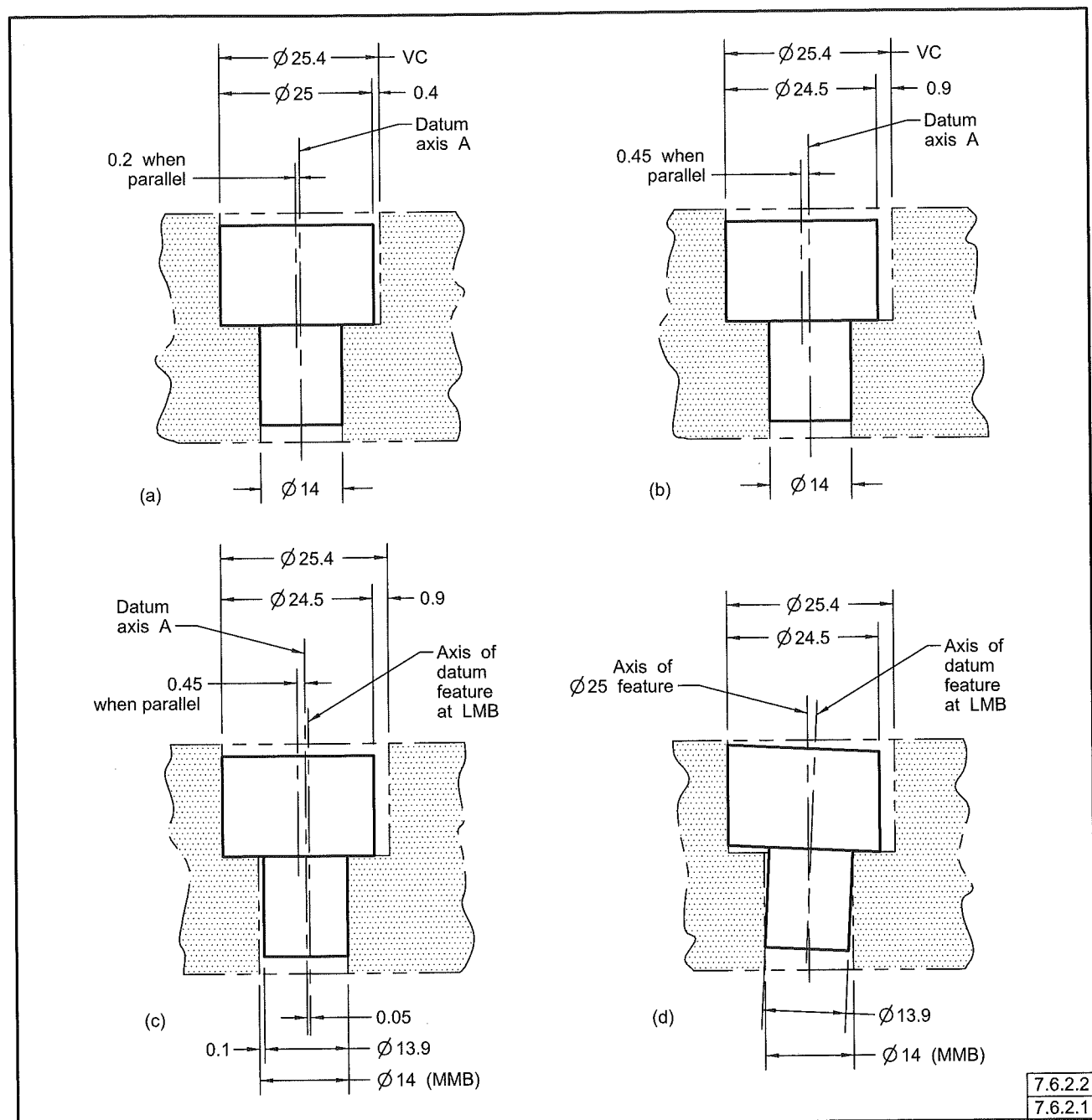


Fig. 7-58 Some of the Allowable Conditions of Part Shown in Fig. 7-56

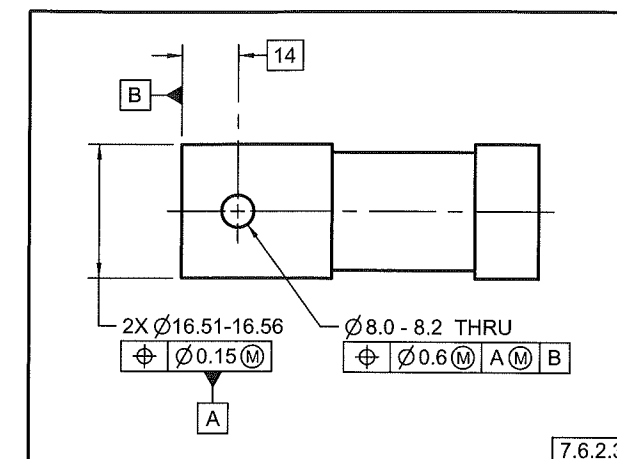


is normally specified on an MMB basis. See Fig. 7-56, illustration (b). The tolerance establishes coaxial boundaries of perfect form. Variations in coaxiality between the features are permitted only where the features depart from their MMC sizes toward LMC. The allowable positional variation is within the “means this” portion of Fig. 7-56. See Fig. 7-58 for possible displacements.

7.6.2.3 Coaxial Features Without Datum References. A coaxial relationship may be controlled by

specifying a positional tolerance without datum references, as shown in Fig. 7-59. This method allows specific control of feature-to-feature coaxiality. Where features are specified with different sizes, a single feature control frame, supplemented by a notation, such as **TWO COAXIAL FEATURES**, is used. A positional tolerance specification with no datum reference creates a relationship between the toleranced features, but implies no relationship to any other features. The toleranced features may be identified as a single datum feature that may then

Fig. 7-59 Two Datum Features, Single Datum Axis



be referenced in the feature control frames of other features, as needed.

7.6.3 Runout Tolerance Control

For information on controlling surfaces of revolution, such as cylinders and cones, relative to a datum axis, with a runout tolerance, see para. 9.2.

7.6.4 Concentricity

Concentricity is that condition where the median points of all diametrically opposed elements of a surface of revolution (or the median points of correspondingly located elements of two or more radially disposed features) are congruent with a datum axis (or center point).

7.6.4.1 Concentricity Tolerancing. A concentricity tolerance is a cylindrical (or spherical) tolerance zone whose axis (or center point) coincides with the axis (or center point) of the datum feature(s). The median points of all correspondingly located elements of the feature(s) being controlled, regardless of feature size, must lie within the cylindrical (or spherical) tolerance zone. The specified tolerance can only apply on an RFS basis, and the datum reference can only apply on an RMB basis. See Fig. 7-60. Unlike the positional control defined in para. 7.6.2, where measurements taken along a surface of revolution are made to determine the location (eccentricity) of the axis or center point, a concentricity tolerance requires the establishment and verification of the feature's median points.

NOTE: Concentricity requirement as described above is substantially different than position, profile, or runout tolerances.

7.6.4.2 Differences Between Concentricity and Other Coaxiality Controls. The items shown in Figs. 7-61 and 7-62 are two possible acceptable configurations of the item depicted in Fig. 7-57.

7.6.4.2.1 Controlling Features With Positional Tolerances. In Fig. 7-61, the axis of the controlled feature's unrelated actual mating envelope has been displaced 0.2 to the left, relative to the axis of datum feature A, and 0.5 material has been removed from the right side of the feature's surface. In Fig. 7-62, the axis of the controlled feature's unrelated actual mating envelope has also been displaced 0.2 to the left, relative to the axis of datum feature A, while 0.25 material has been removed from the upper side of the feature's surface and 0.25 material has been removed from the lower side of the feature's surface. Since the size of the unrelated actual mating envelope of the controlled features in Figs. 7-61 and 7-62 is 25 diameter, the controlled features remain within acceptable limits of size. For coaxial positional tolerance, the location of the axis of the feature's unrelated actual mating envelope is controlled relative to the axis of the datum feature. Where checked for a coaxial positional tolerance relationship, the items depicted in Figs. 7-61 and 7-62 are acceptable.

7.6.4.2.2 Controlling Features With Concentricity.

For concentricity, the locations of the midpoints of diametrically opposed (or the median points of correspondingly located) feature elements are controlled relative to a datum axis. See Fig. 7-63. Where the items depicted in Figs. 7-61 and 7-62 are checked for a concentricity relationship, only the part depicted in Fig. 7-62 would be acceptable, since the midpoints of some of the diametrically opposed elements in Fig. 7-61 would exceed