

# Customized Shielding Solution

## EMC EMI EMP TEMPEST RFI

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# Soliani EMC is a global company

- Offers customized shielding solutions;
- Is manufacturer of several raw material electrically conductive and complete solutions like EMP Chambers;
- Has a testing emc laboratory from 10 Khz to 40 Ghz and few anechoic chambers;
- The products offer several properties if required IP, Flame resistance, salt fog, spray corrosion, EMP qualified;
- Resistance, low volume resistivity and surface resistivity over silicones and textile structures;
- exports around the 65 % of the production;
- takes parts to research development from European and worldwide projects.



**SOLEMI®**  
**SOLEMI®** tend

# Qualification - N.A.T.O. since 20 years



SEGRETARIATO GENERALE DELLA DIFESA E DIREZIONE NAZIONALE DEGLI ARMAMENTI  
VI REPARTO - INFORMATICA

Ufficio Standardizzazione delle procedure e congruità dei prezzi

Prot.N. *02922/621/02/V99944*  
Via di S. Andrea delle Fratte, 1  
00187 ROMA  
Site Web: [www.codmat.difesa.it](http://www.codmat.difesa.it)

Roma, *13.5.2002*  
P&C Op. Fr. Arm. vo P. Pavoni  
Tel. 06 / 4735 6381 Fax 06 / 4796431

**OGGETTO:** Assegnazione Codice NATO (N/CAGE).  
Richiesta pervenuta dalla Società medesima.

Alla Spett.le Società  
SOLIANI EMC Srl  
Via Varesina, 122  
22100 COMO

Riferimento: Trasferimento Codice NATO dalla S.I.R.I. SaS alla SOLIANI EMC Srl

Si comunica che questo Ufficio ha assegnato a codesta Società un nuovo Codice NATO (N/CAGE): **A1046** significando che il vecchio Codice NATO (N/CAGE): **A5607** è stato cancellato e sostituito dal nuovo senza, tuttavia, perdere gli eventuali articoli codificati.

Detto codice sarà utilizzato da codesta Società per la fornitura di articoli/servizi alle Basi NATO e per i lavori di identificazione/codificazione di articoli forniti a fronte di contratti stipulati con l'Amministrazione Difesa nazionale o NATO, rimanendo attivo finché la Società non subirà variazioni tali (fusione con altre Società, cessazione dell'attività, trasformazione della produzione / fornitura, ecc.) da assegnare un altro Codice.

Pertanto, al fine di tenere continuamente aggiornato il nostro archivio, la Società sopradetta è pregata di comunicare tempestivamente ogni variazione che si dovesse verificare in merito alla Ragione Sociale (cambiamento di indirizzo, variazione della denominazione, ecc.).

Si precisa, inoltre, che l'assegnazione del Codice NATO (N/CAGE) è indipendente dalla iscrizione o meno all'Albo dei Fornitori ed Appaltatori Difesa (A.F.A.) della Società stessa.

d'ordine  
IL CAPO UFFICIO  
(Col. Co. Ing. Luigi DI RAUSO)



# Qualification – ISO9001 and ISO9100



**COMPANY WITH  
QUALITY SYSTEM  
CERTIFIED BY DNV**

**= AS/EN/JISQ 9100 =**

**SIEMENS**

**NOKIA**

# Soliani EMC - History of innovation

- 1984** Mr. Ivano Soliani founded S.I.R.I. sas. The purpose is to create the first Italian production of articles for the electromagnetic shielding, designed to meet the growing demand on the national market.
- 1985** The rapid development of the company allows to obtain NATO recognition, through SIRT I and Aeritalia with the qualification AQAP4.
- 1986** A supply relationship starts with Swedes, French, American and Swiss companies also in the medical field. Some specific products are made for the space industry.
- 1990** Production start-up of shielding coated gaskets with conductive and stable to galvanic corrosion fabrics (for the first time is used only Nickel for the treatment) and the first electrically conductive silicone gaskets.
- 1995** The use of electrically conductive fabrics for the realization of shielding gaskets pushes the company to invest in a metallization line for polyester fabrics treated with Nickel and other materials.
- 1998** The SIRI sas becomes Soliani EMC srl, always in Como, in the new headquarters located in Via Varesina. A new painting system with electrically conductive products is launched.
- 2003** In March 2003, the Soliani EMC reach the ambitious result of its quality management system certification according to international standard ISO 9001, and EMP qualification.
- 2009** For innovative proposals in the field of safety at work Soliani the EMC is rewarded within the project Solitech.
- 2010** The Soliani EMC qualifies in first place within of the global program DAPHNE with the project entitled "CashFlex - shielding EMP conduit with conductive room for signal cables to airborne" with partner AgustaWestland and Lockheed Martin.
- 2012** A process designed to pair conductive chambers with composite parts shifts the activity in the automotive field for the development of the electric car.
- 2013** The EN 9100 certification "Quality Management Systems - Requirements for aviation, space and defense organizations " is a further recognition for the company and his staff.



# Why shield

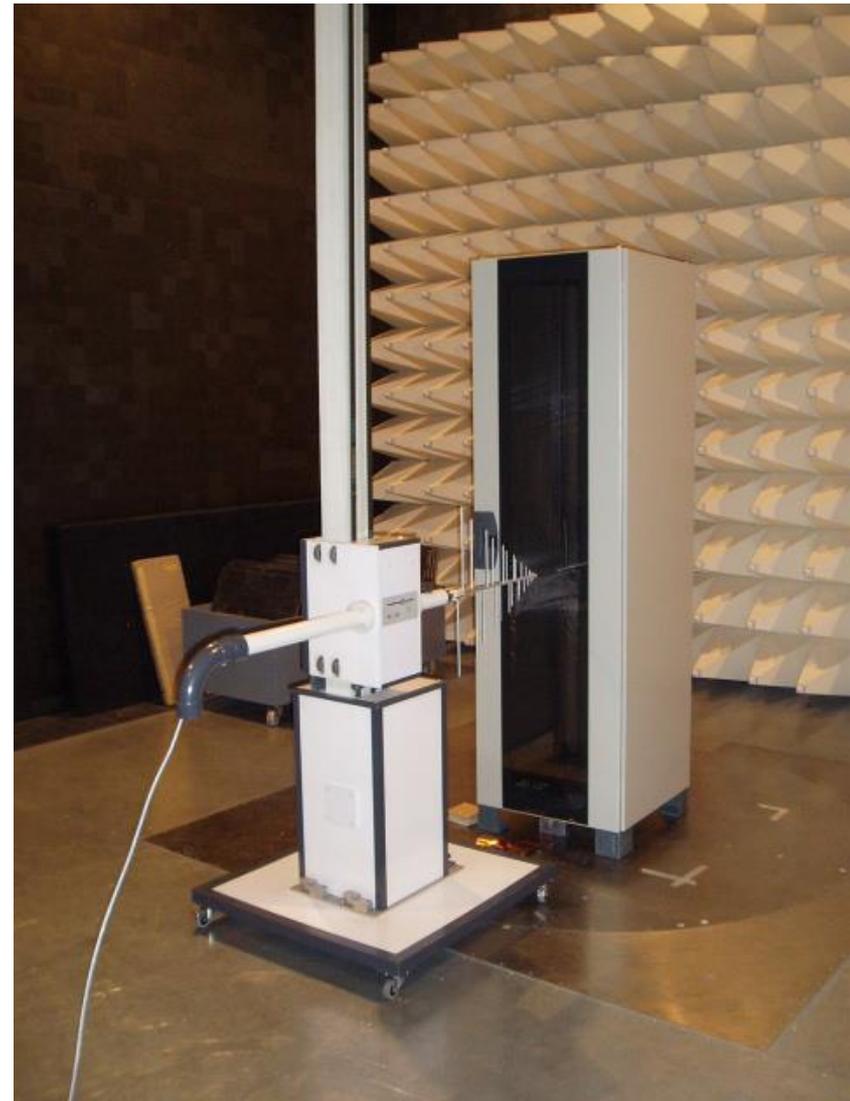
*The development of electronics systems and equipment that generate electromagnetic fields in the environment, such as telecommunications systems, remote broadcasting, radar and remote sensing, increase electromagnetic interferences in industrial, civil and medical applications.*

*The development of wireless systems, for data transmission and multimedia, increase the electromagnetic pollution (Volt meter value and Micro Tesla).*

*These are the important points:*

- 1. measure the amount of radiation;**
- 2. maintain a EMP protection;**
- 3. limit the exposure ;**
- 4. shield the source, the living site or the person.**

*The use of electrically conductive materials offers solutions to protect electronic equipment and reduce the Volt meter way to human ..*



# Markets involved on application

- Aeronautics
  - Defence
  - Telecommunications
  - Aerospace
- Transport
- Medical
- Architecture
- Automotive



# Main Products

## Shielding Gaskets

Metal Gaskets

Wire mesh over elastomer

EMI/EMC-IP65 Twinshield gaskets

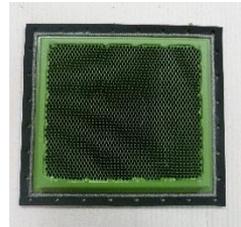
Elastomer gaskets clad in Satmet fabric

## On Design and Standard shielding Gaskets

EPDM conductive gasket EMC/NBC

Electrically conductive silicones gaskets

Thermally conductive silicone gaskets



## Special Shielding Gaskets

A3213-SC and A3208-SC IP 65 EMC/EMI Gaskets

IP65 / EMI EMC IP 65 Sealed gaskets

EMKA gaskets clad in Satmet fabric



## Shielding Products

Shielding Honeycomb Vents

Shielding conductive textile fabrics

Conductive Non-Woven

EMI/EMC Conductive mask tape

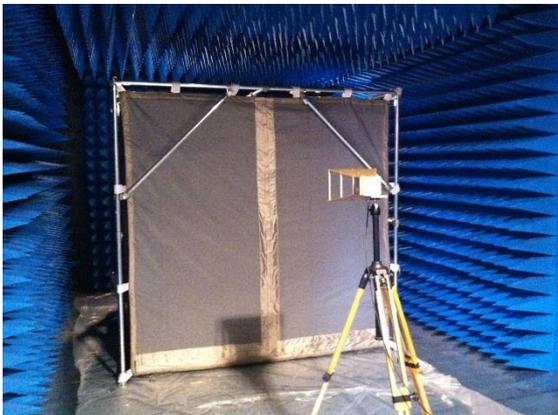
EMI Shielded Windows

Shielded Tent

Radar Absorbent Materials

EMC Electrically conductive paints

Electromagnetic Shielding Test



# Products: Metal gaskets

Conductive gaskets made using various concentric mesh wire. They may have different sections.  
The standard materials can be used: Monel, Copperweld, Copper-Tin, Stainless Steel and Aluminium.  
The yarn suitable for their needs must be evaluated based on the characteristics of shielding and environmental requirements.



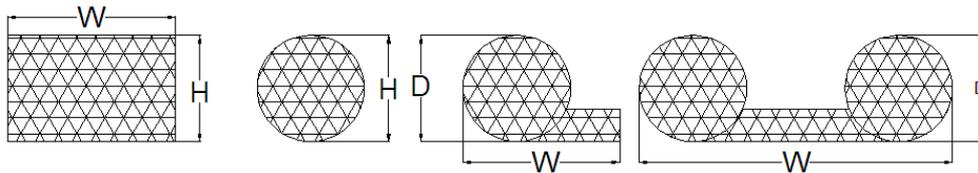
## Applications:

Metal gaskets are used for shielding of cabinet and container when elastic recovery is not required after compression. Ideal if requested stability and resistance to high temperatures, This type is not suitable for water tight sealing. Copperweld wire offers excellent shielding.

## Provision:

In rolls or in pieces cut to size

## STANDARD SECTIONS



# Products: Metal gaskets

Properties	
Dimension (mm)	Custom
Hardness (Shore A)	NA
Service Temperature (°C)	-60 to 300
Surface Resistivity ( $\Omega/\text{sq}$ )	0,1
Flame resistance	Yes

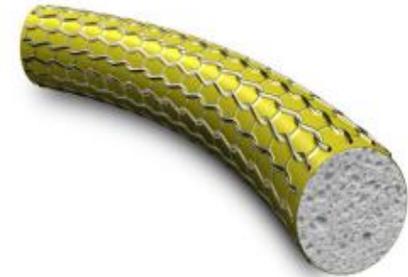


Shielding Values				
Material	Magnetic Field (100 kHz)	Electric Field (10 MHz)	Plane Wave (1 Ghz)	Plane Wave (10 Ghz)
Monel	60 (dB)	130 (dB)	90 (dB)	80 (dB)
CWS	80 (dB)	130 (dB)	105 (dB)	95 (dB)
Aluminum	60 (dB)	130 (dB)	90 (dB)	80 (dB)



# Products: Wire mesh over elastomer

Metal elastomer gaskets obtained with the cladding of layers in concentric metallic mesh around an elastomer material that accomplishes the function of elastic recovery after compression. Various sections are available and dimensions upon client request. This type is not suitable for watertight sealing; for this specific application refer to the Twinshield type gasket. The possibility of combining elastomer and metallic mesh and overlapping layers is very broad and left to the needs of the client.



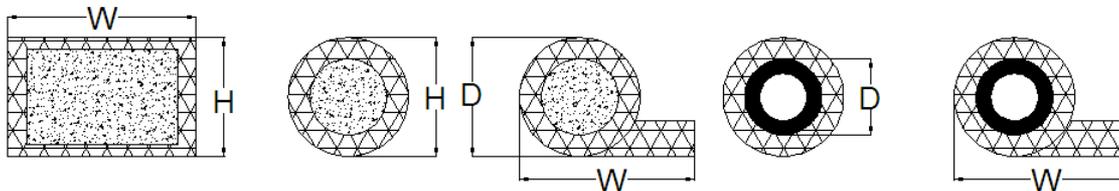
## Applications:

Gasket for the shielding of electric and magnetic fields where there is no requirement for watertight sealing as well. Elastic recovery is obtained with expanded materials of various types such as Silicone, Neoprene and EPDM. These are recommended for panel systems, electrical control panels, doors, etc., which must be disassembled or opened with a certain frequency, therefore the need for the elastic recovery of the gasket.

## Provision:

In spools or in pieces pre-cut to size, in section and dimension upon client request.

## STANDARD SECTIONS



# Products: Wire mesh over elastomer



Properties	
Dimension (mm)	Custom
Hardness (Shore A)	2 to 90
Service Temperature (°C)	-50 to 300
Superface Rersistivity ( $\Omega$ /sq)	< 0,1
Flame resistance	Custom

Shielding Values				
Material	Magnetic Field (100 kHz)	Electric Field (10 MHz)	Plane Wave (1 Ghz)	Plane Wave (10 Ghz)
Monel	60 (dB)	130 (dB)	90 (dB)	80 (dB)
CWS	80 (dB)	130 (dB)	105 (dB)	95(dB)



# Products: Elastomer gaskets clad in Satmet fabric

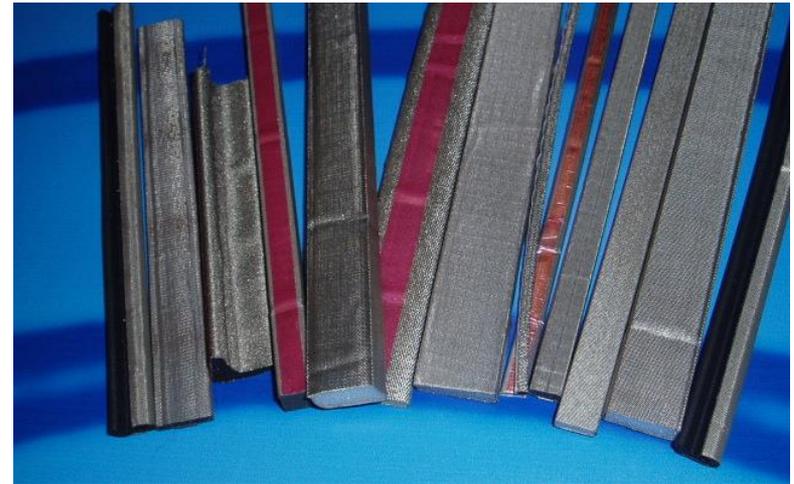
EMI gaskets, noted for their high level of compressibility, obtained by combining expanded materials with different elastic recoveries and different conductive fabric cladding. The fabric-reinforced gaskets originate from the combination of an electrically conductive fabric that wraps a core in expanded polyurethane, neoprene or silicone. These gaskets are furnished with double-sided adhesive mounting tape. The standard geometries are those represented in the figure.

## Applications:

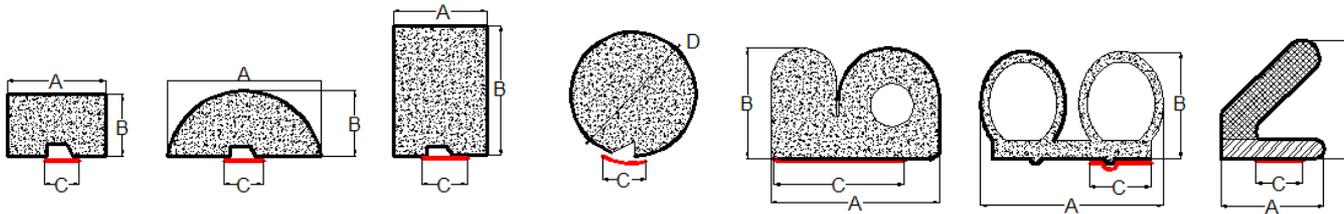
Shielding of electric and telecommunications lockers, and containers, etc., above all if there is a low compression resistance needed.

## Provision:

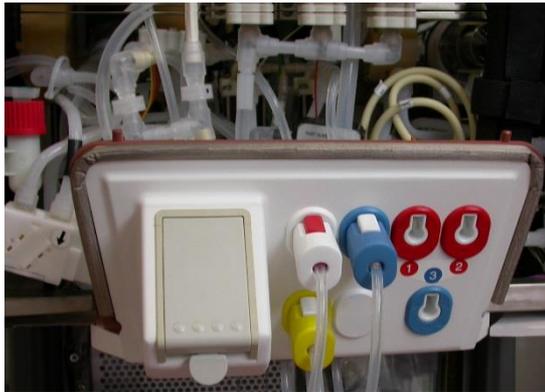
In spools, in pieces cut to size or by rectangular section cut to plan.



## STANDARD SECTIONS



# Products: Elastomer gaskets clad in Satmet fabric



Properties	
Dimension (mm)	Custom
Hardness (Shore A)	10 to 60
Service Temperature (°C)	-40 to 200
Superface Rersistivity ( $\Omega$ /sq)	< 0,4
Flame resistance	Custom

Shielding Values				
Material	Magnetic Field (100 kHz)	Electric Field (10 MHz)	Plane Wave (1 Ghz)	Plane Wave (10 Ghz)
Static Clean	37(dB)	70 (dB)	60 (dB)	53 (dB)
Galileo	32 (dB)	65 (dB)	58 (dB)	60 (dB)



# Products: EMI/EMC-IP65 Twinshield gaskets

The Twinshield type conductive gaskets are made up of one conductive part that provides the electromagnetic shielding function and one part in elastomer for watertight sealing.

## Applications:

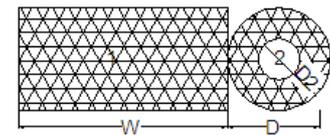
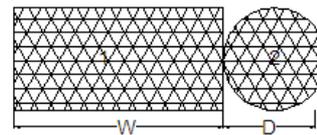
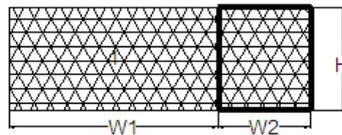
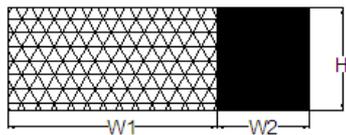
Gasket for shielding of electric and magnetic fields where there is also a requirement for watertight sealing. Elastic recovery is obtained with expanded materials of various types such as Silicone, Neoprene and EPDM, bonded in between the IP sealing sections and the electrically conductive section. Utilised for containers, electrical boxes, electronics cabinets, etc., with the IP64 and the IP65 environmental sealing requirement.

## Provision:

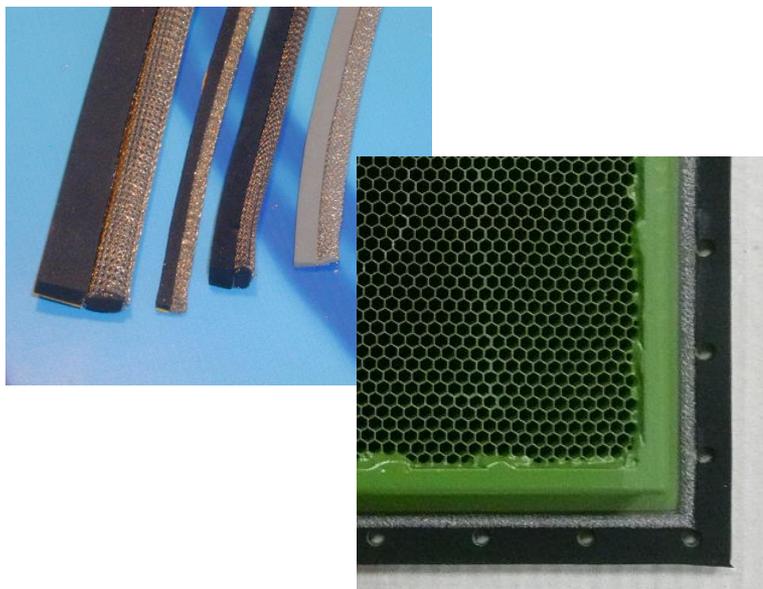
In spools or pieces cut to size with perforations ready to install.



## STANDARD SECTIONS



# Products: EMI/EMC-IP65 Twinshield gaskets



Properties	
Dimension (mm)	Custom
Hardness (Shore A)	2 to 90
Service Temperature (°C)	-50 to 200
Surface Resistivity ( $\Omega$ /sq)	< 0,1
Flame resistance	Custom

Shielding Values				
Material	Magnetic Field (100 kHz)	Electric Field (10 MHz)	Plane Wave (1 Ghz)	Plane Wave (10 Ghz)
Monel	60+ (dB)	130 (dB)	90 (dB)	80 (dB)
CWS	80+ (dB)	130+ (dB)	105 (dB)	95(dB)



# A3213-SC and A3208-SC IP 65 EMC/EMI Gaskets

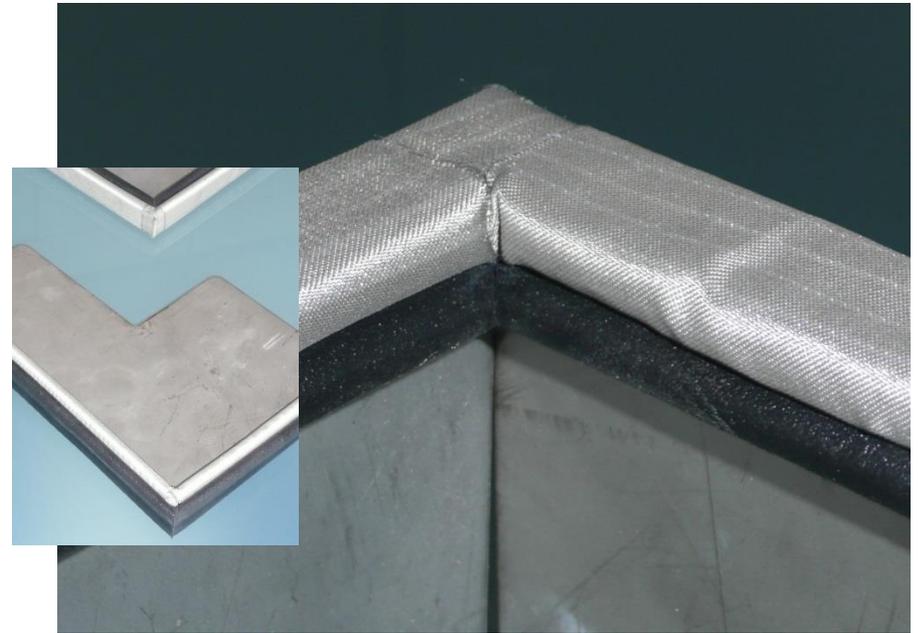
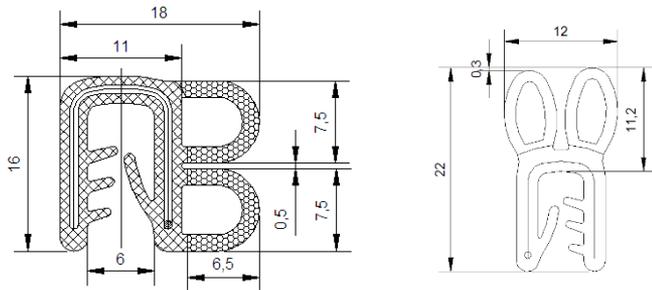
Market requirements permit us to offer different gaskets that cover the double function of watertight seals and electromagnetic interference shielding. An initial demand was for a gasket that was of a self-blocking type to be installed directly on plate moulding. Gaskets with codes A3208, A3213 e A3213-L, are those we offer for this type of application.

## Applications:

Utilised for electric and telecommunications, etc. locker shielding, where there is a watertight seal required as well.

## Provision:

In spools, in pieces cut to size or in thermally welded frames as per client plans, ready for installation



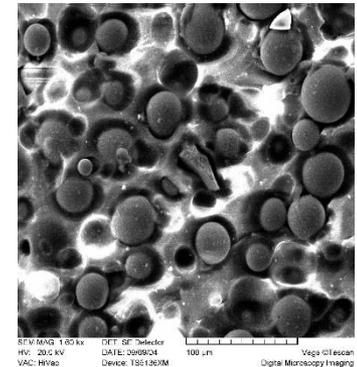
# Electrically conductive silicones

IP 65/66/67 environmental sealing conductive silicone gaskets for electromagnetic shielding.

This category of items is in continuous evolution, the raw material from which it is made is the first component that must be analysed in function of its application characteristics in that it must fulfil the compromise between its response to the electromagnetic shielding and the mechanically operational purposes required. The characteristics that define the choice of materials are:

- IP 65/67 sealing grade;
- minimum and maximum temperature;
- type of assembly foreseen; the compressibility of the material and its elastic recovery;
- the number of pieces to be produced;
- the consequent choice of tools and equipment;
- the need for a sample for shielding trials;
- UL 94 fire resistance.

The may be manufactured in polymer base silicone and fluorosilicone for resistance to oils, gasoline, etc. Materials according to MIL-G-83528 for use in the military field and industrial use Standards.



## Applications:

Conductive silicone gaskets are utilised so as to obtain the combination of electromagnetic shielding and IP environmental sealing, also in critical situations. The blends according to MIL-G-83528 are utilised for EMP and Tempest requests.

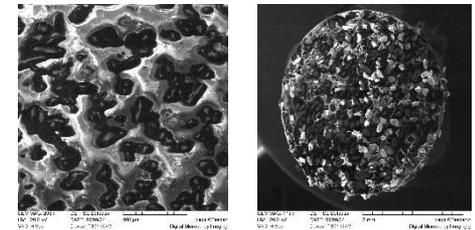
## Provision:

Sheets

O-Rings

Flat gaskets cut with a CNC controlled machine according to client design

Molded and extruded gaskets according to client design.



# Molded and Extruded Materials Selection Guide

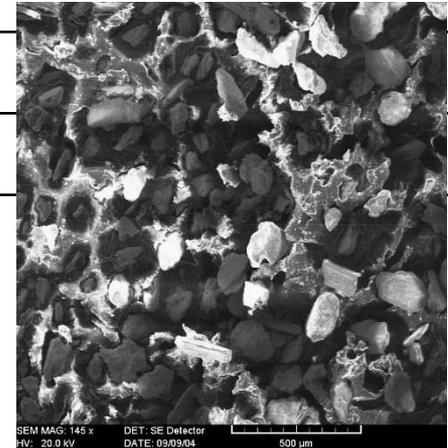
Fluorosilicone	EPDM	Silicone
Offers superior heat resistance. Resistant to cold, oils and solvents of fluorinated rubber. Good for special applications where general resistance to oxidizing chemicals, aromatic and chlorinated solvent bases are required. Narrower Temp range than silicone but better fluid resistance	Excellent ozone, chemical, and aging resistance. Poor resistance to petroleum-based fluids.	Excellent high and low temperature properties. Fair physical properties

Typical Fluid/Media Compatibility			
Fluid	Fluorosilicone	EPDM	Silicone
Air, Below 200°F (93°C)	Good	Good	Good
Air, Below 300°F (149°C)	Good	Fair	Good
Air, Below 400°F (204°C)	Fair	Poor	Good
Air, Below 500°F (260°C)	Poor	Poor	Good
Carbon Dioxide	Good	Good	Good
Hydraulic Fluids (Organic)	Good	Poor	Fair
Hydraulic Fluid (Phosphate Ester)	Good	Good	Poor
Hydrocarbon Fuels (Saturated)	Good	Poor	Poor
Ozone	Good	Good	Good
Water	Good	Good	Good



# Conductive filler Selection Guide

CONDUCTIVE FILLER TYPES	
MATERIAL	COMMENT
<b>Silver-plated aluminium</b>	the best conductive filler in terms of galvanic corrosion compatibility with aluminium alloy components/enclosures. Also so has very good high temperature performance
<b>Nickel coated graphite</b>	comparatively low cost, excellent high temperature resistance, very good electrical/shielding performance – particularly on surfaces with poor contact resistance e.g. stainless steel, zinc, heavy chromate finishes
<b>Silver-plated copper</b>	excellent conductivity, low contact resistance, good current handling for EMP type events
<b>Silver-plated nickel</b>	good conductivity, excellent long-term high temperature performance
<b>Silver-plated glass</b>	general purpose, good high temperature performance
<b>Pure silver</b>	comparatively high cost, has a few niche applications



# Electrically conductive silicones

PRODUCT NUMBER	SSP548-65	SSP500-75	SSP550-70	SSP555-65	SSP416-65
<i>Material to MIL-G-83528B</i>	B	C	D	E	M
<b>Elastomer binder</b> (F.Sil=Fluorosilicone)	Silicone	F.Sil	F.Sil	Silicone	Silicone
<b>Conductive Filler</b> (Ag=Silver, Cu=Copper,Al=Alum, Ni=Nickel, Glass)	Ag/Al	Ag/Cu	Ag/Al	Ag	Ag/Glass
<b>Color</b>	Tan	Gray	Tan	Beige	Tan
<b>Volume Resistivity (Ohm-cm) - Max ref. MIL-G-83528 P4.6.11 (W/O Pressure Sensitive Adhesive)</b>	0.008	0.010	0.012	0.002	0.006
<b>Shielding Effectiveness (dB) Min Ref. MIL-G-83528 P4.6.12 20 MHz – 10 GHz (E-Field)</b>	100	110	90	110	100

PRODUCT NUMBER	SSP547-65	SSP555-75	SSP555-80	SSP555-45	SSP553-85
<i>Material to MIL-G-83528B</i>	A	F	H	J	K
<b>Elastomer binder</b> (F.Sil=Fluorosilicone)	Silicone	F.Sil	Silicone	Silicone	Silicone
<b>Conductive Filler</b> (Ag=Silver, Cu=Copper,Al=Alum, Ni=Nickel, Glass)	Ag/Cu	Ag	Ag	Ag	Ag/Cu
<b>Color</b>	Gray	Beige	Beige	Beige	Gray
<b>Volume Resistivity (Ohm-cm) - Max ref. MIL-G-83528 P4.6.11 (W/O Pressure Sensitive Adhesive)</b>	0.004	0.002	0.005	0.010	0.005
<b>Shielding Effectiveness (dB) Min Ref. MIL-G-83528 P4.6.12 20 MHz – 10 GHz (E-Field)</b>	110	110	110	80	110

# Electrically conductive silicones

PRODUCT NUMBER	SSP416-45	SSP416-55	SSP416-75	SSP-FL-416-55
<b>Elastomer binder</b> (F.Sil=Fluorosilicone)	Silicone	Silicone	Silicone	F. Sil
<b>Conductive Filler</b> (Ag=Silver, Cu=Copper,Al=Alum, Ni=Nickel, Glass)	Ag/Glass	Ag/Glass	Ag/Glass	Ag/Glass
<b>Volume Resistivity (Ohm-cm) - Max ref. MIL-G-83528 P4.6.11</b> (W/O Pressure Sensitive Adhesive)	0.005	0.005	0.005	0.005
<b>Shielding Effectiveness (dB) Min Ref. MIL-G-83528 P4.6.12</b> 20 MHz – 10 GHz (E-Field)	99	99	99	99

PRODUCT NUMBER	SSP502-45	SSP502-55	SSP502-65	SSP502-75
<b>Elastomer binder</b> (F.Sil=Fluorosilicone)	Silicone	Silicone	Silicone	Silicone
<b>Conductive Filler</b> (Ag=Silver, Cu=Copper,Al=Alum, Ni=Nickel,Ni/g=Nickel Graphite)	Ni/g	Ni/g	Ni/g	Ni/g
<b>Volume Resistivity (Ohm-cm) - Max ref. MIL-G-83528 P4.6.11</b> (W/O Pressure Sensitive Adhesive)	0.050	0.050	0.040	0.040
<b>Shielding Effectiveness (dB) Min Ref. MIL-G-83528 P4.6.12</b> 20 MHz – 10 GHz (E-Field)	90	90	90	90



# Electrically conductive silicones

PRODUCT NUMBER	MO1026AR80	MO1007AA60	MO1011AV70	MO1015AR60	MO1016NK60UL
Elastomer binder	Silicone VMQ	Silicone VMQ	Silicone VMQ	Silicone VMQ	Silicone VMQ
Conductive Filler	Argento rame	Argento alluminio	Argento vetro	Argento rame	Nickel grafite
Volume resistivity (Ohm-cm)	0.005	0.01	0.014	0.008	0.200
Surface Resistivity (Ohm/sq)	0.01	0.01	0.015	0.01	0.08

PRODUCT NUMBER	MO1003NK60	MO1004NK60UL	MO1005NK70	MO1001NK40	MO1002NK50
Elastomer binder	Silicone VMQ				
Conductive Filler	Nickel grafite				
Volume resistivity (Ohm-cm)	0.033	0.200	0.033	0.033	0.033
Surface Resistivity (Ohm/sq)	0.08	0.08	0.07	0.1	0.1

PRODUCT NUMBER	MO1008NK65F	MO1009AV70F	MO1010AA60F	MO1014AR60F	MO1017AV70F
Elastomer binder	FSE7540	FSE7560	FVMQ	FVMQ	FSE7560
Conductive Filler	Nickel grafite	Argento vetro	Argento alluminio	Argento rame	Argento vetro
Volume resistivity (Ohm-cm)	0.033	0.010	0.008	0.008	0.010
Surface Resistivity (Ohm/sq)	0.1	0.01	0.01	0.01	0.01



# Electrically conductive silicones

PRODUCT NUMBER	MO1040NK50UL	MO1049AR45	MO1051NK65	MO1052NK65
Elastomer binder	Silicone VMQ	Silicone VMQ	Silicone VMQ	Silicone VMQ
Conductive Filler	Nickel grafite	Argento rame	Nickel carbon	Nickel grafite
Volume resistivity (Ohm-cm)	0.200	0.004	0.033	0.033
Surface Resistivity (Ohm/sq)	0.08	0.008	0.05	0.1

PRODUCT NUMBER	MO1019AA75F	MO1020NK45F	MO1021AA40F	MO1023AV50F
Elastomer binder	FVMQ	FSE7520	FVMQ	FSE7540
Conductive Filler	Argento Alluminio	Nickel grafite	Argento Alluminio	Argento vetro
Volume resistivity (Ohm-cm)	0.008	0.010	0.008	0.010
Surface Resistivity (Ohm/sq)	0.01	0.01	0.01	0.015



# Shielding conductive textile fabrics

One of the qualifying points of SOLIANI EMC is the internal production of conductive fabrics with a metallization line. The line has the possibility of covering every single fibre with a coating such as nickel, which is stable against corrosion and has a good shielding value.

## Applications

The evolution of fabrics as structures and of the fibres that make up their electrical and mechanical performance give hope for an evolution of products beyond those already known.

## Materials

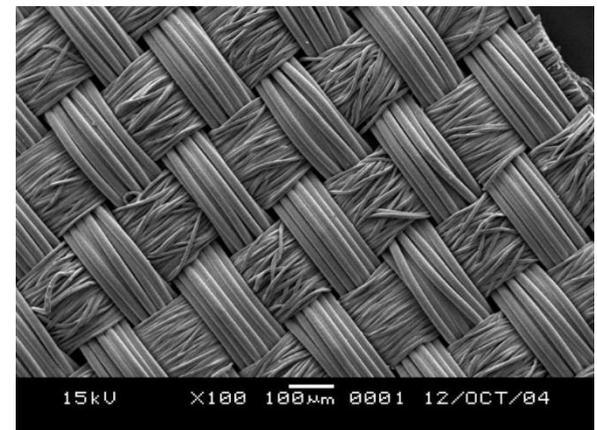
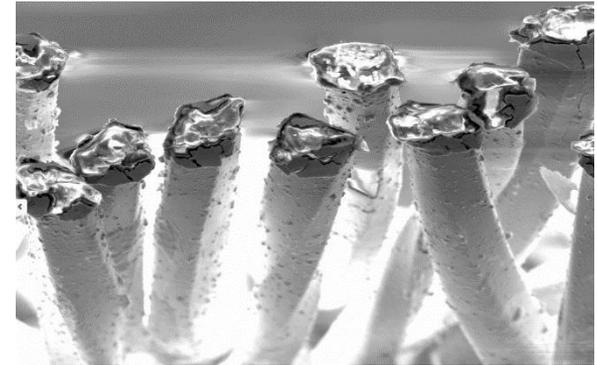
Standard fabrics are Static Clean, Gallileo and Pongé, articles in polyester that have weights that range from 60 to 150 grams per square metre after being metal coated. The proportion of pure nickel varies from 12 to 35 grams of metal per square metre. These fabrics behave differently when exposed to electromagnetic fields and are characterised, compared to competitive products, by the following advantageous reasons:

- High resistance to corrosion
- Stability of the superficial resistance value
- Resistance of conductivity even under repeated mechanical or abrasive action and repeated bending.
- Good shielding from low magnetic field frequencies and from those of up to 18 Ghz
- Good mechanical resistance to traction



# Shielding conductive textile fabrics

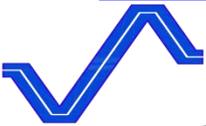
Fabric type	TNT		STATIC CLEAN		GALILEO	PONGE'	SONOMEX
<b>Base material</b>	Polyester		Polyester fabric		Polyester fabric	Polyester fabric	Polyester fabric
<b>Coating</b>	100% Nickel		100% Nickel		100% Nickel	100% Nickel	100% Nickel
<b>(Test Report)</b>	(RP6900)		(RP6900)		(RP3405)	(RP001107)	(RP001107)
<b>N° layers</b>	1 layer	2 layer	1 layer	2 layer	1 Layer	1 Layer	1 Layer
<b>Magnetic field (dB)</b>							
<b>3 MHz</b>	21	25	15	25	13	-	26
<b>10 MHz</b>	23	38	20	38	23	-	30
<b>20 MHz</b>	31	45	30	45	28	-	36
<b>30 MHz</b>	32	53	40	56	31	-	37
<b>Electric field (dB)</b>							
<b>2 MHz</b>	92	103	105	106	90	92	81
<b>10 MHz</b>	63	75	65	74	65	65	64
<b>20 MHz</b>	58	71	62	73	59	62	56
<b>30 MHz</b>	52	66	65	76	78	62	54
<b>Electric field and plane wave ( dB)</b>							
<b>200 MHz</b>	56	82	55	76	50	67	-
<b>400 MHz</b>	69	84	65	87	68	75	-
<b>500 MHz</b>	70	90	60	79	58	70	-
<b>600 MHz</b>	72	95	62	83	60	68	-
<b>700 MHz</b>	73	99	60	81	53	67	-
<b>800 MHz</b>	75	93	70	94	62	69	-
<b>900 MHz</b>	74	88	60	77	60	60	-
<b>Plane Wave (dB)</b>							
<b>1 GHz</b>	95	106	60	81	58	57	62
<b>3 GHz</b>	94	102	62	89	56	50	55
<b>5 GHz</b>	96	100	63	90	48	48	60
<b>10 GHz</b>	96	98	53	88	60	-	54
<b>15 GHz</b>	96	95	53	91	56	-	49
<b>18 GHz</b>	77	80	55	105	45	-	42



# Shielding conductive textile fabrics



# Airbus A400M EMC HEMP protection



# Iveco Lince



# Shielding Honeycomb vents

Honeycomb filters are utilised to obtain effective electromagnetic shielding while assuring, at the same time, excellent airflow. The filters may be provided in various materials, with or without EMI/EMC frame and gaskets (and environmental sealing), ready for installation.

## Applications:

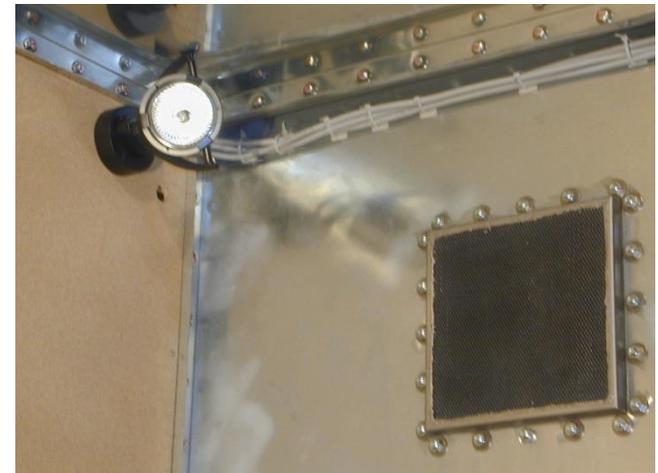
They are used in all apparatus where electromagnetic shielding and airflow are required, such as shelter, electrical control panel, etc., air conditioning systems.

**Aluminium:** Utilized in the industrial sector and is prevalently for electrical shielding up to 3 Ghz.

**Brass:** Utilized both in the industrial and military sectors: excellent resistance to corrosion and reasonable costs. Shielding Effectiveness from 1 KHz to 40 GHz.

**Steel:** This is the type most utilised, both in civil and military applications, for the correct compromise between costs, performance and corrosion resistance. This resistance may be improved with painted coatings (both conductive and/or protective from the aggression of external elements).  
Shielding Effectiveness from 1 KHz to 40 GHz.

**Stainless steel:** Utilization both in civil and military sectors, excellent for all environments. Shielding Effectiveness from 1 KHz to 40 GHz.



# Shielding Honeycomb vents

Frequency	Field	1/8"x1/2" Brass (dB)	1/8"x1 Brass (dB)	3/16"x1" Brass (dB)	1/8"x1/2" Steel and Stainless (dB)	1/8"x1" Steel and Stainless (dB)	3/16"x1" Steel and Stainless (dB)
1 KHz	Magnetic	13	25	20	16	30	29
10 KHz	Magnetic	38	80	70	50	85	72
100 KHz	Magnetic	80	100	95	90	118	108
1 MHz	Magnetic	105	110	110	110	118	115
10 MHz	Magnetic	105	110	110	110	118	115
1 KHz	Electrical	110	110	110	110	111	111
10 KHz	Electrical	115	115	115	115	115	115
100KHz	Electrical	115	120	120	115	120	120
1MHz	Electrical	115	120	120	115	120	120
10 MHz	Electrical	115	120	120	115	120	120
100 MHz	Plane Wave	115	130	130	115	130	130
400 MHz	Plane Wave	115	130	130	115	130	130
1 GHz	Plane Wave	105	120	120	105	120	120
10 GHz	Microwaves	105	120	120	105	120	120
18 GHz	Microwaves	105	110	110	105	110	110
26 GHz	MM waves	105	110	110	105	110	110
40 GHz	MM waves	60	110	N/A	60	110	N/A



# EMC Electrically conductive paints

Paints for the electromagnetic shielding of electronic equipment that satisfy international regulations that impose the respect of any electronic device for its requisite electromagnetic emissions and immunity.

The range of solvent or water based conductive paints are of principally three types: Silver, Copper and Nickel. There are also flexible versions.

Soliani EMC carries out conductive painting on parts provided by the client, guaranteeing the quality of the execution according to the specifications requested, both for assurance of adhesion and for electrical conductivity.

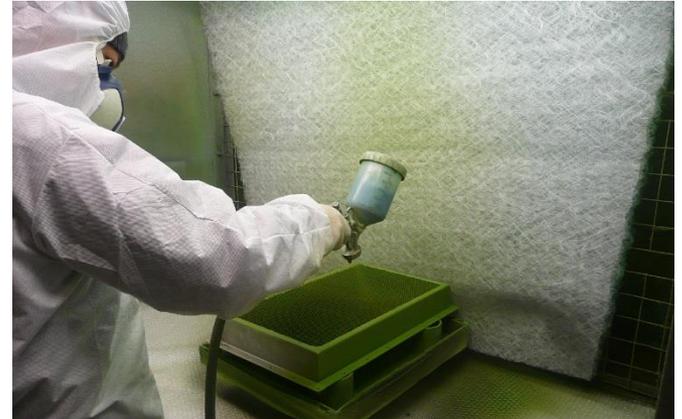
## Applications

Shielding of electronic and electro-medical apparatus realized with materials transparent to electromagnetic waves.

## Provisions

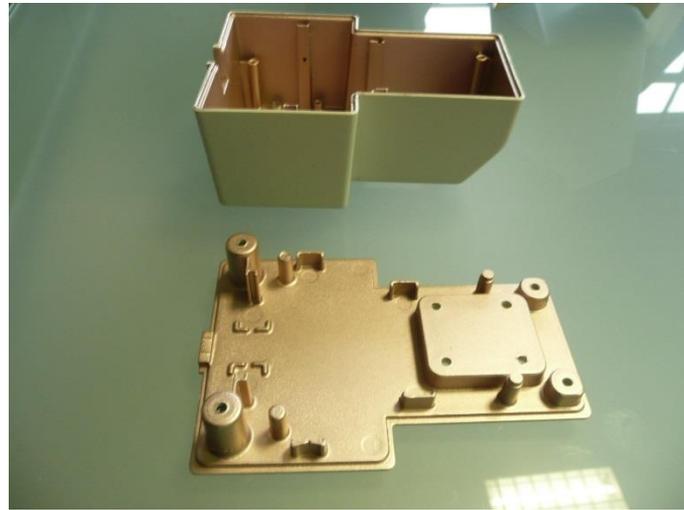
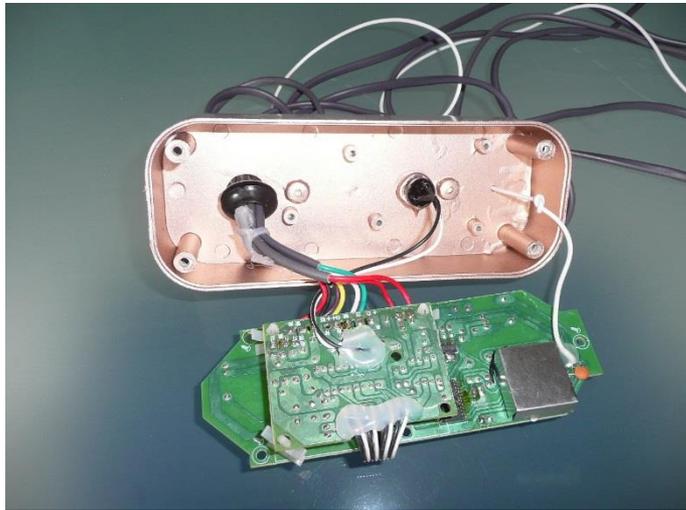
In cans of 1kg, 5kg and 20kg.

400 ml spray cans.



# EMC Electrically conductive paints

Product	RFNI	BN-1	RTU	SSS/46	Static
Type	Solvent	Solvent	Solvent	Solvent	Solvent
Polymer matrix	Acrylic	Polyurethane	Acrylic	Acrylic	Acrylic
Components	1 Component	2 Component	1 Component	1 Component	1 Component
Pigment	Nickel	Nickel	Silver-Copper	Silver	Graphite
Surface Resistivity (Ohm/sq)	0,3	0,5	< 0,06	<0,03	<0.1



# EMI/EMC rooms shielded with conductive fabric

This type of shielding is offered as a solution for more modest requirements yet is still valid as a response to market demands. In a frequency range from 30 MHz to 5 GHz this solution assures an attenuation of 60 dB with a modest cost for the possibility of utilising the structures of existent walls and to therefore clad them with shielding fabric. All solutions are possible even with complex curved surfaces. Usually critical points are identified during the room inspection: Windows, air conditioning system ducts, electrical outlets.

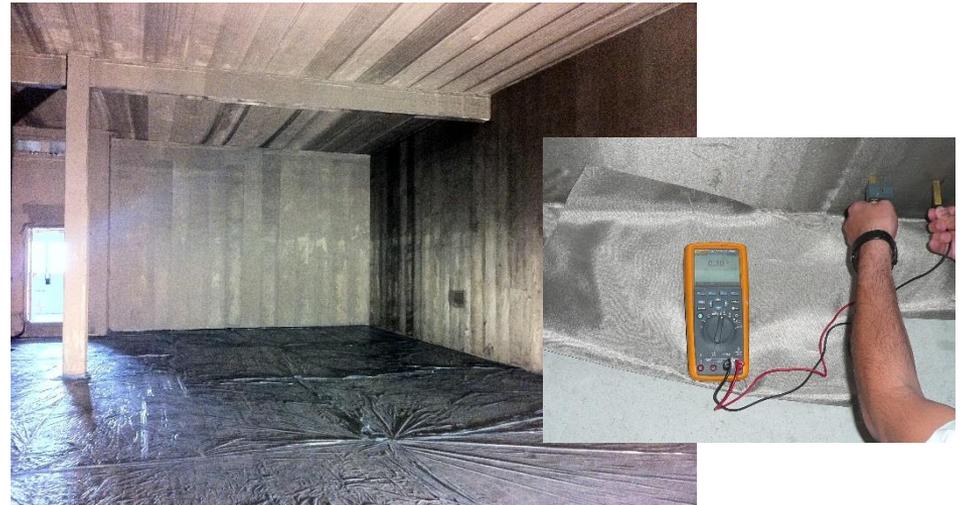
Beginning from these references an economic evaluation is initiated that will quantify the sq metres of fabric required, the stratification necessary to create the shielding effect required within the frequency field considered. The door has simpler characteristics that do not foresee contact fingers, but easily compressible conductive gaskets without the need for enormous forces to open and close the entrances. Eventually the windows, will require frames in electrically conductive materials and screens that are relative to the shielding value needed. Ultimately the honeycomb intakes are fundamental for the passage of air giving the space the properties of a Faraday Cage. A final point is the connections between the electrical power lines and for telephones and data lines.

## Applications:

Rooms for compatibility pre-qualification, applications for data security and prevention environments in the medical field.

## Provision:

Soliani EMC provides the fabric shielding or undertakes all work for environmental shielding. Aesthetic final finish is up to the client.



# EMI/EMC Shielded Windows

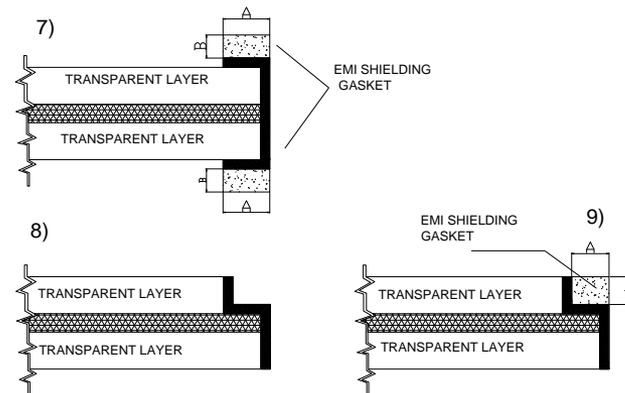
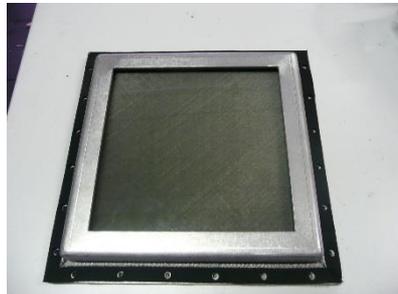
Glassed areas make up a serious negative point for the guarantee of a shielding value of a room or of any electrical apparatus. So as to be able to close and define the concept of the Faraday Cage with a good compromise between visibility and the shielding value required, shielding windows, which may be of different thicknesses, are made, with standard, tempered glass, in transparent or coloured thermo-plastic material. Enclosed inside of this material there is, with the work of an autoclave, a mesh with an opening grade desired from 80 to 130 mesh, which may be In metallic wire, polyester or polyamide treated with copper or nickel, so as to obtain shielding efficiency.

## Applications:

from small screens for electronic apparatus and large windows in buildings, mobile vehicles with plane or curved geometries.

## Provision:

Shielded glass is provided in the dimensions requested by the Client



# EMI/EMC Shielded Windows



<b>SHIELDING EFFECTIVENESS (MAGNETIC FIELD)</b>				
<b>FREQUENCY (MHz)</b>	<b>IRON PANEL</b>	<b>MESH 100</b>	<b>SU4X-13530 MESH 135</b>	<b>MESH 180</b>
0.1	72	0	0	0
1.0	64	18	18	12
10	54	38	46	27
30	53	45	40	50

<b>SHIELDING EFFECTIVENESS (ELECTRIC FIELD)</b>				
<b>FREQUENCY (MHz)</b>	<b>IRON PANEL</b>	<b>MESH 100</b>	<b>SU4X-13530 MESH 135</b>	<b>MESH 180</b>
0.1	70	65	65	60
1.0	70	52	52	50
10	70	45	46.6	46
100	58	40	45.7	40
200			45.2	
300			47	
400			47	
500	40	38	47	37
1000	40	32	52	35



# EMC-EMP-TEMPEST-RFI ROOM



# Protection

- **TEMPEST** is a National Security Agency specification and NATO certification<sup>[1][2]</sup> referring to spying on information systems through leaking emanations, including unintentional radio or electrical signals, sounds, and vibrations.<sup>[3]</sup> TEMPEST covers both methods to spy upon others and also how to shield equipment against such spying. The protection efforts are also known as emission security (EMSEC), which is a subset of communications security (COMSEC).<sup>[4]</sup>



# Protection

- **Electromagnetic compatibility (EMC)** is the branch of electrical engineering concerned with the unintentional generation, propagation and reception of electromagnetic energy which may cause unwanted effects such as electromagnetic interference (EMI) or even physical damage in operational equipment. The goal of EMC is the correct operation of different equipment in a common electromagnetic environment. EMC pursues two main classes of issue. **Emission** is the generation of electromagnetic energy, whether deliberate or accidental, by some source and its release into the environment. EMC studies the unwanted emissions and the countermeasures which may be taken in order to reduce unwanted emissions. The second class, **susceptibility** is the tendency of electrical equipment, referred to as the victim, to malfunction or break down in the presence of unwanted emissions, which are known as Radio frequency interference (RFI). **Immunity** is the opposite of susceptibility, being the ability of equipment to function correctly in the presence of RFI, with the discipline of "hardening" equipment being known equally as susceptibility or immunity. A third class studied is **coupling**, which is the mechanism by which emitted interference reaches the victim.

# EMP

- Terrorist or criminal groups could readily disrupt and damage our way of life by insidiously targeting cities and individual companies with an IEMI weapon. Without causing harm to humans, the effects from an IEMI weapon could disable all electronic devices in a region. In an EMP event, every device that relies on integrated circuits for operation could be immediately disabled or destroyed. Unlike cyber attacks where “fingerprints” can often be found for forensic analysis, an EMP attacker will not leave any information behind. In fact, studies have shown that an EMP is so rapid that computer log files will not be able to indicate what caused the electronics to shutdown.



# Test you can trust!

More than 20 years of collaborations with COBHAM, Worldwide Lightning Simulation Testsg HEMP test field.

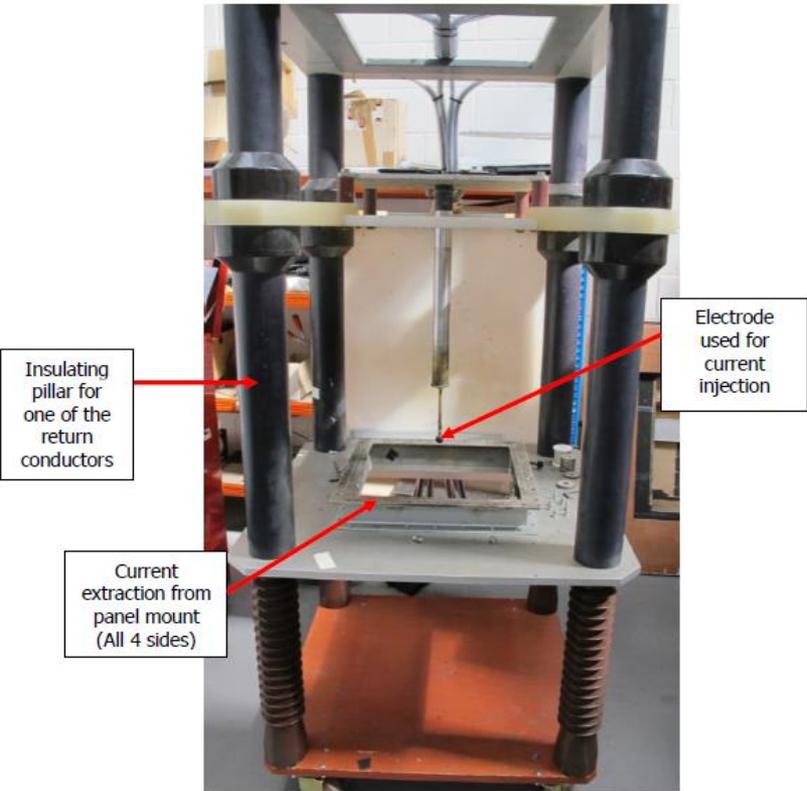
**COBHAM**

## **Cobham Technical Services**

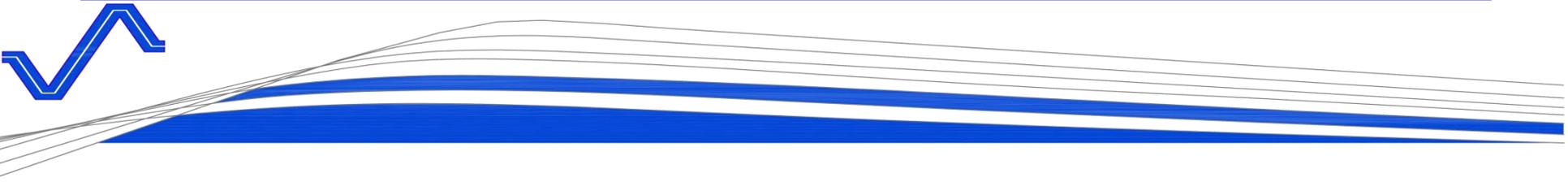
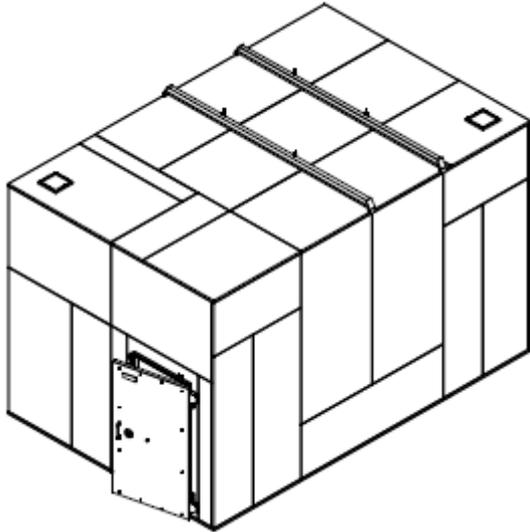
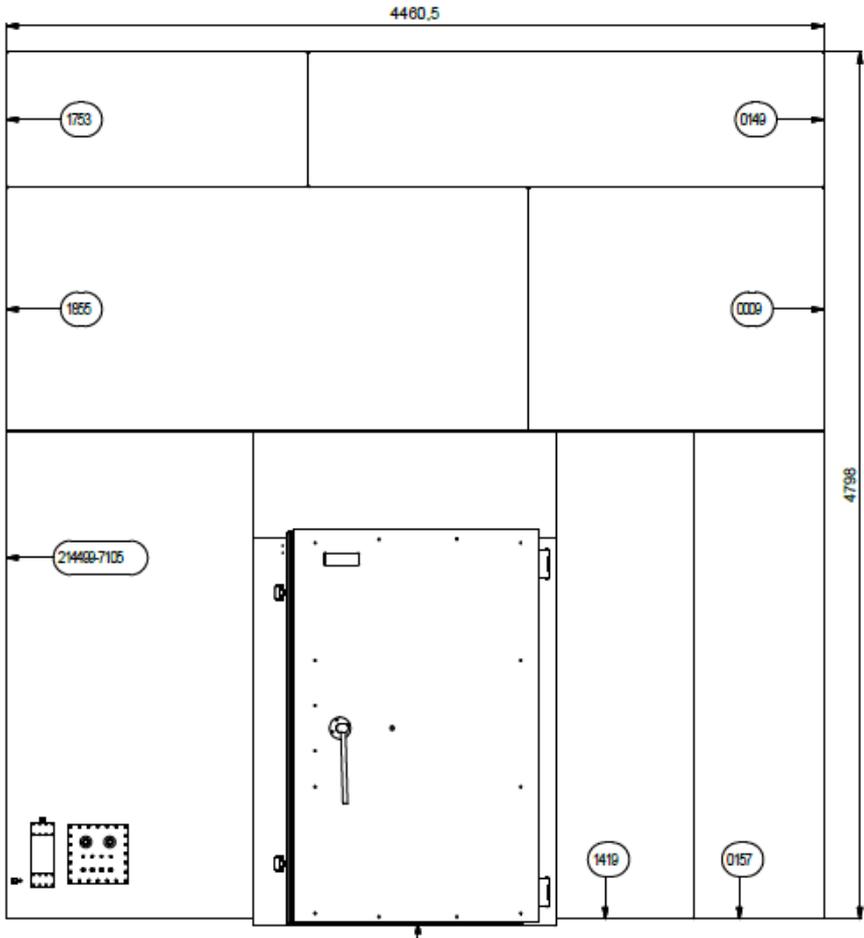
Lightning Testing and Consultancy  
Units 13/15, Nuffield Way, Abingdon  
Oxfordshire, OX14 1RL, England

T: +44 (0) 1235 540970

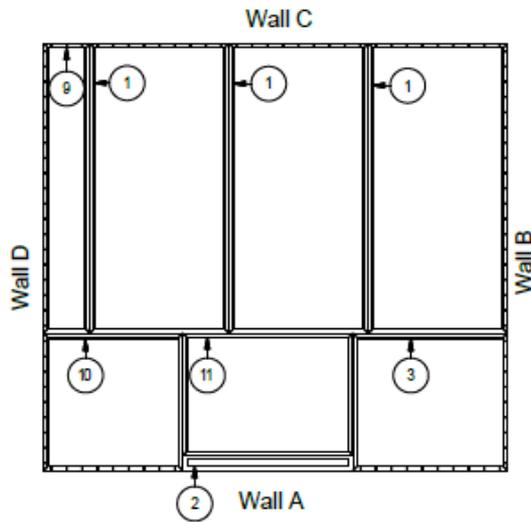
F: +44 (0) 1235 540980



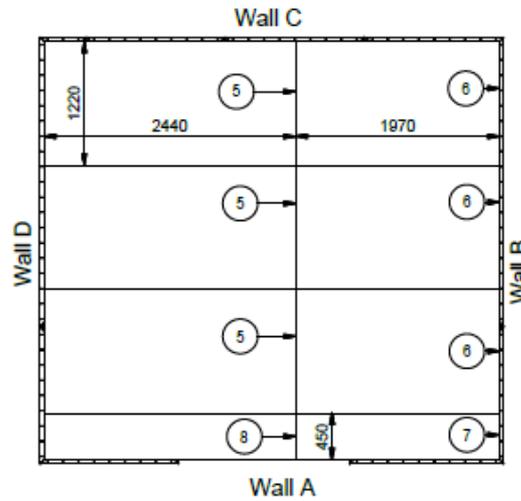
SOLIANI EMC is able to manufacture any kind of design of Metal chamber with 3D drawing for approval before manufacturing



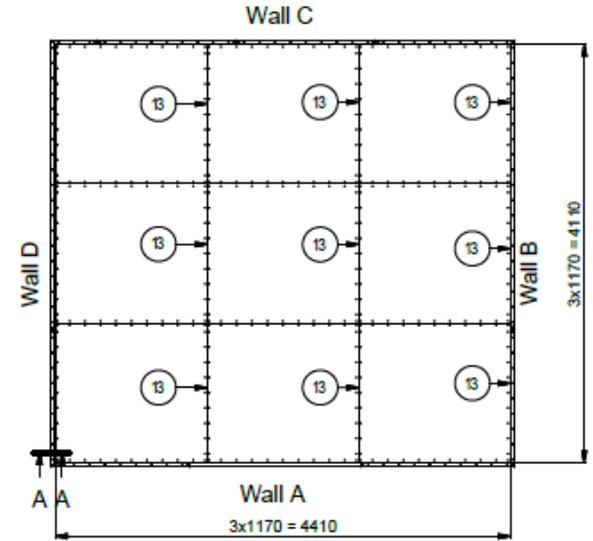
### Chipwood



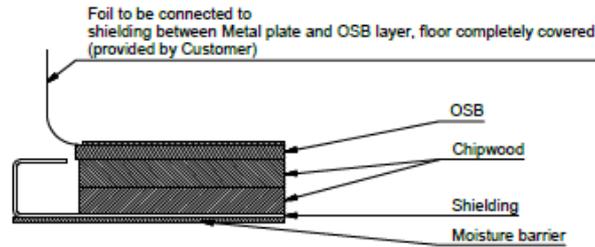
### OSB



### Metal plates



### Section A-A





Still the 3 biggest worldwide EMP chambers are designed, built and developed by SOLIANI EMC for the F-35 worldwide project



# Where

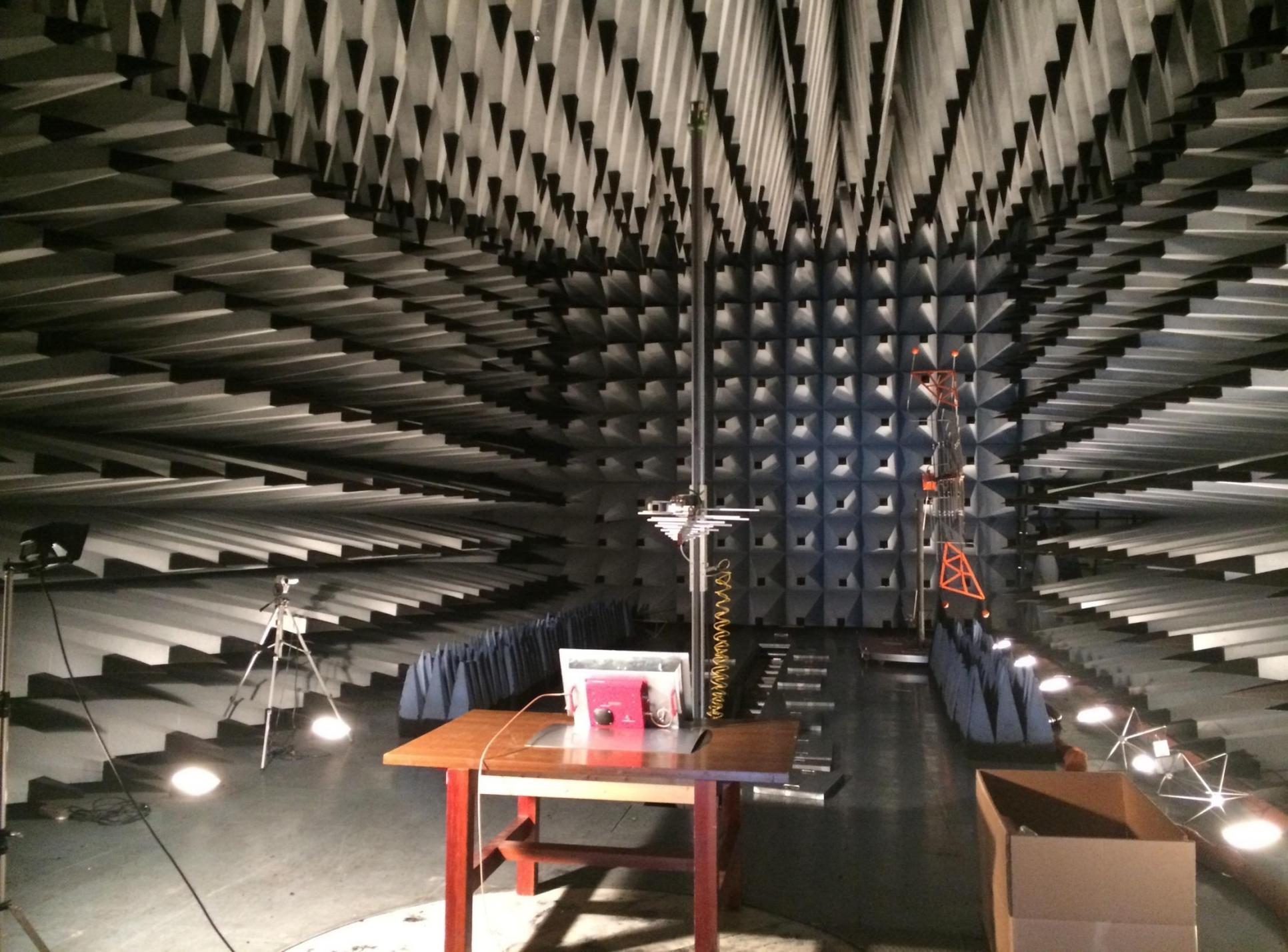




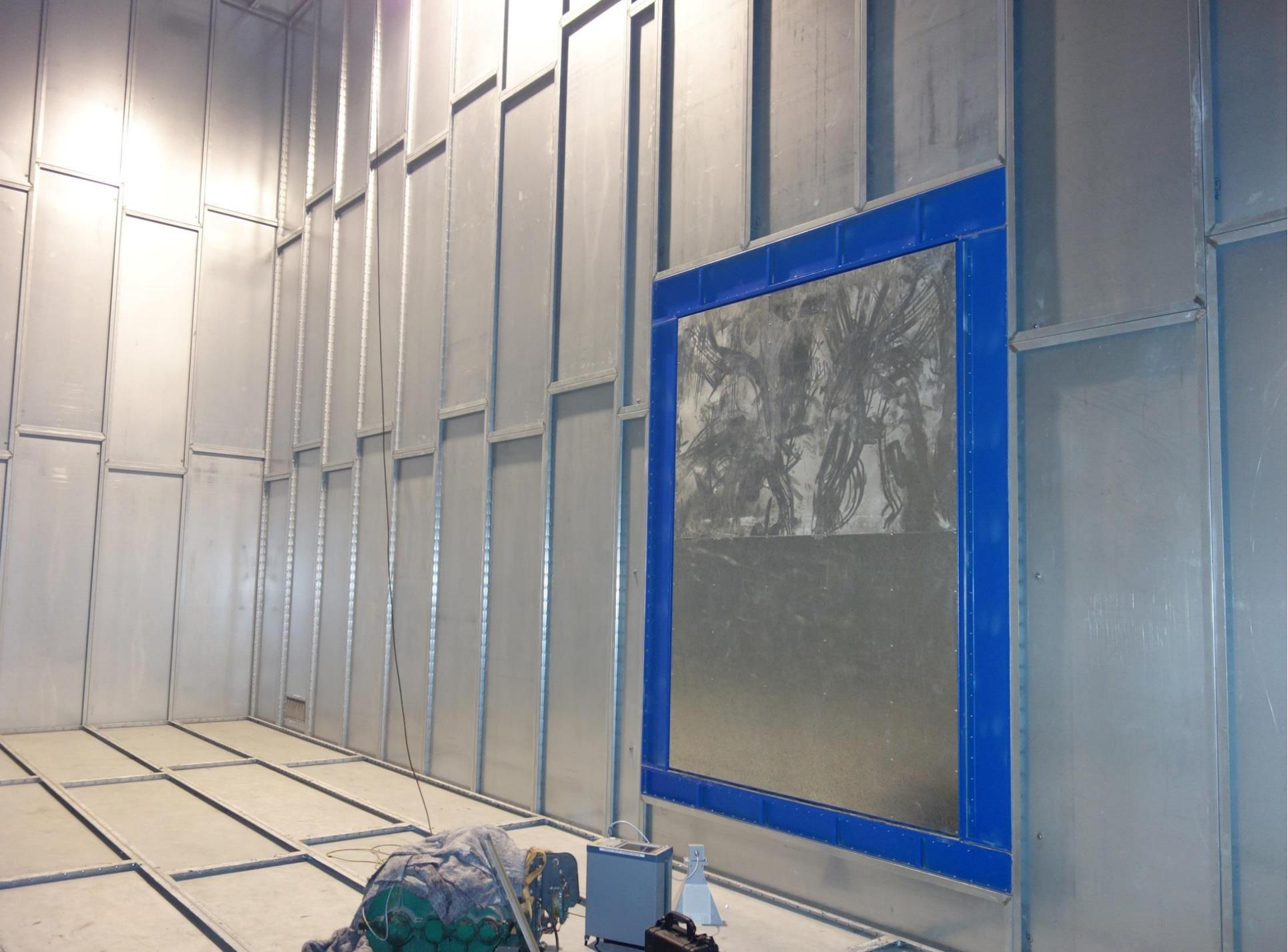








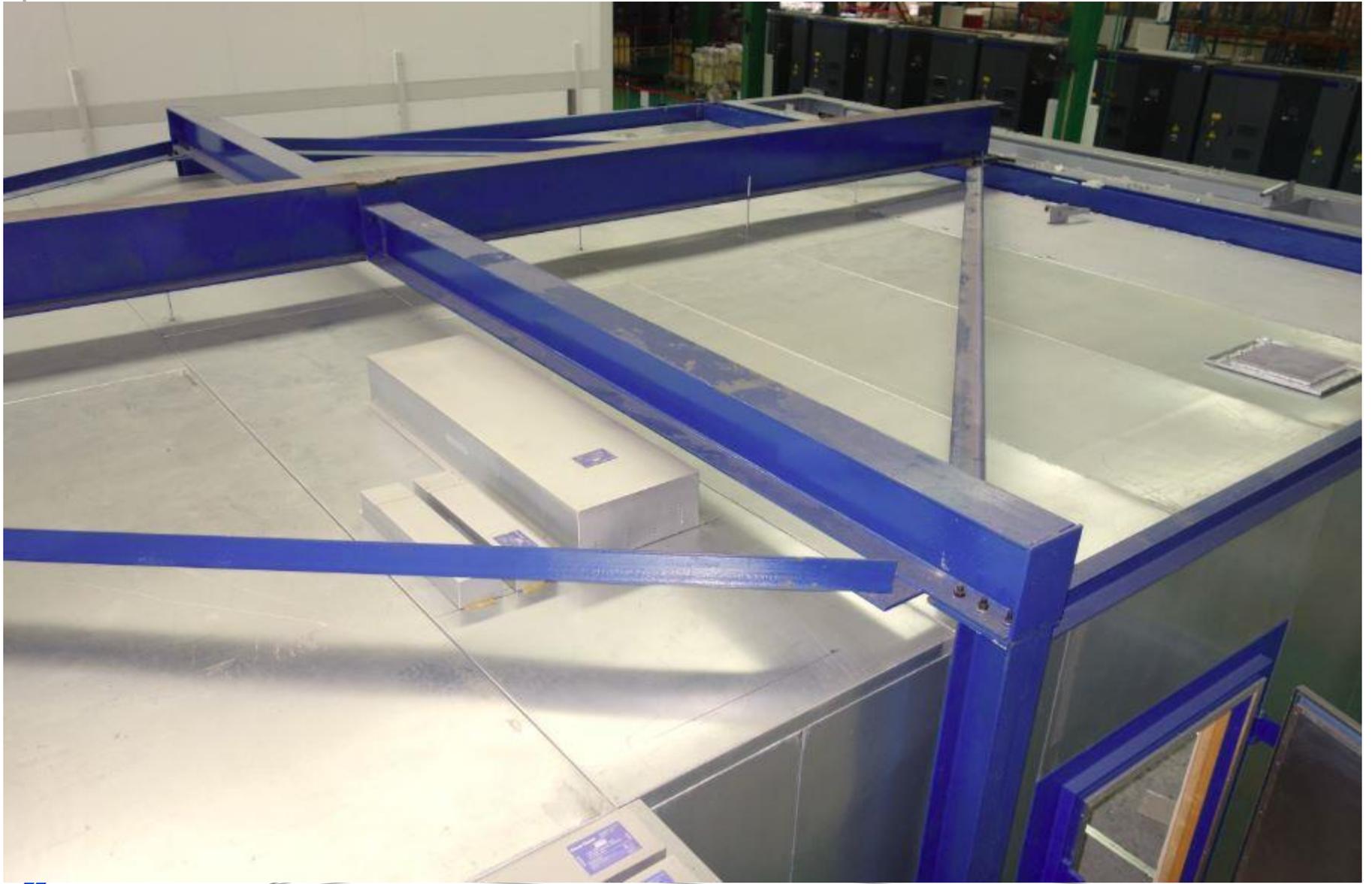




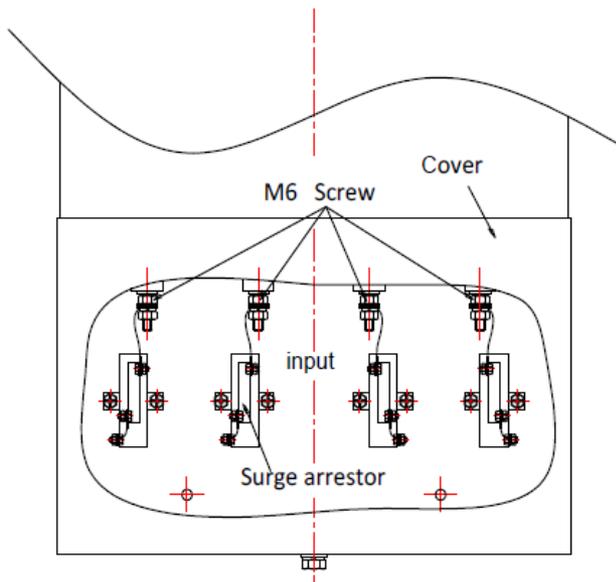
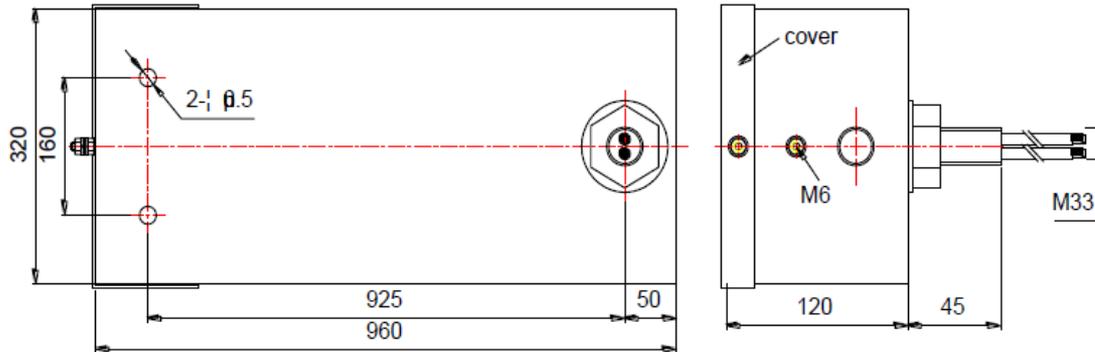


# Semianechoic





# EMC/EMP FILTERS (with or with surge arrester)

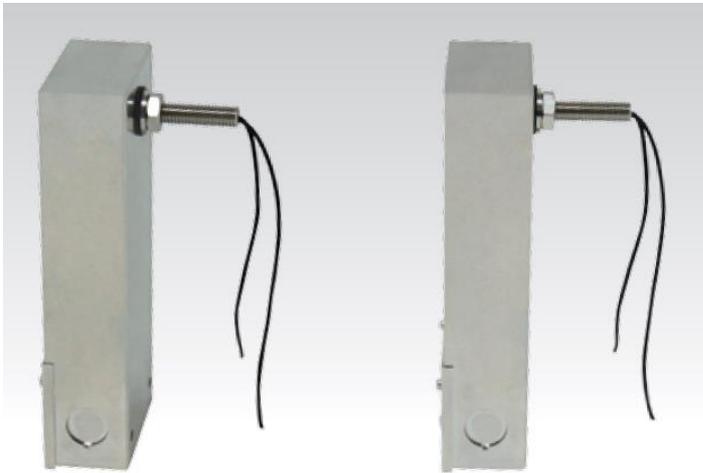


- Rated Voltage : 440VAC-Operating -
- Frequency : 0-60Hz
- Rated Current : 32A
- Insertion Loss : 100dB, 14kHz-40GHz
- Climatic Category : 25/070/21

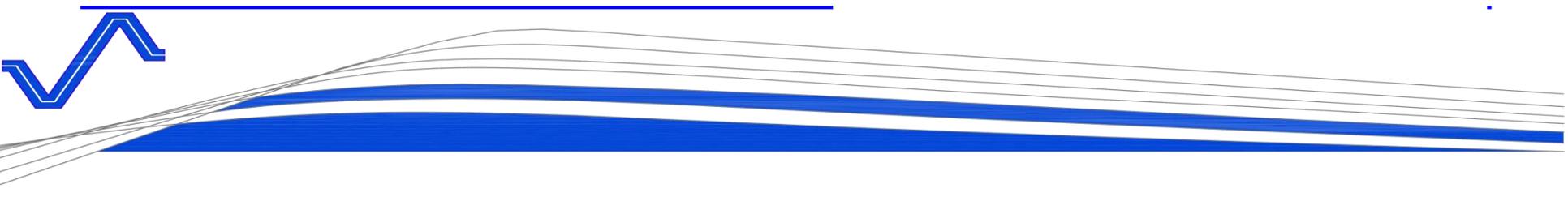
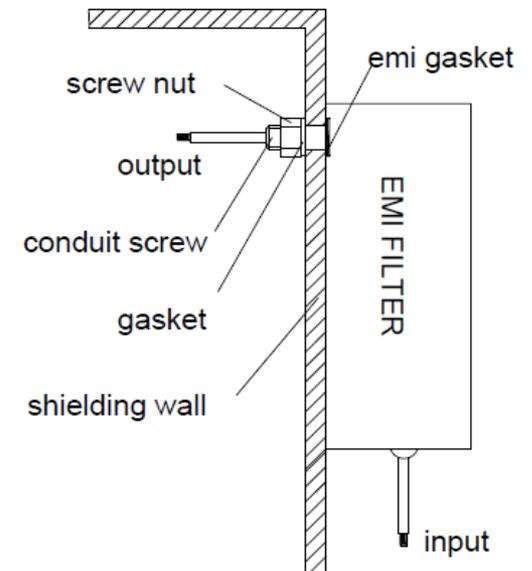


HEMP filters meeting the pci requirements of Mil-Std-188-125-1 and -2 and Def Stan 59-188 parts 1 and 2 for E1 and E2 pulses but having increased insertion loss performance for applications where additional performance is needed beyond just HEMP requirement.

All lines have individual input inductors to offer superior transient handling performance and also coupled inductors to offer superior continuous wave EMC performance in a small package. All lines feature high-energy varistor transient suppressors.



5. Installation Diagram:



Current overrating: 10x for 1 second  
1.5 for 15 minutes  
Voltage overrating: 1.1x continuously  
1.5x for 1 minute  
IP class: IP-64  
Flammability: UL 94V-0  
Operating temp.: -45 to + 85 Degr.C



## We suggest....

On EMP chambers we always suggest as follow:

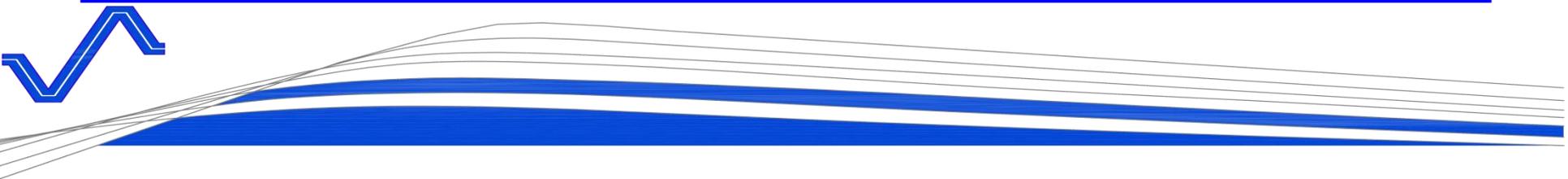
**EMP filters:** to work on electromagnetic impulse (signal generators, wide band on all frequencies in EMC)

Our power line filters meet point of entry requirements of **MIL-STD-188-125-1** for short and intermediate pulses.

These filters are fitted with high transient suppressors in front of the inductive input circuit, resulting in low residual currents during an EMP pulse and protecting the connected equipment.

**Filter cabinets** supplied with two separate removable covers to access input and output terminals. The output compartment is supplied with an EMI (RF) non-corrosive, environmental gasket to prevent RF Leakage and accommodate maximum isolation between input and output compartments. The input compartment is supplied with a moisture resistant gasket.

**Bleeder resistors** are built into each filter line to discharge the capacitor voltage to ground potential during power shutdown.

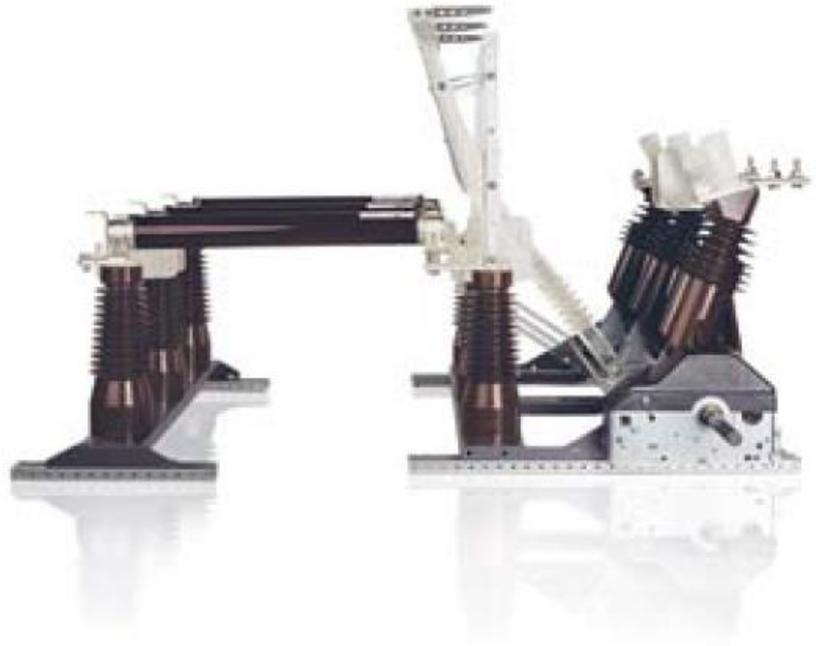




## Automatic disconnectors: high currents and induced voltages

Particulars	Center Break	Double Break	Earth Switch	Semi Pantograph
Maximum System Voltage	33-420 kV	11-420 kV	11-420 kV	123-420 kV
Rated Current	100-4000 A	100-4000 A	100-4000 A	800-3150 A
Mounting Options	Horizontal, Underhung	Horizontal, Vertical, Underhung	Horizontal	Horizontal
Earth Switch	Single, Double	Single, Double	n/a	n/a
Short-time withstand	Upto 40 kA/3s	Upto 50 kA/1s	Upto 50 kA/1s	Upto 50kA/1s
Special Purpose*	Tandem arrangement	Tandem arrangement, Double isolator	Tandem Arrangement	n/a
Galvanized Structures	Yes (Pipe type, Angle type)	Yes (Pipe type, Angle type)	Yes (Pipe type, Angle type)	Yes (Pipe type, Angle type)





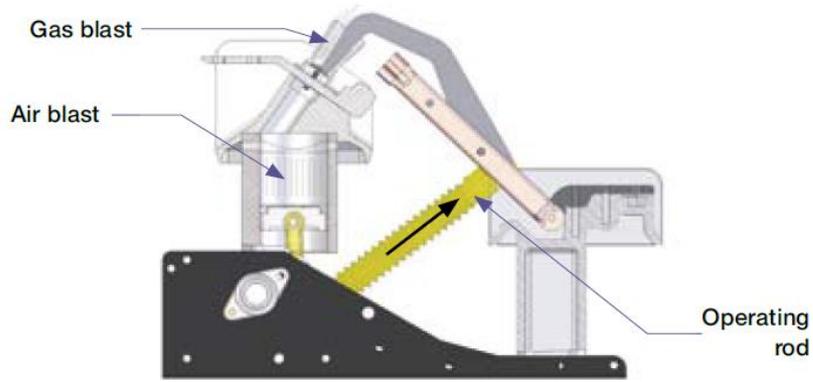


Fig. 4 Interruption

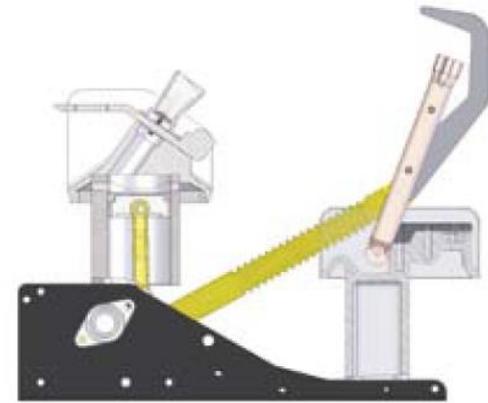


Fig. 5 Switch disconnector in open position

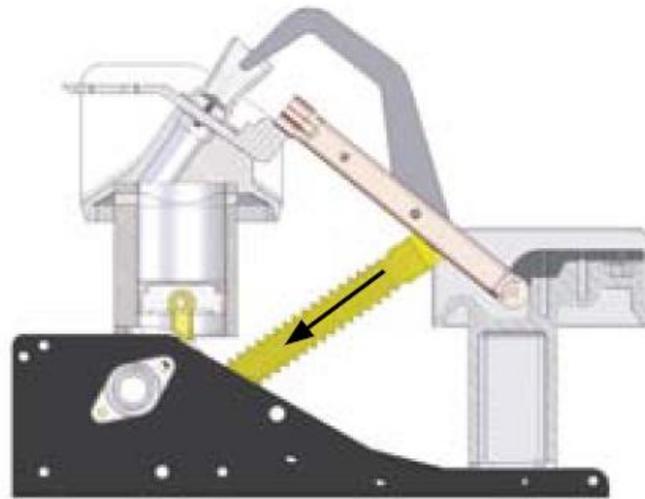
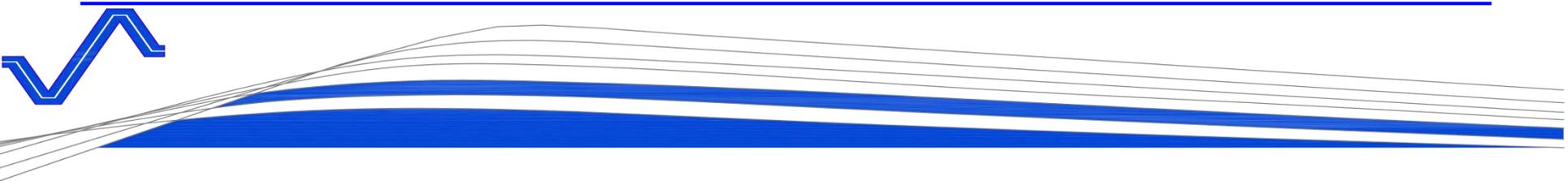


Fig.6 Closing



# TEST

a) Few items comes after certification test made in the manufacturing site (doors, Honeycomb, EMP filter...) all following IEEE:2009-2006 procedure test.



# TEST

- b) Some other components comes with C.o.C. (gaskets etc...)
- c) Certification test made with full equipment when chamber is built up:  
IEEE299-2006



# EMC Chambers

