

Dometic Input on the Restriction on the manufacture, placing on the market and use of PFASs.

Solna, Sweden April 19th 2023.

Feedback from Dometic Group on the proposal from member states on the restriction on the manufacture, placing on the market and use of PFASs. Some more information on Dometic as a company is indicated in Annex A of this document, and information on products discussed in paper indicated in Annex B.

Request for clarification

The proposal include some derogations that preferably would require strict definitions to avoid ambiguity and potential loop holes. We have identified the following unclarities:

- Transport refrigeration – and specifically if this sub-use would include all type of transports on land, on sea and in air, and if there is any limitation on what type of good is transported and refrigerated.
- Mobile Air-conditioning - and specifically if this sub-use is equal to products within the scope of the MAC-Directive or if any other mobile air conditioners would fall under the proposed derogation.
- Mobile – and specifically if this would have the same understanding as in the F-gas Regulation: *“normally in transit during operation”*

We appreciate if clear definition could be included in the legislation and furthermore that such definitions are fully aligned with those found in other relevant legislation covering products in scope.

Request for derogation

We don't see that the use of refrigerant for several **mobile and portable application** of refrigeration and air-conditioning - other than transport refrigeration and car air-conditioning - have been assessed in the proposal. With reference to details below, we therefore request a new derogation with the following suggested wording:

“Refrigerants for refrigeration and air-conditioning in recreational vehicles, trucks, boats and passenger cars (with the exemption of those within the scope of Directive 2006/40/EC of the European Parliament and of the Council), and in portable cooling boxes, until 6.5 years after EoF”.

This sub-use may be sorted in under the use sector “Applications of fluorinated gases” or under “Transport”.

Justification

The main PFAS refrigerants for in mobile applications are R134a, R1234yf and the blends R410A, R407C, R417A and R404A. This use include a wide range of different products and also many different providers for individual products. Some sub-uses are dominated by import from many small providers. Dometic is the major provider of this type of product on the EU market. Examples of products within this sub-use is indicated in Annex B of this document.

Because of the diversity of products and applications for this use, the alternatives to PFAS refrigerants also vary significantly. Furthermore, the legal situation is different for different markets, an important aspect for us as a global provider of products and important to ensure competitiveness for a European supplier in a global arena. We see mainly flammable hydrocarbons (R600a and R290a) – classified as A3 refrigerants - as alternatives for the smaller hermetically sealed products, and potentially CO₂ for bigger ones. R32 could technically be an alternative for air-conditioning applications but will not meet the GWP threshold in the new F-gas Regulation.

The alternatives present different challenges. For the hydrocarbons this is mainly the safety concerns and the need for a deep safety assessment. This have already been assessed for other sub-uses during the development of the proposal. Leaking refrigerants could be ignited with risk of fire and explosion. For CO₂ the bottleneck is the availability of components, but also the challenges related to the very high system pressure. We will elaborate on the alternatives more in detail below.

Dometic is already in the process of analyzing the introduction of alternative refrigerants for concerned products. Some products, with limited safety hazard, is already in the process to be converted to new refrigerants. This include some refrigerators with very small refrigerant charge aimed for larger recreational vehicles (RV) and minibars to cruise line ships. We have also notices that some competitor have introduced some products for RV containing hydrocarbon refrigerants on the EU market. For most of the products though, the conversion is still in a planning phase. The challenge in this context is to predict the use of the products which is different compared to many residential applications where the use is more easily defined. The strict requirement in the various safety standards make the introduction also unpredictable from an approval stand-point.

Our products placed on the EU market are covered by extended producer responsibility according to the WEEE Directive and the ELV Directive. Following these directives, any refrigerants must be reclaimed and treated separately at end-of-life, and consequently there should theoretically be no emissions. The actual performance level of the collection and end-of-life treatment facilities is however not within our control and we encourage you to take direct contact with recycling operators to get precise figures.

CO₂ as alternative

We consider CO₂ to be a potential future alternative for some of our larger chillers and air-conditioning units mainly for marine applications. Existing products operate on the refrigerant blends such as R410A and R407C. We don't see conversion to flammable A3 refrigerants being an option for these product because of the big refrigerant charge in combination with boat installations. Potential leaks in boats are critical and

could cause both explosions and fires. In marine application also a small fire could cause a major accident with limited, or no, escape options.

The major challenge with CO₂ in our applications is the availability of components, specifically compressors, in suitable sizes for our applications. Furthermore, CO₂ require a significantly higher system pressure that both possesses safety risks and risk of lost performance because of the high input power needed. The higher system pressure will also increase weight of the components. A lower efficiency and a higher weight will inadvertently increase the energy consumption which is very unattractive from a climate perspective. No compressors for Direct Current (DC), required in mobile application, are available today for CO₂.

Dometic has not yet started any activities related to CO₂ as refrigerant more than theoretical studies. We estimate that the development process will take minimum 5-8 years assuming that the component availability continue to progress.

Hydrocarbons as alternative

For most of the hermetically sealed products our plan is to move to flammable hydrocarbon refrigerants. Technically we know that this is feasible and the availability of components is good. However we have strong concerns on the safety aspects related to risks of igniting leaked refrigerants. Important considerations here are:

1. The products are often installed in confined spaces like small vehicle and marine application, where also leakage of a limited refrigerant charge could present a significant risk. Air-conditioning units for trucks is one type of products that we identified as critical. We as a product provider do not fully control how the products is installed, used and stored, and information in manuals in manuals is often not followed by the user.
2. Portable products, like cooling boxes, are by definition flexible and could be stored and used in many confined spaces, like wardrobes, in small boats or in the car truck. The free volume in these places is often too small to dilute a leaked refrigerant charge and consequently a spark could ignite the refrigerant with severe consequences.
3. Mobile devices are per definition subject to significantly more vibration than stationary refrigerators, freezers, air conditioners and other appliances due to intended use. Therefore the risk of leakage is also higher for mobile products.

To reduce the risks several options exist like minimizing the refrigerant charge, elimination of components with sparks, minimize tube joints (risk of leakage), sensors to detect leaks etc. Furthermore, simulations and real test could be used to understand the concentration levels of refrigerant at leak condition. Fault tree analyses is a tool we use to assess the risk associated with leaked refrigerants.

Products safety standards consider safety aspects on flammable refrigerants and has shown to be a powerful tool to design safe products. However, safety standards do not consider the safety aspect related to the environment where the products are used or stored. As mobile and portable products have a different use cases than domestic products we have identified this as a significant risk.

The overall most critical bottleneck for us is related to the development time, because of the huge number of products that need redesign and safety assessment. The example products provided in Annex B of the

attached document show some major product categories. These in turn are spitted on many individual models families, models and stock keeping units (SKU). We estimate that approximately 240 different models and 890 SKU's must be converted to new refrigerant. Depending on the risk assessment it is also not solely in our hands. It may also be necessary to make changes on the customer side which will further add to the conversion time required.

At this stage it is difficult to predict detailed costs associated to the substitution, but generally speaking cost will appear both in relation to products (development costs, additional safety components, certification, extended safety assessments, field tests), manufacturing sites (new installations, safety monitoring systems, training) on the market (training, marketing material) and at end-of-life. Cost for product development is depending on the number of products (models) that should be converted.

Time to re-design products and fully implement hydrocarbons vary significantly between product categories. We estimate that most of our products could be converted in the time frame of 3-6 years depending on complexity and the number of models that must be converted. Important though is that the risk assessment might conclude that flammable refrigerants are not possible to introduce for some product categories.

We do not see that new refrigerants should affect the product performance or life time significantly. Slightly increased energy consumption could not be excluded for some products because of safety monitoring systems. Due to safety concerns we might also need to limit the approved use for some products. We however foresee that the product price will increase because of increased safety measures such as sealed electrical components and systems to monitor leaks. We estimate that these additional costs will be in the area of 10-20% increase.

For any further questions we would be glad to assist you.

For Dometic Group



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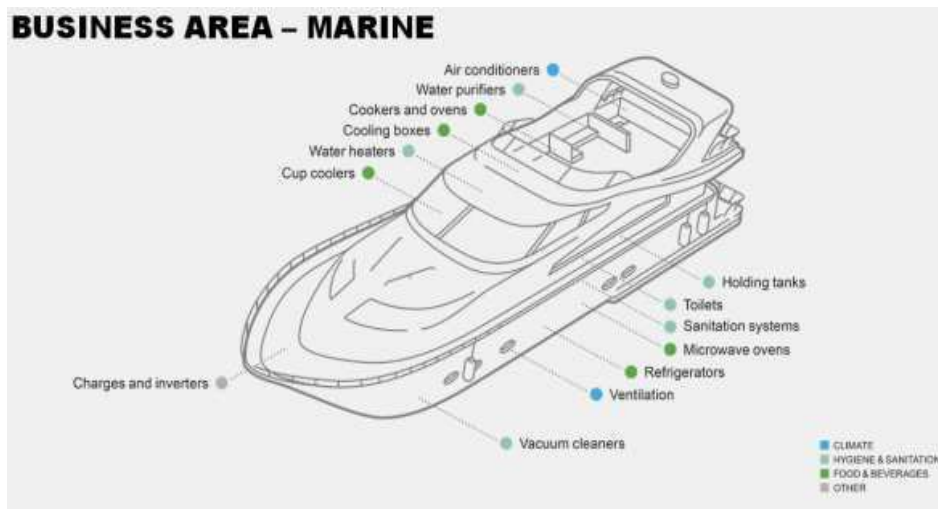
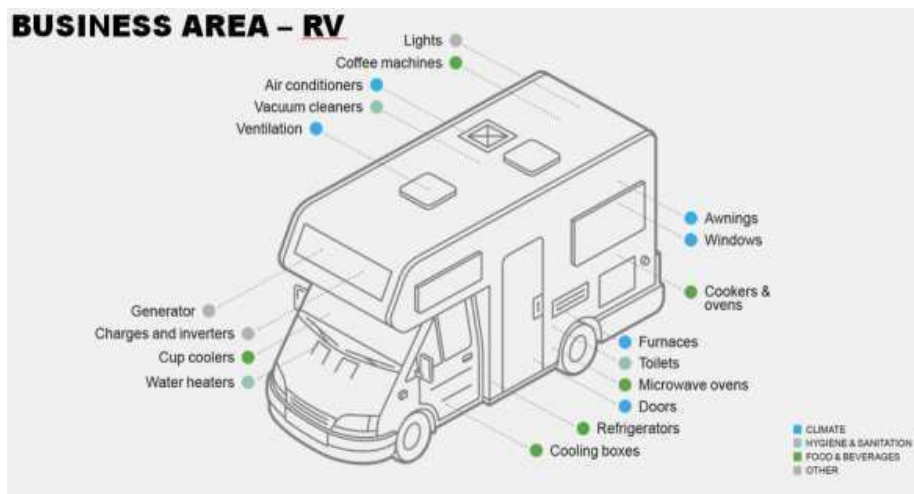


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Annex A

About Dometic Group

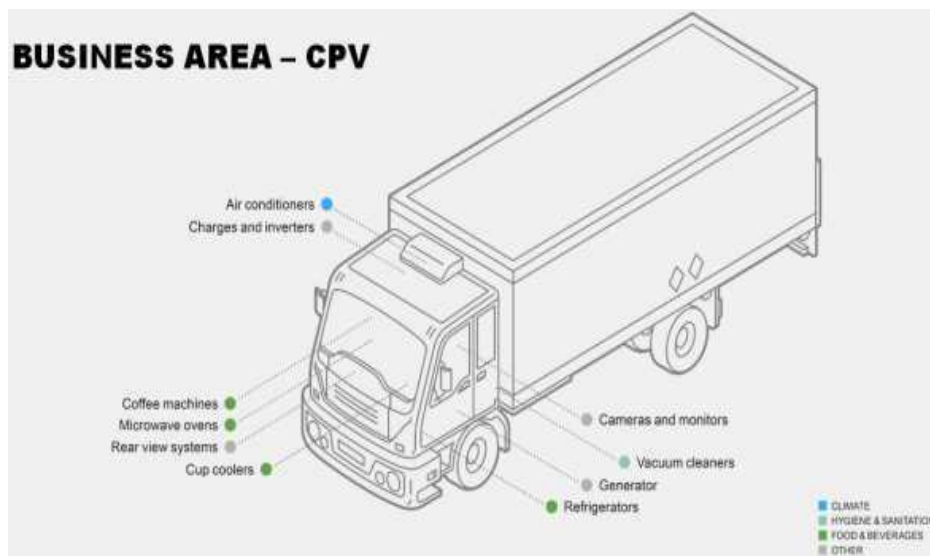
Dometic is a global market leader in branded solutions for mobile living in the areas of Climate, Hygiene & Sanitation and Food & Beverage. Dometic operates in the Americas, EMEA and Asia Pacific, providing products for use in recreational vehicles, trucks and premium cars, pleasure and workboats, and for a variety of other uses. Dometic offer products and solutions that enrich people's experiences away from home, whether in a motorhome, caravan, boat or a truck.



With our unique global market reach with presence in over 100 countries and our core technology competences, Dometic is well positioned in this market for further profitable growth. As a market leader in Mobile Living solutions, Dometic is committed to driving sustainability in our industry. This means offering innovative, durable, low-carbon products that inspire an active, comfortable,

and responsible life in the outdoors. Dometic employs approximately 8,500 people worldwide, had net sales of SEK 30 billion (USD 3.0 billion) in 2022 and is headquartered in Stockholm, Sweden. Dometic shares are traded on the Nasdaq Stockholm Large Cap.

Dometic is providing a number of refrigeration products – as indicated in the pictures - to be used in RV, marine and trucks applications. Furthermore, we supply a range of wine cellars, portable boxes and we are market leaders in hotel minibars.



Our refrigeration products are made with different cooling technologies; compressor, absorption and thermoelectric, all depending on the customers' needs and preferences.

For details about Dometic and our products, please visit our homepage www.dometicgroup.com.

Annex B

Example of products within the suggested use for a new derogation

Refrigerators for RV, trucks and marine		Refrigerators specifically designed for mobile use. Vary significantly in size and design. Operation on DC.
Hotel minibars		Minibars for hotels and for domestic use. These products are already converted to R600a.
Cruise line minibars		Minibars specifically designed for cruise line ships. In process to be converted to R600a
Portable cooling boxes for multi-purpose		Operation flexible on AC or DC voltage depending on location. Available in many variants and sizes.
Cooling box for fixed assembly in cars or trucks		Specifically designed for vehicle. Operation on 12/24 V DC. Fixed installed in the vehicle

Roof-top Air conditioner for Recreational Vehicles, Trucks and Marine		Hermetically sealed unit fixed installed on the roof of RV, truck or boat. Not covered by the scope of the MAC-Directive.
Marine Chillers		Units with larger cooling capacity for supply of chilled water for several purposes.
Transport Refrigeration		For business within food and beverage or hospitality industry. Several niche products such as deep freezers and mobile delivery boxes.