



SLOVENSKI STANDARD
oSIST prEN 16273:2011
01-julij-2011

Železniške naprave - Zgornji ustroj - Prekovane prehodne tirnice

Railway applications - Track - Forged rail transitions

Bahnanwendungen - Oberbau - Geschmiedete Schienenübergänge

Applications ferroviaires - Voie - Rails forgés

Ta slovenski standard je istoveten z: prEN 16273

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ICS:

45.080	Tračnice in železniški deli	Rails and railway components
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EUROPEAN STANDARD
NORME EUROPÉENNE
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ICS 93.100

English Version

Railway applications - Track - Forged rail transitions

Applications ferroviaires - Voie - Rails forgés

Bahnanwendungen - Oberbau - Geschmiedete
Schienenübergänge

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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
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EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (prEN 16273:2011) 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.

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Introduction

This standard has 3 main topics:

- requirements of a forged part;
- procedure approval;
- forged rail production following approval.

This standard satisfies the needs of the railway authority and the manufacturer shall achieve the specified requirements of this standard.

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1 Scope

This European Standard specifies the requirements for the approval of a process wherein a rail of one profile has part of its length forged to a different profile, together with the requirements for subsequent forging production and product acceptance. The standard applies to new Vignole rails according to EN 13674-1 and EN 13674-2, to be welded or fish plated to make up switch rails or transition rails intended for use on railway infrastructures.

2 Normative references

The following referenced documents are indispensable for the application 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 571-1, *Non destructive testing – Penetrant testing – Part 1: General principles*

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

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 ISO 6507-1, *Metallic materials – Vickers hardness test – Part 1: Test method (ISO 6507-1)*

EN ISO 9934 series, *Non-destructive testing – Magnetic particle testing (ISO 9934 series)*

3 Terms and definitions

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

3.1

manufacturer

company that produces forged switch and transition rails

3.2

purchaser

buyer of the forged switch or transition rails in accordance with the requirements of the railway authority

3.3

railway infrastructure

permanent way of national or private railways

3.4

specimen

portion detached from a forged rail transition and prepared as required for testing

3.5

profile finishing

operation by which the rail or relevant part of the component is returned to required profile

NOTE This operation can be by grinding, milling, planing or any other suitable means.

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3.6

finished condition

finished component

3.7

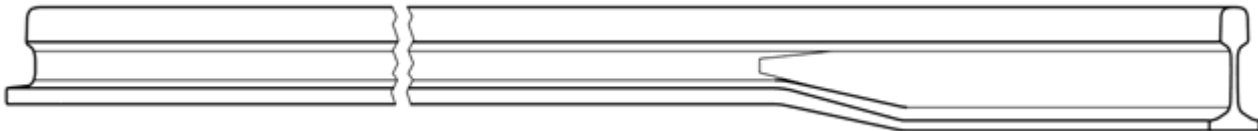
railway authority (RA)

either the railway regulator or the owner of the railway infrastructure or the custodian with a delegated responsibility for a railway infrastructure

3.8

flexible switch

the switch rail in the movable area of the switch is made of one profile only. This can be either a standard rail profile or a special profile



3.9

spring rail switch

the switch rail in the movable area of the switch is made of two different profiles. The transition and the weld between one to the other profile takes place in the movable part of the switch rail and can be either a standard rail profile or a special profile

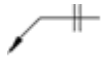
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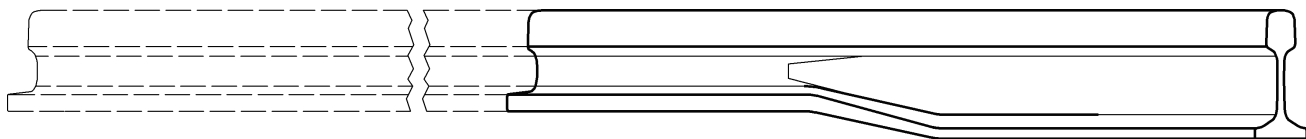


Flash butt weld

3.10

forged part for switches

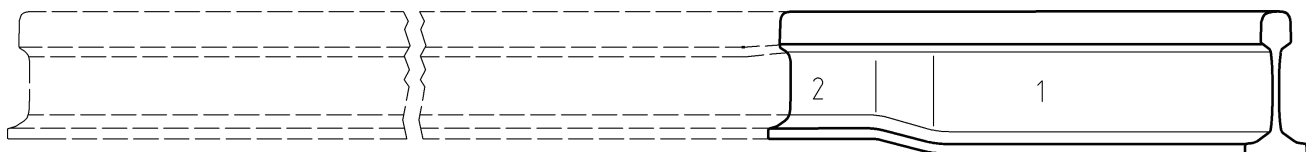
the forged part is the end section of a switch rail with the transition. It is made of one profile only



3.11

transition rail

part of a symmetrical vignole rail profile 1 forged to another symmetrical vignole rail profile 2



3.12

heat affected zone (HAZ)

part of the rail heated to a temperature affecting the hardness

4 Information to be supplied for approval

4.1 By the purchaser

The following information shall be supplied by the purchaser, agreed with the manufacturer and shall be fully documented:

- a) the initial and final rail profiles, length of the switch rail or transition rail and geometrical requirements of the rail transition;
- b) the rail grade;
- c) the profile class of the rail leg-end extension as specified in EN 13674-1 and EN 13674-2.

4.2 By the manufacturer

The following information shall be supplied by the manufacturer, agreed with the purchaser and shall be fully documented:

- a) a drawing of the switch or transition rail.

5 Approval of the manufacturer

The manufacturer shall operate an independently approved and audited quality assurance system, e.g. conforming to the requirements of EN ISO 9001 or other approval accepted by the purchaser.

6 Requirements for the forging process

6.1 General

All heating, forging and cooling shall be carried out in a controlled process.

6.2 Forging parameters

The forging process and any post heat treatment, including the working ranges, shall be determined during procedural trials and once approval has been granted. They shall not be changed without prior purchaser approval.

The parameters shall be monitored and checked against approval limits. These records shall be referenced to the relevant products.

6.3 Post heat treatment

Post heating or controlled post cooling may be required.

6.4 Profile finishing

The finishing shall be carried out in the longitudinal direction using machining and optionally additional grinding. The roughness limit shall be 6,3 Ra.

The profile finishing shall not cause any thermal or mechanical damage. The rail profile in the wheel contact area shall be maintained during profile finishing.

prEN 16273:2011 (E)**6.5 Cutting to length**

The switch rails shall be cut square, in accordance with Table 10 in EN 13674-1, to the requested length. Burrs shall be removed from all edgings. Flame cutting is not allowed for the final cut.

6.6 Identification

The identification shall permit traceability to production records. Every forged rail blank shall be encoded by:

- the sign of the manufacturer;
- the year of manufacturing;
- the identification number for the forged part.

The identification shall permit the traceability of the product for at least the guarantee period.

7 Procedure approval**7.1 General**

Procedure approval tests shall be done for the production of switch and transition rails by the manufacturer as described in chapter 7 of this standard. For grade R260 rails, approval is granted by grade (not per profile). For grade R350HT rails, approval is granted by grade (not per profile) and by rail manufacturer.

Procedure approval shall be carried out by testing samples produced in accordance with this standard; the samples shall be representative of those carried out in production. One failure during the approval tests described in 7.4 and 7.5 involves the rejection of the approval.

Refer to 7.7 for re-qualification requirements.

7.2 Test specimen preparation

The test specimens shall be produced and inspected by the same method used for production pieces.

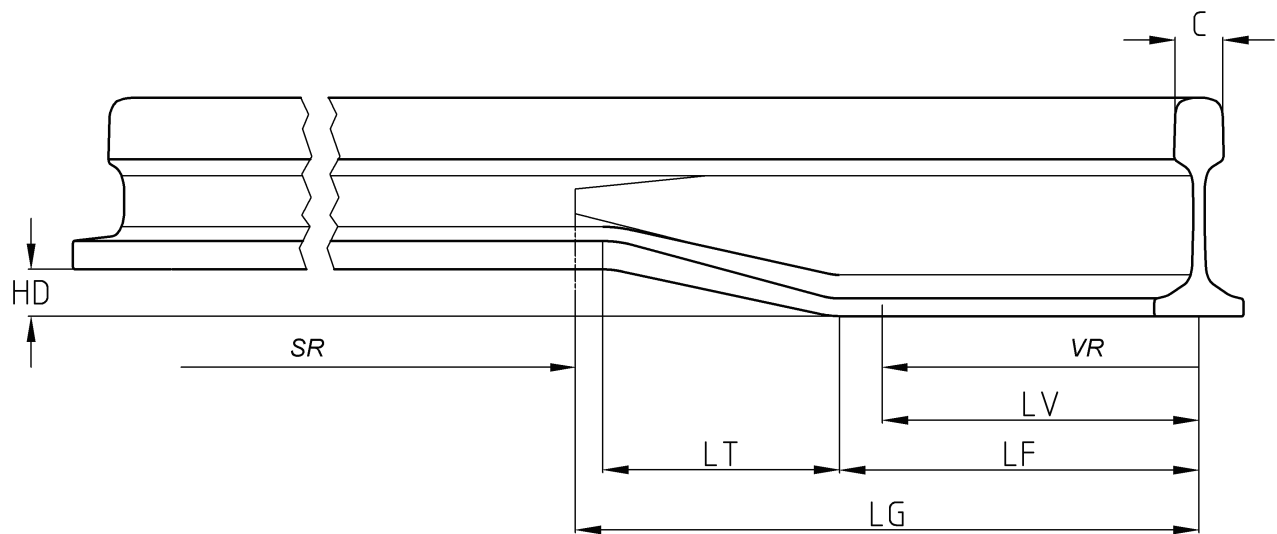
7.3 Number of specimens

Four test specimens in the finished condition (see 3.6) shall be manufactured.

7.4 Non-destructive approval tests**7.4.1 Geometry and dimensions****7.4.1.1 Switch rails**

The dimension of the forged rail head and the profile of the vignole rail at the heel of the switch rail shall comply with the tolerances in Table 1.

Figure 1 indicates the parts of the forged rail that shall be checked according to Table 1.

**Key**

SR switch rail
 VR vignole rail

Figure 1 — Dimensions of forged switch rail
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Table 1 — Length and tolerances for the forged switch rail

Dimension	Length [mm]	Measurement equipment
length of the forged rail transition LT	Minimum 3 x HD	measuring stick, tape or gauge
Dimension	Admissible tolerance [mm]	Measurement equipment
Length of the forged vignole part, when delivered without weld, measured on the foot LF	± 20	measuring stick, tape or gauge
LG	± 20	measuring stick, tape or gauge
Length of the vignole part measured in the web LV	± 20	measuring stick, tape or gauge
Vertical alignment across the running surface along the longitudinal centre line starting at the forged rail end until 1500 mm, measured by moving a 1 m straight edge and a thickness gauge.	- 0,1 / + 0,2	1 m straight edge and a thickness gauge
Horizontal alignment on the running edge at 14 mm below the running surface, starting at the forged rail end until 1500 mm measured by moving a 1 m straight edge and a thickness gauge.	± 0,4	1 m straight edge and a thickness gauge
Head profile concavity (EN 13232-5, Figure 18) HC	An area of concavity may exist only on the opposite of the running edge. This shall not exceed 2 mm	1 m straight edge and a thickness gauge
Vertical twist (twist base length 1 m)	± 0,5	method agreed between the manufacturer and the purchaser
Head profile C	+0,6 / -0,3	gauge E.4 according to EN 13674-1 dependent of the rail profile
Height difference from one rail foot to the other rail foot (Figure 1) HD	± 1,1	method agreed between the manufacturer and the purchaser
NOTE Other measuring methods can be used but in case of dispute, the equipment described above shall be used.		

Other tolerances for the vignole profile shall be in accordance with EN 13674-1, Table 8 profile class X.

Figure 2 shows the definitions of the algebraic sign in the alignment measurement.