Relative Dimensions

General Information:

Dimensions that are described in relation to some other dimension are known as relative dimensions.

Since it is impossible to foresee the many potential designs of all molded products in which relative dimensions will be specified, it is impractical to assign standard drawing tolerance designations to these dimensions.

The design engineer should recognize that the more precise the requirement, the more expensive the product.

He must allow the rubber manufacturer to use support pins, lugs, chaplet pins, or ledges in the mold to provide positive location and registration of the insert or inserts in the mold cavity.

With this in mind, it is suggested that the design engineer discuss relative dimensional tolerances on all products directly with the rubber manufacturer.

Other factors do affect tolerances to some minor degree.

Our attempt has been to acquaint the design engineer with background information on the major factors which result in the need for tolerances on molded rubber products.

Examples of Relative Dimensions:

Several examples of relative dimensions the design engineer may be required to consider are:

- Concentricity
- Perpendicularity
- Flatness
- Parallelism

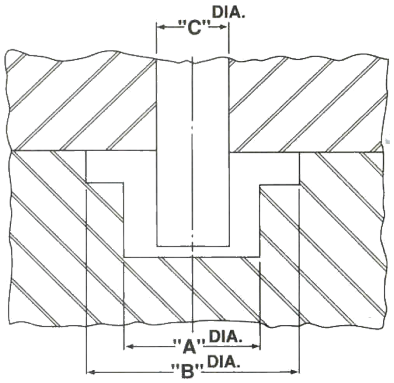
In all cases the tolerances should be considered only as a very general guide.

CONCENTRICITY

Concentricity is the relationship of two or more circles or circular surfaces having a common center.

It is designated as T.I.R. (total indicator reading) and is the total movement of the hand of an indicator set to record the amount that a surface varies from being concentric.

Figure 2



DIA. "B" NOT OVER 50mm (2 in.).

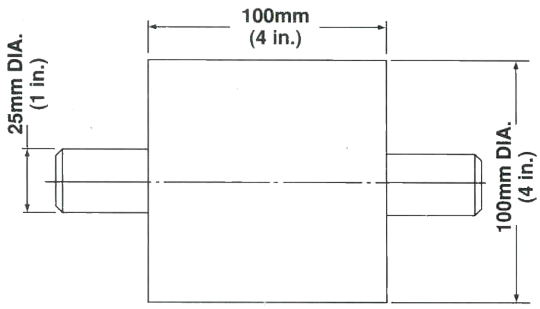
All diameters formed in the 'same' mold plate will be concentric within 0.25mm TIR (.010 in. TIR).

- In Figure 2, diameter "A" will be concentric with diameter "B" within: 0.25mm TIR (.010 in. TIR).

'Other 'diameters will be concentric within 0.75mm TIR (.030 in. TIR).

- In Figure 2, diameter "A" or "B" will be concentric with diameter "C" within 0.75mm TIR (.030 in. TIR).

Figure 3

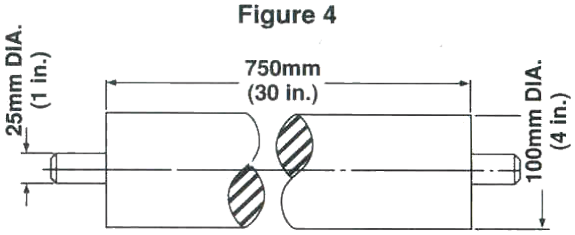


In Figure 3, 'outside' surface will be concentric with shaft within:

0.75mm TIR (.030 in. TIR) plus metal tolerance if unground.

Note: Parts may be ground to closer tolerances.

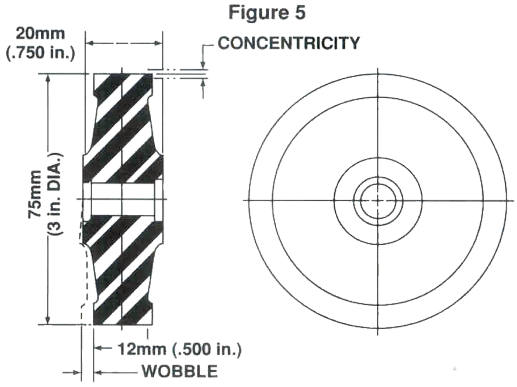
Figure 4



In Figure 4, 'outside' surface will be concentric with shaft within:
2mm TIR (.085 in. TIR) plus metal tolerance if unground.

Note: Parts may also be ground to closer tolerances.

Figure 5



On products similar to that described in Figure 5, having an outside
diameter of 75mm (3 in.) concentricity within:

0.75mm TIR (.030 in. TIR) and wobble within:
0.75mm TIR (.030 in. TIR) can be expected.

Note: Wobble is a term used to identify movement of a surface that is not intended to be parallel to the TIR axis of rotation.

PERPENDICULARITY

Perpendicularity is the quality of being at an angle of 90° such as “surface shall be square with axis”.

A tolerance of 2° should be allowed for rubber surfaces that are not ground.

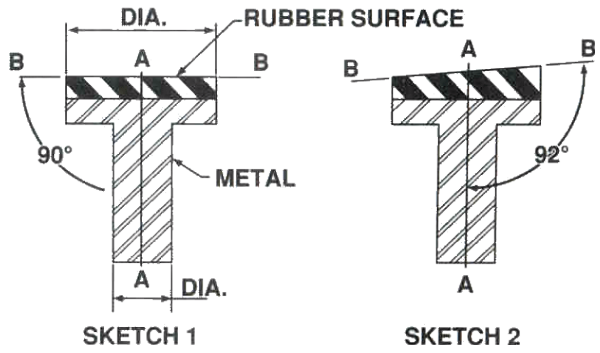
Rubber Product with Metal Insert

In Rubber-to-metal product shown in Sketch 1, Figure 6, Rubber surface B-B is square with axis A-A as the angle is true 90°.

Sketch 2 indicates the same example with 2° tolerances exaggerated.

Note: This type of product requires closer control than is usually normal with commercial products.

Figure 6



FLATNESS

Flatness of a surface on a part is the deviation from a true plane or straight edge.

Rubber Product (Unground).

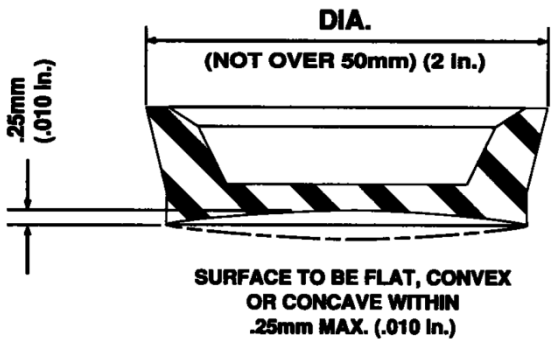
Molded Surfaces (unground) will be flat within:

0.25mm (.010 In.).

In Figure 7, on a cup as illustrated, the bottom can be concaved or convexed by no more than:

0.25mm (.010 in.).

Figure 7



Rubber Product with Metal Insert

Surfaces that are ground after molding will be flat within:

0.12mm (.005 in.).

(Allowance shall be made for removal of stock during grinding operation.)

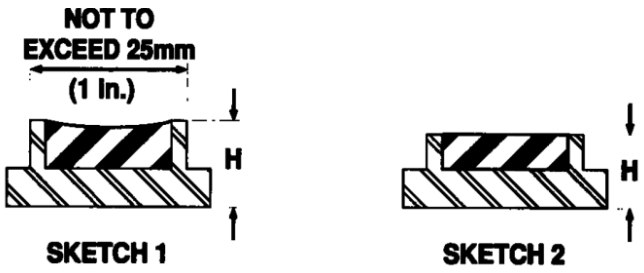
Figure 8

In Sketch 1, Figure 8, after molding, deviation from the true plane can be held to:

0.25mm (.010 in.).

In Sketch 2, Figure 8, after grinding, deviation can be held to:

0.12mm (.005 in.) - but dimension "H" will necessarily be affected.



PARALLELISM

Parallelism is the relationship of surfaces in different planes.

To be parallel, the planes passing through the surfaces must be, equidistant from each other at all points, when measured at 90° to the planes.

Figure 9

Rubber Product with Metal Inserts

In Sketch 1, Figure 9, the plates of the sandwich mount are parallel.

In Sketch 2, Figure 9, they are not.

On such a part approximately 200mm (8 in.) square, parallelism to within:

0.75mm (.030 in.) can be expected.