



Name of the organization

CEA/LITEN

Name of the infrastructure / laboratory

PRETHY - DTBH/LCTA_

Address and country of the infrastructure / laboratory

17 rue des Martyrs - 38054 GRENOBLE Cedex 09

Person responsible of the access / Contact person

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Main field of activity of the infrastructure / laboratory

- ▶ Hydrogen Production & Distribution
- ▶ Hydrogen embrittlement under hydrogen gas pressure

Short description of the infrastructure / laboratory

The equipment proposed, which is in operation since summer 2007, enables materials to be tested in gaseous hydrogen pressures and temperatures. It is designed to understand how materials are affected by hydrogen embrittlement. A pressure vessel, associated to a hydraulic MTS testing machine allows to perform tensile, fatigue as well as fracture mechanics testing under hydrogen pressure. The influence of hydrogen pressure, temperature, strain rate or time can be carefully analysed. Local extensometers inside the vessel allow measuring the imposed displacement on the specimen. In the same laboratory, a disc rupture facility up to 1000 bar under hydrogen (including impurities such as water) is available. These two equipments are complementary to address hydrogen embrittlement. To analyze the experimental results, a FEM simulation tool has been developed associating hydrogen diffusion to the mechanical fields.

Main research area(s) of the infrastructure / laboratory

The lab is involved on the mechanical behavior of materials. A special skill has been developed concerning the study of hydrogen embrittlement mechanisms of metallic alloys under hydrogen gas. Both experimental and simulation tools have been developed for this purpose.

Instruments and tools available for the above mentioned research

Hydraulic testing machine associated to a pressure vessel operating at pressures up to 350 bar and temperatures up to 350°C. Internal available volume of 5.5 l in the pressure vessel. Two cells to perform disc rupture tests up to 1000 bar and, up to 100°C under pure hydrogen, helium or wet hydrogen.



Mechanical testing and disc rupture tests under hydrogen pressure devices