

Tech Note 112 Vibration Severity Guide based on ISO 20816-3:2022

ISO 20816 Mechanical Vibration Measurement and evaluation of machine vibration

20816 Part 3 combines and replaces the ISO 7919-3 and ISO 10816-3 standards. It includes Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 30,000 r/min with the Sensor (Instrument) located directly on and in contact with the measurement point.

Examples of these types of machines are electrical motors of any type, rolls and mills, blowers and fans, conveyors, industrial gas turbines with power up to 3 MW, rotary compressors, turbofans, and certain steam turbines.

These machines can have horizontal, vertical, or inclined shafts and can be mounted on rigid or flexible supports. Typically, large and medium-sized electric motors, mainly with low speeds, would normally have rigid supports, whereas turbogenerators or compressors with power greater than 10 MW and vertical machine sets would usually have flexible supports.

Vibration Velocity is sufficient to characterize the zone boundary values of vibration over a wide range of machine types and machine operating speeds. The main evaluation is therefore the overall RMS value (Root Mean Square) of vibration velocity in millimeter per second [mm/s].

In cases of measurements in the English Systems, the equivalent (derived) Peak Values [in/sec] in the chart are expressed as the converted RMS values times $\sqrt{2}$. ($\sqrt{2} = 1.414$).

$$\text{Equivalent Peak Value [In/sec]} = (\text{RMS Value [mm/s]} / 25.4) \times \sqrt{2}$$

ISO 20816-3		Group 1	Group 2
		Large machines power > 300 kW	Medium machines 15 kW > power ≤ 300 kW
in/sec peak	mm/s rms	Motor height > 315 mm	Motor 160 > height ≤ 315 mm
0.61	11.0	Damage occurs	
0.39	7.1		
0.25	4.5	Restricted operation	
0.19	3.5	Unrestricted operation	
0.16	2.8		
0.13	2.3		
0.08	1.4	Newly commissioned machinery	
0.04	0.7		
0.00	0.0		
Foundation		Flexible	Rigid

The shaft height, sometimes referred to as motor height of a machine, is the distance between the centerline of the shaft and the base plane of the machine itself.

This Tech Note only provides guidance for assessing the severity of vibration, it does not form the only basis for judgement criteria, and it is recommended to set alarms utilizing established baseline Values.

Shown above: ISO 20816-3 Vibration Severity Chart