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Cold-reduced steel sheet of high tensile strength and low yield point with improved formability

Tôles en acier laminées à froid à haute résistance à la traction et faible limite d'élasticité, et aptitude au formage accrue

Reference number
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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.

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The committee responsible for this document is ISO/TC 17, *Steel*, Subcommittee SC 12, *Continuous mill flat rolled products*.

This third edition cancels and replaces the second edition (ISO 14590:2005), which has been technically revised.

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Cold-reduced steel sheet of high tensile strength and low yield point with improved formability

1 Scope

This International Standard applies to cold-reduced steel sheet of two types that are commercially available in the world. Type 1 represents steels that are produced to mechanical properties only and Type 2 represents steels that are produced to both chemical and mechanical properties. Bake hardening steels are included in both types.

This International Standard does not cover steels designated as commercial quality or drawing qualities (covered in ISO 3574), steels of structural quality (covered in ISO 4997) or steels of higher strength with improved formability (covered in ISO 13887).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 16162, *Cold-rolled steel sheet products — Dimensional and shape tolerances*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
bake hardenable steel
highly formable steel that, subsequent to cold working, has been subjected to a low-temperature heat treatment, such as that used for paint baking (170 °C to 200 °C), in order to effect a significant increase in its yield strength, primarily due to carbon ageing

3.2
cold-reduced steel sheet
product obtained from hot-rolled descaled steel sheet by cold-reducing to the required sheet thickness followed by annealing to recrystallize the grain structure

3.3
dual-phase steel
steel whose thermal processing has resulted in a multi-phase structure that includes one or more low-temperature transformation products, thus providing for improved formability at higher strength levels

3.4
skin pass
light cold-rolling of the product

Note 1 to entry: The purpose of the skin passing is one or more of the following: to minimize the appearance of coil breaks, stretcher strains and fluting; to control the shape; and to obtain the required surface finish.

Note 2 to entry: Some increase in hardness and some decrease of ductility will result from skin passing.

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3.5
ageing
change in steel properties with the passage of time

Note 1 to entry: Ageing may result in a change in yield strength and a corresponding decrease in ductility during storage. Ageing always has a negative effect on formability. The redevelopment of a definite yield point phenomenon as a result of ageing can result in a renewed susceptibility to surface imperfections, such as stretcher strain marks (Lüder's Lines) and fluting when the steel is formed. To avoid these adverse outcomes, it is essential that the period between final processing at the producing mill and fabrication be kept to a minimum. Rotation of stock, by using the oldest material first, is important. Effective roller levelling immediately prior to fabrication can achieve reasonable freedom from stretcher strain marks.

3.6
lot
up to a specified quantity of steel sheet of the same designation rolled to the same thickness and grade

3.7
Type 1
cold-reduced steel sheet (3.2) specified to mechanical properties only

3.8
Type 2
cold-reduced steel sheet (3.2) specified to both mechanical properties and chemical composition

3.9
preliminary strain load
F_{WH}
load (kgf or N) of work hardening reached when the preliminary strain elongation specified in the tensile test is reached

Note 1 to entry: Preliminary strain elongation herein shall be 2 %.

Note 2 to entry: to entry: Refer to Figure A.2.

3.10
strain ageing yield load
F_{SA}
load (kgf or N) at yielding measured during the tensile testing of the specimen after it has been strained and heat-treated at 170 °C for 20 min

Note 1 to entry: Refer to Figure A.1.

3.11
BH amount
O_{BH}
value (kgf/mm^2 or N/mm^2) obtained by dividing the value (kgf or N) derived by subtracting the preliminary strain load, F_{WH}, from the strain ageing yield load, F_{SA}, of the test piece parallel portion original area (mm^2) before the preliminary strain

4 Dimensions

Cold-reduced steel sheet of high tensile strength and low yield point with improved formability is produced in thicknesses from 0,25 mm to 3,2 mm and in widths of 600 mm and over in coils and cut lengths. Product less than 600 mm wide, slit from wide sheet, will be considered as sheet.

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