

DIN ISO 16079-2:2022-06 (E)

Condition monitoring and diagnostics of wind turbines - Part 2: Monitoring the drivetrain (ISO 16079-2:2020)

Contents		Page
National foreword		4
National Annex NA (informative) Bibliography		5
Foreword		6
Introduction		7
1	Scope	10
2	Normative references	10
3	Terms and definitions	10
4	Abbreviated terms	11
5	Failure mode and symptoms analysis (FMSA)	11
5.1	General	11
5.2	The process of the FMSA analysis	11
6	Descriptors for fault detection	12
6.1	General	12
6.2	Descriptor types	13
6.3	Descriptors based on process parameters — Operational values	14
6.3.1	General	14
6.3.2	Measurement of process parameter descriptors	15
6.4	Measurement of rotational speed and descriptors based on rotational speed	15
6.4.1	General	15
6.4.2	Measurement of rotational speed	16
6.5	Descriptors based on vibration	16
6.5.1	References to other standards	16
6.5.2	General	16
6.5.3	Measurement of vibration	17
6.5.4	Transducers for vibration measurements	17
6.5.5	Vibration transducer mounting	18
6.6	Descriptors based on stress wave measurements	19
6.6.1	General	19
6.6.2	Measurement of stress waves	19
6.6.3	Transducers for stress wave measurement	20
6.6.4	Mounting of stress wave sensors	20
6.7	Descriptors based on oil debris in lubricant oil	20
6.7.1	General	20
6.7.2	Oil debris descriptors	21
6.7.3	Oil debris sensors	21
7	Descriptor monitoring interval	22
7.1	Reference to other standards	22
7.2	Factors influencing the monitoring interval	22

8	Descriptor notification criteria	23
8.1	Reference to other standards	23
8.2	General	23
8.3	Establishing descriptor alarm and alert limits for a new turbine	24
8.4	Establishing alarm and alert limits for a turbine in normal operating condition	24
8.5	Establishing alert limits upon component change	24
9	Handling changes in operating conditions — The operational state bin concept	25
9.1	General	25
9.2	Example of how to use active power as an operational state	25
10	Transducer locations	26
10.1	Reference to other standards and guidelines	26
10.2	Location of vibration transducers	26
10.3	Location of stress wave transducers	28
10.4	Location of oil debris sensors	28
10.5	Example of naming conventions and transducer locations	28
11	Baseline — Initial recording of data for diagnosis at commissioning time	29
11.1	General	29
11.2	Duration of time waveforms for baseline recording	29
11.3	Repeatability and stability of time waveform recordings	30
11.4	Sampling rate of time waveform for baseline recording	30
11.5	Initial check of the baseline data — Recommendations	30
12	Diagnosis of faults and their causes	31
12.1	Reference to other standards	31
12.2	General	31
12.3	Component data	31
12.4	Raw-data time waveforms for detailed diagnosis	31
12.5	Regular recording	31
12.6	Recording on request	32
13	Prognosis	32
13.1	Reference to other standards	32
13.2	General	32
13.3	Type I — Failure data-based prognostics — Statistically based	33
13.4	Type II — Stress based prognostics — Model based	34
13.5	Type III — Data-driven method — Condition based	34
14	Review of the condition monitoring and diagnosis system design	34
14.1	Reference to other standards	34
14.2	General	35
14.3	Assessment of effectiveness of the condition monitoring system	35
14.4	Cost benefit analysis	36
	14.4.1 General	36
	14.4.2 Simple model	36
	14.4.3 Advanced model	37
	Annex A (informative) Details on vibration-based descriptor types	40
	Annex B (informative) FMSA analysis of the drivetrain	49
	Bibliography	52