Helium Quench Pipe

Emergency Helium Quench Discharge Systems

- The superconducting magnet used in most MRI Systems is cooled by liquid helium at 4 Kelvin (K) = (-269°Celsius). If the magnet cooling system fails, a quench occurs during which the magnet boils off 100% of the liquid helium.
- During a quench, a large volume of extremely cold helium gas needs to be safely vented outside of the building. Failure of the cryogenic vent can result in this cold gas entering the magnet room or another portion of the building, which may result in the ambient oxygen supply being lowered to an unsafe level, as well as a possible risk of cold injuries.
- It is therefore extremely important that the MRI Scanner room helium quench system is properly designed and installed.
- During a quench, the helium gas will warm up and expand rapidly. As the helium gas escapes from the magnet, it will increase in temperature from 4.5K to anywhere between 10K - 150K, depending on the location along the pipe.
- As a result, the gas will expand to up to 700x its original volume. Consequently, quench systems must never decrease in size and may increase in diameter as the distance from the magnet increases.

Low Pressure Helium Extraction

- This is not to be confused with the emergency quench discharge system, but is recommended by the United Kingdom National Health Service NHS Estates for extracting helium that may leak from the cryogenic Dewar when the helium in the scanner is topped up.
- This leaked helium can accumulate in the MRI examination room, displacing the oxygen and compromising patient safety.
- This is not a mandatory requirement, but if desired, it needs to be carefully integrated with the other MRI services.

Specification

- Stainless steel pipe with TIG welded joints, pipe diameter determined by the length of run.
- Insulated so surface temperature of pipe does not exceed 0ºC during a quench, internal temperature -269°C.
- Support bracket design to resist up to 1125 Kilogram-force thrust on a 90 degree bend.
- Designed to accommodate 4.7mm shrinkage per m
- Quench discharge point designed to avoid all potential risks to safety associated with this aspect of the installation. Our design covers all important issues, from human interface hazard at exit point, to prevention of venting obstructions caused by bad design and inappropriate sighting.

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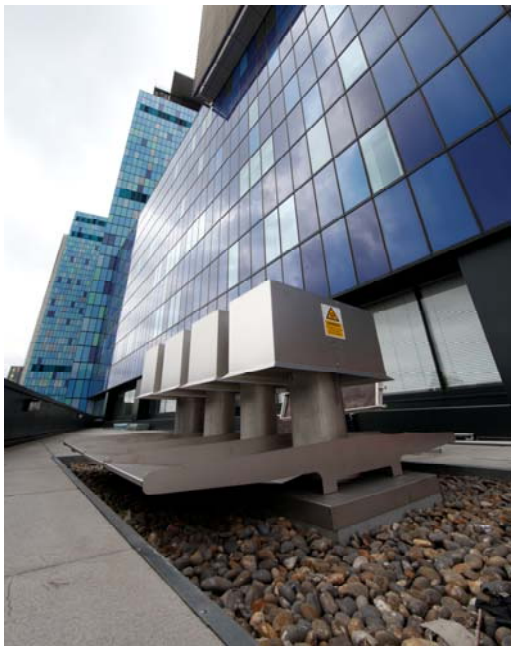
Thermal compensation pipe bellows

Pre-positioned pipe end to match MRI cryostat pipe

Typical pipe run with bellows

Examples of EEP Quench Pipe Discharge Vents.



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