

# JIS

**JAPANESE INDUSTRIAL STANDARD**

**Testing methods for  
centrifugal pumps, mixed flow  
pumps and axial flow pumps**

**JIS B 8301—1990**

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**by**

**Japanese Standards Association**

In the event of any doubt arising,  
the original Standard in Japanese is to be final authority.

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Testing methods for centrifugal pumps,  
mixed flow pumps and axial flow pumps

B 8301-1990

1. Scope

This Japanese Industrial Standard specifies the test methods of testing in the factory the centrifugal pumps, mixed flow pumps and axial flow pumps (hereafter referred to as the "pump"). However, these test methods are not applicable to centrifugal pumps for boiler feed, condensate pumps, self-priming centrifugal pumps and centrifugal type oil pumps.

Further, the extent of a pump shall, as a rule, be the portion partitioned by the sections of the pump suction flange (or the bell attached to the pump body proper) and the sections of the discharge flange.

- Remarks 1. The applicable Standards are given in Attached Table 2.
2. The units and numerical values given in { } in this Standard are based on the traditional units and are appended for informative reference.
3. The pump head and the head referred to in this Standard are indicated by the quotient of fluid energy, that is, specific energy, divided by the acceleration value of free fall at a particular spot which is taken as  $9.80 \text{ m/s}^2$ .

Informative Reference The tests and test methods for centrifugal pumps for boiler feed, condensate pumps, self-priming centrifugal pumps and centrifugal type oil pumps are specified in JIS B 8303, 8304, 8305 and 8306, respectively.

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**Reference Standards:**

JIS B 8303-Testing Methods of Boiler Feed Pumps

JIS B 8304-Testing Methods for Condensate Pumps

JIS B 8305-Testing Methods for Self-priming Centrifugal Pumps

JIS B 8306-Testing Methods for Centrifugal Type Oil Pumps

## 2. Test Items and Inspection Items

2.1 Test Items The test items shall be as listed below. However, the test of item (2) shall be carried out as required.

- (1) Total pump head, discharge, rotational speed, shaft power, suction conditions and operating conditions.
- (2) Suction conditions.

2.2 Inspection Items The inspection items shall be as follows. However, the inspection of item (2) shall be carried out as required.

- (1) Total pump head and discharge, shaft power, pump efficiency, operating conditions and hydrostatic pressure resistance.
- (2) Nondischarge total pump head, discharge at the highest point in total pump head curve, service running range and suction conditions.

## 3. Test Conditions

3.1 Test Liquid The test of pumps shall be conducted using clean water in a temperature range of 0 to 40°C. The density of clean water in this temperature range shall be  $1 \times 10^3 \text{ kg/m}^3$  {1 kgf// as weight per unit volume}.

- (1) In the case where the specified liquid is clean water at a temperature exceeding 40°C or where weight per unit volume of the specified liquid differs from that of clean water at ordinary temperature, the test results shall be converted to the performance values for the specified liquid in accordance with the formula specified in 7.2.
- (2) In the case where the viscosity of the specified liquid is high or where the liquid contains solid particles, the performance values of the pump using clean water at an ordinary temperature should be agreed upon in advance by the parties concerned with delivery.

3.2 Test Rotational Speed The test rotational speed is specified as follows:

- (1) The test rotational speed shall, as a rule, be based on the specified rotational speed.
- (2) In the case where, owing to the limitation of the test apparatus, the specified rotational speed is infeasible, a different rotational speed within the range of  $\pm 20 \%$  of the specified one may be employed. In that case, the test result shall be converted into the performance value at the specified rotational speed in accordance with the formula specified in 7.1.

- (3) In the case of a large powered pump, when the test using the test rotational speed within the range of subclause (2) is infeasible, the test speed may be decreased down to -35 % of the specified rotational speed by agreement between the parties concerned with delivery (hereafter referred to as the "agreement").

Remark: In this case, as discrepancies in the operational conditions and so on may ensue, agreement should be called for as to the conversions of the test results to the performance values for the specified rotational speed and judgment on the operational conditions.

- (4) In the case where a pump is driven by an attached electric motor, the rotational speed obtained by running the pump with the specified load under the normal electric source condition <sup>(1)</sup> shall be taken as the specified rotational speed of the pump.

Note <sup>(1)</sup> The normal electric source condition means a condition within  $\pm 1$  % of the rated frequency and  $\pm 10$  % of the rated voltage.

### 3.3 Measuring Points The measuring points shall be as follows.

- (1) In the tests of a centrifugal pump, measurements shall be taken of not less than five different discharge values ranging from the nondischarge state to the largest possible flow rate, at least one of which shall be lower than the specified head.
- (2) In the tests of a mixed flow pump, measurements shall be taken of not less than five different discharge values ranging widely as far as possible over and below the specified head.
- (3) In the tests of an axial flow pump, measurements shall be taken of not less than five different discharge values ranging from the full open state to the smallest possible discharge values, at least one of which shall be higher than the specified head.

## 4. Test Apparatus

The test apparatus shall have sufficient provisions for the testing of the pump performances.

In this case the measuring apparatus for discharge shall conform to JIS B 8302.

One set of examples of test apparatus are shown in Fig. 1, Fig. 2 and Fig. 3.