REV	DATE	MODIFICATIONS
A	10/Jul/2018	First issue drawing / Final study based on MRI-

Typical

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01 - C1 - Cover Sheet
02 - C2 - Disclaimer - Site Readiness
03 - A1 - General Notes
04 - A2 - Equipment Layout
05 - A3 - Section Views
06 - A4 - Acoustic - Proximity Limits
07 - A5 - RF shielding
08 - A6 - Equipment Details (1)
09 - A7 - Equipment Details (2)
10 - A8 - Equipment Details (3)
11 - A8 - Delivery
12 - S1 - Structural Notes
13 - S2 - Structural Layout
14 - S3 - Structural Details
15 - M1 - Mechanical Layout
16 - M2 - HVAC-Venting
17 - M3 - Chilled Water
18 - M4 - Cryogenics (1)
19 - M5 - Cryogenics (2)
20 - E1 - Electrical Notes
21 - E2 - Electrical Layout
22 - E3 - Electrical Elevations
23 - E4 - Electrical Details
24 - E5 - Electrical Details (2)
25 - E6 - Power Requirements
26 - E7 - Interconnections

A mandatory component of this drawing set is the GE HealthCare Pre Installation manual. Failure to reference the Pre Installation manual will result in incomplete documentation required for site design and preparation.
Pre Installation documents for GE HealthCare products can be accessed on the web at: *https://www.gehealthcare.com/support/manuals*

GE HealthCare does not take responsibility for any damages resulting from changes on drawings made by others. Errors may occur by not referring to the complete set of final issue drawings. GE HealthCare cannot accept responsibility for any damage due to the partial use of GE HealthCare final issue drawings, however caused. All dimensions are in millimeters unless otherwise specified. Do not scale from printed pdf files. GE HealthCare accepts no responsibility or liability for defective work due to scaling from these drawings.

GE HealthCare

OPTIMA MR450W
FINAL STUDY

Drawn by	Verified by	Concession	GON/Quote	PIM Manual	Rev
RET	RET	-	----	5936619-1EN	1

Format	Scale	File Name	Date	Sheet
A3	1/4"=1'-0"	EN-MRI-TYP-OPTIMA_MR450W_HM-NF.DWG	06/Mar/2026	01/26

DISCLAIMER

GENERAL SPECIFICATIONS

- GE is not responsible for the installation of developers and associated equipment, lighting, cassette trays and protective screens or derivatives not mentioned in the order.
- The final study contains recommendations for the location of GE equipment and associated devices, electrical wiring and room arrangements. When preparing the study, every effort has been made to consider every aspect of the actual equipment expected to be installed.
- The layout of the equipment offered by GE, the dimensions given for the premises, the details provided for the pre-installation work and electrical power supply are given according to the information noted during on-site study and the wishes expressed by the customer.
- The room dimensions used to create the equipment layout may originate from a previous layout and may not be accurate as they may not have been verified on site. GE cannot take any responsibility for errors due to lack of information.
- Dimensions apply to finished surfaces of the room.
- Actual configuration may differ from options presented in some typical views or tables.
- If this set of final drawings has been approved by the customer, any subsequent modification of the site must be subject to further investigation by GE about the feasibility of installing the equipment. Any reservations must be noted.
- The equipment layout indicates the placement and interconnection of the indicated equipment components. There may be local requirements that could impact the placement of these components. It remains the customer's responsibility to ensure that the site and final equipment placement complies with all applicable local requirements.
- All work required to install GE equipment must be carried out in compliance with the building regulations and the safety standards of legal force in the country concerned.
- These drawings are not to be used for actual construction purposes. The company cannot take responsibility for any damage resulting therefrom.

CUSTOMER RESPONSIBILITIES

- It is the responsibility of the customer to prepare the site in accordance with the specifications stated in the final study. A detailed site readiness checklist is provided by GE. It is the responsibility of the customer to ensure all requirements are fulfilled and that the site conforms to all specifications defined in the checklist and final study. The GE Project Manager of Installation (PMI) will work in cooperation with the customer to follow up and ensure that actions in the checklist are complete, and if necessary, will aid in the rescheduling of the delivery and installation date.
- Prior to installation, a structrual engineer of record must ensure that the floor and ceiling is designed in such a way that the loads of the installed system can be securely borne and transferred. The layout of additional structural elements, dimensioning and the selection of appropriate installation methods are the sole responsibility of the structural engineer. Execution of load bearing structures supporting equipment on the ceiling, floor or walls are the customer's responsibility.

THE UNDERSIGNED, HEREBY CERTIFIES THAT I HAVE READ AND APPROVED THE PLANS IN THIS DOCUMENT.		
DATE	**NAME**	**SIGNATURE**

CUSTOMER SITE READINESS REQUIREMENTS

REQUIRED MANUALS FOR SYSTEM PRE-INSTALLATION	
Description	**Document Number***
Product specific Pre-installation Manual	Refer to cover page
Magnet Room Venting	5850263
RF Shielded Room Pre-installation Requirements for MR systems	5850260
IEC Electromagnetic Compatibility	5850261
Acoustic Room Details	5850262
Magnet Venting Conformance Assessment Form	2705036
*documents can be accessed in multiple languages at *https://www.gehealthcare.com/support/manuals*	

- A mandatory component of this drawing set is the GE HealthCare Pre-installation manual. Failure to reference the Pre-installation manual will result in incomplete documentation required for site design and preparation.
- The items on the GE HealthCare Site Readiness Checklist **DOC2949060** and Worksheet **DOC2949068** are REQUIRED to facilitate equipment delivery to the site. Equipment will not be delivered if these requirements are not satisfied.
  - Any deviation from these drawings must be communicated in writing to and reviewed by your local GE HealthCare installation project manager prior to making changes.
  - Make arrangements for any rigging, special handling, or facility modifications that must be made to deliver the equipment to the installation site. If desired, your local GE HealthCare installation project manager can supply a reference list of rigging contractors.
  - New construction requires the following;
    1. Secure area for equipment,
    2. Power for drills and other test equipment,
    3. Restrooms.
  - Provide for refuse removal and disposal (e.g. crates, cartons, packing)
  - It is required to minimize vibrations within the scan room. It is the customer's responsibility to contract a vibration consultant/engineer to implement site design modifications to meet the GE vibration specification. Refer to the system Pre-installation manual for vibration specifications.

MRI SITE PLANNING REMINDERS

Please refer to pre-installation checklist in pre-installation manual listed on the cover sheet for items critical to image quality.

1. The layout should be arranged so that the 5g line is contained to the magnet room. If not possible, a barrier is recommended to prevent entry to the 5g field area.
2. The spaces around, above, and below the magnet must be reviewed for effects of the 5g, 3g, 1g, and .5g fields. Refer to the proximity limit chart in the MR pre-installation manual referenced on the cover sheet.
3. For moving metal, the restriction lines typically extend outside of the MR space. Please confirm there are no moving metal concerns within these areas.
4. For vibration, analysis to be completed as required per pre-installation manual.
5. For EMI, review the site for the location of the main electrical feeders, AC devices, or distribution systems. An EMI study is recommended if large AC systems are nearby.
6. Details of the floor below the magnet must be reviewed. The structural engineer must verify that the quantity of steel in the volume 10ft [3.1m] x 10ft [3.1m] x 1ft [.3m] deep (below the magnet) does not exceed the allowable steel content as given in the MR pre-installation manual referenced on the cover sheet.
7. Remove, cover, or fill-in abandoned ducts or troughs from the Equipment and Magnet rooms. Access/computer room flooring in the Equipment room can either be removed or assessed and reinforced to support heavier cabinets.

Responsibility for the coordination, design, engineering, and site preparation resides with the customer and their project architects and contractors. GE does not, by providing reviews and furnishing comments and assistance, accept any responsibility beyond its obligations as defined in the MR system, sale/purchase agreement.

IMAGE QUALITY CONSIDERATIONS

Broadband RF noise is a single transient or continuous series of transient disturbances caused by an electrical discharge. Low humidity environmental conditions will have higher probability of electrical discharge. The electrical discharge can occur due to electrical arcing (micro arcing) or merely static discharge. Some potential sources capable of producing electrical discharge include:

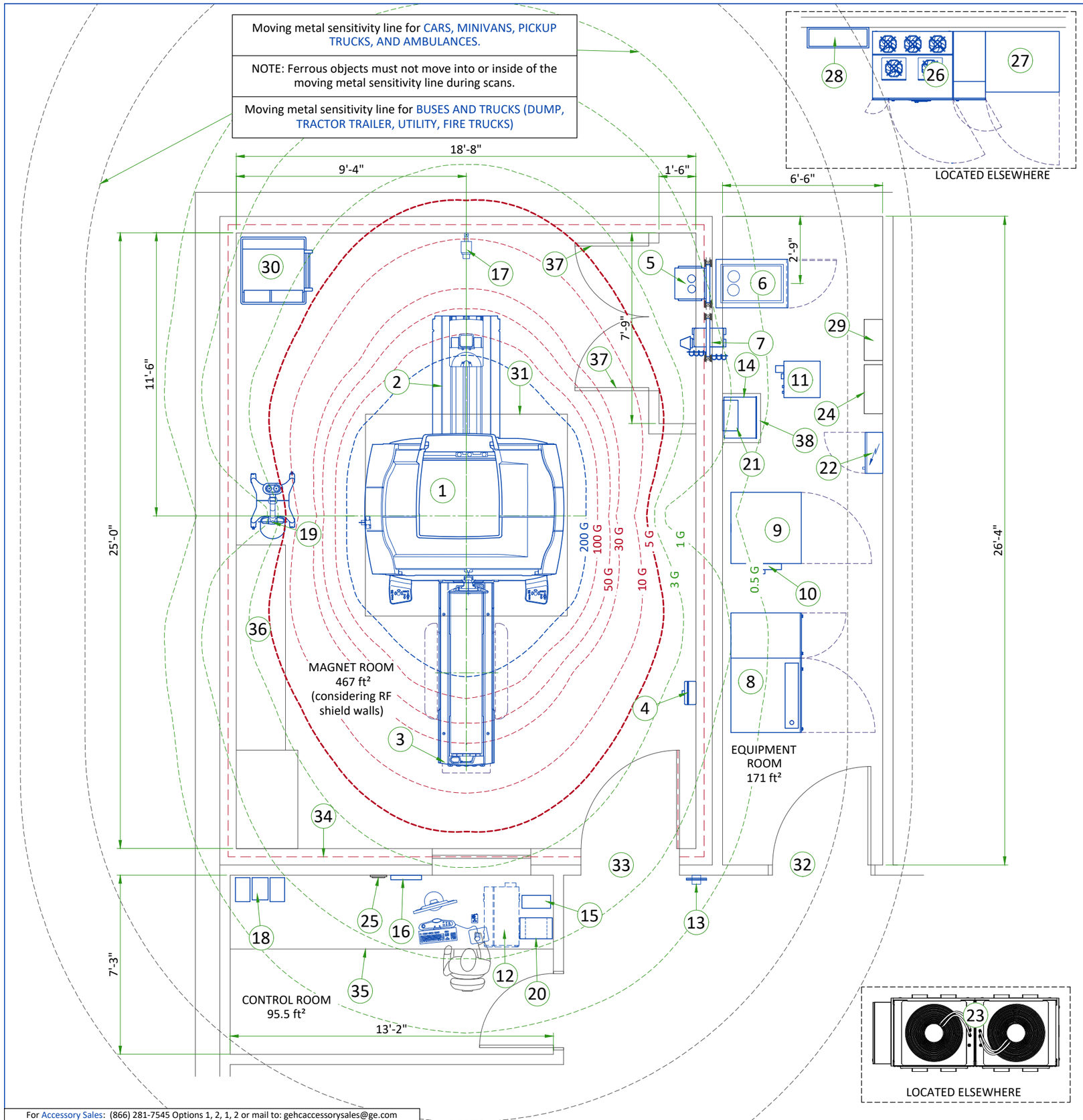
- Loose hardware/fasteners vibration or movement (electrical continuity must always be maintained)
- Flooring material including raised access flooring (panels & support hardware) and carpeting
- Electrical fixtures (i.e. Lighting fixtures, track lighting, emergency lighting, battery chargers, outlets)
- Ducting for HVAC and cable routing
- RF shield seals (walls, doors, windows etc.)

For additional information regarding image quality, refer to the pre-installation manual listed on the cover sheet.

MAGNETIC INTERFERENCE SPECIFICATIONS

- The customer must establish protocols to prevent persons with cardiac pacemakers, neurostimulators, and biostimulation devices from entering magnetic fields of greater than 5 gauss (exclusion zone).
- Main power transformers must remain outside the 3 gauss field. EMI < 20mG RMS AC at the magnet location. EMI < 5.87mG DC.
- Potential exists under fault conditions that the 5 gauss line may expand radially to 9.35 ft. [2.85 m] and axially to 14.27 ft. [4.35 m] for 1 second or less. It should be noted that normal rampdowns or magnet rundown unit initiated quenches will not cause the magnetic field to expand.
- It is recommended every site consider the event of a quench and plan accordingly (such as placing 5 gauss warning signs at expanded locations).
- The ferrous metal objects listed below must not move into or inside of the moving metal sensitivity line during scans.

TYPCIAL MOVING MAGNETIC MASS	DISTANCE RADIALLY		DISTANCE AXIALLY	
Carts, Gurneys 100-400 lbs [45-182 kg]	3 Gauss line		3 Gauss line	
Forklifts, small elevator, cars, minivans vans, pickup trucks, ambulances (objects greater than 400 lbs [182 kg])	15.5 FT	4.72 M	24.6 FT	7.5 M
Buses and trucks (dump, tractor trailer, utility, fire trucks)	18.1 FT	5.52 M	28.75 FT	8.76 M

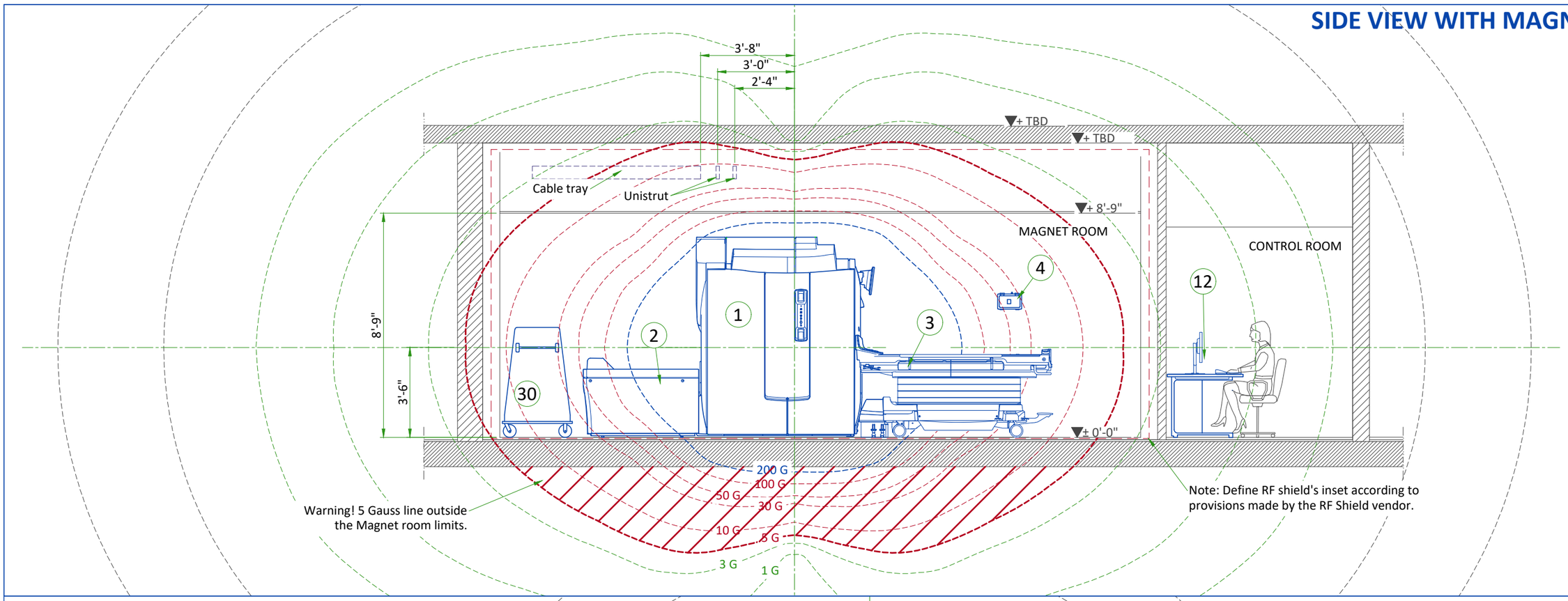


LEGEND			
A	GE SUPPLIED	D	AVAILABLE FROM GE
B	GE SUPPLIED/CONTRACTOR INSTALLED	E	EQUIPMENT EXISTING IN ROOM
C	CUSTOMER/CONTRACTOR SUPPLIED AND INSTALLED	*	ITEM TO BE REINSTALLED FROM ANOTHER SITE
	200 GAUSS		5 GAUSS
	100, 50, 30, 10 GAUSS		3, 1, 0.5 GAUSS

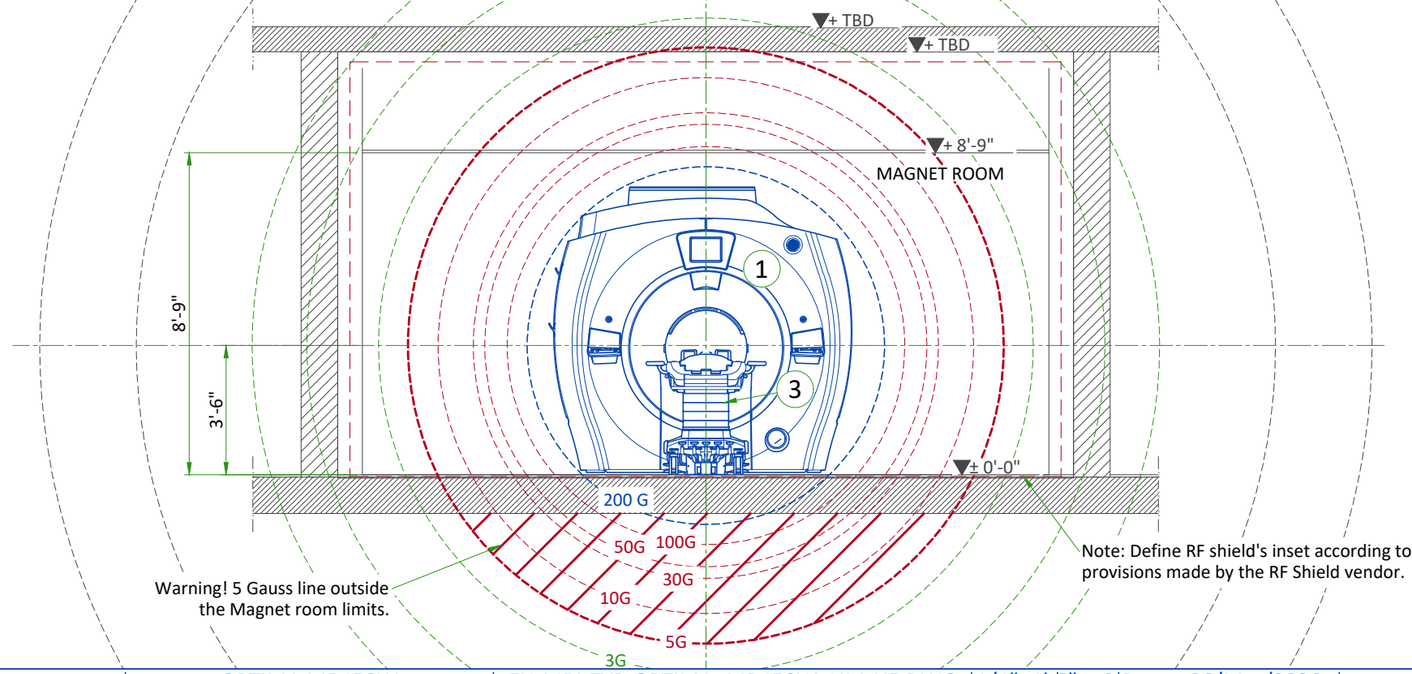
BY	ITEM	DESCRIPTION	MAX HEAT OUTPUT (BTU/h)	WEIGHT (lbs)	MAX HEAT OUTPUT (W)	WEIGHT (kg)
A	1	MAGNET (MAG) (HM)	8189	11175	2400	5068
A	2	REAR PEDESTAL (PED)	-	212	-	96
A	3	PATIENT TABLE (PT)	-	463	-	210
A	4	MAGNET RUNDOWN UNIT (MRU)	-	7	-	3.2
A	5	BLOWER BOX (MG6)	1535	46	450	21
A	6	PENETRATION CABINET (PEN)	10697	578	3135	262
A	7	SECONDARY PENETRATION WALL (SPW)	-	-	-	-
A	8	POWER, GRADIENT, RF CABINET (PGR)	20939	2859	6137	1297
A	9	HEAT EXCHANGER CABINET (HEC)	3412	1349	1000	612
A	10	MAGNET MONITOR (MON)	819	10	240	4.5
A	11	CRYOCOOLER COMPRESSOR (CRY)	1706	264	500	120
A	12	OPERATOR CONSOLE (GOC)	4947	133	1450	60.4
A	13	METAL DETECTOR (HAND HELD)	-	-	-	-
A	14	MAGNETIC RESONANCE ELASTOGRAPHY (MRE)	481	53	141	24.22
A	15	700VA UPS	-	26	-	12
A	16	CCTV MONITOR	-	8	-	3.5
A	17	CCTV CAMERA	-	-	-	-
A	18	MUSIC SYSTEM	-	-	-	-
A	19	INJECTOR HEAD ON PEDESTAL	-	95	-	43
A	20	INJECTOR CONTROL	676	18	198	8
A	21	INJECTOR POWER SUPPLY	601	7	176	3
B	22	MAIN DISCONNECT PANEL (MDP)	901	130	264	59
D	23	DIMPLEX CHILLER (NOT ON ORDER)	214956	5643	63000	2559
D	24	WATER FILTER	-	-	-	-
D	25	REMOTE GRAPHIC DISPLAY (RGD)	-	-	-	-
B	26	RIELLO UL UPS MHT 160 kVA	18429	1852	5401.3	840
B	27	BATTERY CABINET FOR RIELLO UPS	-	2831	-	1284
B	28	BYPASS PANEL - WALL MOUNTED	-	100	-	45.4
D	29	MANUAL WATER BYPASS	-	-	-	-
A	30	PHANTOM SET STORAGE CABINET	-	300	-	136
C	31	MAGNET ACCESS 2.5m x 2.5m [98.5in x 98.5in]	-	-	-	-
C	32	MINIMUM OPENING FOR EQUIPMENT DELIVERY IS 1016 mm x 2083 mm [40 in x 82 in], CONTINGENT ON A 1829 mm [72 in] CORRIDOR WIDTH				
C	33	MINIMUM OPENING FOR EQUIPMENT DELIVERY IS 1092 mm x 2083 mm [43 in x 82 in], CONTINGENT ON A 2438 mm [96 in] CORRIDOR WIDTH				
C	34	DEFINE RF SHIELD'S INSET ACCORDING TO PROVISIONS MADE BY THE RF SHIELD VENDOR				
C	35	COUNTER TOP FOR EQUIPMENT- PROVIDE GROMMETED OPENINGS AS REQUIRED TO ROUTE CABLES				
C	36	BASE CABINET FOR STORAGE OF: SURFACE COILS, PATIENT POSITIONING PADS, PHANTOMS, ETC.				
C	37	LOUVERED DOORS - REFER TO PREINSTALL MANUAL FOR REQUIREMENTS				
C	38	SHELF				

RF SHIELD - 100 dB ATTENUATION	
EXAM ROOM HEIGHT	
FINISHED FLOOR TO SLAB HEIGHT	TBD
FALSE CEILING HEIGHT	8'-9"

SIDE VIEW WITH MAGNETIC FIELD



FRONT VIEW WITH MAGNETIC FIELD



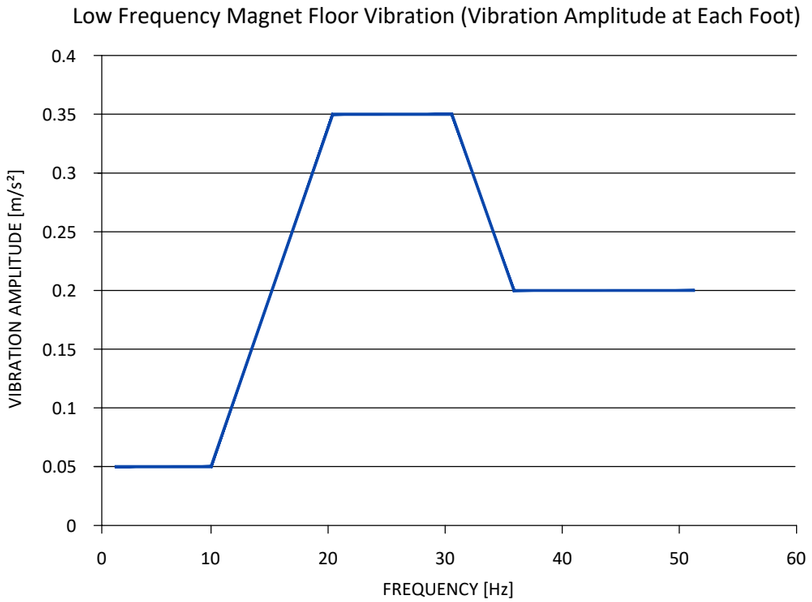
ACOUSTICS SPECIFICATIONS

Acoustic and vibroacoustic information is provided for site planning and architectural design activities. It is the customer's responsibility to hire a qualified acoustic engineer for solutions to further attenuate this transmitted noise and vibration, if required. The actual room noise level may vary based on room design, optional equipment, and usage:

Control Room: 62dBA
Equipment Room: 80dBA
Magnet Room: 128dBA*
(maximum sound pressure level at magnet bore isocenter)

* Frequency: 20 Hz to 20kHz

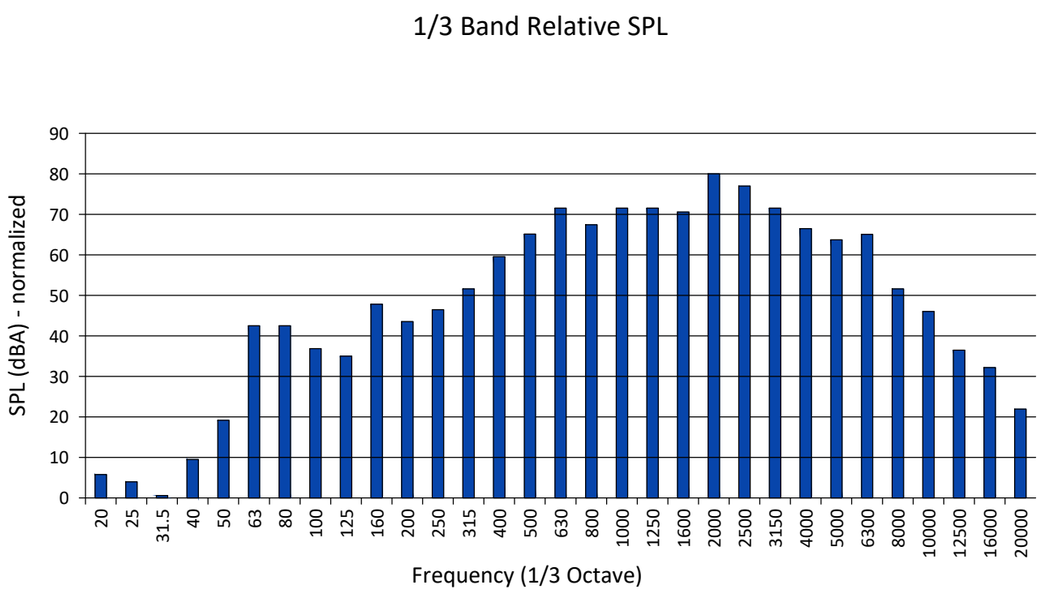
FREQUENCY (Hz)	AMPLITUDE (m/s^2)
2	0.05
10	0.05
20	0.35
30	0.35
35	0.2
50	0.2



ISOGAUSS PLOTS

* The isogauss contour plots depicted on this drawing represent magnetic fringe fields resulting from the normal operation of the magnet provided with the MR system. The actual magnetic field intensity at any point in the vicinity of the magnet when installed may vary from the contour plots due to factors such as the concentrating effects of nearby ferrous objects ambient magnetic fields, including the earth's magnetic field. Therefore, the contours shown are only approximations of actual field intensities found at a corresponding distance from the magnet's isocenter.

SOUND PRESSURE SPECTRAL DISTRIBUTION



MAGNETIC PROXIMITY LIMITS

Gauss (mT) Limit	Equipment
0.5 gauss (0.05mT)	Nuclear camera
1 gauss (0.1mT)	Positron Emission Tomography scanner, Linear Accelerator, Cyclotrons, Accurate measuring scale, Analog image intensifiers, Bone Densitometers, Video display (tube), CT scanner, Ultrasound, Lithotriptor, Electron microscope
3 gauss (0.3mT)	Power transformers, Main electrical distribution transformers
5 gauss (0.5mT)	Cardiac pacemakers, Neurostimulators, Biostimulation devices
10 gauss (1mT)	Magnetic computer media, Line printers, VCRs, Film processor, X-ray tubes, Emergency generators, Commercial laundry equipment, Food preparation area, Water cooling equipment, HVAC equipment, Major mechanical equipment room, Credit cards, watches, and clocks, Air conditioning equipment, Fuel storage tanks, Motors greater than 5 horsepower
50 gauss (5mT)	Metal detector for screening, LCD panels, Telephones
No Limit	Digital Detectors

The customer must provide detail defining ferrous material below the magnet to the Project Manager so the GE Healthcare MR Siting and Shielding team can review for compliance.

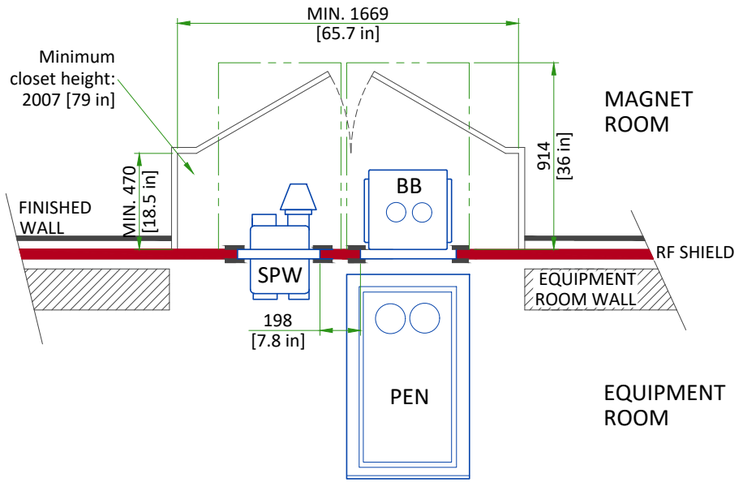
STEEL MASS LIMITS TO MAGNET ISOCENTER (3x3 m [10x10 ft] AREA UNDER MAGNET)

Limits Of Steel Mass		Distance Below Top Surface Of Floor	
kg/m^2	lbs/ft^2	mm	in
0	0	0 - 76	0-3
9.8	2	76 - 127	3-5
14.7	3	127 - 254	5-10
39.2	8	254 - 330	10-13
98.0	20	330+	13+

The actual field strength can be affected by Magnetic shielding, Earth's magnetic field, other magnetic fields and stationary or moving metal. This information must be used to evaluate potential site interaction of GE Healthcare equipment with other non-GE Healthcare equipment. Magnetic shielding can be installed to prevent interaction between the magnet and nearby sensitive devices. The GE Healthcare Project Manager of Installation (PMI) can work with the customer to coordinate the magnetic shielding site evaluation. The customer is responsible for installation of all magnetic shielding.

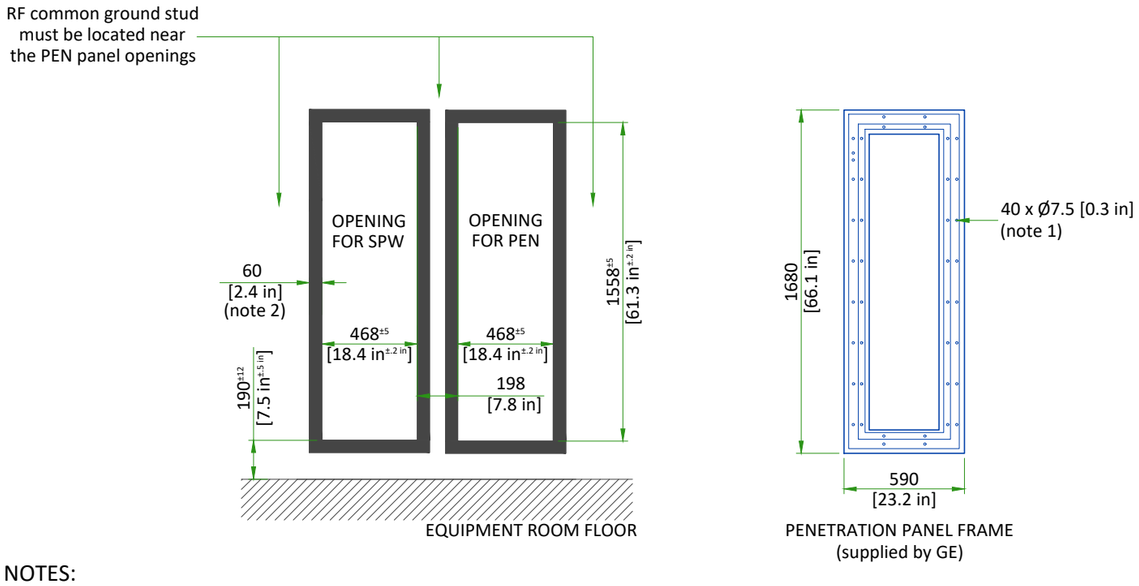
PENETRATION PANEL WITH SPW

PEN PANEL CLOSET (PLAN VIEW)



NOTES:
1) Maximum distance between PEN and SPW is 2743 [108 in]
2) SPW may be on either side of the PEN cabinet.

PEN PANEL OPENINGS (EQUIPMENT ROOM SIDE)



NOTES:
1) RF vendor must supply 40 fasteners for hole size of Ø7.25 mm [0.285 in] (total quantity for both) and install each penetration panel adaptor frame to the wall through the outer ring of holes in the plate.
2) Minimum exposed RF shield material (around entire opening)

SCALE 1:30

PENETRATION PANEL CLOSET

An enclosure (i.e. closet) must be provided to restrict access to the PEN panels and for storage of excess interconnections.

- The PEN closet must have a mechanical locking mechanism to restrict access to the PEN panels
- The PEN closet must maintain the minimum service area outside the 200 Gauss in the magnet room.
- PEN closet must allow free air exchange of **400CFM (680 m³/hour)** between the Magnet room and PEN closet for MR system blowers. Airflow may be achieved through door louvers or other openings in the PEN closet that meet all other PEN closet requirements

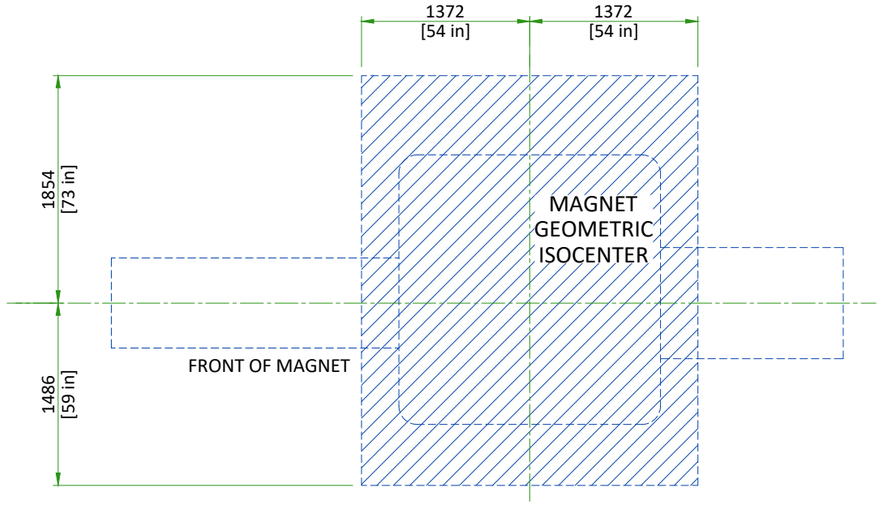
A closet service hatch must be provided if the room does not allow the PEN panel blower box removal path to remain completely outside the 200 Gauss line.
NOTE: If the room size is sufficiently large so the SPW blower box can be removed without entering the 200 Gauss line, a closet service hatch is not required.

The closet service hatch must meet the following requirements:

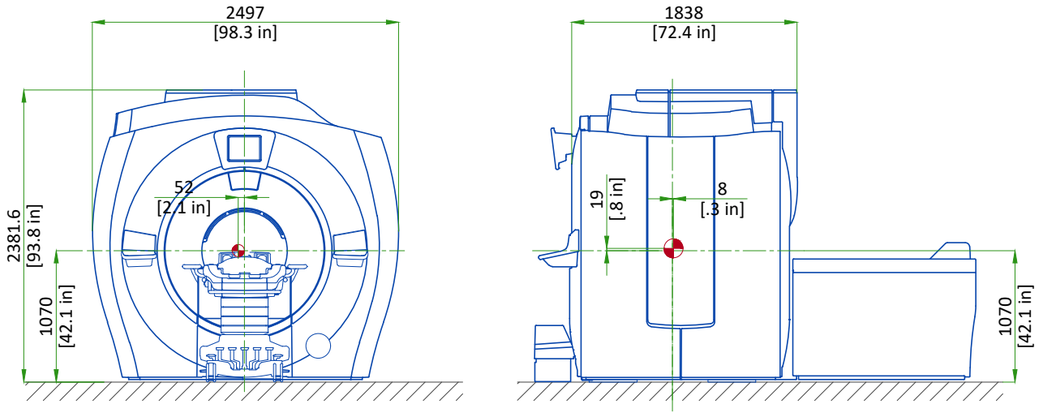
- Must be located within the PEN closet on the RF wall allowing access to the Equipment room
- May be located anywhere within the PEN closet (between 254 [10 in] and 1524 mm [60 in] with unobstructed pass-through)
- Must be minimum 508x508 mm [20x20 in]
- Must maintain RF shield integrity for all service access
- May use any design (quick disconnect RF panel, blanker panel, hinged door, etc.) as long as all other requirements are met
- The closet service hatch removal must take less than 15 minutes (replacement must also take less than 15 minutes)

MINIMUM MAGNET CEILING HEIGHT (TOP VIEW)

If the ceiling height is between 2500 mm (98.5 in.) and 2667 mm (105 in.), the flexible main lead extension for low ceiling height (2.5M Low Ceiling Kit-Passive, M7000GM) is required for ramping the magnet. Contact the GEHC PMI and GEHC Service Field Engineer for further evaluation.

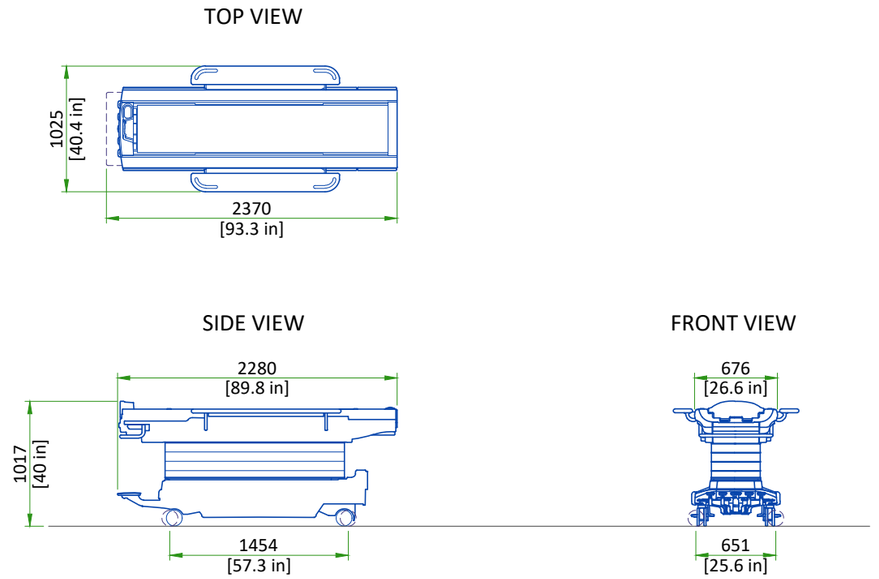


MAGNET ENCLOSURE



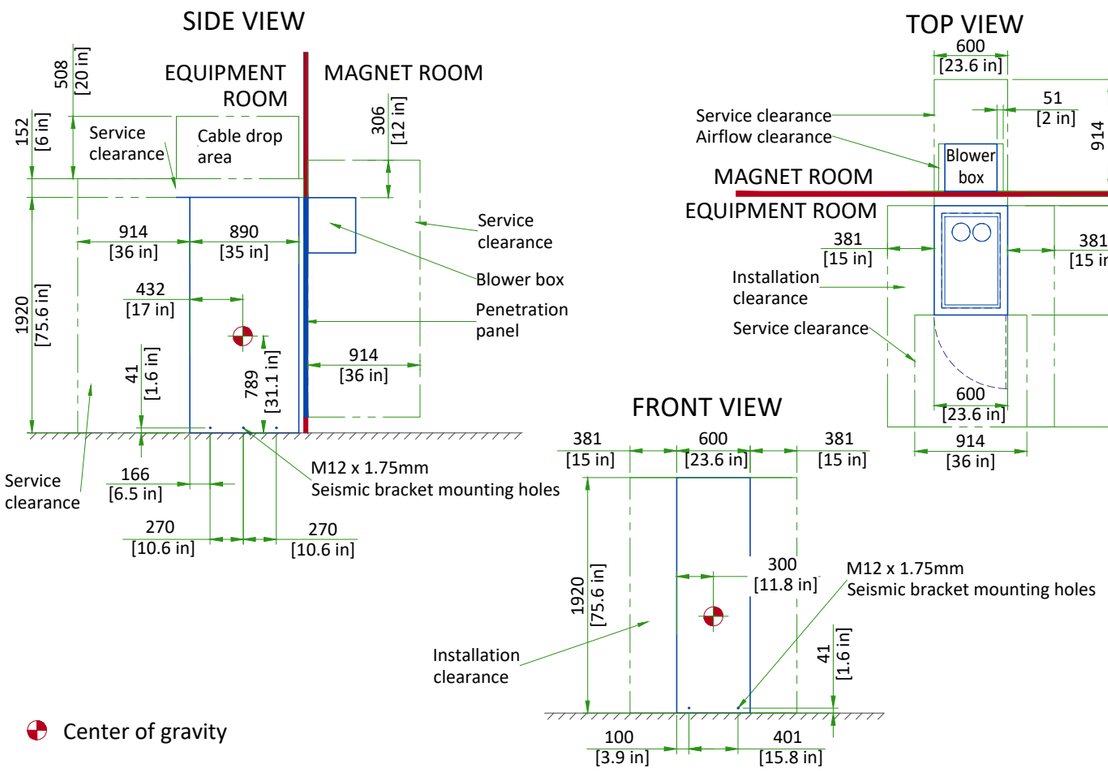
Note:
Center of gravity is approximate and includes the GE Healthcare supplied VibroAcoustic Dampening Kit, but does not include cryogens, gradient assembly, side mounted electronics, or enclosures.
Enclosure dimensions are for reference only, NOT FOR SITE PLANNING USE.
Center of gravity

PATIENT TRANSPORT TABLE (PT)



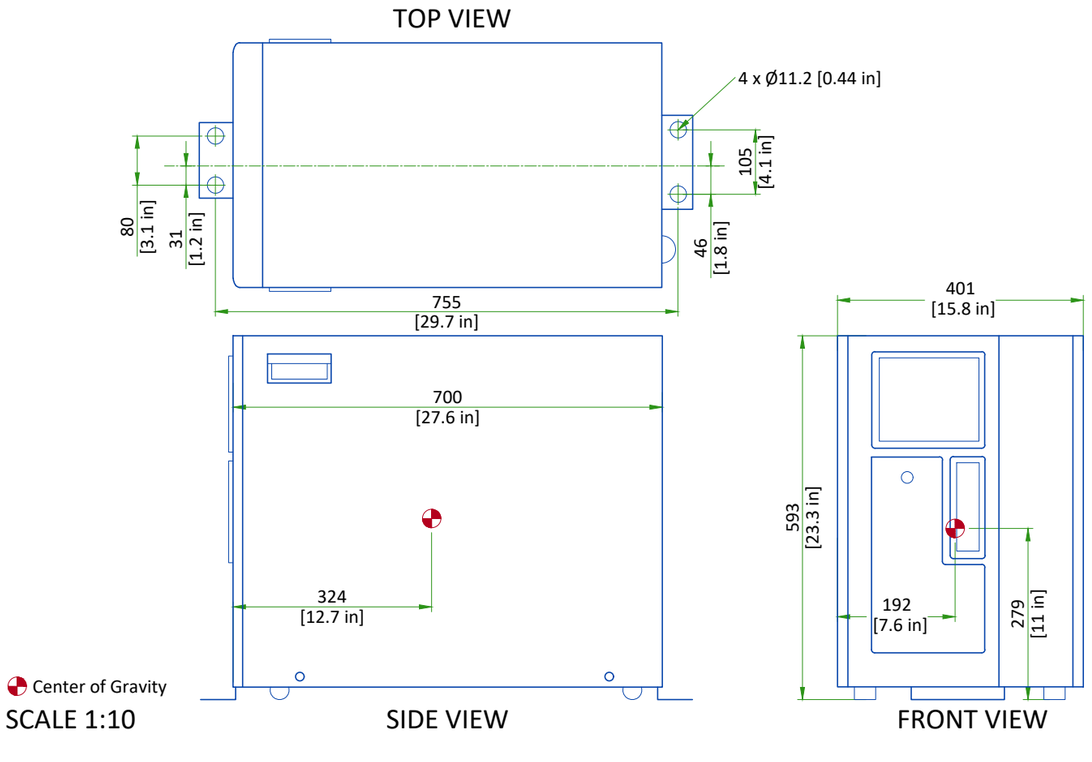
SCALE 1:50

PENETRATION CABINET CLEARANCE



Center of gravity

GLOBAL OPERATORS CABINET (GOC)



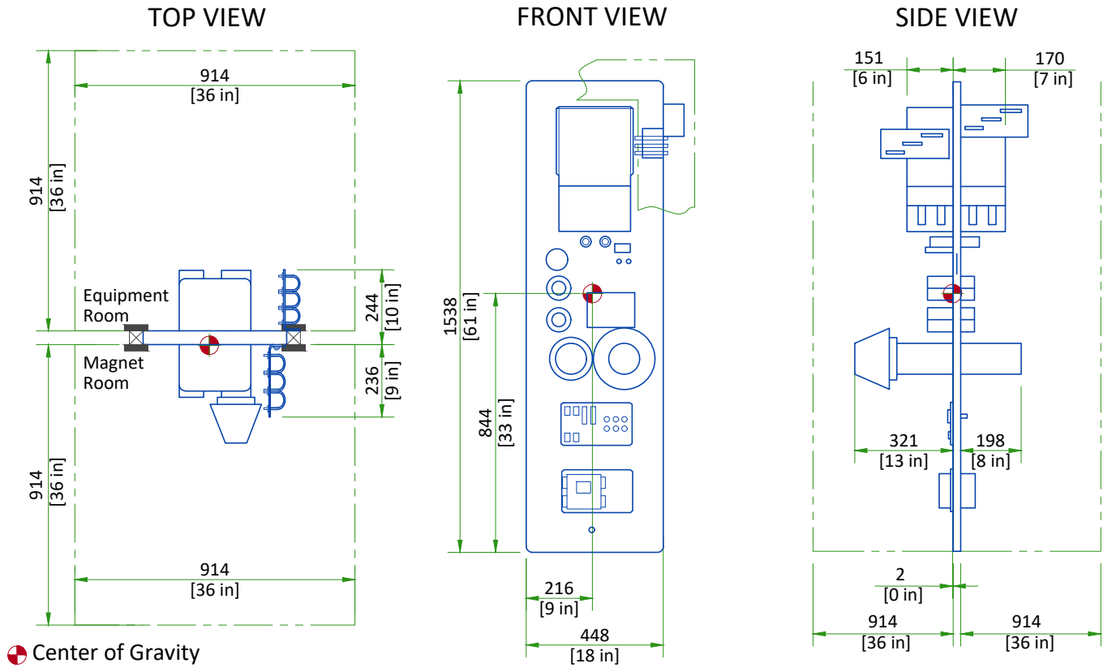
Center of Gravity

SCALE 1:10

SIDE VIEW

FRONT VIEW

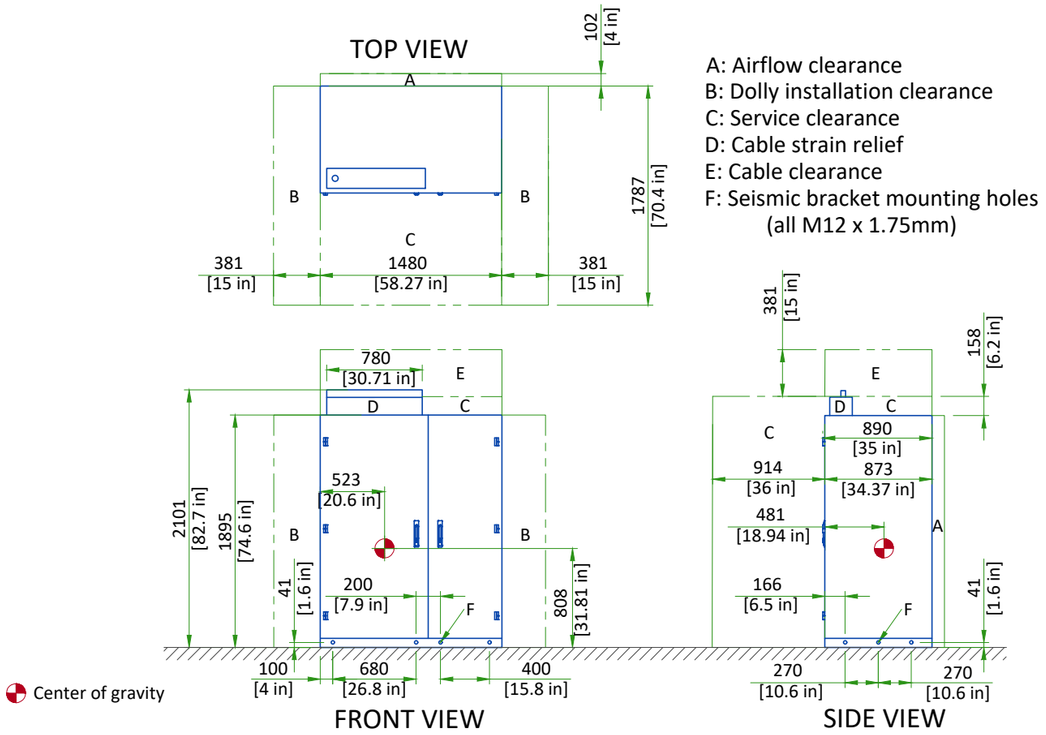
SECONDARY PENETRATION WALL (SPW)



Center of Gravity

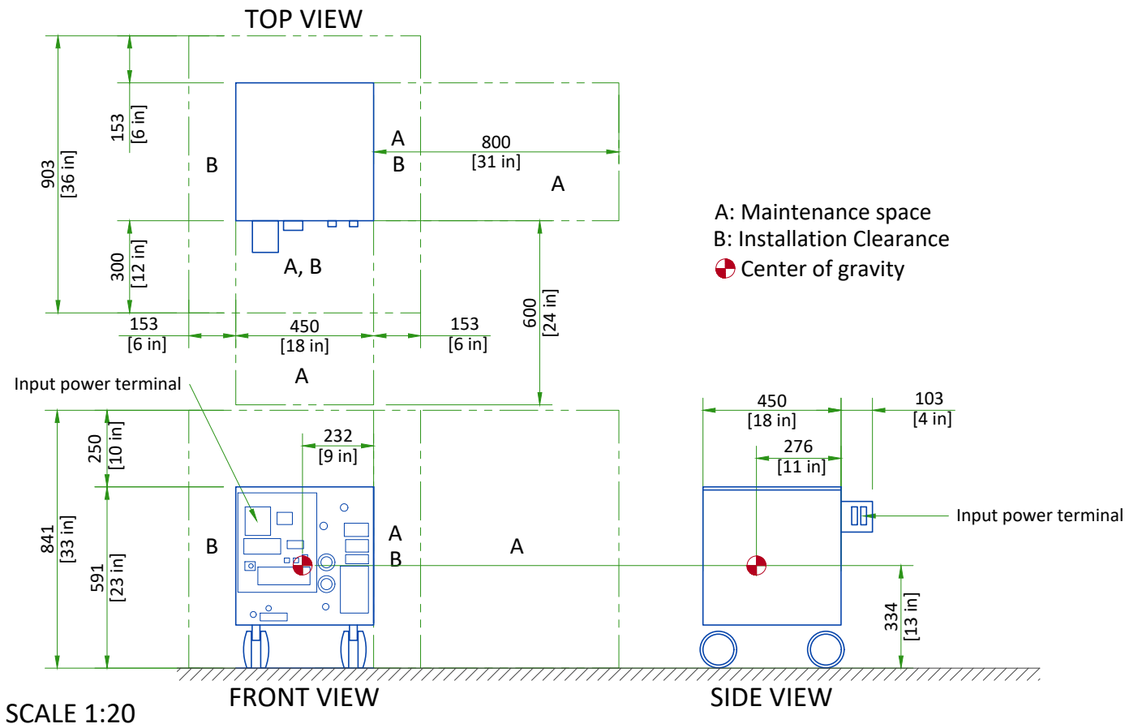
SCALE 1:20

POWER, GRADIENT, RF CABINET (PGR)



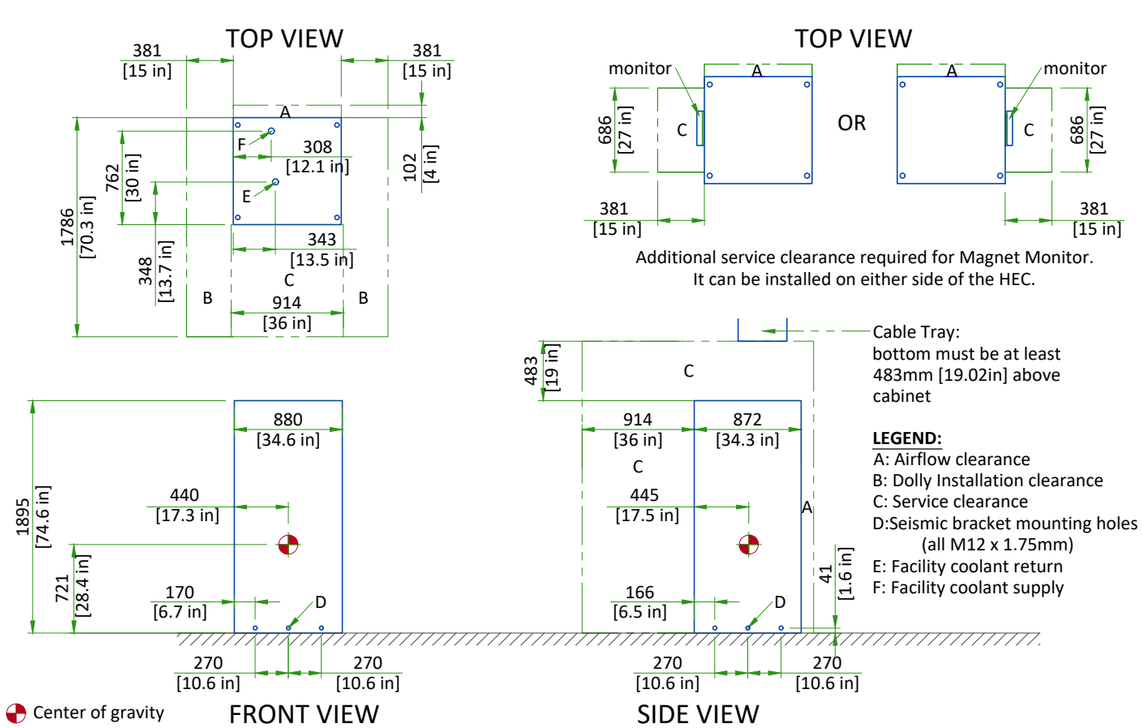
Center of gravity

CRYOCOOLER COMPRESSOR (CRY)



SCALE 1:20

HEAT EXCHANGER CABINET (HEC)

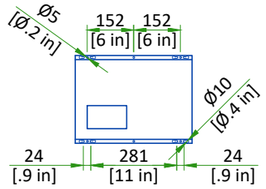


Center of gravity

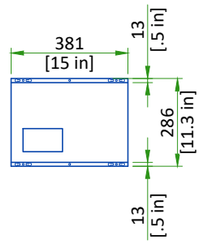
MAGNET MONITOR AND MAGNET RUNDOWN UNIT (MRU)

MAGNET MONITOR

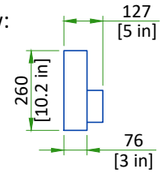
Mounting:



Front view:

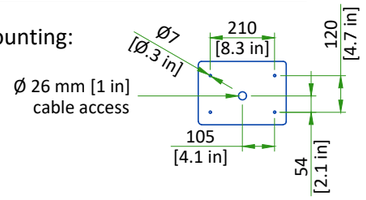


Side view:

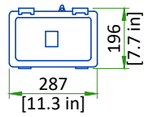


MAGNET RUNDOWN UNIT (MRU)

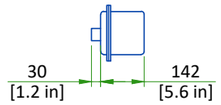
Mounting:



Front view:



Side view:



The bottom edge of the MRU must be mounted 1524 ±25 mm [60 ± 1 in] above the magnet room floor.

SCALE 1:20

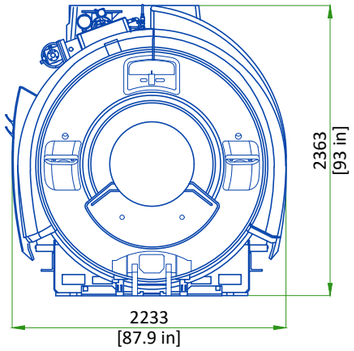
DELIVERY

ROUTING

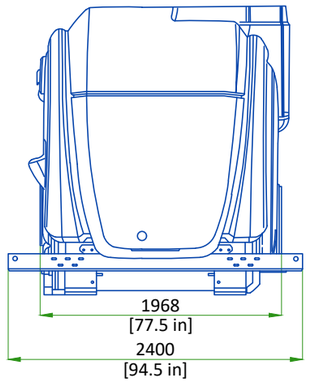
- The customer is solely liable for routing of components from dock to final site.
- GE must be able to move system components in or out with no need to uncrate or disassemble any of the components. The entire passageway must be cleared, adequately lighted and free from dust.
- The floor and it surfacing must be able to withstand the live load of components and handling equipment.
- Floor surfacing must be continuous.
- The customer must protect any fragile flooring surfaces.

SPECIFICATIONS FOR MAGNET ROUTING

- Floor must be able to withstand a moving load of 5323kg [11735 lb]
- Recommended opening height: 2.5m [98.5in], width: 2.5m [98.5in]. If recommended dimensions cannot be met refer to pre-installation manual for detailed specifications.
- Maximum slope: 30°

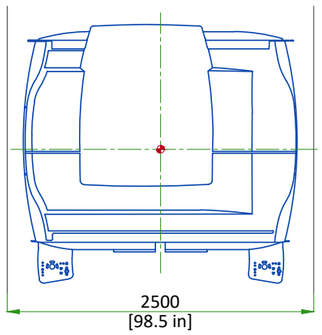


FRONT VIEW OF MAGNET

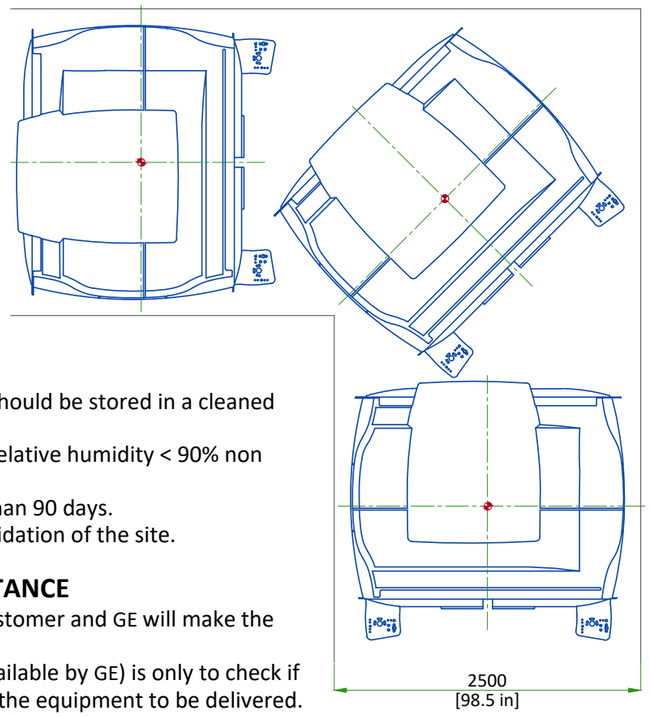


RIGHT SIDE VIEW OF MAGNET

STRAIGHT PATH



PATH WITH 90 DEGREE TURN



STORAGE CONDITIONS

- System components except the magnet should be stored in a cleaned room:
- Temperature = -30 to 60°C [-22 to 140], relative humidity < 90% non condensing.
- Material should not be stored for more than 90 days.
- The magnet will be delivered after GE validation of the site.

INSTALLATION AND DELIVERY ACCEPTANCE

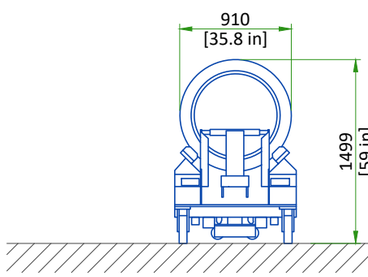
- A survey of the site established by the customer and GE will make the decision for the delivery time.
- This survey of the site (a form is made available by GE) is only to check if the apparent conditions of the site allow the equipment to be delivered.
- If the site is not ready, GE can delay the delivery time.

CRITICAL ITEMS FOR MAGNET DELIVERY

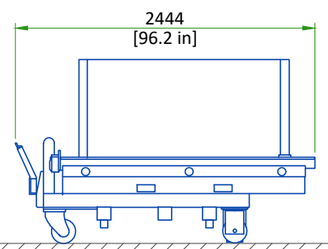
- 24/7 chilled water and three phase power for Cryocooler Compressor. Refer to Power Requirements detail for detailed specifications.
- 24/7 single phase power for the Magnet Monitor. Refer to Power Requirements detail for detailed specifications.
- Ethernet connections for magnet monitoring and phone lines for emergency use. Refer to Connectivity Requirements detail for additional information.
- Operational magnet room exhaust fan. Refer to Magnet Room Venting Requirements detail for detailed specifications.
- The Cryogen Vent system is installed, complete to outside the building and ready for connection to magnet or will be completed by RF cage closure. Connection delay not to exceed 24 Hours.

This is only a partial list of items required for delivery of the magnet. For a complete checklist refer to the Pre-Installation Manual (PIM) referenced on the cover sheet.

GRADIENT COIL REPLACEMENT



Front view of the XRM Gradient



Side view of the XRM Gradient

EQUIPMENT	DIMENSIONS LxWxH		WEIGHT		NOTE
	mm	in	kg	lbs	
Replacement XRM gradient coil assembly on a shipping cradle/cart	910x2444x1499	35.8x96.2x59	1449	3194	Initial gradient coil assembly is shipped installed in the magnet. Shipping/installation cart is used to install replacement coil assembly only.

The weight bearing structure of the site should support any additional weight of the main replacement parts occurring during maintenance of the magnet, throughout the whole lifecycle of the MR.

STRUCTURAL NOTES

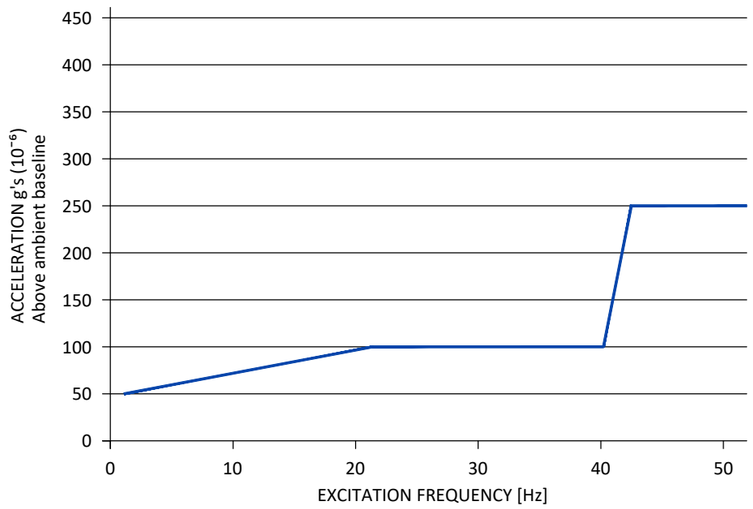
- All units that are wall mounted or wall supported are to be provided with supports where necessary. Wall supports are to be supplied and installed by the customer or his contractors.
- Dimensions are to finished surfaces of room.
- Certain MR procedures require an extremely stable environment to achieve high resolution image quality. Vibration is known to introduce field instabilities into the imaging system. The vibration effects on image quality can be minimized during the initial site planning of the mr suite by minimizing the vibration environment. See PROXIMITY LIMITS, PATIENT TABLE DOCK ANCHOR MOUNTING REQUIREMENTS AND VIBROACOUSTIC DAMPENING KIT details for additional information.
- Standard steel studs, nails, screws, conduit, piping, drains and other hardware are acceptable if properly secured. Any loose steel objects can be violently accelerated into the bore of the magnet. Careful thought should be given to the selection of light fixtures, cabinets, wall decorations, etc. To minimize this potential hazard. For safety, all removable items within the magnet room such as faucet handles, drain covers, switch box cover plates, light fixture components, mounting screws, etc. must be non-magnetic. If you have a specific question about material, bring it to the attention of your GE project manager of installations.
- Floor levelness refer to MAGNET ROOM FLOOR SPECIFICATIONS DETAIL, this floor levelness requirement is important for accurate patient table docking.
- Non-movable steel such as wall studs or hvac components will produce negligible effect on the active shield magnet.
- Customers contractor must provide all penetrations in post tension floors.
- Customers contractor must provide and install any non-standard anchoring. Documents for standard anchoring methods are included with GE equipment drawings for geographic areas that require such documentation.
- Customers contractor must provide and install hardware for "through the floor" anchoring and/or any bracing under access floors. This contractor must also provide floor drilling that cannot be completed because of an obstruction encountered while drilling by the GE installer such as rebar etc.
- Customers contractor to provide and install appropriate supports for the storage of excess cables.
- It is the customer's responsibility to perform any floor or wall penetrations that may be required. The customer is also responsible for ensuring that no subsurface utilities (e.g., electrical or any other form of wiring, conduits, piping, duct work or structural supports (i.e. post tension cables or rebar)) will interfere or come in contact with subsurface penetration operations (e.g. drilling and installation of anchors/screws) performed during the installation process. To ensure worker safety, GE installers will perform surface penetration operations only after the customer's validation and completion of the "GE surface penetration permit"

VIBRATION SPECIFICATIONS

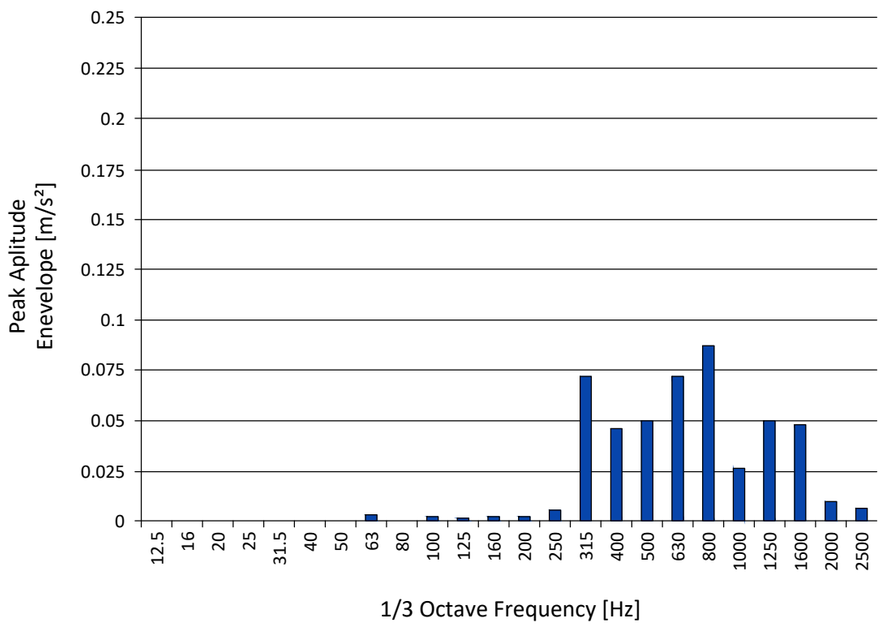
Excessive vibration can affect MR image quality. Vibration testing must be performed early in the site planning process to ensure vibration is minimized. Both steady state vibration (exhaust fans, air conditioners, pumps, etc.) and transient vibrations (traffic, pedestrians, door slamming, etc.) must be assessed.The Magnet cannot be directly isolated from vibration. Any vibration issue must be resolved at the source.

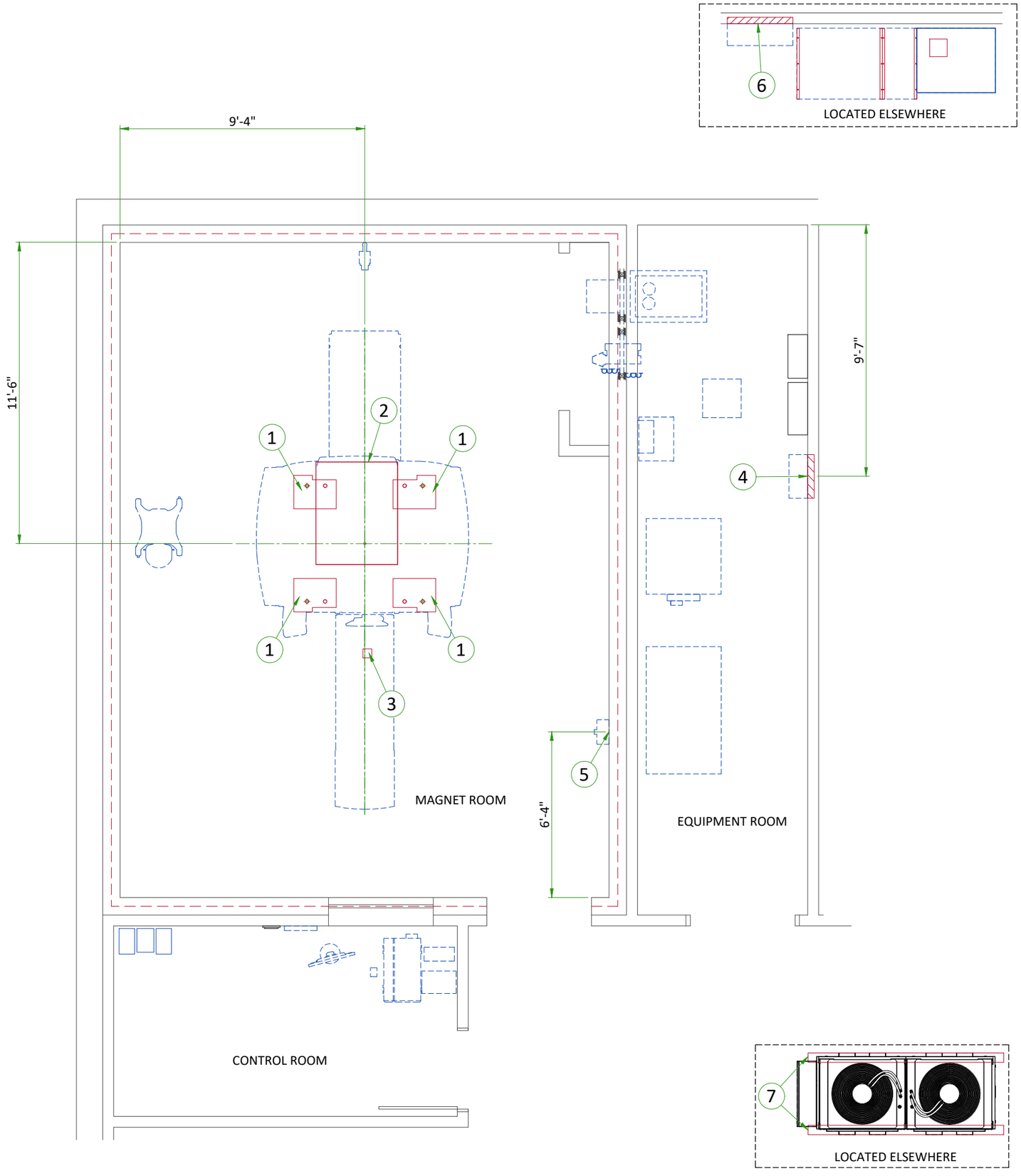
Transient vibration levels above the specified limits in the MR Site Vibration Test Guidelines must be analyzed. Any transient vibration that causes vibration to exceed the steady-state level must be mitigated.

MAGNET STEADY-STATE VIBRATION SPECIFICATIONS



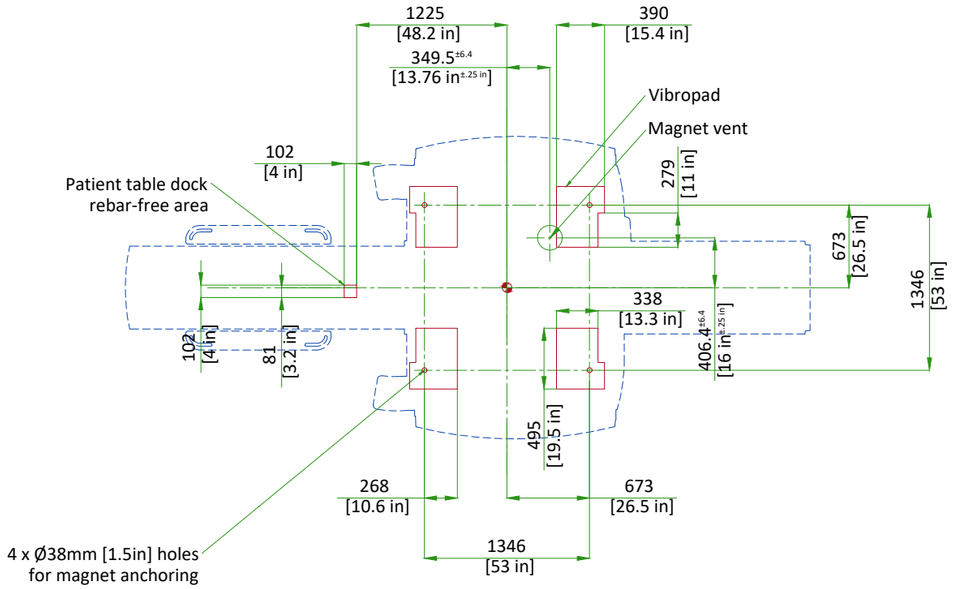
VIBRATION TRANSMITTED THROUGH VIBROACOUSTIC MAT





ITEM	DESCRIPTION
	(GE SUPPLIED / CONTRACTOR INSTALLED)
1	Vibroacoustic dampening kit (see floor structural detail)
2	Magnet curtain kit
	(CONTRACTOR SUPPLIED & INSTALLED)
3	Patient table dock anchoring
4	Structural wall backing for Main Disconnect Panel
5	Structural wall backing for Magnet Rundown Unit
6	Structural wall backing for Main Bypass Panel
7	Two I-beam runners are to support chiller feet at both ends. Refer to Dimplex manual.

MAGNET ON VIBROACOUSTIC DAMPENING KIT "VIBROPAD"

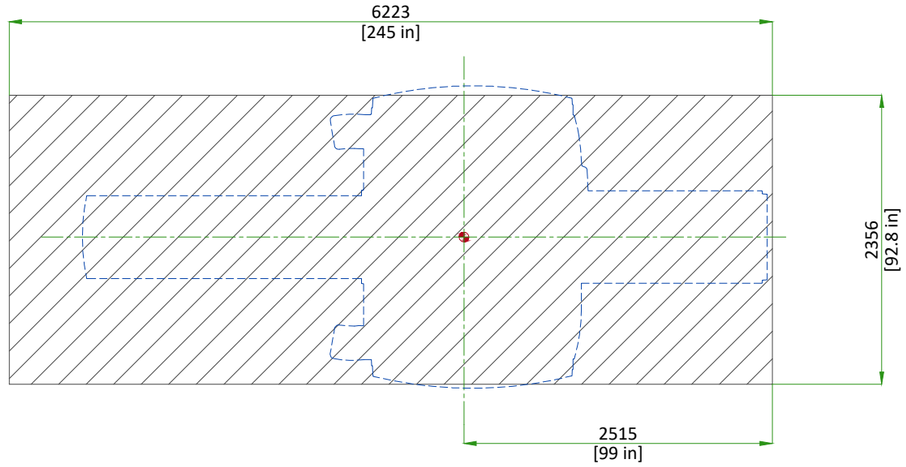


NOT TO SCALE

VibroAcoustic Pad weight:
8 kg [17 lbs] (each)

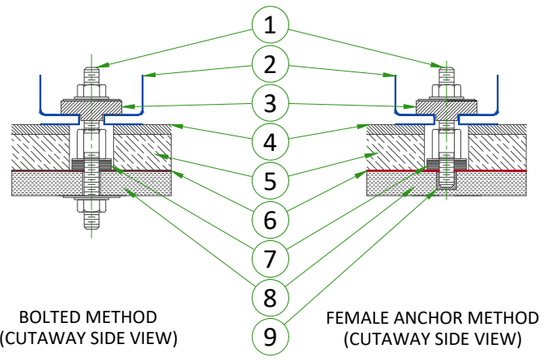
MAGNET ROOM FLOOR SPECIFICATIONS

Floor levelness must be **3 mm** between high and low spots in the rectangular area shown.



The finished floor must support the weight of all components (e.g., patient table, gradient coil replacement cart) throughout operation and service life.

DOCK/TABLE FRAME ANCHOR MOUNTING REQUIREMENTS



1 Removable Anchor Rod (Male insert)
2 Dock
3 Clamp bracket
4 Finished floor
5 Filler Board or Grout
6 RF Shield
7 Conductive Fibrous Washer (RF seal)
8 Concrete
9 Female Anchor Insert

NOT TO SCALE

- The RF Shield vendor must design and install the dock/table frame anchor bolt
- The anchor bolt must be installed **after** the Magnet is installed
- The dock/table frame anchor must not contact floor rebar or other structural steel
- The dock/table frame anchor must electrically contact the RF shield at point of entry
- The RF shield vendor must perform a pull test on the anchor (equal to the clamping force). Results must be provided to the GE HealthCare Project Manager of Installation (PMI).

THE DOCK ANCHOR PROPERTIES MUST COMPLY WITH THE FOLLOWING REQUIREMENTS:

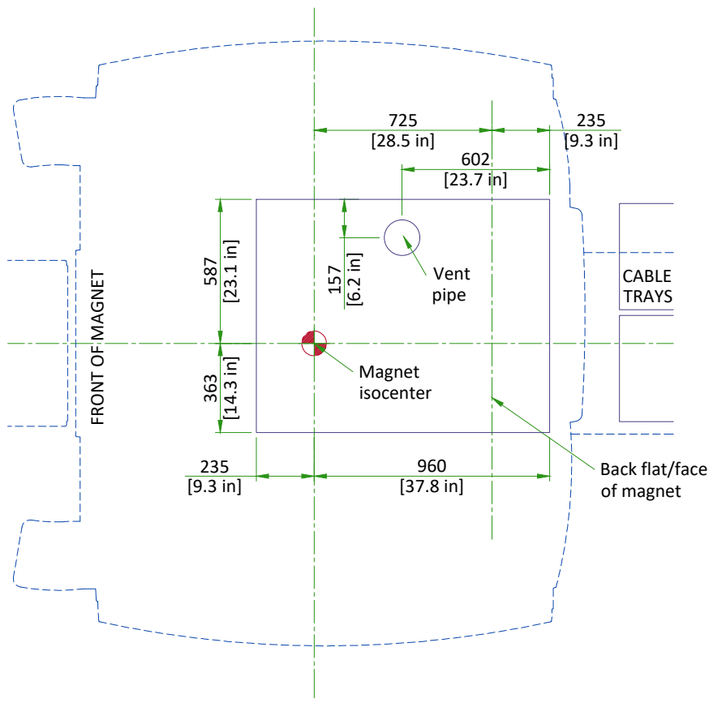
a. Anchors must be two-part assembly (male/female)
b. Female side must be expansion- or epoxy-type
c. Male side must be a bolt or threaded rod with appropriate-sized nut (bolt or rod must be removable - not epoxied or cemented in place)
d. Anchors must be electrically conductive
e. Anchors must be non-ferrous
f. Anchors must not induce galvanic corrosion with the RF shield
g. Anchors must be commercially procured
h. If anchoring a table, the anchor rod hole clearance in the table frame anchor base is 11 mm [0.43 in]. The anchor rod diameter must be sized appropriately.
i. Anchors must meet the following clamping force: 2,669 N [600 lb]
j. The anchor rod must extend at least 35 mm [1.38 in] but not more than 60 mm [2.36 in] above the finished floor.
k. The anchor rod must be less tha 152 mm [6 in] in total length (length above the floor plus embedded length)
l. If underside of deck is metallic, then insulating bushing must be added to through bolt hardware to prevent grounding of shield at this point.

CABLE CONCEALMENT

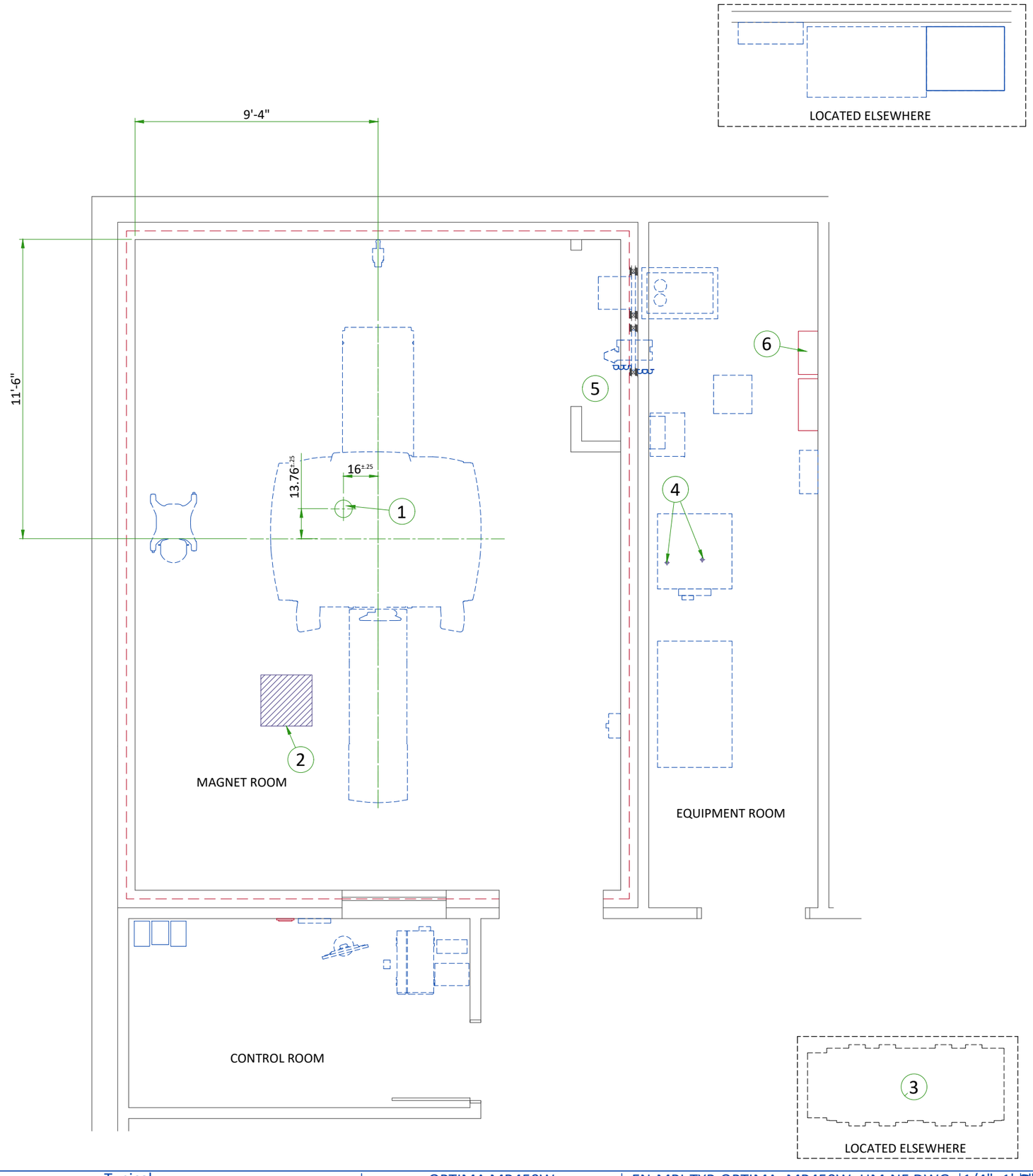
This drawing gives three methods of locating this assembly in the room.
1) Measure to isocenter
2) Measure to vent pipe
3) Measure from centerline and main rear face of magnet

Installation dimensions shown must be within ±15mm (.62 in).
If location exceeds this tolerance, cable covers will not fit at final assembly with magnet covers.

Refer to Pre-Magnet Delivery manual 5500097 for additional information.



SCALE 1:25



ITEM	DESCRIPTION
1	Cryogen vent (200mm [8"] O.D.)
2	Emergency exhaust vent - refer to magnet room vent requirements (position to be defined)
3	(2) 50mm [2"] I.D. High pressure hoses
4	38mm [1.5"] NPT Male connectors, at 2.1m [82.67"] above floor, (2) 38mm [1.5"] copper lines (insulated) and (2) shut off valves. refer to chilled water block diagram
5	Closet must allow free air exchange of 400 CFM between magnet room and closet
6	Provide as needed - low pressure rubber multipurpose hose, inside dia. 1/2" working pressure range: 250 to 499 PSI - refer to the manual city water back-up system detail

MECHANICAL/PLUMBING NOTES

- All piping, fittings, supports, hoses, clamps, ventlation systems, etc. are to be supplied and installed by the customer or his contractors.
- For complete design and requirements, specifications and guidelines refer to the pre-installation manual: system cooling, cryogen venting, waveguides and exhaust venting.
- An emergency water cooling back-up supply is recommended for continuous cryogen compressor operation. if using an open loop back-up design, ensure a drain is provided. please refer to the pre-install manual for optional back-up coolant supply requirements

TEMPERATURE AND HUMIDITY REQUIREMENTS

IN-USE CONDITIONS

	MAGNET ROOM			CONTROL ROOM			EQUIPMENT ROOM		
Temperature	Range			Range			Range		
	15 to 21°C			15 to 32°C			15 to 32°C		
	59 to 69.8°F			59 to 89.6°F			59 to 89.6°F		
Temperature gradient	± 3°C/h			± 3°C/h			± 3°C/h		
	± 5°F/h			± 5°F/h			± 5°F/h		
Relative humidity (1)	30% to 60%			30% to 70%			30% to 70%		
Humidity gradient	≤ 5%/h			≤ 5%/h			≤ 5%/h		
System heat dissipation (base system only)	Stand by	Average	Max	Stand by	Average	Max	Stand by	Average	Max
	1.01kW	1.8kW	3.15kW	1.46kW			5.79kW	6.87kW	13.05kW
	3450 BTU/hr	6142 BTU/hr	10748 BTU/hr	4947 BTU/hr			19769 BTU/hr	23225 BTU/hr	44523 BTU/hr

NOTE
Maximum ambient temperature for the Equipment room at inlet is derated by 1°C per 300 m (984 ft) above 2000 m (6562 ft) (not to exceed 2600 m [8530 ft]).

AIR RENEWAL

According to local standards.

NOTE
In case of using air conditioning systems that have a risk of water leakage it is recommended not to install it above electric equipment or to take measures to protect the equipment from dropping water.

MAGNET ROOM VENTING REQUIREMENTS

HVAC VENT REQUIREMENTS

- HVAC vendor must comply with Magnet room temperature and humidity specifications and RF shielding specifications.
- RF Shield vendor must install open pipe or honeycomb HVAC waveguides.
- All serviceable parts in the Magnet room (e.g.: diffusers) must be non-magnetic.
- Waveguides must be nonmagnetic and electrically isolated.
- Incoming air must contain at least **5% air** from outside the Magnet room (inside or outside the facility) to displace residual helium.

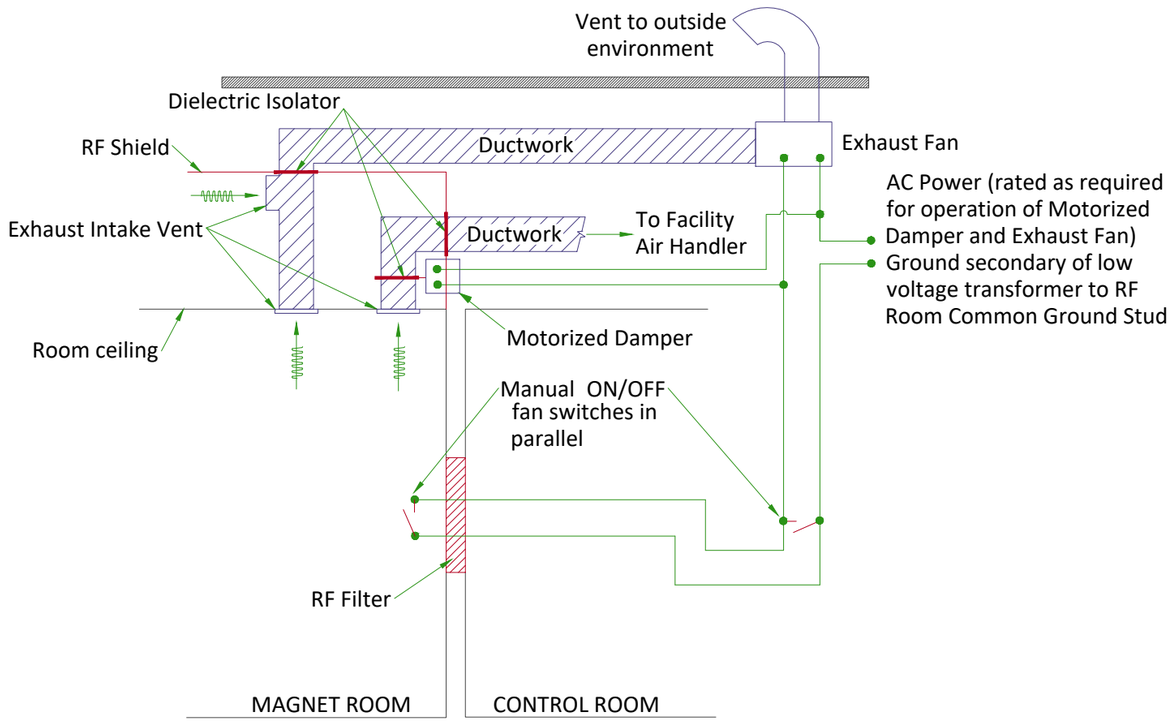
EMERGENCY VENT REQUIREMENT

- Exhaust vent system is supplied by the customer.
- All items within the RF enclosure must be non-magnetic.
- The exhaust vent system must be tested and operational before the magnet is installed.
- The exhaust intake vent must be located near the magnet cryogenic vent at the highest point on the finished or drop ceiling.
- The Magnet room exhaust fan and exhaust intake vent must have a capacity of at least **1200 CFM (34 m^3/min)** with a minimum of **12 room air exchanges per hour.**
- The exhaust fan must be placed above RF shielding located outside 10 gauss (1mT) and with appropriate waveguide.
- The system must have a manual exhaust fan switch near the Operator Workspace and in the Magnet room near the door (the switches must be connected in parallel).
- All system components must be accessible for customer inspection, cleaning and maintenance

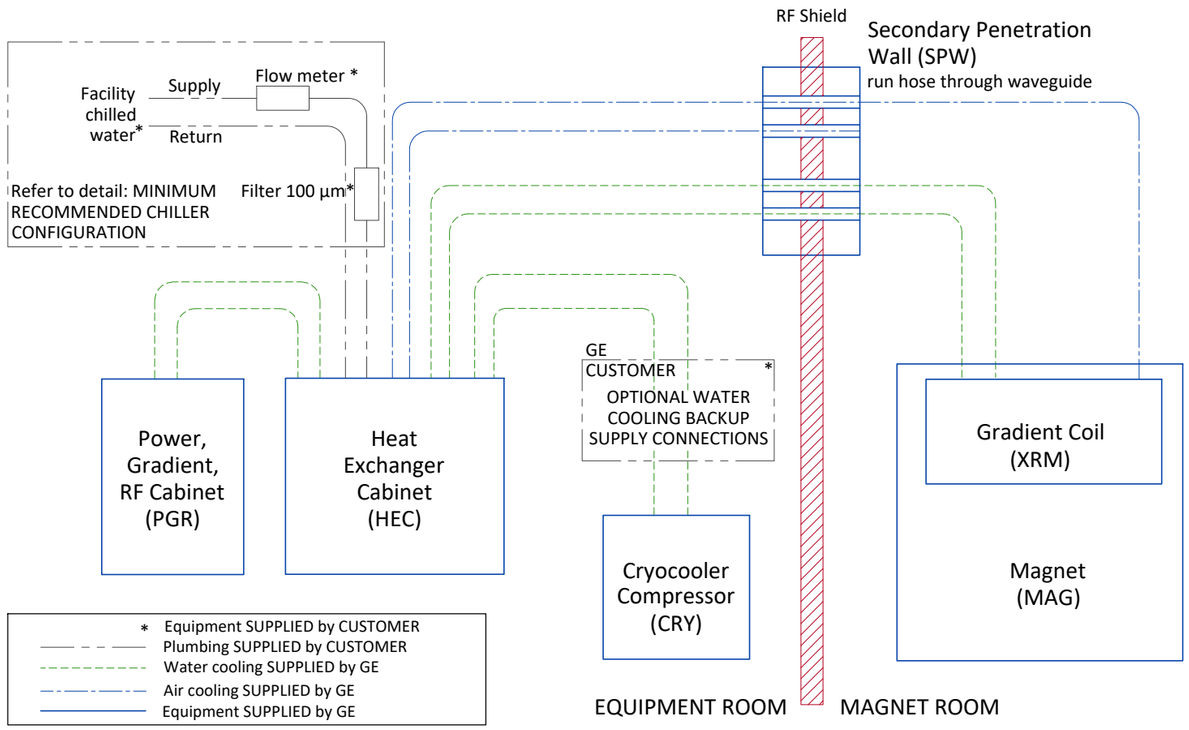
HEAT DISSIPATION DETAILS

DESCRIPTION	ROOM	IDLE		AVERAGE		MAX	
		W	btu	W	btu	W	btu
Magnet (MAG) and Patient Table (PT)	Magnet	561	1915	1200	4095	2400	8189
Blower Box (MG6)	Magnet	450	1535	450	1535	450	1535
Penetration Panel Cabinet (PEN)	Magnet	0	0	150	512	300	1024
Penetration Panel Cabinet (PEN)	Equipment	1568	5349	1568	5349	3135	10697
Secondary Penetration Wall (SPW)	Magnet/Equipment	0					
Main Disconnect Panel (MDP)	Equipment	132	450	132	450	264	901
Power, Gradient, RF Cabinet (PGR)	Equipment	2500	8530	3068	10470	6137	20940
Crycooler Compressor (CRY)	Equipment	500	1706	500	1706	500	1706
Heat Exchanger Cabinet (HEC)	Equipment	500	1706	500	1706	1000	3412
Magnet Monitor (MON)	Equipment	240	819	240	819	240	819
Operator Workspace equipment (OW)	Control	1450	4947	1450	4947	1450	4947

MAGNET ROOM EXHAUST FAN SCHEMATIC



CHILLED WATER BLOCK DIAGRAM

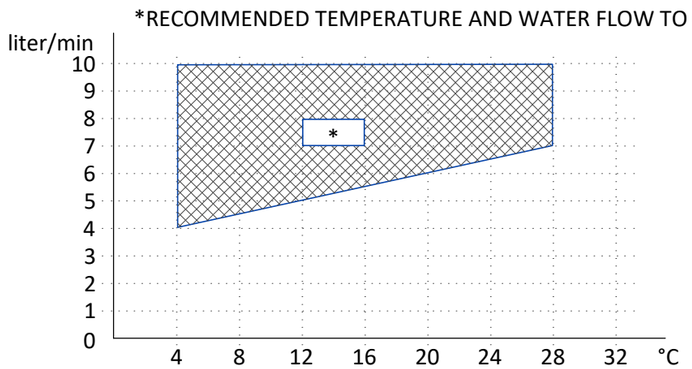


FACILITY LIQUID COOLANT REQUIREMENTS

PARAMETER		REQUIREMENTS	
Chiller size		Minimum 49 kW	
Inlet temperature		6 to 12°C [42.8 to 53.6°F] measured at the inlet to the HEC	
Hose connections to the HEC (supplied by customer)		1.5 inch (38.1 mm) male NPT	
		MINIMUM FLOW 114 l/min [30 gpm]	MAXIMUM FLOW 132 l/min [35 gpm]
PRESSURE DROP IN HEC CABINET	40% propylene glycol	2.4 bars [34.8 psi]	3.3 bars [47.8 psi]
Availability		Continuous	
Antifreeze		no more than 40% propylene glycol	
Temperature rise at minimum flow		6.8°C [12.2°F] with 40% propylene glycol-water 3730J/(kgK) specific heat, 1021kg/m³ density, 49kW heat	
Temperature rise at maximum flow		5.8°C [10.4°F] with 40% propylene glycol-water 3730J/(kgK) specific heat, 1021kg/m³ density, 49kW heat	
Maximum inlet pressure to HEC		6 bar [87 psi]	
Minimum continuous heat load		7.5 kW	
Hoses to be provided by customer		38.1 mm [1.5 in] minimum hose inside diameter	
Condensation protection		Facility plumbing to the HEC must be properly routed and insulated to prevent equipment damage or safety hazards	
Facility water quality requirements		Refer to pre-installation manual for detailed specifications	
Particle size		< 100 micron (with field changeable filter)	

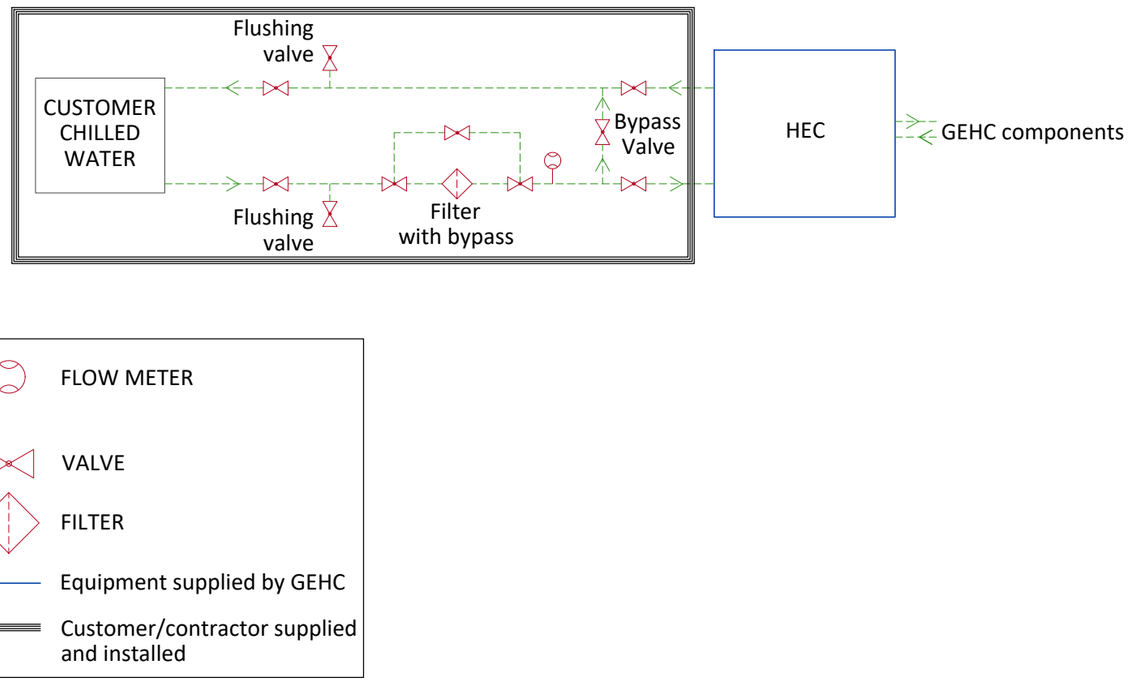
CITY WATER BACKUP REQUIREMENTS FOR COMPRESSOR

INLET WATER FLOW/TEMPERATURE FOR CRYOCOOLER COMPRESSOR

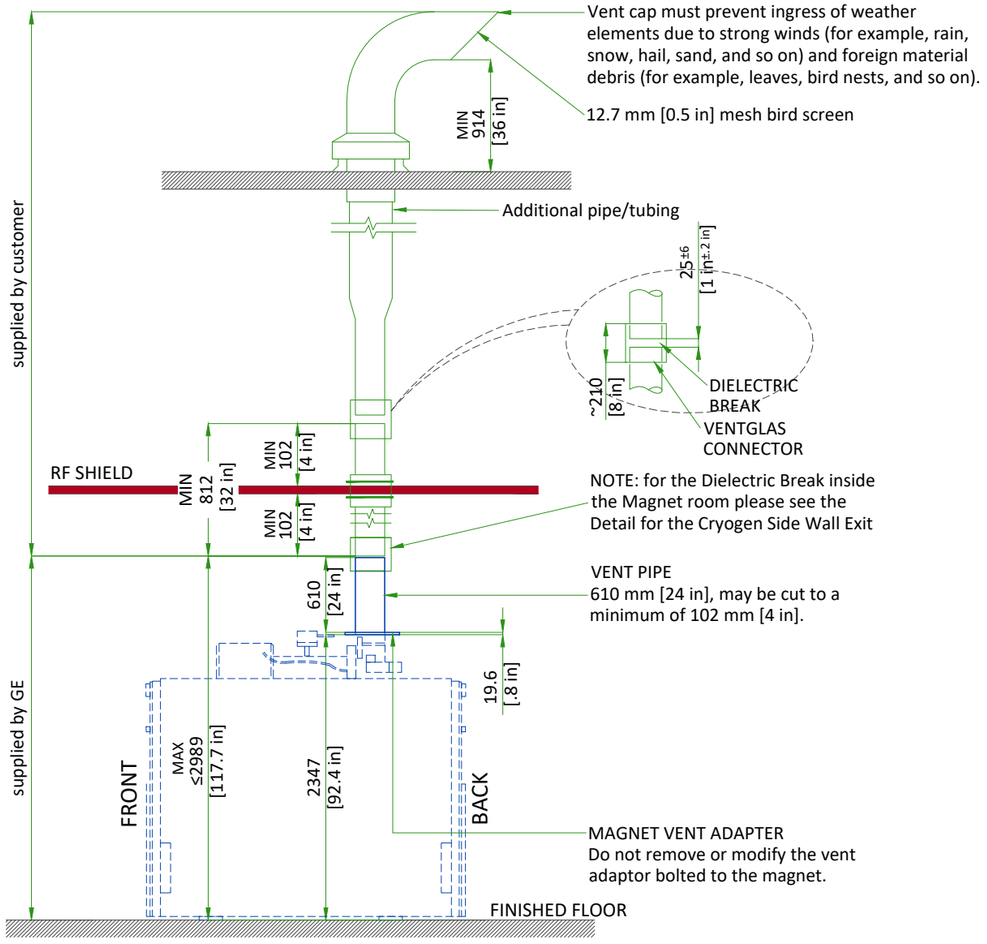


	MIN	MAX	IDEAL
INLET TEMP (°C)	4	28	12-16
INLET FLOW (l/min)	4	10	7-8
INLET PRESSURE (kPa)	200	690	
TEMP RISE	26°C at 4 l/min flow	10°C at 10 l/min flow	
HEAT DISSIPATION (kW)	7.2 kW		
PRESSURE DROP	60 kPa at 8 l/min flow		

MINIMUM RECOMMENDED CHILLER CONFIGURATION



TYPICAL CRYOGENIC VENT PIPE DETAIL



Waveguide is contractor supplied. Minimum 812 mm [32 in]. Must extend at least 100 mm [4 in] on magnet room side of the wall/ceiling and 25±6 mm [1±0.25 in] from the GEHC supplied pipe below isolation joint.

1. The 203 mm [8 in] OD vent material must be one of the following materials with the wall thickness indicated:
   a. SS 304: Minimum 0.89 mm [0.035 in]; Maximum 3.18 mm [0.125 in]
   b. AL 6061-T6: Minimum 2.11 mm [0.083 in]; Maximum 3.18 mm [0.125 in]
   c. CU DWV, M or L: Minimum 2.11 mm [0.083 in]; Maximum 3.56 mm [0.140 in]
2. Either tubes or pipes may be used and must be seamless or have welded seams

NOTE

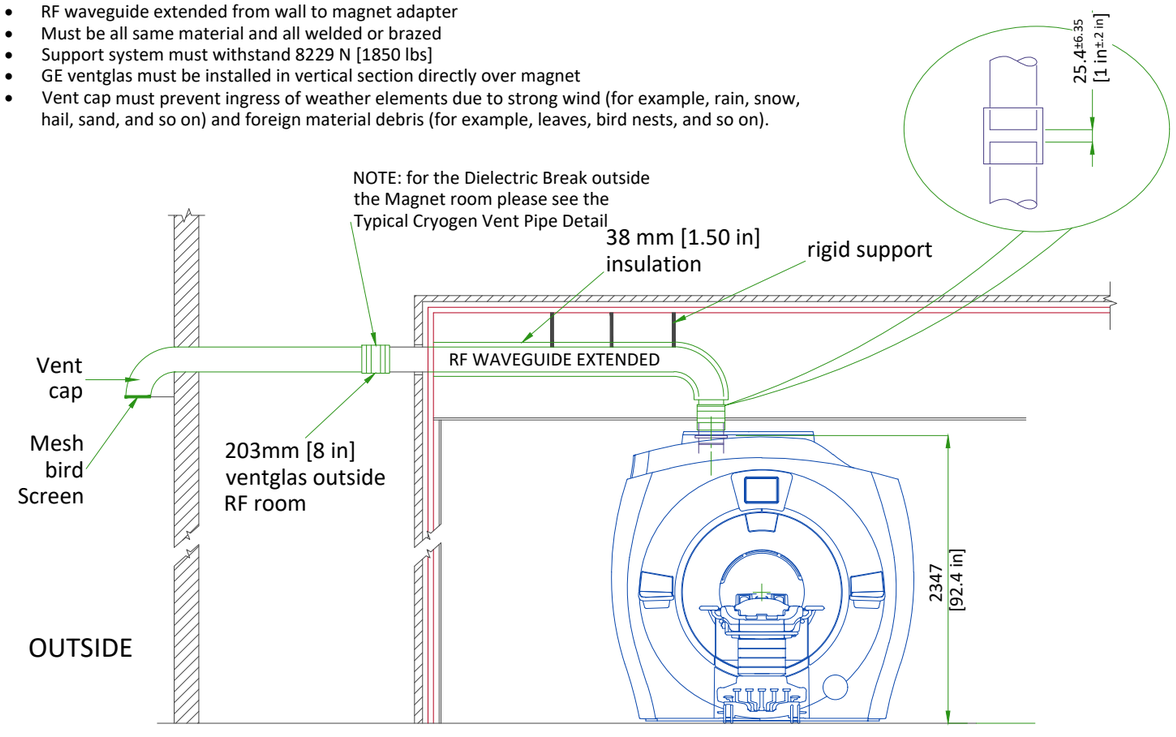
All welds on the pipe must be ground down to a smooth 203 mm [8 in] diameter so that it can be clamped to the Ventglas with enough force.

3. Corrugated pipe or spiral duct must not be used
4. If required, bellows pipe less than 300 mm [12 in] in length may be used as a thermal expansion joint
5. The vent pipe must withstand the maximum pressure listed in the Pre-Installation Manual
6. Waveguide vent material must match the outside diameter of the magnet flanged vent adapter
7. The vent system must be insulated with 38 mm [1.5 in] thick flexible unicellular insulation to prevent condensation during magnet ramping. Exposed insulation must be covered with a white PVC jacket. The clearance area of the dielectric break must be left bare (without insulation) or the insulation must be easily removable for periodic inspection.

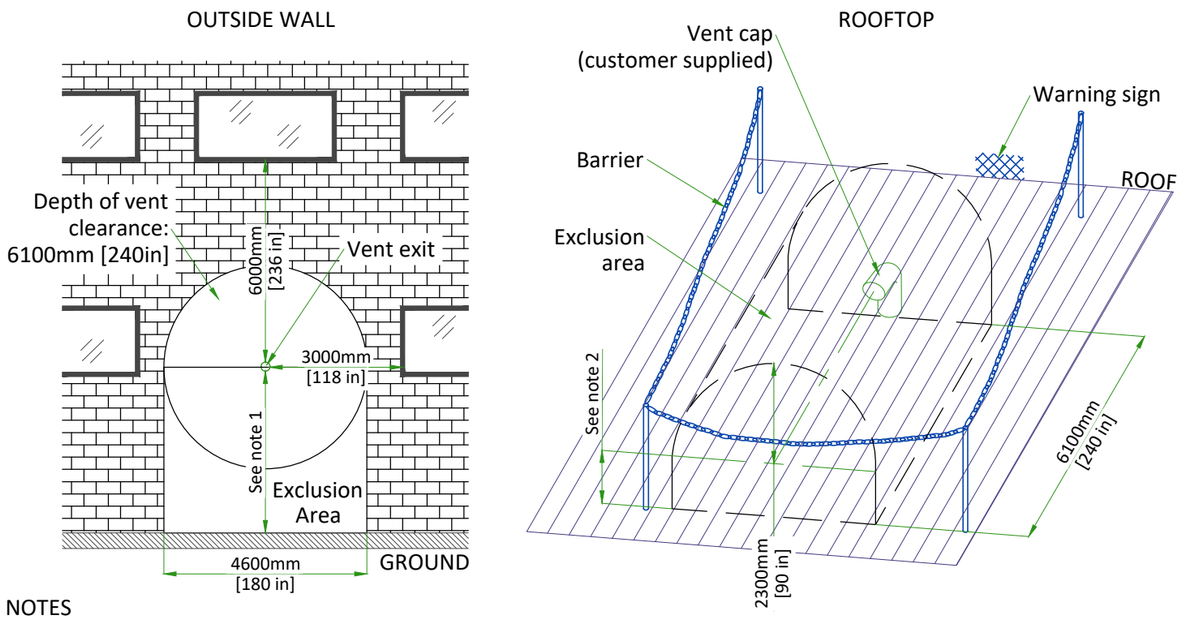
TYPICAL CRYOGEN SIDE WALL EXIT WITH LONG SWEEP ELBOW

KEY COMPONENTS :

- RF waveguide extended from wall to magnet adapter
- Must be all same material and all welded or brazed
- Support system must withstand 8229 N [1850 lbs]
- GE ventglas must be installed in vertical section directly over magnet
- Vent cap must prevent ingress of weather elements due to strong wind (for example, rain, snow, hail, sand, and so on) and foreign material debris (for example, leaves, bird nests, and so on).



CRYOGENIC VENTING (EXTERIOR)



NOTES

(1) Restricted area: minimum distance between vent pipe and ground is 3660mm [144 in]. Barriers are required. Public area: barriers are not required if height is > 5000mm [197 in].

(2) The bottom of the 90° elbow must be at least 914mm [36 in] above the roof deck (or higher if at risk of being blocked by drifting snow, sand, or other potential obstructions.)

NOT TO SCALE

MAGNET CRYOGENIC VENT SYSTEM PRESSURE DROP MATRIX

Outer dia. of pipe (D)	Distance of vent system component from magnet		Pressure drop for straight pipe		Std sweep 45° elbow		Long sweep 45° elbow		Std sweep 90° elbow		Long sweep 90° elbow		90° miter bend	
	m	ft	kPa/m	psi/ft	kPa	psi	kPa	psi	kPa	psi	kPa	psi	kPa	psi
8 in. (200mm)	0.00-3.05	0-10	1.629	0.072	3.877	0.562	2.585	0.375	7.269	1.054	4.846	0.703	14.539	2.108
	3.05-6.10	10-20	2.784	0.123	6.393	0.927	4.262	0.618	11.987	1.738	7.992	1.159	23.975	3.476
	6.10-9.15	20-30	4.172	0.184	8.712	1.263	5.808	0.842	16.535	2.369	10.890	1.579	32.670	4.737
	9.15-12.2	30-40	5.391	0.238	10.847	1.573	7.231	1.049	20.338	2.949	13.559	1.966	40.677	5.898
	12.20-15.25	40-50	6.460	0.286	12.812	1.858	8.541	1.239	24.023	3.483	16.015	2.322	48.046	6.967
	15.25-18.30	50-60	7.394	0.327	14.620	2.120	9.747	1.413	27.413	3.975	18.275	2.650	54.826	7.950
	18.29-24.39	60-80	8.913	0.394	17.813	2.583	11.875	1.722	33.400	4.843	22.266	3.229	66.799	9.686
	24.39-30.49	80-100	10.049	0.444	20.514	2.974	13.676	1.983	38.463	5.577	25.642	3.718	76.926	11.154
10 in. (250mm)	0.00-6.10	0-20	0.824	0.036	2.382	0.345	1.588	0.230	4.467	0.648	2.978	0.432	8.934	1.295
	6.10-12.22	20-40	1.607	0.071	4.035	0.585	2.690	0.390	7.565	1.097	5.043	0.731	15.130	2.194
	12.22-18.29	40-60	2.239	0.099	5.477	0.794	3.651	0.529	10.269	1.489	6.846	0.993	20.537	2.978
	18.29-24.39	60-80	2.745	0.121	6.733	0.976	4.489	0.651	12.625	1.831	8.416	1.220	25.249	3.661
	24.39-30.49	80-100	3.145	0.139	7.827	1.135	5.218	0.757	14.676	2.128	9.784	1.419	29.353	4.256
12 in. (300mm)	0.00-6.10	0-20	0.424	0.019	1.486	0.215	0.991	0.144	2.786	0.404	1.858	0.269	5.573	0.808
	6.10-12.22	20-40	0.829	0.037	2.501	0.363	1.667	0.242	4.689	0.680	3.126	0.453	9.377	1.360
	12.22-18.29	40-60	1.169	0.052	3.408	0.494	2.272	0.329	6.389	0.926	4.260	0.618	12.779	1.853
	18.29-24.39	60-80	1.453	0.064	4.218	0.612	2.812	0.408	7.908	1.147	5.272	0.764	15.816	2.293
	24.39-30.49	80-100	1.688	0.075	4.941	0.716	3.294	0.478	9.263	1.343	6.176	0.895	18.527	2.686
14 in. (350mm)	0.00-6.10	0-20	0.235	0.010	0.970	0.141	0.647	0.094	1.819	0.264	1.213	0.179	3.639	0.528
	6.10-12.22	20-40	0.459	0.020	1.619	0.235	1.079	0.157	3.036	0.440	2.024	0.293	6.072	0.880
	12.22-18.29	40-60	0.652	0.029	2.209	0.320	1.473	0.214	4.142	0.601	2.761	0.400	8.284	1.201
	18.29-24.39	60-80	0.817	0.036	2.745	0.398	1.830	0.265	5.147	0.746	3.431	0.498	10.293	1.493
	24.39-30.49	80-100	0.958	0.042	3.231	0.469	2.154	0.312	6.059	0.879	4.039	0.586	12.117	1.757
16 in. (400mm)	0.00-6.10	0-20	0.184	0.008	0.875	0.127	0.584	0.085	1.641	0.238	1.094	0.159	3.283	0.476
	6.10-12.22	20-40	0.356	0.016	1.444	0.209	0.962	0.140	2.707	0.392	1.804	0.262	5.413	0.785
	12.22-18.29	40-60	0.508	0.022	1.968	0.285	1.312	0.190	3.689	0.535	2.460	0.357	7.379	1.070
	18.29-24.39	60-80	0.642	0.028	2.451	0.355	1.634	0.237	4.596	0.666	3.064	0.444	9.191	1.333
	24.39-30.49	80-100	0.759	0.034	2.896	0.420	1.931	0.280	5.430	0.787	3.620	0.525	10.861	1.575

Notes

1. Refer to Magnet Room Venting manual 5850263-1EN for specifications of distances >100 ft (30.49 m).
2. Elbows with angles greater than 90° must not be used
3. Data in Table is based on the following facts and assumptions:
   a. Initial flow conditions at magnet interface
   b. EM energy (13MJ) is dumped to He during quench and rises He temperature to 10 Kelvin
   c. Gas temperature starting at 10 Kelvin and increase with length determined by thermal energy balance
   d. 90% He is assumed to be evacuated within 30 sec. None left after quench.
   e. Absolute roughness is assumed to be 0.25 mm.
   f. R/D = 1.0 for standard sweep elbows, R/D = 1.5 for long sweep elbows where D = outer diameter of pipe; R = radius of bend
4. The total pressure drop of the entire cryogenic vent system varies with the type of adapter selected, refer to Magnet Room Venting manual. The calculation starts at the magnet vent interface and ends at the termination point outside the building.

LIGHTING REQUIREMENTS

- All lighting fixtures and associated components must meet all RF shielded room and RF grounding requirements (e.g., track lighting is not recommended due to possible RF noise).
- All removable lighting fixtures and associated components must be non-magnetic.
- All lighting must use direct current (the DC must have less than 5% ripple).
- 300 lux must be provided at the front of the magnet for patient access and above the magnet for servicing.
- Fluorescent lighting must not be used in the magnet room.
- Lighting must be adjusted using a discrete switch or a variable DC lighting controller.
- SCR dimmers or rheostats must not be used.
- DC LED lighting may be used if the DC power converter and RF sources are all located outside the magnet room RF shield.

  NOTE: LED lighting could cause image quality issues due to RF interference. Make sure a MR-compatible LED lighting solution is chosen.
- Battery chargers (e.g., used for emergency lighting) must be located outside the magnet room.
- LED Lighting or short filament length incandescent bulbs are recommended.
- Linear lamps are not recommended due to the high burnout rate.

CONNECTIVITY REQUIREMENTS

Your new GE Healthcare imaging modality will require local and remote connectivity to enable our full range of digital support:

- Local connectivity - This allows your system to connect to local devices such as PACS and modality worklist. We will require network information to configure the system(s), and a live ethernet port(s) prior to the delivery of the system(s).
- Remote connectivity - Your GE Healthcare service warranty includes InSite™ (applicable to InSite capable products), a powerful broadband-based service which enables digital tools that can help guard your hospital against equipment downtime and revenue loss by quickly connecting you to a GE Healthcare expert.

Depending on product family and software version, imaging systems can be connected in one of the following methods:

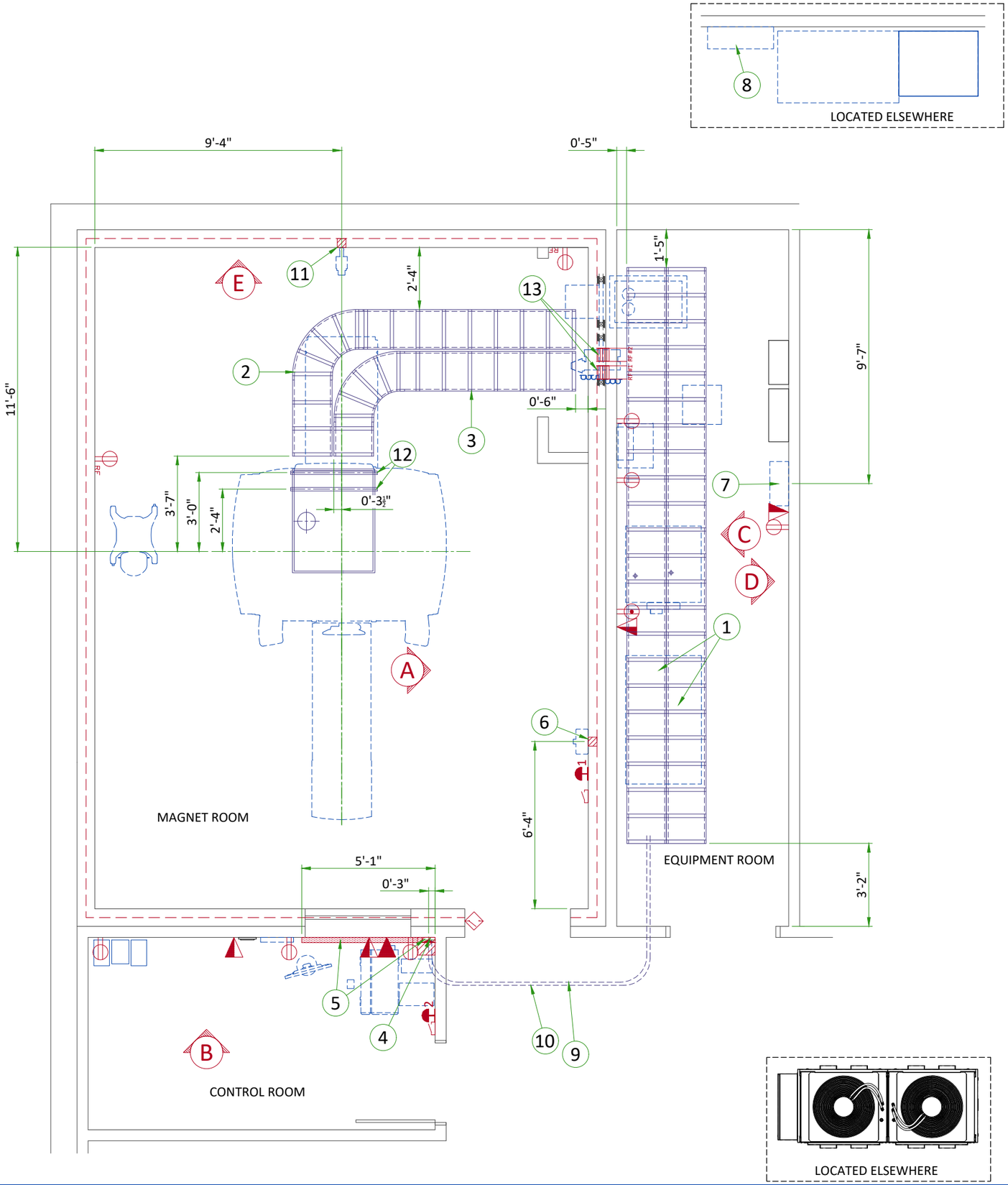
1. TLS over TCP Port 443 (Preferred method for new products) via:
   a. DNS resolution
   b. Customer-provided Proxy or
   c. GE Proxy (Available in some regions)
2. Site-to-Site IPsec VPN tunnel

Please provide the GE project manager with the contact information for the resource that can provide information required to set up these connections. GEHC will send out communication to these contacts, which will include the project's Connectivity requirements, and a Connectivity form. This form will need to be completed and returned to GEHC prior to delivery of the system to ensure the system is tested and connectivity is enabled prior to the completion of the installation.

ELECTRICAL NOTES

1. Aluminum or solid wires are not allowed.
2. Wire sizes given are for use of equipment. Larger sizes may be required by local codes.
3. It is recommended that all wires be color coded, as required in accordance with national and local electrical codes.
4. Conduit sizes shall be verified by the architect, electrical engineer or contractor, in accordance with local or national codes.
5. Convenience outlets are not illustrated. Their number and location are to be specified by others. Locate at least one convenience outlet close to the system control, the power distribution unit and one on each wall of the procedure room. Use hospital approved outlet or equivalent.
6. General room illumination is not illustrated. Caution should be taken to avoid excessive heat from overhead spotlights. Damage can occur to ceiling mounting components and wiring if high wattage bulbs are used. Recommend low wattage bulbs no higher than 75 watts and use dimmer controls (except MR). Do not mount lights directly above areas where ceiling mounted accessories will be parked.
7. Routing of cable ductwork, conduits, etc., must run direct as possible otherwise may result in the need for greater than standard cable lengths (refer to the interconnection diagram for maximum usable lengths point to point).
8. Conduit turns to have large, sweeping bends with minimum radius in accordance with national and local electrical codes.
9. In some cases GEHC will specify ground wires to be sized larger than code. In these situations, the GEHC specification must be followed.
10. A special grounding system is required in all procedure rooms by some national and local codes. It is recommended in areas where patients might be examined or treated under present, future, or emergency conditions. Consult the governing electrical code and confer with appropriate customer administrative personnel to determine the areas requiring this type of grounding system.
11. The maximum point to point distances illustrated on this drawing must not be exceeded.
12. Physical connection of primary power to GEHC equipment is to be made by customers electrical contractor with the supervision of a GEHC representative. The GEHC representative would be required to identify the physical connection location, and insure proper handling of GEHC equipment.
13. GEHC conducts power audits to verify quality of power being delivered to the system. The customer's electrical contractor is required to be available to support this activity.
14. Every installation is unique. The electrical contractor will be required to support the installation of the GEHC equipment by providing knockouts, grommeted openings, bushings, etc. as required. All power connections to be performed by the electrician.

- All junction boxes, conduit, duct, duct dividers, switches, circuit breakers, cable tray, etc., are to be supplied and installed by customers electrical contractor. All junction boxes shall be provided with covers.
- Conduit and duct runs shall have gradual sweep radius bends.
- Conduits and duct above ceiling or below finished floor must be installed as near to ceiling or floor as possible to reduce run length.
- Ceiling mounted junction boxes illustrated on this plan must be installed flush with finished ceiling.
- All ductwork must meet the following requirements:
  1.Ductwork shall be metal with dividers and have removable, accessible covers.
  2. Ductwork shall be certified/rated for electrical power purposes.
  3. Ductwork shall be electrically and mechanically bonded together in an approved manner.
  4. PVC as a substitute must be used in accordance with all local and national codes.
- All openings in raceway and access flooring are to be cut out and finished off with grommet material by the customers contractor.
- Electrical contractor to provide measured pull strings in all conduit and raceway runs.
- Provide 10 foot pigtails at all junction points.
- Grounding is critical to equipment function and patient safety. Site must conform to wiring specifications shown on this plan.

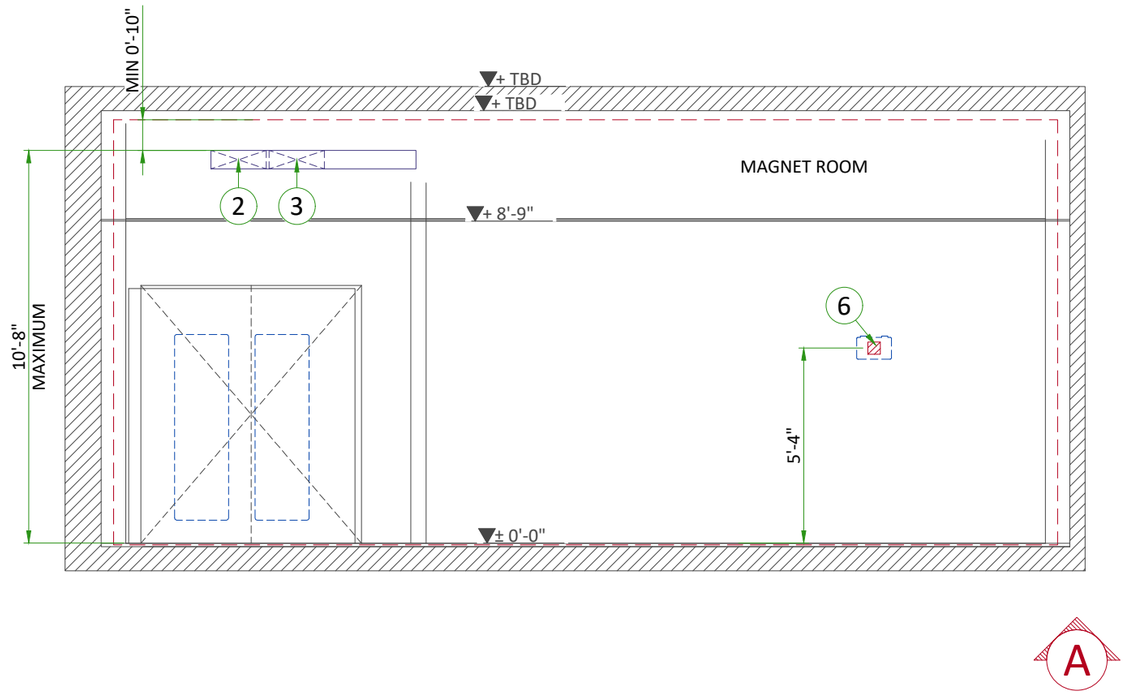


ITEM	Electrical Layout Item List
1	Cable ladder 18" x 6" [450 x 150]
2	Non-ferrous cable ladder 18" x 6" [450 x 150]
3	Non-ferrous cable ladder for gradient cables 18" x 6" [450 x 150]
4	Box above ceiling size per local code
5	Surface wall duct with minimum 2 dividers 6' x 3 1/2" [150 x 100]
6	Box in wall 4" x 4" x 2" [100 x 100 x 50]
7	Main disconnect panel (MDP)
8	Maintenance bypass panel
9	Conduit above RF screen 2" [50]
10	Conduit above RF screen 3" [75]
11	Box in wall 4" x 4" x 4" [100 x 100 x 100]
12	Non-ferrous unistrut cable support
13	RF Filters - grounded to RF shield at Common Ground Stud

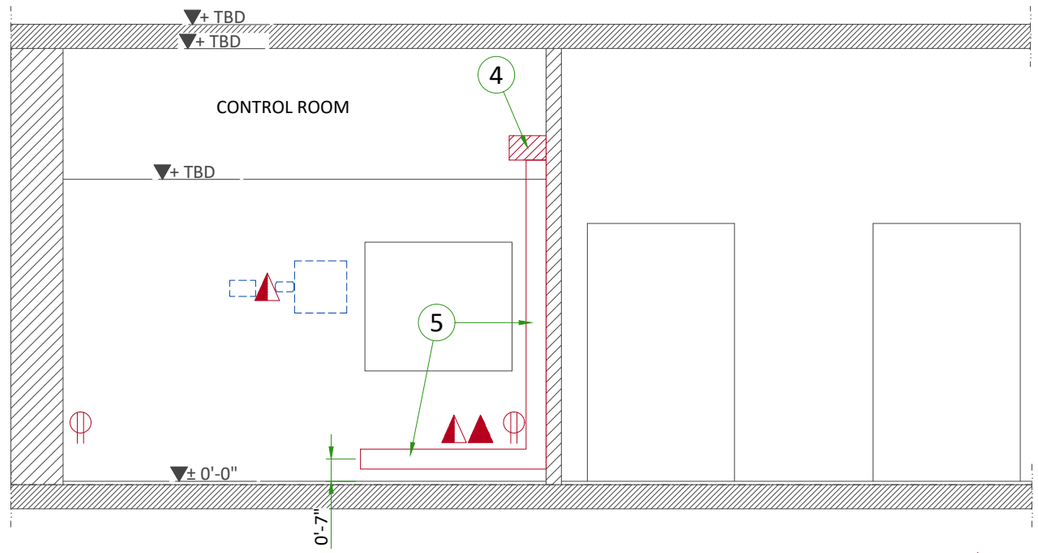
ITEM	QTY	Electrical Outlet Legend Customer/contractor supplied and installed items unless otherwise specified. Height above floor determined by local codes unless otherwise specified.
		System emergency off (EO1-2), (recommended height 1.2m [48"] above floor)
		Door interlock switch
		Emergency exhaust fan switch 1.2m [48"] height recommended)
		Duplex hospital grade, dedicated wall outlet 120-v, single phase power
		Network outlet
		Dedicated telephone lines/network connection
		Duplex hospital grade, dedicated outlet 120-v emergency, single phase power, 15a
RF		Duplex hospital grade, dedicated outlet 120-v, single phase outlet routed through RF filter

Additional Conduit Runs (Contractor Supplied and Installed)

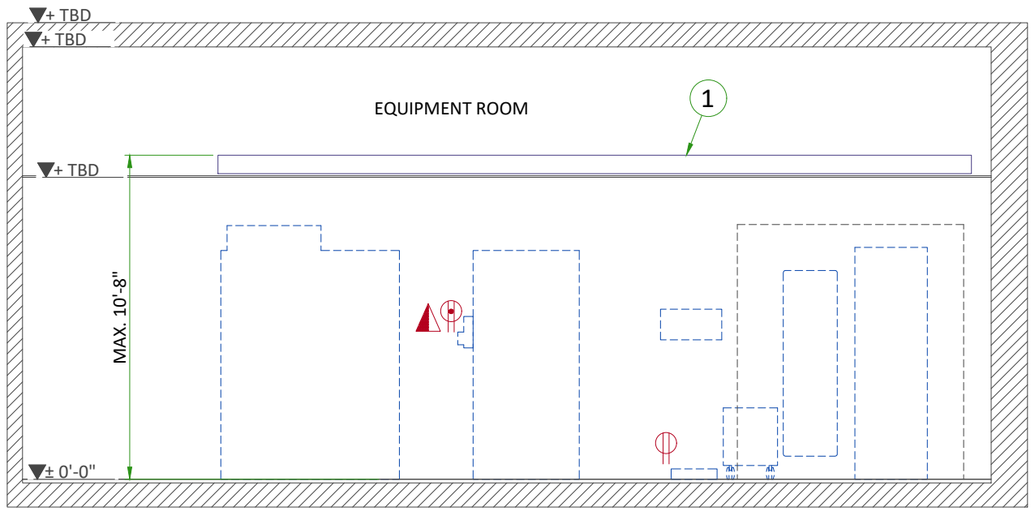
From (Bubble # / Item)		To (Bubble # / Item)		Qty	Size In.	Size mm
7	Main Disconnect Panel		Power, Gradient, RF cabinet	1	As req'd	As req'd
			Heat Exchange Cabinet	1	As req'd	As req'd
			System emergency off 2	1	1/2	16
	System emergency off 2		Secondary Penetration Wall	1	1/2	16
	Door switch		Power, Gradient, RF cabinet	1	3/4	20
	System emergency off 1		Secondary Penetration Wall	1	3/4	20
6	Magnet Rundown Unit		Magnet	1	1	25
			RF filter #1	1	As req'd	As req'd
	RF filter #1		120-V 1Ø Power	1	As req'd	As req'd
	Room Light		RF filter #2	1	As req'd	As req'd
	RF filter #2		Facility emergency power	1	As req'd	As req'd
11	TV Camera		Waveguide or RF filter	1	1	25
4	TV Monitor			1	1	25
	Injector control unit		Waveguide or RF filter	1	2 1/2	70
	Injector head			1	As req'd	As req'd
	Integrated battery charging unit			1	As req'd	As req'd
	Dimplex Chiller	4	Remote Graphic Display	1	3/4	20
			Facility Power	1	as Req'd	
8	Maintenance Bypass Panel	7	Main Disconnect Panel	1	As req'd	As req'd
			Full UPS	2	As req'd	As req'd
			Facility Power		As req'd	As req'd
	Full UPS		Battery Cabinet		As req'd	As req'd


MIN 0'-10"
+ TBD
+ TBD
MAGNET ROOM
2
3
+ 8'-9"
10'-8"
MAXIMUM
6
5'-4"
± 0'-0"

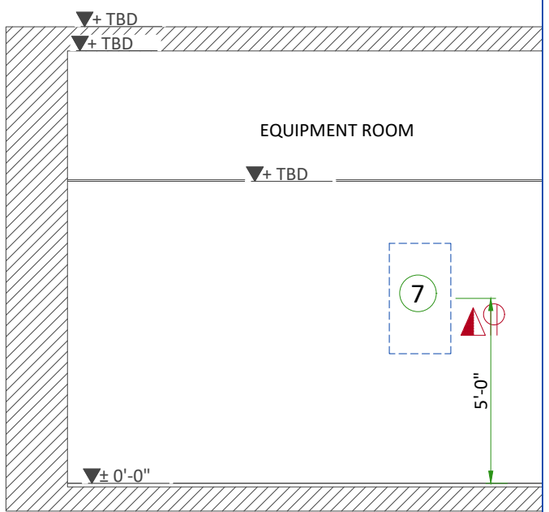
A


+ TBD
+ TBD
CONTROL ROOM
4
+ TBD
5
± 0'-0"
0'-7"

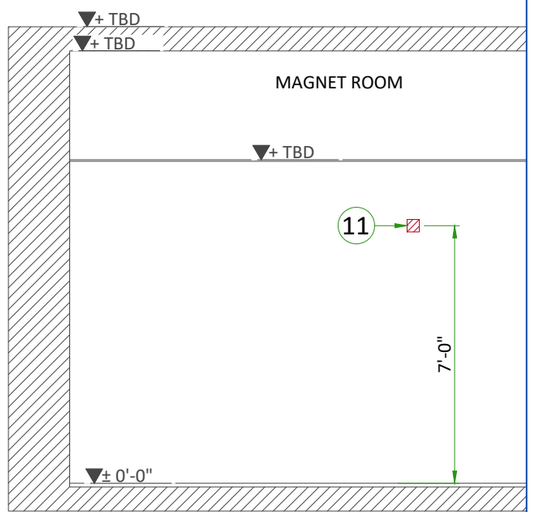
B


+ TBD
+ TBD
EQUIPMENT ROOM
1
+ TBD
MAX. 10'-8"
± 0'-0"

C


+ TBD
+ TBD
EQUIPMENT ROOM
+ TBD
7
5'-0"
± 0'-0"

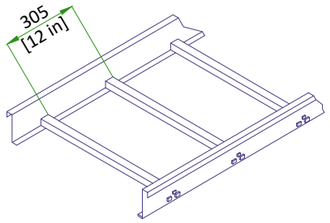
D


+ TBD
+ TBD
MAGNET ROOM
+ TBD
11
7'-0"
± 0'-0"

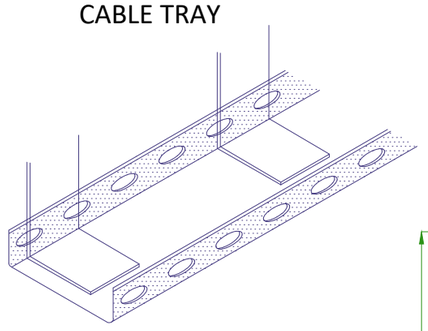
E

CABLE WAYS IN EQUIPMENT ROOM

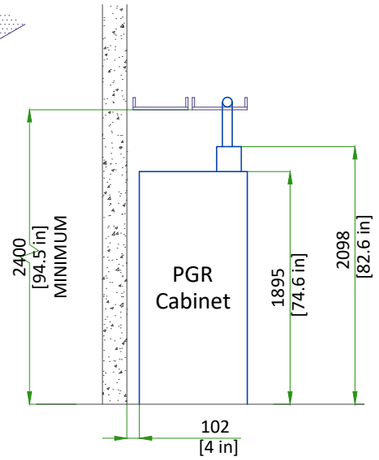
CABLE LADDER



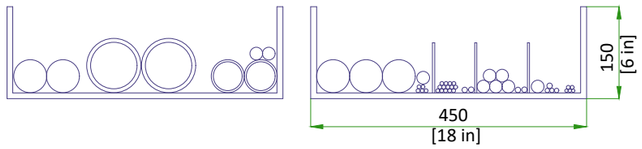
CABLE TRAY



SIDE-BY-SIDE



Cable trays detail side-by-side: (2x450mm [18in])

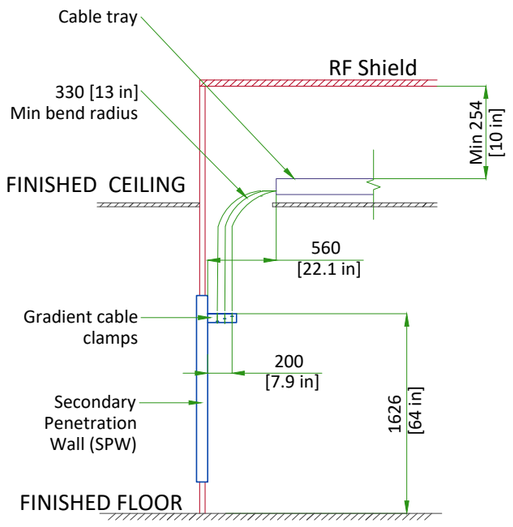


Water and air pipes

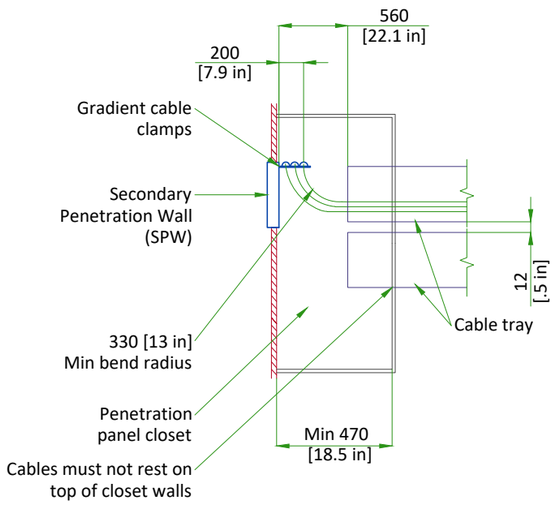
Cables

CABLE WAY TO PENETRATION PANEL

CABLE TRAY TO PENETRATION PANEL REQUIREMENTS IN THE EXAM ROOM

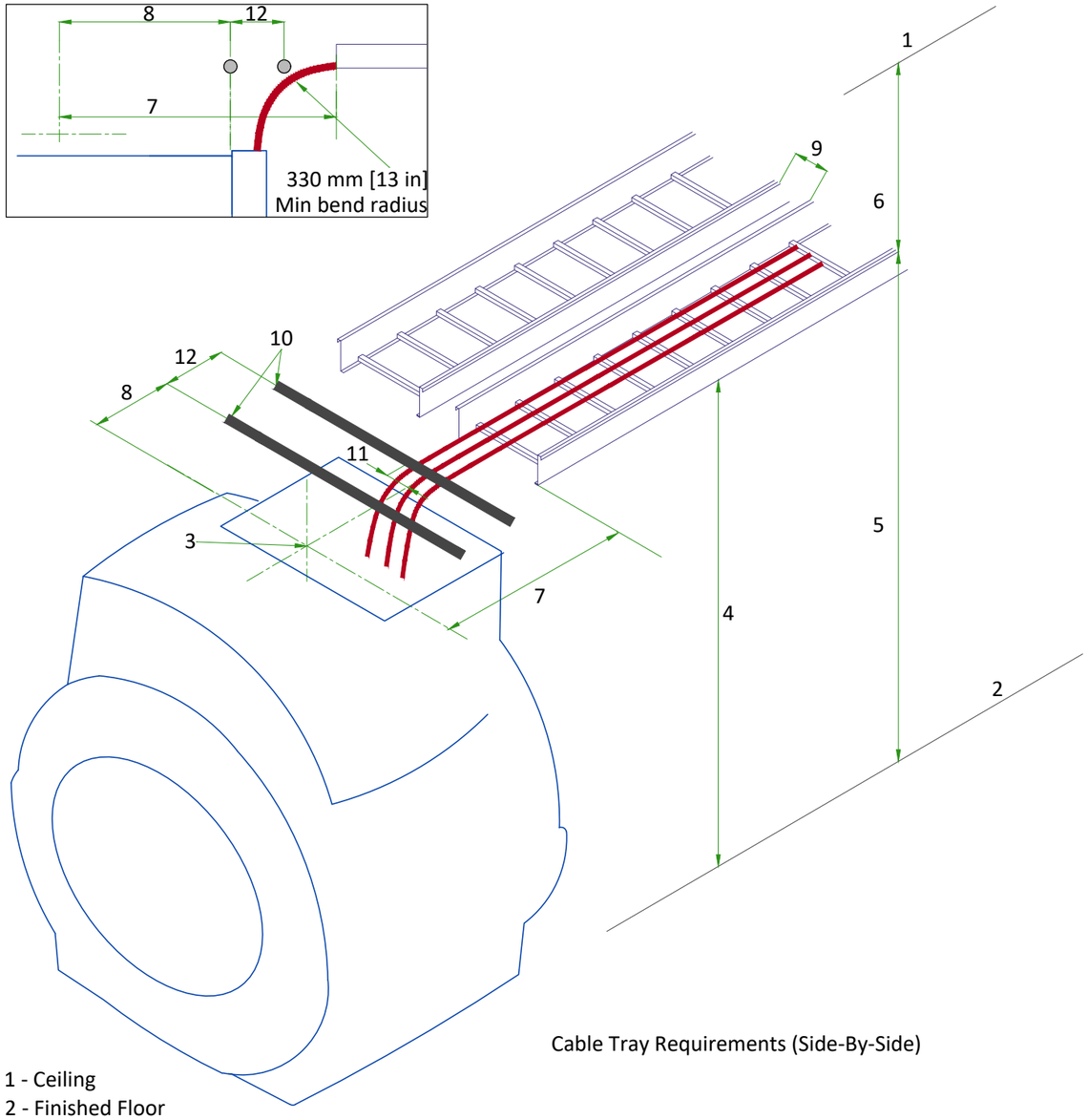


SIDE VIEW



TOP VIEW

CABLE TRAYS REQUIREMENTS IN MAGNET ROOM



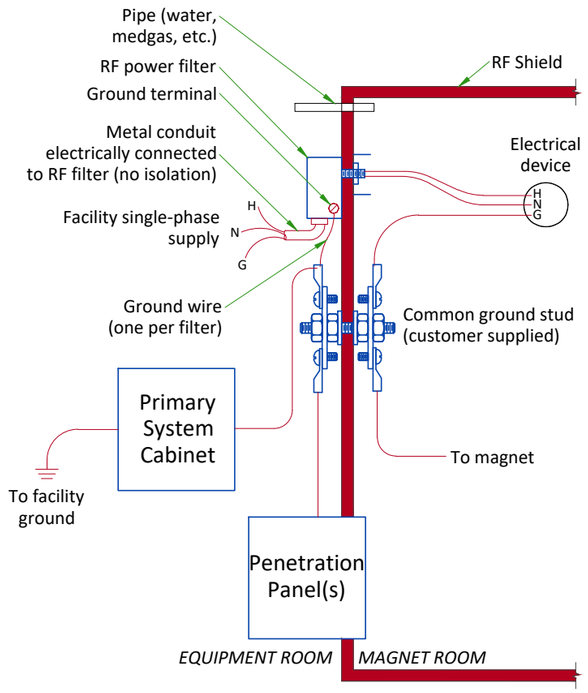
Cable Tray Requirements (Side-By-Side)

1 - Ceiling
2 - Finished Floor
3 - Magnet isocenter. Gradient cables must be centered on magnet isocenter.
4 - Minimum cable tray height required at back of Magnet: 2578 mm [101.5 in].
Tray height may be lower at other points to avoid obstructions.
5 - Maximum height from floor to top of tray (anywhere in Magnet room): 3251 mm [128 in].
6 - Minimum distance from top of cable tray to ceiling or other obstruction: 254 mm [10 in].
7 - Tray end to isocenter: 1099 ±12 mm [43.25 ±0.5 in] (HM series) or 1336 ±12 mm [52.60 ±0.5 in] (IPM series).
8 - Other cable termination to isocenter: 718 ±12mm [28.25 ±0.5 in] (HM series)
or 955 ±12 mm [37.60 ±0.5 in] (IPM series).
9 - Minimum distance between trays: 12 mm [0.5 in].
10 - Non-ferrous cable support
11 - The center of the gradient cable group is 89 mm [3.5 in] from magnet center.
12 - Distance between non-ferrous cable support: ≤ 305 mm [12 in].

TYPICAL MAGNET ROOM GROUNDING

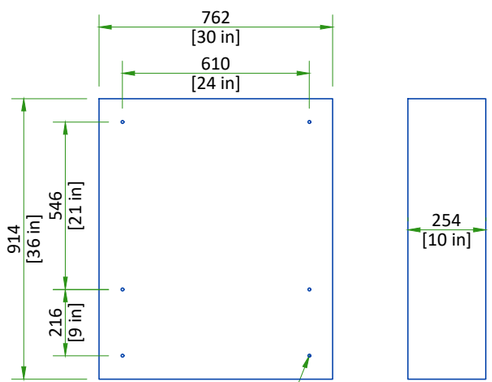
GROUNDING REQUIREMENTS

- All power lines into the RF shielded room require an RF filter.
- All electrical devices (for example, RF filters, outlets, light fixtures, and so on) must have a ground wire from device power source and be grounded to the RF Shield at the RF Common Ground Stud.
- Resistance between any two grounded devices must not exceed 0.1 ohm to ensure equal potential ground system within the Magnet Room.
- Do not ground non-MR equipment to the MR ground system.
- All ground wires for the MR system, including wires between the MR system and the RF Common Ground stud, are provided by GE HealthCare.
- The common ground stud must be installed within 1.5 m [5 ft] of all penetration point(s) of the GE HealthCare equipment, into the RF shield between the Equipment Room and Magnet Room.
- The stud must be expanded with a ground bus on each side (Equipment Room and Magnet Room) with at least 6 additional ground studs or threaded holes on each side. Additional studs/holes must be M6 [¼ in] and include appropriate fastening hardware (lock washers, nuts, bolts).
- For additional information refer to RF Shielded Room manual 5850260-1EN



FULL SYSTEM UPS INTERCONNECT AND BYPASS PANEL

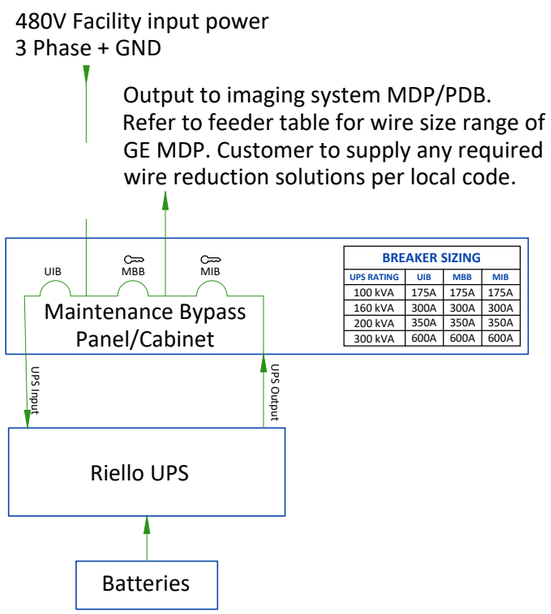
MAINTENANCE BYPASS PANEL (MBP) ELEVATIONS



FRONT VIEW **SIDE VIEW**

SCALE 1:20

TYPICAL UPS SYSTEM CONNECTION METHOD



BREAKER SIZING			
UPS RATING	UIB	MBB	MIB
100 kVA	175A	175A	175A
160 kVA	300A	300A	300A
200 kVA	350A	350A	350A
300 kVA	600A	600A	600A

All cables are customer supplied unless otherwise specified.
Riello warranty support : 1-801-946-2027 (U.S.)
+39 0442 635800 (EMEA)

POWER REQUIREMENTS

SPECIFICATIONS OF MAIN POWER INPUT

POWER SUPPLY	**380/400/415/480V ±10%, 3 PHASE + GND**
FREQUENCIES	**50/60Hz ± 3Hz**
TOTAL SYSTEM 5 SECOND POWER	**123kVA**
TOTAL SYSTEM CONTINUOUS POWER	**99kVA**

- Governing electrical codes may require a neutral wire. If present, neutral must be terminated in MDP.
- Power input must be separated from any others which may generate transients (elevators, air conditioning, radiology rooms equipped with high speed film changers...).
- Total harmonic distortion less than 2.5%. Phase imbalance must not exceed 2%.
- Lock-out/Tag-out: The Main Disconnect Panel (MDP) shall provide an external single point lock-out/tag-out feature for the entire system and a means to externally lock-out/tag-out each output breaker independently. Each lock-out/tag-out feature shall accommodate a standard sized lock hasp.

SPECIFICATIONS OF OPTIONAL BACK-UP POWER SUPPLY

MAGNET MONITOR REQUIRES A 110/220 VAC, 50/60 HZ, 2.0 A FACILITY SUPPLIED OUTLET. POWER AT THE OUTLET MUST BE CONTINUOUSLY AVAILABLE.

FOR CRYOCOOLER COMPRESSOR	
POWER INPUT	**380/400/415/480V, THREE-PHASE + G**
POWER REQUIREMENT	**MIN 9kVA**
POWER CONSUMPTION	**MAX 7.2kW / STEADY STATE 6.5kW at 50Hz** **MAX 8.3kW / STEADY STATE 7.5kW at 60Hz**
FREQUENCY	**50/60Hz ± 3Hz**
Power to Cryocooler Compressor must be removed when emergency off circuit is actuated.	

CABLES

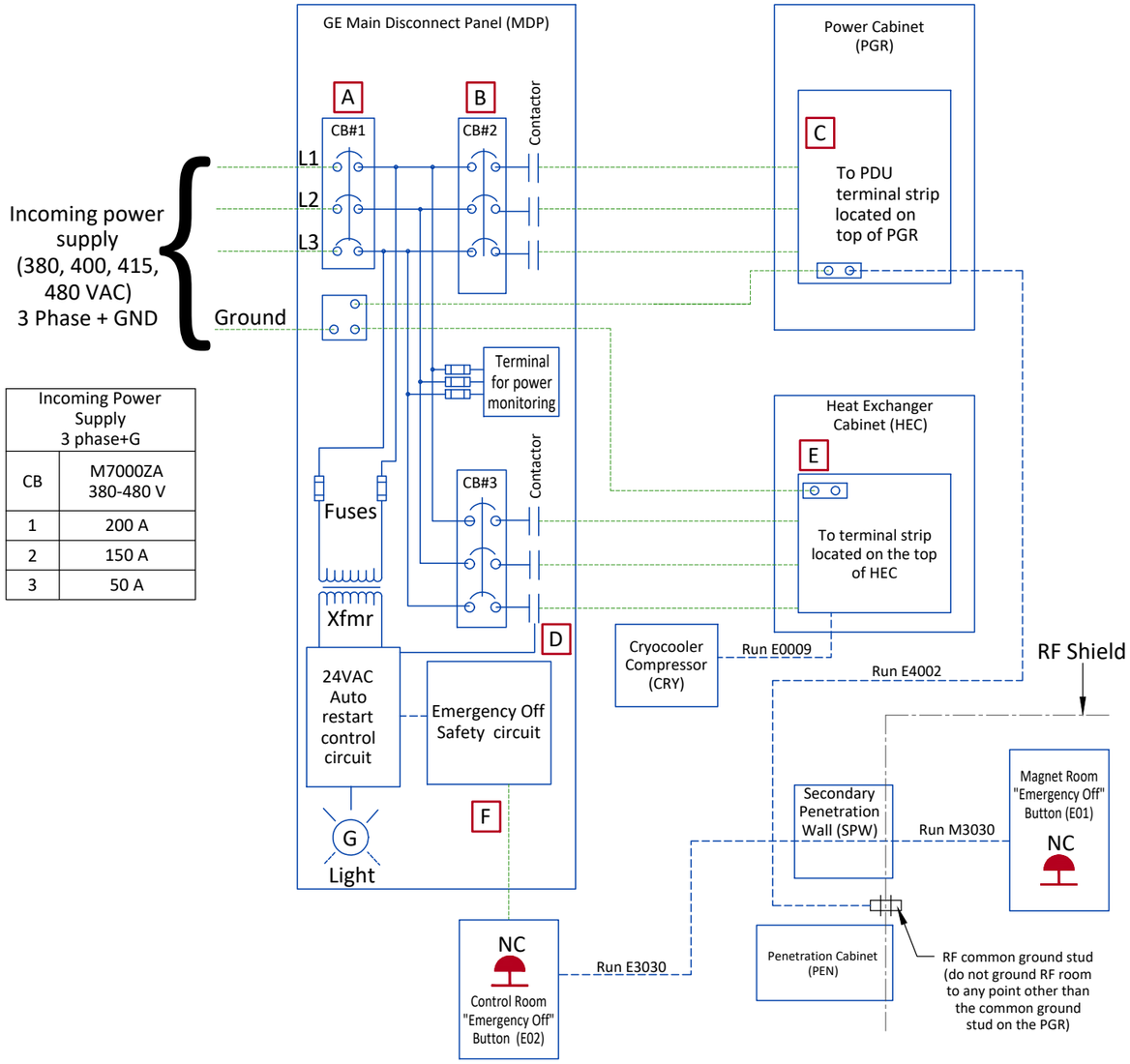
- Power and cable installation must comply with the distribution diagram.
- Size of the Main power input cable is determined by the customer, taking its length and admissible voltage drops into consideration.
- All cables must be isolated and flexible, cable color codes must comply with standards for electrical installation.
- The cables from signaling and remote control (Y,Emergency Off Buttons,L...) will go to Main Panel with a pigtail length of 1.5m [60in], and will be connected during installation.
- Each conductor will be identified and isolated (screw connector).

GROUND SYSTEM

- The equipotential link will be by means of an equipotential bar.
- The grounding point of MDP is directly connected to the building's ground by an isolated copper cable.
- The impedance of the earth bar should be less than or equal to 2 ohms.

GUIDANCE ON SLECTION OF FEEDER AND TRANSFORMER FOR MR SYSTEM			
	Direct feed from facility to MR system	MR system fed by dedicated facility distribution transformer	
Prerequisite Conditions			
MR System Incoming Voltage	480V 3-phase		
Minimum Source short-circuit kVA	7,900 kVA (at source of feeder to MDP)	8,325 kVA (at input to distribution transformer)	
Minimum No-Load Voltage	460V	475V (transformer secondary tapped accordingly)	
Feeder and Transformer Recommendations			
Dedicated Distribution Transformer Recommendations	N/A	Size: 225 kVA Impedance (Z): ≤5% K-Factor: ≥ K=20 200A overcurrent protection on secondary*	Size: 225 kVA Impedance (Z): ≤4% K-Factor: ≥ K=20 200A overcurrent protection on secondary*
Maximum Feeder Length*	280 ft	150 ft	240 ft
Feeder Size - 3-phase power conductors*	3/0 AWG Cu	3/0 AWG Cu	
Feeder Size - Ground (USA)*	6 AWG Cu (equipment grounding conductor)	4 AWG Cu (supply side bonding jumper) 6 AWG Cu (equipment grounding conductor)	
Feeder Size - Ground (Canada)*	6 AWG Cu (bonding conductor)	6 AWG Cu (bonding conductor)	
* NOTE: Recommendations shown apply only to cases defined exactly as shown in this table and when not in conflict with local electrical codes . For all other cases, refer to the local codes and the System Voltage Regulation Calculator located on the GE Healthcare Site Planning Website			

POWER DISTRIBUTION



Incoming Power Supply 3 phase+G	
CB	M7000ZA 380-480 V
1	200 A
2	150 A
3	50 A

Cable SUPPLIED by CUSTOMER
Cable SUPPLIED by GE - Customer Installed
Equipment SUPPLIED by CUSTOMER
Equipment SUPPLIED by GE

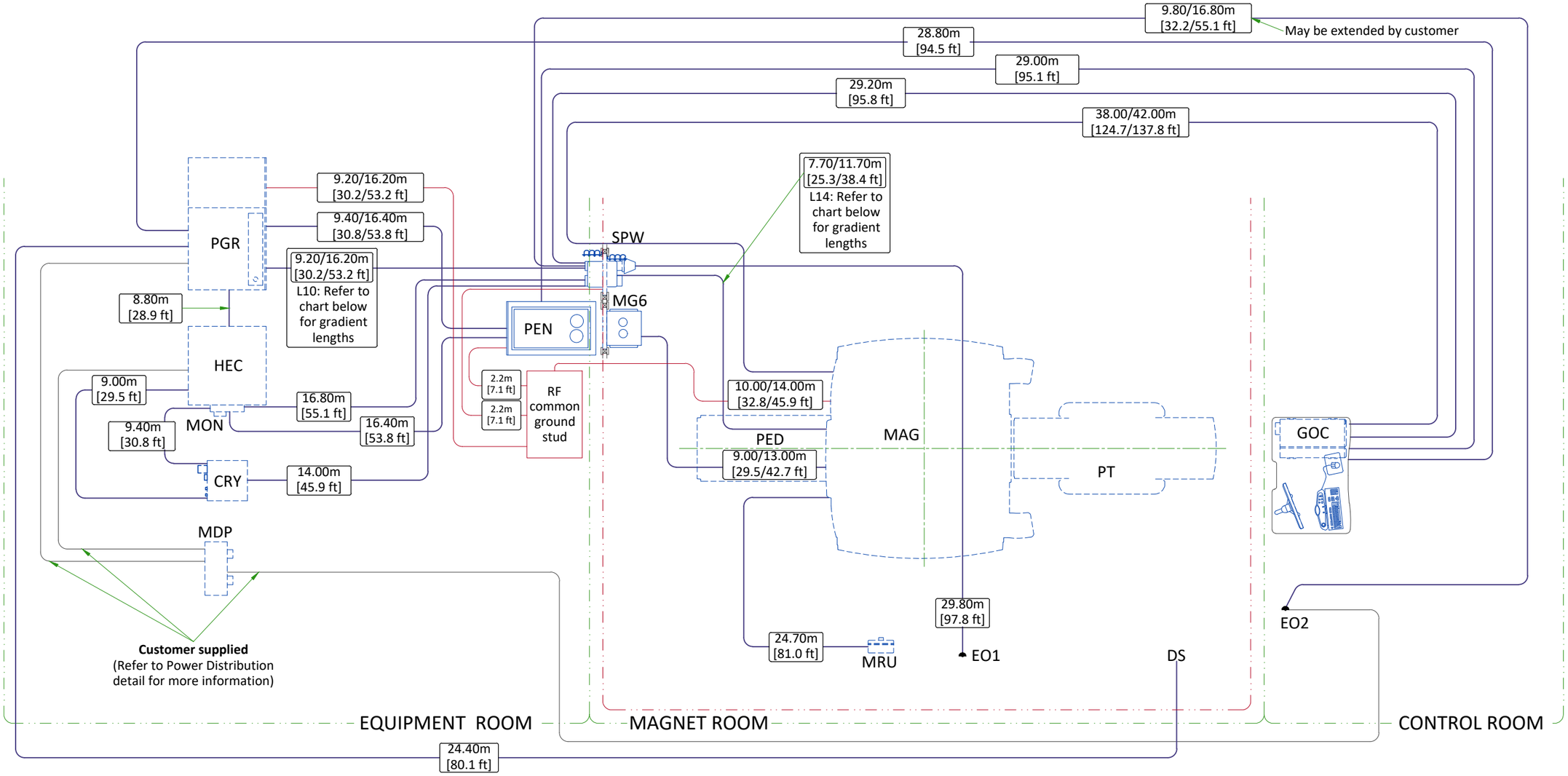
NOTES:

1) Cryocooler Compressor (CRY) must operate 24 hours per day, 7 days per week.
2) Runs E0009, E3030 and M3030 are GE supplied cables. All other wiring is customer supplied and installed.
3) Two remote Emergency Off Maintained Buttons are supplied with the MDP. Emergency Off removes power from all outputs when activated.
4) All MDP output circuits drop out on loss of power. the Cryocooler (CRY) circuit will automatically restart upon restoration of power.
5) All feeder circuits require dedicated ground wires.

Accepts following range of stranded conductors . All wire types, color and sizing to be selected in accordance with governing electrical code(s).

Global MDP M7000ZA 380-480 V				
Item	Phase		Ground	
	sq mm	AWG/kcmil	sq mm	AWG/kcmil
A	6-185	10-350	16-125	6-250
B	6-150	10-300	35-125	6-250
C	2.5-70	14-2/0	2.5-70	14-2/0
D	6-35	10-2	13-21	6-4
E	1.5-50	10-1/0	1.5-50	10-1/0
F	1.5	16	2.5	14

INTERCONNECTIONS



GRADIENT CABLE LENGTH OPTIONS

Length Identifier	Available lengths m (ft)	Proposed
L10 (Equipment Room)	3.7 (12.9)	-
	5.7 (18.7)	-
	7.7 (25.3)	-
	9.7 (31.8)	-
	11.7 (38.4)	-
	13.7 (45.0)	-
	15.7 (51.5)	-
L14 (Magnet Room)	4 (13.1)	-
	6 (19.7)	-
	8 (26.3)	-
	10 (32.8)	-
	12 (39.4)	-

CABLE ROUTING FOR ACCESSORIES

OPTION	FROM	TO	CABLE LENGTH m (ft)
Magnetic Resonance Elastography (MRE)	MRE	Magnet (Isocenter)	Nominal: 7.31 (24) Maximum: 10.06 (33) Extra long: 11.90 (39)
	MRE	PEN cabinet	15.24 (50)
	MRE	Ethernet Hub in PGR	15.24 (50)
	MRE	Customer Supplied Outlet	60Hz: 6.10 (20) 50Hz: 7.62 (25)
Multi-Nuclear Spectroscopy (MNS)	MNS	PGR	9.85 (32.3)
	MNS	PGR	7.85 (25.7)/14 (45.9)
	SPW	PGR	8.2 (26.9)/14.35 (47)
Brainwave (BW)	BW	PEN cabinet	18.3 (60)

GENERAL NOTE: PMI must validate proposed selectables and send confirmation to OTR. Refer to MyProjects if Proposed field is blank.
GOLDSEAL/SILVER PREFERRED NOTE: Cable lengths listed may differ from what is shipped with the system. Contact the Goldseal group for actual lengths to be delivered.
ROOM MOVE NOTE: Cable lengths listed may differ from what is included with reinstalled system. Contact the local field engineer for actual lengths to be delivered.

Order Configuration Options

Configuration	Equipment Room - site option	Magnet Room - site option	Proposed
A	Short	Short	-
B	Long	Short	-
C	Short	Long	-