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Continuous hot-dip zinc-coated and zinc-iron alloy-coated carbon steel sheet of commercial and drawing qualities

Tôles en acier au carbone galvanisées en continu par immersion à chaud, de qualité commerciale et pour emboutissage

Reference number
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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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.

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

This fifth edition cancels and replaces the fourth edition (ISO 3575:2011), which has been technically revised.

Continuous hot-dip zinc-coated and zinc-iron alloy-coated carbon steel sheet of commercial and drawing qualities

1 Scope

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

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

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

This document does not cover steels designated as structural quality, which are covered in ISO 4998[1].

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 http://www.electropedia.org/

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

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

3.2
drawing
intended for parts where drawing or severe forming may be involved

3.3
deep drawing
intended for parts where severe forming or severe drawing may be involved

3.4
deep drawing aluminium killed
intended for fabricating parts where particularly severe drawing or forming may be involved

3.5
extra deep drawing stabilized
intended for applications where maximum formability is required by applying interstitial free steel

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

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

3.7
ageing
change in steel properties with the passage of time

Note 1 to entry: Ageing can 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.

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

3.9
continuous hot-dip zinc-iron alloy coated steel sheet
steel sheet product obtained by processing continuous hot-dip zinc-coated steel sheet to form a zinc-iron alloy coating

Note 1 to entry: This product, designated ZF, is not spangled, is normally dull in appearance and, for some applications, can be suitable for immediate painting without further treatment, except normal cleaning. Zinc-iron alloy coatings can powder during severe forming.

3.10
differential coating
coating deliberately produced to have a different coating mass on each surface

3.11
breakage allowance
agreed upon level of acceptable die breakage not subject to claim

3.12
normal spangle
coating formed as a result of unrestricted growth of zinc crystals during normal solidification

Note 1 to entry: This coating has a metallic lustre and is the type normally furnished for a wide variety of applications. It can be furnished S (normal coating, with skin pass) or N (normal coating, as coated); however, it can be variable in appearance and not suitable for decorative painting.

3.13
smooth finish
smoothness produced by skin-passing the coated material in order to achieve an improved surface condition as compared with the normal as-coated product

3.14
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; to obtain the required surface finish.

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

3.15
lot
up to a specified quantity of steel sheet of the same designation rolled to the same thickness and coating condition

3.16
coating mass
total amount of coating on both sides of the sheet, expressed in grams per square metre

4 Dimensions

4.1 Zinc-coated and zinc-iron 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-coated and zinc-iron alloy-coated steel sheet less than 600 mm wide, slit from wide sheet, will be considered as sheet.

4.2 The thickness of zinc-coated and zinc-iron alloy-coated steel sheet 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 will 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-coated and zinc-iron alloy-coated steel 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 tolerances 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

[a] Interstitial free steel may be applied (see 5.4.3).

Table 2 — Limits on additional chemical elements

Mass fractions in percent

Element	Cu[a] max.	Ni[a] max.	Cr[ab] max.	Mo[ab] max.	Nb[c] max.	V[cd] max.	Ti[c] 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 % 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 producer and purchaser.

Table 3 — Product analysis tolerances

Mass fractions in percent

Element	Maximum of specified element	Tolerance over maximum specified
C	0,15	0,03
Mn	0,60	0,03
P	0,05	0,01
S	0,035	0,01

NOTE The above maximum tolerance is the allowable excess over the specified requirement and not the heat analysis.

5.4 Mechanical properties

5.4.1 Ordering conditions

Zinc-coated and zinc-iron alloy-coated steel sheet of designations 02, 03, 04 and 05 are supplied under either of the following two ordering conditions:

a) Ordering condition A): steel sheet mechanical properties shall, at the time the steel is made available for shipment, satisfy the applicable requirements of Table 4, when they are determined on test pieces obtained in accordance with the requirements in Clause 7.

b) Ordering condition B): steel sheet, ordered to make an identified part, shall be supplied with a commitment for satisfactory manufacturing performance within an established breakage allowance, which shall be previously agreed upon by the interested parties. In the agreement, the part name, the details of fabrication, and special requirements (such as freedom from stretcher strain or fluting) shall be specified.

NOTE In the case of ordering condition B, mechanical properties of the steel sheet can also be agreed upon by the interested parties and such properties cannot necessarily satisfy the requirements of Table 4.

5.4.2 Fabrication qualities

Zinc-coated and zinc-iron alloy-coated steel sheet is available in several fabrication qualities as given in 3.1 to 3.5.

5.4.3 Interstitial free steel

Stabilized interstitial free steel (IF Steel) is applicable to orders for designations 03, 04 and 05; provided that the purchaser is informed of the substitution and that related shipping documents reflect the actual material shipped.

Table 4 — Mechanical properties

Base-metal quality[a]		R_{eL} max.[b] MPa[h]	R_m max.[c] MPa	A min.[d] %			$\bar{r}$ [e,f,g] min.	$\bar{n}$ [e,f,g] min.
Designation	**Name**			$L_o = 80$ mm	$L_o = 50$ mm	$L_o = 5{,}65\sqrt{S_o}$[i]		
01	Commercial	—	—	—	—	—	—	—
02	Drawing	300 [j]	430	24	23	22	—	—
03	Deep drawing	260	410	26	25	24	—	—
04	Deep drawing aluminium killed	220	410	29	28	27	—	—
05	Extra deep drawing stabilized	200	350	37	36	35	1,4	0,17

R_{eL} = lower yield strength

R_m = tensile strength

A = percent elongation after fracture

L_o = gauge length of original test piece

S_o = original cross-sectional area of gauge length

$\bar{r}$ = index of drawability of the product

$\bar{n}$ = index of the stretchability of the product

NOTE 1 Time period from date of shipment for values stated in this table to be applicable.

Designation	Time period
01	—
02	8 days
03	1 month
04	6 months
05	6 months

NOTE 2 For products produced according to performance criteria (ordering condition B), the typical mechanical properties presented here are non-mandatory. For products specified according to mechanical properties (ordering condition A), the purchaser may negotiate with the manufacturer if a specific range, or a more restrictive range, is required for the application. When agreed to, such values may be specified.

NOTE 3 With the exception of footnotes d and e, these typical mechanical properties apply to the full range of steel sheet thicknesses. The yield strength tends to increase and the formability tends to decrease as the sheet thickness decreases.

[a] All qualities are available with a normal spangle; minimized spangle or skin passed finish for Z coating designations, and with a matte or skin passed finish for ZF coating designations.

[b] The values apply to 0,2 % proof strength when a definite yield phenomenon is not present, otherwise to the lower yield strength (R_{eL}).

[c] Minimum tensile strength for qualities 02, 03, 04 and 05 would normally be expected to be 270 MPa. All tensile strength values are determined to the nearest 10 MPa.

[d] For material up to and including 0,6 mm in thickness, the elongation values in the table shall be reduced by 2.

[e] $\bar{r}$ and $\bar{n}$ values are only applicable to thickness 0,5 mm. For thickness > 2,0 mm, the $\bar{r}$ value is reduced by 0,2.

[f] $\bar{r}$ can also be written as r-bar and $\bar{n}$ can also be written as n-bar.

[g] $\bar{r}$ and $\bar{n}$ values may be modified or excluded from this specification, by agreement between the producer and the purchaser.

[h] 1 MPa = 1 N/mm2.

[i] May be used for material over 3 mm in thickness.

[j] This value applies to skin-passed products only.

5.5 Coating

5.5.1 Coating mass

The coating mass limits shall conform to the limits for the designations shown in Table 5. The interested parties shall agree upon the coating mass of differentially coated products. If a maximum coating mass is required, the manufacturer shall be notified at the time of ordering.

Table 5 — Coating mass (total both sides)

Coating designation (Z – zinc; ZF – zinc-iron alloy)	Minimum check limit	
	Triple-spot test g/m² (of sheet)	Single-spot test g/m² (of sheet)
Z001	No minimum [a]	No minimum [a]
Z100	100	85
Z180	180	150
Z200	200	170
Z275	275	235
Z350	350	300
Z450	450	385
Z600	600	510
Z700	700	595
ZF001	No minimum [a]	No minimum [a]
ZF100	100	85
ZF180	180	150

NOTE 1 Because of the many variables and changing conditions that are characteristic of continuous zinc coating, the coating mass is not always evenly divided between the two surfaces of zinc-coated and zinc-alloy coated sheet; neither is the coating evenly distributed from edge to edge. However, it can normally be expected that not less than 40 % of the single-spot check limit will be found on either surface.

NOTE 2 The coating thickness may be estimated from the coating mass by using the following relationship: 100 g/m² total mass both sides = 0,014 mm total thickness both sides.

[a] "No minimum" means that there are no established minimum check limits for triple- and single-spot tests.

5.5.2 Coating adherence

Zinc-coated (Z) sheet shall be capable of being bent in any direction, in accordance with the mandrel diameter requirements of Table 6, without flaking of the coating on the outside of the bend. Flaking of the coating within 7 mm from the edge of the test piece shall not be cause for rejection. The bend test requirements of Table 6 do not apply to zinc-iron alloy-coated (ZF) sheet.

Table 6 — Coating adherence — Bend test mandrel diameter

Base-metal quality	Coated metal –180° bend mandrel diameter mm								
	Coating designation								
	$e < 3$				$e \geq 3$				
	Up to Z275	Z350	Z450 Z600	Z700	Up to Z275	Z350	Z450	Z600	Z700
Commercial	1*a*	1*a*	2*a*	3*a*	2*a*	2*a*	2*a*	3*a*	4*a*
Drawing	0	1*a*	2*a*	2*a*	0	1*a*	2*a*	2*a*	2*a*
Deep drawing	0	1*a*	2*a*	2*a*	0	1*a*	2*a*	2*a*	2*a*
Deep drawing aluminium killed	0	1*a*	2*a*	2*a*	0	1*a*	2*a*	2*a*	2*a*
Extra deep drawing stabilized	0	1*a*	2*a*	2*a*	0	1*a*	2*a*	2*a*	2*a*
a = thickness of bend test piece, in millimetres *e* = thickness of steel sheet, in millimetres									

5.6 Weldability

This product is normally suitable for welding when appropriate welding methods and procedures are used with special attention to the heavier coatings. Zinc-iron alloy coatings (ZF) are usually more suitable than zinc coatings (Z) for resistance welding.

5.7 Painting

Zinc-coated, and especially zinc-iron alloy-coated steel sheet, is a suitable base for paint, but the first treatment may be different from those used on uncoated steel. Pre-treatment primers, chemical conversion coatings (chromate, phosphate or oxide type), and some paints specially formulated for direct application to zinc and zinc-iron surfaces, are all appropriate first treatments for zinc-coated and zinc-iron alloy-coated sheet. In drawing up a painting schedule, consideration shall be given to whether the zinc-coated and zinc-iron alloy-coated sheet shall be ordered in the passivated or not passivated state.

NOTE Surfaces with certain passivation treatments (e.g. chromated) are not suitable for phosphating or the application of a pre-treatment (etch) primer.

5.8 Surface treatment

5.8.1 Mill passivation

A chemical treatment is normally applied to zinc coatings to minimize the hazard of wet-storage staining (white rust) during shipment and storage. However, the inhibiting characteristics of the treatment are limited and if a shipment is received wet, the material shall be used immediately or dried. This treatment is not usually applied to zinc-iron alloy coatings because it interferes with the adhesion of most paints. If specified by the purchaser, zinc-iron alloy coatings shall have a chemical treatment applied.

5.8.2 Mill phosphating

When specified, the manufacturer shall apply phosphate treatments to zinc-coated and zinc-iron alloy-coated steel sheet to prepare the surface for painting without further treatment except normal cleaning.

5.8.3 Oiling

When specified, zinc-coated and zinc-iron alloy-coated steel sheet as produced shall be oiled to prevent marring and scratching of the soft surface during handling or shipping and to minimize wet storage stain.

NOTE When zinc-coated and zinc-iron alloy-coated steel sheet has received a passivating treatment, oiling will further minimize the hazard of wet storage stain.

5.9 Coated coil joining

Continuous coil coating lines use various methods to join coil ends. These methods include; lap welding, butt welding and stitching. The shipment of coils containing the joined coil ends shall be permitted if agreed upon between the purchaser and manufacturer.

5.10 Dimensional and shape tolerances

5.10.1 Dimensional and shape tolerances applicable to zinc-coated and zinc-iron alloy-coated steel sheet shall be as specified in ISO 16163. The tolerances for thickness apply to products whose thickness is a combination of base metal and coating thickness.

5.10.2 When base metal thickness is specified, the thickness tolerances of ISO 16163 shall apply to the average coated-product thickness calculated in accordance with Annex A.

6 Sampling

6.1 Tensile test

When required, one representative transverse sample from each lot of 50 t or less for shipment shall be taken for the tensile test to verify conformance to the requirements of Table 4.

6.2 Coating tests

6.2.1 Coating mass

6.2.1.1 The producer shall develop a testing plan with a frequency sufficient to adequately characterize the lot of material and ensure conformance with specification requirements.

6.2.1.2 The purchaser may conduct verification tests by securing a sample piece approximately 300 mm in length by the as-coated width, and cutting three test specimens, one from the mid-width position and one from each side, not closer than 25 mm to the side edge. The minimum area of each specimen shall be 1 200 mm^2.

6.2.2 Triple-spot test

The triple-spot test result shall be the average coating mass found on the three specimens taken in accordance with 6.2.1.

6.2.3 Single-spot test

The single-spot test result shall be the minimum coating mass found on any one of the three specimens used for the triple-spot test. Material, which has been slit from wide coil, shall be subject to a single-spot test only.

6.2.4 Coating adherence

One representative sample for the coating-adherence bend test shall be taken from each lot of sheet for shipment. The specimens for the coated bend test shall not be taken closer than 25 mm from a side edge. The minimum width for the test specimen shall not be less than 50 mm.

7 Test methods

7.1 Tensile test

The tensile test shall be conducted in accordance with the methods specified in ISO 6892-1. Transverse test pieces shall be taken midway between the centre and the edge of the as-coated sheet. Base-metal thickness shall be used to calculate the cross-sectional area needed for the tensile test; however, for orders specifying thickness "as base metal only", there are two permissible methods for determining the base-metal thickness:

a) Option A — Determine the actual base-metal thickness through direct measurement of the substrate of a specimen whose coating has been removed.

b) Option B — Calculation of the base-metal thickness, by subtraction of the average coating thickness for the appropriate coating designation included in Annex A from the actual coated thickness of the test specimen.

7.2 Coating properties

7.2.1 Coating mass

The manufacturer shall conduct tests using methods deemed necessary to ensure that the material complies with the requirements shown in Table 5. Commonly used methods include ISO 1460, ISO 3497 and ISO 2178. The coating mass is determined by converting coating thickness measurements made with magnetic gauges (ISO 2178) or by X-ray spectrometry (ISO 3497) using the relationship given in Table 5. Either the test method in ISO 2178 or ISO 3497 shall be used as a basis for acceptance, but not for rejection. In cases of dispute, ISO 1460 shall be used as the referee method.

7.2.2 Coating adherence

Bend tests shall be conducted in accordance with the methods specified in ISO 7438.

8 Designation system

8.1 General

The designation system includes the coating name, coating type, coating mass, coating condition, surface treatment and base-metal quality.

8.2 Coating designation

The letter Z indicates a zinc coating, and the letters ZF indicate a zinc-iron alloy coating.

8.3 Coating mass

8.3.1 The coating mass designations for zinc coating are Z001, Z100, Z180, Z200, Z275, Z350, Z450, Z600 and Z700. The coating mass designations for zinc-iron alloy coating are ZF001, ZF100 and ZF180.

8.3.2 The coating is expressed as the total mass on both surfaces, in grams per square metre. The coating mass specified should be compatible with the desired service life, the thickness of the base metal, and with the forming requirements involved.

NOTE For differential coatings, the coating mass of each surface, which is based on the agreement of the interested parties, is shown in the order of top surface and bottom surface. An example of a differential coating designation is: Z180Z100C02 (see 8.7.3).

8.4 Coating finish condition

The coating finish condition designations are:

— N: normal coating, as coated;

— S: normal coating with skin pass;

— M: minimized spangle, as produced;

— E: minimized spangle with skin pass.

The "M" and "E" coating conditions are normally furnished in designations Z350, Z275, Z200 and Z180 in thicknesses of 0,40 mm to 3 mm inclusive.

8.5 Surface treatment

The surface treatment designations are:

— C: mill passivation;

— P: mill phosphating;

— O: oiling;

— CO: mill passivation and oiling.

8.6 Base-metal quality designation

The base-metal quality designations are:

— 01: commercial quality;

— 02: drawing quality;

— 03: deep drawing quality;

— 04: deep drawing aluminium killed quality;

— 05: extra deep drawing stabilized quality.

8.7 Examples

8.7.1 An example of a complete designation is Z275NC02. This designation example includes the following components:

— Z: zinc coating;

— 275: coating mass;

— N: normal coating (as-coated);

— C: mill passivation;

— 02: drawing quality.

8.7.2 An example of a complete designation is ZF001SO04. This designation example includes the following components:

— ZF: zinc-iron alloy coating;

— 001: coating mass;

— S: normal coating (skin-passed);

— O: oiled;

— 04: deep drawing aluminium killed quality.

8.7.3 An example for differential coatings, the standard designation would give the top surface before the bottom surface; Z180Z100C02:

— Z: zinc coating;

— 180: coating-mass top surface;

— 100: coating-mass bottom surface;

— C: mill passivation;

— 02: drawing quality.

9 Retests

9.1 Machining and flaws

If any tensile test piece shows defective machining or develops flaws, it shall be discarded and another test piece shall be substituted.

9.2 Elongation

On any tensile test, if any part of the fracture is outside the middle half of the gauge length as scribed before the test, the test shall be discarded and a retest carried out.

9.3 Additional tests

If any test does not give the specified results, two additional tests shall be conducted on samples selected at random from the same lot. Both retests shall conform to the requirements of this document; otherwise the lot shall be rejected.

10 Resubmission

10.1 The manufacturer has the right to resubmit for acceptance the products that have been rejected during earlier inspection because of unsatisfactory properties, after the rejected products have been subjected to a suitable treatment (e.g. selection, heat treatment), which on request, will be indicated to the purchaser. In this case, tests shall be carried out as if they applied to a new lot.

10.2 The manufacturer has the right to present the rejected products to a new examination for compliance with the requirements for another quality.

11 Workmanship

11.1 The surface condition shall be that normally obtained for a zinc-coated and zinc-iron alloy-coated steel sheet product.

11.2 The steel sheet in cut lengths shall be free from quantities of laminations, surface flaws and other imperfections that are detrimental to the final product or to subsequent appropriate processing.

11.3 Processing for shipment in coils does not afford the manufacturer the opportunity to observe readily or to remove non-conforming portions, as can be carried out on the cut length product. However, it is the responsibility of the manufacturer to provide a product that meets the requirement for surface condition that is normally obtained on zinc-coated and zinc-iron alloy-coated steel sheet products.

12 Inspection and acceptance

12.1 Although not usually required for products covered by this document, when the purchaser specifies that inspection and tests for acceptance shall be observed 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 document.

12.2 Steel that is reported to be nonconforming after arrival at the user's works shall be set aside, properly and correctly identified and adequately protected. The manufacturer shall be notified in order that the reported nonconforming material may be properly investigated.

13 Coil size

When this document is ordered in coils, a minimum or range of acceptable inside diameter(s) (ID) shall be specified. In addition, the maximum outside diameter (OD) and the maximum acceptable coil mass shall be specified.

14 Marking

Unless otherwise stated, the following minimum requirements for identifying the steel sheet shall be legibly stencilled on the top of each lift, or shown on a tag attached to each coil or shipping unit:

a) the manufacturer's name or identifying brand;

b) a reference to this document, i.e. ISO 3575:2016;

c) the quality designation;

d) the coating designation;

e) the order number;

f) the product dimensions;

g) the mass;

h) the bundle or coil number.