Nederlandse norm

NEN-ISO 19835

(en)

Non-destructive testing - Acoustic emission testing - Steel structures of overhead travelling cranes and portal bridge cranes (ISO 19835:2018,IDT)

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- ISO 19835:2018,IDT

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Postbus 5059, 2600 GB Delft
Telefoon (015) 2 690 390, Fax (015) 2 690 190

INTERNATIONAL STANDARD

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Non-destructive testing — Acoustic emission testing — Steel structures of overhead travelling cranes and portal bridge cranes

Essais non destructifs — Essais d'émission acoustique — Structures en acier des ponts roulants et des portiques

Reference number
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
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Foreword

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 135, *Non-destructive testing*, Subcommittee SC 9, *Acoustic emission testing*.

INTERNATIONAL STANDARD **ISO 19835:2018(E)**

Non-destructive testing — Acoustic emission testing — Steel structures of overhead travelling cranes and portal bridge cranes

1 Scope

This document describes the acoustic emission (AE) testing technique used to perform structural integrity evaluation on steel structures of overhead travelling cranes and portal bridge cranes.

This document applies to the testing of steel structures of in-service overhead travelling cranes and portal bridge cranes. Testing of other kinds of cranes can refer this document.

This testing method is not intended to be an alone NDT standard method for the evaluation of the structural integrity of overhead travelling cranes and portal bridge cranes. Other NDT methods are used to verify and supplement the AT results.

This document does not establish evaluation criteria.

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 4310, *Cranes — Test code and procedure*

ISO 12714, *Non-destructive testing — Acoustic emission inspection — Secondary calibration of acoustic emission sensors*

ISO 12716, *Non-destructive testing — Acoustic emission inspection — Vocabulary*

ISO/TR 13115, *Non-destructive testing — Methods for absolute calibration of acoustic emission transducers by the reciprocity technique*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12716 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 http://www.electropedia.org/

3.1
acoustic emission source
AE source
source point or spatial position in the material where transient elastic waves are generated by the release of energy

3.2
acoustic emission location source
AE location source
spatial area comprising one or more clusters associated with an *AE source* (3.1) and encompassing the true physical location of the AE events giving rise to the AE source

Note 1 to entry: Common location methods include zone location, computed location and continuous AE signal location.

3.3
activity
<of acoustic emission source> increasing total number of AE events in *AE location source (3.2)* with loading process or loading time

3.4
intensity
<of acoustic emission source> average elastic energy released by the AE events in the *AE location source (3.2)*

Note 1 to entry: Burst AE source intensity related parameters are, e.g. maximum amplitude, energy, signal strength and, to a certain extent, ring down counts. Continuous AE source intensity related parameters are, e.g. root mean square (RMS AE) signal voltage, average rectified signal voltage and average signal level (ASL).

3.5
maximum operating load
maximum operation load is the maximum load of the crane bearing in the last 6 months before the AE testing

4 General principles

The main purpose of acoustic emission testing (AT) is to detect the acoustic emission source generated in the parent metal of steel structures, weld surface and internally, and locate the acoustic emission source.

The acoustic emission testing shall be done during the loading process, which includes the loading, load holding and unloading. The acoustic emission sensors should be arranged on the surface of steel structure being detected, to receive the signals generated by the active source and transfer it into electric signals. The AE instrument is used to collect, handle, display, record and analyse the signals, and then provides the parameters and location of the acoustic emission source.

5 Qualification of personnel

It is assumed that AE testing is performed by competent personnel. In order to ensure that this is the case, it is recommended that the personnel meet the requirements of ISO 9712 or equivalent.

6 Equipment

6.1 AE testing system

AE testing employs an AE instrument, AE sensors, preamplifiers, and interconnecting cables.

This combination together with some mechanical equipment holding the sensors forms the AE testing system.

All essential parts of the system shall be defined in a written procedure agreed at the time of enquiry or order (see 10.2).

6.2 AE sensors

It is recommended to use sensors in the frequency range between 100 kHz and 400 kHz.

The minimum sensitivity shall be equivalent or greater than 60 dB referred to 1 V/(m·s-1) in surface wave sound field calibration, or in longitudinal wave calibration.

When sensors with other response frequencies are used, they shall provide enough sensitivity within its frequency band.

Sensors shall be shielded against radio frequency and electromagnetic noise interference by proper shielding practice or by differential element design, or both. The metallic case of each AE sensor shall be electrically isolated from a metallic test object.

The AE sensors shall be stable over the response frequency and temperature range of use, and shall not exhibit sensitivity changes greater than 3 dB over this range.

AE sensors mounted on the surface of a steel structure shall be insulation from each other.

For sufficient sensitivity, a pencil lead break of 0,5 mm diameter, hardness 2H, in 50 mm distance from the sensor, shall generate an amplitude of at least 95 dB_{AE}.

The calibration of the sensors shall be performed according to ISO 12714 or with ISO/TR 13115.

6.3 Signal cables

The signal cables connecting sensors and preamplifiers shall be shielded against electromagnetic interference. Its length shall not exceed 1 m, unless the length-depending signal loss is considered and acceptable.

This requirement may be omitted where the preamplifier is mounted in the shielded sensor housing.

6.4 Couplant

The used couplant should keep good sound transfer effect during testing.

6.5 Preamplifiers

The preamplifiers may be separate or may be mounted in the sensor housing.

The RMS voltage of preamplifiers circuit noise shall be less than 7 μV.

The preamplifiers shall be stable over the response frequency and temperature range of use, and shall not exhibit sensitivity changes greater than 3 dB over this range.

The preamplifiers response frequency shall match with that of the sensors, and the gain of the preamplifiers, usually 40 dB or 34 dB, shall not cause saturation of the measurement chain up to a 100 dB_{AE} signal amplitude.

If the preamplifiers are of differential design, a minimum of 40 dB of common-mode rejection shall be provided.

6.6 Power-signal cables

The cable providing power to the preamplifier and conducting the amplified signal to the main processor shall be shielded against electromagnetic noise. Signal loss shall be no more than 1 dB per 30 m of cable length. 150 m is the recommended maximum cable length to avoid excessive signal attenuation.

The cables providing power to the preamplifier and conducting the amplified signal to the main processor shall be shielded against electromagnetic noise.

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