ANGLE OF MISALIGNMENT

T E C H N I C A L

ANGLE OF MISALIGNMENT

The maximum angle of the ball in a rod end or spherical bearing that can be maintained without interference is calculated as the angle of misalignment. It is defined as the angle between the ball centerline and the outer member centerline when the ball is aligned in its extreme position as allowed. The worst case limiting angle is determined by clevis-mounted assembly as seen in Figure 1. Total misalignment under this condition, as cataloged by QA1 for rod end applications, is twice the angle from one side of center to the opposite extreme position. Misalignment in a spherical bearing is limited by ball and race width, as functions of ball diameter, and is illustrated in Figure 3 on the right. This calculation is the basis for QA1 cataloged angles of misalignment. Other mounting arrangements as shown in Figures 2-4 can also be used as guidelines in calculating the precise angle of misalignment depending on the mounting configuration, and are frequently referenced for metric usage.

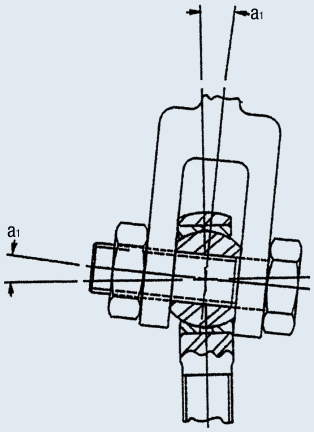

FIGURE 1

$$a^1 = \text{Sin}^{-1}\frac{W}{D} - \text{Sin}^{-1}\frac{T}{D}$$

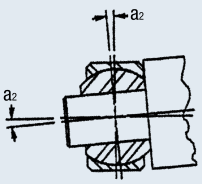

FIGURE 2

$$a^2 = \text{Sin}^{-1}\frac{W}{A} - \text{Sin}^{-1}\frac{T}{A}$$

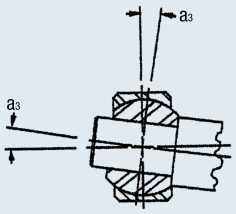

FIGURE 3

$$a^3 = \text{Sin}^{-1}\frac{W}{E} - \text{Sin}^{-1}\frac{T}{E}$$

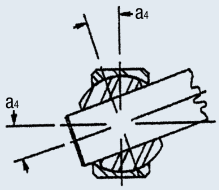

FIGURE 4

$$a^4 = \text{Cos}^{-1}\frac{B}{E} - \text{Cos}^{-1}\frac{T}{E}$$

Reference Letters

B = Ball Bore

M = Outer Race Chamfer

D = Head Diameter of the Outer Race Diameter

E = Ball Diameter

T = Housing Width

A = $\sqrt{(D\text{-}2M)^2 + T^2}$

W = Ball Width