

JIS

JAPANESE INDUSTRIAL STANDARD

**Test Code for Performance and
Accuracy of External
Cylindrical and Universal
Grinding Machines**

JIS B 6212—1986

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Test Code for Performance and Accuracy of External Cylindrical and Universal Grinding Machines B 6212-1986

1. Scope

This Japanese Industrial Standard specifies the test and inspection methods on the running performance, rigidity, mechanical accuracy and working accuracy of external cylindrical and universal grinding machines having distance of 3000 mm or less between centres.

Remarks 1. The coordinate axes of the machine used in this standard shall be as follows [see JIS B 6310].

Z axis: Z axis shall be taken in a parallel direction to the wheel spindle (right-left direction).

X axis: X axis shall be taken in a perpendicular direction to Z axis in a horizontal plane (front-rear direction).

Y axis: Y axis shall be taken in a perpendicular direction to Z axis and X axis (up-down direction).

2. The units and the numerical values shown in { } in this standard are in accordance with the traditional units and are appended for reference.

Applicable Standards:

JIS B 6003-Methods of Vibration Testing for Machine Tools

JIS B 6004-Method of Sound Level Measurement for Machine Tools

JIS B 6014-General Code of Safety for Machine Tools

JIS B 6201-Test Code for Performance and Accuracy of Machine Tools

JIS B 6310-Axis and Motion Nomenclature for Numerically Controlled Machine Tools

JIS G 4051-Carbon Steels for Machine Structural Use

JIS G 4105-Chromium Molybdenum Steels

JIS K 2241-Cutting Fluid

Corresponding International Standard:

ISO 2433-Test conditions for external cylindrical grinding machines with a movable table - Testing of accuracy

2. Running Test Methods

2.1 Performance Test The performance test shall be carried out according to Table 1.

Table 1

No.	Test item	Test method	Reference Corresponding No. of 3.2 in JIS B 6201
1	Starting, stopping and running operation of wheel spindle	Carry out starting and stopping at a suitable wheel spindle speed continuously ten times to test the smoothness and security of the working. Also concerning the internal wheel spindle, this shall be tested.	1-11
2	Changing operation of wheel spindle speed	Change the wheel spindle speed concerning all marked speeds and test the smoothness of working of the operating device and the security of indication. Also concerning the internal wheel spindle, this shall be tested.	1-12
3	Starting, stopping and running operation of work spindle	Carry out starting, and stopping (including inching and control) at a suitable work spindle speed continuously ten times to test the smoothness and security of working.	1-21
4	Changing operation of work spindle speed	Change the work spindle speed concerning all the marked speeds ⁽¹⁾ to test the smoothness of working of operation device and the security of indication.	1-22
5	Changing operation of table-feed speed	Change the table-feed speed from the minimum to the maximum to test the smoothness of working and the security of indication.	1-22
6	Changing operation of wheel power feed amount and in-feed speed	Change the power feed amount from the minimum to the maximum, and change the power feed speed from the minimum to the maximum to test the smoothness of respective workings and the security of indication.	1-23 1-24

Table 1 (Continued)

No.	Test item	Test method	Reference Corresponding No. of 3.2 in JIS B 6201
7	Automatic reversing operation for table	Run the table at the minimum and the maximum speeds and concerning the setting of position and working of automatic reversing (including tarry), test the respective smoothness and the security.	1-25
8	Hand-feed-handle operation for table	Travel the table in Z-axis direction (right-left) ⁽²⁾ by means of a hand-feed handle to test the smoothness and uniformity of the working over the whole length of movement.	1-27
9	Hand-feed-handle operation for wheel in feed	Travel the wheel spindle stock in the X-axis direction (front-rear) ⁽²⁾ by means of a hand-feed handle, and test the smoothness and uniformity of the working over the whole length of movement.	1-27
10	Putting on and off of table power feed and the operation of its device	Concerning the setting of position of putting on and off of table power-feed and the working, test the smoothness and security of respective working.	1-21
11	Operation of automatic stopping device for wheel power-feed	Concerning the setting of command position of automatic stopping device for wheel power-feed and the working, test the security respectively.	1-32
12	Operation of automatic stopping device for table power-feed	Concerning the setting of command position of automatic stopping device for table power-feed and the working, test the security respectively.	1-32

Table 1 (Continued)

No.	Test item	Test method	Reference Corresponding No. of 3.2 in JIS B 6201
13	Operation of tailstock spindle	Travel the tailstock spindle according to the manual or power working to test the smoothness and the uniformity of working over the whole length of movement.	—
14	Operation of table swivelling and clamping	Swivel the table and test the smoothness of swivelling over the specified swivelling range and the security of clamping at an arbitrary position.	1-33
15	Operation of swivelling and clamping the work spindle stock	Swivel the work spindle stock and test the smoothness of the swivelling and the security of clamping at an arbitrary position.	1-33
16	Operation for swivelling and clamping of wheel spindle stock	Swivel the wheel spindle stock and test the smoothness of movement and the security of clamping at an arbitrary position.	1-33
17	Operation for travelling and clamping of the work spindle stock and the tailstock	Travel the work spindle stock and the tailstock on the table and test the smoothness of respective movements and the security of clamping at an arbitrary position. This shall be tested also on the regulating type wheel spindle stock.	1-33
18	Operation for mounting and demounting of wheel	Test the security of mounting and demounting of the wheel and the smoothness of fastening operation of screw threads.	1-41
19	Operation for wheel truing device	Actuate the wheel truing device to test the smoothness and the security of working.	1-56
20	Electric device	Test the insulation condition respectively once before and after the running test. However, this does not apply to the circuit using semiconductor and the like.	1-51

Table 1 (Continued)

No.	Test item	Test method	Reference Corresponding No. of 3.2 in JIS B 6201
21	Safety device	Test the safety for the operator and the security of machine protective function ⁽³⁾ [see JIS B 6014].	1-52
22	Lubricating device	Test the security of oil tightness, and function of suitable distribution of oil amount, or the like.	1-53
23	Oil-hydraulic device	Test the security of oil tightness and of the function of pressure regulation or the like.	1-54
24	Accessories	Test the security of the function.	1-55

Notes ⁽¹⁾ In the case of stepless speed change, the test shall be carried out on the three speeds of the minimum, intermediate and maximum.

⁽²⁾ The side where the table exists relative to the wheel spindle stock shall be called the front of machine and the right side toward the rear be called the right of the machine.

⁽³⁾ For example, it means the emergency stop function and the like in case where overheating, overload, etc. of electric motor for wheel spindle or work spindle are generated.

2.2 No-Load Running Test For the no-load running test, start to move each moving part at the same time, continue the running and measure each item specified in Table 2 Recording Form 1-1.

Further, when the temperature of each part has stabilized approximately, measure each item specified in Table 3 Recording Form 1-2 [see 3.3 of JIS B 6201].

Further, at the completion of running, measure the electric power required for the whole running.

Furthermore, observe the vibration and the noise. In the case where the vibration and noise are made problem specially, the test shall be carried out according to JIS B 6003 and JIS B 6004.

Table 2. Recording Form 1-1

No.	Measuring time o'clock min	Temperature °C								Descrip- tion
		Wheel bearing		Internal wheel bearing		Work spin- dle bearing		Hyd- raulic oil	Room temper- ature	
		Front	Rear	Front	Rear	Front	Rear			

- Remarks 1. Run the table at a suitable intermediate speed.
2. Run the work spindle at the maximum speed.
3. Concerning the front and rear of each bearing, the wheel side in the case of wheel spindle, and the work side in the case of work spindle are respectively taken as the front and the opposite side thereto is taken as the rear.

Table 3. Recording Form 1-2

Electric motor use division		Speed min^{-1} [rpm] or mm/min		Requiring electric power (power source frequency Hz)			Description
		Marking	Actual measurement	Voltage V	Current A	Input kW	
Wheel spindle							
Internal wheel spindle							
Work spindle	Minimum speed						
	Intermediate speed						
	Maximum speed						
Table	Minimum speed						
	Maximum speed						
Whole running							

- Remarks 1. The work spindle shall be measured on the minimum, maximum and, as required, the intermediate speeds.
2. The minimum and the maximum speeds of the table means its capable limits.
3. As required, the rated values of the electric motor shall be recorded in the description column.
4. The running conditions of whole running shall be recorded in the description column.

2.3 No-Load Running Test For the no-load running test, carry out the grinding power test and measure each item specified in Table 4 Recording Form 2 (see 3.4 of JIS B 6201).

Further, observe the conditions of vibration, noise and finished surface. In the case where the vibration and noise are made specially the problem, apply JIS B 6003 and JIS B 6004. For the grinding power test, carry out the cylindrical grinding and internal grinding according to the following conditions to test that it is endurable against the definite electric power (see Table 4 Recording Form 2).

Table 4. Recording Form 2

No.	Marking of wheel	Material, hardness, shape, etc. of works	Grinding fluid	Grinding conditions								Electric power required for wheel spindle (power source frequency Hz)				Condition of finished surface	Description			
				Grinding system	In feed or cutting (in diameter) mm/min or mm	Wheel		Works		Traverse speed		Wheel truing speed		Voltage V	Current A			Load input kW	No-load input kW	Grinding power kW
						Rotary speed min ⁻¹ (rpm)	Peripheral speed m/min	Rotary speed min ⁻¹ (rpm)	Peripheral speed m/min	mm/min	Per one revolution mm	mm/min	Per one revolution mm							

(1) Works

Material: S 45 C specified in JIS G 4051 or SCM 435 specified in JIS G 4105 which is, as a rule, heat-treated to make HRC 40 or superior.

Shape: The shape in the cylindrical grinding shall be in accordance with Table 5 and in the internal grinding, the inside diameter shall be 25 to 50 mm and the length be 1 to 1.5 times the inside diameter.