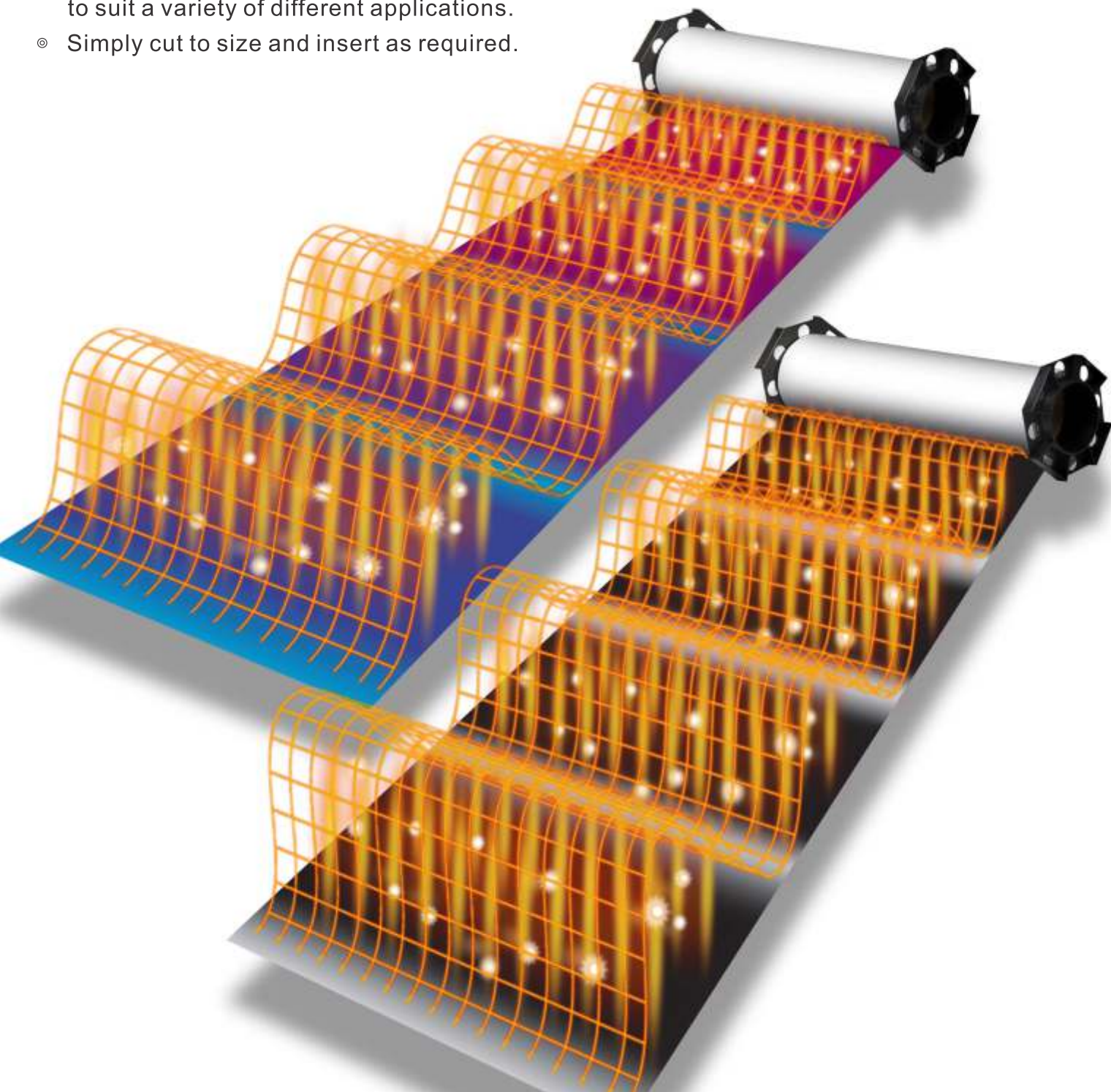


Heat Distribution Measurement Film **NEW THERMOSCALE**

THERMOSCALE is a revolutionary new film that enables anyone to measure heat distribution easily by observing the variation in density and hue.

- ⊙ Available in a wide range of temperatures from (80°C–105°C) to (150°C–210°C) to suit a variety of different applications.
- ⊙ Simply cut to size and insert as required.

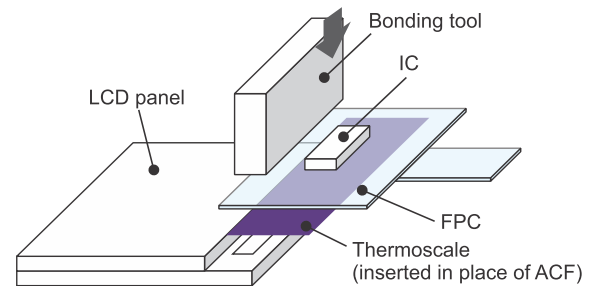


■ Typical applications of THERMOSCALE

THERMOSCALE 200C

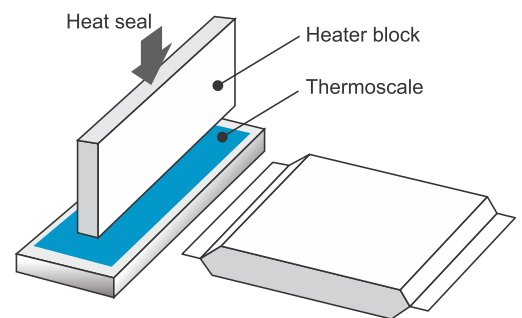
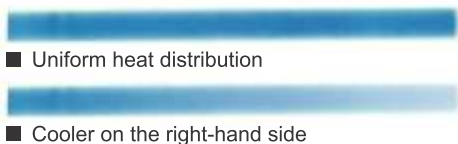
1 ACF compression bonding in LCD panels

In LCD panel production, ACF (anisotropic conductive film) is used to attach the driver IC by holding the part under pressure and applying heat via the bonding tool. If heat is unevenly distributed across the bonding surface (i.e., hotter in some places and cooler in others), the ACF may not bond properly. THERMOSCALE provides an easy-to-read visual map for evaluating the uniformity of heat distribution.



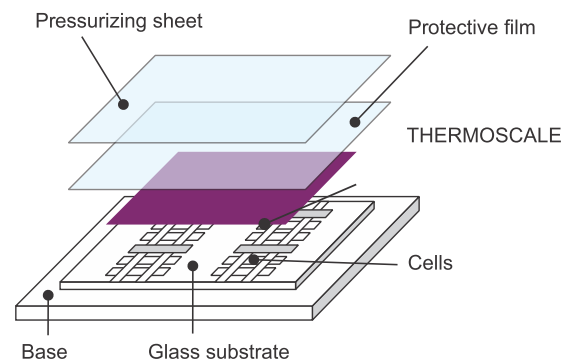
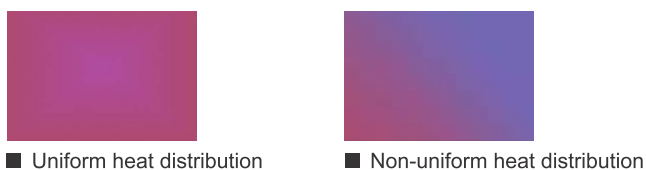
2 Heat-sealed packages

Heat sealers are commonly used to seal packages for foodstuffs, medical supplies and products such as Li-ion batteries. A heater block applies strong heat to the end of the package to seal the plastic. If heat is distributed unevenly across the heat seal surface or the heater block, or if the packaging is not heated sufficiently, the seal may not be formed properly. THERMOSCALE can be used to evaluate the quantity of heat applied to the package.



3 EVA bonding of solar panels

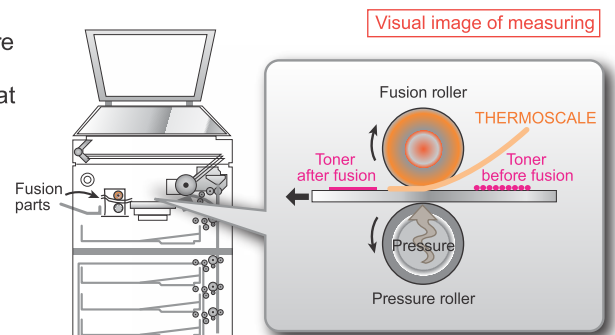
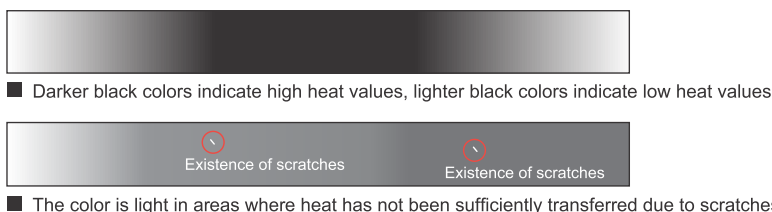
In solar panel production, the solar cells are sandwiched between the glass substrate and a protective film layer and bonded together with EVA resin in a vacuum laminator. If the heat distribution is not uniform, the EVA resin may be harder in some places and softer in others, affecting bonding performance. In some cases, the bond may hold initially but then degrade over time. Until now there has been no means of measuring heat distribution across the bonding surface. THERMOSCALE provides a simple way to check for thermal inconsistencies and prevents failure.



THERMOSCALE 100

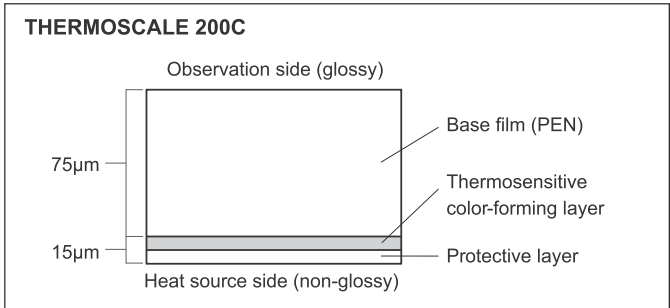
Copier: Heat fusion

In general laser copiers (multifunction printers) used in offices, fusion rollers—which are heated—use heat to melt toner and fuse it to paper to portray letters and pictures, etc. However, if heat is unevenly distributed or if there are scratches on the surface of the fusion roller, copying cannot be carried out properly. By using THERMOSCALE, you can determine if there are any heat irregularities or slight scratches on the surface of the fusion roller.



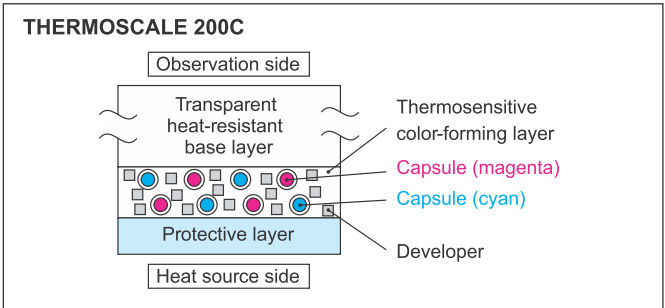
■ Structure

The base film is coated with a thermosensitive color-forming layer and a protective layer. This is the non-glossy surface that comes into direct contact with the heat source. The glossy side of the sheet is used to observe the color patterns that represent heat distribution.



■ How it works

Heat melts the developer and makes the microcapsule walls permeable, allowing developer to enter the microcapsules, where it reacts with the color-forming agent to produce color.



■ How to use THERMOSCALE

1

2

3

4

Cut a piece of THERMOSCALE film to the required shape/length and place it on or inside the equipment with the non-glossy side facing the heat source.

Operate the equipment in the normal manner to bring the THERMOSCALE sheet in direct contact with the heat source.

Color patterning is produced on the THERMOSCALE sheet.

Remove the THERMOSCALE sheet and observe from the glossy side. The color patterning indicates the heat distribution over the heating surface.

■ Features

THERMOSCALE 200C

The extent of color change depends on the temperature of the heat source and the contact time. A shorter contact time produces paler colors with a blue tint. As the contact time increases (at the same temperature), the colors become deeper and take on a red tint. Note that the color change is also influenced by factors such as the type of material on the opposite side (i.e., the non heat source side), thermal characteristics, contact pressure and air flow (see below).

	150	160	170	180	190	200	210	°C
Contact for 1 second								
Contact for 10 seconds								
Contact for 60 seconds								

*Note: The above sample colors were produced by Fujifilm under test conditions. Calibration should be performed under actual usage conditions to ensure temperature correspondence.

Recommended temperature range: 15°C-30°C Recommended humidity: 35% RH-80% RH

THERMOSCALE 100

	80	85	95	105	°C
Contact for 1 second					
Contact for 10 seconds					
Contact for 60 seconds					

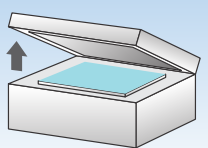
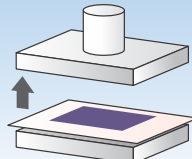
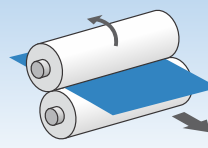
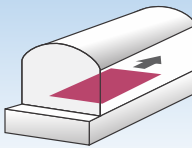
*Note: The above sample colors were produced by Fujifilm under test conditions. Calibration should be performed under actual usage conditions to ensure temperature correspondence.

Recommended temperature range: 15°C-30°C Recommended humidity: 35% RH-80% RH

Color of THERMOSCALE sheet turns black when coming in contact with the heat source. A shorter contact time produces paler colors. As the contact time increases (at the same temperature), the colors become deeper. Note that the color change is also influenced by factors such as the type of material on the opposite side (i.e., the non-heat source side), thermal characteristics, contact pressure and air flow (see below).

■ Uses

THERMOSCALE uses special technology that regulates color intensity and hue in accordance with heat value to generate a highly accurate depiction of heat values over a wide range. THERMOSCALE is ideal for applications involving analysis of heat distribution during press, roll, and laminate processes and within drying ovens.

Laminator	Press	Roll	Ovens
			
Printed substrates, solar panels, protective film laminating	ACF compression bonding, heat seals, Li-ion batteries, solar panels	Nip roll, calendar roll, printing roll, printer roll	Drying oven, baking oven, vacuum film production, measuring surface heat distribution on parts

■ Specifications

Product	Temperature range	Base layer	Thickness	Size	
				Roll Type (width × length)	Sheet Type (height × width)
THERMOSCALE 200C	150°C-210°C *1	PEN	0.09mm	270 mm × 5 m	270 mm × 200 mm (5 sheets)

* Actual temperature range depends on conditions of use including contact time, materials, pressure, and air flow. *1 Contact time = 5-20 sec *2 Contact time = 1-10 sec



Using film for simple measurements of pressure, heat, and UV light

The visualization of various distributions using film has become a reality through Fujifilm's technologies.




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