This report presents the results from a series of full-scale experiments with different foam fire extinguishing systems designed to combat fires in ship engine-rooms. The project was divided into three parts:

1. Fire tests with foam sprinklers to extinguish pool fires in a machinery area.

2. Fire tests with foam sprinlers to extinguish high-and low-pressure oil spray fires in a machinery area.

3. Fire tests with-expansion foam against pool and spray fires.

All tests were carried out in a 60 m2 room with a 4,9 m ceiling height. The room was built in SP's fire hall. Mechanical ventilation was used in a number of tests. Various fire scenarios and design of the extinguising systems have been studied in more than 80 experiments. The main results from the three parts of the project are as follows:

* The AFFF sprinkler system controlled and suppressed the fire relatively rapidly after activation.

* No effect of the ventilation system on the extinction time were observed, regardless of the degree of ventilation

* The full-scale tests demonstrated that problems arose in the uninsulated sprinkler system due to the generation of steam inside the pipes, even when the sprinkler system due to the generation of steam inside the pipes, even when the sprinkler system was activated after relatively short pre-burn times (1,5 - 3 minutes depending on the fire size). These with insulated pipes showed no tendencies towards evaporation of the water.

Part 2 - Oil spray fires

The tests showed that a foam sprinkler system based on high-velocity full-cone jet nozzles effectively controlled or extinguished spray fires in the simulated engineroom. There is, though, need for great care in the design of the sprinkler system. It is of the utmost important that the water spray is well distributed over the hazardous area, so that full coverage is obtained. An equivalent water/foam density of 30-40 l min-1 m-2 is necessary to achieve a high enough level of safety for the worst scenario, of a high-capacity high-pressure oil flow burning at a location where the ignition source is hidden from the water spray. Howewer a lower water density will effectively controll the fire during the time it takes to stop the oil flow.

Part 3 - High-expansion foam in the extinction of pool and spray fires.

The tests showed that a high-expansion foam system with a net filling rate of 1 metre per min was capable of extinguishing the pool fires in the simulated engine-room. The extinguishing time in most tests was less than 1 minute after start of foam application.

When simulating a spray fire from e.g. a leaking fuel system, the efficiency of the high-expansion foam system was greatly limited and only under certain conditions could the fire be extinguished. Whether it would have been possible to extinguish these fires using a higher filling rate, higher expansion rate is a highly critical factor when the fire starts at an elevated position in the engine-room.