

Continuously hot-dip galvanized mild steel
sheet and strip for cold forming
Technical delivery conditions
English version of DIN EN 10 142

DIN
EN 10 142

Kontinuierlich feuerverzinktes Blech und Band aus weichen Stählen zum Kaltumformen; technische Lieferbedingungen

Supersedes DIN 17 162
Part 1, September 1977
edition.

European Standard EN 10 142 : 1990 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*.

Besides the principal amendments made to the standard now superseded, as listed on page 2, the following should be noted.

a) Classification and designation 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 1.

DIN EN 10 142	Steel grade as in	
	Designation	Material number
Fe P02 G	St 02 Z	1.0226
Fe P03 G	St 03 Z	1.0350
Fe P05 G	St 05 Z	1.0355
Fe P06 G	St 06 Z ¹⁾	1.0306 ¹⁾

¹⁾ Cf. DIN 17 162 Part 1, April 1988 draft.

Grades St 01 Z and St 04 Z are no longer included, grade Fe P06 G (St 06 Z) has been introduced for the first time. 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 Part 1). Since that European Standard will in-

clude 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 Part 1, that the material designations or numbers from DIN 17 162 Part 1 given in the above table be used for a transitional period.

b) Mechanical properties

The specifications for mechanical properties of grades Fe P03 G, Fe P05 G and Fe P06 G have been supplemented by adding maximum values of yield strength, the minimum elongation for grade Fe P03 G having been raised to 26 %.

The requirement regarding the behaviour of sheet and strip in the cupping test has been dropped since the majority of CEN members did not deem the results obtained in this test to be meaningful in the assessment of the formability of the material.

c) Coatings

The specifications for available coatings (cf. table 2) represent a compromise between the desire for an increase and that for a reduction in the number of standardized values, those coatings which did not find the support of the majority of the committee members being given in brackets. If such coatings are to be supplied, this must be agreed by manufacturer and customer.

Zinc-iron alloy coatings (denoted by ZF), which were not dealt with in DIN 17 162 Part 1, have been included for the first time (cf. table 3).

d) Surface characteristics

Coating finish S has been dropped, skin-passing of products now being required only for surface qualities B and C. Coating finish R has been specified for zinc-iron alloy coatings.

Continued overleaf.
EN comprises 8 pages.

Standards referred to

(and not included in **Normative references**)

DIN 17 010 General technical delivery conditions for steel and steel 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 1: 09.77.

Amendments

In comparison with DIN 17 162 Part 1, September 1977 edition, the following amendments have been made.

- a) The specifications for standard designations have been changed.
- b) Grades St 01 Z and St 04 Z have been dropped and grade Fe P06 G introduced.
- c) The specifications for mechanical properties have been amended.
- d) The cupping test (and the respective requirement) is no longer specified.
- e) The specifications for available coatings and for the coating mass have extended.
- f) Zinc-iron alloy coatings have been introduced.
- g) The reference method for determining the coating mass has been revised.

International Patent Classification

B 21 B 1/36

C 21 C 1/00

G 01 B 21/00

G 01 N 33/20

Editor's note

*This standard reproduces the official text of the English version of EN 10 142 as issued by CEN. In its preparation for publication as DIN EN 10 142 (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 *In the heading of clause 5, the generic term 'forms on delivery' or 'forms (to be) supplied (or delivered)' should preferably be substituted for 'types of delivery'.*
- 2 *To make the sense complete, in subclause 5.4.3, 2nd and 3rd sentence, 'face' be substituted for 'surface'.*
- 3 *In the heading of clause 6.9, 'form tolerances' (which is the common technical term) should be substituted for 'tolerances on shape'.*
- 4 *To make the sense complete, in A.3, 2nd sentence, 'fume hood' should preferably be substituted for 'take-off device'.*
- 5 *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 10 142

December 1990

UDC 669.146.99-4 : 689.586.5 : 620.1

Descriptors: Iron and steel products, steel strip, low carbon steels, hot-dip galvanizing, continuous coating, cold working, delivery condition, designation, acceptance testing, marking.

English version

**Continuously hot-dip zinc coated mild steel sheet
and strip for cold forming**

Technical delivery conditions

Tôles et bandes en acier doux galvanisés
à chaud et en continu pour formage à froid;
conditions techniques de livraison

Kontinuierlich feuerverzinktes Blech und
Band aus weichen Stählen zum Kaltumfor-
men; technische Lieferbedingungen

This European Standard was approved by CEN on 1990-08-04. 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

Contents

	Page		Page
1 Scope	2	7 Testing	6
2 Normative references	2	7.1 General	6
3 Definitions	3	7.2 Test units	6
4 Designation	3	7.3 Number of tests	6
5 Classification of grades and types of delivery*)	3	7.4 Sampling	6
5.1 Steel grades	3	7.5 Methods of test to be used	6
5.2 Coatings	4	7.6 Retests	7
5.3 Coating finish	4	7.7 Inspection documents	7
5.4 Surface quality	4	8 Marking	7
5.5 Surface treatment (surface protection)	4	9 Packing	7
6 Requirements	5	10 Storage and transportation	7
6.1 Manufacturing process	5	11 Disputes	7
6.2 Selection of properties	5	12. Information to be supplied by the purchaser	7
6.3 Mechanical properties	5	Annex A Reference method for determination of the zinc coating mass	8
6.4 Freedom from coil breaks	5	Annex B List of national standards corresponding to the EURNORMs referred to	8
6.5 Stretcher strains	5		
6.6 Coating mass	5		
6.7 Adhesion of coating	5		
6.8 Surface condition	5		
6.9 Dimensions, tolerances on dimensions and shape*)	5		
6.10 Suitability for further processing	5		

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 EURNORM 142-79 'Continuous hot-dip coated unalloyed mild steel sheet and coil for cold forming; technical delivery conditions' published by the European Coal and Steel Community.

The European Committee for Iron and Steel Standardization (ECISS) has allocated TC 27 the task of transforming EURNORM 142-79 into a European Standard (EN 10 142). prEN 10 142 appeared in September 1988.

This standard was approved by CEN on 1990-08-04.

In accordance with the requirements of the CEN/CENELEC 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 up to 3,0 mm, unless otherwise agreed at the time of ordering, made of the steel given in 5.1 and 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 (≥ 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 The products covered by this European Standard are suitable for applications where suitability for forming 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).

1.3 This European Standard is not applicable to

- continuously hot-dip zinc coated unalloyed steel sheet and strip with specified minimum yield strengths for structural purposes (see EURNORM 147);
- electrolytic zinc coated flat steel products (see EURNORM 152);
- continuously organic coated flat steel products (see EURNORM 169).

2 Normative references

- | | |
|-------------|---|
| EN 10 002-1 | Metallic materials; tensile testing. Part 1: Methods of test at ambient temperature |
|-------------|---|

EN 10 020	Definition and classification of grades of steel
EN 10 079	Definition of steel products
EN 10 204	Steel and steel products; types of inspection documents
EURONORM 12-55 ¹⁾	Bend test for steel sheet and strip less than 3 mm thick
EURONORM 21-78 ¹⁾	General technical delivery conditions for steel and steel-products
EURONORM 27-74 ¹⁾	Designation of steels
EURONORM 143-79 ¹⁾	Continuous hot-dip zinc coated unalloyed mild steel sheet and coil for cold forming; tolerances on dimensions and shape

3 Definitions

For the purposes of this European Standard, the following definitions apply.

3.1 hot-dip zinc coating: hot-dip zinc coating is basically the application of zinc coating by immersing the prepared products in molten zinc.

In this case, wide strip steel is continuously hot-dip coated; the zinc content of the bath shall be at least 99 %.

3.2 unalloyed and alloyed quality steels: see EN 10 020.

3.3 strip, sheet, cut lengths: see EN 10 079. Hot-dip zinc coated steel wide strip, if agreed at the time of ordering, may be further processed into strip of smaller width by slitting (slit strip) or into sheet or cut lengths by cutting.

3.4 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:

- type of product (e.g. strip, sheet or cut length);
- number of this standard (EN 10 142);
- full designation of the steel grade (e.g. Fe P03 G, see table 1);

NOTE: The designations in table 1 are formed in accordance with EURONORM 27 (1974). This EURONORM is currently being transformed into a European Standard (EN 10 027 Part 1). A change of the designations for the steel grades covered by EN 10 142 is also planned.

d) letter indicating the type of coating:

- Z Zinc coating
- ZF Zinc-iron alloy coating;

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

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 P03 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 10 142 — Fe P03 G Z275 NA — C

Designation of sheet made of steel Fe P05 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 10 142 — Fe P05 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 delivery requirements (see clause 12).

5 Classification of grades and types of delivery¹⁾

5.1 Steel grades

Table 1 gives a summary of the steel grades available. It contains the following steel grades listed in order of increasing suitability for cold forming.

Fe P02 G: bending and profiling quality

Fe P03 G: drawing quality

Fe P05 G: deep drawing quality

Fe P06 G: special deep drawing quality

Table 1. Steel grades and mechanical properties

Steel grade	Yield strength ¹⁾ R_e N/mm ² max. ²⁾	Tensile strength R_m N/mm ² max. ²⁾	Elongation A_{80} % min. ³⁾
Fe P02 G	—	500	22
Fe P03 G	300 ⁴⁾	420	26
Fe P05 G	260	380	30
Fe P06 G	220	350	36

¹⁾ The yield strength values apply to the 0,2 % proof stress ($R_{p0,2}$) if the yield point is not pronounced, otherwise to the lower yield point (R_{eL}).

²⁾ For all steel grades a minimum value of 140 N/mm² for the yield strength (R_e) and of 270 N/mm² for the tensile strength (R_m) may be expected.

³⁾ For product thicknesses $\leq 0,7$ mm (including zinc coating) the minimum elongation values (A_{80}) shall be reduced by 2 units.

⁴⁾ This value applies to skin-passed products only (surface qualities B and C).

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 are given in tables 2 and 3. 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 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 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 specified if the normal spangle applicable (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 6.8)

5.4.1 As-coated surface (A)

Imperfections such as small pits, variations in spangle 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 quality ²⁾			
		A	A	B	C
Fe P02 G	Z100	X	X	X	X
	Z140	X	X	X	X
	Z200	X	X	X	X
	(Z225)	X	X	X	X
	Z275	X	X	X	X
	Z350	X	X	-	-
	(Z450) (Z600)	X	-	-	-
Fe P03 G	Z100	X	X	X	X
	Z140	X	X	X	X
	Z200	X	X	X	X
	(Z225)	X	X	X	X
	Z275	X	X	X	X
Fe P05 G and Fe P06 G	Z100	X	X	X	X
	Z140	X	X	X	X
	Z200	X	X	X	X
	(Z225)	X	X	X	X
	(Z275)	X	X	X	X

1) See also 5.2.2.
2) The coating designations and surface qualities given in brackets are available on agreement.

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

Steel grade	Coating designation ¹⁾	Coating finish		
		R		
		Surface quality		
		A	B	C
All	ZF100	X	X	X
	ZF140	X	X	-

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 an increased risk of corrosion.

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 Selection of properties

6.2.1 The products are generally supplied on the basis of the mechanical property requirements in table 1.

6.2.2 If specially agreed at the time of ordering, products made of steel grades Fe P03 G, Fe P05 G and Fe P06 G with suitability for manufacturing a specific part may be supplied. In this case, the values in table 1 do not apply. The reject tolerances arising when the material is processed shall not exceed a specific proportion to be agreed upon at the time of ordering.

6.3 Mechanical properties

6.3.1 If ordered in accordance with 6.2.1, the mechanical property values in table 1 apply for the following periods agreed upon at the time of ordering, commencing from the date on which they are made available by the works:

- 8 days for steel grades Fe P02 G and Fe P03 G;
- 6 months for steel grades Fe P05 G and Fe P06 G.

6.3.2 The tensile test values apply to transverse samples and relate to the test piece cross section without zinc coating.

6.4 Freedom from coil breaks

If particular requirements are made for freedom from coil breaks (fluting), it may be necessary to skin-pass or stretch level the products. This treatment may limit the formability. Similar conditions exist for the appearance of coil breaks as for the appearance of stretcher strains (see 6.5).

6.5 Stretcher strains

6.5.1 In order to avoid the formation of stretcher strains when cold forming, it may be necessary for the products to be skin-passed at the manufacturer's works. As there is a tendency for stretcher strains to form again after some time, it is in the interest of the purchaser to use the products as soon as possible.

6.5.2 Products with surface qualities B and C are free from stretcher strains for the following periods commencing from the agreed date on which they are made available by the works:

- 1 month for steel grades Fe P02 G and Fe P03 G;
- 6 months for steel grades Fe P05 G and Fe P06 G.

6.6 Coating mass

6.6.1 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.

Table 4. Coating masses

Coating designation ¹⁾	Minimum coating mass, in g/m ² , including both surfaces ²⁾	
	Triple spot test ³⁾	Single spot test ³⁾
Z100, ZF100	100	85
Z140, ZF140	140	120
Z200	200	170
Z225	225	195
Z275	275	235
Z350	350	300
Z450	450	385
Z600	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 approximately 7,1 µm per surface.

3) See 7.4.4 and 7.5.3.

6.6.2 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 tables 2 and 3.

6.7 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. Cracking and roughening are permissible, as is dusting of zinc-iron alloy (ZF) coatings.

6.8 Surface condition

6.8.1 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 bottom surface.

Small edge cracks which may occur in the case of uncut edges are not justification for rejection.

6.8.2 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.

6.9 Dimensions, tolerances on dimensions and shape^{*)}

The requirements of EURONORM 143 shall apply.

6.10 Suitability for further processing

6.10.1 Products complying with the requirements of this standard are suitable for welding using the normal welding methods. With larger coating masses, special measures shall be taken for welding, as appropriate.

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

6.10.3 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 EURO-NORM 21);
- 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 type and surface condition. 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);
- the coating mass (see 7.5.3).

7.4 Sampling

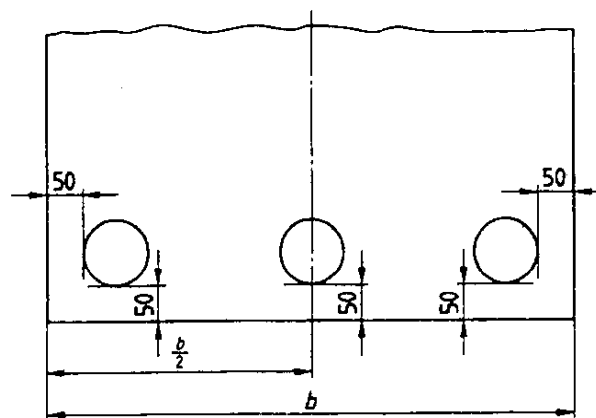
7.4.1 In the case of strip, the samples shall be taken from the beginning or end of the coil. In the case of sheet and cut lengths, the selection of the sample shall be left to the discretion of the inspector carrying out the inspection tests.

7.4.2 The sample for the tensile test (see 7.5.1) shall be taken transversely to the direction of rolling, at a distance of at least 50 mm from the edges of the product.

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 the 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.



b = strip or sheet width

Figure 1. Position of the samples for determining the zinc coating mass (dimensions in mm)

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

7.5 Method 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 annex A of EN 10 002-1 (see also 6.3.2).

7.5.2 The bend test to determine the adhesion of the coating (see also 6.7 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 the two legs of the test piece, care shall be taken that the coating is not damaged.

Table 5. Mandrel diameter in the bend test to determine the adhesion of the coating (see 7.5.2)

Coating designation	Mandrel diameter, D , in the bend test ¹⁾
Z100, ZF100 Z140, ZF140 Z200 Z225 Z275	0
Z350	1a
Z450 Z600	2a

¹⁾ a: Product thickness.

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 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 EURONORM 21 shall apply. In the case of coils, the retest specimens shall be taken from a distance of at least one lap away, but with 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 containing 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.

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

9 Packing

The packing 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

EURONORM 21 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 6.2.2);
- g) any products with pronounced spangle (see 5.3.1);
- h) any products suitable for the manufacture of a specific part (see 6.2.2);
- i) any products supplied free from coil breaks (see 6.4);
- j) any maximum or minimum value for the coating per product side (see 6.6.2);
- k) information on which surface is to be inspected (see 6.8.1);
- l) any testing at the manufacturer's works (see 7.1.1 and 7.1.2);
- m) any supply of a test document, and type of document (see 7.7);
- n) any marking desired by branding of the products (see 8.2);
- o) any requirement for packing (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 square metre of product, including both sides.

A.2 Reagents and preparation of the solution

Reagents:

- hydrochloric acid (HCl, $\rho_{20} = 1,19 \text{ g/cm}^3$);
- hexamethylenetetramine.

Preparation of the solution:

The hydrochloric acid is diluted with deionized or distilled water in the ratio one part of pure HCl to one part of water (50 % dilution). Hexamethylenetetramine is then added, 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 sample 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 hydrochloric acid solution with hexamethylenetetramine inhibitor, 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, calculated in grams, represents the mass 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 6 may be used.

Table 6. EURONORMs and corresponding national standards

EURO-NORM	Corresponding national standard in						
	Germany DIN	France NF	UK BS	Italy UNI	Belgium NBN	Sweden SS	Spain UNE
12	50 111	A 03-158	1639			11 26 26	7 472
21	17 010	A 03-115	2989	- EU 21	A 02-001	11 00 01	36 007
27	-	A 02-005	-	- EU 27	147	MNC1003 MNC1005	36 009
143	59 232	A 46-323	2989			21 12 20	36 130