ELECTRONIC MEASUREMENT
Transmitters

1. SCOPE

This material specification covers electronic transmitters having a Class I, Division 1 and Group D Hazardous Location as specified in NFPA/NEC-500.3 through 500.5.

2. APPLICABLE DOCUMENTS

2.1 NFPA/NEC-500.3 through 500.5; Chapter 5, "Special Occupancies," Article 500, "Hazardous (Classified) Locations."

2.2 NFPA/NEC-501; Chapter 5, "Special Occupancies," Article 501, "Class 1 Locations."

2.3 American National Standards Institute (ANSI) B-1.20.1, "Pipe Threads General Purpose (INCH)."

2.4 American National Standards Institute (ANSI) B-16.11, "Forged Fittings, Socket-Welding and Threaded."

2.5 American National Standards Institute (ANSI) B-16.5, "Pipe Flanges and Flange Fittings."

2.6 ASTM International ASTM) A-105, "Standard Specifications for Forgings, Carbon Steel for Piping Components."

2.7 Manufacturers Standardization Society (MSS) SP-25, "Standard Specifications for Forgings, Carbon Steel for Piping Components."

2.8 International Electrotechnical Commission (IEC), IEC-751 Class B.

2.9 Southwest Gas Material Specification (MS) Q-2, "Thermowells."

2.10 United States Department of Transportation (DOT), Code of Federal Regulations (CFR), Title 49, Part 192, "Transportation of Natural and Other Gas by Pipeline; Minimum Safety Standards."

NOTE: Unless otherwise specified, the editions of the above documents incorporated by DOT 49 CFR 192 are applicable. Documents not incorporated by DOT 49 CFR 192 will be the most recent edition.

3. TERMINOLOGY

3.1 General

3.1.1 "Southwest Gas," "Southwest" or "SWG" wherever used in this specification and other related documents will refer exclusively to Southwest Gas Corporation.

3.1.2 The terms "approved," "as approved," "satisfactory," "as directed," "or equal" or other similar terms wherever used in this specification and other related documents will mean "as determined by Southwest Gas," unless specifically stated otherwise.

3.1.3 "Product Information Package" or "PIP" wherever used in this specification and other related documents will mean the required technical product information that a manufacturer must submit to SWG to determine if the product is suitable for use by SWG, unless specifically stated otherwise.

3.2 The term "forged steel" is as defined by ASTM A-105.

3.3 The term "transmit" refers to the instruments output signal only. Remote Terminal Unit (RTU) will receive current signals from the transmitters for relay.

3.4 The term "transmitter" refers to an instrument containing a transducer and transducer signal conversion-processing devices.

3.5 The term "transducer" refers to the portion of the transmitter which is converting a physical force into another physical force (e.g., pressure to a DC voltage).

3.6 The term "smart" refers to transmitters which are able to accept and process communication signals from remote locations, are able to self-check and report problems with the transmitter and are able to accept configurations/calibration from a communication device.

4. MATERIALS AND MANUFACTURING

4.1 Transmitters manufactured to this specification shall have steel fittings manufactured, as a minimum, in accordance with ANSI B-16.11, ASTM A-105 and any additional requirements as defined in this specification.

4.2 All steel pipe flanges and flange fittings manufactured to this specification will meet the requirements of ANSI B-16.5.

4. MATERIALS AND MANUFACTURING (Cont'd)

4.3 The material for any O-rings used in the manufacture of the transmitters having contact with natural gas will be either nitrile or Buna N.

4.4 All fittings shall have tapered threads and shall be threaded in accordance with ANSI B-1.20.1.

4.5 The static pressure reading will be gauge (psig). The differential pressure reading will be in inches of H_2O.

4.6 The transmitters will have an adjustable zero and range of operation (span within the maximum and minimum points of operation).

4.7 Transmitter parts exposed to natural gas will be made of a material which is compatible with natural gas and agents commonly found in natural gas pipelines.

4.8 Transmitter parts exposed to ambient conditions shall be resistant to corrosion from these ambient conditions and be made waterproof. For example, corrosive conditions may include, aqueous salts found in water or acids in rain.

4.9 Plastic material used in transmitter parts will contain suitable ultraviolet inhibitors which are acceptable to SWG, so that the material's physical properties will not be adversely affected by exposure to natural ultraviolet light in locations throughout SWG's service area.

4.10 Transmitters shall be constructed to accept electrical grounding as specified in NFPA/NEC-501-16.

4.11 Pressure transducers will be manufactured for exposure to working fluid temperatures from -40°F to 220°F (-40°C to 104°C).

4.12 Transducers converting current to pressure will be designed to utilize process gas (natural gas) as the pneumatic source.

4.13 The temperature transducers will be manufactured to be mechanically compatible with thermowells approved for use in Southwest Gas MS Q-2.

4.14 All pressure fittings will be marked in accordance with MSS SP-25.

4.15 Where plated fittings are specified, cadmium plating is not acceptable. Nickel plating is acceptable for process flanges, flanged fittings, bolts and fusing hardware. Stainless Steel Type 316 may be used instead of plating.

5. PERFORMANCE REQUIREMENTS

5.1 Transmitters

5.1.1 Transmitters shall be certified to perform in Class I, Division 1, and Group D Hazardous Material Locations as specified in the NFPA/NEC-500.3 through 500.5. Transmitters must be certified as explosion-proof or intrinsically safe, preferably both.

5.1.2 Transmitters will be required to operate in ambient temperature ranges from -20°F to 175°F (-29°C to 79°C).

5.1.3 Transmitters will have an accuracy of ±0.25 percent or better in the specified and calibrated operating span.

5.1.4 Transmitters should have a stability of calibration of 0.25 percent over a continuous six-month period.

5.1.5 Maximum temperature effects on the accuracy of transmitters should be within 3.5 percent of span per 100°F (38°C).

5.1.6 Transmitters will be made to operate on external DC voltage power supplies. The supply voltage may range from 12 volts to 45 volts DC.

5.1.7 Transmitters shall be of a standard two-wire 4 mA to 20 mA DC output configuration and capable of driving a minimum 575 ohm load.

5.1.8 Transmitters should to be able to operate accurately in humidity ranges from 0 percent to 100 percent.

5.1.9 Static pressure or differential transmitters must be able to withstand pressures/temperatures of 1.5 times their upper range limit with complete recoverability.

5.1.10 Static-pressure transmitters will be required to operate within pressure ranges from 0 psig to 3000 psig.

5.1.11 Differential pressure transmitters will be required to operate within ranges from 0 inches to 250 inches H^2O.

5.1.12 Differential pressure transmitters should be able to withstand static overpressure conditions to 2000 psig with complete recoverability.

5. PERFORMANCE REQUIREMENTS (Cont'd)

5.1 Transmitters (Cont'd)

5.1.13 "Smart" pressure/differential/temperature transmitters are the only type to be purchased by SWG.

5.1.14 "Smart" transmitters must be able to detect and transmit malfunctions in themselves when interrogated.

5.1.15 It is preferred, but not required, that the zero and span settings of "smart" transmitters are capable of being set manually without the aid of special communication devices.

5.1.16 "Smart" transmitters must have selectable, by programming, jumper, or Dip switches, failure detection output modes and must drive the output of the transmitter for fail low to ≤3.6mA/.95V and for fail high to ≥21.75mA/5.4V dependent on the failure mode selected.

5.1.17 "Smart" transmitters will have a means of connecting the communication device and will have the terminals identified where the device is to be connected.

5.1.18 "Smart" transmitters should have, as an option from the factory or as a fiend replaceable option, an LCD screen that gives a readout of the current value and EU of the transmitter and that display must be configurable and be able to be calibrated.

5.1.19 All fittings under this specification will be capable of withstanding a leak test at a pressure level not less than the maximum operating pressure of the transmitter/transducer system.

5. PERFORMANCE REQUIREMENTS (Cont'd)

5.2 Temperature Transducers

5.2.1 Temperature transducers will be resistance temperature devices (RTD) of the type IEC 751, Class B, having a zero at 100 ohms, and ά = 0.00385 ohms/ohm/0°C.

5.2.2 Temperature transducers will have a sensing range from -58°F to 392°F (-50°C to 200°C).

5.2.3 Temperature transducers will be available in normal emersion lengths from 2 inches through 24 inches (50.30 mm through 609.6 mm).

5.3 Current to Pressure Transducers

5.3.1 Current to pressure transducers will be required to operate in the fluid temperature range from -40°F through 180°F (-40°C through 82°C).

5.3.2 Standard current to pressure transducers will be required to have an output pressure range from 3 psig through 15 psig.

5.3.3 Variable-range current to pressure transducers will be required to have output pressure ranges within 3 psig through 30 psig.

5.3.4 Current to pressure transducer's linearity and stability of response must be ±0.35 percent of span.

6. DIMENSIONS AND TOLERANCES

6.1 All forged-screwed type steel fittings manufactured to this specification will meet the dimension and tolerance requirements of ANSI B-16.11.

6.2 All steel pipe flanges and flange fittings manufactured to this specification will meet the dimension and tolerance requirements of ANSI B-16.5.

7. INSPECTION

7.1 Successful review of the Product Information Package (PIP), as well as any future reference by SWG to the Seller's part number or internal code number in any future contract or purchase, will mean only that no conflict with the specification was found, and will not relieve the Seller from meeting all the requirements of this specification.

7.2 SWG retains the option to inspect the manufacture and testing of any and all materials, products or systems referenced in this specification that are sold to SWG.

7.3 SWG will make appropriate inspections and tests of any and all materials, products or systems supplied to this specification. SWG will have the right, at their option, to reject any material which fails to conform to this specification. Any such rejection may take place at the manufacturer's facility; the supplier's warehouse or any subsequent delivery location, before or after SWG assumes possession. Notice of the rejection will be made promptly to the supplier by SWG. The defective product will be replaced or returned for credit at the manufacturer's expense.

7.4 Any changes in the manufacturing of previously-approved materials, products or systems described in this material specification for sale to SWG, must be approved by SWG's Engineering Staff. **Failure to obtain SWG's approval may be cause for rejection and disqualification as an approved supplier**.

8. CERTIFICATION

The manufacturer's or supplier's certification will be furnished to Southwest. This certification will state that samples representing each lot have been manufactured, tested and inspected in accordance with this specification and that all requirements have been met. When requested or specified in the purchase order or contract, a report of test results will be provided.

Upon the request of Southwest, the certification of an independent third party indicating conformance to the specification may be considered at Southwest's expense.

9. SAFETY DATA SHEETS

In accordance with law, the Seller will supply Safety Data Sheets for all applicable items supplied under this specification to the following:

1) The Receiving Location
2) Engineering Staff
3) Southwest Gas Corporation
   Corporate Safety
   Mail Station LVA-120
   P.O. Box 98510
   Las Vegas, NV 89193-8510

10. PRODUCT MARKING

10.1 All transmitters sold to Southwest will be marked with the manufacturer's name or trademark and the manufacturer's part number. Fittings will be marked with the nominal pipe size. Southwest retains the right to require the fittings to be marked with Southwest's purchase order number.

10.2 All transmitters will be marked with Factory Mutual (FM) or Underwriters Laboratories (UL) approval alone with their corresponding certifications.

10.3 All transmitters will be marked by tagging. The tag will provide applicable information about sensing ranges, electrical or pressure output ranges and electrical supply voltages. Also, if applicable, overpressure ranges will be clearly detailed.

11. PACKAGING

All transmitters and fittings will be packaged in a manner to prevent damage during transportation and storage. Openings to the transducers and transmitters will be supplied with dust caps.

12. STOCK CLASSIFICATION DESCRIPTION

12.1 TRANSMITTERS:

TRANSMITTER, PRESSURE, “electronics type,” “manufacturer,” “model,” CALIBRATED _____ PSIG PRESSURE RANGE, 4 TO 20 MILLIAMP OUTPUT SIGNAL, XXX-INCH NPT PROCESS CONNECTION, XXXX FLANGE MATERIAL, “other attributes,” 1/2-INCH NPT ELECTRICAL CONNECTION, SUITABLE FOR CLASS I, GROUP D, DIVISIONS 1 & 2, “certification,”.

TRANSMITTER, DIFFERENTIAL PRESSURE, “electronics type,” “manufacturer,” “model,” CALIBRATED _____ INCHES OF WATER COLUMN PRESSURE RANGE, 4 TO 20 MILLIAMP OUTPUT SIGNAL, XXX-INCH NPT PROCESS CONNECTION, XXXX FLANGE MATERIAL, 1/2-INCH NPT ELECTRICAL CONNECTION, SUITABLE FOR CLASS I, GROUP D, DIVISIONS 1 & 2, “certification,”.

TRANSMITTER, TEMPERATURE, “electronics type,” “manufacturer,” “model,” CALIBRATED ___ TO ___ °F, 4 TO 20 MILLIAMP OUTPUT SIGNAL, 1/2-INCH NPT ELECTRICAL CONNECTION, SUITABLE FOR CLASS I, GROUP D, DIVISIONS 1 & 2, “certification,”.

NOTE: Sensor ordered separately. Refer to sensor, temperature, assembly for manufacture and model and select temperature transmitter sensor application.

“Certification”:

Underwriters Laboratories (UL)
Factory Mutual (FM)
Canadian Standards Authority (CSA)

INTRINSICALLY-SAFE (IS)
EXPLOSION-PROOF (EXPF)

12. STOCK CLASSIFICATION DESCRIPTION (Cont'd)

12.2 CURRENT TO PRESSURE TRANSDUCERS:

TRANSDUCER, CURRENT TO PRESSURE, (I/P), "Manufacturer", "Model", TO PSIG OUTPUT PRESSURE RANGE WITH A 4 TO 20 MILLIAMP INPUT SIGNAL, ¼ INCH NPT PRESSURE CONNECTIONS, "Other Attributes", ½ INCH NPT ELECTRICAL CONNECTION, SUITABLE FOR CLASS I, GROUP D, DIVISIONS 1 & 2, "Certification".

"Certification": Underwriters Laboratories (UL)
Factory Mutual (FM)
Canadian Standards Authority (CSA)
INTRINSICALLY-SAFE (IS)
EXPLOSION-PROOF (EXPF)

12.3 TEMPERATURE TRANSDUCERS

SENSOR, TEMPERATURE, ASSEMBLY FOR "Manufacturer", "Model", TEMPERATURE TRANDSMITTER, COMPOSED OF SENSOR, UNION AND EXTENSION NIPPLE, IMMERSION LENGTH INCHES.

SENSOR, TEMPERATURE, (ONLY) SPARE PART FOR "Manufacturer", "Model" TEMPERATURE TRANSMITTER, PLATINUM 100 OHM SENSOR ENCASED IN 0.250-INCH DIAM. 304 STAINLESS STEEL PROBE, IMMERSION LENGTH INCHES, THE OVERALL LENGTH INCLUDES EXTENSTION TUBE LENGTH.

Other: BRACKET, MOUNTING, FOR "Manufacturer", "Model", "Unit Type", "Description".