

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

## Part 1: General requirements

The European Standard EN 10163-1:2004 has the status of a British Standard

ICS 77.140.50

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## National foreword

This British Standard was published by BSI. It is the UK implementation of EN 10163-1:2004, incorporating corrigendum February 2007. It supersedes BS EN 10163-1:1991 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/12, Structural steels.

A list of organizations represented on this committee can be obtained on request to its secretary.

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

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 16 December 2004

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ISBN 0 580 45121 6

### Amendments issued since publication

Amd. No.	Date	Comments
17030 Corrigendum No. 1	30 April 2007	Replaces references to EN 288-2 and EN 288-3 by EN ISO 15609-1 and EN ISO 15614-1 respectively

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 10163-1

December 2004

ICS 77.140.50

Supersedes EN 10163-1:1991  
Incorporating corrigendum February 2007

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 4 November 2004.

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.

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## Foreword

This document (EN 10163-1:2004) has been prepared by Technical Committee ECISS/TC 10 "Structural steels – Grades and qualities", the secretariat of which is held by NEN.

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 June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

This document supersedes EN 10163-1:1991, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 1: General requirements*.

This document covers the general delivery requirements for the surface condition of hot-rolled steel products such as:

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

During the 5 year review of EN 10163-1:1991 the members of ECISS/TC 10 agreed to revise EN 10163-1:1991. It was asked to bring the text in line with ECISS DOCS N 809 "Iron and steel standardization – Model for a product standard".

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## 1 Scope

**1.1** This document 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 document 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.

## 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 287-1, *Qualification test of welders – Fusion welding – Part 1: Steels*.

EN 10079:1992, *Definition of steel products*.

EN 10163-2:2004, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 2: Plate and wide flats*.

EN 10163-3:2004, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 3: Sections*.

EN ISO 15607, *Specification and qualification of welding procedures for metallic materials – General rules (ISO 15607:2003)*.

EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials – Welding procedure specification – Part 1: Arc welding (ISO 15609-1:2004)*.

EN ISO 15614-1, *Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2004)*.

NOTE In Annex C EURONORM 19, 53 and 54 are mentioned with corresponding national standards. These EURONORMS are formally withdrawn, but there are no corresponding EN's. Therefore they are not mentioned in this clause.

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10079:1992, EN 10163-2:2004 and EN 10163-3:2004 apply.

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

## 4 General

Responsibility for the required surface condition, whether the product is delivered descaled or not, 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 given opportunity to repair the product provided that this is not in conflict with the appropriate material or product standard.

## 5 Classification

The surface requirements and repair conditions are subdivided into classes as specified in EN 10163-2 and EN 10163-3.

## 6 Requirements

### 6.1 Depth and affected area of discontinuities

#### 6.1.1 Depth

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.

#### 6.1.2 Affected area

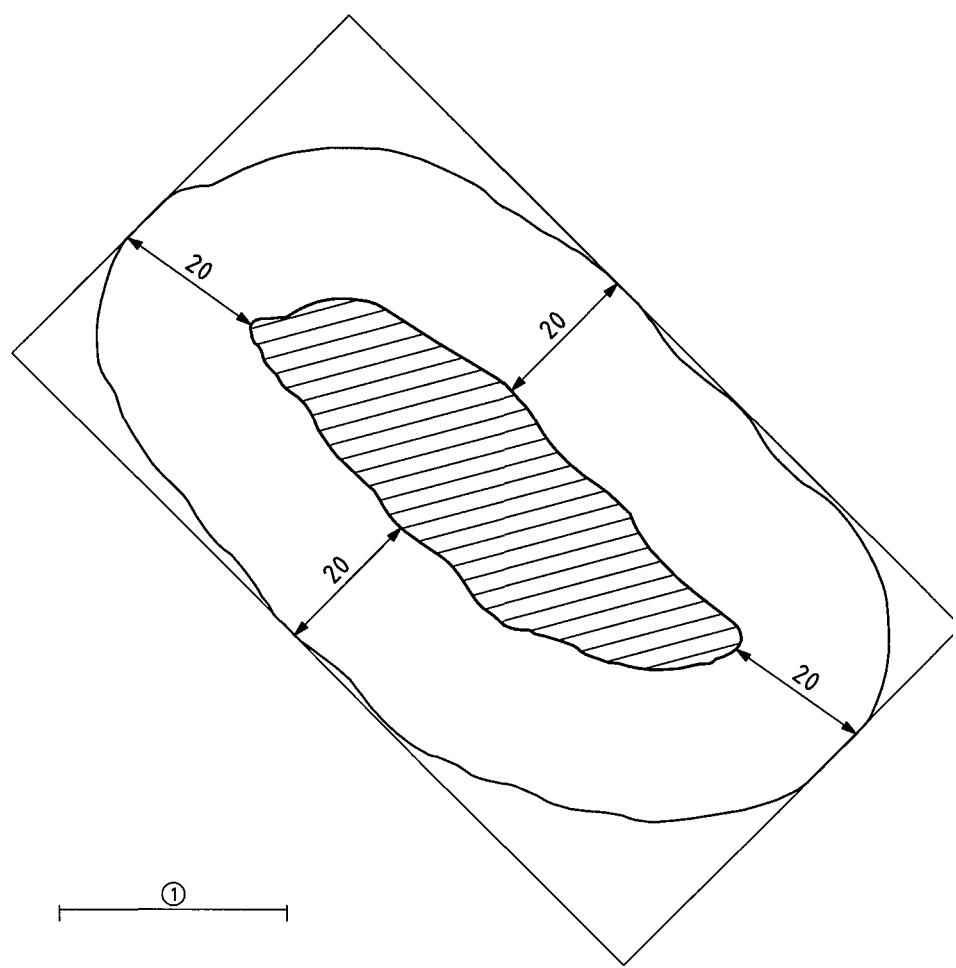
Areas affected by surface discontinuities shall when necessary be determined as follows:

- a) for isolated discontinuities (Figure 1) the affected area is obtained by drawing a continuous line which follows the circumference of the discontinuity at a distance of 20 mm or by drawing a rectangle whose sides are 20 mm from the edges of the discontinuity;
- b) for discontinuities appearing in a cluster (Figure 2), the affected area is obtained by drawing a continuous line which follows the circumference of the cluster at a distance of 20 mm or by drawing a rectangle whose sides are 20 mm from the continuous line which follows the cluster or by the product edge if this is closer.

For discontinuities appearing in a line (Figure 3), the affected area is obtained by drawing a rectangle the sides of which are 20 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.

Multiple appearing discontinuities whose edges are closer together than 40 mm shall be considered as one cluster.

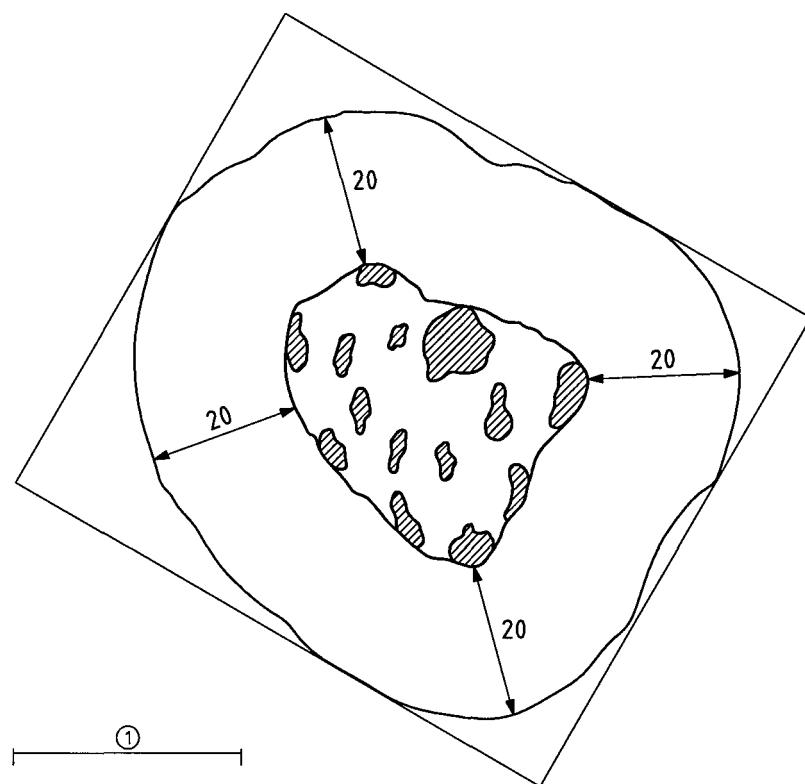
Dimensions in millimetres



1 Horizontal line

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

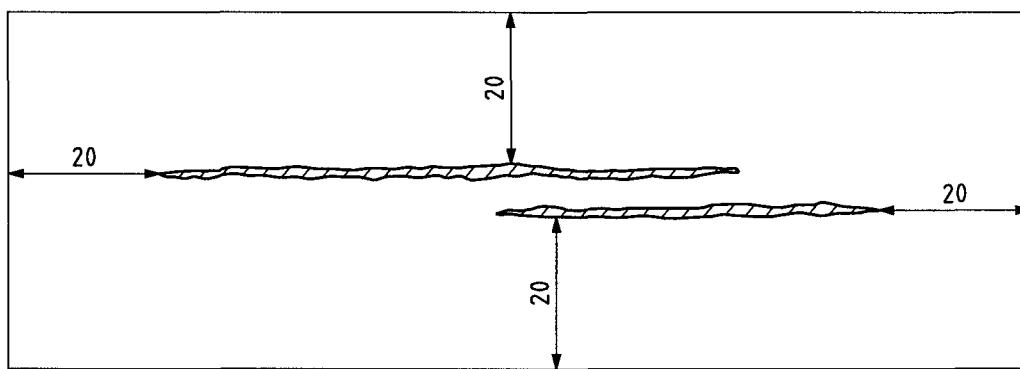
Dimensions in millimetres



1 Horizontal line

**Figure 2 — Determination of the areas affected by clustered discontinuities**

Dimensions in millimetres



**Figure 3 — Determination of the areas affected by aligned single or multiple discontinuities**

## 6.2 Repair requirements

The repair requirements for each class (see Clause 5) are specified in EN 10163-2 and EN 10163-3.

## 6.3 Repair procedures

### 6.3.1 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.

### 6.3.2 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 70 % 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 EN 287-1. Welding procedures shall be carried out in accordance with EN ISO 15607, EN ISO 15609-1 and EN ISO 15614-1.

The weld shall be free of any lack of fusion, undercutting, cracks and other defects which could impair the workability or 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 manufacturer's discretion.

If requested at the time of the 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.

In EN 10163-2 and EN 10163-3 classes and subclasses are defined for which repair by welding is not allowed.

## Annex A (informative)

### Description of most common discontinuities

#### **A.1 General**

For the most common surface discontinuities the following descriptions apply:<sup>1)</sup>

##### **A.1.1**

##### **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.1.2**

##### **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.1.3**

##### **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.1.4**

##### **spills, slivers**

minute surface discontinuities of an irregular and shell 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.1.5**

##### **blisters**

blow hole located closely beneath the surface

Blisters often appear during hot-rolling.

##### **A.1.6**

##### **sand patches**

non-metallic internal inclusions, elongated in the direction of rolling and distinctly coloured

##### **A.1.7**

##### **cracks**

narrow line of fracture on the surface

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<sup>1)</sup> 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, Postfach 105145, 40042 Düsseldorf, Germany.

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

**A.1.8**

**shell**

overlapping material partially connected with the base material

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

**A.1.9**

**seams**

seams are caused mainly when imperfections in the semi-product are elongated and extended during rolling

## Annex B (informative)

### List of equivalent terms in foreign languages

The list of equivalent terms in foreign languages is given in Table B.1.

**Table B.1 — List of equivalent terms in foreign languages**

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

## Annex C

(informative)

### List of national standards which correspond with EURONORMS referenced

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

**Table C.1 — EURONORMS with corresponding national standards**

EURONORM	Corresponding national standard in						
	Germany	France	United Kingdom	Spain	Italy	Belgium	Portugal
19 <sup>a</sup>	DIN 1025 T5	NF A 45 505	-	UNE 36-526	UNI 5398	NBN 533	NP-2116
53	DIN 1025 T2	NF A 45 201	BS 4	UNE 36-527	UNI 5397	NBN 633	NP-2117
	DIN 1025 T3			UNE 36-528			SS 21 27 50
	DIN 1025 T4			UNE 36-529			SS 21 27 51
54 <sup>a</sup>	DIN 1026-1	NF A 45 007	BS 4	UNE 36-525	UNI-EU 54	NBN A 24-204	NP-338
							SS 21 27 52
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## Bibliography

- [1] EURONORM 19, *IPE beams; I-beams with parallel flange facings*
- [2] EURONORM 53, *Hot-rolled broad flanged I-beams (wide-flanged I-beams) with parallel flange facings*
- [3] EURONORM 54, *Hot-rolled small U-beams*

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