



Technical delivery conditions for the surface condition
of hot rolled steel plate, wide flats and sections
General requirements

DIN
EN 10 163
Part 1

Lieferbedingungen für die Oberflächenbeschaffenheit von warmgewalzten Stahlerzeugnissen
(Blech, Breitflachstahl und Profile); allgemeine Anforderungen

European Standard EN 10 163-1 : 1991 has the status of a DIN Standard.

National foreword

This standard has been prepared by ECISS/TC 10.

The responsible German body involved in the preparation of this standard was the *Normenausschuß Eisen und Stahl* (Steel and Iron Standards Committee), Technical Committee 20/1 *Maßnormen für warmgewalzte Flacherzeugnisse*.

DIN EN 10 163 is the first German standard to deal with technical delivery conditions for the surface condition of hot rolled steel products. The present standard specifies general requirements, Part 2 dealing with plate and wide flats, and Part 3 with sections (I sections, channels, tee sections and angular steel). The specifications of this series of standards are to be used only where the relevant materials or products standard does not give any specifications regarding surface finish. By agreement, the specifications of the present standard may also be applied for hot rolled steel products not covered in EN 10 163.

The DIN Standards corresponding to the European Standards referred to in clause 2 of the EN are as follows:

European Standard	DIN Standard
EN 287-1	DIN EN 287 Part 1
EN 288-1	DIN 8563 Part 100 (at present at the stage of draft)
EN 288-2	DIN 8563 Part 101 (at present at the stage of draft)
EN 288-3	DIN 8563 Part 102 (at present at the stage of draft)
EN 10 021	DIN EN 10 021 (at present at the stage of draft)
EN 10 079	DIN EN 10 079
EN 10 204	DIN 50 049

Standards referred to

(and not included in **Normative references** and annex C)

DIN 1024	Steel bars; hot rolled round-edged T-bars; dimensions, mass, limit deviations and static values
DIN 1025 Part 1	Steel sections; hot rolled narrow flange I-beams (I series); dimensions, mass, limit deviations and static values
DIN 1025 Part 2	Steel sections; hot rolled wide flange I-beams (IPB and IP series); dimensions, mass, limit deviations and static values
DIN 1025 Part 3	Steel sections; hot rolled wide flange I-beams, light duty (IPBI series); dimensions, mass, limit deviations and static values
DIN 1025 Part 4	Steel sections; hot rolled wide flange I-beams, heavy duty (IPBv series); dimensions, mass, limit deviations and static values
DIN 1025 Part 5	Steel sections; hot rolled I-beams of medium flange width (IPE series); dimensions, mass, limit deviations and static values

Continued overleaf.
EN comprises 6 pages.

4.16.01

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DIN 1026	Steel bars and sections; hot rolled round-edged U steel; dimensions, mass, limit deviations and static values
DIN 1028	Steel bars; hot rolled round-edged equal angles; dimensions, mass, limit deviations and static values
DIN 1029	Steel sections; hot rolled round-edged unequal angles; dimensions, mass, limit deviations and static values
DIN 8560	(at present at the stage of draft) Qualification testing of welders for fusion welding of steel
DIN 8563 Part 100	(at present at the stage of draft) Quality assurance of welding operations; description and application of welding processes; fusion welding; general principles
DIN 8563 Part 101	(at present at the stage of draft) Quality assurance of welding operations; description and application of welding processes; instructions for arc welding of metallic materials
DIN 8563 Part 102	(at present at the stage of draft) Quality assurance of welding operations; description and application of welding processes; instructions for arc welding of steel
DIN 17 010	General technical delivery conditions for steel and steel products
DIN 50 049	Inspection documents for the delivery of metallic products
DIN 59 200	Hot rolled wide steel flats; dimensions, mass and limit deviations
DIN EN 10 021	(at present at the stage of draft) General technical delivery conditions for steel and steel products
DIN EN 10 079	(at present at the stage of draft) Definition and classification of steel products by shape and dimensions

Other relevant standards

DIN EN 10 163 Part 2	Technical delivery conditions for the surface condition of hot rolled steel plate, wide flats and sections; plate and wide flats
DIN EN 10 163 Part 3	Technical delivery conditions for the surface condition of hot rolled steel plate, wide flats and sections; sections

International Patent Classification

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E 04 C 2/08
G 01 N 33/20

Editor's note

*This standard reproduces the official text of the English version of EN 10 163-1 as issued by CEN. In its preparation for publication as DIN EN 10 163 Part 1 (English version), the following point has been noted which we consider to be in need of correction. This has been marked *). The suggested amendment is given below and will be forwarded to the responsible CEN Secretariat for its consideration.*

In presentation, orthography, punctuation and hyphenation, the aim has been to implement the PNE Rules consistently. Obvious errors (e.g. redundancies and omissions) have been rectified without further reference.

Suggested amendment

1 In the title and text of the standard, 'steel plates' should preferably read 'steel plate' in those cases where reference is made to the semi-finished product.

UDC 669.14-122.4-41 : 620.179.11

Descriptors: Iron and steel products, hot rolled products, steels, delivery condition, surface condition, definitions, general requirements, defects, repair.

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 1991-08-21. 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

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Foreword

This draft European Standard has been drawn up by ECISS/TC 10 'Structural steel; quality standards' whose Secretariat is held by NNI.

Parts 1 and 2 of this European Standard replace: Euronorm 163-83 Delivery conditions for surface finish of hot rolled plates¹⁾ and wide flats.

Parts 1 and 2 of this document were 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 at that meeting: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Sweden and United Kingdom.

This European Standard EN 10 163-1 was approved by CEN on 1991-04-16.

According to the CEN/CENELEC Internal Regulations, 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.

1 Scope

1.1 This European Standard specifies the general requirements for the surface condition of hot rolled steel plates¹⁾, 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 covers the general delivery requirements for the surface quality of hot rolled steel products such as:

- plates¹⁾ and wide flats; see Part 2;
- sections; see Part 3.

2 Normative references

prEN 10 021 ¹⁾	General technical delivery requirements for steel and iron and steel products
EN 10 079	Definition of steel products
EN 10 204	Metallic products; types of inspection documents
EN 287-1	Approval testing of welders; fusion welding. Part 1: Steels

prEN 288-1 ¹⁾	Specification and qualification of welding procedures for fusion welding. Part 1: General rules
prEN 288-2 ¹⁾	Specification and qualification of welding procedures for fusion welding. Part 2: Welding procedure specification for arc welding of metallic materials
prEN 288-3 ¹⁾	Specification and qualification of welding procedures for fusion welding. Part 3: Welding procedure test for arc welding of steels

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.

¹⁾ Draft is under discussion.

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.

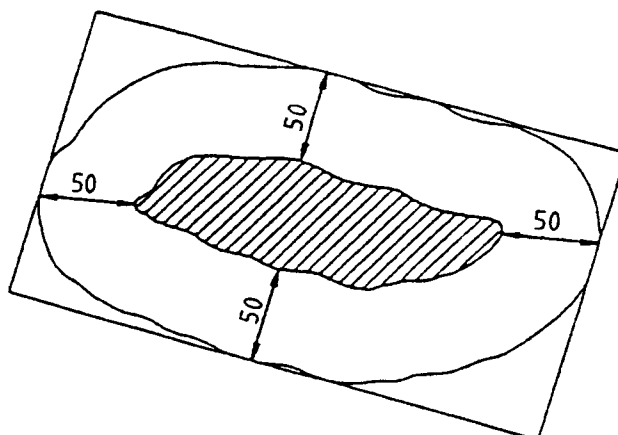
5.2 Areas affected by surface discontinuities shall when necessary be determined as follows.

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.

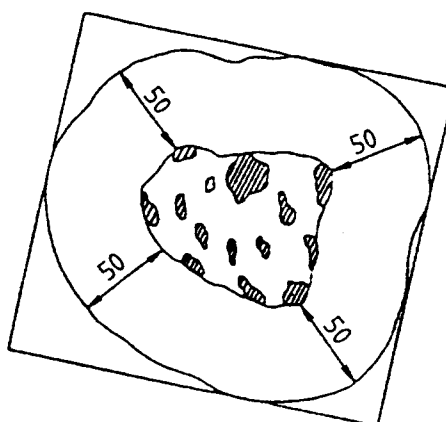
For discontinuities appearing in a line (figure 1c), the affected area is obtained by drawing a rectangle the sides of which are 50 mm in the longitudinal direction and 20 mm in the transverse direction from the edge of the discontinuity or by the product edge if this is closer.

Aligned discontinuities shall be at least 10 times their greatest width. Single or multiple 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.



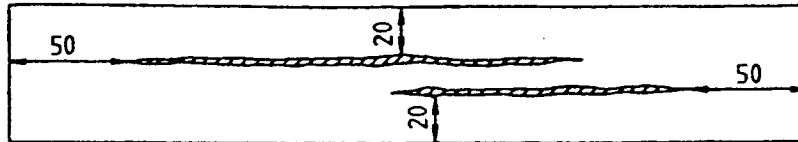
Dimensions in mm

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



Dimensions in mm

Figure 1b. Determination of the areas affected by clustered discontinuities



Dimensions in mm

Figure 1c. Determination of the areas affected by aligned single or multiple discontinuities

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 inwards, shall not exceed the nominal thickness of the product, with a maximum of 30 mm.

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

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 option.

If requested at the time of ordering 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

(informative)

Description of most common discontinuities

For the most common surface discontinuities, the following descriptions apply.¹⁾

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: Blowhole 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.

¹⁾ Photographs of the most common surface discontinuities can be found in the VDE brochure *Oberflächenfehler von warmgewalzten Flachstahlerzeugnissen* (1978 edition) published by *Verlag Stahleisen GmbH*, Sohnstraße 65, D-4000 Düsseldorf, Germany.

Annex B

(informative)

List of equivalent terms in foreign languages

English	French	German	Italian	Spanish	Dutch
imperfections	imperfections	Unvollkommenheiten	imperfezioni	imperfecciones	onvolkomenheden
defects	défauts	Fehler	difetti	defectos	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	indrinkingen 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	inclusiones de sable	Sandstellen	inclusioni terrose	incrustaciones no metálicas	zandplekken
cracks	criques	Risse	cricche	grietas superficiales	scheuren
shell	pailles	Schalen	doppia pelle	pliegues	bladders
seams	replitures	Schalenstreifen	solchi, ripiegature	costuras	overwalsingen

Annex C

(informative)

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

EURO-NORM	Corresponding national standard in				
	Germany ¹⁾	France	United Kingdom	Spain	Italy
19	DIN 1025 T3	NF A 45-205	--	UNE 36-526	UNI 5398
21 ¹⁾	DIN 17 010 DIN 50049	NF A 03-115	BS 4360	UNE 36-007	UNI-EU 21
24	DIN 1025 T1 DIN 1026	NF A 45-210	BS 4	UNE 36-521 UNE 36-522	UNI 5679 UNI 5680
34 ¹⁾	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
44 ¹⁾	DIN 1025 T5	NF A 45-206	BS 4	UNE 36-526	UNI 5398
53	DIN 1025 T2 DIN 1025 T3 DIN 1025 T4	NF A 45-201	BS 4	UNE 36-527 UNE 36-528 UNE 36-529	UNI 5397
54	DIN 1026	NF A 45-007	BS 4	UNE 36-525	UNI-EU 54
55	DIN 1024	NF A 45-008 ²⁾	BS 4	UNE 36-533	UNI-EU 55
56	DIN 1028	NF A 45-009 ²⁾	BS 4848	UNE 36-531	UNI-EU 56
57	DIN 1029	NF A 45-010 ²⁾	BS 4848	UNE 36-532	UNI-EU 57
91	DIN 59 200	NF A 46-012	BS 4360	--	UNI-EU 91

EURO-NORM	Corresponding national standard in				
	Belgium	Portugal	Sweden	Austria ^{*)}	Norway
19	NBN 533	NP-2116	SS 21 27 40	M 3262	--
21 ¹⁾	NBN A 02-001	NP-2149	SS 11 00 01 SS 21 93 01	M 3101	NS 10010
24	NBN 632-01	--	SS 21 27 25 SS 21 27 35	H 3261	NS 911
34 ¹⁾	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 ¹⁾	NBN 632-04	--	SS 21 27 40	M 3262	NS 1910
53	NBN 633	NP-2117	SS 21 27 50 SS 21 27 51 SS 21 27 52	--	NS 1907 NS 1908
54	NBN A 24-204	NP-338	--	M 3260	--
55	NBN A 24-205	NP-337	SS 21 27 20	--	NS 1905
56	NBN A 24-201	NP-335	SS 21 27 11	M 3246	NS 1903
57	NBN A 24-202	NP-336	SS 21 27 12	M 3247	NS 1904
91	NBN A 43-301	--	SS 21 21 50	M 3231	--

¹⁾ These EURONORMs are being transformed in European Standards.

²⁾ NFA 45-001 and NFA 45-101 shall be added for the tolerances.

^{*)} T denotes 'Part'.