



Defense/Government

MIL-STD 461/462 | RTCA DO-160 | TEMPEST

Our EMC Test Sites offer much more than the sum of components, products, services and integration. Our solution philosophy begins with the initial customer inquiry and continues through the entire process to include maintenance service and a lifelong commitment to our customer's EMC facilities.

Chamber Overview

STANDARDIZATION MAKES CUSTOMIZED SOLUTIONS AFFORDABLE.

Today, we directly control the R&D and manufacturing of the two principal components found in any defense/government facility solution namely the shielding and the RF absorbers. Additionally, we work closely with our suppliers in the development of the components (i.e. RF filters, turntables, antenna masts, etc.), to insure they meet our stringently defined specifications.

Our range of anechoic chambers for the defense/government market includes MIL-STD, RTCA DO and Tempest equipment measurement chambers. Due to the requirements set in CISPR and IEC standards, most of the fully compliant test sites exceed the MIL-STD requirements. Therefore, very large military EUT chambers meeting

CISPR/IEC standards can be used, provided that the size and the geometry of the test site allows it.

Two absorber technologies, pyramidal resistive and hybrid, can provide solutions to meet the MIL-STD 461 requirements. The pyramidal matched part of the hybrid is approximately half as long as the resistive pyramidal offering more compact chambers. In the MHz frequency range, the hybrid technology shows a much better reflectivity down to 30 MHz. That becomes helpful when R&D tasks require expanding the technical horizon and going further than the Standard requires. Therefore, the hybrid absorbers are now the preferred technology.

Chamber Validation

A WIN-WIN SITUATION FOR BOTH CUSTOMER AND SUPPLIER.

The chamber validation procedure and test reports serve many functions but most importantly, are proof positive that we fulfill our contractual obligation to the client by providing a high performance RF chamber.

In order for the customer to receive accreditation for their chamber, it is necessary that the chamber undergo final verification testing by an independent third party who will certify conformity to the required standards.

We, as an EMC Test Site solution provider, consider the validation procedure to be the final and irrevocable quality control of the chamber design, selected materials and installation skills. From the very beginning we have invested considerable resources in the capability of independently performing the chamber validation procedure according to the recognized international standards.

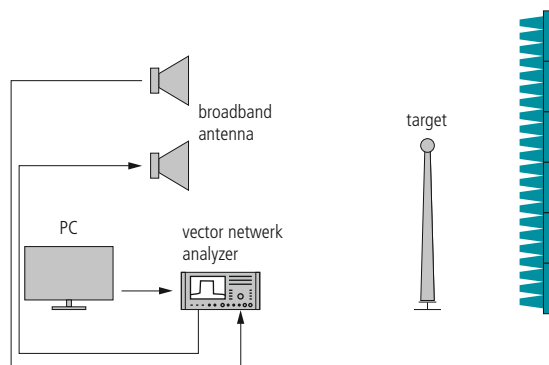
Our record of more than 200 continuous chamber validations over the past ten years furthers our understanding of the behavior of an anechoic chamber. Our close cooperation with globally recognized

independent test houses ensures a continuous and accurate calibration of our measuring antennas. We offer chamber validation service wherever requested and appropriate.

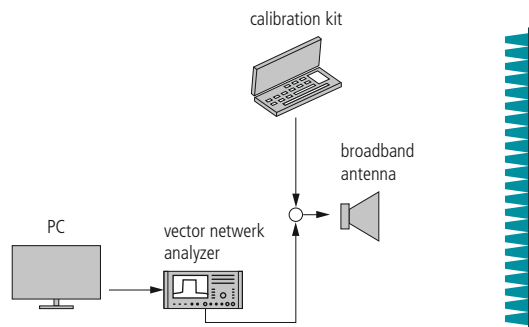
The international rules for the accepting of MIL-STD, RTCA DO and Tempest measurement test sites require the validating of the:

- shielding effectiveness (SE)
- absorber performance suitability

The shielding effectiveness measurements are performed on the basis of established and recognized procedures as set in NSA 65-6, EN 50147-1 or IEEE 299. The shielding effectiveness measurements are performed on the basis of established and recognized procedures as set in NSA 65-6, EN 50147-1 or IEEE 299. Validating the absorber performance according MIL-STD requirements might be more challenging. Measurements either can be performed as factory testing in coaxial lines or as on-site measurements as VSWR reflectivity measurement. Both alternatives have pros and cons which need to be balanced before writing the chamber specification.



RCS measurement method



AVSWR measurement method

Purpose & Standards

WHAT IS THIS SOLUTION FOR?

Electro Magnetic Compatibility is the ability of electrical and electronic equipment and systems to share the electromagnetic spectrum and perform their desired functions without unacceptable degradation to or from the specified electromagnetic environment.

Then main difference is that government testing a higher level of confidentiality and non-disclosure is required for both measurement procedures and results.

Several measures need to be taken on the test site to ensure confidentiality for Tempest equipment measurement. High shielding effectiveness, electrical isolation from the building, single point grounding and galvanic separation of the power lines are recommended.

Test sites for the measurement and test on civil and military equipment need to comply with standards like:

- MIL-STD 461/462
- RTCA DO-160
- EUROCAE

or the corresponding national implementation of these standards.

With shielding effectiveness of a least 100 dB or test sites are suitable for all conducted and radiated measurements on electrical and electronic equipment for civil and military applications. Special low leakage current EMC power line filters are used for Tempest measurement chambers.

Quality Management

QUALITY MEANS DOING IT RIGHT FROM THE VERY FIRST THOUGHT.

Our quality management ensures a most efficient quality control over products, management and organizational systems.

The organization ensures the availability of resources and information necessary to support the operation and monitoring of these processes. All relevant processes are defined in our management system. Through monitoring, analysis, and improvement, the highest quality and customer satisfaction is our target.

In an effort to improve our quality assurance systems, we ask our customers to provide an evaluation of our performance at the conclusion of each project. This feedback, coupled with input from the market and the Standards Committees, gives continuous enhancement to our systems and correction to any non-conformity found.

Product purchasing and sourcing is a priority in our role as system integrator, so much that it encompasses one of sixteen chapters in our quality and environmental management system. Key process figures are:

- audit & approval of suppliers
- evaluation of products by our technical team
- technical reporting on delivered products
- project related factory acceptance by the project manager.

Our ISO 9001 and ISO 14001 certification guarantees that our designs, products, and solutions will always meet the highest quality standards. It's our goal to provide you the very best of expertise, project management, and products. The main system components like shielding, absorbers etc. are manufactured by daughter companies or by our shareholders. This ensures a full control with regard to quality and delivery time.



Cassidian, EADS

MIL/RTCA

MIL/RTCA

The chamber dimensions according to MIL-STD 461/462 and RTCA DO-160 are defined by the EUT set-up and by the minimum distance between EUT and the chamber walls. A highly conductive ground plane below the EUT is required for tabletop equipment.

Basic Outline MIL/RTCA

KEY FEATURES

- Self-supporting modular pan shielding for floor, walls and ceiling inclusive of an earthing stud
- Electrical isolation from parent building
- Raised floor with distributed load of 1 t (2,205 lb)
- Floor connection points and wall access panels as to chamber size
- Honeycomb vents in walls and ceiling 0.33 m x 0.33 m (12 in x 12 in) as to the chamber size
- One manually operated RF shielded EUT door 1.2 m x 2.05 m (4 ft x 7 ft)
- One door maintenance kit
- Lining for walls and ceiling with hybrid or resistive absorbers, designed to chamber specification and performance
- EUT table according to the standard with grounding interface
- EMC power line filters: one filter 3 phase 32 A for EUT supply and one 2 phase 16 A for internal use
- Connectors including one six-fold fiber optic connector, two N-precision connectors and two SMA connectors
- Standard electrical package: electrical distribution, lighting, emergency and signal lamps
- Installation of the MIL chamber including leakage test after shielding installation

Option MIL/RTCA

CUSTOMIZABLE UPGRADES

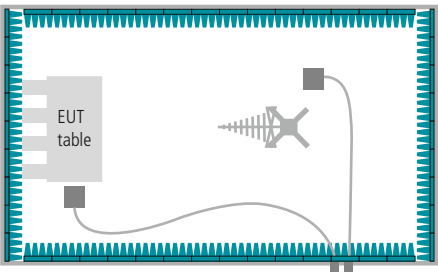
- Fully functional shielded control room
- Fully functional shielded amplifier room
- Larger entrance door as requested
- Digital CCTV monitoring system
- FO converter for Ethernet, GPIB, RS232, VGA, USB, MM and Digi 88
- Isolation transformer appropriate for the EMC power line filters rating
- EMC filters for control- and communication lines
- Fire detection and extinguishing system
- Heating, ventilation and air conditioning system (HVAC)
- Painted hybrid absorbers
- Exterior paint on the visible shielding surfaces
- SE measurement according to EN 50147-1, IEEE 299
- Chamber validation according to CISPR 16-1-4, ANSI C63.4
- Absorber validation on site according to AVSWR, RCS, Evaluation VSWR

MIL-STD 461/RTCA DO-160 chamber

ROOM DIMENSIONS

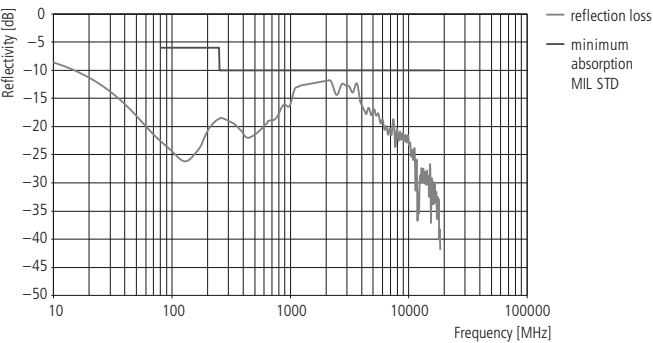
Room type	Total required space ¹⁾	Shielding external ²⁾	Clear internal ³⁾
MIL/RTCA	10.2 m x 7.7 m x 5.6 m 33.5 ft x 25.3 ft x 18.4 ft	9.7 m x 6.4 m x 5.1 m 31.8 ft x 21.0 ft x 16.7 ft	8.5 m x 5.2 m x 3.9 m 27.9 ft x 17.1 ft x 12.8 ft

L x W x H ¹⁾Dimensions including steel structure, gate drive track and HVAC ducts. ²⁾Dimensions excluding steel structure. ³⁾Absorber to absorber, i.e. ground plane to absorber.

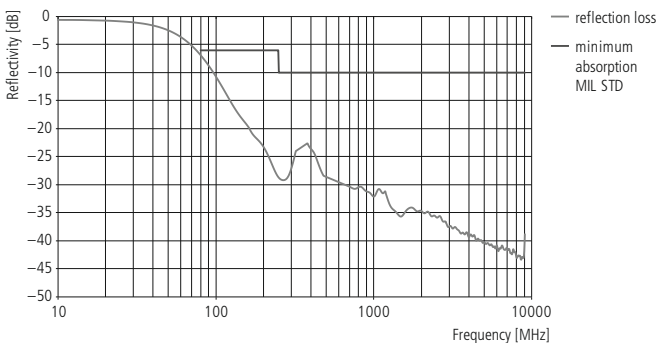


PERFORMANCE

	MIL-STD 461	
Standard		
Frequency range	80 MHz – 250 MHz	251 MHz – 18 GHz
Reflectivity	> 6 dB	> 10 dB



Typical performance VHY 12 hybrid absorbers



Typical performance VX 20 resistive absorbers

MIL/TEMPEST

The size of test sites for Tempest equipment is analogous to MIL-STD 461 chambers. However, the confidentiality level of the test procedures and/or results is much higher. Requirements of shielding effectiveness level, power line protection, and grounding must be detailed during the design review.

Basic Outline MIL/Tempest

KEY FEATURES

- Self-supporting modular pan shielding for floor, walls and ceiling inclusive of an earthing stud
- Electrical isolation from parent building
- Raised floor with distributed load of 1 t (2,205 lb)
- Floor connection points and wall access panels as to chamber size
- Honeycomb vents in walls and ceiling 0.33 m x 0.33 m (12 in x 12 in) as to the chamber size
- One manually operated RF shielded EUT door 1.2 m x 2.05 m (4 ft in x 7 ft)
- One door maintenance kit
- Lining for walls and ceiling with hybrid or resistive absorbers, designed to chamber specification and performance
- EUT table according to the standard with grounding interface
- Low leakage EMC power line filters: one 3 phase 16 A for EUT supply and one 2 phase 16 A for internal use
- Isolation transformer appropriate for the EMC power line filters rating
- Connectors including one six-fold fiber optic connector, two N-precision connectors and two SMA connectors
- Standard electrical package: electrical distribution, lighting, emergency and signal lamps
- Installation of the MIL chamber including leakage test after shielding installation

Option MIL/Tempest

CUSTOMIZABLE UPGRADES

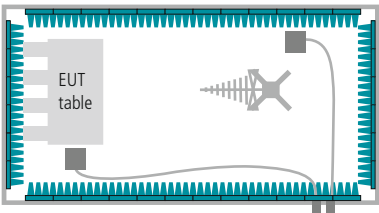
- Fully functional shielded control room
- Fully functional shielded amplifier room
- EUT table with built-in turntable
- Larger entrance door as requested
- Digital CCTV monitoring system
- FO converter for Ethernet, GPIB, RS232, VGA, USB, MM and Digi 88
- EMC filters for control- and communication lines
- Metal ducting for electrical distribution
- Fire detection and extinguishing system
- Heating, ventilation and air conditioning system (HVAC)
- Painted hybrid absorbers
- Exterior paint on the visible shielding surfaces
- SE measurement according to EN 50147-1, IEEE 299
- Chamber validation according to CISPR 16-1-4, ANSI C63.4

MIL-STD 461/Tempest chamber

ROOM DIMENSIONS

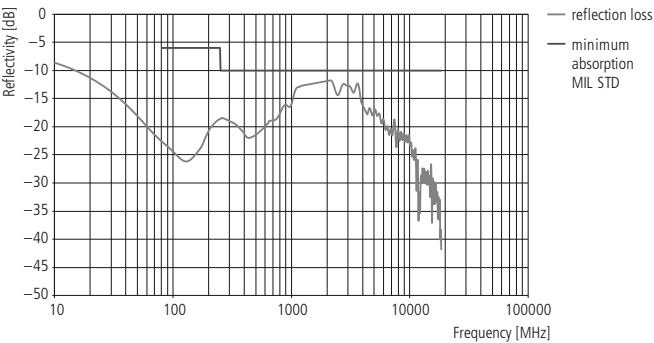
Room type	Total required space ¹⁾	Shielding external ²⁾	Clear internal ³⁾
MIL/Tempest	4.3 m x 5.2 m x 3.2 m 14.1 ft x 17.1 ft x 10.5 ft	4.3 m x 4.3 m x 3.0 m 14.1 ft x 14.1 ft x 9.8 ft	3.4 m x 3.4 m x 2.4 m 11.2 ft x 11.2 ft x 7.9 ft

L x W x H ¹⁾Dimensions including steel structure, gate drive track and HVAC ducts. ²⁾Dimensions excluding steel structure. ³⁾Absorber to absorber, i.e. ground plane to absorber.

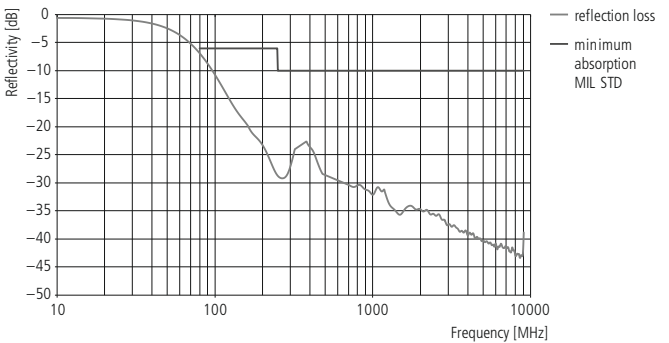


PERFORMANCE

	MIL-STD 461	
Standard		
Frequency range	80 MHz – 250 MHz	251 MHz – 18 GHz
Reflectivity	> 6 dB	> 10 dB



Typical performance VHY 12 hybrid absorbers



Typical performance VX 20 resistive absorbers

PROTECTION MEASURES FOR TEMPEST

The defense and government market is driven by the responsibilities of national integrity and security. Understandably, there are constraints regarding how much information can be provided. Occasionally this can conflict with design requirements for an appropriate facility. The information flow between customer and supplier is shared on a need-to-know basis (i.e. not as much as possible, but as much as needed, information will be exchanged).

The creation, elaboration and transmission of confidential information between governments and government agencies require a high level of protection for the sites and transmission paths. To a large extent, shielding and filtering can significantly contribute to achieving this target. We have been designing and providing solutions for Embassies, Presidential offices, Military C³ (Control, Command, Communication) centers and other government agencies for over a decade. Our customers are international so, where necessary, we provide instructions and training to customers’ personnel for installation and maintenance purposes when site access is restricted.

Basic Outline Tempest

KEY FEATURES

- Self-supporting modular pan shielding for floor, walls and ceiling inclusive of an earthing stud
- Electric isolation from parent building and humidity barrier
- Inner lining as required for floor, walls and ceiling
- Floor connection points and wall access panels as to requirements
- Honeycomb vents in walls & ceiling 0.33 m x 0.33 m (12 in x 12 in) as to the room size and specification
- Electrically operated RF shielded doors 0.9 m x 2.05 m (3 ft x 7 ft) built as a fully functional sluice
- One door maintenance kit
- EMC power line-/control- and communication lines filters as required including surge voltage protection
- Electrical package: main switchboard with appropriate protection, electrical distribution, lighting, emergency and signal lamps

Option Tempest

CUSTOMIZABLE UPGRADES

- Architectural shielding if required by the building conditions
- Card readers or other access systems for shielded doors
- Handicapped personnel package: shielded door size of 1.2 m x 2.05 m (4 ft x 7 ft), automatic door opening/closing and access ramp
- High performance acoustic isolation integrated in the inner lining
- FO converter for Ethernet, GPIB, RS232, VGA, USB, MM and Digi 88

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