

PULP AND PAPER

# **L&W Elrepho** Testing and industry-specific instruments



L&W Elrepho comes in a standard version with a measurement table for fast sample handling (seen to the right above). But it can also be supplied without the measurement table (seen to the left above) which is useful when measuring on e.g. fillers. L&W Elrepho is designed to make laboratory work easier. A sample is placed on the measurement table, and then automatically positioned against the instrument's measurement aperture. For opacity measurements, the black cavity is controlled automatically. In fact, the measurement software controls everything.

L&W Color-Brightness software is optimized for shift testing and has complete user interfaces for identification, measurement, and reporting. Grades with limit and target values can be set as required. The software reports most optical characteristics. Calculations can also be implemented to meet the user's needs.

#### Simple measurement sequences

The software automatically measures according to the conditions specified by the user, e.g. D65 illuminant, C illuminant, or a 420 nm cut-off filter. Measurement results can be copied to other programs by a simple copy and paste function. Alternatively, data can be saved in an Excel compatible file. Sample identities can be retrieved from (and measurement results sent to) other databases using standard commands and tools. L&W Elrepho is the paper industry's own spectrophotometer. It measures color, brightness, opacity and whiteness of paper, paperboard, tissue, pulp, coating inks and fillers. The visual appearance for a printed product is of crucial importance and is expensive to achieve. The instrument automatically measures according to the conditions specified by the user, e.g. D65-illuminant, C-illuminant, or a 420nm cut-off filter.

### Benefits

- Easy to operate due to measurement table and optimized measurement program for routine testing
- One calibration for all filter conditions
- Different apertures included for measurements on small surfaces
- Fast measurement sequences with different UV-settings
- Residual ink evaluation with ERIC and INGEDE method
- Complies with ISO 2469, diffuse illumination and 0 (zero) degrees observation
- Measures whiteness and brightness at D65 and C-illuminant

# Effective Residual Ink Concentration (ERIC) measurements

Residual ink measurements of recycled pulp and paper are made on a sheet and opaque pad according to the ISO 22 754 and TAPPI T 567 standards respectively. This measurement can alternatively be made on an opaque pad only. This latter method is not standardized. An alternative is to measure the ink elimination between two process stages with the INGEDE method.

#### **Graphic presentations**

The program features a number of ways to display the results graphically. The trend diagram is used to monitor the production over a longer period, while the L\*a\*b\* plot shows the color coordinates for a series of samples. The reflectance curve provides important information about color dyeing and the fluorescence of the sample.

# Traceable calibration

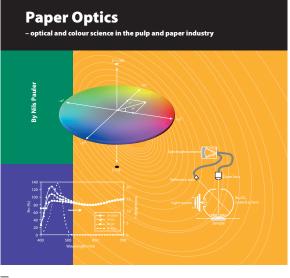
L&W Elrepho comes with traceable calibration in accordance with the ISO's hierarchy for photometric calibration and UV calibration at level C and D65. Working standards and a delivery certificate are included. The software has an easy function for checking the calibration, or making a new calibration, when necessary. A large number of reference and working standards with target values can be stored.

# A complete system

The delivery includes L&W Elrepho spectrophotometer, L&W Color-Brightness software, PC and the accessories necessary for checking the calibration. Elrepho comes in a standard version with a measurement table for fast sample handling and can also be supplied without the measurement table, which can be useful when measuring on fillers, for example.



Accessories, such as working standards, fixtures and measurement apertures.

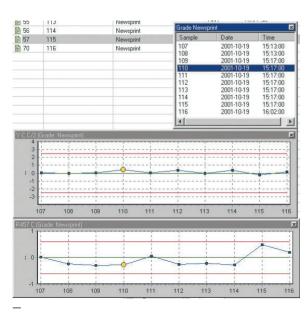


PAPER OPTICS (by Prof. Nils Pauler) gives valuable knowledge regarding the measurement of optical properties of paper.

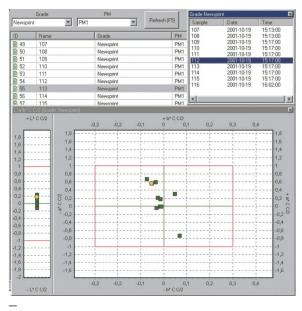
#### L&W Elrepho report examples

Deta	Detailed Report 2001-12-21 100 L&WColour Brightness									
ID	Туре	Group	Source	Date	Time	Samp	ple	Grade		
57	Development	1	PM1	D1-1D-19	15.17	115		Newsprint		
No.	Property			Mean	Std.D	lev.	Count	min	max	
6 87,66	L* C C/2			82,66	0.00		1	82,66	82,66	
14 0,73	a* C C/2			0,25	0,	DD	1	0,25	0,25	
22 9,04	Ь* С С/2			9 <sub>0</sub> 4	0,	00	1	9 <sub>0</sub> 4	9,04	
еі,53 36	Y C C/2			61,53	0,	00	1	61,53	61,53	
64 ادردا	CIE W 420 C/2			15,31	0,	00	1	15,31	15,31	
66 14,33	CIE W C C/2			14,55	0.00		1	14,55	14,55	
70 -0,77	CIE Flour C C/2			-0,77	0.00		1	-0,77	-0,77	
72 53,04	R457 420			53,04	0,	00	1	53,04	53,04	
74 52,91	R457 C			52,91	0,	00	1	52,91	52,91	
76 -D,13	R457 Flour C			-0,13	0,	DD	1	-0,13	-0,13	

The measurement results are presented on the screen as a test report...



... or as trend graphs...



# DEFINITIONS

The spectrophotometer has a diffuse illumination of the sample and an angle of observation of 0 degrees. The instrument's other details are specified in ISO 2469 (Annex A).

The diffuse reflectance factor is the ratio between the quantity of light that is reflected by a test piece and the quantity of light that is reflected by the perfect reflecting diffuser. The ratio is expressed as a percent- age. The measurement is performed with a spectrophotometer calibrated according to ISO 2469 (Annex B).

Brightness (diffuse blue reflectance factor) is the intrinsic factor calculated with a weighting function with an effective wavelength of 457 nm and a width at half height of 44 nm according to ISO 2470 Annex A, table 1. The incident light must be set to UV-level C or UV-level D65.

The opacity is the ratio between the reflectance factor for a specific sheet of paper, measured over a black surface and the reflectance factor for an opaque pad of the same test piece. Opacity is expressed as a percentage. Color is the test pieces L\*, a\* and b\* values determined according to the CIE 1976 system.

The measurement is performed either at C/2°, D65/10° or D50/2° illuminant/observer.

The light scattering coefficient is a measure of the test piece's ability to disperse light, and thereby contribute to the opacity of the test piece.

The light absorption coefficient indicates the test piece's ability to absorb light, and thereby appear darker.

Whiteness is a measure of the white appearance of a paper sample. By calculation the observer's visual perception of this whiteness is simulated. The whiteness is measured at D65/10° or C/2° illuminant/ observer. The whiteness is calculated according to the CIE or Ganz-Griesser method.

... or as L\*a\*b\*-plots

Alternatives	al specifications – L&W Elrepho, code 071 Exives code 071 (with measurement table), code 071E (with measurement table, with ERIC), code 070 (without measurement table, without ERIC), code 070E (without measurement table with ERIC), all with or without PC								
Inclusive	L&W Color-Brightness software, PC, working standards, apertures								
Measurement									
Photometric range	0-200 %								
Repeatability	< 0.01 $\Delta$ E CIELAB units on white ceramic tiles								
Reproducibility	< 0.25 $\Delta$ E CIELAB units (average) on NCS color samples								
Instrument									
Spectral range	360–700 nm								
Reporting range	400–700 nm a	400–700 nm adjustable to 360–700 nm							
Measurement geometry	d/0°, according	d/0°, according to ISO 2469							
Measuring principle	SP 2000 dual-b	SP 2000 dual-beam monochromator with 2 × 256 diodes in 2 nm intervals							
Apertures		Standard 34 mm. Alternatively 9 mm or 6.6 mm. Automatic focus on the test area with 30 m 5 mm or 2.5 mm diameter. Optional 18 mm aperture with 16 mm test area diameter							
Bandwidth	10 nm								
Light source	Pulsed xenon la	Pulsed xenon lamp, D 65 – filtered							
Measurement time	4–20 s, depend	4–20 s, depending on the type of measurement							
Filters	395 nm and 42	395 nm and 420 nm (UV cut-off), automatically selected from the program							
UV level	D65 and C, aut	D65 and C, automatically controlled from the program after calibration							
Software									
Operating system	Microsoft Wind	Microsoft Windows							
User program	L&W Color-Brig	L&W Color-Brightness measurement program specially developed for L&W Elrepho							
Functions	Overview, cont	Overview, control, identification, measurement, reporting, data output							
Help functions	Calibration, ca	Calibration, calibration control, grade settings, calculated properties							
Illuminant/Observer	D65/10°, C/2°,	D65/10°, C/2°, A/10°, D50/2°, F11/10°							
Calibration		Commands for photometric and UV calibration. Calibrations and working standards with target values can be stored							
Data output	L&W Autoline and Excel-compatible								
Tabular reports	Test report	Test report							
Graphical reports	Reflectance fa	Reflectance factor, opacity, scattering, absorption, trend, L*-a*-b*							
Properties	65-Brightness	X, Y, Z, L*, a*, b*, x, y, Rx, Ry, Rz, CIE Whiteness/Tint-D65 resp. C, Fluorescence, ISO Brightness 65-Brightness, Yellowness, Opacity, Transparency, K/N-value, IE, Residual ink, DW, pe, s, k, sR457, kR457, Metamerism, ΔE and others							
Installation requirements									
Power	400 W	400 W							
Instrument air	> 0,5 MPa (70 p	> 0,5 MPa (70 psi) (not 070)							
Air consumption	0.2 m³/h (0.1 ft	0.2 m³/h (0.1 ft³/min) NTP (not 070)							
Dimensions	Instrument PC/Screen	0.4 × 0.5 × 0.6 m /16 × 20 × 24 in 0.6 × 0.6 × 0.5 m / 24 × 24 × 20 in	Volume	0.4 m³ / 14 ft³ 0.4 m³ / 14 ft³					
Net weight	Instrument PC/screen	26 kg / 57 lb 12 kg / 27 lb	Gross weight	50 kg / 110 lb 32 kg / 71 lb					
Applicable standards									

ISO 2469/2470/2471/5631/9416/11475/11476/12625-7/12625-15/22754/22891 SCAN G5/P3/P8/P66/P71/P 72

TAPPI T 519/525/527/560/567

ABB AB / Lorentzen & Wettre P.O. Box 4 SE-16493 Kista Sweden Tel: +46 8 477 90 00 The information provided in this data sheet contains descriptions or characterizations of performance which may change as a result of further development of the products. Availability and technical specifications are subject to change without notice. Copyright© 2020 ABB. All rights reserved.