GTEM-1500
For emissions and immunity testing

Introduction

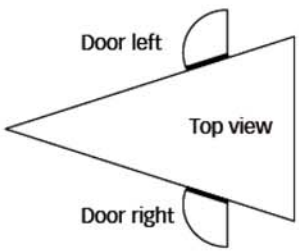
The GTEM (Gigahertz Transverse Electro Magnetic) cell is a low-cost alternative measurement facility for both radiated emission and immunity measurements. In principle the GTEM cell is a coaxial line expanding pyramidally at its end terminated by a combination of broadband resistors and RF absorbers designed and constructed to match an impedance of 50 Ohms.

It is included in the recently published standard IEC/EN 61000-4-20 "Emission and Immunity Testing in Transverse Electromagnetic (TEM) Waveguides". Compared to other measuring methods like EMC test in anechoic chambers or OATS (Open Area Test Sites), GTEM-cells offer some significant advantages for the testing of small and medium sized EUT´s (Equipment Under Test) up to a frequency range of 20 GHz. Quick turnarounds of the EUT as well as numerous testing variations are easy and fast to handle. Switching from emission to immunity testing requires only simple adjustments from receiver input to amplifier output.

You are irrespective of long waiting times associated with off-site test labs or weather and ambient delays that can occur at OATS facilities. Whether you are at the design qualification, pre-compliance, compliance, or production sampling stage, the GTEMCELL is the right choice for you!.

GTEM 1500, door Left side

- **Emissions and immunity testing in a single, shielded environment**
- **Meet basic standard:**
  IEC/EN 61000-4-20,
  for emission testing: CISPR 14-1,
  IEC 61000-6-3,
  IEC 61000-6-4 for EUTs without connected cables,
  for immunity testing: EN60118-13 Automotive: ANSI C63.4 Annex F (2009); SAE J1752/3
- **Ideal for design qualification and pre-compliance,**
- **Calibrations of antennas and field probes, test and measuring of wireless transceivers,**
- **Shielding effectiveness testing....**
- **Field generated are largely homogeneous and simple to compute.**
- **Efficient power conversion: requires smaller power amplifiers**
- **Excellent VSWR over the entire frequency range**



Standard Configuration:

- Trolley with 30cm. height
- Door, Left or Right (on demand), clear opening 80x120cm.
- EUT Line filter box for 2x16A with magneto-thermal switch and hearth ground connection. Supply by: IEC 16A input tape and Schuko 16A output socket.
- Hi power termination resistors 1Kw
- Media interface: 1 N connector, 2 SMA, 1 fiber-optics (3 couples).
- Factory Measurement reports for input power requirements, and VSWR
- Shipped disassembled, requires *GTEMCELL* supervisor. Option: DIV-ASS

Options:

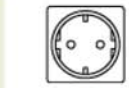
- Shielded window: Diam. 25cm
- Switchable illumination with LED lamp
- Media interface: additional N and SMA,
- 9-poles signal filter DB9,
- 25-poles signal filter (DB25),
- RJ485 feed-thru connector
- RJ11 (RJ9) feed-thru connector
- Additional: DC termination plugs.
- wave guide channel for fiber optic leads 6 couples
- Additional RF feed-thru N type connector
- Additional RF feed-thru SMA type connector
- Door contact safety interlock for free application
- INOX stainless steel version for Tropical environment.
- Ferrite coating panels and Frankonia's absorbers on bottom
- Additional secondary door
- honeycomb panels
- Technical exchange media panel pre-drilled for for customized applications
- Customized I/O filters solutions up to 400A
- XZY Manipulator
- 2KW terminations

Assembly

- Supervisor build up for GTEM-1500. (Travel and accommodation costs are additionally.

Ordering information:

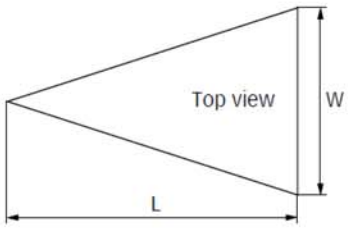
The door side and the single phase AC line sockets need to be selected: Without advise we assume to supply the door left side and Schuko socket.

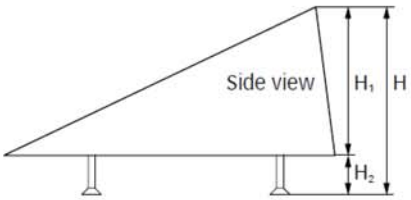

Schuko

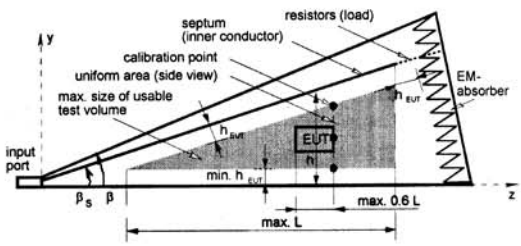

UK version

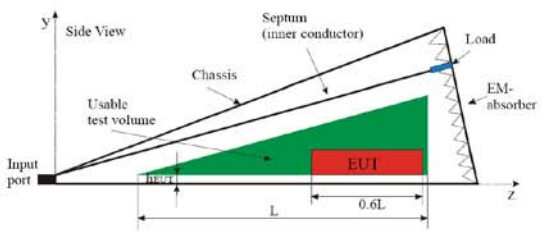

US/JP version

* Options such as ferrite coating on the bottom and GTEM's stainless steel frames should be decided at time of order. All other options can be added at any time without notice.



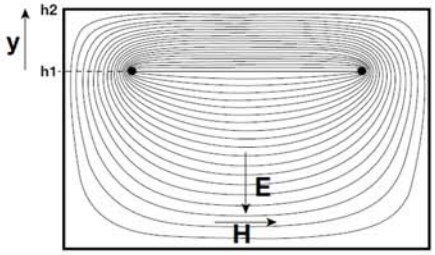




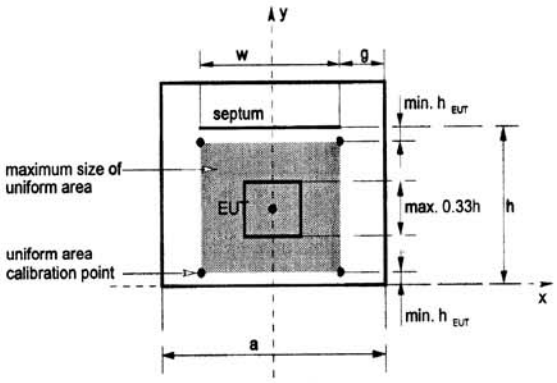


Technical Specifications

Height of septum in the test section at marker position	h = 1500 mm
Max. septum height in the back of cell	H_h = 1856 mm
Dimensions(LxWxH) m.	7,16x3,83x2,73
Weight	Approx. 1500Kgs
Height H_1 of cell corpus in m.	2,43
Height H_2 of the trolley in m.	0,3
Door clear opening (LxH)cm.	80x120 (left side)
EUT Max. dimensions (LxWxH)m	1,2x1,2x0,8 *according to the door size
EUT Dimensions for uniform area 0 to 6dB (LxWxH) in m.	0,5x0,5x0,5
Max. test volume (IEC/EN61000-4-20) h/3 x 0,6w x 0,6L	0,5 x 1,75 x 3,5
Maximum EUT testing volume (0 to 3 dB)	
h_{EUT} = h/3	0,5
Distance of the testing section from back of cell along *z* axis	L_S = 1440 mm
Testing section dimensions m.	a=2976, b=2051, h=1500, w=2130
Frequency range	DC to 20 GHz
Frequency range according IEC/EN61000-4-20	30MHz to 1000MHz
Shielding effectiveness (30MHz to 3GHz)	>60dB (Typ.>80dB)



EM Field strenght pattern



Required input power for 10V/m (isotropic, 9 points, 80 to 1000MHz)	21,9W (6,8W CW)
Field deviation (isotropic, 9 points, 30 to 1000MHz)	<6dB
RF input connector	N UG-21 connector *Optional 7/16"
Nominal Impedance	50 Ohm
Max. Input Power	1KW (*frequency depending)
Typical VSWR:	1:1,2
Typ. VSWR at critical frequency:	1:1,6
Electrical	
Main Switch:	magneto-thermal 16Amp. mono phase
Input Socket plug:	16Aac (Mono Phase + Ground)
Output Socket EUT tape:	16 Aac (Mono Phase + Ground) Schuko type
Ground connection:	M6 bolt
AC filter wires	(Mono phase +Ground) 16Amp. 2 poles.
Channel for fiber optic leads:	3 couples
RF feed-thru connectors:	N. 1 double N female
RF feed-thru connectors:	N. 2 double SMA female

TESTING VOLUME - CALCULATING POWER REQUIRED – (Theory)

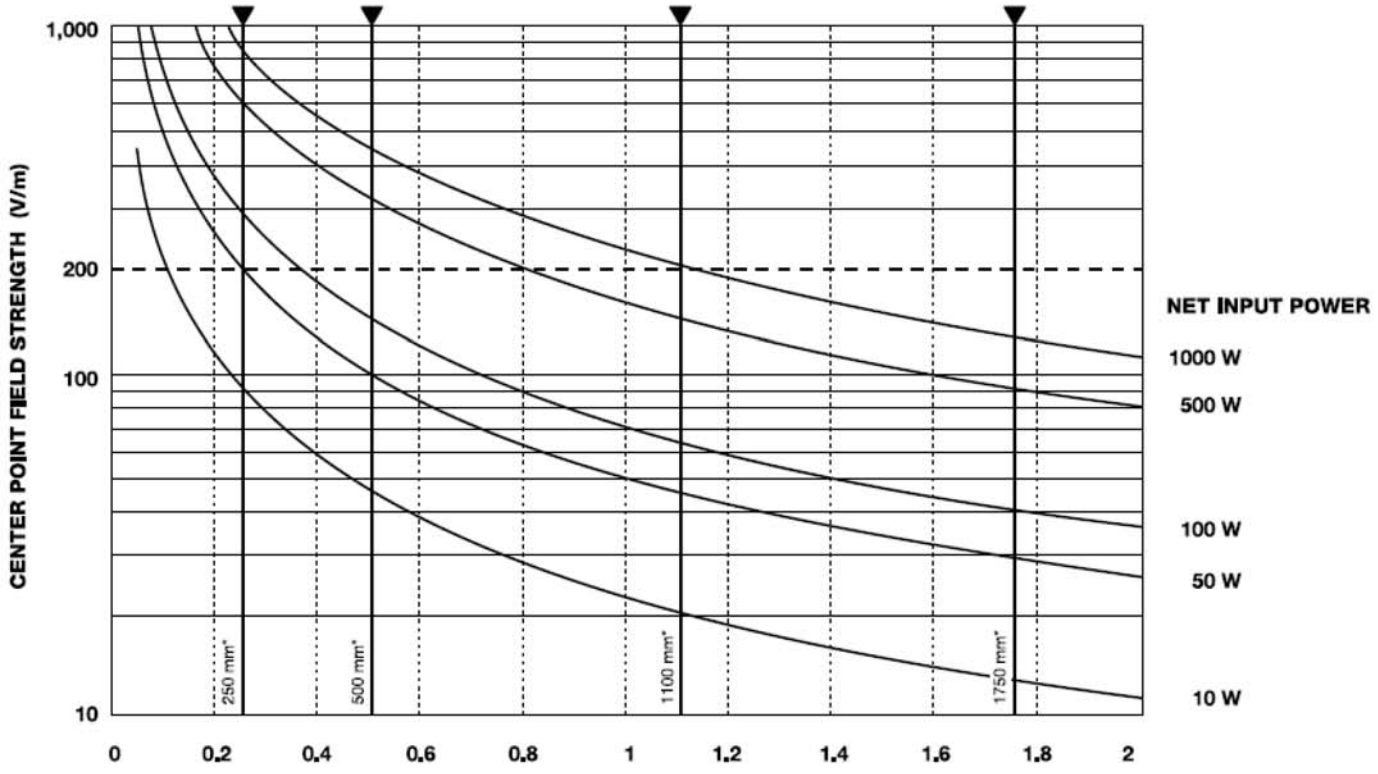
Basically, we consider the volts per meter, the height of the septum, the allowance of voltage peaks caused by amplitude modulation and the flatness with frequency.
Generally allowed flatness is 3 dB, this only takes effect after the first resonance point.
The example below shows 10 V/m with a GTEM 1500:
Septum height = 1,500 m
Flatness = 3 dB = 2

Power Required = (E x h)^2 /R x Flatness x Modulation Allowance

Where **E** = required field strength: **h** = septum height: **R** = GTEM input impedance 50 Ohm
Power Required = (10 x 1,500)^2 / 50 x 2 x 3.24 = **29,16 Watt**

GTEM 1500 - Power requirements				
Field Strenght [E]	**Flatness**	**Modulation allowance**	**Required power modulated**	**Required power CW**
V/m	**3dB = 2**	**80% AM**	**Watts**	**Watts**
3	2	3,24	2,63	1,12
10	2	3,24	29,16	9
30	2	3,24	262,44	81

Theoretical Field Strength vs CW Input Power



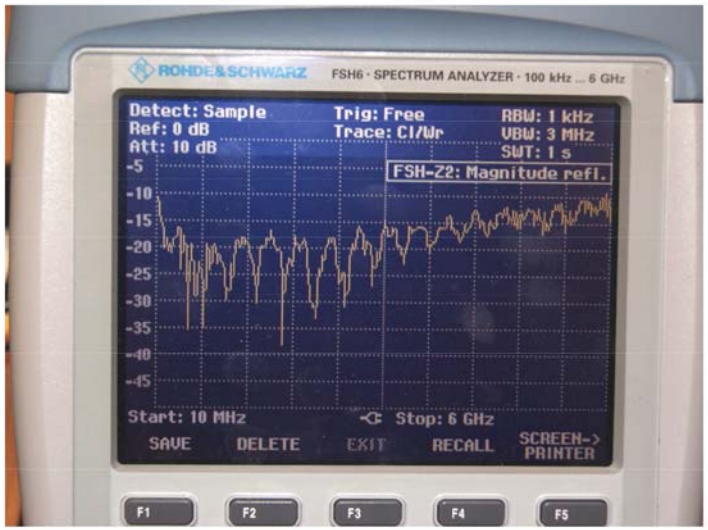
(*at rear of test volume)

E-Field variation may be ± 3 db with respect to theoretical field strength depending on frequency and location in test volume.

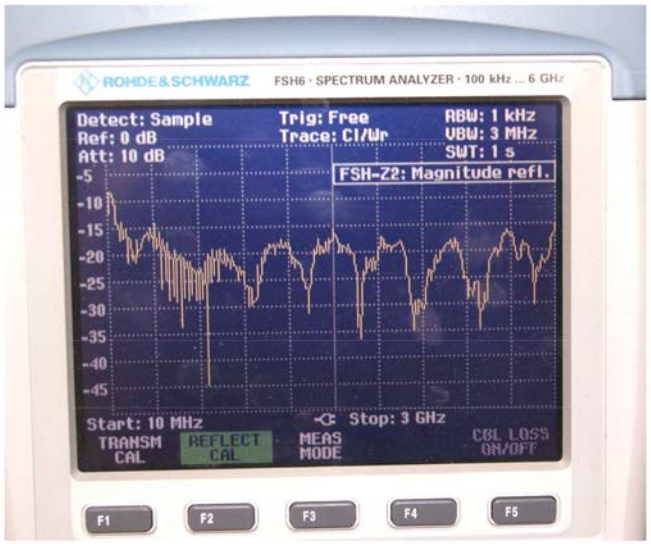
Factory controls:

Performance test.
A verification test was performed on site of the installation with a Rohde e Schwarz FSH6 spectrum analyzer and its SWR bridge accessory.

REFLECTION COEFFICIENT:
S11 magnitude of GTEM 1500 in the range 10MHz-6000MHz



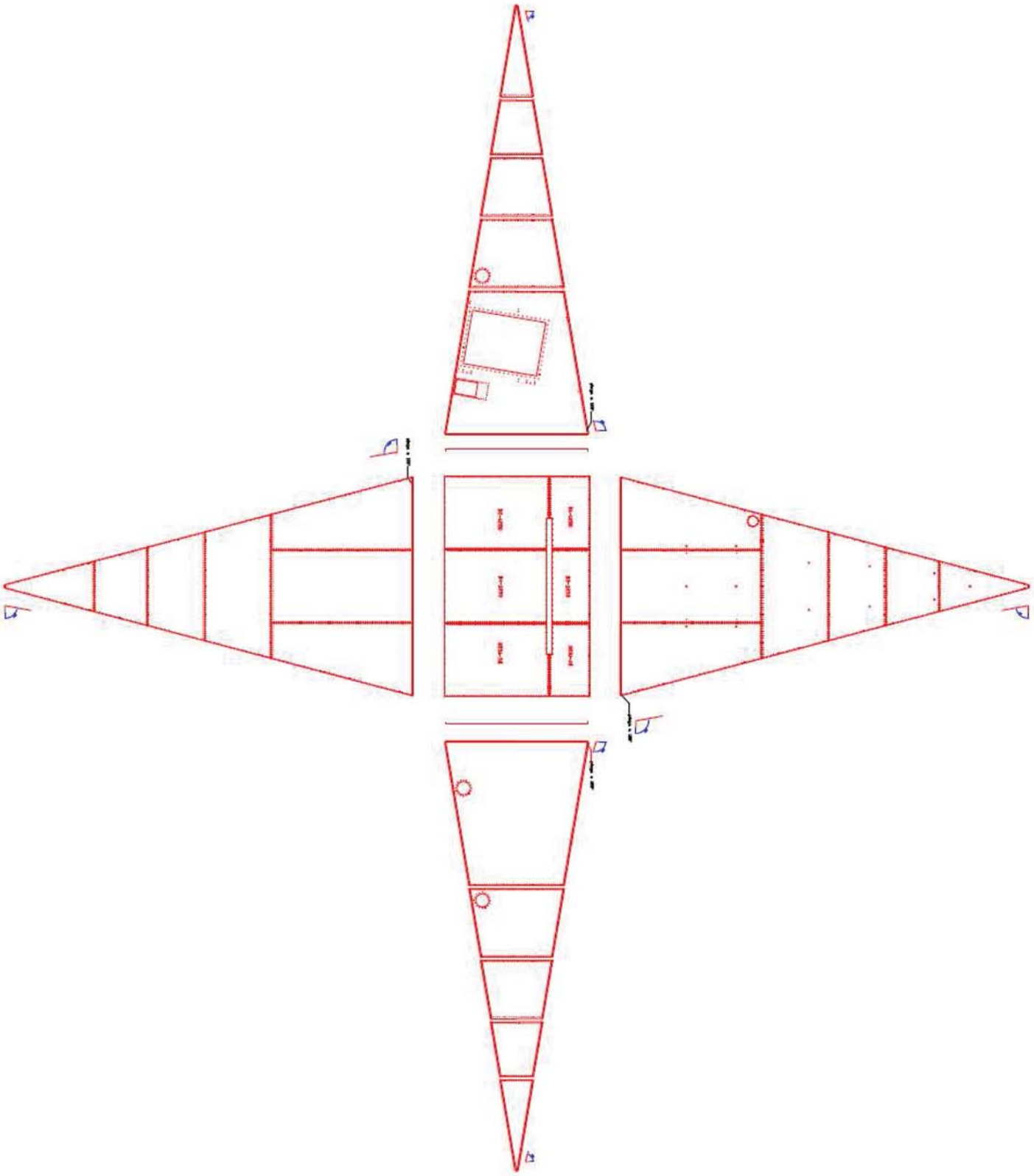
REFLECTION COEFFICIENT:
S11 magnitude of GTEM 1500 in the range 10MHz-3000MHz



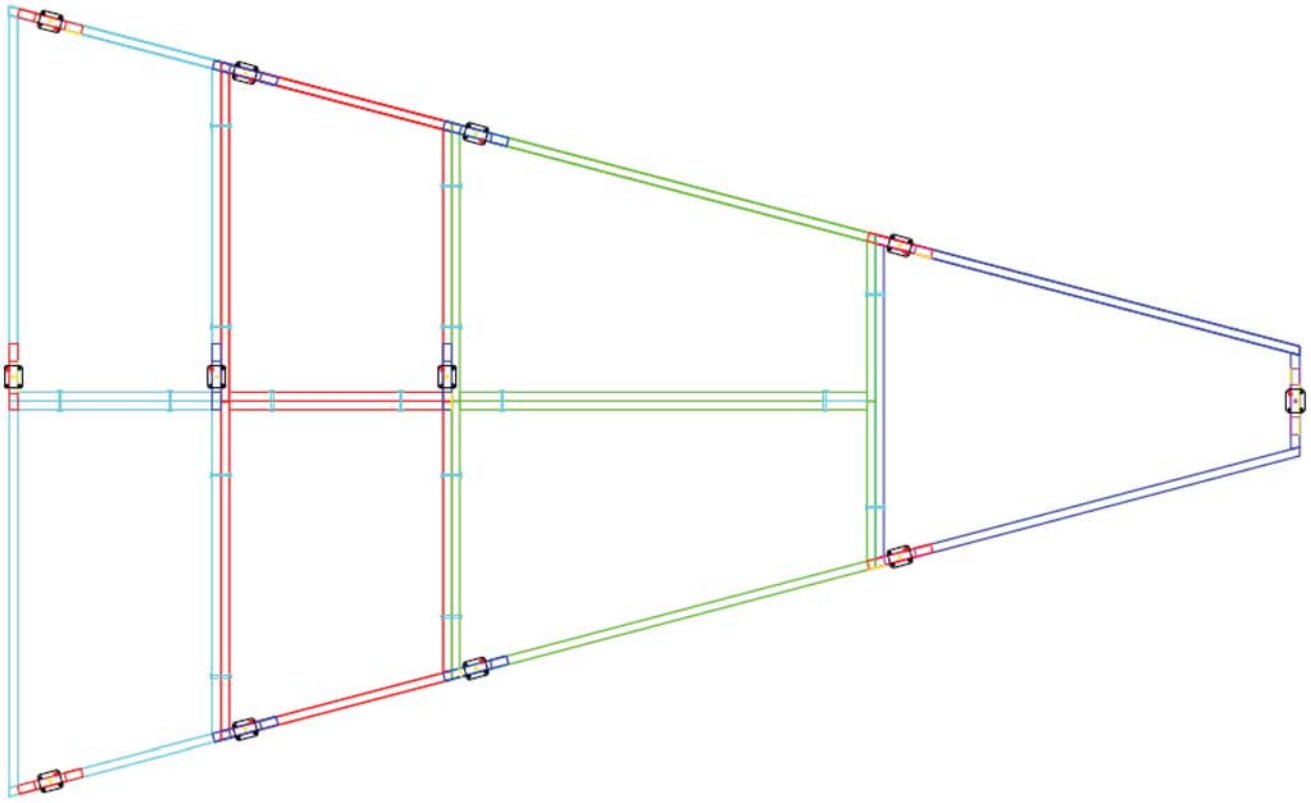
Tab.1 Guaranteed reflection coefficient S11

GTEM 1500
Reflection coefficient S11
<-14 dB in 100 MHz-3,8 GHz

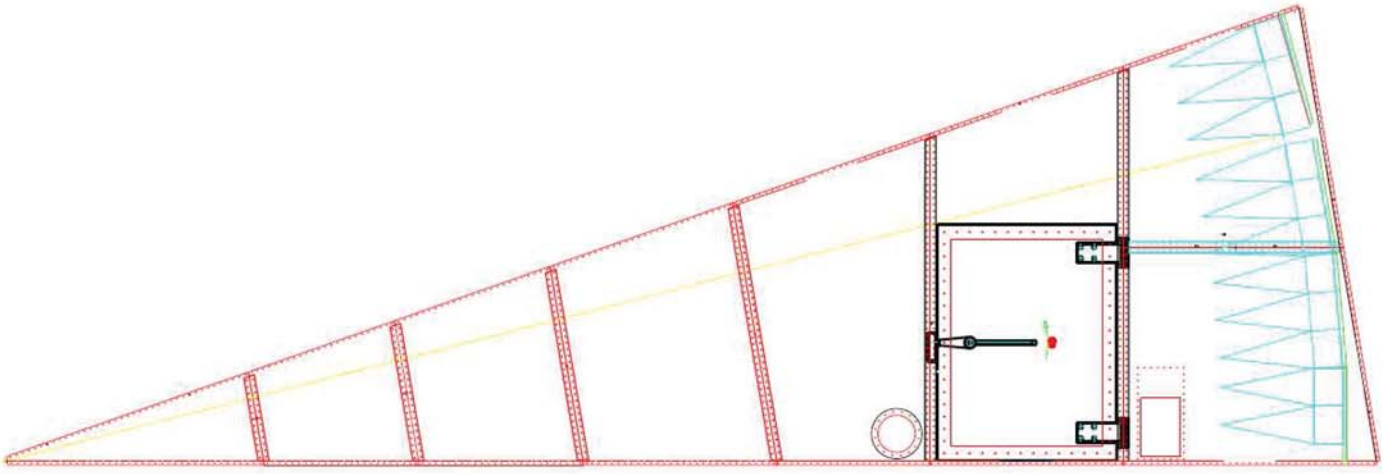
MECHANICAL
Metal sheets configuration



Trolley



Front view, door and absorbers



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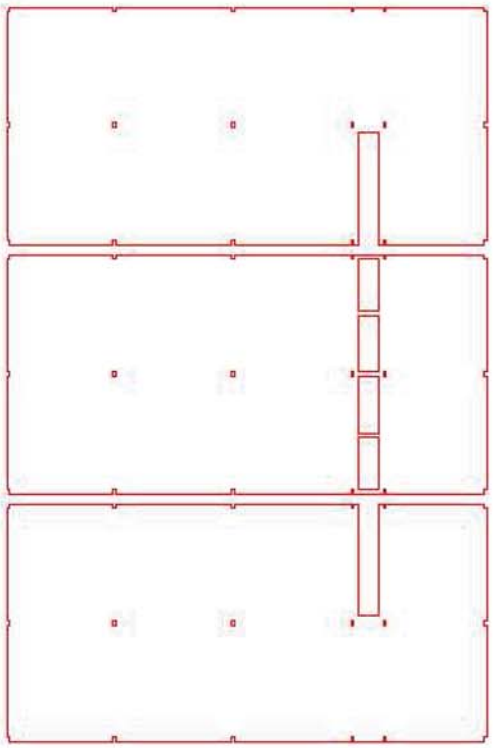
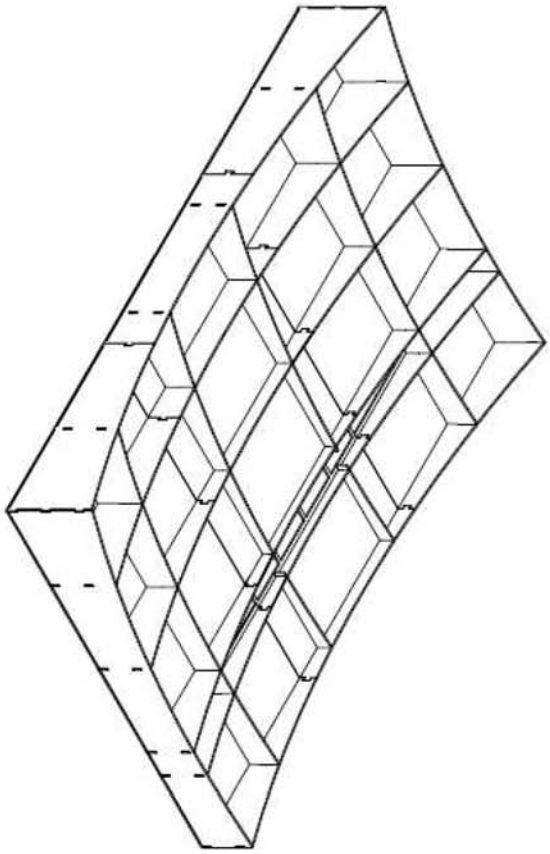
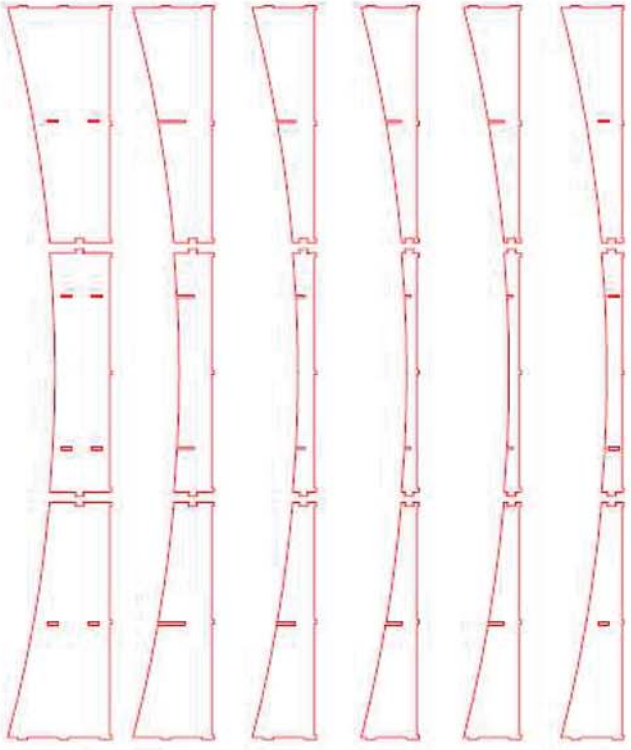
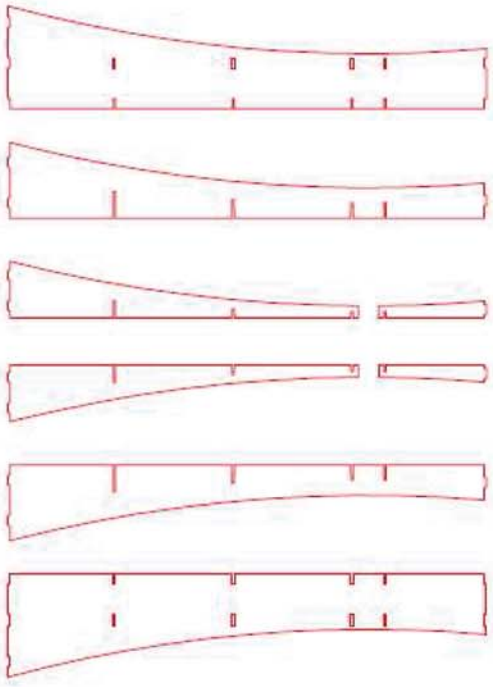
Spherical bottom - wooden structure









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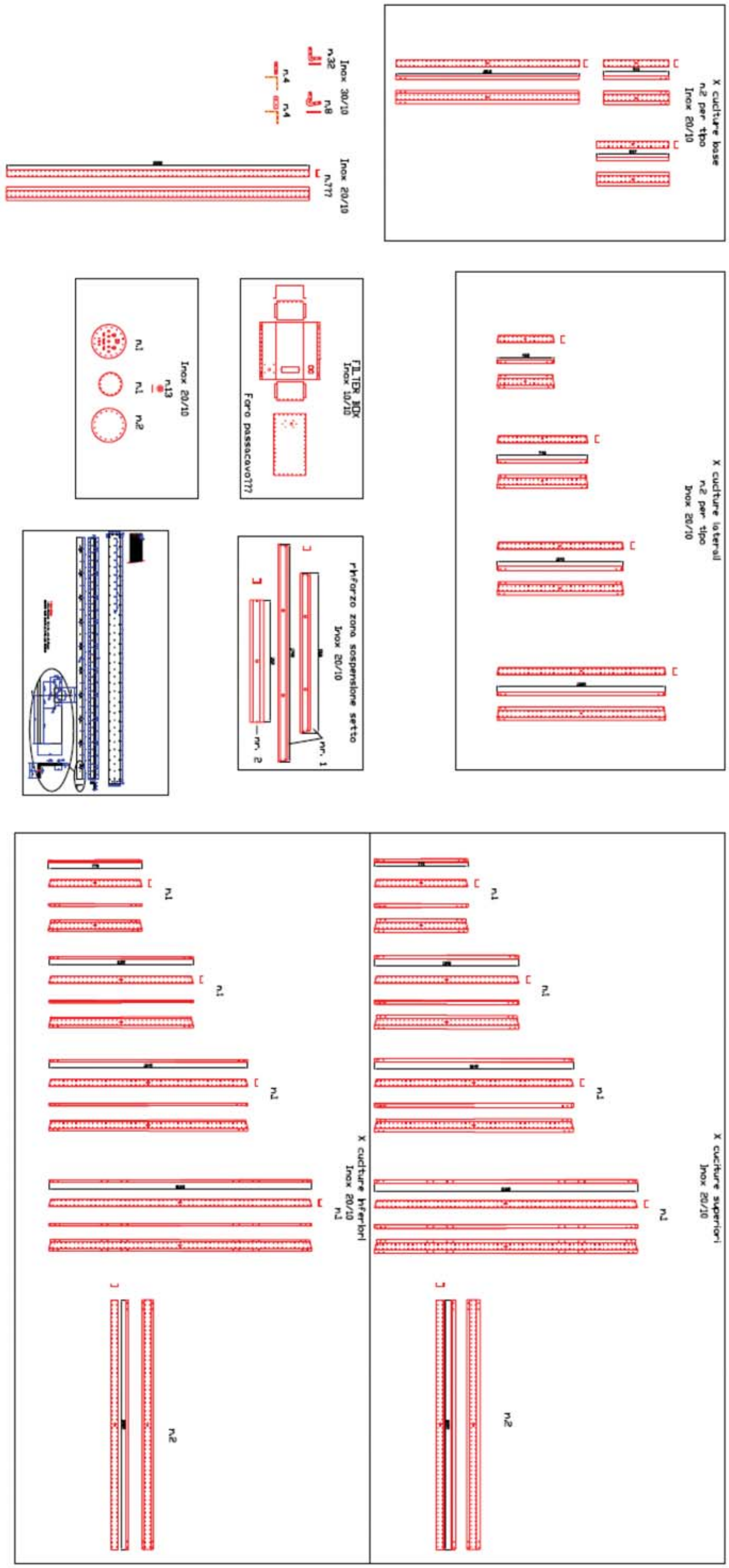
Renforcement bars



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Door details