MSFC-SPEC-2492
July 1995

National Aeronautics and
Space Administration

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

# CLEANER, AQUEOUS WITH D-LIMONENE

Prepared by
Materials & Processes Laboratory
George C. Marshall Space Flight Center

MSFC - Form 454 (Rev. October 1992)

| Release Date: ___/___/___ | Marshall Space Flight Center<br>**SPECIFICATION/DOCUMENT CHANGE INSTRUCTION**<br>Spec./Doc. No. MSFC-SPEC-2492 | Page 1 of 1<br>Copy No.: |
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| cl 1 | SCN 001 | SB3-01-5392<br>SM3-01-5545 | Remove MSFC-QPL-2492 from MSFC-SPEC-2492. The QPL will be baselined as a stand alone doc. |

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MSFC-SPEC-2492
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| Prepared by | EH33 Organization | 7/24/95 Date |
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MATERIALS

*GEORGE C. MARSHALL SPACE FLIGHT CENTER*
*NATIONAL AERONAUTICS AND SPACE ADMINISTRATION*
*SPECIFICATION*

# CLEANER, AQUEOUS WITH D-LIMONENE

This specification has been approved by the George C. Marshall Space Flight Center (MSFC) and is available for use by MSFC and associated contractors.

## 1.0 SCOPE

This specification establishes the requirements for an environmentally compliant hand wipe cleaner. Refer to MSFC-QPL-2492 for a list of qualified materials which conform to these specification requirements.

## 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 request for proposals shall apply.

**SPECIFICATIONS**

**NASA**

| | |
|---|---|
| MSFC-QPL-2492 | Qualified Products List, Products Qualified Under George C. Marshall Space Flight Center Specification MSFC-SPEC-2492, Cleaner, Aqueous with D-Limonene |
| SE-S-0073 | National Space Transportation System Specification, Fluid Procurement and Use Control |

**STANDARDS**

| | |
|---|---|
| MIL-STD-129 | Marking for Shipment and Storage |

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the 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 date of invitation for bids or request for proposals shall apply.

**STANDARDS**

**AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

ASTM D 501 Sampling and Chemical Analysis of Alkaline Detergents, Standard Test Method for

ASTM D 1193 Reagent Water, Standard Test Method for

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

## 3.0 REQUIREMENTS

## 3.1 MATERIAL

The cleaner shall be aqueous based and shall meet the requirements of this specification.

## 3.2 REQUIREMENTS

The cleaner shall meet the requirements specified in Table I.

**TABLE I. Cleaner Requirements**

| Property | Requirement | Test Paragraph |
|---|---|---|
| Active $Na_2O$ (Sodium Oxide) | (Full Strength) 0.85 to 1.25% wt<br>(Diluted 1:3) 0.21 to 0.31% wt | 4.7.1.1 |
| Total $Na_2O$ (Sodium Oxide) | (Full Strength) 1.05-1.45% wt<br>(Diluted 1:3) 0.26-0.36% wt | 4.7.1.2 |
| Specific Gravity | (Full Strength) 1.03-1.04<br>(Diluted 1:3) 1.00-1.01 | 4.7.1.3 |
| Aluminum Safety | No sign of white rust or blushing* | 4.7.1.4 |
| Appearance | Clear orange liquid, free of foreign material | 4.7.1.5 |
| pH (1% Solution) | (Full Strength) 10.6 +/-0.4<br>(Diluted 1:3) 10.0 +/-0.5 | 4.7.1.6 |
| Dilution | No separation or settling for a one hour minimum | 4.7.1.7 |
| Liquid Phase Separation | No separation between liquid phases | 4.7.1.8 |

* This is an optional test and is not required during lot acceptance testing.

## 3.3 SHELF LIFE AND STORAGE

The cleaner shall be stored at 40°F to 120°F in the original sealed containers in a closed facility away from direct sun or rain (see 5.3). The storage life under these conditions shall be 12 months from date of manufacture.

## 3.4 TOXIC PRODUCTS AND SAFETY

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

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

Extending the shelf life of this material is not permitted.

# 4.0 QUALITY ASSURANCE PROVISIONS

## 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.

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. not free-flowing or failure of visual inspection criteria), then the material in question shall be 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. The procuring activity shall also perform the liquid phase separation test in Table I upon receipt of the material.

## 4.4 QUALIFICATION TESTS (SEE ALSO 6.3.1)

Qualification testing shall consist of all examinations and tests specified in Tables II and III 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.

## 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 |
|---|---|---|
| Active $Na_2O$ | 3.2 | 4.7.1.1 |
| Total $Na_2O$ | 3.2 | 4.7.1.2 |
| Specific Gravity | 3.2 | 4.7.1.3 |
| pH | 3.2 | 4.7.1.6 |

### 4.5.2 Vendor Certifications

The vendor shall supply certifications of compliance for the tests in Table III.

**Table III. CERTIFICATION REQUIREMENTS**

| Examination or Test | Requirement Paragraph | Examination or Test Paragraph |
|---|---|---|
| Aluminum Safety | 3.2 | 4.7.1.4 |
| Appearance | 3.2 | 4.7.1.5 |
| Dilution | 3.2 | 4.7.1.7 |

## 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 within this specification.

### 4.7.1 Test Requirements

#### 4.7.1.1 Active $Na_2O$

Active $Na_2O$ (Sodium Oxide) shall be determined per ASTM D 501.

#### 4.7.1.2 Total $Na_2O$

Total $Na_2O$ (Sodium Oxide) shall be determined per ASTM D 501.

#### 4.7.1.3 Specific Gravity

Specific gravity shall be determined using a gravimetric method at 25°C +/-1°C.

#### 4.7.1.4 Aluminum Safety

Concentrated cleaner shall be tested on an unclad 2024 specimen (any temper) between 65°F and 140°F for five minutes minimum.

#### 4.7.1.5 Appearance

Visual inspection of material sample with the unaided eye.

#### 4.7.1.6 pH

pH shall be determined using suitable equipment on cleaner solutions that are 1% solutions of the product form being procured. To perform the pH tests, mix 1 part cleaner to 100 +/- 5 parts water.

#### 4.7.1.7 Dilution

1 part +/- 10% of concentrated cleaner shall be diluted to 3 parts +/-10 % (by volume) using type IV water per ASTM D 1193 or grade A water per SE-S-0073.

#### 4.7.1.8 Phase Separation

A sample of diluted cleaner that has not been disturbed within the last hour prior to or during the inspection shall be used for liquid phase separation testing. The test shall be conducted by inserting a clear clean plastic tube slowly to the lowest point of the container and then sealing the top part of the tube airtight. The plastic tube shall be removed from the container in an upright position without tilting. A clear to pale yellow layer at the bottom of the tube indicates liquid phase separation.

### 4.8 REJECTION

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

## 5.0 PREPARATION FOR DELIVERY

### 5.1 PACKAGING AND PACKING

Packaging and packing of the cleaner material shall be in accordance with standard commercial practice and 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

Each container shall be marked for identification and shipment in accordance with MIL-STD-129 and shall include the following:

a. Specification number and revision level

b. Manufacturer's name, lot identification, and material identification

c. Purchase document number

d. Date of manufacture

e. Storage temperature range

## 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 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.

## 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

Jettacin Cleaner (Formula # 04876) manufactured by Diversey DuBois International, 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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| C H | DOCUMENT NUMBER | DRL DSH | DRL REV | TITLE | CCBD NO. | PCN | PC | EFFECTIVITY |
|---|---|---|---|---|---|---|---|---|
| * | MSFC-SPEC-2492 | 202 | - | CLEANER, AQUEOUS WITH D-LIMONENE | 000-00-0000 | 83001 | ZA | 1 |

| CHG NO. | CHG REV | CHG NOTICE | RESPONSIBLE ENGINEER | RESPONSIBLE ORGANIZATION | ACTION DATE | DESCRIPTION |
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| | | | R. A. MCFARLAND | EH43 | 08/15/95 | BASELINE RELEASE |
| * | 1 | SCN001 | GREG BOWEN | MP41 | 11/27/00 | UPDATE MSFC-SPEC-2492 BY REMOVING AND BASELINING THE QPL AS A STAND ALONE DOC. AUTHORIZED BY SB3-01-5392 AND SM3-01-5545. |

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| E003-0000 | 0000000 | 000-00-0000<br>SB3-00-0000 | 02/22/07 |

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| | | | MSFC-HDBK-1453 | | 202 | - | | | |
| | | | MSFC-HDBK-1674 | | 202 | - | | | |
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| | | | MSFC-MNL-1951 | | 209 | - | | | |
| | | | MSFC-PROC-1301 | | 202 | - | | | |
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| | | | MSFC-PROC-404 | | 202 | - | | | |
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| | | | MSFC-QPL-1918 | | 204 | - | | | |
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| | | | MSFC-SPEC-1870 | | 202 | - | | | |
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| | | | MSFC-SPEC-1919 | | 206 | - | | | |
| | | | MSFC-SPEC-2083 | | 202 | - | | | |
| | | | MSFC-SPEC-2223 | | 202 | - | | | |
| | | | MSFC-SPEC-2489 | | 206 | - | | | |
| | | | MSFC-SPEC-2490 | | 205 | - | | | |
| | | | MSFC-SPEC-2491 | | 203 | - | | | |
| | | | MSFC-SPEC-2492 | | 203 | - | | | |
| | | | MSFC-SPEC-2497 | | 211 | - | | | |
| | | | MSFC-SPEC-250 | | 202 | - | | | |
| | | | MSFC-SPEC-445 | | 202 | - | | | |
| | | | MSFC-SPEC-504 | | 202 | - | | | |
| | | | MSFC-SPEC-521 | | 202 | - | | | |
| | | | MSFC-SPEC-548 | | 202 | - | | | |
| | | | MSFC-SPEC-560 | | 202 | - | | | |
| | | | MSFC-SPEC-626 | | 202 | - | | | |
| | | | MSFC-SPEC-684 | | 202 | - | | | |
| | | | MSFC-SPEC-708 | | 202 | - | | | |
| | | | MSFC-SPEC-766 | | 202 | - | | | |
| | | | MSFC-STD-1249 | | 202 | - | | | |
| | | | MSFC-STD-1800 | | 202 | - | | | |
| | | | MSFC-STD-246 | | 202 | - | | | |
| | | | MSFC-STD-2594 | | 203 | - | | | |

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| | | | MSFC-STD-2903 | | 202 | - | | | |
| | | | MSFC-STD-2904 | | 202 | - | | | |
| | | | MSFC-STD-2905 | | 202 | - | | | |
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12/19/06

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| 6. DOCUMENT/DRAWING TITLE: | 7. REPORT TYPE: |
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| Cleaner, Aqueous with D-Limonene | Specification |

| 8. CONTRACT NO./PERFORMING ACTIVITY: | 9. DRD NUMBER: | 10. DPD / DRL / IDRD NUMBER: |
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| 11. DISPOSITION AUTHORITY (official records only): | 12. SUBMITTAL AUTHORITY: | 13. RELEASING AUTHORITY: |
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## III. TO BE COMPLETED FOR REPORTS, SPECIFICATIONS, ETC.

| 25. REVISION: | 26. CHANGE: | 27. VOLUME: | 28. BOOK: | 29. PART: | 30. SECTION: |
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| Basic | 1 | | | | |

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|---|---|---|---|---|
| Shuttle Reusable Solid Rocket Motor, Solid Rocket Booster | MSFC-SPEC-2492 | | 08/15/1995 | 08/07/2003 |

| 6. DOCUMENT/DRAWING TITLE: | 7. REPORT TYPE: |
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| Cleaner, Aqueous with D-Limonene | Specification |

| 8. CONTRACT NUMBER / PERFORMING ACTIVITY: | 9. DRD NUMBER: | 10. DPD / DRL / IDRD NUMBER: |
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| 11. DISPOSITION AUTHORITY (Check One): | 12. SUBMITTAL AUTHORITY: | 13. RELEASING AUTHORITY: |
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| ☒ Official Record - NRRS 8/12/A<br>MS ☒ Reference Copy - NRRS 8/5/A/3 (destroy when no longer needed) | C. Darrell DeWeese | Gail H Gordon |

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| 376-50; 376-60 | |

## II. ENGINEERING DRAWINGS

| 20. REVISION: | 21. ENGINEERING ORDER: | 22. PARTS LIST: | 23. CCBD: |
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## III. REPORTS, SPECIFICATIONS, ETC.

| 24. REVISION: | 25. CHANGE: | 26. VOLUME: | 27. BOOK: | 28. PART: | 29. SECTION: |
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