Sealing Requirements for Temperature Applications

1.1 Sealing requirements for electrical equipment

Sealing is a serious concern for industrial process control due to the nature of the hazardous materials used in the process industry. The considerations for transmitter sealing are outlined below:

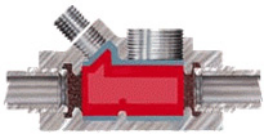
- For explosion-proof/flameproof approved transmitters, seals are necessary to prevent the propagation of flame through the cable or conduit system.
- For transmitter sensors with wetted parts, sealing is necessary to prevent the process from entering the electrical system and migrating from hazardous areas to safe or unclassified areas.

Most facilities have rules and regulations for sealing. In addition, there are national regulations or standards that address sealing requirements. The most common are listed below:

- NEC 2014 Articles 501.15, 501.17, 502-15, 505.16, 505.26, and 506.16
- CEC© C22.1-12 Rule 18-072, 18-092, 18-108, 18-154, 18-204, and 18-254
- IEC/EN 60079-14:2013 Clauses 5.9, 9.4, and 14.4
- ANSI/API RP 14F Section 6.8.2.2

1.2 Flameproof/explosion-proof seals

A flameproof/explosion-proof seal (commonly referred to as a conduit/cable seal) is installed at the entry of electrical equipment to prevent flame propagation from one portion of the electrical system to another. The seal is either a poured seal (potted) or a compression fitting. Flameproof/explosion proof seals are required on all installations where conduit or cable passes from one hazardous location to another or to a safe area. These seals are not designed to contain process fluids and typically hold a maximum pressure of 6 inH_2O (14.9 mbar) before allowing process fluids to pass. A typical poured seal is shown below.



This type of sealing can also be incorporated into the equipment. Explosion-proof enclosures that do not contain arcing, sparking, or heat producing components may be approved and marked “factory sealed” or equivalent. This type of enclosure does not require seals at the conduit/cable entries. This is the case with most enclosures used for Rosemount products. Review the product label or installation drawing for sealing requirements

EMERSON™
Process Management

1.3 Process seals

A process seal prevents flammable process fluids from getting into the electrical system and moving from a hazardous area to a non-hazardous area, such as a control room. Process seals must be robust to withstand the pressure, temperature, corrosion, and cyclic effects associated with industrial processes. They must be considered for any installation where a flammable process fluid is present. Thermowells and welded diaphragms are examples of process seals.

1.4 ANSI/ISA 12.27.01 standard for process sealing

In 2000, user members of the ISA (International Society of Automation) SP12 committee pushed for the development of a standard for process sealing of electrical equipment used in hazardous locations that would allow the equipment to be exempted from the NEC process sealing requirements. ANSI/ISA 12.27.01 was the result of this effort. This standard identifies two sealing methods. The first sealing method is to test and certify a single high integrity seal, referred to as single seal. Testing includes temperature and fatigue testing of the seal, where it is subjected to 100,000 pressure cycles at worst case temperatures. Following this testing, the seal is subjected to leakage and burst overpressure tests.

The second sealing method is to test and certify a multiple seal configuration, referred to as dual seal. Refer to ANSI/ISA 12.27.01 for dual seal testing of devices with and without annunciation of the primary seal failure.

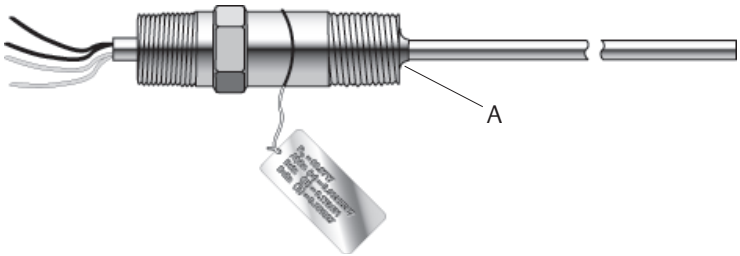
Both methods provide adequate measures to prevent process fluid from entering into the electrical system.

1.5 Temperature process sealing compliance

Rosemount offers several types of temperature sensor configurations including “General Purpose”, “Spring Loaded” and “Bayonet Spring Loaded” style sensors.

The General Purpose sensor configuration provides an all-welded construction between the sensor sheath and the process fitting (see below) and provides a seal for the process. When used with a thermowell, the sensor and thermowell provide multiple seals between the process and electrical system. If annunciation is required, a vented thermowell can be used to provide the annunciation in the event of a thermowell failure.

Figure 1-1. Rosemount “General Purpose” Style Sensor



A. 360° Welded Seal

Thermowells are required with the Spring Loaded and Bayonet Spring Loaded style sensors to provide a seal since these designs do not provide isolation between the process fluids and the electrical system. Since the thermowell is a single seal, additional sealing must be provided to insure process fluids do not enter the electrical system.

Rosemount Temperature transmitter enclosures do not provide process sealing. Housings are marked as “Factory Sealed” or “Seal not Required” because they have been evaluated for purposes of flame propagation and do not require conduit seals.

1.6 Summary

Rosemount Temperature Transmitters marked as "Factory Sealed" or "Seal not Required" do not need conduit seals installed at their conduit entries.

Additional process sealing may be required if there is the possibility of process entering the electrical system. This information has been provided as reference only. Users should seek guidance of the local authority having jurisdiction (AHJ) for final approval of all electrical installations.

Global Headquarters

Emerson Process Management
6021 Innovation Blvd
Shakopee, MN 55379, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RFQ.RMD-RCC@EmersonProcess.com

North America Regional Office

Emerson Process Management
8200 Market Blvd.
Chanhassen, MN 55317, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RMT-NA.RCCRFQ@Emerson.com

Latin America Regional Office

Emerson Process Management
1300 Concord Terrace, Suite 400
Sunrise, Florida, 33323, USA
+1 954 846 5030
+1 954 846 5121
RFQ.RMD-RCC@EmersonProcess.com

Europe Regional Office

Emerson Process Management Europe GmbH
Neuhofstrasse 19a P.O. Box 1046
CH 6340 Baar
Switzerland
+41 (0) 41 768 6111
+41 (0) 41 768 6300
RFQ.RMD-RCC@EmersonProcess.com

Asia Pacific Regional Office

Emerson Process Management Asia Pacific Pte Ltd
1 Pandan Crescent
Singapore 128461
+65 6777 8211
+65 6777 0947
Enquiries@AP.EmersonProcess.com

Middle East and Africa Regional Office

Emerson Process Management
Emerson FZE P.O. Box 17033,
Jebel Ali Free Zone - South 2
Dubai, United Arab Emirates
+971 4 8118100
+971 4 8865465
RFQ.RMTMEA@Emerson.com

ROSEMOUNT

EMERSON.
Process Management