DNV·GL

Certificate No:
MEDG00000D3

CERTIFICATE OF CONFORMITY – EC (MODULE G)

Application of: Directive 2014/90/EU of 23 July 2014 on marine equipment (MED), issued as "Forskrift om Skipsutstyr" by the Norwegian Maritime Authority. This Certificate is issued by DNV GL AS under the authority of the Government of the Kingdom of Norway.

This is to certify:

That the Shipboard incinerators

with type designation and serial number
MAGS V8 - V8.00025

Issued to
Terragon Environmental Technologies
Montréal QC, Canada

is, by design assessment and product verification, found to comply with
Regulation **(EU) 2017/306,**
item No. MED/2.7. Marpol 73/78 as amended, Annex VI Regulation 16, IMO Res. MEPC.244(66)

USCG Approval No: **N/A**
Further details of the equipment and conditions for certification are given overleaf.

Issued at **Høvik** on **2017-09-11**

DNV GL local station:
Montreal

Approval Engineer:
Pål Evang Nundal

Notified Body
No.: **0575**

for **DNV GL AS**

Vidar Dolonen
Head of Notified Body

0575/yyyy

0575: Notified Body number undertaking quality surveillance
yyyy: The year in which the mark is affixed

NORWEGIAN ACCREDITATION PROD 019

The product liability tests with the manufacturer or his representative in accordance with Directive 2014/90/EU. This certificate remains valid unless suspended, withdrawn, recalled or cancelled, provided this equipment is not modified without the acceptance of the notified body named herein.

This certificate authorises the manufacturer to affix the "Mark of Conformity" (wheelmark) to the product described herein.

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Product description

The incinerator is intended for installation onboard ships and other marine installations for incineration of garbage/ solid wastes and waste oil / 'sludge'. It is batch loaded. The bags of waste are loaded into a hot gasification chamber where synthesis gas is produced and burned in the combustion chamber at high temperature. The hot exhaust gases are redirected to the heat-exchange section of the gasification chamber. Terragon Environmental Technologies company is holding a patent for the principle of this incinerator. The unit needs beside fuel and electricity also water. The unit is producing heat which can be used for other processes. Similar to solid waste, these oils and sludge are fed to one of the MAGS Gasifiers at a controlled oxygen environment that will produce a mixture of volatile substances and syngas which combust inside the combustion chamber. A specially designed sludge oil injection system has been integrated with MAGS to control the rate of treatment, based on the oil and water content of these liquid streams.

PlC and Display
Hardware: Software version:
Advantech TPC 1251T, 2.4.1151-3222C3fbc2cd

Application/Limitation

TYPE	PARAMETER	MAGS V8	UNIT
MAGS V8	Oil sludge waste	20	l/h
	Calorific Capacity - Solid waste	50	kg/h

Type Approval documentation

Model/Type:	Dwg.No:	Rev./ Date :	Title:
MAGS V8	M0800-02000-00-00	00 / 2016-05-09	Lid assembly
	M0800-01000-00-00	00 / 2016-04-07	GCC Stainless Assembly
	M0800-03000-00-00	00 / 2016-05-09	Quench
	M0800-04000-00-00	00 / 2016-05-09	Mixer
	M0800-06000-00-00	00 / 2016-05-09	Auger and Char Box
	M0800-07000-00-00	00 / 2016-05-09	Diesel Delivery
	M0800-08000-00-00	00 / 2016-05-09	Burner
	M0800-09000-00-00	00 / 2016-05-09	Hot Frame, Step Assembly and Panel
	M0800-10000-00-00	00 / 2016-05-09	Cooling Tank
	M0800-51000-00-00	00 / 2016-05-09	Scrubber
	M0800-52000-00-00	00 / 2016-04-05	Separater Assembly
	M0800-53000-00-00	00 / 2016-04-05	Cold Skip Frame

Model/Type:	Dwg.No:	Rev./ Date :	Title:
MAGS V8	M0800-54000-00-00	A / 2016-05-26	Ring Pump and Piping
MAGS V8	M0800-55000-00-00	B / 2016-05-26	Vacuum Bypass
	M0800-57000-00-00	B / 2016-05-26	Process Loop
	M0800-58000-00-00	B / 2016-05-26	Separater Loop
	100D-8-00016-LAY01	2016-02-01	P&ID Bill of Material
	MAGS V8.16 & P ID	01 / 2016-03-08	MAGS V8.16 P & ID

Mechanical drawings with material lists			
Model/Type:	**Dwg.No:**	**Rev./ Date :**	**Title:**
MAGS V8	M0800-56000-00-00	A / 2016-05-26	ERU Heat Exchanger
	M0800-59000-00-00	B / 2016-05-26	Caustic Delivery

Electrical system and instrumentation layout and diagrams and list of components			
Model/Type:	**Dwg.No:**	**Rev./ Date :**	**Title:**
MAGS V8	MAGS 8_00016 CAB 1	1 / 2016-01-07	22 pages Electrical drawings
MAGS V8	MAGS 8_00016 CAB 1 BOM	1 / 2016-03-24	6 pages Parts List
MAGS V8	MAGS 8_00016 CAB 3	1 / 2016-01-08	6 pages Electrical drawings
MAGS V8	MAGS 8_00016 CAB 3 BOM	1 / 2016-03-24	3 pages Parts List
MAGS V8	100D-8-00016-GEN	1 / 2016-01-26	Cable Layout (6 pages)

Operation, installation and maintenance manual with drawings, electric diagrams, spare-part lists etc. and including routine maintenance			
Model/Type:	**Dwg.No:**	**Rev./ Date :**	**Title:**
MAGS V8		V1 / Dec. 2015	Operation and Maintenance Manual

Tests carried out

Model/ Type:	Location :	Date :	Title :
MAGS V8	Montreal, Canada	2016-07-12	Capacity and Emission Test
MAGS V8	Montreal, Canada	2016-08-19	Safety Control Test
MAGS V8	Montreal, Canada	2016-09-22	Visual Test

Marking of product

For traceability to this type approval, each incinerator is to be marked with:

- Manufacturer's name or trade mark
- Type designation or model identification
- Capacity (net design heat release)
- Serial No.
- Revision information, as applicable, for all firmware or software modules installed per hardware unit, necessary to identify the equipment, permanently marked somewhere on the final product

APPENDIX

Job Id: **344.1-007371-1**
Certificate No: **MEDG00000D3**

Capacity and emission test data

This is to certify that the shipboard incinerators listed below have been examined and tested in accordance with the requirements of the standard for shipboard incinerators MEPC.244(66) for disposing of ship-generated waste appended to the Guidelines for the Implementation of Annex V of MARPOL 73/78.

Incinerator manufactured by: **Terragon**
Montreal, Canada

Incinerator type and model: **MAGS V8, MAGS MV8**

Place and date of test: **Test area of Terragon in Montreal**

Max. capacity:
Solid waste: **50 kg/h**
Sludge waste: **20 l/h**

COMBUSTION CHAMBER AND FLUE GAS RECORDS

Type of waste / Parameters	*Solid waste kW*	*Sludge waste kW*
Average capacity	**48 kg/h**	**20 l/h**
Fuel consumption during gasification	**4.5 l**	**0.8 l**
O_2 average in combustion chamber/zone	**10.13 %**	**11 %**
CO average in flue gas	**33 mg/MJ**	**15 mg/MJ**
Soot number average	**0.24 Bacharach scale**	**1.0 Bacharach scale**
Combustion chamber flue gas outlet temperature average	**1050 °C**	**1081 °C**
Amount of unburned components in ashes	**4.2 %**	**4.2 %**