

### WATER COOLING SPECIFICATIONS

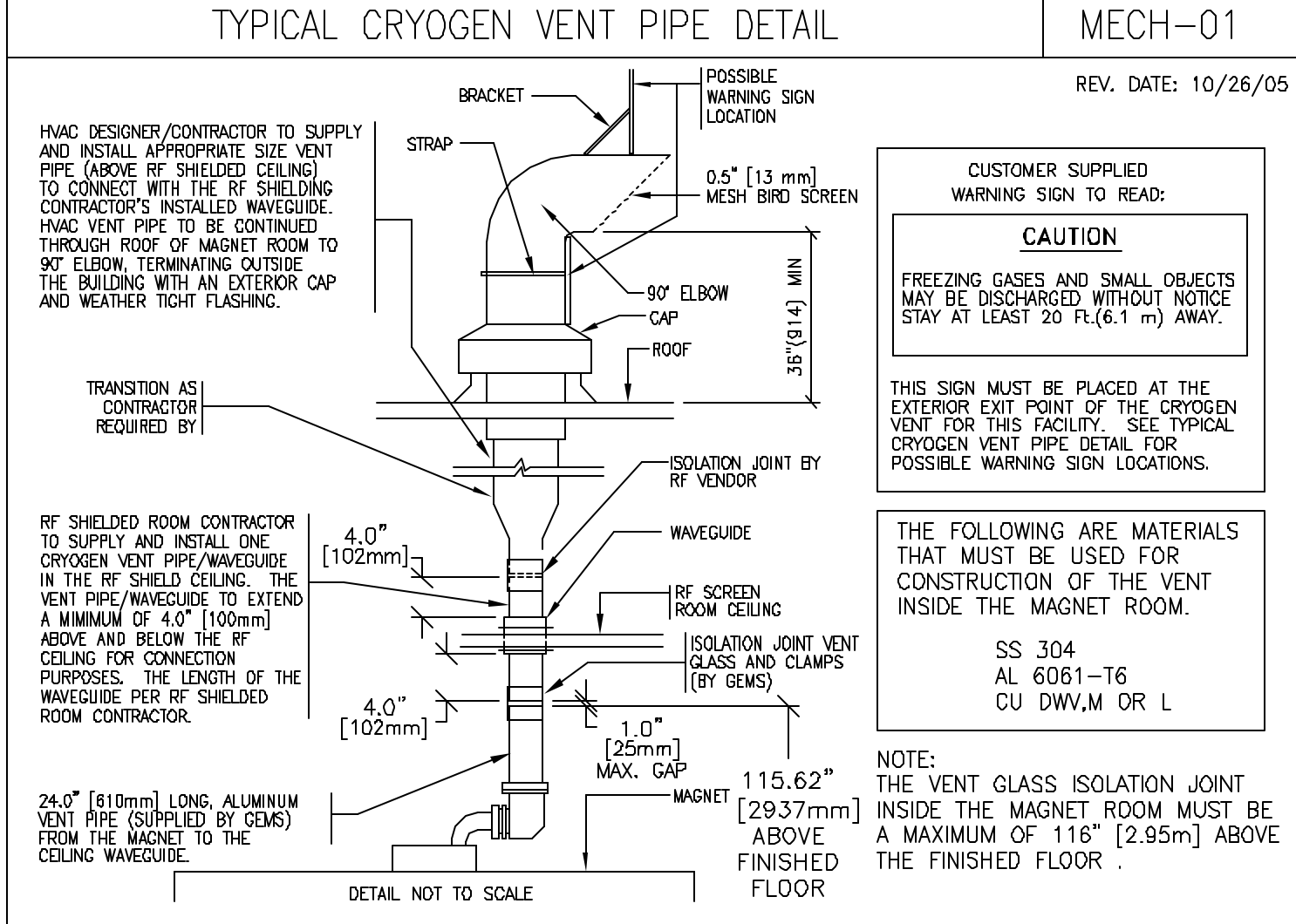
MECH-07  
REV. DATE: 04/08/03

A CLOSED LOOP WATER COOLING SYSTEM IS REQUIRED FOR THE SHIELD COOLER COMPRESSOR. OPEN LOOP CITY WATER IS UNACCEPTABLE.

EQUIPMENT	TEMPERATURE RANGE °F (°C)	INLET PRESS. psi (KPa)	RECOMMENDED FLOW RATE gal/min (liters/min)	TEMPERATURE RISE psi (KPa)	TEMPERATURE RISE °F Δ(°C)	TYPICAL HEAT OUTPUT BTU/Hr (WATTS)	MAXIMUM HEAT OUTPUT BTU/Hr (WATTS)
SHIELD/CRYO COOLER COMPRESSOR **	39.2-82.4 (4-28)	MIN 28(200) MAX 100(690)	MINIMUM 1.1 (4) MAXIMUM 2.6 (10.0)	AT MIN FLOW RATE 7.5 (28) AT MAX FLOW RATE 47 (324)	AT MIN FLOW RATE 48.4 (26.9) AT MAX FLOW RATE 19.4 (10.8)	25500 (7500) 28320 (8300)	28320 (8300)

NOTES: \* ENSURE WATER COOLING SYSTEM CAPACITY IS CAPABLE OF DISSIPATING MAXIMUM HEAT OUTPUT.  
 \*\* THESE WATER COOLING SPECIFICATIONS ARE THE REQUIREMENTS AT THE EQUIPMENT. THE COOLING SYSTEM DESIGN MUST HAVE ALLOWANCES FOR PRESSURE/TEMPERATURE CHANGES DUE TO DISTANCE THE CHILLER IS LOCATED FROM THE EQUIPMENT.

- PRESSURE DROP AND WATER TEMPERATURE RISE ACROSS EQUIPMENT IS GIVEN FOR MINIMUM AND MAXIMUM RECOMMENDED FLOW RATES AS INDICATED. PRESSURE DROP IS MEASURED BETWEEN COOLANT INLET AND OUTLET AT COMPRESSOR UNIT.
- WATER FLOWMETER KIT (46-29405261) IS AVAILABLE TO CHECK/MONITOR FLOW RATE FOR THE SHIELD COOLER COMPRESSOR. ADD 2 PSI TO TOTAL SYSTEM PRESSURE DROP IF FLOWMETER IS PERMANENTLY INSTALLED IN SYSTEM.
- RECOMMEND A FLOWMETER BE PERMANENTLY INSTALLED IN SYSTEM, INCLUDE FLOWMETER DROP IN TOTAL SYSTEM PRESSURE DROP.
- SHIELD COOLER COMPRESSOR WATER FLOW RATE IS BASED ON INLET WATER TEMPERATURE OF 82.4° F (28° C), LOWER TEMPERATURE PERMITS LOWER FLOW.
- MINIMUM FLOW RATE IS FOR CLEAN WATER WITHOUT ANTI-FREEZE, MAXIMUM FLOW RATE IS ANY MIXTURE OF WATER/ANTI-FREEZE.
- WATER FLOW RATE AND TEMPERATURE RISE VALUE ARE BASED ON WATER, LABORATORY GRADE ETHYLENE GLYCOL OR PROPYLENE GLYCOL. ANTI-FREEZE MAY BE USED (DO NOT MIX ETHYLENE GLYCOL WITH PROPYLENE GLYCOL). PREFERRED CONCENTRATION IS 50% WATER AND 50% GLYCOL. TO MINIMIZE ORGANIC GROWTH, CONCENTRATION OF 50/50 IS ACCEPTABLE WITH A DERRATE OF 0.8 IN SPECIFIC HEAT CALCULATIONS AND A 20% INCREASE IN FLOW.
- PRESSURE DROP VALUES BASED ON NEW SYSTEM, MAY RISE DUE TO CALCIFICATION.
- SHIELD/CRYO COOLER TEMPERATURE RISE, TYPICAL AND MAXIMUM HEAT OUTPUT ARE REDUCED BY 18% AT 50 HZ OPERATION.
- WATER COOLING CIRCUIT TYPICAL VALUES: - WATER INLET FLOW 1.8 TO 2.1 GAL/MINUTE (7 TO 8 LITER/MINUTE)  
 - WATER INLET TEMPERATURE 53.6 TO 59°F (12 TO 15°C)  
 THERE IS A RISK OF DAMAGING THE SHIELD/CRYO COOLER COMP. WITH WATER INLET LOW TEMPERATURE AND LOW FLOW RANGE.



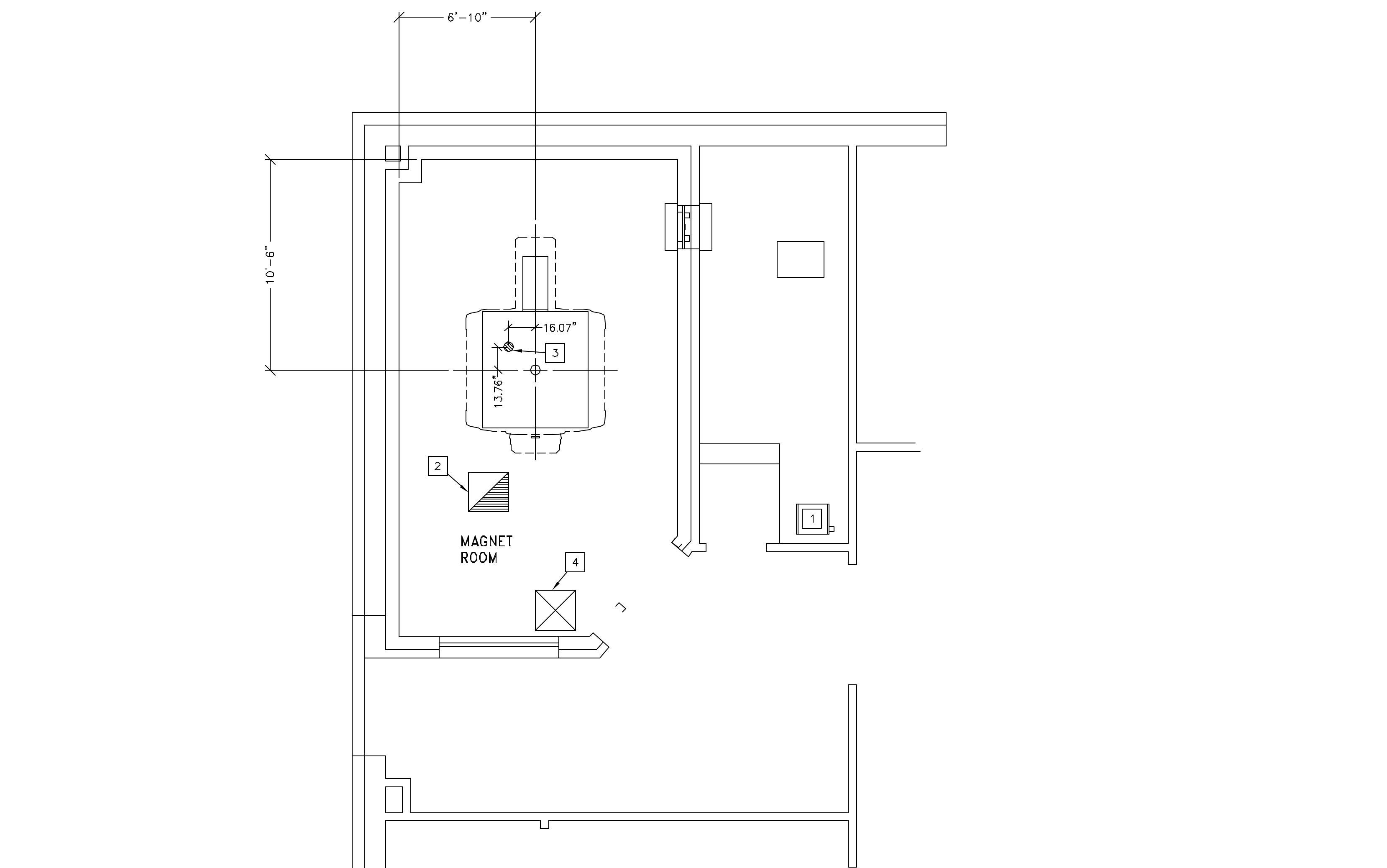
### CRYOGENIC VENT SYSTEM PRESSURE DROP MATRIX (A)

MECH-04  
REV. DATE: 10/04/02

(THIS TABLE MUST BE USED FOR CRYOGENIC VENT SYSTEM DESIGN)

INSIDE DIAMETER OF VENT PIPE - in.(mm)	CRYOGENIC VENT SYSTEM PRESSURE DROP MATRIX FOR A MAGNET WITH 8" [203mm] VENT.				PRESSURE DROP PER ELBOW USED ANYWHERE WITHIN 20 FT VENT SEGMENT			
	DISTANCE OF VENT SYSTEM COMPONENT FROM MAGNET - ft.(m)	STANDARD SURFACE ELBOW	STANDARD SWEEP ELBOW	LONG SWEEP ELBOW	STANDARD SURFACE ELBOW	STANDARD SWEEP ELBOW	LONG SWEEP ELBOW	
8(203)	0-20 (0-6.1)	0.10 (2.26)	1.10 (7.58)	2.06 (14.20)	0.55 (3.79)	1.03 (7.10)	1.85 (12.76)	
10(254)	0-20 (0-6.1)	0.03 (0.88)	0.55 (3.79)	0.82 (5.56)	0.27 (1.86)	0.41 (2.93)	0.75 (5.17)	
12(305)	0-20 (0-6.1)	0.013 (0.29)	0.27 (1.86)	0.41 (2.93)	0.14 (0.97)	0.21 (1.45)	0.35 (2.33)	

NOTE 1: ELBOWS WITH ANGLES GREATER THAN 90° MUST NOT BE USED.  
 NOTE 2: THE TABLE DATA IS BASED ON THE FOLLOWING:  
 A. INITIAL FLOW CONDITIONS AT MAGNET INTERFACE.  
 B. GAS TEMPERATURE STARTING AT 4.5 KELVIN (-452° F OR -268° C).  
 C. HELIUM GAS FLOW RATE OF 2.737 CUBIC FEET (77.5 CUBIC METERS) PER MINUTE.  
 D. 45° STANDARD SWEEP ELBOW K = 15 F.  
 E. 90° STANDARD SWEEP ELBOW K = 30 F.  
 F. 45° LONG SWEEP ELBOW K = 7.5 F.  
 G. 90° LONG SWEEP ELBOW K = 15 F.  
 NOTE 3: THE TOTAL PRESSURE DROP OF THE ENTIRE CRYOGENIC VENT SYSTEM MUST BE LESS THAN 17 PSI (117.2 KPa).  
 THE CALCULATION STARTS AT THE MAGNET VENT INTERFACE AND ENDS AT THE TERMINATION POINT OUTSIDE THE BUILDING.  
 NOTE 4: FOR 14 IN. [356mm] AND 18 IN. [457mm] VENT PIPE DIAMETERS REFER TO PRE-INSTALLATION MANUAL, REFERENCED ON SHEET C1.



### MECHANICAL/PLUMBING ITEMS

CUSTOMER/CONTRACTOR SUPPLIED AND INSTALLED ITEMS

ITEM NO.	ITEM DESCRIPTION (* INDICATES EXISTING)
1	(2) 1/2" [13 mm] I.D. HIGH PRESSURE HOSES AND (4) 1" [25 mm] COMPRESSION CLAMPS. 150 MICRON FILTER, SHUT OFF VALVES AND BY-PASS VALVE AS REQUIRED. SEE DETAIL MECH-06. WATER QUALITY MUST BE 6.5-8.5 PH, A HARDNESS OF LESS THAN 200 PPM, SUSPENDED MATTER OF 10 PPM PER LITER AND LESS THAN 150 MICRON PARTICLE SIZE. ANTI-FREEZE MINIMUM OF 25 PER CENT, MAXIMUM OF 50 PER CENT BY VOLUME. FOR WATER SPECIFICATIONS SEE DETAIL MECH-07 AND EQUIPMENT DETAIL M16-15E ON THE EQUIPMENT DETAIL SHEETS.
2	EXHAUST FAN AND AIR INLET TO PROVIDE A MINIMUM OF 12 AIR EXCHANGES PER HOUR OR 1800 CFM, WHICH EVER IS LARGER. SEE DETAIL ELEC-55 ON THE ELECTRICAL DETAIL SHEET(S). MAGNET ROOM EXHAUST FAN INTAKE VENT MUST BE LOCATED AT THE HIGHEST CEILING PLANE NEAR THE MAGNET CRYOGEN VENT.
3	REFER TO PRE-INSTALLATION MANUAL LISTED ON SHEET C1 FOR CRYOGEN VENT REQUIREMENTS. SEE SHEET S-2 FOR CRYOGEN VENT LOCATION. 8" [203 mm] CRYOGEN VENT - TOLERANCE FOR VENT LOCATION +/- 0.25" [6 mm]. SEE DETAILS MECH-04 AND MECH-01. THE CUSTOMER'S DESIGNER IS RESPONSIBLE FOR SELECTING VENT MATERIALS AND HARDWARE CAPABLE OF SAFELY HANDLING EVER IS LARGER. SEE DETAIL ELEC-55 ON THE ELECTRICAL DETAIL SHEET(S). THE CUSTOMER'S CONTRACTOR IS RESPONSIBLE FOR PROVIDING AND INSTALLING THE CRYOGEN VENT FROM THE MAGNET VENT ADAPTER TO THE BUILDING'S EXTERIOR. FOR NON-STANDARD VENT CONFIGURATIONS (I.E. OFFSET CEILING EXITS, WALL EXITS, AND GEDDESIC DOWNS) THE CUSTOMER'S CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF THE CRYOGEN VENT SYSTEM AND VENT SUPPORTS WITHIN THE MAGNET ROOM.
4	MINIMUM 8 FT. x 8 FT. [0.61m x 0.61m] PRESSURE EQUALIZING WAVEGUIDE VENT IN THE MAGNET ROOM CEILING.

### 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 INSTALLATION REQUIREMENTS, SPECIFICATIONS AND GUIDELINES REFER TO THE PRE-INSTALLATION MANUAL REFERENCED ON SHEET C1 FOR:  
 MR SYSTEMS - SYSTEM COOLING, CRYOGEN VENTING, WAVEGUIDES AND EXHAUST VENTING.  
 CYCLOTRON SYSTEMS - CHEMISTRY LINES, GAS LINES, AND SYSTEM COOLING.

This drawing is based on Sketch No.: 06NEF026

PROJECT TITLE: MERCY HOSPITAL FORE RIVER PORTLAND, MAINE

PROJECT	REVISION
065904	00

DATE: 10/4/06  
 DRAWN BY: PMM  
 CHECKED BY: PMM  
 QUOTE NO: KX1CB7  
 QT. DATE: 9/25/06

REVISION HISTORY:

SHEET M1

Drawn by: Paul Merchen Octel no.: 3204579  
 GE Installation  
 Project Manager: JIM DOMBROSKI  
 Telephone no.: 603-934-3739

GE Healthcare Technologies  
 Installation Services Design Center  
 Milwaukee, Wisconsin

SHEET TITLE: MECHANICAL LAYOUT  
 MODALITY TYPE: 1.5T SIGNA HDX

THIS PLAN IS SUBMITTED TO SUGGEST LOCATION OF GE HEALTHCARE EQUIPMENT AND ASSOCIATED APPARATUS, ELECTRICAL WIRING DETAILS AND ROOM ARRANGEMENTS. IN PREPARING THIS PLAN, GREAT EFFORT HAS BEEN MADE TO CONFORM TO ALL APPLICABLE CODES AND REGULATIONS. HOWEVER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGES RESULTING THEREFROM.

NFSH-1002