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**Review and Update of STANAG 4496**

**Fragment Impact, Munitions Test Procedure**

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BACKGROUND


 2 Custodial Working Group meetings
  • DGA Missiles Testing, Bordeaux, France (January 2017)
  • Kromhout Kazerne, Utrecht, Netherlands (April 2017)

 STANAG 4496 ed.1 will be replaced by Allied Ordnance Publication (AOP-4496 ed.A version 1) to allow for more efficient updates
PROCEDURES AND NUMBER OF TESTS

- Procedures
  - Procedure 1: 2530 +/- 90 m/s
  - Procedure 2: 1830 +/- 60 m/s

- Number of tests
  - Shall be carried out twice by sub-component of the munition;
  - Once against the main charge filling
  - Once against the most sensitive component/energetic material (e.g. motor igniter, warhead booster)
AIM POINT SELECTION

- Shall be selected to create the most stressing condition on the target energetic

- Shall represent a credible exposure condition, based on the THA
  - First test \textit{at the centre of the energetic component}
  - Second test \textit{on the most vulnerable area}
  - Nota Bene:
    - Aim point and shotline for each test should be approved by national authorities prior to testing
    - Guidance for choosing aim point and shotline can be found in SRD AOP-39.1
ACCURACY REQUIREMENT

- Shall be defined prior to testing and recorded after the test

Current STANAG 4496 ed.1

New AOP-4496 ed.1

- Should be agreed by the National Authority
**ACCURACY REQUIREMENT**

- Shall be dependent on the geometry of the item under test

**Large area:**
Hit the centre of the EM with an accuracy to define prior to testing

\[ \varnothing = ? \]

**Small area (booster, small munition, …):**
Hit the energetic component
Angular deviation (e.g. vector sum of yaw and pitch) for the threat fragment at impact shall be measured and recorded.

- Should be limited to ±10°

- Collect data before imposing an acceptable limit value (next edition of the AOP)
LOWER VALUE FOR THE BRINELL HARDNESS

- Addition of a lower value for the Brinell Hardness
- Measurement and record of the value

<table>
<thead>
<tr>
<th>Current STANAG 4496 ed.1</th>
<th>New AOP-4496 ed.1</th>
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<tbody>
<tr>
<td>HB &lt; 270</td>
<td>190 &lt; HB &lt; 270</td>
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NEW
OTHER ISSUES DISCUSSED (1/2)

- No sabot design guidance
- No launcher system design guidance
- No example of the test set-up design
OTHER ISSUES DISCUSSED (2/2)

- No requirement for a standoff distance between the launching system and the test item

- No new requirement on the measurement of the fragment velocity
  - Assess the measurement uncertainties of the impact velocity, the impact location, and the total angular deviation
NEW OBSERVATIONS AND RECORDS

- Aim point(s) selected, hit point(s) (if possible) and whether the fragment exited from the test item or remained within it (if possible)
- Impact velocity of the fragment and method of determination
- Suitable blast or pressure gauges shall be positioned around the test item. The location and height of the gauges have to be recorded
- Accuracy at impact
- Brinell hardness of the threat fragment
- Total angular deviation of the fragment at impact (e.g. vector sum of yaw and pitch)

Estimated measurement uncertainties for: (a) the impact velocity, (b) impact location, and (c) total angular deviation
OBSERVATIONS AND RECORDS

Unchanged / Rewording (1/2)

- Test item identification and configuration; Type and weight of energetic material; Listing of environmental preconditioning test performed; Spatial orientation of the test item;
- Test setup/configuration: Type of procedure, details of weapon(s) and munition used; Distance between weapon(s) and test item; Method of mounting and/or restraint; Distances from the test item to any protective wall or enclosure; Identification and location of any other instrumentation if used;
- Record of events versus time from the order to fire to the end of the trial;
- The nature of any reactions by the test item
OBSERVATIONS AND RECORDS
Unchanged / Rewording (2/2)

- Imagery of the item under test and the test setup shall be done before and after performing the test
- The nature and distribution of residue and debris (included recovery and mapping)
- Meteorological data (wind speed, direction) during the trial
- Indication of propulsion (video or other suitable means)
- Microphone or other suitable listening device to record audible events and enable correlation with visible events and indicated time
- Witness screens as a measure of projection severity
Sentences which are not specific to Fragment Impact test

- Tested Sample selection
- Layout of the munition
- Preliminary Shot
- Safety
- Orientation of impact normal to the surface of the munition
- Calibration of blast gauges
Annex A: Standard fragment

- Conical ended cylinder
- Tolerances: ± 0.05 mm and ± 0°30'
- Fragment Mass: 18.6 g
- Fragment material: mild, carbon steel with Brinell Hardness (HB) between 190 and 270
ANNEXES

- Annex B: Historical overview
  - Changes between STANAG 4496 ED 1 and AOP 4496 ed.A version 1
  - Historical information on the shape, the material and velocities of the fragment from the first version to now
STATUS

- Sent to AC/326 SG/B members for approval (March 2018)
  – silence procedure

- Next steps
  - Approbation by AC/326 Main Group (June 2018)
  - Ratification process
  - Formal application of STANAG 4496 ed.2 and AOP-4496 ed.A version 1
PARTICIPANTS

Thanks to all!

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Thank you for your attention!

Any Questions?