

**Your Ref** : **Our Ref:** CD/HAZ/14/03/02/01  
**Date** : 14 November 2016

Attn: Manufacturers / Suppliers / Distributors / Automobile workshops

Dear Sir/Madam,

**REGULATORY REQUIREMENTS FOR THE USAGE OF R1234YF REFRIGERANT IN MOBILE AIR CONDITIONING SYSTEM IN SINGAPORE**

In recent years, SCDF has received requests from the industry to consider allowing the usage of R1234yf refrigerant in mobile air conditioning systems. SCDF subsequently engaged the relevant industry stakeholders to seek clarity on the fire risks, safety standards and the safety control measures on the operations, servicing and disposal of mobile air conditioning systems using R1234yf refrigerant.

2. After careful consideration, SCDF is prepared to allow the usage of R1234yf refrigerant in mobile air conditioning systems, subject to the relevant parties, including but not limited to the manufacturer, his approved suppliers and automobile workshops, complying with SCDF's requirements. This circular serves to inform all relevant parties about the requirements to be complied with in order to use R1234yf refrigerant in mobile air conditioning systems (Refer to **Annex A** for details). This circular shall take immediate effect.

3 Please convey the contents of this circular to the parties concerned. For any inquiry or clarification, please contact CPT Matthew Goh at Tel. No.: 68483323 (e-mail: Matthew\_Goh@scdf.gov.sg).

Yours faithfully,



CPT MATTHEW GOH  
HazMat Department  
for Commissioner  
Singapore Civil Defence Force



**SCDF – A member of the Home Team**

## **1 SCOPE**

This document outlines the requirements to allow the safe usage of R1234yf refrigerant in mobile air conditioning systems. R1234yf is classified as A2L (lower flammability) in accordance with International Organization for Standardization (ISO) 817:2014.

## **2 DEFINITION**

- 2.1 'Mobile air conditioning system (MAC)' –  
Refers to any air conditioning system which provides occupant comfort and inclement weather window clearing, by heating or cooling and dehumidifying the air that is delivered to the passenger compartment through various air distribution outlets in the interior of the vehicle.
- 2.2 'Manufacturer' –  
Refers to any party who owns or runs the manufacturing plant that produces the automobile with a MAC installed.
- 2.3 'Supplier' –  
Refers to any party who makes the automobile with a MAC installed commercially available to the end-users in Singapore.
- 2.4 'Automobile workshop' –  
Refers to any party who provides after-sale services for the automobile, including but not limited to installation, maintenance and decommissioning of the MAC.
- 2.5 'User' –  
Refers to any party who uses the automobile containing the MAC.

## **3 SAFETY REQUIREMENTS**

### **3.1 General Safety Requirements**

- 3.1.1 Manufacturer and automobile workshop shall ensure that all MAC using R1234yf refrigerant in their automobiles comply with the latest applicable International Organization for Standardization (ISO) standards (eg. ISO 13043) and SAE International standards (eg. SAE J639) for MACs. Manufacturer, supplier and automobile workshop shall also be familiar with Honeywell's "Guidelines for Use and Handling of HFO-1234yf".
- 3.1.2 Manufacturer and automobile workshop shall ensure that refrigerant risk analysis for the MAC installed is conducted in accordance with SAE J2773 so as to understand the risks associated with using R1234yf refrigerant in the MAC and to keep these risks within acceptable limits.
- 3.1.3 Manufacturer and automobile workshop shall ensure that R1234yf refrigerant is only used in new MACs designed specifically for the refrigerant.
- 3.1.4 Manufacturers shall perform Failure Mode and Effect Analysis (FMEA) and to keep records of the FMEA in accordance with SAE J1739.
- 3.1.5 Employer of service personnel shall comply with the relevant requirements under the Workplace Safety and Health Act administered by the Ministry of Manpower.

### **3.2 Safety Awareness**

- 3.2.1 Manufacturer, either directly or through his approved suppliers, and automobile workshops shall take all necessary measures as may be deemed reasonable to educate users on the inherent safety risks from the usage of R1234yf refrigerant in the MAC and to ensure the safe handling and usage of the MAC. These measures shall include, but are not limited to, those outlined under Parts 4 and 5 of this document.

#### **4 ADVISORY LABEL REQUIRMENTS**

##### **4.1 Advisory Label for Service Personnel**

- 4.1.1 The advisory label shall remain permanently attached and legible under the car hood to indicate the flammability risks to the service personnel. The advisory label shall be clearly visible from the maintenance access area to the MAC without requiring the removal of any parts or covers to be read.
- 4.1.2 The advisory label shall be in accordance to the latest applicable SAE J639 standard. The label shall have a minimum size of 60mm by 30mm. It shall have text in bold-type letters with the minimum height of 3mm for identifying refrigerant, lubricant type and refrigerant charge amount, as shown in the sample below.



- 4.1.3 The advisory label shall include the flammability symbol, the certified technician symbol and the name or logo of the original equipment vehicle manufacturer responsible for design compliance to SAE J639 standard.
- 4.1.4 The advisory label shall comply with the design specifications outlined in the SAE J639 standard. The printed label shall be in an indelible manner and with a minimum resolution of 300 pixels per inch (ppi).

#### **5 SAFETY CONTROL MEASURES**

##### **5.1 Manufacturer/Supplier**

- 5.1.1 Manufacturer, either directly or through his approved suppliers, shall take all necessary measures as may be deemed reasonable to ensure that service personnel, who work with R1234yf, are trained according to SAE J2845 and equipped with all the relevant technical skills to work safely with R1234yf refrigerant and the MAC. Manufacturer may fulfil this either by providing the training or leveraging on training provided by a third party (eg. another manufacturer). The training provided shall either be accredited by the Singapore Workforce Skills Qualifications (WSQ) system or be conducted by a Ministry of Education registered institution (e.g. Institute of Technical Education).

- 5.1.2 Manufacturer, either directly or through his approved suppliers, shall include the safety risks posed by R1234yf refrigerant in the MAC and the essential safety precautions to be adopted by the user in the owner's manual and on the manufacturer's website. A recommended maintenance regime in accordance to relevant safety standards and industry best practices for the MAC should also be included on both platforms. It shall be stated in the owner's manual and on the manufacturer's website that users should only go to qualified specialist workshops trained according to SAE J2845 for any maintenance of the MAC.
- 5.1.3 Manufacturer, either directly or through his approved suppliers, shall offer assistance/services to the user in carrying out maintenance and decommissioning of the MAC in accordance to the relevant safety standards and industry best practices.

5.2 Automobile Workshop

- 5.2.1 Employer of service personnel, who work with R1234yf, shall ensure that they are trained according to SAE J2845 and equipped with all the relevant technical skills to work safely with R1234yf refrigerant and the MAC. The training provided shall either be accredited by the Singapore Workforce Skills Qualifications (WSQ) system or be conducted by a Ministry of Education registered institution (e.g. Institute of Technical Education).
- 5.2.2 Automobile workshop shall offer assistance/services to the user in carrying out maintenance and decommissioning of the MAC in accordance to the relevant safety standards and industry best practices.

5.3 User

- 5.3.1 User shall be advised by the manufacturer, either directly or through his approved suppliers, and automobile workshops, to impose strict ignition control measures.
- 5.3.2 User shall be advised by the manufacturer, either directly or through his approved suppliers, and automobile workshops, to engage trained service personnel to carry out any maintenance, decommissioning or disposal of the system.

**6 REFERENCES**

- 6.1 International Organization for Standardization (ISO) 817 standard
- 6.2 International Organization for Standardization (ISO) 13043 standard
- 6.3 All relevant SAE International standards including, but not limited to SAE J639, SAE J2773 and SAE J2845



**SCDF**

The Life Saving Force

SINGAPORE CIVIL DEFENCE FORCE

Your Ref :

Our Ref: CD/HAZ/14/03/02/01

Date : 17<sup>th</sup> June 2015

Attn: **To all relevant parties**

Dear Sir/Madam,

## REVIEW ON THE USE OF FLAMMABLE REFRIGERANTS IN SINGAPORE

Since December 2011, SCDF has restricted the use of hydrocarbon refrigerants in accordance with the issued circulars (dated 6<sup>th</sup> & 27<sup>th</sup> Dec 2011) for the "Review on Use of Hydrocarbon Refrigerants in Singapore". This circular serves to inform all relevant parties that the same restrictions on the use of hydrocarbon refrigerants shall be applied to all flammable<sup>1</sup> refrigerants unless exemption has been subsequently given and announced through circulars. In addition, the exemption given in the issued circular (dated 25 Jan 2013) for "Regulatory Requirements for the Usage of Flammable Refrigerant in Stand-Alone Commercial Refrigeration System in Singapore" shall remain effective.

2. Please convey the contents of this circular to the parties concerned. For any inquiry or clarification, please contact CPT Matthew Goh at Tel. No.: 68483323 (e-mail: [Matthew\\_Goh@scdf.gov.sg](mailto:Matthew_Goh@scdf.gov.sg)) or LTC Han Fook Kuang at Tel No.: 68481467 (e-mail: [Han\\_Hook\\_Kuang@scdf.gov.sg](mailto:Han_Hook_Kuang@scdf.gov.sg)).

Yours faithfully,

CPT MATTHEW GOH  
HazMat Department  
for Commissioner  
Singapore Civil Defence Force

<sup>1</sup>Refrigerants that are classified as flammable in the safety data sheet in accordance to GHS definition.



**SCDF – A member of the Home Team**



Please quote our ref. no. in all future correspondences

Our Ref: SCDF/HAZ/14/03/02/01

DID: 68483312  
FAX: 68483318

27 December 2011

Attn: **Importers, Traders and Suppliers of Motor Vehicles**

Dear Sir/Madam,

## REVIEW ON USE OF HYDROCARBON REFRIGERANTS IN SINGAPORE

Since September 2009, a multi-agencies (HSD, SCDF, NEA, SPRING, MOM, LTA) working group undertook a total holistic review on the use of Hydrocarbon (HC) refrigerants across various applications<sup>2</sup>. While we recognise that HC refrigerants have an edge over many refrigerants in terms of their environment impact, the main consideration is that HC refrigerant is extremely flammable and would pose a potential safety hazard to users and occupants. These are additional risks which can be avoided if safer alternative refrigerants or other refrigerant blends are used.

2. The working group had reviewed the use of HC refrigerants carefully over the past months and had also engaged the relevant agencies (eg. NEA, LTA) and industry stakeholders (eg. Motor Traders Association) for feedbacks during the review. We regret to inform that the use of HC refrigerants in vehicle air-conditioning systems<sup>3</sup> shall be disallowed. We have not come to this conclusion lightly as we understand the potential ramifications to the industry and users. Notwithstanding the restriction on certain applications, we would continue to monitor the market for emerging alternatives to HC refrigerants that could better address the safety, environmental and economic concerns.

3. This circular serves to inform all concern parties that the policy to restrict and regulate the use of HC refrigerants in vehicle air-conditioning systems shall take effect from 1<sup>st</sup> April 2012. Please assist to convey the

<sup>2</sup> Applications under review include domestic refrigerator, air-conditioning system, commercial refrigeration system and industrial process refrigeration system.

<sup>3</sup> These vehicles include all type of road transport such as motor cars, vans, lorries, buses and trains.

contents of this circular to the parties concerned. For any inquiry or clarification, please contact CPT Jason Zhou at Tel. No.: 68483312 (e-mail : [jason\\_zhou@scdf.gov.sg](mailto:jason_zhou@scdf.gov.sg)).

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Jason Zhou', with a stylized flourish at the end.

CPT JASON ZHOU  
HazMat Department  
for Commissioner  
Singapore Civil Defence Force

cc: **Land Transport Authority (LTA)**

Mr. Long Say Jee  
Deputy Director  
Vehicle Engineering Division  
Vehicle Services Sub-Group  
Vehicle & Transit Licensing Group