

MIL-T-37402
6 April 1977

MILITARY SPECIFICATION
TESTER, ANTIFREEZE SOLUTIONS

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

1. SCOPE

1.1 Scope. This specification covers testers of the hydrometer-thermometer type, used for determining the freezing temperatures of certain antifreeze solutions used in liquid-cooled engines.

1.2 Classification. Antifreeze solution testers covered by this specification shall be of the following types, as specified (See 6.1).

Type I - Combination, for inhibited ethylene glycol solutions and inhibited methanol solutions. Type I may also include provisions for testing ethyl alcohol solutions.

Type II - Combination, with removable hydrometers for inhibited ethylene glycol solutions and ethyl alcohol solutions.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

O-A-548	- Antifreeze/coolant, Engine, Ethylene Glycol, Inhibited Concentrated.
PPP-B-636	- Boxes, Shipping, Fiberboard.
PPP-B-676	- Boxes, Setup.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to. Headquarters, Defense Personnel Support Center, ATTN: Directorate of Medical Materiel, Code ATT, 2800 South 20th Street, Philadelphia, PA 19101, 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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STANDARDS

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.

(Copies of specifications, standards, 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

- C 148 - Polariscopic Examination of Glass Containers.
- D 1176 - Method for Sampling and Preparing Aqueous Solutions of Engine Antifreezes or Antirusts for Testing Purposes.
- D 1177 - Method of Test for Freezing Point of Aqueous Engine Antifreeze Solution.

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

3. REQUIREMENTS

3.1 Materials.

3.1.1 Elastomer. Elastomer shall be natural or synthetic rubber, or other suitable material.

3.1.2 Glass. Glass shall be clear transparent glass with a coefficient of expansion of approximately 0.0000128 cm/cm per 1 degree Fahrenheit (^oF.) at 60^oF.

3.1.3 Metal. Metal components shall be corrosion-resistant or coated or treated to prevent corrosion.

3.2 Design and construction. The tester shall consist of a hydrometer enclosed in an assembly consisting of a glass cylinder, upper fitting, thermometer, lower fitting with an inlet tube and freezing temperature charts. The type II tester shall be enclosed in a suitable carrying case with three added hydrometers as indicated in 3.2.1.

The overall length of the tester, including the bulb and base, but excluding the inlet tube, shall be not more than 19 inches. The inlet tube shall extend beyond the base to a distance of $14 + 2$ inches for type I tester. For type II tester, the inlet tube shall be a minimum of 15 inches in length and not less than $5/32$ inch inside diameter.

Tester shall be so designed that, when lying on a flat surface, no glass part shall touch that surface. Tester shall roll less than one revolution when the surface on which it lies is tilted 10° from the horizontal.

3.2.1 Hydrometer. The hydrometer shall be of glass and shall consist of a cylindrical bulb (lower part) and a cylindrical stem (upper part) which shall be airtight and dry. The hydrometer shall contain a fixed ballast in the bulb and a fixed scale in the stem. The hydrometer shall be designed so that it shall assume a free floating position within the limits of its scale without adhering to the walls of the glass cylinder. When the hydrometer is immersed in a solution to the lowest line on its scale and is floating freely, the vertical axis of the hydrometer at the top shall be not more than $1/8$ inch from the true vertical position. For type II, four glass hydrometers, two for ethylene glycol, and two for ethyl alcohol, shall be provided with each instrument.

3.2.1.1 Hydrometer scales. Hydrometer scales shall be printed on plastic or good grade durable paper in a manner permitting easy and accurate reading. Scales shall be divided into suitable spaces by lines running around the circumference of the stem in a plane normal to the longitudinal axis of the stem. Scales shall be differentiated by color or other means for each type of anti-freeze.

3.2.1.1.1 Type I. Each space shall be designated by a number or by a letter of the alphabet starting with A and continuing alphabetically as far as needed but not using the letter V. Each letter or number shall be repeated three or more times at points equidistant circumferentially around the stem. Each shall designate the indication based on the line below. No scale shall be less than $1\frac{1}{2}$ inches in length. Length of scale shall be measured from the center of the top space to the center of the bottom space. Hydrometer scales for ethylene glycol solutions shall have not less than 12 and for methanol solutions not less than 9 lettered divisions.

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3.2.1.1.2 Type II. Each division shall be denoted by a symbol appearing in at least two places bisected by the graduation line. Length of scale shall be at least 2 inches and shall be measured from the top graduation to the bottom graduation. Colors for the scales shall be yellow for ethylene-glycol and blue for ethyl-alcohol. There shall be a minimum of 18 divisions for the ethylene-glycol scale and 13 for the ethyl-alcohol scale.

3.2.2 Thermometer. Thermometer shall be enclosed in the instrument.

3.2.2.1 Stem and bulb. The thermometer shall be made from high-grade magnifying white-back tubing. The actuating liquid shall be red and shall show a clear, unbroken column. The capillary bore shall be centrally located in the stem. The stem shall be straight to within 1/32 inch. Thermometer shall be mounted in such a manner that it will not move and will be protected against breakage in shipments and in normal handling. Thermometer shall be so positioned that its bulb is directly in the path of the solution entering the tester, and remains immersed during the testing. The range of temperatures at which the thermometer may be read on its associated scale shall be suitable to the tester range shown in 3.3.2.

3.2.2.2 Scale.

3.2.2.2.1 Type I. Thermometer shall be graduated to indicate a temperature range of at least 60°F. to 180°F. The scalar portion shall be not less than 1-1/2 inches in length for 60°F. to 180°F. range.

3.2.2.2.2 Type II. Thermometer shall be graduated from -60°F. to +160°F. in increments of 5° directly adjacent to the side of the liquid column of the thermometer and shall be numbered horizontally each 10°. Figures indicating temperatures above 0°F. shall be black, and those indicating temperatures below 0°F. shall be red. The scalar portion shall be not less than 2 inches in length.

3.2.3 Hydrometer syringe unit. The hydrometer syringe unit shall consist of a glass cylinder, an upper fitting and a lower fitting.

3.2.3.1 Cylinder. The glass cylinder shall be a straight hollow tube of uniform diameter and wall thickness. The ends of the glass cylinder shall have rolled edges or beads so as to receive and securely retain fittings. Elastomer fittings, when wet with water, shall be capable of being attached to the glass cylinder without undue difficulty. The glass cylinder shall be of such length as to permit a clearance of at least 2 inches between the top of hydrometer and bulb stopper with hydrometer resting on bottom buffer. The outside diameter shall be not greater than 2 inches.

3.2.3.2 Upper fitting. The upper fitting shall consist of an elastomer suction bulb and an elastomer stopper. The stopper shall contain holes to permit the passage of air but shall prevent the hydrometer stem from passing into the suction bulb. The wall thickness of the bulb shall be not less than 0.090 inch. The bulb shall have an internal groove to accommodate the rolled edge or bead of the glass cylinder. Bulb shall include a suitable ring, loop or eyelet which shall have a diameter of at least a 1/4 inch for hanging the tester. When specified, an eyelet shall be molded in the bulb or lower fitting.

3.2.3.3 Lower fitting. The lower fitting shall consist of a cylinder extension and/or an elastomer cup provided with an elastomer inlet tube. The elastomer cup shall have a groove to accommodate the rolled edge or bead of the glass cylinder. There shall be provided a suitable elastomer buffer for the hydrometer. Type II tester shall be delivered with the intake tube attached. If the cylinder extension is glass, it may be made integral with the glass cylinder, or it may be fitted to the glass cylinder. The lower fittings shall permit free passage (intake or expulsion) of antifreeze solution irrespective of the position of the hydrometer.

3.3 Freezing temperature charts.

3.3.1 General. Charts shall be legibly printed and shall be a part of the assembled tester.

3.3.2 Description. Charts shall consist of vertical columns of freezing temperature values shown in numerical figures. The columns shall be clearly designated by letters or numbers corresponding to the same letters or numbers which appear on the hydrometer scale described in 3.2.2. Horizontal rows across the chart shall correspond to readings of the thermometer described in 3.2.2. Temperatures above 0°F. shall be printed in black. Temperatures below 0°F. shall be printed in red and may be preceded by a minus sign. Chart shall carry a conspicuous legend stating that the red figures mean temperatures below 0°F. Chart shall be 1-1/2 inches or more in height, measured vertically from the highest scale line to the lowest scale line in a group of columns for any type of antifreeze.

3.3.3 Type II. The background of ethylene-glycol charts shall be yellow and marked "Ethylene-Glycol", and that of ethyl-alcohol charts shall be blue and marked "Alcohol". White may be used in conjunction with the colors yellow and blue.

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3.3.4 Additional protection chart (type II testers). A chart shall be furnished on type II testers for determining the number of quarts of additional antifreeze necessary to protect known quantities of solution from freezing at predetermined lower temperatures within the range of the hydrometer scale. The chart shall be attached to the instrument and arranged in such a manner that its use will be facilitated, yet will cause no interference with other functions of the instrument. It shall be neatly printed and lithographed on good grade material.

3.3.5 Chart range. The **type II** additional protection chart shall show the additional antifreeze in quarts necessary to protect solutions to the specified temperatures, and to cover a solution capacity range from 8 to 60 quarts in increments of 4 quarts. The chart shall indicate additional amount of antifreeze necessary to protect solutions over the following ranges

From	To
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Not less than-

+ 20°F. ---	+ 10°F., 0°F., and -10°F.
+ 10°F. ---	0°F., -10°F., and -20°F.
0°F. ---	- 10°F., -20°F., and -30°F.
- 10°F. ---	- 20°F., -30°F., and -40°F.
- 20°F. ---	- 30°F., and -40°F.

3.4 Tester case, type II Tester. A substantial durable case shall be furnished to house the assembled tester and extra hydrometers. The case shall be designed to prevent damage to the tester in storage or transport. The cover shall be hinged and suitable provisions shall be made for locking in a closed position. Attached securely to the inside of the case cover shall be separate instructions with protection charts (see 3.3). Adequate provisions shall be made to carry three hydrometers in a fixed and protected position in the case (3.2.1).

3.5 Solution testing range.

3.5.1 Type I. Tester shall indicate the freezing temperature of solutions from 0 percent to 57.5 percent or more of inhibited ethylene glycol and the freezing temperature of solutions containing from 8 percent, or less to 55 percent, or more, of inhibited methanol when the solution tested is at a temperature between 60° and 180°F.

3.5.2 Type II. Testers shall indicate the freezing temperature of ethylene glycol or ethyl alcohol liquid solutions when the temperature of the liquid solution is between -60°F. and $+160^{\circ}\text{F.}$

3.6 Annealing. Ring strain shall be no greater than temper No. 1 for any glass component when tested as specified in 4.4.1. Any longitudinal strain, if present, shall be faint and highly diffused (with the exception of the top seal of the hydrometer).

3.7 Accuracy. Freezing temperature readings made with testers covered by this specification, shall not differ more than 8°F. from the solution freezing temperature as determined by ASTM Standard D1177 when tested as indicated in 4.4.2. Tester shall be tested for accuracy enclosing each hydrometer provided with item.

3.8 Retained volume. In a previously wetted tester not more than 3 percent of the volume of liquid drawn in by suction shall remain after the tester has been emptied in the conventional manner when tested as specified in 4.4.2.

3.9 Leakage. There shall be no internal or external leakage of air or solution between component parts when tester is tested as specified in 4.4.2.

3.10 Pull test.

3.10.1 Upper fitting. The upper fitting shall not part from the glass cylinder when a force of 10 pounds is applied to the bulb as specified in 4.4.3.

3.10.2 Lower fitting. The lower fitting or inlet tube shall not part from the tester when a force of 10 pounds is applied to the inlet tube as specified in 4.4.3.

3.11 Flexibility test.

3.11.1 Type I. The suction bulb shall fill the cylinder with antifreeze solution, allowing the hydrometer to float freely, in less than one minute, when tested as specified in 4.4.2 at all solution densities and temperatures selected for type I tester.

3.11.2 Type II. The suction bulb shall fill the cylinder with antifreeze solution, allowing the hydrometer to float freely, in less than one minute, when tested as specified in 4.4.2 at all solution densities and temperatures selected for type II tester.

3.11.3 Inlet tube. No breaking, cracking or other damage shall be sustained by the inlet tube when tested as specified in 4.4.4.

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3.12 Low temperature test, type II tester. The tester, case and all components shall sustain no damage and shall meet accuracy requirements of 3.7 when tested as specified in 4.4.5.

3.13 High temperature test, type II tester. The case enclosing the tester and all components shall sustain no damage and shall meet the accuracy requirements of 3.7 when tested as specified in 4.4.6.

3.14 Humidity test, type II tester. The case enclosing the tester and all components shall sustain no damage, and shall meet the accuracy requirements of 3.7 when tested as specified in 4.4.7.

3.15 Vibration test, type II tester. The case with the tester and all components enclosed shall sustain no damage nor shall any component be dislodged within the case when tested as specified in 4.4.8.

3.16 Drop test, type II tester.

3.16.1 Case. The case enclosing the tester and components shall sustain no damage nor shall any component be displaced within the case when tested as specified in 4.4.9.

3.16.2 Tester. The assembled tester shall sustain no damage when tested as specified in 4.4.10.

3.17 Thermal shock. The tester shall not break, crack or sustain any damage when tested as specified in 4.4.11.

3.18 Instructions. Instructions shall be supplied with each tester in brief but complete form for performing a test. Instructions shall be printed on card stock approximately 8 X 10 inches in size. Operating instructions for type II testers shall be printed on the additional protection chart (see 3.3.4).

3.19 Markings.

3.19.1 Tester. Each tester shall be legibly marked with manufacturer's name or trademark. The solution or solutions for which the tester is intended shall be clearly evident by legends on the chart or elsewhere.

3.19.2 Type II. Each tester shall have the following information attached to the instrument in letters not less than 1/8 inch in height:

- (1) Manufacturer's name
- (2) Tester, Antifreeze: for Radiator Solutions from -60°F. to +160°F.

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3.19.3 Hydrometer. Hydrometer shall contain a label showing the manufacturer's name or trademark, the part number identifying it with the tester model, and the type or types of antifreeze for which the hydrometer is intended.

3.20 Workmanship. Workmanship shall be first class throughout and the tester, case or hydrometers shall be free from defects which detract from their appearance or may impair their serviceability.

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.

4.1.1 Records. Records of examinations and tests performed by or for the contractor shall be maintained by the contractor and made available to the Government, upon the Government's request, at any time, or from time to time, during the performance of the contract and for a period of 3 years after delivery of the supplies to which such records relate.

4.1.2 Inspection. Inspection, as used in this specification, is defined as both examination (such as visual, or auditory, investigation without the use of special laboratory appliances or procedures) and testing (determination by technical means of physical and chemical properties) of the item.

4.1.3 Certificate of quality. Certificate of quality, supplied by the manufacturer of the glass, may be furnished in lieu of actual performance of such testing by the contractor, provided lot identity has been maintained and can be demonstrated to the Government. The Certificate shall include the name of the contractor, the contract number, the name of the manufacturer or supplier, the NSN, the Item Identification, the name of the component/material, the lot number, the lot size, the sample size, the date of testing, the test method, individual test results, and the specification requirements.

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4.2 Sampling.

4.2.1 Sampling for examination. Sampling for examination shall be conducted in accordance with MIL-STD-105 and table I.

TABLE I. Sampling for examination.

Type defect	Inspection level	AQL (percent defective)
For visual examination		
Major defects	II	2.5
Minor defects	II	4.0
For dimensional examination	S-2	2.5

4.2.2 Sampling for tests. Sampling for tests shall be conducted in accordance with MIL-STD-105 and table II.

TABLE II. Sampling for tests.

Tester Type	Component (Unit of product)	Characteristic	Requirement	Test Procedure	Inspection level	AQL
I & II	Glass components	Annealing	3.6	4.4.1	S-1	*
I & II	Tester	Accuracy	3.7	4.4.2	S-3	*
I & II	Tester	Retained Volume	3.8	4.4.2	S-1	*
I & II	Tester	Leakage	3.9	4.4.2	S-1	*
I & II	Upper fitting	Pull test	3.10.1	4.4.3	S-1	*
I & II	Lower fitting	Pull test	3.10.2	4.4.3	S-1	*
I	Tester	Flexibility test	3.11.1	4.4.2	S-1	*
II	Tester	Flexibility test	3.11.2	4.4.2	S-1	*
I & II	Inlet tube	Flexibility test	3.11.3	4.4.4	S-1	*
II	Case enclosing tester and hydro-meters	Low Temperature test	3.12	4.4.5	S-1	*
II	Case enclosing tester and hydro-meters	High temperature test	3.13	4.4.6	S-1	*

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TABLE II. Sampling for tests. (cont'd)

Tester Type	Component (Unit of product)	Characteristic	Requirement	Test Procedure	Inspection level	AQL
II	Case enclosing tester and hydro-meters	Humidity test	3.14	4.4.7	S-1	*
II	Case enclosing tester and hydro-meters	Vibration test	3.15	4.4.8	S-1	*
II	Case enclosing tester and hydro-meters	Drop test	3.16.1	4.4.9	S-1	*
II	Tester	Drop test	3.16.2	4.4.10	S-1	*
I & II	Tester	Thermal shock	3.17	4.4.11	S-1	*

* Acceptance number shall be zero.

4.3 Examination. The tester and the case shall be examined to determine compliance with all requirements contained in this specification.

4.3.1 Classification of defects. Examination shall be conducted in accordance with the following table:

TABLE III. Classification of defects.

Categories	Defects *
Major:	
101	Component part missing.
102	Elastomer or glass not free of cracks.
103	Glass not free of sharp edges or deformation.
104	Elastomer not free of tackiness, blisters or tears.
105	Graduations not complete, correct or legible.
106	Instructions not complete, correct, or legible.
107	Chart marking or information not complete, correct or legible.
Minor:	
201	Glass not free of bubbles or scratches.
202	Manufacturer's identification marking missing.
203	Marking not correct, complete or legible.

* Examination shall not be restricted to the classified defects listed above.

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4.3.2 Dimensional examination. The testers shall be examined for defects in dimensions. Any dimension not within the tolerance specified herein shall be classified as a defect.

4.3.3 Packaging inspection. The inspection of the unit, intermediate package, packing and marking for shipment and storage shall be in accordance with quality assurance provisions of the applicable container specification and the marking requirements of MIL-STD-129.

4.4 Tests. Tests shall be conducted to determine compliance with specification requirements.

4.4.1 Annealing. Glass components shall be tested in accordance with method A or B of ASTM Standard C 148.

4.4.2 Accuracy.

4.4.2.1 Procedure. Using test antifreeze solutions, as specified hereafter, the tester shall be operated according to the instructions provided by the manufacturer (see 3.20). Freezing temperature determinations shall be made upon inhibited ethylene glycol solutions, inhibited methanol solutions or ethyl alcohol solutions according to the type of tester (see 1.2). Solutions used in the tests shall be maintained in a suitable temperature bath, the temperature of which has been determined by National Bureau of Standards certified thermometer.

4.4.2.2 Test solutions. Solutions shall be prepared from concentrated antifreeze in accordance with ASTM Standard D 1176.

4.4.2.2.1 Inhibited ethylene glycol. The inhibited ethylene glycol used to prepare the test solution shall conform to O-A-548, type I.

4.4.2.2.2 Inhibited methanol. Inhibited methanol shall be commercial grade inhibited methanol antifreeze.

4.4.2.2.3 Ethyl-alcohol Ethyl alcohol shall be commercial grade ethyl alcohol antifreeze.

4.4.2.3 Range of tests. Three or more solutions of the same type antifreeze, each with a different freezing point, shall be used. Tests shall be made at four or more temperatures for each solution. Freezing points and temperatures shall be selected and combined so that readings will be well distributed over the range of the hydrometer scale and the range of the thermometer scale (see 3.7).

4.4.3 Pull test. A force of ten pounds pull shall be applied to the bulb and lower fitting inlet tube along the longitudinal axis away from the cylinder and then in each of four mutually perpendicular directions normal to the longitudinal axis of the cylinder.

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4.4.4 Flexibility test, inlet tube. The inlet tube shall be wrapped and unwrapped around a 2 inch diameter mandrel after the inlet tube and mandrel have been maintained in an atmosphere of -30° F. for four hours. Immediately after test, inlet tube shall be immersed in water at 180° F.

4.4.5 Low temperature test, type II tester. The case with tester and hydrometers enclosed shall be placed in an ambient air temperature of -80° F. for a period of 72 hours. At the end of the 72 hour period, the items shall be allowed to stabilize at an air temperature of $+80^{\circ}$ F. $\pm 10^{\circ}$ F. The case, tester and hydrometers shall then be inspected for evidence of damage and the tester tested for performance and accuracy as specified in 4.4.2.

4.4.6 High temperature test. The case with tester and components enclosed shall be subjected to a 24 hour cycle of temperature starting with 10 hours at $+90^{\circ}$ F., followed by 5 hours of steady increase to $+160^{\circ}$ F., 4 hours at $+160^{\circ}$ F., and 5 hours of steady decrease to $+90^{\circ}$ F. The case, tester and components shall then be inspected for evidence of damage and the tester tested for performance and accuracy as specified in 4.4.2.

4.4.7 Humidity test. The case with tester and components enclosed shall be subjected to 20 hours exposure with relative humidity between 93 and 97 percent at an air temperature from $+80^{\circ}$ F. to $+85^{\circ}$ F., with negligible air movement and heat radiation. The case, tester and components shall then be inspected for evidence of damage and the tester tested for performance and accuracy as specified in 4.4.2.

4.4.8 Vibration test, type II tester and case. The case with tester and components enclosed shall be subjected to a vibration test at 10 cycles per second and total excursion of 0.20 inch for 30 minutes.

4.4.9 Drop test, case, type II instrument, and hydrometers. The carrying case with the instrument and hydrometers enclosed shall be dropped from a height of 30 inches onto a concrete surface in such a manner that the corner of the container absorbs the full force of the fall. This test shall be repeated once on each of the 8 corners of the case. (The height of 30 inches refers to the distance from the concrete surface to the nearest corner of the case when suspended prior to the fall.) The fall shall be free-fall in that no ropes or other suspending media are attached to the case during the fall.

4.4.10 Drop test, instrument only, type II. The assembled tester shall be dropped from a height of 30 inches onto a concrete surface in such a manner that the long dimension of the instrument is as close as possible to the horizontal position. This test shall be repeated 10 times. (The height of 30 inches refers to the distance from the concrete surface to the nearest part of the instrument). The fall shall be free-fall in that no ropes or other suspending media are attached to the instrument during the fall.

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4.4.11 Thermal shock test. The tester shall be placed in an atmosphere of -30° F. for one hour. At the end of one hour, water at 200° F. shall be drawn into the barrel chamber by the suction bulb.

5. PACKAGING.

5.1 Packaging. Packaging shall be level A or C, as specified (see 6.1).

5.1.1 Unit of issue. One tester of the type specified, constitutes one unit of issue.

5.1.2 Level A.

5.1.2.1 Unit packaging.

5.1.2.1.1 Type I. The hydrometers shall be immobilized within the glass tube by use of die cut polystyrene or other suitable material. As an alternate, the hydrometer shall be removed from the tube and packaged in a paperboard box of an appropriate size and design. Each type I tester shall be cushioned with suitable cushioning material in a box conforming to PPP-B-676. Closure of the box shall be adequate to prevent accidental opening.

5.1.2.1.2 Type II. Each type II tester shall have the hydrometer secured as specified in 5.1.2.1.1. The tester along with the three extra hydrometers shall be adequately secured and cushioned within a carrying case as specified in 3.2.

5.1.2.2 Intermediate package. Twelve testers of one type only shall be packaged in an intermediate package conforming to PPP-B-636, class domestic. Closure shall be as specified in the appendix of the box specification.

5.1.3 Level C. Testers shall be packaged in a manner which will afford adequate protection against deterioration or physical damage during shipment from supply source to the first receiving activity. The supplier may use his commercial practice providing it meets these requirements.

5.2 Packing. Packing shall be level A, B or C, as specified (see 6.1).

5.2.1 Level A. Four intermediate packages (48 units) containing one type of tester only, shall be packaged in an exterior container designed for a type 2 load and conforming to PPP-B-636, class weather resistant. Closure, strapping and waterproofing shall be as specified in the appendix of the box specification.

5.2.2 Level B. Four intermediate packages (48 units) containing one type of tester only, shall be packed in an exterior container designed for a type 2 load and conforming to PPP-B-676, class domestic. Closure shall be as specified in the appendix of the box specification.

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5.2.3 Level C. The packaged testers shall be packed in shipping containers in a manner that will afford adequate protection against damage during direct shipment from the supply source to the first receiving activity. These packs shall conform to the applicable carrier rules and regulations.

5.3 Marking. Each unit package, intermediate package and exterior container shall be marked as specified in MIL-STD-129.

6. NOTES

6.1 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- a. Title, number and date of specification.
- b. National Stock Number (NSN).
- c. Type required (see 1.2).
- d. Eyelet required in upper fitting (see 3.4.2).

6.2 National Stock Number (NSN) coverage. This specification covers the following items listed in the Federal Supply Catalog

<u>National Stock Number</u>	<u>Item Identification</u>
6630-00-247-2968	TESTER, ANTIFREEZE SOLUTIONS, Multi-Solution Testing.
6630-00-449-6609	TESTER, ANTIFREEZE SOLUTIONS, Multi-Solution Testing.

6.3 Limitations. This specification does not cover all types of the commodity indicated by the title of this specification, or those which are commercially available, but is intended to cover those items which are normally procured to meet Military requirements.

Custodians
 Army - MD
 Navy - MS
 Air Force - 03

Preparing activity:
 Defense Supply Agency - DM
 Project No. 6630-0267

FOLD

DEFENSE PERSONNEL SUPPORT CENTER
2800 South 20th Street
Philadelphia, PA 19101

POSTAGE AND FEES PAID
DEFENSE SUPPLY AGENCY
DoD - 304



OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE \$300

HEADQUARTERS, DEFENSE PERSONNEL SUPPORT CENTER
ATTN DIRECTORATE OF MEDICAL MATERIEL, CODE ATT
2800 SOUTH 20TH STREET
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