Machine Vibration Severity: ISO Zone Boundaries

vibration_severity_iso_a ver 1.0 by Tom Irvine

Measure

Broadband RMS velocity measured on the bearing housings or machine casing, in each measurement direction. Range 10 to 1000 Hz; ISO 20816-3 uses 2 to 1000 Hz for machines running below 600 rpm.

Amplitude conversion (sinusoidal motion assumed)

$$v_{rms} = \frac{v_{pk}}{\sqrt{2}} \qquad v_{rms} = \frac{v_{pk\text{-}pk}}{2\sqrt{2}} \qquad v\ [\text{in/sec}] = \frac{v\ [\text{mm/sec}]}{25.4}$$

Zones (a value equal to a boundary is placed in the lower zone)

A Vibration typical of newly commissioned machines.

B Acceptable for unrestricted long-term operation.

C Not acceptable for long-term continuous operation; may run for a limited time until corrected.

D Severe enough to cause damage to the machine.

Default zone boundaries (RMS velocity)

	mm/sec			in/sec		
Group / class	**A/B**	**B/C**	**C/D**	**A/B**	**B/C**	**C/D**
ISO 20816-3 Group 1, rigid	2.30	4.50	7.10	0.0906	0.1772	0.2795
ISO 20816-3 Group 1, flexible	3.50	7.10	11.00	0.1378	0.2795	0.4331
ISO 20816-3 Group 2, rigid	1.40	2.80	4.50	0.0551	0.1102	0.1772
ISO 20816-3 Group 2, flexible	2.30	4.50	7.10	0.0906	0.1772	0.2795
ISO 10816-1 Class I	0.71	1.80	4.50	0.0280	0.0709	0.1772
ISO 10816-1 Class II	1.12	2.80	7.10	0.0441	0.1102	0.2795
ISO 10816-1 Class III	1.80	4.50	11.20	0.0709	0.1772	0.4409
ISO 10816-1 Class IV	2.80	7.10	18.00	0.1102	0.2795	0.7087

Groups and classes (summary; see the standards for the full definitions)

Group 1: large machines above 300 kW up to 50 MW, or electrical machines with shaft height $H \geq 315$ mm.

Group 2: medium machines 15 kW to 300 kW, or electrical machines with 160 mm $\leq H <$ 315 mm.

Rigid support: lowest machine-plus-support natural frequency at least 25% above the main excitation frequency.

Class I: parts integral with a complete machine, e.g. production electric motors up to about 15 kW.

Class II: medium machines of about 15 to 75 kW without special foundations, or rigidly mounted up to 300 kW.

Class III: large machines on rigid, heavy foundations. Class IV: large machines on soft foundations.

Sources and caution

ISO 10816-3:2009 table values, carried unchanged into ISO 20816-3:2022 according to the secondary sources below.

ISO 10816-1:1995 Annex B values. ISO 10816-1 was superseded by ISO 20816-1:2016.

Values taken from vendor technical notes that reproduce the tables (Siemens, Fabrico, Vibromera, Tractian; URLs in sources.txt). One source lists 2.8 mm/sec for Group 1 rigid A/B; the majority give 2.3. The app's boundary table is editable: check every value against your copy of the standard before using it for acceptance or alarms.