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Non-magnetic metallic coatings on metallic and non-metallic basis materials — Measurement of coating thickness — Phase-sensitive eddy-current method

Revêtements métalliques non magnétiques sur des matériaux de base métalliques et non métalliques — Mesurage de l'épaisseur de revêtement — Méthode par courants de Foucault sensible aux variations de phase

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 21968 was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 2, *Test methods*.

Non-magnetic metallic coatings on metallic and non-metallic basis materials — Measurement of coating thickness — Phase-sensitive eddy-current method

1 Scope

This International Standard describes a method of using phase-sensitive eddy-current instruments for non-destructive measurements of the thickness of non-magnetic metallic coatings on metallic and non-metallic basis materials, such as:

a) zinc, cadmium, copper, tin or chromium on steel;

b) copper or silver on composite materials.

The phase-sensitive method can be applied without thickness errors to smaller surface areas and to stronger surface curvatures than the amplitude-sensitive eddy-current method described in ISO 2360[1], and is less affected by the magnetic properties of the basis material. However, the phase-sensitive method is more affected by the electrical properties of the coating materials.

When measuring metallic coatings on metallic basis materials, the product of conductivity and permeability (σ, μ) of one of the materials should be at least a factor of 1,5 times the product of conductivity and permeability for the other material. Non-ferromagnetic materials have a relative permeability of 1.

2 Principle

An eddy-current probe (or integrated probe/instrument) is placed on (or near) the surface of the coating(s) to be measured, and the thickness is read from the instrument's readout.

For each instrument, there is a maximum measurable thickness of the coating.

Since this thickness range depends on both the applied frequency of the probe system and the electrical properties of the coating, the maximum thickness should be determined experimentally, unless otherwise specified by the manufacturer.

An explanation of eddy-current generation and the calculation of the maximum measurable coating thickness, $d_{\max}$, is given in Annex A.

However, in the absence of any other information, the maximum measurable coating thickness, $d_{\max}$, can be estimated using Equation (1):

$$d_{\max} = 0{,}8\delta_0 \tag{1}$$

where δ_0 is the standard penetration depth of the coating material [see Equation (A.1)].