



Quality Alert

Ground Source Heat Pumps – Refrigerant Gas and Compliance

1. Description of Issue

During the development of the Ground Source Heat Pump (GSHP) design at a DfE Primary School, a prolonged technical review process was required to achieve compliance with DfE refrigerant requirements. The GSHP specialist proposed the use of R410A refrigerant (GWP 2088), which exceeds the limits defined in DfE Technical Annex 2F.

2. DfE Compliance Requirement

DfE Technical Annex 2F (November 2022) – Mechanical Services (Public Health) requires agreement to be sought for any refrigerant with a Global Warming Potential (GWP) greater than 1500. An RFI submitted to DfE's Technical Advisors was rejected on the basis that compliant alternatives exist without compromising system performance.

3. Resolution

Following further engagement, a revised solution was agreed using R454B refrigerant combined with a 6kW electrical immersion element within the buffer tank to provide maintenance resilience. This proposal was accepted by DfE's Technical Advisors after approximately three months of review.

4. Risks and Impacts Identified

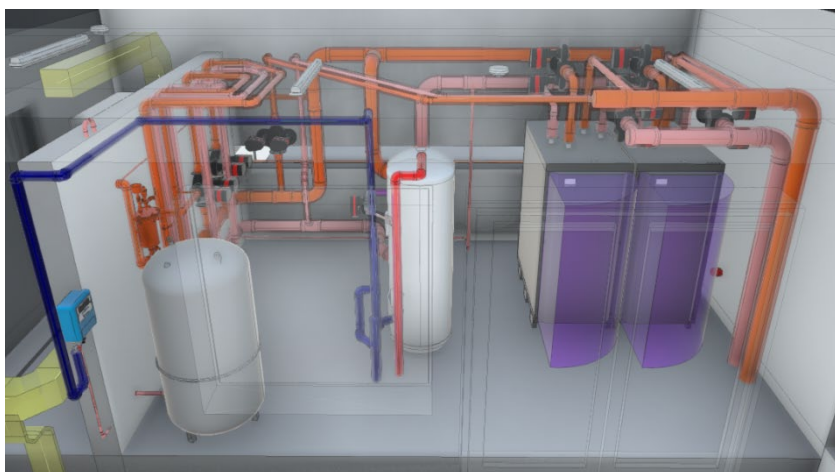
The adoption of R454B introduces additional statutory and design considerations, including DSEAR (The Dangerous Substances and Explosive Atmospheres Regulations 2002) assessments and potential ATEX (ATmospheres EXplosibles) compliance. These may impact plant room ventilation strategy, refrigerant leak detection, electrical infrastructure, programme, and cost.

5. Root Cause

Refrigerant compliance considerations under DfE Technical Annex 2F were not fully explored during the tendering process, and the potential impacts of alternative compliant refrigerants were not identified at tender stage.

6. Quality Alert / Recommendation

Projects proposing GSHP systems should understand the refrigerant being used and the implications of using flammable gasses within these systems and the impact this will have on plant room design, additional ventilation requirements and additional monitoring of systems.



This advice should be used, where the above is applicable, and the information discussed with your team highlighting the following points:

- As the recommendations above

Toolbox Talk Packages (put an 'x' next to the related work packages):

Brickwork / Blockwork	Doors & Windows	Roof	Drainage	Frames	Roads, Paths, Pavings & Surfacing	Site preparation works
Substructure	FFE	Flooring	Internal walls & partitions, Ceilings	Joinery / General Carpentry	Painting	Fire & Lightning protection
Walling (Tiling)	Electrical Installations	X Services / Systems	Water installations	DFMA (Offsite Manufacture)	X Design	Miscellaneous



Everyone has the right to be
100% Safe