

Technical description



Rapid response pumping systems for firefighting
Framo diesel-hydraulic fire water pumps

The Framo advantage

At Framo, we're driven by the simple idea that pumps should never be isolated from the task they perform. It's a belief that revolutionized marine cargo handling. And today it's creating new possibilities for faster, safer and more profitable business in the oil and gas industry.

It's also an idea backed up by experience. Framo has proud roots that stretch back to 1938, and marine customers have put their trust in our unique pumping technology for over 50 years.

But even more important is the trust that customers place in us. That's why we see our designs through from start to finish at our own facilities in Norway, where we test each project in full scale before delivery.

Framo customers know they receive full support throughout the service life of their equipment. No matter the problem, our experts can be dispatched 24/7 to any location worldwide, and they stay until the issue is resolved.

With a global organization of 1200 dedicated employees, we are a partner you can rely on.



Think outside the pump room

Pumps are the heart of oil and gas processes. But traditional solutions with a central pump room mean wasted space, added risk and higher operational costs.

Framo pumps are different. Submerged in simple side-mounted caissons, they eliminate both hull penetrations and the need for a massive internal pump room and extensive piping.

Powered with the unique electric Framo cable-free concept, submersible pumps also ensure increased uptime. This is thanks to a short, stiff rotating shaft that avoids excessive wear and tear.

The total result is an oil and gas pumping solution that reduces risk while saving both space and money. That's what it means to think outside the pump room.

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Diesel-hydraulic fire water pumps

Design philosophy of the fire water system

The fire water pump system shall be available, reliable and capable to operate for a specified time under specified conditions.

The system should be inherently self-contained, with a "fail-safe start" philosophy and should be continuously available.

Framo diesel-hydraulic fire water pump system

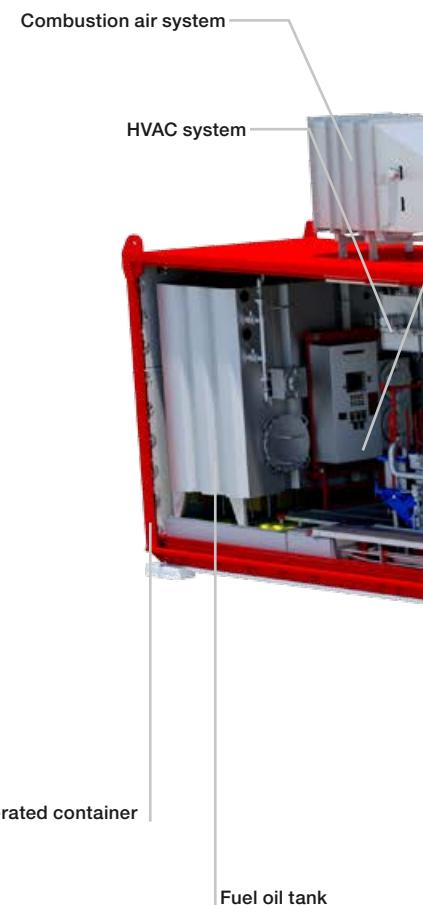
The Framo diesel-hydraulic fire water pump system is a self-contained unit including all necessary auxiliary systems. The system is designed for a specified number of hours' continuous operation at rated capacity under specified conditions.

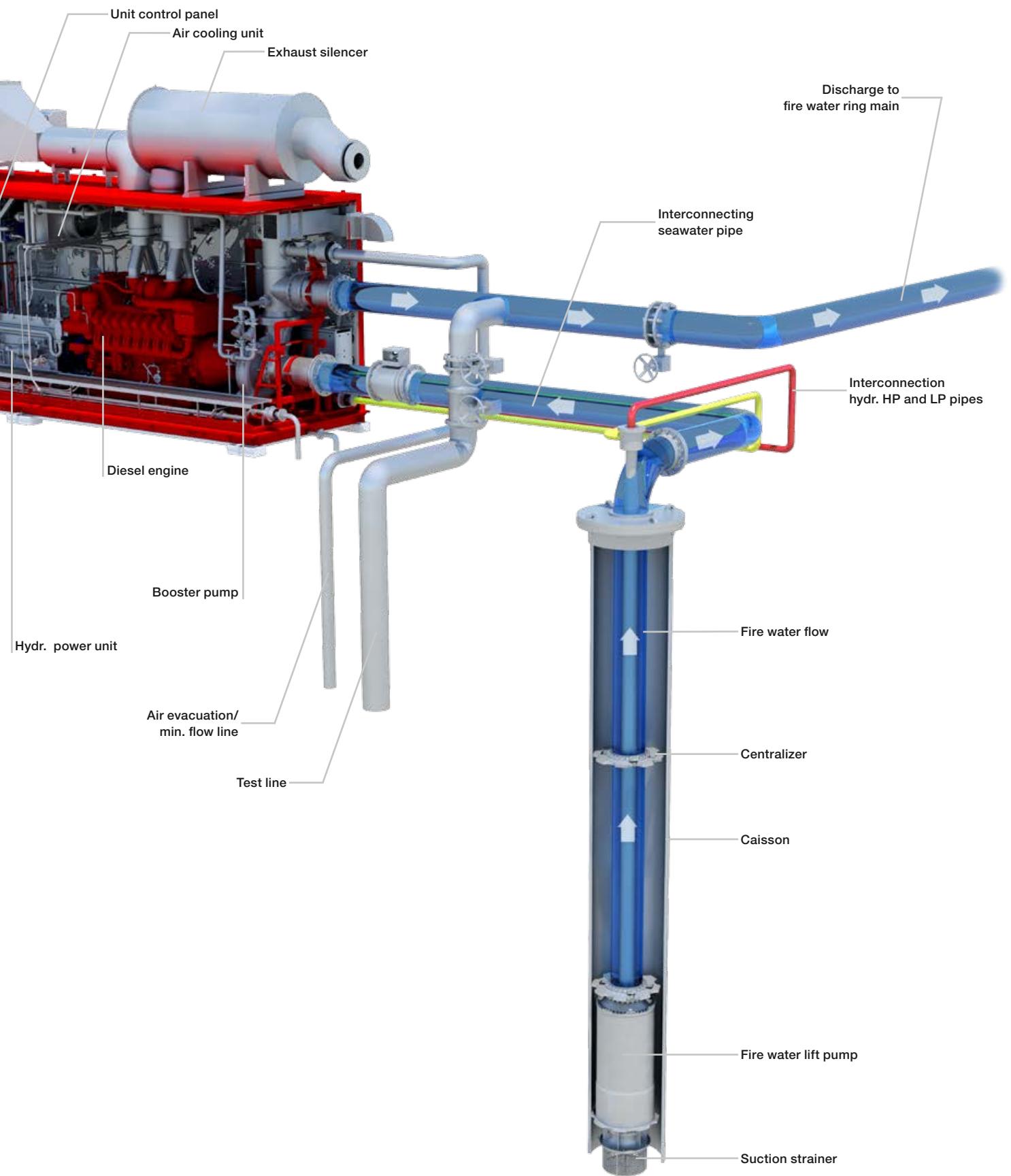
The Framo diesel-hydraulic fire water pump system is designed to meet the pump characteristics curve as required by NFPA 20. In the rated capacity, we have also allowed for system cooling water. If specified, the system can be designed and certified for hazardous area zone 2 operation.

The provision of fire water is ensured by the submerged hydraulically driven fire water lift pump supplying water to the direct-driven booster pump, which gives the required discharge pressure to fire water main header. This "split" design is chosen for system reliability, simplified maintenance and low torque at start-up.

The Framo diesel-hydraulic fire water pump system consists of the following main components:

- Hydraulically driven fire water lift pump
- Fire-rated container with the following main components:
 - Hydraulic power unit
 - Booster pump with air evacuation system
 - Diesel engine
 - Seawater cooling system for engine and hydraulic oil
 - Combustion air system
 - Exhaust system
 - Fuel oil tank
 - HVAC system
 - Air cooling unit
 - Unit control panel
 - Fire detection and extinguisher system





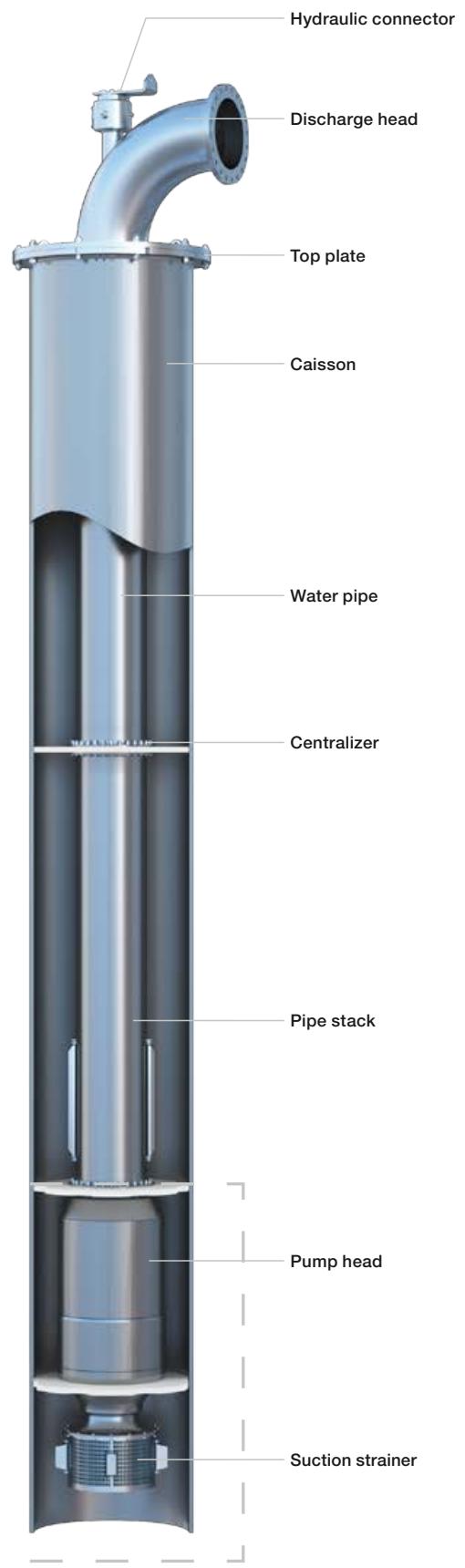
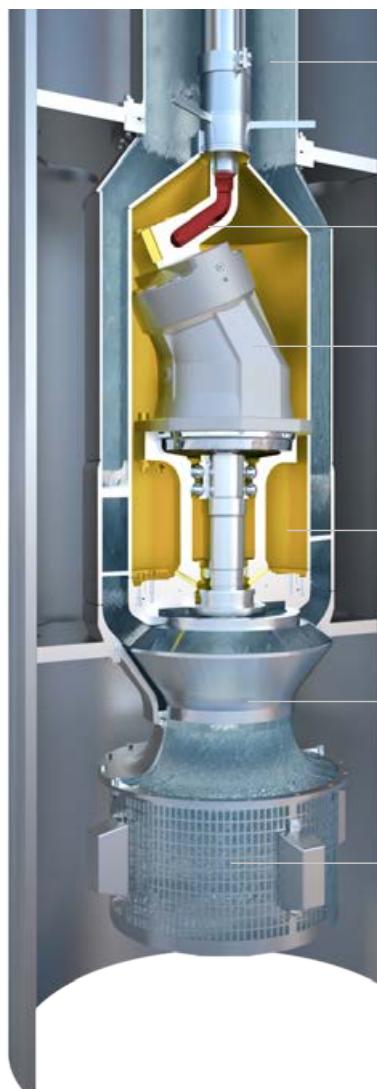
Hydraulically driven fire water lift pump

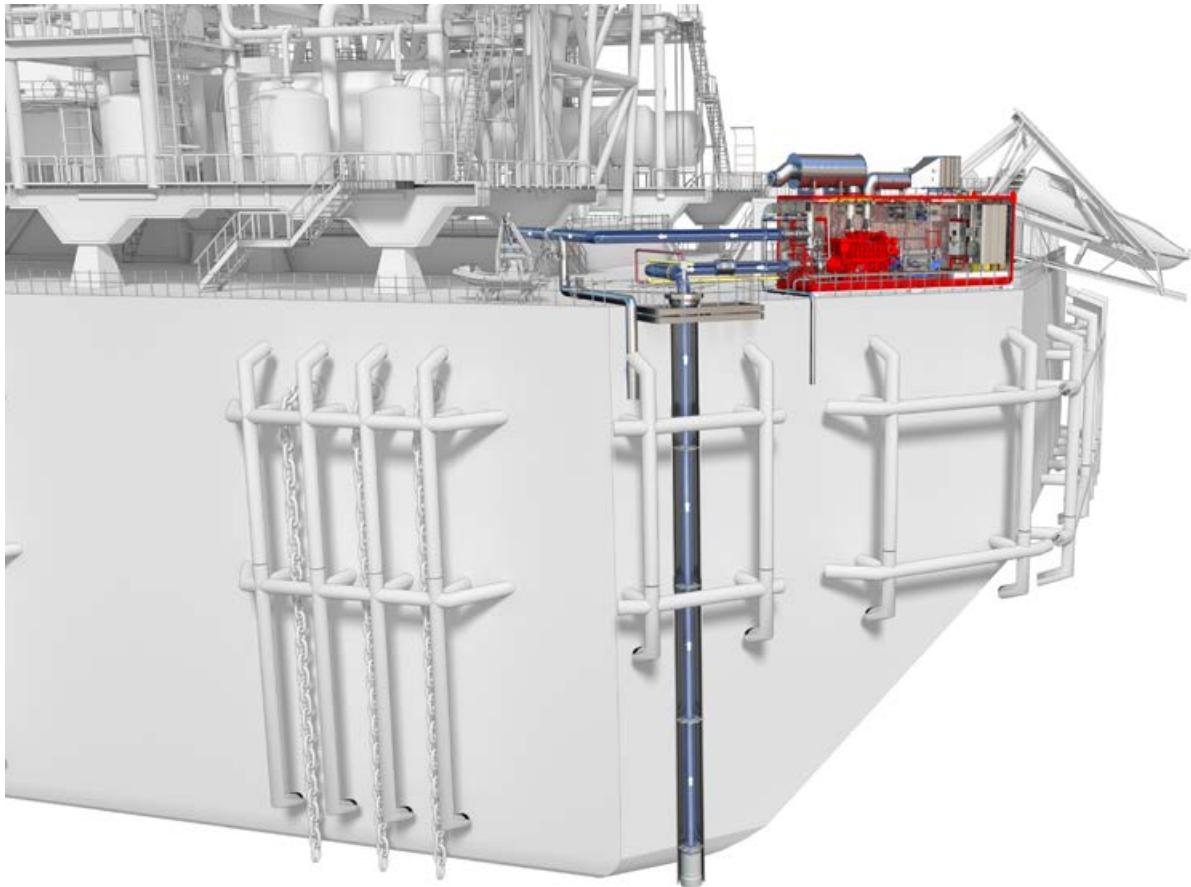
The submerged hydraulically driven fire water lift pump is a single stage centrifugal pump of short stiff shaft overhung design. To ensure maximum submergence under any operation conditions, the pump has an end suction design and is suspended in the water from the pipe stack. The pump is powered by the diesel engine driven hydraulic power unit.

The pump discharge water through the flanged pipe stack sections to the booster pump. The pipe stack sections are arranged with built-in concentric hydraulic transmission lines, with the water pipe surrounding and protecting the hydraulic transmission lines. The hydraulic high-pressure line is mounted inside the low-pressure line.

The hydraulic oil lubricates and cools all rotating parts in the fire water lift pump and is always on a higher pressure than the pumped media, hence preventing contamination of the hydraulic oil.

The fire water lift pump impeller rotates continuously at low speed (40-50 rpm) in stand-by mode. This ensures continuous availability and lubrication/heating of the fire water lift pump and preventing marine growth in the pump.





Fire-rated container

All the above deck-mounted equipment is installed in a fire-rated container. Fire ratings from A-0 to J-120 are available. The container is sized for housing the fire pump system with all required auxiliary equipment. The container consists of a base-frame and an enclosure, both designed for the specified fire and blast conditions. The container is designed for maximum convenience on maintenance both by the general layout and by mechanical handling beams and pad eyes. A removable panel is installed in the sidewall for dismantling and removal of the diesel engine.

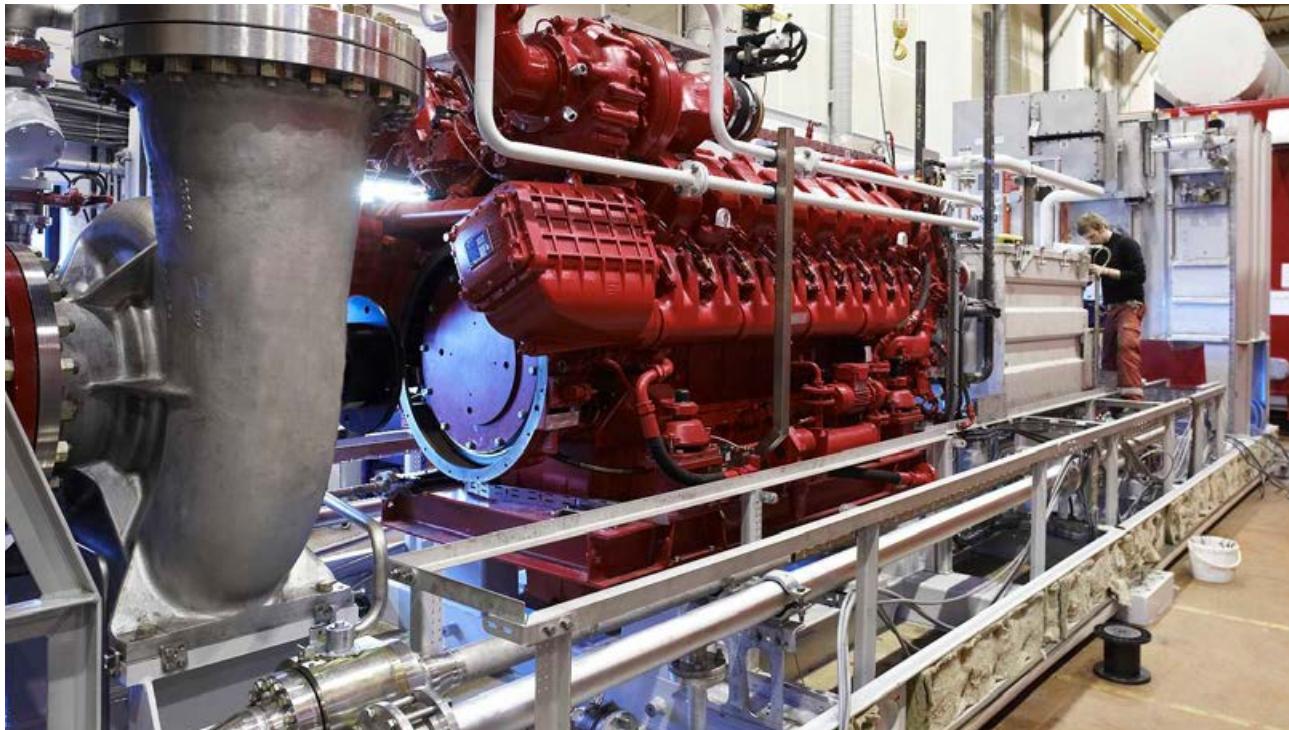
Hydraulic power unit

The hydraulic power unit is directly driven by the diesel engine via a flexible coupling. The unit powers the submerged hydraulically driven fire water lift pump. The hydraulic oil returns to the pump/hydraulic tank via a hydraulic oil cooler and a filter. To avoid overload of the system, a pressure relief valve is set at the desired pressure.

The hydraulic power unit is equipped with an electric motor-driven circulation pump. The circulation pump runs during system stand-by and provides condition monitoring, lubrication and heating of the hydraulic system. This ensures that the fire water pump is ready to start.

In duty mode, the hydraulic system also feeds the fan motor on the room cooler unit.

Diesel engine



The diesel engine is fitted with auxiliary equipment to comply with the requirements of NFPA 20, main classification societies and national authorities.

The start-up torque of the fire pump is low relative to the engine rating, as the booster pump is not engaged before water has been lifted to the deck level. The diesel engine is normally supplied with the following:

- Fire water booster pump drive arrangement from engine aft end
- Hydraulic power unit drive arrangement from engine front end
- Engine cooler(s)
- Engine auxiliary pre/post lubricating oil pump and jacket water pump with heater

- Engine start system; the following alternative starting methods can be provided in accordance with NFPA-20 requirements:
 - Electric battery start with chargers
 - Pneumatic start system and charge unit
 - Hydraulic start system and charge unit

Combustion air system

The combustion air inlet to the diesel engine is routed through the container roof or sidewall and is equipped with a low-velocity, two-stage filter coalescer. To comply with noise requirements, or if otherwise required, a combustion air silencer can be installed downstream of the air filters.

Exhaust system

The exhaust system can either be a dry-lagged or water-cooled system with the silencer horizontally mounted on the roof. The water-cooled system will ensure surface temperatures below temperature class T3. Arrangement for cooling of the exhaust gas to temperature class T3 by use of water injection downstream of the exhaust silencer can be supplied.

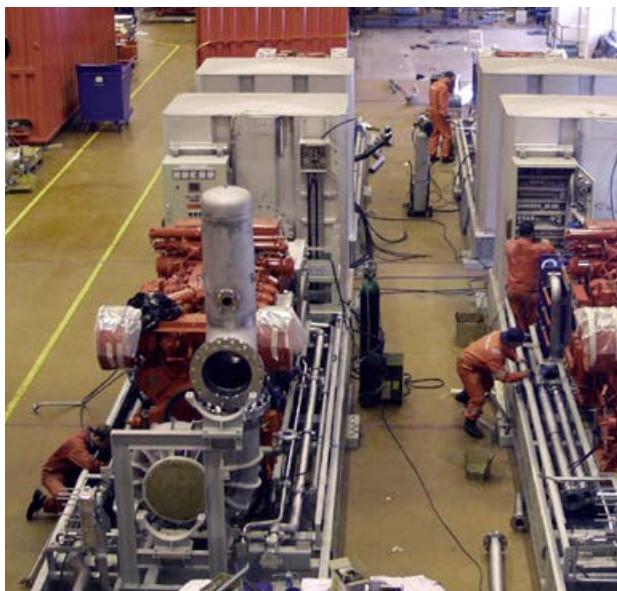
Fuel oil tank

The fuel oil tank is designed with sufficient capacity to operate the system for the specified numbers of hours at rated conditions.

The tank is fitted with flame arrestor, overflow line, level gauge and transmitter, sampling valve, filling valve and emergency shut off valve remotely operated from outside of the container.

HVAC system

To ensure ventilation of the fire water pump container, it can be fitted with an independent HVAC system or connected to the platform/vessel HVAC system. In both cases there will be an inlet fire damper and fire damper with an externally mounted louver on the outlet. The independent system will be complete with inlet louvre/coalescer/filter unit and fans. Heaters can be included for installations in cold environment. If required a pressure control damper can be installed in the outlet to maintain an overpressure inside the container.



Air cooling unit

A sea-water cooled air cooling unit with a hydraulically driven fan is installed to remove heat radiation from the container's internal equipment during operation. Thus, the temperature inside the container will be kept to an acceptable level during operation, even if the inlet and outlet fire dampers are closed.

Unit control panel

The unit control and distribution panel (UCP) takes care of both power distribution in the system and control and monitoring of the diesel-hydraulic fire water system. The PLC is a Framo standard type, and interface is based on hardwired signals. Serial link interface is available if required.

At front of the UCP an operator panel (HMI) is installed for displaying all rising alarms and other relevant messages. All alarms are acknowledged on the VDU. In addition, facilities for manual operation are provided in front of the UCP.

In stand-by mode the UCP is fed from the normal or emergency platform/vessel switchboard (UPS if applicable). During operation, the package will be fully automated, and UCP power is provided from internal package instrument batteries. Battery chargers for instrument battery and electrical start batteries (if included) are integrated in the UCP.

The UCP is available in different configurations depending on the hazardous area requirements.

The following sub-systems are part of the instrumentation system and connected to the UCP:

- Diesel engine (diesel engine manufacturer's standard instrumentation)
- Diesel engine start system
- Fuel oil tank level control
- Battery charger
- El. heaters (if applicable)
- Hydraulic system

Fire detection and extinguisher system



A fire detection and extinguisher system is installed to detect and extinguish a potential fire inside the container. The type of extinguisher system can be water mist, inergen or CO₂.

Supply of extinguisher medium can be from the main platform/vessel system or from dedicated supply sources. The combination of detectors (flame/heat/smoke) and type of extinguisher system can be included as specified.



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