



AEROSPACE STANDARD	AS6886™	
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Counterfeit Materiel: Assuring Acquisition and Use of Authentic and Conforming Refrigerant		

RATIONALE

This document is intended to provide guidance and requirements for users during the purchase and use of refrigerants.

AS6886 has been reaffirmed to comply with the SAE Five-Year Review policy.

FOREWORD

To assure customer satisfaction, industry organizations must produce, and continually improve, safe, reliable materiel that meet or exceed customer and regulatory authority requirements. The globalization of industry and the resulting diversity of regional/national requirements and expectations has complicated this objective. End-product organizations face the challenge of assuring the quality and integrity of materiel purchased from suppliers throughout the world and at all levels within the supply chain. Suppliers and processors face the challenge of delivering materiel to multiple customers having varying quality expectations and requirements.

This document standardizes requirements, practices, and methods related to: (a) refrigerant supply chain management, procurement, inspection, and tests/evaluation to assure the authenticity and conformance of refrigerant being acquired, and (b) response strategies when suspect or confirmed counterfeit refrigerant is discovered.

TABLE OF CONTENTS

1.	SCOPE.....	3
1.1	Protocols for Refrigerants	3
1.2	Reasons for Counterfeit Refrigerants	3
1.3	Counterfeiting Refrigerant.....	3
1.4	Extent of Counterfeit Refrigerants.....	3
2.	REFERENCES.....	4
2.1	Applicable Documents	4
2.2	Related Definitions	5
2.3	Acronyms and Abbreviations	7
2.4	Definitions of Counterfeit Refrigerant and Counterfeiting Methods:	7
3.	AVOIDANCE AND DETECTION	8
3.1	Avoidance	8
3.2	Authenticity Verifications	9
3.2.1	Refrigerant Test and Inspection Methods	9
3.2.2	Visual Inspection	10
4.	REPORTING AND DISPOSITION OF COUNTERFEIT REFRIGERANTS.....	11
5.	REMEDiation	12
6.	NOTES.....	12
APPENDIX A	EXAMPLES OF COUNTERFEIT REFRIGERANT	14
APPENDIX B		16
APPENDIX C		17
Table 1	Detection methods	11

1. SCOPE

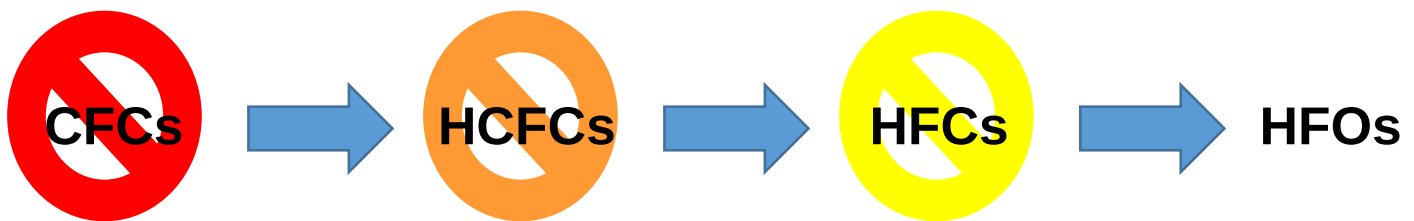
1.1 Protocols for Refrigerants

Counterfeiting of refrigerants has seen a dramatic rise over the past two decades. This rise can be partially attributed to global restrictions placed on production and use of refrigerants by the 1987 Montreal and the 1997 Kyoto Protocols (1, 2). These Protocols regulate the gradual phase-out and strict regulations on the use of refrigerants with high Ozone Depletion Potential (ODP) and high Global Warming Potential (GWP). These protocols require that older refrigerants shall be replaced with newer, more expensive, and environmentally friendly chemicals (3, 4) and necessitates redesigned or replaced equipment to operate efficiently with these new refrigerants.

1.2 Reasons for Counterfeit Refrigerants

These Protocols require the staggered phase-out of these refrigerants allowing unrestricted countries a longer time to comply with the phase down. This staggered system has created an opportunity for brokers diverting high ODP and/or GWP refrigerants from unrestricted countries to restricted countries, where they can be sold to support the needs of legacy equipment. The increasing use of air conditioning and refrigeration in developing nations has increased the demand and cost of refrigerants, which makes counterfeiting refrigerants a very economically viable criminal activity.

Refrigerant changes since the 1980s



CFC Chlorofluorocarbons

HCFC Hydrochlorofluorocarbons

HFC Hydrofluorocarbons

HFO Hydrofluoroolefins

First, the very environmentally damaging (high ODP) Chlorofluorocarbons (CFCs) were replaced by Hydrochlorofluorocarbons (HCFCs). However, since HCFCs also have ODP and GWP, they were replaced by Hydrofluorocarbons (HFCs). But that was not a perfect solution since some HFCs have significant GWP, so they are in the process of being replaced by Hydrofluoroolefins (HFOs).

1.3 Counterfeiting Refrigerant

Counterfeiters primarily target non-refillable/non-returnable 30 pounds/13.62 kg cylinders and 1 kg or less cans of refrigerant. Methods may include tampering with the non-refillable valves; refilling or topping-off the contents of the containers; painting or repainting and re-stenciling the exterior cylinder/can to more or less match genuine products; and/or replacing the valves. Forged trademarks and falsified outer markings, or fake company names with similar appearance to internationally known manufacturers are examples of labeling used by counterfeiters on generic cylinders/cans. Counterfeiters may also reuse genuine brand name packaging or manufacture counterfeit packaging, and then put the forged/falsified generic cylinders/cans with unknown contents inside.

1.4 Extent of Counterfeit Refrigerants

Counterfeit refrigerants are flooding markets around the world, with European and United States Armed Forces reporting significant contamination in vehicles/equipment returning from the Middle East (12, 13, 14, and 15). The countries/areas currently most prone to counterfeit refrigerants are Indonesia, China and the Middle East, per the United Nations' 2011 Report "Risk Assessment of Illegal Trade in HCFCs" (5), but they can and have been identified world-wide. The areas targeted are hot climates with high demand for refrigerants, limited inspections and/or a lack of general knowledge about the issues with counterfeits. The April 2013 United Nations Threat Assessment "Transnational Organized Crime in East Asia and the Pacific" estimates that counterfeit refrigerants and illegal trafficking in high ODP refrigerants has a flow volume of 3660 tons per year totaling around US \$67.7 million (11).

Example:

In 2011, it was reported that methyl chloride (R-40) was one of several ingredients being used in counterfeiting of various common refrigerants (6). Methyl chloride is currently not used for refrigeration because it is highly toxic (Class 2B per ASHRAE 34), corrosive and unstable - use was discontinued for the most part when the much safer and less corrosive CFCs were developed (7). It is still commonly used in the production of plastics, and is very inexpensive to purchase, which makes it ideal for counterfeiting. When R-40 is blended with other refrigerants, the mix will mimic the pressure/temperature curve of R-134a, making it difficult to detect using conventional pressure gauge tests.

According to the Safety Data Sheet, R-40 is a colorless gas with a faint sweet smell (8) and is flammable. It is a suspected human carcinogen and is also a potent narcotic (9). Methyl chloride reacts with moisture in air or with water to form hydrochloric acid, and explodes on contact with magnesium, and sodium. R-40 is extremely corrosive to plastics and aluminum. Furthermore, when corroding aluminum, R-40 also reacts with the aluminum to form trimethyl aluminum (a clear fluid), which is pyrophoric in air, and reacts violently with water, carbon dioxide, halon, oxidizers, alcohols, carbon tetrachloride, halogens and halogenated hydrocarbons, and many other substances. (In other words, when exposed to air, the trimethyl aluminum will spontaneously combust, and then when trying to put out the fire using common fire suppressants such as water, carbon dioxide, or halon; it can explode violently.)

The first recognized incidences of R-40 being used to counterfeit R-134a involved explosions of compressor units fitted to refrigerated shipping containers (called reefers) in Vietnam and Brazil (10), which caused civilian fatalities and multiple physical injuries to personnel. In Southern Europe, there were multiple physical injuries (passenger poisonings when R-40 escaped the air conditioning containment), explosions, and a maintenance facility fire at a public transportation service caused by counterfeit R-134a containing R-40.

R-134a is not the only refrigerant being counterfeited and many substances other than R-40 (methyl chloride) are being used as the counterfeiting refrigerants. Other common refrigerant counterfeiting schemes involve recovering refrigerants from old equipment and/or using other "filler" materials such as flammable hydrocarbons (methane, ethane, propane or butane) to increase the output of the counterfeit refrigerants. Obviously, there can be unknown/dangerous interactions from mixing multiple chemicals and contaminants.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

The referenced documents are deemed applicable as of the publication date of this document. Additional standards related to other refrigerants may be added at a later time.

J639	Safety Standards for Motor Vehicle Refrigerant Vapor Compression Systems
J2099	Standard of Purity for Recycled R-134a (HFC-134a) and R-1234yf (HFO-1234yf) for Use in Mobile Air-conditioning Systems
J2843	R-1234yf [HFO-1234yf] Recovery/Recycling/Recharging Equipment for Flammable Refrigerants for Mobile Air-Conditioning Systems

J2844	R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems
J2845	R-1234yf [HFO-1234yf] and R-744 Technician Training for Service and Containment of Refrigerants Used in Mobile A/C Systems
J2851	Recovery Equipment for Contaminated R-134a or R-1234yf Refrigerant from Mobile Automotive Air Conditioning Systems
J2912	Performance Requirements for R-134a and R-1234yf Refrigerant Diagnostic Identifiers (RDI) for Use with Mobile Air Conditioning Systems
J2927	R-1234yf Refrigerant Identifier Installed In Recovery and Recycling Equipment for Use with Mobile A/C Systems
AS6174	Counterfeit Materiel; Assuring Acquisition of Authentic and Conforming Materiel

2.1.2 U.S. Government Publications

Copies of these documents are available online at <http://www.dtic.mil/whs/directives/>.

DoDM 4140.01 DoD Supply Chain Materiel Management Procedures

DoD 4160.21-M DoD Disposition Manual

Government-Industry Data Exchange Program (GIDEP) Operations Manual SO300-BT-PRO-010 (GIDEP Manuals and Guides are available from <http://www.gidep.org/>)

Government-Industry Data Exchange Program (GIDEP) Requirements Guide - SO300-BU-GYD-010 (April 2008) (<http://www.gidep.org/>)

OMB Policy Letter 91-3 Reporting Nonconforming Products (http://whitehouse.gov/omb/procurement_policy_letter_91-3)

2.1.3 Air Conditioning, Heating, and Refrigeration Institute (AHRI) Standards

AHRI Standard 700 Specification for Fluorocarbon Refrigerants

2.1.4 American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standards

ASHRAE Standard 34 Designation and Safety Classification of Refrigerants

2.2 Related Definitions

AUTHORIZED DISTRIBUTION: Transactions conducted by a Manufacturer-Authorized Distributor distributing product within the terms of a Distribution Agreement. Franchised Distribution is considered synonymous with Authorized Distribution.

AUTHORIZED DISTRIBUTION CHANNEL: Sales conducted by the Manufacturer or their Authorized Distributor which carry the Manufacturer's rights of warranty with the product.

AUTHORIZED (FRANCHISED) DISTRIBUTOR: A distributor that performs Authorized Distribution. A Franchised Distributor is considered synonymous with an Authorized Distributor.

AUTHORITY HAVING JURISDICTION: The governmental organization at the federal, national, state, or local levels having statutory authority to respond to, enforce, or prosecute laws. NOTE: Statutory authority can differ between countries. Examples are Customs, Judicial and Enforcement bodies.

CERTIFICATE OF ANALYSIS (C of A): A document that certifies an analysis and gives the exact details about the refrigerant's quality and compliance to specifications - relates specifically to the result of testing a representative sample drawn from the specific batch or lot of material it is purported to represent and stating that all refrigerants listed are genuine, new and unused unless otherwise specified in writing; are suitable for the intended purpose; are not defective, suspect, or counterfeit; have not been provided under false pretenses; and have not been altered, damaged, deteriorated, or degraded.

CERTIFICATE OF CONFORMANCE (C of C, CoC): A document provided by a supplier formally declaring that all buyer purchase order requirements have been met. The document may include information such as manufacturer, distributor, quantity, lot and/or date code, inspection date, etc., and is signed by a responsible party for the supplier.

CERTIFICATE OF ORIGIN (C of O, CoO): A document completed by an exporter or its agent and certified by an issuing body, attesting that the goods in a particular export shipment have been wholly produced, manufactured or processed in a particular country.

DISTRIBUTION AGREEMENT: A specific, written contract between the Manufacturer and the Distributor that authorizes the Distributor to resell the Manufacturer's refrigerant. Contractual terms include, but are not limited to, distribution region, distribution products or lines, and warranty flow down from the Manufacturer. These agreements often include failure analysis support, return privileges and product change notifications as well.

FRANCHISED DISTRIBUTION: For the purposes in this standard, Franchised Distribution is considered synonymous with Authorized Distribution (see "Authorized Distribution" definition above).

INDEPENDENT DISTRIBUTOR: A distributor that purchases new or used refrigerant with the intention to sell and redistribute it back into the market. Purchased materiel may be obtained from original manufacturers or contract manufacturers (typically from excess inventories), or from other independent distributors. Resale of the purchased materiel (re-distribution) may be to users or other independent distributors. Independent distributors do not have legally binding relationships with original manufacturers.

ORIGINAL MANUFACTURER: An organization that designs and/or engineers and produces refrigerant and is pursuing or has obtained the intellectual property rights to that refrigerant.

Notes:

- a. The materiel and/or its packaging are typically identified with the original manufacturer's trademark.
- b. Original manufacturers may contract out manufacturing and/or distribution of its product.
- c. Different original manufacturers may supply product for the same application or to a common specification.

PACKAGING: Packaging refers to the manner in which refrigerant is packaged in preparation for use. Refrigerant may be obtained in bulk, cylinders or cans. There may also be a cardboard box used with the cylinders and/or the cans of refrigerant.

SUPPLIER: Within the context of this document, a blanket description of all sources of supply for refrigerant (e.g., original manufacturer, authorized distributor, independent distributor) who may or may not have a legally binding relationship with the legally authorized source. This relationship generally includes direct product support, training and marketing support from the legally authorized source and provides direct product support to the customer.

USER: In the context of this document, it refers to entities (government and contractor), that procures and installs refrigerants in equipment.