# Characterisation of Engulfing Gaseous H2 jet fires

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Hydrogen is widely recognized as a promising alternative to fossil fuels given its low environmental impact. Nevertheless, it poses unique safety challenges due to its flammability and low ignition energy. In this framework, jet fires generated by accidental high-pressure releases of hydrogen represent critical scenarios since they can threaten the integrity of nearby structures and equipment.

The availability of data characterizing the behaviour of hydrogen jet fires, including their temperature, flame length, and the impact on impinged objects is paramount to ensure safety in hydrogen ensuring the safe deployment of hydrogen technologies, and fostering public confidence in the use of hydrogen as a sustainable energy solution.

This paper presents results obtained during the hydrogen jet fire tests carried out at the Bundesanstalt für Materialforschung und -prüfung (BAM) in Germany under a joint research agreement with PFPNet ltd. The hydrogen releases characterised were between approximately 0.05 and 0.2 kg/s from cylinder bundles at 300 bar, which is representative of releases from storage cylinders and bulk storage for use in the transportation industry. Test specimens were 273 mm diameters pipes instrumented with total heat flux gauges, radiometers, and thermocouples. They were insulated on the inside to simulate an adiabatic surface.

Two specimens were used, with instruments from differing gauge suppliers. Tests included thermal imaging cameras and bolometers to characterise the overall flame shape and emissivity.