Certificate No: LR2376958SF-02
Issue Date: 30/11/2023
Expiry Date: 22/02/2028

Certificate Of Fire Approval

This is to certify that the product detailed below will be accepted for compliance with the applicable Lloyd's Register Rules and Regulations and with the International Convention for the Safety of Life at Sea, (SOLAS), 1974, as amended, for use on ships and offshore installations classed with Lloyd's Register, and for use on ships and offshore installations when authorised by contracting governments to issue the relevant certificates, licences, permits etc.

Manufacturer	**Kidde-Fenwal, Inc.**
Address	400 Main Street, Ashland, MA, 01721, United States of America
Type	Fixed Gas Fire Extinguishing System
Description	Fixed Fire Extinguishing System – Type: “Fluoroketone Fire Suppression Agent” for Machinery Spaces of Category A and Cargo Pump Rooms equivalent to Fire Extinguishing Systems required by SOLAS 1974 as amended, Chapter II-2/10.5 and 10.9.
Trade Name	Kidde Fire Systems ECS-500psi Fire Suppression System Marine Series for use with Fluoroketone Fire Suppression Agent (NOVEC 1230 or Fluoro-K)
Specified Standard	IMO MSC/Circ. 848 as amended by MSC.1/Circ.1267

This certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. The manufacturer should notify Lloyd's Register North America, Inc. of any modification or changes to the equipment in order to obtain a valid Certificate.

The Design Appraisal Document and its supplementary Type Approval Terms and Conditions form part of this Certificate.

This certificate remains valid unless cancelled or revoked, provided the conditions in the attached Design Appraisal Document are complied with and the equipment remains satisfactory in service.

Bruce McDonald

Technical Authority - Statutory to Lloyd's Register North America, Inc.
A member of the Lloyd's Register group

1330 Enclave Parkway, Houston, Texas, 77077,
United States

DESIGN APPRAISAL DOCUMENT

ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. LR2376958SF-02

The undernoted documents have been appraised for compliance with the relevant requirements of International Conventions, and this Design Appraisal Document forms part of the Certificate.

This Design Appraisal Document forms part of the Certificate.

This Certificate Supersedes and is an Amendment of Certificate Number LR2376958SF-01

APPROVAL DOCUMENTATION

Underwriters Laboratory of Canada, Test Report No. EX 4674 (Project 04NK23160), dated 1 February 2005 and Lloyd's Register witness report, dated 26 October 2004.

FM Approvals, Norwood, USA, Report PI 3026502, dated 24 March 2006.

Kidde-Fenwal Inc. and U.S. Coast Guard. CRADA, No. 04-CRADA-RDC-001, dated 16 November 2004.

File EX 4674 Test Record No.3 (on Page T3-1) dated 3 February 2005 and revised on 27 June 2012 confirming IMO MSC.1/Circ.1267 compliance.

06-237589-001 Rev AD Kidde Fire Systems ECS-500psi Fire Suppression System Manual Series for use with FloroKetone Suppression Agent.

TEST REPORTS

TEST RECORD NO. 1 File EX4674

DESCRIPTION FILE EX4674

CONDITIONS OF CERTIFICATION

1. This type approval is restricted to the fire extinguishing agent and arrangement of the nozzles only; approval of ancillary components is to be carried out at the design stage and suitable evidence of their approval such as Type Approval certificates are to be provided to the design Plan Approval authority and the attending surveyor.
2. The National Authorities of the vessel concerned are to accept the use of NOVEC 1230 or Fluoro-K as being acceptable for compliance with The International Code for Fire Safety Systems (Fire Safety Systems Code), Chapter 1, paragraph 4 and Chapter 5, paragraph 2.4 at the design stage. The manufacturers of the system are to advise, whoever they are contracted to, of this requirement at the earliest opportunity.
3. If the system is to be of the modular type, i.e., with the cylinders distributed within the machinery space, the National Authorities are to accept the arrangements with due reference to the Fire Safety Systems Code, Chapter 5, paragraph 2.1.2.2 and MSC/Circular 848, paragraph 11 of the Annex, as amended by IMO MSC.1/Circ.1267.

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4. The computation of the discharge time for each application is to be produced by the programme Kidde Fenwal Flow Calculation Software 06-237588-001 Rev AA dated Oct 2017 and is to be independently verified at the design stage. The system should be designed so that 95% of the extinguishing agent can be discharged in 10 seconds.

5. The quantity of Novec 1230 or Fluoro-K for the protected space is to be calculated at the minimum expected ambient temperature (which is to be no greater than zero degrees Celsius) with a minimum design concentration of 5.85%. The maximum concentration is not to exceed 10% (LOAEL Limit) at the maximum expected ambient temperature, (not less than 50 degrees Celsius). Other temperature ranges may be considered on a project-by-project basis, subject to agreement by the National Administration.

6. The design concentration is to be based on the net volume of the protected space, including the casing, the bilge and the volume of free air contained in air receivers that in the event of a fire, is released into the protected space. All objects that occupy volume in the protected space should be subtracted from the gross volume of the space. They include, but are not necessarily limited to auxiliary machinery, boilers, condensers, evaporators, main engines, reduction gears, tanks, and trunks.

7. The pressure at each nozzle is to be a minimum of 4.2 bar, at a maximum cylinder fill density of 1121 kg/m^3, for nozzle types: 360° and 180°. The drill sizes of each nozzle orifice, nozzle part numbers and the quantity of agent to be discharged from each nozzle is to be determined by the flow calculation program. Nozzles to be manufactured from ASTM B16 Brass or stainless steel.

8. 10% of the piping is to be tested to 1.25 times the maximum pressure likely to be experienced in service. For NOVEC 1230 or Fluoro-K systems, this equates to 1.25 x 40 bar (at 50 degrees. C) = 50 bar.

9. For systems with cylinders stored outside the protected space, with a manifold and distribution valve(s). The manifold pipework is to be tested to at least 1.5 times the setting of the manifold relief valve. The manifold relief valve is to be set at a minimum pressure of 50 bar and the minimum manifold test pressure is to be 75 bar.

10. All pipework including manifold and fittings should be of suitable galvanised steel or stainless-steel construction. Threaded joints in fixed gas systems shall only be allowed inside protected spaces and in cylinder storage spaces.

11. The arrangements and parts used in the system are to be in accordance with the manual 06-237589-001 Rev AD Kidde Fire Systems ECS-500 psi Fire Suppression System. This manual also contains recommended procedures for the control of products of agent decomposition, including HF vapour generated from fluorocarbon extinguishing agents which could impair escape. Note: The Design Installation Manual and addendums are for reference only; system installation is to be in accordance with the conditions of certification and general notes and to the satisfaction of the design plan approval authority and the attending surveyor. Additionally, where differences exist between the Installation Manual and the Certificate, the information in the Certificate must be considered correct and applied.

12. The means of control of the fixed gas fire-extinguishing system shall be readily accessible, simple to operate, and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there shall be clear instructions relating to the operation of the system having regard to the safety of personnel.

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13. Where agent containers are stored within a protected space, the containers should be evenly distributed throughout the space and the arrangement of containers and the electrical circuits and piping essential for the release of any system should be such that in the event of damage to any one power release line or container valve through mechanical damage, fire or explosion in a protected space, i.e. a single fault concept, at least the amount of agent needed to achieve the minimum extinguishing concentration can still be discharged having regard to the requirement for uniform distribution of medium throughout the space; and the containers should be monitored for decrease in pressure due to leakage and discharge. Visual and audible alarms in the protected area and on the navigation bridge or in the space where the fire control equipment is centralised should be provided to indicate this condition.
14. Arrangement drawings and calculations are to be submitted for acceptance in each case where it is proposed to install this system. Control panel schematics are also to be submitted. All principal components of the system are to be identified and their location indicated.
15. Suitable warning of the possible products of agent decomposition is to be posted at the release station and personnel advised not to enter the space without breathing apparatus and protective clothing until the space has been thoroughly ventilated. Warning should also be posted to say that the integrity of the space is to be maintained after release of the agent and that the products of decomposition and combustion are not to be vented into areas where personnel could be present.
16. Production items are to be manufactured in accordance with a quality control system which shall be maintained to ensure that items are of the same standard as the approved prototype.
17. The certificate holder is solely responsible for the products supplied under this Certificate and to ensure that their products, whether manufactured by themselves or their licensee manufacturers, if agreed by Lloyd's Register, are fully compliant with the relevant statutory regulations and Lloyd's Register Class rules as applicable and designed, manufactured and installed to the same quality and specifications as the prototype tested, including components that are designed and manufactured by third parties.

GENERAL NOTES

1. The system is to be designed in accordance with the Annex of IMO MSC/Circ. 848 as amended by MSC.1/Circ 1267. Revised requirements apply where agent containers are stored within a protected space.
2. All systems should be designed to allow evacuation of the protected spaces prior to discharge. Means should also be provided for automatically giving audible and visual warning of the release of the fire-extinguishing medium into any space in which personnel normally work or to which they have access. The alarm should operate for the period necessary to evacuate the space, but not less than 20 seconds before the medium is released. Unnecessary exposure, even at concentrations below an adverse effect level, should be avoided.

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3. Even at concentrations below an adverse effect level, exposure to gaseous fire extinguishing agents should not exceed 5 minutes. If a halocarbon agent is to be used above its NOAEL, means should be provided to limit exposure to no longer than the time specified according to a scientifically accepted physiologically based pharmacokinetic (PBPK) model or its equivalent which clearly establishes safe exposure limits both in terms of extinguishing media concentration and human exposure time.

4. The mechanical ventilation of the protected space(s) must be stopped before the activation of the fixed gas system and compartment closure arrangements should be designed to provide an agent hold time of at least 15 minutes. The release of an extinguishing agent may produce significant over and under pressurisation in the protected space. Measures to limit the induced pressures to acceptable limits should be provided.

5. The system should be supplied by both main and emergency sources of power, with the emergency power supply being provided from outside the protected machinery space.

6. The system pipework including flexible hoses, pipes, valves and fittings are to be approved by Lloyd's Register, in accordance with Lloyd's Register Rules, Part 5.

7. The storage system containers and associated pressure components, in particular, valves and fittings exceeding 7 bar, are to be designed and tested to codes of practice recognised by Lloyd's Register, indicating that they can withstand the pressure expected in service, having regard to their installed location and that they are suitable for the agent identified.

8. For cylinder head valves or actuators or other components of marine safety critical systems, which use retainer screws or similar arrangements for torque setting or other critical applications that are likely to change from its set position due to vibration, thus adversely affecting system functionality:

    - Screwed fastenings that are subject to vibration require a locking device to prevent them working loose.
    - If stroke length is determined by external stroke end stops, means shall be provided for locking the adjustable end stops.
    - For critical operations, positive locking arrangements are to be utilised.

9. Recommended procedures for the control of products of agent decomposition are to be provided. On passenger ships, the decomposition products should not be discharged in the vicinity of muster (assembly) stations.

10. Provisions should also be made to ensure that escape routes which may be exposed to leakage from the protected space are not rendered hazardous during or after discharge of the agent. Control Stations and other locations that require manning during a fire situation should have provisions to keep HF and HCl below 5 ppm at that location. The concentrations of other products should be kept below concentrations considered hazardous for the required duration of exposure.

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11. As longer exposure of the agent to high temperatures would produce greater concentrations of HF and HCl gases, the type and sensitivity of detection, coupled with the rate of discharge, should be selected to minimise the exposure time of the agent to the elevated temperature. The performance of fire-extinguishing arrangements on passenger ships should not present health hazards from decomposed extinguishing agents, for example on passenger ships, the decomposition products should not be discharged in the vicinity of muster (assembly) stations. Other mitigating steps include evacuation and donning masks.
12. Warning signs should be located outside each entry to the protected space(s).
13. Suitable means of checking storage cylinder pressure and weight to be provided.
14. The quantity and design concentration of the fire extinguishing agent and the nozzle configuration to be used onboard for each application must be in accordance with this certificate. The approval of all other system components and the final system installation onboard must be to the satisfaction of the of the design plan approval authority and the attending surveyors. On completion of the installation, final acceptance of the system is dependent on satisfactory survey.

PLACE OF PRODUCTION

Kidde Products Limited	Kidde-Fenwal Inc.
Station Road	400 Main Street
High Bentham	Ashland
Lancaster LA2 7NA	MA 01721
United Kingdom (UK)	United States of America (USA)

Bruce McDonald
Technical Authority-Statutory
Lloyd's Register Americas

Supplementary Type Approval Terms and Conditions

This certificate and Design Appraisal Document relates to type approval, it certifies that the prototype(s) of the product(s) referred to herein has/have been found to meet the applicable design criteria for the use specified herein, it does not mean or imply approval for any other use, nor approval of any products designed or manufactured otherwise than in strict conformity with the said prototype(s)