

ALL INFORMATION IN THIS DRAWING SET IS PRELIMINARY, SUBJECT TO CHANGE!




A	23/Jul/2018	First issue drawing / Final study based on MRI-
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REV	DATE	MODIFICATIONS
01 - C1 - Cover Sheet		16 - M2 - HVAC-Venting
02 - C2 - Disclaimer - Site Readiness		17 - M3 - Chilled Water
03 - A1 - General Notes		18 - M4 - Cryogenics (1)
04 - A2 - Equipment Layout		19 - M5 - Cryogenics (2)
05 - A3 - Section Views		20 - E1 - Electrical Notes
06 - A4 - Acoustic - Proximity Limits		21 - E2 - Electrical Layout
07 - A5 - RF shielding		22 - E3 - Electrical Elevations
08 - A6 - Equipment Details (1)		23 - E4 - Electrical Details
09 - A7 - Equipment Details (2)		24 - E5 - Power Requirements
10 - A8 - Equipment Details (3)		25 - E6 - Interconnections
11 - A9 - Delivery		
12 - S1 - Structural Notes		
13 - S2 - Structural Layout		
14 - S3 - Structural Details		
15 - M1 - Mechanical Layout		

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.

Typical					

	GE HealthCare	----	----	----
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SIGNA 7T FINAL STUDY

Drawn by	Verified by	Concession	GON/Quote	PIM Manual	Rev
PMM	PMM	-	----	5809186	2
Format	Scale	File Name		Date	Sheet
A3	1/8"=1'-0"	EN-MRI-TYP-SIGNA_7T-NF.DWG		06/Oct/2025	01/25

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 structural 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. An EMI study is recommended if the restriction lines are violated.
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 (below the magnet) does not exceed the allowable steel content as given in the MR pre-installation manual referenced on the cover sheet.
7. All access/computer flooring is to be removed in both the equipment room.

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

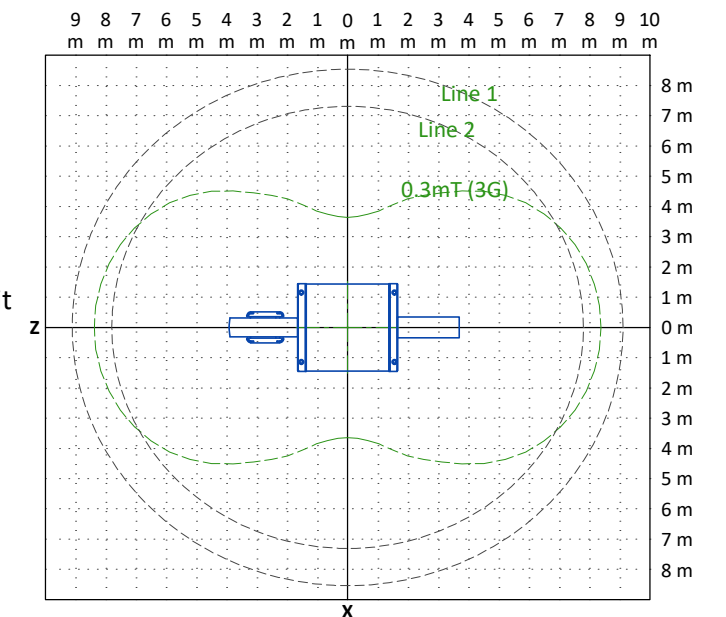
Broadband RF noise is a single transient or continuous series of transient disturbances caused by an electrical discharge. Low humidity environmental conditions will have higher probability of electrical discharge. The electrical discharge can occur due to electrical arcing (micro arcing) or merely static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

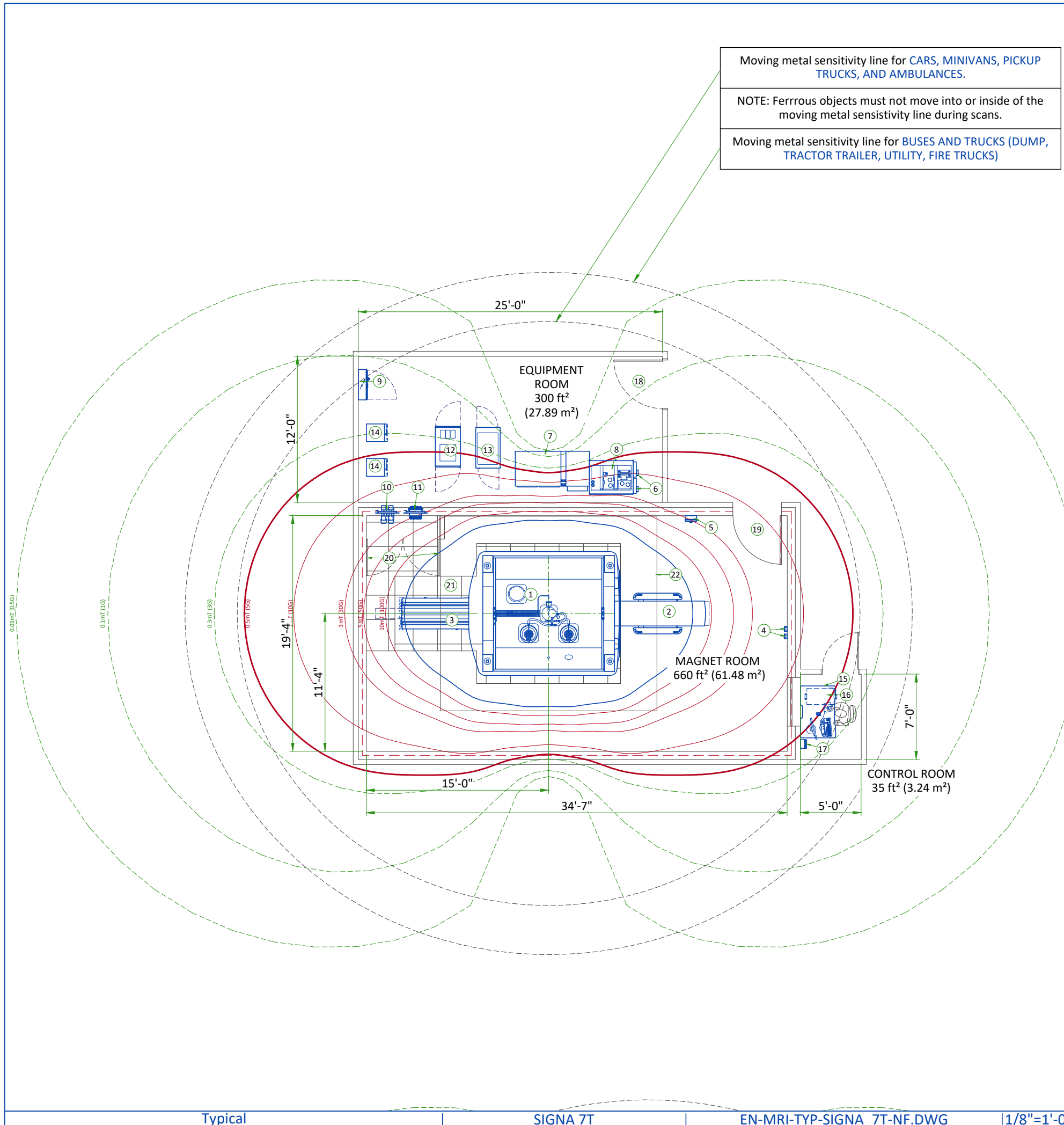
For additional information regarding image quality, refer to the pre-installation manual listed on the cover sheet.

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.
- Potential exists under fault conditions that the 5 gauss line may expand radially to 21.3 ft. [6.5 m] and axially to 29.5 ft. [9 m] for 60 seconds or less. It should be noted that normal rampdowns or magnet rundown unit initiated quenches will not cause the magnetic field to expand.
- The ferrous metal objects listed below must not move into or inside of the moving metal sensitivity line during scans.
- **For unshielded rooms**, the 3 gauss line area goes beyond the analytical sensitivity line for cars (line 2). In this case, the 3 gauss line must be used for site planning. For shielded rooms, the 3 gauss line area should be contained by line 2. Therefore line 2 should be used for site planning.

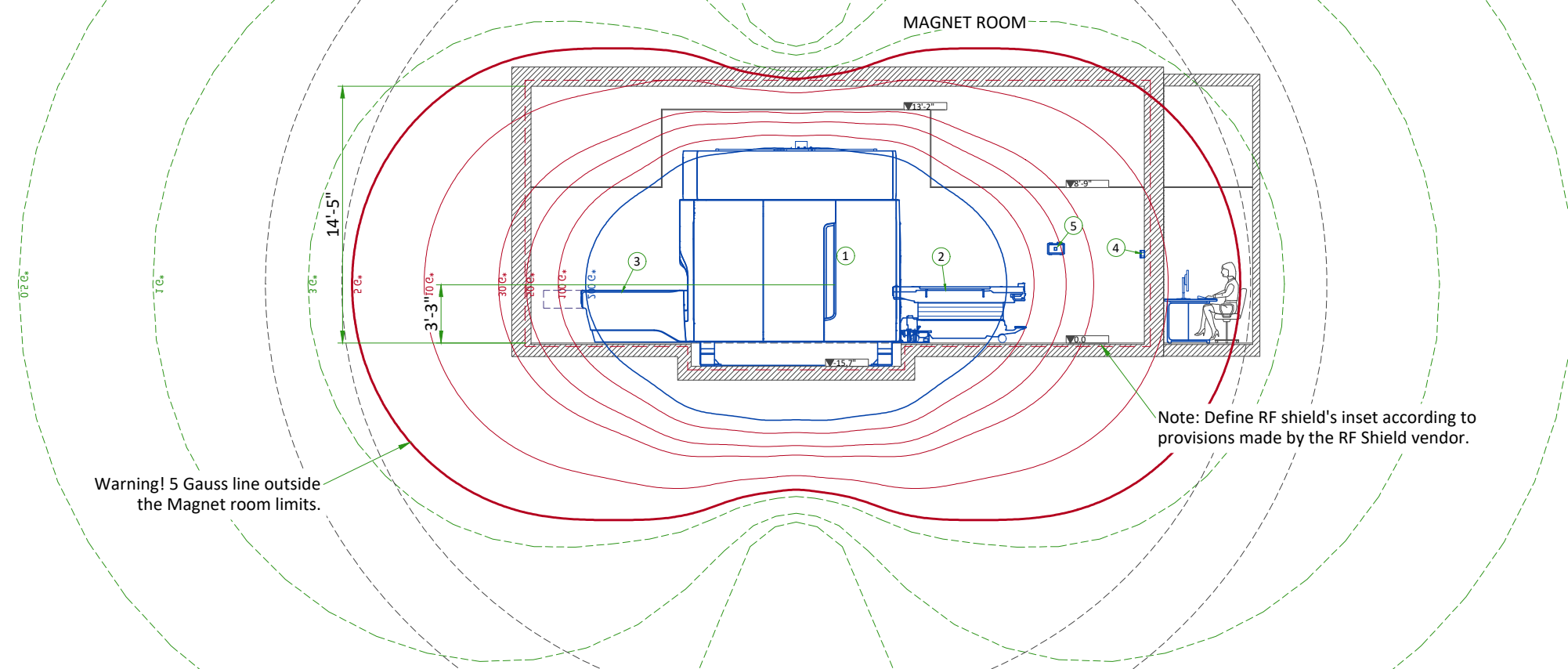


TYPICAL MOVING MAGNETIC MASS	DISTANCE RADIALLY		DISTANCE AXIALLY	
Carts, Gurneys 100-400 lbs [45-182 kg]	3 Gauss line		3 Gauss line	
Line 2: Forklifts, small elevator, cars, minivans vans, pickup trucks, ambulances (objects greater than 400 lbs [182 kg])	23.98 FT	7.31 M	25.6 FT	7.8 M
Line 1: Buses and trucks (dump, tractor trailer, utility, fire trucks)	28.0 FT	8.54 M	29.9 FT	9.11 M

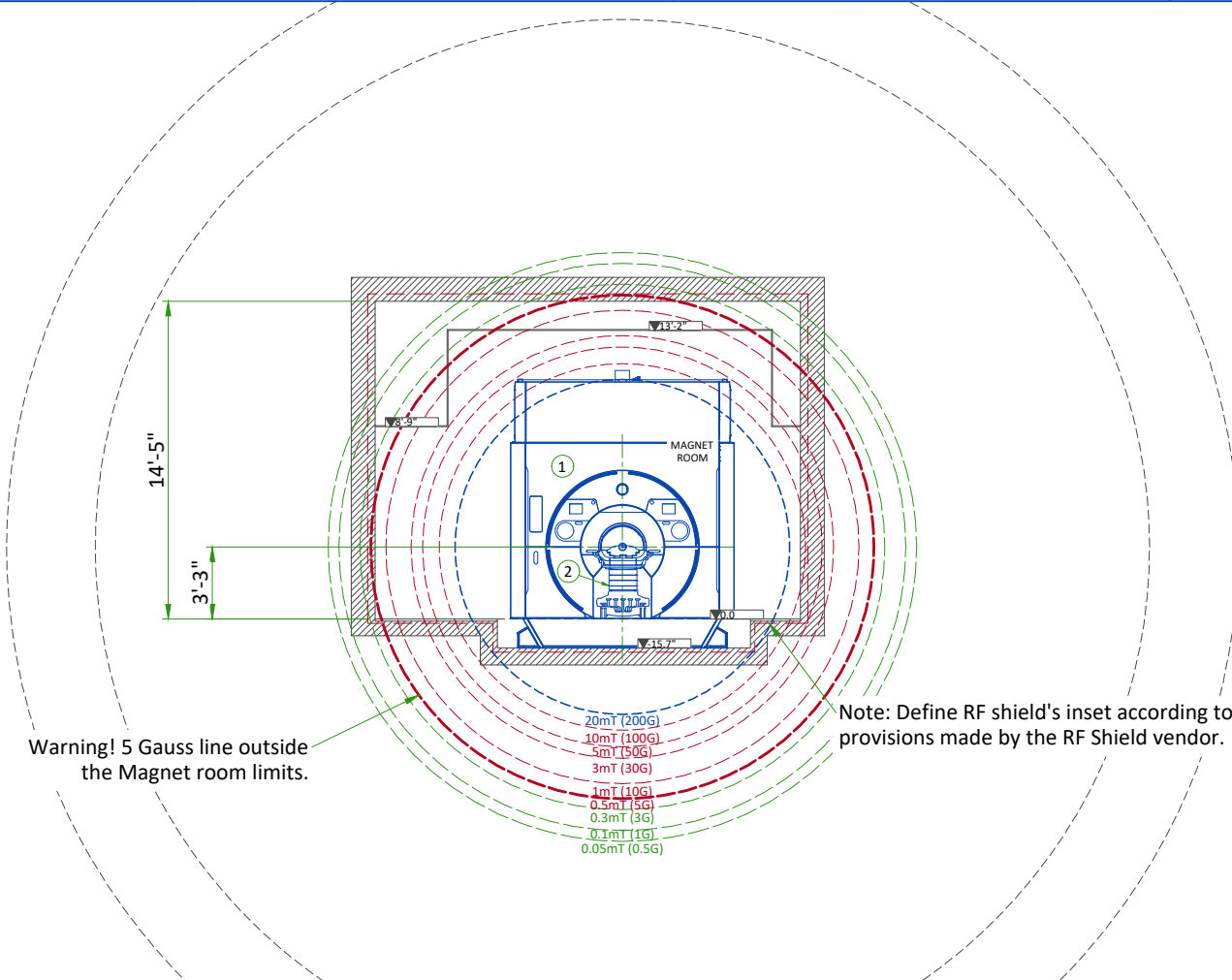


LEGEND						
A	GE Supplied	D	Available from GE			
B	GE Supplied/contractor installed	E	Equipment existing in room			
C	Customer/contractor supplied and installed	*	Item to be reinstalled from another site			
	200 Gauss		5 Gauss			
	100, 50, 30, 10 Gauss		3, 1, 0.5 Gauss			
BY	ITEM	DESCRIPTION	MAX HEAT OUTPUT (btu)	WEIGHT (lbs)	MAX HEAT OUTPUT (W)	WEIGHT (kg)
A	1	7.0 TESLA VARIAN MAGNET (MAG)	9281	102144	2720	46324
A	2	PATIENT TRANSPORT TABLE	-	419	-	190
A	3	REAR PEDESTAL	-	-	-	-
A	4	OXYGEN REMOTE SENSOR (OM2)	-	2	-	0.9
A	5	MAGNET RUNDOWN UNIT (MRU)	-	7	-	3.2
A	6	MAGNET MONITOR (MON)	205	8	60	3.6
A	7	INTEGRATED SYSTEMS CABINET	39238	4540	11500	2059
A	8	INTEGRATED COOLING CABINET	3412	1356	1000	615
A	9	MAIN DISCONNECT PANEL	972	202	285	91.6
A	10	COOLING PENETRATION PANEL (ICC SPW)	-	93	-	42
A	11	SYSTEMS PENETRATION PANEL (ISC PP)	1024	93	300	42
A	12	RF AMPLIFIER CABINET	21154	1398	6200	634
A	13	HIGH ORDER SHIM POWER SUPPLY (HOS)	5541	904	1624	410
A	14	CRYOCOOLER COMPRESSOR (CRY)	1706	220	500	100
A	15	OPERATOR WORKSPACE (OW)	-	126	-	57
A	16	OPERATOR CONSOLE (GOC)	4947	121	1450	55
A	17	OXYGEN MONITOR (OXY)	-	9	-	4
C	18	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	19	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	20	LOUVERED DOORS - REFER TO PREINSTALL MANUAL FOR REQUIREMENTS				
C	21	DEPRESSION FOR MAGNET 400MM [15.7"] D				
C	22	MINIMUM 4000 MM x 3600 MM [13'-2" x 11'-10"] ROOF HATCH FOR MAGNET DELIVERY/REMOVAL				
		RF SHIELD - 100 dB ATTENUATION				
Exam room height						
Finished floor to slab height					TBD	
Recommended finished ceiling height					8'-9"	

SIDE VIEW WITH MAGNETIC FIELD



FRONT VIEW WITH MAGNETIC FIELD



ACOUSTIC SPECIFICATIONS

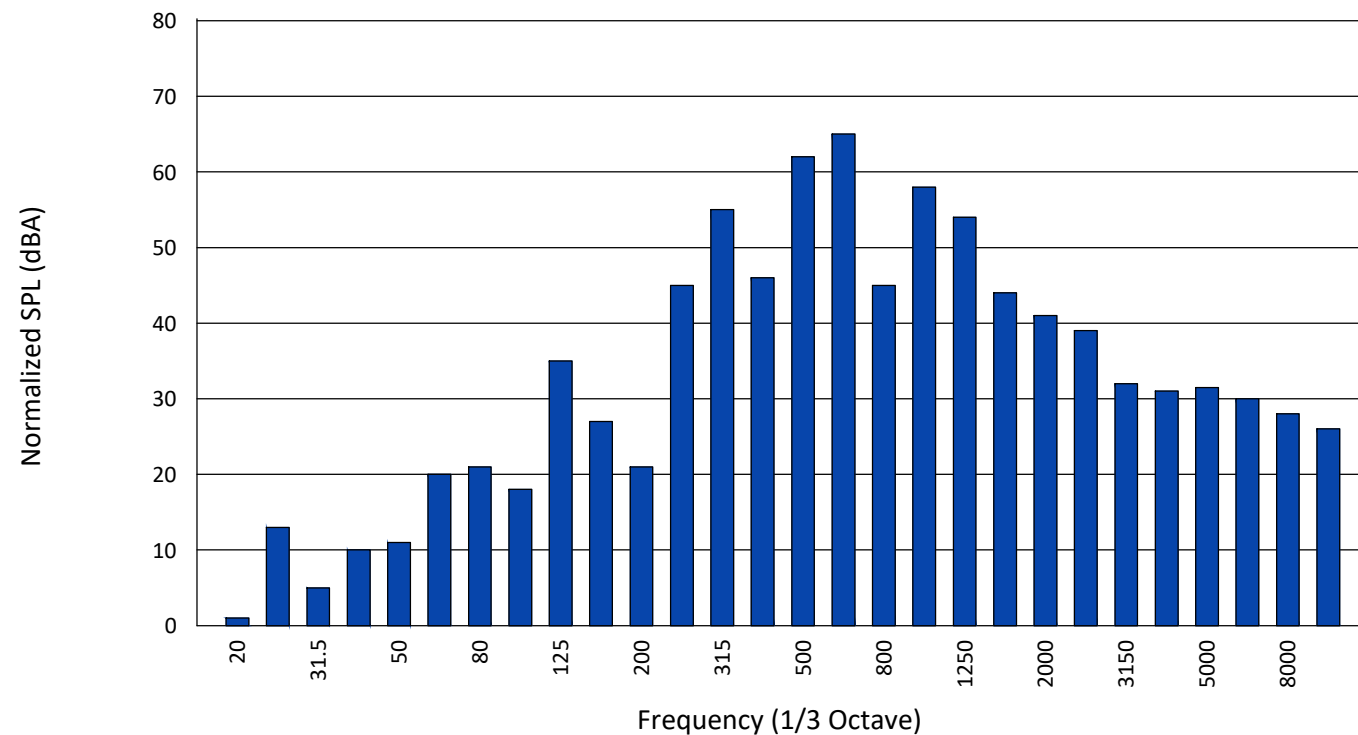
	GE Equipment Acoustic Output	Notes
Control Room	62 dBA	
Equipment Room	83.6 dBA	
Magnet Bore Isocenter	128 dBA	See Sound Pressure Spectral Distribution Detail
Front of Magnet - 800mm from bore measurement	124 dBA	

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

1/3 Band Relative SPL



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, Lithotripter, 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, Hard copy imagers, Line printers, Video Casette Recorder (VCR), Film processor, X-ray tubes, Emergency generators, Commercial laundry equipment, Food preparation area, Telephone switching stations, 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 (3.3x3.3 M [10.8x10.8 ft] AREA UNDER MAGNET)

Limit of Steel Mass		Distance Below Top Surface Of Recessed Floor		Limit of Steel Mass		Distance Below Top Surface Of Recessed Floor	
kg/m ²	lbs/ft ²	mm	in	kg/m ²	lbs/ft ²	mm	in
0	0	0-50	0-2	76	15.6	300-350	12-14
32	6.6	50-100	2-4	95	19.5	350-400	14-16
38	7.8	100-150	4-6	117	24	400-450	16-18
46	9.4	150-200	6-8	166	34	450-500	18-20
54	11.1	200-250	8-10	264	54.1	500-550	20-22
64	13.1	250-300	10-12				

RF SHIELDED ROOM REQUIREMENTS

The RF Shielded room is critical to the proper MR system operation. RF shielding reduces the interaction of external RF electromagnetic fields with MR system operation. Special care must be used when installing all fixtures penetrating the RF shield (e.g.: vents, electrical conduit, penetration panels, etc.) to ensure the integrity of the RF shield is maintained.

It is customer responsibility to contract with an RF Shielding Enclosure vendor to design, install, test the RF shielded room. As well as maintenance and repair of the RF shielded room to include, but not limited to, shielding effectiveness, door threshold and door seal, pressure equalization vent operation for the life of the MR System.

RF SHIELD REQUIREMENTS

The RF shielded room must provide a minimum of 100 dB of shielding effectiveness for the entire room, please refer to the Pre-Installation Manual for the frequencies.

The RF shielded room must be isolated from earth ground by more than 1000 ohms DC resistance during construction (before electrical installation).

The RF shielded room must be grounded to the RF common ground stud (which is grounded back to the Power Distribution Unit in the Integrated System Cabinet).

RF shielded room installation materials must meet steel mass limits listed in Magnet Room Structural Requirements to keep magnetic field homogeneity.

Any moving part (such as doors) must not contain magnetic materials.

DOORS AND MAGNET ACCESS OPENINGS

- The finished opening of the Magnet room main door must be at least 1092 mm (43 in) wide
- Threshold height must not exceed 25 mm (1 in) on both sides of the door with a maximum 10° threshold inclination
- Patient viewing windows recommended dimensions are 1219 mm x 1067 mm (48 in x 42 in) and 1829 mm (72 in) above finished floor
- The magnet delivery requires opening into the room to allow access for the magnet and any rigging.

MAGNET ROOM FLOORS

- The finished floor must support the weight of all components throughout operation and service life
- The finished floor must be water resistant to protect the subfloor and shielding from water damage
- The customer is responsible for providing flooring to prevent the buildup to 8 kV
- RF shield seams, joints, or overlaps must not be located under the Magnet
- The floor area beneath the magnet must be recessed 400 mm (15.8 in) below the finished floor in front of the magnet.

RF SHIELDING EFFECTIVENESS AND GROUND ISOLATION TESTING

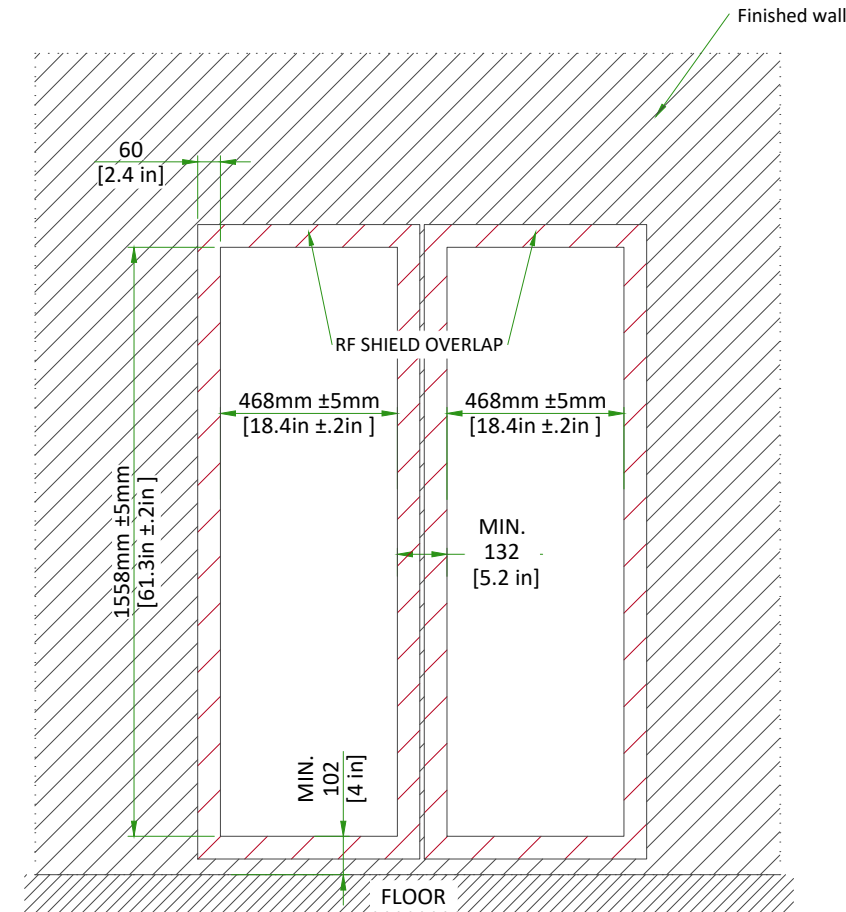
RFI site surveys are to be performed by cycling through the preceding frequency bands and a broad band range up to 145 MHz \pm 10 MHz. Special emphasis, however, should be placed on the ¹H band since this is used in proton imaging.

ACOUSTIC DESIGN GUIDELINES

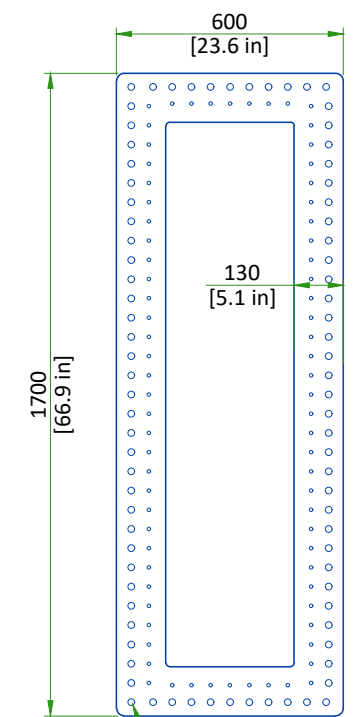
- The preferred wall would have an ASTM Sound Transmission Coefficient (STC) 50 construction
- RF windows should be purchased as window/frame units with an STC rating obtained from laboratory testing per ASTM standards. STC 50 to 60 windows are needed. The installation must include proper sealing to avoid sound leaks.
- RF doors should be selected to provide an STC 50 to 60 to quell the noise. RF door seals must be selected to prevent small gaps around the door perimeter and at the door threshold.
- Pipes (gas or water) and electrical conduit or Magnet Room signal cables must be sealed where they penetrate the walls or ceiling.

PENETRATION PANEL WALL OPENINGS

Magnet room side



Penetration Panel Adapter Plate



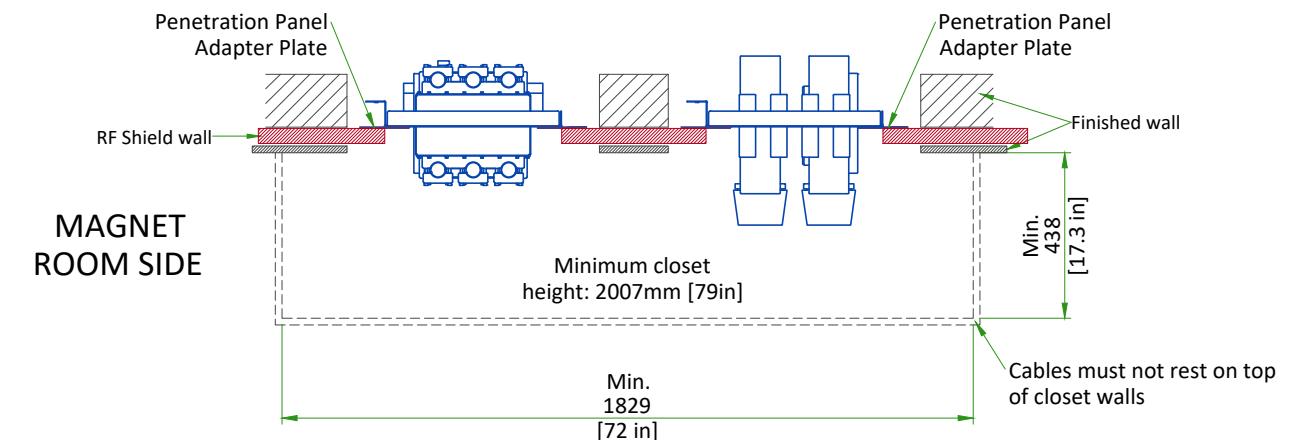
RF vendor must supply 168 fasteners for hole size of \varnothing 8.8 mm [0.35 in] (total quantity for both panels)

Maximum distance between the penetration panels is determined by the available length of the cables between the RF common ground stud and pen panels. Refer to Interconnections detail.

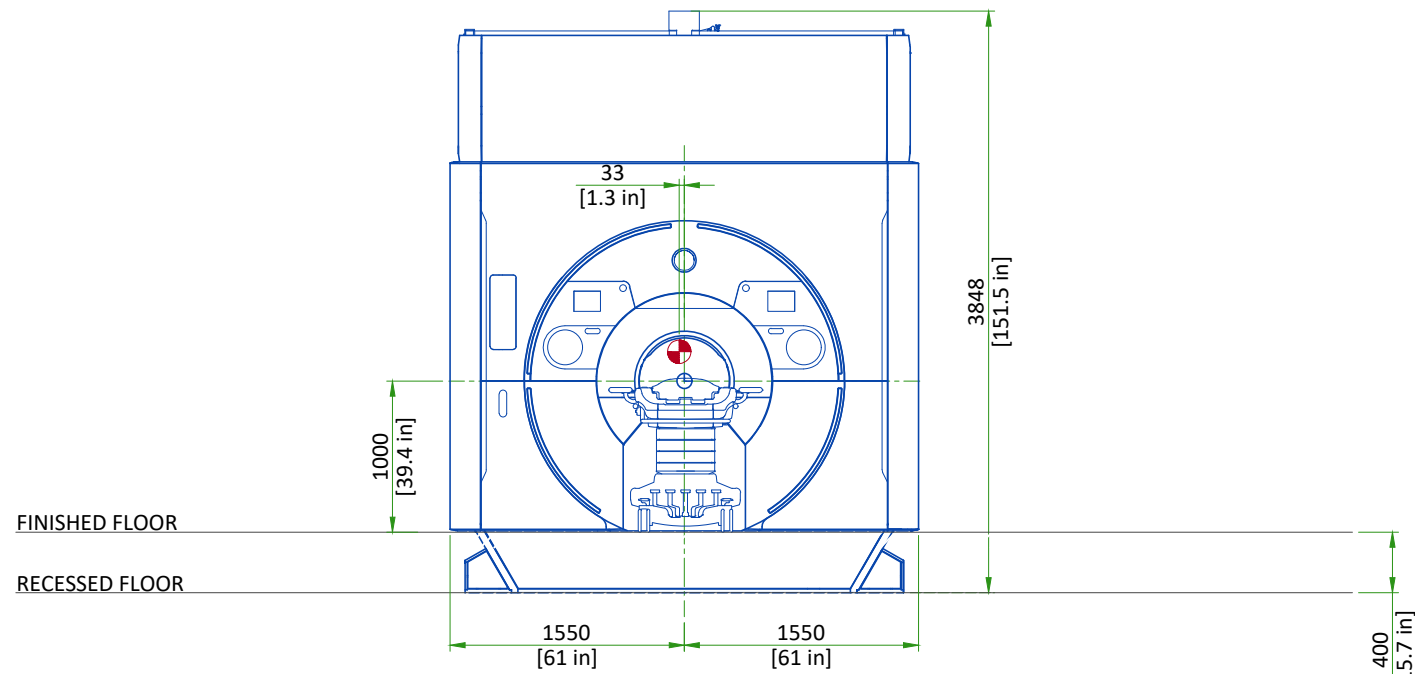
EQUIPMENT ROOM SIDE

Integrated Systems Cabinet Penetration Panel

Integrated Cooling Cabinet Secondary Penetration Wall



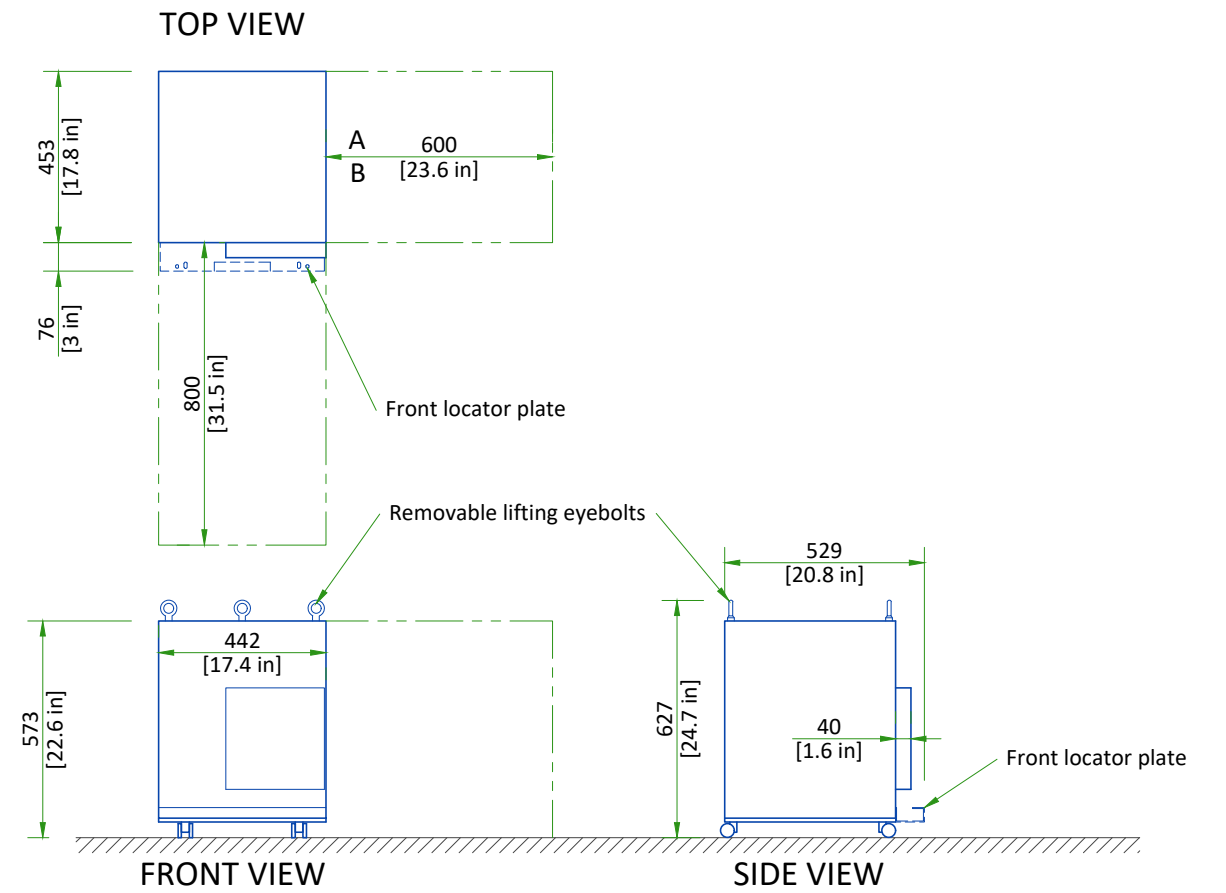
MAGNET AND PATIENT TABLE (FRONT VIEW)



NOT TO SCALE

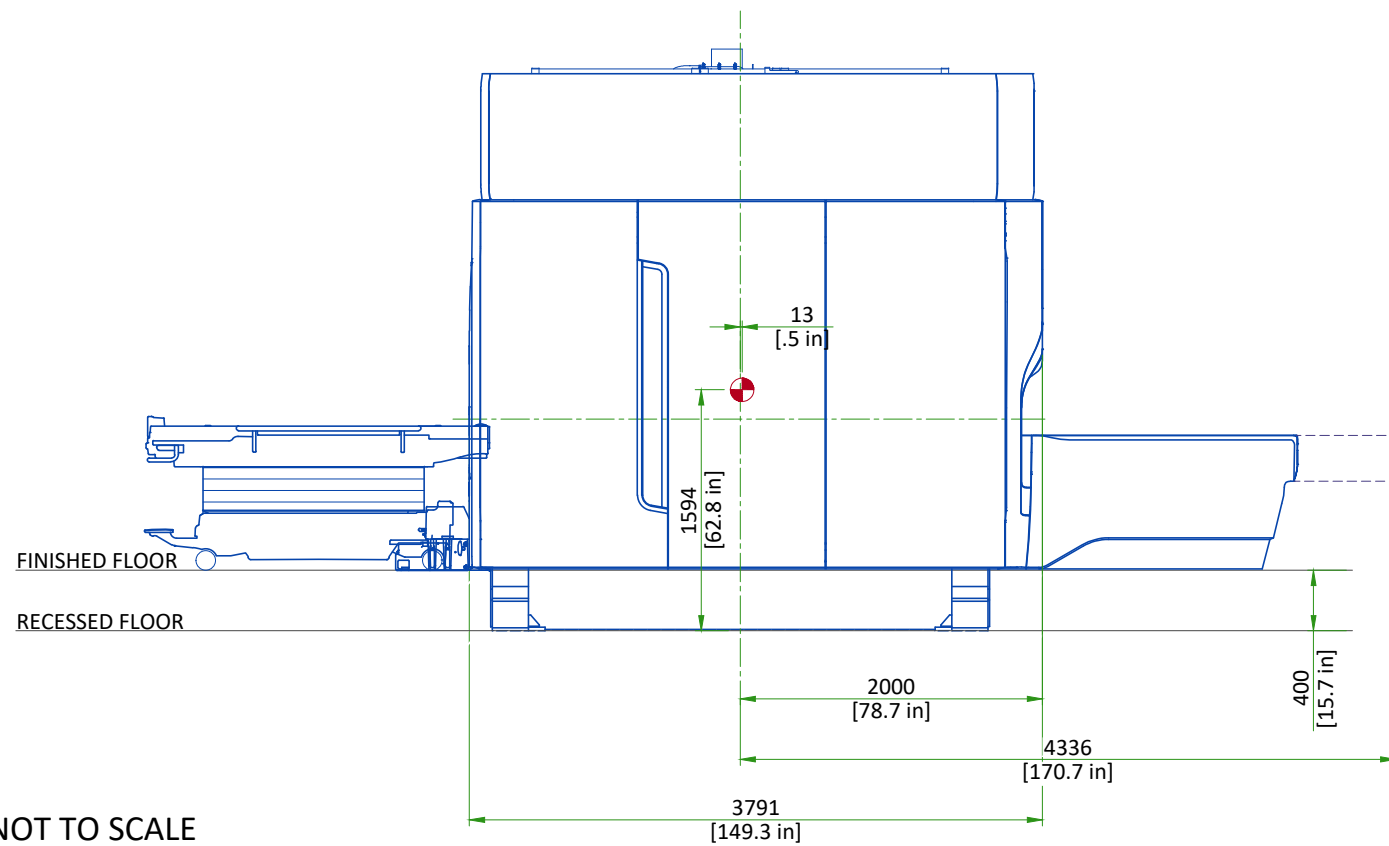
Center of gravity

CRYOCOOLER COMPRESSOR (CRY)



SCALE 1:20

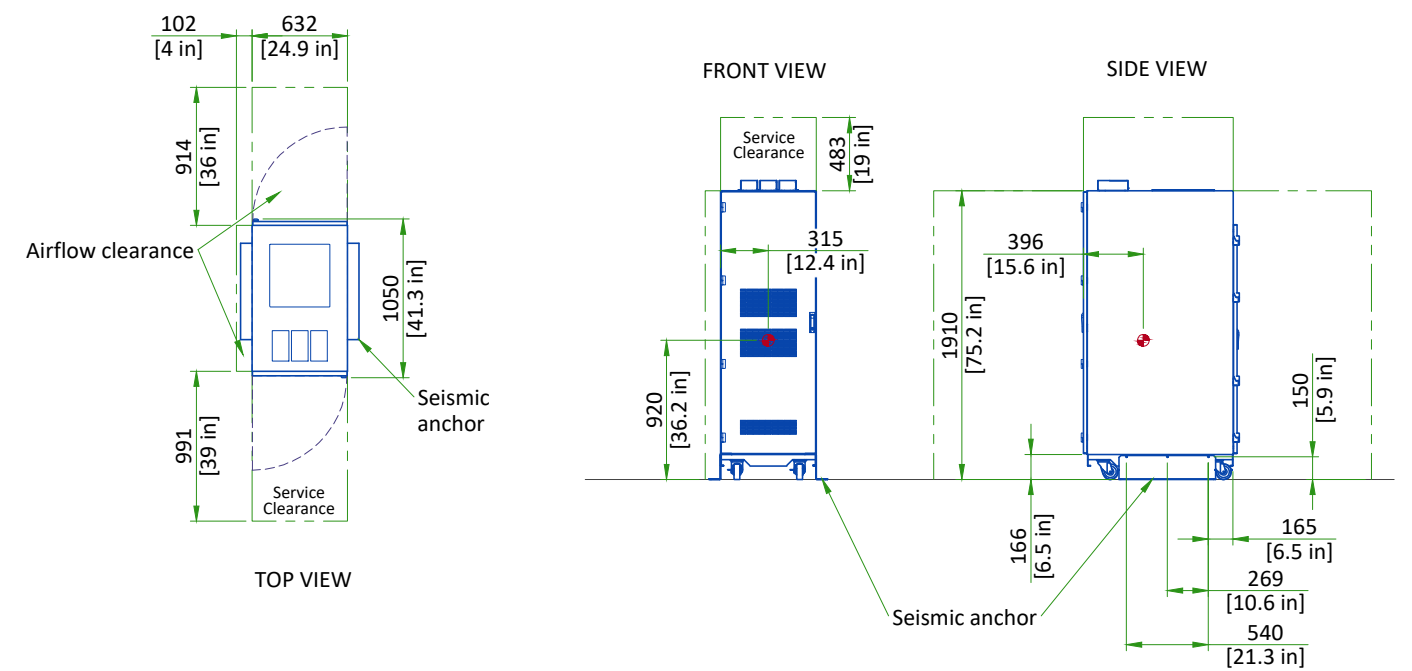
MAGNET, PATIENT TABLE, AND REAR PEDESTAL (SIDE VIEW)



NOT TO SCALE

Center of gravity

RF AMPLIFIER CABINET



NOT TO SCALE

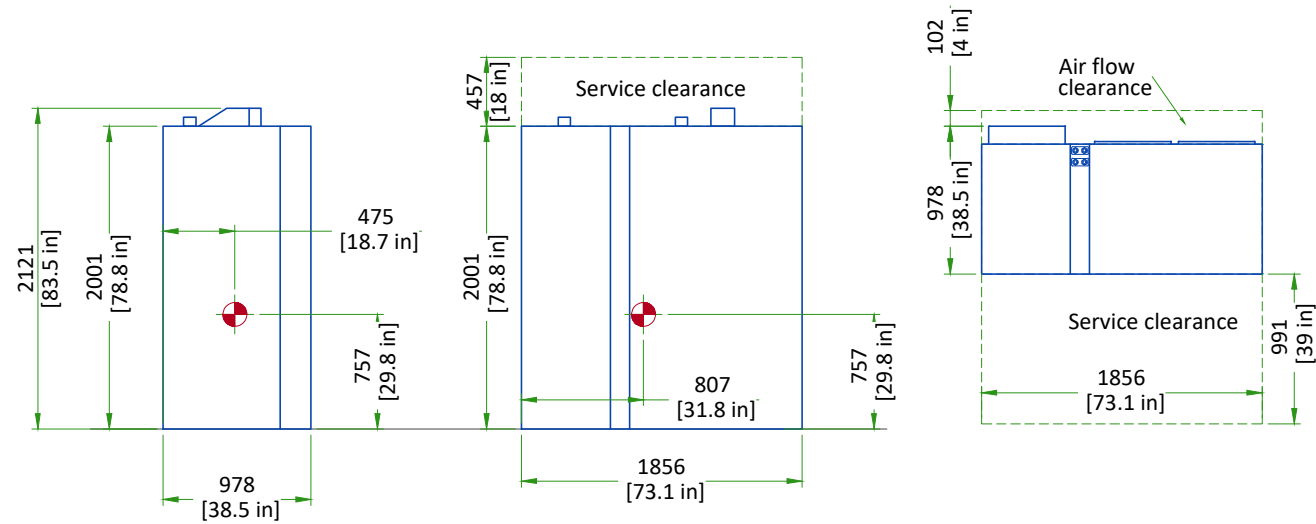
Center of gravity

INTEGRATED SYSTEMS CABINET

SIDE VIEW

FRONT VIEW

TOP VIEW



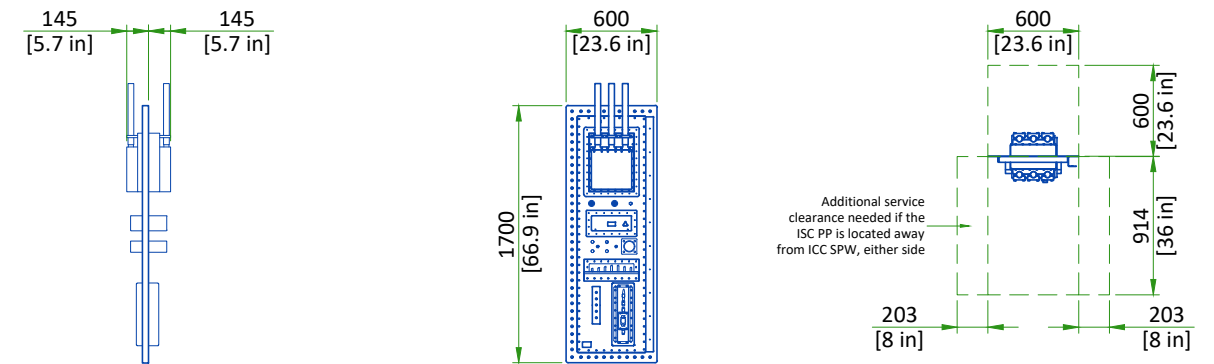
Center of gravity
NOT TO SCALE

INTEGRATED SYSTEMS CABINET PENETRATION PANEL (ISC PP)

SIDE VIEW

FRONT VIEW

TOP VIEW



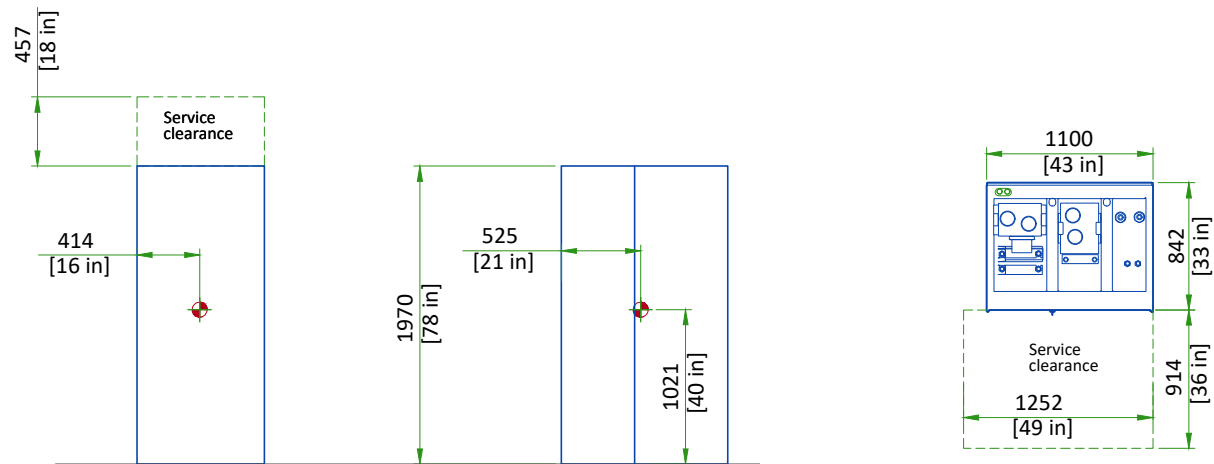
NOT TO SCALE

INTEGRATED COOLING CABINET

SIDE VIEW

FRONT VIEW

TOP VIEW



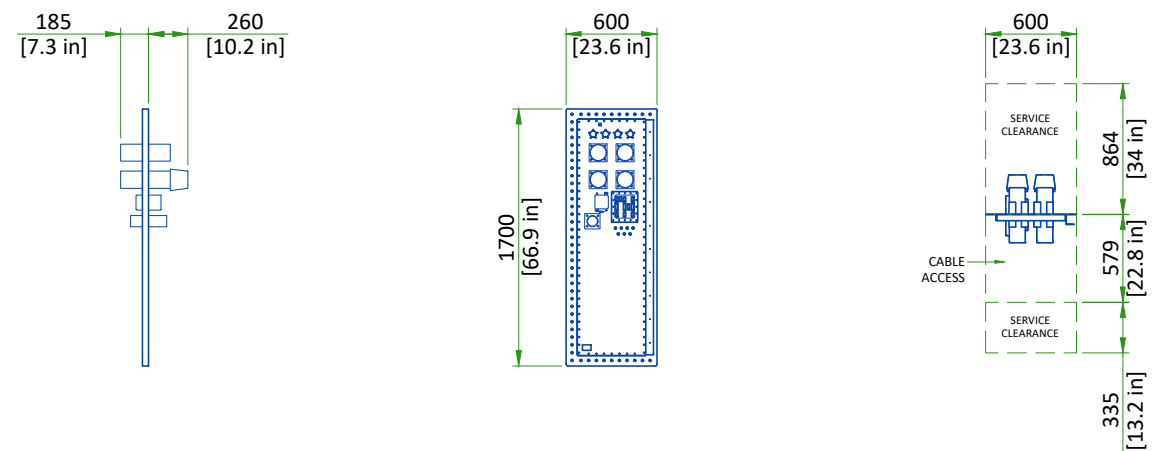
Center of gravity
NOT TO SCALE

INTEGRATED COOLING CABINET SECONDARY PENETRATION WALL (ICC SPW)

SIDE VIEW

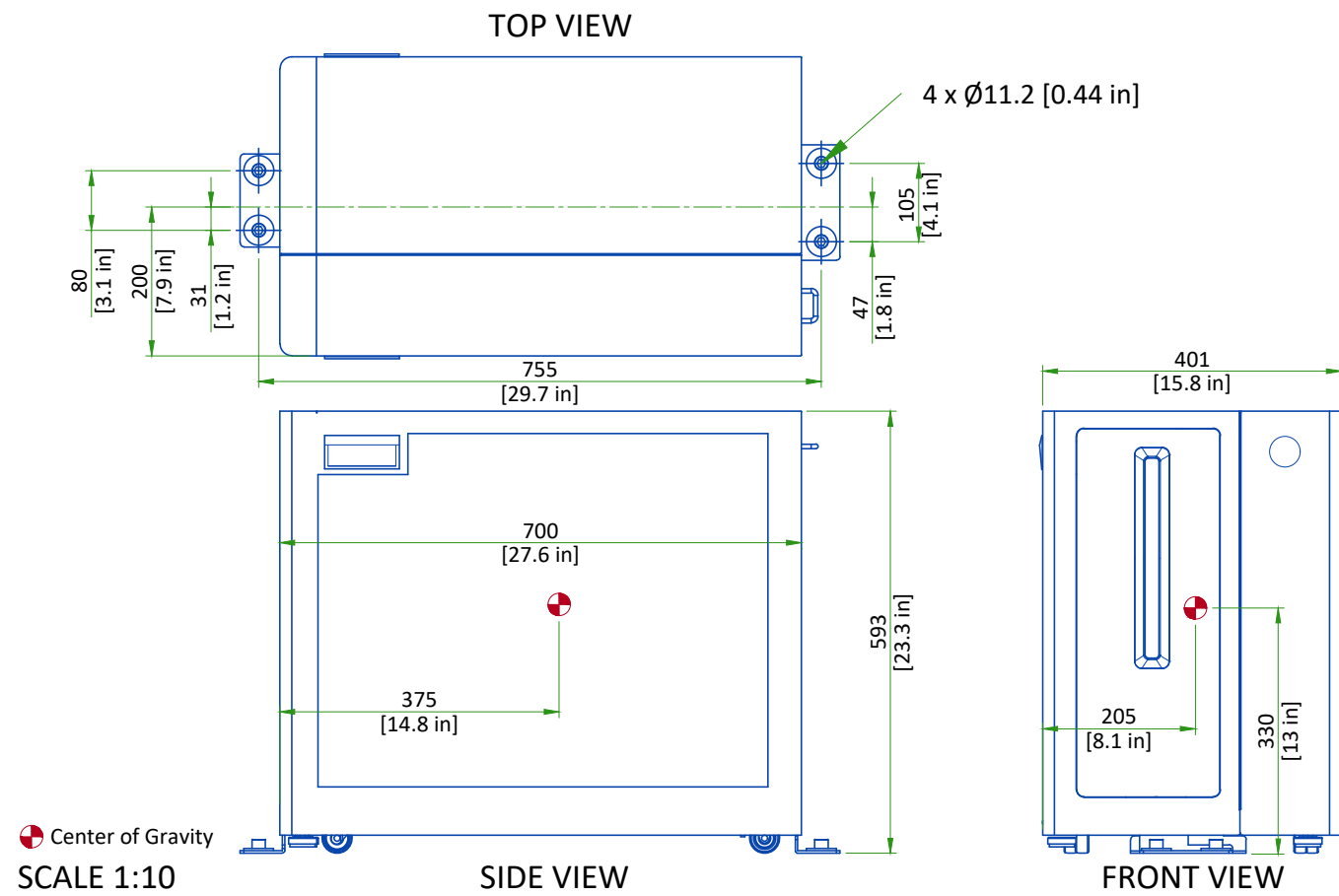
FRONT VIEW

TOP VIEW



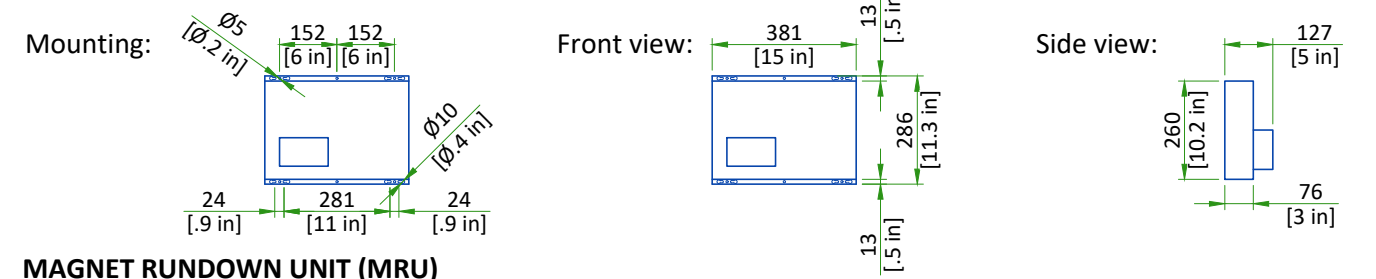
NOT TO SCALE

GLOBAL OPERATOR CABINET (GOC)

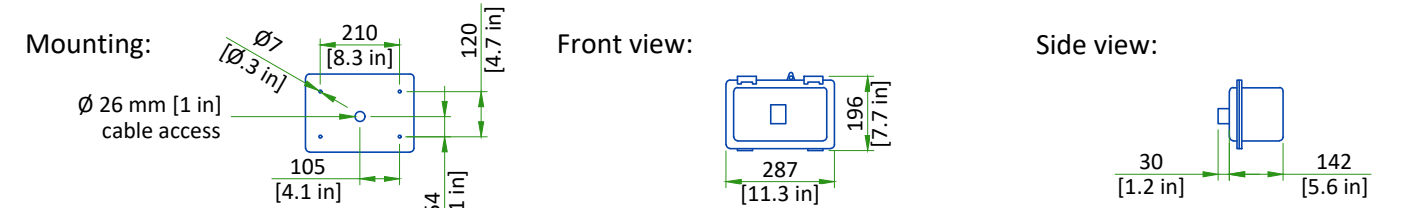


MAGNET MONITOR, MRU, AND OXYGEN MONITOR

MAGNET MONITOR

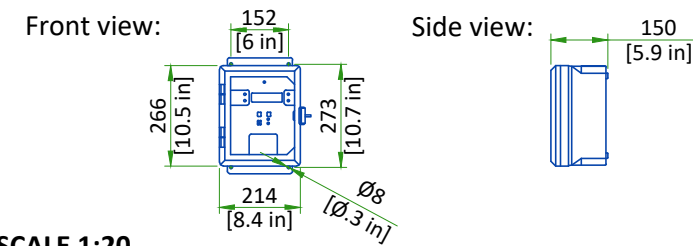


MAGNET RUNDOWN UNIT (MRU)

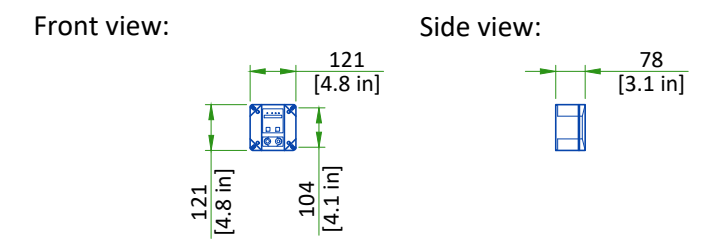


The bottom edge of the MRU must be mounted 1524 \pm 25 mm [60 \pm 1 in] above the magnet room floor.

OXYGEN MONITOR

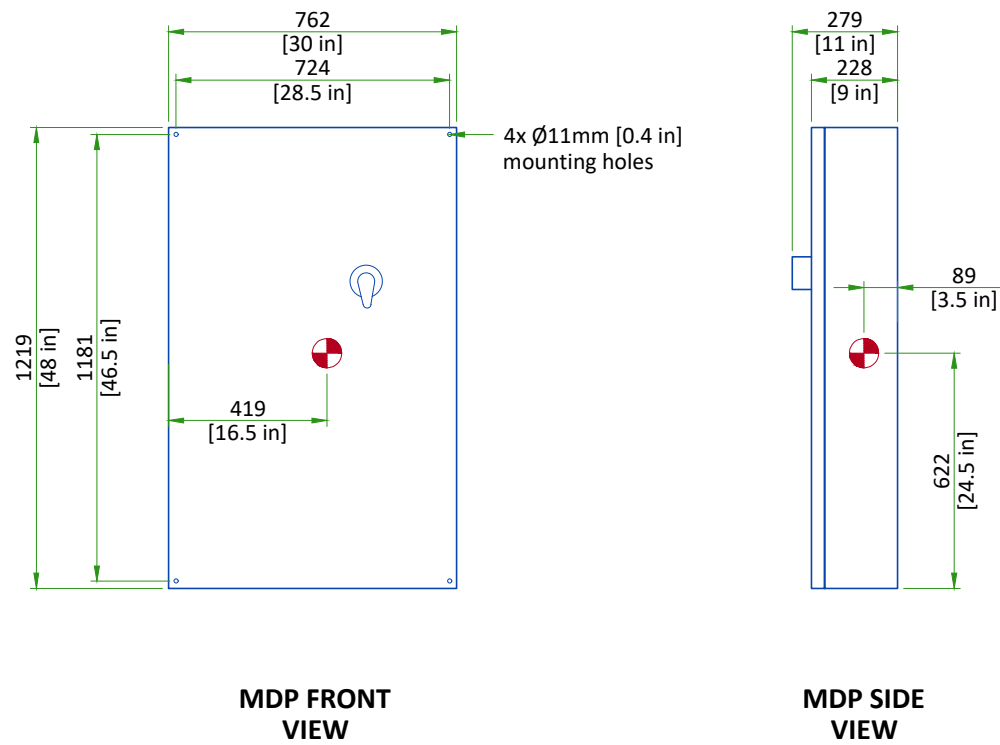


REMOTE SENSOR



SCALE 1:20

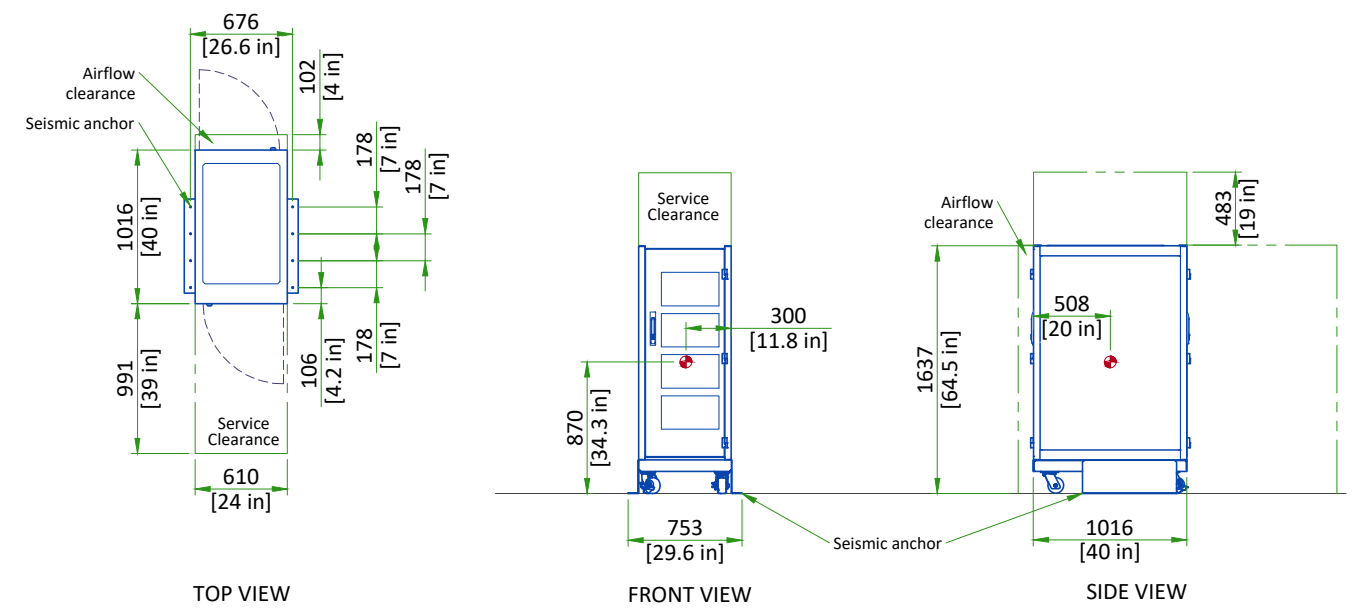
MAIN DISCONNECT PANEL (MDP)



SCALE 1:20

Center of gravity

HIGH ORDER SHIM (HOS) POWER SUPPLY



NOT TO SCALE

Center of gravity

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.

DELIVERY

All shipping dimensions and weights are approximate and may vary based on ship-to location, required rigging, or other requirements. Some shipping or access routes may have requirements in addition to those listed below.

REQUIREMENTS

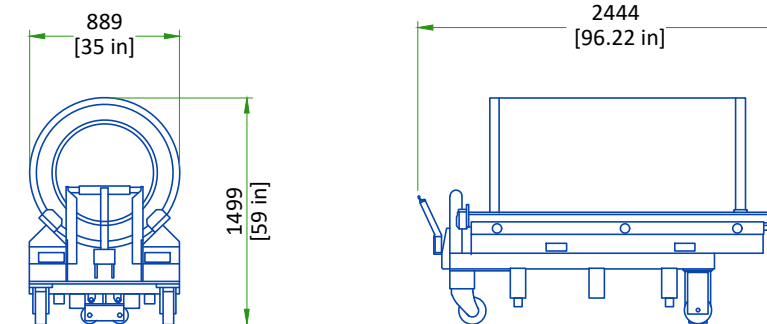
The customer must provide an area for unloading system components from the truck and delivering to the MR suite.

At delivery, the customer is responsible for ensuring:

- All floors along the route will support the weight of the Magnet (GE Healthcare recommends a structural analysis)
- Doors or other openings are sufficiently wide to allow passage
- Sufficient room is provided for any required dollies or rigging tools

Component	Width		Depth		Height		Weight	
	in	mm	in	mm	in	mm	lbs	kg
Magnet	Refer to Pre-Installation Manual for delivery specifications							
Cryogen	Dimensions vary depending on dewar type used. Verify with cryogen supplier							
ISC 1 (Gradient PDU)	23.7	602	38.5	978	78.8	2001	2275	1034
with dolly	47.7	1212					2455	1116
ISC 2 (System PDU)	53.6	1362	38.8	986	78.8	2001	2250	1023
with dolly	77.6	1972					2430	1105
ICC Cabinet	43.3	1100	33.1	842	77.6	1970	1235	560
with dolly	67.3	1710					1415	642
Platform ICC Cabinet	32.7	830	31.9	811	78.1	1983	935	424
with dolly	56.7	1440					1115	506
RF Amplifier Cabinet	25	635	42	1067	81.5	2070	1397	634
High Order Shim Power Supply Cabinet	23.62	600	40	1016	64.5	1637	904	410

DIMENSIONS OF THE MAIN REPLACEMENT PARTS



COMPONENT	DIMENSIONS LxWxH		WEIGHT		NOTE
	mm	in	kg	lbs	
Replacement HRMb gradient coil assembly on a shipping cradle/cart	889x2444x1469	35x96.2x57.8	1407	3100	Gradient coil is not shipped in the magnet. It is shipped separately and installed at the site with the shipping/installation cart.
Gradient Coil Replacement Tool Kit Crate	900x1250x880	35.4x49.2x34.6	340	750	Gradient Coil Assembly and shipping cart dimensions are with cart in lowest position. Cart can be adjusted to maximum height of 61.88 in. (1572 mm).

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.

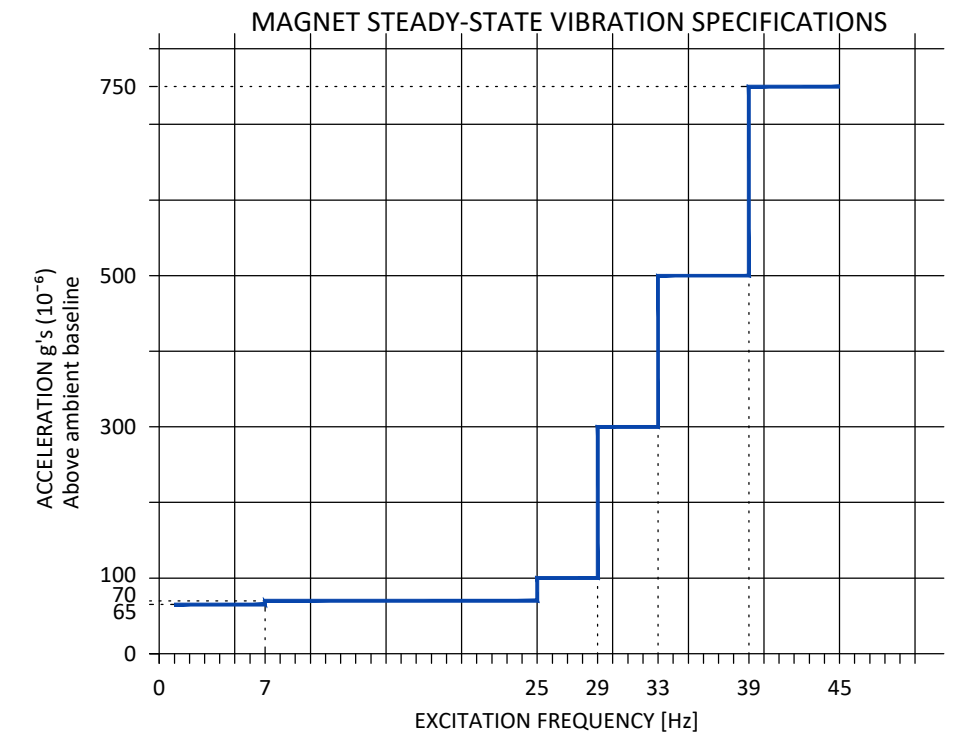
STRUCTURAL NOTES

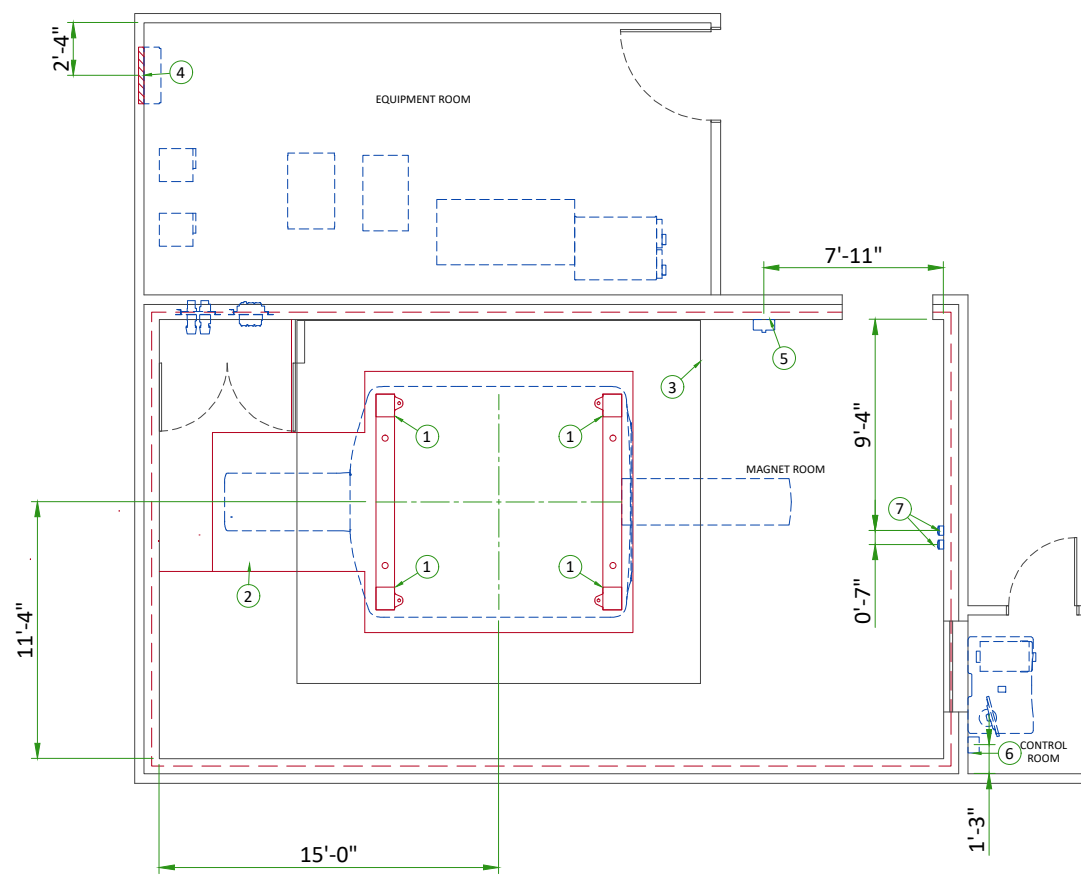
- All units that are wall mounted or wall supported are to be provided with supports where necessary. Wall supports are to be supplied and installed by the customer or his contractors.
- Dimensions are to finished surfaces of room.
- Certain MR procedures require an extremely stable environment to achieve 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, MAGNET MOUNTING REQUIREMENTS AND MAGNET MOUNTING DETAIL](#) 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.

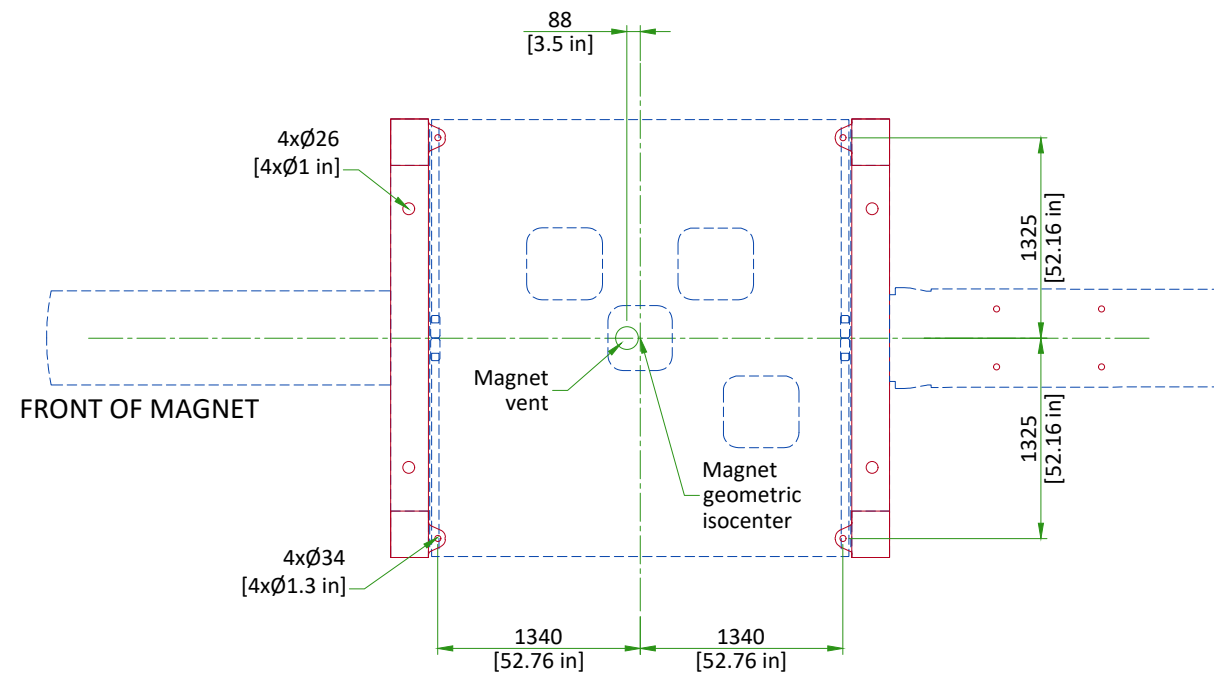
Transient vibration levels above the specified limits in the MR Site Vibration Test Guidelines must be analyzed. Any transient vibration that causes vibration to exceed the steady-state level must be mitigated.





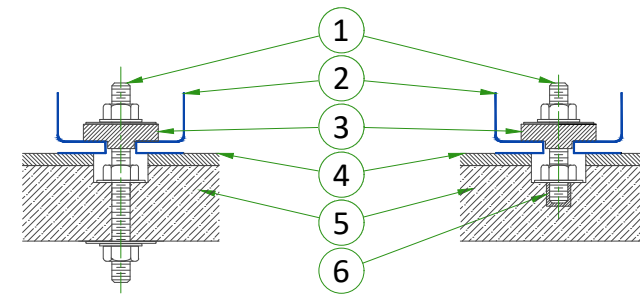
ITEM	DESCRIPTION
1	Magnet Mounting (see Magnet Mounting Detail)
2	Depression in floor (see Magnet Room Floor Specifications Detail)
3	Recess in Ceiling (see Minimum Magnet Ceiling Height Detail)
4	Structural wall backing for Main Disconnect Panel
5	Structural wall backing for Magnet Rundown Unit
6	Structural wall backing for Oxygen Monitor
7	Structural wall backing for Oxygen Sensor

MAGNET MOUNTING DETAIL



Contact GE Healthcare Project Manager for Magnet Mounting Details

DOCK/TABLE FRAME ANCHOR MOUNTING REQUIREMENTS



BOLTED METHOD
(CUTAWAY SIDE VIEW)

FEMALE ANCHOR METHOD
(CUTAWAY SIDE VIEW)

- 1 Removable Anchor Rod (Male insert)
- 2 Dock
- 3 Clamp bracket
- 4 Finished floor
- 5 Raised floor
- 6 Female Anchor Insert

NOT TO SCALE

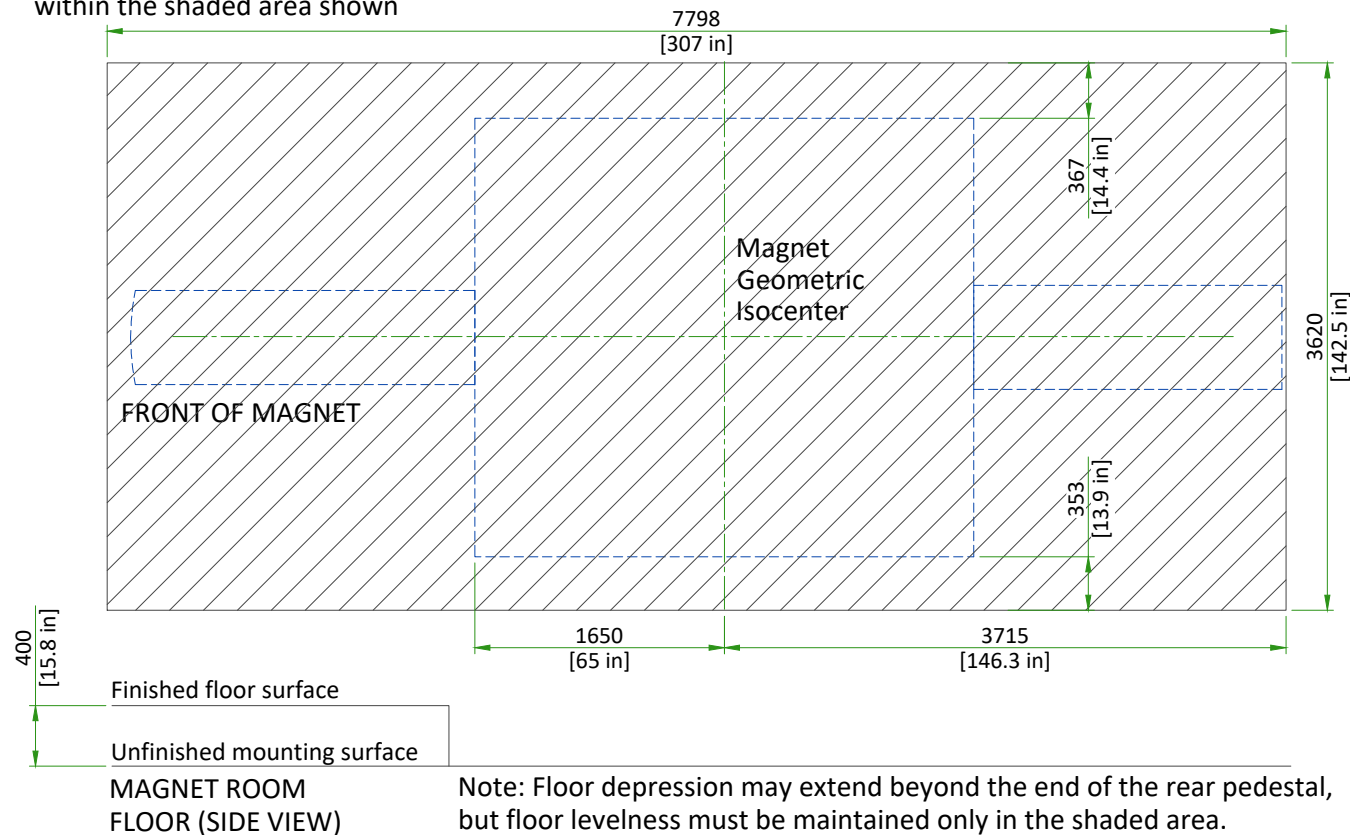
- The RF Shield vendor must design and install the dock/table frame anchor bolt
- The anchor bolt must be installed **after** the Magnet is installed
- The dock/table frame anchor must not contact floor rebar or other structural steel
- The dock/table frame anchor must electrically contact the RF shield 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 than 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.

MAGNET ROOM FLOOR SPECIFICATIONS

Floor levelness must be 8 mm (0.3125 in) between high and low spots over any 3048mm (120 in) distance within the shaded area shown



Typical

SIGNA 7T

EN-MRI-TYP-SIGNA 7T-NF.DWG

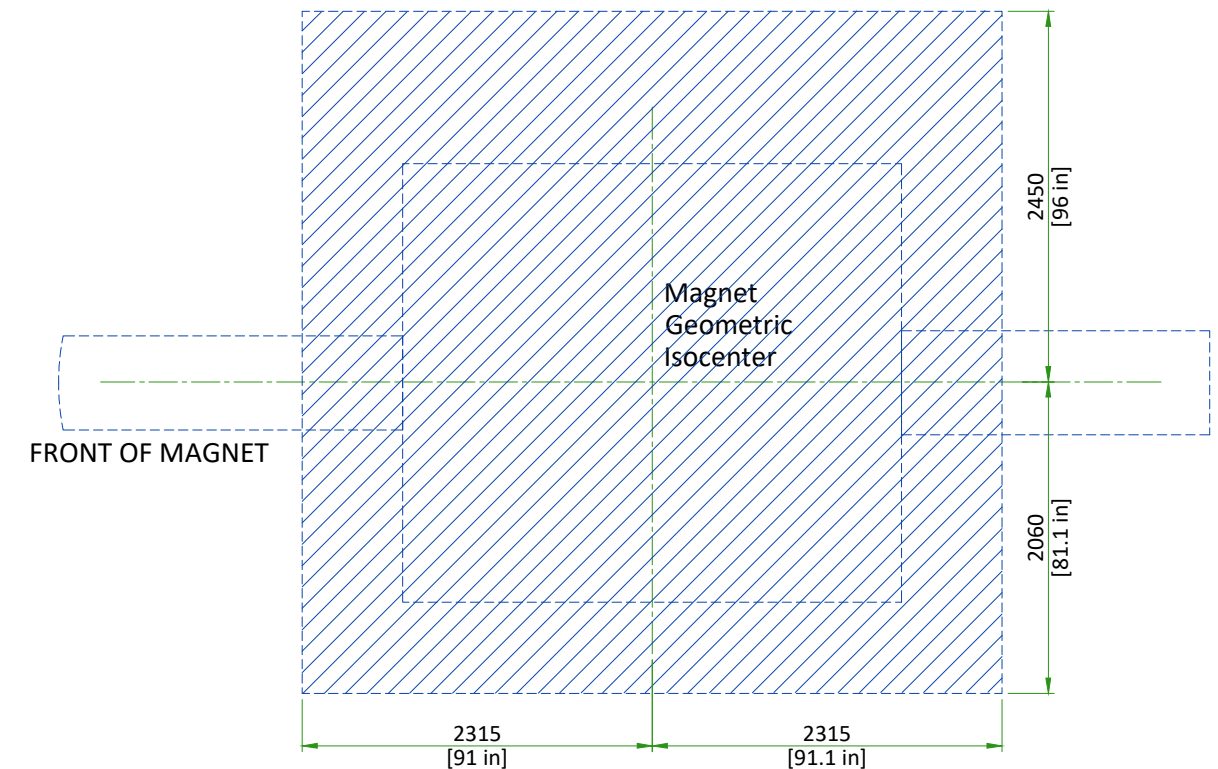
|1/8"=1'-0" | Rev B | Date 06/Oct/2025 |

S3 - Structural Details

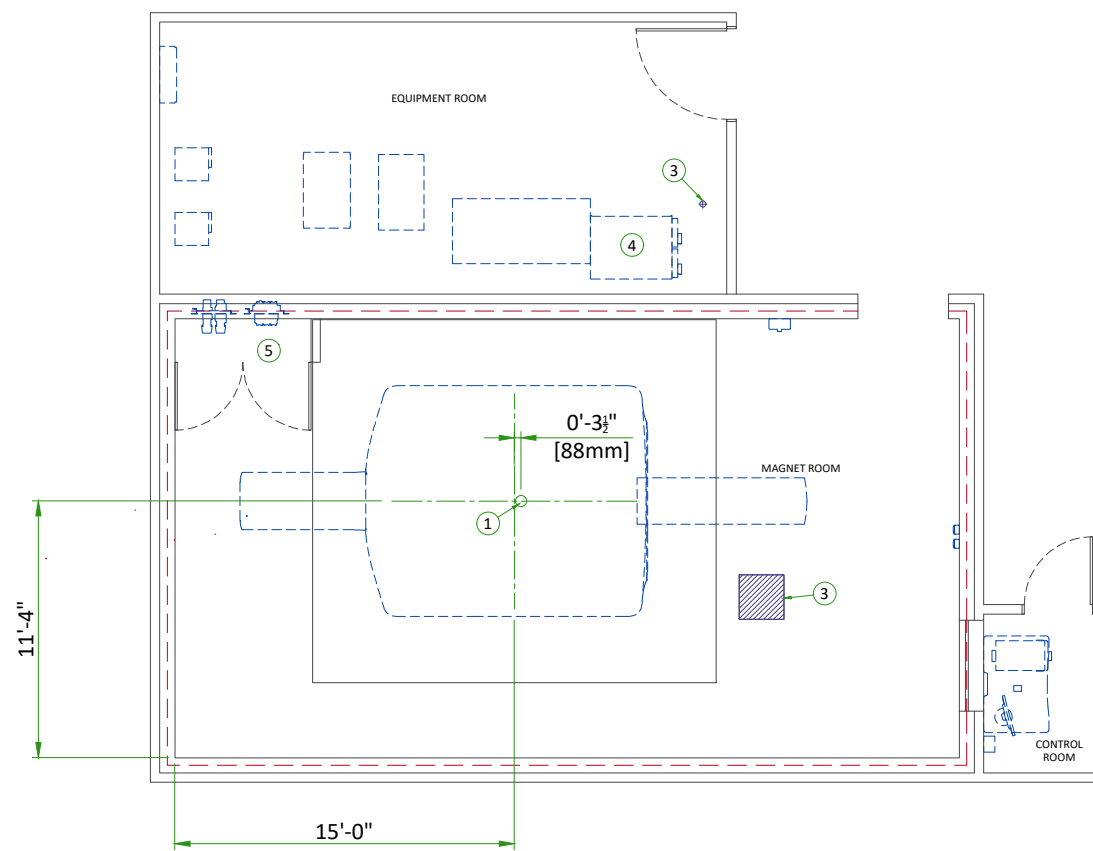
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MINIMUM MAGNET CEILING HEIGHT

Recessed floor to ceiling minimum height of 4000 mm [157.5 in].



NOT TO SCALE



ITEM	DESCRIPTION
1	Cryogen vent (200mm [8"] O.D.)
2	Emergency exhaust vent - refer to magnet room vent requirements (position to be defined)
3	Floor Drain
4	38mm [1.5"] NPT Male connectors, (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

MECHANICAL/PLUMBING NOTES

- All piping, fittings, supports, hoses, clamps, ventilation 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 SPECIFICATIONS

IN-USE CONDITIONS

	MAGNET ROOM			CONTROL ROOM			EQUIPMENT ROOM		
	Min	to	Max	Min	to	Max	Min	to	Max
	15°C		21°C	15°C		32°C	15°C		32°C
Temperature	59°F		69.8°F	59°F		89.6°F	59°F		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 75%			30% to 75%		
Humidity gradient (2)	≤ 5%/h			≤ 5%/h			≤ 5%/h		
Heat dissipation (base system only)	kW		BTU/hr	kW		BTU/hr	kW		BTU/hr
	2.72		9289.00	1.45		4945	21.34		72817

NOTE

- Operating temperature gradient limits shall be between -3° C/Hr [-5° F/Hr] and 3° C/Hr [5° F/Hr], when averaged over 1 hour
- Operating humidity gradient limits shall be between -5% RH/hour and 5% RH/hour, when averaged over 1 hour
- Maximum ambient temperature is derated by 1° C [1.8°F] per 175 m [574 ft] above 950 m [3117 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.

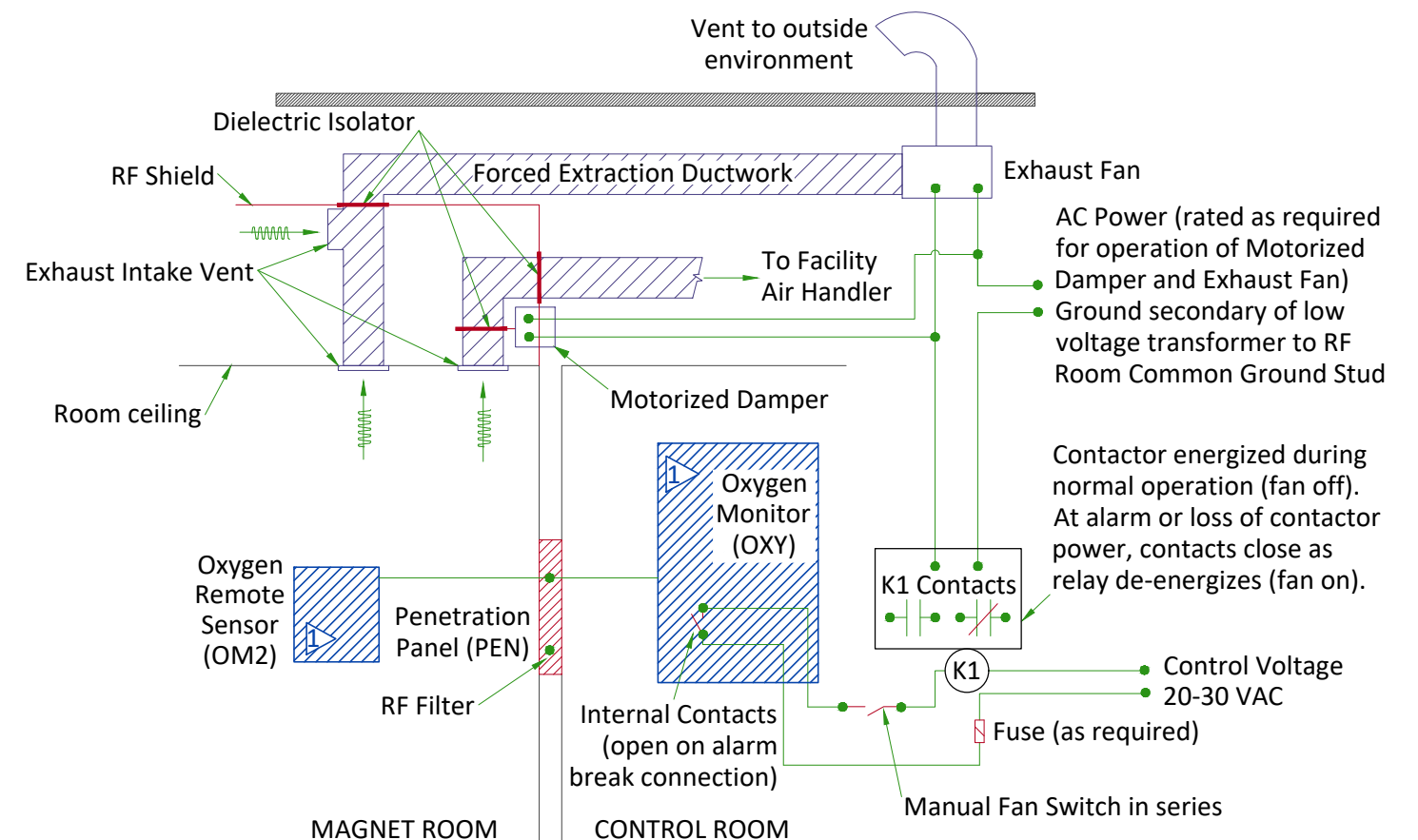
EMERGENCY VENT REQUIREMENT

- 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 m³/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

EQUIPMENT HEAT OUTPUT SPECIFICATIONS

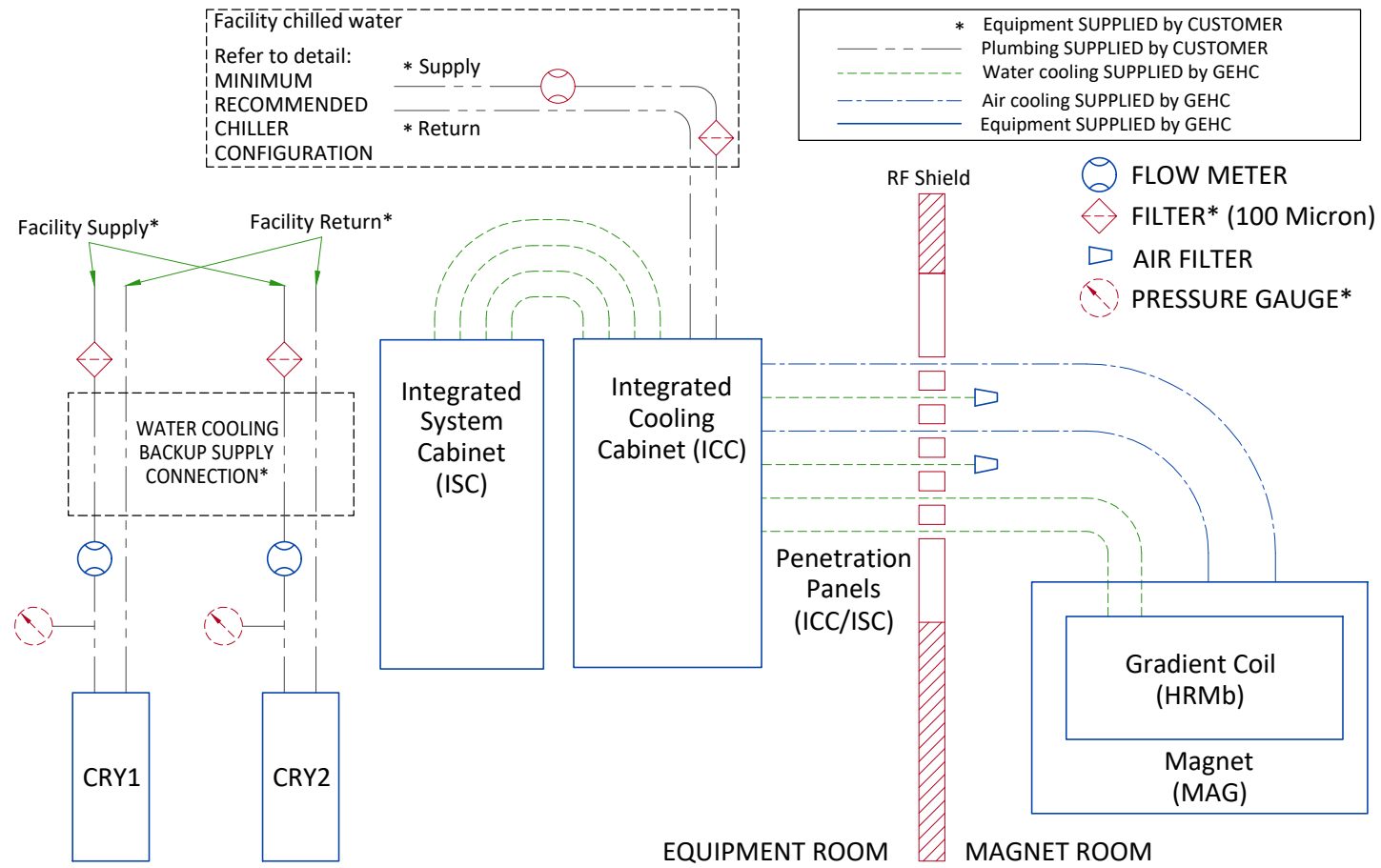
COMPONENT	ROOM	MAX kW	MAX BTU/hr
Magnet (MAG) and Patient Table (PT)	Magnet	2.72	9289
Penetration Panel (ISC PP)	Equipment & Magnet	0	0
Secondary Pen Wall (ICC SPW)	Equipment & Magnet	0.3	1023
Integrated System Cabinet (ISC)	Equipment	11.5	39215
Integrated Cooling Cabinet (ICC)	Equipment	1.0	3410
Main Disconnect Panel (MDP)	Equipment	0.28	972
Magnet Monitor (MON) (x2)	Equipment	0.06	205
Cryocooler Compressor (CRY) (x2)	Equipment	0.5	1705
RF Cabinet (RF)	Equipment	6.2	21156
High Order Shim Power Supply (HOS)	Equipment	1.624	5541
Operator Workspace equipment (OW)	Control	1.45	4945
Magnet Rundown Unit (MRU)	Control	-	-
Oxygen Monitor (OM)	Control	0.005	17

EMERGENCY EXHAUST VENT



GE option: equipment supplied and installed by GE. All other items supplied and installed by customer or contractors.

CHILLED WATER BLOCK DIAGRAM

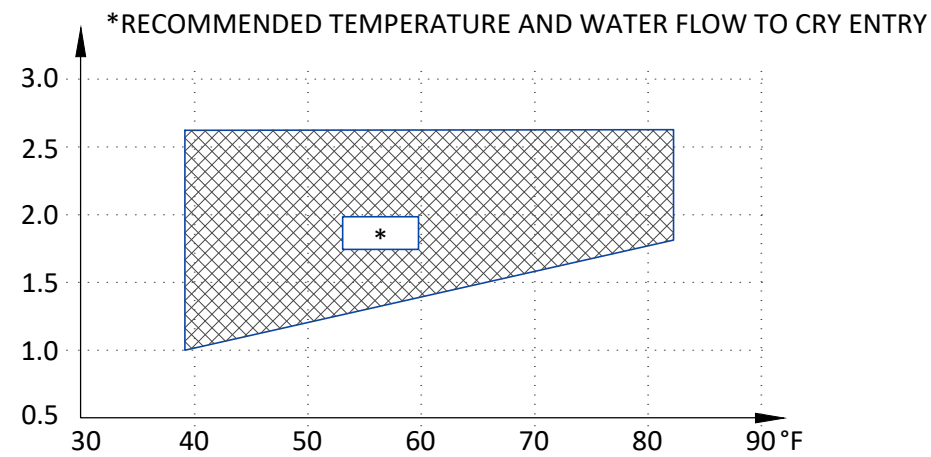


CHILLED WATER SPECIFICATIONS

FACILITY LIQUID COOLANT REQUIREMENTS FOR THE ICC	
PARAMETER	REQUIREMENTS
Chiller size	79 kW
Availability	Continuous
Antifreeze or treated process water	no more than 50% propylene (PGW) or ethylene (EGW) glycol-water
Minimum Flow	114L/min (30 gpm)
Maximum Flow	132 L/min (35 gpm)
Maximum pressure drop in ICC at minimum flow	2.7 bar (39.5 psi) with 50% PGW, 1060 kg/m ³ (66.2 lbs/ft ³) density 2.2 bar (31.6 psi) with pure water, 994 kg/m ³ (62.1 lbs/ft ³) density
Maximum pressure drop in ICC at maximum flow	3.7 bar (53.4 psi) with 50% PGW, 1060 kg/m ³ (66.2 lbs/ft ³) density 2.9 bar (42.7 psi) with pure water, 994 kg/m ³ (62.1 lbs/ft ³) density
Temperature rise at Minimum Flow	11.7°C (21.1°F) with 50% PGW; 3346 J/(kg K) specific heat; 1060 kg/m ³ density; 79 kW heat
Temperature rise at Maximum Flow	10.1°C (18.2°F) with 50% PGW; 3346 J/(kg K) specific heat; 1060 kg/m ³ density; 79 kW heat
Maximum inlet pressure to ICC	6 bar (87 psi)
Condensation protection	Facility plumbing to the ICC must be properly routed and insulated to prevent equipment damage or safety hazards
Minimum continuous heat load	1 kW in stand-by state 0 kW in off mode state
Inlet temperature	5 to 12°C (41 to 54°F) measured at the inlet to the ICC
ICC feeder hoses (provided by customer)	38.1 mm (1.5 inch) minimum hose inside diameter
Hose connections to the ICC	38.1 mm (1.5 inch) male NPT
Water quality	Refer to pre-installation manual for detailed specifications

CITY WATER BACKUP SPECIFICATIONS FOR COMPRESSOR

INLET WATER FLOW/TEMPERATURE FOR CRYOCOOLER COMPRESSOR

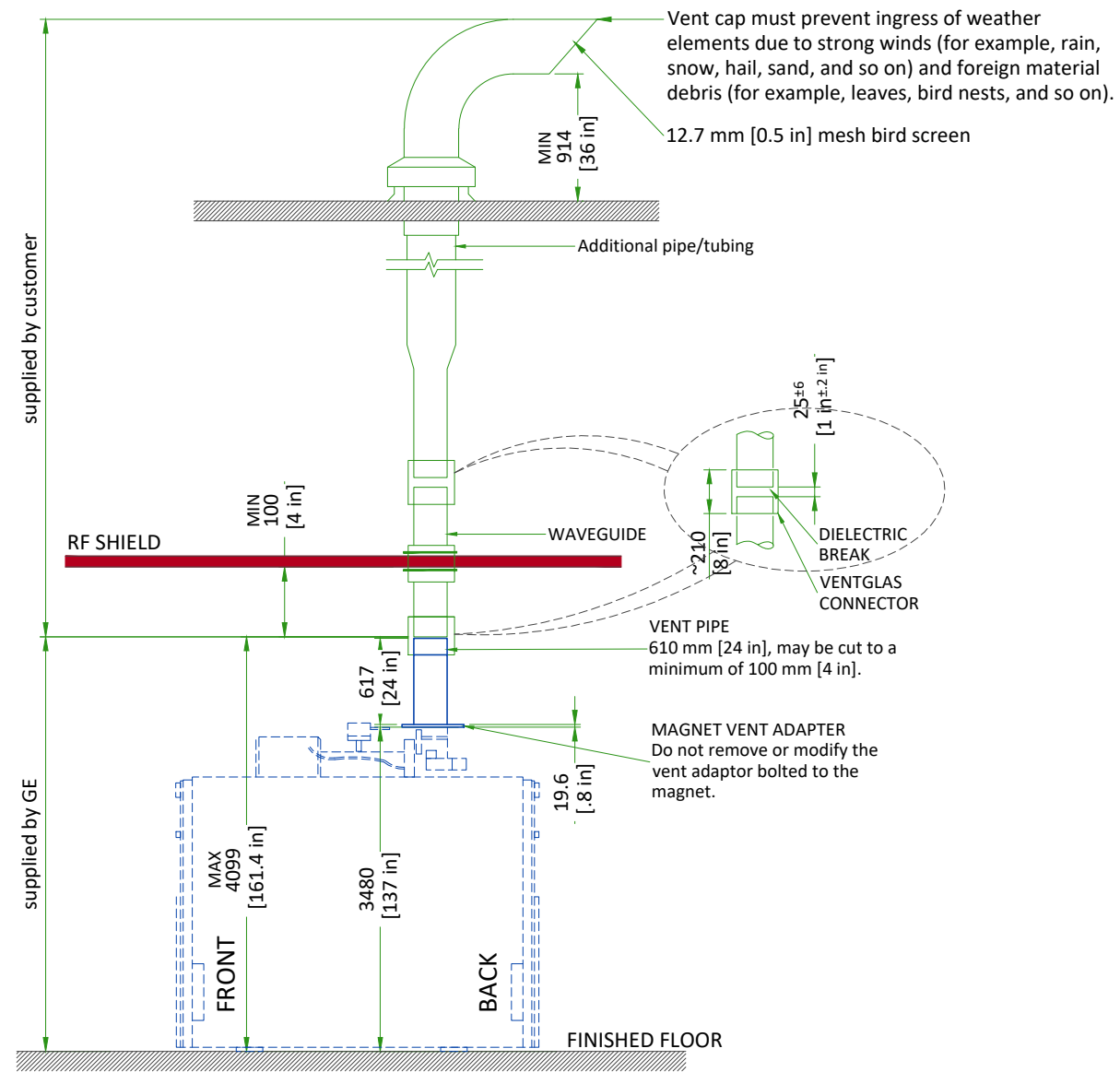


	MIN	MAX
INLET TEMP	39.2°F (4°C)	82.4°F (28°C)
INLET FLOW	1.0 gpm (4 l/min)	2.6 gpm (10 l/min)
TEMP RISE	89.6°F at 1.0 gpm (32°C at 4 l/min flow)	53.6°F at 2.6 gpm (12°C at 10 l/min flow)
HEAT DISSIPATION (kW)	7.2 kW	
PRESSURE DROP	8.7 psi at 2.1 gpm flow (60 kPa at 8 l/min flow)	

FACILITY LIQUID COOLANT REQUIREMENTS FOR EACH CRYOCOOLER COMPRESSOR

PARAMETER	REQUIREMENTS
Availability	Continuous
Antifreeze or treated process water	no more than 50% propylene (PGW) or ethylene (EGW) glycol-water
Minimum Flow	7.8 L/min (2.1 GPM) with 50% EGW, 1064 kg/m ³ (66.4 lbs/ft ³) density 6 L/min (1.6 GPM) with pure water, 994 kg/m ³ (62.1 lbs/ft ³) density
Maximum Flow	11.7 L/min (3.1 GPM) with 50% EGW, 1064 kg/m ³ (66.4 lbs/ft ³) density 9 L/min (2.4 GPM) with pure water, 994 kg/m ³ (62.1 lbs/ft ³) density
Maximum pressure drop at 8 L/min (2.1 GPM) flow	0.48 bar (7 psi)
Maximum inlet pressure to ICC	8 bar (116 psi)
Condensation protection	Facility plumbing to the Cryocooler Compressors must be properly routed and insulated to prevent equipment damage or safety hazards
Continuous heat load	7.8 kW
Inlet temperature	5 to 25°C (41 to 77°F)
Hose connections to the Cryocooler Compressors (supply and return)	12.5 mm (0.5 inch) onto hose barb and clamp
Hose connections to the GE supplied in-line flow meters	12.5 mm (0.5 inch) onto hose barb and clamp

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 GE supplied pipe below isolation joint. Magnet room end must not be more than 4099 mm [161.4 in] above finished floor.

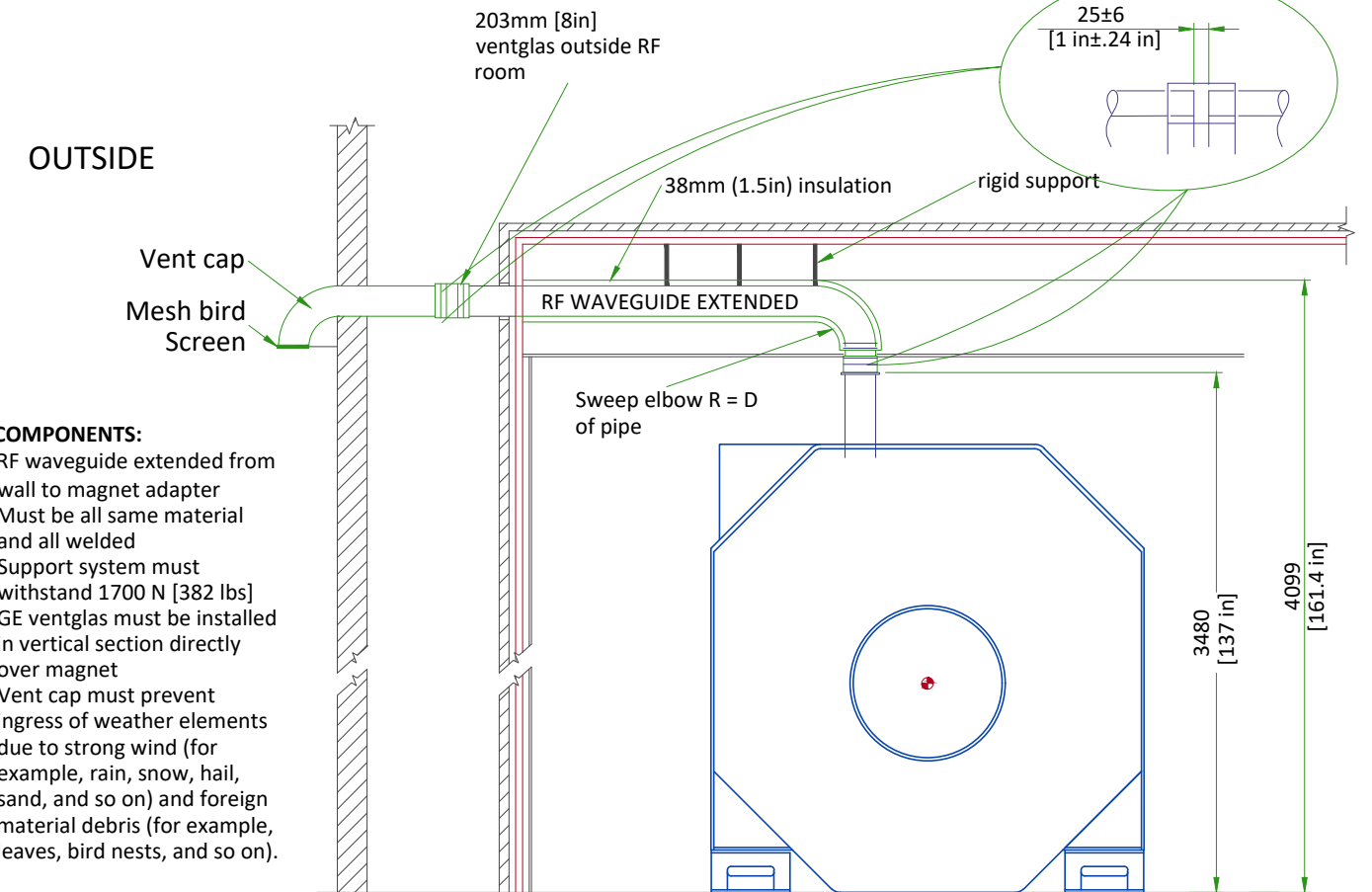
- The 203 mm [8 in] OD vent material must be one of the following materials with the wall thickness indicated:
 - SS 304: Minimum 0.89 mm [0.035 in]; Maximum 3.18 mm [0.125 in]
 - AL 6061-T6: Minimum 2.11 mm [0.083 in]; Maximum 3.18 mm [0.125 in]
 - CU DWV, M or L: Minimum 2.11 mm [0.083 in]; Maximum 3.56 mm [0.140 in]
- 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.

- Corrugated pipe or spiral duct must not be used
- If required, bellows pipe less than 300 mm [12 in] in length may be used as a thermal expansion joint
- The vent pipe must withstand the maximum pressure listed in the Pre-Installation Manual
- Waveguide vent material must match the outside diameter of the magnet flanged vent adapter

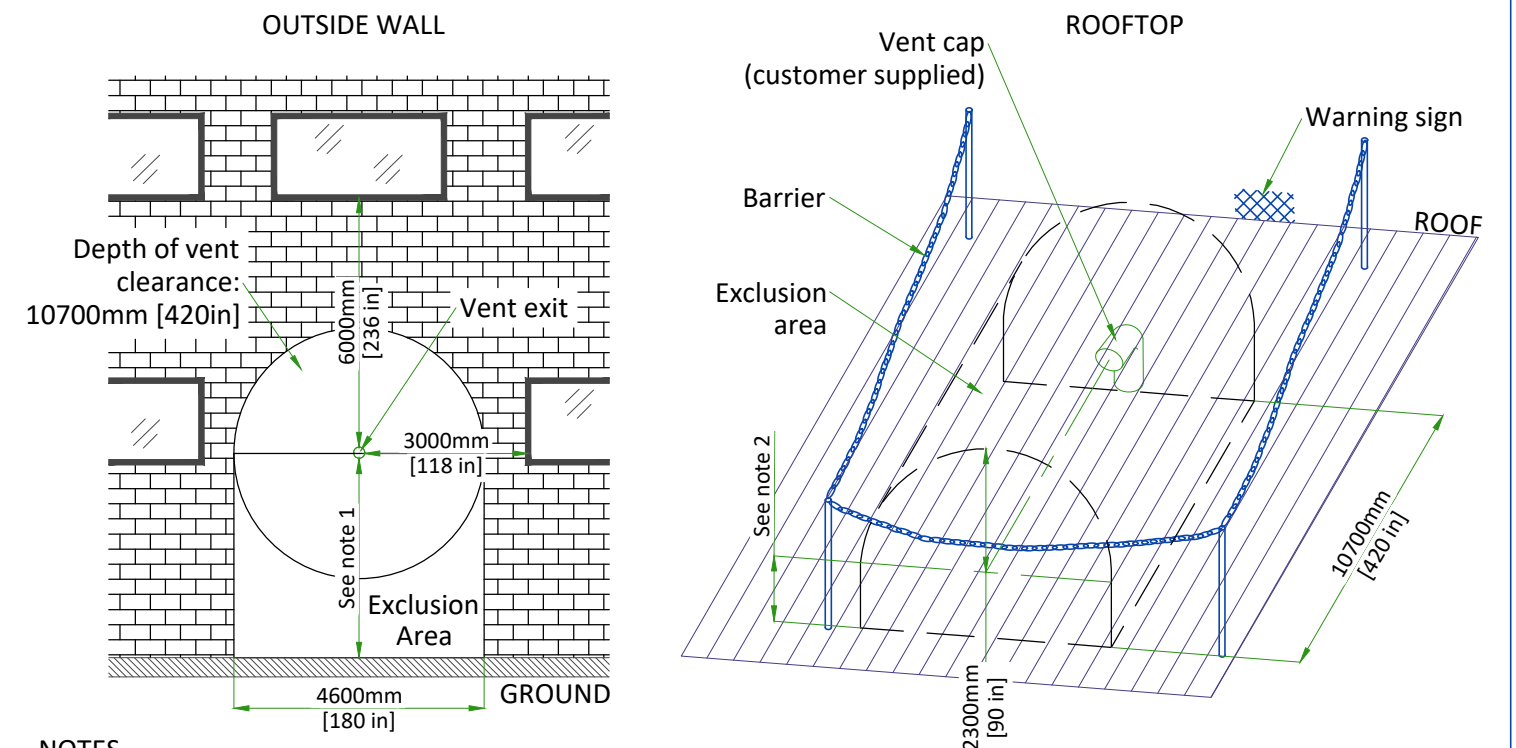
TYPICAL CRYOGEN SIDE WALL EXIT



KEY COMPONENTS:

- RF waveguide extended from wall to magnet adapter
- Must be all same material and all welded
- Support system must withstand 1700 N [382 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

- 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].
- 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	kPa	psi	kPa	psi	kPa	psi	kPa	psi	kPa	psi
200 mm (8 in.)	0.00-3.05	0-10	1.131	0.050	4.596	0.666	3.064	0.444	8.206	1.190	5.471	0.793	16.413	2.379
	3.05-6.10	10-20	2.263	0.100	9.191	1.332	6.127	0.888	16.413	2.379	10.942	1.586	32.826	4.758
250 mm (10 in.)	0.00-3.05	0-10	0.352	0.0016	1.883	0.273	1.256	0.182	3.363	0.488	2.242	0.325	6.727	0.975
	3.05-6.10	10-20	0.704	0.031	3.767	0.546	2.511	0.364	6.727	0.975	4.484	0.650	13.453	1.950
	6.10-9.15	20-30	1.056	0.047	5.650	0.819	3.767	0.546	10.090	1.463	6.727	0.975	20.180	2.925
	9.15-12.19	30-40	1.407	0.062	7.534	1.092	5.023	0.728	13.453	1.950	8.969	1.300	26.906	3.900
300 mm (12 in.)	0.00-3.05	0-10	0.134	0.006	0.910	0.132	0.607	0.088	1.625	0.236	1.083	0.157	3.249	0.471
	3.05-6.10	10-20	0.268	0.012	1.820	0.264	1.213	0.176	3.249	0.471	2.166	0.314	6.499	0.942
	6.10-9.15	20-30	0.402	0.018	2.730	0.396	1.820	0.264	4.874	0.707	3.249	0.471	9.748	1.413
	9.15-12.19	30-40	0.535	0.024	3.639	0.528	2.426	0.352	6.499	0.942	4.333	0.628	12.998	1.884
	12.19-15.25	40-50	0.669	0.030	4.549	0.659	3.033	0.440	8.124	1.178	5.416	0.785	16.247	2.355
	15.25-18.29	50-60	0.803	0.035	5.459	0.791	3.639	0.528	9.748	1.413	6.499	0.942	19.497	2.826
	18.29 - 21.35	60-70	0.937	0.041	6.369	0.923	4.246	0.615	11.373	1.649	7.582	1.099	22.746	3.297
350 mm (14 in.)	0.00-3.05	0-10	0.059	0.003	0.490	0.071	0.327	0.047	0.875	0.127	0.584	0.085	1.751	0.254
	3.05-6.10	10-20	0.119	0.005	0.981	0.142	0.654	0.095	1.751	0.254	1.167	0.169	3.502	0.508
	6.10-9.15	20-30	0.178	0.008	1.471	0.213	0.981	0.142	2.626	0.381	1.751	0.254	5.253	0.761
	9.15-12.19	30-40	0.237	0.010	1.961	0.284	1.307	0.190	3.502	0.508	2.335	0.338	7.004	1.015
	12.19-15.25	40-50	0.297	0.013	2.451	0.355	1.634	0.237	4.377	0.635	2.918	0.423	8.755	1.269
	15.25-18.29	50-60	0.356	0.016	2.942	0.426	1.961	0.284	5.253	0.761	3.502	0.508	10.506	1.523
	18.29 - 21.35	60-70	0.415	0.018	3.432	0.497	2.288	0.332	6.128	0.888	4.086	0.592	12.257	1.777
400 mm (16 in.)	0.00-3.05	0-10	0.030	0.001	0.287	0.042	0.192	0.028	0.513	0.074	0.342	0.050	1.027	0.149
	3.05-6.10	10-20	0.059	0.003	0.575	0.083	0.383	0.056	1.027	0.149	0.684	0.099	2.053	0.298
	6.10-9.15	20-30	0.089	0.004	0.862	0.125	0.575	0.083	1.540	0.223	1.027	0.149	3.080	0.446
	9.15-12.19	30-40	0.119	0.005	1.150	0.167	0.767	0.111	2.053	0.298	1.369	0.198	4.106	0.595
	12.19-15.25	40-50	0.148	0.007	1.437	0.208	0.958	0.139	2.566	0.372	1.711	0.248	5.133	0.744
	15.25-18.29	50-60	0.178	0.008	1.725	0.250	1.150	0.167	3.080	0.446	2.053	0.298	6.159	0.893
	18.29 - 21.35	60-70	0.208	0.009	2.012	0.292	1.341	0.194	3.593	0.521	2.395	0.347	7.186	1.042
450 mm (17.7 in.)	0.00-3.05	0-10	0.016	0.001	0.180	0.026	0.120	0.017	0.321	0.047	0.214	0.031	0.642	0.093
	3.05-6.10	10-20	0.032	0.001	0.359	0.052	0.240	0.035	0.642	0.093	0.428	0.062	1.283	0.186
	6.10-9.15	20-30	0.048	0.002	0.539	0.078	0.359	0.052	0.962	0.140	0.642	0.093	1.925	0.279
	9.15-12.19	30-40	0.063	0.003	0.719	0.104	0.479	0.069	1.283	0.186	0.855	0.124	2.566	0.372
	12.19-15.25	40-50	0.079	0.004	0.898	0.130	0.599	0.087	1.604	0.233	1.069	0.155	3.208	0.465
	15.25-18.29	50-60	0.095	0.004	1.078	0.156	0.719	0.104	1.925	0.279	1.283	0.186	3.850	0.558
	18.29 - 21.35	60-70	0.111	0.005	1.258	0.182	0.838	0.122	2.246	0.326	1.497	0.217	4.491	0.651

NOTES

1. Refer to Magnet Room Venting manual 5850263-1EN for specifications of distances >70 ft (21.35 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
3. The total pressure drop of the entire cryogenic vent system must be less than 5 psi (34.5 kPa). 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:

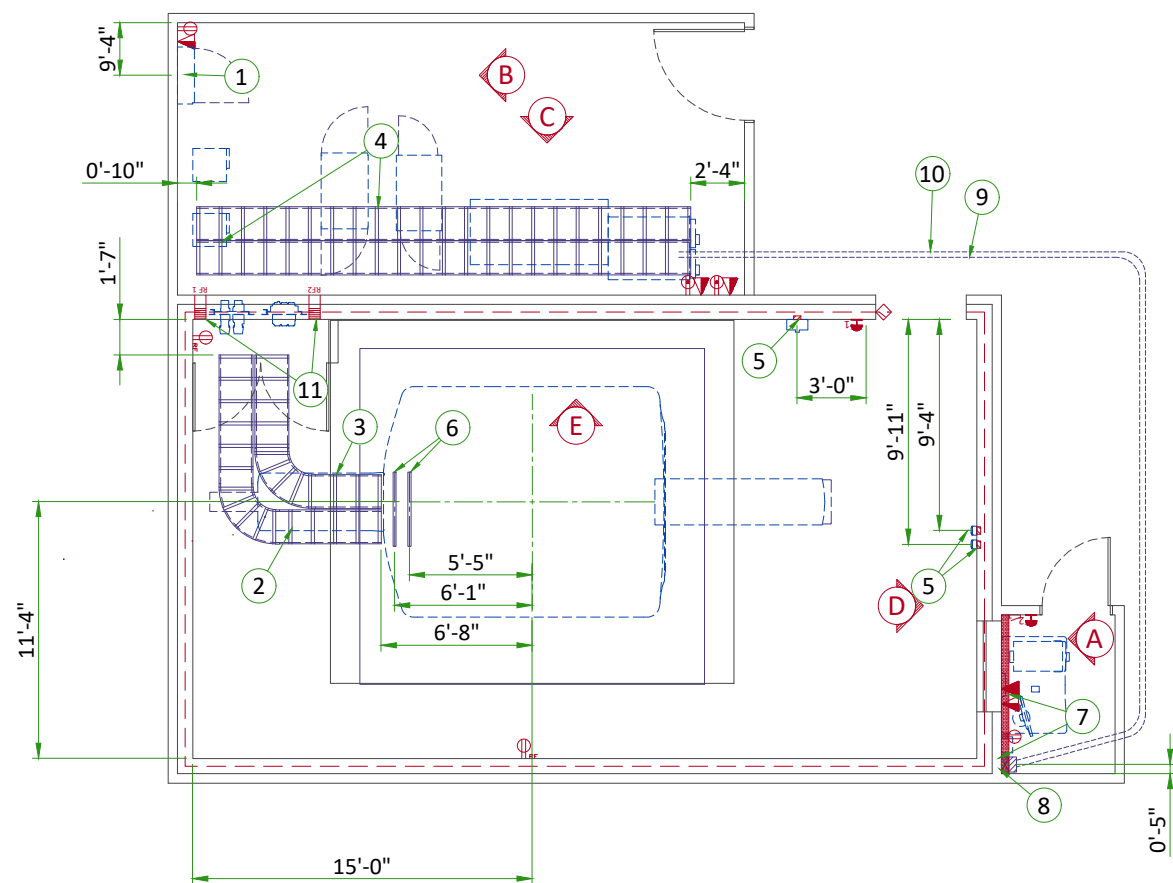
1. TLS over TCP Port 443 (Preferred method for new products) via:
 - a. DNS resolution
 - b. Customer-provided Proxy or
 - c. GE Proxy (Available in some regions)
2. Site-to-Site IPsec VPN tunnel

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.

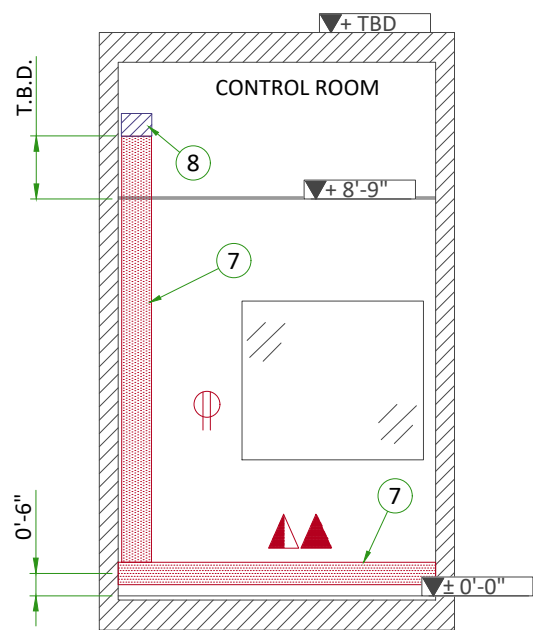
- All junction boxes, conduit, duct, duct dividers, switches, circuit breakers, cable tray, etc., are to be supplied and installed by customers electrical contractor. All junction boxes shall be provided with covers.
- Conduit and duct runs shall have gradual sweep radius bends.
- Conduits and duct above 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.



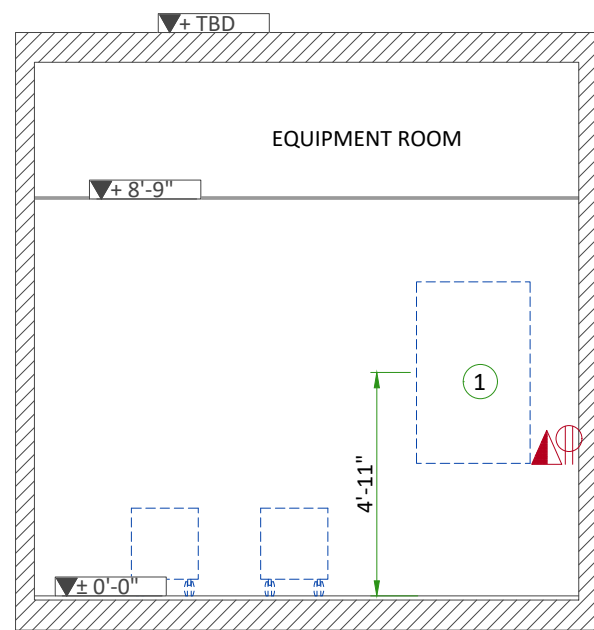
ITEM	Electrical Layout Item List
1	Main disconnect panel (MDP)
2	Non-ferrous cable ladder 18" x 6" [450 x 150]
3	Non-ferrous cable ladder for gradient cables 18" x 6" [450 x 150]
4	Cable ladder 18" x 6" [450 x 150]
5	Box in wall 4" x 4" x 2" [100 x 100 x 50]
6	Non-ferrous unistrut cable support
7	Surface wall duct with minimum 2 dividers 6' x 3 1/2" [150 x 100]
8	Box above ceiling size per code
9	Conduit above RF screen 2" [50]
10	Conduit above RF screen 3" [75]
11	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 120V, single phase power
		Network outlet
		Dedicated telephone lines/network connection
		Duplex hospital grade, dedicated outlet 120V emergency, single phase power, 15A
		Duplex hospital grade, dedicated outlet 120V, single phase outlet routed through RF filter

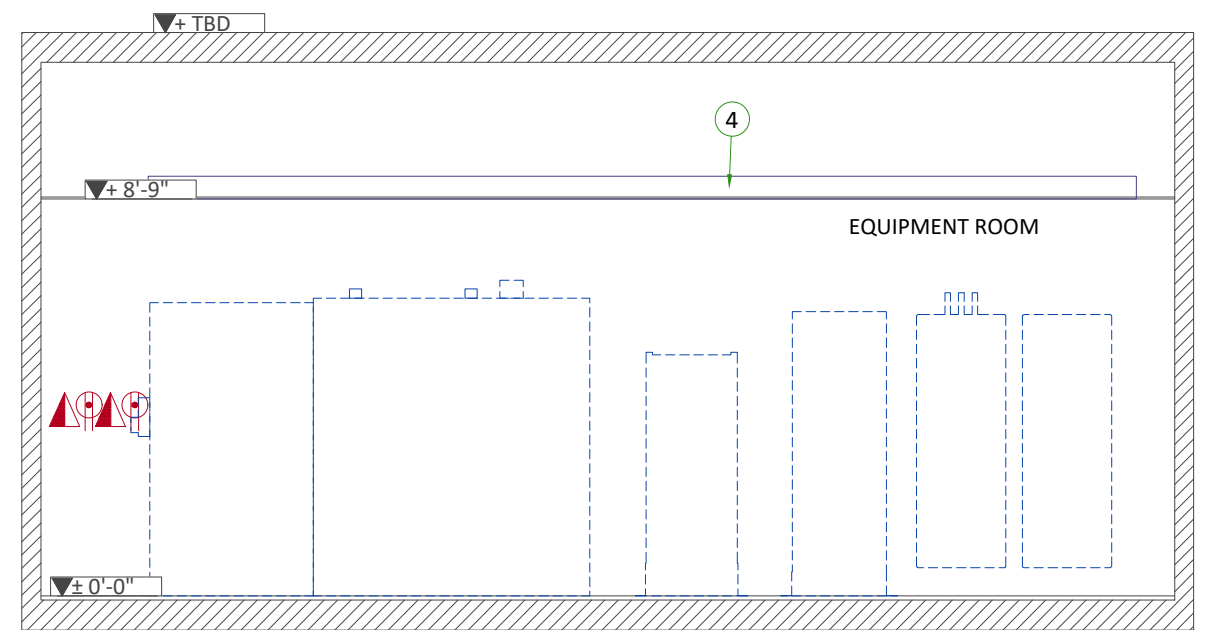
Additional Conduit Runs (Contractor Supplied and Installed)					
From (Bubble # / Item)	To (Bubble # / Item)	Qty	Size		
			In.	mm	
1 Main Disconnect Panel	Facility Power	1	As req'd	As req'd	
1 Main Disconnect Panel	Integrated Systems Cabinet	1	As req'd	As req'd	
	System emergency off 2	1	1/2	16	
System emergency off 2	Cooling Penetration Panel	1	1/2	16	
Door switch	Integrated Systems Cabinet	1	3/4	20	
System emergency off 1	Cooling Penetration Panel	1	3/4	20	
5 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	
5 Oxygen Sensor	Waveguide or RF filter	1	3/4	20	
		1	3/4	20	
5 Oxygen Monitor	120-V Emergency Power	1	As req'd	As req'd	



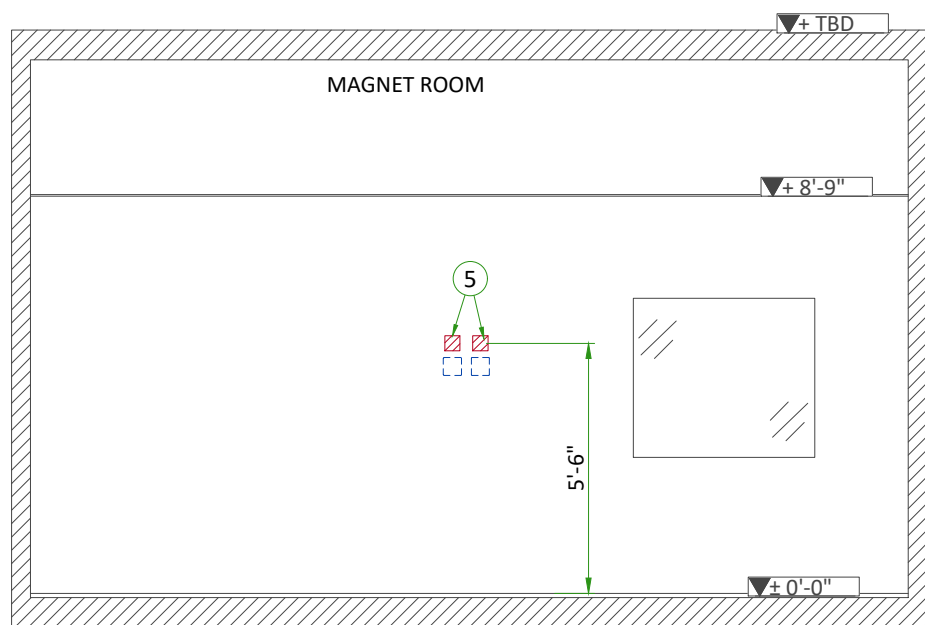
A



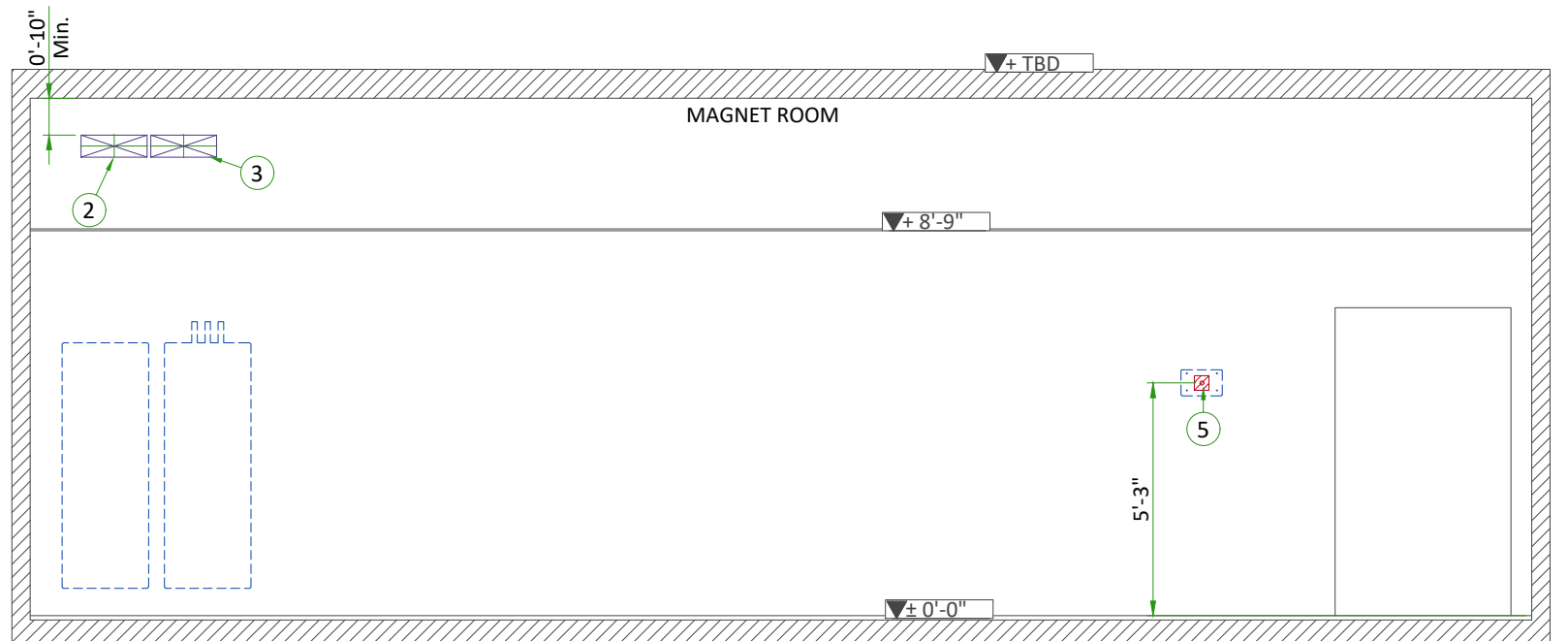
B



C



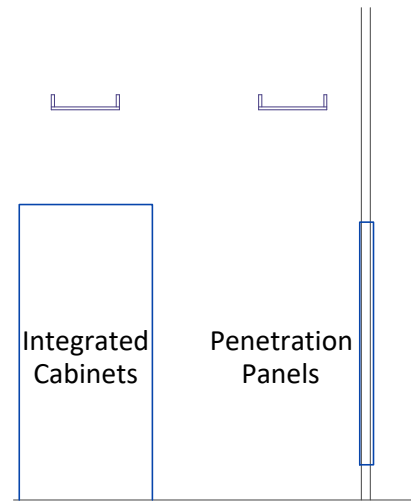
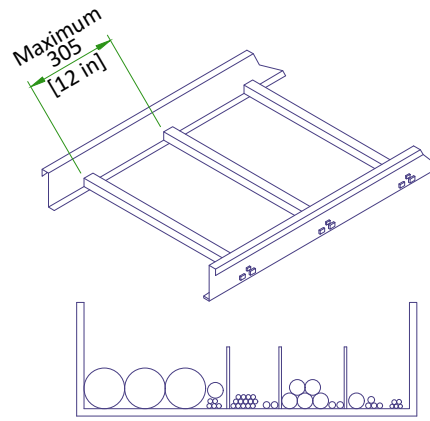
D



E

CABLE TRAYS IN EQUIPMENT ROOM

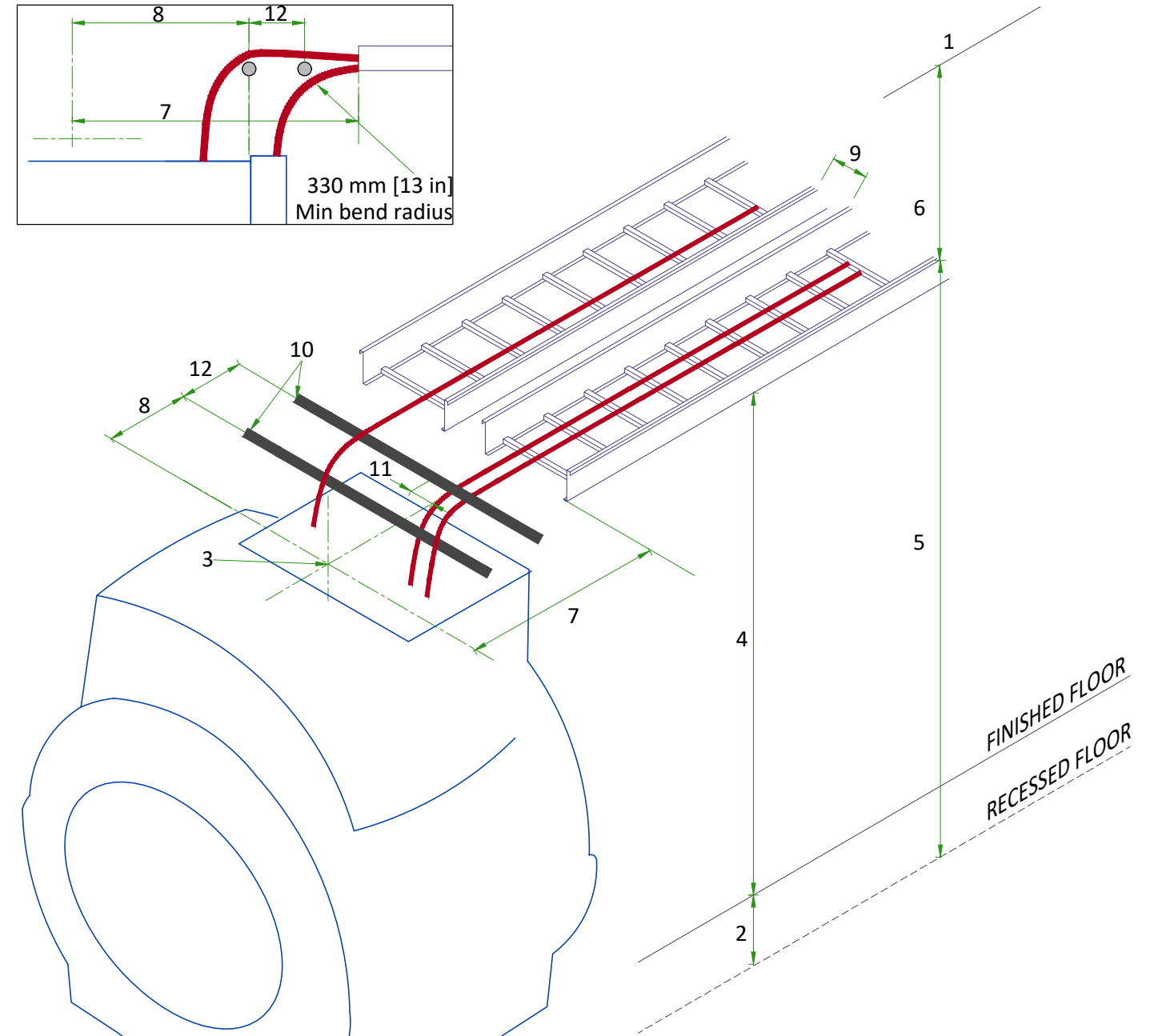
CABLE TRAY DETAIL



Minimum Cable Tray Width					
	ISC		ICC		OW
	Electrical	Air/Water	Electrical	Air/Water	Electrical
ICC	76 [3 in]	102 [4 in]	N/A	N/A	N/A
OW	76 [3 in]	N/A	76 [3 in]	N/A	N/A
ISC PW	450 [18 in]	N/A	N/A	N/A	N/A
ICC PW	76 [3 in]	N/A	76 [3 in]	300 [12 in]	76 [3 in]

NOT TO SCALE

CABLE TRAYS REQUIREMENTS IN MAGNET ROOM



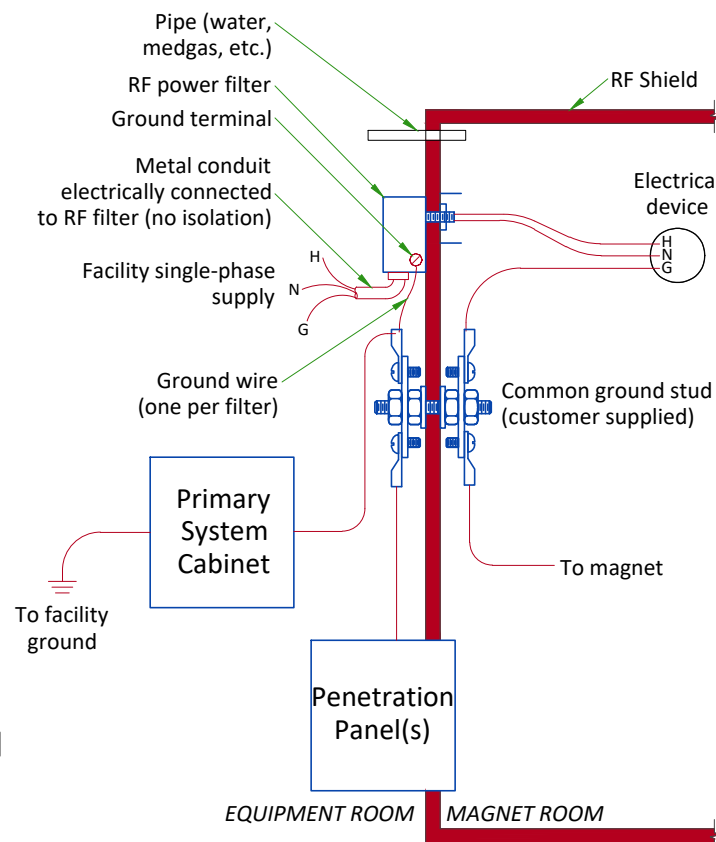
Cable Tray Requirements (Side-By-Side)

- 1 - Ceiling
- 2 - 400mm [15.7 in]
- 3 - Magnet isocenter
- 4 - Minimum cable tray height required at back of Magnet: 3125 mm [123 in].
Tray height may be lower at other points to avoid obstructions.
- 5 - Minimum height from floor to top of tray (anywhere in Magnet room): 3251mm [128 in]
- 6 - Minimum distance from top of cable tray to RF ceiling: 254 mm [10 in].
Minimum distance on either side of an obstruction: 254 mm [10 in], minimum distance from top of cable tray to Obstruction: 178 mm [7 in].
- 7 - Tray end to isocenter: 2030 ±12 mm [80 ±0.5 in].
- 8 - Other cable termination to isocenter: 1650 ±12 mm [65 ±0.5 in].
- 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 the inside edge of the tray, in line with the 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



POWER REQUIREMENTS

SPECIFICATIONS OF MAIN POWER INPUT

POWER SUPPLY	380/400/415/480V ± 10%, 3 PHASE + GND
FREQUENCIES	50/60Hz ± 3Hz
TOTAL SYSTEM 50 MILLISECOND POWER	291kVA
TOTAL SYSTEM 15 MINUTE POWER	190kVA
TOTAL SYSTEM CONTINUOUS POWER	153kVA
CRYO COMPRESSOR CONTINUOUS POWER	18kVA (2 Compressors)

- 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%.

SPECIFICATIONS OF OPTIONAL BACK-UP POWER SUPPLY

MAGNET MONITOR REQUIRES A 100-240 VAC, 50/60 HZ, 3.0 A FACILITY SUPPLIED OUTLET. POWER AT THE OUTLET MUST BE CONTINUOUSLY AVAILABLE.

FOR CRYOCOOLER COMPRESSOR (EACH)

POWER INPUT	380/400/415/480V, THREE-PHASE
POWER DEMAND	MIN 9kVA
FREQUENCY	50/60Hz ± 3Hz

Power to Cryocooler Compressor must be removed when emergency off circuit is actuated.

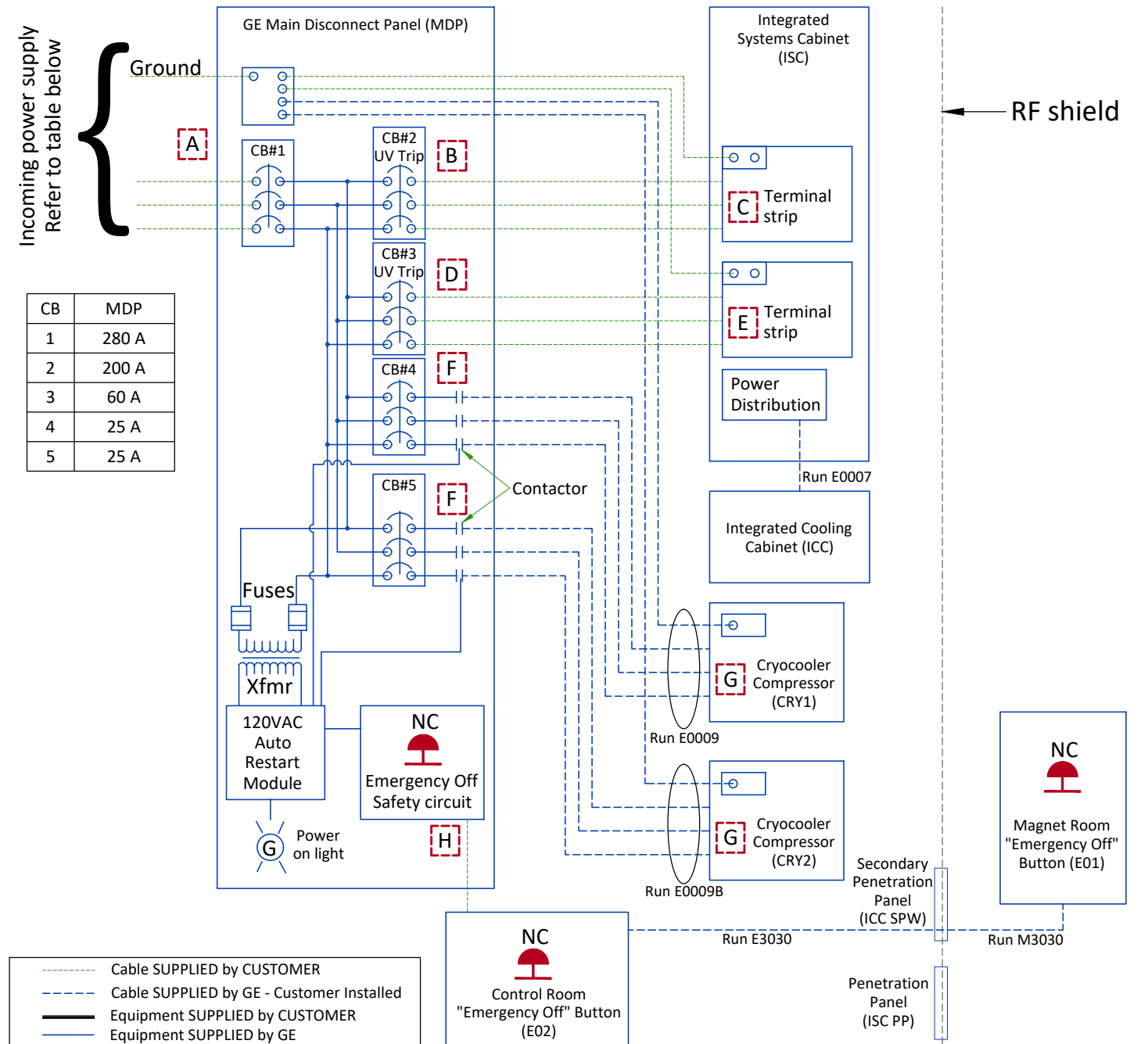
CABLES

- Power and cable installation must comply with the distribution diagram.
- Size of the MDP 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,EO#,L...) will go to MDP with a pigtail length of 1.5m [4.9 ft], 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.

POWER DISTRIBUTION



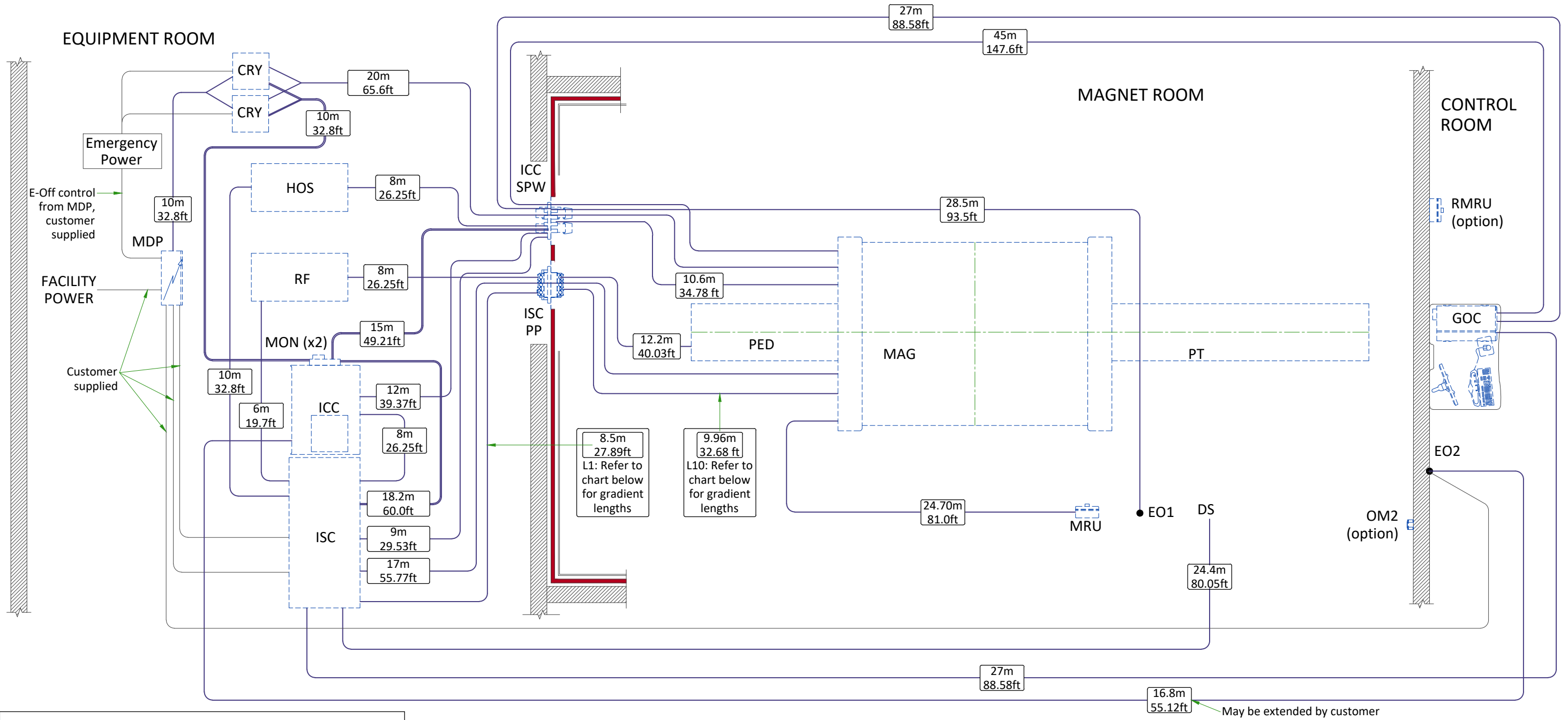
NOTE:

- Cryocooler Compressors (CRY1,2) must operate 24 hours per day, 7 days per week.
- Runs E0007, E0009, E0009B, E3030, and M3030 are GE supplied cables. All other wiring is customer supplied and installed.
- Two remote Emergency Off Buttons are supplied with the MDP. Emergency Off removes power from all outputs when activated.
- All MDP output circuits drop out on loss of power. The Cryocooler (CRY) circuits will automatically restart upon restoration of power.
- GE MDP Short circuit current rating is 25,000 amperes at 480V (M7700MA) or 415V (M7700MB).
- All feeder circuits require dedicated ground wires.
- GE MDP is NRTL rated in accordance with UL 508A.

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

GE MDP M7700MA (480V)				
Item	Phase		Ground	
	sq mm	AWG/kcmil	sq mm	AWG/kcmil
A	(2) 70-240	(2) 2/0-500	(2) 35-240	(2) 2-500
B	6-120	10-250	16-150	6-300
C	16-120	6-250	16-185	6-350
D	2.5-50	14-1/0	16-150	6-300
E	6-35	10-2	4-35	12-2
F	2.5-10	14-8	2.5-6	14-10
G	2.5-6	14-10	2.5-6	14-10
H	0.34-6	22-10	N/A	N/A

INTERCONNECTIONS



GRADIENT CABLE LENGTH OPTIONS		
Length Identifier	Available lengths m (ft)	Proposed
L1 (Equipment Room)	4.6 (15.1)	-
	6.6 (21.7)	-
	8.6 (28.3)	-
	10.6 (34.8)	-
	12.6 (41.3)	-
L10 (Magnet Room)	4.6 (15.1)	-
	6.6 (21.7)	-
	8.6 (28.3)	-
	10.6 (34.8)	-

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	ISC cabinet	15.24 (50)
	MRE	Ethernet Hub in ISC	15.24 (50)
	MRE	Customer Supplied Outlet	60Hz: 6.10 (20) 50Hz: 7.62 (25)
Multi-Nuclear Spectroscopy (MNS)	MNS	ISC PW	9.85 (32.3)
	MNS	ICC PW	7.85 (25.7)/14 (45.9)
	ISC PW	ICC PW	8.2 (26.9)/14.35 (47)