

STN	Nedeštruktívne skúšanie Skúšanie akustickej emisie Charakteristika zariadenia Časť 2: Overenie prevádzkových vlastností	STN EN 13477-2 01 5070
------------	--	--

Non-destructive testing - Acoustic emission testing - Equipment characterisation - Part 2: Verification of operating characteristics

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. 12/21

Obsahuje: EN 13477-2:2021

Oznámením tejto normy sa ruší
STN EN 13477-2 (01 5070) z marca 2011

134047

EUROPEAN STANDARD

EN 13477-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2021

ICS 19.100

Supersedes EN 13477-2:2010

English Version

Non-destructive testing - Acoustic emission testing - Equipment characterisation - Part 2: Verification of operating characteristics

Essais non destructifs - Essais d'émission acoustique -
Caractérisation de l'équipement - Partie 2 :
Vérifications des caractéristiques de fonctionnement

Zerstörungsfreie Prüfung - Schallemissionsprüfung -
Charakterisierung der Prüfausrüstung - Teil 2:
Überprüfung der Betriebskenngrößen

This European Standard was approved by CEN on 30 May 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 13477-2:2021 (E)

Contents

Page

European foreword.....	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Required test equipment and test signals.....	8
4.1 List of required equipment.....	8
4.2 Test signal waveforms.....	9
4.2.1 Continuous sine wave	9
4.2.2 Triangular-modulated sine wave burst signal	10
4.2.3 Sin ² -modulated sine wave burst signal.....	12
4.2.4 Rectangular-modulated sine wave burst signal.....	13
4.2.5 Rectangular pulse	14
4.2.6 Repetitive signals.....	14
4.2.7 DC signal	15
4.2.8 Summary of test signals	15
4.3 Test block.....	15
4.4 Shielding test plate	15
5 Sensor verification.....	15
5.1 General.....	15
5.2 Intended purpose.....	16
5.3 Preparation of the report form and preliminary examination	16
5.4 Sensitivity verification	17
5.4.1 General.....	17
5.4.2 Test procedure	17
5.5 Verification of the electrical shield crosstalk	18
5.5.1 General.....	18
5.5.2 Procedure.....	22
5.6 Pre-amplifier verification of sensor-internal pre-amplifier	22
6 Pre-amplifier verification	23
6.1 Preparation of the report form and preliminary examination	23
6.2 Verification of DC consumption	24
6.2.1 General.....	24
6.2.2 Verifying a limit or a deviation.....	25
6.2.3 Procedure.....	25
6.3 Verification of the pre-amplifier characteristics.....	26
6.3.1 General.....	26
6.3.2 Gain verification	26
6.3.3 Bandwidth verification	28
6.3.4 Electronic noise verification	30
6.3.5 Dynamic range verification	32
6.3.6 Common mode rejection verification	35
6.3.7 Pulsing test	35
7 Acoustic emission signal processor verification	35
7.1 General.....	35
7.1.1 Overview	35

7.1.2	Preparation of the report form.....	38
7.2	Signal processor noise verification	39
7.2.1	General	39
7.2.2	Test procedure	40
7.3	Verification of RMS measurement and floating threshold functionality.....	41
7.3.1	General	41
7.3.2	Test procedure	43
7.4	Verification of the fixed detection threshold.....	43
7.4.1	General	43
7.4.2	Procedure for signal stimulation and data acquisition	45
7.4.3	Procedure for the data verification.....	45
7.5	Bandwidth and filter roll-off verification	45
7.5.1	General	45
7.5.2	Data needed for verification of bandwidth and roll-off verification.....	46
7.5.3	Procedure for signal stimulation and storage.....	46
7.5.4	Test procedure for bandwidth verification based on stored AE data.....	46
7.6	Burst signal parameter verification.....	47
7.6.1	General	47
7.6.2	Maximum amplitude verification	47
7.6.3	Duration verification.....	50
7.6.4	Rise-time verification.....	52
7.6.5	Ring-down count verification.....	54
7.6.6	Energy and signal strength verification	55
8	Verification of the system performance	58
8.1	External parametric input verification.....	58
8.1.1	General	58
8.1.2	Formulae for parametric input verification	59
8.1.3	Avoiding the use of a high-accuracy digital voltmeter (HADVM).....	60
8.1.4	Report form preparation	60
8.1.5	Test procedure for signal stimulation and measurement for parametric input verification.....	61
8.1.6	Test procedure for parametric input data verification	62
8.2	Pulser verification.....	62
8.3	System acquisition rate verification.....	62
8.4	Delta t (Δt) measurement verification.....	63
8.5	Software verification.....	63
9	Test report	64
	Annex A (informative) Report form for the sensor performance verification	65
	Annex B (informative) Report form for the pre-amplifier performance verification	67
	Annex C (informative) Report form for the acoustic emission signal processor verification	70
	Annex D (informative) Report form for the external parametric input verification	75
	Annex E (informative) List of designations	77
	Bibliography	79

EN 13477-2:2021 (E)

European foreword

This document (EN 13477-2:2021) 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 April 2022, and conflicting national standards shall be withdrawn at the latest by April 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.

This document supersedes EN 13477-2:2010.

In comparison with the previous edition, the following technical modifications have been made:

- Improvement of Clause 3 “Terms & Definitions”;
- Improvement of Clause 5 “Sensor verification”;
- Improvement of Clause 6 “Pre-amplifier verification”;
- Improvement of Clause 7 “Acoustic emission signal processor verification”;
- Improvement of Clause 8 “Verification of the system performance”.

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.

1 Scope

This document specifies test routines for the periodic verification of the performance of acoustic emission (AE) test equipment, i.e. sensors, pre-amplifiers, signal processors, external parametric inputs.

It is intended for use by qualified personnel to implement an automated verification process.

Verification of the measurement characteristics is advised after purchase of equipment, in order to obtain reference data for later verifications. Verification is also advised after repair, modifications, use under extraordinary conditions, or if one suspects a malfunction.

The procedures specified in this document do not exclude other qualified methods, e.g. verification in the frequency domain. These procedures apply in general unless the manufacturer specifies alternative equivalent procedures.

Safety aspects of equipment for use in potentially explosive zones are not considered in this document.

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*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN