GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 25.120.30
J 61

GB/T 37365-2019

Die casting unit - Performance testing method

压铸单元 性能检测方法

Issued on: March 25, 2019 **Implemented on: October 01, 2019**

Issued by: State Administration for Market Regulation;

Standardization Administration of the PRC.

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Die casting unit - Performance testing method

1 Scope

This Standard specifies the performance testing method for die casting unit.

This Standard applies to the performance testing of the die casting unit of cold chamber die casting machine.

This Standard does not apply to hot chamber die casting machines and other foundry equipment.

2 Normative references

The following documents are indispensable for the application of this document. For the dated references, only the editions with the dates indicated are applicable to this document. For the undated references, the latest edition (including all the amendments) are applicable to this document.

GB/T 3785.1-2010 Electroacoustics - Sound level meters - Part 1: Specifications

GB/T 9813.4-2017 General specification for computers - Part 4: Industrial application microcomputer

GB/T 15969.1-2007 Programmable controllers - Part 1: General information

GB/T 15969.2-2008 Programmable controllers - Part 2: Equipment requirements and tests

GB 20906 Safety requirements for high pressure metal diecasting units

GB/T 21269 Cold chamber die casting machines

JB/T 10894 Computer control systems for plastics injection moulding machines - General requirements

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Dry running cycle time

machine;

b) The dimension shall be greater than or equal to 0.8b×0.8b (b is the inner dimension between the pull rods);

c) The thickness shall be set according to the minimum thickness of the die casting mold of GB/T 21269; and shall be the average of the sample thickness of die casting machine;

d) When the parallelism of the two planes matched with the die plate is less than 0.05 mm, it shall ensure that the strain, under the corresponding clamping force, is less than 30 μm/m.

4.2 Testing of dry running cycle time

4.2.1 Testing instrument

The testing tool is a stopwatch.

4.2.2 Testing conditions

The main equipment of die casting unit includes a die casting machine and auxiliary equipment, wherein the auxiliary equipment shall include: a pouring device, a pickup device, and a spraying device.

The main action flow of die casting unit includes closing the door, closing the mold, pouring, shot, opening the mold, opening the door, ejection, pushing back, pressing back, picking up, spraying.

The parameter settings are shown in Table A.1.

4.2.3 Testing method

4.2.3.1 In the state of continuous operation under a fully-automatic mode and the operational data meeting the requirements of Table A.1, the test shall be carried out. The number of cycles of the die casting unit with a clamping force of less than 10000 kN is 50. The number of cycles of the die casting machine with a clamping force greater than or equal to 10000 kN is 30.

4.2.3.2 During the test, if an alarm occurs which causes the machine to stop, it shall be retested.

4.2.3.3 The average of the measured data is the dry running cycle time of die casting unit.

4.4.2.4 It shall test the energy consumption generated by the following actions or components:

a) Main drive actions such as closing the door, closing the mold, pouring, shot, opening the mold, opening the door, ejection (no-load ejection), pushing back, pressing back, picking up (no-load pickup), spraying (no-blowing and no-paint spraying);

b) Electrical control device;

c) Internal maintenance unit (provided by the manufacturer), such as electrical component cooling system, lubrication system, hydraulic oil cooling system.

4.4.2.5 The hydraulic system has an oil temperature of 30 °C~55 °C.

4.4.2.6 The die casting machine does not select the shot piston tracking function.

4.4.3 Testing method

4.4.3.1 Confirm the integrity of the sample machine under test.

4.4.3.2 The three-phase power tester and the centralized power incoming line of die casting unit are reliably connected.

4.4.3.3 According to Table A.1, SET the parameters. COMPLETE the filling of the table.

4.4.3.4 When the die casting unit enters the state of continuous operation in the fully-automatic mode, after confirming that the heat balance is reached, the test is started.

4.4.3.5 The number of dry running cycles shall be in accordance with 4.2.3.1.

4.4.3.6 If any alarms cause a shutdown, retest is carried out.

4.4.4 Data acquisition

After the test is completed, on the human-machine interface of the three-phase power tester and the sample machine under test respectively, the following data shall be collected:

a) Total unit related electrical energy consumption (E), in kilowatt-hours (kW • h);

b) Power factor of die casting unit (φ);

provisions of Table A.1.

4.6.2.2 The test shall include at least the main drive actions such as closing the door, closing the mold, pouring, shot, opening the mold, opening the door, ejection (no-load ejection), pushing back, pressing back, picking up (no-load pickup), spraying (no-blowing and no-paint spraying).

4.6.2.3 The hydraulic system has an oil temperature of 30 °C~55 °C.

4.6.2.4 The die casting machine does not select the shot piston tracking function.

4.6.3 Testing method

4.6.3.1 Confirm the integrity of the unit under test. Refer to Table A.2; the unit shall, at the corresponding location, have a sensor interface.

4.6.3.2 Confirm that the sensor signal is reliably and accurately read.

4.6.3.3 When the die casting unit enters the state of continuous operation in the fully-automatic mode, after confirming that the fault-free smooth operation is achieved, data acquisition is started.

4.6.3.4 Each set of parameters shall be tested repeatedly at least 10 times.

4.6.3.5 TRY to rely on a paperless recorder to record all the data.

4.6.4 Calculation method

The control accuracy is calculated according to the method specified in JB/T 10894.

4.7 Testing of repeatability accuracy

4.7.1 Testing items

The testing of repeatability accuracy shall include at least the items listed in Table A.3.

4.7.2 Testing conditions

4.7.2.1 In the state of continuous dry shot operation in the fully-automatic mode, the test shall be carried out. The test parameters shall comply with the provisions of A.1.

4.7.2.2 The test shall include at least the main drive actions such as closing the door, closing the mold, pouring, shot, opening the mold, opening the door, ejection (no-load ejection), pushing back, pressing back, picking up (no-load

The testing items shall include at least the items listed in Table A.4.

4.8.2 Testing conditions

4.8.2.1 In the state of continuous dry shot operation in the fully-automatic mode, the test shall be carried out. The test parameters shall comply with the provisions of Table A.1.

4.8.2.2 The test shall include at least the main drive actions such as closing the door, closing the mold, pouring, shot, opening the mold, opening the door, ejection (no-load ejection), pushing back, pressing back, picking up (no-load pickup), spraying (no-blowing and no-paint spraying).

4.8.2.3 The hydraulic system has an oil temperature of 30 °C~55 °C.

4.8.2.4 The die casting machine does not select the shot piston tracking function.

4.8.3 Testing method

4.8.3.1 Confirm the integrity of the unit under test. Refer to Table A.4; the unit shall, at the corresponding location, have a sensor interface.

4.8.3.2 Confirm that the sensor signal is reliably and accurately accepted by the paperless recorder.

4.8.3.3 The unit motion parameters are set according to Table A.1. The filling of the table is completed.

4.8.3.4 When the die casting unit machine enters the state of continuous operation in the fully-automatic mode, after confirming that the fault-free smooth operation is achieved, data acquisition is started.

4.8.3.5 The number of dry running cycles shall be in accordance with 4.2.3.1.

4.8.3.6 TRY to rely on the records of the paperless recorder to calculate all the data.

4.8.3.7 The method of collecting and calculating single-item data shall meet the standards of die casting machine and auxiliary equipment.

4.8.4 Calculation method

Sampling: Continuous testing 50 times and record.

The upper control limit (USL) and the lower control limit (SLS) of the capability machine index calculation shall be calculated according to formulas (3) and (4),

$\bar{x}$ - Average of the readings;

S - Standard deviation.

CMK is the smaller of CMU and CML.

4.9 Function and performance check of integrated control systems

4.9.1 Industrial application microcomputer control system

4.9.1.1 Check items and methods

By checking accompanying documents and accompanying operating systems or other monitoring applications, the basic functions and performance of industrial application microcomputer control system are checked. The check items and methods shall be implemented in accordance with 5.3 of GB/T 9813.4-2017.

4.9.1.2 Key check and record items

Key check and record items are:

a) frequency of central processor;

b) bus speed;

c) storage capacity;

d) number of digital I/O interfaces;

e) number of analog I/O interfaces.

4.9.2 PLC control system

4.9.2.1 Check items and methods

Through the use of information provided by the PLC manufacturer and programming and debugging tools (PADT), the basic functions and performance of the control system are checked.

The basic functions and performance items of PLC are described in Clause 4 of GB/T 15969.1-2007. The information provided by PLC manufacturer shall meet the requirements of Clause 7 of GB/T 15969.2-2008.

4.9.2.2 Key check and record items

Key check and record items are:

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