SLOVENSKI STANDARD

SIST EN 13232-9:2006

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Ģelezniģke naprave ï Zgornji ustroj ï Kretnice in kriģiģļ a ï 9. del: Kretniģki sklopi

Railway applications - Track - Switches and crossings - Part 9: Layouts

Bahnanwendungen - Oberbau - Weichen und Kreuzungen - Teil 9: Weichenanlagen

Applications ferroviaires - Voie - Appareils de voie - Partie 9: Ensemble de l'appareil

Ta slovenski standard je istoveten z: EN 13232-9:2006

ICS:

45.080	Traļ nice in ģelezniģki deli	Rails and railway components

SIST EN 13232-9:2006 **en**

EUROPEAN STANDARD

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English Version

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This European Standard was approved by CEN on 13 February 2006.

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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 Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 13232-9:2006) 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of an identical text or by endorsement, at the latest by November 2006, and conflicting national standards shall be withdrawn at the latest by November 2006.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to support Essential Requirements of EU Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system amended by the Directive 2004/50/EC of the European Parliament and of the Council of 29 April 2004.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this European Standard.

This series of standards “Railway applications — Track — Switches and crossings” covers the design and quality of switches and crossings in flat bottom rails. 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 the standard.

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 functional and geometrical dimensions and tolerances for layout assembly.

The following terms are used within to define the parties involved in using the EN as the technical basis for a transaction:

CUSTOMER The operator or user of the equipment, or the purchaser of the equipment on the user's behalf.

SUPPLIER The body responsible for the use of the EN in response to the customer's requirements.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta,

Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

The scope of this part is:

— to describe the design process of switches and crossings, and the use of the other parts of this standard;

— to define the main criteria to be taken into account during the design of the layout, including the safety and functional dimensions as well as geometrical and material aspects;

— to define the main criteria to be verified during the design approval;

— to define the geometrical and non-geometrical acceptance criteria for inspection of layouts assembled both in the fabrication plant and at track site in case of layouts that are delivered non or partially assembled or in a "kit" form;

— to determine the limits of supply;

— to define the minimum requirements for traceability.

This European Standard applies only to layouts that are assembled in the manufacturing plant or that are assembled for the first time at trackside.

Other aspects such as installation and maintenance also influence performance; these are not considered as part of this European Standard.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13145, *Railway applications — Track — Wood sleepers and bearers*

EN 13230-4, *Railway applications — Track — Concrete sleepers and bearers — Part 4: Prestressed bearers for switches and crossings*

EN 13232-2, *Railway applications — Track — Switches and crossings — Part 2: Requirements for geometric design*

EN 13232-3, *Railway applications — Track — Switches and crossings — Part 3: Requirements for wheel/rail interaction*

EN 13232-4, *Railway applications — Track – Switches and crossings — Part 4: Actuation, locking and detection*

EN 13232-5, *Railway applications — Track — Switches and crossings — Part 5: Switches*

EN 13232-6, *Railway applications — Track — Switches and crossings — Part 6: Fixed common and obtuse crossings*

EN 13232-7, *Railway applications — Track — Switches and crossings — Part 7: Crossings with moveable parts*

prEN 13232-8, *Railway applications — Track — Switches and crossings — Part 8: Expansion devices*

EN 13481 (all parts), *Railway applications — Track — Performance requirements for fastening systems*

EN 13674-1, *Railway applications — Track — Rail — Part 1: Vignole railway rails 46 kg/m and above*

EN 13674-2, *Railway applications — Track — Rail — Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above*

EN 13674-3, *Railway applications — Track — Rail — Part 3: Check rails*

EN 13674-4, *Railway applications — Track — Rail — Part 4: Vignole railway rails from 27 kg/m to, but excluding 46 kg/m*

EN 13715, *Railway applications — Wheelsets and bogies — Wheels — Tread profile*

prEN 13803-2, *Railway applications — Track alignment design parameters — Track gauges 1 435 mm and wider — Part 2: Switches and crossings and comparable alignment design situations with abrupt changes of curvature*

prEN 14730 (all parts), *Railway applications — Track — Aluminothermic welding of rails*

UIC 505-1, *Railway transport stock — Rolling stock construction gauge*

UIC 505-4, *Effects of the application of the kinematic gauges defined in the 505 series of leaflets on the positioning of structures in relation to the tracks and of the tracks in relation to each other*

UIC 510-2, *Trailing stock — Conditions concerning the use of wheels of various diameters with running gear of different types*

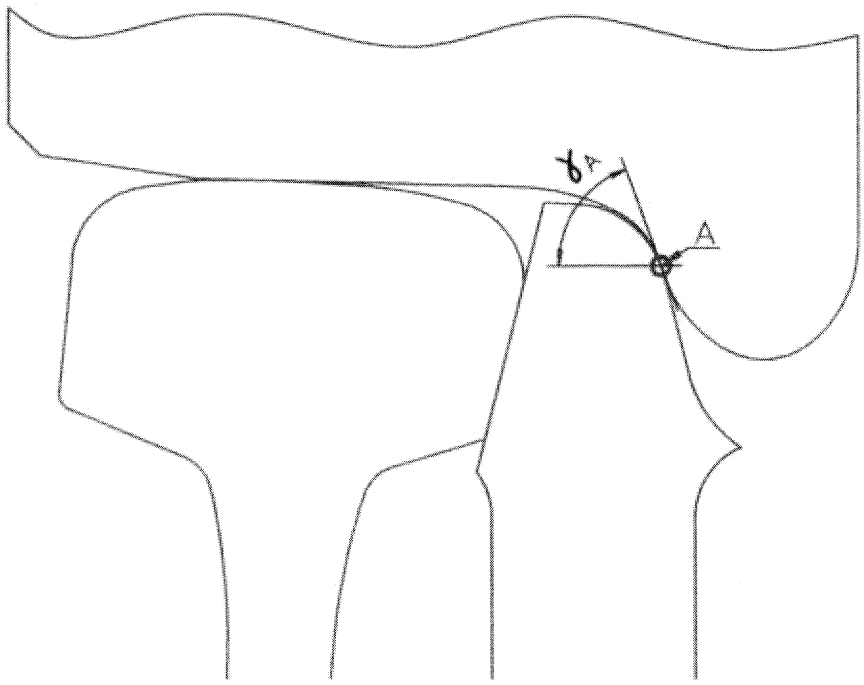
3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
guiding force *Y*
lateral force, acting parallel to the running surface, between the wheel and the relevant track component (usually a rail)

3.2
wheel load *Q*
force, acting perpendicular to the running surface, between the wheel on one hand and the relevant track component (rail)

3.3
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 will be considered.



Key

γ_A contact angle
A contact point

Figure 1 — Contact angle

This contact angle determines the contact danger zone on the wheel, as defined in EN 13232-3

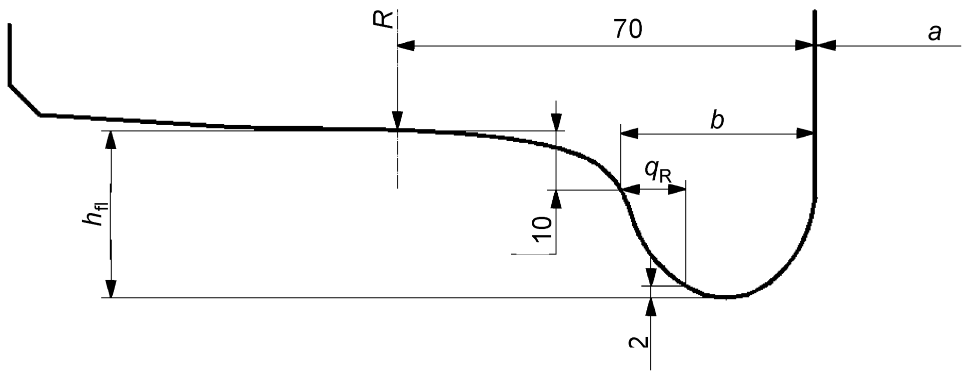
3.4
friction coefficient μ
friction coefficient encountered at the contact point where the contact angle is determined

3.5
flange sharpness q_R
parameter which characterises the sharpness of the wheel flange. The measurement is taken in accordance with UIC 510-2 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;

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

Dimensions in millimetres



Key

a wheel back to back

b flange width

h_{fl} flange depth

q_R flange sharpness

R wheel radius

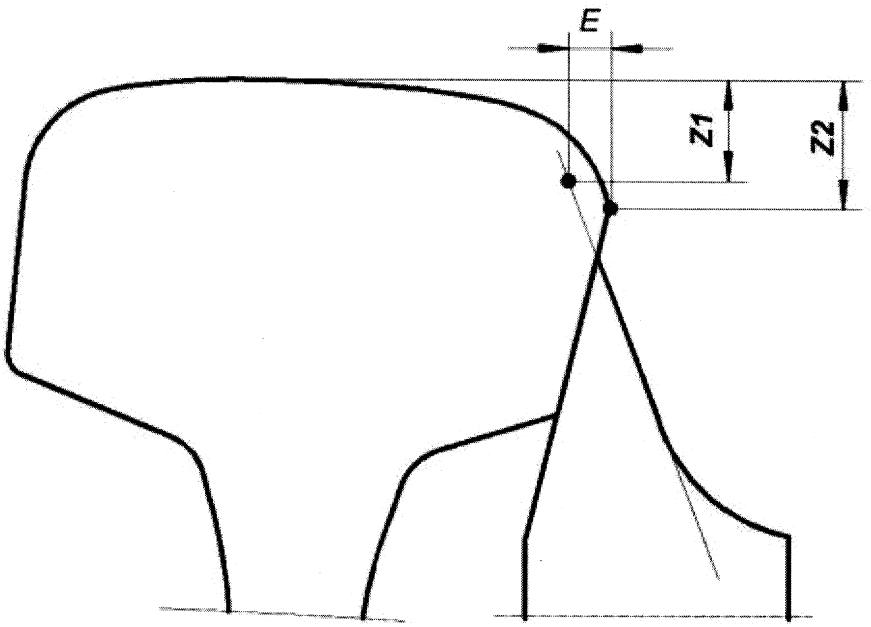
Figure 2 — Wheel parameters

3.6
flange depth h_{fl}
see EN 13232-3

3.7
wheel back-to-back *a*
see EN 13232-2. The symbol "a" is used throughout this standard. An index max or min is given to this symbol according respectively to the maximum and minimum values that can occur during operation

3.8
flange width *b*
see EN 13232-2. The symbol "*b*" is used throughout this standard. An index max or min is given to this symbol according respectively to the maximum and minimum values that can occur during operation

3.9
switch point retraction *E*
distance, measured at the reference plane, between the reference line of switch and stock rail at the actual switch toe



Key

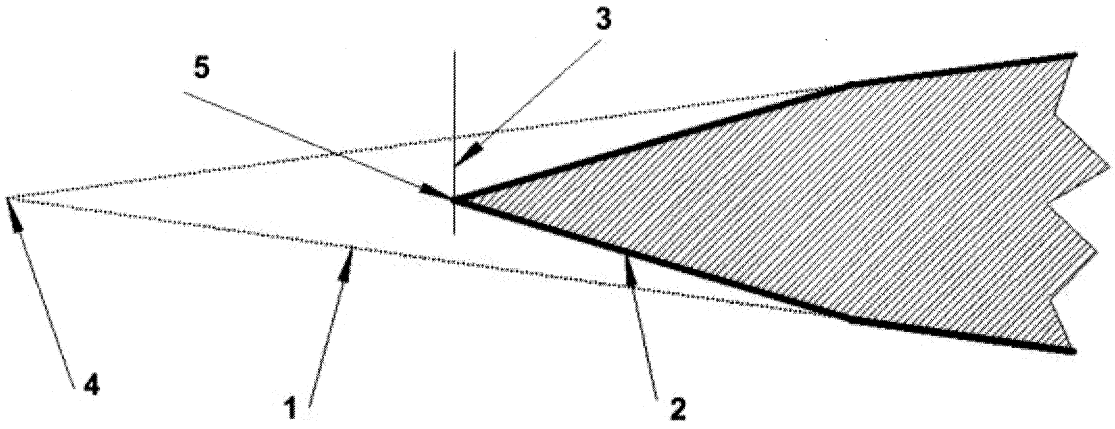
E point retraction

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

3.10
point retraction in fixed common crossing
reference line in a fixed common crossing which can deviate from the theoretical geometry line. 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.



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

The value of the point retraction is measured at the actual point (*RP*).

3.11
lead of turnout
distance between reference points of the different components of the S&C, e.g. the distance between theoretical points of crossing and switch in a standard layout. The lead is measured parallel to the reference line, except when stated otherwise

4 General design process

4.1 General process

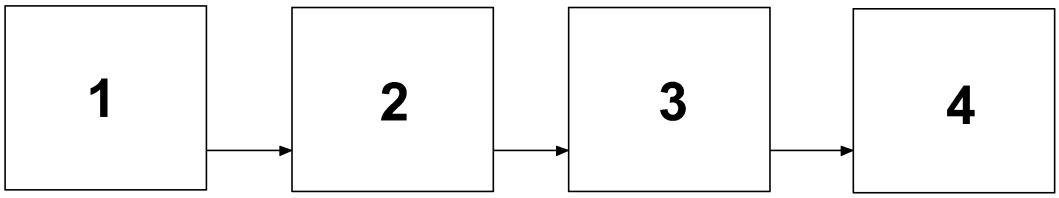
The design process of switches and crossings is complex due to the many requirements that apply and the different situations that may occur. Figure 5 gives a schematic representation of the general design process. It separates the whole process into 4 main steps:

— step 1 contains the general design of the S&C. It permits the definition of the fundamental aspects of the S&C, respecting the main design requirements, as defined in parts 2 to 4;

— step 2 is the main constructional design process, which specifies the main construction of the S&C;

— step 3 consists of the detailed design of the individual components;

— step 4 is the product acceptance.



Key

1 step 1: General design
2 step 3: Main constructional design
3 step 3: Detailed component design
4 step 4: Acceptance

Figure 5 — General design process

Step 1 consists of the geometrical design, the design of the wheel-rail interaction and the design requirements for compliance with the actuation, locking and detection system.

Step 2 is based on the technology used by the supplier and is not dealt with in detail by any standard. It is mainly based on the suppliers' experience and expertise.

Step 3 is dealt with in different standards. The design of the main components shall respect the requirements laid down in parts 5 to 8. Other components, such as fastenings, bearers, etc, are dealt with in respective EN's.

4.2 Design step details

a) Every design step requires sufficient **input data** to enable the design to be completed.

b) These input data are dealt with by the supplier through the **design rules**. The rules are defined in EN 13232, parts 2 to 8.

c) The result of the different design steps are **outputs**.

All these aspects are schematically represented for each design step in Figure 6, with a reference to the different parts and clauses where these aspects are dealt with in detail.

4.3 Practical use of the design process

The previous scheme deals with the complete design process of the S&C. The use of the standard is not limited to this case only.

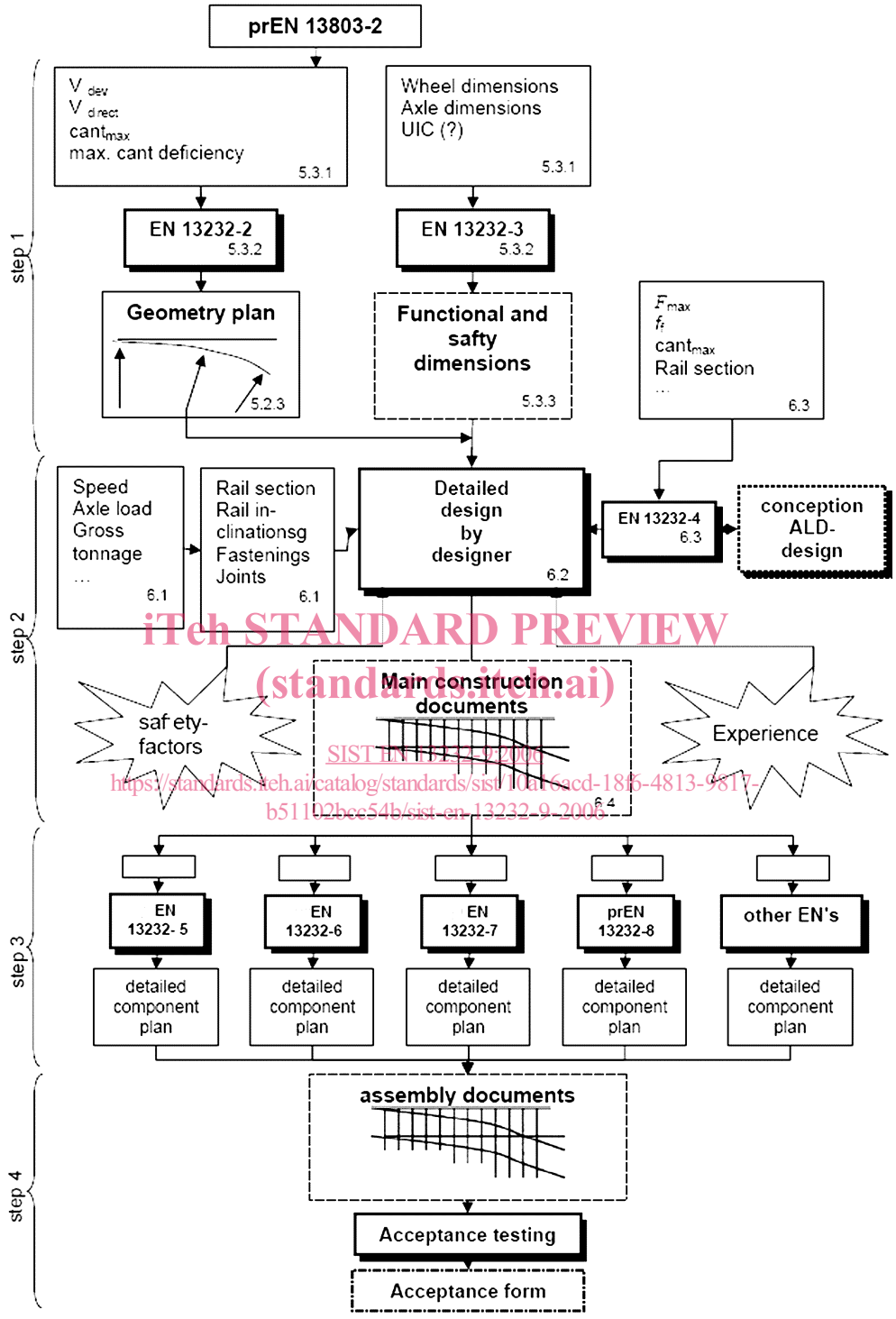
The customer may choose to instruct the supplier to perform the whole design process and therefore the customer would provide all the necessary input data to permit the supplier to perform the design

The customer may also opt to instruct the supplier to perform only parts of the design process. In this case the customer shall deliver all inputs of the design steps he has requested the supplier to perform. This means that he has to deliver all outputs of the previous design steps.

EXAMPLE 1 The customer may instruct the supplier to perform the detailed design of an S&C layout based on the geometry of an existing design for use on a main railway line. In this case the customer shall provide the supplier with the outputs from geometrical requirements (the geometry plan) as well as the requirements for wheel-rail interaction, specified by the functional and safety dimensions.

Based on this information and the inputs for both conformity for actuation, locking and detection (ALD) and general requirements, he performs the general and detailed component design.

EXAMPLE 2 The customer may instruct the supplier to fabricate an S&C layout in accordance with an existing design. He therefore shall deliver all detailed plans to the supplier. The supplier only has to do step 4 of the general design process.



NOTE Subclause references in Figure 6 relate to this European Standard.

Figure 6 — Design process