CONFIDENTIAL

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND, MARYLAND 21005

S: 30 Sep 68

SMYAC CJ 4420-68

AMSTE-BC

6 SEP 1968

SUBJECT: Safety Certification of Rifle Grenades for the M16 Rifle

Commanding Officer
Aberdeen Proving Ground
ATTN: STEAP-MT
Aberdeen Proving Ground, Md 21005

1. Reference, message, USAMUCOM, subject as above, dated 29 August 1968, CITE CONFIDENTIAL AMSMU-RE-M, 08-1915, inclosure 1.

2. In order to accommodate USAMUCOM request for expeditious scheduling and completion of safety certification of subject grenades, safety certification referred to in paragraph 1a, reference 1, is interpreted to mean the capability of a firer to launch subject grenades without injury to self.

3. Remaining portions of test pertaining to environmental suitability, reliability and functioning will be conducted as currently scheduled.

4. HQ, APG, will provide HQ, USATECOM, ATTN: AMSTE-BC, with necessary information to permit this headquarters to comply with paragraph 1D, reference 1, NLT 30 Sep 68.

FOR THE COMMANDER:

LeROY S. STANLEY
Colonel, GS
Dir, Inf Mat Test Dir

1 Incl
as

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REGRADED UNCLASSIFIED
WHEN SEPARATED FROM
CLASSIFIED INCLOSURES

Mr. G. Hendricks/em/895-3350-4634

18 OCT 1968

STEAP-MT-TI

SUBJECT: Safety Evaluation of Grenades with M16A1 Rifle, USATECOM Project Nos. 8-7-0210-02 and 8-4-0210-07

Commanding General
U. S. Army Test and Evaluation Command
ATTN: AMSTE-BC

1. References:

a. Letter, AMSTE-BC, 6 September 1968, Subject: Safety Certification of Rifle Grenades for the M16 Rifle.

b. Approved Test Plan Outline for Safety Evaluation of Various Grenades and Signals Fired From the M16A1 Rifle.

2. An evaluation has been made of the safety aspects of launching from the M16A1 rifle the various types of grenade, signal, and illuminating ammunition (hereafter referred to as grenades), identified in the inclosed test data. In accordance with reference 1a, the evaluation covered only the launching operation and did not consider reliability of the items or system for tactical employment as is set forth in the test plan for the over-all program, reference 1b.

3. Pertinent results and observations are contained in Inclosure 1. On the basis of these, it is recommended that:

a. The M19A2 and M64 grenade types be regarded as incompatible with the M16A1 rifle/XM195 cartridge system and unsafe for use in any application involving launching the grenades from the M16A1 rifle.

b. Exclusive of the M19A2 and M64, and under the provisions of paragraph c and d below, any of the grenade types listed in Inclosure 1 be considered safe to launch from an M16A1 rifle fitted with a closed-end flash suppressor and grenade-retainer spring (part no. 62323) of the type employed in these firings.

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c. It be considered unsafe to launch any of the grenades from the M16A1 rifle with the rifle body-supported in any manner (i.e. variations of the hip, underarm, or shoulder position); additionally, to reduce occurrences of stock breakage, the rifle butt should not be supported against surfaces or objects offering greater resistance than approximately that of a sandbag.

d. The user adhere to appropriate provisions of the TM 9-1330-200 and FM23-30 with regard to handling, assembly of the grenades to the rifle, and procedures for launching.

FOR THE COMMANDER:

1 Incl
as

R. P. WITT
Associate Director
Materiel Test Directorate
(Formerly Development and Proof Services)

TEST DATA

A. Method of Test

A grenade retaining spring (GRS), part number 62323, was assembled on each of the rifles. The design of the GRS permits a more positive retention of the rifle grenade or grenade adapter when assembled to the rifle.

Rifles were equipped with minimum and maximum outside diameter flash suppressors (serves as grenade launcher), and the XM195 grenade cartridge, Lot LC 12000, was used.

All firing was at normal ambient temperature. Velocity was recorded for the lightest and heaviest type grenades fired (MK1 and M14, respectively) to provide data for calculation of recoil energy.

In order to minimize stock breakage commonly associated with launching of grenades from the M16A1 rifle, fixed-rest firings were accomplished with the rifles installed in a spring-loaded mount; firings with the weapon hand held were conducted with the buttstock resting against a sandbag. Reference is made to Aberdeen Proving Ground Firing Record No. S-46549 in which it is reported that launching grenades from M16A1 rifles with stocks supported on hard surfaces frequently resulted in broken stocks.

The number and types of grenades launched in test follows:

No. of Rounds Fired	Type		Lot No.
21	MK1	Illuminating hand grenade	20-C-68
20	M14	Incendiary hand grenade	PB 4389-12
20	M30	Practice hand grenade	PA-E-57646
20	M27	Illuminating rifle grenade	Low-500-1
7	M19A2	Parachute rifle grenade	PXC-5-14
7	M64	Signal ground smoke rifle grenade	CCG-2-7
20	AN-M8	Smoke HC hand grenade	2013-75-1035
20	M18	Smoke hand grenade	1028-56-7005
20	M31	HE-AT rifle grenade (inert filled)	LS 35-7
10	M26A1	Fragmentation hand grenade (with fuze M204A2)	LS 48-5
20	M34	WP smoke (with fuze M206A2)	EA-1-1

TEST DATA (continued)

The configuration of the M30 grenade closely simulates the M26A1; therefore, firing was limited to 10 rounds of the M26A1. With exception of inert filling of the M31 grenade, all grenades contained standard charges.

B. Results

No safety hazards were detected in firing M193 ball ammunition without cleaning the rifle, following the firing of a series of grenades.

The calculated recoil energy from firing the lightest and heaviest grenades in the test was, respectively, 73 and 136 foot pounds. These values are in excess of the upper range of recoil energy (i.e., 60 foot pounds) covered in TECP 700-700, interim pamphlet 20-05 dated 12 July 1967, and indicate that the launching of any of the types of grenades considered in these firings from the M16A1 rifle is potentially hazardous if the weapon is body supported in regard to recoil.

After launching 37 grenades from one rifle the GRS failed to retain the grenade on the rifle when the rifle was tilted muzzle downward, and the GRS on another rifle was broken after launching 72 grenades.

In assembly of grenades to M1A2 adapters, the safety lever is forced against the safety pin, thereby creating excessive resistance on the pin. The safety pin then requires such force in removal that the grenade can be pulled out of the adapter prongs. Displacement of the grenade can be prevented by firmly grasping the grenade and retaining claws during removal of the safety pin.

In this test only the M26A1, one of three models of the M26 series, was fired. According to TM-9-1330-200, page 2-4, the fuzes in the M26 series differ among models in physical detail as to shape of body and shape of the safety lever. Differences in configuration may render a particular model of grenade incompatible with the M1A2 adapter.

The stabilizer tubes on all M19A2 and M64 rifle grenades ruptured simultaneously with launching from rifles, using both maximum and minimum diameter suppressors. Fragments of the stabilizer tubes were randomly expelled in a manner to present possible hazards to the firer or persons adjacent to the weapon. The body portion of the grenades impacted far short of intended range. Several M19A2 and M64 grenades were then launched using rifles with maximum and minimum diameter suppressors, but without the GRS assembled. The grenades fitted loosely on the flash suppressor, particularly on the minimum-diameter suppressor. All of these grenades ruptured similar to those fired with the retainer spring except that the fin assembly of one M64 grenade fired from a minimum-diameter suppressor remained on the rifle after rupture of the stabilizer tube.