

Technical Information

SHORE HARDNESS EXPLAINED

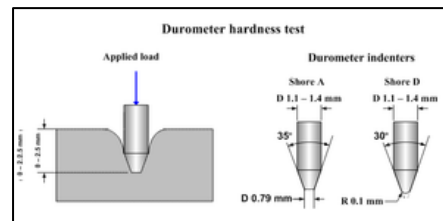
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Guidance on Shore Hardness and cylinder 'O' rings

Hardness may be defined as a material's resistance to permanent indentation. The durometer scale was defined by Albert Ferdinand Shore, who developed a device to measure **Shore hardness** in the 1920s. The term *durometer* is often used to refer to the measurement as well as the instrument itself. Durometer is typically used as a measure of hardness in polymers, elastomers, rubbers and 'O' rings

Measuring hardness

Durometer, like many other hardness tests, measures the depth of an indentation in the material created by a given force on a standardised presser foot. This depth is dependent on the hardness of the material, its viscoelastic properties, the shape of the presser foot and the duration of the test.



The basic test requires applying the force in a consistent manner, without shock, and measuring the hardness (depth of the indentation). If a timed hardness is desired, force is applied for the required time and then read. The material under test should be a minimum of 6.4 mm (0.25 inches) thick.^[3]

Durometer Scales

There are several scales of durometer, used for materials with different properties. The two most common scales, using slightly different measurement systems, are the ASTM D2240 type A and type D scales. The A scale is for softer plastics, while the D scale is for harder ones. However, the ASTM D2240-00 testing standard calls for a total of 12 scales, depending on the intended use; types A, B, C, D, DO, E, M, O, OO, OOO, OOO-S, and R. Each scale results in a value between 0 and 100, with higher values indicating a harder material.

Hydraulic 'O' rings are measured on scale A and should have a value between 70 and 90. If an 'O' ring has a value of 70 and is used as a cylinder neck 'O' ring then it could be too soft, get deformed under pressure and leaks can be caused. Cylinder neck 'O' rings should have a Shore hardness of 90.

Beware of cheap options

Buying 'O' rings in bulk at a cheaper price may not be the solution unless you can be reassured that they have a Shore hardness of 90.

NBR (Nitrile Butadiene Rubber) is a widely used elastomer for "O" rings, known for its excellent resistance to oils, fuels, and various chemicals, making it ideal for a range of industrial applications.

EPDM (Ethylene Propylene Diene Monomer) rubber is a synthetic rubber known for its excellent resistance to heat, ozone, and weathering, making it ideal for various applications.

Viton™ (FKM) is a fluoropolymer elastomer synthetic rubber used for highly durable seals and known for its superb chemical resistance, temperature stability, and longevity, making them ideal for demanding applications.