

DEKRA Technology Center



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Whole vehicle

Emissions

Passive Safety

Crash Test Center

Proving Ground

DEKRA Technology Center

- Whole vehicle and component tests
- Homologation and type approval testing
- Development support for the automotive industry
- Research projects for authorities
- Quality assurance for vehicle and system manufacturers (CoP)
- Support of the core business within the DEKRA Group



Our offering

Laboratories, infrastructure and technology for testing and type approval of vehicles. Laboratories ISO 17025 accredited. Appointed Technical Service for EU-type approval.

Main modules:

- Whole vehicle
- Emissions
- Passive Safety
- Crash Test Center
- Proving Grounds



Target Groups / Customer Segments

- Vehicle manufacturers
- Parts manufacturers (incl. aftermarket)
- Supplier industry
- Engineering – service provider
- Authorities
 - Two- and three-wheeled motor vehicles
 - Passenger Cars
 - Commercial vehicles / buses
 - Agricultural or forestry tractors
 - Self-propelled working machines
 - Military and other special vehicles
 - Electrical powered vehicles of all categories

Quality Requirements

Accreditation as a Testing Laboratory according to ISO 17025

- Germany – DAkkS (Deutsche Akkreditierungsstelle GmbH)

Designation as a Technical Service

- Germany – KBA (Kraftfahrt-Bundesamt)
- The Netherlands – RDW (Rijksdienst voor het Wegverkeer)
- Bulgaria – Ministry for Transport
- Ireland – NSAI (National Standards Authority of Ireland)
- Taiwan – MOTC (Ministry of Transportation and Communications)
- Austria – BMVIT (Bundesministerium für Verkehr, Innovation und Technologie)
(ECE regulations only)
- Sweden (Transportstyrelsen)
- Lettland – CSDD (Road Traffic Safety Directorate)

ISO 27001 (not certified) / TISAX

- Information safety management system including VDA prototype protection

Quality Requirements

Further accreditations / approvals

- Japan (exhaust emissions, noise, pedestrian protection, crash)
- Australia (including seats and seat anchorages, seat belts, seat belt anchorages, steering column, wipers, light installation, head restraints, exhaust emissions and fuel consumption, brakes, child restraint systems, coupling device, frontal and side impact, motorcycle noise)
- Brasilia (exhaust emissions)
- Saudi Arabia (Saudi Arabian Standard Organisation; Automotive)
- FIA (seat testing)

Whole vehicle

- Steering Robot + Pedal Robot for extremely accurate driving tests
- Portable Pedestrian Dummy Equipment
- E-Liner BRIDGE for AEB-Testing
- AEB Test System with EURO NCAP Vehicle Target
- GPS Systems with IMU integration
- GPS Data logger Racelogic VBOX 3i with IMU integration



Exhaust Emission

- 4x4 chassis dynamometer test bench in climate chamber
- 4x2 chassis dynamometer test bench (also for motorcycles)
- E-mobility testing devices
- Shed chamber
- Outdoor 4x4 test bench with driving robot
- Engine test bench
- Two different soak areas with different temperature conditioning
- RDE (Real Driving Emissions) with PEMS (MAHA, AVL)



Passive Safety

■ Hyper-G sled

- Frontal, side and rear impact simulation (Euro NCAP, UNECE, FMVSS)
- Dynamic tests for motorsport according FIA-standards (e.g. 8855-1999)
- Dynamic tests for seat and headrest development, interior as well as vehicle bodys and equipment
- Cargo securing testing
- Tests according customer requirements



■ Impact sled facility / child safety

- Dynamic frontal, side and rear impact tests on seat bench or in the vehicle body according > ECE-R44-04
> ECE-R129
- Conditioning of child restraint systems including temperature and corrosion
- Testing of ISOFIX-anchorages



■ Hydraulic traction unit

- Tensile testing according requirements (EC, UNECE, FMVSS, ADR)
- Test bench for the strength of seat-backs and head restraints up to 3 seats in a row according ECE-R 17 and FMVSS 202a
- Pendulum unit according ECE-R 17 and guided headform impactor for energy absorption according FMVSS202a
- Special tests according customer requirements



■ Pedestrian protection facilities

- Pedestrian protection tests acc. requirements (EC, UNECE, GTR, NCAP, TRIAS)
- Testing the vehicle structure or on test rack
- Testing of components (frontal protection systems, accessory parts)
- Analysis of innovative materials
- Misuse tests (conditioned from -20 to +45°C)
- Designated testing institute for:
 - TRIAS 18-J099(1)-01 (TRIAS 63-2004)
 - Reg. (EC) 78/2009 (including 631/2009)
 - UNECE-R 127



■ Drop tower

- Material examination
- Testing of energy absorption elements for race cars (Formula Student SAE)
- Test according to customer requirements



■ Side curtain test facility

- Static and dynamic testing
- Tensile test
- Test according to customer requirements



Structural Testing

■ Coupling devices

- Testing of mechanic coupling devices according: → ECE-R 55 , 2009/144/EC , §22a in conjunction with TA31
- Multi-component load transmission
- Simulation of environmental conditions
- Testing of underrun protection devices → ECE-R 58 – rear underrun protection, ECE-R 73 – lateral underrun protection, ECE-R 93 – front underrun protection



■ Whole vehicle structure

■ Determination of coefficients of friction

- According VDI-guideline 2700 Part 14
- Testing of loading floors, different surfaces, slip-inhibiting materials etc.

■ Normalized forces

■ Strain gauge measuring

■ Testing of vehicle floors

- Strength testing of vehicle floor segments regarding frame or vehicle floor plates
- Different axle-loads possible (upper / lower forklift category, lift truck)

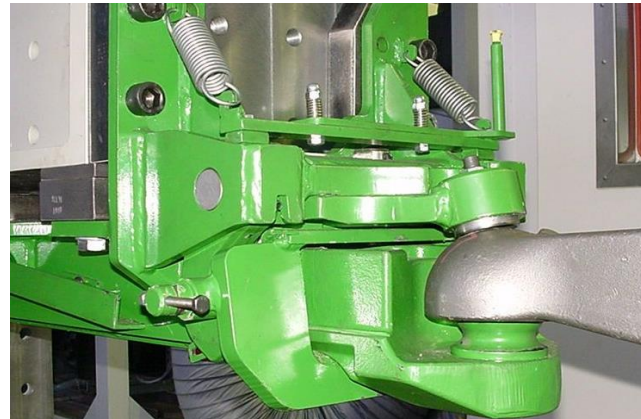


- Servo-hydraulic test facility

- Various standard sensors (force, pressure, acceleration, temperature...)

- Climatic / temperature chamber

- Dynamic tests with servo-hydraulic test facility under influence of environmental conditions
- Flexible application of forces by three-sided and top access



Fields of Service

Services

- Track and infrastructure rental for client projects
- Driving tests performed by DEKRA - including test tracks, measurement equipment, drivers and staff
- Complete project organization by DEKRA according to clients requirements

Scope

- Functional testing for automated vehicles
- Classic driving tests – active safety, durability
- Driver trainings
- Marketing events and incentives
- Technical training for resellers and workshops
- Motorsport events and tests



Joint Approach to test Connected and Automated Vehicles

Combined Coverage of Klettwitz and Malaga

Automated Driving



Test Track Only

| LEVEL 0 DRIVER ONLY | LEVEL 1 ASSISTED | LEVEL 2 PARTLY AUTOMATED | LEVEL 3 HIGHLY AUTOMATED | LEVEL 4 FULLY AUTOMATED | LEVEL 5 DRIVERLESS |
|---|--|---|---|--|--|
| <ul style="list-style-type: none"> Lane Change Warning Blind Spot | <ul style="list-style-type: none"> Lane Keeping Assistant Park Assistant Cruise Control | <ul style="list-style-type: none"> Key Parking Traffic Jam Assistant Parking Assistant | <ul style="list-style-type: none"> Driving on the Motorway Driving in a Traffic Jam | <ul style="list-style-type: none"> Driving in Town Valet Parking | <ul style="list-style-type: none"> Fully Driverless Driving |

Connected Driving



Laboratory Only

| Infotainment Applications | Electrical Vehicle Charging Service Control | Safety & Tracking Control | V2X Communications | Automatic Tolling Services | In Vehicle Wireless Control | Cyber Security |
|--|--|--|---|--|---|---|
| <ul style="list-style-type: none"> Smartphone Integration Communic. & Hands free Calling In Vehicle MiFi In Vehicle TV | <ul style="list-style-type: none"> Charge Points Networking Paying & Billing | <ul style="list-style-type: none"> Safety Tracking & eCall Drive Assist. & Navigation Maintenance & Support | <ul style="list-style-type: none"> Road Hazard Signaling (RHS) Signage Applications | <ul style="list-style-type: none"> Highway Tolling Parking Control | <ul style="list-style-type: none"> Sensors / Actuators (TPMS, RKE) Radars | <ul style="list-style-type: none"> Functional Safety Attack Protection Information Privacy |

Area Concept Klettwitz

High Speed

- Test Oval (5,8km)
- Grand Prix short (3,1km)
- Trioval (3,4km)
- Long Course (11,8 km)
- (3-4 Highway lanes and markings)

Interurban Course

City Courses

- City 1
- City 2
- City 3
- 3 Tunnels
- Intersection Course

Free defined Scenarios

- 2 Multifunctional Areas
- Large Skidpad
- 2 Multifunctional Areas (Stage 2)

Euro NCAP Facilities

- NCAP Straight (long)
- 3 NCAP Straights (short)
- Pedestrian Safety Test Facility



Buildings, Offices, Garages, Event Areas

Grandstand

- Administration offices
- 23 x 50 m² office-, meeting-, event rooms
- 12 x 36 m² customer office

Paddock Area

- 54 x 75 m² garages
- 20 x 50 m² office-, meeting-, event rooms

Event Center

- 1 x 800 m² room
- 2 x 150 m² rooms
- 3 x small meeting rooms
- 4 x customer office

Multifunctional Area

- 2 x 225 m² garage, multifunctional hall
- 2 x small customer offices



Testing Infrastructure

- dGPS 2cm
- WLAN 802.11 p
- 4G, (5G) coverage
- 10 GB upload link for customers
- 800 m mobile guard rails
- Mobile traffic lights
- Mobile obstacles
- Traffic signs



Test Equipment

- Oxford GPS platforms (OXTS)
- Vehico driving and steering robots
- Messring AEB test equipment and soft target
- Pedestrian AEB E-Liner Bridge
- 4A target mover (4Active SBX) for Euro NCAP tests
- Ultraflat overrunable platform with soft target (DSD UFO)



International network

- International testing network for connected and automated driving in Europe, Asia and North America
- Europe's largest independent testing center for connected and automated driving located in Klettwitz, Germany now including Lausitzring racetrack
- Unique model, combining strong R&D and early testing Test Area (Spain) and Large Production Test Track (Germany)
- Identifying test tracks and leading partners in USA and Asia to extend our international network
- Possibility to set up complex scenarios, for urban, non-urban or highway journeys, in a highly flexible way; existing infrastructure is ideal when it comes to road, infrastructure and communication systems/technologies
- Proven expertise in automotive type a approval and homologation and wireless & cellular testing and certification



Our offering

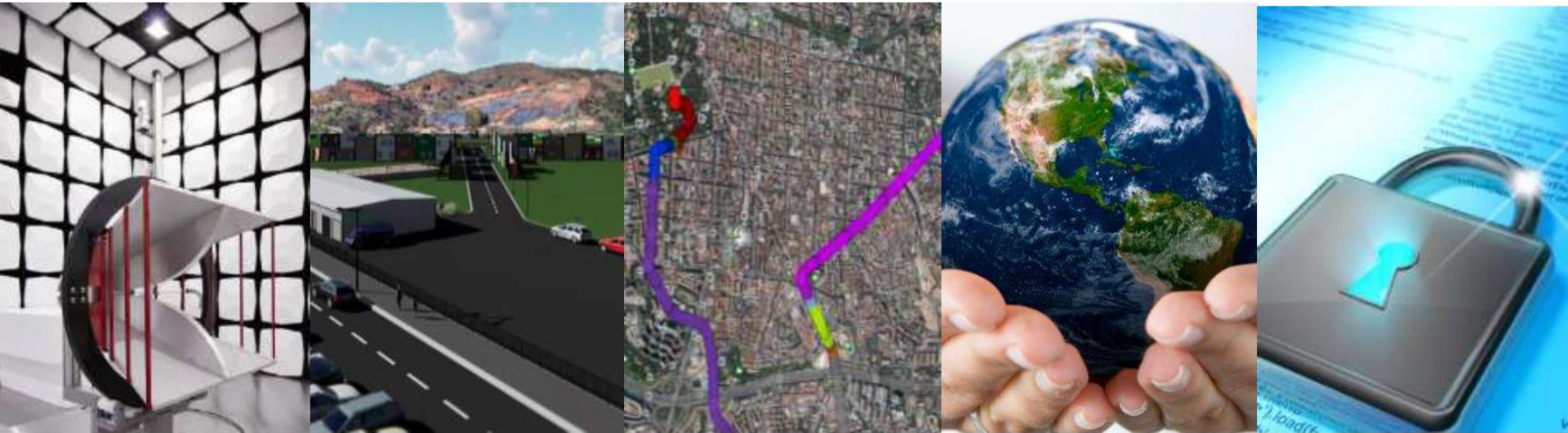
Laboratories, infrastructure and technology for testing and certification of wireless communication components and systems for the connected car or other vehicles

Main technologies:

- V2V/V2X communications
- eCall
- Safety & tracking control systems
- Infotainment Apps
- In-vehicle wireless control systems
- Automatic tolling systems (future)
- EV Charging service control & communications systems (future)



Connected car service scope



Laboratory testing

Test area testing

Field testing

Certification

Cyber security

Laboratory testing

Mobile

- GSM/GPRS/EDGE/AMR
- UMTS
- HSPA+
- LTE
- SIM/USIM
- Over-The-Air (OTA)

Internet of Things (IoT)

- AllJoyn
- LoRa
- OCF
- SigFox
- oneM2M*

Internet of Vehicle (IoV)

- eCall
- Mirrorlink
- Omniair* DSRC
- IEEE 802.11p
- ETSI ITS-G5
- USDOT (SAE J2945/1 & SAE J2735, IEEE1609.X, RSU Requirements)

Wireless

- Wi-Fi™
- Bluetooth®
- Wireless Power
- NFC/RFID
- EMV®
- ULE
- Mobile Payment
- Mirrorlink

Regulatory

- EMC
- RF
- SAR
- Audio/Acoustics
- Automotive
- Batteries
- Electrical Safety
- Environmental

* In development



Test area testing

Including real and simulated infrastructure elements and vehicles; as well as replicas of other elements that interact with the device under test

- ITS-G5 & DSRC/WAVE Infrastructure
- Smartphone Integration Testing
- MiFi Testing
- Cellular network (GSM, UMTS, LTE)
- Scenarios Simulation Elements
- eCall & Navigation Systems Testing
- Automatic Tolling Systems Testing*
- Electrical Vehicle Charging Infrastructure Testing*
- Proximity Radars Testing*
- Other future developments

Traffic signals & lights, road works simulation, real and simulated auxiliary vehicles, simulation of urban scenarios, tunnel, trees etc.

** In development*



Field testing

- KPI are defined prior to test, and statistical trials are reproduced to evaluate all potential real scenarios
- Customized KPI
- Root cause analysis
- Worldwide routes
- Team of expert test engineers
 - understand the technology and use all product functions in the field
 - know the routes with different infrastructure
 - log the events happening between devices and network to track potential issues

- **Call Performance**

- Voice call / Multi-RAB

- **SMS**

- **Data Performance**

- TCP / Ping

- **App Performance**

- Web Browsing / FTP

- **Network Performance**

- RSSI / RSRP / RSRQ

- **Location Based Services**

- Ecall / ERA-GLONASS



Global coverage with
DEKRA own tools provides
great flexibility



Certification services

Wireless

- Bluetooth SIG Qualification
- ULE Alliance (Qualification Body)
- Mirrorlink (Car Connectivity Consortium)
- NFC Forum
- WiFi Alliance (WFA)
- AllJoyn (OCF)
- LoRa Alliance
- AirFuel (PMA & A4WP)
- SigFox

Mobile

- PTCRB
- GCF

Cyber Security

- ISO 15408/
Common Criteria
- FIPS 140-2

Notified and Certification bodies

- International Type Approval Services (\cong 200 countries)
- Notified Body for The Radio Equipment Directive (RED) 2014/53/EU
- Notified Body for the EMC Directive 2014/30/EU
- TCB (USA), FCB (Canada)
- eCall. Technical Service for Type Approval

Everything needed to put your connected components, systems and vehicles on the global market

Cyber security evaluation services

Product security evaluation

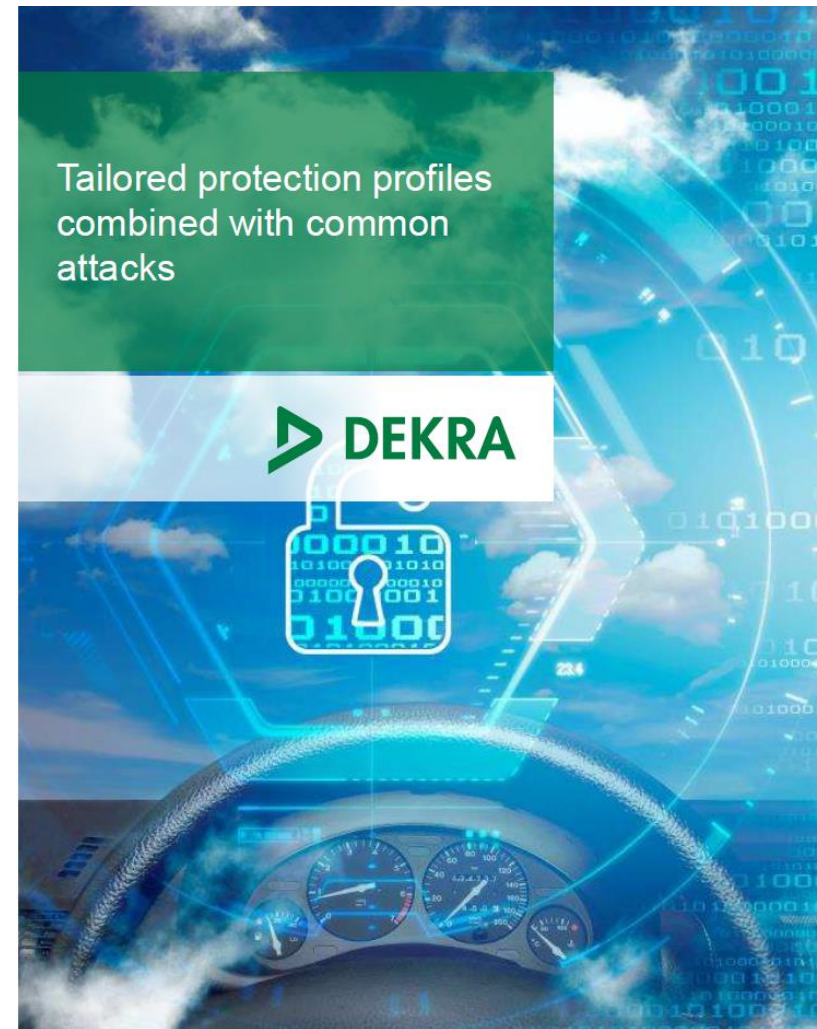
- Formal security assessment, following DEKRA security evaluation methodology
- Penetration testing

Product security certification

- Common criteria/ISO 15408
- ISO 19790/NIST FIPS 140-2
- 3GPP Accredited for MME devices

Cyber security Lab focused on Product Security Evaluation

- Solid and experienced team, fully dedicated to security evaluation for hardware and software products
- More than 10 years experience in common criteria certification, cryptography certifications and penetration testing
- Comprehensive analysis of the device and its ecosystem (mobile applications, cloud server, etc.)
- Continuous R&D in new vulnerabilities and attacks methods



Thank you!



MISSION
SAFETY