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CAUTION:

This method may require the use, disposal, or both, of chemicals which may present serious health hazards to humans. Procedures for the handling of such substances are set forth on Material Safety Data Sheets which must be developed by all manufacturers and importers of potentially hazardous chemicals and maintained by all distributors of potentially hazardous chemicals. Prior to the use of this test method, the user should determine whether any of the chemicals to be used or disposed of are potentially hazardous and, if so, must follow strictly the procedures specified by both the manufacturer, as well as local, state, and federal authorities for safe use and disposal of these chemicals.

Grease resistance of flexible packaging materials

1. Scope

1.1 This method describes an accelerated test designed to measure the transudation of oily or greasy constituents of products to flexible packages, such as those made from greaseproof, glassine, vegetable parchment, or other grease resistant papers and plastic coatings.

1.2 This method is intended as a supplement for TAPPI T 454 “Turpentine Test for Grease Resistance of Paper” (see Additional Information 9.2 and 9.3).

2. Significance

2.1 In addition to providing standardized conditions suitable for comparison testing, the method may be used to select materials that show promise for an intended use. The selection, however, should be preliminary to, and not a substitute for, tests with prototype packages made with the material and containing the actual commodity of interest.

2.2 It has also been found useful for measuring the effects of folding or creasing the barrier material.

3. Apparatus

3.1 *Bedplate*, consisting of a smooth, flat, rigid material of sufficient area to support an assembly or assemblies of specimens within an oven.

3.2 *Pressure block*, consisting of a smooth metal plate measuring 102 ± 2 mm (4.0 in.) square and weighing 408 ± 8 g (0.9 lb).

3.3 *Creasing roller*¹, weighing 2040 ± 45 g (4.5 lb) with a rubber cover approximately 6 mm (0.25 in.) thick and having a Durometer hardness of 75 ± 5 . The approximate dimensions are 95 mm (3.75 in.) diameter and 45 mm (1.75 in.) wide. The handle supplied with the roller is so attached that when operated no additional pressure is applied.

3.4 *Test reagent carrier*¹, of new white blotting paper as specified in TAPPI T 205 “Forming Handsheets for Physical Tests of Pulp” cut 76 ± 2 mm (3 in.) square.

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.

- 3.5 *Stain absorbers*, of the same blotting paper as in 3.4, cut approximately 100 mm (4 in.) square.
- 3.6 *Separators*, of aluminum foil, approximately 0.01 mm (0.0005 in.) thick, cut into approximately 100-mm (4-in.) squares.
- 3.7 *Pipet*, calibrated to deliver 1.0 mL of the test liquid.
- 3.8 *Oven*, having a temperature of $60 \pm 2.8^{\circ}\text{C}$ (140°F) and of sufficient size to accommodate the assemblies without impairing air circulation.
- 3.9 *Magnifier*¹, at least 5 $\times$, having a reticle of various sizes of circles with a metric scale graduated to 0.2 mm (0.01 in.) or less.

4. Reagents

- 4.1 *Oleic acid*, USP (to simulate animal fat), colored and water free.
- 4.2 *Vegetable oil*¹, colored and water free.
- 4.3 *Mineral oil*¹, lightweight, colored, and water free.
- 4.4 *Possible test oils*, any other designated oil or fat.
- 4.5 Prepare the test reagents by mixing 100 mL of the chosen oil or fat and 1 g of oil-soluble red dye. Stopper the container, shake well, filter through a filter paper and store in an airtight bottle. Congealed fats may require warming to give them enough fluidity to permit the dyeing and filtering operation.

5. Sampling and test specimens

From each test unit obtained in accordance with TAPPI T 400 "Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, or Related Product," cut at least five 100-mm (4-in.) square specimens for each of the required tests, i.e., side exposed to product, flat and creased, or wire and felt sides, flat and creased. CAUTION: Avoid placing the fingers in the area to be tested.

6. Procedure

NOTE 1: To test the effect of creasing, condition the specimens in an atmosphere in accordance with TAPPI T 402 "Standard Conditioning and Testing Atmospheres for Paper, Board, Pulp Handsheets, and Related Products" and crease according to TAPPI T 512 "Creasing of Flexible Packaging Material Paper Specimens for Testing." This involves making two diagonal creases on a specimen as follows: gently fold the specimen along a diagonal, place it on a hard, smooth surface and place the creasing roller on one end of the fold and at right angles to it. Roll it along the fold in 5 ± 2 s to form a crease. Unfold the specimen, then lightly refold it along the other diagonal, but with the reverse side folded in, and crease it with the roller. Finally, unfold the test specimen.

6.1 First apply 1.0 mL of the test reagent uniformly to each of the smaller blotters so as to substantially saturate them. Congealed fats may require warming to give them enough fluidity to permit pipeting and application. Then build a stack of components from bottom to top as follows:

- 6.1.1 *Bedplate*
- 6.1.2 *Foil separator*
- 6.1.3 *Stain absorber*, smooth side up (large blotter identified for the adjacent specimen and side).
- 6.1.4 *Test specimen* (uncreased) with side to be tested facing up.
- 6.1.5 *Saturated blotter*
- 6.1.6 *Foil separator*
- 6.1.7 *Stain absorber*, smooth side up.
- 6.1.8 *Specimen* (creased), with side to be tested facing up.
- 6.1.9 *Saturated blotter*
- 6.1.10 *Foil separator*

6.2 Repeat steps 6.1.1 through 6.1.8 to make a pile with up to 10 specimens, then cover with the pressure block to ensure their intimate contact. Immediately place the assemblies in the oven for 4 h at $60 \pm 3^{\circ}\text{C}$ (140°F).

NOTE 2: A shorter time, i.e., one-half hour, or longer time (8 to 24 h) may be desirable for unusual materials, but in general a shorter or longer period does not substantially change the ranging of the variety of greases and barriers. The three suggested oils rank most