

PRODUCT INFORMATION**PRODUCTS FOR SOUR OILFIELD APPLICATIONS, NACE MR0175/ISO 15156
AND SOUR PETROLEUM REFINING OPERATIONS NACE MR0103**

This Product Information page updates compliance from NACE MR0103-2003 to NACE MR0103-2007.

The following Ashcroft gauge types with 316L stainless steel tube and socket are approved to NACE MR0175/ISO 15156 for oilfields only, not refineries: 1009 (4½" and 6" only), 1259, 1279, 1377, 1379, T5500, T6500, 1010, 1017, 1020, 1220 and 2462. No variation codes are required when ordering. However if a certification is required, specify XCD-5/ See the current list price sheet.

Read the information below for details and restrictions, Q & A, other products for NACE applications and background information.

RESTRICTIONS FOR USE OF STAINLESS STEEL GAUGES

Maximum Gauge Pressure range: 15,000psi = 103,400 kPa = 1054 kg/cm²
Maximum Temperature: 70°C/158°F

Gauges must be used in accordance with ASME B40.100 and Ashcroft recommendations.

A diaphragm seal with a Tantalum or Hastelloy C276 diaphragm and Hastelloy C276 lower housing is needed to meet service conditions exceeding the limits above, or for unrestricted sour Hydrogen Sulfide service. See more information in the table below.

Q & A**Why The Change?**

NACE MR0175/ISO 15156-2003 specifies test conditions to qualify materials and devices for sour service. An independent laboratory tested a broad range of Ashcroft stainless steel gauges at a temperature of 70°C/158°F and 80% of scale range in the highly corrosive mixture of Hydrogen Sulfide, Carbon Dioxide, and chlorides specified in table E.1 level V, of the specification.

What About Refinery Service To NACE MR0103?

Because our testing did not simulate refinery service, Ashcroft gauges with 316 stainless steel tube and socket are NOT approved for refinery service gauges ordered to NACE **MR0103**; use a seal or a Monel gauge with variation XMA as listed in the table below. For more details see the "Background" section on page 3.

What About Certificates?

If a CD5 certification is ordered, it will state the materials of construction comply with the appropriate sour service specification for the instrument ordered. Stainless steel gauges will be certified as suitable for oilfield service based on the testing described above.

What Are the Details of the Test Parameters for the Gauges Tested.

Testing was performed by an independent laboratory at 70°C/158°F, using the solution listed in NACE MR0175/ISO 15156, table E.1, Level V. No cracking was found after the prescribed 720 hour (30 day) exposure period. The test conditions were: a partial pressure of H₂S (Hydrogen Sulfide), of 100psi, or , 0.7MPa, a partial pressure of CO₂, Carbon Dioxide of 200 or 1.4MPa, and 91,000mg/1 of chlorides. (“Partial pressures” are a measure of concentration of gases). Gauges were pressurized to 80% of range during the exposure period. The test solution was renewed at one week intervals.

Other Products:

The table below is a list of Ashcroft instruments and products for sour gas/oil service.

| Specification | OILFIELDS NACE MR0175/ISO 15156 with Sept. 2005 corrigendums | REFINERIES NACE MR0103-2007 |
|--|---|---|
| Instrument | | |
| Gauges: | 316L (SS) systems type numbers show above and restrictions. | XMA Monel gauges to 23,000psi |
| Switches | Hermetically sealed switches with welded all Monel 400 “P” wetted surfaces. | Hermetically sealed switches with welded all Monel 400 “P” wetted surfaces. |
| Diaphragm Seals with no restrictions See Note 1 | T100, 200, 702, 703, 740 series seals with Tantalum or Hastelloy C276 diaphragms with Hast. C276 Lower Hsg. Preferred: 100/200HH See note 1 | T100, 200, 702, 703, 740 series seals with Tantalum or Hastelloy C276 diaphragms with Hast. C276 Lower Hsg. Preferred: 100/200HH See note 1 |
| Diaphragm Seals limited to 140°F (60°C) See Note 2 | 316SS diaphragm and Lower Hse, any model seal except the 310 SS miniseal, use with SS or Monel gauge. See Note 2. | 316SS diaphragm and Lower Hse, any model seal except the 310 SS miniseal, use with SS or Monel gauge. See Note 2. |
| Transducers Transmitters limited to 140°F (60°C) | A2 with XNS sensor (SS wetted surfaces) limited to 140°F (60°C) | A2 with XNS sensor (SS wetted surfaces) limited to 140°F (60°C) |
| Thermowells limited to 140°F (60°C): The customer will receive our vendor’s certification. | If stainless steel, order to XMA Other alloys on application. | If stainless steel, order to XMA Other alloys on application. |

Note 1: *The preferred materials* are diaphragm seals with Hastelloy C276 and/or Tantalum wetted parts which have no restrictions on temperature, hydrogen sulfide, or to quote the spec: “chloride concentration, or *in situ* pH occurring in production environments.” Only Type 100/200 – 702/740 diaphragm seals qualify. When combined with a Hastelloy C276 diaphragm, the stainless steel top-housings of the all-welded seals, Types 310, 400 and 500 series, make a dissimilar metal weld joint which is unacceptable.

On any diaphragm seal, only SS, Monel or hermetically sealed instruments should be used to avoid possible stress cracking of copper alloys from hydrogen sulfide in the ambient atmosphere. Halocarbon is not required; any fill may be used with the usual restrictions of temperature.

Note 2: *Diaphragm seals* with 316 stainless steel wetted surfaces meeting the hardness limits, are permitted by NACE/ISO without restrictions. However at temperature above 140°F (60°C) 316SS is subject to stress corrosion cracking in the presence of chlorides. The combination of chlorides and hydrogen sulfide is still more aggressive. For these reasons, Ashcroft limits the operating temperature of SS diaphragm seals to 140°F (60°C). The 310SS mini seal is not approved because it does not consistently meet the hardness limit.

BACKGROUND

The previous version of this PI page, DU/PI-63D, discussed the confusion created by the complete revision of NACE MR01-75 issued in early 2003. By the end of 2003, the specification had undergone yet another major revision of both content and format. The new designation is now NACE MR0175/ISO 15156 (NACE/ISO) – with the title: *Petroleum and natural gas industries – Materials for use in H₂S – containing environments in oil and gas production.*”

Please note that this NACE/ISO specification governs only metals, and only oilfields, not refineries. To include refineries NACE issued an entirely new specification NACE MR0103-2003 titled: *“Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments.”*

To Quote MR0103

“The high pH sour environments differentiate refinery sour service from the oil and gas production sour environments covered by NACE MR0175, because many wet sour streams in production also contain carbon dioxide and hence exhibit a lower pH. Another major difference is that chloride ion concentrations tend to be significantly lower in refinery sour services than in oil production sour services.”

H₂S is the chemical symbol for hydrogen sulfide, a contaminant in many oilfields causing the gas or oil to be called “sour.” Hydrogen sulfide is the gas responsible for bad smell of rotten eggs and other decomposing organic materials. At over 300ppm it is a deadly poison to human and animal life and can cause common metals to crack and fail prematurely.

Grandfather clause of NACE MR0175 2003: With a few exceptions, it should no longer be necessary for customers to order XMA Monel gauges to the 2002 version of NACE MR0175 as permitted by the “grandfather” clause of NACE MR0175-2003.

Again, Ashcroft stainless steel gauges are not approved for refinery service to MR0103. Use a Monel gauge or a diaphragm seal.