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THE PEOPLE'S REPUBLIC OF CHINA

中华人民共和国电力行业标准

P DL/T 5142-2012

Replaces DL/T 5142-2002

Technical Code for the Design of Ash Handling System of Fossil-fired Power Plant

火力发电厂除灰设计技术规程

Issued on: August 23, 2012 Implemented on: December 1, 2012

Issued by the National Energy Administration

Professional Standard of the People's Republic of China

中华人民共和国电力行业标准

Technical Code for the Design of Ash Handling System of Fossil-fired Power Plant

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Chief Development Department:

Electrical Planning and Design Institute

Approval Department:

National Energy Administration

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According to the requirements of "Management Method for Standardization of Power Industry (Tentative)" (GUONENGJUKEJI [2009] No.52), the National Energy Administration, upon examination, has approved 288 professional standards (see the attachment), e.g. "Technical Code for Environmental Impact Assessment of Photovoltaic Power Station", among which there are 15 energy standards (NB), 104 power industry standards (DL) and 169 petroleum and natural gas industry standards (SY), and hereby publishes them.

Attachment: Catalogue of Professional Standards

National Energy Administration

August 23, 2012

Attachment:

Catalogue of Professional Standards

No.	Serial number of standard	Standard name	Replaced standard	Number of adopted standard	Approval date	Implementation date
……						
114	DL/T 5142-2012	Technical Code for the Design of Ash Handling System of Fossil-fired Power Plant	DL/T 5142-2002		2012-08-23	2012-12-01
……						

Foreword

According to the requirements of "Notification on Issuing the Formulation (Revision) Plan of the First Batch of Professional Standards on Energy Industry in 2009" (GUONENGKEJI [2009] No.163), the Northwest Electric Power Design Institute of China Power Engineering Consulting Group in conjunction with other organizations concerned formulated this code by revising "Technical Code for the Design of Ash Handling System of Fossil-fired Power Plant" (DL/T 5142-2002).

During revision, the standard drafting group carefully summarized the practical design experience of fossil-fired power plant, absorbed the relevant research achievements and the practical construction experience of the power engineering in China, widely solicited opinions from relevant design and design management organizations and finalized the code upon the examination and modification of experts.

After revision, this code comprises 14 chapters and 4 appendixes and has the basic frame of Edition 2002. The main contents revised this time are as follows:

1. Basic requirements for the physical and chemical properties, conveying characteristics, storage characteristics and test of ash were added.
2. Design requirements for fly ash classifying system were added.
3. Design requirements for ash handling system of municipal solid waste incineration power plant, ash handling system of straw power plant and slime pipeline conveying system were added.
4. Design requirements for positive pressure pneumatic conveying system, mechanical conveying system, mill reject conveying system, material storage and unloading system, high-concentration ash slurry conveying system, compressed air supply system and other auxiliary systems and ash handling system of circulating fluidized bed (CFB) are supplemented and revised.
5. Design requirements for rake thickener were cancelled.
6. Chapters "Water Carriage for Ash Handling" and "Discharge of Flue Gas Desulfurization Device Waste Residues" were cancelled and the relevant contents were incorporated into the relevant chapters.

The former "Technical Code for the Design of Ash Handling System of Fossil-fired Power Plant" (DL/T 5142-2002) shall be abolished simultaneously from the implementation date of this code.

The National Energy Administration is responsible for the administration of this code. This code was proposed by the Electrical Planning and Design Institute. Technical Committee of National Energy Administration is responsible for the daily administration of this code. Northeast Electric Power Design Institute of China Power Engineering Consulting Group is responsible for the explanation of specific technical contents. In the process of implementing this code, the relevant opinions and advice, whenever necessary, can be posted or passed on to Electrical Planning and Design Institute (Address: No.65 Ande Rd, Xicheng District, 100120, Beijing).

Chief development organizations, participating organizations and chief drafting staff:

Chief drafting organization:

Northwest Electric Power Design Institute of China Power Engineering Consulting Group

Participating organizations:

China Power Engineering Consulting Group

Northeast Electric Power Design Institute of China Power Engineering Consulting Group

North China Power Engineering Co., Ltd. of China Power Engineering Consulting Group

Southwest Electric Power Design Institute of China Power Engineering Consulting Group

East China Electric Power Design Institute of China Power Engineering Consulting Group

Central Southern China Electric Power Design Institute of China Power Engineering Consulting Group

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Contents

1 General Provisions

1.0.1 This code is formulated with a view to ensuring conformity of the ash handling design of fossil-fired power plant with the requirements of safety, reliability, advanced technology, economy and suitability, unifying and defining the construction standards, actively utilizing the advanced technologies, processes, materials and equipment proven through operation practice or industrial test.

1.0.2 This code is applicable to the ash handling design of solid fossil fuel power plant, municipal solid waste incineration power plant and straw power plant.

1.0.3 The ash handling design of fossil-fired power plant shall meet the relevant requirements of the current national standards "Code for Design of Large and Medium Fossil Fired Power Plants" (GB 50660) and "Code for Design of Small Fossil Fired Power Plant" (GB 50049).

1.0.4 The ash handling design shall create conditions for comprehensive utilization of ash.

1.0.5 The ash handling system shall be planned uniformly according to the construction scale of power plant and constructed by stages according to the construction schedule of unit. If construction by stages is unreasonable upon technical and economical comparison, it may be built-up at a time.

1.0.6 The ash handling system may adopt pneumatic, mechanical and hydraulic conveying systems or a combined system and should meet the following requirements:

1 Slag handling by dry bottom furnace should adopt mechanical slag handling system, fly ash handling by pulverized coal fired boiler should adopt pneumatic ash handling system and mill reject handling by medium speed coal mill should adopt simple mechanical conveying system. Where the conditions are suitable, other types of conveying systems may also be adopted.

2 Where dry ash storage yard is adopted, the off-site conveying system of ash, mill reject and gypsum should adopt automobile transportation.

3 Where wet ash storage yard is adopted, the off-site conveying system of ash should adopt hydraulic pipeline conveying.

1.0.7 The design capacity of off-site ash handling system shall be determined according to the specific engineering conditions and the implementation conditions of comprehensive utilization of ash.

1.0.8 The ash handling system shall be designed according to the ash discharge amount of boiler when it fires the design fuel at the working condition of maximum continuous evaporation, be checked according to the ash discharge amount of boiler when it fires the check fuel and be left with certain allowance.

1.0.9 The ash amount discharged from each part of boiler shall be calculated according to the method given in Appendix A of this code. The ash and slag ratio shall adopt the data provided by the boiler factory, and if the data is unavailable, the ash and slag ratio may adopt the value given in Table A.0.3 in the Appendix A of this code. The mill reject amount discharged by the medium speed coal mill should be calculated according to the method given in Appendix B of this code.

1.0.10 Mature operation practice experience of engineering with similar conditions shall be

provided for the design of pneumatic conveying system and auxiliary storage facilities; where mature operation practice experience is unavailable, test, study and technical demonstration on the basis characteristics as well as the conveying and storage characteristics of materials shall be carried out. Where the material density data is unavailable, values may be taken according to the requirements of Appendix C of this code.

1.0.11 Necessary overhaul lifting facility shall be installed at the centralized layout place of ash handling equipment, and shall meet the following requirements:

1 The rated lifting capacity of lifting facility shall be determined according to the heaviest overhaul lifting component; the installation elevation of lifting facility shall be determined according to the lifting height of the required lifting equipment.

2 The overhaul lifting facility shall be selected in accordance with the following requirements:

1) Repair and lifting facilities shall be arranged for equipment with lifting capacity of 1t or above, pipe fittings and valve required for repair;

2) Electric lifting facilities should be arranged for frequently used equipment with lifting capacity of 3t or above;

3) Electric lifting facilities shall be arranged for equipment with lifting capacity of 10t or above;

4) Where it is inconvenient to arrange fixed maintenance and repair platform, mobile lifting facilities may be arranged;

5) Movable or fixed lifting facilities may be arranged for equipment outdoors according to surrounding conditions.

1.0.12 Necessary cleaning facilities shall be arranged at the centralized layout place of ash handling equipment and the buildings or structures with ash handling system, and dust-proof and suppression measures shall be adopted at the loading and unloading places.

1.0.13 The water and gas pipeline design of ash handling system shall meet the requirements of the current professional standards "Code for Design of Thermal Power Plant Steam/Water Piping" (DL/T 5054) and "Code for Oil/Gas Piping Design of Fossil Fuel Power Plant" (DL/T 5204), and the two phase pipeline design of ash handling system may be implemented by reference to the standards.

1.0.14 The design of ash handling system and ancillary facilities shall meet the requirements of the current professional standards "Design Code for Occupational Safety of Fossil-fired Power Plant" (DL 5053), ""Design Code for Occupational Health of Fossil-fired Power Plant" (DL 5454) and "Code for Designing Insulation and Painting of Fossil Fuel Power Plant" (DL/T 5072).

2 Terms

2.0.1 Particle density

The ratio of the material mass to its true volume.

2.0.2 Loose-poured bulk density

The mass per unit volume of particle materials under natural stacking state.

2.0.3 Slurry weight density

The percentage of solid weight, flowing in unit time, in the slurry weight.

2.0.4 Material gas ratio

The ratio of the material mass, being conveyed in unit time in the pneumatic conveying pipeline, to the gas mass

2.0.5 Percentage of mill rejects

The percentage of mill reject amount, being discharged by the medium speed coal mill in unit time, in the coal amount entering into coal mill.

3 Pneumatic Ash Handling System

3.1 Basic Requirement

3.1.1 The on-site ash conveying system should adopt positive pressure pneumatic conveying system. Where the material characteristics and conveying conditions are suitable, positive pressure dense phase pneumatic conveying system should be adopted.

3.1.2 According to different conveying distances, pneumatic ash conveying system may adopt air slide, negative pressure and other conveying modes and should meet the following requirements:

1 Where the conveying distance is shorter than 60m, air slide conveying mode may be adopted.

2 Where the length of conveying pipeline does not exceed 150m, negative pressure pneumatic conveying system may be adopted.

3 In combination with specific engineering conditions, system combined by various pneumatic conveying modes may be adopted.

3.1.3 Where the slag warehouse is relatively far and it is difficult to arrange mechanical conveying equipment, pneumatic slag conveying system may be adopted.

3.1.4 The flow velocity of pneumatic ash handling pipeline shall be determined reasonably according to such factors as ash particle diameter, density, conveying pipe diameter and ash handling and conveying system.

3.1.5 The pneumatic conveying system design shall consider the effects from local air pressure, air temperature, humidity and other natural conditions.

3.1.6 Where the boiler adopts electric precipitator, the ash conveying system output of the following stage electric fields shall not be less than the ash amount of the earlier stage electric field under normal working conditions when the preceding stage electric field loses of power.

3.1.7 Where the boiler slag handling adopts the combined system of air-cooled type slag conveyor and pneumatic slag conveying, high-temperature resistant slag crusher shall be arranged at the outlet of air-cooled type slag conveyor, and the particle size of slag discharged by the slag crusher shall meet the conveying requirements. Buffer slag hopper should be arranged between the slag crusher outlet and the pneumatic conveying equipment.

3.2 Positive Pressure Pneumatic Conveying

3.2.1 The design output of positive pressure pneumatic ash conveying system should not be less than 150% of the ash discharge amount of boiler when it fires the design coal at the working condition of maximum continuous evaporation and should not be less than 120% of the ash discharge amount of boiler when it fires the check coal.

3.2.2 Two sets of positive pressure pneumatic slag conveying systems should be set for each boiler that one for operation and the other for standby. The design output of each set of system should not be less than 150% slag discharge amount of design coal and should not be less than 120% slag discharge amount of check coal.

3.2.3 The bin type pneumatic conveying pump (hereinafter referred to as bin pump) under

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