

IEC/TS 62622:2012-10 (E)

Nanotechnologies - Description, and measurement of dimensional quality parameters of artificial gratings

Contents	Page
FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	7
3.1 Basic terms	7
3.2 Grating terms	10
3.3 Grating types.....	11
3.4 Grating quality parameter terms	14
3.5 Measurement method categories for grating characterization	17
4 Symbols and abbreviated terms.....	18
5 Grating calibration and quality characterization methods	18
5.1 Overview	18
5.2 Global methods	18
5.3 Local methods.....	19
5.4 Hybrid methods	20
5.5 Comparison of methods.....	20
5.6 Other deviations of grating features.....	21
5.6.1 General	21
5.6.2 Out of axis deviations	21
5.6.3 Out of plane deviations.....	22
5.6.4 Other feature deviations	22
5.7 Filter algorithms for grating quality characterization.....	23
6 Reporting of grating characterization results.....	23
6.1 General.....	23
6.2 Grating specifications	24
6.3 Calibration procedure	24
6.4 Grating quality parameters	24
Annex A (informative) Background information and examples	25
Annex B (informative) Bravais lattices.....	34
Bibliography.....	38
Figure 1 – Example of a trapezoidal line feature on a substrate	8
Figure 2 – Examples of feature patterns.....	9
Figure 3 – Examples of 1D line gratings.....	12
Figure 4 – Example of 2D gratings	13
Figure A.1 – Result of a calibration of a 280 mm length encoder system which was used as a transfer standard in an international comparison [31].....	27
Figure A.2 – Filtered (linear profile Spline filter with $\lambda_C = 25$ mm) results of Figure A.1	28
Figure A.3 – Calibration of a 1D grating by a metrological SEM	30
Figure A.4 – Calibration of pitch and straightness deviations on a 2D grating by a metrological SEM.....	31

Figure A.5 – Results of an international comparison on a 2D grating by different participants and types of instruments	33
Figure B.1 – One-dimensional Bravais lattice	34
Figure B.2 – The five fundamental two-dimensional Bravais lattices illustrating the primitive vectors \vec{a} and \vec{b} and the angle φ between them	35
Figure B.3 – The 14 fundamental three-dimensional Bravais lattices	36
Table 1 – Comparison of different categories for grating characterization methods	21
Table A.1 – Grating quality parameters of the grating in Figures A.1 and A.2	28
Table A.2 – Grating quality parameters of the grating in Figure A.3	30
Table A.3 – Grating quality parameters of the grating in Figure A.4	32
Table B.1 – Bravais lattices volumes	37