DNV·GL

Certificate No:
TAF0000050

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Equivalent Fixed Gas Fire Extinguishing System

with type designation(s)
ANSUL MARINE INERGEN FIRE SUPPRESSION SYSTEM

Issued to
Tyco Fire Protection Products
Marinette WI, United States

is found to comply with
DNV GL offshore standards
DNV GL rules for classification – Ships

Application :

Approved for use as a "total flooding" fire extinguishing system in enclosed spaces.
Minimum design concentration: 41%.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **2020-11-26**.

Issued at **Høvik** on **2015-11-27**

for **DNV GL**

DNV GL local station: **New York**

Approval Engineer: **Silje Helene Waagaard**

Petter Langnes
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Product description

"ANSUL MARINE INERGEN FIRE SUPPRESSION SYSTEM"
Is a fixed gas fire extinguishing system using fire extinguishing agent Inergen stored in cylinders and distributed through pipes and nozzles.

The extinguishing concentration and Ansul Inergen nozzles are covered by this type approval certificate. Documentation for the other system components shall be submitted and approved for each project.

The system is to be designed in accordance with IMO MSC/Circ. 1267 and the gas is to be produced by a maker certified by Ansul.

Physical Properties

Type designation:	INERGEN® 52/40/08 (IG541)
Composition:	Nitrogen (N2): 52% ± 10% Argon (Ar): 40% ± 10% Carbon Dioxide (CO2): 8% ± 5%
Specific volume @ 25 °C	1.39 kg/m^3
Design concentration, % [1)]	41.0
NOAEL [2)]	43.0 %
LOAEL [2)]	52.0 %

1) To be applied in conjunction with IMO MSC/Circ.848 as amended by IMO MSC/Circ. 1267, item 3.4.2.3.1
2) NFPA 2001 (2008 Edition) [IG-541]

Application/Limitation

The design concentration (based on oil fuel) shall be minimum 41 % (applied on a net volume) and the maximum agent discharge time shall be 120 seconds for 85% of design concetration. The extinguishing system shall be designed and installed according to SOLAS Ch. II-2, IMO MSC/Circ.848 as amended by IMO MSC.1/Circ.1267 and the Ansul manual.

The following additional limitations will apply:

A. Inergen is approved for use in engine rooms, cargo pump rooms (hydrocarbon only) and similar spaces. This certificate does not address use of the system for protection of cargo holds and cargo handling spaces for other cargoes than oil (alcohol, LPG, LNG). This will have to be considered by the applicable Administration on a case by case basis.
B. Evacuation time and warning procedures as per IMO MSC.1/Circ. 1267, 6.2 should be considered for each project. In no case should the design concentration exceed 52% (net volume, maximum expected ambient temperature).
C. Steel storage cylinders are available with size of 81 litre at 200 bar at 21°C. Cylinders being 81 litre or larger is only accepted when arrangements are provided on board to ensure that cylinders can be easily moved (even to shore) for service and recharging.
D. Cylinders are to be delivered with DNV GL product certificate, or equivalent certificates acceptable to the flag administration and class in question.
E. Cylinders to be located in a separate room in accordance with SOLAS Ch. II-2 Reg. 10.4.3, or distributed throughout the protected space in accordance with the requirements in IMO MSC/Circ.848 item 11as amended by IMO MSC.1/Circ.1267. When distributed within the protected space, the minimum extinguishing concentration (after anysingle failure) shall be 31.5 %.
F. Components in the system will be regarded as pressure class I with a maximum design pressure as per the hydraulic calculations for each project. Consideration will though be made for piping and couplings inside the protected space.

G. Nozzles type UL EX-4510 360° Discharge Nozzle and/or 180° Discharge Nozzle shall be used. These nozzles are made of brass and the average pressure at the nozzles is typically 100 bar.
   a. The nozzles are to be located in accordance with the Ansul Inergen Design, Installation, Recharge and Maintenance Manual. The maximum coverage height for a row of nozzles is 5 m. 360° Discharge Nozzle typically covers an area of 10m x 10m installed in the centre and 180° Discharge Nozzle (Sidewall) covers an area of typically 5m x 10m when installed in the centre of the 10m side.

H. Bilges (except open bilges in small volume engine rooms) are to be protected with a dedicated nozzle network.

The following documentation is to be submitted to the flag administration in each case:

1. Plans showing location of cylinders, piping, nozzles and release stations as well as the assembled system.
2. Inergen capacity calculations, including hydraulic flow calculations.
3. Plans defining release lines and alarm system.
4. Specification for piping, valves and other components in the system.
5. Ship specific release procedures and post discharge ventilation procedures.
6. The manual containing design, inspection, operation and maintenance procedures.
7. Control arrangements for closure of openings and stop of fans and any pressure relief devices as per IMO MSC/Circ. 848 as amended by IMO MSC/Circ. 1267, item 13. These plans can also be supplied by yard.

Testing at installations and periodical surveys

The system shall be tested as per maker's manual both at installations and at periodical surveys. The minimum test pressure is 1.5 times the design pressure.

The system is subject to inspections every 2nd year by an approved service supplier. The attending surveyor will also apply requirement relevant for flag administration and / or class on newbuildings and ships in operation surveys.

Type Approval documentation

Certification in accordance with Standard for Certification No. 1.2, Type Approval, January 2013.

Test report CG-D-02-99 dated December 1998 from U.S. Coast Guard Research and Development Center.

ANSUL Marine 200-Bar INERGEN System Design, Installation and Maintenance Manual, Tyco Part No. 432033-01, dated March 1, 2011, with revisions dated April 26, 2012.

Tests carried out

Tested in accordance with IMO MSC/Circ. 776 (IMO MSC/Circ. 848) as amended by IMO MSC.1/Circ.1267.

Marking of product

Main components in the system is to be marked with name of manufacturer, type designation and fire technical rating.

Periodical assessment

DNV GL's surveyor is to be given permission to perform Periodical Assessments at any time during the validity of this certificate and at least every second year. The arrangement is to be in accordance with procedure described in Standard for Certification no. 1.2 Item 4.