

## Foreword

This code is modified by Capital Engineering & Research Incorporation Limited (CERI) in conjunction with other relevant organizations according to the requirements of Document JIAN BIAO [2013] No.169 issued by the Ministry of Housing and Urban-Rural Development (MOHURD) of the People's Republic of China — "Notice on Printing and Distributing 'the Development and Revision Plan of National Engineering Construction Standards in 2014' ".

The code consists of 6 chapters and 1 appendix, covering: general provisions, terms, basic requirements, site selection and general layout, design of environmental protection in procedures, and division of environmental protection facilities.

Main content of this modification includes:

1. According to the newly enacted related laws, regulations, policies and standards promulgated by the state, the basic requirements, factory site selection and general layout, and the related contents of environmental protection in each procedure of iron and steel industry of GB 50406-2007 *Code for Design of Environmental Protection of Iron and Steel Industry* (hereinafter referred to as original code) is revised and refined.

2. The iron and steel industry has owned the complete clean production index evaluation system and resource comprehensive utilization code; therefore, the content which belongs to the clean production technology or comprehensive utilization technology but is not directly related with environmental protection facility in the original code will be properly deleted. After the revision of this code, the design content of control on the terminal of each procedure of iron and steel industry is highlighted.

The provisions printed in bold type in this code are mandatory ones and must be implemented strictly.

The Ministry of Housing and Urban-Rural Development of the People's Republic of China is in charge of the administration of this code and the explanation of the compulsory provisions. China Metallurgical Construction Association takes responsibility for routine management, and CERI is responsible for explaining specific technical details. All relevant organizations are kindly requested to sum up experiences and accumulate data during the process of implementing this code. If any amendment and addition is found necessary, please mail your comments and suggestions to the code administration office of CERI (address: No. 7 Jiananjie, Beijing Economic & Technical Development Area; Post code: 100176).

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## 1 General provisions

**1.0.1** The code is established in order to improve the environmental protection design level of the iron and steel industry construction project, fully implement the *Environmental Protection Law of the People's Republic of China* and the related laws, regulations and policies on pollution prevention of iron and steel industry, development policies of iron and steel industry and the like, and protect and improve the environment quality.

**1.0.2** The code is applicable to the environmental protection design of construction project of iron and steel industry. iron and steel industry includes iron ore, manganese ore, chromium ore mining and dressing, sintering, pelletizing, coking, ironmaking, steelmaking, rolling, ferroalloy, carbon, refractory material, metal product and other auxiliary processes. The environmental protection of iron and steel industry covers the environmental protection design on exhaust gas, wastewater, noise and solid wastes produced in the production process of iron and steel industry, requirements on selection of factory site and general layout, and division of environmental protection facilities.

**1.0.3** The environmental protection design of the iron and steel industry construction project, in addition to complying with this code, shall also meet the related requirements of current national standards.

## 2 Terms

### 2.0.1 Flue gas cleaning of sintering and pelletizing

Control the flue gas containing pollutants of particles, sulfur dioxide, oxynitride  $\text{NO}_x$ , fluoride and dioxin produced in the sintering and pelletizing production process of iron ore powder.

### 2.0.2 Dedusting of blast furnace casting house

Control the particles produced in BF casting house, mainly including taphole, main channel, slag runner, slag skimmer, tilting runner, etc.

### 2.0.3 Flue gas cleaning of EAF smelting

Control the pollutant flue gas containing particles and dioxin produced in the melting, oxidative decarbonizing and reduction smelting process of EAF.

### 2.0.4 Dedusting of primary flue gas of converter

Control the particles in flue gas (including recycling gas and bleeding gas) produced in the oxygen blowing smelting process of converter.

### 2.0.5 New OG method for primary flue gas cleaning of converter

Adopt the wet type cleaning method of spray tower and annular gap device and dewatering tower on the particles in the primary flue gas of converter.

### 2.0.6 Dedusting of secondary flue gas of converter

Control the dust-containing flue gas produced in the hot metal mixing, charging, slag discharging, and tapping processes of converter, except primary flue gas.

### 2.0.7 Utilization of recycled water

The used water in a defined production system either directly or after proper treatment, is reused in the same production process.

### 2.0.8 Cascade utilization of water

According to each procedure, each workshop or different requirements on water quality within different scopes in the production process, the water is orderly used in cascade from high to low according to the water quality requirements.

### 2.0.9 Direct cooling water

Cooling water which is in direct contact with cooled equipment or medium.

### 2.0.10 Recycle utilization rate of water

The ratio of repeated utilization amount to total utilization amount in the whole production process of enterprise within the certain metering time.

### 3 Basic requirements

**3.0.1** The design document of construction project shall cover the design content of environmental protection.

**3.0.2** The environmental protection design content of the construction project shall be performed, constructed and running with main works simultaneously.

**3.0.3** The environmental protection design of construction project of iron and steel industry shall strictly control the total emission amount of pollutants to ensure that the emission of pollutants meet the standards.

**3.0.4** The design of exhaust gas, wastewater, solid waste and noise environmental protection control facilities and the ecological protection in the construction project of iron and steel industry shall meet the following requirements:

**1** Mature exhaust gas pollutant technology shall be adopted for the prevention and control technology of cleaning; for the gas cleaning, dry type cleaning technology shall be replaced by wet type cleaning technology. Waste gas pollution prevention and control requirements shall be established in the key control areas for air pollution control designated by the nation. After cleaning, the exhaust gas pollutant in each procedure shall meet the requirements of the nation and local iron and steel industry and related exhaust gas pollutant emission standards.

**2** According to the principle of water supply and utilization by different grade and different quality, clean water and sewage division, recycled utilization of water, cascade utilization of water, and other technologies are adopted to improve the repeated utilization rate of produced water in each procedure; use urban recycled water as part of the water supply source to reduce the amount of water extracted per unit of product and the amount of discharged wastewater. It is strictly forbidden to discharge coking phenol-cyanogen wastewater and cold-rolling heavy metal-containing wastewater into the environment. After cleaning, the wastewater pollutant in each procedure shall meet the requirements of nation and local iron and steel industry and related wastewater pollutant emission standards.

**3** The solid wastes shall be treated by comprehensive utilization or safety disposal. The storage and disposal of solid wastes shall meet the requirements of current national standards, e.g. GB 18599 *Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes*, GB 18597 *Standard for Pollution Control on Hazardous Waste Storage*, and GB 18598 *Standard for Pollution Control on the Security Landfill Site for Hazardous Wastes*.

**4** Low-noise production process and equipment shall be selected and noise source shall be controlled. After the noise sources are controlled by measures, the factory boundary shall meet the requirements of nation and local iron and steel industry and related environment noise emission standards of factory boundary.

**5** In the construction, running and closing process of ore mining and ore dressing of metal mines of iron and steel industry, the ecological environmental protection shall be enhanced, and the ecological environmental protection shall be well planned and implemented.

**3.0.5** The automatic monitoring design on exhaust gas, wastewater and the like of the construction project of iron and steel industry shall meet the related current national technical requirements.

**3.0.6** For imported projects, the pollutant emission of equipment and devices shall meet the related requirements of the current national pollutant emission standards.

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## 4 Site selection and general layout

### 4.1 Selection of factory site

**4.1.1** The factory site of construction project must comply with the related laws and regulations of the P. R. C Environmental Protection Law. It is strictly forbidden to select sites in landscape areas and nature reserve areas designated by the nation and local governments.

**4.1.2** The factory site shall be selected in accordance with the requirements of national and local main function area plan, environmental protection plan, urban overall plan, environment function area plan and other related plans. The factory site of new project shall not be selected in urban built-up areas, municipal districts of prefecture-level and above cities.

**4.1.3 The factory site of project shall not be selected in the following locations:**

**1 Primary conservation areas and secondary conservation areas of surface water and underground water drinking water sources.**

**2 National or local special water resource protection areas (hot water, mineral water and thermal spring water), supplementing areas and runoff areas.**

**4.1.4** The site of coking plant of iron and steel industry shall not be located at both banks of main rivers, both sides of highways, and within one mile of food and medicine enterprises with strict pollution control requirements.

**4.1.5** The selection of special railways and highways for construction projects shall minimize the damage and pollution of the natural ecological environments along the routes.

**4.1.6** The construction project that emit pollutants into the atmospheric environment shall not be built in river valleys where atmospheric pollutants are difficult to diffused, basins, and areas with high static wind frequencies.

**4.1.7** The construction project with influence on quality of ambient air shall be built at the downwind side with annual maximum-frequency wind direction to environment-sensitive protection goals, e. g. living residential areas, hospitals and schools, and shall keep specified sanitary protection distance from living residential areas.

**4.1.8** The administrative management facilities and living facilities of the construction project shall be set at one side near the living residential areas and serve as the non-extension end of the construction project.

**4.1.9** The high-noise production facilities of the construction project shall be centrally arranged in the places away from person concentration areas and with quiet requirements; the anti-noise distance between the high-noise production facilities and their adjacent workplaces shall meet the current national noise and sanitary protection distance standards.

### 4.2 General layout

**4.2.1** At the premises of reaching conditions of reasonable production process and smooth material transportation, the general layout of construction project shall arrange the facilities with higher pollution hazard on the downwind side with annual maximum-frequency wind direction, and away from the areas



with higher environment quality requirements. For the determination of other facilities with pollution influence, the mutual influence and the pollutant stacking shall be minimized. The location shall be reserved for the environmental protection facilities which are temporary suspended due to technical problems.

**4.2.2** The coal storage yard and the coke storage yard shall be arranged together with the comprehensive stock yard of iron and steel plant. When they are separately arranged, they shall be located on the upwind side with annual minimum-frequency wind direction in the coking area.

**4.2.3** The steel slag treatment facilities of the steelmaking workshop shall be located on the upwind side with annual minimum-frequency wind direction in the steelmaking main plant.

**4.2.4** The production management area shall be located at the downwind side with annual minimum-frequency wind direction in the plant, and shall be oriented to the city or larger residential areas.

**4.2.5** The factory site of construction project of iron and steel industry shall be selected in accordance with the related requirements of the current national standard, e. g. GB 50603 *Code for Design of General Layout and Transportation for Iron and Steel Enterprise*.

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## 5 Design of environmental protection in procedures

### 5.1 Ore mining

**5.1.1** The dust suppression measures and the air ventilating and dedusting measures (wet rock drilling, water sprinkling and mist spraying) shall be taken in the production procedures of drilling (rock drilling), blasting, shoveling and transportation in the ore mining process. The dry dust trapping measures can be taken for the drilling operation in water-lack areas or hillside exposed mines.

**5.1.2** The special water sprinkling trucks shall be arranged in the mines, and be used for spraying water to roads to suppress dust at fixed time. The ore rock scattering preventing measure shall be taken in the truck transportation process.

**5.1.3** The effective dedusting measures shall be taken in ground crushing stations and underground crushing chambers. The high-efficiency dry type deduster shall be adopted for the dedusting equipment.

**5.1.4** The industrial sites of main well and auxiliary wells of underground mines and the mouth of air return well shall be kept away from residential areas. When the conditions are limited, they can be located at the downwind side with annual maximum-frequency wind direction in the residential area.

**5.1.5** When the fuel oil powered equipment is used in the mining process, the tail gas cleaning device shall be installed.

**5.1.6** The waste dump shall fully utilize the wastelands of hillsides and valleys, and minimize the occupation of tillage lands and forest lands. The site of waste dump shall be selected in accordance with the related requirements of the current national standard, e.g. GB 51119 *Code for Waste Dump Design of Metal Mine*. The water sprinkling or other dust suppression measures shall be taken for the dumping areas and other dust producing points.

**5.1.7** The water in exposed mining pits, and overflowed water in underground mine wells shall be collected and drained into water storage tanks, water storage ponds and other water storage facilities. After treating, they shall be recycled, or be drained after reaching standards.

**5.1.8** The leaching water in waste dump, and the heavy metal or other harmful mineral-containing mine wastewater shall be cleaned, and then be recycled, or be drained after reaching standards.

**5.1.9** The complete water cutoff and drainage systems and the barrier protection facilities for prevention and controlling water and soil loss shall be installed in the mining yards, waste dumps and mine roads.

**5.1.10** The stabilizing treatment facilities shall be taken for the exposed mining yard and waste dump; the preventing and monitoring facilities shall be installed. For the goaf with possible collapsing hazards, the preventing and monitoring facilities shall be taken on the ground.

**5.1.11** For the mines with destroyed lands, the lands shall be reclaimed in accordance with the relevant provisions of the land reclamation regulations and their implementation methods.

**5.1.12** The poisonless waste rocks of mines may be used as the filling or building materials for the exposed mining pits, underground goafs, and mined collapsing pits. The waste rocks containing poisonous matters or radioactive matters shall be disposed or utilized according to the related technical requirements.

**5.1.13** The proper silencing, damping, noise reduction and other denoising measures shall be taken for the perforating machines, rock drilling machines, air compressors, air ventilators and other high-noise equipment.

## **5.2 Ore dressing**

**5.2.1** The pollution prevention and control of ore dressing shall be designed according to the type, quantity, concentration and emission method of pollutants in the ore dressing test report and other pollution prevention and control plans.

**5.2.2** When the ore dressing process is designed, the transfer frequency of material shall be reduced, and the fall difference of transfer shall be reduced; the powerless dust trapping device may be adopted at the transfer point of rubber belt. The dedusting systems shall be installed at the dust producing points of procedures or facilities, e.g. ore transportation, transfer, ore warehouse, crushing and screening; the bag type deduster or electrostatic precipitator shall be used; the spraying dust-suppression device shall be installed at the dust producing points which cannot be sealed and have small amount of dust.

**5.2.3** The high-efficiency flue gas cleaning facilities shall be equipped for the rotary kiln and shaft kiln for magnetized roasting.

**5.2.4** The air ventilating and dedusting measures shall be taken for the underground operation spaces of ore grinding and sorting plants, laboratory and ground ore bin.

**5.2.5** The poisonless, non-corrosive or low-poison and low-corrosion flotation agents shall be selected for the flotation operation. When the high-alkalinity and high-acidity flotation operation is selected, the wastewater shall be recycled after neutralized.

**5.2.6** The ore dressing plant shall be equipped with perfect circulating water system. The production wastewater (return water of concentrate filtering, overflow water of tailing concentration tank, cooling water of equipment, floor water of plant flushing and the like) and the clarified water of tailing warehouse shall be sent into the circulating water system to recycle.

**5.2.7** The ore dressing plant shall be equipped with emergency pond to collect the slurry which is discharged under the emergency condition.

**5.2.8** The tailing slurry shall be conveyed after concentrated at high concentration; the wearing resistant pipes shall be used for the conveying system, preferably double wearing resistant pipes.

**5.2.9** The waste tailings produced in the ore dressing process shall be properly treated without arbitrate discharge.

**5.2.10** The site selection and closing of tailing warehouse and the environmental protection measures of tailing facilities shall meet the related requirements of current national standard, e.g. GB 50863 *Code for Design of Tailings Facilities*.

**5.2.11** The non-metallic screen nets, spring dampers, and other denoising measures shall be used for the vibration screen of crushing and screening system. The local sealing measures shall be taken for the vibration screen and ball grinder. The underground ore bin shall be equipped with low-noise feeding and discharge equipment.

## **5.3 Stock yard**

**5.3.1** The raising dust preventing measures shall be taken for the stock yard. For the stock yard within the key control area, and the stock yard outside key control area but within city planning area, the

closed type material storage process shall be adopted for bulk materials. For the stock yard outside key control area and city planning area, the dustproof net, water spraying or surface covering agent spraying and other pollution prevention and control measures shall be taken.

**5.3.2** The bulk materials shall be conveyed by the automatic continuous conveying facilities; the material stacking and reclaiming device shall be equipped with spraying dust suppression device.

**5.3.3** For the stock yard within key control area, the rubber conveyor shall be equipped with enclosed corridor or take other sealed transportation types; the rubber conveyors in other areas shall be equipped with belt covers. The sealing measures shall be taken for the producing dust points in the transfer, discharge and receiving process of belt conveyor, and be equipped with dedusting or dust suppression facilities. The sealing measures shall be taken for the dust producing points of crushing and screening facilities, and be equipped with dedusting facilities.

**5.3.4** The sealing measures shall be taken for the train dumpers and truck receiving trough, and be equipped with dedusting facilities or high-efficiency spraying dust suppression devices.

**5.3.5** The sealing devices shall be installed in the dust discharge, conveying and storage process of deduster; when the dust is conveyed in long distance, the sealed conveying type shall be adopted for the pneumatic conveying type or closed type tank car, without secondary pollution.

**5.3.6** The car service rack shall be set at an exit of stock yard.

**5.3.7** The rainwater drainage system of stock yard shall be equipped with precipitating tank; the precipitated rainwater shall be recycled. The flushing water shall be collected and treated, and then recycled.

**5.3.8** The dust and water treatment sludge collected by dedusting facility shall be recycled, without secondary pollution.

**5.3.9** The silencing, sound isolation, damping and other noise control measures shall be taken for the crushing and screening equipment, fans and other high-noise sources. The equipment layers with transfer stations, crushing and screening stations and other high-noise noises shall be sealed.

## **5.4 Sintering and pelletizing**

**5.4.1** The following requirements shall be met in the material conveying process:

1 The material transfer frequency shall be reduced in the conveying process, and the fall difference shall be reduced.

2 When the material which is easy to produce raise dust is conveyed, the humidifying measure shall be taken, or the closed type conveying process is implemented.

3 The producing dust point shall be equipped with the dedusting system with closed type air suction, and the high-efficiency deduster shall be selected.

4 When the materials are loaded and unloaded by trains, trucks and other open type transportation equipment, the dust preventing and suppression measures shall be taken.

**5.4.2** In the proportioning process, the material which is easy to produce raise dust shall be centrally arranged, and the applicable isolation and dust suppression measures shall be taken.

**5.4.3** The flue gas circulating technology shall be taken for the sintering, so as to reduce the amount of sintering flue gas which is exhausted into atmosphere. The material discharge ends of sintering machines, belt type roasting machines, and belt type cooling machines shall be equipped with large-capacity sealing hoods; before the dust-containing exhaust gas is exhausted, the high-efficiency

dedusters shall be used for cleaning. At the same time, the high-efficiency sealing technologies shall be adopted to prevent the dust of the cooling machine from escaping.

**5.4.4 The roasting flue gas produced in the production process shall be cleaned via dedusting and desulfurization.**

**5.4.5** When the content of other pollutants(nitrogen oxides, fluorides, lead and its compounds, dioxins, etc.) which are prohibited from being exhausted in the flue gas during the production process cannot meet the environmental protection requirements, the applicable pollutant removal measures shall be taken. The sintering machine within the key control area shall be equipped with flue gas comprehensive cleaning facility. The produced flue gas shall be firstly cleaned and then exhausted via chimney; the height of chimney shall meet the applicable technical requirements.

**5.4.6** The dust collected by the third electric field and subsequent electric fields of electric precipitator at head of sintering machine shall not be recycled, and shall be properly treated. The produced waste liquid, exhaust gas and solid matters in the flue gas cleaning process(desulfurization and denitrification) shall be treated according to the properties, without secondary pollution.

**5.4.7** The floor flushing water and wet type dedusting wastewater shall be collected and treated for recycling.

**5.4.8** The noise reduction and sound isolation measures shall be taken for the high-noise fans; for other noise production points, applicable noise reduction or sound isolation measures shall also be adopted. When the large-scale fans are arranged in the open air, the rain protection, heat isolation and sound isolation measures shall be taken for the fan shell, air pipe and silencer enclosure.

**5.4.9** The damping measures shall be taken according to the characteristics of crushers, mixers, pelletizers, vibration screens and other large equipment. When the production process conditions are permitted, the local or whole sound isolation hoods shall be adopted.

## **5.5 Coking**

**5.5.1** The coal warehouse or closed type coal yard shall be adopted for the coal storage facility; the water spraying dust suppression device shall be installed in the stack yard. The vehicle flushing facilities and flushing water precipitating tanks shall be installed at the vehicle entry and exit of coal warehouse or coal yard; the flushing water shall be firstly recycled after precipitated.

**5.5.2** The sealed corridor or sealed hood shall be adopted for the belt conveyor of coal preparation system. The dust suppression and dedusting facilities shall be installed in the coal conveying process. The pulverized coal crushing machine room shall be equipped with bag type deduster, and the trapped dust shall be conveyed back into the coal feed system for coking.

**5.5.3** The closed type air suction measures shall be taken in the adhesive storage, adhesive adding and mixing, forming and briquette coal conveying processes of shaped coal system, and the flue gas cleaning device shall be installed. The produced wastewater in the flue gas cleaning process shall be conveyed into phenol-cyanogen wastewater treatment station.

**5.5.4** The cleaned gas shall be adopted for the coke oven and tubular reheating furnace.

**5.5.5** The air-cooling elastic knife-edge door shall be selected for the door of coke oven; heat-isolation and energy-saving type hole cover shall be selected for the coal charge hole cover; water seal type shall be selected for the uptake cover; the bridge pipe and the water seal valve shall be closely and tightly inserted.

**5.5.6** The coke pushing machine and coke blocking machine shall be equipped with cleaning devices of furnace doors and furnace framework. The mechanical cleaning device shall be installed at the top of coke oven.

**5.5.7** When the coal is charged into coke oven, the perfect flue prevention and control measures shall be taken.

**5.5.8** When the coke is discharged out of coke oven, the perfect smoke trapping and cleaning measures shall be taken at the machine side and coke side.

**5.5.9** When the coke oven is designed, the source control measures shall be taken to reduce the emission of NO<sub>x</sub> in combustion exhaust gas. When the standard still cannot be reached, the flue gas denitrification facility shall be adopted.

**5.5.10** The reliable automatic adjusting device shall be installed for the pressure control of gas collecting pipe of coke oven. When the pressure of crude gas of the gas collecting pipe of coke oven exceeds the specified upper limit of bleeding pressure, the gas can be automatically bled, and the automatic ignition device shall be installed. When the pressure is lower than the specified lower limit of bleeding pressure, the bleeding can be automatically closed.

**5.5.11** The new coke oven shall be synchronously equipped with coke dry quenching device.

**5.5.12** The closed type air suction and dedusting facilities shall be installed at the producing dust points, e.g. bleeding of coke charge, coke discharge and pre-storage chambers of coke dry quenching device, and bleeding of circulating gas.

**5.5.13** The belt conveyor of coke dry quenching and conveying system shall be equipped with spraying dust suppression facilities, and adopt the sealed corridors or sealed hoods which can be conveniently opened. The underground part of first belt conveyor after coke discharge of coke dry quenching system shall be equipped with air suction and dedusting device. The gas collecting and dedusting devices shall be installed at the material falling points of transfer stations, coke warehouse in front of coke oven, coke granulating chamber, coke screening building and coke storage trough.

**5.5.14** The pulverized coal or coke collected by the dedusting devices of coal preparation and coking systems shall be recycled.

**5.5.15** **The desulfurization and decyanation gas cleaning device shall be installed for the crude gas of coke oven.**

**5.5.16** The cleaned gas shall be used by the gas users, e.g. tubular reheating furnaces for refining of chemical products.

**5.5.17** The harmful gas exhausted or bled by the process equipment of gas cleaning device shall be treated according to the following requirements:

**1** The bleeding gas of various storage tanks, water seal tanks and underground emptying tanks (except benzene storage tanks) shall be accessed into the pressure balance system, or be firstly washed by the exhaust washing tower and then exhausted. The large storage tanks shall be equipped with breathing valves for standby.

**2** The bleeding gas of benzene storage tank shall be accessed into the pressure balance system or internal floatation roof tank using nitrogen seal.

**3** The ammonium sulfate shall be dried by vibration fluidized bed drying system; the tail gas shall be separated by cyclone, dedusted in wet way, and exhausted.

**4** For the wet oxidizing type desulfurization process using ammonia as alkaline source, the

regenerated tail gas of desulfurization liquid shall be exhausted after washing and cleaning.

**5.5.18** For the produced wastewater in the gas cleaning process and the chemical product refining device area, the following prevention and control measures shall be taken:

1 The water in each device area shall be drained according to the water quality, and the principle of separating clean water and sewage shall be strictly followed.

2 The ammonia water distillation device shall take the ammonia salt decomposing and fixing measures.

3 The separated water in separators, intermediate tanks and raw material product storage tanks of crude benzene distillation, solvent dephenolization, benzene refining and tar distillation devices shall be collected and sent into the tar and ammonia water separation equipment in condensing and air blowing section for treatment.

4 The drained water in each production device area shall take the primary rainwater and floor flushing water collecting measures, and then be uniformly sent into the acid and phenol-containing wastewater treatment station to centrally treat.

5 The wastewater of tank washing station shall be subject to oil and water separation; the recycled oil shall be sent back into each process system; the wastewater shall be sent into phenol-cyanogen wastewater treatment station.

6 The sodium carbonate or sodium sulfate-containing wastewater produced in the decomposing process of phenol salt decomposing unit of coal tar processing system shall be sent into the phenol-cyanogen wastewater treatment station.

7 The emptying liquid of equipment or pipeline shall be collected and returned to the respective system.

8 The leakage-free environment-friendly pumps shall be selected for the conveying pumps of benzene and other mediums.

9 The turbid circulating water for asphalt forming and cooling shall independently form the system for circulating.

**5.5.19** The harmful gas exhausted by the process equipment in the crude benzene hydrogenation and refining device shall be treated according to different conditions:

1 The internal floatation roof tank shall be adopted for the benzene liquid storage tank, which is equipped with nitrogen sealing system and breathing valve.

2 The gas exhausted by stabilizing tower shall be accessed into gas suction pipeline before primary cooling of gas, or being firstly desulfurized and then accessed into fire torch system.

3 The gas exhausted by negative-pressure distillation vacuum unit shall be accessed into tubular type furnace to incinerate.

4 The gas exhausted by other process equipment shall be accessed into negative-pressure gas pipeline or fire torch system after centrally treated.

**5.5.20** The harmful gas exhausted by process equipment in the tar processing device shall be treated according to the following requirements:

1 The internal floatation roof tank shall be used by the light oil storage tank which is equipped with nitrogen seal system and breathing valve.

2 Other poisonous and combustible liquid storage tanks shall be equipped with nitrogen seal systems and breathing valves, and the gas exhausted by process equipment and storage tanks shall be

accessed into exhaust cleaning system.

**5.5.21** The phenol-cyanogen wastewater, other wastewater and domestic sewage shall be centrally treated according to the following requirements:

1 The production wastewater of coal tar processing and crude benzene hydrogenation and refining device shall be sent into the phenol-cyanogen wastewater treatment station to uniformly treat.

2 The phenol-cyanogen wastewater shall be subject to deoiling pretreatment, and the recycled oil shall be sent into the tar and ammonia water separation equipment.

3 The wastewater reaching standard requirements after biochemical treatment can be used for steelmaking and ironmaking slag or sintering proportioning.

4 The wastewater after biochemical treatment shall be deeply treated, and the recycled water shall be used as the make-up water of circulating water.

5 The treated wastewater shall be fully utilized, and the phenol-cyanogen wastewater shall not be drained into environment.

**5.5.22** The following control measures shall be taken for the waste slag produced in the gas cleaning and phenol-cyanogen wastewater treatment:

1 The tar residue discharged by tar and ammonia water separation equipment and tar storage tank, the acid tar discharged by ammonia sulfate production device, the remaining sludge after dewatering in phenol-cyanogen wastewater treatment station, and other hazardous wastes shall be treated by the secondary pollution-free measures, and then mixed into the coking coal. The tar residue shall be conveyed in a sealing way.

2 The regenerated residues in the crude benzene distillation and solvent dephenolization processes shall be mixed into tar.

3 The distillation residues in the phenol refining and pyridine refining processes shall be mixed with kreosote to prepare the fuel oil.

**5.5.23** The waste liquid produced in the gas desulfurization process shall not be discharged out, and shall be subject to harmless treatment by different desulfurization processes:

1 The waste liquid produced in the wet oxidizing desulfurization process shall be subject to salt extracting, or the waste liquid is mixed with the recycled sulfur and then incinerated to prepare sulfuric acid.

2 The waste liquid produced in the vacuum carbonate type desulfurization process shall be sent into the phenol-cyanogen wastewater treatment station after singly pretreated.

**5.5.24** The area division anti-seepage measures shall be taken for the coking to prevent the underground water from being polluted.

**5.5.25** The coal breakers (frozen block breaking), coal crushers, coal charge and coke discharge dedusting fans, coke granulating and screening equipment, coke dry quenching circulating fans and the like shall be provided with the damping and denoising facilities.

**5.5.26** The damping and denoising measures shall be taken for the gas air blower for gas cleaning, vibration fluidized bed drying machine, air blower of phenol-cyanogen wastewater treatment station, etc.

## **5.6 Ironmaking**

**5.6.1** The sealing and dedusting measures shall be taken for the dust producing facilities, e. g. top receiving facility and bottom screening, weighing, feeding and conveying facilities of ore bin and coke



bin. The dust producing points for discharge at the transfer station and belt conveyor shall be sealed and equipped with dedusting or dust suppression devices.

**5.6.2** The discharging point at the top of furnace of charging shall be equipped with gas collecting hood and dedusting facility.

**5.6.3** The closed type negative pressure pulverized coal preparation process shall be taken for the injection & pulverized coal preparation process. The dedusting measures shall be taken for the pulverized coal discharge point, pressure-equalizing exhaust and other dust producing points.

**5.6.4** The sealing measures shall be taken for the dust producing points, e.g. taphole, main channel, slag runner, slag skimmer, tilting runner, etc. of casting house; the side suction and top suction trapping measures shall be taken at the taphole to collect flue gas, and the dedusting facilities shall be equipped.

**5.6.5** The ironmaking gas shall be firstly recycled after cleaned. The dry type cleaning process shall be used for BF gas; the non-blast furnace gas shall be used by the dry type cleaning process, and the untreated gas shall not be bled into atmosphere.

**5.6.6** The dust producing points of mud mill and pig casting machine shall be equipped with dedusting facilities.

**5.6.7** The cleaning measures shall be taken for the furnace top equalizing bleeding gas, and the cleaned gas shall be recycled.

**5.6.8** The indirect cooling water, slag granulating water, water of pig casting machine, cooling water of dry slag pit and other wastewater shall be respectively recycled. The blowdown water of each circulating system shall be utilized in cascade according to the water quality requirements. The water quality assurance measures shall be taken for the indirect cooling water circulating system, e.g. stabilizing of water quality.

**5.6.9** The blowdown water of gas scrubbing circulating water system shall be drained into slag granulating water circulating system, and the gas scrubbing wastewater treatment facility shall be equipped with water quality monitoring and sludge dewatering devices.

**5.6.10** The furnace slag in ironmaking shall be treated by furnace front water quenching process; the steam of slag granulating water shall be led into overhead part to be drained, or be used as waste heat for utilization.

**5.6.11** The sealing systems shall be equipped in the dust discharge, conveying and storage process of deduster. Under the condition of long-distance conveying, the pneumatic conveying or closed type tank car shall be used. The dust shall not be stacked outdoors.

**5.6.12** The silencing, sound isolation, damping and other noise control measures shall be taken for the BF blower, combustion air fan of hot stove, gas pressure-relief valve unit, gas remaining pressure recovery and reusing device, air bleeding valve, gas pressure-equalizing bleeding valve, dedusting fan and other noise production equipment.

## **5.7 Steelmaking and continuous casting**

**5.7.1** The closed type air suction and dedusting measures shall be taken for the dust produced in the material crushing and screening process.

**5.7.2** When the bulk material of steelmaking is conveyed, the transfer frequency and fall difference shall be reduced. The sealing measures shall be taken for the bulk material screening and charging system; each dust producing point shall be equipped with air suction and dedusting system and

applicable dust collecting, loading and unloading, transportation and storage facilities. The scrap shall be sorted, so as to minimize the charge amount of chloride and organic matter-containing scrap, e.g. grease, coating and plastic.

**5.7.3** For the dust produced in the hot metal reloading station and hot metal pretreatment technology, the dust trapping and dry type dedusting systems shall be equipped.

**5.7.4** For the dust produced in mixer, the closed or semi-closed type air suction and dedusting system shall be equipped. The flue gas can be cleaned by dry process.

**5.7.5** The un-combustion type design shall be used for the converter, and the flue gas cleaning & recovery facility shall be installed.

**5.7.6** The primary flue gas of converter shall be cleaned by the dry type process or new OG process; other bleeding systems shall be equipped with ignition devices. The converter shall be equipped with secondary dust trapping system, and the bag filtering cleaning process is used.

**5.7.7** The steelmaking EAF shall be equipped with flue gas trapping and cleaning system.

**5.7.8** The refining device with producing dust shall be equipped with dust trapping and dry type dedusting systems. The vacuum oxygen blowing decarbonizing refining furnace shall be equipped with bag type filter to clean the flue gas.

**5.7.9** The dust trapping and dedusting device shall be equipped in the caster mould area, billet flame cutting area of continuous casting, online scarfing machine and tundish repair place shall be equipped with dust trapping and dedusting device.

**5.7.10** The steelmaking plant within the key control area shall be internally equipped with roof dust trapping and dedusting system.

**5.7.11** The independent circulating water system shall be installed for the direct cooling water of refining, and the high-efficiency precipitating or filtering facility shall be selected. The quality of water after treatment shall meet the water quality requirements of circulating water supply.

**5.7.12** The continuous casting secondary cooling water shall be treated by the high-efficiency precipitating and deoiling facilities. The quality of water after treatment shall meet the water quality requirements of continuous casting circulating water supply.

**5.7.13** The iron-containing dust and dust sludge collected by the dedusting system and wastewater treatment system shall be recycled. For the dust sludge with high content of zinc, the zinc shall be removed, and then the dust sludge can be comprehensively utilized. The second dust preventing measures shall be taken for the collecting, loading and unloading, transportation and storage facilities of dry dust and dust sludge.

**5.7.14** The steel slag shall be treated with the drum method, tray hot splashing method and hot soaking method and the applicable steel slag crushing, magnetic dressing and screening processes. Each dust source unit shall be equipped with closed type air suction and dedusting device.

**5.7.15** The sound isolation measures shall be taken for the steelmaking crushing and screening equipment. The silencing and sound isolation measures shall be taken for the fans; the outdoor intake pipeline of fan shall be bundled in a sound isolation way. The waste heat boiler safety valve and air cylinder pressure adjusting valve shall be equipped with silencers.

**5.7.16** The enclosed hood or semi-enclosed hood shall be taken for the control of smelting noise of EAF.

**5.7.17** The steam injection vacuum pump for refining shall be installed in the sealed building, and the

injector can be bundled in a sound isolation way; the exhaust pipe and the steam bleeding pipe shall be equipped with silencers.

## **5.8 Steel rolling and metal products**

**5.8.1** The byproduct gas shall preferably be used for the steel rolling industrial furnace kiln, and the low-nitrogen combustion technology shall be utilized.

**5.8.2** The exhaust gas collecting and cleaning facilities shall be installed in the straightening and withdrawal, finishing, polishing, grinding, welding, rolling, pickling, degreasing, plating and acid regeneration procedures.

**5.8.3** The bearing of rolling mill shall be lubricated by the closed-loop lubricating technology.

**5.8.4** The indirect cooling water of rolling shall be recycled after cooled.

**5.8.5** The quenching cooling water system shall be combined treated with the turbid circulating cooling water system of rolling mill. The quenching cooling water system can be individual recycled and treated. The combined treatment can be recycled and reused after primary settlement, secondary settlement, deoiling (filtering) and cooling; the individual recycled treatment should be reused after (settlement) filtering and cooling.

**5.8.6** The acid, alkaline, chromium-containing wastewater and oil-containing wastewater produced by the rolling system shall be separately treated; the chromium-containing wastewater and oil-containing wastewater shall be centrally treated after respectively pretreated. The wastewater treatment system shall comprise water quantity and water quality adjusting, deoiling, emulsion demulsifying and decomposing, waste oil recycling, aerating, neutralizing, flocculation, precipitating, neutralizer preparation and feeding, mud concentration, sludge dewatering and automatic monitoring facilities. The wastewater after treated shall be recycled.

**5.8.7** The oil and emulsion-containing wastewater and the concentrated-alkaline wastewater with high oil concentration shall be equipped with independent demulsifying and deoiling wastewater treatment systems, be comprehensively treated after singly treated or locally treated.

**5.8.8** The chromium-containing wastewater shall be equipped with independent reduction, precipitation, and wastewater separation treatment system; the concentration of hexavalent chromium at the drain port of independent treatment facility shall be comprehensive treated after reaching the standard.

**5.8.9** The rinsing wastewater after electroplating and the heavy metal ion-containing wastewater shall be compared according to technical and economic parameters, and then be determined to be recycled or be treated as wastewater. When treating as wastewater, the independent treatment system shall be installed, and other wastewater shall not be mixed. When the chemical agent method is used for continuous treatment, the heavy metals shall be recycled.

**5.8.10** The waste oil of rolling factory shall be recycled and regenerated.

**5.8.11** The valuable waste acid liquids produced by the pickling facilities of rolling plant and other plants shall be recycled and regenerated, or be comprehensively utilized by other methods.

**5.8.12** The chromium and graphite-containing sludge shall be properly stored; the storage location and facility shall meet the related technical requirements; or the chromium and graphite-containing sludge shall be treated according to the related treatment requirements of hazardous wastes.

**5.8.13** The oil residue-containing sludge shall be incinerated, the treatment facilities and emission

concentration shall meet the related technical requirements, the iron-containing slag after treated can be used for sintering.

**5.8.14** The degreasing sections of zinc plating, tin plating and continuous annealing units shall be equipped with degreasing liquid cleaning devices.

**5.8.15** The silencing, sound isolation, sound absorption, vibration isolation or damping methods shall be respectively taken for various units and facilities of rolling plant according to the specific conditions of noise sources.

**5.8.16** For the internal blowing of galvanized steel pipe of steel rolling plant, the silencer shall be installed at the steam injector; the sound isolation and dust collection devices shall be set at the exit of galvanized steel pipe.

**5.8.17** The acid and alkaline wastewater of metal product plant shall be neutralized, or centrally treated; the rinsing wastewater of electroplating shall be continuously treated by the chemical agent method; when the ion exchange method is used, the other wastewater shall not be mixed. The chromium-containing wastewater which is drained by the electroplating center shall be treated according to the related technical requirements; the heavy metal ion-containing wastewater shall be singly treated according to system, and the heavy metal shall be recycled.

## **5.9 Metallurgical lime and refractory material**

**5.9.1** The limestone yard shall be equipped with water sprinkling or other dust suppression devices.

**5.9.2** The dust producing points in the metallurgical lime and refractory material production process shall take the effective dedusting devices, and avoid the secondary raise dust.

**5.9.3** The pneumatic conveying way shall be used for lime powder, the suction and discharge tank car shall be adopted for the car transportation.

**5.9.4** The shaft kiln and rotary kiln of calcined limestone and refractory material and the drying cylinder of refractory material shall be equipped with flue gas cleaning devices.

**5.9.5** The tar and asphalt flue gas produced in the oil impregnating process of refractory material shall be discharged after firstly treated.

**5.9.6** The limestone and silica washing wastewater shall be centrally collected, treated and recycled.

**5.9.7** Under the allowable condition of production technology, the sprinkler facility and dust suppression device or floor flushing device shall be installed in the plant; the wastewater shall be centrally collected, treated and recycled. The outdoor site and road shall be equipped with water sprinkling and dust suppression devices.

**5.9.8** The dedusting device shall be set according to the production system of same variety of raw material; the collected dust shall be recycled. The dust which fails in recycling shall be properly treated, and the secondary pollution shall be prevented.

**5.9.9** The finished product and waste product of chromium-containing refractory material and the waster brick shall be safely disposed.

**5.9.10** The damping and denoising measures shall be taken for the crusher, cylinder mill, ball mill, vibration screen, high-noise fan, air compressor and large ore chute.

**5.9.11** The environmental protection design in the light-burnt dolomite production process shall follow the design requirements of metallurgical lime part in the article.

## 5.10 Ferroalloy

**5.10.1** All dust producing parts in the raw material treatment, smelting, casting, finishing, loading, unloading and conveying processes shall be equipped with dedusting and recycling devices. Various ferroalloy EAFs, blast furnaces, converters, refining furnaces, shaking furnaces and metal heat type copulas shall be equipped with dry bag type flue gas cleaning and dust collecting devices.

**5.10.2** The raising dust preventing measures shall be taken for the raw material storage yard. Except the silica exposed stack yards, the closed type storage process shall be used for the manganese ore, chromium ore, laterite nickel ore, carbon reductant and other bulk materials, and the wind protection, rain protection, seepage prevention, dust suppression and other pollution prevention and control measures shall be taken.

**5.10.3** The preheating and pre-reduction rotary kiln using rotary kiln-submerged arc furnace(RKEF) process technology in the nickel iron production process shall be equipped with dry type flue gas cleaning, electrostatic dedusting and desulfurization devices; the environmental protection of sintering, pelletizing and agglomeration facilities of manganese ores and chromium ores shall be set according to the requirements of Article 5.4 in the code; the rotary kilns, multi-layer furnaces, boiling furnaces, drying kilns and shaft kilns for roasting minerals shall be equipped with closed type hoods and applicable dedusting devices.

**5.10.4** The short hood type semi-enclosed EAF devices shall be used for 75% silicon iron(FeSi75) and silicon-calcium alloy which are difficult in totally-enclosed EAF; the flue gas shall be cleaned by the heat energy recycling type dry cleaning technology; for the high-temperature flue gas, the steam shall be recycled by waste heat boiler, and be directly used, or the steam is used for generating power.

**5.10.5** The advanced and practical totally-enclosed EAF shall be used for the high-carbon ferromanganese, manganese-silicon alloy, high-carbon ferrochrome and ferronickel which are suitable for totally-enclosed EAF production, and be equipped with gas recycling device; the EAF gas shall be treated by the dry type cleaning and dedusting technology. The recycled gas with high calorific value can be used for production, and the surplus gas can be used for generating power.

**5.10.6** The semi-enclosed or cover type EAF shall be used for the ferromanganese and ferrochrome refining production, and be equipped with flue gas trapping system and dry flue gas cleaning and dedusting facilities.

**5.10.7** The wastewater produced in the silica washing process shall be recycled after firstly settlement. The produced sludge and tailing stone shall be properly treated or utilized.

**5.10.8** The washing water of totally-enclosed EAF gas wet dedusting shall form the independent system, and be recycled after treated. The phenol-cyanogen washing water treatment system shall comprise the settlement, slag filtering, chemical treatment, mud treatment, and monitoring and water quality stabilizing facilities. A small amount of blowdown water can be used for water granulating system.

**5.10.9** The mud of the totally-enclosed EAF gas scrubbing water treatment system shall be dewatered after secondary concentrated, The dewatered sludge cake can be used as the raw material for smelting and recycled. When the harmful component-containing sludge is stacked, the environment pollution preventing measures shall be taken. When the sludge belongs to hazardous wastes, it shall be treated according to the related requirements of national hazardous waste standard.

**5.10.10** The metal chromium production wastewater and chromium hydroxide reaction waste liquid after treating shall be returned into production system, but not drained out. The treatment of chromium-containing wastewater shall form the independent system. After treating, the produced chromium-containing wastewater in the electrolytic manganese metal production process shall be returned into the production system to recycle, but not drained out. The treatment of vanadium-containing wastewater shall form the system, and shall not be mixed with other wastewater.

**5.10.11** The treatment of ferromanganese blast furnace gas scrubbing cyanogen-containing wastewater shall form the system. The treated wastewater shall be recycled, but not drained out.

**5.10.12** The high-carbon ferromanganese, manganese-silicon alloy, high-carbon ferrochrome, ferronickel and other ferroalloy furnace slag shall be treated by the water quenching granulating or dry hot splashing methods. The slag granulating water shall be recycled.

**5.10.13** Because of high alkalinity, the refined ferrochrome and other pulverized slag are easy to pulverize and form dust pollution; therefore, they shall be treated and transported in a sealing way. The dust raising points in the treatment process shall be equipped with dust collecting hoods and the bag type dedusters are used.

**5.10.14** The harmless treatment measures shall be taken for the metal chromium extracting slag, vanadium pentoxide extracting slag and other poisonous slag, which is respectively mixed with smelting chromium-containing and vanadium-containing pig iron in furnace charge to be comprehensively utilized. For the extracting slag which cannot be comprehensively utilized due to condition limitation, it shall be disposed according to the related requirements of current national hazardous waste control standards.

**5.10.15** The crusher and vibration screen of raw material and finished product system shall be equipped with dampers between base and foundation; the dry ball mill and wet ball mill shall be equipped with sound isolation hoods or chambers. The silencing, damping and sound isolation measures shall be taken for the sound sources of other high-noise equipment according to different conditions.

## **5.11 Carbon**

**5.11.1** The closed type dust collection and dedusting facilities shall be equipped for the dust producing parts, e.g. stock yard, secondary crushing proportioning, roasting filling material processing, graphitizing filling material processing and product processing. The dedusted and recycled material shall be returned into production process to use.

**5.11.2** When the delayed petroleum coke is calcined, the rotary kiln, rotary bed or calcining furnace shall be selected according to characteristics of different raw materials and construction scale. For the produced high-temperature tail gas, the air shall be sucked in a sealing way, and be cleaned via dedusting and desulfurization, and the waste heat recycling device shall be set.

**5.11.3** For the asphalt fume produced in the asphalt melting and high-pressure impregnating process, the gas shall be collected in a sealing way, and the asphalt fume cleaning device shall be installed. The electric tar trapping device shall be used for the cleaning equipment.

**5.11.4** For the asphalt fume with low dust concentration in the mixing and kneading process, the gas shall be collected, and the coke breeze adsorption dry type cleaning method shall be adopted.

**5.11.5** For the asphalt fume with low dust concentration in the cooling process, the gas shall be collected, and the coke breeze adsorption dry type cleaning method or electric tar trapping device

cleaning method shall be used.

**5.11.6** For the asphalt fume produced by the roasting furnace, the recycling and cleaning device shall be provided. The evaporation type cooler shall be set in front of electric tar trapping device. The flame-proof and explosion-proof measures shall be taken for the cleaning device, which is equipped with bypass flue. The recycled tar shall be comprehensively utilized.

**5.11.7** For the harmful matters of chloride and fluorine in the high-purity product (graphitized flue gas), the cleaning facilities to remove applicable chloride and fluorine shall be installed.

**5.11.8** The oil-containing cooling water in the forming and impregnating procedures and the scrubbing water in the wet asphalt fume cleaning process shall be deoiled and then recycled.

**5.11.9** The waste slag in the production process, silicon carbide in the graphitizing process, and the crushed materials in the product processing process shall be comprehensively utilized. For the waste slag which cannot be utilized or cannot be utilized at temporary, the slag yard shall be built for stacking. The anti-seepage, anti-bleeding, anti-loss and rainwater collecting measures shall be taken for the slag yard.

**5.11.10** The crushers, vibration screen, ball mills, air compressors, high-pressure fans and extruders shall be equipped with silencing, damping and sound isolation devices according to different conditions.

## **5.12 Public and auxiliary facilities**

**5.12.1** The coal-fired boiler shall be designed according to the following requirements:

**1** For the coal used by the self power plant and industrial boiler house of iron and steel enterprise and by the large and medium coal-fired boilers, the dust producing points of loading and unloading, storage, crushing, screening, transportation and charge facilities shall be equipped with mechanical air suction and dedusting facilities; the collected dust shall be recycled. The coal stack yard shall be equipped with closed type coal storage facilities.

**2** The low-sulfur coal or fired coal shall be used for the coal-fired boiler, which shall be mixed with gas, and the flue gas cleaning facility shall be installed. The flue gas cleaning facility can be selected according to the model of boiler, coal quality, region conditions, etc., and the dry high-efficiency deduster shall be adopted for cleaning. The cleaned flue gas shall be exhausted via high chimney. The coal-fired power plant shall be equipped with desulfurization, denitrification and demercuration devices.

**3** The wet type dust discharge system is adopted; the drain water of boiler body water utilization system, and the drained water of softening water system shall be used as the boiler hydraulic slag granulating water. The wastewater in the flue gas wet dedusting and wet desulfurization processes of coal-fired boiler shall be recycled after treated.

**4** The circulating system shall be installed for the boiler hydraulic granulation and wet dedusting wastewater, and the wastewater shall be neutralized according to the acid and alkaline characteristics of wastewater.

**5** The pulverized coal of self power plant shall be comprehensively utilized, and the special stack yard shall be built. The pulverized coal transportation and storage system, dust digging and loading machines, and dust transportation vehicles shall be equipped according to dry and wet separate discharge principle.

**6** The roads shall be arranged around the dust yard, and are used for transporting out the dust. The secondary dust raising preventing measure shall be taken for the dust yard.

7 The silencer shall be installed at the blower entry of coal-fired boiler, and the vibration isolation flexible pipe shall be set between the air outlet and the pipeline. The induced draft fan and pipeline shall be performed with sound isolation and bundling treatment.

**5.12.2** The gas station shall be designed according to the following requirements:

1 When the gas generation station is built, the new type energy-saving gas generation furnace is favorably adopted. The gas shall be desulfurized and dedusted, and the proper desulfurization and dedusting technology is adopted according to the sulfur and dust contents.

2 The scrubbing water of gas wet cleaning treatment should be divided into the hot circulating system and the cold circulating system according to water quality conditions. The drained water of cold circulating water system shall be supplemented to the hot circulating water system; the make-up water of cold circulating water system shall be supplied by industrial water. The bypass flow treatment facility shall be installed in the hot circulating water system for improving water quality. The bypass flow can be treated by the resin adsorption method, chemical flocculation method or acidifying method according to specific conditions.

3 The tar, tar residue, gas generation furnace slag and undersieve material collected by the gas generation station shall be comprehensively utilized, and the secondary pollution shall be prevented.

4 The tar residue stack yard of gas generation station shall be equipped with anti-seepage floor; the seepage leaking water collecting facility shall be installed. The water shall be treated, and returned back into the circulating system.

5 The phenol-containing wastewater of gas generation station shall be treated by the applicable pretreatment method or final prevention and control method according to the pollution index of phenol-containing wastewater, and be comprehensively utilized.

**5.12.3** The carbide slag of acetylene generation station shall not be deliberately discarded. The wastewater of carbide slag shall be recycled after settled.

**5.12.4** The casting and machining shall be designed according to the following requirements:

1 The dust-containing flue gas of iron melting furnace for maintenance casting, EAF, etc. shall be trapped and cleaned; the flue gas shall be cleaned by the bag type deduster.

2 The painting procedure of package material processing factory shall be equipped with applicable paint mist tail gas purifying device; the applicable purifying facilities shall be installed for the flue gas of industrial furnaces and tail gas of core making.

3 The dust producing points in molding sand treatment of machine repair, casting and roll shot blasting treatment, dry type grinding of sand wheel, dry type grinding of rubber roll, pulverized coal conveying, limestone preparation and wood processing procedures shall be equipped with applicable dedusting facilities.

4 The applicable denoising measures shall be taken for the noise generating points, e. g. maintenance forging, wood form and wood processing workshop according to different conditions.

5 The dust producing points, e. g. torpedo car and hot metal ladle repair workshop, shall be equipped with applicable dedusting facilities.

6 The granulation wastewater of casting copula, wastewater of casting hydraulic sand cleaning, and wastewater of heat treatment water quenching shall be recycled for using after settlement.

7 The applicable treatment systems shall be installed for the wet type dedusting wastewater of machine repair system, pickling wastewater, oil (emulsion) -containing wastewater, roll cooling and



cleaning wastewater, and heavy metal ion-containing wastewater.

**5.12.5** The wastewater produced by the laboratory, center laboratory and environment monitoring station shall be treated according to water amount and water quality, and cannot be drained until reaching standard.

**5.12.6** The oxygen station shall be designed according to the following requirements:

1 The sound isolation measures shall be taken for the centrifugal type air compressor, oxygen compressor and nitrogen compressor in oxygen station.

2 The silencer shall be installed at the pressurized gas exhaust (bleed) port. The air and argon bleeding port shall be equipped with small-pore spray silencer; the oxygen bleeding port shall be equipped with micro-perforating plate silencer.

3 The waste nitrogen switching valve and the front and back pipelines shall be properly installed in the buildings. Under the condition of outdoor arrangement, the waste nitrogen switching valve and the front and back pipelines shall be treated by the sound isolation measures. When the waste nitrogen is exhausted, the ground pit type silencer may be used.

4 The exit of water pump in circulating water pump house shall be equipped with rubber flexible joint to reduce the noise pollution in running.

5 The perlite shall be stored at the designated stack place, and the raising dust preventing measure shall be taken.

**5.12.7** The water treatment facility and other facilities shall be designed according to the following requirements:

1 The comprehensive iron and steel enterprise shall conserve water and reduce drainage of water; the production sewage recycling station shall be built in the whole factory; the production wastewater deep treatment recycling facility shall be built. The circulating water shall be used for the cooling water, and the softening water closed circulating system, clean circulating water system or direct cooling water system will be used according to water quality. For the production wastewater, the treatment systems shall be installed according to different water quality in each procedure; the production wastewater shall not be drained or recycled until reaching standard, and shall not be drained in diluting way.

2 The blowdown water of clean circulating water system shall be preferably used as the make-up water of turbid circulating water system, and the water quality stabilizing device shall be installed. When the make-up water of circulating water system is used as recycled water, the water quality of make-up water shall be treated until meeting the water quality requirements of make-up water.

3 For the regions with lacked water or abundant rainfall, the rainwater recycling system shall be installed.

4 The environment-friendly coolant shall be used for the refrigerating unit of centralized refrigeration station.

5 The sealing measures shall be taken for the dust producing unit and dust raising point in the material storage and transportation, breaking (crushing), screening and mixing processes, and the effective dedusting devices shall be installed. The water spraying dust suppression facilities or water floor shall be installed in the plant, and the outdoor site and road shall be equipped with water spraying dust suppression facilities. The wastewater shall be centrally collected, treated and recycled.

**5.12.8** The large and medium comprehensive iron and steel enterprises shall be equipped with corresponding environment monitoring stations. The environment monitoring stations shall be designed

according to the following requirements:

**1** The environment monitoring station of iron and steel enterprise shall be used for monitoring the pollution sources of plant, and monitoring the environments of factory boundary, factory district and living area.

**2** The large iron and steel enterprise shall be equipped with automatic environment monitoring station, which is used for automatically and continuously monitoring the main exhaust gas pollution source of enterprise, and automatically and continuously monitoring the main wastewater drain port of enterprise.

**3** For exhaust gas pollution sources which are listed as the environment monitoring objects, the monitoring hole, monitoring working platform, ladder and power source meeting technical requirements shall be installed at the related locations of equipment or chimney(exhaust cylinder).

### **5.13 Centralized environmental protection facilities**

**5.13.1** When a large amount of water-containing waste oil is produced in the whole factory, the centralized waste oil regeneration station shall be provided. The oil-containing sludge residue shall be deoiled and then utilized or recycled. The zinc-containing dust sludge in the whole factory shall be equipped with centralized zinc removal system.

**5.13.2** At the premises of establishing respective wastewater treatment circulating system in each workshop (procedure) of enterprise, the centralized overall water drainage facility and deep treatment facility shall be installed for the to-be-drained wastewater of each system; the centrally treated water is further recycled as the industrial make-up water. The concentrated salt water shall be preferably used for granulation and water sprinkling. For the concentrated salt water which cannot be comprehensively utilized, the airing tank, membrane treatment, heat treatment or various combined technologies can be selected according to actual conditions. A small amount of drained water of treatment system shall meet the wastewater drainage standard and total amount control requirement. For the wastewater which shall not enter the centralized overall water drainage system shall form the system, and be deeply treated.

**5.13.3** The new and reconstructed iron and steel enterprises shall be equipped with domestic sewage collecting and recycling system.

**5.13.4** The whole factory shall be equipped with the centralized radioactive matter management organization and radioactive waste anti-ionizing radiation pollution facility.

**5.13.5** The waste oil produced by internal combustion locomotive in the whole factory shall be centrally treated and comprehensively utilized.

**5.13.6** The gas pipeline network condensate containing phenol-cyanogen pollutants, e. g. coke oven gas and high-coke mixed gas of whole factory, shall be centrally recycled and sent into coking plant, or phenol-cyanogen wastewater treatment system of gas station to be uniformly treated.

**5.13.7** The whole factory shall be equipped with various solid waste treatment and disposal yards, and shall be installed with anti-seepage and dust-suppression facilities.

## 6 Division of environmental protection facilities

**6.0.1** The environmental protection facilities shall include:

**1** Various equipment, device and engineering facilities for pollution preventing and environment protection, environment monitoring station, environment greening facility, and mine land reclamation.

**2** Three-waste comprehensive utilization facility for environment protection and comprehensive utilization of resources, and applicable auxiliary works.

**3** Facilities for process production and environment protection.

**6.0.2** The contents of environmental protection facilities in each production procedure of iron and steel enterprise shall meet the requirements of Appendix A in this code.

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## Appendix A Contents of environmental protection facilities in each production procedure of iron and steel enterprise

**Table A Contents of environmental protection facilities in each production procedure of iron and steel enterprise**

No.	Name of procedure	Contents of environmental protection facilities
1	Ore mining and ore dressing	<p>Dedusting, dust suppression and dust collecting facilities for various dust sources in the ore mining and ore dressing processes.</p> <p>Cleaning facilities for downhole poisonous and harmful gases, roasting flue gas of rotary kiln and shaft kiln, and wet concentrate drying flue gas.</p> <p>Collecting and cleaning treatment and recycling facilities for exposed pit water, overflow water of underground ore wells, leaching water of waste dump, other wastewater of mines, ore dressing wastewater, and clarified water of tailing warehouse.</p> <p>Waste rock, tailing and sludge disposal facilities.</p> <p>Tailing conveying facilities, and emergency collecting ponds.</p> <p>Engineering facilities, pollution prevention and control facilities and other auxiliary facilities of soil dump, tailing warehouse, and tailing stack yard.</p> <p>Mine water and soil conservation facilities, e. g. mining yard, soil dump, road water cutoff and drainage ditches, and barrier protection facilities.</p> <p>Stabilizing and monitoring facilities for predicting landslide, debris flow, collapsing and other geological disasters in mines.</p> <p>Mine land reclamation engineering facilities.</p> <p>Various denoising and damping facilities.</p> <p>Mine greening and protection forest zone facilities</p>
2	Stock yard	<p>Facilities for closed type material storage method, belt conveyor hood, dustproof net, spraying and dosage facilities, and other flying dust producing preventing facilities.</p> <p>Sealing, dedusting, water spraying and mist spraying facilities at dust producing points of material crushing, screening, receiving, feeding and belt conveyor head and tail</p> <p>Sealing, dedusting, water spraying, mist spraying and other pollution prevention and control facilities at train dumpers and car receiving troughs.</p> <p>Sealing, dedusting and water spraying facilities at transfer station, belt conveyor, and belt conveyor head and tail.</p> <p>Vehicle flushing facilities.</p> <p>Production turbid wastewater treatment and recycling facilities, water drainage system facilities, and rainwater treatment facilities.</p> <p>Dust and water treatment sludge collecting, conveying and storage facilities, and dust and water treatment sludge comprehensive utilization facilities.</p> <p>Various denoising and damping facilities.</p> <p>Environment greening and greening facilities</p>
3	Sintering and pelletizing	<p>Dedusting equipment, pipeline, exhaust cylinders, dust conveyors and auxiliary facilities of raw material preparation system, proportioning mixing system, solvent and fuel crushing and screening system, and finished ore cooling, screening, granulating and return system; dust suppression facilities of material storage yard, material storage bin, receiving trough, etc.</p> <p>Flue gas dedusting facilities of belt sintering (roasting) machine head and tail, chain grate machine, rotary kiln and shaft kiln, and pipelines, chimney and dust conveying system connected with dedusting equipment.</p>

**Table A ( continued )**

No.	Name of procedure	Contents of environmental protection facilities
3	Sintering and pelletizing	<p>Flue gas recycling equipment ,pipeline, flue gas hood and dust system.</p> <p>Harmful gas ( sulfur dioxide , oxynitride (NO<sub>x</sub>) , fluoride and dioxin ) cleaning facilities and comprehensive utilization facilities.</p> <p>Water cleaning and recycling facilities.</p> <p>Iron-containing dust and slag sludge recycling, treatment, utilization and transportation facilities.</p> <p>Denoising and damping facilities.</p> <p>Waste heat recycling facilities in the sintering and pelletizing production process.</p> <p>Environment greening and greening facilities</p>
4	Coking	<p>Coal warehouse or sealed coal yard; water spraying dust suppression facilities, vehicle flushing facilities and flushing water settlement tank in coal warehouse or coal yard.</p> <p>Sealing and dedusting facilities in the coking coal crushing and crushing and coke screening, storage and transportation(transfer) processes.</p> <p>Charged coal humidity adjusting device and auxiliary dedusting facilities; closed type air suction and fume dust facilities in the shaped coal preparation process; facilities for conveying dust cleaning wastewater into phenol-cyanogen wastewater treatment station.</p> <p>Sealing facilities of coke oven body (door, coal charge hole cover and uptake water seal) , cleaning device, chimney of coke oven, flue gas desulfurization and denitrification facility, and coke oven crude gas emergency bleeding device.</p> <p>Coke oven flume-free charged coal and dust collecting and cleaning facilities. Dust collecting and cleaning facilities at coke discharger side and coke side of coke oven.</p> <p>Closed type air suction and dedusting facilities at dust producing points of coke dry quenching device.</p> <p>Cleaning equipment and devices for emission of harmful gases in gas cleaning workshop and chemical product refining workshop (exhaust washing tower, pressure balance system for recycled exhaust gas, breathing valve and nitrogen sealing facility).</p> <p>Gas desulfurization and decyanation device, deacidifying and ammonia evaporation device, sulfur recycling, ammonia recycling and ammonia decomposing device, hydrogen cyanide recycling device, remaining ammonia water dephenolization device, etc.</p> <p>Various turbid wastewater (phenol-cyanogen wastewater, primary rainwater, floor flushing water, etc.) collecting, treatment and recycling facilities, sewage recycling facilities, concentrated salt water treatment facilities, and anti-seepage facilities in production workshop.</p> <p>Neutralizing treatment facilities of acid and alkaline waste liquid.</p> <p>Treatment facility of gas desulfurization waste liquid.</p> <p>Oil tank car cleaning facilities, and cleaning water(liquid) treatment facilities.</p> <p>Various dust, dust(sewage)sludge, and waste slag treatment and recycling facilities.</p> <p>Various denoising and damping facilities.</p> <p>Environment greening and greening facilities</p>
5	Ironmaking	<p>Sealing and dedusting facilities for top receiving facility and bottom screening, weighing and feeding facilities of ore bin and coke bin; dedusting facilities of material pit; sealing and dedusting facilities for furnace top material discharge of charge belt conveyor, transfer station and belt conveyor head and tail; sealing and dedusting equipment of other dust producing equipment.</p> <p>Sealing and dedusting facilities at dust producing points of taphole, main runner, iron runner, slag runner, skimmer and tilting runner of casting house.</p> <p>Sealing and dedusting facilities for dust producing points of pig casting machine and sludge grinder room.</p>

**Table A ( continued )**

No.	Name of procedure	Contents of environmental protection facilities
5	Ironmaking	<p>Dedusting facilities of pulverized coal preparation and blowing system.</p> <p>Gravity deduster or cyclone deduster of gas cleaning system; dry gas cleaning and recycling facilities.</p> <p>Furnace top equalizing bleeding gas dedusting and recycling device.</p> <p>Dust collecting, conveying and storage facilities.</p> <p>Hot stove chimney, air exhaust cylinder of dedusting system, and steam exhaust cylinder of water granulation system.</p> <p>Water treatment facilities for turbid wastewater of gas scrubbing wastewater, granulation wastewater, dry slag cooling wastewater and pig casting machine cooling wastewater; circulating and cascade utilization facilities of turbid wastewater; sludge dewatering system facilities; water drainage system facilities.</p> <p>Furnace slag comprehensive utilization and treatment facilities of hydraulic granulation system, slag pit, and slag product production facilities.</p> <p>Conveying, storage, drying, zinc removal and comprehensive utilization facilities of gas dust and cleaning sludge; comprehensive utilization facilities of other solid wastes.</p> <p>Various denoising and damping facilities.</p> <p>Environment greening and greening facilities</p>
6	Steelmaking and continuous casting	<p>Flue gas cleaning facilities of primary and secondary dust of converter and EAF, as well as roof hood, and connected pipelines and chimneys.</p> <p>Dust trapping and cleaning facilities of material crushing and screening system, mixer, bulk material conveying system, refining unit, furnace charge preheating, steel ladle treatment, and hot metal pretreatment.</p> <p>Gas recovery and utilization facility of converter, and EAF hot flue gas waste heat utilization facility of EAF. Dedusting facilities of mould area, tundish tilting, continuous casting billet cutting and surface cleaning.</p> <p>Production turbid wastewater and recycling facilities of steelmaking, continuous casting, etc.</p> <p>Iron-containing dust, dust sludge, scale and steel slag treatment and comprehensive utilization facilities and auxiliary cleaning equipment.</p> <p>Various denoising and damping facilities.</p> <p>Environment greening and greening facilities</p>
7	Rolling and metal products	<p>Dust cleaning facility of surface cleaning of billet.</p> <p>Dust exhausting dedusting facility of rolling mill.</p> <p>Acid and alkaline mist trapping and cleaning facilities of acid and alkaline washing systems.</p> <p>Dust and harmful gas cleaning or incinerating facilities of plating (coating), heat treatment and finishing systems.</p> <p>Chimneys of various industrial furnaces.</p> <p>Various turbid wastewater treatment and recycling facilities of rolling production system.</p> <p>Treatment and recycling facilities of iron-containing dust, magnesium oxide dust, scale, waste acid, waste alkaline, waste oil and slag of reheating furnace.</p> <p>Flue gas waste heat recycling facilities of reheating furnace and annealing furnace.</p> <p>Various denoising and damping facilities.</p> <p>Environment greening and greening facilities</p>
8	Metallurgical lime and refractory material	<p>Water sprinkling or other dust suppression devices of limestone yard.</p> <p>Sealing and dedusting facilities for dust raising points of production workshops, and dust and dust sludge treatment and recycling facilities. Flue gas dedusting facilities of shaft kiln, rotary kiln and drying cylinder, and connected pipelines and chimneys.</p>

**Table A ( continued )**

No.	Name of procedure	Contents of environmental protection facilities
8	Metallurgical lime and refractory material	<p>Tar and asphalt flue gas cleaning facilities.</p> <p>Limestone washing wastewater collecting, treatment and recycling facilities.</p> <p>Water sprinkling dust suppression or floor flushing devices in plant, and wastewater collecting, treatment and recycling facilities; outdoor site and road water sprinkling dust suppression device.</p> <p>Furnace kiln flue gas waste heat recycling facilities.</p> <p>Various denoising and damping facilities.</p> <p>Environment greening and greening facilities</p>
9	Ferroalloy	<p>Sealing and dedusting facilities for dust producing points in the raw material treatment and conveying process.</p> <p>Flue gas dedusting facilities of ferroalloy furnace kiln, and connected pipelines and chimneys.</p> <p>Ferroalloy furnace kiln gas recycling device, and flue gas waste heat recycling facilities.</p> <p>Wet dedusting wastewater, granulating water, silica washing wastewater, and process wastewater treatment and recycling facilities.</p> <p>Dust treatment and comprehensive utilization facilities of ferroalloy slag and furnace kiln.</p> <p>Various denoising and damping facilities.</p> <p>Environment greening and greening facilities</p>
10	Carbon	<p>Dedusting facilities in raw material warehouse, secondary crushing proportioning, roasting filling material processing, graphitizing filling material processing and finished product processing procedures.</p> <p>Raw material calcining flue gas cleaning facilities and calcining kiln chimney. Asphalt fume cleaning facilities and roasting furnace chimney in asphalt melting, asphalt proportioning, mixing and kneading, cooling, roasting and impregnating procedures.</p> <p>Graphitizing furnace flue gas cleaning facility (related measures for cleaning harmful matters of chloride and fluorine).</p> <p>Various turbid wastewater treatment and recycling facilities.</p> <p>Various waste slag treatment and comprehensive utilization facilities.</p> <p>Various denoising and damping facilities.</p> <p>Environment greening and greening facilities</p>
11	Public and auxiliary facilities	<p>Dust prevention and dedusting facilities of fired coal loading and unloading, crushing, screening, conveying, storage and pulverized coal preparation systems of self power plant.</p> <p>Boiler flue gas cleaning facilities (including desulfurization and denitrification devices) , and connected pipelines and chimneys.</p> <p>Various turbid wastewater treatment and comprehensive utilization facilities.</p> <p>Fly ash dust yard, and fly ash treatment and comprehensive utilization facilities.</p> <p>Gas cleaning facilities of gas generation stations, e.g. boiler blower, induced draft fan, ball mill, steam pressure relief device, and turbine power generator of self power station.</p> <p>Gas scrubbing water treatment and recycling facilities of gas generation station.</p> <p>Tar, tar residue, and gas generation furnace slag treatment and comprehensive utilization facilities.</p> <p>Production wastewater and carbide slag treatment facilities of acetylene generation station.</p> <p>Waste liquid and wastewater treatment facilities of hydrogen and oxygen station.</p> <p>Oil-containing wastewater treatment facilities of oil tank area.</p> <p>Dedusting facilities for dust sources in each procedures (sand treatment and casting sand falling) of maintenance system. Dust cleaning facilities of copula for casting, EAF, etc.</p>

**Table A ( continued )**

No.	Name of procedure	Contents of environmental protection facilities
11	Public and auxiliary facilities	<p>Dedusting facilities for dust producing points of torpedo car and hot metal ladle repair workshop.</p> <p>Cleaning facilities of flue gas of industrial furnaces(salt bath furnaces)and sand preparation tail gas.</p> <p>Various turbid wastewater treatment and recycling facilities, and waste emulsion pollution control facilities.</p> <p>Copula slag, EAF slag, waste mold sand, waste cutting material and waste wood treatment and comprehensive utilization facilities.</p> <p>Various waste liquid and wastewater treatment facilities of inspection and test laboratory, center test laboratory and environment monitoring station. Poisonous and harmful gas cleaning facilities, and local dedusting facilities.</p> <p>Environment monitoring station of whole factory, e. g. instrument, equipment, monitoring and sampling instruments, vehicles, buildings(structures), etc.</p> <p>Various denoising and damping facilities.</p> <p>Environment greening and greening facilities</p>
12	Centralized environmental protection facilities	<p>Centralized treatment facilities for iron-containing dust, dust sludge, waste oil and oil-containing mud slag of whole factory, e. g. waste oil regeneration station, oil-containing mud slag incineration and flue gas cleaning facilities, and dust recycling or disposal facilities.</p> <p>Coke oven and blast furnace gas pipeline condensate collecting and treatment facilities of whole factory.</p> <p>Sewage treatment plant(station)and pipeline network of whole factory; domestic sewage treatment facilities and pipeline networks in each procedure of whole factory.</p> <p>Recycled water collecting, treatment and utilization system of whole factory.</p> <p>Greening and protection forest belts of whole factory.</p> <p>Solid waste stack yard, harmful matter diffusion, leakage and loss preventing facilities and harmless treatment facilities of whole factory</p>



## Explanation of wording in this code

1 Words used for different degrees of strictness are explained as follows in order to mark the differences in implementing the requirements of this code.

1) Words denoting a very strict or mandatory requirement:

"Must" is used for affirmation, "must not" for negation.

2) Words denoting a strict requirement under normal conditions:

"Shall" is used for affirmation, "shall not" for negation.

3) Words denoting a permission of a slight choice or an indication of the most suitable choice when conditions permit:

"Should" is used for affirmation, "should not" for negation.

4) "May" is used to express the option available, sometimes with the conditional permit.

2 "Shall comply with..." or "shall meet the requirements of..." is used in this code to indicate that it is necessary to comply with the requirements stipulated in other relative standards and codes.

## List of quoted standards

- GB 50603 *Code for Design of General Layout and Transportation for Iron and Steel Enterprise*  
GB 50863 *Code for Design of Tailings Facilities*  
GB 51119 *Code for Waste Dump Design of Metal Mine*  
GB 18597 *Standard for Pollution Control on Hazardous Waste Storage*  
GB 18598 *Standard for Pollution Control on the Security Landfill Site for Hazardous Wastes*  
GB 18599 *Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes*

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