ConocoPhillips

Australasia Business Unit

Bayu Undan / Darwin LNG Facilities
Technical Delivery Terms

Material Description:	Generic Pressure and Temperature Transmitters		
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1 SCOPE

This document outlines the general technical requirements for the supply of generic Pressure and Temperature Instrumentation for the ConocoPhillips (COP) Bayu-Undan and Darwin LNG Facilities.

Specifically, Pressure and Temperature Transmitters shall be manufactured under the general requirements of the following codes and standards:

AS/NZS 60079.0:2005	Electrical Apparatus for Explosive Gas Atmosphere – General Requirements
AS/NZS 60079.1:2005	Electrical Apparatus for Explosive Gas Atmosphere – Flameproof
AS/NZS 60079.10:2004	Electrical Apparatus for Explosive Gas Atmosphere – Classification of Hazardous Areas
AS 60529:2004	Degrees of Protection Provided by Enclosures (IP Code)
API RP 551:1993	Process Measurement Instrumentation
API RP 554:1995	Process Instrumentation and Control
ANSI NC96.1	Temperature Instruments - Thermocouples
ANSI/ASME B1.20.1	Pipe Thread General Purpose (Covering NPT Threads)
ASME PTC 19.3	Thermowell Wake Frequency Calculations
IEC 801	Electro-magnetic Compatibility for Industrial-Process Measurement and Control Equipment
NACE MR0175	Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment
NAMUR Recommendation 43	

2 EXCEPTIONS AND ADDITIONAL REQUIREMENTS

- Instruments and enclosures shall not contain mercury, beryllium or asbestos.
- The materials of construction for instrument bodies and electronic housings is 316SS, although suitable alternatives including filled polymer based materials, and high-grade epoxy coated metals (including marine grade aluminium and steel) may be considered. Copper or zinc-based alloys shall not be used. Protection of steel by plating or galvanizing alone is not adequate. Instrument enclosures exposed to outdoor environments shall be ingress protected to IP56 or higher
- 304 stainless steel shall not be used for any parts or equipment
- All electronic components and boards shall be "tropicalised" using a silicone encapsulation treatment or equivalent.
- Instrumentation to be designed to handle the following ambient and plant conditions:

    - Maximum ambient temperature 38 deg C
    - Minimum ambient temperature 10 deg C
    - Relative Humidity 100%

- Unless otherwise specified, all brackets, fixings, bolts, nuts, and washers for mounting and securing instrumentation shall be 316SS. Bolting shall be suitably rated for containment of pressure retaining components and secured using lock washer, nut or loctite.
- Where required on the data sheets, all wetted materials shall comply with the requirements of NACE MR0175.
- All instrumentation and glands shall be suitable for Class I, Zone 1, Group IIA, temperature class T3; as a minimum.
- All electrical equipment for use in these hazardous areas shall be certified and approved for use in the area concerned by Standards Australia (SAA). Where SAA certification or approval is not available, IECEx certified equipment is acceptable. Equipment supplied with other test house certification shall be subject to Purchaser scrutiny and approval.
- All instrumentation shall have its tag/identification number and service description engraved on a 316SS label. Label details are as follows:

    - Label size 90x35mm
    - Tag Number text size 10mm
    - Service description text size 5mm
    - Details of tag number and service description can be found on the instrument data sheet

- Tag/ID plates shall be attached to the equipment using stainless steel wire.
- Manufacturer's standard nameplates may be used, subject to Principal approval.
- Transmitters shall have calibration stability warranted for a minimum of two years.
- Transmitter capsule materials shall be Hastelloy 'C'.
- Pressure transmitters shall be suitable for direct threaded type mounting.
- Transmitters shall be supplied with 2-inch pipe stand mounting brackets for DLNG and no bracket for Bayu Undan. For Bayu Undan transmitters, support shall be provided from the valve manifold and its bracket assembly.
- Provisions shall be made for single point connections to the transmitter assemblies as follows:

    - 20 mm ISO electrical entry connection for all transmitters.
    - ½ inch NPT Male process connection(s) for pressure transmitters only
    - Traditional flange connection for differential pressure transmitters only (ie. suitable for direct coupling to the associated manifold).
    - Spare cable entries shall be covered with a 316 SS plug (plug to be certified Exd).

- Vent and drain ports are required on the transmitter body.
- NPT thread connections shall conform to ANSI/ASME B1.20.1 with the following exceptions:

- Gauging External Taper Threads with Ring Gauge (Male Threads): When hand tight, the male fitting must engage into the ring gauge -0 to +1 turn more than the start of the first scratch mark on the chamfer zone.
- Gauging Internal Threads with Plug Gauge (Female Threads): When hand tight, the plug gauge must engage into the female fitting -0 to +1 turn below the last thread scratch on the chamfer zone.
- This will ensure a minimum engagement of 4 threads by hand pressure. Four turns will also be expected for wrench tightness, including application of PTFE tape or equivalent.
- If fittings are supplied that do not meet the above requirement, then the Supplier must guarantee that the thread engagement of 4 turns, including wrench tightness as described above, will be achieved on all fittings. Any fittings/threads that do not meet this requirement will be replaced at no cost to the Principal.

- Instruments, wherever possible, shall be of the manufacturer's standard type, using charts and scales of standard ranges.
- All instruments shall be calibrated in factory and the supplier shall provide calibration certification. One copy of the calibration certificate shall be shipped with instruments.
- All instruments shall be capable of being field calibrated without being disconnected from the process.
- Units of Measurement - Pressure

▪ Static Pressure	Bar Gauge
▪ Low Range Static Pressure	Bar Absolute
▪ Vacuum	Bar Absolute
▪ Compound Pressure	Bar Absolute
▪ Absolute Pressure	Bar Absolute.
▪ Differential Pressure	Bar

- Units of Measurment – Temperature – degrees Celcius
- RTD's shall be platinum, 100 ohm at 0°C detectors. The temperature coefficient of the RTD's shall be 0.00385 ohm/°C. Three wire elements shall be used as a minimum.
- Thermocouple type selection shall be in accordance with the instrument data sheet and/or process conditions.
- Thermocouples and RTD's shall be spring loaded into the thermowell to minimize the transfer lag.
- Thermocouples and RTD's shall be sheathed with magnesium-oxide insulation. The sheath shall be 316 stainless steel and 0.250" OD. Conductors shall be 1.00mm² (#18 AWG). The thermocouple element shall be insulated (non grounded) from the element sheath.
- The RTD transmitters shall be all electronic, two-wire units with a selectable digital/4-20 mA DC output. The unit shall accept a 3-wire 100-ohm platinum resistance sensor and provide a linearized output. Zero and span adjustability is required. Screw terminals are required for wiring termination.
- Thermocouple transmitters shall be all electronic, two-wire units with a selectable digital/4-20 mADC output (depending on data sheet requirements). The unit shall accept a thermocouple input and provide an output linearized to the thermocouple voltage signal. Zero and span adjust-ability, cold junction compensation and burnout protection are required. Screw terminals are required for wiring terminations. Burnout indication shall normally be upscale but some special and low temperature applications will require downscale indication.
- Analog signals, other than thermocouple signals shall be digital (HART protocol) or 4-20 mADC (selectable – depending on datasheet requirements). For DLNG DCS application the transmitter shall be capable of providing a Honeywell DE signal (specified on the instrument data sheet if required). A two-wire system shall be used, when they are available. Electronic instrument systems shall use a digital or 4-20 mADC signal for transmission and 4-20 mADC for control. Discrete signals shall be 24 volt DC. Unless specified otherwise, alarm, shutdown, and ON/OFF control signals shall be 24 volt DC.

- Transmitters shall be compliant to Namur NE43. Output signals shall be limited to between 3.8mA and 20.5mA.

3 CERTIFICATION AND DOCUMENTATION

All transmitters shall be supplied with the following certification as a minimum:

- Hazardous Area Certificate of Conformance
- Material traceability certificates for wetted components
- Pressure Test Certification (Pressure Transmitters)
- Instrument Factory Calibration Certificate

Documentation to be supplied with each transmitter:

- Installation, Operating, Maintenance Manual/User Guide
- Certification as described above