17

INTERNATIONAL STANDARD ISO 3576

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

1981 - Norme confirmée pour 5 ans

Hot-rolled carbon steel sheet coils for the production of cold-reduced products

Tôles en acier au carbone laminées à chaud, en bobines, destinées au laminage à froid

First edition — 1976-10-15

UDC 669.14-41 **Ref. No. ISO 3576-1976 (E)**

Descriptors : iron and steel products, hot-rolled products, metal plates, carbon steels, cold rolling, specifications, chemical composition, mechanical properties, mechanical tests, dimensions, tolerances (mechanics).

Price based on 6 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3576 was drawn up by Technical Committee ISO/TC 17, *Steel*, and was circulated to the Member Bodies in April 1975.

It has been approved by the Member Bodies of the following countries :

Austria	Germany	New Zealand
Belgium	Hungary	Romania
Brazil	Iran	South Africa, Rep. of
Bulgaria	Ireland	Spain
Canada	Italy	Sweden
Chile	Japan	Switzerland
Czechoslovakia	Korea, Dem. P. Rep. of	Turkey
Denmark	Korea, Rep. of	U.S.A.
Finland	Mexico	U.S.S.R.
France	Netherlands	Yugoslavia

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Australia
United Kingdom

Printed in Switzerland

Hot-rolled carbon steel sheet coils for the production of cold-reduced products

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard applies to hot-rolled carbon steel sheet to be used for rerolling in the manufacture of the following cold-reduced flat steel products :

— Cold-reduced carbon steel sheet of commercial and drawing qualities to ISO 3574.

— Cold-reduced strip to ISO . . .[1].

— Cold-reduced metallic-coated steel sheet, such as :

continuous hot-dip zinc-coated carbon steel sheet of commercial, lock-forming and drawing qualities to ISO 3575.

— Cold-reduced steel sheet of structural quality to ISO 4997[2].

— Cold-reduced tinplate and cold-reduced blackplate :

sheet to ISO/R 1111/I;

coil for subsequent cutting into sheet form to ISO 1111/II[2].

— Cold-reduced spring steel to ISO . . .[1]

1.2 Material to this International Standard is supplied in coil form, commonly in the range of thickness 1,8 mm and thicker and in widths 600 mm and over. The scale or oxide must be removed by the manufacturer, purchaser or reroller prior to cold-reduction. Surface is of considerable importance because of the variety of finishes and other characteristics required in the final cold-reduced product.

1.3 Material to this International Standard is generally supplied to chemical composition. This chemical composition shall be in accordance with that shown in the relevant International Standard for the product (see 1.1), or by agreement between the manufacturer and reroller at the time of ordering.

1.4 When the end product is to have special characteristics, the specifications of the hot-rolled sheet coil shall be agreed upon between the manufacturer and reroller at the time of ordering.

1.5 Widths less than 600 mm wide may be slit from wide coils and will be considered sheet coils for rerolling.

NOTE — Approximate conversions into inches are given in the annex for information only.

2 DEFINITIONS AND OTHER INFORMATION

2.1 hot-rolled steel sheet : A product obtained by rolling heated steel through a continuous-type or reversing-type strip mill to the required sheet thickness. The product has a surface covered with oxide or scale resulting from the hot-rolling operation.

2.2 hot-rolled descaled steel sheet : Hot-rolled steel sheet from which oxide or scale has been removed, commonly by pickling in an acid solution. Descaling may also be performed by mechanical means such as grit blasting. Oxide or scale on hot-rolled steel is subject to variations in thickness, adherence and colour. Removal of the oxide or scale may disclose surface imperfections not readily visible prior to this operation. As a deterrent to rusting, a coating of oil is usually applied to hot-rolled descaled sheet. It may be necessary for the reroller to ensure that this oil is compatible with subsequent processing.

2.3 mill edge : A normal side edge produced in hot-rolling. Mill edges may contain some irregularities such as cracked or torn edges or thin (feathered) edges.

2.4 edge trimmed : A normal edge obtained by shearing, slitting or trimming a mill edge product. In higher carbon steel, the cut edge may crack more readily during cold reduction, and an annealing operation may have to be included in the processing prior to cold-reduction.

1) In preparation.

2) At present at the stage of draft.

2.5 End product

It is desirable that the end product be identified, such as for the production of cold-reduced sheet or cold-reduced strip, or cold-reduced spring steel or tin mill products with qualities, tempers or finishes indicated. Such information is for guidance only since the reroller's equipment facilities and processing techniques and controls determine the end product characteristics.

3 CONDITIONS OF MANUFACTURE

3.1 Steelmaking

The process used in making the steel and in manufacturing hot-rolled sheet coil are left to the discretion of the manufacturer. When requested, the purchaser shall be informed of the steelmaking process being used. If necessary or required, the type of steel shall be designated. The reroller's facilities or the end product may require a specific type or a specific deoxidation practice.

3.2 Chemical composition

The chemical composition (cast analysis) shall be in accordance with that shown in the relevant International Standard for the product (see 1.1), or by agreement between the manufacturer and reroller at the time of ordering.

3.3 Chemical analysis

3.3.1 *Cast analysis*

A cast analysis of each cast of steel shall be made by the manufacturer to determine the percentage of carbon, manganese, phosphorus and sulphur, or any other elements agreed upon between the manufacturer and the reroller. This analysis shall conform to the relevant product standard or to any other agreement between the manufacturer and the reroller. When requested, this analysis shall be reported to the purchaser or his representative.

3.3.2 *Verification analysis*

A verification analysis may be made by the purchaser to verify the specified chemical composition of the semi-finished or finished steel and shall take into consideration any normal heterogeneity. Non-killed steels (such as rimmed or capped) are not technologically suited to verification analysis, except for copper analysis when copper-bearing steel is specified. For killed steels, or when copper-bearing steel is specified, the sampling method and the deviations in chemical analysis shall be agreed upon between the manufacturer and the reroller at the time of ordering.

4 DIMENSIONAL AND MASS TOLERANCES

4.1 Dimensional tolerances applicable to hot-rolled sheet coils for rerolling are shown in tables 1 to 4 inclusive. These tables apply to plain carbon steel specified to cast analysis up to carbon content of 0,25 % maximum, manganese 0,70 % maximum, phosphorus 0,05 % maximum and sulphur 0,05 % maximum. For other chemical compositions and where grain-refining elements are required, tolerances shall be subject to an agreement between the manufacturer and the purchaser.

4.2 Because of the variety of the manufacturers' and rerollers' facilities, the limitations on the masses of coils shall be the subject of an agreement between the manufacturer and reroller.

5 WORKMANSHIP

The surface condition shall be that normally obtained in the hot-rolled or hot-rolled descaled product for the end product application. Since this product is supplied in coils, the manufacturer is not afforded the opportunity to observe readily or to remove defective portions.

6 INSPECTION AND ACCEPTANCE

6.1 While not usually required for products covered by this International Standard, when the purchaser specifies inspection prior to shipment from the manufacturer's works, the manufacturer shall afford the purchaser's inspector all reasonable facilities to determine that the steel is being furnished in accordance with this International Standard.

6.2 Sheet that is reported to be defective after arrival at the user's works shall be set aside, properly and correctly identified and adequately protected. The supplier shall be notified in order that he may properly investigate.

7 COIL SIZE

A minimum or range of acceptable inside diameter (I.D.) shall be specified. In addition, the maximum outside diameter (O.D.) and the maximum acceptable coil mass shall be specified.

8 MARKING

Unless otherwise stated, the minimum requirements for identifying the steel shall be the following :

a) manufacturer's name or identifying brand;

b) the number of this International Standard;

c) coil number;

d) coil mass;

e) product dimensions;

f) agreed grade identify;

g) order number.

This information shall be shown legibly either on the coil or on an attached tag.

9 INFORMATION TO BE PROVIDED BY THE PURCHASER

To specify adequately the requirements under this International Standard, inquiries and orders shall include the following information :

a) the number of this International Standard;

b) the name of the material;

c) the dimensions of the product and the quantity required;

d) the chemical composition (see 3.2);

e) any special requirements, if required;

f) the end product with characteristics desired (see 1.1, 1.4 and 2.5);

g) whether pickling (or descaling by grit or shot blasting) is required (material so specified will be oiled unless ordered not oiled) (see 2.2);

h) the type of edge (mill edge or edge trimmed) (see 2.3 and 2.4);

i) a report of the cast analysis, if required (see 3.3.1);

j) limitations on masses and dimensions of individual coils, if applicable (see clause 7 and 4.2);

k) inspection prior to shipment from the manufacturer's works, if required (see 6.1).

NOTE – A typical ordering description is as follows :

International Standard ISO 3576, hot-rolled steel sheet coils for rerolling, mill edge, 90 000 kg, 2,5 × 1 200 mm × coil, 600 mm minimum I.D., 1 500 mm maximum O.D., maximum coil mass 15 000 kg, to be used for production of cold-reduced sheet, commercial quality (CR1) to ISO 3574.

TABLE 1 – **Thickness tolerances[1] on sheet (including descaled sheet)**

Values in millimetres

Specified widths	Thickness tolerances[2], over and under, for specified thicknesses							
	1,8 up to and including 2,00	over 2,00 up to and including 2,50	over 2,50 up to and including 3,00	over 3,00 up to and including 4,00	over 4,00 up to and including 6,00	over 6,00 up to and including 8,00	over 8,00 up to and including 10,00	over 10,00 to 12,50 inclusive
600 up to and including 1 200	0,21	0,23	0,24	0,26	0,30	0,35	0,38	0,41
Over 1 200 up to and including 1 500	0,23	0,25	0,26	0,28	0,31	0,36	0,41	0,43
Over 1 500 up to and including 1 800	0,25	0,27	0,28	0,29	0,32	0,38	0,43	0,46
Over 1 800	–	0,29	0,30	0,31	0,33	–	–	–

1) The values specified do not apply to the uncropped ends for a length l of a mill edge coil. Length l would be calculated from the formula :

$$\text{Length } l \text{ in metres} = \frac{90}{\text{Thickness in millimetres}}$$

provided that the result was not greater than 30 m.

2) Thickness is measured at any point on the sheet not less than 40 mm from a side edge.

TABLE 2 — **Width tolerances[1] on sheet (including descaled sheet), mill edge**

Values in millimetres

Specified widths	Tolerance
Up to and including 1 200	+ 30 0
Over 1 200 up to and including 1 500	+ 35 0
Over 1 500	+ 40 0

1) The values specified do not apply to the uncropped ends for a length l of a mill edge coil. Length l would be calculated from the formula :

$$\text{Length } l \text{ in metres} = \frac{90}{\text{Thickness in millimetres}}$$

provided that the result was not greater than 30 m.

TABLE 3 — ***Width tolerances on sheet* (including descaled sheet), edge trimmed**

Values in millimetres

Specified widths	Tolerance
Up to and including 1 200	+ 6 0
Over 1 200 up to and including 1 500	+ 8 0
Over 1 500	+ 10 0

TABLE 4 — **Camber tolerances on sheet (including descaled sheet)**

Camber tolerance
25 mm in any 5 000 mm length

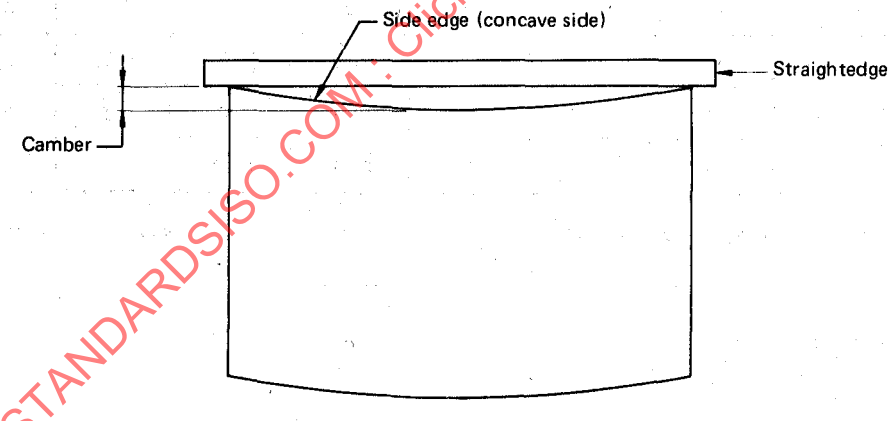

FIGURE 1 — **Measurement of camber**

Camber is the greatest deviation of a side edge from a straight line, the measurement being taken on the concave side with a straightedge.