

INCH-POUND

MIL-W-215D

1 May 1989

SUPERSEDING

MIL-C-215C

15 December 1987

MILITARY SPECIFICATION

WHITE PHOSPHORUS (WP)

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

1. SCOPE

1.1 Scope. This specification covers one grade of white phosphorus (WP).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

PPP-D-736 - Drums, Shipping, Steel DOT-6A, DOT 6B and DOT 17C

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, U.S. Army Chemical Research, Development and Engineering Center, ATTN: SMCCR-SPT-S, Aberdeen Proving Ground, MD 21010-5423 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 1365

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STANDARDS

FEDERAL

Fed. Std. No. 313 - Material Safety Data Sheets Preparation and the Submission Of

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes

MIL-STD-129 - Marking for Shipment and Storage

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.1000 - Air Contaminants

29 CFR 1910.1200 - Occupational Safety and Health Standard on Hazard Communication

48 CFR 52.223-3 - Federal Acquisition Regulations System Hazardous Material Identification and Materials Safety Data

49 CFR 171 to 199 - Department of Transportation Hazardous Materials Regulations

(The Code of Federal Regulations is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Orders for the above regulations should cite "29 CFR 1910.1000", "29 CFR 1910.1200", "48 CFR 52.223-3", or "49 CFR 171 to 199".)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issue of the documents cited in the solicitation (see 6.2).

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ANSI STANDARDS

Z129.1 - Hazardous Industrial Chemicals - Precautionary Labeling

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

ASTM STANDARDS

D1500- ASTM Color of Petroleum Products

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Appearance. WP shall be a solid having a waxy luster with no visual black particulate matter when tested as specified in 4.2.4.1.

3.2 Color. WP shall have a color no darker than 2.5 on the ASTM color scale when tested as specified in 4.2.4.2.

3.3 Melting point. WP shall have a melting point of no less than 43.9°C when tested as specified in 4.2.4.3.

3.4 Insoluble matter in toluene. WP shall contain no more than 0.03 percent by weight of insoluble matter in toluene when tested as specified in 4.2.4.4.

3.5 Material Safety Data Sheets. Material Safety Data Sheets for WP shall be prepared in accordance with 48 CFR 52.223-3 by the contractor and shall comply with the provisions of 29 CFR 1910.1200 and Fed. Std. No. 313 (see 6.6). In the event of a conflict, 29 CFR 1910.1200 shall take precedence.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Quality conformance inspection.

4.2.1 Lotting. A lot shall consist of the WP offered for acceptance at one time which has been produced by one manufacturer, at one plant, from the same materials, and under essentially the same manufacturing conditions provided the operation is continuous. In the event the process is a batch operation, each batch shall constitute a lot (see 6.3). When shipments are made by tank cars or tank trucks, the contents of each tank car or tank truck shall constitute a lot.

4.2.2 Sampling.

4.2.2.1 For examination of packaging. Sampling for examination of packaging shall be conducted in accordance with MIL-STD-105.

4.2.2.2 For test. CAUTION. WP is flammable and must be kept under water or an atmosphere of carbon dioxide at all times. During sampling, the WP shall be handled under water and transferred while still wet to a container filled with water.

(a) Drums. Sampling for test shall be conducted in accordance with table I. A 1-quart specimen shall be removed from each sample drum in such a manner that the top, middle, and bottom portions of the WP are approximately equally represented in the specimen. For drums containing WP in block form, one block shall be removed from each sample drum. The specimen shall be placed in a bottle or other suitable container filled

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with water. The specimen container shall be tightly closed and labeled to identify the lot and drum from which the specimen was taken.

TABLE I. Sampling for test (drums)

Number of drums in batch or lot	Number of sample drums
1	1
2 to 25	2
25 to 150	3
151 to 1,200	5
1,201 to 7,000	8
7,0001 to 20,000	10
Over 20,000	20

(a) Tank cars and tank trucks. The WP in each tank car or tank truck shall be melted and four specimens of no less than 1 ounce each shall be individually removed in such a reamer that 6 inches from the top of the tank, one-third down, two-thirds down, and the bottom portions of the WP are equally represented in the sample. Samples shall be taken immediately after filling tank cars or tank trucks and before settling if taken at the contractor's plant, or immediately after melting and while still heated if taken at the user's plant.

4.2.3 Inspection procedure.

4.2.3.1 For examination of packaging. The sample unit shall be one filled and closed shipping container, ready for shipment. Sample containers and the packaging thereof shall be examined for the following defects using an AQL of 1.5 percent defective:

- (a) Contents per container not as specified
- (b) Container not as specified
- (c) Water missing or incorrect quantity
- (d) Container closure not as specified
- (e) Container damaged or leaking
- (f) Marking incorrect, missing, or illegible

4.2.3.2 For test.

(a) Drums. Each sample specimen taken in 4.2.2.2(a) shall be tested as specified in 4.2.4. Failure of any test by any specimen shall be cause for rejection of the lot represented.

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(b) Tank cars or tank trucks. The four individual specimens taken as specified in 4.2.2.2(b) shall be separately tested as specified in 4.2.4. Failure of any test by any specimen shall be cause for rejection of the lot represented.

4.2.4 Tests. Unless otherwise specified below, all specimens shall be transferred in the following manner:

(a) Melt the phosphorus in its container using a water bath. Do not heat above 50°C.

(b) Immerse the tip of a Mohr pipet in the water layer, flush several times, and draw approximately 1 inch of water into the pipet.

(c) Place the tip of the pipet in the WP layer, stir to bring any sediment into suspension, and draw the required volume.

(d) Return the tip of the pipet to the water layer and shake out a few drops of WP, replacing them with water.

(e) Withdraw the pipet and place the specimen in the appropriate water-filled glassware.

Reagent grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Tests shall be conducted as follows:

4.2.4.1 Appearance. Visually examine the specimen for form, luster, and black particulate matter.

4.2.4.2. Color. Run hot water on the specimen until it becomes a liquid (about 140°F). Determine the color in accordance with ASTM D 1500.

4.2.4.3 Melting point. Cool a thermometer having a 0° to 50°C range and calibrated in 0.1°C divisions by inserting the bulb in cold water until the temperature is approximately 10°C. Insert the bulb of the thermometer into the tube containing the specimen used in the color determination in 4.2.4.2 (Caution. Make sure that the water and specimen have cooled enough so that the specimen will solidify on the thermometer bulb.) Immediately insert the bulb with cooled specimen on it into a 300-milliliter (mL) tall form beaker containing approximately 200 mL of water having a temperature of 90° to 100°F. Swirl the beaker while slowly adding water having a temperature of 160° to 170°F until the specimen begins to melt from the bulb. Immediately read the thermometer and record this reading as the melting point of the specimen.

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4.2.4.4 Insoluble matter in toluene. Safety precautions: Wear dust-proof and splash-proof safety goggles and a faceshield (when skin contact is possible), rubber gloves, and robber apron when handling or analyzing phosphorus. A rubber glove may be omitted from one hand while pipetting a sample. Never use the mouth to pipet phosphorus. Check all glassware for cracks before use. Ensure that personnel are not exposed to airborne concentrations of white phosphorus in excess of the permissible exposure limit contained in 29 CFR 1910.1000 or, when applicable, a more stringent workplace exposure standard. Determine insoluble matter in toluene in accordance with procedure A or procedure B.

(a) Procedure A. Place a spot plate into a large evaporating dish and add 350 to 400 mL of hot water, making sure that the spot plate is completely covered with water. Insert the tip of a 10-mL Mohr pipet containing the specimen under the water in the evaporating dish and place the specimen on three sections of the spot plate, forming pellets having a weight of approximately 1 gram (g) each. Cool until the pellets solidify. Fill a Nesbitt absorption bulb with carbon dioxide gas and weigh. Immerse the three pellets in acetone to dissolve most of the water and then add them to the Nesbitt absorption bulb. Fill the Nesbitt absorption bulb with carbon dioxide gas, flush thoroughly, and weigh. Transfer the pellets from the Nesbitt absorption bulb to a 1000-mL beaker containing 800 mL of toluene. (Xylene may be used in place of the toluene.) Place the beaker on a hot plate or steam bath and heat until the pellets have gone into solution. Do not add more than 1.0 g of specimen to each 100 mL of toluene as spontaneous ignition of the solution can occur if there is more than 1.5 percent by weight of specimen in toluene. Filter the toluene solution through a tared medium porosity sintered glass crucible. (NOTE: Prior to use, wash the medium porosity sintered glass crucible with toluene, dry in an oven at 100°C for 30 minutes, cool to room temperature in a desiccator, and weigh.) Do not allow the crucible to become dry, Wash with warm toluene. Air dry in a hood for 10 to 15 minutes. Wash with a small amount of water, dry the medium porosity sintered glass crucible in an oven at 100°C for 30 minutes, cool to room temperature in a desiccator, and weigh. Calculate the percent insoluble matter in toluene as follows:

$$\text{Percent insoluble matter in toluene} = \frac{100 (A - B)}{(C - D)}$$

where: A = Weight of Gooch crucible and residue in grams,

B = Weight of Gooch crucible in grams,

C = Weight of Nesbitt absorption bulb, carbon dioxide, and pellets in grams,
and

D = Weight of Nesbitt absorption bulb filled with carbon dioxide in grams.

(b) Procedure B. Melt the specimen by submerging its container in hot water having a temperature of about 55°C. Stand a 50-mL centrifuge tube in a beaker and

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submerge it in hot water beside the phosphorus specimen. Use a Mohr pipet fitted with a pipet filler to transfer 5.75 mL (10.0 g) of molten specimen to the centrifuge tube, keeping the end of the pipet under water while transferring the specimen. Remove the centrifuge tube containing the specimen and place it in a cold water bath for a minimum of 5 minutes to solidify the specimen. Apply pressure to one side of the specimen nugget with a stirring rod to dislodge it from the tube. Pour about 250 mL of toluene into an extraction flask. Transfer the specimen nugget from the centrifuge tube to a beaker containing enough acetone to remove water from the specimen surface. Transfer the specimen nugget from the acetone to a tared, medium porosity, 30-mL, high form, fritted glass crucible filled with toluene. Immediately place the crucible containing the specimen nugget in the neck of the extraction flask and close the flask by placing the distillation trap in position while introducing carbon dioxide into the opening to keep out all air (see figure 1). Place the stream of carbon dioxide in the top of the condenser and connect the ground glass joint to the distillation trap. Remove the carbon dioxide from the top of the condenser, place a heat source under the flask, and heat until heated toluene vapors melt the specimen in the crucible. Place the carbon dioxide stream in the top of the condenser, remove the heat source, and let cool until the specimen filters through. Remove the carbon dioxide from the condenser. Place the heat source under the flask and boil gently until all of the specimen is dissolved in the flask and no traces are left in the crucible. Place the carbon dioxide stream in the top of the condenser, remove the heat source, and cool to room temperature. (NOTE: A cold water bath may be placed under the flask if desired.) Remove the condenser and trap from the extraction flask and place a gentle stream of carbon dioxide in the neck of the flask. Remove the crucible from the flask, place in a suction flask fitted with a crucible holder, and wash three times with fresh toluene. Dry the crucible in the oven at 105°C for about 20 minutes, cool to room temperature in a desiccator, and weigh. Calculate the percent insoluble matter in toluene as follows:

$$\text{Percent insoluble matter in toluene} = \frac{100 (A - B)}{W}$$

where: A = Weight of crucible and residue in grams
 B = Weight of crucible in grams, and
 W = Weight of specimen in grams.

5. PACKAGING

5.1 Packing. Packing shall be level A or C as specified (see 6.2).

5.1.1 Level A. One hundred 2-1/2-pound blocks of WP shall be packed under water to nominal drum capacity in a 30-gallon capacity steel drum with fully removable head. The drum shall conform to type III or IV of PPP-D-736. Packing shall also be in accordance with Department of Transportation (DOT) regulations.

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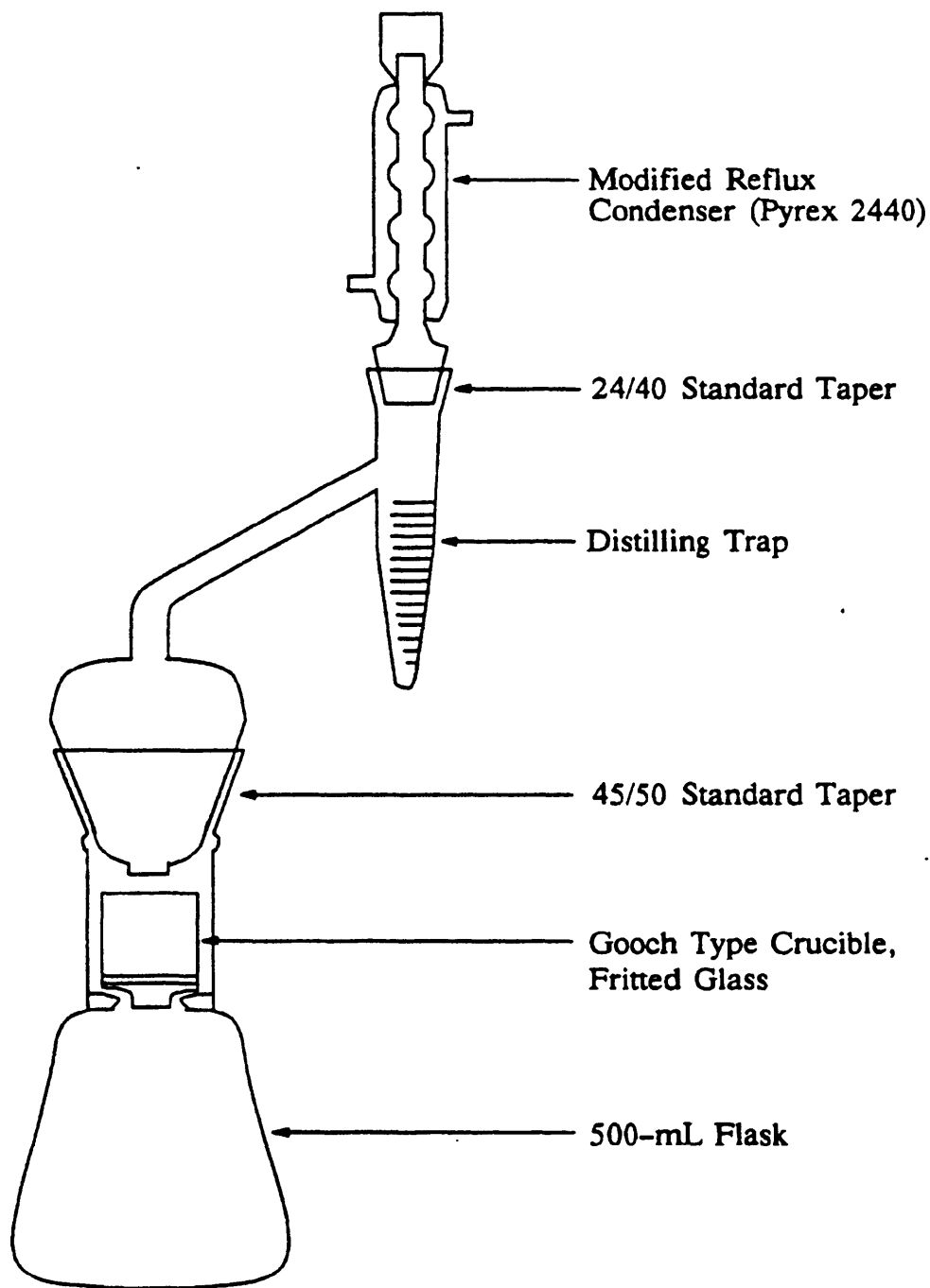


FIGURE 1. Modified Dean and Stark extraction apparatus for determining Toluene insolubles in phosphorus

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5.1.2 Level C.

5.1.2.1 Drums. WP shall be packed as specified in 5.1.1 except that the drum shall conform to DOT Specification 6B for an authorized gross weight of 480 pounds and the drum shall be fitted with "U" type rolling hoops.

5.1.2.2 Tank cars and tank trucks. WP shall be packed under water in accordance with DOT regulations in either tank cars or tank trucks as specified (see 6.2). Tank cars shall conform to DOT Specification 103 or 103W. Tank trucks shall conform to DOT Specification MC310 or MC311.

5.2 Marking. In addition to any marking required by the contract or order (see 6.2), shipping containers shall be marked in accordance with MIL-STD-129, ANSI Z129.1, and DOT regulations. Each shipping container, tank car, and tank truck shall bear the DOT yellow "Flammable Solid" label and shall be labeled or placarded to show the following information:

DANGER! POISON: MAY BE FATAL IF
SWALLOWED OR INHALED. CAUSES
SEVERE BURNS TO SKIN AND EYES.

Contents are packed under water and will ignite if water is removed. Do not get in eyes, or skin, or on clothing. Do not breathe (vapor or crystals). Use only with adequate ventilation. Wear protective rubber gloves, robber apron and faceshield when handling.

FIRST AID: Call for medical attention immediately.

In case of contact, immediately flush eyes and skin with plenty of water for at least 20 minutes; keep skin area wet until medical attention is obtained. Remove contaminated clothing.

If swallowed and person is conscious, give two glasses of water and induce vomiting by having the victim touch the back of his throat with his finger. Do not give water or induce vomiting in an unconscious victim.

If inhaled, remove to fresh air. If not breathing, administer CPR.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

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6.1 Intended use. WP is intended for use as a screening agent and for use as an intermediate or raw material in the manufacture of other chemical agents.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification
- (b) Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2)
- (c) Level of packing required for drums (see 5.1)
- (d) If tank cars or tank trucks are required (see 5.1.2.2)
- (e) Additional marking, if required (see 5.2)

6.3 Batch. A batch is defined as that quantity of material which has been manufactured by some unit chemical process or subjected to some physical mixing operation intended to make the final product substantially uniform.

6.4 Significant places. For the purpose of determining conformance with this specification, an observed or calculated value shall be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of ASTM E 29.

6.5 International interest. Certain provisions of this specification are the subject of international standardization agreement. When amendment, revision, or cancellation of this specification is proposed which will modify the international agreement concerned, the preparing activity will take appropriate action through international standardization channels including departmental standardization offices to change the agreement or make other appropriate accommodations.

6.6 Material Safety Data Sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with 29 CFR 1910.1200 and Fed. Std. No. 313. The pertinent government mailing addresses for submission of data are listed in appendix B of Fed. Std. No. 313 except that the address for the Army should be: Commander, U.S. Army Materiel Command Catalog Data Activity, ATTN: AMXCA-DA, New Cumberland, PA 17070-5018.

6.7 Subject term (key word) listing.

White phosphorus
WP

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Custodians:

Army - EA
Navy - OS

Preparing activity:

Army - EA

Project No. 1365-0243

Review activities:

Army - AR, MD
Navy - AS

User activity:

Navy - MC

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-W-215D		2. DOCUMENT TITLE WHITE PHOSPHORUS (WP)	
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 Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER <i>(Last, First, MI) - Optional</i>		7b. WORK TELEPHONE NUMBER <i>(Include Area Code) - Optional</i>	
c. MAILING ADDRESS <i>(Street, City, State, ZIP Code) - Optional</i>		8. DATE OF SUBMISSION (YYMMDD)	

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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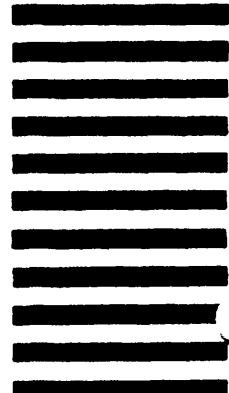
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Aberdeen Proving Ground, MD 21010-5423



INCH-POUND

MIL-W-215D
AMENDMENT 2
19 March 1991

SUPERSEDING
INT. AMENDMENT 1 (EA
14 September 1990

MILITARY SPECIFICATION

WHITE PHOSPHORUS (WP)

This amendment forms a part of MIL-W-215D, dated 1 May 1989, and is approved for use by all Departments and Agencies of the Department of Defense.

PAGE 1

1.1, line 1: Delete "one grade" and substitute "two grades".

Add the following new paragraph:

"1.2 Classification. WP shall be of the following grades as specified (see 6.2):

Grade 1 - 0.03 maximum percent by weight insoluble matter
Grade 2 - 0.25 maximum percent by weight insoluble matter"

PAGE 3

3.4: Delete paragraph in its entirety and substitute the following:

"3.4 Insoluble matter in toluene.

3.4.1 Grade 1. Grade 1 WP shall contain no more than 0.03 percent by weight of insoluble matter in toluene when tested as specified in 4.2.4.4.

AMSC N/A

FSC 1

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AMENDMENT 2

3.4.2 Grade 2. Grade 2 WP shall contain no more than 0.25 percent by weight of insoluble matter in toluene when tested as specified in 4.2.4.4."

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6.2: Add the following to the end of the paragraph:

"(f) Grade of WP required (see 1.2)"

Custodians:

Army - EA
Navy - OS

Preparing activity:

Army - EA

Project No. 1365-0250

Review activities:

Army - AR, MD
Navy - AS, SH

User activity:

Navy - MC

**NOTICE OF INACTIVATION
FOR NEW DESIGN**

MIL-W-215D
NOTICE 1
19 April 1996

MILITARY SPECIFICATION

WHITE PHOSPHORUS (WP)

This notice should be filed in front of MIL-W-215D, dated 1 May 1989, with Amendment 2, dated 19 March 1991.

MIL-W-215D is inactive for new design and is no longer used except for replacement purposes.

Custodian:

Army - EA
Navy - OS

Preparing activity:

Army - EA
(Project 1365-0263)

Review Activities:

Army - AR, MD
Navy - AS, MC

AMSC N/A

FSC 1365

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