GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 13.110; 25.100.70

C 68

GB 4674-2009

Replacing GB 4674-1984

Safety code for grinding machines

磨削机械安全规程

Issued on: March 31, 2009 **Implemented on: December 01, 2009**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;

Standardization Administration of the People's Republic of China.

Table of Contents

Foreword

All contents of this Standard are compulsory.

This Standard is the revision of GB 4674-1984. Compared with GB 4674-1984, the main changes of this Standard are as follows:

-- “Foreword” is added;

-- “Introduction” is revised to be “Scope” (Chapter 1 of edition-1984; Chapter 1 of this edition);

-- The Chapter “Normative reference” is added (see Chapter 2 of this edition);

-- The general requirements for design and manufacture of grinding machines are added (3.1 of this edition);

-- 2.2.1 of edition-1984 is revised to be “the grinding wheel spindle shall be designed to be able to operate with the maximum allowable load” (2.2.1 of edition-1984; 3.2.1 of this edition);

-- The requirements for clamp nuts of grinding wheel spindle are added (3.4 of this edition);

-- Regulations for marks of grinding machines are added (3.14 of this edition);

-- Regulations of modification, reformation and parts replacement for grinding machines are deleted (2.13 of edition-1984);

-- The requirements for grinding wheel checking are revised: the mark checking is added (3.1.1 of edition-1984, 4.1.1.1 of this edition);

-- Requirements for compaction of grinding wheel and grinding wheel chuck are revised, which stipulates that the pad shall totally cover the contacting surface of the grinding wheel chuck (3.3.3 of edition-1984, 4.3.2 of this edition);

-- The requirements for grinding wheel carrying are revised; add the stipulation that “the marks printed with grinding wheel features and safety speed shall not be smeared or damaged without permission” (4.1 of edition-1984, 5.1 of this edition);

-- The stipulation “changing grinding machines’ structure and performance are strictly prohibited without the approval of chief engineer” is deleted (4.6 of edition-1984);

-- Add the terms of guaranteeing personal safety, and the training and assessment requirements for the operating personnel (5.10, 5.11, 5.12 and 5.13 of this edition);

-- Appropriate revisions are made in text editing.

This Standard was proposed by State Administration of State Work Safety Supervision Authority.

This Standard shall be under the jurisdiction of National Technical Committee of Work Safety standardization.

Drafting organization of this Standard: Tangshan Institute of China Coal Research Institute, Kailuan (Group) Co., Ltd., and CNR Tangshan Railway Vehicles Equipment Co., Ltd.

Main drafters of this Standard: Zhang Wenjun, Wang Zhongchang, Zhang Ruixi, He Xiaoqun, Wei Guanghou, Chen ying, and Mou JianHua.

Previous version replaced by this Standard is as follows:

— GB 4674-1984.

Safety Code for Grinding Machines

1 Scope

This Standard stipulates the safety technical requirements in design and manufacture, use, management and maintenance of grinding machines.

This Standard applies to the grinding machines that use grinding wheel or grinding segment to conduce manual, mechanical or automatic process.

This Standard does not apply to grinding processing machines that use grinding head with a handle, coated abrasive tools, oilstone and grinding paste.

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 6171 Hexagon nuts, style 1, with fine pitch thread (eqv ISO 8673:1999)

GB 12348 Emission standard for industrial enterprises noise at boundary

GB/T 16769 Metal-cutting machine tools - Measurement method of sound pressure level (neq ISO/DIS 230-5-2:1996)

JB/T 9878 Measurement of dust concentration of metal-cutting machine tool

3 Safety requirements for the design and manufacture of grinding machines

3.1 General requirements

3.1.1 The design shall, as possible, eliminate or reduce all potential dangerous factors.

3.1.2 Necessary safety devices shall be adopted, in case of dangers that cannot be avoided or fully restrained through design.

Table 1 The matching of grinding wheel hole diameter and the grinding wheel spindle or grinding wheel chuck (mm)

Grinding wheel hole diameter	Diameter of grinding wheel spindle or grinding wheel chuck	Grinding methods
H11	f7	Mirror-surface grinding, thread grinding, and high-speed grinding with running speed >45 m/s
H12	e8	Fine grinding
H13	e8	Corse grinding

3.3 Grinding wheel chuck

3.3.1 The diameter of grinding wheel chuck shall not be less than 1/3 of that of the grinding wheel. The diameter of the grinding wheel chuck for cutting-off wheel shall not be less than 1/4 of that of the grinding wheel.

3.3.2 For any form of grinding wheel chuck, the diameter of its left-right sides shall equal the radial width of the compaction surface.

3.3.3 The grinding wheel chuck shall be able to reliably transmit the driving force to the grinding wheel.

3.3.4 The grinding wheel chuck shall have enough stiffness to ensure that the compaction surface is flat and evenly contacted after being compacted.

3.3.5 There shall be enough space at the non-contacting parts between the grinding wheel chuck and the two sides of the grinding wheel; and the minimum size of the space shall be 1.5mm.

3.3.6 Each surface of the grinding wheel chuck shall be smooth and without sharp edges, and have good dynamic balance performance.

3.3.7 Grinding wheel chuck can be divided into:

a) Groove-type (Figure 2a): It is used to install grinding wheel that has a small hole diameter and is directly mounted on the grinding wheel spindle.

b) Sleeve-type (Figure 2b): It is used to install grinding wheel with a large hole diameter.

c) Liner-type (Figure 2c): It is used to install grinding wheel with a large hole diameter and with thickness more than 32cm.

d) Cone-type (Figure 2d): It is used to install double bevel frame grinding wheel.

verification. Shield of grinding wheel with operating speed less than or equal to 40 m/s can also select other materials, but their strength shall not be less than the value specified in this Standard.

3.5.11 The upper end of the shield opening shall be equipped with an adjustable guard plate to adjust the clearance between the guard plate and peripheral surface according to the abrasion of the grinding wheel. The guard plate shall be fixed on the grinding wheel shield; the binding strength shall not be lower than that of the components of the grinding wheel shield; the guard plate width shall be larger than that of the outer circle part of the grinding wheel shield.

When the shield's opening angle above the level of the grinding wheel spindle center line is less than 30°, the guard plate does not have to be installed.

3.5.12 The clearance between the grinding wheel's peripheral surface and the adjustable guard plate edge shall be less than 6 mm. During the installation of the grinding wheel with the maximum design thickness, the clearance between the outer side surface of the grinding wheel chuck and the opening edge of the grinding wheel shield shall be less than 15 mm. The clearance between the inner wall of the annular-band-type grinding wheel shield and the peripheral surface of the grinding wheel shall not be more than 15 mm.

Grinding machines with the grinding wheel rotation center line in the same direction of the operator's facing direction can be exempted from 6-mm clearance regulation.

When the shield's opening angle above the level of the grinding wheel spindle center line is less than 30°, the 6-mm clearance does not have to be guaranteed.

3.6 The rotation direction shall be marked on the spindle of the grinding machine, and the mark shall be visible and can remain visible for long-time.

3.7 Handheld grinding machine shall not have work-piece bracket; its position shall be able to be adjusted according to the abrasion of the grinding wheel; the table height of the work-piece bracket shall be at the same level of the grinding wheel spindle center line; and there shall be enough area to guarantee the stability of the work-piece to the grinded. The work-piece bracket's edge near the grinding wheel shall have no sinking, unfilled corner or other flaws.

3.8 Guard plates shall be set at the two ends of or around the surface grinder workbench to prevent grinded work-piece flying out.

3.9 Grinding machines with electric, pneumatic or hydraulic clamping work-piece shall be equipped with interlocking devices, which means that the grinding shall stops as soon as the clamping force disappears.

3.10 All rotating members on the grinding machines, such as grinding wheel, electric machine, belt wheel and work-piece headstocks, shall be equipped with a protective cover.

4.1.1.3 Acoustic inspection (also called knock test): inspection method is that hang the grinding wheel through the center hole (for light ones) or place the grinding wheel on the smooth hard ground; use a (200 ~ 300)g hammer to knock it; the knocking point is at any side face of the grinding wheel, 45° at both sides of the vertical center line, (20 ~ 50)mm away from the outer circle surface of the grinding wheel. After the knocking, turn the grinding wheel 45°; and repeat again. If there is no crack and a silvery sound is heard, it means that the grinding wheel is qualified and can be used; if a dead or hoarse sound is heard, it means that the grinding wheel shall not be used.

4.2 Before the installation of grinding wheel, the rotation speed of the spindle shall be checked and shall not exceed the maximum allowable running speed.

4.3 Installation of grinding wheel

4.3.1 When the hole diameter of the grinding wheel is too large, shrinkage cavity sleeve is allowed to be used. The sleeve width shall not exceed the two sides of the grinding wheel, and shall not be less than 1/2 of grinding wheel thickness. Shrinkage cavity sleeve shall not be used to install the grinding wheel with its diameter larger than the maximum allowable diameter of the grinding machine.

4.3.2 The space between the grinding wheel and the chuck compaction surface shall use the pad made of flexible materials (such as asbestos rubber sheet, etc.); its thickness shall be (1 ~ 2)mm; its diameter shall be 2 mm larger than that of the compaction surface; the pad shall totally cover the contacting surface of the grinding wheel chuck.

4.3.3 During the installation of grinding wheel, grinding wheel spindle, pad and grinding wheel chuck, the fitting surface and the compaction surface shall be clean and without any attachment.

4.3.4 During the installation, pay attention to the degree of tightness of the compression nuts or the screws; the degree is appropriate when the grinding wheel can be driven without sliding, so as to prevent too much compaction to damage the grinding wheel. If there are several compression nuts, they shall be screwed in diagonal manner; the screwing force shall be even.

4.3.5 During the installation of grinding segment, the compression length shall be more than the grinding segment's thickness; after installation, the center of the grinding segment assembly shall be aligned with the center of rotation.

4.3.6 When more than one grinding wheels are installed on the same grinding wheel chuck, isolation piece is allowed to separate the grinding wheels. The diameter of the isolation piece and the size of the grind wheel's compaction surface shall be equal to that of the grinding wheel chuck. Specially made grinding wheels are allowed to install in bonding or stacking manner.

4.3.7 When the total mass of the grinding wheel and the chuck is over 16 kg, hoisting

machinery shall be used for the installation.

4.4 After the installation of grinding wheel chuck, the grinding wheel shall be firstly conducted for static balance. When unbalance is discovered during the operation after the first time of trimming and adjustment, static balance shall be repeated.

4.5 All grinding wheels and grinding segments shall be used on the grinding machines equipped with a shield. However, the following conditions can be exempted from this provision:

a) Internal grinding;

b) Used for grinding wheel with diameter not more than 50mm on the portable grinding machines;

c) Metallic matrix diamond and cubic boron nitride grinding wheel.

4.6 After the grinding wheel is installed on the spindle, the guard plate on the grinding wheel shield shall be properly adjusted and fastened.

4.7 Newly installed grinding wheel shall conduct idle running at the operating speed, the duration shall be:

Diameter≥400 mm	duration of the idle running more than 5 min;
Diameter<400 mm	duration of the idle running more than 2 min.

During the idle running, the operator shall stand at a safe position, and shall not stand in front of or in the tangential direction of the grinding wheel.

4.8 The distance between the grinding wheel and the work-piece bracket shall be less than 1/2 of the minimum appearance size of the grinded work-piece, and shall not exceed 3 mm. It shall be fastened after the adjustment.

4.9 The guard plate on the grinding wheel shield and the work-piece bracket shall be adjusted when the grinding wheel stops running.

4.10 The outer circle for grinding long and thin work-piece shall be equipped with a center bearing bracket.

4.11 Grinding wheel using peripheral surface as the operating surface is not allowed to use its side face for grinding to prevent grinding wheel being damaged.

4.12 The highest running speed of the grinding wheel shall not exceed the value marked on it.

4.13 When the grinding wheel is worn off, rotation speed of the grinding wheel spindle is allowed to adjust to maintain the running speed of the grinding wheel. However, it shall not

5 Management and maintenance of grinding machines

5.1 All grinding wheels and grinding segments are fragile products. Therefore, during the carrying and storage, grinding wheels shall not suffer severe vibration and impact to avoid falling down or collision; rolling the grinding wheel is prohibited. Vehicles with pneumatic tyre shall be adopted during the transportation by vehicles. The marks printed with grinding wheel's features shall not be smeared or damaged without permission.

5.2 The storage place shall be dry, with appropriate temperature, and without being mixed with other chemicals. Grinding wheels shall be carefully placed on the shelves or the boxes.

5.3 Grinding wheels shall be used within its validity. Grinding wheel of resin and rubber binding agent, after one year of storage out of the factory, can be used after successfully passing the rotation test.

5.4 Regular inspection shall be conducted for the rotation speed of the grinding wheel spindle, with records being written down.

5.5 Regular inspection shall be conducted for the part of the spindle where the grinding wheel is installed; when there is any abnormal phenomenon, use is prohibited.

5.6 Records shall be made for grinding machine replacement or electric motor maintenance.

5.7 Regular inspection shall be conducted for all grinding wheel chucks; maintenance or replacement shall be conducted when any of the following conditions appears:

a) The compaction surface is unsmooth;

b) Excessive wearing in diameter or thickness;

c) Lack of precision (deflection);

d) Thread of balance block is damaged;

e) Jointing pair of the compression screws is damaged.

5.8 When the grinding wheel is damaged, inspections shall be timely conducted to see whether the shield is damaged; whether the grinding wheel chuck is deformed or unbalanced; and whether the spindle end thread and the compression nuts are damaged. After successfully passing the inspections, they can be reinstalled and used.

5.9 The dust collection device of the grinding machines shall be regularly checked and

maintained to maintain its de-dusting performance.

5.10 During the selection of grinding speed, feed rate and grinding depth, these parameters shall not exceed the rated operating range of the machine tool to avoid dangers due to excessive grinding.

5.11 Generally, grinding machines shall be equipped with specialized grinding room, and shall not be installed at the places straightly facing nearby equipment and operators or with other peoples frequently passing by. If specialized grinding rooms fail to be provided due to condition limits, the front of the grinding machine shall be equipped with a guard plate no less than 1.8 m high.

5.12 Operators and related personnel for grinding processing shall take safety education and safety knowledge training. After successfully passing the examination and obtaining the certificate of qualification, then they can conduct the operation.

5.13 The using organization of the grinding machines shall prepare the equipment safety operation regulations.

_____ END _____

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------