

HyTReC **HyTReC Encourages Hydrogen Industries**



Shogo Watanabe
Hydrogen Energy Test and Research Center

Overview of Fukuoka Hy-Life Project

HYDROGENIUS (AIST)



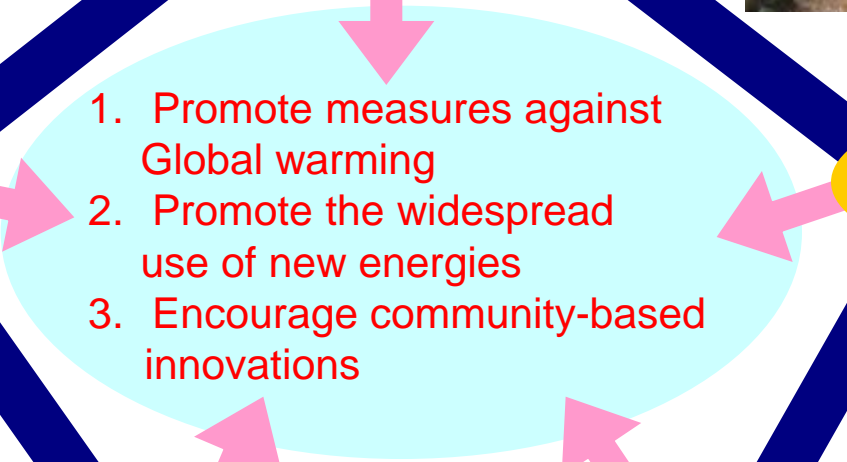
Fukuoka Personnel Training Center for Hydrogen Energy



Development of a "Hydrogen Town"



Construction of a "Hydrogen Highway"

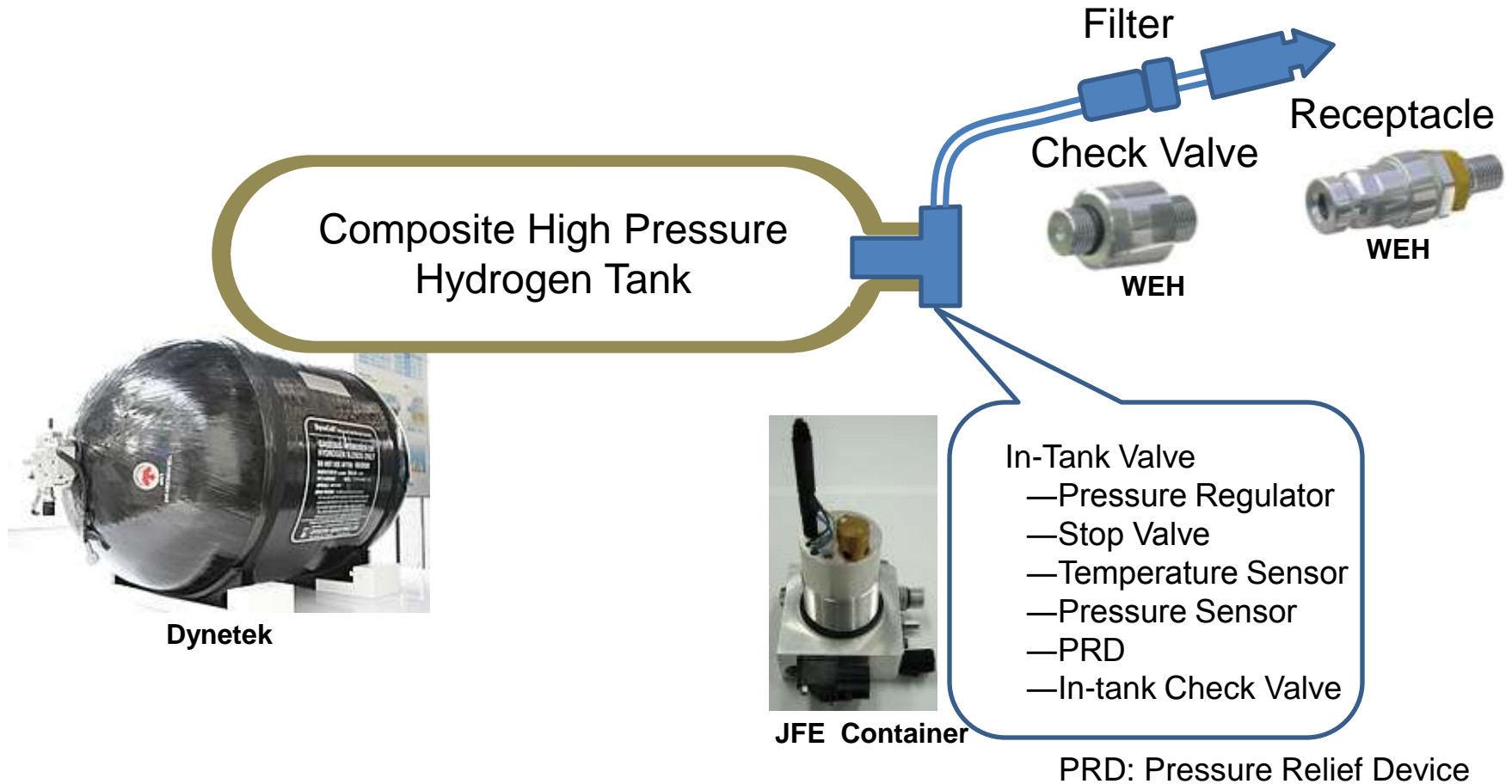


Hydrogen Energy Test & Research Center (HyTReC)

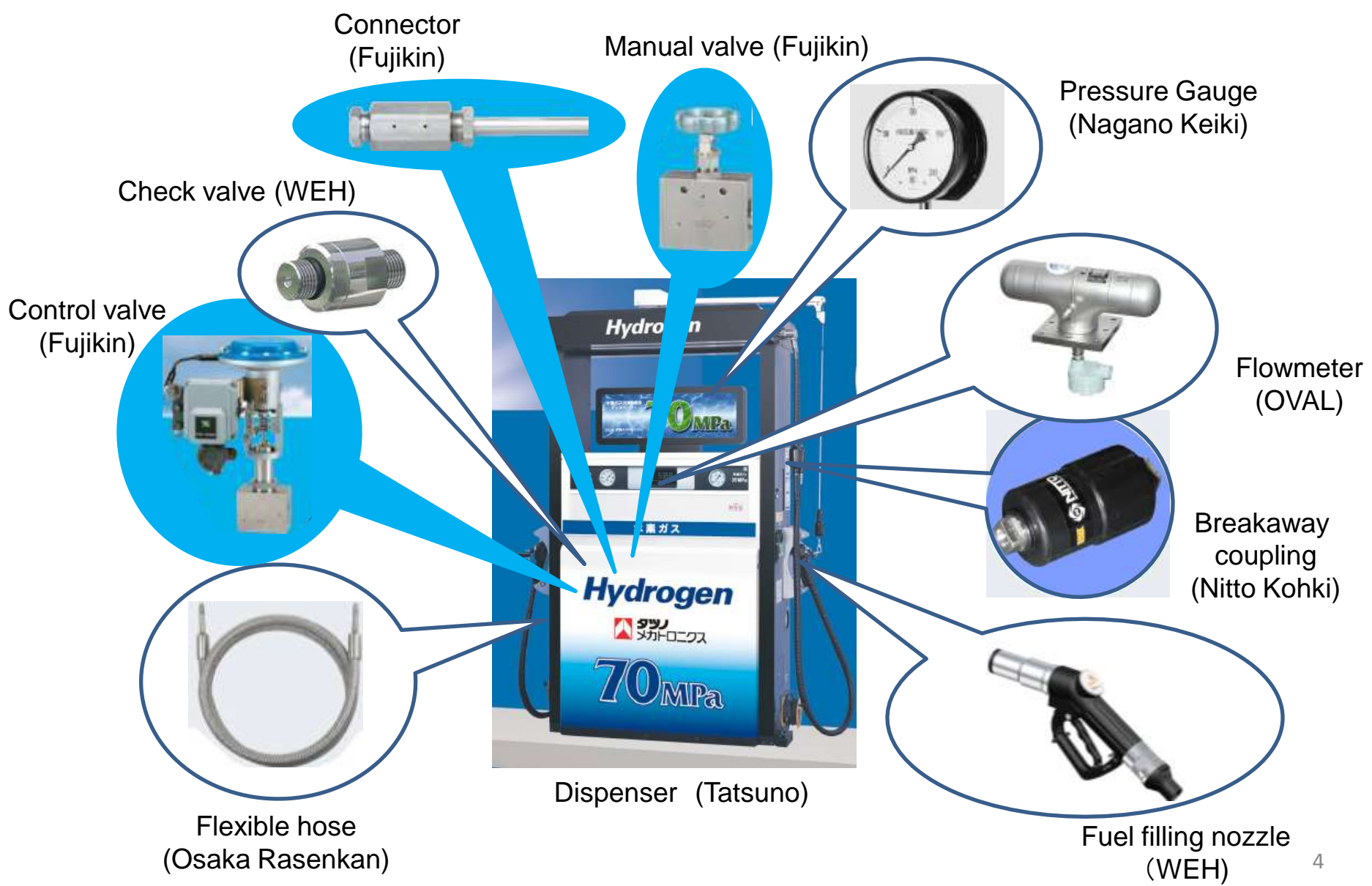


International Hydrogen Energy Development Forum

Components of Fuel System of FCV



Components of Hydrogen Dispenser



Support to Enter the Hydrogen Industry

Proprietary technologies
and ideas of the company

Barrier to enter the hydrogen industry

Product testing

High value of test equipment

Venues for testing high-pressure/ volume hydrogen

Safety measures following legal standards

Barrier, Distance from ignition source, Explosion-proof
electric devices,

Ventilation, Hydrogen leak detector, etc.

Rated personnel for high pressure gas generation

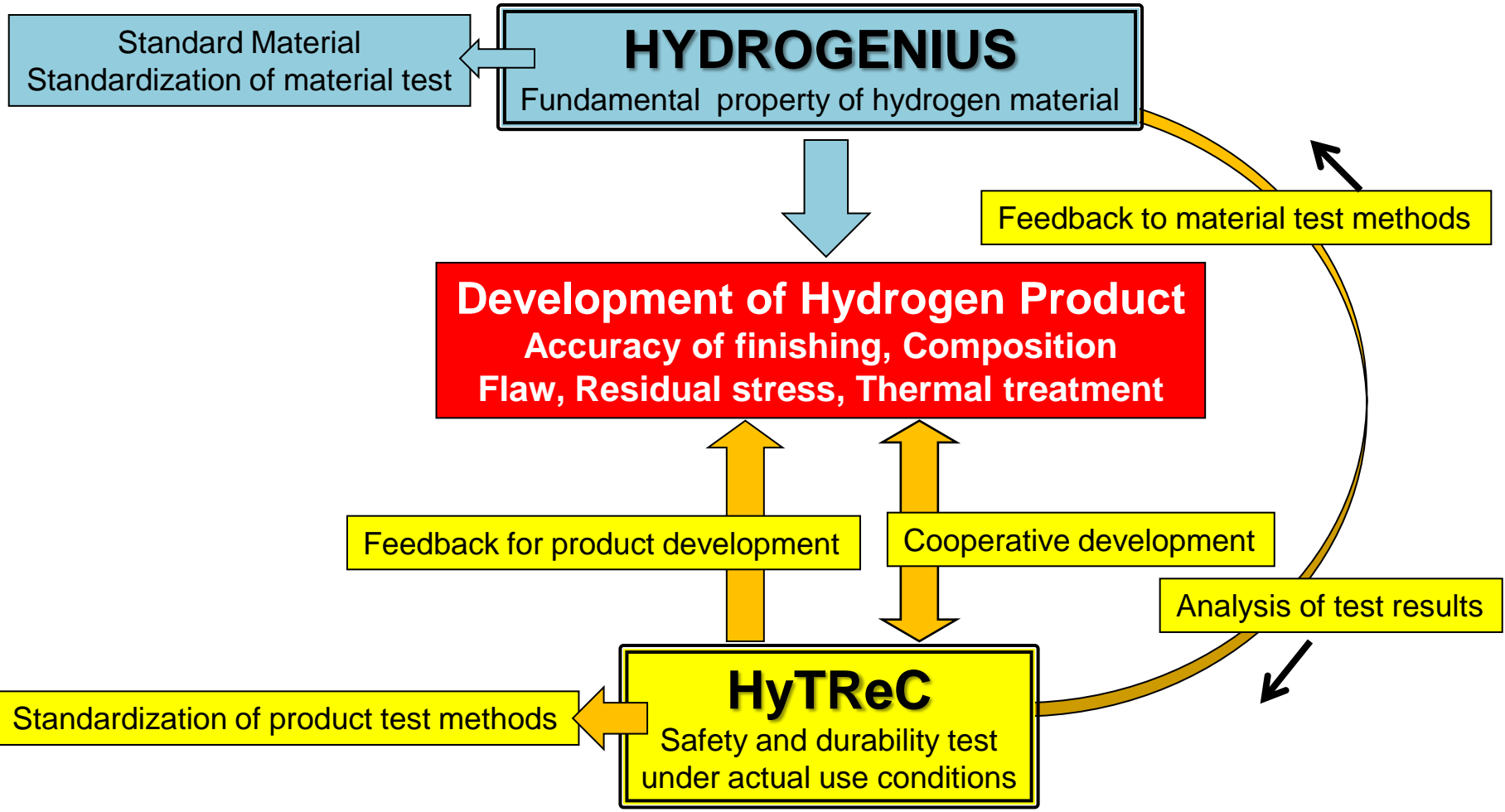
Maintenance and safety inspection of the equipment

Certification by KHK

Sales approach to automobile manufacturer

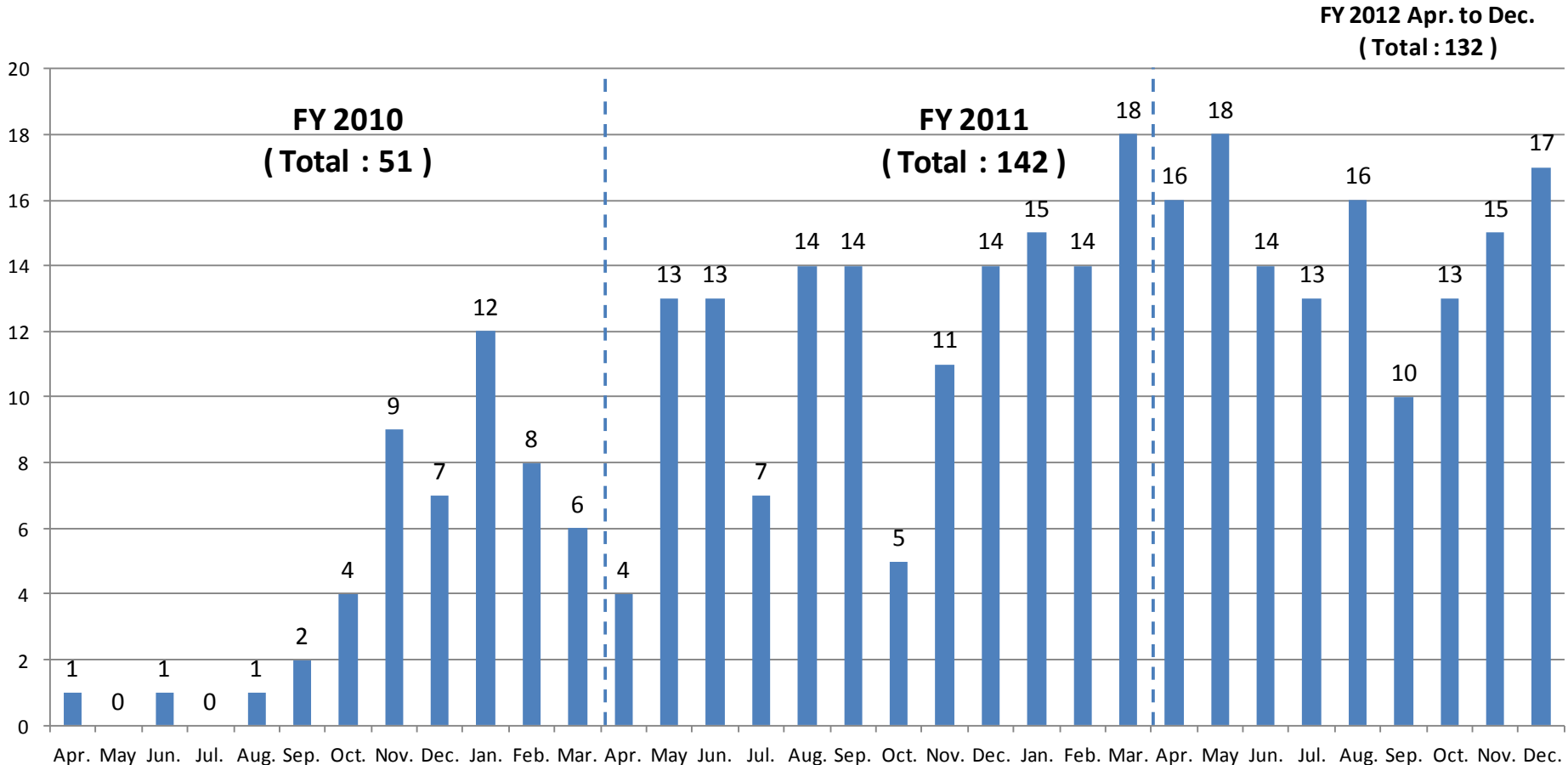
Supported by HyTReC

Cooperation with HYDROGENIUS



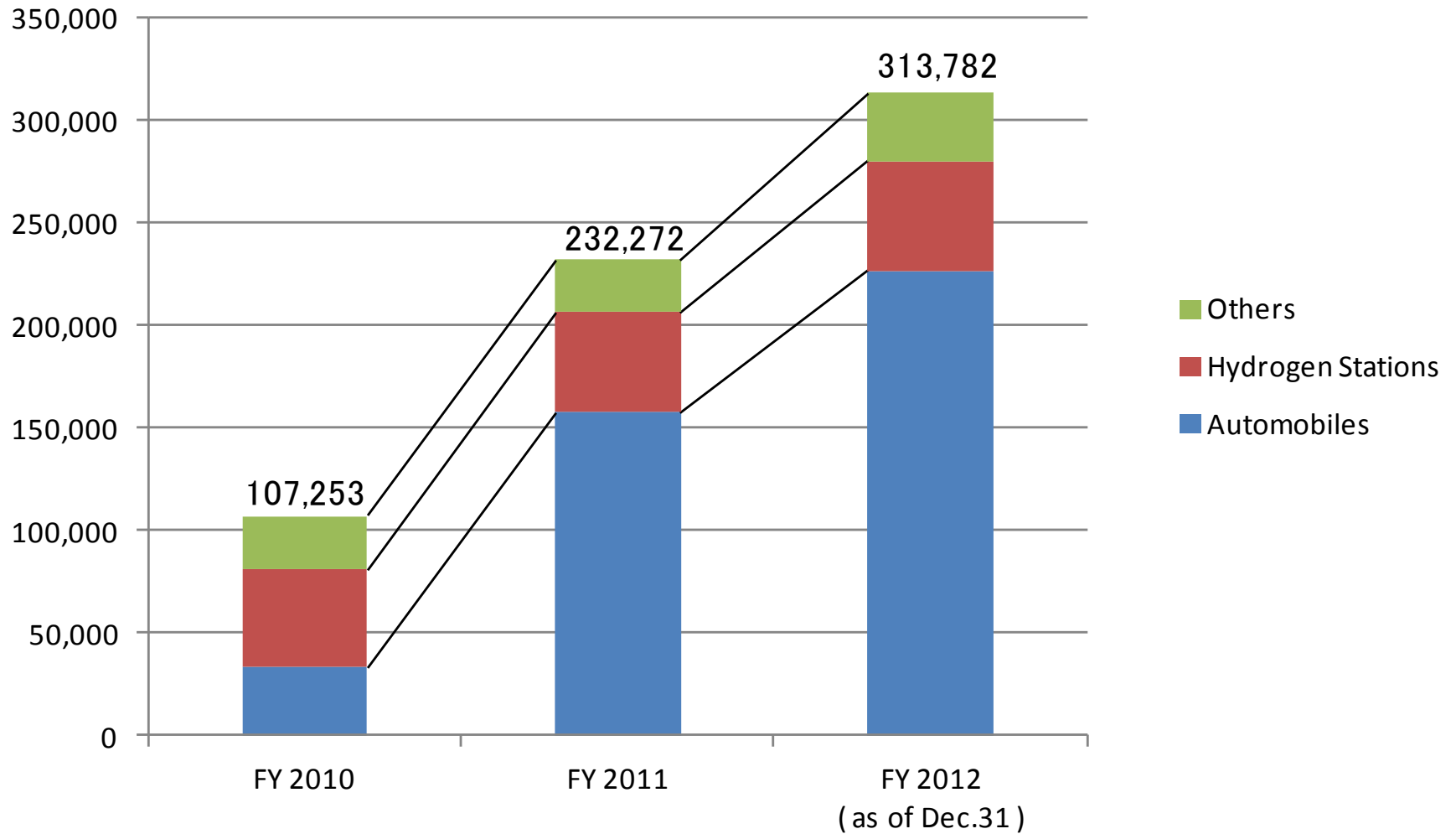


Test Number Progress Since Opening (Apr. 2010)



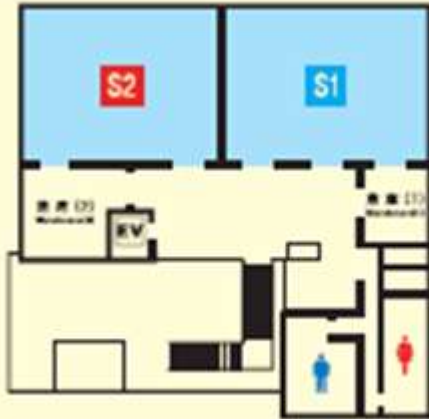
Classified Order Volume

(Unit : ¥ × 1000)



Floor map

2F



- S1** Seminar Room(1)
- S2** Seminar Room(2)

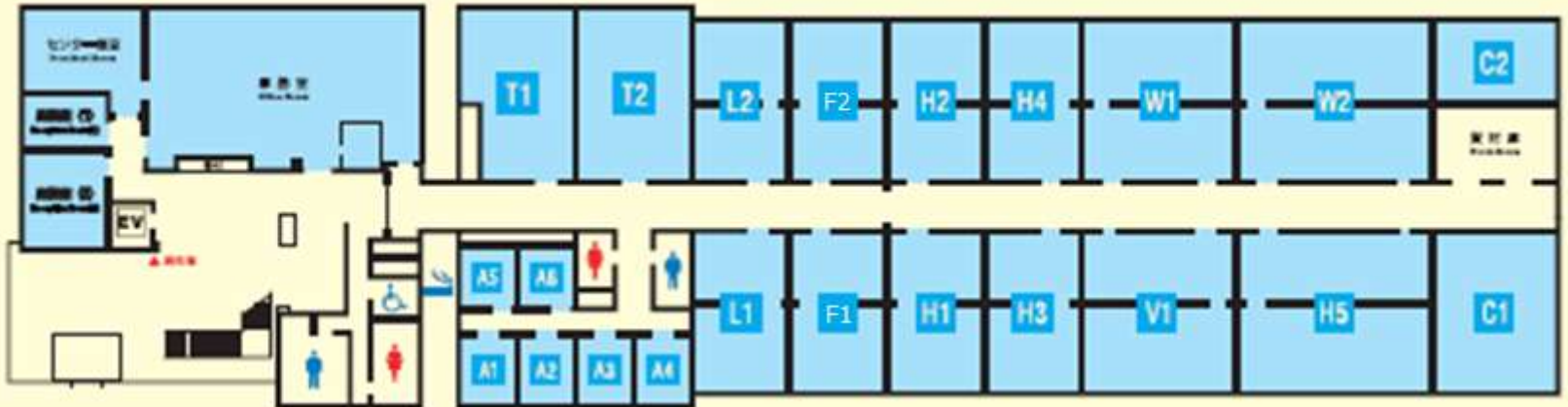
- H1 ~ H5** High Pressure Lab.
- L1 ~ L2** Low Pressure Lab.

- V1** Vibration Lab.
- W1** Hydraulic Pressure Lab.
- W2** Hydraulic Pressure Lab.

- T1** Central Monitor Room
- T2** Workshop
- A1 ~ A6** Analysis Room

- C1** Hydrogen Comp. Room
- C2** Air Comp. Room

1F



Test Equipments at HyTReC

HyTReC will provide testing services, including durability, performance, vibration, air-tightness, pressure cycling, gas permeability, and material evaluation.



Hydraulic pressure
Cycle: 130 MPa
Burst: 343 MPa



Airtight chamber



Vibration testing machine



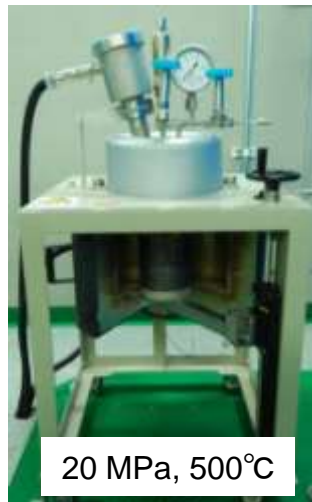
-73°C to +180°C

Environmental tester



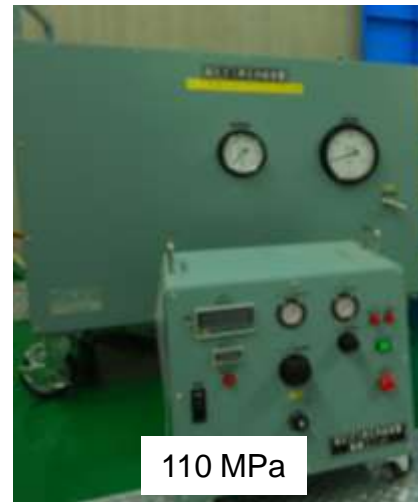
110MPa, 120°C

Autoclave



20 MPa, 500°C

Autoclave



110 MPa

Mobile booster

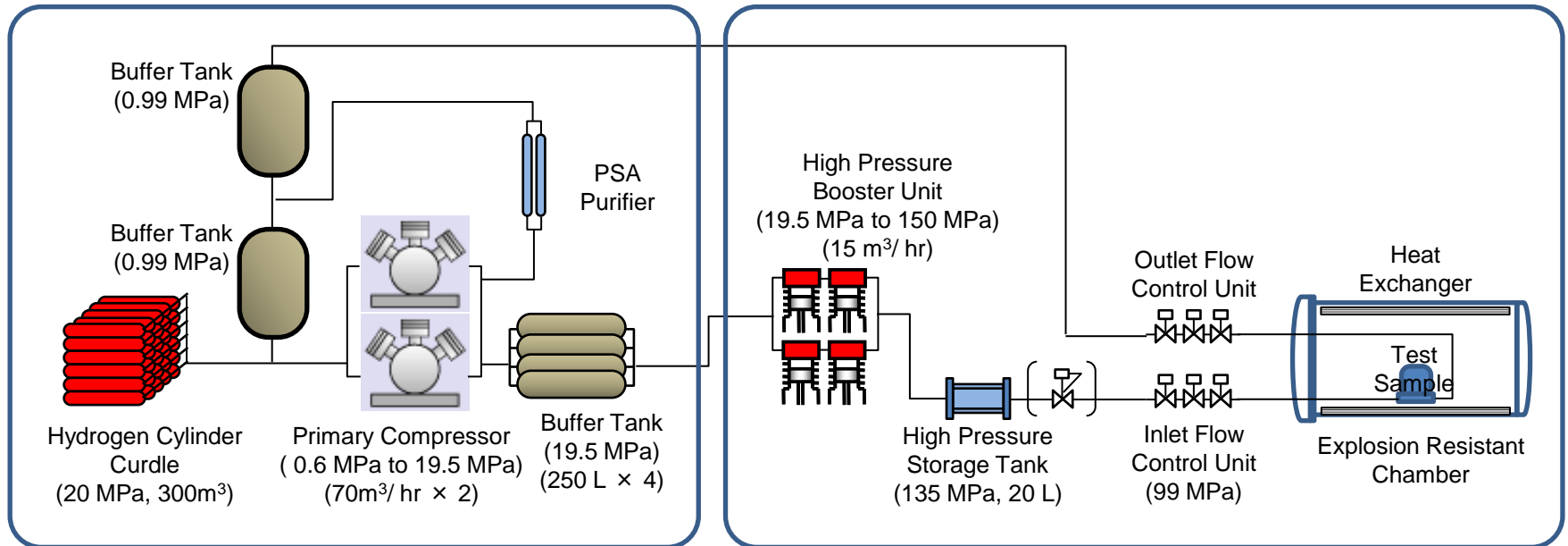


87.5 MPa

High pressure water bath

High pressure hydrogen test system at HyTReC

Hydrogen test system of HyTReC is designed for tests of small products such as valves, connectors, sensors, hoses, etc. at very high pressure and wide range of temperature.



Hydrogen gas utility facility

High pressure hydrogen test rooms
(Five high pressure test rooms)



Primary Compressor



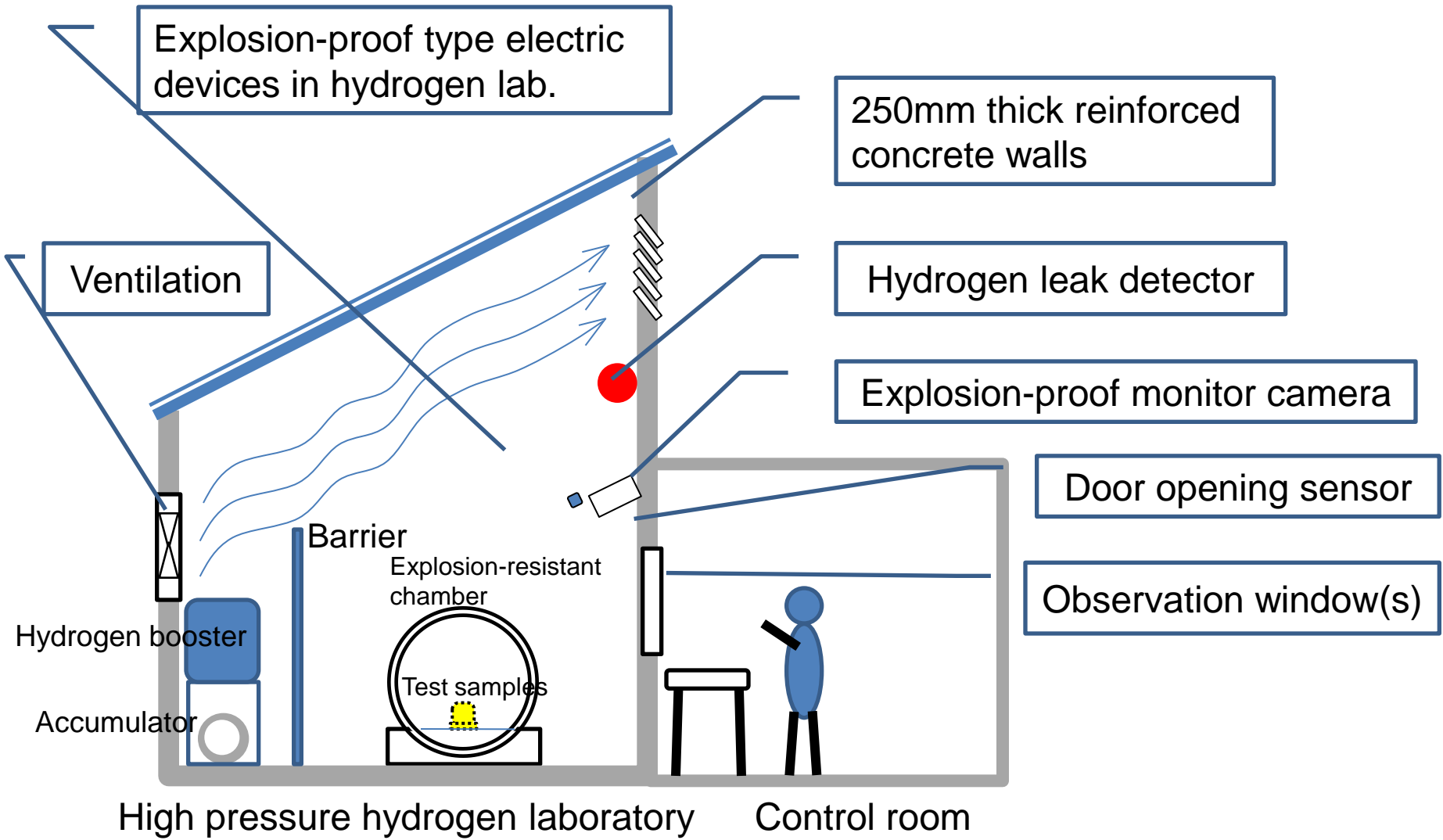
Booster Unit



Flow Control Unit

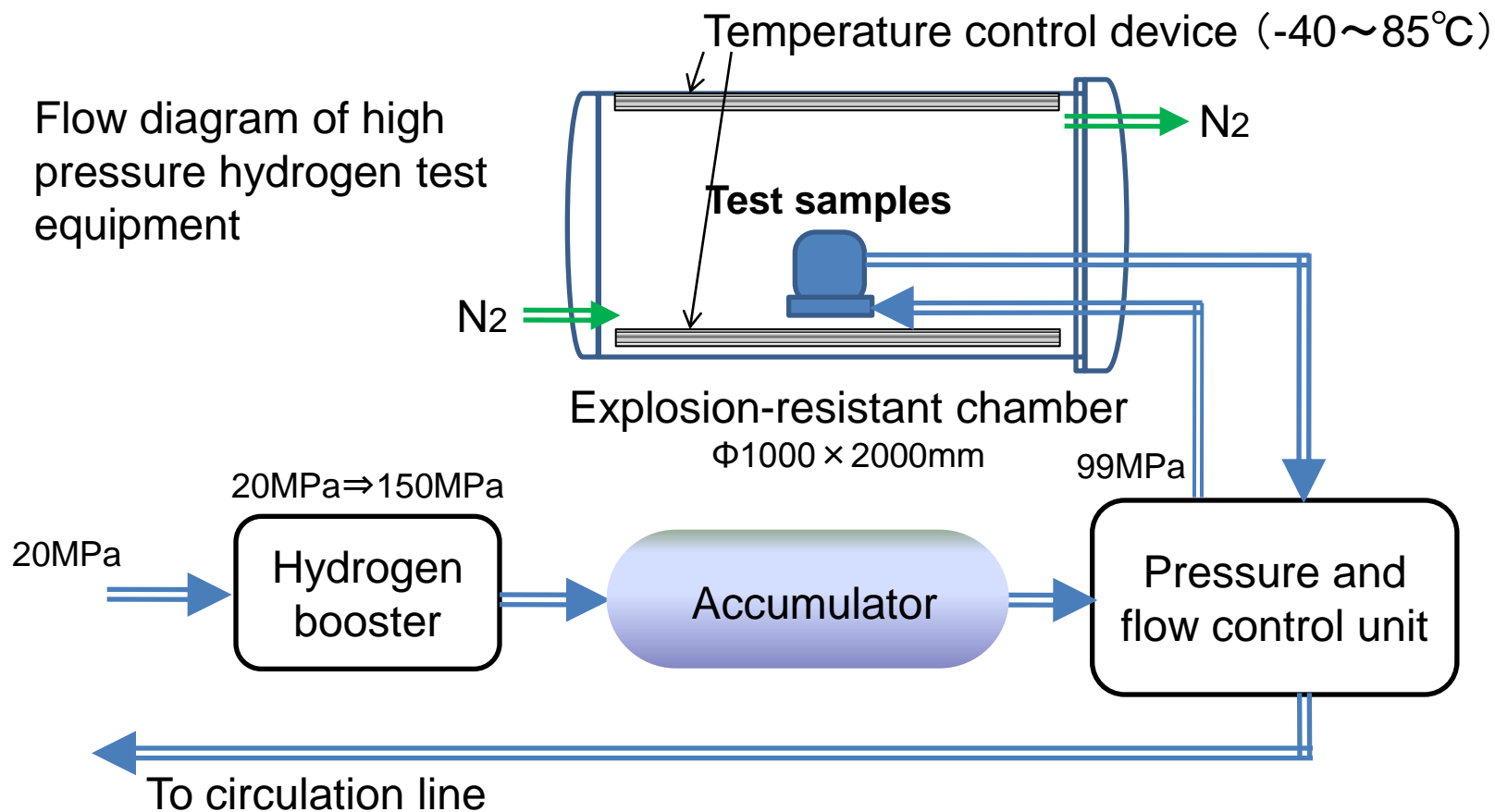


High pressure hydrogen laboratory safety features



High pressure hydrogen laboratory safety features

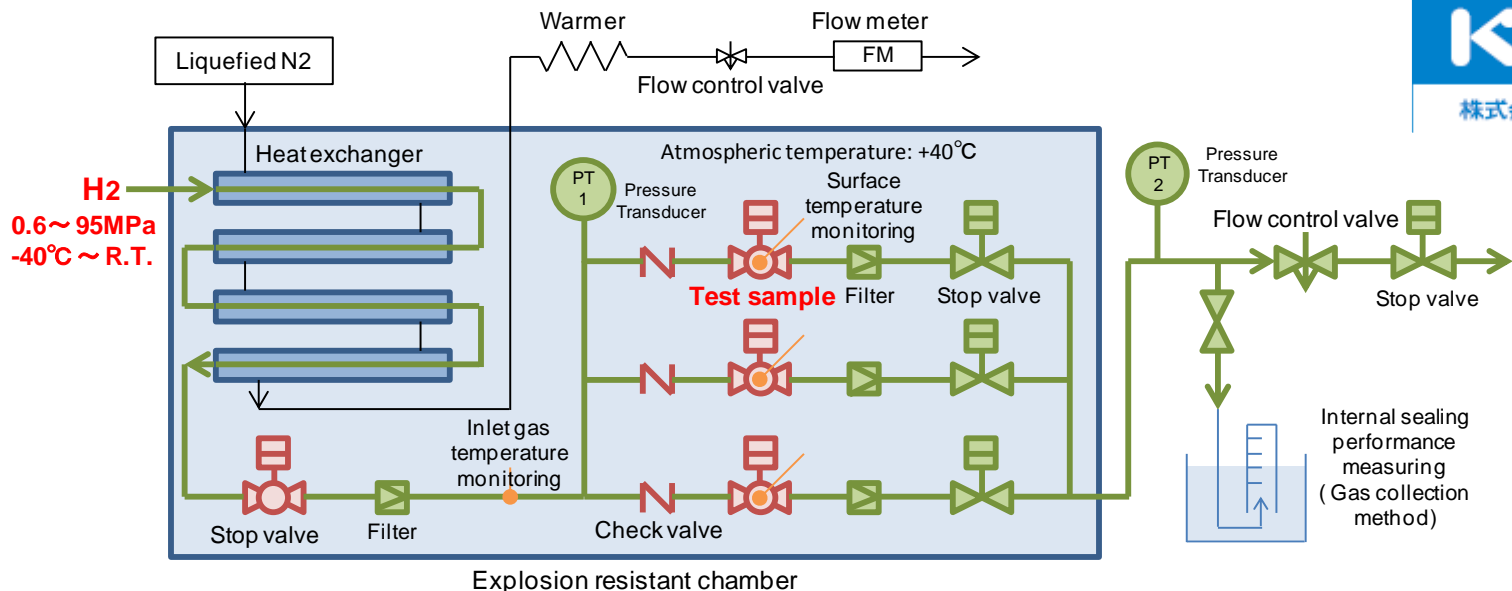
Explosion-resistant chamber made of 8mm thick stainless steel. The surrounding temperature can be controlled.



High pressure hydrogen ball valve durability test

Developed by **KITZ** as a NEDO project in cooperation with **HYDROGENIUS**.

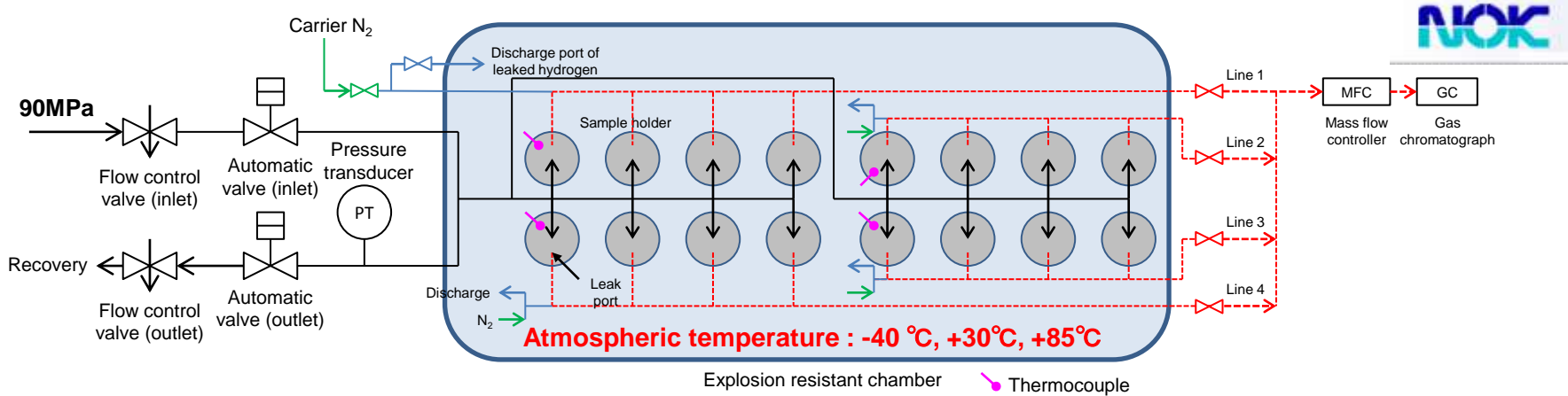
80,000 cycle durability test is ongoing (from Jan. to Feb. in 2013).



40,000 cycle durability test in 2012 **The ball valves were commercialized in 2012.** Cross section

High pressure hydrogen gas cycle test of O-ring

Developed by **NOK** as a NEDO project in cooperation with **HYDROGENIUS**
 Examination of the mechanical and blister damage of O-ring by H₂ gas cycle of 0 to 90 MPa.



Test system diagram



16 sample holders in the explosion resistant chamber



After gas cycle test (Result of 2011)



After gas cycle test (Result of 2012)

Low temperature H₂ gas cycle test of hoses

Developed by The Yokohama Rubber as a NEDO project



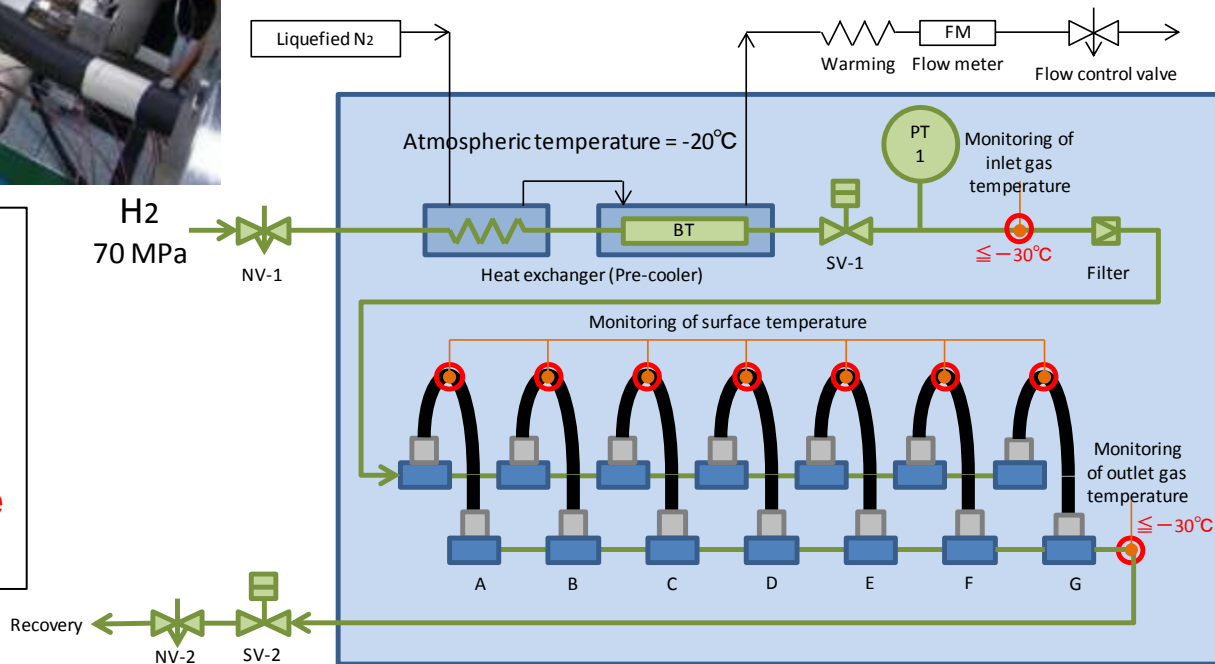
The low temperature performance of high pressure hose was examined.



Test condition
 Bend radius: 75 mm (U shape)
 Gas temperature: < -30°C
 Atmospheric temperature: -20°C
 Pressure cycle: 0 to 70 MPa
 Cycle number: 2,200 cycle

Result
No leakage

The high pressure hose developed by The Yokohama Rubber is adopted at the 70MPa hydrogen station at Technical Research Institute of THOHO GAS.



Pressure cycling test of hydrogen fuelling nozzles

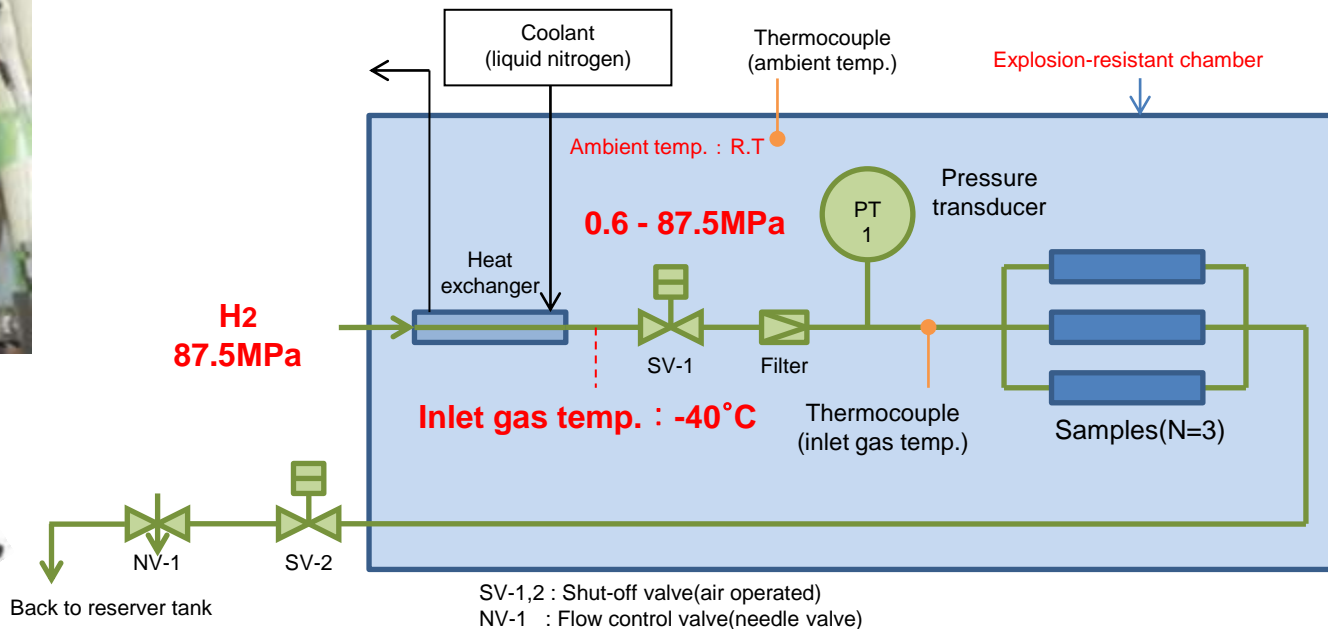
Trying to introduce Japanese market by Hamai Industrie



Test condition
 Inlet Gas temperature: -40°C
 Atmospheric temperature: R.T.
 Pressure cycle: 0 to 87.5 MPa
 Cycle number: 100,000 cycle

Result

- **No mechanical damage to the body of nozzles.**
- **Air tightness was confirmed after 100,000 pressure cycling test.**



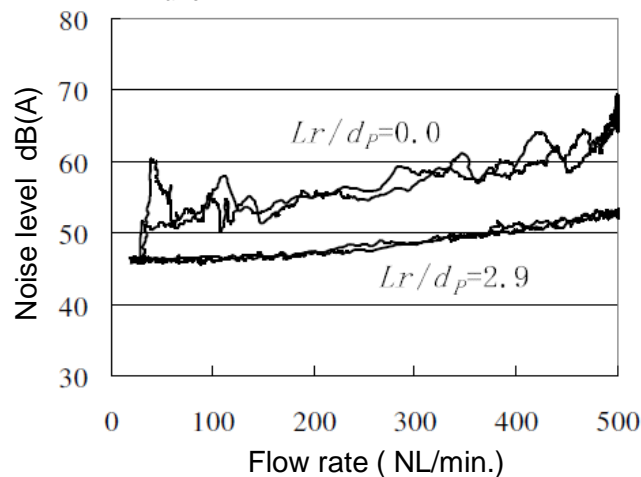
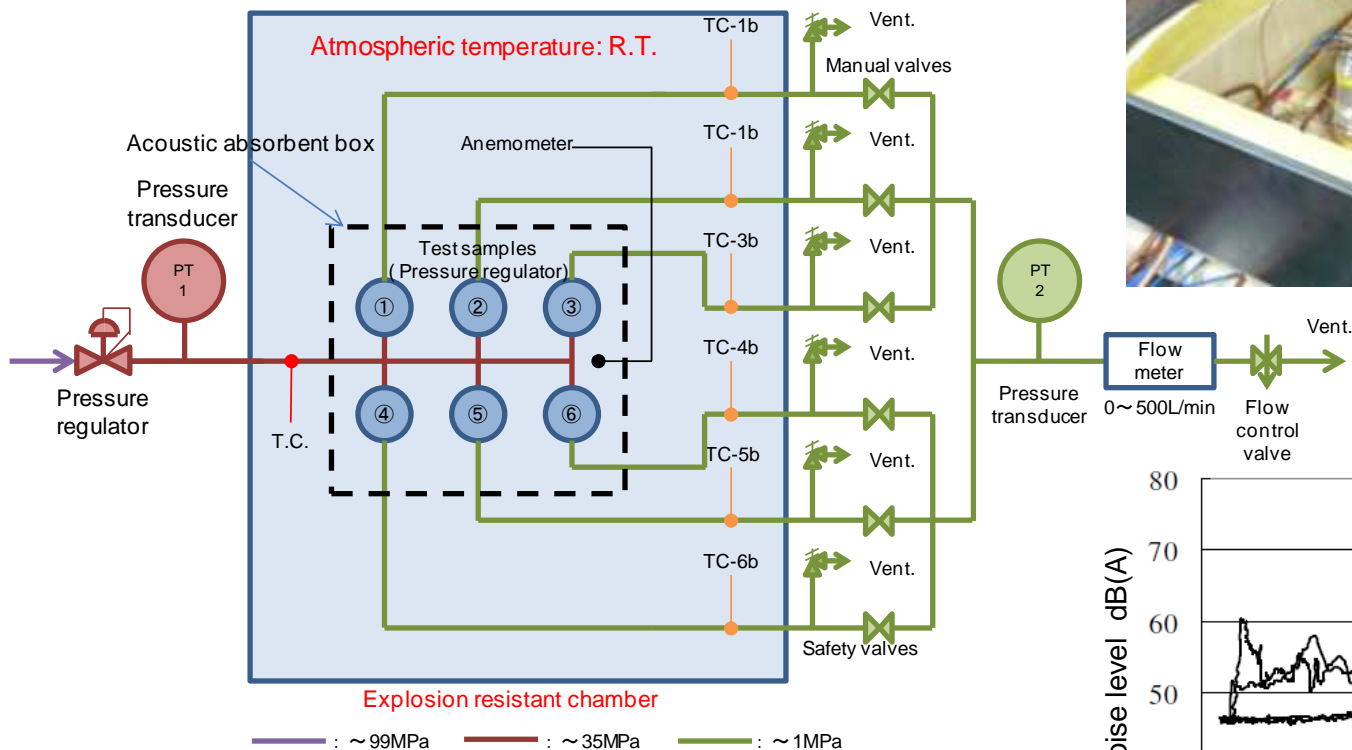
The fuelling nozzle manufactured by WEH was approved by KHK.
 Hamai Industrie is the commercial agent of WEH's nozzle in Japanese market.

Sound measurement of low noise pressure regulator

Low noise pressure regulator for high pressure hydrogen is developed by KYB. Cooperating with Tokyo Institute of Technology.



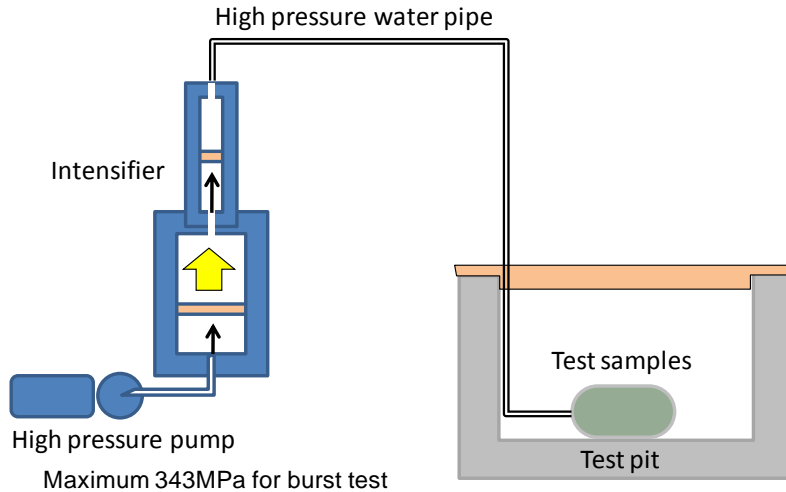
Using unique flow pass structure, the noise level of the pressure regulator was reduced dramatically.



The result was announced at the Symposium of Japan Fluid Power System Society in 2012.

Hydraulic burst test of Type3 high pressure tank

High pressure Type 3 tank for hydrogen station was developed by Samtech.
HyTReC carried out a hydraulic burst test successfully.



Maximum filling pressure : 82 MPa
Internal volume: ~200 L



The tank was approved by KHK in first in Japan for the use as storage tanks for H2 stations.



Thank you for your attention

