METRIC
A-A-59692
November 21, 2001

# COMMERCIAL ITEM DESCRIPTION

# ADHESIVE, WATER-RESISTANT (FOR CLOSURE OF FIBERBOARD BOXES)

**The General Services Administration has authorized the use of this Commercial Item Description as a replacement for Federal Specification MMM-A-250C.**

## 1. SCOPE.

**1.1** This Commercial Item Description (CID) covers water-resistant adhesives intended for closure of fiberboard boxes, cartons, and cases.

## 2. CLASSIFICATION.

**2.1** The adhesives covered by this document shall be one of the following types (see 6.2) as specified in the solicitation, contract, or purchase order.

**Type I** - For application, by automatic box closing equipment.
**Type II** - For hand application, by brushing.
**Type III** - For hand application, from pressurized container (aerosol).

## 3. REQUIREMENTS.

**3.1 Material.** Except for the limitations of 3.2, the manufacturer is permitted to use any ingredients, which will produce an adhesive conforming to the requirements of this document.

**3.2 Nontoxicity.** The adhesive shall not contain benzene, chlorinated hydrocarbons, or other materials in amounts which can reasonably be toxic to using personnel. The use of poly-

**Beneficial comments, recommendations, additions, deletions, clarifications, etc., and any data which may improve this document should be sent to: Commander, Defense Supply Center Philadelphia, ATTN: DSCP-HSL, 700 Robbins Avenue, Philadelphia, PA 19111-5092 or FAX (215) 737-2963.**

**AMSC N/A** **FSC 8040**

chlorinated biphenyls (PCB's) is specifically prohibited. Certification that the material is free from harmful toxic substances shall be provided by the manufacturer and included with each shipment of material (see 6.3).

**3.3 Bond Strength.** The adhesive shall be capable of bonding pieces of weather-resistance fiberboards to make lap-shear tensile specimens which, when prepared, conditioned, and tested in accordance with 4.4.1 shall either sustain the following loads before failure, or shall fail by pulling out of fibers, as defined in 4.4.1.7.

| Conditioning procedure | Minimum load, pounds |
|---|---|
| 4.4.1.4.1 | 100 |
| 4.4.1.4.2 | 100 |
| 4.4.1.4.3 | 100 |
| 4.4.1.4.4 | 10 |

**3.4 Shelf Storage Life.** When stored as specified in 4.4.5, each type of adhesive shall meet the applicable requirements of section 3 except that the bond strength values shall not be less than 10 percent below the originally specified values.

**3.5 Workmanship.** All adhesive submitted against this specification shall be homogeneous and free of lumps and foreign matter as determined in accordance with 4.3.3. A slight separation of components, commonly known as "phasing", which can be corrected by moderate stirring, shall not be cause for rejection.

**3.6 Ability to be applied by automatic equipment.** Type I adhesive shall be capable of satisfactory application by means of a specified type of automatic box closing equipment. Conformance to this requirement shall be assured in the manner specified (see 4.4.2 and 6.2).

**3.7 Brushing Properties.** Type II adhesive shall have a consistency such that it will permit easy and satisfactory brush application at $15^{o}$C ($59^{o}$F), as determined in accordance with 4.4.3.

**3.8 Aerosol properties.** (applicable to Type III only).

**3.8.1 Propellant.** The propellant shall be a suitable hydrocarbon or halogenated hydrocarbon and shall not contain any gas such as nitrogen, nitrous oxide, or carbon dioxide. The manufacturer shall certify that the propellant is nontoxic when used in accordance with the manufacturer's instructions.

**3.8.2 Dispenser.** The dispenser shall be a commercial type metal pressure container generally known as an aerosol dispenser of such construction as to assure acceptance of the finished

package by common carrier operating in interstate commerce. The capacity of the dispenser shall be sufficient to contain the specified net contents of the product with outage in accordance with generally recognized safe commercial practice.

**3.8.2.1 Dispenser valve.** The valve shall have a spray head, which can be removed without releasing pressure from the aerosol. The spray head shall have a metering orifice accessible to cleaning with a common pin after removal from the container. The removable spray heads shall contain orifices of such dimensions as to produce spraying properties as required 3.8.6. The lower end of the dip tube shall not elongate and touch the bottom of the can and shall have a clearance of one-quarter inch to three quarters inch from the bottom rim of the can after storage for one week in the product (which allows for swelling of the tube).

**3.8.2.1.1 Valve operation.** The valve shall operate freely without excessive finger pressure, shall close immediately upon release of finger pressure, shall operate in such a manner that spray is continuous without sputtering or interruption, and shall not clog nor collect heavy deposits of adhesive coating around the orifice.

**3.8.2.2 Cover can.** The valve shall be protected from accidental functioning and damage by a press fitting plastic cover cap, which shall be removable and replaceable.

**3.8.3 Condition in container.** The adhesive shall be easily dispersed when the container is shaken normally by hand.

**3.8.4 Gross weight.** When tested as specified in 4.4.3, the gross weight of the full dispenser shall be 705 g $\pm$ 25 g (1 lb 9 oz $\pm$ .9 oz).

**3.8.5 Total solids.** When tested as specified in 4.4.3 the total solids shall be not less than 10 percent of the total net contents of the adhesive dispensers by weight.

**3.8.6 Spraying properties.** When tested as specified in 4.4.5 the dispenser shall deliver a 6.35 cm x 11.43 cm (2-1/2" x 4 -1/2") wide, webby, non-misting and uniform spray pattern requirements through 90 percent exhaustion of the container.

## 4. QUALITY ASSURANCE PROVISIONS.

**4.1 Responsibility for inspection.** Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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 that supplies and services conform to prescribed requirements.

**4.1.1** The supplier shall submit to the contracting officer a certificate of compliance indicating that the adhesive complies with the shelf storage life requirement as specified in 3.4. When certificates of compliance are submitted, the Government reserves the right to test such items to determine the validity of the certificate.

**4.2 Sampling for inspection and acceptance.** Sampling for inspection and acceptance shall be performed in accordance with the provisions set forth in ANSI/ASQC Z1.4, except where otherwise indicated. For purpose of sampling, an inspection lot for examination and tests shall consist of all material of the same Type and manufacturer's designation submitted for delivery at the same time.

**4.2.1 Sampling for inspection of filled containers.** A random sample of filled containers shall be taken from each lot in accordance with ANSI/ASQC Z1.4 at inspection level I and acceptable quality level (AQL) equal to 2.5 percent defective to verify compliance with all requirements of this specification regarding fill, closure, marking, and other requirements not involving tests. The lot size for use in determining the sample size under ANSI/ASQC Z1.4 shall be expressed in number of unit containers.

**4.2.2 Sampling for uniformity and workmanship.** A random sample of inspection units of adhesive shall be selected from the lot in accordance with ANSI/ASQC Z1.4 at inspection level I. The lot size for purpose of determining the sample size shall be expressed in units of five gallons of adhesive. Each unit sample shall consist of the entire contents of a unit container of 3.78 liters (one gallon) capacity or smaller, or of a 0.47 liter (one-pint) sample taken from the thoroughly mixed contents of a larger container. Not more than one sample unit shall be taken from any one container. Each sample unit shall be examined for uniformity and workmanship in accordance with 4.3.3.

**4.2.3 Sampling for tests.** If the examination for uniformity and workmanship (see 4.3.3) indicates that all the units in the sample have essentially the same appearance and viscosity, one of the sample units shall be selected at random and a sufficient quantity shall be taken from it for use in testing. If, on the other hand, this examination indicates that there may be differences between units, separate samples shall be taken from the two units, which appear to differ the most. Each of these samples shall be subjected separately to the applicable tests of 4.4.

**4.2.3.1 Sample size.** 0.47 liter (one-pint) samples are sufficient for testing Type II adhesive and one pressurized container (nominal 0.70 liters (24 fluid ounce) capacity) is sufficient for testing Type III adhesive. Larger samples, as specified (see 6.2), may be necessary for testing Type I adhesive against 4.4.2.

**4.3 Inspection.**

**4.3.1 Inspection of materials and components.** In accordance with 4.1, the supplier is responsible for insurance that materials and components used were manufactured, inspected, and found to be in accordance with the requirement of this specification and, to the extent specified, of referenced subsidiary specifications and standards. In the event of conflict, this specification shall govern. A certificate of nontoxicity shall be furnished in accordance with 3.2.

**4.3.2 Inspection of filled containers.** Each filled container in the sample of 4.2.1 shall be examined for defects of the container and closure, for evidence of leakage, and for inadequate or improper markings. It also shall be weighed to determine conformance to fill requirements. Any container in the sample having one or more visual defects, or having less than the required fill, shall be rejected. If the number of rejected containers exceeds the acceptance number for the appropriate sampling plan of ANSI/ASQC Z 1.4 (see 4.2.1), the lot represented by the sample shall be rejected. Unless otherwise specified, rejected lots may be resubmitted for acceptance provided that the supplier has removed the defective containers and corrected the cause of the defects.

**4.3.3 Examination of material.** Each unit of the sample for examination for uniformity and workmanship (see 4.2.2) shall be poured into another clean container of the same or larger size and examined for homogeneity, lumps, and foreign matter. If the number of sample units failing to meet the requirements of 3.5 equals or exceeds the rejection number corresponding to an acceptable quality level (AQL) of 4.0 percent defective under the sampling plan used, the lot shall be rejected. For Type III adhesives, the 0.70 liter (24 fluid ounce) aerosol container, conditioned at $23^{o} \pm 2^{o}C$ ($73.5^{o} \pm 3.5^{o}F$) for a minimum of 4 hours, shall be sprayed onto a non-porous surface for a minimum of 10 seconds to determine satisfactory spray properties as noted in 3.8.6.

**4.3.3 Testing.** Each of the samples selected in accordance with 4.2.3 shall be subjected separately to each of the tests of 4.4 applicable to the type of adhesive specified. If the sample fails on any test, the lot shall be rejected

**4.4 Test Procedures.**

**4.4.1 Bond strength.**

**4.4.1.1 Apparatus.** The following apparatus shall be provided.

**a**. Appropriate apparatus for cutting fiberboard into panels, for spreading the adhesive uniformly over portions of these panels, for holding the bonded panels under a uniform pressure of 4 pounds per square inch, and for cutting the bonded panels into 1-inch wide specimens.

**b**. A room or cabinet maintained at the "standard" conditions of 23° ± 2°C (73.5° ± 3.5°F) and 50 % ± 5 % relative humidity.
**c**. A cold box capable of maintaining the specimens at a temperature of -40° ± 2°C (-40° ± 3.5°F).
**d**. An oven capable of holding the specimens at a temperature of 60° ± 2°C (140° ± 3.5°F).
**e**. A vessel of suitable dimensions, containing clean water of sufficient depth to permit the specimens to be completely immersed. This vessel shall be provided with a means of maintaining the temperature of the water at 23° ± 2°C (73.5° ± 3.5°F).
**f**. A tensile testing machine, equipped with flat or wedge grips not less than one inch wide. The machine shall have a capacity in excess of 45,359.24 g (100 lb) and a precision of ± 453.59 g (1 lb) or better. It shall have a speed of pulling grip sufficient to exert a force of 45,359.24 g (100 lb) within 5 to 15 seconds after starting to apply load. (When a pendulum type testing machine is used, a speed of pulling grip of 30.48 cm (12 in) per minute will usually be found to meet this requirement.)

**4.4.1.2 Test boards.** Fiberboard for use in preparing the test specimens shall conform to the requirements of grade V2s of ASTM-4727 and, in addition, shall conform to the following requirements. It shall have sufficient tensile strength, after each of the conditioning procedures of 4.4.1.4, that the specimens of 4.4.1.6 will not break outside the bonded area at loads less than those specified in 3.3. Its surfaces shall be typical of those of a majority of brands of V2s board (see 6.4). They shall be neither unusually easy nor unusually difficult to wet by adhesives. They shall not have unusually loose surface fibers or surface layers (which might be pulled from the board during the tests).

**4.4.1.3 Specimen preparation.** For each sample of adhesive selected in accordance with 4.2.3, four sets of ten specimens each shall be prepared. Rectangular panels measuring not less than 30.48 cm by 8.89 cm (12" by 3-1/2") shall be cut from the fiberboards of 4.4.1.2. The shorter dimension of each panel shall be parallel with the machine dimension of the fiberboard. These panels shall be conditioned for a minimum of 24 hours under standard conditions described in 4.4.1.l b. The adhesive to be tested shall be brought to a temperature of 23° ± 2°C (73.5° ± 3.5°F) in a covered container. Pairs of panels shall be bonded with the adhesive as shown in Figure I. The two halves of each pair shall be positioned so that the original top face of one fiberboard shall be bonded to the original bottom face of the other. For Type I and Type II, the adhesive shall be applied to only one panel of each pair and for Type III, shall be applied to both panels of each pair, using the thickness and method of application recommended by the manufacturer of the adhesive. Within one minute after starting to apply adhesive to one panel (both panels for Type III adhesive), the other panel shall be placed on top of the first and positioned to give an overlap of 2.54 cm ± 0.25 cm (1" ± 0.1"). The bonded area shall be subjected to a uniform load of 1,814.36 g (4 lb) per square inch for a period of 24 hours ± 2 hours in the standard atmosphere (see 4.4.1.1.b), and shall then be subjected to an additional 24 hours ± 2 hours of standard conditioning without load. Immediately thereafter, each pair of bonded

panels shall be cut into ten 2.54 cm ± 0.25 cm (1" ± 0.1") wide specimens. These specimens shall be maintained under standard conditions until tested or exposed to further conditioning.

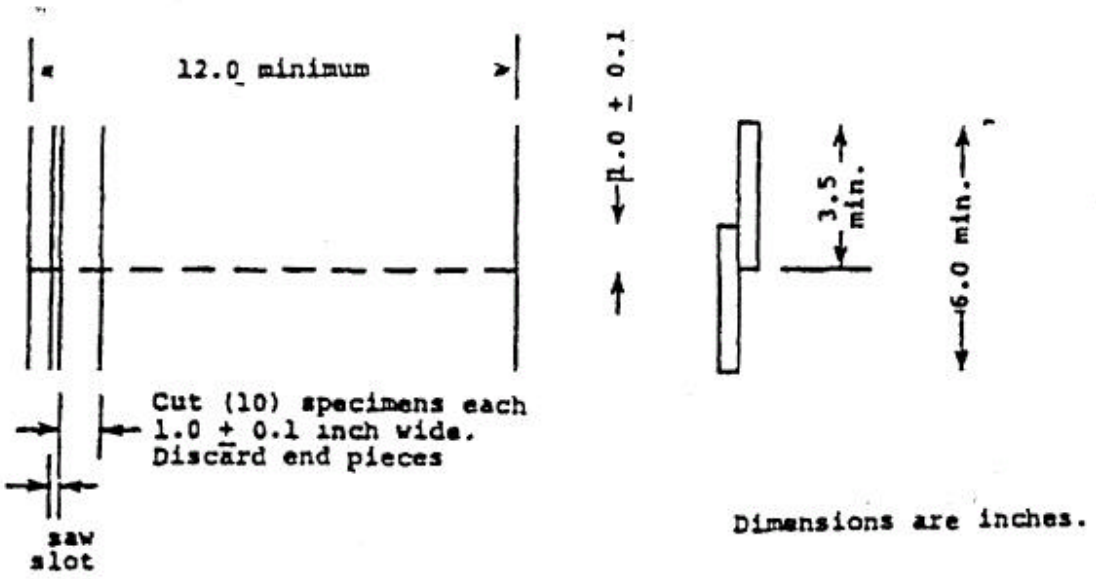


FIGURE 1. Bond strength specimens.

**4.4.1.4 Conditioning.** Within one hour after their preparation in accordance with 4.4.1.3, each of the four sets of specimens shall be subjected to a different one of the four following conditioning procedures. The conditioned specimens shall be tested in accordance with 4.4.1.6 within the time limits specified below.

**4.4.1.4.1** The specimens shall be tested within one hour after the preparation without any further conditioning.

**4.4.1.4.2** The specimens shall be exposed for 24 hours ± 2 hours in an oven maintained at a temperature of 60° ± 2°C (140° ± 3.5°F), and tested between 1 and 2 minutes after removal from the oven.

**4.4.1.4.3** The specimens shall be exposed for 24 hours ± 2 hours in a cold box maintained at a temperature of -40° ± 2°C (-40° ± 3.5°F), and tested between 1 and 2 minutes after removal from the cold box.

**4.4.1.4.4** The specimens shall be exposed to the standard atmosphere (see 4.4.1.1.b) for an additional 0 to 72 hours, at the discretion of the manufacturer of the adhesive. Then the specimen shall be completely immersed for 24 hours ± 2 hours in clean water at a temperature of 23° ± 2°C (73.5° ± 3.5°F). They shall be removed from the water one at a time, their surface water shall be

removed by blotting for approximately one minute, and they shall be tested within 3 minutes after removal from water.

**4.4.1.5 Adjustment of testing machine.** Rectangular 2.54 cm by 15.24 cm (1" by 6") pieces of the fiberboard of 4.4.1.2 shall be conditioned to approximate equilibrium with air at standard conditions and shall be pulled in the tensile machine operating in the standard atmosphere (see 4.4.1.1.b). (If preferred, the specimens, which were conditioned in accordance with 4.4.1.4.1, if strong enough, may be used instead of these pieces.) If the pieces break before an average load of 45,359.24 g (100 lb) has been applied, two pieces of fiberboard shall be placed together and tested as one specimen. The speed of the machine shall be adjusted until the loads on these specimens reach 45,359.24 g (100 lb) within an average time of 5 to 15 seconds after starting to apply load. The speed so determined shall be used with all the bonded specimens of 4.4.1.6. For all tests, the grips shall be positioned 10.16 cm (4") apart before the specimen is inserted. Great care shall be taken to make sure that the center line of each specimen is exactly parallel with the direction of motion of the grip.

**4.4.1.6 Testing.** The specimens prepared in accordance with 4.4.1.3 and 4.4.1.4, shall be tested to failure or until they have sustained loads appreciably in excess of 45,359.24 g (100 lb) before failure, using the conditions specified in 4.4.1.5. The maximum load sustained by each specimen, the average load sustained by the set, the nature of the failures, and the brand of V2s board used to make the specimens, shall be reported.

**4.4.1.7 Interpretation of results.** Each specimen, which broke before the required minimum load had been applied, shall be examined for the following types of failure.

a. One leg of the specimen has broken, leaving a massive portion adhering to the other leg, or

b. The adhesive layer adhering to the legs of the broken specimen is coated over not less than 75 percent of its area with fibers pulled from the other leg.

The load value of any specimen which broke in accordance with (a) or (b) before the minimum required load had been applied shall be excluded from the calculation of the average breaking load of the set. If two or more specimens of a set broke in accordance with (a) before the required minimum load had been applied, the results shall be discarded and the bond strength tests shall be repeated using a stronger brand of V2s board. If six or more specimens of a set broke in accordance with (b) before the required minimum load had been applied, the specimens shall be considered to have failed by pulling out of fibers, and the adhesive shall be considered to have passed this test.

**4.4.2 Ability to be applied by automatic equipment (applicable to Type I only).** Conformity to the requirements of 3.6 shall be assured in the manner specified by the procuring agency (see 6.2).

**4.4.3 Brushing properties (applicable to Type II only).**

**4.4.3.1 Apparatus.**

a. A chamber maintained at a temperature of $15^{o} \pm 1^{o}C$ ($59^{o} \pm 2^{o}$ F).

b. Two pieces, each 7.62 cm by 15.24 cm (3" by 6"), of the fiberboard used in 4.4.1, for each of the samples of adhesive to be tested.

c. A clean, dry, 2.54 cm (1-inch) wide paintbrush, for each of the samples of adhesive to be tested.

**4.4.3.2 Procedure**

a. Place the adhesive sample(s) of 4.2.3 (in a closed container), the pieces of fiberboard, and the brushes, in the chamber and allow to remain until they all have attained the temperature of the chamber.

b. While still in the chamber, open the container and apply the adhesive to the panels with the brush, coating one panel on one face and the other on the other face. (If the sample has "phased", see 3.5, it shall be mixed by stirring before applying.)

c. Observe the material applied for areas of non-adhesion, flow characteristics, and uniformly of thickness.

**4.4.4 Aerosol properties (applicable to Type III only).**

**4.4.4.1 Apparatus.**

a. A chamber maintained at a temperature of $23^{o} \pm 2^{o}C$ ($73.5^{o} \pm 3.5^{o}F$).

b. A balance with a 1000 g (35.27 oz) capacity and accurate to within 1 g (.035 oz).

c. Four pieces, each 30.48 cm by 30.48 cm (12" by 12"), of a non-porous material.

**4.4.4.2 Procedure.**

**a. Sprayability.** Condition the aerosol container at $23^{o} \pm 2^{o}C$ ($73.5^{o} \pm 3.5^{o}F$) for a minimum of 4 hours. Holding the conditioned container 12.7 cm (5") from the non-porous surface (distance from spray nozzle opening to non-porous surface), spray across the surface at a moderate speed. Determine compliance as specified in 3.8.6 for spraying properties.

**b. Gross weight.** Determine the gross weight by weighing the ready-to-use pressurized dispenser and cover cap on a balance having an accuracy of $\pm$ 1 g. Weigh not less than six dispensers from a given inspection lot. Record the average weights of the dispensers of each size tested for conformance to 3.8.4.

**c. Total solids.** Test for total solids by the CSMA December 4, 1956, Vacuum Distillation Method for the Determination of Volatile – Nonvolatile Ratios of Aerosol Formations.

**4.4.5 Shelf storage life.** Samples of the adhesive (0.47 liters (one pint) containers for Type I and Type II and a 0.70 liter (24 fluid ounce) pressurized container for Type III) shall be stored in the original unopened container for 12 months from the date of manufacture at standard conditions (see 4.4.1.1.b) and then tested to determine compliance with the requirements of 3.4. If phasing occurs in Type I or Type II, the adhesive shall be mixed to the original homogeneous condition by hand stirring.

## 5. PREPARATION FOR DELIVERY.

**5.1 Preservation, packaging, packing, labeling, and case marking.** Preservation, packaging, packing, labeling, and case marking shall be as specified in the solicitation, contract, or purchase order.

## 6. NOTES.

**6.1 Intended use.** The adhesive covered by this specification, is intended for use by the Government for closing of shipping containers and boxes. It is recommended that this document not be used to tell a contractor furnishing packaged commodities to the Government what adhesive he shall employ for closing his packages.

**6.2 Ordering data.** Purchasers should select the preferred option permitted herein, and include the following information in procurement documents.

(a) Title, number, and date of this specification.
(b) Type of adhesive required (see 2.1).
(c) Unit quantities of adhesive required.
(d) When Type I adhesive is ordered, the type of automatic equipment to be used, the sample size, and the kind and amount of inspection required (see 3.6, 4.2.3.1, and 4.4.2).
(e) Level of packaging and packing required (see contract).

**NOTE:** Level B packaging and packing is intended to provide economical but limited protection, and should be specified when it is determined that the adhesive will be kept in covered storage for a period not exceeding one year from the date of original packaging.

(f) Any additional labeling or marking or other requirements, if required (see contract).

**6.3 Nontoxicity.** Any questions raised regarding toxicity should be referred by the procuring activity to the departmental medical authority. In the case of Army procurement, the Surgeon General will act as advisor to the procuring activity.

**6.4 Test boards.** It is suggested that procuring agencies be prepared to furnish suppliers of adhesives with lists of brand names of V2s boards which have been found to conform to the requirements of 4.4.1.2. Such lists should be revised frequently, since there is no assurance that the supplier will not change the surface properties of brand name boards.

**MILITARY CUSTODIANS:**

Army - MR
Air Force - 99
DLA - SS

**CIVIL AGENCY COORDINATING ACTIVITIES:**

USDA - AFS
GSA - 6FEE

**REVIEW ACTIVITIES:**

Army - MI
Air Force - 84

**PREPARING ACTIVITY:**

DLA - SS

(Project No. 8040-0720)