

# FUJIFILM THERMOSCALE

## Easy Made Surface Heat Flux Evaluation

For 20 years Dr. Müller Instruments distributes Fujifilm Prescale, the pressure measuring film for the determination of surface pressure.

Prescale today is in all sectors of industry a standard tool: from the mechanical engineering, automotive, pharmaceutical and paper industry to roll manufacturers. Dr. Müller Instruments markets, these pressure-measuring films as the largest distributor in Europe from the beginning.

With the new film "Thermoscale", a temperature measuring film, we are expanding our product range to include a film that does more than measure the temperature. Thermoscale measures the heat flow. A heat flux is composed of the parameters of temperature and time. At the same time, a uniform contact pressure must be ensured. Thus, the pressure measuring film in addition to the heat measured films is essential.

Dr. Müller Instruments offers the three types for the temperature range from 60 to 210°C. The resolution is less than 1 °C.



### **Applications**

The use of the heat distribution film Thermoscale varies similar to the Prescale pressure measuring film. Applications for sealing plastic bags, laminating, heat seals, PCB or solar panels, nip rollers or thermo printers are just some examples. Often it's about knowing not only the absolute heat flux, but especially to ensure uniformity in the area in order to avoid weak spots.

Below we present some examples in detail:

### **ACF Bonding:**

This is a typical process for the production of LCD screens or solar panels. The individual joints can be easily checked and uniformity is immediately visible. Thermoscale helps with the design of the equipment as well as in process control. The determination of the heat supply can therefore easily be optimized based on the parameters of temperature and time.

### **Laser copy machine and -printer:**

The thermo sensitive film can be an important tool in the development of the device. The fixing of the toner depends on the parameters heat roll diameter, rubber structure and hardness as well as along the temperature distribution.

The service can quickly check the function and even heat distribution of the heat roller.

### **Lamination:**

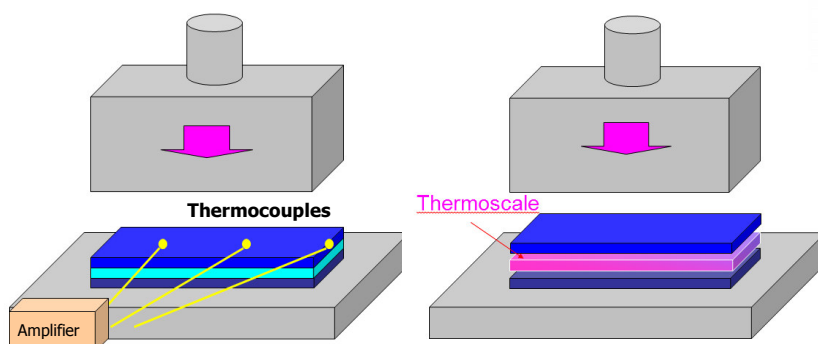
Here the heat flux can be simply represented by inserting the heat flux measuring film Thermoscale. The aim is to avoid cyclical and non-uniform heat distribution. Especially with roller systems a first investigation with Prescale is appropriate, because often the temperature of the rollers is even, but different gap widths along the roll leads to different local surface pressures and lead finally to different heat flux.

### **Sealing of sterile bags:**

Similar to laminating it is in sealing to ensure even heat distribution at the same uniform closing pressure of the sealing machine. The heat- and pressure-measuring films help ensure a secure seal. Regular checks are quickly and easily.

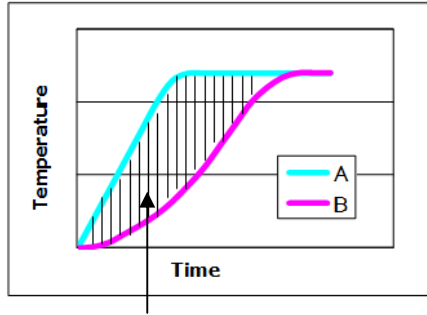
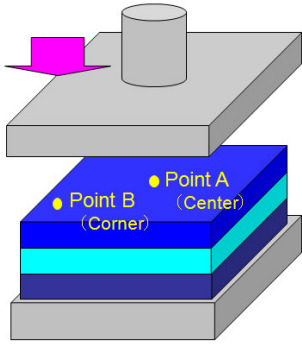
On the basis of the above examples it is clear how diverse the possibilities are. After a short time scale we therefore assume that the heat measuring films Thermoscale will be absorbed by the market as successfully as Prescale.

## **Advantages to Other Measurement Technologies**



### **Advantage against thermocouples**

- easy handling
- no time consuming measurement set up
- no power source
- identical heat conditions
- no contact disturbance by thickness of thermocouples



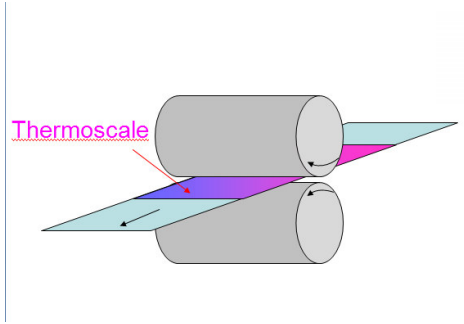
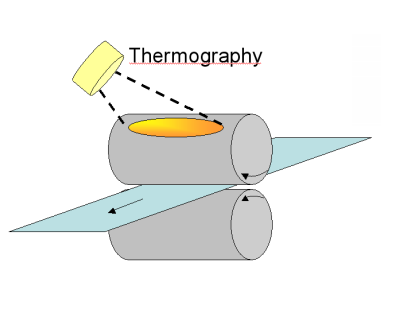
Heat Difference A-B

**Advantage against thermocouples**

- measuring heat flux in complete area not only in some spots
- same ultimate temperature but different heat value

**Advantage against thermography**

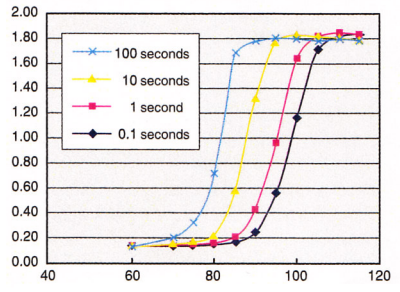
- easy handling  
no set up or power supply
- not only temperature measures but heat flux
- Measure the real heat distribution of target



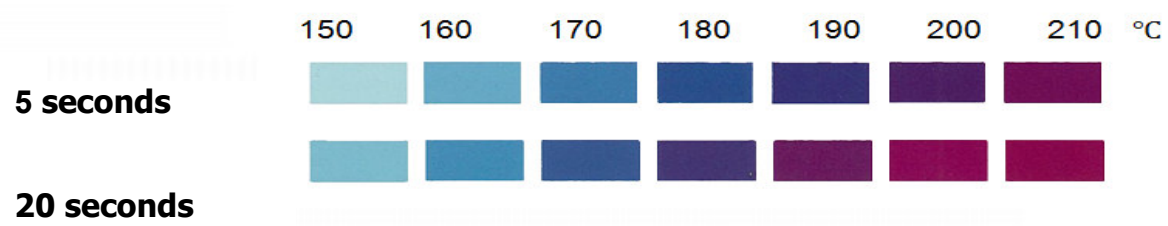
**Principle**

The 90 micron thick single temperature film may be similar used as the pressure sensitive film. Cut with scissors it is placed between the body to be tested.

Within the temperature sensitive film, microcapsules with colour and developer respond to the heat and discolour the film. The intensity of staining is proportional to the amount of heat flow. The heat flow is dependent on temperature and time. The requirement is, that the film is pressed evenly. This can be easily checked by using the pressure measuring film Prescale before the measurement.

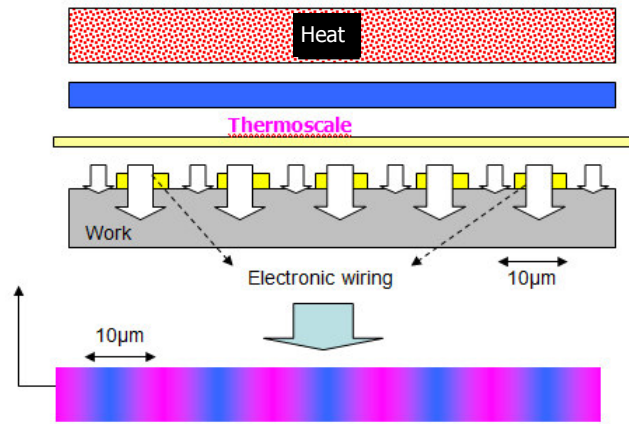


Thermoscale 100: Colour density vs. Temperature



The analysis is then visually compared with sample boards, Thermoscale200C

The resolution of the heat measuring film is approximately 1 °C and locally at about 10 microns. The contact duration is between 5 to 20 seconds. By prolonged contact the heat flow through the film will be higher.



Uneven heat transfer due to heat-absorbing traces

## **Measurement Range**

For the measurement range of 60 to 210 °C Dr. Müller Instruments provides three different heat flow films. The Thermoscale 100 for 70 to 105 °C, the Thermorex 150 for 100 to 150°C and the film 200C for 150 - 210 °C.

<b>Film Type</b>	<b>Layers</b>	<b>Temperature Range</b>	<b>Film Size</b>
Thermoscale 100	1 layer	70 – 105 °C	297 mm x 10 m
Thermorex	1 layer	100 – 150°C	25 sheets, 33 x 46 cm
Thermoscale200C	1 layer	150 – 210 °C (250°C)	270 mm x 5 m

The experiences with Thermoscale200C show that the range can be expended a little bit down to 135°C for very long durations and up to 250°C for very short applications.

## **Technical Data**

Temperature Range:	100: 70 to 105°C 150: 100 to 150°C 200C: 150 to 210 °C
Contact duration:	1 to 100 s
Film size:	100: 297 mm x 10 m 150: 46 x 33 cm, 25 sheets 200C: 270 mm x 5 m
Temperature resolution:	+/- 1°C
Local resolution:	10 µm
Material:	PEN
Film thickness:	90 µm

