

JIS

JAPANESE INDUSTRIAL STANDARD

Test Code for Performance and
Accuracy of Wire Electrical
Discharge Machines

JIS B 6360—1983

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Test Code for Performance and Accuracy of
Wire Electrical Discharge Machines

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1. Scope

This Japanese Industrial Standard specifies the tests on running performances and methods for inspecting accuracy for the wire electrical discharge machines of working range 1000 mm x 1000 mm x 250 mm or under.

Remark: The units and numerical values given in { } in this standard are in accordance with the gravitational system of units and are appended for reference.

2. Testing Methods on Running2.1 Functional Tests

2.1.1 Functional Tests not Using Numerical Control The functional tests not using numerical control of the wire electrical discharge machines shall be carried out in accordance with Table 1, with respective parts operating 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 4404-Alloy Tool Steels

Table 1

No.	Test item	Testing method	Reference Corresponding No. of 3.2 in JIS B 6201
1	Start and stop of feed, and change of feed speeds	Respectively on X , Y and Z (¹) axes of the table, and U and V axes(¹) of the taper processing apparatus, change the feed speeds into at least three feed speeds of the lowest, intermediate and highest of the marking and a rapid feed, carry out start and stop on plus and minus of each feed to test the smoothness of works and reliability of functions.	1-21 1-22
2	Inching (¹)	Carry out inching operations respectively on X , Y and Z axes (¹) of the table and U -axis (¹) and V -axis (¹) directions of the taper processing apparatus to test the smoothness of works and reliability of functions.	1-21
3	Operation of automatic stop device of table travel limit	Carry out travel limit automatic stop by the rapid feed, respectively in directions of X , Y and Z axes (¹) of the table and U -axis (¹) and V -axis (¹) of the taper processing apparatus, to test the smoothness of works and reliability of functions.	1-32
4	Operation of wire tension adjusting device	Test the smoothness of works and reliability of indications of the operating device on the entire wire tension adjusting device.	—
5	Change of wire electrode travelling speeds and operation of device	Test the smoothness of works and reliability of indications of the operating device by changing the wire electrode travelling speed into the lowest, intermediate and highest speeds.	—

Note (¹) It shall be carried out on that provided with this function.

Table 1 (Continued)

No.	Test item	Testing method	Reference Corresponding No. of 3.2 in JIS B 6201
6	Operation of wire electrode vertical adjusting device	Actuate the wire electrode vertical adjusting device throughout overall length of the adjusting range to test the smoothness and reliability of works.	1-33
7	Operation of Z-axis slider	Actuate the Z-axis slider throughout overall length of the adjusting range to test the smoothness and reliability of works and clamping.	1-33
8	Adjusting device of processing liquid	Test the smoothness of operation of liquid pressure or flow regulating valve and reliability of indication of the pressure gauge or flowmeter.	1-55
9	Feeding device of processing liquid	Test the reliability of cleaning function of the processing liquid and reliability of indications of electric specific resistance.	1-55
10	Attaching and detaching of wire electrode	Test the reliability and smoothness in attaching and detaching of the wire electrode.	1-41
11	Electrical apparatus	Test insulating conditions once each before and after the running test.	1-51
12	Numerical control device	Test the smoothness of works and reliability of functions of each indicating lamp, tape reader, fan, etc. of the numerical control device.	1-57 ⁽²⁾
13	Safety device	Test the reliability of safety for operators and mechanical protective functions of emergency stopping functions and other in the case of any wrong operation in control system or any abnormal actuation of motor for table drive [see JIS B 6014].	1-52

Table 1 (Continued)

No.	Test item	Testing method	Reference Corresponding No. of 3.2 in JIS B 6201
14	Lubricating device	Test the reliability of such functions as oil tightness and adequate distribution of oil quantity.	1-53
15	Accessories	Test the reliability of functions.	1-55

Note (²) A corresponding No. of 3.2 in JIS B 6330.

2.1.2 Function Tests by Numerical Control The function tests by numerical control of the wire electrical discharge machines shall be carried out in accordance with Table 2, actuating each part by numerical control tapes(¹) for testing and other numerical control commands (³).

Table 2

No.	Test item	Testing method	Reference Corresponding No. of 3.2 in JIS B 6330
1	Start and stop of feed and change of feed speeds	Respectively on X-axis, Y-axis, Z-axis ⁽¹⁾ of the table and U-axis ⁽¹⁾ and V-axis ⁽¹⁾ directions of the taper processing apparatus, change the feed speeds into at least processing feed speeds of the lowest, intermediate and highest and rapid feed, and carry out start and stop in plus and minus directions of each feed to test the smoothness of the works and reliability of functions.	1-13 1-14
2	Zero resetting ⁽¹⁾	Carry out one time of zero resetting each from resettable arbitrary two positions to test the smoothness of works and reliability of functions.	1-35
3	Other functions ⁽¹⁾	Test the smoothness and reliability of such functions as the programme stop, end of programme, sequence number indication, feed speed indication (command value and actually measured value), optional stop, machine lock, single block feed, wire diameter correction, pitch error correction, backlash correction, positioning, processing feed control, axis interchange, search-mirror image, changeover of control code, present position indication and MDI.	1-61

Note ⁽³⁾ Other numerical control commands mentioned here include numerical control commands by inputs by card, on-line, and manual data input devices and by manual input by push button on operation board.

Remark: This may be carried out simultaneously with the continuous no load running tests.

2.2 No Load Running Test In no load running test of the wire electrical discharge machines, start each moving part and continue running, and measure each item specified in Recording Form 1 of Table 3 on two feed speeds of the lowest and highest and rapid feed when temperature at each part has been stabilized (see No. 2-21 of 3.3 in JIS B 6201).

Furthermore, observe the vibrations and noises. In the case where the vibrations and noises are particularly in question, JIS B 6003 and JIS B 6004 apply.

Table 3. Recording Form 1

Measuring item		Feed speed mm/min										Remark
		X-axis		Y-axis		Z-axis ⁽¹⁾		U-axis ⁽¹⁾		V-axis ⁽¹⁾		
Feed	Com- ⁽⁵⁾ mand	Actual ⁽⁶⁾ measure- ment	Com- ⁽⁵⁾ mand	Actual ⁽⁶⁾ measure- ment	Com- ⁽⁵⁾ mand	Actual ⁽⁶⁾ measure- ment	Com- ⁽⁵⁾ mand	Actual ⁽⁶⁾ measure- ment	Com- ⁽⁵⁾ mand	Actual ⁽⁶⁾ measure- ment		
	Feed speed	Lowest ⁽⁴⁾										
	Highest											
	Rapid feed											

Notes ⁽⁴⁾ The lowest one shall be 0.1 mm/min, and the highest one shall depend on the specifications of the machine.

⁽⁵⁾ For that which is capable of indicating the feed speed on the programme the commands shall be entered.

⁽⁶⁾ Speeds and distinction of plus (+) or minus (-) in direction shall be recorded.

2.3 Continuous No Load Running Test In the continuous no load running test of the wire electrical discharge machines, carry out about 2 h ⁽⁷⁾ of continuous running using the test tape including various functions of the wire electrical discharge machine or other numerical control commands to test the presence of abnormalities (see 3.4 of JIS B 6330). To the test tape or other numerical control commands in this case the following contents shall be included.

The feed speed shall be the intermediate speed of marking for each axis, and the travel distance shall be approximately the whole range of the marking.

Note ⁽⁷⁾ It shall be a continuous running of 2 cycles or over.

Remark: No load shall be applied on the table.

2.4 Load Running Test In the load running test of the wire electrical discharge machines, carry out the processing under the following conditions and measure the discharge processed amount and the maximum loading power (see Recording Form 2 of Table 4) (see 3.4 of JIS B 6201).

Furthermore, observe vibrations and noises. In the case where vibrations and noises are particularly in question, JIS B 6003 and JIS B 6004 apply.