Exemption Request Form

Date of submission: 2015-01-20

1. Name and contact details

1) Name and contact details of applicant:

Company: Dometic

Tel.: +46 8-501 025 00

Name: Bernt Andersson

E-Mail: bernt.andersson@dometic.com

Function: Consultant

Address: Hemvärnsgatan 15, S-171 54 Solna, Sweden

2) Name and contact details of responsible person for this application (if different from above):

Company: _____ Tel.: _____

Name: _____ E-Mail:

Function: _____ Address: _____

---

2. Reason for application:

Please indicate where relevant:

- ☐ Request for new exemption in:
- ☐ Request for amendment of existing exemption in
- ☒ Request for extension of existing exemption in
- ☐ Request for deletion of existing exemption in:
- ☐ Provision of information referring to an existing specific exemption in:
  - ☒ Annex III ☐ Annex IV

No. of exemption in Annex III or IV where applicable: 9

Proposed or existing wording: See below

Duration where applicable: 3 years

- ☐ Other: _____

3. Summary of the exemption request / revocation request

Dometic is applying for a three year extension of Exempt 9 in RoHS. Please see more details in our letter and the attached documentation. We suggest an equal wording as for the existing exempt: *"Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0,75 % by weight in the cooling solution "*. Furthermore, we suggest the exempt to be specified as follows: "*Expires on 1 August 2019 and after that date may be used in spare parts for EEE placed on the market before 1 August 2019"*.

---

4. Technical description of the exemption request / revocation request

(A) Description of the concerned application:

1. To which EEE is the exemption request/information relevant?

Name of applications or products:

Anti corrosion inhibitor of the carbon steel cooling system for absorption refrigerators

a. List of relevant categories: (mark more than one where applicable)

☒ 1	☐ 7
☐ 2	☐ 8
☐ 3	☐ 9
☐ 4	☐ 10
☐ 5	☐ 11
☐ 6	

b. Please specify if application is in use in other categories to which the exemption request does not refer: No

c. Please specify for equipment of category 8 and 9:

The requested exemption will be applied in

☐ monitoring and control instruments in industry

☐ in-vitro diagnostics

☐ other medical devices or other monitoring and control instruments than those in industry

2. Which of the six substances is in use in the application/product?

(Indicate more than one where applicable)

☐ Pb ☐ Cd ☐ Hg ☒ Cr-VI ☐ PBB ☐ PBDE

3. Function of the substance:

Hexavalent chromium works very well as corrosion inhibitor thanks to a thin chromium oxide (Cr_2O_3) layer that is formed on the interior surface of the steel tubes. This layer is very thin and tight which protects the steel from further corrosion.

Content of substance in homogeneous material (%weight):

The average amount of CrVI used for an average fridge model is around 2 grams. The refrigerant charge is 350 grams for this average model with a total weight of the refrigerator of 17 kg. Hence:

i) the concentration of CrVI in the homogenous material (the refrigerant) is less than 0,6 % by weight.

ii) the concentration of CrVI in the application (the refrigerator) is less than 0,012 % by weight.

4. Amount of substance entering the EU market annually through application for which the exemption is requested:

Approximately 200 kg per annum referring to units produced by Dometic. Se detailed calculation for 2014 in the attached document.

Please supply information and calculations to support stated figure.

5. Name of material/component:

Sodium Chromate is used in the refrigerant (homogenous material) of cooling unit for absorption refrigerators

6. Environmental Assessment: _____

LCA: ☒ Yes

☐ No

Comment: LCA of our fridges has been done, but the impact from the sodium chromate is limited in these analysis. The material databases are not well representing the effects of such substances.

(B) In which material and/or component is the RoHS-regulated substance used, for which you request the exemption or its revocation? What is the function of this material or component?

The substance, Sodium Chromate, is used as an additive to the refrigerant (cooling media) used in absorption refrigerators. Other components in the refrigerant are ammonia, water and hydrogen. Sodium Chromate is forming a thin corrosion protective layer of Chromium oxide on the interior tube surface

(C) What are the particular characteristics and functions of the RoHS-regulated substance that require its use in this material or component?

See B) above. A corrosion protective layer of hexavalent chromium has major technical advantages. To allow a long service life of the *sealed* cooling system the chromate protects the steel pipes from interior corrosion.

---

5. Information on Possible preparation for reuse or recycling of waste from EEE and on provisions for appropriate treatment of waste

1) Please indicate if a closed loop system exist for EEE waste of application exists and provide information of its characteristics (method of collection to ensure closed loop, method of treatment, etc.)

Yes, a closed loop exist for the product and the refrigerant. The products are covered by the WEEE directive and it is required to reclaim the refrigerant before other treatment of the refrigerator. Reclaimed refrigerant is considered hazardous waste and sent for separate treatment.

A more detailed summary of the End-of-life treatment of absorption refrigerators are attached in a separate document

2) Please indicate where relevant:

☐ Article is collected and sent without dismantling for recycling

☒ Article is collected and completely refurbished for reuse

☒ Article is collected and dismantled:

☐ The following parts are refurbished for use as spare parts: _____

☒ The following parts are subsequently recycled: See below

☐ Article cannot be recycled and is therefore:

☐ Sent for energy return

☐ Landfilled

Comment 1: Refurbishment of complete refrigerators exist on some market, but the total number is very low (although increasing). We do not have figures on how many products (and consequently how much hexavalent chromium) this represent.

Comment 2: The products are at end-of-life recycled as other refrigerators in a step 1 process (reclaim of refrigerant) and step 2 (shedding and material separation). The total recycling rate is more than 95 %.

Comment 3: Basically the whole refrigerator is recycled apart from the refrigerant and the insulation blowing agent that is treated as hazardous waste.

3) Please provide information concerning the amount (weight) of RoHS substance present in EEE waste accumulates per annum:

☐ In articles which are refurbished _____

☐ In articles which are recycled _____

☐ In articles which are sent for energy return _____

☐ In articles which are landfilled _____

Replay: A summary of the end-of-life handling of absorption refrigerators is found in a separate document. This document also include a calculation on remaining hexavalent chromium after treatment.

6. Analysis of possible alternative substances

(A) Please provide information if possible alternative applications or alternatives for use of RoHS substances in application exist. Please elaborate analysis on a life-cycle basis, including where available information about independent research, peer-review studies development activities undertaken

As we have described in previous applications for exemptions, Dometic (and previously Electrolux) has for a very long time put high attention in finding an alternative to Cr VI as corrosion inhibitor. This work has been ongoing for decades studying not only inhibitor alternatives but also other materials.

We now feel confident that a new inhibitor (hereafter named Inhibitor #7) is a candidate to replace CR VI in our products with an acceptable expected life time, performance level and

safety level. We are working fully on industrializing this alternative now, confirming the successful laboratory results on an industrial scale. For more details on this work we refer to the attached document Corrosion Studies 2008 - 2014.

However, there are some specific tasks that needs to be finalised before we can start a full scale roll-out of products with the new inhibitor. This include finalising of the field testing, re-design of the cooling units and development and installation of the factory equipment for the new inhibitor, paralleled by a final verification of functionality. We also need to further analyse the impact of boiler temperatures >180 C in relation to localized corrosion in the heat transferring area and more specifically the ability to Inhibitor 7 to repair damages to the protective surface. More details on this are lined out in the attached files Corrosion Studies 2008-2014 and the Road map.

(B) Please provide information and data to establish reliability of possible substitutes of application and of RoHS materials in application

See answer above. Within the analysis of alternatives we are now only considering Inhibitor #7.

---

7. Proposed actions to develop possible substitutes

(A) Please provide information if actions have been taken to develop further possible alternatives for the application or alternatives for RoHS substances in the application.

See answer 6. above. We only consider Inhibitor£7 as an alternative.

(B) Please elaborate what stages are necessary for establishment of possible substitute and respective timeframe needed for completion of such stages.

Replay: Dometic now feel confident in establishing a time plan for substitution of Sodium Chromate. A full scale implementation of the substitute is however not possible before the existing exemption in RoHS expires on 21 July 2016. To ensure a reliable and safe product we have some further steps to go before a full implementation can be made. Details of this is indicated in the roadmap attached. In short the following tasks must be finalised:

- Finalising and extension of field tests and increased testing of some specific models.
- Redesign of our cooling units to decrease the boiling temperature and minimising the risk for corrosion inside the tubes. This is an extensive work as we have close to 100 different models of cooling units in production.
- Design and installation of factory equipment for inhibitor #7. This important step include also reliability testing of inhibitor #7 in combination with the new equipment.

---

8. Justification according to Article 5(1)(a):

(A) Links to REACH: (substance + substitute)

1) Do any of the following provisions apply to the application described under (A) and (C)?

☒ Authorisation

- ☒ SVHC
- ☒ Candidate list
- ☒ Proposal inclusion Annex XIV
- ☒ Annex XIV

☐ Restriction

- ☐ Annex XVII
- ☐ Registry of intentions

☒ Registration

Remark 1. We are in the process of applying for authorisation for usage of Sodium Chromate according to Reach. This is necessary for us to keep the substitution plan according to our road map. Our application for authorisation will be submitted during 2015.

Remark 2: Remark 2. Sodium Chromate (and Sodium dichromate) is registered under Reach by our supplier Honeywell

2) Provide REACH-relevant information received through the supply chain.

Name of document: _____

(B) **Elimination/substitution:**

1. Can the substance named under 4.(A)1 be eliminated?

☐ Yes. Consequences? _____

☒ No. Justification: Products without any corrosion inhibitor stop to operate within months.

2. Can the substance named under 4.(A)1 be substituted?

☒ Yes.

☒ Design changes:

☐ Other materials:

☒ Other substance:

☐ No.

Justification: _____

Comment: Dometic feel confident in substituting Sodium Chromate in the refrigerant. Following our road map we however need some more time before a full roll-out can be made.

3. Give details on the reliability of substitutes (technical data + information):

See the separate technical document Corrosion studies 2008-2014

4. Describe environmental assessment of substance from 4.(A)1 and possible substitutes with regard to

1) Environmental impacts: _____

2) Health impacts: _____

3) Consumer safety impacts: _____

The impact on environment, health and consumer safety for the existing inhibitor Sodium Chromate is well known and documented. The substance is classified as SVHC and is subject for authorisation according to the RECAH regulation.

For our refrigerant including the new inhibitor #7 we have put together an MSDS. This document is attached but considered confidential at this point of time.

Do impacts of substitution outweigh benefits thereof?

Please provide third-party verified assessment on this:

The question is not relevant for Dometic as we have decided to substitute Sodium Chromate.

(C) Availability of substitutes:

a) Describe supply sources for substitutes:

Supply sources for the new inhibitor #7 have not been set up yet. See details in the road map document.

Have you encountered problems with the availability? Describe:

Not applicable, see question a) above

b) Do you consider the price of the substitute to be a problem for the availability?

☐ Yes ☐ No

c) What conditions need to be fulfilled to ensure the availability?

The supply of inhibitor #7 will follow the processes as for other substances and articles.

(D) Socio-economic impact of substitution:

⇨ What kind of economic effects do you consider related to substitution?

☒ Increase in direct production costs

☐ Increase in fixed costs

☒ Increase in overhead

☐ Possible social impacts within the EU

☐ Possible social impacts external to the EU

☐ Other: _____

⇨ Provide sufficient evidence (third-party verified) to support your statement: _____

Comment: Although the increased cost because of the substitution, these have been approved internally and Dometic has established a time plan for the substitution of Sodium Chromate

9. Other relevant information

Please provide additional relevant information to further establish the necessity of your request:

---

10. Information that should be regarded as proprietary

Please state clearly whether any of the above information should be regarded to as proprietary information. If so, please provide verifiable justification:

Please note that it is our request that part of the information we have submitted to you should be considered as confidential, which we have clearly marked at the documents. The material contain business confidential material both of technical and financial nature. If you feel that the exemption cannot be justified on the basis of the confidential information we have submitted please let me know as soon as possible and we will try to find an acceptable agreement for both parties

---