UNCLASSIFIED

AD NUMBER
AD043040
CLASSIFICATION CHANGES
TO: unclassified
FROM: confidential
LIMITATION CHANGES
TO: Approved for public release, distribution unlimited
FROM: Distribution authorized to DoD only; Administrative/Operational Use; APR 1954. Other requests shall be referred to Arctic Test Branch, Army Field Offices, Seattle, WA.
AUTHORITY
30 Apr 1966, DoDD 5200.10; USAATC ltr, 23 Nov 1979

THIS PAGE IS UNCLASSIFIED

Armed Services Technical Information Agency

Because of our limited supply, you are requested to return this copy WHEN IT HAS SERVED YOUR PURPOSE so that it may be made available to other requesters. Your cooperation will be appreciated.

AD 430440

NOTICE: WHEN GOVERNMENT OR OTHER DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE U. S. GOVERNMENT THEREBY INCURS NO RESPONSIBILITY, NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

Reproduced by

DOCUMENT SERVICE CENTER

KNOTT BUILDING, DAYTON, 2, OHIO

CONFIDENTIAL

NOTICE: THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, U.S.C., SECTIONS 793 and 794. THE TRANSMISSION OR THE REVELATION OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

AD No. 43040
ASTIA FILE COPY

ASTIA

CONFIDENTIAL

OFFICE, CHIEF OF ARMY FIELD FORCES
Fort Monroe, Virginia

ATDEV-11 471/88(C)(13 Oct 54) 13 October 1954

SUBJECT: Army Field Forces Report of Board Nr 3, OCAFF, Project Nr 2601 (Arctic), Grenade, Hand, Fragmentation, M26 (DA Proj Nr 5-04-11-004)

TO: Assistant Chief of Staff, G3
Department of the Army
Washington 25, DC
ATTN: Org, RD Br, O&T Div

1. Inclosed is a copy of letter, ATBC 471.6 (P-2601)(Arctic), Board Nr 3, OCAFF, 24 September 1954, subject: "Report of Project Nr 2601 (Arctic), Grenade, Hand, Fragmentation, M26 (DA Proj Nr 5-04-11-004)," with Report of Army Field Forces Arctic Test Branch, 30 April 1954, subject: "Grenade, Hand, Fragmentation, M26."

2. This Office concurs in the conclusions contained in paragraph 5 of the Board Nr 3, OCAFF, letter and approves the recommendations contained in paragraph 6 thereof.

3. It is recommended that the production type Grenade, Hand, Fragmentation, M26, be considered suitable for use by Army Field Forces under Arctic winter conditions.

4. Field manuals and other pertinent publications will be modified by this Office to include instructions that Grenade, Hand, Fragmentation, M26, is ineffective under snow.

FOR THE CHIEF OF ARMY FIELD FORCES:

1 Incl
(Over)

P. C. CASPERSON
Major, AGC
Asst Adjutant General

CN 148940

54AA 64246

CONFIDENTIAL

1 Incl
Ltr, ATBC 471.6 (P-2601)(Arctic), Bd Nr 3, OCAFF, 24 Sep 54, subj: "Rept of Proj Nr 2601 (Arctic), Grenade, Hand, Frag, M26 (DA Proj Nr 5-04-11-004)," w/incl

14 OCT '54 PM
DISPATCHED
AFF DISTRIBUTION CENTER

Copies furnished:
CG, US Army, Alaska
CG, Third Army (w/o incl)
Comdt
US Marine Corps
The Infantry School
The Artillery School
Pres, Bds Nr 1; 2; 3(w/o incl); 4 and 5, OCAFF
Dir
Marine Corps Development Center
ASTIA
AFF LNO, APG, Md
CO, ATB, OCAFF (w/o incl)

CONFIDENTIAL

BOARD NUMBER 3
Office, Chief of Army Field Forces
Fort Benning, Georgia

ATBC 471.6 (P-2601)(Arctic)

SUBJECT: Report of Project Nr 2601 (Arctic), Grenade, Hand, Fragmentation, M26 (DA Project Nr-5-04-11-004)

TO: Chief of Army Field Forces
Fort Monroe, Virginia
ATTN: ATDEV-11

1. Reference is made to:

a. Report of Project Nr 2481, AFF Bd Nr 3, 21 Jul 52, Military Characteristics for Fragmentation Hand Grenade.

b. Tentative Report of Project Nr 2588, Bd Nr 3, OCAFF, 12 Feb 54, Check Test of M26 Fragmentation Hand Grenade.

2. Herewith Arctic Test Branch Report of Project Nr 2601 (Arctic), Arctic Test of Grenade, Hand, Fragmentation, M26, 30 April 1954.

3. An expedited service test (less the arctic phase) of the T38E1 fragmentation hand grenade was completed in February 1952 by Board Nr 3. The grenade was then classified as the standard fragmentation hand grenade, M26 by OCM Item 34232. Production models were delivered to ATB for the arctic service tests of the grenade.

4. This Board concurs in the conclusions and recommendations of the ATB report (Incl 1) which are restated below.

5. It is concluded that the production type Grenade, Hand, Fragmentation, M26 is suitable for Army Field Forces use under arctic winter conditions, but is ineffective when detonated under snow.

6. It is recommended that:

a. The production type Grenade, Hand, Fragmentation, M26 be considered suitable for use by Army Field Forces under arctic winter conditions

706A
148940
OCT 20 1954
54AA 64246
CONFIDENTIAL
COPY 16 OF 32 COPIES

ATBC 471.6 (P-2601)(Arctic) 24 SEP 1954
SUBJECT: Report of Project Nr 2601 (Arctic), Grenade, Hand, Fragmentation, M26 (DA Project Nr-5-04-11-004)

b. Field Manuals and other pertinent publications include instructions that Grenade, Hand, Fragmentation, M26, is ineffective under snow.

7. This report was coordinated with The Infantry School, Board Nr 2, OCAFF, The Artillery School, The Armored School, and the USMC Development Center. All agencies concurred or had no comment.

1 Incl
Rpt of Test P-2601 (Arctic),
30 Apr 54

CHARLES S. D'ORSA
Colonel, Infantry
President

DISTRIBUTION

Copy Nr.	
1-28	OCAFF, ATTN: ATDEV-11
29	CO, Arctic Test Branch, OCAFF
30	Board File
31	Retirement File
32	Library File

CONFIDENTIAL

REPORT

of the

ARMY FIELD FORCES ARCTIC TEST BRANCH

BIG DELTA, ALASKA

"Note: Distribution may be made by ASTIA to US Military Organizations only, and copies are not to be further distributed by them. Requests for this document (or report) by other than military organizations must be approved by (appropriate Department, Bureau, or other originator) prior to release."

PROJECT NO. 2601 (Arctic)

GRENADE HAND FRAGMENTATION M26

DATE 30 April 19[illegible]

7064

CONFIDENTIAL

148940

CONFIDENTIAL

ARCTIC TEST BRANCH
ARMY FIELD FORCES (AAU 8576)
APO 733, c/o Postmaster
Seattle, Washington

REPORT OF TEST - PROJECT NR 2601 (ARCTIC)
GRENADE, HAND, FRAGMENTATION, M26

1. AUTHORITY:

a. Directive: Ltr, ATBC 471.6 (P-2601), Board Nr 3, OCAFF, 28 Oct 53, subject: "Tentative Plan of Test of Project 2601, Arctic Test of M26 Hand, Fragmentation Grenade, (DA Project 504-11-004)."

b. Purpose: To determine the suitability of the production type M26 Hand Fragmentation Grenade for Army Field Forces use under arctic winter conditions.

2. REFERENCES:

a. AFF Board Nr 3, Report of Project Nr 2481, Military Characteristics for Fragmentation Hand Grenade, 21 July 52.

b. Board Nr 3, OCAFF, Tentative Report of Project Nr 2588, Check Test of M26 Fragmentation Hand Grenade, 12 Feb 54.

3. DESCRIPTION OF MATERIEL:

a. Test Item: The production Grenade, Hand Fragmentation, M26, hereafter referred to as the test grenade is a thin steel, ellipsoidal container loaded with approximately 7.5 ounces of composition B and wrapped with internal coils of .093-inch square steel wire. It weighs 15.85 ounces and is assembled with the M204A1 Fuze. It produces small, needle-like fragments. (Appendix B-1)

b. Control Item: The Grenade, Hand, Fragmentation MK II, hereafter referred to as the control grenade, is a Substitute Standard item. The body is made of serrated cast iron 1/8 to 1/4 inch thick and produces various size fragments when detonated. The grenade weighs 22.40 ounces. (Appendix B-1)

CONFIDENTIAL

706

148940

4. BACKGROUND:

a. In May 1946, the War Department Equipment Board established a requirement for an improved fragmentation hand grenade with selective combination time-impact fuze. It further required that this grenade be usable for both offensive and defensive combat and adaptable for use as a rifle grenade.

b. In 1948, AFF Bd Nr 3 recommended development of an interim grenade. Development of an interim grenade was initiated in January 1949, and resulted in the test item. This grenade employs a time burning fuze only.

5. SUMMARY OF TESTS:

a. Exposure to arctic winter conditions for a period of 14 days resulted in no apparent adverse effect on the test or control grenade. The test grenade produced approximately 2 to 4 times as many penetrating fragments as did the control grenade. (Test Nr 1, Appendix A)

b. Sixty feet was the radius of the lethal area of the test grenade, and seventy feet for the control grenade. (Test Nr 2, Appendix A)

c. The average maximum range of the test grenade when rifle-projected was 138 yards. The average maximum range of the control grenade was 123 yards. When using the M7 booster cartridge, the average maximum range of the test grenade was 165 yards and of the control grenade 144 yards. (Test Nr 3, Appendix A)

d. One test and two control grenades of 20 each fired during conduct of test were unstable in flight. (Test Nr 4, Appendix A)

e. Throwers wearing arctic handgear had difficulty pulling the pin of the grenade. Slightly greater hand throwing ranges were attained with the test grenade than with the control grenade. (Test Nr 5, Appendix A)

f. Five inches of snow reduced the fragmentation effect of the grenades, in some instances, 100% at 10 feet. (Test Nr 6, Appendix A)

g. Of 40 each test and control grenades fired during conduct of tests, no malfunctions occurred with the test grenade. Two control grenades failed to detonate. (Test Nr 7, Appendix A)

h. The average fuze time was 5.04 seconds for the test grenade and 4.94 seconds for the control grenade. (Test Nr 8, Appendix A)

6. **CONCLUSION:** The production type Grenade, Hand, Fragmentation, M26, is suitable for Army Field Forces use under arctic winter conditions, but is ineffective when detonated under snow.

7. **RECOMMENDATIONS:**

a. The production type Grenade, Hand, Fragmentation, M26, be considered suitable for use by Army Field Forces under arctic winter conditions.

b. Field Manuals and other pertinent publications include instructions that Grenade, Hand, Fragmentation, M26, is ineffective under snow.

James G. Harding

JAMES G. HARDING
Colonel, Artillery
Commanding

APPENDICES:

A - Details of Test
B - Photographs
C - Coordination

DISTRIBUTION:

2 - Board Nr 3, OCAFF
1 - CG, USARAL
1 - British Joint Services Mission (Army Staff)
1 - Canadian Army Staff
1 - United Kingdom Army Liaison Staff
1 - Chief, Naval Operations (OP-03D3)
1 - AFF Liaison Officer, Aberdeen Proving Ground
1 - File

ARCTIC TEST BRANCH
ARMY FIELD FORCES (AAU 8576)
APO 733, c/o Postmaster
Seattle, Washington

APPENDIX A - DETAILS OF TEST
REPORT OF TEST - PROJECT NR 2601 (ARCTIC)

Test Nr 1

1. PURPOSE: To determine the effect of exposure to arctic weather on the test and control item.

2. METHOD:

a. Ten each test and control grenades in their service packing, and ten each ready for immediate use, were exposed to the elements for a two-week period that included a snowfall of 4 to 6 inches and temperatures as low as -25°F.

b. At the completion of the exposure period, an inspection of the grenades and containers was made to determine any damage or irregularities.

c. Five of each type grenade conditioned as in par 2a, were statically detonated at ground level and at the common center of two opposing semicircular six-foot-high panels. One semicircle had a 15-foot radius and consisted of one-inch pine boards. The other had a 60-foot radius and consisted of frames for "A" targets and interspersed pine panels three feet wide.

d. Grenades were detonated with the long axis parallel to the ground and the fuze oriented on various axes.

e. The number of penetrations and perforations above and below the three-foot level were counted and recorded.

f. Only fragments passing completely through the panels were recorded as perforations.

g. Fuze burning time was recorded.

3. RESULTS:

a. There was no apparent damage or irregularities to either type grenade or the containers as a result of outside storage.

b. The average fragmentation effect of five test and control grenades conditioned as in par 2a, when detonated at temperatures from -15°F to -30°F, was:

TEST GRENADE

HOW EXPOSED	PENETRATIONS				PERFORATIONS			
	15' Radius		60' Radius		15' Radius		60' Radius	
	Above 3' Lev	Below 3' Lev	Above 3' Lev	Below 3' Lev	Above 3' Lev	Below 3' Lev	Above 3' Lev	Below 3' Lev
In Service Packing	706	1229	89.2	75.2	49.6	71	.4	0
Immediate Use	886.4	1387	100.5	72	57.8	81.2	.4	.2

CONTROL GRENADE

HOW EXPOSED	PENETRATIONS				PERFORATIONS			
	15' Radius		60' Radius		15' Radius		60' Radius	
	Above 3' Lev	Below 3' Lev	Above 3' Lev	Below 3' Lev	Above 3' Lev	Below 3' Lev	Above 3' Lev	Below 3' Lev
In Service Packing	319	621	91	55	12	17	.6	.4
Immediate Use	350	659	62	42	12	29	.6	.2

c. The above table shows that the test grenade produced approximately twice as many penetrating fragments at 15' and approximately 4 times as many perforating fragments as did the control grenade.

d. The average fuze burning time for the test and control grenades were:

Exposed in Service Packing		Exposed Ready for Immediate Use	
Test	Control	Test	Control
5.1 sec	4.9 sec	5.1 sec	5.0 sec

Test Nr 2

1. PURPOSE: To determine the comparative lethal area for the test and control grenades.

2. METHOD:

a. This test was conducted concurrently with Test Nr 1.

b. The irregularly spaced one-inch pine panels on the sixty-foot radius semicircle were checked for perforations.

c. Additional panels were placed at greater distances and were checked for perforations.

3. RESULTS:

a. A total of 5 perforations with the test grenade and 9 perforations with the control grenade were obtained on the pine panels at a range of sixty feet.

b. The test grenade produced more casualty-producing fragments than the control grenade at ranges of 15 and 60 feet.

c. No perforations were obtained at a range of seventy feet with the test grenade. 4 perforations were obtained with the control grenade.

Test Nr 3

1. PURPOSE: To determine the comparative maximum range attainable with the test and control grenade when weapon-projected.

2. METHOD:

a. Ten each test and control grenades were projected from an M1 rifle mounted in a machine rest. The M7A3 grenade launcher and M1A2 grenade projection adapter were used. Firing was conducted using the

rifle grenade cartridge, Cal. 30, M3, and repeated using the booster cartridge M7. Grenades were fired prior to actual test to determine an elevation to produce near ground bursts.

b. Maximum, average, and minimum ranges with each type grenade in each phase were recorded.

c. Time in flight was recorded.

d. Difficulties encountered while placing the grenade in the adapter were noted.

3. RESULTS:

a. Approximate ranges in yards attained: (temperatures were -30° to -35°F)

	TEST GRENADE		CONTROL GRENADE	
	46° Elevation w/o Booster	36° Elevation w/M7 Cartridge	46.8° Elevation w/o Booster	40.6° Elevation w/M7 Cartridge
Max Range	146	180	130	162
Min Range	127	146	116	104
Av Range	138.3	165	123	144

b. The average time in flight was 5.1 seconds for the test grenade and 4.92 seconds for the control grenade. One of each type grenade failed to detonate because of a malfunction in the projection adapter.

c. No difficulties were encountered in placing the grenade in the adapters.

Test Nr 4

1. PURPOSE: To determine the comparative trajectory and stability in flight of the grenades.

2. METHOD: During the conduct of Test Nr 3, the comparative trajectory and stability of the test and control grenades in flight were observed.

3. RESULTS:

a. The trajectories of the test and control grenades were similar.

b. One test and two control grenades of 20 each fired, were unstable in flight.

Test Nr 5

1. PURPOSE: To determine the comparative adaptability for hand-throwing of the test and control grenades.

2. METHOD:

a. Five men of different physical make-up prepared and threw five practice test and control grenades from the standing and prone positions while attired in various uniforms of typical arctic clothing and handgear.

b. Difficulties encountered in preparing the grenades, the ranges attained, and the accuracy were recorded.

c. Additional precautions appropriate for throwing with arctic handgear were noted.

3. RESULTS:

a. The thrower had difficulty pulling the safety pin while wearing arctic handgear.

b. Average throwing distances, in yards, measured from the throwing line to the position of the thrown grenades were:

Uniform	Handgear	Position	Test	Control
Field Jacket M1951 w/Liner	Inserts M1948	Prone	20	19
		Standing	40	33
Field Jacket M1951 w/Liner	Mittens M1949 w/inserts M1948	Prone	19	17
		Standing	35	32

Field Jacket M1951 w/Liner; Parka M1951 w/Liner	Inserts M1948	Prone	18	18
		Standing	36	31
Field Jacket M1951 w/Liner; Parka M1951 w/Liner	Mittens w/inserts M1948	Prone	17	16
		Standing	31	31

c. Arctic clothing and handgear had no great effect on the throwers accuracy, but did reduce ranges attained.

d. Because manual dexterity of the thrower was reduced by arctic handgear, extreme caution was necessary to prevent accidental release of the safety lever while removing the safety pin.

Test Nr 6

1. PURPOSE: To determine the effect of various types of snow on the functioning of the test and control items.

2. METHOD:

a. Five each test and control grenades were statically detonated at various depths in fresh-fallen and wind-blown crusted snow. Inert grenades were thrown prior to the test to determine the depth of snow and thickness of crust that the grenades would penetrate.

b. The grenades were detonated at the center of a target area of 6 concentric circles, 7½ feet apart, each consisting of 12 targets to represent prone and kneeling figures. The radius of the inner circle was 10 feet. Fragmentation data was recorded.

3. RESULTS:

a. Fragmentation effect in fresh fallen snow: (temperature -10°F)

			NUMBER OF HITS						
Rd Nr	Type Grenade	Depth in Snow	1st* Circle	2nd Circle	3rd Circle	4th Circle	5th Circle	6th Circle	Total
1	Test	On Top	62	24	3	3	4	0	96
	Control	On Top	6	11	3	3	0	0	23

2	Test	2 inches	18	13	3	1	0	0	35
	Control	2 inches	2	7	1	0	0	0	10
3	Test	3 inches	1	5	0	0	1	1	8
	Control	3 inches	2	4	2	0	0	0	8
4	Test	3½ inches	4	6	13	0	0	0	29
	Control	3½ inches	2	0	1	0	0	0	3
5	Test	5 inches	2	6	2	1	0	0	11
	Control	5 inches	1	5	0	0	0	0	6

b. Fragmentation effect in wind-blown crusted snow at a temperature of -10°F:

NUMBER OF HITS

Rd Nr	Type Grenade	Depth in Snow	1st* Circle	2nd Circle	3rd Circle	4th Circle	5th Circle	6th Circle	Total
1	Test	On Top	133	55	30	5	7	1	231
	Control	On Top	30	17	3	5	1	0	56
2	Test	½ inch	86	32	29	6	12	1	166
	Control	½ inch	15	15	9	2	5	0	46
3	Test	1½ inches	0	0	0	0	0	0	0
	Control	1½ inches	0	0	0	0	0	0	0
4	Test	3 inches	0	0	0	0	0	0	0
	Control	3 inches	0	0	0	0	0	0	0
5	Test	5 inches	0	0	0	0	0	0	0
	Control	5 inches	0	0	0	0	0	0	0

* Prone type silhouettes. All other circles consisted of kneeling type silhouettes.

Test Nr 7

1. PURPOSE: To determine the comparative reliability of the test and control items.

2. METHOD: During the conduct of all tests, malfunctions and unusual occurrences were noted.

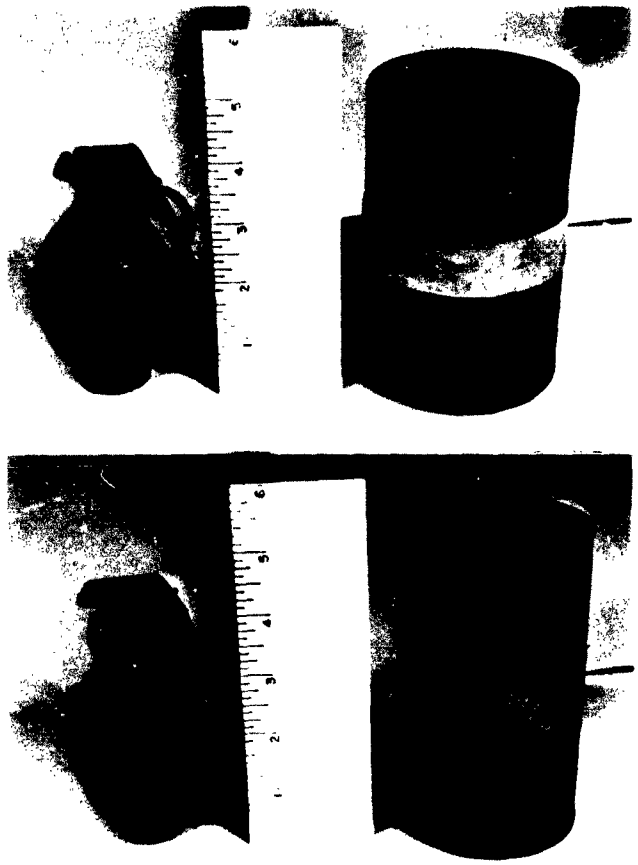
3. RESULTS: Of the 40 test and control grenades fired during conduct of tests, two control grenades failed to detonate. There were no malfunctions with the test grenade.

Test Nr 8

1. PURPOSE: To determine the effect of winter arctic conditions on the fuzes of the test and control items.

2. METHOD: The fuze burning time of the grenades was checked with a stop watch whenever possible throughout the conduct of all tests.

3. RESULTS: The fuze burning time averaged 5.04 seconds for the test grenade and 4.94 seconds for the control grenade.



ARMY FIELD FORCES ARCTIC TEST BRANCH BIG DELTA, ALASKA

PAGE NR	PROJECT NR	DATE	NEGATIVE NR
B-1	2601 (ARCTIC)		54-3-1122 54-3-1124

TOP. GRENADE, HAND, FRAGMENTATION, M26, AND CONTAINER
BOTTOM: GRENADE, HAND, FRAGMENTATION, MK II AND CONTAINER

CONFIDENTIAL

ARCTIC TEST BRANCH
ARMY FIELD FORCES (AAU 8576)
APO 733, c/o Postmaster
Seattle, Washington

APPENDIX C - COORDINATION
REPORT OF TEST - PROJECT NR 2601 (ARCTIC)

1. The following agencies have been furnished copies of this report:

a. Commanding General, U. S. Army, Alaska

b. British Joint Services Mission (Army Staff)

c. Canadian Army Staff

d. United Kingdom Army Liaison Staff

e. Chief, Naval Operations (OP-03D3)

f. AFF Liaison Officer, Aberdeen Proving Ground.

2. Comments from the Commanding General, USARAL, will be forwarded when received.

CONFIDENTIAL