
International Standard



4518

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Metallic coatings — Measurement of coating thickness — Profilometric method

Revêtements métalliques — Mesurage de l'épaisseur — Méthode profilométrique

First edition — 1980-07-15

UDC 669.058 : 531.717

Ref. No. ISO 4518-1980 (E)

Descriptors : metal coatings, dimensional measurement, thickness, measuring instruments, profile meters.

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4518 was developed by Technical Committee ISO/TC 107, *Metallic and other non-organic coatings*, and was circulated to the member bodies in June 1978.

It has been approved by the member bodies of the following countries:

Czechoslovakia	Italy	Switzerland
France	Mexico	Turkey
Germany, F. R.	New Zealand	United Kingdom
Hungary	Poland	USA
India	Romania	USSR
Ireland	South Africa, Rep. of	
Israel	Sweden	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Japan
Netherlands

Metallic coatings — Measurement of coating thickness — Profilometric method

1 Scope and field of application

1.1 This International Standard specifies a method for the measurement of metal coating thickness by first forming a step between the surface of the coating and the surface of its substrate and then measuring the step height using a profile recording instrument. It covers the instrumentation characteristics and the procedure appropriate to this specific application of profilometric methods.

1.2 The method is applicable to the measurement of thicknesses of metal coatings from 0,01 μm to 1 000 μm on flat surfaces and, if appropriate precautions are taken, on cylindrical surfaces. It is highly suitable for the measurement of minute thicknesses but, for thicknesses of less than 0,01 μm , surface flatness and surface smoothness are very critical and accordingly, the method is not recommended for use down to the lowest level of measurement usual for electronic stylus instruments. The method is suitable for measuring coating thicknesses when preparing coating thickness reference standards.

2 References

ISO 2064, *Metallic and other non-organic coatings — Definitions and conventions concerning the measurement of thickness*.

ISO 2177, *Metallic coatings — Measurement of coating thickness — Coulometric method by anodic dissolution*.

3 Principle

Formation of a step either by dissolving part of the coating (acceptance testing) or by masking a portion of the substrate prior to coating (production inspection). Measurement of the height of the step using a profile recording instrument.

4 Instrumentation : Operational parameters and measurement characteristics

4.1 Types of profile recording instruments

Either of two types may be used :

- a) electronic stylus instruments, known as surface analysers and surface profile recorders, generally used to

measure surface roughness but which, for the purposes of this International Standard, are used to record the profile of a step;

- b) electronic inductive comparators equipped with styli and capable of recording the profile of a step.

Electronic stylus instruments may have a greater utility, being suitable for roughness measurements, while electronic inductive comparators may be simpler in construction. The two types of instrument generally cover different ranges of coating thickness : 0,005 to 250 μm for electronic stylus instruments, and 1 to 1 000 μm for electronic inductive comparators.

4.2 Electronic stylus instruments

4.2.1 These instruments are used to record the profile of a surface and have the following components.

4.2.1.1 A pick-up with a conical or pyramidal stylus having an included angle of 1,57 rad (90°) and a nominal tip radius, in the direction of the traverse, of 2, 5, 10 or 50 μm . The force of contact on the test surface shall not exceed the appropriate value given in the table.

Table — Force on stylus

Nominal value of stylus tip radius, μm	2	5	10	50**
Maximum static force at the mean level of the stylus, mN*	0,7	4	16	10**

* 1 mN \approx 0,1 gf

** Values useful for low-hardness metals such as tin and lead.

4.2.1.2 A traverse unit that moves the pick-up relative to a datum skid or, in those cases where the skid may result in damage to the surface or introduce distortion of the step to be measured, a datum surface having nominal form of the profile.

4.2.1.3 An amplifying unit giving nominal values of the vertical (V_v) magnifications of the profile selected from the following series :

100 — 200 — 500 — 1 000 — 2 000 — 5 000 — 10 000 —
20 000 — 50 000 — 100 000 — 200 000 — 500 000 —
1 000 000.