5.1 Taylor's Principles

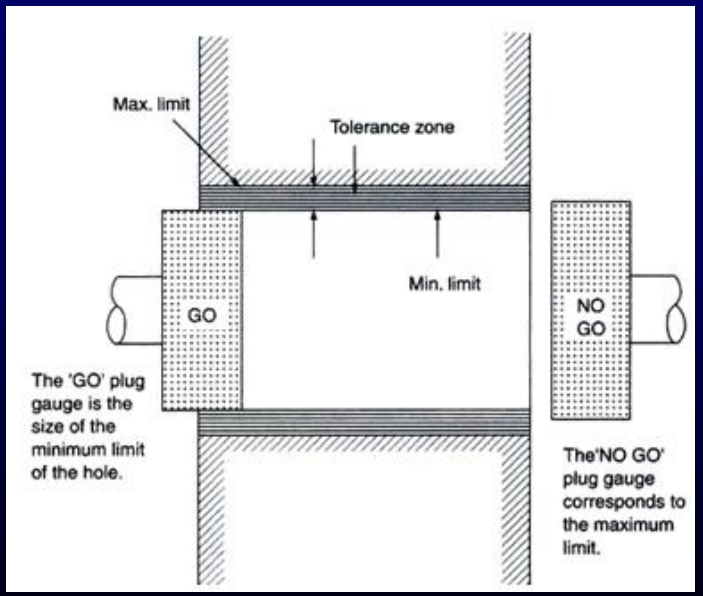
- In 1789-1864, Richard Robertsused the plug and collar gauges to inspect the part dimensions；
- In 1857, Joseph Whiteworth demonstrated the use of internal and external gauges for a shaft-based limit system
- In 1905, Willium Taylor explained the concept of a relationship between the two processes of checking the component.
  - His concepts, known as Taylor's principles, are used in the design of smooth limit gauges.

- Taylor stares that the 'GO' gauge should check all the possible elements of dimensions at a time and the 'NO GO ' gauge should check only one element of the dimension at a time.

- 'Go' and 'No GO' gauges should be designed to check the maximum and the minimum material limits of components.

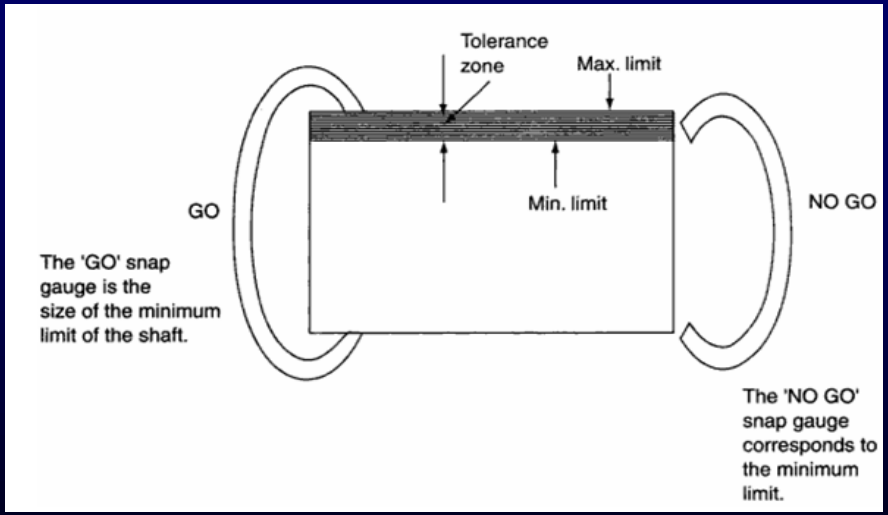
'Go' Limit

- 'go' limit is the one between the two size limits which corresponds to the maximum material limit
- the upper limit of a shaft and the lower limit of a hole
- 'GO' gauge can check one feature of the component in one pass



'NO GO' Limit

- 'no go' limit is the one between the two size limits which corresponds to the minimum material condition
- the lower limit of a shaft and the upper limit of a hole.

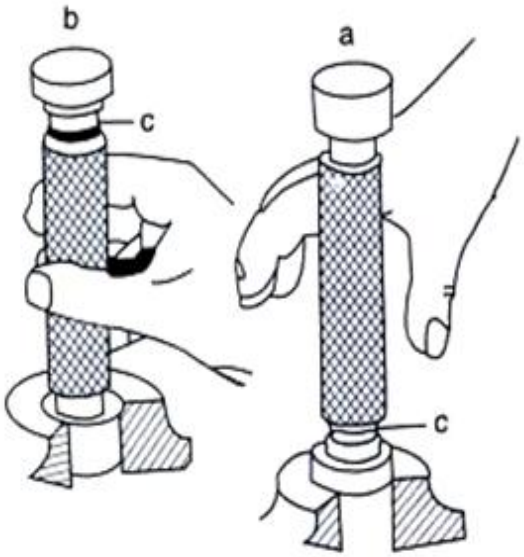


5.2 Smooth Limit Gauges

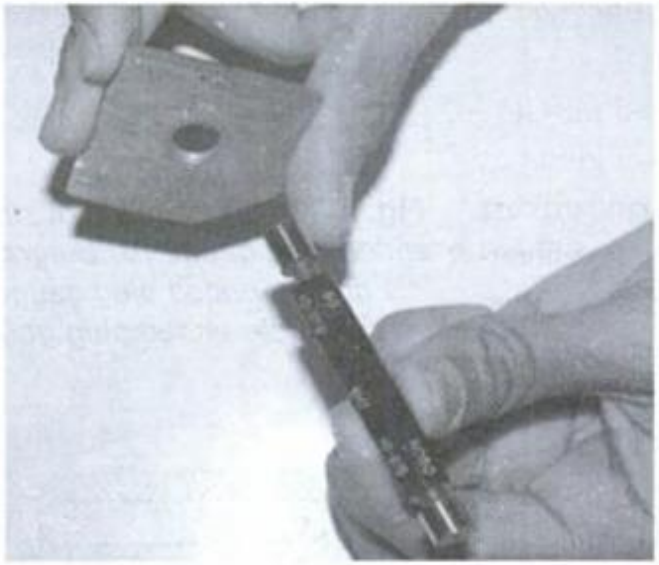
- Smooth limit gauges are used for the measurement test of holes and shafts
- The common type include plug gauges, ring gauges, and caliper gauges with the GO and NOT GO sides forming one set

5.2.1 Limit Plug Gauge

- Limit plug gauges are fixed gauges usually made to check the accuracy of a hole with the highly finished ends of different diameters
- If the hole size is correct within the tolerable limits, the small end (marked “go”) will enter the hole, while the large end (“not go”) will not.



Limit plug gauge
a--GO-side
b--NO-GO side
c--Red marking



(a)

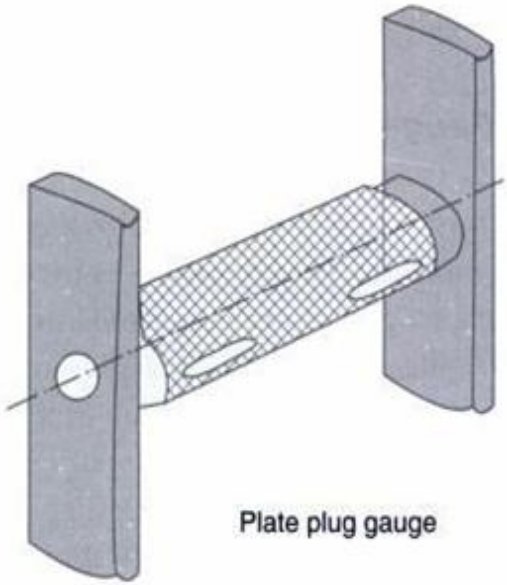
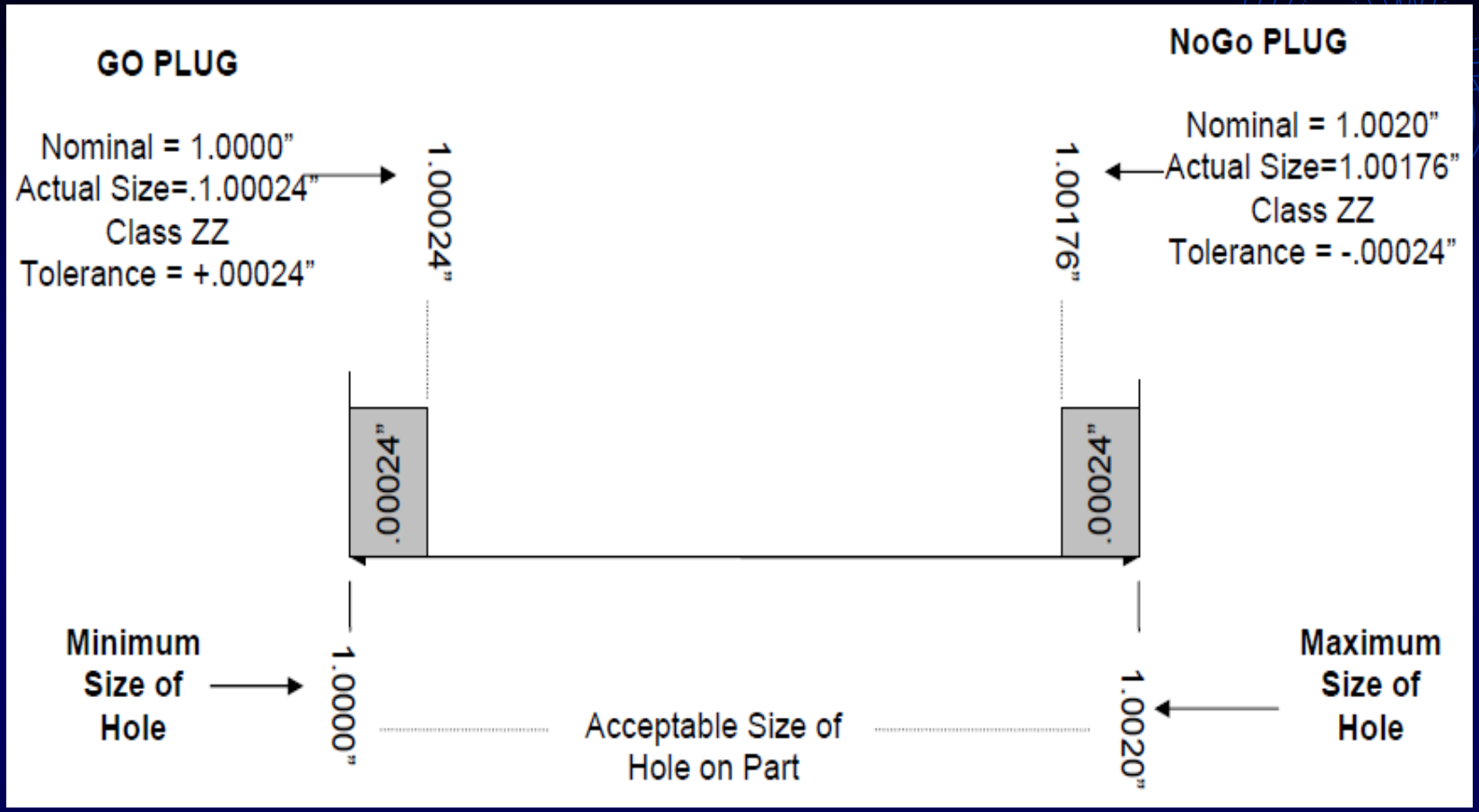


Plate plug gauge

(b)

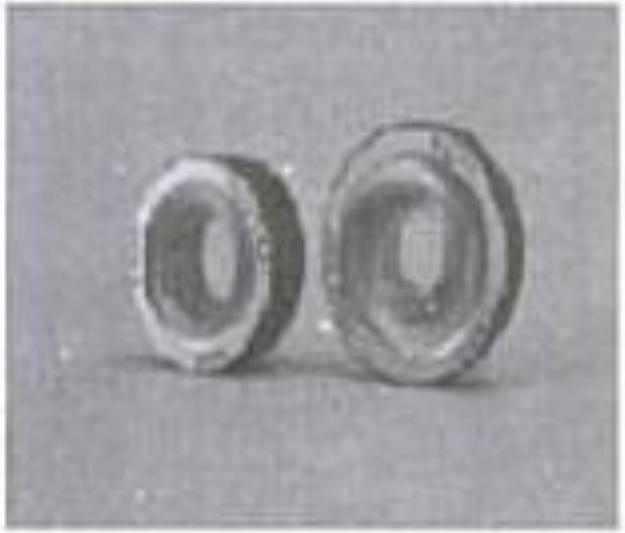
Plug Gauge Example

- **Dimension on part to gauge**
  - The nominal hole size on part to gauge is 1.0000”;
  - Tolerance of the hole is +0.002”/-0.000” ;
  - This means the hole must be manufactured somewhere between 1.0000” and 1.0020” in size;


GO PLUG
Nominal = 1.0000"
Actual Size=.1.00024"
Class ZZ
Tolerance = +.00024"
1.00024"
NoGo PLUG
Nominal = 1.0020"
Actual Size=1.00176"
Class ZZ
Tolerance = -.00024"
1.00176"
.00024"
.00024"
Minimum Size of Hole
1.0000"
Acceptable Size of Hole on Part
1.0020"
Maximum Size of Hole

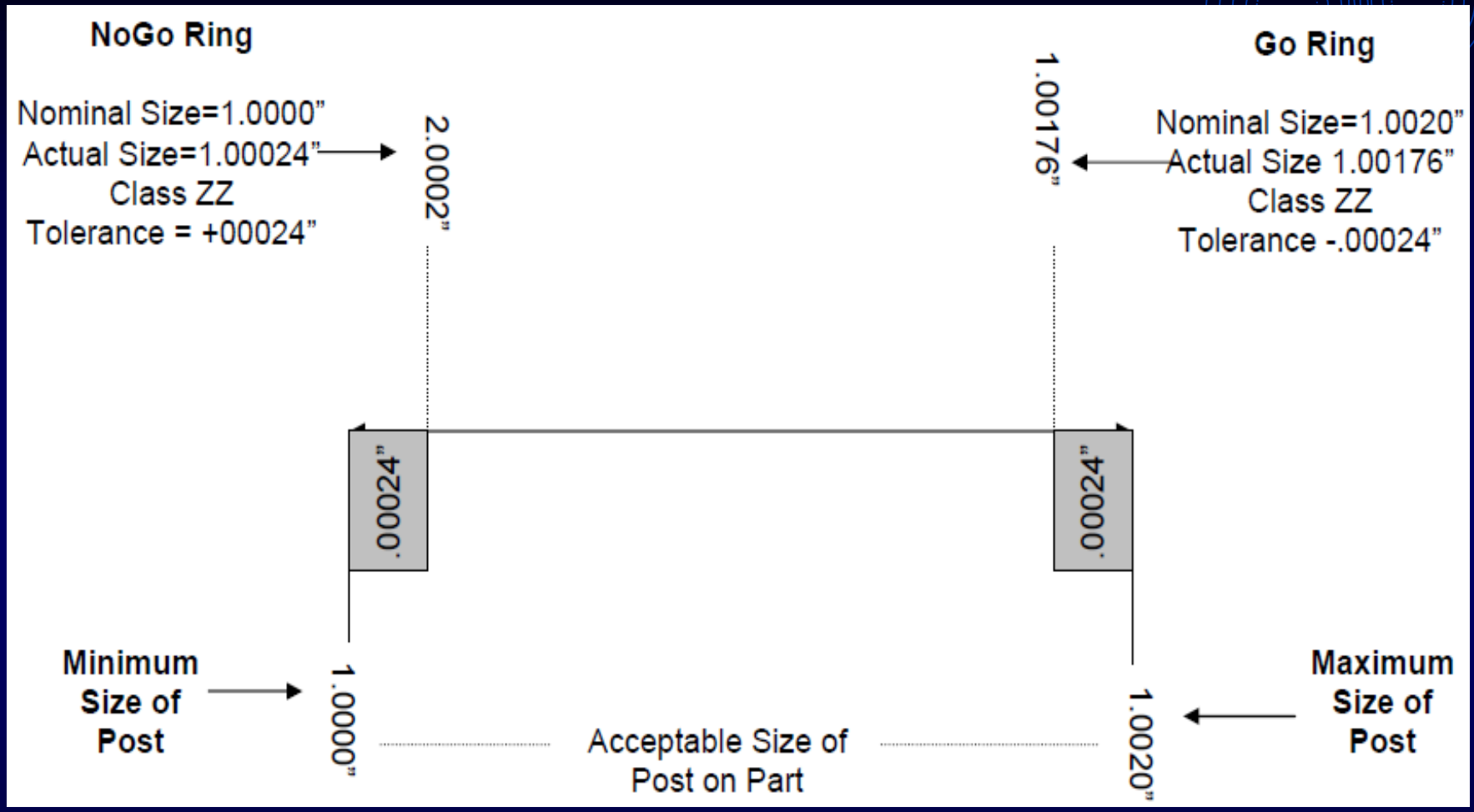
5.2.2 Limit Ring Gauge

- Limit plug gauges are fixed gauges usually made to check the accuracy of a shaft with highly finished ends of different diameters is used
- If the shaft size is correct within the tolerable limits, the large end (marked “go”) will go through the shaft, while the small end (“not go”) will not.

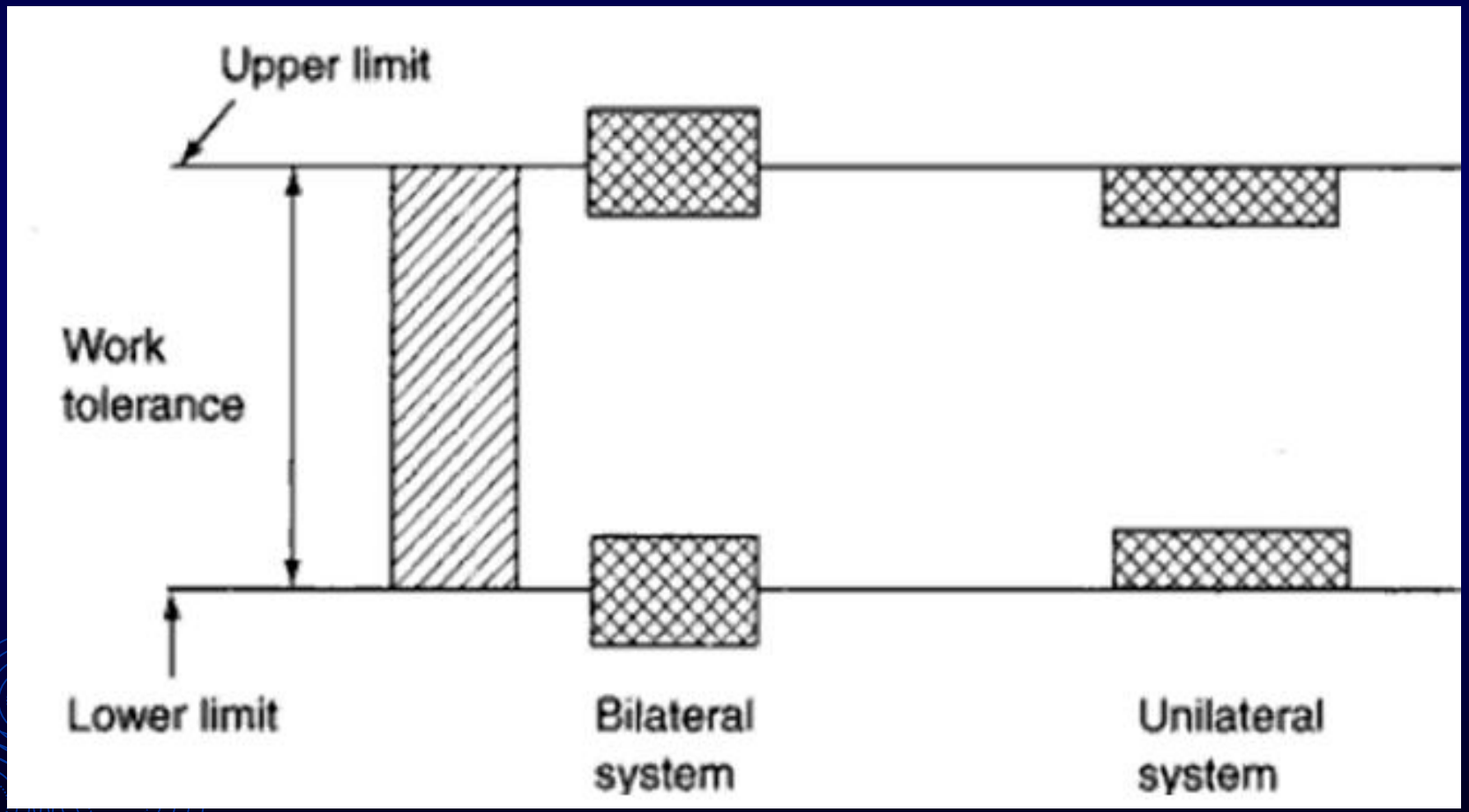


Ring Gauge Example

- **Dimension on part to gauge**:
  - Post on part to gauge is 1.0000”;
  - Tolerance of post on part is +0.002”/-0.000”;
  - This means the post will be somewhere between 1.0000” and 1.0020” in size;


NoGo Ring
Nominal Size=1.0000"
Actual Size=1.00024"
Class ZZ
Tolerance = +00024"
2.0002"
1.00176"
Go Ring
Nominal Size=1.0020"
Actual Size 1.00176"
Class ZZ
Tolerance -.00024"
.00024"
.00024"
Minimum Size of Post
1.0000"
Acceptable Size of Post on Part
1.0020"
Maximum Size of Post

5.3 Gauge Tolerance



Wear Allowance