

ISO 8401:2017-02 (E)

Metallic coatings - Review of methods of measurement of ductility

Contents		Page
Foreword		v
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Principle	2
5	Tests on unsupported foils	3
5.1	General	3
5.2	Tensile testing	4
5.2.1	Principle	4
5.2.2	Apparatus	4
5.2.3	Preparation of test pieces	4
5.2.4	Procedure	6
5.2.5	Expression of results	6
5.2.6	Notes on procedure	6
5.3	Bending (micrometer bend test)	7
5.3.1	General	7
5.3.2	Apparatus	7
5.3.3	Preparation of test pieces	7
5.3.4	Procedure	7
5.3.5	Expression of results	8
5.4	Folding (vice-bend test)	10
5.4.1	General	10
5.4.2	Apparatus	10
5.4.3	Preparation of test pieces	10
5.4.4	Procedure	10
5.4.5	Results	10
5.5	Hydraulic bulging	11
5.5.1	General	11
5.5.2	Principle	11
5.5.3	Apparatus	11
5.5.4	Procedure	12
5.5.5	Expression of results	13
5.5.6	Notes on procedure	13
5.6	Mechanical bulging	13
5.6.1	General	13
5.6.2	Apparatus	14
5.6.3	Procedure	14
5.6.4	Expression of results	15
5.6.5	Special cases	15
6	Tests on coatings on substrates	17
6.1	General	17
6.2	Tensile testing	18
6.2.1	Apparatus	18
6.2.2	Preparation of test pieces	18
6.2.3	Procedure	18
6.3	Three-point bending[10]	19

6.3.1	Principle	19
6.3.2	Apparatus	19
6.3.3	Procedure	19
6.3.4	Expression of results	20
6.4	Four-point bending[11]	21
6.4.1	General	21
6.4.2	Expression of results	21
6.5	Cylindrical mandrel bending	22
6.5.1	Principle	22
6.5.2	Apparatus	22
6.5.3	Preparation of test pieces	23
6.5.4	Procedure	23
6.5.5	Expression of results	23
6.5.6	Notes on procedure	23
6.6	Spiral mandrel bending	23
6.6.1	Principle	23
6.6.2	Apparatus	24
6.6.3	Procedure	24
6.6.4	Expression of results	24
6.7	Conical mandrel bending	25
6.7.1	Principle	25
6.7.2	Apparatus	25
6.7.3	Procedure	25
6.7.4	Expression of results	25
6.7.5	Special cases	26
6.8	Mechanical bulging	26
6.8.1	Apparatus	26
6.8.2	Preparation of test pieces	26
6.8.3	Procedure	26
6.8.4	Expression of results	26
7	Selection of test method	27
8	Test report	28
Annex A (informative) Methods of producing foils		29
Annex B (informative) Calculation of ductility when increasing the surface area of a foil (bulging) ..		31
Annex C (informative) Calculation of ductility and tensile strength in the hydraulic bulge test		34
Annex D (informative) Calculation of ductility in the mechanical bulge test		37
Bibliography		38