

METRIC

DOD-D-87934

~~16 May 1983~~

Superseding

DGSC-PD 168B

8 Mar 1982

MILITARY SPECIFICATION

DESICCANT, MOLECULAR SIEVE (IMPREGNATED) (METRIC)

This specification is approved for use by all departments and agencies of the Department of Defense.

1. SCOPE. This military specification covers one type of sodium alumina-silicate molecular sieve desiccant.
2. APPLICABLE DOCUMENTS. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this military specification to the extent specified herein.

SPECIFICATIONS

Federal

PPP-C-96	Cans, Metal; 28 Gage and Lighter
PPP-B-636	Box, Fiber
RR-S-366	Sieve Test
O-G-491	Glycerol, Technical

Military

MIL-D-3464	Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification.
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STANDARDS

Federal

FED-STD-595	Colors
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Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-1188	Commercial Packaging of Supplies and Equipment.

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: San Antonio ALC, Kelly AFB TX 78241, ATTN: SFTT, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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3. REQUIREMENTS

3.1 Material. The desiccant shall be a sodium alumina-silicate molecular sieve type impregnated with an inorganic metal salt moisture indicator.

3.2 Size and Form. The desiccant shall be a spherical 4 X 8 bead form conforming to the following sieve analysis when tested in accordance with 4.5.

<u>% Max by Wt</u>	<u>U.S. Sieve No.</u>
5	retained on 6.73 mm
10	through 8
0.2	through 20

3.3 Crushing Strength. The desiccant shall withstand a minimum average pressure of 10 lbs., without crushing, when tested in accordance with 4.6.

3.4 Moisture Indicator. The moisture indicator shall be an inorganic metal salt which will indicate moisture saturation by changing from a blue color to a beige or buff color. The use of organic dyes is prohibited. A minimum of 95% of the beads shall be impregnated with the moisture indicator, having a blue color approximately matching number 35177 or 35109 of Federal Standard 595. The rest of the beads shall be of a lighter shade of blue. The presence of white or off-white beads which have not been processed for impregnation is prohibited.

3.5 Moisture Content. The packaged desiccant shall contain a maximum of 5% by weight adsorbed water when tested in accordance with 4.7.

3.6 Water Adsorption Capacity. The water vapor absorption capacity of the desiccant shall conform to the minimum weight percents in Table I when tested in accordance with 4.8.

TABLE I

<u>WATER VAPOR</u> <u>% RELATIVE HUMIDITY</u>	<u>ABSORPTION CAPACITY</u> <u>% EQUILIBRIUM ABSORPTION @ 25°C</u>
10	17
20	18
40	19
60	20

3.7 Regeneration. Desorption by three heating cycles in accordance with 4.9, shall re-activate the desiccant to the as-manufactured absorption capacity, 3.6, and blue color, 3.4.

3.8 Appearance. The packaged desiccant shall be free from foreign material and have a uniform clean appearance.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Inspection Responsibility. The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services 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. 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 Sampling for Inspection and Acceptance. Sampling for inspection and acceptance shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated. For purposes of sampling, an inspection lot for acceptance inspection and tests shall consist of all material submitted for inspection and delivery at one time.

4.2.1 Examination of the End Item. Representative sample units shall be selected from each inspection lot and shall be visually examined for defects in appearance, uniformity and presence of foreign matter. The sample unit shall be one primary container.

4.2.2 Examination of Fill. An examination shall be made to determine the fill of the primary container. The sample unit shall be one primary container. Failure to comply with the weight specified in Paragraph 5.1.1. shall be classified as a defect.

4.2.3 Examination of Preparation for Delivery. An examination shall be made to determine that the packaging, packing and marking comply with the requirements of Section 5. The sample unit shall be one can or one shipping container, as applicable.

4.2.4 End Item Testing. Samples of the end item shall be tested for the applicable characteristics indicated in Table II from each lot submitted for inspection. The sample unit shall be one container of desiccant.

4.3 Inspection Levels and Acceptable Quality Levels (AQL). The inspection levels and acceptable quality levels, as defined in MIL-STD-105, shall be in accordance with II.

TABLE II

<u>Requirements</u>	<u>Test Method</u>	<u>Levels</u>	<u>AQLs (defects per hundred units)</u>
3.2 Size and Form	4.5	S-2	2.5
3.3 Crushing Strength	4.6	S-2	2.5
3.4 Moisture Indicator	4.4	S-2	2.5
3.5 Moisture Content	4.7	S-2	2.5
3.6 Water Absorption Capacity	4.8	S-2	2.5
3.7 Regeneration	4.9	S-2	2.5
3.8 Appearance	4.2.1	S-4	4.0
5.1 -5.3 Packaging, Packing and Marking	4.2.3	S-4	4.0

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4.4 Certification. The contractor shall furnish a certificate that the desiccant is a sodium alumina silicate molecular sieve type having a free aperture pore size of 3.5 angstroms in diameter and that the beads are impregnated with a moisture indicator which will change from a blue to a beige color when adsorption capacity is exhausted.

4.5 Sieve Analysis. Nest together, with the coarsest on top, a 6.73 mm, No. 8 and No. 20 U.S. Standard Sieve conforming to Type I, Class 4 of RR-S-366. Transfer of 100 grams of sample desiccant into the top sieve and sift the desiccant down through all three sieves by shaking and tapping the sieve frame as necessary. After the retained amount of desiccant on all sieves is not significantly reduced by further sifting, remove and weigh the desiccant retained on each sieve. Failure of the retained percentage of total weight to conform to 3.2 and Table II shall be cause for rejection.

4.6 Crushing Strength. Ten beads from each sample shall be tested. Place a single bead between a pair of anvils on a compression tester equipped with a load indicator graduated in 1/4 lb increments. Apply an increasing load at a steady rate of approximately 60 pound/minute until the bead crushes and record the load in pounds to the nearest 1/4 pound. Failure of the calculated average load for samples to conform to 3.3 and Table II shall be cause for rejection.

4.7 Moisture Content. Exercise care to minimize adsorption of moisture after the package is opened, avoiding exposure to humid air before conducting this weight test. Weigh out at room temperature, 100.00 g \pm 1 mg of the sample desiccant and spread in a pyrex glass dish to a maximum depth of two beads. Place the dish and contents in an oven and heat for 2 hours at 315 \pm 5°C. Cool at room temperature in a closed desiccator and reweigh the sample. Failure of the weight loss of the specimens to conform to 3.5 and Table II shall be cause for rejection.

4.8 Water Adsorption Capacity. Testing shall be in accordance with MIL-D-3464, Para 4.6 I, except the relative humidity solutions shall be prepared from glycerol conforming to O-G-491 and distilled or deionized water as specified in Table III. Testing shall be at 25°C \pm 2°C. The desiccant sample shall be 20 to 30 grams. The adsorption capacity of the desiccant in equilibrium with air at a specified relative humidity shall be calculated as specified below:

$$\% \text{ Adsorption Capacity} = \frac{\text{Increase in weight} \times 100}{\text{Initial weight of sample}}$$

TABLE III

<u>% Relative Humidity at 25°C</u>	<u>% by Weight Glycerol Distilled Water</u>
10	99
20	96
40	86
60	74

Failure of water adsorption capacity of the samples to conform to 3.6 and Table II shall be cause for rejection.

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4.9 Regeneration. Spread approximately 50g of moisture saturated desiccant in a pyrex dish to a depth of approximately 13 millimeters. Place the dish and contents in a convection oven for two hours at $180 + 5^{\circ}\text{C}$, and then cool to $20 + 5^{\circ}\text{C}$ in a closed desiccator. Failure of sample regeneration to conform to 3.7 and Table II shall be cause for rejection.

5. Packaging.

5.1 Packaging. Packaging shall be level A or industrial as specified (see 6.2).

5.1.1 Quantity per Container. Each container shall contain 450 grams $\pm 5\text{g}$. The containers shall be at least 85% full.

5.1.2 Containers. Containers in 5.1.1 shall conform to the following, as specified (see 6.2).

5.1.2.1 Level A. The desiccant shall be packaged in a round, multiple friction top can conforming to PPP-C-96, Type V, Class 2, exterior coating Plan A.

5.1.2.2 Industrial. The desiccant shall be packaged in accordance with MIL-STD-1188.

5.2. Packing. Packing shall be level A or industrial, as specified (see 6.2).

5.2.1 Level A. Forty-eight cans of desiccant packaged, as specified in 5.1, shall be packed 4 by 6, 2 tier, in a snug fitting fiberboard box conforming to PPP-B-636, Type CF, class weather resistant, variety SW, Grade V3c. Tiers shall be separated by a fiberboard pad. Closure and reinforcement shall be in accordance with the appendix to the box specification.

5.2.2 Industrial. Forty-eight cans of desiccant shall be packed 4 by 6, 2 tier, in accordance with MIL-STD-1188. Tiers shall be separated by a fiberboard pad.

5.3. Markings. In addition to any special marking required by the contract, interior and exterior containers shall be marked in accordance with MIL-STD-129 (see 6.2).

6. NOTES

6.1 Intended Use. The molecular sieve desiccant covered by this specification is intended for use in a dehydrator in accordance with Westinghouse Electric Corp. drawing 500R840. The moisture indicator will be visible to signal approaching saturation. Desiccant is designed to be re-activated by heating.

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6.2 Ordering Data. Procurement documents should specify the following:

- (a) Title, number and date of this Military Specification
- (b) Applicable level of packaging and packing required (see 5.1 and 5.2).
- (c) Special markings required as applicable (see 5.3).

CUSTODIAN:

AIR FORCE - 68

REVIEW ACTIVITIES:

AIR FORCE - 20

DLA - GS

USER ACTIVITIES:

NAVY - SH, OS, AS, YD, MC

PREPARING ACTIVITY:

AIR FORCE - 68

PROJECT NO. 6850-0720

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION <i>(Mark one)</i> <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER <i>(Specify):</i> _____
b. ADDRESS <i>(Street, City, State, ZIP Code)</i>	
5. PROBLEM AREAS	
a. Paragraph Number and Wordings:	
b. Recommended Wording:	
c. Reason/Rationale for Recommendation:	
6. REMARKS	
7a. NAME OF SUBMITTER <i>(Last, First, MI) – Optional</i>	b. WORK TELEPHONE NUMBER <i>(Include Area Code) – Optional</i>
c. MAILING ADDRESS <i>(Street, City, State, ZIP Code) – Optional</i>	8. DATE OF SUBMISSION <i>(YYMMDD)</i>