

DIN 53099:2024-12 (E)

Metallic coatings - Electrodeposited chromium coatings with chromium(III)-based electrolytes on copper-nickel coatings on plastics - Requirements and test methods

Contents		Page
Foreword		5
Introduction		6
1	Scope	7
2	Normative references	7
3	Terms and definitions	7
4	Ordering information	8
4.1	Essential information	8
4.2	Additional information	9
5	Service condition numbers	9
6	Designation	9
6.1	General	9
6.2	Base material	10
6.3	Intermediate metal coating	10
6.4	Metal coatings	10
6.4.1	General	10
6.4.2	Nickel coatings	10
6.4.3	Chromium coatings from chromium(III)-based electrolytes	11
6.5	Examples of designations	13
7	Requirements	14
7.1	Base material	14
7.2	Appearance of the coated component	14
7.2.1	Freedom from defects	14
7.2.2	Colour characteristics	15
7.2.3	Colorimetry	15
7.3	Local coating thickness	15
7.4	Pore count	17
7.5	Adhesive strength of the metal coatings	17
7.6	Corrosion resistance	18
7.7	Potential differences between the individual nickel coatings	18
8	Sampling	19
9	Further test methods	19
10	Test report	19
Annex A (normative) Service condition numbers		21
Annex B (informative) Methods of determining coating thickness		22
B.1	General	22
B.2	Methods	22
B.2.1	Microscopic method	22

B.2.2	Coulometric method	22
B.2.3	X-ray spectrometric method	23
B.2.4	Profilometric method	23
Annex C (normative) Determination of pore count in the chromium coating		24
C.1	General	24
C.2	Sample preparation	24
C.3	Galvanostatic test (Dubpernell test)	25
C.3.1	Composition of the copper electrolyte	25
C.3.2	Working conditions	25
C.3.3	Procedure	25
C.3.4	Evaluation	25
C.4	Potentiostatic test (modified Dubpernell test)	25
C.4.1	Composition of the copper electrolyte	25
C.4.2	Working conditions	26
C.4.3	Procedure	26
C.4.4	Evaluation	26
C.5	Potentiostatic test (Fuhrmann test)	26
C.5.1	Set-up and description of measuring cell	26
C.5.2	Composition of the copper electrolyte	27
C.5.3	Working conditions	27
C.5.4	Procedure	27
C.5.5	Evaluation	28
C.6	Anodizing test (Fechner test)	28
C.6.1	General	28
C.6.2	Test set-up	28
C.6.3	Composition of the electrolyte	28
C.6.4	Working conditions	28
C.6.5	Procedure	29
C.6.6	Evaluation	29
Annex D (normative) Thermal cycling test		30
D.1	General	30
D.2	Principle of method	30
D.3	Samples	30
D.3.1	Sampling and number of test pieces	30
D.3.2	Exposure of test pieces	30
D.4	Test apparatus	30
D.5	Procedure	31
D.5.1	Test procedure	31
D.5.2	Evaluation	31
Annex E (informative) Thermal cycling test combined with NSS or CASS test		32
E.1	Principle of method	32
E.2	Procedure	32
E.3	Evaluation	32
Annex F (informative) Glacial acetic acid test		33
F.1	General	33
F.2	Reagents	33
F.3	Test apparatus	33
F.4	Procedure	33
F.5	Evaluation	33
Bibliography		35

Figures

Figure C.1 — Schematic set-up of measuring cell	27
--	-----------

Tables

Table 1 — Requirements for double nickel coatings	11
Table 2 — Requirements for double nickel coatings with additional microporous nickel coating.....	11
Table 3 — Designation of significant surfaces [2]	14
Table 4 — Minimum thicknesses of the copper and nickel coatings for coating systems on plastic....	17
Table 5 — Test durations for type A chromium coatings	18
Table A.1 — Classification of service condition numbers.....	21
Table D.1 — Service condition numbers and exposure temperatures.....	31