

MIL-I-85326(AS)

25 September 1979

MILITARY SPECIFICATION

IGNITER, ROCKET MOTOR, MARK 297 MOD 0

This specification is approved for use by the Naval Air 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 Igniter, Rocket Motor, Mk 297 Mod 0 referred to herein as the igniter. The igniter is used in the Mk 36 rocket motor.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

MILITARY

MIL-C-45662 Calibration System Requirements

STANDARDS

MILITARY

MIL-STD-810 Environmental Test Methods

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 Air Engineering Center, Engineering Specifications and Standards Department (ESSD) Code 93, Lakehurst, NJ 08733) by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 1337

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DRAWINGS

Naval Air Systems Command, (Code Ident 30003)

1204AS201	Igniter, Rocket Motor, Mk 297 Mod 0
1204AS206	Lever, Locking
1204AS211	Disk, Rupture
1204AS215	Seal
1204AS217	Decalcomania, Safe/Arm
2623628	Arming Key and Safety Flag Assembly
2605139	Case Assembly

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 **First article.** When specified (see 6.2), the contractor shall furnish sample units for first article inspection and approval (see 4.4 and 6.4).

3.2 **Conformance to documents.** Unless otherwise specified herein, the igniter and igniter components shall conform to the requirements specified herein and on Drawing 1204AS201.

3.3 **Function.**

3.3.1 **ARM function.** The igniter shall attain a pressure of 75 psig minimum within 50 milliseconds after T_0 and a pressure of 110 psig minimum within 100 milliseconds after T_0 , as shown in figure 1 when fired in the test chamber of 4.3.4. (See 4.6.1.1)

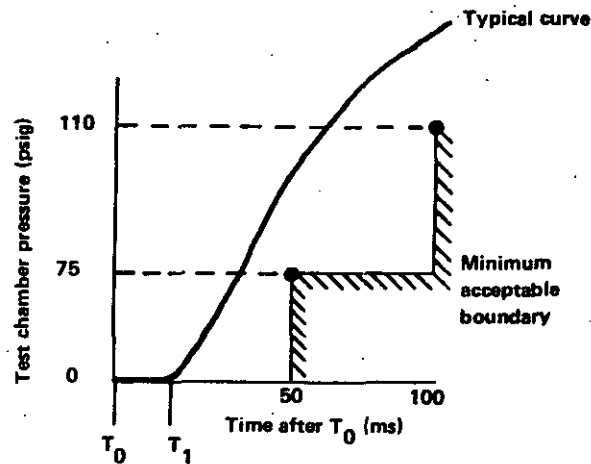
3.3.2 **SAFE function.** When the igniter is fired in the SAFE position, the seal (Drawing 1204AS215), boron-potassium-nitrate pellets, and rupture disk (Drawing 1204AS211) shall not show any evidence of hot gas leakage. It shall withstand an arming torque of 100 in-pounds minimum without rotation to the ARM position. (See 4.6.1.2)

3.4 **SAFE/ARM operation.**

3.4.1 **Automatic safe return.** The igniter shall automatically return to the SAFE position if not positively locked in the ARM position. (See 4.6.2.1)

3.4.2 **Arming torque.** The torque required to ARM the igniter shall be 4 to 14 in-pounds. (See 4.6.2.2)

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NOTE: See 6.5 for definitions.

FIGURE 1. Functional requirements.

3.4.3 Arming key removal. The arming key, Drawing 2623628, shall be removable only in the ARM position. (See 4.6.2.3)

3.5 Ignition circuit resistance. The igniter squib bridge resistance shall be 0.5 ± 0.1 ohm at $70 \pm 10^\circ\text{F}$. (See 4.6.3)

3.6 Workmanship. The igniter shall be free from explosive material on all external surfaces, uniform in quality, free from foreign material, and manufactured in a manner to assure compliance with the requirements of this specification and applicable drawings. (See 4.6.7)

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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

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

4.3. Inspection conditions. Unless otherwise specified the igniter shall be tested at the atmospheric pressure conditions of the test facility.

4.3.1. Equipment and facilities. Test equipment and inspection facilities shall be provided by the testing activity, and shall be of sufficient quality and quantity to permit the performance of the required tests and measurements, under the conditions and to the accuracies specified herein.

4.3.2. Maintenance and calibration. All test equipment shall be calibrated and maintained in accordance with the provisions of MIL-C-45662. Certification to this effect shall accompany all reports of quality verification, first article, or quality conformance inspections.

4.3.3 Test equipment. The test equipment shall provide a recording system having capabilities of measuring:

- a. Pressure of 750 psig with an accuracy of ± 1.5 percent of calibration range
- b. Response of 100 psi per ms, minimum
- c. Time graduations of 100 ± 20 ms per inch

4.3.4 Test chamber. The empty test chamber shall be a cylindrical chamber having a free volume of 181 ± 2 cubic inches, and a length of $13\text{-}1/8 \pm 1/16$ inches. The chamber shall have two pressure taps, located 180 degrees apart and approximately 10.5 inches from end of chamber to which the igniter is attached. One end of the chamber shall provide igniter mounting features duplicating those of the SIDEWINDER case and forward closure.

4.4. First article inspection: First article inspection shall be performed by the contractor, after award of contract and prior to production; at a location acceptable to the Government. First article inspection shall be performed on sample units which have been produced with equipment and procedures normally used in production. First article approval is valid only on the contract under which it is granted, unless extended by the Government to other contracts.

4.4.1 Sample size. Unless otherwise specified, 22 igniters shall be subjected to first article inspection.

4.4.2. Inspection routine. The sample shall be subjected to tests as shown in table I.

4.5 Quality conformance inspection. Quality conformance inspection shall consist of the tests of 4.6.1, 4.6.2, 4.6.3, and 4.6.7. Each igniter in the lot shall be subjected to the tests of 4.6.2, 4.6.3 and 4.6.7.

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TABLE I. First article inspection program.

Test	Para.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Visual examination	4.6.7	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Circuit resistance	4.6.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Safe-arm operation	4.6.2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Thermal cycle	4.6.5	D	D	D	D	D	D	D	D															
Vibration	4.6.4					E	E	E	E	D	D	D	D											
Mechanical actuation	4.6.6				E	F	F	F	F	E	E	E	E											
Circuit resistance	4.6.3	E	E	F	F	G	G	G	G	F	F	F	F											
Safe-arm operation	4.6.2	F	F	G	G	H	H	H	H	G	G	G	G											
Arm-function (70° ± 5°F)	4.6.1.1	G	G	H	H	I			I	H	H	H	H											
Safe-function Hot (165° ± 5°F)	4.6.1.2						I																	
Safe-function Cold (-65° ± 5°F)								I																

NOTE: Letters indicate tests. These tests are to be performed in alphabetical sequence.

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4.5.1 Lot. A production lot of igniters shall consist of all components and subassemblies that will comprise a lot of igniters for assembly with rocket motors. An igniter lot shall not include more than one igniter grain lot.

4.5.2 Sampling. The samples shall be randomly selected from the above defined lot, and assembled for testing in accordance with the applicable test procedure. In accordance with table II, two sample groups shall be selected and designated as sample Groups A and B. Sample group A shall be subjected to the test of 4.6.1.1 and Sample group B subjected to the test of 4.6.1.2.

4.6 Tests and examinations.

4.6.1 Function. Function tests shall be conducted with the igniter (including components and subassemblies) assembled into a test chamber in accordance with 4.3.4.

4.6.1.1 ARM function. Each igniter to be tested shall be temperature conditioned for 4 hours minimum. It shall then be placed in the ARM position and fired with a firing current of 3.5 plus 0.2 minus 0.5 amperes dc within 10 minutes after removal from the conditioning chamber.

4.6.1.2 SAFE function. Each igniter to be tested shall be temperature conditioned for 4 hours minimum. It shall then be fired in the SAFE position using a firing current of 3.5 + 0.2, -0.5 amperes d.c. within 10 minutes after removal from the conditioning chamber. After firing a counterclockwise torque of 100 inch-lbs minimum shall be applied to the arming key. This shall not result in rotation to the ARM position. The igniter shall then be disassembled and the seal, boron-potassium-nitrate pellets, and rupture disk visually examined for evidence of hot gas leakage.

4.6.2 SAFE/ARM operational test. SAFE/ARM operational tests shall be conducted with the igniter assembled into the rocket motor with adapter of figure 2 installed, or in a fixture which simulates the rocket motor with warhead assembled.

TABLE II. Quality conformance sampling plan.

Lot size	Sample size	Sample distribution		
		Groups		
		A	B	
			Function temperature	
		$170^{\circ} \pm 5$	$165^{\circ} \pm 5$	$-65^{\circ} \pm 5$
Up to 800	30	24	3	3
801-3200	40	32	4	4

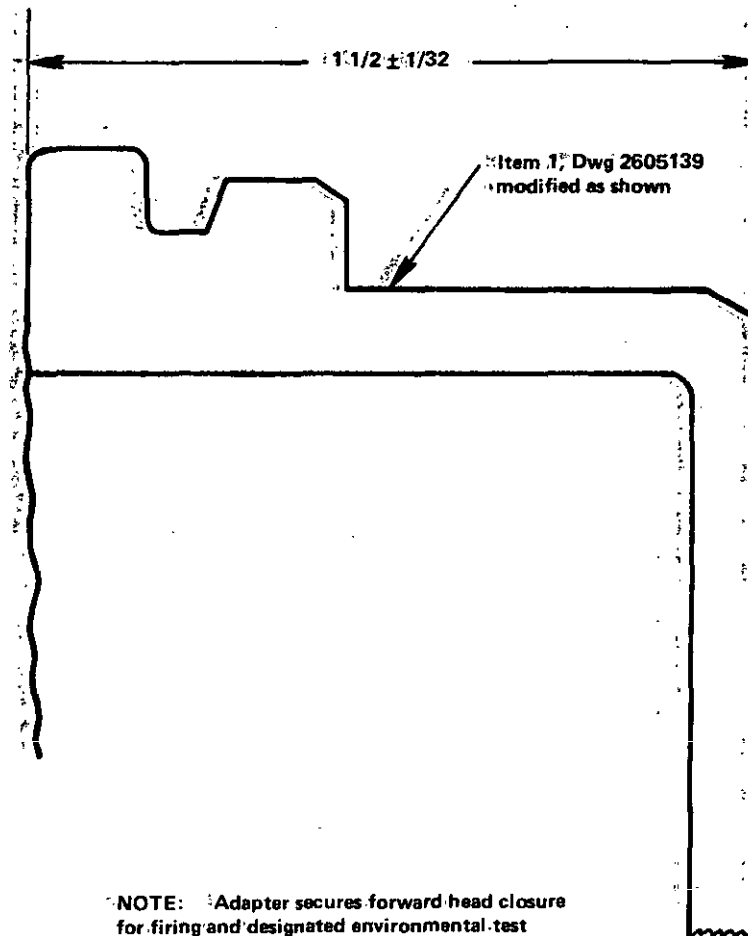


FIGURE 2. Environmental test adapter.

4.6.2.1 **Automatic safe return.** With the igniter in the locked ARM position the arming key shall be installed and depressed to disengage the locking lever, Drawing 1204AS206. When the arming key is released, the igniter shall rotate and lock in the SAFE position within 3 seconds.

4.6.2.2 **Arming torque.** The maximum torque shall be measured during rotation of the arming key from the SAFE position to the ARM position as directed on decal, Drawing 1204AS217.

4.6.2.3 **Arming key removal.** With the igniter in the SAFE position, a radial pull of 10 ± 0.5 lbs shall be exerted on the arming key. The key shall be retained within the rocket motor or fixture when subjected to this force.

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4.6.3 Ignition circuit-resistance. The resistance of the initiator circuit shall be measured, prior to installation in the motor, using a circuit tester that limits the current flow to 0.010 amperes maximum, and is accurate within .01 ohm.

4.6.4 Vibration. The igniters (in ARM position) shall be subjected to random vibration, while conditioned at temperature extremes, in accordance with MIL-STD-810 (Test conditions) and Method 514 except as noted herein. The random vibration profile shall be a flat power spectral density from 10 Hz to 2000 Hz @ a level of $0.02 \text{ g}^2/\text{Hz}$. Vibration control filter cut-off characteristics shall roll-up to 10 Hz and roll-off at 2000 Hz, equal to or greater than the rate of +18 dB/octave and -18dB octave respectively. The igniters shall utilize service attachment when assembled to the vibration fixture representing the rocket motor interface. The igniters, while assembled to the vibration fixture, shall be conditioned for a minimum of four hours prior to vibration at each of the three following temperatures: $-65^\circ \pm 5^\circ \text{ F}$, $+165^\circ \pm 5^\circ \text{ F}$, $+70^\circ \pm 5^\circ \text{ F}$. The igniters, while exposed to each of the above temperatures shall be subjected to random vibrations for a period of no less than one hour per axis for a total of nine hours vibration. After completion of the vibration testing the igniter shall meet the requirements of 3.4.2, 3.5, and 3.6.

4.6.5 Thermal cycle. The igniters specified shall be subjected to five full temperature cycles with the safe-arm assembly in the SAFE position. The temperature limits shall be $-65^\circ \pm 5^\circ \text{ F}$ and $165^\circ \pm 5^\circ \text{ F}$. A full cycle shall consist of conditioning the unit for 4 hours + 30 minutes, -0 minutes at one temperature limit, transferring the unit within 10 minutes to the other temperature limit, conditioning the unit for 4 hours + 30 minutes, -0 minutes and return to the original temperature limit. One-half of the sample shall begin cycling at -65° F and one-half at 165° F . After testing, each unit shall meet the requirements of 3.4.2, 3.5, and 3.6.

4.6.6 Mechanical actuation. Each igniter indicated (See table I) shall be manually armed and returned to safe for 250 cycles. Arming shall be accomplished as directed on the decal, Drawing 1204AS217, using the arming key, Drawing 2623628, supplied as part of the igniter. After completion of each 50 cycles, or whenever the arming torque appears excessive, the arming torque shall be measured. After completion of 250 cycles the unit shall meet the requirements of 3.4, 3.5, and 3.6.

4.6.7 Visual examination. The igniter shall be visually inspected for conformance to the workmanship, finish, cleanliness, presence of components, visual arm indication, and marking requirements. Component parts shall be dimensionally inspected for compliance with the applicable drawings.

5. PACKAGING

(This section is not applicable to this specification).

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6. NOTES:

6.1. Intended use: Igniter Mk 297 Mod-0 is intended for use in rocket motors for SIDEWINDER AIM9L Missile:

6.2. Ordering data. Procurement documents should specify the following:

6.2.1 Procurement requirements:

- a. Title, number, and date of this specification.
- b. If first article is required, and sample size if different from 4.4.1.
- c. Name and location of testing activity designated to evaluate the first article sample (4.4).
- d. Exceptions to documentary compliance, if applicable (3.2).
- e. Responsibility for inspection, if other than as specified in 4.1.
- f. Lot size (4.5.1).
- g. Invocation of MIL-C-45662 (4.3.2).

6.2.2 Data requirements. When this specification is used in a procurement which incorporates a DD Form 1423 and invokes the provisions of 7-104.9(n) of the Defense Acquisition Regulation, the data requirements identified below will be developed as specified by an approved Data Item Description (DID) (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of DAR-7-104.9(n) are not invoked, the data specified below will be delivered by the contractor in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraph:

<u>Paragraph</u>	<u>Data Requirement</u>	<u>Applicable DID</u>
4.4	Report, Test, First Article	DI-T-2072
4.5	Data, Lot Acceptance	DI-T-21471B

(Copies of data item description required by the contractors in connection with specific procurement functions should be obtained from the procuring activity of as directed by the contracting officer.)

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6.3 Advisory note. Sleeve inserts (steel) within the test chamber located opposite the holes in the igniter will prevent erosion of chamber wall, but compensation for the volume of the sleeves must be made.

6.4 First article. When a first article is required, it shall be tested and approved under the appropriate provisions of 7-104.55 of the Defense Acquisition Regulation. The first article shall consist of 22 units. The contracting officer shall include specific instructions in all procurement instruments, regarding arrangements for examinations, test and approval of the first article.

6.4.1 Supplemental testing. Static firings of Mk 36 Rocket Motors may be required at the discretion of the procuring activity.

6.5 Definitions

6.5.1 Zero time (T_0). T_0 is defined as the time that the current is applied to the initiator.

6.5.2 Delay time (T_1). The time required from zero time (T_0) until pressure rise is indicated.

6.5.3 Test chamber pressure, psig. The gage pressure which represents the difference between the absolute pressure and the local atmospheric pressure in the test chamber prior to firing and is expressed in pounds per square inch.

Preparing activity:
NAVY-AS

Project No. 1337-NO51

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. 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. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

MIL-I-85326(AS), Igniter, Rocket Motor, Mark 297 Mod.0

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER PA

 DIRECT GOVERNMENT CONTRACT SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

 YES NO (If "Yes", in what way?)

4. REMARKS

SUBMITTED BY (Printed or typed name and address - Optional)

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