BRITISH STANDARD

BS 3083:1988

Incorporating Amendment Nos. 1 and 2

Specification for

Hot-dip zinc coated and hot-dip aluminium/zinc coated corrugated steel sheets for general purposes

UDC 669.14 – 417.2:669.146:669.586.5

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Iron and Steel Standards Committee (ISM/-) to Technical Committee ISM/10, upon which the following bodies were represented:

British Railways Board
British Steel Industry
Cold Rolled Sections Association
Institution of Production Engineers
Society of Motor Manufacturers and Traders Ltd.

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

British Welded Steel Tube Association
Coated Metals Ltd.
Electricity Supply Industry in England and Wales
International Tin Research Institute
Lead Development Association
Metal Roof Deck Association
National Association of Steel Stockholders
Paintmakers Association of Great Britain Ltd.
Zinc Development Association

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6054	May 1990	
8761	November 1995	Indicated by a sideline in the margin

Contents

Foreword

This British Standard has been prepared under the direction of the Iron and Steel Standards Committee and is a revision of BS 3083:1980,which is withdrawn.

In this revision an aluminium/zinc coating (nominally 55 % aluminium) has been added. The zinc coated products specified in earlier editions of BS 3083 have however been retained and no changes have been made to dimensional requirements.

It should be noted that bi-metallic corrosion may occur if aluminium/zinc coated surfaces are allowed to come in contact with lead or copper. Run off water from copper pipes may also cause corrosion of the aluminium/zinc coated surface.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies the requirements for materials, profiles and dimensions of hot-dip zinc coated and hot-dip aluminium/zinc coated corrugated steel sheets for general purposes.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Designation

The designation shall consist of the following items in the order given:

a) the number of this British Standard, i.e. BS 3083;

b) the number of corrugations (see Table 2);

c) the coating designation (see Table 1), where "Z" indicates zinc coating, "AZ" indicates aluminium/zinc coating, and the number denotes the coating mass (e.g. 350 denotes 350 g/m^2 total including both surfaces).

Example of designation: BS 3083 10/3 Z 350.

3 General

Hot-dip zinc and aluminium/zinc coated corrugated steel sheets shall comply with clause **5** to clause **12**. Where any of the options given in Appendix A are called up at the time of the enquiry and order, the corrugated steel sheets shall, instead of or in addition to the basic specification, comply with the requirements of such options.

4 Information to be supplied by the purchaser

4.1 General

The following information shall be supplied by the purchaser at the time of the enquiry and order:

a) the complete designation as covered by clause **2**;

b) the required dimensions;

c) the quantity required and handling requirements.

4.2 Options

A number of options are specified in Appendix A. In the event that the purchaser does not indicate his wish to implement any of these options and specify his requirements at the time of enquiry and order, the manufacturer shall supply in accordance with the basic specification.

5 Steel base

The steel base of the products shall be a grade for which it can be assumed for design purposes that the yield strength will not be less than 220 N/mm^2.

See also option **A.1**.

6 Surface protection

The products shall be supplied chemically passivated.

See also option **A.2**.

NOTE 1 Chemical passivation is carried out after coating to protect the surface against humidity and to reduce the risk of formation of wet storage stain ("white rust" in the case of zinc coated products, "black rust" in the case of aluminium/zinc coated products). However, the inhibiting characteristics are limited, and if packs of sheets are received wet or become wet in storage, it is important that the sheets are immediately separated.

NOTE 2 Chemical passivation may cause slight discoloration of the surface that is not detrimental to the general performance of the product.

NOTE 3 If untreated products are specified, the manufacturer is not responsible for the formation of storage stain.

7 Oiling: aluminium/zinc coated products

Aluminium/zinc coated products shall be supplied on the basis that the presence of residual oil from processing is permitted.

See also option **A.3**.

8 Supply condition

The products shall be supplied not curved.

See also option **A.4**.

9 Coating

9.1 Coating mass

The minimum value of the coating mass shall be as given in Table 1 for the single and triple spot test when tested as described in **9.2** and **9.3**.

9.2 Test lot

A test lot shall consist of 50 t, or fraction thereof, of the same steel grade, coating type, coating mass, nominal thickness and number of corrugations.

9.3 Test method

9.3.1 *Sampling*. Three measurements shall be taken from one sheet in each test lot, one from the centre and one from each edge of the product at least 50 mm from the edge.

9.3.2 *Triple spot test*. The triple spot test shall be determined as the average coating mass of the measurements as specified in **9.3.1**.

9.3.3 *Single spot test*. The single spot test shall be the lowest coating mass result of any one of the measurements determined for the triple spot test.

NOTE See Appendix B for details of the referee method to be used in cases of dispute.

Table 1 — Minimum coating mass

Coating designation	Minimum coating mass (including both surfaces)	
	Triple spot test	Single spot test
	g/m^2	g/m^2
AZ 185	185	155
Z 350	350	300
Z 450	450	385
Z 600	600	510

NOTE 1 A zinc coating mass of 100 g/m^2, including both surfaces, corresponds to a coating thickness of approximately 7 µm on each surface. This relationship should be used for guidance only.
NOTE 2 An aluminium/zinc coating mass of 100 g/m^2, including both surfaces, corresponds to a coating thickness of 13.5 µm on each surface. This relationship should be used for guidance only.
NOTE 3 The mass of coating is not always evenly divided between the two surfaces of the sheet or from edge to edge. However, it can normally be expected that not less than 40 % of the specified minimum single spot test limit will be found on either surface.

9.3.4 *Retests*. If any test does not meet the specified requirements, two further sets of measurements shall be taken from the same lot for retest purposes.

Both these sets of measurements shall meet the specified requirements otherwise the lot shall be deemed not to comply with this standard. The manufacturer shall have the option to carry out rectification processing or sorting and resubmitting the product for inspection and testing.

9.4 Coating adherence

The coating adherence shall be such that there is no flaking of the coating after corrugating the sheets.

10 Dimensional requirements

10.1 Width

The widths before and after corrugating shall be as given in Table 2.

10.2 Profile and cover width

Sheets shall possess the profiles and have the nominal cover widths shown in Figure 1.

10.3 Overlap of corrugated sheets at sides

Information on overlap of corrugated sheets at sides is given in Appendix D.

10.4 Tolerances on length

The tolerances on length shall be as given in Table 3.

10.5 Tolerances on corrugations

The tolerance on the 19 mm depth of corrugation shall be + 0, – 3 mm as shown in Figure 5.

Table 2 — Width

Description	Width
	mm
Sheets before corrugating[a]	
8/3 corrugations	743
10/3 corrugations	908
10½/3 corrugations	946
12/3 corrugations	1070
12½/3 corrugations	1113
Sheets after corrugating (distance between the crowns of the outside corrugations)	
8/3 corrugations	610 ± 5
10/3 corrugations	762 ± 5
10½/3 corrugations	800 ± 6
12/3 corrugations	914 ± 6
12½/3 corrugations	952 ± 6

[a] Not always applicable to sheets for curving.

Table 3 — Tolerances on length

Ordered length	Tolerances
mm	
≤ 3 000	– 0 + 8 mm
> 3 000	– 0 + 0.30 %

10.6 Tolerances on thickness

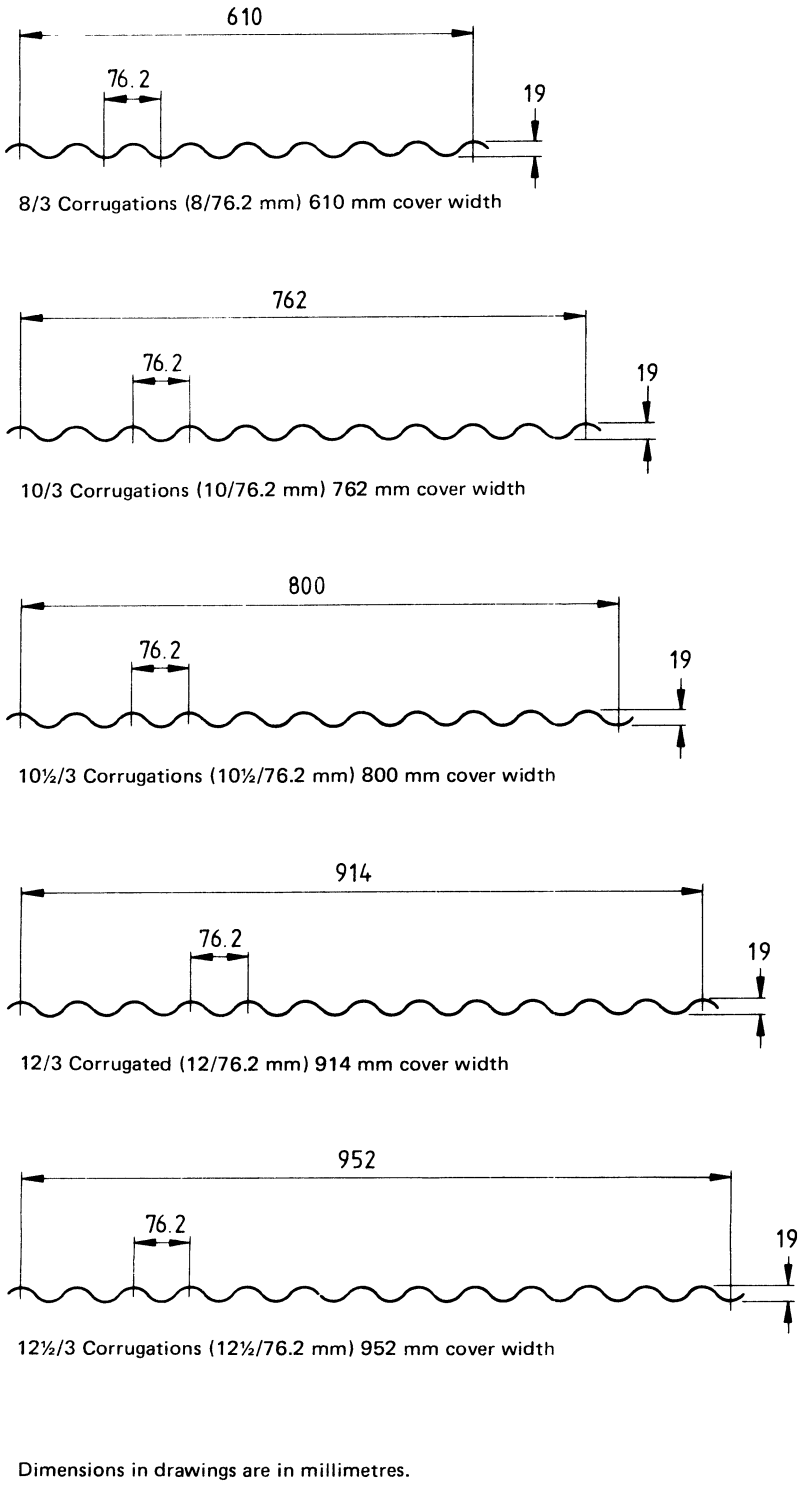
The tolerances on thickness shall be as given in Table 4.

Table 4 — Tolerances on thickness (including coating on both sides)

Specified coating thickness[a]		Tolerances[b]
Over	Up to and including	
mm	mm	mm
—	0.6	± 0.06
0.6	0.8	± 0.07
0.8	1.0	± 0.08
1.0	1.2	± 0.09
1.2	1.6	± 0.11
1.6	2.0	± 0.13

[a] Thickness should be measured at any point on the material not less than 40 mm from one edge.
[b] For coatings Z450 and Z600, thickness tolerance shall be increased by 0.02 mm.

See also option **A.5**.



Dimensions in drawings are in millimetres.

Figure 1 — Profile and cover width

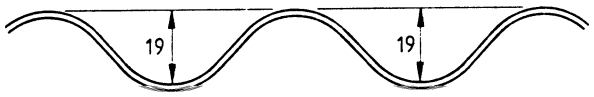


Figure 2 — Method of measuring depth of corrugations

11 Nominal mass per metre run

The nominal mass per metre run for zinc coated and aluminium/zinc coated products are given in Appendix C for guidance only.

12 Marking

The material shall be marked with the number of this British Standard, i.e. BS 3083,[1)] and the coating designation (see Table 1).

[1)] Marking BS 3083 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of this standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Appendix A Options

(See **4.2**.)

A.1 Steel base

The purchaser shall specify a structural grade specified in BS EN 10147 or BS EN 10215 as appropriate (see clause **5**).

A.2 Surface protection

The products shall be supplied untreated (see clause **6**).

A.3 Oiling: aluminium/zinc coated products

Aluminium/zinc coated products shall be supplied oiled (see clause **7**).

A.4 Supply condition

The products shall be supplied curved to the radius of curvature specified by the purchaser (see clause **8**).

NOTE Grades S 550 GD + Z (from BS EN 10147) and S 550 GD + AZ (from BS EN 10215) are unsuitable for curving.

A.5 Tolerances on thickness

If thickness is specified as a minimum with tolerances all plus, or if thickness is specified as a maximum with tolerances all minus, the permitted variation shall be double the tolerance values. The tolerances applicable shall be those for the mean of the range specified or implied.

Appendix B Method for determination of coating mass

B.1 Principle

Using a sample with a surface area of 5 000 mm^2, 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.

B.2 Reagents

Hydrochloric acid (HCl ρ_{20} = 1,19 g/cm^3)
Hexamethylenetetramine

B.3 Preparation of the solution

Dilute the hydrochloric acid with deionized or distilled water in the ratio one part pure HCl to one part water (50 % dilution). Add hexamethylenetetramine, 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.

B.4 Apparatus

B.4.1 *Balance* capable of weighing samples to an accuracy of 0,01 g. For the test, use a take-off device.

B.5 Procedure

The sample shall be at least 5 000 mm^2 in area.

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 °C 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, wash and brush the sample under running water, dry it with a cloth and then by heating to around 100 °C, and cool or dry by blowing with warm air.

— Weigh the sample again to an accuracy of 0,01 %.

— 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 m of the coating.

Appendix C Nominal mass per metre run (and length per mass)

Table 5 and Table 6 can be used to determine the nominal mass for any particular length of sheet, or the length for any particular mass of sheet(s). These tables are given for guidance purposes only.

Table 5 — Nominal mass per metre run (and length per mass) for hot-dip zinc coated products

Thickness	8/3 (743 mm)		10/3 (908 mm)		10½/3 (946 mm)		12/3 (1 070 mm)		12½/3 (1 130 mm)	
mm	kg/m	m/t	kg/m	m/t	kg/m	m/t	kg/m	m/t	kg/m	m/t
0.40	2.50	400	3.05	328	3.18	315	3.59	278	3.80	263
0.50	2.94	341	3.59	279	3.74	267	4.23	236	4.47	224
0.60	3.52	284	4.31	232	4.49	223	5.07	197	5.36	187
0.70	4.11	243	5.02	199	5.23	191	5.92	169	6.25	160
0.80	4.70	213	5.74	178	5.98	167	6.77	148	7.15	140
0.90	5.28	192	6.45	156	6.73	151	7.61	133	8.04	126
1.00	5.87	170	7.17	139	7.48	134	8.46	118	8.93	112
1.20	7.05	142	8.61	116	8.97	111	10.15	99	10.72	93
1.60	9.40	106	11.48	87	11.96	84	13.53	74	14.29	70
2.00	11.75	85	14.35	70	14.95	67	16.92	59	17.87	56

Table 6 — Nominal mass per metre run (and length per mass) for hot-dip aluminium/zinc coated products

Thickness	8/3 (743 mm)		10/3 (908 mm)		10½/3 (946 mm)		12/3 (1 070 mm)		12½/3 (1 130 mm)	
	kg/m	m/t	kg/m	m/t	kg/m	m/t	kg/m	m/t	kg/m	m/t
0.40	2.18	459	2.66	376	2.78	360	3.14	318	3.31	302
0.50	2.76	362	3.37	297	3.52	284	3.98	251	4.20	238
0.60	3.38	299	4.09	244	4.25	235	4.82	207	5.09	196
0.70	3.93	254	4.80	208	5.01	200	5.66	177	5.98	167
0.80	4.51	222	5.52	181	5.75	174	6.50	154	6.86	146
0.90	5.10	196	6.23	161	6.49	154	7.34	136	7.75	129
1.00	5.68	176	6.94	144	7.23	138	8.18	122	8.74	116
1.20	6.74	148	8.37	119	8.72	115	9.86	101	10.41	96

Appendix D Overlap of corrugated sheets at sides

D.1 One corrugation overlap

This overlap is as shown in Figure 3. The sheets usually have the edge corrugations turned downwards.

Figure 3 — One corrugation overlap

D.2 One-and-a-half corrugations overlap

This overlap is achieved by turning over each alternate sheet so that its outside corrugation is turned or by using 10½/3 or 12½/3 corrugations (see Figure 4).

Figure 4 — One-and-a-half corrugations overlap

D.3 Two corrugations overlap

This overlap is as shown in Figure 5. It is laid with both edges turned downwards.

Figure 5 — Two corrugations overlap

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Publications referred to

BS EN 10125, *Continuously hot dip aluminium zinc (AZ) coated sheet and strip.*
BS EN 10147, *Continuously hot dip zinc coated structural steel sheet and strip.*

BSI — British Standards Institution

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