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Coalmine High-Low Concentration Methane Transducers

煤矿用高低浓度甲烷传感器

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Coalmine High-Low Concentration Methane Transducers

1 Scope

This standard specifies technical requirements, testing methods, rules for inspection, marking, packing, operating instruction, transport and storage of coalmine carrier catalysis and heat conduction combined high-low concentration methane transducers.

This standard applies to carrier catalysis and heat conduction combined high-low concentration methane transducers with measuring ranges (0-40)% CH₄ and (0-100)% CH₄ used in underground coalmine environment monitoring (known as transducers for short hereafter).

2 Normative references

The following normative documents contain provisions which, through reference in the text, constitute provisions of this standard. For dated reference, subsequent amendments to, or revisions of, any of these publications (excluding contents of corrigenda) do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. For undated references, the latest edition of the normative document referred to applies.

GB 191-2000 Packaging—Pictorial marking for handling of goods

GB/T 2423.1-2001 Environmental testing for electric and electronic and electronic products--Part 2: Test methods--Tests A: Cold

GB/T 2423.2-2001 Environmental testing for electric and electronic products--Part 2: Test methods--Tests B: Dry heat

GB/T 2423.4-93 Basic environmental testing procedures for electric and electronic products—Test Db: Damp heat, cyclic

GB/T 2423.5-1995 Environmental testing for electric and electronic products Part 2: Test methods Test Ea and guidance: Shock

GB/T 2423.8-1995 Environmental testing for electric and electronic products Part 2: Test methods Test Ed: Free fall

GB/T 2423.10-1995 Environmental testing for electric and electronic products—Part 2: Test

methods Test Fc and guidance: Vibration (Sinusoidal)

GB 3836.1-2000 Electrical apparatus for explosive gas atmospheres--Part 1: General requirements

GB 3836.2-2000 Electrical apparatus for explosive gas atmospheres--Part 2: Flameproof enclosure

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GB 3836.4-2000 Electrical apparatus for explosive gas atmospheres--Part 4: Intrinsic safety

GB 4208-93 Degrees of protection provided by enclosure (IP code)

GB9969.1-1998 General principles for preparation of instructions for use of industrial products

GB 10111-88 Methods for and sampling by utilizing dices of random number

AQ 6202-2006 Coal mina carrier catalytic element for methane detection

MT 210-90 Basic test methods for electric and electronic products for coal mine communication, testing and control

MT/T 772-1998 Measuring methods for the primary performances of coal mine supervision systems

3 Terms and Definitions

3.1 Displayed value

Measured numerical value displayed on transducer.

3.2 Zero point

Value displayed on transducer which operates normally in clean air.

3.3 Calibration point

Standard gas sample value selected for transducer to meet measuring accuracy.

3.4 Alarm point

Alarm actuation value preset for transducer according to application requirement.

3.5 Basic error

Transducer measurement error value determined under normal test conditions.

3.6 Stability

Performances of transducer to maintain its zero point, calibration point and alarm point within allowed variation ranges within specified operating conditions and time.

3.7 response time T_{90}

Time required for transducer output to reach 90% stabilized value when methane concentration

shows step change.

4 Technical Requirements

4.1 General Requirements

4.1.1 Transducers shall meet requirements provided herein and be manufactured according to specified procedure and drawings and technical documents approved by a state-authorized inspection agency.

4.1.2 Transducer outfitting with associated equipment shall be qualified by an anti-explosion inspection agency authorized by a competent authority. Equipment associated with transducers shall carry mining product safety certificate with validity.

4.1.3 Transducer anti-explosion type shall be mining intrinsic safety and explosion suppression type, marked with “ExibdI”.

4.2 Operating Conditions

Temperature: (0-40) °C;

Relative humidity: ≤98%;

Atmospheric pressure: (80-116) kPa;

Wind speed: not more than 8 m/s.

4.3 Storage Temperature: (-40-60) °C.

4.4 Output Signal Types

Following signal types should be used:

- a) Current type: DC (1-5) mA, (4-20) mA;
- b) Frequency type: (200-1,000) Hz (pulse width more than 0.3ms), (200-2,000) Hz;
- c) Digital signal type: transmission rate 1,200bps, 2,400 bps, 4,800 bps, 9,600 bps, not lower than 3V.

4.5 Requirements for Transducer Appearance and Structure

4.5.1 Transducer display window shall have good light transparence, numbers and symbols shall be legible and complete.

4.5.2 Transducer surface, plating or coating shall be free of air bubble, crack, obvious flake-off or stain.

4.5.3 Transducers shall be structure-reasonable, firm and durable, with suspension or support

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