

Specification for

**Delivery requirements
for surface condition of
hot rolled steel plates,
wide flats and
sections —**

Part 1: General requirements

This European Standard EN 10163-1:1991 has the status of
British Standard

Cooperating organizations

The European Committee for Standardization, under whose supervision this European Standard was prepared, comprises the national standards organizations of the following countries.

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|----------------|--|
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| Denmark | Dansk Standardiseringsraad |
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This British Standard was published under the authority of the Standards Board and comes into effect on 20 December 1991

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The following BSI references relate to the work on this standard:
Committee reference ISM/12
Draft for comment 89/44688 DC

ISBN 0 580 20205 4

Amendments issued since publication

| Amd. No. | Date | Comments |
|----------|------|----------|
| | | |
| | | |
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National foreword

This British Standard has been prepared under the direction of the Iron and Steel Standards Policy Committee and is the English language version of EN 10163 “*Delivery requirements for surface condition of hot rolled steel plates, wide flats and sections — Part 1: General requirements*”. Together with EN 10163-2 it supersedes BS 6512:1984, which is withdrawn.

The other Parts of EN 10163 are as follows:

- *Part 2: Plate and wide flats;*
- *Part 3: Sections.*

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

UDC 669.14-122.4-41:620.179.11

Descriptors: Iron and steel products, hot rolled products, steels, delivery condition, surface condition, definitions, generalities, defects, repairs

English version

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

Conditions de livraison relatives à l'état de surface des tôles, larges plats et profilés en acier laminés à chaud —
Partie 1: Généralités

Lieferbedingungen für die Oberflächenbeschaffenheit von warmgewalzten Stahlerzeugnissen (Blech, Breitflachstahl und Profile) —
Teil 1: Allgemeine Anforderungen

This European Standard was approved by CEN on 21 August 1991. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This draft European Standard has been drawn up by ECISS/TC 10 "Structural steel — qualities" whose Secretariat is held by NNI.

Part 1 and 2 of this European Standard replaces:

EURONORM 163 Delivery conditions for surface finish of hot rolled plates and wide flats (1983)

Part 1 and 2 of this document was originally drawn up as Euronorm 163 under the European Coal and Steel Community. With the formation of ECISS and the establishment of the ECISS work programme TC 10 was asked to prepare this document for eventual publication as a European Standard.

ECISS/TC 10 met 3 and 4 May, 1990 in Brussels and agreed on the text for publication as a European Standard. The following countries were represented in that meeting: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Sweden and United Kingdom.

This European Standard EN 10163-1 was approved by CEN on 1991-04-16.

According to the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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1 Scope

1.1 This European Standard specifies the general requirements for the surface condition of hot rolled steel plates, wide flats and sections. It covers the requirements on the type, the permissible depth and the permissible size of the surface area affected by:

- discontinuities (imperfections and defects) and
- repairs by grinding and/or welding.

1.2 This European Standard shall be applied so far as no other requirements for the surface condition exist in the appropriate material or product standard. The requirements laid down in the appropriate material or product standard shall always prevail.

1.3 This Part 1 covers the general delivery requirements for the surface quality of hot rolled steel products such as:

- plates and wide flats, see Part 2;
- sections, see Part 3.

2 Normative references

prEN 10021, *General technical delivery requirements for steel and iron and steel products*¹⁾.

EN 10079, *Definition of steel products*.

EN 10204, *Metallic products — Type of inspection documents*.

prEN 287-1, *Approval testing of welders — Fusion welding — Part 1: Steels*¹⁾.

prEN 288-1, *Specification and qualification of welding procedures for fusion welding — Part 1: General rules*¹⁾.

prEN 288-2, *Specification and qualification of welding procedures for fusion welding — Part 2: Welding procedure specification for arc welding of metallic materials*¹⁾.

prEN 288-3, *Specification and qualification of welding procedures for fusion welding — Part 3: Welding procedure test for arc welding of steels*¹⁾.

3 General

Responsibility for the required surface quality rests with the material producer, who has to take the necessary precautions.

The producer can only take account of discontinuities which are visible to the naked eye. Rolling or heat-treatment scale may conceal surface discontinuities.

If, during the subsequent descaling or working operations by the user, the material is found to be defective because of faulty rolling or processing by the producer, the producer shall be allowed to have the product repaired provided that this is not in conflict with the appropriate material or product standard.

4 Definitions

For the purposes of this European Standard the following definitions apply.

4.1 imperfections

surface discontinuities other than cracks, shell and seams with a depth and/or area equal to or less than a specified limiting value

imperfections may be left without repair

4.2 defects

surface discontinuities including all cracks, shell and seams with a depth and/or area greater than a specified limiting value

defects shall be repaired

4.3

for the most common surface discontinuities see the descriptions in Annex A. In Annex B the terms can be found in their respective languages

5 General requirements

5.1 To differentiate the surface discontinuities in terms of imperfections and defects, the depth of representative surface discontinuities shall when necessary be measured. The measurement shall be carried out from the surface of the product. The depth of the discontinuities chosen as representative ones shall be determined after the discontinuity has been removed by grinding.

5.2 Areas affected by surface discontinuities shall when necessary be determined as follows.

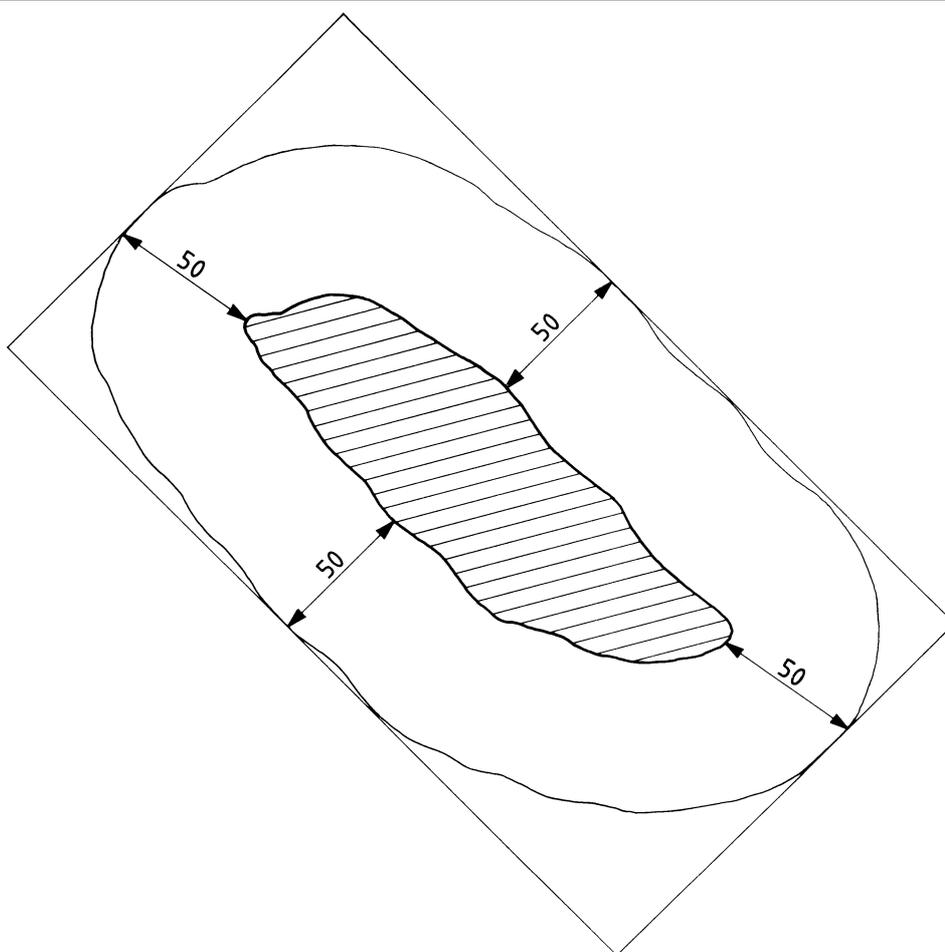
a) For isolated discontinuities (Figure 1a) the affected area is obtained by drawing a continuous line which follows the circumference of the discontinuity at a distance of 50 mm or by drawing a rectangle whose sides are 50 mm from the edges of the discontinuity.

b) For discontinuities appearing in a cluster (Figure 1b), the affected area is obtained by drawing a continuous line which follows the circumference of the cluster at a distance of 50 mm or by drawing a rectangle whose sides are 50 mm from the continuous line which follows the cluster or by the product edge if this is closer.

¹⁾ Draft is under discussion.

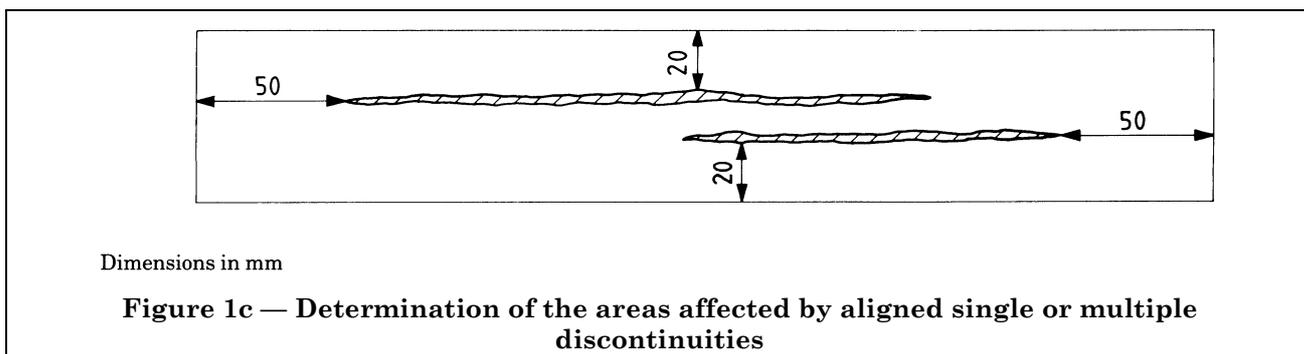
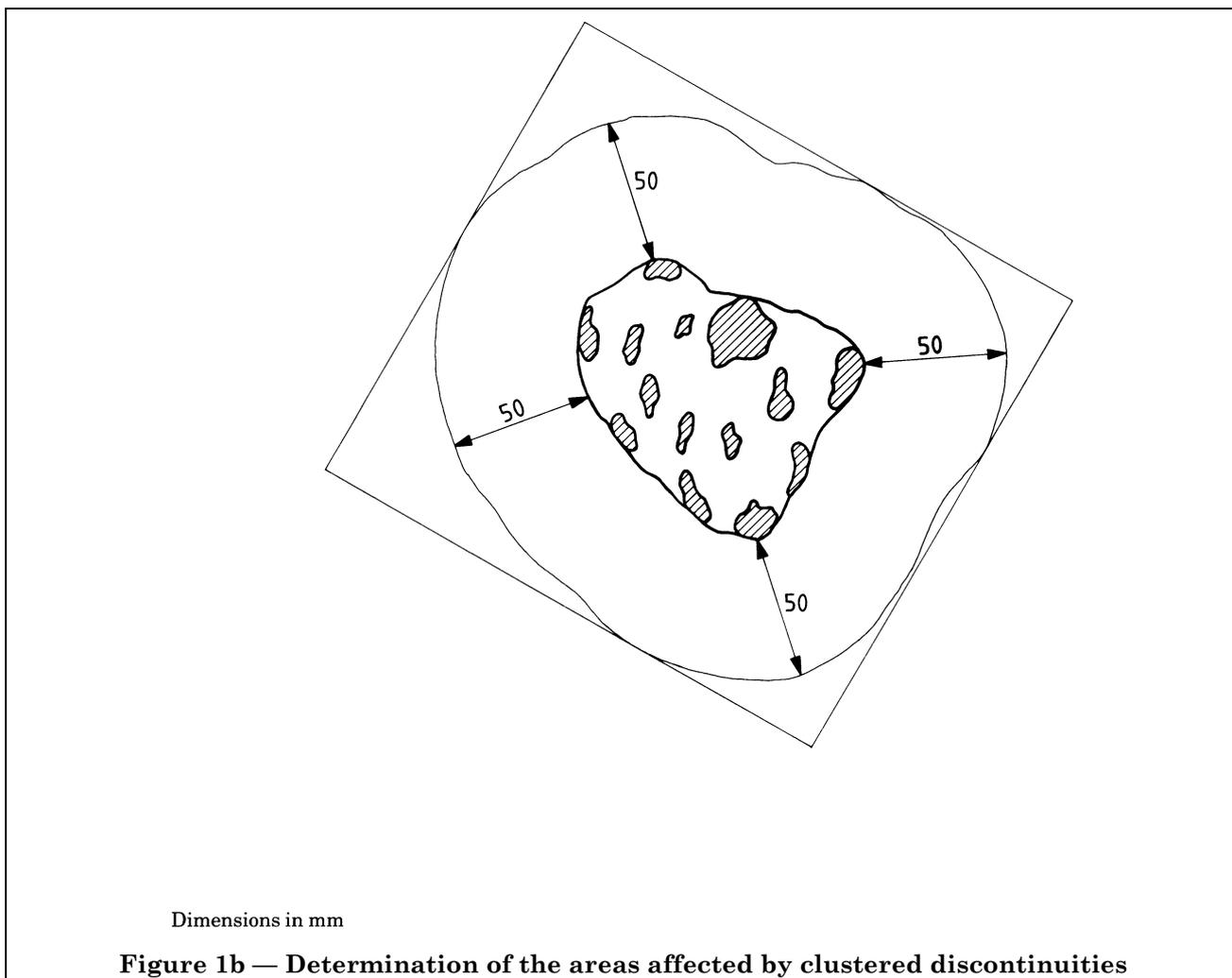
For discontinuities appearing in a line (Figure 1c), the affected area is obtained by drawing a rectangle the sides of which are 50 mm in the longitudinal direction and 20 mm in the transverse direction from the edge of the discontinuity or by the product edge if this is closer.

Aligned discontinuities shall be at least 10 times their biggest width. Single or multiple appearing discontinuities whose edges are closer together than 100 mm shall be considered as one discontinuity. Aligned discontinuities, whose edges in the longitudinal direction have a distance smaller than 100 mm or in the transverse direction smaller than 40 mm, shall be considered as one discontinuity.



Dimensions in mm

Figure 1a — Determination of the area affected by an isolated discontinuity



6 Repair procedures

6.1 Grinding

If a discontinuity has to be repaired, it shall be removed completely by grinding to its full depth. The ground areas shall have a smooth transition to the surrounding surface of the product. In case of dispute complete elimination of the defect may be demonstrated by magnetic particle or by dye penetrant test techniques.

6.2 Welding

Defects shall be completely eliminated before any weld repair is commenced. This procedure shall not reduce the thickness of the product to less than 80 % of its nominal thickness.

Prior to weld repair of edges of flat products, the depth of the groove, measured from the edge inward, shall not exceed the nominal thickness of the product with a maximum of 30 mm.

The welding shall be carried out by operators qualified in accordance with prEN 287-1. Welding procedures shall be carried out in accordance with prEN 288-1, prEN 288-2 and prEN 288-3.

The weld shall be free of any lack of fusion, undercutting, cracks and other defects which could impair the workability of use of the product in question as specified by the purchaser.

The deposited weld material shall reach above the plate surface and shall subsequently be ground smooth and level with the product surface. After grinding smooth, ordered product thickness tolerances apply to the ground area.

After repair a post-weld heat treatment may be agreed between the producer and the purchaser.

Proper repair shall be verified by ultrasonic, radiographic, magnetic particle or dye penetrant inspection.

When the method has not been specified by the purchaser, the choice of the method is at the manufacturers options.

If requested at the time of enquiry and order for every welding repair the producer shall provide reports containing a sketch, showing dimensions and location of the defect and full details of the repair procedure, including the welding consumables, eventual post-weld heat treatment and non-destructive testing.

NOTE In certain applications, such as otherwise unwelded components of structures for which the choice of steel grade with respect to notch ductility would be determined by the presence or absence of welding or in which permissible stresses are limited by considerations of fatigue, repair by welding may not be satisfactory or may require special inspection after completion.

Annex A (for information)

Description of most common discontinuities

For the most common surface discontinuities the following descriptions apply.²⁾

A.1 rolled-in scale and pitting: Marks on the rolled surface varying in shape, thickness and frequency.

Rolled-in scale results from the inherent surface scaling of the stock before or during hot-rolling or processing.

A.2 indentations and roll marks: Indentations (depressions) or hot roll marks (protuberances) are normally attributed to the natural wear of rolls or pinch rolls.

These discontinuities can be distributed at definite distances apart or irregularly throughout the length and width of the stock.

A.3 scratches, grooves: Mechanical scoring at the surface.

Scratches are mostly parallel or at right angles to the rolling direction. They may be slightly rolled over and seldom contain scale.

This scoring is caused by friction between the stock and parts of the equipment due to relative movements.

A.4 spills, slivers: Minute surface discontinuities of an irregular and flake-like nature.

Spills and slivers are elongated in the direction of rolling, their extent depending on the degree of reduction. They are still connected, as minute particles of shell, to the base metal at certain points.

A.5 blister: Blow hole located closely beneath the surface.

Blisters often appear during hot-rolling.

A.6 sand patches: Non-metallic internal inclusions, elongated in the direction of rolling and distinctly coloured.

A.7 crack: Narrow line of fracture on the surface.

Cracks are due mainly to material stresses which often develop during the cooling of the feedstock.

A.8 shell: Overlapping material partially connected with the base material.

There is a preponderance of non-metallic inclusions and/or scale among the shell.

A.9 seams: Seams are caused mainly when imperfections in the semi-product are elongated and extended during rolling.

²⁾ Photographs of the most common surface discontinuities can be found in the VDEh brochure "Oberflächenfehler von warmgewalzten Flachstahlerzeugnissen" (edition 1978) published by Verlag Stahleisen GmbH, Sohnstraße 65, D-4000 Düsseldorf, Germany.

Annex B (for information)
List of equivalent terms in foreign languages

| English | French | German | Italian | Spanish | Dutch |
|--------------------------------|---|-------------------------------------|-------------------------------------|---------------------------------|----------------------------------|
| imperfections defects | imperfections défauts | Unvollkommenheiten Fehler | imperfezioni difetti | imperfecciones defectos | onvolkomenheden fouten |
| rolled-in scale and pitting | incrustations de calamine, marques de calamine | Zundereinwalzungen, Zundernarben | scaglia impressa e vaiolatura | incrustaciones de cascarilla | ingewalst oxide, putjes |
| indentations and roll marks | empreintes et marques de laminage | Eindrücke und Abdrücke | incisione e impronte di cilindro | marcas de cilindros | indrukkingen en walsafdrukken |
| scratches and grooves | stries et rayures | Schrammen und Riefen | graffi e rigature | rozaduras | krassen en groeven |
| spills and slivers | gravelures | Schuppen | paglie | hojas | schubben |
| blisters | soufflures de peau | Blasen | soffiature | ampollas | blazen |
| sand patches | inclusions de sable | Sandstellen | inclusioni terrose | incrustaciones no metálicas | zandplekken |
| cracks | criques | Risse | cricche | grietas superficiales | scheuren |
| shell | pailles | Schalen | doppia pelle | pliegues | bladders |
| seams | repliures | Schalenstreifen | solchi, ripiegature | costuras | overwalsingen |

Annex C (for information)**List of national standards which correspond with EURONORMS referenced**

Until the following EURONORMS are transformed into European Standards, they can either be implemented or reference made to the corresponding national standards as listed in Table 1.

Table 1 — EURONORMS with corresponding national standards

| EURONORM | Corresponding national standard in | | | | | | | | | |
|-----------------|---|--------------------------|----------------|--|----------------------|--------------|----------|---|---|--------------------|
| | Germany | France | United Kingdom | Spain | Italy | Belgium | Portugal | Sweden | Austria | Norway |
| 19 | DIN 1025 T5 | NF A 45 205 | — | UNE 36-526 | UNI 5398 | NBN 533 | NP-2116 | SS 21 27 40 | M 3262 | — |
| 21 ^a | DIN 17 010 DIN 59 049 | NF A 03 115 | BS 4360 | UNE 36-007 | UNI-EU 21 | NBN A 02-001 | NP-2149 | SS 11 00 01 SS 21 93 01 | M 3101 | NS 10 010 |
| 24 | DIN 1025 T1 DIN 1026 | NF A 45 210 | BS 4 | UNE 36-521 UNE 36-522 | UNI 5679 UNI 5680 | NBN 632-01 | — | SS 21 27 25 SS 21 27 35 | M 3261 | NS 911 |
| 34 ^a | DIN 1025 T2 DIN 1025 T3 DIN 1025 T4 | NF A 45 211 | BS 4 | UNE 36-527 UNE 36-528 UNE 36-529 | UNI 5397 | NBN 633-02 | NP-2117 | SS 21 27 50 SS 21 27 51 SS 21 27 52 | DIN 1025 T2 DIN 1025 T3 DIN 1025 T4 | NS 1907 NS 1908 |
| 44 ^a | DIN 1025 T5 | NF A 45 206 | BS 4 | UNE 36-526 | UNI 5398 | NBN 632-04 | — | SS 21 27 40 | M 3262 | NS 1910 |
| 53 | DIN 1025 T2 DIN 1025 T3 DIN 1025 T4 | NF A 45 201 | BS 4 | UNE 36-527 UNF 36-528 UNE 36-529 | UNI 5397 | NBN 633 | NP-2117 | SS 21 27 50 SS 21 27 51 SS 21 27 52 | — | NS 1907 NS 1908 |
| 54 | DIN 1026 | NF A 45 007 | BS 4 | UNE 36-525 | UNI-EU 54 | NBN A 24-204 | NP-338 | — | M 3260 | — |
| 55 | DIN 1024 | NF A 45 008 ^b | BS 4 | UNE 36-533 | UNI-EU 55 | NBN A 24-205 | NP-337 | SS 21 27 20 | — | NS 1905 |
| 56 | DIN 1028 | NF A 45 009 ^b | BS 4848 | UNE 36-531 | UNI-EU 56 | NBN A 24-201 | NP-335 | SS 21 27 11 | M 3246 | NS 1903 |
| 57 | DIN 1029 | NF A 45 010 ^b | BS 4848 | UNE 36-532 | UNI-EU 57 | NBN A 24-202 | NP-336 | SS 21 27 12 | M 3247 | NS 1904 |
| 91 | DIN 59 200 | NF A 46 012 | BS 4360 | — | UNI-EU 91 | NBN A 43-301 | — | SS 21 21 50 | M 3231 | — |

^a These EURONORMS are being transformed in European Standards.

^b NF A 45 001 and NF A 45 101 shall be added for the tolerances.

National appendix NA (informative)

The United Kingdom participation in the preparation of this European Standard was entrusted by the Iron and Steel Standards Policy Committee (ISM/-) to Technical Committee ISM/12 upon which the following bodies were represented:

BEAMA Ltd.
British Constructional Steelwork Association Ltd.
British Railways Board
British Steel Industry
County Surveyors' Society
Department of Transport
Institution of Structural Engineers
Lloyd's Register of Shipping
National Association of Steel Stockholders
Railway Industry Association of Great Britain
Society of Motor Manufacturers and Traders Ltd.
Steel Construction Institute
Welding Institute

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