

DIN 32877-2:2021-07 (E)

Geometrical product specification (GPS) - Dimensional measuring equipment: Optoelectronic measurement of length - Part 2: Design characteristics and metrological characteristics for backward scattering measuring principles

Contents

Page

Foreword	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Symbols and abbreviated terms	16
5 Design characteristics	16
6 Metrological characteristics	17
6.1 Maximum permissible measurement error (MPE)	17
6.2 Limit values of further metrological characteristics (MPL)	17
6.3 Rated operating conditions	18
6.3.1 Reference measuring system	18
6.3.2 Temperature	18
6.3.3 Warm-up time	18
6.3.4 Parameters of the optoelectronic length measuring device	18
6.3.5 Further conditions	19
6.4 Test method	19
6.4.1 General	19
6.4.2 Linearity deviation (limited by E_{lin} ,MPE)	19
6.4.3 Temporal repeatability and spatial repeatability (limited by R_{temp} ,MPE and $R_{spatial}$,MPE)	21
6.4.4 Step response time with respect to changes in the measurand (limited by $t_{response}$,MPL)	22
6.4.5 Setting time with respect to changes in the measurand (limited by t_{value} ,MPL)	23
6.4.6 Limit frequency with respect to changes in the measurand (limited by t_{value} ,MPL)	23
6.4.7 Limit frequency with respect to changes in the received radiant power (limited by f_{flux} ,MPL)	24
6.4.8 Limit tilt (limited by $tilt$,MPL)	24
6.4.9 Axial optical resolution (limited by $z_{resolution}$,MPL)	24
6.4.10 Dynamic range of the received radiant power during a single measurement (limited by SNR_{flux} ,MPL)	25
6.4.11 Proof of conformity with the metrological specifications	26
Annex A (informative) (Measurement) standards	27
A.1 General	27
A.2 Design characteristics	27
A.2.1 Standard 1 for testing the linearity deviation and repeatability	27
A.2.2 Standard 2 for testing the linearity deviation and repeatability	27
A.2.3 Standard 3 for testing the linearity deviation and repeatability	27
A.2.4 Standard 4 for testing the step response time, the setting time and the limit frequency with respect to changes in the measurand	28

A.2.5	Standard 5 for testing the step response time, the setting time and the limit frequency with respect to changes in the measurand	28
A.2.6	Standard 6 for testing the step response time, the setting time and the limit frequency with respect to changes in the measurand	28
A.2.7	Standard 7 for testing the limit frequency with respect to changes in the received radiant power	29
A.2.8	Standard 8 for testing the limit frequency with respect to changes in the received radiant power	29
A.2.9	Standard 9 for testing the limit tilt	30
A.2.10	Standard 10 for testing the axial optical resolution	30
A.2.11	Standard 11 for testing the dynamic range of the received radiant power during a single measurement	31
A.3	Application	32
A.4	Test set-up	34
Annex B (informative) Data sheet requirements		35
Bibliography		37
Figures Figure 1 -- Measurement corridor for the triangulation measuring principle		9
Figure 2 -- Measurement corridor for the confocal chromatic measuring principle and the absolute interferometric measuring principle		10
Figure 3 -- Step response time and setting time for an abrupt change in the measurand		11
Figure 4 -- Testing of the axial optical resolution by simultaneous distance measurements to the front and back of a partially transparent test object		13
Figure 5 -- Testing the dynamic range of the received radiant power during a single measurement by simultaneous distance measurements to the front and back of a partially transparent test object		15
Figure 6 -- Schematic representation of the method of testing linearity deviation, temporal repeatability and spatial repeatability		20
Figure 7 -- Diagram of the linearity deviation, the temporal repeatability and the spatial repeatability		21
Figure A.1 -- Schematic representation of standard 11		31
Figure A.2 -- Schematic representation of a possible set-up for testing linearity deviation, temporal repeatability and spatial repeatability		34
Tables Table 1 -- Abbreviated terms		16
Table A.1 -- Application of the standards		32
Table B.1 -- Design characteristics of optoelectronic length measuring devices		35
Table B.2 -- Metrological characteristics of optoelectronic length measuring devices		36