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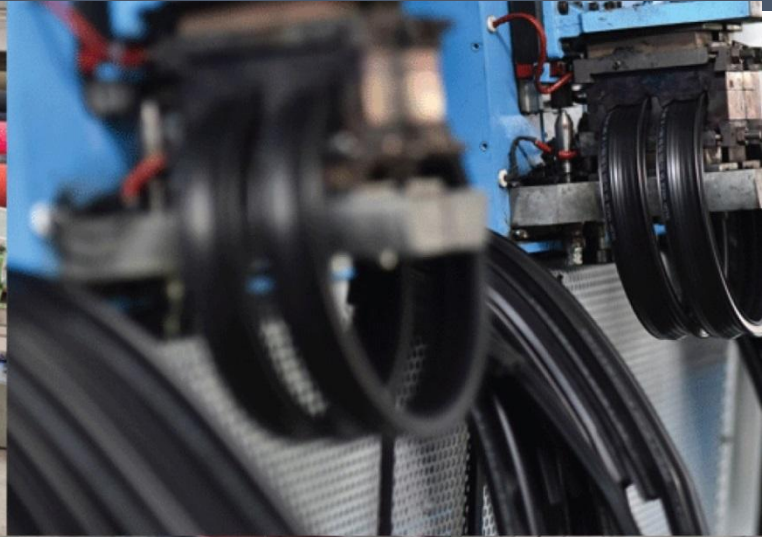
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In Association With



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



**Continuous Infra-red Heat Treatment for
Drying of Bamboo Sticks**



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Customer:	M/s. Machau Industries LLP
Process:	Continuous Infra-red Heat Treatment for Drying of Bamboo Sticks

TEST REPORT No: 47/KRDC/LAB/17 Mum 29/09/2020

Date Sample reception : 29/09/2020
ID : 47/LAB/182

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 3 Nos. of bunch
Sampling date : 06/10/2020
Product : Bamboo Sticks
Requirement : Final Moisture Content should be 2%
Start Date test : 06/10/2020
End Date test : 06/10/2020

LABORATORY EXPERIMENTAL SET UP:



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LAB CONTINUOUS INFRARED HEATING SYSTEM SPECIFICATIONS:

IR Medium Wave Emitters	6 Nos (-each having 0.5 kW, 445 mm heating length)
Short Wave IR Emitter with special reflectors	6 Nos (-each having 1 kW, 406 mm heating length)
IR Emitter to Object Distance	120 mm (- in medium wave zone)
IR Emitter to Object Distance	100 mm (- in short wave zone)
Overall IR Heating Zone length	1400 mm
Web width	400 mm
IR wavelength range	0.7 to 10 microns
Direct Exposure of MW IR	500 mm
Direct Exposure of SW IR	750mm
Temperature Range	0-400°C

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	33°C (±5°C)
Humidity (%)	≤80% RH
Pressure (kN/m ² 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



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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
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: $\pm (1.8^{\circ}\text{F})$ 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 Bamboo sticks in continuous infrared heating system for drying treatment. For this experimental run, given bamboo sticks have been soaked overnight in normal water and then again half hour in boiling water and then after draining it has been placed in infrared heating system with uniform layer to achieve even drying characteristics. Drying treatment has been continued till it gives completely dry texture. Observations are made after every pass by visible observations and by texture.

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ANALYTICAL RESULTS:

Setting Temperature: 130°C

Thickness of layer: 15 mm

No. of Passes: 9

Cycle Time of Single Pass: 3 minutes

Total Drying Time: 27 minutes

Temperature on Product: 90-100°C

Initial Moisture Content: 41.9%

Final Moisture Content: 2.6%

THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

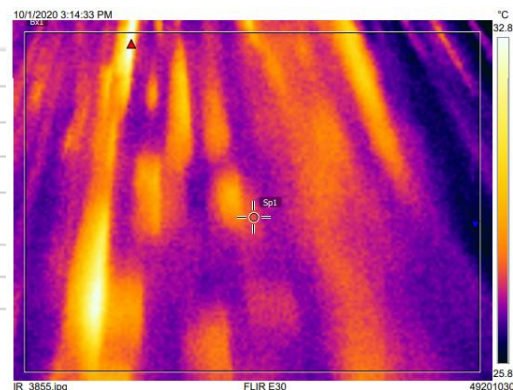
1. Before Heat Treatment:

Measurements

Bx1	Max	33.8 °C
	Min	25.6 °C
	Average	27.5 °C
Sp1		27.8 °C

Parameters

Emissivity	0.95
Ref. temp.	20 °C



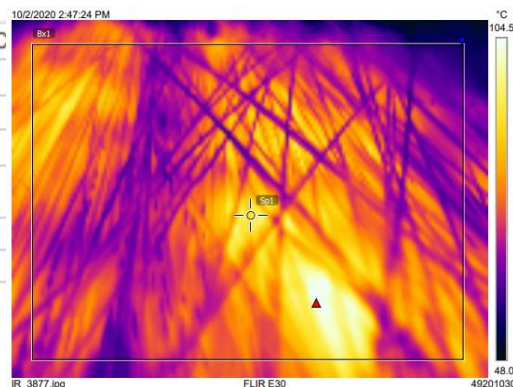
2. After Heat Treatment:

Measurements

Bx1	Max	105.0 °C
	Min	56.1 °C
	Average	76.9 °C
Sp1		94.1 °C

Parameters

Emissivity	0.95
Ref. temp.	20 °C



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BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

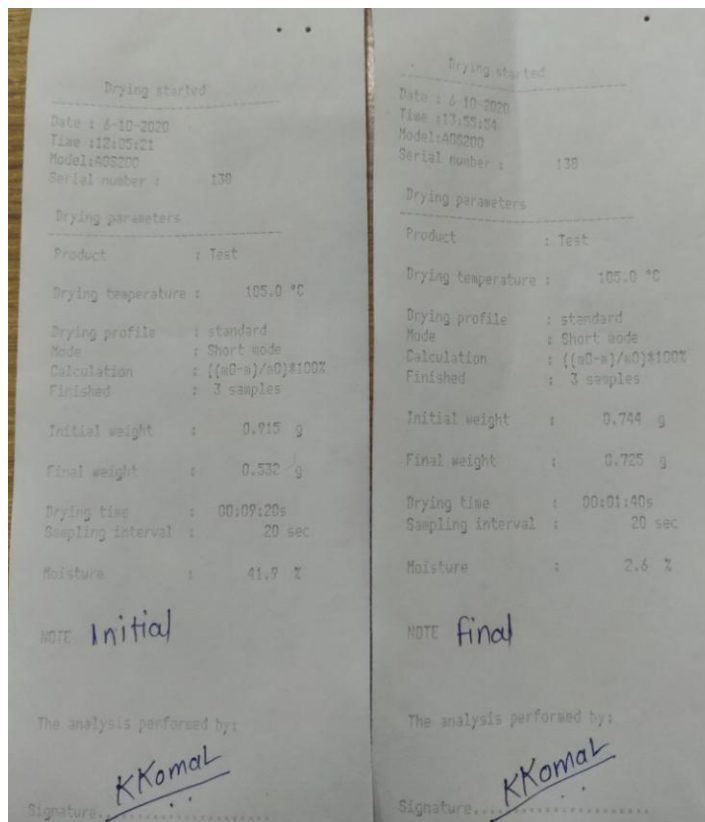


BEFORE



AFTER

MOISTURE ANALYSIS REPORTS:



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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.



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OBSERVATIONS:

The drying behavior of Bamboo sticks have been investigated under the Continuous Infrared Heating System. The drying rate is found to be increasing with respect to increasing drying time. It has been found that the moisture content on the dry basis (%) decreases with respect to increase in drying time. As per physical investigation, it has been observed that there is little colour change without any damage to sample with final moisture content less 3%.

A handwritten signature in black ink that reads "K Komal".

Miss Komal Bhoite
Tested By