



Government Headquarters Hospital

Thuraiyur- Perambalur Rd, Supernagar, Perambalur,
Tamil Nadu-621212

Date: 09/08/2022

From

Dr. K. Ashokan M.D
The Joint Director of Health Services
Perambalur
Tamil Nadu

To

The Mission Director
National Health Mission - Tamil Nadu
DMS Annex Building
Teynampet
Chennai

Dear Madam,

REF: NHM - Tamilnadu letter no.442181/NHM/E2/2021 dated 17/12/21

SUBJECT: Regarding evaluation and remarks of product OPTIMASER-

Microwave medical waste sterilisation system towards BMW Rules compliance
of pretreatment of biomedical waste

As per the instructions with reference to the above mentioned NHM letter,

We have evaluated the OPTIMASER product through demonstration and put to Trial use in the hospital and for better understanding and realization of product Benefits, the following were done during the evaluation,

- 1) Learning sessions of Technology, Working Concept, Benefits, Operations of the device
- 2) Usage of the product in pretreatment of medical waste, lab waste, blood bags, linen etc.
- 3) Conducted operational training to the department staffs, technicians
- 4) Conducted efficacy testing using Biological Indicator vials and department provided samples - Urine, Blood, Sputum

Hereby, after thorough evaluation, I am stating my observations and remarks as follows,

A. INTRODUCTION:

The OptiMaser technology is designed, developed and patented by Govt. of India.

OptiMaser - Microwave technology for pretreatment of highly infectious medical waste is approved by CPCB /MOEF and is 100% in compliance with latest Bio Medical Waste Management Rules 2016 & 2018 as per Gazette notification by MOEF.

B. STATUTORY COMPLIANCE:

(1) As per the Govt. of India Gazette Notification No. G.S.R 343 (E)

dt 28.03.2016 Bio Medical Waste Management Rules-2016 & Amendment rules G.S.R 234(E) dt 16.03.2018,

- All healthcare establishments should **pre-treat** the **laboratory** waste, **microbiological waste, blood** samples and blood bags through sterilisation or sterilization **on-site**
- The lab and highly infectious bio-medical waste generated shall be pre-treated by equipment like autoclave or **microwave**
- Every authorized person shall maintain records related to the generation, collection, reception, storage, transportation, treatment, disposal or any other form of handling of bio medical waste, for a period of five years.

2) ORDERS OF THE NATIONAL GREEN TRIBUNAL PRINCIPAL BENCH, NEW DELHI

Original Application No. 710 - 713/2017 dated
15.07.2019 & 22.01.2020

ISSUES RAISED

- Non-Compliance of Provisions of BMW rules 2016
- Adverse consequences on the public health due to improper management of Bio-medical waste

PENALIZATION OF STATES

Rs. 1 Crore Penalty per month to the states for delay in
and submitting reports

(3) TAMILNADU POLLUTION CONTROL BOARD Order No.T4/TNPCB/F.1/BMWM/2020 Dated 25.02.2020

Pre-treat the laboratory waste, microbiological waste, blood samples
and blood bags through sterilisation or sterilization
on-site

C. PRODUCT TECHNOLOGY:

- Microwaves are non-ionizing electromagnetic waves with frequencies between 0.3 and 300 GHz.
- When irradiating living organisms, the absorption of microwave energy by cell, causing them to vibrate, these vibrations leads to the heating of the cellular components.
- The disintegrating effect of microwave irradiation is instant, where the intensity of the cell wall damage is proportional to the total absorbed microwave.
- Microwaves generate extreme heat directly inside the exposed cells. The stimulated internal molecular heating provides extraordinarily high levels of sterilization.

D. PRODUCT APPLICATIONS:

100 % **STERILIZATION** of all kinds of

- Medical and Lab waste
- Blood Bags
- Linen
- Dialyzer
- Plastic Catheters
- OT Consumables
- Bactec (BD) bottles
- N95 masks, PPE kits

E. PRODUCT BENEFITS:

- Ultra Low Power consumption
- Highest Efficacy
- Best Safety features
- No Maintenance
- No Emission and Pilferage
- No Chemicals
- No Skilled Labour
- Mobile device
- Real-time IOT audit
- Automatic Process Recorder

F. TECHNOLOGY BENEFITS COMPARISION:

S. No.	Parameters	Microwave (Optimaser)	Autoclave	Remarks
1.	Sterilisation cycle duration	20-45 Mins	90-120 mins	50% less cycle duration
2.	Level of disinfect	10 log 8 – 10 log 10	10 log 3 – 10log 5	Higher efficacy
3.	Power consumption	1.5kw/hr	10kw/hr	Microwave- 85% less power consumption with zero additional equipment support like secondary boilers
4.	consumables required(Reccuring cost)	Only 8 ltr. water/day	3000 ltrs Water + ETP + Softener + Boiler	Very very low running cost
6.	Skilled labour required	No	Yes	Microwave - fully automated does not required a skilled labour
7.	IOT Enabled	Yes	No	Internet centralized control & real time audit
8.	Practical utilization in suburban & Rural areas.	Yes 1.5Kw. low footprint, Solar Connectivity	No 10 kw, dedicated room, no solar connectivity	Autoclave require very high & Skilled manpower which is impractical in suburban & rural areas
9.	Mobility (Onsite Treatment)	Yes	No	Microwave-Mobility which is essential to maintain point of care sterilisation
10.	Metal corrosion	Nil	Very high	Autoclave-corrosion/ contamination occur due to water based sterilisation process.
11.	5 year cost per installation	Rs. 22 lacs	Rs. 34.5 lacs	Autoclave is almost 55% more expensive

ADDITIONAL BENEFITS ON MICROWAVE TECHNOLOGY vs AUTOCLAVE:

- 1) No charing of sugar & Carbohydrates in samples
- 2) Proper Serum & Cell Culture Media Sterilization
- 3) Plastic Fibres Treatment
- 4) 10 log 10 Super Sterilisation - Fully effective to handle covid contaminated waste

5) EFFECTIVE STERILISATION OF BLOOD BAGS:

- Microwaves penetrate through most of the material including plastics. As blood bags are made of PVC and blood coagulates upon heating, hence, convective or conductive heating methods (autoclaves) takes lot of time to kill microbes.
- Microwaves are most suited for sterilisation of thermally non conductive materials such as plastics, textiles, fibres, etc. and also microwaves action on microbial cells combats limitation of sterilisation due to coagulation.

6) EFFECTIVE STERILISATION OF CULTURE MEDIA BOTTLES:

There is a strong Interaction between microwaves and charged atoms. Since, culture media bottles contain charged resins and thus, show strong interaction with microwaves leading to excessive heating & instant sterilisation.

7) EFFECTIVE STERILISATION OF Tuberculosis WASTE DISPOSAL:

- Microwaves have high penetrative power and higher ability of microbial cells to absorb microwaves, the sterilisation cycles is very quick for microwaves.
- Since microbial cells contain at least 60 % water, they absorb microwaves and are killed almost instantly. Microwave can achieve a 10 log microbial and sporicidal reduction at 70°C in a 20 min exposure time.

G. EVALUATION TESTING:

The following samples and corresponding Sterilization process was done

DATE	SAMPLES
20/04/2022	Lab waste sterilisation
20/04/2022	Biological Indicator vials
15/06/2022	Blood bags sterilisation
16/06/2022	Linen sterilisation

Lab samples of urine, blood were taken for efficacy testing randomly and multiple sterilisation cycles were conducted randomly on different days.

The above samples which has growth in microbes are disinfected using Medical waste, Lab waste, Bactec bottles - cycles in OptiMaser and after the sterilisation, the samples were streaked into plates and incubated for 24 hrs and when analyzed, there is no growth.

H. ACCREDITATIONS:

1) Microwave Technology were also accepted by Delhi Pollution Control Board DPCC, Maharashtra Pollution Control Board MPCB, Karnataka Pollution Control Board KPCB and NACO

2) OptiMaser product provides sterilisation of 10 log 7-10 log

10, highest sterilisation possible against major pathogens duly authenticated by renowned institutions - **AIIMS, Haffkine, Bharat Serums, Apollo Hospitals, ESIC etc.** across the country.

3) REUSE of N95 MASK & PPE KIT: OptiMaser successfully kills the H1N1 virus which, as per ICMR, has the same gene composition as the Coronavirus. We have successfully tested cycle for Reuse of N95 mask at AIIMS Jodhpur and this first in his own kind who has got the test certificate to Reuse N95 mask & PPE Kit in entire country.

Honorable Prime minister on June 17th 2020 also acknowledged the technology through his tweet.

Former WHO Chairman Dr. Harsh Vardhan also in his tweet said that the equipment will help in saving on the cost of new Personal Protective Equipment (PPE) kits and masks and also save the environment as bio-medical waste will be reduced.

4) Microwaves are far more resource efficient **(55% COST EFFECTIVE)** than autoclaves - as mentioned in

- **Dr. Aruna Sharma IAS, Secretary** Ministry of Electronics & Information Technology MeitY vide letter No.2(5)/97-H&B (Vol.II).
- **AIIMS - New Delhi** (End user) evaluation comparison study

5) OptiMaser is also well accepted and adopted by many prestigious hospitals across the Country **Pan India AIIMS, ESI & ESIC, NIV - PUNE, BSF, NITB, Railways**

6) OptiMaser is established as the **most potent methodology** to treat the **Corona virus in Hospitals for contaminated waste** as well as for Quarantine center for contaminated Linen & Hospital-ware.

1: **CONCLUSION** :

The OptiMaser is significant in the following aspects,

- 1) Out of the various available options for onsite waste treatment viz. autoclave, Chemical, hydroclave, dry heat technologies & amp; etc. These methods whole in existence for many years have left a lacuna for an efficient, resource conscious & environmental friendly method of waste management. Microwave holds the potential and key to this problem. It has the power of 3 of 3E's - Efficiency, Economy & Ecology.
- 2) OptiMaser machine is a beautiful amalgamation of vision, technology & research which provides **100% pre-treatment/sterilization** of all medical Items which **minimizes the pre-possibility of spreading Infection** and reduces hospital acquired infections due to such untreated highly infectious waste.
- 3) OptiMaser a Mobile Microwave Based Medical Waste Sterilisation System (MMDS), encapsulating the high end technology of using short wavelength, high frequency radiations and thus bringing about an absolute sterilization and a major temperature rise.
- 4) OptiMaser is mobile, **100% cost effective and highly efficient, easy to handle device** that takes care of the infectious medical waste without emitting any harmful chemicals or gases.

5) OptiMaser is Tested and Proven for **360° sterilisation** in which Microwaves penetrates all the materials at molecular level and hence no blind spots inside the sterilisation chamber.

6) **SUPERBUG KILLER:**

Drug resistant strains which have a high mortality rate were able to infect people that had recently visited a hospital. It's alarming that such MRSA are spreading to people who have had no contact with any health care center for over three months.

Since microwaves are physical method of sterilisation, all strains of S.aureus including MRSA can be effectively killed by this technology.

7) **EFFICIENT STERILISATION OF BLOOD BAGS IN BLOOD BANKS:**

Materials absorbing microwaves are heated uniformly, producing volumetric heating effects and **combats limitation of sterilisation due to coagulation**. This property makes the microwaves more suitable for sterilisation purposes in comparison to convective or conductive heating methods (autoclaves)

8) **EFFECTIVE STERILISATION OF LINEN in CSSD:**

Microwave technology provides an efficient and quick solution to the linen sterilisation process. Short time cycle of OptiMaser sterilisation renders the Linen absolutely safe for washing & reuse. Even washed & ready to use Linen can be flash Microwaved before use for **absolute patient, doctor's safety at minimal cost of time**.

9) **EFFECTIVE STERILISATION OF Tuberculosis WASTE DISPOSAL in TB wards:**

Since, TB is an airborne infection; the entire passage through which waste is carried becomes infected. This also poses a serious threat to workers handling such waste. Thus there is an urgent need for a technology that can be used in isolated or quarantined wards for the pretreatment of such waste before being carried for final disposal.

Microwave technology for sterilisation of such waste is **highly effective and promising, green technology** with several above mentioned advantages and since microbial cells contain at least 60% water, they absorb microwaves and are killed almost instantly because of thermal and non thermal effects of microwaves.

J. REMARKS:

I am completely satisfied with the product and functionalities of OptiMaser and it will make state Healthcare facilities to be 100% BMM compliance and reduce the stated disease burden, by significantly decreasing the infection acquired ailments and contribute to make the state, infection and epidemic free and thereby saves millions of lives and cost to the state exchequer since it is **highly cost effective and efficient compared to old technology autoclaves**.

Looking at the above scope of the product I recommend to implement OptiMaser in all the healthcare institutions in the state.

SIGNATURE:


Joint Director of Health Services,
Perambalur District - 621 212.

Joint Director of Health Services

Perambalur

National Health Mission - Tamilnadu

From
Dr. Darez Ahamed., I.A.S
Mission Director,
National Health Mission - TN DMS
Annex Building, Teynampet,
Chennai-600 006.

To
1. The Dean,
Madras Medical College, Chennai
2. The joint Director of Health
services, Perambalur

Ref. No. 442181/NHM/E2/2021 Dated: 17.12.2021

Sir,

Sub:	NHM-TN - Request for product demonstration of OptiMaser world first mobile microwave Medical waste sterilisation system towards the compliance of Pre-treatment of Bio-Medical waste -Requested to evaluate and to furnish the remarks - Reg	
Ref:	1.	Instruction from Mission Director NHM on 16.12.2021

In order to strengthen the Biosafety management services, it has been proposed to have a demo on new mobile microwave Medical waste sterilization system. It was made mandatory as per the BioMedical waste Management Rules to pretreat Lab waste, Blood bags, Blood samples and highly infectious waste samples on site.

It is an alternative Non burn technology for point of generation sterilisation and sterilization of Bio Medical waste. The details of the product are enclosed for further reference.

Hence, the Dean, MMC, Chennai and the JDHS, Perambalur are requested to allow OptiMaser to demonstrate this product in their institutions (Institute of Biochemistry, MMC, Chennai and Govt. Head Quarters Hospital, Perambalur) and kindly evaluate and furnish your remarks for the same.


For Mission Director

Copy to:

Forsta Medtech Pvt. Ltd., New Delhi