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Environmental protection technical specification for co-processing of solid wasters in cement kiln

水泥窑协同处置固体废物环境保护技术规范

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Foreword

In order to implement the "People's Republic of China Environmental Protection Law", "People's Republic of China Solid Waste Pollution Prevention Law", "People's Republic of China Air Pollution Prevention Law", "People's Republic of China Circular Economy Promotion Law" and "Decision of the State Council on Scientific Development and Strengthening Environmental Protection" and other laws and regulations; regulate cement kiln co-processing of solid waste management; prevent solid waste disposal and its co-products making secondary pollution to the environment; and protect ecological environment and human health, this Standard is formulated.

This Standard specifies the use of cement kiln co-disposal of solid waste facilities selection, equipment construction and renovation, operation and running to environmental technical requirements and other aspects of pollution control.

This Standard was developed by Science-Technology Standard Division of Ministry of Environmental Protection of China.

Main drafting organizations of this Standard: China Environmental Science Research Institute, China Building Materials Academy, BBMG Mangrove Environmental Technology Limited, Foreign Economic Cooperation Office, Ministry of Environmental Protection.

This Standard was approved by Ministry of Environmental Protection on December 27, 2013.

This Standard shall be implemented since March 1, 2014.

This Standard shall be interpreted by Ministry of Environmental Protection.

Environmental protection technical specification for co-processing of solid wasters in cement kiln

1 Application scope

This Standard specifies facility selection, equipment construction and renovation, operation and running, environmental technical requirements and other aspects of pollution control by utilizing co-processing of solid waste in cement kiln.

This standard applies to co-processing of solid wasters in cement kiln, e.g., hazardous waste, household garbage (including waste plastics, waste rubber, waste paper, waste tires, etc.), city and industrial wastewater treatment sludge, animal and vegetable processing waste, contaminated soil, emergency waste, etc.

Cement products which use fly ash, slag, sulfuric acid slag, blast furnace slag, coal gangue and other general industrial solid wastes as alternative raw materials (including mixed materials) or fuel refer to provisions in 7.2 of this Standard.

2 Normative references

The following standards contain the provisions which, through reference in this Standard, constitute the provisions of this Standard. For undated reference documents, the latest versions apply to this Standard.

GB 175 *Common Portland Cement*

GB 4915 Emission Standard of Air Pollutants for Cement Industry

GB 5805.1 *Identification standards for hazardous wastes - Identification for corrosivity*

GB 5805.4 *Identification standards for hazardous wastes - Identification for ignitability*

GB 5805.5 *Identification standards for hazardous wastes - Identification for reactivity*

GB 8978 *Integrated Wastewater Discharge Standard*

GB 12573 *Sampling method for cement*

GB 14554 *Emission standard for odor pollutants*

GB 15562.2 *Graphical signs for environmental protection solid waste storage (disposal) site*

GB 18597 *Standard for pollution control on hazardous waste storage*

GB 30485 *Standard for pollution control on co-processing of solid wastes in cement kiln*

GB 50016 *Code of Design on Building Fire Protection and Prevention*

GBZ 2 *Occupational exposure limits for hazardous agents in the workplace*

HJ 421 *Standard of packaging bags containers and warning symbols specific to medical waste*

HJ/T 20 *Technical specifications on sampling and sample preparation from industry solid waste*

HJ/T 76 *Specification and test procedures for continuous emission monitoring systems of flue gas emitted from stationary sources (on trial)*

HJ/T 176 *Technical specifications for centralized Incineration facility construction on hazardous waste*

HJ/T 177 *Technical specifications for centralized Incineration facility construction on medical waste*

HJ/T 298 *Technical specifications on identification for hazardous waste*

HJ/T 299 *Solid waste - Extraction procedure for leaching toxicity - Sulphuric acid & nitric acid method*

AQ/T 9002 *Guidelines for enterprises to develop emergency*

Regulations on the Safety Administration of Dangerous Chemicals (Order of the State Council of the People's Republic of China No. 344)

Guide on Preparation Plan for Hazardous Waste Management Organizations (Announcement of the State Environmental Protection Administration No. 48 in 2007)

Measures for the Prevention and Control of Environment Pollution by Discarded Dangerous Chemicals (Order of the State Environmental Protection Administration of China, Order No.27 in 2005)

d) with kiln dust return devices so as to send kiln dust collected by dust remover and other flue gas treatment devices back to raw materials into kiln system.

4.1.3 Location for collaborative treatment of solid waste in cement production facilities should meet the following conditions:

a) in line with the overall urban development plan, urban industrial development planning requirements;

b) in area with no flooding or waterlogging flood threat; facility should be located in place where the elevation of the return period is not less than once in 100 years flood level above, and constructed outside flooded area and protected area with various types of existing and planned reservoirs and other artificial storage facilities;

c) co-hazardous waste disposal facilities, distance between residential, commercial areas, schools, hospitals and other environmentally sensitive areas confirmed by environmental Impact assessment conclusions which are approved by local environmental protection authorities, shall meet the needs of environmental protection;

d) co-disposal of hazardous waste of which the transport routes should not go through residential areas, commercial areas, schools, hospitals and other environmentally sensitive areas.

4.2 Solid waste feeding facilities

4.2.1 Solid waste feeding facilities shall meet the following conditions:

a) can automatically feed; equipped with metering device of which rate can be adjusted to realize quantitative feeding;

b) solid waste transport device and feeding mouth should be kept closed; solid waste feeding port should have the function of anti-tempering;

c) keep smooth feeding to prevent clogging of solid waste bypass;

d) equipped with online monitoring system of real-time display of solid waste situation feeding;

e) with automatic on and off functions; when cement kiln or flue gas treatment facilities fail to operate, or when kiln temperature, pressure, rotational speed of kiln, flue gas oxygen content and other operating parameters are from the set value, or when flue gas emissions exceed standard values, it can automatically stop feeding of solid waste;

f) when handling corrosive waste, feeding and transport facilities should

grounded and equipped with antistatic equipment. Explosion-proof communication equipment should be set up and intact patency should be maintained.

4.3.4 Hazardous waste storage facility's design, safety, pollution prevention and control shall meet related requirements in GB 18597 and HJ/T 176. Clear safety warnings and evacuation routes in hazardous waste storage area shall be marked. Emergency shower body wash facilities with clearly marked use shall be equipped in hazardous waste storage area and nearby.

4.3.5 Storage facilities of life garbage and urban sewage treatment plant sludge should have good barrier properties and be set with sewerage system. Storage facilities should adopt containment measures to ensure they are at negative pressure when life garbage or sludge is stored. Air extracted in storage facilities shall be imported into high-temperature section of cement kiln for burning or emission after complying with requirements via other treatments.

4.3.6 Storage facilities of solid waste except those stipulated in 4.3.4 and 4.3.5 should have good barrier properties and necessary rain-proof, dust-proof functions.

4.4 Pretreatment facilities of solid waste

4.4.1 Pretreatment facilities of solid waste such as crushing, grinding, mixing and stirring have good tightness, and ensure the separation from operators. Pretreatment facilities of solid waste with volatile and semi-volatile toxic ingredients should be set in indoor workshop. Ventilation system should be set inside the workshop. Exhaust gas should be discharged after treatment or imported into high temperature section of cement kiln for burning.

4.4.2 Materials for pretreatment facilities shall suit solid waste characteristics, so as to ensure that there is no corrosion and no reaction with solid waste.

4.4.3 Pretreatment facilities should comply with requirements of GB 50016 and other related fire codes. Fire and explosion device should be equipped in the area. Extinguishing water reserves are greater than 50 m^3. Be equipped with explosion-proof communication equipment and intact patency should be maintained. Crushing warehouse and mixing warehouse for pretreatment of combustible solid waste should be equipped with nitrogen filling devices with priority, so as to prevent fire and explosion.

4.4.4 Emergency shower body wash facilities should be equipped in hazardous waste pre-treatment area and nearby. Use should be marked.

4.4.5 Pretreatment process and pretreatment facilities should be determined in accordance with solid waste characteristics and requirements of enter-kiln:

sealed and stored after confirmed by both parties, used for accident and dispute investigation. Backup sample should be stored after co-processing of this solid waste is stopped. If characteristics of backup sample change during storage, it shall replace backup sample, so as to ensure that the backup sample characteristics consistent with the co-disposal of solid waste characteristics.

6.2 Reception and analysis of solid waste

6.2.1 Examination on enter-plant solid waste

a) When solid waste enters co-processing enterprise, it shall make a preliminary judgment via appearance and odor if it is consistent with the solid waste category indicated in signed contract. Weigh the solid waste and determine it complies with contract signed;

b) For hazardous waste, it shall also conduct the following examinations:

1) Check if solid waste label meets the requirements; the labeling information shall be consistent with "Hazardous waste transfer manifest" and contract signed;

2) Make a preliminary judgment via appearance and odor if it is consistent with the solid waste category indicated in "Hazardous waste transfer manifest";

3) If the weight of hazardous waste complies with "Hazardous waste transfer manifest";

4) Check if the package meets the requirements of hazardous waste; there shall be no damage or leakage;

5) When necessary, perform radioactive test;

After completing the aforementioned examinations and confirm that they all comply with each requirements, solid waste is allowed to enter depot or pretreatment workshop;

c) After examination is completed according to provisions of a) and b) of 6.2.1, if the category of solid waste planned to enter plant is not consistent with the solid waste category marked in the signed contract, or hazardous waste packaging if broken or leaked, it shall immediately contact with producer, transporter and person responsible for transport of solid waste, and jointly make an on-site judgement. When solid waste planned to enter plant is not consistent with "Hazardous waste transfer manifest", it shall also report to local environmental protection authorities without delay.

If co-processing can be conducted under existing conditions of co-processing

during storage, transport within plant, pretreatment and burning in kiln;

3) Content of harmful substances in enter-kiln solid waste and feeding rate shall meet related requirements of this Standard; prevent adverse effects on cement quality and cement production;

c) During the process of developing co-processing program, if it cannot confirm whether it meets the requirements of Article 6.2.3 b), it shall confirm by compatibility test.

6.2.4 Solid waste enter-plant examination and inspection results shall be kept of records, filed and stored with co-processing program of solid waste. The storage time for solid waste enter-plant examination and inspection result record and co-processing program of solid waste shall not be less than 3 years.

6.3 Technical requirements for solid waste storage

6.3.1 Solid waste should be stored separately from conventional cement raw materials, fuels and products. Never share the same storage facility.

6.3.2 In the liquid waste storage area, sufficient amount of sand and other adsorbing substances shall be provided, so as to prevent spilling out in case liquid waste leakage. Adsorbing substances shall be managed and disposed as hazardous waste after absorbing hazardous waste.

6.3.3 Operation and management of hazardous waste storage facilities shall meet related requirements in GB 18597 and HJ/T 176.

6.3.4 Storage time for unknown waste in kiln shall not exceed 1 week.

6.4 Technical requirements for pretreatment of solid waste

6.4.1 It shall perform pretreatments such as crushing, screening, sorting, neutralization, precipitation, drying, compatibility, mixing, stirring, homogenizing to solid waste, according to characteristics of enter-plant waste and requirements for enter-kiln solid waste, in accordance with co-processing program of solid waste.

6.4.2 Solid waste after pretreatment shall have the following features:

a) Meet requirements in Clause 5 of this Standard;

b) Uniform physical and chemical properties ensure continuous and stable kiln operating conditions;

c) Meet conveying, feeding requirements of existing facilities of co-processing cement company.

6.4.3 It shall take measures to ensure that environmental quality of preprocessing operations area meets requirements of GBZ 2.

6.4.4 It shall replace outdated fire equipment and fire-fighting material in pre-treatment area, so as to ensure the effectiveness of fire-fighting equipment and fire-fighting material.

6.4.5 A sufficient number of sand or wood chips in pretreatment area shall be set, so as to prevent spilling out in case of liquid waste leakage.

6.4.6 Various of wastes generated by hazardous waste pre-treatment shall be managed and disposed as hazardous waste.

6.5 Technical requirements for transporting solid waste in plant

6.5.1 When transporting solid waste in plant, it shall take necessary measures to prevent solid waste from dusting, spilling out and leakage.

6.5.2 Solid waste transport vehicles should be cleaned regularly.

6.5.3 When transporting hazardous waste via vehicles in plant, it shall drive in accordance with specific route for transport vehicles.

6.5.4 Various types of wastes generated by management and maintenance of hazardous waste transporting facilities shall be managed and disposed as hazardous waste.

6.6 Technical requirements for solid waste feeding

6.6.1 Select appropriate solid waste feeding position, according to solid waste characteristics, requirements for feeding device, features of working conditions at feeding port.

6.6.2 While feeding solid waste, it shall ensure stable operating conditions of kiln system.

6.6.3 Technical requirements for feeding in main burner

a) Solid waste with the following characteristics should be fed at main burner:

   1) Liquid or powdery waste which is easy for pneumatic conveying;

   2) Wastes containing POPs or high chlorine, highly toxic, biodegradable organic substances;

   3) Organic waste liquid of high calorific value, low moisture content.

b) Solid waste feeding in main burner shall meet the following conditions:

9.2 Emergency waste

9.2.1 Co-processing of emergency waste should be approved by local provincial environmental protection department. Its technical guidance shall be accepted.

9.2.2 Before co-processing of emergency waste, it shall conduct necessary detection on waste based on characteristics of waste generator. After waste characteristics are determined, confirm co-processing program according to requirements of this Standard.

9.2.3 If waste characteristics are hard to determine, it shall take this waste as unknown waste. Treat it according to provisions in 9.3.

9.2.4 Cement kiln facilities with hazardous waste management license shall be prior choice for co-processing of emergency waste. If it is subject to conditions, after approval from local provincial environmental protection department, it shall select cement kiln facilities without hazardous waste management license. The facilities and corresponding co-processing process shall meet relevant requirements for co-processing of hazardous waste in this Standard, excluding 4.1.1 b) and 10.1.

9.2.5 If co-processing time is expected not more than 3 months, the co-processing can be conducted without performance test. If co-processing time is expected to exceed 3 months, performance test shall be conducted according to working parameters determined by co-processing program. Trial burning waste in performance test shall use emergency waste planned for co-processing. Organic marker and its feeding cannot be limited by requirements in 8.1.4, 8.1.5, 8.1.7. Marker shall be fed in accordance with substances contained in waste itself, designed waste feeding rate and content of waste itself. Test of other performances shall be conducted according to relevant provisions in Clause 8 of this Standard.

9.2.6 If co-processing time for co-processing of emergency waste exceeds 1 year, special provisions in 9.2.4 and 9.2.5 shall not apply. Conduct the management according to relevant requirements for co-processing of conventional hazardous waste.

9.3 Unknown waste

9.3.1 After reception of unknown waste, it shall immediately report to local environmental protection authorities and local production safety administrative departments and public security departments when necessary.

9.3.2 After unknown waste is confirmed not to be explosive, it shall take conventional analytical method to conduct sampling analysis. After waste nature is determined, conduct co-processing according to relevant

10.3.2 Hazardous waste co-processing cement company should comply with relevant safety regulations on hazardous chemicals, including "Dangerous Chemical Safety Regulations" and "Discarded Dangerous Chemicals Pollution Prevention Measures", prevent accidents caused by improper operation and management of hazardous waste.

10.3.3 Solid waste co-processing cement company should formulate appropriate safety management system based on company features; build basic requirements of safety code of conduct, fire safety management system, risky job management system, toxic materials management system, incident management system and other safety management systems for solid waste collection, storage, transport and security issues that may arise during co-processing.

10.4 Personnel health management system

10.4.1 Establish labor protection system for hazardous waste workers; comply with requirements for occupational safety, health and labor protection in HJ/T 176.

10.4.2 Co-processing enterprise should establish regular medical examinations system for employees, specifying frequency and content of medical examination of pre-service, in service and after service. Make medical examination timely.

10.4.3 Establish employee health record.

10.5 Emergency management system

10.5.1 Co-processing enterprise should comply with relevant requirements of "Strengthening Environmental Emergency Management" and "Environmental Emergency Plan Management Measures", establish comprehensive emergency management system including production accidents and environmental emergencies.

10.5.2 Emergency management system mainly include emergency management organization system, production safety emergency rescue plan management, environmental emergencies contingency plans for management, emergency management training, emergency drills, emergency supplies guarantee, etc..

10.5.3 Emergency management organization system includes emergency management leadership team and emergency management office of which main company leader is team leader.

10.5.4 Emergency management leadership team shall be responsible for stipulation of "Safety Emergency Rescue Plan". Plan shall comply with "Safety

department to evaluate the investigation and treatment of environmental emergencies, environmental damage, for timely implementation of corrective measures.

10.5.13 Co-processing enterprise shall fully use social emergency resources, joint with local government plan, plans of superiors and relevant departments and emergency organizations. The enterprise shall sign ambulance agreement with rescue centers at all levels. Once the enterprise cannot perform self-rescue in the accident, make request for support to rescue center.

10.6 Operation log system

Co-processing cement enterprise shall establish registration system of operation of production facilities, facilities maintenance, co-processing production activities, etc.. The main record shall include:

(1) Performance test record (basic information of cement kiln used for performance test, including kiln type, scale, dust remover type, etc.; harmful organic marker for performance test, its feeding rate, feeding position; DRE of harmful organic marker; flue gas emission concentration during performance test; basic information of cement production conditions during performance test, including temperature at kiln-head, kiln-tail and oxygen concentration, raw mill running record, conditioning tower, working conditions of primary dust collector, etc.).

(2) Origin, weight, type, enter-plant time, number plate of transport vehicle of solid waste.

(3) Co-processing date record (daily storage, pre-treatment and co-disposal of solid waste category and quantity; solid waste transport vehicles disinfection record; pretreatment and running process control parameters record of co-processing facilities, including harmful element feeding rate, waste feeding rate, feeding position; record of maintenance service and record of safety production accidents; records of bypass leaked emission and kiln ash treatment).

(4) Environmental monitoring records (monitoring results of flue gas emissions and pollution control of cement products).

(5) Regular testing, evaluation and assessment records (periodic evaluation on co-processing of solid waste effects as well as relevant improvement record; regular detection and assessment records for operation and safety of co-processing facilities of solid waste; regular safety evaluation on program and staff operation for co-processing of solid waste, and relevant improvement record).

10.7 Environmental management system