

GD&T GUIDE

Geometric Dimensioning & Tolerancing per ASME Y14.5 - 2009

FEATURE CATEGORIES	TOLERANCE TYPES	ASME Symbol	DRAWING CALLOUT EXAMPLE	DRAWING CALLOUT MEANING	MANUAL OR FUNCTIONAL GAGING METHOD	PICTORIAL VIEW	TOLERANCE ZONE DEFINITION (FOR EXAMPLE)	ZONE Modifiers Allowed	DATUMS USED
FOR Individual Features	FORM	 Straightness	Ø10±0.2	0.1 Tol. Zone	0.1		Parallel lines, within which the surface element must lie	No (Surface)	No
			Ø10±0.2 Ø0.1\ \ \ \ \ \	00.1 Tol. Zone at MMC (Ø10.2) Ø0.5 Tol. Zone at LMC (Ø9.8)	Ø10.3 Ring Gage (Virtual Cond.)	(Cylindrical boundary, within which the axis of the feature must lie (derived median line)	Yes (Axis)	No
		Flatness		0.1 Tol. Zone	0.1		Parallel planes, within which the elements of a surface must lie	No	No
		O Circularity	Ø10±0.2	R 0.1 Tol. Zone	R 0.1		Concentric circles, within which each circular element of the surface must lie	No	No
		(ylindricity	Ø10±0.2	R 0.1 Tol. Zone	FR 0.1		Concentric cylinders, within which all surface elements must lie	No	No
FOR INDIVIDUAL OR RELATED FEATURES	PROFILE	Profile of a Surface	10 C C D C D R 5 A	0.1 Tol. Zone (0.05 Each Side)	Datum B		A uniform boundary equally disposed along the true (theoretically exact) profile within which the elements of the surface must lie	No	Yes
			10±0.2 ————————————————————————————————————	0.1 Tol. Zone	0.1		Parallel planes, within which the elements of both surfaces must lie simultaneously	No	No (In this example)
		Profile of a line	20±1 — 20±1	0.1 Tol. Zone (0.05 Each Side)	0.1		A uniform boundary equally disposed along the true (theoretically exact) profile, within which the surface elements of each cross-section	No	No (In this example)
FOR RELATED FEATURES	ORIENTATION	∠ Angularity	10±0.2 Z0.1AB 30° A B	0.1 Tol. Zone Datum A Datum B	Datum A Datum B		Parallel planes, at a specified basic angle from a datum plane(s) within which all surface elements must lie	No (Surface)	Yes
		<u> </u>	10±0.2	O.1 Tol. Zone Datum A	0.1————————————————————————————————————		Parallel planes, at 90° basic (perpendicular) to a datum plane(s) within which the elements of a surface must lie	No (Surface)	Yes
			Ø5±0.2 Ø0.1@A	Datum A	Ø4.7 Gage Pin (Virtual Cond.)	#	Cylindrical boundary, at 90° basic (perpendicular) to a datum plane within which the axis of the feature must lie	Yes (Axis)	Yes
		// Parallelism	10±0.2 ///0.1 A	O.1 Tol. Zone Datum A	O.1 Datum A		Parallel planes, parallel to a datum plane (or axis) within which the elements of a surface must lie	No (Surface)	Yes
	LOCATION	⊕ Position	Ø5±0.2 ⊕Ø0.1₩ABC B —————————————————————————————————	Datum C Ø0.1 Tol. Zone at MMC (Ø4.8) Ø0.5 Tol. Zone at LMC (Ø5.2) Datum B	Datum C Ø4.7 Pin (Virtual Cond.)	cà	Cylindrical boundary, within which the center axis of a cylindrical feature of size is permitted to vary from the true (theoretically exact) position	Yes	Yes
			10±0.2 5±0.2 (₱10.10) AB (B) (A)	0.1 Tol. Zone at MMC (4.8) Datum B 0.5 Tol. Zone at LMC (5.2)	10.2 Wide Slot (Virtual Cond.) Datum B Datum A		Parallel planes, within which the center plane of a slot is permitted to vary from the true (theoretically exact) position	Yes	Yes
		⊚ Concentricity	Ø10±0.2 Ø5±0.2 Ø00.1A	Ø0.1 Tol. Zone Datum A	Ø0.1 Datum A	CA	Cylindrical boundary, within which the axis of all cross-sectional elements of a surface of revolution are common to the axis of the datum feature	No	Yes
		= Symmetry	10±0.2 5±0.2 = 0.1A	O.1 Tol. Zone Datum A	Datum A		Parallel planes, within which the median points of all opposed or correspondingly located elements of a surface(s) are common to the center plane of the datum feature	No	Yes
	RUNOUT	/ Circular Runout	Ø10±0.2	R 0.1 Tol. Zone-	Datum A		Two concentric circles, within which each circular element must lie in relationship to the datum axis	No	Yes
		<i>L_J</i> Total Runout	Ø10±0.2 Ø5±0.2 [L/]0.1 A	R 0.1 Tol. Zone Datum A	P 0.1		Two concentric cylinders, within which all circular elements must lie (simultaneously) in relationship to the datum axis	No	Yes







