ISO 1101:2017-02 (E)

Geometrical product specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out

Contents

Page

Foreword vi

Introduction vii

1 Scope 1

2 Normative references 1

3 Terms and definitions 2

4 Basic concepts 4

5 Symbols 6

6 Toleranced features 9

7 Tolerance zones 12
7.1 Tolerance zone defaults 12
7.2 Tolerance zones of variable width 13
7.3 Orientation of tolerance zones for derived features 13
7.4 Cylindrical and spherical tolerance zones 13

8 Geometrical specification indication 14
8.1 General 14
8.2 Tolerance indicator 14
8.2.1 Symbol section 14
8.2.2 Zone, feature and characteristic section 14
8.2.3 Datum section 35
8.3 Plane and feature indicators 35
8.4 Indications adjacent to the tolerance indicator 36
8.4.1 General 36
8.4.2 Toleranced feature identifiers 36
8.4.3 Patterns 38
8.4.4 Adjacent indication sequence 38
8.5 Stacked tolerance indications 38
8.6 Indication of drawing defaults 38

9 Supplementary indications 39
9.1 Indications of a compound or restricted toleranced feature 39
9.1.1 General 39
9.1.2 All around and all over -- Continuous, closed tolerance feature 39
9.1.3 Restricted area toleranced feature 42
9.1.4 Continuous, non-closed toleranced feature 44
9.2 Moveable assemblies 45

10 Theoretically exact dimensions (TED) 46

11 Restrictive specifications 46

12 Projected toleranced feature 48

13 Intersection planes 52
13.1 Role of intersection planes 52
13.2 Features to be used for establishing a family of intersection planes 52
13.3 Graphical language 52
13.4 Rules 52

14 Orientation planes 55
14.1 Role of orientation planes 55
14.2 Features to be used for establishing orientation planes 55
14.3 Graphical language 55
14.4 Rules 55

15 Direction feature 57
15.1 Role of direction features 57
15.2 Features to be used for establishing direction features 59
15.3 Graphical language 59
15.4 Rules 59

16 Collection plane 60
16.1 Role of collection planes 60
16.2 Features to be used for establishing collection planes 61
16.3 Graphical language 61
16.4 Rules 61

17 Definitions of geometrical specifications 61
17.1 General 61
17.2 Straightness specification 61
17.3 Flatness specification 64
17.4 Roundness specification 64
17.5 Cylindricity specification 66
17.6 Line profile specification not related to a datum 67
17.7 Line profile specification related to a datum system 68
17.8 Surface profile specification not related to a datum 70
17.9 Surface profile specification related to a datum 70
17.10 Parallelism specification 71
17.10.1 General 71
17.10.2 Parallelism specification of a median line related to a datum system 72
17.10.3 Parallelism specification of a median line related to a datum straight line 75
17.10.4 Parallelism specification of a median line related to a datum plane 76
17.10.5 Parallelism specification of a set of lines in a surface related to a datum plane 77
17.10.6 Parallelism specification of a planar surface related to a datum straight line 77
17.10.7 Parallelism specification of a planar surface related to a datum plane 78
17.11 Perpendicularity specification 79
17.11.1 General 79
17.11.2 Perpendicularity specification of a median line related to a datum straight line.79 17.11.3 Perpendicularity specification of a median line related to a datum system 80
17.11.4 Perpendicularity specification of a median line related to a datum plane 82
17.11.5 Perpendicularity specification of a planar surface related to a datum straight line 83
17.11.6 Perpendicularity specification of a planar surface related to a datum plane 83
17.12 Angularity specification 84
17.12.1 General 84
17.12.2 Angularity specification of a median line related to a datum straight line 84
17.12.3 Angularity specification for a median line related to a datum system 86
17.12.4 Angularity specification for a planar surface related to a datum straight line 87
17.12.5 Angularity specification for a planar surface related to a datum plane 88
17.13 Position specification 89
17.13.1 General 89
17.13.2 Position specification of a derived point 89
17.13.3 Position specification of a median line 90
17.13.4 Position specification of a median plane 94
17.13.5 Position specification of a planar surface 96

17.14 Concentricity and coaxiality specification 97
17.14.1 General 97
17.14.2 Concentricity specification of a point 97
17.14.3 Coaxiality specification of an axis 98
17.15 Symmetry specification 100
17.15.1 General 100
17.15.2 Symmetry specification of a median plane 100
17.16 Circular run-out specification 101
17.16.1 General 101
17.16.2 Circular run-out specification -- Radial 101
17.16.3 Circular run-out specification -- Axial 103
17.16.4 Circular runout in any direction 104
17.16.5 Circular run-out specification in a specified direction 106
17.17 Total run-out specification 107
17.17.1 General 107
17.17.2 Total run-out specification -- Radial 107
17.17.3 Total run-out specification - Axial 108

Annex A (informative) Deprecated and former practices 110

Annex B (informative) Explicit and implicit rules for geometrical tolerance zones 119

Annex C (informative) Filters 125

Annex D (normative) ISO special specification elements for form 128

Annex E (informative) Filter details 129

Annex F (normative) Relations and dimensions of graphical symbols 142

Annex G (informative) Relation to the GPS matrix model 144

Bibliography 145