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Hydrogen sulfide indicator/alarm

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, and Minister of Health, Labour and Welfare through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS T 8205 : 1992** is replaced with **JIS T 8205 : 2002**.

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Hydrogen sulfide indicator/alarm

1 Scope This Japanese Industrial Standard specifies a hydrogen sulfide indicator/alarm used for measurement, supervision and warning of the concentration of hydrogen sulfide in an underground structure such as a pit, a manhole, a purification tank, a closed conduit, a basement; a ground structure such as a tank, a pipe, a channel, a vessel, a heat exchanger; and the inside of baggage racks of a ship and the like where hydrogen sulfide may be produced.

Further, the working temperature range of hydrogen sulfide indicator/alarm specified in this Standard shall be 0 °C to 40 °C.

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS C 0930 *Electrical apparatus for explosive gas atmospheres—General requirements*

JIS K 0108 *Analytical methods for determination of hydrogen sulfide in exhaust gas*

3 Definitions For the purposes of this Standard, the following definitions apply.

- a) **detection part** A portion of the hydrogen sulfide indicator/alarm which detects the concentration of hydrogen sulfide, directly by contacting air at a measuring position.
- b) **diffusion system** An air-collecting system to allow air at a measuring position to contact with the detection part naturally.
- c) **suction system** An air-collecting system to allow air at a measuring position to contact with the detection part by sucking with a pump or the like.
- d) **hydrogen sulfide concentration indicator** Hydrogen sulfide indicator wherein the concentration of hydrogen sulfide is measured, and the concentration is indicated on an indicator part which is separated from the detection part or integrated therewith.
- e) **hydrogen sulfide concentration alarm** Hydrogen sulfide alarm wherein the concentration of hydrogen sulfide is measured. An alarm is issued when the concentration reaches the value which is previously set. An alarm part is separated from the detector part or integrated therewith.
- f) **hydrogen sulfide concentration indicator/alarm** A hydrogen sulfide indicator/alarm of a structure having both functions of d) and e).
- g) **stationary type** A type installed to be fixed on a specific position. There are one-point system and multi-point system having plural detecting positions.
- h) **movable type** A type to be used in transportation by a carriage or a moving car.

- i) **portable type** A type to be used by holding by hands.
- j) **pocket type** A type to be put into a pocket which is fixed to the body such as waist.
- k) **test gas** A gas to be used for confirming whether a hydrogen sulfide indicator/alarm rightly operates or not.
- l) **calibration gas** A gas to be used for calibrating a hydrogen sulfide indicator/alarm among test gases.
- m) **zero gas** A calibration gas for determining the zero point of a hydrogen sulfide indicator/alarm. Clean air or nitrogen not containing hydrogen sulfide is generally used.
- n) **type test** A test for confirming the quality of an initial product every time new designing, remodeling, or a change of production condition is carried out.
- o) **delivery test** A test to be carried out for confirming the quality of a product for each lot.

4 Classification, type and air collecting system The classification, type and air collecting system of a hydrogen sulfide indicator/alarm shall be as given in Table 1.

Table 1 Classification of hydrogen sulfide indicator/alarm

Classification	Type			
	Stationary type	Movable type	Portable type	Pocket type
Hydrogen sulfide concentration indicator	◎		◎	
Hydrogen sulfide concentration alarm	◎	◎	◎	○
Hydrogen sulfide concentration indicator/alarm	◎	◎	◎	○

Remarks : Air collecting system

Diffusion system and suction system: ◎

Diffusion system: ○

5 Performance

5.1 Indication precision and alarm operating precision

5.1.1 As to an indication precision, when subjected to the test of 7.3.1, the hydrogen sulfide concentration is within ± 1.5 ppm for 0 ppm to 30 ppm of the indication range, and within ± 3 ppm for other indication ranges.

5.1.2 As to an alarm operating precision, when subjected to the test of 7.3.2, an alarm is issued at an optional alarm set concentration of not more than 10 ppm, and the hydrogen sulfide concentration shall be within ± 3 ppm to the alarm set concentration.

5.2 Repeatability When subjected to the test specified in 7.4, difference between each indication value and average shall be within ± 1 ppm in concentration of hydrogen sulfide.

5.3 Stability When subjected to the test specified in 7.5, the indication precision and the alarm operating precision shall be as specified in 5.1.1 and 5.1.2, respectively.

5.4 Influence of inclination When subjected to the test specified in 7.6, the indication precision and the alarm operating precision shall be as specified in 5.1.1 and 5.1.2, respectively.

5.5 Shock resistance When subjected to the test specified in 7.7, the indication precision and the alarm operating precision shall be as specified in 5.1.1 and 5.1.2, respectively.

5.6 Indication delay and alarm delay When subjected to the test specified in 7.8, the indication delay shall be within 30 s and the alarm delay shall be within 15 s.

5.7 Influence of temperature change When subjected to the test specified in 7.9, the indication precision, alarm operating precision, indication delay and alarm delay shall be within the precision and the time specified in 5.1.1, 5.1.2 and 5.6, respectively.

5.8 Influence of power source voltage fluctuation When subjected to the test specified in 7.10, indication precision and alarm operating precision shall be the precision specified in 5.1.1 and 5.1.2, respectively.

6 Construction

6.1 General construction A hydrogen sulfide indicator/alarm consists of a detection part, an indication part and/or an alarm part, and shall be so structured the indication part and/or the alarm part may work converting change of the concentration of hydrogen sulfide to an electric signal as follows:

- a) A stationary type shall be easy in installation, handling, maintenance and control.
- b) Types excepting the stationary type shall be as light-weighted as possible, small sized, convenient for transportation and carrying and easy in handling, maintenance and control.
- c) The construction of each part shall have sufficient strength and durability.
- d) As to metallic material, corrosion resistant material shall be used, or otherwise it is thoroughly processed on the surface with rust preventive treatment. The coating shall excellently be finished and not easily discolored nor peeled off.
- e) Each part shall be smoothly and accurately operated corresponding to its purpose.

- f) When being in an operating state, the state shall easily be discriminated.
- g) In the case where an explosion-proof property is required, the construction shall conform to the requirements specified in **JIS C 0930**.

6.2 Construction of each part

6.2.1 For the air collecting system of a detection part, there are two kinds, a diffusion type and a suction type.

6.2.2 Indication part The indication range shall be 0 ppm to 30 ppm, or 0 ppm to ≥ 30 ppm in hydrogen sulfide concentration. The digital system shall be capable of indicating at least 0.5 ppm.

6.2.3 Alarm part An alarm part shall be as follows:

- a) An alarm part is capable of setting at any concentration (≤ 10 ppm) within the indication range, and gives an alarm at the set concentration or over.
- b) Alarm is given by light, sound or vibration, or joint use thereof.
- c) Once given an alarm, the alarm continues even though the concentration of hydrogen sulfide becomes lower than the alarm set concentration until the relief operation is carried out. However, as to those of the movable type, the portable type, and the pocket type, this requirement is not applied thereto.
- d) The mechanism is provided wherein an alarm sound stops by carrying out the relief operation, and the other alarm continues until the concentration of hydrogen sulfide becomes lower than the alarm set concentration. However, this requirement is not applied to those of the movable type, the portable type and the pocket type.
- e) In the case where other detection parts catch the increase of concentration of hydrogen sulfide under the alarm working, the stationary type multi-point system shall give an alarm at each position detected.

7 Test method

7.1 Sampling method A sampling method shall be as given in Table 2.

Table 2 Sampling method

Test item	Hydrogen sulfide concentration indicator	Hydrogen sulfide concentration alarm	Hydrogen sulfide concentration indicator/alarm
General construction	◎	◎	◎
Construction of each part	◎	◎	◎
Indication precision	◎		◎
Alarm operating precision		◎	◎
Repeatability	○	○	○
Stability of indication precision	○		○
Stability of alarm operating precision		○	○
Influence of inclination	○	○	○
Shock resistance	○	○	○
Indication delay	○		○
Alarm delay		○	○
Influence of temperature change	○	○	○
Influence of power source voltage fluctuation	○	○	○

Remarks : Type test and delivery test: ◎

Type test: ○

7.2 Standard conditions of test location The standard conditions of a test location shall be 20 ± 2 °C in temperature, (65 ± 20) % in humidity and 860 hPa to 1 060 hPa in atmospheric pressure.

7.3 Indication precision test and alarm operating precision test

7.3.1 Indication precision test Make the hydrogen sulfide indicator/alarm be in a working state. After the stability time shown in Table 3 has elapsed, carry out the calibration of indication by using the calibration gas specified in Annex, introduce not less than three different concentrations of test gas centering 10 ppm into the detection part, and examine difference between the concentration indicated by indicator/alarm and the concentration of the test gas. As to the indicator/alarm of over 30 ppm in indication range, add examination with the test gas of an optional concentration exceeding 30 ppm.

Table 3 Stability time of indication precision test

Unit : min

Type	Stability time
Stationary type	30
Movable type	5
Portable type	
Pocket type	

7.3.2 Alarm operating precision test Make the hydrogen sulfide indicator/alarm be in an operating state. After the stability time specified in Table 3 has elapsed, set the hydrogen sulfide indicator/alarm at an optional alarm concentration of 10 ppm max., and introduce the test gas lower than the set concentration into the detection part. Then, gradually raise the concentration of hydrogen sulfide and examine the difference between the alarm set concentration and the test gas concentration at the alarm working.

7.4 Repeatability test Make the hydrogen sulfide indicator/alarm be in an operating state. After the stability time specified in Table 3 has elapsed, contact alternately a zero gas and a test gas of about 10 ppm in concentration for three times to the detection part, and obtain differences between indicated concentration and its average for cases of zero gas and test gas.

7.5 Stability test Make the hydrogen sulfide indicator/alarm be in an operating state. After carrying out the tests in accordance with 7.3.1 and 7.3.2, carry out the tests by a) and b).

- a) **Stability test of indication precision** Examine the indication precision by the method specified in 7.3.1 after ≥ 8 h has elapsed for the stationary type or ≥ 1 h has elapsed for the movable, portable and pocket types under the operating state.
- b) **Stability test of alarm operating precision** Examine the alarm operating precision by the method specified in 7.3.2 after ≥ 8 h has elapsed for a stationary type, and ≥ 1 h has elapsed for the movable type, the portable type and the pocket type under the operating state.

7.6 Inclination test Incline the indicator/alarm rightward, leftward, forward and backward from the posture of a standard service state by not less than 30 degrees under the operating state and examine the indication concentration to the test gas and/or the operating concentration to the alarm setting concentration.

7.7 Shock test

7.7.1 Shock test of stationary type Place the pine board or cedar board of 30 ± 5 mm in thickness on a concrete floor, put the hydrogen sulfide indicator/alarm under the operating state, raise one end thereof to at least 100 mm in height, drop it, then repeat it on the other end in the same way. Thereafter, examine the indication