SLOVENSKI STANDARD
SIST EN 15689:2012

01-september-2012

Železniške naprave - Zgornji ustroj - Kretnice in križišča - Lita srca iz manganovega jekla z avstenitno strukturo

Railway applications - Track - Switches and crossings - Crossing components made of cast austenitic manganese steel

Bahnanwendungen - Oberbau - Weichen und Kreuzungen - Gegossener austenitischer Manganstahl für Herzstückbauteile

Applications ferroviaires - Voie - Appareils de voie - Coeurs ou composants de coeur en acier moulé au manganèse

Ta slovenski standard je istoveten z: **EN 15689:2009**

ICS:

93.100	Gradnja železnic	Construction of railways

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EUROPEAN STANDARD

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EN 15689

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English Version

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This European Standard was approved by CEN on 10 October 2009.

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

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Foreword

This document (EN 15689:2009) 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of an identical text or by endorsement, at the latest by May 2010, and conflicting national standards shall be withdrawn at the latest by May 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This European Standard is complementary to the series of standards EN 13232 “*Railway applications — Track — Switches and crossings*”, which covers the design and quality of switches and crossings in flat bottomed rail.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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 the United Kingdom.

1 Scope

The scope of this European Standard is:

— to establish material requirements for cast austenitic manganese steel for fixed crossings and cradles for crossings with moveable parts designed to be welded or bolted to rails;

— to formulate codes of practice for inspection, testing of un-machined and machined heat-treated castings;

— to list the methods by which crossings should be identified and traced;

— to define limits of weld rectification by the supplier;

— special requirements for pre-hardened crossings.

Geometrical aspects, as machining tolerances and inspection of finished crossings are covered in EN 13232-6 and EN 13232-7 and therefore not in this European Standard.

This European Standard specifies the minimum requirements for cast manganese crossing components. Special applications (for instance tram systems) can require different demands in certain paragraphs and need to be agreed between customer and supplier.

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 444:1994, *Non-destructive testing — General principles for the radiographic examination of metallic materials using X- and gamma-rays*

EN 462-3:1996, *Non-destructive testing — Image quality of radiographs — Part 3: Image quality classes for ferrous metals*

EN 473:2008, *Non destructive testing — Qualification and certification of NDT personnel — General principles*

EN 571-1, *Non destructive testing — Penetrant testing — Part 1: General principles*

EN 1370, *Founding — Surface roughness inspection by visual/tactile comparators*

EN 1371-1, *Founding — Liquid penetrant inspection — Part 1: Sand, gravity die and low pressure die castings*

EN 10204, *Metallic products — Types of inspection documents*

EN 13232-1:2003, *Railway applications — Track — Switches and crossings — Part 1: Definitions*

EN 13232-6:2005, *Railway applications — Track — Switches and crossings — Part 6: Fixed common and obtuse crossings*

EN 13232-7:2006, *Railway applications — Track — Switches and crossings — Part 7: Crossings with moveable parts*

EN ISO 11970, *Specification and approval of welding procedures for production welding of steel castings (ISO 11970:2001)*

ISO 8062, *Castings — System of dimensional tolerances and machining allowances*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in 7.4 and 7.5 of EN 13232-1:2003, 3.1 of EN 13232-6:2005, Clause 4 of EN 13232-7:2006 and the following apply.

3.1
weldable crossing
crossing with rail ends suitable for welding into track

3.2
fishplated crossing
crossing with rail ends suitable for mechanical joints

3.3
pre hardened
contact area and running table which is intentionally hardened prior to installation in track

3.4
chaplet
metallic core support that remains in finished part

3.5
customer
operator or user of the equipment, or the purchaser of the equipment on the user's behalf

3.6
supplier
body responsible for the use of the EN in response to the customer's requirements

4 Quality systems

The supplier responsible for the manufacture of the crossing shall be certified by an accredited third party and have an audited quality system or shall have a quality system approved by the customer.

5 Sample approval

The suitability of the pattern design, mould preparation procedures, casting conditions and heat treatment procedures shall be demonstrated by producing prototype casting for every new pattern.

Sample approval by the supplier is necessary for every new pattern. Any subsequent modifications in the manufacturing process, which may influence the quality of the components, shall be the responsibility of the cast foundry to test and record. The customer shall have the right to have access to these records.

All tests according to Clause 7 shall be performed for sample approval. However, radiography may be dispensed with by the customer, in which case this shall be specified in the tender documents.

6 General requirements

6.1 Materials (liquid chemistry)

Table 1 — Materials (liquid chemistry)

Element	Percentage weight components Weight %
Carbon	0,95 to 1,3 [a]
Silicon	0,65 max.
Manganese	11,5 to 14,0 [a]
Phosphorus	0,050 max.
Sulphur	0,030 max.
Nickel	1,75 max.
Molybdenum	0,75 max.
Chromium	0,50 max.
Copper	0,30 max.
Aluminium	0,045 max.
[a] Manganese shall not be less than 10 times the carbon content.	

Other alloying elements shall not be added.

6.2 Microstructure

Crossing shall have an austenitic microstructure and be free of detrimental carbide precipitation. To prove the as-cast carbidic structure has changed to an acceptable austenitic structure this shall be demonstrated by metallographic examination or mechanical testing (see Clause 7).

6.3 Surface conditions

6.3.1 Un-machined and heat treated surfaces

The minimum level of surface finish shall be as specified in Table 2 with the relevant SCRATA comparators (refer to EN 1370).

Table 2 — Inspection zones

Inspection zone	Ai	Aii	Aiii	Bi	Bii	Biii
Surface finish	A2	A2	A3	A2	A2	A4
Surface inclusions	B2	B2	B4	B2	B2	B5
Gas porosity	C2	C2	C3	C2	C1	C4
Laps and cold shuts	D1	D1	D2	D2	D1	D5
Scabs	E3	E3	E5	E3	E3	E5
Welds	J1	J1	J1	J1	J1	J1

6.3.2 Definition of surface zones

The definition of surface zones is as shown in Figure 1.

Dimensions in millimetres

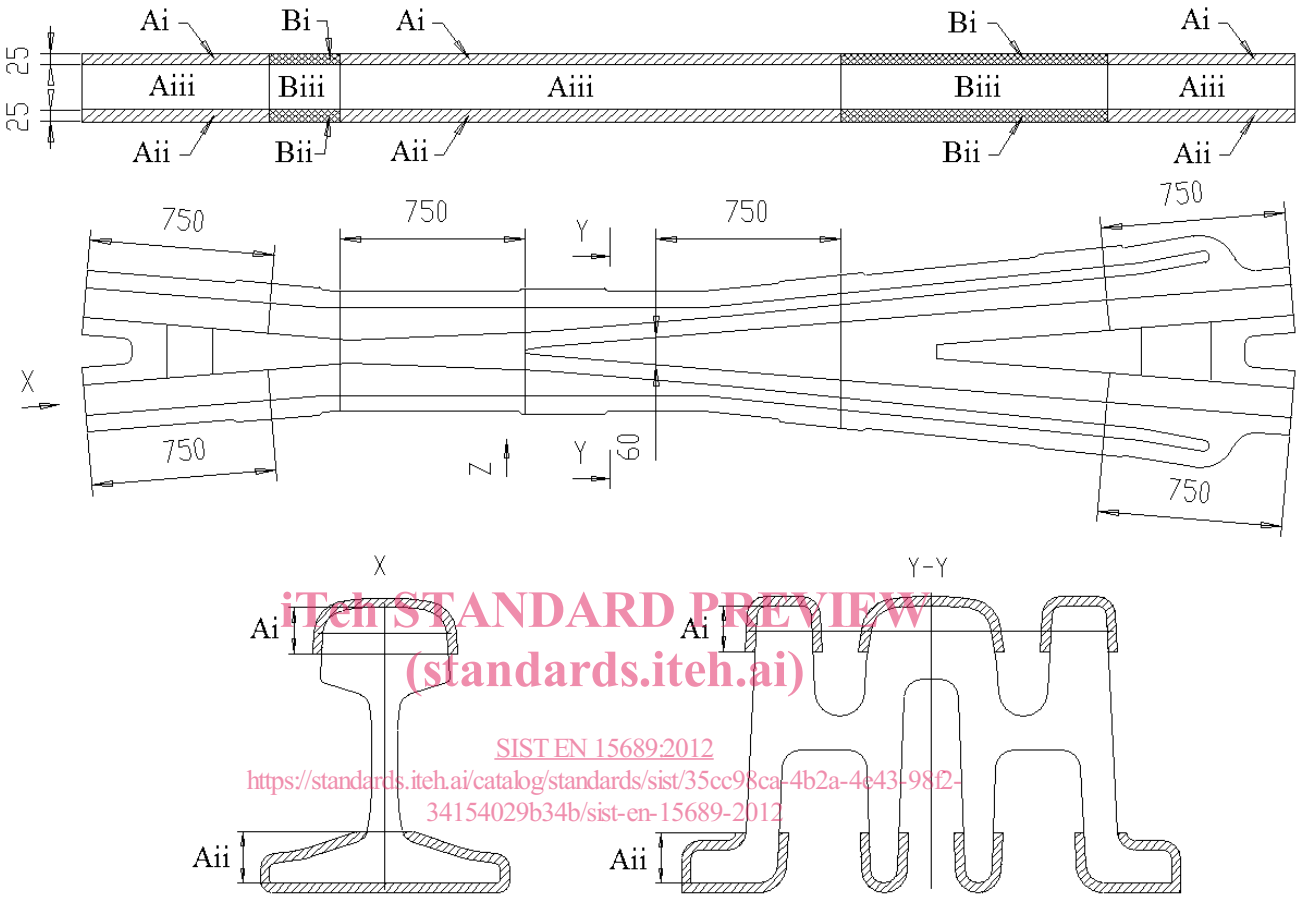


Figure 1 — Definition of surface zones

6.3.3 Machined surfaces

The maximum levels of arithmetical roughness are:

— wheel contact area: Ra 6,3 µm;

— surfaces without wheel contact: Ra 12,5 µm;

— fishplate areas: Ra 6,3 µm.

6.3.4 Tolerances

Dimensions of non-machined areas of the casting areas shall comply with tolerances given by ISO 8062 – CT11 unless otherwise agreed between the customer and supplier.

Dimensional tolerances for machined castings shall be referenced on detail drawings for the crossing component. Basic dimensional requirements are given in EN 13232-6 and EN 13232-7.

6.4 Internal soundness

6.4.1 General

Check all zones on sample castings over the full length, using radiography according to 7.6.1.

6.4.2 Definition of zones and acceptance levels

If the customer requires different quality levels than those stated in the table below, they shall be agreed at the time of tender.

In areas with greater width additional radiographs may be taken to determine the location of indications where possible.

Acceptance levels according to ASTM E446, ASTM E280 and ASTM E186 for the zones of test are illustrated in Figures 2 to 6 and Table 3.

Table 3 — Inspection zone

Zone	Location	Acceptance level	See Figure
Zone 1	running surface and rail weldable endpieces	A1 – B1 – C1	2, 3, 4, 6
Zone 2	under running surface on the nose up to 60 mm nose width	A3 – B3 – C3	2, 3
Zone 3	below Zone 1; wing rail limited by a distance of 400 mm from theoretical point towards wing front rearwards up to the end of the running surface	A3 – B3 – C3	3
Zone 4	changes of section (below Zone 1)	A3 – B3 – C3	2, 5
Zone 5	web of the leg ends of fishplated crossings for the whole length of the fishplate	A3 – B3 – C3	6
Rest	all other zones of the crossing	A3 – B3 – C4	All
A = Gas porosity B = Inclusions (sand and slag) C = Shrinkage			

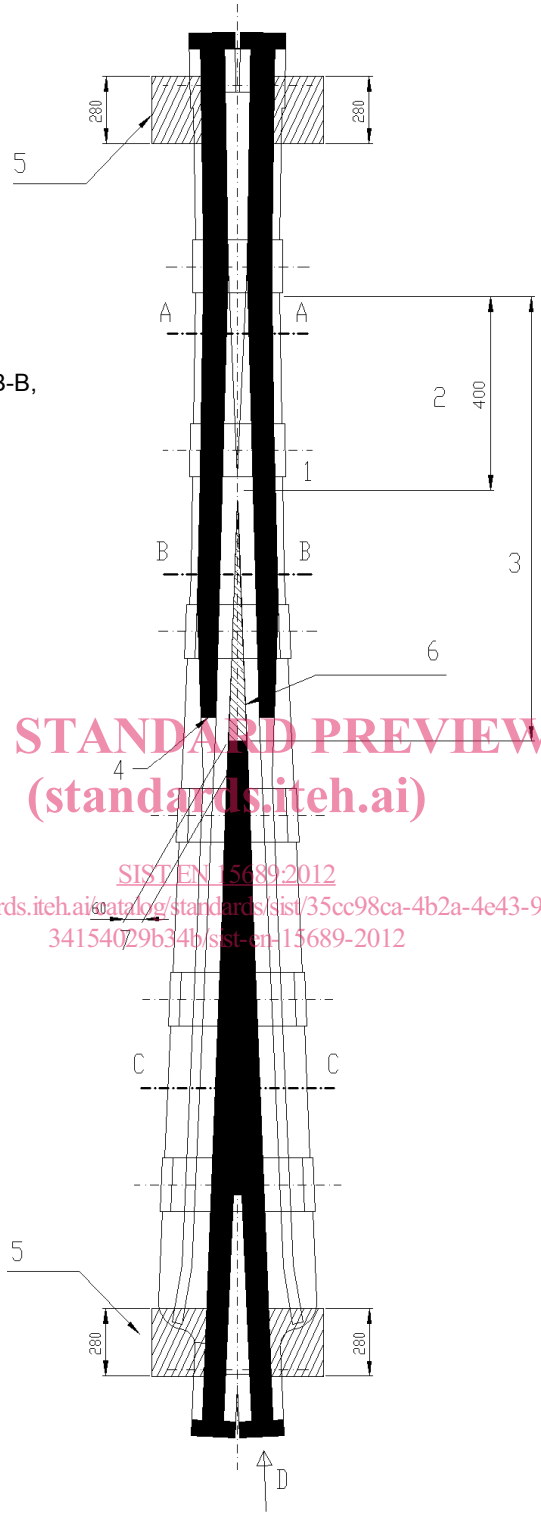
The minimum depths of the different zones are post machining.

Dimensions in millimetres

NOTE 1 For section A-A and B-B, see Figure 3.

NOTE 2 For section C-C, see Figure 4.

NOTE 3 For view on D, see Figure 6.



Key

1 theoretical point rearwards
2 theoretical point toward wing front
3 wheel transfer area
4 end of running table
5 zone 4
6 zone 2 under zone 1
7 thickness of vee measured at 14 mm below running surface

Figure 2 — Crossing