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Testing adhesives used in glued lap joints of corrugated fiberboard containers

1. Scope and significance

1.1 This method describes a procedure for evaluating the adhesive used in glued lap joints of corrugated containers. This method describes a laboratory procedure for evaluating glued lap adhesive applied to laboratory-prepared specimens made from the linerboard to be used in the manufacture of corrugated containers. A separate testing procedure for the finished containers is TAPPI T 813 "Tensile Test for the Manufacturer's Joint of Fiberboard Shipping Containers."

1.2 This procedure measures heat resistance, water resistance, and cold resistance of the adhesive used in glued lap joints.

2. Apparatus

2.1 *Oven*, thermostatically controlled, to provide a constant temperature to within 0.5°C (1°F) and with a soft pad in bottom to absorb the shock of falling weights.

2.2 *Weights*, 4.5 ± 0.1 kg (9.9 ± 0.2 lb) with a clamp and hooks for attaching to test specimens.

2.3 *Tank*, sufficiently deep so that it will hold at least 40 cm (16 in.) of water.

2.4 *Weights*, with clamps for attaching to test specimens, each assembly when immersed in water having a total weight of 200, 300, 400, 500, and/or 600 g (0.44, 0.66, 0.88, 1.10, 1.32 lb).

2.5 *Refrigeration chamber*, capable of maintaining a temperature of $-18 \pm 0.5^{\circ}\text{C}$ ($-0.4 \pm 1^{\circ}\text{F}$).

2.6 *Paper cutter*.

2.7 *Clamps and rods*, for suspending specimens during heat and water resistance tests.

2.8 *Applicator bar*, with a milled slot 0.0075 cm (0.003 in.) deep and 5 cm (2 in.) long on the lower face, to apply an adhesive film approximately 0.004 cm (0.0016 in.) thick and 5 cm (2 in.) wide (see Fig. 1.).

Approved by the Standard Specific Interest Group for this Test Method



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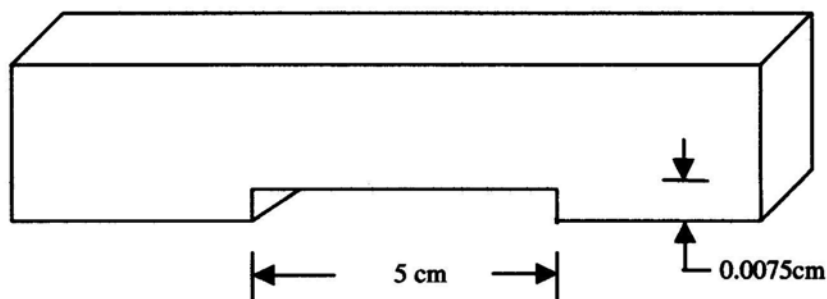


Fig. 1. Application bar. Conversions: 5 cm $\approx$ 2 in.; 0.0075 cm $\approx$ 0.003 in.

2.9 *Plate glass*, about 1.0 cm (0.4 in.) thick and at least 30.0 $\times$ 45.0 cm (12 $\times$ 18 in.), having a plane surface and equipped with a spring clamp at the 30-cm (12 in.) end for holding down the two pieces of liner stock to be coated.

2.10 *Steel weight*, 2.25 $\pm$ 0.25 kg (4.95 $\pm$ 0.55 lb), approximately 3.8 $\times$ 3.8 $\times$ 20.0 cm (1.5 $\times$ 1.5 $\times$ 8 in.) in size for applying pressure to the freshly bonded specimens. At least one of the long faces of this weight must be perfectly flat.

3. Sampling

3.1 From each corrugated linerboard sample obtained in accordance with TAPPI T 400 "Sampling and Accepting a Single Lot of Paper, Paperboard, Containerboard, or Related Product," cut 10 $\times$ 20 cm pieces (4 $\times$ 8 in.) with the longer dimension in the cross-machine direction. Any grade of linerboard may be used, preferably wet strength fourdrinier kraft 205 g/m² (42 lb/1000 ft²) or heavier, because it has a high enough strength both wet and dry to provide a stringent test of the adhesive.

3.2 Select representative adhesive from material to be used in production.

4. Test specimens

4.1 Prepare glued lap specimens by preconditioning the 10 $\times$ 20 cm (4 $\times$ 8 in.) pieces of linerboard in accordance with TAPPI T 402 "Standard Conditioning and Testing Atmospheres for Paper, Board, Pulp Handsheets, and Related Products."

4.2 Clip two of the pieces, smooth side up, side by side on the glass plate surface with their 20-cm (8-in.) edges adjacent.

4.3 Place a thin sheet of scrap paper just under the opposite end of the pieces to catch excess adhesive and applicator after the adhesive is applied.

4.4 Place the applicator just in front of the spring clamp so that the center line of applied adhesive will follow the 20-cm (8-in.) edge of the two adjacent pieces.

4.5 Pour sufficient adhesive immediately in front of the applicator and draw the adhesive down the full length of the adjacent pieces so that each piece receives a 2.5-cm (1.0-in.) wide band of adhesive.

4.6 Immediately remove the paper from the spring clamp, separate the pieces sideways (discard one piece), and on the other piece place another uncoated 10 $\times$ 20 cm (4 $\times$ 8 in.) piece, smooth side downward, so as to overlap the glued area and form a 2.5-cm (1.0-in.) wide glued lap joint.

4.7 Place the bonded area of the glued lap joint under the 2.25-kg (5-lb) weight to apply uniform pressure along the entire length of the joint for 5 min.

4.8 Remove the weight and allow the joint to dry for 24 h in an atmosphere in accordance with TAPPI T 402.

4.9 Then cut 2.5-cm (1.0-in.) wide glued lap specimen strips perpendicular to the glued seam with the 6.25-cm² (0.97 in²) bonded area in the center of each strip. Discard the strips at each end.