

# DIN ISO 13373-2:2016-11 (E)

## Condition monitoring and diagnostics of machines - Vibration condition monitoring - Part 2: Processing, analysis and presentation of vibration data (ISO 13373-2:2016)

---

Contents	Page
National foreword.....	4
National Annex NA (informative) <b>Bibliography</b> .....	6
<b>Introduction</b> .....	8
<b>1 Scope</b> .....	9
<b>2 Normative references</b> .....	9
<b>3 Signal conditioning</b> .....	9
3.1 General.....	9
3.2 Analogue and digital systems.....	11
3.2.1 General.....	11
3.2.2 Digitizing techniques.....	12
3.3 Signal conditioners.....	12
3.3.1 General.....	12
3.3.2 Integration and differentiation.....	12
3.3.3 Root-mean-square vibration value.....	13
3.3.4 Dynamic range.....	14
3.3.5 Calibration.....	14
3.4 Filtering.....	15
<b>4 Data processing and analysis</b> .....	15
4.1 General.....	15
4.2 Time domain analysis.....	16
4.2.1 Time wave forms.....	16
4.2.2 Beating.....	17
4.2.3 Modulation.....	18
4.2.4 Envelope analysis.....	19
4.2.5 Monitoring of narrow-band frequency spectrum envelope.....	19
4.2.6 Shaft orbit.....	20
4.2.7 d.c. shaft position.....	20
4.2.8 Transient vibration.....	20
4.2.9 Impulse.....	21
4.2.10 Damping.....	22
4.2.11 Time domain averaging.....	24
4.3 Frequency domain analysis.....	25
4.3.1 General.....	25
4.3.2 Fourier transform.....	25
4.3.3 Leakage and windowing.....	26
4.3.4 Frequency resolution.....	27
4.3.5 Record length.....	27
4.3.6 Amplitude modulation (sidebands).....	27
4.3.7 Aliasing.....	29
4.3.8 Synchronous sampling.....	30
4.3.9 Spectrum averaging.....	31
4.3.10 Logarithmic plots (with dB references).....	31
4.3.11 Zoom analysis.....	32
4.3.12 Differentiation and integration.....	32

4.4	Display of results during operational changes .....	33
4.4.1	Amplitude and phase (Bode plot) .....	33
4.4.2	Polar diagram (Nyquist diagram) .....	34
4.4.3	Cascade (waterfall) diagram .....	35
4.4.4	Campbell diagram .....	37
4.5	Real-time analysis and real-time bandwidth .....	38
4.6	Order tracking (analogue and digital) .....	39
4.7	Octave and fractional-octave analysis .....	39
4.8	Cepstrum analysis .....	39
<b>5</b>	<b>Other techniques .....</b>	<b>40</b>
	<b>Bibliography .....</b>	<b>42</b>