Constant Volume Combustion Chamber

1. **Facility/ equipment name**

Constant Volume Combustion Chamber

2. **Brief description**

- Constant volume combustion chamber (CVCC) is used to study the fundamental aspects of combustion with laser ignition.
- Q-switched Nd:YAG laser is used for ignition of gaseous fuel-air mixture, which delivers pulse energies upto 200 mJ and with a pulse duration of 6-9 ns at full width half maximum (FWHM) at fundamental wavelength.
- The maximum repetition rate of the laser is 30 Hz.
- CVCC (stainless steel) has internal diameter and length of 72 mm and 220 mm respectively.
- It has two pairs diametrically opposite optical windows. Four sapphire windows are installed in the CVCC. Clear aperture of window is approximately 17 mm.
- One pair of windows is used for laser ignition (providing access to the laser) of combustible charge and the other pair is used for visualization of flame kernel.
- CVCC can be heated up to 4000C using six finger heaters (750 W each).
- A thermocouple was installed in the CVCC to monitor the chamber temperature. Temperature of chamber is controlled by temperature controller within ± 50C.
- This chamber is designed to withstand 300 bar static pressure.
- CVCC is able to simulate the real engine combustion chamber conditions except turbulence.

3. **List of testing, research and consulting areas, where it can be useful:**

Minimum ignition energy required for combustion, effects of laser parameters, flame propagation, optimum focal length of converging lens and pressure-time history inside the CVCC.

4. **List of keywords for which it should be findable**

Laser ignition, Pulse energy, Constant volume combustion chamber, Gaseous fuel, Hydrogen, Methane, Hythane.