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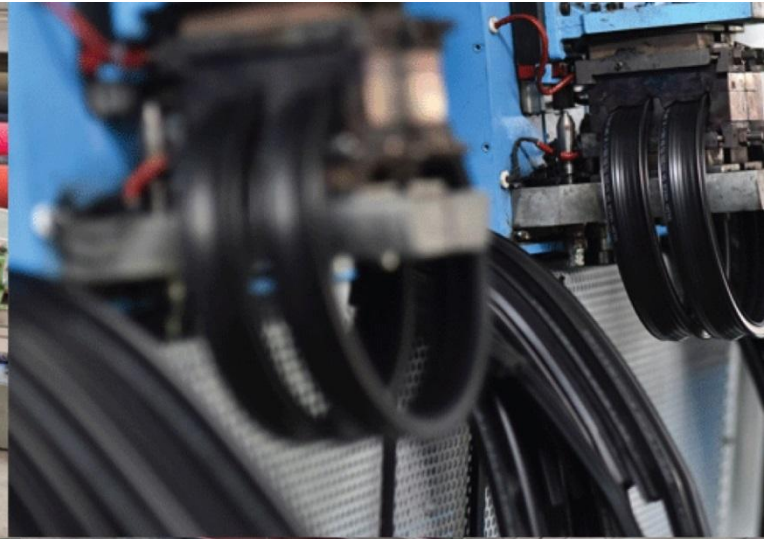
A.M.P.E.R.E (EUROPE)

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 Drying & Sterilization/Disinfection of Fecal  
Sludge**

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



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Customer :	M/s. Banka Biolo
Process :	Batch Microwave+Convection Heat Treatment for Drying & Sterilization/Disinfection of Fecal Sludge

**TEST REPORT No: 47/KRDC/LAB/17 Mum 29/12/2018**

Date Sample reception : 29/12/2018  
ID : 47/LAB/76

**SAMPLE DESCRIPTION:**

Sampling : As Requested  
Sample Condition : Acceptable  
Quantity : 1 kg  
Sampling date : 09/01/2019  
Product : Fecal Sludge  
Requirement : Final product must have moisture content between 15 to 20%  
Start Date test : 09/01/2019  
End Date test : 09/01/2019

**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>	28.1°C ( $\pm$ 5°C)
<b>Humidity (%)</b>	$\leq$ 63% 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 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 fecal sludge without adding any additive to speed up the drying rate and sterilization treatment. For this experimental run, particular quantity of sample has been taken in microwave transparent tray with uniform thickness of 5 mm and this material loaded tray has been placed in heating system with different setting parameters. The observations are made on the basis of LOD and moisture content.

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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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### ANALYTICAL RESULTS:

Microwave Power: a) Initially 1.5 kW for 1 hour

b) After 1 hour 2 kW

Setting Temperature: a) Initially 120°C for 1 hour

b) After 1 hour 150°C

Initial Moisture Content: 76%

Initial Weight: 442 grams

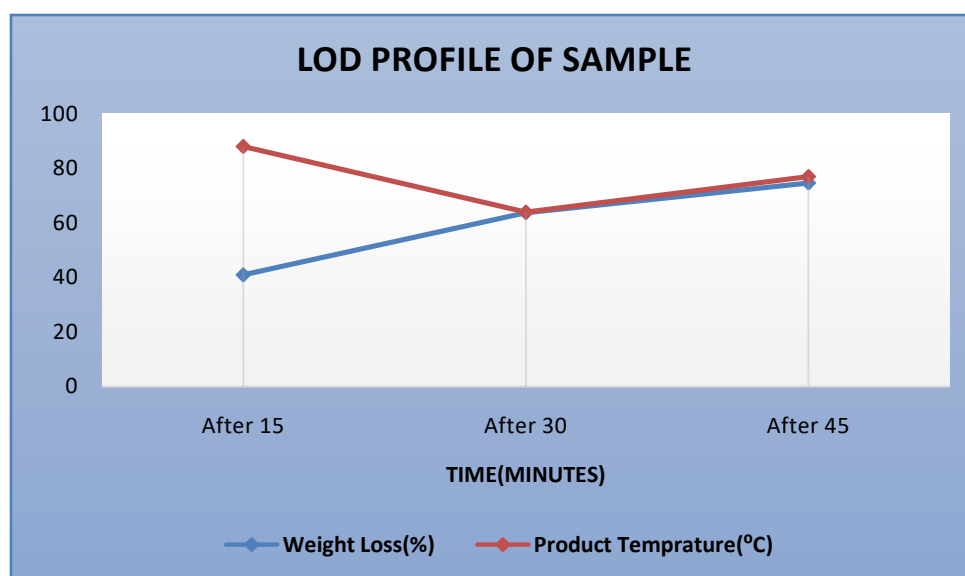
Sr. No.	Time (minutes)	Weight noted (grams)	Total weight loss (%)	Moisture Content (%)	Temperature on sample(°C)	Remarks, if any
1.	After 15	261	40.95	69	88	Drying rate started
2.	After 30	160	63.8	56	64	Drying phase continue
3.	After 45	112	74.7	25	77	Variant of Drying rate
4.	After 47	107	75.8	6.3	64	Less than Required Drying rate

Sample weight after drying: 107 grams

Total weight loss on drying: 75.8%

Final Moisture Content: 6.3%

### GRAPHICAL REPRESENTATION OF DRYING PARAMETERS:



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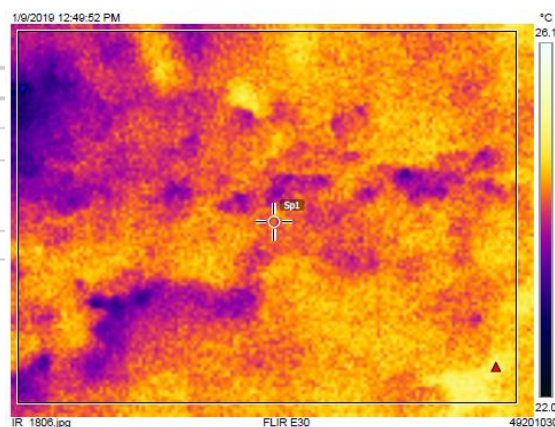
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**THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:**

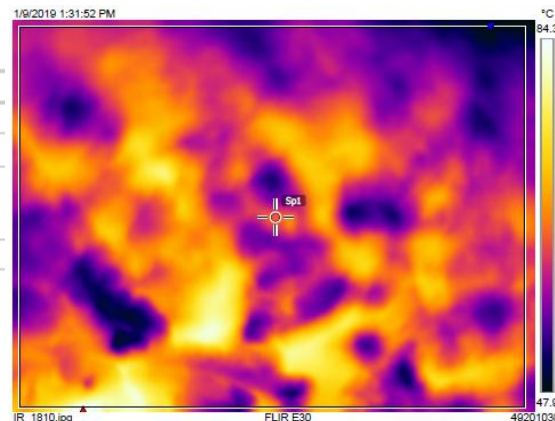
**1. Before Heat Treatment:**

Measurements		
Bx1	Max	25.3 °C
	Min	22.8 °C
	Average	24.3 °C
Sp1		24.3 °C
Parameters		
Emissivity		0.95
Refl. temp.		20 °C



**2. After Heat Treatment:**

Measurements		
Bx1	Max	84.1 °C
	Min	48.0 °C
	Average	63.4 °C
Sp1		64.4 °C
Parameters		
Emissivity		0.95
Refl. temp.		20 °C



**BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:**



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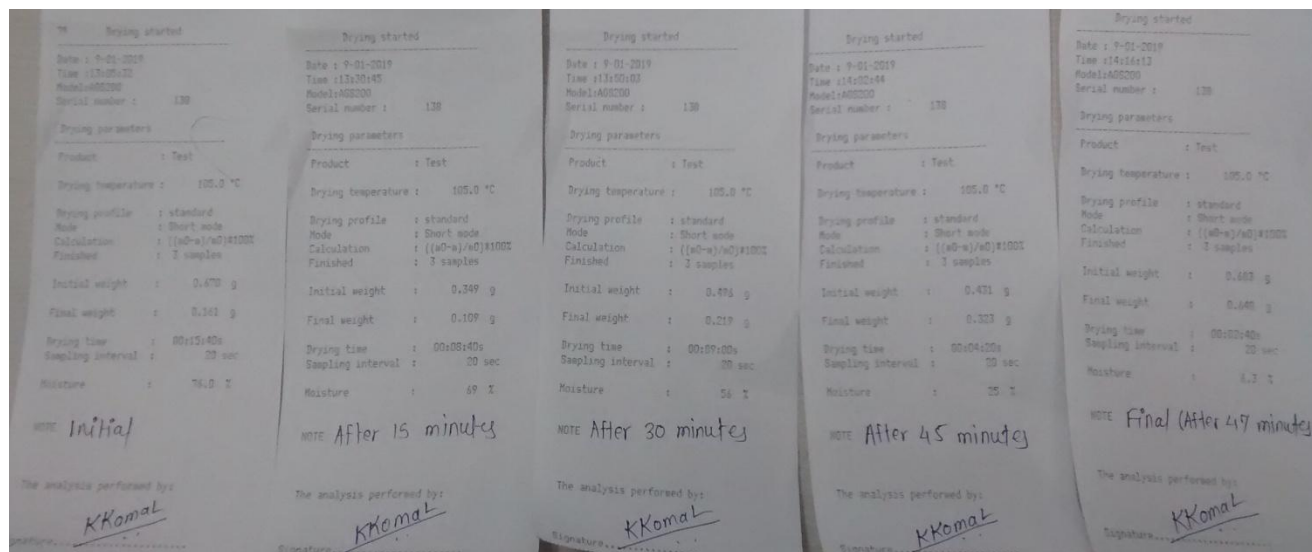
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**MOISTURE ANALYSIS REPORTS:**



**OBSRVATIONS:**

The Drying behavior of fecal sludge 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 drying time. As per physical investigation, it has been observed that there is complete drying with less than required moisture content without burning effect.

*K Komal*

Miss. Komal Bhoite  
Tested By