



保障电动汽车一路安全 Safeguarding E-Mobility



为电动汽车保驾护航 Ensuring E-Mobility as safe and comfortable as traditional mobility

在能源紧缺、环境污染越来越严重的今天，新能源汽车已成为汽车产业未来发展的趋势。其中，电动汽车被普遍认为是未来汽车能源动力系统转型发展的主要方向，已经成为世界汽车强国和主要汽车制造商的发展重点。

德国莱茵 TÜV 在电动交通领域拥有多年的经验及高质量的团队，为整条价值链提供有关安全、可靠性等实用的行业解决方案。我们致力于让电动汽车像传统汽车那样安全、舒适并极具魅力。

Energy shortages and increasingly severe environmental pollution are driving the trend towards new energy vehicles in the automotive sector. In particular, E-Mobility is widely believed to be the future transitional direction for automotive energy systems. It is now being developed by the major automakers in the world's leading automobile industry centres.

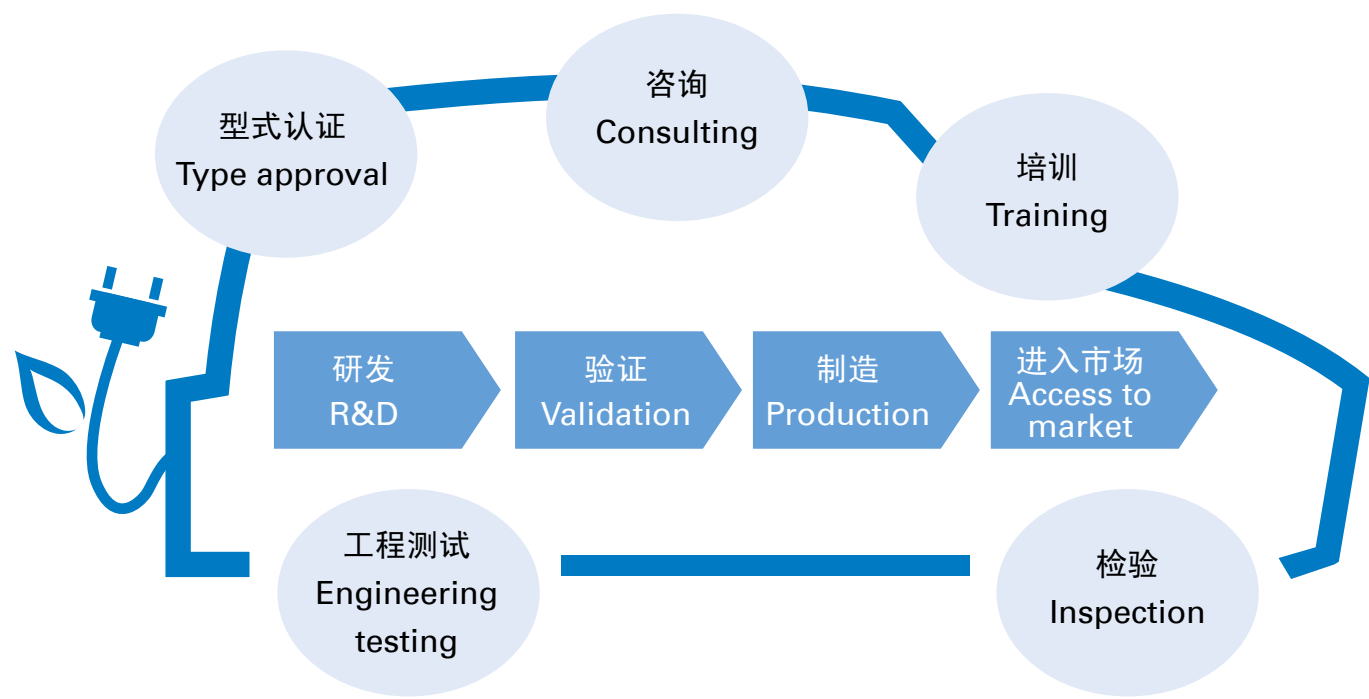
TÜV Rheinland has many years of experience in the field of E-Mobility, and boasts a high-calibre professional team. We accompany clients along the entire innovative mobility value chain with regard to safety, reliability and acceptance, and offer practical industry solutions. We are fully aware that E-Mobility needs to be as safe, comfortable and attractive as conventional mobility, and we are making significant contributions to ensuring that it becomes so.

德国莱茵 TÜV，您值得信赖的合作伙伴 TÜV Rheinland is your reliable partner

- 我们的车辆检测认证服务始于 1904 年，并在大中华区拥有 20 年以上的成功经验，我们备受国内外知名企业的认可及青睐
- Our vehicle certification testing services date back to 1904. With more than 20 years of successful experience in Greater China, we have gained recognition and appreciation from both domestic and foreign enterprises
- 我们是大中华区首家有能力为电动汽车全产业链提供服务的第三方检测认证机构
- We are the first third-party testing and certification agency capable of providing services throughout the E-Mobility industrial chain in Greater China
- 我们为企业的员工提供度身定制的培训服务，从源头为企业产品的安全及可靠性提供支持
- Our tailored staff training helps to ensure the safety and reliability of products at source
- 我们的品牌及标识在国际市场广受认可，证明您产品及系统的安全与质量，获得买家信赖
- Our brand and marks are well recognised in international markets, serving as a guarantee of the safety and quality of your products and systems

电动汽车整体解决方案贯穿整条价值链

Our holistic solutions run through the entire value chain



电动汽车出口认证 EV homologation

国内生产制造的纯电动汽车出口欧洲必须通过欧盟规定的整车型式认证。欧盟整车型式认证是欧盟委员会依据 EC 指令强制其成员国使用的整车、安全零部件及系统认证，是极其严格的认证体系。

德国莱茵 TÜV 具备全球领先的检验、检测及认证技术，能凭借在汽车检测认证领域的丰富经验及专业技术帮助客户实现电动汽车的出口欧洲的目标。我们电动交通领域的专家会帮助客户进行电动汽车与传统汽车的认证差异化分析，制定电动汽车认证策略并根据国际上最新的 UN ECE R100 标准提供电动汽车车辆、REESS 储能系统的测试与认证服务。

China-made BEV must obtain the finished automobile-related certification required by the EU before they can be exported to Europe. Such certification in line with EC directives is a mandatory requirement of the European Commission, and applies to all finished automobiles and safety components and systems exported to EU member states.

By offering the most advanced inspection, testing and certification technology available, in addition to extensive experience and expertise in automotive testing and certification, TÜV Rheinland can help customers to achieve their objective to export electric vehicles (EV) to Europe. Our E-Mobility experts help customers to understand the differences between E-Mobility and traditional vehicle certification, and provide them with assistance in formulating EV certification strategies. We also offer testing and certification services for rechargeable energy storage systems (REESS) in accordance with the latest UN ECE R100 standard.



M 和 N 类汽车的电力动力系统安全要求（不涵盖碰撞后的安全要求）
Safety requirements for electric-powered train and road vehicles in categories M and N (excluding the post-crash safety requirements for road vehicles)

- 电击保护
- 可充电储能系统（REESS）
- 功能安全
- 氢排放测定（只针对开放式牵引用电池）

- Protection against electric shocks
- REESS
- Functional safety
- Determination of hydrogen emissions (only for open-type traction batteries)

M 类和 N 类电动汽车 REESS 储能系统的安全性要求
Safety requirements for the REESS of electric-powered road vehicles in categories M and N

- 振动
- 温度冲击及循环
- 机械冲击
- 防火
- 外部短路保护
- 过度充电保护
- 过度放电保护
- 超温保护
- 排放

- Vibration
- Thermal shock and cycling
- Mechanical impact
- Fire resistance
- External short circuit protection
- Overcharge protection
- Over-discharge protection
- Over-temperature protection
- Emissions

E 1

E4

E13

E24

储能系统的测试与认证

Testing and certification for energy storage system

我们根据 IEC/EN 62660-1 及 IEC/EN 62660-2 检测认证电动汽车锂电池的安全性能，并根据 ISO 12405-1、ISO 12405-2 及 UN ECE R100 第二部分（安全性）对电动汽车锂电池模块 / 电池组进行检测。

We are capable to test and certify the safety and performance of EV lithium cells according to IEC/EN 62660-1 and IEC/EN 62660-2 and to provide partial testing for EV lithium modules/packs according to ISO 12405-1, ISO 12405-2 and UN ECE R100 part II (Safety).



高压零部件及系统的电磁兼容测试

EMC testing for high-voltage components and assemblies

新能源汽车（纯电动汽车和混动汽车）上有大量的高压部件和系统，这些部件和系统的 EMC 性能评估方案不同于传统的低压部件和系统，并且这些高压部件和系统对周边的 EMC 环境有很大影响，需要依据最新的标准和法规进行充分评估和测试，以满足整车厂的要求和不同国家 / 区域的市场准入要求。

我们已经获得了大部分国内外的主机厂认可，并已完成多个 EMC 和电气性能验证实验项目。我们不但可以提供精准的测试服务，还可以在开发和整改阶段提供技术支持，协助客户以最少的时间和资金投入即满足主机厂和不同国家 / 区域的法规要求。

EV and hybrid vehicles contain many high-voltage components and systems, and the evaluation scheme covering them differs from that for the usual components and systems of traditional vehicles. As these high-voltage components and systems greatly influence the ambient electromagnetic compatibility (EMC) environment, full evaluation and testing in accordance with the latest standards/regulations are required to ensure that both the original equipment manufacturer's (OEM) requirements and mandatory national/regional market entry requirements are met.

We have been accredited by most international and domestic OEMs, and have completed numerous EMC and electrical validation testing projects. We not only provide a precise testing service, but also offer technical support during the R&D and debugging periods, thus helping our clients to meet the requirements of various OEMs and countries/regions with a minimum investment in time and money.

服务范围 Service scope

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|----------------------------|---|
| ■ EMC 测试和电气性能测试服务 | ■ EMC testing and electrical testing service |
| ■ 技术培训和咨询服务 | ■ Technical training and consulting service |
| ■ 依据 UN ECE R10.04 的国际认证服务 | ■ Homologation service according to UN ECE R10.04 |

适用标准 Applied standard

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|---------------|------------------|
| ■ GS95002 | ■ BDN TIG-TP-026 |
| ■ GS95025 | ■ WG2 of CISPR D |
| ■ GS95024-2-1 | ■ UN ECE R10.04 |
| ■ GS95024-2-2 | |

备注：以上标准和规范适用于高压部件和系统
Remark: The abovementioned standards/regulations concern high-voltage components and assemblies.



牵引电机的检测认证

Traction motor testing and certification

随着新能源汽车行业的发展，电动汽车电机作为重要的部件，其安全性能的要求是备受电机制造商和整车商关注的问题。德国莱茵 TÜV 在电机行业影响力广泛，技术专家经验丰富，能针对行业上下游能够开展全方位服务。

With the development of the new energy automobile industry, the safety performance of EV motors and other essential EV parts has become a great concern for both motor and finished vehicle manufacturers. TÜV Rheinland has considerable influence in the motor industry, and our team of experts can provide all-round services to both upstream and downstream companies.

服务范围 Service scope

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|------------|-------------------------------|
| ■ 电动汽车电机检测 | ■ EV motor inspection |
| ■ 出具检测报告 | ■ Issue inspection reports |
| ■ 颁发认证证书 | ■ Issue certificates |
| ■ 标准技术培训 | ■ Standard technical training |

适用标准 Applicable standards

- | | |
|---------------------|---------------------|
| ■ EN 60349-1:2010 | ■ EN 60349-2:2010 |
| ■ GB/T 18488.1-2006 | ■ GB/T 18488.2-2006 |

充电系统的测试与认证

Testing and certification for charging system

我们率先在国内推出电动汽车充电系统的测试与认证服务, 是亚太区首家 CB 体系认可的电动汽车充电桩实验室, 可根据欧洲、美洲、日本和中国的要求和标准, 对电动汽车充电站、充电电缆、电耦合器、车载充电器等进行检测与认证。

As the first certification body in Greater China capable of offering services to the entire EV industry chain, we have also taken the lead in introducing testing and certification services for EV charging systems. We are the first accredited certification laboratory for EV charging stations in the Asia-Pacific region, and offer inspection and certification services for charging stations, cables, electric coupling and car chargers in accordance with European, North American, Japanese and Chinese requirements and standards.



服务范围 Service scope

- 充电站和车载充电器
 - 充电站功率计费装置测试
 - 充电站和汽车通讯测试
 - 充电站充电模式验证
 - 充电站软件功能安全验证
 - 充电站过充电测试
 - 充电站人员保护系统测试
 - 环境试验
 - 非正常测试
- 充电耦合器
 - 汽车碾过测试
 - 寿命测试
 - 紫外线暴露测试
 - 二氧化硫、二氧化碳和空气混合气体测试
 - 硫化氢混合气体测试
 - 耐电弧测试
 - 短路耐受测试
- 充电电缆
 - 电性能测试
 - 机械性能测试
 - 低温测试
 - 流体兼容性测试
 - 抗外载压力
 - 整线伸展、耐弯曲
 - 环境试验
 - 燃烧性能
- 为汽车厂商及充电设备运营商提供全面的安全方案。除了设备安装完成后的调试检查, 我们还可提供定期检验服务, 评估充电设备的安全运营情况。同时, 我们可以颁发符合当地法规要求的证明。

- Charging stations and car chargers
 - Electricity metering testing
 - Data communication testing
 - Charging mode verification
 - Software functional safety verification
 - Overcharge testing
 - Personnel Protection System testing
 - Environmental testing
 - Testing for abnormalities
- Couplers
 - Vehicle drive-over testing
 - Service life testing
 - Ultraviolet light exposure testing
 - Mixture of carbon dioxide, sulphur dioxide and air
 - Mixture of hydrogen sulfide and air
 - Resistance to arcing testing
 - Conditional short-circuit current withstanding testing
- Charging cables
 - Electrical testing
 - Mechanical properties
 - Testing at low temperature
 - Fluid compatibility
 - Vehicle drive-over
 - Testing for extensible leads and flexibility
 - Environmental testing
 - Testing under fire conditions
- A comprehensive safety package for vehicle manufacturer and EV charging system operators. After a commissioning inspection once the installation is completed, we set inspection intervals and assess location specific hazards associated with E-Mobility and public places. Meanwhile, we can provide proof of compliance with local statutory requirements.

培训与咨询 Training and consulting

燃料电池、混合动力及电动汽车所使用的汽车技术常使用超过 30V 的交流电或超过 60V 的直流电, 这增加了汽车制造期间发生电击和电弧的风险。为了保障员工的安全, 企业有责任就此对其员工进行培训。

The growing use of voltages above 30V AC and 60V DC in automotive technology owing to developments in fuel cells, hybrid technology and EVs has given rise to electrical hazards in the form of electric shocks and arcing during work on vehicles. Employers thus have a responsibility to train their employees in how to avoid these hazards.

电动汽车高压安全培训

Electric vehicle high voltage safety training

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|---------------|--|
| 课程助益 | Benefits |
| ■ 学习电动车的安全操作 | ■ Learn the safe operation of electric vehicles (EV) |
| ■ 学习电动车高压系统知识 | ■ Acquire knowledge of the high-voltage systems used in EV |

- | | |
|------------------|--|
| 课程大纲 | Course outline |
| ■ 电力技术基础知识 | ■ Basic electrical knowledge |
| ■ 电力危害及急救 | ■ Electrical hazards and first aid |
| ■ 防护措施与安全技术 | ■ Protective measures against electric shocks and fault arcs |
| ■ 电动车上的高压系统 | ■ High-voltage systems in EV |
| ■ 五大安全法则 | ■ Five safety rules |
| ■ 布线及线保护 | ■ Laying and securing wiring |
| ■ 数字开关设备和电路的功能测试 | ■ Functional testing of digital switching devices and circuits |
| ■ 车辆上的故障诊断和维修 | ■ Troubleshooting and other practical work on EV |

备注: 本课程基于 BGI/GUV-I 8686 E 等国际标准。
Remark: the training course is based on international standards, e.g. BGI/GUV-I 8686 E.

电动汽车培训

Electric vehicle training

- | | |
|---------------|--|
| 课程助益 | Benefits |
| ■ 学习电动车高压系统知识 | ■ Acquire knowledge of high-voltage systems used in EV |
| ■ 故障诊断及维修 | ■ Learn to diagnose and repair EV |

- | | |
|----------------|--|
| 课程大纲 | Course outline |
| ■ 电动车结构及原理 | ■ Structure and theory of EV |
| ■ 防护措施与安全技术 | ■ Protective measures against electric shocks and fault arcs |
| ■ 驱动电机及其控制器 | ■ Drive motors and control systems |
| ■ 电动空调压缩机及其控制器 | ■ Electric air-conditioning compressors and control systems |
| ■ 逆变器 | ■ Inverters |
| ■ 动力电池组及电池管理系统 | ■ Power batteries and battery management systems |
| ■ 充电系统 | ■ Charging systems |
| ■ 车辆上的故障诊断和维修 | ■ Troubleshooting and other practical work on EV |

ISO 26262 功能安全咨询认证

Functional safety consulting & certification

汽车行业的发展突飞猛进，安全控制系统可靠性和安全问题不容忽视。汽车电子系统在安全设计上的缺陷，将给驾乘人员的生命安全带来了隐患，随之而来的召回事件给企业带来巨额的经济损失。在产品的设计阶段，如何采用技术手段来规避潜在风险，已成为了汽车企业迫切需要解决的问题。与 ISO 26262 相关的系统可靠性问题，已经得到了社会的普遍重视。德国莱茵 TÜV 作为专业的功能安全认证服务提供者，已获得广泛认可，并在此领域拥有多年丰富的经验。

As the automobile industry develops by leaps and bounds, the reliability and safety of safety control systems are becoming pressing issues. Any faults in the safety design of cars' electronic systems pose risks to drivers, and are likely to result in the withdrawal of products and, in turn, huge financial losses. A matter of urgency for automotive companies is finding a way to avoid potential hazards at the product design stage through the adoption of technical measures. System reliability in accordance with ISO 26262 has thus aroused wide-spread public attention. TÜV Rheinland is a recognised provider of expert functional safety certification services, and has many years of experience in this field.

服务范围 Service scope

- 偏差分析
- 产品级系统认证
- 功能安全管理认证
- 开发流程认证
- ISO 26262 标准基础培训
- ISO 26262 功能安全工程师资格培训
- ISO 26262 功能安全经理资格培训
- In-house 客户定制化主题培训
- OEM/ 供应商功能安全管理咨询
- 功能安全合规性咨询
- 项目构建及安全管理
- 风险分析
- 整车级 ASIL 等级定义
- 开发验证与确认
- 相关软件支持工作
- 基于 IEC 61508 评估
- 基于 ISO 26262-5/-6 评估

- Gap analysis
- Production system certification
- Safety management certification
- Development process certification
- Basic functional safety training on ISO 26262 standard
- ISO 26262 functional safety engineers qualifications training
- ISO 26262 functional safety managers qualifications training
- In-house training
- OEM/supplier safety management consulting
- Performance safety compliance consulting
- Project establishment and safety management
- Risk analysis
- Vehicle ASIL level definition
- Development verification and validation
- Support work in relevant software development
- Assessment base on IEC 61508
- Assessment based on ISO 26262-5/-6



适用的汽车零部件产品范围 Product scope

电动汽车 Electric vehicles

■ BMS (电池管理系统) BMS (battery management system)	■ MCS (电机控制系统) MCS (motor control system)
■ VMS (整车控制系统) VMS (vehicle management system)	■ BCM 等 BCM, etc.

传统汽车 Traditional vehicles

■ 底盘控制 Chassis control	■ 自适应助力转向 Adaptive power-assisted steering
■ 制动控制 Brake control	■ 主动停车辅助系统 Active parking assist
■ 防抱死制动系统 Anti-lock brake system	■ 自适应悬架控制 Adaptive suspension control
■ 车身稳定控制系统 Vehicle stability control system	■ 安全带预紧 Seat belt pre-tensioner
■ 牵引力控制 Traction control	■ 安全气囊 Air bag restraint system
■ 电子制动力分配系统 Electronic brake distribution system	■ 司机瞌睡警示系统 Drowsy driver warning system
■ 转向控制 Steering control	■ 司机监控系统 Driver monitoring system
■ 紧急制动辅助系统 Emergency braking assist	■ 自适应远光灯辅助系统 Adaptive high-beam assist
■ 防撞系统 Collision avoidance system	■ 自动巡航系统 Auto cruise system
■ 车道偏离警报系统 Lane departure warning system	■ 胎压监控系统等 Tire pressure monitoring system, etc.



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