The Series 7000 Spirahelic® Pressure Gages employ a unique triple helix Bourdon tube for precision measurement of compatible gases and liquids. The direct drive design reduces friction and mass, resulting in exceptionally good responsiveness, repeatability and accuracy. Because there are no gears, springs, linkages or other complicated mechanisms, wear is practically eliminated.

Solid brass or 316 stainless steel connection block features other complicated mechanisms, wear is practically eliminated. and accuracy. Because there are no gears, springs, linkages or

Gages fit ASME standard panel cutouts, 4.94˝ (125 mm) -

Safety is assured with solid front case design and rear blowout

Solid brass or 316 stainless steel connection block features convenient dual 1/4˝ female NPT ports-one each on back and bottom. Block also includes integral filter plug to keep dirt out.

The direct drive design reduces friction and

Use a dead weight tester or certified test gage having accuracy of

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Solid brass or 316 stainless steel connection block features convenient dual 1/4˝ female NPT ports—one each on back and bottom. Block also includes integral filter plug to keep dirt out.

Normal operation should be between 25% and 75% of full scale. Pressure Limit: 150% of full scale. Gage will maintain its specifications for overpressures up to 150% maximum range. Normal operation should be between 25% and 75% of full scale.

Temperature Limits: -65 to 180°F (-53.9 to 82.2°C).

Sizes: 4 1/2˝ dial face (114.3 mm), 6˝ dial face (152.4 mm), 8 1/2˝ dial face (215.9mm). Design conforms to ASME B40.1.

Process Connections: Two 1/4˝ female NPT field selectable back or bottom connection.

Weight: 4 1/2˝ dial face: 16.3 oz. (462.1 g); 6˝ dial face: 19.6 oz. (555.6 g); 8 1/2˝ dial face: 27.3 oz. (773.9 g).

Standard Accessory: One 1/4˝ male NPT stainless steel plug.

DO NOT allow torque to be transmitted from block to the gage case.

CALIBRATION TEST

Use a dead weight tester or certified test gage having accuracy of 1/4% or better for ASME Grade A gages, 0.1% or better for ASME Grade 2A or 3A gages. The test gage range should be comparable to the range of the Dwyer® Spirahelic® gage being checked. For test gage range, use a dead weight tester or certified test gage having accuracy of 1/4% or better for ASME Grade A gages, 0.1% or better for ASME Grade 2A or 3A gages. The test gage range should be comparable to the range of the Dwyer® Spirahelic® gage being checked.

Connect lines from the two instruments to a tee and the third line from the tee to a controllable source of pressure. Apply pressure slowly so pressure equalizes throughout the system. Compare readings. If gage being tested is found to need calibration, return it, freight prepaid, to the address below.

MAINTENANCE

No lubrication or periodic servicing is required. Keep case exterior and lens clean. Use only cleaners compatible with acrylic plastic.

REPAIRS

Field repair should not be attempted and may void warranty. Gages needing calibration or other service should be returned prepaid to:

Dwyer Instruments
Attn: Repair Department
102 Highway 212
Michigan City, IN 46360

CAUTION: When installing fittings or pipe always use a second wrench on the 1˝ pressure block
The following material is excerpted from a standard titled Ghages-PresWessing Indicating Dial Type-Elastic Element (ANSI/ASME B40.1-1983) as published by the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017. This information is furnished to assist the user of Dwyer® Spirahelic® gages in properly evaluating their suitability for the intended application and conditions.

4 SAFETY

4.1 Scope

This Section of the Standard presents certain information to guide users, suppliers, and manufacturers toward minimizing the hazards that could result from misuse or misapplication of pressure gauges with elastic elements. The user should become familiar with all sections of this Standard, as all aspects of safety cannot be covered in this Section. Consult the manufacturer or supplier whenever there is uncertainty about the safe application of a pressure gauge.

4.2 General Discussion

4.2.1 Adequate safety results from intelligent planning and careful selection and installation of gauges into a pressure system. The user should inform the supplier of all conditions pertinent to the application and environment so that the supplier can recommend the most suitable gauge for the application.

4.2.2 The history of safety with respect to m use of pressure gauges has been excellent. Injury to personnel and damage to property in hazardous systems has been minimized. In most instances, the cause of failure has been misuse or misapplication.

4.2.3 Pressure sensing element in most gauges is subjected to high internal stresses, and applications exist where failure of the sensing element may result in hazardous systems. The hazard potential increases at higher operating pressure.

4.2.4 The following systems are considered potentially hazardous and must be carefully evaluated:

(a) compressed gas systems
(b) oxygen systems
(c) systems containing hydrogen or free hydrogen atoms
(d) corrosive fluid systems (gas and liquid)
(e) systems containing any explosive or flammable medium or mixture
(f) explosive gas systems
(g) nonsteady pressure systems
(h) systems where high overpressure could be accidently applied
(i) systems wherein interchangeability of gauges could not be maintained
(j) systems containing radioactive or toxic fluids (liquids or gases)
(k) systems installed in a hazardous environment

4.2.5 When gauges are to be used in contact with media having known or uncertain corrosive effects, it is essential that the user inform the manufacturer with information relative to the application and solicit his advice prior to selecting a gauge.

4.2.6 Fire and explosions within a pressure system can cause pressure element failure with very violent effects, causing complete disintegration or melting the pressure gauge. Violent effects are also produced in a variety of other ways due to:

(a) hydrogen embrittlement
(b) contamination of a compressed gas
(c) formation of acetylene
(d) weakening of soft solder joints by steam or other heat sources
(e) weakening of soft soldered or silver brazed joints caused by heat sources such as fires
(f) fatigue
(g) impact shock
(h) excessive vibration

Failure of a compressed gas system can be expected to produce violent effects.

4.2.7 Modes of Elastic Element Failure. There are four basic modes of failure to be considered:

4.2.7.1 Fatigue Failure. Fatigue failure caused by pressure cycles generally occurs from the inside of the gauge to the outside along the highly stressed edge radius, appearing as a small crack that propagates along the edge radius. Such failures are usually more critical with compressed gas media than with liquid media.

4.2.7.2 Overpressure Failure. Overpressure failure is caused by the application of external pressure greater than the rated limits of the elastic element and can occur when a low pressure is employed in a high pres sure system. The effects of overpressure failure, usually more critical in compressed gas systems than in liquid filled systems, are unpredictable and may cause parts to be propelled in any direction. Cases with pressure relief openings will not always retain expected parts.

4.2.7.3 Corrosion Failure. Corrosion failure occurs when interaction between media and gauge component has been weakened through the attack by corrosive chemicals present in either the media inside or the environment outside it. Failure may occur as a result of leakage through the walls existing early fatigue failure due to stress cracking brought about by chemical reactions and the concentrated media. A chemical (diaphragm) seal should be considered for use with pressure media that may have a corrosive effect on the elastic element. When a solid front case per para. 3.3.1 will reduce the immediate effect of failure, but will help control the flow of escaping fluid following rupture and reduce potential of secondary effects.

It is generally accepted that solid front cases with pressure release back will reduce the possibility of parts being projected in the event of failure. The window alone will not provide adequate protection against internal case pressure buildup, and may be the most hazardous component.

4.2.7.4 Explosive Failure. Explosive failure is caused by the release of energy generated by a chemical reaction such as can result with adiabatic compression of oxygen occurs in the presence of hydrogen. In the absence of secondary reactions, it is generally accepted that there is no known means of predicting the magnitude or effects of this type of failure. If failure, a solid seal or partition between the elastic element and the window will not prevent some parts being projected forward.

4.2.8 Pressure Connections. See recommendations in paragraph 3.3.4.

4.3 Safety Recommendations

4.3.1 Operating Pressure. The pressure gauge selected should have a full scale pressure such that the operating pressure occurs in the middle half (25 to 75%) of the scale. The full scale pressure of the gauge selected should be approximately twice the intended operating pressure.

4.3.2 Use of Gauges Near Zero Pressure. The use of gauges near zero pressure is not recommended because the accuracy tolerance may be a large percentage of the intended reading. For example, a 0/100 psi Grade B gauge is used to measure 5 psi, the accuracy of measurement will be ±50% of the applied pressure. In addition, the scale of a gauge is often laid out with takeup, which can result in further inaccuracies when measuring pressures that are too small a percentage of the scale span.

For the same reasons, gauges should not be used for the purpose of indicating that the pressure in a tank, autoclave, or other similar unit has been completely evacuated to atmospheric pressure. Depending on the accuracy and the span of the gauge and the possibility that takeup is incorporated at the beginning of the scale, hazardous pressure may remain in the tank even though the gauge indicates zero pressure. A venting device must be used to completely reduce the pressure before unlocking covers, removing fittings, or performing any similar activities.

4.3.3 Compatibility With the Pressure Medium. The elastic element of a walled member which of necessity operates under high stress conditions and must, therefore, be carefully selected for compatibility with the pressure media involved. None of the common element materials is imperious to every type of chemical attack. The potential for corrosive attack is established by many factors, including the concentration, temperature, and contamination of the medium. The user should inform the manufacturer of the installation conditions so that the appropriate element materials can be selected.

4.3.4 In addition to the factors discussed above, the capacity of the gage is influenced by the design, material, and fabrication of the joints between its parts.

4.3.4.1 Connections. See recommendations in paragraph 3.3.4.2. The user shall furnish detailed information relative to the application of gauges having liquid filled cases and solicit the advice of the gauge supplier prior to installation.

4.3.5 Some special applications require that the pressure element assembly have a high degree of accuracy and durability. Special applications made between manufacturer and user to assure that the allowances of accuracy and life are established. The user shall furnish detailed information relative to the application and environment so that the supplier can recommend the most suitable gauge for the application.

4.3.6 Cases

4.3.6.1 Cases, Solid Front. It is generally accepted that a solid front case per para. 3.3.1 will reduce the possibility of parts being projected forward in the event of the elastic element assembly failure. An explosion is an explosive failure of the elastic element assembly.

4.3.6.2 Cases, Liquid Filled. The general practice to use silicone or glycerine filling liquids. However, these fluids may not be suitable for all applications. They are typically strong oxidizing agents including, but not limited to, oxygen, chlorine, nitric acid, and hydrogen peroxide are involved. In the presence of oxidizing agents, potential hazard can result from chemical reaction, ignition, or explosion. Completely fluorinated or chlorinated fluids, or both, may be more suitable for such applications.

4.3.7 Restrictor. Placing a restrictor between the pressure gauge and pressure system will reduce the immediate effect of failure, but will help control flow of escaping fluid following rupture and reduce the potential of secondary effects.

4.3.8 Specific Service Conditions

4.3.8.1 Specific applications for pressure gauges exist where hazards are known. In many instances, requirements for compatibility, corrosion resistance, and safety for these applications are specified by state or federal agencies or Underwriters Laboratories, Inc. Some of these specific service gauges are listed below. The list is not intended to include all types, and the user should always consult the supplier of the gauges.

4.3.8.2 Acetylene Gauges. A gauge designed to indicate acetylene pressure, it shall be constructed using materials that are compatible with acetylene. The gauge may bear the inscription ACETYLENE on the dial. It may also include the equivalent SATURATION TEMPERATURE scale markings on the dial.

4.3.8.3 Ammonia Gage. A gauge designed to indicate ammonia pressure and to withstand the corrosive effects of ammonia. The gauge may bear the inscription AMMONIA on the dial. It may also include the equivalent SATURATION TEMPERATURE scale markings on the dial.

4.3.8.4 Chemical Gage. A gauge designed to indicate the pressure of corrosive liquids or gases, or both. The primary materials in contact with the gauges media is known to be corrosive. This may be equipped with a chemical (diaphragm) seal, pulsation dampers or snubbers, syphons, and other similar items, are available for the use in these potentially hazardous systems. The hazard potential increases at higher operating pressure.

4.4 Reuse of Pressure Gauges

4.4.1 Chemical Compatibility. The consequences of incompatibility can range from contamination to explosive failure. For example, moving an oil service gauge to oxygen service can result in explosive failure. For example, moving an oil service gauge to oxygen service can result in explosive failure. For example, moving an oil service gauge to oxygen service can result in explosive failure.

4.4.2 Partial Failure. Partial failure may involve pressure pulsation that has expended most of the gauge’s life, resulting in early failure in the second installation.

4.4.3 Corrosion. Corrosion of the pressure element assembly in the first installation may not cause early failure in the second installation.

4.4.4 Insulation. Reinsulating a gauge, all guidelines covered in the Standard relative to application of gauges should be followed in the same manner as when a new gauge is selected.

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