

STN	Nedeštruktívne skúšanie Skúšanie akustickou emisiou Monitorovanie akustickej emisie v prevádzke kovového tlakového zariadenia a konštrukcií Všeobecné požiadavky	STN EN 17391 01 5090
------------	---	--

Non-destructive testing - Acoustic emission testing - In-service acoustic emission monitoring of metallic pressure equipment and structures - General requirements

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 09/22

Obsahuje: EN 17391:2022

EUROPEAN STANDARD

EN 17391

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2022

ICS 19.100

English Version

Non-destructive testing - Acoustic emission testing - In-service acoustic emission monitoring of metallic pressure equipment and structures - General requirements

Essais non destructifs - Contrôle par émission
acoustique - Surveillance en service par émission
acoustique des équipements et structures métalliques
sous pression - Exigences générales

Zerstörungsfreie Prüfung - Schallemissionsprüfung -
Überwachung der Schallemission von metallischen
Druckgeräten und Strukturen im Betrieb - Allgemeine
Grundsätze

This European Standard was approved by CEN on 5 March 2021.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN 17391:2022 (E)

Contents	Page
European foreword	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Personnel qualification	6
5 Information prior to testing	7
5.1 Structural information.....	7
5.2 Operating conditions	7
5.3 AE event mechanisms.....	8
5.3.1 General.....	8
5.3.2 Crack growth	8
5.3.3 Corrosion	9
5.3.4 Friction, fretting and cavitation erosion	9
6 Monitoring methodology	9
6.1 Periodic, temporary or continuous monitoring	9
6.2 On-site or remote-controlled monitoring.....	10
6.3 Supervised or automated monitoring.....	11
7 Monitoring instrumentation	11
7.1 System requirements	11
7.2 Sensors and preamplifiers.....	11
7.2.1 General requirements.....	11
7.2.2 Frequency range (band width)	12
7.2.3 Coupling agent	13
7.2.4 Mounting method.....	13
7.2.5 Temperature range, wave guide usage.....	13
7.2.6 Use in explosive atmosphere.....	13
7.2.7 Immersed sensors	13
7.2.8 Integral electronics (amplifier, band-pass filter, RMS converter, ASL converter).....	13
7.2.9 Grounding.....	14
7.2.10 External preamplifiers.....	14
7.2.11 Sensor and preamplifier cables.....	14
7.3 Portable AE equipment.....	14
7.4 Single channel and multi-channel AE equipment	14
7.5 Measured parameters	14
7.5.1 Burst signal parameters.....	14
7.5.2 Continuous signal parameters	15
7.6 Verification of sensor sensitivity and coupling quality	15
7.7 External parameters.....	15
7.8 AE system.....	15
7.9 Monitoring in hazardous areas.....	16
8 Pre-monitoring measurements	16
8.1 Wave propagation behaviour.....	16
8.1.1 General.....	16
8.1.2 Liquid or gas containment.....	17
8.1.3 Wall thickness	17

8.1.4	Geometry of the structure	17
8.1.5	Insulation.....	17
8.1.6	Surface preparation.....	17
8.2	Background noise measurement.....	17
8.2.1	Representative location	17
8.2.2	Process noise.....	18
8.2.3	Other disturbance noise.....	18
8.2.4	Noise sampling period	18
8.3	Sensitivity of AE monitoring using linear or planar location	18
9	Monitoring procedure.....	19
9.1	Sensor positioning.....	19
9.2	External parameters.....	19
9.3	Instrumentation verification.....	19
9.4	Data acquisition and online filtering.....	19
10	Data analysis	20
10.1	General	20
10.2	Online analysis	20
10.3	Data processing.....	20
10.3.1	General	20
10.3.2	Background noise analysis.....	20
10.3.3	Pre-location data analysis	21
10.3.4	AE event location	21
10.3.5	Cluster analysis	22
10.3.6	Pattern recognition.....	22
11	AE source interpretation and evaluation.....	22
11.1	Interpretation of AE results	22
11.2	Source evaluation criteria	23
11.3	Grading of AE sources	25
11.4	Verification of AE sources and follow-up NDT	26
12	Documentation and reporting	26
Annex A (informative) Fatigue crack growth and associated acoustic emission applied to monitoring of marine structures		27
Bibliography		38

EN 17391:2022 (E)**European foreword**

This document (EN 17391:2022) has been prepared by Technical Committee CEN/TC 138 “Non-destructive testing”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2022, and conflicting national standards shall be withdrawn at the latest by December 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Acoustic emission testing (AT) is well established for the detection of discontinuities in metallic structures. Furthermore, AT is widely accepted and applied during hydraulic or pneumatic test. In-service acoustic emission (AE) monitoring can provide global surveillance of structural details for early detection of active cracks and damage evolution. It allows through life damage assessment guiding subsequent non-destructive testing (NDT) for damage verification and damage sizing purposes.

EN 17391:2022 (E)**1 Scope**

This document specifies general requirements for in-service acoustic emission (AE) monitoring. It relates to detection, location and grading of AE sources with application to metallic pressure equipment and other structures such as bridges, bridge ropes, cranes, storage tanks, pipelines, wind turbine towers, marine applications, offshore structures. The monitoring can be periodic, temporary or continuous, on site or remote-controlled, supervised or automated. The objectives of AE monitoring are to define regions which are acoustically active as a result of damage or defect evolution.

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.

EN 1330-1:2014, *Non destructive testing — Terminology — Part 1: List of general terms*

EN 1330-2:1998, *Non destructive testing — Terminology — Part 2: Terms common to the non-destructive testing methods*

EN 1330-9:2017, *Non-destructive testing — Terminology — Part 9: Terms used in acoustic emission testing*

EN 13477-1:2001, *Non-destructive testing — Acoustic emission — Equipment characterisation — Part 1: Equipment description*

EN 13477-2:2010, *Non-destructive testing — Acoustic emission — Equipment characterisation — Part 2: Verification of operating characteristic*

EN 13554:2011, *Non-destructive testing — Acoustic emission testing — General principles*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code)*¹

EN ISO/IEC 17025:2017, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2017)*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN

¹ As impacted by EN 60529:1991/corrigendum May 1993, EN 60529:1991/A1:2000, EN 60529:1991/A2:2013, EN 60529:1991/AC:2016-12 and EN 60529:1991/A2:2013/AC:2019-02.