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Services along the hydrogen value chain

Distribution/transport:

# Refuelling stations/filling systems



TÜV®



TÜV NORD GROUP

# H<sub>2</sub> competence @ TÜV NORD

## 1. Energy generation

Wind energy ■■■

## 2. H<sub>2</sub> generation

Electrolysis ■■■

Seawater desalination plants ■■■

## 3. Distribution/transport

Electrical grid ■■■

Pipelines ■■■

District heating ■■■

Intelligent networks ■■■

Pipelines ■■

Refuelling stations/  
filling systems ■

Tankers (lorry, train, ship) ■

## 4. Storage

Battery storage ■■■

Gas tanks ■■■

Cavern storage (H<sub>2</sub> and CO<sub>2</sub>) ■■■

Pressure vessels ■■■

H<sub>2</sub> hybrid storage ■

## 5. Consumption/use

Fuel cell systems ■■■

Methanol synthesis units ■■■

Refinery ■■■

Mobility ■■

**In every field of services, we support you in the following phases:**

■ Concept/planning

■ Production

■ Operation



## Concept

We support you in the concept phase with comprehensive services that will give your project the security it needs in technical and legal aspects from the very start. From product design through the assessment of requirements and technical specifications to plant development and process optimisation, our specialists have the details and the desired goal in view and are equipped and prepared for your tasks with ultra-modern IT and AI instruments as well as a broad spectrum of risk analysis, certification, test and evaluation services.



## Production

With specific testing, auditing and approval services, we provide neutral and technically competent support as a notified and accredited body for manufacturers. This includes assessment and certification as a material manufacturer, obligatory for the production of certain products. Our range of services also includes the assessment of manufacturing processes, material assessments, stress tests, damage appraisal and product certifications. In addition, on top of monitoring production, we also support commissioning, assembly works and personnel instruction in production processes.



## Operation

After setup and commissioning, we help you when operations are up and running to avoid shutdowns, eliminate technical sources of danger and reduce costs with the use of software-supported maintenance systems. We take on the task of carrying out all recurring inspections and specific tests of electrical and mechanical plants and systems. We can also create risk-based maintenance plans and provide you with tailor-made strategies to reduce operational risks and increase plant safety over the long term.

# Refuelling stations and filling systems for hydrogen

Hydrogen refuelling for road and rail vehicles takes place at refuelling stations allowing fuel to be supplied at various levels of pressure. Alongside stationary hydrogen refuelling stations there are also mobile ones. Of importance here is the storage and compression technology which is selected depending on the initial condition of the hydrogen (liquid or gaseous) and the number and type of vehicles to be filled. A particular challenge for the sealing technology of refuelling systems is also posed by the high pressure.

We are your partner for the energy transition in the mobility sector – particularly with regard to the development of national hydrogen refuelling station networks and the setup and safe operation of refuelling stations and filling systems for hydrogen. With the most modern analytical methods, measurement processes and competent specialists, we are at your side to carry out your project safely and successfully, and to help you benefit from subsidies as available. Do get in touch.

# Refuelling stations for gaseous hydrogen

With the development of a hydrogen infrastructure, Germany will see the establishment of a network of fixed hydrogen refuelling stations allowing for road vehicles to be supplied with gaseous hydrogen. There will also be small facilities e.g. for refuelling fuel cell-powered forklifts, mobile refuelling stations for specific local needs and refuelling stations for fuel cell-powered trains. Most refuelling stations will be supplied with hydrogen by tanker but some will have electrolyzers to produce hydrogen on site.

Gaseous hydrogen is stored at refuelling stations in ranks of pressure vessels, overground tanks or underground tubes. For refuelling, compressors reduce the volume of the hy-

drogen by compressing it to the required level. Currently, most hydrogen refuelling stations are designed to fill a car in around 3 minutes at 700 bar. Refuelling stations with suitably sized compressors can also supply commercial vehicles with 700 bar. To refuel hydrogen buses and cars, refuelling stations need a 350 bar pump, while the vessels on board trains are filled at 250 bar.

An important role in the process is also played by thermal management. Hydrogen for gaseous refuelling is brought to a temperature of  $-40^{\circ}\text{C}$ . When it is stored as a gas, this is achieved by cooling devices; if stored liquid, a cryopump is used to warm the hydrogen stored at  $-253^{\circ}\text{C}$ .

# Our services

We offer you comprehensive services in the fields of testing, inspection and certification – in the following phases of the project at hand:

	Concept / planning	Production	Operation
Certification	 ■		

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