 Butterfly valves should be fitted with stainless steel vanes and shafts in a precipitation hardening material (e.g. 17-4 PH, see RP 13-3-1).

7.8 Valves for use in sour gas (Wet H_2S) service shall use materials which conform to NACE MR0175, except that hardness requirements for the body, bonnet, and stem shall be per RP 13-4-1 . In addition, free machining steels as defined in this Practice shall not be used in sour gas service.

*__7.9__ Soft seats shall be used only where tight shut off cannot be achieved with hard seated valves, and are subject to the approval of the Owner's Engineer.

7.10 All nonmetallic materials used in the valve shall be capable of withstanding the maximum temperature encountered in service and during steamout. Service limits for soft-seat materials shall be in accordance with RP 5-3-1 .

*__7.11__ Tubing will be specified by the Owner's Engineer and shall be seamless PVC coated copper or stainless steel. Tube fittings shall be per RP 5-2-1 , Table 12.

7.12 Control valves in Hydrofluoric Acid (HF) Service, shall meet the following requirements:

1. The valve shall have Monel trim including seats, plugs, stems, and guides.

2. Special clearances on the guides and bushing shall be provided.

3. Valve packing shall be PTFE V ring type without spring loading and lantern rings; the packing box shall be filled with packing.

4. Only replacement parts from the original Manufacturer shall be used for repair and maintenance.

*__7.13__ Unless otherwise specified by the Owner's Engineer, butterfly valves shall have shaft blowout protection.

8.0 DESIGN AND FABRICATION

8.1 The minimum body thickness shall meet the minimum requirements of ASME/ANSI B 16.34 for the specified design pressure and temperature. If the specified line corrosion allowance exceeds 1/8 inch, additional corrosion allowance shall be added to the valve body in the amount of the specified line corrosion allowance that is in excess of 1/8 inch. The direction of flow shall be cast or stamped on the valve body.

*__8.2__ Flange shall be in accordance with RP 5-2-2 . The face to face dimensions shall comply with ANSI/ ISA S75.03, S75.04, and S75.16. Screwed in seat rings shall not be used without approval of the Owner's Engineer. Screwed body control valves shall not be used. Separable flanges shall not be used in hydrocarbon or flammable service.

8.3 The minimum size of globe, butterfly, eccentric plug, and ball valve bodies shall be NPS 1 inch. Body sizes corresponding to NPS 1-1/4, NPS 2-1/2, NPS 3-1/2, and NPS 5 inches shall not be used.

8.4 The pressure ratings of globe valves and ball valves with bodies up to NPS 8 inches shall be at least ASME/ANSI Class 300.

8.5 When specified on the Data Sheet, valves shall be drilled and tapped to accept gland lubrications. HF service valves shall not have lubricators. Lubricators shall not be installed on TFE Packing.

*__8.6__ The acceptable degree of seat leakage shall be specified on the Data Sheet (Line 84) for each valve by the Owner's Engineer, using the six classes defined in ANSI B16.104 (FCI 70-2).

*__8.7__ The application and design of extension bonnets shall be subject to approval by the Owner's Engineer. They may be specified in the following circumstances:

1. Extension bonnet for fluid temperatures down to -150°F or above +450°F for teflon packing and above +850°F for graphite packing in an oxidizing environment. In a non-oxidizing environment, extension bonnets may be specified above 1200°F for graphite packing.

2. Cryogenic bonnet for fluid temperatures below -150°F. The design should allow plug and seat to be withdrawn through the bonnet.

*3. Bellows seal bonnets should be used only when no stem leakage can be tolerated. They should be fitted with a monitor for bellows leakage, e.g. small pressure gauge and excess flow valve. The bellows material shall be specified by the Owner's Engineer.

8.8 Where it has been agreed to butt-weld the valve body into a pipeline, the valve trim should be completely replaceable through the bonnet. Precautions shall be taken during installation to avoid damage to the inner valve.

9.0 NOISE REQUIREMENTS

9.1 All valves shall be assessed for their noise (sound power) level. The maximum noise emitted from any control valve operating at normal design conditions shall comply with the requirements of BPOUS Recommended Environmental Guidelines.

*__9.2__ Unless otherwise specified by the Owner's Engineer, control valves with special trim for noise reduction should have globe bodies and cage trims. Pipe strainers should be provided on valves with noise reduction trim.

*__9.3__ Proposals to employ higher schedule piping, additional insulation, restrictor plates or silencers shall be submitted to the Owner's Engineer for approval.

9.4 The passages in special low noise trims shall be large enough to avoid plugging in service.

9.5 Noise reduction trim shall not be used for control valves in HF acid service.

10.0 ACTUATORS

10.1 Valves should be operated by spring return diaphragm actuators.

10.2 The normal operating range should be 3.0 to 15 psig, but shall not exceed 60 psig. Only side mounted handwheels shall be used. Positioners, I/P's, and handwheels shall be easily accessible.

10.3 "Bench setting" ranges should be avoided by the use of adequately sized actuators.

10.4 Reverse-acting spring diaphragm actuators using seals or glands shall be avoided.

10.5 Piston actuators should be used to provide longer strokes or greater thrust than is available from spring diaphragm units. They should be sized to operate at a maximum air supply of 60 psig.

10.6 Double-acting piston actuators which do not automatically fail to a safe position in the event of air failure shall be supplied complete with a local air receiver, with sufficient capacity for at least two complete open-close cycles, over the full travel of the valve.

10.7 Volume tanks (local air receivers) should be supplied with a check valve and local pressure gauge.

11.0 ACCESSORIES

11.1 Actuators shall be provided with positioners in all of the following cases:

1. The valve size is NPS 6 inches and over.

2. The valve size is NPS 2 inches and over with operating temperature outside the limits -4°F and +450°F.

3. The valve has a rotary action.

4. The valve is split range application.

5. The valve actuator has a spring range which is not compatible with the control air pressure range.

6. The distance between a pneumatic controller and its valve exceeds 250 ft.

7. When $(p \times s)/A$ exceeds 1.5 psi;

   where p = pressure differential across the valve, determined with the valve in the closed position (psi).
   s = effective valve seat area opposing the actuator (in^2).
   A = effective diaphragm area (in^2).

8. The valve signal is from a controller with an integral time exceeding approximately 2 minutes, e.g., averaging liquid level controllers, temperature controllers.

*9. Unless otherwise specified by the Owner's Engineer, positioners shall be provided on all HF service control valves.

11.2 Positioners shall be fitted with gauges and air set. Positioner by-passes shall be fitted except where reverse acting or split range positions are required or where the actuator spring range is not compatible with the control signal.

***11.3** When specified by the Owner's Engineer, booster relays shall be fitted where necessary to ensure speed of response of valves and shall be close coupled to the valve actuator.

***11.4** When specified by the Owner's Engineer, lockup relays may be used where process conditions demand and where they cannot give rise to a hazardous situation.

11.5 Electro-pneumatic positioners should be used in place of separate I/P's and pneumatic positioners.

11.6 Trip solenoid valves initiated by a shutdown system to override modulating valves shall be fitted directly into the actuator supply line.

12.0 INSPECTION AND TESTING

12.1 Inspectors shall have access to all quality control and other records that document the design, materials, and testing of the control valve, actuator, and accessories. The Inspector shall determine the compliance with the valve specification form.

12.2 Valves shall be inspected and tested per ISA S75.19. Seat leakage testing shall be in accordance with ANSI B16.104. Valves in hydrofluoric acid (HF) service shall be tested with Kerosene.

13.0 VALVE DATA SHEET AND PURCHASE SPECIFICATION REQUIREMENTS

*__13.1__ The information on the Control Valve Data Sheet (see RP 5-3-15 DS) or a Owner's Engineer approved alternative, is to be completed by the Purchaser prior to placement of a valve order.

13.2 The completed control valve data sheet and this Practice can be used in conjunction with RP 5-3-16 as a purchase specification.

13.3 A line-by-line description of the information to be provided on the data sheet is provided in Table 1. A line in the data sheet containing an asterisk indicates that the information shall be supplied by the Manufacturer unless specified by the Purchaser.

TABLE 1
INSTRUCTIONS FOR CONTROL VALVE DATA SHEET

Line	Explanation of Terms and Definitions	Examples
Line No.	Explanation of Terms and Definitions	Examples
1	Describe fluid flowing into valve and its state. Indicate corrosive or erosive service and the corrosive or erosive agents.	Superheated steam Saturated water Crude oil and natural gas
	Specify thermodynamic critical pressure of the fluid. Specify the Tag number.	3206 psia
2	Specify volumetric or mass flow rate at inlet or standard conditions. Maximum flow conditions, if greater than normal flow condition, is the condition for which the valve is sized.	3000 gpm 10,000 bpd 600 std. m^3/s 7500 scfm 300 kg/h
3	Specify inlet pressure (gauge or absolute)	5000 psig 2000 kPa abs.
4	Specify outlet pressure (gauge or absolute)	1000 psig 400 kPa gauge
5	Specify inlet temperature in °F, °R, °C or K. Must agree with state of fluid and its inlet pressure.	750°F 200°C 815 K
6	Specify specific weight (in lb/ft^3 or kg/m^3), specific gravity, or molecular weight of fluid. Identify the appropriate term.	61.9 lb/ft^3 1.03 44.01
7	Specify viscosity in appropriate units for liquids or specific heats ratio for gases.	20 centipoise 17.8 centistokes 1.27
8	Specify vapor (saturation) pressure at inlet	680 psia 46.9 bar. abs.
9	Specify required C_V as calculated for each condition per ANSI/ISA S75.01-1985. No additional safety (oversize) factor should be included at this point.	260
10	Specify travel of the valve in percent of rated travel calculated from required C_V , rated C_V of the valve, trim selected, and characteristic (see lines 33, 34, and 36). 0% is full closed, 100% is full open.	78%
11	Specify laboratory-measured allowable and predicted sound pressure levels, both normally in dBA as measured per ISA-S75.07-1987.	90/87 dBA
12	Extra line for information not covered in lines 1 through 11.	Compressibility factor Z Ambient temperature Base pressure and temperature
13 & 14	Specify size and schedule (or wall thickness if nonstandard) of pipe line into which valve is installed.	8” SCH 40 15” OD x 0.500” wall DN 200, PN 100
15	Specify pipe line insulation. This information is required for predicted sound pressure level calculations.	2” thermal None

TABLE 1
INSTRUCTIONS FOR CONTROL VALVE DATA SHEET (CONTINUED)

Line	Explanation of Terms and Definitions	Examples
16	Specify type of valve body.	Globe (through, angle) Split body Double port Butterfly Ball Pinch
17	Specify nominal size of valve body. Specify ANSI class in accordance with ANSI B16.34-81.	4” 600 2500 SPECIAL
18	Specify maximum pressure and temperature of the valve.	2500 psig, 650°F
19	Specify manufacturer and model number.	XYZ Controls Model 719-2
20	Specify body and bonnet material.	Steel, ASTM A216, WCB
21	Specify body liner material, if any, and its inside diameter.	Polyurethane, 3.9”
22 & 23	Specify end connection. May be integral or welded onto body.	6” RTJ Class 1500 flange Buttweld end 2” FNPT
24	Specify flange face finish per RP 5-2-2 for special finish, as required	Special finish: 32 RMS
25	Specify end extensions, if any. Normally, refers to sections of pipe or reducers welded to the body by the valve manufacturer.	6” long, SCH 80, A106, GR. B
26	Specify direction of the flow through the body. FTO=flow-to-open, FTC=flow to close valve. NOTE: The descriptors “FTO” and “FTC” refer to the direction of fluid forces on the closure member. If immaterial, leave blank. When FTO and FTC are not applicable, specify direction as appropriate.	FTO FTC
27	Specify type of bonnet.	Standard Cooling fin Extended
28	Specify whether a lubricator and isolation valve are required. Specify lubricant.	Yes Silicone
29	Specify packing material.	Graphite impreg. asbestos TFE Non-asbestos
30	Specify type of packing.	Braided Molded V-ring Laminated filament Pressure/Vacuum
31	Extra line for special body or bonnet not covered in lines 16 through 30.	Body drain Separable flanges Flangeless
32	Specify type of trim.	Single seat cage-guided Multi-stage Multi-hole Top- and bottom-guided Double seat
33	Specify nominal size and rated travel of installed trim.	2” 50 mm
34	Specify inherent flow characteristic of installed trim.	Linear Equal % Modified parabolic Quick-opening

TABLE 1
INSTRUCTIONS FOR CONTROL VALVE DATA SHEET (CONTINUED)

Line	Explanation of Terms and Definitions	Examples
35	Specify whether trim is balanced or unbalanced. Semi-balanced trim should be considered as balanced.	Balanced Unbalanced
36	Specify rated C_v , F_L , and X_T of installed trim. Refer to ANSI/ISA S75.01-1986.	260 0.9 0.68
37	Specify closure member, i.e., plug, ball, or disk material as applicable.	17-4 PH, H-1150 316
38	Specify seat material.	420 hardened 316 hardfaced
39	Specify cage, bearing, or guide material.	410 hardened
40	Specify stem material.	17-4PH H-150 316
41 & 42	Extra lines for additional trim requirements not covered in lines 32 through 40.	Chrome-plate Pilot-operated
43	Specify hazardous location classification per the *National Electrical Code*®, ANSI/ NFPA 70-1987.	NEC® Class 1, Div. 1, Group C
44-52	Specify special requirements and/or accessories not covered elsewhere.	Solenoid valves E/P transducer NACE MR-01-75 Seismic Net weight= 275 lb
53	Specify type of actuator.	Diaphragm, pneumatic Hydr. piston, double acting Pneumatic rotary vane

Line No.	Explanation of Terms and Definitions	Examples
54	Specify manufacturer and model number.	XYZ Controls P-100-160
55	Specify nominal size and effective diaphragm/ piston area.	8” 160 square inch 0.2 m^2
56	Specify whether actuator is for on/off or modulating service.	Modulating On/off
57	Specify whether spring, if any, acts to open or to close valve.	Open Close None
58	Specify maximum pressure for which the actuator is designed.	100 psig 60 kPa
59	Specify minimum pressure required to fully stroke the installed valve under specified conditions.	65 psig
60 & 61	Specify limits of available air or hydraulic supply pressure. If upper limit is greater than line 58, a reducing valve (air set) should be furnished. Lower limit or reducing valve setting must be higher than pressure shown on line 59.	90 psig/70 psig
62	Specify the pressures in the actuator when the valve starts travel and at its rated travel position without fluid forces acting on the valve.	8/32 psig 10/22 psig 1.2/2.1 kPa
63	Specify orientation of actuator as “VERT.UP”	VERT.UP HORIZ.

TABLE 1
INSTRUCTIONS FOR CONTROL VALVE DATA SHEET (CONTINUED)

Line	Explanation of Terms and Definitions	Examples
	or "VERT.DOWN" (vertical) or "HORIZ." (horizontal). For rotary valves, also specify whether mounting is "RH" (right-hand) or "LH" (left-hand) as viewed from the valve inlet, if appropriate. Specify additional information as appropriate or provide sketch.	RH LH
64	Specify type and orientation of handwheel (manual override), if any.	Side-Mounted/LH
65	Specify if air failure valve (actuator air lock up valve) is required and at what supply pressure it shuts.	Yes 40 psig
66	Extra line for additional actuator requirements not covered in lines 53 through 65.	Hydraulic damper Stroking speed 1"/sec. Stainless steel tubing
67	Specify input signal range for full travel.	3-15 psig 20-100 kPa 4-20 mA
68	Specify type of positioner.	None Single acting Double acting
69	Specify manufacturer and model number.	XYZ Control Co. Model AB
70	Specify whether an increasing signal increases or decreases output pressure to actuator.	Incr. Decr.
71	Specify whether air pressure gauges and whether positioner bypass are required.	No Yes
72	Specify cam characteristic, if positioner has a cam. Normally linear.	Linear Square root
73	Extra line for positioner requirements not covered in lines 67 through 72.	Aluminum-free
74	Specify type and quantity of limit switches.	Mech. (lever arm) Proximity Pneumatic 2
75	Specify manufacturer and model number.	ABC Electric Co. Model A20Z
76	Specify electrical rating and number of contacts and action.	10A, 600 VAC/ DPDT
77	Specify valve travel at which switches are to actuate.	Full open/full closed
78	Extra line for additional limit switch requirements not covered in lines 74 through 77.	NEMA 4 IP 65
79	Specify manufacturer and model number of air set (pressure regulator).	RBJ Co. Model R-70
80	Specify output pressure setting.	70 psig 20 psig
81	Specify whether filter and/or output pressure gauge is required.	Yes No

TABLE 1
INSTRUCTIONS FOR CONTROL VALVE DATA SHEET (CONTINUED)

Line	Explanation of Terms and Definitions	Examples
82	Extra line for additional air set requirements not covered in lines 79 through 81.	Mount separate from valve
83	Specify pressure of hydrostatic test. Normally per ANSI/ISA S75.19 or API 6A.	3350 psig
84	Specify leakage class per ANSI/FCI 70-2-76.	Class IV
85 & 86	Extra lines for additional test requirements not covered in lines 83 and 84.	Hydro for 30 minutes Helium leak test Stroking time test Dead band test

Line No.	Explanation of Terms and Definitions	Examples