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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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Ball mills and rod mills

球磨机和棒磨机

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Foreword

Since implementation date of this Standard, previous Standard JB/T 1406-2002 Ball-mill and rod-mill is abolished. This Standard was proposed by China Machinery Industry Federation. This Standard shall be under the jurisdiction of National Technical Committee (SAC/TC 88) on Mining Machinery of Standardization Administration of China. The responsible drafting organization of this Standard. Luoyang Mining Machinery Engineering Design & Research Institute Co., Ltd. The participating drafting organizations of this Standard. Shenyang Heavy Machinery Group Co., Ltd, CITIC Heavy Industries Co., Ltd, Jinan Heavy Machinery Joint-stock Co., Ltd, Hengyang Heavy Machinery Co., Ltd, Sinosteel Co., Ltd., and Shendong Shankuang Machinery Co., Ltd. The chief drafting staffs of this Standard. Zhang Xiao, Li Chunran, Wang Jisheng, Yu Xiao, Gao Junkun, Zhou Xiaoping, Zhao Heng, Yang Xianli, Liu Wanhua, Wang Jianhua, Fan Yongqing, and Wang Chunhong. Ball mill and Rod mill

1 Scope

China's national standard for ball mills and rod mills. It specifies the types and basic parameters, the technical requirements, the test methods, the inspection rules and the marking, packaging, transport and storage of tumbling mills charged with steel balls or rods. A grinding mill is the largest energy consumer in a mineral processing plant by a wide margin - comminution accounts for the majority of a concentrator's power - and the reason is that grinding is inherently inefficient: almost all the energy put into a tumbling mill becomes heat and noise, and only a small fraction creates new mineral surface. That fact makes the machine's parameters commercially decisive rather than merely technical, since a small difference in efficiency is a large sum over a mill's life. The two types in the standard grind differently. A ball mill is charged with steel balls, which grind mainly by impact and attrition and produce a wide size distribution including a lot of fines. A rod mill is charged with long steel rods that lie parallel and contact the coarser particles first, because the rods bridge across the fines - so it acts as a size-selective crusher and produces a narrower distribution with less overgrinding, which matters where the downstream process is sensitive to slimes. The requirements are those of a very large slow-turning machine carrying a heavy load: the shell and its manufacture, the trunnions and bearings, the girth gear and drive, the liners and their attachment, the critical speed and the operating speed as a fraction of it, the charge volume, and the capacity and power draw. And the tests are of a machine that cannot be run at full load in a works, so much of the verification is dimensional and of the no-load running. Issued on 23 December 2010 and in force since 1 July 2011.

This Standard specifies ball-mill and rod-mill's types and basic parameters, technical requirements, test methods, inspection rules, marking and operation instructions, packaging, transportation and storage. This Standard applies to ball-mills and rod-mills that grind ores, rocks and other suitable materials of various hardness in wet and dry processes (hereinafter referred to as mills).

2 Normative references

The articles contained in the following documents have become part of this Standard when they are quoted herein. For the dated documents so quoted, all the modifications (excluding corrections) or revisions made thereafter shall not be applicable to this Standard. For the undated documents so quoted, the latest editions shall be applicable to this Standard.

GB/T 191 Packaging - Pictorial marking for handling of goods (GB/T 191-2008, ISO 780.1997, MOD)

GB/T 700 Carbon structural steels (GB/T 700-2006, ISO 630.1995, NEQ)

GB/T 1174 Cast bearing metals (GB/T 1174-1992, neq ISO 4382-1.1991)

GB/T 1348 Spheroidal graphite iron castings (GB/T 1348-2009, ISO 1083.2004, MOD)

GB/T 1804-2000 General tolerances Tolerances for linear and angular dimensions without individual tolerance indications (eqv ISO 2768-1.1989)

GB/T 3768 Acoustics - Determination of sound power levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane (GB/T 3768-1996, eqv ISO 3746.1995)

GB/T 5226.1 Electrical safety of machinery - Electrical equipment of machines - Part

3.1 Types

3.1.1 Mills are divided into ball-mill and rod-mill; ball-mill are divided into grate type and overflow type according to different media; grate ball-mills are divided into dry type and wet type.

3.2 Model

3.2.1 Representation method of ball-mill model Marking example.

3.3 Basic parameters of mills Basic parameters of mills shall respectively comply with the provisions in table 1, table 2, table 3 and table 4.

4.1 Basic requirements

4.1.1 Mill shall comply with provisions of this Standard, and shall be manufactured according to the drawings and technical documents that have been approved based on established procedure.

4.1.5 Welding parts shall comply with relevant provisions of JB/T5000.3.

4.1.6 Steel castings shall comply with relevant provisions of JB/T5000.6.

4.2 Machine performance requirements

4.2.1 Main technical parameters of mills shall comply with provisions of this Standard and meet system process requirements.

4.2.5 Sound pressure level of noises during mill idling running shall not exceed 90dB (A).

4.2.6 Complete set of mill shall include host machine, main motor, spray lubrication device, main bearing lubrication station, low-voltage centralized electrical control equipment, etc. Synchronous transmission shall also include clutch; asynchronous transmission includes reducer and coupling; gearless transmission shall also include brake. Mills of which the barrel diameter is greater than or equal to $\varnothing 2700\text{mm}$ series shall be provided with necessary auxiliary equipment (e.g. low-speed transmission device, jack-up device, etc.).

4.3 Safety requirements

4.3.1 Rotating part of transmission gear shall be fitted with a protective cover; user shall set up the protective railings around rotating parts.

4.3.2 Requirements of protective grounding, insulation resistance, pressure test, etc. shall comply with relevant provisions of GB5226.1.

4.4 Requirements for main components and parts

4.4.1 Main bearing bush and slider bearing bush material shall not be lower than the specifications on mechanical properties in table 5.

4.4.2 Steel plate material of barrel shall not be lower than the specifications on Q235A mechanical properties in GB/T 700; tensile strength of welding rod used shall not be lower than 420MPa.

4.4.8 Pinion or shaft gear Mechanical properties of pinion and shaft gear material shall not be lower than the standard specified in table 5; tooth surface hardness shall be at least 30HB harder than large gear surface; machining precision shall comply with the provisions of GB/T10095.1 and GB/T10095.2.

4.4.9 Large gear Mechanical properties of large gear material shall not be lower than the standard specified in table 5; machining precision shall comply with the provisions of GB/T10095.1 and GB/T10095.2; flange thickness shall be uniform.

4.4.12 Reducer performance shall comply with provisions of JB/T8853.

4.5 Assembly technical requirements

4.5.1 Main bearing shall uniformly contact with periphery of bearing base plate.

4.5.7 Backlash in circular tooth for large gears and pinions shall be calculated in accordance with formula (1) to formula (3).

4.6 Electrical control Mill shall be equipped with complete set of low-voltage electrical control devices matched, so as to complete the following control functions.

5 Test method

5.1 Appearance inspection is conducted visually; there shall be no significant defect.

5.2 During complete machine idling, noises shall be determined by the method specified in GB/T3768.

5.3 Mill shall be conducted for idling test and meets the following requirements.