SLOVENSKI STANDARD
SIST EN 13848-1:2019

01-junij-2019

Nadomešča:
SIST EN 13848-1:2004+A1:2008

Železniške naprave - Zgornji ustroj proge - Kakovost tirne geometrije - 1. del: Karakteristike tirne geometrije

Railway applications - Track - Track geometry quality - Part 1: Characterisation of track geometry

Bahnanwendungen - Oberbau - Gleislagequalität - Teil 1: Beschreibung der Gleisgeometrie

Applications ferroviaires - Voie - Qualité géométrique de la voie - Partie 1: Caractérisation de la géométrie de voie

Ta slovenski standard je istoveten z: **EN 13848-1:2019**

ICS:

45.080	Tračnice in železniški deli	Rails and railway components
93.100	Gradnja železnic	Construction of railways

SIST EN 13848-1:2019 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13848-1

March 2019

ICS 93.100

Supersedes EN 13848-1:2003+A1:2008

English Version

Railway applications - Track - Track geometry quality - Part 1: Characterization of track geometry

Applications ferroviaires - Voie - Qualité géométrique de la voie - Partie 1: Caractérisation de la géométrie de voie

Bahnanwendungen - Oberbau - Gleislagequalität - Teil 1: Beschreibung der Gleisgeometrie

This European Standard was approved by CEN on 23 December 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 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

Contents

Page

European foreword

This document (EN 13848-1:2019) 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 September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

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 supersedes EN 13848-1:2003+A1:2008.

The main changes with respect to the previous edition are listed below:

— Uncertainty and resolution values are exported to the relevant other parts (EN 13848-2, -3 and -4);

— Addition of *D0* domain;

— New Annex A on decolouring;

— Improvement of Annex B on mainly cyclic top and dip angle;

— New Annex C and D on filtering;

— New Annex F on simulation.

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 European Standard is one of the EN 13848 series, *Railway applications — Track — Track geometry quality*, as listed below:

— *Part 1: Characterization of track geometry*;

— *Part 2: Measuring systems — Track recording vehicles*;

— *Part 3: Measuring systems — Track construction and maintenance machines*;

— *Part 4: Measuring systems — Manual and lightweight devices*;

— *Part 5: Geometric quality levels — Plain line, switches and crossings*;

— *Part 6: Characterisation of track geometry quality*.

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.

1 Scope

This document gives definitions for the principal track geometry parameters and specifies minimum requirements for measurement and the analysis methods. The aim is to allow the comparability of the output of different measuring systems.

This document does not apply to Urban Rail Systems.

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 13848-2, *Railway applications — Track — Track geometry quality — Part 2: Measuring systems — Track recording vehicles*

EN 13848-3, *Railway applications — Track — Track geometry quality — Part 3: Measuring systems — Track construction and maintenance machines*

EN 13848-4, *Railway applications — Track — Track geometry quality — Part 4: Measuring systems — Manual and lightweight devices*

EN 13848-5:2017, *Railway applications — Track — Track geometry quality — Part 5: Geometric quality levels — Plain line, switches and crossings*

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

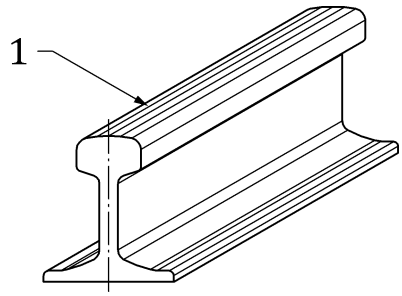
NOTE Refer also to the symbols and definitions described in Clause 4.

3.1
track geometry quality
assessment of excursions in the vertical and lateral planes from the mean or designed geometrical characteristics of specified parameters which give rise to safety concerns or have a correlation with ride quality

3.2
gauge face
inside face of the running rail head

3.3
running table
upper surface of the head of the rail

Note 1 to entry: See Figure 1.



Key

1 running table

Figure 1 — Running table

3.4
running surface
curved surface defined by the longitudinal displacement of a straight line perpendicular to the centre-line of the track and tangential to both running tables

Note 1 to entry: See Figure 2.

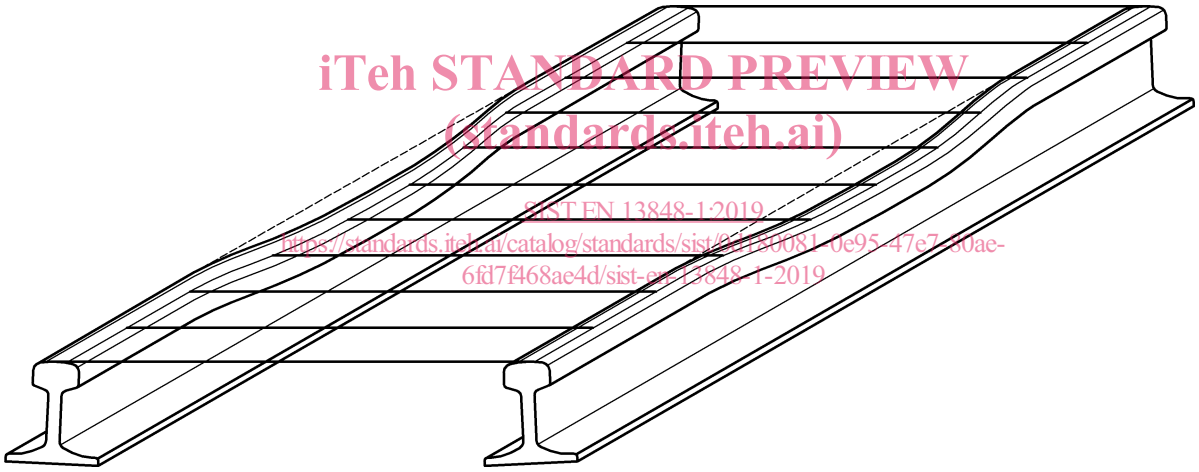


Figure 2 — Running surface

3.5
uncertainty
quantity defining an interval about a result of a measurement expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand [refer to ISO 21748]

Note 1 to entry: The coverage factor is equal to 2. The uncertainty as defined corresponds to a confidence interval of about 95 % of a normal distribution.

Note 2 to entry: The value applicable for track recording vehicles is described in EN 13848-2. For other measurement devices specific values may apply according to EN 13848-3 and EN 13848-4.

3.6
resolution
smallest change in the value of a quantity to be measured which produces a detectable change in the indication of the measuring instrument

Note 1 to entry: The value applicable for track recording vehicles is described in EN 13848-2. For other measurement devices specific values may apply according to EN 13848-3 and EN 13848-4.

3.7
wavelength range
space domain taken by the parameters' components

3.8
sampling distance
travelled distance between any two consecutive measurement points

3.9
range of measurement
specific domain described by its limits

3.10
isolated defect
part of the signal exceeding a given limit such as *IAL*, *IL* or *AL* with at least one sample for a sampling distance of 0,25 m

Note 1 to entry: The length of the exceedance is given by the number of samples exceeding the limit [refer to EN 13848-5:2017].

4 Symbols and abbreviations

For the purposes of this document, symbols and abbreviated terms applied are specified in Table 1.

Table 1 — Symbols

No.	Symbol	Designation	Unit
1	G	Track gauge	mm
2	Z_{p}	Limit of the range below the running surface within which the gauge is measured. Z_{p} is always 14 mm for a Vignole rail	mm
3	Z_{ll1}	Deviation in the direction of consecutive running table levels on right hand rail. Used in the measurement of Longitudinal Level	mm
4	Z_{ll2}	Deviation in the direction of consecutive running table levels on left hand rail. Used in the measurement of Longitudinal Level	mm
5	Y_{p1}	Distance between point P and a reference line on right hand rail. Used in the measurement of Alignment	mm
6	Y_{p2}	Distance between point P and a reference line on left hand rail. Used in the measurement of Alignment	mm
7	P	Gauge face contact point	
8	*D0, D1, D2, D3*	Wavelength ranges	m
9	λ	Wavelength	m
10	*V1*	Amplitude from the zero line. Used in the measurement of Twist	mm/m
11	*V2*	Amplitude from the mean value. Used in the measurement of Twist	mm/m
12	ℓ	Twist base-length	m
13	*X, Y, Z*	Axes of a track coordinate system	

5 Description of the track coordinate system

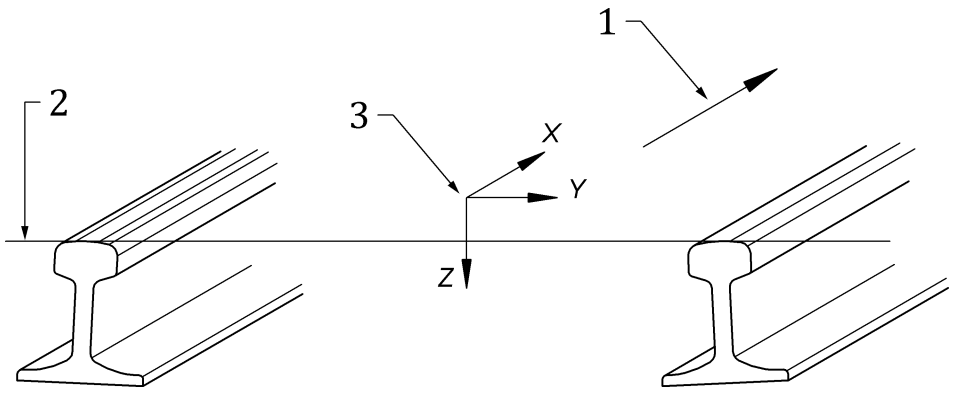
The track geometry quality is described by means of a moving right-hand Cartesian coordinate system centred to the track with clockwise rotation (refer to Figure 3):

— X-axis: axis represented as an extension of the track towards the direction of running;

— Y-axis: axis parallel to the running surface;

— Z-axis: axis perpendicular to the running surface and pointing downwards.

NOTE This description is for the coordinate system of the measurement vehicle. It is up to the infrastructure manager to define a reference direction of the track.



Key

1 running direction

2 intersection between considered cross section and running surface

3 track coordinate system

Figure 3 — Relationship between the axes of the track coordinate system

Rail identification (left or right rail) is not in the scope of the document, but is to be defined for the purpose of exchanging data.

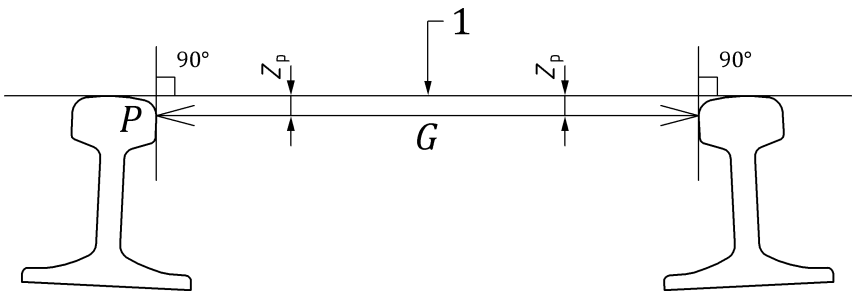
6 Principal track geometric parameters

6.1 Track gauge

6.1.1 General

Track gauge, G, is the smallest distance between lines perpendicular to the running surface intersecting each rail head profile at point P in a range from 0 to Z_p below the running surface. In this standard Z_p is always 14 mm.

In the situation of new unworn rail head the point P will be at the limit Z_p below the railhead, see Figure 4.

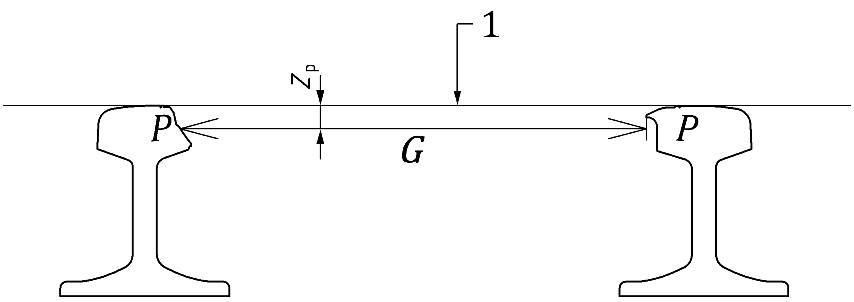


Key

1 running surface

Figure 4 — Track gauge for new rail

In the situation of worn rail head the height of point P for the left rail can be different from the right rail, see Figure 5.



Key

1 running surface

Figure 5 — Track gauge for worn rail

6.1.2 Measurement method

Track gauge can be measured using a contact system or a non-contact system.

6.1.3 Wavelength range

Not applicable.

6.1.4 Resolution

The values of resolution depend on the type of measuring system and are given in the corresponding parts of the standard EN 13848-2, EN 13848-3 and EN 13848-4.

6.1.5 Measurement uncertainty

The values of uncertainty depend on the type of measuring system and are given in the corresponding parts of the standard EN 13848-2, EN 13848-3 and EN 13848-4.

6.1.6 Range of measurement

The range shall be the nominal gauge −15 mm/+50 mm.

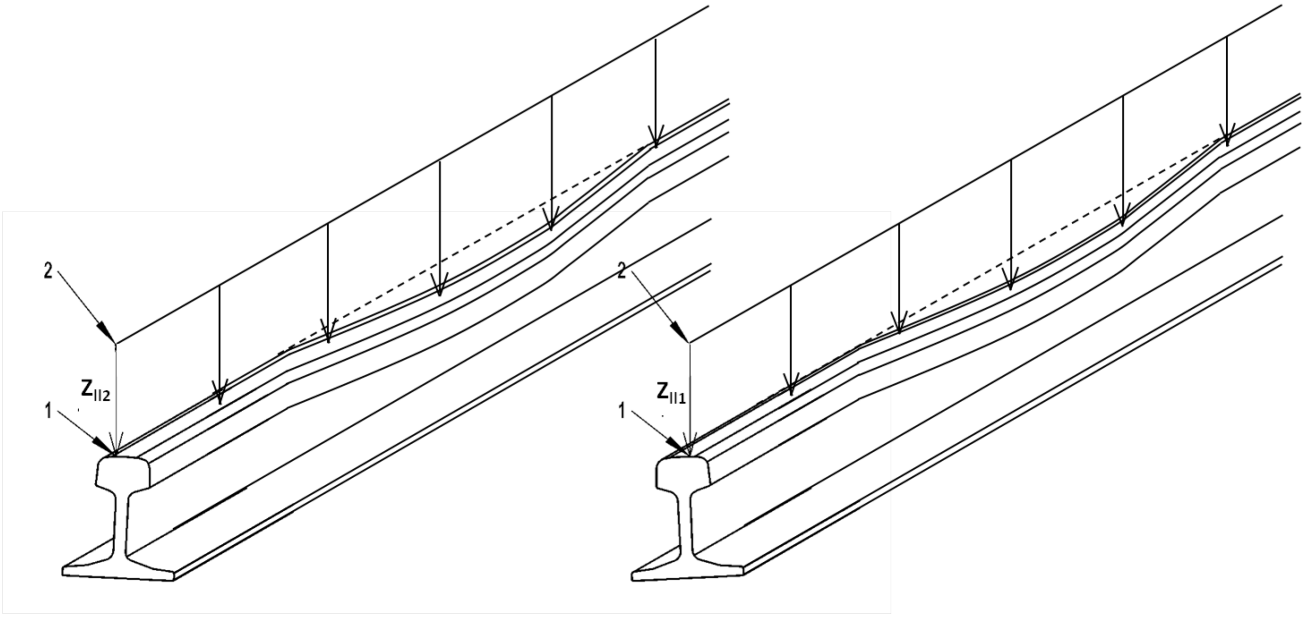
6.1.7 Analysis method

Individual defects are represented by the amplitude from the nominal value to the peak value (minimum and maximum peak value).

6.2 Longitudinal level

6.2.1 General

Longitudinal level is the deviation z_{ll} in z-direction of running table levels on any rail from the smoothed vertical position (reference line) expressed in defined wavelength ranges. The smoothing is applied over a length that covers the wavelength range of interest (minimum two times the upper limit of the wavelength range of interest). The reference line and the longitudinal level are calculated from successive measurements (refer to Figure 6).



Key

1 running table

2 reference line

Figure 6 — Longitudinal level

6.2.2 Measurement method

Longitudinal level measurements shall be made with either an inertial system or a versine system (that should preferably be asymmetric) or by a combination of both methods. If the versine method of measurement is used, a decolouring of the measured signals is necessary in order to eliminate the influence of the transfer function of the versine system (see Annex A).

NOTE In the case of limited analysis length, the longitudinal level can be evaluated also from geodetic measurements.

6.2.3 Wavelength range

Three ranges expressed in wavelengths (λ) shall be considered:

— *D1*: 3 m < λ ≤ 25 m;

— *D2*: 25 m < λ ≤ 70 m;

— *D3*: 70 m < λ ≤ 150 m, used for measuring long wavelength defects. Generally this range should only be considered for line speeds greater than 230 km/h.

NOTE Other wavelengths longer than 70 m can also be taken into consideration by the vertical curvature parameter (refer to Annex B); however, this does not give an equivalent assessment of *D3* domain.

In order to detect short wavelength defects, which can generate high dynamic forces, an optional wavelength range can be considered:

D0: 1 m < λ ≤ 5 m (1)