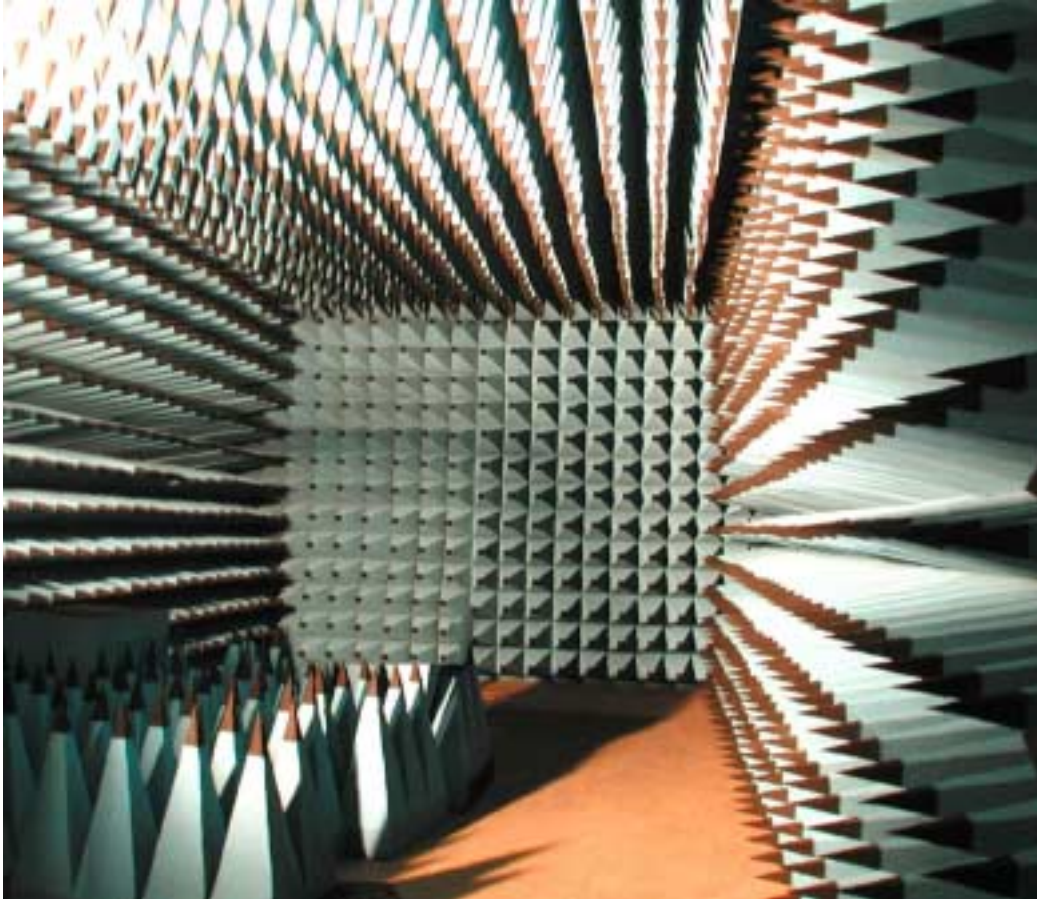


# Shielding Technics



## Planning – Manufacture – Installation - Service

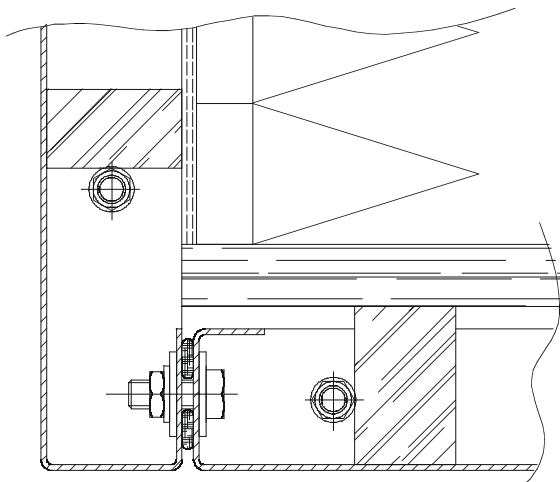
- **Shielded Rooms**
  - **Anechoic Chambers**
    - **Open Test Sites (OATS)**
      - **High Voltage Test Halls**
        - **Shielding for Buildings**
          - **EMC-Measurement-Technique**
            - **Computer Centers**



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## **THOMAS Shielding Systems**

The continuously increasing use of electronics in all areas of industry, commerce and services, together with miniaturization and higher packing density has led to interferences within the individual system components among each other. An important quality feature for judging interference influences is the electromagnetic compatibility (EMC). It characterizes that an electrical unit is able to function within its surrounding without interfering or being interfered with by electromagnetic fields of other appliances.



Wall-Floor-Connection

Metallic shielding offers effective protection against electromagnetic interference emissions, and is used as room or building shielding. This prevents the penetration of interference signals from the outside, and the emission of signals from inside the room or building.

Due to our assembly method it is possible to adjust the interior layout within the shield to the exact requirements of the user without reducing the EMC-protection.

### **EMC – Chambers**

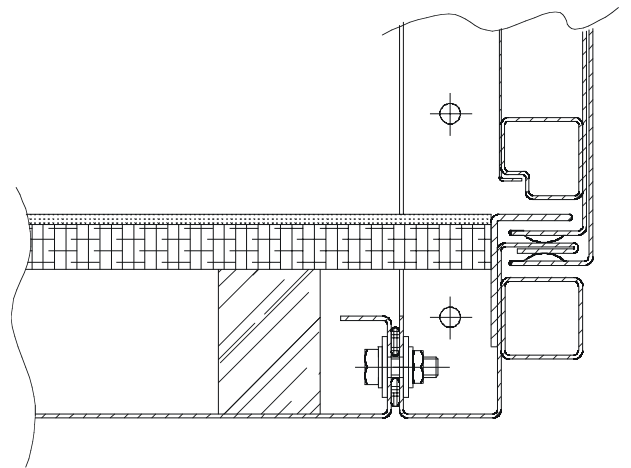
RF-shielded chambers for normal measuring requirements are constructed from galvanized steel sheet. The approved module construction consists of 2 mm thick folded panels with welded corners for RF integrity. The folded panel guarantees stability and provides a wide flange for assembly and compression of the RF gasket.

The panels can be manufactured from other materials, typically high-grade steel, copper or aluminium. The gradations of the panel dimensions are 10 cm. Therefore any chamber dimension is

possible in steps of 10 cm. However as an option it is possible to have an exactly dimensioned chamber to meet the existing host building size. The double row RF-gasket will guarantee, in any case, excellent shielding attenuation values:

80 dB / 10 kHz	magnetic field H
100 dB / 100 kHz	magnetic field H
100 dB / 10 kHz – 1 GHz	electric field E
100 dB / 1 GHz – 20 GHz	plane wave

Also important for the sealing of the shielded chamber is the use of a knife-edge door. A double row of BeCu-finger contacts is placed in an U-channel in the door panel. This facilitates service or repair work with the contacts as the door can be removed and put on a bench. The finger contacts can be exchanged by removing the clamping profile.



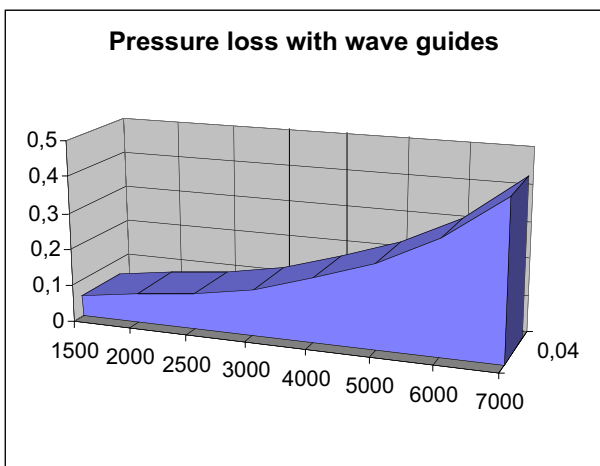
Floor-Door-Connection

The doors are mainly single leaf-doors (200 x 100 cm clear opening). It is also possible to build in double doors or sliding doors (mainly with anechoic chambers). The activation of large doors can be manual or fully automatic with pneumatic or hydraulic closing functions.

Automatically operated ramps will help for a safe and stepfree access to the shielded room. Regular cleaning and maintenance of the RF-sealing of the door is necessary, we recommend a maintenance and service contract.

The chambers will be supplied with structurally calculated wall supports and roof beams so that the chamber can be installed as a free-standing structure. Of course it is also possible to integrate the chamber into the existing walls and ceilings. We can calculate the best possible solution for you!

The chamber will be equipped with an internal raised double floor (carrying capacity 500 kg/m<sup>2</sup>) level inside with the door threshold. Any floor finish requested by the customer can be installed (PVC, vinyl, metal, wood etc.). Further interior installation can be adjusted according to customer use. To prevent damaging the shielding all required mounting parts can be fixed to the inner boardings of the shielding panels. By building-in simple wall linings normal room conditions will be achieved, moreover all safety standards of personnel protection can be fulfilled (additional noise- and heat-protection). This also applies to shielded ventilation vents allowing sufficient air circulation.



A shielded room also requires filtering of all electrical supply lines. For this there are available current compensated and also low-leakage power line filters. The insertion loss performance of the filters is higher than the shielding attenuation of the chamber. Therefore it is guaranteed that with the filters will not degrade the shielding efficiency of the room..

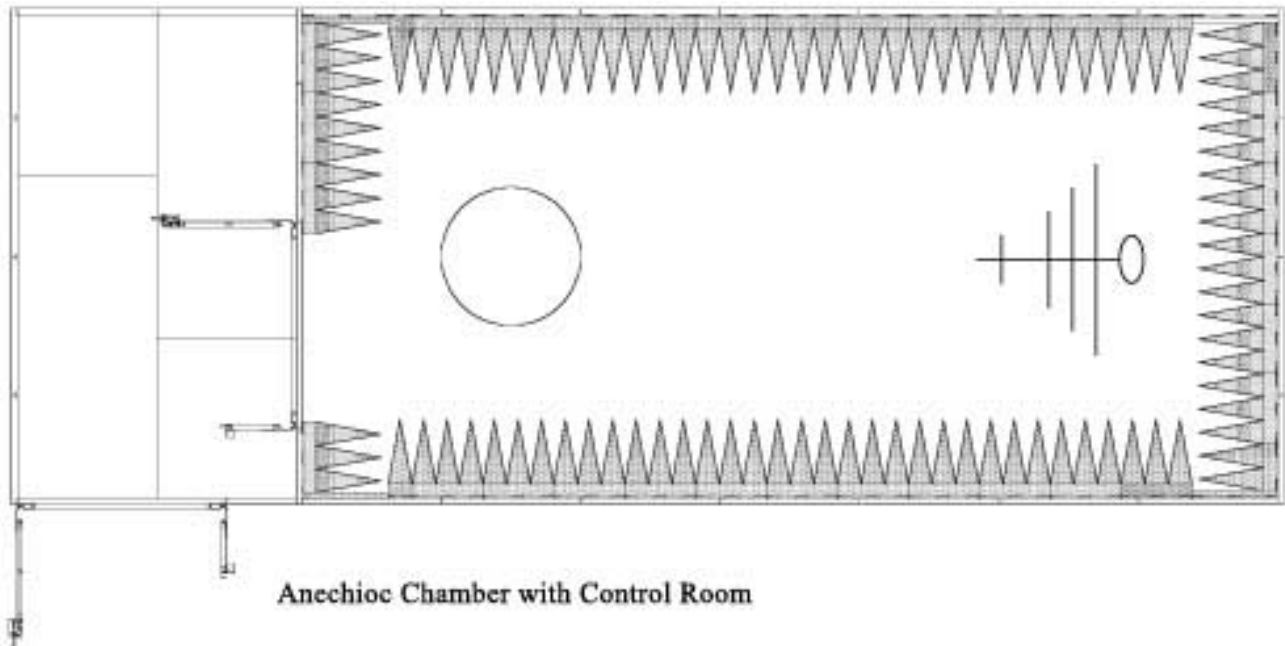
This may be critical with the data line filters. The high transmission rates of these filters require a filter pass band which will degrade the room shielding. In this case we recommend fiber optic connection with a converter on both sides, one outside and one inside the chamber. We can offer a complete transmission system.



Filter Cabinet

The electric installation in the shielded chamber consists of a secondary distribution board with ELCB and MCB's. All supply lines are laid in conduit on the walls which also carry all necessary sockets and switches. As an alternative all additional power supply lines can be installed under the double floor, with floor mounted sockets (preferred with anechoic chambers).

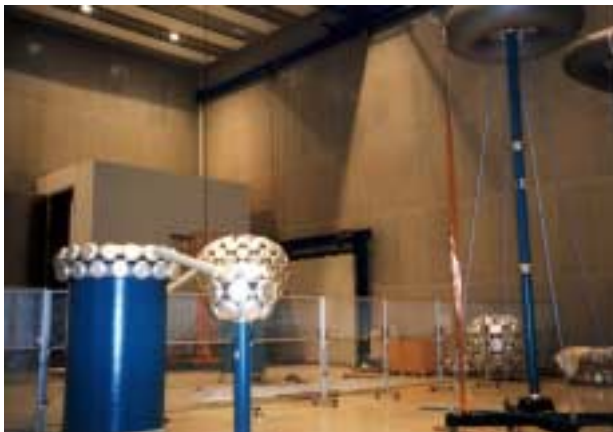
For lighting halogen spot lights usually are used as these lamps are interference free. Additional fluorescent fittings can be installed for better illumination of the chamber and they can be switched off during tests.



## Anechoic Chambers

For certain EMC-measuring procedures anechoic rooms are advantageous or absolutely necessary (interference emission and interference immunity). Installing absorbers helps to absorb reflection from the metallic surfaces of the chamber. We offer the following materials:

Classical foam pyramids impregnated with carbon. Attenuation of these absorbers rises with increasing frequency. As the building height rises the absorbers usefulness is shifted to lower frequencies. Satisfactory results will be reached when the minimum height of the pyramids is a 25 – 30% of the lowest measured wavelength. This requirement often means chamber dimensions which often are not feasible.



High Voltage Hall in Cottbus

Ferrite absorbers are an alternative. They are installed as a thin tile (5 – 6 mm). They offer nearly constant attenuation characteristics in the range of 30 – 1000 MHz. A typical absorber chamber with ferrite tiles for 3-m-measurement distance has dimensions of about 7 x 3 x 3 m and with regard to price and capabilities it is a real alternative to a hall with pyramidal absorbers. A combination of ferrite- and pyramidal absorbers enables the use of low absorbers with low frequencies. On the other hand such a “hybrid absorber“ will not reach the high attenuation values of a pure pyramid absorber of about 50 dB.

Shielding Chambers manufactured by THOMAS SHIELDING TECHNIQUE can be installed with any kind of absorber. The inner linings of the steel panels are suitable either for direct fixing of ferrite tiles as well as by a rail system allowing the pyramids to be fastened with glue or hung.

## Data Technique

EMC Measuring Technique DATA safety in EDP (electronic data processing) plays an important role for room and building shielding. The use of electronic data processing devices by banks, and insurance companies, as well as civil and military offices, requires, besides data safety and fire protection, more and more protection against interception. There are areas where appropriate measures for data protection

are legally required. Our shielding projects can be planned and carried through as room-within-a-room shielding or as free-standing room with interior and external lining. This includes the complete equipment for the computer centre (current supply, air conditioning technique, fire protection etc.)



Computer Data Room with shielded window

## Military

Besides the stringest requirements for military facilities as regarding interception safety and controlling of secret data specified by TEMPEST, NSA65-2, MIL-STD 285, THOMAS SHIELDING TECHNIQUE can help solve special problems. E.g. the examination of sensitive electronic data processing areas as to their confidential emission, bug devices as well as comprehensive protection against nuclear radiation (NEMP), lightning strikes (EMP), mechanical damage and noise. Thomas Shielding Technique offers comprehensive solutions for infrastructural measures of NEMP-protected installations.

## Medicine

The therapy procedures in medicine as well as the sensitive measuring of brain waves and body magnet field measuring need appropriate measures for protection against reciprocal interference. The difficulties due to the increasing environmental “electro-smog“ can injure sensitive measuring devices in hospitals and surgery rooms. Therefore more and more room shieldings are built in, that means those rooms are furnished with a complete shielding.

Besides the classical foil shielding which is glued direct to the inside building walls and soldered at the joints, a new method has emerged which does not have the shielding

efficiency of a foil shielding but is considerably cheaper. A coppercoated synthetic fibre fleece is glued with an overlap onto the wall surfaces. This fleece more easily adheres to the unevenness of the wall surfaces and does not need conductive connection at the overlaps. As shielded doors do not look different from standard doors the appearance of a “normal“ room remains.

All assemblies (heating, air-condition, hand basins) will be integrated into the room shielding system by special shielding elements so that the required shielding attenuation will not be impaired. Shielded windows or shielded black-outs (for laboratories carrying out sleep experiments) complete the system. The internal lining of the shield can be chosen according to the room: Antistatic or static controlled floor covering, glass fiber wall paper or tiles, suspended ceilings. THOMAS SHIELDING TECHNIQUE can complete a turnkey shielded room ready for operation.



Installation of a shielding wall paper

## Open Test Sites

Open Test Sites or OATS (Open Area Test Sites) are the most simple and cost effective EMC-measuring instrument for emission measuring. Thomas Shielding Technique offers sites for 10m and 30m measuring distance.

The method of installation depends on the existing ground conditions, the required mechanical carrying capacity and the outside conditions. It is made so that even with extreme weather conditions interference-free use will be possible. Preferably hot-galvanized surfaces or high-grade steel are used. As an alternative the open test site can be equipped completely or partially with a non-reflecting structure for weather protection.



Installation of an Open Test Site

Supply and measuring lines as well as sufficient spare pipes are installed underneath the metal surface. Turntable and antenna mast are included with the delivery.

The maximum deviation of 4,0 dB to ANSI-C 63-4 from the normed field attenuation (30 – 1000 MHz) is guaranteed. The minimum dimension of 20 x 18 m (10m-distance) or 60 x 53 m (30m-distance) must be kept.

## Service

As a service I. Thomas GmbH will offer maintenance for shielding of all kinds. This mainly refers to movable parts and those not wear-resistant, as e.g. doors. We also offer maintenance and performance check of the shielding itself and of the electrical filters.



Examination of Shielding

Furthermore we will carry out installation and dismantling of shielded rooms as well as extension, rebuilding or removal of shielded rooms. Missing parts can be replaced. We also offer second-hand rooms manufactured by well-known producers.

Upon request shielded rooms which are no longer needed can be bought or disposed of by us.

Second-hand shielded rooms to be sold by us will be guaranteed for up to 5 years depending on their condition.

## Filters

For efficient RF-shielding electric filters are indispensable. The insertion loss performance of the filters must at minimum correspond to the attenuation values of the shielding, thus avoiding a reduction of the total performance.

The filters of MPE Ltd. fulfil this requirement. MPE is one of the leading companies in developing and manufacturing of EMC-filters and can look back on a multitude of military and civil projects.

- power line filters up to 1000 V, 2000 A, DC, 50, 60, 400 Hz
- control line filters for 24 – 250 V, 0,1 – 10 A, up to 32 lines / filter
- telephone- and data linefilters 24 – 250 V, 0,1 – 1 A, up to 32 lines / filter
- other values can be manufactured to customers' request

The filter housings are RF-tight and resin-filled. The connecting housings are RF-tight, too. Installation can be carried through direct to the shielding so that the lines can be connected from the other side of the shielding



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# EMC-Measuring Installation by I. Thomas GmbH (extract)

## Anechoic Chambers

Anechoic Chambers	8,9 x 7,9 x 3,3	m	TU-Dresden
Anechoic Chambers	7,3 x 3,4 x 3,3	m	Hf-Shielding GmbH
Anechoic Chambers	6,0 x 3,6 x 3,0	m	EMC Testhaus Dr. Schreiber
Anechoic Chambers	8,6 x 4,3 x 4,5	m	Kriwan EMV-Testzentrum
Anechoic Chambers	7,0 x 2,0 x 2,5	m	Bundesamt für Strahlenschutz
Anechoic Chambers	7,3 x 3,1 x 3,0	m	Fachhochschule Ostfriesland
Anechoic Chambers	7,3 x 3,1 x 3,0	m	Universität Erlangen-Nürnberg
Anechoic Chambers	10,9 x 4,3 x 3,4	m	Saint Sekurit Gobain
Anechoic Chambers	7,0 x 4,0 x 3,0	m	CEIS, Spanien
Anechoic Chambers	6,3 x 3,7 x 3,0	m	VDE-Prüfinstitut
Anechoic Chambers	10,3 x 5,0 x 5,0	m	Schaffner EMC Systems GmbH
Anechoic Chambers	8,0 x 3,0 x 3,0	m	Manfred Zollner

## Shielded Rooms

Shielded Room	3,6 x 2,4 x 2,4	m	Fachhochschule Lausitz
Shielded Room	4,6 x 2,8 x 2,5	m	Visolux Elektronik GmbH
Shielded Room	3,6 x 2,4 x 2,4	m	Uni-Klinik Berlin
Shielded Room	4,1 x 3,5 x 2,5	m	PTB Berlin
Shielded Room	5,6 x 2,5 x 2,6	m	MEB Berlin
Shielded Room	7,1 x 3,1 x 2,4	m	Fachhochschule Stralsund
Shielded Room	4,1 x 4,1 x 2,4	m	Hauni AG
Shielded Room	3,1 x 2,5 x 2,6	m	Cordless Technologies
Shielded Room	4,1 x 3,1 x 2,5	m	Fachhochschule Ostfriesland
Shielded Room	2,7 x 1,9 x 2,5	m	Fachhochschule Ostfriesland
Shielded Room	7,1 x 3,1 x 2,8	m	ORGA Kartensysteme GmbH
Amplifier chambers	6,5 x 2,9 x 2,6	m	Thyssen-Henschel GmbH
Shielded Room	5,0 x 3,2 x 2,4	m	Stiebel Eltron GmbH & Co. KG
Shielded Room	2,4 x 1,2 x 2,4	m	ISA GmbH
Shielded Room	4,0 x 2,4 x 2,4	m	F+G Megamos Sich.El. GmbH
Shielded Room	6,0 x 4,0 x 2,5	m	Robert Bosch GmbH
Shielded Room	3,6 x 2,4 x 2,4	m	elrest Automationssysteme GmbH
Shielded Room	5,4 x 3,6 x 3,0	m	Kriwan Industrieelektronik
Shielded Room	8,5 x 3,0 x 3,0	m	Kriwan EMV-Testzentrum
Shielded Room	5,3 x 3,5 x 3,0	m	Kriwan EMV- Testzentrum
Amplifier chambers	3,5 x 1,8 x 3,0	m	Kriwan EMV- Testzentrum
Shielded Room	4,0 x 2,4 x 2,4	m	Megatec GmbH
Amplifier chambers	1,5 x 1,5 x 1,5	m	Robert Bosch GmbH
Shielded Room	3,5 x 3,0 x 2,5	m	Zettler GmbH
Shielded Room	2,4 x 2,4 x 2,4	m	MPI f. Physik
Shielded Room	2,4 x 2,4 x 2,4	m	Atis Assmann GmbH
Shielded Room	7,5 x 4,0 x 3,5	m	PLG GmbH
Shielded Room	1,7 x 1,3 x 2,4	m	Manfred Fink Security
Shielded Room	8,5 x 4,1 x 3,0	m	Daimler-Chrysler
Shielded Room	7,0 x 2,0 x 2,4	m	Honeywell, Niederlande
Shielded Room	9,1 x 4,9 x 3,6	m	AGFA-Gevaert AG
Shielded Room	4,9 x 3,7 x 2,7	m	Dräxelmeyer System Technik
Shielded Room	11,8 x 12,3 x 3,8	m	Bundesbaugesellschaft Berlin
Shielded Room	4,2 x 3,0 x 3,8	m	Bundesbaugesellschaft Berlin
Shielded Room	3,0 x 2,4 x 2,4	m	MDN, Algerien
Shielded Room	6,1 x 4,1 x 3,0	m	Astat, Polen

## High Voltage Halls

High Voltage Hall	18 x 14 x 10 m	Fachhochschule Lausitz
High Voltage Hall	30 x 24 x 15 m	BTU Cottbus

## Open Test Sites (OTS)

Open Test Site	20 x 10 m	JVC Technology Centre Europe
Open Test Site	20 x 10 m	Samsung Elektronik
Open Test Site	20 x 10 m	Samsung Electronics Euro Q.A.LAB. Camberley (U.K.)

## Room Shielding

Medical Treatment Room	572 m	Psychiatrische Landesklinik Eberswalde
Medical Treatment Room	120 m	Klinikum Potsdam
Magn. Shielding	4,0 x 3,2 m	Stadtwerke Crimmitschau
Medical Treatment Room	268 m	Bundeswehrkrankenhaus Amberg
Machinery Room		Bundesamt f. Strahlenschutz, Neuher.

## Rebuilding, Extension, New Installation etc.

Shielded Room (MPE)	4,6 x 2,8 x 2,5 m	Visolux Elektronik GmbH
Shielded Room (F)	7,0 x 3,0 x 2,8 m	Schaffner-MEB
Shielded Room (S+M)	6,0 x 4,0 x 2,5 m	TÜV-Nord
Shielded Room (S+M)	4,0 x 3,0 x 2,5 m	TÜV-Nord
Shielded Room (B+L)	2,5 x 2,5 x 2,5 m	C. Plath GmbH
Shielded Room (S+M)	6,7 x 4,0 x 2,4 m	Ferrocontrol GmbH
Shielded Room (T)	7,1 x 3,1 x 2,8 m	ORGA-Kartensysteme GmbH
Shielded Room (B+L)	2,5 x 2,5 x 2,5 m	Paragon sensoric GmbH
Shielded Room (B+L)	3,6 x 3,0 x 2,4 m	Phywe System GmbH
Shielded Room (S+M)	4,0 x 3,6 x 2,4 m	Universität Magdeburg
Shielded Room (B+L)	3,6 x 2,4 x 2,4 m	Lucas-Nülle GmbH
Shielded Room (S)	4,1 x 3,5 x 2,5 m	VDE-Prüfinstitut
Shielded Room (S)	3,5 x 3,0 x 2,5 m	VDE-Prüfinstitut
Shielded Room (B+L)	3,6 x 3,6 x 2,4 m	VDE-Prüfinstitut
Shielded Room (R)	7,3 x 3,7 x 3,0 m	TRW-Fahrzeugtechnik
Shielded Room (MPE)	3,5 x 3,0 x 2,5 m	Zettler GmbH
Shielded Room (S)	4,1 x 3,5 x 2,5 m	Faurecia Autositze GmbH
Shielded Room (S)	2,4 x 1,8 x 2,5 m	PTB
Shielded Room (S+M)	2,5 x 3,4 x 2,5 m	Cordless Technologies
Shielded Room (S+M)	2,8 x 3,4 x 2,5 m	Hagenuk
Shielded Room (S)	5,3 x 3,6 x 4,0 m	Deutsche Montanunion
Shielded Room (S)	5,2 x 3,0 x 2,5 m	Komtech Kommunikationstechnik

(B+L=Belling-Lee, F=Frankonia, R=Rayproof, S=Siemens, S+M=Siemens-Masushita, T=Thomas)



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