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Services along the hydrogen value chain

Usage/application:

# Methanol synthesis unit



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/planning

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.

# Methanol synthesis: turbocharging decarbonisation

With an annual production volume of over 100 million tonnes worldwide, methanol is one of the most important basic organic chemicals. As a flexible starting compound, it is used as a solvent and in the fuel sector. The gas needed for its manufacture was previously obtained from natural gas, meaning that conventional methanol synthesis is connected with high greenhouse gas emissions. Over the course of the energy transition, research is being carried out into new, highly efficient manufacturing methods by which methanol can be generated from the synthesis of green hydrogen with CO<sub>2</sub> or CO.

We are your partner for the research, development and market deployment of methanol synthesis – particularly with a focus on municipal and industrial actors who are aiming to make use of hydrogen. With the most modern analytical methods 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.

# Green hydrogen for green methanol

If methanol is produced from green hydrogen, renewable electricity and CO<sub>2</sub>, it makes a valuable contribution to the necessary reduction of greenhouse gas emissions and the implementation of carbon capture and utilisation strategies. To make this possible, innovative hydrogen-based power-to-liquid concepts

(P2) are being tested, offering the carbon footprint-related advantages of making use of CO<sub>2</sub>, whether produced by industrial processes, treated, contaminated or atmospheric, returning it to the cycle and even acting as a CO<sub>2</sub> sink where methanol is placed in storage.

## Research and pilot projects




The synthesis of methanol from green hydrogen and CO<sub>2</sub> makes high demands of catalysts in terms of their resistance to ageing. In research facilities working on hydrogen-based methanol synthesis, catalytic processes are thus being investigated in synthesis reactors. To couple in a single plant the separate, energy-intensive stage required by conventional reactors of thermally separating the by-product, water, membrane reactors are being researched, which also offer higher methanol yields. The goal of the first pilot projects is to gain knowledge of efficient production and scalability so that green methanol can be

produced in future on a decentralised basis and at competitive prices – anywhere where cheap electricity from renewable sources and CO<sub>2</sub> are available, either from the combination of wind farms and waste incinerators or solar energy and biogas plants.




The beneficiary of the energy-rich, environmentally friendly and unlimitedly storable raw material produced in this way is, alongside the chemicals industry, above all the mobility sector, where green methanol can be used as an additive to e-fuels or employed in fuel cells..

# Our services

We will support you at the concept creation stage, providing all the tests, conformity assessments and certifications required, monitoring production and standing at your side during acceptance and operation. To this end, we offer you comprehensive services in the fields of testing, inspection and certification – in all phases of the project at hand:

	Concept / planning	Production	Operation
			
Inspection of concepts to current legal requirements, standards and regulations	■		
Inspection of requirements specifications	■		
Inspection of technical specifications	■		
Inspection of component designs on the basis of standards, third-party requirement catalogues or customer demands	■		
Certification of protective devices	■		
Inspection of staggered power system protection plans, protection tests	■		
Analysis of electrical grids	■		
Certification of the grid connection	■		
Certification of protective devices, inspection, safety design	■		
Conformity assessments of electronic components/systems	■		
Inspection of the design, construction, functioning and reliability of hoists, cranes and load handling equipment	■		
Inspection of risk analyses to determine the potential risk of intervention by unauthorised persons	■		
Inspection of safeguarding concepts	■		
Inspection on determination of intervention measures by guarding/security company or police	■		
Inspection on determination of administrative security measures	■		

Services along the hydrogen value chain: Consumption/use

	Concept / planning	Production	Operation
			
Inspection commissioning and periodic inspection concepts	■		
Technical due diligence	■		
Technical, financial, legal due diligence (with external partners)	■		
Testing electromagnetic compatibility	■		■
Inspection on installation and operation of alarm receiving stations		■	
Production monitoring and auditing		■	
Inspection and support for commissioning and assembly works		■	
Acceptance and functional tests		■	
Acceptance tests (commissioning, periodic inspection) of isolated grids with involvement of e.g. decentralised generator units, electrolysers and any necessary storage systems (on and offshore)		■	
Inspection of switchgears/control cabinets to EN 61439-1			■
Inspection of electrical and mechanical safeguarding systems			■
Recurring inspections			■
Analysis of faults/unusual events with regard to cause, remedies and consequences			■

## Your contact

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