UDC 669.146.99-41 : 669.586.5 January 1992

Continuously hot-dip galvanized structural steel sheet and strip

Technical delivery conditions
English version of DIN EN 10 147 : 1991

DIN EN 10 147

Kontinuierlich feuerverzinktes Blech und Band aus Baustählen

Supersedes DIN 17 162 Part 2, September 1980 edition.

European Standard EN 10 147 : 1991 has the status of a DIN Standard.

A comma is used as the decimal marker.

National foreword

This standard has been prepared by ECISS/TC 27.

The responsible German body involved in the preparation of this standard was the *Normenausschuß Eisen und Stahl* (Steel and Iron Standards Committee), Technical Committee 01 *Flacherzeugnisse; Gütenormen.*

Classification of steel grades

The following table correlates the steel grades covered in this standard and the equivalent grades previously covered in DIN 17 162 Part 2.

Steel grade as in DIN EN 10 147	Steel grade as in DIN 17 162 Part 2 Material	
	designation	number
Fe E 220 G	–	–
Fe E 250 G	StE 250-2 Z	1.0242
Fe E 280 G	StE 280-2 Z	1.0244
Fe E 320 G	StE 320-3 Z	1.0250
Fe E 350 G	StE 350-3 Z	1.0529
Fe E 550 G	–	–

Grade StE 280-3 Z is no longer included, grades Fe E 220 G and Fe 550 G have been introduced.

The specifications for standard designations still conform with those given in EURONORM 27, which is in the process of being adopted as a European Standard (EN 10 027-1). Since that European Standard will include changes to the symbols, it is not recommended that the symbols used hitherto be replaced by those specified in EURONORM 27 but, pending the publication of EN 10 027-1, that the material designations or numbers from DIN 17 162 Part 2 given in the above table be used for a transitional period.

Chemical composition and mechanical properties

No specifications have been made for the chemical composition.

Some changes have been made to the minimum values of tensile strength; the maximum values have been dropped.

Coatings

The requirements regarding coating type, finish, quality, surface treatment and coating mass havee been brought into line with the specifications of DIN EN 10 142.

The DIN Standards corresponding to the EURONORMs and European Standards referred to in clause 2 of the EN are as follows:

European Standard/EURONORM	DIN Standard
EN 10 002-1	DIN EN 10 002 Part 1
EN 10 020	DIN EN 10 020
prEN 10 021	DIN EN 10 021 (at present at the stage of draft)
EN 10 079	DIN EN 10 079
EN 10 204	DIN 50 049
EURONORM 12	DIN 50 111
EURONORM 27	DIN 17 006 (withdrawn)
EURONORM 148	DIN 59 232

Continued overleaf.
EN comprises 8 pages.

Standards referred to

(and not included in Normative references)

DIN EN 10 002 Part 1	Tensile testing of metallic materials; method of test at ambient temperature
DIN EN 10 020	Definition and classification of grades of steel
DIN EN 10 021	(at present at the stage of draft) General technical delivery conditions for steel and steel products
DIN EN 10 079	Definition and classification of steel products by shape and dimensions
DIN 50 049	Inspection documents for the delivery of metallic products
DIN 50 111	Bend testing of metallic materials
DIN 59 232	Hot-dip galvanized sheet and strip made of unalloyed mild steel or of structural steel; dimensions and tolerances on size and form

Previous edition

DIN 17 162 Part 2 : 09.80.

Amendments

In comparison with DIN 17 162 Part 2, September 1980 edition, the following amendments have been made.

a) The specifications for standard designations have been changed.
b) Grade StE 280-3 Z has been dropped, grades Fe E 220 G and Fe 550 G have been introduced.
c) Specifications relating to the chemical composition of the base material are no longer included.
d) The specifications for mechanical properties have been amended in some respects.
e) The specifications for available coatings and for the coating mass have been extended (cf. tables 2 and 3).
f) Zinc-iron alloy coatings have been introduced.

International Patent Classification

G 01 L 1/00

Editor's note

This standard reproduces the official text of the English version of EN 10 147 as issued by CEN. In its preparation for publication as DIN EN 10 147 (English version), certain points have been noted which we consider to be in need of correction. These have been marked +). The suggested amendments are given below and will be forwarded to the responsible CEN Secretariat for its consideration.

In presentation, orthography, punctuation and hyphenation, the aim has been to implement the PNE Rules consistently. Obvious errors (e.g. redundancies and omissions) have been rectified without further reference.

Suggested amendments

1 To make the sense complete, in A.3, 'fume hood' should preferably be substituted for 'take-off device'.

2 To make the sense complete, in A.4, the 4th item should be reworded to read '– after the attack, the sample is washed and brushed under running water, dried first with a cloth and then by heating to around 100 °C, and subsequently cooled down by blowing with warm air;'.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10 147

November 1991

UDC 669.146.99-41 : 669.586.5

Descriptors: Iron and steel products, metal plates, steel strip, structural steel, unalloyed steel, hot-dip galvanizing, continuous coating, delivery condition, designation, classification, inspection, testing, marking.

English version

Continuously hot-dip galvanized structural steel sheet and strip

Technical delivery conditions

Tôles et bandes en acier de construction galvanisés à chaud en continu; conditions techniques de livraison

Kontinuierlich feuerverzinktes Blech und Band aus Baustählen; technische Lieferbedingungen

This European Standard was approved by CEN on 1991-11-30. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 10 147 : 1991 E

Contents

Foreword

This European Standard has been prepared by ECISS/TC 27 'Surface coated steel flat products', the Secretariat of which is held by DIN.

It supersedes EURONORM 147-1979, Continuous hot-dip zin coated unalloyed steel sheet and coil with specified minimum yield strength for structural purposes; quality standard.

The European Committee for Iron and Steel Standardization (ECISS) has allocated TC 27 the task of transforming EURONORM 147 into a European Standard (EN 10 147).

This European Standard EN 10 147 was approved by CEN on 1991-11-30.

According to the CEN Internal Regulations, the following countries are bound to adopt this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

1.1 This European Standard specifies requirements for continuously hot-dip zinc coated flat products in thicknesses $\leq$ 3,0 mm made of the steels given in table 1. The thickness is the final thickness of the delivered product after zinc coating. This European Standard applies to strip of all widths and to sheets cut from it ($\geq$ 600 mm width) and cut lengths ($<$ 600 mm width).

The types of coating, coating masses and coating finishes available, and surface qualities are given in tables 2 to 4 (see also 5.2 to 5.4).

1.2 If agreed at the time of ordering, this European Standard may also be applied to continuously hot-dip zinc coated flat products in thicknesses $>$ 3,0 mm. In this case, the mechanical property, adhesion of coating and surface condition requirements shall also be agreed at the time of ordering.

1.3 The products covered by this European Standard are suitable for applications where the minimum yield strength values and resistance to corrosion are of prime importance. Corrosion protection afforded by the coating is directly proportional to the mass of coating (see also 5.2.2).

1.4 This European Standard is not applicable to

- continuously hot-dip zinc coated low carbon steel sheet and strip for cold forming (see EN 10 142);
- electrolytic hot-dip zinc coated flat steel products (see EURONORM 152);
- continuously organic coated flat steel products (see EURONORM 169).

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 10 002-1	Metallic materials; tensile testing. Part 1: Method of test at ambient temperature
EN 10 020	Definition and classification of grades of steel
prEN 10 021	General technical delivery conditions for steel and steel products
EN 10 079	Definition of steel products
EN 10 204	Metallic materials; types of inspection documents
EURONORM 12[1])	Bend test for steel sheet and strip less than 3 mm thick
EURONORM 27[1])	Designation of steels
EURONORM 148[1])	Continuous hot-dip zinc coated unalloyed mild steel sheet and coil with specified minimum yield strength for structural purposes; tolerances on dimension and shape

3 Definitions

For the purposes of this European Standard, the following definitions apply in addition to the definitions in EN 10 020, EN 10 021, EN 10 079 and EN 10 024:

3.1 hot-dip zinc coating: Application of zinc coating by immersing the prepared products in molten zinc. In this case, wide strip of steel is continuously hot-dip coated; the zinc content of the bath shall be at least 99 %.

3.2 coating mass: Total mass including both surfaces (in g/m²).

4 Designation

4.1 The products covered by this European Standard shall be designated as follows, in the order given:

a) type of product (e.g. strip, sheet or cut length);

b) number of this standard (EN 10 147);

c) full designation of the steel grades (e.g. Fe E 250 G; see table 1);

NOTE: The designations in table 1 are formed in accordance with EURONORM 27-74. This EURONORM is currently being transformed into a European Standard (EN 10 027-1). A change of the designations for the steel grades covered by EN 10 147 is also planned.

d) letter indicating the type of coating:
Z zinc coating
ZF zinc-iron alloy coating

e) number denoting the mass of coating (e.g. 275 = 275 g/m² including both surfaces; see table 4);

f) letter denoting the coating finish (N, M or R; see tables 2 and 3);

g) letter denoting the surface quality (A, B or C; see tables 2 and 3);

h) letter denoting the surface treatment (C, O, CO or U; see 5.5).

EXAMPLES:

Designation of strip made of steel Fe E 250 G, zinc coating (Z), coating mass 275 g/m² (275), coating finish: normal spangle (N), surface quality A, surface treatment: chemical passivation (C):

Strip EN 10 147 – Fe E 250 G Z275 NA–C

Designation of sheet made of steel Fe E 320 G, zinc-iron alloy coating (ZF), coating mass: 100 g/m² (100), coating finish: regular (R), surface quality B, surface treatment: oiled (O):

Sheet EN 10 147 – Fe E 320 G ZF100 RB–O

4.2 Where appropriate, additional information to the designation as specified in 4.1 shall be given to describe clearly the desired delivery requirements (see clause 12).

5 Classification of grades and types of delivery

5.1 Steel grades

Table 1 gives a summary of the steel grades available.

[1]) Until they are transformed into European Standard, either the EURONORMs listed or the corresponding national standards in annex B of this European Standard may be applied.

Table 1: Steel grades and mechanical properties of steels (for thicknesses $\leq$ 3 mm)

Steel grade	Yield strength R_{eH} N/mm² min.	Tensile strength R_m N/mm² min.	Elongation A_{80} % min[1)]
Fe E 220 G	220	300	20
Fe E 250 G	250	330	19
Fe E 280 G	280	360	18
Fe E 320 G	320	390	17
Fe E 350 G	350	420	16
Fe E 550 G	550	560	–

[1)] For product thicknesses $\leq$0,7 mm (including zinc coating), the minimum elongation values (A_{80}) shall be reduced by 2 units.

5.2 Coatings

5.2.1 Zinc (Z) or zinc-iron alloy (ZF) coatings as given in tables 2 and 3 are applicable for the products.

5.2.2 The available coating masses given in tables 2 and 3 may be supplied. Other coating masses shall be agreed separately at the time of ordering.

Thicker zinc coatings limit the formability and weldability of the products. Therefore, the forming and weldability requirements should be taken into account when ordering the coating mass.

5.2.3 If agreed at the time of ordering, different coating masses on each surface may be supplied for the hot-dip zinc coated flat products. The two surfaces may have a different appearance as a result of the manufacturing process.

5.3 Coating finish (see tables 2 and 3)

5.3.1 Normal spangle (N)

This finish is obtained when the zinc coating is left to solidify normally. Either no spangle or zinc crystals of different sizes and brightness appear, depending on the galvanizing conditions. The quality of the coating is not affected by this.

NOTE: If a pronounced spangle is desired, this shall be indicated specially at the time of ordering.

5.3.2 Minimized spangle (M)

The surface has minimized spangles obtained by influencing the solidification process in a specific way. The finish may be ordered if the normal spangle (see 5.3.1) does not satisfy the surface appearance requirements.

5.3.3 Regular zinc-iron alloy coating (R)

This coating results from heat treatment in which iron diffuses through the zinc. The surface has a uniform matt grey appearance.

5.4 Surface quality

(see tables 2 and 3 and subclause 6.6)

5.4.1 As coated surface (A)

Imperfections such as small pits, variations in spangle size, dark size, dark spots, stripe marks and light passivation stains are permissible. Stretch levelling breaks or zinc run-off marks may appear.

5.4.2 Improved surface (B)

Surface quality B is obtained by skin-passing.

With this surface quality, small imperfections such as stretch levelling breaks, skin pass marks, scratches, indentations, spangle structure and zinc run-off marks and light passivation marks are permissible. The surface has no pits.

5.4.3 Best quality surface (C)

Surface quality C is obtained by skin-passing.

The better surface shall not impair the uniform appearance of a high-class paint finish. The other surface shall have at least the characteristics of surface quality B (see 5.4.2).

Table 2: Available coatings, finishes and surface qualities for zinc coatings (Z)

Steel grade	Coating designation [1) 2)]	Coating finish N | M Surface qualities [2)] A	A	B	C
All	Z 100	×	×	×	×
	Z 140	×	×	×	×
	Z 200	×	×	×	×
	Z 225	×	×	×	×
	Z 275	×	×	×	×
	Z 350	×	×	–	–
	(Z 450)	(×)	–	–	–
	(Z 600)[3)]	(×)	–	–	–

[1)] See also 5.2.2.

[2)] The coating designations and surface qualities given in brackets are available on agreement.

[3)] Not for steel grade Fe E 550 G.

Table 3: Available coatings, finishes and surface qualities for zinc-iron alloy coatings (ZF)

Steel grade	Coating designation [1)]	Coating finish R Surface qualities A	B	C
All	ZF 100	×	×	×
	ZF 140	×	×	–

[1)] See also 5.2.2.

5.5 Surface treatment (surface protection)

5.5.1 General

Hot-dip zinc coated flat products generally receive surface protection at the producer's plant, as specified in 5.5.2 to 5.5.4. The period of protection afforded depends on the atmospheric conditions.

5.5.2 Chemical passivation (C)

Chemical passivation protects the surface against humidity and reduces the risk of formation of 'white rust' during transportation and storage. Local discoloration as a result of this treatment is permissible and does not impair the quality.

5.5.3 Oiling (O)

This treatment also reduces the risk of corrosion of the surface.

It shall be possible to remove the oil layer with a suitable degreasing solvent which does not adversely affect the zinc.

5.5.4 Chemical passivation and oiling (CO)

Agreement may be reached on this combination of surface treatment if increased protection against the formation of 'white rust' is required.

5.5.5 Untreated (U)

Hot-dip zinc coated flat products complying with the requirements of this standard are only supplied without surface treatment if expressly desired by the purchaser on his own responsibility. In this case, there is increased risk of corrosion.

Table 4: Coating mass

Coating designation[1]	Minimum coating mass, in g/m², including both surfaces[2]	
	Triple spot test[3]	Single spot test[3]
Z 100, ZF 100	100	85
Z 140, ZF 140	140	120
Z 200	200	170
Z 225	225	195
Z 275	275	235
Z 350	350	300
Z 450	450	385
Z 600	600	510

[1] The coatings available for the individual steel grades are given in tables 2 and 3.

[2] The coating mass of 100 g/m² (including both surfaces) corresponds to a coating thickness of 7,1 µm per side.

[3] See 7.4.4 and 7.5.3.

6 Requirements

6.1 Manufacturing process

The processes used in steelmaking and manufacture of the products are left to the discretion of the manufacturer.

6.2 Mechanical properties

6.2.1 The values given in table 1 apply for the mechanical properties. The values apply for any sample position, i.e. for both longitudinal samples and transverse samples.

6.2.2 The tensile test values relate to the test piece cross section without zinc coating.

6.2.3 A reduction in the formability of all the hot-dip zinc coated products specified in this standard may occur over time. Therefore, it is in the interest of the user to use the products as soon as possible after receiving them.

6.3 Freedom from coil breaks

If the products are to be delivered with freedom from coil breaks (fluting), this shall be indicated separately at the time of ordering.

6.4 Coating mass

6.4.1 The coating mass shall correspond to the data in table 4. The values apply for the total mass of the coating on both surfaces for the triple spot test and the single spot test (see 7.4.4 and 7.5.3).

The coating mass is not always equally distributed on both the product surfaces. However, it may be assumed that a coating mass of at least 40 % of the value given in table 4 for the single spot test exists on each surface of the product.

6.4.2 A maximum or minimum value for the coating mass may be agreed upon per surface of product (single spot test) for each coating given in table 4.

6.5 Adhesion of coating

The adhesion of the coating shall be tested using the method specified in 7.5.2. After bending, the coating shall show no signs of flaking, but an area of 6 mm from each edge of the specimen shall be disregarded in order to exclude the effect of the cutting. Crazing and roughening are permissible, as is dusting of zinc-iron alloy (ZF) coatings.

6.6 Surface condition

6.6.1 The surface shall comply with the requirements in 5.3 to 5.5. Unless otherwise agreed at the time of ordering, only one surface shall be inspected at the manufacturer's works. If requested, the supplier shall inform the purchaser whether the inspected surface is the top surface or the bottom surface.

Small edge cracks which may occur in the case of uncut edges are no justification for rejection.

6.6.2 When supplying strip in coils, there is greater risk of surface defects than if sheet and cut lengths are supplied as it is not possible for the manufacturer to eliminate all the defects in a coil. This shall be taken into account by the purchaser when evaluating the products.

6.7 Dimensions, tolerances on dimensions and shape

The requirements of EURONORM 148 shall apply.

6.8 Suitability for further processing

6.8.1 Products complying with the requirements of this standard – with the exception of grade Fe E 550 G – are suitable for welding using normal welding methods appropriate for the steel grade and coating mass.

6.8.2 Products complying with the requirements of this standard are suitable for bonding together.

6.8.3 All steel grades and surface qualities are suitable for organic coating. The appearance after this treatment depends on the surface quality ordered (see 5.4).

NOTE: Application of surface coatings requires corresponding pretreatment at the processor's works.

7 Testing

7.1 General

7.1.1 The products may be supplied with or without testing for compliance with the requirements of this European Standard.

7.1.2 If testing is desired, the purchaser shall give the following information at the time of ordering:

- type of test (specific or non-specific test; see EN 10 021);
- type of inspection document (see 7.7).

7.1.3 Specific tests shall be carried out in accordance with the requirements in 7.2 to 7.6.

7.2 Test units

The test unit consists of 20 t or a fraction of 20 t of hot-dip zinc coated flat products of the same grade and nominal thickness, coating finish and surface appearance. In the case of strip, a coil weighing more than 20 t is regarded as one test unit.

7.3 Number of tests

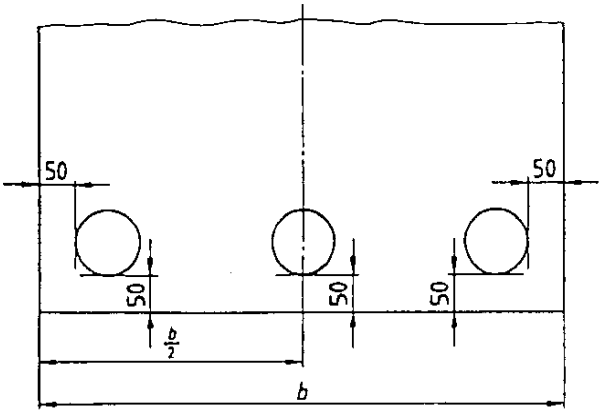
One series of tests shall be carried out per test unit as specified in 7.2 to determine

- the mechanical properties (see 7.5.1);
- the adhesion of the coating (see 7.5.2), and
- the coating mass (see 7.5.3).

7.4 Sampling

7.4.1 In the case of strip, the samples shall be taken from the beginning or end of the coil. In the case of sheet and cut lengths, the selection of the sample shall be left to the discretion of the inspector carrying out the inspection tests.

7.4.2 The samples for the tensile test (see 7.5.1) shall be taken at a distance of at least 50 mm from the edges of the product.



b = strip or sheet width

Figure 1: Position of the samples for determining the zinc coating mass (dimensions in millimetres)

7.4.3 The sample for the bend test to determine the adhesion of the coating (see 7.5.2) may be taken in any direction. The distance from the product edges shall be at least 50 mm. The size of the sample shall be such that the length of the folded edge is at least 100 mm.

7.4.4 The three samples for testing the coating mass (see 7.5.3) shall be taken as shown in figure 1 if the product width is adequate. The samples may be round or square and each individual sample shall be at least 5000 mm² in area.

If sampling as shown in figure 1 is not possible because the product width is too small, only one sample shall be taken with an area of at least 5000 mm². The coating mass determined from it shall comply with the requirements for the single spot test as specified in table 4.

7.4.5 All samples shall be taken, and, machined if necessary, in such a way that the results of the tests are not affected.

7.5 Methods of test to be used

7.5.1 The tensile test shall be carried out as described in EN 10 002-1 using type 2 test pieces (initial gauge length, $L_0 = 80$ mm; width, $b = 20$ mm) as described in EN 10 002-1 (see also 6.2.2).

7.5.2 The bend test to determine the adhesion of the coating (see also 6.5 and 7.4.3) shall be carried out as described in EURONORM 12.

The diameters, D, of the mandrel or bending roll given in table 5 shall be used. The angle of bend shall be 180° in all cases.

When pressing together with the two legs of the test piece, care shall be taken that the coating is not damaged.

7.5.3 The coating mass shall be determined from the difference in mass of the samples before and after the coating has been removed chemically. In the test with samples as shown in figure 1, the triple spot test value is the arithmetic mean of the three test results. Each individual result shall meet the requirements of the single spot test as given in table 4.

However, other methods (e.g. non-destructive tests) may be used for continuous checks at the manufacturer's works.

In cases of dispute, the method described in annex A of this standard shall be used.

7.6 Retests

The requirements of EN 10 021 shall apply. In the case of coils, the retest specimens shall be taken from a distance of at least one lap away, but at a maximum of 20 m from the end of the coil.

7.7 Inspection documents

If agreed at the time of ordering, one of the inspection documents specified in EN 10 204 shall be supplied (see 7.1.2).

8 Marking

8.1 A label shall be attached to each coil or bundle and shall contain at least the following information:

- name or mark of the manufacturer's works;
- full designation (see 4.1);
- nominal dimensions of the product;
- identification number;
- order number;
- mass of the coil or bundle.

Table 5: Bend test for determining adhesion of the coating (for product thicknesses ≤ 3 mm)

Coating	Bending mandrel diameter, D [1]					
	Fe E 220 G	Fe E 250 G	Fe E 280 G	Fe E 320 G	Fe E 350 G [2]	Fe E 550 G
Z 100, ZF 100	a	a	$2a$	$3a$	$3a$	–
Z 140, ZF 140	a	a	$2a$	$3a$	$3a$	–
Z 200	a	a	$2a$	$3a$	$3a$	–
Z 225	a	a	$2a$	$3a$	$3a$	–
Z 275	a	a	$2a$	$3a$	$3a$	–
Z 350	a	a	$2a$	$3a$	$3a$	–
Z 450	a	a	$2a$	$3a$	$3a$	–
Z 600	$2a$	$2a$	$3a$	$4a$	$4a$	–

[1] a = product thickness.
[2] Bending mandrel diameter = $4a$ for specimen thicknesses $> 1{,}5$ mm.

8.2 Marking of the products by branding may be agreed upon at the time of ordering.

9 Packaging

The packaging requirements for the product shall be agreed at the time of ordering.

10 Storage and transportation

10.1 Moisture, in particular condensation between the sheets, laps of the coil or other adjacent parts made of hot-dip zinc coated flat products, may lead to the formation of matt grey to white deposits (white rust). The possible types of surface protection are given in 5.5. However, if there is lengthy contact with moisture, the corrosion protection may be reduced locally. As a precaution, the product should be transported and stored dry and protected from moisture.

10.2 During transportation, dark spots may appear on the hot-dip zinc coated surfaces as a result of friction. Generally, they only impair the appearance. Friction is reduced by oiling the products. However, the following precautionary measures should be taken: secure packing, laid flat, no local pressure spots.

11 Disputes

prEN 10 021 is applicable to disputes after delivery and their settlement.

12 Information to be supplied by the purchaser

The following information is required from the purchaser so that the manufacturer may supply the products to conform with the requirements:

a) product type (strip, sheet, cut length);

b) nominal dimensions (thickness, width and, in the case of sheet and cut lengths, length);

c) quantity;

d) complete designation (see 4.1);

e) limiting mass and sizes of the coils and individual bundles of sheets;

f) any products desired with different coating masses on each side (see 5.2.3);

g) any products with pronounced spangle (see 5.3.1);

h) any products to be supplied free from coil breaks (see 6.3);

i) any maximum or minimum value for the coating per product side (see 6.4.2);

j) notification of which surface has been inspected (see 6.6.1);

k) any testing at the manufacturer's works (see 7.1.1 and 7.1.2);

l) any supply of an inspection document and type of document (see 7.7);

m) any marking desired by branding of the products (see 8.2);

n) any requirement for packaging (see clause 9).

Annex A (normative)

Reference method for determination of the zinc coating mass

A.1 Principle

The sample shall be at least 5000 mm² in area. Using a sample with a surface area of 5000 mm², the loss of mass, in grams, when the coating is dissolved, multiplied by 200, will represent the zinc mass in grams per m² of product, including both sides.

A.2 Reagents and preparation of the solution

Reagents:

- hydrochloric acid (HCl, ϱ_{20} = 1,19 g/cm³)
- hexamethylenetetramine

Preparation of the solution:

The hydrochloric acid is diluted with deionized or distilled water in the ratio one part HCl to one part water (50 % dilution). Hexamethylenetetramine is then added while stirring, in the ratio of 3,5 g per litre of dilute hydrochloric acid solution.

This prepared solution is equally suitable for a zinc coating or zinc-iron alloy coating and permits the execution of numerous successive dissolutions under satisfactory conditions of attack of the coating, both from the point of view of speed and accuracy.

A.3 Apparatus

Balance capable of weighing samples to an accuracy of 0,01 g. For the test, use a take-off device⁺).

A.4 Procedure

The following operations are applied to each sample:

- if necessary, degrease the test piece with an organic solvent which will not attack the zinc, then dry the sample;
- weigh the sample to an accuracy of 0,01 g;
- place the sample in the solution specified in A.2 at ambient temperature (20 to 25 °C). Leave the sample immersed in the solution until the release of hydrogen ceases or only a few bubbles are released;
- after the attack, the sample is washed and brushed under running water, dried with a cloth and then by heating to around 100 °C and cooled or dried by blowing with warm air⁺);
- weigh the sample again to an accuracy of 0,01 g;
- determine the difference between the mass of the coated sample and that of the sample without its coating. This difference, in grams, represents the mass, m, of the coating.

Annex B (informative)

List of national standards corresponding to the EURONORMs referred to (see clause 2)

Until their transformation into European Standards, either the EURONORMs referred to or the corresponding national standards in table B.1 may be used.

Table B.1: EURONORMs and corresponding national standards

EURO-NORM	Corresponding national standard in						
	Germany DIN	France NF	United Kingdom BS	Italy UNI	Belgium NBN	Sweden SS	Spain UNE
12	50111	A 03-158	1639			11 26 26	7 472
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