

Recommended Practice

Installation, Operation, and Maintenance of Hydrogen Sulfide Detection Instruments

Instrument Society of America



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ISA-RP12.15, Part II, Installation, Operation, and Maintenance of
Hydrogen Sulfide Detection Instruments

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INSTRUMENT SOCIETY OF AMERICA
67 Alexander Drive
P.O. Box 12277
Research Triangle Park, North Carolina 27709

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**CAUTION: HYDROGEN SULFIDE IS AN
EXTREMELY TOXIC GAS, AND EXPOSURE
MAY RESULT IN A LOSS OF CONSCIOUSNESS
OR DEATH**

1. Purpose

ISA-RP12.15, Part II, establishes user criteria for the installation, operation, and maintenance of hydrogen sulfide gas detection instruments.

Its companion standard, ISA-S12.15, Part I, Performance Requirements for Hydrogen Sulfide Detection Instruments, has been prepared to provide minimum requirements for the performance of hydrogen sulfide gas detection instruments.

2. Scope

2.1 This recommended practice applies to all hydrogen sulfide gas detection instruments that satisfy the performance requirements in ISA-S12.15, Part I.

2.2 Reference Section 3 of ISA-S12.15, Part I, for definitions of terms as used herein. Reference Appendix D of this document for definitions of terms not specifically related to hydrogen sulfide gas detection instruments but of general interest to the users of such equipment.

2.3 References useful in the installation, operation, and maintenance of hydrogen sulfide gas detection instruments are listed in Appendix C. These references are not considered to be part of this document except for those specific sections of documents referenced elsewhere in this recommended practice.

3. General Requirements

To assure that the instrument is suitable for the application and is compatible with its operating environment,

(a) the user should provide the potential supplier with detailed information on the conditions that exist in the area(s) in which the instrument is to be used;

(b) the instrument must meet the requirements of the applicable regulating agency having jurisdiction; and

(c) the instrument must be compatible with the environmental conditions (e.g., relative humidity, temperature, atmospheric contaminants, etc.) in which the instrument is to operate. A typical "Environmental and Application Checklist" is included as Appendix A and is intended to aid users in properly specifying requirements for their specific applications.

4. Unpacking

4.1 Unpack the shipping carton(s) and determine whether the order is complete "as received" (check for main assembly, accessories, spare parts, and instruction manual).

4.2 In the event of shipment damage, or for purposes of future correspondence, record the following:

(1) User's purchase order number and manufacturer's order number and their respective dates

(2) Carrier waybill number and date received (in case of transit claim)

(3) Instrument serial number and user identification (ID) number (if assigned)

5. Storage

5.1 When storing hydrogen sulfide gas detection instruments, leave them in their original containers or provide suitable protective covers.

5.2 Select a location that is in accordance with the manufacturer's recommendations. Store hydrogen sulfide gas detection instruments where environmental conditions (temperature, humidity, etc.) are within the manufacturer's storage specifications.

5.3 Before storage, inspect the instruments and remove any internal batteries that could cause corrosion. If the instruments have rechargeable or "permanent" batteries, consult

the manufacturer's instructions for battery maintenance during this period.

6. User Record Keeping

It is recommended that the user:

(a) assign an equipment identification (control) number to each instrument, and

(b) maintain complete records — including periodic performance, calibration, and maintenance checks (see Appendix B).

7. Maintenance

7.1 To maintain the reliability of hydrogen sulfide gas detection instruments, it is recommended that the user assign responsibility for their initial inspection and subsequent use (including maintenance) to a specific qualified individual or group.

7.2 It is important that the Checkout Procedures (see Section 10) be performed by qualified personnel — trained in the operation, maintenance, and repair of hydrogen sulfide gas detection instruments — and that the group responsible for maintenance be defined clearly.

7.3 The user should establish responsibility for obtaining the gas mixture recommended by the instrument manufacturer for calibrating and testing.

NOTE: Calibration and testing should be performed in accordance with the manufacturer's recommendations (flow rates, concentrations, procedures, etc.).

7.4 It is recommended that when instruments are first put into use, the calibration be checked on a routine basis as prescribed by the manufacturer. If experience shows minimal calibration deviation, then the period between calibration checks may be extended. Likewise, if routine checks indicate an increasing need for calibration, the period should be shortened, and the cause should be investigated.

8. Preparing Instruments for Use

8.1 Read and understand the manufacturer-provided In-

struction Manual. Particular attention should be paid to the locations and functions of all controls and readout devices.

8.2 A shop calibration test of the type described in Section 13.7 is recommended before the initial use of any hydrogen sulfide gas detector instrument.

9. Installation of Stationary Instruments

It is extremely important that the equipment manufacturer-provided Instruction Manual be read thoroughly and followed completely.

9.1 If instruments or ancillary components are installed in a hazardous (classified) location, these instruments or components must be approved for the area in which they are installed and clearly marked. Hazardous (classified) locations in the United States are defined by the National Electrical Code, NFPA 70, Article 500. Markings required by ISA-S12.15, Part I, Section 6, should be visible to the operator. Installation of intrinsically safe systems shall be in accordance with ISA-RP12.6, Installation of Intrinsically Safe Instrument Systems in Class I Hazardous Locations.

9.2 Detector Locations. While many factors are involved in detector head quantity and location selection, and industry standards and/or applicable regulations may dictate quantities and general or specific locations, the following should be considered:

(1) **Density of Gases To Be Monitored.** Hydrogen sulfide gas is 20 percent heavier than air and tends to settle. However, air movement and elevated temperatures may cause hydrogen sulfide to rise.

(2) **Air movement, air velocity, and direction** influence the dispersion of vapors/gases to be monitored.

(3) **Potential Sources.** The location and nature of the potential hydrogen sulfide sources (e.g., pressure, amount, source temperature, and distance) need to be assessed.

(4) **Ambient Temperature.** Reference Section 9.8.

(5) **Vibration.** Reference Section 9.7.

(6) **Accessibility.** Detector head locations should consider future maintenance and calibration requirements.

(7) **Structural Arrangements.** Structural arrangements (such as walls, troughs, or partitions) could allow hydrogen sulfide to accumulate.

(8) **Mechanical Damage and Contamination.** Detectors should be installed in locations to preclude mechanical damage from normal operations (e.g., cranes, traffic, exhausts, and wash-downs).

(9) **Potential for personnel exposure.**

(10) **Possible sources of electromagnetic interference/radio frequency interference (emi/rfi).**

9.3 Detector heads must be connected to their respective control units as specified by the manufacturer (observing maximum loop resistance, minimum wire size, isolation, etc.) and using a cable, wire and conduit system, or other system suitable and approved for the purpose and the area classification.

9.4 Equipment required to be connected to ground in order to provide protection from electrical shock hazards shall be connected effectively with the general mass of the earth through a grounding system. The grounding system shall have sufficiently low impedance and shall have a current-carrying capacity sufficient at all times, under the most severe conditions that are likely to arise in practice, to prevent any current in the grounding conductor from causing a potential of 30 V rms or 42.4 V peak to exist between accessible conductive parts of the equipment and adjacent accessible conductive surfaces within a 12-foot radius. Where wet contact may occur, the maximum potential is reduced to 15 V rms or 21.2 V peak, respectively. This grounding system performance shall remain effective under all conditions.

9.5 To minimize electromagnetic interference (emi), it is recommended that properly grounded, shielded interconnecting cables (or wire and conduit) be used and enclosures (if of conductive material) be adequately grounded. It is recommended that cable shields be grounded at one point only, the controller end, unless otherwise specified by the manufacturer. It is recommended that splices in sensor wiring be properly soldered.

9.6 Lubricate all threaded connections, but ascertain that the lubricant used contains no substance that might be deleterious to the sensors.

9.7 Mount all instruments and detector heads in a manner to minimize vibration.

9.8 Mount all detector heads and instruments in areas that ensure compliance with the manufacturer's operating temperature specifications.

9.9 Adequate drainage should be incorporated into the system design to minimize moisture and condensation in the

instrument, detector head, and interconnecting cable/conduit system.

9.10 Any potentially flammable or toxic gases introduced into sampling systems should be vented in a safe manner.

9.11 When interconnecting ancillary devices, maximum current and voltage ratings of the instrument's outputs (e.g., interposing relay contacts) must be observed.

10. Equipment Checkout Procedures

10.1 Portable Instruments

10.1.1 With reference to the Instruction Manual, perform the following where applicable and necessary:

- (1) With the power OFF, reset the mechanical zero of any analog meters.
- (2) Ascertain that all electrical connections are properly tightened (remote detector head, power supply, etc.).
- (3) Check the battery voltage and/or battery condition, and make any required adjustments or battery replacements (according to the Instruction Manual).
- (4) With the power ON, allow adequate warm-up time (in accordance with the Instruction Manual.)
- (5) Check for sample line leaks and proper flow (sample-draw instruments only).
- (6) Check for clogged or dirty flame-arresting systems.
- (7) Perform a test of the failure (malfunction) circuit(s).

10.1.2 Place the detector head (integral or remote) or the sample draw assembly in an atmosphere free of any gas to which the instrument responds, aspirate a large enough sample to purge the lines (applicable only to sample-draw instruments), and adjust the electrical output to indicate zero.

10.1.3 Check the response of the instrument using a known hydrogen sulfide gas mixture as recommended by the manufacturer for the selected range concentration for which the instrument is indicated to be used. If the test results are not within 2 ppm or 10 percent, whichever is greater, of the applied gas concentration, recalibrate the instrument.

The concentration of the test gas mixture used must be