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**Code for security system design of low concentration gas
pipeline transportation of coal mine**

煤矿低浓度瓦斯管道输送安全保障系统设计规范

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Code for security system design of low concentration gas pipeline transportation of coal mine

1 Scope

This document specifies the basic requirements for the design of the security system for low concentration gas pipeline transportation of coal mine, the installation requirements for security facilities.

This document is applicable to the security system design of low concentration gas pipeline transportation of coal mine.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB 50016, *Code for Fire Protection Design of Buildings*

GB 50028, *Code for design of city gas engineering*

GB 50057, *Code for design protection of structures against lightning*

GB 50471, *Code for design of the gas drainage engineering of coal mine*

AQ 1072, *Specification for water sealing of fire barriering and explosion venting devices of gas pipeline transportation*

AQ 1073, *Specification for automatic preventing explosion devices of gas piping*

AQ 1078, *General specifications for transmission system of low concentration coal mine gas blending with water mist*

AQ 1079, *General specification for automatic spurting powder explosion suppression devices of gas pipeline transmission*

AQ/T 1104, *Technical Rules for the Security Delivery Device of Gas-water Two-phase Flow of Low Concentration Gas in Coal Mine*

CJJ 33, *Code for construction and acceptance of city and town gas distribution works*

A device that the continuous mixing of gas and fine water mist in the coal mine gas pipeline can inhibit the flame propagation of combustion or explosion.

4 Basic requirements

4.1 In the low concentration gas pipeline transportation of coal mine, close to the possible fire source points (generator set intake side, ground emptying nozzle, spontaneous combustion and easy spontaneous combustion coal seam gob drainage gas pipe inlet), a security system shall be installed to ensure the security of pipeline transportation.

4.2 The system design shall follow the basic principles of "fire and explosion prevention, explosion suppression and explosion prevention, multi-level protection, and security assurance". The security system shall choose different combinations of security facilities such as fire and explosion relief, explosion suppression, explosion prevention, anti-backflow, security monitoring and control, and lightning protection according to the different uses of gas transportation.

4.3 Anti-backflow devices shall be installed in the positive pressure pipeline system. Prevent backflow due to sudden shutdown of the extraction pump.

4.4 Buffer tanks shall not be installed in low concentration gas pipeline transportation systems.

4.5 Pressurization equipment shall choose a wet compressor.

4.6 Drainage equipment shall choose wet drainage pumps.

4.7 When conveying under positive pressure, the conveying pressure shall not exceed 20kPa.

4.8 There shall be no mechanical moving parts and electrical components in the dehydrator.

4.9 Security monitoring and control facilities shall be set up in the pipeline transportation system. In addition to complying with the relevant provisions of MT209, security monitoring and control facilities shall also have the following functions:

- a) The function of state parameter monitoring and alarm of gas pipeline transportation security facilities;
- b) In the event of gas combustion or explosion, it shall be possible to control the rapid start-up of security equipment. Control gas combustion or explosion within a certain range.

4.10 The pipelines and accessories in the security facility installation section shall be

- 6 - Water sealing of fire barriering & explosion venting device;
- 7 - Pressure sensor;
- 8 - Flame sensor;
- 9 - Power equipment;
- 10 - Branch pipe;
- 11 - Airflow direction.

Figure 1 -- Schematic diagram of installation of security facilities for gas power generation utilization system

5.1.3 Flame and pressure sensors for monitoring are installed on the branch pipe. The flame sensor is no more than 3m away from the generator set. The pressure sensor is 3m~5m away from the flame sensor. If a dehydrator is installed on the branch pipe, the flame sensor is located between the dehydrator and the generator set, 2m~3m away from the dehydrator. The pressure sensor is located between the dehydrator and the branch pipe, 1m~2m away from the dehydrator.

5.1.4 The distance between the installation position of the water sealing of fire barriering & explosion venting device and the farthest branch pipe (along the pipeline axis) shall be less than 30m.

5.1.5 The water sealing of fire barriering & explosion venting device shall be able to automatically control the water level. Make it maintain the effective fire-blocking water seal height.

5.1.6 When the automatic explosion suppression device is selected as the explosion suppression device, the distance between the installation position of the explosion suppression device and the nearest flame sensor (along the axial direction of the pipeline) is 40m~50m. When using explosion suppression devices for water mist transportation or explosion suppression devices for two-phase-flow (gas-water), the distance between the installation starting end and the water sealing of fire barriering & explosion venting device shall not be greater than 3m.

5.1.7 The distance between the automatic preventing explosion device and the end of the explosion suppressor of the explosion suppression device shall not be greater than 10m.

5.1.8 When the operating parameters of any device in the security facility cannot meet the security requirements, it shall be able to realize automatic alarm. Then open the drainpipe. Shut down the generator set within 3min after the alarm.

5.1.9 The nominal inner diameter of the pipeline in the installation section of the security facilities shall meet the inner diameter requirements specified by the security facilities and equipment.

5.2 Pipeline transportation for surface gas drainage

5.2.2 The flame sensor of the automatic explosion suppression device is installed on the exhaust pipe. The distance from the outlet of the exhaust pipe (along the axial direction of the pipe) shall be less than 5m.

5.2.3 The distance between the installation position of the explosion suppressor of the automatic explosion suppression device and the flame sensor (along the axial direction of the pipeline) is 30m~60m.

5.3 Pipeline transportation for low concentration gas in goaf drainage

5.3.1 For low concentration gas drainage in underground mined-out areas of coal seams that are prone to spontaneous combustion and spontaneous combustion, explosion suppression devices shall be installed on pipelines close to the extraction site. Automatic explosion suppression devices shall be preferred for explosion suppression devices.

5.3.2 At least one set of automatic explosion suppression devices shall be installed. Each set of explosion suppression devices shall contain 2 explosion suppressors. The distance between the first explosion suppressor and the flame sensor is 50m~60m. The distance between the second explosion suppressor and the flame sensor shall not exceed 100m.

5.4 Low concentration gas mixed utilization pipeline transportation

Low concentration gas pipeline transportation security facilities for the mixed utilization of low concentration gas (low concentration gas power generation, low concentration gas thermal storage and oxidation) shall comply with the provisions of 5.1.

6 Others

6.1 Gas pumping stations, gas transmission station buildings and exhaust pipes shall comply with the requirements of GB 50057. Set up lightning protection facilities. Install lightning protection belt or lightning rod device, respectively. The drainage pipeline leading to the underground shall comply with the requirements of GB 50471. Take lightning protection and isolation measures.

6.2 Ground gas transmission pipelines shall be laid underground. When overhead laying is required in special circumstances, grounding shall be done every 25m within 100m of the pipeline entering and leaving the building. Its grounding resistance shall not be greater than 20Ω.

6.3 A certain safe distance shall be kept between ground low concentration gas transmission pipelines and ground or underground buildings, structures or other pipelines, see Table 1.

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