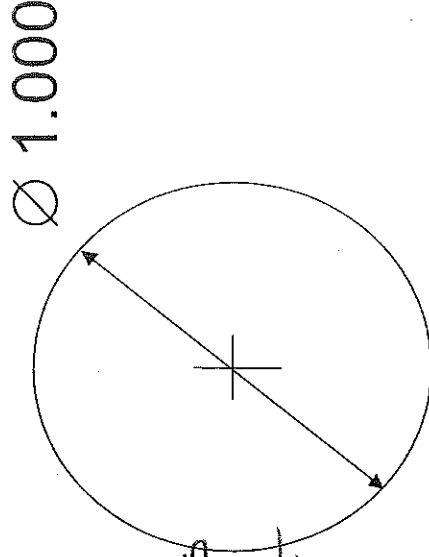


Geometric Symbols

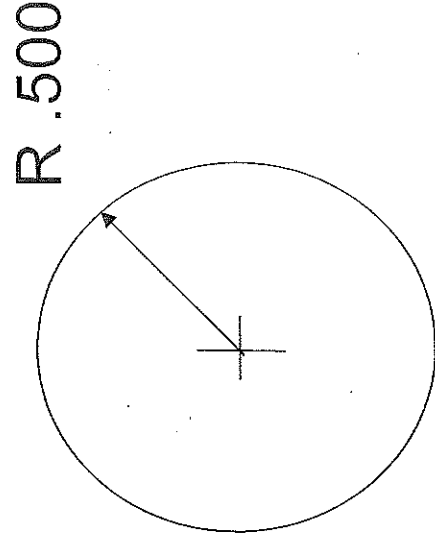
$\varnothing$ = Diameter

*The Distance Across
A Circle that passes
through its center point
(Twice the length of radius)*



R = Radius

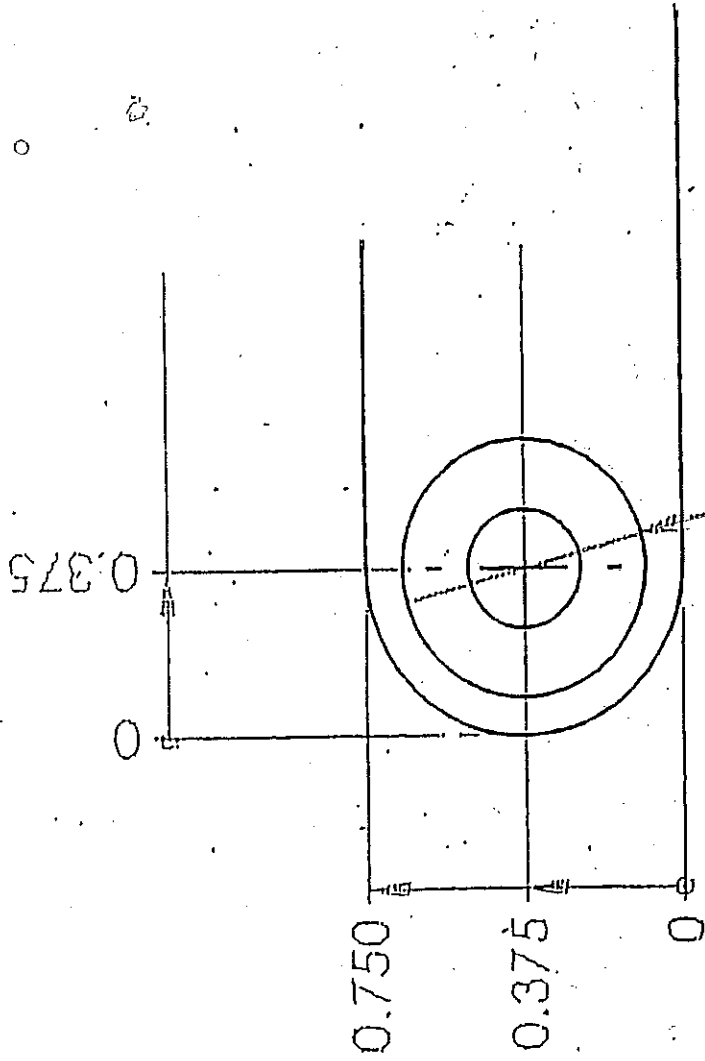
*The Distance from the
center point to the
outside edge of a circle
(Half the length of diameter)*



$\varnothing$ = Diameter

A diameter symbol is used for all round features.

Holes, bores, counterbores, countersinks, and bosses will have this symbol followed by a dimensional callout.

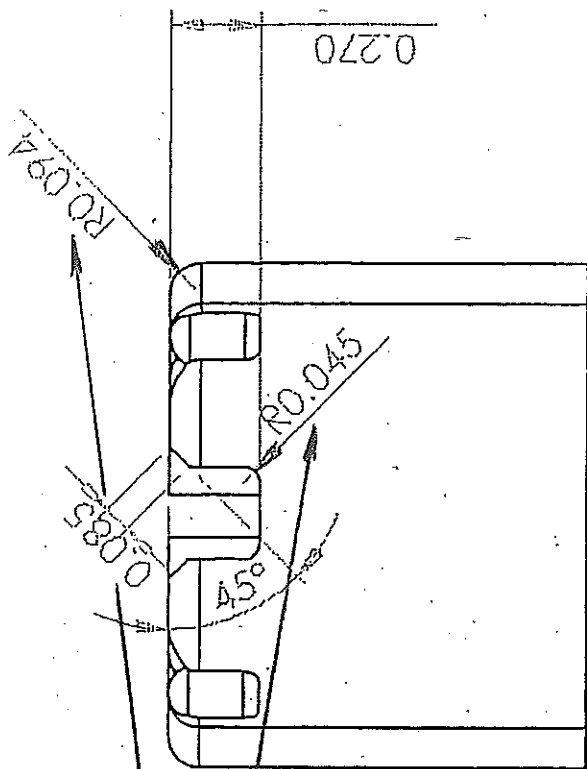


2 x $\varnothing$ 0.266 THRU ALL
✓ $\varnothing$ 0.577 X 82°

$R = \text{Radius}$

A Radius symbol is used

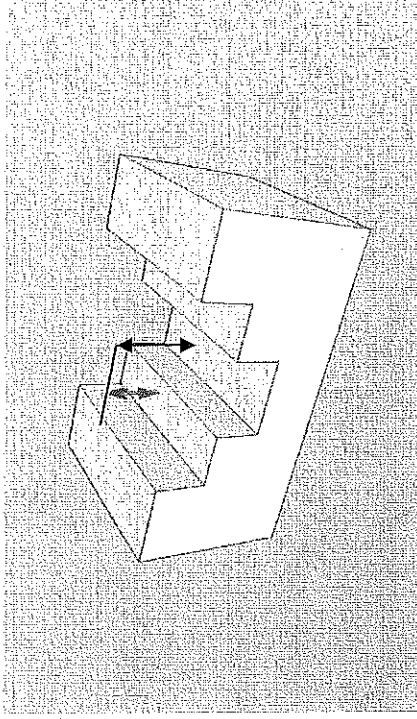
A Radius Symbol Is used
for All Rounded Corners
Followed by A dimension
Call out.



Geometric Symbols

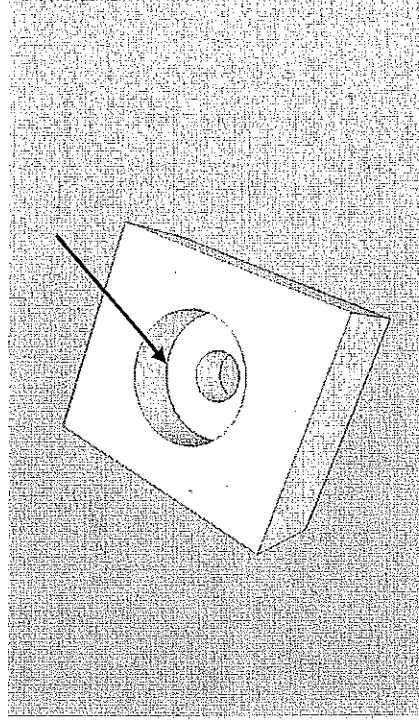
T = Depth

The Distance from a specified surface to a lower surface on a part



U = Counter Bore
(spot face)

A cylindrical recess that has a flat bottom and does not break through the part.

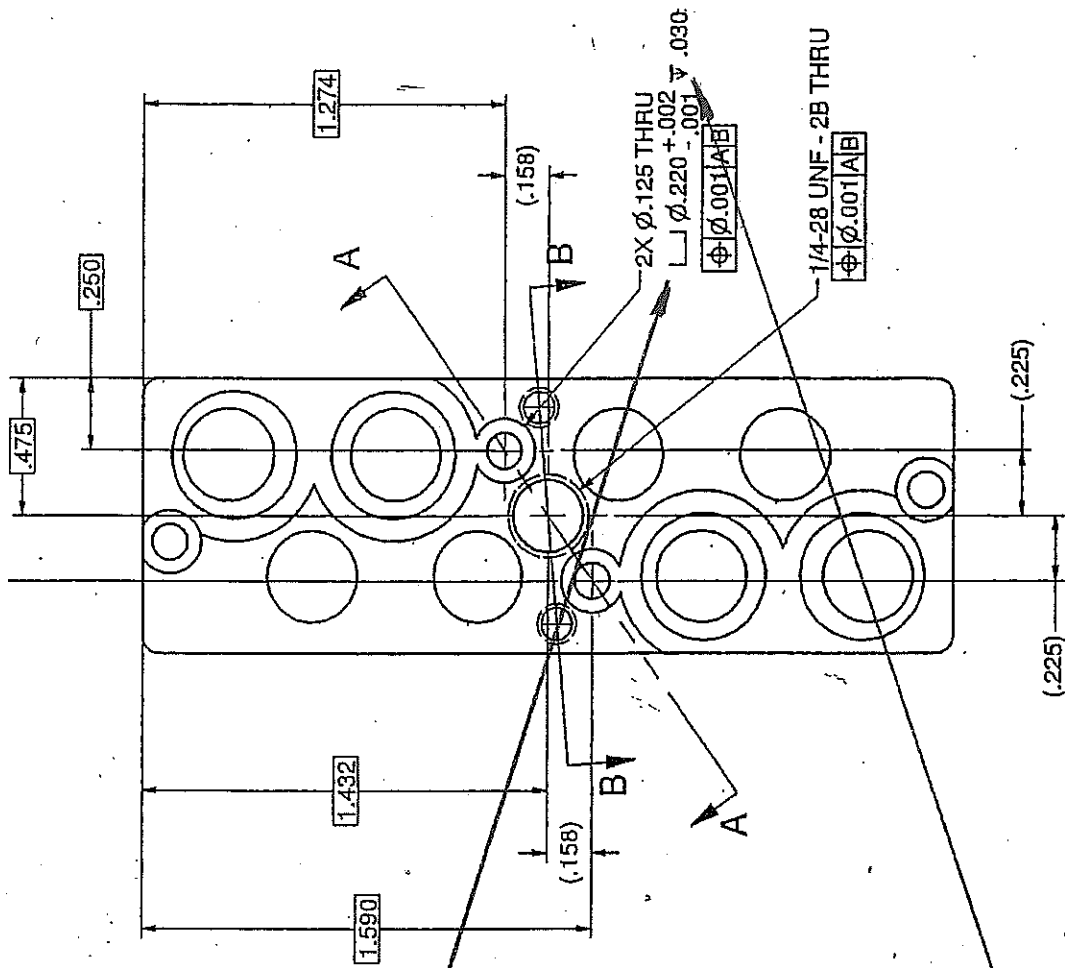


 = Counterbore
or
Spotface

A counterbore symbol is used for recessed features with a flat bottom, followed by a diameter symbol, followed by a dimensional callout.

 = Depth

A depth symbol is used when a drop in height is specified, followed by a dimensional callout.



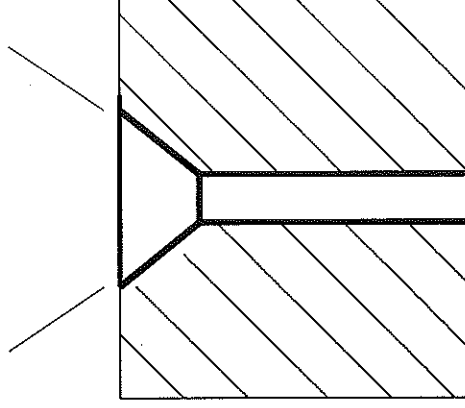
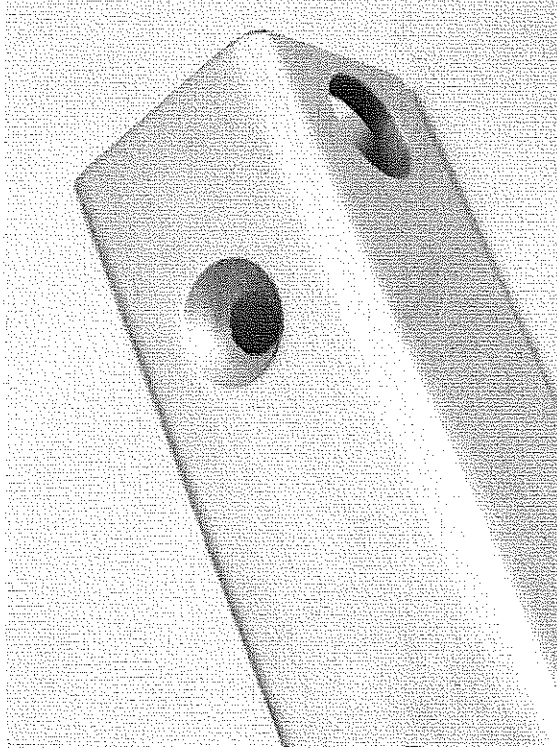
Geometric Symbols

✓ = Countersink

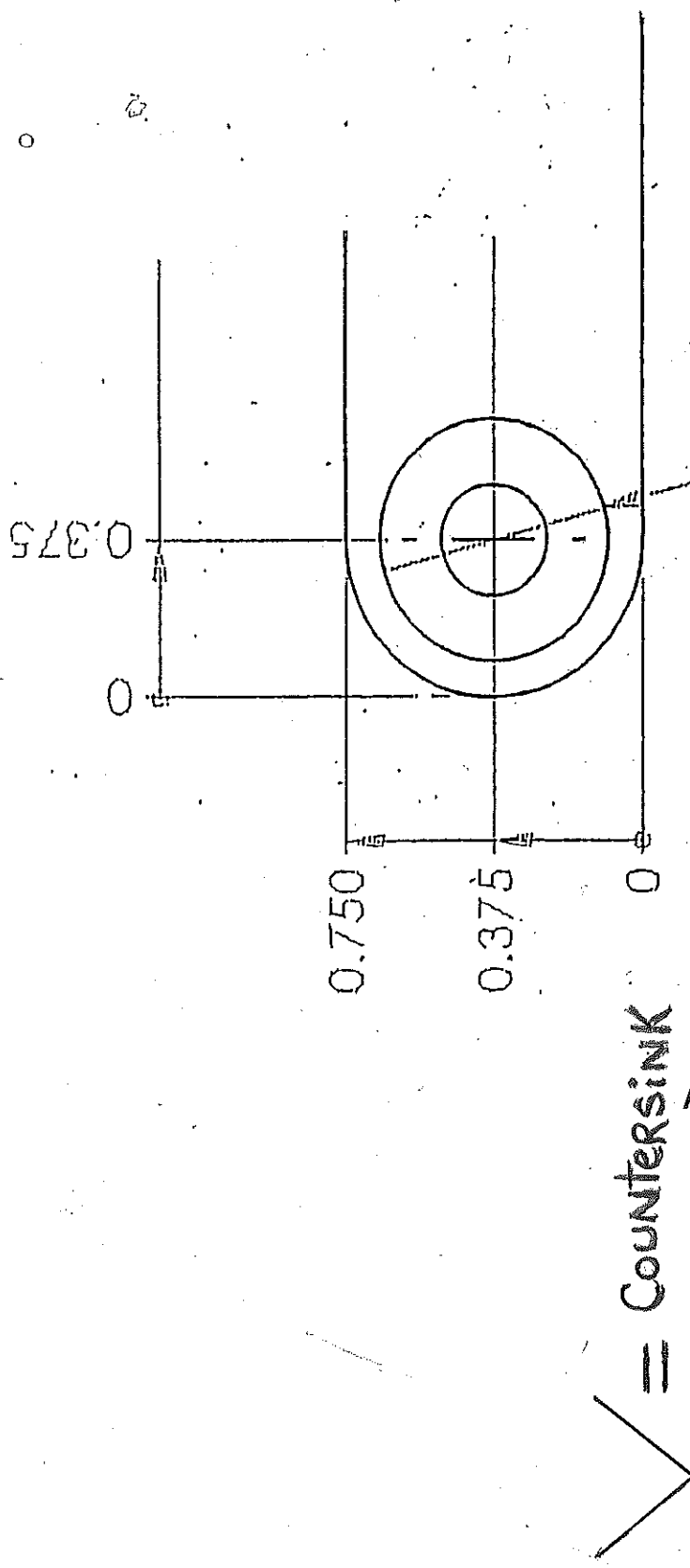
An Angled cut at the top of a hole that is commonly used to allow a screw to sit flush with or just below the top surface

Ø.300 THRU

✓ Ø.630 x 82°



C/S Angles: 60°, 82°, 90°, 100°, 120°



✓ = Countersink

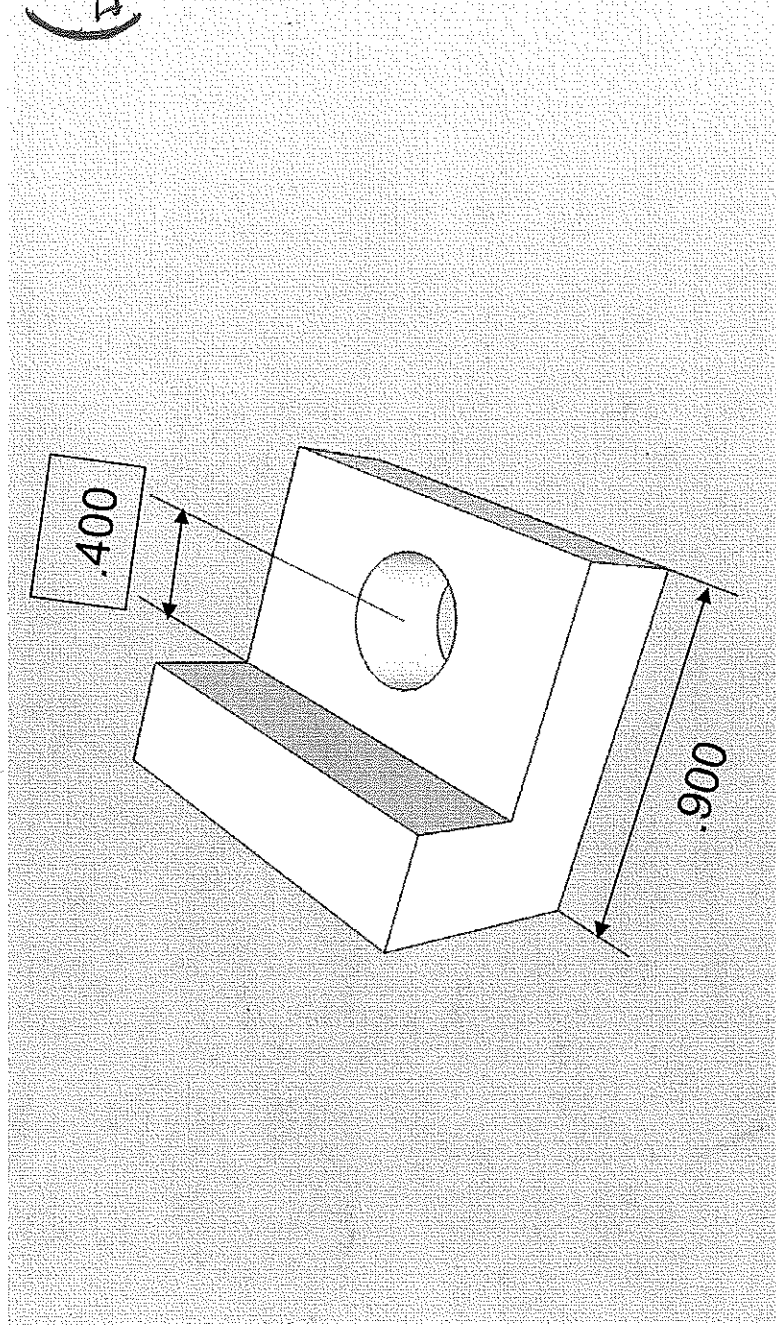
A countersink symbol is used for angled/funnel-shaped enlargements at the top of a hole. Followed by a diameter symbol, followed by an angular callout.

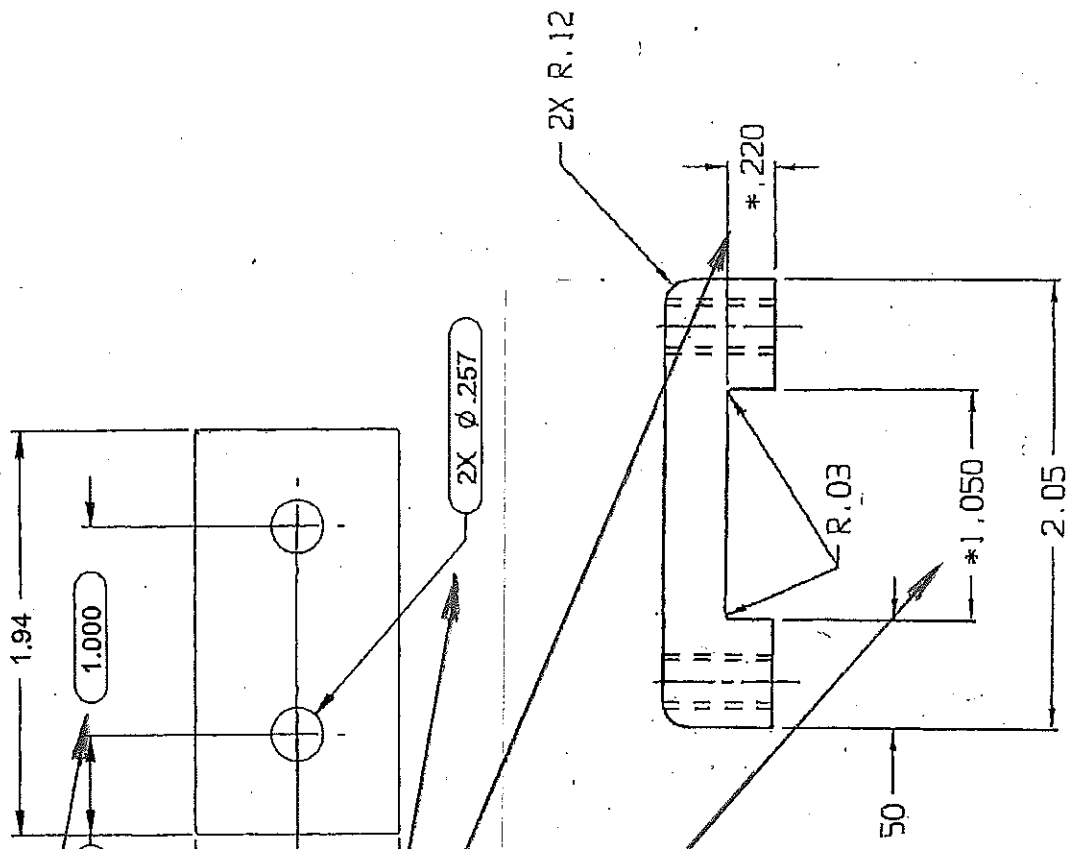
Geometric Symbols

.100 = Key Dimension

These dimensions are critical to the function of the part

(These Dimensions Demand more Attention)





1.000 or * 1.000

= Key Dimensions

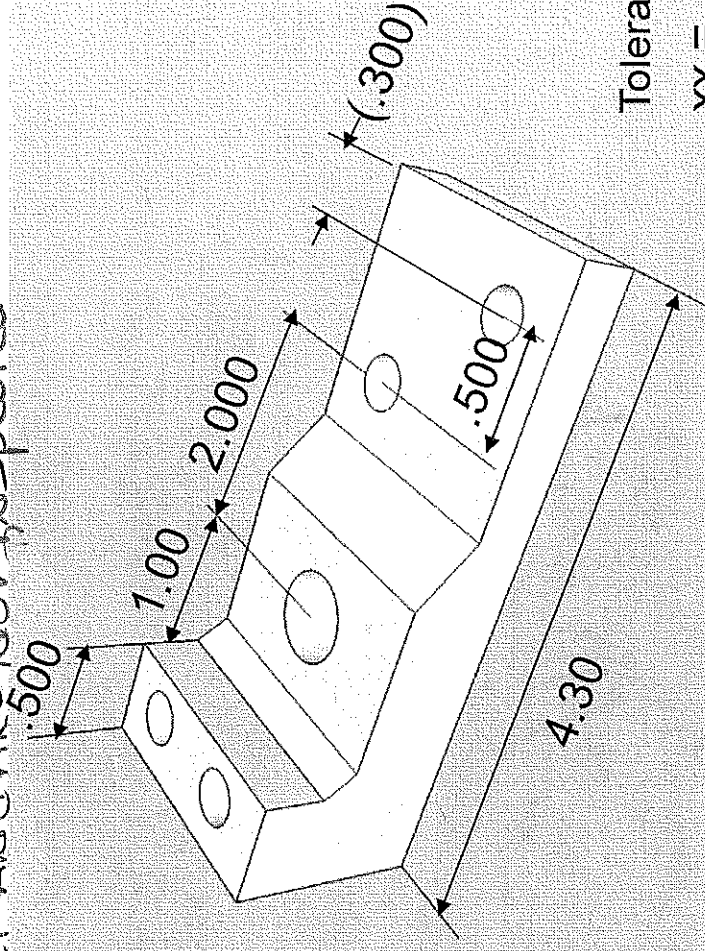
Key dimensions are critical to the function of the part and must be held as tight as possible.

Key dimensions will be inside of an oblonged box or can have an asterisk in front of it.

Geometric Symbols

(.100) = Reference Dimension

These Dimensions Provide Auxiliary Information ON A PART AND ARE NOT INSPECTED

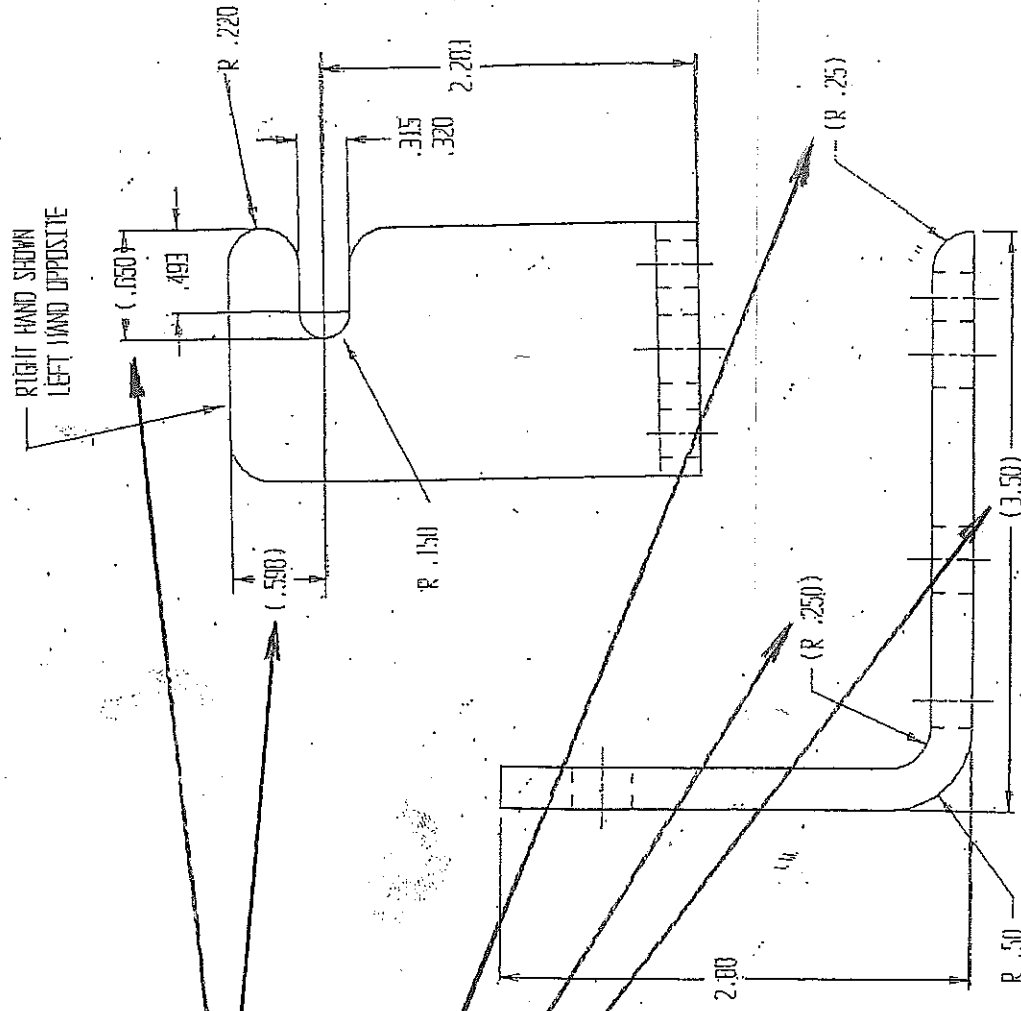


$$.505 + 1.010 + 2.005 + .505 + (.300) = 4.325 \longrightarrow \text{Exceeds 4.30 tolerance}$$

(1.000) = Reference Dimensions

Reference Dimensions Provide Information that CAN/WILL VARY, but is NOT CRITICAL for the PART to FUNCTION.

Reference Dimensions will be inside of Parentheses.



ON the first view, the .650 and the .598 DIMENSIONS ARE NOT AS CRITICAL AS the .493 and the 2.283 DIMENSIONS ARE.

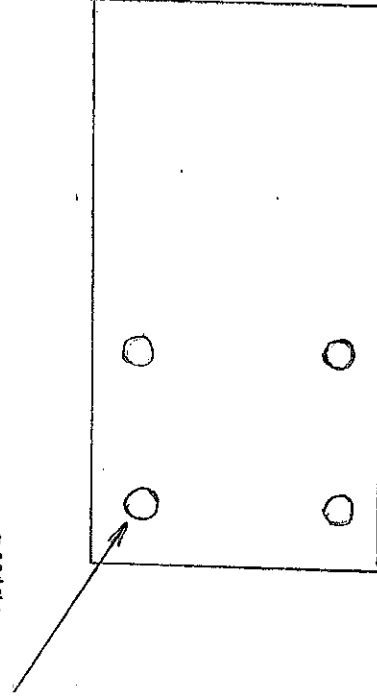
ON the second view, the .250 Radii and the 3.50 DIMENSIONS will VARY because the MATERIAL is EXTRUDED, but that will NOT AFFECT the FUNCTION of the PART.

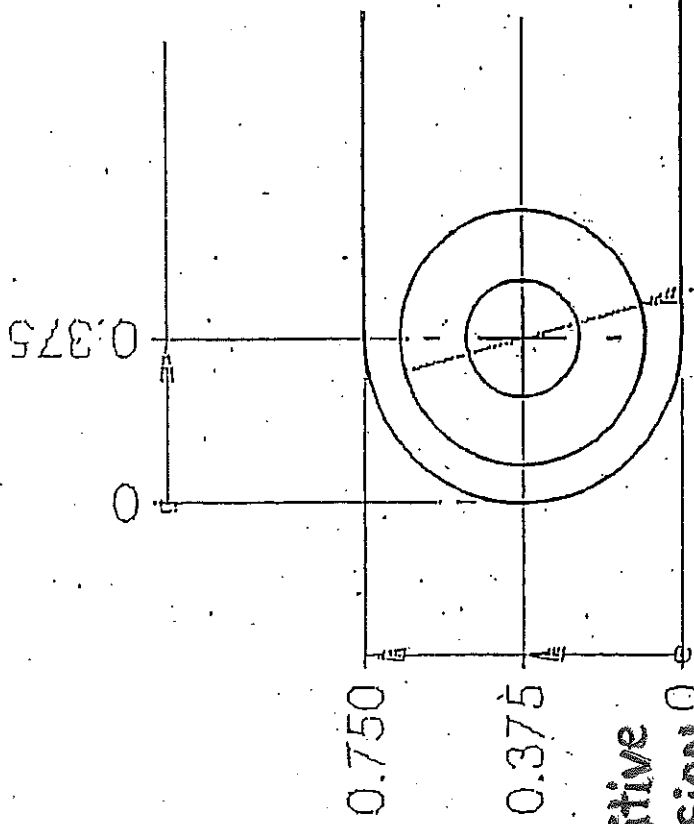
~~X~~ or ()

= Repetitive Dimension

When A Dimension Is Used In Multiple places either of these Prefixes can be Added to the Dimension to define How many times the Dimension Is Used

4x Ø.265 THRU

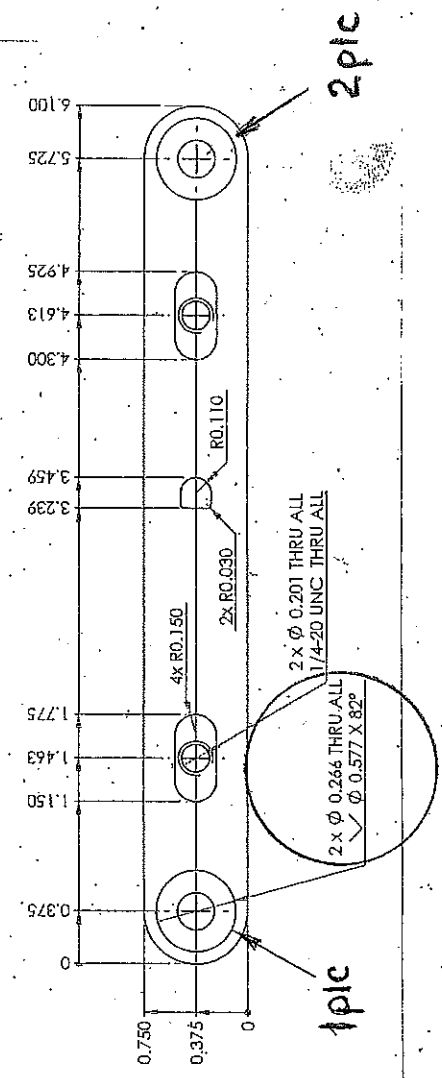




X or () = Repetitive Dimension

A number will be shown in front of the 'X' or inside of the '()' indicating the number of times the feature or features will appear on the part.

2 x Ø 0.266 THRU ALL
✓ Ø 0.577 X 82°

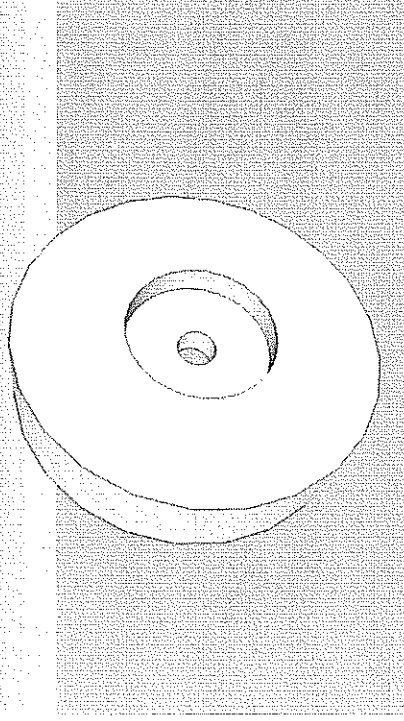


Geometric Symbols

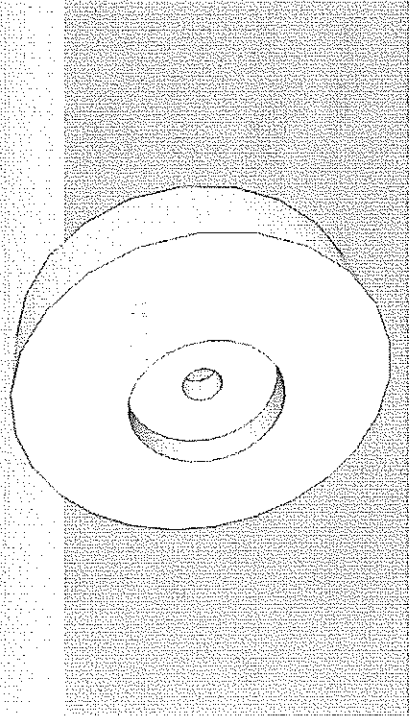
◎ = Concentricity

two circular features that share the same Center Point

Counterbores are Concentric

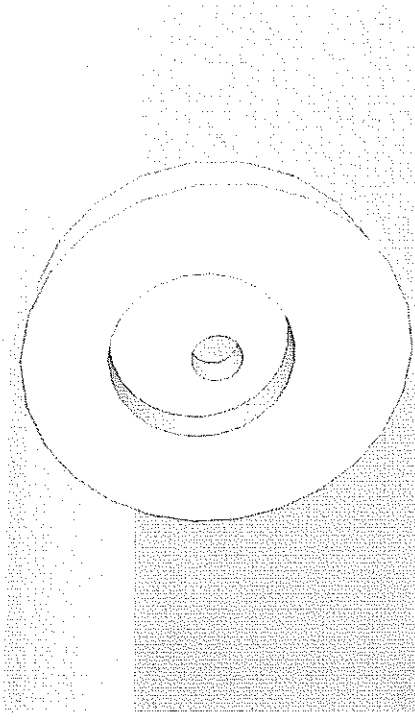


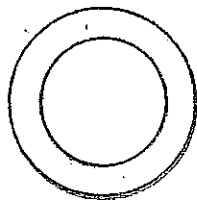
Front



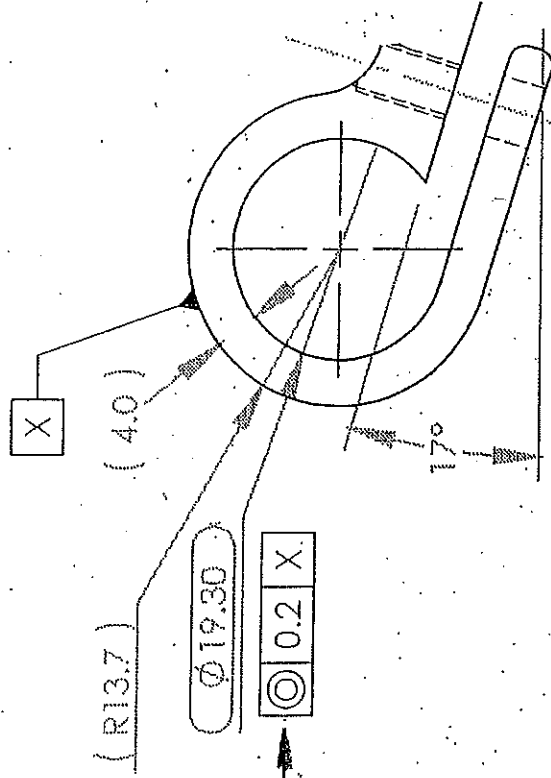
Backside

Counterbores not Concentric





= Concentricity



A concentricity symbol is used when two circular features that share the same center point are specified a maximum tolerance of mis-alignment.

A concentricity symbol inside of a box will be shown, followed by the maximum allowable variance, followed by the specified feature.

Above;

concentricity, must be held within .2mm (.008"), the specified feature is 'X' (R13.7mm)

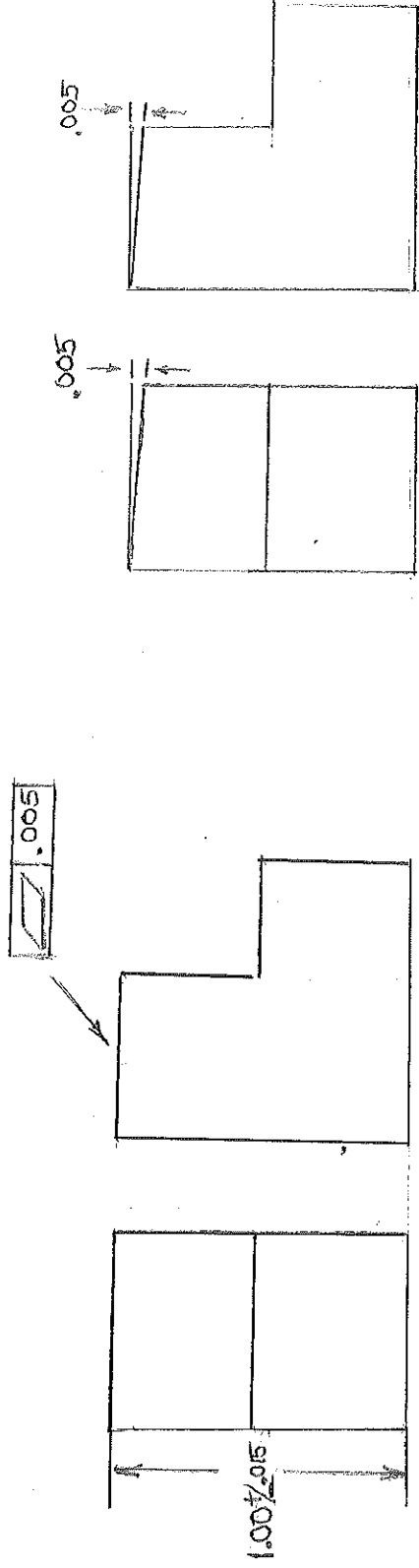
Because the 'R13.7' and the $\phi 19.30$ mm share the same center point, the maximum allowable variance is .2mm (or .008") - The wall thickness must not vary more than .2mm (.008")

Geometric Symbols



= Flatness

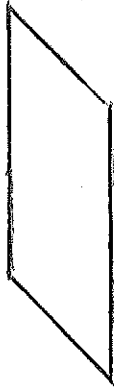
Defines a Zone between two Parallel planes within which a surface must lie



THIS ON A PRINT

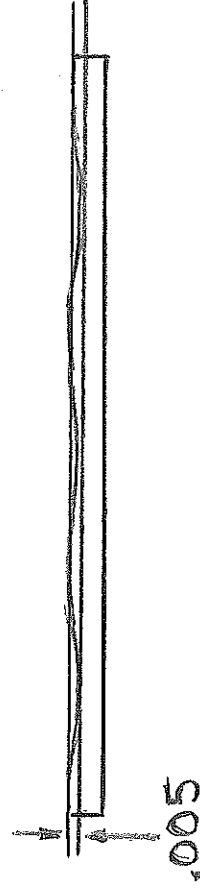
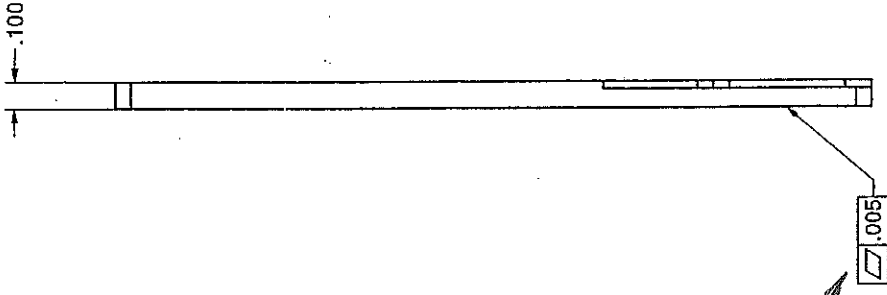
MEANS THIS

Flatness is used on a surface associated to a size dimension, acting as a refinement to the size requirement to ensure proper function of the part, or even wear. Flatness applies to all drawings, views, not just the view shown in the call out

 = Flatness

Flatness Is usually used as a refinement to a size dimension, to ensure proper function of the part, or even wear.

A flatness symbol inside of a box will be shown. Followed by the maximum allowable variance.

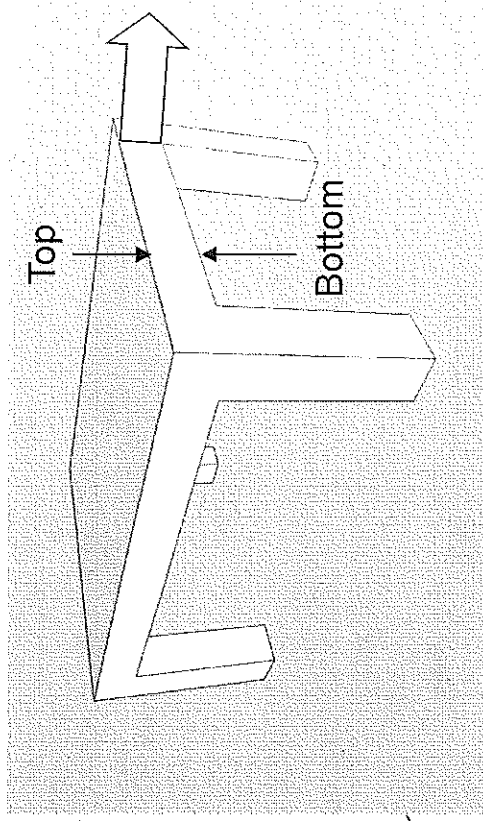


The flatness of the part cannot drop more than .005" from the highest point.
(across the entire surface)

Geometric Symbols

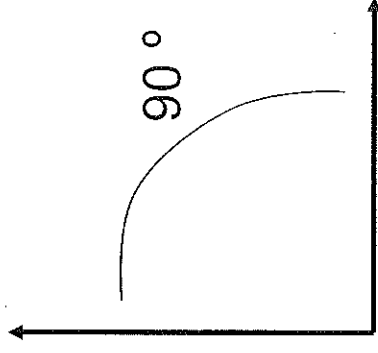
// = Parallelism

Two Surfaces At the same
Plane that will never intersect



⊥ = Perpendicularity

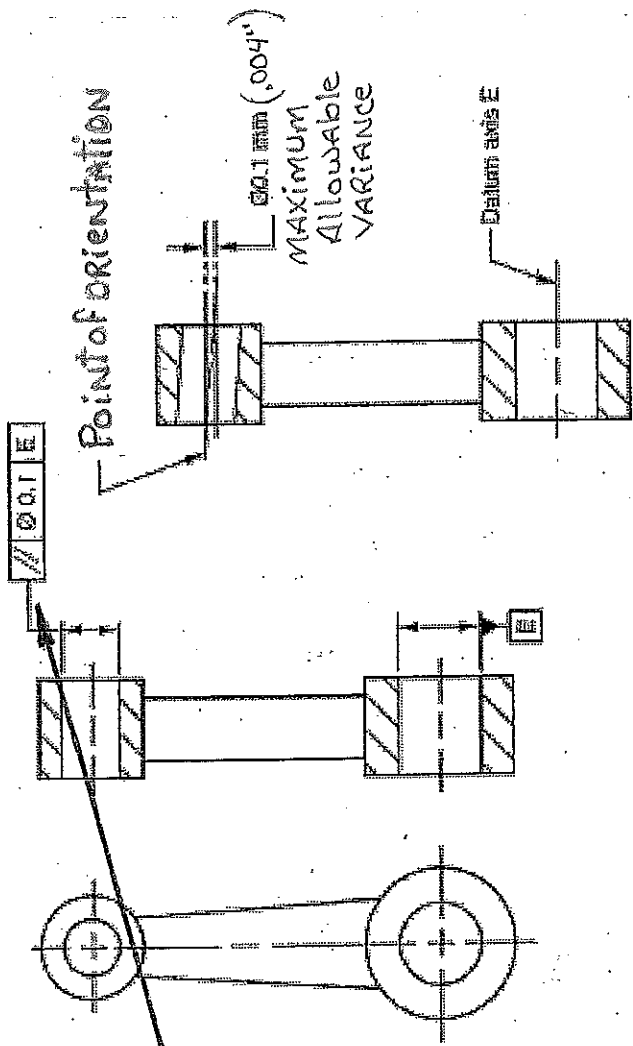
2 surfaces / planes At a 90° angle
In Relation to each other



// = Parallelism

A Parallelism Symbol Is used to Specify the Orientation of a Referenced Feature to a Datum Surface or Line.

A Parallel Symbol inside of a box will be shown. Followed by the Maximum Allowable Variance, followed the datum surface or line the orientation is referred from.



⊥ = Perpendicularity

A perpendicularity

Symbol is used to specify that 2 surfaces/planes (or features) must be oriented at 90° to each other.

A perpendicularity symbol inside of a box will be shown. Followed by the MAXIMUM ALLOWABLE VARIANCE, followed by the specified DATUM the orientation is referred from.

