

Solna, Sweden 13/8 2015

Replay on 1st round clarification questions

Replay on questions raised by Öko-Institut and Fraunhofer IZM on our application for renewal of RoHS exemption no. 9. The specific questions have been inserted into this document.

Question 1: *Domestic requests a duration of the exemption for another three years. You have provided a roadmap for the substitution of CrVI detailing among others the stages for testing the possible substitute “inhibitor#7”. Please clarify the remaining stages and provide the time frame (in years) of the various stages.*

Is it possible that the application of “inhibitor #7” as a substitute will be abandoned e.g. by results from the tests on the ability to repair damages to the protective surface?

Answer 1: Our tests for the substitution alternative are still positive in relation to the main part of the products covered by RoHS (low boiler temperature applications – see below). We are currently making significant investments into production equipment in order to be able to meet the time line. In parallel there are still tests ongoing.

There is of course an existing risk that our following tests involving new production equipment and large quantities of products will fail. Should this happen we will have to renew the application to extend the exemption. However, we are very committed to the change when technically viable and given this we do not want to extend the exemption period longer than necessary.

The remaining stages outline in the application are still valid. These stages include

In house test for statistical evaluation: This is a continuous work to analyze the effects of the new inhibitor. This work will not be finished by 2019 but will constantly continue as part of the entire phase-over process.

Large scale field test: This is the final verification to ensure that there are no production parameters that we have not foreseen with influence on the protection. This is thus not only a verification of the corrosion protection but also a verification that a new large scale filling process can be properly controlled and monitored to give sufficient result.

Design and production of large scale equipment: Since we require the use of different substances we need to redesign the filling equipment. Due to different properties of the new

inhibitor a new system has to be used. As this is not a standard industry equipment we have to carry out all safety and reliability parameters ourselves.

Redesign of products and tooling: In order to facilitate the protection and formation of the oxide film we need to optimize the cooling system both from a mechanical and also from a boiler temperature minimization point of view. Almost every product has its own cooling unit that has been optimized for this particular product and thus there is a significant amount of practical work required to redesign all cooling units, including the various production tools required for these cooling units.

Question 2: *In the application for exemption renewal, it is explained that the absorption refrigerators for which the exemption is needed are used in hotels, in recreational vehicles, in marine applications etc.*

- a) Do absorption refrigerators used in different application areas have different performance requirements, e.g. in respect of vibration resistance, operation in a more diverse environment in terms of ambient temperatures, etc.) or differing characteristics (e.g. size, dimensions) or can you confirm that the same technology is applied in all models?*
- b) It is mentioned that a phase out of CrVI is planned in the various application areas. Is this phase out of CrVI planned to be applied in all application areas at the same time or are there different stages for substitution related to application areas? If so, please clarify the time frame in relation to various application areas and the considerations for this grouping.*

Answer 2: Clarification: Most of the products covered by the RoHS Directive are used in lodging industry and in private homes. Products for recreational vehicles (RV) and marine applications with absorption technology are most often specifically designed for that purpose and thus fall outside of the scope of RoHS. Several products for RV fall within the scope of the ELV-directive.

2a) In principle the absorption cooling units for different applications are the same and following the technical description in the application. Depending on the cooling capacity required some physical dimensions are however differing. There are also some very important operational factors that differ.

- Products designed to operate under high ambient conditions (e.g. units in recreational vehicles) operate with considerably higher boiler temperature (180-220 C) compared to 140-180 C for a typical minibar. The temperature has a very significant impact on corrosion rate.
- Units operating in recreational vehicles are subject to much more diverse conditions, e.g. operation when tilted that may lead to further locally increased temperatures.

- Units operating on gas is also subject to higher and more difficulty controlled temperature pattern on the steel tubes.
- Transport boxes, recreational vehicle products etc. are subject to vibration requirements that may have an impact on oxide film formation and stability.
- Units operating outside of the household area will be subject to more varying conditions, this will lead to more frequent start and stop which in turn effect the properties of the formation of protecting oxides and the possibility for the oxide to maintain its properties.
- Varying operating conditions make the development of a safety monitoring system more difficult

Most products falling under the scope of the RoHS Directive are products that run under well-controlled conditions at lower temperature levels. The relatively constant conditions also facilitate the development of a monitoring system detecting a failure of the corrosion protection prior to any leakage taking place.

2b) To avoid misunderstanding, the timeline provided in the RoHS application for exemption only apply to those products that are within the scope of RoHS. We plan to phase out the existing inhibitor gradually depending on application. The first products will be products running with electrical heater in low boiler temperature applications. It should however be highlighted that the switch to Inhibitor 7 is including significant redesign of the cooling unit and also introduction of a boiler temperature management system. These changes require some further development and testing as indicated in our time plan.

Most products falling under the scope of RoHS are with electric heater only and operates under the most favorable conditions, low boiler temperature, stable operation, no vibration, this is why we apply for only a three years exemption under RoHS.

A tentative time line for the entire phase out has been provided in our application for authorization under REACH. For most products not falling under the RoHS legislation such as RV- products significant work still remains. Current estimate indicate a market introduction in 2025 with a complete phase out in 2029. For products under RoHS we plan to start the market introduction in 2018.

Excerpt of the REACH application for authorization:

If the results from the field trials and statistical tests are positive, Dometic will firstly introduce products with the new inhibitor to the market, starting in 2018. At this stage, the products that could be launched would be the ones with the lowest boiler temperature, approximately 150 C. The phase out would then continue gradually to products operating under more difficult conditions and higher boiler temperature [---] If all goes well, Dometic could introduce products with high boiler temperature to the market from 2025 on. The phase out of sodium chromate would be finalized in 2029, when all products would be using inhibitor 7 as the corrosion inhibitor.

Question 3: *As mentioned in your application, under the ELV Directive (200/53/EC), there is a corresponding exemption for Cr VI as an anticorrosion agent in carbon steel cooling systems of absorption refrigerators (ELV, Annex II, Ex. 14). Under ELV the exemption is formulated as follows:*

“As an anti-corrosion agent of the carbon steel cooling system in absorption refrigerators in motorcaravans up to 0,75 weight -% in the cooling solution except where the use of other cooling technologies is practicable (i.e. available on the market for the application in motor caravans) and does not lead to negative environmental, health and/or consumer safety impacts”.

Please explain in what cases other cooling technologies such as compressor-based or thermoelectric refrigerators can be used to eliminate the need for using Cr VI in your application range, or explain why available alternative technologies are not practicable in the RoHS relevant application areas specified by Dometic.

Answer 3) The main reason for using absorption technology in products currently falling under the RoHS Directive¹ is that those products are noiseless and vibration free in combination with high cooling performance allowing the products to meet refrigeration and freezer temperature requirements and to operate under high ambient conditions. This is an important market aspect for hotel minibars, but also for refrigerators to hospitals, student apartments and other type of small apartments.

Dometic group currently produce and sell refrigerators with absorption, thermoelectric and compressor technology and provide the most suitable technology in each specific case. It is clear that the noise question as well as temperature performance are very important in many applications. We therefore see a continuous need for products with of absorption technology in the market.

In the last review of RoHS exemptions a similar wording like in ELV was discussed but rejected at a late stage. We argued then (and still) that RoHS is not the legislation that should consider eco-design aspects. (This applies of course also for the ELV-directive). Such aspects would rather be considered under the eco-design framework. RoHS should not disqualify any technology that have significant market advantages in some applications.

¹ For products covered by the ELV-Directive absorption products are mainly used because of they could operate on several energy sources. These product could normally run on AC-current (when AC y is available), DC-current (during transit or when generator is running) or on gas (eg at free camping). Only absorption technology could provide this advantage for the customer.

Question 4: *Are you aware of other manufacturers that supply absorption refrigerators? Please state names of other manufacturers.*

Answer 4: Some other suppliers of products with absorption cooling technology, mainly offering hotel minibars, are:

Thetford: <http://www.thetford-europe.com/dealers-service-centres/>

IndelB: <http://www.indelb.com/products/>

Hartmann Tresore AG: <http://www.hartmann-tresore.com/en/hotel-safes-and-minibars/minibars.html>

Please do not hesitate to take contact if you have any further questions. If required we would be happy to meet in person whenever suitable.

Kind regards

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