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Steel — Surface finish of hot-rolled plates and wide flats — Delivery requirements

Acier — État de surface des tôles et larges-plats laminés à chaud — Conditions de livraison

ICS: 77.140.50

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This second edition cancels and replaces the first edition (ISO 7788:1985), which has been technically revised.

The main changes compared to the previous edition are as follows:

- updated normative reference
- new definitions added
- deletion of distinction concerning boilers and pressure vessel applications ([Clause 4](#))
- new definition of two classes and three subclasses added ([Clause 5](#))
- new [Clause 6](#): concerning “depth and determination of affected areas”, “repair requirements” and “repair procedures”
- deletion of [Annex A](#)

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

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

However, rolling or heat-treatment scale may conceal surface discontinuities. In these conditions, the producer can only take account of discontinuities which are visible to the naked eye.

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Steel — Surface finish of hot-rolled plates and wide flats — Delivery requirements

1 Scope

This document specifies delivery requirements which apply to the surface finish of hot-rolled plates and wide flats rolled on reversing mills, with nominal thickness ≥ 3 mm and ≤ 400 mm.

For plates with a nominal thickness greater than 400 mm and for special applications for which a different surface condition is required, special agreements shall be made at the time of enquiry and order.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 6929, *Steel products — Vocabulary*

ISO 7452, *Hot-rolled steel plates — Tolerances on dimensions and shape*

ISO 9034, *Hot-rolled structural steel wide flats — Tolerances on dimensions and shape*

ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels*

ISO 15607, *Specification and qualification of welding procedures for metallic materials — General rules*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6929 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <http://www.electropedia.org/>

3.1 imperfections

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

Note 1 to entry: Discontinuities that shall be repaired are regarded as defects.

3.2 defects

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

3.3 rolled-in scale, pitting (to be regarded as discontinuities)

marks on the rolled surface varying in shape, thickness and frequency, resulting from the unsatisfactory subsequent removal of scale from the stock before or during hot-rolling and processing.

3.4 indentations and roll marks (to be regarded as discontinuities)

roll marks appearing at periodic intervals caused by damaged rolls or pinch rolls

Note 1 to entry: Indentations (depressions) or roll marks (protuberances) can be distributed at definite distances apart or irregularly throughout the length and width of the stock.. Indentations can be caused, inter alia, by protuberances on rolls or rollers.

3.5 scratches and grooves (to be regarded as discontinuities)

mechanical damages varying in width, depth and length at the surface, mostly parallel or at right angles to the rolling direction.

Note 1 to entry: They may be slightly rolled over and seldom contain scale. These damages are caused by friction between the stock and parts of the equipment due to relative movements.

3.6 spills, slivers (to be regarded as discontinuities)

minute surface discontinuities of an irregular and flake-like nature

Note 1 to entry: Spills / slivers are elongated in the direction of rolling, their extent depending on the degree of reductions. They are still connected – as minute particles of shell – to the base metal at certain points.

3.7 blisters (to be regarded as discontinuities)

blow holes of varying size and shape located closely beneath the surface and appearing during hot rolling

3.8 hot tears (to be regarded as discontinuities)

variably orientated material discontinuities in the surface region varying in length, width and depth and occurring in preferred directions and/or distributed over a limited area

Note 1 to entry: Hot tears arise in the processing of slab ingots, roughed slabs and continuously cast slabs and are associated with the steel, with stresses in the initial material or with adverse forming conditions.

3.9 sand patches (to be regarded as discontinuities)

non-metallic inclusions in the surface that vary in size and shape. They are elongated in the direction of rolling, randomly localized and they are distinctly coloured, standing out from their background

3.10 cracks (to be always considered as defects, see 6.2.1.2.3)

localized discontinuities of varying length and varying orientation related to the rolling direction in the region of the surface and which may less frequently occur as crazing

Note 1 to entry: Cracks are due mainly to material stresses which arise during the cooling process.

3.11 shell and seams (to be always considered as defects, see 6.2.1.2.3)

overlapping material being irregularly distributed over areas of the rolled product and being only partially connected with the base material

Note 1 to entry: The overlapping portions of the surface varying in shape and extent. There is a preponderance of non-metallic inclusions and/or scale among the shell. Shell can originate during casting or because of the shifting or sliding of layers of the material during hot rolling. Seams are caused mainly when defects in the semi-product parallel to the rolling direction, for instance, flame-cutting burrs, are overlapped during rolling.

Note 2 to entry: To get information about other surface of defects on the flat products, refer to valid references, including reference [3] in the bibliography.

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 the purchaser needs to be sure that all discontinuities visible to the naked eye have been identified, assesses and where necessary repaired before delivery, products should be ordered descaled.

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 2 classes each class further subdivided into 3 sub classes :

Class A : The surface condition shall comply with the requirements of [Clause 6.2.1](#) and [6.3.1.1](#). The remaining thickness of the affected area (see [Clause 6.1.2](#)) under the discontinuities and of the repaired ground areas may be less than the minimum thickness as specified in the appropriate tolerance standard

Class B : The surface condition shall comply with the requirements of [Clause 6.2.2](#) and [6.3.1.2](#). The remaining thickness of the affected area under the discontinuities and of the repaired ground areas shall not be less than the minimum thickness as specified in the appropriate tolerance standard

Subclass 1 : Repair by chipping and/or grinding followed by welding is permitted in compliance with [Clause 6.3.2.2](#) <https://standards.iteh.ai/catalog/standards/sist/15e6a553-29ed-4fbc-a2b1-946cf27d6475/iso-dis-7788>

Subclass 2 : Repair by welding is only permitted if agreed at the time of the order and under agreed conditions (see [Clause 6.3.2.3](#))

Subclass 3 : Repair by welding is not allowed

The required class and subclass is specified in the appropriate material or product standard. If this is not the case, the class and subclass shall be class A and subclass 1 unless otherwise specified at the time of the order.

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.