

3 Beveled Rings

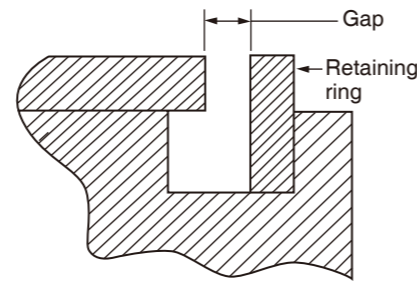
(1) Purpose of Use:

When using the Basic Rings, the accuracy of machining in the groove position and variation of retained parts may cause a gap between the ring and the part to be retained resulting in looseness and unsteadiness (Fig. 1). This gap will cause abnormal sound and damage to the ring.

The conventional measures of eliminating looseness are as follows:

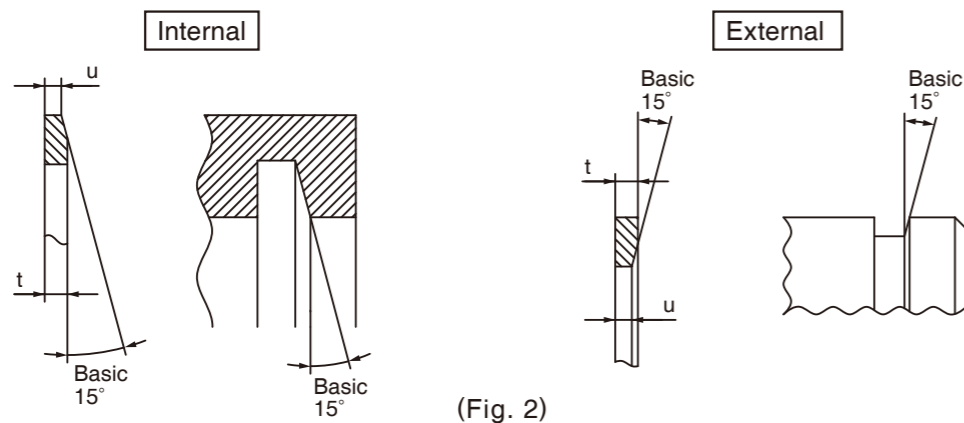
- By using the retaining ring with the gap adjusted by shims having a different thickness. (Fig. 1)
- By using the Wave Washer or other pressurized spring.
- By using the retaining ring that has a different plate thickness.
- By using the Bowed Ring and the like in which the ring is worked on an arched line.

However, there are limitations of a more quantity of parts, the need of a wide variety of rings and weak spring force. Thus the Beveled Ring products are developed.

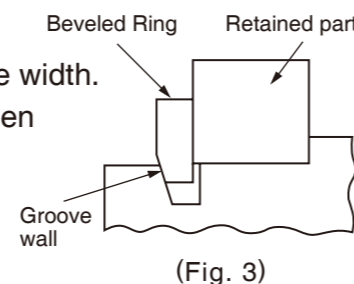


(2) Characteristics of the Rings:

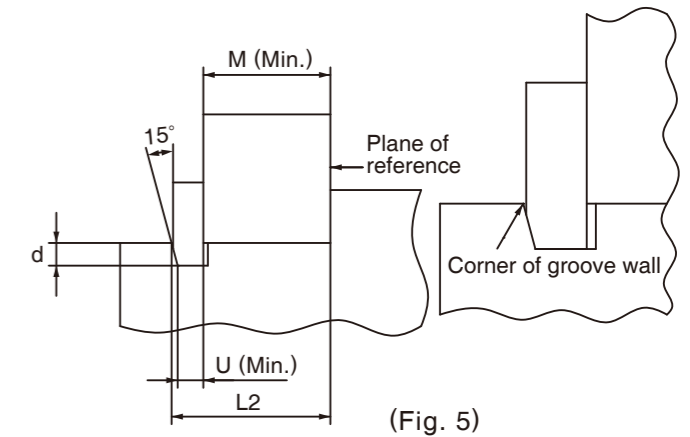
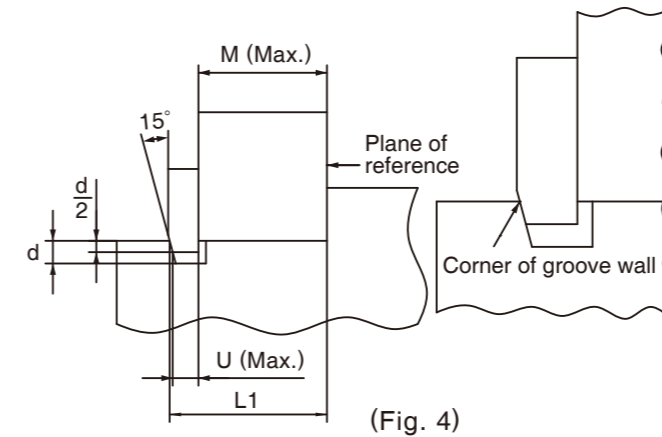
The Beveled Rings basically have the same structure with the Basic Rings. However, their ring segments to be fit in the groove have a bevel of 15 degrees differently from the basic ones. This bevel is provided on the outer periphery for Internal Ring and on the inner periphery for External Ring. These rings are designed to be set in the groove that basically has a slant of 15 degrees of the groove wall supporting the load (Fig. 2).



It is necessary to keep such an area that is sufficiently in contact with the groove wall. The Beveled Ring needs to be inserted at least half the groove width. When the Beveled Ring is inserted in the groove, it acts as a wedge between the outer groove wall and the retained part. When there is a gap between the Ring and the adjacent face of the retained part, the spring action of the ring will correct the gap and slide it deeply into the groove (Fig. 3).



(3) Positioning: L



- 1) If the distance from the corner of the outer groove wall to the plane of reference is at minimum with M (Max.) and U (Max.), the retaining ring should engage at least half the depth of the groove (Fig. 4).

$$L1 \geq M(\text{Max.}) + U(\text{Max.}) + \frac{d}{2} \tan 15^\circ$$

- 2) If the distance from the corner of the outer groove wall to the plane of reference is at maximum with M (Min.) and U (Min.), the retaining ring should engage the full depth of the groove (Fig. 5).

$$L2 \leq M(\text{Min.}) + U(\text{Min.}) + d \tan 15^\circ$$

(4) Take-up (End-play Take-up)

To allow the Beveled Ring to function properly, its take-up must equal or exceed the total of the tolerances.

$$\text{Take-up} = \frac{d}{2} \tan 15^\circ \geq \Delta L + \Delta M + \Delta U$$

$$\Delta L = L(\text{Max.}) - L(\text{Min.})$$

$$\Delta M = M(\text{Max.}) - M(\text{Min.})$$

$$\Delta U = U(\text{Max.}) - U(\text{Min.})$$