

DIN EN ISO 8401:2017-05 (E)

Metallic coatings - Review of methods of measurement of ductility (ISO 8401:2017)

Contents		Page
European foreword		4
Foreword		5
1	Scope	6
2	Normative references	6
3	Terms and definitions	6
4	Principle	7
5	Tests on unsupported foils	7
5.1	General.....	7
5.2	Tensile testing.....	9
5.2.1	Principle.....	9
5.2.2	Apparatus.....	9
5.2.3	Preparation of test pieces.....	9
5.2.4	Procedure.....	11
5.2.5	Expression of results.....	11
5.2.6	Notes on procedure.....	11
5.3	Bending (micrometer bend test).....	12
5.3.1	General.....	12
5.3.2	Apparatus.....	12
5.3.3	Preparation of test pieces.....	12
5.3.4	Procedure.....	12
5.3.5	Expression of results.....	13
5.4	Folding (vice-bend test).....	15
5.4.1	General.....	15
5.4.2	Apparatus.....	15
5.4.3	Preparation of test pieces.....	15
5.4.4	Procedure.....	15
5.4.5	Results.....	15
5.5	Hydraulic bulging.....	16
5.5.1	General.....	16
5.5.2	Principle.....	16
5.5.3	Apparatus.....	16
5.5.4	Procedure.....	17
5.5.5	Expression of results.....	18
5.5.6	Notes on procedure.....	18
5.6	Mechanical bulging.....	18
5.6.1	General.....	18
5.6.2	Apparatus.....	19
5.6.3	Procedure.....	19
5.6.4	Expression of results.....	20
5.6.5	Special cases.....	20

6	Tests on coatings on substrates	22
6.1	General	22
6.2	Tensile testing	23
6.2.1	Apparatus	23
6.2.2	Preparation of test pieces	23
6.2.3	Procedure	23
6.3	Three-point bending ^[10]	24
6.3.1	Principle	24
6.3.2	Apparatus	24
6.3.3	Procedure	24
6.3.4	Expression of results	25
6.4	Four-point bending ^[11]	26
6.4.1	General	26
6.4.2	Expression of results	26
6.5	Cylindrical mandrel bending	27
6.5.1	Principle	27
6.5.2	Apparatus	27
6.5.3	Preparation of test pieces	28
6.5.4	Procedure	28
6.5.5	Expression of results	28
6.5.6	Notes on procedure	28
6.6	Spiral mandrel bending	28
6.6.1	Principle	28
6.6.2	Apparatus	29
6.6.3	Procedure	29
6.6.4	Expression of results	29
6.7	Conical mandrel bending	30
6.7.1	Principle	30
6.7.2	Apparatus	30
6.7.3	Procedure	30
6.7.4	Expression of results	30
6.7.5	Special cases	31
6.8	Mechanical bulging	31
6.8.1	Apparatus	31
6.8.2	Preparation of test pieces	31
6.8.3	Procedure	31
6.8.4	Expression of results	26
7	Selection of test method	32
8	Test report	33
	Annex A (informative) Methods of producing foils	34
	Annex B (informative) Calculation of ductility when increasing the surface area of a foil (bulging)	36
	Annex C (informative) Calculation of ductility and tensile strength in the hydraulic bulge test	39
	Annex D (informative) Calculation of ductility in the mechanical bulge test	42
	Bibliography	43