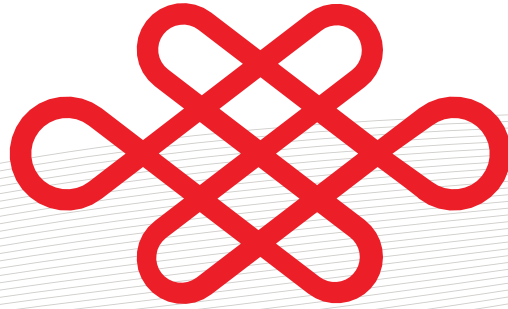




FRANKONIA

Automotive EMC Test Facilities



FRANKONIA

Brief Introduction

Frankonia

Turnkey Solution Provider

The Frankonia Group was founded in 1987 as a solution provider for EMC laboratories, meeting the increasing demand for highly specialized testing environments for the electronic and automotive industry. Without limitations in its capabilities, Frankonia develops future-oriented concepts for our complete product range, which guarantee the optimal use of resources, as well as the best possible customized solutions. Frankonia offers complete solutions for the electronic, military and automotive industry, which meet customers' individual requirements.

Frankonia at a Glance

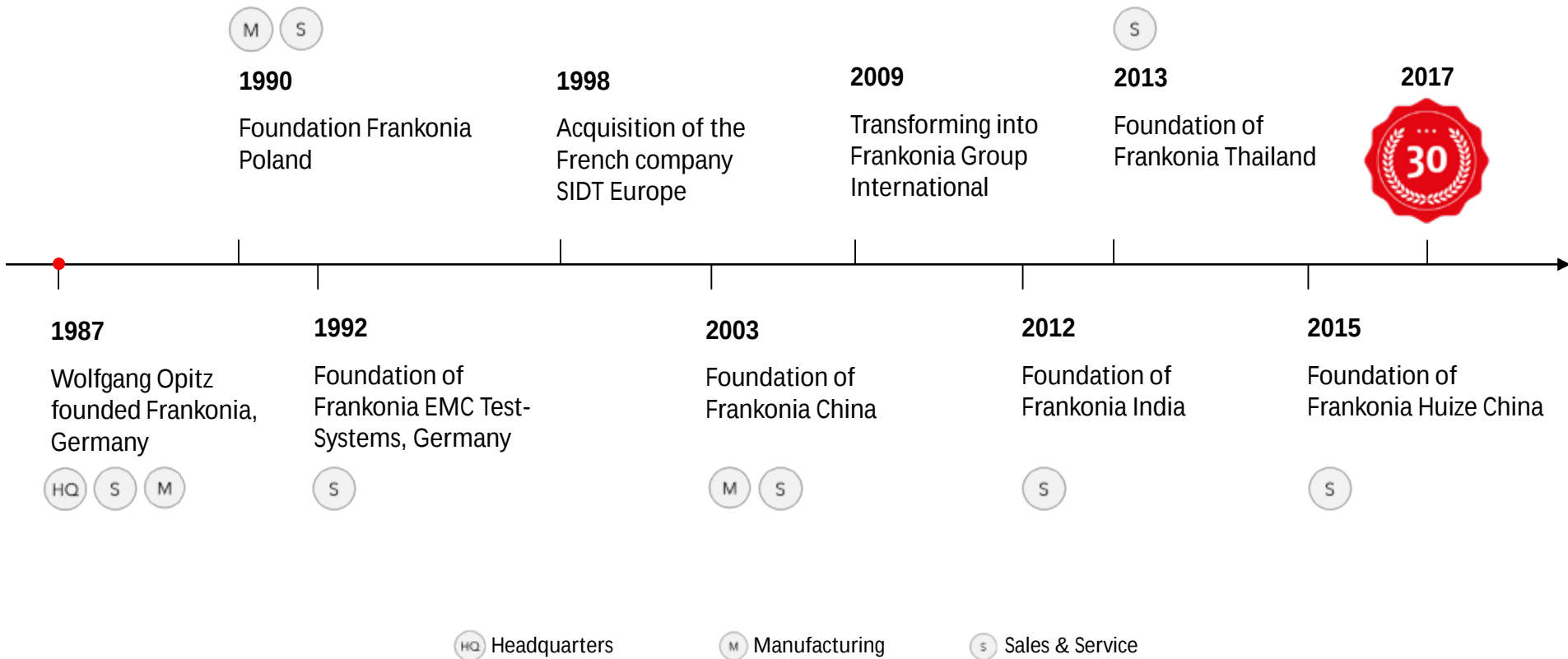
- ü Frankonia demonstrates a global presence in cooperation, with a well-structured network of productions, representations and service units.
- ü Frankonia strives to be the preferred partner for customized and state-of-the-art solutions.
- ü Frankonia provides fundamental knowledge to operate as a complete solution provider.
- ü Frankonia implements innovative technologies to enhance efficiency and improve the outcomes and quality along with customers' needs

The EMC testing industry is a high-technical, innovative and fast-changing niche industry. With 30 years of experience to date, Frankonia maintains its leading position in EMC solutions worldwide.



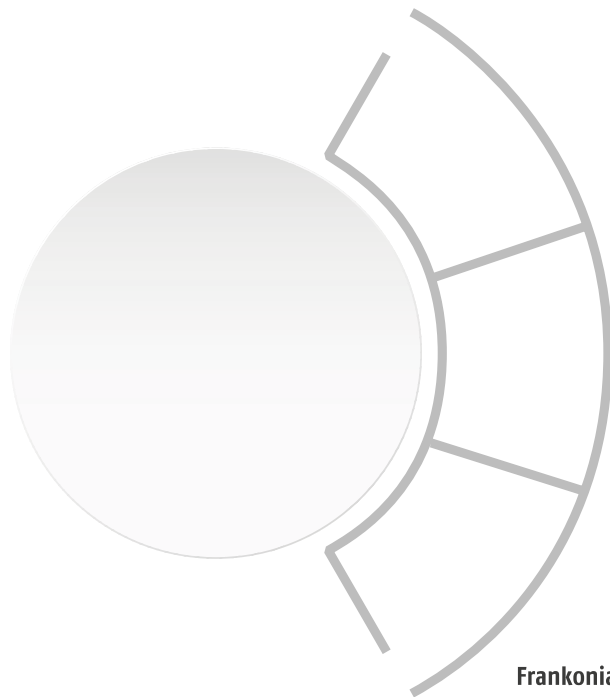
Frankonia Group

History



Frankonia Group

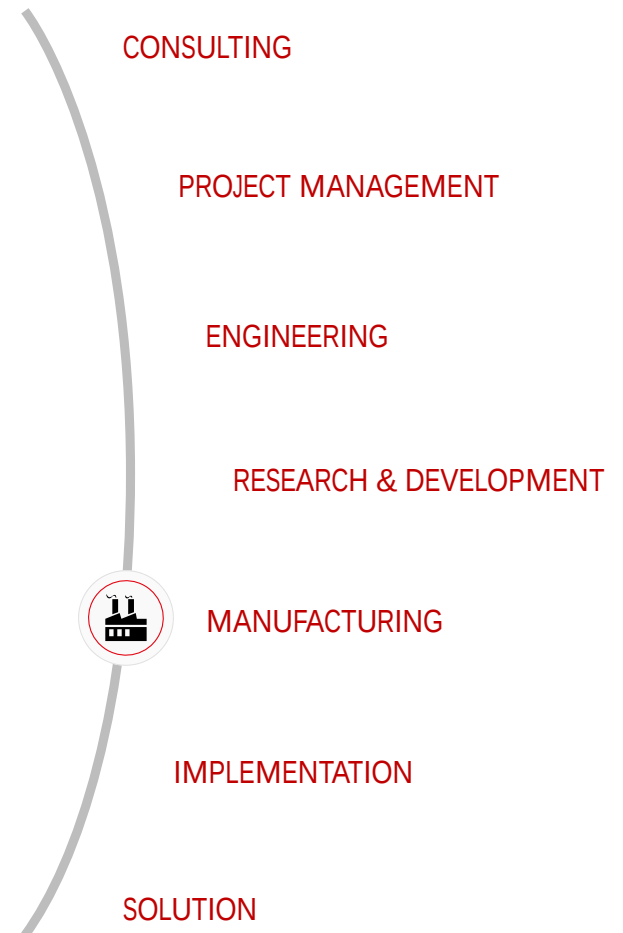
Solution Portfolio



Frankonia EMC Test-Systems GmbH



Forchheim, Bavaria, Germany
Founded 1992



Frankonia

Frankosorb® Absorber Technology for high-performance Anechoic Chambers

Within our Anechoic Chamber business that includes a wide range of standardized chambers from pre-compliance up to full compliance and customized chambers.

We offer a variety of innovative positioning devices and accessories required in modern testing facilities like monitoring equipment, antenna mast, turntables, doors and gates, and our unique absorber technology Frankosorb®.

Frankonia trusted solutions

- ü Unique Nano thin-film absorber technology (Frankosorb®)
- ü Modular and prefabricated standards
- ü Completely dismountable chambers as everything is screwed
- ü Stable quality and technology through our own manufacturing and engineering
- ü Complete range of products
- ü Customized turnkey solutions

Frankonia's Anechoic Chambers are part of testing laboratories of different industries all over the world. Customers from commercial test institutes, manufacturers of electronic devices, as well as customers from the automotive or military industry trust Frankonia's solutions for now more than 30 years.





FRANKONIA

Anechoic Chambers



ACTC

Automotive Component Testing Chamber

ACTC

Automotive Component Testing Chamber

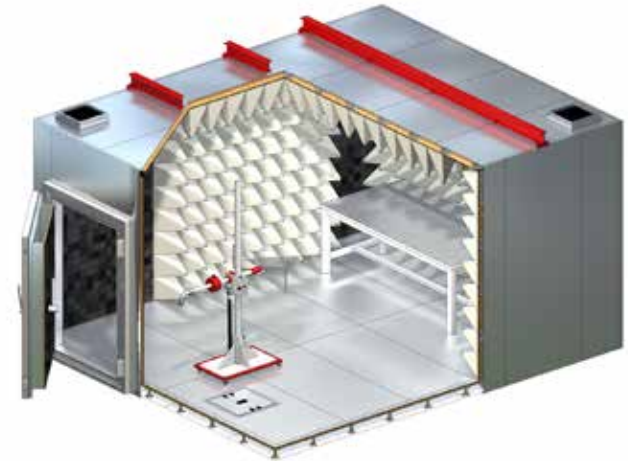
The ACTC is Frankonia's automotive component testing chamber solution at 1,0 m measuring distance. This chamber solution is adapted for full compliant tests of automotive components according to CISPR 25 and ISO 11452.

Technical specifications

- § External dimensions:
ACTC: 6,380 x 5,480 x 3,750 m (L x W x H) for components
ACTC L: 11,480 x 6,580 x 4,500 (L x W x H) for components and customized to any EUT sizes, e.g., for vehicles
- § Frequency range: 150 kHz to 18 GHz (option 40 GHz)

Absorber lining

- § Wall and ceiling: Optimized lining with Ferrite absorbers; partial lining with Frankosorb® hybrid absorbers
- § Floor: Ground plane, optional floor absorbers
- § Table: custom table size, with galvanized ground plane or copper ground plane, grounding to the wall or to the floor



Emission (EMI)

- § Compliant according to CISPR 25 Ed. 4 at 1,0 m test distance

Immunity (EMS)

- § Compliant according to ISO 11452 at 1,0 m test distance



AVTC

Automotive Vehicle Testing Chamber – Vehicle Test Setup



AVTC

Automotive Vehicle Testing Chamber – Commercial Test Setup

AVTC

Automotive Vehicle Testing Chamber

The AVTC is Frankonia's automotive anechoic chamber solution for a test distance of 3,0 m or 5,0 m. The AVTC is adapted for radiated emission and immunity tests on vehicles and components according to CISPR 12, CISPR 25, and ISO 11451 and ISO 11452. Furthermore, the AVTC meets commercial test requirements according to CISPR 16-1-4, ANSI C63.4 and IEC/EN 61000-4-3.

Technical specifications

§ External dimensions:

AVTC: 11,480 x 9,380 x 6,000 m (L x W x H), QZ ø3,0 m at 3,0 m test distance, with d=5,0m turntable

AVTC L: 14,780 x 11,480 x 6,000 m (L x W x H), QZ ø3,0 m at 3,0 m and 5,0 m test distance, with d=6,0m turntable

AVTC XL: 16,280 x 12,680 x 6,000 m (L x W x H), QZ ø5,0 m at 3,0 m test distance with integrated dynamometer

§ Frequency range: 9 kHz to 18 GHz (option 40 GHz)

Absorber lining

§ Wall and ceiling: Full lining with Ferrite absorbers; optimized or full lining with Frankosorb® hybrid absorbers H600 and H1000

§ Floor: Moveable Frankosorb® hybrid absorbers H600 for immunity tests; and pyramid absorbers P450 or PF300 for emission tests

§ Optional floor-absorberboard for EMI/EMS tests (AVTC L)

§ Turntable (AVTC, AVTC L) or dynamometer integration (AVTC XL) to meet ECE R10.5 at 3m test distance



Emission (EMI)

§ Compliant according to CISPR 16-1-4 and ANSI C63.4

§ AVTC: Quiet Zone: ø3,0 m at 3,0 m test distance

§ AVTC L: Quiet Zone: ø3,0 m at 3,0 m and 5,0 m test distance

§ AVTC XL: Quiet Zone: ø5,0 m at 3,0 m test distance

§ Compliant according to CISPR 25 Ed. 4

§ Compliant according to CISPR 12 at 3,0 m test distance

Immunity (EMS)

§ Compliant according to IEC/EN 61000-4-3 at 3,0 m test distance (Uniform Field 1,5 x 1,5 m)

§ Compliant acc. to ISO 11452

§ Compliant acc. to ISO 11451



SAC-10V

Semi Anechoic Chamber for Vehicle Testing with Long Pyramid Absorbers



SAC-10V

Semi Anechoic Chamber for Vehicle Testing with Hybrid Absorbers



SAC-10V

Semi Anechoic Chamber for Vehicle Testing with Hybrid and Long Pyramid Absorbers

SAC-10V

Semi Anechoic Chamber for Vehicle Testing

The SAC-10V chambers are Frankonia's full compliant and customizable EMC testing solutions at 10,0m measuring distance dedicated to full vehicle tests offering an integrated emission free dynamometer.

All SAC-10 V chambers can be offered with Frankosorb® long pyramid or hybrid absorbers and meets the test criteria's according to ECE R10.5.

Technical specifications

- § External dimensions with **hybrid absorbers (H)**:
SAC-10V-6/H: 22,580 x 15,680 x 8,7000 m (L x W x H), QZ ø6,0 m
- § Frequency range: 9 kHz/ 26 MHz to 18 GHz (option 40 GHz)
- § External dimensions with **long pyramid absorbers (P)**:
SAC-10V-6/P: 26,480 x 20,180 x 10,500 m (L x W x H), QZ ø6,0 m
- § Frequency range: 150 kHz/ 26 MHz to 18 GHz (option 40 GHz)

Absorber lining

- § Wall and ceiling with H-Absorbers: Full lining with Ferrite absorbers; optimized or full lining with Frankosorb® hybrid absorbers
- § Wall and ceiling with P-Absorbers: Optimized lining with Frankosorb® long pyramid absorbers P2400
- § Floor: Moveable Frankosorb® hybrid absorbers H600 for immunity tests; and pyramid absorbers P450 or PF300 for emission tests



Emission (EMI)

- § Compliant according to CISPR 16-1-4 and ANSI C63.4
- § SAC-10V-6 Quiet Zones: ø6,0 m at 10,0 m test distance
- § Customized SAC-10 Quiet Zone: from ø6,0 m up to ø8,0 m
- § Compliant according to CISPR 12 at 3,0 m or 10,0 m distance
- § Compliant according to CISPR 25 Ed. 4
- § Compliant according to ECE R10.5 with dynamometer

Immunity (EMS)

- § Compliant according to IEC/EN 61000-4-3 at 3,0 m test distance (Uniform Field 1,5 x 1,5 m)
- § Compliant acc. to ISO 11451 and ISO 11452



Powertrain and Battery Solutions



EDTC

External Load Machine

Load Machine

E-Drive Testing Solution with Fixed Load Machine

The EDTC is Frankonia's fully compliant e-drive test solution that is designed for EMC component and system testing for all types of hybrid, electric, fuel cell and battery drive systems. The EDTC offers superior conditions for radiated emission testing according to CISPR 25 Ed. 4 and radiated immunity testing according to ISO 11452.

Technical specifications

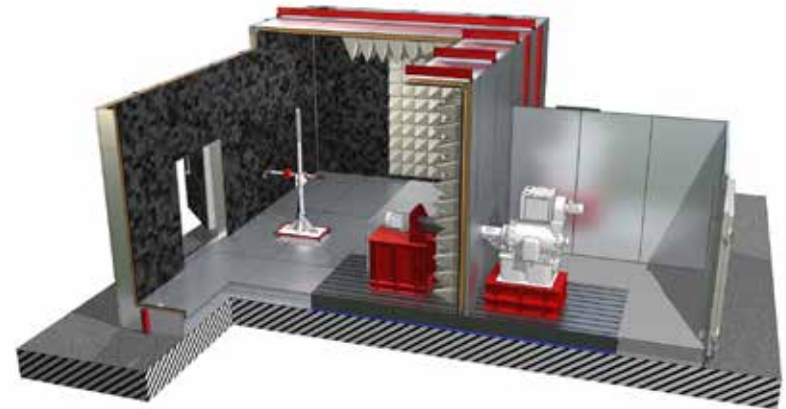
- § External dimensions:
EDTC: 7,880 x 5,480 x 3,750 m (L x W x H)
- § Frequency range: 150 kHz to 18 GHz (option 40 GHz)

Absorber lining

- § Wall and ceiling: Optimized lining with Ferrite absorbers; partial lining with Frankosorb® hybrid absorbers
- § Floor: Ground plane, optional floor absorbers

E-Drive Solutions as fixed shaft version

- § 125 kW external load machine up to 12.000 RPM
- § 160 kW external load machine up to 12.000 RPM
- § 250 kW external load machine up to 12.000 RPM



Emission (EMI)

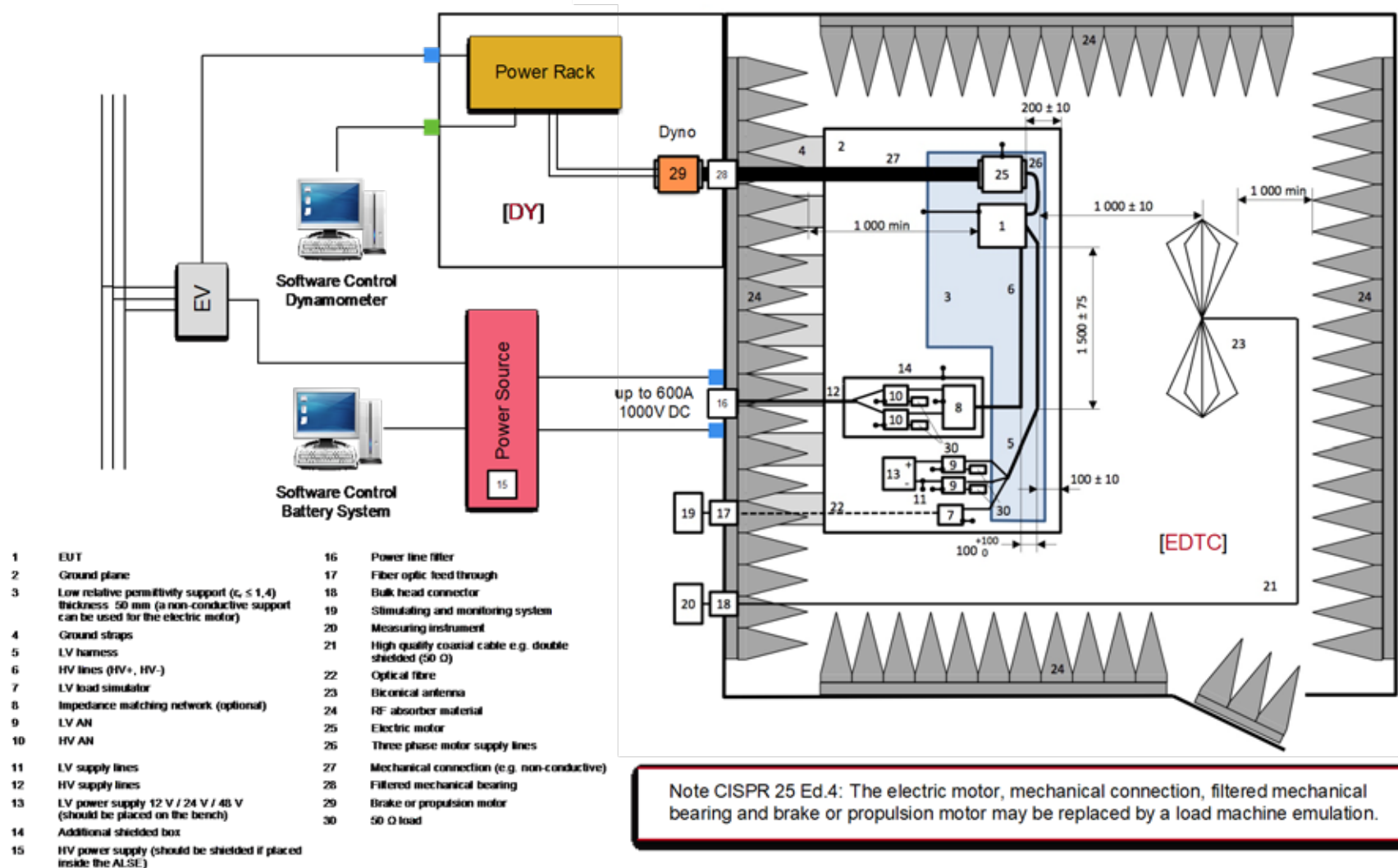
- § Compliant according to CISPR 25 Ed. 4 at 1,0 m test distance

Immunity (EMS)

- § Compliant according to ISO 11452 at 1,0 m test distance

Load Machine

EMC test on electric motors acc. to CISPR 25 Ed.4



Load Machine

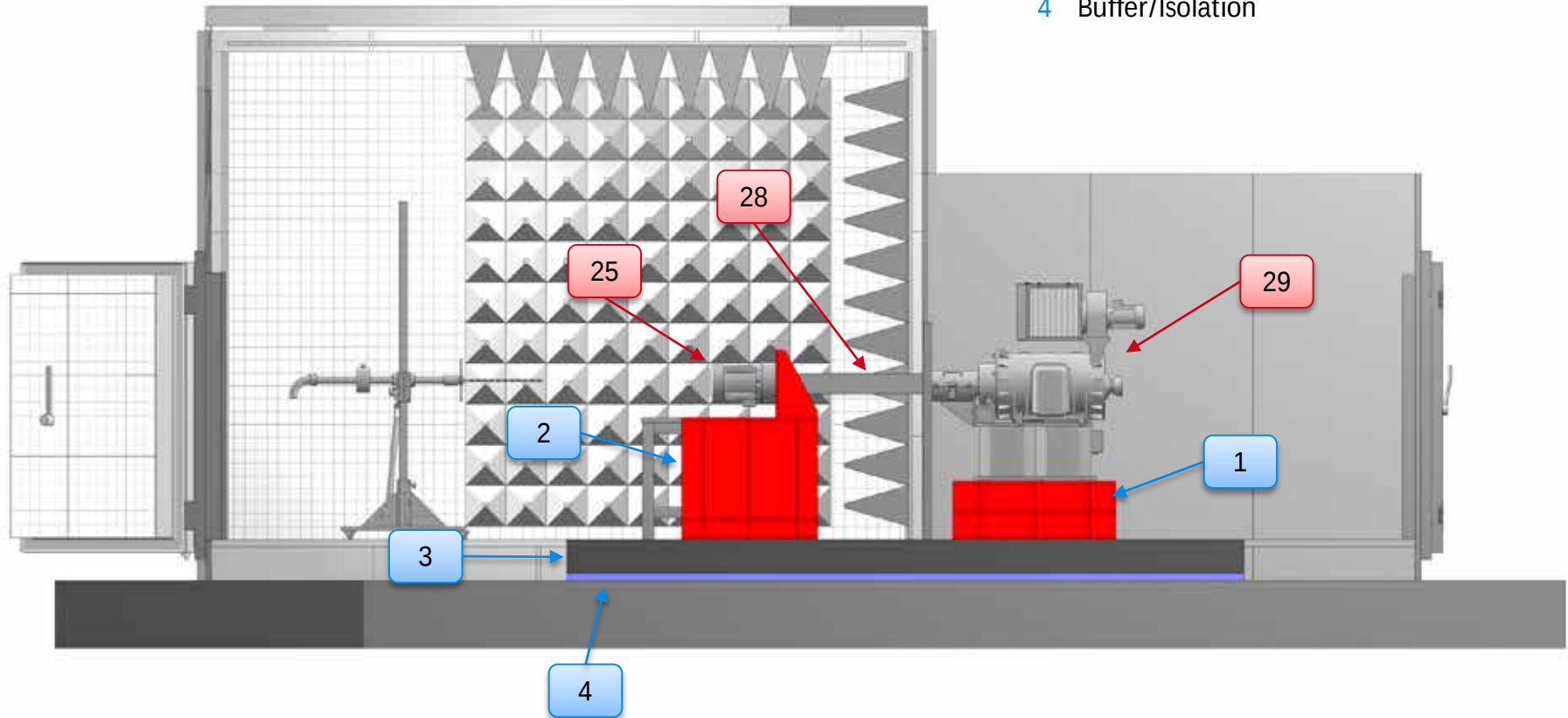
External Load Machine

According to CISPR 25 Ed.4

- 25 Electric Motor (EUT)
- 28 Filtered mechanical bearing
- 29 Brake or propulsion motor (Dyno)

Frankonia EDTC preparation:

- 1 Load machine support
- 2 Electric motor support (customized)
- 3 Vibration-free-Basement
- 4 Buffer/Isolation





BlueBox

Mobile Load Machine

BlueBox

E-Drive Testing Solution with Mobile Load Machine

The BlueBox is the perfect and full compliant alternative when it comes to efficiency, flexibility and cost savings for EMC tests on motors, or in combination with battery tests.

Technical specifications

- § External dimensions:
EDTC-BB: 7,880 x 6,380 x 3,750 m (L x W x H)
- § Frequency range: 150 kHz to 18 GHz (option 40 GHz)

BlueBox Mobile E-Drive Solutions

- § 30 kW mobile load machine BlueBox up to 8.000 RPM
- § 40 kW mobile load machine BlueBox up to 7.000 RPM
- § 65 kW mobile load machine BlueBox up to 6.500 RPM
- § 120 kW mobile load machine BlueBox up to 6.000 RPM

Special features

- § Flexible solution for e-motor tests in front of absorber wall, or setup on turntable for 360° test
- § Combination with any battery systems
- § Inclusive EUT power source and battery emulation
- § Usable in every CISPR 25 compliant EMC chamber; integration kit for existing chambers available
- § Emission free and adapted to real EMC test conditions
- § Premium references: BMW, EETI, CSA Group, CATARC



Emission (EMI)

- § Compliant according to CISPR 25 Ed. 4
- § Reliable test results

Immunity (EMS)

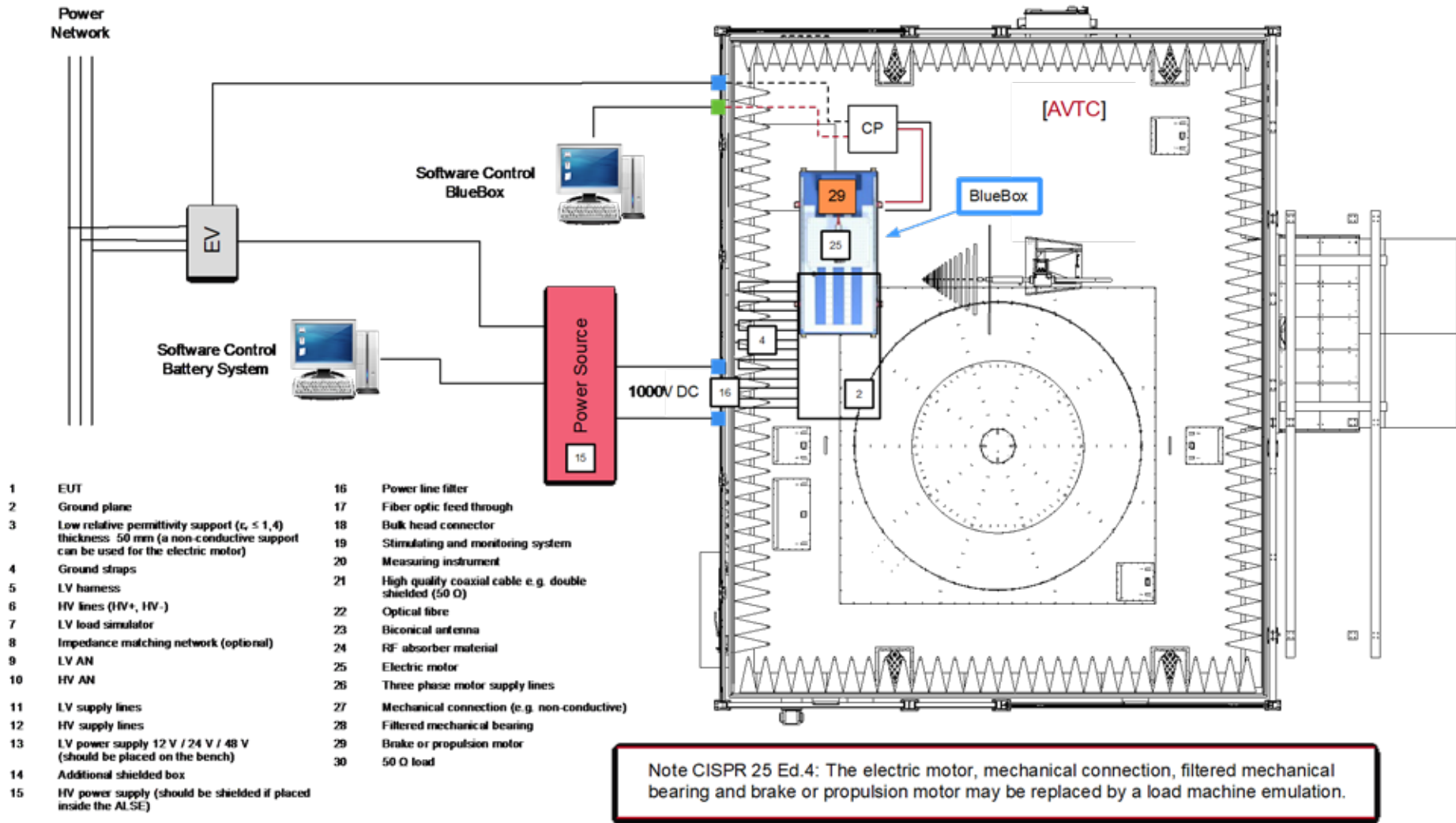
- § Compliant according to ISO 11452

Verified conditions

- § Fully integrated as per CISPR 25 (ALSE long-wire method)
- § Fully compatible with low Ambient Noise

BlueBox

E-Drive Testing Solution with Mobile Load Machine





Battery Solution

Battery and Infrastructure Testing

Battery Solution

E-Drive Testing Solution for Battery

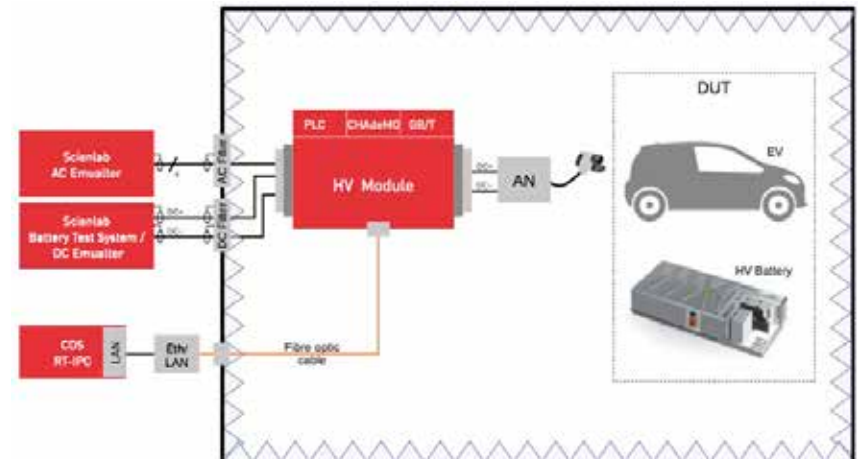
Frankonia with partners offer adapted EMC test environments incl. EMC test equipment, integrates a battery test system, AC or DC emulator, or a complete charging infrastructure as a turnkey solution.

Battery Test Solutions

- § Battery system from 100 kW up to 600 kW, with 300 A or 600 A at 1.000 V DC for components and vehicles
- § DC and/or AC battery emulation
- § CDS charging emulation and monitoring with protocols:
 - § **PLC**, incl. cables and connectors
 - § **GB/T**, incl. cables and connectors
 - § **CHAdMo**, incl. cables and connectors
- § Usable in every CISPR 25 compliant EMC chamber; integration kit for existing chamber available

Power Source Solutions

- § FSL-100 with 100 kW from 1000V DC with 300A/600A
- § FSL-150 with 150 kW from 1000V DC with 300A/600A
- § FSL-180 with 180 kW from 1000V DC with 300A/600A
- § FSL-250 with 250 kW from 1000V DC with 300A/600A
- § FSL-350 with 350 kW from 1000V DC with 600A
- § FSL-600 with 600 kW from 1000V DC with 600A



Battery Solution

E-Drive Testing Solution for Battery

Usability

- § Operation as battery test system
(=current source to test HV battery packs)
- § Operation as DC Emulator
(=emulation of HV battery to supply a traction inverter)
- § Operation as DC quick charging station
(=emulation of EVSE incl. communication)
- § Operation as AC charging station
(with local grid, or grid emulation)
- § Charging Discovery System with EMC optimized casing
- § Fully adapted and integrated to Frankonia EMC Anechoic Chambers
- § Charging protocols: PLC, GB/T, CHAdeMO



Charging Discovery System (CDS)

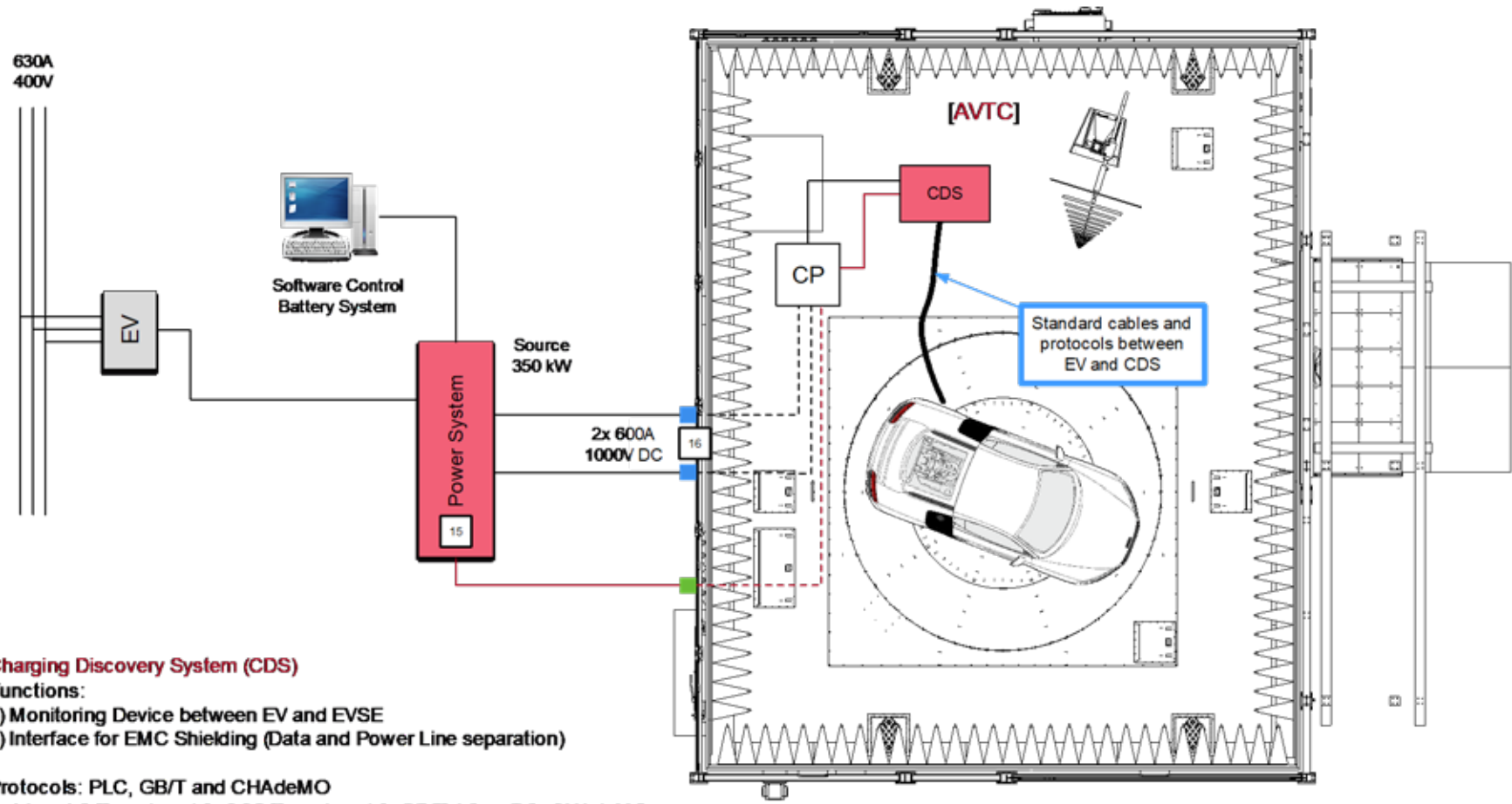
The communication between EV (Electro Vehicle) and EVSE (Electro Vehicle Supply System) will be done by the Charging Discovery System.

- § Analyzing communication between the EVSE and EV
- § Testing the charging function of a charging station (EVSE test)
- § Testing the charging function of electric/hybrid vehicles (EV test)



Battery Solution

Charging Discovery System



Charging Discovery System (CDS)

Functions:

- 1) Monitoring Device between EV and EVSE
- 2) Interface for EMC Shielding (Data and Power Line separation)

Protocols: PLC, GB/T and CHAdeMO

Cables: AC Type 1 and 2, CCS Type 1 and 2, GB/T AC or DC, CHAdeMO



FRANKONIA

Introducing: SAC-10Vx
Next generation multi-purpose Anechoic Chambers

Automotive Trends

Technology Drivers affecting EMC Test Conditions



Automotive today

- § mostly mechanical or hydraulically systems with low influence to the EMC testing

Automotive trends

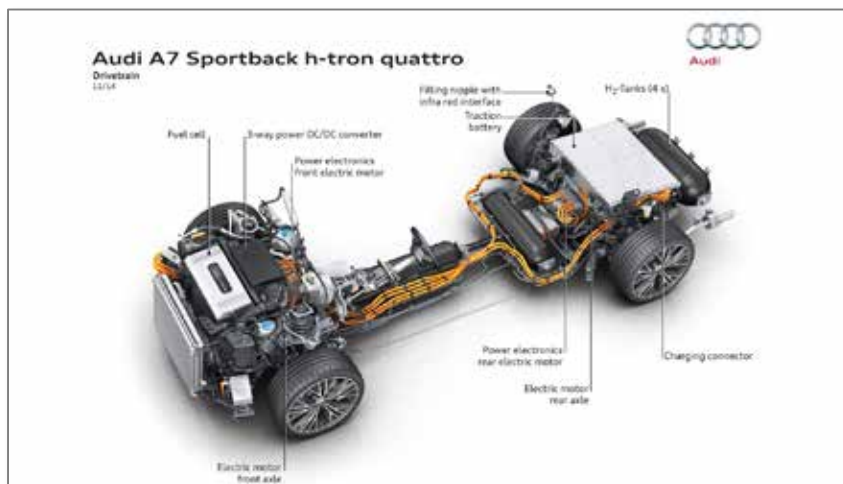
- § Hybrid cars, electric cars, fuel-cell cars
- § Autonomous driving, wireless communications, IoT, V2V, V2X

Challenge EMC engineering

- § Provide defined operating condition during the EMC measuring.
- § Free of interdependencies during EMC measuring while changing measuring methods.
- § International regulations, modular platforms, faster model change

Challenge EMC philosophy

- § How to measure all appropriate EMC testing's effectively within a dedicated time?
- § How to reproduce testing results?
- § How to react on changing operating conditions during the EMC measurement?
- § How to evaluate simulation data with real-tested data?



Automotive Trends

Technology Drivers for EMC Test Conditions

Automotive System Technologies

- § Navigation GPS/GNSS/BeiDou
- § Cellular Connectivity 4G/5G/Wi-Fi 2.4G
- § Entertainment and Radio
- § Assistant Systems via Camera, Lidar, Radar, Ultrasonic
- § Safety Systems like eCall/OnStar
- § Vehicle-2-Vehicle communication, Vehicle-2-Infrastructure (IoT)
- § Remote Systems and Monitoring Systems (e.g. TPMS)
- § Cyber Security and Safety
- § Dedicated Short Range Communication (DSRC), NFC
- § ...

Summary

It is obvious that every new vehicle on the road will be wirelessly connected to other vehicles or systems. Automotive manufacturers will rely on wireless communications for an extremely wide range of functions, including vehicle safety and control.

Those functions will require support for many cellular technologies including 4G and 5G, as well as Wi-Fi, Bluetooth and near-field communications (NFC). As the automotive RF environment becomes more complex and challenging, it will become important to consider all these wireless technologies to a real testing of vehicles, their functionality and overall safety.



Test Site Requirements

- § Meet EMC regulative standards as per ECE R10.5
- § Capability to test real driving conditions
- § 100% testing requires a reproducible site for component and system level, and vehicle level
- § High-performance EMC chamber from 9 kHz up to 40 GHz
- § Multipurpose coverage for all kind of powertrain variations
- § Involve simulation data to the real test
- § Integrate wireless communications and driverless technologies
- § Fully-functional and all-in-one EMC anechoic chamber

Introducing the next gen. Frankonia SAC-10Vx Anechoic Chamber

Frankonia SAC-10Vx

Semi Anechoic Chamber for Vehicle-2-Vehicle/Infrastructure Testing

NEW

The SAC-10Vx chamber is Frankonia's full compliant and customizable EMC testing solutions at 10,0m measuring distance dedicated to full vehicle tests offering an integrated emission free dynamometer. The SAC-10V-2V meets ECE R10.5 criteria's and offers the possibility to test vehicle communications.

Technical specifications

- § External dimensions with **hybrid absorbers (H)**:
SAC-10Vx: 28,205 x 18,080 x 11,8500 m (L x W x H)
 QZ ø6,0 m
- § Frequency range: 9 kHz/ 26 MHz to 18 GHz (option 40 GHz)

Absorber lining

- § Wall and ceiling with advanced H-Absorbers: Full lining with Ferrite absorbers; optimized or full lining with Frankosorb® "turbine" hybrid absorbers with high-end performance in the low frequency and extended wide-span frequency range up to 40 GHz.
- § Floor: Moveable Frankosorb® hybrid absorbers H600 for immunity tests; and pyramid absorbers P450 or PF300 for emission tests
- § Scalable to passenger vehicles, trucks, or heavy-duty vehicles



Emission (EMI)

- § Compliant according to CISPR 16-1-4 and ANSI C63.4
- § SAC-10V-2V Quiet Zones: ø6,0 m at 10,0 m test distance
- § Compliant according to CISPR 12 at 3,0 m or 10,0 m distance
- § Compliant according to CISPR 25 Ed. 4
- § Compliant according to ECE R10.5 with dynamometer
- § Optimized for **Vehicle-2-Vehicle** and **Vehicle-2-Infrastructure**

Immunity (EMS)

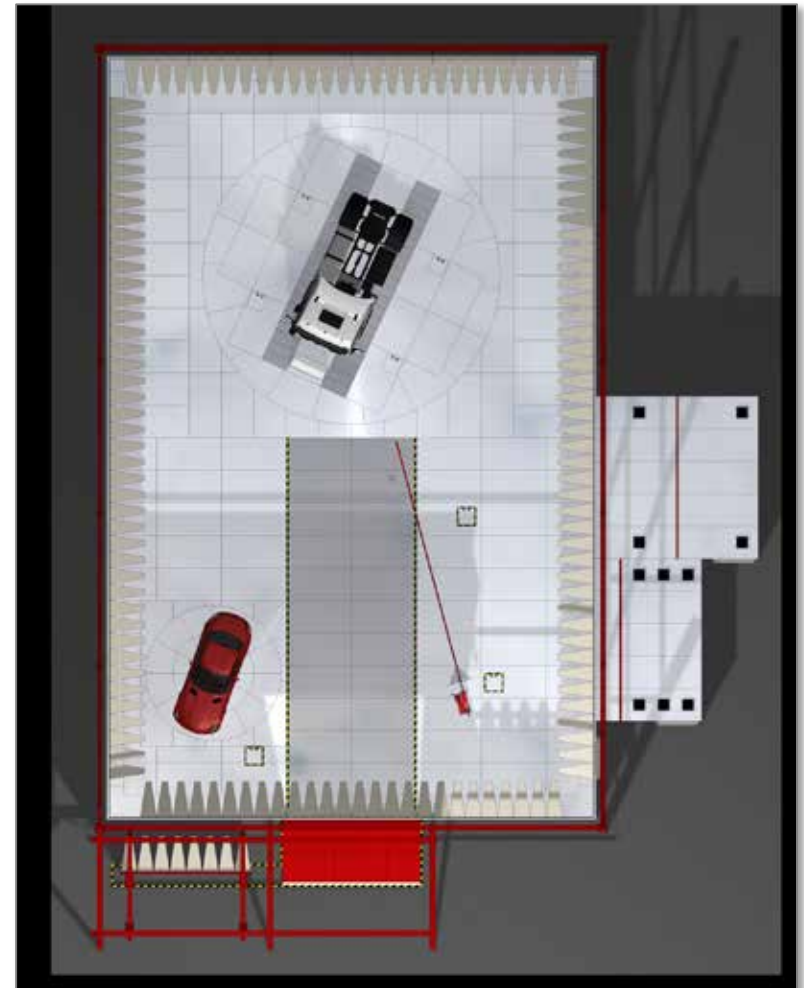
- § Compliant according to IEC/EN 61000-4-3 at 3,0 m test distance (Uniform Field 1,5 x 1,5 m)
- § Compliant acc. to ISO 11451 and ISO 11452

Frankonia SAC-10Vx

Semi Anechoic Chamber for Vehicle-2-Vehicle/Infrastructure Testing

Features

- § The SAC-10Vx works as a regular EMC chamber with an integrated dynamometer, customized for passenger vehicles or trucks
- § The chamber is large enough to accommodate a second turntable to position a second vehicle at 10m distance, or to integrate a heavy load area for heavy-duty vehicles
- § The optimized absorber lining with Frankosorb® technology improves the performance in the low frequency from 9 kHz up to 6 GHz for the main applications, and also offers a wide-span range up to 40 GHz
- § Capability to test today's and future technologies that are related to autonomous driving, wireless communications, IoT, Vehicle-2-Vehicle and Vehicle-2-Infrastructure dedicated to real testing (e.g. GPS, 4G, 5G, Wi-Fi, Lidar, Radar, Ultrasonic, eCall, TPMS, ...)
- § Possibility to integrate a mobile arch system for antenna measurements (Spherical Near-field, 400 MHz to 6 GHz)



First implemented SAC-10V-2V by
Frankonia early 2018 at:



Research Institute of Sweden
Boras, Sweden

Frankonia SAC-10Vx

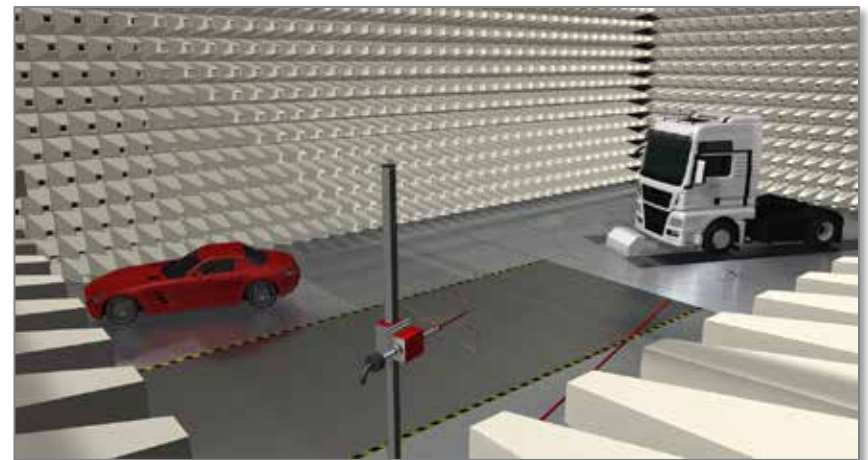
Semi Anechoic Chamber for Vehicle-2-Vehicle Testing

NEW



Scenario 1

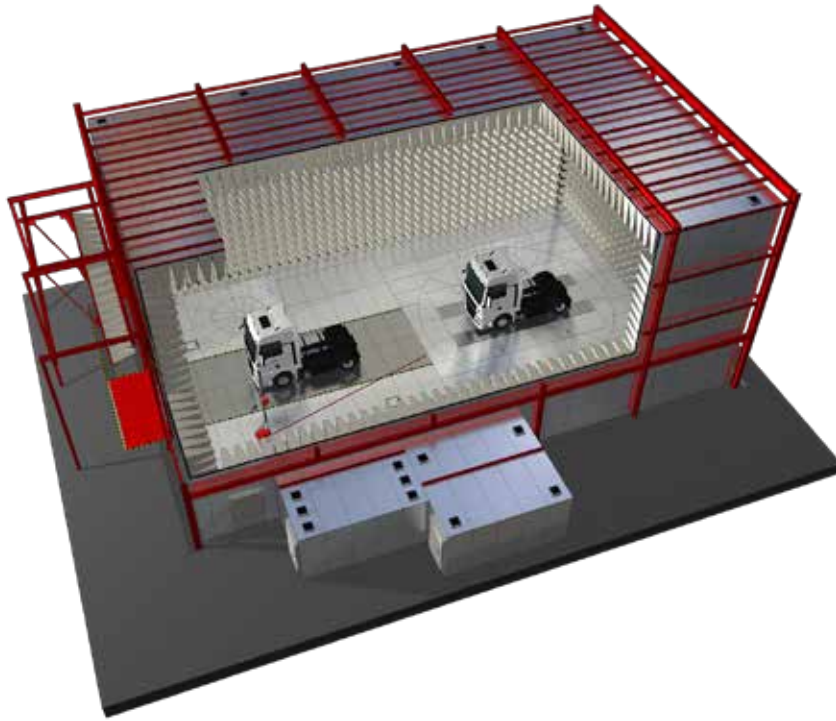
- § The SAC-10Vx with a truck on the dynamometer, and a passenger car on a separate turntable at 10m distance.
- § Vehicle-2-Vehicle communications, e.g. dedicated short range communication DSRC



Frankonia SAC-10Vx

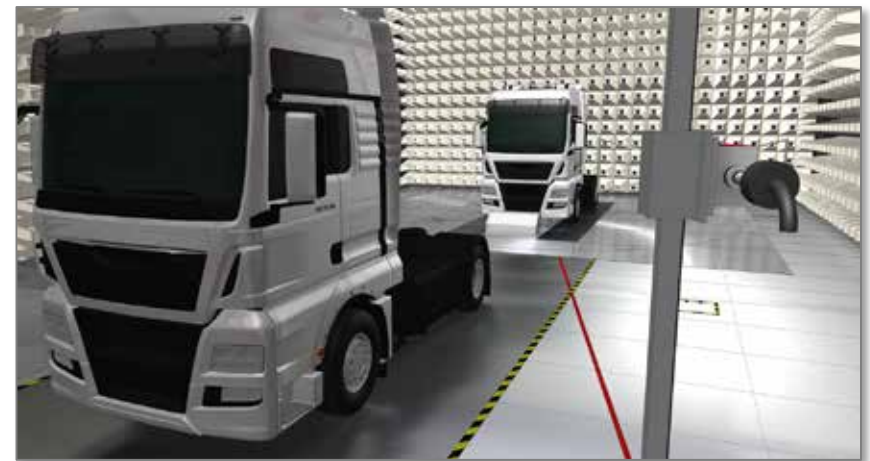
Semi Anechoic Chamber for Vehicle-2-Vehicle Testing

NEW



Scenario 2

- § The SAC-10Vx with a truck on the dynamometer, and a truck located on the heavy load area.
- § Vehicle-2-Vehicle communications, e.g. platooning



Frankonia SAC-10Vx

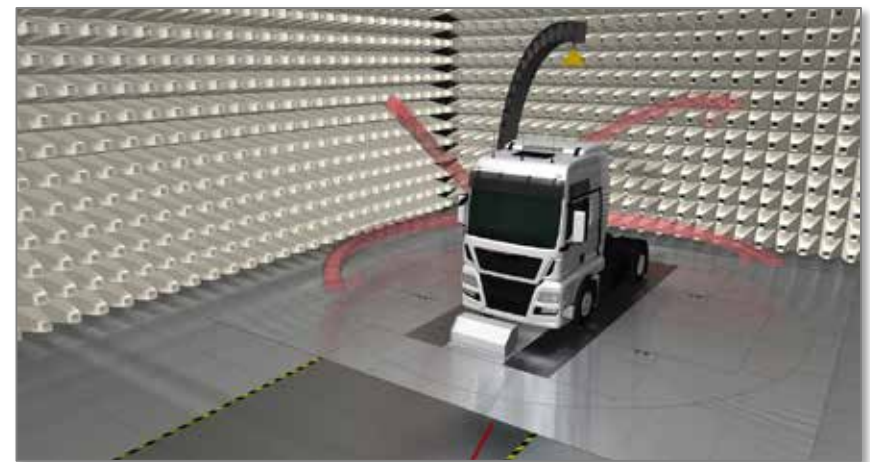
Semi Anechoic Chamber for Vehicle-2-Infrastructure Testing

NEW



Scenario 3

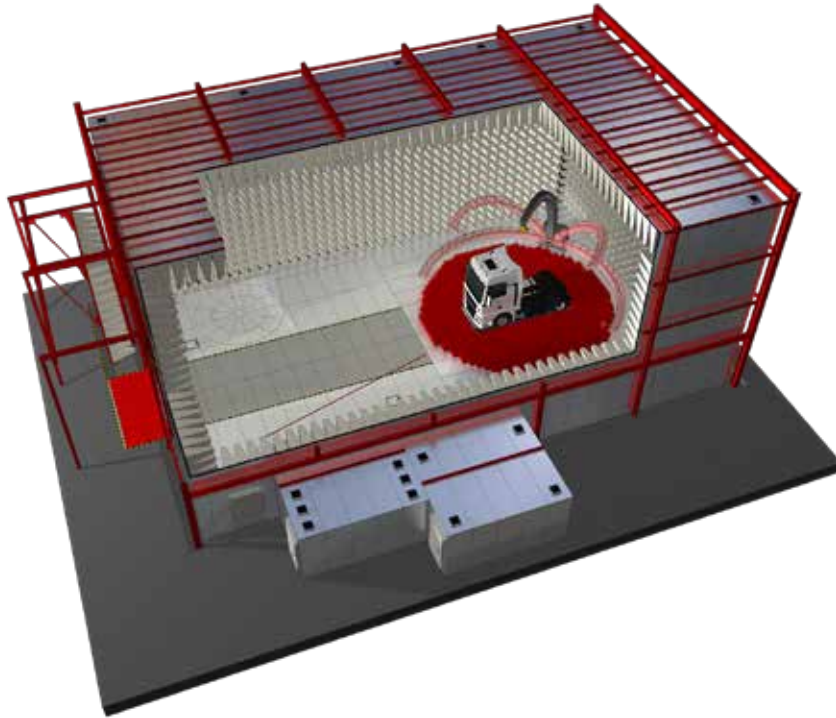
- § The SAC-10Vx with a truck on the dynamometer, and mobile arch system integrated without floor absorbers.
- § Vehicle-2-Infrastructure communications
- § Antenna measurements with ground plane



Frankonia SAC-10Vx

Semi Anechoic Chamber for Vehicle-2-Infrastructure Testing

NEW



Scenario 4

- § The SAC-10Vx with a truck on the dynamometer, and mobile arch system integrated with floor absorbers.
- § Vehicle-2-Infrastructure communications
- § Antenna measurements in free-space





Frankosorb® Absorber Technology



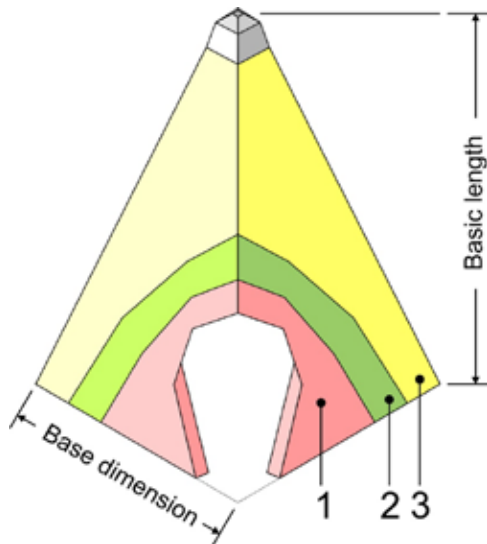
Absorber Technology

Frankosorb® Unique Nano Thin-film Absorbers

Absorber Technology

Frankonia's unique Frankosorb® absorber technology is using the Nano thin-film technology developed in the early 1990's by Prof. Nimtz from the University of Cologne. His research focused on the impedance of a thin polyethylene film coated with metal for absorbing waves.

Together with Frankonia, the fundamental research results have been converted into usable materials for pyramidal absorbers and paired with an industrial manufacturing.



- 1: Transport material in B or A2
- 2: Nano thin-film technology
- 3: Glass-fiber Protection (white)

Today, Frankonia's Frankosorb® unique absorber technology is the only solution existing on the world market, that is completely carbon-free, guarantees long-term stable conditions and is non-combustible.

Frankosorb® can be offered in several solutions:

Frankosorb® Hybrid Series (H)

- + Small size (chamber is smaller)
- Combination with Ferrite (impedence problematic)
- Weight
- Price

Frankosorb® Pyramid Series (P) >> length up to 2,5m

- + Performance
- + Weight
- + Price
- Large size (chamber is larger)

Physical background:

The size of absorbers is mainly defined by the lowest usable frequency. It is calculated according to $\frac{1}{4}$ of the wave length.
For example: 30 MHz

Physical formula: $\frac{1}{4} \lambda = C/F$

C = light velocity (approx. 300.000.000 m/s)

F = lowest frequency 30.000.000 Hz

$\lambda = 300.000.000 / 30.000.000 = 10 \text{ m}$

Long pyramid absorbers at 30 MHz >> $\frac{1}{4} \lambda = 2,5 \text{ m}$

Absorber Features

The Frankonia Frankosorb® absorber technology combines a variety of high-performance standards in a single solution.

Features at a glance

- § Nano thin-film technology guarantees highest homogeneity and impedance accuracy
- § Non-combustible acc. to DIN EN 13501-1 class A2 – s1 d0
- § Hardly inflammable acc. to DIN EN 13501-1 class B
- § High absorption capability paired with a fast cooling feature (hollow absorber)
- § Not carbon-based absorbers
- § High-performance characteristics (reproducible results)
- § Non-hygroscopic materials are used to meet any climatic conditions (humidity-proof and temperature-proof)
- § Completely heat, cold and moisture resistant
- § Clean room classification according to ISO 14644-1 Class 5
- § No toxic gases emitted in case of absorber heating
- § Proven long-term stability for more than 25 years
- § No aging or drooping, no losing performance

Due to the stable performance characteristics and its unique non-combustible attribute, a safe environment for people and EUT can be assured, which also leads to a constant, reproducible and long-lasting testing quality.



Absorber range (typical)

- § Ferrite absorbers
30 MHz to 1 GHz (typical)
- § Hybrid absorbers (H series)
30 MHz to 18/40 GHz (typical)
- § Short pyramid absorbers (P600 or P900 series)
80 MHz to 18/40 GHz (typical)
- § Long pyramid absorbers (P2400 series)
26/30 MHz to 18/40 GHz (typical)



Frankosorb® Hybrid Series (H)

Semi Anechoic Chamber SAC-10

Frankosorb® Hybrid Series (H)

The Frankosorb® hybrid absorbers are a combination of Ferrite tiles typically from 30 MHz to 1 GHz and short pyramid absorbers to expand the frequency range from 1 GHz to 18/40 GHz.

The Ferrite tiles are pre-assembled on wooden chip boards in a typical size of 600 mm x 600 mm, and will be screwed to a substructure. The pyramids absorbers are installed in a second step, in which the Ferrite absorbers typically get special fixation kits. Those are simply screwed to the Ferrite using nuts and threaded rods.

Frequency range

- § The typical frequency range of hybrid absorbers is from 30 MHz to 18/40 GHz.

Features

- § High quality prefabrication
- § Everything is screwed
- § Removable hybrid absorbers piece-by-piece
- § Optimized impedance matching between hybrid absorbers and Ferrites
- § Frankosorb® technology
- § Absorbers available acc. to DIN EN 13501-1 in fire class B (hardly inflammable) or A2 (non-combustible)





Frankosorb® Pyramid Series (P)

Semi Anechoic Chamber SAC-10

Frankosorb® Pyramid Series (P)

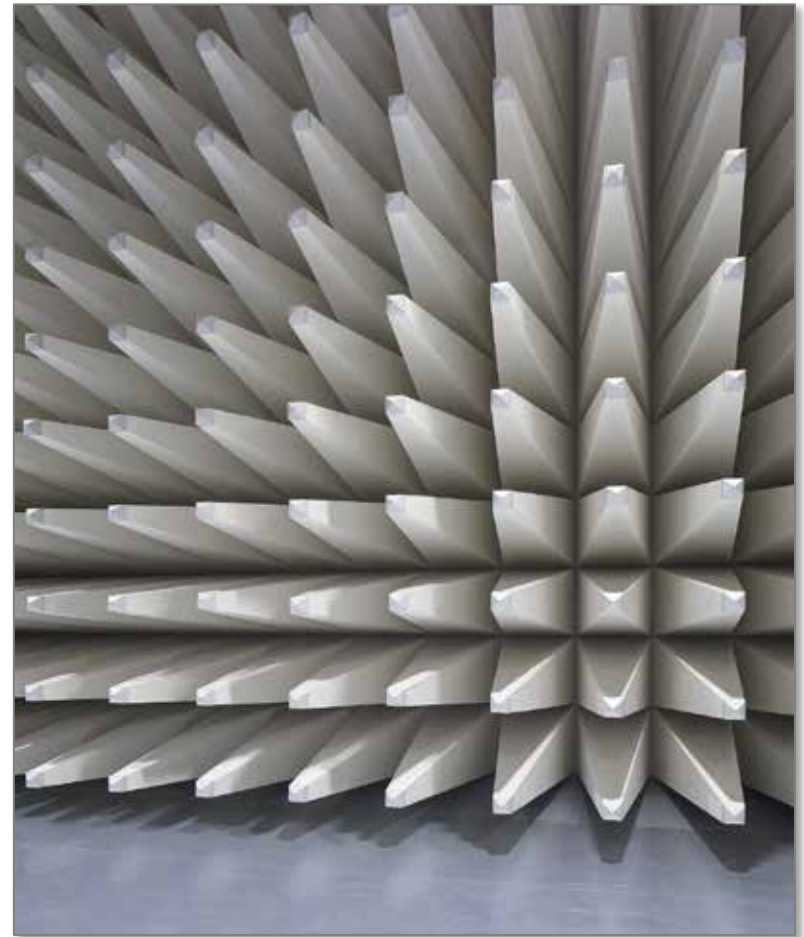
Like hybrid absorbers, the inner shielding will be assembled with a horizontal clip-in substructure in a predefined grid that accepts the prefabricated long pyramid absorbers with their specific size to ensure the highest performance level.

Frequency range

- § P600 or P900: The typical frequency range is from 80 MHz to 18/40 GHz (e.g., MIL Chambers)
- § P2400: The typical frequency range is from 26/30 MHz to 18/40 GHz (e.g., automotive & commercial chambers)

Features

- § Short or long pyramid absorbers available
- § High quality prefabrication
- § Everything is hanged into rails
- § Frankosorb® long pyramid absorbers start already below 30 MHz (no Ferrite necessary)
- § No impedance matching problem
- § Removable long pyramid absorbers piece-by-piece
- § Frankosorb® technology
- § Absorbers available acc. to DIN EN 13501-1 in fire class B (hardly inflammable) or A2 (non-combustible)





FRANKONIA

Product Details



Shielding, Doors & Gates

Modular and Prefabrication Standards

Shielding and Structure

Since 1987, Frankonia follows a prefabrication and modular standard at highest quality and efficiency. Nothing is welded, nothing is glued, everything remains modular to meet any future modification requirements.

Shielding and Structure

- § Modular and prefabricated standard
- § PAN TYPE shielding modules
- § Prefabricated and modular shielding panels made of 2,0 mm thick galvanized sheet steel
- § Self-supporting stability or with static steel structure for any seismic condition
- § Mounted from the inside
- § Interior finishing
- § Raised floor systems
- § Long life shielding attenuation characteristics
- § Nothing is glued or welded
- § Dismountable without any damage
- § Easy modifications and maintenance
- § A complete transfer or future modification is possible
- § Frequency range: 10 kHz to 18 GHz (option 40 GHz)
- § Broad range of doors and gates designed for 20.000 MTBF



Single-leaf Doors (SLD)



- § Single-leaf doors (SLD)
- § Manual or electrical ramps

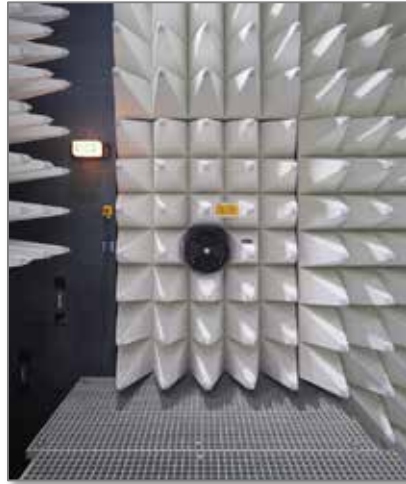


Double-leaf Doors (DLD)



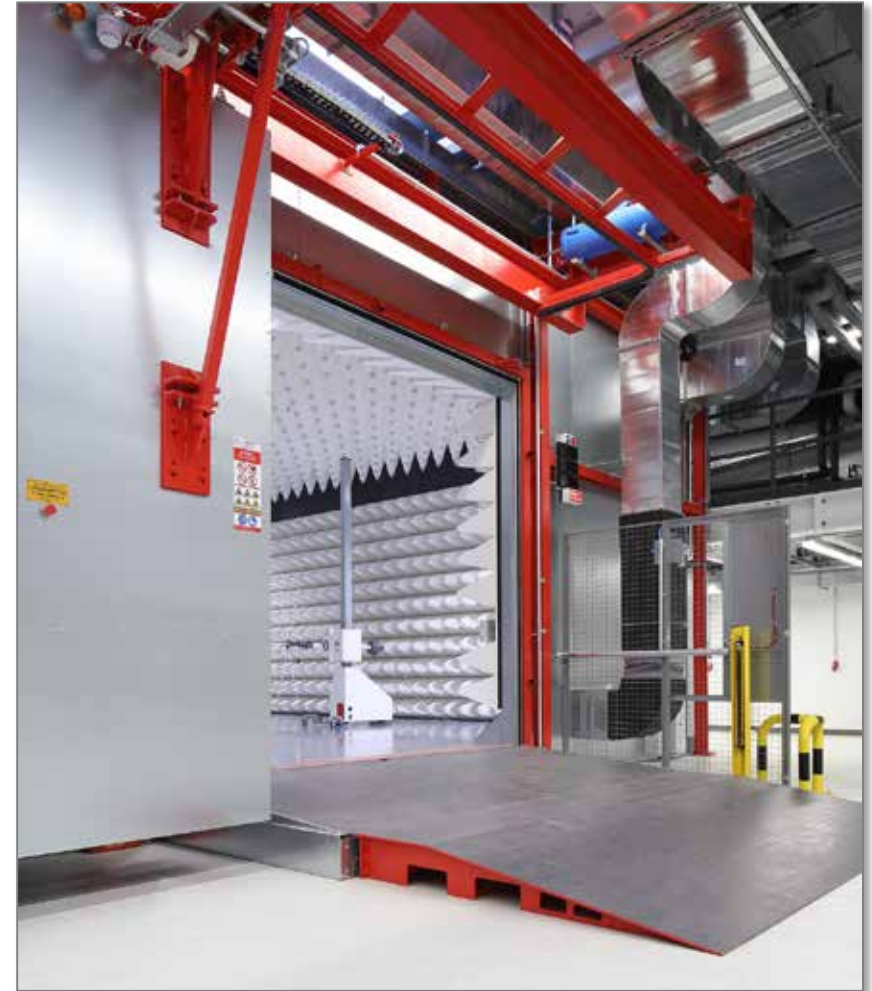
- § Double-leaf doors (DLD)
- § Lifting platforms, or lifting ramps

Sliding Doors (SSD)

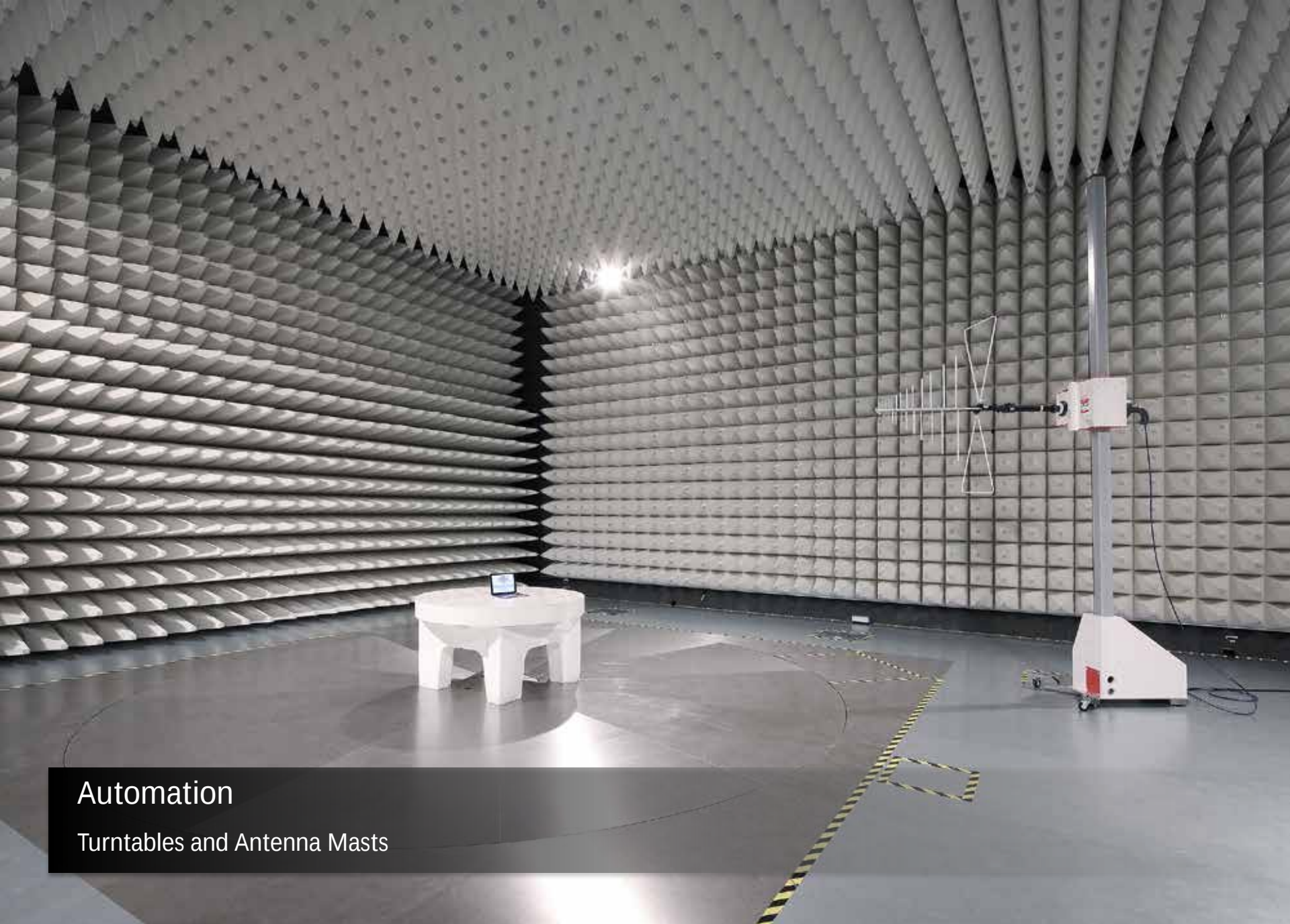


- § Sliding doors (SSD)
- § Light-weight lifting ramps or platforms

Sliding Gates (SG)



- § Sliding gates (SG)
- § Lifting ramps, or lifting platforms



Automation

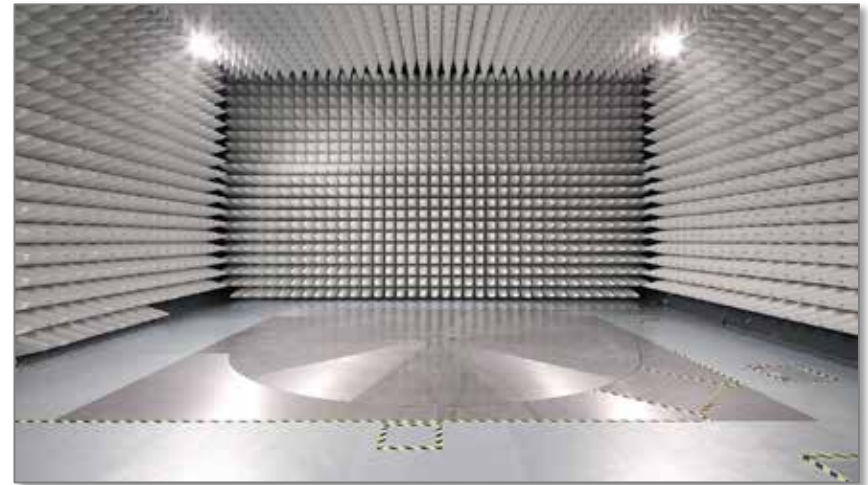
Turntables and Antenna Masts

Automation

Frankonia provides a broad range of positioning devices such as standardized and multi-use turntable systems and antenna masts, which are designed and developed by Frankonia's own R&D department. Frankonia considers highest quality and technology standards respecting the latest EMC standard requirements.

Turntables

- § Integrated turntable systems (FTM)
 - § without limits in terms of size and EUT weight
 - § Surface made of hot galvanized steel or stainless steel, flush integrated into the raised floor
 - § Water or gas outlets
 - § High AC or DC power or data outlets
 - § Rotating energy chain possible
 - § Rotating exhaust or cooling integration possible
 - § adaptable to any EUT requirement
- § Mobile turntable systems (FTM Mobile)
- § Dynamometer, Rollers, On-top Dynamometers
- § Independent Frankonia software (SCPI commands)
- § Controllable with common EMC software

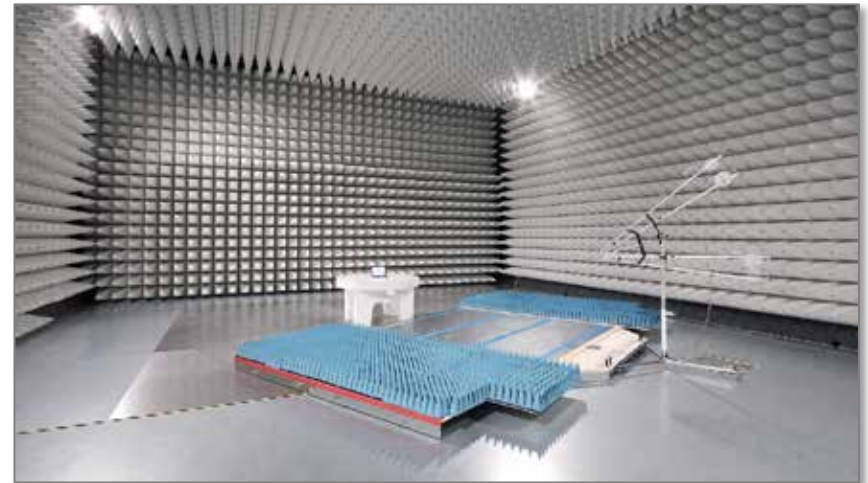


Automation

Frankonia provides a broad range of positioning devices such as standardized and multi-use turntable systems and antenna masts, which are designed and developed by Frankonia's own R&D department. Frankonia considers highest quality and technology standards respecting the latest EMC standard requirements.

Antenna Masts

- § FAM Antenna Mast (CISPR)
- § FBM Boresight Antenna Mast (FCC/ANSI+CISPR)
- § FSM antenna stand and tripod
- § Independent controller FC06.1
- § Independent Frankonia software (SCPI commands)
- § Controllable with common EMC software





Accessories

Integration, Ventilation, Video & Audio, Tables and Accessories

Accessories

As a specialist in RF-shielding and EMC testing chambers, Frankonia offers complementary, standardized and customized products to maintain its position as a turnkey provider.

Electrical Integration

Every chamber is designed as an autonomous room with its own full-integrative electrical system setup that includes:

- § Electrical distribution unit, cabling, safety functions
- § LED lighting
- § ExTox lighting option
- § Emergency lighting
- § Cable tray below the raised floor
- § Cabling and wiring
- § Wall access: Penetration Panels on the wall (PP)
- § Floor access: Connection Panels in the raised floor (CP)



Accessories

Ventilation & Liquids

- § Honeycombs
- § Exhaust (up to 600°C) or cooling systems
- § RFI trap (special cables)
- § Liquid or gas wave-guide components
- § Tube feed-through components

Smoke and Gas Detection

- § Smoke and gas sampling units
- § Central analyzing systems
- § Extinguishing systems (water, fog, foam, gas)
- § Emergency systems
- § Internal finishing
- § Complete electrical installation and central distribution

Filters

- § AC or DC power line filters
- § Signal and data line filters
- § Optic converters



Accessories

Test Tables

- § CISPR 25 test tables
- § CISPR 22 transparent test tables (round or square)

Video & Audio Systems

- § Video camera systems (SD or HD) – mobile version
- § Video camera systems (SD or HD) – fixed wall version
- § Audio system (duplex)
- § Recording systems

Specials

- § Floor-absorberboards for EMI/EMS tests
- § Stackable floor absorbers
- § Moveable floor absorbers (Ferrite boards)





The unique and trustworthy partner for EMC solutions worldwide.

A large anechoic chamber with white pyramidal absorbers. A person is visible on a ladder on the left side, and another person is visible in the distance on the right. The chamber is illuminated by several bright lights.

Thank you.

Your contact:

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