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Wet pin adhesion of corrugated board by selective separation

1. Scope

1.1 This method measures the force required to separate the linerboard facings from the medium in corrugated board after the board has been immersed in water for a period of time. It may be used to evaluate the water resistance properties or levels in water resistant adhesive.

1.2 This procedure mirrors the process in T 821 "Pin Adhesion of corrugated board by selective separation" with differences in how samples are prepared for testing and how results are interpreted.

2. Significance

2.1 The test described in this procedure measures the Z-direction force required to separate selectively either the inside or outside facing of corrugated board.

2.2 Good adhesion of the corrugated medium to its facings is important in obtaining high-quality corrugated board and boxes. The pin-adhesion test provides a means of determining the nature and strength of the bond formed during the combining operation and may be used to detect some manufacturing defects.

2.2.1 Good adhesion under wet/saturated conditions, examined in this method, may be important for boxes used under refrigerated conditions or other environments with high humidity, as well as for boxes that come in direct contact with water.

2.2.2 Some producers of corrugated board, manufacturers of combining adhesive, and manufacturers of resin for adding water resistance to the adhesive, have definitions of the level of water resistance provided to the board that are based on the absolute wet-pin test values obtained following a given immersion time.

3. Apparatus

3.1 *Pin-adhesion attachment*¹ identical to that used in T 821, consisting of pins of the proper diameter and length. The requirement is seven support pins, 76.2 mm (3 in.) long [69.8 mm (2.75 in.) inside dimension] when resting on supports and six pressure pins 63.5 mm (2.5 in.) [57.2 mm (2.25 in.) inside dimension] when resting on supports. One end of the support and pressure pins may be attached to a separate frame which keeps the pins in each set properly spaced according to the number of flutes per unit length for the board to be tested. Means for supporting the open ends (or other end of the pins) must be provided. This other support may consist of a series of holes in a frame into which the open ends of the pins are inserted. As an alternate, notches in the end of this frame are acceptable. Base plates are required to hold the frames and pins in fixed and rigid positions. All pins, when firmly engaged in the holder, must be parallel throughout their entire length within ± 0.05 mm (± 0.002 in.) to the base plate.

3.1.1 Illustrations of a commonly used instrument are shown in Figs. 1 and 2.

3.1.2 Because the radius of curvature is different for the various flute sizes, use the pin diameter as shown in Table 1.

3.1.2.1 There are no recognized flute pitch standards for corrugating rolls today. Those shown in Table 1 are still common for the designated flute profiles, but there are many others in use. There are many C flute profiles alone that require unique test fixtures. A difference between the actual flute structure and the jig of as little as 1.3 flutes per meter (0.4 flute per foot) may cause flank interference with the inserted pins to the extent that dry pin test results can be affected. This problem is exacerbated when performing the wet pin test as the weaker bond following soaking facilitates sample failure with the slightest misalignment while inserting the pin fixture pins in the sample.

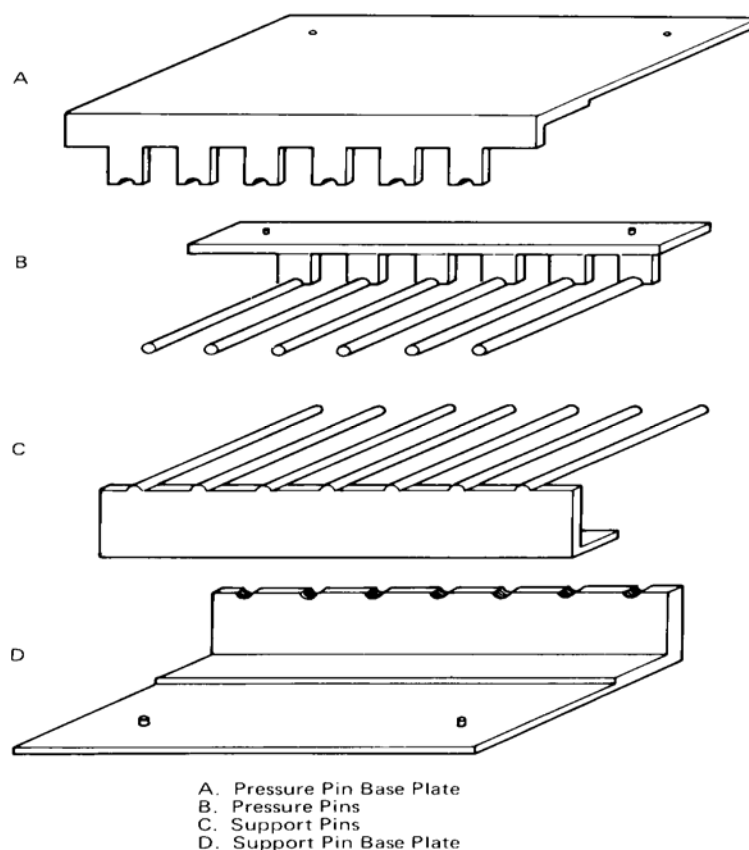


Fig. 1. Commonly used pin-adhesion test fixture components – selective separation.

¹Names of suppliers of testing equipment and materials for this method may be found on the Test Equipment Suppliers list, available as part of the CD or printed set of Standards, or on the TAPPI website general Standards page.