
Železniške naprave - Vozna sredstva - Zahteve za neporušitveno preskušanje na tekalnih sestavih pri vzdrževanju železnice - 1. del: Kolesne dvojice

Railway applications - Rolling stock - Requirements for non-destructive testing on running gear in railway maintenance - Part 1: Wheelsets

Bahnanwendungen - Schienenfahrzeuge - Anforderungen an die zerstörungsfreie Prüfung an Fahrwerken in der Instandhaltung - Teil 1: Radsätze

Applications ferroviaires - Matériel roulant - Exigences pour les essais non destructifs sur les organes de roulement lors de la maintenance ferroviaire - Partie 1: Essieux

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Railway applications - Rolling stock - Requirements for non-destructive testing on running gear in railway maintenance - Part 1: Wheelsets

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EN 16910-1:2018 (E)**European foreword**

This document (EN 16910-1:2018) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by October 2018, and conflicting national standards shall be withdrawn at the latest by October 2018.

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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

For many years, non-destructive testing (NDT) has been used as a part of the maintenance system on European networks to control the influence of in-service condition on safety-relevant assembly groups, components and parts in order to ensure that the inspected entity treated will be used in-service in a safe condition.

The maintenance standard (EN 15313 wheelsets maintenance) requires appropriately trained and capable personnel undertaking these NDT maintenance tasks (see EN ISO 9712:2012).

The purpose of this document is to describe the necessary requirements on NDT additional to the existing standards to promote safety, interoperability and cross acceptance.

The maintenance plan for wheelsets should ensure safe operation of railway vehicles at the right cost. It deals with wear, unexpected damages, and takes into account the vehicles usage and the track conditions. In this context, NDT is used to search for defects and failures on wheelsets.

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1 Scope

This European Standard provides the specific requirements for NDT of wheelsets for:

- in-service maintenance;
- off-vehicle maintenance;
- NDT personnel;
- NDT documentation (Procedure and Instruction);
- traceability of the maintenance NDT results.

It gives guidance for the introduction of new NDT techniques.

For this standard, the following NDT methods are considered:

- Ultrasonic testing (UT);
- Magnetic particle testing (MT);
- Eddy Current testing (ET).

Other methods considered in EN ISO 9712:2012 are outside the scope of this standard.

For this purpose, a catalogue of the common defects is given as guidance. Examples of common NDT indications are given in an informative annex.

Specific NDT requirements relating to the quality of new products delivered by manufacturers are not within the scope of this European Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15313, *Railway applications - In-service wheelset operation requirements - In-service and off-vehicle wheelset maintenance*

EN ISO 9712:2012, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712:2012)*

CEN ISO/TR 25107:2006, *Non-destructive testing — Guidelines for NDT training syllabuses (ISO/TR 25107:2006)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15313 and the following apply.

3.1

non-destructive tests

NDT

process of examining a component to assess its integrity by a means which does not compromise the components properties and characteristics

3.2

indication

representation or signal from a discontinuity in the format typical for the NDT method used

[SOURCE: EN 1330-2:1998, 2.12]

3.3

defect

discontinuity defect

discontinuity or inhomogeneity which creates an indication which can prevent the component from fulfilling its designed purpose

3.4

acceptance or rejection criteria

criteria against which the specimen is examined in order to determine its acceptability / rejectability

3.5

cracks

local separation of material mostly of 2 dimensions direction resulting from thermal, chemical or mechanical exposure

3.6

NDT instruction

written description of the precise steps to be followed in testing to an established standard, code, specification or NDT procedure

[SOURCE: EN ISO 9712:2012, 3.16]

3.7

NDT method

discipline applying a physical principle in non-destructive testing

[SOURCE: EN ISO 9712:2012, 3.17]

3.8

NDT procedure

written description of all essential parameters and precautions to be applied when non-destructively testing products in accordance with standard(s), code(s) or specification(s)

[SOURCE: EN ISO 9712:2012, 3.18]

3.9

NDT technique

specific way of utilizing an NDT method

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[SOURCE: EN ISO 9712:2012, 3.19]

3.10**NDT training**

process of instruction in theory and practice in the NDT method

3.11**semi-automated test equipment**

mechanical equipment with automated mechanical movement of the test object or test equipment but evaluation is left to the NDT personnel

3.12**detection threshold**

defect size at which defects can be reliably detected by the chosen method

4 Requirements for NDT personnel**4.1 General**

NDT personnel shall have knowledge and skills relevant to the component to which they are inspecting. An example of a typical process is shown in the Informative Annex A.

The organization offering the training, examination and acceptance of experience shall provide evidence of fulfilling the relevant requirements of this standard.

NOTE In practice the evidence is provided by an independent body to the organization.

These processes are organized with three levels of competence:

- level 1 personnel: persons with competencies in a specific NDT method that allows to perform the following in accordance with NDT instructions: set up NDT equipment, perform the tests, record and classify the results of the tests according to written criteria, report the results;
- level 2 personnel: persons with competencies in a specific NDT method that allows to deal with the following points:
 - choose NDT techniques, tests, equipment, specification and procedures;
 - select the NDT technique for the testing method to be used;
 - define the limitations of application of the testing method;
 - translate NDT codes, standards, specifications and procedures into NDT instructions adapted to the actual working conditions;
 - set up and verify equipment settings;
 - perform and supervise tests;
 - interpret and evaluate results according to applicable standards, codes specifications or procedures;
 - carry out and supervise all tasks at or below Level 2;
 - provide guidance for personnel at or below level 2;

- report the results;
- level 3 personnel: persons with competencies that allow to perform and direct NDT operations and validate documents.

In order to work as NDT personnel the person has to follow training and pass an examination. In addition the employer shall authorize the person to operate in accordance with the conditions of paragraph 4.8.

4.2 Training

4.2.1 Training contents for Wheelsets

The training required for each different NDT method shall include both wheelset-specific theoretical and practical training.

The minimum length of training required for each different NDT method shall be in accordance with Table 1.

Table 1 — Minimum training requirements (hours)

NDT methods	Level 1		Level 2 from level 1 wheelset		Direct access level 2	
	Basics	Wheelsets	Basics	Wheelsets	Basics	Wheelsets
Ultrasonic Testing (UT)	40	40	80	0	120	40
Magnetic particle Testing (MT)	16	8	24	0	40	8
Eddy Current Testing (ET)	40	8	48	0	88	8

The complete training content is defined in the Normative Annex B.

4.2.2 Industrial experience

Table 2 gives the minimum days of experience of NDT on wheelsets prior to examination.

Table 2 — Minimum period of experience prior to examination (in days)

NDT methods	level 1	level 2	
		From level 1 in wheelset	direct
Magnetic particle Testing (MT)	3	7	10
Ultrasonic Testing (UT) Eddy Current Testing (ET)	7	19	26

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Table 3 gives the minimum duration of supervised experience after examination.

Table 3 — Minimum period of experience after examination (in months)

NDT methods	Experience ^a	
	Level 1	Level 2
Magnetic particle Testing (MT)	1	3
Ultrasonic Testing (UT) Eddy Current Testing (ET)	3	9

^a Work experience is based on a nominal 40 h/week or the legal week of work. When an individual works in excess of 40 h/week, they may be credited with experience based on the total hours, but they shall be required to produce evidence of their experience.

4.3 Examination for levels 1 and 2

4.3.1 General examination

The general examination shall include only randomly selected questions from a collection of general examination questions valid at the date of examination. The candidate shall give answers to the minimum number of multiple choice questions shown in Table 4.

The collection of questions shall be validated by an independent body.

Table 4 — Minimum required number of questions - general examination

NDT method	Number of questions
UT	40
ET	40
MT	30

4.3.2 Specific examination in wheelsets

The specific examination shall include only questions selected from a collection of questions related to wheelsets.

During the specific examination, the candidate shall be required to give answers to at least 20 multiple choice questions, including questions involving calculations, NDT procedures and questions on codes, standards and specifications.

The following topics shall be addressed in the questions:

- 1) terms and definitions;
- 2) purpose of NDT;
- 3) typical equipment and techniques;
- 4) typical defects for wheelsets for manufacturing as well as in service;
- 5) typical procedures.

The collection of questions shall be validated by an independent body.