

Standard

Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

1 PURPOSE

1.1 The purpose of this standard is to promote uniformity in instrument specifications, both in content and form. Because of the complexity of present day instruments and controls it is desirable to have some type of specification form to list pertinent details for use by all interested parties. General use of these forms by users and manufacturers offers many advantages, as listed below:

1. Assist in preparation of complete specification by listing and providing space for all principal descriptive options.
2. Promotes uniform terminology*.
3. Facilitates quoting, purchasing, receiving, accounting and ordering procedures by uniform display of information.
4. Provides a useful permanent record and means for checking the installation.
5. Improves efficiency from the initial concept to the final installation.



Instrument Society of America

Specification Forms for Process Measurement and
Control Instruments, Primary Elements and Control Valves

CONTENTS

SECTION	Page
1 Purpose	6
2 Scope	6
Form No. Title	
S20.1a Receiver Instruments	7
S20.1b Receiver Instruments	8
S20.2a Annunciators	10
S20.2b Annunciators Nameplate Schedule	11
S20.3a Miscellaneous (Blank Form)	13
S20.3b Miscellaneous (Blank Form)	14
S20.3c Miscellaneous (Blank Form)	15
S20.10a Potentiometer Instruments	16
S20.10b Potentiometer Instruments	17
S20.11a Temperature Instruments (Filled System)	19
S20.11b Temperature Instruments (Filled System)	20
S20.12a Thermocouples and Thermowells	22
S20.12b Thermocouples and Thermowells	23
S20.13a Resistance Temperature Sensors	25
S20.13b Resistance Temperature Sensors	26
S20.14a Industrial Bimetal and Glass Thermometers	28
S20.14b Industrial Bimetal and Glass Thermometers	29
S20.20a Differential Pressure Instruments	31
S20.20b Differential Pressure Instruments	32
S20.21 Orifice Plates and Flanges	34
S20.22 Rotameters (Variable Area Flowmeters)	36
S20.23 Magnetic Flowmeters	38
S20.24 Turbine Flowmeters	40
S20.25 Positive Displacement Meters	42
S20.26 Level Instruments (Displacer or Float)	44
S20.27 Level Instruments (Capacitance Type)	46
S20.28 Gage Glasses and Cocks	48
S20.29 Traps and Drainers	50
S20.40a Pressure Instruments	52
S20.40b Pressure Instruments	53
S20.41a Pressure Gages	55
S20.41b Pressure Gages	56
S20.42a Pressure Switches	58
S20.42b Pressure Switches	59
S20.50 Control Valves	61
S20.51 Pressure Control Valves Pilots and Regulators	63
S20.52 Self-Actuated Temperature Regulator	65
S20.53 Pressure Relief Valves	67
S20.54 Rupture Discs	69
S20.55 Solenoid Valves	71

ISA FORM S20.41a

PRESSURE GAGES

Instructions for ISA Forms S20.41a and 20.41b

1. When receiver gages are specified, the "Range" in the abulation is the dial range.
2. Select mounting style.
3. Specify nominal dial diameter. Dial assumed white unless otherwise specified.
4. Select case material.
5. Specify ring style, or check "STD" if not important.
6. Specify blow-out protection. "Back" refers to a blow-out back. "Disc" refers to a blow-out disc located on the back or side of the case.
7. Specify lens material.
8. Options:
 - Snubber Specify type or model number.
 - Sylphon If sylphon required, specify material.
 - Material
 - Movement
 - Dampening Specify if required.
9. Specify nominal accuracy, such as " $\pm 1/2$ %".
10. Write in make and model number after selection is made.
11. Specify element type or write in "MFR. STD."
12. If stainless steel is required, write in the type; such as "316."
13. See 12.
14. Specify connection size and location.
15. Specify movement or write in "MFR. STD."
16. If Diaphragm Seal is required, fill in specifications.

For convenience, write in psig or other pressure unit at the top of "Range" and "Op. Press" columns, if all are the same.

	ORIFICE PLATES and FLANGES				SHEET _____ OF _____	
					SPEC. NO.	REV.
	NO	BY	DATE	REVISION		
					CONTRACT	DATE
					REQ. - P.O.	
				BY	CHK'D	APPR.

<p style="text-align: center;">ORIFICE PLATES</p> <p>1. Concentric <input type="checkbox"/> Other _____</p> <p>2. ISA Standard <input type="checkbox"/> Other _____</p> <p>3. Bore: Maximum Rate <input type="checkbox"/> Nearest 1/8 in. <input type="checkbox"/></p> <p>4. Material: 304SS <input type="checkbox"/> 316SS <input type="checkbox"/> Other _____</p> <p>5. Ring Material & Type _____</p> <p>6. MFR. & Model No. _____</p>	<p style="text-align: center;">ORIFICE FLANGES</p> <p>7. Taps: Flange <input type="checkbox"/> Vena Contracta <input type="checkbox"/> Pipe <input type="checkbox"/> Other _____</p> <p>8. Tap Size: 1/2 in. <input type="checkbox"/> Other _____</p> <p>9. Type: Weld Neck <input type="checkbox"/> Slip On <input type="checkbox"/> Threaded <input type="checkbox"/></p> <p>10. Material: Steel <input type="checkbox"/> Other _____</p> <p>11. Flanges included <input type="checkbox"/> By others <input type="checkbox"/></p> <p>12. Flange Rating _____</p>
---	---

FLUID DATA	13	Tag Number						
	14	Service						
	15	Line Number						
	16	Fluid						
	17	Fluid State						
	18	Maximum Flow						
	19	Normal Flow						
	20	Pressure						
	21	Temperature						
	22	Specific Gravity at Base						
	23	Operating Spec. Gravity						
	24	Supercomp. Factor						
	25	Mol. Weight	Cp/Cv					
	26	Operating Viscosity						
	27	Quality % or ° Superheat						
	28	Base Press.	Base Temp.					
	METER	29	Type of Meter					
		30	Diff. Range — Dry					
31		Seal sp. gr. at 50° F						
32		Static Press. Range						
33		Chart or Scale Range						
34		Chart Multiplier						
PLATE & FLANGE	35	Beta=d/D						
	36	Orifice Bore Diameter						
	37	Line I.D.						
	38	Flange Rating						
	39	Vent or Drain Hole						
	40	Plate Thickness						

Notes:

ISA FORM S20-21

ISA FORM S20.12a

THERMOCOUPLES AND THERMOWELLS

Instructions for ISA Forms S20.12a and 20.12b

Reference: ANSI MC96.1, American National Standard
for Temperature Measurement Thermocouples.

1. Check COMPLETE ASSEMBLY, or write in ELEMENT ONLY, ELEMENT & HEAD, etc.

2. Specify ISA type:
- E Chromel/Constantan
 - J Iron/Constantan
 - K Chromel/Alumel
 - R Platinum-13 percent Rhodium/Platinum
 - S Platinum-10 percent Rhodium/Platinum
 - T Copper/Constantan

and wire diameter in American Wire Gage (AWG), also known as Brown and Sharpe Gage (B & S). Thermocouple wire normally runs from AWG No. 24 (0.0201 in. dia.) through AWG No. 8 (0.1285 in. dia.).

3. Specify required construction by filling in sheath diameter and material, or checking BEADED INSULATORS. Check type of junction, EXPOSED, ENCLOSED and GROUNDED, ENCLOSED and UNGROUNDED.

4. Specify nominal diameter of nipple, or write NONE. Specify length N (as defined on sketch below line 8) if appropriate.
Check UNION if required.

5. Specify connection size and material of packed connector, and whether Fixed or Adjustable. (For ceramic packed thermocouples only).

6. Specify general type of head.

7. Specify material of construction of head.

8. A duplex terminal block accommodates two thermocouples as listed. Refer to Notes.

9. Specify material of well or tube.

10. A built-up well has a welded tip. Check as many as apply.

11. Give dimensions if required.

12. Process connection is external. However, INT will cover a thread dimension if well flange is threaded.

13. Fill in any applicable company standards or specifications.

Note: For thermocouples other than arrangement shown in sketch, space has been provided for you to draw your own picture.

Tabulation: Fill in all applicable information. SINGLE/DUPLEX, need only be filled in on line 8 if they are the same for all thermocouples on the sheet.

		DIFFERENTIAL PRESSURE INSTRUMENTS				SHEET ____ OF ____		
						SPEC. NO.	REV.	
		NO	BY	DATE	REVISION	CONTRACT	DATE	
						REQ. - P.O.		
						BY	CHK'D	APPR.
	1	Tag No.	Service					
GENERAL	2	Function	Record <input type="checkbox"/> Indicate <input type="checkbox"/> Control <input type="checkbox"/> Blind <input type="checkbox"/> Trans <input type="checkbox"/> Integ <input type="checkbox"/> Other _____					
	3	Case	MFR STD <input type="checkbox"/> Nom Size _____ Color: MFR STD <input type="checkbox"/> Other _____					
	4	Mounting	Flush <input type="checkbox"/> Surface <input type="checkbox"/> Yoke <input type="checkbox"/> Other _____					
	5	Enclosure Class	General Purpose <input type="checkbox"/> Weather proof <input type="checkbox"/> Explosion proof <input type="checkbox"/> Class _____					
	6	Power Supply	For use in Intrinsically Safe System <input type="checkbox"/> Other _____					
	7	Chart	117V 60 Hz <input type="checkbox"/> Other ac _____ dc _____ Volts _____					
	8	Chart Drive	12 in. Circ. <input type="checkbox"/> Other _____ Range _____ No. _____					
	9	Scale	24 hr Other _____ Elec. <input type="checkbox"/> Spring <input type="checkbox"/> Other _____					
			Type _____ Range: 1 _____ 2 _____ 3 _____					
XMTR	10	Transmitter Output	4-20 mA <input type="checkbox"/> 10-50 mA <input type="checkbox"/> 21-103 kPa (3-15 psig) <input type="checkbox"/> Other _____					
			For Receiver, See Spec Sheet _____					
CONTROLLER	11	Control Modes	P=Prop (Gain), I=Integral (Auto Reset), D=Derivative (Rate) Sub: s=Slow, f=Fast If <input type="checkbox"/> Df <input type="checkbox"/> P <input type="checkbox"/> PI <input type="checkbox"/> PD <input type="checkbox"/> PID <input type="checkbox"/> Is <input type="checkbox"/> Ds <input type="checkbox"/>					
	12	Action	Other _____					
	13	Auto-Man Switch	On Meas. Increase Output: Increases <input type="checkbox"/> Decreases <input type="checkbox"/>					
	14	Set Point Adj.	None <input type="checkbox"/> MFR STD <input type="checkbox"/> Other _____					
	15	Manual Reg.	Manual <input type="checkbox"/> External <input type="checkbox"/> Remote <input type="checkbox"/> Other _____					
	16	Output	None <input type="checkbox"/> MFR STD <input type="checkbox"/> Other _____					
			4-20 mA <input type="checkbox"/> 10-50 mA <input type="checkbox"/> 21-103 kPa (3-15 psig) <input type="checkbox"/> Other _____					
UNIT	17	Service	Flow <input type="checkbox"/> Level <input type="checkbox"/> Diff. Pressure <input type="checkbox"/> Other _____					
	18	Element Type	Diaphragm <input type="checkbox"/> Bellows <input type="checkbox"/> Mercury <input type="checkbox"/> Other _____					
	19	Material	Body _____ Element _____					
	20	Rating	Overrange _____ Body Rating _____ psig					
	21	Diff. Range	Fixed <input type="checkbox"/> Adj. Range _____ Set At _____					
	22		Elevation _____ Suppression _____					
	23	Process Data	Fluid _____ Max Temp. _____ Max. Press. _____					
	24	Process Conn.	1/2 in. NPT <input type="checkbox"/> Other _____					
	25	Alarm Switches	Quantity _____ Form _____ Rating _____					
	26	Function	Meas. Var. <input type="checkbox"/> Deviation <input type="checkbox"/> Contacts To _____ on Inc. Meas.					
	27	Options	Pressure Element <input type="checkbox"/> Range _____ Material _____					
			Temp. Element <input type="checkbox"/> Range _____ Type _____					
			Filt Reg. <input type="checkbox"/> Sup. Gage <input type="checkbox"/> Output Gage <input type="checkbox"/> _____ Charts _____					
			Valve Manifold _____					
			Cond. Pots <input type="checkbox"/> Adj. Damp <input type="checkbox"/> Integral Sq. Rt. Ext. <input type="checkbox"/>					
			Integrator _____					
			Other _____					
	28	MFR & Model No.	_____					
Notes:								


DIFFERENTIAL PRESSURE INSTRUMENTS

Instructions for ISA Forms S20.20a and 20.20b

1. To be used for a single item. Use secondary sheet for multiple listing.
2. Check as many as apply.
3. Nominal size refers to approximate front of case dimensions; width x height.
4. Yoke refers to a bracket designed for mounting the instrument on a pipe stand.
5. Enclosure class refers to composite instrument. If electrical contacts are in the case they must meet this classification inherently or by reasons of the enclosure. Use NEMA identification system or ISA identification RP8.1.
6. Specify electrical power to the entire instrument from an external source.
7. Specify chart size, range and number if applicable.
8. "24 hr" is the time for one rotation of the chart. Other speeds should be listed in hours or days. If a spring wound clock is used fill in number of hours or days it runs between windings.
9. The scale type may be SEGMENTAL, ECCENTRIC, or DIAL (CIRCULAR). Space is provided for multiple ranges on the same scale.
10. Specify transmitter output if applicable.
11. See explanation of terminology given on specification sheet. For further definition refer to American National Standard C85-1-1963, "Terminology for Automatic Control." Specific ranges of control modes can be listed after "OTHER", if required.
12. For multiple items specify on second sheet.
13. If standard auto-manual switching is not known or not adequate, specify number of positions.
14. Remote set point adjustment assumes full adjustment range. Specify limits if required.

15. Specify if applicable.
16. Specify if applicable.
17. Specify measured variable.
18. Specify type of element or write in "MFR. STD."
19. Materials refer to wetted parts only.
20. Over-range protection refers to maximum differential pressure. The instrument can withstand without a shift in calibration.
21. Adjustable range means that the range can be changed without replacing any parts.
22. Elevation
23. Give process data affecting meter selection. Flow elements such as orifice plates are specified on separate forms.
24. Refers to connections piped to process equipment or pipe line. Special flanged connections and extended diaphragms for level applications should be described after "OTHER."
25. Form may be SPST, DPDT, or others. Rating refers to electrical rating of switch or contacts in amps.
26. Specify if alarm is actuated by measured variable or by deviation from controller set point. Give contact action if single throw form.
27. Specify required accessories. If temperature element is used, the second line is provided to specify well, length of capillary tubing and other details of the thermal system.
28. After selection is made fill in manufacturer and specific model number.

SECONDARY SHEET — for listing multiple instruments. List all instruments of the same type specified on the primary sheet, with variations as shown. "Notes" refers to notes listed by number at the bottom of the sheet.

		CONTROL VALVES				SHEET ____ OF ____	
		NO	BY	DATE	REVISION	SPEC. NO.	REV.
						CONTRACT	DATE
				BY	CHK'D	APPR.	
GENERAL	1.	Tag No.					
	2.	Service					
	3.	Line No./Vessel No.					
	4.	Line Size/Sched. No.					
BODY	5.	Type of Body					
	6.	Body Size					
	7.	Guiding					
	8.	End Conn. & Rating					
	9.	Body Material					
	10.	Packing Material					
	11.	Lubricator					
	12.	Bonnet Type					
	13.	Trim Form					
	14.	Trim Material	Seat/Plug				
ACTUATOR	15.	Required Seat Tightness					
	16.	Max. Allow. Sound Level dBA					
	17.	Model No. & Size					
	18.	Type of Actuator					
	19.	Close at					
	20.	Flow Action to					
POSIT. <i>Indicator</i>	21.	Fail Position					
	22.	Handwheel & Location					
	23.	MFR. & Model No.					
	24.	Filt. Reg.	Gages	Bypass			
	25.	Input Signal					
TRANSDUCER	26.	Output Signal					
	27.	Air Supply Pressure					
	28.	Make & Model No.					
OPTIONS	29.	Input Signal					
	30.	Output Signal					
	31.						
SERVICE	32.						
	33.						
	34.	FLOW UNITS	LIQUID	STEAM	GAS		
	35.	Fluid					
	36.	Quant. Max.	Cv				
	37.	Quant. Oper.	Cv				
	38.	Valve Cv	Valve FL				
	39.	Norm. Inlet Press.	ΔP				
	40.	Max. Inlet Press.					
	41.	Max. Shut Off	ΔP				
	42.	Temp. Max.	Operating				
	43.	Oper. sp. gr.	Mol. Wt.				
	44.	Oper. Visc.	% Flash				
	45.	% Superheat	% Solids				
	46.	Vapor Press.	Crit. Press.				
47.	Predicted Sound Level dBA						
48.	Manufacturer						
49.	Model No.						
Notes							

CONTROL VALVES

Specification sheet instructions for ISA Form S20.50

1-3. Identification and service or location. It is assumed that each tag number is for a single valve.

4. Can be used for extra identification or in case of duplicate valves indicate quantity.

5. State type of body: Globe, Angles, 3-way, Y-type, Butterfly, Ball, Saunders, Plug Cock, 4-way.

6. State inlet and outlet connection size, internal port size.

7. Type of Guiding — Top, top and bottom, skirt or port, cage.

8. State Type of connection, i.e.: screwed (NPT), flanges, weld end. State rating and standard such as 300 lb ANSI.

9. Material: Iron, steel, alloy plastic, bronze, etc.

10. Packing: Teflon, teflon-asbestos, graphite asbestos, durametallic, etc.

11. If required, State Yes.

12. Bonnet: Standard, plain extension, finned extension, bellows seal.

13. State Characteristic:

- L — Linear
- LV — Linear V Port
- EP — Equal Percentage
- EPT — Equal Percentage Turned
- EPH — Equal Percentage Balanced
- Q — Quick Opening

Or use your own code and identify in notes.

14. Material: State type of stainless steel or alloy, Alloy #6, composition, hardened, other.

15. Fill in if required.

16. Max allowable sound level dBA 3 ft from pipe and 3 ft downstream or the valve outlet.

17. Actuator manufacturers model number and size if not included in the model number — this is usually supplied by the vendor after purchase of actuator.

18. Type of actuator diaphragm, cylinder, motor Electro/Hydraulic or other.

19. Actuator Signal Open/Closed could be 3-15 psig, 0-90 psig, etc. whatever is required to cause full stroke of the valve.

20. Flow action — tends to "open" or "close" valve.

21. Failure position — open, closed, or last position.

22. Handwheel Location — Top or side mounted and on rotary valves such as Butterfly's which end of the shaft.

23. If a positioner is required, state manufacturer. Model number can be supplied by the vendor.

24. Check if required.

25. Positioner Input Signal. State each end 3-15 psig, 4-20 mA, etc.

26. Positioner Output signal for each end of Input signals, i.e., 0-30 psig.

27. Air supply pressure to positioner.

28. If a separate transducer is required (not integral with the positioner), give manufacturer. The supplier can give the model number.

29. Input signal to the transducer.

30. Output signal from the transducer.

31, 32, 33. For options such as travel stops, mounted Solenoid Valves, speed control valves, limit switches, etc. Use a letter code and identify under notes, i.e., LS — Limit Switch, SC — Speed Control.

34. State liquid, steam, gas units gpm, lb/hr, ft³/min, etc.

35. Name of fluid and state whether vapor or liquid if not apparent.

36. State maximum quantity required by process and corresponding Cv.

37. State operating quantity required by process and corresponding Cv.

38. The manufacturer shall fill in the valve Cv and F_L (Liquid Pressure) Recovery Factor without reducers or other accessories. *Factor de Recuperación de P*

39. Operating inlet pressure and pressure differential with units (psia, psig, inches H₂O or Hg). Note at this point that one might consider how minimum conditions will fit the sizing.

40. Maximum inlet pressure if different from normal.

41. State the maximum pressure drop in shut-off position to determine proper actuator size. This is actual difference in inlet and outlet pressure stated in psi, inches of H₂O or Hg, etc.

42. State °F. or °C.

43. State operating specific gravity and molecular weight.

44. State operating viscosity and its units. State flash at valve outlet, i.e., of max flow that will be flashed to vapor because of the valve pressure drop.

45. In the case of vapors, state superheat and in the cases of liquids, state the solids, if present.

46. Note vapor pressure of fluid as well as the critical pressure.

47. Give manufacturers predicted sound level dBA.

48. Complete when available.

41. Se debe establecer la más caída de P en posición de cierre la cual es necesaria para seleccionar el actuador.
44. % Flash. % del F. máx. q' se vaporizará debido al AP. térmico de la V.

PROJECT _____ UNIT _____ PO _____ ITEM _____ CONTRACT _____ MFR SERIAL* _____		DATA SHEET ____ of ____ SPEC _____ TAG _____ DWG _____ SERVICE _____	
1	Fluid _____	Crit Pres PC _____	
2	Flow Rate _____	Units _____	Max Flow _____
3	Inlet Pressure _____	Norm Flow _____	Min Flow _____
4	Outlet Pressure _____	Shut-Off _____	
5	Inlet Temperature _____		
6	Spec Wt/Spec Grav/Mol Wt _____		
7	Viscosity/Spec Heats Ratio _____		
8	Vapor Pressure P_v _____		
9	*Required C_v _____		
10	*Travel _____		
11	Allowable/*Predicted SPL _____	dBA _____	/ / /
12			
13	PIPE LINE SIZE In _____	53	*Type _____
14	& Schedule Out _____	54	*Mfr & Model _____
15	PIPE LINE INSULATION _____	55	*Size _____ Eff Area _____
16	*Type _____	56	On/Off _____ Modulating _____
17	*Size _____ ANSI Class _____	57	Spring Action Open/Close _____
18	Max Press/Temp _____	58	*Max Allowable Pressure _____
19	*Mfr & Model _____	59	*Min Required Pressure _____
20	*Body/Bonnet Matl _____	60	Available Air Supply Pressure:
21	*Liner Material/ID _____	61	Max _____ Min _____
22	End In _____	62	*Bench Range _____ / _____
23	Connection Out _____	63	Act Orientation _____
24	Flg Face Finish _____	64	Handwheel Type _____
25	End Ext/Matl _____	65	Air Failure Valve _____ Set at _____
26	*Flow Direction _____	66	
27	*Type of Bonnet _____	67	Input Signal _____
28	Lub & Iso Valve _____ Lube _____	68	*Type _____
29	*Packing Material _____	69	*Mfr & Model _____
30	*Packing Type _____	70	*On Incr Signal Output Incr/Decr _____
31		71	Gauges _____ By-pass _____
32	*Type _____	72	*Cam Characteristic _____
33	*Size _____ Rated Travel _____	73	
34	*Characteristic _____	74	Type _____ Quantity _____
35	*Balanced/Unbalanced _____	75	*Mfr & Model _____
36	*Rated C_v _____ F_L _____ X_T _____	76	Contacts/Rating _____
37	*Plug/Ball/Disk Material _____	77	Actuation Points _____
38	*Seat Material _____	78	
39	*Cage/Guide Material _____	79	*Mfr & Model _____
40	*Stem Material _____	80	*Set Pressure _____
41		81	Filter _____ Gauge _____
42		82	
43	NEC Class _____ Group _____ Div _____	83	*Hydro Pressure _____
44		84	ANSI/FCI Leakage Class _____
45		85	
46		86	
47			
48			
49			
50			
51			
52			

Rev	Date	Revision	Orig	App

*Information supplied by manufacturer unless already specified.

[illegible]

