

**Improvement Condition 10 – BAT 9 (Refrigerants)**

First Milk Haverfordwest Creamery has a number of refrigeration systems on site to provide cooling for production processes, for storage of finished product prior to despatch, and small quantities of ingredients such as frozen starter cultures.

The site use a specialist refrigerant company, J&E Hall International, to provide a full service for design, installation, servicing and maintenance of refrigeration equipment on site.

The table below provides an overview of our refrigeration equipment against the BAT requirements, based on technical guidance provided by J&E Hall.

| System                                 | Refrigerant |      |             | BAT Compliance Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------|-------------|------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        | Type        | GWP  | Charge (Kg) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Cheese store (2 units)                 | R449A       | 1397 | 65Kg + 70Kg | Originally on R22. Retrofilled initially to R404A to eliminate R22 (required new condensers to be installed) and then again in 2019 to R449A to reduce the GWP.<br><br>Next stage will be at the end of its useful life. Replacement will be either through putting the load onto the existing ammonia plant (capacity dependent) or a new stand alone ultra-low GWP system (e.g. Ammonia, CO <sub>2</sub> or propane)                                                                                                                                                                                                                                                                                                                                         |
| Chilled Water Plant                    | Ammonia     | 0    | 500Kg x 2   | Ammonia chilled water plant installed in 2021, replacing old F-Gas system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Rapid Chiller Store (4 units)          | R438A       | 2265 | 342Kg x 4   | System retrofilled from R22 to R438A. New semi hermetic compressors and new condensers were installed in 2015 to extend the plant life post the ban on R22.<br><br>Due to the plant design, retrofitting to a lower GWP refrigerant such as R449A (~38% reduction) is not viable due to the PS rating of major system components and the excessive cost of replacing them on an old system.<br><br>Plans will be developed to replace the RCS at the end of its life (estimated 5-10 years) with an ultra-low GWP system (e.g. ammonia, CO <sub>2</sub> or propane). Due to the limited down time available, the potential window to install new equipment within the existing RCS may not be feasible and a new store construction may have to be considered. |
| Walk in lab freezer                    | R404A       | 3922 | 5.5Kg       | Small, contained unit not suitable for change of refrigerant – will be replaced at end of life with lowest feasible GWP refrigerant system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Cheese Starter Room freezers (3 units) | R410A       | 2088 | 1.8Kg x 3   | Very small, contained freezer units not suitable for change of refrigerant – will be replaced at end of life with lowest feasible GWP refrigerant system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Cheese grading room fridges (2 units)  | R410A       | 2088 | 2.5Kg x 2   | Very small, contained fridge units not suitable for change of refrigerant – will be replaced at end of life with lowest feasible GWP refrigerant system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |