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Part 10: Diagnostic techniques for electrical generators with fluid-film bearings

Surveillance et diagnostic d'état des machines — Surveillance des vibrations —

Partie 10: Techniques de diagnostic pour les générateurs électriques de puissance à paliers à film fluide

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 2, *Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures*.

A list of all parts in the ISO 13373 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document provides guidelines for the procedures to be considered when carrying out vibration diagnostics of electrical generators with fluid-film bearings. It is intended to be used by vibration practitioners, engineers and technicians and it provides them with useful diagnostic tools which include the use of flowcharts and fault tables.

ISO 20816-2 sets out the criteria for monitoring the vibration of gas turbines, steam turbines and generators in excess of 40 MW and establishes provisions for evaluating the severity of the in-situ, broad-band vibration.

ISO 13373-1 presents the basic procedures for analysing narrow-band vibration signals. It includes the types of transducers to be used, their ranges, their recommended mounting locations on various types of machines, on-line and periodic vibration monitoring systems and potential machinery problems.

ISO 13373-2 includes descriptions of the signal conditioning equipment that is required, the time and frequency domain techniques that can be used and the waveforms and signatures that represent the most common machinery operating phenomena or faults encountered when performing vibration signature analysis.

ISO 13373-3 describes some procedures to determine the causes of vibration problems common to all types of rotating machines. It includes descriptions of systematic approaches that can be used to characterize vibration effects, the diagnostic tools available, which tools are needed for particular applications and recommendations on how the tools can be used for different machine types and components. ISO 13373-3 does not preclude the use of other diagnostic techniques.

Note that ISO 17359 indicates that diagnostics can be

a) started after detection of an anomaly during machine monitoring, or

b) carried out in parallel with machine monitoring.

This document considers only where diagnostics are performed after an anomaly has been detected and focusses mainly on the use of flowcharts, process tables, fault and symptom tables as diagnostic tools, since it is felt that these are the tools that are most appropriate for use in the field.

The flowchart and diagnostic process table methodology presents a structured procedure for use by a person in the field to diagnose a fault and find its cause. This step-by-step procedure guides the practitioner to be able to diagnose the machine anomaly in order to establish the probable root cause of this anomaly.

The fault tables present a list of the most common faults found in machinery, as well as their manifestations in the machine and vibration data. The symptom tables contain the main distinguishing vibration features of the main faults. When used with the flowcharts, the tables assist with the identification of machinery faults.

When approaching a machinery problem that manifests itself as a high or erratic vibration signal, the diagnosis of the problem should be done in a systematic manner. This document and ISO 13373-3 achieve that by providing guidance regarding the selection of the measuring and analysis tools, their use and the step-by-step procedures that can be used to diagnose the problem.

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Condition monitoring and diagnostics of machines — Vibration condition monitoring —

Part 10: Diagnostic techniques for electrical generators with fluid-film bearings

1 Scope

This document gives guidelines and requirements for the procedures to be followed when carrying out vibration diagnostics of 2- and 4-pole electrical generators of cylindrical pole design with fluid-film bearings.

This document does not apply to salient pole generators.

This document establishes a practical step-by-step vibration-based approach to fault diagnosis.

The requirements of this document should be considered together with those in ISO 13373-4.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2041, *Mechanical vibration, shock and condition monitoring — Vocabulary*

ISO 13372, *Condition monitoring and diagnostics of machines — Vocabulary*

ISO 13373-1, *Condition monitoring and diagnostics of machines — Vibration condition monitoring — Part 1: General procedures*

ISO 13373-2, *Condition monitoring and diagnostics of machines — Vibration condition monitoring — Part 2: Processing, analysis and presentation of vibration data*

ISO 13373-3:2015, *Condition monitoring and diagnostics of machines — Vibration condition monitoring — Part 3: Guidelines for vibration diagnosis*

ISO 21940-2, *Mechanical vibration — Rotor balancing — Part 2: Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2041, ISO 13372 and ISO 21940-2 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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