ISO 16962:2017-02 (E)

Surface chemical analysis - Analysis of zinc- and/or aluminium-based metallic coatings by glow-discharge optic al-emission spectrometry

Contents

Page

Foreword v

Introduction vi

1 Scope 1

2 Normative references 1

3 Termsanddefinitions 1

4 Principle 1

5 Apparatus 2
5.1 Glow-discharge optical-emission spectrometer 2
5.1.1 General 2
5.1.2 Selection of spectral lines 2
5.1.3 Selection of glow-discharge source type 2

6 Adjusting the glow-discharge spectrometer system settings 3
6.1 General 3
6.2 Setting the parameters of a DC source 4
6.2.1 Constant applied current and voltage 4
6.2.2 Constant applied current and pressure 5
6.2.3 Constant voltage and pressure 5
6.3 Setting the discharge parameters of an RF source 6
6.3.1 General 6
6.3.2 Constant applied power and pressure 6
6.3.3 Constant applied power and DC bias voltage 6
6.3.4 Constant effective power and effective RF voltage 7
6.4 Minimum performance requirements 7
6.4.1 General 7
6.4.2 Minimum repeatability 7
6.4.3 Detection limit 8

7 Sampling 9

8 Calibration 9
8.1 General 9
8.2 Calibration samples 10
8.2.1 General 10
8.2.2 Brass calibration samples 10
8.2.3 Zn-Al alloy samples 10
8.2.4 Low alloy iron or steel samples 10
8.2.5 Stainless steel samples 10
8.2.6 Nickel alloy samples 10
8.2.7 Aluminium-silicon alloy samples 10
8.2.8 Aluminium-magnesium alloy samples 10
8.2.9 High-purity copper and zinc samples 11
8.3 Validation samples and optional RMs for calibration 11
8.3.1 General 11
8.3.2 Zinc-nickel electrolytically coated RM 11

8.3.3 Zinc-iron electrolytically coated RM 11
8.3.4 Zinc-aluminium hot dip coated RM 11
8.3.5 Zinc-iron hot dip coated and annealed RM 11
8.4 Determination of the sputtering rate of calibration and validation specimens 11
8.5 Emission intensity measurements of calibration specimens 13
8.6 Calculation of calibration equations 13
8.7 Validation using reference materials 13
8.7.1 General 13
8.7.2 Checking analytical accuracy using bulk reference materials 13
8.7.3 Checking analytical accuracy using surface layer reference materials 14
8.8 Verification and drift correction 14

9 Analysis of test specimens 15
9.1 Adjusting discharge parameters 15
9.2 Setting of measuring time and data acquisition rate 15
9.3 Quantifying depth profiles of test specimens 15

10 Expression of results 15
10.1 Expression of quantitative depth profile 15
10.2 Determination of total coating mass per unit area (coating aeric mass) 17
10.2.1 General method 17
10.2.2 Method for special applications 17
10.3 Determination of average mass fractions 17

11 Precision 17

12 Test report 18

Annex A (normative) Calculation of calibration constants and quantitative evaluation of depthprofiles 19

Annex B (informative) Suggestions concerning suitable spectral lines 31

Annex C (informative) Determination of coating mass per unit area (coating areic mass) 32

Annex D (informative) Additional information on international cooperative tests 38

Bibliography 40