



DETERMINATION OF SEAT FOAM PROPERTIES IN COMPRESSION

Application

The purpose of this test method is to define the steps required to obtain the initial thickness and to measure the hardness and hysteresis loss of molded flexible PUR foam padding material used for automotive seat cushions, seat backs, and other flexible foam applications. Refer to Appendix A for a summary of Load Test Fixture (LTF) design guidelines and Appendix B for a detailed summary in table form of the test method.

Apparatus and Materials Required

Universal Test Machine

The typical equipment used for measuring foam pad hardness and hysteresis is a Zwick Materials Testing Z010 machine. Other manufacturers may be used provided the equipment has the capability of measuring the force of the load and unload curve to a precision of $\pm 1\%$ or $\pm 1\text{N}$ whichever is greater. In addition, the equipment must be able to provide a means of measuring the test piece thickness under load to an accuracy of $\pm 0.5\text{mm}$. The support surface of the test machine shall be rigid and horizontal in nature, providing a perpendicular condition between the part and the load application. The support surface of the test machine shall be suitably vented with holes $6.0 \pm 0.1\text{mm}$ in diameter and $20.0 \pm 0.1\text{mm}$ pitch. The load cell rating and tolerance should be included as a note when reporting values for this method (i.e. 5kN load cell, $\pm 0.5\%$ accuracy).

The equipment used for the test must have the ability to establish individual preloads, initial thickness values, and test speeds for the conditioning and test cycles. In addition, the equipment must be able to output stress/strain curves, hysteresis loss, and any given load value on either the load or unload curve.

Indenter Platen

The indenter platen used for this test is a $200 \pm 1\text{ mm}$ diameter flat circular plate with an edge radius of 1.0 mm. A 360 degree ball/universal joint with a central axis located $22 \pm 2.5\text{ mm}$ from the contact surface of the indenter platen is used throughout the test protocol. The ball joint must be free to move through all aspects of the test protocol when a downward force $\leq 4.0\text{N}$ is applied to the outer edge of the indenter platen. A representative indenter platen is pictured in Figures 1 – 3 and typical dimensions are provided in Figure 4. On the rare occasion that the size and or shape of the test specimen does not lend itself to be tested with the standard size platen, it is permissible to select other suitable size and shaped indenters. The selected indenter must be specified on the engineering drawing and agreed to by all concerned parties.



Figure 1



Figure 2

Date	Action	Revisions	Rev. 0
2015 12 09	Activated		



Figure 3

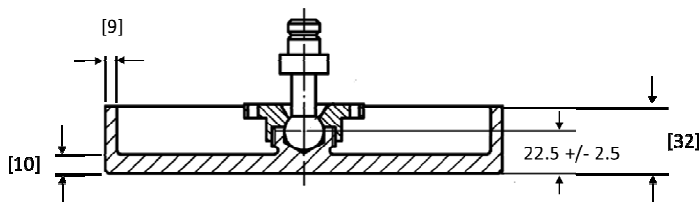


Figure 4

Load Test Fixture Support

A foam test sample shall always be supported by means of a test fixture as per the engineering drawing. The load test fixture support surface contours shall mimic the “B” surface of foam sample being tested. The test fixture drawing should detail fixture alignment to insure the load application is perpendicular to the “A” surface of the test sample. Use of a round or rectangular test fixture is acceptable to accommodate planar “B” surfaces, provided the test fixture presents a support surface equal to, or larger than the diameter of the indenter platen. Perforation of the test fixture is optional. Further details of Load Test Fixture may be provided by customer specification. Test fixture details described in the Load Test Fixture Design Guidelines in Appendix A.

Use of a circular weighted ring to insure B-surface fit to test fixture is permitted. Ring is to be constructed with a minimum internal diameter of 245 mm and a maximum outside diameter of 300 mm. Total mass of the ring must be 1.8 ± 0.2 kg. Thickness and material type used for ring construction is at the discretion of the supplier. Non slip material may be added to the ring to prevent movement during pre-conditioning and test cycle. Refer to Figure 5 for application detail.

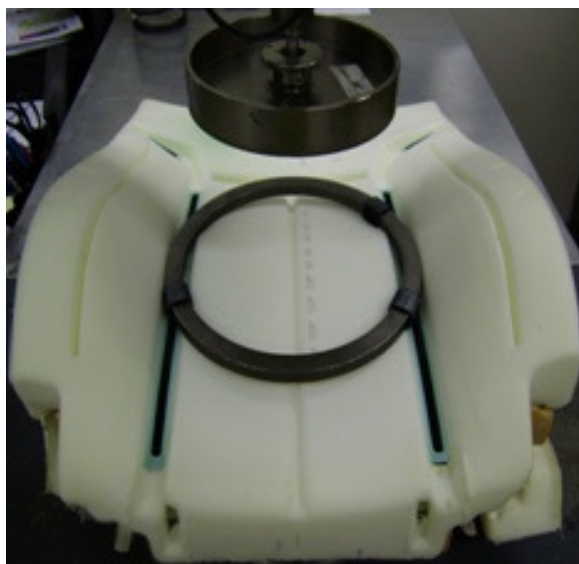


Figure 5

Laboratory Conditions

All test values indicated herein are based on material conditioned and tested in a controlled atmosphere of 23 ± 2 C and $50 \pm 5\%$ relative humidity, for not less than 4 hours prior to testing, unless otherwise specified. Molded foam test samples or parts must be allowed to cure a minimum of 18 hours from time of molding prior to performing hardness and hysteresis loss testing for prototype or production control purposes.