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Irish Standard
I.S. EN 13674-4:2006+A1:2009

Railway applications - Track - Rail - Part 4: Vignole railway rails from 27 kg/m to, but excluding 46 kg/m

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 13674-4:2006+A1

November 2009

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Supersedes EN 13674-4:2006

English Version

Railway applications - Track - Rail - Part 4: Vignole railway rails from 27 kg/m to, but excluding 46 kg/m

Applications ferroviaires - Voie - Rail - Partie 4: Rails Vignole de masse comprise entre 27 kg/m et 46 kg/m, 46 kg/m non compris

Bahnanwendungen - Oberbau - Schienen - Teil 4: Vignolschienen mit einer längenbezogenen Masse zwischen 27 kg/m und unter 46 kg/m

This European Standard was approved by CEN on 9 January 2006 and includes Amendment 1 approved by CEN on 22 September 2009.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 13674-4:2006+A1:2009) 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of an identical text or by endorsement, at the latest by May 2010, and conflicting national standards shall be withdrawn at the latest by May 2010.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 document includes Amendment 1, approved by CEN on 2009-09-22.

This document supersedes EN 13674-4:2006.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟦A1⟩ ⟨A1⟧.

This part of EN 13674 is the fourth of the series EN 13674 *Railway applications – Track – Rail* which consists of the following parts:

— Part 1: Vignole railway rails 46 kg/m and above;

— Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above;

— Part 3: Check rails;

— Part 4: Vignole railway rails from 27 kg/m to, but excluding 46 kg/m.

Other standards planned for publication include the following:

— ⟦A1⟩ EN 14587-1 ⟨A1⟧ Railway applications– Track – Flash butt welding of rails – Part 1: New R220, R260, R260Mn and R350HT grade rails in a fixed plant;

— ⟦A1⟩ EN 14587-2 ⟨A1⟧ 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 at a fixed plant;

— prEN 14587-3 Railway applications – Track – Flash butt welding of rails – Part 3: Welding in association with crossing construction;

— ⟦A1⟩ EN 14730-1 ⟨A1⟧ Railway applications – Track – Aluminothermic welding of rails – Part 1: Approval of welding processes;

— ⟦A1⟩ EN 14730-2 ⟨A1⟧ Railway applications – Track – Aluminothermic welding of rails – Part 2: Qualification of aluminothermic welders, approval of contractors and acceptance of welds;

— ⟦A1⟩ EN 14811 ⟨A1⟧ Railway applications – Track – Special purpose rail – Grooved and associated construction;

— ⟦A1⟩ EN 15594 ⟨A1⟧ Railway applications – Track – Restoration of rails by electric arc welding.

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

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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 United Kingdom.

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Introduction

This introduction provides an explanation of the concepts and reasoning used in the drafting of this European Standard. Its inclusion also ensures that during future revisions, restrictions are removed where technology progresses and held where it does not, thus ensuring continued safety as new manufacturers, products and technologies are introduced.

The most commonly used standards of the world for the supply of railway rails have been reviewed during the preparation of this European Standard. However, modern rail production technology within the European Union has demanded a completely new look at the philosophy and content of this part of EN 13674.

Whenever possible this part of EN 13674 is performance based, recognises the European Quality System standard EN ISO 9001 and requires manufacturers to offer the latest proven technology to consistently satisfy the demanding quality of the required product.

Rail grading is based on hardness rather than tensile strength.

The acceptance tests have been designed to control those characteristics of the rail steel and rail that are of relevance to the production of high quality rails and the demands of the railway.

The steel grades covered by this part of EN 13674 reflect trends in railway usage and heat treated rails are included. This European Standard includes rail profiles for Vignole rails having a linear mass from 27 kg/m to, but excluding 46 kg/m.

To ensure the supply of high quality rails, some restrictions on production processes have been imposed.

This European Standard supersedes national standards covered by the scope. In addition CEN required, where possible, a performance based standard, taking into account safety implications and at the same time addressing modern production technology. It was recognised that there would be few opportunities (and these would have to be for transparent safety considerations) for derogation from this European Standard to operate between the user and the manufacturer.

This European Standard reflects this change in philosophy from the traditional content of rail standards. A review was undertaken of the most commonly used rail standards of the world. All relevant aspects important to both user and manufacturer were considered with the aim of ensuring that all of the content had specific usefulness and relevance. For example rail grading and much of this European Standard has been based on hardness rather than tensile strength. Whilst the two are directly related, hardness is very quick and cheap to carry out and provides more relevant guidance to the user particularly where properties vary in different parts of the profile.

Since many rail manufacturers would not have previously carried out proving trials, this European Standard includes a prerequisite for all manufacturers to prove conformity against a set of qualifying test criteria at the time of tendering. The qualifying tests include all “normal” acceptance test results plus new ‘type-casting’ features such as fracture toughness, fatigue and residual stress (see EN 13674-1). To provide users with the necessary confidence, acceptance limits have been based on results from rail known to have performed well in demanding track installations.

One aspect of this European Standard, which is a complete break from tradition, is the inclusion of quality assurance and inspection clause as part of product integrity.

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In order that quality management systems are consistent across all manufacturers and that users have the best assurance for the consistency of required product quality on this safety critical component of the track, the rail standard requires that the manufacturers quality assurance systems are at least equivalent to the requirements of EN ISO 9001. The inclusion of this requirement also reduces the need to incorporate detailed method and calibration descriptions on items such as normal chemical composition determination and the need to define more extensive testing.

Ideally, manufacturing techniques should not be referenced in a product standard. However, some rail attributes are either not known in an exact manner or are not measurable with satisfactory statistical significance. In such cases best practice manufacturing techniques have been included as a last resort. The equipment specified is that which gives the best probability of achieving the required product for use in track. In the future new technology can add to, but preferably will reduce or delete such items.

Examples of areas where the technological state of the art renders the standard less than complete include:

— oxide/oxygen relationships;

— hydrogen test techniques;

— roller straightening effects on residual stresses;

— roller straightening effects on contact scrub;

— measurement and effect of residual stresses throughout the rail.

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1 Scope

This part of EN 13674 specifies flat bottom Vignole railway rails from 27 kg/m to, but excluding 46 kg/m.

Five pearlitic steel grades are specified covering a rail hardness range of 200 HBW to 390 HBW and include non-heat-treated non-alloy steels, non-heat-treated alloy steels and heat-treated non-alloy steels.

There are 13 rail profiles specified in this European Standard, but these may not be available in all steel grades.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

〚A1〉 *deleted text* 〈A1〛

EN 10163-1, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections — Part 1: General requirements*

EN 13674-1:2003, *Railway applications — Track — Rail — Part 1: Vignole railway rails 46 kg/m and above*

EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1:2005)*

〚A1〉 EN ISO 6892-1*, Metallic materials – Tensile testing – Part 1: Method of test at room temperature (ISO 6892-1:2009)* 〈A1〛

3 Terms and definitions

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

3.1
heat
one liquid steel melt tapped out of a converter or electric arc furnace which includes after continuous casting a given number of blooms relating to the weight of the heat and the extension of the mixing zone

NOTE In the case of sequence casting the blooms belonging to the mixing zone should be clearly defined.

3.2
sequence
number of heats, of the same steel grade, which undergo continuous casting in tundishes. Tundishes may be used in parallel if the caster has many strands

3.3
heat treated rail
rail that has undergone accelerated cooling from austenitizing temperature during the metallurgical transformation period

3.4
re-heated rail
all rolled rail that has undergone re-austenitization for heat treatment purposes

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