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Railway applications – Wheelsets and bogies – Product requirements for cast wheels

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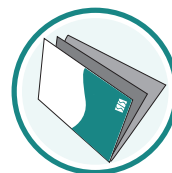
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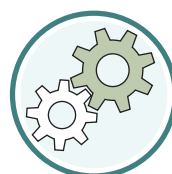
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TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
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CEN/TS 15718

September 2011

ICS 45.040

English Version

Railway applications - Wheelsets and bogies - Product requirements for cast wheels

Applications ferroviaires - Essieux montés et bogies -
Exigences pour roues en acier moulé

Bahnanwendungen - Radsätze und Drehgestelle -
Produktanforderungen für Gussräder

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Foreword

This document (CEN/TS 15718:2011) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

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Introduction

Prior to the publication of this Technical Specification, the only European Standard available to define quality requirements for monobloc wheels was EN 13262, which applies only to forged and rolled wheels. Forging and rolling was the only authorized process to be used by the UIC regulation that was applicable in the recent past for European countries.

Cast wheels are commonly used by AAR networks and have been introduced into Europe on some applications for freight wagons. As a reference document, this standard defines the product requirements of a monobloc cast wheel. In order for a cast wheel to maintain the same level of safety as for a forged and rolled wheel, for the product characteristics, the main content of this document is derived from EN 13262.

This standard addresses a complete definition of the product and delivery procedures for cast wheels by:

a) defining all the wheel characteristics;

NOTE 1 These are either verified during the qualification or for the delivery of the product (see Clause 3).

b) defining qualification procedures (see Annex D);

c) defining delivery conditions (see Annex E).

NOTE 2 A choice is given to the supplier, of either:

- 1) a traditional delivery procedure with a control by batch sampling as in existing documents (see E.4) or;
- 2) delivery procedure using quality assurance concepts (see E.4.6).

1 Scope

This technical standard specifies the characteristics of cast railway wheels for use on European networks.

Two steel grades, C ER7 and C ER8, are defined in this Technical Specification. For tread-braked wheels; only C ER7 is used.

This Technical Specification is applicable to cast wheels which have a chilled rim. The standard is only applicable to cast wheels that have satisfied the technical approval procedure according to CEN/TS 13979-2.

This Technical Specification applies only to wheels used in freight wagon applications for speeds up to and including 120 km/h.

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 13262, *Railway applications — Wheelsets and bogies — Wheels — Product requirements*

EN 10045-1, *Metallic materials — Charpy impact test — Part 1: Test method*

EN ISO 148-1, *Metallic materials - Charpy pendulum impact test - Part 1: Test method (ISO 148-1:2009)*

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

EN ISO 6892-1, *Metallic materials — Tensile testing. Part 1: Method of test at room temperature (ISO 6298-1:2009)*.

ISO 1101, *Geometrical Product Specifications (GPS) – Geometrical tolerancing -- Tolerances of form, orientation, location and run-out.*

ISO 5948:1994, *Railway rolling stock material — Ultrasonic acceptance testing*

ISO 6933:1986, *Railway rolling stock material — Magnetic particle acceptance testing*

ISO/TR 9769¹⁾, *Steel and iron — Review of available methods of analysis*

ISO 14284, *Steel and iron — Sampling and preparation of samples for the determination of chemical composition*

ASTM E 399-90:1990, *Test method for plane-strain fracture toughness of metallic materials*

ASTM E1245, *Standard Practice for Determining the Inclusion or Second-Phase Constituent Content of Metals by Automatic Image Analysis*

SAE J827, *High-carbon cast-steel shot*

SAE J442, *Test strip, holder and gage for shot peening*

SAE J443, *Procedures for using standard shot peening test strip*

1) See also CEN report CR 10261:1995.

SAE J444, *Cast shot and grit size specifications for peening and cleaning*

3 Product definition

When the characteristics of the wheel vary as a result of the casting process, the test pieces shall be taken from the worst-case location. The worst-case location has to be defined during the product qualification process by means of comparative tests in different parts of the wheel (feeder head area, outside feeder head area, intermediate). These defined locations are valid for a given manufacturing process and used for the ongoing production. In the case of a process change, these locations will have to be defined again.

3.1 Chemical composition

3.1.1 Values to be achieved

The maximum percentage contents of the various elements contained within cast wheels shall be as given in Table 1.

Table 1 — Maximum content of various elements within cast wheels

Steel grade	Maximum content										
	%										
	C	Si ^c	Mn	P ^a	S ^{a, b}	Cr	Cu	Mo ^c	Ni	V	Cr + Mo + Ni
CER7	0,52	0,6	0,80	0,020	0,02	0,30	0,30	0,12	0,30	0,06	0,52
CER8	0,56	0,6	0,80	0,020	0,02	0,30	0,30	0,12	0,30	0,06	0,52
NOTE For special applications, variations within the maximum limit of these values may be agreed.											
^a A maximum content of 0,025 % may be agreed at the time of enquiry or order.											
^b A minimum sulfur content may be agreed at the time of enquiry and at the time of order in order to safeguard against hydrogen cracking.											
^c These values exceed those in EN 13262. It shall be ensured that use of these values does not adversely affect the metallurgical structure of the wheel.											

3.1.2 Location of the sample

The sample used for determining the chemical composition shall be taken 15 mm below the tread at its nominal diameter.

3.1.3 Chemical analysis

The chemical composition analysis shall be performed according to methods and definitions that are described in ISO/TR 9769.

3.2 Mechanical characteristics

3.2.1 Tensile test characteristics

3.2.1.1 Values to be achieved

Cast wheels shall have rim and web characteristics of at least the values given in Table 2.