2.6.2 It should be appreciated that the temperature responsive element in a temperature gauge is subjected to external stresses and if any of the above conditions are present, failure is likely to occur. Installing the instrument within a Thermowell will provide protection.

2.7 THREADS AND JOINTING (INSTALLATION)

2.7.1 All pressure connections should be leak tight and should be tested when first applying the system.

2.7.2 Recommended maximum pressure for each size of thread and type of material must not be exceeded. 

2.7.3 Carefully install to ensure mismatch of threads does not occur.

2.7.4 Making female connections must have a pressurerating that is compatible with the maximum design pressure of the system.

2.7.5 Gauges with parallel threads must have the seal made on the flat seating using a washer of material compatible with the medium.

2.7.6 Gauges with tapered threads have the joint made by mating of the threads. It is common practice to apply sealing material to the male thread to ensure good interface without damaging the thread.

2.7.7 The joint must be made by tightening the gauge by means of a spanner on the hexagon or square section provided on the screw fitting.

2.7.8 Do not tighten by grasping the case of the instrument as this can lead to pointer shift and loss of calibration.

2.7.9 NPT and other tapered thread forms when manufactured to the standard specification may not be adequate to offer sufficient thread engagement for safe use under pressure.

2.7.10 Our tighter NPT threads ensure sufficient thread engagement.

Please consult our Datasheet RA.125.208 for further information.

2.7.11 The gauge and connection should be examined to ensure they are compatible with the medium and applied in the correct quantity to ensure non-interference with mating of the threads.

2.7.12 The joint must be made by tightening the gauge by means of a spanner on the hexagon or square section provided on the screw fitting.

2.8 MOUNTING

2.8.1 Instrument heads should be mounted in the vertical position unless otherwise agreed with the manufacturer.

2.8.2 Gauges should be stored in dry, clean conditions within the temperature range of -40°C to +70°C. Because of a possible build-up of internal pressure, liquid filled cases must be stored in the upright position, except stainless steel, which may be stored flat or in any position.

2.8.3 The housing can be ventilated after installation. See affixed label.

2.8.4 Gauges must be protected against any impact damage. This could affect the calibration or correct operation of the instrument without visible damage. Temperature Gauge calibration should always be confirmed prior to installation.

2.8.5 Any shift in temperature readings greater than twice the tolerance of the instrument must be investigated and the immediate replacement of the gauge if it is faulty.

2.8.6 REPAIRS AND SPARE PARTS

2.8.7 The repair and recalibration of gauges should be undertaken only by competent personnel with the necessary facilities available.

2.8.8 We do not recommend the carrying of spare parts but advise the carrying of complete instruments which will allow quick replacement and ensure the system continues to operate within the requirements specified.

2.8.9 Where the cost is justified, gauges should be returned to the manufacturer for any remedial work. Certifiedclean for safe handling.

3. CONSTRUCTION

3.1 Temperature Gauges are designed and constructed to comply with the requirements of international standards and legislative safety regulations. Full understanding of all obligations and compliance to directives is the responsibility of the end user.

3.1.1 Temperature Gauges are manufactured in accordance with international standards such as the European Standard EN 138 for Temperature Gauges, also to and also to apply jointing material to the male thread. This must be compatible with the medium and applied in the correct quantity to ensure non-interference with mating of the threads.

3.1.2 Temperature Gauges must comply with legislation and directives in force in the UK, in Europe and elsewhere, as indicated in section 1.4.

3.2 OPERATION PRINCIPLE

3.2.1 An elastic measuring element, Gas Filled Bourdon Tube & Bell or Bi-metallic Spring, is subjected to a differential pressure which deflects. The linear deflection is proportional to the applied temperature and is transmitted, directly to the pointer for Bi-metal gauges, or via link, to a rotary geared movement for Gas Filled Gauges. The movement center of the pointer indicates the pressure on a circular dial scale ±20ºC, printed with graduations of appropriate pressure units.

3.2.2 A Temperature Gauge has no "own source of ignition" when in use or when under normal pressure application, but when cold it can have such an ignition source.

3.2.3 In adverse conditions gauges may "dormant operation" develop an ignition hazard.

3.2.4 Additional accessories or features can be specified to prevent these potential hazards.

3.3 AMBIENT TEMPERATURE

3.3.1 Ambient temperature acting upon the gauge housing should be within the range -20°C to +60°C, as specified in the data sheet.

3.3.2 The instrument head and capillary (if fitted) should be protected from localised heat or cold sources as may be considered necessary. Compensation for ambient temperature variation acting on the gauge housing is provided by a bi metal link attached to the movement in Gas Filled models.

3.3.3 In regions with high solar radiation or high external heat source, Gauges should be installed with provision for external heat shielding or a bi metal link protecting the gauge housing.

3.3.4 In regions with low ambient temperature, liquid filling the gauge housing is recommended to prevent condensation forming on the gauge housing.

4. FEATURES

4.1 Temperature Gauges for ATEX Directive 2014/34/EU have housings manufactured from Stainless Steel Case & Bezel or Aluminium Cases & Brass Bezel. Sealing gaskets and filler plug are either NiCr on NiCr models. The instrument heads are of brass.

4.2 ATEX hazard assessment based on EN ISO 80079-36 and 80079-37.

4.3 Materials of construction in accordance with PED 2014/68/EU.

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I.O.M. ATEX TG bs.01/22

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4. OPERATING PARAMETERS

4.1 SPECIFICATION

4.1.1 All models must be compatible with process medium conditions.

4.1.2 Pressure and temperature also have direct bearing on the correct material to be used and must be considered when specifying.

4.1.3 Gauge housing must be compatible with local ambient conditions.

4.1.4 Correct temperature units must be represented on the dial scale.

4.1.5 If in any doubt, consult the manufacturer.

4.2 TEMPERATURE LIMITS

4.2.1 See Temperature Gauges sections 2.4.1 & 2.5.2, for limitations on use.

4.3 THREADS AND JOINTING

4.3.1 See Temperature Gauges section 2.7, for limitations on use.

4.4 ADDITIONAL FEATURES

4.4.1 Filled systems are available with enhanced features or accessories to minimise hazards from known adverse process operating conditions.

4.4.2 Pressure Sensors & Probes. Thermowell protects gauge stem and temperature sensing element by providing a stronger barrier to process system pressure fluctuations.

4.4.3 System Vibration. Vibragauge movement or Liquid Filled housing dampens pointer fluctuation. Remote mounting the instrument via capillary will avoid mechanical stresses.

4.4.4 High Process Media Flow Rate: Thermowell protects gauge stem and temperature sensing element by providing a stronger barrier to process flow induced stresses.

4.4.5 Corrosive Media. Thermowell protects gauge stem and temperature sensing element by providing a chemically compatible barrier to process mediums.

4.4.6 Overpressure. Thermowell protects gauge stem and temperature sensing element by providing a stronger barrier to process system pressure.

5. GAUGES WITH ELECTRIC CONTACTS

5.1 Recommendations and instructions contained in sections 2 and 3 also apply to these instruments, except window in Perspex and dial size is 0100mm.

5.2 We recommend these are built into the process connection, remote from high temperature areas, and adhered to strictly.

5.3 We recommend these are built into the process connection, remote from high temperature areas, and adhered to strictly.

5.4 If in any doubt, consult the manufacturer.

5.5 Where there is danger of explosion, intrinsically safe contacts, relay and cabling must be used. (Refer to Weibrecht and Pepperl-Fuchs datasheets).

5.6 Inductive contact switches to IEC 60947-5-6 (NAMUR) with slot type proximity sensors certified to 2008/94/EC (EMC).

5.7 We recommend a relay should be used in all applications, as this will give a more efficient and safer installation.

5.8 Switching amplifier WE 77/Ex, types, which are certified to 2014/34/EU (ATEX), 2014/30/EU (EMC) and 2014/35/EU (LV).

5.9 Instruments supplied with electric contacts must not be used as "Safety Accessories" as described in the Pressure Equipment (Safety) Regulations 2016 (SI 2016 No.1105), or the Pressure Equipment Directive (PED): 2014/68/EU, unless the design has been subject to third party approval.

5.10 For further information contact the manufacturer.

5.11 MAINTENANCE

5.11.1 Always disconnect power supply before carrying out maintenance work.

5.11.2 Drain housing fill fluid prior to and re-fill after maintenance.

5.11.3 Check all electrical wiring and joints for any wear or damage.

5.11.4 Refer to contacts label or diagram attached to the instrument.

6. POTENTIAL MALFUNCTIONS

6.1 FAILURE MODES

6.1.1 Overpressure Failure.

6.1.1.1 Caused by the application of pressure greater than the rated limit of the stem or temperature sensing element. More critical in compressed gas than liquid-filled systems.

6.1.1.2 Installing the Stem/Element in a Thermowell provides the most protection by reducing possibility of damage during this failure mode.

6.1.1.3 Short duration pressure pulses can occur in systems when valves open or close and their movement may be either by means of the normal operating system or due to high cyclic loading caused by vibration failure of or incorrect indication of temperature on the dial scale.

6.1.2 Corrosion Failure.

6.1.2.1 Caused when corrosive chemicals in the media attack and weaken the stem or temperature sensing element.

6.1.2.2 Installing the Stem/Element in a Thermowell provides the best protection by reducing possibility of corrosion during this failure mode.

6.1.3 Vibration Failure.

6.1.3.1 The most common mode of vibration failure is wear of movement parts or bearing surfaces due to high cyclic loading caused by vibration, which results in gradual loss of accuracy and ultimately failure of the pointer to indicate any pressure change.

6.1.3.2 Vibration can be subdued by Vibragauge® feature or Liquid Filled housing option.

6.1.4 Vibration Induced Failure Failure.

6.1.4.1 The most common mode of fatigue failure is stress of stem parts due to high cyclic loading caused by media flow, which fails in frequency induced oscillations and ultimately failure of the stem.

6.1.4.2 Fatigue can be eliminated by installing in a Thermowell, which can also be designed to overcome wake frequency failure mode.

6.2 OPERATING FAULTS

6.2.1 Temperature Indication error. (Pointer outwith accuracy class)

6.2.1.1 Calibration has been affected by an unidentified malfunction.

6.2.1.2 Operator: close isolate valve and remove gauge for calibration check.

6.2.2 Safety Device Activated

6.2.2.1 Blow-out Plug (Filler Plug) is dislodged from the case. (Missing Blow-out Plug reduces IP rating of gauge).

6.2.2.2 Can be caused by, leaking element or a build-up of internal pressure within the case due to ambient or process temperature rise.

6.2.2.3 Operator: check for pressure leaks, close isolate valve and remove gauge for further inspection or fitting of Blow-out Plug.

6.2.3 Over-Temperature Indicated. (Pointer outside graduated scale)

6.2.3.1 Can be caused by permanent excess temperature or temporary higher-temperature causing pointer shift.

6.2.3.2 Operator: close isolate valve and remove gauge for calibration check.

6.2.4 Rapid Pointer Oscillation.

6.2.4.1 Pressure Systems are subjected to harmful system vibration. Possible incorrect gauge specification, requires features to subdue oscillation. Liquid Filled housing or Vibragauge®. (See sections 2.6 and 4.4).