CONTAINERBOARD INSTRUCTIONS

Collaborative Testing Services, Inc.

Tel: 571-434-1925

Fax: 571-434-1937

containerboard@cts-interlab.com

GENERAL INSTRUCTIONS

- Test according to the designated TAPPI method
- Condition samples according to TAPPI standard conditions of 50 ± 2% RH and 23 ± 1°C
- Report any variations
- Use the same instrument and procedure throughout a test
- If the instrument fails during a test, contact CTS as soon as possible for instructions on how to proceed
- Data must be submitted to CTS in its entirety by the data due date in order to be included in the analyses
- CTS encourages the use of the Portal for online data entry

SPECIFIC TESTING INSTRUCTIONS

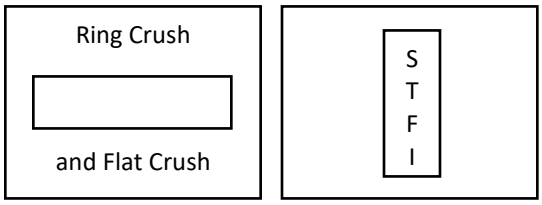
201: Box Compression Strength (BCT)
202-203: Edgewise Compression Strength (ECT)
205-207: Mullen Burst of Linerboard
215-217: Ring Crush of Linerboard
223-225: STFI of Linerboard
228: Roughness, Stylus Method
229: Roughness, Sheffield Method
231: Internal Bond Strength
234: COF, Inclined Plane Method
237: Air Resistance, Gurley Method
240: Flat Crush of Medium
250: Fluted Edge Crush of Medium
255: Ring Crush of Medium
261: STFI of Medium
281-289: Autoline Test Series

LINERBOARD – WEEKLY TESTS

Samples for tests 205, 206, 207, 215, 216, 217, 223, 224 & 225 are tested approximately one week apart in the month indicated on the data entry forms. Open, condition and test the samples in your laboratory at the TAPPI standard conditions of 50 ± 2% RH and 23 ± 1°C. *If your lab cannot test according to TAPPI standard conditions, then test the samples immediately after removing them from the sealed packet*, testing the most moisture-sensitive properties (Ring Crush or STFI) first. If known, report the relative humidity and temperature of your testing room.

Three weights of linerboard are used as samples in the program: 35 lb., 42 lb., and 52 lb. The 42 lb. linerboard is sent each month, the 52 lb. is sent in even numbered testing cycles, and the 35 lb. in odd numbered testing cycles. Each package of material is marked with the board weight.

For **EACH** linerboard test in which you have enrolled, you will find enclosed four packages of 42 lb. and four packages of either the 35 lb. or 52 lb. linerboard, with each package containing five 6" by 8" sheets. The long direction of each sheet is cut in the machine direction. Arbitrarily designate the sheets 1 through 5 and identify each test piece in accordance with the sheet from which it was cut. Consult the appropriate test method and the diagrams on the right for instructions on specimen preparation.



** Remember, one package per week per test. **

205, 206 & 207 - MULLEN BURST

Cut two test specimens from each sheet, condition to 50% R.H. for 24 hours, and test in accordance with TAPPI Method T807, Bursting Strength of Paperboard and Linerboard. Perform an equal number of tests on each side of the sheet; i.e., five tests on the top side of the sheet and five tests on the bottom side of the sheet.

215, 216 & 217 - RING CRUSH (Rigid Platen)

Cut two test specimens from each sheet and condition to 50% R.H. for 24 hours. Follow TAPPI Method T822, Ring Crush of Paperboard (Rigid Support Method).

NOTE: For the Mullen Burst and Ring Crush tests, if a false reading is obtained during the test (from an imperfection in the test specimen or from mechanical difficulty), leave a blank on the data entry form in place of the result. Do not eliminate more than two readings on the data entry form. Contact CTS if you have more than 2 invalid readings.

223, 224 & 225 - STFI COMPRESSION

Cut 15mm wide test specimens from each sheet in the cross machine direction and condition to 50% R.H. for 24 hours. Test in accordance with TAPPI Method T826, Short Span Compressive Strength of Paperboard. Make a total of 20 tests with not more than four tests on each specimen.

Report both the average uncorrected STFI compressive strength and the variation of the 20 tests. The variation may be reported as a standard deviation or as a coefficient of variation in either a percentage or a decimal format. Indicate the parameter you reported using the dropdown menu on the Portal.

CORRUGATING MEDIUM – WEEKLY TESTS

For EACH medium test in which you have enrolled, we have enclosed four packages of 26 lb. corrugating medium, with each package containing five 6" by 8" sheets. The long direction of each sheet is cut in the machine direction. Arbitrarily designate the sheets 1 through 5 and identify each test piece in accordance with the sheet from which it was cut. Refer to the diagrams on the front page of these instructions for sample cutting directions.

240 - FLAT CRUSH (CMT)

Cut two specimens from each sheet, condition to 50% R.H. for 24 hours, and test in accordance with TAPPI Method T809, Flat Crush of Corrugating Medium.

250 - CORRUGATED FLUTED CRUSH

Cut two specimens from each sheet, condition to 50% R.H. for 24 hours, and test in accordance with TAPPI Method T843, Fluted Edge Crush of Corrugating Medium, while referring to TAPPI Method T809 for details on the fluting of the medium specimens.

255 - RING CRUSH (Rigid Platen)

Cut two specimens from each sheet and condition to 50% R.H. for 24 hours. Follow TAPPI Method T822, Ring Crush of Paperboard (Rigid Support Method). Test one specimen from each sheet with the wire side to the outside, and one with the wire side to the inside.

> NOTE: For Flat Crush (CMT), Corrugated Fluted Crush (CFC) and Ring Crush (RCT) analyses, test only two specimens from each sheet, except when mechanical difficulties occur during a test. In that case, discard the test reading, and prepare and test another specimen.

261 - STFI COMPRESSION

Cut one 15mm wide test specimen from each sheet in the cross machine direction and condition to 50% R.H. for 24 hours. Test in accordance with TAPPI Method T826, Short Span Compressive Strength of Paperboard. Make a total of 20 tests with not more than four tests on each specimen.

Report both the average uncorrected STFI compressive strength and the variation of the 20 tests. The variation may be reported as a standard deviation or as a coefficient of variation in either a percentage or a decimal format. Indicate the parameter you reported using the dropdown menu on the Portal.

Your results for all 4 weeks must be submitted on the Portal or received at CTS by the date indicated on the data entry forms to be included in the analyses.

CORRUGATED BOXES & FIBERBOARD – MONTHLY TESTS

Tests in the monthly Containerboard Program are conducted 12 times per year. Each monthly sample pack contains sufficient samples to perform the test once during the month, with the exception of box compression. Box compression samples are sent annually as a bulk shipment for testing each month.

201 - BOX COMPRESSION TEST (BCT), Top to Bottom Compression

Conduct testing following TAPPI T804. Labs should be cautioned that because of the size of the samples, the test boxes have not been preconditioned. Please precondition, then condition the specimens according to TAPPI T402. Laboratories are asked to erect and seal the box flaps using the procedure most commonly used in their laboratory. Please indicate the method used to seal the box flaps on the drop-down menu on the portal. The minor flaps of the box must also be secured, even if this is not the routine procedure in your laboratory.

202 & 203 - EDGEWISE COMPRESSION STRENGTH (ECT)

Laboratories may report results for TAPPI T811 or TAPPI T839. Participants may report results for both methods, if both methods are routinely performed. Conduct testing according to the procedures outlined in the chosen method, including: sample cutting, specimen preparation and specimen size. Please note variations from the chosen method on the data entry form. **Be sure that you use the correct data entry form to report the results from your chosen method – Analysis 202 for T811 (wax) and Analysis 203 for T839 (clamp).**

Verify that you have indicated a valid unit for ECT data (the default unit is lbf/in) on your data entry form.

For all labs:

1. Please cut specimens from the cleanest portion of each specimen. Avoid the edges of the specimen and any crushed, partially crushed or deformed sections.
2. Report lab humidity and temperature.
3. If unable to condition the samples in the TAPPI standard atmosphere, please prepare and test the specimens as soon as the barrier bag has been opened
4. Cut one test specimen from each supplied blank. If the specimen does not exhibit a valid failure, cut a second specimen from the same blank.
   **** Remember: Divide load by 2 to report as lbf/in for 2 inch sample, if applicable. ****

For labs using TAPPI T811:

Labs testing within TAPPI standard condition of 50 ± 2% R.H.:

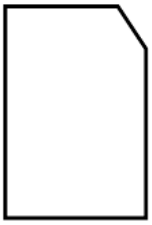
1. Condition the corrugated fiberboard to 50% R.H. for 24 hours, then cut one 2" x 1.5" specimen from each board with the 2" width perpendicular to the axis of the flutes.
2. Wax the loading edge of all specimens and condition them for two more hours.
3. Test the specimens in accordance with TAPPI Official Test Method T811.
4. Record the maximum load of ten valid failures; convert readings and report as lbf/inch or kN/m.
5. If a specimen from a board does not exhibit a valid failure, cut another test piece from the same board and retest. Do not cut more than two specimens from a piece of fiberboard.

LINERBOARD – MONTHLY TESTS

228 – ROUGHNESS, STYLUS METHOD

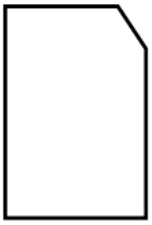
Perform testing according to TAPPI Method T575 and the instrument manufacturer's instructions using the following settings:

Number of Readings: 500 Sample Spacing: 0.01"
Speed: 400 Group Spacing: 0.01"
Number of Groups: 1



Each sample is composed of five (5) specimens. To determine the top side of each specimen, position the notch in the top right corner. For each specimen record two determinations; both determinations should be made on the top side in non-overlapping (at least 0.25" offset), regular intervals in the long direction of each sheet. Keep ½ inch between the two measurement sets on each sheet. Report the smoothness in microdeviations for 10 determinations.

229 – ROUGHNESS, SHEFFIELD METHOD



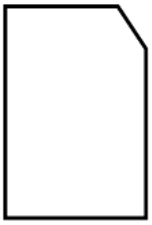
Perform testing according to TAPPI Method T538 and the instrument manufacturer's instructions. Test on the top side of the linerboard only. The top side can be identified by positioning the specimen like the image to the right, with the notch in the top right corner. Each sample pack is composed of 10 specimens. Record one determination for each specimen. Data must be recorded in Sheffield Units.

231 – INTERNAL BOND STRENGTH

Cut the test piece from the center of the sample sheet with its length parallel to the long direction of the sheet and test in accordance with TAPPI Method T569. Calibrate the instrument to low range scale. Prepare test pieces 2.5 cm (1 in.) wide and 16.5 cm (6.5 in.) long. It is recommended that the sample and tape be clamped together for two seconds using a pressure of 100 psi. For each test piece (specimen), average the five readings; discard readings of samples that do not completely separate. Report the average of the five readings as one determination on your data entry form.

234 – COEFFICIENT OF STATIC FRICTION (Slide Angle, Incline Plane Method)

A total of 5 (4" x 12") sheets of linerboard have been supplied. The 12" side is parallel to the machine direction; identify the top and bottom sides of the first sheet and ensure that the other sheets are orientated in the same manner. The top side can be identified by positioning the notch in the top right corner. Follow TAPPI Method T815.



Cut one sled and one base piece from each sample sheet, so that the long edge of the samples is the test direction. Sled pieces will be attached to the sled with the bottom side against the sled (top side facing the base). Attach base pieces to the base with the top side up (bottom side against the base). This should yield a test setup measuring slide angle for a MD to MD and top side to top side orientation.

If the sled to be used has a soft rubber backing, the sled piece will likely not need to be secured to the sled. If the sample needs to be secured to the sled, it is recommended that the sample be scored prior to folding. Allow a dwell time of 10 seconds before increasing the angle. Per TAPPI T815, Record each determination as the angle of the 3rd slide. Record the slide angle in degrees. Ensure that the sled geometry used is such that the applied pressure conforms to specifications detailed in TAPPI T815. Please note that the linerboard samples are compressible; and, therefore, the COF is affected by the applied pressure.

237 – AIR RESISTANCE (Gurley Method)

Test in accordance with TAPPI Method T460. For this analysis make one determination on each side of the 6" x 8" sheet. Report the readings for each side and the total of the ten determinations from the five specimens.

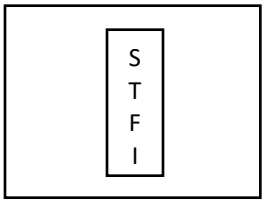
AUTOLINE TEST SERIES

Open, condition and test the samples in your laboratory at the TAPPI standard conditions of 50 ± 2% RH and 23 ± 1°C. *If your lab cannot test according to TAPPI standard conditions, then test the samples immediately after removing them from the sealed packet*, testing the most moisture-sensitive properties (Ring Crush or STFI) first. If known, report the relative humidity and temperature of your testing room.

In this test series, participants have option to report for any or all of the following five tests: Bursting strength, Short-span compression (STFI), Roughness using the Stylus method, Roughness using the Sheffield method, & Gurley air resistance. Similar to their corresponding tests with the smaller samples, the Mullen and STFI test occur weekly, and the two Roughness tests along with the Air Resistance test occur monthly.

Three weights of linerboard are used as samples in the program: 35 lb., 42 lb., and 52 lb. The 42 lb. linerboard is sent each month, the 52 lb. is sent in even numbered testing cycles, and the 35 lb. in odd numbered testing cycles. Each package of material is marked with the board weight. The monthly tests will be performed exclusively on the 42 lb. linerboard while the weekly tests will occur on both the 42 lb. liner and the alternate liner.

This test series includes four packages of 42 lb. and four packages of either the 35 lb. or 52 lb. linerboard, with each package containing five 12" by 24" sheets. The long direction of each sheet is cut in the machine direction. The weekly tests should be performed on all the packages sent while the monthly tests should be tested on the 42 lb. packages only. The monthly tests could all be performed on the same package or interspersed among multiple packages depending on what is most convenient.



WEEKLY TESTING

281, 282 & 283 - MULLEN BURST – AUTOLINE

Test in accordance with TAPPI Method T807, Bursting Strength of Paperboard and Linerboard. Perform an equal number of tests on each side of the sheet; i.e., five tests on the top side of the sheet and five tests on the bottom side of the sheet. If tests on either side of the same liner sheet cannot be made, then alternate the sides tested on subsequent sheets such that six tests are performed on one side of the sheets and four tests are performed on the other.

284, 285 & 286 - STFI COMPRESSION – AUTOLINE

Test each sheet in the cross machine direction in accordance with TAPPI Method T826, Short Span Compressive Strength of Paperboard. Note that these samples are long in the machine direction so a machine direction cutter may need to be used to test the cross machine direction. Refer to the diagram above for an orientation guide. Make a total of 20 tests with not more than four tests on each specimen.

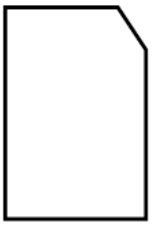
Report both the average uncorrected STFI compressive strength and the variation of the 20 tests. The variation may be reported as a standard deviation or as a coefficient of variation in either a percentage or a decimal format. Indicate the parameter you reported using the dropdown menu on the Portal.

MONTHLY TESTING

287 – ROUGHNESS, STYLUS METHOD – AUTOLINE

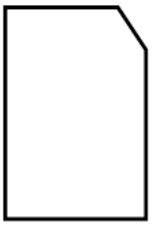
Perform testing according to TAPPI Method T575 and the instrument manufacturer's instructions using the following settings:

Number of Readings: 500 Sample Spacing: 0.01"
Speed: 400 Group Spacing: 0.01"
Number of Groups: 1



The top side of the specimen can be identified by positioning the notch in the top right corner. For each specimen record two determinations; both determinations should be made on the top side in non-overlapping (at least 0.25" offset), regular intervals in the long direction of each sheet. Keep ½ inch between the two measurement sets on each sheet. Report the smoothness in microdeviations for 10 determinations.

288 – ROUGHNESS, SHEFFIELD METHOD – AUTOLINE



Perform testing according to TAPPI Method T538 and the instrument manufacturer's instructions. Test on the top side of the linerboard only. To identify the top side, position the notch in the top right corner. Perform two measurements on each specimen. A total of 10 determination should be reported. Data must be recorded in Sheffield Units.

289 – AIR RESISTANCE (Gurley Method) – AUTOLINE

Test in accordance with TAPPI Method T460. For this analysis make one determination on each side of the sheet. Report the readings for each side of the five specimens for a total of ten determinations.

Submit data using the CTS PORTAL at www.cts-portal.com
You may also return data by FAX (571-434-1937) or MAIL.
Type or print the data using blue or black ink prior to faxing.
If you are mailing your results to us from outside the United States (except Canada and Mexico), please add appropriate postage to assure AIRMAIL delivery.

If you have any questions or are missing any items, please contact CTS at 571-434-1925.