



NSAI
Standards

Irish Standard Recommendation
S.R. CWA 17454:2019

Bionic Aircraft - Quality control of metal ALM parts using the Ultrasonic Technique

S.R. CWA 17454:2019

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:

CWA 17454:2019

Published:

2019-09-11

*This document was published
under the authority of the NSAI
and comes into effect on:*

2019-09-29

ICS number:

25.030

49.025.01

NOTE: If blank see CEN/CENELEC cover page

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

National Foreword

S.R. CWA 17454:2019 is the adopted Irish version of the European Document CWA 17454:2019, Bionic Aircraft - Quality control of metal ALM parts using the Ultrasonic Technique

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

For relationships with other publications refer to the NSAI web store.

Compliance with this document does not of itself confer immunity from legal obligations.

In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

This page is intentionally left blank

CEN

CWA 17454

WORKSHOP

September 2019

AGREEMENT

ICS

English version

Bionic Aircraft - Quality control of metal ALM parts using the Ultrasonic Technique

This CEN Workshop Agreement has been drafted and approved by a Workshop of representatives of interested parties, the constitution of which is indicated in the foreword of this Workshop Agreement.

The formal process followed by the Workshop in the development of this Workshop Agreement has been endorsed by the National Members of CEN but neither the National Members of CEN nor the CEN-CENELEC Management Centre can be held accountable for the technical content of this CEN Workshop Agreement or possible conflicts with standards or legislation.

This CEN Workshop Agreement can in no way be held as being an official standard developed by CEN and its Members.

This CEN Workshop Agreement is publicly available as a reference document from the CEN Members National Standard Bodies.

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

© 2019 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No.:CWA 17454:2019 E

CWA 17454:2019 (E)

Contents	Page
European foreword.....	3
Introduction	5
1 Scope	6
2 Normative references.....	6
3 Terms and definitions	6
4 Symbols and abbreviations	7
5 Relevant acoustic parameters of the ALM material.....	7
5.1 General.....	7
5.2 Ultrasonic velocity	7
5.3 Attenuation due to material absorption.....	7
5.4 Anisotropy	8
5.5 S/N ratio	9
5.6 Influence of the surface quality.....	9
6 Ultrasonic configuration parameters for the inspections.....	10
6.1 Frequency	10
6.2 Type and amplitude of energizing pulse	10
6.3 Reception filters	11
7 Automatic scanning under in-line conditions (definition of main steps).....	11
7.1 General.....	11
7.2 Selection of the automatic measuring machine	11
7.3 Definition of the part reference system	12
7.4 Definition of the measuring path in case of complex (free form) surfaces (keeping the sensor as orthogonal as possible to the surface)	12
7.5 Automatic application of the coupling fluid.....	13
7.6 Detection of the defects with their position on the workpiece	14
7.7 Estimation of defect size	14
8 Inspection of areas with difficult access under in-service conditions.....	15
8.1 Potential Defects and Severity Mapping.....	15
8.2 Transducer and equipment dimensions.....	16
8.3 Testing techniques.....	16
8.4 Sensitivity setting.....	16
8.5 Acceptance levels	16
9 Advanced ways of ultrasound generation and detection, without couplant agent, by LUS.....	17
9.1 Technology and applicability.....	17
9.2 Implications with reference to this document	17
Bibliography.....	18

European foreword

CWA 17454 is a technical agreement, developed and approved by an open, independent Workshop structure within the framework of the CEN-CENELEC system.

CWA 17454 reflects the agreement only of the registered participants responsible for its content and was developed in accordance with the CEN-CENELEC rules and practices for the development and approval of CEN/CENELEC Workshop Agreements.

CWA 17454 does not have the status of a European Standard (EN) developed by CEN and/or CENELEC and their national Members. It does not represent the wider level of consensus and transparency required for a European Standard (EN) and is not intended to support legislative requirements or to address issues with significant health and safety implications. For these reasons, CEN and/or CENELEC are not accountable for the technical content of CWA 17454 or for any possible conflicts with national standards or legislation.

CWA 17454 was developed in accordance with CEN-CENELEC Guide 29 “CEN/CENELEC Workshop Agreements – The way to rapid agreement” and with the relevant provisions of CEN/CENELEC Internal Regulations – Part 2. It was agreed on 2019-08-31 in a Workshop by representatives of interested parties, approved and supported by CEN and/or CENELEC following a public call for participation made on 2019-04-09. It does not necessarily reflect the views of all stakeholders that might have an interest in its subject matter.

The research leading to these results has funding from the European Union's HORIZON 2020 Programme under the grant agreement numbers 690689 (Bionic Aircraft).

The final text of CWA 17454 was submitted to CEN for publication on 2019-07-19. It was developed and approved by:

- Dr. Ing. Philipp Imgrund, Fraunhofer-Einrichtung für Additive Produktionstechnologien IAPT – Chairman
- Francisco Luis Arribas, UNE – Secretary
- Silvan Meile, Hexagon Technology Center
- Suela Ruffa, Hexagon Manufacturing Intelligence
- Lorenzo Merlo, Hexagon Manufacturing Intelligence
- Luca Di Stefano, Hexagon Manufacturing Intelligence
- Tim Wischeropp, IAPT
- Benjamin Rubio, Fundación TECNALIA Research & Innovation
- Nekane Galarza, Fundación TECNALIA Research & Innovation
- Jose Perez Larrazábal, Fundación TECNALIA Research & Innovation
- Maria Parco, Fundación TECNALIA Research & Innovation
- Vincenzo De Rosa, Leonardo Aircraft
- Robert Holzer, RECENDT

CWA 17454:2019 (E)

It is possible that some elements of CWA 17454 may be subject to patent rights. The CEN-CENELEC policy on patent rights is set out in CEN-CENELEC Guide 8 “Guidelines for Implementation of the Common IPR Policy on Patents (and other statutory intellectual property rights based on inventions)”. CEN and/or CENELEC shall not be held responsible for identifying any or all such patent rights.

The Workshop participants have made every effort to ensure the reliability and accuracy of the technical and non-technical content of CWA 17454, but this does not guarantee, either explicitly or implicitly, its correctness. Users of CWA 17454 should be aware that neither the Workshop participants, nor CEN and/or CENELEC can be held liable for damages or losses of any kind whatsoever which may arise from its application. Users of CWA 17454 do so on their own responsibility and at their own risk.

The copyright in CWA 17454 is owned exclusively by CEN and/or CENELEC. Copies of CWA 17454 are available from the national standards bodies and/or national electrotechnical committees of the following countries: 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.

Comments or suggestions from the users of the CEN-CENELEC Workshop Agreement are welcome and should be addressed to the CEN-CENELEC Management Centre.

Introduction

Additive Layer Manufacturing of metallic high-performance parts is a cutting-edge manufacturing process which gives rise to a family of materials with a particular inner structure. In addition, this manufacturing process makes possible to manufacture, in a natural way, parts with high geometrical complexity in a single process.

Because this process is already under development for certain material families (such as AlSiSc), not all the properties of those layered materials are fully known yet. Therefore, the issues related to feasible quality control techniques are not fully defined. As a consequence of that, a deficit in specific standards related to this issue has been detected.

BIONIC AIRCRAFT research project (GA n° 690689, founded by the European Union's H2020 Programme) aims to further the knowledge on some of these unknown issues. This document gathers general conclusions derived from some of the results of this project that may be useful to go further in the development of specific standard on this field.

CWA 17454:2019 (E)

1 Scope

This CWA provides a set of guidelines to control the quality of metal Additive Layer Manufactured (ALM) parts in terms of existence of defects by using ultrasonic technique. With the aim of characterizing the material in the aspects most relevant to the inspection, the measurement of some relevant acoustic parameters of the layered material is proposed first. Secondly, the most important configuration parameters are gathered together with a range of example values. After that, a set of specific guidelines for the automatic inspection under in-line conditions is provided. Finally, the specific highlights and restrictions coming from in-service conditions are explained.

This CWA does not include the basic vocabulary and general configuration and calibration steps for ultrasonic inspections, which are specified by the referenced general standards.

This CWA is not a testing procedure, because the specific parameters and scanning steps depend on each particular material and geometry of the part.

The information provided in this document is based on the results of the BIONIC AIRCRAFT research project.

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 ISO 16811:2014, *Non-destructive testing — Ultrasonic testing — Sensitivity and range setting (ISO 16811:2012)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

ALM material

3D solid structure made out of different metallic components by ALM manufacturing process

EXAMPLES AlSi10Mg, AlSiSc alloys.

3.2

part

3D structure with a defined function and targeted geometry

EXAMPLE Complex geometry aeronautical metallic brackets located in the wings.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- Looking for additional Standards? Visit Intertek Inform Infostore
 - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-