Presentation

Hardness testing is a recognised tool used on a wide range of materials, from the old Mohs scale for minerals to the Brinell, Vickers and Rockwell scales for steel and other materials and to a multiplicity of other hardness test methods - Shore, Barcol, IRHD, etc. - widely applied to rubber, elastomer and plastic materials.

Such a multitude of test methods are proof both of the value of hardness testing as well as of its limitations.

Most hardness test methods applied for elastomer materials were developed for homogeneous materials and for a specific thickness range.

Shore A

Shore A hardness test method was designed for soft rubber parts with 1/4" thicknesses onwards. Indentation force is 806,5 cN applied by the ~0,8 mm Ø flat tip of a truncated cone, at the centre of an annular foot.

The annular foot has 18 mm Ø where a force of 12,5 N is applied on the test piece.

Finally, the 2,5 mm travel of the spring loaded indenter is linked to a linear 0-100 scale.

Hardness testing equipment manufacturers suggest that correct Shore A readings may still be obtained from thinner parts provided the required test thickness is built with several layers.

Shore A hardness test method has traditionally been used by the printing blankets industry.

The anisotropic structure of blankets denies practical value for Shore A testing of blanket stacks.

Shore A hardness values ranging from 75 to 83º do cover the overall blanket hardness of the vast majority of blanket models available on the market.

Only a mere ~8% of the Shore A hardness range is in fact used in printing blankets hardness evaluation.

It would sound sensible for the blanket's industry to adopt instead an alternate hardness test method to Shore A, with its 2,5 mm indenter travel for testing blankets (normally) with up to 2 mm thickness.

IRHDµ

IRHDµ hardness test method was developed for rubber and elastomer parts such as O-rings and thin test pieces with 0,5 mm thicknesses onwards.

Indentation force is 153,5 mN applied by the 0,4 mm Ø semispherical tip of the indenter, at the centre of an annular foot.

The annular foot with 3,35 mm Ø does apply a force of 235 mN on the test piece.

Finally, the 0,3 mm travel of the spring loaded indenter is processed by an indentation-measuring instrument connected to a microprocessor display unit.

IRHDµ measuring range is 30-100º.

Extra care may be required with some printing blanket models when obtaining test samples for IRHDµ hardness testing as this test method will often not return exact results from warped parts.

Some blanket carcasses keeping high manufacturing stress levels may warp in which case the sample surface will not seat flat on the specimen table. The aim of the annular foot's force is exactly to flatten down the sample onto the specimen table but it will only succeed with a relatively small blanket's reaction.

Reducing adequately the size of the sample until a negligible blanket reaction is obtained to the forces applied by the hardness tester will usefully extend hardness testing to these blankets.

Lower hardness values and steeper than normal interval hardness graphs for the tested material will be the most frequent results of inadequate size test piece testing.