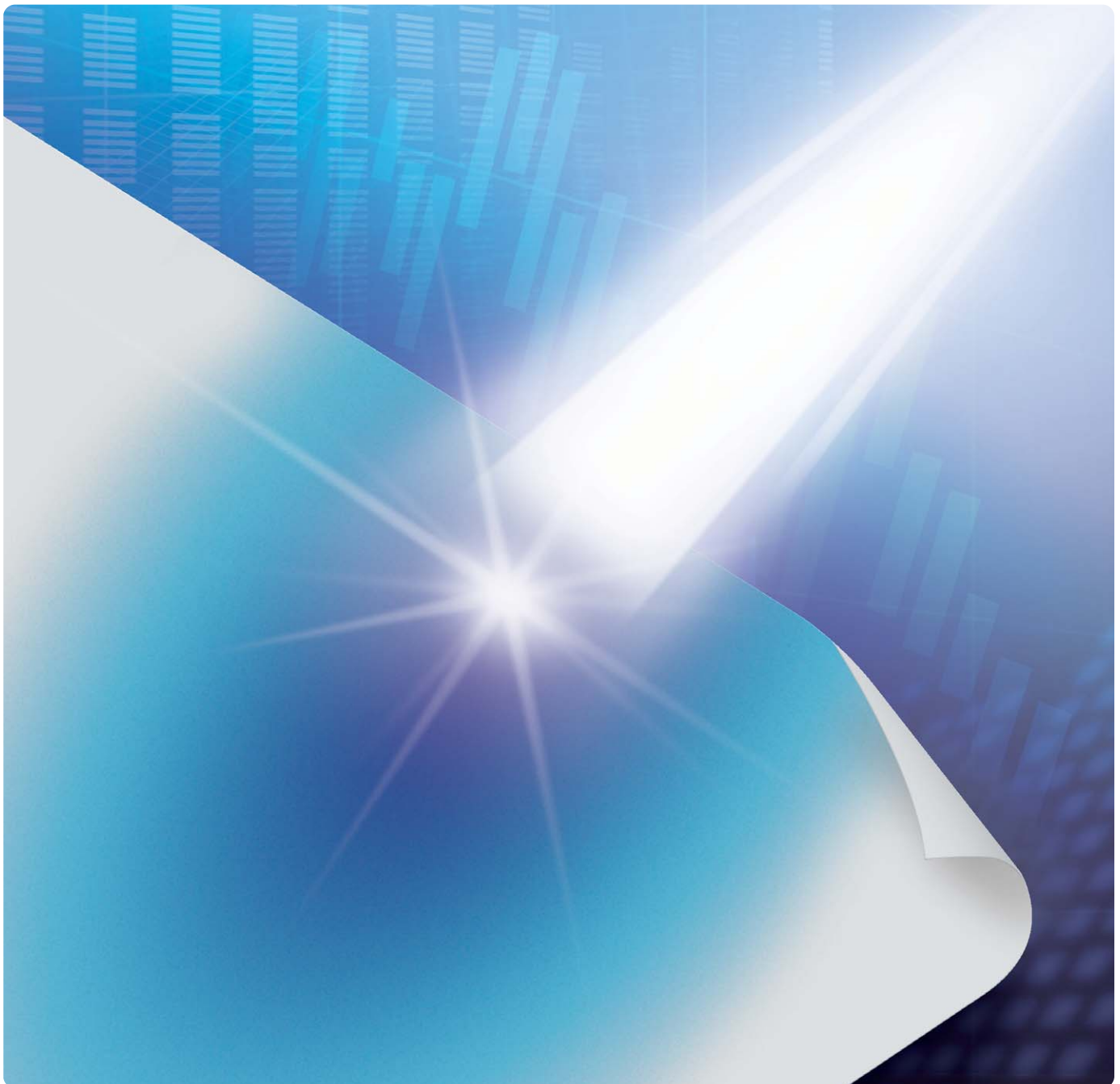# FUJIFILM

UVSCALE

NEW UVSCALE

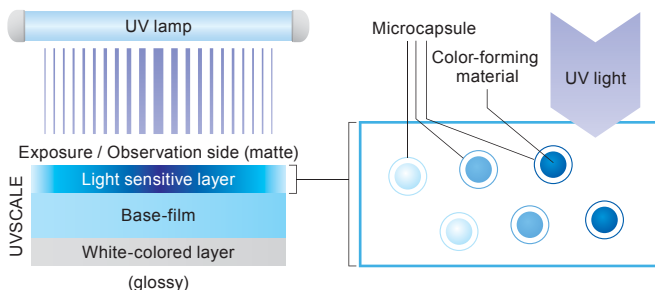### Visualizes UV light amount distribution by color density

Ultraviolet Light Amount Distribution Measurement Film
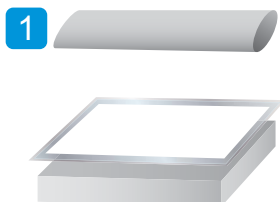
Structure and How it works

■ Structure

One side of the base film has a UV light sensitive layer, with the opposite side having a white-colored layer. The light sensitive layer changes color according to the amount of UV light it receives, so the amount of light distributed on the exposed surface is easily seen by observing a light sensitive layer and white-colored layer are attached to the base. Since the color density of the white-colored layer corresponds to the amount of UV light received, the light amount distribution on the light receiving surface can easily be investigated.
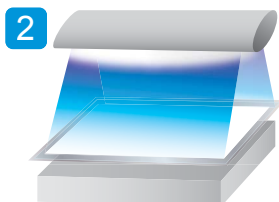
UV lamp

Exposure / Observation side (matte)

| UVSCALE | Light sensitive layer |
| Base-film |
| White-colored layer |

(glossy)

Microcapsule
Color-forming material
UV light

■ Principle

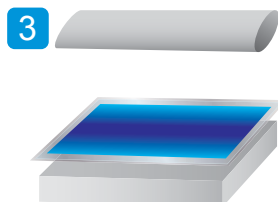The color forming material in the microcapsules reacts to the UV light and changes color.
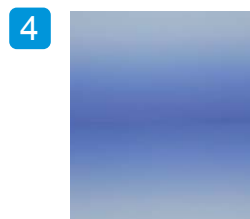
How to Use

1 After cutting UVSCALE to the required shape (length), place it on the location that you want to measure.

2 Operate the equipment or device, and expose UVSCALE to UV light.
* The side of UVSCALE with matt surface should be exposed.

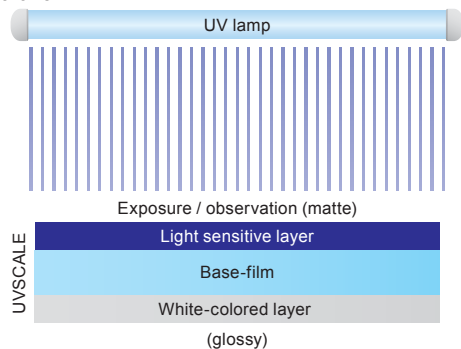**3** The UVSCALE changes color in accordance with the amount of light.

4 Remove UVSCALE, and determine the distribution of light by observing the color distribution.
* Use the matte side for observing.

Reducing light Film

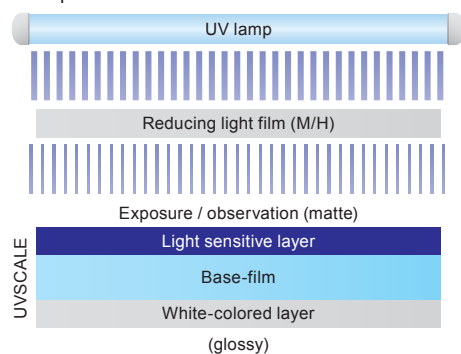In order to cover a range of accumulated light amount, we offer the product in three types.

❶ Mono sheet type (L)
For low levels of light, UVSCALE can be used alone.

UV lamp

Exposure / observation (matte)

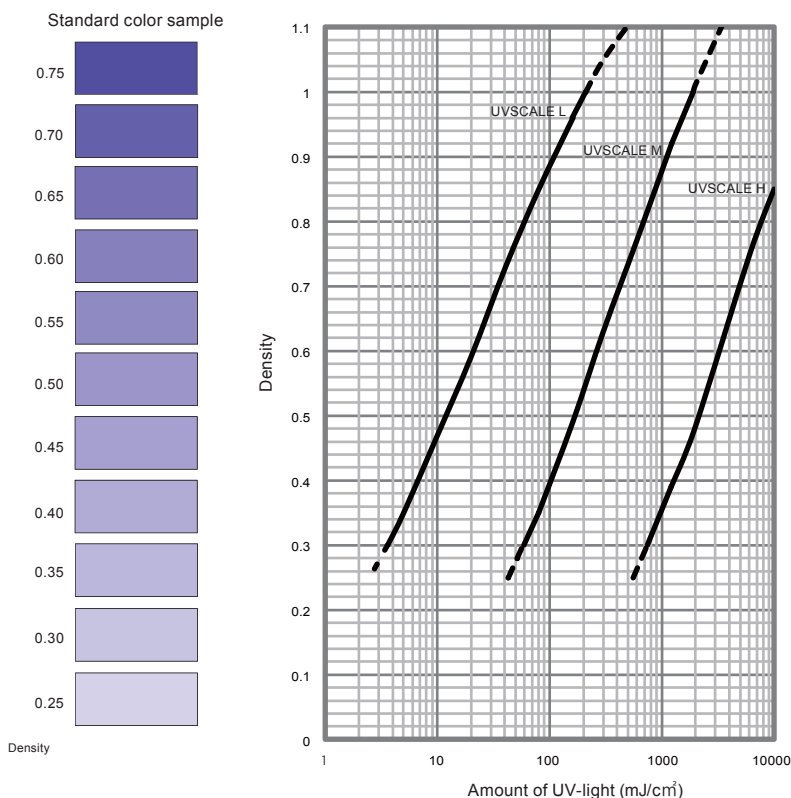| UVSCALE | Light sensitive layer |
| Base-film |
| White-colored layer |

(glossy)

❷ Two sheet types (M/H)
For medium to high levels light, use UVSCALE M or H. These are two sheet types, where a reducing light film is placed over UVSCALE.

UV lamp

Reducing light film (M/H)

Exposure / observation (matte)

| UVSCALE | Light sensitive layer |
| Base-film |
| White-colored layer |

(glossy)

Standard Color Chart

[High pressure mercury lamp]

The following are color characteristics generated by a high-pressure mercury lamp. However, please note that these color characteristics are values generated by using FUJIFILM light source and devices, so there may be differences in color density for a given amount of light due to difference and variations in individual lamps or environment.

Standard color sample

Density
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25

Density (vertical axis) vs Amount of UV-light (mJ/cm²) (horizontal axis)

UVSCALE L
UVSCALE M
UVSCALE H

*1: Each density is the value measured by FUJIFILM. It is not a warranty of density level.
*2: The amounts of UV-light are values using a 365nm UV illuminometer.
*3: The solid lines on the graph show the recommended measurement range. The broken lines represent values that are not as precise as the solid lines and should be used as a reference only.
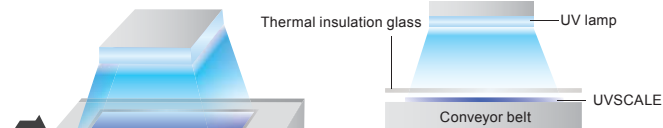*4: Standard Color Samples show the density range for visual evaluation.

Examples of Measurement

Touch Panels

Checking UV light distribution on a conveyer belt during the OCR attachment process

Challenges: 1

- An illuminometer requires measurements at a large number of points.
- It is not possible to check whether the UV light extends right to the edge of the conveyor belt.

Thermal insulation glass — UV lamp
UVSCALE
Conveyor belt

Results

Was able to check that radiation at the edge of the conveyor belt is weak.

Benefits

- Unevenness of UV exposure and decreases in the amount of light can be checked by observing the intensity of the color.
- Allows the height and position of UV lamps to be adjusted when equipment is installed.
- Allows checking of the time for replacing lamps.

Challenges: 2

- Cannot check for unevenness of UV exposure caused by multiple point light sources.

UV-LED lamp
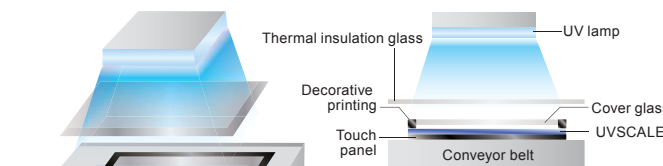UVSCALE
Conveyor belt

Results

Was able to check unevenness of UV exposure in areas where the light from point sources overlaps.

Checking UV light distribution between panels in the OCR attachment process

Challenges

- It is not possible to check whether the areas below the cover glass decorative printing and touch panel metal lines are being suitably exposed to UV light.
- Because the illuminometer will not fit into the space between panels, measurements cannot be made.

Thermal insulation glass — UV lamp
Decorative printing
Touch panel — Cover glass
UVSCALE
Conveyor belt

Results

Was able to check that the UV exposure in the area surrounding the attached surface is weak.
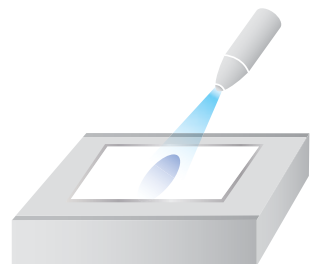
Benefits

- By observing the intensity of color, allows checking of whether the whole surface between panels is suitably exposed to UV light.
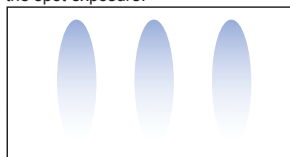
Spot Exposure

Challenges

- Illuminometer cannot measure UV exposure coverage of diagonal rays.
- The extent and strength of UV exposure is not known.
- Measurements cannot be performed on curved surfaces.

Results

Was able to check the extent and strength of UV exposure provided by the spot exposure.
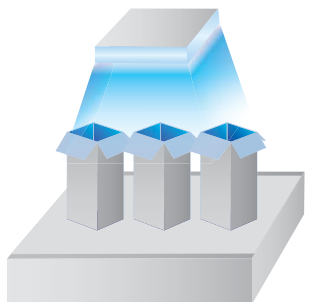
Benefits

- Since decreases in the amount of UV light can be identified from the intensity of color, the presence of dirt on the lamp and the period for lamp replacement can be determined.
- Allows the height and position of UV lamps to be adjusted when equipment is installed.

Food Packaging

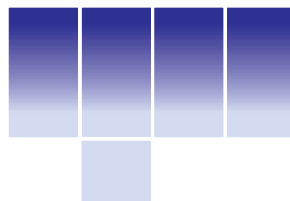### Checking of UV exposure in UV sterilization of drink cartons

Challenges

- Measurements cannot be taken of moving objects.
- It is difficult to measure the amount of light inside the drink cartons.
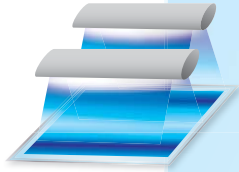
Results

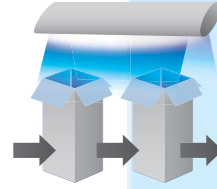Was able to check the unevenness of UV exposure inside the drink cartons.

Benefits

- Coverage and strength of exposure can be determined from the intensity of color.
- By attaching UVSCALE to a curved surface, the amount of light on a curved surface can be measured.
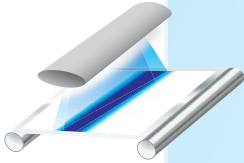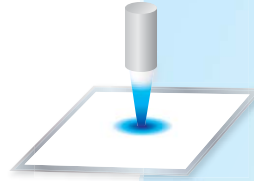
Example Applications

Attachment of LCD touch panels

Exposure of resists

Adhesion of hard disk function resin

UV sterilization of food packaging

Hardening of UV printing inks

Hardening of UV adhesives

Hardening of coating resins

Hardening of UV adhesives (spot)

Exposure of resists (direct drawing)

Specifications

Type	Product size		Light amount measurement range (mJ/cm^2)	Thickness	Classification
	Roll type	Sheet type			
UVSCALE L			4 – 60	0.1 mm	Mono sheet type
UVSCALE M	270 mm × 5 m	270 mm × 200 mm (5 sheets)	60 – 700	0.1 mm × 2	Two sheet type
UVSCALE H			700 – 6,000	0.1 mm × 2	Two sheet type

* Please note that these light amount measurement ranges are estimates using our own high pressure mercury lamps, and that these ranges will vary depending on the type of lamp used as a light source and on the ambient environment.

   Light amount measurement range: For color density 0.30-0.75 in the standard color sample

* Applies to wavelengths in the 200 to 420 nm range

■Roll type

■Sheet type

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