

## Fires on materials made of fibre-reinforced plastic (FRP)

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A member reports that serious fires have broken out on vessels with fibre-reinforced plastic (FRP) materials.

### What happened?

The fires appear to have been caused by overheating of the FRP from hot exhaust systems.

FRP is combustible and introduces several challenges compared to traditional non-combustible materials. It is imperative that safety barriers and fire safety measures are in place.

## **Fibre Reinforced Polymer (FRP) materials ¶**

With the appropriate choice of resin, additive and fillers, Fibre Reinforced Polymer (FRP) materials can be used to make structures with clear fire performance benefits over many other materials. In addition, FRP composites generally are good thermal insulators, so they can significantly limit the heat of a fire spreading in the way that can occur with metals. In addition, FRP composites generally are good thermal insulators, so they can significantly limit the heat of a fire spreading in the way that can occur with metals. ¶

Source: Composites UK Trade Association  
<https://compositesuk.co.uk/> ¶

### **Incident 1**

A fire was thought to have originated in FRP panels above the exhaust in an area between the main engine room and the adjacent casing. Maintenance of the engines had previously been carried out, requiring removal of insulation. The fire was contained, but with extensive material damage.

### **Incident 2**

A fire had likely started in a compartment with direct access to open air and adjacent to an auxiliary engine room. The engine exhaust was routed through the compartment housing the silencer or muffler. A low-pressure cooling water alarm was experienced followed by a high temperature cooling water alarm, but without activation of the automatic engine shutdown. The vessel had to be evacuated and was declared a total loss

In both cases, there were no reported injuries to any persons.

## **What went wrong? What were the causes?**

The **immediate causes** of the fires were likely to be due to:

- A combination of missing insulation on FRP structural surfaces exposed to heat radiation or direct contact with hot exhaust parts and limited engine room ventilation.
- Overheating of exhausts could also develop suddenly due to insufficient cooling water.
- Issues with temperature sensors or the malfunction of the shutdown system.

The ignition point of FRP materials is typically around 275° to 375°C, which is relatively low compared to metallic materials, i.e. aluminium alloys or steel.

The typical operating temperatures of engines and exhausts can be considerably higher and there is an inherent risk of fire if safety measures are not satisfactorily arranged or managed.

## Recommendations

- Thorough and regular maintenance of machinery and associated parts, with regular check of known or potential hot spots and any signs of overheating.
- When removal of insulation is necessary during modifications or other work, the insulation should be correctly reinstalled and restored to at least the original condition.
- Adequate training of vessel crew for emergency preparedness.

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