Nederlandse norm

NEN-EN 13231-5

(en)

Railtoepassingen - Bovenbouw - Aanvaarding van werk - Deel 5: Procedures voor herprofileringswerk van spoorstaven in lopend spoor, wissels, kruisingen en compensatie-inrichtingen

Railway applications - Track - Acceptance of works - Part 5: Procedures for rail reprofiling in plain line, switches, crossings and expansion devices

Vervangt NEN-EN 13231-5:2016 Ontw.

ICS 93.100

juli 2018

Als Nederlandse norm is aanvaard:
- EN 13231-5:2018,IDT

Normcommissie 345051 'Spoorwegen'

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13231-5

June 2018

ICS 93.100

English Version

Railway applications - Track - Acceptance of works - Part 5: Procedures for rail reprofiling in plain line, switches, crossings and expansion devices

Applications ferroviaires - Voie - Réception des travaux - Partie 5 : Procédures pour le reprofilage de rails en voie courante, en appareil de voie et en appareil de dilatation

Bahnanwendungen - Oberbau - Abnahme von Arbeiten - Teil 5: Prozedere zur Schienen-Reprofilierung in Gleisen, Weichen, Kreuzungen und Schienenauszügen

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Ref. No. EN 13231-5:2018 E

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European foreword

This document (EN 13231-5:2018) 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of an identical text or by endorsement, at the latest by December 2018, and conflicting national standards shall be withdrawn at the latest by December 2018.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 document is one of the series EN 13231, *Railway applications — Track — Acceptance of works* as listed below:

— *Part 1: Works on ballasted track - Plain line, switches and crossings*;

— *Part 3: Acceptance of reprofiling rails in track*;

— *Part 4: Acceptance of reprofiling rails in switches and crossings*;

— *Part 5: Procedures for rail reprofiling in plain line, switches, crossings and expansion devices* (the present document).

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1 Scope

This document specifies the procedure for planning and execution of rail reprofiling work including description of rail surface defects. It concerns work in both plain lines and switches and crossings generally done with machines according to the EN 14033 series and EN 15746 series.

It applies to vignole railway rails of 46 kg/m and above according to 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 13231-3:2012, *Railway applications — Track — Acceptance of works — Part 3: Acceptance of reprofiling rails in track*

EN 13231-4:2013, *Railway applications — Track — Acceptance of works — Part 4: Acceptance of reprofiling rails in switches and crossings*

3 Terms and definitions

For the purposes of this document the terms and definitions given in EN 13231-3:2012 and EN 13231-4:2013 and the following 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

3.1
anti–head check profile
AHC Profile
rail head profile with a geometry to prevent and reduce head checking

3.2
rolling contact fatigue
RCF
rail damage caused by the complex stresses that are characteristic of rail wheel contact

3.3
head checking
HC
small parallel cracks on the rail head near or on the gauge corner

3.4
Belgrospi
network of cracks developing on the rail head of track with speed greater than 160 km/h affected by short pitch corrugation

3.5
squat
rolling contact fatigue defect whose main characteristics are a blackish patch on rail head, a lateral flow of steel and a collapsed and widened rolling band

3.6
flaking
surface condition consisting of the gouging of metal on the rail head

3.7
spalling
cracking and chipping on the top of the rail

Note 1 to entry: Occurs commonly on low rails.

3.8
transverse profile deformation
plastic metal flow on the rail head

3.9
side cutting
wear occurring on high rails in small radius curves where wheel flanges contact the rail

3.10
lipping
plastic metal flow occurring on the rail head under conditions of high axle load and high gross tonnage

3.11
short pitch corrugation
quasi-periodic irregularities on the running surface

Note 1 to entry: The wavelength usually is 10 mm to 100 mm. Covering hereby two jointed wavelength according to the EN 13231 series.

3.12
short wave corrugation
depressions in the running surface which are pronounced

Note 1 to entry: The wavelength usually is 30 mm to 300 mm. Covering hereby two jointed wavelength according to the EN 13231 series.

3.13
long wave corrugation
irregular unevenness on the running surface

Note 1 to entry: The wavelength usually is 300 mm to 1 000 mm.

3.14
imprint
damage resulting from a small object which has been pressed into the rail by the wheel

3.15
wheel burn
abrasive, plastic and thermal damage occurring in zones where trains start to move

Note 1 to entry: Occurs e.g. at signals.

4 Basics

4.1 Technical Introduction

The complexity of vehicle-track interaction generates high stresses at the rail-wheel contact, the severity of which is governed by local track characteristics, vehicle type and other operational conditions. The repeated application of these stresses results in the development of fatigue cracks usually referred to as RCF manifested as head checks, gauge corner cracking, or squats. Although rail metallurgy offers a key mitigation measure against such fatigue degradation, there are no rail steels currently in use that could fully withstand the repeated application of such contact stresses. Furthermore the majority of rails in track today, despite their adequate but lower fatigue resistance, have an appreciable residual life span, which makes it more economic to maintain them in an appropriate manner to extend their life rather than to change them.

Management of rail profile and condition is therefore a prerequisite for safe and cost effective operation of railways. Predictable work – at least in a medium time horizon – organized in a strategic way needs to be defined to extract the maximum benefit from existing technologies and to guide the industry for future development. However, it is essential to ensure that the chosen approach provides enough flexibility to adapt to changing situations in both senses: increased requirements for maintenance due to higher loads and dynamic forces, reduced requirements for maintenance due to lower loads (improved vehicle characteristics) and better performing rails (reduced fatigue development).

The life expectancy of a rail is influenced by its interactions with the other parts of the train-track system. The faster and more frequent train services, higher axle loads and new generations of vehicles with greater primary yaw stiffness have significantly increased the critical track forces that promote more rapid degradation of the rail (and wheel) leading to more frequent and costly maintenance interventions and even rail renewal. Significant research into rail metallurgy has resulted in the development of rail steels with much higher resistance to wear and RCF. Nevertheless rail maintenance by reprofiling is an essential requirement for efficient and safe functioning of railway track. The combination of rail grade selection and maintenance strategy considering local track and traffic characteristics ensures effective control of any kind of rail surface defects.

4.2 Background of rail reprofiling

Reprofiling strategy is a planned maintenance activity usually defined by the infrastructure maintainer. In theory it is independent of available technologies, but in practice it is often influenced by the equipment that is easily accessible to or proposed by the contractors.

Work is programmed depending on damage having reached predetermined intervention thresholds such as corrugation depth, deviation from the transverse profile and depth of cracks.

Alternatively work is executed in cycles which are derived from experience and influenced by availability of machines, track possession times and similar factors such as traffic, usually expressed in mega gross tonnes (MGT), months, seasons, etc. Often work is combined with other maintenance activities (e.g. after rail replacement, after tamping or when the line is closed for other work, etc.).

Before the execution of rail maintenance work, specifications (i.e. the results that need to be achieved) shall be defined for:

— defect repair (metal removal);

— longitudinal profile (tolerance);

— transversal profile (target and tolerance);

— surface condition (roughness, facet widths, etc.).

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