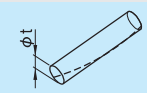
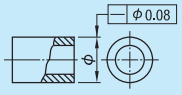
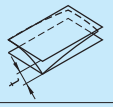
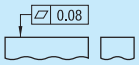
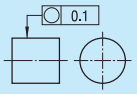
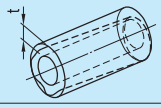
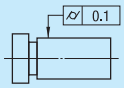
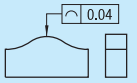
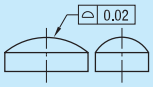
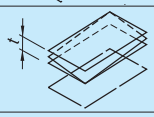
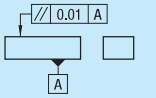
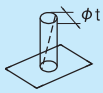
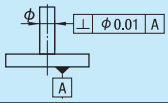
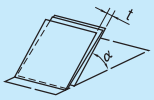
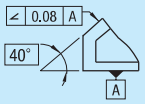
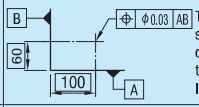
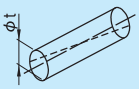
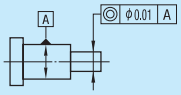
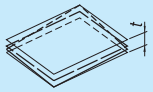
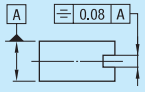
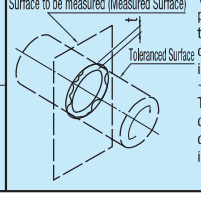
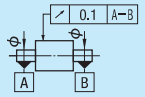
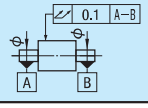
[Technical Data]
Geometric Tolerance Indications

Excerpts from JIS B0021(1984)

Geometric Tolerances and Symbols

Tolerance Types		Symbols	Definition of Tolerance Zones	Illustrated Examples and Interpretations
Form Tolerance	Straightness	—	 If the tolerance value is preceded by a Ø symbol, this tolerance zone is the range within a cylinder of diameter t.	 If a tolerance frame is connected to a dimension that indicates the diameter of a cylinder, the axis line of the cylinder shall be contained within a cylinder of 0.08mm diameter.
	Flatness	▱	 The tolerance zone is the area between two parallel planes separated by distance t.	 This surface shall be contained within two parallel planes separated by 0.08mm.
	Circularity	○	The tolerance zone in the subject plane is the area between two concentric circles separated by distance t.	 The circumference of arbitrary axis perpendicular cross sections shall be contained between two concentric circles separated by 0.1mm on the same plane.
	Cylindricity	⌭	 The tolerance zone is the range contained between two coaxial cylinder surfaces separated by distance t.	 The subject surface shall be contained between two coaxial cylinder surfaces separated by 0.1mm.
	Profile of Line	⌒	The tolerance zone is the range contained between the two enveloping lines formed by a circle with diameter t with the center located on the theoretically correct profile curve.	 On arbitrary cross-sections parallel to the projection plane, the subject profile shall be contained between the two envelope lines formed by a 0.04mm diameter circle with the center located on the theoretically correct profile curve.
	Profile of Surface	⌓	The tolerance zone is the range contained between the two enveloping surfaces formed by a sphere with diameter t with the center located on the theoretically correct profile surface.	 The subject surface shall be contained between the two enveloping surfaces formed by a 0.02mm diameter sphere with the center located on the surface containing the theoretically correct profile.
Orientation Tolerance	Parallelism	//	 The tolerance zone is the range contained between two planes parallel to the datum plane separated by distance t.	 The surface indicated by the arrow leader shall be contained between two planes parallel to the datum plane A separated by 0.01mm in the direction of the arrow leader.
	Perpendicularity Tolerance	⊥	 If the tolerance value is preceded by a Ø symbol, the tolerance zone is the range contained within a cylinder of diameter t perpendicular to the datum plane.	 The axis of the cylinder indicated by the arrow leader shall be contained within a 0.01mm cylinder perpendicular to the datum plane A.
	Angularity	∠	 The tolerance zone is the range contained between two parallel planes inclined at a specified angle to the datum plane and separated from each other by distance t.	 The surface indicated by the arrow leader shall be contained between two parallel planes inclined theoretically exactly by 40 degrees to the datum plane A, and separated by 0.08mm in the direction of the arrow of the leader.
Positional Tolerance	Positional Tolerance	⌖	The tolerance zone is the range contained within a circle or sphere of diameter t with its center located at theoretically true location of the subject point (True Position).	 The point indicated by the arrow leader shall be contained within a 0.03mm diameter circle with its center located at the true location 60mm from the datum line A, and 100mm from the datum line B.
	Coaxiality or Concentricity	◎	 If the tolerance value is preceded by a Ø symbol, the tolerance zone is the range within a cylinder of diameter t with axis coinciding matching the datum axis line.	 The axis of the cylinder indicated by the arrow leader shall be contained within a cylinder of diameter 0.01mm with axis coinciding the datum axis line A.
	Symmetry	⌯	 The tolerance zone is the range contained between two parallel planes separated by distance t and located symmetrically with relation to the datum plane.	 The central plane indicated by the arrow leader shall be contained between two parallel planes separated by 0.08mm and located symmetrically in relation to the datum plane A.
Runout Tolerance	Runout Tolerance	↗	 The tolerance zone is an arbitrary surface perpendicular to the datum axis between two concentric cylinders with centers common with the datum axis, separated in radial direction by the distance t.	 The radial run-out of the cylinder surface indicated by the arrow leader shall not exceed 0.1mm on any measuring plane perpendicular to the datum axis line when the cylinder is rotated about the datum axis A-B.
	Total Runout	⌰	The tolerance zone is between two concentric cylinders with centers common with the datum axis, separated in radial direction by distance t.	 The total radial runout of the cylinder surface indicated by the arrow leader shall not exceed 0.1mm at any point on the cylinder surface when the cylinder is rotated about the datum axis A-B.

The lines used in the Tolerance Zone definitions mean the following.
Thick solid or broken line: Shape Thin dash-dot line: Center line Thick dash-dot line: Datum
Thin alternating long and two short dashed line: Supplementary projection plane or cross section plane Thin solid or broken line: Tolerance range
Thick alternating long and two short dashed line: Projection of shape onto supplementary plane or cross section plane