

Translated English of Chinese Standard: JB/T8490-2008

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Industry Standard of the People's Republic of China

ICS 25.080.20

J 54

Record Number: 24637-2008

JB/T 8490-2008

Replacing JB/T 4367.2-1999

JB/T 8490.2-1996

Specification for Floor Type Boring and Milling & Boring Machines

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Issued on: June 4, 2008

Implemented on: November 1, 2008

**Issued by: National Development and Reform Commission of the
People's Republic of China**

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Foreword

This Standard replaces JB/T 4367.2-1999 "Specification for Milling & Boring Machines" and JB/T 8490.2-1996 "Specification for Numerical control Milling & Boring Machines, Milling & Boring Machining Center"

Compared with JB/T 4367.2-1999 and JB/T 8490.2-1996, the main changes of this Standard are as follows:

- Delete 6.7 in JB/T 4367.2-1999;
- the idle running time of the complete machine in 7.7.3 is changed from 16h to 36h.

The standards used together with this Standard are listed as follows:

- JB/T 4367.1-1999 "Parameters of Milling & Boring Machine";
- GB/T 5289.3-2006 "Test Conditions for Boring And Milling Machines with Horizontal Spindle-Testing of the Accuracy – Part 3: Floor Type Machines with Detached, Stationary Work-Holding Table".

This Standard was proposed by China Machinery Industry Federation.

This Standard shall be under the jurisdiction of National Technical Committee on Metal Cutting Machine Tools of Standardization Administration of China (SAC/TC 22).

Drafting organization of this Standard: Wuhan Heavy Duty Machine Tool Group Corporation.

Chief drafting staff of this Standard: Wu Jinping.

Historical editions replaced by this Standard are:

- ZBn J54 024-1989;
- JB/T 4367.2-1999;
- JB/T 8490.2-1996.

Specification for Floor Type Boring and Milling & Boring Machines

1 Scope

This Standard specifies manufacturing and acceptance requirements for floor type boring machines and milling & boring machines.

This Standard is applicable to ordinary and numerical control floor type boring machines and milling & boring machines with a boring machine axis diameter of 130mm~260mm.

2 Normative References

The following documents contain provisions which, through reference in this text, constitute provisions of this Standard. For dated reference, subsequent amendments (excluding correction contents) or revisions of these publications do not apply. However, all parties coming to an agreement according to this Standard are encouraged to study whether the latest edition of these documents is applicable. For undated references, the latest edition of the normative document is applicable to this national standard.

GB 5226.1-2002 Safety of Machinery - Electrical Equipment of Machines-Part 1: General Requirements (IEC 60204-1: 2000, IDT)

GB/T 9061-2006 General Specifications for Metal-Cutting Machine Tools

GB 15760-2004 Metal-Cutting Machine Tools - General Safeguarding Specification

GB/T 5289.3-2006 Test Conditions for Boring and Milling Machines with Horizontal Spindle - Testing of the Accuracy – Part 3: Floor Type Machines with Detached, Stationary Work-Holding Table (ISO 3070-3: 1997, MOD)

GB/T 16769-1997 Metal-Cutting Machine Tools - Measurement Method of Sound Pressure Level (neq ISO/DIS 230:5.2: 1996)

JB/T 9872-1999 Metal-Cutting Machine Tools - General Specification for Mechanical Processing Parts

- b) If emergency stop of the controlling mechanism is after the completion of emergency stop actuation, the function shall not automatically recover.
- c) Extreme position of moving parts of each rectilinear coordinate shall have a limit device.
- d) Parts, easily worn by dust, such as track of the machine tool shall have guarding devices.
- e) Balancing devices of moving parts, such as headstock shall be inside the component or devices, which could prevent counter balance to drop accidentally and damage the machine tool. Guarding devices are needed for the outer part.
- f) Ladders, corridor and other corresponding devices shall have strong anti-skid footrests, and shall have continuous protecting sheets and handrails along the margin.
- g) If elevator is installed to lift and lower persons, it shall conform to the specifications of elevator installation and safety handling.
- h) If the distance between the working platform (traverse) and the extreme lower position of the floor is less than 2.2m, the protection plate shall be painted with same-width yellow-black stripes. The strips' width is 20mm~50mm and form an angle of 45°.
- i) Machine tools using static pressure devices shall be ensured to be started up after the static pressure is established. If pressure change exceeds that specified in the provision or the electric power is off, safety shall be ensured.

5.4 As specified in GB/T 16769, inspection and measurement of noise of the machine tool shall be carried out in conditions of main movement with low-speed, middle-speed, or high speed idle running; noise pressure levels of the complete engine shall not exceed 85dB (A).

Note: Noise pressure level of the main machine shall not exceed 90dB (A).

5.5 Handwheel or stick control force of the general purpose machine tool shall not exceed those specified in Table 2.

Table 2

Unit: N

Boring machine axis diameter mm	Operating force	
	Frequently used	Infrequently-used
130	100	160
≥160	120	200

6.7 The following rail pairs shall be assessed in accordance with "Static Pressure, Slide (Rolling) Motional Track":

- a) Slide carriage and lathe bed rail pair;
- b) Headstock pillar rail pair or carriage and pillar rail pair;
- c) Ram and headstock rail pair or headstock and carriage rail pair.

6.8 Paint inspection shall be carried out for the following important dowel pins, whose contact length shall not be less than 60% of the working length and shall be uniformly distributed along the two sides of the seam:

- a) Dowel pins used for lathe bed splicing and joint surface splicing;
- b) Dowel pins used for joint surfaces of pillars and slide carriages.

6.9 Nondestructive testing shall be carried out for steel-edged rails, which shall be free from cracks.

6.10 Inverse idle running amount of graduated handwheels of the general purpose machine tool shall not exceed 1/8r.

6.11 Inspect the cleanliness of the machine tool according to those specified in JB/T 9877. Internal cleanliness of headstocks and hydraulic tanks shall be inspected according to the weight method. Limit for impurity and dirt: headstock shall not exceed 400mg/L; hydraulic tank shall not exceed 200mg/L (random inspection); other parts shall be inspected by visual observation or hand feeling, and they shall be free from dirt.

7 Idle running Test of Machine Tools

7.1 Main movement structure of the machine tool shall run successively from the lowest rotational speed (step-less speed-change machine tool could run in low, medium and high speed); running time for each speed shall not be less than 2min; the running time of the highest speed shall be not less than 1h; make the main shaft bearing to reach the steady temperature; measure the temperature and temperature rise of the bearing; the temperature and temperature rise shall not exceed those specified in Table 3.

Table 3

Unit: °C

Bearing type	Temperature	Temperature rise
Sliding bearing	60	30
Rolling bearing	70	40

7.7.2.1 It shall be carried out according to those specified in 7.4, 7.5 and 7.7.1.1.

7.7.2.2 Automatic tool change test shall be carried out for each cutting tools in the tool changer, including cutting tools with the maximum weight in an optional method for at least two times; this test shall be carried out on each cutter spacing of the cutting tools with the maximum weight; the operation is required to be flexible and reliable.

7.7.2.3 Test shall be carried out according to function of the numerical control system.

7.7.3 Idle running tests shall be continuously carried out for the machine tool with the numerical control command and the continuous running time shall not be less than 36h. Off-time between automatic cycles shall not exceed 1 min; the entire operation process shall be free from malfunction.

In the test, automatic cycle shall include all functions of the machine tool and following content:

- a) Main shaft includes forward and reverse rotation with low, medium and high rotary speed; the time is generally not less than 10% of the time for each loop program.
- b) Moving parts of each coordinate shall include in low, medium and high feed speed, and fast forward running in the forward and backward direction; the running shall be within the range of the whole stroke; an arbitrary point may be selected for positioning. Operation time with high speed of feed and rapid operation is generally not less than 10% of the time for each loop program.
- c) Cutting tool on the cutter position in the tool changer shall not be less than two times of automatic exchange;
- d) Linkage of each linking coordinate axis.

8 Load Tests of Machine Tools

The following load tests shall be carried out for machine tools:

- a) Test for maximum torque of the main transmission;
- b) Test for the maximum resistance to cutting;
- c) Test of maximum efficiency of the main transmission (random inspection).

8.1 For the tests of maximum torque of main transmission, maximum resistance to cutting, and maximum power of main transmission, the test piece's material and

cutting specification shall be according to the design document. For mass produced machine tools, items a), b) allow the test to be carried out under 2/3 of the maximum torque and the maximum cutting resistance, however, tests of maximum torque and maximum resistance to cutting shall be regularly carried out.

8.2 Tests for general purpose machine tools - the maximum torque is over 25% in a short time; and the resistance to cutting is over 25% in a short time.

It shall be carried out according to the cutting specifications specified in the design. Test shall be carried out for mass produced machine tools in the 2/3 of the maximum torque and the maximum resistance to cutting. However, random test shall be carried out regularly in a short time for those exceed the maximum torque and exceed the maximum resistance to cutting by 25%.

9 Accuracy Inspection of Machine Tools

9.1 Accuracy inspection for machine tools shall be carried out according to GB/T 5289.3-2006; in which, the inspection for G13 and G18 shall be carried out when main shaft of the machine tool reaches the medium speed and stable temperature.

9.2 In the accuracy inspection of work, surface roughness of the specimen: the maximum allowable value of bore surface R_a is 1.6 μm ; the maximum allowable value of plane or external-circle R_a is 3.2 μm .

9.3 The minimum setting-unit test for numerical control machine tools:

9.3.1 Test method

Make the moving parts on the rectilinear coordinates to rapidly move for a certain given distance in the forward (or backward) direction; then stop; give several commands for the minimum setting-units in the same direction; then stop; the position is the reference position; give one command for one time and 20 commands for the minimum setting unit in total; make it move in the same direction; measure the stop position of each command. From the above motioned final position, give several additional commands for the minimum setting-unit in the same direction; then stop; give several minimum setting unit commands in the backward (or forward) direction to make it almost back to the above final measurement; the stop position of these minimum setting-unit commands in the forward and backward directions shall not be measured. Then, start from the above final position, one for one time; give 20 commands for minimum setting-unit in total; move continuously in the backward (forward) direction; measure the stop position of each command, see Figure 1.

Tests shall be carried out at middle position, and both ends of the stroke of each rectilinear coordinates. Calculate according to Formula (1) and Formula (2); the maximum error between the three positions is the error of this item.