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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 tow for excel fiber

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

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Customer :	**M/s. Grasim Industries Limited**
Process :	**Batch Microwave+Convection Heat Treatment for Drying of tow for excel fiber**

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

Date Sample reception : 29/09/2020
ID : 47/LAB/183

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 10 kg
Sampling date : 29/09/2020
Product : Tow for excel fiber
Requirement : Final Moisture Content should be less than 5%
Start Date test : 07/10/2020
End Date test : 07/10/2020

LABORATORY EXPERIMENTAL SET UP:

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LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM SPECIFICATIONS:

Microwave Power	2 kW(CW)
Frequency	2450 MHz ± 50
Convective Power	3.5 kW (air flow 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	1HP
Tray Size	450x950x50 mm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	33°C (±5°C)
Humidity (%)	≤82% 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

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EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolution: 160x 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: ±°C (1.8°F) Temperature resolution: 0.1°C (0.2°F) Humidity range: 10%~99% RH Humidity accuracy: ±5% RH Humidity resolution: 1% RH

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on given sample of Tow for excel fiber in batch microwave+convection heating system for drying treatment. For this experimental run, given sample has been cut in 1 meter length and it has been placed in microwave+convection heating system for drying. Drying treatment has been continued till it gives completely dry texture. Observations are made after every 10 minutes by visible observations and by texture and by weight.

ANALYTICAL RESULTS:

Microwave Power: 2 kW
Setting Temperature: 200°C
Total Cycle Time: 20 minutes

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	Sample No.1	Sample No.2	Sample No.3	Sample No.4	Sample No.5
Initial Weight	**20**	**23**	**23**	**23**	**23**
Weight After 10 minutes	**9**	**10**	**10**	**10**	**9**
Weight After 20 minutes	**8**	**9**	**9**	**9**	**9**
Total Weight loss (%)	**60**	**60.9**	**60.9**	**60.9**	**60.9**

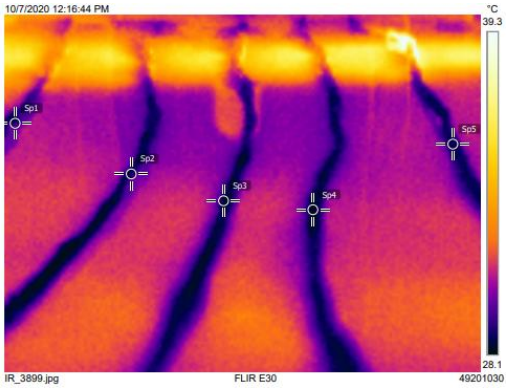
Initial Moisture Content: 63.1%

Final Moisture Content: 7%

THERMAL IMAGE BEFORE AND AFTER HEAT TRAETMENT:

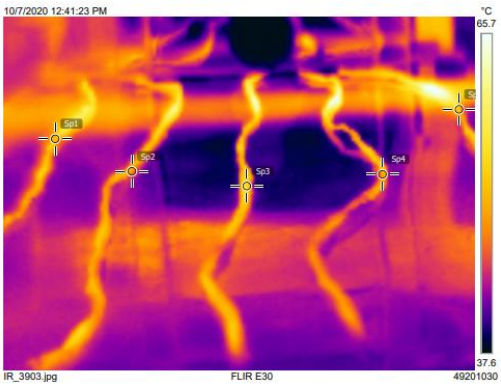
1. **Before Heat Treatment:**

Measurements	
Sp1	28.8 °C
Sp2	28.8 °C
Sp3	28.4 °C
Sp4	28.2 °C
Sp5	28.7 °C
Parameters	
Emissivity	0.95
Refl. temp.	20 °C



2. **After Heat Treatment:**

Measurements	
Sp1	53.3 °C
Sp2	50.2 °C
Sp3	56.7 °C
Sp4	50.6 °C
Sp5	52.7 °C
Parameters	
Emissivity	0.95
Refl. temp.	20 °C



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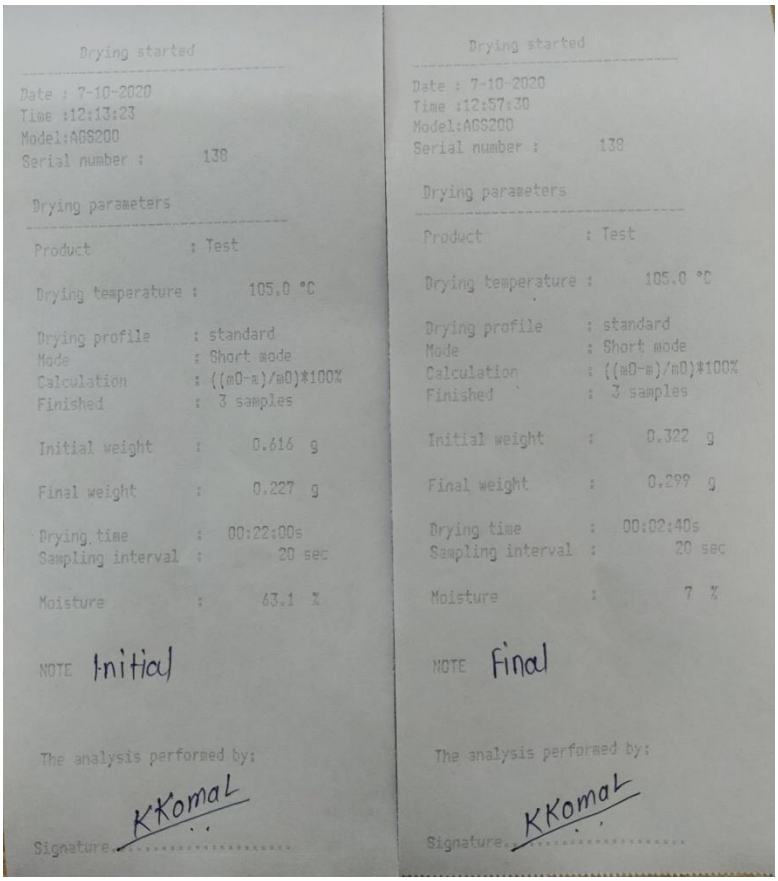
BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

BEFORE

AFTER

MOISTURE ANALYSIS REPORTS:



Drying started

Date : 7-10-2020
Time :12:13:23
Model:AGS200
Serial number : 138

Drying parameters

Product : Test
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples
Initial weight : 0.616 g
Final weight : 0.227 g
Drying time : 00:22:00s
Sampling interval : 20 sec
Moisture : 63.1 %

NOTE Initial

The analysis performed by:

Signature K Komal

Drying started

Date : 7-10-2020
Time :12:57:30
Model:AGS200
Serial number : 138

Drying parameters

Product : Test
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples
Initial weight : 0.322 g
Final weight : 0.299 g
Drying time : 00:02:40s
Sampling interval : 20 sec
Moisture : 7 %

NOTE Final

The analysis performed by:

Signature K Komal

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OBSRVATIONS:

The drying behavior of tow for excel fiber has been investigated under the Microwave+Convection 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 with little hard in texture without any damage to sample having final moisture content 7%.

K Komal

Miss. Komal Bhoite
Tested By