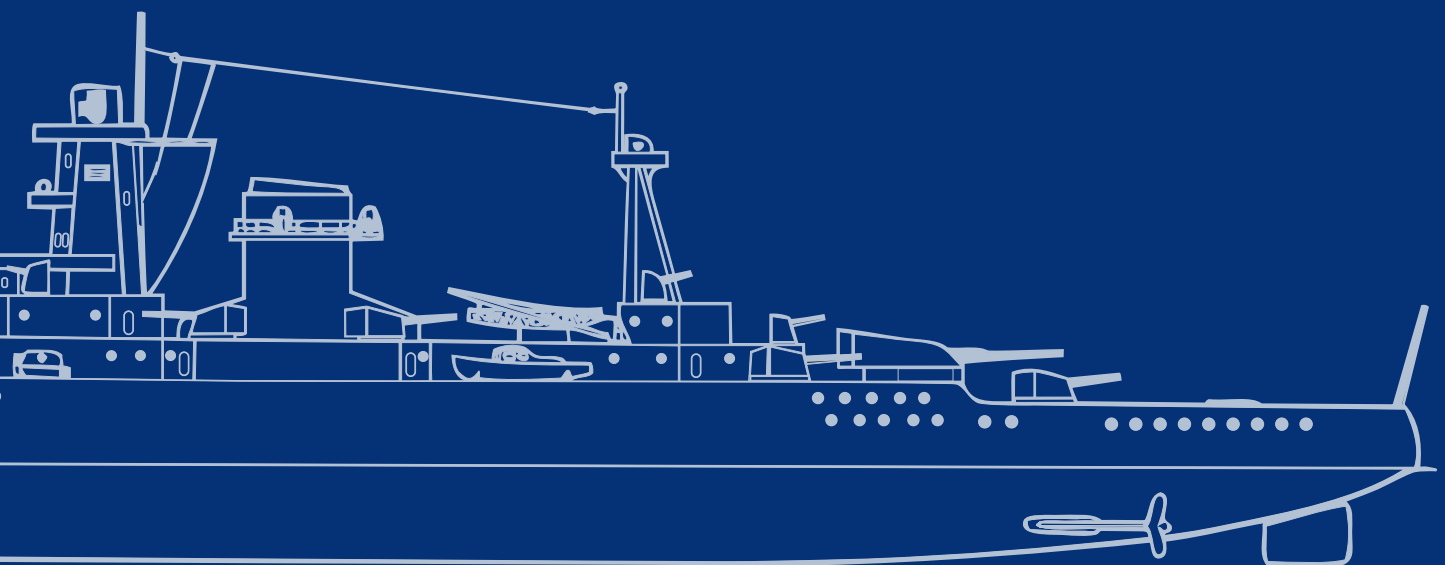




Navy Vessels

Danfoss Semco A/S

Total Solution Provider of Certified Fixed Fire Fighting Systems



Cover Page: *USS Independence* –protected with a Danfoss Semco SEM-SAFE® high-pressure water mist system

Total solution provider for navy vessels



Danfoss Semco A/S in Odense, Denmark.

Danfoss Semco has the experience and technological knowledge to provide you with reliable fire fighting solutions for even the toughest naval applications.

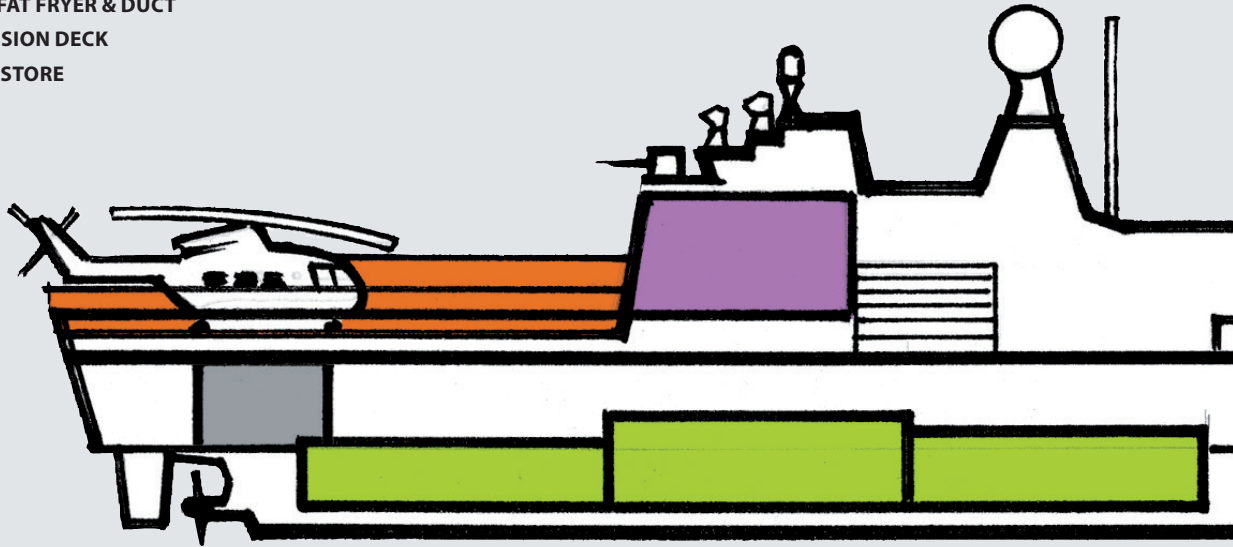
Being the total fire fighting solution provider, that we are; Danfoss Semco can help protect every corner of your ship against fire. Our team specializes in meeting your specifications, to supply precisely the reliable system you need.

Our variety of system types are designed in accordance with IMO/ SOLAS regulations and tested according to naval protocols which make us the safe choice within fire protection of naval vessels.



Reliable fire fighting for all of your ship

- MACHINERY SPACE
- ELECTRONIC ROOMS
- ACCOMMODATION AREA
- GALLEY DEEP FAT FRYER & DUCT
- HELIDECK/MISSION DECK
- AMMUNITION STORE



■ MACHINERY SPACE

High-pressure water mist system

SEM-SAFE® is a high-pressure water mist based fire-fighting system that utilise micro droplets released through nozzles in protected areas. It comprises a high-pressure modular pump unit, section valves to operate designated areas, piping and water mist nozzles. The system is safe, efficient and environmentally friendly. With small pipe dimensions, large coverage, minimal water consumption, a compact skid unit and simple design, SEM-SAFE® high-pressure water mist is the perfect choice to protect Navy vessels against fire, with reliability, low maintenance cost and crew safety in mind.

Machinery space is protected by a dry pipework system with manual activation. Bilge area is protected by either water mist or an AFFF (Aqueous Film-Forming Foam) system.

Argonite system

Argonite® used in Danfoss Semco fire protection systems is a non-toxic, non-corrosive, non-fogging, environmentally friendly extinguishing medium. In sealed spaces, the gas will extinguish (almost) any fire when the oxygen concentration falls below 15%. Argonite has been used since 1992 as an alternative to Halon 1301.

■ ELECTRONIC ROOMS

High-pressure water mist system

SEM-SAFE® high-pressure water mist is very suitable for the protection of electronic rooms, switchboard rooms and other rooms with sensitive electronic installation. The system has been tested and installed in computer rooms, server rooms and switchboard rooms without damaging running electronic equipment. The minimum protection rating of equipment installed in the room is IP23.

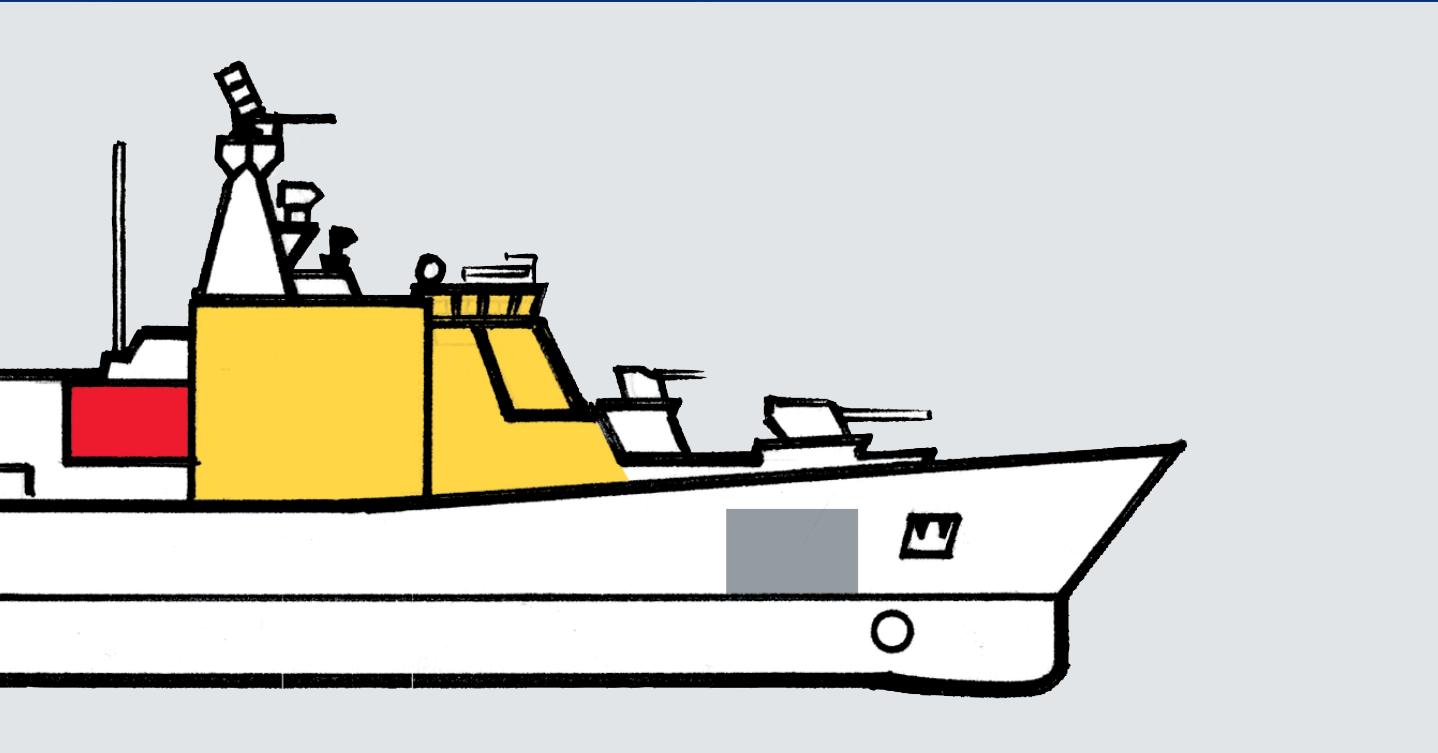
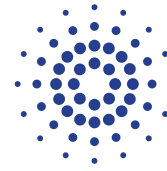
Normally a double knock pre-action system is used for protecting electronic rooms against fires. This provides you with added safety for your electronics in the unlikely event of accidental release. The piping system is dry and nozzles are closed. When a fire is detected and confirmed by the fire alarm system, the section valve of the SEM-SAFE® system opens and water flows into the actual section pipes. Only nozzles with bursted bulbs are activated. This means that only the areas affected by fire will be actively sprayed.

■ ACCOMMODATION AREA

High-pressure water mist

Accommodation areas can be protected with the same pump unit used for the total flooding and local application system, making this a simple and cost-effective fire protection solution. The system can be easily installed in any accommodation area, such as public spaces, storages, corridors and cabins.

In standby, the system maintains a nozzle pressure of 10-15 bar. The nozzles used in accommodation areas are usually the closed type with a glass bulb that breaks at a set temperature, e.g. 57° C.



■ GALLEY DEEP FAT FRYER & DUCT

High-pressure water mist system

Protection against fire in deep fat fryers and ducts is possible via direct connection to the pump unit used for other areas. The deep fat fryer and duct system enables super-fast extinguishing and subsequent cooling of oil to prevent re-ignition. The fine water mist evaporates before reaching the oil surface, thus eliminating the risk of hot oil splashes.

K5

Another alternative for protecting deep fat fryers is the fully independent k5 system that can be activated manually or automatically when connected to a heat sensor. Upon receiving a fire signal, the system immediately shuts off the power supply to the protected appliance(s) and simultaneously releases extinguishing liquid onto the fire. With a simple compact design in high quality stainless steel, the K5 systems are easy to maintain and integrate within the galley environment.

■ HELIDECK/MISSION DECK

Foam Monitors

Complete helideck fire fighting systems - can be delivered as a complete skid unit with all equipment integrated on a common steel frame or separate components for individual placement and connection.

All systems consist of a foam liquid storage tank, a mixture proportioning device, a foam liquid pump and a number of monitors and nozzles as well as handheld foam branches depending on the size

of the helideck to be protected or applicable rules. All systems are delivered with certified AFFF or protein type foam liquid.

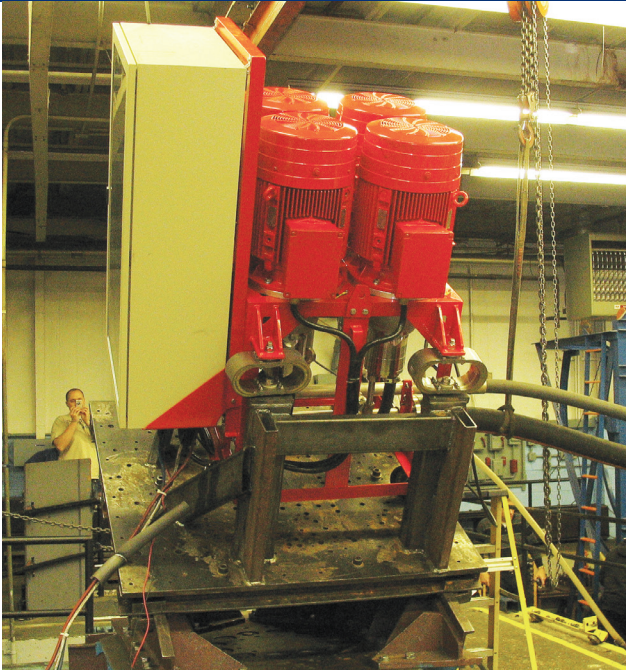
Pop-up nozzles

The system consists of the same components as a foam monitor system, however, with pop-up nozzles. When activated, nozzles pop up from the helideck and apply the fire fighting agent with a mixture of foam and water on the protected area.

■ AMMUNITION STORE

Drencher system

Rapid Reaction Spray System or RRSS is an automatic system activated by approved type detectors and supplied with seawater from the vessel's fire main and operated by automatic control valve (with manual intervention mode). Inside the magazine, the system is of dry pipe type, with open ended large droplet sprinkler nozzles capable of protecting deck area and wet down the bulkhead. Water application rates are according to requirements from authorities/owner.



The SEM-SAFE® unit while shock-tested for navy purposes.

SEM-SAFE® in short

When water is forced through nozzles at high-pressure, a super-fine mist is formed that has a two-fold extinguishing effect – it rapidly cools down the fire and starves the flame of oxygen to reduce damage and quell fires. This makes the SEM-SAFE® high-pressure water mist system a high performance solution, especially designed for the Navy.

Benefits of SEM-SAFE® high-pressure water mist

Tackles fires swiftly and efficiently

- The system can be instantly activated without the need to seal off and/or evacuate the area
- No need to close hatches and stop ventilation
- The system is harmless for the crew
- The maintenance of the system is minimal
- Reduced extinguishing time thanks to rapid and dense water discharge
- Immediately cools fires preventing reigniting
- High pressure water mist is documented to be harmless to electrical installations (IP23)
- For total flooding and local application, the SEM-SAFE® high-pressure water mist system is ready for use immediately after a fire

In-house design and production

- Danfoss Semco is the only supplier with in-house design and production of all three key fire fighting components: nozzles, pumps and section valves. This is a prerequisite for top quality high-pressure water mist systems
- With 30% fewer components compared to most competing systems, the SEM-SAFE® system is lighter and more compact. This allows for easier installation, simplified maintenance and valuable weight saving

Money-saving solutions

- With fewer nozzles required thanks to optimised spacing and the need for only one pump unit for all on-vessel applications, installation cost and time as well as required service interventions are considerably reduced
- The stainless steel pipes are extremely corrosion-proof and dirt resistant to prevent malfunctions, e.g. clogging that usually affects other types of pipes
- The high-pressure pumps are water-lubricated and hence virtually maintenance-free
- The small water droplets evaporate immediately during application. The result is minimal water damage to surrounding equipment and the environment, reducing operational downtime on board to a minimum

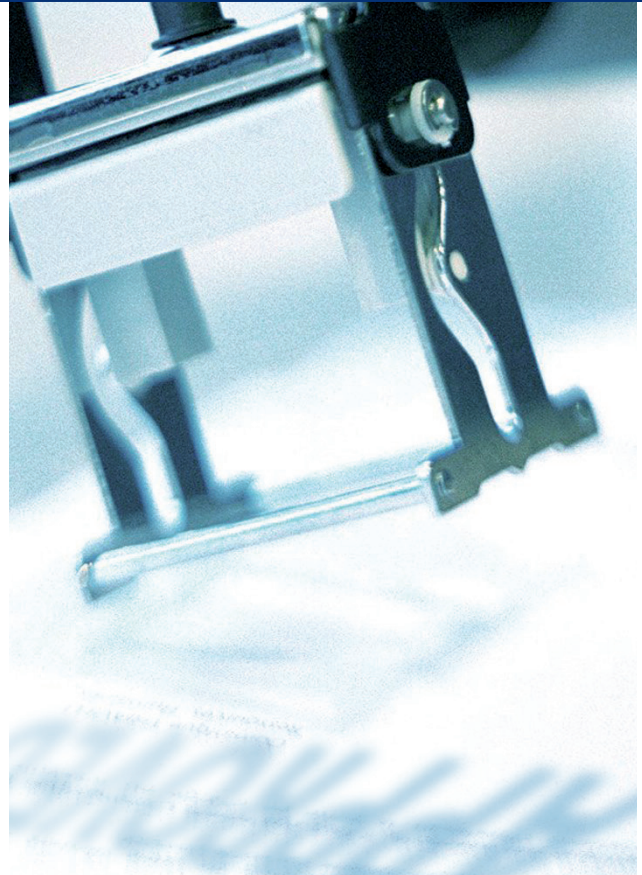
Tested and approved for battles

Based on intensive research, the Danfoss Semco fire fighting systems have been developed to fulfil the anti-shock and vibration requirements of military standards. In addition, the systems are designed in accordance with the following standards:

- NFPA 750 2012 edition -Standard on Water Mist Fire Protection System
- MIL-S-901D for Shock Resistance
- MIL-F-24385(F) for AFFF Liquid Concentrate
- MIL-S-167; equivalent mechanical vibration test is part of the IMO approval procedure
- IEC 60533 for EMI/EMC
- IMO MSC 800A and IMO MSC 265 for public and service area
- IMO MSC 1165
- IMO MSC 913 (1387)

Extensive reference list

Danfoss Semco has an extensive list of references within the navy segment; please see a few selected references below:



VESSEL CLASS	NAME	TYPE	SHIP-YARD	COUNTRY	YEAR
KDX-II / Okpo	Choi Young	Destroyer	DSME	South Korea Navy	2008
KDX-III / Sejong the Great Class	King Sejong	Destroyer	HHI	South Korea Navy	2008
LCS-4 / Independence Class	USS Coronado	Littoral Combat	Austal	US Navy	2012
Logistic Support Vessel	Pelikaan	Amphibious & diving operations and transport	Damen	Royal Netherlands Navy	2006
Logistic Support Vessel	Søløven	Amphibious & diving operations and transport	Faaborg	Royal Danish Navy	2011
Absalon Class	HDMS Espern Snarre	Support/Combat	Odense	Royal Danish Navy	2010
Dokdo Class	ROKS Dokdo	Amphibious assault ship	Hanjin	South Korea Navy	2007
Cape Class Patrol Boat (CCPB)	Hull 361 (Cape St George)	Patrol Boat	Austal, Australia	Australian Government	2012

Danfoss Semco A/S

History

Danfoss Semco A/S is a global leader in the sale, development, production and service/commissioning of certified fixed fire fighting systems. In 2006, two leading firms in the field, Danfoss A/S and Semco Maritime A/S, joined forces to form the present company, with Semco Maritime boasting over half a century of expertise in designing and installing fixed fire fighting systems. All the while, Danfoss has developed and delivered key components for the high-tech systems.

Today Danfoss Semco is an integral part of the Danfoss Group, Denmark's largest industrial manufacturing company with a daily output of more than 250,000 finished components. With more than 24,000 employees worldwide, Danfoss is truly a global company.

Business areas

Our company is located in Odense, Denmark, and operates three main business areas.

Our water mist division comprises two business areas: the marine division and the industrial and commercial division. The former has pushed the boundaries for development and design to offer a wide range of solutions for numerous application areas on almost any type of vessel.

Within the industrial and commercial area, Danfoss Semco has a successful track record with different applications, ranging from complex fire fighting systems for museums and heritage sites to industrial applications, office buildings and universities.

Our gas and foam division is the world's largest low-pressure CO₂ based fire fighting systems supplier for the marine industry. This division supplies gas, foam and dry chemical powder systems worldwide.

In-house manufacturing of key components

Danfoss Semco operates in-house research, development and manufacturing facilities of all critical components to ensure uncompromising performance and cost-effective systems. This puts us in a unique position to maintain our technological leadership in the future.

Proven experience

Danfoss Semco has supplied fire fighting systems to more than 1,500 vessels, including world class ships, such as:

- *Allure of the Seas* and *Oasis of the Seas*, the world's largest cruise liners
- *Mærsk Mc-Kinney Møller*, the world's largest container ship
- *HSC Fjord Cat*, the world's fastest passenger vessel and holder of the record for the fastest transatlantic voyage
- *Island Constructor*, ship of the year in 2008
- *Le Grand Bleu*, one of the world's biggest yachts



Destroyer for the South Korean Navy - "King Sejong" is fully protected with a SEM-SAFE® high-pressure water mist system.