



### Name of the organization

Karlsruher Institut für Technologie (KIT)

### Name of the infrastructure / laboratory

HYKA (IKET) / HYKA

### Address and country of the infrastructure / laboratory

Karlsruher Institut für Technologie (KIT), Campus Nord, Hermann-von-Helmholtz-Platz 1 - 76344 Eggenstein-Leopoldshafen, Germany

### Person responsible of the access / Contact person

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### Main field of activity of the infrastructure / laboratory

► Hydrogen safety, transportation, refueling, hydrogen storages

### Short description of the infrastructure / laboratory

At the hydrogen test centre HYKA of the Karlsruhe Institute of Technology (KIT) there are several safety vessels and test tubes for hydrogen combustion experiments in various scales and a large test chamber for hydrogen distribution and in particular combustion experiments. In particular: Hydrogen Test Chamber (PZ); Safety-Vessels A1, A2, A3, A8; Explosion tubes. The experimental facilities constituting the hydrogen test site HYKA are among the largest available in Europe. In combination with the high static and dynamic pressures the experimental facilities are designed for a unique experimental centre especially for combustion experiments in confined spaces is available with HYKA. Inside the 160 m<sup>3</sup> test chamber (KIT-PZ), for example, it is possible to test automotive hydrogen engines, and space is sufficient for even a complete hydrogen powered passenger car. Furthermore the powerful venting system allows creating air flows around samples comparable to a wind tunnel or even with a more complex flow structure. Since the integrity of the chamber was tested in combustion experiments with up to 16 g H<sub>2</sub>, even detonation experiments at relevant scales are possible. Due to the different orientations and sizes (the internal volumes of the safety vessels A1 with 110m<sup>3</sup> and A3 with 60 m<sup>3</sup> can be flexibly combined), the set of large and strong experimental vessels offer a flexible basis for scientific experimental work on reactive hydrogen mixtures. Depending on the purpose, large samples can be tested inside them, or the whole vessel can be used as a test volume. For all experiments in HYKA compressed (CGH<sub>2</sub>) or cold liquid hydrogen (LH<sub>2</sub>) are available. Due to the numerous vents, ports and windows versatile instrumentation of a sample inside the safety vessel is possible. The HYKA explosion tubes allow basic combustion experiments with uniform and non-uniform gas mixtures at different initial pressures. The smaller tube additionally offers the possibility to investigate the effects of variable transverse vent openings on the combustion process. It is even possible to conduct experiments with a combustible surrounding atmosphere, which can be generated inside a thin polyethylene film around the tube.

### Main research area(s) of the infrastructure / laboratory

Hydrogen combustion and detonation, high pressure hydrogen releases, laminar flame velocity, flammability and self-ignition limits for hydrogen-air mixtures, structural response of piping structures to internal pressure loads, high pressure tank testing to mechanical and thermal loads, car testing to the effects of internal hydrogen explosion, cryogenic hydrogen releases, ventilation system efficiency

