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## **An innovative thermal and acoustic insulation foam for naval fire doors: characterization and study with FEM analysis**

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An innovative acoustic and thermal insulating foam was developed starting from fibreglass waste. In this work, the thermo-mechanical response of a fire door containing the foam as insulating material is considered and also the acoustic properties are investigated. In order to comply with the certification process provided by 2010 FTP Code, fire doors must undergo a standard fire test where a prototype is subjected to temperature up to 945°C. A realistic simulation of the heating process is useful during the design phase for the evaluation of the fire door behaviour without prototype construction. A RINA report of a standard fire test performed on the same fire door containing rockwool as insulating material is used to validate the model. Foam thermal and mechanical properties needed for the numerical analysis (e.g. thermal conductivity, specific heat capacity, Young's modulus) are obtained through experimental tests. The results pointed out an improved acoustic insulating performance respect to rockwool and comparable thermo-mechanical properties. The foam is a promising alternative to rockwool thanks to the environmental benefits derived from fibreglass recycling and the absence of fibre release.

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