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Kerone Research & Development Centre (KRDC),
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Batch Microwave+Convection Heat Treatment for Drying of Silicon Carbide Powder

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

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Customer :	**M/s. Grindwell Norton Ltd, Gujrat**
Process :	**Batch Microwave+Convection Heat Treatment for Drying of Silicon Carbide Powder**

TEST REPORT No: 47/KRDC/LAB/17 Mum 05/09/2020

Date Sample reception : 05/09/2020
ID : 47/LAB/172

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 400 grams
Sampling date : 10/09/2020
Product : Silicon Carbide Block's Powder
Requirement : Final moisture content should be 0.1%
Start Date test : 10/09/2020
End Date test : 10/09/2020

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)	31°C (±5°C)
Humidity (%)	≤83% 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 Silica Carbide Block's powder to speed up the heating rate for drying treatment. For this experimental run, given sample of block has been broke into powder form and then this powder has been placed in a tray with uniform layer and this loaded tray has been placed in batch microwave+convection hybrid heating system for different setting parameters to achieve required drying rate. The observations are made on the basis of temperature on product, total weight loss and any damage to product samples.

ANALYTICAL RESULTS:

	Trial No.1	Trial No.2
MW Power (kW)	1.5	1.8

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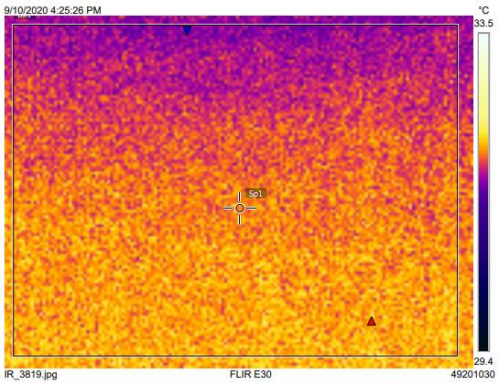
Hot Air Temperature(°C)	**150**	**160**
Cycle Time(minutes)	**10**	**12**
Initial Weight (grams)	**200**	**200**
Final Weight(grams)	**193**	**195**
Temperature on Product(°C)	**117-125**	**130-140**
Final Moisture Content(%)	**0.6**	**0.28**

THERMAL IMAGE BEFORE AND AFTER HEAT TRAETMENT:

1. **Before Heat Treatment:**

Measurements		
Bx1	Max	32.5 °C
	Min	31.3 °C
	Average	31.9 °C
Sp1		32.1 °C

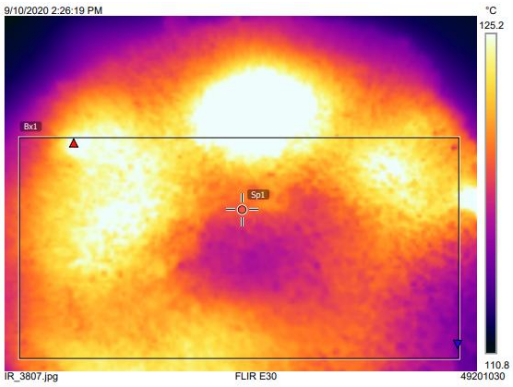
Parameters	
Emissivity	0.95
Refl. temp.	20 °C



2. **After Heat Treatment:**

Measurements		
Bx1	Max	124.2 °C
	Min	111.8 °C
	Average	118 °C
Sp1		119.9 °C

Parameters	
Emissivity	0.95
Refl. temp.	20 °C



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BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

BEFORE

AFTER

OBSRVATIONS:

The drying behavior of Silicon Carbide block's powder 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 no damage to sample with required product temperature.

K Komal

Miss. Komal Bhoite
Tested By