SLOVENSKI STANDARD
oSIST prEN 13232-3:2020

01-marec-2020

Železniške naprave - Zgornji ustroj proge - Kretnice in križišča za Vignolove tirnice - 3. del: Zahteve na stiku kolo-tirnica

Railway applications - Track - Switches and crossings for Vignole rails - Part 3: Requirements for wheel/rail interaction

Bahnanwendungen - Oberbau - Weichen und Kreuzungen für Vignolschienen - Teil 3: Anforderungen an das Zusammenspiel Rad/Schiene

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Applications ferroviaires - Infrastructure - Appareils de voie - Partie 3: Exigences pour l'interaction Roue/Rail

oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9c8a-6e0b-4f3d-be19-e229fad3b18b/osist-pren-13232-3-2020

Ta slovenski standard je istoveten z: **prEN 13232-3**

ICS:

45.080	Tračnice in železniški deli	Rails and railway components

oSIST prEN 13232-3:2020 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

oSIST prEN 13232-3:2020

iTeh STANDARD PREVIEW
(standards.iteh.ai)

oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9c8a-6e0b-4f3d-be19-a239fed3b18b/osist-pren-13232-3-2020

oSIST prEN 13232-3:2020

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 13232-3

January 2020

ICS 93.100

Will supersede EN 13232-3:2003+A1:2011

English Version

Railway applications - Track - Switches and crossings for Vignole rails - Part 3: Requirements for wheel/rail interaction

Applications ferroviaires - Infrastructure - Appareils de voie - Partie 3: Exigences pour l'interaction Roue/Rail

Bahnanwendungen - Oberbau - Weichen und Kreuzungen für Vignolschienen - Teil 3: Anforderungen an das Zusammenspiel Rad/Schiene

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

If this draft becomes a European Standard, 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This draft European Standard was established by CEN 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.

oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9e8a-be0b-4f8d-be19-a2596d3b18b/osist-pren-13232-3-2020

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

© 2020 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

oSIST prEN 13232-3:2020

Contents

iTeh STANDARD PREVIEW
(standards.iteh.ai)
oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9c8a-6e0b-4f3d-be19-a239fed3b18b/osist-pren-13232-3-2020

oSIST prEN 13232-3:2020

iTeh STANDARD PREVIEW
(standards.iteh.ai)
oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1e7c9e8a-6e0b-4f3d-be19-a2396d3b1f8b/osist-pren-13232-3-2020

oSIST prEN 13232-3:2020

European foreword

This document (prEN 13232-3:2020) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13232-3:2003+A1:2011.

This document has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2016/797/EU.

For relationship with EU Directive 2016/797/EU, see informative Annex ZA, which is an integral part of this document.

This series of standards “*Railway applications – Track – Switches and crossings for Vignole rails*” covers the design and quality of switches and crossings in flat bottomed rail. The list of Parts is as follows:

— *Part 1: Definitions*

— *Part 2: Requirements for geometric design*

— *Part 3: Requirements for wheel/rail interaction*

— *Part 4: Actuation, locking and detection*

— *Part 5: Switches*

— *Part 6: Fixed common and obtuse crossings*

— *Part 7: Crossings with moveable parts*

— *Part 8: Expansion devices*

— *Part 9: Layouts*

Part 1 contains terminology used throughout all parts of this series. Parts 2 to 4 contain basic design guides and are applicable to all switch and crossing assemblies. Parts 5 to 8 deal with particular types of equipment including their tolerances. These use Parts 1 to 4 as a basis. Part 9 defines the geometric and non-geometric acceptance criteria for layout inspection.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9c8a-6e0b-4f3d-be19-a239fed3b18b/osist-pren-13232-3-2020

oSIST prEN 13232-3:2020

1 Scope

This document defines the main wheel/track interaction criteria to be taken into account during the geometrical design of switches and crossings (S&C) layouts.

It specifies:

— characterization of wheel and track dimensions;

— geometric design principles for wheel guidance;

— design principles for wheel load transfer;

— whether movable crossings are needed.

These are illustrated by their application to turnout components:

— switches;

— crossings;

— check rails,

but the principles apply equally to more complex layouts. There are also simplified definitions of the safety and functional dimensions, which can be used in conjunction with the general principles as the basis for more in-depth assessment.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

2 Normative references

oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9c8a-0c8b-4e9d-be19-a259ced561f8/osist-pren-13232-3-2020

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.

prEN 13232-4:2020, *Railway applications – Track – Switches and crossings for Vignole rails – Part 4: Actuation, locking and detection*

EN 13715:2006+A1:2010, *Railway applications - Wheelsets and bogies - Wheels - Tread profile*

EN 15313:2016, *Railway applications - In-service wheelset operation requirements - In-service and off-vehicle wheelset maintenance*

EN 15273-1:2013+A1:2016, *Railway applications - Gauges - Part 1: General - Common rules for infrastructure and rolling stock*

EN 15273-2:2013+A1:2016, *Railway applications - Gauges - Part 2: Rolling stock gauge*

EN 15273-3:2013+A1:2016, *Railway applications - Gauges - Part 3: Structure gauges*

oSIST prEN 13232-3:2020

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 http://www.electropedia.org/

3.1
customer
term used to define one party involved in using the EN as the technical basis for a transaction: the Operator or User of the equipment, or the Purchaser of the equipment on the User's behalf

3.2
supplier
term used to define one party involved in using the EN as the technical basis for a transaction: the Body responsible for the use of the EN in response to the Customer's requirements

3.3
guiding force
Y
force, acting parallel to the running surface, between the wheel and the relevant track component (usually a rail)

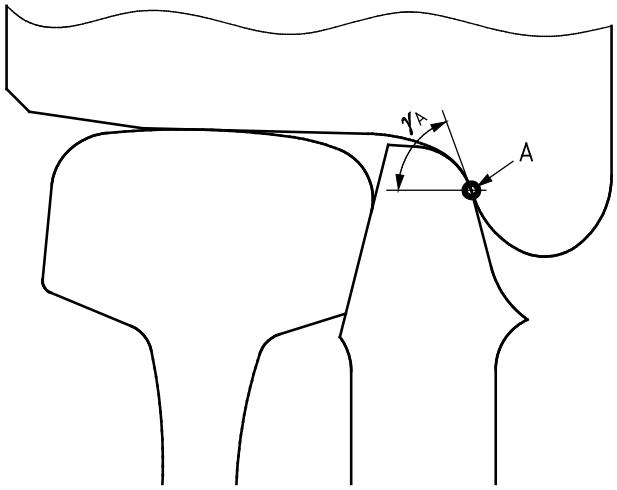
iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.4
wheel load
Q
force, acting perpendicular to the running surface, between the wheel on one hand and the relevant track component (rail)

oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7e9c8a-6e0b-4f3d-be19-a239fed3b18b/osist-pren-13232-3-2020

3.5
contact angle
γ_A
angle of the contact plane measured at the contact point A between the wheel and the track component. In the case of a two-point contact, the one nearest the wheel flange shall be considered (see Figure 1)

oSIST prEN 13232-3:2020



Key

γ_A contact angle

A contact point

Figure 1 — Contact angle

3.6
friction coefficient
μ

iTeh STANDARD PREVIEW
(standards.iteh.ai)

friction coefficient encountered at the contact point where the contact angle is determined

oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9c8a-6e0b-4f3d-be19-a239fed3b18b/osist-pren-13232-3-2020

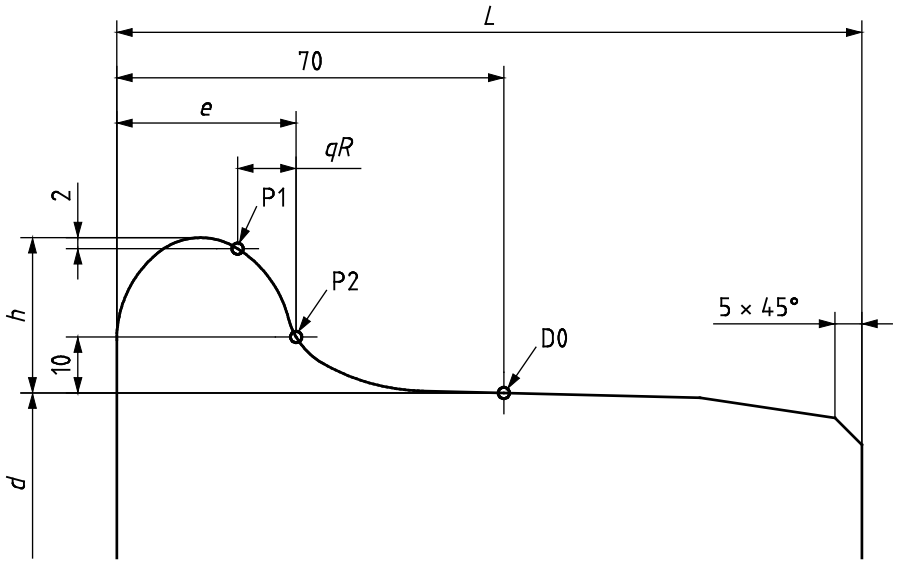
3.7
flange sharpness
qR

parameter which characterises the flange angle of the wheel as a linear dimension. The measurement is taken at the active side of the flange as defined in Figure 2. It is the distance, parallel to the wheel axis, between the following two points:

- reference point on the profile, at a distance from wheel axis of 10 mm more than the wheel radius;

- a reference point located at a distance 2 mm from the flange tip towards the wheel axis

oSIST prEN 13232-3:2020



Key

d wheel diameter

D0 position of wheel tread

h flange height

q_R flange sharpness

L rim width

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Figure 2 — Wheel parameters

3.8
flange height
parameter *h* in Figures 2 and 5

oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9c8a-6e0b-4f3d-be19-a239fed3b18b/osist-pren-13232-3-2020

3.9
wheel back-to-back
parameter a in Figures 2, 5 and 31

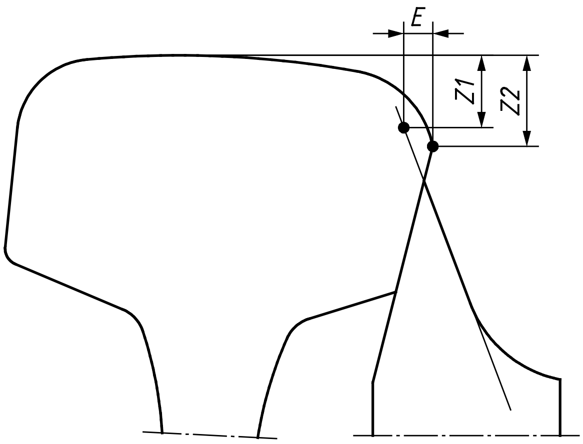
Note 1 to entry: An index max or min is given to this symbol according respectively to the maximum and minimum values that can occur during operation.

3.10
flange width
parameter b in Figures 2 and 5

Note 1 to entry: An index max or min is given to this symbol according respectively to the maximum and minimum values that can occur during operation.

3.11
switch point retraction
distance E, measured at the reference plane, between the reference line of switch and stock rail at the actual switch toe (see Figure 3)

oSIST prEN 13232-3:2020



Key

E Point retraction

Z1 Switch rail machining reference plane (see EN 13232-5)

Z2 Stock rail machining reference plane (see EN 13232-5)

Figure 3 — Switch point retraction

3.12

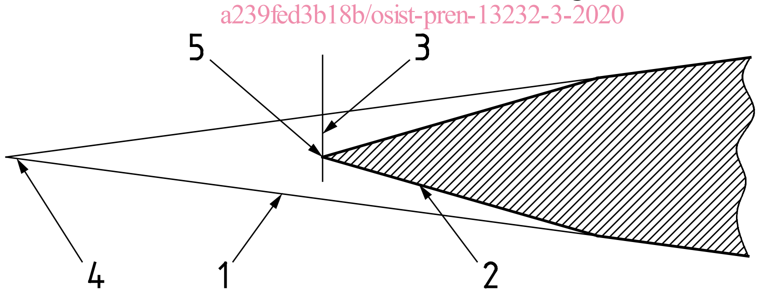
point retraction in fixed common crossing

reference line in a fixed common crossing which can deviate from the theoretical geometry line

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Note 1 to entry: From a certain distance to the crossing point, the reference line of the Vee can, depending on the design, be removed from this theoretical line away from the wheel flange in order to avoid contact between both elements. This situation is described in Figure 4.

oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9a8e-6e0b-4f3d-be19-a239fed3b18b/osist-pren-13232-3-2020



Key

1 Theoretical reference line

2 Actual reference line

3 Point retraction

4 Mathematical point (*MP*)

5 Actual point (*RP*)

Figure 4 — Point retraction in fixed common crossing

Note 2 to entry: The value of the point retraction is measured at the actual point (*RP*).

oSIST prEN 13232-3:2020

3.13
false flange
flange on the overhanging portion of a wheel tread caused by wear on the wheel tread in the area where the wheel and the rail normally make contact (see Figure 7 item 1)

4 Inputs

4.1 General

The motion of wheels and transfer of wheel loads is a complex subject, involving the accumulation of extensive data and an understanding of dynamic effects.

By making certain assumptions it is feasible to define rules which are simple yet rigorous enough for design of all types of switches and crossings. Some of these rules assume a 2-axle bogie or vehicle. The need for other special requirements such as those posed by 3-axle or other vehicles shall be stated by the Customer.

4.2 Wheel and track parameters

4.2.1 Introduction

This clause deals with the key parameters needed for the analysis of the interaction between wheels and the track, either for guidance calculations or load transfer calculations.

Wheel and track dimensions are defined below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

4.2.2 Wheel profiles

Sufficient dimensions of the cross-section or profile of a wheel are required for switch and crossing design. As a minimum, a dimensioned profile drawing shall be provided by the customer, with the following key dimensions as defined in Figure 5:

SIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/[illegible]-be19-a239fed3b18b/osist-pren-13232-3-2020

— flange width, height and flange angle;

— tyre/rim width and tread angle;

— wheel diameter or radius.

4.2.3 Wheelsets

Additional parameters related to the wheelsets are required for calculations for wheelset guidance. The Customer shall provide the following parameter values:

— wheel back-to-back (see Figure 2 or 5);

— axle spacing;

— number of axles;

— clearance of middle axles, if applicable;

— bogie spacing and minimum curve radius for vehicles.

4.2.4 Rail and track

The key parameters related to the track geometry which are used in calculations for wheelset guidance are shown in Figure 6 and listed below:

oSIST prEN 13232-3:2020

— centreline radius (R);

— track gauge (G);

— dimension for nose protection (check gauge) (F);

— crossing flangeway (D).

and the following shall be provided by the Customer:

— maximum permissible check rail height above running table (H).

4.2.5 Tolerances and wear

It is necessary to consider tolerances and wear in order to design correctly. These are alternatively referred to as manufacturing tolerances and service tolerances.

If the Customer provides worn wheel profiles or amounts of wear, then these should be used. Otherwise the assumptions made by the Supplier shall form the basis for design, and these shall be stated. The following areas of wear shall be considered:

— back of wheel flanges;

— front of wheel flanges;

— false flanges;

— flange angle.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Locations of typical lateral wheel and track wear are shown in Figure 7. These shall be taken into account when designing flangeway gaps. See Clause 5.

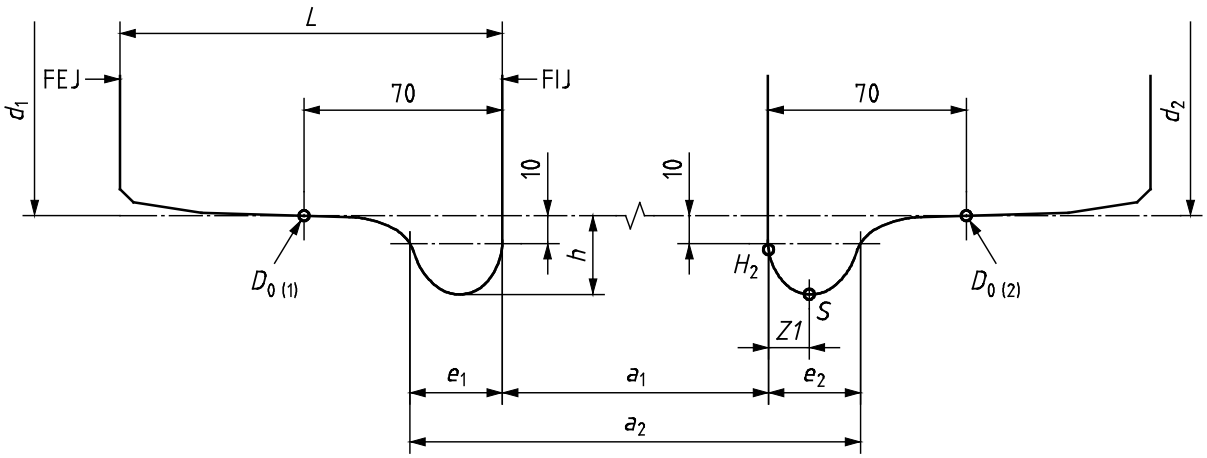
oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9c8a-6e0b-4f3d-be19-a239fed3b18b/osist-pren-13232-3-2020

Vertical wear, examples of which are also illustrated in Figure 7, is more relevant to wheel load transfer. See Clause 6.

A false flange of 2 mm shall be allowed for in the design.

Vertical wear to the rail head occurs but is not shown in the figure.

oSIST prEN 13232-3:2020

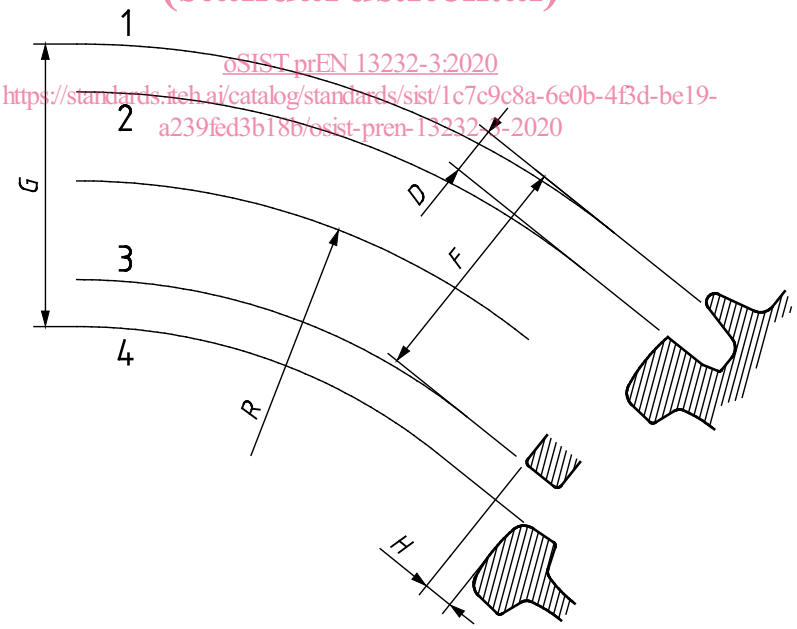


Key

a_1	back-to-back dimension	L	rim width
a_2	front-to-front dimension	Z1	internal zone of flange
D_0	position of wheel tread (1) wheel 1 (2) wheel 2	FEJ	external face of rim
e_1,e_2	flange thicknesses	FIJ	internal face of rim
h	flange height	S	flange tip
H_2	transition point	d_1, d_2	wheel diameters

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Figure 5 — Key wheel dimensions (in addition to profile details)



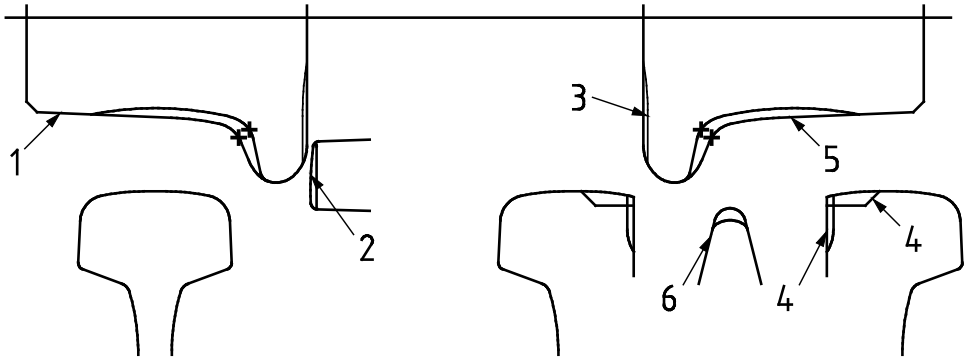
oSIST prEN 13232-3:2020
https://standards.iteh.ai/catalog/standards/sist/1c7c9c8a-6e0b-4f3d-be19-a239fed3b18b/osist-pren-13232-3-2020

Key

1	Highside rail	D	crossing flangeway
2	Wing	R	track radius
3	Check rail	F	dimension for nose protection
4	Lowside rail	H	height of check rail

Figure 6 — Key track dimensions

oSIST prEN 13232-3:2020



Key

1	False flange	4	Wing wear
2	Guard or check rail wear	5	Wheel wear (front)
3	Wheel wear (back) also on left wheel	6	Vee wear

Figure 7 — Locations of wheel and rail wear

4.3 Contact zone

4.3.1 Introduction

iTeh STANDARD PREVIEW

For switch and crossing design, there are issues which shall be verified during design. These are as follows.

(standards.iteh.ai)

4.3.2 Contact danger zone

oSIST prEN 13232-3:2020

The wheel profile supplied by the Customer shall indicate the danger zone for guidance contact, which is that part of the wheel flange which falls on the flange radius and which therefore exceeds the angle for safe guidance. The switch and crossing Supplier shall ensure that guidance contact does not take place within this zone for both new and worn wheels, except where it is agreed that flange-running is a normal operating regime.

The danger zone is illustrated in Figures 16 and 17.

4.3.3 Flangeway depth

The depth of the flangeway shall be sufficient to prevent flanges from running on the floor of the flangeway except if otherwise required by the Customer. This shall be verified considering the increased depth of flange of a maximum worn wheel and with the shallow flangeway of a maximum worn running surface of a rail.

4.3.4 Flangeway width

Flangeway width is governed by a number of vehicle and track parameters as described in the following sections.

5 Guidance principles

5.1 General

The guidance of a wheelset through switches and crossings concerns mainly the lateral or horizontal dimensions of wheel, axle, and track. Note that, in Figures 9, 10, 11 and 12, the wheels are shown in a simplified form as ellipses at the gauge reference plane.