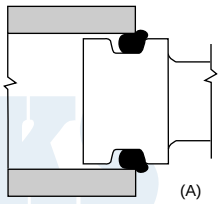
13. O-ring Assembling Conditions

Installation tips

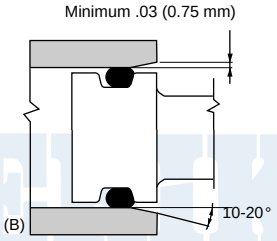
The following instructions must be observed when installing O-rings: Assembly must be done with care so that the O-ring is properly placed in the groove and is not damaged when the gland is closed.

- Always check the O-ring elastomer material first. Briefly check the cross section and inside diameter before installing the O-ring.
- Cleanliness is important for proper seal action and long O-ring life. Foreign particles in the gland may cause leakage and can damage the O-ring .
- Never glue the O-rings in the groove; there is a risk for chemical attack and hardening. An alternative is to use mounting grease. First, however, check the chemical compatibility.
- For problem free assembly of O-rings it is important that metal parts are rounded and free from sharp areas. Never force the O-ring over sharp threads, keyways, slots and other sharp edges.
- Do not use sharp tools, use an O-ring assembling aid to avoid damage.
- ID stretch as installed in a groove may not be more than 5-6%, because more stretch will reduce and flatten the cross section and thus reduce the squeeze.
- ID expansion to reach the groove during assembly should not exceed 50%. For very small diameters, it may be necessary to exceed this limit. If so, one should allow sufficient time for the O-ring to return to its normal size before closing the gland.
- Prevent the O-ring from being twisted. Twisting during installation may occur with O-rings having a large ratio of ID to cross section.
- Check the roughness of the counter surface.
- For removal of O-rings use an O-ring tool kit to prevent the metal surface or O-ring from being damaged.

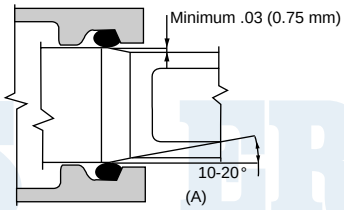
For Cylinders:



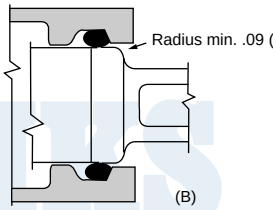
The O-ring is damaged by sharp edges



Easy assembling

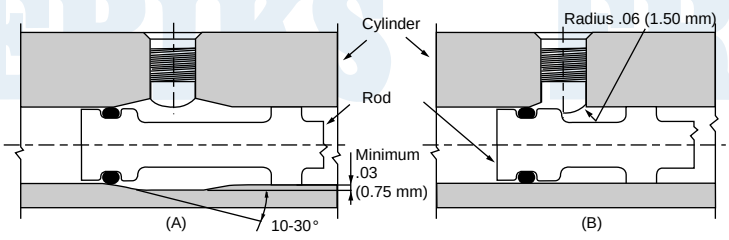


Recommended construction



Also this construction can be used (low pressure only)

For Piston Seals



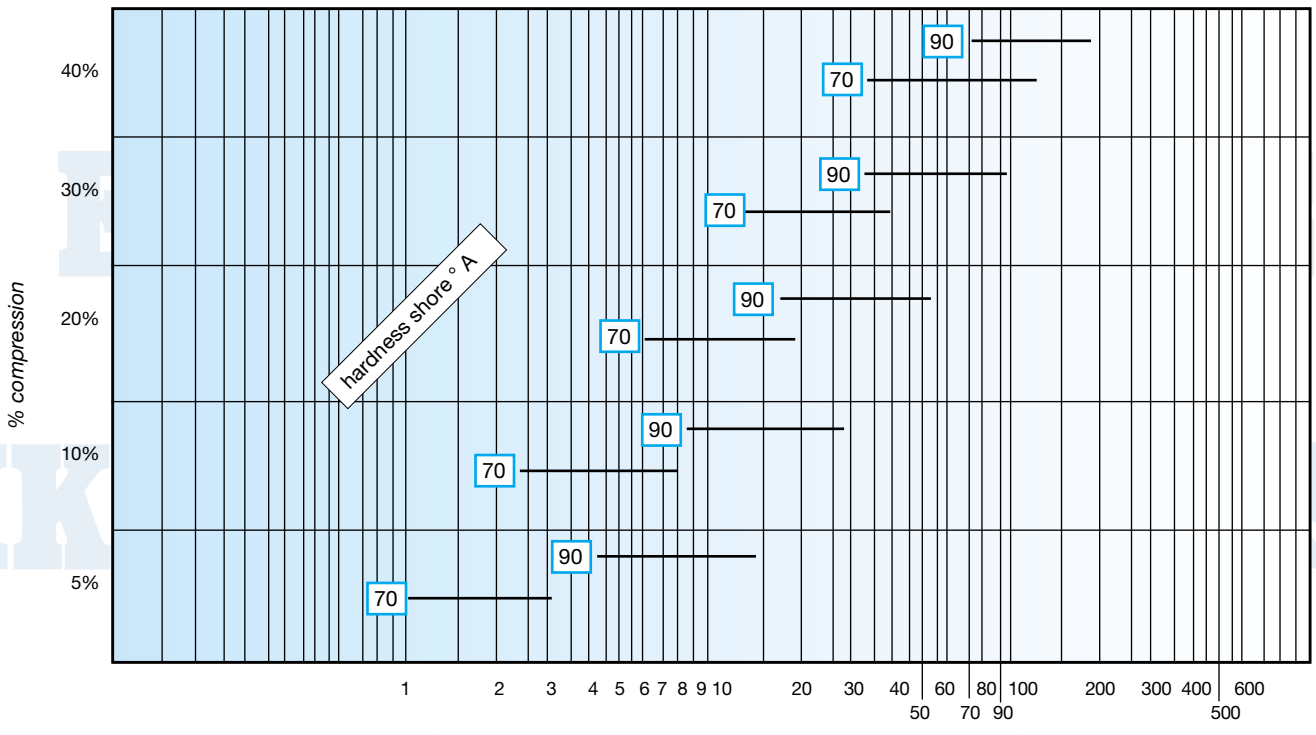
Chamfered parts can solve assembling problems

13. O-ring Assembling Conditions

Lubrication
For static and dynamic applications lubricated parts are important for ease of assembly. Silicone grease is recommended for NBR, CR, FKM, EP, and VMQ.

Compression Forces
The force required to compress an O-ring is related to the material compound, the hardness, the amount of squeeze, the cross section of the O-ring, and the temperature of the application. The anticipated load for a given installation is not fixed, but falls within a range of values.

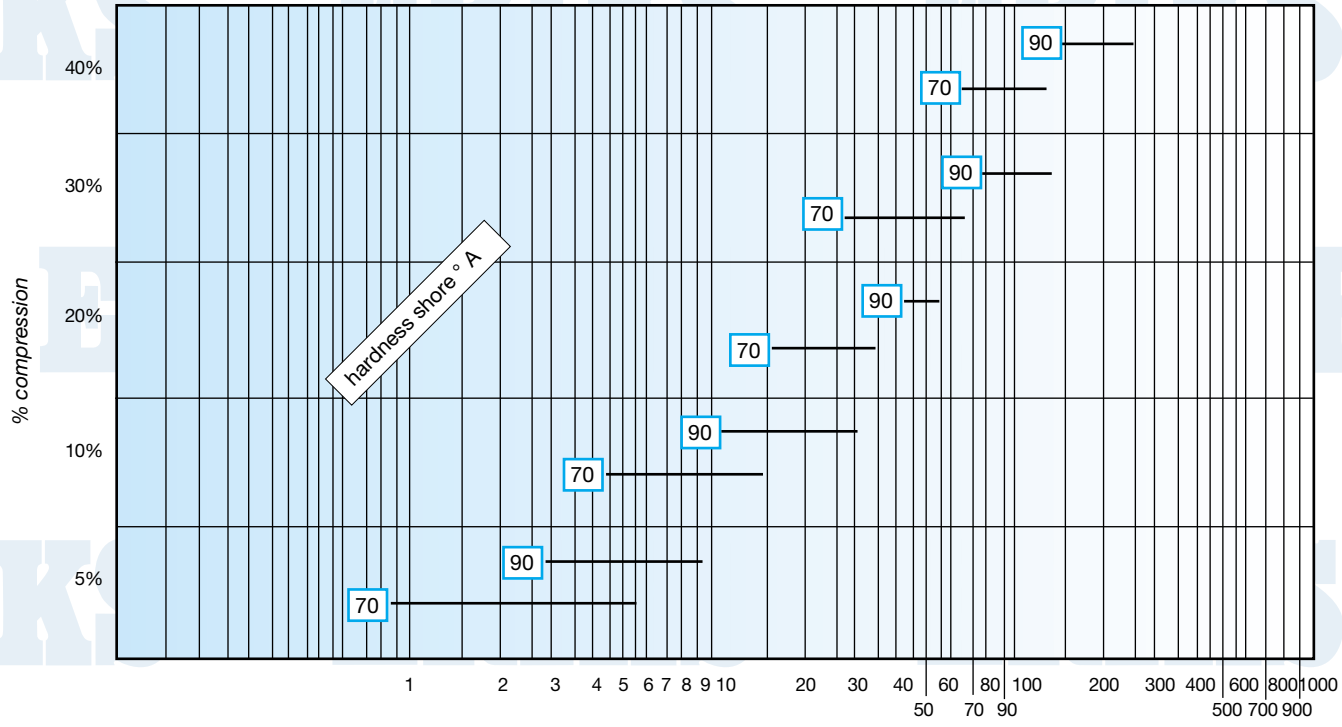
The tables indicate approximate force requirements at 20°C (70°F) for different percentages of squeeze on 70° and 90° O-rings.



cross section .070 (1,78mm)

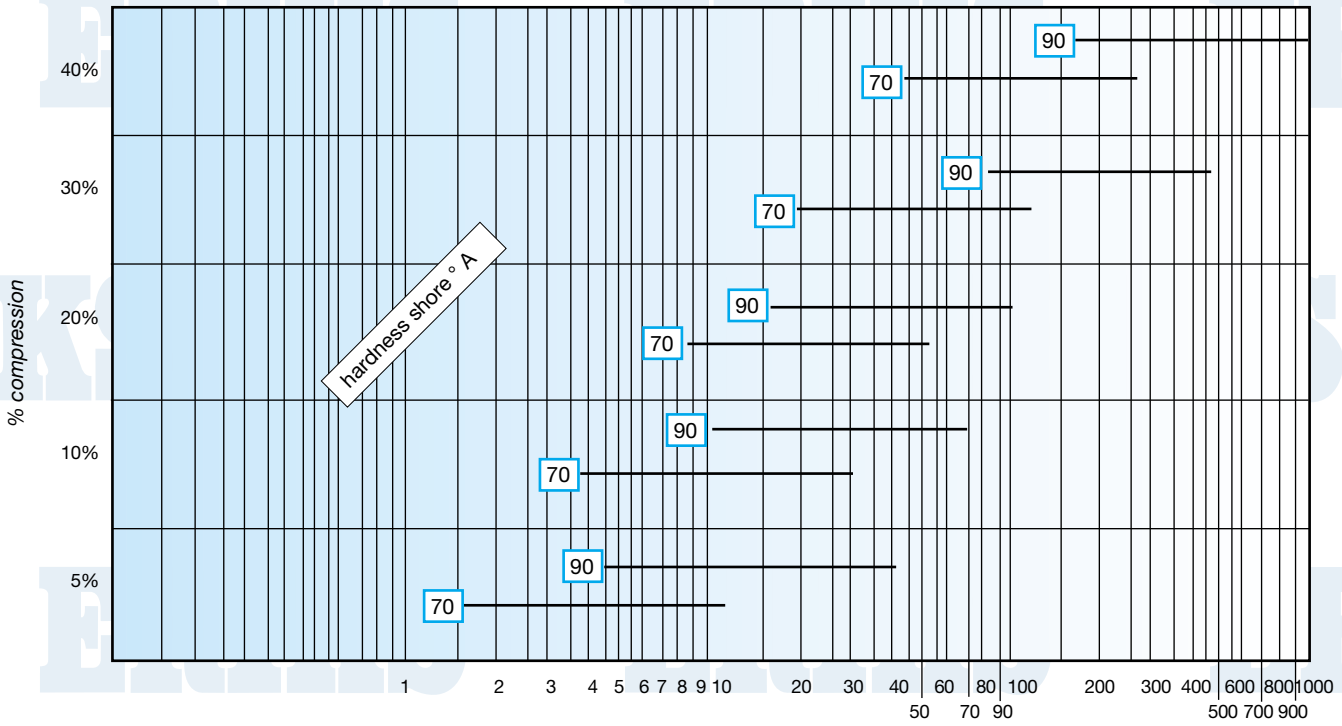
compression load Newton per linear cm

13. O-ring Assembling Conditions



cross section .103 (2,62mm)

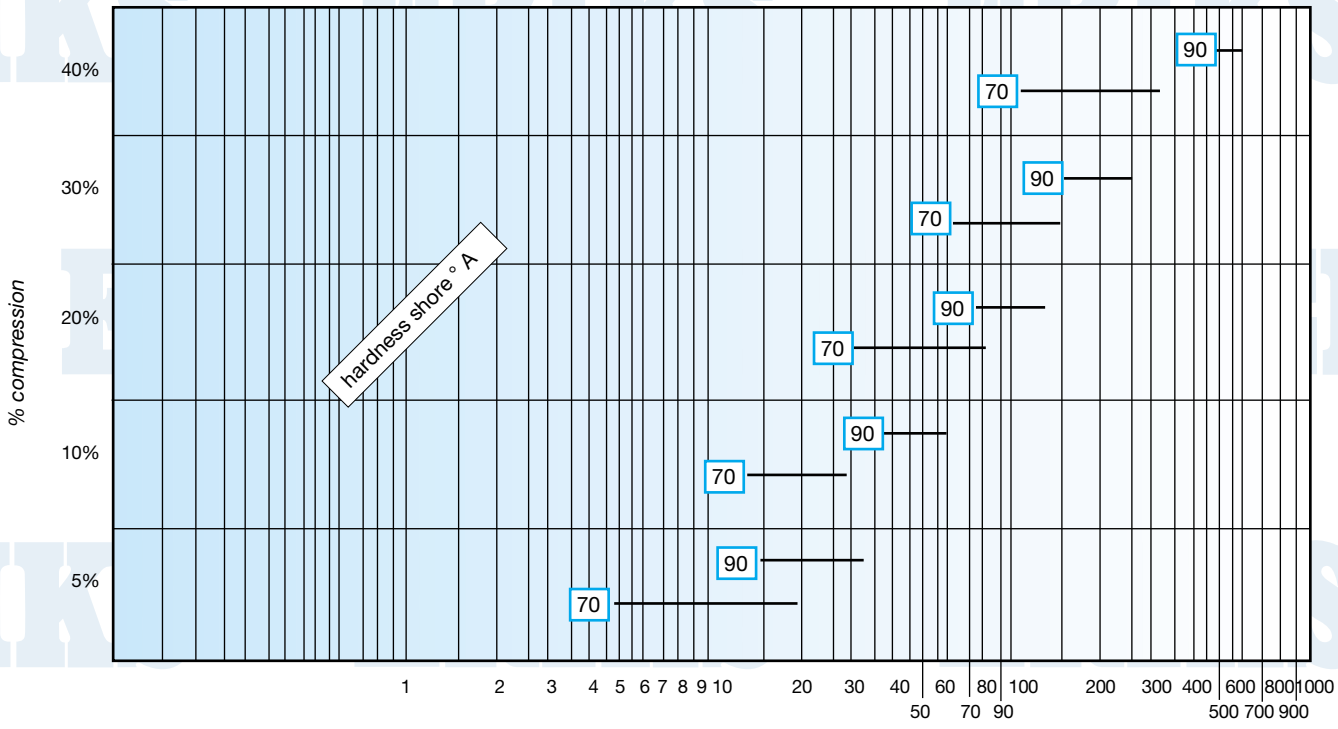
compression load Newton per linear cm



cross section .139 (3,53 mm)

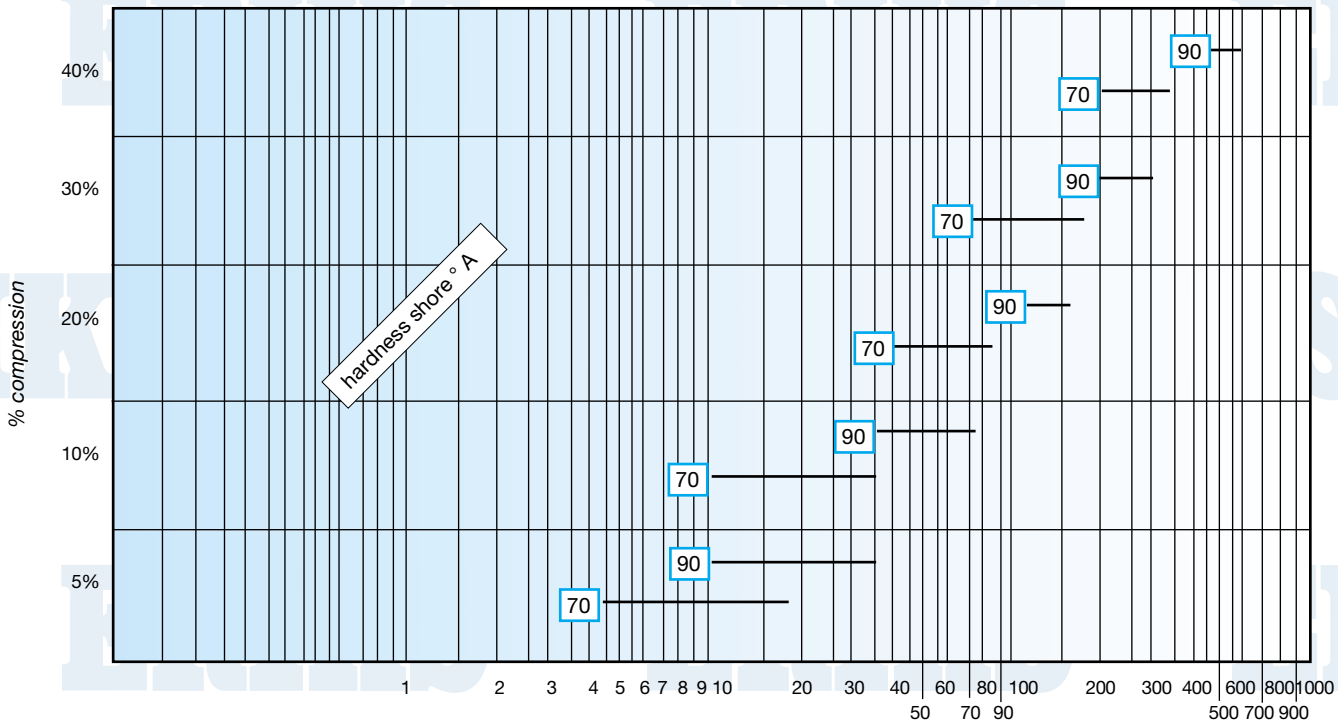
compression load Newton per linear cm

13. O-ring Assembling Conditions



cross section .210 (5,33 mm)

compression load Newton per linear cm



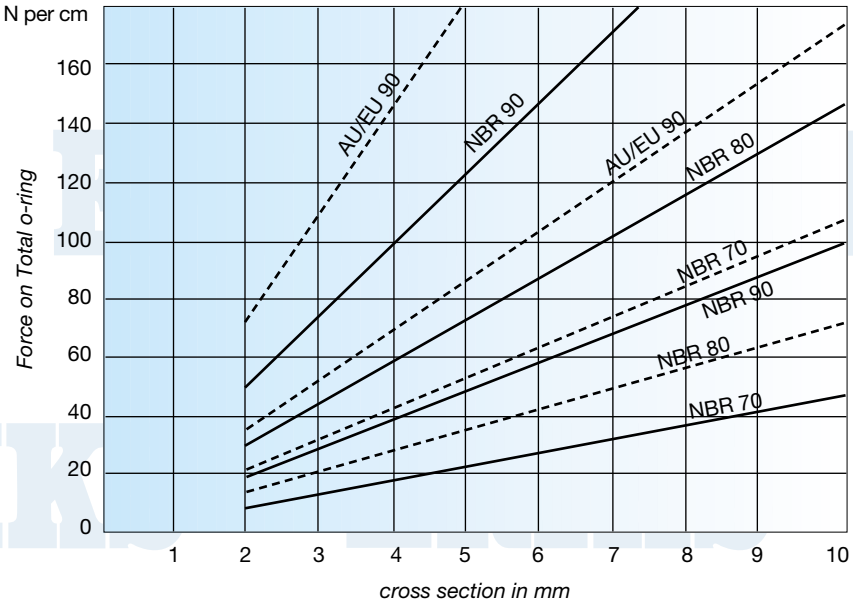
cross section .275 (7 mm)

compression load Newton per linear cm

13. O-ring Assembling Conditions

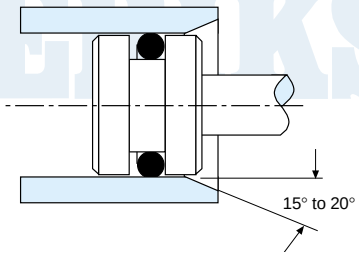
Assembling Conditions

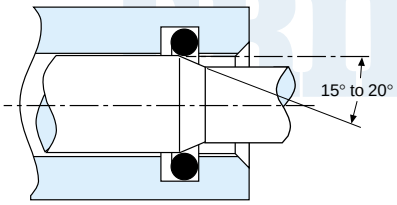
Deforming Forces for O-rings

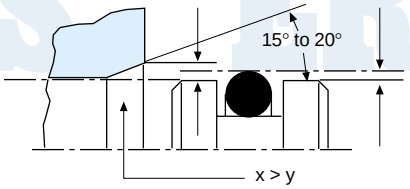


This graph indicates the deforming force to be used for different hardnesses and compounds.

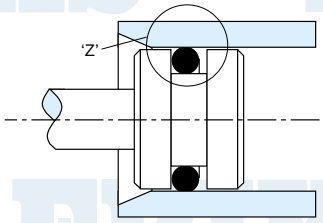
How to Avoid Damage by O-ring Mounting

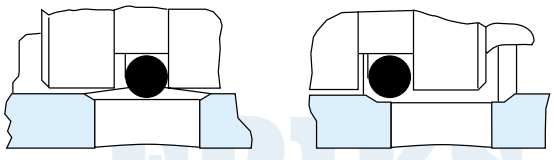




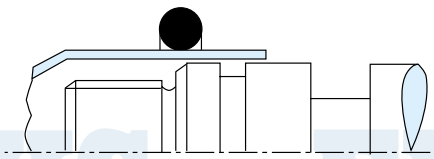


How to Avoid Sharp Edges





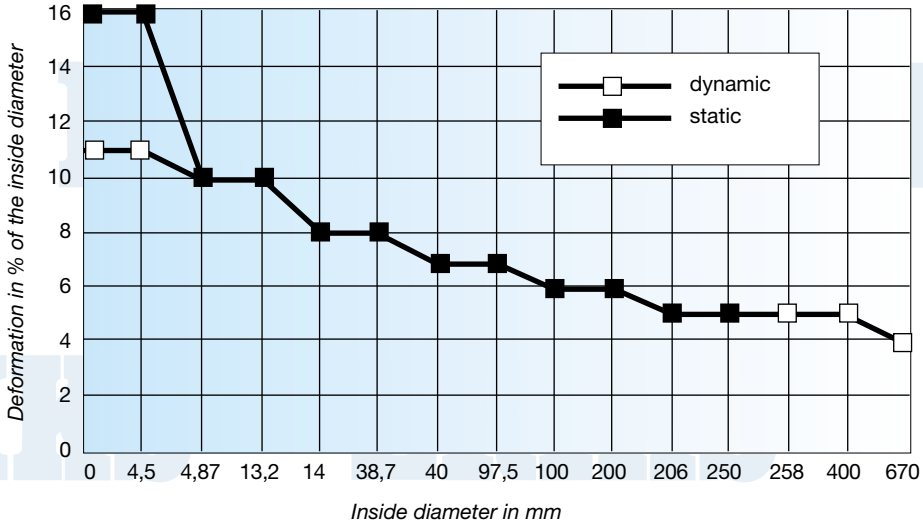
Use of Sleeve



13. O-ring Assembling Conditions

Maximum Elongation at Installation

The DIN 3771 Teil 5 describes the maximum elongation after installation.



Surface Roughness

The surface roughness is an important factor when determining the life of an O-ring.
Our experience suggests the following roughnesses:

Gases:

contact surface:	R_{max}	< 6,3 µm
	R_a	< 1,6 µm
non contact surface:	R_{max}	< 12,5 µm
	R_a	< 3,2 µm

Fluids:

contact surface:	R_{max}	< 16 µm
non contact surface:	R_{max}	< 25 µm

Vacuum:

contact surface :	R_{max}	< 3,2 µm
	R_a	< 0,8 µm
non contact surface:	R_{max}	< 6,3 µm
	R_a	< 1,6 µm

13. O-ring Assembling Conditions

Stretch or squeeze for O-ring I.D.

An O-ring that is too small may be stretched slightly for installation. This stretch results in some reduction of the cross section diameter of the O-ring material. Figure 25 indicates the approximate percentage the cross section decreases at given stretch percentages. This information should be taken into consideration when designing the groove.
Likewise, an O-ring that is too large may be compressed to fit the groove. Compression should not exceed 3% of the O-ring diameter. Stretch for a smaller O-ring should not exceed 5%.

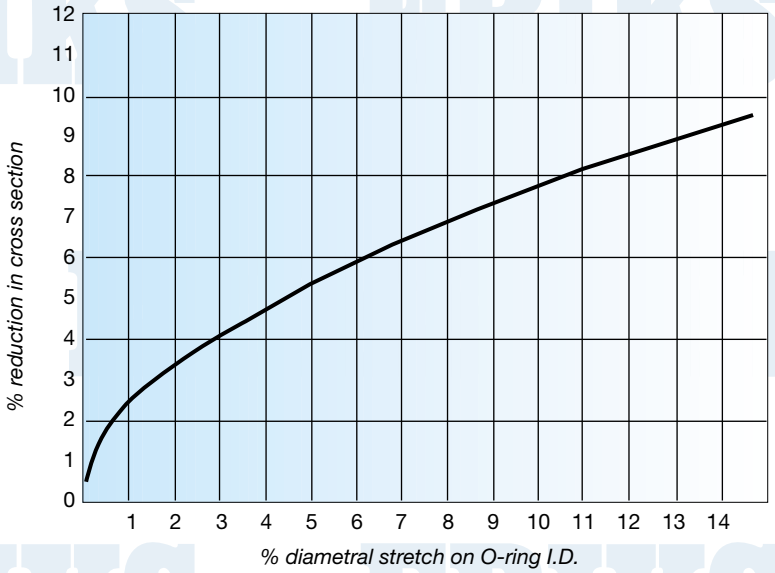


Fig. 1-25