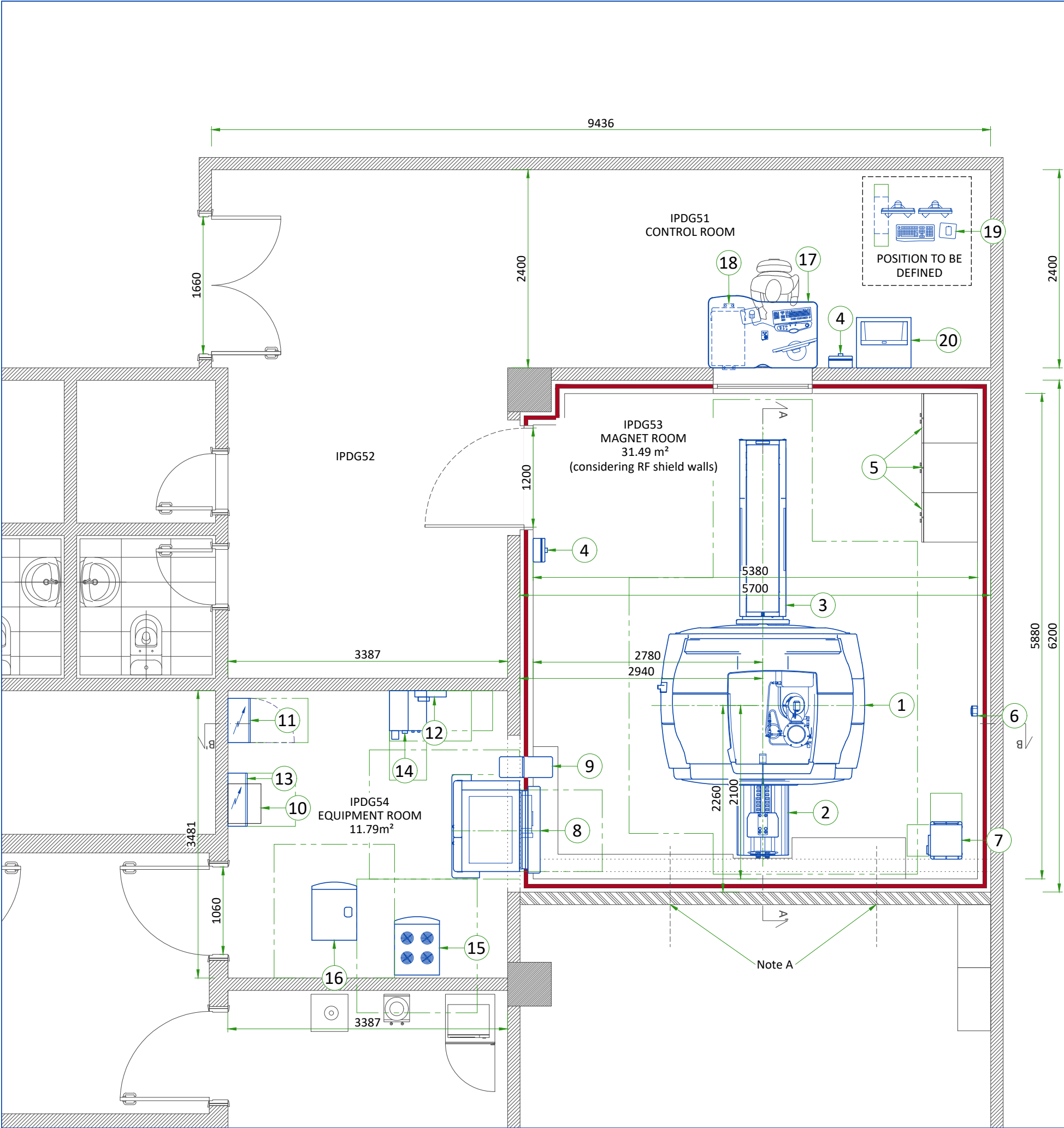




			SUDABELT MEDICAL CO LTD LAGOS NIGERIA																																
A	27/FEB/2023	First issue drawing (DC-376445)																																	
REV	DATE	MODIFICATIONS																																	
01 - Cover Sheet		16 - Cryogenics layout				<div><div>GE Healthcare</div><div>Efosa Amayo</div><div>-</div><div>Efosa.amayo@ge.com</div></div> <div>SIGNA EXPLORER FINAL STUDY</div> <table><tr><td colspan="2">Drawn by</td><td>Verified by</td><td>Concession</td><td>S.O. (GON)</td><td>PIM Manual</td><td>Rev</td></tr><tr><td colspan="2">N. Sadoud</td><td>M. Marothy</td><td>-</td><td>-</td><td>5538857-1EN</td><td>13</td></tr><tr><td>Format</td><td>Scale</td><td colspan="3">File Name</td><td>Date</td><td>Sheet</td></tr><tr><td>A3</td><td>1:50</td><td colspan="3">MRI-B329270-FIN-00-A.DWG</td><td>27/FEB/2023</td><td>01/26</td></tr></table>		Drawn by		Verified by	Concession	S.O. (GON)	PIM Manual	Rev	N. Sadoud		M. Marothy	-	-	5538857-1EN	13	Format	Scale	File Name			Date	Sheet	A3	1:50	MRI-B329270-FIN-00-A.DWG			27/FEB/2023	01/26
Drawn by		Verified by	Concession	S.O. (GON)	PIM Manual			Rev																											
N. Sadoud		M. Marothy	-	-	5538857-1EN			13																											
Format	Scale	File Name			Date			Sheet																											
A3	1:50	MRI-B329270-FIN-00-A.DWG			27/FEB/2023			01/26																											
02 - Equipment Layout		17 - Cryogenics																																	
03 - Magnetic Fringe Field		18 - RF shielding																																	
04 - Equipment Layout Top View With Magnetic Field		19 - Acoustic - Vibration																																	
05 - Equipment Layout Side View With Magnetic Field		20 - Delivery																																	
06 - Equipment Layout Front View With Magnetic Field		21 - Equipment Dimensions (1)																																	
07 - Floor - Electrical Layout		22 - Equipment Dimensions (2)																																	
08 - Floor Structural Details		23 - Equipment Dimensions (3)																																	
09 - Power Requirements		24 - Interconnections																																	
10 - Power Distribution		25 - Environment																																	
11 - Detailed PDB Schematics		26 - Disclaimer - Site Readiness																																	
12 - Grounding																																			
13 - HVAC																																			
14 - HVAC - Chilled water - Ceiling Layout																																			
15 - Chilled water details																																			
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: www.gehealthcare.com/siteplanning																																			
GE 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 drawing. GE cannot accept responsibility for any damage due to the partial use of GE final issue drawings, however caused. All dimensions are in millimeters unless otherwise specified. Do not scale from printed pdf files. GE accepts no responsibility or liability for defective work due to scaling from these drawings.																																			



EQUIPMENT LAYOUT

ITEM	DESCRIPTION	DIMENSIONS LxWxH (mm)	WEIGHT (kg)
1	MAGNET (MAG)	1938x2469x2383	5320
2	REAR PEDESTAL (PED)	853x510x956	132
3	FIXED PATIENT TABLE (PT)	2158x572x965	136
4	MAGNET RUNDOWN UNIT (MRU)	287x206x172	3.2
5	FURNITURE FOR COILS (NOT SUPPLIED BY GE)	650x600x1200	-
6	OXYGEN REMOTE SENSOR (OM2)	121x121x78	0.9
7	BLOWER BOX (MG6)	381x453x558	21
8	SYSTEM CABINET (SC)	969x1250x2200	890
9	PENETRATION PANEL (PP)	250x800x750	-
10	MAIN DISCONNECT PANEL (MDP)	233x645x1130	84
11	POWER DISTRIBUTION BOX (PDB)	500x270x700	42
12	MAGNET MONITOR (MON)	381x260x127	4.5
13	4.6 kVA STEP DOWN TRANSFORMER FOR WC1 (NOT SUPPLIED BY GE)	-	-
14	CRYOCOOLER COMPRESSOR (CRY)	588x450x671	125
15	WATER CHILLER FOR SYSTEM CABINET (WC2)	544x705x811	100
16	WATER CHILLER FOR BRM GRADIENT COIL (WC1)	544x705x811	134
17	OPERATOR WORKSPACE (OW)	1300x875x750	57
18	OPERATOR CONSOLE (GOC)	-	65
19	ADVANTAGE WORKSTATION (AW)	445x169x386	31.7
20	DV5700 LASER IMAGER	660x610x470	54

	WALL - ACCORDING TO RECEIVED DRAWING
	STRUCTURE - ACCORDING TO RECEIVED DRAWING
	WALLS - RECOMMENDED MODIFICATIONS BY GE
	WALL TO DEMOLISH
	RF SHIELD - 100 dB ATTENUATION

EXAM ROOM HEIGHT	
FINISHED FLOOR TO SLAB HEIGHT	3.30 m
FALSE CEILING HEIGHT	2.70 m

NOTES

A) Magnet access

MAGNETIC PROXIMITY LIMITS

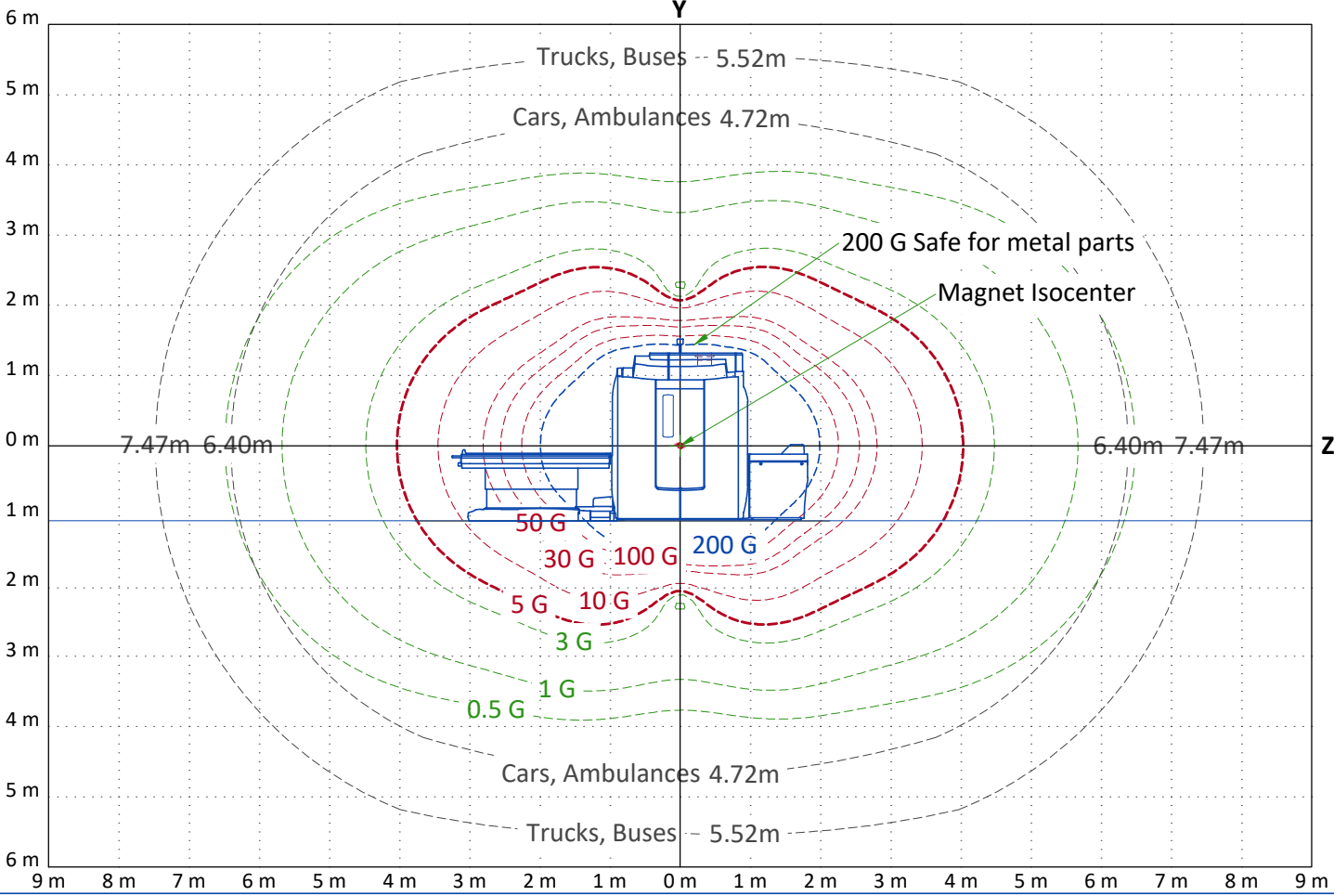
Gauss (mT) Limit	Equipment
0.5 gauss (0.05mT)	Nuclear camera
1 gauss (0.1mT)	Positron Emission Tomography scanner, Linear Accelerator, Cyclotrons, Accurate measuring scale, Image intensifiers, Bone Densitometers, Video display (tube), CT scanner, Ultrasound, Lithotripter, Electron microscope, Digital X-Ray
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, 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.

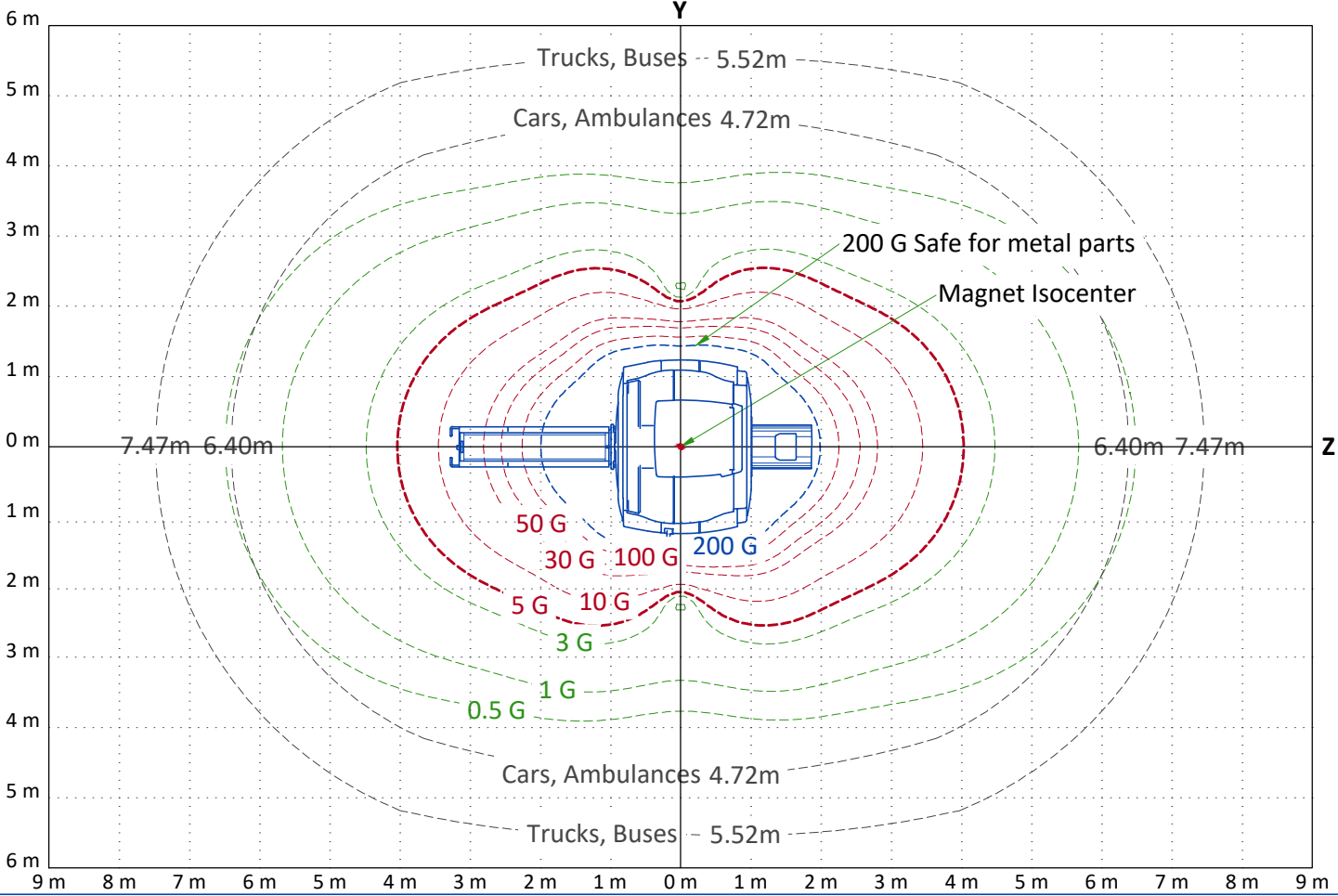
STEEL MASS LIMITS TO MAGNET ISOCENTER (3x3 m [10x10 ft] AREA UNDER MAGNET)			
Limits Of Steel Mass		Distance Below Top Surface Of Floor	
kg/m²	lbs/ft²	mm	in
0	0	0 - 76	0-3
9.8	2	76 - 127	3-5
14.7	3	127 - 254	5-10
39.2	8	254 - 330	10-13
98.0	20	330+	13+

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.

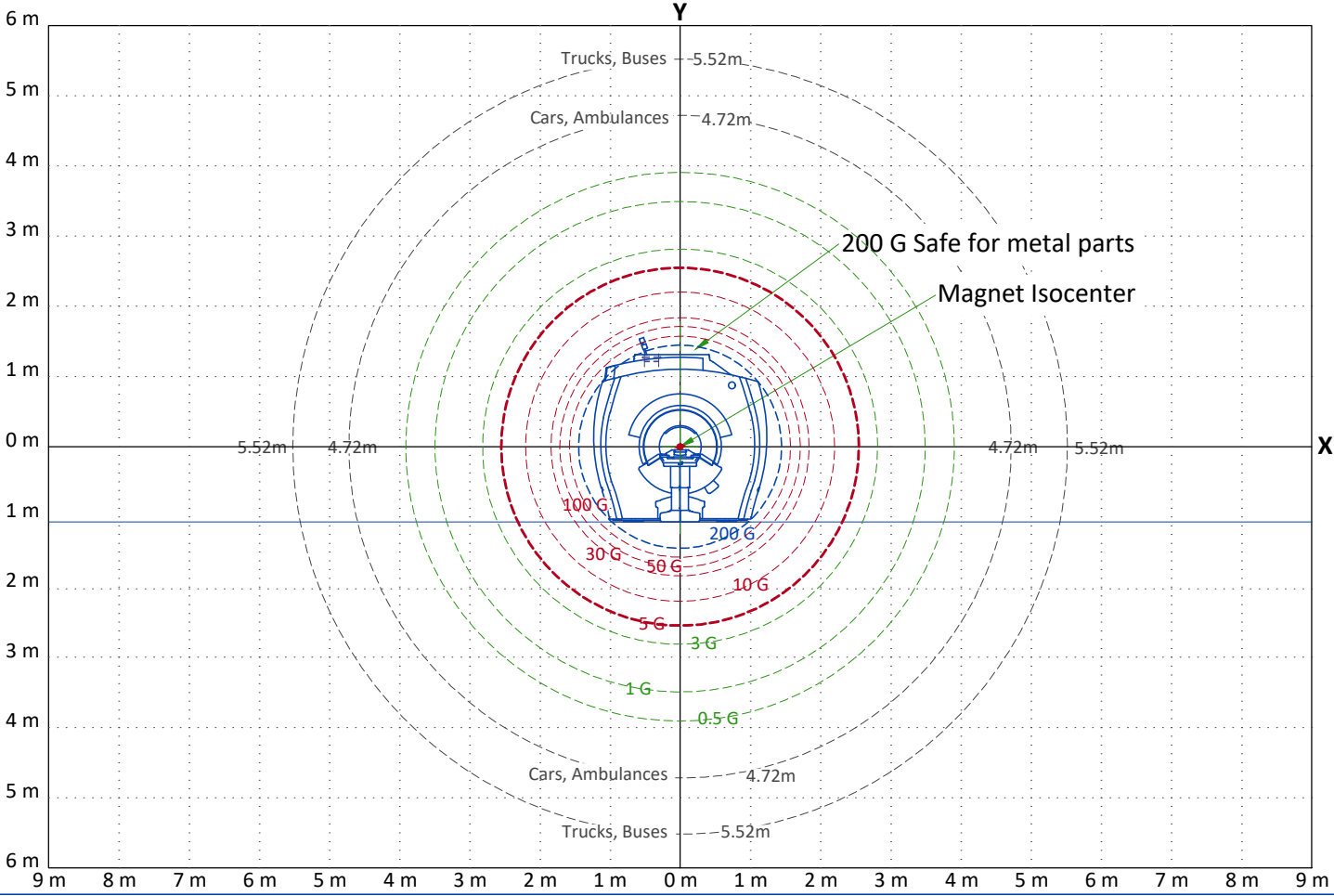
MAGNETIC FRINGE FIELD SIDE VIEW

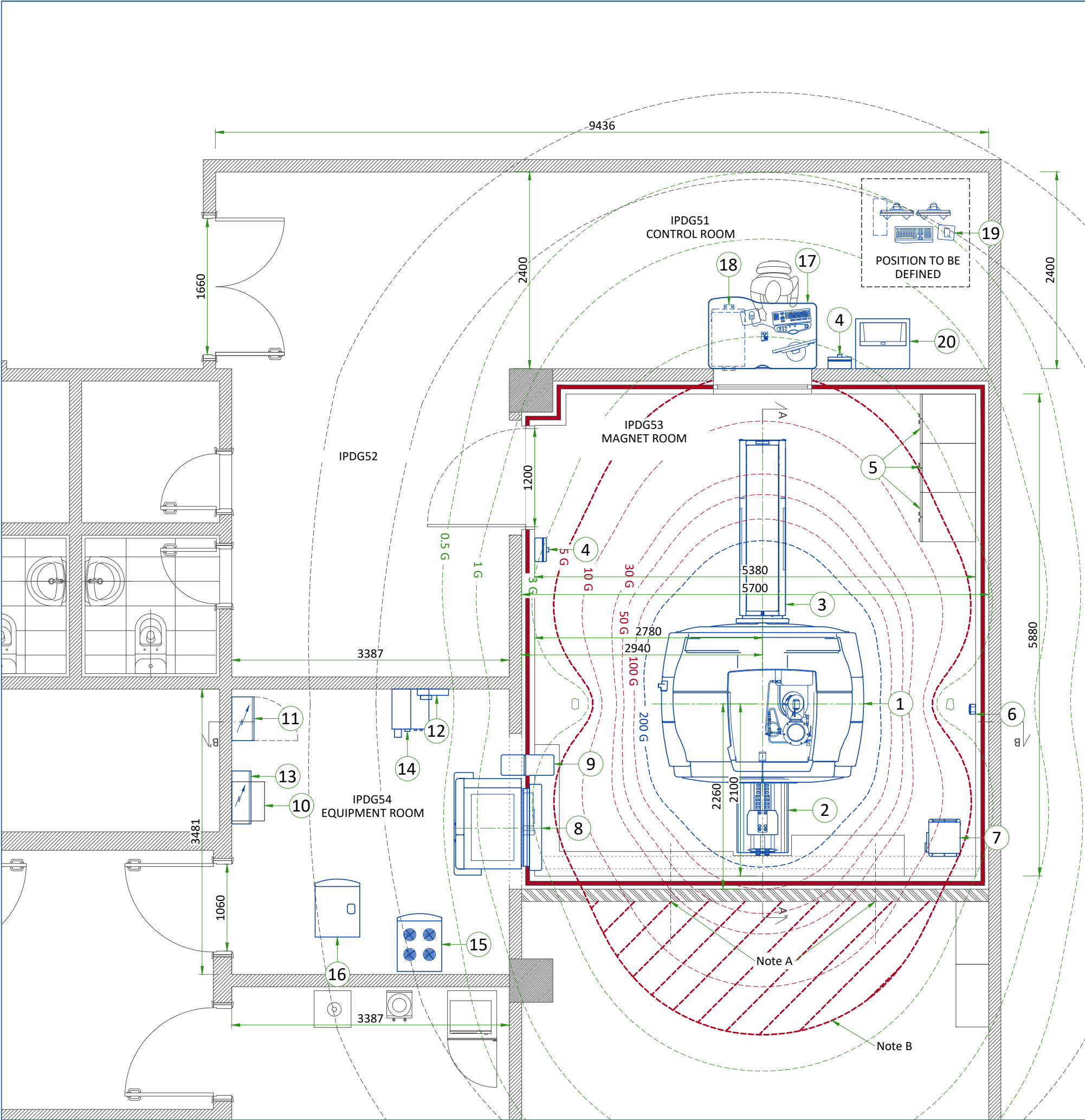


MAGNETIC FRINGE FIELD TOP VIEW



MAGNETIC FRINGE FIELD FRONT VIEW





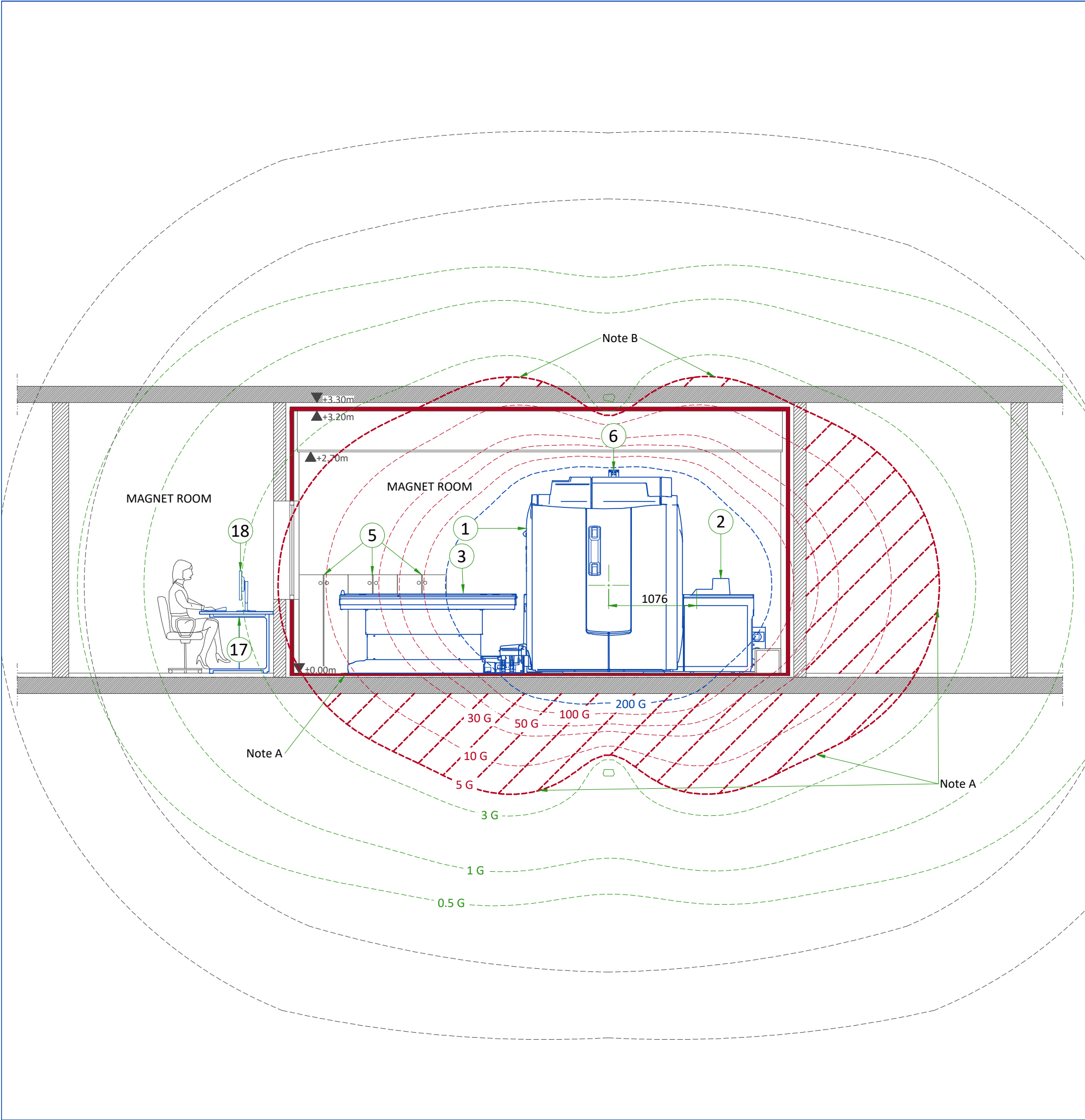
EQUIPMENT LAYOUT TOP VIEW
WITH MAGNETIC FIELD

ITEM	DESCRIPTION	DIMENSIONS LxWxH (mm)	WEIGHT (kg)
1	MAGNET (MAG)	1938x2469x2383	5320
2	REAR PEDESTAL (PED)	853x510x956	132
3	FIXED PATIENT TABLE (PT)	2158x572x965	136
4	MAGNET RUNDOWN UNIT (MRU)	287x206x172	3.2
5	FURNITURE FOR COILS (NOT SUPPLIED BY GE)	650x600x1200	-
6	OXYGEN REMOTE SENSOR (OM2)	121x121x78	0.9
7	BLOWER BOX (MG6)	381x453x558	21
8	SYSTEM CABINET (SC)	969x1250x2200	890
9	PENETRATION PANEL (PP)	250x800x750	-
10	MAIN DISCONNECT PANEL (MDP)	233x645x1130	84
11	POWER DISTRIBUTION BOX (PDB)	500x270x700	42
12	MAGNET MONITOR (MON)	381x260x127	4.5
13	4.6 kVA STEP DOWN TRANSFORMER FOR WC1 (NOT SUPPLIED BY GE)	-	-
14	CRYOCOOLER COMPRESSOR (CRY)	588x450x671	125
15	WATER CHILLER FOR SYSTEM CABINET (WC2)	544x705x811	100
16	WATER CHILLER FOR BRM GRADIENT COIL (WC1)	544x705x811	134
17	OPERATOR WORKSPACE (OW)	1300x875x750	57
18	OPERATOR CONSOLE (GOC)	-	65
19	ADVANTAGE WORKSTATION (AW)	445x169x386	31.7
20	DV5700 LASER IMAGER	660x610x470	54

	WALL - ACCORDING TO RECEIVED DRAWING
	STRUCTURE - ACCORDING TO RECEIVED DRAWING
	WALLS - RECOMMENDED MODIFICATIONS BY GE
	WALL TO DEMOLISH
	RF SHIELD - 100 dB ATTENUATION

EXAM ROOM HEIGHT	
FINISHED FLOOR TO SLAB HEIGHT	3.30 m
FALSE CEILING HEIGHT	2.70 m

- NOTES
- A) Magnet access
 - B) Warning! 5 Gauss line outside the Magnet room limits



EQUIPMENT LAYOUT SIDE VIEW
WITH MAGNETIC FIELD (A-A')






ITEM	DESCRIPTION	DIMENSIONS LxWxH (mm)	WEIGHT (kg)
1	MAGNET (MAG)	1938x2469x2383	5320
2	REAR PEDESTAL (PED)	853x510x956	132
3	FIXED PATIENT TABLE (PT)	2158x572x965	136
4	MAGNET RUNDOWN UNIT (MRU)	287x206x172	3.2
5	FURNITURE FOR COILS (NOT SUPPLIED BY GE)	650x600x1200	-
6	OXYGEN REMOTE SENSOR (OM2)	121x121x78	0.9
7	BLOWER BOX (MG6)	381x453x558	21
8	SYSTEM CABINET (SC)	969x1250x2200	890
9	PENETRATION PANEL (PP)	250x800x750	-
10	MAIN DISCONNECT PANEL (MDP)	233x645x1130	84
11	POWER DISTRIBUTION BOX (PDB)	500x270x700	42
12	MAGNET MONITOR (MON)	381x260x127	4.5
13	4.6 kVA STEP DOWN TRANSFORMER FOR WC1 (NOT SUPPLIED BY GE)	-	-
14	CRYOCOOLER COMPRESSOR (CRY)	588x450x671	125
15	WATER CHILLER FOR SYSTEM CABINET (WC2)	544x705x811	100
16	WATER CHILLER FOR BRM GRADIENT COIL (WC1)	544x705x811	134
17	OPERATOR WORKSPACE (OW)	1300x875x750	57
18	OPERATOR CONSOLE (GOC)	-	65
19	ADVANTAGE WORKSTATION (AW)	445x169x386	31.7
20	DV5700 LASER IMAGER	660x610x470	54

	WALL - ACCORDING TO RECEIVED DRAWING
	STRUCTURE - ACCORDING TO RECEIVED DRAWING
	WALLS - RECOMMENDED MODIFICATIONS BY GE
	WALL TO DEMOLISH
	RF SHIELD - 100 dB ATTENUATION

- NOTES
- A) Define RF shield's inset according to provisions made by the RF Shield vendor.
- B) Warning! 5 Gauss line outside the Magnet room limits.

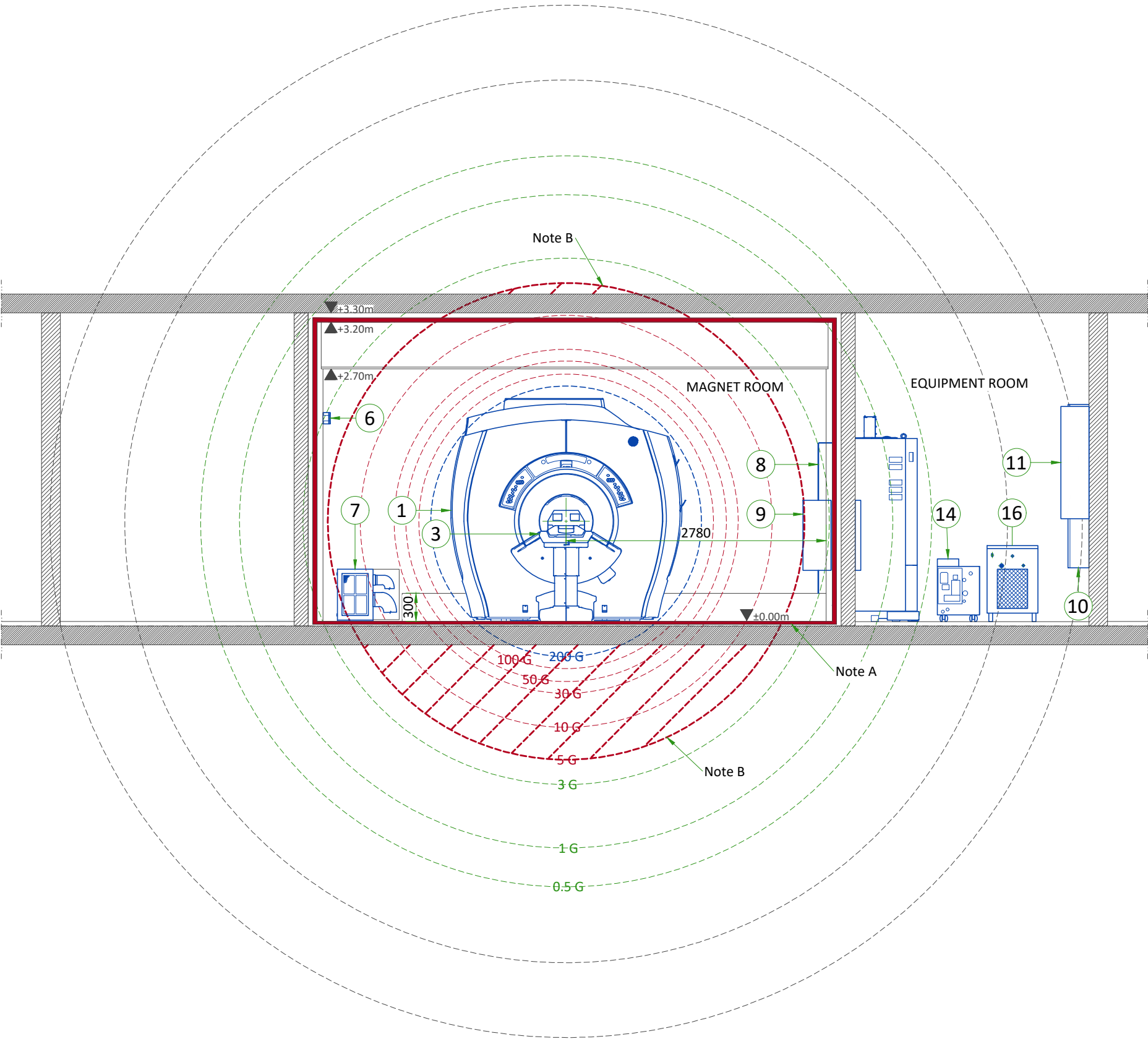
EQUIPMENT LAYOUT FRONT VIEW
WITH MAGNETIC FIELD (B-B')

ITEM	DESCRIPTION	DIMENSIONS LxWxH (mm)	WEIGHT (kg)
1	MAGNET (MAG)	1938x2469x2383	5320
2	REAR PEDESTAL (PED)	853x510x956	132
3	FIXED PATIENT TABLE (PT)	2158x572x965	136
4	MAGNET RUNDOWN UNIT (MRU)	287x206x172	3.2
5	FURNITURE FOR COILS (NOT SUPPLIED BY GE)	650x600x1200	-
6	OXYGEN REMOTE SENSOR (OM2)	121x121x78	0.9
7	BLOWER BOX (MG6)	381x453x558	21
8	SYSTEM CABINET (SC)	969x1250x2200	890
9	PENETRATION PANEL (PP)	250x800x750	-
10	MAIN DISCONNECT PANEL (MDP)	233x645x1130	84
11	POWER DISTRIBUTION BOX (PDB)	500x270x700	42
12	MAGNET MONITOR (MON)	381x260x127	4.5
13	4.6 kVA STEP DOWN TRANSFORMER FOR WC1 (NOT SUPPLIED BY GE)	-	-
14	CRYOCOOLER COMPRESSOR (CRY)	588x450x671	125
15	WATER CHILLER FOR SYSTEM CABINET (WC2)	544x705x811	100
16	WATER CHILLER FOR BRM GRADIENT COIL (WC1)	544x705x811	134
17	OPERATOR WORKSPACE (OW)	1300x875x750	57
18	OPERATOR CONSOLE (GOC)	-	65
19	ADVANTAGE WORKSTATION (AW)	445x169x386	31.7
20	DV5700 LASER IMAGER	660x610x470	54

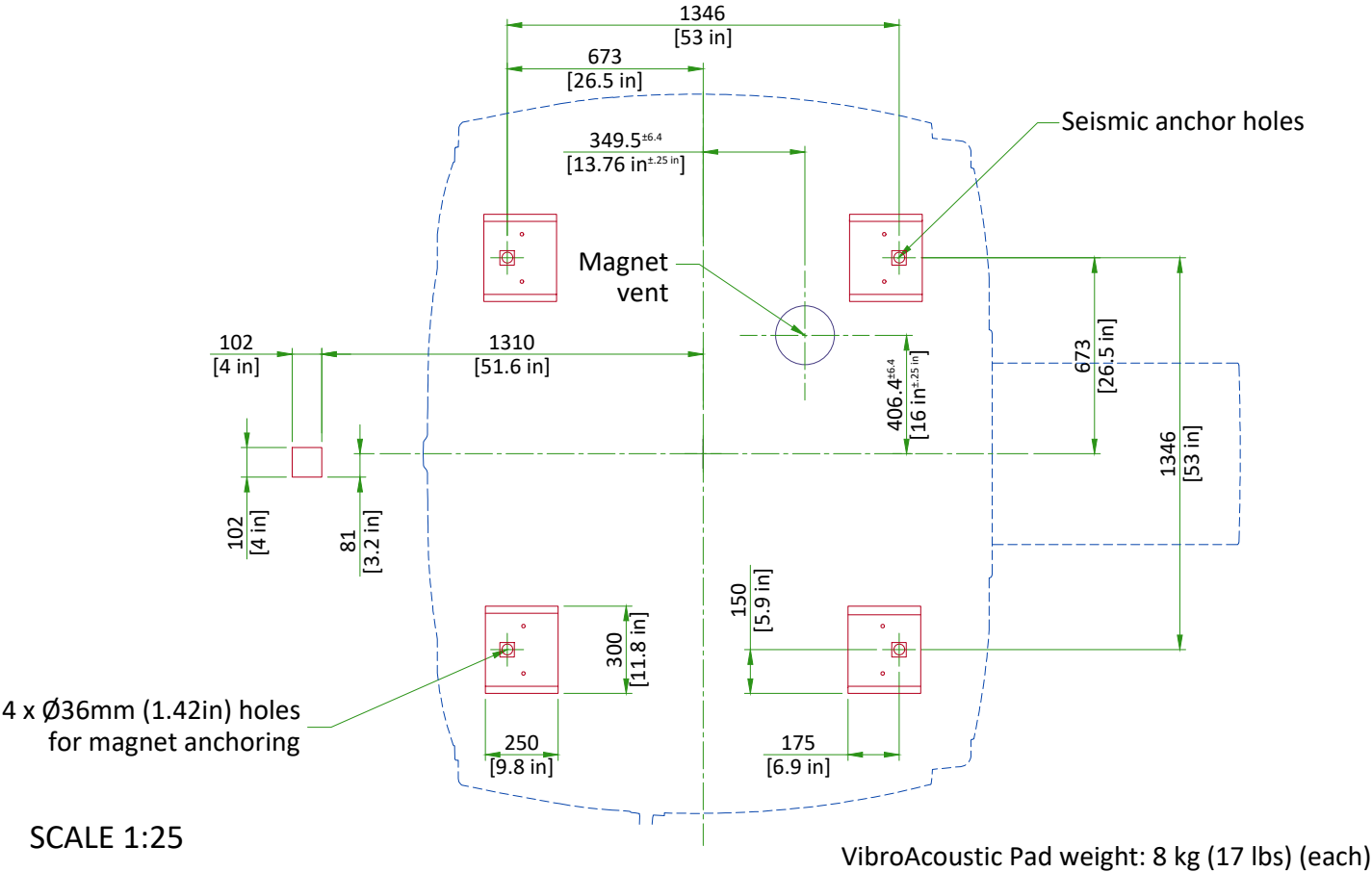
	WALL - ACCORDING TO RECEIVED DRAWING
	STRUCTURE - ACCORDING TO RECEIVED DRAWING
	WALLS - RECOMMENDED MODIFICATIONS BY GE
	WALL TO DEMOLISH
	RF SHIELD - 100 dB ATTENUATION

NOTES

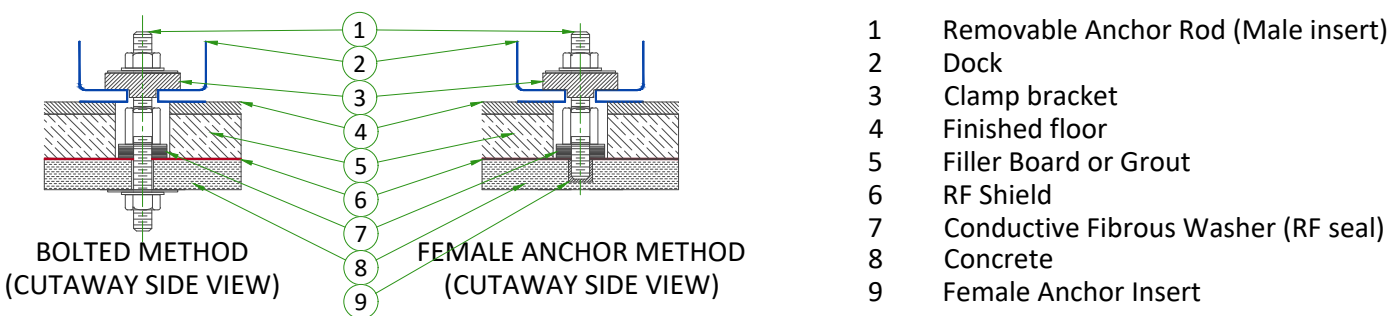
- A) Define RF shield's inset according to provisions made by the RF Shield vendor.
- B) Warning! 5 Gauss line outside the Magnet room limits.



MAGNET ON VIBROACOUSTIC DAMPENING KIT



DOCK ANCHOR MOUNTING REQUIREMENTS

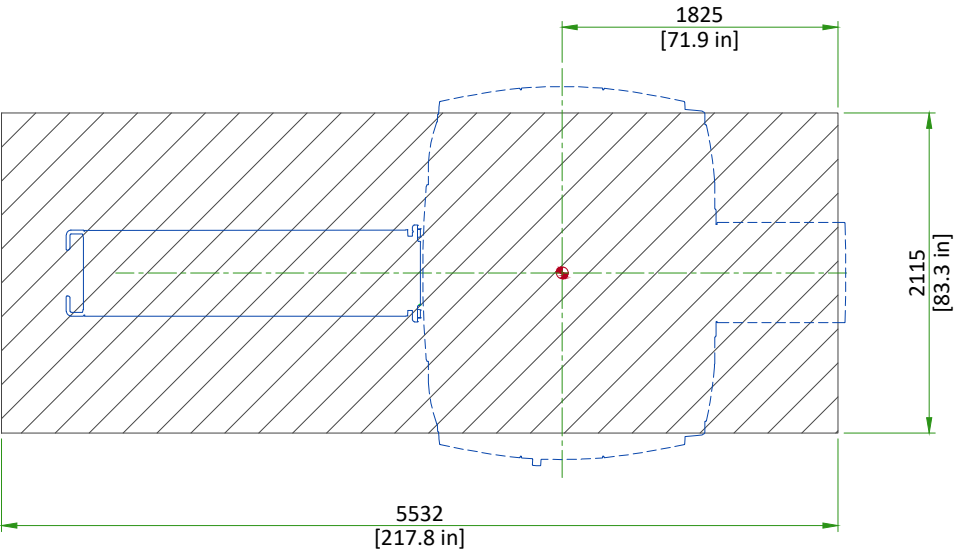


- The RF Shield vendor must design and install the dock anchor bolt
- The dock anchor hole must be drilled after the Magnet is installed
- The dock anchor must not contact floor rebar or other structural steel
- The dock anchor must electrically contact the RF shield at point of entry
- The dock anchors must have the following properties: Anchors must be two-part assembly (male/female), female side expansion- or epoxy-type, male a bolt or threaded rod with appropriate-sized nut (bolt or rod must be removable-not epoxied or cemented in place), anchors electrically conductive, anchors non-magnetic, anchors must not induce galvanic corrosion with the RF Shield, anchors commercially procured. The anchor rod hole clearance in the dock anchor base is 11mm [0.43 in], extend 60 mm ± 13 mm [2.25 in ± 0.5 in] above the finished floor, the diameter must be sized appropriately. Anchors must meet the following clamping force: 2669 N. [600 lbs]
- The RF shield vendor must perform a pull test on the anchor (equal to the clamping force).

NOT TO SCALE

MAGNET ROOM FLOOR SPECIFICATIONS

Magnet, Enclosure, and Patient Table areas must be flat and level within **3 mm (0.125 in)** within the shaded 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.

SCALE 1:50

POWER REQUIREMENTS

SPECIFICATIONS OF MAIN POWER INPUT

Power Supply (3 Phases+G)	INPUT VOLTAGE (V) ±10%					
	Frequency 50Hz/60Hz					
	480	415	400	380	208	200
Total Current	47.6	55.1	57.2	60.2	114	117.7
Maximum input power (5 sec max)	43.75 kVA					
Stand-by power	13.4 kVA at 0.9 lagging Power Factor including 4.4 KVA for PDU and 9KVA (continuous operation) for Shield/Cryo Cooler Cabinet. Critical Power Requirements is different per each configuration.					

- 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 MAGNET MONITOR POWER

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

CABLES

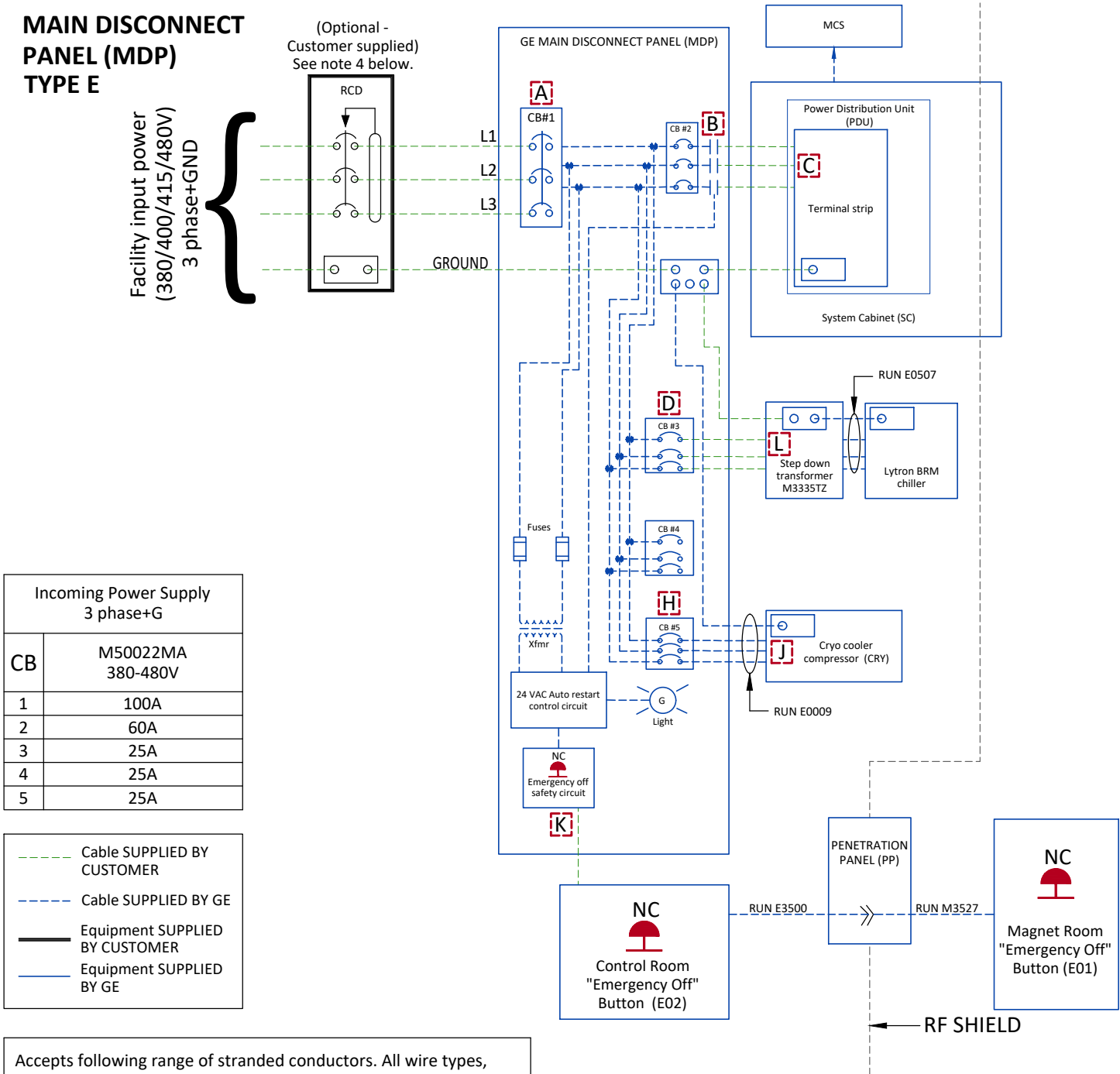
- Power and cable installation must comply with the distribution diagram.
- Size of the Main power input cable is determined by the customer, taking its length and admissible voltage drops into consideration.
- All cables must be isolated and flexible, cable color codes must comply with standards for electrical installation.
- The cables from signaling and remote control (Y, Emergency Off Buttons, L...) will go to the Distribution Panel/Box 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 Distribution Panel/Box 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

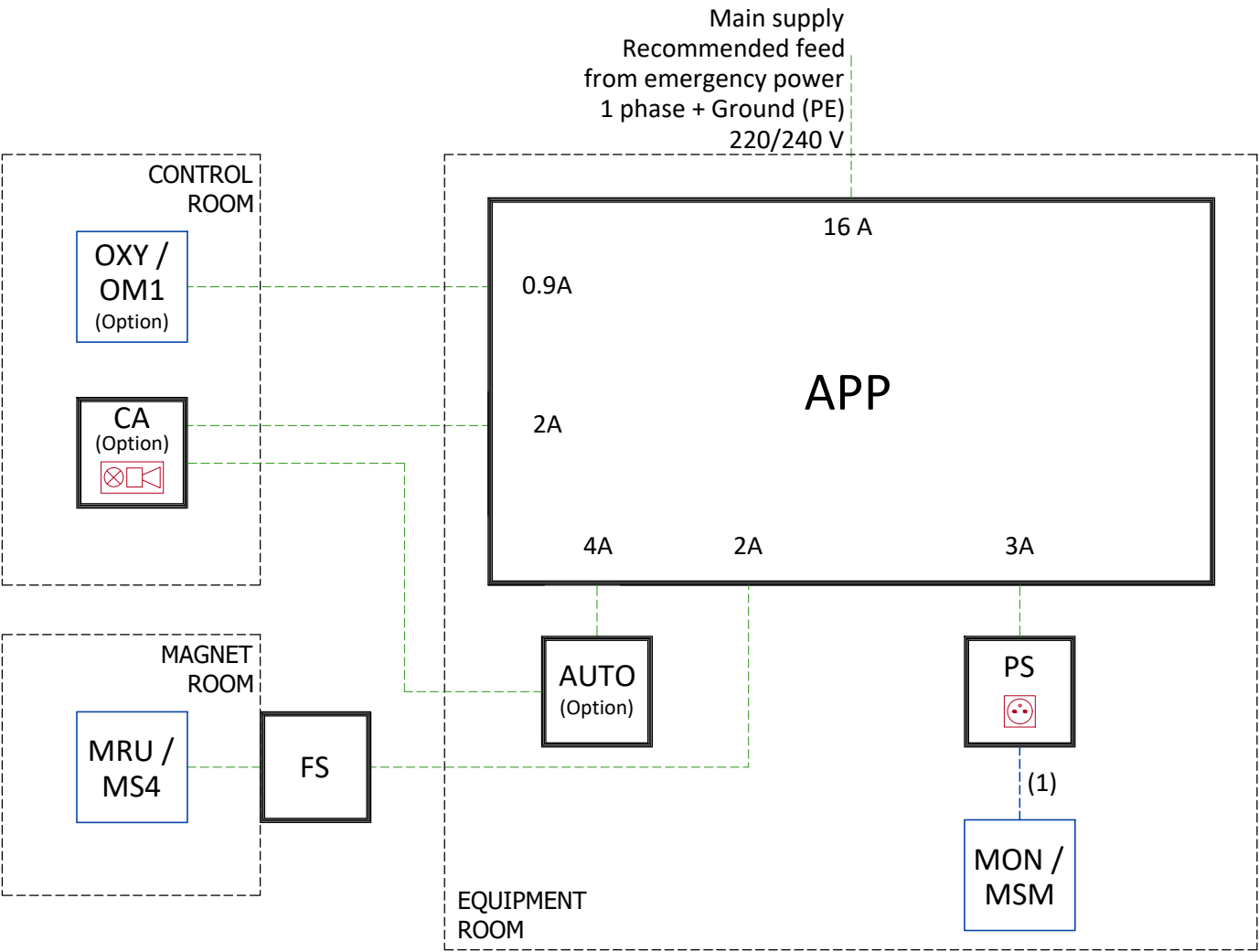
POWER DISTRIBUTION

MAIN DISCONNECT PANEL (MDP) TYPE E



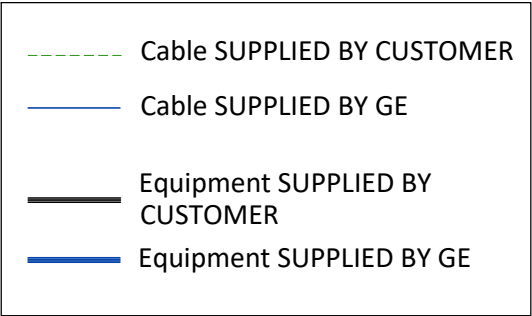
- NOTES:
- Two remote emergency "off" buttons are supplied with GE MDP(PDB) option, emergency off buttons are customer supplied if GE MDP(PDB) option not used.
 - If 3 phase wye with neutral and ground (5 wire system) input is used then neutral must be terminated inside the main disconnect panel and not brought to the power cabinet.
 - In some MDP configurations, output contactors may not be present. Confirm the details of the termination points with MDP manual delivered with MDP.
 - Circuit breaker must comply with local regulations and codes. Part is also available from GE via catalog numbers E4600RG/LG.

OPTIONAL AUXILIARY POWER PANEL (SECONDARY GRID)



- APP Auxiliary Power Panel, provided by customer if needed per regional requirements.
- AUTO Automated city water backup system for Cryocooler Compressor (Option)
- CA Cable prepared at 1.20 m [4 ft] from floor
Central alarm placed at 1.50 m [5 ft] from floor
Visual and audible alarm:
1 - Cryocooler compressor water inlet error (Operating with city water)
- FS Low-pass filter (Supplied and installed by cage manufacturer)
Installed on penetration panel cabinet door of the Faraday cage
- MON/MSM Magnet Monitor
100-240 VAC, Max. 3A
- MRU/MS4 Magnet Rundown Unit
100-240 VAC, Max 1A
Cable prepared at 1.50 m [5 ft] from floor
- OXY/OM1 Oxygen Monitor (Option)
100-240 VAC, Max 0.9A
Cable prepared at 1.50 m [5 ft] from floor
- PS Power socket

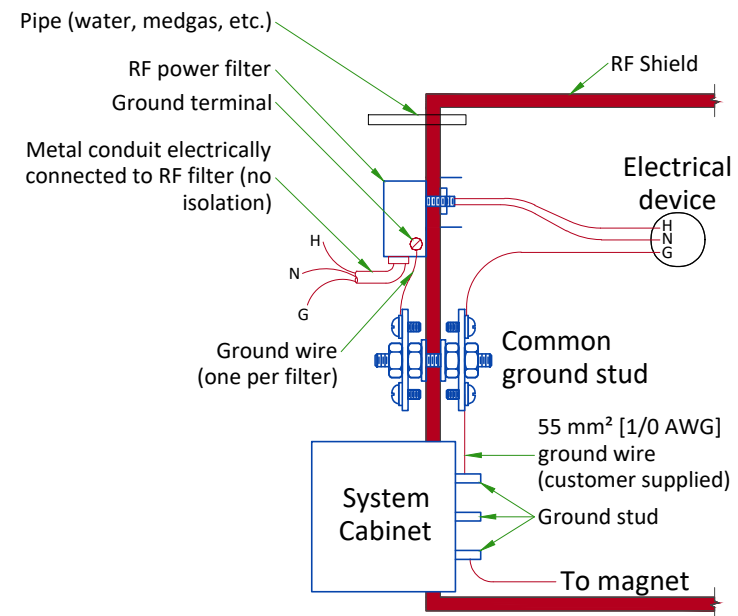
Notes :
(1) Cable delivered with magnet control cabinet installed by GE



TYPICAL MAGNET ROOM GROUNDING

GROUNDING REQUIREMENTS

- All power lines into the RF shielded room require an RF filter.
 - All electrical devices (for example, 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.
 - If needed, electrical devices can be grounded at the System Cabinet rear panel.
 - The common ground stud must be installed near the penetration point(s) of the GE equipment, into the RF shield between the Equipment Room and Magnet Room.
 - For additional information refer to RF Shielded Room manual 5850260-1EN
-
- The diagram illustrates the grounding system for an RF shielded room. A red vertical line represents the RF Shield. A metal conduit runs vertically through it. A pipe (water, medgas, etc.) enters from the top. An RF power filter is installed on the conduit, with a ground terminal and metal conduit electrically connected to the RF filter (no isolation). A ground wire (one per filter) connects the ground terminal to a common ground stud on the RF Shield. An electrical device with H, N, and G terminals is connected to the filter and the common ground stud. A system cabinet is connected to the common ground stud via a 55 mm² [1/0 AWG] ground wire (customer supplied). The cabinet also has a ground stud and a connection to the magnet.



TEMPERATURE AND HUMIDITY SPECIFICATIONS

IN-USE CONDITIONS

AREA	Temperature		Humidity		Maximum Room Gradient	
	Range		Change /Hr		Range %	Change %
	°C	°F	°C	°F		
EQUIPMENT ROOM at Inlet	15-28 *	59-82.4 *	3	5	30-75 *	5
MAGNET ROOM	15-21	59-69.8	3	5	30-60 *	5
CONTROL ROOM	15-32	59-89.6	3	5	30-75 *	5
	MAGNET ROOM		CONTROL ROOM		EQUIPMENT ROOM	
SYSTEM HEAT DISSIPATION (base system only)	W	BTU	W	BTU	W	BTU
	3400	11604	1450	4947	15887	54184

NOTE
* Non-condensing humidity with 50% nominal at 18.3°C [65°F]
** Room temperature gradient specification applies from floor to height of top discharge of equipment cabinets.
Maximum ambient temperature is de-rated by 1°C [33.8°F] per 300 m [984 ft] above 800 m [2624.6 ft].
The altitude is from 30.5 m [100 ft] below sea level to 2438 m [7992 ft] above sea level.

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.

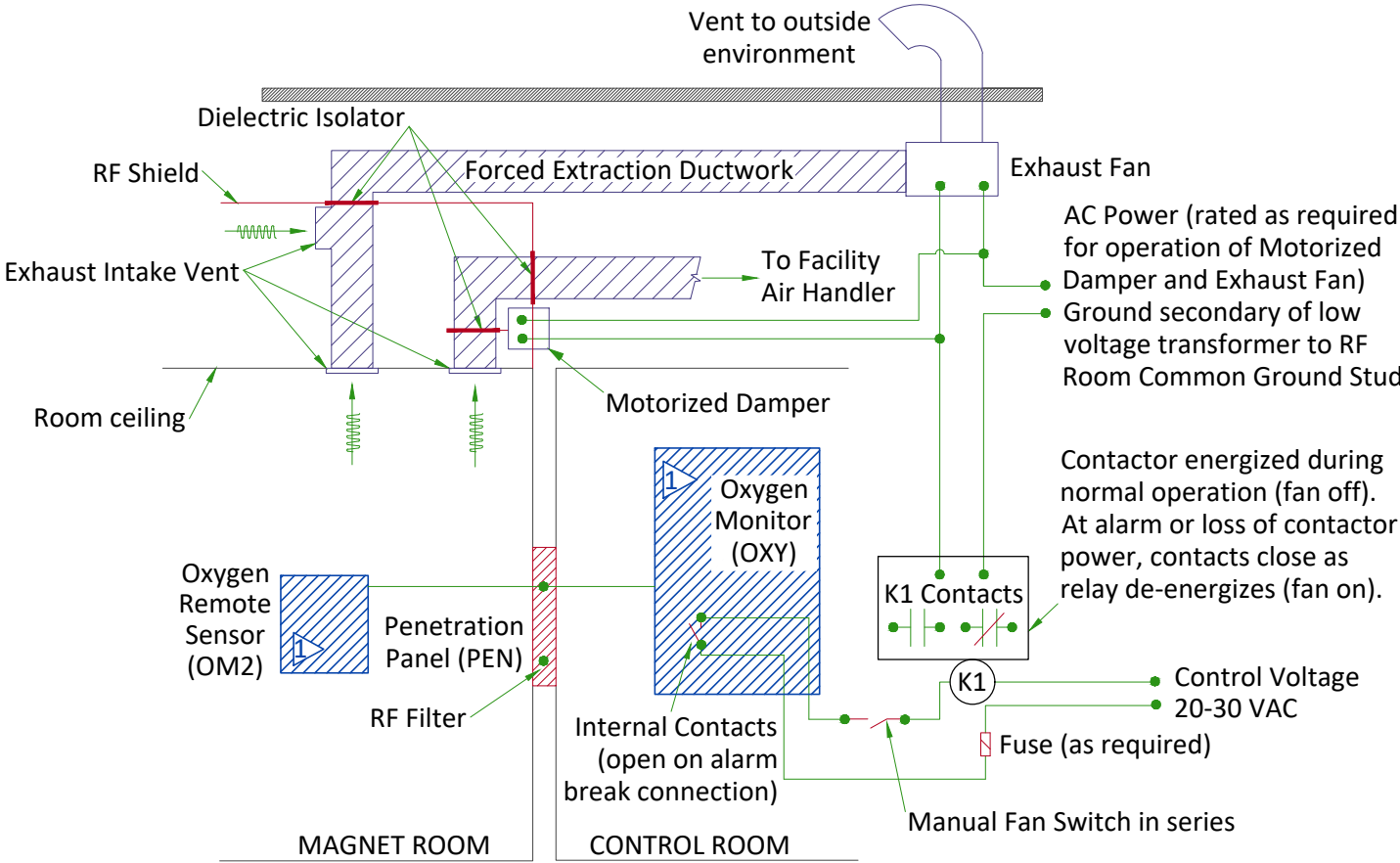
EMERGENCY VENT REQUIREMENT

- 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

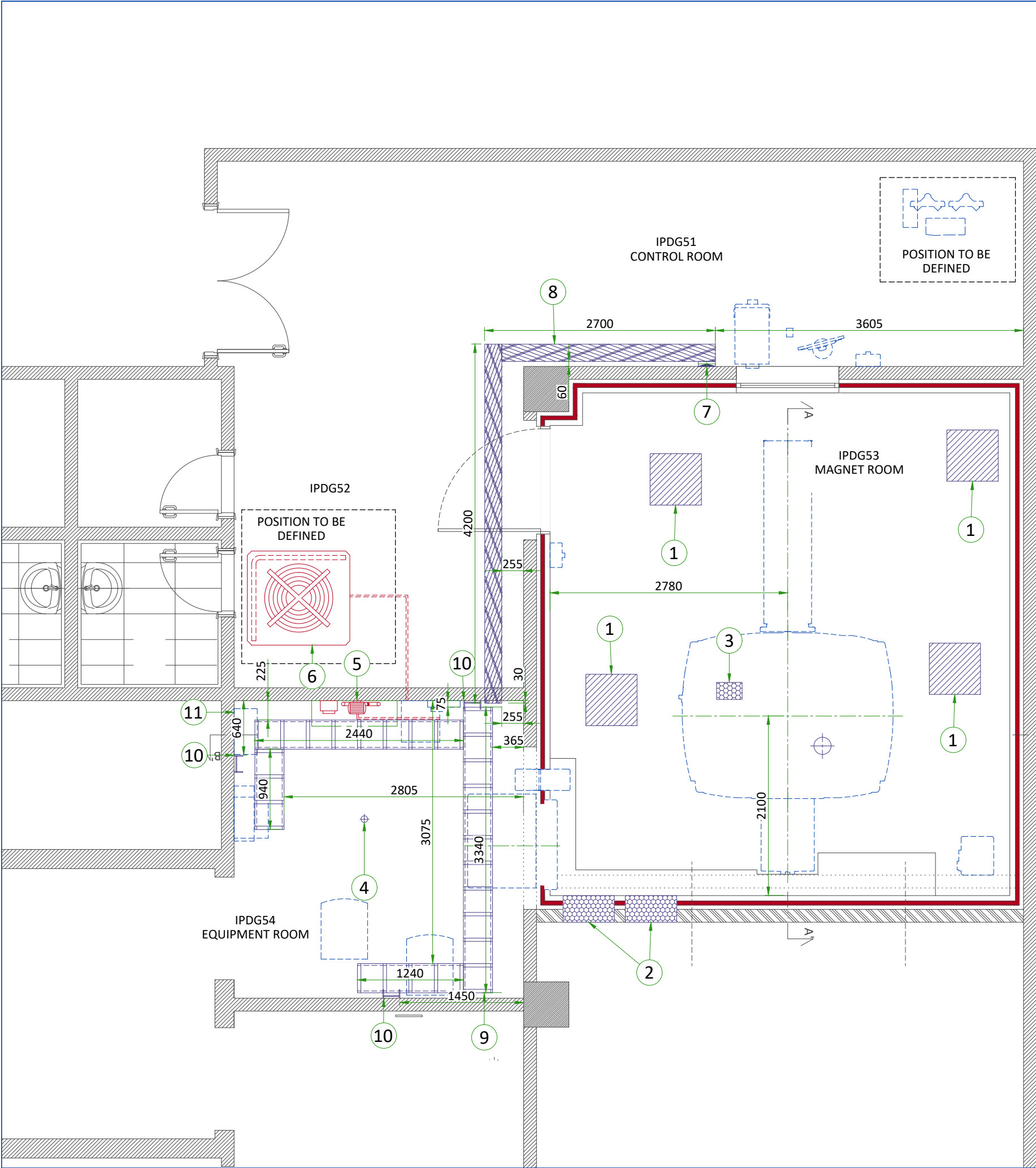
HEAT DISSIPATION DETAILS

DESCRIPTION	ROOM	MAX W	MAX BTU
Magnet (MAG) and Patient Table (PT)	Magnet Room	2400	8189
Blower Box (MG6)	Magnet Room	1000	3415
Magnet Monitor (MON)	Control/Equipment Room	60	205
System Cabinet (SC)	Control/Equipment Room	5000	17000
Operator Workspace with LCD Color Display (GOC)	Control/Equipment Room	1450	4947
Shield/Cryo Cooler Compressor - Water Cooled (CRY)	Equipment Room	500	1706
Step Down Transformer (SDT)	Equipment Room	223	760
Water Chiller for BRM (Lytron Chiller) (WC1)	Equipment Room	4100	14000
Water Chiller for SC (MCS) (WC2)	Equipment Room	5740	19613
Options			
GE pre-engineered Main Disconnect Panel (MDP)	Control/Equipment Room	264	900
Magnetic Resonance Elastography (MRE)	Equipment Room	200	682
Smart Subscription Server ML350G10	Control/Hospital Data Center	1798	6134
SG-CE Series 60/80 kVA Full UPS (E45961DY/DL/DX/DG)	Equipment Room	4520	15422
GEDE 100 kVA Full UPS (E4502FB)	Equipment Room	3060	10439
TLE Series 80 KW Full UPS (E4502DA)	Equipment Room	4500	15355
PowerWave 33 S3 60kVA Full UPS (E45971DG/EG/RG)	Equipment	3.16	10776
PowerWave 33 S3 80kVA Full UPS (E45971DL/EL/RL)	Equipment	4.21	14369

EMERGENCY EXHAUST VENT



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

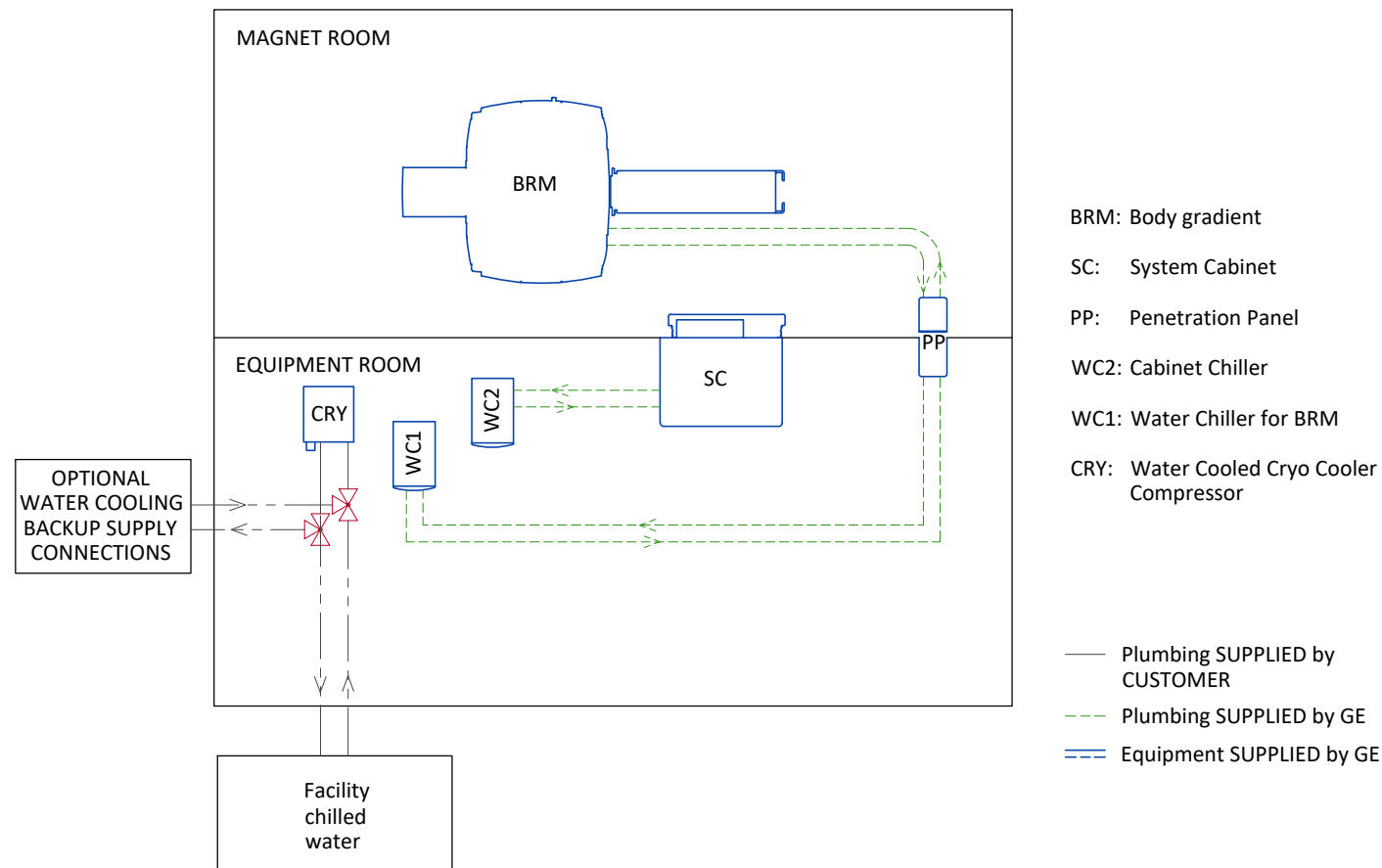


HVAC - CHILLED WATER - CEILING LAYOUT

REP	DESIGNATION
1	Air diffusers (number and position to be defined)
2	AC in/out waveguide (number and position to be defined)
3	Emergency air exhaust waveguide (position to be defined, highest point in the room)
4	Floor drain
5	Water backup
6	Indoor/outdoor chiller
7	200x60 opening on false ceiling and vertical duct from false ceiling to horizontal duct
8	200x60 cable tray above false ceiling
9	Horizontal cable ladder 300
10	Vertical cable ladder 200
11	Power Distribution Box (PDB)

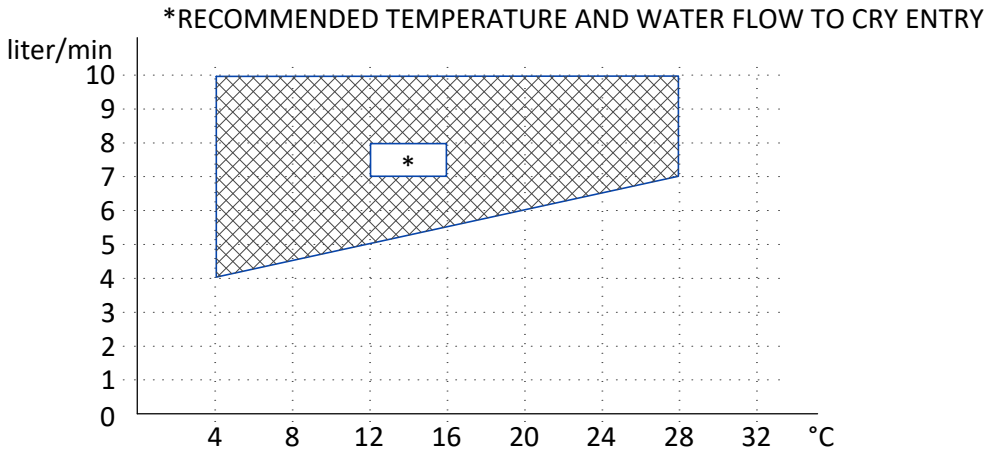
	Opening in the false ceiling
	Opening in the RF cage
	Ceiling duct

WATER COOLING



CITY WATER BACKUP SPECIFICATIONS FOR COMPRESSOR

INLET WATER FLOW/TEMPERATURE FOR CRYOCOOLER COMPRESSOR

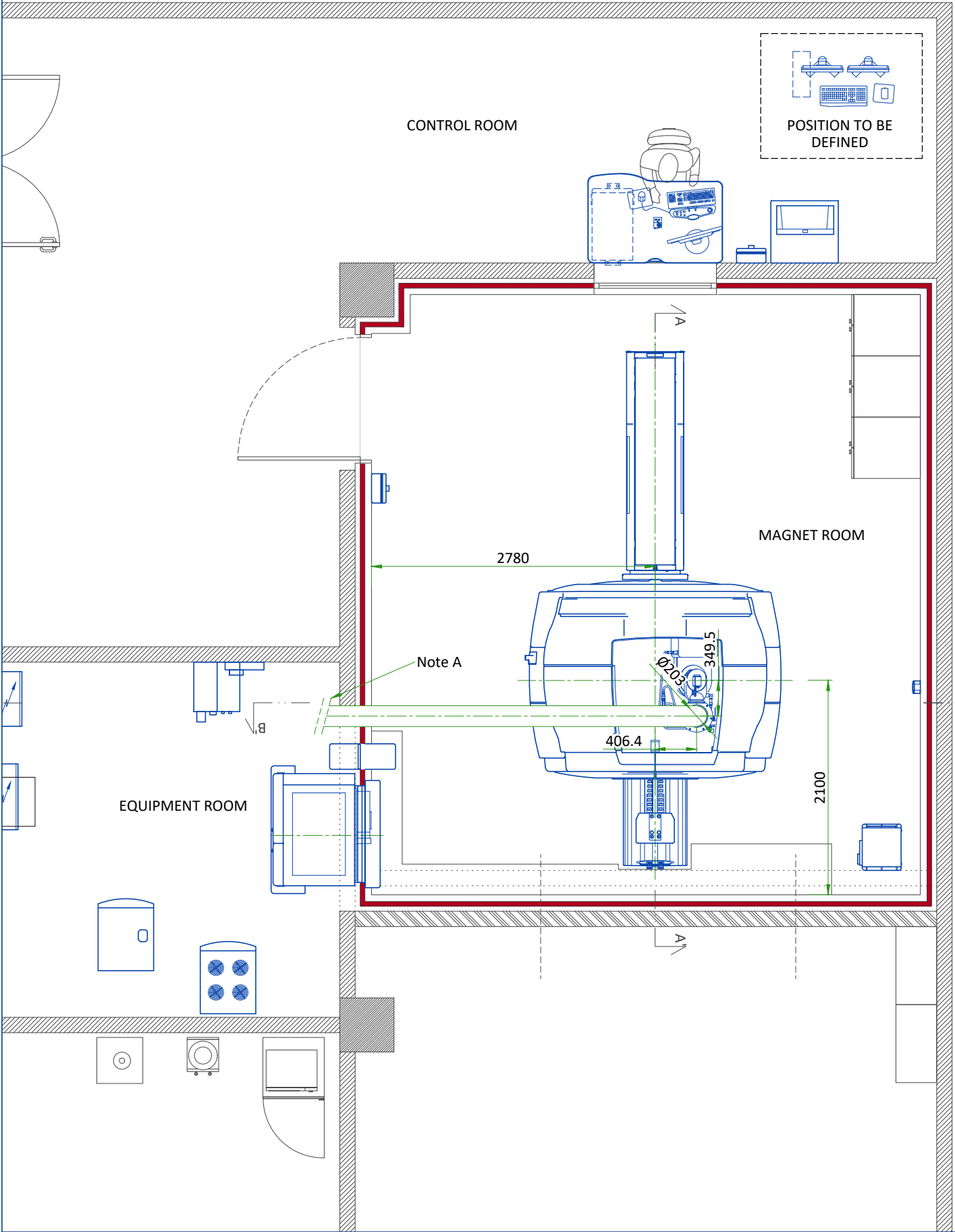


	MIN	MAX	IDEAL
INLET TEMP (°C)	4	28	12-16
INLET FLOW (l/min)	4	10	7-8
INLET PRESSURE (kPa)	200	690	
TEMP RISE	26°C at 4 l/min flow		10°C at 10 l/min flow
HEAT DISSIPATION (kW)	7.2 kW		
PRESSURE DROP	60 kPa at 8 l/min flow		

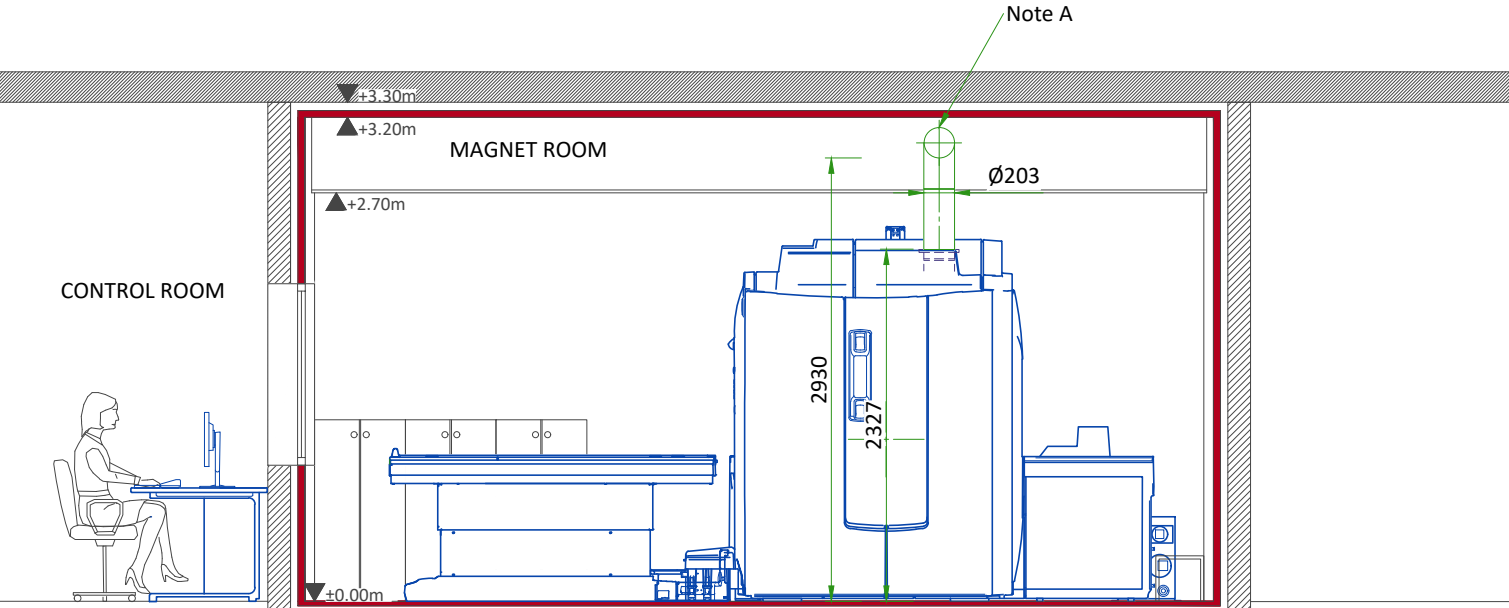
CHILLED WATER SPECIFICATIONS

PARAMETER		REQUIREMENTS
Inlet temperature		from 4 to 28 °C [39.2 to 82.4°F] measured at the inlet
Inlet Pressure Range		from 200 to 690 kPa [29 to 100 psi]
Flow Rate		4 to 10 l/min [1.1 to 2.6 gpm]
Heat output	Steady state	Less than 6.5 kW [22180 btu] for 50Hz Less than 7.5 kW [25590 btu] for 60Hz
	Maximum	Less than 7.2 kW [24570 btu] for 50Hz Less than 8.3kW [28320 btu] for 60Hz
Pressure Drop		from 25 kPa to 85 kPa [3.55 to 12.1 psi]
Condensation protection		Condensation must be managed to prevent equipment damage or safety hazards
Water quality		Refer to pre-installation manual for detailed specifications

CRYOGENICS TOP VIEW



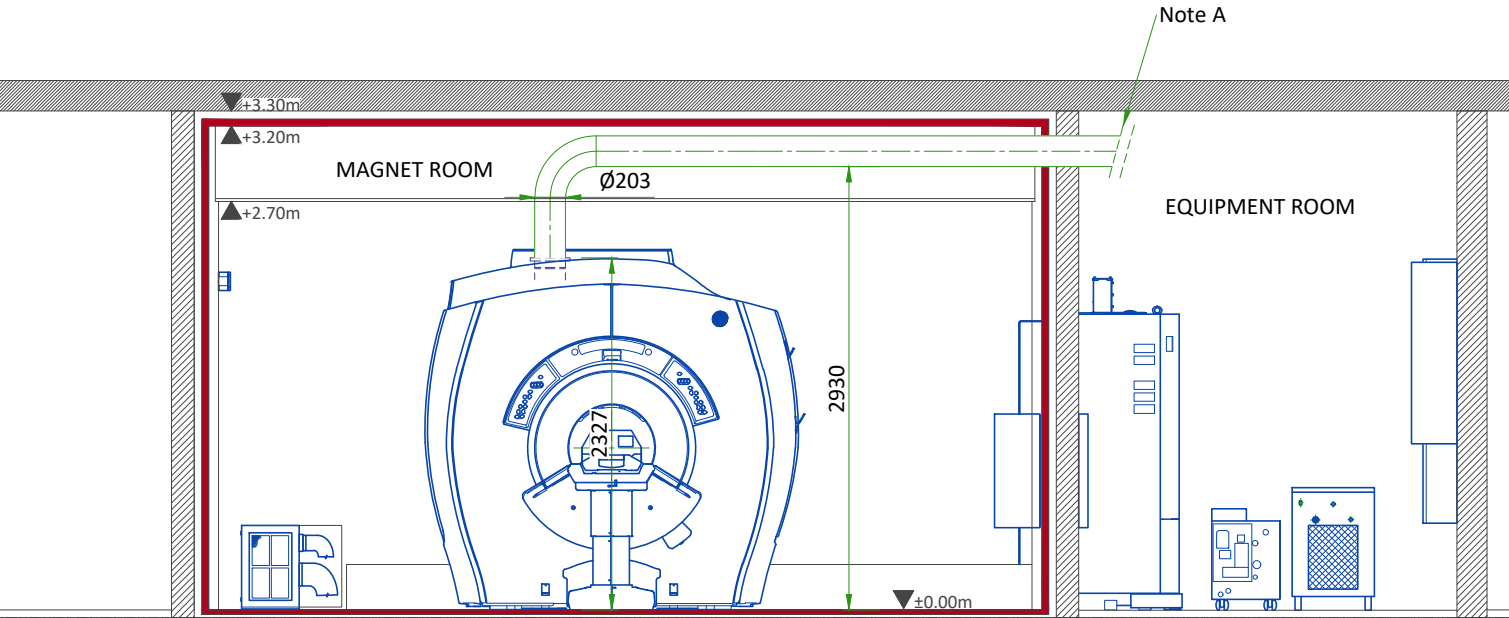
CRYOGENICS SIDE VIEW (A-A')



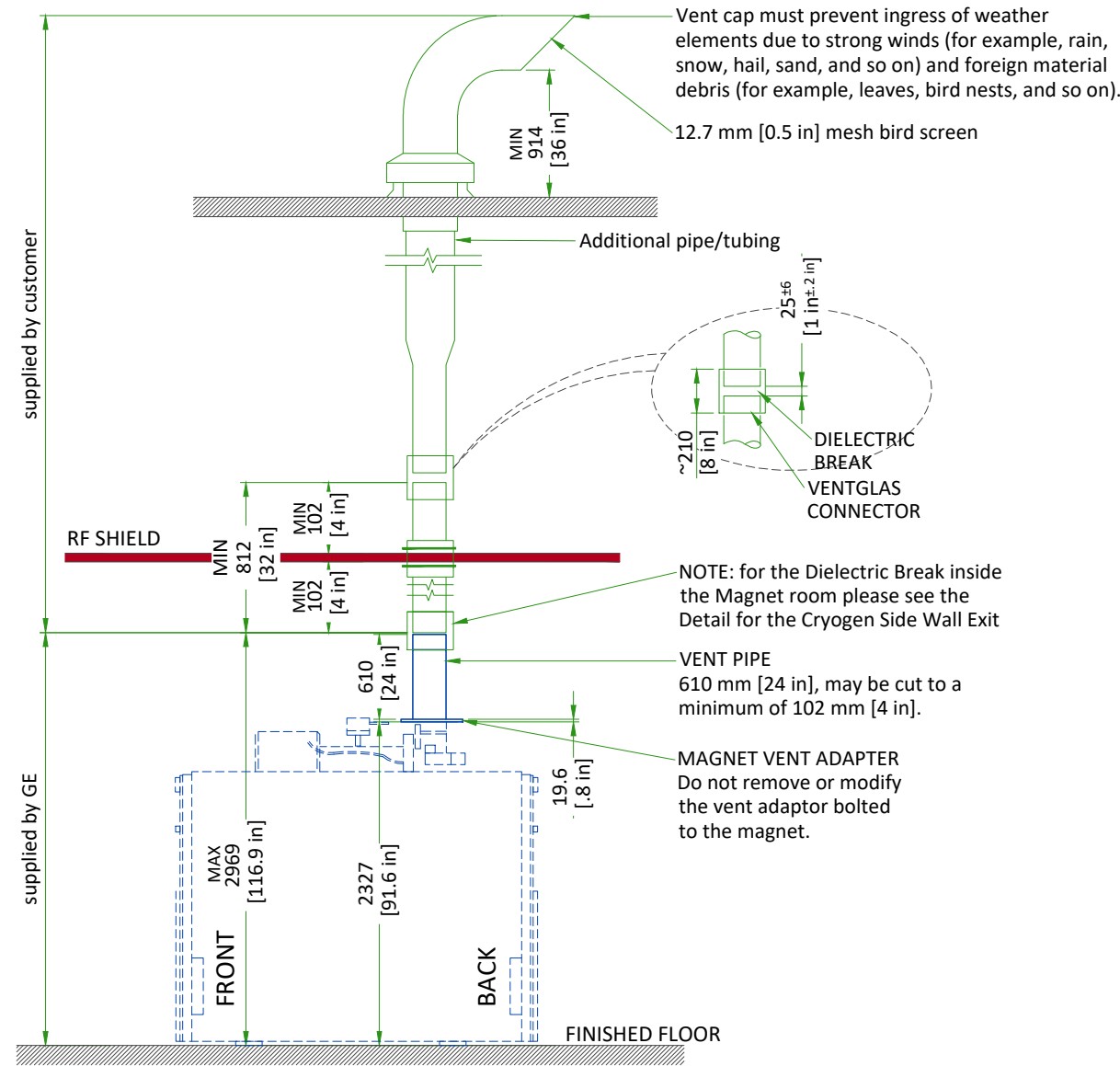
NOTES

- A) He exhaust pipe path and position to be defined

CRYOGENICS FRONT VIEW (B-B')



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 2969 mm [117 in] above finished floor.

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

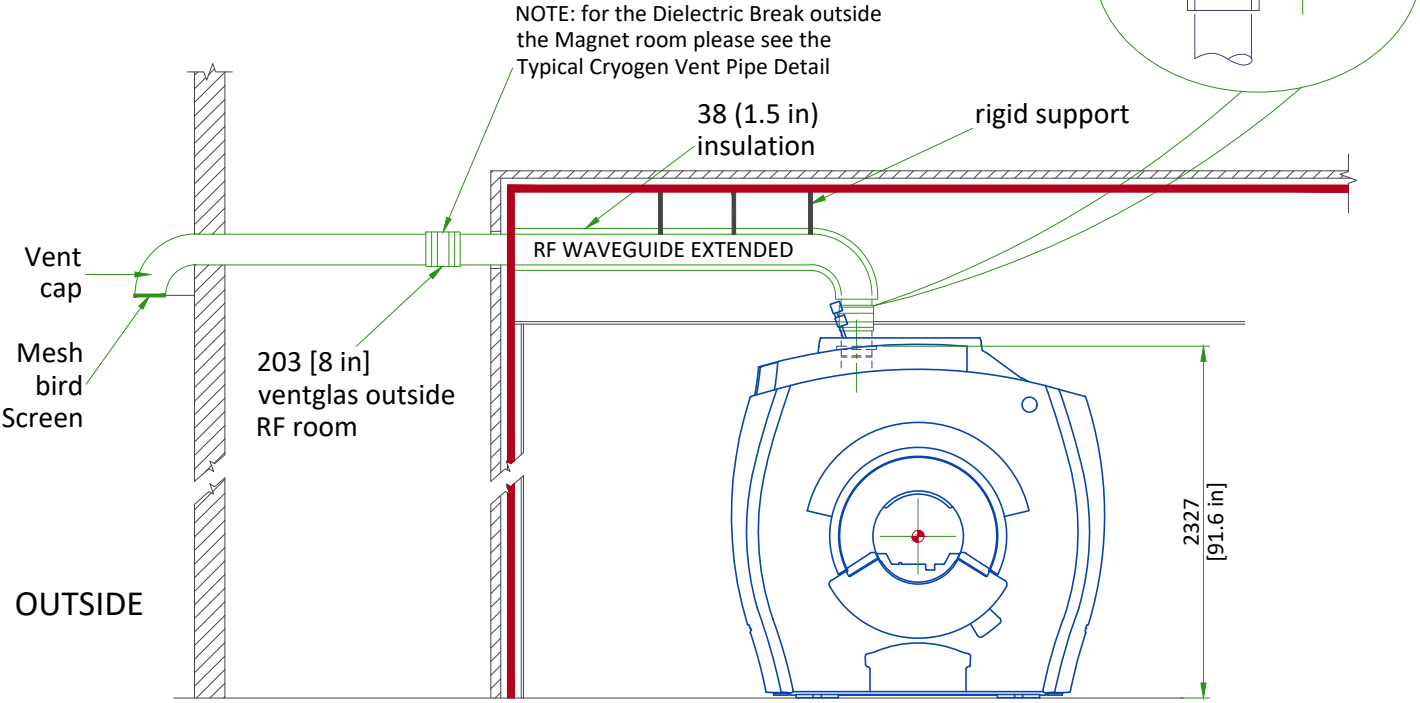
All welds on the pipe must be ground down to a smooth 203 mm [8 in] diameter so that it can be clamped to the Ventglas with enough force.

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

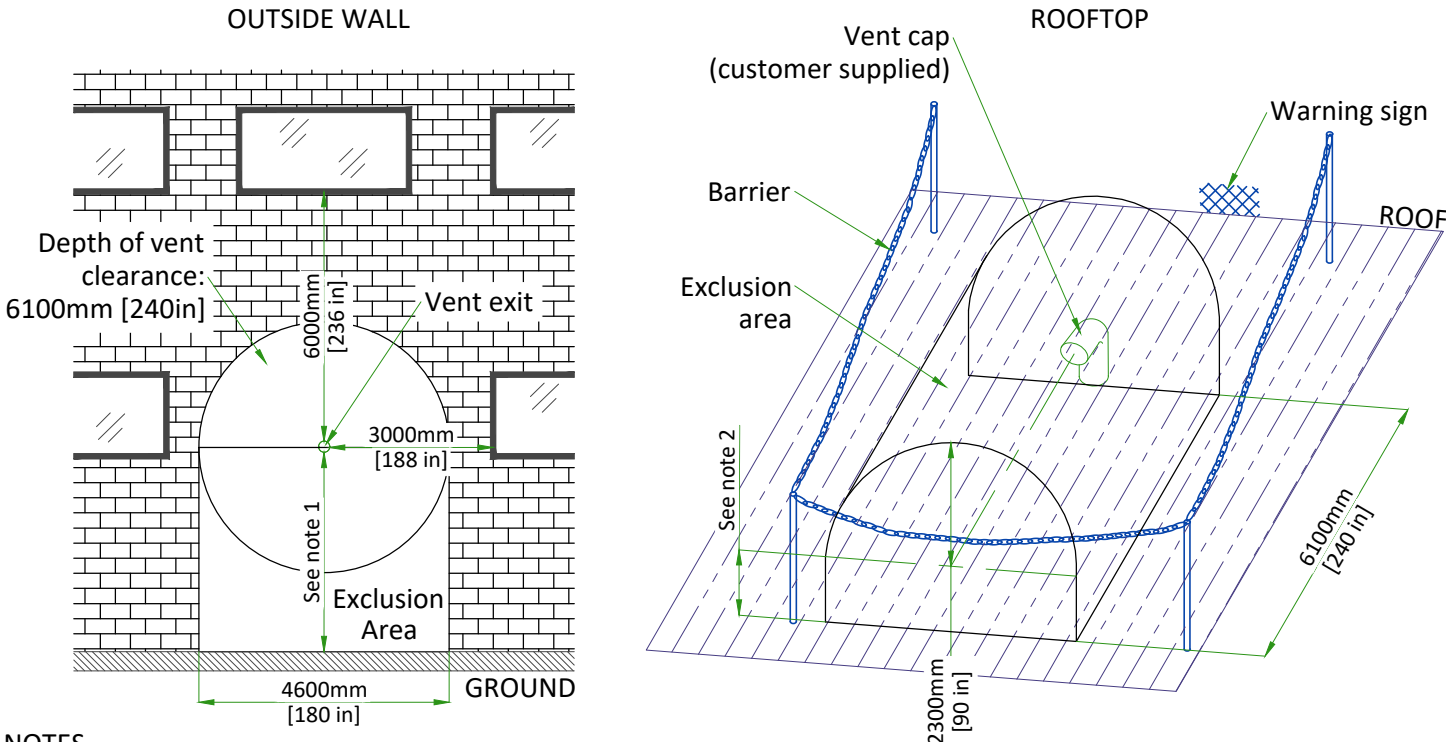
TYPICAL CRYOGEN SIDE WALL EXIT WITH LONG SWEEP ELBOW

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 ventglass must be installed in vertical section directly over magnet
- Vent cap must prevent ingress of weather elements due to strong winds (for example, rain, snow, hail, sand, and so on) and foreign material debris (for example, leaves, bird nests, and so on).



CRYOGENIC VENTING (EXTERIOR)

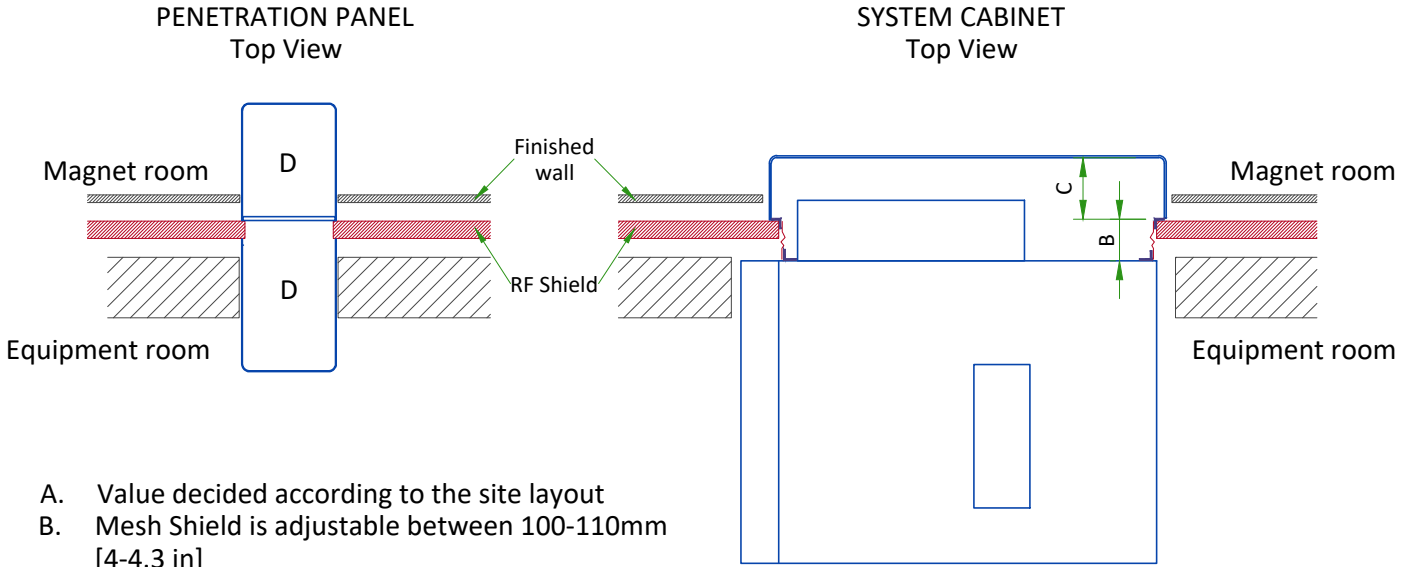
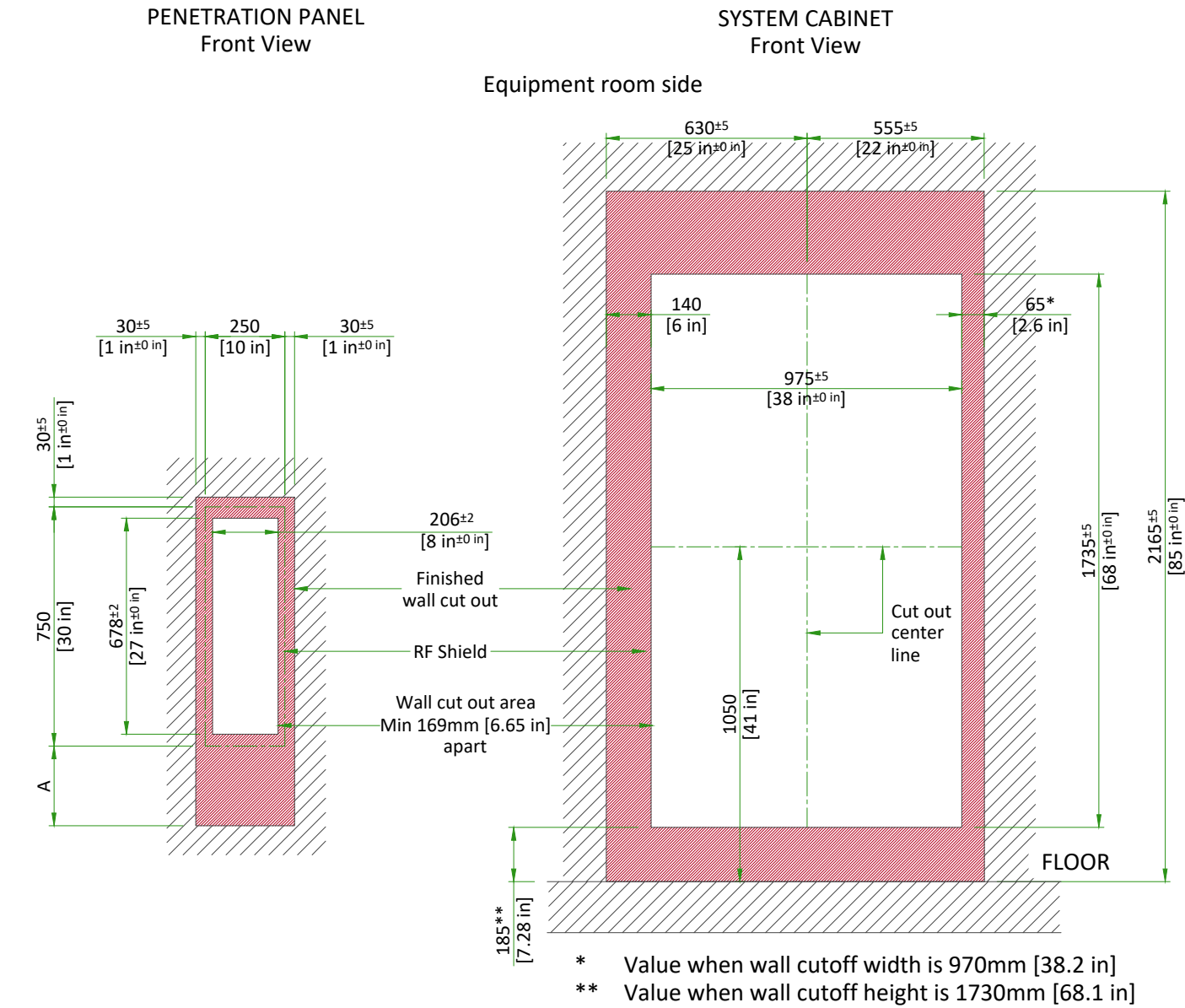


NOTES

- (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.)

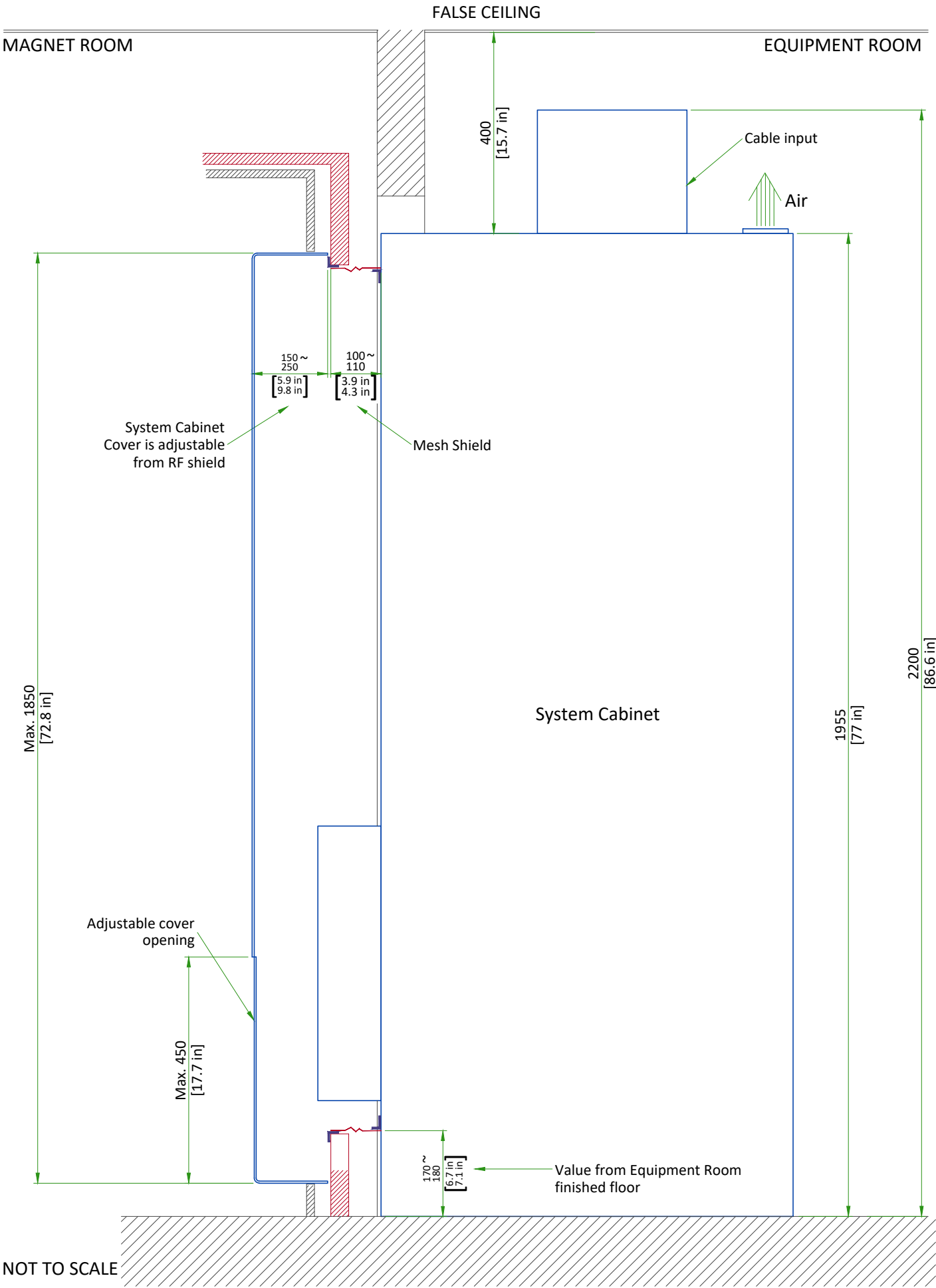
NOT TO SCALE

WALL OPENINGS



- A. Value decided according to the site layout
- B. Mesh Shield is adjustable between 100-110mm [4-4.3 in]
- C. System Cabinet cover is adjustable between 100-200mm [4-8 in]
- D. PP cover is adjustable between 300-400mm [11.8-15.7 in]

RF CAGE OPENING SIDE VIEW



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.

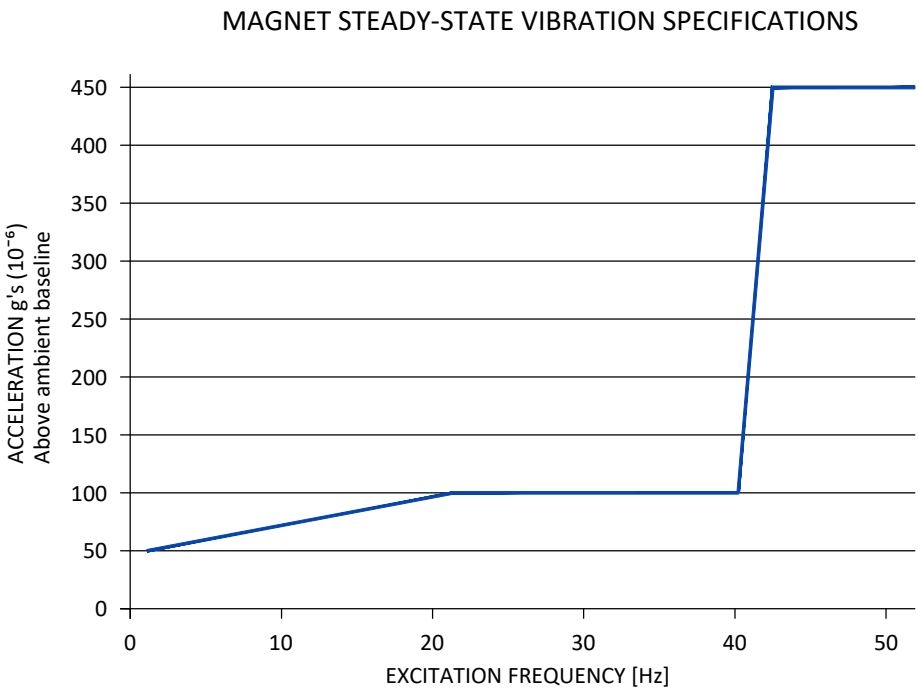
The actual room noise level may vary based on room design, optional equipment, and usage:

	Average sound pressure level	Frequency
Control room	80dBA	20 Hz to 20kHz
Equipment room	80dBA	20 Hz to 20kHz
Magnet room	127 dBA	20 Hz to 20kHz

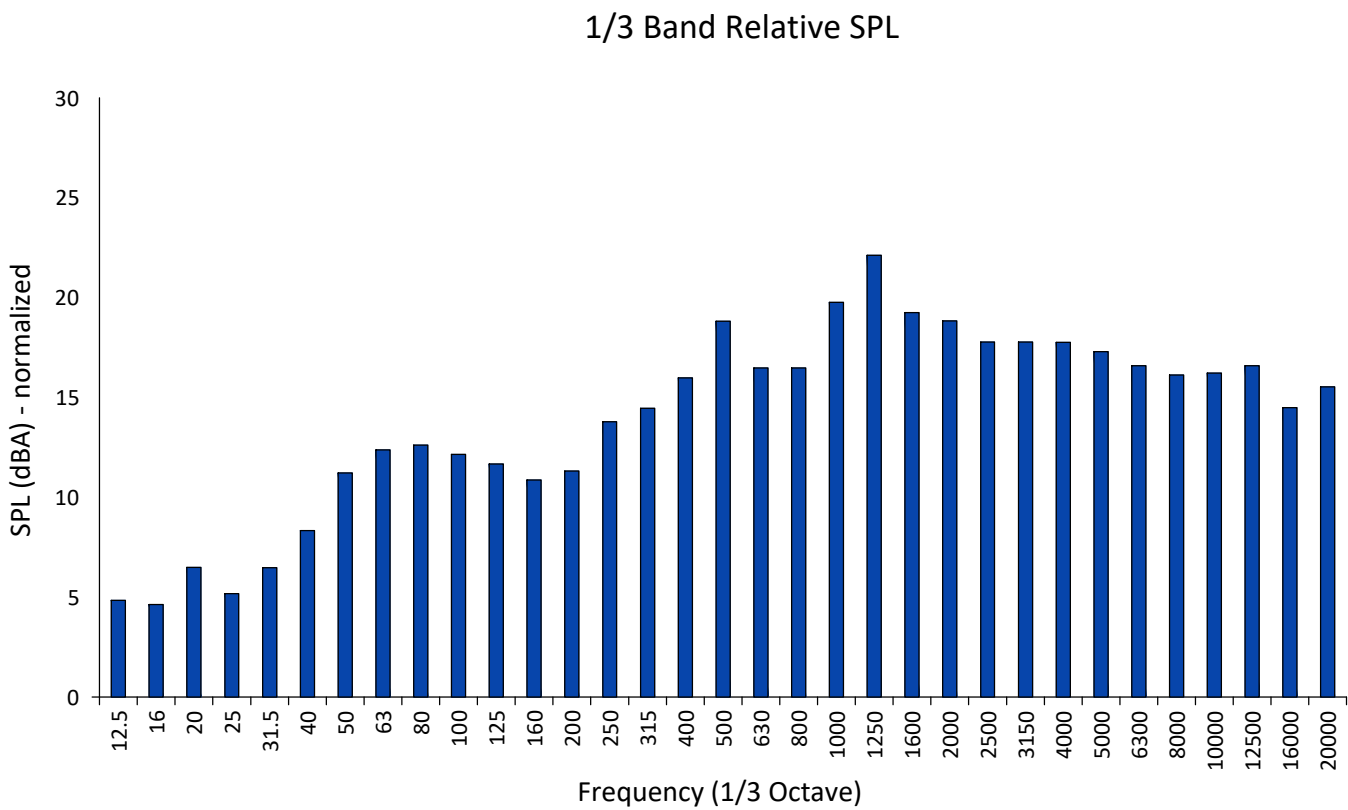
VIBRATION SPECIFICATIONS

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.



SOUND PRESSURE SPECTRAL DISTRIBUTION



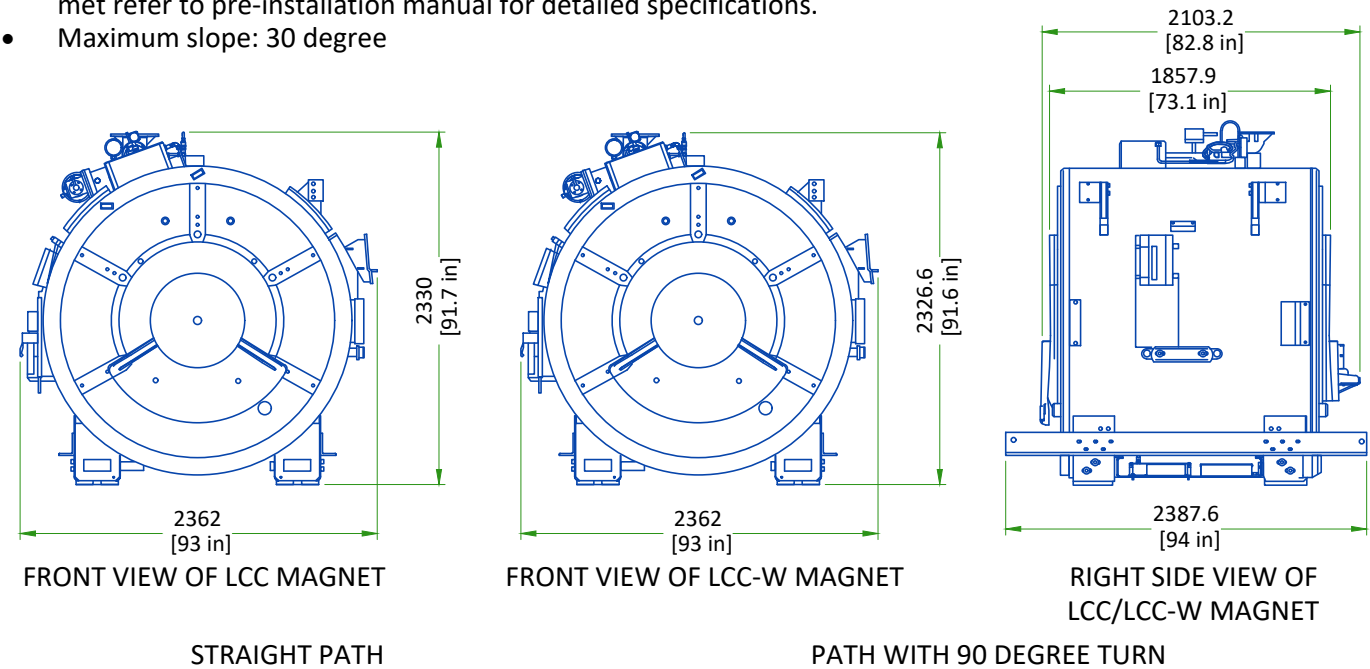
DELIVERY

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 5320 kg [11700 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 degree

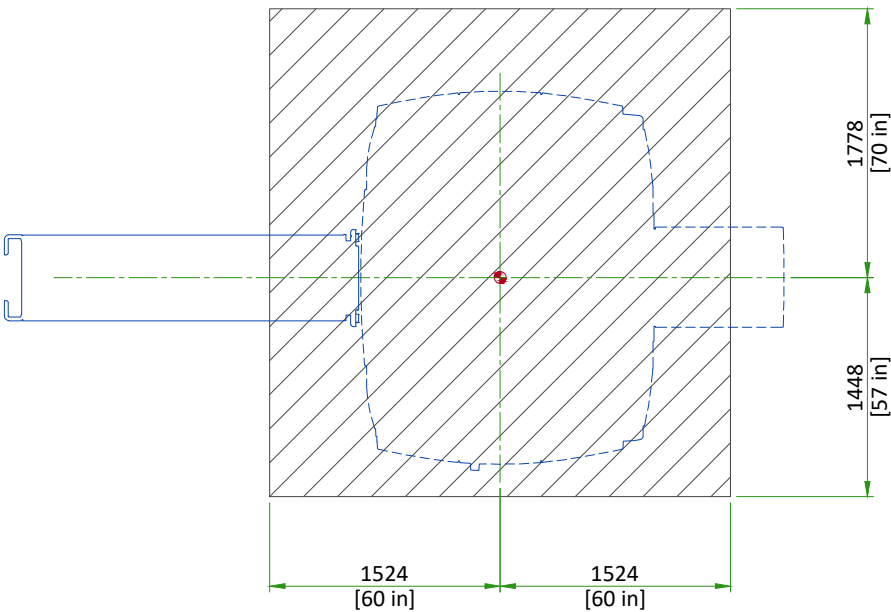


INSTALLATION AND DELIVERY ACCEPTANCE

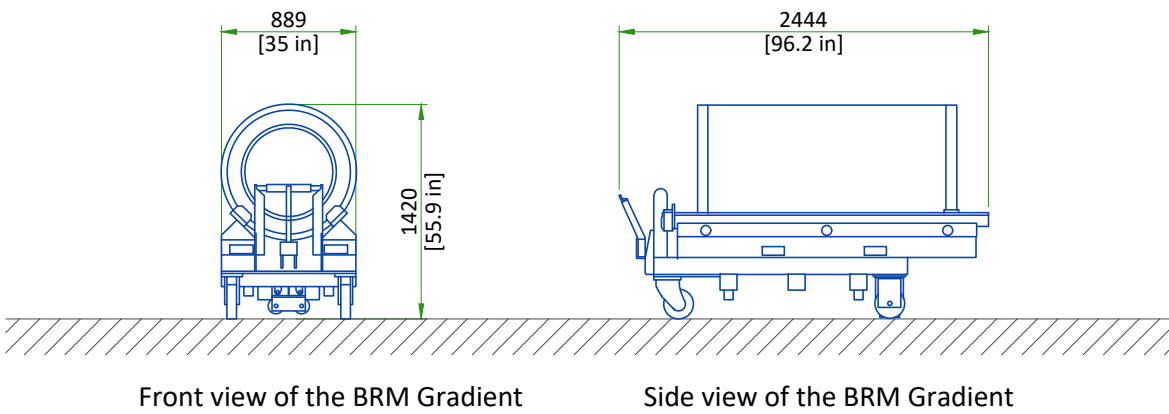
- A survey of the site established by the customer and GE Healthcare will make the decision for the delivery time.
- This survey of the site (a form is made available by GE) is only to check if the apparent conditions of the site allow the equipment to be delivered.
- If the site is not ready, GE can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

MINIMUM MAGNET CEILING HEIGHT (TOP VIEW)

Shaded area within solid lines indicates floor to ceiling minimum height of **2500 mm (98.5 in)**. This drawing is only valid if the quench pipe is leaving vertically from the magnet. If not the minimum height is **2667 mm (105 in)**.



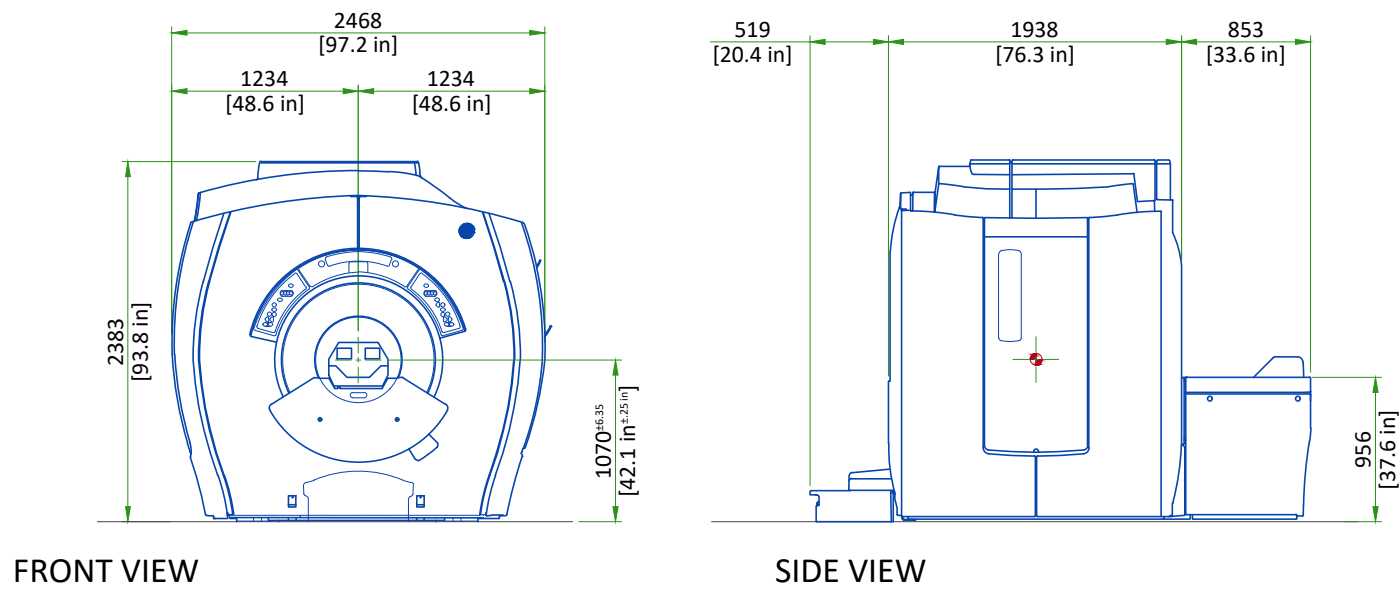
DIMENSIONS OF THE MAIN REPLACEMENT PARTS



EQUIPMENT	DIMENSIONS LxWxH		WEIGHT		NOTE
	mm	in	kg	lbs	
Replacement BRM gradient coil assembly on a shipping cradle/cart	889x2444x1420	35x96.2x55.9	1491	3287	Initial gradient coil assembly is shipped installed in the magnet. Shipping/installation cart is used to install re-placement 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.

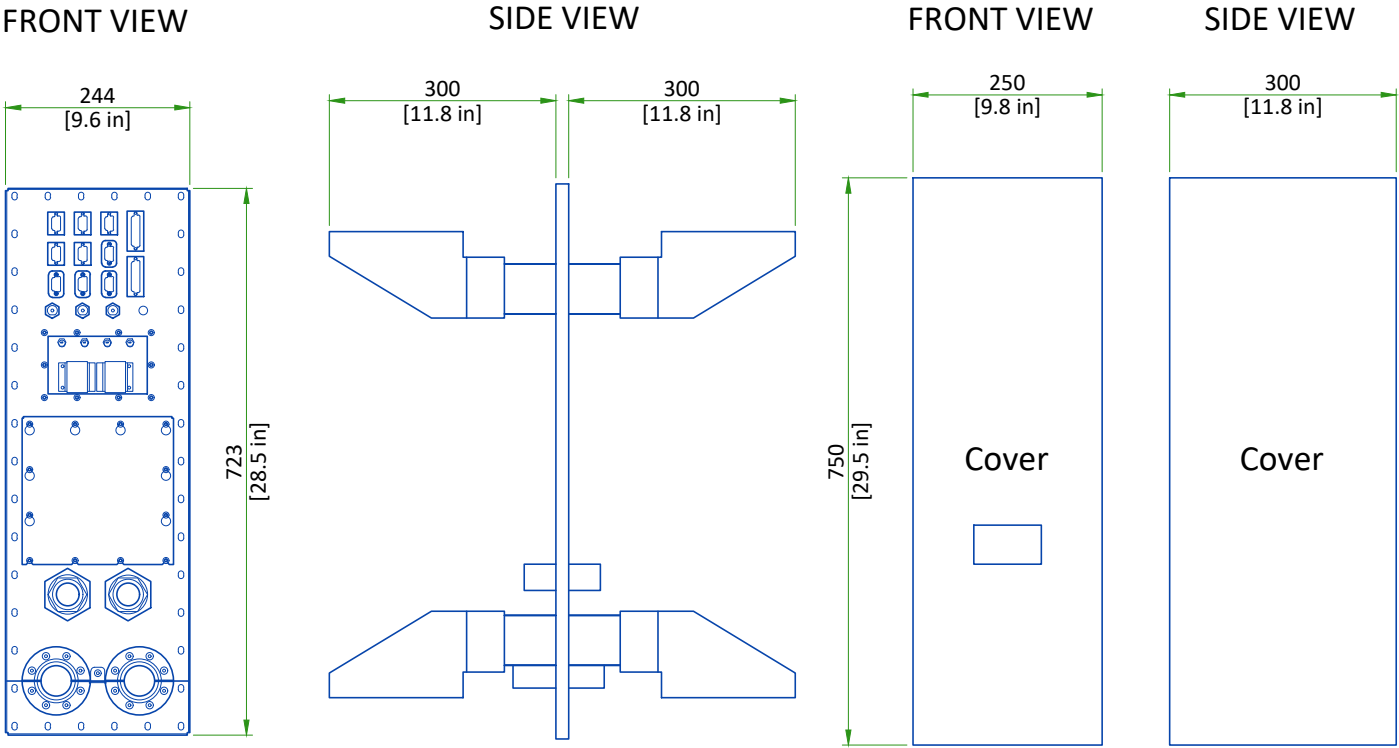
MAGNET ENCLOSURE



- Notes:
- 1) Finished floor to magnet center line height must be within 1070mm ± 6.35mm [42 1/8in ± 1/4in] to allow patient table to properly dock to the enclosure.
 - 2) Center of gravity is approximate and includes the GE Healthcare supplied VibroAcoustic Dampening Kit, but does not include cryogenes, gradient assembly, side mounted electronics, or enclosures.
 - 3) Enclosure dimensions are for reference only, NOT FOR SITE PLANNING USE.

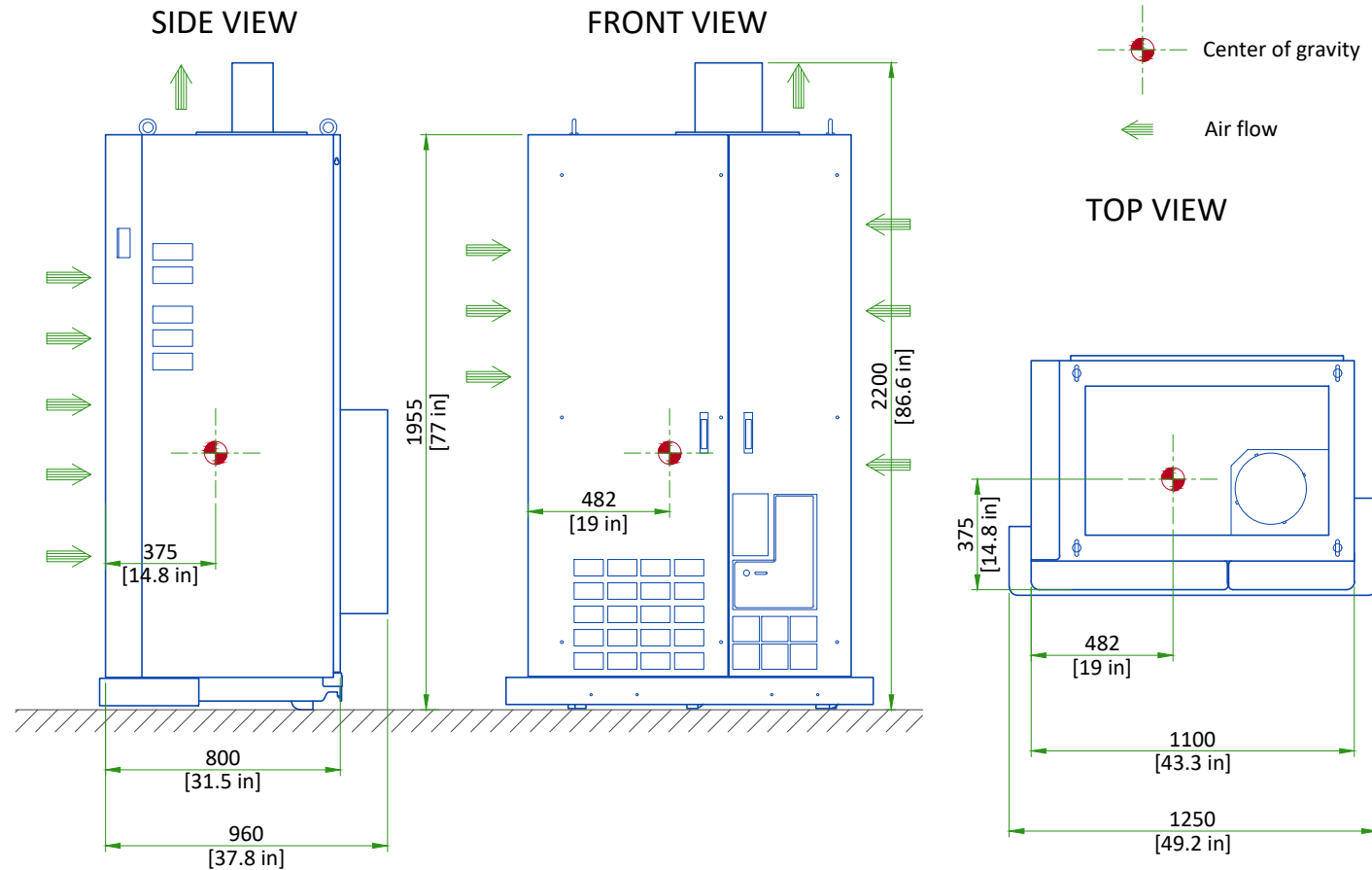
Center of gravity

PENETRATION PANEL

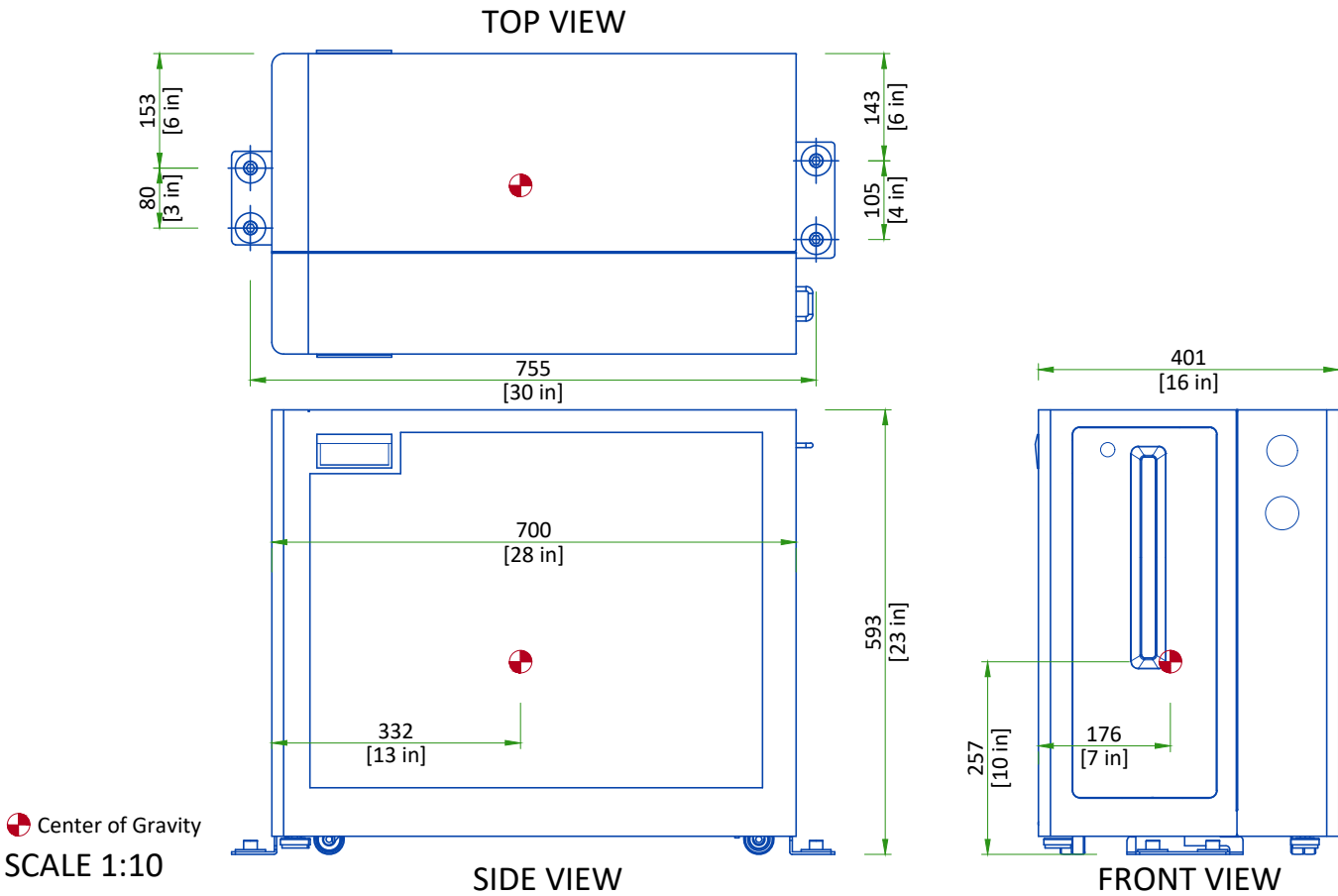


SCALE 1:10

SYSTEM CABINET



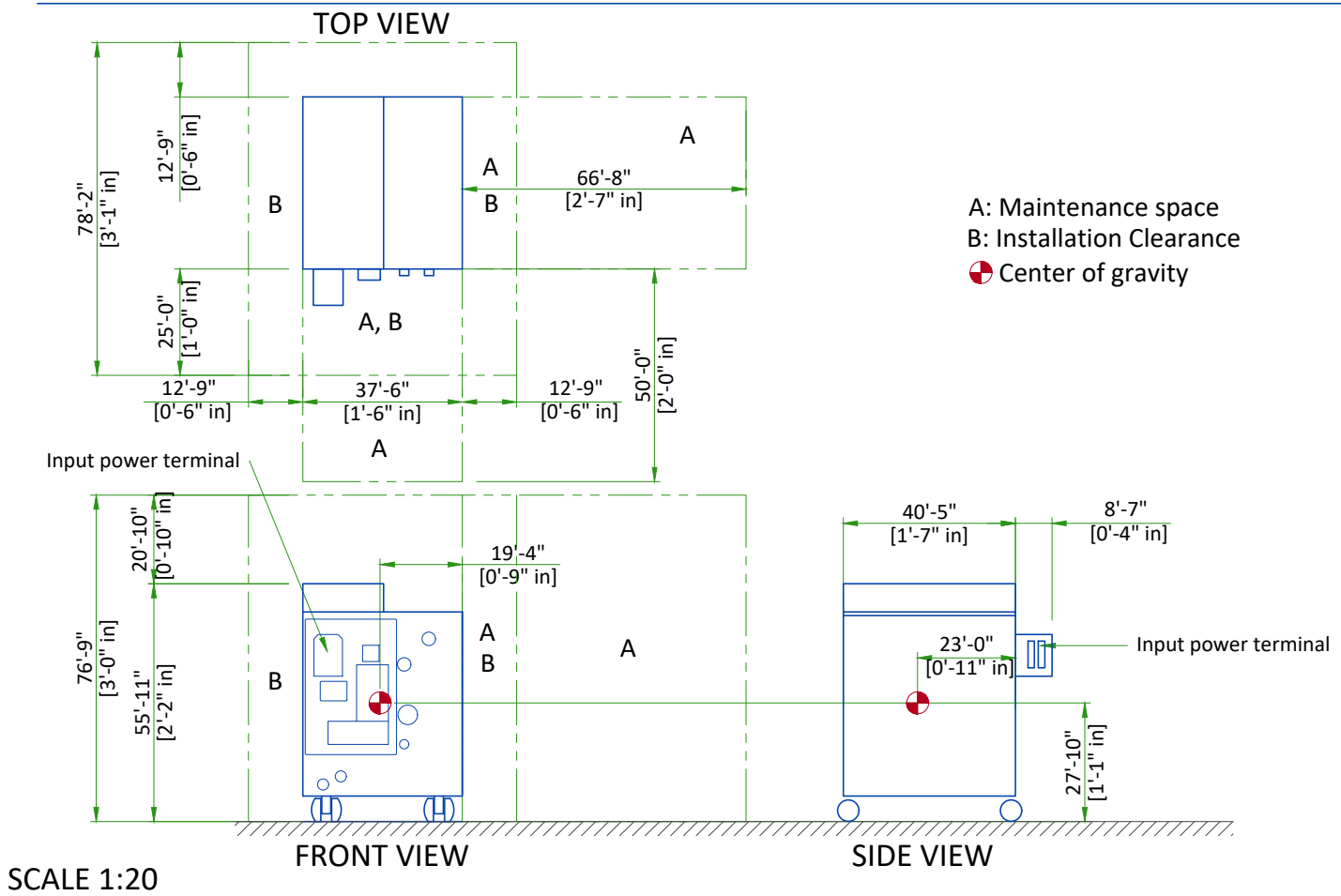
GLOBAL OPERATOR CABINET (GOC)



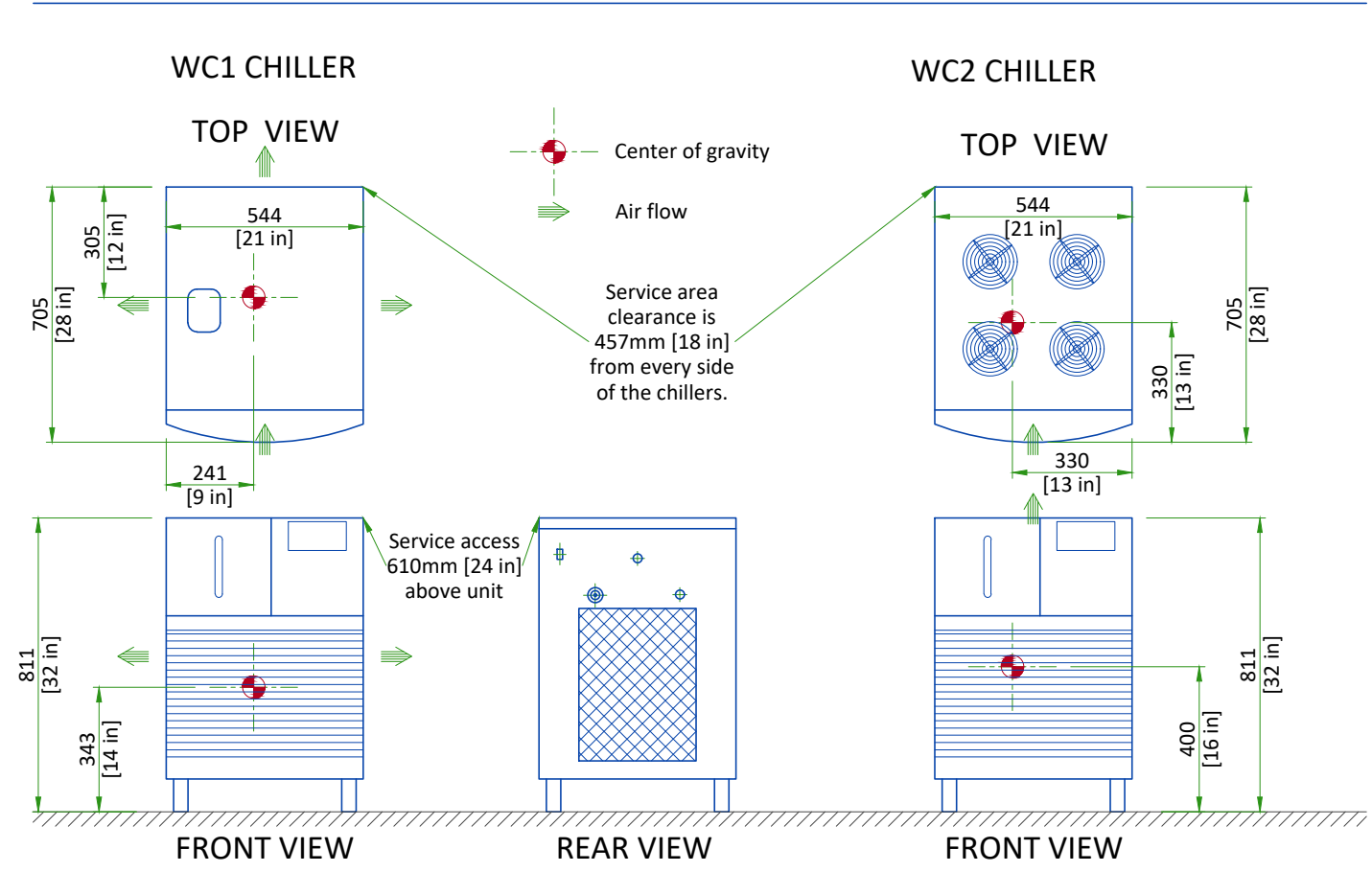
Center of Gravity

SCALE 1:10

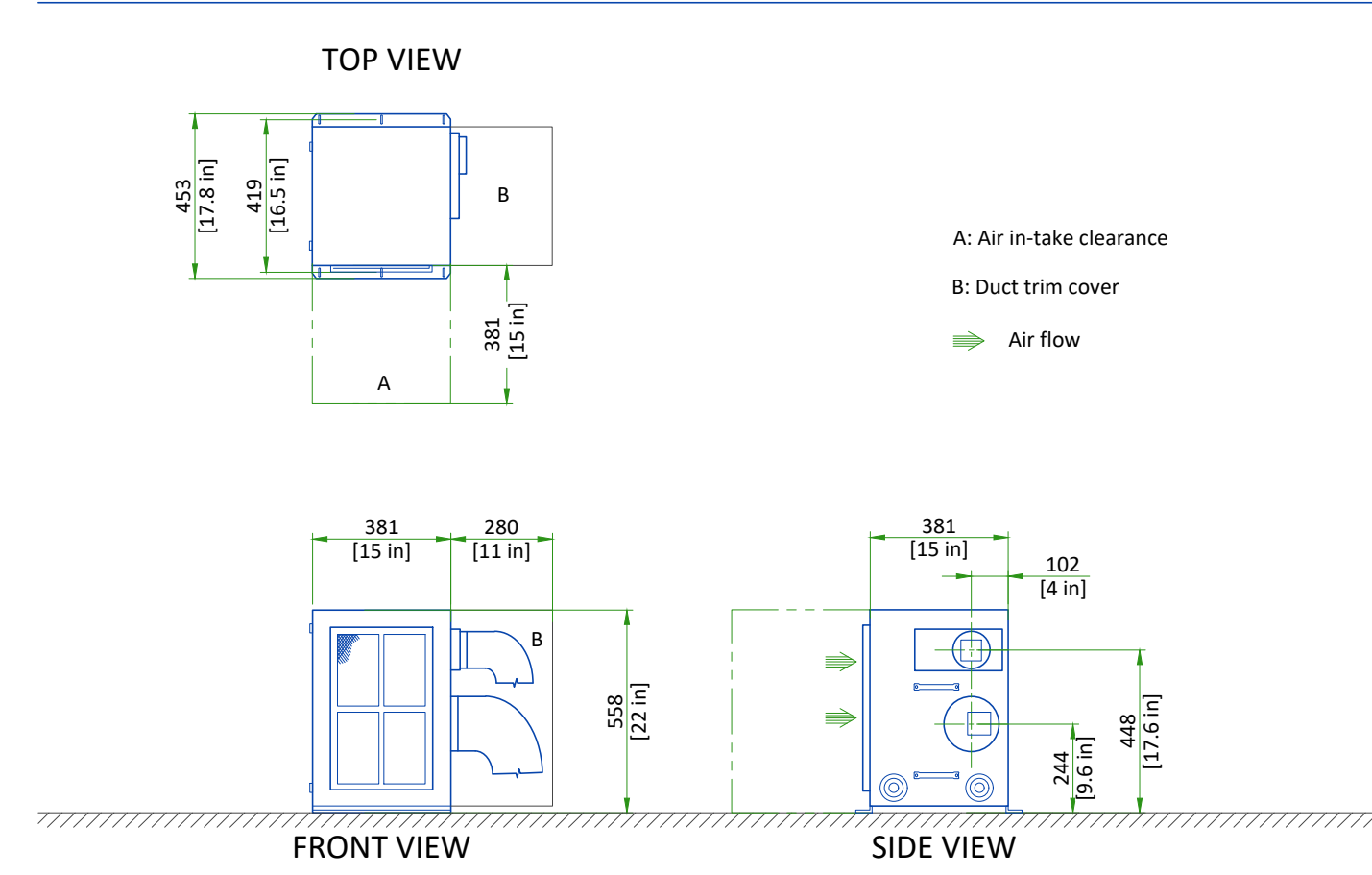
CRYOCOOLER COMPRESSOR (CRY)



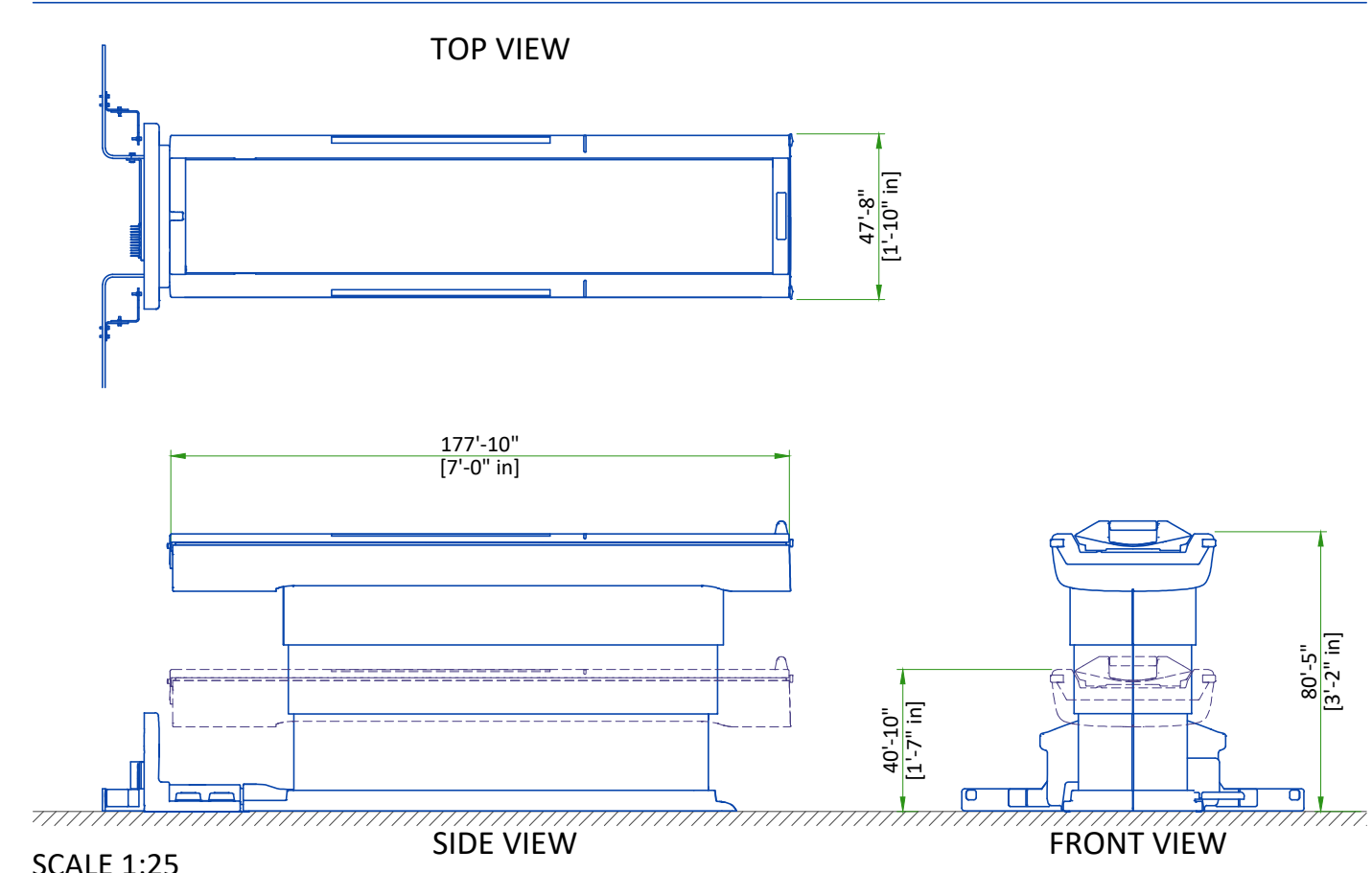
WATER CHILLERS



BLOWER BOX

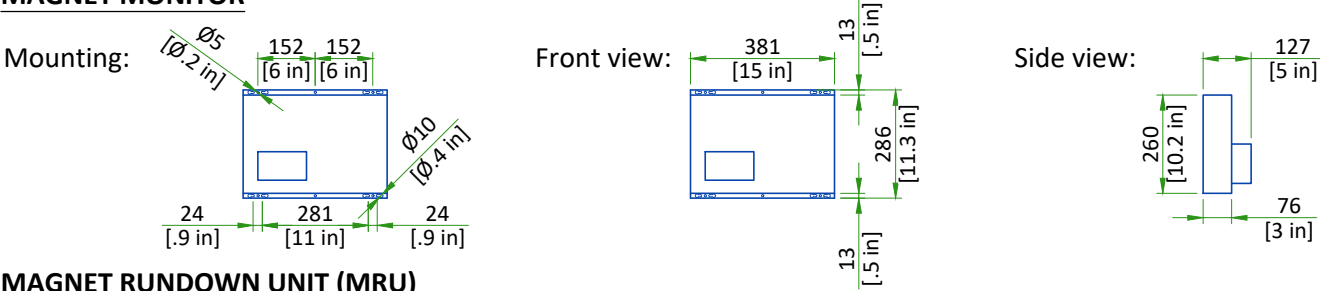


LOW HEIGHT PATIENT TRANSPORT TABLE - FIX

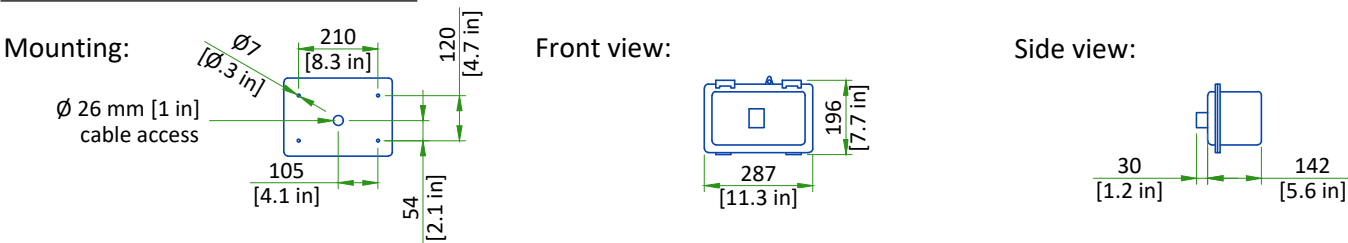


MAGNET MONITOR, MRU, AND OXYGEN MONITOR

MAGNET MONITOR

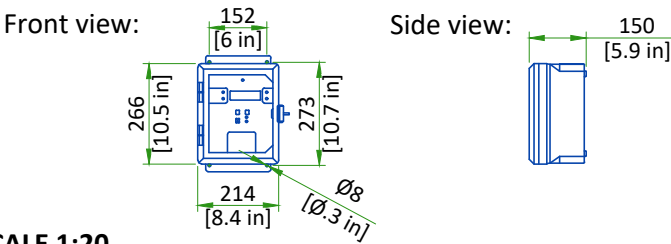


MAGNET RUNDOWN UNIT (MRU)

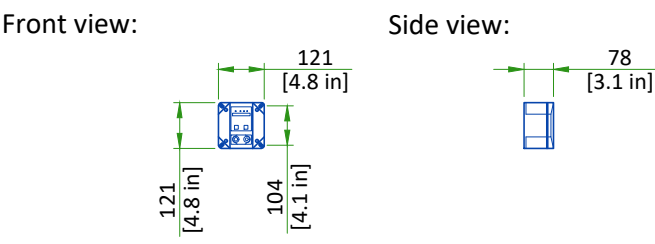


The bottom edge of the MRU must be mounted 1524 ±25 mm [60 ± 1 in] above the magnet room floor.

OXYGEN MONITOR

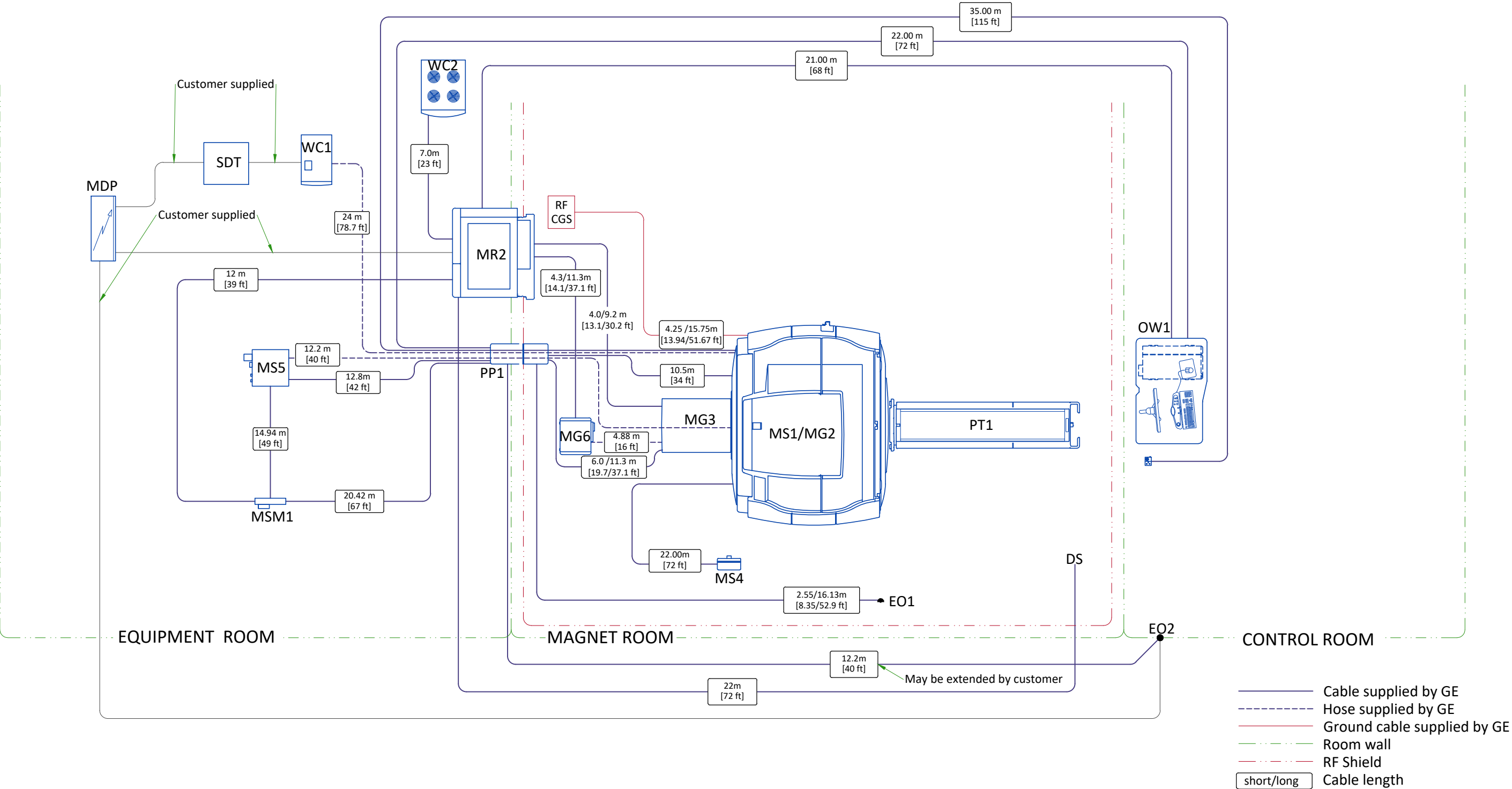


REMOTE SENSOR



SCALE 1:20

INTERCONNECTIONS



- Long / Short cable selection guidance:
- If the MG3 – MR2 Distance is less than 13.1 feet (4 m) , select short cable.
 - If the MG3 – MR2 Distance is in between 13.1 feet (4 m) and 30.2 feet (9.2 m) , select long cable. RF extension cable option can provide additional 16.4 feet (5m) usable length.

Component Designator	Description	Component Designator	Description
DS	Door interlock switch	MS5	Shield/Cryo Cooler Compressor Cabinet
EO1/EO2	Emergency off buttons	MSM1	Magnet Monitor
MDP	Main Disconnect Panel	OW1	Operator Workspace
MG2	Magnet Enclosure	PP1	Penetration Panel
MG3	Magnet Rear Pedestal	PT1	Patient Transport Table
MG6	Blower Box	RGD	Remote Graphic Display
MR2	System Cabinet	SDT	Step Down Transformer
MS1	Superconducting Magnet	WC1	Water Chiller for BRM
MS4	Magnet Rundown Unit	WC2	Water Chiller for System Cabinet

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.

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-installtion 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://customer-doc.cloud.gehealthcare.com/#/cdp/dashboard	

- 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 **DOC1809666** 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.