

# Geometrical Tolerance Definitions

## Terms and Symbols



Symbol and properties to which tolerances relate	Drawing entry and explanation		
	Drawing entry	Tolerance zone	Explanation
Straightness			The extracted median line (extracted axis) of the tolerated cylinder must lie within a cylindrical tolerance zone with a diameter of 0.08.
Flatness			The extracted surface must lie between two parallel planes with a distance of 0.08.
Roundness			The extracted circumference of any cross section perpendicular to the axis of the cylinder must lie between two concentric coplanar circles with a radial distance of 0.1.
Cylindricity			The extracted cylindrical surface must lie between two coaxial cylinders with a radial distance of 0.1.

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Line profile			Between R and S and in any cross section parallel to A the extracted profile must lie between two lines of equal distance to the line of geometrically ideal shape, which enclose circles of diameter 0.04, whose centers lie on the line of ideal shape. The ideal shape is defined by CAD data.
Surface profile to datum surface			The extracted surface must lie between two equally spaced surfaces that enclose spheres of diameter 0.2, whose centers lie on a surface of a sphere of radius 60 and are aligned to the reference surface A. The perpendicular distance of the highest point of the sphere surface from the reference plane A is 35.

Symbol and properties to which tolerances relate	Drawing entry and explanation		
	Drawing entry	Tolerance zone	Explanation
Parallelism			The extracted median line (extracted axis) must lie within a cylinder with a diameter of 0.03 and parallel to the datum straight line A.
Perpendicularity			The extracted median line must lie within a cylinder of diameter 0.1 perpendicular to the datum plane A.
Angularity			The extracted median line of the hole must lie within a cylinder of diameter 0.2 inclined at an angle of 60° to the primary datum plane A and parallel to the secondary datum plane B.

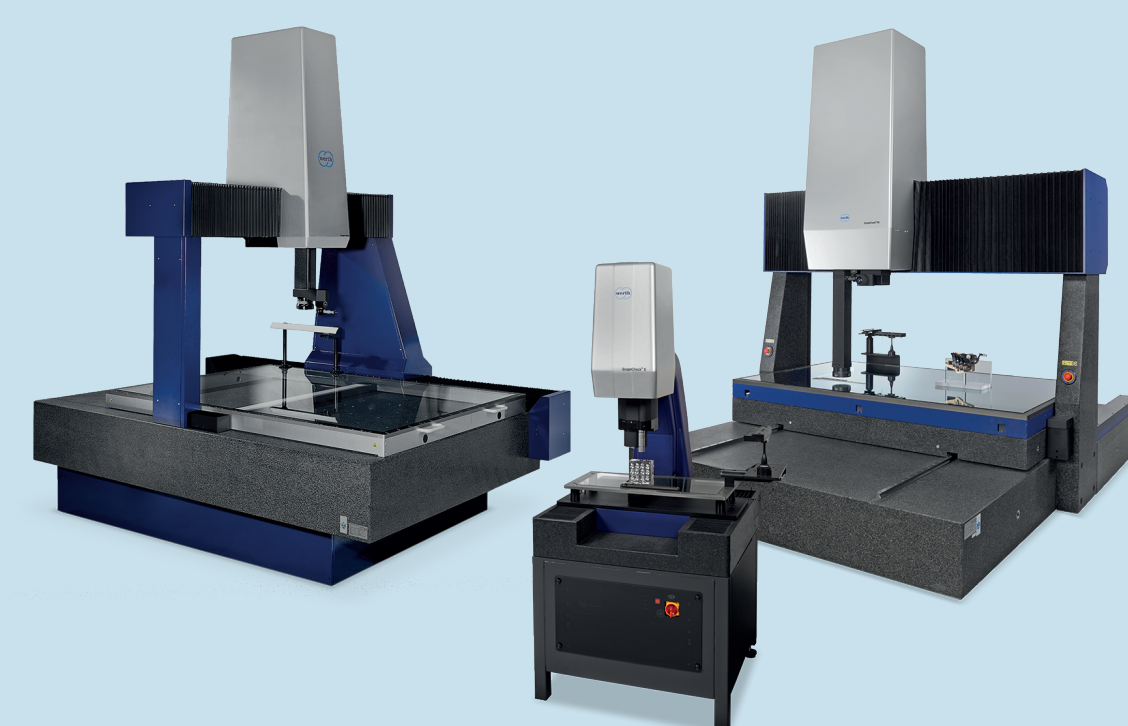
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Position			The extracted median line (axis) must lie within a cylindrical tolerance zone of diameter 0.08, whose axis is perpendicular to datum plane A and is at a distance of 68 from datum plane B and a distance of 100 from datum plane C (the theoretically exact dimension of the axis of the hole).
Coaxiality			The extracted median line of the tolerated shaft segment must lie within a cylinder of diameter 0.08 coaxial with a line formed simultaneously from the datum elements A and B.
Symmetry			The extracted median surface of the groove must lie between two parallel planes with a separation of 0.08, which are located symmetrically in relation to the datum plane.

Symbol and properties to which tolerances relate	Drawing entry and explanation		
	Drawing entry	Tolerance zone	Explanation
Circular run-out radial to a common straight line (axis)			The extracted circumference in every cross section perpendicular to the common datum axis A-B must lie between two coplanar, concentric circles with a radial distance of 0.1.
Circular run-out axial to a datum straight line (axis)			The extracted line must lie between two parallel planes with a distance of 0.1, and perpendicular to the datum axis D, in any cylindrical section whose axis is coaxial with the datum line D.
Total run-out radial to a common straight line (axis)			The extracted surface must lie between two coaxial cylinders with a radial distance of 0.1, whose axes are coaxial with the common datum axis A-B.
Total run-out axial to a datum straight line (axis)			The extracted surface must lie between two parallel planes with a distance of 0.1, which are perpendicular to the datum axis D.

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Dimensions in mm

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Production monitoring



Measuring room



Computed tomography



Tool measurement