

NATO UNCLASSIFIED
NORTH ATLANTIC TREATY ORGANIZATION
ORGANISATION DU TRAITE DE L'ATLANTIQUE NORD

MILITARY AGENCY FOR STANDARDIZATION (MAS)
BUREAU MILITAIRE DE STANDARDISATION (BMS)
1110 BRUSSELS

Tel : 707.55.78

Fax : 707.57.18

mas@hq.nato.int

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MAS/175-LAND/4114

See Distribution List No. 2

STANAG 4114 LAND (EDITION 3) - MEASUREMENTS OF PROJECTILE VELOCITIES


References:

- a. AC/225-D/1364
- b. MAS(77)314 dated 4 August 1977 (Edition 2)

1. The enclosed NATO Standardization Agreement which has been ratified by nations as reflected in page iii is promulgated herewith.
2. The references listed above are to be destroyed in accordance with local document destruction procedures.
3. AAP-4 should be amended to reflect the latest status of the STANAG.

ACTION BY NATIONAL STAFFS

4. National staffs are requested to examine page iii of the STANAG and, if they have not already done so, advise the Defence Support Division, IS, through their national delegation as appropriate of their intention regarding its ratification and implementation.

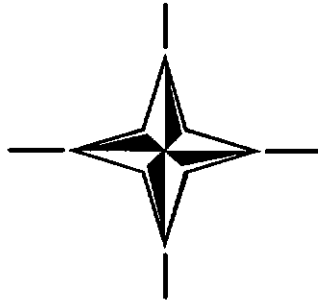

A. GRØNHEIM
Major General, NOAF
Chairman MAS

Enclosure:
STANAG 4114

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STANAG No. 4114
(Edition 3)

**NORTH ATLANTIC TREATY ORGANIZATION
(NATO)**

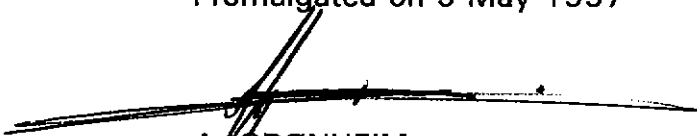


**MILITARY AGENCY FOR STANDARDIZATION
(MAS)**

**STANDARDIZATION AGREEMENT
(STANAG)**

SUBJECT: MEASUREMENTS OF PROJECTILE VELOCITIES

Promulgated on 9 May 1997



A. GRØNHEIM
Major General, NOAF
Chairman MAS

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RECORD OF AMENDMENTS

No.	Reference/date of amendment	Date entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Chairman MAS under the authority vested in him by the NATO Military Committee.
2. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.
3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

4. Ratification is "The declaration by which a nation formally accepts the content of this Standardization Agreement".
5. Implementation is "The fulfilment by a nation of its obligations under this Standardization Agreement".
6. Reservation is "The stated qualification by a nation which describes that part of this Standardization Agreement which it cannot implement or can implement only with limitations".

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

7. Page iii gives the details of ratification and implementation of this agreement. If no details are shown it signifies that the nation has not yet notified the tasking authority of its intentions. Page iv (and subsequent) gives details of reservations and proprietary rights that have been stated.

NATO STANDARDIZATION AGREEMENT
(STANAG)

MEASUREMENTS OF PROJECTILE VELOCITIES

Annex Definitions of Velocity

Related Documents:

AEP-34	A Handbook for the Measurement of Projectile Velocities
STANAG 4097	Procedures with Respect to Charge Adjustment for Velocity for Standardised Gun Ammunition
STANAG 4098	Procedures for the Determination of Propellant Charge Temperature Corrections
STANAG 4106	Procedures to Determine the Degree of Ballistic Performance Similarity of NATO Indirect Fire Ammunition and the Applicable Corrections to Aiming Data
STANAG 4110	Definition of Pressure Terms and their Inter-Relationship for Use in the Design and Proof of Cannons and Ammunition
STANAG 4113	Pressure Measurements by Crusher Gauges
AEP-23	Pressure Measurements by Crusher Gauges - NATO Approval Tests for Crusher Gauges
STANAG 4355	The Modified Point Mass Trajectory Model
STANAG 4367	Thermodynamic Interior Ballistic Model with Global Parameters
STANAG 4425	Procedure to Determine the Degree of Interchangeability of NATO Indirect Fire Ammunition - AOP-29
AOP-29	NATO Indirect Fire Ammunition Interchangeability

STANAG 4114
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AIM

1. The aim of this agreement is to ensure that velocity measurements made by one country in the production, testing and operational use of guns, howitzers or ammunition for those weapons are acceptable to other NATO countries so that ballistic performance can either be accurately matched, or differences from standard ascertained.

2. These velocity measurements apply to both proving ground and fire control systems.

AGREEMENT

3. Participation Nations agree to use the following parameters concerning velocity measurements in connection with the acceptance testing of guns, howitzers and ammunition for these weapons and for use with their fire control systems.

- a. Measurements that are intended to be passed to another nation will conform to one of the approved measurement systems listed in AEP-34.
- b. Acceptance testing will be in accordance with the general requirements specified in AEP-34.
- c. All velocity requirement equipment for obtaining measurements intended to be passed to another nation will be qualified in accordance with the general requirements specified in AEP-34.

FUTURE CHANGES TO AEP-34

4. This STANAG authorises future changes to the list of approved velocity measurement equipment in AEP-34 and to the contents of the various chapters of the latter. That publication will accordingly be regularly revised and updated for the NATO Army Armaments Group by a subordinate group appointed for that purpose. At the date of submission of this STANAG for ratification, that was AC/225-Panel IV/SP.2.

DEFINITIONS OF VELOCITY

5. See Annex.

IMPLEMENTATION OF THE AGREEMENT

6. This STANAG shall be considered to be implemented when a nation has issued instructions that all measurements of projectile velocities intended to be passed to another nation shall be made in accordance with this agreement and with AEP-34.

DEFINITIONS OF VELOCITY

1. MUZZLE VELOCITY

Muzzle Velocity is the projectile's speed obtained by extrapolating back to the muzzle position from real velocities on the trajectory beyond the intermediate ballistic phase.

This muzzle velocity is thus a fictitious value which enables trajectory calculations to be made without considering the complex intermediate ballistic conditions.

In practice the estimation of this muzzle velocity is based upon the reduction of observed speed measurements, thereby using a classical mathematical regression technique or a trajectory back calculation technique.

2. PROJECTILE VELOCITY

The projectile velocity (vector) is the derivative with respect to time of the vector characterising the position of the projectile centre of gravity in the ballistic reference system.

As defined, this velocity represents a relative velocity, related to the earth surface. The projectile velocity is a vector, characterised by its magnitude and direction and is at any time tangent to the trajectory.

Since a velocity measurement requires measurements during a certain time interval, the instantaneous velocity is never measured. In practice the instantaneous velocity is approximated by a weighted mean formula.

3. RADIAL VELOCITY

The radial velocity is the vector, obtained by projection of the projectile velocity on the line that connects the projectile gravity centre and an observation point (origin of the ballistic reference system, radar head, etc.).

In practice the radial velocity can be used to evaluate the projectile velocity. However, this requires knowledge of the trajectory orientation.