SLOVENSKI STANDARD
oSIST prEN 13232-2:2020

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Železniške naprave - Zgornji ustroj proge - Kretnice in križišča za Vignolove tirnice - 2. del: Geometrijske zahteve pri projektiranju

Railway applications - Track - Switches and crossings for Vignole rails - Part 2: Requirements for geometric design

Bahnanwendungen - Oberbau - Weichen und Kreuzungen für Vignolschienen - Teil 2: Anforderungen an den geometrischen Entwurf

Applications ferroviaires - Infrastructure - Appareils de voie - Partie 2: Exigences de la conception géométrique

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

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English Version

Railway applications - Track - Switches and crossings for Vignole rails - Part 2: Requirements for geometric design

Applications ferroviaires - Infrastructure - Appareils de voie - Partie 2: Exigences de la conception géométrique

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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.

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

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European foreword

This document (prEN 13232-2:2020) 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 13232-2:2003+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 inspection of layouts.

1 Scope

This document covers the following subjects:

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

— geometric design principles for wheel guidance;

— definition of basic limits of supply;

— applied forces and their adequate support;

— tolerance levels.

These are illustrated herein by application to a turnout. The main switch and crossing components are represented in turnouts and the principles used in turnouts apply equally to more complex layouts.

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.

prEN 13232-1:2020, *Railway applications – Track – Switches and crossings for Vignole rails – Part 1: Definitions*

prEN 13232-3:2020, *Railway applications – Track – Switches and crossings for Vignole rails – Part 3: Requirements for wheel/rail interaction*

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

prEN 13232-5:2020, *Railway applications – Track – Switches and crossings for Vignole rails – Part 5: Switches*

prEN 13232-9:2020, *Railway applications – Track – Switches and crossings for Vignole rails – Part 9: Layouts*

EN 13803:2017, *Railway applications - Infrastructure — Track alignment design parameters - Track gauges 1435 mm and wider*

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

3 Terms and definitions

For the purpose of this document the terms and definitions given in prEN 13232-1:2020 and the following 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

4 Design process

4.1 General process

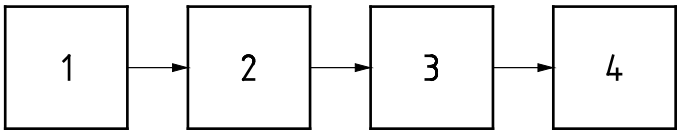
The process for designing switches and crossings is complex owing to the many requirements that apply and the different situations that may occur. Figure 1 gives a schematic representation of the general design process. It separates the whole process into 4 main steps:

— step 1 contains the general design of the S&C. It 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. It leads to the definition of the main aspects of the S&C, respecting the main design requirements. Geometric design is defined in this part; other aspects are dealt with in parts 3 and 4;

— step 2 is the main constructional design process, which specifies the main construction of the S&C. It is based on the technology used by the supplier. It is based mainly on the suppliers' experience and expertise;

— step 3 consists of the detailed design of the individual components. It 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 ENs;

— step 4 is the product acceptance, which is described in Part 9.



Key

1 Step 1: General design

2 Step 2: Main constructional design

3 Step 3: Detailed component design

4 Step 4: Acceptance

Figure 1 — General design process

4.2 Design step details

— Each design step requires sufficient **input data** to enable the design to be completed.

— Input data are dealt with by the supplier through the **design rules**. The rules are defined in EN 13232, Parts 2 to 8.

— The results of the different design steps are **outputs**.

All these aspects are schematically represented for each design step in Annex A, 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 section 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 request the supplier to perform the whole design process and therefore gives all necessary input data to permit the supplier to perform the design.

The customer may also opt to request 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 A customer requests 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 supplier receives from the customer the outputs from geometrical requirements as well as the requirements for wheel-rail interaction, in the form of functional and safety dimensions.

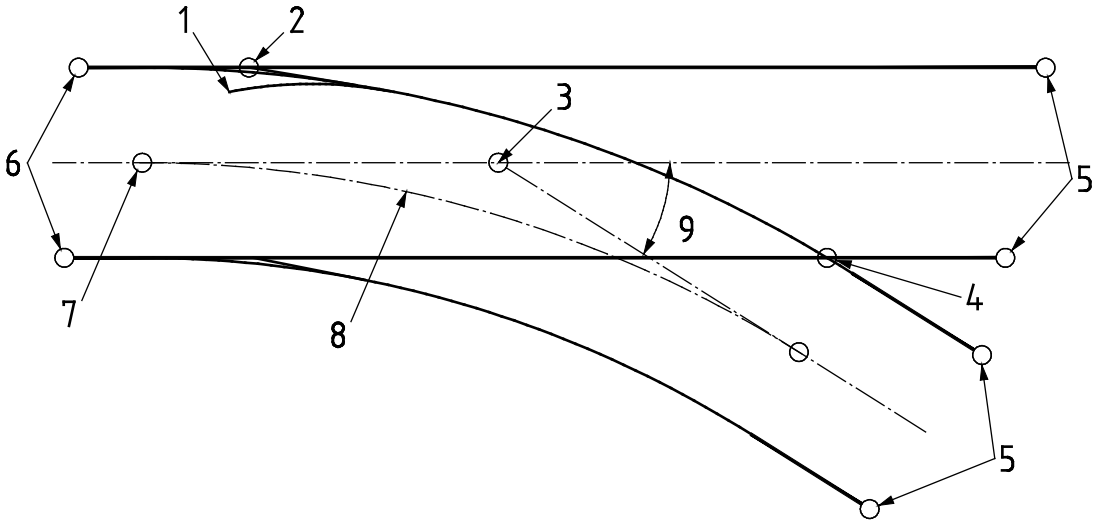
Based on this information and the inputs for both conformity for actuation, locking and detection (ALD) and general requirements, the supplier performs the general and detailed component design.

EXAMPLE 2 A customer requests a supplier to manufacture an S&C layout in accordance with an existing design. The customer delivers a set of detailed drawings to the supplier. The supplier only performs step 4 of the general design process.

5 General design requirements

5.1 Reference points

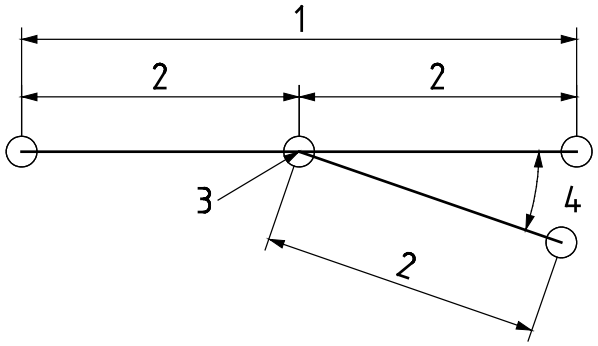
Key reference points relating to turnout geometry and the limits of supply of a turnout are illustrated in Figures 1 and 2.



Key

1 Actual switch toe
2 Mathematical point of switch
3 Tumout intersection
4 Theoretical intersection
5 Limits of supply (heel joints)
6 Limits of supply (front joints)
7 Origin of switch curve
8 Centreline radius
9 Turnout angle

Figure 2 — Key reference points



Key

1 Overall length
2 Tangent length
3 Turnout intersection
4 Turnout angle

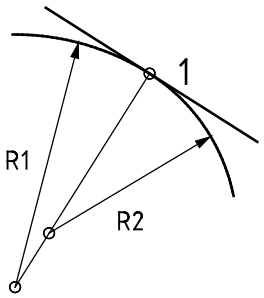
Figure 3 — Setting out diagram

5.2 General tangency rules

At any change in radius the two radii shall be mutually tangential at the running edges. To achieve this, the centres of adjacent curves shall lie on the same radial line (see Figure 3).

Exceptions to the mutual tangency rule may occur. Examples include switch entry angle for intersecting switches or to allow for gauge widening.

Details are given in prEN 13232-3:2020 and prEN 13232-5:2020.



Key

1 Tangent

Figure 4 — Mutual tangency

5.3 Inputs

For a concise definition of the geometry of an assembly of switches and crossings, a minimum amount of basic quantitative information is required. The following items are both necessary and sufficient for such a definition of a turnout.

The following shall be defined by the Customer and numerical values provided to the Supplier. Note that some values may be different from those for plain line:

— track gauge;

— speed;

— maximum lateral acceleration or cant deficiency;

— maximum rate of change of lateral acceleration or cant deficiency;

— turnout intersection point and angle (see Figure 4);

— limits of supply (front joints, heel joints);

— gauge widening (if any);

— abrupt change of cant deficiency;

— vehicle length.

For a crossover or junction, in addition, the following shall be defined by the Customer and provided to the Supplier:

— distance between main line track centrelines.