PULP AND PAPER

L&W Elrepho

Lorentzen & Wettre Products | Paper testing

L&W Elrepho is the paper industry's own spectrophotometer. It measures colour, 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 420 nm cut-off filter.

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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 Colour-Brightness software, is optimized for shift testing and has complete user interfaces for identification, measurement, and reporting. Grades with limit values 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.

Benefits
- Easy to operate due to measurement table and optimized measurement program for routine testing
- One calibration for all filter conditions
- Different apertures include 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

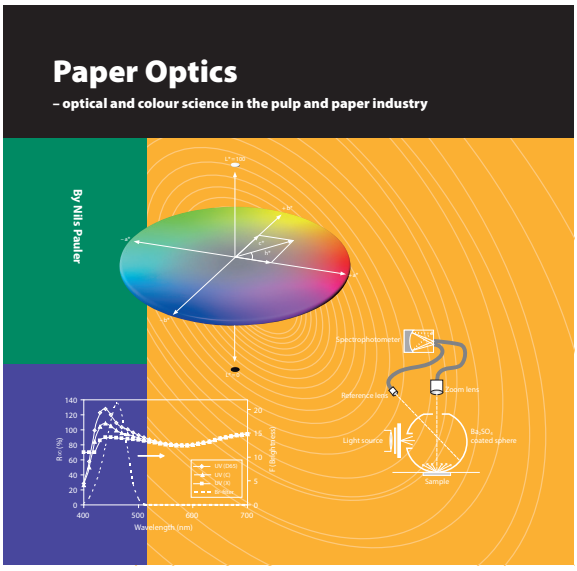
Measures effective residual ink concentration, ”ERIC”, of recycled pulp and paper
Residual ink measurements of recycled pulp and paper are made on a sheet and opaque pad according to the ISO 22 754 and TAPPI T 567 standards respectively. This measurement can alternatively be made on an opaque pad only. 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 colour coordinates for a series of samples. The reflectance curve provides important information about colour 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 Colour-Brightness software, PC, printer and the accessories necessary for checking the calibration. Elrepho comes in a standard version with a measurement table for fast sample handling, but can also be supplied without the measurement table. Elrepho without measurement table is useful when measuring on e.g. fillers.

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

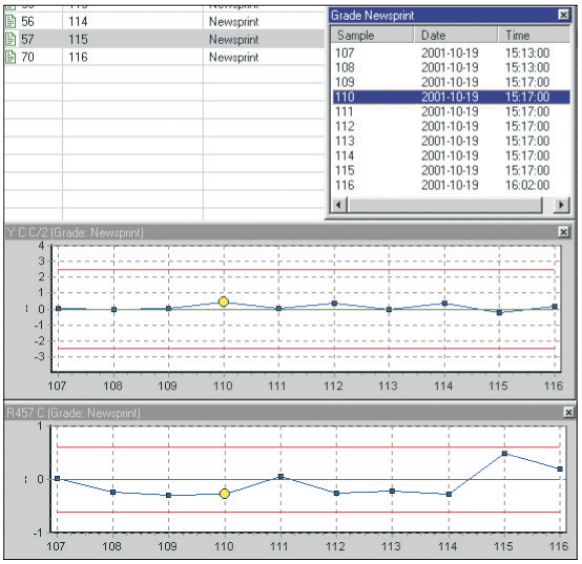
Detailed Report 2001-12-21 10:09:21

L&W Colour Brightness

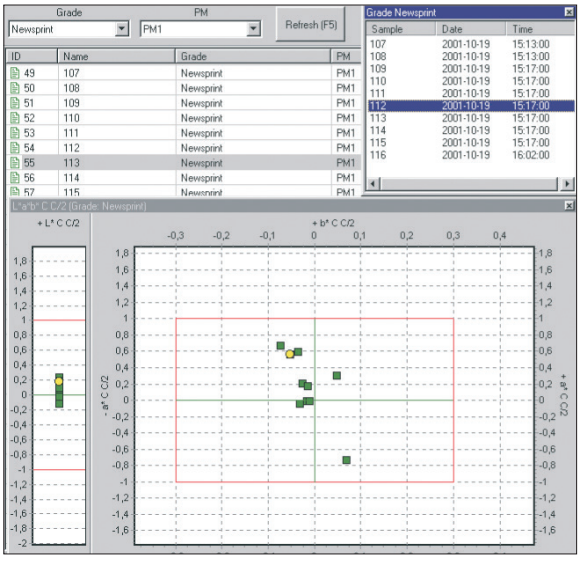
ID	Type	Group	Source	Date	Time	Sample	Grade
57	Development	1	PM1	01-10-19	15.17	115	Newsprint

No.	Property	Mean	Std.Dev.	Count	min	max
6	L* C C/2	82,66	0,00	1	82,66	82,66
14	a* C C/2	0,25	0,00	1	0,25	0,25
22	b* C C/2	9,04	0,00	1	9,04	9,04
36	Y C C/2	61,53	0,00	1	61,53	61,53
64	CIE W 420 C/2	15,31	0,00	1	15,31	15,31
66	CIE W C C/2	14,55	0,00	1	14,55	14,55
70	CIE Flour C C/2	-0,77	0,00	1	-0,77	-0,77
72	R457 420	53,04	0,00	1	53,04	53,04
74	R457 C	52,91	0,00	1	52,91	52,91
76	R457 Flour C	-0,13	0,00	1	-0,13	-0,13

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



… or as trend graphs…



… or as L*a*b*-plots.

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 percentage. 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.

Colour 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.

Technical specifications – L&W Elrepho, code 071				
Alternatives	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/printer			
Inclusive	L&W Colour-Brightness software, PC, laser printer, working standards, apertures, black cavity, and cables			
Measurement				
Photometric range	0–200 %			
Repeatability	< 0.01 ΔE CIELAB units on white ceramic tiles			
Reproducibility	< 0.25 ΔE CIELAB units (average) on NCS colour samples			
Instrument				
Spectral range	360–700 nm			
Reporting range	400–700 nm adjustable to 360–700 nm			
Measurement geometry	d/0°, according to ISO 2469			
Measuring principle	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 mm, 5 mm or 2.5 mm diameter. Optional 18 mm aperture with 16 mm test area diameter			
Bandwidth	10 nm			
Light source	Pulsed xenon lamp, D 65 – filtered			
Measurement time	4–20 s, depending on the type of measurement			
Filters	395 nm and 420 nm (UV cut-off), automatically selected from the program			
UV level	D65 and C, automatically controlled from the program after calibration			
Software				
Operating system	Microsoft Windows			
User program	L&W Colour-Brightness measurement program specially developed for L&W Elrepho			
Functions	Overview, control, identification, measurement, reporting, data output			
Help functions	Calibration, calibration control, grade settings, calculated properties			
Illuminant/Observer	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			
Graphical reports	Reflectance factor, opacity, scattering, absorption, trend, L*-a*-b*			
Properties	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			
Instrument air	> 0,5 MPa (70 psi) (not 070)			
Air consumption	0.2 m^3/h (0.1 ft^3/min) NTP (not 070)			
Dimensions	Instrument Printer PC/Screen	0.4 × 0.5 × 0.6 m /16 × 20 × 24 in 0.3 × 0.3 × 0.3 m / 12 × 12 × 12 in 0.6 × 0.6 × 0.5 m / 24 × 24 × 20 in	Volume	0.4 m^3 /14 ft^3 0.2 m^3 / 7 ft^3 0.4 m^3 / 14 ft^3
Net weight	Instrument PC/printer/screen	26 kg / 57 lb 41 kg / 90 lb	Gross weight	50 kg / 110 lb 61 kg / 134 lb
Applicable standards				
PAPTAC E1, E2 DIN 53 145/53 146/53 147/54 500 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

abb.com/pulpandpaper

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