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GOVERNMENT OF THE PUNJAB
LAW AND PARLIAMENTARY AFFAIRS DEPARTMENT

NOTIFICATION
(119 of 2016)

12th August 2016

The following Notification No. SO(G)/EPD/7-26/2013, dated 05.08.2016 regarding the Punjab Environmental Quality Standards for Treatment of Liquid and Disposal of Bio-medical Waste by Incineration, Autoclaving, Microwaving, and Deep Burial is published for general information:

DR SYED ABUL HASSAN NAJMEE
Secretary
Government of the Punjab
Law and Parliamentary Affairs
Department

Government of the Punjab
Environment Protection Department

NOTIFICATION: No. SO(G)/EPD/ 7-26 /2013: In exercise of the powers conferred under clause (c) of sub-section (1) of section 4 of the Punjab Environmental Protection Act, 1997 (XXXIV of 1997), the Environmental Protection Council has approved the following as the Punjab Environmental Quality Standards for Treatment of Liquid and Disposal of Bio-medical Waste by Incineration, Autoclaving, Microwaving, and Deep Burial.

All bio-medical waste incinerators shall meet the following operating and emission standards:

A. Operating Standards:

1. Combustion Efficiency, computed as given below, shall be at least 99.0%:

$$\text{Combustion Efficiency} = \frac{\%CO_2}{\%CO_2 + \%CO} \times 100$$

2. Minimum temperature of the primary chamber shall be 800°C.
3. The gas residence time in secondary chamber shall be at least 1 (one) second at the temperature of 1200 ± 50°C with at least 3% oxygen in the stack emissions.

B. Emission Standards:

No.	Parameter	Standard	
1.	2.	3.	4.
		Limiting concentration in mg/NM^3 unless stated	Sampling Duration in minutes, unless stated
1.	Particulate matter	50	30 or $1NM^3$ of sample volume, whichever is more
2.	Nitrogen Oxides expressed as NO_2	400	30 for online sampling or grab sample
3.	HCl	50	30 or 1 NM^3 of sample volume, whichever is more

No.	Parameter	Standard	
1.	2.	3.	4.
4.	Total Dioxins and Furans	0.1 ng TEQ/N^3 (at 11% O_2)	8 hours or 5NM^3 of sample volume, whichever is more
5.	Hg and its compounds	0.05	2 hours or 1NM^3 of sample volume, whichever is more

Note:

(a) Air pollution control devices shall be installed or retrofitted with the incinerator to achieve the above given emission standards. All existing incinerators shall comply with these standards within a period of 2 years from the date of this notification.

(b) Secondary combustion chambers and pollution control devices of existing incinerators shall be suitably retrofitted, if necessary, to achieve these standards.

(c) Chlorinated plastics shall not be incinerated and the wastes incinerated shall also not be chemically treated with any chlorinated disinfectant.

(d) Ash from incineration of biomedical waste shall be disposed of at a Hazardous Waste Treatment and Disposal Facility. However, it may be disposed of in municipal landfill, if the toxic metals in incineration ash are within the regulatory quantities as defined under the Hazardous Waste or as revised from time to time.

(e) Only low Sulphur fuel such as Light Diesel Oil, CNG, or LGP shall be used as fuel in the incinerator.

(f) Stack gaseous emissions shall be monitored under maximum capacity of the incinerator once in three months through a laboratory approved under the Punjab Environmental Protection Act, 1997 and record of such analysis results shall be maintained and submitted to EPA Punjab. For dioxins and furans, monitoring shall be done once in a year.

(g) Continuous emission monitoring system for the CO, CO_2, and O_2 parameters shall be installed in stack and its data shall be transmitted in real time to the servers at EPA Punjab.

(j) The monitored values shall be corrected to 11% Oxygen on dry basis.

(k) In addition to complying with temperature and residence time standards, incinerators (combustion chambers) shall be operated with such temperature, retention time and turbulence, as to achieve Total Organic

Carbon (TOC) content in the slag and bottom ashes less than 3% or their loss on ignition shall be less than 5% of the dry weight.

(l) Combustion gas analyzers shall be used to measure CO_2, CO and O_2.

DEEP BURIAL

1. A pit or trench shall be dug about 2 meters deep. It shall be half filled with waste, then covered with lime within 50 cm of the surface, before filling the rest of the pit with soil.
2. It shall be ensured that animals do not have any access to burial sites. Covers of galvanized iron/wire meshes may be used.
3. Burial shall be performed under close and dedicated supervision.
4. The deep burial site shall be relatively impermeable and no shallow well should be close to the site.
5. The pits shall be away from habitation, and sited so as to ensure that no contamination of any surface water or ground water occurs. The area should not be prone to flooding or erosion.
6. The location of the deep burial site shall be authorized by EPA Punjab.
7. A record of all pits for deep burial shall be maintained.

AUTOCLAVING

Dedicated autoclave shall be used for disinfecting and treating bio-medical waste.

1. In a gravity flow autoclave, medical waste shall be subjected to:
   (i) a temperature of not less than 125°C at 15 pounds per square inch (psi) with a residence time of not less than 60 minutes; or
   (ii) a temperature of not less than 135 °C and a pressure of 30 psi with an autoclave residence time of not less than 45 minutes; or
   (iii) a temperature of not less than 150 °C and a pressure of 50 psi with an autoclave residence time of not less than 30 minutes.
2. In a vacuum autoclave, medical waste shall be subjected to a minimum of one pre-vacuum pulse to purge the autoclave of all air. Waste shall be treated at:
   (i) a temperature of not less than 125 °C and pressure of 15 psi with a autoclave residence time of not less than 45 minutes. or
   (ii) a temperature of not less than 135 °C and a pressure of 35 psi with an autoclave residence time of not less than 30 minutes.
3. Medical waste shall be deemed treated if all parameter (residence time, temperature and pressure) indicators indicate that their required values

were reached during the autoclaving process. If for any reasons, either of the parameter (residence time, temperature or pressure) was not reached, the entire batch of waste shall be autoclaved again until all the required parameters (temperature, pressure and residence time) are achieved.

4. For recording of operational parameters, each autoclave shall have graphic or computer recording devices which will automatically and continuously monitor and record dates, time of day, load identification number and operating parameters throughout the entire length of the autoclave cycle.

5. The autoclave should completely and consistently kill the approved biological indicator at its maximum design capacity. Biological indicator for autoclave shall be *Bacillus stearothermophilus* spores using vials or spore strips with at least 1×10^4 spores per milliliter.

6. Under no circumstances will an autoclave have minimum operating parameters less than a residence time of 30 minutes, regardless of temperature and pressure, a temperature less than 125°C or a pressure less than 15 psi.

7. A chemical indicator strip/tape that changes color when a certain temperature is reached can be used to verify that a specific temperature has been achieved. It may be necessary to use more than one strip over the waste package at different location to ensure that the inner content of the package has been adequately autoclaved

STANDARDS OF MICROWAVING

1. Microwave treatment shall not be used for cytotoxic or radioactive wastes, contaminated animal carcasses, body parts, and large metal items.

2. The microwave system shall comply with the efficacy test/routine tests and a performance guarantee provided by the manufacturer/supplier.

3. The microwave should completely and consistently kill the bacteria and other pathogenic organisms that is ensured by approved biological indicator at its maximum design capacity. Biological indicators for microwave shall be *Bacillus Subtilis* spores using vials or spore strips with at least 1×10^1 spores per milliliter.

LIQUID WASTE

The effluent generated from a hospital should conform to the following limits:

PARAMETERS	PERMISSIBLE LIMITS
pH	6.3-9.0

Suspended solids	100 mg/l
Oil and grease	10 mg/l
BOD_5	30 mg/l
COD	250 mg/l
Bio-assay test	90% survival of fish after 96 hours in 100% effluent.

These limits are applicable to the hospitals, which are either connected to sewers without terminal sewage treatment plant or not connected to public sewers.

For discharge into public sewers with terminal treatment facilities, the general standards as notified under the Punjab Environmental Protection Act, 1997 shall be applicable.

(IQBAL MOHAMMED CHAUHAN)
Secretary, Government of the Punjab
Environment Protection Department