

ISA-S20-1981

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Standard

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



ISA-S20 — Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

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Preface

(This Preface is included for information purposes and is not part of S20).

This Standard has been prepared as a part of the service of the ISA toward a goal of uniformity in the field of instrumentation. To be of real value this report should not be static, but should be subjected to periodic review. Toward this end the Society welcomes all comments and criticisms, and asks that they be addressed to the Standards and Practices Board Secretary, ISA, 67 Alexander Drive, P.O. Box 12277, Research Triangle Park, North Carolina 27709, Telephone (919) 549-8411, Fax (919) 549-8288, e-mail: standards@isa.org.

This document was prepared by the Subcommittee on Instrument Specification Forms (RP20.1) and was originally published in 1956 under the direction of G. G. Gallagher of the Fluor Corporation. In 1961 additional forms were published, prepared by Committee 8D-RP20 under the direction of W. Carmack of the Fluor Corporation. This revision was prepared, with the supervision of the Chairman, R. E. Frey of Rohm and Haas Company, by the committee as listed below.

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The assistance of those who aided in the preparation of this Standard, by their review of the draft and by offering suggestions toward its improvement, is gratefully acknowledged. The following have reviewed the report and served as Board of Review:

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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) Assists 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.

2 Scope

2.1 These forms are intended to assist the specification writer to present the basic information. In this sense they are "short-form" specifications or "check sheets" and may not include all necessary engineering data or definitions of application requirements. While the types of instruments described by these forms are more common to the process industries the forms should also prove useful in other areas if special requirements are defined elsewhere.

2.2 Some forms consist of a primary sheet and a secondary (tabulation) sheet. The primary sheet may be used by itself to specify a single instrument or to specify general requirements for a series of similar instruments which are then tabulated on the secondary sheet.

2.3 The heading used on all forms is designed to permit the user to add company name, plant location, trade mark, or specific project data.

2.4 The specification forms included in this standard are intended to cover the most commonly used instruments. The list is not a complete catalog of instruments and control valves available. It is intended that new forms shall be added with each general revision of this standard.

2.5 An instruction sheet is provided for each form to explain the terms used and the intended procedure. The instructions are keyed to the form by reference to the line numbers. The Committee has minimized dependence on the instruction sheet since the forms are frequently reprinted and used without the instructions. The explanation is omitted where the meaning is felt to be obvious.

2.6 Instrument specifications may be prepared by the use of Automatic Data Processing (ADP) techniques. The format of such specifications may be modified in order to be compatible with ADP machine capabilities. However, general consistency with this Standard shall be retained.

*Where applicable, the terminology used is in accordance with American National Standards C85.1-1963, "Terminology for Automatic Control," sponsored by the American Society of Mechanical Engineers.

	RECEIVER 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"/> Integ <input type="checkbox"/> Deviation <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"/> Rack <input type="checkbox"/> Multi-Case <input type="checkbox"/> Other _____ For Multiple Case, See Spec. Sheet _____
	5	Enclosure Class General Purpose <input type="checkbox"/> Weather Proof <input type="checkbox"/> Explosion-Proof <input type="checkbox"/> Class _____ For Use in Intrinsically Safe System. <input type="checkbox"/> Other _____
	6	Power Supply 117 V 60Hz <input type="checkbox"/> Other ac _____ dc <input type="checkbox"/> _____ Volts
	7	Chart Strip <input type="checkbox"/> Roll <input type="checkbox"/> Fold <input type="checkbox"/> Circular _____ Time Marks _____ Range _____ Number _____
	8	Chart Drive Speed _____ Power _____
	9	Scales Type _____ Range 1 _____ 2 _____ 3 _____ 4 _____
	CONTROLLER	10
11		Action On Meas. Increase Output: Increases <input type="checkbox"/> Decreases <input type="checkbox"/>
12		Auto-Man Switch None <input type="checkbox"/> MFR STD <input type="checkbox"/> Other _____
13		Set Point Adj. Manual <input type="checkbox"/> External <input type="checkbox"/> Remote <input type="checkbox"/> Other _____
14		Manual Reg. None <input type="checkbox"/> MFR STD <input type="checkbox"/> Other _____
INPUTS	15	Output 4-20 mA <input type="checkbox"/> 10-50 mA <input type="checkbox"/> 21-103 kPa (3-15 psig) <input type="checkbox"/> Other _____
	16	Input Signals 4-20 mA <input type="checkbox"/> 10-50 mA <input type="checkbox"/> 21-103 kPa (3-15 psig) <input type="checkbox"/> Other _____
	17	No. of Inputs 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>
	18	Power for XMTRS External <input type="checkbox"/> This Inst <input type="checkbox"/> No. of Independent Supplies _____ For Transmitters. See Spec Sheet.
ALARMS	19	Alarm Switches Quantity _____ Form _____ Rating _____
	20	Function Meas. Var. <input type="checkbox"/> Deviation <input type="checkbox"/> Contacts To _____ On Meas. _____ Other _____
	21	Options Filter-Reg <input type="checkbox"/> Supply Gage <input type="checkbox"/> Charts <input type="checkbox"/> Int. Illumination <input type="checkbox"/> Other _____
	22	MFR & Model No. _____
Notes:		

ISA Form S20.1a

3 Receiver instruments

3.1 Instructions for ISA Forms S20.1a and 20.1b.

- 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) It is assumed that the instrument has its own case or shelf suitable for single mounting, unless "MULTICASE" is checked. Shelf or separable case for multiple case mounting instrument is not included unless listed and described as an accessory.
- 5) Enclosure class refers to composite instrument. If electrical contacts are the case they must meet this classification inherently or by reason of the enclosure. Use NEMA identification system or ISA system RP8.1.
- 6) Specify electrical power to the entire instrument from an external source.
- 7) For multiple instruments list ranges on secondary sheet, but specify other chart options on primary sheet. Chart graduations assumed to be uniform unless otherwise noted. Circular charts assumed to have 24 hr/revolution speed; strip charts 3/4 in. to 1 in. per hour.
- 8) Chart drive mechanism assumed to be synchronous motor operating on 117V 60 Hz and suitable for ENCLOSURE CLASS specified on line 5. If the chart drive is pneumatic so state — identify pneumatic pulser under options. Note deviations from standard (MFR) under notes, i.e., dual speed or special speeds.
- 9) The scale type may be SEGMENTAL, VERTICAL, HORIZONTAL, DIAL (CIRCULAR) or other. Ranges 1, 2, 3 and 4 are used for multiple inputs. The first listed (No. 1) is assumed to be the controller input, if a controller is used.
- 10) 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.
- 11) For multiple items specify on second sheet.
- 12) If standard auto-manual switching is not known or not adequate, specify particular requirements, such as BUMPLESS, PROCEDURELESS, 4-POSITION, or as required.
- 13) Remote set point adjustment assumes full adjustment range. Specify limits if required. Under other can be noted bias or ratio.
- 14) Specify if applicable.
- 15) Specify if applicable.
- 16) All input signals on multi-channel instruments assumed to be the same range unless otherwise noted.
- 17) Specify number of inputs.
- 18) Check if power source for the loop is contained in this instrument or in some external instrument.

- 19) Form may be SPST, SPDT, DPDT or other. Rating refers to electrical rating of switch or contacts in amps.
- 20) Specify if alarm is actuated by measured variable or by deviation from controller set point. Give contact action if single throw form.
- 21) Specify required accessories and options, fill in number of charts. This is assured to be number of chart rolls for strip charts.
- 22) 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. Line 11 of sheet 1a is tabulated under measurement increases, output tabulate increase or decrease.

	ANNUNCIATORS				SHEET _____ OF _____	
	NO		BY		DATE	
	REVISION		SPEC. NO.		REV.	
	CONTRACT		DATE		REQ. - P.O.	
	BY		CHK'D		APPR.	

GENERAL	1	Tag No. _____ Location: _____
	2	Cabinet Size: _____ Rows High By _____ Columns Wide _____
	3	Mounting: _____ Flush Panel <input type="checkbox"/> Surface <input type="checkbox"/>
	4	Cabinet Style: Plug-In Light Boxes <input type="checkbox"/> Swing Door <input type="checkbox"/> Remote Logic Cabinet <input type="checkbox"/> Watertight Door <input type="checkbox"/>
	5	Rating: General Purpose <input type="checkbox"/> Weather proof <input type="checkbox"/> Explosion proof <input type="checkbox"/> Class _____ Group _____ Division _____
	6	Power Supply: 117V 60Hz <input type="checkbox"/> 125 Vdc <input type="checkbox"/> 12 Vdc <input type="checkbox"/> 24 Vdc <input type="checkbox"/> Other: _____

DISPLAY	7	Backlight Nameplates: White Translucent <input type="checkbox"/> Other: _____ Size: _____
	8	Alarm Points Per Lightbox: One <input type="checkbox"/> Two <input type="checkbox"/> Three <input type="checkbox"/> Four <input type="checkbox"/>
	9	Lamps Per Alarm: One <input type="checkbox"/> Two <input type="checkbox"/> Three <input type="checkbox"/> Four <input type="checkbox"/>
	10	Bullseye Type: Number of Lights: _____ Color: _____
	11	Other Display: _____

LOGIC	11	Logic: Electro-Mechanical Relay <input type="checkbox"/> Solid-State Electronic <input type="checkbox"/> Mercury Bottle <input type="checkbox"/> Fluidic <input type="checkbox"/>
	12	In Display Cabinet <input type="checkbox"/> Remote Cabinet <input type="checkbox"/> Strip Chassis <input type="checkbox"/>
	13	General Purpose <input type="checkbox"/> Weather proof <input type="checkbox"/> Explosion proof <input type="checkbox"/> Class _____ Group _____ Division _____ Intrinsically Safe <input type="checkbox"/>
	14	Field Contact Voltage: 117 Vac <input type="checkbox"/> 12 Vdc <input type="checkbox"/> 125 Vdc <input type="checkbox"/> Other: _____
	15	On Alarm, Actuating Contacts: Open Close Field Selectable Form _____

FEATURES	16	Required Features: Lock-In of Momentary Alarms <input type="checkbox"/> Auxiliary Contacts <input type="checkbox"/> Sequential Alarm Circuit <input type="checkbox"/>
	17	Ring-Back Circuit: Via Alarm Audible Signal <input type="checkbox"/> Via Other Audible Signal <input type="checkbox"/>
	18	Fail-Safe Circuit to Signal Own Failure <input type="checkbox"/> Operational Test <input type="checkbox"/> Lamp Test <input type="checkbox"/>
	19	Flasher: Remote <input type="checkbox"/> In Cabinet <input type="checkbox"/> Model No.: _____
	20	Acknowledge Common <input type="checkbox"/> Unit <input type="checkbox"/> Light <input type="checkbox"/> Audible <input type="checkbox"/> PB Location in Cabinet <input type="checkbox"/> Remote <input type="checkbox"/> Others <input type="checkbox"/>
	21	Reset Common <input type="checkbox"/> Unit <input type="checkbox"/> Light <input type="checkbox"/> Audible <input type="checkbox"/> PB Location in Cabinet <input type="checkbox"/> Remote <input type="checkbox"/> Others <input type="checkbox"/>

SEQUENCE	22	STAGE	VISUAL SIGNAL	AUDIBLE SIGNAL
		Normal		
		Alert, Initial		
		Alert, Subsequent		
		Acknowledge, Int.		
		Acknowledge, Subs.		
		Return to Normal		
		Reset		
		Test		
		ISA Sequence Number: _____		

OPTIONS	23	Horn: _____
	24	Bell: _____
	25	Dimmer: _____
	26	Color Caps: _____
	27	Power Supply Location _____
	28	Manufacturer: _____
	29	Model No. _____

Notes:

ISA Form S20.2a


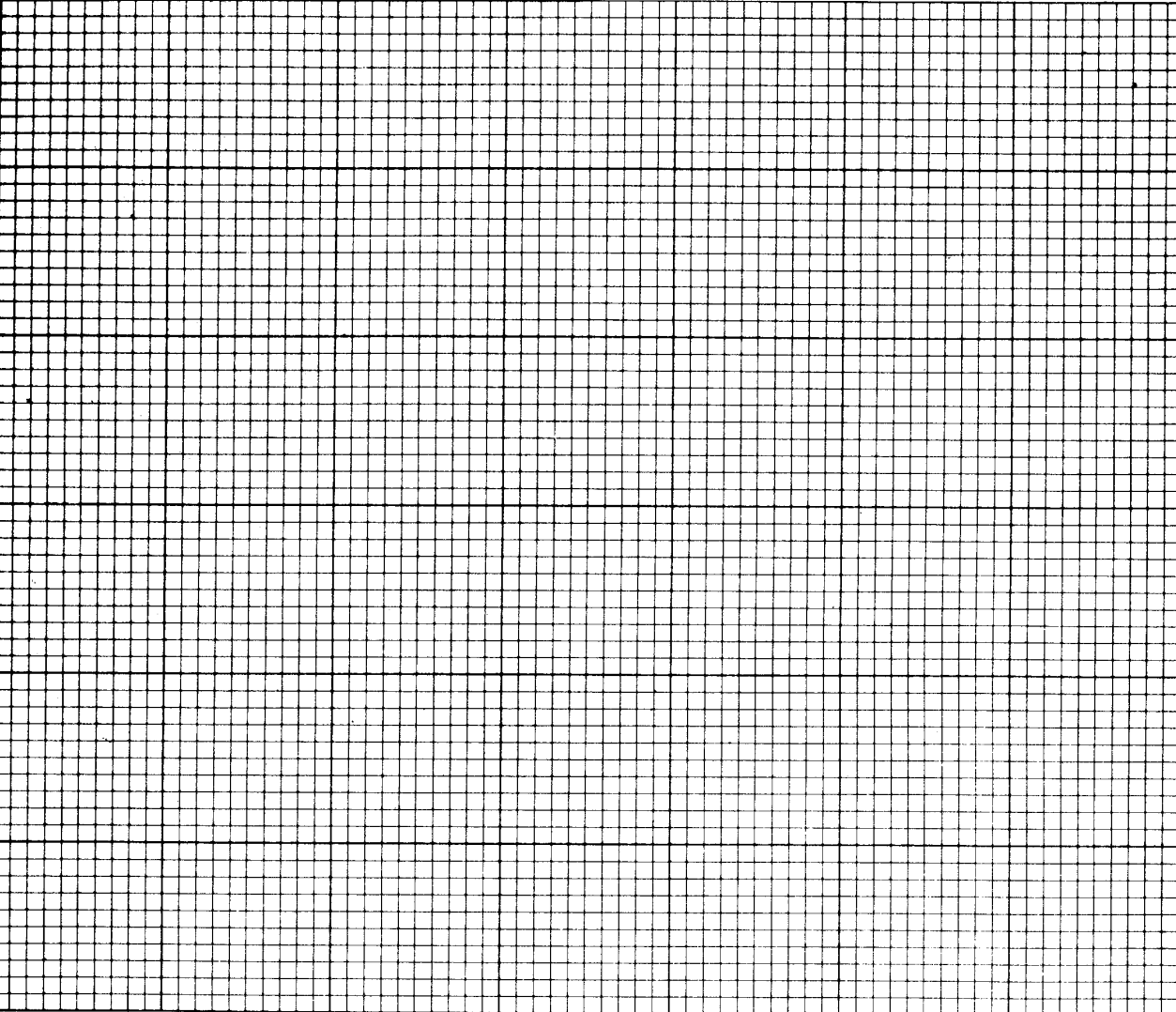
[illegible]

4 Annunciators


Instructions for ISA Forms S20.2a and 20.2b

- 1) Write in Tag Number of entire Annunciator system.
- 2) Omit if single unit.
- 3) Specify cabinet mounting.
- 4) Specify type of cabinet.
- 5) Refers only to display and audible.
- 6) Specify power supply required.
- 7) Check WHITE TRANSLUCENT, or write in color of plate and engraving required. Specify window size in height x width.
- 8) Number of independent displays in one box, or position in cabinet.
- 9) If individual bullseyes, specify number and color required. If self-contained unit, specify number of normal and off-normal lights and color of each. (Example — two red independent off-normal and one green common normal light.)
- 10) Describe display if other than backlighted nameplate or bullseye. For example; Backlighted prism, Electroluminescent, Two-color pneumatically operated.
- 11) Specify type of logic unit which operates display and audible system.
- 12) Check required location of logic components.
- 13) Check Enclosure Class of logic components and or enclosure. General purpose relays inside an explosion proof housing, or explosion proof relays will both satisfy the hazardous area classification. Use NEMA identification system or ISA system RP8.1.
- 14) Specify voltage across contacts which actuate alarm.
- 15) Give contact action.
- 16) Sequential Alarm refers to "First Out" system.
- 17) Specify type of ring back, if applicable.
- 18) An operational test actuates audible as well as lamps.
- 19) Specify flasher location and model number.
- 20) Specify type of Acknowledgment, and Pushbutton locations.
- 21) Specify reset and pushbutton location.
- 22) Write in ISA Sequence number as described in RP18.1, Specifications and Guides for the Use of General Purpose Annunciators, or fill in the table for the sequence required.
- 23) Write in the model number, or describe type, if required.
- 24) Write in the model number, or describe type, if required.

- 25) Write in the model number, or describe type, if required.
- 26) Specify number required, and color.
- 27) Specify power supply location, i.e., in logic cabinet, or separate cabinet.
- 28) For any additional accessories required.
- 29) Fill in after selection is made.

					SHEET _____ OF _____								
					SPEC. NO.	REV.							
	NO	BY	DATE	REVISION	CONTRACT	DATE							
					REQ. - P.O.								
					BY	CHK'D							
					APPR.								
													
							<div>ISA Form S20.3a</div>						

ISA Form S20.3b

				SHEET _____ OF _____			
				SPEC. NO.	REV.		
	NO	BY	DATE	REVISION			
					CONTRACT	DATE	
					REQ. - P.O.		
					BY	CHK'D	APPR.
ISA Form S20.3c							

	POTENTIOMETER 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"/> Transmit <input type="checkbox"/> Other _____
	3	Type Auto Bal. <input type="checkbox"/> Man Bal. <input type="checkbox"/> Galv <input type="checkbox"/> Other _____
	4	Case MFR STD <input type="checkbox"/> Nom Size _____ Color: MFR STD <input type="checkbox"/> Other _____
	5	Mounting Flush <input type="checkbox"/> Surface <input type="checkbox"/> Rack <input type="checkbox"/> Multi-Case <input type="checkbox"/> Other _____ For Multiple Case Spec, See Sheet _____
	6	Enclosure Class Gen Purp <input type="checkbox"/> Weather Proof <input type="checkbox"/> Explosion-Proof <input type="checkbox"/> Class _____ Other _____
	7	Power Supply 117V 60 Hz <input type="checkbox"/> Other _____
	8	Chart _____ Strip <input type="checkbox"/> _____ Circ <input type="checkbox"/> Time Marks <input type="checkbox"/> Range _____ No _____ Chart Speed: _____ Change Gears _____
	9	Scale Type _____ Range 1 _____ 2 _____
	10	Printout No. of Points _____ Sec Per Point _____ Full Travel Speed _____ Print Character and Color _____ Point Select <input type="checkbox"/>
	11	Selector Switches No. and Form _____ In Case <input type="checkbox"/> External <input type="checkbox"/> Switch Cabinet Specs _____
	XMTR	12
13		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"/> Other _____
CONTROLLER	14	Action On Meas. Increase Output: Increases Decreases
	15	Auto-Man Switch None <input type="checkbox"/> MFR STD <input type="checkbox"/> Specify _____
	16	Set Point Adj. Manual <input type="checkbox"/> External <input type="checkbox"/> Remote <input type="checkbox"/> Specify _____
	17	Manual Reg. None <input type="checkbox"/> MFR-STD <input type="checkbox"/> Other _____
INPUT	18	Output 4-20 mA <input type="checkbox"/> 10-50 mA <input type="checkbox"/> 21-103 kPa (3-15 psig) <input type="checkbox"/> Other _____
	19	Thermocouple Type J(IC) <input type="checkbox"/> K(CA) <input type="checkbox"/> T(CC) <input type="checkbox"/> E(CHR-CON) <input type="checkbox"/> Other _____ Ref Junction Comp <input type="checkbox"/> Lead Resistance (Galv) _____
	20	Other Input Resistance Temp Sensor <input type="checkbox"/> Calibration _____ Other _____
ALARM	21	Alarm Switches Quantity _____ Form _____ Rating _____
	22	Function Meas. Var. <input type="checkbox"/> Deviation <input type="checkbox"/> Contacts to _____ measure _____
	23	Other _____ Front Adj _____ Back Adj _____
OPTIONS	24	T/C Burnout Drive None <input type="checkbox"/> Upscale <input type="checkbox"/> Downscale <input type="checkbox"/>
	25	Accessories Case Illuminator <input type="checkbox"/> _____ Charts
		Filter Reg. <input type="checkbox"/> Other _____
	26	MFR. & Model No. _____
Notes:		

ISA Form S20.10a

5 Potentiometer instruments specification sheet instructions

Instructions for ISA Forms S20.10a and 20.10b

Prefix number designates line number on corresponding specification sheet.

- 1) To be used for single item. Use secondary sheet for multiple listing.
- 2) Check as many as apply.
- 3) Check one. Note that sheet may be used to specify galvanometric type of instrument.
- 4) Nominal size refers to approximate front of case dimensions; width x height.
- 5) It is assumed that the instrument has its own case or shelf suitable for single mounting unless "multi-case" is checked. Shelf or separable case for multiple case mounting instrument is not included in this sheet unless listed as an accessory.
- 6) Enclosure Class refers to composite instrument. If electrical contacts are in the case, they meet this rating inherently or by reason of the enclosure. Use NEMA identification system or ISA system presented in RP8.1.
- 7) Specify electrical power to entire instrument.
- 8) For multiple instruments list ranges on second sheet, but specify other items here.
- 9) Ranges 1 and 2 refer to multi-channel instruments. The first listed is assumed to be the controller input (if any).
- 10) For multiple items list number of points on second sheet. "Point Select" permits by-passing any or all points by a switching mechanism.
- 11) For multiple items show number of switches on second sheet under "No. of Points."
- 12) Specify if applicable.
- 13) See explanation of terminology given on spec. sheet. Specific ranges of control modes can be listed under "other" if required.
- 14) For multiple items specify on second sheet.
- 15) If standard auto-manual switching is not known or not adequate, specify particular requirements, such as BUMPLESS, PROCEDURELESS, 4-POSITION, or as required.
- 16) Remote set point adjustment assumes full adjustment range. Specify limits if required.
- 17) Specify if applicable.
- 18) Specify if applicable.
- 19) Check if thermocouple input applies. Lead resistance required only for galvanometer.
- 20) Specify any input other than thermocouple. "Calibration" refers to curve used and does not imply that element is specifically calibrated for this instrument.
- 21) Form may be SPST, SPDT, DPDT, etc. Rating is electrical rating of switch in amps.

- 22) Check if alarm is actuated by measured variable or by deviation from controller set point. Give contact action if single throw form. Specify calibrated or blind alarm index setter.
- 23) Specify if applicable.
- 24) Specify if applicable.
- 25) Accessories for multiple items may be covered by "notes" second sheet.
- 26) May be filled in after selection is made.

SECONDARY SHEET — for listing multiple instruments. List all instruments of the same type, specified on Primary Sheet, with variations as shown. "Notes" refers to notes listed by number at the bottom of the sheet. Or use Secondary Sheet to list and identify the multiple points of a single multipoint instrument.

		TEMPERATURE INSTRUMENTS (FILLED SYSTEM)				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
	3	Case
	4	Mounting
	5	Enclosure Class
	6	Power Supply
	7	Chart
	8	Chart Drive
	9	Scales
	10	Transmitter Output
CONTROLLER	11	Control Modes
	12	Action
	13	Auto-Man Switch
	14	Set Point Adj.
	15	Manual Reg.
	16	Output
	ELEMENT	17
18		Process Data
19		Range
20		Bulb
21		Capillary
22		Well
23	Alarm Switches	
24	Function	
25	Options	
26	Mfr. & Model No.	

Notes:

ISA FORM S20.11a

[illegible]

6 Temperature instruments (filled systems)

Instructions for ISA Forms S20.11a and 20.11b

- 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 reason of enclosure. Use NEMA identification 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) Chart drive mechanism assumed to be synchronous motor operating in 117V 60 Hz and suitable for ENCLOSURE CLASS specified on line 5. If the chart drive is pneumatic so state — identify pneumatic pulser under options. Note deviations from standard (MFR) under notes, i.e., dual speed or special speeds.
- 9) The scale type may be SEGMENTAL, VERTICAL, HORIZONTAL, DIAL (CIRCULAR) or other. Ranges 1, 2, 3 and 4 are used for multiple inputs. The first listed (No. 1) is assumed to be the controller input, if a controller is used.
- 10) Specify transmitter output if applicable.
- 11) See explanation of terminology given on specifications 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 particular requirements, such as BUMPLESS, PROCEDURELESS, 4-POSITION, or as required.
- 14) Remote set point adjustment assumes full adjustment range. Specify limits if required.
- 15) Specify if applicable.
- 16) Specify if applicable.
- 17) Filled thermal systems can be of the following SAMA classifications:

Class IA:	Liquid filled, uniform scale, fully compensated.
Class IB:	Liquid filled, uniform scale, case compensated only.
Class IIA:	Vapor pressure, non-linear scale with measured temperature above case and tubing temperature.
Class IIB:	Vapor pressure, non-linear scale with measured temperature below case and tubing temperature.

- Class IIC: Vapor pressure, non-linear scale with measured temperature above and below case and tubing temperature.
- Class IIIA: Gas filled, uniform scale, fully compensated.
- Class IIIB: Gas filled, uniform scale, case compensated only.
- Class VA: Mercury filled, uniform scale, fully compensated.
- Class VB: Mercury filled, uniform scale, case compensated only.
- 19) Range refers to process input span for which an output is desired. Adjustable range means that the unit can give its normal output over a range of inputs.
- 20) Bulb type can be plain, averaging, rigid, adjustable union connections, fixed union connection. Capillary extension length can be rigid or flexible, etc.
- 21) Capillary tube specifications
- 22) Well Specifications
- 23) Form may be SPST, SPDT, DPDT, etc. Rating is electrical rating of switch in volt amps.
- 24) Check if alarm is to be actuated by measured variable or by deviation from controller set point. Give contact action if single throw from.

[illegible]

7 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.

8 Resistance temperature sensors

Instructions for ISA Forms S20.13a and 20.13b

Refer to Scientific Apparatus Manufacturers Association (SAMA) Tentative Standard on Resistance, RC 5-10-1955.

- 1) Complete assembler includes head, element, and well; as shown in sketch.
- 5) Give size and pipe schedule of nipple. Check if union is required.
- 7) The ice point resistance in ohms usually defines the resistance vs. temperature curve. If not, provide additional data as an attachment.
- 8) Give maximum range over which the elements will be used.
- 9) Specify sealing of leads.
- 11) This thread is on the element termination, not the well.
- 12) It is necessary to specify the number of wires, depending on the compensation required. The other items refer to the element termination.
- 14) A built-up well has a welded tip and connection.
- 16) Internal thread of flange if well flange is threaded.

Instructions for the tabulation:

- 17) Process Connection is the connection on the element or well which is connected to the pipe or vessel. Well dimensions are illustrated in the sketch. It is not necessary to specify "Element Length" if well dimensions are already given. Single or Dual elements are assumed to be within the same sheath. Refer to Notes by number or letter and explain in the space at the bottom of the form.

9 Bi-metal thermometers

Instructions for ISA Forms S20.14a and 20.14b

- 1) Specify mounting termination of stem and write in stem materials or "MFR.STD."
- 2) Select stem thread size.
- 3) Stem diameter standards may vary. Check specific size if this is important.
- 4) Write in case material if other than standard.
- 5) Write in nominal dial size and color.
- 6) Scale Length
- 7) The form of the thermometer is illustrated on the form. The adjustable form may be set to any angle. If a stem connection form other than shown is required, make a sketch in the space provided.
- 8) Check applicable options.
- 9) List specific make and model number when selection is made.
- 10) Specify how well is to be furnished, if any.
- 11) Specify well material. If not all are the same, cover exceptions by notes in the tabulation.
- 12) Specify well construction. A "built-up" well has a welded tip. Special well designs should be described by a sketch in the space provided or on an attached sheet.

Tabulation:

Tag No:	It is assumed that a tag number represents a single item. If multiple units have the same number, cover this with a special note.
Range:	Write "F" or "C" at the top of the column. May be left blank on initial issue if Operating Temp. is specified.
Operating Temp.	Must be filled in if range is not specified.
Stem Length:	Refer to illustrations on form.
Well Conn:	Show thread size, such as "1 in. NPT" or flange size and rating, such as "1 1/2 in. 150 lb." All flanges are assumed to be ANSI Standard; if not, cover by a special note.
Lag. Ext:	Applies to screwed wells only.

NOTE: Index notes by number or letter and specify in space below tabulation.

		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:							

ISA Form S20.20a

10 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 setpoint. 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.

	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 60° 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


11 Orifice plates and flanges

Instructions for ISA Form S20.21

Refer to ISA Recommended Practice RP3.2, "Flanged Mounted, Sharp Edged Orifice Plates for Flow Measurement."

- 1) Check if concentric bore, or write in eccentric, segmental, etc.
- 2) ISA Standard reference given above. This also conforms to AGA-ASME requirements.
- 3) Check whether plate is to be bored odd size for exact maximum rate, or to nearest 1/8 in. for approximate maximum rate.
- 4) Select plate material.
- 5) If ring joint assembly is used, give ring material and configurations.
- 6) Refers to plate, not flanges.
- 7) Select one of the standard tap locations or write in other.
- 8) Select tap size.
- 9) Select flange construction.
- 10) Select flange material. If stainless steel, show type; such as, "304 SS."
- 11) Indicate whether orifice flanges are to be included with the plate, or furnished by others.
- 12) Note Flange Rating.
- 13) Tag number or other identification No.
- 14) Process service.
- 15) Line number. Include line size.
- 16) List fluid, unless classified.
- 17) Liquid, gas, or vapor.
- 18) Maximum flow assumed to be meter maximum. Give flow units.
- 19) Figure only if units given above.
- 20) Upstream operating pressure and units. This is also the contract figure unless otherwise noted.
- 21) Operating temperature, °F or °C. See comment in 20 above.
- 22) Specific gravity at Base Temperature.
- 23) Liquid specific gravity at operating temperature given on Line 21.
- 24) Applies to gas, at operating pressure. Supercompressibility factor normally required for gases over 100 psig because the gas at this pressure and above does not follow the ideal gas laws.

- 25) Applies to vapor or gas. C_p specific heat at constant pressure, C_v specific heat at constant volumes — Ratio = K at the operating temperature.
- 26) Viscosity and units, at operating temperature given on line 21.
- 27) Applies to vapor or steam. Write "SAT" if saturated; otherwise give % quality or degrees superheat, in F or C.
- 28) Contract base conditions. Pressure must be given in absolute units.
- 29) Bellows, diaphragm, mercury, etc.
- 30) Set range and units.
- 31) Applies to wet meters.
- 32) Fill in if applicable.
- 33) Full scale range and units. See comment under 18 above.
- 34) Fill in if required.
- 35) Fill in for final records after approved bore calculation is available.
- 36) For final records, see comment on 35.
- 37) In inches; or give line size and Schedule.
- 38) ANSI Flange Rating, i.e., 4 in. 300 lb RF
- 39) If desired, state whether top or bottom.
- 40) Give plate thickness.

		ROTAMETERS (VARIABLE AREA FLOWMETERS)				SHEET ____ OF ____		
						SPEC. NO.		REV.
		NO	BY	DATE	REVISION	CONTRACT		DATE
						REQ. - P.O.		
						BY	CHK'D	APPR.
GENERAL	1	Tag Number						
	2	Service						
	3	Line No./Vessel No.						
	4	Function						
	5	Mounting						
	6	Power Supply						
	7	Conn. Size	Type					
	8	Inlet Dir.	Outlet Dir.					
	9	Fitting Material						
	10	Packing or O-Ring Mtl.						
	11	Enclosure Type						
METER	12	Size	Float Guide					
	13	Tube Mtl.	Float Mtl.					
	14	Meter Scale: Length & Type						
	15	Meter Scale Range						
	16	Meter Factor						
	17	Rated Accuracy						
	18	Hydraulic Calib. Required						
FLUID DATA	19	Fluid						
	20	Color or Transparency						
	21	Maximum Flow Rate						
	22	Norm Flow	Min Flow					
	23	Oper. Specific Gravity (Liq)						
	24	Max Oper. Viscosity						
	25	Oper. Press.	Oper. Temp.					
	26	Oper. Density (Gases)						
	27	Std. Density	Mol. Wgt.					
	28	Max. Allowable Press. Drop						
	29							
EXT	30	Extension Well Mtl.						
	31	Gasket Mtl.						
XMTR	32	Transmitter Output						
	33	Trans. Enclosure Class						
	34	Scale Range						
ALARM	35	No. of Contacts	Form					
	36	Rating	Housing					
	37	Action						
	38							
OPTIONS	39	Valve Size & Material						
	40	Valve Location						
	41	Const. Diff. Relay Mtl.						
	42	Purge Meter Tubing						
	43	Airset						
	43a							
	44	Manufacturer						
	45	Model Number						
	46	Tube Number						
	47	Float Number						
Notes:								


ISA FORM S20.22

12 Rotameters

Instructions for ISA Form S20.22 (Refer to ISA RP16.1, 2, 3, 4)

- 1) List tag number.
- 2) Refers to process applications.
- 3) Show line number, vessel number, or line specification.
- 4) Give functions such as INDICATE RECORD, CONTROL TRANSMIT, INTEGRATE, etc.
- 5) FLUSH PANEL, FRONT PANEL, PIPE, etc.
- 6) Give voltage, dc or ac, and ac frequency.
- 7) Give nominal connection size and type such as SCREWED, 150 lb FLANGED, etc.
- 8) Select orientation of inlet and outlet and designated as RIGHT, LEFT, VERTICAL or REAR.
- 9) Select material of end fittings. Note if lining is required.
- 10) Select either packing or "O" ring design and note material.
- 11) Select type of enclosure, if any, such as SIDE PLATE, SAFETY GLASS, etc.
- 12) Give meter size. Note that this is not the same as connection size but refers to the nominal size of the tube and float combination.
Give the method of float guiding such as NONE, FLUTES, POLE, EXTENSIONS.
- 13) Select tube and float material.
- 14) Select type meter scale: NONE, ON GLASS, METAL STRIP. Select meter scale length.
- 15) Select meter scale range and flow units. Remember that rotameters' scales cannot start at zero but typically have rangeability of 10:1 or 12:1.
- 16) Meter factor if not direct reading.
- 17) Accuracy statement does not imply any specific calibration.
- 18) Note if hydraulic calibration is required and state required accuracy.
- 19) If fluid cannot be identified, state if liquid or gas.
- 20) Give fluid color or transparency which will affect float visibility in glass tube meters.
- 21) List maximum operating flow rate and units, usually the same as maximum of meter scale.
- 22) Show normal and minimum flow rates expected.
- 23) Give operating specific gravity of liquid. (Numerically equal to density in gm/cm³.)
- 24) Give maximum expected viscosity and units.
- 25) Give operating pressure and temperature, with units.
- 26) For gases give operating density and units, unless molecular weight is given on Line 27.

- 27) For gases give density at standard conditions (14.7 psia and 60°F unless stated otherwise) and/or molecular weight if known.
- 28) State maximum allowable pressure drop at full flow, if applicable.
- 30) If meter has an extension well, state material of well.
- 31) Select material of gasket on extension.
- 32) If meter transmits, state pneumatic or electronic output such as 21-103 kPa (3-15 psig), 4-20 mA, etc.
- 33) Give transmitter electrical classification such as General Purpose, Class 1, Group D, etc.
- 34) Give transmitter scale size and range. Note that this is not the meter scale but the scale of the attached instrument.
- 35) Number of alarm contacts in case.
Form of contacts: SPDT, SPST, DPDT, etc.
- 36) Contact electrical load rating. Contact housing — GP, Class I, GR.D, etc. Use NEMA identification.
- 37) HIGH, LOW, DEVIATION.
- 39) Specify needle valve if required.
- 40) Valve may be on the inlet, outlet or separately mounted. Do not list here if valve is to be furnished by others.
- 41) This relay may be used on purge assemblies.
- 44-47) When manufacturer is selected fill in exact model and part numbers.

		MAGNETIC FLOWMETERS				SHEET _____ OF _____	
						SPEC. NO.	REV.
		NO	BY	DATE	REVISION	CONTRACT	DATE
						REQ. - P.O.	
				BY	CHK'D	APPR.	
METERING ELEMENT	1	Meter Tag No.					
	2	Service					
	3	Location					
	4	CONN'S.	Line Size, Sched.				
	5		Line Material				
	6		Connection Type				
	7		Connection Mat'ls.				
	8	METER	Tube Material				
	9		Liner Material				
	10		Electrode Type				
	11		Electrode Matl.				
	12		Meter Casing				
	13		Power Supply	Elect. Code			
	14		Grounding, Type & Matl.				
	15		Enclosure Class				
	16	FLUID					
	17		Fluid				
	18		Max. Flow, Units				
	19		Max. Velocity, Units				
	20		Norm. Flow	Min. Flow			
	21		Max. Temp.	Min. Temp.			
	22		Max. Press.	Min. Press.			
	23		Min. Fluid Conductivity				
	24	Vacuum Possibility					
	25						
ASSOCIATED INSTRUMENT	26	Instrument Tag Number					
	27	Function					
	28	Mounting					
	29	Enclosure Class					
	30	Length Signal Cable					
	31	Type Span Adjustment					
	32	Power Supply					
	33	TRANS.	Transmitter Output				
	34						
	35	DISPLAY	Scale Size	Range			
	36		Chart Drive	Speed			
	37		Chart Range	Chart No.			
	38		Integrator				
	39	CONTR.	Modes	Output			
	40		Action	Auto-Man.			
41							
42	ALARM	Contact No.	Form				
43		Rating	Elec. Code				
44		Action					
45	Manufacturer						
46	Meter Model Number						
47	Instrument Model Number						
Notes:							

ISA FORM S20.23

13 Magnetic flowmeters

Instructions for ISA Form S20.23


- 1) Tag number of meter only.
- 2) Refers to process application.
- 3) Show line number or identify associated vessel.
- 4) Give pipeline size and schedule. If reducers are used, so state.
- 5) Give material of pipe. If lined, plastic or otherwise non-conductive, so state.
- 6) Give connection type: FLANGED, DRESSER COUPLINGS, ETC.
- 7) Specify material of meter connections.
- 8) Select tube material. (Non-permeable material required if coils are outside tube).
- 9) Specify material of line.
- 10) Select electrode type: STD., BULLET NOSED, ULTRASONIC CLEANED, BURN OFF, etc.
- 11) Specify electrode material.
- 12) Describe casing: STD., SPLASH PROOF, SUBMERSIBLE, SUBMERGED OPERATION, etc.
- 13) Give ac voltage and frequency, along with application NEMA identification of the electrical enclosure.
- 14) State means for grounding to fluid: GROUNDING RINGS, STRAPS, etc.
- 15) State power supply and enclosure class to meet area electrical requirements.
- 17) State fluid by name or description.
- 18) Give maximum operating flow and units; usually same as maximum of instrument scale.
- 19) Give maximum operating velocity, usually in ft/s.
- 20) List normal and minimum flow rates.
- 21) List maximum and minimum fluid temperature °F.
- 22) List maximum and minimum fluid pressure.
- 23) List minimum (at lowest temp.) conductivity of fluid.
- 24) If a possibility of vacuum exists at meter, so state and give greatest value (highest vacuum).
- 26) List tag number of instrument used directly with meter.
- 27) Control loop function such as INDICATE, RECORD CONTROL, etc.
- 28) Mounting: FLUSH PANEL, SURFACE INTEGRAL WITH METER, etc.
- 29) Give NEMA identification of case type.
- 30) State cable length required between meter and instrument.

- 31) Span adjust: BLIND, ft/s DIAL, OTHER.
- 32) Give ac supply voltage and frequency.
- 33-34) If a transmitter, state analog output electrical or pneumatic range, or pulse train frequency for digital outputs, i.e., pulses per gallon.
- 35) List scale size and range.
- 36) Recorder chart drive — ELECT. HANDWIND, etc. and chart speed in time per revolution or inch per hour.
- 37) List chart range and number.
- 38) If integrator is used, state counts per hour, or value of smallest count; such as "10 GAL UNITS."
- 39) For control modes: (Per ANSI C85.1-1963, "Terminology for Automatic Control.") Write-in PI_f , I_f , PI_s , $PI_f D_f$, etc.
 - P = proportional (gain)
 - I = integral (auto reset)
 - D = derivative (rate)

Subscripts:

 - f = fast
 - s = slow
 - n = narrow

State output signal range, pneumatic or electronic.
- 40) Controller action in response to an increase in flowrate — INC. or DEC.
State auto-man. switch as NONE, SWITCH ONLY, BUMPLESS, etc.
- 42) Number of alarm lights in case. Give form of contacts; SPDT, SPST, etc.
- 43) Contact electrical load rating. Contact housing General Purpose, Class 1, Group D, etc., if not in the same enclosure described in line 29.
- 44) Action of alarms: HIGH, LOW, DEVIATION, etc.
- 45-47) Fill in manufacturer and model numbers for meters and instrument after selection.

		TURBINE FLOWMETERS				SHEET _____ OF _____	
						SPEC. NO.	REV.
		NO	BY	DATE	REVISION	CONTRACT	DATE
						REQ. - P.O.	
						BY	CHK'D
METER	1	Tag Number					
	2	Service					
	3	Meter Location					
	4	Line Size					
	5	End Connections					
	6	Body Rating					
	7	Nominal Flow Range					
	8	Accuracy					
	9	Linearity					
	10	K Factor, Cycles per Vol. Unit					
	11	Excitation					
	12	Materials: Body					
	13	Support					
	14	Shaft					
	15	Flanges					
	16	Rotor					
	17	Bearings: Type					
	18	Bearing Material					
	19	Max. Speed					
	20	Min. Output Voltage					
	21	Pickoff Type					
	22	Enclosure Class					
	FLUID DATA	24	Fluid				
25		Flow Rate: Min. Max.					
26		Normal Flow					
27		Operating Pressure					
28		Back Pressure					
29		Operating Temp. Max. Min.					
30		Operating Specific Gravity					
31		Viscosity Range					
32		Percent Solids & Type					
SECONDARY INSTR.		34	Secondary Instr. Tag No.				
	35	Preamplifier					
	36	Function					
	37	Mounting					
	38	Power Supply					
	39	Scale Range					
	40	Output Range					
OPTIONS	41	Totalizer Type					
	42	Compensation					
	43	Preset Counter					
	44	Enclosure Class					
	45	Strainer Size & Mesh					
	46						
	47						
	48						
	49	Manufacturer					
	50	Meter Model No.					
	51	Secondary Instr. Model No.					
Notes:							

ISA Form S20.24


14 Turbine flowmeters

Instructions for ISA Form S20.24

Refer to ISA Standard S31, "Specification, Installation, and Calibration of Turbine Flowmeters"

- 1) Show meter tag number. Quantity is assumed to be one unless otherwise noted.
- 2) Refers to process service or applications.
- 3) Give line number or process area.
- 5) Specify size and style of connections, such as "1 in. NPT," "2 in. 150 lb ANSI," etc.
- 6) Pressure and temperature design rating required.
- 7) Nominal flow range is obtained from manufacturer's data. This usually defines linear range of selected meter.
- 8) Turbine meter accuracy figures are in terms of percent of instantaneous flow rate.
- 9) Degree of linearity over nominal flow range.
- 10) K factor relates cycles per second to volume units. Enter this figure after selection is made.
- 11) Excitation modulating type only expressed as volts ____ at ____ hertz.
- 12-16) Specify materials of construction or write in "MFR.STD."
- 17) Specify sleeve or ball bearings, or none if floating rotor design.
- 18) Bearing material — will be MFG STD if not stated otherwise.
- 19) Maximum speed or frequency which the meter can produce without physical damage.
- 21) Pickoff may be standard hi-temp., radio-frequency type (RF) or explosion proof. Minimum output voltage ____ volts peak to peak.
- 22) Specify electrical classification of enclosure such as General Purpose, Weather Proof, Class 1, Group D, etc.
- 23) Specify fluid data as indicated, using line 28 for additional item if required.
- 34) Give Tag No. of secondary instrument if different from meter Tag No.
- 35) Pre-amplifier if used.
- 36) Specify function of instrument, such as rate indicator, totalizer, or batch control.
- 37) Flush, surface or rack.
- 38) Power Supply, i.e., 117 Vac.
- 39) Applies to rate indicator.
- 40) Give output range such as "40-20mA," 21-103kPA (3-15 psig), etc.
- 41) May be used for number of digits, and to state whether counter is reset or non-reset type.

- 42) Specify range of compensation, if required, in pressure and/or temperature units or viscosity units.
- 43) Pre-set counter.
- 44) Specify NEMA classification of enclosure.
- 45) Specify strainer size and mesh size. Request vendor's recommendation if not known.
- 50-51) Fill in after selection is made.

		POSITIVE DISPLACEMENT METERS				SHEET _____ OF _____		
						SPEC. NO.	REV.	
		NO	BY	DATE	REVISION	CONTRACT	DATE	
						REQ.	P.O.	
						BY	CHK'D	APPR.
METER	1	Tag Number						
	2	Service						
	3	Line No./Vessel No.						
	4	Type of Element						
	5	Size						
	6	End Connections						
	7	Temp. & Press. Rating						
	8	Flow Rate Range						
	9	Totalized Units						
	10	Enclosure Class						
	11	Power Supply						
	12	Materials: Outer Housing						
	13	Main Body Cover						
	14	Rotating Element						
	15	Shaft						
	16	Blades						
	17	Bearings: Type & Material						
	18	Packing						
	19	Type of Coupling						
	COUNTER	20						
21		Register Type						
22		Totalizer						
23		Reset						
24		Capacity						
25		Set-Stop						
FLUID DATA	26							
	27	Fluid						
	28	Flow Rate: Min. Max.						
	29	Normal Flow						
	30	Oper. Press. Oper. Temp.						
	31	Oper. Specific Gravity						
OPTIONS	32	Oper. Viscosity						
	33	Coef. of Expansion						
	34	Flow Units						
	35	Shut-Off Valve						
	36	Switch: Single or 2-Stage						
	37	Temp. Compensator						
	38	Transmitter Type						
	39	Transmitter Output						
	40	Air Eliminator						
	41	Strainer: Size & Mesh						
	42							
	43							
	44							
	45	Manufacturer						
	46	Model Number						
Notes:								


ISA FORM S20.25

15 Positive displacement meters

Instructions for ISA Form S20.25.

- 1) Tag No. of instrument.
- 2) Process service.
- 3) Pipe line or vessel identification.
- 4) Write in type of rotating element, such as, disc, piston, vane, helical, rotors, etc.
- 5) Show connection pipe size.
- 6) Specify end connections type and ANSI rating such as 300 lb R.F.
- 7) Specify the manufacturer's recommended body pressure and temperature rating, such as 250 psi at 190°F.
- 8) Write in manufacturer's recommended normal operating range.
- 9) Specify smallest totalized unit, such as "Tens of Gallons," "Pounds," "Barrels."
- 10) Specify enclosure electrical classification, if applicable, such as "Class 1, Group D., Div. 2," "General Purpose," etc.
- 11) Specify power supply, if applicable.
- 12) Specify materials of construction. If no preference, write in, MFR.STD. (Manufacturer's Standard).
- 13-18) Specify materials of construction, if no preference, write in, Manufacturer's Standard (MFG-STD)
- 19) Specify type of coupling.
- 20) Specify coupling such as "Magnetic," or MFR. STD.
- 21) Specify register type such as horizontal, vertical, inclined, inline reading, dial reading, print, etc.
- 22) Specify number of figures such as 6 digit, 5 digit, or 0-99, 999, etc.
- 23) If totalizer reset required, write in type. If reset is not required, write in "none."
- 24) Write in number of figures or maximum quantity (in flow units) that can be held in counter.
- 25) Specify by writing in "yes" if a set-stop is required to operate shutoff valve, switch, etc.
- 27-34) Specify fluid data as completely as possible, note at operating conditions. Be sure to note if liquid is at saturation conditions.
- 35) Specify by writing in "yes" if a shut-off valve is required. Valve to be manufacturer's standard construction unless otherwise noted.
- 36) Specify by writing in "yes" if a switch is required. Two switches are required for 2-stage shut-off control.

- 37) Write in "yes" if manufacturer's standard temperature compensator is required. Write in "no" if not required.
- 38) Specify, if transmitter is required, by writing in type such as pulse, rate of flow, etc.
- 39) Give transmitter output in pulse per gallon, 4-20 mA, etc.
- 40) Write in "yes" if air eliminator is required, otherwise write in "no".
- 41) Specify, if strainer is required, by writing in type such as "Y," "Basket," etc. Strainer to have same pressure and temperature rating, end connections and material as meter body unless otherwise noted.
- 45-46) Identify manufacturer's name and model number after selection is made.

			LEVEL INSTRUMENTS (DISPLACER or FLOAT)				SHEET ____ OF ____		
							SPEC. NO.		REV.
							CONTRACT		DATE
							REQ. - P.O.		
			NO	BY	DATE	REVISION	BY	CHK'D	APPR.
BODY/CAGE	1	Tag Number							
	2	Service							
	3	Line No./Vessel No.							
	4	Body or Cage Mtl							
	5	Rating							
	6	Conn Size & Location Upper							
	7	Type							
	8	Conn Size & Location Lower							
	9	Type							
	10	Case Mounting							
	11	Type							
	12	Rotatable Head							
DISPLACER OR FLOAT	13	Dimensions							
	14	Insertion Depth							
	15	Displacer Extension							
	16	Disp. or Float Material							
	17	Displacer Spring/Tube Mtl							
	18								
	19								
XMTR/CONT.	20	Function							
	21	Output							
	22	Control Modes							
	23	Differential							
	24	Output Action: Level Rise							
	25	Mounting							
	26	Enclosure Class							
	27	Elec. Power or Air Supply							
SERVICE	28								
	29	Upper Liquid							
	30	Lower Liquid							
	31	sp. gr.: Upper	Lower						
	32	Press. Max.	Normal						
	33	Temp. Max.	Normal						
OPTIONS	34								
	35								
	36	Airset	Supply Gage						
	37	Gage Glass Connections							
	38	Gage Glass Model No.							
	39	Contacts: No.	Form						
	40	Contact Rating							
	41	Action of Contacts							
	42								
	43								
	44								
	45								
	46	Manufacturer							
47	Model Number								
48									

Notes:


ISA FORM S20.26

16 Level instruments (displacer or float)

Instructions for ISA Form S20.26.

- 1) Tag No. or other identification.
- 2) Process service.
- 3) Line number or vessel number on which cage or body is installed.
- 4) Material of chamber and/or mounting flange.
- 5) For float specify top or side of vessel connection. For displacer in a chamber specify upper, then lower connection; such as side-side, side-bottom, top-bottom, etc. Give flange size and rating or NPT size.
- 6) Same as 5.
- 7) Refers to position of case when viewing the front of the case relative to the chamber; the case is either to the left, right, or top.
- 8) On displacer instruments specify if case is to be rotatable with respect to the chamber. This only applies if there is one or more side connections.
- 10) Orientation of control with respect to displacer cage.
- 11) Cooling Extension
- 13) Specify float diameter or displacer length. The displacer length is also the range.
- 14) Insertion depth applied to ball floats. It is the mounting flange to the center of the ball.
- 15) The displacer extension is measured from the face of the mounting flange to the top of the displacer. This dimension is required only for top of vessel mounted instruments.
- 16) Includes rod.
- 17) Refer to MFR's standard materials or special materials.
- 20) Transmitter, controller, switch, etc.
- 21) Air pressure or electrical signal output of transmitter or controller.
- 22) P: Proportional
Pn: Narrow band proportional
PI: Proportional plus Integral (Reset).
- 23) Differential if controller on/off must specify differential adj. or fixed. State adjustable range or fixed amount.
- 24) INCREASE (Direct action) or DECREASE (Reverse Action).
- 25) Remote, or integral.
- 26) Electrical classification of housing. NEMA number
- 27) Air pressure or voltage. If electronic, state whether ac or dc.

- 29) Used only for interface application.
- 30) Used for all services.
- 31) Specific gravities at operating temperature.
- 32) Operating and max. pressure, or vacuum.
- 33) For cryogenic service, give minimum temperature.
- 36) Airset assumed mounted to case.
- 37) Connections on chamber, give size.
- 38) Specify gauge glass, if required.
- 39) Contact form: SPST, SPDT, etc.
- 40) Give Volts, Amps.
- 41) Describe contact action with level.
- 47) Model number of entire assembly.

		LEVEL INSTRUMENTS (CAPACITANCE TYPE)				SHEET _____ OF _____	
						SPEC. NO.	REV.
		NO	BY	DATE	REVISION	CONTRACT	DATE
						REQ. - P.O.	
GENERAL	1	Tag Number					
	2	Service					
	3	Line No./Vessel No.					
	4	Application					
	5	Function					
	6	Fail-Safe					
PROBE	7	Model Number					
	8	Orientation					
	9	Style					
	10	Material					
	11	Sheath					
	12	Insertion Length					
	13	Inactive Length					
	14	Gland Size & Mat'l.					
	15						
	16	Conduit Connection					
AMPLIFIER	17	Location					
	18	Enclosure					
	19	Conduit Connection					
	20	Power Supply					
SWITCH	21	Type					
	22	Quantity and Form					
	23	Rating: Volts/Hz or dc					
	24	Amps/Watts/HP					
	25	Load Type					
	26	Contacts Open	On	Incr.			
	27	Close	Level	Decr.			
TRANS.	28	Output					
	29	Range					
	30	Enclosure Class					
OPTIONS	31	Compensation Cable					
	32	Local Indicator					
	33	I/P Transducer					
	34	Signal Lights					
	35						
SERVICE	36	Upper Fluid					
	37	Dielectric Constant					
	38	Lower Fluid					
	39	Dielectric Constant					
	40	Pressure Max.	Normal				
	41	Temp. Max.	Normal				
	42	Moisture					
	43	Material Buildup					
	44	Vibration					
	45	Manufacturer					
	46	Model Number					
Notes:							

ISA Form S20.27

17 Level instruments, capacitance type

Specification Sheet Instructions for ISA Form S20.27

Prefix number designates line number on corresponding Specification Sheet.

- 1) Identification of item by tag number.
- 2) Process area or function.
- 3) Stream description and/or pipe size and number or vessel number in which probe is installed.
- 4) Specify solids level, liquid level, interface, foam detection, etc.
- 5) Specify alarm, transmit, on-off control, etc.
- 6) Specify high, low, none.
- 7) Specify probe model number if known.
- 8) Specify if probe axis is horizontal, vertical, etc.
- 9) Specify general purpose, heavy duty, knife-blade, inline plate, concentric shield, etc.
- 10) Specify probe material as 316 SS, etc.
- 11) Specify sheath, if required, as 1/4 in. Teflon, etc.
- 12) Specify total immersion in inches, or feet and inches.
- 13) Specify length of inactive extension in inches, or feet and inches.
- 14-15) Specify sealing gland material and size as 316 SS, 3/4 in. NPT, etc.
- 16) Specify conduit connection as 3/4 in. NPT hub, 7/8 in. OD knockout, etc.
- 17) Specify if electronics are mounted at probe or remotely located.
- 18) Specify general purpose, weatherproof, explosion-proof, etc.
- 19) Specify conduit connection as 3/4 in. NPT, 7/8 in. OD knockout, etc.
- 20) Specify power input as 115V 60 Hz, etc.
- 21) Specify switch type as mercury bottle, snapaction, etc.
- 22) Specify number of switches and contact form of each switch (SPST, SPDT, DPDT, etc.)
- 23) Specify switch voltage as 115V 60 Hz, 24 Vdc, etc.
- 24) Specify contact rating in amps, watts, or horsepower.
- 25) Specify load as inductive on non-inductive.
- 26-27) Specify if contacts open or close when the level increases or decreases.
- 28) Specify transmitter output as 1-5, 4-20, or 10-50 mA, 1-5 Vdc, etc.
- 29) Specify level range in inches or feet and inches corresponding to minimum and maximum transmitter signal.


- 30) Use NEMA identification numbers.
- 31) Specify length of special compensating cable to be furnished with probe, if required.
- 32) Specify size, type and range of local indicator, if required.
- 33) Specify if electro-pneumatic transducer 21-103 kPa (3-15 psig output) is required.
- 34) Specify if High, Low, HI/LO lights are required, and rating.
- 35) For items not covered in lines 31 through 34.
- 36) Specify upper fluid by name and state (liquid, vapor).
- 37) Specify dielectric constant of upper fluid.
- 38) Specify lower fluid by name and state.
- 39) Specify dielectric constant of lower fluid.
- 40) Specify maximum and normal operating pressure at probe.
- 41) Specify maximum and normal operating temperature at probe.
- 42) Specify percentage moisture content of solids.
- 43) Specify if material is expected to build up on probe.
- 44) Specify vibration environment of probe as mild, severe, etc.
- 45-46) Fill in manufacturer and model number after selected.

18 Gage glasses and cocks

Instructions for ISA Form S20.28

- 1) Check what is to be supplied, and whether assembled or unassembled.
- 2) Select one type only per sheet.
- 3) Specify size, style and location of process connections. If side or back connections are used, vent and drain connections are available.
- 4) Material of gage glass chamber and connections.
- 5) Specify minimum rating. It is assumed that a higher rating is also acceptable.
- 6) This section is used only if the option applies to all items listed on the sheet. Where options apply to certain items only, use the notes column instead.
- 7) Use for Manufacturer and Series or Type; detailed number may be listed in the tabulation.
- 8) Select style of cock, if used.
- 9) Show connection sizes only.
- 10) Write in body and trim materials.
- 11) See Line 5 above.
- 12) Specify action and type of handle: plain closing or quick closing; handwheel or lever handle. This may be covered by the Model No. given on Line 17.
- 13) Specify type of connection on each side: plain union, spherical union, solid shank. Give flange size, rating and type, if applicable.
- 14) Bonnet may be screwed, union type, or bolted.
- 15) Options checked here apply to all items. See line 6 above. Include special packing.
- 16) Fill in if required, or as a final record after selection is made.

" \varnothing CONN" in tabulation refers to distance between center lines of vessel connections. This figure, along with the visible glass dimension, defines the length of the column. A secondary sheet with tabulation only may be made up if required.

		TRAPS and DRAINERS				SHEET ____ OF ____	
		NO	BY	DATE	REVISION	SPEC. NO.	REV.
						CONTRACT	DATE
						REQ. - P.O.	
						BY	CHK'D
	1	Tag Number					
	2	Service					
	3	Line No./Vessel No.					
	4						
	5	Type					
	6						
BODY	7	Material					
	8	Size: Inlet Outlet					
	9	End Connections					
	10	Press. & Temp. Rating					
	11	Equalizing Conn. Size					
	12	Conn. Orientation					
	13						
TRIM	14	Trim Material					
	15						
OPTIONS	16	Internal Check Valve					
	17	Internal Bimetallic Vent					
	18	Thermostatic Vent Mtl.					
	19	Gage Glass					
	20						
	21						
	22						
STRAINER	23	Internal or External					
	24	Type & Size					
	25	Body Material					
	26	Press. & Temp. Rating					
	27	End Connections					
	28	Blowoff Connections					
	29	Mesh Size & Material					
	30						
PROCESS DATA	31	Fluid					
	32	Normal Flow					
	33	Load Safety Factor					
	34	Maximum Capacity					
	35	Oper. Temp. Superheat					
	36	Press: In Out					
	37	Allow Press. Diff: Max. Normal					
	38	Oper. sp. gr. Top Bottom					
	39						
	40						
	41	Calc. Orifice Size					
	42	Selected Orifice Size					
	43						
	44						
	45	Manufacturer					
	46	Model Number					
Notes:							

ISA Form S20.29

19 Traps and drainers

Instructions for ISA Form S20.29

- 1) Identification or item number.
- 2) Fill in service or location.
- 5-6) Write in specific trap type corresponding to general classification such as, inverted bucket, float, drainer, thermodynamic, etc.
- 7) Specify body material required.
- 8) Write in inlet & outlet connection size.
- 9) Specify if traps are to have flanged, screwed socket welded, buttwelded end connections and specify the respective rating.
- 10) Write in temperature and pressure rating required.
- 11) Specify equalizing connection size if required (used with continuous drainers).
- 12) Show orientation or connections by sketch if necessary.
- 13) Write in any other features characteristic of the trap body.
- 14) Write in trim material. If to be manufacturers standard, write in "STD."
- 15) If specific items of trim, such as valve seats, need to be harder material than 14 above, write in material or description.
- 16) Indicate if internal check valve is required, state size (applies to Bucket Traps).
- 17) Specify if internal Bi-metallic Vent is required, (applies to Bucket Traps).
- 18) Indicate if thermostatic vent is required (used with Ball Floats) and specify bellows material.
- 19) Show if Gage Glass is required.
- 20) Write in any other accessory required not included in 16 through 19 above.
- 23) Specify if strainer is to be of internal or external variety, if to be supplied with trap. If not, write in "By others."
- 24) Indicate the specific type, i.e., "Y" type, Angle Type, etc., and inlet outlet connection size.
- 25) Write in body material.
- 26) Write in strainer temperature and pressure rating.
- 27) Specify if strainers are to be flanged or screwed and specify the respective rating.
- 28) Show size of Blow off connections. Also indicate if bushing or cap is required.
- 29) Specify mesh size and material if other than manufacturer's standard is required.
- 30) Write in any other strainer requirements.
- 31) Show fluid being handled.

- 32) Specify the anticipated normal flow quantity of condensate to be handled.
- 33) Write in the safety load factor which is added to compensate for the start-up load under reduced pressure conditions.
- 34) Maximum capacity of trap should always exceed normal quantity to be handled plus the load safety factor.
- 35) Show the steam temperature plus superheat that may be present.
- 36) Show the normal pressure at Trap inlet and outlet.
- 37) Show the allowable pressure differential across the trap or drainer.
- 38) Show the liquid gravity above and below the normal level being held (important for Continuous Drainers.)
- 41) Show the calculated orifice size.
- 42) Specify the orifice selected from manufacturer's charts.
- 45-46) Write in manufacturer and model number if desired.

	PRESSURE INSTRUMENTS				SHEET ____ OF ____	
					SPEC. NO.	REV.
					CONTRACT	DATE
					REQ. P.O.	
					BY	CHK'D

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"/> Other _____ MFR STD <input type="checkbox"/> Nom Size _____ Color: MFR STD <input type="checkbox"/> Other _____ Flush <input type="checkbox"/> Surface <input type="checkbox"/> Yoke <input type="checkbox"/> Other _____ General Purpose <input type="checkbox"/> Weather proof <input type="checkbox"/> Explosion proof <input type="checkbox"/> Class _____ For Use In Intrin. Safe System <input type="checkbox"/> Other _____ 117V 60Hz <input type="checkbox"/> Other ac _____ dc _____ Volts _____ Strip <input type="checkbox"/> Roll <input type="checkbox"/> Fold <input type="checkbox"/> Circular _____ Time Marks _____ Range _____ Number _____ Speed _____ Power _____ Type _____ Range 1 _____ 2 _____ 3 _____ 4 _____
	3	Case	
	4	Mounting	
	5	Enclosure Class	
	6	Power Supply	
	7	Chart	
	8	Chart Drive	
	9	Scales	
	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 P <input type="checkbox"/> PI <input type="checkbox"/> PD <input type="checkbox"/> PID <input type="checkbox"/> If <input type="checkbox"/> Df <input type="checkbox"/> Is <input type="checkbox"/> Ds <input type="checkbox"/> Other _____ On Meas. Increase Output: Increases <input type="checkbox"/> Decreases <input type="checkbox"/> None <input type="checkbox"/> MFR STD <input type="checkbox"/> Other _____ Manual <input type="checkbox"/> External <input type="checkbox"/> Remote <input type="checkbox"/> Other _____ None <input type="checkbox"/> MFR STD <input type="checkbox"/> Other _____ 4-20mA <input type="checkbox"/> 10-50mA <input type="checkbox"/> 21-103 kPa (3-15 psig) <input type="checkbox"/> Other _____
	12	Action	
	13	Auto-Man Switch	
	14	Set Point Adj.	
	15	Manual Reg.	
	16	Output	
ELEMENT	17	Service	Gage Press. <input type="checkbox"/> Vacuum <input type="checkbox"/> Absolute <input type="checkbox"/> Compound <input type="checkbox"/> Diaphragm <input type="checkbox"/> Helix <input type="checkbox"/> Bourdon <input type="checkbox"/> Bellows <input type="checkbox"/> Other _____ 316 SS <input type="checkbox"/> Ber. Copper <input type="checkbox"/> Other _____ Fixed <input type="checkbox"/> Adj. Range _____ Set at _____ Overrange protection to _____ Press: Normal _____ Max _____ Element Range _____ 1/4 in. NPT <input type="checkbox"/> 1/2 in. NPT <input type="checkbox"/> Other _____ Location: Bottom <input type="checkbox"/> Back <input type="checkbox"/> Other _____
	18	Element Type	
	19	Material	
	20	Range	
	21	Process Data	
	22	Process Conn.	
OPTIONS	23	Alarm Switches	Quantity _____ Form _____ Rating _____ Press <input type="checkbox"/> Deviation <input type="checkbox"/> Contacts To _____ on Inc Press.
	24	Function	
	25	Options	Filt-Reg. <input type="checkbox"/> Sup Gage <input type="checkbox"/> Output Gage <input type="checkbox"/> _____ Charts _____ Diaph Seal <input type="checkbox"/> Type _____ Diaph _____ Bot Bowl _____ Conn _____ Capillary: Length _____ Mtl. _____ Other _____
	26	MFR & Model No.	

Notes:

ISA Form S20.40a

20 Pressure instruments

Instructions for ISA Forms S20.40a and 20.40b

- 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 reason of the enclosure. Use NEMA identification or ISA identification per RP8.1.
- 6) Specify electrical power to the entire instrument from an external source.
- 7) Specify chart size, range and number if applicable.
- 8) Chart drive mechanism assumed to be synchronous motor operating in 117V 60 Hz and suitable for ENCLOSURE CLASS specified on line 5. If the chart drive is pneumatic so state — identify pneumatic pulser under options. Note deviations from standard (MFR) under notes, i.e., dual speed or special speeds.
- 9) The scale type may be SEGMENTAL, VERTICAL, HORIZONTAL, DIAL (CIRCULAR) or other. Ranges 1, 2, 3 and 4 are used for multiple inputs. The first listed (No. 1) is assumed to be the controller input, if a controller is used.
- 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 particular requirements, such as BUMPLESS, PROCEDURELESS, 4-POSITION, or as required.
- 14) Remote set point adjustment assumes full adjustment range. Specify limits if required.
- 15) Specify if applicable.
- 16) Specify if applicable.
- 17) Specify pressure measurement application.
- 18) Specify type of pressure element.
- 19) Specify material of element.
- 20) If range is adjustable, specify range of adjustment and initial range setting.
- 21) Specify normal and maximum pressure.

- 22) Specify process connection size. If a diaphragm seal is used, connection is specified in line 26.
- 23) Form may be SPST, SPDT, DPDT, or other. Rating refers to electrical rating of switch or contacts in amps.
- 24) Specify if alarm is actuated by measured variable or by deviation from controller set point. Give contact action if single throw form.
- 25) Specify required accessories.
- 27) Use these lines to specify other options and accessories.
- 28) Fill in after selection is made.

21 Pressure gages

Instructions for ISA Forms S20.41a and 20.41b

- 1) When receiver gages are specified, the "Range" in the tabulation 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 in the back or side of the case.
- 7) Specify lens material.
- 8) Options:

Snubber	Specify type or model number.
Sylphon Material	If sylphon required, specify 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.


22 Pressure switches

Instructions for ISA Forms S20.42a and 20.42b

- 1) Specify pressure, vacuum, compound, or differential pressure.
- 2) Check setting in field or factory. Check internal or external setting adjustment. Check whether calibrated setting dial is required.
- 3) Specify fixed or adjustable dead band.
- 4) Specify diaphragm, bourdon, bellows, or write MFR.STD.
- 5) Select element material, for stainless fill in number, or write MFR.STD.
- 6) Specify connection size or write MFR.STD. Specify bottom or back connection.
- 7) Specify mounting — Local (pipe) surface or flush.
- 8) Check Mercury or Snap acting, or write MFR.STD.
- 9) Specify number of switches in common housing.
- 10) Specify switch form.
- 11) Electrical rating in amps or watts, dc, or if ac, give frequency in Hz.
- 12) Check inductive or non-inductive load.
- 13) Check one: general purpose, weatherproof or explosion-proof. Use NEMA identification.
- 14) Check MFR.STD. or specify connection size.

Tabulation:

"Process Condition" refers to process condition which actuates switch, such as "High Level." "Adj Range" refers to limits within which a set point may be established, such as "1-18#." If the pressure switch is in an instrument air line, the set point may be specified in both process and signal units. "Notes" should be indicated by a number or letter and then explained in the space below the tabulation.

		PROJECT _____				DATA SHEET _____ of _____			
		UNIT _____				SPEC _____			
		P.O. _____				TAG _____			
		ITEM _____				DWG _____			
		CONTRACT _____				SERVICE _____			
		*MFR. SERIAL _____							
1	Fluid _____					Crit Press PC _____			
2	SERVICE CONDITIONS	Flow Rate	Units	Max Flow	Norm Flow	Min Flow	Shut-Off		
3		Inlet Pressure							
4		Outlet Pressure							
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	%				0		
11		Allowable/*Predicted SPL	dBA	/	/	/			
12									
13	LINE	Pipe Line Size	In _____	53	*Type _____				
14		& Schedule	Out _____	54	*Mfr & Model _____				
15	VALVE BODY/BONNET	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	Actuator 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	TRIM	*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	SPECIALS/ACCESSORIES	NEC Class _____ Group _____ Div _____		83	*Hydro Pressure _____				
44				84	ANSI/FCI Leakage Class _____				
45				85					
46				86					
47					Rev _____ Date _____ Revision _____ Orig _____ App _____				
48									
49									
50									
51									
52									

*Information supplied by manufacturer unless already specified

ISA FORM S20.50 Rev. 1

ISA FORM S20.50, Rev.1

23 Instructions for control valve data sheet — ISA Form S20.50, Rev. 1

Line	Explanation of Terms and Definitions	Examples
PROJECT	Specify project name for which control valve is intended.	XYZ Nuclear PS
UNIT	Specify unit within project.	#1
P.O.	Specify purchase order number from purchaser to control valve manufacturer.	P.O. 12345
ITEM	Specify item number of purchase order.	3
CONTRACT	Specific contract number of project for purchaser's reference.	56-V-32510
MFR SERIAL	This line may show the valve manufacturer's serial number(s) and is normally filled in at the time of shipment of the valve. Serial numbers often contain the manufacturer's shop order number.	C12650-3
DATA SHEET	Specify data sheet number. Normally assigned by purchaser.	3 of 12
SPEC	Specify number of technical specification on which valve selection is based.	FL-13265-A
TAG	Specify tag number, if any, used to designate location of valve.	FV-103
DWG	Specify piping and instrumentation diagram number, loop diagram number, engineering flow diagram number, etc.	17-453
SERVICE	Describe service of control valve and/or pipe line number.	Feedwater control Reheat spray 2" MA 1051 WA7


NOTE: The above lines are suggested only and may be modified to fit the individual company's needs. If the provided space is insufficient, add an additional sheet and refer to it.

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
2	Specify thermodynamic critical pressure of the fluid.	3206 psia
2	Specify volumetric or mass flow rate at inlet or standard conditions. Maximum flow condition, if greater than normal flow condition, is the condition for which the valve is sized.	3000 gpm 10000 bdp 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 temperature in absolute units. Only required for liquid flow.	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

Line No.	Explanation of Terms and Definitions	Examples
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
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 ANSI B16.5-81 or special finish as required.	ANSI B16.5-81 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
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-S75.01-1985.	260 0.9 0.68

Line No.	Explanation of Terms and Definitions	Examples
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.	17-4 PH H-1150, 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 <i>National Electrical Code</i> ®, ANSI/NFPA 70-1987.	NEC® Class I, 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
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 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" 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 valve inlet, if appropriate. Specify additional information as appropriate or provide sketch.	VERT. UP HORIZ. RH LH
64	Specify type and orientation of handwheel (manual override), if any.	Top-mounted 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, 200-100 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

Line No.	Explanation of Terms and Definitions	Examples
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
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 B16.37-80 or API 6A-83.	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

		PRESSURE CONTROL VALVES PILOTS and REGULATORS				SHEET _____ OF _____	
						SPEC. NO.	REV.
		NO	BY	DATE	REVISION	CONTRACT	DATE
						REQ.	P.O.
						BY	CHK'D
GENERAL	1.	Tag No.					
	2.	Service					
	3.	Line No./Vessel No.					
	4.	Line Size/Sched. No.					
	5.	Function					
BODY	6.	Type of Body					
	7.	Body Size	Port Size				
	8.	Guiding	No. of Ports				
	9.	End Conn. & Rating					
	10.	Body Material					
	11.	Packing Material					
	12.	Lubricator	Iso. Valve				
	13.	Seal Type					
	14.	Trim Form					
	15.	Trim Material					
	16.	Seat Material					
	17.	Required Seat Tightness					
	18.	Max. Allow Sound Level dBA					
ACTUATOR/ PILOT	19.	Type of Actuator					
	20.	Pilot					
	21.	Supply to Pilot					
	22.	Self Cont.	Ext. Conn.				
	23.	Diaphragm Material					
	24.	Diaphragm Rating					
	25.	Spring Range					
	26.	Set Point					
	27.						
ACCESSORIES	28.	Filt. Reg.	Supply Gage				
	29.	Line Strainer					
	30.	Housing Vent					
	31.	Internal Relief					
	32.						
	33.						
SERVICE	34.	FLOW UNITS	LIQUID	STEAM	GAS		
	35.	Fluid					
	36.	Quant. Max.	Cv				
	37.	Quant. Oper.	Cv				
	38.	Valve Cv	Valve F _L				
	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:							

ISA FORM S20.51

24 Pressure control valves — pilots & regulators

Instructions for ISA Form S20.51

- 1-4) Identification and service or location. It is assumed that each tag number is for a single valve.
- 5) Pressure reducing, back pressure control, or differential pressure regulator.
- 6) Globe, angle, or Manufacturer's Standard (MFR.STD.).
- 7) Body connection size and inner valve size.
- 8) Guiding may be top, top and bottom, skirt, or MFR.STD. Select single or double port, if applicable.
- 9) Specify screwed (NPT), flanged, or weld end; and flange rating, such as 150 lb ANSI.
- 10-11) Specify materials.
- 12) Write in "yes" or use check mark if required.
- 13) Quick open, equal percent, linear, etc.


State Characteristic:

- L = Linear
- LV = Linear V Port
- EP = Equal Percentage
- EPT = Equal Percentage Turned
- EPB = Equal Percentage Balanced
- Q = Quick Opening

Or use your own code and identify in notes.

- 14) Refers to seal between body and top works, such as diaphragm, stuffing box, etc.
- 15) Refers to seat, plug, stem; in general, all internal wetted parts.
- 16) Use only to specify soft seat, otherwise material will be same as trim specified in line 14.
- 17) Use if required.
- 18) Max allowable sound level dBA 3 ft from pipe and 3 ft downstream of the valve outlet.
- 19) Actuator may be spring type or springless pressure balanced.
- 20) The pilot is an integral or external auxiliary device which amplifies the force available through an operating medium, usually air.
- 21) Give pressure available and specify medium.
- 22) Refers to valve pressure sensing system. Specify whether controlled pressure is sensed internally or by means of an external line requiring an additional piping connection.
- 23-24) Specify diaphragm material and pressure or temperature limits, if applicable.

- 25) Range over which pressure setting can be made.
- 26) Specification of set pressure does not apply to factory setting. This must be called for specifically, if required.
- 27) Specify filter regulator, with or without gage, if required for air supply to pilot. Write "yes" or use check mark.
- 28) Specify if strainer is to be furnished with valve. Write "yes" to check off; or give style or model number.
- 30-31) Options available in gas regulators. On line 30 specify "bug-proof" if required.
- 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 C_V .
- 37) State operating quantity required by process and corresponding C_V .
- 38) The manufacturer shall fill in the valve C_V and F_L (Liquid Pressure) Recovery Factor without reducers or other accessories.
- 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.

		SELF-ACTUATED TEMPERATURE REGULATOR				SHEET _____ OF _____		
		NO		BY	DATE	REVISION	SPEC. NO.	REV.
							CONTRACT	DATE
							REQ.	P.O.
							BY	CHK'D
GENERAL	1.	Tag No.						
	2.	Service						
	3.	Line No./Vessel No.						
	4.	Line Size/Sched. No.						
	5.	Function						
VALVE	6.	Body Size						
	7.	Trim Size						
	8.	Number of Ports						
	9.	End Conn. and Rating						
	10.	Body Material						
	11.	Trim Material						
	12.	Plug Form						
	13.	Seat Material						
	14.	Action On Temp. Rise						
THERMAL SYSTEM	15.	Fill: SAMA Class						
	16.	Bulb Type						
	17.	Bulb Material						
	18.	Extension Length						
	19.	Insertion Length						
	20.	Bulb Connection						
	21.	Capillary Material						
	22.	Armor						
	23.	Capillary Length						
	24.	Well Material						
	25.	Well Connection						
	26.	"U" Dimension						
	27.	"T" Dim.						
ACC	28.	Adjustable Range						
	29.	Integral Thermometer						
	30.							
	31.							
	32.							
	33.							
	SERVICE	34.	FLOW UNITS	LIQUID		STEAM		GAS
35.		Fluid						
36.		Quant. Max. C_v						
37.		Quant. Oper. C_v						
38.		Valve C_v 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:								

ISA FORM S20.52

25 Self-actuated temperature regulators

Instructions for ISA Form S20.52

- 1) Identification of item by tag number.
- 2) Process area or function.
- 3) Stream description and/or pipe size or vessel number with which valve is used.
- 5) Function heating or cooling.
- 6) Specify nominal size of body and trim in inches.
- 7) 1 — single port (SP); 2 — double port (DP); 3 — three-way.
- 8) Specify screwed or flange rating and facing.
- 9) Specify material of body such as bronze, carbon steel, cast iron, etc.
- 10) Specify material of trim such as bronze, 316 stainless steel, etc.
- 11) State Characteristic:

L	= Linear	B = Blending
LV	= Linear V Port	D = Diverting
EP	= Equal Percentage	
EPT	= Equal Percentage Turned	
EPB	= Equal Percentage Balanced	
Q	= Quick Opening	

Or use your own code and identify in notes.
- 12) Specify seat material such as 316 stainless steel, Buna N, etc.
- 13) Specify open or close.
- 15) Filled thermal system instruments are classified as follows:

Class IA:	Liquid filled, uniform scale, fully compensated.
Class IB:	Liquid filled, uniform scale, case compensated only.
Class IIA:	Vapor pressure, increasing scale, with measured temp. above case and tubing temp.
Class IIB:	Vapor pressure, increasing scale, with measured temp. below case and tubing temp.
Class IIC:	Vapor pressure, increasing scale, with measured temp. above and below case and tubing temp.
Class IID:	Vapor pressure, increasing scale, above, at, and below case and tubing temp.
Class IIIA:	Gas filled, uniform scale, fully compensated.
Class IIIB:	Gas filled, uniform scale, case compensated only.

Class VA: Mercury filled, uniform scale, fully compensated.
Class VB: Mercury filled, uniform scale, case compensated only.

- 16) State whether plain, averaging, sanitary bulb.
- 17) Give material and type of bulb and extension; such as 316 SS.
- 18) Write in length of extension, followed by "ben" for bendable, "adj" for adjustable or "rgd" for rigid.
- 19) The bulb insertion length should be given if no well data are shown.
- 20) Specify size of jam nut or union connector; or part number.
- 21) Specify material of capillary tubing.
- 22) Specify material of armor (Bronze, 316 SS, etc.) or write "None."
- 23) Specify length in feet.
- 24) Specify well material such as bronze, 304 stainless steel, 316 stainless steel, monel, etc.
- 25) Specify process connection size and type, such as 3/4 in. NPT, 1 1/2 in. 150 lb RF, etc.
- 26) Specify "U" dimension from face of flange or bottom of thread to tip of well. Specify "T" (lagging extension) dimension in inches.
- 27) Note adjustable range available from the manufacturer.
- 29) Specify range, or write in "None."
- 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 C_V .
- 37) State operating quantity required by process and corresponding C_V .
- 38) The manufacturer shall fill in the valve C_V and F_L (Liquid Pressure) Recovery Factor without reducers or other accessories.
- 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 differential 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 unit. 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.

	PRESSURE RELIEF VALVES				SHEET _____ OF _____		
	NO		BY	DATE	REVISION	SPEC. NO.	REV.
						CONTRACT	DATE
						REQ. - P.O.	
						BY	CHK'D

GENERAL	1.	Tag Number				
	2.	Service				
	3.	Line No./Vessel No.				
	4.	Full Nozzle/Semi Nozzle				
	5.	Safety or Relief				
	6.	Conv., Bellows, Pilot Op.				
	7.	Bonnet Type				
CONN.	8.	Size: Inlet Outlet				
	9.	Flange Rating or Screwed				
	10.	Type of Facing				
MATERIALS	11.	Body and Bonnet				
	12.	Seat and Disc				
	13.	Resilient Seat Seal				
	14.	Guide and Rings				
	15.	Spring				
	16.	Bellows				
	17.					
OPTIONS	18.	Cap: Screwed or Bolted				
	19.	Lever: Plain or Packed				
	20.	Test Gage				
	21.					
	22.					
BASIS	24.	Code				
	25.	Fire				
	26.					
	27.					
	28.	Fluid and State				
FLUID DATA	29.	Required Capacity				
	30.	Mol. Wt. Oper. sp. gr.				
	31.	Oper. Press. Set Press.				
	32.	Oper. Temp. Rel. Temp.				
	33.	{	Constant			
	34.		Back Pressure Variable			
	35.		Total			
	36.	% Allowable Overpressure				
	37.	Overpressure Factor				
	38.	Compressibility Factor				
	39.	Latent Heat of Vaporization				
	40.	Ratio of Specific Heats				
	41.	Operating Viscosity				
	42.	Barometric Pressure				
	43.					
	44.					
		45.	Calc. Area sq. in.			
46.		Selected Area				
47.		Orifice Designation				
48.		Manufacturer				
49.		Model No.				

Notes:

ISA Form S20.53

26 Pressure relief valves

Instructions for ISA Form S20.53

This Form is identical in content to the Pressure Relief Valve Specification Sheet of the American Petroleum Institute contained in the second edition of API Standard 526, November, 1969.

- 1) Where multiple valves are used, it is assumed that all have the same tag number, unless otherwise noted.
- 2) Process service or location designation.
- 3) Line number or vessel number on which valve is located.
- 4) Refers to valve inlet construction.
- 5) Specify valve classification: safety, relief, or safety-relief. These terms are defined in the American Society of Mechanical Engineers, ASME Boiler and Pressure Vessel Code, Section 1, 1968 Edition, Paragraph PG-67 (footnote), as follows:

Safety Valve:	An automatic pressure relieving device actuated by the static pressure upstream of the valve and characterized by full opening pop action. It is used for gas or vapor service.
Relief Valve:	An automatic pressure relieving device actuated by the static pressure upstream of the valve which opens further with the increase in pressure over the opening pressure. It is used primarily for liquid service.
Safety Relief Valve:	An automatic pressure relieving device suitable for use either as a safety valve or relief valve, depending on application.
- 6) Specify conventional type of bellows, or pilot operated valve.
- 7) Bonnet may be open or closed.
- 8-10) Specify inlet connection in the left side and outlet connection in the right side of the spaces. Flanges assumed to be ANSI unless otherwise noted. For screwed ends, specify male or female NPT.
- 11-16) Specify materials of construction. If resilient seat seal is not used, write "None."
- 18) Specify cap only if lever is not used.
- 19) If lifting lever is required, specify plain or packed.
- 20) A test gage is supplied with the safety valve, when specifically ordered, for the purpose of holding the valve closed against upstream pressure when hydrostatically testing the vessel or pipe line on which the valve is installed.
- 24) State applicable code, if any.
- 25) Check or write "yes" if selection is based on fire.
- 26-27) Specify other bases of selection, if applicable, such as "blocked discharge," or "thermal relief."
- 28) Specify whether liquid or vapor and name fluid.
- 29) Specify maximum quality valve will be required to pass at relief condition and give flow units.


- 30) For liquids, state specific gravity and for vapor or gases give molecular weight or specific gravity at 60°F.
- 31) State operating pressure and the set pressure.
- 32) State operating temperature and relief temperature.
- 34-35) Back pressure conditions. State constant, variable or developed back pressure and the total.
- 36) Allowable overpressure is the percent increase over the set pressure permitted.
- 37) Overpressure factor utilized in some calculation forms, i.e., 1.10 would be 10 percent allowable overpressure.
- 38) Compressibility Factor Z is the measure of deviation from Boyle's Law (p) obtained from gas curves.
- 39) Latent Heat of vaporization. The heat required to change liquid into vapor.
- 40) Ratio of specific heats. C_p/C_v .
- 41) Operating Viscosity.
- 42) Barometric Pressure.
- 45) Calculated Area.
- 46) Selected Area.
- 47) Orifice Size Designation.
- 48-49) Filled in after selection.

		RUPTURE DISCS				SHEET ____ OF ____		
						SPEC. NO.	REV.	
						CONTRACT	DATE	
						REQ. - P.O.		
						BY	CHK'D	APPR.
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">GENERAL</div> <div style="margin-bottom: 10px;">SERVICE CONDITIONS</div> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); margin-right: 5px;">CONSTRUCTION</div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">DISC</div> <div style="margin-bottom: 10px;">VAC. SUPP.</div> <div style="margin-bottom: 10px;">FLANGES</div> <div style="margin-bottom: 10px;">OPTIONS</div> </div> </div> </div>		1.	Tag Number					
		2.	Service					
		3.	Line No./Vessel No.					
		4.	Line Size/Sched. No.					
		5.	Design Code					
		6.	Basis For Selection					
		7.	Primary/Secondary Relief					
		8.	Fluid					
		9.	Vapor	Pounds/Hour				
		10.	or Gas	Mol. Weight				
		11.		gpm				
		12.	Liquid	sp.gr. @ Rel. Temp				
		13.	Corrosive Agents					
		14.	Operating Press. & Temp.					
		15.	Desired Burst Pressure					
		16.	Flowing Temperature					
		17.	Constant Back Pressure					
		18.	Vacuum: Operating	Max.				
		19.	Press: Static or Pulsating					
		20.	Bursting Pressure Range					
		21.	EST. Burst Press. @ 72° F					
		22.						
		23.						
		24.	Manufact. & Model No.					
		25.	Size					
		26.	Material					
		27.	Coating: Inlet	Outlet				
		28.	Quantity per Assembly					
		29.						
		30.	Model No.					
		31.	Material					
		32.	Quantity per Assembly					
		33.	Attached to Disc					
		34.	Assembly No.					
		35.	Base Material					
		36.	Holddown Material					
		37.	I.D. of Conn. Piping					
38.	Flange Rating & Facing							
39.	½ in. NPT Tap in Holdown Flg.							
		40.	Studs & Nuts					
		41.	Preassembly Screws					
		42.	Excess Flow Valve					
		43.	Pressure Gage					
		44.	Jackscrews					
		45.						
		46.						
<div style="display: flex; justify-content: space-between;"> Notes: ISA FORM S20.54 </div>								

27 Rupture discs

Instructions for ISA Form S20.54

- 1) Tag number of entire assembly.
- 2,3) Location in process equipment or pipe line.
- 5) Write in the Code governing the vessel or line design; ASME UPV, ASME BOILER, ANSI B9 Refrigeration, ANSI B19.1 Compressors, ANSI B31.3 Refinery Piping, API RP520, etc.
- 6) Specify if overpressure is caused by FIRE, BLOCKED DISCHARGE, COOLING WATER FAILURE, etc.
- 7) Write in PRIMARY or SECONDARY.
- 8-12) Fill in fluid properties under normal conditions.
- 13) Specify corrosive fluid and percentage if the manufacturer is to select the disc material.
- 14) Fill in normal conditions.
- 15) Fill in burst pressure at prevailing temperature.
- 16) Extremely high or low (cryogenic) temperature will affect the choice of material for the disc holder.
- 17) Write in ATMOS., or pressure of header system, if used.
- 18) Describe extent of vacuum, if any is possible.
- 19) If pressure is pulsating, specify range of pressure excursion.
- 20) For conventional preformed discs, a manufacturing tolerance must be applied to the desired rupture pressure. Specify MFR. STD. or write in the range required.
- 21) To be determined by the manufacturer.
- 24) Fill in after selection is made.
- 25) Nominal size, in inches.
- 26,27) List disc materials.
- 28) Include all spares.
- 31) List vacuum support material.
- 32) Should have one per disc, including spares.
- 33) Write in YES or NO.
- 34-37) Describe safety head or hold-down flange assembly.
- 38) Specify 125 lb FF, 150 lb RTJ, SCREWED, etc.
- 39-44) Write YES or NO

		SOLENOID VALVES				SHEET _____ OF _____	
		NO	BY	DATE	REVISION	SPEC. NO.	REV.
						CONTRACT	DATE
						REQ.	P.O.
				BY	CHK'D	APPR.	
VALVE BODY	1.	Tag Number					
	2.	Service					
	3.	Line No./Vessel No.					
	4.	Quantity					
	5.	Type					
	6.	Size – Body/Port					
	7.	Rating & Type Conn.					
	8.	Material – Body					
	9.	Material – Seat					
	10.	Material – Diaphragm					
	11.	Operation Direct/Pilot					
	12.	Packless or Type Packed					
	13.	Manual Re-Set					
	14.	Manual Operator					
	15.						
	WHEN DE-ENERGIZED	17.	2-Way Valve Opens/Close				
18.		3-Way					
19.		Vent Port Opens/Close					
20.		Press Port Opens/Close					
21.		4-Way					
22.		Press to Cyl. 1/Cyl 2					
23.		Exh. from Cyl 1/Cyl 2					
24.							
25.							
26.		Enclosure					
SOLENOID	27.	Voltage/Hz					
	28.	Style of Coil					
	29.	Single or Double Coil					
	30.						
	31.						
SERVICE CONDITIONS	32.	Fluid					
	33.	Qty. Maximum					
	34.	Oper. Diff. Min/Max					
	35.	Allow. Diff. Min/Max					
	36.	Temp. Norm/Max.					
	37.	Oper. sp. gr.					
	38.	Oper. Viscosity					
	39.	Required Cv					
	40.	Valve Cv					
	41.						
	42.						
	43.						
	44.						
	45.	Manufacturer					
46.	Model Number						
Notes:							

ISA Form S20.55

28 Solenoid valves

Instructions for ISA Form S20.55

- 1) Identification by tag number.
- 2) Process service.
- 3) Identification of line and vessel.
- 4) Number of identical valves.
- 5) Indicate whether 2-way, 3-way, or 4-way.
- 6) Specify body and port size in inches.
- 7) Maximum pressure rating and type of connections such as screwed or FLANGE rating.
- 8) Specify material such as bronze, aluminum or stainless steel.
- 9) Specify seat such as bronze or stainless steel, synthetic rubber, teflon, etc.
- 10) If diaphragm is used, specify material such as synthetic rubber, teflon.
- 11) Designate whether direct operated, self-pilot type or with pilot requiring auxiliary operating medium.
- 12) Specify packless or type packing.
- 13) State whether no voltage release or electrically tripped.
- 14) Specify if required.
- 15,16) Blanks for special requirements, i.e., manifold valves etc.
- 17-23) State whether open or closed in appropriate places.
- 24,25) Blanks for special requirements.
- 26) Specify enclosure as general purpose, water tight, explosion proof.
- 27) State electrical characteristics voltage, ac or dc, and ac hertz.
- 28) Style of coil to be standard, molded, high temperature.
- 29) State whether single or dual coil. If dual coil, explain operation in space for notes.
- 30,31) Blanks for special requirements.
- 32) Name fluid and state whether liquid or gas if not apparent.
- 33) State maximum required capacity in units of flow such as gpm, lb/hr, SCFH.
- 34) State actual minimum and maximum differential encountered under operating conditions.
- 35) Vendor to state minimum operating differential required to operate valve and maximum allowable differential.
- 36-38) State normal operating temperature and maximum possible temperature operating, specific gravity or molecular weight and operating viscosity.
- 39) State calculated C_v requirement.
- 40) Vendor to state valve C_v .

Addendum to:

ISA Standard S20 "Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves."

In the ISA Standard ISA-S20-1975 the strict SI conversion, 21-103 kPa, is used for 3-15 psig. It is acceptable to round-off the 21-103 kPa to 20-100 kPa.

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