



A CRISIL-NSIC RATED COMPANY
ISO-9001-2008 COMPANY

Member Of



AIMCAL (USA)



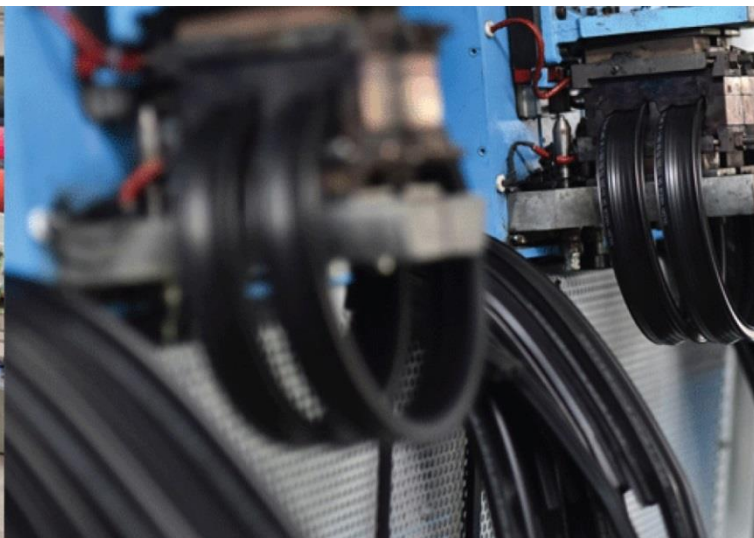
A.M.P.E.R.E (EUROPE)

In Association With



ELECTRO MAGNETIC innovative technologies

Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambernath (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 Drying of Pressed Nata De Coco (microbial cellulose)



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



Kerone Research & Development Centre (KRDC)

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

Customer :	M/s. NANOLLOSE
Process :	Batch Microwave + Convection Heat Treatment for Drying of Pressed Nata De Coco (microbial cellulose)

TEST REPORT No: 47/KRDC/LAB/17 Mum 13/07/2021

Date Sample reception : 15/05/2021

ID : 47/LAB/06

SAMPLE DESCRIPTION:

Sampling : As Requested

Sample Condition : Acceptable

Quantity : 4.85 Kgs.

Samples opening date : 12/07/2021

Product : Pressed Nata De Coco (Microbial Cellulose)

Start Date test : 13/07/2021

End Date test : 13/07/2021

LABORATORY EXPERIMENTAL SET UP:



Format: F/R&D/01



Kerone Research & Development Centre (KRDC)

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

LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM SPECIFICATIONS:

Microwave Power	2 KW (CW)
Frequency	2450 MHz \pm 50
Convective Power	3.5 KW (airflow 350 l/min at 20°C)
Microwave Exposure Zone (Cavity)	1 Cubic meter
Mode Stirrer	One
Thermal Monitoring System	Single Channel Fiber Optic: Range -40 to 250°C
Exhaust Power	1 HP
Tray size (width*height*depth)	450*950*50 mm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (°C)	30°C (\pm 5°C)
Humidity (%)	\leq 70% RH
Pressure (kN/m² or kPa)	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.



Kerone Research & Development Centre (KRDC)

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

EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolution: 160 x 120 IR Thermal sensitivity of 0.10°C
Moisture Analyzer		Make: Axis Balance Description: Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample>5g)
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 microbial cellulose to speed up the drying rate. For this experimental run, given sample has been spread like sheets and then placed in MW+ Convection heating system with suitable parameters. Observations are made after decided time period on the basis of change of Weight and moisture of the product.

Initial Wt. of Cellulose: 2.454 Kg

Initial moisture of Cellulose : 76.3%

Format: F/R&D/01



Kerone Research & Development Centre (KRDC)

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

Cycles	Specifications of Microwave	Cycle Time (min s.)	Product Temperature	Product Weight (Kg)	Product Weight Loss(%)	Product Moisture (%)
C1	Magnetron Power: 1 KW; Temperature Limit : 100°C; Fan speed: 100; Heater- 100%	20	(40-45) °C	2.208 Kg	10.02	70.4
C2	Magnetron Power:1 KW; Temperature Limit : 100°C; Fan speed: 100; Heater- 100%	20	(45-50) °C	1.682 Kg	23.82	46.5
C3	Magnetron Power: 1 KW; Temperature Limit : 100°C; Fan speed: 100; Heater- 100%	20	(50-55) °C	1.325 Kg	21.22	36.6
C4	Magnetron Power: 1 KW; Temperature Limit : 100°C; Fan speed: 100; Heater- 80%	20	(60-65) °C	0.995 Kg	24.90	12.6
C5	Magnetron Power: 0.8 KW; Temperature Limit : 100°C; Fan speed: 100; Heater- 80%	20	(60-65) °C	0.697 Kg	29.9	8.3

Total cycle time: 1Hr 40mins

Final Wt. of Cellulose: 0.697 Kg

Final moisture of Cellulose : 8.3%

BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:





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

THERMAL ANALYSIS REPORTS :

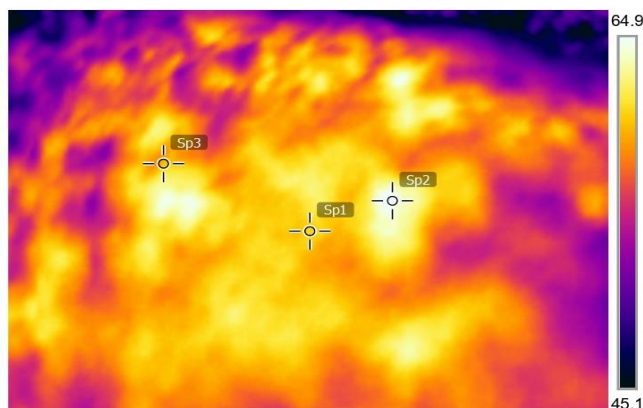
During Cycle 4-

Measurements

Sp1	61.0 °C
Sp2	65.1 °C
Sp3	60.3 °C

Parameters

Emissivity	0.95
Ref. temp.	20 °C



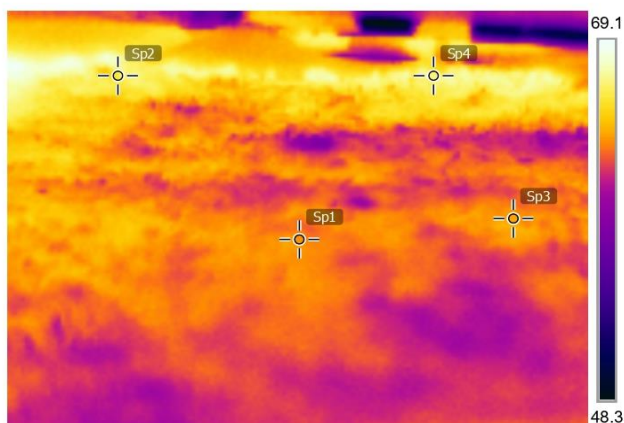
During Cycle 5-

Measurements

Sp1	63.6 °C
Sp2	66.0 °C
Sp3	64.0 °C
Sp4	66.9 °C

Parameters

Emissivity	0.95
Ref. temp.	20 °C

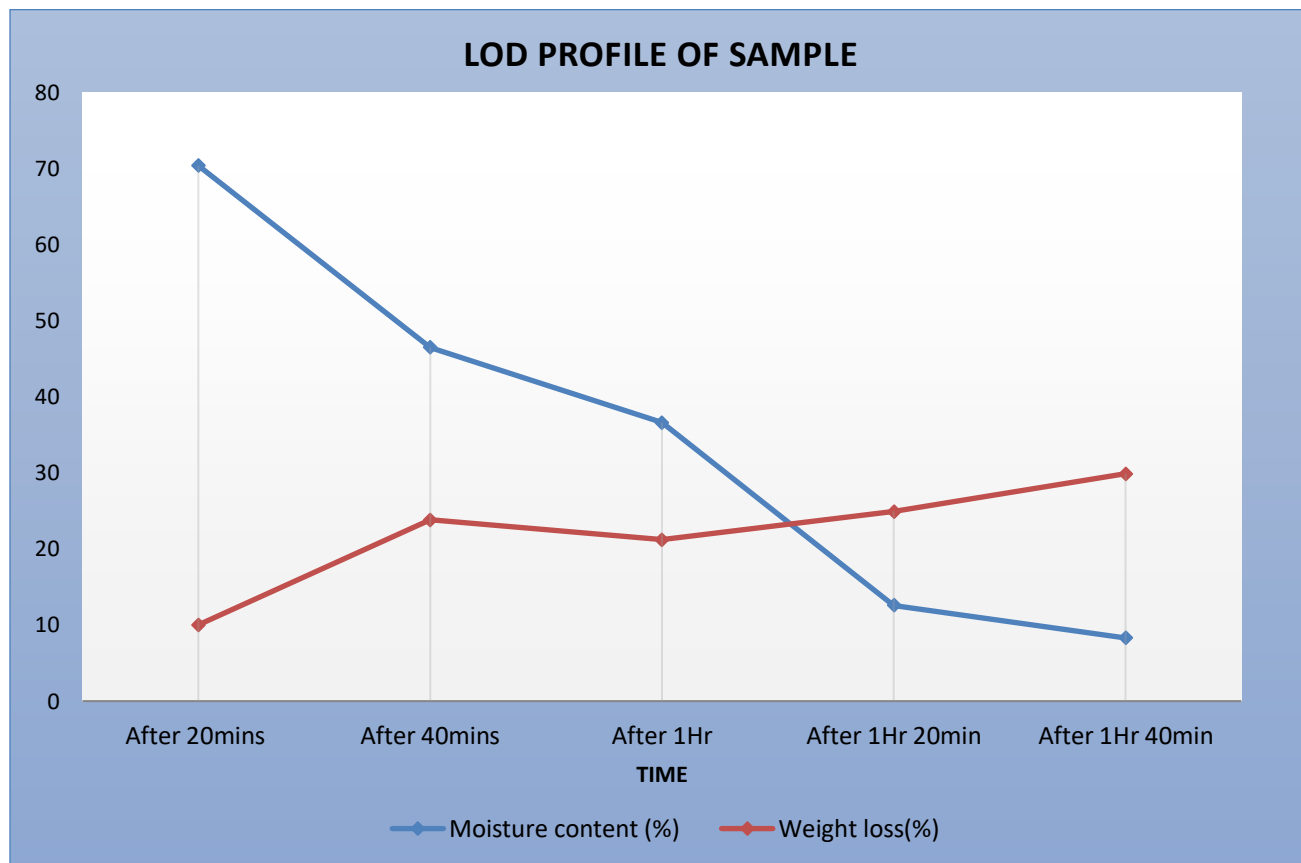




Kerone Research & Development Centre (KRDC)

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

GRAPHICAL REPRESENTATION OF LOD:



Format: F/R&D/01

The value obtained is already corrected for possible recover value stated, if applicable. This document may not be reproduced or disclosed wholly or partly in any part thereof without the written consent of the laboratory management or customer. This document relates only to the specimen samples processed. The processed sample will be kept in this laboratory for 7 days from the date of heat treatment.



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

MOISTURE ANALYSIS REPORTS:

Drying started		Drying started	
Date :13-07-2021		Date :13-07-2021	
Time :14:06:02		Time :16:43:07	
Model:AGS200		Model:AGS200	
Serial number : 138		Serial number : 138	
Drying parameters		Drying parameters	
Product : 0		Product : 0	
Drying temperature : 105.0 °C		Drying temperature : 105.0 °C	
Drying profile : standard		Drying profile : standard	
Mode : Short mode		Mode : Short mode	
Calculation : ((m0-m)/m0)*100%		Calculation : ((m0-m)/m0)*100%	
Finished : 3 samples		Finished : 3 samples	
Initial weight : 1.404 g		Initial weight : 1.514 g	
Final weight : 0.333 g		Final weight : 1.389 g	
Drying time : 00:22:40s		Drying time : 00:07:00s	
Sampling interval : 20 sec		Sampling interval : 20 sec	
Moisture : 76.3 %		Moisture : 0.3 %	
NOTE Initial moisture of Cellulose		NOTE Final moisture of Cellulose.	
The analysis performed by: 0		The analysis performed by: 0	
Signature..... <i>Komal</i>		Signature..... <i>Komal</i>	

OBSERVATION:

The drying of microbial cellulose has been investigated under the Microwave + Convection heating system. The heating rate is found to be increasing with respect to increase in time. It has been found that the product's weight decreases with respect to increase in setting temperature. As per physical investigation, it has been observed that product is dried without any burns but colour changes slightly off white.

Ms. Komal Ingle
(Tested By)

Format: F/R&D/01