



Image: TÜV Rheinland ©

Excellence for the oil, gas and petrochemical industry.

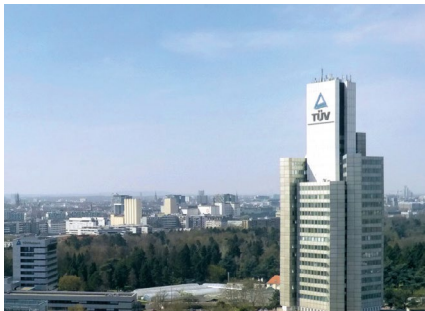
Highly complex assets require a highly experienced partner.

www.tuv.com

 **TÜVRheinland®**
Precisely Right.

About TÜV Rheinland.

TÜV Rheinland is your experienced and independent partner to ensure the safety, reliability and regulatory compliance of your industrial assets and components throughout their lifecycle.



OUR HERITAGE

People and companies around the globe have placed their trust in the TÜV Rheinland Group since 1872, the year the company was founded with the aim of ensuring the safety and reliability of steam boilers in Germany. Independence paired with technical expertise and customer orientation has since been our unique characteristic.



OUR VALUES

Precisely Right. Two words that perfectly encapsulate our commitment to service: whatever we do, we do it precisely and we do it right for the benefit of our client. We are committed to sustainability and to combatting corruption, that is why we are a member of the United Nations Global Compact.



OUR MISSION

We support our clients on their path to success. Safety, quality, efficiency and compliance are the results of our work. This applies to our operations in all markets, whether local or global. TÜV Rheinland is committed to helping create a future that meets both human and environmental needs on a sustainable basis.



Since 1872 TÜV Rheinland supports high hazardous industries with independent, technical expertise to ensure asset compliance, safety and reliability.

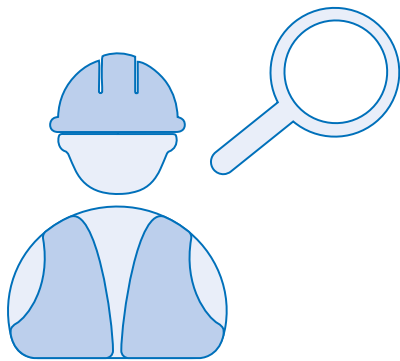
Industrial services for the oil, gas and petrochemical industry.

Oil and gas will remain the essential energy sources in the coming decades. New and improved exploration technologies are providing access to new reserves.

Nevertheless, the challenges are increasing. Not only are new reserves harder to reach, but projects are also becoming increasingly complex and old assets are operating beyond

the design life. A low oil price adds additional pressure on oil companies to reduce production costs. Owners, insurers, investors and operators are therefore confronted with large investments, high competition, new technologies and tight project schedules as well as increased legal, commercial and environmental requirements.

As one of the leading single source providers for the oil, gas and petrochemical sector, we support you with solutions for all your certification, testing, inspection, training and consulting needs for your up-, mid- and downstream assets. Whether you are involved in planning, design, construction or operations, we enable you to meet the challenges of the industry now and in the future.



**TESTING
INSPECTION
CERTIFICATION**



**CONSULTING
TRAINING**

BENEFITS AT A GLANCE

- The assurance that all of your planning, construction, or operational processes are optimized – so that you can fulfill all requirements and run cost-effective operations.
- A worldwide network of experts and inspectors.
- An independent partner providing support and ensuring regulatory compliance across all stages of the lifecycle as well as access to international markets.
- An experienced partner ensuring asset safety and reliability throughout the entire lifecycle.
- Continuously improved technologies through dedicated innovation programs and the continual education and training of your personnel.



We are one of the leading single source providers offering testing, inspection, certification, consulting and training services to the oil, gas and petrochemical industry.



Testing, inspection and certification services.

We support the oil, gas and petrochemical industry in ensuring safety, reliability and regulatory compliance of your industrial components and assets throughout their lifecycle with independent inspection, testing and certification services. We help you understand the condition of your components and assets, avoid incidents and ensure that you meet the latest regulatory and individual requirements from the design, construction and operation phases through decommissioning.

INDUSTRIAL INSPECTION

Mega-projects have become commonplace, resulting in even more complex international supply chains and making it increasingly difficult

to manage the quality of your asset and components during the lifecycle. Moreover, the total costs resulting from poor quality are tremendously high with a direct impact on the

profitability of your project or asset.

Our global network of experts and inspectors enables you to monitor and control the quality of the required

Our service portfolio includes:

INDUSTRIAL INSPECTION

- Vendor inspections
- Vendor assessment
- Factory acceptance test
- Pre-shipment inspection
- Site supervision

PRESSURE EQUIPMENT CERTIFICATION

- Independent pressure equipment certification
- Market access services and advice on codes and standard compliance
- Periodic inspection and audits
- Verification and design review

MATERIALS AND NON-DESTRUCTIVE TESTING

- Failure and damage analysis
- Conventional NDT solutions
- Advanced and special NDT solutions:
 - Well integrity inspections (corrosion in tidal zone)
 - Computed radiography
 - High temperature inspection (up to 500°C)
 - Phased array flaw detection
 - Pulsed eddy-current (PEC)
 - Time of flight diffraction (ToFD)
- Tailored NDT training programs

FUNCTIONAL SAFETY

- Identification of safety-critical elements, development of performance standards and verification schemes
- Support in the implementation of internationally relevant standards (IEC 61508/ IEC 61511)
- Certification of safety functions and safety-related systems
- Certification of functional safety management systems
- TÜV Rheinland functional safety training program

materials from a single piece of equipment up to the whole project. We support you with tailored solutions that mitigate the risk of non-compliance, enable an early detection of quality issues and help you deliver according to the individual requirements, specifications and deadlines.

PRESSURE EQUIPMENT CERTIFICATION

Pressure vessels, tanks, boilers, pressurized systems - key equipment for the oil, gas and petrochemical industry is operated and manufactured all over the world. Due to the potential risk associated with pressure equipment, both manufacturers and operators have to comply with national and international regulations.

Our local experts and our global expertise help you ensure the regulatory compliance of your pressure equipment, wherever you

and your equipment are located. We assist you through the entire component lifecycle from design to operation and support manufacturers in accessing new markets.

MATERIALS AND NON-DESTRUCTIVE TESTING

The condition of an asset or component is crucial for a manufacturer and an operator to ensure safety and integrity. Therefore, our materials specialists, engineers and non-destructive testing technicians provide you with highly specialist solutions and deep engineering know-how to gather and evaluate the required data needed to assess the integrity of your component and asset.

We help you understand the origin and cause of specific material damage and outline appropriate remediation measures. Our solution portfolio ranges from conventional and

advanced NDT solutions to condition and corrosion monitoring to NDT Level III consultancy.

FUNCTIONAL SAFETY

Proper and reliable operation of assets, especially in hazardous industries, strongly relies on electrical and electronic elements and computer-based systems that perform safety functions. A failure within these systems can lead to dangerous conditions, putting people and environment at risk.

Thus, the reliability and safety of systems and software are of utmost importance. To ensure that these components achieve the required safety level, our global network of functional safety experts supports you with testing and certification of your safety-relevant devices and management systems.



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Consulting services.

Complementary to our testing, inspection and certification services, we offer asset specific consulting services targeting the improvement of the performance of your asset while safeguarding health, process safety, security and environment. Whether we are providing independent verification, technical assessments or developing an entire risk management system, our focus is always on a value-adding solution for your individual needs.

PROJECT MANAGEMENT

As the owner of major oil, gas and petrochemical projects, there are many questions you need to address. Success involves meeting deadlines, avoiding cost overruns, ensuring compliance with quality and HSSE requirements, qualifying suppliers and

contractors, coordinating stakeholders and – most importantly – making sure the project will meet operational requirements. With us by your side, you can be assured that your project is supported by dedicated specialists.

INDEPENDENT VERIFICATION SERVICES

Our experts provide independent verification services to the latest industry standards and recognized codes of practice. With our profound engineering expertise and in-depth knowledge of regulatory

Our service portfolio includes:

PROJECT MANAGEMENT

- Resources monitoring
- Quality assurance
- Management of statutory and legal compliance
- Supervision of schedules and deadlines

INDEPENDENT VERIFICATION SERVICES

- Design review
- Scrutiny of safety critical elements
- Development of performance standards
- Independent verification of SCE performance

RISK, SAFETY, SECURITY AND ENVIRONMENTAL SERVICES

- Hazard identification / HAZOP
- Bowtie analysis
- Fire, explosion and toxic gas hazard analysis
- Fire protection
- HSSE / safety cases
- Qualitative / risk assessments
- Quantitative / risk assessment
- HSSE management system
- Reliability, availability, maintainability (RAM)
- Process safety management (PSM)
- Cultural and behavioral safety improvement
- Auditing

ASSET INTEGRITY SERVICES

- Data collection and management
- Condition monitoring solutions
- Mechanical integrity assessments (e.g. fitness for service, remaining lifetime calculations)
- Integrity audits and gap analysis
- Inspection and maintenance planning and optimization
- Risk based inspection (RBI)
- Risk and safety assessment
- AIM/RBI software selection and implementation support
- AIM/PSM system development, implementation and auditing

requirements, we support you to identify non-compliances, quality and safety constraints early on in order to assure that performance standards are achieved and maintained.

RISK, SAFETY, SECURITY AND ENVIRONMENTAL CONSULTING

The wide range of hazards potentially leading to loss of life and environmental damage remains a challenge. The ability to predict, prevent or mitigate undesirable events is key to business success.

Our engineering, management and safety specialists from TÜV Rheinland Risktec help you identify, assess and manage health, safety, security, environmental (HSSE) and business risks and reduce them to the lowest practicable level. Our work is supported by extensive tools and techniques to help assess HSSE issues and identify improvements.

ASSET INTEGRITY SERVICES

We support and advise you in establishing and safeguarding

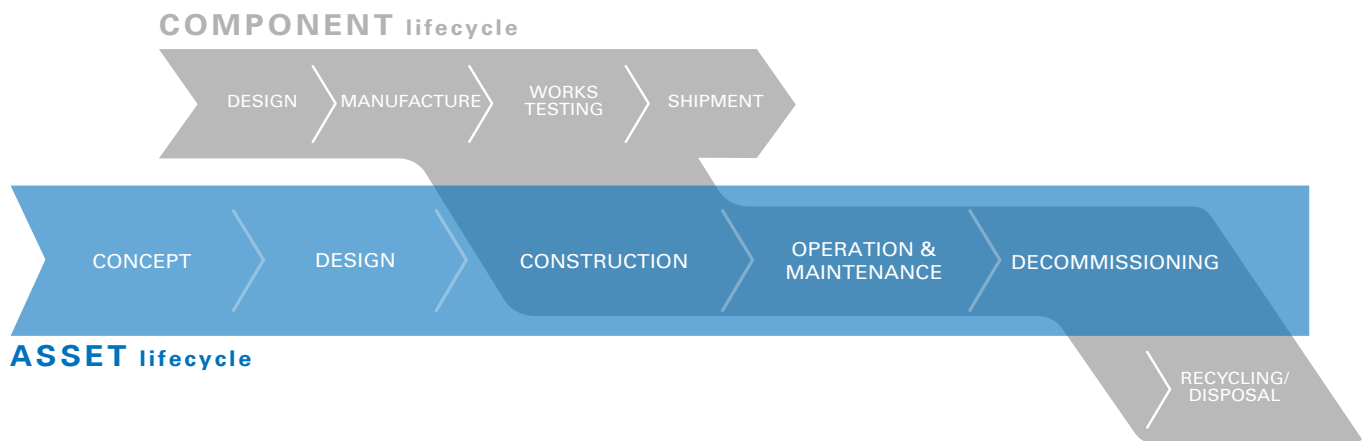
asset integrity over the entire lifecycle of your asset and ensure that the right tools, processes and resources are in place.

We offer tailored solutions of testing and inspection services (data collection) combined with engineering and system-related consulting services (data assessment and interpretation) and AIM system and software consultancy.

| | | | | | |
|-----------------|---|--|--|----------------------------------|--------------------------------------|
| Asset Integrity | Management System & Software Consulting | AIM system and strategy development and implementation | | | AIM Training and Independent Reviews |
| | | AIM software selection & implementation support | Data management | Auditing and certification | |
| | Data Analysis & Technical Consulting | Inspection planning and RBI consulting | | Maintenance optimization and RCM | |
| | | Integrity assessment | Risk, process safety & security assessment | Independent verification | |
| | Data Collection (testing, inspection) | Inspection of plants and components | | Condition monitoring | |
| | | Materials testing and Non-destructive testing (NDT) | | | |

TÜV Rheinland services at a glance.

We support you in ensuring the safety, reliability and regulatory compliance of your industrial assets and components.



SERVICES ALONG THE COMPONENT LIFECYCLE

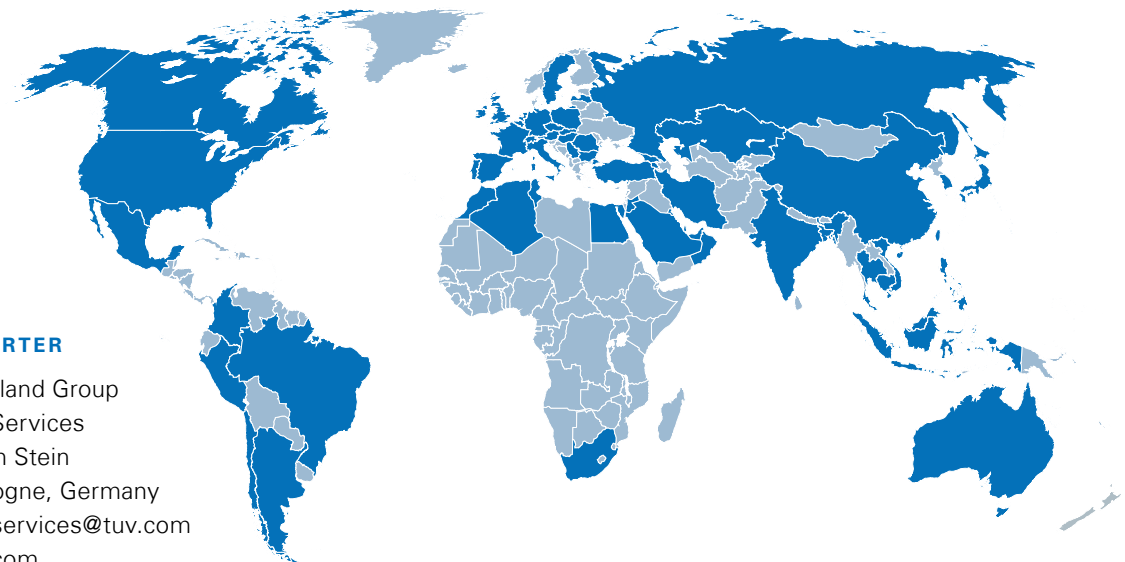
- Pressure equipment certification
- Design review and verification of pressure equipment
- Market access services
- Materials and non-destructive testing
- Vendor inspections
- Vendor assessment
- Factory acceptance test
- Pre-shipment inspection
- Functional safety product and system certification

SERVICES ALONG THE ASSET LIFECYCLE

- Vendor inspection
- Vendor assessment
- In-service inspection
- Materials and non-destructive testing
- Advanced non-destructive testing solutions
- Corrosion monitoring
- Mechanical integrity assessment
- Remaining lifetime calculation
- Fitness for service calculation
- Well integrity services
- Risk-based inspection (RBI) consulting
- Inspection and maintenance optimization
- Condition monitoring solutions
- Independent verification services
- Functional safety management
- Asset integrity management consulting
- Pipeline integrity management consulting
- Process safety management consulting
- Risk and safety assessments
- Hazard identification and management
- Reliability, availability and maintainability (RAM) studies
- HSSE consulting

Global experience with TÜV Rheinland.

Working in different industrial sectors in different geographical regions is a daily routine for our experts. In a time of globalization where industrial projects, production and purchase are becoming cross-region activities, we can be your reliable partner worldwide.



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