

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 1111

COLD-REDUCED TINPLATE AND COLD-REDUCED BLACKPLATE

PART 1

SHEET

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 1111, *Cold-reduced tinplate and cold-reduced blackplate – Part 1 : Sheet*, was drawn up by Technical Committee ISO/TC 17, *Steel*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of a Draft ISO Recommendation.

In December 1967, this Draft ISO Recommendation (No. 1374) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Germany	South Africa, Rep. of
Austria	Hungary	Spain
Belgium	India	Sweden
Brazil	Israel	Switzerland
Canada	Italy	Thailand
Chile	Japan	Turkey
Colombia	Netherlands	U.A.R.
Czechoslovakia	New Zealand	United Kingdom
Denmark	Norway	U.S.A.
Finland	Poland	U.S.S.R.
France	Romania	

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in September 1969, to accept it as an ISO RECOMMENDATION.

COLD-REDUCED TINPLATE AND COLD-REDUCED BLACKPLATE

PART 1

SHEET

SECTION I

GENERAL

1. SCOPE

- 1.1 This ISO Recommendation applies to cold-reduced tinplate sheet in low carbon mild steel in nominal thicknesses from 0.15 mm (0.0060 in) up to and including 0.49 mm (0.0193 in) and to cold-reduced blackplate sheet in low carbon mild steel in nominal thicknesses from 0.15 mm (0.0060 in) up to and including 0.49 mm (0.0193 in).
- 1.2 Thicknesses of tinplate and blackplate outside the ranges specified in clause 1.1 may be supplied by agreement between the manufacturer and the purchaser.
- 1.3 This ISO Recommendation does not apply to tinplate or blackplate in coils, or to double reduced tinplate or blackplate, or to material described commercially as tinned sheets or steel sheets.

2. DEFINITIONS

For the purpose of this ISO Recommendation the following definitions apply :

- ✓ 2.1 *Tinplate*. Low carbon mild steel sheet coated on both faces with tin, applied either by dipping in molten tin or by electro-deposition.
Tinplate produced by the hot-dipping process is called hot-dipped tinplate; that produced by electro-deposition is called electrolytic tinplate.
- 2.2 *Blackplate*. Low carbon mild steel sheet, not tinned, and normally not oiled or otherwise treated.
- ✓ 2.3 *Differentially coated tinplate*. Electrolytic tinplate, one surface of which carries a heavier tin coating than the other.
- 2.4 *Minimum average coating weight*. The minimum average coating weight values as shown in Tables 1, 2 and 3 represent the minimum permissible values for the arithmetic mean of a sample selected in accordance with Section II, clause 4, and determined in accordance with Section II, clause 5.
- 2.5 *Consignment*. A quantity of tinplate or blackplate of the same dimensions and quality made available for despatch at the same time.

3. CONDITIONS OF MANUFACTURE

- 3.1 The method 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 The tin used for the coating of tinplate should have a purity of not less than 99.75 %.
- 3.4 For special applications, limits on the chemical composition of the steel can be agreed between the manufacturer and the purchaser provided they are consistent with this ISO Recommendation (see Section IV).

NOTES

- 1. When ordering tinplate and blackplate it is recommended that the purpose of manufacture for which the tinplate or blackplate is intended should be stated. When he so requires, the purchaser should indicate to the manufacturer the direction of rolling required by underlining the rolling width dimension.
- 2. It is recommended that the purchaser should be informed of any alterations in the method of manufacture which will significantly affect the properties of the purchased product. Similarly, the purchaser should inform the manufacturer of modifications in his fabrication methods which will significantly affect the way in which the purchased product is used.

4. USAGES

Under normal conditions of storage and transport, tinplate and blackplate are suitable for surface treatments such as lacquering and printing. Appropriate grades and tempers are also suitable for shaping operations such as stamping, drawing, folding and bending, and assembly work such as joint forming, soldering (tinplate only) and welding.

SECTION II

QUALITY REQUIREMENTS

1. GRADES

1.1 Hot-dipped tinplate

After coating, hot-dipped tinplate is inspected and graded as follows :

1.1.1 *First grade or primes.* Tinplates which at the time of despatch are free from defects readily visible to the unaided eye. In normal conditions of storage and use they are suitable for lacquering or printing over the entire surface of the sheet.

1.1.2 *Second grade or seconds.* Tinplates which at the time of despatch have visible imperfections of moderate magnitude or frequency. Lacquering or printing over the entire surface of the sheet cannot be guaranteed.

NOTE. – The term “standard grade” is applied to hot-dipped 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.

1.2 Electrolytic tinplate, 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 entire surface.

NOTE. – Electrolytic tinplate, second grade, is available in certain countries. It represents the best sheets rejected from the standard grade but may contain sheets exhibiting surface and tinning defects. Suitability for lacquering and printing over the entire surface is not guaranteed.

1.3 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 entire surface.

NOTE. – Second grade. In certain countries, blackplate rejected during line inspection for only minor defects is available as second grade. Suitability for lacquering or printing over the entire surface is not guaranteed.

2. TIN COATING WEIGHTS

2.1 Expression of tin coating weights

The tin coating weights should be expressed in grammes per square metre.

2.2 Hot-dipped tinplate

2.2.1 Four coating weights are specified as shown in Table 1. The values stated represent the total weight (mass) of tin on both surfaces of a tinplate sheet of area 1 m².

TABLE 1 — Coating weights for hot-dipped tinplate

Code*	Nominal coating weight*	Minimum average coating weight (see clause 2.4 of Section I and clause 2.2.3 of Section II)
	g/m ²	g/m ²
H12/12	24.0	21.0
H14/14	28.0	24.6
H15/15	30.0	26.0
H17/17	33.6	28.0

* The code figures are derived from the nominal coating weight on each surface of the tinplate. In hot-dipped tinplate it is not possible, as for electrolytic tinplate, intentionally to vary the distribution between the two surfaces and the total coating is assumed to be equally divided between the two surfaces.

2.2.2 Other coating weights may be supplied by agreement between the manufacturer and the purchaser.

2.2.3 The average value of the coating weights of the sample selected to represent a consignment in accordance with clause 4 of this Section and tested in accordance with clause 5 of this Section should not be lower than the appropriate minimum average coating weight specified in Table 1.

NOTE. — On the individual specimens of the sample the check may show tin coatings as low as, for example, 60 % of the nominal coating weight, but it is emphasized that isolated specimens have no representative value in relation to the consignment under consideration.

2.3 Electrolytic tinplate, equally coated

2.3.1 Four coating weights are specified as shown in Table 2.

TABLE 2 — Coating weights for electrolytic tinplate — equally coated

Code*	Nominal coating weight*	Minimum average coating weight (see clause 2.4 of Section I and clause 2.3.3 of Section II)
	g/m ²	g/m ²
E2.8/2.8	5.6 (2.8/2.8)	4.9
E5.6/5.6	11.2 (5.6/5.6)	10.5
E8.4/8.4	16.8 (8.4/8.4)	15.7
E11.2/11.2	22.4 (11.2/11.2)	20.2

* The code figures are derived from the nominal coating weight on each surface of the tinplate. The nominal coating weight values refer to the total weight (mass) of coating on both surfaces; thus the nominal coating weight on each surface is half the stated value, for example, E2.8/2.8 has 2.8 g/m² on each surface and a total of 5.6 g/m² on both surfaces.

2.3.2 Other coating weights can be supplied by agreement between the manufacturer and the purchaser.

2.3.3 The average value of the coating weights of the sample selected to represent a consignment in accordance with clause 4 of this Section and tested in accordance with clause 5 of this Section should be lower than the appropriate minimum average coating weight specified in Table 2.

NOTE. — On the individual specimens of the sample the check may show tin coatings as low as, for example, 80 % of the nominal coating weight, but it is emphasized that isolated specimens have no representative value in relation to the consignment under consideration.

2.4 Electrolytic tinplate, differentially coated

2.4.1 Four coating weights are specified as shown in Table 3.

TABLE 3 — Coating weights for electrolytic tinplate — differentially coated

Code*	Nominal coating weight*	Minimum average coating weight (see clause 2.4 of Section I and clause 2.4.3 of Section II)
	g/m ²	g/m ²
D8.4/2.8	8.4/2.8	7.85/2.25
D11.2/2.8	11.2/2.8	10.1/2.25
D11.2/5.6	11.2/5.6	10.1/4.75
D15.1/5.6	15.1/5.6	13.4/4.75

* The code figures are derived from the nominal coating weight on each surface of the tinplate. The nominal coating weight values refer to the nominal weight (mass) of coating on each surface, for example, D8.4/2.8 has 8.4 g/m² on one surface and 2.8 g/m² on the other.

2.4.2 Other coating weights can be supplied by agreement between the manufacturer and the purchaser.

2.4.3 The average value of the coating weights of the sample selected to represent a consignment in accordance with clause 4 of this Section and tested in accordance with clause 5 of this Section should not be lower than the appropriate minimum average coating weight specified in Table 3.

NOTE. — On the individual specimens of the sample the check may show tin coating weights as low as, for example, 80 % of the nominal coating weight, but it is emphasized that isolated specimens have no representative value in relation to the consignment under consideration.

2.5 Marking of differentially coated tinplate

2.5.1 In order to distinguish material having differential coatings, the sheet should be marked on one face. Usually it is marked on the face carrying the heavier coating, but by arrangement the marking can be on the lighter coated face. In all cases the code number is written with the marked face first and the face which is to be piled uppermost should be indicated by underlining the code number of the corresponding coating weight.

The marking should be in the form of dull straight parallel lines about 1 mm (0.04 in) wide. If the marking is on the more heavily coated face all the lines should be continuous; if on the lighter coated face at least the alternate lines should be broken.

2.5.2 If it is desired to indicate the coating weight combination by surface marking, the system detailed in Appendix Y is recommended.

3. TEMPER CLASSIFICATIONS

- 3.1 The term “temper”, when applied to tinplate and blackplate, summarizes a combination of inter-related mechanical properties and no single mechanical test can measure all the various factors which contribute to the fabrication characteristics of the material. However, the Rockwell 30T hardness test (HR 30T) is the best single test available and serves as a guide to the properties of the material. This test forms the basis for a system of temper classification as shown in Tables 4 and 5, which give the hardness values at which the manufacturer should aim.
- 3.2 The Rockwell hardness values shown in Tables 4 and 5 are for tests performed with a diamond anvil on tinplate after de-tinning. For a given temper classification, the corresponding HR 30T values for blackplate may be as much as 4 units lower, depending on the age of the material and the conditions of storage.
- 3.3 The hardness of tinplate and blackplate should be determined on samples selected in accordance with clause 4 of this Section and tested in accordance with clause 6 of this Section. When evaluating the hardness of tinplate and blackplate, average values and not individual values should be considered.
- 3.4 The Rockwell hardness test is sensitive to the “anvil” effect and hence is affected by the thickness of the test specimen. The values in Tables 4 and 5 are typical for nominal thicknesses in the range of 0.26 to 0.30 mm (0.0099 to 0.0118 in). Material of the same metallurgical quality in 0.22 mm (0.0088 in) thickness, for instance, would be one HR 30T unit higher and material of 0.43 mm (0.0171 in) thickness, one unit lower. Thinner material, for example 0.17 mm (0.0066 in), may be 2 units higher.
- 3.5 The purchaser should specify the temper required by reference to the appropriate temper classification as set out in Table 4 or 5.

TABLE 4 — Rockwell HR 30T hardness values normally associated with the temper classifications of batch annealed tinplate

Temper classification	Rockwell HR 30T hardness aim	
	Mean	Maximum deviation of sample average
T 50	← 52 max. →	
T 52	52	± 4
T 57	57	+ 4 - 3
T 61	61	± 4
T 65	65	+ 3 - 4
T 70	70	+ 3 - 4