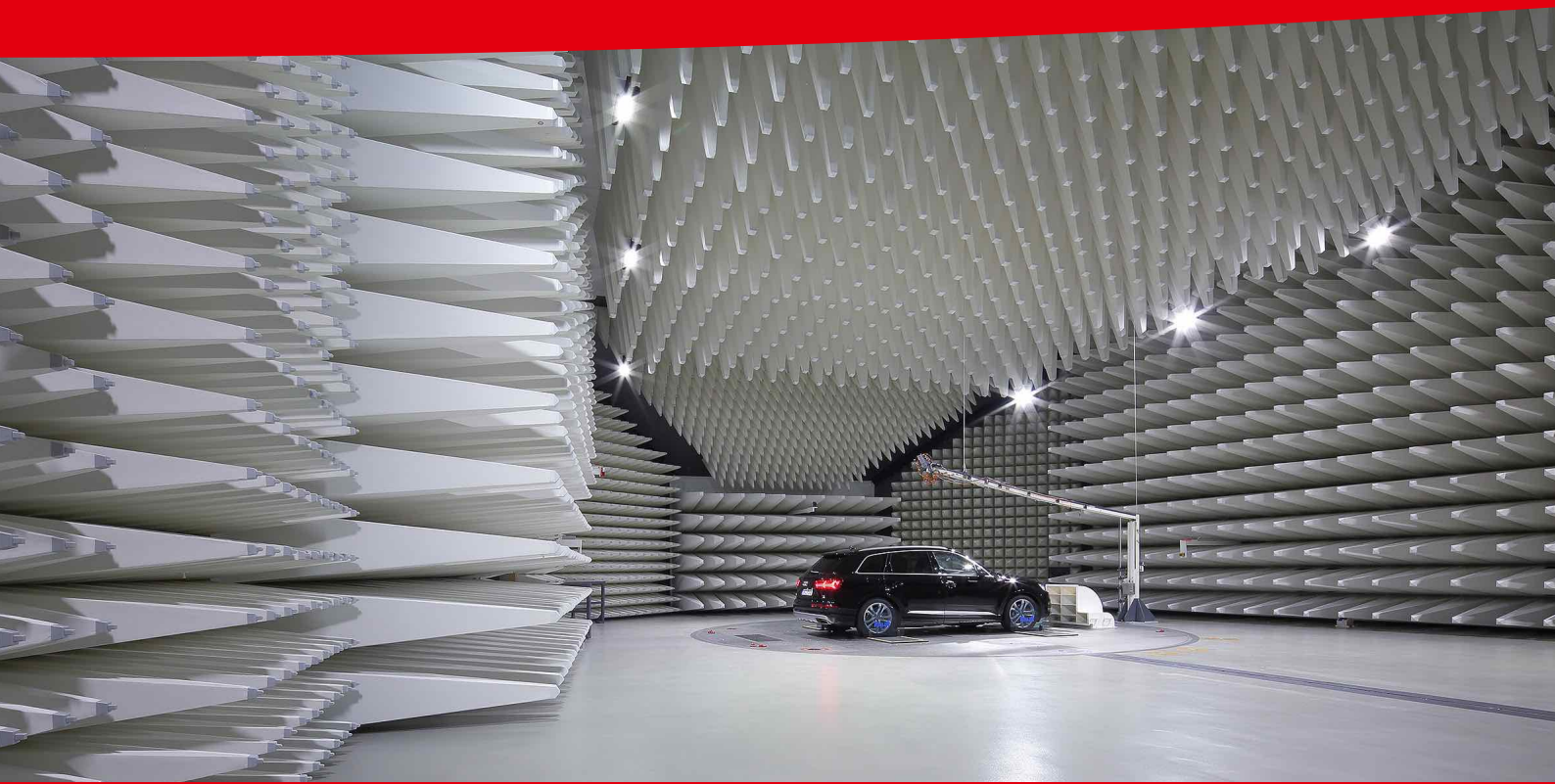
FRANKONIA

- ● ANECHOIC CHAMBERS & SHIELDED ROOMS
- ● ACCESSORIES FOR ANECHOIC CHAMBERS & SHIELDED ROOMS
- ○ RADIATED IMMUNITY TEST SYSTEMS
- ○ RF-POWER-AMPLIFIERS
- ○ BROADBAND ANTENNAS
- ○ EMC TEST & MEASUREMENT INSTRUMENTS
- ○ GTEM-CELLS

ANECHOIC CHAMBERS

SHIELDED ROOMS & ACCESSORIES



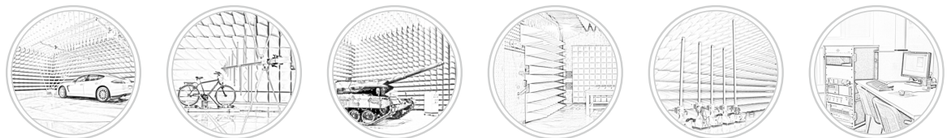
FRANKONIA
GROUP

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.

The EMC testing laboratory industry is a high-technical, innovative and fast-changing niche industry. With 30 years of experience to date, Frankonia maintains its leading position in laboratory solutions worldwide. 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 demonstrates a global presence in cooperation, with a well-structured network of productions, representations and service units.
- Frankonia strives to be the preferred partner for customized and state-of-the-art solutions.
- Frankonia provides fundamental knowledge to operate as a complete solution provider.
- Frankonia implements innovative technologies to enhance efficiency and improve the outcomes and quality along with customers' needs.

Frankonia offers complete solutions for the electronic, military and automotive industry, which meet customers' individual requirements.
The Frankonia core business contains: **Anechoic Chambers** and **Test Systems**



Automotive | Electrics | Military | Innovations | Automation | Test Systems

Frankonia Solutions

Frankonia starts from the very first moment with planning, technical drawings, coordination and definition that meets our customers' individual demands. Due to the solution ambitiousness, Frankonia provides excellent expertise in every stage of a project. Frankonia's project business convinces with its own project management, engineering and manufacturing, research and development, as well as installation and implementation and provides the latest technology at highest quality.

Frankonia Solutions

Anechoic Chambers

AC

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 GROUP

Frankonia GmbH

FRH

Headquartered in Heideck, Bavaria, Germany
Founded 1987

Frankonia Poland Sp. Z o.o.

FRP

Dzierzoniów, Poland
Founded 1990
Manufacturing site

Jiashan Frankonia Co., Ltd.

FRJ

Jiashan, China
Founded 2003
Manufacturing site

Frankonia EMC Test-Systems GmbH

FRF

Forchheim, Bavaria, Germany
Founded 1992

Test Systems

TS

Within our Test System business, we offer a wide variety of EMC test systems that encompass testing equipment for a broad range of emission and immunity tests. Beside complete test-systems Frankonia offers also single components like a broad range of antennas, pre-amplifiers, broadband RF-power amplifiers, software, GTEM cells, strip-lines, open TEM cells, signal generators, RF-power meters, and EMI receivers.

Consulting

Frankonia provides precise knowledge of state-of-the-art Anechoic Chamber and Test System solutions with the latest technology and highest quality, while considering todays and future standards. Together with our customers, we define customized projects, provide technical details, project timeline and complete drawings. Herewith, in every single phase of the project, we ensure a perfect solution.

Project Management

From the first moment to the final handover, our project management takes care of the project and represents the central interface between Frankonia's scope of delivery and building related parties. Thus, we meet our customers' requirements without compromises.

Engineering

Frankonia's engineering ensures that our customers' requirements will be impeccable implemented from a single product up to a complete solution. Having our own engineering guarantees the quality and technology level that our customers' expect. Herewith, Frankonia claims to be a competent solution partner.

Research & Developing

Frankosorb® is Frankonia's unique absorber innovation that defines the leading standard for absorber technologies. Our continuous research on materials, a proper adaptation to our customers' requirements, as well as the respect of future standards put Frankonia's R&D department to the core when it comes to providing long-term efficient and trustful chamber solutions.

Manufacturing

Frankonia runs a stand-alone production network and constantly invests in innovative technologies and latest manufacturing equipment to meet our customers' as well as our own expectations. Having our own manufacturing resources, which enable us to conequently provide the highest production quality and accuracy, distinguishes Frankonia from others.

Implementation

Our own European installation team ensures a proper implementation and installation of single products up to complete solutions that are engineered, developed and manufactured according to Frankonia's modular and prefabricated standards. Offering a complete scope of products and a broad range of international capabilities verifies Frankonia to be named as the trusted turnkey solution provider.

Solution

With 30 years experience to date, Frankonia's goal is to transform our customers' individual requirements into reliable state-of-the-art solutions, always considering todays and future standards and test related specifications. We offer our expertise and innovation to customers seeking for complete solutions with leading ambitions. Because we know, only a complete and comprehensive solution can create and maintain long-term satisfaction.

SR Shielded Room

Frankonia shielded rooms and anechoic chambers are designed based on a modular construction system. Prefabricated high quality shielding panels guarantee a maximum of flexibility regarding possible dimensions. All PAN type modules allow for easy handling and entry via standard building doors. The standard modules are bolted from inside every 75,0 mm with high conductivity mesh gasket inserted for sealing the joints of the panels. This facilitates an installation close to the walls of the parent building. The small screwing distance and the precise tightening of the screws with predefined torque guarantee long life shielding attenuation characteristics.

All Frankonia shielded rooms and chambers are completely removable as nothing is glued or welded; hence the transfer of a complete chamber is possible as well as future modifications and repairs.

Technical specifications	
External dimension	Any size is possible
Frequency range	10 kHz to 18 GHz (option 40 GHz)
Shielding Attenuation	According to EN 50147-1
Accessories	
Walls and ceiling	• Interior finishing in various materials and colors • Acoustics damping • LED ambient lighting
Floor	• Standard raised floor with vinyl flooring • Moisture protection below the shielding • Electrical isolation for shielding and steel structure

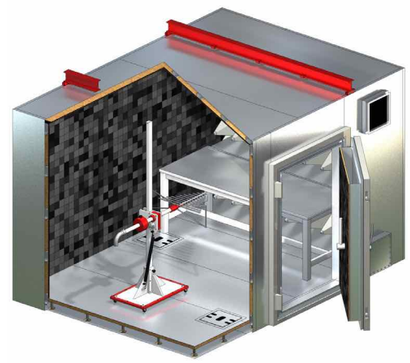
Features

- PAN TYPE shielding modules
- Prefabricated and modular shielding panels made of 2,0 mm thick galvanized sheet steel
- Self-supporting stability
- Mounted from inside
- Long life shielding attenuation characteristics
- Dismountable without any damage
- Easy modifications and maintenance

Ultra Compact Chamber UCC

The UCC is Frankonia's ultra-compact hybrid chamber solution at 1,0 m measuring distance. It is an alternative solution for the GTEM cell for pre-compliance testing as well as for research and scientific purposes. The ultra-compact chamber solution is designed for pre-compliance radiated emission and immunity tests, conducted tests, and pre-compliance tests for automotive components per the CISPR 25 method.

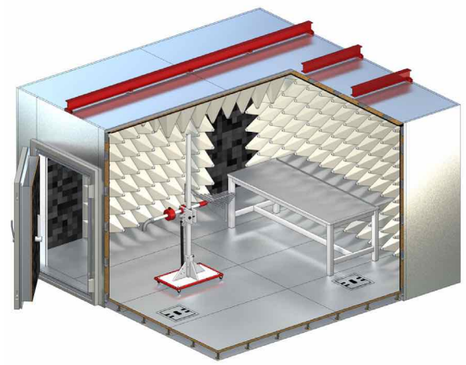
Technical specifications	
External dimension	4,280 m x 3,080 m x 2,550 m (L x W x H)
Frequency range	150 kHz to 18 GHz (option 40 GHz)
Absorber lining	
Walls and ceiling	Full lining with ferrite absorbers; partial lining with Frankosorb® hybrid absorbers
Floor	Movable ferrite absorbers between antenna and EUT
Performance	
Emission test (EMI)	Pre-compliance according to CISPR 25
Measuring distance	1,0 m
Immunity test (EMS)	Compliance according to IEC/EN 61000-4-3 and pre-compliance according to ISO 11452-2
Uniform area	0,5 m x 0,5 m
Measuring distance	1,0 m
Deviation FU	0 dB/+6 dB at 100 % of 4 measuring points (80 MHz to 18 GHz)



Military Compact Hybrid Chamber MIL CHC

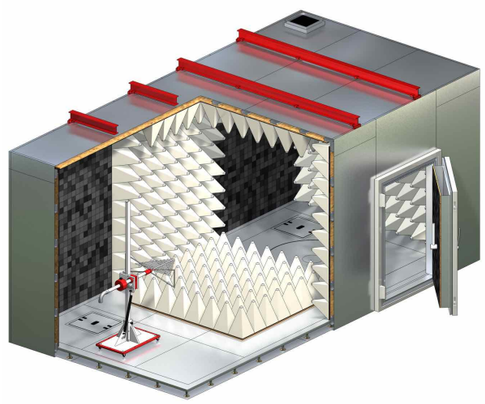
The MIL CHC is Frankonia's compact hybrid chamber solution according to MIL-STD 461 for component tests. This chamber solution is adapted for radiated emission and immunity tests at 1,0 m measuring distance.

Technical specifications	
External dimension	4,880 m x 4,880 m x 3,000 m (L x W x H)
Frequency range	30/80 MHz to 40 GHz
Absorber lining	
Walls and ceiling	Optimized lining with ferrite absorbers; partial lining with Frankosorb® hybrid absorbers
Floor	Movable absorbers as option
Performance	
Emission test (EMI)	Compliance according to MIL-STD 461
Immunity test (EMS)	Compliance according to MIL-STD 461
Measuring distance	1,0 m
Absorption at normal incidence	
80 MHz to 250 MHz	≥ 6 dB, as per standard requirements
above 250 MHz	≥ 10 dB, as per standard requirements



Compact Hybrid Chamber **CHC**

The CHC is Frankonia's compact hybrid chamber solution at 3,0 m measuring distance with a Quiet Zone (QZ) of ø1,2 m. The CHC is an upgradable solution and can transform from a semi anechoic chamber configuration with ground plane to a fully anechoic chamber configuration with floor absorbers. It is an optimal solution for both pre-compliance emission tests and full compliance immunity tests at 3,0 m measuring distance.

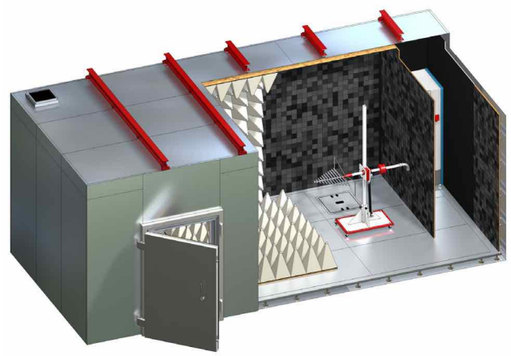


Technical specifications	
External dimension	7,355 m x 3,755 m x 3,300 m (L x W x H)
Frequency range	30 MHz to 18 GHz (option 40 GHz)
Absorber lining	
Walls and ceiling	Full lining with ferrite absorbers; partial lining with Frankosorb® hybrid absorbers H450
Floor	Movable hybrid absorbers between antenna and EUT; optional configuration for fully anechoic chamber

Performance			
Emission test (EMI)	Pre-compliance	Immunity test (EMS)	Full compliance
Measuring distance	3,0 m	Uniform area	1,5 m x 1,5 m
Chamber validation	According to CISPR 16-1-4	Measuring distance	3,0 m
Quiet Zone	ø1,2 m; height 2,0 m (semi configuration) ø1,2 m; height 1,0 m (fully configuration)	Chamber validation	According to IEC/EN 61000-4-3
		Deviation FU	0 dB /+6 dB at 75 % of 16 measuring points (80 MHz to 18 GHz)

Compact Hybrid Chamber (extended) **CHC-L**

The CHC-L is the extended version of the CHC that includes an absorber-lined partition wall that offers the feature for housing and storing RF power amplifiers, antennas, and floor absorbers inside the chamber.



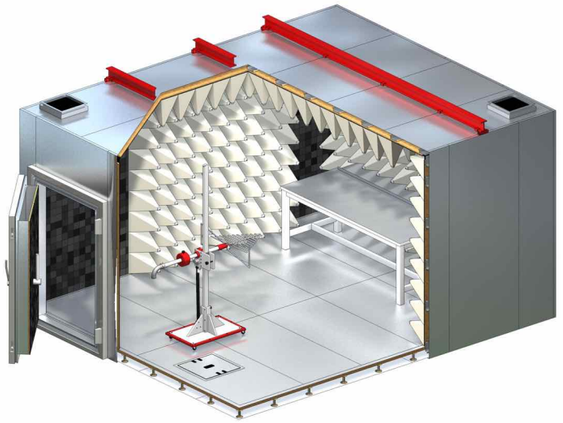
Technical specifications	
External dimension	8,255 m x 3,755 m x 3,300 m (L x W x H)
Frequency range	30 MHz to 18 GHz (option 40 GHz)
Absorber lining	
Walls and ceiling	Full lining with ferrite absorbers; partial lining with Frankosorb® hybrid absorbers H450, absorber-lined partition wall
Floor	Movable hybrid absorbers between antenna and EUT; optional configuration for fully anechoic chamber

Performance			
Emission test (EMI)	Pre-compliance	Immunity test (EMS)	Full compliance
Measuring distance	3,0 m	Uniform area	1,5 m x 1,5 m
Chamber validation	According to CISPR 16-1-4	Measuring distance	3,0 m
Quiet Zone	ø1,2 m; height 2,0 m (semi configuration) ø1,2 m; height 1,0 m (fully configuration)	Chamber validation	According to IEC/EN 61000-4-3
		Deviation FU	0 dB /+6 dB at 75 % of 16 measuring points (80 MHz to 18 GHz)

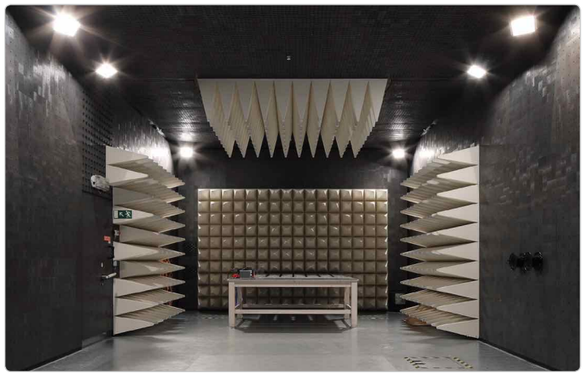
Automotive Component Testing Chamber **ACTC**

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 11452-2.

A permanent plug-in contact strip is installed between the absorbers to ensure the electrical connection of the test table to the shielding and includes the test table as required per CISPR 25. The typical chamber is lined with ferrite absorbers and partially lined with Frankosorb® hybrid absorbers to cover a frequency range from 150 kHz to 18 GHz (40 GHz as option).



Technical specifications	
External dimension	6,380 m x 5,480 m x 3,750 m (L x W x H)
Frequency range	150 kHz to 18 GHz (option 40 GHz)
Measuring distance	1,0 m
Absorber lining	
Walls and ceiling	Optimized lining with ferrite absorbers; partial lining with Frankosorb® hybrid absorbers
Floor	Ground plane, optional floor absorbers
Performance	
Emission test (EMI)	Full compliance according to CISPR 25 Ed.4
Immunity test (EMS)	Full compliance according to ISO 11452-2



E-Drive Testing Solutions

Frankonia's solution for battery and motor tests at component and vehicle level

EDTC E-Drive Testing Solutions

Battery and Motor Solutions

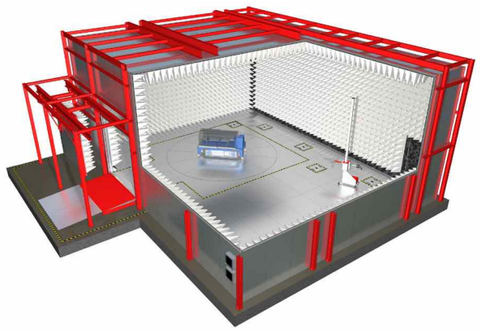
The EDTC is Frankonia's fully compliant e-drive test solution that is designed for EMC component and system testing for all types of hybrid, electric, fuel cell and battery drive systems. The EDTC offers superior conditions for radiated emission testing according to CISPR 25 Ed. 4 and radiated immunity testing according to ISO 11452-2.
The typical chamber is lined with ferrite absorbers and partially lined with Frankosorb® hybrid absorbers to cover a frequency range from 150 kHz to 18 GHz (40 GHz as option).

The EDTC includes several disciplines as per CISPR 25 Ed.4 in a single solution:
- EMC tests on automotive components (standard)
- EMC tests on e-motor applications with an external load machine (fixed version) or BlueBox (mobile version)
- EMC tests on energy system with battery simulation, battery test, and charging station emulation
- Combination of e-motor, energy system and component tests

BlueBox Mobile Load Machine

The BlueBox is a mobile version for dynamic EMC tests of electrical powertrain units in a shielded enclosure. The BlueBox works in a four-quadrant operation; any EUT stress situation can be simulated. Similar to the fixed load machine it includes, for instance, braking, driving, direction of rotation (right/left), speed regulation, torque control and a mix out of this range. With the BlueBox it is no longer necessary to purchase a separate anechoic chamber with external dynamometer to test e-drive-motors and systems. Thanks to the mobile test bench, EMC chambers that already exist can be used for relevant tests with almost no modifications needed.

The BlueBox is fully compliant according to CISPR 25 Ed.4.



Version	BlueBox-30	BlueBox-40	BlueBox-63	BlueBox-120
Power	30 kW	40 kW	63 kW	120 kW
Torque	82 Nm	130 Nm	240 Nm	470 Nm
Revolution speed	up to 8.000 RPM	up to 7.000 RPM	up to 6.500 RPM	up to 6.000 RPM

Features
- Fully compliant with CISPR 25 Ed.4
- Mobile, flexible and adjustable to any kind of EUT
- 360° view when placed on a turntable (extended testing range)
- Connection to a CISPR 25 test table
- Combination with battery tests

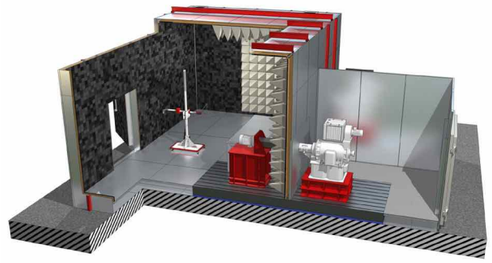
In the shielded body of the BlueBox a drive unit up to 120 kW is integrated to brake the EUT (mainly electric motors) in passive mode, or to accelerate the EUT in active mode. The shielding and the perfect implementation into the system guarantees that no interferences that could lead to measuring errors will be emitted. Also, component testing can be simply performed as the BlueBox can be connected to an appropriate CISPR 25 testing table.

Furthermore, thanks to the mobility of the test bench, it is possible to install it onto a turntable and perform 360° measurements. Due to that a broader test range tops the CISPR 25 standard requirements. Such a feature can be beneficial, for instance, in connection with battery components.

Fixed Load Machine

The fixed load machine is fully separated outside the anechoic chamber, and provides power to the EUT or receives power coming from the EUT through an isolated and shielded shaft system to ensure a stable test environment for the EUT and secure working. The fixed load machine is available as a complete turnkey system, but also as a modification kit for existing Frankonia chambers.

Version	EDTC-125	EDTC-160	EDTC-250	EDTC-350
Power	125 kW	160 kW	250 kW	350 kW
Revolution speed	up to 12.000 RPM	up to 12.000 RPM	up to 12.000 RPM	up to 8.000 RPM



Features
- Fully compliant with CISPR 25 Ed.4
- Motor adapter and connection to a CISPR 25 test table
- Combination with battery tests
- Integration to an ACTC chamber (150 kHz to 18/40 GHz)
- Vibration-free and non-interacting solid basement (floating slab)

Battery System

The battery system provided by Frankonia enables the simulation and testing of batteries in several configurations, and in combination with a load machine. It allows a maximum of flexibility in testing e-drive components and moreover ensures a correct implementation into an EMC environment.

Version	FSL-100	FSL-150	FSL-180	FSL-250	FSL-350	FSL-600
Output	100 kW	150 kW	180 kW	250 kW	350 kW	600 kW
Voltage	50 ... 1.000 V DC					
Current output	300 A or 600 A				600 A	

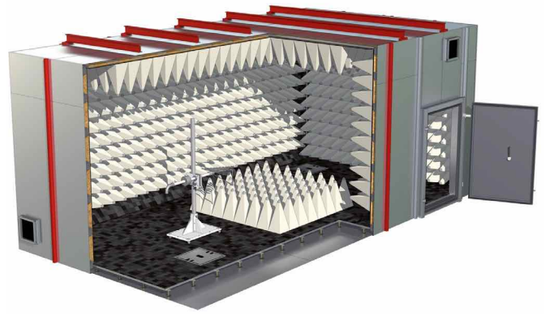
Features
- Adjustable and state-of-the-art solution
- Non-combustible A2 absorbers recommended for testing batteries

Versions
- Basic version:
  Test of the battery system that only considers the power supply for battery components.
- Standard version:
  Test of battery system that can emulate a battery and offers an extended spectrum of testing methods.
- Extended version:
  With the so-called Charging Discovery System, it is possible to measure and monitor the communication between charging station and battery component or vehicle, as well as the charging behavior of a charging station.

Fully Anechoic Chamber **FAC-3**

The FAC-3 is Frankonia's fully anechoic chamber solution at 3,0 m measuring distance. It is designed as full compliant chamber for measurements under free-space conditions and is based on CISPR 16-1-4 as a test site without ground plane.

Without the reflections from the floor, a height scan is no longer necessary. With its specific requirements for the test site, Frankonia's FAC-3 is supremely prepared to meet our customers' demands.



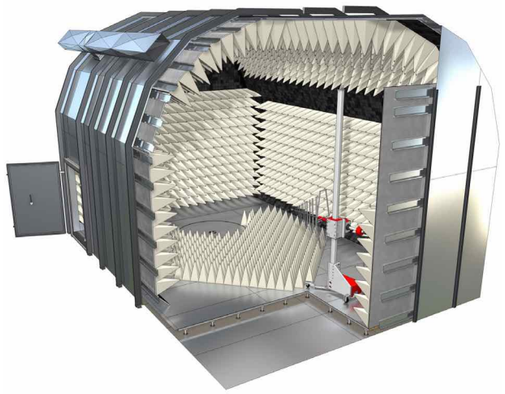
Technical specifications			
Chamber type	FAC-3		FAC-3 L
External dimension	8,705 m x 4,655 m x 3,750 m (L x W x H)		9,380 m x 5,780 m x 5,550 m* (L x W x H)
Turntable	ø1,5 m		
Load capacity	up to 2,0 tons; special turntable systems possible		
Frequency range	30 MHz to 18 GHz (option 40 GHz)		
Absorber lining			
Walls and ceiling	Full lining with ferrite absorbers; partial lining with Frankosorb® hybrid absorbers		
Floor	Full lining with ferrite absorbers; partial lining with moveable Frankosorb® hybrid absorbers		
Performance			
Emission test (EMI)	Full compliance		
Chamber validation	According to CISPR 16-1-4		
Quiet Zone	ø1,5 m; height 1,5 m		ø1,5 m; height 2,0 m
EUT's	Table top EUT's		Table top and floor standing EUT's
Measuring distance	3,0 m		
Deviation FS NSA	±4,0 dB (30 MHz to 1 GHz)		±3,5 dB (30 MHz to 1 GHz)
Deviation FS SVSWR	+6,0 dB (1 GHz to 18 GHz)		+5,5 dB (1 GHz to 18 GHz)
Immunity test (EMS)	Full compliance		
Chamber validation	According to IEC/EN 61000-4-3		
Uniform area	1,5 m x 1,5 m		
Measuring distance	3,0 m		
Deviation FU	0 dB/+6 dB at 75 % of 16 measuring points (80 MHz to 18 GHz)		
Emission (EMI) & Immunity (EMS)	Full compliance according to IEC/EN 61000-4-22		
Frequency range	30 MHz to 1 GHz	1 GHz to 6 GHz	30 MHz to 18 GHz
Quiet Zone	ø1,5 m; height 1,5 m	ø1,0 m; height 1,0 m	ø1,5 m; height 2,0 m
EUT's	Table top EUT's		Table top and floor standing EUT's
Standard Deviation SdB, c	≤ 1,8 dB		

*Chamber type and size adjustable according to customer specific requirements

SAC-3 Plus

Frankonia's most versatile 3 m test chamber with innovative Dome Design

SAC-3 Plus Semi Anechoic Chamber



The SAC-3 Plus is Frankonia's most versatile full compliant EMC testing solution at 3,0 m measuring distance with a Quiet Zone (QZ) up to ø2,0 m. It is adapted for full compliant emission and immunity testing. The innovatively shaped roof, called dome design, with its optimized absorber layout leads to minimized reflections and offers outstanding performance for NSA, SVSWR and FU.

Since its introduction, the SAC-3 Plus has been the undisputed leading chamber in its class, and through the innovative concept, the customization and performance, it represents an efficient and economical solution that fully satisfies our customers.

Technical specifications					
Chamber type	SAC-3 Plus	SAC-3 Plus S	SAC-3 Plus M	SAC-3 Plus L	SAC-3 Plus Square
External dimension (L x W x H)	9,680 m x 6,530 m x 6,000 m	8,480 m x 6,530 m x 6,000 m	8,780 m x 6,530 m x 6,000 m	9,230 m x 6,530 m x 6,000 m	9,680 m x 6,530 m x 6,000 m
Version	Dome				Square
Turntable	ø2,0 m	ø1,2 m	ø1,5 m	ø2,0 m	ø2,0 m
Load capacity	up to 5,0 tons; special turntable systems possible				
Frequency range	150 kHz/ 30 MHz to 18 GHz (option 40 GHz)				
Absorber lining					
Walls and ceiling	Optimized lining with ferrite absorbers; partial lining with Frankosorb® hybrid absorbers H600 and H1000				
Floor	Moveable Frankosorb® hybrid absorbers H600 for immunity tests; and pyramid absorbers P450 for emission tests				
Performance					
Emission test (EMI)	Full compliance				
Chamber validation	According to CISPR 16-1-4 and ANSI C63.4				
Quiet Zone	ø2,0 m height 2,0 m	ø1,2 m height 2,0 m	ø1,5 m height 2,0 m	ø2,0 m height 2,0 m	ø2,0 m height 2,0 m
Measuring distance	3,0 m				
Deviation NSA	±3,5 dB (option ±3,0 dB) (30 MHz to 1 GHz)				
Deviation SVSWR	+5,5 dB (option +5,0 dB) (1 GHz to 18 GHz)				
Immunity test (EMS)	Full compliance				
Chamber validation	According to IEC/EN 61000-4-3				
Uniform area	1,5 m x 1,5 m				
Measuring distance	3,0 m				
Deviation FU	0 dB/+6 dB at 75 % of 16 measuring points (30/ 80 MHz to 18 GHz)				

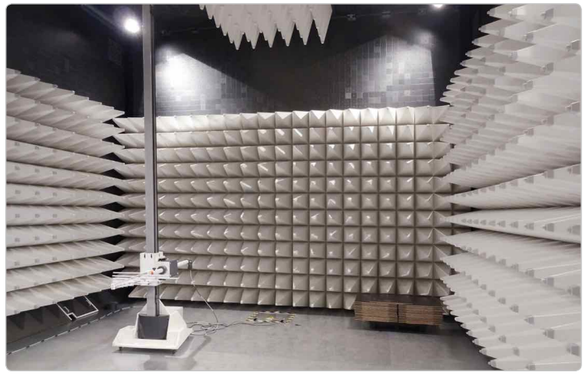
Features
- Adapted steel structure and optimized RF-shielding with dome-shaped roof
- Cost-effective and high-performance solution
- Advanced absorber lining with long-lasting Frankosorb® absorbers
- Upgradeable for CISPR 25 and EDTC components (load machine, BlueBox, battery test system)

Semi Anechoic Chamber SAC-5 Plus

The SAC-5 Plus is Frankonia's full compliant EMC testing solution at 3,0m & 5,0m measuring distance with a Quiet Zone (QZ) of ø2,0 m. It is adapted for full compliant emissions and immunity testing. The innovatively shaped roof, called dome design, with its optimized absorber layout leads to minimized reflections and offers outstanding performance for NSA, SVSWR and FU.

Technical specifications	
Chamber type	SAC-5 Plus
External dimension	12,680 m x 7,730 m x 6,000 m (L x W x H)
Version	Dome
Turntable	ø2,0 m
Load capacity	up to 5,0 tons; special turntable systems possible
Frequency range	150 kHz/ 30 MHz to 18 GHz (option 40 GHz)
Absorber lining	
Walls and ceiling	Optimized lining with ferrite absorbers; partial lining with Frankosorb® hybrid absorbers H600 and H1000
Floor	Moveable Frankosorb® hybrid absorbers H600 for immunity tests; and pyramid absorbers P450 for emission tests
Performance	
Emission test (EMI)	Full compliance
Chamber validation	According to CISPR 16-1-4 and ANSI C63.4
Quiet Zone	ø2,0 m; height 2,0 m
Measuring distance	3,0 m & 5,0 m
Deviation NSA	±3,5 dB (option ±3,0 dB) (30 MHz to 1 GHz)
Deviation SVSWR	+5,5 dB (option +5,0 dB) (1 GHz to 18 GHz)
Immunity test (EMS)	Full compliance
Chamber validation	According to IEC/EN 61000-4-3
Uniform area	1,5 m x 1,5 m
Measuring distance	3,0 m
Deviation FU	0 dB/+6 dB at 75 % of 16 measuring points (30/ 80 MHz to 18 GHz)

Features
- Adapted steel structure and optimized RF-shielding with dome-shaped roof
- Cost-effective and high-performance solution for a 5,0 m measuring distance
- Upgradeable for CISPR 25 and EDTC components (load machine, BlueBox, battery test system)
- Advanced absorber lining with long-lasting Frankosorb® absorbers



SAC-3 Plus Square

SAC-3 Plus Dome

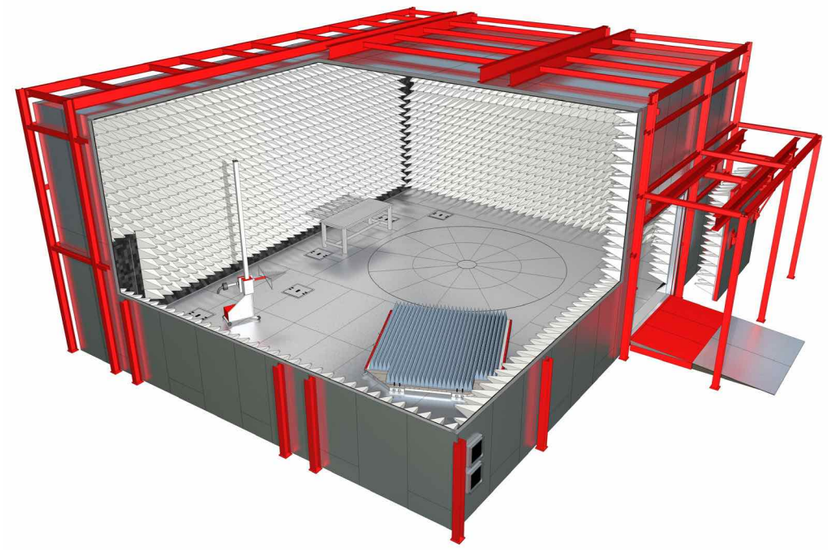
AVTC

Frankonia's most functional test chamber for commercial and automotive tests

AVTC Automotive Vehicle Testing Chamber

The AVTC is Frankonia's automotive anechoic chamber solution offering a Quiet Zone (QZ) of ø3,0 m for a test distance of 3,0 m or 5,0 m.

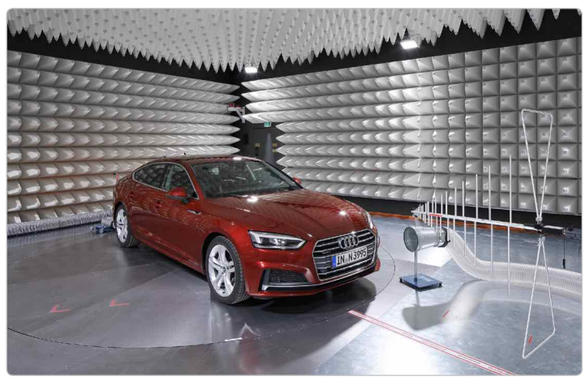
The AVTC is adapted for radiated emission and immunity tests on vehicles and components according to CISPR 12, CISPR 25, and ISO 11451-2 and ISO 11452-2. Furthermore, the AVTC meets commercial test requirements according to CISPR 16-1-4, ANSI C63.4 and IEC/EN 61000-4-3.



Features
- Automotive component and vehicle tests together with commercial tests in a single solution
- Cost-effective and high-performance solution for a 3,0 m or 5,0 m measuring distance
- Floor-absorberboard for an efficient and fast modification of the test setup
- Upgradeable with EDTC components (load machine, BlueBox, battery test system)

Technical specifications		
Chamber type	AVTC	AVTC-L
External dimension*	11,480 m x 9,380 m x 6,000 m (L x W x H)	11,780 m x 11,480 m x 6,450 m (L x W x H)
Turntable	ø5,0 m	ø6,0 m
Load capacity	up to 20,0 tons; special turntable systems and dynamometer integration possible	
Frequency range	150 kHz/ 26 MHz to 18 GHz (option 40 GHz)	
Absorber lining		
Walls and ceiling	Optimized lining with ferrite absorbers; partial lining with Frankosorb® hybrid absorbers H600 and H1000	
Floor	Moveable Frankosorb® hybrid absorbers H600 for immunity tests; and pyramid absorbers P450 for emission tests	
Option	Floor-absorberboard for EMI/EMS tests (AVTC-L)	
Performance		
Emission test (EMI)	Full compliance for vehicle and component tests (CISPR 12 and CISPR 25) Full compliance for commercial tests	
Chamber validation	According to CISPR 16-1-4 and ANSI C63.4	
Quiet Zone	ø3,0 m; height 2,0 m	
Measuring distance	3,0 m	3,0 m & 5,0 m
Deviation NSA	±4,0 dB (option ±3,5 dB) (30 MHz to 1 GHz)	
Deviation SVSWR	+6,0 dB (option +5,0 dB) (1 GHz to 18 GHz)	
Immunity test (EMS)	Full compliance for vehicle and component tests (ISO 11451 and ISO 11452) Full compliance for commercial tests	
Chamber validation	According to IEC/EN 61000-4-3	
Uniform area	1,5 m x 1,5 m	
Measuring distance	3,0 m	
Deviation FU	0 dB/+6 dB at 75 % of 16 measuring points (26/ 80 MHz to 18 GHz)	

*Chamber type and size adjustable according to customer specific requirements



AVTC - Vehicle Tests

AVTC - Automotive Component Tests with CISPR 25 table

AVTC - Commercial Tests (EMI)

AVTC - Commercial Tests (EMI) with floor-absorberboard

Military Standard Anechoic Chamber MIL-STD Chamber

The MIL-STD Chamber is Frankonia's large chamber solution at 1,0 m measuring distance according to MIL-STD 461 adapted for radiated emission and immunity tests for large EUT's or vehicles.

Technical specifications	
External dimension*	21,080 m x 30,080 x 11,025 m (L x W x H) (exemplary size)
Load capacity	up to 80,0 tons; special turntable systems and integration possible
Frequency range	26/30/80 MHz to 40 GHz
Absorber lining	
Walls and ceiling	Optimized lining with Frankosorb® short- or long-pyramid absorbers
Floor	Movable absorbers as option
Performance	
Emission test (EMI)	Compliance according to MIL-STD 461
Immunity test (EMS)	Compliance according to MIL-STD 461
Measuring distance	1,0 m
Absorption at normal incidence	
80 MHz to 250 MHz	≥ 6 dB, as per standard requirements
above 250 MHz	≥ 10 dB, as per standard requirements

*Chamber type and size adjustable according to customer specific requirements

Military Standard Anechoic Chamber (advanced)

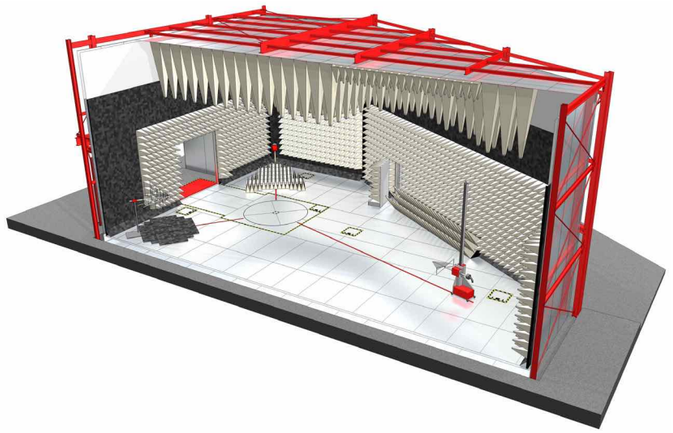
Frankonia's long pyramid absorbers offer the possibility to combine MIL-STD 461 test requirements with commercial test requirements according to CISPR 16-1-4 and ANSI C63.4, as well as a combination of automotive component and vehicle tests is possible. Frankonia's expertise in turnkey projects and the ability to provide solutions fully adapted to customers' demands allows especially military testing of heavyweight and large EUT's.

Advanced performance	
Emission test (EMI)	Full compliance for MIL-STD 461 tests Full compliance for vehicle and component tests Full compliance for commercial tests
Chamber validation	According to CISPR 16-1-4 and ANSI C63.4
Quiet Zone	ø2,0 m up to ø8,0 m possible
Measuring distance	10,0 m, 5,0 m & 3,0 m possible
Deviation NSA	±3,5 dB (30 MHz to 1 GHz)
Deviation SVSWR	+5,5 dB (1 GHz to 18 GHz)
Immunity test (EMS)	Full compliance for MIL-STD 461 tests Full compliance for vehicle and component tests Full compliance for commercial tests
Chamber validation	According to IEC/EN 61000-4-3
Uniform area	1,5 m x 1,5 m
Measuring distance	3,0 m
Deviation FU	0 dB/+6 dB at 75 % of 16 measuring points (26/ 80 MHz to 18 GHz)

SAC-10 Plus Triton

Frankonia's multiple test axes chamber with trend-setting workflow efficiency

SAC-10 Plus Triton Semi Anechoic Chamber



The SAC-10 Plus Triton is Frankonia's full compliant EMC testing solution with multiple test axes at 10 m, 5 m & 3 m measuring distance with a Quiet Zone (QZ) of ø3,0 m.

The innovative polygonal shape along with its optimized absorber layout allows for a usage of multiple axes having a ready test setup for emission and immunity tests.

Benefits of the multiple test axes

Full compliant
Validated according to CISPR 16-1-4, ANSI C63.4 and IEC/EN 61000-4-3

Quiet Zone ø3,0m
Semi-anechoic chamber designed for measuring distances of 10,0 m, 5,0 m and 3,0 m on a quiet zone of ø3,0 m.

Multiple Test Axes
Innovative shape with optimized absorber layout with the use of three axes for emission and immunity tests.

Everything in the chamber
Time saving and efficient workflow as antennas and floor absorber areas for each test procedure remain in the chamber and specifically move to the test position either in manual or semi-automatized mode.

Reproducible and stable quality
Quality of every EMC testing remains at a constantly high level, the testing time decreases, malfunction and damage is almost impossible, and reproducible test site conditions guaranteed.

Future-proof solution
Compact chamber design with adapted steel structure and optimized RF-shielding in polygonal shape and an advanced absorber lining with long-lasting Frankosorb® absorbers.

Multiple Test Axes
- All required EMI/EMS tests in one chamber
- 10,0 m, 5,0 m & 3,0 m measuring distances with a Quiet Zone of ø3,0 m
- No need to modify the test environment or the test setup
- Test equipment and antennas remain connected in the chamber
- Floor absorbers remain in the chamber
- Quality of testing at a constant high level
- Test time decreases considerably
- Outstanding performance in a compact chamber size
- Frankosorb® non-combustible and long-lasting absorbers
- Cost-saving and future-proof investment

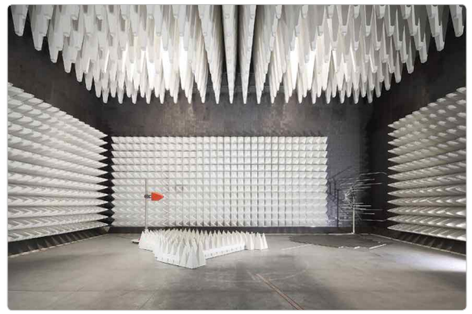
Reproducibility & Quality
- Easy and efficient to use
- Guided floor absorber movements
- Constant quality and performance
- Long-lasting Frankosorb® absorbers

Time & Efficiency
- No need to modify the test environment or the test setup
- Integrative automation set incl. antenna masts and turntable
- Antennas remain in the chamber
- Antennas are part of the package and included
- Floor absorbers remain in the chamber with guided movements (manual or semi- automatic)
- Malfunctions or damages are almost impossible
- Optimized workflow

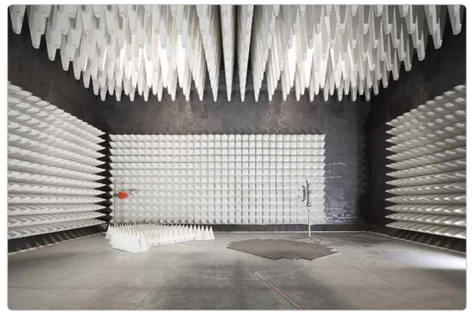
Innovative
- Multiple test axis
- Individual use for all kinds of EMI/EMS tests
- Radiated emissions (EMI): Full compliance according to CISPR 16-1-4 and ANSI C63.4
- Radiated immunity (EMS): Full compliance according to IEC/EN 61000-4-3
- Space-saving chamber in polygonal shape
- Ingenious absorber lining with Frankosorb®

Test axis 1 - Performance	
Emission test (EMI)	Full compliance
Chamber validation	According to CISPR 16-1-4 and ANSI C63.4
Quiet Zone	ø3,0 m; height 2,0 m
Measuring distance	10,0 m, 5,0 m & 3,0 m
Deviation NSA at 10,0 m	±3,5 dB (30 MHz to 100 MHz) ±3,0 dB (100 MHz to 400 MHz) ±2,0 dB (400 MHz to 1 GHz)
Deviation NSA at 5,0 m	±3,5 dB (30 MHz to 100 MHz) ±3,0 dB (100 MHz to 400 MHz) ±2,0 dB (400 MHz to 1 GHz)
Deviation NSA at 3,0 m	±3,0 dB (30 MHz to 200 MHz) ±1,0 dB (200 MHz to 1 GHz)
Deviation SVSWR at 5,0 m	+6 dB (1 GHz to 18 GHz)
Deviation SVSWR at 3,0 m	+6 dB (1 GHz to 18 GHz)
Test axis 2 - Performance	
Emission test (EMI)	Full compliance
Chamber validation	According to CISPR 16-1-4
Quiet Zone	ø3,0 m; height 2,0 m
Measuring distance	3,0 m
Deviation SVSWR	+5 dB (1 GHz to 18 GHz)
Immunity test (EMS)	Full compliance
Chamber validation	According to IEC/EN 61000-4-3
Uniform area	1,5 m x 1,5 m
Measuring distance	3,0 m
Deviation FU	0 dB/+6 dB at 75% of 16 measuring points (1 GHz to 18 GHz)
Test axis 3 - Performance	
Immunity test (EMS)	Full compliance
Chamber validation	According to IEC/EN 61000-4-3
Uniform area	1,5 m x 1,5 m
Measuring distance	3,0 m
Deviation FU	0 dB/+6 dB at 75% of 16 measuring points (30/ 80 MHz to 18 GHz)
Technical specifications	
External dimension	19,205 m x 12,080 m x 8,325 m (polygonal shape) (L x W x H)
Turntable	ø3,0 m
Load capacity	up to 5,0 tons; special turntable systems possible
Frequency range	30 MHz to 18 GHz (option 40 GHz)
Absorber lining	
Walls and ceiling	Partial lining with ferrite absorbers; mix of long and short Frankosorb® pyramid/hybrid absorbers
Floor	Sliding absorber area for immunity and emission test, individual configured for each test axis

Test axis 1 (EMI)



Test axis 2 (EMI/EMS)

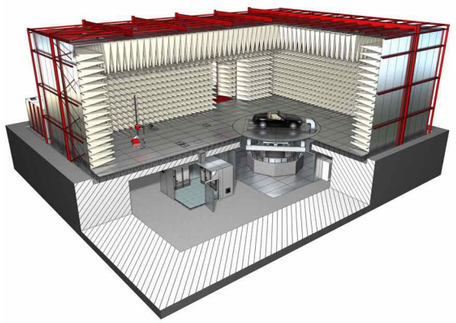


Test axis 3 (EMS)

SAC-10

Customized 10 m anechoic chambers that entirely meet any EUT specifications

SAC-10 Semi Anechoic Chamber



The SAC-10 chambers are Frankonia's full compliant and customizable EMC testing solutions at 10,0m measuring distance offering various sizes of the Quiet Zone (QZ). Due to the high grade of customization reflecting the demands of our customers, this semi-anechoic chamber is adaptable in size and offers several configuration possibilities. The innovative concept with its impressionable absorber layout achieves exceptional performance for emission and immunity testing.

The fully customizable SAC-10 covers all requirements in today's and future EMC testing environments, without any difference between EUTs that belong to the road, water or air. Putting specific customers' demand into practice and the integration of individual applications is without limitation due to our highly specialized and adjustable solution. All SAC-10 chamber sizes are available either with long-pyramid absorber lining or as hybrid absorber lining solution.

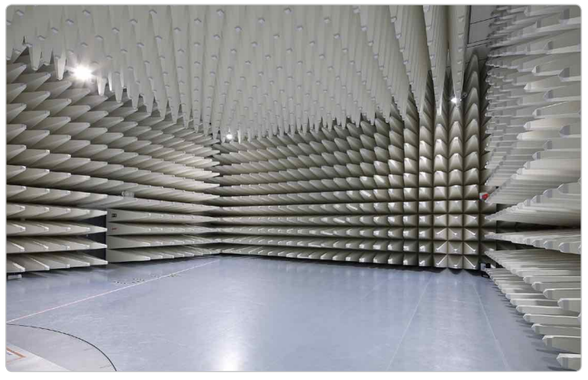
Technical specifications – Chambers with long pyramid absorbers				
Pyramid Chamber*	SAC-10-3	SAC-10-4	SAC-10-5	SAC-10-6
Absorber configuration	Frankosorb® long pyramid absorbers			
External dimension (L x W x H)	21,680 m x 13,730 m x 8,550 m	21,680 m x 13,730 m x 8,550 m	23,480 m x 16,580 m x 9,000 m	26,480 m x 20,180 m x 10,500 m
Turntable	ø3,0 m	ø4,0 m	ø5,0m	ø6,0 m
Load capacity	up to 80,0 tons; special turntable systems and dynamometer integration possible			
Frequency range	26/30 MHz to 18 GHz (option 40 GHz)			
Absorber lining				
Walls and ceiling	Optimized lining with Frankosorb® long pyramid absorbers P2400			
Floor	Moveable Frankosorb® hybrid absorbers H600 for immunity tests and pyramid absorbers P450 for emission tests			
Option	Floor-absorberboard for EMI/EMS tests			

Technical specifications – Chambers with hybrid absorber lining				
Hybrid Chamber*	SAC-10-3 H	SAC-10-4 H	SAC-10-5 H	SAC-10-6 H
Absorber configuration	Frankosorb® hybrid absorbers; full lining with Ferrite in combination with partial or full lining of pyramid absorbers			
External dimension (L x W x H)	18,380 m x 12,830 m x 8,550 m	19,580 m x 14,780 m x 8,700 m	21,380 m x 15,380 m x 8,700 m	24,380 m x 18,980 m x 10,200 m
Turntable	ø3,0 m	ø4,0 m	ø5,0m	ø6,0 m
Load capacity	up to 80,0 tons; special turntable systems and dynamometer integration possible			
Frequency range	26/30 MHz to 18 GHz (option 40 GHz)			
Absorber lining				
Walls and ceiling	Optimized lining with Frankosorb® hybrid absorbers			
Floor	Moveable Frankosorb® hybrid absorbers H600 for immunity tests and pyramid absorbers P450 for emission tests			
Option	Floor-absorberboard for EMI/EMS tests			

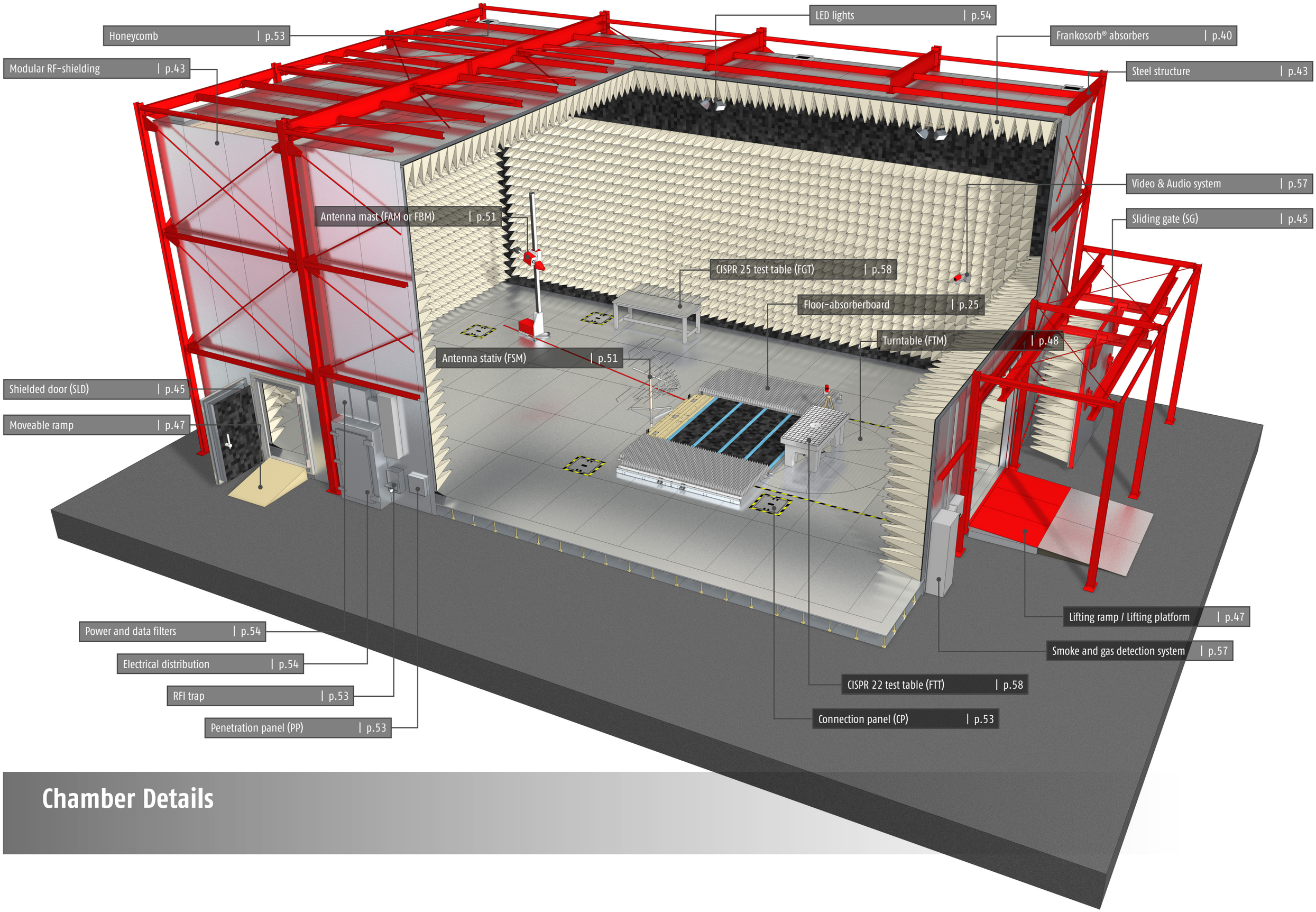
*Chamber type and size adjustable according to customer specific requirements; the measures illustrated in the table are just for orientation purposes

Performance				
Chamber	SAC-10-3	SAC-10-4	SAC-10-5	SAC-10-6
Emission test (EMI)	Full compliance			
Chamber validation	According to CISPR 16-1-4 and ANSI C63.4			
	Quiet Zone – NSA (30 MHz to 1 GHz)			
Measuring distance 10,0 m	ø3,0 m (2,0 m H)	ø4,0 m (2,0 m H)	ø5,0 m (2,0 m H)	ø6,0 m (2,0 m H)
Measuring distance 5,0 m	ø3,0 m (2,0 m H)	ø4,0 m (2,0 m H)	ø5,0 m (2,0 m H)	ø5,0 m (2,0 m H)
Measuring distance 3,0 m	ø3,0 m (2,0 m H)	ø3,0 m (2,0 m H)	ø3,0 m (2,0 m H)	ø3,0 m (2,0 m H)
Deviation NSA	±3,5 dB (30 MHz to 1 GHz)			
Test axes	Single test axis, or double test axis chamber			
	Quiet Zone – SVSWR (1 GHz to 18 GHz)			
Measuring distance 5,0 m	ø3,0 m (2,0 m H)	ø4,0 m (2,0 m H)	ø5,0 m (2,0 m H)	ø5,0 m (2,0 m H)
Measuring distance 3,0 m	ø3,0 m (2,0 m H)	ø3,0 m (2,0 m H)	ø3,0 m (2,0 m H)	ø3,0 m (2,0 m H)
Deviation SVSWR	+5,5 dB (1 GHz to 18 GHz)			
Immunity test (EMS)	Full compliance			
Chamber validation	According to IEC/EN 61000-4-3			
Uniform area	1,5 m x 1,5 m			
Measuring distance	3,0 m			
Deviation FU	0 dB/+6 dB at 75 % of 16 measuring points (26/ 80 MHz to 18 GHz)			

Features
- Highly customizable solution for any kind of EMC testing and limitless integration of individual applications
- Adjustable chamber size, characteristics and configuration due to different EUT requirements
- Advanced absorber lining with long-lasting Frankosorb® absorbers (Frankonia technology)
- Available with long pyramid absorbers or with hybrid absorbers
- Specialized for 'out-of-the-range' EMC test environments
- Performance chamber solution better ±2,5 dB with long-pyramid Frankosorb® available



Chamber Details

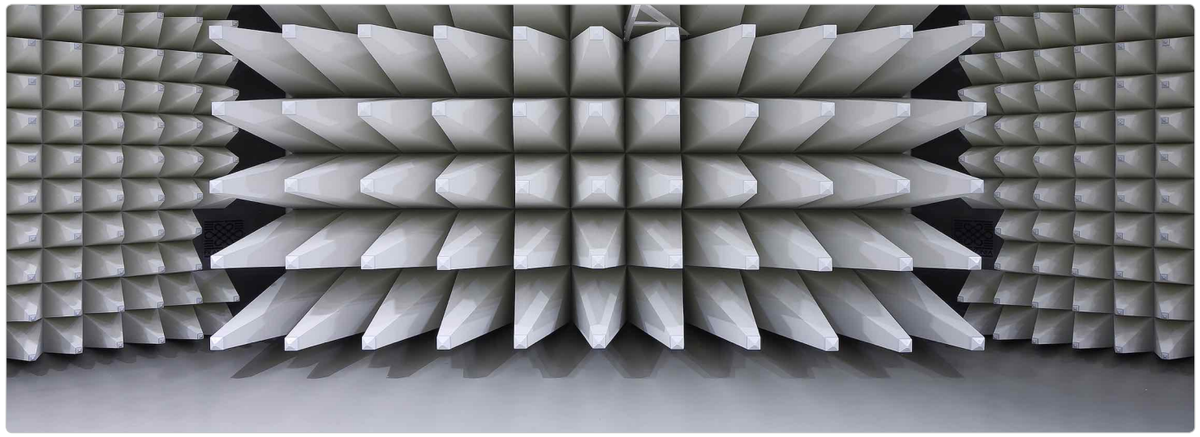


Frankosorb®

Frankonia’s unique absorber technology

Frankosorb® Absorber Technology

Frankonia's unique absorber technology



Since Frankonia's Frankosorb® thin film absorber technology started to dominate the world market, more and more customers recognize and appreciate the stable performance characteristics and many more unique attributes offered by this technology. Frankosorb® convinces with more than 25 years of operation without having any malfunction, defect, quality or performance loss or the need to refurbish.

The unique method of Frankosorb® technology and its specific manufacturing process is available either as a hybrid solution in combination with Ferrite absorbers, or as a stand-alone pyramid solution with a length up to 2,4 m. The most important advantage of the Frankosorb® long pyramid absorbers is the covering of the whole frequency range starting from 30 MHz so that additional Ferrite absorbers are unnecessary.

Facts and Benefits

- Nano thin-film technology guarantees highest homogeneity and impedance accuracy
- Non-combustible Absorbers according to DIN EN 13501-1 class A2 – s1 d0, equivalent to DIN 4102 class A2 (US NRL 8093 Tests 1,2,3,4 and 5; Chinese GB8624-2006; Russia GOST 30244-94), EN/ISO 5659-2 (smoke generation and opacity), very high power handling capacity up to 2 kW/m² or 850 V/m (continuous duty); 3,5 kW/m² or 1,150 V/m (intermediate power)
- Hardly inflammable Absorbers according to DIN EN 13501-1 class B, equivalent to DIN 4102 class B1 (US NRL 8093 Tests 1,2 and 3; Chinese GB8624-2006; Russia GOST 30244-94), very high power handling capacity up to 1 kW/m² or 600 V/m (continuous duty); 2,6 kW/m² or 1,000 V/m (intermediate power)
- High absorption capability paired with a fast cooling feature (hollow absorber)
- Not carbon-based absorbers
- Cost protective solution with Frankosorb® non-combustible absorbers as no sprinkler or fire extinguishing system is necessary
- High-performance characteristics ensure reproducible test results
- Proven long-term stability for more than 25 years
- Non-hygroscopic materials are used to meet any climatic conditions (humidity-proof and temperature-proof)
- Completely heat, cold and moisture resistant
- No toxic gases emitted in case of absorber heating
- No dirt, solvent-free, and free of glue or other harmful substances ensure a healthy environment for people and EUT
- Recyclable at 99%
- Clean room classification according to ISO 14644-1 Class 5
- Easy to clean and washable
- White coloring that improves the illumination level (no covers necessary)
- No aging or drooping, no losing performance
- Space-saving and stackable floor absorbers
- Digital manufacturing process of each absorber guarantees identical performances
- Easy and modern installation method, piece by piece that fits for any kind of shielding
- Lightweight absorbers require less statics
- Removable due to absorber fixation either by screw or hanging type

The Frankonia Frankosorb® absorber technology combines a variety of high-performance standards in a single solution. Due to the stable performance characteristics and its unique non-combustible attribute, a safe environment for people and EUT can been assured, which also leads to a constant, reproducible and long-lasting testing quality. Aligned with customers' requirements, the Frankosorb® absorbers are available in several configurations that achieve a cost-effective and high-performance solution. Thus, together with the Frankosorb® absorber technology, Frankonia's chambers offer the best choice for long-term investments.

Ferrite absorbers

The individual Ferrite tiles are pre-assembled on wooden chip boards in a typical size of 600 mm x 600 mm. Due to the modular and prefabricated principles of Frankonia, the inner shielding will be assembled with a horizontal substructure in a predefined grid that accepts the prefabricated Ferrite absorbers with its specific size to ensure the highest performance level. The typical frequency range of Ferrite absorbers is from 30 MHz to 1 GHz.

Features
- High quality prefabrication
- Everything is screwed, nothing is welded or glued, no use of harmful substances
- Removable Ferrite absorber plates piece-by-piece

Ferrite absorbers

Frankosorb® hybrid absorbers

To expand the frequency range above 1 GHz, additional pyramidal shaped absorbers in combination with Ferrite are necessary. These absorbers are installed in a second step, in which the Ferrite absorbers typically get special fixation kits that allow the installation of additional pyramid absorbers. Those are simply screwed to the Ferrite using nuts and threaded rods. 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® hybrid absorbers

Frankosorb® long pyramid absorbers

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.
Without the need of Ferrite, the Frankosorb® pyramid absorbers with a length of 600 mm offer a typical frequency range from 80 MHz to 18/40 GHz and are therefore predestinated for MIL-STD chambers.
By physical explanation, with a size of 2.400 mm the typical frequency range is 26/30 MHz to 18/40 GHz and is herewith the right choice for commercial and automotive testing chambers.

Features
- 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)

Frankosorb® pyramid absorbers

Shielding & Gates

RF-Shielding & Steel Structure

RF-Shielding

The RF-shielding is Frankonia's basic system and follows the principles of the Faraday cage. The modular and prefabricated high-quality RF-shielding is typically a pan-type shielding made of 2,0 mm galvanized steel that is manufactured to perfection. Frankonia's shielding is used for all kinds of chambers and shielded rooms, such as control rooms, amplifier rooms, or any other room that requires a shielded standard.

Standardization matters to ensure the highest shielding quality and to ensure a maximum of functionality and flexibility that adapts to all special conditions. The complete shielding system is designed to match current or even future modifications and requirements in length, width and height. Thanks to the modular and prefabricated system, modifications can be realized in a very short time at lowest cost, minimizing dirt, dust and noise. Frankonia's contribution to an overall modular system allows for a complete transfer of all kinds of chambers and is therefore a future-proof solution.

Frankonia's shielding is prepared for internal bolting that allows an installation very close to the building surface. In special cases, the shielding can be bolted in reverse from outside. The corners are completely welded in-house, thus a perfect connection to the surrounding modules is assured. Frankonia's shielding is a completely self-supporting construction system with a standard module of 3,0 x 1,2 m that is bolted every 75,0 mm. In between all modules a highly conductive mesh gasket is integrated that ensures a long-lasting shielding quality. Within this system, all Frankonia components, e.g., honeycombs, doors and gates, feed-throughs or filters, offer the same RF quality level.

Shielding prefabrication

Shielding attenuation according to EN 50147-1 (guaranteed)

Frequency	Attenuation	Field
10 kHz	≥ 80 dB	Magnetic
100 kHz	≥ 100 dB	Magnetic
1 MHz	≥ 100 dB	Magnetic
100 MHz	≥ 110 dB	Plane wave
400 MHz	≥ 110 dB	Plane wave
1 GHz	≥ 110 dB	Plane wave
18 GHz	≥ 90 dB	Microwave
40 GHz	≥ 90 dB	Microwave

The standard shielding is made of German steel that offers a minimum of 20,0 µm galvanic coating in accordance with DIN EN 10346:2009-07 with quality index DX 52 D+Z. The acceptable tolerance is limited in accordance with DIN/EN 10143 and is minimum 275 g/m².

Features
- Modular and prefabricated pan-type shielding modules
- Hot-galvanized 2,0 mm thick steel
- Dismountable, nothing is glued or welded
- Self-supporting construction along with industrial design standards
- High-class and identical shielding attenuation for modules, doors, gates and all accessories

Steel Structure

For static purposes, larger chambers require an additional steel structure support that perfectly meets the shielding fixation, considers a variable static design for different chamber sizes and configurations, and adapts to any specific building characteristics and A/C layouts. Frankonia's steel structure is a totally self-supporting system and does not require a connection to the existing building. Furthermore, for corrosion prevention the steel structure is coated by default akin to RAL 3020 with a guarantee of 10 years. Moreover, Frankonia's steel structure considers country-specific seismic conditions as well as low point loading to the concrete slab of the building.

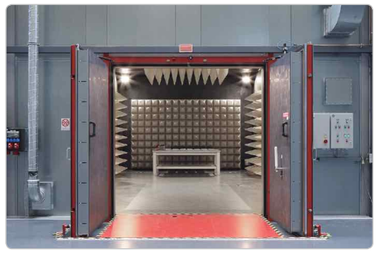
Features
- Steel structure that meets specific static purposes and country-specific seismic conditions
- Independent and totally self-supporting system

Doors & Gates

The doors and gates by Frankonia are designed according to industrial standards in respect of durability, flexibility and all kinds of safety issues related to the EC machinery directive. The triple-row knife-edge system achieves the same shielding effectiveness as the standard shielding modules by its innovative design, and therefore offers continuous quality. This special development allows for complex double-pivoted hinges that stabilize the construction and greatly extend the lifespan of the highly conductive contact springs. Furthermore, this system reduces the maintenance intervals to a minimum, ensuring a stable shielding performance.

General characteristics
- Very strong construction for long-lasting stability
- RF-shielding realized with an innovative triple row of highly conductive contact springs
- The complete triple-row knife-edge system is easily exchangeable
- Threshold protection considered to avoid damage
- Materials are hot-galvanized for corrosion prevention
- All materials used are equal to the shielding to ensure continuous quality
- Clever and easy to maintain
- Designed for MTBF 20.000 cycles without failure
- Door frame and leaf finish color in RAL 9002

Single-leaf door (SLD)



Double-leaf door (DLD)

Sliding door (SSD)
Sliding gate (SG)

All gates are available as automatic version without limitation in size, which meet all kinds of EUT and customer-specific requirements. Any version of the door or gate is perfectly integrated in the shielding and respects the lining of the wall absorbers.

A great advantage of Frankonia's sliding gates is the fact that all types of pyramid and hybrid absorbers, up to a length of 2,4 m, can be directly installed on the door leaf. Considering the EC machinery directive for safety issues to ensure a user-friendly and safe movement, audio and visible signals turn automatically on while moving.

Features
- Equal shielding attenuation as Frankonia's standard shielding according to EN 50147-1
- Triple-row knife-edge system of highly conductive contact springs
- Variety of doors and gates in combination with ramps, sliding ramps and lifting platforms
- Manual, electric or pneumatic powered latching system
- Motorized movement for sliding doors and gates
- Perfectly integrated in the shielding and absorber lining
- Designed and built for long-lasting performance and stability
- User-friendly and safe use according to EC machinery directive

Single-leaf door (SLD)

Double-leaf door (DLD)

Sliding Gate (SG)

*Clear opening reduction depending on absorber lining

Single-leaf door (SLD)		
Type	Clear Opening*	
	Width (mm)	Height (mm)
SLD 09/19	938	1968
SLD 10/20	1013	2043
SLD 12/21	1238	2118
SLD 12/24	1238	2418
SLD 15/21	1538	2118
SLD 15/24	1538	2418
Custom	Customized solutions on request	
Locking	• Manual • Pneumatic • Electric	

Double-leaf door (DLD)		
Type	Clear Opening*	
	Width (mm)	Height (mm)
DLD 18/21	1838	2118
DLD 21/21	2138	2118
DLD 21/24	2138	2418
DLD 24/24	2438	2418
DLD 30/30	3038	3018
DLD 39/39	3938	3918
DLD 42/42	4238	4218
Custom	Customized solutions on request	
Locking	• Manual (only up to DLD 24/24) • Pneumatic	

Sliding door (SSD)		
Type	Clear Opening*	
	Width (mm)	Height (mm)
SSD 09/19	938	1968
SSD 12/19	1238	1968
SSD 12/21	1238	2193
SSD 15/19	1538	1968
SSD 15/21	1538	2193
SSD 18/19	1838	1968
SSD 18/21	1838	2193
SSD 21/19	2138	1968
SSD 21/21	2138	2193
Custom	Customized solutions on request	
Locking	• Manual • Pneumatic • Electric	
Features	Electric locking with motor assistance	

Sliding gate (SG) for pyramid absorbers				
Type	Gate Dimension		Clear Opening	
	Width (mm)	Height (mm)	Width (mm)	Height (mm)
SG 23/23	2438	2438	2320	2320
SG 23/29	2438	3093	2320	2900
SG 29/29	3093	3093	2900	2900
SG 29/34	3093	3693	2900	3480
SG 34/34	3543	3543	3480	3480
SG 34/40	3543	4143	3480	4060
SG 40/40	4088	4143	4060	4060
SG 40/46	4088	4743	4060	4640
SG 46/46	4688	4743	4640	4640
SG 46/52	4688	5343	4640	5220
SG 52/52	5288	5343	5220	5220
SG 52/58	5288	5868	5220	5800
SG 58/58	5888	5868	5800	5800
SGS xx/xx	Customized solutions on request			

Sliding gate (SG) for hybrid absorbers				
Type	Gate Dimension		Clear Opening	
	Width (mm)	Height (mm)	Width (mm)	Height (mm)
SG 24/24	2438	2438	2400	2400
SG 24/30	2438	3093	2400	3000
SG 30/30	3093	3093	3000	3000
SG 30/36	3093	3693	3000	3600
SG 36/36	3638	3693	3600	3600
SG 36/42	3638	4293	3600	4200
SG 42/42	4238	4293	4200	4200
SG 42/48	4238	4893	4200	4800
SG 48/48	4838	4893	4800	4800
SG 48/54	4838	5493	4800	5400
SG 54/54	5438	5493	5400	5400
SG 54/60	5438	6093	5400	6000
SG 60/60	6038	6093	6000	6000
SGS xx/xx	Customized solutions on request			

Lifting Platforms & Lifting Ramps

In addition to all doors and gates, lifting ramps and lifting platforms are available, with either manual or automatic movements. The lifting platform is used in case the chamber is installed in a pit and provides a flat access level. The lifting ramp is used in case the chamber is installed on the finished floor or is partially installed in a pit and provides a smooth ramp access level. A sliding platform completes Frankonia's range of EUT and personal access solutions. As a specialist in customer-specific requirements, there are almost no limitations in weight and size.

Lifting platforms
- Light weight EUT's up to 5 t; equal level inside/outside
- Heavy weight EUT's up to 60 t; equal level inside/outside

Sliding platform
- Sliding platform for heavy EUT's that moves with the sliding gate; equal level inside/outside

Lifting ramps
- Ultra-light weight EUT's up to 800 kg
- Light weight EUT's up to 5 t
- Medium weight EUT's up to 20 t
- Heavy weight EUT's up to 60 t

Moveable ramps
- Wooden ramp up to 200 kg
- Aluminium ramp up to 500 kg

Features
- Perfectly adapted to match Frankonia's doors or gates
- Materials are hot-galvanized and colored in RAL 3020
- Slip resistant coating (option)
- Clever and easy to maintain
- Designed for MTBF 20.000 cycles without failure

Lifting platform

Lifting ramp

Automation

Turntables, Controller & Software

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.

Range of products
- Turntable (FTM)
- Dynamometer
- Antenna stand for manual use (FSM) with polarization unit (FPD)
- Antenna mast for automatic use (FAM)
- Antenna mast for automatic use and boresight function (FBM)
- Controller (FC) and Software

FTM – Frankonia Turntables

Frankonia's wide range of turntables is fully compliant with the EMC chamber environment. The turntables are available in different sizes and can be equipped with various options. They are flush integrated in the raised floor and are surrounded by a conductivity grounding ring to ensure the contact with the ground plane of the chamber. For the control of the turntables series FTM, the Frankonia controller FC06.1 is perfectly adapted using the IEEE 488.2 (GPIB) commands.

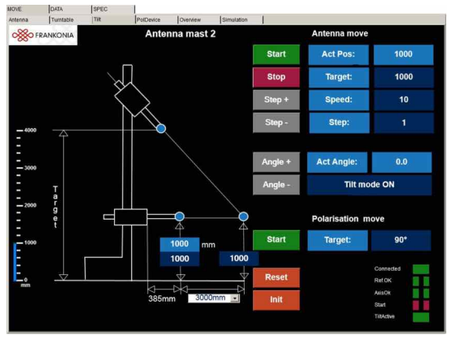
FTM – Turntable Systems	
Size	ø1,2 m up to ø8,0 m
EUT weight	500 kg up to 40 tons
Options	• Integrated energy chain for power lines and data lines, with rotating connection panels on the outer rim • Integrated fixed or rotating exhaust system up to 800° C • Waterproof solution and EUT water supply • Integration of any rotating components below the surface, e.g., transformer
FTM Custom	Customized turntable systems without limitations in configuration, size and EUT weight are possible

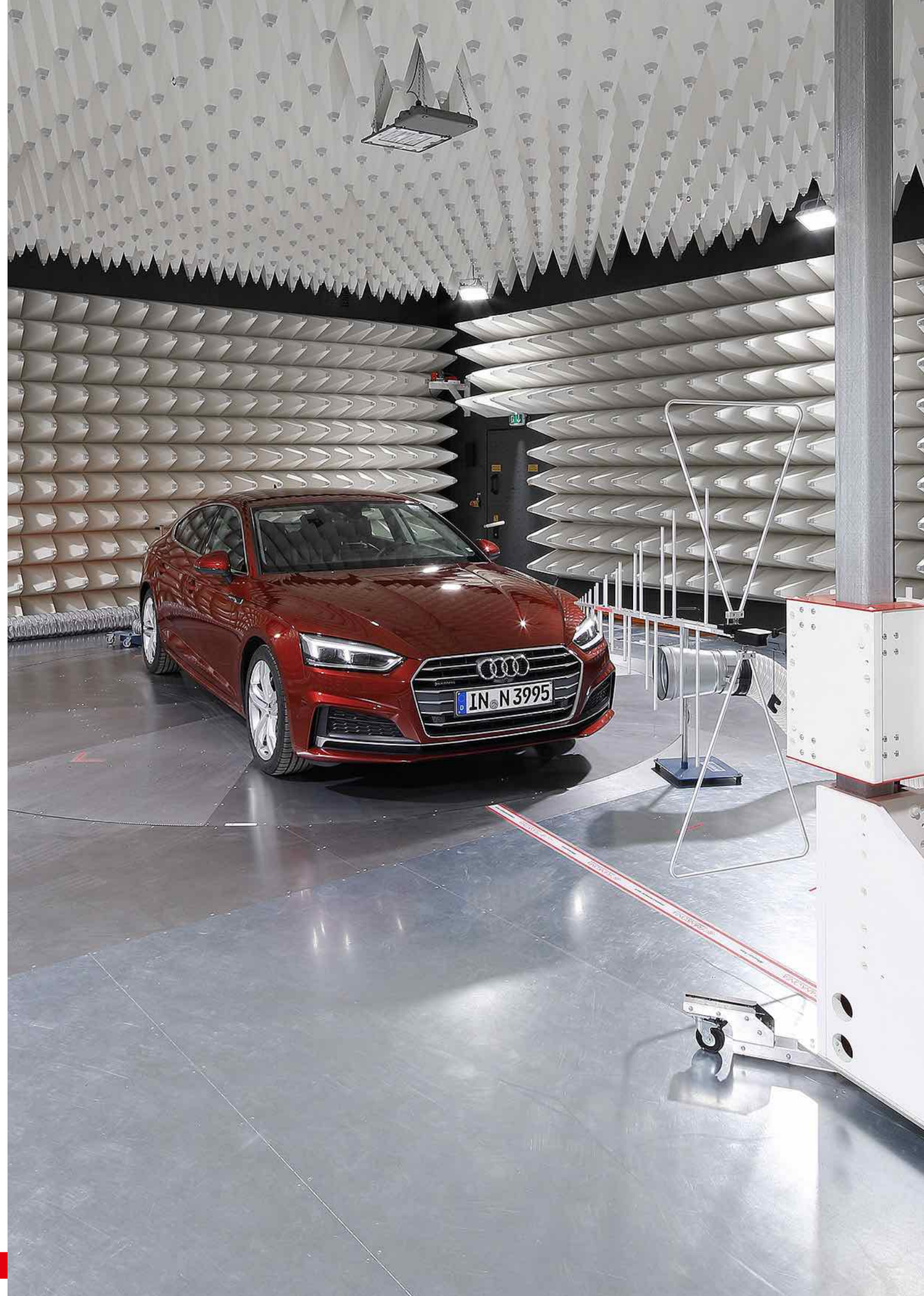
FTM – Mobile Turntable Systems	
Size	ø0,6 m or ø0,8 m
EUT weight	200 kg

Controller & Software

To navigate and control Frankonia's antenna masts, turntables and other positioning devices, our controller FC06.1 is perfectly adapted to any EMC tasks.

- IEEE 488.2 (GPIB interface with SCPI commands, supported by any EMC software)
- Modern and intuitive software control (web software, no Java required)
- Control of several positioning devices (Mast, Turntable, ...) within an EMC chamber
- Full programmable functionality that meet customers' specific test scenario
- Test procedure preset and loop function
- Preset of customer specific values and limits
- Monitoring of the test procedure
- Up to 3 interfaces and 24V outputs



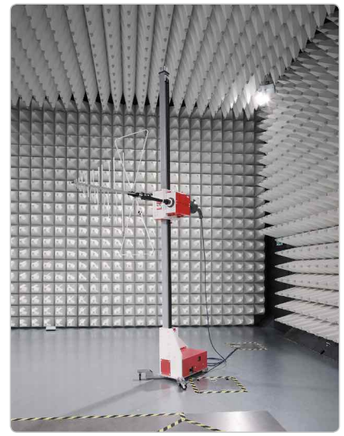


Antenna Masts

FAM – Frankonia Antenna Mast

For customers' convenience, the Frankonia antenna mast solutions are equipped with wheels and can be folded to enable easy transportation and handling. To reduce unintentional reflections, the masts are made of fiberglass and plastic materials. Any reflecting materials have been reduced to a minimum.

FAM/FBM Standards
- Antennas up to 12 kg (incl. adapter weight) at cross-beam section
- FAM2-4/FBM1-4 for height scan up to 4,0 m; FAM2-6 for height scan up to 6,0 m
- Compliant CISPR 16-1-4 (FAM) and ANSI C63.4 (FBM)
- Easy positioning of antenna tube through clamp ring
- Adapted software
- EMC proof

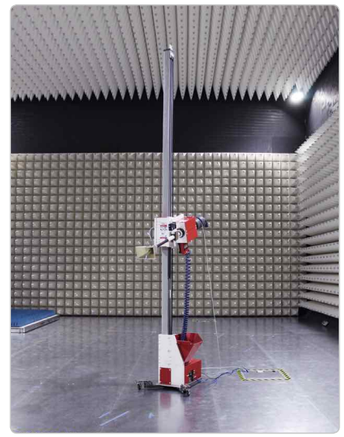


FAM2-4

FBM – Frankonia Boresight Antenna Mast

Based on the FAM antenna mast construction, the FBM boresight antenna mast is compliant with ANSI C63.4 and CISPR 16-1-4 that includes an advanced tilt function. To offer full flexibility, the tilt function can be switched off, so that the FBM operates as a standard mast. Within the tilt function, the FBM software automatically calculates the tilt angle in accordance with the antenna specific reference point, as well as distance, position and size of the EUT and monitors the complete test procedure.

- Standard operating mode without tilt function, antennas up to 12 kg (incl. adapter weight) (fig. 1)
- Boresight operating mode with tilt function, antennas up to 8 kg (incl. adapter weight) (fig. 2)
- Adjustable antenna start height and tilt angle calculation (fig. 3)
- Negative tilt angle at 1,0 m antenna height (fig. 4)
- Automatic tilt angle calculation using the antenna's specific reference point
- Automatic tilt angle calculation in accordance with distance, position and size of EUT
- Compliant with ANSI C63.4 and CISPR 16-1-4



FBM1-4

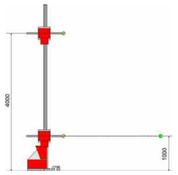


Fig. 1

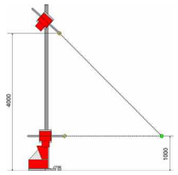


Fig. 2

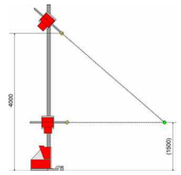


Fig. 3

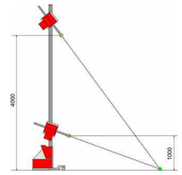


Fig. 4

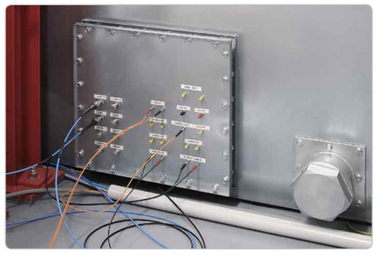
	FAM		FBM
Compliant	CISPR 16-1-4		ANSI C63.4 and CISPR 16-1-4
Type	FAM2-4	FAM2-6	FBM1-4
Height scan	from 1,0 m to 4,0 m	from 1,0 m to 6,0 m	from 1,0 m to 4,0 m
Height	4,5 m	6,5 m	4,9 m
Accuracy	• Height scan accuracy ±5 mm • Manual antenna alignment ±2° • Electrical polarization 0°-90° (6 sec.)		• Height scan accuracy ±5 mm • Manual antenna alignment ±2° • Pneumatic polarization 0°-90° (6 sec.) • Height scan speed 10 mm/sec to 150 mm/sec (dynamic movement)
Features	• Easy positioning of antenna tube through clamp ring • Adapted software • EMC proof		• Automatic tilt adjustment • Tilt accuracy ±0,5° • Step-wise and step-less mode

Accessories

Ventilation, Feed-through & Wave-guide Components

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. This includes, for instance, connection panels (CP) located in the floor, penetration panels (PP) incl. connectors located on the wall, wave-guide components for liquids, air or gases, fiberglass feed-through components, special cable feed-through via RFI trap, and all kinds of ventilation and air conditioning.

The shielded ventilation can be realized via honeycombs with a frequency range from 10 kHz up to 18/40 GHz and can be located individually on the shielding modules that meet any applications, e.g., for air balance, exhaust gases recirculation, or for tube and pipe connections. Frankonia's honeycombs are designed for easy mounting of on-site air ducts. In the scope of Frankonia's turnkey capabilities, complete air conditioning units are available for all chamber sizes and applications. In addition, gas evacuating and protection systems as well as extinguishing systems are available.



Penetration Panel (PP) assembled on the walls
RF specific connectors and sockets
Optic fiber wave guides

Connection Panel (CP) integrated in the raised floor
Waterproof Connection Panel (CP) with valves
RF specific connectors and sockets

Liquid or gas feed-through components for EUT cooling

Honeycombs with duct connection flange
Air cooling and gas extraction systems

Exhaust gases recirculation systems or EUT cooling systems
(fixed installation or turning with turntable)
Extinguishing systems (with water, fog, foam or gas)

RFI trap for a special cable feed-through

Features

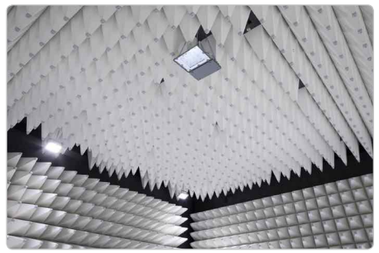
- Equal shielding attenuation as Frankonia's standard shielding according to EN 50147-1
- Broad range of feed-through and wave guide components
- Customized and flexible equipment configuration
- Turnkey solutions incl. air conditioning unit, protection and extinguishing systems

Chamber Interior & Electrical Integration

Beside Frankonia's Frankosorb® absorber lining for SAC's or FAC's, other shielded rooms of any kind provide an equal appealing internal finish. This includes an adapted inner lining for walls and ceilings that can be made with almost every material our customers desire, for instance, glass, PVC or stainless steel. The floor is designed as a false floor that is adjustable in height to ensure a minimum space for all necessary ducting of power and data lines. In the case of a semi-anechoic chamber, a ground plane of 2,0 mm made of hot-galvanized steel is installed on the false floor that is perfectly connected to the shielding modules on the walls. To support any kind of EUT weights, Frankonia has special solutions to support heavyweight EUT's, even considering more than 80 tons.

Range of products
- Internal wall and ceiling cladding with various materials
- False floors, EUT weight up to 40 t
- Heavy load floor systems, EUT weight up to 80 t (or customized)
- Ground plane for SAC or low-reflective lifted floors for FAC

To complete each chamber configuration, Frankonia's electrical integration is designed per European safety standards and is prepared as an upgradable solution that allows future modifications. In its standard configuration, an electrical distribution box with MCB's and RCD's, illumination with LED lights, connection panels for the false floor, and emergency functions incl. a battery buffered emergency light are considered. To provide the necessary power and data line connections for the EMC testing procedures, Frankonia's connection panels can be placed in the false floor and be individually configured with power outlets and connectors. In addition to the connection panels located in the floor, the penetration panels are located on the walls. Further, a complete range of power line, data line, and signal line filters are available. Frankonia's specially designed ducting and electrical engineering ensures the shortest cable length and highest flexibility for future modifications, as well as a cost-effective and state-of-the-art integration.



Explosion resistant lighting
LED lighting
Emergency lighting

Smoke and gas sampling network with external detection unit (autonomous or connected with building)
Integrated extinguishing system in absorbers

Exit emergency lighting with battery or UPS system

AC and DC – Power line filters
Data and signal filters
Optic converters (RS485, USB, Ethernet, CAN, Video, etc.)

Internal finishing for shielded rooms
Raised floor systems (for FAC or SAC with ground plane)

Complete electrical installation incl. cabling
Customer specific connectors and sockets

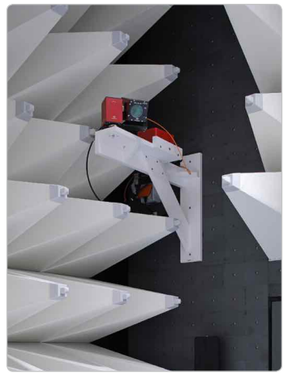
Features
- Complete and integrative electrical installation
- Customized and locally adapted
- Optimum lighting conditions with LED lights
- Complete range of power line, data line, and signal line filters

Video Systems, Audio System, Smoke & Gas Detection Systems

FMC – Frankonia Camera System

Frankonia's shielded camera module FMC-03 is perfectly adapted to the EMC environment and to monitoring EUT's during EMC tests. The camera module FMC-03 is available as SD or full HD version and comes with either a power supply (FPS-03) or a battery pack (FPB-03) for mobile use. Full functionality provided with Frankonia software and more remote controlled possibilities are available. Further amenities that are available for the FMC-03 are a PAN/Tilt unit and a small setting-up display. Using optic fibers, the camera systems are adapted for long distance transmission of pictures without loss of signal quality.

Features
- 20x zoom range
- Image format PAL 16:9
- Resolution 720p (SD), or 1080p (HD)
- Integrated mono audio transmission (60 Hz to 15 kHz)
- Robust against field strength up to 200 V/m
- User-friendly integration and software control
- Video recorder for SD or HD in addition
- PAN/Tilt functionality
- Software, or Joystick camera control
- Wall or absorber fixation kit
- Compliant with EMC standards



FMC-03 – Fixed version

FMC-03 – Mobile version

FAS – Frankonia Audio System

Frankonia's FAS is a shielded audio system, which is fully compatible with the EMC environment. It offers the possibility to communicate between shielded rooms or anechoic chambers or to survey EUTs during EMI or EMS tests and assures high-quality communication.

Features
- Hi-Fi intercom system (50 Hz to 20 kHz)
- Robust against field strength up to 225 V/m
- Compliant with EMC standards

Control center, EUT monitoring, and audio system

Smoke and Gas Detection Systems

With the multi-use of modern EMC chambers, the demands on protecting people and EUT's rise. Herewith, an adapted smoke and an advanced gas detection system ensures a consistently protected environment.

Frankonia's smoke and gas detection system samples air inside the anechoic chamber with an implemented tube system located behind the absorbers on the roof, or at dedicated positions within the chamber. The tubes cross the shielding with special wave-guide components. An extended piping outside the chamber feed the central unit, in which the smoke and gases detection takes place. A self-sufficient alarm system is considered that meets related safety standards, which can be connected to the building warning system, in addition. Alternatively, smoke detector heads for shielded rooms can be added.

Features
- Self-sufficient detection system for smoke (fire) incl. central alarm unit
- Extended detection of light-, medium- and heavy-weight gases at different locations
- Non-reflective tube system inside the chamber
- Autonomous system, or integrated as sub system to the building

Smoke and gas detection central unit

Test Tables

FGT – Frankonia Grounded Test Table

Frankonia's grounded test table FGT has been designed according to CISPR 25. The table itself is made of wood and is optional equipped with wheels and brakes for easy handling. An optional wooden support for the contact strips facilitates the correct connection to the F-contact bar that is integrated into the absorber lining.

FGT		
Version	FGT-1.0	FGT-1.5
Dimensions	2,5 x 1,0 x 0,9 m	2,5 x 1,5 x 0,9 m
Compliance	CISPR 25	
Load	500 kg (spot load max. 50 kg at 200 x 200 mm)	
Table cover	• 2,0 mm hot galvanized ground plane, or • ground plane made of copper	
Options	• F-contact system integrated in the wall • F-contact system integrated for floor connection • Table on wheels • Combination with fixed load machine, or BlueBox	

FTT – Frankonia Transparent Test Table

Frankonia's low reflective test table FTT has been designed according to CISPR 22. To not affect the EMC or RF measurements, this transparent test table is made of non-conductive material that generates no reflections and has a low dielectric constant. The top of the table is covered with plastic to offer a non-sensitive surface, and it provides a scale to facilitate the positioning of equipment under test.

	FTT - Square			FTT - Round
Dimensions	1,0 x 0,8 x 0,8 m	1,5 x 0,8 x 0,8 m 1,5 x 1,0 x 0,8 m (Basis ø1,2 m) 1,5 x 1,2 x 0,8 m	2,0 x 1,0 x 0,8 m 2,0 x 1,2 x 0,8 m	ø1,2 m x 0,8 m ø1,5 m x 0,8 m
Compliance	CISPR 22			
Load	200 kg (spot load max. 20 kg at 200 x 200 mm)			
Features	• with plastic cover with scaled grid indication for a proper EUT positioning • centered hole ø250 mm for EUT power and data connection			

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