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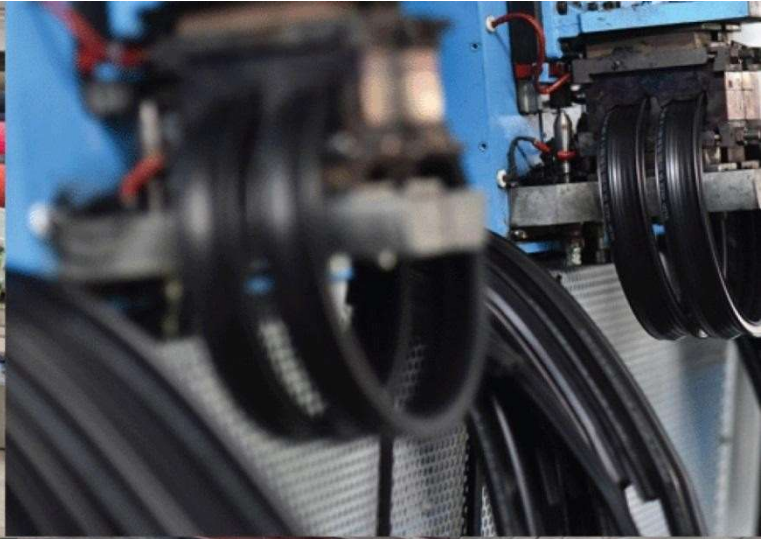
A.M.P.E.R.E (EUROPE)

In Association With



ELECTRO MAGNETIC innovative technologies

Kerone Research & Development Centre (KRDC),  
B/47, Addl. MIDC. Anand Nagar, Ambarnath (East), Thane- 421 506, India  
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com



**Batch Microwave+Convection Heat Treatment  
for Maintaining Oil Temperature during frying  
process**



ISO 9001-2008 | ISO 9001-2015 | EMS 14001 | OHSAS 18001  
In Association with SVCH-Technologii, Moscow (Russia)



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Customer :	M/s. Bhadrara Naturall Fruits Pvt. Ltd.
Process :	Batch Microwave+Convection Heat Treatment for Maintaining Oil Temperature during frying process

### TEST REPORT No: 47/KRDC/LAB/17 Mum 21/01/2021

Date Sample reception : 21/01/2021  
ID : 47/LAB/185

### SAMPLE DESCRIPTION:

Sampling : As Requested  
Sample Condition : Acceptable  
Quantity : 1 litre  
Sampling date : 21/01/2021  
Product : Refined oil  
Requirement : Time required to reach temperature of oil around 140°C  
Start Date test : 21/01/2021  
End Date test : 21 /01/2021

### LABORATORY EXPERIMENTAL SET UP:



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### LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM SPECIFICATIONS:

<b>Microwave Power</b>	2 kW(CW)
<b>Frequency</b>	2450 MHz $\pm$ 50
<b>Convective Power</b>	3.5 kW (air flow 350 l/min at 20°C)
<b>Microwave Exposure Zone (cavity)</b>	1 cubic meter
<b>Mode Stirrer</b>	One
<b>Thermal Monitoring System</b>	Single Channel Fiber Optic: Range -40 to 250°C
<b>Exhaust Power</b>	1HP
<b>Tray Size</b>	450x950x50 mm

### ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

<b>Temperature (degree C)</b>	30°C ( $\pm$ 5°C)
<b>Humidity (%)</b>	$\leq$ 35% RH
<b>Pressure (kN/m<sup>2</sup> or kPa)</b>	Not recorded

**Note for recommendation:** Environmental conditions have a direct impact on test results. Accuracy and consistency of test data are affected by the laboratory conditions



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### EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolution: 160x 120IR Thermal sensitivity of 0.10°C
Thermo Hygrometer		Model No: HTC-2 Temperature accuracy: $\pm^{\circ}\text{C}$ (1.8°F) Temperature resolution: 0.1°C (0.2°F) Humidity range: 10%~99% RH Humidity accuracy: $\pm 5\%$ RH Humidity resolution: 1% RH

### SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on Refined oil to speed up the heating rate. For this experimental run, system has been preheated for particular time period, given oil sample has been placed in microwave transparent beaker and microwave heat treatment has been given to reach temperature around 140°C and then material (potato slices) has been added followed by stirring and after adding it wait for a time until temperature of oil goes down by 20°C and then again give heating treatment until it goes to 140°C and record the time required for each.



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## ANALYTICAL RESULTS:

Microwave Power	2 kW
Setting Temperature	200°C
Quantity of oil	500 ml
Quantity of Material (Potato slices)	50 grams
Time to reach oil temperature 140°C	7 minutes
Waiting time till temperature down by 20°C after adding material	3 minutes
Time to reach oil with material temperature again 140°C	7 minutes

## THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

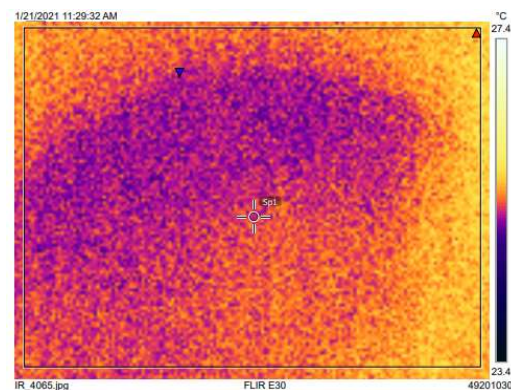
### 1. Before Heat Treatment:

#### Measurements

Bx1	Max	26.1 °C
	Min	24.9 °C
	Average	25.4 °C
Sp1		25.2 °C

#### Parameters

Emissivity	0.95
Refl. temp.	20 °C



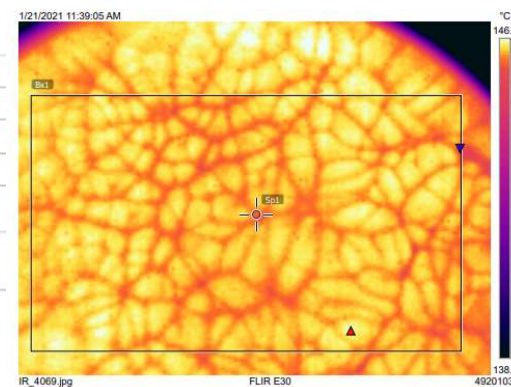
### 2. After adding Material:

#### Measurements

Bx1	Max	142.8 °C
	Min	138.2 °C
	Average	140.5 °C
Sp1		139.0 °C

#### Parameters

Emissivity	0.95
Refl. temp.	20 °C



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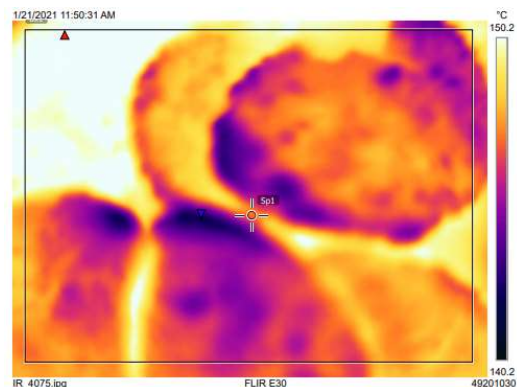
### 3. After heat treatment with material:

#### Measurements

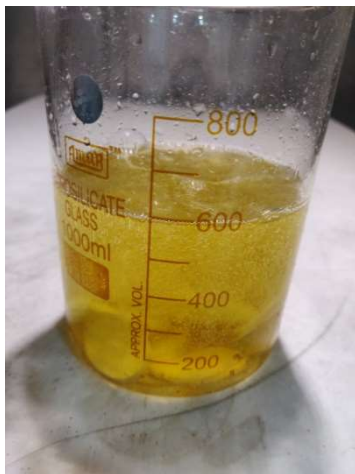
Bx1	Max	150.2 °C
	Min	140.9 °C
	Average	145.5 °C
Sp1		143.0 °C

#### Parameters

Emissivity	0.95
Refl. temp.	20 °C



### PICTURES TAKEN DURING TRIALS:



### OBSRVATIONS:

The Heating behavior of Refined oil has been investigated under the Batch Microwave+Convection Heating System. The heating rate is found to be increasing with respect to increase in time. It has been found that the required temperature on oil has been achieved under given conditions.

*K Komal*

Miss. Komal Bhoite  
Tested By

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MEMBER OF A.M.P.E.R.E (EUROPE)

MEMBER OF AIMCAL (USA)

IN ASSOCIATION WITH EMitech, ITALY



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