

JB

**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

JB/T 9752.3-2014

Replacing JB/T 9752.3-2004

**Turbochargers - Part 3: Balance Quality Requirements and
Check Methods of Rotors**

涡轮增压器 第3部分：转子平衡品质及校验方法
(English Translation)

Issued on: May 6, 2014

Implemented on: October 1, 2014

**Issued by: Ministry of Industry and Information Technology of the
People's Republic of China**

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1 Scope

This Part of JB/T 9752 specifies the rotor balance quality grade, the calculation and verification method of the unbalance distribution on the two correction planes, the balance limit of the core rotor assembly, the marking method on the drawing, of the turbocharger (hereinafter referred to as the supercharger).

This Part describes the dynamic balancing of single-piece and core rotor assembly for various types of supercharger rotors.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 4201 Description verification and evaluation of balancing machines

GB/T 7184 Small and medium power diesel engines - Measurement and evaluation of vibration

GB/T 9239.1-2006 Mechanical vibration - Balance quality requirements for rotors in a constant (rigid) state - Part 1: Specification and verification of balance tolerances

JIS B 0905-1992 Rotating machines - Balance quality requirements of rigid rotors

3 Terms and definitions

The terms and definitions, as defined in GB/T 9239.1-2006, as well as the following terms and definitions, apply to this document.

3.1 Balancing

Check and, if necessary, adjust the rotor mass distribution, to ensure that the residual unbalance or journal vibration and/or the force acting on the bearing is within specified limits, at the corresponding operating speed frequency.

3.2 Unbalance

The state of the rotor, when the vibration force or motion, which is caused by the centrifugal force due to the rotation of the rotor, acts on the bearing.

3.3 Residual unbalance

The residual unbalance on the rotor, after balancing.

3.4 Couple unbalance

A moment unbalance, which is formed by a pair of unbalance vectors of equal magnitude and opposite phase angles, in two spaced radial planes.

3.5 Dynamic unbalance

The state of any position of the central primary inertial axis, as relative to the axis.

3.6 Balance quality

A quantity, which is used to express the degree of balance of a rigid rotor. Its value is the product of the rotor centroid offset multiplied by the rotor speed.

3.7 Rigid rotor

A rotor, whose working speed is lower than the first-order critical speed of the rotor shaft.

3.8 Flexible rotor

A rotor, whose working speed is higher than the first-order critical speed of the rotor of the pressure roller is still > 0.015 mm, after 360° rotation, the parts on the shaft shall be replaced, to repeat the above balancing steps.

8.4.3 Balancing of core rotor assembly

Install the combined and dynamically balanced rotor into the intermediate shell. Align the assembly marks. Tighten the end nut, to form the core rotor assembly. Then carry out the dynamic balance of the core rotor combination. At any rotational speed, its vibration acceleration g or vibration velocity V shall not exceed the specified value, which is specified in Figure 5. If it exceeds, it can be corrected, by removing the weight from the edge of the end nut, in the angular direction indicated by the balancing machine.

9.1 Calibration rotor

9.1.1

Make a rotor, which has the same mass and consistent support position as the supercharger's rotor, as well as good rigidity; OR select a rotor in the product as the calibration rotor. Put the calibration rotor on the balancing machine, on the production line or a balancing machine, which has a higher precision, for calibration. The residual unbalance of the calibration rotor shall reach the minimum value (close to zero), which can be reflected by the balancing instrument. Verified calibration rotors shall be properly stored, to prevent corrosion and deformation. For single-piece and small batch of products, it is allowed to not keep the calibration rotor.

9.1.2

Calibration rotor shall be calibrated, at the rotating speed of the balancing machine, which has a higher sensitivity.

9.1.3

The support position and direction of rotation, during calibrating by the calibration rotor, shall be consistent with the working state of the product rotor.

9.1.4

Calibration rotor shall be inspected regularly; the validity period is one year.

9.2 Calibration of balancing instrument's accuracy

9.2.1

Add the test weight unbalance to the calibration rotor. Make calculation, according to formula (13):

Where:

U_w - The unbalance of the test weight, in grams millimeters (g · mm).

PB - The scale value of the balancing instrument, in grams millimeter per grid.

9.3 Inspection of rotor's balance quality

9.3.1

The rotor can be divided into two types: integral assembly balance and single-piece balance, according to the design requirements. For the rotor parts, which are subject to integral assembly balancing, if there is no fixed position, it shall identify the assembly mark.

9.3.2

Adjust the supporting frame of the balancing instrument, so that the supporting position of the rotor, when it is balanced, is consistent with the actual position; the balancing speed and direction of rotation shall be the same as the rotation speed and direction of rotation, when the rotor is calibrated.

9.3.3

When the unbalance of the rotor is so large, that the normal work cannot be performed, the balance speed can be reduced OR the primary balance can be carried out by means of static balance.

9.3.4

According to the position, which is specified in the design drawing, remove the unbalanced part, by the weight removal methods, such as grinding, milling or drilling.

9.3.5

For the rotor, which is assembled after single-piece dynamic balance, when the dynamic balance is re-calibrated, if the indicated value of the balancing instrument exceeds the specified range of the drawing or single-piece balancing, some parts on the rotor (such as thrust plate, shaft seal, nut, etc.) are allowed to be replaced, OR use the part transposition method, to carry out calibration. It may also remove the weight of the rotor again, to meet the requirements of the design drawings.