

JIS

JAPANESE INDUSTRIAL STANDARD

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

JIS B 6335—1986

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

B 6335-1986

1. Scope

This Japanese Industrial Standard specifies the test code for operation performance, rigidity, machine accuracy and working accuracy of numerically controlled external cylindrical and universal grinding machines having a distance between centres of not more than 3,000 mm.

Remark: In this standard, the units and numerical values shown in { } are in accordance with the traditional units, and are appended for reference.

2. Operation Test Methods2.1 Function Tests

2.1.1 Function Test Method not by Numerical Control The function test not by numerical control shall be carried out in accordance with Table 1, by operating each part manually.

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 6330-Test Code for Performance and Accuracy of
Numerically Controlled Machine Tools

JIS G 4051-Carbon Steels for Machine Structural Use

JIS G 4105-Chromium Molybdenum Steels

JIS K 2241-Cutting Fluid

JIS R 6210-Vitrified Grinding Wheels

Table 1

No.	Test item	Test method	Reference Corresponding No. of 3.2 in JIS B 6201 and 3.2.1 in JIS B 6330
1	Starting, stopping and working operation of wheel spindle	Carry out starting and stopping continuously 10 times at a suitable wheel spindle speed to test the smoothness and security of working. Test this also concerning the internal wheel spindle.	1-11
2	Conversion operation of wheel spindle speed	Concerning all marked speeds, convert the wheel spindle speed to test the smoothness of working of operation device and security of indication. Concerning the internal wheel spindle, also test this.	1-12
3	Starting, stopping and working operation of work main spindle	Carry out starting and stopping (including inching and braking) at a suitable work spindle speed continuously 10 times to test the smoothness and security of working.	1-21
4	Conversion operation of work spindle speed	Concerning all marked speeds ⁽¹⁾ , convert the work spindle speed to test the smoothness of working of operation device and the security of indication.	1-22
5	Conversion operation of table feed speed	Convert the table feed speed from the lowest to the highest to test the smoothness of working and security of indication.	1-22
6	Conversion operation of wheel power feed rate and in-feed speed	Convert the power feed rate from the minimum to the maximum, further convert the power feed speed from the lowest to the highest to test the smoothness of respective working 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 and 3.2.1 in JIS B 6330
7	Automatic reversing operation of table	Operate the table at lowest and highest speeds, and concerning setting position and working of automatic reversing (including tarry), test the respective smoothness and security.	1-25
8	Operation of table hand-feed handle	Travel the table in Z-axis direction by hand feed handle to test the smoothness and uniformity of working over the whole length of movement.	1-27
9	Operation of hand-feed handle for wheel in-feed	Travel the wheel spindle stock in X-axis direction by hand-feed handle to test the smoothness and uniformity of working over the whole length of movement.	1-27
10	Putting on and off of table power feed and operation of its device	Concerning setting of position of putting on and off of table power feed and working, test the smoothness and security of respective workings.	1-21
11	Operation of wheel power-feed automatic stopping device	Concerning setting of command position of wheel-power-feed automatic stopping device and working, test the security respectively.	1-32
12	Operation of table-power-feed automatic stopping device	Concerning setting of command position of table-power-feed automatic stopping device and the working, test the security respectively.	1-32
13	Operation of tailstock spindle	Travel the tailstock spindle by hand or power and test the smoothness and uniformity of working over the whole length of movement.	—
14	Swiveling of table and clamping operation	Over the specified swivel range of table, test the smoothness of swivel and the security of clamping at an arbitrary position.	1-33

Table 1 (Continued)

No.	Test item	Test method	Reference Corresponding No. of 3.2 in JIS B 6201 and 3.2.1 in JIS B 6330
15	Swivelling and clamping operation of wheel spindle stock	Swivel the work spindle stock and test the smoothness of moving and the security of clamping at an arbitrary position.	1-33
16	Swivelling and clamping operation of work spindle stock	Swivel the wheel spindle stock and test the smoothness of moving and the security of clamping at an arbitrary position.	1-33
17	Traveling and clamping operation of work spindle stock and tailstock	Travel the work spindle stock and tailstock on the table, and test the smoothness of respective moving and the security of clamping at an arbitrary position.	1-33
18	Attaching and detaching operation of grinding wheel	Test the security of attaching and detaching of grinding wheel and the smoothness of fastening operation of screws.	1-41
19	Electric apparatus	Before and after the operation test, test the insulation condition once respectively. However, this does not apply to the circuit using semiconductors and the like.	1-51
20	Numerically controlling device	Test the smoothness of working of various display almps, tape leader, fan, etc. and the security of function.	1-57
21	Safety device	Test the safety relating to the worker and the security of machine protective function ⁽²⁾ . [See JIS B 6014].	1-52
22	Lubricating device	Test the security of functions such as oil tightness, adequate distribution of oil amount, etc.	1-53
23	Oil-hydraulic and pneumatic equipment	Test the security of functions such as oil tightness, gas tightness, pressure regulation, etc.	1-54
24	Attachments	Test the security of the function.	1-55

Notes (¹) In the case of infinite variable speed, carry out the test concerning three speeds of the lowest, medium, and the highest.

(²) It means, for example, the travel limit automatic stopping function of each motion spindle, and the emergency stopping function in case where the synchronization of control system is lost or where overheating or overloading of electric motor for wheel spindle or for work spindle is generated.

2.1.2 Numerically Controlled Function Test The numerically controlled function test shall be carried out in accordance with Table 2 with working each part by numerical control tape for test and by other numerical control command(³).

Table 2

No.	Test item	Test method	Reference Corresponding No. of 3.2 in JIS B 6201 and 3.2.2 in JIS B 6330
1	Starting and stopping of work spindle and conversion of spindle speed	Revolve the work spindle, carry out starting, stopping, and convert the spindle speed on all marked speed(¹) and test the security of function and smoothness of working.	1-13 1-14
2	Starting and stopping of in-feed of wheel spindle stock and conversion of its speed	Convert the in-feed speed to at least three marked feed speeds of lowest, medium and highest and quick traverse speed, and carry out starting and stopping on positive and negative feeds to test the security of function and the smoothness of working.	1-28
3	Starting and stopping of the table and conversion of feed speed	Convert the feed speed to at least three marked feed speeds of lowest, medium, and highest, and quick traverse, and carry out starting and stopping on positive and negative feeds to test the security of function and the smoothness of working.	1-28
4	Positioning of table	Carry out positioning of table to test the security of function and the smoothness of working.	1-34
5	Returning to original point	Concerning each control spindle, carry out returning to original point(⁴) from an arbitrary position capable of returning to test the security of function and smoothness of working.	1-35

Table 2 (Continued)

No.	Test item	Test method	Reference Corresponding No. of 3.2 in JIS B 6201 and 3.2.2 in JIS B 6330
6	Dimension setting of dimensioning device	Carry out dimension setting concerning an arbitrary dimension in the measuring range to test the security of function and the smoothness of working.	1-34
7	Positioning of dimensioning device	Carry out positioning in W axis direction of dimensioning device to test the security of function and smoothness of working.	1-34
8	Grinding wheel correction device	Actuate the grinding wheel correction device to test the smoothness and security of working.	1-61
9	Other functions	Concerning other respective provided functions, test the security of function and smoothness of working.	1-61

Notes (3) Other numerical control command includes the numerical control command according to the input by card, on-line, manual data input device and according to manual input by push button and the like on the operation board.

(4) The traveling shall, as a rule, be quick traverse and its distance shall be not less than the distance including automatic acceleration and deceleration.

Remark: This test may be carried out at the same time as the continuous no-load operation test.

2.2 No-Load Operation Test For no-load operation test, start each motion part simultaneously and continue the operation to measure each item specified in Table 3. Recording Form 1-1 [See 3.3 of JIS B 6330].

Further, when the temperature of each part has been stabilized approximately, measure each item specified in Table 4 Recording Form 1-2.

Furthermore, at the completion of operation, measure the required electric power for over all operation.

Further, observe the vibration and noise. In the case where the vibration and noise are put into question specially, the test shall be in accordance with JIS B 6003 and JIS B 6004.

Table 3. Recording Form 1-1

No.	Measuring time hour· minute	Temperature °C								Description
		Wheel spindle bearing		Internal wheel spindle bearing		Work spindle bearing		Hy-draulic oil	Room tem- pera- ture	
		Front	Rear	Front	Rear	Front	Rear			

- Remarks 1. Operate the table at a suitable medium speed.
2. Operate the work spindle at the highest speed.
3. The front and rear of each bearing mean the wheel side as front for wheel spindle, and work side as front for work spindle, and their opposite sides as the rear.

Table 4. Recording Form 1-2

Using division of electric motor		Speed min^{-1} {rpm} or mm/min		Required electric power (power source frequency Hz)			Description
		Marked	Actually measured	Voltage V	Current A	Input kW	
Wheel spindle							
Internal wheel spindle							
Work spindle	Lowest speed						
	Medium speed						
	Highest speed						
Table	Lowest speed						
	Highest speed						
Overall operation							

- Remarks 1. The lowest and highest speeds of the table mean the possible limits.
2. As required, record the rating value of electric motor in the description column.
3. Record the operating conditions of overall operation in the description column.

