

# DIN EN ISO 1101:2017-09 (E)

## Geometrical product specifications\_(GPS)\_ - Geometrical tolerancing\_ - Tolerances of form, orientation, location and run-out (ISO 1101:2017)

---

<b>Contents</b>		<b>Page</b>
European foreword .....		5
Foreword .....		6
Introduction .....		7
<b>1</b>	<b>Scope</b> .....	<b>9</b>
<b>2</b>	<b>Normative references</b> .....	<b>9</b>
<b>3</b>	<b>Terms and definitions</b> .....	<b>10</b>
<b>4</b>	<b>Basic concepts</b> .....	<b>12</b>
<b>5</b>	<b>Symbols</b> .....	<b>14</b>
<b>6</b>	<b>Toleranced features</b> .....	<b>17</b>
<b>7</b>	<b>Tolerance zones</b> .....	<b>20</b>
7.1	Tolerance zone defaults .....	20
7.2	Tolerance zones of variable width .....	21
7.3	Orientation of tolerance zones for derived features .....	21
7.4	Cylindrical and spherical tolerance zones .....	21
<b>8</b>	<b>Geometrical specification indication</b> .....	<b>22</b>
8.1	General .....	22
8.2	Tolerance indicator .....	22
8.2.1	Symbol section .....	22
8.2.2	Zone, feature and characteristic section .....	22
8.2.3	Datum section .....	43
8.3	Plane and feature indicators .....	43
8.4	Indications adjacent to the tolerance indicator .....	44
8.4.1	General .....	44
8.4.2	Toleranced feature identifiers .....	44
8.4.3	Patterns .....	46
8.4.4	Adjacent indication sequence .....	46
8.5	Stacked tolerance indications .....	46
8.6	Indication of drawing defaults .....	46
<b>9</b>	<b>Supplementary indications</b> .....	<b>47</b>
9.1	Indications of a compound or restricted toleranced feature .....	47
9.1.1	General .....	47
9.1.2	All around and all over — Continuous, closed tolerance feature .....	47
9.1.3	Restricted area toleranced feature .....	50
9.1.4	Continuous, non-closed toleranced feature .....	52
9.2	Moveable assemblies .....	53
<b>10</b>	<b>Theoretically exact dimensions (TED)</b> .....	<b>54</b>
<b>11</b>	<b>Restrictive specifications</b> .....	<b>54</b>
<b>12</b>	<b>Projected toleranced feature</b> .....	<b>56</b>
<b>13</b>	<b>Intersection planes</b> .....	<b>60</b>
13.1	Role of intersection planes .....	60
13.2	Features to be used for establishing a family of intersection planes .....	60
13.3	Graphical language .....	60
13.4	Rules .....	60
<b>14</b>	<b>Orientation planes</b> .....	<b>63</b>
14.1	Role of orientation planes .....	63

14.2	Features to be used for establishing orientation planes.....	63
14.3	Graphical language.....	63
14.4	Rules.....	63
<b>15</b>	<b>Direction feature.....</b>	<b>65</b>
15.1	Role of direction features.....	65
15.2	Features to be used for establishing direction features.....	67
15.3	Graphical language.....	67
15.4	Rules.....	67
<b>16</b>	<b>Collection plane.....</b>	<b>68</b>
16.1	Role of collection planes.....	68
16.2	Features to be used for establishing collection planes.....	69
16.3	Graphical language.....	69
16.4	Rules.....	69
<b>17</b>	<b>Definitions of geometrical specifications.....</b>	<b>69</b>
17.1	General.....	69
17.2	Straightness specification.....	69
17.3	Flatness specification.....	72
17.4	Roundness specification.....	72
17.5	Cylindricity specification.....	74
17.6	Line profile specification not related to a datum.....	75
17.7	Line profile specification related to a datum system.....	76
17.8	Surface profile specification not related to a datum.....	78
17.9	Surface profile specification related to a datum.....	78
17.10	Parallelism specification.....	79
	17.10.1 General.....	79
	17.10.2 Parallelism specification of a median line related to a datum system.....	80
	17.10.3 Parallelism specification of a median line related to a datum straight line.....	83
	17.10.4 Parallelism specification of a median line related to a datum plane.....	84
	17.10.5 Parallelism specification of a set of lines in a surface related to a datum plane.....	85
	17.10.6 Parallelism specification of a planar surface related to a datum straight line.....	85
	17.10.7 Parallelism specification of a planar surface related to a datum plane.....	86
17.11	Perpendicularity specification.....	87
	17.11.1 General.....	87
	17.11.2 Perpendicularity specification of a median line related to a datum straight line.....	87
	17.11.3 Perpendicularity specification of a median line related to a datum system.....	88
	17.11.4 Perpendicularity specification of a median line related to a datum plane.....	90
	17.11.5 Perpendicularity specification of a planar surface related to a datum straight line.....	91
	17.11.6 Perpendicularity specification of a planar surface related to a datum plane.....	91
17.12	Angularity specification.....	92
	17.12.1 General.....	92
	17.12.2 Angularity specification of a median line related to a datum straight line.....	92
	17.12.3 Angularity specification for a median line related to a datum system.....	94
	17.12.4 Angularity specification for a planar surface related to a datum straight line.....	95
	17.12.5 Angularity specification for a planar surface related to a datum plane.....	96
17.13	Position specification.....	97
	17.13.1 General.....	97
	17.13.2 Position specification of a derived point.....	97
	17.13.3 Position specification of a median line.....	98
	17.13.4 Position specification of a median plane.....	102
	17.13.5 Position specification of a planar surface.....	104
17.14	Concentricity and coaxiality specification.....	105
	17.14.1 General.....	105
	17.14.2 Concentricity specification of a point.....	105
	17.14.3 Coaxiality specification of an axis.....	106
17.15	Symmetry specification.....	108
	17.15.1 General.....	108
	17.15.2 Symmetry specification of a median plane.....	108

17.16	Circular run-out specification .....	109
17.16.1	General .....	109
17.16.2	Circular run-out specification — Radial .....	109
17.16.3	Circular run-out specification — Axial .....	111
17.16.4	Circular runout in any direction .....	112
17.16.5	Circular run-out specification in a specified direction .....	114
17.17	Total run-out specification .....	115
17.17.1	General .....	115
17.17.2	Total run-out specification — Radial .....	115
17.17.3	Total run-out specification - Axial .....	116
<b>Annex A</b>	<b>(informative) Deprecated and former practices .....</b>	<b>118</b>
<b>Annex B</b>	<b>(informative) Explicit and implicit rules for geometrical tolerance zones .....</b>	<b>127</b>
<b>Annex C</b>	<b>(informative) Filters .....</b>	<b>133</b>
<b>Annex D</b>	<b>(normative) ISO special specification elements for form .....</b>	<b>136</b>
<b>Annex E</b>	<b>(informative) Filter details .....</b>	<b>137</b>
<b>Annex F</b>	<b>(normative) Relations and dimensions of graphical symbols .....</b>	<b>150</b>
<b>Annex G</b>	<b>(informative) Relation to the GPS matrix model .....</b>	<b>152</b>
<b>Bibliography</b>	<b>.....</b>	<b>153</b>