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**SUPERSEDING
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MILITARY SPECIFICATION

DESICCANTS, ACTIVATED FOR DYNAMIC DEHUMIDIFICATION

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 Scope. This specification covers desiccants intended for the removal of moisture from air, other gases, and liquids by dynamic means and for the approximate indication of the relative humidity of an enclosed space.

1.2 Classification. Desiccants shall be furnished in the following types and grades, as specified (see 6.2):

- Type I — Large particle size.
 - Grade H — High adsorption capacity.
 - Grade M — Medium adsorption capacity.
 - Grade L — Low adsorption capacity.
- Type II — Medium particle size.
 - Grade H — High adsorption capacity.
 - Grade M — Medium adsorption capacity.
- Type IV — Medium particle size impregnated with a humidity indicator.
 - Grade H — High adsorption capacity.

2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards, and drawings, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS

FEDERAL

- QQ-A-355 — Aluminum Alloy (24S), Plate and Sheet.
- QQ-N-35 — Naval Brass; Rods, Bars, Wire, Shapes and Forgings and Flat Products With Finished Edges.
- AQ-M-44 — Magnesium Alloy Plate and Sheet (AZ31).
- QQ-S-636 — Steel, Carbon (Low Carbon): Sheets and Strips.

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- RR-S-366 — Sieves, Standard for Testing Purposes.
- TT-E-485 — Enamel, Semi-Gloss Rust-Inhibiting.
- PPP-C-96 — Cans, Metal, 28 Gage and Lighter.
- PPP-D-760 — Drums and Pails, Metal (5 and 16.64 Gallon).

STANDARDS

MILITARY

- MIL-STD-105 — Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 — Marking for Shipment and Storage.
- MIL-STD-147 — Palletized Unit Load (40" x 48") 4-Way Partial and 4-Way Pallets.
- MS16188 — Chart: Humidity Indicator Color Comparison.
- MS20003 — Indicator, Humidity, Card, Three Spot Impregnated Areas.
- MS26507 — Indicator Card Desiccant Relative Humidity (8 Percent \pm 5 Percent).

DRAWINGS

BUREAU OF SHIPS

- S3803-873409 — Package Dehumidifier.
- S3803-848380 — Desiccant Dehumidifier.

(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. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

INTERSTATE COMMERCE COMMISSION

Regulations for Transportation of Explosives and Other Dangerous Articles.

(The Interstate Commerce Commission Regulations form a part of the Code of Federal Regulations, available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

OFFICIAL CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules.

(Application for copies should be addressed to the Official Classification Committee, 1 Park Avenue at 33rd Street, New York 16, N. Y.)

3. REQUIREMENTS

3.1 Preproduction sample. Prior to production, a sample shall be submitted for Government approval (see 4.2).

3.2 Material. Desiccants shall be nondeliquescent.

3.3 Impregnation.

3.3.1 Types I and II. Types I and II, shall not be impregnated.

3.3.2 Type IV. Type IV shall be impregnated with an indicator for the purpose of providing for a visual approximation of the degree of saturation of the desiccant. The material shall have characteristic colors when in equilibrium with atmospheres of varying relative humidities, and shall coincide closely with the colors shown on Standard MS16188.

3.4 Apparent density. When the desiccant is tested as specified in 4.8.1, the apparent density shall be as follows:

	<i>Pounds per cubic foot</i>
Grades H and M	Not less than 37
Grade L	Not less than 50

TABLE I. Minimum water-vapor absorption capacity.

Nominal relative humidity (percent)	Types I, II and IV, grade H	Types I and II, grade M	Type I, grade L
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
10	5.5	14.7	8.3
20	10.0	15.6	5.0
40	19.0	16.9	7.5
60	23.0	18.2	11.7
80	33.0	19.2	15.0

3.5 Water-vapor absorption, capacity. When the desiccant is tested as specified in 4.8.2, the water-vapor adsorption capacity shall conform to table I.

3.6 Particle size. When the desiccant is tested as specified in 4.8.3, the particle sizes of types I, II and IV shall be as shown in table II. Except as otherwise specified herein, the sieves shall conform to Specification RR-S-366.

TABLE II. Particle size

Sieve No.	Distribution	Percent
10	Retained (max.)	0.5
6	Through 0.265 inch, retained on 6 (min.)	45.0
10	Through 6, retained on 10 (max.)	50.0
18	Through 10, retained on 18 (max.)	2.5
18	Through 18 (max.)	0.5

¹ The permissible variations in average openings shall be plus or minus 3 percent. The permissible variations in maximum openings shall be plus 5 percent. The wire diameter shall be 0.003 to 0.005 inch.

3.7 Particle strength. When the desiccant is tested as specified in 4.8.4, the particle strength shall be as shown in table III.

3.8 Loss-on-ignition. When the desiccant is tested as specified in 4.8.5, the loss-on-ignition shall be as shown in table IV.

TABLE III. Particle strength.

Type	Percent passing through a No. 80 sieve (max.)
I and II, grades H and M	1.5
IV, grade H	2.5
I, grade L	2.5

TABLE IV. Loss-on-ignition.

Type	Percent (maximum)
I, and II, grade H	6.50
IV, grade H	5.75
I and II, grade M	4.00
I, grade L	10.00

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3.9 Corrosiveness, types I, II, and IV. When types I, II, and IV are tested as specified in 4.8.6, the test specimens of steel, brass, magnesium, and aluminum in contact with the desiccant shall not be more corroded than the bare metal.

3.10 Machine performance.

3.10.1 Type I, grades H, M and L; type II, grades H and M; and type IV, grade H. When a desiccant is tested as specified in 4.8.8.1, the material shall not cake or agglomerate. After the machine performance test, no more than 2.0 percent by weight of the desiccant shall pass through the No. 6 sieve.

3.10.2 Type I, grade L. When a desiccant is tested as specified in 4.8.8.2, the material shall not cake or agglomerate. After the machine performance test, no more than 2.0 percent by weight of the desiccant shall pass through the No. 6 sieve.

4. QUALITY ASSURANCE PROVISIONS

4.1 Unless otherwise specified herein the supplier is responsible for the performance of all inspection requirements prior to submission for Government inspection and acceptance. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. Inspection records of the examinations and tests shall be kept complete and available to the Government as specified in the contract or order.

4.2 Preproduction equipment. Prior to production, 15 pounds of material shall be submitted to a laboratory designated by the bureau or agency concerned for the tests specified in 4.8, with the exception of 4.8.8.2 for type I, grade L. This material shall be submitted after it has been fully tested by the contractor at his plant and preliminarily accepted by the inspector. The contractor shall record all data obtained during such tests in such form as is consonant with good

engineering practice. One copy of such record shall be presented to the inspector at the time of preliminary inspection, one copy shall be included with the equipment at the time of submission for final approval and three copies shall be furnished to the bureau or agency concerned at the time of such submission. The cover sheet of each copy of the record shall be marked with the number of the contract or order.

4.2.1 Within 45 days after submission of the preproduction material, the contractor will be notified whether the preproduction material has been approved, conditionally approved, or disapproved. In the event that the contractor does not receive such notification within such period and promptly so notifies the contracting officer in writing, the contract delivery dates for the production material shall be extended by the contracting officer the number of days by which notification is delayed.

4.2.2 The contractor may acquire all materials required for use on the contract prior to approval of the preproduction unit. However any production started prior to approval of the preproduction unit shall be at the contractor's risk.

4.3 Sampling for acceptance inspection.

4.3.1 Lot. A lot shall consist of material of the same type and grade from one day's production or of any fractional day's production which constitutes completion of a manufacturing run, offered for delivery at one time.

4.3.2 Method of sampling.

4.3.2.1 Types I and II, grade H and M; type IV, grade H. Four separate 15-pound samples of material shall be selected from separate portions of the lot. Each of the four 15-pound samples shall immediately be placed in clean, dry containers, which, when sealed, shall be air- and moisture-tight. Extreme care shall be taken to insure that the material is exposed for a minimum time and

that the containers are closed and sealed immediately.

4.3.2.2 Type I, grade L. The method of sampling shall be as specified in 4.3.2.1. In addition to the smaller samples, a separate sample of at least 150 pounds shall be taken for retention by the MIL-D-3716A inspector and shall be forwarded when requested under 4.5.1.

4.3.2.3 Identification and use of samples. Samples shall be identified with the name of manufacturer, name of the material, the specification number, type, grade, the reactivation instructions, the contract or order number, and the lot number. The four separate 15-pound samples shall be used as follows:

- (a) Two for the acceptance inspection.
- (b) One for the contractor.
- (c) One to be held by the inspector 90 days to be used for retests in case of dispute.

4.3.2.4 Sampling for examination of filled containers. A random sample of filled containers shall be selected in accordance with Standard MIL-STD-105 at inspection level I and acceptable quality level = 2.5 percent defective to verify compliance with all requirements regarding fill, closure, marking, and other requirements not involving tests.

4.3.3 Place of acceptance inspection. Unless otherwise specified in the contract or order, the contractor shall furnish all samples, and shall be responsible for accomplishing the required tests. Tests as conducted shall be as specified in 4.5.1. When inspection is conducted at the contractor's plant, all examination and testing shall be under the supervision of the inspector. Contractors not having laboratory testing facilities satisfactory to the bureau or agency concerned shall engage the services of a commercial testing laboratory acceptable to the inspector. Acceptance or approval of material during

course of manufacture shall in no case be construed as a guaranty of the acceptance of the finished product.

4.3.3.1 When Government acceptance inspection is required (see 6.2), samples shall be forwarded to the Government laboratory designated by the procuring agency together with copy of the contractor's data.

4.4 Examination of filled containers at place of manufacture. Each sample-filled container selected as specified in 4.3.2.4 shall be examined for defects of construction of the container and the closure, for evidence of leakage, and for unsatisfactory markings; each filled container shall also be weighed to determine the amount of contents. Any container in the sample having one or more defects or under required fill, shall be rejected, and if the number of defective containers in any sample exceeds the acceptance number for appropriate sampling plan of Standard MIL-STD-105 the lot represented by the sample shall be rejected. Rejected lots may be resubmitted for Government examination provided the contractor has removed or repaired all nonconforming containers.

4.5 Acceptance inspection.

4.5.1 Tests. Samples forwarded as specified in 4.3.3.1 shall normally be subjected to all the tests specified in 4.8, except the corrosiveness tests and the water vapor adsorption capacity tests for 40, 60, and 80 percent. The large machine performance test specified in 4.8.8.2 shall also be excepted for type I, grade L. These excepted tests may be added to the inspection procedure when, in the opinion of the inspector or Government laboratory, special circumstances warrant such action.

4.5.2 Retests. If, in the opinion of the contractor, failure of a portion of a sample to conform to this specification was due to faulty test methods or damage to the test sample, the test shall be repeated on the

other two portions of the sample. If any two of the three portions of a sample are found to be non conforming, the entire sample shall be judged nonconforming.

4.5.3 Rejection. If the sample selected in accordance with 4.3.2 is judged to be non-conforming (see 4.5.2), the entire sampling lot shall be rejected. A rejected sampling lot may be resubmitted for Government acceptance, but only after the contractor, subsequent to the first Government acceptance inspection, has reworked and reinspected all material represented in the rejected sampling lot, and has corrected all deficiencies. Before resubmitting, full particulars concerning previous rejection and the action taken to correct the defects found in the original material shall be furnished to the inspector.

4.6 Additional Government inspection. Where other specifications form a part of this specification, unless otherwise specified in the contract or order, sampling, examination and tests shall be conducted as required in the referenced specifications.

4.7 Contractor's inspection. The contractor shall have laboratory facilities or shall engage the services of a commercial testing laboratory satisfactory to the Government inspector. From each lot from which material

is to be offered for delivery under a contract or order, the contractor shall select a suitable sample and subject it to all the inspection and tests specified in 4.8, except the corrosiveness tests and the water-vapor adsorption capacity tests for relative humidities of 40, 60 and 80 percent. These excepted tests may be added to the inspection test procedure when, in the opinion of the inspector, circumstances warrant such action.

4.7.1 Reports of contractor's tests. Quantitative test reports for each lot sampled and tested in accordance with 4.7 shall be furnished to the inspector. The test reports shall be signed by the director (or his authorized assistant) of the laboratory in which the tests were conducted.

4.8 Test procedures.

4.8.1 Apparent density. A clean dry, 100-milliliter (ml.), graduated cylinder shall be weighed to the nearest 0.1 gm. The cylinder shall be filled to approximately the 100-ml. mark with activated desiccant and shall be weighed again. The cylinder shall be firmly tapped on a resilient surface, such as heavy sheet rubber, until the volume of desiccant remains constant between two successive, 1-minute, tapping periods. The volume of desiccant shall be read in the graduated cylinder. The apparent density shall be calculated by the following formula:

$$\text{Apparent density (lb/cu. ft.)} = \frac{\text{Weight of desiccant (gm.)} \times 62.45}{\text{Volume of desiccant (ml.)}}$$

4.8.2 Water-vapor adsorption capacity.

4.8.2.1 Apparatus. The general arrangement of the apparatus shall be as shown on figure 1. The fitting comprising the inlet, outlet, and petticoat bubbler for each saturator bottle shall have a ground glass stopper to fit the bottle. The saturator bottle and bubbler shall be so designed that with one liter of solution in the bottle the upper holes

of the bubbler shall be not more than 3 inches, nor less than 1-inch below the surface of the liquid. Each of the six saturator bottles shall be filled with one liter of identical sulfuric acid solutions to give the required nominal relative humidity at 25°C. Table V shows the solutions to be used for this purpose. The sample-containing bottle shall be a Nesbitt, Fleming or other standard form of adsorption bulb. The bulb shall be pro-

vided with a suitable closure to prevent diffusion. The room in which the tests are being run should be controlled to $25 \pm 1^\circ\text{C}$. It is essential that the temperature variation within the saturator bottles, the inlet air and the sample-containing bottle during any one

run shall vary not more than plus or minus 0.5°C . A desiccant trap filled with activated desiccant under test shall be placed in front of the saturator bottles to pick up any adsorptive impurities in the inlet air.

TABLE V. Relative humidity solutions.¹

Solution	Percent by weight	RH percent at 25°C .	Specific gravity: $20^\circ/4^\circ\text{C}$.	Specific gravity: $77^\circ/60^\circ\text{F}$.
H_2SO_4	64.61	10	1.5459	1.5462
H_2SO_4	58.21	20	1.4789	1.4754
H_2SO_4	47.85	40	1.3739	1.3715
H_2SO_4	38.26	60	1.2889	1.2859
H_2SO_4	26.23	80	1.1894	1.1853

¹ This table has been computed on the basis of values for the specific gravity found in the International Critical Tables. The nominal relative humidities represent values that would be obtained in a closed static system. The actual off-gas relative humidities generally will be slightly below these nominal values.

² Specific gravity measurements should be made at either indicated temperature using a precision hydrometer with a smallest subdivision of 0.0005. The specific gravity of the sulphuric acid solution should be checked prior to each determination since the acid-water ratio will change during the course of determination.

4.8.2.2 Procedure. A 6- to 10-gram sample of the desiccant shall be weighed to the nearest milligram in the tared adsorption bulb. Extreme care shall be exercised to insure that the material is exposed to the air for a minimum time. The adsorption bulb shall then be connected to the apparatus and the air flow adjusted to 4 ± 0.5 liters per minute with the bypass closed. If the manometer indicates the pressure in the last bottle to be greater than 1.0 inch mercury, the bleed-off line should then be cracked open until the manometer indicates less than 1 inch and that point maintained for the balance of the run. When using the bypass an occasional check shall be made of the amount of air passing through the adsorption bulb by diverting the bypass air from the flowmeter to

atmosphere through the "tee" connection. The flowmeter reading will then indicate the actual air flow through the adsorption bulb. Periodically the adsorption bulb shall be removed from the train, the stop-cocks closed, and the bulb weighed. This process shall be repeated until two successive weighings, approximately 1 hour apart, show a weight variation not exceeding 0.1 percent; however, the test shall be considered complete if at any time the minimum specification values are attained. It will generally be found that the weight will rise to a maximum and then decrease slightly before approaching a constant value. The moisture adsorption capacity shall be calculated from the following equation:

$$\text{Moisture adsorption capacity, percent} = 100 \times \frac{W_1 - W_0}{W_0 - W_e}$$

Where:

- W_1 = Final weight of adsorption bulb.
- W_0 = Original weight of bulb and sample.
- W_e = Weight of empty bulb.

4.8.3 Particle size.

4.8.3.1 Apparatus. The mechanical shaker to be employed in conducting particle size test shall operate with a single eccentric cir-

cular motion at 285 plus or minus 10 revolutions per minute (r.p.m.) and with a tapping action of 150 plus or minus 5 strokes per minute to obtain dependable sieve analyses. To permit flexible operation, the shaker shall accommodate one to six 8-inch sieves with one pan and cover. For ease of operation and reproducibility of sizing tests, an automatic electric time switch is desired.

4.8.3.2 Procedure. The sieves shall be nested in the order of decreasing sizes with the largest sieve on top and a pan at the bottom. A sample of approximately 150 gm. of the material shall be weighed and shall be placed on the top sieve of the nest. The nest of sieves with the cover shall be placed in the testing machine and shall be vibrated for 3 minutes plus or minus 3 seconds with the tapper in operation. It shall be weighed accurately to within 0.1 gm., and the percentage of desiccant retained on each sieve shall be calculated immediately following the shaker operation. The sum of all individually retained weights shall be used as the total weight of the sample.

4.8.4 Particle strength.

4.8.4.1 Apparatus. The apparatus shall be the same as specified in 4.8.3.1.

4.8.4.2 Procedure. Procedures shall be as follows:

4.8.4.2.1 Type I, grades H, M and L; type II, grades H and M; and type IV, grade H. Thoroughly mix all material retained on the No. 18 and coarser sieves (Spec. RR-S-366) as specified in 4.8.3.2. Weigh a sample to approximately 50 gm. Place the sample on the No. 18 sieve together with five copper disks (of the size and weight of 1-cent pieces) backing the sieve with a No. 30 sieve and retaining pan. Shake the sample in the apparatus for 15 minutes. Report the percentage of the desiccant passing through the No. 30 sieve determined by weighing accurate to within 0.2 gm., immediately following conclusion of the specified shaker operation time. Use the sum of the individually retained weights as the total weight of the sample.

4.8.5 Loss-on-ignition. Two to 4 gm. of the sample of the material shall be accurately weighed as quickly as possible into a silica crucible. The crucible with a cover lid shall be placed in a cool electric furnace. The temperature shall be allowed to rise to $960 \pm 20^\circ\text{C}$. in approximately 1 hour. The cover lid shall be removed from crucible and heated for $\frac{1}{2}$ to $\frac{3}{4}$ hour at that temperature. The crucible shall be removed from the furnace and placed in a desiccator to cool before weighing. The loss-on-ignition shall be calculated as follows:

$$\text{Loss on-ignition, percent} = \frac{\text{Loss in weight} \times 100}{\text{Sample weight}}$$

4.8.6 Corrosiveness type I, grades H, M, and L; type II, grades H and M; and type IV, grade H.

4.8.6.1 Corrosiveness shall be determined as follows: Grind 20 gm. of desiccant, retaining that portion that passes a U. S. No. 40 sieve and is held on a U. S. No. 80 sieve (Spec. RR-S-366). Place this 40 to 80 mesh material in a desiccator maintained at 25°C .

and 60 percent relative humidity by sulfuric acid solutions (see table V) for a minimum of 24 hours. Prepare a 2 by 1 by $\frac{1}{8}$ inch specimen each of hot rolled steel conforming to class A of Specification QQ-S-636, magnesium conforming to condition A of Specification QQ-M-44 brass conforming to Specification QQ-N-35, and aluminum conforming to condition T of Specification QQ-A-355, by grinding and polishing one surface

to 6 to 8 root mean square micro-inches. Clean the panel of each metal by successive treatments with:

- (a) Hot toluene (210°F.) 2-minutes immersion.
- (b) Hot acetone (120°F.) quick rinse.
- (c) Hot methanol (120°F.) quick rinse.

During and after cleaning, handle the panels (a) with forceps and on the edge only, or (b) by wire loops passing through holes previously drilled near one corner. Do not blot dry, but immediately after the methanol rinse, dry each panel for 1 to 2 (but not more than 2) minutes in an oven at 100°F. Cover one half of each of the panels with the desiccant and place the panels in a desiccator maintained at 60 percent relative humidity by sulfuric acid solutions. (See table V.) Place the desiccator in an oven maintained at a temperature of $38 \pm 1^\circ\text{C}$. for 72 hours. Remove the panels from the desiccator, carefully brush with a camel's-hair brush, and visually compare the covered and uncovered surfaces for extent of corrosion.

4.8.7 Color comparison (type IV only).

4.8.7.1 Color comparison shall be as follows: Place samples of type IV desiccant in U tubes and pass conditioned air of 20, 40, and 60 percent relative humidity through the tubes in the manner specified in 4.8.2 until equilibrium is reached. Also, place a sample of a few grains in an oven kept at 300°F. After 24 hours, remove the activated desiccant. Examine the desiccant for uniformity of color throughout and for conformity of the characteristic colors shown in Standard MS16188.

$$\frac{\text{Weight of material in pan (in grams)} \times 100}{\text{Weight of material on No. 6 sieve plus weight of material in pan (in grams)}} = \text{Percent material passing through No. 6 sieve}$$

4.8.8.2 Desiccant dehumidifier test.

4.8.8.2.1 Apparatus. The dehumidifier shall

4.8.8 Machine performance tests.

4.8.8.1 Package dehumidifier test.

4.8.8.1.1 Apparatus. The package dehumidifier shall be as specified in Drawing S3803-873409 with the two top screens and desiccant charges removed. The mechanical shaker shall be the same as specified in 4.8.3.1.

4.8.8.1.2 Procedure. Approximately 200 grams of the material shall be placed in a No. 6 sieve and the cover, sieve, and pan placed in the mechanical shaker and vibrated for 3 minutes plus or minus 3 seconds. Transfer the material passing through the No. 6 sieve to a separate container and discard the material passing through the No. 6 sieve. Repeat the above sieving until 2000 plus or minus 10 grams of the material retained on the No. 6 sieve have been collected. Pour this material into the desiccant bed of the package dehumidifier so that it is in contact with the heater wires and is evenly distributed to prevent channeling of air. Replace the cover, start the machine, and adjust the inlet air relative humidity to 0 plus or minus 5 percent in any suitable manner. The inlet air temperature shall be between 65° and 95°F. Maintain these conditions throughout the test. After operation for 24 hours with eight alternate adsorption and reactivation cycles, carefully remove all the desiccant particles from the machine and sieve it again through the No. 6 sieve backed with the pan using 200- plus or minus 10-gram portions of desiccant. Weigh the material retained on the sieve and the material retained in the pan to 0.1 gram and calculate as follows:

be the same as specified in Drawing S3803-848380. The mechanical shaker shall be the same as specified in 4.8.3.1.

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4.8.8.2.2 Procedure. The desiccant material shall be poured from the shipping container into one empty bed of the dehumidifier. While pouring the sample into the bed, 200-grams of the desiccant shall be removed at intervals until 2000 grams of the sample have been removed to determine the as-received particle size.

4.8.8.2.2.1 Fill the bed carefully (filling all voids to prevent air channeling) until the desiccant is level with the top of the outer screen of the bed. Replace the bed cover and the absorber casing cover. Operate the dehumidifier with alternating adsorption and reactivation cycles for 30 days. The inlet re-

lative humidity on the adsorption cycle shall be 80 plus or minus 5 percent at an inlet air temperature within a range of 65° to 95°F. Maintain these conditions at all times throughout the test. After exposure, remove all the desiccant from the bed. At intervals, while unloading the bed, 200-gram samples shall be taken until a 2000-gram sample has been collected. The particle size of the as-received and after-exposed 2000-gram samples shall be determined according to the method specified in 4.8.3, using the entire 2000 grams of material in each case. The percent of material passing through the No. 6 sieve shall be calculated as follows:

(a) As-received particle size:

Weight of material on No. 6 sieve (in grams)
x 100

= Percent material on No. 6 sieve as-received

Weight of material on No. 6 sieve plus weight of material in pan (in grams)

(b) After-exposure particle size:

Weight of material on No. 6 sieve (in grams)
x 100

= Percent material on No. 6 sieve after-exposure

Weight of material on No. 6 sieve plus weight of material in pan (in grams)

Percent material on No. 6 sieve as received minus percent material on No. 6 sieve after-exposure = Percent material passing through No. 6 sieve.

be included in the containers enclosing the desiccant.

5.1.1 Packaging.

5. PREPARATION FOR DELIVERY

5.1.1.1 Level A. The desiccant shall be packaged in 5-, 25-, 100- or 200-pound capacity containers, as specified (see 6.2), conforming to the following requirements.

5.1 General requirements. The material shall be furnished in bulk, and each container enclosing type I, or II desiccant shall contain at least one humidity indicator conforming to Standard MS20003 or MS26507. Containers enclosing type IV desiccant shall contain at least one humidity indicator color comparison chart not less than 1 by 4 inches, with colors conforming to Standard MS-16188. No cushioning or overpacking shall

5.1.1.1.1 Five-pound containers. Five-pound containers shall be multiple friction or screw cap closure cans conforming to Specification PPP-C-96, type V, class 2 or 4 respectively. Screw cap closure cans shall be provided with inner seals. Plan B exterior coating shall be required.

5.1.1.1.2 Twenty-five pound containers. Twenty-five pound containers shall be lug cover metal pails conforming to type II, class 1, of Specification PPP-D-760. Wire handles or bails shall be galvanized or protectively coated to resist corrosion.

5.1.1.1.3 One hundred or 200-pound capacity containers. One hundred or 200-pound capacity metal containers shall be of the bolted ring cover style conforming to Specification 37A of Interstate Commerce Commission Regulations (Title 49 of the Code of Federal Regulations) except that bottom seams shall be compound lined and covers shall be fitted with a suitable tubular or flowed-in gasket securely affixed so that it will remain in position when covers are removed. The entire exterior shall be protected with a corrosion-resistant coating conforming to Specification TT-E-485.

5.1.1.2 Level B. When specified (see 6.2 and 6.5), desiccant may be packed for domestic shipment in 100-pound capacity fiberboard drums. The drums shall conform to Specification 21A or 21B of Interstate Commerce Commission Regulations (Title 49 of the Code of Federal Regulations). The drums shall have a water-vapor barrier consisting of metal foil laminated between sheets of kraft paper with thermoplastic adhesive wound into the side wall of the drum and located not more than two plies from the interior. A metal foil shall also be used in the bottom heading. The drum interior shall be wax-coated after manufacture. Covers shall be of metal and fitted with a suitable tubular or flowed-in gasket securely affixed so that it will remain in position when the cover is removed.

5.1.1.3 Level C. The desiccant shall be packaged in accordance with the manufacturer's commercial practice.

5.2 Packing.

5.2.1 Level A. Twelve 5-pound containers,

arranged in two tiers of 3 rows having 2 containers per row shall be packed in an overseas type container in accordance with appendix of Specification PPP-C-96. Twenty-five pound pails and 100- or 200-pound drums shall not require additional packing.

5.2.2 Level B. Twelve 5-pound containers, arranged as specified in 5.2.1, shall be packed in a domestic type container in accordance with appendix of Specification PPP-C-96. Twenty-five pound pails and 100- or 200-pound drums shall not require additional packing.

5.2.3 Level C. The desiccant packaged as specified (see 6.2) shall be packed in containers in a manner to insure safe delivery and acceptance at destination. Containers shall comply with the Uniform Freight Classification Rules or other carrier regulations applicable to the mode of transportation.

5.3 Pallets. When specified (see 6.2), 25-pound pails and 100- or 200-pound drums shall be palletized in accordance with Standard MIL-STD-147.

5.4 Marking. In addition to any special marking required by the contract or order, interior and exterior shipping containers and palletized unit loads shall be marked with the date (month and year) of manufacturer and in accordance with Standard MIL-STD-129.

5.4.1 Additional marking. The interior packages and shipping containers shall be marked with type and grade of contents.

6. NOTES

6.1 Intended uses. Desiccants are intended for use in removing moisture from liquids and gases as follows:

6.1.1 Types I and II desiccants. Types I and II desiccants are particularly adaptable for use in mechanical dehumidification ma-

chines of the regenerative type and are furnished in desiccant containers complete with desiccant covered by Specification MIL-C-8263.

6.1.2 Type IV desiccants. Type IV desiccant is intended for use in indicator cards or humiplugs, when an approximate indication of the relative humidity in the surrounding atmosphere is desired.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type and grade of desiccant required (see 1.2).
- (c) When Government acceptance inspection is required (see 4.3.3.1).
- (d) Levels of packing and packaging required (see 5.1 and 5.2).
- (e) Whether 100-pound capacity drums are required (see 5.1.1.2).
- (f) Whether shipping containers shall be palletized (see 5.3).

6.3 Particular attention should be paid to procurement of the smallest size exterior container commensurate with the probable rate of use of the desiccant. The material rapidly loses its dehydrating strength when exposed to air so that use of containers requiring a minimum of openings will help insure most efficient use of the desiccant.

6.4 Color standard. The colors given on Standard MS16188 possibly may be found to have faded subsequent to printing. Additional information concerning the desired colors are given in table VI, wherein the

colors are further identified by numbers from the Munsell Book of Color, published by the Munsell Color Company Incorporated, Baltimore, Md.

TABLE VI. Color standard

	Munsell chart number	Munsell color number
Activated (shade A)	77.5	7.5PB 1/2
20 percent R. H. (shade B)	82.5	2.5P 1/2
40 percent R. H. (shade C)	95	5RP 1/2
60 percent R. H. (shade D)	5	5R 1/2

6.5 For Government installations, the use of the 100-pound capacity containers (see 5.1.1.2) should be restricted to direct shipment to the using activity in carload or truckload lots.

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.

Preparing activity:

Navy—Bureau of Ships
(Project 6850-0005)

Custodians:

Army—Chemical Corps
Navy—Bureau of Ships
Air Force

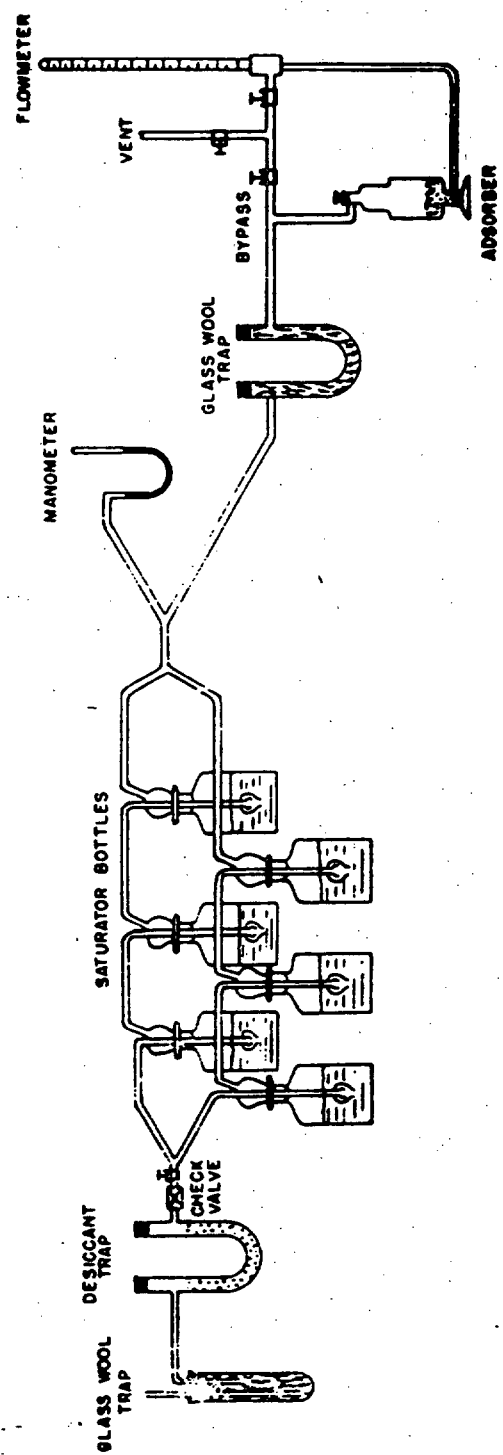


FIGURE 1. Apparatus for water vapor adsorption capacity test.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER

2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

VENDOR

USER

MANUFACTURER

OTHER (Specify): _____

b. ADDRESS (Street, City, State, ZIP Code)

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) - Optional

b. WORK TELEPHONE NUMBER (Include Area Code) - Optional

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

8. DATE OF SUBMISSION (YYMMDD)

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(TO DETACH THIS FORM, CUT ALONG THIS LINE.)