SLOVENSKI STANDARD
SIST EN 14587-1:2019

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Nadomešča:
SIST EN 14587-1:2007

Železniške naprave - Infrastruktura - Elektrouporovno varjenje novih tirnic - 1. del: Varjenje tirnic kakovosti R220, R260, R260Mn, R320Cr, R350HT, R350LHT, R370CrHT in R400HT v varilnici

Railway applications - Infrastructure - Flash butt welding of new rails - Part 1: R220, R260, R260Mn, R320Cr, R350HT, R350LHT, R370CrHT and R400HT grade rails in a fixed plant

Bahnanwendungen - Infrastruktur - Abbrennstumpfschweißen von Schienen - Teil 1: Schweißen neuer Schienen der Stahlsorte R220, R260, R260Mn, R320Cr, R350HT, R350LHT, R370CrHT und R400HT in einer stationären Anlage

Applications ferroviaires - Voie - Soudage des rails neufs par étincelage - Partie 1 : R220, R260, R260Mn, R320Cr, R350HT, R350LHT, R370CrHT et R400HT dans une installation fixe

Ta slovenski standard je istoveten z: **EN 14587-1:2018**

ICS:

25.160.10	Varilni postopki in varjenje	Welding processes
45.080	Tračnice in železniški deli	Rails and railway components
93.100	Gradnja železnic	Construction of railways

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EUROPEAN STANDARD

NORME EUROPÉENNE

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English Version

Railway applications - Infrastructure - Flash butt welding of new rails - Part 1: R220, R260, R260Mn, R320Cr, R350HT, R350LHT, R370CrHT and R400HT grade rails in a fixed plant

Applications ferroviaires - Infrastructure - Soudage des rails neufs par étincelage - Partie 1: Rails de nuances R220, R260, R260Mn, R320Cr, R350HT, R350LHT, R370CrHT et R400HT dans une installation fixe

Bahnanwendungen - Infrastruktur - Abbrennstumpfschweißen von Schienen - Teil 1: Schweißen neuer Schienen der Stahlsorte R220, R260, R260Mn, R320Cr, R350HT, R350LHT, R370CrHT und R400HT in einer stationären Anlage

This European Standard was approved by CEN on 17 September 2018.

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

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European foreword

This document (EN 14587-1:2018) 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 June 2019, and conflicting national standards shall be withdrawn at the latest by June 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 14587-1:2007.

This document is one of a series of three parts of the EN 14587 series:

— *Railway applications – Infrastructure - Flash butt welding of new rails – Part 1: R220, R260, R260Mn, R320Cr, R350HT, R350LHT, R370CrHT and R400HT grade rails in a fixed plant*;

— *Railway applications – Track - Flash butt welding of rails – Part 2: New R220, R260, R260Mn and R350HT grade rails by mobile welding machines at sites other than a fixed plant*;

— *Railway applications – Track - Flash butt welding of rails – Part 3: Welding in association with crossing construction*.

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.

Introduction

This part of EN 14587 has five main topics:

a) requirements of a welding process;

b) procedure approval for a fixed plant;

c) approval of other rail profiles or grades;

d) approval of welding contractor;

e) weld production following approval.

1 Scope

This document specifies requirements for the approval of a welding process in a fixed plant, together with the requirements for subsequent welding production.

It applies to new Vignole railway rails R220, R260, R260Mn, R320Cr, R350HT, R350LHT, R370CrHT and R400HT grade rails of 46 kg/m and above, as contained in EN 13674-1, welded by a flash butt welding process in a fixed plant and intended for use on railway infrastructure.

This document applies to the welding of rails into welded strings.

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

EN ISO 3452-1, *Non-destructive testing — Penetrant testing — Part 1: General principles (ISO 3452-1)*

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

EN ISO 7500-1:2018, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system (ISO 7500-1:2018)*

EN ISO 17638, *Non-destructive testing of welds — Magnetic particle testing (ISO 17638)*

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

3.1
as-welded condition
rails that have been welded and trimmed only

3.2
contractor
company approved by a railway authority to provide staff and machinery to execute the production of flash butt welds in a fixed plant, which may include staff and machinery from within the railway authority

3.3
die burn
damage caused by localized overheating (arcing) on the surface of the rail due to poor contact between the rail and electrode during welding

3.4
dressing
removing trimmed upset by grinding or other similar process

3.5
finished condition
welded, trimmed and rail head profile finished

3.6
fixed plant
stationary production line for flash butt welding of rails

3.7
flat spot
process driven discontinuity shown after the slow bend test on the weld fracture face, which has a small lens like shape

Note 1 to entry: In a vertical longitudinal section (macro) it appears elliptical in shape.

3.8
lack of bond
area of incomplete fusion between the rails at the fusion line

Note 1 to entry: This may appear crack like or as a line discontinuity at the interface either on the surface after removal of the upset or in a weld macro section.

3.9
profile finishing
operation by which the rail head or relevant part of the rail head at the weld is restored to rail profile

Note 1 to entry: The operation can be by grinding, milling, planing or any other suitable means.

3.10
purchaser
purchaser of the welds

3.11
railway authority
either the railway regulator or the owner of the railway infrastructure or the custodian with a delegated responsibility for a railway infrastructure

3.12
trimmed upset
metal remaining around the rail profile following the shearing process

3.13
trimming
removal of upset

3.14
upset
metal extruded around the rail profile as a result of forging

3.15
welded string
long rail comprising of a number of shorter rails welded together

3.16
welding process
part of the sequence from the selection of the rail prior to welding through to the finishing of the welded string

4 Requirements for the welding process

4.1 General

All welding shall be carried out on a flash butt welding machine using an automatic, programmed welding sequence.

4.2 Rail end preparation and horizontal alignment requirements

The rail ends shall always be sawn or disc cut to the tolerances specified by the purchaser. Areas of electrical contact on the rails and the machine shall be cleaned to bright metal to give a consistent and good electrical contact at the interface.

The rail shall not be damaged by the cleaning operation or through poor electrical contact.

Rails of the same profile shall be positioned in the welding machine such that the welding interface is central to the contact electrodes as assessed by visual or mechanical means.

Before welding, rails shall be aligned laterally to the required rail face or edge, i.e. left, or right, or to the rail centreline.

For reasons of asymmetry rails may be welded with the brand marks on the same side throughout the welded string.

4.3 Clamping force

Rails shall be secured in the flash butt welding machine by a clamping arrangement. The clamping force that is exerted on the rails shall not damage in such a way that subsequent cracking in the rail is generated, see 5.4.1.

4.4 Pre-heating

For the pre-heating, the rail ends shall progress uniformly in a reversible or a continuous process, and perpendicular to the running surface during the whole welding cycle.

4.5 Final flashing

Once initiated the final flashing shall be continuous.

4.6 Upsetting

Upsetting shall immediately follow final flashing. Sufficient forging pressure shall be applied to ensure that voids are closed and oxides are expelled such that they are kept to a minimum at the weld interface. The weld interface shall extend into the upset.

4.7 Unclamping

In order to maintain the alignment, the time between completion of forging and unclamping shall be a minimum of 4 s.

4.8 Slippage

Clamping force shall be maintained to avoid any movement between the contact dies and rails.

4.9 Welding parameters

1) The welding machine and/or management system equipment shall be capable of displaying the following:

   a) programme identification and setting details;

   b) welding current;

   c) upset force or pressure;

   d) displacement;

   e) welding time;

   f) limits/range of the main welding parameters.

2) The welding parameters shall be determined during procedural trials and, once approval has been granted, shall not be changed, with the exception of changes concerning the environments in 4.9, 4).

3) The welding parameters shall be monitored and recorded. These records shall be referenced to the appropriate welds.

4) Due to extreme variations in seasonal temperatures, the contractor may request from the railway authority the use of an alternative welding program. A bending test according to 5.4.5 shall be carried out in this case.

4.10 Steps across the weld

— Any step between the rails across the weld in the trimmed but not dressed condition shall not exceed those dimensions shown in Table 1.

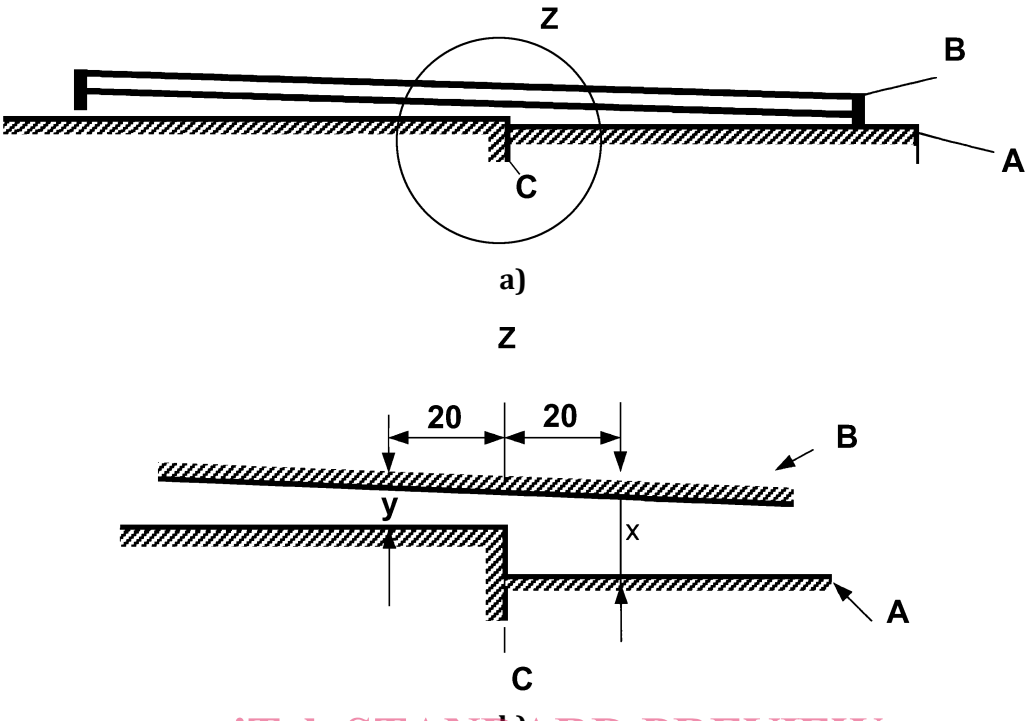
— Checks shall be made at a position 20 mm on each side of the weld upset centreline using a 1 m nibbed straight edge and feeler shims as shown in Figure 1. An alternative step measurement gauge may be used as shown in Figure 2.

Table 1 — Maximum permitted steps

Position of step on the rail	Maximum permitted step (in millimetres)
Vertically on the longitudinal centreline of the running surface	0,5
Horizontally on the aligned face or edge (14 ± 1) mm below the running surface	0,5
Horizontally on the edge of the rail foot	2,0

Where the step arises from the rail dimensions the rail foot tips may be dressed locally to achieve this requirement.

Dimensions in millimetres



Key

A running surface
B nibbed straight edge
C weld upset centreline
Z detail view of the step

NOTE Step = [x-y] mm.

Figure 1 — Measurement of the step with nibbed straight edge