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Railway rolling stock materials

Part 7: Specification for product and technical approval requirements for cast wheels

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 54, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 5892 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 November 2014. It was prepared by Panel RAE/3/-/1, *Wheels and Wheelsets*, under the authority of Technical Committee RAE/3, *Railway rolling stock materials.* A list of organizations represented on this committee can be obtained on request to its secretary.

Information about this document

Text introduced or altered by Corrigendum No. 1 is indicated in the text by the tags [C1] 〈C1〉. Minor editorial corrections are not tagged.

Relationship with other publications

BS 5892 is published in the following parts:

- BS 5892-1, *Railway rolling stock materials – Part 1: Specification for axles for traction and trailing stock*;
- BS 5892-2, *Railway rolling stock materials – Part 2: Specification for forged and rolled wheel centres*;
- BS 5892-3, *Railway rolling stock materials – Part 3: Specification for monobloc wheels for traction and trailing stock*;
- BS 5892-4, *Railway rolling stock materials – Part 4: Specification for forged and rolled tyres*;
- BS 5892-5, *Railway rolling stock material (metric) – Part 5: Specification for steel bars for retaining rings for tyred wheels*;
- BS 5892-6, *Railway rolling stock materials – Part 6: Specification for wheelsets for traction and rolling stock*;
- BS 5892-7, *Railway rolling stock materials – Part 7: Specification for product and technical approval requirements for cast wheels*;
- BS 5892-8, *Railway rolling stock materials – Part 8: Railway applications – Wheelsets and bogies – Powered and non-powered wheelsets with inboard bearings – Product requirements*.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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Introduction

Before the publication of this part of BS 5892, the only standards available to define quality and technical approval requirements for monobloc wheels were BS 5892-3, BS EN 13262 and BS EN 13979-1, which apply only to forged and rolled wheels, and DD CEN/TS 13979-2 and DD CEN/TS 15718, which were published as reference documents for cast wheels.

Cast wheels are commonly used by railways applying the Association of American Railroads (AAR) standards and have been introduced into Europe on some applications for freight wagons. The product and technical approval requirements of this British Standard are derived from BS 5892-3, BS EN 13262 and BS EN 13979-1.

This British Standard provides 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 procedures or for the delivery of the product (see Clause **4**).*

b) defining qualification procedures (see Annex A); and

c) defining delivery conditions (see Annex B).

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 **B.4**); or*

*2) a delivery procedure using quality assurance concepts (see **B.4.6**).*

This British Standard also describes how to assess the wheel design, following the principles of BS EN 13979-1 as set out for cast wheels in DD CEN/TS 13979-2. To be able to apply the specifications, the use of the wheel needs to be defined; this standard also states how to define this use.

At least four aspects are described with different purposes:

- a geometric aspect – to allow interchangeability of different solutions for the same application;
- a thermomechanical aspect for tread braked wheels – to manage wheel deformations and to ensure that braking does not cause wheels to break;
- a mechanical aspect – to ensure that no fatigue cracks occur in the web; and
- an acoustic aspect – to ensure that the solution chosen is as good as the reference wheel, for the use in question.

For each of these three latter aspects, the rules tend to limit the procedure; thus, the easier the objectives are to attain by the wheel under study.

The main content of the technical approval clauses of this standard is derived from BS EN 13979-1 with differences linked to the needs of the cast process for the product as proposed in DD CEN/TS 13979-2.

1 Scope

This British Standard specifies the characteristics of, and technical approval requirements for, cast railway wheels for conventional rail operation. It can be applied in conjunction with BS or BS EN standards for axles and wheelsets. This standard is not applicable to urban rail.

Three steel grades, C48, C56 and C64, are defined in this standard.

NOTE 1 For the purpose of this British Standard, the steels referred to as C48, C56 and C64 are based on those defined as AAR Class L, A and B respectively.

This British Standard is applicable to cast wheels which are rim-chilled and have their wheel webs shot peened.

NOTE 2 'Rim-chilled' is a heat treatment of the rim, the aim of which is to harden the rim and to create compressive residual stresses in the rim.

NOTE 3 Cast wheels are shot peened to improve the web fatigue strength.

The wheels defined in this British Standard are for applications up to 120 km/h (i.e. 75 mph).

It only applies to wheels of new design or new application.

These requirements are intended to be used to assess the validity of the design choice for the proposed use and constitute the technical approval procedure.

This British Standard does not cover assessment of the hub nor of the static mechanical dimensioning of the wheel.

2 Normative references

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ASTM E399-90:1997, *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*

BS EN 13103, *Railway applications – Wheelsets and bogies – Non-powered axles – Design method*

BS EN 13104, *Railway applications – Wheelsets and bogies – Powered axles – Design method*

BS EN 13979-1:2003+A2:2011, *Railway applications – Wheelsets and bogies – Monobloc wheels – Technical approval procedure – Part 1: Forged and rolled wheels*

BS EN ISO 148-1, *Metallic materials – Charpy pendulum impact test – Part 1: Test method*

BS EN ISO 6506-1, *Metallic materials – Brinell hardness test – Part 1: Test method*

BS EN ISO 6506-2, *Metallic materials – Brinell hardness test – Part 2: Verification and calibration of testing machines*

BS EN ISO 6506-3, *Metallic materials – Brinell hardness test – Part 3: Calibration of reference blocks*

BS EN ISO 6892-1:2009, *Metallic materials – Tensile testing – Part 1: Method of test at ambient temperature*