Add value.
Inspire trust.

Assessment of innovative traction technologies for the rail sector

Safety assessment of systems with hydrogen storage, fuel cells, hydrogen combustion engines and traction batteries

Your challenges

Safe, functional and economical fuel cell and traction battery systems play a decisive role in the successful change-over to a sustainable energy supply. For vehicle manufacturers and operating companies, it is a challenge to ensure the safety of persons in this process, while preserving the asset value and protecting the environment. In this regard, the existing legal and normative requirements for alternative railway power supply systems do not yet provide an adequate basis for generic safety validation. Currently, this requires engineering assessments based on extensive risk analysis. This results in rail-specific evidence for an acceptable level of residual risk.

How can we help you?

At TÜV SÜD, we provide technical and process-based service through the integration of all aspects of vehicle technology, infrastructure and railway operation in our assessment. Accordingly, disproportionate technical measures are avoided in observing the safety requirements, which provides the basis for guarantee for product liability. Our global team of experts works with you to minimise project risk while achieving a high level of efficiency.

Our experts have decades of experience in the field of safety assessments and complete railway systems and provide interdisciplinary knowledge of assessment methods, especially in relation to FMEA or HAZOP risk, consequences and sensitivity analysis. As one-stop service provider we act as Independent Safety Assessor (ISA) with specific experience in the application of alternative railway traction technologies, Notified Body (NoBo), Designated Body (DeBo), and Assessment Body (AsBo). Additionally, we support you with specialist moderation between manufacturers, operating companies and institutions to develop concensus.

Our assessment services for alternative rail traction technologies

We assess, test and certify complete system concepts, designs and implementations during their development:

- We check the safety-related design concepts.
- We check hazard and risk analyses (e.g. FMEA, FTA, HAZOP, RAMS) in order to identify weak points and potential for optimisation.
- We assess the suitability of defined design measures, applied codes of practice and verification and validation tests.
- We inspect and certify pressure gas components, tank systems and vehicles according to international standards (high-pressure storage, liquid tanks, fuel cells etc.).
- Our accredited laboratories perform tests such as:
  - Material compatibility examinations (metallic and non-metallic materials)
  - Pressure, leakage, and permeation testing
  - Service life testing and durability examinations
  - Hydraulic and pneumatic cycle testing
  - Overpressure and burst testing
  - Gas flow testing
  - Railway suitability and environmental testing
- We inspect and assess the railway suitability according to European and international standards for all components of innovate traction systems.
- We provide assessment of safety functions (sensor – logic – actuator) against performance levels (PL) or safety integrity levels (SIL) determined during risk assessments.
- We review test specifications and witness type tests (e.g. hydrogen tightness and hydrogen filling).
- We examine technical documentation (e.g maintenance and servicing plans, operating manuals) and approval-relevant documentation (e.g. hazard analysis, explosion protection documents and CE declarations of conformity).

Development-accompanying and independent safety assessment according to EN 50126

We assist you in the following areas, among others:

- Assessment of safety documentation along the development process.
- Expert opinions on application of non-railway standards, derogations and evidence of equal safety.
- Issue of a declaration of no objection before commissioning, H2-filling and testing.
- Provision of first-hand information of new and revised standards and regulations throughout the project.
- Assessment of interfaces between vehicle, plant and railway infrastructure as well as hydrogen filling stations with regards to the completeness of identified hazards, suitability of defined mitigations and safety-related application conditions.
- Assessment of safety-related application conditions between vehicle and component manufacturers, vehicle operators and infrastructure managers to ensure safe product implementation and operation.

Training courses

Our training programmes are tailored to meet the needs of our customers. Key content includes:

- Safe handling of hydrogen applications.
- Implications on the train approval process.
- Introduction to regulation codes and standards for the implementation of hydrogen applications.
- Qualification of employees according to the Industrial Safety Regulation.

Your business benefits

- **Save time and money** – as your expert partner, we help you avoid expensive and time-consuming reworking.
- **Minimise risk** – as we support you in identifying safety-relevant weak points in order to avoid disproportionate technical rework.
- **Gain reliable specialist knowledge** – drawn from our vast experience in numerous national and international safety and standardisation projects.

Add value. Inspire trust.

TÜV SÜD is a trusted partner of choice for safety, security and sustainability solutions. It specialises in testing, certification, auditing and advisory services. Through more than 25,000 employees across over 1,000 locations, the company adds value to customers and partners by enabling market access and managing risks. By anticipating technological developments and facilitating change, TÜV SÜD inspires trust in a physical and digital world to create a safer and more sustainable future.

Related services

TÜV SÜD provides the following related services:

- Services for rail vehicles
- Services for light rail systems
- Services for railway infrastructure

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