

# Laboratory Spectrophotometer ERX30 for High-Visibility Clothing as in EN 471

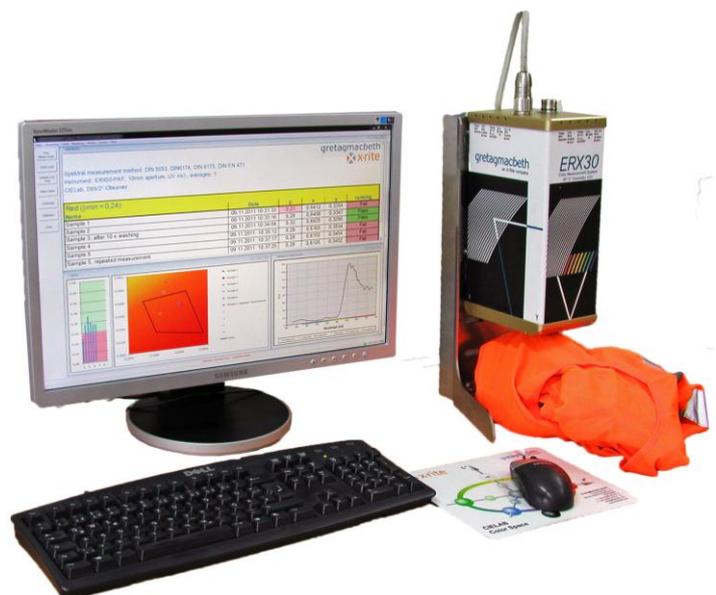
Spectral color measurement 45°:0° geometry  
(CIE Standard) and with calibrated UV content

## Advantages of Color Measurement

- ✓ Good correlation with average visual color difference perception (45°:0° geometry)
- ✓ Objective figures, no guess work
- ✓ Documentation of the production (ISO 9000)

## Special advantages ERX30

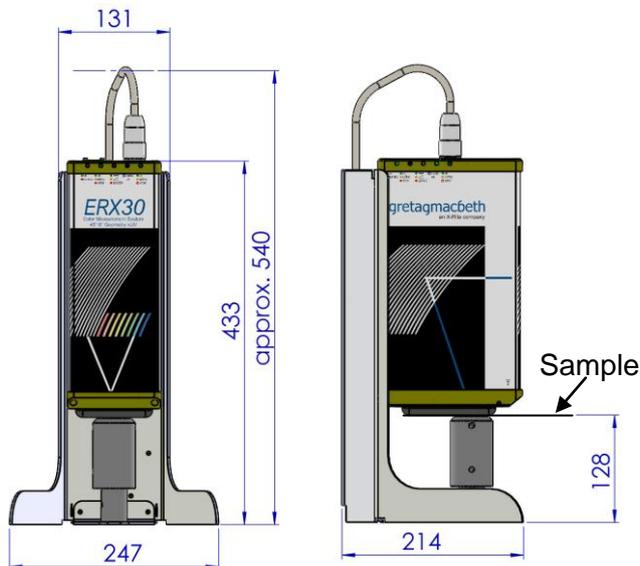
- ✓ Conform to EN471: High-visibility warning clothing for professional use – Test methods and requirements.
- ✓ Clear pass / fail decisions and display of results in ESWin software
- ✓ UV content can be adjusted to D65
- ✓ Direct display of color indices x, y and luminance factor ( $\beta$ -value) numerically and in a chart
- ✓ Direct pass / fail calculation
- ✓ Easy measurement one layer against a black hole
- ✓ Excellent measurement of results with real spectral resolution of 1 nm.
- ✓ Excellent long-term stability because of reflectance and wave length calibration
- ✓ Excellent short term stability because of real dual beam measurement
- ✓ External calibration necessary only every 4 weeks



## Functional description ERX30

The ERX30 is a compact spectrophotometer with the standardized geometry  $45^\circ$ circular: $0^\circ$ .

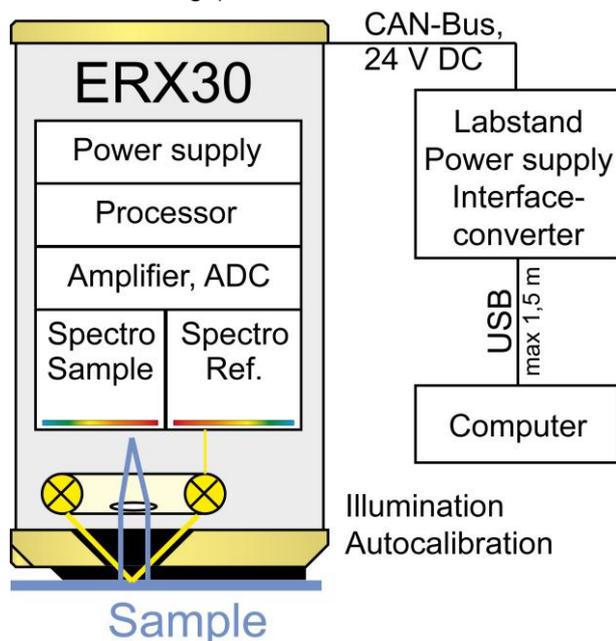
The sample is measured from the bottom with direct contact to the instrument (picture 1).



Picture 1 Measurements

For a measurement the sample will be illuminated by white light (Xenon flash lamp, daylight) and light without UV component under  $45^\circ$ circular for approx. 1 / 1000 sec. Vertical to the sample's surface (under  $0^\circ$ ) the reflected light will be collected and guided to a high resolution spectrometer (picture 2).

Simultaneously with the sample measurement a reference measurement of the lamp will be taken with a second high resolution spectrometer (full dual beam design).



Picture 2: Function blocks in the ERX30

In both spectrometers the optical measurement signals will be separated into 401 different wavelength signals via corrected holographic concave gratings and measured via 401 photoelectrical sensors. The result is a true 1 nm spectral measurement resolution.

The measurement signals will be amplified and digitised with high resolution. A fast processor calculates corrected spectral reflectance data.

These 401 reflectance results (from 330 nm to 730 nm) are the basis for all further colorimetric calculations for any possible illuminant and observer (e.g. CIE Lab data for illuminant D65 /  $10^\circ$  observer or illuminant C /  $2^\circ$  observer or others).

The automatic internal calibration of the system also includes automatic wavelength calibration for excellent measurement accuracy and long-term stability. The calibration can be verified by measuring a known, colored sample. Calibration of the UV part of the lamp will be checked with a brightened white standard. This guarantees high and reproducible measurement accuracy and stability.

Control over the color measurement system ERX30 is done via USB interface by a computer (PC); the measurement data will be transmitted to the computer.

## Typical Applications

The spectrophotometer ERX30 is well suited for all high visibility clothing, corresponding to EN 471. The sample is measured in a single layer over a "black hole" to have no reflectance from the background. The special ESWin software calculates the luminance factor as well as the x,y coordinates, for D65,  $2^\circ$  observer. All values are displayed numerically and in a graph for easy visualisation. Other coordinates (e.g.  $L^*$ ,  $a^*$ ,  $b^*$ ) and light conditions (D65, C, A, F11,  $2^\circ$  and  $10^\circ$  observer) are also available for measurements of non-fluorescent colors.

This guarantees an excellent color communication between clothing manufacturers, laundry services and their customers. The ERX30 is the ideal complement in the laboratory to the ERX50 In-Line system.

## References

The spectrophotometer family ERX is successfully working for the measurement of:

- ✓ Paper
- ✓ Textiles
- ✓ Fibres
- ✓ Plastic
- ✓ Powders
- ✓ ...

## Special advantages of the ERX30

- ◆ **Precise spectral color measurement**
  - ✓ 45°:0°, Xenon flash lamp as required in EN471.
  - ✓ Also critical colors and demanding applications can be measured with high quality based on the excellent spectral resolution of 1 nm.
  - ✓ The wide spectral range of the ERX30 from 330 nm to 730 nm gives excellent information.
  - ✓ The sample illumination has adjustable UV and non-UV settings to set the illumination to D65.
  - ✓ Good correlation with the human vision.
- ◆ **Excellent short and long term stability**
  - ✓ Precise color measurement because of automatic internal calibration.
  - ✓ Absolute automatic wavelength calibration with highest precision (0.07 nm). Therefore very good long-term stability and precision.
- ◆ **Easy to use**
  - ✓ A handy sample holder fixes the textile at the measurement aperture.
  - ✓ The unit is robust, and has long lifetime.
  - ✓ The long-life Xenon flash lamp (1 year warranty), typically lasts several years and is a low-price item.
- ◆ **Our ER product family has been successfully measuring in hundreds of installations since 1987**
  - ✓ By continued development and improvements our customers have a proven system with the latest technology.
  - ✓ The current model is the fourth generation and has further improved technical data.
  - ✓ Development and production of the ERX spectrophotometer family in Germany.
  - ✓ Installations worldwide.



X-Rite group supplies:

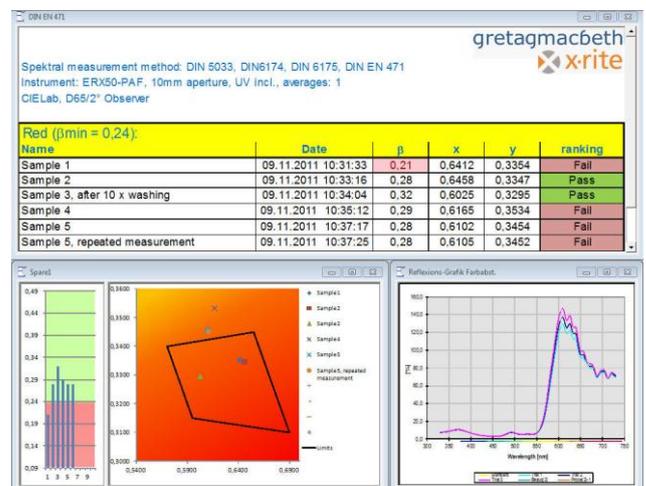
- ✓ **Color data products (portable, benchtop, In-Line)**
- ✓ **Software for quality control, color matching and Closed Loop Color Control**
- ✓ **Light booths for visual inspection**
- ✓ **Densitometers, color management systems**

## ESWin software for easy visualisation

The standard program ES15Win includes the complete user interface, control of color measurement, statistical measurement control, colorimetry, presentation of measurement results, printouts, storage (MS Access), management of data, diagnostic, data export (MS Excel) etc.

### **User Interface**

In user specific profiles standard measurement procedures are stored. Each profile can have its own settings like language, averaging and the color values which should be measured. Configurable buttons allow easy user operation. The special selection menu is password protected to avoid unwanted changes.



Picture 3: Display for a fluorescent red

### **Monitor display**

The measurement results are displayed numerical and graphical as color plot and / or reflectance curve. Pass / Fail rankings are made based on the EN 471 Standard.

The type of display can be easily customized (MS Excel).

### **Printout**

For the documentation of the results there are different printouts, also configurable to the needs of the customers (MS Excel).

### **Color metrics**

CIELAB ( $L^*a^*b^*$ ,  $L^* C^* h^*$ ),  $\beta_{xy}$  CIE Luv, XYZ, CMC (1:1, 2:1), ISO 105, DIN 99  
Illuminants: A, C, D65, F11 (=TL84)  
Observers: 2°, 10°

Metamerism (DIN 6172)

# Technical Data ERX30 and Laboratory Stand

## Color sensor ERX30

Measurement in the laboratory; not sensitive to ambient light; automatic internal calibration and measurement; standardized measurement geometry 45°: 0°; robust construction; high accuracy and precision; built-in diagnostics with service memory (remote diagnostic).

Illumination	45° circular
Flash lamp 1	D65 approximated, UV adjustable
Flash lamp 2	no UV, wavelength limit typ. 420 nm
Measurement	0°
Spectral measurement area with UV	330 nm ... 730 nm
Spectral resolution (optical !)	1 nm
Absolute wavelength accuracy with internal automatic control	better than 0,1 nm
Dual beam (sample and reference channel)	simultaneous
Measurement time	20 ms
Measurement area	12 mm diameter
Measurement distance	0 mm, sample has to touch the instrument
Measurement interval	3 sec min.
Reproducibility (standard deviation for repeated difference measurements of the white standard)	dE* < 0,1
Interinstrument agreement between ERX systems (average color difference for measurement of the 12 BCRA standards from production average)	dE* < 0,3
Size	approx. 170 x 110 x 295 mm <sup>3</sup>
Weight	approx. 5 kg
	CE Mark
Calibration (traceable to PTB)	instrument specific white standard
Spectral data directly from the measm. head (330nm - 730nm)	measured in steps of 1 nm
More data will be available via the computer (see evaluation programs ESWin)	
Ambient temperature:	max. 40°C

## Laboratory stand with power supply and interface converter

Input Voltage	115V/230V AC, +25% / -15%, 45-440 Hz
Power consumption	max. 100 VA, typ. 10 VA
USB interface to computer	USB 2.0, typ. 1.5 m, max. 3 m cable
Pressure of sample holder to aperture	ca. 4 N
Black background reflection	<<0.5%
Size approx.	265 x 265 x 135 mm <sup>3</sup>
Weight including ERX30	approx. 8.5 kg
	CE Mark



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ERX30 E EN 471 E Brochure.doc  
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