

T 520 cm-07

SUGGESTED METHOD – 1970

REVISED – 1979

CLASSICAL METHOD – 1985

REVISED – 1996

REVISED – 2007

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Curl of gummed flat paper

1. Scope

This method describes a procedure for determining the degree of curl developed by a remoistenable gummed sheet when it is exposed to specified conditions of humidity.

2. Significance

The significance depends on the tolerance limits, which can usually be established from field experience.

3. Apparatus

3.1 *Conditioning room*, or chamber with circulating atmosphere, accurately controlled to a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 2\%$.

3.2 *Enclosed vessels*, such as larger desiccators, with appropriate salt solutions to give the required RH.

NOTE 1: The chamber or vessel must be brought to equilibrium before any tests are made.

Approved by the Standard Specific Interest Group for this Test Method
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4. Materials

Saturated salt solutions, as follows, to give the indicated relative humidities at $23 \pm 2^\circ\text{C}$ (1, 2):

Salt	RH, %
Sodium nitrite, NaNO_2	64.8
Calcium nitrate, $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$	51.8 (if a constant humidity room is not available)
Chromium trioxide, CrO_3	39.2
Potassium acetate, $\text{KC}_2\text{H}_3\text{O}_2$	22.9

NOTE 2: For the two lower humidities a portion of the salt must be exposed above the surface of the saturated solution.

5. Test specimens

Obtain a sample in accordance with TAPPI T 400 "Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, or Related Product." From each test unit select 12 specimens, cut into squares with 100-mm (4-in.) sides.

6. Procedure

6.1 In the conditioning room place one set of three specimens, with the gummed side up, on a flat, perforated support in each of the enclosed vessels at approximately 23, 40, 50, and 65% RH. Ignore any initial curl.

6.2 Measure the curl after approximately 15 h (or overnight) by determining the average height to the nearest 3 mm (1/8 in.) of the two straightest parallel edges from the supporting plane if a forward curl (F), and the average height of the arch from the plane if a reverse curl (R). See Figures 1 and 2.



Figure 1. Curl measurement on a Forward Curl (F), where h_1 and h_2 are height of parallel edge of the specimen.

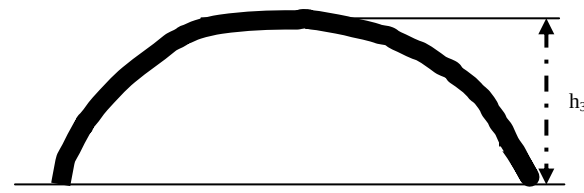


Figure 2. Curl measurement on a reverse curl (R), where h_3 = height of the arch of the specimen.

NOTE 3: Suggested alternate procedure: place one set of three specimens with the gummed side up and another set of three specimens with the gummed side down at each relative humidity. Before placing the specimens in the test environment, put a slight up (i.e. forward) curl (where h_1 and h_2 in Figure 1 is about 5 mm) such that the curvature is on the cross direction edge. The slight up curl can be created by pulling the specimen across a narrow edge. In each set, measure curl only. Report curl for (a) gummed side up and (b) gummed side down. The purpose of this variation is to allow the specimens to freely curl up and to take into account the effect of initial curvature (I). One additional procedure should be done if the gummed samples are expected to be exposed to a humid environment, an additional set of specimens should be exposed to about 90% RH, then removed and then placed in a lower RH environment such as 50% RH. The final curl should then be measured.