



Republic of the Philippines
NATIONAL POLICE COMMISSION
NATIONAL HEADQUARTERS PHILIPPINE NATIONAL POLICE
OFFICE OF THE CHIEF, PNP
Camp BGen. Rafael T Crame, Quezon City

MAY 06 2021

MEMORANDUM CIRCULAR

NO.: 2021 - 048

**TEST PARAMETERS IN THE CONDUCT OF TEST AND EVALUATION
OF STAND ALONE PLATE LEVEL III**

1. REFERENCES:

- a. Republic Act No. 9184 entitled: "An Act Providing for the Modernization, Standardization and Regulation of the Procurement Activities of the Government and for other Purposes and its Revised Implementing Rules and Regulations (RIRR);
- b. NAPOLCOM Resolution No. 2019 – 433 entitled: "Approving the PNP-UESB Resolution No. 2019-006 dated January 2019 that Prescribes the Minimum Standard Specifications for Stand Alone Plate Level III";
- c. U.S. Department of Justice National Institute of Justice (NIJ) Ballistic Resistant Protective Materials (NIJ Standard 0108.01 September 1985);
- d. Ballistic Resistance of Body Armor NIJ Standard – 0101.06 (July 2008);
- e. Military Standard: Sampling Procedures and Tables for Inspection and Attributes (MIL – STD – 105E), May 10, 1989 Revised, USA;
- f. Honeycomb in Hybrid Composite Armor Resisting Dynamic Impact by Advait Bhat, Bachelor of Science in Mechanical Engineering University of Mumbai Mumbai, Maharashtra, India 2007; and
- g. PNP-UESB No. 2019-006 "Proposed Minimum Standard Specifications for Stand Alone Plate Level III".

2. RATIONALE:

- a. To establish test and evaluation procedures during post qualification and acceptance tests for Ballistic Plate Level III;
- b. To determine whether the particular Stand Alone Plate Level III design meets or exceeds the performance standards and test methods identified in these guidelines; and
- c. To ensure compliance and conformity to the approved NAPOLCOM Standard Specifications of the Stand Alone Plate Level III.

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2. SITUATION:

PNP personnel in the field, particularly from the maneuver units, had determined variety of choices for the hard armor protection pertaining to comfortability, mobility, and concealability.

In the past, PNP personnel typically used Level IV in conjunction with body armor vest which is bulky and heavy. Today, some countries use hard plates (Level III and IV) that are normally inserted into designed carrier to provide maximum comfort and mobility during tactical operations.

4. PURPOSE:

This Memorandum Circular (MC) sets forth the policy guidelines, procedures, and test parameters in the conduct of functional test and evaluation of Stand Alone Plate Level III during Post-Qualification and Acceptance as required in every procurement activity.

5. DEFINITION OF TERMS:

For purposes of this PNP MC, the following terms shall mean:

- a. **Acceptance Testing** – refers to a test conducted in evaluating properties of one or more items to determine if the requirements or specifications included in the contract are met. It may involve physical tests (visual and dimensional), chemical tests (laboratory tests), and/or performance tests.
- b. **Angle of Incidence** – refers to the angle between the line of flight of the bullet and the perpendicular to the plane tangent to the point of impact. Also known as angle of obliquity.
- c. **Aramid Fabric** – refers to a class of heat-resistant and strong synthetic fibers. They are used in aerospace and military application, for ballistics rated body armor fabric and ballistic composite.
- d. **Ballistic** – refers to the science of mechanics that deals with the launching, flight, behavior, and effects of projectiles, especially bullets, gravity bombs, rockets, or the like; the science or art of designing and accelerating projectiles so as to achieve a desired performance.
- e. **Back Face Signature (BFS)** – refers to the greatest extent of indentation in the backing material caused by a non-perforating impact on the armor. The BFS is the perpendicular distance between two planes, both of which are parallel to the front surface of the backing material fixture.
- f. **Backing Material** – refers to a homogenous block of non-hardening, oil-based modeling clay placed in contact with the back of the armor panel during ballistic testing.


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- g. **Backing Material Fixture** – refers to a box-like rigid frame, with removable back, which contains the backing material. The removable back is used for perforation-backface signature testing but is not used for ballistic limit testing.
- h. **Bids and Awards Committee (BAC)** – refers to Bids and Awards Committee established in accordance with Article V of R.A No. 9184.
- i. **Defect** – refers to any nonconformance of the unit of product with specified requirement.
- j. **Fair Hit** – refers to a test shot that impacts the hard armor panel at an angle of incidence no greater than $\pm 5^\circ$ from the intended angle of incidence, no closer to the edge of the ballistic panel than the minimum shot-to edge distance, and no closer to a prior hit than the minimum shot-to-shot distance.
- k. **Feet per Second (FPS)** – refers to a unit measurement of velocity of an object.
- l. **Full Metal Jacket (FMJ)** – refers to a bullet made of lead completely covered, except for the base, with copper alloy (approximately 90 copper-10 zinc).
- m. **Functional Test** – refers to the test to demonstrate that the product unit can meet the performance requirements as specified in the specifications and/or for intended purpose.
- n. **Hard armor** – refers to rigid plates or inserts that may be constructed from ceramics, compressed laminate sheets, metallic plates or composites that incorporate more than one material.
- o. **Inspection** – refers to the critical appraisal involving examination, measurement, testing, gauging, and comparison of materials, items, equipment, etc. An inspection determines if the material, item or equipment is in proper quantity and condition and if it conforms to the applicable or specified requirements.
- p. **Major Defect** – refers to a defect, other than critical, that is likely to result in failure, or in reducing materially the performance/efficiency or the usability of the unit of product for its intended purpose.
- q. **Minor Defect** – refers to a defect that is not likely to reduce materially the performance/efficiency or the usability of the unit of product for its intended purpose, or departure from established standards having little bearing of the effective use or operation of the unit.
- r. **National Institute of Justice (NIJ)** – refers to the law enforcement agency that is the research and development branch of Department of Justice of America.

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- s. **Penetration** – refers to the 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-W light bulb.
- t. **Perforation** – refers to any impact that creates a hole passing through the armor. This may be evidenced by any of the following: (1) the presence of the projectile, a projectile fragment, or an armor fragment in the clay or backing material; (2) a hole that passes through the armor and/or backing material; or any portion of the bullet being visible from the body side of the armor panel.
- u. **Polycarbonate** – refers to a particular group of thermoplastics. They are easily worked, molded, and thermoformed; as such, these plastics are very widely used in modern manufacturing. They are called polycarbonates because they are polymers having functional groups linked together by carbonate groups (-O-(C=O)-O-) in a long molecular chain.
- v. **Polyethylene armor** – is manufactured by bonding unidirectional UHMWPE (Ultra High Molecular Weight Polyethylene) fibers over an HDPE (High Density Polyethylene) sheet. The sheets are cut to shape, placed in a mold, and compressed under high heat and pressure resulting in a cohesive hard armor plate.
- w. **Post-Qualification** – refers to a systematic examination performed after the opening of bids on the bid documents and prototype/sample of item/goods equipment being submitted by the suppliers or distributors to ascertain if the said prototype is capable of meeting the necessary requirements set forth by the Bids and Awards Committee.
- x. **Proponent** – refers to suppliers/dealers duly accredited to transact business with the PNP.
- y. **Stand Alone Plates** – are designed and tested to defeat ballistic threats using the plate only. No ballistic vest is required, as all the ballistic energy and fragments are stopped in the **plate**.
- z. **Technical Working Group (TWG)** – refers to a pool of technical, financial and/or legal experts to assist in the procurement process.
 - aa. **Test Team** – refers to a group of people composed of uniformed and non-uniformed personnel of the Directorate for Research and Development (DRD) tasked to facilitate the conduct of test and evaluation of equipment during the post qualification and acceptance.
 - bb. **Test and Evaluation** – refers to the process or procedure in determining the requirements and specifications of a certain item/goods/equipment through testing. The results are evaluated to assess progress of design, performance or function, supportability, environmental interference, etc.

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- cc. **Test Parameter** – in its common meaning, is a characteristic, feature, or measurable factor that can help in defining a particular system relative to assessment/analysis. A parameter is an important element to consider in evaluation or comprehension of an event, project, or situation.
- dd. **Warranty** – refers to a written guarantee, issued to the purchaser of an object by its manufacturer, promising to repair or replace it if necessary within a specified period of time.

6. GUIDELINES:

- a. The Directorate for Research and Development (DRD) shall function as independent testing facility of the PNP. The DRD Test Team shall perform their duties pursuant to the mandates of PNP Memorandum Circular No. 2015-015.
- b. The DRD Test Team shall conduct physical inspection (components) and functional test on the sample item submitted to determine conformity with the approved NAPOLCOM Minimum Standards and PNP Minimum Technical Specifications.
- c. The test result containing findings shall be forwarded to the Bids and Awards Committee and Committee (BAC) of Inspection and Acceptance of PNP offices/units or the Philippine International Trading Corporation/Procurement Service Department of Budget and Management that requested the conduct of test and evaluation for a particular sample/test specimen/prototype.
- d. Sample unit/test specimen submitted for post-qualification and test and evaluation shall not be considered part of the delivered item, **unless otherwise specifically provided in the bidding documents.**
- e. If test equipment is not available in the DRD facility, or any certified Government/Private agencies/reputable scientific organization during the conduct of test and evaluation procedures specified under this MC, the test and evaluation shall be conducted in an accredited government institution or in a third party (independent organization) consistent with the international standard procedures.
- f. In case of additional test imposed by the BAC, which is not included in the approved test parameters, the same maybe allowed only if the additional test parameters are properly reflected in the bidding documents or in its Supplemental Bid Bulletin with proper consultation with the DRD.
- g. Government Procurement Policy Board (GPPB) Circular No. 06-2016 with subject "Expenses Related to the Conduct of Post-Qualification" shall be observed during the conduct of post-qualification. Hence, the administrative and operational expenses shall be charged to the proceeds of the sale of the bidding documents as indirect cost or administrative cost pursuant to GPPB Resolution No. 04-2012.


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- h. Administrative and operational expenses for the conduct of test and evaluation during the delivery inspection and acceptance shall be imposed upon the supplier/requesting party if the same were included in the computation of the Approved Budget and Contracts and integrated in the preparation of the Project Management Plan. If such expenses were not considered therein, the same may be charged to the proceeds of the sale of the bid documents as indirect cost or administrative cost allocated to the bidding activities, pursuant to GPPB Resolution No. 04-2012.
- i. Consistent with the "pass or fail criteria," non-conformance with the approved NAPOLCOM Minimum Standards and PNP Technical Specifications during post-qualifications test is ground for post-disqualification.
- j. As appropriate, all testing fees and/or needed materials/equipment (automated and calibrated equipment) and other incidental expenses related to the test and evaluation of equipment/item shall be borne by the requesting party during post qualification and acceptance.

7. TEST PROPER:

- a. Purpose: To determine conformity with standard and specifications, and the ballistic performance of Stand Alone Plate Level III.
- b. Procedure: Visually and manually inspect the Stand Alone Plate and its label/markings.
- c. Physical Inspection (visual and dimensional):

Technical Specifications PNP-UESB No. 2019-006	Test Procedure	Class of Defect
a. Configuration : Stand Alone	Visual inspection on the label available	Major
b. Material : Ceramic/Polyethylene/Ceramic Integrated with UHMWPE or Lightweight ceramic and poly hybrid or its equivalent	Refer to Laboratory test	
c. Size : 10" x 12"	Visual inspection on the label available	Major

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d. Thickness	: 31mm (maximum)	Measure the thickness using digital caliper	Major
e. Weight	: 2.3kg (maximum)	Weigh using digital weighing scale	Major
f. Threat Level	: Can defeat the 7.62mmx51mm M80FMJ (2,780ft/s) and 5.56mm x 45m SS109/M855 (3,100 ft/s) at firing distance of 12m	Refer to functional test	
g. Fit/Cut	: Small Arms Plate Insert (SAPI)	Visual Inspection	Major

c. Standard:

	Remarks	Class of Defect
The stand alone plate shall be complete, free from dents, blister, cracks, chipped or sharp corners, and other visible defects that can affect its performance and injure the wearer.	Visual Inspection	Major

8. FUNCTIONAL AND EVALUATION TEST:

a. Dry Condition

Purpose: To determine the ballistic performance of the stand alone plate in dry condition.

b. Procedure:

1) Armor Backing Material

a.1) Backing Material

a.1.1) Roma Plastilina No.1 oil-based modelling clay shall be used as the backing material.

a.2) Mounting of Stand Alone Plate for Ballistic Testing

a.2.1. Strapping:

a.2.1.1. Stand Alone plate samples or panels shall be positioned, held in contact with the backing material and secured to the backing material fixture using mounting straps, such that the point of impact may be projected through the plate onto the surface of the backing material fixture.

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2) Shot Location: (See figure 1):

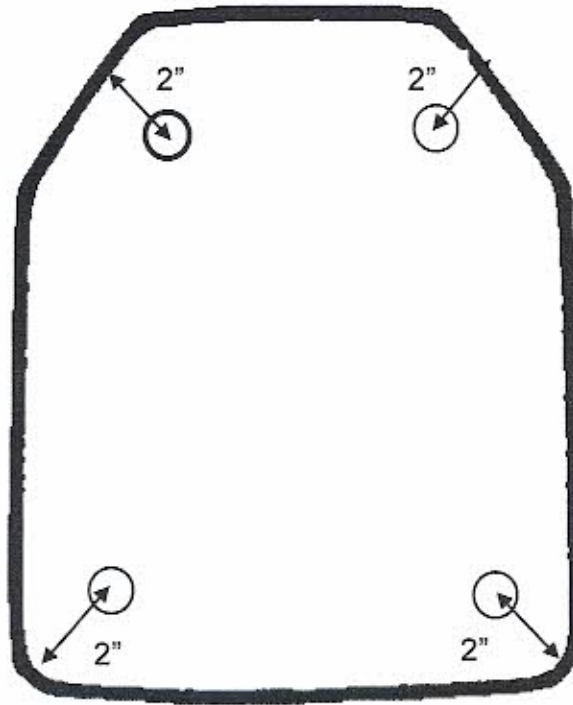


Figure 1

3) No perforations shall occur at the corresponding fair hit velocity.

4) The distance of firing shall be 12 meters for Level III.

Type of Stand Alone Plate	Test Ammunition	Nominal Bullet mass	Required Hits Per Hard Armor Panel	Required Bullet Velocity	Distance of Firing	Maximum BFS Depth	Test Procedure	Class of Defect
Level III	7.62mmx51 FMJ	147 to 150 gr	4	2,750 ft/s ± 50 ft/s	12 m	28 mm (*)	Functional	Major
	SS109/M855 (green tip /steel penetrator)	62 gr	4	3,100 ft/s ± 50 ft/s	12 m	28 mm	Functional	Major

(*) Recently, research groups have tried to address this issue by attempting to develop the maximum allowable clay BFS lethality relationship by corresponding body armor tests on clay, porcine surrogates, and human cadaver torsos. Gryth et al. [69] concluded a maximum allowable clay BFS should be 28 mm to ensure the highest probability of survival.

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b. Wet Condition

- 1) Purpose: To determine the ballistic performance of the stand alone plate after being submerged in the water.
- 2) Procedure:
 - a) The armor submersion equipment shall consist of a water bath sufficiently sized to allow at least one plate size to hang vertically, without any folds or bends, with the top edge of the plate at least 100 mm (3.9 in) below the surface of the water, and with at least 50 mm (2.0 in) clearance around the plate panel.
 - b) After removing the plate from the water, it shall be hung vertically and allowed to dry for 10 min (+ 5 min/- 0 min) before mounting on the test fixture.
 - c) Remount the plate as specified in the procedures in determining its performance in dry condition.
- 3) No perforations shall occur at the corresponding fair hit velocity.

Type of Stand Alone Plate	Test Ammunition	Nominal Bullet mass	Required Hits Per Hard Armor Panel	Required Bullet Velocity	Distance of Firing	Maximum BFS Depth	Test Procedure	Class of Defect
Level III	7.62mmx51 FMJ	147 to 150 gr	4	2,750 ft/s ± 50 ft/s	12 m	28 mm	Functional	Major
	SS109//M8 55 (green tip /steel penetrator)	62 gr	4	3,100 ft/s ± 50 ft/s	12 m	28 mm	Functional	Major

9. LABORATORY TEST:

- a) Purpose: To determine the chemical properties of raw materials and components of ballistic plate.
- b) Procedure:
 - 1) Cut a small test piece from ballistic plates that were used in the functional testing.
 - 2) Place the test piece in material testing machine (e.g. fiber optic spectrometer).

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Technical Specifications PNP-UESB No. 2019-006	Test Procedure	Class of Defect
Ceramic/Polyethylene/Ceramic Integrated with UHMWPE or Lightweight ceramic and poly hybrid or its equivalent	<i>Check the test report from International Organization for Standardization Third Party testing facility with validity of 1 year.</i>	Major

Note:

If the material test machine is not available, the test piece may be submitted to the government accredited testing facility or refutable third party.

10. LABELING REQUIREMENTS:

Miscellaneous	Test Procedures	Class of Defect
a. Name or Logo of the Manufacturer b. Country of Origin c. Month and Year of Manufacture d. Level of Protection e. Serial Number	<i>Visually inspect label</i>	Major
Note: <ul style="list-style-type: none"> The label markings must not be easily removed or destroyed when rubbed by hand for 15 seconds with cotton/cloth soaked with distilled water. The label marking within the representative area must remain legible. 	<i>Actual</i>	Major
<ul style="list-style-type: none"> The label markings then be rubbed by hands for 15 seconds with cotton soaked with isopropyl alcohol. It must not be easily removed or destroyed. The label marking within the representative area must remain legible. 	<i>Actual</i>	Major

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11. PROCEDURES:

- a. Post-Qualification:
- 1) The supplier must submit sample of test item in accordance with Military Standard 105E or as prescribed by the procuring entity.
 - 2) There should be "NO" major defect.
 - 3) One (1) or more major defect means failure in the test and evaluation.
 - 4) No permitted perforation or complete penetration.

5) The sample must pass the NAPOLCOM approved technical specifications and Test Parameters; otherwise it shall mean outright post disqualification.

b. For Acceptance:

- 1) Random sampling will be done where the delivered items are stored using the Military Standard 105-E.
- 2) The sample must pass the given functional test otherwise it shall mean outright rejection of the whole delivery.
- 3) No permitted perforation or complete penetration.
- 4) One Major defect constitutes rejection.
- 5) Functional/Destructive test as prescribed by the procuring entity.

12. RESCISSION:

All other test parameters, guidelines or standard operating procedures contrary to or inconsistent with the provisions of these test parameters are hereby rescinded, modified or amended.


13. EFFECTIVITY:

This MC shall take effect immediately after 15 days from filing a copy thereof at the UP Law Center in consonance with Section 3, Chapter 2, Book VII of Executive Order 292 otherwise known as the "Revised Administrative Code of 1987, as amended.

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