

### 10. Control

The purpose of control is to insure uniformity of purchased parts from lot to lot. Control may be based on the requirements of the qualification section or actual qualification test results. One should be careful not to be trapped by writing a specification based on test reports having only a single set of values. Any single set of tests made on a particular batch is very unlikely to reflect mean values that can be duplicated in everyday production. Control tests should be limited to only those properties really pertinent to the control section of the specifications.

**Dimensions** and surface quality are checked according AS 568A and AS 871 A , MIL-STD-413C, and DIN 3771 Part 1 and Part 4.

**Hardness** is often specified as a control and is frequently problematic because of inherent difficulties in measuring hardness with O-ring specimens rather than standard hardness discs. A tolerance of  $\pm 5$  points is the standard allowance for experimental error caused by reading and production variance in batches of the same compound. Hardness also has a potential for discrepancies between durometer gauges, most manufactures have a  $\pm 3$  hardness points tolerance range. Hardness is a parameter of relatively minor importance, the service life of an O-ring will not be significantly changed by a small difference in hardness.

**Elongation**, a tolerance of  $\pm 20\%$  is generally acceptable.

**Modulus**, a tolerance of  $\pm 25\%$  is standard. This is a more sensitive indicator of the condition of the compound than tensile strength and elongation. This means that it varies more from batch to batch, requiring a wider tolerance range.

**Specific Gravity**

A tolerance of  $\pm 0.02$  may be applied. ( $\pm 0.03$  for silicone)

**Volume Change**, a plus or minus tolerance on this property is frequently unrealistic because for expedience, the most critical time is usually specified for the test. This, combined with variance in commercial fluids and sample size, gives such an accumulation of negative factors, that it is not always feasible to use volume swell as a control.

#### TGA

To determine the composition of a rubber compound, thermogravimetric analysis (TGA) is a relative inexpensive method. ERIKS uses this TGA-analysis to control compounds by essentially fingerprinting the customer compound. In cooperation with the customers' quality-control department, specific TGA standards can be developed. The table below illustrates an example of TGA.

