

ISO 25178-700:2022-12 (E)

Geometrical product specifications (GPS) - Surface texture: Areal - Part 700: Calibration, adjustment and verification of areal topography measuring instruments

Contents		Page
	Foreword.....	v
	Introduction.....	vi
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Symbols and abbreviated terms	2
5	Calibration, adjustment and verification of an instrument	3
5.1	General.....	3
5.2	Methods for calibration, adjustment and verification.....	3
5.3	Instrument calibration procedure.....	4
5.3.1	Calibration by measurement standards.....	4
5.3.2	Handling of defects on material measures.....	4
5.3.3	Measurement procedures for calibration with measurement standards.....	4
5.3.4	Calibration conditions.....	4
6	Determination of the metrological characteristics of the instrument	5
6.1	General.....	5
6.2	Reporting of the measurement conditions.....	5
6.3	Handling of non-measured points.....	5
6.4	Handling of spurious data and outliers.....	5
6.5	Metrological characteristic: measurement noise, N_M , and instrument noise, N_I	5
6.5.1	General.....	5
6.5.2	Determination of measurement and instrument noise: application of filters or operators.....	6
6.5.3	Determination of measurement and instrument noise: material measures for instrument and measurement noise estimation.....	6
6.5.4	Determination of measurement and instrument noise: procedure for the determination of measurement noise.....	6
6.6	Determination of flatness deviation.....	10
6.6.1	General.....	10
6.6.2	Material measure for determination of flatness deviation.....	10
6.6.3	Procedure for determination of flatness deviation.....	10
6.6.4	Improvement of flatness deviation estimation.....	10
6.6.5	Application of filters and operators.....	11
6.6.6	Calibration of flatness deviation.....	11
6.7	Determination of the amplification coefficient α_z for the z-axis.....	11
6.7.1	General.....	11
6.7.2	Determination of the amplification coefficient α_z for the z-axis: material measures.....	11
6.7.3	Procedure for determination of amplification coefficient α_z for the instrument z-axis.....	12
6.7.4	Type PGR (profile-groove-rectangular): groove, straight (rectangular or trapezoidal) measurement areas.....	12
6.7.5	Other material measures for the instrument z-axis calibration.....	14
6.7.6	Procedure for determination of amplification coefficient α_z for the instrument z-axis: range and distance of measurement positions for the calibration of the z-scale of the instrument.....	15

6.7.7	Range and distance of measurement position for the calibration of a reduced z-scale of the instrument.....	15
6.8	Determination of z-linearity deviation l_z	15
6.8.1	General.....	15
6.8.2	Determination of the complete and local z-linearity deviation l_z : z-scan range.....	15
6.8.3	Determination of z-linearity deviation l_z	15
6.8.4	Determination of z-linearity deviation l_z : sizes of step heights to be measured.....	16
6.8.5	Determination of z-linearity deviation l_z : positions within the instrument z-range.....	17
6.8.6	Determination of z-linearity deviation l_z : Non-default methods.....	17
6.9	Determination of the amplification coefficients α_x and α_y in x- and y-direction and mapping deviation $\Delta_x(x,y)$ and $\Delta_y(x,y)$	17
6.9.1	General.....	17
6.9.2	Determination of the amplification coefficient α_x and α_y in x- and y-direction and mapping deviation $\Delta_x(x,y)$ and $\Delta_y(x,y)$: material measures.....	18
6.9.3	Determination of the amplification coefficient α_x and α_y in x- and y-direction and mapping deviation $\Delta_x(x,y)$ and $\Delta_y(x,y)$: assessed measurement volume.....	19
6.9.4	Procedure for the determination of the amplification coefficient α_x and α_y and mapping deviation $\Delta_x(x,y)$ and $\Delta_y(x,y)$ of the x- and y-axes.....	20
6.10	Perpendicularity of the instrument z-axis with respect to the x-y areal reference.....	20
6.11	Topographic spatial resolution W_R	20
6.11.1	General.....	20
6.11.2	Material measures for topographic spatial resolution.....	20
6.11.3	Instrument transfer function (ITF) curve f_{ITF}	21
6.11.4	Lateral period limit D_{LIM}	21
6.11.5	Use of optical lateral resolution parameters.....	21
6.12	Topography fidelity T_{FI}	21
6.12.1	General.....	21
6.12.2	Determination of the topography fidelity T_{FI} using reference metrology.....	21
6.12.3	Determination of the small-scale fidelity limit T_{FIL}	22
6.12.4	Slope-dependent effects.....	22
7	General information.....	22
	Annex A (informative) Relation to the GPS matrix model.....	23
	Bibliography.....	24