

## **DIRECTIONAL VARIATIONS IN MECHANICAL PROPERTIES OF K-FLEX ELASTOMERIC FOAM INSULATION**

Because an elastomeric thermal insulation foam matrix is made up of various kinds of polymers, and the manufacturing process involves extrusion and vulcanization, most of K-FLEX USA elastomeric foams show some variation in mechanical properties in different directions. This is the case regardless of whether the elastomeric matrix consists of Nitrile Butadiene Rubber (NBR), NBR/PVC blend or EPDM. Elastomeric materials are characterized by long chains depending on the molecular structure and the nature of the polymer. During any processing of elastomeric compounds, the long chains orient in one direction due to various forces exerted to the material. However, orientation can vary depending on manufacturing process. For example, orientation of a polymer in an extrusion process will be different from the orientation that occurs during a calendaring process.

Orientation of the elastomeric molecule is the key for any mechanical property variations observed in elastomeric foam insulation products. K-FLEX USA uses an extrusion process for manufacturing various elastomeric foams (sheets / rolls and tubes). During extrusion, molecules align mostly in the extrusion direction (or machine direction). This leaves product with slightly better mechanical properties in the direction of extrusion and slightly weak mechanical properties in the direction perpendicular to the extrusion direction (cross machine direction). Also shrinkage and recovery characteristics of the products would also be affected slightly in different directions, due to the orientation of the molecules.

Physical properties may also be affected due other processes (such as skiving, die cutting etc.) involved in fabricating finished products. The orientation of the molecules may also vary for various thickness of the products due to the different heat history and pressure within the material during the extrusion and vulcanization process.

K-FLEX USA encourage their customers to perform internal evaluations of our products based on their manufacturing processes to determine suitability for use in finished products. This evaluation will enable customers to adjust their tolerances to meet end user fitment requirements. It has been observed that the use of PSAs with a scrim carrier for backing helps to minimize the variation during the die cutting process.

Please feel free to contact the K-Flex USA technical department should you have any questions.