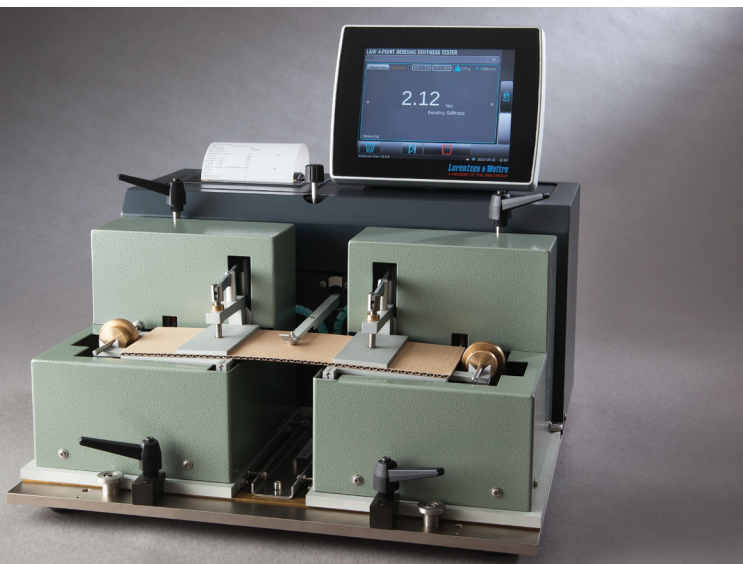


PULP AND PAPER

L&W 4-Point Bending Stiffness Tester

Lorentzen & Wettre Products | Paper testing



L&W 4-Point Bending Stiffness Tester measures the bending stiffness of corrugated board and heavy paperboard rapidly and accurately. The unique design of the pneumatic clamps permits measurements of warped and twisted samples without impairing results.

The bending stiffness is a of major importance for the top-to-bottom stacking strength of a finished box, as well as its ability to resist buckling. Bending stiffness is closely related to the thickness of the corrugated board material and the quality of the outer and inner liner layers. These factors may change during production, thus reducing the quality of the finished product. Routine testing of the bending stiffness of corrugated board, before and after converting, is therefore the obvious solution.

Previous methods for measuring bending stiffness of corrugated board have involved severe accuracy problems. The 4-point bending method, as performed by L&W 4-point Bending Stiffness Tester, avoids the influence of twist and warp. The clamp design ensures that the test piece is kept flat at the beginning of the measurement. This makes the test results very dependable. To prevent errors because of shear forces introduced during bending the test piece, one of the clamp rotation points are fixed and the other can move in horizontal direction.

Automatic measurement and calculation

L&W 4-Point Bending Stiffness Tester is easy to use. The operator only chooses appropriate flute type settings program and places the test piece in the measuring gap and push the start button. The test piece is clamped on both ends with two wide clamps

which remove the influence of twist and warp. Weights are slowly lowered on the outer ends of the clamps and a bending moment is applied on the test piece. The weights are chosen so that the test piece is loaded within the elastic region. After a pre-defined dwell time the displacement in the center is recorded and bending stiffness is calculated. The measurement is finished and the load is removed and the test piece is released.

Touch screen and printer

The easy to use touch screen has intuitive menus and large easily accessible buttons. The capacitive touch screen has a protective surface for easy cleaning and durability with fast response and high resolution. A thermo printer is included for logging of test results.

Benefits

- Fully automated testing sequence
- Pneumatic clamping effectively eliminates any problems with twisted and curled test pieces
- Recommended settings for different flute types are pre-programmed
- Touch screen
- Tabular or graphical presentation of results
- Thermo printer
- Ethernet connection

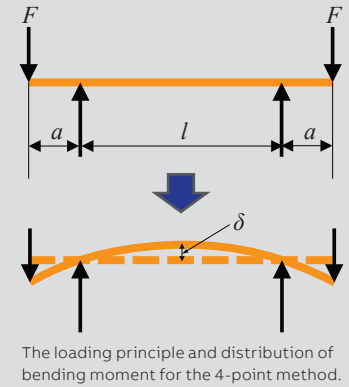
DEFINITION

By using the relationship between curvature and deflection the bending stiffness becomes:

$$S^b = \frac{F \times a \times l^2}{w \times \delta \times 8}$$

where:

S^b = bending stiffness (Nm)
 F = loading force force (N)
 a = distance of the loading point from the support point (m)
 l = bending length (m)
 δ = maximum displacement (m)
 w = width of test piece (m)



The loading principle and distribution of bending moment for the 4-point method.



Built-in thermo printer.



Touch screen for ease of use.

Technical specifications

– L&W 4-Point Bending Stiffness Tester, code 287

Inclusive	- Weights and accessories needed for measurements - Built-in thermo printer
Measurement range	0.5–500 Nm (4.5–2770 lbf × in)
Instrument	
Bending length	50, 100, 150, 200 or 300 mm (2, 4, 6, 8 or 12 in)
Dead weights	20–1020 g (0.044–2.25 lb)
Test piece	The sample size depends on board type, normally 50–100 mm (2–4 in) wide and bending length at least 120 mm (4.7 in) longer than chosen bending length. Maximum thickness is 16 mm (0.6 in)

Results

Measurement values	- Bending stiffness - Displacement
Statistics	- mean value - standard deviation - coefficient of variation - maximum and minimum values of the series - MD/CD ratio - Geometrical mean of MD and CD

Connections

Data	Ethernet The instrument acts as a FTP-server. Test results can be retrieved by a FTP-client.
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Installation requirements

Power	100 W
Instrument air	0.5–0.6 MPa (73–90 psi)
Dimensions	0.6 × 0.6 × 0.5 m 24 × 24 × 20 in
Volume	0.3 m ³ 11 ft ³
Net weight	33 kg 72 lb
Gross weight	52 kg 115 lb

Applicable standards

DIN 53 121, ISO 5628, SCAN P65, TAPPI T820, TAPPI T836
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