

DYNAMIC FLEX FATIGUE TEST FOR FOAM AND FIBER PADS**Application**

Method A of this procedure is used to determine the load bearing properties, loss of thickness and the amount of structural breakdown of polyurethane foam seating materials, such as topper pads and molded assemblies.

Method B is used to evaluate the resistance of carpet insulating fiber pads to fiber separation, breakdown and destruction from dynamic flexing.

Scope

Method A simulates conditions which contribute to breakdown of polyurethane foam, resulting in loss of load bearing properties and loss of thickness. A test specimen is measured for thickness under a specified load, mounted on the fixture shown in the illustration and subjected to dynamic fatigue by compression and directional deformation. This is accomplished by rolling the specimen diagonally under constant load for a specified number of cycles. Specimen thickness under a constant load is obtained after a one hour recovery period following dynamic fatigue to determine loss in foam thickness and load bearing characteristics.

Method B simulates heel action on the carpet which could be a contributor to the breakdown of brittle fibers in the carpet underlayment. The test specimen is examined for fiber separation, breakdown and destruction after dynamic flexing. This flexing is accomplished by subjecting a carpet and fiber pad composite to a specified number of reciprocating rubbing cycles with a metal heel simulator under a specified constant load.

Conditioning and Test Conditions

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 °C and 50 +/- 5 % relative humidity for not less than 24 h prior to testing and tested under the same conditions unless otherwise specified.

Date	Action	Revisions	
2001 08 22	Revised	Typographical corrections to section 14	A. Cockman
2001 03 27	Revised	Editorial – no technical change	A. Cockman
1992 07 14			

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Method A

Apparatus Required

Load Deflection Test Apparatus

Burke-Porter or equivalent (see Figure 1). An apparatus having a flat circular indenter foot, 323 cm² in area and dead weight loaded through a swivel joint (capable of accommodating the angle of the sample) with loads of 4.4 N, 111 N, 222 N, and 75 lbs.

334 N shall be mounted over a level horizontal 375 x 375 mm platform with 6.35 mm holes on 19 mm centers. The distance between indenter foot and platform shall be variable to compress sample under test at a speed of 50 mm/minute for thickness measurements or 200 mm/minute for preflex conditioning and shall be measured with a gage measuring device. This apparatus shall be used in the constant load or indentation residual gage load (IRGL) test.

Source: Burke-Porter Machinery Co.
Grand Rapids, Michigan
(Specify Model 445)

Dynamic Fatigue Apparatus

The equipment for dynamic fatigue of the specimen is shown in the attached photograph (see Figure 2). The apparatus consists of the following parts:

1. A perforated base plated with 6.35 mm diameter holes on 19 mm centers.
2. A roller 460 mm long and 75 mm in diameter mounted in an offset position (15°) with suitable means for a specified load on the test specimen. The test is conducted at the rate of 24 - 28 cycles/ minute (one cycle consists of one forward and one reverse stroke).
3. Motor and gear box for actuating the roller.
4. Counter for recording test cycles.
5. Sturdy table for mounting and supporting of the entire apparatus.

Source: Rise Machine Company
905 N. Kinney
Mt. Pleasant, Michigan 48858

Specify Job No. 42. Equivalent apparatus may be used.

Cotton Sheeting

ESB-M9H13-A, or equivalent. Generally used as a headlining listing. 76 mm wide strips are required - two pieces shall be 360 mm long and two shall be 430 mm long. This material is bonded to the base of the foam pad with latex base adhesive and is used to secure the test specimen to the platen with metal retainer straps.

Adhesive

ESB-M2G17-A, solvent release type, or ESB-M2G110-A, water emulsion latex base adhesive, or equivalent. Either of these materials may be used to bond the cotton sheeting strips to the base of the foam pad.

Procedure

1. Cut a test specimen 305 x 380 x 50 mm thick from a representative sample of current production polyurethane foam (slab or molded). The length and width shall be measured with a tape or scale so that the dimensions are within +/- 6 mm. The samples shall be sawed with a scalloped blade. Sufficient time should be allowed for complete recovery.
2. Four 75 mm wide pieces of cotton sheeting shall be required - two 360 mm long and two 430 mm long. Bond the cotton sheeting strips to the bottom surface of the specimen with a solvent or water emulsion type of adhesive. Allow 50 mm of each strip to extend beyond the edges of the test specimen so that the specimen can be securely held in place on the base platen of the fatigue machine by the use of metal retainer straps.
3. Condition the test specimen, undeflected and undistorted, at a temperature of 22 +/- 3 °C and in an atmosphere of 50 +/- 5 % relative humidity for at least 12 h before being tested. This 12 h minimum waiting period serves as a conditioner for the foam as well as a drying time for the adhesive used to bond the sheeting to the foam. All subsequent tests should also be conducted under the above temperature and relative humidity conditions. All tests shall be performed a minimum of 7 days after the foam has been manufactured.
4. Place the test specimen on the supporting plate of the load deflection test apparatus. If the sample has one side cored or honeycombed, this face shall rest on the perforated plate. For specimens of uniform thickness, the position shall be such that the indentation will be made at the center of the specimen. For assemblies of varying thickness, the area shall be selected which provides an approximate average thickness. In either case, the indentation area shall be suitably identified with a marking pencil so that subsequent indentation will be performed in exactly the same area.
5. Deflect the test specimen ten times, using the 334 N load at the 200 mm/ minute speed. The specimen shall then be allowed to rest in an undeflected and undistorted position for a period of 5 minutes.