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 drawings. 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.
**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.

- 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.
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- 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.

**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.

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

<table>
<thead>
<tr>
<th>DATE</th>
<th>NAME</th>
<th>SIGNATURE</th>
</tr>
</thead>
</table>

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**CUSTOMER SITE READINESS REQUIREMENTS**

- 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. Capability for image analysis,
  4. Restrooms.
- Provide for refuse removal and disposal (e.g. crates, cartons, packing)
- It is the customer’s responsibility to contact a vibration consultant/engineer to implement site design modifications to meet the GE vibration specification. Refer to the system preinstallation manual for the vibration specification.

**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 contunuity 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.

**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 in the volume 10ft [3.1m] x 10ft [3.1m] x 1ft [0.3m] deep (below the magnet) does not exceed the allowable steel content as given in the MR pre-installation manual referenced on the cover sheet.
7. All access/computer flooring is to be removed in both the magnet room and 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.

**MAGNETIC INTERFERENCE SPECIFICATIONS**

- The customer must establish protocols to prevent persons with cardiac pacemakers, neurostimulators, and biostimulation devices from entering magnetic fields of greater than 5 gauss (exclusion zone).
- Main power transformers must remain outside the 3 gauss field. EMI < 17.1mG AC. EMI < 4.1mG DC.
- Potential exists under fault conditions that the 5 gauss line may expand radially to 14.8 ft [4.5 m] and axially to 19.7 ft [6.0 m] for 8 seconds or less. It should be noted that normal rampdowns or magnet rundown unit initiated quenches will not cause the magnetic field to expand.
- It is recommended every site consider the event of a quench and plan accordingly (such as placing 5 gauss warning signs at expanded locations).
- The ferrous metal objects listed below must not move into or inside of the moving metal sensitivity line during scans.
- For vibration, analysis to be completed as required per pre-installation manual.
- 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.
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For additional information regarding image quality, refer to the pre-installation manual listed on the cover sheet.
RADIOPROTECTION

RADIOACTIVE ISOTOPES AND RADIOPROTECTION
Since the equipment involves the use of radioactive isotopes, compliance with Nuclear Regulatory Commission regulations, or similar regulatory requirements (depending on the country), must be adhered to and all permissions obtained well in advance. It is recommended that regulatory compliance is arranged early in the site planning process.

It is Customer's responsibility consult a qualified radiological health physicist for radiation protection requirements for the walls, floor, ceiling, doors, window glass, etc. (lead content and thickness) and warning lights and signs, in accordance with local requirements.

It is essential that all preparations are completed so that required source materials can be obtained prior to installation, including calibration sources. Take into consideration that these sources may have fairly long delivery lead times, yet may also have a short half life, so that it may not be advisable to store them over long periods of time.

RADIOACTIVE ISOTOPES FOR SYSTEM CALIBRATION
Three phantoms and PET spheres are used for calibrations performed on the PET/MR system. It is customer's responsibility provide isotopes for system calibration and prepare the required doses.

<table>
<thead>
<tr>
<th>PHANTOM</th>
<th>ISOPE</th>
<th>DOSE RATE</th>
<th>HALF LIFE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annulus</td>
<td>Germanium-68</td>
<td>55 MBq</td>
<td>271 days</td>
<td>Daily by Customer</td>
</tr>
<tr>
<td>Volumetric Quality Control (VQC)</td>
<td></td>
<td>5x0.7 MBq</td>
<td></td>
<td>Quarterly</td>
</tr>
<tr>
<td>PET Spheres</td>
<td></td>
<td>3x0.7 MBq</td>
<td></td>
<td>Quarterly</td>
</tr>
<tr>
<td>Flood</td>
<td>Fluoro-deoxyglucose</td>
<td>20 MBq</td>
<td>110 min</td>
<td>Quarterly</td>
</tr>
<tr>
<td></td>
<td>F18 (FDG)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical Positron Emitting Isotopes</td>
<td></td>
<td></td>
<td>2 to 110 min</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Carbon 11</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nitrogen 13</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oxygen 15</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BACKGROUND RADIATION
It is important that background radiation be kept to a minimum. The coincidence detection used in a PET/MR system allows a moderate amount of external singles events. The PET/MR system has been found to have less than 1% dead time if the external field is below 1mR/hr from a single source. Because area background can be more general than a single source, a lower limit is appropriate. If the area dose rate is maintained to less than 0.2mR/hr (due to 511 or lower energy gamma rays) at the covers, detector dead time should not exceed 1%.

Radioactive sources must be stored in approved shielded containers. It is recommended that any radioactive source be stored in a separate room (hot lab) adjacent to, and accessible from, the Scan Room. Doses should be prepared in the same area.
Moving metal sensitivity line for CARS, MINIVANS, PICKUP TRUCKS, AND AMBULANCES.

NOTE: Ferrous objects must not move into or inside of the moving metal sensitivity line during scans.

Moving metal sensitivity line for BUSES AND TRUCKS (DUMP, TRACTOR TRAILER, UTILITY, FIRE TRUCKS)

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For further assistance or product questions, contact GE HPI Technical Support Group at (877)-305-9677 or mail to Accessory Sales.

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For general GE CONTROL ROOM equipment, please refer to the following:

- Moving metal sensitivity line for CARS, MINIVANS, PICKUP TRUCKS, AND AMBULANCES.
- Moving metal sensitivity line for BUSES AND TRUCKS (DUMP, TRACTOR TRAILER, UTILITY, FIRE TRUCKS)

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Exam room height

- Finishing floor to slab height: TBD
- Recommended finished ceiling height: 8'-5"
Warning! 5 Gauss line outside the Magnet room limits.

Note: Define RF shield’s inset according to provisions made by the RF Shield vendor.

MAGNET ROOM

CONTROL ROOM

FRONT VIEW WITH MAGNETIC FIELD

Cable tray
Unistrut

SIDE VIEW WITH MAGNETIC FIELD

Warning! 5 Gauss line outside the Magnet room limits.

Note: Define RF shield’s inset according to provisions made by the RF Shield vendor.
MAGNETIC PROXIMITY LIMITS

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

<table>
<thead>
<tr>
<th>Limits Of Steel Mass</th>
<th>Distance From Magnet Isocenter</th>
<th>Distance Below Top Surface Off Floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg/m³</td>
<td>min</td>
<td>in</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0 - 1143</td>
</tr>
<tr>
<td>9.8</td>
<td>2</td>
<td>1143 - 1194</td>
</tr>
<tr>
<td>14.7</td>
<td>3</td>
<td>1194 - 1321</td>
</tr>
<tr>
<td>39.2</td>
<td>8</td>
<td>1321 - 1397</td>
</tr>
<tr>
<td>98.0</td>
<td>20</td>
<td>1397+</td>
</tr>
</tbody>
</table>

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

A closet service hatch must be provided if the room does not allow the PEN panel blower box removal path to remain completely outside the 200 Gauss line.

NOTE: If the room size is sufficiently large so the SPW blower box can be removed without entering the 200 Gauss line, a closet service hatch is not required.

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

Shaded area indicates floor to ceiling minimum height of 2500 mm (98.5 in). Special service procedures are required if ceiling height is between 2500 mm and 2667 mm (985 in and 105 in).
**MAGNET ENCLOSURE**

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

**Penetration Cabinet Clearance**

- **Service clearance**: 50 ± 25mm from RF shield room wall required for proper connection to penetration panel and cabinet airflow.

**Global Operators Cabinet (GOC)**

- **Blower box**: Service clearance
- **Cable drop area**: 51 [2 in]

**Patient Transport Table (PT)**

Top view, side view, and front view diagrams are provided.
SECONDARY PENETRATION WALL (SPW)

- TOP VIEW
- FRONT VIEW
- SIDE VIEW

CRYYOCOOLER COMPRESSOR (CRY)

- TOP VIEW
- FRONT VIEW
- SIDE VIEW

POWER, GRADIENT, RF CABINET (PGR)

- TOP VIEW
- FRONT VIEW
- SIDE VIEW

HEAT EXCHANGER CABINET (HEC)

- TOP VIEW
- FRONT VIEW
- SIDE VIEW

Additional service clearance required for Magnet Monitor. It can be installed on either side of the HEC.

- Cable Tray: bottom must be at least 483mm (19.02 in) above cabinet

A: Airflow clearance
B: Installation clearance
C: Service clearance

Shipping without fluid
Shipping with fluid
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 its 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.

MINIMUM SPECIFICATIONS FOR MAGNET ROUTING
- Floor must be able to withstand a moving load of 7691 daN
- Height: 2.5m [98.5in], width: 2.7m [106in]
- Maximum slope: 30 degree

MINIMUM SPECIFICATIONS FOR MAGNET ROUTING
- Recommended opening for side (wall) delivery : 2750 [106 in] (width) x 2750 [106 in] (height)

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

CRITICAL ITEMS FOR MAGNET DELIVERY
- 24/7 chilled water and 480v power for shield/cryo cooler
- 24/7 120v power for the magnet monitor
- Phone lines for magnet monitoring and emergency use
- Magnet room exhaust fan
- Cryogen venting (if roof hatch, completed within 24 hrs)

This is only a partial list of items required for delivery of the magnet. For a complete checklist refer to the pre-installation manual referenced on cover sheet.

GRADIENT AND PET/MR COIL REPLACEMENT

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>DIMENSIONS LxWxH</th>
<th>WEIGHT kg</th>
<th>lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacement XRM gradient coil assembly on a shipping cradle/cart</td>
<td>991x2536x1499</td>
<td>1449</td>
<td>3194</td>
</tr>
<tr>
<td>PET/MR Insert on Shipping Cart</td>
<td>2134x1016x1600</td>
<td>347</td>
<td>765</td>
</tr>
</tbody>
</table>

Initial gradient coil assembly is shipped installed in the magnet. Shipping/installation cart is used to install replacement coil assembly only.

Insert is shipped in a protective case. Weight and dimensions are for insert, case, plus cart.

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.
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.

VIBRATION TRANSMITTED THROUGH VIBROACOUSTIC MAT

- All units that are wall mounted or wall supported are to be provided with supports where necessary. Wall supports are to be supplied and installed by the customer or his contractors.
- Dimensions are to finished surfaces of room.
- Certain MR procedures require an extremely stable environment to achieve high resolution image quality. Vibration is known to introduce field instabilities into the imaging system. The vibration effects on image quality can be minimized during the initial site planning of the MR suite by minimizing the vibration environment. See PROXIMITY LIMITS, PATIENT TABLE DOCK ANCHOR MOUNTING REQUIREMENTS AND VIBROACOUSTIC DAMPENING KIT details for additional information.
- Standard steel studs, nails, screws, conduit, piping, drains and other hardware are acceptable if properly secured. Any loose steel objects can be violently accelerated into the bore of the magnet. Careful thought should be given to the selection of light fixtures, cabinets, wall decorations, etc. To minimize this potential hazard. For safety, all removable items within the magnet room such as faucet handles, drain covers, switch box cover plates, light fixture components, mounting screws, etc. Must be non-magnetic. If you have a specific question about material, bring it to the attention of your GE project manager of installations.
- Floor levelness refer to MAGNET ROOM FLOOR SPECIFICATIONS DETAIL, this floor levelness requirement is important for accurate patient table docking.
- Non-movable steel such as wall studs or HVAC components will produce negligible effect on the active shield magnet.
- Customers contractor must provide all penetrations in post tension floors.
- Customers contractor must provide and install any non-standard anchoring. Documents for standard anchoring methods are included with GE equipment drawings for geographic areas that require such documentation.
- Customers contractor must provide and install hardware for "through the floor" anchoring and/or any bracing under access floors. This contractor must also provide floor drilling that cannot be completed because of an obstruction encountered while drilling by the GE installer such as rebar etc.
- Customers contractor to provide and install appropriate supports for the storage of excess cables.
- It is the customer’s responsibility to perform any floor or wall penetrations that may be required. The customer is also responsible for ensuring that no subsurface utilities (e.g., electrical or any other form of wiring, conduits, piping, duct work or structural supports (i.e. post tension cables or rebar)) will interfere or come in contact with subsurface penetration operations (e.g. drilling and installation of anchors/screws) performed during the installation process. To ensure worker safety, GE installers will perform surface penetration operations only after the customer’s validation and completion of the “GE surface penetration permit"
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vibroacoustic dampening kit (see floor structural detail)</td>
</tr>
<tr>
<td>2</td>
<td>Magnet curtain kit</td>
</tr>
<tr>
<td>3</td>
<td>Patient table dock anchoring</td>
</tr>
<tr>
<td>4</td>
<td>Structural wall backing for Main Disconnect Panel</td>
</tr>
<tr>
<td>5</td>
<td>Structural wall backing for Magnet Rundown Unit</td>
</tr>
<tr>
<td>6</td>
<td>Structural wall backing for Main Bypass Panel</td>
</tr>
</tbody>
</table>

**Diagram:**

- **MAGNET ROOM**
- **EQUIPMENT ROOM**
- **CONTROL ROOM**
- **LOCATED ELSEWHERE**
MAGNET ON VIBROACOUSTIC DAMPENING KIT "VIBROPAD"

NOT TO SCALE

MAGNET ROOM FLOOR SPECIFICATIONS

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

CABLE CONCEALMENT

Customer/contractor installed cable concealment frame customer/contractor to provide opening and install frame.

NOTE:
- This drawing is to be used only as a design intent document. Refer to GE installation manual for tray install.
- Actual tray installation may be site dependent.
- This drawing not to scale
1. Cryogen vent (300mm [8"] O.D.)
2. Emergency exhaust vent - refer to magnet room vent requirements (position to be defined)
3. Pressure equalization vent - refer to magnet room vent requirements (position in ceiling to be defined)
4. 38mm [1.5"] NPT Male connectors, at 2.1m [82.67"] above floor, (2) 38mm [1.5"] copper lines (insulated) and (2) shut off valves. refer to chilled water block diagram
5. Closet must allow free air exchange of 400 CFM between magnet room and closet
6. Provide as needed - low pressure rubber multipurpose hose, inside dia. 1/2" working pressure range: 250 to 499 PSI - refer to the manual city water back-up system detail
7. (2) 50mm [2"] I.D. High pressure hoses and (2) 50mm [2"] to 38mm [1.5"] Reducers

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

<table>
<thead>
<tr>
<th></th>
<th>Magnet Room</th>
<th>Control Room</th>
<th>Equipment Room</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEMPERATURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>15 to 21°C</td>
<td>15 to 32°C</td>
<td>15 to 32°C</td>
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<tr>
<td>Temperature</td>
<td>± 3°C/h</td>
<td>± 3°C/h</td>
<td>± 3°C/h</td>
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<tr>
<td>Temperature grad</td>
<td>± 3°C/h</td>
<td>± 5°F/h</td>
<td>± 5°F/h</td>
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<tr>
<td>Relative humidity</td>
<td>30% to 60%</td>
<td>30% to 70%</td>
<td>30% to 70%</td>
</tr>
<tr>
<td>Humidity gradient</td>
<td>± 5%/h</td>
<td>± 5%/h</td>
<td>± 5%/h</td>
</tr>
<tr>
<td>System heat dissipation</td>
<td>Stand by 2.1Kw</td>
<td>Average 2.89Kw</td>
<td>Max 4.24Kw</td>
</tr>
<tr>
<td></td>
<td>Stand by 11.1Kw</td>
<td>Average 11.7Kw</td>
<td>Max 22.1Kw</td>
</tr>
<tr>
<td></td>
<td>7171 btu</td>
<td>9863 btu</td>
<td>14469 btu</td>
</tr>
</tbody>
</table>

**NOTE**
- Maximum ambient temperature for the Equipment room at inlet is derated by 1°C per 300 m (984 ft) above 2000 m (6562 ft) (not to exceed 2600 m (8330 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.

### HEAT DISSIPATION DETAILS

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>ROOM</th>
<th>Idle</th>
<th>Average</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnet (MAG) and Patient Table (PT)</td>
<td>Magnet</td>
<td>561</td>
<td>1915</td>
<td>1200</td>
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<tr>
<td>Blower Box (M66)</td>
<td>Magnet</td>
<td>450</td>
<td>1535</td>
<td>1200</td>
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<td>Penetration Panel Cabinet (PEN)</td>
<td>Magnet</td>
<td>0</td>
<td>0</td>
<td>150</td>
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<tr>
<td>Penetration Cabinet (PEN)</td>
<td>Equipment</td>
<td>1568</td>
<td>5349</td>
<td>3135</td>
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<tr>
<td>Secondary Penetration Wall (SPW)</td>
<td>Magazine/Equipment</td>
<td>122</td>
<td>450</td>
<td>132</td>
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<tr>
<td>Main Disconnect Panel (MDP)</td>
<td>Equipment</td>
<td>2500</td>
<td>8530</td>
<td>3685</td>
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<tr>
<td>Cryocooler Compressor (CRY)</td>
<td>Equipment</td>
<td>500</td>
<td>1706</td>
<td>500</td>
</tr>
<tr>
<td>Heat Exchanger Cabinet (HEC)</td>
<td>Equipment</td>
<td>500</td>
<td>1706</td>
<td>500</td>
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<tr>
<td>Magnet Monitor (MON)</td>
<td>Equipment</td>
<td>240</td>
<td>819</td>
<td>240</td>
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<tr>
<td>Operator Workspace equipment (OW)</td>
<td>Control</td>
<td>1450</td>
<td>4947</td>
<td>450</td>
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<tr>
<td>PET Electronics</td>
<td>Magnet</td>
<td>1090</td>
<td>3721</td>
<td>1090</td>
</tr>
<tr>
<td>PET Cabinet (PET)</td>
<td>Equipment</td>
<td>3195</td>
<td>10938</td>
<td>3195</td>
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<tr>
<td>PET Chiller (P-Chill)</td>
<td>Equipment</td>
<td>2500</td>
<td>8500</td>
<td>2500</td>
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</table>

### OPTIONS

<table>
<thead>
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<th>Idle</th>
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<th>Max</th>
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</thead>
<tbody>
<tr>
<td>Multi-Nuclear Spectroscopy Cabinet (MNS)</td>
<td>Equipment</td>
<td>7205</td>
<td>24584</td>
<td>24584</td>
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<tr>
<td>BrainWave HW Lite Cabinet (BW)</td>
<td>Equipment</td>
<td>685</td>
<td>2337</td>
<td>685</td>
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<tr>
<td>BrainWave HW Lite Cabinet (BW) with options</td>
<td>Equipment</td>
<td>815</td>
<td>2781</td>
<td>815</td>
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<tr>
<td>CADstream</td>
<td>Equipment</td>
<td>354</td>
<td>1209</td>
<td>799</td>
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<tr>
<td>MR Elastography (MRE)</td>
<td>Equipment</td>
<td>141</td>
<td>480</td>
<td>141</td>
</tr>
</tbody>
</table>

### 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

**PRESSURE VENT REQUIREMENT**
- A pressure equalizing vent is required in the magnet room ceiling or in the wall, at the highest point possible.
- The vent minimum size must be (610 mm x 610 mm [24 in x 24 in]) or equivalent.
- The pressure equalization vent must be located so any Helium gas is not vented into occupied areas.

**Note:** Location may affect acoustic noise transmission into occupied spaces.
**PARAMETER**

**REQUIREMENTS**

- **Chiller size**
  - Minimum 70 kW

- **Inlet temperature**
  - 42.8 to 53.6°F (6 to 12°C) measured at the inlet to the HEC

- **Hose connections to the HEC (supplied by customer)**
  - 1.5 inch (38.1 mm) male NPT

- **MINIMUM FLOW**
  - 30 gpm (114 l/min)

- **MAXIMUM FLOW**
  - 35 gpm (132 l/min)

- **Pressure drop in HEC Cabinet**
  - 40% propylene glycol, 60% water
  - 34.8 psi (2.4 bars)
  - 47.8 psi (3.3 bars)

- **Availability**
  - Continuous

- **Antifreeze**
  - no more than 40% propylene glycol

- **Temperature rise at minimum flow**
  - 17.3°F (9.6°C) with 40% propylene glycol-water 3730J/(kgK) specific heat, 1021 kg/m³ density, 70kW heat

- **Temperature rise at maximum flow**
  - 15.1°F (8.4°C) with 40% propylene glycol-water 3730J/(kgK) specific heat, 1021 kg/m³ density, 70kW heat

- **Maximum inlet pressure to HEC**
  - 87 psi (6 bar)

- **Minimum continuous heat load**
  - 7.5 kW

- **Hoses to be provided by customer**
  - 1.5 inch (38.1 mm) minimum hose inside diameter

- **pH level**
  - 6.5 to 8.2 at 77°F (25°C)

- **Total hardness**
  - Less than 200 ppm

- **Suspended matter**
  - Less than 10 ppm

- **Particle size**
  - Less than 100 micron

- **Facility filter**
  - 100 micron or smaller with a field-changeable filter

- **Condensation protection**
  - Facility plumbing to the HEC must be properly routed and insulated to prevent equipment damage or safety hazards

---

**CITY WATER BACKUP SPECIFICATIONS FOR COMPRESSOR**

**INLET WATER FLOW/Temperature for Cryocooler Compressor**

<table>
<thead>
<tr>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>INLET TEMP</td>
<td>39.2°F</td>
</tr>
<tr>
<td>(4°C)</td>
<td>(5°C)</td>
</tr>
<tr>
<td>INLET FLOW</td>
<td>1.0 gpm</td>
</tr>
<tr>
<td>(4 l/min)</td>
<td>(6 l/min)</td>
</tr>
<tr>
<td>TEMP RISE</td>
<td>89.6°F at 1.0 gpm</td>
</tr>
<tr>
<td>(32°C at 4 l/min flow)</td>
<td>(12°C at 10 l/min flow)</td>
</tr>
<tr>
<td>HEAT DISSIPATION (kW)</td>
<td>7.2 kW</td>
</tr>
<tr>
<td>PRESSURE DROP</td>
<td>8.1 psi at 2.6 gpm flow</td>
</tr>
<tr>
<td>(60 KPa at 10 l/min flow)</td>
<td></td>
</tr>
</tbody>
</table>

---

**MANUAL CITY WATER BACKUP SYSTEM (SAMPLE-DIMPLEX)**

**SECTION A-A**

THIS PIPING IS LOCATED BEHIND THE PIPING SHOWN IN "FRONT VIEW"

**TOP VIEW**

**BOTTOM VIEW**

**FRONT VIEW**

HEC = MAIN (NORMAL) COOLING SOURCE
ALTERNATE SUPPLY = BACKUP COOLING SOURCE
ERIS = EQUIPMENT TO BE COOLED

VALVE HANDLES WILL BE CONNECTED BY A MECHANICAL LINKAGE
COVER THREADED ROD WITH HEAT SHRINK TUBING.

DETAIL NOT TO SCALE
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±0.2 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
- Support system must withstand 11125 N [2500 lbs]
- GE ventglas must be installed in vertical section directly over magnet

CR YOGENIC VENTING ( EXTERIOR )
### MAGNET CRYOGENIC VENT SYSTEM PRESSURE DROP MATRIX

<table>
<thead>
<tr>
<th>Outer dia. of pipe (D)</th>
<th>Distance of vent system component from magnet</th>
<th>Pressure drop for straight pipe</th>
<th>Std sweep 45° elbow</th>
<th>Long sweep 45° elbow</th>
<th>Std sweep 90° elbow</th>
<th>Long sweep 90° elbow</th>
<th>90° miter bend</th>
</tr>
</thead>
<tbody>
<tr>
<td>ft</td>
<td>m</td>
<td>psi/ft</td>
<td>kPa/m ft</td>
<td>psi</td>
<td>kPa</td>
<td>psi</td>
<td>kPa</td>
</tr>
<tr>
<td>8 in. (200mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>0.00-3.05</td>
<td>0.14</td>
<td>3.22</td>
<td>1.12</td>
<td>7.70</td>
<td>0.74</td>
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<tr>
<td>10-20</td>
<td>3.05-6.10</td>
<td>0.24</td>
<td>3.49</td>
<td>1.83</td>
<td>12.63</td>
<td>1.12</td>
<td>8.44</td>
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<tr>
<td>20-30</td>
<td>6.10-9.15</td>
<td>0.36</td>
<td>8.23</td>
<td>2.49</td>
<td>17.20</td>
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<td>11.45</td>
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<td>30-40</td>
<td>9.15-12.2</td>
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<tr>
<td>40-50</td>
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<td>0.57</td>
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<td>3.67</td>
<td>25.32</td>
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<td>50-60</td>
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<td>0.65</td>
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<td>60-80</td>
<td>18.29-24.39</td>
<td>0.77</td>
<td>17.44</td>
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<td>35.35</td>
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<td>23.53</td>
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<td>8 in. (250mm)</td>
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<td>0.00-6.10</td>
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<td>12.22-18.29</td>
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<td>4.859</td>
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<tr>
<td>10 in. (300mm)</td>
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<td>0-20</td>
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<tr>
<td>14 in. (350mm)</td>
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<td>0.00-6.10</td>
<td>0.004</td>
<td>0.038</td>
<td>0.065</td>
<td>0.45</td>
<td>0.043</td>
<td>0.30</td>
</tr>
<tr>
<td>20-40</td>
<td>6.10-12.22</td>
<td>0.008</td>
<td>0.174</td>
<td>0.108</td>
<td>0.75</td>
<td>0.072</td>
<td>0.50</td>
</tr>
<tr>
<td>40-60</td>
<td>12.22-18.29</td>
<td>0.011</td>
<td>0.253</td>
<td>0.148</td>
<td>1.02</td>
<td>0.098</td>
<td>0.68</td>
</tr>
<tr>
<td>16 in. (400mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-20</td>
<td>0.00-6.10</td>
<td>0.017</td>
<td>0.383</td>
<td>0.022</td>
<td>1.49</td>
<td>0.144</td>
<td>0.99</td>
</tr>
<tr>
<td>20-40</td>
<td>6.10-12.22</td>
<td>0.018</td>
<td>0.732</td>
<td>0.065</td>
<td>0.537</td>
<td>0.072</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Notes:
1. Elbows with angles greater than 90 deg must not be used.
2. Data in Table 2 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 20 psi (138 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 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 power source is located outside the magnet room RF.
- Battery chargers (e.g., used for emergency lighting) must be located outside the magnet RF room.
- Short filament length bulbs are recommended.
- Linear lamps are not recommended due to the high burnout rate.

**CONNECTIVITY REQUIREMENTS**

Broadband Connections are necessary during the installation process and going forward to ensure full support from the Engineering Teams for the customers system. Maximum performance and availability for the customers system is maintained and closely monitored during the lifetime of the system. Proactive and reactive maintenance is available utilising the wide range of digital tools using the connectivity solutions listed below:

- Site-to-Site VPN/GE Solution
- Site-to-Site VPN/Customer Solution
- Connection through Dedicated Service Network
- Internet Access - connectivity for InSite 2.0

The requirements for these connectivity solutions are explained in the broadband solutions catalogue (separate document).

**ELECTRICAL NOTES**

1. All wires specified shall be copper stranded, flexible, thermo-plastic, color coded, cut 10 foot long at outlet boxes, duct termination points or stubbed conduit ends. All conductors, power, signal and ground, must be run in a conduit or duct system. Electrical contractor shall ring out and tag all wires at both ends. Wire runs must be continuous copper stranded and free from splices.
   - 1.1. 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. 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.
   - 10. The maximum point to point distances illustrated on this drawing must not be exceeded.
   - 11. Physical connection of primary power to GE equipment is to be made by customers electrical contractor with the supervision of a GE representative. The GE representative would be required to identify the physical connection location, and insure proper handling of GE equipment.
   - 12. 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.

- All junction boxes, conduit, duct, duct dividers, switches, circuit breakers, cable tray, etc., are to be supplied and installed by customers electrical contractor.
- Conduit and duct runs shall have 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, accessable covers.
  2. Ductwork shall be certified/rated for electrical power purposes.
  3. Ductwork shall be electrically and mechanically bonded together in an approved manner.
- PVC as a substitute must be used in accordance with all local and national codes.
  - All openings in access flooring are to be cut out and finished off with grommet material by the customers contractor.
  - General contractor to insert pull cords for all cable run conduits between the equipment room and the operators control room.
  - 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.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cable ladder 450mm x 150mm [18&quot; x 6&quot;]</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Non-ferrous cable ladder 450mm x 150mm [18&quot; x 6&quot;]</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Box above ceiling size per local code</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>150mm x 100mm (6&quot; x 3 1/2&quot;) Surface wall duct</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>100mm x 100mm x 50mm [4&quot; x 4&quot; x 2&quot;] J-Box</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Main disconnect panel</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Main bypass panel</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>One 50mm [2&quot;] cnd above ceiling</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>One 75mm [3&quot;] cnd above ceiling</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>100mm x 100mm x 100mm [4&quot; x 4&quot; x 4&quot;] J-Box</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Non-ferrous unistrut cable support</td>
<td></td>
</tr>
</tbody>
</table>

**Outlet Legend for GE Equipment**

- System emergency off (SEO), (recommended height 1.2m [48"] above floor)
- Door interlock switch
- Emergency exhaust fan switch 1.2m [48"] height recommended)
- Duplex hospital grade, dedicated wall outlet 120-v, single phase power
- Network outlet
- Dedicated telephone lines/network connection
- Duplex hospital grade, dedicated outlet 120-v emergency, single phase power, 15a
- Duplex hospital grade, dedicated outlet 120-v, single phase outlet routed through RF filter

**Additional Conduit Runs**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>QTY</th>
<th>Size (in)</th>
<th>Size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Disconnect Panel</td>
<td>Power, Gradient, RF cabinet</td>
<td>1 as Req'd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PET Cabinet</td>
<td>1 as Req'd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System emergency off</td>
<td>1/2</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System emergency off</td>
<td>Secondary Penetration Wall</td>
<td>1/2</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Door Switch</td>
<td>Power, Gradient, RF cabinet</td>
<td>3/4</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Secondary Penetration Wall</td>
<td>3/4</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnet Rundown Unit</td>
<td>Magnet</td>
<td>1</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>RF filter</td>
<td>1 as Req'd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120-V 1Ø Power</td>
<td>1 as Req'd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room Light</td>
<td>RF filter</td>
<td>1 as Req'd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF filter</td>
<td>Facility emergency power</td>
<td>1 as Req'd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Bypass Panel</td>
<td>Main Disconnect Panel</td>
<td>1 as Req'd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UPS</td>
<td>2 as Req'd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facility power</td>
<td>as Req'd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiller</td>
<td>Remote graphic display</td>
<td>3/4</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Facility power</td>
<td>as Req'd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV Camera</td>
<td>Waveguide or RF filter</td>
<td>1</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>TV Monitor</td>
<td>1</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injector control unit</td>
<td>1 as Req'd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injector head</td>
<td>2 1/2</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated Battery Charging Unit</td>
<td>Waveguide or RF filter</td>
<td>1 as Req'd</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**CABLE TRAYS REQUIREMENTS IN MAGNET ROOM**

1. Ceiling
2. Finished Floor
3. Magnet isocenter. Gradient cables must be centered on magnet isocenter.
4. Minimum cable tray height required at back of Magnet: 2581 mm [101.5 in]. Tray height may be lower at other points to avoid obstructions.
5. Maximum height from floor to top of tray (anywhere in Magnet room): 3251 mm [128 in].
6. Minimum distance from top of cable tray to ceiling or other obstruction: 254 mm [10 in].
7. Tray end to isocenter: 1245 ±12 mm [49 ±0.5 in].
8. Other cable termination to isocenter: 864 ±12 mm [34 ±0.5 in].
9. Minimum distance between trays: 12 mm [0.5 in].
10. Non-ferrous cable support
11. Distance from isocenter to edge of right cable tray 60mm [2.36 in].

**CABLE TRAY REQUIREMENTS IN MAGNET ROOM**

- **Cable Tray Requirements (Side-By-Side)**
  - Min bend radius
  - Min 254 [10 in]
  - Min 330 [13 in]

**CABLE LADDER**

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- **Cable Tray Requirements (Side-By-Side)**
  - Min bend radius
  - Min 254 [10 in]
  - Min 330 [13 in]
POWER REQUIREMENTS

SPECIFICATIONS OF MAIN POWER INPUT

- **POWER SUPPLY**: 380/400/415/480V ±10%, THREE-PHASE + G
- **FREQUENCIES**: 50/60Hz ± 3Hz
- **POWER FACTOR**: 0.9
- **MAXIMUM INPUT POWER (5 sec MAX)**: 133kVA
- **INSTALLED LOAD**: 103kVA
- **STAND-BY POWER**: < 27kVA

- 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 BACK-UP POWER SUPPLY

**FOR MAGNET MONITOR**

- **POWER INPUT**: EMERGENCY POWER SUPPLY, SINGLE PHASE + GROUND
- **POWER DEMAND**: 2kVA
- **VOLTAGE**: 110V / 220V
- **FREQUENCY**: 50/60Hz ± 3Hz

**FOR CRYOCOOLER COMPRESSOR**

- **POWER INPUT**: 380/400/415/480V, THREE-PHASE + G
- **POWER REQUIREMENT**: MIN 9kVA
- **POWER CONSUMPTION**: MAX 7.2kW / STEADY STATE 6.5kW at 50Hz
  MAX 8.3kW / STEADY STATE 7.5kW at 60Hz
- **FREQUENCY**: 50/60Hz ± 3Hz

CABLES

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

GROUND SYSTEM

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

**POWER DISTRIBUTION**

COMPONENT POSITIONING, INTERCONNECT RUNS AND EMERGENCY OFF LOCATIONS ARE TYPICAL.

OPTIONAL CUSTOMER SUPPLIED BACKUP POWER MUST BE PROVIDED TO THE FACILITY BREAKER.

1. **FACILITY POWER GROUND**
2. **FACILITY POWER NEUTRAL**
3. **FACILITY CIRCUIT BREAKER**
4. **CIRCUIT BREAKER 1 (100 A)**
5. **120 VAC AUTO RESTART MODULE**
6. **EMERGENCY OFF DC SAFETY CIRCUIT WITH BATTERY BACKUP**
7. **CIRCUIT BREAKER 3 (50 A)**
8. **HEAT EXCHANGER CABINET (HEC)**
9. **HEC-POWER DISTRIBUTION**
10. **HEC TERMINAL STRIP**
11. **POWER, GRADIENT, RF CABINET (PGR)**
12. **PGR CABINET GROUND BUS BAR ON POWER DISTRIBUTION UNIT (PDU)**
13. **PGR CABINET TERMINAL STRIP**
14. **EMERGENCY OFF BUTTON**
15. **OPERATOR WORK SPACE LOWS** - PART OF GLOBAL OPERATOR CONSOLE (GOC)
16. **SECONDARY PENETRATION PANEL (SPW)**
17. **MAGNET (MAG)**
18. **RF COMMON GROUND STUD**
19. **EMERGENCY OFF BUTTON**
20. **CIRCUIT BREAKER 2 (150 A)**
21. **NEUTRAL BUS BAR**
22. **GROUND BUS BAR**
23. **CRYOCOOLER COMPRESSOR CABINET (CRY)**
24. **PET PDU**
25. **PET CHILLER**
26. **CIRCUIT BREAKER 4 (100 A)**
  A. **MAIN DISCONNECT PANEL (MOP)**
  B. **EQUIPMENT ROOM**
  C. **CONTROL ROOM**
  D. **MAGNET ROOM**
  E. **CABLE RUN M3030**
  F. **CABLE RUN E3030**
  G. **ADDITIONAL CUSTOMER SUPPLIED CABLE (IF NEEDED)**
  H. **CABLE RUN E4002**
  I. **CABLE RUN E4002**

NOTE:
- **THE HEC PROVIDES POWER TO THE CRY WHICH MUST OPERATE 24 HOURS PER DAY, 7 DAYS PER WEEK TO MAXIMIZE PROPER UNINTERRUPTED MAGNET OPERATION.**
- **RUNS E3030, M3030, M4040 AND E4002 ARE GE SUPPLIED CABLES. ALL OTHER WIRING IS CUSTOMER SUPPLIED.**
- **TWO REMOTE FLUSH WALL MOUNTED EMERGENCY OFF BUTTONS ARE SUPPLIED WITH THE MDP.**
- **MOP PROVIDES CIRCUIT BREAKERS FOR PDU (LOCATED IN THE PGR, THE HEC AND THE PET PDU).**
- **ALL MDP OUTPUT CIRCUITS DROP OUT ON LOSS OF POWER. THE HEC CIRCUIT WILL AUTOMATICALLY RESTART UPON RESTORATION OF POWER. EMERGENCY OFF LOCKS OUT ALL CONTRACTORS.**
- **GE MDP SHORTH CIRCUIT CURRENT RATING IS 25,000 AMPERES AT 480 VAC.**
- **GE MDP IS UL AND LEL LABELED.**
- **ALL CIRCUITS REQUIRE GROUND WIRES.**
- **THE WIRE SIZE FOR THE EMERGENCY-OFF CIRCUIT IS 12-22 AWG CUSTOMER SUPPLIED.**

**FEEDER TABLE**

<table>
<thead>
<tr>
<th>MIN. FEEDER WIRE SIZE</th>
<th>MINIMUM FEEDER WIRE LENGTH - ft (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>480 VAC</td>
<td></td>
</tr>
<tr>
<td>3/0 (85)</td>
<td>4/0 (85)</td>
</tr>
<tr>
<td>5/0 (100)</td>
<td>4/0 (100)</td>
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<tr>
<td>6/0 (100)</td>
<td>3/0 (100)</td>
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<td>7/0 (100)</td>
<td>3/0 (100)</td>
</tr>
<tr>
<td>8/0 (100)</td>
<td>3/0 (100)</td>
</tr>
<tr>
<td>9/0 (100)</td>
<td>3/0 (100)</td>
</tr>
<tr>
<td>10/0 (100)</td>
<td>3/0 (100)</td>
</tr>
</tbody>
</table>

**GENERAL NOTES**

In all cases qualified personnel must verify that the feeder (at the point of take-off) and the run to the MR system meet all the requirements stated in the PIM.

For a single unit installation, the minimum transformer size is 225kVA. Regulated transformer is not required unless voltage changes exceed +/- 10% over a period of 1 hour or longer.

Grounding conductor will run from the equipment back to the power source/main grounding point and always travel in the same conduit with the feeders.