NAGMAGIC®

Over 50 Years Of Delighting Customers

BIO-DIGESTER

EFFECTIVE SEWAGE TREATMENT FOR AN ECO-FRIENDLY FUTURE

A breakthrough in hygienic, convenient sewage treatment

A Swachhta Status Report released in 2016 by the National Sample Survey (NSS) states that over half of rural and semi-urban India chooses to defecate in the open. In a country where sanitation underlines health, education and life, these numbers are a serious concern.

Poor sanitation is not only a sign of poverty, but is also one of the key reasons for it. Lack of proper sewage treatment leads to contaminated water and soil which further contaminates the food chain. Eventually, it creates a rippling effect of ill health which impacts productivity and the economy of our nation.

In the past, conventional solutions such as Dry Pit and Twin Pit Toilets, Septic Tanks, Soak Pits and Eco-San Toilets have proven to be inefficient, heavy on the pocket and have caused more damage to the environment than good. In fact none of these solutions actually treat the human waste. Instead, they act as storage reservoirs for disposal at a later stage or rely on Mother Earth to absorb the effluents, thus leading to more contamination. To battle the challenge, Defence Research & Development Organisation (DRDO), Ministry of Defence, Government of India, spent decades researching eco-friendly waste management techniques. They developed and deployed the Anaerobic Bio-digestion Technology for sewage treatment in toilets at Siachen Glacier for our defence personnel. After a successful run of more than 8 years, the Bio-Digester technology is now being used widely across the country.

K.K. Nag Waste Treatment Division are licensees of the DRDO Technology.
Product range:

1) Bio-Digester Tanks
2) Toilet Superstructures
3) Anaerobic Microbial Inoculum (AMI, commonly referred to as DRDO bacteria)
4) Reed Bed Systems

Bio-Digester Technology:

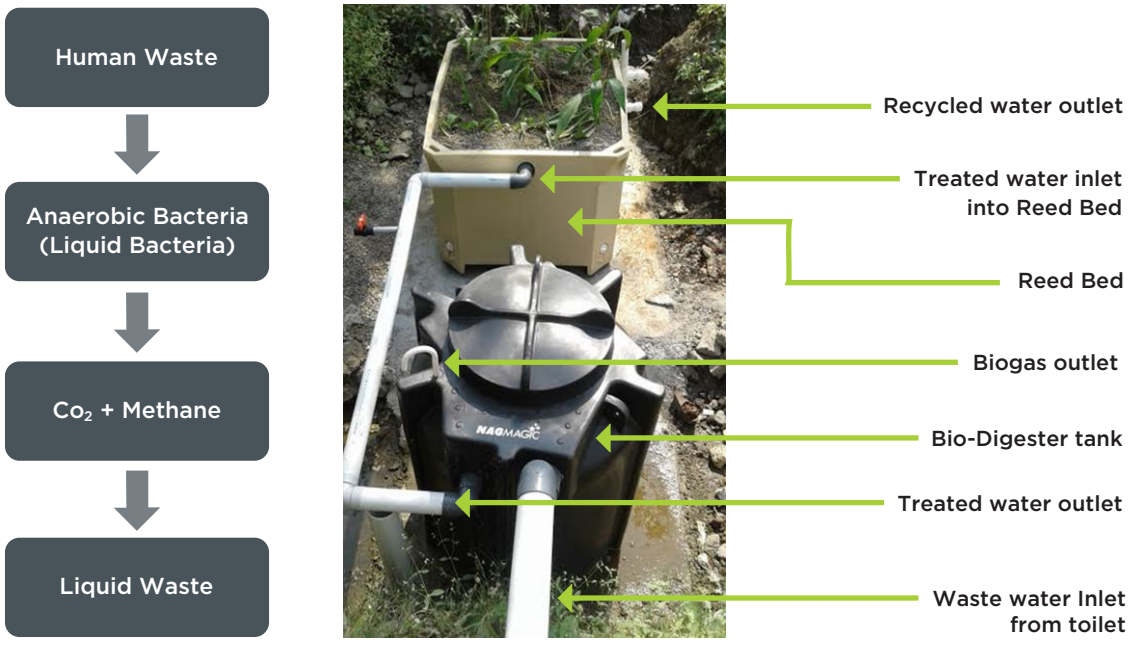
Psychrotrophic bacteria have the natural capability to survive on waste. Anaerobic Bio-digestion Technology uses these bacteria to break down the waste matter into usable water and gas through an anaerobic process. The zero-waste process is not limited by place or temperature (it works from 5°C to 50 °C), and does not need sewerage networks or sewage treatment plants (STPs). It is an on-site, independent system and does not require any major infrastructure.

The revolutionary on-site technology consists of two parts:

1. **The bacterial formulation known as Anaerobic Microbial Inoculum (AMI or DRDO Bacteria)**
2. **A specially designed tank called the Bio-Digester Tank (BDT)**

The BDT is connected to the outlet of the toilet and can be installed either above or below the ground. The sewage matter flows into the BDT from the toilet and the AMI treats it (digests it) into an effluent that is safe to discharge. The human waste matter is broken down into water, carbon dioxide and methane (biogas).

How a Bio-Digester System Works



When it comes to usability, BDT scores on several parameters:

High on hygiene:

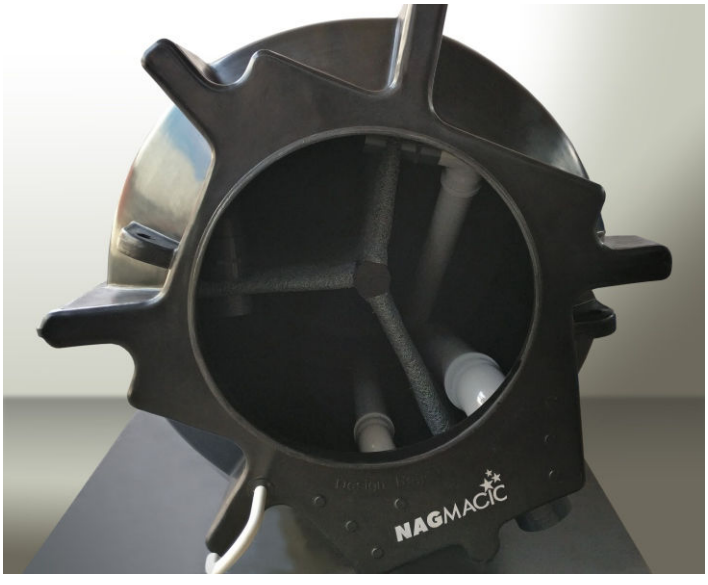
- BDT reduces pathogens by > 99% and organic matter by 99%
- The effluent released is non-toxic and usable for irrigation and gardening purposes
- Commercially available Toilet Cleaners such as Harpic, Domex, etc., can be used

Complete convenience:

- No moving parts means zero maintenance
- No de-sludging or cleaning needed
- Only one time addition of bacteria
- No clogging of the Bio-Digester Tank

Easy to maintain:

- No foul smell in toilets from the system
- No infestation of cockroaches and flies
- Human waste matter in the tank is not visible
- Effluent is free from odour and solid waste



Bio-Digester Tanks

To change the sanitation scenario in India over the long-term, a systemic value-chain approach is needed. With this vision in mind, K. K. Nag has joined hands with DRDO to introduce sustainable measures such as the maintenance-free Bio-Digester Tanks. These can be installed across environments, are customisable and cost-effective. They even use less water, which further strengthens their eco-friendly features and encourages adoption on a wide scale.

Specifications of Bio-Digester Tanks:

- Rotationally moulded, factory assembled, ready for installation
- Material of construction: Polyethylene
- Tank wall thickness: 7 mm (minimum)
- Heavy-duty poly-grass matting to ensure good formation of bacterial colonies
- 3 compartment design for complete digestion of faecal matter
- Lifting hooks for ease of handling
- Inbuilt vent pipe

Design Registration # 286483

Bio-Digester Tank Capacity Chart:

Sr. No.	Bio-Digester Tank Size - Litres	No of users in domestic setting	No of users in industrial setting	Tank Dimensions		First charge of AMI - Litres
				Dia (mm)	Height (mm)	
1	700	4 to 6	8 to 12	1,100	1,015	200
2	1,000	6 to 10	12 to 20	1,100	1,385	300
3	1,500	10 to 20	20 to 40	1,210	1,670	450
4	2,000	20 to 30	40 to 60	1,425	1,600	600
5	2,400	30 to 35	60 to 70	Two 700 litre tanks combined with one 1,000 litre tank		700
6	3,000	35 to 45	70 to 90	1,680	1,665	900
7	3,500	45 to 55	90 to 110	Two 1,000 litre tanks combined with one 1,500 litre tank		1,000
8	5,000	55 to 80	110 to 160	Two 1,500 litre tanks combined with one 2,000 litre tank		1,500
9	7,000	80 to 120	160 to 240	Two 2,000 litre tanks combined with one 3,000 litre tank		2,100

Bio-Digester Tank Performance Data: Compared to a Septic Tank

Working Features	Septic Tank	Bio-Digester
Waste Degradation	Aerobic dominant	Anaerobic
Waste Decomposition	Only 30%	Up to 99%
Maintenance	Periodic removal of sludge, to be emptied every 2 years as per IS 2470 norms	Maintenance-free
Mechanical Sludge Removal	Pumping device required	No sludge removal required
Discharge from Tank	Odorous, sludge formation and hazardous waste	Odourless, colourless and hazard-free waste (water only)
Space for 300 Users	Three times more than the Bio-Digester, hence costly to construct and occupies more space	One third space required compared to Septic Tank, hence economical and has a smaller footprint
Sensitivity towards Cleaning Agents	Cannot tolerate toilet cleaning agents	Bacteria conditioned to remain unaffected by cleaning agents up to permitted limits
pH	6.7-7.5	7.0-7.2
Turbidity (NTU)	500-800	70-90
Total Suspended Solids (mg/L)	150-300	90-120
TDS (mg/L)	500-850	350-450
VS (mg/100ml)	50-60	20-30
COD (mg/L)	1200-2000	250-300
BOD 5 (mg/L)	350-500	70-120
Coliforms (MPN/ml)	> 3,000	300-350

Source: DRDO

Our sanitation-based product suite includes components that affirm our commitment to benefit the environment and mankind. From DRDO Bacteria that treat human waste matter in the Bio-Digester to Toilet Superstructures that provide a complete solution, to Reed Beds that complement the system by providing secondary treatment.

Toilet Superstructures

A Toilet Superstructure comprises of walls, door, toilet pan, wash basin, plumbing and fittings and is delivered completely assembled and ready-to-use. This provides the user privacy, security and all necessary facilities within the superstructure: an all-in-one benefit that is the need of the hour. The Toilet Superstructures can even be offered along with a combination of urinals and bathing or washing facilities commonly known as Community Toilet Blocks.

We offer a range of Toilet Superstructures built with various material combinations, such as:

- Brick and Mortar
- Ferro-cement
- Glass Reinforced Cement
- Aluminium Composite Panel cladded over Steel Structure
- Fibre Reinforced Plastic (FRP)
- XPS Composite Panel Superstructure
- Rotationally Moulded
- Epoxy Polyester Powder Coated Steel
- Stainless Steel
- PP/EPS Insulated GI Panel

Our range of fittings for Toilet Superstructures includes:

- Indian/Western Type Pan
- Flush Tank
- Overhead Water Tank
- Exhaust Fan
- Tiling
- Solar Powered Light
- P-Trap
- Wash Basin
- Mirror

Configurations of our range of Toilet Superstructures are as follows:

- Single Seat: Independent Super Structure: Ideal for family use
- Multiple Seats: For community toilets
- Mobile Toilets: Mounted on trailers and moved to various locations depending on need
- Combination of Toilets, Urinals and Bathing Facilities customised as per specific requirements.

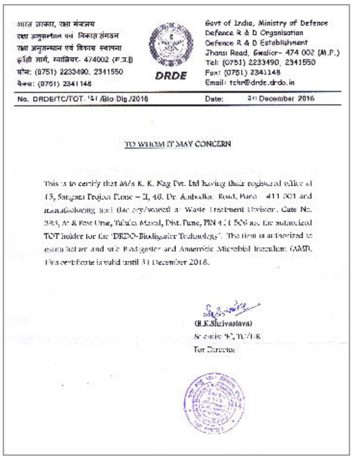
Anaerobic Microbial Inoculum (AMI or DRDO Bacteria)

The AMI consortium has been developed by DRDO. It is a mixture of different types of bacteria responsible for the breakdown of complex polymers into simple sugars, further broken down into low chain fatty acids and finally into biogas.

The AMI microbial consortium was developed by selecting desired groups of bacteria from a mixture of microbes through a process of natural selection. Several critical species of bacteria, sourced and isolated from cold regions like Antarctica, Leh and Siachen glaciers, were added to the AMI grouping along with Volatile Fatty Acid degraders to enhance its efficiency. The AMI microbial consortium can adapt and grow in extreme temperatures. It efficiently degrades waste at temperatures from as low as 5°C to as high as 50°C, making it an ideal option for all climatic conditions.

Specifications of AMI:

- pH: 6.5 – 8.0
- Biogas: > 50 % of total volume of flask after 48 hours
- Inflammability: Biogas generated is inflammable but not the AMI
- Percentage methane: > 40 % after 48 hours
- MPN for methanogens: > 10^3/ml or 1000/ml
- Total solids: 3 – 4 %



भारत सरकार, रक्षा मंत्रालय
रक्षा अनुसन्धान एवं विकास संगठन
रक्षा अनुसन्धान एवं विकास स्थापना
झाँसी मार्ग, ग्वालियर- 474002 (म.प्र.)
फोन: (0751) 2233490, 2341550
फैक्स: (0751) 2341148

DRDE

Govt of India, Ministry of Defence
Defence R & D Organisation
Defence R & D Establishment
Jhansi Road, Gwalior- 474 002 (M.P.)
Tel: (0751) 2233490, 2341550
Fax: (0751) 2341148
Email: tchr@drde.drdo.in

No. DRDE/TC/TOT- 141 /Bio Dig./2016 Date: 2? December 2016

TO WHOM IT MAY CONCERN

This is to certify that M/s K. K. Nag Pvt. Ltd having their registered office at 15, Sangam Project Phase – II, 46, Dr. Ambedkar Road, Pune – 411 001 and manufacturing unit (factory/works) at Waste Treatment Division, Gate No. 393, At & Post Urse, Taluka Maval, Dist. Pune, PIN 410 506 are the authorized TOT holder for the 'DRDO-Biodigester Technology'. The firm is authorized to manufacture and sale Biodigester and Anaerobic Microbial Inoculum (AMI). This certificate is valid until 31 December 2018.

(R.K.Shrivastava)
Scientist 'F', TC/TK
For Director

Reed Beds (Wet Lands)

Engineered Reed Beds can be optionally added in series to the Bio-Digester Tank for the secondary treatment of water generated from the Bio-Digester Tank. They comprise of a bed of sand and pebbles along with natural reed plants that can grow in wet areas and can withstand water-logging. Reed Beds improve the Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) of the effluent.

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Fax: (0751) 2341148
Email: tchr@drde.drdo.in

No. DRDE/TC/TOT- 161 /Bio-Dig./2016 Date: 20 December 2016

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(R.K.Shrivastava)
Scientist 'E', TC/HR
For Director

रक्षा अनु. तथा विकास स्थापना
Defence R & D Establishment
DRDE
Gwalior-474002
भारत / India
Ministry of Defence
रक्षा मंत्रालय

THE COMPANY WITH A VISION

K. K. Nag Pvt. Ltd represents more than half a century of pioneering enterprise. Headquartered in Pune, it is renowned for having introduced several innovative plastic products into India for the first time.

Its main line of business is Expanded Polystyrene (EPS) moulded packaging and components, which it manufactures at factories in Pune (at two locations), Puducherry and Chennai. It also processes other foamed plastics at these factories, and was the first to introduce Expanded Polypropylene (EPP) in the country.

The Company also specialises in the manufacture of rotationally moulded products in LLDPE and various other plastics, and has in-house facilities for PU foaming. In addition, it has its own tool room in Pune which designs and manufactures all the moulds that are used by its five plastic processing factories.

The Company's tryst with sanitation began at the turn of the century when it decided to contribute towards making sanitation available to all in India. It designed a special plastic pan and trap that had several unique features geared towards the needs of rural India, and sold them at highly subsidised rates to obviate the excuse that one could not afford to build a toilet. This CSR initiative has since grown into a full-fledged commercial activity with the latest product being a Bio-Digester that will replace septic tanks and will never require sludge removal or cleaning.

The Company is a strong believer in Total Quality Management, Customer Focus and Team Work, which has led to its products having won several awards, many against international competition. All the factories are certified for ISO 9001, ISO/TS 16949, ISO 14001 and BS OHSAS 18001.

K. K. NAG PVT. LTD
15 Sangam Project, Phase II
Sangam Bridge, 46 Dr Ambedkar Road
Pune 411 001, INDIA.

Tel.: +91 – 20 – 3026 9650
Fax: +91 – 20 – 3026 9651
Email: wtd@kknag.com
www.biodigester.in