

Steel sleepers

ICS 45.080

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee RAE/2, Railway track components, upon which the following bodies were represented:

- British Precast Concrete Federation
- Confederation of British Forgers
- London Underground Ltd.
- Prestressed Concrete Association
- Railtrack
- Railway Industry Association
- Society of Chemical Industry
- Timber Trade Federation
- UK Steel Association

This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 November 2000

© BSI 11-2000

First published November 1956
Second edition November 2000

The following BSI references relate to the work on this standard:
Committee reference RAE/2
Draft for comment 97/710769 DC

ISBN 0 580 33178 4

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 Normative references	1
3 Information and requirements to be agreed and to be documented	1
3.1 General	1
3.2 Information to be supplied by the purchaser	1
3.3 Information to be supplied by the manufacturer when tendering to supply	2
4 Sleeper dimension	2
5 Type approval tests	2
5.1 Cyclic loading resistance	2
5.2 Lateral resistance	2
5.3 Electrical resistance	2
6 Marking	2
Annex A (informative) Advice on achieving and verifying product consistency	3
Annex B (informative) Estimation of the maximum rail seat reactions and lateral forces	4
Annex C (normative) Cyclic loading test procedure	5
Annex D (normative) Method of determining sleeper lateral resistance	10
Annex E (normative) Method of measuring electrical resistance	11
Annex F (normative) Specification for ballast	12
Bibliography	13
Figure C.1 — Cyclic loading test arrangement	8
Figure C.2 — Detail of thrust arm	9
Figure D.1 — Ballast box dimensions	10
Figure E.1 — Electrical resistance test arrangement	12
Table F.1 — Ballast sizes	12

Foreword

This British Standard has been prepared by Technical Committee RAE/2. It supersedes BS 500:1956, which is withdrawn. The standard differs radically from previous editions in that it is performance based and is intended to provide the supplier with the maximum flexibility in design and manufacture compatible with achieving a consistent and satisfactory service performance.

Extracts from Railtrack Line Specification RT/CE/S/021, *Steel Sleepers*, are used with permission.

Assessed capability. Users of this British Standard are advised to consider the desirability of quality system assessment and registration against BS EN ISO 9001 or BS EN ISO 9002 by an accredited third-party certification body (see annex A).

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 13 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

1 Scope

This British Standard specifies performance requirements for steel sleepers for railway track. It includes definitive requirements relating to the ability of the sleeper to retain track geometry, sleeper durability, electrical resistance, and the control of the production process so that the consistency of the sleeper's performance is assured.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 812-103.1, *Testing aggregates — Part 103: Method for determination of particle size distribution — Section 103.1: Sieve tests.*

BS 812-105.1:1989, *Testing aggregates — Part 105: Methods for determination of particle shape — Section 105.1: Flakiness index.*

BS 812-105.2:1990, *Testing aggregates — Part 105: Methods for determination of particle shape — Section 105.2: Elongation index of coarse aggregate.*

BS 6072:1981, *Method for magnetic particle flow detection.*

BS EN 27888:1993, *Water quality — Method for the determination of electrical conductivity.*

BS EN ISO 7500-1:1999, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system.*

3 Information and requirements to be agreed and to be documented

3.1 General

For compliance with the standard, both the definitive requirements specified throughout the standard and the following documented items shall be satisfied.

3.2 Information to be supplied by the purchaser

3.2.1 Fastening system specified by purchaser

If the purchaser specifies the fastening system to be used, the following information shall be supplied and fully documented:

- a) the rail fastening system to be used (including the rail pad and any insulators) and whether its components are to be supplied with the sleeper;
- b) the nominal track gauge;
- c) the rail profile to be used;
- d) the nominal rail inclination;
- e) the maximum static and dynamic rail seat reactions and the maximum lateral force to be supported (see annex B);
- f) any specific requirements to ensure that installation of the sleepers and track maintenance can be undertaken effectively using the procedures available to the purchaser;
- g) any specific requirements for the packaging and protection of sleepers in transit;
- h) whether an electrical resistance test is required and the minimum resistance to be achieved.

3.2.2 Fastening system not specified by purchaser

If the purchaser does not specify the fastening system to be used, the following information shall be supplied and fully documented:

- a) whether the fastening system is to be supplied with the sleeper as an assembled unit;
- b) the nominal track gauge and the acceptable variation;
- c) the rail profile to be used;
- d) the nominal rail inclination and its acceptable variation;
- e) the maximum static and dynamic rail seat reaction, and the maximum lateral force to be supported (see annex B);
- f) any specific requirements to ensure that installation of the sleepers and track maintenance can be undertaken effectively using the procedures available to the purchaser;
- g) any specific requirements for the packaging and protection of sleepers in transit;
- h) whether an electrical resistance test is required and the minimum resistance to be achieved.

3.3 Information to be supplied by the manufacturer when tendering to supply

The following information shall be supplied by the manufacturer and fully documented:

- a) a dimensioned and toleranced drawing of the sleeper that is to be supplied;
 - b) the sleeper mass;
 - c) a statement of how the manufacturer will ensure that all sleepers meet the requirements of this specification. Sufficient detail, including the grade of steel, shall be provided to enable the purchaser or a third party to verify that the manufacturer is adhering to the stated method;
- NOTE Advice on achieving a consistent and verifiable performance is given in annex A.
- d) the results of the cyclic loading tests specified in **5.1**;
 - e) the results of the sleeper lateral resistance measurements specified in **5.2**;
 - f) if electrical isolation of the rail from the sleeper is required, the results of the electrical resistance test specified in **5.3**;
 - g) the method by which any specific requirements of the purchaser in relation to installation of the sleepers in track and the subsequent maintenance of the track have been met [**3.2.1f**];
 - h) where the purchaser has no specific packaging or protection arrangements, the method of packaging which will be used, including stack size;
 - i) if the purchaser has specified the fastening system, the maximum and minimum track gauge and rail inclination possible.

4 Sleeper dimension

The soffit width shall be such that the ballast pressure under a force equal to the maximum static rail seat reaction shall not exceed 0.5 MN/m^2 , assuming this load to be uniformly distributed over a length of 0.8 m, unless otherwise specified by the purchaser (see **B.5.1**). To ensure that this can be achieved, the sleeper soffit shall be continuous for at least 450 mm on either side of the rail seat centre line except for small apertures necessary for fastening attachment.

5 Type approval tests

5.1 Cyclic loading resistance

The cyclic loading resistance determined in accordance with annex C shall be not less than 2.4 times the dynamic rail seat reaction [see **3.2.1e**].

This test shall be repeated when there is any change in the sleeper design or manufacturing process which might affect fatigue performance.

NOTE The results of the tests required by annex C are reported in terms of the total vertical load, i.e. twice the rail seat reaction. An additional factor of 1.2 has been applied to allow for the potential loss of section in service through corrosion.

5.2 Lateral resistance

The lateral resistance of the sleeper in a ballast box containing **uncompacted** ballast shall be not less than 4.5 kN when tested in accordance with annex D.

5.3 Electrical resistance

If the rail is to be electrically insulated from the sleeper, the resistance of the assembly shall be tested in accordance with annex E.

6 Marking

Sleepers shall be durably marked with the following information:

- a) the identification mark of the manufacturer;
- b) the last two figures of the year of manufacture;
- c) the sleeper type.

The marking shall be clearly visible with the sleeper installed in track.