

INCH-POUND

MIL-DTL-32124(OS)
27 August 2003

DETAIL SPECIFICATION

PROPELLANT, NSWC/IH-BC-15, NSWC/IH-BC-16, NSWC/IH-BC-17 and NSWC/IH-BC-20

This specification is approved for use within the Naval Sea Systems Command, 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 covers the requirements of four types of propellant, designated as follows:

Type I - NSWC/IH-BC-15
Type II - NSWC/IH-BC-16
Type III - NSWC/IH-BC-17.
Type IV - NSWC/IH-BC-20

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or documents recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not those documents are listed.

2.2 Government documents.

2.2.1 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 supplements thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

Department of Defense

MIL-F-82655 Ferric Oxide

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Indian Head Division, Naval Surface Warfare Center, Documentation Branch (Code 4230), 101 Strauss Avenue, Indian Head, MD 20640-5035, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by sending a letter.
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AMSC N/A .

FSC 1377

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

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MIL-A-82667/2	Ammonium Perchlorate
MIL-S-82858	Silicon dioxide, microfine
MIL-C-85498	Curing agents, dimeryl-di-isocyanate & isophorone di-isocyanate

STANDARDS

Department of Defense

MIL-STD-286	Propellants, Solid: Sampling, Examination and Testing
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(Unless otherwise specified, copies of federal and military specifications and standards are available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2.2 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.

SPECIFICATIONS

Naval Sea Systems Command (CAGE Code 53711)

WS 19733	Imine Curing/Bonding Agents
WS 19738	Antioxidant, t-butylphenol type
WS 19740	Diocetyl adipate
WS 20700	Hydroxyl terminated polybutadiene

(Application for copies should be addressed to Commander, Naval Surface Warfare Center, Indian Head Division, 101 Strauss Avenue, Documentation Branch (Code 4230), Indian Head, MD 20640-5035.)

Naval Sea Systems Command (CAGE Code 10001)

OS 10170	Aluminum powder
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(Application for copies should be addressed to Commander, Naval Surface Warfare Center, Indian Head Division, 101 Strauss Avenue, Documentation Branch (Code 4230), Indian Head, MD 20640-5035.)

DRAWINGS

Naval Air Systems Command (CAGE Code 30003)

673AS131	Liner Filler
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(Application for copies should be addressed to Commander, Naval Surface Warfare Center, Indian Head Division, 101 Strauss Avenue, Documentation Branch (Code 4230), Indian Head, MD 20640-5035.)

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2.3 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).

CHEMICAL PROPULSION INFORMATION AGENCY (CPIA)

Publication No. 21: JANNAF Solid Propellant Physical Behavior Manual

(Applications for copies should be addressed to Chemical Propulsion Information Agency, The Johns Hopkins University Applied Physics Laboratory, Johns Hopkins Road, Laurel, MD 20707.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
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D 2240	Standard Test Method for Rubber Property - Durometer Hardness
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(Applications for copies should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

2.4 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. Unless otherwise specified in the contract (see 6.2), a first article sample (see 6.4) of the cured propellant consisting of one batch (see 6.8.2) is required and shall be manufactured using the methods and procedures proposed for production (see 4.3.1). The contractor shall furnish a copy of the propellant mixing procedure and applicable casting procedure to the contracting activity prior to delivery of the first article sample (see 6.3). Prior to starting production the sample shall be tested as specified in 4.3 and 4.5 for the purpose of determining that the contractor's production methods are capable of producing propellant that complies with the technical requirements of the contract. No process changes shall be made, subsequent to approval of the first article sample, without prior written approval of the procuring activity. Failure to meet the requirements of 3.1.1 and 3.4 shall result in the rejection of the first article sample.

3.1.1 Aging Characteristics. Unless specified in the contract or purchase order (see 6.2), all contractors shall test the propellant in accordance with the applicable end item specification to assure compliance to Table 2.

3.2 Material. The material shall be a solid composite propellant as described herein.

3.3 Chemical composition and ingredients. The chemical composition and ingredients shall be in accordance with Table 1 and Sections 3.3.2, 3.3.3 and 3.3.4. The contractor shall submit a record of the ingredient weights and ingredient lot/batch number for each batch of propellant to the contracting activity (see 6.3).

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Table 1. Chemical composition of NSWC/IH-BC-15, NSWC/IH-BC-16, NSWC/IH-BC-17, and NSWC/IH-BC-20

Ingredients	Specification/ Type	NSWC/IH-BC-15 Percent by Weight	NSWC/IH-BC-16 Percent by Weight	NSWC/IH-BC-17 Percent by Weight	NSWC/IH- BC-20 Percent by Weight
HTPB	WS 20700, Type 1	15.97	14.46	13.06	10.4
Isophorone Diisocyanate	MIL-C- 85498, Type 2	1.10	1.11	1.01	0.8
Antioxidant	WS 19738	0.17	0.17	0.17	0.15
Diocetyl Adipate	WS 19740		1.50	3.00	3.00
HX-752	WS 19733, Type 1	0.30	0.30	0.30	0.30
Cab-O-Sil, Microfine SiO ₂	MIL-S-82858	0.50	0.50	0.50	-
Liner Filler	673AS131	0.10	0.10	0.10	-
Ferric Oxide	MIL-F- 82655, Class 2	1.50	1.50	1.50	2.00
Aluminum Powder	OS 10170B, Class 1	2.00	2.00	2.00	2.00
Ammonium Perchlorate	MIL-A- 82667/2, Type III, Class 1	78.36 (2 sizes): 200 μ , ¹ 55 μ	78.36 (2 sizes): 200 μ , ¹ 55 μ	78.36 (2 sizes): 200 μ , ¹ 55 μ	81.35 (2 sizes): 200 μ , ¹ 30 μ

¹ Particle size shall be ground from the same 200 μ stock, and as listed, is the 50% Microtrac nominal value by weight.

3.3.1 Weight tolerances. Each ingredient shall be weighed to ensure compliance with Table 1 prior to mixing. Weights shall be measured with equipment having a minimum accuracy of ± 1.0 percent of the nominal ingredient weight specified in Table 1.

3.3.2 Ammonium perchlorate (AP) ratio of particle sizes. Control of the propellant burn rate shall be maintained by varying the ratio of weight fractions of the unground (coarse) and ground (fine) ammonium perchlorate (see Table 1). The weight fractions are the weight of the coarse AP or fine AP divided by the total weight of the coarse and fine AP. The ratio of the coarse (200 μ) AP/fine (55 μ) AP shall be nominally 30/70 but may be adjusted as needed.

3.3.3 Binder.

3.3.3.1 Binder, NSWC/IH-BC-15. Control of the physical properties of the propellant shall be maintained by varying the amounts of HTPB polymer (WS 20700), Isophorone diisocyanate (IPDI, MIL-C-85498) and HX-752 (WS 19733) bonding agent. The amounts of HTPB polymer and IPDI shall be determined by adjusting the ratio of chemical equivalents of the curative (IPDI) to the chemical equivalents of the HTPB polymer. The value of this ratio shall be nominally 0.80/1.0 based on the functional equivalence values from the vendor's ingredient certifications. The amount of the HX-752

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shall be nominally 0.30% and can be adjusted as needed to improve cold temperature strain properties. Total amounts of the HTPB polymer, IDPI, and HX-752 shall remain constant at 17.37 ± 1 percent.

3.3.3.2 Binder, NSWC/IH-BC-16. Control of the physical properties of the propellant shall be maintained by varying the amounts of HTPB polymer (WS 20700), Isophorone diisocyanate (IPDI, MIL-C-85498) and HX-752 bonding agent. The amounts of HTPB polymer and IPDI shall be determined by adjusting the ratio of chemical equivalents of the curative (IPDI) to the chemical equivalents of the HTPB polymer. The value of this ratio shall be nominally 0.90/1.0 based on the functional equivalence values from the vendor's ingredient certifications. The amount of the HX-752 shall be nominally 0.30% and can be adjusted as needed to improve cold temperature strain properties. Total amounts of the HTPB polymer, IDPI, and HX-752 shall remain constant at 15.87 ± 1 percent.

3.3.3.3 Binder, NSWC/IH-BC-17. Control of the physical properties of the propellant shall be maintained by varying the amounts of HTPB polymer (WS 20700), Isophorone diisocyanate (IPDI, MIL-C-85498) and HX-752 bonding agent. The amounts of HTPB polymer and IPDI shall be determined by adjusting the ratio of chemical equivalents of the curative (IPDI) to the chemical equivalents of the HTPB polymer. The value of this ratio shall be nominally 0.90/1.0 based on the functional equivalence values from the vendor's ingredient certifications. The amount of the HX-752 shall be nominally 0.30% and can be adjusted as needed to improve cold temperature strain properties. Total amounts of the HTPB polymer, IDPI, and HX-752 shall remain constant at 14.37 ± 1 percent.

3.3.3.4 Binder, NSWC/IH-BC-20. Control of the physical properties of the propellant shall be maintained by varying the amounts of HTPB polymer (WS 20700), Isophorone diisocyanate (IPDI, MIL-C-85498) and HX-752 bonding agent. The amounts of HTPB polymer and IPDI shall be determined by adjusting the ratio of chemical equivalents of the curative (IPDI) to the chemical equivalents of the HTPB polymer. The value of this ratio shall be nominally 0.90/1.0 based on the functional equivalence values from the vendor's ingredient certifications. The amount of the HX-752 shall be nominally 0.30% and can be adjusted as needed to improve cold temperature strain properties. Total amounts of the HTPB polymer, IDPI, and HX-752 shall remain constant at 11.50 ± 1 percent.

3.3.4 Formulation adjustment. The nominal values and nominal limits of the ingredient weight percentages (see Table 1), the curative to HTPB polymer ratio (see 3.3.3) were determined experimentally (see 6.5). Decisions to vary these ratios and ingredient weight percentages from their nominal values and nominal limits shall be based on ballistic and physical properties obtained from previous batch history, trends indicated by statistical control charts, or lot changes of raw materials. The nominal limits of these ratios and weight percentages shall not be criteria for accepting or rejecting a batch of propellant. Only the physical properties (see Table 2) and ballistic performance of the end item (see 6.1) shall be propellant acceptance/rejection criteria. Failure to meet the requirements of 3.4 and the ballistic performance of the end item (see 6.1) shall result in the rejection of the propellant lot.

3.4 Physical properties. The physical properties of the cured propellant shall conform to Table 2 when cured in accordance to 4.4.3. Test specimens shall be tested within 30 days after the end of cure. The contractor shall report all data from the tests specified in 4.5.4 through 4.5.8 (see 6.3).

3.5 Burn rates of the cured propellant. The contractor shall conduct burn rate testing on the propellant cured in accordance with 4.4.3. The contractor shall report all data from the tests specified in 4.5.8 (see 6.3). The burn rate shall be such as to meet the performance required of its intended use. Advisory burn rates are shown in Tables 3 and 4 (see 6.6).

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3.6 Workmanship. The material shall be uniform in consistency and free from contamination, foreign matter, or any other defect that would prevent its use for the purpose intended.

Table 2. Physical properties of the propellant

Physical Property		NSWC/IH-BC-15		NSWC/IH-BC-16		NSWC/IH-BC-17		NSWC/IH-BC-20	
	Temp ($\pm 5^{\circ}\text{F}$)	Min	Max	Min	Max	Min	Max	Min	Max
Maximum tensile stress (psi)	165	86.2		80		81.2		49	
Strain at maximum stress (%)	-65	7.1		6		15.5		8	
Heat of explosion (cal) (reference)	77	1125	1135	1125	1135	1125	1135	1280	1300
Shore hardness "A" (reference)	77	55	67	55	67	55	67	65	75
Density (lb/in ³)	77	.059	.061	.059	.061	.059	.061	.0605	.0625

**Table 3. Advisory burn rates of the propellant,
NSWC/IH-BC-15, NSWC/IH-BC-16, and NSWC/IH-BC-17**

Pressure Versus Temperature	2000 psia (in/sec)		4000 psia (in/sec)		6000 psia (in/sec)		8000 psia (in/sec)	
	Min	Max	Min	Max	Min	Max	Min	Max
-65 $\pm 5^{\circ}\text{F}$	.73		1.15		1.46		1.74	
165 $\pm 5^{\circ}\text{F}$		1.04		1.57		2.01		2.51

**Table 4. Advisory burn rates of the propellant,
NSWC/IH-BC-20**

Pressure Versus Temperature	1000 psia (in/sec)	2500 psia (in/sec)	3000 psia (in/sec)	4000 psia (in/sec)
	nominal	nominal	nominal	nominal
-65 $\pm 5^{\circ}\text{F}$	.595	.91	.987	1.13
165 $\pm 5^{\circ}\text{F}$	.759	1.14	1.25	1.43

4. VERIFICATION

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

- First article inspection (see 4.3),
- Quality conformance inspection (see 4.4).

4.2 Inspection conditions. Unless otherwise specified in the contract or purchase order (see 6.2), all inspections shall be performed as specified in the applicable test method of 4.5.

4.3 First article inspection. The first article inspection shall consist of the examination and tests of section 4.5 performed on samples prepared in accordance with Sections 4.3.1 and 4.4.3. Failure to pass any examination or test shall result in rejection of the first article sample.

4.3.1 First article sample. Unless otherwise specified in the contract or purchase order (see 6.2), a sample (see 4.4.1) consisting of one batch of propellant per the contractor's normal practice shall be manufactured in accordance to 3.1. Test samples in accordance with 4.4.3 shall be prepared from propellant drawn from the first article batch and forwarded to an activity designated by the contracting activity (see 6.2) for first article inspection. The sample shall be tested to determine, prior to starting production, that the contractor's production methods are capable of producing propellant that complies with the technical requirements of the contract. No process changes shall be made, subsequent to the approval of the first article sample, without prior approval of the procuring activity. The remainder of the batch may be used, at the contractor's risk, to cast units for use in the first article sample assemblies required by the applicable end item specification. Rejection of the propellant first article sample will result in rejection of any units cast from the first article batch. Further production of the propellant by the contractor, prior to approval of the first article sample, shall be at the contractor's risk.

4.4 Quality conformance inspection. The quality conformance inspection shall consist of the examination and tests of 4.5 performed on samples prepared in accordance to 4.4.2 and 4.4.3. Failure to pass any examination or test shall result in rejection of the lot. The contractor shall furnish test reports showing quantitative results of all quality conformance tests required by this specification for each lot (see 6.8.3) of propellant (see 6.3).

4.4.1 Sample size. The quality conformance lot sample size from the propellant lot shall be adequate to perform all examinations and tests necessary to verify the properties listed in Tables 2 and 3.

4.4.2 Sampling for quality conformance inspection. A quality conformance inspection sample, consisting of sufficient material to allow performance of the quality conformance tests as specified in 4.5, shall be withdrawn from each batch of propellant. Samples shall be cast and cured in accordance to 4.4.3.

4.4.3 Sample preparation. Samples for first article and quality conformance inspections shall be cast, in the same manner used for production units, in pans or blocks of sufficient size and quantity to complete all tests in 4.5.

4.4.3.1 Curing. Propellant grains and samples shall be cured together in the same oven at $140^{\circ}\text{F} \pm 5^{\circ}\text{F}$ until two consecutive Shore "A" hardness measurements, taken at least 24 hours apart, show no more than a 2 durometer point increase (see 6.10).

4.5 Examination and tests. Unless an alternative inspection method is proposed, tests shall be performed using the apparatus and procedures specified herein. Alternate inspection methods must be approved by the contracting activity prior to use in acceptance testing.

4.5.1 Visual examination. All samples shall be visually examined to verify conformance with the workmanship requirements of 3.6. Packaging shall be examined for conformance to section 5.

4.5.2 Aging characteristics. Unless otherwise specified in the contract or purchase order (see 6.2), all contractors shall test the propellant in accordance with the applicable end item specification to assure compliance to 3.1.1.

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4.5.3 Chemical composition. The contractor shall submit a record of the ingredient weights and ingredient lot/batch number for each batch of propellant to the contracting activity (see 6.3). Failure to meet the requirements of 3.3, 3.4 and the ballistic performance of the end item (see 6.1) shall result in the rejection of the propellant lot.

4.5.4 Maximum stress and strain at maximum stress. The maximum stress and strain at maximum stress of the cured propellant shall be in accordance with CPIA Publication No. 21, Class C specimen. The average properties of five specimens tested at each temperature shall meet the requirements specified in table 2. Crosshead rate shall be 2.0 inches/minute. Test sample temperature conditioning time shall be 3 hours minimum.

4.5.5 Density. The test specimen shall be tested in accordance with Method 510.3.1 of MIL-STD-286 and the test temperature shall be $77 \pm 5^{\circ}\text{F}$ and shall meet the requirements of 3.4. An alternative test that may be used is ASTM D 792, Method A-1, except isopropyl alcohol shall be used in place of water.

4.5.6 Hardness. Hardness shall be determined in accordance with ASTM D 2240, Type A, at a temperature of $77 \pm 5^{\circ}\text{F}$. The average of five different hardness readings taken on a single sample of propellant shall be reported as the hardness.

4.5.7 Heat of explosion. The heat of explosion (HOE) of the cured propellant shall be determined in accordance with Method 802.1 of MIL-STD-286. The results of five determinations and their average shall be recorded for each lot.

4.5.8 Burn rate. The burn rate of the cured propellant shall be determined for each batch of propellant in accordance to Method 803.1.1 of MIL-STD-286 for each pressure-temperature combination specified in Table 3.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2 and 6.9). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain required packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging Activity.

6. NOTES

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

6.1 Intended use. NSWC/IH-BC-16 propellant are intended for use in the CCU-22B/A and CCU-149/A Impulse Cartridges. NSWC/IH-BC-20 propellant is intended for use in the CKU-5C/A Aircraft Ejection Seat Catapult. These propellants were developed for use in the cartridges and the catapult, are used in military aircraft only, and have no commercial application.

6.2 Acquisition requirements. Acquisition documents must specify the following:

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- a. Title, number and date of this specification.
- b. Issues of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2 and 2.3).
- c. Conditions where a first article sample is not required (see 3.1, 4.3.1, and 6.4).
- d. Whether aging characteristics are required (see 3.1.1).
- e. Inspection activity
- f. Inspection conditions, if other than as specified (see 4.2).
- g. Assigned activity for first article inspection (see 4.3.1).
- h. Lot size, if other than specified (see 6.8.3).
- i. That the safety precaution requirements of the “Contractors’ Safety Manual for Ammunition and Explosives, “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”, OP 5, are applicable.

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The specific acquisition should be reviewed to ensure that only essential data are requested/provided. 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	Title
3.1	Operating Procedures
3.1.1, 3.3, 3.4 3.5	Test/Inspections

6.4 First Article. When a first article sample is required, the contracting officer should provide guidance as to the number of items to be tested as specified in 4.3 and whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, or a standard production item from the contractor’s current inventory (see 3.1). 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 previously been 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 Propellant history. The nominal values shown in Table 5 are based on formulations used by Indian Head Division, Naval Surface Warfare Center (IHDI/NSWC). INDIV/NSWC, which uses Baker-Perkins brand vertical mixers, has successfully met the requirements of this specification using those values. Due to the known effects of moisture-related degradation of AP-based composite propellants, manufacturing processes should be carefully designed to severely restrict the propellant and ingredients exposure to moisture and contaminants prior to unit loading (sealing off the propellant).

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Table 5. Properties of NSWC/IH-BC-16 Propellant

Theoretical Property					
FLAME TEMPERATURE (°F, CALCULATED), CHAMBER					4215
GLASS TRANSITION TEMPERATURE (°F)					-97
SPECIFIC HEAT RATIO (GAMMA, CALCULATED)					1.21
SPECIFIC IMPULSE (1000 PSIA IN STANDARD ATMOSPHERE, LBF-S/LBM, CALCULATED)					235.9
TEMPERATURE SENSITIVITY (%/°F) RANGE OF -65 TO 165°F					0.043
Approximate exhaust gas composition (mole %, 1Atm.):					
H ₂ O	27.13	N ₂	8.01	H	0.20
CO	24.04	CO ₂	5.36	Cl	0.11
H ₂	19.05	Al ₂ O ₃ (s)	0.70	SiO (s)	0.08
HCl	14.73	FeCl ₂	0.43	HO	0.06
Molecular weight of exhaust					23.59

6.6 Burn rates. Past acceptable lots of propellant have conformed to the burn rates of Tables 3 and 4.

6.7 Propellant properties. The properties of the NSWC/IH-BC-16 propellant are shown in table 5.

6.8 Definitions.

6.8.1 Process change. A process change is a change in the way the propellant and/or its ingredients are manufactured. Process changes include, but are not limited to, (a) a change in ingredient manufacturer, or in the manufacturer's process, (b) a change in mixing vessel size or type, (c) a change in mix time or temperature, and (d) a change in cure temperature.

6.8.2 Batch. A batch is a quantity of propellant consisting of a mix of all the ingredients including curative manufactured at one time in one mixer per the contractor's normal practice.

6.8.3 Lot. Unless otherwise specified in the contract (see 6.2), each batch of propellant should constitute a lot for inspection purposes. No batch of propellant should contain more than one batch (or lot) of any ingredient.

6.9 Packaging

6.9.1 Packaging. When packaging is required for propellant shipment, the propellant should be individually wrapped in moisture proof packing material and properly identified as to propellant lot and batch number.

6.10 Curing Hardness test. Using a small plastic beaker of propellant as a curing sample the following tests will be performed to determine when the propellant has attained sufficient cure for further processing. A cut section of a pan or carton sample may be also be used.

a. Use a craftsman knife, exacto knife, or equivalent to obtain a cut surface layer of the propellant over an area sufficient to squarely support the Shore "A" gage presser foot. Do not use the same place on the sample for readings done on subsequent days.

b. Perform the Shore "A" durometer test at $140 \pm 5^\circ\text{F}$ in accordance with ASTM D2240 Method A. Reading is to be taken 10 ± 1 seconds after presser foot is in contact with specimen.

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c. When two measurements taken 24 hours apart show less than a 2 durometer point increase with time then the sample should be deemed sufficiently cured.

d. When the two measurements 24 hours apart indicate a decrease in hardness an additional wait of 24 hours is required to assure that cure has progressed to the point that another reading may be taken.

6.11 Subject terms (keyword) listing.

CCU-22B/A
CCU-149/A
CKU-5C/A
Cartridges
Aircraft Ejection Seat Catapults
AEPS

Preparing Activity:
Navy-OS
(Project 1377-0200)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL		
<p align="center"><u>INSTRUCTIONS</u></p> <p>1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.</p> <p>2. The submitter of this form must complete blocks 4, 5, 6, and 7.</p> <p>3. The preparing activity must provide a reply within 30 days from receipt of the form.</p> <p>NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.</p>		
I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-DTL-32124	2. DOCUMENT DATE (YYMMDD) 030827
3. DOCUMENT TITLE PROPELLANT, NSW/IH-BC-15, NSW/IH-BC-16, NSW/IH-BC-17 and NSW/IH-BC-20		
4. NATURE OF CHANGE <i>(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)</i>		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME <i>(Last, First, Middle Initial)</i>	b. ORGANIZATION	
c. ADDRESS <i>(Include Zip Code)</i>	d. TELEPHONE <i>(Include Area Code)</i> (1) Commercial (2) DSN <i>(If applicable)</i>	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY		
a. NAME Commander, Indian Head Division Naval Surface Warfare Center	b. TELEPHONE <i>(Include Area Code)</i> (1) Commercial 301-744-1973 (2) DSN 354-1973	
c. ADDRESS <i>(Include Zip Code)</i> Engineering Documentation Branch (Code 4230) 101 Strauss Avenue Indian Head, MD 20640-5035	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, VA 22060-6221 Telephone (703) 767-6888 DSN 427-6888	