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## **BALANCE STANDARDS FOR IN-PLACE MACHINE ROTORS**

When balancing machine rotors in-place, Machine Diagnostics, Inc. uses balance quality standards found in ISO 1940/1.

This document and the attachment "Balance Quality Requirements of Rigid Rotors", Rockwell International, is intended to assist in understanding how the tolerance is applied.

### **UNITS OF MEASURE**

MDI will balance using a portable data collection device and will measure the vibration at rotor speed in velocity. Measuring units will be Inches-per-second (i.p.s.). Other vibration-measuring units can be used if requested by the customer (mils of displacement or g's of acceleration). In some cases where required by specification, residual unbalance can be calculated where the rotor weight and diameter of the rotor where the balance weight is applied is known.

This document will assume that the final balance criteria will be measured with the portable data collector and the units will be i.p.s.

### **APPLICATION OF THE STANDARD**

Vibration values will be measured on the housing of the retaining bearings of the rotor to be balanced.

The vibration values will be measured in velocity i.p.s. and applied to the ISO 1940/1 standard.

To apply these values, use the attached document "Balance Quality Requirements of Rigid Rotors":

1. Go to page 2. Using the Chart "Balance Quality Grades...", select the rotor type and corresponding balance quality grade from the chart.
2. Convert the balance quality grade to i.p.s. by dividing the grade value by 25.4. Note: The balance quality grade is actually given as a velocity value in millimeters-per-second (mm/s). 25.4 is the conversion value used to get from millimeters to inches.
3. Balance the machine rotor until the vibration value is equal to or less than the standard.
4. As a general rule, MDI will strive for the next lower balance quality grade. This should improve rotor life and performance beyond the grade specified for a given machine type. Example: Industrial fans would fall into balance quality grade G 6.3 (from chart found on page 2). MDI will strive for the next lower grade, which would be G 2.5.

**EXAMPLE USING THIS METHOD:**

1. Machine to be balanced is an industrial fan operating at 1200 r.p.m. The rotor is over-hung.
2. Quality grade from the chart on page 2 is G 6.3. Convert from mm/s to in/s by dividing by 25.4. ( $6.3 / 25.4 = .248$  i.p.s.) The final vibration value must be equal to or lower than this number.
3. Strive for the next lower quality grade. In this case, G 2.5. Convert ( $2.5 / 25.4 = .098$  i.p.s.).

Applying this balance standard is a simple and straightforward approach that will allow the user to achieve a proper machine rotor balance.

Note: This approach may not suit all applications. Where no standard is available from a machine manufacturer, this method will be used. Where a tolerance is specified by the machine manufacturer, MDI will apply the lower of the values (ISO 1940/1 or the manufacturer's spec.).