

# DIN ISO 16962:2018-12 (E)

## Surface chemical analysis - Analysis of zinc- and/or aluminium-based metallic coatings by glow-discharge optical-emission spectrometry (ISO 16962:2017)

---

Contents	Page
National foreword.....	4
National Annex NA (informative) Bibliography.....	5
Foreword.....	6
Introduction.....	7
1 Scope .....	8
2 Normative references .....	8
3 Terms and definitions .....	8
4 Principle .....	8
5 Apparatus.....	9
5.1 Glow-discharge optical-emission spectrometer .....	9
5.1.1 General.....	9
5.1.2 Selection of spectral lines.....	9
5.1.3 Selection of glow-discharge source type.....	9
6.1 General .....	10
6.2 Setting the parameters of a DC source .....	10
6.2.1 Constant applied current and voltage .....	11
6.2.2 Constant applied current and pressure .....	12
6.2.3 Constant voltage and pressure .....	12
6.3 Setting the discharge parameters of an RF source .....	13
6.3.1 General.....	13
6.3.2 Constant applied power and pressure .....	13
6.3.3 Constant applied power and DC bias voltage.....	13
6.3.4 Constant effective power and effective RF voltage.....	14
6.4 Minimum performance requirements .....	14
6.4.1 General.....	14
6.4.2 Minimum repeatability .....	14
6.4.3 Detection limit .....	15
7 Sampling.....	16
8 Calibration.....	16
8.1 General .....	16
8.2 Calibration samples .....	17
8.2.1 General.....	17
8.2.2 Brass calibration samples .....	17
8.2.3 Zn-Al alloy samples .....	17
8.2.4 Low alloy iron or steel samples .....	17
8.2.5 Stainless steel samples .....	17
8.2.6 Nickel alloy samples .....	17
8.2.7 Aluminium-silicon alloy samples .....	17
8.2.8 Aluminium-magnesium alloy samples .....	17
8.2.9 High-purity copper and zinc samples .....	18

8.3	Validation samples and optional RMs for calibration .....	18
8.3.1	General.....	18
8.3.2	Zinc-nickel electrolytically coated RM .....	18
8.3.3	Zinc-iron electrolytically coated RM .....	18
8.3.4	Zinc-aluminium hot dip coated RM .....	18
8.3.5	Zinc-iron hot dip coated and annealed RM.....	18
8.4	Determination of the sputtering rate of calibration and validation specimens.....	18
8.5	Emission intensity measurements of calibration specimens .....	20
8.6	Calculation of calibration equations.....	20
8.7	Validation using reference materials .....	20
8.7.1	General.....	20
8.7.2	Checking analytical accuracy using bulk reference materials .....	20
8.7.3	Checking analytical accuracy using surface layer reference materials .....	21
8.8	Verification and drift correction .....	21
<b>9</b>	<b>Analysis of test specimens.....</b>	<b>22</b>
9.1	Adjusting discharge parameters.....	22
9.2	Setting of measuring time and data acquisition rate .....	22
9.3	Quantifying depth profiles of test specimens.....	22
<b>10</b>	<b>Expression of results.....</b>	<b>22</b>
10.1	Expression of quantitative depth profile.....	22
10.2	Determination of total coating mass per unit area (coating areic mass) .....	24
10.2.1	General method.....	24
10.2.2	Method for special applications.....	24
10.3	Determination of average mass fractions .....	24
<b>11</b>	<b>Precision .....</b>	<b>24</b>
<b>12</b>	<b>Test report .....</b>	<b>25</b>
<b>Annex A</b> (normative) <b>Calculation of calibration constants and quantitative evaluation of depth profiles.....</b>	<b>26</b>	
<b>Annex B</b> (informative) <b>Suggestions concerning suitable spectral lines .....</b>	<b>38</b>	
<b>Annex C</b> (informative) <b>Determination of coating mass per unit area (coating areic mass) .....</b>	<b>39</b>	
<b>Annex D</b> (informative) <b>Additional information on international cooperative tests .....</b>	<b>44</b>	
<b>Bibliography .....</b>	<b>46</b>	