



UNITED STATES COAST GUARD

U.S. Department of Homeland Security

MARINE SAFETY ALERT

Inspections and Compliance Directorate

March 11, 2015
Washington, DC

Safety Alert 4-15

ENGINE ROOM OPERATIONS

Maintaining Machinery, Knowing Escape Routes, & Conducting Thorough Engineering Watches

Recently an engine room fire occurred onboard an older cruise ship while it was at berth. A fuel oil spray under pressure developed from an operating engine's fuel supply line when a bolted flange parted. The fuel spray ignited when it contacted the engine's exhaust piping or turbocharger components. The vessel's fine mist extinguishing system automatically activated and performed as designed extinguishing the primary fire. Fuel pumps and shutoff valves were also secured. However, the short-duration fire also ignited cable bundles, quickly filling the machinery space with smoke. As a result, one crewmember and two technicians were unable to egress and perished in the engine room.

Although the investigation is not complete and there is more to be learned, the Coast Guard is issuing this safety alert to: 1) reiterate the importance of vessel engineers being cognizant of and taking action on engine manufacturer technical bulletins and service letters, 2) remind personnel working in machinery spaces to have a personal exit plan no matter where they are working, and 3) stress the value of having engineers frequently perform detailed engineering space inspection rounds on engines, systems, and other equipment.

The ongoing investigation into the fire has revealed that a fuel line supply flange integral to the engine parted after three bolts completely loosened and the remaining bolt fractured. Other bolts within the engine's hot box were also found broken. The involved engine was a Wartsila model VASA12V32LNE also referenced as a VASA 32. It is a very common engine with thousands operating in ship and shore side service. Over its service life the manufacturer has produced a number of technical bulletins and service letters related to the fuel system piping, shielding of hot surfaces, other fire protection devices, and availability of components to meet SOLAS requirements. In its service letters Wartsila notes that fuel pipes leading to and from the injection pumps are subject to pressure pulses derived from the injection pumps, vibrations caused by normal engine vibrations, and static stresses caused by heat expansion. Any repairs or modifications to the fuel system must follow manufacturer guidance provided in associated manuals, bulletins, and service letters. Owners and operators may obtain engine bulletins and service letters through their Wartsila service representative and other OEM / engine manufacturers.

In this case, the loosening of these bolts may have been caused by vibrational loosening. It is unknown when the involved piping was last removed and reinstalled and whether or not proper torque was applied to the bolts.

Emergency egress was also identified as an issue during the fire investigation. Machinery spaces onboard cruise ships and other large vessels are complex spaces where an unfamiliar person can become quite disoriented, particularly during emergencies. Additional factors like the loss of all

power and lighting or excessive smoke can make rapid evacuation extremely difficult. There are simple steps to improve the odds of a successful escape. Before any work begins, learn the locations of available exits and escape routes in all directions (i.e. up and down levels and platforms, port and starboard). If there are watertight doors present review the procedures to manually open them if they should be closed. Also learn the location of Emergency Escape Breathing Devices (EEBDs) and review their proper usage and activation. Lastly and very importantly, always carry a good flashlight in your pocket. The light it provides may save your life.

An Oil Companies International Marine Forum (OCIMF) information document related to machinery space inspections and rounds states, "The widespread introduction of machinery automation and associated alarm and control systems has significantly changed the nature of operational practices on board vessels. The extensive use of computers, monitoring tools, and equipment has increased the volume and accuracy of data to the extent that there is a risk that the responsible officer may become insulated from the actual machinery status and performance." The full document is available on OCIMF's website: <http://tinyurl.com/OCIMF-PDF>. This reference is for informational purpose only and is not an endorsement.

The purpose of engineering personnel conducting rounds in machinery spaces is to identify and initiate intervention, preventative maintenance, and repair actions when unsafe conditions exist. Carefully accomplished, engineers will discover abnormalities as they occur, enabling them to minimize negative compounding events. Identifying discrepancies such as loosening bolts, leaking piping and flanges, excessive oil loss through poor seals and gaskets, failing pump seals, loosening of pipe brackets, inadequate lubricant levels, etc., are typical issues found when thorough inspection rounds are conducted. Each operating engine should be thoroughly examined several times a watch on all sides available noting potential leakages, loosening of components, proper drainage of air coolers, etc. All persons making rounds should be using very bright flashlights in the performance of their inspection duties.

As a result of this casualty, the Coast Guard **strongly recommends** that owner and operators of all types of vessels develop policy and procedures to ensure:

- They have up to date service bulletins and service letters for critical equipment, implementing the requirements specifically when such items relate to fire prevention and safety;
- That service vendors, technicians, crewmembers, or any persons working within machinery spaces understand their escape routes and available emergency equipment before they start work and;
- That all engineering personnel know how to perform effective and comprehensive inspections and rounds to detect abnormalities and problematic systems, equipment, and components as early as possible.

This Safety Alert is provided for informational purposes only and does not relieve any domestic or international safety, operational, or material requirement. Developed by the Sector San Juan Prevention Division and the Office of Investigations and Casualty Analysis, Washington DC. For questions or concerns, please email hqs-pf-flidr-cg-inv@uscg.mil.