



### Name of the organization

Karlsruher Institut für Technologie (KIT)

### Name of the infrastructure / laboratory

HYKA-A3 Facility (a Large Scale Vertical Vessel)

### 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

### Short description of the infrastructure / laboratory

The safety vessel A3 has main dimensions of 2.5 m id and 8 m height with a volume of 33 m<sup>3</sup>. It was certified at maximum static pressure of 60 bar. The vessel may be evacuated or filled with a hydrogen-air mixture at different pressures from sub-atmospheric to several bar of initial pressure. Having a sub-volume of 11 m<sup>3</sup> together with system of obstructions it can be used for combustion propagation tests in a multi-compartment geometry. The existing gas-filling system allows creating nonuniform hydrogen-air mixtures with a "positive" or "negative" (related to the gravity) vertical concentration gradient from 0.1 to 1.0 %H<sub>2</sub>/m. The vessel is equipped with measuring ports and windows for visual observations. The measuring system consists of thermocouples array (gas temperature, flame arrival time); piezoelectric and piezoresistive gauges (initial pressure, explosion pressure); gas analyzer and mass spectrometer (to control mixture composition); photodiodes and ion probes (flame arrival time, flame speed). The data acquisition system is based on multi-channel (64) ADC with a sampling rate of 1 MHz. The vessel was successfully tested for detonation of 16 m<sup>3</sup> of stoichiometric hydrogen-air mixture at ambient pressure and temperature.

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

Turbulent hydrogen combustion in uniform and nonuniform gas mixtures at different pressures; effect of venting on flame propagation regimes; experiments on hydrogen distribution.

### Instruments and tools available for the above mentioned research

Hydrogen injection system, obstruction grid



Hydrogen injection system

