



Supplementary Specification to API Recommended Practice 551 Process Measurement

(Field Instruments – Electronic Transmitters –
Pressure, Differential Pressure and Temperature)

Public Review Draft

Revision history

VERSION	DATE	PURPOSE
0.1	9 th October 2019	Issued for 3 rd Party Review

Acknowledgements

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Foreword

This specification was prepared under a Joint Industry Programme 33 (JIP33) "Standardization of Equipment Specifications for Procurement" organized by the International Oil & Gas Producers Association (IOGP) with the support from the World Economic Forum (WEF). Companies from the IOGP membership participated in developing this specification to leverage and improve industry level standardization for projects globally in the oil and gas sector. The work has developed a minimized set of supplementary requirements for procurement, with life cycle cost in mind, resulting in a common and jointly approved specification, building on recognized industry and/or international standards.

Recent trends in oil and gas projects have demonstrated substantial budget and schedule overruns. The Oil and Gas Community within the World Economic Forum (WEF) has implemented a Capital Project Complexity (CPC) initiative which seeks to drive a structural reduction in upstream project costs with a focus on industry-wide, non-competitive collaboration and standardization. The CPC vision is to standardize specifications for global procurement for equipment and packages, facilitating improved standardization of major projects across the globe. JIP33 provides the oil and gas sector with the opportunity to move from internally to externally focused standardization initiatives and provide step change benefits in the sector's capital projects performance.

This specification has been developed in consultation with a broad user and supplier base to realize benefits from standardization and achieve significant project and schedule cost reductions.

The JIP33 work groups performed their activities in accordance with IOGP's Competition Law Guidelines (November 2014).

Table of Contents

1	Scope	6
3	General.....	6
	3.1 Introduction	6
	3.3 Instrument Range Selection.....	6
	3.4 Instrument Selection	7
	3.5 Mechanical Integrity	7
	3.6 Metallurgy and Soft Goods Selection.....	7
	3.7 Signal Transmission and Communications.....	9
	3.8 Power, Grounding, and Isolation.....	10
	3.9 Local Indicators	10
	3.10 Tagging and Nameplates	11
	3.11 Configuration and Configuration Management	11
	3.12 Documentation	11
	3.13 Other Technical Requirements	11
4	Temperature.....	13
	4.1 Introduction	13
	4.2 Thermowells.....	13
	4.3 Thermocouples	15
	4.4 Resistance Temperature Devices.....	16
	4.5 Thermistors	17
	4.6 Distributed Temperature Sensing	17
	4.7 Radiation Pyrometers.....	17
	4.8 Temperature Element Wiring	17
	4.9 Temperature Signal Conditioners and Transmitters	18
	4.10 Local Temperature Indicators	18
5	Pressure	18
	5.1 Introduction	18
	5.2 Pressure Measurements.....	18
	5.3 Pressure and Differential Pressure Transmitters.....	18
	5.4 Pressure Transmitter Performance.....	19
	5.5 Pressure Gauges	19
	5.6 Miscellaneous Pressure Devices	20
6	Flow.....	20
	6.1 Introduction	20
	6.2 Head Type Flow Meters.....	21
	6.3 Variable-Area Meters	23
	6.4 Magnetic Flowmeters	24

6.5	Turbine Meters	24
6.6	Positive Displacement Meters.....	25
6.7	Vortex Meters.....	25
6.8	Ultrasonic Flow Meters.....	25
6.9	Coriolis Flow Meter	25
6.10	Thermal Dispersion Meter.....	25
7	Level.....	26
7.1	Introduction	26
7.2	Vessel Connections	26
7.3	Level Transmitters.....	26
9	Instrument Protection	27
9.1	Introduction	27
9.2	Diaphragm Seals.....	27

Introduction

The purpose of this specification is to define a minimum common set of specification requirements for the procurement of Electronic Transmitters - Pressure, Differential Pressure and Temperature in accordance with API RP 551, Second Edition, February 2016, Process Measurement, for application in the petroleum and natural gas industries.

This JIP33 standardized procurement specification follows a common document structure comprising the four documents as shown below, which together with the purchase order define the overall technical specification for procurement.



**JIP33 Specification for Procurement Documents
Supplementary Technical Specification**

It is required to use all of these documents in conjunction with each other when applying this specification, as follows.

S-718: Specification for Electronic Transmitters – Pressure, Differential Pressure and Temperature

This specification is written as an overlay to API RP 551, following the clause structure of the parent standard, to assist in cross-referencing the requirements. Where clauses from the parent standard API RP 551 are not covered in this specification, there are no supplementary requirements or modifications to the respective clause. The terminology used within this specification follows that of the parent standard and otherwise is in accordance with ISO/IEC Directives, Part 2.

Modifications to the parent standard defined in this specification are identified as Add (add to clause or add new clause), Replace (part of or entire clause) or Delete.

S-718D: Data sheet for Electronic Transmitters – Pressure, Differential Pressure and Temperature

This document provides project specific requirements where this specification requires the purchaser to define an application specific requirement. It also includes information required by the purchaser for technical evaluation. Additional purchaser supplied documents are also listed in the data sheet, to define scope and technical requirements for enquiry and purchase of the equipment.

S-718L: Information requirements for Electronic Transmitters – Pressure, Differential Pressure and Temperature

This document defines the information requirements, including format, timing and purpose, for information to be provided by the vendor. It also defines the specific conditions which must be met for conditional information requirements to become mandatory. The information requirements listed in the IRS have references to the source of the requirement.

S-718Q: Quality requirements for Electronic Transmitters – Pressure, Differential Pressure and Temperature

This document includes a conformity assessment system (CAS) which specifies standardized user interventions against quality management activities at four different levels. The applicable CAS level is specified by the purchaser in the data sheet.

The data sheet and IRS are published as editable documents for the purchaser to specify application specific requirements. The supplementary specification and QRS are fixed documents.

Unless defined otherwise in the purchase order, the order of precedence (highest authority listed first) of the documents shall be:

- a) regulatory requirements;
- b) contract documentation (e.g. purchase order);
- c) purchaser defined requirements (data sheet, IRS, QRS);
- d) this specification;
- e) the parent standard.

1 Scope

Replace first paragraph with

This document provides requirements for the instrument design of electronic transmitters.

Replace second paragraph with

This document covers the instrument design and technical requirements for electronic transmitters comprising of pressure, differential pressure (including differential pressure flow and differential pressure level) and temperature (including RTD sensor and thermocouple sensor). The technical requirements for thermowell and orifice plate assembly are also added to provide a critical mass of instrument types that may be purchased together as a package.

Delete third and fourth paragraphs

3 General

3.1 Introduction

Replace first paragraph with

The quality of instruments shall be maintain at all stages of manufacturing, to provide satisfactory performance at the specified process conditions written in data sheets.

Delete second paragraph

3.3 Instrument Range Selection

3.3.1 Range Requirements

Replace first paragraph with

The instrument calibrated range shall be provided as specified in the transmitter data sheet, and should be selected to cover the full operating window.

Replace second paragraph with

Transmitters shall allow re-ranging to be performed without requiring any re-calibration.

Delete third to ninth paragraphs

3.3.2 Units of Measurement and their Presentation

Delete section

Delete Table 1

3.3.3 Span Limits

Delete section

3.4 Instrument Selection

Delete section

3.5 Mechanical Integrity

Replace section with

The wetted parts of the transmitter shall be able to withstand the maximum design pressure with its associated temperature, and the maximum design temperature with its associated pressure.

3.6 Metallurgy and Soft Goods Selection

3.6.1 Introduction

Replace first paragraph with

Materials shall be selected to resist corrosive and erosive properties of fluids at their exposed pressure and temperature, in accordance to the transmitter data sheet.

Delete second paragraph

3.6.2 Wetted Materials

Delete first paragraph

Replace second paragraph with

Wetted parts of the material shall be minimum 316/316L stainless steel or upgraded to improve corrosion resistance, in accordance with the process parameters provided in the data sheets.

Delete third paragraph

Replace fourth paragraph with

AISI 304 SS shall not be used as wetted part material for transmitters.

Replace fifth paragraph with

AISI 316/316L SS shall not be used when operating in aqueous chloride environments at metal temperatures above 60 °C, since there is potential for stress corrosion cracking.

Replace sixth paragraph with

Hastelloy C-276 (UNS N10276) sensor elements shall be used if chloride or hydrogen sulfide concerns exist.

3.6.3 Material Codes

Delete first to fourth paragraphs

3.6.4 Soft Goods

Delete first paragraph

Replace second paragraph with

The selection of elastomers shall be in accordance with manufacturer's standard base on the specified process data.

Delete third and fourth paragraphs

3.6.5.1 General

Delete first and second paragraphs

3.6.5.2 NACE MR0175/ISO15156

Replace first paragraph with

Wetted part materials in H₂S services for petroleum production, drilling, gathering and gas field processing facilities shall be in accordance with NACE MR 0175.

Delete second paragraph

3.6.5.3 NACE MR0103

Replace first paragraph with

Wetted parts of the material in alkaline environments normally associated with downstream facilities (e.g. refineries) shall be in accordance with NACE MR 0103 to address the risk of sulfide stress cracking.

Delete second paragraph

3.6.6 Hydrogen Services

Delete first paragraph

Replace second paragraph with

For hydrogen services, where there is a risk of hydrogen atom permeation across the sensor, 316 SS diaphragm shall be gold plated in accordance with manufacturer's standard.

Delete third paragraph

Replace fourth paragraph with

The transmitter body flanges, bypass manifolds and pipe fittings should be 316/316L SS.

Delete fifth paragraph

3.6.7 Liquid Metal Embrittlement

Delete first paragraph

Replace second paragraph with

Wetted parts of the material containing copper (e.g. monel and brass) shall not be used on process fluids with a high mercury content.

Replace third paragraph with

Cadmium plated fasteners shall not be used in contact with steel as it can lead to liquid metal embrittlement.

Delete fourth paragraph

3.7 Signal Transmission and Communications

3.7.1 Electronic Analog Signals

Delete first paragraph

Replace second paragraph with

The output signal for instrument transmitters shall be hard wired 4-20 mA with HART protocol, unless otherwise specified in the data sheet.

Replace third paragraph with

The signal transmission for transmitters shall conform to NAMUR NE-43 requirements, unless otherwise specified in the data sheet.

Delete fourth to sixth paragraphs

Delete Table 2

3.7.2 Pneumatic Signals

Delete section

3.7.3 Digital Signals

Delete first and second paragraphs

Replace third paragraph with

If the digital signal transmission is specified in the data sheet, only the Foundation Fieldbus or Profibus standards shall be acceptable.

Replace fourth paragraph with

Transmitters shall be intelligent type, providing self-diagnostic functions to identify electronics and sensors faults.

Delete fifth paragraph

3.8 Power, Grounding, and Isolation

3.8.1 Power

Replace first paragraph with

All pressure, differential pressure and temperature transmitters are 2-wire 24V DC loop powered instruments, unless otherwise specified in the data sheet.

Delete second and third paragraphs

3.8.2 Grounding

Delete section

3.8.3 Isolation and Surge Protection

Delete first paragraph

Replace second paragraph with

A surge protector shall be provided with the transmitter, if specified in the data sheet.

3.9 Local Indicators

3.9.1 General

Delete section

3.9.2 Direct Connect Gauges

Delete section

3.9.3 Local Electronic Indicators

Replace first paragraph with

The local indicator shall be provided in the form of LCD display integral with the electronic transmitter or via a remote display unit hardwired in series with the electronic transmitter.

Replace second paragraph with

Remote local indicators shall have the facility for span and zero adjustments with protection against unauthorized access.

3.10 Tagging and Nameplates

Replace first paragraph with

The supplier shall provide instrument tags engraved on a 316 stainless steel plate and secured to the transmitter with a 316 stainless steel tie wire.

Replace second paragraph with

The standard technique of laser engraving shall be utilized to produce stainless steel tags.

Delete third paragraph

Replace fourth paragraph with

The transmitter nameplate shall be the manufacturer's standard material and shall include the following minimum information:

1. supplier's name;
2. model, type and serial number;
3. operating voltage;
4. hazardous area certification details;
5. date of manufacture.

3.11 Configuration and Configuration Management

Replace section with

The transmitter tag number, range and other user defined parameters shall be configured into the device prior to shipment. Device specific programs for process control system configuration interfaces, personal computer interfaces and handheld configurators shall be offered by the supplier.

3.12 Documentation

Replace first paragraph with

The documentation to be provided for electronic transmitters shall be in accordance with S-718L and S-718Q.

Delete second and third paragraphs

Add new section heading

3.13 Other Technical Requirements

Add new section

3.13.1 Environment Protection

The transmitter and remote indicator housing shall have minimum protection of IP 65 per IEC 60529 or NEMA 4X per NEMA 250.

Add new section

3.13.2 Housing Material

The transmitter housing material shall be manufacturer's standard for the environment, unless specified otherwise in the instrument data sheet.

Add new section

3.13.3 Cable Entry

The transmitter cable entry size shall be M20 ISO or 1/2-14 NPT, as specified in the data sheet.

Add new section

3.13.4 Hazardous Area Protection

Electrical protection for transmitter shall meet the hazardous area classification requirement, as specified in the instrument data sheet.

Add new section

3.13.5 Electromagnetic Compatibility

Protection for EMC shall meet the requirement of IEC 61326.

Add new section

3.13.6 Write Protection

Transmitters shall include a hardware write protection (switch or jumper), or password protection to prevent unauthorized access.

Add new section

3.13.7 Manifold

The transmitter manifold shall be supplied as specified in the instrument data sheet.

Add new section

3.13.8 Sunshade

Protective sunshade shall be supplied if specified in the data sheet.

Add new section

3.13.9 Vibration Resistance

Transmitters shall be able to operate within $\pm 0.1\%$ of the calibrated range during vibration amplitude up to 0.21 mm (0.008 in.) and vibration frequency from 10 Hz to 2 000 Hz, unless otherwise specified in the data sheets.

4 Temperature

4.1 Introduction

Replace section with

This section covers the requirements for thermowell and temperature sensors, for measuring temperature in the upstream and downstream oil and gas production facilities.

4.2 Thermowells

4.2.1 General

Delete first paragraph

Replace second paragraph with

Tip-sensitive elements shall be provided with a mechanical means to ensure thermal connection with the thermowell tip (e.g. spring loaded).

Delete third paragraph

4.2.2 Thermowell Terminology

Replace section with

Refer to Figure 1 for graphical details of the thermowell terminology.

4.2.3 Measurement Error Reduction

Delete first, second and third paragraph

Replace fourth paragraph with

Thermowell insertion length shall be at least $\frac{1}{3}$ of the pipe outer diameter (OD) to ensure accurate measurement of the representative fluid temperature, unless specified otherwise in the instrument data sheet.

Delete fifth paragraph

Delete figure 2

4.2.4 Thermowell Strength

Delete second and third paragraphs

Thermowells shall be evaluated in conformance to ASME PTC (Performance Test Code) 19.3 TW.

Delete fifth paragraph

Replace sixth paragraph with

The support collar shall not be used as a solution to strengthen the thermowell since it is difficult to maintain and it is outside the scope of ASME PTC 19.3 TW.

Delete seventh, eighth and nine paragraphs

Delete eighth and ninth paragraphs

4.2.5 Materials

Replace first paragraph with

The thermowell material of construction shall be 316 SS as a minimum or higher grade as required to meet piping specification or vessel material specification. The thermowell material shall be specified in the instrument data sheet.

Replace second paragraph with

The material of a thermowell operating in high temperature services shall be specified in the instrument data sheet, in accordance with the project piping specification.

Replace third paragraph with

Thermowells in corrosive services shall be coated or be made of corrosion resistant alloys.

Delete second paragraph

Replace third paragraph with

Thermowells shall be flanged with full penetration welds or as specified in the data sheet.

4.2.6 Construction

Replace fourth paragraph with

Welds shall be validated by non-destructive means such as a liquid dye-penetrant test.

Replace fifth paragraph with

Thermowells shall be fabricated from a solid piece bar stock or single piece forged for maximum strength or with flange attached by a full penetration weld in conformance to ASME B31.3.

4.2.7 Reactor Thermowells

Delete section

4.2.8 High Temperature Thermowells

Replace section with

For furnace or fired equipment applications where temperatures are equal or greater the 540 °C, ceramic thermowells shall be used, unless otherwise specified in the data sheet.

Delete figure 5

4.3 Thermocouples

4.3.2 Fabrication

Replace first paragraph with

Thermocouple assemblies shall be metal sheathed, unless otherwise specified in data sheet.

Replace second paragraph with

Metal sheathed thermocouples shall be mineral insulated.

Replace third paragraph with

Thermocouples shall meet either IEC 60584-2 or ASTM E230-2012 tolerance classes, as specified in the data sheet.

Replace fifth paragraph with

Thermocouple junctions shall be isolated and ungrounded to minimize measurement error cause by induced noise from ground loops.

Replace sixth paragraph with

Sheathed thermocouple fabrication shall be according to the requirements of IEC 61515 or ASTM E608, as specified in the data sheet.

Delete table 4

Delete table 5

4.3.3 High Temperature Thermocouple Measurements

Replace first paragraph with

The element material of a high temperature thermocouple shall be compatible with its environment.

Replace second paragraph with

The sheath and the mineral oxide insulation shall be chemically compatible for the process conditions.

Delete third to eleventh paragraph

4.3.4 Skin Tube Temperature Measurement

Replace first paragraph with

Thermocouples shall be welded Type K or N for furnace skin tube temperature measurement.

Delete second to thirteenth paragraph

Delete figure 7

Delete figure 10

4.3.5 Thermocouple Extension Wire

Delete section

4.4 Resistance Temperature Devices

4.4.1 General

Delete section

Delete table 6

4.4.2 Calibration

Delete first paragraph

Replace second paragraph with

Nominal resistance of RTD at 0 °C shall be 100 Ω.

Delete Table 7

Replace third paragraph with

Resistance tolerance classes for platinum RTDs shall be in accordance with IEC 60751 or ASTM E1137, as specified in the transmitter/temperature element data sheet.

Delete Figure 11

4.4.3 Fabrication

Delete first to third paragraphs

Replace fourth paragraph with

RTD elements shall be mineral insulated and have 316 SS outer sheath.

Delete fifth and sixth paragraphs

4.4.4 Application

Replace first paragraph with

RTD sensors shall be minimum three-wire type.

Delete second to fifth paragraphs

4.4.5 RTD Extension Wires and Signal Transmission

Delete first and second paragraphs

Delete second paragraph

4.5 Thermistors

4.5.1 Selection and Application

Delete section

4.5.2 Linearization

Delete section

4.6 Distributed Temperature Sensing

Delete section

4.7 Radiation Pyrometers

Delete section

4.8 Temperature Element Wiring

Delete section

Delete Figure 12

Delete Figure 13

4.9 Temperature Signal Conditioners and Transmitters

Delete first paragraph

Replace second paragraph with

Temperature transmitters shall provide thermocouple sensors with automatic compensation for temperature variations at the cold junction.

Delete third and fourth paragraphs

Replace fifth paragraph

Thermocouple burnout protection (open circuit or loss of signal detection) shall be provided by the temperature transmitter.

Delete Figure 14

4.10 Local Temperature Indicators

4.10.1 Bimetal Dial Thermometers

Delete section

Delete Table 8

5 Pressure

5.1 Introduction

Delete section

5.2 Pressure Measurements

Delete section

Delete Figure 15

5.3 Pressure and Differential Pressure Transmitters

Delete first, second and third paragraphs

Transmitters shall be specified with over pressure protection to the process design pressure, or as specified in the data sheet.

Replace fifth paragraph with

Process connections for the pressure transmitter shall be as specified in the instrument data sheet.

Delete sixth and seventh paragraphs

5.4 Pressure Transmitter Performance

5.4.1 Intelligent versus Analog Transmitters

5.4.1.1 Intelligent Transmitters

Delete section

5.4.2 Pressure Transmitter Performance Characteristics

Delete section

5.4.3 Pressure Transmitter Accuracy

Replace first paragraph with

The transmitter accuracy shall be within $\pm 0.1\%$ of the specified span.

Delete second, third and fourth paragraphs

5.4.4 Pressure Transmitter Response Time

5.4.4.1 General

Delete section

5.4.4.2 First Order Response

Delete first to fifth paragraphs

Replace sixth paragraph with

Transmitter response time shall be less than one second, unless specified otherwise in the instrument data sheet.

5.4.4.3 Dead Time

Delete section

5.4.4.4 Process Piping Response

Delete section

5.5 Pressure Gauges

Delete section

Delete Table 9

5.6 Miscellaneous Pressure Devices

5.6.1 Pressure Switches

5.6.1.1 General

Delete section

5.6.2 Bellows Meters

Delete section

6 Flow

6.1 Introduction

Replace first paragraph with

This section covers the design requirements for differential pressure flow measurement.

6.1.1 Meter Types

Delete section

6.1.2 Flow Profile

Delete section

Delete Table 10

Delete Figure 16

6.1.3 Pulsation

Delete section

6.1.4 Two Phase Flow

Delete section

6.1.5 Flow Meter Orientation

Delete section

6.1.6 Meter Bypass

Delete section

6.2 Head Type Flow Meters

6.2.1 Orifice Plate

6.2.1.1 Concentric Sharp-edge Orifice Plates

Delete first paragraph

Replace second paragraph with

The calculated d/D (Beta ratio) for concentric sharp-edge orifice plates shall be within the limits of 0.1 and 0.75.

Delete third and fourth paragraphs

6.2.1.2 Conic, Quadrant Edge, and Eccentric Orifice Plate

Delete first paragraph

Replace second paragraph with

Conic, quadrant edge and eccentric orifice plate shall be designed according to ISO TR 15377-2007, 6.1, 6.2 and 6.3 respectively.

Delete third paragraph

6.2.1.3 Meter Run Requirements for Orifice Plates

Delete section

Delete Table 11

6.2.1.4 Orifice Meter Differential Pressures

Delete first paragraph

Replace second paragraph with

Differential pressure range for orifice plate sizing shall be between 0 to 250 mbar (100 in H^2O), unless otherwise specified in the data sheet.

Delete third and fourth paragraphs

6.2.1.5 Orifice Construction

Replace first paragraph with

Orifice plate shall be designed and constructed in conformance to ISO 5167 or API MPMS 14.3.2, as specified in the data sheet.

Delete third and fourth paragraphs

Replace fifth paragraph with

Due to limits in orifice fabrication, bore calculations should be rounded to nearest 0.1 mm or 0.01 in.

Replace sixth paragraph with

Drain and vent holes shall be provided as per ISO-TR 15377, if specified in the instrument data sheet.

Replace seventh paragraph with

Orifice plate material shall be minimum 316 SS, or as specified in the data sheet.

Replace eight paragraph with

Orifice plate handle shall be engraved on the upstream side with the following information: UPSTREAM, instrument tag, bore size, plate material, plate type, vent/drain hole size (if provided), flange size, rating and facing.

Delete Figure 17

6.2.1.6 Honed Orifice Runs and Integral Orifices

Replace first paragraph

Prefabricated honed runs with small bore orifice in accordance to ASME MFC-14M-2003 shall only be used for small size pipes 50 mm and below.

Delete second, third and fourth paragraphs

Delete Figure 18

6.2.2 Flow Tubes

Delete section

Delete Figure 19

Delete Figure 20

6.2.3 Flow Nozzles

Delete section

6.2.4 Cone Meter

Delete section

6.2.5 Multi-Hole Orifice Plates

Delete section

6.2.6 Wedge Meters

Delete section

6.2.7 Elbow Meters

Delete section

6.2.8 Pitot Tubes

Delete section

6.2.9 Averaging Pitot Tubes

Delete section

6.3 Variable-Area Meters

6.3.1 General

Delete section

6.3.2 Variable Area Meter Characteristics

Delete section

6.3.3 Variable Area Flow Meter Accuracy

Delete section

6.3.4 Viscosity

Delete section

Delete Figure 21

6.3.5 Direct Reading Variable Area Meters

Delete section

6.3.6 Metal Tube Variable Area Meters

Delete section

6.3.7 Installation

Delete section

Delete Figure 22

6.4 Magnetic Flowmeters

6.4.1 General

Delete section

6.4.2 Magnetic Flow Meter Types

6.4.2.1 General

Delete section

6.4.3 Electrodes and Liners

Delete section

6.4.4 Installation

6.4.4.1 General

Delete section

6.4.5 Start-Up and Calibration

Delete section

6.5 Turbine Meters

6.5.1 General

Delete section

Delete Figure 23

6.5.2 Turbine Meter Backpressure

Delete section

6.5.3 Universal Viscosity Curve

Delete section

6.5.4 Bearings

6.5.4.1 General

Delete section

Delete Figure 24

6.5.5 Pickups

6.5.5.1 General

Delete section

6.5.6 Installation

6.5.6.1 General

Delete section

6.5.7 Meter Start-Up and Operation

Delete section

6.6 Positive Displacement Meters

Delete section

6.7 Vortex Meters

Delete section

6.8 Ultrasonic Flow Meters

Delete section

6.9 Coriolis Flow Meter

Delete section

6.10 Thermal Dispersion Meter

Delete section

Delete Figure 25

7 Level

7.1 Introduction

Delete section

7.2 Vessel Connections

Delete section

7.3 Level Transmitters

7.3.1 General

Delete section

7.3.2 Hydrostatic Measurement

7.3.2.1 General

Delete section

7.3.2.2 Wet Leg Differential Pressure Level Measurement

Delete first to ninth paragraphs

Replace tenth paragraph with

The calibrated span of the differential pressure level transmitter shall be based on the minimum process fluid specific gravity as well as the maximum seal leg specific gravity.

7.3.2.3 Flange Level Transmitters

Delete first paragraph

Replace paragraph two with

Extended diaphragm seals shall be provided only when specified in the instrument data sheet.

Delete third paragraph

7.3.2.5 Submersible Hydrostatic Pressure Transmitters

Delete section

7.3.2.6 Steam Drum Level Measurement

Delete section

Delete Figure 30

7.3.2.7 Steam Drum Startup

Delete section

7.3.2.8 Bubbler Level Measurement

Delete section

7.6.1

Replace third paragraph with

Transmitters shall be calibrated using the lightest density expected for high level safety trip, and using the heaviest density expected for low level safety trip, taking into consideration all startup, shutdown and emergency modes.

9 Instrument Protection

9.1 Introduction

Delete section

9.2 Diaphragm Seals

Replace section with

Diaphragm seals shall be specified in the transmitter data sheet when required to isolate pressure sensors from high temperatures, dirty or corrosive process fluids.

9.2.1 Construction

Delete first and second paragraphs

Replace third paragraph with

Diaphragm seal material shall be as specified in the transmitter data sheet, being compatible with the process fluid.

Replace fourth paragraph with

Diaphragm seal process connection shall be flanged, unless otherwise specified in the instrument data sheet.

Replace fifth paragraph with

For dirty services, a flushing ring complete with vent or drain valve shall be provided with the diaphragm seal of the transmitter.

9.2.2 Diaphragms

Delete first paragraph

Replace second paragraph with

Diaphragm seal flange size shall be as specified in the data sheet.

Delete third paragraph

Delete Table 19

9.2.3 Capillaries

Replace first paragraph with

Diaphragm seal assembly capillaries shall be 316 SS flexible armoured tubing, coated with PVC or polyethylene.

Delete second to seventh paragraph

Replace eighth paragraph with

Capillary length shall be as specified in the data sheet.

Deleted ninth to fifteenth paragraphs

9.2.4 Fill Fluids

Replace first paragraph with

Fill fluid for the diaphragm seal shall be compatible with the ambient and process conditions.

Delete second to seventh paragraphs

9.2.5 Time Response

Delete section

9.2.6 Vacuum Applications

Delete section

9.2.7 Pressure Gauge Diaphragm Seals

Delete section

9.2.8 Installation

Delete section

Public Review Draft

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