

MIL-C-85043A
30 December 1977
SUPERSEDING
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9 July 1976

MILITARY SPECIFICATION

CLOTH, CLEANING, LOW-LINT

This specification is approved for use by all
Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements for low-lint type cleaning cloths (see 6.2).

1.2 Classification. Low-lint cleaning cloths covered by this specification shall be of the following types (see 6.2).

Type I - For clean room use
Type II - For general use

2. APPLICABLE DOCUMENTS

* 2.1 Issues of documents. The following documents of the issue in effect on the date of invitation for bids or request for proposal form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

L-P-378	- Plastic Sheet and Strip, Thin Gauge, Polyolefin
PPP-B-566	- Box, Folding, Paperboard
PPP-B-636	- Box, Shipping, Fiberboard

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Engineering Specifications and Standards Department (Code 93), Naval Air Engineering Center, Lakehurst, N. J. 08733 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 7920

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PPP-B-665 - Box, Paperboard, Metal Edged and Components

PPP-B-676 - Box, Setup

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MIL-B-117 - Bags, Sleeves and Tubing-Interior Packaging

MIL-H-5606 - Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance

STANDARDS

FEDERAL

FED-STD-101 - Preservation, Packaging, and Packing Materials: Test Procedures

FED-STD-191 - Textile Test Methods

FED-STD-791 - Lubricants, Liquid Fuels and Related Products, Methods of Testing

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MIL-STD-105 - Sampling Procedures and Tables for Inspection By Attributes

MIL-STD-129 - Marking For Shipment and Storage

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

* 2.2 Other publications. 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 proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F51-68 Sizing and Counting Particulate Contaminant in and on Clean Room Garments

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

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AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

B93.28-1973

Method for Calibration of Liquid Automatic
Particle Counters Using "AC" Fine Test Dust

(Application for copies should be addressed to the American National
Standards Institute, 1430 Broadway, New York, NY 10018.)

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Application for copies should be addressed to the National Motor Freight
Traffic, Tariff Department, 1616 P Street, N.W., Washington, DC 20036.)

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification Rules

(Application for copies should be addressed to the Uniform Classification
Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), the contractor
shall furnish 2.27 kilograms (5 lb) of cloths for first article inspection
and approval (see 4.4 and 6.2.1).

3.2 Material. The cloth shall be of a knit construction and
shall be made entirely of new stretch-textured nylon nonfilament fiber.

3.3 Physical properties. The cloths shall conform to the
requirements specified in Table I.

3.4 Dimensions. Each cloth shall be between 1300 and 2000
square centimeters (approximately 200 and 310 square inches) except that 10
percent of the lot may be between 1000 and 1300 square centimeters (approx-

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mately 155 and 200 square inches) and 10 percent may be between 2000 and 2600 square centimeters (approximately 310 and 400 square inches). Unless otherwise specified, each cloth shall be approximately rectangular with a minimum width of 25.4 centimeters (10 inches). The length shall not exceed twice the width of any cloth. All dimensions shall be determined without stretching the cloth. Joining of the cloths by sewing shall not be permitted.

3.5 Color. The color of the cloth shall be white unless otherwise specified by the procuring activity (see 6.2).

3.6 Workmanship. The finished cloth shall conform to the quality established by this specification when examined as specified in 4.5.1.1. The occurrence of defects shall not exceed the acceptable quality level.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

First article inspection (4.4)

Quality conformance inspection (4.5)

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in the applicable paragraphs of this specification.

4.4 First article inspection. When specified (see 6.2), the first article sample submitted in accordance with 3.1 shall be visually examined for appearance and color. The sample shall be tested for all tests in accordance with the methods specified in table II and 4.6.

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4.5 Quality conformance inspection. The quality conformance inspection of the cloths shall consist of all the examinations under this specification and the following tests:

Oil absorption
Dissipation time
Particle count
Particulate contaminants

4.5.1 Quality conformance inspection sampling. Sampling shall be in accordance with MIL-STD-105, unless otherwise specified.-

4.5.1.1 Visual examination for workmanship. A minimum of three cloths from each 0.454 kilogram (one lb) of sample shall be visually examined. Defects clearly noticeable at normal inspection distance (3 feet) shall be scored as listed below. All defects found shall be counted regardless of their proximity to each other except where two or more defects represent a local condition, in which case only the more serious defect shall be counted. A continuous defect shall be counted as one defect for the individual cloth in which it occurs. The sample unit for this examination shall be 0.454 kg (one lb). The sample size shall be in accordance with MIL-STD-105, Inspection Level I and Acceptable Quality Level (AQL) 6.5 defects per 100 units. The lot shall be expressed in units of 0.454 kg (one lb) each.

DEFECTS

Hole, cut or tear
Mend, snag or seam
Size not within limits
Spot or stain (any)
Dirty, fuzzy or linty

4.5.1.2 Packaging inspection. An examination shall be made to determine that packaging, packing and container marking comply with section 5 of this specification. Defects shall be scored in accordance with the list below. The sample unit shall be one shipping container fully prepared for delivery except that it need not be sealed. Defect of closure listed below shall be examined on shipping containers fully prepared for delivery. The lot size shall be the number of shipping containers in the end item inspection lot. Inspection shall be in accordance with MIL-STD-105, Inspection Level S-2 and Acceptable Quality Level (AQL) 2.5 defects per 100 units.

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ExamineDefectMarkings

Missing, incorrect, illegible, improper size, improper location, sequence or method of application

Material

Any nonconforming component, component missing, or damaged

Closure

Incomplete

4.5.1.3 Testing of the end item. The methods of testing shall be as specified in table II and 4.6. The physical values specified in section 3 apply to the results of the determinations made on the sample unit. No test result obtained from less than two determinations shall be acceptable. The sample unit shall be 2.27 kg (5 lb.) of cloths. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. All test reports shall contain the individual values utilized in expressing the final result. The sample test units shall be as follows:

<u>Lot size (kilograms)</u>	<u>Sample test units (2.27 kilograms)</u>
800 or less	2
801 to 22,000	3
22,001 & over	5

4.6 Test methods.

4.6.1 Standard conditions. Unless otherwise specified, the test conditions shall be 50 percent \pm 5 percent relative humidity at a temperature of 21°C to 24°C (70°F to 74°F). Test specimens shall have conditioned in this atmosphere for a minimum of 24 hours before the test is begun.

4.6.2 Weight. The weight shall be determined in accordance with Method 5041 of FED-STD-191.

4.6.3 Oil absorption. The properly conditioned cloth shall be weighed intact to the nearest 0.01 gram. Add one liter of hydraulic fluid conforming to MIL-H-5606 to a beaker of suitable size. Immerse the cloth specimen in the oil so that the specimen will be completely below the surface of the oil. After one minute has elapsed, remove the specimen and suspend it by one corner. Let the oil drain off until no drop forms for 30 seconds. The specimen shall then be reweighed. The test shall be performed in triplicate for each sample unit and the results shall be the average. Calculate the percent oil absorption as follows:

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$$\text{Oil absorption, \%} = \frac{A - B}{B} \times 100$$

where:

A = final weight of the cloth
B = initial weight of the cloth

4.6.4 Electrostatic (dissipation time). The time required to dissipate a charge induced on the surface of the cloth shall be determined in accordance with Method 4046 of FED-STD-101.

4.6.5 Particle count. The particle count shall be determined in accordance with Method 3009 of FED-STD-791 in a dust free environment (see 6.4). A sample of new hydraulic oil conforming to MIL-H-5606 shall be placed in a 1-liter container. The quantity of oil used shall be such that the free space above the oil level with the cloth in it shall constitute not less than 20 percent nor more than 30 percent of the volume of the container. The container shall be stoppered with a non-shedding plastic film and agitated for a minimum of 15 minutes using a shaker capable of biaxial motion. At the completion of this period, a sample shall be drawn at once and the particle count determined. If the particle count exceeds that indicated in table III, filter a second sample of the hydraulic oil and repeat the process or draw a second sample of hydraulic oil from a different source. The particle count of the hydraulic oil shall not exceed that indicated in table III. A 15.2 cm X 15.2 cm (6" X 6") sample swatch of wiper cloth shall be placed in the container with the hydraulic oil and the operation repeated. The reading shall be normalized per square centimeter of cloth using the following formula:

$$\frac{\text{Number of particles}}{\text{Square centimeter}} = \frac{\text{Number of particles}}{\text{Milliliters}} \times$$

$$\text{Milliliters of suspension} \times \frac{1}{\text{Area of cloth (cm)}^2}$$

The difference between the final reading and the initial reading shall be calculated. The results shall be expressed as the average per sample unit. The particle count may be determined by using an automatic particle counter such as the Hiac Model PC305 or equivalent. When this procedure is used, the instrument shall be calibrated in accordance with ANSI B93.28-1973 (NFPA Std T2.9.6 - 1972) (see 6.4).

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4.6.6 Particulate contaminants. The particulate contaminants, 5 microns and larger, shall be determined as specified in ASTM Method F5168.

5. PREPARATION FOR DELIVERY

* 5.1 Preservation. Preservation shall be Level A or minimum protection as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Type I. Unless otherwise specified, the cloths, in 2.27 kg (5 lb) units, shall be packaged in pre-cleaned, contamination free, hermetically sealed polyethylene bags conforming to MIL-B-117, type I, class B, style 2. The bags shall be heat sealed. Excess air shall be expelled from the bags prior to heat sealing. The bags shall be made of polyethylene film having a thickness of 0.102 \pm 0.005 mm (0.004 \pm 0.0002 in.) and conforming to type I of L-P-378.

5.1.1.2 Type II. Unless otherwise specified, the cloths, in 2.27 kg (5 lb) units, shall be packaged in pre-cleaned, contamination free polyethylene bags. The top of the bag shall be folded three times and held in position with a piece of tape. The bags shall be made of polyethylene film conforming to type I of L-P-378. The film shall have a minimum thickness of 0.038 mm (0.0015 in.)

5.1.1.3 Intermediate packaging. Two 5-lb bags of one type only, packaged in accordance with 5.1.1.1 or 5.1.1.2 as required, shall be packaged in an intermediate container conforming to PPP-B-566, PPP-B-665 or PPP-B-676. The intermediate containers shall be of uniform size, shape and quantity.

5.1.2 Minimum protection.

5.1.2.1 Commercial. The cloths shall be packaged in a manner that will afford adequate protection against physical damage or contamination during shipment from the supply source to the first receiving activity.

5.2 Packing. Packing shall be level A, B or Commercial (see 6.2).

5.2.1 Level A. Level A shall not apply.

* 5.2.2 Level B. Cloths packaged as specified in 5.1 shall be packed in weather resistant fiberboard boxes conforming to grade V3C of PPP-B-636.

5.2.3 Commercial. The packaged cloths shall be packed in shipping containers in a manner that will afford adequate protection against damage or contamination during direct shipment from the supply source to the first receiving activity. These packs shall conform to the requirements of the National Motor Freight Classification or Uniform Freight Classification Rules, as applicable.

5.3 Marking. In addition to any special marking required by the contract (see 6.2), each unit package and exterior container shall be marked in accordance with MIL-STD-129. The marking shall include the following:

CAUTION:

- (a) Do not use with solvent having a flash point below 37.8°C (100°F).
- (b) Do not use for wiping large plastic surfaces such as radomes and canopies.

6. NOTES

6.1 Intended use. The type I cloths are intended for use in clean rooms and any other operation where ultra-clean, low-lint wipers are required. The type II cloths are intended for use in cleaning, polishing and wiping operations requiring low-lint, highly absorbent wipers, but not clean room standards.

NOTE: These cloths should not be used on plastic surfaces nor with any solvent which has a flash point below 37.8°C (100°F).

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* 6.2
the following:

Ordering data. The procurement documents should specify

- (a) Title, number and date of this specification.
- (b) Type required (see 1.2).
- (c) Quantity in kilograms (pounds).
- (d) Preservation level A, unless otherwise specified (see 5.1).
- (e) Packing level B, unless otherwise specified (see 5.2).
- (f) Color, if other than white (see 3.6).
- (g) Number of kilograms (pounds) per bag.
- (h) When first article sample is required.

6.2.1 First article. When a first article is required, it shall be tested and approved under the appropriate provisions of 7-104.55 of the Armed Services Procurement Regulation. The first article should be a preproduction sample. The first article should consist of one sample unit. The contracting officer should include specific instructions in all procurement instructions regarding arrangements for examination, test and approval of the first article.

6.3 All manufacturing processes subsequent to laundering, including drying and packaging, should be conducted under clean room conditions as specified in FED-STD-209.

6.4 Information regarding the Hiaz Model PC 305 may be obtained from the High Accuracy Products Company, Claremont, California, 91711.

6.5 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:
Army - GL
Navy - AS
Air Force - 99

User activity:
Navy - MC

Preparing activity:
Navy - AS
(Project No. 7920-0245)

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TABLE I. Physical requirements.
(see 3.3)

Characteristic	Requirement		Test Paragraph
	Type I	Type II	
Weight, g/sq. meter (oz/sq.yd)	101.7(3)min 305.2(9)max	101.7(3)min. 305.2(9)max	4.6.2
Oil absorption, % min.	200	200	4.6.3
Electrostatic, dissipation time (charge), sec. max.	2.0	2.0	4.6.4
Particle count, max/cm ² (size in microns)			4.6.5
5-10	1600	10,000	
11-25	160	2,150	
26-50	45	225	
51-100	20	50	
Over 100	3	10	
Particulate contaminants, max. 5 microns and over particles/m ² (particles/ft ²)	21,528 (2,000)	-- (--)	4.6.6

TABLE II. Test methods.
(see 4.6)

Requirement	Requirement reference	Test Method
Material	3.2	1530 of FED-STD-191
Color	3.6	Visual
Weight	Table I	4.6.2
Oil absorption	Table I	4.6.3
Electrostatic, dissipation time	Table I	4.6.4
Particle count	Table I	4.6.5
Particulate contaminants	Table I	4.6.6

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TABLE III. Background fluid particle count.
(see 4.6.5)

Particle size range (microns)	Number of particles per 100 milliliters (max.)
5-10	2500
11-25	670
26-50	93
51-100	16
Larger than 100	1

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