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MIL-PRF-82736A(OS)
16 November 1988
SUPERSEDING
DOD-I-82736(OS)
27 MARCH 1985

PERFORMANCE SPECIFICATION

IGNITION PELLETS, MAGNESIUM-FLUOROCARBON

This specification is approved for use by the Naval Sea Systems Command (OS), Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification describes ignition pellets consisting of magnesium powder dispersed in a mixture of solid fluorocarbon polymers.

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Ordnance Station, Technical Information Department (Code 36) Indian Head, MD 20640-5000 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 1376

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Military

MIL-M-382 Magnesium Powder (For Use in Ammunition)

MIL-B-82647 Bag, Conductive Plastic, Heat-Sealable, Flexible

Naval Sea Systems Command

WS 7682 Copolymer, Vinylidene Difluoride and
Hexafluoropropylene

(Application for copies of WS's should be addressed to:
Commanding Officer, Naval Ordnance Station, (Attn: Code 802),
Louisville, KY 40214.)

STANDARDS

Military

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-286 Propellant Solid: Sampling Examination
and Testing

MIL-STD-1168 Lot Numbering of Ammunition

(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 (see 6.2).

Code of Federal Regulations

49 CFR 100-177 Transportation
49 CFR 178-199 Transportation

(Application for copies should be addressed to the Superintendent of
Documents, Government Printing Office, Washington, DC 20404.)

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 issues of the documents cited
in the solicitation (see 6.2).

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American Society for Testing and Materials

- D 792 Method of Test for Specific Gravity and Density of Plastics
- D 1457 Standard Specification for PTFE (Polytetrafluoro-ethylene) Molding and Extrusion Material
- D 1513 Carbon Black, Pelleted - Pour Density

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19013.)

(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 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.4), in accordance with 4.4.

3.2 Material requirements. When analyzed in accordance with paragraph 4.5.1, the ignition powder shall be composed of the ingredients in the proportions shown in Table I, each of which meets the requirements of the application publication listed therein.

TABLE I. Material Composition

Ingredient	Applicable document	Percent by weight	
		Min.	Max.
Magnesium Powder (Mg), Type II, Granulation 16	MIL-M-382	52.5	54.5
Plastic Molding Material, (PTFE)	D 1457-83 Type IV	29.5	32.0
Copolymer, Vinylidene Difluoride and Hexa- fluoropropylene	WS 7682	15.0	16.5

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3.3 Dimensions. When measured in accordance with paragraph 4.5.2, the ignition pellets (extruded ignition powder) shall comply with the dimensional requirements of Figure 1.

FIGURE 1. Dimensional Requirements



3.4 Performance and product characteristics.

3.4.1 Heat of explosion. When tested in accordance with paragraph 4.5.3, the heat of explosion shall be 1400 calories per gram (cal/g) to 1500 cal/g.

3.4.2 Density. When tested in accordance with paragraph 4.5.4, the density shall be 178 grams per cubic centimeter (g/cm³) to 1.94 g/cm³.

3.4.3 Burning rate. When tested in accordance with paragraph 4.5.5, the strand burning rate shall be:

Pressure (psig)	Burning Rate (inches per second)
-----	-----
500	0.361 to 0.561
1,000	0.894 to 1.094

3.4.4 Loading density. When tested in accordance with paragraph 4.5.6, the loading density shall be 0.92 g/cm³ \pm 1.04 g/cm³.

3.5 Lot numbers. The assignment of lot numbers shall be in accordance with MIL-STD-1168.

3.6 Workmanship. When inspected in accordance with paragraph 4.5.1, the ignition pellets shall be free of dirt, grease and foreign matter.

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

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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 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.4).
- b. Quality conformance inspection (see 4.5).

4.3 Lot. The ignition powder shall come from a single 200-lbs maximum mix. Each ignition pellet ingredient shall come from a single ingredient lot.

4.4 First article inspection.

4.4.1 Sample. The contractor shall submit a first article sample as designated by the contracting officer (see 6.4) for evaluation in accordance with provisions of paragraph 4.4.2. The first article lot size shall be same as production lot size. The sample shall be obtained from the first production lot which has been produced by the contractor using the same production processes, procedures and equipment as will be used in fulfilling the contract. The sample shall consist of: 100g of ignition powder, one kilogram (kg) of ignition pellets, six 12-inch strands and twenty four 6-inch strands.

4.4.2 Inspection to be performed. The sample will be subjected by the Government to any or all of the examinations or tests specified herein.

4.4.3 Acceptance or rejection. When the inspections of 4.4.2 show that the first article sample meets all the requirements of 3, the sample shall be accepted. Otherwise, the first article

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sample shall be rejected. The Government reserves the right to terminate its inspection upon any failure of an assembly, component, or test specimen in the sample to comply with any of the stated requirements.

4.5 Quality conformance inspection. The material shall be subjected to all inspections and tests herein for acceptance.

4.5.1 Chemical analysis. Determine the chemical composition of ignition powder as follows:

4.5.1.1 Copolymer determination.

a. Weigh a 1.0 ± 0.3 g specimen of ignition powder to the nearest 0.1 milligram (mg) into a 250 - milliliter (mL) beaker. Perform test in triplicate. Add 100 mL of reagent grade acetone to the beaker and cover with a watch glass. Dissolve the copolymer at room temperature for a minimum of 16 hours.

b. Place a 3.7 - centimeter (cm) GF/C Whatman (or equivalent) glass fiber filter paper in a clean, dry 30 - mL medium porosity glass crucible. Weigh the crucible and paper. Place the crucible in a vacuum filtration apparatus.

c. Transfer the contents of the beaker to the crucible and filter. Wash the beaker quantitatively with acetone and filter. Rinse the crucible with more acetone.

d. Dry crucible and residue in an oven at 100 ± 5 Celsius (C) for 30 minutes to 60 minutes. Cool in a desiccator and weigh.

e. Calculation:

$$\text{Percent Copolymer} = ([A - (C-B)] / A) \times 100$$

Where, A = weight of specimen, g
 B = weight of crucible and paper, g
 C = weight of crucible, paper and residue, g.

Report average value to the nearest 0.1 percent. The average value shall meet the requirements of paragraph 3.2 or the lot shall be rejected (see 6.2).

4.5.1.2 Magnesium determination.

a. Place the crucible from paragraph 4.5.1.1, containing magnesium (Mg) and PTFE, in a 250 - mL beaker. Slowly add 1:1 HCl to the crucible until the evolution of gas ceases. Add enough 1:1 HCl into the beaker to cover the top of the crucible and cover beaker with a watch glass.

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b. Heat the beaker on a steam bath for 16 hours minimum. Allow the solution to cool to room temperature. Remove the crucible with tongs and rinse the outside of crucible with 1:1 HCl into the beaker.

c. Place the crucible into the filtration apparatus, transfer the solution into the crucible and filter. Wash the beaker quantitatively with 1:1 HCL and filter. Repeat washing with distilled water. Wash crucible with acetone.

d. Dry crucible and residue in an oven at 100 ± 5 C for 30 minutes to 60 minutes. Cool in a desiccator and weigh.

e. Calculation:

$$\text{Percentage Mg} = [(C - D) / A] \times 100$$

Where, A = weight of specimen, g
 C = weight of crucible, paper and residue (Mg + PTFE) from paragraph 4.5.1.1, g
 D = weight of crucible, paper and residue (PTFE), g.

Report average value to the nearest 0.1 percent. The average value shall meet the requirements of paragraph 3.2 or the lot shall be rejected (see 6.2).

4.5.2 Dimensions. Each specimen of a 50-pellet sample shall be measured with a micrometer. Each of the 50 pellets shall meet the requirements of paragraph 3.3 or the lot shall be rejected (see 6.2).

4.5.3 Heat of explosion. Determine the heat of explosion of ignition powder in accordance with MIL-STD-286B, Method 802.1, except argon gas and a 2.0 ± 0.3 g specimen shall be used. Perform the test in triplicate and record each value. Report each value to the nearest whole cal/g. Each value shall meet the requirements of paragraph 3.4.1 or the lot shall be rejected (see 6.2).

4.5.4 Density. Determine the density using a 12 ± 1 inch ignition strand in accordance with ASTM D792, except hexane shall be used as the immersion solvent. Perform test in triplicate and record each value. Report each value to the nearest 0.01 g/cm³. Each value shall meet the requirements of paragraph 3.4.2 or the lot shall be rejected (see 6.2).

4.5.5 Burning rate. The ignition material shall be subjected to the strand burning test of MIL-STD-286B, Method T803.1 except the following:

(a) Strand sample should be 6 inches to 7 inches long with 0.090 inches to 0.098 inches diameter. Test samples in a closed bomb filled with water conditioned to 24 ± 5 C.

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(b) Six samples should be tested at 500 pounds per square inch gauge (psig) and six samples should be tested at 1000 psig.

Record each burn rate value. Report the average value to the nearest 0.10 inches per second. The average value shall meet the requirements of paragraph 3.4.3 or the lot shall be rejected (see 6.2).

4.5.6 **Loading density.** Determine the loading density using 1.0 ± 0.1 kg of ignition pellets in accordance with ASTM D1513, except calculate the density as weight per volume, g/cm³. Report the average of two determinations to the nearest 0.01 g/cm³. The average value shall meet the requirements of paragraph 3.4.4 or the lot shall be rejected (see 6.2).

4.5.7 **Examination.**

4.5.7.1 **Visual.** Visual examination shall be performed to assure that the ignition pellets meet the requirements of paragraph 3.6.

4.5.7.2 **Packaging, packing, and marking.** Examination shall be made to ascertain that packaging, packing, and marking conform to Section 5 of this specification.

5. **PACKAGING**

5.1 **Preservation.** Preservation shall be commercial and shall be in accordance with 49 CFR part 173 in general and with 173.154 specifically.

5.2 **Packing.** The ignition pellets shall be packed in sealed bags conforming to MIL-B-82647(OS). The weight of pellets in one bag shall be 0.5 lb to 1.0 lb.

5.3 **Marking.** Containers shall be marked in accordance with 49 CFR 172 Subpart D and specifically 172.422 and in accordance with MIL-STD-129, including the following:

- (a) Number and date of this document
- (b) Name and type number of product
- (c) Manufacturer
- (d) Date of completion of manufacture
- (e) Date of shipment
- (f) Lot (batch) and control numbers
- (g) Contract or purchase order number
- (h) Quantity: weight of ignition pellets in container.

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6. NOTES

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

6.1 Intended use. The fluorocarbon ignition pellets covered by this document are intended for use in ignition of solid propellant rocket motors and other pyrotechnic devices.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number and date of the specification
- b. Unit of issue
- c. Applicable issue of DODISS (see 2.1.1)
- d. Applicable issues of other Government documents, drawings and publications (see 2.1.2)
- e. Applicable issues of non-Government publications (see 2.2)
- f. Whether a first article sample is required (see 3.1, 4.4 and 6.4)

g. That the safety precaution requirements of the "Contractor's Safety Manual for Ammunition, Explosives, and Related Dangerous Material," DoD 4145.26M are applicable. NOTE: When this specification is used as part of the description of work to be accomplished by a Government activity, the safety precaution requirements of "Ammunition and Explosives Ashore," OP5 are applicable.

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements to the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Reference Paragraph	DID Number	DID Title	Suggested Tailoring
4.5.1, 4.5.2, 4.5.3, 4.5.4, 4.5.5, 4.5.6	DI-I-2072	Test Report	Contractor format
4.5.7	UDI-A-23264B	Certification Data/Report	None

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The above DID's were those cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first production item, a sample selected from the first N production items, a standard production item from the contractor's current inventory (see 3.1), and the number of items to be tested as specified in 4.4. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.5 Advisory notes. The following notes are for information only.

a. 35% to 50% of magnesium powder through 325 sieve is recommended in addition to the Granulation 16 requirements. The recommended magnesium powder density is 0.500 g/cm³ to 0.550 g/cm³.

b. The recommended apparent density for PTFE is 0.300 g/cm³ to 0.400 g/cm³.

6.5.1 Processing. OD 24524, Instruction for Preparation of Compositions Using the Elastomeric Copolymer of Vinylidene Fluoride and Hexafluoropropylene as a Binder, contains pertinent advisory information. Formulate the ignition pellets by precipitation mixing (shock-gel), extruding into strands and cutting to length.

6.6 Subject term (key word) listing:
pyrotechnic material

6.7 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing Activity
Navy-OS
Project 1376-N352

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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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-I-82736A(OS)		2. DOCUMENT TITLE IGNITION PELLETS, MAGNESIUM-FLUOROCARBON	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
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