WI 220808.09

T 491

BALLOT NO. 2 SARG

DRAFT NO. 01

DATE 06/01/2023

WORKING GROUP CHAIR To be Determined

SUBJECT CATEGORY Physical Properties

RELATED METHODS See "Additional Information"

CAUTION:
This Test Method may include safety precautions which are believed to be appropriate at the time of publication of the method. The intent of these is to alert the user of the method to safety issues related to such use. The user is responsible for determining that the safety precautions are complete and are appropriate to their use of the method, and for ensuring that suitable safety practices have not changed since publication of the method. 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 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 method, the user must 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.

Water immersion number of paperboard

(Five-year review of Official Method T 491 om-18)

1. Scope

This test is applicable to paperboards that are medium-sized, with an immersion number between 4.5 and 6.0, to hard-sized, with an immersion number of 3.5 or less, throughout.

2. Significance

This test measures the amount of water in grams absorbed by a test piece of a given size of the board including its resistance to the absorption of water through its cut edges as well as transversely through its faces. The water resistance of the faces alone may be measured by the Cobb test as described in TAPPI T 441 "Water Absorptiveness of Sized (Non-Bibulous) Paper and Paperboard (Cobb Test)." The water resistance may be a measure of the degree of sizing imparted to the board in its manufacture.

3. Apparatus

3.1 *Cutter*, suitable for cutting the test specimen to the prescribed size. A paper cutter is one such device and a scissors may also be satisfactory if used carefully.

3.2 *Container*, of sufficient size to hold 152 × 152 mm (6 × 6 in.) specimens of paperboard horizontally under 76 mm (3 in.) of water.

3.3 *Coarse wire screen*, or the equivalent, to cover the bottom of the container and to permit free access of the water to the underside of the specimen.

3.4 *Weights*, or a piece of coarse wire screen, of sufficient weight to keep the specimen submerged against the wire on the bottom of the container.

3.5 *Metal roller*, weighing 13 kg (28 lb), 114 mm (4.5 in.) diameter by 178 mm (7.0 in.) wide, as specified in TAPPI T 205 "Forming Handsheets for Physical Tests of Pulp."

3.6 *Timer*, preferably with alarm.

3.7 *Balance*, suitable for weighing the test pieces to 0.1 g.

4. Materials

4.1 *Blotting paper*, sheets of blotting paper, as specified in TAPPI T 205.

4.2 *Water*, distilled or deionized water that has been aged at least three days by holding in an open container in contact with air at 23.0 ± 1.0°C (73.4°F).

5. Test specimens

5.1 From each test unit of a sample obtained in accordance with TAPPI T 400 "Sampling and Accepting a Single Lot of Paper, Paperboard, Containerboard, or Related Product," cut at least five test specimens, each larger than 152 (6 in.) square.

5.2 Condition the specimens according to TAPPI T 402 "Standard Conditioning and Testing Atmospheres for Paper, Board, Pulp Handsheets, and Related Products." Cut the test pieces to 152 ± 1 mm square.

6. Procedure

6.1 Weigh the test specimen to within 0.1 g.

6.2 Submerge the specimen horizontally in 76 mm (3 in.) of water in the container at 23 ± 2°C (73 ± 3.5°F), being careful not to trap any air bubbles or pockets. Hold the specimen submerged for 10 min ± 10 s, or as otherwise specified (for example linerboard is commonly immersed for 60 min), by placing weights on two diagonally opposite corners, or by means of a piece of wire screen.

6.3 Remove the specimen and quickly place it between two sheets of the blotting paper. Remove the surplus water by moving the metal roller once backward and once forward over the pad without exerting any additional pressure on the roller.

6.4 Remove the blotting paper and immediately weigh the specimen. Record the weight and calculate the amount that has been gained in the immersion.

6.5 Test at least five specimens in this manner.

7. Calculations

7.1 For each test unit, subtract the dry test specimen weight (6.1) from the wet test specimen weight in (6.4). The weight difference in grams is the Water Immersion Number for the test specimen.

7.2 For each unit of sample tested (5.1), average the calculated results as the Water Immersion Number for the test unit.

7.3 For each test unit, calculate the percentage water absorbed using the following equation:

$$\% \text{ Water absorbed} = \text{Water Immersion Number} \times 100 / \text{Conditioned dry weight}$$

8. Report

Report as the "Water Immersion Number" the average increase in weight of the conditioned specimens to the nearest 0.1 g. State the average conditioned weight of the specimen in grams, the percentage of water absorbed, the standard deviation of results, and the time of immersion.

9. Precision

9.1 For the maximum expected difference between two test results, each of which is the average of 6 test determinations:

9.1.1 Repeatability (within a laboratory):

10 min. immersion = 0.6 g

60 min. immersion = 1.2 g

9.1.2 Reproducibility:

10 min. immersion = 1.3 g

60 min. immersion = 1.4 g

9.1.3 These values are based on a 1994 study of six samples of hard to medium sized boards by six laboratories.

10. Keywords

Paperboard, Water resistance, Sizing, Submersion, Water absorption

11. Additional information

11.1 Effective date of issue: To be Assigned

11.2 The changes made in the 2008 draft are minor, many being merely changes in wording to improve the understanding of the techniques. The note has been removed since it was incorrect.

Your comments and suggestions on this procedure are earnestly requested and should be sent to the TAPPI Standards Department.

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