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Specification for

Cold-reduced tinplate and cold-reduced blackplate

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The following BSI references relate to the work on this standard:
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Department of Employment
Department of Trade and Industry
(Marine Division)

Documents

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FOREWORD

This British Standard, prepared under the authority of the Iron and Steel Industry Standards Committee, is a revised and metricated version of the 1969 edition. It refers to tinplate and blackplate delivered in sheet form and has taken account of the content of ISO/R 1111 'Cold-reduced tinplate and cold-reduced blackplate', Part 1, 'Sheet'.

The coding system has been modified in this edition to align with ISO/R 1111 Part 1. Obsolete codes are related to the new codes in appropriate parts of the standard.

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BRITISH STANDARD SPECIFICATION FOR
COLD-REDUCED TINPLATE AND
COLD-REDUCED BLACKPLATE

1. SCOPE

1.1 This British Standard specifies requirements for:

- (1) *Tinplate*. Cold-reduced tinplate sheet in nominal thicknesses from 0.17 mm up to 0.50 mm inclusive.
- (2) *Blackplate*. Cold-reduced blackplate sheet in nominal thicknesses from 0.17 mm up to 0.50 mm inclusive.

1.2 Tinplate and blackplate of qualities or properties not specified in this standard may be supplied by agreement between the manufacturer and the purchaser.

1.3 This standard does not apply to tinplate or blackplate in coils, nor to double-reduced tinplate or blackplate, nor to material described commercially as tinned sheets or steel sheets.

1.4 The properties covered by this British Standard are detailed in Clause 4.

NOTE. The titles of the British Standards referred to in this standard are given on the inside back cover.

2. DEFINITIONS

For the purposes of this British Standard the following definitions apply:

(1) *Tinplate*. Low carbon mild steel sheet coated with tin applied either by dipping in molten tin or by electrodeposition. Tinplate produced by the hot-dipping process is called hot-dipped tinplate; that produced by electrodeposition is called electrolytic tinplate.

(2) *Electrolytic tinplate - differentially coated*. Electrolytic tinplate one surface of which carries a thicker tin coating than the other. (See Table 3.)

(3) *Blackplate*. Low carbon mild steel sheet, not tinned, and normally not oiled or otherwise treated.

(4) *Consignment*. A quantity of tinplate or blackplate of the same dimensions and quality and despatched at the same time.

NOTE. A list of general trade terms is included as Appendix F.

3. MANUFACTURE AND USAGE

3.1 The methods of manufacture of tinplate and blackplate are the province of the producer.

3.2 The methods of using tinplate and blackplate are the province of the consumer.

3.3 When ordering tinplate or blackplate it is recommended that the usage for which the tinplate or blackplate is intended should be stated and, when he so desires, the purchaser should indicate to the manufacturer the direction of rolling (grain direction) required, by underlining the rolling width dimension on his order.

It is recommended that the purchaser should be informed of any alterations in the method of manufacture which might significantly affect the properties of the purchased product. Similarly, the purchaser should inform the manufacturer of modifications in his fabrication methods which might significantly affect the way in which the purchased product is to be used.

3.4 In certain circumstances it may be agreed, by special arrangement between the manufacturer and the purchaser, that bulk packages of electrolytic tinplate shall be marked in numerical order to disclose the sequence in which the tinplate was cut up into sheet form on a particular cutting unit.

3.5 Under normal conditions of storage and use tinplate and blackplate are suitable for surface treatments such as lacquering and printing. Appropriate grades and temper numbers are also suitable for

Shaping operations such as stamping, drawing, folding and bending;

Assembly work such as joint-forming, soldering (tinplate only) and welding.

4. PROPERTIES

Requirements covering the following properties are included in this British Standard and, except in the case of the five surface finishes, the means of verifying conformity with the appropriate requirements are also specified.

- (1) Grades (see Clause 5)
- (2) Thickness (see Table 2)
- (3) Linear dimensions (see 10.2)
- (4) Squareness (see 8.5)
- (5) Tin coating (see Table 3)
- (6) Temper numbers (see Table 4)
- (7) Alternating bend test values (see Table 5)
- (8) Surface finishes (see Appendix C)

5. GRADES

5.1 *Hot-dipped tinplate.* After coating, hot-dipped tinplate shall be inspected and graded as follows.

(1) *First grade.* Tinplate which at the time of despatch is free from defects readily visible to the unaided eye. Under normal conditions of storage and use it is suitable for lacquering or printing over the whole surface of the sheet.

(2) *Second grade.* Tinplate which at the time of despatch has visible imperfections of moderate magnitude or frequency. Lacquering or printing over the whole surface of the sheet cannot be guaranteed.

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(3) *Standard grade.* Tinplate which is inspected during processing, and from which material not of first or second grade is rejected. The accepted material, however, is not segregated into first and second grades.

5.2 *Electrolytic tinplate (equally or differentially coated).* After coating, electrolytic tinplate shall be inspected and graded as follows.

Standard grade. Standard grade electrolytic tinplate represents the normal production of lines employing the usual inspection and classification procedures. In normal conditions of storage and use, standard grade electrolytic tinplate permits lacquering and printing over the whole surface.

NOTE. If heavy oil coatings are ordered these may affect the suitability for lacquering and printing.

5.3 *Blackplate.* Blackplate is line inspected during processing. Material having visible imperfections of only moderate magnitude or frequency is included. Blackplate is liable to rust but, at the time it is made available by the manufacturer, the material is suitable for normal lacquering and printing over the whole surface.

6. SAMPLING PROCEDURES

6.1 *General.* In cases where tests are made to verify compliance with the requirements of this British Standard, they shall be made on samples selected as described in 6.2, 6.3 and 6.4.

6.2 *Selection of bulk packages for sheet sampling*

6.2.1 There are three 'classes' of consignment as follows:

- (1) Small consignments: less than 4000 sheets
- (2) Medium consignments: 4000 sheets, up to and including 20 000 sheets
- (3) Large consignments: exceeding 20 000 sheets.

For sheet sampling purposes, each bulk package is considered to contain approximately 1000 sheets.

6.2.2 Bulk packages shall be selected at the appropriate rate given in Table 1.

TABLE 1. RATE OF SELECTION OF BULK PACKAGES

Consignment class	Number of sheets in consignment	Rate of selection of bulk packages
Small	Less than 4 000	Each bulk package
Medium	4 000 - 20 000	4 at random
Large	20 001 - 40 000	8 at random
	40 001 - 60 000	12 at random
	60 001 - 80 000	16 at random
	and so on	

6.2.3 In the case of large consignments it is important that the bulk packages selected should fairly represent the consignment. It will be found convenient to divide a large consignment into lots of approximately 20 bulk packages and from each of these lots to select the appropriate number of bulk packages to make up the total specified in Table 1. For property verification the bulk packages so selected shall be grouped together to represent the whole consignment.

6.3 *Selection of sheets from selected bulk packages*

6.3.1 *General.* From each of the bulk packages, selected as described in 6.1, sheets shall be selected at the rates given in 6.3.2, 6.3.3, 6.3.4 and 6.3.5.

6.3.2 *Verification of grades.* 50 sheets shall be taken at random from each of the selected bulk packages.

NOTE. Specimen sheets for the verification of other properties may be taken from this sample.

6.3.3 *Verification of thickness, linear dimensions and squareness*

6.3.3.1 *Large and medium consignments.* From each of the selected bulk packages five sheets shall be taken at random.

6.3.3.2 *Small consignments.* A sample of 20 sheets shall be taken at random, all bulk packages being included.

6.3.4 *Verification of tin coating weight*

6.3.4.1 *Hot-dipped tinplate.* Two sheets shall be taken from each of the selected bulk packages. Test specimens from each of the sheets shall be taken for determination of the tin coating weight.

6.3.4.2 *Electrolytic tinplate (equally coated or differentially coated).* One sheet shall be taken from each of the selected bulk packages. Test specimens from each of the sheets shall be taken for determination of the tin coating weight.

6.3.5 *Verification of mechanical properties (i.e. temper number and alternating bend test values).* One sheet shall be taken from each of the selected bulk packages (this can be one of the two sheets selected for the verification of hot-dipped tin coating, or the single sheet selected for the verification of electrolytic tin coating).

6.4 *Selection of test specimens from within a sheet*

6.4.1 *General.* The test specimens required for determination of thickness variation within a sheet, tin coating weight and mechanical properties shall be taken from each sample sheet as illustrated in Fig. 1.

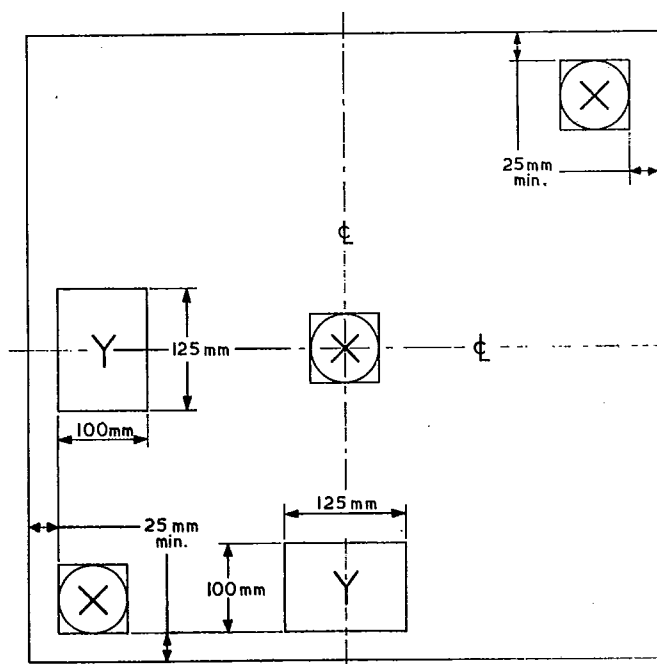
6.4.2 *Thickness.* Thickness variation within a sheet shall be determined on the two specimens marked Y. Each specimen shall be so taken that its edge is not less than 25 mm from the sheet edge and the specimen shall be of the dimensions given in Fig. 1.

6.4.3 *Tin coating weight.* Tin coating weight shall be determined on three specimens taken from each sample sheet at the positions marked X in Fig. 1. Each specimen shall be of an area not less than 2500 mm² and preferably should be in the form of discs accurately punched from the three marked positions. The edge specimens shall be clear of the edges of the sheet by a minimum of 25 mm.

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6.4.4 *Mechanical properties.* The temper number, which is measured in terms of Rockwell Superficial HR 30T values, shall be determined on the specimens marked Y in Fig. 1.

Alternating bend tests shall be carried out on two bend test pieces so cut from each of the specimens marked Y in Fig. 1 that they are at right angles to each other and parallel to the sheet edges.



X = Specimens for tin coating weight tests.

Y = Specimens for hardness, alternating (Jenkins) bend tests and determination of within sheet thickness tolerance.

FIG. 1. POSITION OF TEST SPECIMENS

7. VERIFICATION PROCEDURES

7.1 *General.* Compliance with the relevant requirements of this British Standard shall be verified by the adoption of the procedures given in 7.2 to 7.7 inclusive on the sample selected in accordance with Clause 6.

7.2 *Grades.* Each whole sheet of the sample selected shall be visually examined.

7.3 Thickness

7.3.1 Except when determining the variation within a sheet, thickness shall be derived by determining the mass of a whole sheet, measuring the area and applying the formula given in 7.3.3. The mass of the sheet shall be determined to a precision of 2 g, and the thickness shall be stated to the nearest 0.001 mm. The dimensions of the sheet shall be measured to a precision of 0.5 mm.