PULP AND PAPER

L&W ZD Tensile Tester

Lorentzen & Wettre Products | Paper testing

L&W ZD Tensile Tester measures internal bond strength – or Z-direction (ZD) tensile forces – of paper and multi-layered paper products, such as liner- and box-board. It uses an automated method and you obtain fast and reliable measurement values, which make it possible to achieve uniform strength across the reel width. All in compliance with customer specifications, and in accordance with applicable standards (ISO, TAPPI, SCAN).

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The accuracy of L&W ZD Tensile Tester means paper makers can now achieve a more consistent final product quality and reduce wastage.

Full control of the internal bond strength, is particularly important in the production of multi-layered paper products. Low or unevenly distributed internal bond strength can cause material splitting in an offset press with sticky printing ink. In the creasing or scoring operation of boxboard the material should delaminate “just enough”. Otherwise after folding there will be poor folding lines or cracks in the outer layer. Internal bond strength tests can predict this.

Enough internal bond strength is also needed in heat-set web offset printing of highly coated paper. Otherwise blistering will occur when moisture will try to escape during the heating process. Too high internal bond strength impedes the creasing of the boxboard and high values also mean a waste of raw material and energy. In other words, the aim is to achieve an even strength within specifications and across the reel width. L&W ZD-Tensile Tester can achieve this.

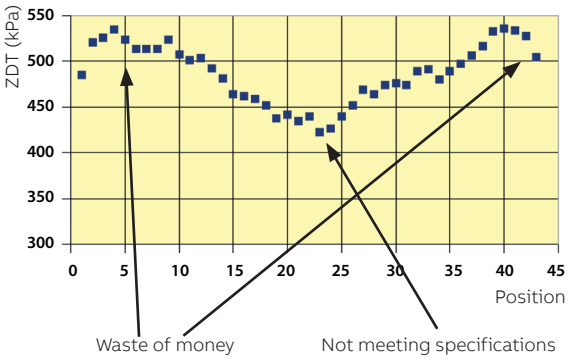
Easy to use
L&W ZD-Tensile Tester is easy to use. The capacitive colourtouch screen has intuitive menus, large accessible buttons, and has a protective surface for easy cleaning. The operator only needs to place the sample on the measurement table and press the start button. The rest is performed automatically by the instrument, including the application and removal of tape. Measurement of ten positions takes only six minutes. The Z-directional tensile method suits most paper and board grades. Measurements are made in accordance with ISO 15754, SCAN P 80 and TAPPI T 541 standards.

Benefits
- Fully automated testing, including the application of tape
- Perfect for troubleshooting as profiles can be measured and sections of poor strength can be found
- Operator-independent measurement results
- Unique compression device for perfect alignment of upper and lower test surface
- Touchscreen for ease of use
- Integrated strip feeder
- Built-in thermo printer for alternative logging of results

Measurement results
The measurement values are presented on the touchscreen, either in tabular or graphic form. Results can also be printed on the built-in printer, on a network printer or exported via Ethernet.

More accurate than other methods
A common method for internal bond strength measurements is the manual Scott Bond method. This method is very time-consuming and complex, with many manual steps. To meet production's need for fast reporting of measured values, very few measurements are done when using this method. This means that there is a risk that the test results are quite unreliable. L&W ZD-Tensile Tester on the other hand is fast, delivers more results and therefore holds a better degree of precision.

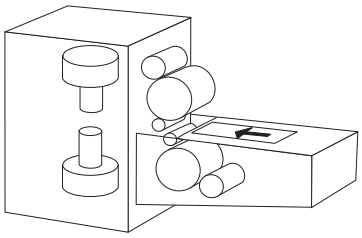
ZDT Kraftliner 150 g/m²



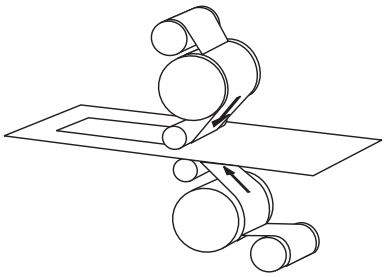
The cross profile shows great variations in internal bond strength values across the machine reel.

MEASUREMENT PROCEDURE OF INTERNAL BOND STRENGTH WITH L&W ZD TENSILE TESTER

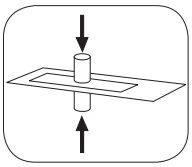
1. The sample is placed on the feeding table.

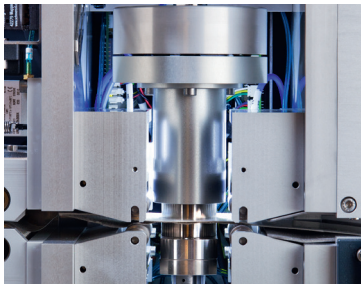


2. Tape is automatically applied on both sides of the sample.

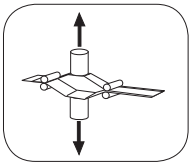


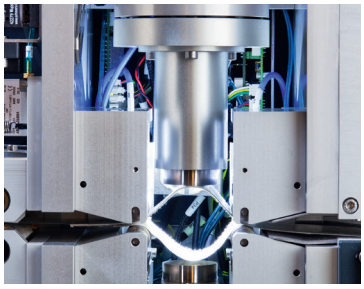
3. Steel platens are pressed against the taped paper/board sample.



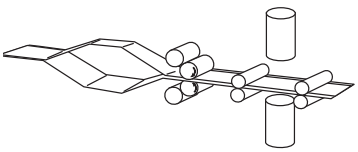


4. The platens pull the paper apart and the force at break is recorded.





5. The sample is automatically fed to the next measurement position.



6. The results are displayed in tabular form or as graphics.

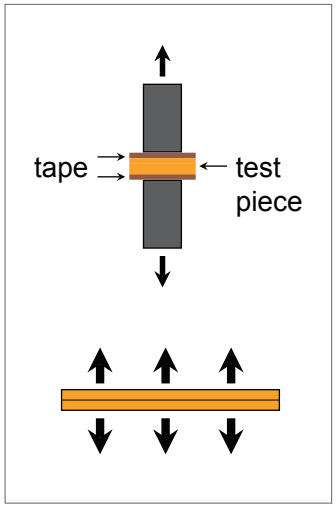
Technical specifications – L&W ZD Tensile Tester, code 285			
Inclusive	Pulling unit 10 cm² or 1 in² 4 rolls of tape		
Measurement range	The measuring range is only limited by the adhesive capacity of the tape between the test piece and the tester platen. When measuring thin paper samples (grammage lower than 60 g/m²) there is a risk that the tape will reinforce the test piece, which will give an incorrect measuring result.		
Instrument			
Testing modes	- individual measurement - measurement of a sample strip - measurement of several sample strips in a sequence		
Test piece	width approx. 100 mm		
Distance between measurement points	minimum 70 mm		
Measurement area	10 cm² or 1 in²		
Tape	Double-sided and self-adhesive		
Tape width	50 or 75 mm		
Compression time	3–300 sec		
Compression force	Adjustable		
Printer	Integrated		
Results			
Measurement values	- ZD tensile strength		
Statistics	- mean value - standard deviation - coefficient of variation - maximum and minimum of the series		
Connections			
Data	Ethernet The instrument acts as an FTP-server. Test results can be retrieved by an FTP-client.		
Installation requirements			
Power	100 W		
Instrument air	0.6–1 MPa (90–145 psi)		
Dimensions	1.0 × 0.4 × 0.7 m 38 × 16 × 28 in	Volume	0.96 m³ 33 ft³
Net weight	66 kg 146 lb	Gross weight	110 kg 242 lb
Applicable standards			
ISO 15754 , SCAN P 80, TAPPI T 541			

Description

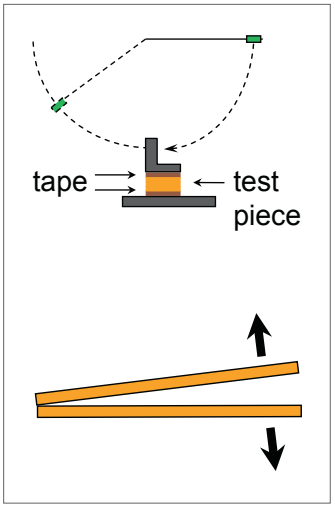
The Z-directional tensile (ZDT) and Scott Bond method are different methods to measure the material's strength in the thickness direction.

The ZD-tensile measures the maximum force needed to split the sample at a low standardized test speed exactly perpendicular to the test surface.

The Scott Bond method measures the energy needed to split the sample in a complex way at a speed several thousand times higher. The two methods do not always react the same to changes in the papermaking process.

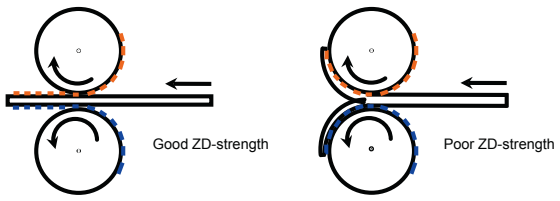


ZDT-method



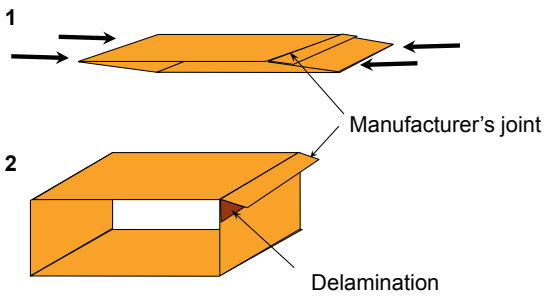
Scott Bond

PROBLEMS RELATED TO ZD STRENGTH – PRINTING PROCESS

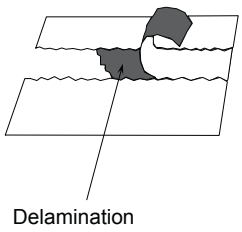


Splitting/delamination due to tacky and poor ZD-strength.

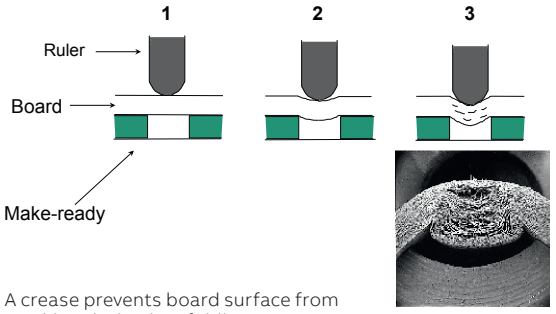
PROBLEMS RELATED TO ZD STRENGTH–PREDICTION: DELAMINATION DURING SET-UP PACKAGING



PROBLEMS RELATED TO ZD STRENGT–PREDICTION: SPLITTING OF "TEAR STRIPS"

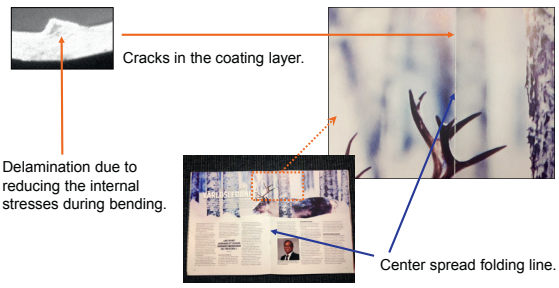


PROBLEMS RELATED TO ZD STRENGTH – CREASING AND FOLDING PAPERBOARD

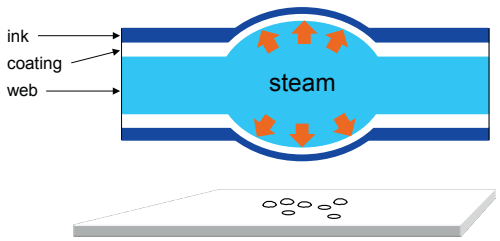


A crease prevents board surface from cracking during box folding.

PROBLEMS RELATED TO ZD STRENGTH – FOLDING OF COATED FINE PAPER



PROBLEMS RELATED TO ZD STRENGTH – BLISTERING



Enough internal bond strength is needed in heat-set web offset printing of highly coated paper. Otherwise blistering will occur when moisture will try to escape during the heating process.

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