

P-T-1544A  
November 28, 1975  
SUPERSEDING  
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April 14, 1969

FEDERAL SPECIFICATION

TEST KIT (DETERGENT CONCENTRATION AND WATER HARDNESS)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers one type of test kit and one grade of refill solutions for use with commercial dishwashing machines.

1.2 Classification.

1.2.1 Type and grade. The test kit and refill solutions covered by this specification shall be of the following type and grade, as specified (see 6.2):

- Type I - Test kit, detergent concentration and water hardness.
- Grade A - Refill solutions (set) for use with type I test kit.
- Solution A - 0.1N Hydrochloric Acid Reagent Grade.
- Solution B - Phenolphthalein Indicator Reagent Grade.
- Solution C - 0.1N Standard Soap Reagent Grade.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

Federal Specifications:

- L-P-390 - Plastic, Molding and Extrusion Material, Polyethylene and Copolymers.
- MNN-B-1194 - Bottles: Dropper, and Dropping TK.
- PPP-B-636 - Boxes, Shipping, Fiberboard.

Federal Standard:

- Fed. Std. No. 123 - Marking for Shipment (Civil Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks, and the Index of Federal Specifications and Standards, from established distribution points in their agencies.)

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Military Standards:

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

(Copies of Military Specifications and Standards required by suppliers 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 a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Chemical Society (ACS) Specification:

Reagent Chemicals - Fifth Edition.

(Application for copies should be addressed to the American Chemical Society, 1155 16th Street, NW., Washington, DC 20036.)

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Tariff Order Section, 1616 P Street, NW., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

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

## 3. REQUIREMENTS

3.1 Test kit. The test kit shall conform to the requirements of table I and 3.1.1. Items 1-4, inclusive, shall be assembled in item 7. Item 7 shall have four loops of leather or plastic which fit snugly around items 1-4, inclusive. Items 5 and 6 shall be folded and assembled in item 7.

TABLE I. Type I test kit

Item No.	Item	Approximate Capacity Milliliter (ml)	Body 1/ Material	Permanent Marking	Additional Features
1	Dropping bottle	20	Glass or plastic	ACID 0.1N HCL	Bottle with screw-on eye dropper or dispensing bottle with a recloseable feature.
2	Dropping bottle	20	Glass or plastic	INDICATOR PHENOL- PTHALEIN	Bottle with screw-on eye dropper or dispensing bottle with a recloseable feature.
3	Dropping bottle	20	Glass or plastic	SOAP 0.1N	Bottle with screw-on eye dropper or dispensing bottle with a recloseable feature.
4	Test tube	20	Glass or plastic	5 ml 10 ml	
5	Directions for detergents concentration test (see 3.1.2).				
6	Directions for water hardness test (see 3.1.3).				
7	Carrying case		Leather or rigid plastic	Test kit	Close with snap-on fastener or self-closing clasps.

1/ In accordance with NNN-B-1194, type II, class 2, grade A or B, or plastic material in accordance with L-P-390, type I, class 1.

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3.1.1 Item numbers 1-3 specified in table I shall be filled to capacity (approximately 20 ml.) with solutions A, B, and C, specified in table II, respectively. Tolerance for solutions A and C shall be  $\pm 2$  percent. Each bottle shall contain the appropriate solution for which it is marked.

3.1.2 Directions for the detergent concentration test. The directions for the detergent concentration test shall consist of two 8 by 10-1/2 inch sheets and shall contain the following directions:

#### DETERGENT CONCENTRATION TEST

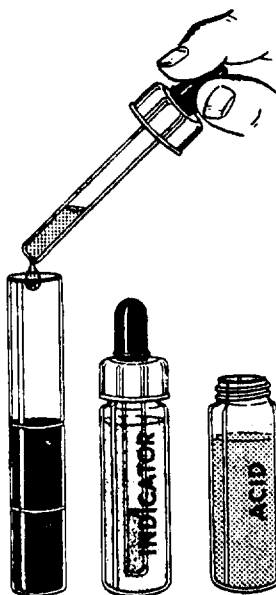


Figure 1.

#### DIRECTIONS

##### Detergent Concentration Test:

- 1 - Fill test tube to the upper of the two marks (10 ml.) with the solution to be tested.
- 2 - Add 2 drops of Phenolphthalein Indicator Solution.
- 3 - Add 0.1N HCL Acid, dropwise counting the number of drops needed to make the red color disappear.

NOTE: When adding drops of any solution, be sure to hold the dropper at an angle (approximately 45°) to insure drops of uniform size.

- 4 - The approximate detergent concentration is the number of drops times 0.01 percent.

EXAMPLE - 8 drops of acid equals titration of 8 = approximate concentration of 0.08 percent.

NOTE: Since some detergents are more alkaline than others, this test kit has been designed around the average (available  $\text{Na}_2\text{O}$  - 27.5 percent). It is usually sufficient in mechanical dishwashing to set the electronic controller for the least amount of detergent which gives the best results; and to check titration periodically thereafter, keeping titration the same as before.

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3.1.3 Directions for water hardness test. The directions for the water hardness test shall consist of two 2 by 10-1/2 inch sheets and shall contain the following directions:

## WATER HARDNESS TEST

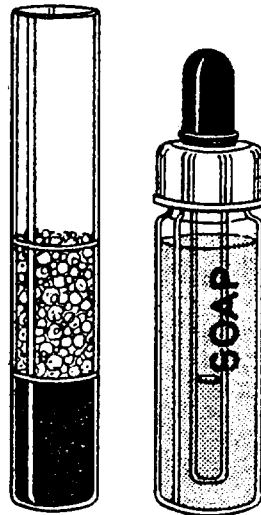


Figure 2.

## DIRECTIONS

- 1 - Fill the test tube to the lower of the two marks (5 ml.) with water to be treated.
- 2 - Add 1 drop of 0.1N Soap Solution--place thumb over the end of the tube and shake. This drop of soap is "for the tube"--forget it in calculating water hardness.
- 3 - Add 0.1N Soap Solution--1 drop at a time, shaking the tube as above after each drop has been added.
- 4 - Continue adding 0.1N Soap Solution dropwise as directed in (3) above until suds about 3/4 inch high last for at least 2 minutes.
- 5 - Water hardness in grains per gallon is given by dividing the number of drops of 0.1N Soap Solution needed for the suds described (except for the first drop) (see (2) above) by 2.

EXAMPLE - 9 drops of 0.1N Soap Solution required equals hardness of 4-1/2 grains per gallon. To convert water hardness as parts per million (ppm), multiply the number of grains per gallon by 17.1.

3.2 Refill solutions. The refill solutions for type I test kit shall conform to the requirements of table II and 3.2.1.

TABLE II. Grade A test kit solutions

Solution Number	Item	Capacity Fluid Oz. + 1/2 Oz.	Bottle Material	Permanent Marking
A	Pint bottle 0.1N hydrochloric acid reagent grade	16	Glass or plastic with screw cap <u>1/</u>	ACID 0.1N HCL
B	Pint bottle phenolphthalein indicator reagent grade	16	Glass or plastic with screw cap <u>1/</u>	INDICATOR PHENOLPHTHALEIN
C	Pint bottle 0.1N standard soap solution reagent grade	16	Glass or plastic with screw cap <u>1/</u>	SOAP 0.1N

1/ Metal, plastic, or composition screw cap with liner.

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3.2.1 Reagent grade chemicals shall be used for the solutions, where applicable, and conform to the requirements contained in the American Chemical Society (ACS) Publication Reagent Chemicals.

3.3 Finish. All glass or plastic items shall have smooth surfaces. The outside leather or plastic surfaces shall have a brown color and smooth surfaces.

3.4 Marking for identification. The test kit and refill solutions shall be plainly and permanently marked with the manufacturer's name and trade name, or trademark of such known character that the source may be determined.

3.5 Workmanship. The finished test kit and refill solutions shall be clean, well made, and free from all sharp edges and other defects which may cause injury or may affect appearance or serviceability, as applicable.

#### 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.

4.2 Sampling for inspection. Sampling for inspection shall be performed in accordance with the applicable provisions set forth in MIL-STD-105, except where otherwise indicated.

4.2.1 End product inspection. The inspection lot shall consist of all test kits of one type or all refill solutions offered for inspection at the same time. The sample unit shall be one completely finished test kit or one set of solutions (one bottle of each solution), as applicable.

4.2.1.1 Visual examination. Examination shall be made of the end item for the defects in table III. The inspection level shall be S-2 with an acceptable quality level (AQL) of 2.5 for major defects and 6.5 for total defects, expressed in terms of percent defective.

TABLE III. Classification of defects

Examine	Defect	Classification		
		Major	Minor	
Test kit	Item(s) missing.	X		
	Material not as specified.	X		
	Marking missing, illegible, incorrect.		X	
	Directions not as specified.	X		
	Bottles not filled to capacity.	X		
Finish	Bottles not marked to indicate solutions.	X		
	Rough surfaces.	X		
	Outer surfaces not brown color.		X	
	Marking for identification	Missing, illegible, incorrect.		X
		Refill solutions		
Refill solutions	Not a set (one bottle of each solution).	X		
	Bottles not marked to indicate solutions.	X		

4.2.1.2 Dimensional and capacity examination. An examination shall be made of the test kits for dimensional and capacity defects. Any dimension or capacity not within specified requirements shall be classified as a defect. The inspection level shall be S-2 with an AQL of 4.0, expressed in terms of percent defective.

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4.2.2 Examination of preparation for delivery. An examination shall be made to determine whether the packaging, packing, and marking comply with the requirements of section 5. Defects shall be scored as specified in table IV. The sample unit shall be one shipping container fully prepared for delivery. The inspection level shall be S-2 with an AQL of 4.0, expressed in terms of percent defective.

TABLE IV. Examination of preparation for delivery

Examination	Defect
Marking (exterior and and interior container)	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application.
Materials	Component missing, damaged, or otherwise defective.
Workmanship	Bulging or distortion of containers. Cushioning inadequate or improper.
Contents	Not as specified.

4.2.2.1 Examination of closure, waterproofing, and banding of shipping containers. When shipping containers are required to comply with PPP-B-636, examination for defects in closure, waterproofing, and banding shall be in accordance with the appendix of that specification.

#### 5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A, B, or C, as specified (see 6.2).

##### 5.1.1 Levels A and B unit containers.

5.1.1.1 Kit. Each kit, assembled as specified in 3.1, shall be packaged in a box conforming to PPP-B-636. The box shall be closed to prevent accidental opening.

5.1.1.2 Set. Each set of solutions, prepared as specified in 3.2, shall be packaged in a box conforming to PPP-B-636, class domestic. The bottles of solutions shall be separated to prevent accidental breakage. The box shall be closed in accordance with the appendix to the box specification.

5.1.2 Level C. The kits or sets of solutions shall be packaged to afford adequate protection against damage during shipment from the supply source to the first receiving agency.

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

5.2.1 Level A. Six (6) kits or six (6) sets shall be packed in a box conforming to PPP-B-636, class weather resistant. The box shall be closed, waterproofed, and banded in accordance with the appendix to PPP-B-636.

5.2.2 Level B. Six (6) kits or six (6) sets shall be packed in a box conforming to PPP-B-636, class domestic. The box shall be closed in accordance with the appendix to PPP-B-636.

5.2.3 Level C. Kits and sets, in quantities as specified (see 6.2), shall be packed in a container complying to the Uniform Freight or National Motor Freight Classification, as applicable. The containers shall be packed to assure acceptance and safe arrival at destination.

5.3 Marking. The unit and shipping containers shall be marked in accordance with Fed. Std. No. 123 or MIL-STD-129, as applicable.

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## 6. NOTES

6.1 Intended use. The test kit and refill solutions covered by this specification are intended for use with commercial dishwashing machines in determining detergent concentration and water hardness.

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

- (a) Title, number, and date of this specification.
- (b) Type of test kit and grade of refill solutions required (see 1.2.1).
- (c) Selection of applicable levels of packaging and packing (see 5.1 and 5.2).
- (d) Quantities required (see 5.2.1).
- (e) Marking document required (see 5.3).

Civil Agency Coordinating Activities:

CPSC  
GSA - FSS, FBC  
VA-DMS

Preparing Activity:

GSA-FSS

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Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See Section 2 of this specification to obtain extra copies and other documents referenced herein. Price 30 cents each.

