

ISA-S12.15, Part I-1990

Standard

Performance Requirements for Hydrogen Sulfide Detection Instruments (10-100 ppm)

Instrument Society of America



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ISA-S12.15, Performance Requirements for Hydrogen Sulfide Detection
Instruments (10-100 ppm), Part I

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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

1.1 ISA-S12.15, Part I, has been prepared to provide minimum requirements for performance of electrical instruments for the detection of hydrogen sulfide gas to enhance the safety of personnel.

1.2 Part II of this standard establishes user criteria for the installation, operation, and maintenance of hydrogen sulfide gas detection instruments.

2. Scope

2.1 This standard covers the details of construction, performance, and testing of portable, mobile, and stationary electrical instruments used for continuous monitoring for the presence of hydrogen sulfide gas concentrations in air, parts of which may be installed or operated in hazardous (classified) locations.

2.2 This standard applies to line voltage-operated instruments rated at 250 V nominal or less and to portable, mobile, and stationary-type instruments utilizing a battery(s).

2.3 This standard applies to instruments suitable for use in an ambient temperature range of at least -10°C to 50°C (14°F to 122°F).

2.4 This standard covers hydrogen sulfide gas detection instruments intended to provide a warning of the presence of potential hazards in the concentration ranges up to 100 ppm. Hereafter, the term "gas detection instrument" or just "instrument" refers to a hydrogen sulfide gas detection instrument.

2.5 This standard does *not* cover gas detection instruments of the laboratory or scientific type used for analysis or measurement in process control and process monitoring applications, instruments intended for residential purposes, or instruments with full-scale gas concentration ranges less than 10 ppm or greater than 100 ppm.

NOTE: The user should specify instrumentation that will provide a higher

level of accuracy than the minimum tolerances of this standard if required by the application risk.

3. Definitions

Alarm is an audible, visual, or physical presentation designed to alert the instrument user that a specific level of hydrogen sulfide concentration has been reached or exceeded.

Alarm-Only Instrument is an instrument providing an alarm(s), but which does not have an integral meter or other readout device indicating current hydrogen sulfide concentration levels.

Alarm Set Point is the selected gas concentration level(s) where an alarm is activated.

Ambient Air is air to which the sensing element is normally exposed.

Approved is acceptable to the authority having jurisdiction. In this standard, the term is considered synonymous with "listed" and "certified."

Calibration is the procedure used to adjust the instrument for proper response (e.g., zero level, span, alarm and range).

Calibration Gas is the known concentration(s) of hydrogen sulfide gas used to set the instrument span or alarm level(s). Reference also Section 7.8.

Clean Air is air that is free of any substance that will adversely affect the operation or cause a response of the instrument.

Consumables are those materials or components that are depleted or require periodic replacement through normal use of the instrument.

Control Unit is the portion of a multi-part gas detection instrument that is not directly responsive to the gas but responds to the electrical signal obtained from one or more

detector heads to produce an indication, alarm, or other output function.

Detector Head is the gas responsive portion of a gas detection instrument located in the area where sensing the presence of gas is desired. Its location may be integral with or remote from its control unit.

NOTE: In the same housing, the detector head may incorporate the gas-sensing element and additional circuitry such as signal processing or amplifying components or circuits.

Diffusion is a process by which the atmosphere being monitored is transported to the gas-sensing element by natural random molecular movement.

Gas Detection Instrument or Instrument is an assembly of electrical, mechanical, and chemical components (either a single integrated unit or a system comprised of two or more physically separate but interconnected component parts) that senses and responds to the presence of gas in air mixtures.

Gas-Sensing Element (Sensor) is the particular subassembly or element in the gas detection instrument that, in the presence of a gas, produces a change in its electrical, chemical, or physical characteristics.

Hydrogen Sulfide is interchangeable within this document for: hydrogen sulfide, H_2S , dihydrogen sulfide, and hydrogen sulfide gas.

IDLH is the immediate danger to life or health concentration value (300 ppm for hydrogen sulfide).

Mobile refers to a continuous-monitoring instrument mounted on a vehicle such as, but not limited to, a mining machine or industrial truck.

Nominal Voltage is that given by manufacturers as the recommended operating voltage of their gas detection equipment. If a range (versus a specific voltage) is given, the nominal voltage shall be considered as the midpoint of the range, unless otherwise specified.

Portable refers to a self-contained, battery-operated instrument that can be carried.

NOTE: This type instrument is intended to operate continuously for 8 hours (h) or more.

Range is the series of outputs corresponding to values of concentrations of hydrogen sulfide over which accuracy is ensured by calibration.

Sample Draw refers to a method used to cause deliberate

flow of the atmosphere being monitored to a gas-sensing element.

Span is the algebraic difference between the upper and lower values of a range.

Stationary refers to a gas detection instrument intended for permanent installation in a fixed location.

Test Gas is hydrogen sulfide diluted with clean air to a known concentration.

Trouble Signal is a signal (contact transfer and/or visible or audible signal) advising an instrument user of conditions such as input power failure, an open circuit breaker, a blown fuse, loss of continuity to the detector head, defective gas-sensing element, or significant downscale indication.

4. General Requirements

4.1 Gas detection instruments shall meet the applicable electrical and electronic measuring instrument requirements of ANSI/ISA-S82.01, S82.02, and S82.03. See Reference F(10) of Appendix A.

4.2 Any portion of a stationary gas detection instrument intended for installation or use in a hazardous (classified) location and all portable instruments shall be approved for use in the location and marked accordingly. Reference NFPA 70, Article 500-3, FPN No. 2.

4.3 All gas detection instruments shall meet the minimum construction and test requirements contained in this standard. If the manufacturer makes performance claims that exceed these requirements, all such claims shall be verified to the satisfaction of parties having jurisdiction.

5. Construction

5.1 General

5.1.1 Gas detection instruments, their components, or remote detector heads specifically intended for use in the presence of hydrogen sulfide or other corrosive vapors or gases, or vapors or gases that may produce corrosive byproducts as a result of oxidation or other chemical process(es), shall be constructed of materials resistant to, or protected against, such corrosion.

NOTE: When present, even at low parts per billion concentrations, hydrogen sulfide may rapidly attack copper, silver, aluminum, and iron alloys.