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**