



# SLOVENSKI STANDARD

## SIST EN 16729-3:2018

01-junij-2018

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**Železniške naprave - Infrastruktura - Neporušitveno preskušanje na progi - 3. del:  
Zahteve za ugotavljanje notranjih in površinskih napak na progi**

Railway applications - Infrastructure - Non-destructive testing on rails in track - Part 3:  
Requirements for identifying internal and surface rail defects

Bahnanwendungen - Infrastruktur - Zerstörungsfreie Prüfung an Schienen im Gleis - Teil  
3: Anforderungen zur Identifizierung von inneren Fehlern und  
Schienenoberflächenfehlern

Application ferroviaires - Infrastructure - Contrôle non destructive sur des rails en voie -  
Partie 3 : Critères pour l'identification des défauts internes et des défauts de surfaces  
des rails

**Ta slovenski standard je istoveten z: EN 16729-3:2018**

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**ICS:**

19.100	Neporušitveno preskušanje	Non-destructive testing
93.100	Gradnja železnic	Construction of railways

**SIST EN 16729-3:2018**

**en,fr,de**

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EUROPEAN STANDARD

**EN 16729-3**

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2018

ICS 93.100

English Version

## Railway applications - Infrastructure - Non-destructive testing on rails in track - Part 3: Requirements for identifying internal and surface rail defects

Applications ferroviaires - Infrastructure - Essais non destructifs sur les rails de voie - Partie 3 : Exigences pour l'identification des défauts internes et de surface des rails

Bahnanwendungen - Infrastruktur - Teil 3: Anforderungen zur Identifizierung von inneren Fehlern und Schienenoberflächenfehlern

This European Standard was approved by CEN on 22 January 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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

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**EN 16729-3:2018 (E)****European foreword**

This document (EN 16729-3:2018) 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of an identical text or by endorsement, at the latest by October 2018, and conflicting national standards shall be withdrawn at the latest by October 2018.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.

This series of European Standards EN 16729 “Railway applications – Infrastructure – Non-destructive testing on rails in track” consists of the following parts:

- *Part 1: Requirements for ultrasonic inspection and evaluation principles;*
- *Part 2: Eddy current testing of rails in track (in preparation);*
- *Part 3: Requirements for identifying internal and surface rail defects;*
- *Part 4: Qualification of personnel for non-destructive testing on rails (in preparation).*

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.

## Introduction

This European Standard represents the actual state of the art of identifying surface and internal rail defects of rails in track applied by European railway companies.

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**EN 16729-3:2018 (E)****1 Scope**

This part of this European Standard specifies the NDT methods used to detect internal and surface rail defects and the suitability of each method for the detection and evaluation of typical rail defects of rails installed in track.

This part of this European Standard does not specify the assessment criteria of rail defects and the derived actions.

This part of this European Standard applies only to rail profiles meeting the requirements of EN 13674-1.

**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 16729-1:2016, *Railway applications - Infrastructure - Non-destructive testing on rails in track - Part 1: Requirements for ultrasonic inspection and evaluation principles*

**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:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>  
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**3.1 damaged rail**

rail which is neither cracked nor broken, but which has other defects

**3.2 cracked area**

part of the rail with a localized discontinuity of material

**3.3 broken rail**

rail which has separated into two or more pieces;

or

rail from which a piece of metal becomes detached from the rail head, with a gap of more than 50 mm in length and more than 10 mm in depth resulting in a running band less than 30 mm in width

Note 1 to entry: See Figure 1 and Figure 2 for the first part of the definition, and Figure 3 for the second part.



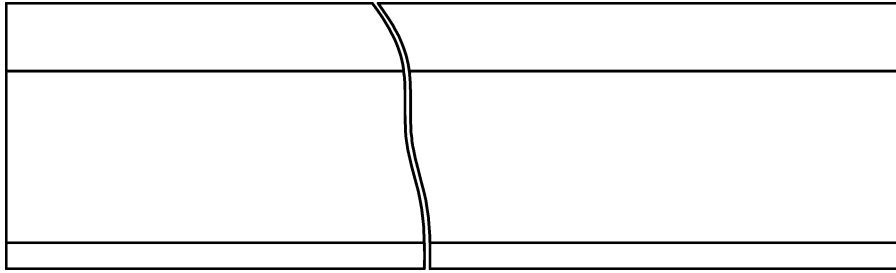
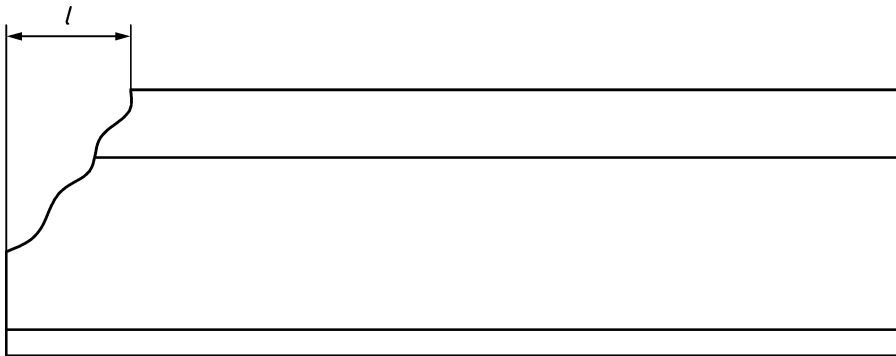


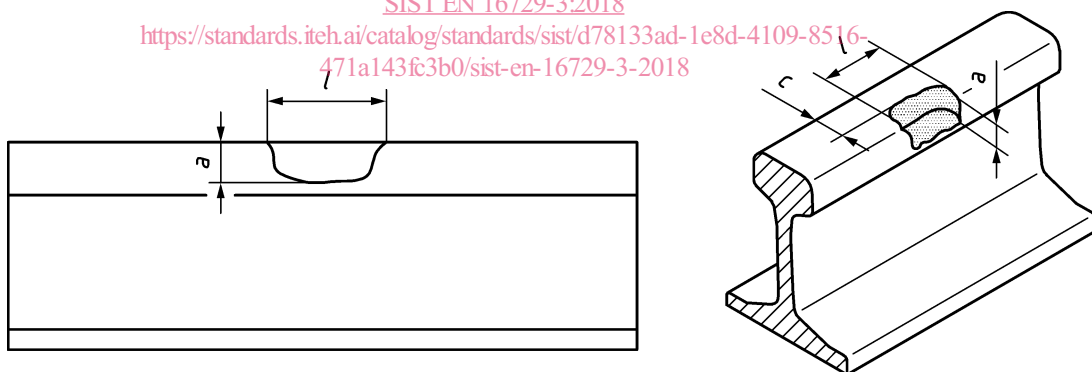
Figure 1 — Broken rail

**Key**

$l$  visible horizontal length

Figure 2 — Example of a broken rail with a gap at the rail end

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**Key**

$a$  vertical depth

$l$  visible horizontal length

$c$  non cracked area

Figure 3 — Example of a broken rail with a gap

**3.4****rail surface defect**

defect which initiates on any of the surfaces of the rail

**3.5****rail head surface defect**

defect which initiates on the running surface of the rail

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## 3.6

**rail internal defect**

defect which initiates from within the rail section but may grow to become visible on the rail surface

## 3.7

**NDT Method**

discipline applying a physical principle in Non-Destructive Testing

[SOURCE: EN 13938-5:2004-08, definition 3.2]

EXAMPLE Ultrasonic testing.

## 3.8

**wheel/rail interaction**

effect of rolling and sliding contact and direct forces from the vehicle wheels which can cause damage to the rail

## 3.9

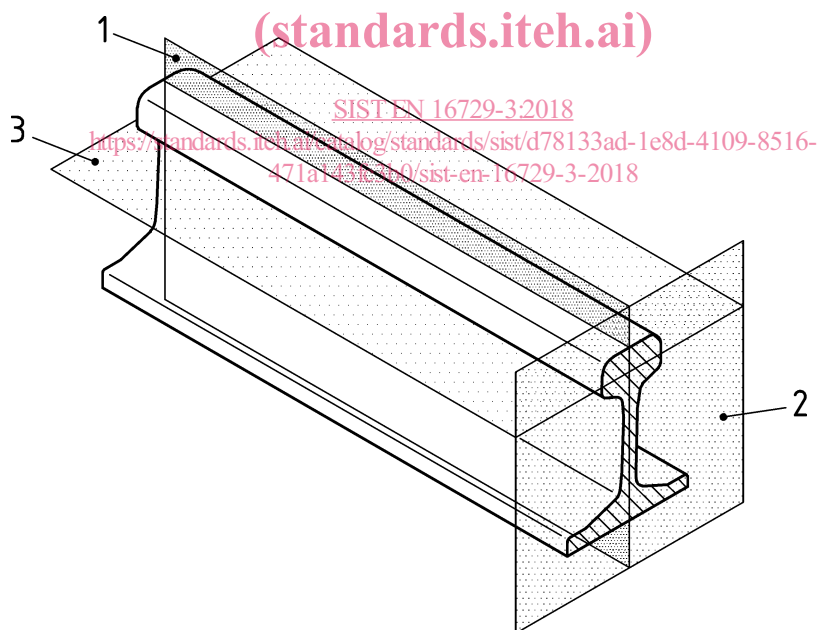
**environmental degradation**

damage to the rail caused by external environmental factors

## 3.10

**vertical plane**

geometrical plane of the rail as defined in Figure 4

**Key**

- 1 vertical plane
- 2 transverse plane
- 3 horizontal plane

**Figure 4 — Geometrical planes of the rail**

## 4 Symbols and abbreviations

For the purposes of this document, the abbreviations in Table 1 apply.

**Table 1 — Abbreviations**

Abbreviation	Abbreviated term
AVT	Automatic visual testing
ET	Eddy current testing
GWT	Guided wave testing
lx	Lux, the SI unit of illuminance
MT	Magnetic particle testing
NDT	Non-destructive testing
PT	Penetrant testing
RCF	Rolling contact fatigue
UT	Ultrasonic testing
VT	Visual testing

## 5 NDT Methods to detect internal and surface rail defects

### 5.1 General

There is no single, universally applicable inspection method – all have advantages and disadvantages. It is therefore recommended that inspection systems be chosen and combined in order to ensure that certain defect types do not remain undetected.

Each NDT method focuses on a specific area of the rail cross section and defect type.

### 5.2 Convention

Transverse plane, vertical plane and horizontal plane are defined according to Figure 4.

### 5.3 Visual testing - VT

#### 5.3.1 Description

Visual testing of rails is a direct visual examination of the condition of a section of rail, specifically the surface of the rail head, to detect the presence of a defect, define and measure it.

Visual Testing can be divided into two categories:

- general visual testing;
- detailed visual testing.

General visual testing (for example walking the track) is used for detecting the presence of defects. In this case, the rail shall be illuminated, if necessary, with auxiliary lighting to attain a minimum of 160 lx and the distance between the viewing position and the rail surface may be more than 600 mm.

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Detailed visual testing is used for defining and measuring defects (for example the assessment of RCF). In this case, if necessary, the rail shall be illuminated with auxiliary lighting to attain a minimum of 500 lx. The distance between the viewing position and the rail surface shall not be more than 600 mm with a viewing angle of not less than 30° from the rail surface.

Consideration shall be given to the application of illumination to maximize the effectiveness of the test by:

- using the optimum direction of light with respect to the viewing point;
- avoiding glare;
- optimizing the colour temperature of the light source;
- using an illumination level compatible with the surface reflectivity.

**5.3.2 Test area**

Visual testing is capable of inspecting the head, web and the upper surface of the rail foot for surface-breaking defects and damage.

**5.3.3 Example applications**

Examples of fault conditions identified by visual testing are:

- horizontal / vertical cracking;
- corrosion;
- squats;
- wheel burns;
- head checks;
- shelling;
- corrugation;
- missing or damaged components associated with the rail (fish plates, insulated joints, chairs, clips, etc.)

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**5.4 Automatic visual testing – AVT****5.4.1 Description**

Automatic visual testing is used for rail inspection and automatic identification of rail surface defects. The operating principles are:

- a specific, properly designed, illuminating system lights the rails to be inspected;
- a digital camera provides relative images;
- a processing device analyses the images in order to identify rail defects.

See Figure 5 for an overview of the process of automatic visual testing.