Experimental assessment of the robustness in fire of lightweight ship bulkheads - DTU Orbit (20/12/2018)

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Full-scale tests of A-60 steel and FRD-60 aluminium and FRP bulkheads exposed to fire were carried out in order to compare their respective behaviours in terms of their ultimate load-carrying capacity beyond the prescribed 60 min threshold under thermomechanical loadings. These three materials were chosen as implementation within the SOLAS framework requires documenting a level of robustness equivalent to that of steel. This is a complex process since robustness is not clearly defined and no procedure exists to quantify it. It was found that robustness can be quantified as a time-to-mechanical-failure and is highly dependent on the fire scenario (load, fire exposure, and boundary conditions). Regulatory codes and design practices were found to disregard specific properties of alternative materials, and only consider one default scenario, which is not representative of a real-life situation. It was concluded that specific properties of alternative materials should be used and equivalence in terms of safety should be documented through performance-based design, for instance risk analyses, instead of forcing requirements originally developed for steel structures on their lightweight counterparts.

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