August 27, 2018

Iwatani Renovates and Introduces the Most Advanced Hydrogen Research Facilities in Japan

Establishes unique environment in Japan for low-temperature, ultrahigh-pressure hydrogen testing

Iwatani Corporation (Head Offices: Osaka and Tokyo, President: Mitsuhiro Tanimoto, Paid-in Capital: 20 billion yen) has renovated the hydrogen research facilities at its R&D Center (Amagasaki-shi, Hyogo) to become the most advanced facilities in Japan for testing equipment durability, hydrogen-compatible materials and more.

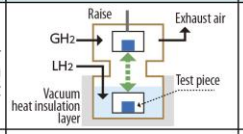
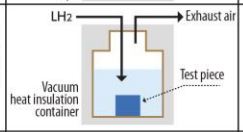
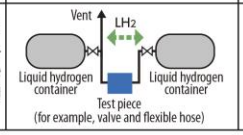
■ Background and aim of renovation

With the opening of the R&D Center in April 2013, Iwatani introduced a facility for liquid hydrogen research characterized by the very low temperature of -253°C, as well as a facility for research on ultrahigh-pressure hydrogen gas. After five years, Iwatani must adapt to more sophisticated testing with the aim to pursue the safety of its hydrogen refueling stations, reduce construction cost and develop an infrastructure for a hydrogen energy society.

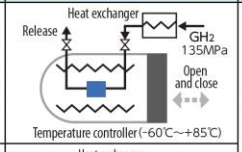
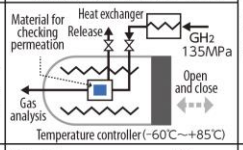
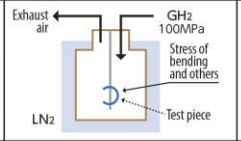
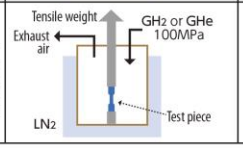
Iwatani has reviewed the specifications and structure of both the facility for research on liquid hydrogen and the facility for research on ultrahigh-pressure hydrogen gas, unique in Japan, to domestically achieve the top testing environment. In addition, another facility has been introduced for the evaluation and research of hydrogen-compatible materials and is capable of determining the hydrogen embrittlement of metal material used in plumbing and other equipment. These technological developments will be accelerated through collaborative research with universities and test agencies.

As the leading company in hydrogen, Iwatani conducts tests and evaluations of plumbing equipment and metallic materials for use in hydrogen manufacturing plants, such as hydrogen refueling stations, in an effort to reduce construction cost and strengthen its security technologies and engineering. Iwatani will actively continue to fulfill role to develop a hydrogen energy society early.

■ Features of the renovated facilities: facility for research on liquid hydrogen

Name of test	Schematic drawing	Difference from former specifications	Reason for reinforcing the capacity	Strengths
Thermal cycle test Repeat the thermal cycle durability test under the liquid hydrogen temperature of -253°Cusing a test piece.		(New addition)	Determine the deterioration of materials that are alternately exposed to extremely low-temperature liquid hydrogen and normal temperatures.	No other company in Japan is capable of conducting it.
Liquid hydrogen immersion test Immerse the test piece in liquid hydrogen for an extended period and determine any alteration.		(New addition)	Verify the long-term reliability of materials, for example, used for the transportation of liquid hydrogen carriers.	Also available for superconductivity experiments with liquid hydrogen conducted at universities and others institutions.
Liquid hydrogen circulation test Observe the behavior and performance of the valve, flexible hose and other devices by circulating liquid hydrogen around them.		Previously: Mono-directional circulation New: Bidirectional circulation	Streamline tests. Minimize liquid hydrogen losses.	Iwatani is the only company capable of flexibly handling liquid hydrogen.

■ Features of the renovated facilities: facility for research on ultrahigh-pressure hydrogen gas

Name of test	Schematic drawing	Difference from former specifications	Reason for reinforcing the capacity	Strengths
Impulse (repeated pressurization and depressurization) test Repeatedly pressurize and depressurize the valve, flexible hose and other devices using temperature-controlled, high-pressure hydrogen.		Test pressure increased from 85 MPa to 135 MPa, making it possible to precisely control the temperature.	The filling hoses of hydrogen refueling stations and other materials used in harsh conditions with repeated pressurization and degassing must undergo a dynamic reliability test.	The highest level in Japan is achieved in terms of the testing environment with pressure at 135 MPa and temperature at -60°C.
Air-tightness and permeation test Pressurize resin and seal materials using temperature-controlled, high-pressure hydrogen and check for permeation and leakage.			Basic data such as the amount of hydrogen permeation of resin and leak rate measurements of joints are imperative for designing a product.	Same as above
Hydrogen exposure (delayed crack) test Apply stress to the test piece and expose it to a hydrogen atmosphere at a high pressure and low temperature to check for distortion and cracks.		(New addition)	Determination of effects of metal fatigue and weld strength under stress is important and may serve as engineering data.	The highest level in Japan is achieved in terms of the testing environment with pressure at 100 MPa and temperature at -150°C.
Hydrogen brittleness test Slowly pull the test piece in a hydrogen atmosphere at high pressure and low temperature and compare it with a helium atmosphere to check for hydrogen brittleness.		(New addition)	Iwatani aims to pursue less-expensive, hydrogen-compatible materials and evaluate the reliability of the welded parts.	The highest level in Japan is achieved in terms of the testing environment with pressure at 100 MPa and temperature at -150°C.