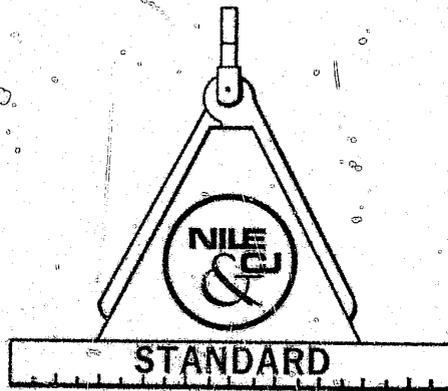


NILECJ-STD-0103.00  
MAY 1974

**LAW ENFORCEMENT STANDARDS PROGRAM**

**PORTABLE BALLISTIC SHIELDS**



13316

**U.S. DEPARTMENT OF JUSTICE**  
**Law Enforcement Assistance Administration**  
**National Institute of Law Enforcement and Criminal Justice**

**LAW ENFORCEMENT STANDARDS PROGRAM**

**NILECJ STANDARD  
FOR  
PORTABLE BALLISTIC SHIELDS**

**A Voluntary National Standard Promulgated by the  
National Institute of Law Enforcement and Criminal Justice**

**MAY 1974**

**U.S. DEPARTMENT OF JUSTICE  
Law Enforcement Assistance Administration  
National Institute of Law Enforcement and Criminal Justice**

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**ACKNOWLEDGMENTS**

This standard was formulated by the Law Enforcement Standards Laboratory of the National Bureau of Standards under the direction of Ronald C. Dobbyn, Protective Equipment Program, and Jacob J. Diamond, Chief of LESL. The technical research was performed by Nicholas J. Calvano, project leader, Jack Gorman, and other personnel of the NBS Measurement Engineering Division. Linda K. Smith typed the final manuscript and assisted with the editing and copy preparation.

**NILECJ Standard  
for  
Portable Ballistic Shields**

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## FOREWORD

Following a Congressional mandate\* to develop new and improved techniques, systems, and equipment to strengthen law enforcement and criminal justice, the National Institute of Law Enforcement and Criminal Justice (NILECJ) has established the Law Enforcement Standards Laboratory (LESL) at the National Bureau of Standards. LESL's function is to conduct research that will assist law enforcement and criminal justice agencies in the selection and procurement of quality equipment.

In response to priorities established by NILECJ, LESL is (1) subjecting existing equipment to laboratory testing and evaluation and (2) conducting research leading to the development of several series of documents, including national voluntary equipment standards, user guidelines, state-of-the-art surveys and other reports.

This document, NILECJ-STD-0103.00 for *Portable Ballistic Shields*, is a law enforcement equipment standard developed by LESL and approved and issued by NILECJ. Additional standards as well as other documents will be issued under the LESL program in the areas of protective equipment, communications equipment, security systems, weapons, emergency equipment, investigative aids, vehicles and clothing.

This equipment standard is a technical document, consisting of performance and other requirements together with a description of test methods. Equipment which can meet these requirements is of superior quality and is suited to the needs of law enforcement agencies. Purchasing agents can use the test methods described in this standard to determine first-hand whether a particular equipment item meets the requirements of the standard, or they may have the tests conducted on their behalf by a qualified testing laboratory. Law enforcement personnel may also reference this standard in purchase documents and require that any equipment offered for purchase meet its requirements and that this compliance be either guaranteed by the vendor or attested to by an independent testing laboratory.

The necessary technical nature of this NILECJ standard, and its special focus as a procurement aid, make it of limited use to those who seek general guidance concerning portable ballistic shields. The NILECJ Guideline Series is designed to fill that need. We plan to issue guidelines to this as well as other law enforcement equipment as soon as possible, with the constraints of available funding and the overall NILECJ program.

The guideline documents to be issued are highly readable and tutorial in nature in contrast to the standards, which are highly technical, and intended for laboratory use by technical personnel. The guidelines will provide, in nontechnical language, information for purchasing agents and other interested persons concerning the capabilities of equipment currently available. They may then select equipment appropriate to the performance required by their agency. Recommendations for the development of particular guidelines should be sent to us.

NILECJ standards are subjected to continuing review. Technical comments and recommended revisions are invited from all interested parties. Suggestions should be addressed to the Program Manager for Standards, National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Administration, U.S. Department of Justice, Washington, D.C. 20530.

Gerald M. Caplan, Director  
National Institute of Law Enforcement  
and Criminal Justice

\* Section 402(b) of the Omnibus Crime Control and Safe Streets Act of 1968, as amended.

# NILECJ STANDARD for PORTABLE BALLISTIC SHIELDS

## 1. PURPOSE AND SCOPE

The purpose of this document is to establish performance requirements and a method of test for the ballistic resistance of portable ballistic shields intended to protect against gunfire.

## 2. CLASSIFICATION

Table 1 summarizes the protection afforded by the various types of shields.

### 2.1 Type .22 LR—.38 Special

This shield protects against the standard threats as defined in paragraph 4.1.1. It also provides protection against lesser threats such as caliber .22, .25, .32, and .45 standard handgun rounds and 12 gauge No. 4 shot.

### 2.2 Type .41 Magnum

This shield protects against the standard threat as defined in paragraph 4.1.2. It also provides protection against lesser threats such as 9 mm Luger, .357 Magnum and 12 gauge 00 buckshot, as well as the threats mentioned in paragraph 2.1.

### 2.3 Type .30 Carbine

This shield protects against the standard threat as defined in paragraph 4.1.3. It also provides protection against lesser threats such as caliber .44 Magnum, and the 12 gauge rifled slug, as well as the threats mentioned in paragraphs 2.1 and 2.2.

Protection Afforded by Portable Ballistic Shields

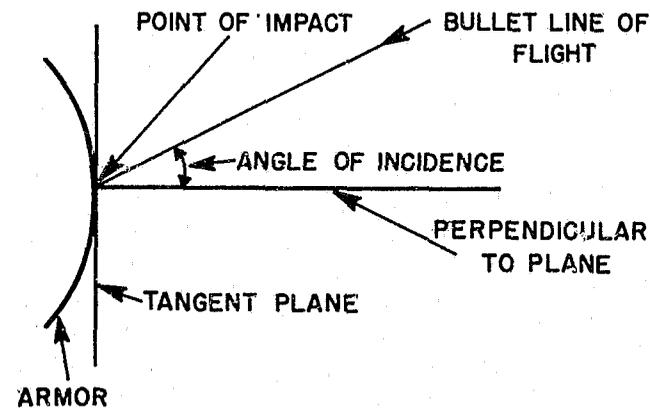
Threat	Protection afforded		
	Type .22 LR - .38 Spec Shield	Type .41 Magnum Shield	Type .30 Carbine Shield
.22 LRHV (R) .....	Yes	Yes	Yes
.38 Special lead .....	Yes	Yes	Yes
.22 LRHV (P) .....	Yes	Yes	Yes
.25 ACP .....	Yes	Yes	Yes
.32 ACP .....	Yes	Yes	Yes
.45 ACP .....	Yes	Yes	Yes
12 gauge #4 shot .....	Yes	Yes	Yes
.41 Magnum SP .....	No	Yes	Yes
.357 Magnum .....	No	Yes	Yes
9 mm Luger FMJ .....	No	Yes	Yes
12 gauge 00 BK .....	No	Yes	Yes
.30 Carbine FMJ .....	No	No	Yes
.44 Magnum .....	No	No	Yes
12 gauge RS .....	No	No	Yes

Abbreviations: ACP—automatic Colt pistol  
 BK—buckshot  
 FMJ—full metal jacketed  
 LRHV—Long Rifle High Velocity  
 (P)—pistol  
 (R)—rifle  
 RS—rifled slug  
 SP—soft point

3. DEFINITIONS

3.1 Angle of Incidence

The angle between the line of flight of a bullet and the perpendicular to the plane tangent to the point of impact (see figure 1).



ANGLE OF INCIDENCE

FIGURE 1

3.2 Fair Hit

A hit that impacts the shield at an angle of incidence no greater than 5 degrees, and is at least 50 mm (2 inches) from a prior hit or the edge of the shield.

3.3 Full Metal Jacketed Bullet

A lead alloy bullet covered completely, except for the base, with gilding metal (90 percent copper alloy).

3.4 Penetration

Perforation of a witness plate by any part of the test specimen or test bullet, as determined by the passage of light when the witness plate is held up to a 60 watt light bulb.

3.5 Soft Point Bullet

A lead alloy bullet covered completely, except for the tip, with gilding metal.

3.6 Witness Plate

A 0.5 mm (0.020 in) thick sheet of type 2024-T3 or 2024-T4 aluminum alloy placed behind a test specimen to serve as a means of determining penetration.

4. REQUIREMENTS

4.1 Ballistic Resistance

The ballistic resistance test variables and test requirements are summarized in table 2.

4.1.1 Type .22 LR—.38 Special

Each shield shall be tested for resistance to ballistic penetration in accordance with Section 5 until it has been impacted with ten fair hits by caliber .22 LRHV lead rounds with nominal weights of 2.6 grams (40 grains) and with measured velocities equal to or greater than 360 meters (1181 feet) per second. Penetration by any fair hit, no matter what its velocity, shall constitute failure.

If the shield passes the test, it shall be retested with caliber .38 Special lead rounds with nominal weight of 10.2 grams (158 grains) and with measured velocities equal to or greater than 238 meters (782 feet) per second. Penetration by any one of ten fair hits shall constitute failure.

4.1.2 Type .41 Magnum

Each shield shall be tested for resistance to ballistic penetration in accordance with Section 5 until it has been subjected to ten fair hits by caliber .41 Magnum soft point rounds with nominal weights of 13.6 grams (210 grains) and with measured velocities equal to or greater than 393 meters (1289 feet) per second. Penetration by any fair hit shall constitute failure.

TABLE 2. Test Summary

Shield Type	Cartridge	Nominal Bullet Weight	Suggested Barrel Length	Test Requirements		
				Minimum Bullet Velocity	Fair Hits	Penetrations
.22 LR-.38 Spec .....	.22 LRHV (R) Lead	2.6 g 40 gr	56 cm 22 in	360 m/s 1181 ft/s	10	0
	.38 Spec. Lead	10.2 g 158 gr	15-16.5 cm 6-6.5 in	238 m/s 782 ft/s	10	0
.41 Magnum .....	.41 Magnum SP	13.6 g 210 gr	15-16.5 cm 6-6.5 in	393 m/s 1289 ft/s	10	0
	.30 Carbine FMJ	7.1 g 110 gr	46 cm 18 in	580 m/s 1903 ft/s	10	0

Abbreviations: FMJ—full metal jacketed  
g—grams  
gr—grains  
LRHV—Long Rifle High Velocity  
(R)—rifle  
SP—soft point  
Spec—Special

#### 4.1.3 Type .30 Carbine

Each shield shall be tested for resistance to ballistic penetration in accordance with Section 5 until it has been subjected to ten fair hits by caliber .30 Carbine full metal jacketed rounds with nominal weights of 7.1 grams (110 grains) and with measured velocities equal to or greater than 580 meters (1903 feet) per second. Penetration by any fair hit shall constitute failure.

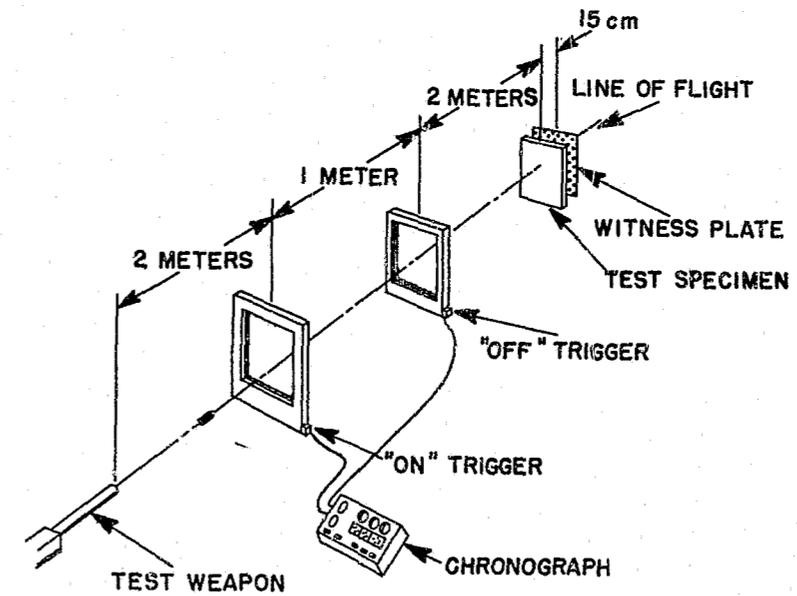
#### 4.2 Workmanship

Shields shall be free from dents, blisters, cracks, crazing, chipped or sharp corners, and other evidences of inferior workmanship.

#### 4.3 Marking

Each shield shall be clearly marked with the manufacturer's name, brand name or logo, month and year of manufacture, the model number, and the type of shield, according to Section 2 of this standard.

### 5. TEST METHOD



BALLISTIC PENETRATION TEST SETUP

FIGURE 2

A diagram of the test setup is shown in figure 2.

## 5.1 Test Equipment

### 5.1.1 Test Weapon and Ammunition

#### 5.1.1.1 Type .22 LR—.38 Special

Two test weapons shall be used. The first weapon shall be a caliber .22 rifle. The use of a rifle with a 56 cm (22 in) barrel is suggested. Test bullets shall be caliber .22 Long Rifle High Velocity lead having nominal weights of 40 grains and nominal muzzle velocities of 1280 feet per second.

The second weapon shall be a test barrel or a handgun capable of firing caliber .38 Special rounds. The use of a handgun with a barrel length of 15 to 16.5 cm (6 to 6.5 in) is suggested. Test bullets shall be caliber .38 Special lead having nominal weights of 158 grains and nominal muzzle velocities of 850 feet per second.

#### 5.1.1.2 Type .41 Magnum

The test weapon shall be a caliber .41 Magnum test barrel or a revolver with a suggested barrel length of 15 to 16.5 cm (6 to 6.5 in). The test bullets shall be caliber .41 Magnum soft point having nominal weights of 210 grains and nominal muzzle velocities of 1500 feet per second.

#### 5.1.1.3 Type .30 Carbine

The test weapon shall be a caliber .30 test barrel or a carbine with a suggested barrel length of 46 cm (18 in). The test bullets shall be full metal jacketed caliber .30 Carbine having nominal weights of 110 grains and nominal muzzle velocities of 1980 feet per second.

### 5.1.2 Test Weapon Support

The test weapon shall be firmly supported, with the barrel horizontal, in such a manner that the alignment of the weapon is not altered by discharging the weapon.

### 5.1.3 Chronograph

A chronograph is used to measure the time interval between the bullet's activation of the first and second triggering devices and shall have a precision of one microsecond and an accuracy of two microseconds.

### 5.1.4 Triggering Devices

Two triggering devices which serve respectively to start and stop a chronograph are required. They may be of either the photoelectric or conductive screen type.

### 5.1.5 Shield Support

The shield under test shall be supported in a device which permits its position and attitude to be readily adjusted so that it is perpendicular to the line of flight of the bullet at the point of impact.

### 5.1.6 Witness Plate

The witness plate shall be placed and rigidly affixed perpendicular to the line of flight of the bullet and 15 cm (6 in) beyond the shield under test.

## 5.2 Test Procedure

Place the triggering devices two and three meters (6.6 and 9.8 feet), respectively, from the muzzle of the test weapon and arrange them so that they define planes perpendicular to the line of flight of the bullet. Measure the distance between them with an accuracy of 1.0 mm (0.04 in). Use the time of flight and distance measurements to calculate the velocity of each test round.

After the specified test weapon has been supported, leveled and positioned, fire one or more pre-test rounds (as needed) through a witness plate to determine the point of impact.

Place the shield under test in the shield support and position it five meters (16 feet) from the muzzle of the test weapon. Then position an unperforated witness plate 15 cm (6 in) beyond the test shield. Fire a test round and record the time of flight of the bullet as measured by the chronograph. Examine the witness plate to determine penetration, and examine the shield specimen to see if the bullet made a fair hit.

If no penetration occurred, reposition the shield or position another shield specimen (as required) and repeat the procedure with additional test rounds until the test is completed. Space the hits as evenly as possible in order that every portion of the shield be subject to test.

**END**