BN 151-05

DETERMINATION OF 180 DEGREE PEEL ADHESION STRENGTH

Application

This procedure is used to determine the peel adhesion strength of laminated rolled goods, wrapped or multi layered components.

Apparatus and Materials Required

Tensile Testing Machine
Universal Testing Machine, Instron or equivalent capable of using the integral method of calculation.

Tape
3M Scotch filament tape 898 or tape with equivalent tensile strength.

Conditioning Chambers which may be required (See applicable Materials or Performance Specification)

Mechanical Convection Test Oven
Conforming to ASTM E145 Type IIA normal oven or equivalent, 150 +/- 50 air changes per hour and capable of maintaining the specified temperature within +/- 1 °C.

Cold Box/Environmental Chamber
Capable of maintaining the specified temperature within +/- 1 °C down to - 40 °C.

Humidity Cabinet
Capable of maintaining a temperature of 38 +/- 1 °C and 98 +/- 2% relative humidity.

Environmental Cabinet
Capable of maintaining controlled temperature and humidity conditions to +/- 1 °C and +/- 2% relative humidity.

Autoclave
According to ASTM D3574, para 105.1.

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.

Alternate test conditions required by specific material applications will be listed in the relevant material or material performance specification.

Date	Action	Revisions	Rev 04
2015 06 12	Revised	See Summary of Revisions	L. Sinclair, NA
2015 02 26	Editorial	See Summary of Revisions	D. Murtonen, NA
1993 09 28			

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Preparation of Test Specimens

Number of specimens required will be identified in the material or performance specification. If the number of specimens is not specified then test 3 specimens in each direction. Roll goods sampling should be across the roll/sample width at least 10 cm from the selvedge.

Test Specimen Dimensions

Width: 50 mm, or as noted in spec
Length: 200 mm, or long enough to clamp the specimen in the machine and record separation for 100 mm, or as noted in spec.

Procedure

1. Manually separate the layers per the specification along the width of each test specimen for a distance of approximately 40 mm in the direction of the specimen length.

2. Adhere and staple the 3M 898 tape to the more flexible surface having at least a 25 mm overlap. Use the same width tape as the specimen width +/- 3 mm. Cut the tape if necessary to obtain the same width. The tape needs to be long enough to clear the specimen end by at least 25 mm after it has been adhered to the sample and folded back on itself. (See photograph Figure 1)

3. Clamp separation distances should be set so that the test specimen is clamped in position without undue distortion. This should be set to allow a 180° peel. The method of clamping should ensure no slippage or material damage (use rough grip faces). See Figure 2 for set up. The grip faces need to be as wide or wider than the specimens.

   Note: If specimen is a rigid substrate bonded to a flexible material, then separate the bonded flexible material from the rigid substrate along the width of each test specimen such that the fixed rigid component can be held in the stationary clamp and the flexible component is in the pulling clamp.

4. Start the machine at a rate of 125 mm/minute and separate the specimen. (Different rates may be specified in the material/performance specification). Obtain separation data for a distance of at least 100 mm. Recommend recording data for 130 mm of separation.

5. Ignore data for the first and last 10% of traverse and determine the average value (integral method preferred) as calculated per the specification requirement.

6. Report values in Newtons per specimen width or as required in the material/performance specification.

   Example calculation:

   $$\frac{\text{Load}}{\text{Specimen width}} = \text{N/mm}$$

   If required as only N then report load only

Data Reporting

The report should include the following:

1) Specimen width
2) Cross head speed
3) Pre-conditioning requirements (ex. Autoclave, wet, short term heat, etc)
4) Deviations from method (ex. Specimen size due to component limitations)

Figure 1: Photograph of Test specimen.

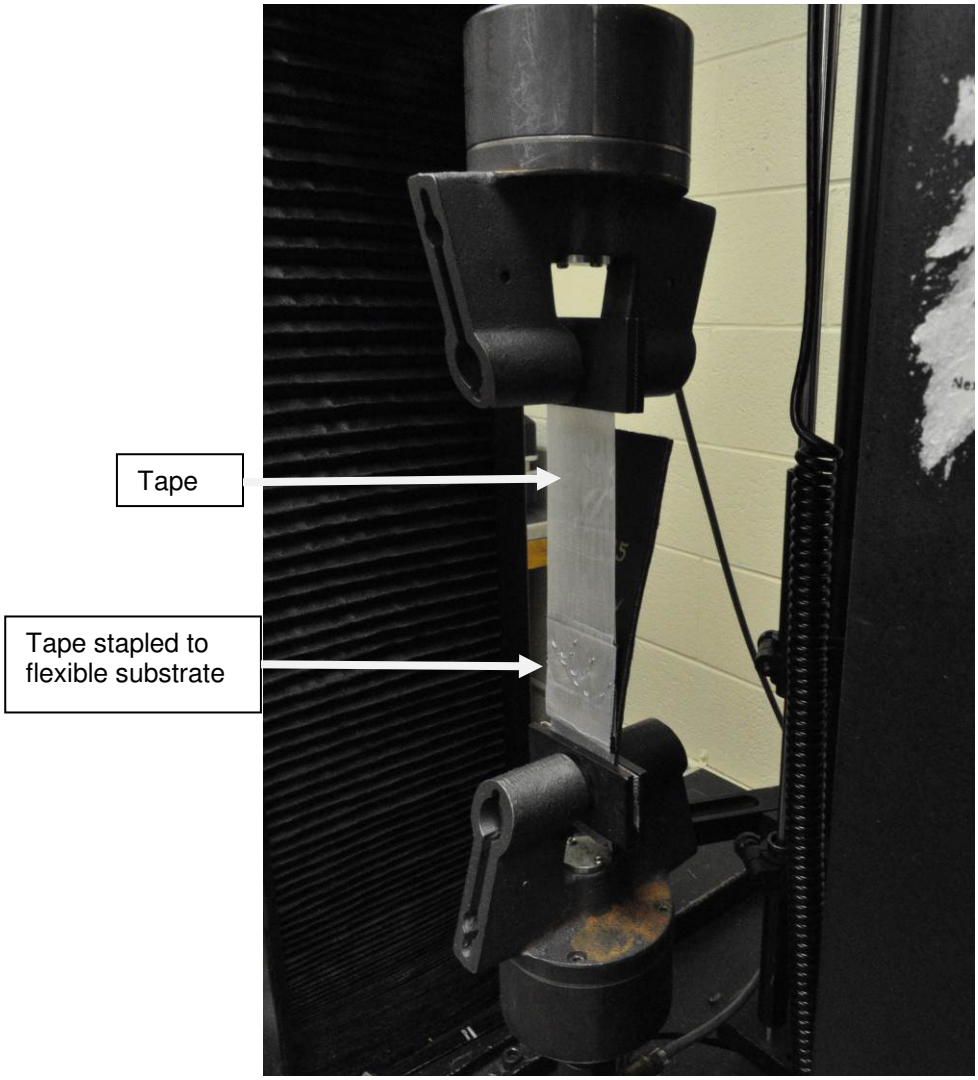

Figure 2: Test set up for peel test.

Summary of Revisions

2015 06 12 -Combined with BN 113-01 and updated to encompass aspects of BN 113-01.
-Removed laminates from title and application to include other applications.
-Added 3M tape to list of materials required.
-Updated equipment to current versions
-Removed number of samples and direction needed in preparation of test specimens, this is located in specifications.
-Removed Method A/B/C distinctions and combined into one method. Removed all information for method B. For method C added a note into the procedure for how to handle rigid to flexible substrates.
-Added the addition of tape to assist the pull in step 2 of the procedure.
-Updated step 2 of the method to clarify how to set up the fixture before the peel. Added photographs for visual reference.
-Added recommended separation distance.
-Updated data retrieval, step 5.
-Added how to calculate the data and sample calculation.
-Added data reporting section

-Removed environmental conditionings other than original conditioning. All environmental conditionings should be located in material/performance spec.

2015 02 26 Editorial – Moved test specimen dimensions from apparatus required to preparation of test specimens.

2008 11 18

Deleted - Mechanical Convection Drying Oven; Revised - Adhesion Strength after Cleaning and Adhesion Strength after Autoclave Test (for textile foam laminates only)