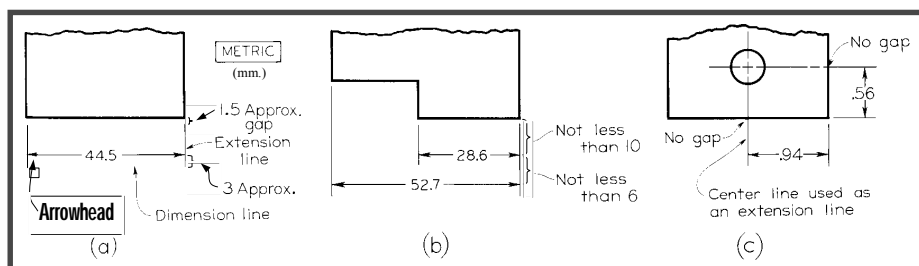
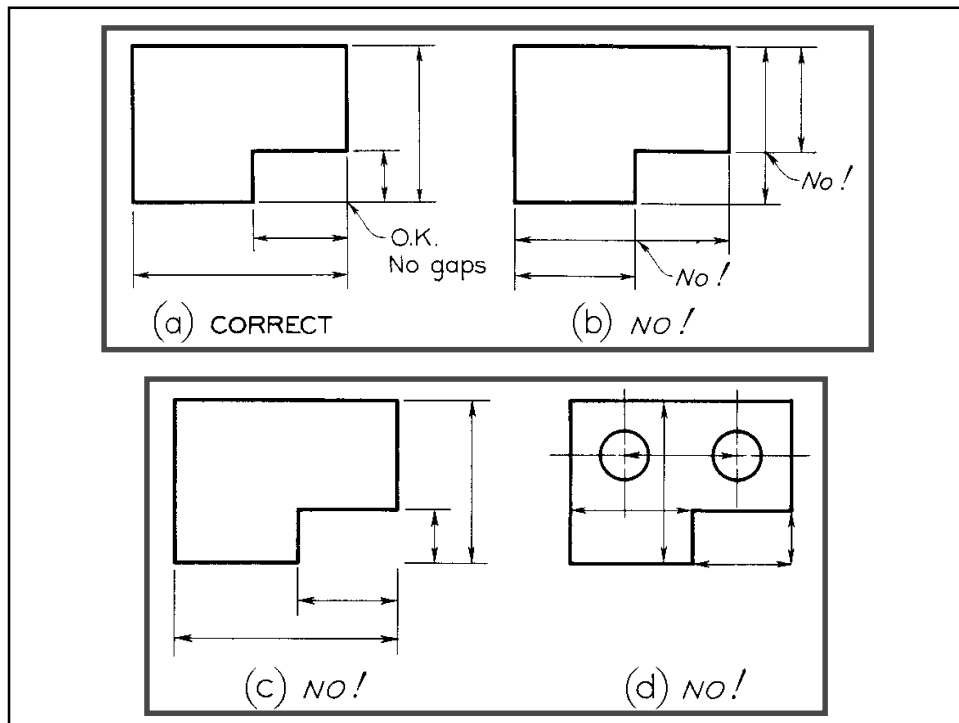


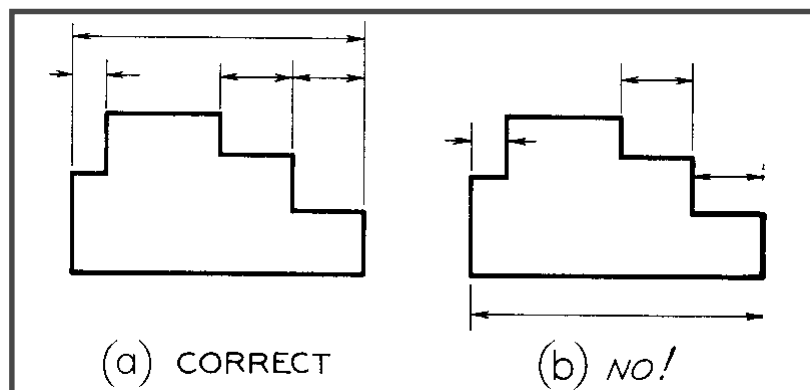
# DIMENSIONING

## PLACEMENT OF DIMENSION AND EXTENSION LINES

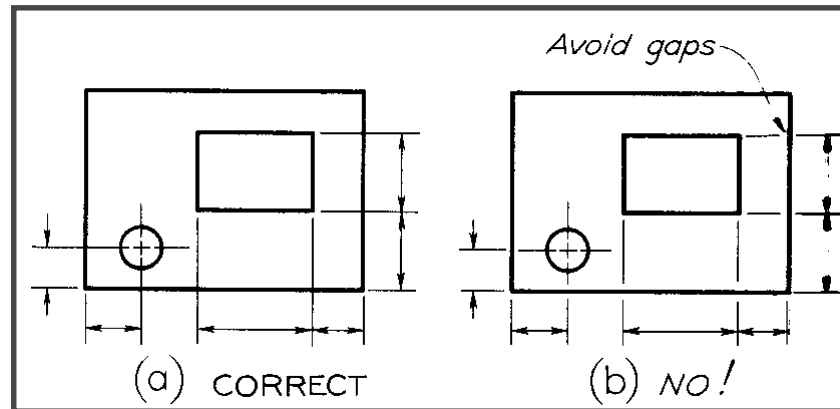




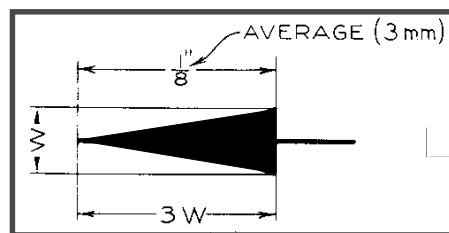
● **Grouped dimensions.**



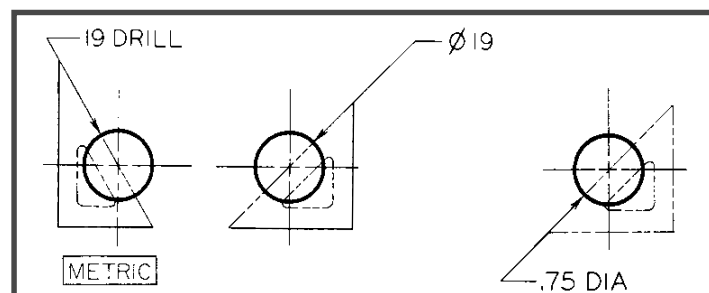
● **Crossing lines.**



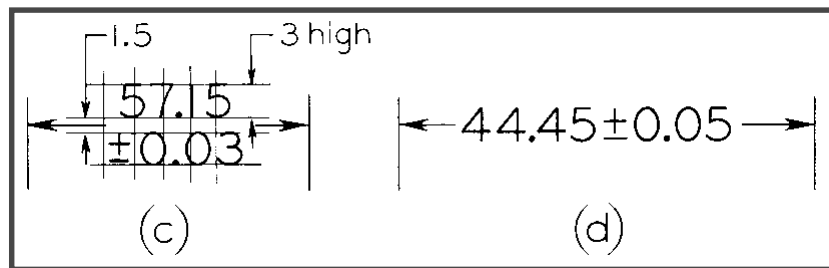
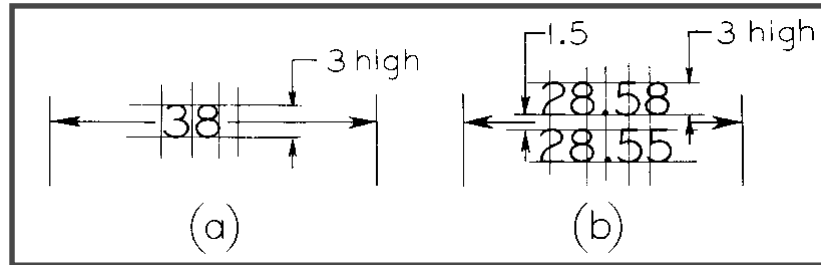
● **Arrowhead.**



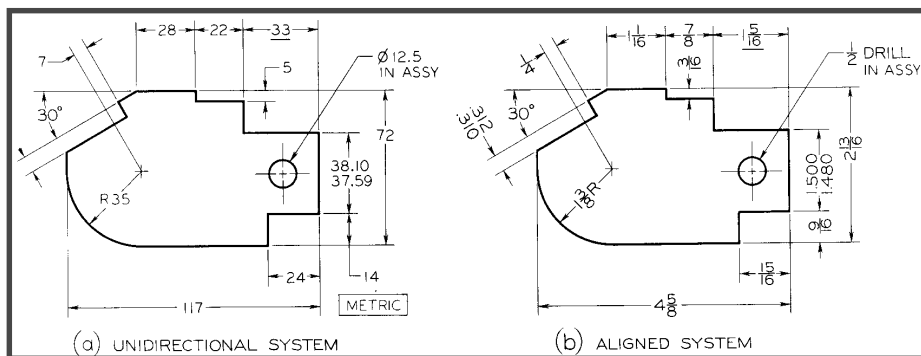
● **Leaders.**



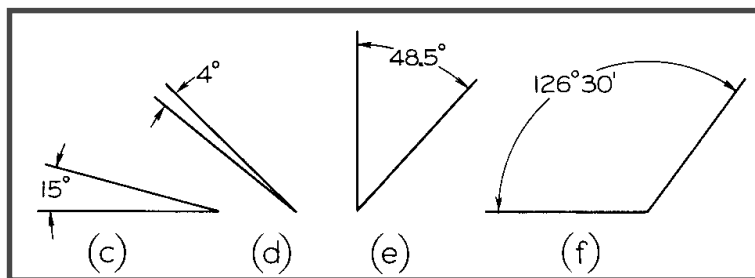
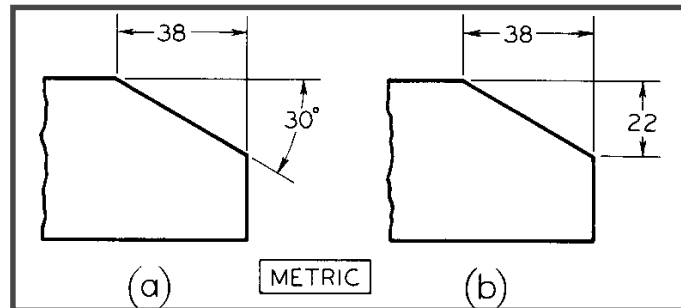
● **Dimension figures.**



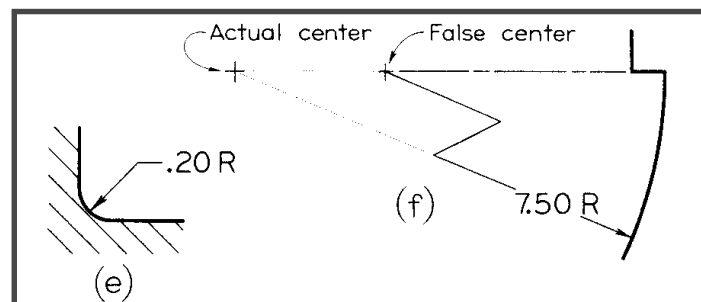
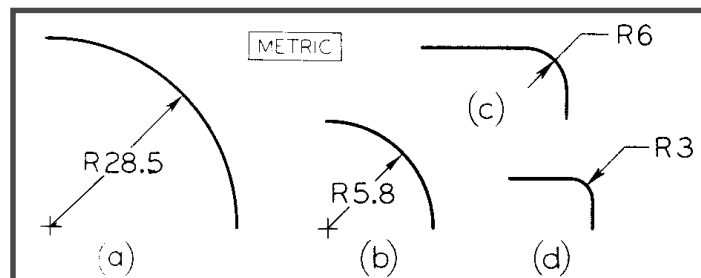
● **Directions of dimension figures.**



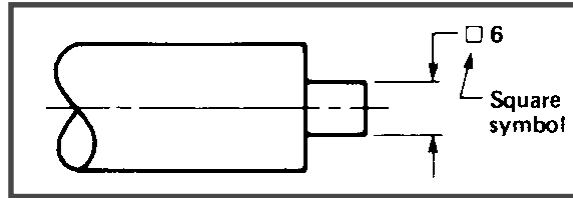
● **Dimension angles.**



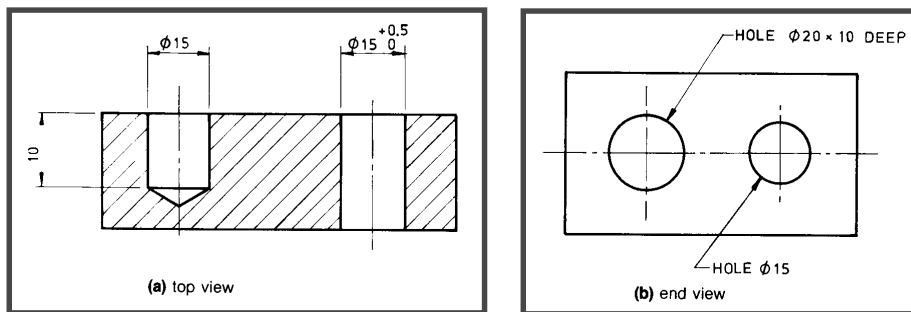
● **Dimension arcs.**



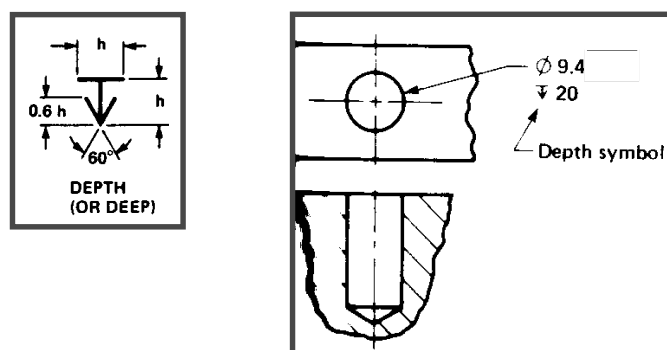
● **Square symbol.**



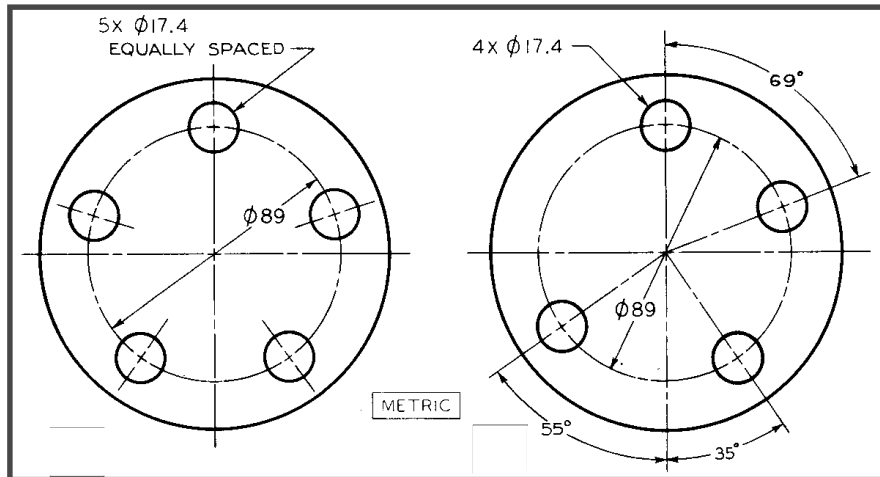
● **Hole symbol.**



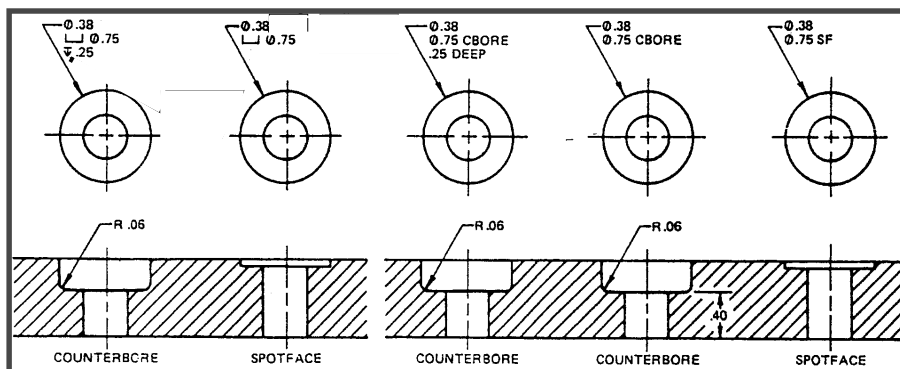
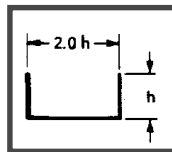
● **Hole symbol.**



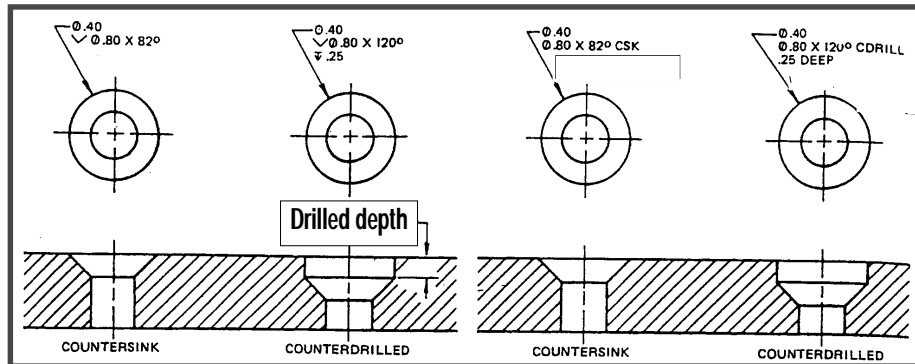
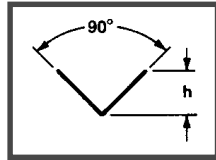
## ● Hole symbol.



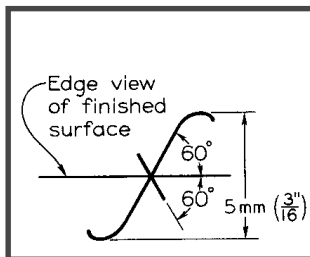
## ● Counterbore and spotface symbols.



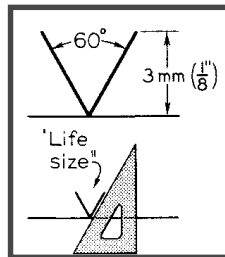
● Countersink and counterdrilled symbols.



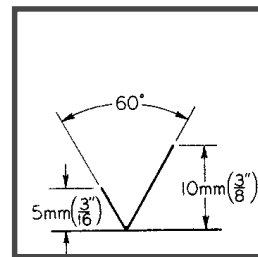
● Finish mark symbol.



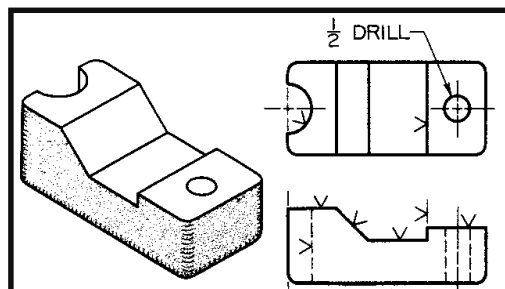
Traditional symbol



General symbol

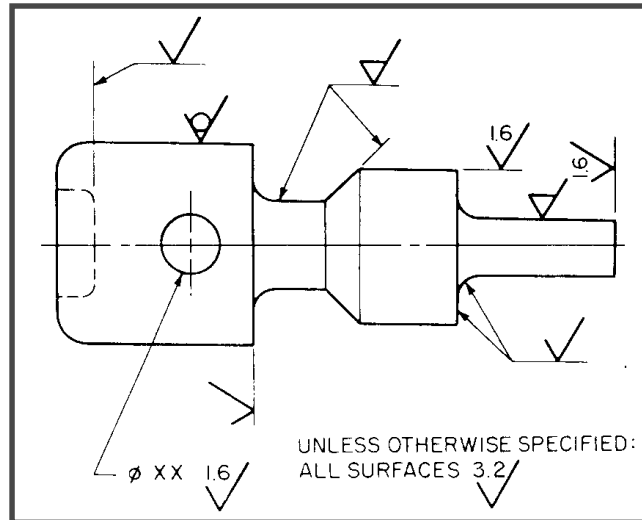


New symbol





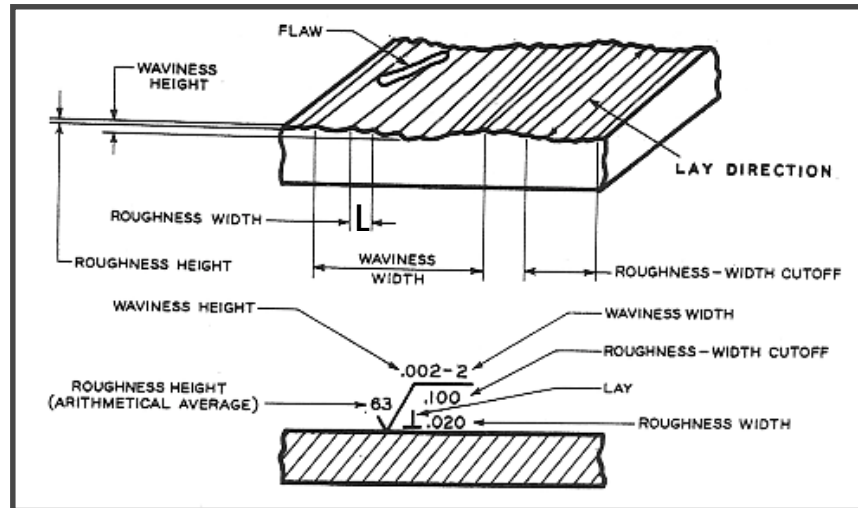
## ● Surface texture symbol.



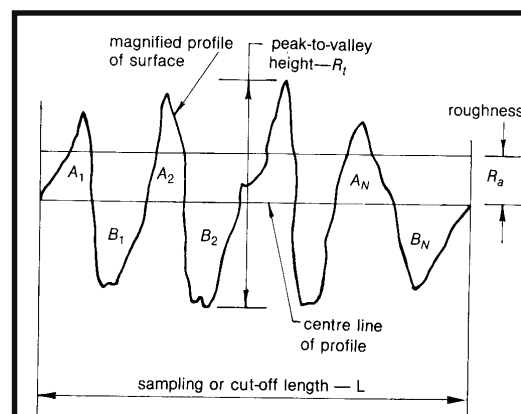
## ● Surface texture symbol.

Symbol	Meaning
(a) ✓	Basic Surface Texture Symbol. Surface may be produced by any method except when the bar or circle, (b) or (d), is specified.
(b) ✓	Material Removal By Machining Is Required. The horizontal bar indicates that material removal by machining is required to produce the surface and that material must be provided for that purpose.
(c) 3.5 ✓	Material Removal Allowance. The number indicates the amount of stock to be removed by machining in millimeters (or inches). Tolerances may be added to the basic value shown or in a general note.
(d) ✓	Material Removal Prohibited. The circle in the vee indicates that the surface must be produced by processes such as casting, forging, hot finishing, cold finishing, die casting, powder metallurgy or injection molding without subsequent removal of material.
(e) ✓	Surface Texture Symbol. To be used when any surface characteristics are specified above the horizontal line or to the right of the symbol. Surface may be produced by any method except when the bar or circle, (b) or (d), is specified.
(f)	<p>3 X 1.5 X 3 X APPROX</p> <p>60° 60°</p> <p>0.00 1.5 X</p> <p>LETTER HEIGHT = X</p>

● Surface texture symbol.

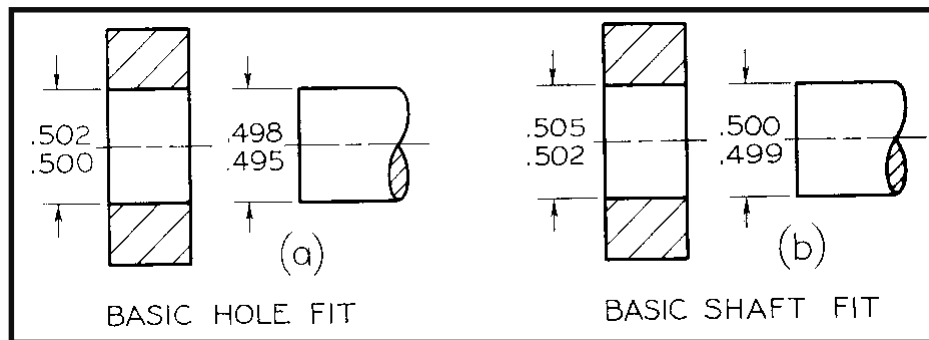


● Surface roughness,  $R_a$ .



$$R_a = \frac{(A_1 + A_2 \dots + A_N) + (B_1 + B_2 \dots + B_N)}{L}$$

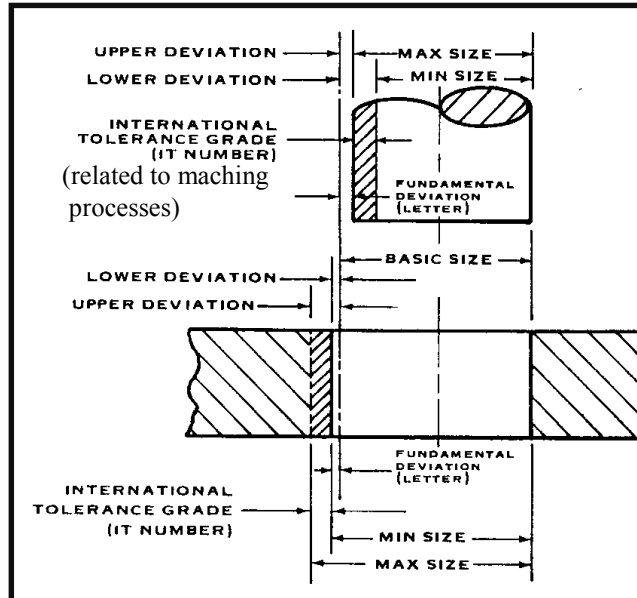
● Geometric tolerancing symbol.



● Geometric tolerancing symbol.

Range of Sizes From To and Including		Tolerances									
.000	.599	.00015	.0002	.0003	.0005	.0008	.0012	.002	.003	.005	
.600	.999	.00015	.00025	.0004	.0006	.001	.0015	.0025	.004	.006	
1.000	1.499	.0002	.0003	.0005	.0008	.0012	.002	.003	.005	.008	
1.500	2.799	.00025	.0004	.0006	.001	.0015	.0025	.004	.006	.010	
2.800	4.499	.0003	.0005	.0008	.0012	.002	.003	.005	.008	.012	
4.500	7.799	.0004	.0006	.001	.0015	.0025	.004	.006	.010	.015	
7.800	13.599	.0005	.0008	.0012	.002	.003	.005	.008	.012	.020	
13.600	20.999	.0006	.001	.0015	.0025	.004	.006	.010	.015	.025	
Lapping & Honing											
Grinding, Diamond											
Turning & Boring											
Broaching											
Reaming											
Turning, Boring, Slotting, Planing & Shaping											
Milling											
Drilling											

## ● Geometric tolerancing symbol.



## ● Geometric tolerancing symbol.

