INTERNATIONAL STANDARD

ISO 18436-6

Third edition
2021-09

Condition monitoring and diagnostics of machines — Requirements for certification of personnel —

Part 6: Acoustic emission

Surveillance et diagnostic d'état des machines — Exigences relatives à la certification du personnel —

Partie 6: Émission acoustique

Reference number
ISO 18436-6:2021(E)

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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

Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword - Supplementary information

This document was prepared by Technical Committee ISO/TC 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 5, *Condition monitoring and diagnostics of machines*.

This third edition cancels and replaces the second edition (ISO 18436-6:2014), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— in Table A.2, the ISO reference standards have been cited more precisely;

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

The use of acoustic emission technology in condition monitoring is one of the key activities in predictive maintenance programmes for most industries. Other non-intrusive technologies including infrared thermography, vibration analysis, lubricant analysis, wear debris analysis and motor current analysis are used as complementary condition analysis tools. Those in the manufacturing industry who have diligently and consistently applied these technologies have experienced a return on investment far exceeding their expectations. However, the effectiveness of these programmes depends on the capabilities of individuals who perform the measurements and analyse the data.

A programme, administered by an assessment body, has been developed to train and assess the competence of personnel whose duties require the appropriate theoretical and practical knowledge of machinery condition monitoring and diagnostic techniques.

This document defines the requirements against which personnel using non-intrusive machinery condition monitoring and diagnostics technologies associated with acoustic emission for machinery condition monitoring are to be qualified and the methods of assessing such personnel.

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Condition monitoring and diagnostics of machines — Requirements for certification of personnel —

Part 6: Acoustic emission

1 Scope

This document specifies the requirements for qualification and assessment of personnel who perform machinery condition monitoring and diagnostics using acoustic emission.

A certificate or declaration of conformity to this document will provide recognition of the qualifications and competence of individuals to perform acoustic emission measurements and analysis for machinery condition monitoring using acoustic emission equipment. This procedure may not apply to specialized equipment or other specific situations.

This document specifies a three-category classification programme that is based on the technical areas delineated herein.

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

ISO 13374 (all parts), *Condition monitoring and diagnostics of machine systems — Data processing, communication and presentation*

ISO 13379-1, *Condition monitoring and diagnostics of machines — Data interpretation and diagnostics techniques — Part 1: General guidelines*

ISO 17359, *Condition monitoring and diagnostics of machines — General guidelines*

ISO 18436-1, *Condition monitoring and diagnostics of machines — Requirements for certification of personnel — Part 1: Sector specific requirements for certification bodies and the certification process*

ISO 18436-3, *Condition monitoring and diagnostics of machines — Requirements for qualification and assessment of personnel — Part 3: Requirements for training bodies and the training process*

ISO 22096, *Condition monitoring and diagnostics of machines — Acoustic emission*

ISO/IEC 17000, *Conformity assessment — Vocabulary and general principles*

EN 1330-9, *Non-destructive testing — Terminology — Part 9: Terms used in acoustic emission testing*

EN 13477-1, *Non-destructive testing — Acoustic emission — Equipment characterization — Part 1: Equipment description*

EN 13477-2, *Non-destructive testing — Acoustic emission — Equipment characterization — Part 2: Verification of operating characteristic*

EN 13554, *Non-destructive testing — Acoustic emission — General principles*

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ASTM E650-M17, *Standard Guide for Mounting Piezoelectric Acoustic Emission Sensors*

ASTM E1106-12(2021), *Standard Test Method for Primary Calibration of Acoustic Emission Sensors*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13372, ISO/IEC 17000, EN 1330-9 and the following apply.

ISO and IEC maintain terminological 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/

3.1
trainee
person who is being trained to become qualified

4 Classification of personnel (acoustic emission)

4.1 General

Individuals assessed as conforming to the requirements of this document shall be classified in one of three categories, depending upon their qualifications. They shall have demonstrated the necessary skills in acoustic emission condition monitoring for their category as indicated in Annex A.

Personnel classified as Category II need to have all the knowledge and skills expected of personnel classified as Category I, while personnel classified as Category III need to have all the knowledge and skills expected of personnel classified as Category II.

4.2 Category I

Individuals classified as Category I are qualified to perform acoustic emission measurements according to established and recognized procedures.

Personnel classified as Category I shall be able to:

a) apply a specified acoustic emission measurement procedure;

b) set up and verify operation of equipment for basic acoustic emission data collection;

c) verify the integrity of collected data and prevent or control poor data;

d) perform basic acoustic emission analysis;

e) record and categorize the results in terms of written criteria;

f) maintain a database of results or trends; and

g) evaluate and report test results in accordance with instructions.

Persons classified as Category I shall not be regarded as competent to choose the test method or technique to be used nor to assess the test results.

4.3 Category II

Individuals classified as Category II are qualified to perform and/or direct acoustic emission analysis according to established and recognized procedures, and will be aware of the limitations of the acoustic emission method.

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