PART 1 GENERAL

1.01 DESCRIPTION

A. This Section specifies the construction of piping for the listed system.

B. Provide piping for the following high pressure system:
   1. MRI cryogen vent

C. Include all wall and ceiling access panels, flexible couplings, diffusers, roof caps, sealing systems, hangers and supports necessary to complete the indicated and specified system and achieve the desired system operation.

1.02 QUALITY ASSURANCE

A. All piping and fittings must have a computer generated label affixed to each section detailing all applicable information including the pipe dimensions, gauge, reinforcement type/class, and connector type of systems manufacturer. In addition, country of origin must be clearly stenciled on each pipe section.

B. The Engineer reserves the right to randomly check metal gauges and reinforcing to verify all pipe construction is in compliance. Non-conforming material will be replaced by the Contractor at no cost to the Hospital.

1.03 SUBMITTALS

A. Submit cryogen vent fabrication and layout shop Drawings in accordance with Section 20 05 15, "Submittals." Coordinate the detailed fabrication Drawings with all trades. Coordinate size and location of piping with structure, piping, lighting, equipment, conduit, bus ducts, ceiling construction and clear height above ceilings and other items which may present a potential conflict.

B. Layout drawings shall be at 1/4 inch = 1 foot scale on reproducible media with enlarged sections, elevations, plan Drawings, and mechanical room Drawings as necessary to ensure a coordinated installation.

C. Submit documentation that the minimum air flush-out was completed, including dates when the flush-out was begun and completed.

1.04 CRYOGEN VENT DIMENSIONS

A. The dimensions indicated on the contract Drawings are the net inside clear dimensions available for cryogen flow.

B. Contractor shall allow for exterior insulation thickness as required and indicate this on the cryogen vent layout shop Drawings.
PART 2 PRODUCTS

2.01 MRI CRYOGENIC VENT PIPE

A. For cryogenic venting, welded non-magnetic stainless steel pipe shall be used in all MRI rooms where shown on the Drawings.

B. Stainless steel pipe shall be Type 304 non-ferromagnetic. All vent pipe shall be Schedule 5 pipe.

C. Piping shall be installed with bracing as required to withstand the forces encountered during a cryogenic release event. These forces are indicated by the MRI manufacturer to be 2500 lb. helium flow reaction force and temperature increase from 4.5°K to ambient.

D. Provide a stainless steel bellows in each cryogen vent system, to be located in the middle of each horizontal piping run exceeding 25 feet. Bellows shall be rated to 50 psi. Provide Flexicraft MNLC50WS or equal as manufactured by U.S. Bellows, PHPK Tech or Microflex.

E. All expansions in diameter shall be made with a diffuser. All elbows shall be long radius (centerline radius at least 1.5 times pipe diameter).

F. Provide 12 to 19 inch flexible section of pipe at cryogen valve of MRI.

G. All connections to be welded. All internal surfaces shall be smooth.

H. Provide 3/8 inch stainless steel wire mesh at outlet, covering at least 2.5 times the cross sectional area of the cryogenic vent pipe.

PART 3 EXECUTION

3.01 INSTALLATION

A. All piping installations and construction shall comply with all requirements of this Specification and meet or exceed MRI manufacturer's standards and recommendations for construction and installation.

B. Seal all pipe seams, joints, connections, and penetrations.

C. Keep piping tight to underside of structure. Maintain at least 3 inches clear between pipe and ceiling construction.

D. Secure all insulation and vapor barriers on pipes with a separate draw band.

E. Coordinate all attachments through roofing penetration with Roofing Contractor.
3.02 TESTING

A. Test Requirements:
   1. Installed piping shall be tested prior to installation of MRI equipment.
   2. Leak-test all piping. Leakage in any tested section of cryogen vent shall not be accepted.

B. Document all duct testing and submit testing results as part of "As-Built" documents.

3.03 CRYOGEN VENT CLEAN OUT

A. Clean and blow out complete cryogen vent system before any connections to equipment are made. Inspect for debris before starting any equipment.

B. Interior surfaces shall be free of dust and debris prior to initial start up. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access for cleaning purposes. Any cleaning of cryogen vent systems shall comply with recommendations of NAIMA and NADCA.

C. When internally cleaning pipe work prior to installation or shipment to the jobsite, cover all pipe ends and openings with a dual polyethylene protective film. Securely affix the film to protect against dirt and debris. Film must be translucent to facilitate inspection of interior surfaces without removing film. Film must have a minimum elongation of 600%, contain no VOC and leave no residue on pipe after removal.

D. Clean external surfaces of foreign substances that might cause corrosion, deterioration of the metal, or where cryogen vent is to be painted.

END OF SECTION