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Safety Specifications for Dedusting System Used in Dust Explosion Hazardous Area

粉尘爆炸危险场所用除尘系统安全技术规范

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Foreword

All the technical content of this Standard is compulsory, except Clauses 1, 2 and 3, 5.1.4c), 5.1.7c), 6.3.7.1.1, 7.1.6, 7.1.7, 9.3a).

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard was proposed by the Fourth Supervision Division of the State Administration of Work Safety.

This Standard shall be under the jurisdiction of Technical Subcommittee 5 on Dust Explosion Prevention of National Technical Committee 288 on Work Safety of Standardization Administration of China (SAC/TC 288/SC 5).

The drafting organizations of this Standard: Guangdong Jinfangyuan Safety Technology Testing Co., Ltd., Sinosteel Corporation Wuhan Safety & Environmental Protection Research Institute. Safety Enginerring Research Center of NEU, Guangzhou Gan Feng Machinery Equipment Co., Ltd., Guangzhou Tongsheng Environmental Protection Technology Co., Ltd.

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Safety Specifications for Dedusting System Used in Dust Explosion Hazardous Area

1 Scope

This Standard specifies the requirements for explosion-proof measures, maintenance and overhaul, detection and verification of dedusting system that are used in dust explosion hazardous area.

This Standard applies to the design, manufacturing, installation, acceptance, use and maintenance of dedusting system that are used in dust explosion hazardous area.

This Standard does not apply to dedusting system that are used in production sites of chemicals, mining, tunneling, fireworks and firecrackers, and commercial explosive materials.

2 Normative References

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

GB 2894, *Safety Signs and Guideline for the Use*

GB 7231, *Basic Identification Colors and Code Indications and Safety Sign for Industrial Pipelines*

GB 12158, *General Guideline for Preventing Electrostatic Accidents*

GB 12476.1, *Electrical Apparatus for Use in the Presence of Combustible Dust - Part 1: General Requirements*

GB 12476.2, *Electrical Apparatus for Use in the Presence of Combustible Dust - Part 2: Selection and Installation*

GB 15577, *Safety Regulations for Dust Explosion Prevention and Protection*

GB/T 15605, *Guide for Pressure Venting of Dust Explosions*

GB/T 16758, *The Classification and Technical Specification of Exhaust Hood*

GB/T 17919, *Directives for Dust Explosion Protection for Deduster in Dust Explosion Hazardous Area*

GB 50019, *Code for Design of Heating Ventilation and Air Conditioning in Industrial Buildings*

GB 50057, *Design Code for Protection of Structures against Lightning*

GB 50058, *Code for Design of Electrical Installations in Explosive Atmospheres*

AQ 7005, *Safety Requirements for the Use of Woodworking Machinery*

3 Terms and Definitions

For the purposes of this Standard, the following terms and definitions apply.

3.1

dust

small solid particles in the atmosphere which settle out under their own weight, but which may remain suspended in air for some time.

3.2

combustible dust

dust that can burn or glow in air and could form explosive mixtures with air at atmospheric pressure and normal temperatures.

3.3

dust explosion hazardous area

the sites at where combustible dust, combustion-supporting gas or ignition source is present.

3.4

dedusting system

a system which is used to gather the solid particles in gas- and solid-phase flows, comprising dust collection hood or dust collection cabinet, air hose, fan, dust catcher and control device.

3.5

explosion-proof device

the device which adopt the technique of prevention and control of dust explosion, to prevent the formation of dust clouds or possible ignition sources and put combustible

If there exists toxic, corrosive dust and combustible dust, the deduster and air-duct shall not adopt explosion-venting device for pressure release; it shall select the explosion-suppression device that can charge fire extinguishing gas or powder media into the deduster and air-duct to extinguish flames.

4.3 The box of the deduster shall meet the following requirements:

a) The box is made of a steel metallic material, or select flame-resistant materials and take anti-static measures if other materials are used; it shall not use aluminium metallic materials.

b) The design strength of the box shall be able to withstand the maximum explosive pressure generated after explosion-proof measures are adopted; and the box installed in buildings shall adopt steel metallic materials and welding structures.

c) The included angles between the box-plates of a square-box shall be arc-treated.

d) The internal surface of the box shall be smooth; the box made of steel metallic material shall be treated for rust-proofing; aluminium coating shall not be used.

4.4 The operating conditions of the dry deduster shall include continuous dust discharging and continuous dust conveying. It should not adopt settling chamber to perform dust treatment.

4.5 The deduster used in explosion hazardous areas of aluminium-magnesium dust and wooden product dust shall work under negative pressure conditions; for other dust explosion areas, if dedusting system adopts positive pressure to blow dust, then it shall adopt reliable measures to prevent the ignition sources.

4.6 Aluminium-magnesium dust shall not share the same dedusting system with iron dust and other kinds of combustible dust; and the dedusting system shall not connect with air-duct and equipment that carry combustible gas, high-temperature gas, smoke dust and other industrial gases.

4.7 The entry of sparks into the air-duct and deduster of the dedusting system is not allowed. For the production-processing system that exists suction of sparks into the air-duct through dust hood or dust cabinet, it shall adopt the measures to block sparks to enter into the air-duct and deduster.

4.8 The dedusting system shall be set up with control device meeting the following requirements:

a) Start and stop. The dedusting system shall be started before the production-processing system. When the production-processing system is stopped, the dedusting system shall be delayed for 10 min before being stopped.

b) Protection interlock. The dedusting system shall be set up with protection interlocking device. When the monitoring device give an acoustic-optical alarm

c) Dust conveying device should adopt pneumatic dust conveying; it should not adopt scraper dust conveyors and spiral dust conveyors.

d) The safety requirements for pneumatic dust conveying:

-- The air-volume and air-velocity of the designed pneumatic dust conveying duct shall be calculated based on that no dust will block the duct and the duct temperature is not higher than 70°C.

-- Set up air pressure monitoring alarm device which give acoustic-optical alarm signals when the air pressure is lower than the design value.

-- Set up dust discharging openings every 6 m of horizontal dust conveying duct and in the positions where the angle of air-duct elbow is greater than 45°. The dust discharging openings shall be sealed-closed in the non-discharging state. The design strength shall be greater than the design strength of the air-duct.

-- In the positions where the angle of air-duct's elbow is greater than 45°, set up observation window to monitor the dust flowing in the duct. The design strength shall be greater than the design strength of the air-duct.

-- For the duct of the length greater than 10 m, set up explosion-proof device as specified in 4.2.

e) The safety requirements for scraper dust conveying:

-- Use the sealed-closed dust conveying method. Do not discharge dust to the outside of the scraper conveyor during the dust conveying operation.

-- The operating speed of the designed scraper dust conveyor shall be calculated based on that dust will not block in the scraper dust conveyor.

-- Set up the monitoring-alarm device for the operating speed of the scraper dust conveyor; and they shall give acoustic-optical alarm signals when the operating speed deviates from the set value.

-- The scraper shall be made of flame-resistant and antistatic materials.

-- Set up manholes for dust discharging, overhauls and repairs every 6 m of the scraper dust conveyor. The manholes shall be sealed-closed when dust discharging, overhauls and repairs are not done.

-- Set up observation window to monitor the operating state of the scraper dust conveyor.

-- If the conveying length of the scraper dust conveyor is greater than 10 m, set up explosion-proof device as specified in 4.2.

f) The safety requirements for spiral dust conveying:

monitoring-alarm device for water-volume and water-pressure; and when the water-volume and water-pressure is lower than the set value, they shall give acoustic-optical alarm signals.

5.2.3 The water storage pool (tank), water filter pool (tank) and water filter units of the circulating water for wet dedusting shall not be enclosed; and there shall be ventilation airflow.

5.2.4 The circulating water for wet dedusting shall be filtered to remove dusts, oil contaminations and impurities. There shall be no dust retention in the deduster and circulating water ducts.

5.2.5 The capacity of the water storage pool (tank) of the circulating water for wet dedusting shall conform to the designed water consumption for wet dedusting. The water shall be clean. There shall be no mud settling in the pool (tank).

5.2.6 The water storage pool (tank), water filter pool (tank) and water filter units of the circulating water for the deduster shall not be frozen.

5.2.7 Protective fence shall be set up around the water storage pool and water filter pool (tank) of circulating water, which are located on the ground outdoor.

5.2.8 Clean the mud of water filter pool (tank) on each shift; and carry out harmless treatment for mud and sewage in time.

6 Dust Hoods and Dust Cabinets

6.1 Dust hoods or dust cabinets shall be set up for the work stations where the production-processing system generates dust.

6.2 Dust hoods or dust cabinets shall be designed as specified in GB/T 16758. The designed air-velocity at the inlet shall comply with the requirements in GB 50019. Dust hoods or dust cabinets shall have no dust retention.

6.3 For the air-duct having the risk of suction of sparks through dust hoods or dust cabinets, it should install the spark detection-alarm device and spark extinguishing device on them.

6.4 Dust hood or dust cabinet shall be made of steel metallic materials. If other materials are used, select flame-resistant materials and take anti-static measures. Do not use aluminium metallic materials.

7 Air-Duct

7.1 Trunk duct connected with the inlet duct of deduster

The calculation of explosion-venting area of the dedusting system, and the design, selection and installation of the explosion-venting device shall comply with the requirements in GB/T 15605.

9.2 Inerting device

The selection of inerting device shall meet the following requirements:

a) Determine the type of inert gas or powder medium that is charged into the deduster in accordance with the dust explosive characteristics;

b) When an inert gas is used as the charged medium, set up the continuous monitoring device to alarm the oxygen content in the box of the deduster. When the oxygen content is higher than the set value, it gives acoustic-optical alarm signals and starts the interlocking protection with the control device of the dedusting system.

c) When an inert powder is used as the charged medium, the flow and blowing pressure of charged powder shall be calculated based on that the dust concentration in the box of the deduster is not greater than 50% of the lower explosive limit. For the deduster that is connected to the production-processing system of powders such as aluminium powder, magnesium powder or coal powder that exists generating explosive hazard after mixing with oxygen OR the powders of same explosive characteristics, POWDERS shall not be used as the explosion-suppression medium to be charged into the deduster.

d) The explosion-proof device that charges the inert gases or powder media into deduster has the monitoring function of operating abnormality and breakdown; when occurring operating abnormality and breakdown, it shall give acoustic-optical alarm signals, and start the interlocking protection with the control device of the dedusting system.

9.3 Explosion-isolation device

The selection of explosion-isolation device shall meet the following requirements:

a) Arrangement of the explosion-proof device outside plant buildings is preferable.

b) Select the explosion-isolation device in accordance with the dust explosive characteristics and the anti-explosion strength of the deduster and air-duct; and determine the installation positions of the explosion-isolation device on the main air-duct.

c) The explosion-isolation device shall be started in the protective interlock with the control device of the dedusting system.

9.4 Explosion-suppression device

the external-wall of the plant buildings shall comply with the requirements in GB/T 15605.

b) The deduster connected with the production-processing system of agricultural product powder and electrostatic spraying powder shall meet the following requirements:

-- Set up the pneumatic dust conveying device as specified in 5.1.7 a), b), d).

-- If the dust discharging quantity of the deduster is less than 5 kg on each shift, containers (buckets) may be used to collect the dust discharged by the air-lock dust discharging device of the deduster. The dust is cleaned on each shift.

c) The deduster connected with the textile fibre processing system shall meet the following requirements:

-- A single unit is arranged in a single room near the external-wall of buildings in plant; the partition wall of the room shall be solid partition wall with the fire endurance not less than 3.00 h; the external-wall of the room is set up with explosion-venting openings to the outside or other openings used for explosion-venting; and the explosion-venting area shall comply with the requirements in GB 15605.

-- The air-duct of the dedusting system shall be set up with automatic fire retardance valves; and the inlet-ducts of the deduster shall be set up with spark detection-alarm device and spark extinguishing device.

-- Set up pneumatic dust conveying device as specified in 5.1.7 a), b), d); and adopt compacting-method to collect dust.

d) The deduster connected with the tobacco processing system shall meet the following requirements:

-- Set up explosion-venting device;

-- The inlet-ducts of the deduster shall be set up with explosion-isolation valves, spark detection-alarm device and spark extinguishing device.

-- Set up pneumatic dust conveying device as specified in 5.1.7 a), b), d); and adopt compacting-method to collect dust.

e) For the deduster connected with the processing system of POWDERS such as metallic power and fuel powder that can generate explosive hazard after mixing with oxygen OR POWDERS of the same explosive characteristics, it shall meet the following requirements:

-- Set up inerting device as specified in 9.2 a), b), d).

-- the dust hoods or dust cabinets;

-- the containers (buckets) collecting the dust discharged by dry deduster;

-- the wet deduster' water filter pool (tank), water filter device and filter screens outside the box of deduster;

-- the filter screens and filter chambers of fibre- or flying-deduster;

-- power compacting-collection device;

-- the filter bags and dedusting fans of stand-along filter-bag deduster for wood dust.

b) The positions which shall be cleaned each week at least include:

-- the filter bags, dust hoppers, air-lock dust discharging device, dust conveying device, dust bins or silos of the dry deduster;

-- the electrical circuits, electrical equipment, monitoring device and alarm-control device;

-- the water storage pool (tank) of circulating water for wet deduster.

c) The positions which will be cleaned each month at least include:

-- the trunk air-duct and branch air-duct;

-- the fans;

-- the explosion-proof device;

-- the dust discharging device inside the box of the dry deduster.

12.2 During the cleaning operation, use the cleaning methods that will not cause dust and the cleaning tools which will not cause sparks.

12.3 Harmless treatment shall be carried out for the dust and mud cleaned-collected.

13 Maintenance-Overhaul, Testing and Verification

13.1 Ensure the dedusting system meet the explosion-proof safety requirements; and carry out maintenance-overhaul once at least each half year. Before the operation of maintenance-overhaul of the dedusting system, clean the dust in the work zones, inside the dedusting system and in the surrounding areas. The fire protection safety measures shall be taken for naked-fire as specified in GB 15577.

13.2 During the maintenance-overhaul of the bag deduster, it shall renew or replace

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