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**MEASUREMENT
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MSFC-SPEC-2489

REVISION A

EFFECTIVE DATE: February 6, 2014

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

EM40

MSFC TECHNICAL STANDARD

CLEANER, ORGANIC

Approved for Public Release; Distribution is Unlimited.

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline			BASELINE INITIAL RELEASE
CHG 1	SCN 001		REPLACE PAGES 7 AND NASA-MSFC-C
CHG 2	SCN 002	SB3-01-5389 SM3-01-5542	Remove MSFC-QPL-2489 from MSFC-SPEC-2489. The QPL will be baselined as a stand-alone doc.
Change 3	SCN 003		Replace page 6 with new page 6.
Change 4	SCN 004	SB3-01-5637 SM3-01-5828	Replace page 7 with new page 7.
Revision	A	2/6/2014	Revision A release was authorized by the MSFC Technical Standards Document Control Board (DCB) through the Multiprogram Document Management System (MPDMS). Update specification in entirety with changes requested from vendor to eliminate a hazardous test, align specification with primary components and update to new format.

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APPENDIX

A. % Non-Volatile Content by Use of Drying Oven.....11

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1.0 SCOPE

This specification established the requirements for a hand wipe cleaner that is not an ozone depleting substance (ODS). Refer to MSFC-QPL-2489 for a list of qualified materials which conform to these specification requirements. This specification has been approved by the George C. Marshall Space Flight Center (MSFC) and is available for use by MSFC and associated contractors.

2.0 APPLICABLE DOCUMENTS

2.1 GOVERNMENT DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or requests for proposals shall apply.

SPECIFICATIONS

MSFC

MSFC-QPL-2489 Qualified Products List, Products Qualified Under George C. Marshall Space Flight Center Specification MSFC-SPEC-2489, Cleaner, Organic

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

2.2 NON-GOVERNMENT DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of invitation for bids or request for proposals shall apply.

STANDARDS

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 56 Flash Point by Tag Closed Cup Tester, Standard Test Method for

ASTM D 86 Distillation of Petroleum Products at Atmospheric Pressure, Standard Test Method for

(Application for copies should be addressed <http://www.astm.org/>.)

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3.0 REQUIREMENTS

3.1 MATERIAL

The cleaner shall consist of a petroleum distillate meeting the requirements of this specification.

3.2. PHYSICAL PROPERTIES

Physical properties of the cleaner shall be in accordance with Table I.

TABLE I. Cleaner Physical Properties

Property	Requirement	Test Paragraph
Distillation (Initial Boiling Point (IBP))	325° F min (163° C)	4.7.1.1
Distillation (Dry Point (DP))	405 °F max (207°C)	4.7.1.1
Flash Point (Thermal Conversion (TCC))	115°F, min (46°C)	4.7.1.2
%Non-Volatile Residue	0.05% max	4.7.1.3

3.3 APPEARANCE

The cleaner shall be visually inspected with the unaided eye (corrective lenses permitted). The cleaner shall be a clear colorless liquid free of foreign material.

3.4 SHELF LIFE AND STORAGE

The cleaner shall be stored at 0 to 120°F in the original sealed containers in a closed and vented facility away from direct sun or rain (see 5.3). The storage life under these conditions shall be 24 months from date manufacture.

3.5 TOXIC PRODUCTS AND SAFETY

The vendor shall furnish a Material Safety Data Sheet (MSDS) to the procuring activity.

3.6 SHELF LIFE EXTENSION REQUIREMENTS (APPLICABLE TO THE PROCURING ACTIVITY ONLY)

Allowable shelf life extension shall be twelve months from the date of test on material taken from the original sealed container provided storage requirements have been met and the material passes all of the specified vendor lot acceptance tests in 4.5.1. Only one twelve month shelf life extension is permitted for this material.

4.0 VERIFICATION

4.1 IN-PROCESS MATERIAL (APPLICABLE TO USERS)

When the vendor container is opened at the user's site, the material is regarded as in-process material. In-process material can be used up to its certified shelf life provided that normal precautions are taken for handling and storage including those precautions cited below.

CHECK THE MASTER LIST - VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE
<https://repository.msfc.nasa.gov/docs/multiprogram/MSFC-SPEC-2489>

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- a. When in-process material is not in use, the material's container shall be closed immediately in a manner as closely as possible to its original state. Opening of containers for inspection of contents shall be limited to less than ten (10) minutes.
- b. Said container shall be stored in a safety approved location within a vented facility, away from direct sun or rain.
- c. For a given work station, opened containers shall be used to exhaustion before another vendor container of the material is opened for use at the station.
- d. If the integrity of in-process material is at any time suspect (e.g. agglomeration due to moisture absorption, not free flowing, or failure of visual inspection criteria), then the material in question shall be either recertified per 3.6 or discarded.

4.2 GENERAL PROVISIONS

The vendor shall provide and maintain a quality control system in accordance with the requirements of the purchase document. Vendors shall only submit those materials which meet the requirements of this specification.

4.3 RESPONSIBILITY FOR INSPECTION AND TEST

4.3.1 Vendor

The vendor is responsible for the performance of all inspection and test requirements as specified herein. Unless otherwise indicated, the vendor may utilize his own or any other inspection facilities and services acceptable to the procuring activity. Records of the examination and tests shall be transported to the procuring activity with the material.

The vendor shall notify the procuring activity of any changes in formulation or procedures used in product manufacture.

4.3.2 Procuring Activity

The procuring activity is responsible for verifying acceptability of the vendor test data or vendor certifications of selected acceptance tests.

4.4 QUALIFICATION TESTS (SEE ALSO 6.3.1)

Qualification testing shall consist of all examinations and tests specified in Table II and any other tests as deemed necessary by the MSFC Materials and Processes Laboratory. The test data shall be submitted to the procuring activity. The lots subjected to the qualification tests shall be representative of the manufactured lot from the proposed production facility.

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4.5 QUALITY CONFORMANCE TESTS (SEE ALSO 6.3.2)

4.5.1 Vendor Tests

The following tests specified in Table II are inspection tests for this specification which are to be performed by the vendor and reported to the procuring activity along with certifications of compliance to the requirements below.

Table II. VENDOR TESTS

Examination or Test	Requirement Paragraph	Examination or Test Paragraph
Distillation Range (IBP and DP)	3.2	4.7.1.1
Flash Point (TCC)	3.2	4.7.1.2
% Non-Volatile Residue	3.2	4.7.1.3
Appearance*	3.3	3.3

*Only a certification of compliance is required for this test, vendor test data not required.

4.6 SAMPLING

A sample of sufficient size to perform the required tests shall be randomly selected from each lot.

4.7 TEST METHODS

The following test methods and procedures shall be used. Unless otherwise specified in the test or procedure description, all weights, volumes, and temperatures shall be measured to the nearest specified unit or decimal. When a referenced document provides the test method description, that document applies only to the extent of specifying the method.

NOTE: Unless otherwise specified within this specification, reagent grade chemicals shall be used for chemical reactions in the conduct of all tests defined in this specification. Solvents and indicators may be commercial nonreagent grade materials unless otherwise specified with this specification.

4.7.1 Properties Tests

4.7.1.1 Distillation Range

Distillation range (IBP and DP) shall be determined per ASTM D 86.

4.7.1.2 Flash Point (TCC)

Flash point shall be determined per ASTM D 56.

4.7.1.3 %Non-Volatile Residue

% Non-Volatile Residue shall be determined per the procedure contained in Appendix A.

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4.8 REJECTION

Failure to meet any requirements of this specification is cause for rejection.

5.0 PACKAGING

5.1 PACKAGING AND PACKING

Packaging and packing of the cleaner material shall be in accordance with standard commercial practice in conformance to federal and state regulations applicable to the type of material. Containers in the same shipment shall be of the same size and of such construction and materials that the cleaner material will be adequately protected against loss or contamination.

5.2 MARKING

Marking for shipment shall contain as a minimum:

- a. Product/component Identification
- b. Manufacturer's name
- c. Batch Number or manufacturer Lot number

5.3 STORAGE

After receipt of the material, the procuring activity is responsible for storage.

6.0 NOTES

6.1 INTENDED USE

The material shall be used as a cleaner for flight or associated hardware.

6.2 ORDERING DATA

Purchase documents should specify the following:

- a. Title, number, and revision letter of this specification
- b. Types and quantity of material required

This specification requires procurement from vendors who are listed on the QPL for this specification.

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6.3 DEFINITIONS

6.3.1 Qualification Tests

Qualification tests are those tests necessary to qualify a supplier as an approved source. Once the material is qualified, these tests need not be repeated, provided the formulation or process of manufacturer does not change.

6.3.2 Quality Conformance Tests

Quality conformance tests are those tests performed on each lot of material to verify compliance with specification requirements.

6.3.3 Lot

A lot shall consist of all material manufactured in the same production shift, from the same raw materials and by the same manufacturing process and submitted for acceptance at one time.

6.4 MODIFICATIONS OR CHANGES

Recommendations for modifications or changes to the requirements specified herein shall be submitted in writing to the Materials and Processes Laboratory at MSFC for consideration.

6.5 TYPICAL MATERIAL

Spirit 126 (Product #s 04126010 and 04126100) manufactured by [DuBois Chemicals, Inc](#) is typical of the material covered by this specification.

NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, and 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 in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

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Appendix A

% Non-Volatile Content by Use of Drying Oven

Purpose: Determine the % Non-volatile (Anhydrous) content of liquid materials using a temperature-controlled oven.

Scope: This method applies to any aqueous based material or solvent based liquids with a volatile point of <95 °C.

Principle: The non-volatile content can be determined by evaporating the volatile components of a measured mass of material in a temperature-controlled oven for a specified amount of time. The residue can then be weighed. The difference between the beginning and final mass are used to determine the % non-volatile content of the test material.

Equipment:

Drying Oven (thermostatically controllable up to 160 +/- 2 °C)
Analytical Balance (+/- 0.1mg)
Desiccator (w/active dessicant)
Evaporating dishes
Glass pipettes

Procedure:

1. Set temperature of the drying oven to 105 °C (+/- 1 °C) (or as specified otherwise in the product specifications) and verify the oven is warmed to the set temperature prior to continuing.
2. Prepare at least (2) evaporating dishes and (1) glass pipette by placing them into the drying oven at least 1 hour. After drying, immediately place the evaporating dishes and glass pipette into the desiccators and allow to cool.
3. When cooled, separately weigh the mass of each evaporating dish on the analytical balance, and record the mass of each empty dish as the “tare weight blank” and “tare weight sample”, respectively.
4. Leaving the “sample dish” on the analytical balance, and using the prepared glass pipette, add approximately 5 – 10g of the test material to the sample dish. Record the total weight (of the dish and sample) to the nearest 0.1 mg.
5. Place both the “blank” dish and the “sample” dish in the drying oven for one hour.

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6. After 1 hour, remove the dishes from the oven allow to cool in the desiccator for 5-10 minutes.
7. Weigh each of the dishes, and record the mass of the dishes to the nearest 0.1mg.
8. Repeat steps #5-7 until the difference in mass between successive measurements for each dish is less than 0.0005g.

Quality Control:

The mass of the blank dish should have a difference of <0.0005g between initial and post drying weight. If the post drying weight is less than the starting weight or if the difference is >0.0005g, then the test must be repeated.

Calculations:

$$\begin{array}{l} \text{\%Non-volatile} \\ \text{(Anhydrous)} \end{array} = \frac{(M_2 - M_0)}{(M_1 - M_0)} \times 100\%$$

Where →

- M_0 = mass of empty evaporating dish
- M_1 = mass of evaporating dish and sample before drying
- M_2 = mass of evaporating dish and sample after drying