

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 2093

ELECTROPLATED COATINGS OF TIN

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BRIEF HISTORY

The ISO Recommendation R 2093, *Electroplated coatings of tin*, was drawn up by Technical Committee ISO/TC 107, *Metallic and other non-organic coatings*, the Secretariat of which is held by the Ente Nazionale Italiano di Unificazione (UNI).

Work on this question led to the adoption of Draft ISO Recommendation No. 2093, which was circulated to all the ISO Member Bodies for enquiry in October 1970.

The Draft was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Israel	Sweden
Chile	Italy	Switzerland
Czechoslovakia	Netherlands	Thailand
France	New Zealand	U.A.R.
Germany	Portugal	United Kingdom
Greece	Romania	U.S.S.R.
Hungary	South Africa, Rep. of	
India	Spain	

No Member Body opposed the approval of the Draft.

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

FOREWORD

This ISO Recommendation covers a range of coatings of tin applied by electro-deposition to fabricated articles of ferrous and some non-ferrous metals to protect them against corrosion and to facilitate soldering.

The minimum thickness requirements apply only to those portions of the significant surface that can be touched by a ball 20 mm in diameter.

Attention is drawn to the possibility of interdiffusion between tin coatings and copper alloys, slow at room temperature and more rapid at elevated temperatures. This may lead to darkening and impairment of solderability of thin coatings after long storage. With such thin coatings, provision is made for the use of an undercoat to act as a diffusion barrier but users should consider the use of a thicker coating when solderability has to be maintained over a period of years.

When tin coatings are used with the primary purpose of restraining galvanic corrosion between two dissimilar metals, it will usually be sufficient to choose the class appropriate to the conditions of service for a coating on the less noble metal.

IT IS ESSENTIAL THAT THE PURCHASER STATE EITHER THE BASIS METAL AND THE SERVICE CONDITION NUMBER, OR THE CLASSIFICATION NUMBER.

MERELY TO ASK FOR PLATING TO BE CARRIED OUT IN ACCORDANCE WITH ISO RECOMMENDATION R 2093 WITHOUT THIS NUMBER IS INSUFFICIENT.

ELECTROPLATED COATINGS OF TIN

1. SCOPE AND FIELD OF APPLICATION

This ISO Recommendation applies to electroplated coatings of not less than 99.5 % of tin on steel (or iron), and copper or copper alloys. It also applies to coatings brightened by fusion after electrodeposition, the process being known as flow-brightening (or flow-melting). It does not apply to

- coatings applied to machine screw threads (with tolerance);
- coatings applied to sheet, strip or wire in the unfabricated form, or to coil springs.

This ISO Recommendation does not specify surface condition of the basis metal prior to plating; agreement on the degree of surface roughness of the basis metal which is acceptable should be reached between the purchaser and the supplier.

2. DEFINITION

For the purposes of this ISO Recommendation the following definition applies :

Significant surface. The part of the surface which is essential to the appearance or serviceability of the article and which is to be covered, or is covered, by the coating.

When necessary, the significant surface should be the subject of agreement, and should be indicated on drawings, or by the provision of suitably marked samples.

3. CLASSIFICATION

3.1 Grading of service conditions

The service condition number indicates the severity of the service conditions in accordance with the following scale :

- 4 – exceptionally severe (such as contact with food or water where a complete cover of tin has to be maintained against corrosion and abrasion)
- 3 – severe
- 2 – moderate
- 1 – mild (including applications where solderability is the main requirement)

The letter “F” should be added after service condition number 1 when a flow-brightened coating is to be indicated.

These designations are conventional and it is recommended that the choice of the service condition corresponding to the use of the part to be plated should be the subject of agreement between the purchaser and the supplier.

3.2 Classification of coatings

The classification number comprises :

- the chemical symbol for the basis metal (or for the principal metal if an alloy) as given below, followed by an oblique stroke :
 - Fe for steel (or iron);
 - Cu for copper or copper alloy;
- the chemical symbol for tin, Sn;
- a number indicating the minimum thickness (in micrometres) of the tin coating;
- (where appropriate) the letter “f”, indicating that the coating has been flow-brightened.

3.3 Coatings appropriate to each service condition number

Tables 1 and 2 show, for the various basis metals, the coating classification number and minimum thickness appropriate for each service condition number.

TABLE 1 – Coatings of tin on steel (or iron)

Service condition number	Classification number	Minimum thickness μm
4	Fe/Sn 30	30
3	Fe/Sn 20	20
2	Fe/Sn 12	12
1	Fe/Sn 4	4
1f	Fe/Sn 4f	4*

* The local thickness should not exceed 8 μm . The use of an undercoat of copper, bronze or nickel is advantageous but the thickness of tin should not be reduced if an undercoat is used.

TABLE 2 – Coatings of tin on copper or copper alloy

Service condition number	Classification number	Minimum thickness μm
4	Cu/Sn 30	30
3	Cu/Sn 15	15
2	Cu/Sn 8	8
1	Cu/Sn 4	4*
1f	Cu/Sn 4f	4**

* For brass basis metal, an undercoat of 2 μm of copper, bronze or nickel should be used.

** The local thickness should not exceed 8 μm .
For brass basis metal, an undercoat of 2 μm of copper, bronze, or nickel should be used.