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Steel sheet, zinc-5 % aluminium alloy-coated by the continuous hot-dip process, of commercial, drawing and structural qualities

Tôles en acier revêtues à chaud en continu d'alliage zinc-aluminium 5 %

Reference number
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Foreword

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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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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 12, *Continuous mill flat rolled products*.

This fourth edition cancels and replaces the third edition (ISO 14788:2011), which has been technically revised.

Steel sheet, zinc-5 % aluminium alloy-coated by the continuous hot-dip process, of commercial, drawing and structural qualities

1 Scope

This document is applicable to the minimum requirements for steel sheet, in coils and cut lengths, metallic-coated by the continuous hot-dip process, with zinc-5 % aluminium alloy coating.

The product is intended for applications requiring corrosion resistance, formability and paintability.

The steel sheet is produced in a number of quality designations and grades, coating type, coating mass, surface treatments and coating finish conditions designed to be compatible with differing application requirements.

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 1460, *Metallic coatings — Hot dip galvanized coatings on ferrous materials — Gravimetric determination of the mass per unit area*

ISO 2178, *Non-magnetic coatings on magnetic substrates — Measurement of coating thickness — Magnetic method*

ISO 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods*

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

ISO 7438, *Metallic materials — Bend test*

ISO 16163, *Continuously hot-dipped coated steel sheet products — Dimensional and shape tolerances*

3 Terms and definitions

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

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

— IEC Electropedia: available at https://www.electropedia.org/

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

3.1
commercial
base-metal quality intended for general fabricating purposes where sheet is used in the flat condition, or for bending or moderate forming

3.2
drawing
base-metal quality intended for parts where drawing or severe forming may be involved

3.3
deep drawing
base-metal quality intended for parts where severe forming or severe *drawing* (3.2) may be involved

3.4
deep drawing aluminium killed
base-metal quality intended for fabricating parts where particularly severe *drawing* (3.2) or forming may be involved or essential freedom from *ageing* (3.13) is required

3.5
extra-deep drawing stabilized
base-metal quality intended for applications requiring *interstitial-free steel* (*IF steel*) (3.6) which is non-ageing and has maximum formability

3.6
interstitial-free steel
IF steel
extra-low-carbon steel in which all interstitial elements are combined with titanium and/or equivalent elements

Note 1 to entry: Interstitial-free steel is sometimes referred to as “stabilized steel”.

3.7
breakage allowance
agreed upon level of acceptable die breakage not subject to claim

3.8
continuous hot-dip zinc-5 % aluminium-coated steel sheet
steel sheet product in coils or cut lengths manufactured on a continuous coating line with a hot-dip zinc-5 % aluminium coating on base metal of cold-reduced or hot-rolled descaled steel

3.9
differential coating
coating deliberately produced to have a different coating mass on each surface

3.10
normal spangle
coating formed as a result of the unrestricted growth of zinc-5 % aluminium alloy crystals during normal solidification

3.11
smooth finish
smoothness produced by *skin passing* (3.12) the coated material in order to achieve an improved surface condition as compared with the normal as-coated product

3.12
skin pass
light cold rolling of the coated steel sheet

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; to obtain the required surface finish.

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

3.13
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.

3.14
lot
up to a specified quantity of steel sheet of the same designation rolled to the same thickness and coating condition

3.15
coating mass
total amount of coating on both sides of the sheet

Note 1 to entry: Expressed in grams per square metre.

4 Dimensions

4.1 Zinc-5 % aluminium alloy-coated steel sheet is produced in thicknesses from 0,25 mm to 5 mm inclusive after coating, and in widths of 600 mm and over in coils and cut lengths. Zinc-5 % aluminium alloy-coated steel sheet less than 600 mm wide may be slit from wide sheet and will be considered as sheet.

4.2 The thickness of zinc-5 % aluminium alloy-coated sheet steel may be specified as a combination of the base metal and metallic coating, or as the base metal alone. The purchaser shall indicate on the order which method of specifying thickness is required. In the event that the purchaser does not indicate any preference, the thickness as a combination of the base metal and coating shall be provided. Annex A describes the requirements for specifying the thickness of the base metal alone.

5 Conditions of manufacture

5.1 Steelmaking

Unless otherwise agreed by the interested parties, the processes used in making the steel and in manufacturing zinc-5 % aluminium alloy-coated sheet are left to the discretion of the manufacturer. On request, the purchaser shall be informed of the steelmaking process being used.

5.2 Chemical composition

The chemical composition (heat analysis) shall conform to the requirements given in Tables 1 and 2.

5.3 Chemical analysis

5.3.1 Heat analysis

An analysis of each heat shall be made by the manufacturer in order to determine compliance with the requirements given in Tables 1 and 2. On request, a report of the heat analysis shall be made available to the purchaser or the purchaser's representative. Each of the elements listed in Tables 1 and 2 shall be included in the report of the heat analysis. When the amount of copper, nickel, chromium or molybdenum present is less than 0,02 %, the analysis may be reported as "< 0,02%".

5.3.2 Product analysis

A product analysis may be made by the purchaser in order to verify the specified analysis of the product and shall take into consideration any normal heterogeneity. The product analysis shall be in accordance with Tables 2 and 3.

Table 1 — Chemical composition (heat analysis)

Mass fractions in percent

Base-metal quality		C	Mn	P	S	Ti
Designation	Name	max.	max.	max.	max.	max.
01	Commercial	0,15	0,60	0,05	0,035	—
02	Drawing	0,10	0,50	0,04	0,035	—
03[a]	Deep drawing	0,08	0,45	0,03	0,03	—
04[a]	Deep drawing aluminium killed	0,06	0,45	0,03	0,03	—
05[a]	Extra-deep drawing stabilized	0,02	0,25	0,02	0,02	0,15
220 to 550	Structural	0,25	1,70	0,035[b]	0,035	—

[a] Interstitial-free steel may be applied (see 5.4.1.3).

[b] Grades 250 and 280: phosphorus – 0,10 % max. Grade 350: phosphorus – 0,20 % max.

Table 2 — Limits on additional chemical elements

Mass fractions in percent

Element	Cu[a]	Ni[a]	Cr[a,b]	Mo[a,b]	Nb[c]	V[c,d]	Ti[d]
	max.	max.	max.	max.	max.	max.	max.
Heat analysis	0,20	0,20	0,15	0,06	0,008	0,008	0,008
Product analysis	0,23	0,23	0,19	0,07	0,018	0,018	0,018

[a] The sum of copper, nickel, chromium and molybdenum shall not exceed 0,50 % on heat analysis. When one or more of these elements are specified, the sum does not apply, in which case, only the individual limits on the remaining elements apply.

[b] The sum of chromium and molybdenum shall not exceed 0,16 % on heat analysis. When one or more of these elements are specified, the sum does not apply, in which case, only the individual limits on the remaining elements apply.

[c] For interstitial-free steels only, the value of 0,15 % maximum for titanium, and 0,10 % maximum for niobium and vanadium are acceptable to ensure that the carbon and nitrogen are fully stabilized.

[d] Heat analysis greater than 0,008 % may be supplied after agreement between the manufacturer and the purchaser.

Table 3 — Product analysis tolerances for Table 1

Mass fractions in percent

Element	Maximum of specified element	Tolerance over maximum specified
C	0,02	0,01
	0,15	0,03
	0,25	0,04
Mn	0,60	0,03
	1,70	0,05
P	0,20	0,01
S	0,035	0,01
Ti	0,15	0,01

NOTE The above maximum tolerance is the allowable excess over the requirement of heat analysis shown in Table 1.