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SURFACE VEHICLE RECOMMENDED PRACTICE

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(R) Load Deflection Testing of Urethane Foams for Automotive Seating

1. ***Scope—***Traditionally, cellular foam products have been checked for load deflection by determining the load required to cause a 25% deflection. In automotive seating, on the other hand, the load deflection is checked by determining the thickness under constant force conditions to (a) indicate the initial softness of the seat cushion, (b) measure how thick the seat cushion is under the average passenger load (a measurement of padding left for "ride" and seated height), and (c) determine a value to indicate resiliency. In this method these measurements are made by determining the thickness of the seat cushion under fixed loads of 4.5 N, 110 N, and 220 N with a 323 cm^2 circular indentor foot.

2. ***Reference***

2.1 Applicable Publication—The following publication forms a part of the specification to the extent specified herein.

2.1.1 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTMD3574—Standard Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams (Test B_2 Indentation Force Deflection Test—Specified Force

3. ***Test Conditions—***Material must be at least 96 h old before testing. Conditioning and testing shall be conducted at a temperature and relative humidity of 23 °C ± 2 °C and a relative humidity of 0% ± 5%. The conditioning period shall be a minimum of 16 h. The standard in case of disputes is ASTM D 3574.

4. ***Test Specimens—***The finished manufactured product shall be used with top and bottom skins, intact, where possible. In the case of tapered cushions, the location of the test area for load deflection measurement is to be agreed upon by the parties concerned. In cases where a finished part is not feasible for testing, by mutual agreement, a 380 mm x 380 mm x average cushion thickness specimen may be cut from the cushion. In the case of tapered or irregularly surfaced pads, by mutual agreement, 380 mm x 380 mm pieces may be cut to a uniform thickness. Specimens may be plied up to achieve the average cushion thickness (no cement is to be used). Test values are dependent on the specimen dimensions. Specimens with dimensions other than 380mm x 380 mm will give different results and failure to retain all molded surfaces will also affect test values.

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5. ***Apparatus—***An apparatus having a flat circular indentor foot 323 cm^2 in area, and equipped with a swivel joint for applying loads of 4.5 N, 110 N, 220 N, and 330 N, shall be mounted over a level horizontal platform (which is perforated with 6.5 mm holes on 20 mm centers to allow for rapid escape of air during test). The apparatus shall be equipped with a device for measuring distance between the indentor foot and the base platform. Any special support for leveling contoured cushions shall be perforated in the same manner as the base platform. The cushion thickness, in these cases, is determined as the distance between the indentor foot and the support. The apparatus must be capable of raising and lowering either the indentor foot or the base platform at rates of 50 mm/min and 100 m/min.

6. ***Procedure***

a. One specimen is sufficient for each test. Place the specimen on the platform base with the distance from the indentor foot to the edge of the specimen not less than the cushion thickness. Preflex the specimen with a 330 N load twice the indentor foot at a rate of 100 mm/min ± 10 m/min. Allow the specimen to rest 6 min ± 1 min. It is advisable to mark test area (around indentor foot) with a marker.
b. After the rest period specified previously, determine the cushion thickness by applying a 4.5 N load with the indentor foot to the preflexed area at a rate of 50 mm/min ± 5 mm/min. Record the thickness.
c. Immediately apply a 100 N load to the specimen at a rate of 50 mm/min ± 5 mm/min. Record the cushion thickness after maintaining the load for 60 s ± 3 s.
d. Increase the loading to 220 N at a rate of 50 mm/min ± 5 mm/min. Record the cushion thickness after maintaining the load for 60 s ± 3 s.
e. Finally reduce the loading on the indentor foot to 100 N at a rate of 50 mm/min ± 5 mm/min and again record the cushion thickness after maintaining the load for 60 s ± 3 s.

PREPARED BY THE SAE TEXTILES AND FLEXIBLE PLASTICS COMMITTEE