BS EN 4179:2021

BSI Standards Publication

Aerospace series — Qualification and approval of personnel for non-destructive testing

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National foreword

This British Standard is the UK implementation of EN 4179:2021. It supersedes BS EN 4179:2017, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/61, Metallic materials for aerospace purposes.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Luft- und Raumfahrt - Qualifizierung und Zulassung des Personals für zerstörungsfreie Prüfungen

This European Standard was approved by CEN on 11 July 2021.

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Full document details: BS EN 4179:2021

Contents

Page

European foreword 3
Introduction 4
Annex A (normative) Credit system for recertification of Level 3 NDT personnel 28
A.1 Scope 28
A.2 Requirements 28
A.3 Definitions 29
Annex B (normative) Qualification and certification of Level 1-Limited 31
B.1 Scope 31
B.2 Requirements 31
Annex C (normative) National aerospace non-destructive testing boards (NANDTB) 34
C.1 Scope 34
C.2 Requirements 34
C.3 Examinations 36
C.4 Record retention 36
Bibliography 37

Documents
Document Sharing Hub
Full document details: BS EN 4179:2021

European foreword

This document (EN 4179:2021) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

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of an identical text or by endorsement, at the latest by June 2022, and conflicting national standards shall be withdrawn at the latest by June 2022.

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

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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.

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Introduction

In the event of a conflict between the text of this document and the references cited herein, the requirements of this document take precedence. Nothing in this document supersedes applicable laws and regulations unless a specific exemption has been obtained.

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1 Scope

1.1 Purpose

This document establishes the minimum requirements for the qualification and certification of personnel performing non-destructive testing (NDT), non-destructive inspection (NDI), or non-destructive evaluation (NDE) in the aerospace manufacturing, service, maintenance and overhaul industries. For the purposes of this document, the term NDT will be used and will be considered equivalent to NDI and NDE.

In Europe, the term "approval" is used to denote a written statement by an employer that an individual meets specific requirements and has operating approval. The term "certification" as defined in 3.2 is used throughout this document as a substitute for the term "approval". Except when otherwise specified in the written practice, certification in accordance with this document includes operating approval.

1.2 Applicability

1.2.1 General

This document applies to personnel using NDT methods to test and/or accept materials, products, components, assemblies or sub-assemblies. This document also applies to personnel: directly responsible for the technical adequacy of the NDT methods used, who approve NDT procedures and/or work instructions, who audit NDT facilities, or who provide technical NDT support or training.

This document does not apply to individuals who only have administrative or supervisory authority over NDT personnel or to research personnel developing NDT technology for subsequent implementation and approval by a certified Level 3.

Personnel performing specialized inspections using certain direct readout instruments as determined by a Level 3 person certified in the test method, do not require qualification or certification to this document.

1.2.2 Implementation

This document addresses the use of a National Aerospace NDT Board (NANDTB). NANDTBs are only used as specified according to Annex C and it is not mandatory to have such a board for compliance with this document. Personnel certified to previous revisions of NAS 410 or EN 4179 need not recertify to the requirements of this document until their current certification expires.

1.3 Test Methods

1.3.1 Common test methods

This document contains detailed requirements for the following common NDT methods:

Eddy Current Testing	(ET)
Magnetic Particle Testing	(MT)
Penetrant Testing	(PT)
Radiographic Testing	(RT)
Thermographic Testing	(TT)
Ultrasonic Testing	(UT)

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1.3.2 Other test methods

When invoked by engineering, quality, cognizant engineering organization or prime contractor requirements, this document applies to other current and emerging NDT methods used to determine the acceptability or suitability for intended service of a material, part, component, assembly or sub-assembly. Such test methods can include, but are not limited to, acoustic emission testing (AT), neutron radiography, leak testing, holography, and shearography. The requirements for personnel training, experience, and examination for these other test methods are established in accordance with 6.4 and are documented by the employer.

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 18490, *Non-destructive testing — Evaluation of vision acuity of NDT personnel*[1]

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 https://www.electropedia.org/

3.1
basic examination
examination utilized to verify a Level 3 candidate's knowledge of NDT methods used by the employer at a Level 2 proficiency

3.2
certification
written statement by an employer that an individual has met the applicable requirements of this document

3.3
closed book examination
examination administered without access to any reference materials

3.4
cognizant engineering organization
engineering or NDT organization of the prime contractor, OEM (Original Equipment Manufacturer), or end user authorized to make NDT-related decisions and give NDT-related approvals

3.5
committee meetings
panel meetings
meetings, conferences, symposia, seminars, trade association meetings, panels, organized or sponsored by a regional, national or international NDT organization or technical society

[1] Published by: ISO International Organization for Standardization http://www.iso.ch/.

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Note 1 to entry: Foreign or international meetings qualify if the sponsor(s) are national or international.

3.6
committee projects
specific identifiable official activities of regional or national technical societies, committees or work groups

EXAMPLE round robins or individual studies, preparation of guidelines, appendices, specifications, recommended practices, procedures, codes or standards.

Note 1 to entry: Documentation may include memos or reports, drafts of committee output documents, or official written comments submitted by the candidate on such documents.

3.7
direct observation
observer's viewing of the NDT process in a manner that permits uninterrupted, visual and verbal two-way contact with the trainee

3.8
direct-readout instrument
instruments that physically display measurements in dimensional or electrical units (e.g. inches, millimetres or % IACS) either as digital readout or an analog display, such as a scale/pointer configuration, and do not require special skills or knowledge to set up the instrument and do not involve adjusting signal displays such as gates, delays, gain, or phase to obtain measurements

EXAMPLE Common direct readout instruments include basic ultrasonic thickness gauges without an oscilloscope display, and eddy current coating thickness gauges.

3.9
documented
condition of being recorded in written or electronic form

3.10
employer
organization employing or contracting the services of one or more individuals who perform NDT

Note 1 to entry: Self-employed individuals are included in this definition.

3.11
evaluation
review following interpretation of the indications noted during an NDT inspection to determine whether the indications meet specified acceptance criteria or to determine the significance of the indication

3.12
examination
formal, controlled, documented testing conducted in accordance with a documented written practice to verify a candidate's visual capability, skill or knowledge of an NDT method

3.13
examiner
Level 3 person certified to this document and designated by the Responsible Level 3 person to administer all or part of the qualification process in the NDT method(s) in which the Examiner is certified

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3.14
experience
actual performance of an NDT method conducted in the work environment resulting in the acquisition of knowledge and skill

Note 1 to entry: This does not include formal classroom training but may include laboratory and on-the-job training as defined by the employer's written practice.

3.15
formal education
engineering or science studies at a technical school, college, or university

3.16
formal training
organized and documented program of learning activities designed to impart the knowledge and skills necessary to be qualified to this document

Note 1 to entry: Formal training may be a mix of classroom, practical and programmed self-instruction as approved by the Responsible Level 3 Person or Examiner.

3.17
general examination
written examination addressing the basic principles and theory of an NDT method

3.18
indication
response or evidence of a condition resulting from an NDT inspection that requires interpretation

3.19
instructor
individual designated or approved by the Responsible Level 3 person or Examiner to provide training for NDT personnel

3.20
interpretation
determination of whether indications are relevant or non-relevant

3.21
test method
1 (one) of the disciplines of non-destructive testing (e.g. ultrasonic testing, radiographic testing) within which different test techniques may exist

3.22
National Aerospace NDT Board
NANDTB
independent aerospace organization representing a nation's aerospace industry that is chartered by the participating prime contractors and recognized by the nation's regulatory agencies to provide or support NDT qualification and/or examination services in accordance with Annex C of this document

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3.23
non-film radiography
radiographic imaging that does not use a film-based recording medium

Note 1 to entry: Non-Film radiography includes, but may not be limited to, Computed Radiography, Digital Radiography, Radioscopy, and Computed Tomography.

3.24
on-the-job training
training in the work environment to gain experience in learning instrument set-up, equipment operation, applying the process, and recognition, interpretation and evaluation of indications under appropriate technical guidance

3.25
open book examination
examination administered with access to specific reference material that is provided with or referenced in the examination

3.26
operating approval
written statement issued by the employer, based upon the scope of certification, authorizing the individual to carry out defined tasks

Note 1 to entry: Such authorization can be dependent on the employer having provided job or task-specific training.

3.27
outside agency
independent company or organization outside the employer who provides NDT services to implement the requirements of this document, such as training and examination of NDT personnel

Note 1 to entry: Consultants and self-employed individuals are included in this definition.

3.28
practical examination
examination to demonstrate an individual's ability to conduct an NDT method as used by the employer

Note 1 to entry: Questions and answers need not be written, but a checklist shall be used, and observations and results shall be documented.

3.29
prime contractor
organization having overall responsibility for design, control and delivery of a system, component or product

3.30
procedure
written general “how to” instruction for conducting a given process

Note 1 to entry: Procedures are then used to develop work instructions, as defined in 3.38.

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3.31
qualification
skills, training, knowledge, examinations, experience and visual capability required for personnel to properly perform to a particular level

3.32
responsible Level 3 person
Level 3 person designated by the employer with the responsibility and authority to ensure that the requirements of this document are met and to act on behalf of the employer

3.33
specific examination
written examination to determine an individual's understanding of operating procedures, codes, standards, product knowledge, test techniques, equipment and specifications for an NDT method as used by the employer

3.34
sub-contractor
organization responsible to the prime contractor for the manufacture or maintenance of aerospace products

Note 1 to entry: For the purposes of this document, this includes suppliers and processors.

3.35
task
activity for which Level 3 certification is required, e.g. approval of an NDT Technique Instruction or NDT procedure

3.36
test technique
category within a test method as defined in the written practice by the employer

3.37
test sample
part or image containing one or more known and documented natural or artificial discontinuities, flaws or conditions used in the practical examination to demonstrate the candidate's proficiency in an NDT method.

Note 1 to entry: Test samples can refer to actual hardware, fabricated test parts, or, when applicable, images of actual hardware such as radiographs.

3.38
work instruction
document detailing the NDT technique and testing parameters to be used for the inspection of a specific component, group of parts (e.g. “aluminium extrusions” or “steel brackets”), or assembly

Note 1 to entry: These are sometimes referred to in the industry as “test technique sheets” or “data cards”. Such work instructions are based on procedures defined in 3.30.

3.39
written
retrievable electronic or hard copy

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