

ITOFINISH PCM is a range of thermal accumulation finishes that utilise microencapsulated paraffin wax that helps regulate the temperature of treated fabrics to more closely maintain the desired temperature.

PROPERTIES

- **Appearance** : White Emulsion
- **Main Ingredient** : Micro-encapsulated paraffin wax.
- **Ionic Character** : Anionic
- **Solubility** : Soluble in water

CHARACTERISTICS

1. ITOFINISH PCM come in a range of finishes which will regulate to a range of temperatures.
2. ITOFINISH PCM repeatedly absorb and emit heat energy to help treated fabrics maintain the desired temperature.
3. ITOFINISH PCM is also available in the form of a viscous gel and powder

DISCLAIMER

The information herein offered is based on the best of our knowledge at present. However, we are not able to guarantee these matters, as the result of application may vary according to conditions adopted. Preliminary tests are, therefore, recommended in all cases. Please refer to MSDS regarding handling of the products.

APPLICATION

In Padding:

- ITOFINISH PCM : 50-200 g/l
- ITOBINDER PCM : 30-50g/l
- ITOSILICONE LJ88 : 10-20g/l (as required for handle)
- **Drying** : 100°C for 1-3 min.
- **Curing** : 150°C for 1-3 min.

In Exhaustion:

- **Set bath at 30°C with goods circulating @ a liquor ratio of 10:1**
- **Add 3% of Pre diluted ITOFIX EZF**
- **Raise to 50°C and run for 25 minutes**
- **Drain bath, fill and give a 2 minute rinse with cold water, then drain again**
- **Fill bath & raise to 50°C, add well dispersed 5-20% ITOFINISH PCM**
- **Run for 25 minutes**
- **Add well dispersed 3-% of ITOBINDER PCM (add softener as required)**
- **Run for a further 25 minutes**
- **Add softener as required in same or fresh bath.**
- **Run for a further 10 minutes if adding softener.**
- **Drain bath and unload**
- **Hydro extract goods**
- **Dry/Cure @ 150°C (temperature must not exceed 150°C)**

In Lavatec:

- ITOFINISH PCM : 5-20%
- ITOBINDER PCM : 3-5%
- ITOSILICONE LJ88 : 1-2% (as required for handle)
- **Temperature** : 40°C for 20 minutes
- **Drying** : 100°C for 1-3 minutes
- **Curing** : 150°C for 1-3 minutes.

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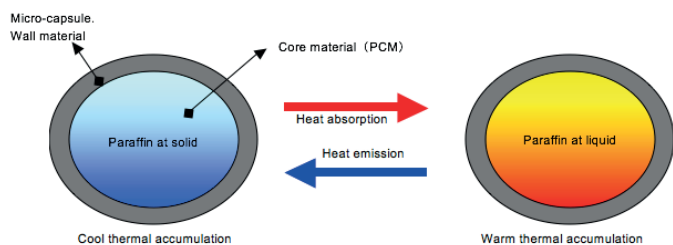
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APPENDIX

The advantage and character of Thermal accumulation micro-capsule is that it can repeatedly absorb and emit heat energy. The paraffin in the micro-capsule absorbs and emits “the potential heat energy” when it inverts from solid to liquid phase and from liquid to solid phase. The paraffin absorbs the “heat of fusion”, when solid phase melts into liquid phase by heating. The paraffin emits the “heat of solidification”, when liquid phase solidifies into solid phase. This is the basic mechanism of Thermal accumulation of warm & cool action.

The temperature of thermal accumulation of absorption and emission can be adjustable with change of melting temperature of paraffin as core material of micro-capsule.

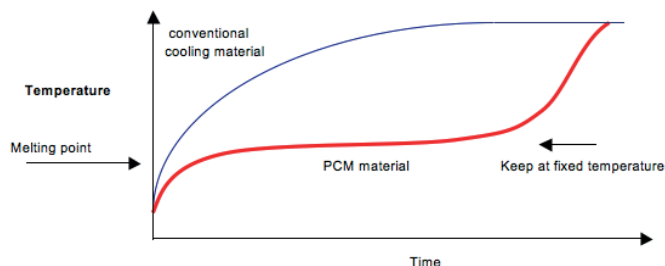


CHARACTER & APPLICATION OF MICRO-CAPSULATED THERMAL ACCUMULATION MATERIAL

It is possible at the option of the kind of PCM (paraffin) to be required temperature and also possible to develop the new product having temperature buffering property to be required certain temperature.

For example, 5°C type can accumulate the temperature at 5°C even if the heating temperature rises more than that. On the contrary, even if the heating temperature go down at less than 5°C, it works to keep its temperature at 5°C.

The conventional cooling material goes up its temperature when the heating temperature rises. However, Micro-capsulated Thermal accumulation material can keep its temperature at fixed of 5°C for a certain period of time.



THE LIST OF MICRO-CAPSULATED THERMAL ACCUMULATION MATERIALS

GRADE	Appearance	Kind of Capsule wall material	Active content %	Ionic	Application
Liquid	High viscous liquid	Resin polymer Capsule	3.0	Nonionic	Textiles
Powder	Powder	Melamine capsule	75	Nonionic	Masterbatch

- Available in temperatures 5,15,25,32°C
- Range of temperature from 5 to 60°C are available as tailor made.
- All products are basically “production upon order “.

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APPENDIX

The character of Micro capsulated Thermal accumulation material

1. Liquid

ITOFINISH

These are composed resin polymer as micro capsule wall material in an aqueous emulsion, so that it does not become powdering and white powdering as it makes film formation on the substrates like textiles.

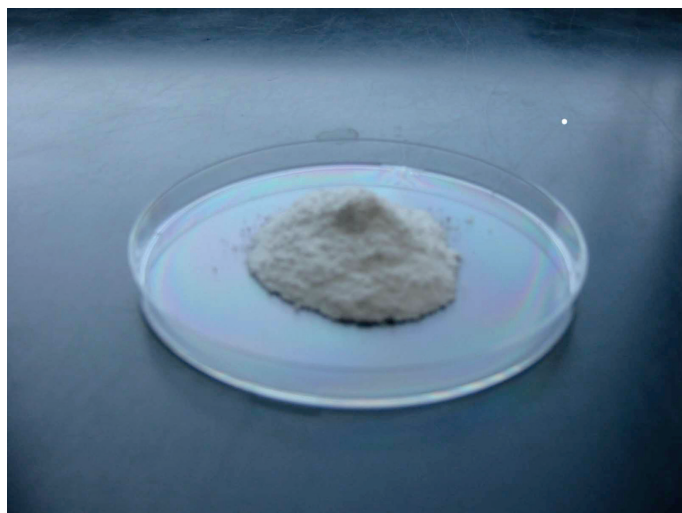
2. Powder

ITOFINISH PCM- SP series.

These are processed with dry-spray of Melamine capsulated slurry.

The active contents is 70% so that its potential heat energy is very large.

It can work well even in solvent. It contains formaldehyde.



1) Measuring by Thermography and Thermometer:

Thermo-camera and Thermometer are very effective evaluation method and tool to measure the performance of quality of the finished products. Its measuring methods depend upon the kind of materials or form of substrates. The proper measuring method will be advised by our technical team upon request.

2) Differential thermal scanning count (D S C)

Few ten gram of micro capsulated material its self or its finished fabrics can be measured for heat energy amount. The below is the measuring example of PCM-25.

Obtainable information by this measuring.

Through this chart, the range of temperature of melting and solidification point can be obtainable. In this measuring, melting point at 26.2°C and solidification point at 24.8°C

Amount of potential heat of fusion =49. 55mJ/mG

Amount of potential heat of solidification =-50. 43mJ/mG

By the repeating tests, the durability of capsulation performance can be measured.

[Measuring device : Seiko instruments DSC220CU]

APPENDIX

Measurement of surface and inside temperature of fabrics by Thermo-graphy and Thermometer.

Test material:

100% Polyester fabric

PCM - 32

32°C.

Weight of fabric: 350g/m²

Dry content of PCM-32: 80g/m²



Measuring device

Thermo-Camera

AGEMA made.

Model THARMOVISION 570

Thermo-Sensor

Adachi measure made.

Model THARMOPRINTER

AP-320



Measuring conditions

Heat the test-specimen by infrared light lamp (Kett 400w) with the distance of 40cm from the fabrics. Take the thermo-graph picture by thermo-camera with every 1 minute. At the same time, Inside of fabric temperature is also measured by thermo-sensor.

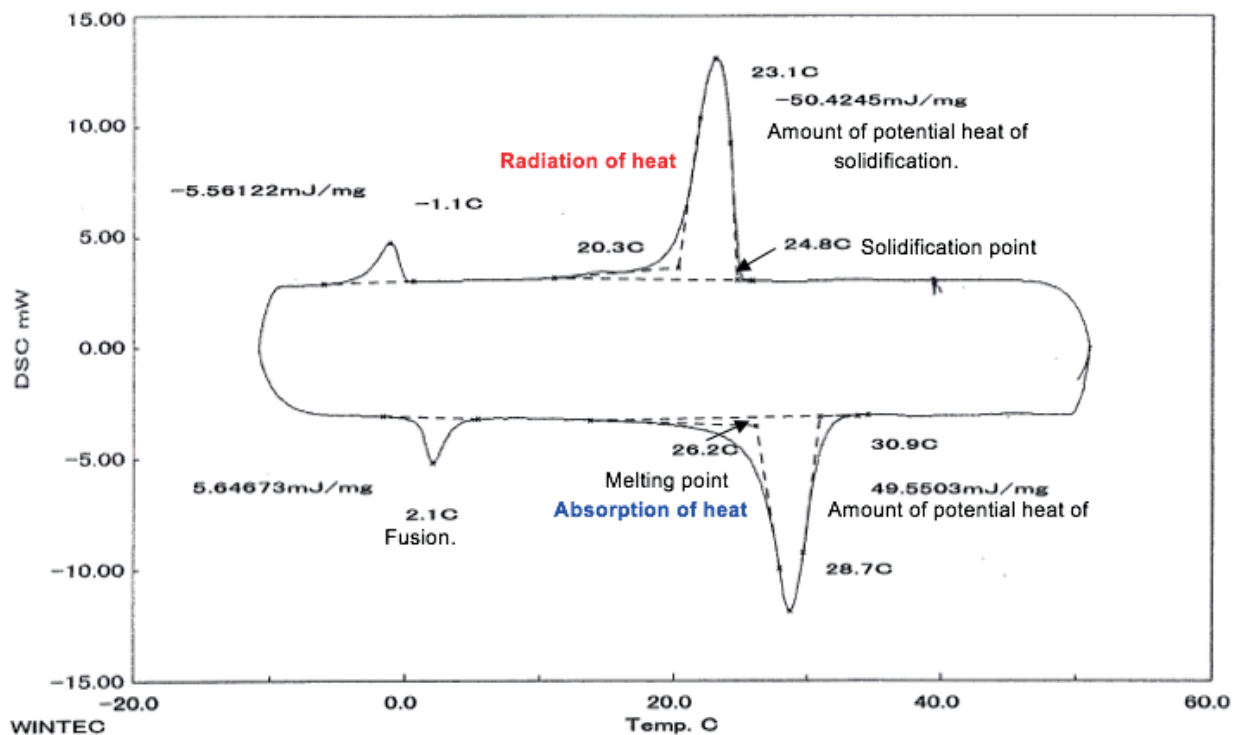
Prepared 2 test specimens fabrics and thermal-sensor inserted between two fabrics.

Measured place

Wakayama industrial technology Center.

Room with constant temperature

@ 20°C and humidity at 55%.



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MEASURED RESULTS

ITOFINISH PCM-32 is treated on 100% polyester fabrics.

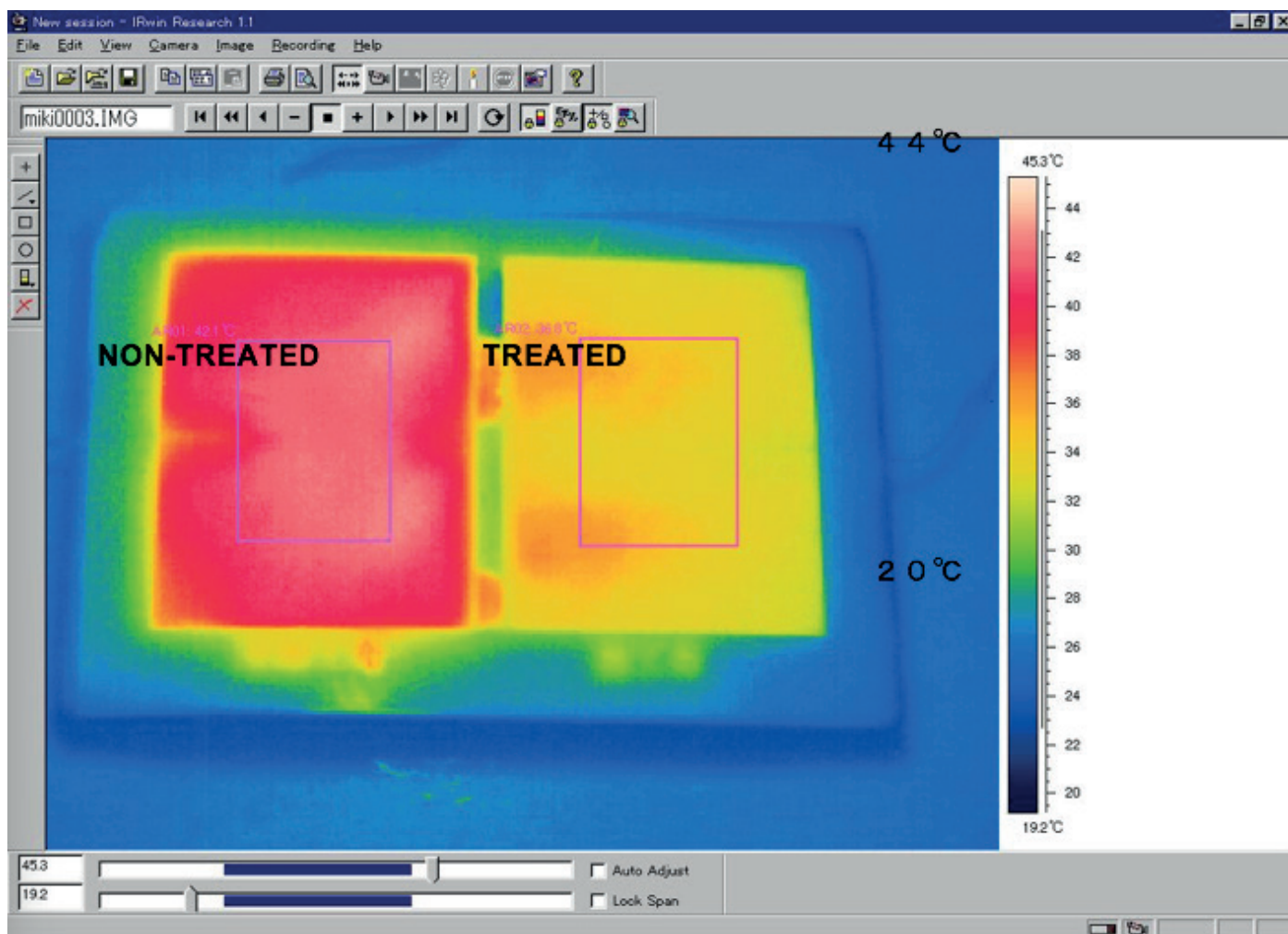
The temperature of surface of fabric is measured by Thermography and the temperature of inside of fabric is measured by Thermo-sensor.

The difference in temperature of surface of fabrics are observed after 1 minute later of infrared heating and the treated fabrics temperature does not rise.

Besides, the temperature drop of treated fabric is slower than non-treated fabric after cooling down. The data of fabric surface temperature change and its inside temperature change is made into graph with repeated heating and cooling at three times.

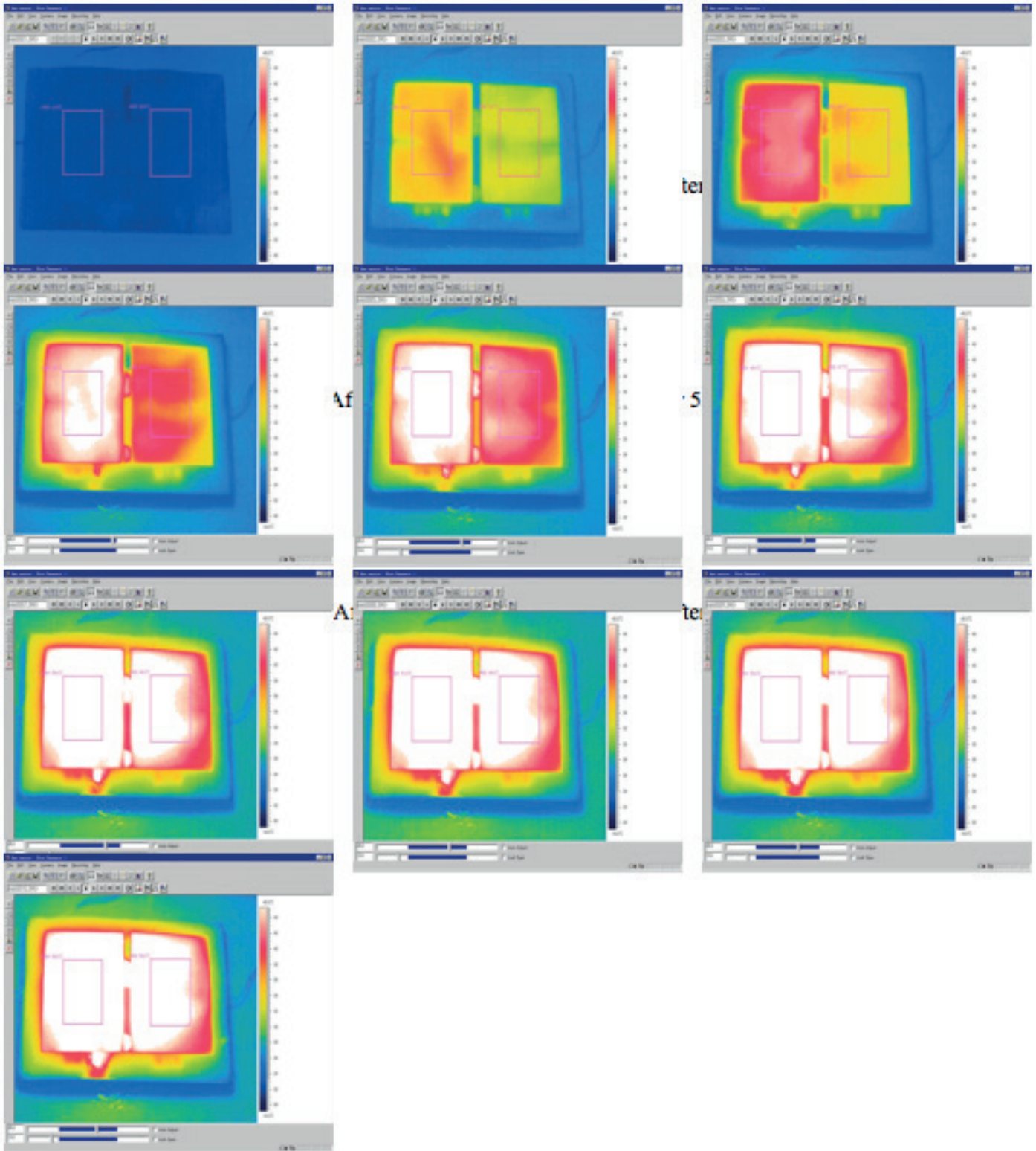
It has been proven that thermal accumulation performance is achieved even after heating and cooling.

Thermo-camera picture: heating after 2 minutes



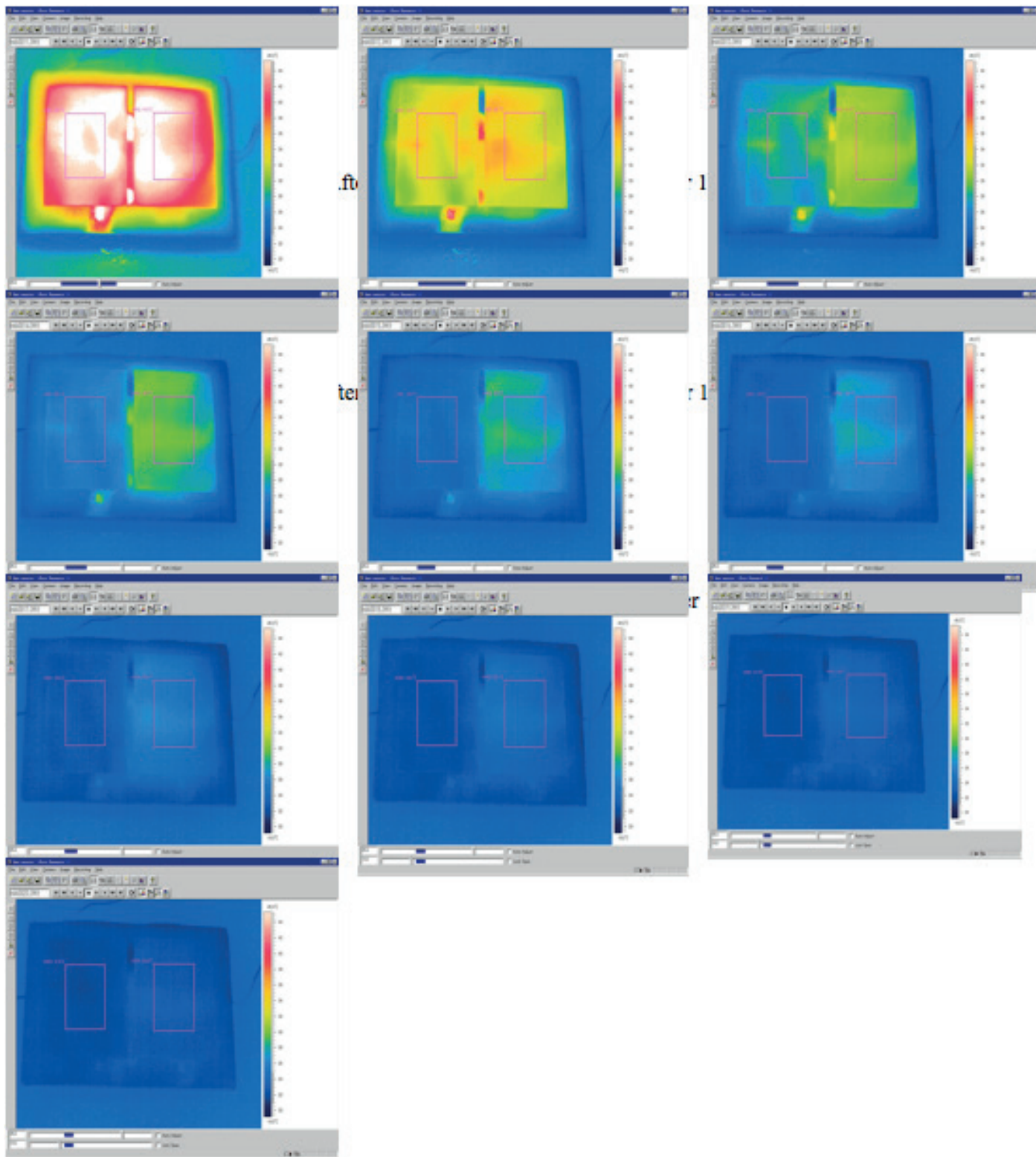
MEASURED RESULTS

Just after heating started



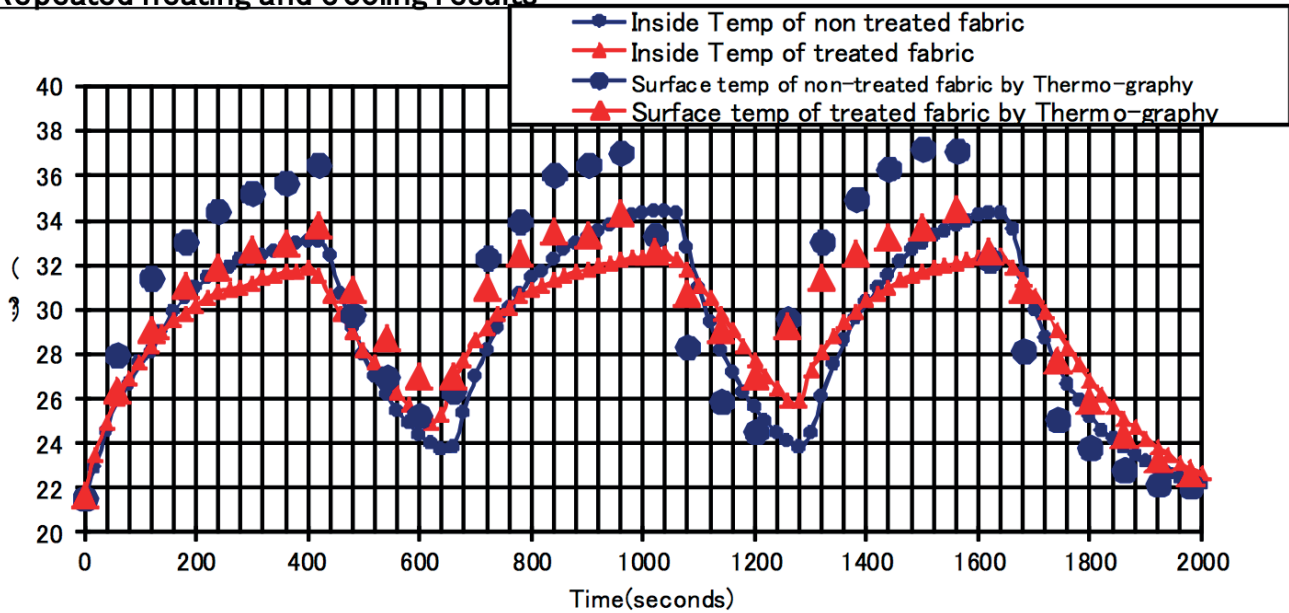
MEASURED RESULTS

Just after cooling started

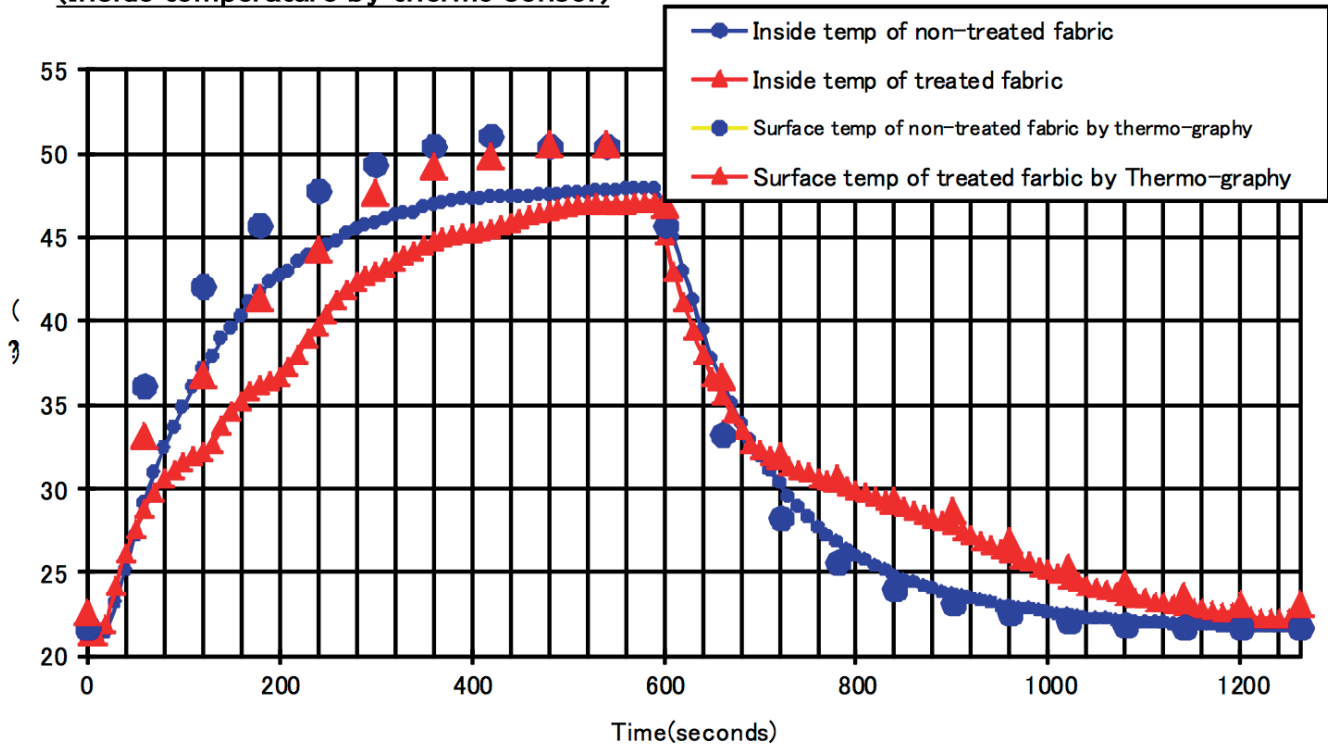


MEASURED RESULTS

Repeated heating and cooling results



Graph of measured temperature by thermograph (Inside temperature by thermo sensor)



ADDITION TO GEL TYPE THERMAL ACCUMULATION MATERIAL

Test specimen PCM-25 50% MIXTURE IN GEL

Test Subject:

Measure the temperature change of Sealed pack GEL by changing the temperature of Circumstances.

As comparison, test the two difference test specimens. One is conventional transparent gel and another is gel containing 50% of PCM-25 (25°C TYPE).

Measuring device:

Thermo-Printer AP - 320 (Adachi measurement made)

Test method:

Measure the temperature of Gels by thermal-sensor.

Keep the Gels over night at Room with constant temperature at 20°C. Then, Heat them at 37°C

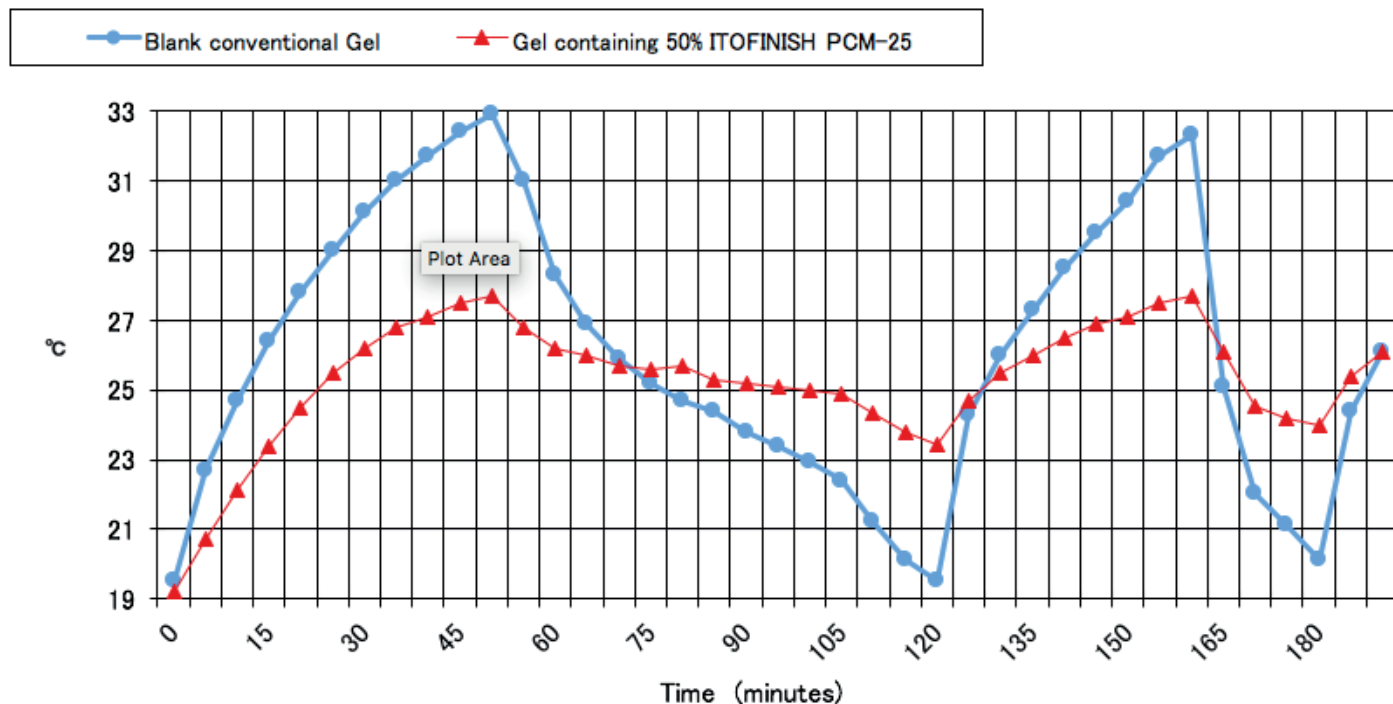
And cool down at room temperature of 20 ~ 18°C repeatedly.

Test results:

Temperature change data and graph is as per attached.

The conventional Gel changes its temperature with the change of outside temperature.

While, the change of temperature of Gel containing 50% of PCM-25 is very small at around 25°C area. This is proven data of good performance of Thermal accumulation material.



ADDITION TO CONCRETE BLOCK

Test specimen

Concrete containing PCM-15 (15°C type)

Conventional high speed dry solidification concrete used.

1. Target :concrete = 50, water = 20, PCM-15 = 30.
2. Comparison: concrete = 70, water = 30.

Test subject:

Prepare the concrete containing 30% of PCM-15 and compare with conventional concrete.

Measure the change of surface temperature of concrete by changing the temperature of outside circumstance.

Measuring device:

Thermo-Printor AP - 320 (Adachi measurement made)

Test method:

Measure the surface temperature of dried concrete by thermo-printor.

Initial temperature: Measure the temperature at 20°C after keeping 20°C room.

Cool down temperature: Cool down it at 0°C. Heat it at 30°C room.

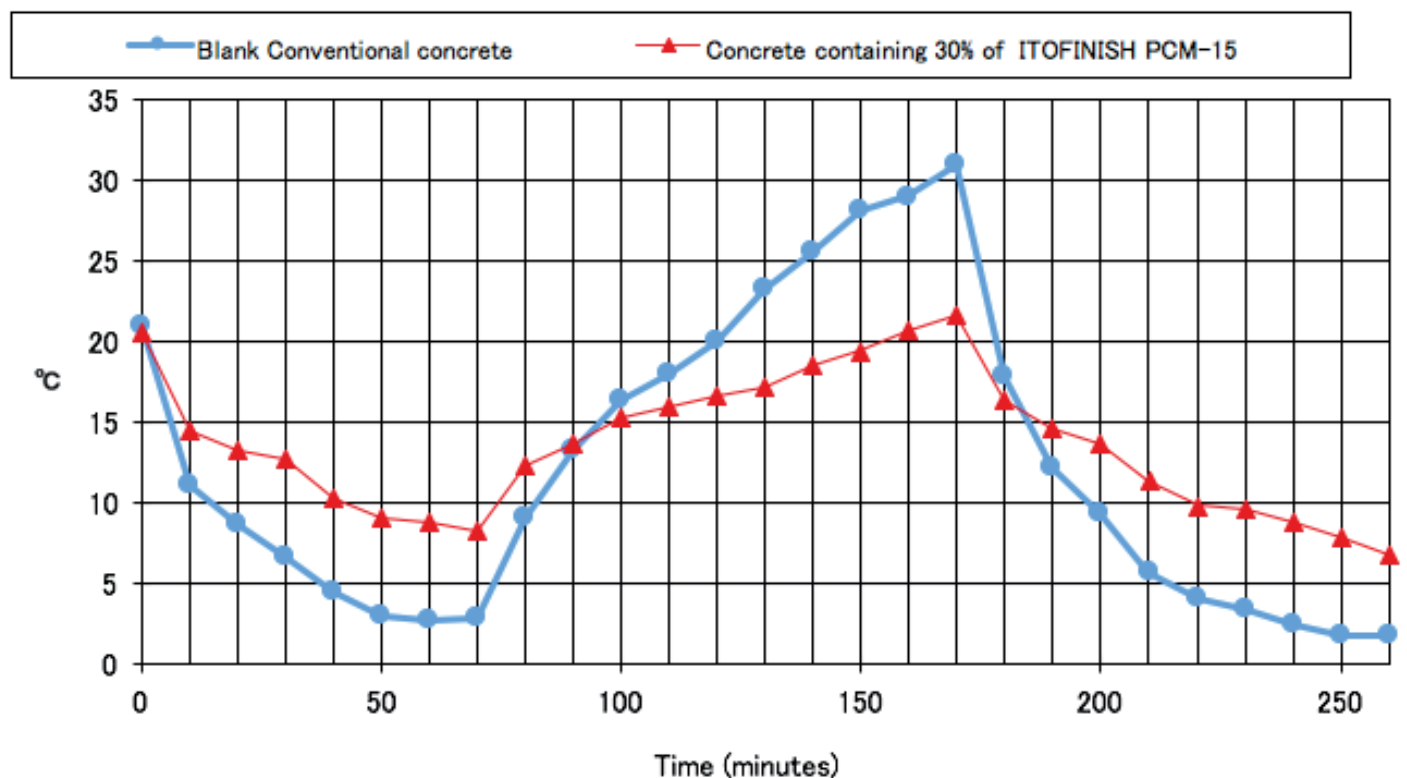
Test results:

Temperature change data and graph is as per attached.

The difference is observed at less than 15°C. After 70 minutes passed,

Thermal accumulated concrete dose not rise up its temperature and stays at

Around 15°C area near by. This is proven data of good performance of Thermal accumulation material.



ADDITION TO NON-WOVEN SHEET

Test specimen: PCM-32SP (32°C type Powder type)

Test subject:

Observe the temperature change of heated sheets.

Measuring device:

Thermo-camera by Nippon Electric made Model JTG-6200

Test method:

Keep them at room temperature at 20°C

Test results:

Non woven sheet containing thermal accumulation material does not drop its temperature on compared with non-woven sheet blank without addition

