

Guidelines for Verification of Two Seconds Residence Time in Secondary Combustion Chamber of the Biomedical Waste Incinerator

Biomedical Waste Management Rules, 2016 (BMWM Rules, 2016) stipulates that biomedical waste incinerator should have two seconds residence time in secondary chamber. A minimum residence time has been stipulated to ensure desired level emission control with respect to volatile organic compounds, especially dioxins and furans. Target date for compliance by Common Biomedical Waste Treatment Facilities was two years from the date of notification that is March, 2016.

These guidelines provide guidance to the State Pollution Control Boards/Pollution Control Committees officials in verification of Two Seconds Residence Time (RT) in Secondary Combustion Chamber of biomedical waste incinerator while authorizing Common Biomedical Waste Treatment Facilities (CBWTFs) or the captive treatment facilities installed by hospitals.

A procedure for verification of two seconds residence time in secondary combustion chamber of incinerator is give below:

Residence time of waste gases in secondary combustion chamber is defined as the combustion chamber volume divided by the volumetric flow rate of the gas. As per BMWM Rules, 2016, biomedical waste incinerators are required to maintain 2 seconds of RT for flue gases in secondary combustion chamber with temperatures around 1050° C.

Therefore,

RT of flue gas in secondary Combustion Chamber =
$$\frac{\text{Volume of secondary chamber (m}^3\text{)}}{\text{Flue gas flow (m}^3\text{/sec) at 1050}^\circ\text{C}}$$

Above method would require measurement of flue-gas flow at 1100°C, which is not a feasible and reliable option, therefore following methods of verification to be adopted to check two second of RT;

1. By Certification of Manufacturers: Incinerator Manufacturers shall provide a certificate stating that the incinerator is designed with two seconds RT in secondary combustion chamber, as per the format given Annexure-I, supported with technical details.
2. By size of Secondary Combustion Chamber: Volume of secondary combustion chamber corresponding to 2 seconds RT for a specific size of incinerator up to 1000 kg/hr capacity can be verified as per the table given below:

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Capacity of the Incinerator in kg/hr	Volume of secondary combustion chamber in m ³	Estimated Thermal Capacity in Million Kcal/Hour ($\pm 10\%$)
50	1.2 – 1.8	0.16
100	2.5 – 3.75	0.35
150	3.8 – 5.02	0.5
200	5.2 – 6.0	0.6
250	6.3 – 8.75	0.7
300	9.0 - 9.5	0.9
500	12.8 – 15.5	1.5
750	19.2 – 25	2.3
1000	26 – 31	3.5

Note.: Based on information provided by manufacturers of Incinerators

3. By Verification of Operating Conditions – Following checks can be carried out to verify operating conditions of incinerator to ensure 2 seconds RT;
- (a) Verify records of quantity of waste disposed during last one month of operation vis-à-vis number of hours of operation of incinerator to ascertain average feed rate maintained in incinerator. Daily records should be verified for random checks on feed rate.
 - (b) Verify thermal capacity maintained in incinerator over a specific time, for which collect data on quantity of fuel fired vis-à-vis quantity of waste incinerated. Calorific value of waste may be considered up to 1500 Kcal/Kg, whereas calorific value of fuel shall be as per type of fuel used.
 - (c) Above data to be cross checked with average temperature maintained in secondary combustion chamber during the period of data verification, which should be taken from Online Continuous Emission Monitoring System (OCEMS) data of CBMWTF for corresponding period.

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Annexure I

CERTIFICATE FOR BIOMEDICAL WASTE INCINERATOR

(to be issued by Manufacturer)

TO WHOMSOEVER IT MAY CONCERN

We hereby certify that the [*Insert Name of Incinerator make*] Model, Oil/Gas Fired Incinerator of designed Capacity kg/hr installed at M/s -----, has been supplied by [*insert Name of manufacturer*]. The said incinerator has more than or equal to 2 seconds flue gas Residence Time in secondary combustion chamber at 1050°C at its designed capacity. The technical data sheet of specification in respect of the said incinerator is enclosed herewith. The incinerator was installed / upgraded by us on

Authorized Signature

(Name & Seal of the Manufacturer)

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TECHNICAL DATA SHEET ON BIOMEDICAL WASTE INCINERATOR

(To be issued by Manufacturer)

Name of the Common Biomedical Waste Treatment Facility : M/s

Name of the Manufacturer : M/s

Maximum Capacity of the Incinerator (in kg/hr) :

Residence time of flue gas at 1050°C : seconds

Flow of flue gas through Secondary Combustion Chamber (m³/sec) :

Volume of Secondary Combustion Chamber (in m³) :

Thermal Capacity of the incinerator (in Million Kcal/hr) :

Authorized Signature

(Name & Seal of the Manufacturer)

Date:
Place: