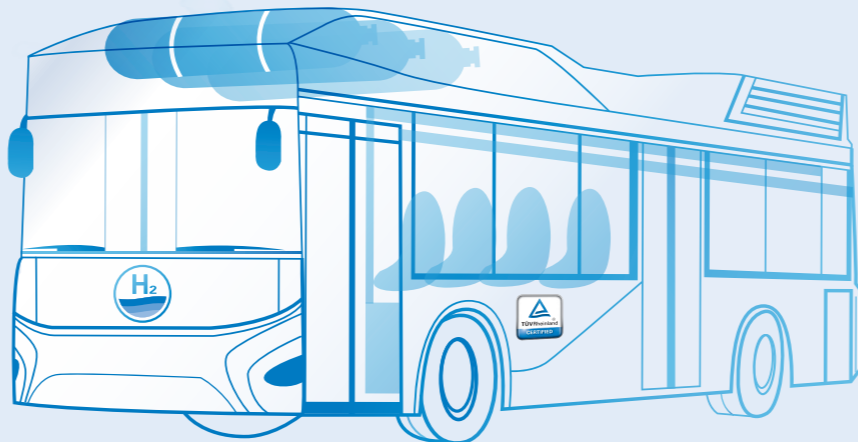
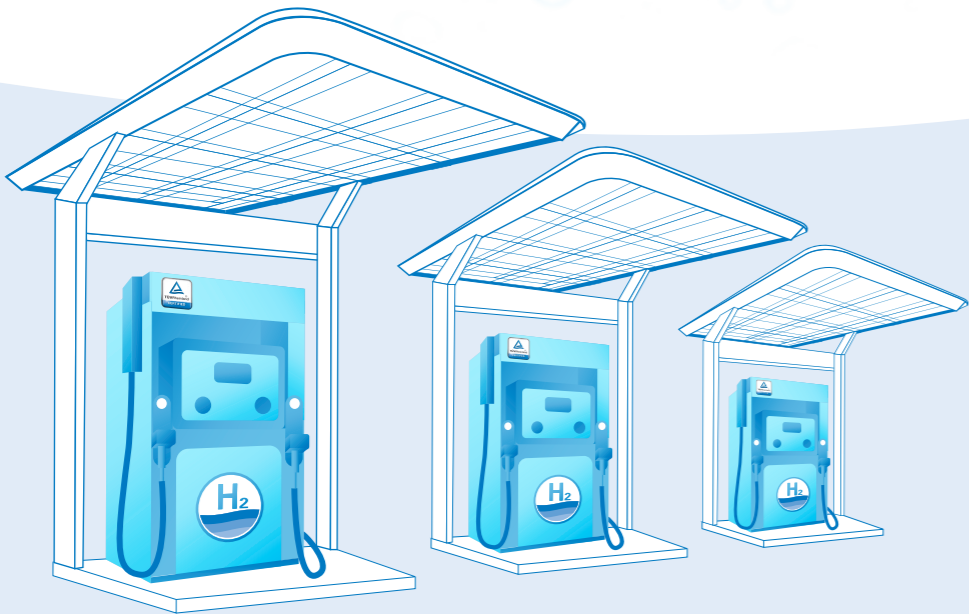


Hydrogen & Fuel Cell Technology



Hydrogen ensures a clean world
and a bright future





Hydrogen is a zero-emission clean energy source and is the ideal alternative energy source for the future of humanity. A power generator that converts the chemical energy of hydrogen and oxygen directly into electricity is the hydrogen fuel cell. Compared with traditional batteries, hydrogen fuel cells have the advantages of high power generation efficiency, high specific energy, high reliability and zero emissions. Its development has been the attention of governments and enterprises, and the corresponding investment in research and development, demonstration and commercialization applications is also increasing.

However, opportunities and risks coexist, and the future of hydrogen clean world needs better technical support and risk management. TÜV Rheinland is a leading international technical service provider with a history of nearly 150 years. We provide one-stop professional technical solutions for the entire industry chain, as well as technical support and safety guarantees for companies at various stages to promote the safe, sound and sustainable development of hydrogen and fuel cell technology in industry.

TÜV Rheinland is your reliable partner



WE PROVIDE ONE-STOP PROFESSIONAL TECHNICAL SOLUTIONS FOR THE ENTIRE INDUSTRY CHAIN.



A full scope of accreditation worldwide



Market leader in hydrogen and fuel cell technology services



Use new technologies and innovative methods to provide services



Advanced labs with maximum capacity, and access to global experts

Our services



Hydrogen fuel cell vehicle

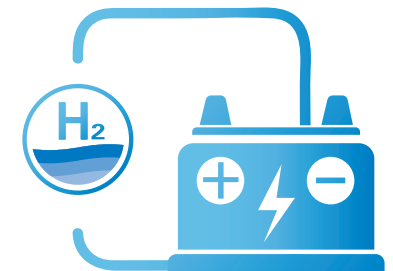
Hydrogen fuel cell vehicle is a clean energy vehicle that can realize zero emission of carbon dioxide during operation by combining hydrogen and oxygen in the air to bring about electrochemical reaction inside the vehicle and to generate electric energy and water. It can purify inhalable particulate matter in the process of obtaining oxygen in the atmosphere, and is regarded as a mobile air purifier. In addition, it can be connected with homes or offices and provide electric energy when parking. As an important technical direction of new energy vehicles and a key field of hydrogen and fuel cell utilization, hydrogen fuel cell vehicles will lead the continuous evolution and promotion of the entire global industrial chain with their technological development and industrialization.

As an officially technical service designated by European vehicle type approval authorities, TÜV Rheinland has ISO 17025 accredited hydrogen storage system laboratories. It is a member of NGVA Europe and has established long-term partnerships with several international organisations for standardisation.

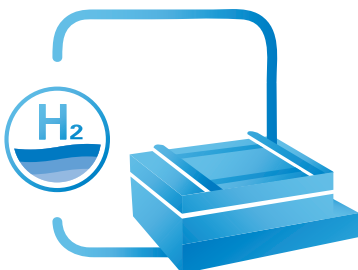
Since 1994, TÜV Rheinland has more than 25 years of experience in the field of fuel cell vehicles and offers long-term services to many vehicles and their suppliers including Daimler, Volkswagen, Man and General Motors. The services cover training and consultation on standards and regulations, testing and inspection, type approval, high-voltage safety research and development support, etc. to help customers enter the global market and enhance their competitiveness.

Fuel cell stack

Fuel cell stack is the place where the electrochemical reaction occurs, and is the core part of the fuel cell system. It is the assembly of cells, separators, cooling plates, manifolds and a supporting structure that electrochemically converts, typically, hydrogen rich gas and air reactants to DC power, heat and other reaction products. In the whole fuel cell industry, the fuel cell stack is the core part of midstream.



TÜV Rheinland can provide safety certification, performance testing and risk assessment for these products based on IEC, SAE, ISO and other standard systems to help customers enter the global market. The related standards include IEC 62282-2, GB/T 29838, SAE J2617, ISO 14687-2, ISO 14687-3 and etc.

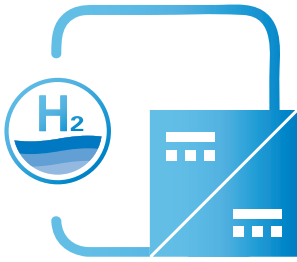


Fuel cell engine

Fuel cell engine is a kind of generating device which converts hydrogen and oxygen into electricity directly through electrochemical reaction. In the fuel cell industry chain, fuel cell engine is in the downstream link.

TÜV Rheinland can provide safety certification, performance testing and risk assessment for these products based on IEC, SAE, ISO and other standard systems to help customers enter the global market. The related standards include IEC 62282-4-101, IEC 62282-4-102, ISO 14687-2, SAE J 2579, SAE J 2578 and etc.

Our services



Fuel cell DC/DC converter

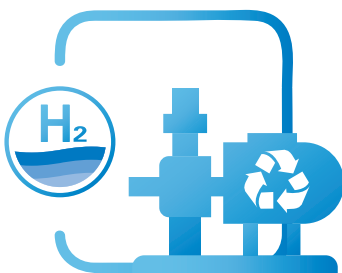
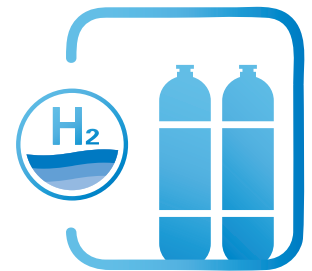
As a key component of the hydrogen fuel cell engine system, fuel cell DC/DC converter functions to improve the output voltage characteristic curve of hydrogen fuel cell, and boost the low-voltage direct current (DC) voltage of hydrogen fuel cell to high-voltage DC voltage for output, in order to provide electric energy for hydrogen fuel cell vehicles and charge the power battery at the same time. By making accurate control of the output power of hydrogen fuel cell engine, it realizes the power distribution and upgrading-based control of the whole vehicle power system, improves the power performance of hydrogen fuel cell vehicles and energy use efficiency, and realizes the reliable operation of other control systems.

TÜV Rheinland can provide safety certification, performance testing and risk assessment for these products based on IEC, SAE, ISO and other standard systems to help them enter the global market. The related standards include IEC 62477-1, SAE J2617, ISO 14687-2, ISO 14687-3 and etc.

Hydrogen storage system

Hydrogen storage system is composed of cylinders, thermally-activated pressure relief device (TPRD), check valve and shut off devices. The key functions of it are to receive hydrogen during fuelling, contain the hydrogen until needed, and then release the hydrogen to the fuel cell system for use in powering the vehicle.

TÜV Rheinland can conduct safety assessment, type approval, inspection services, technical training and consulting services based on Regulation (EC) No.79/2009, UN R134, GTR 13 and etc. as well as support customers to access the overseas markets.



Hydrogen fuel delivery system

Hydrogen fuel delivery system is composed of regulator, pressure relief valve, fuel lines, fitting and etc. The key functions of it are to transfer hydrogen from the storage system to the fuel cell system.

TÜV Rheinland can conduct safety assessment, type approval, inspection services, technical training and consulting services based on Regulation (EC) No.79/2009, as well as support companies to access the overseas markets.

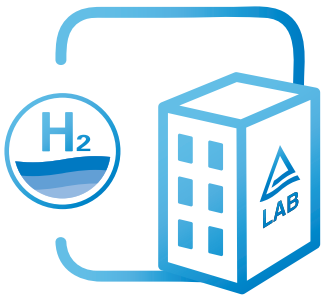
Components for the compressed hydrogen storage system

Components for the compressed hydrogen storage system include container, integrated valve, TPRD, heat exchanger, hydrogen leakage detection sensor and etc.

TÜV Rheinland can conduct multiple professional services like type approval, batch inspection, technical consulting and ATEX certification according to customers' needs.



Our services



Hydrogen fuel cell laboratory

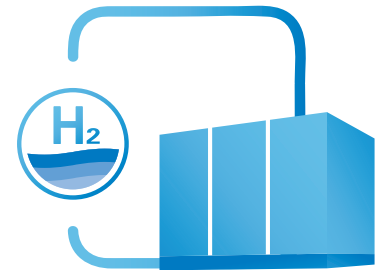
Hydrogen fuel cell laboratory conducts functional testing for the hydrogen fuel cell, includes vibration laboratory, weathering laboratory, after-sales system laboratory, etc.

TÜV Rheinland can provide technical training and consulting services, zoning classification, explosion-proof safety inspection and etc.

Fuel cell power system

Fuel cell power system is a generator system that uses fuel cell modules to generate electric power and heat. In the whole fuel cell industry, the fuel cell power system is in the midstream.

TÜV Rheinland can provide safety certification, performance testing and risk assessment for these products based on IEC, SAE, ISO and other standard systems to help them enter the global market. The related standards include IEC 62282series, GB/T 27748 series, GB/T 23751 series, GB/T 30084, GB/T 31036, GB/T 31037 series, SAE J2579, SAE J 2594, SAE J2615, ISO 14687-2, ISO 14687-3 and etc.



Hydrogen refuelling station

Hydrogen refuelling station is a gas station providing fuel for fuel cell vehicles. The equipment in the station mainly includes storage tank, compressor, pump, hydrogen dispenser, control system, cooling system, valve & pipe and etc.

TÜV Rheinland can conduct ATEX/PED/TPED/LVD/MD/EMC certifications, risk analysis and safety assessments, on-site safety inspections, material testing and failure analysis, technology training and consulting services, technical document review, risk assessment and hazard identification, and equipment integrity management.

Value-added services



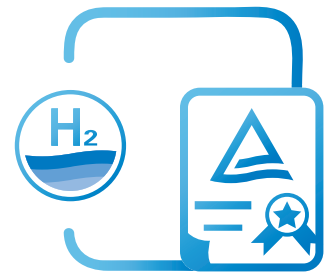
Supply chain services

The industrial chain of hydrogen and fuel cell is consisted of fuel cell, hydrogen production and renewable energy, hydrogen transportation and storage, complete sets of equipment for hydrogen refuelling stations, fuel vehicles and parts, as well as rail vehicles and parts.

In addition to technical services for all links in the industrial chain, TÜV Rheinland can also provide supply chain services such as supplier evaluation, product and equipment inspection, production site safety assessment, site installation and construction inspection, etc. to ensure product safety in all-round manner and help customers control risks.

Training and consulting services

We are the most prestigious training and consulting organization in Europe, with training centers in more than 50 cities in Germany. Today, we have about 2,500 professional trainers and consultants worldwide to provide more than 12,000 types of training and consulting products. We are committed to helping enterprises to develop high-quality teams and realize sustainable operation by providing services like open courses, on-site training for enterprises, personnel qualification certification, diagnosis of enterprise problems and project consulting.



ATEX

Hydrogen storage system and charging system usually release hydrogen during normal or abnormal situation. It will accumulates Ex hazardous area. There are risks of explosion when ignition sources are working in hazardous area.

TÜV Rheinland can conduct risk analysis of onsite and equipment basing on ATEX 95 and ATEX 137. In addition, we provide hazardous zoning, ignition sources analysis, testing and certification as well as onsite Ex assessment to coincide with global standard. We are also the training center and CB of IECEx 05, which is a global personal qualification of explosion protection.



About TÜV Rheinland

TÜV Rheinland is a world's leading independent technical service provider with nearly 150 years of experience and more than 20,000 people worldwide. The business scope covers Industrial Services & Cybersecurity, Mobility, Products, Academy & Life Care, and Systems.

The people at TÜV Rheinland are united by their passion for safety. We want to become the world's best sustainable and independent service provider for testing, inspection, certification, consulting and training.

Here for safety. Born for quality.

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