

# SVENSK STANDARD

## SS-EN 15085-4:2007

Fastställt/Approved: 2007-11-05

Publicerad/Published: 2007-12-03

Utgåva/Edition: 1

Språk/Language: engelska/English

ICS: 25.160.10; 45.060.10

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### **Järnvägar – Svetsning av järnvägsfordon och -komponenter – Del 4: Tillverkningskrav**

### **Railway applications – Welding of railway vehicles and components – Part 4: Production requirements**



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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 15085-4**

October 2007

ICS 45.060.01; 25.160.10

English Version

## Railway applications - Welding of railway vehicles and components - Part 4: Production requirements

Applications ferroviaires - Soudage des véhicules et des composants ferroviaires - Partie 4: Exigences de production

Bahnanwendungen - Schweißen von Schienenfahrzeugen und -fahrzeugteilen - Teil 4: Fertigungsanforderungen

This European Standard was approved by CEN on 18 August 2007.

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## Foreword

This document (EN 15085-4:2007) 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of an identical text or by endorsement, at the latest by April 2008, and conflicting national standards shall be withdrawn at the latest by April 2008.

This series of European Standards EN 15085 "Railway applications – Welding of railway vehicles and components" consists of the following parts:

- Part 1: General
- Part 2: Quality requirements and certification of welding manufacturer
- Part 3: Design requirements
- Part 4: Production requirements
- Part 5: Inspection, testing and documentation

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## **Introduction**

Welding is a special process in the manufacture of railway vehicles and their parts. The required provisions for this process are laid down in the standards series EN ISO 3834. The basis of these provisions are the basic technical welding standards in respect of the special requirements for the construction of railway vehicles.

This standard is aimed at defining the terms of enforcement applicable to European Standards, it should not be construed as a substitute to these standards.

This standard can also be used by internal and external parties, including certification bodies, to assess the organisation's ability to meet customer, regulatory and the organisation's own requirements.



## 1 Scope

This series of standards applies to welding of metallic materials in the manufacture and maintenance of railway vehicles and their parts.

This part of the series describes the production requirements (i.e. preparation and execution) of the welding work.

## 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 287-1, *Qualification test of welders – Fusion welding – Part 1: Steels*

EN 1011 (all parts), *Welding – Recommendations for welding of metallic materials*

EN 10204:2004, *Metallic products – Types of inspection documents*

EN 13479, *Welding consumables – General product standard for filler metals and fluxes for fusion welding of metallic materials*

EN 15085-1:2007, *Railway applications - Welding of railway vehicles and components - Part 1: General*

EN 15085-3:2007, *Railway applications – Welding of railway vehicles and components – Part 3: Design requirements*

EN ISO 544, *Welding consumables - Technical delivery conditions for welding filler materials - Type of product, dimensions, tolerances and markings (ISO 544:2003)*

EN ISO 4063:2000, *Welding and allied processes - Nomenclature of processes and reference numbers (ISO 4063:1998)*

EN ISO 9013:2002, *Thermal cutting - Classification of thermal cuts - Geometrical product specification and quality tolerances (ISO 9013:2002)*

EN ISO 9606-2, *Qualification test of welders - Fusion welding - Part 2: Aluminium and aluminium alloys (ISO 9606-2:2004)*

EN ISO 9606-3, *Approval testing of welders - Fusion welding - Part 3: Copper and copper alloys (ISO 9606-3:1999)*

EN ISO 9606-4, *Approval testing of welders - Fusion welding - Part 4: Nickel and nickel alloys (ISO 9606-4:1999)*

EN ISO 9606-5, *Approval testing of welders - Fusion welding - Part 5: Titanium and titanium alloys, zirconium and zirconium alloys (ISO 9606-5:2000)*

EN ISO 14555, *Welding - Arc stud welding of metallic materials (ISO 14555:2006)*

CEN ISO/TR 15608:2005, *Welding - Guidelines for a metallic materials grouping system (ISO/TR 15608:2005)*

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EN ISO 15609 (all parts), *Specification and qualification of welding procedures for metallic materials – Welding procedure specification*

EN ISO 15610 *Specification and qualification of welding procedures for metallic materials - Qualification based on tested welding consumables (ISO 15610:2003)*

EN ISO 15611, *Specification and qualification of welding procedures for metallic materials - Qualification based on previous welding experience (ISO 15611:2003)*

EN ISO 15612 *Specification and qualification of welding procedures for metallic materials - Qualification by adoption of a standard welding procedure (ISO 15612:2004)*

EN ISO 15613, *Specification and qualification of welding procedures for metallic materials - Qualification based on pre-production welding test (ISO 15613:2004)*

EN ISO 15614 (all parts) <sup>1)</sup> *Specification and qualification of welding procedures for metallic materials – Welding procedure test*

EN ISO 15620, *Welding - Friction welding of metallic materials (ISO 15620:2000)*

EN ISO 17652-1, *Welding - Test for shop primers in relation to welding and allied processes - Part 1: General requirements (ISO 17652-1:2003)*

EN ISO 17652-2, *Welding - Test for shop primers in relation to welding and allied processes - Part 2: Welding properties of shop primers (ISO 17652-2:2003)*

### **3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 15085-1:2007 apply.

## **4 Preparation before welding**

### **4.1 Welding planning documents**

#### **4.1.1 General**

Welding planning documents shall be prepared by the manufacturers with the assistance of the recognised welding coordinator Level A for new and converted vehicles and maintenance of rail vehicles (see EN 15085-2). Type, scope and time of the submission and inspection should be agreed between customer and manufacturer.

Welding planning documents may include working plans, welding sequence plans, test planning documents and welding procedure specifications.

#### **4.1.2 Working plans**

For the production of railway vehicles it is necessary to have working plans for the following sub-assemblies:

— bogie (sub-assemblies, assembly);

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1) For railway applications, only EN ISO 15614-1, EN ISO 15614-2, prEN ISO 15614-3, EN ISO 15614-4, EN ISO 15614-7, EN ISO 15614-11, EN ISO 15614-12 and EN ISO 15614-13 are relevant.

- underframe (with sub-assemblies);
- body (side wall, end wall, roof);
- further sub-assemblies with high safety and functional requirements (e.g. cardan shafts, brake cross members, motor housing, hollow shaft drive, drawbar coupling, bogie pivot pin, cross bearer).

#### 4.1.3 Other welding planning documents

For more complicated assemblies welding sequence plans are necessary, e.g. for:

- bogies (bogie bolster, bogie centre plate including bogie pivot pin member, solebar, headstock, bogie pivot pin cross member, traction bar coupling, assembly of solebar and cross member);
- underframe (including cross member, solebar, headstock, bogie pivot pin cross member, traction bar coupling).

Standardised welding sequence plans (that applies for different types of vehicles) are also allowed.

Furthermore, other welding planning documents may be necessary (e.g. tacking sequence plans, repairing plans, test plans, documents for jigs and tools, remarks for protection of labour and health, plans for separating of damaged parts, special instructions for electronic parts). These details shall be determined by the responsible welding coordinator and/or the customer.

#### 4.1.4 Welding procedure specification

For welds with welding performance classes CP A, CP B, CP C1, CP C2 and CP C3, welding procedure specifications according to EN ISO 15609-1 to EN ISO 15609-5, to EN ISO 14555 or to EN ISO 15620 are necessary. For weld performance class CP D this is only necessary if the customer demands it.

Dependent on the weld performance classes according to EN 15085-3, the following evidences are necessary for the welding procedure specification:

- Weld performance class CP A:  
Evidence according to any of the following standards: EN ISO 15614<sup>2)</sup> or EN ISO 15620; EN ISO 15613 only if a WPQR according to EN ISO 15614 exists; for materials with  $R_{eh} > 500$  MPa or fully mechanised welding processes: EN ISO 15614. For the WPQR the acceptance criteria of weld performance class CP A (EN 15085-3:2007, Table 5 and Table 6) shall be fulfilled.
- Weld performance classes CP B, CP C1, CP C2:  
Evidence according to any of the following standards: EN ISO 15613, EN ISO 14555, EN ISO 15620; if necessary for component or the material: EN ISO 15614.
- Weld performance class CP C3:  
Evidence according to any of the following standards: EN ISO 15610, EN ISO 15611, EN ISO 15612, EN ISO 15613, EN ISO 14555, EN ISO 15620; if necessary for component or the material: EN ISO 15614.
- Weld performance class CP D:  
According to the requirements of the customer.

In general, every WPS shall be covered by a WPQR, except for weld performance class CP D unless specified in the contract.

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2) See footnote 1).