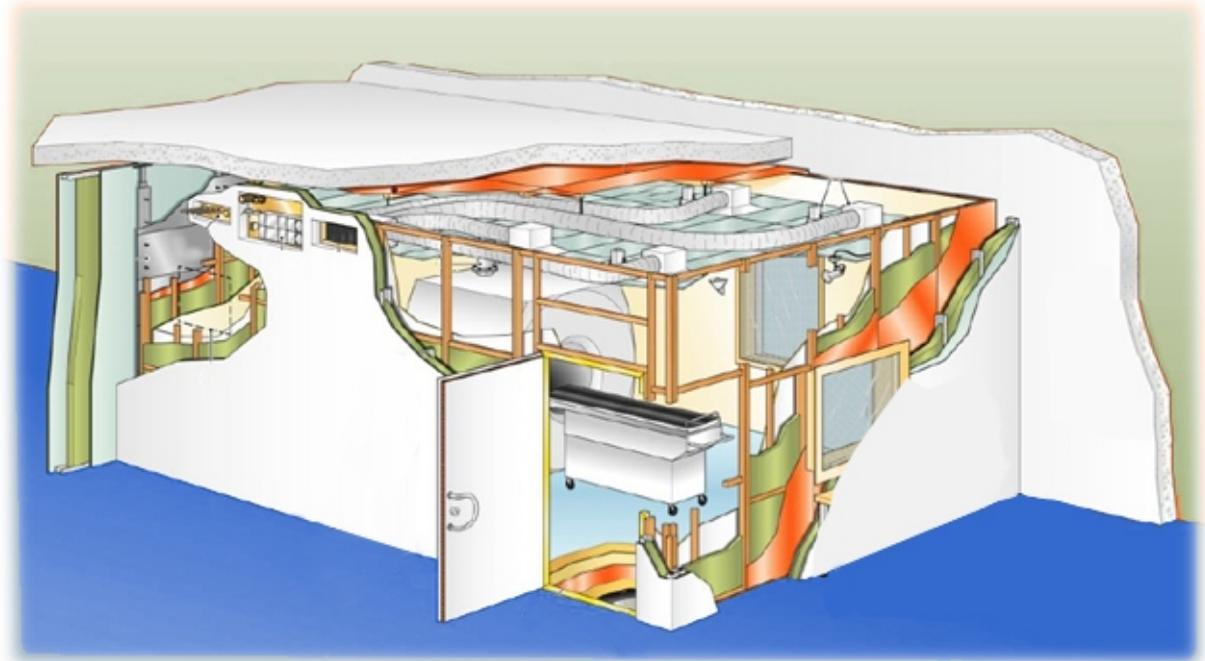




Radio Frequency Shielding & Applications

MRI equipment generates strong RF (radio frequency) interference which can disrupt smooth working of other electronic equipment in the nearby vicinity. Vice versa, external RF signals may be picked up by the MRI system which will adversely impact the accuracy of the imaging data. Thus MRI rooms have to be effectively shielded from both incoming and outgoing RF interference.

To provide RF shielding, a Faraday's cage have to be build to cover the MRI scan machine with varied metals like Copper, Galvanized Iron and Aluminium depending on numerous specifications and customer requirements. The shield should have good attenuation of more than 90DB to perform which will isolate the MRI scan machine from rest of structures of building, electronics equipments etc.



About NuMed Systems

NuMed Systems specialises in designing and manufacturing of shielding products for MRI Scanner containing devices either sensitive to Radio Frequency signals or that generate electromagnetic interference.

NuMed Systems is a healthy growing company which pursues a policy of ongoing technological development. RF shielding is our strong business vertical and we are fully committed in providing the highest quality shielding solutions with optimal costing models. NuMed Systems has a strong business accumen with project foot print across India and Nepal. Numed's quality management system is certified according to ISO 13485:2016 and is designed to best fit industry's latest trends.

OUR MISSION

'NuMed Systems' is committed to provide high quality and innovative products and services that meet the needs of patients and healthcare providers in an ethical, honest, and collaborative manner



RF Shielding:

The critical MRI scan room is shielded using a pre-formed Aluminum/copper/galvanized iron panels, a shielded RF door and laminated mesh window. All other services in room such as air condition, helium vent, water supply, medical air, fire fighting systems are routed through specialized waveguides mounted on walls. All these elements will form 'NuShield', a comprehensive RF shielding solution

Key Product Features

- NuShield is basically a Faraday cage constructed of panels of high-quality copper foil, Aluminum or Galvanized Iron
- The self-supporting structure of pre-fabricated wall elements makes them independent of the surrounding walls, greatly simplifying assembly and installation
- All fittings are non magnetic materials. Doors, windows and penetrations for supply services are also shielded or fitted with filters to prevent RF leakage.
- RF enclosures are delivered to site in prefabricated modules or assembled by NuMed trained technician thus consuming lesser turn around time.
- With the exception of the floor, the RF cage can be dis-mantled and erected at another location if necessary



Product Features and Highlights:

SI No	Category	Description
1	Wall	0.07mm Thick x 1290 mm Wide ED Copper sheet attached to self-supporting modular wooden frame made of Kongu/ Salwood/ Pinewood and finished with 18mm Prelaminated Particle board
2	Floor	1 X 18mm and 1x 12 mm MDF over Copper above a Moisture resistant barrier (Bitumen Sheet) and finished with 2mm Vinyl floor
3	Door	1.2m x 2.1m door with high-quality brass frame with Copper Fingers attached to all 4 sides of the door provides for ease of opening and good RF contact
4	Window	RF Shielded window, 1.2m x 1m
5	Wave guides	4 nos. SS 304 wave guides for medical gas line and optical fibres
6	A/C Ducting	4 Nos powder coated Aluminium Diffusers, 2 for Supply and 2 for return connected with flexible air duct attached to Honey comb filters
7	False Ceiling	600 x 600 Armstrong modular ceiling with Armstrong make Biomedical grade tiles & Non-magnetic support with Aluminium Square pipe pest on Ceiling with concealed aluminium framework
8	Room Light	MRI Compatible LED light - S2 / Rock forest Make (6inch x 6inch LED Module 12W - White Colour) and cabling for lighting circuit
9	Power sockets	6 / 16 Amp - 5 pin Power Sockets with Switches (Inside MRI Room)
10	Service area Light	2' LED MRI compatible tube light at magnet service area and cabling for lighting circuit
11	Medical Gas Line	Medical Gas lines (3 Outlets Inside RF Cage and Flexible hoses will be routed outside) O2, Air and Vacuum
12	Sound Proofing	50 mm Thick Glass wool/ Rock wool soundproofing at 5 sides (Except Floor)



Product Details

The wall

The walls of the RF enclosure are made from self supporting wooden frames. These approximately 1 m wide frames are built to the desired room height and are placed at an average of 50 mm distance from the structural room walls. The structural room walls of brick or plaster, as built by the contractor, do not need to be finished on the inside. It is possible to build these walls before or after erection of the RF enclosures. However, precaution must be taken not to damage the copper if built afterwards. Architectural Site Planning Guide

With some exceptions, the walls will usually contain filters for air, electricity and other services. To give access to these filters the architect will provide openings in the structural room wall according to drawings provided by NuMed. In a few cases these filters are installed in the ceiling or the floor.

The wall frames of the RF enclosure receive vertical furring strips at 62,5 cm center distance. This dimension may be changed at the customer's request. These wooden strips provide solid fixing points for the interior decoration panels. The interior finish may be provided by local trades or can be ordered from NuMed. The base frames are filled with rock wool insulation to provide thermal protection and soundproofing. System generated noise may be quite loud and sound dampening is necessary for users and patients comfort. NuMed has designs for the enclosures to provide this additional noise insulation.

The floor

NuShield prefers a design which utilizes a depressed floor if at all possible, which will avoid a ramp and provide a smooth entry of beds and helium Dewar container.

The depression or depth recommendation for a standard floor is 25 mm if the door opens outward.

The floor consists of several layers. Most important is the dielectric separation of the RF enclosure from the rest of the building. NuShield uses special tar sheets.

The copper is protected after soldering by a floor board.

It is important to realize that an antistatic or conductive vinyl floor, if required by the system supplier, needs a special installation procedure inside an RF enclosure. NuShield uses copper ribbons which are placed so that they are interconnected and grounded.

RF Doors:

NuShield is indigenously designed and manufactured to ensure a durable High Quality Door. Apart from being a good RF shield, the door of an MRI room also has to be easy and safe for medical staff to use and look attractive to reassure patients. A high-quality frame provides for ease of opening and good RF contact. Worn contact fingers around the edge of the door can be replaced without difficulty with the door in site. The standard size is 1.20 m x 2.10 m and the outer surfaces are a white laminate, but other sizes and colours are available on request. Regardless of whether a door is locked or not, it can always be opened from the inside for safety.



RF Windows :

RF windows are double-glazed with a special safety glass that incorporates two layers of bronze mesh as the RF shield. The bronze mesh is blackened to avoid reflection and the layers are positioned to minimise moiré patterns. The transparency of the windows is excellent and they afford an unhindered view of the scan room. The standard observation window has a viewing area of 1.2 m x 0.9 m. Other sizes are optionally available for observation and daylight windows and skylights.



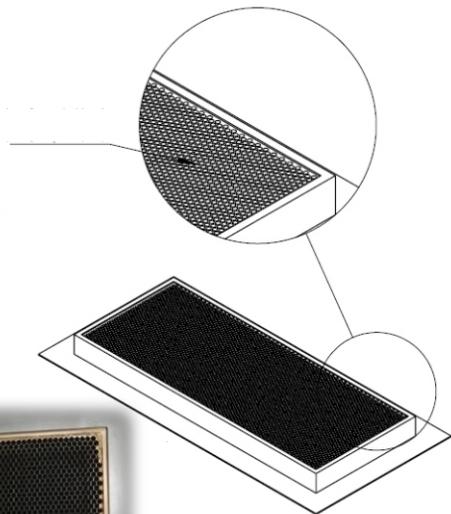
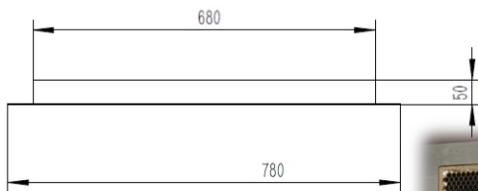
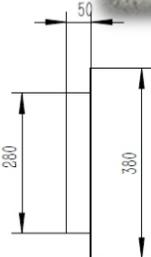
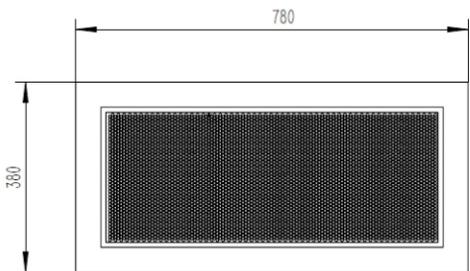
Wave guides

Air, gas and liquid medias must enter or leave the RF enclosure through wave guides. This is a device that blocks RF waves and it is available in different forms and sizes.

Honey-comb type air vents are used for ventilation and air conditioning. The standard size is 600 mm x 200 mm. On special request almost any other rectangular size up to 900 mm x 600 mm may be built.

Brass pipes are used for other media including fiber optic cable. Medical gases or liquids are usually carried in plastic or rubber hoses.

In some sites special wave guides are required for medical gases. They have copper pipes on both ends and can therefore be incorporated directly into the medical gas distribution system of the hospital.



A/C Ducting

NuShield uses non metallic spiral ducts for flexible routing and also eliminate spikes as compare to metallic ducts. For Honey comb Grill 2' x 2', aluminum diffusers of 6" ducts are used, which is sufficient enough to supply 500 m³/Hr. To reduce noise of airflow, plenum of adequate size is used before diffuser.



Ceiling and False Ceiling:

The ceiling is built with similar panels as the wall described above the ceiling is suspended from the structural room ceiling using dielectric isolators. The minimum suspension height is 50 mm. For structural calculation purposes, the weight of the ceiling may be Architectural Site Planning Guide assumed as 12 kg/m² plus the weight of suspended ceiling tiles and eventual electrical components and any other installations in the plenum.

NuShield Prefers 2' x 2' Mineral fiber Grid Ceiling Which has Noise and moisture absorption capabilities, which is also a fire retardant material. However, We do Aluminium or Gypsum False ceiling with Coving etc. as per Customer Choise.

RF Attenuation and RF Testing

The best MRI results can only be obtained in an environment which is free of electromagnetic interference. NuMed has realized this business problem and that is why they have come up with optimal RF testing solutions.

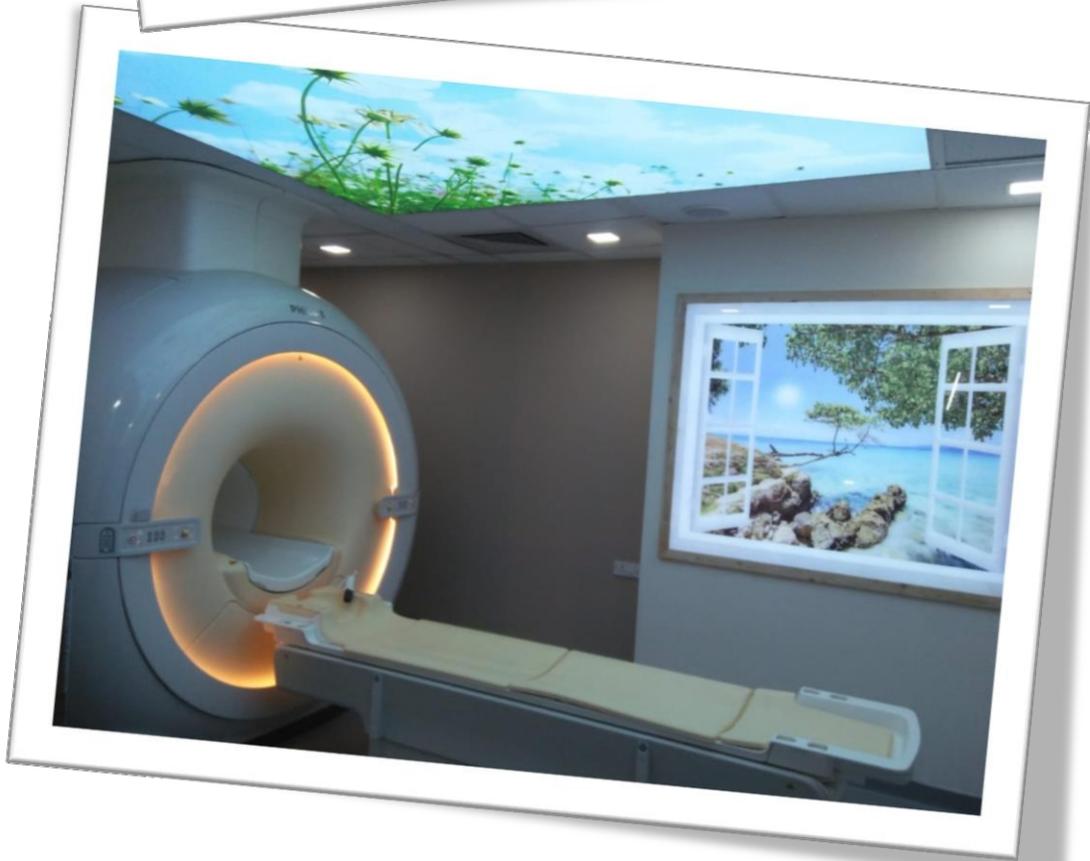
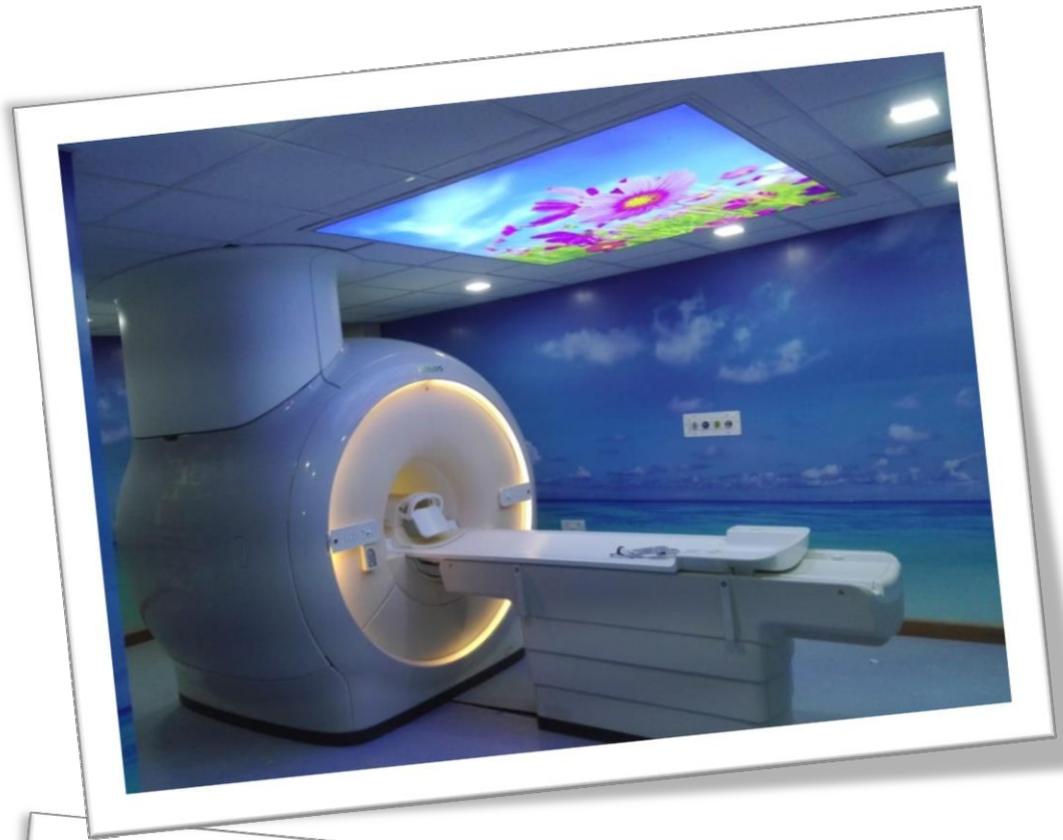
With NuMed RF enclosure you are assured of unsurpassed shielding characteristics, the basis of consistently high long-term diagnostic quality and all-round operational reliability.

Standard attenuations for copper foil RF enclosure

Magnetic field	10 MHz	90 dB
	15 MHz	100 dB
Electric field	10 kHz	100 dB
	30 MHz	100 dB
Plane waves	30 MHz	100 dB
	100 MHz	100 dB
	150 MHz	100 dB

Before handing over the installation to the user, the confirmity of the entire enclosure with the requirements of the respective MRI manufacturer is verified by certified personnel using the apt field measuring instruments and the results are recorded in a test report.





Contact Us

F4 Kubera Homes, Kubera Nagar 2nd Street,
Ayancheri, Urapakkam,
Chennai-603210, India.
Phone: +917401114488
E-Mail: Info@NumedSystems.com

