Data sheet

L&W Autoline 400

Lorentzen & Wettre Products | Automated Paper Testing

L&W Autoline 400 is the fastest and most accurate automatic system for paper testing on the market. More than 50 properties can be measured and calculated within a few minutes. Short feedback time is a very important part of the process control. Everything from newsprint to heavy linerboard and cardboard can be measured by L&W Autoline 400.

L&W Autoline greatly reduces, or even eliminates, traditional sources of variation in paper testing; such as:

- **Operator and instrument variation.** Unlike using individual bench top instruments for testing, L&W Autoline 400 requires no operator involvement and no specialized skills. Thus, differences in lab results, due to tester changes or different operating techniques, are avoided. With L&W Autoline 400, the operator simply inserts the sample and it is automatically tested and fed through the system.

- **Sample preparation.** Sample preparation is one of the most important and often ignored areas causing testing variation. Manually cutting samples from a jumbo reel is difficult to duplicate from reel to reel, much less from operator to operator. Incorrect cut samples from the reel can affect how the individual test pieces are prepared as well as the orientation of the sample in the test instrument. When using L&W Profile Sample Cutter, samples are collected the same way every time, ensuring consistency and less variability.

- **Testing in the true MD and CD direction.** Manually cutting samples from the reel and then cutting the individual test pieces presents another opportunity for variation. If samples are not cut straight, you cannot test in the true

MD and CD direction. Not testing in the true MD and CD direction will introduce variations as well as poorer test results. With L&W Profile Sample Cutter, the samples are cut in the true CD direction. With L&W Autoline 400 the precise feeding of the sample ensures testing in the true MD and CD direction every time.

- **Same position testing.** Not testing in the same position on the reel every time could simply be showing position variations, rather than an actual quality problem. Contrarily, this fault could also be hiding existing or developing problems. L&W Autoline 400 utilizes a precise feeding mechanism, to ensure measurement at exactly the same position every time. This also facilitates long-term comparisons of a particular cross machine position in order to analyse MD variations.

- **Increasing the number of data points.** Increasing the number of positions tested makes the average of those measurements statistically more reliable. With L&W Autoline 400 testing volume is considerably increased compared to manual testing. It is possible to test every property, every reel, every time.

Financial benefits

Highly skilled personnel no longer need to carry out repetitious and routine functions. This type of work can now be performed more cost effectively by automatic paper testing equipment, leaving technicians more time to concentrate on the process and quality improvements, rather than measurement and data collection.

Increased productivity results

- Speed increase on dryer-limited grades
- Weight decrease (when sold by area or strength)
- Less downgraded product
- Reduced grade change losses
- Reduced start-up time
- Reduced breaks

Improved quality

- Improved market share
- Reduced customer complaints
- Reduced machine-direction variability
- Reduced cross-direction variability

Reduced costs

- Reduced steam costs per ton
- Reduced fibre usage
- Total weight increase (when sold by weight)
- Substitution of recycle for virgin fibre
- Substitution of fillers for fibre
- Decreased chemical additive costs
- Reduced refining
- Reduced freight costs
- Manpower optimization

Benefits

- Measures and calculates more than 50 different properties, most of them according to international standards
- Warning alert if the measurement results are outside specified targets and limits
- Fast – about 8 minutes to measure a profile at 20 positions
- Results are easily accessible via the mill's local area network
- Several pre-programmed testing sequences available
- Remote viewing station provides real time data

A complete product specification "L&W Autoline 400 Product Profile" as well as other product information can be obtained from your local Lorentzen & Wettre company or distributor.

Technical specifications

L&W Autoline 400 – code 411

Inclusive	L&W Autoline 400 is delivered and installed as a complete system, with the following main components: - L&W Autoline 400 - L&W Autoline 400 software - Computer and keyboard - Report printer - Interface for host computer communication - Capability for networking with other L&W Autoline 400 units - Installation, start-up and training on-site by Lorentzen & Wettre personnel

Measuements

Measurements available	- Smoothness, Bekk, Oken - Roughness, Bendtsen, Sheffield and PPS - Air permeance, Bendtsen, Gurley and Sheffield - Thickness - Bursting strength, version P and J (Paper and board respectively) - Tearing strength - Bending resistance - Moisture - Gloss - Grammage/Basis weight - TSO - Optical testing - Dynamic absorption and wettability - Formation - Surface formation - Tensile - Roughness – stylus type - Compressive strength (SCT)
Grammage range	15–800 g/m² (3–160 lb/1000 ft²) Depending on sample thickness and stiffness
Measuring time	Depending on which modules are activated, the sample length and the number of positions measured

Installation requirements

Power	Total consumption: depends on the modules included
Instrument air	0.6–1 MPa Consumption depends on the modules included
Options	Bar-code reader Bar-code printer L&W Sample Loading System, code 525 L&W Profile Sample Cutter, code 148 L&W Sample Trimmer, code 149

Dimensions	2.85 × 1.5 × 0.9 m 112 × 59 × 35 in	**Volume**	6 m³ 210 ft³
Net weight	500–900 kg 1100–1980 lb	**Gross weight**	600–1000 kg 1300–2200 lb

Wide choice of measuring modules

L&W Autoline 400 is configured with measurement modules that can be freely selected and combined for the desired cross-profile measurements. The majority of modules measure according to current industry standards.

L&W Autoline Smoothness, Bekk
Code 513
L&W Autoline Smoothness measures the smoothness on both sides of a paper sample, according to the Bekk method. Test results are reported in Bekk seconds. The measurement method is most often used on fine and ultra smooth paper, but can also be used on paper with a coarser surface.

Specification	
Measuring range	5–3000 Bekk seconds
Measurement pressure	–50.7 kPa (–380 mm Hg)
Standards	DIN 53107, ISO 5627:1995, TAPPI T479

L&W Autoline Smoothness, Oken
Code 512
L&W Autoline Smoothness Oken measures smoothness according to the Oken method on both sides of the paper. Test results are reported in Bekk seconds. The measurement method is most often used on fine paper.

Specification	
Measuring range	5–5000 Bekk seconds
Measurement pressure	4,9 kPa
Standards	Japan TAPPI No. 5-2

L&W Autoline Roughness, PPS
Code 541 U/D (upper/double)
L&W Autoline Roughness measures surface roughness according to the PPS method on the topside, or both sides of the paper sample with one measuring head.

Specification	
Measuring range	0.6–6 µm
Clamping pressure	0.5, 1 or 2 MPa
Standards	BS 6563, ISO 8791/4, PAPTAC D.31.P, TAPPI 555

L&W Autoline Roughness, Sheffield
Code 514 U/D (upper/double)

L&W Autoline Roughness (Sheffield), measures surface roughness according to the Sheffield method. A measuring head is applied to the sheet, from the top side or both sides.

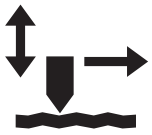
Specification	
Measuring range	5–400 Sheffield Units (SU)
Test air pressure	9.85 kPa
Standards	APPITA AS 1301.441, PAPTAC D.29P, ISO 8791/3, TAPPI T538

L&W Autoline Roughness, Bendtsen
Code 515 U/D (upper/double)

L&W Autoline Roughness (Bendtsen), measures surface roughness according to the Bendtsen method. A measuring head is applied to the paper sheet, from top side or both sides.
The measurement is performed with pressure compensation according to SCAN P84.

Specification	
Measuring range	50–4000 ml/min (SCAN P84), 50–2800 ml/min, not corrected
Measurements pressure	98 or 490 kPa
Standards	APPITA AS 1301.440, DIN 53108, ISO 8791/2, SCAN P84

L&W Autoline Roughness, Stylus type
Code 548



L&W Autoline Roughness – Stylus type, measures surface topography of paper and board products. It has the ability to detect, evaluate and analyze surface characteristics that affect printing quality.

Specification	
Scanning length	76 mm (3 in)
Stylus radius	25 µm
Reference head diameter	38.1 mm (1.5 in)
Vertical resolution	25 µm (0.000010 in)
Standards	TAPPI T575

L&W Autoline Tensile
Code 510

L&W Autoline Tensile measures the tensile strength and the tensile stretch of paper in the machine (MD) and cross (CD) directions of a paper sample.

Specifcation	
Tensile strength	up to 83 kN/m (depending on load cell and sample strain)
Elongation	1–15%
Tensile Energy Absorption	Calculated
Standards	Closely related to SCAN P67, ISO 1924/3

L&W Autoline Compressive Strength STFI
Code 530

L&W Autoline Compressive Strength STFI measures the compressive strength of liner and fluting, according to the short-span compression test (SCT) method, developed by the Swedish Pulp and Paper Institute (STFI) in collaboration with Lorentzen & Wettre.

Specification	
Grammage	approx. 100–400 g/m²
Standards	APPITA AS 1301.450 rp,BS 7325, DIN 54518, ISO 9895, SCAN P46, TAPPI T826

L&W Autoline Bursting Strength P and J
Code 519 U/L – P type (upper/lower)
Code 520 U/L – J type (upper/lower)

L&W Autoline Bursting Strength measures the bursting strength of paper (P type) or board (J type) from the bottom or top side of the sample.

Specifcation	
P type	70–2000 kPa
J type	170–5000 kPa
Standards	P type: APPITA AS 1301.403, BS 3137, PAPTAC D.8, ISO 2758, SCAN P24, TAPPI T403 J type: APPITA AS 1301.438, BS 3137, ISO 2759, SCAN P25, TAPPI T807

L&W Autoline Tearing Strength
Code 522

L&W Autoline Tearing Strength measures the tearing strength of a paper sample, in the machine (MD) and cross (CD) directions. The values obtained can be recalculated to values according to the Elmendorf method using a formula in the L&W Autoline 400 software.

Specification	
Tearing strength (measuring range for three different versions)	50–1700 mN 100–3400 mN 200–6800 mN (approx Elmendorf values)
Standards	Calculated to Elmendorf Tear (APPITA AS 1301.400S, BS 4468, PAPTAC D.9, DIN 53128, ISO 1974, NF Q03-011, SCAN P11, TAPPI T414)

L&W Autoline Bending Resistance
Code 542 and 543

L&W Autoline Bending Resistance measures the bending resistance of paper and board in the machine (MD) and cross (CD) directions of the paper sample and in two directions, upwards and downwards.

Specification	
Bending length	10 mm (542), 50 mm (543)
Grammage range	80–150 g/m² (542), 150–500 g/m² (543)
Bending angle	5°, 7,5° and 15°
Sample width	38 mm
Bending velocity	5°/s
Standards	DIN 53 121, ISO 2493, 5628, SCAN P29, TAPPI T556

L&W Autoline Grammage
Code 538

L&W Autoline Grammage measures the grammage or basis weight of paper samples.

Specification	
Grammage range	approx. 20–800 g/m²
Standards	ISO 536, ASTM D646-96, SCAN P6, TAPPI T410

L&W Autoline TSO
Code 626

L&W Autoline TSO measures TSO (Tensile Stiffness Orientation) and TSI (Tensile Stiffness Index) properties. It is an ultrasonic measurement, which is a non-destructive and easy method to evaluate a paper's elastic properties and its orientation.

Specification	
TSI	0–25 kNm/g
TSI_{AREA}	0–3000
TSO	0 to 90 degrees
Standards	N/A

L&W Autoline Gloss
Code 524 U/D (upper/double)

L&W Autoline Gloss measures the gloss value in machine direction (MD) of a paper sample. This is performed either at the reflection angles 75°/20° (according to TAPPI standards) or at 75°/45° (according to DIN).

Specifcation	
Measuring range	0–100 Gloss units
Standards	
TAPPI 75°	ISO 8254-1, TAPPI T480
TAPPI 20°	ISO 8254-3, TAPPI T653
DIN 75°	ISO 8254-2, DIN 54502
DIN 45°	DIN 54502

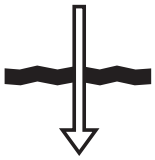
L&W Autoline Brightness, Opacity and Colour
Code 539U (upper)
Code 539L (lower)
L&W Autoline Optical (ISO version) measures brightness, opacity and color of paper samples using a diffuse illuminant and a zero degree observation angle.

Specifcation	
Reflectance	0–200%
Standards	ISO 2469/2470-1/ 2471/9416/5631/11475/ 11476, SCAN G5/P72, DIN 53140/53145/53146/53147/ 54500, TAPPI T519/ 525/527/560, PAPTAC E1/ E2/E5P

L&W Autoline Thickness
Code 618
L&W Autoline Thickness, measures thickness/ caliper of a paper sample. It is based on the well-proven L&W Micrometer, standalone instrument. The module enables automatic measurements with very high precision. Values obtained during the measurement can be presented in metric or fps units, in accordance with the specified standard.

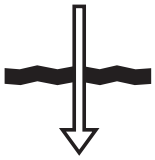
Specification	
Range	0.1–15000 µm
Resolution	0.1 µm
Lifting height	15 mm
Measuring surface	2 cm^2
Cleaning function	Automatic cleaning and zero setting before profile start
Standards	APPITA/AS 1301.426, 1301.427, DIN 53105, ISO 534, SCAN P7, TAPPI T411

L&W Autoline Air Permeance
Code 516
The L&W Autoline Air Permeance module, measures air permeance of paper according to the most common method. The values obtained can easily be recalculated to give air permeance values in accordance with Bendtsen Gurley and Sheffield methods.



Specifcation	
Measuring range	0.003–100 µm/Pa s, 2–40000 Gurley s, 0.3–8800 Bendtsen ml/min, 0.2–1400 Sheffield units
Test air pressure	20 kPa
Standards	See page 206-207

L&W Autoline Air Permeance, Low Range
Code 517
L&W Autoline Air Permeance, low range, module measures the air permeance for greaseproof paper, conductor insulation paper, release paper and similar paper grades with low air permeance.



Specifcation	
Measuring range	100–10000 pm/Pa s at 20 kPa test air pressure and 50 cm^2 test area 8–800 pm/Pa s at 20 kPa test air pressure and 100 cm^2 test area
Standards	N/A

L&W Autoline Moisture
Code 523

L&W Autoline Moisture measures the water content in the paper using the well-proven microwave method with double-frequency resonance. The moisture content of the paper is calculated with the help of grammage information from L&W Autoline Grammage Module, code 538.

Specification	
Moisture	2–15% H2O at 30–500 g/m², or 6–100 lb/1000ft²
Standards	N/A

L&W Autoline Dynamic Absorption and Wettability
Code 544

L&W Autoline Dynamic Absorption and Wettability is used for the rapid optical evaluation of contact angle (wettability), volume (sorption) and drop base diameter (spreading) as a function of time. Applications include the evaluation of printing problems such as mottling, feathering, and bad ruling. Other applications such as coating, sizing, gluing with hot melt and water based glues, surfactants, bio-sensors, and powders can also be studied.

Specification	
Droplet size	0,5–20 µl (typically 4,0 µl)
Droplet accuracy	within 5 % or + - 0,1 µl
Contact angle, measuring range	10–150 degrees
Timing precision	within 1 millisecond
Number of images	50 images during first second of contact
Standards	TAPPI T558

L&W Autoline Formation
Code 545

L&W Autoline Formation is a camera based image analyzer. The analyzing software uses advanced algorithms to quantify formation quality at several different scales of formation. The values at these various levels of formation have been found to strongly correlate with important properties of paper and board.

Specification	
Grammage range	15–400 g/m² (depending on the paper's optical properties)
Standards	N/A

L&W Autoline Surface Formation
Code 545S

L&W Autoline Surface Formation is a camera based image analyzer. The analyzing software uses advanced algorithms to quantify formation quality at several different scales of formation. The values at these various levels of formation have been found to strongly correlate with important properties of paper and board. Measurements are made on the surface of the sample and therefore not affected by grammage. This method was developed in order to measure white-top linerboard and to quantify the 'show through' from the brown layer underneath.

Specification	
Grammage range	Unlimited (somewhat depending on the paper's optical properties - black or very dark samples can not be measured)
Standards	N/A

L&W Autoline S-Test
Code 534

L&W Autoline S-Test measures the failure strength of a test piece loaded in compression, when the initial span width is 4 mm and the offset is 1 mm. One of the critical strength properties for Fluting medium is Concore Medium Test (CMT). The S-Test simulates the initial failure in a CMT test, known as the CMT first peak value.

Specifcation	
Grammage	Approx. 70–400g/m²
Standards	N/A

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For more information, please contact:

ABB AB / Lorentzen & Wettre
P.O. Box 4
SE-16493 Kista
Sweden
Tel: +46 8 477 90 00

www.abb.com/pulpandpaper