METRIC

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# SOLVENT, CLEANING, 1,3-DICHLORO-1,1,2,2,3-PENTAFLUORO-PROPANE, HCFC-225G, SPECIFICATION FOR

## SPACEPORT ENGINEERING AND TECHNOLOGY DIRECTORATE

National Aeronautics and
Space Administration

**John F. Kennedy Space Center**

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# SOLVENT, CLEANING, 1,3-DICHLORO-1,1,2,2,3-PENTAFLUORO-PROPANE, HCFC-225G, SPECIFICATION FOR

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## JOHN F. KENNEDY SPACE CENTER, NASA

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# SOLVENT, CLEANING, 1,3-DICHLORO-1,1,2,2,3-PENTAFLUOROPROPANE, HCFC-225G, SPECIFICATION FOR

## 1. SCOPE

This specification establishes the requirements for hydrochlorofluorocarbon-(HCFC)-225G, 1,3-dichloro-1,1,2,2,3-pentafluoropropane, HCFC-225 cb isomer.

NOTE

HCFC-225 ca and HCFC-225 cb represent a convention of the American Society of Heating, Refrigeration, and Air-Conditioning Engineers, Inc. to designate 3,3-dichloro-1,1,1,2,2-pentafluoropropane and 1,3-dichloro-1,1,2,2,3-pentafluoropropane, respectively.

## 2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. When this document is used for procurement, including solicitations, or is added to an existing contract, the specific revision levels, amendments, and approval dates of said documents shall be specified in an attachment to the Solicitation/Statement of Work/Contract.

### 2.1 Governmental.

#### 2.1.1 Specifications.

National Institute of Standards and Technology (NIST)

| | |
|---|---|
| NIST Handbook 44 | Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices |

(Applications for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402-9325.)

John F. Kennedy Space Center (KSC)

| | |
|---|---|
| KSC-C-123 | Surface Cleanliness of Fluid Systems, Specification for |

2.1.2 Other Documents.

Code of Federal Regulations (CFR)

| | |
|---|---|
| 29 CFR 1910 | U.S. Department of Labor (Occupational Safety and Health Standards) |
| 49 CFR 173 | U.S. Department of Transportation (Shippers, General Requirements for Shipments and Packagings) |

(Applications for copies of the Code of Federal Regulations should be addressed to the Superintendent of Documents, Government Printing Office, North Capitol and H Streets N.W., Washington, DC 20401.)

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specified procurement functions should be obtained from the procuring activity or as directed by the Contracting Officer.)

2.2 Non-Governmental.

American Society for Quality Control (ASQC)

| | |
|---|---|
| ASQC Z1.4 | Sampling Procedures and Tables for Inspection by Attributes |

(Applications for copies should be addressed to the American Society for Quality Control, 611 East Wisconsin Ave., Milwaukee, WI 53202-3005.)

American Society for Testing and Materials (ASTM)

| | |
|---|---|
| ASTM D2109 | Standard Test Methods for Nonvolatile Matter in Halogenated Organic Solvents and Their Admixtures |
| ASTM D2989 | Standard Test Method for Acidity-Alkalinity of Halogenated Organic Solvents and Their Admixtures |
| ASTM D3401 | Standard Test Methods for Water in Halogenated Organic Solvents and Their Admixtures |

| | |
|---|---|
| ASTM D3443 | Standard Test Method for Chloride in Tri-chloro-trifluoroethane |
| ASTM D3447 | Standard Test Method for Purity of Halogenated Organic Solvents |

(Applications for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959.)

## 3. REQUIREMENTS

3.1 Chemical and Physical Properties. - The solvent shall conform to the requirements of table 1 when tested as specified in section 4.

3.2 Shelf Life. - Shelf life is considered to be indefinite at ambient conditions unless degradation or discoloration is detected. The fluid shall be tested before use on flight hardware or flight interface hardware.

3.3 Qualitative. - When examined visually, the solvent shall be a homogeneous, clear, colorless liquid that is free of particulate matter.

## 4. QUALITY ASSURANCE PROVISIONS

4.1 Qualification and Acceptance Tests. - Qualification and acceptance tests shall include all the tests required in this specification.

4.2 Certification. - A certified test report from the supplier shall accompany each lot of material comprising a shipment stating that the material meets all the requirements of this specification. This report shall include the actual test data (e.g., sample analysis report and actual laboratory results) for all requirements of this specification.

4.3 Responsibility for Inspection and Testing. - The supplier is responsible for the performance of all inspections and testing specified herein. Suppliers may, with the approval of the procuring agency, use their own facilities or those of a commercial laboratory. The procuring agency reserves the right to perform any of the inspections and testing set forth in this specification, where such are deemed necessary to ensure compliance with specification requirements.

4.3.1 Material Inspection.

4.3.1.1 Inspection Lot. - Containers filled in a 24-hour period from the same source and with the same type of solvent shall be considered an inspection lot.

4.3.1.2 Sampling. - Sampling for tests shall be performed in accordance with ASQC Z1.4.

4.3.1.3 Examination. - Samples selected in accordance with 4.3.1.2 shall be tested for conformance to the requirements listed in table 1 and 3.3. A result other than that specified shall constitute failure of the test.

Table 1. Requirements and Test Methods

| Chemical and Physical Property | Requirement | Test Method (Paragraph) |
|---|---|---|
| Chemical purity, minimum percent | 99.5 | 4.4.1 |
| Isomer ratio, percent | <2 - ca/>98 - cb | 4.4.1 |
| Moisture content, parts per million (ppm), maximum by weight | 100 | 4.4.2 |
| Acidity (equivalent hydrochloric acid ppm, maximum by weight) | 1.0 | 4.4.3 |
| Free chloride ion, ppm, maximum by weight | 1.0 | 4.4.4 |
| Nonvolatile residue, maximum ppm by weight | 10 | 4.4.5 |

4.4 Test Methods.

4.4.1 Chemical Purity. - The solvent shall be tested for chemical purity and isomer ratio in accordance with ASTM D3447 or an equivalent test method.

4.4.2 Moisture Content. - The solvent shall be tested for moisture content in accordance with ASTM D3401 or an equivalent test method.

4.4.3 Acidity. - The acidity of the solvent shall be determined in accordance with ASTM D2989 or an equivalent test method.

4.4.4 Chloride Ion. - The chloride ion content of the solvent shall be determined in accordance with ASTM D3443 or an equivalent test method.

4.4.5 Nonvolatile Residue. - The residue in the solvent shall be determined using a minimum sample volume of 100 milliliter (mL) in accordance with ASTM D2109 or an equivalent test method.

4.5 Inspection of Packaging. - The packaging of the containers of solvent shall be examined to ensure there is no leakage, corrosion, or any visible contaminants that could degrade the solvent or cause it to be inadvertently released from its container.

## 5. PREPARATION FOR DELIVERY

5.1 Packaging. - The solvent shall be furnished in cans, bottles, pails, drums, or in larger containers (e.g., tankers, portable tanks, or "totes") conforming to 49 CFR 173 in accordance with the manufacturer's commercial practice and this specification. Packaging shall have integrity control seals installed on all outlets after filling.

5.2 Marking. - Each container of solvent shall include the proper warning labels for personnel safety in accordance with 29 CFR 1910. Each container shall also be legibly and permanently labeled with the following information:

MATERIAL: Solvent, cleaning
SPECIFICATION: KSC-SPEC-P-0022
MANUFACTURER'S NAME AND PRODUCT IDENTIFICATION:
DATE OF MANUFACTURE:
LOT NUMBER:
QUANTITY IN THIS CONTAINER:
PURCHASE ORDER NUMBER:

5.3 Container Inspection and Cleaning. - Containers shall be cleaned as required by the filling contractor to meet the requirements listed in table 1. All container interiors shall be clean and free of contaminants that could alter the properties of the fluid.

5.4 Filling Containers. - Unless otherwise specified, containers shall be filled to the rated capacity of the container leaving at minimum a 3 percent by volume ullage. The weight of the solvent supplied shall be the difference between the filled (gross) weight and the unfilled (tare) weight of the container. The scale must be calibrated for commerce in accordance with NIST Handbook 44.

5.5 Leakage. - Containers and valves shall not leak after being filled and sealed.

5.6 Documentation. - The Material Safety Data Sheet (MSDS) shall be provided by the supplier and permanently retained by the user.

## 6. NOTES

6.1 Intended Use. - The solvent described in this specification is intended for use as a precision cleaning fluid for spaceflight hardware and related ground support equipment, their interfaces, and other systems in which it may be used to clean.

6.2 Hazard Potential. - See the MSDS for complete hazard, health, and reactivity information. The National Fire Protection Association hazard ratings follow:

a. Fire 0

b. Health 2

c. Reactivity 0

6.3 Acquisition Requirements. - Acquisition documents shall specify the following:

a. Title, number, and date of this specification

b. Method of shipment and the type and capacity of containers

c. Quantity by weight

d. When a different sampling plan is required (see 4.3.1.2)

e. Packaging requirements (see section 5)

NOTICE. The Government drawings, specifications, and/or data are prepared for the official use by, or on the behalf of, the United States Government. The Government neither warrants these Government drawings, specifications, or other data, nor assumes any responsibility or obligation, for their use for purposes other than the Government project for which they were prepared and/or provided by the Government, or an activity directly related thereto. The fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded, by implication or otherwise, as licensing in any manner the holder or any other person or corporation, nor conveying the right or permission, to manufacture, use, or sell any patented invention that may relate thereto.

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Spaceport Engineering and
Technology Directorate

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document or to amend contractual requirements.

| **I RECOMMEND A CHANGE:** | 1. DOCUMENT NUMBER<br>KSC-SPEC-P-0022 | 2. DOCUMENT DATE<br>February 26, 2001 |
|---|---|---|

3. DOCUMENT TITLE
Solvent, Cleaning, 1,3-Dichloro-1,1,2,2,3-Pentafluoropropane, HCFC-225G, Specification for

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

**6. SUBMITTER**

| a. NAME *(Last, First, Middle Initial)* | b. ORGANIZATION | |
|---|---|---|
| c. ADDRESS *(Include Zip Code)* | d. TELEPHONE *(Include Area Code)* | 7. DATE SUBMITTED |

**8. PREPARING ACTIVITY**

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