AASTP-3
(Edition 1)

MANUAL OF NATO SAFETY PRINCIPLES

FOR THE HAZARD CLASSIFICATION OF

MILITARY AMMUNITION AND EXPLOSIVES

AASTP-3

March 1995

Conditions of Release:

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NORTH ATLANTIC TREATY ORGANIZATION

MILITARY AGENCY FOR STANDARDIZATION (MAS)

NATO LETTER OF PROMULGATION

March 1995

1. AASTP-3 (Edition 1) - MANUAL OF NATO PRINCIPLES FOR THE HAZARD CLASSIFICATION OF MILITARY AMMUNITION AND EXPLOSIVES - is a NATO UNCLASSIFIED publication. The agreement of interested nations to use this publication is recorded in STANAG 4123.

2. AASTP-3 (Edition 1) is effective upon receipt.

3. AASTP-3 (Edition 1) contains only factual information. Changes to these are not subject to the ratification procedures; they will be promulgated on receipt from the nations concerned.

Major General G.B. FERRARI, ITAF
Chairman , MAS

AASTP-3
(Edition 1)

RECORD OF RESERVATIONS

NATION	RESERVATIONS

AASTP-3
(Edition 1)

RECORD OF CHANGES

CHANGE	DATE OF CHANGE	SIGNATURE	REMARKS
1	11 May 1999		
2	December 2005		
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PREFACE

1. Purpose

This Manual deals with the classification of ammunition and explosives according to the United Nations recommendations on the transport of dangerous goods.

It is intended to provide a common basis for use by NATO nations in assessing the risks generated by military ammunition and explosives during transport and storage.

It is covered by STANAG 4123 (3rd Edition) the subject of which is: "Determination of the Classification of Military Ammunition and Explosives."

2. Scope

This Manual describes the considerations and criteria used to assess the correct Hazard Division and Compatibility Group for a given substance or article (the Classification Code), to calculate the Net Explosive Quantity (NEQ) for storage purposes, and to show which explosives may be stored or transported together.

3. Basis:

The Manual is based on the following documents:

NATO HISTORICAL DOCUMENTS:

1. AC/258-D/258 (1976) including Corrigenda 1 to 23.
2. AC/258-D/419 (1 November 1990).

U.N. DOCUMENTS:

3. U.N. Recommendations on the Transport of Dangerous Goods, Model Regulations, Volumes I and II, 16th Revised Edition, 2009.
4. U.N. Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, 4th Edition, Amendment 2007, as amended by UN ST/SG/AC.10/36/Add.2 of 12 March 2009

It is related to the following documents:

NATO DOCUMENTS:

5. STANAG 4440 (1st Edition), "Safety of the Storage of Military Ammunition and Explosives"
6. AASTP-1, (1st Edition), "Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives"
7. STANAG 4441 (1st Edition), "Safety of the Transport of Military Ammunition and Explosives"

8. AASTP-2, "Manual of NATO Safety Principles for the Transport of Military Ammunition and Explosives"
9. STANAG 4439 (1st Edition), “Policy for Introduction, Assessment and Testing for Insensitive Munition”
10. STANAG 4240 (2nd Edition), “Liquid Fuel/External Fire, Munition Test Procedures”
11. STANAG 4241 (2nd Edition), ”Bullet Impact, Munition Test Procedures”
12. STANAG 4375 (2nd Edition), “Safety Drop Test”
13. STANAG 4382 (2nd Edition), “Slow Heating Test Procedures”
14. STANAG 4487 (1st Edition), “Explosive, Friction Sensitivity Tests”
15. STANAG 4488 (1st Edition), “Explosives, Shock Sensitivity Tests”
16. STANAG 4489 (1st Edition), “Explosives, Impact Sensitivity Tests”
17. STANAG 4396 (2nd Edition), “Sympathetic Reaction, Munition Test Procedures”

OTHER DOCUMENTS:

18. ADR, Accord européen relatif au transport international des marchandises dangereuses par route
19. RID, Règlement international concernant le transport des marchandises dangereuses par chemins de fer
20. IMDG Code, International Maritime Dangerous Goods Code.
21. ICAO Technical Instructions.

4. Observation

Although references 3 and 4 form the bases of AASTP-3, not all UN recommendations in those documents or later revisions will necessarily be acceptable for military purposes. Attention will be drawn to such divergences at the appropriate points of this publication.

5. Conditions *of release*

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CHAPTER 1 - GENERAL

1.1. General

In order to promote the safe storage and transport of dangerous goods, an International System for Classification has been devised. The system consists of 9 Classes (1-9) of which Class 1 comprises ammunition and explosives. Class 1 is divided into six divisions. The hazard division indicates the primary type of hazard to be expected in the event of an accident:

(a) Division 1.1: mass explosion hazard

(b) Division 1.2: projection hazard but not a mass explosion hazard

(c) Division 1.3: fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard

(d) Division 1.4: no significant hazard

(e) Division 1.5: very insensitive substances which have a mass explosion hazard

(f) Division 1.6: extremely insensitive articles which do not have a mass explosion hazard

This Manual uses the term "Hazard Division" (HD) instead of "Division" both to emphasize the correspondence with the previous term "Hazard Class" and to avoid the cumbersome alternatives "Division 1 of Class 1" etc. Furthermore the word "Division" used alone would be insufficient. The purpose of using hazard divisions is to simplify the task of making regulations for safe storage and transport, and to facilitate the observance of such regulations by identifying packages or articles by a simple numerical code. For storage purposes, HDs 1.2 and 1.3 are further sub-divided in Storage Sub-Divisions (SsD) to better describe the unique hazards associated with each. Those SsD are used in the application and use of AASTP-1 quantity-distance criteria. Chapter 2, Section 2 provides additional details on SsD.

1. 2. Annexes give details as follows:

(a) Annex A is “RESERVED” for future use, as necessary.

(b) Annex B gives the acceptance procedure to determine whether or not a substance or ammunition is relevant for inclusion in UN Hazard Class 1.

(c) Annex C describes the tests and criteria for assessing HD and, as applicable, the correct SsD.

(d) Annex D gives alternate hazard classification test procedures for solid propellant rocket motors for situations where it is impractical to conduct the hazard classification Test Series 6 tests.

(e) Annex E is the list of National Competent Authorities for the classification of ammunition and explosives.

CHAPTER 2 - CLASS 1 OF THE UN INTERNATIONAL SYSTEM FOR CLASSIFICATION OF DANGEROUS GOODS

Section I – General

2.1.1. Class 1 in the U.N. International System for Classification of dangerous goods consists of substances and articles which have an explosive character and of which the stability and sensitivity, both chemical and physical, are shown to be acceptable.

2.1.2. Class 1 comprises:

1. Explosive substances (a substance which is not itself an explosive but which can form an explosive atmosphere of gas, vapour or dust is not included in Class 1), except those that are too dangerous to transport or those where the predominant hazard is appropriate to another class;
2. Explosive articles, except devices containing explosive substances in such quantity or of such character that their inadvertent or accidental ignition or initiation during transport shall not cause any effect external to the device either by projection, fire, smoke, heat or loud noise; and
3. Substances and articles not addressed by paragraphs 2.1.2.1 or 2.1.2.1 above, but which are manufactured with a view to producing a practical, explosive or pyrotechnic effect.

2.1.3. Figure 1 indicates the general scheme for classifying a substance or article, which is to be considered for inclusion in Class 1.

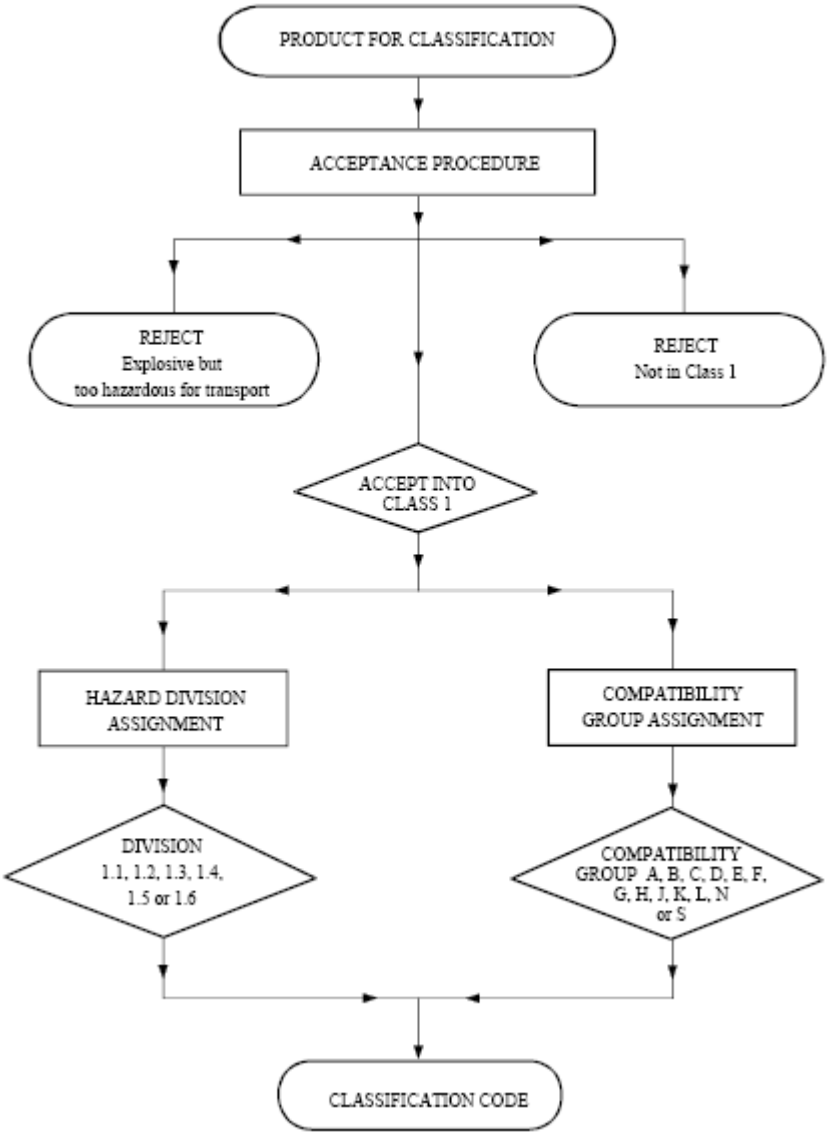
PRODUCT FOR CLASSIFICATION
ACCEPTANCE PROCEDURE
REJECT
Explosive but
too hazardous for transport
REJECT
Not in Class 1
ACCEPT INTO
CLASS 1
HAZARD DIVISION
ASSIGNMENT
COMPATIBILITY
GROUP ASSIGNMENT
DIVISION
1.1, 1.2, 1.3, 1.4,
1.5 or 1.6
COMPATIBILITY
GROUP A, B, C, D, E, F,
G, H, J, K, L, N
or S
CLASSIFICATION CODE

Figure 1

2.1.4. The assessment is in two stages. First, the potential of an explosive or ammunition must be ascertained and its stability and its sensitivity, both chemical and physical, must be shown to be acceptable. In order to promote uniform assessments by competent authorities, it is recommended that data from suitable tests be analyzed systematically with respect to the appropriate test criteria using the flow chart in figure 2. If the substance or article is acceptable for Class 1, it is then necessary to proceed to the second stage, to assign the correct hazard division by the flow chart in figure 3 (see paragraph 3.2.7).

2.1.5. Annex B gives the tests and criteria for assessing Class 1.

2.1.6 Harmonization with Insensitive Munitions (MURAT) Testing

Hazard classification test plans should be arranged, as far as possible, to minimize unnecessary duplication in testing and assessment programs including those conducted for insensitive munitions (MURAT) in accordance with reference 9 (STANAG 4439) and system vulnerability. The test-related annexes indicate where this can be accomplished.

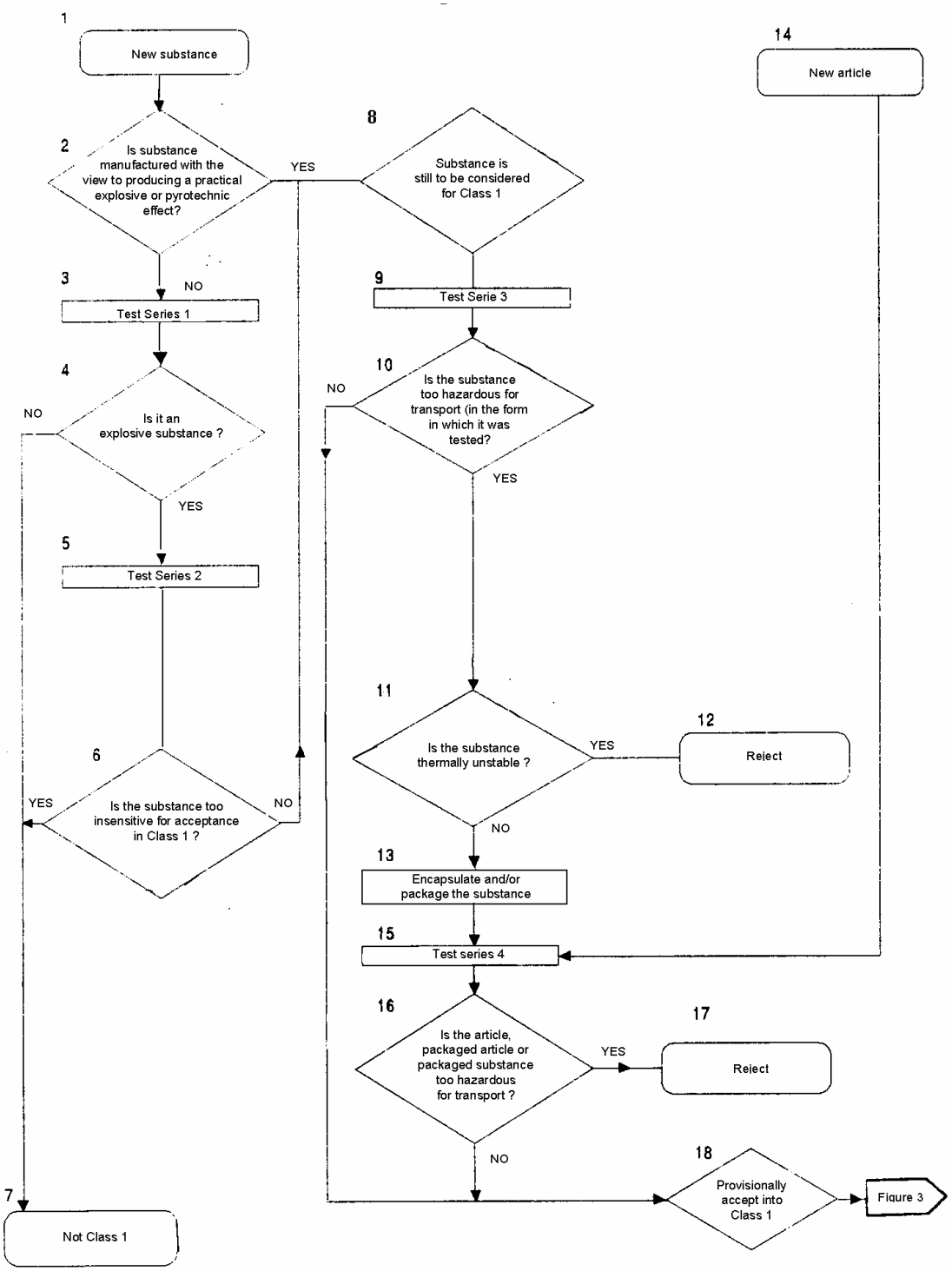

Figure 2 - Procedure for provisional acceptance of a substance or article into Class 1

Section II - Hazard Divisions

2.2.1. Definitions of the HD

a) HD 1.1: Substances and articles which have a mass explosion hazard

1. The major hazards of this division are blast, high velocity projections and other projections of relatively low velocity.

2. The explosion results in severe structural damage, the severity and range being determined by the amount of high explosives involved. There may be a risk from heavy debris propelled from the structure in which the explosion occurs or from the crater.

b) HD 1.2: Substances and articles which have a projection hazard but not a mass explosion hazard

1. The explosion results in items burning and exploding progressively, a few at a time. Furthermore fragments, firebrands and unexploded items may be projected in considerable numbers; some of these may explode on, or some time after, impact and cause fires or explosions. Blast effects are limited to the immediate vicinity.

2. For the purpose of determining quantity-distances a distinction, depending on the size and range of fragments, is made between those items, which give fragments of moderate range (classified as Storage Sub-division [SsD] 1.2.2) and those which give fragments with a considerable range (classified as SsD 1.2.1). SsD 1.2.2 items include HE projectiles (with or without propelling charges) with an individual NEQ less than or equal to 0.73 kg and other items not containing HE such as cartridges, rounds with inert projectiles, pyrotechnic items or rocket motors. SsD 1.2.1 items are generally HE projectiles (with or without propelling charges) with an individual NEQ greater than 0.73kg.

3. A special storage subdivision, SsD 1.2.3, with its own unique set of quantity-distances, is applicable to munitions that exhibit at most an explosion reaction in sympathetic reaction testing (reference 17) and a burning reaction in bullet impact (reference 11), slow heating (reference 13), and liquid fuel / external fire (reference 10) testing.

c) HD 1.3: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard

1. This division comprises substances and articles:

(a) which give rise to considerable radiant heat, or

(b) which burn one after another, producing minor blast or projection effects or both.

2. This division includes some items, which burn with great violence and intense heat emitting considerable thermal radiation (mass fire hazard) and others, which burn sporadically. Items in this division may explode but do not usually form dangerous fragments. Firebrands and burning containers may be projected.

For the purpose of determining quantity-distances and defining mixing and aggregations rules, a distinction is made between the more hazardous propellant explosives of HD 1.3 (classified as SsD 1.3.1) and the less hazardous items and substances of HD 1.3 (classified as SsD 1.3.2).

d) HD 1.4: Substances and articles which present no significant hazard

This division comprises substances and articles which present only a small hazard in the event of ignition or initiation during transport. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package.

Note: *Substances and articles of this division are in Compatibility Group S if they are so packaged or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder fire-fighting or other emergency response efforts in the immediate vicinity of the package.*

e) HD 1.5: Very insensitive substances which have a mass explosion hazard

This division comprises substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions.

Note: *The probability of transition from burning to detonation is greater when large bulk quantities are transported or stored.*

f) HD 1.6: Extremely insensitive articles which do not have a mass explosion hazard

This division comprises articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

Note. *The risk from articles of HD 1.6 is limited to the explosion of a single article.*

2.2.2. Annex C gives tests and criteria for the determination of the HD of the ammunition or explosive to be classified.

Section III - Compatibility Groups

2.3.1. General Principles

a) Ammunition and explosives are considered to be compatible if they may be stored or transported together without significantly increasing either the probability of an accident or, for a given quantity, the magnitude of the effects of such an accident.

b) Ammunition and explosives should not be stored or transported together with other goods which can hazard them. Examples are highly flammable materials, acids, corrosives.

c) The safety of ammunition and explosives in transport or storage would be ensured most easily if each kind was kept separate but this ideal is not practicable. A proper balance of the interests of safety against other factors requires the mixing of several kinds of ammunition and explosives.

d) As the principles of mixing CG may differ in storage and transport circumstances, detailed information is to be found in Chapter 5 of this manual.

2.3.2. Formulation of Compatibility Groups

a) On the basis of the principles in paragraph 2.3.1., ammunition and explosives are formally grouped into thirteen compatibility groups: A through H, J, K, L, N and S.

b) Group I is omitted to avoid possible confusion between the letter "I" and the Roman numeral "I". Group S is given a distinctive letter since it corresponds to a unique possibility for mixing in storage and transport.

2.3.3 Determination of Compatibility Group

The compatibility group of the ammunition or explosive shall be determined on the basis of the description of compatibility groups given in paragraph 2.3.4 below.

2.3.4. Definitions of the Compatibility Groups

Group A — Primary explosive substance

Group B — Article containing a primary explosive substance and not containing two or more effective protective features

Group C — Propellant explosive substance or other deflagrating explosive substance or article containing such explosive substance

Group D	Secondary detonating explosive substance or black powder or article containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or article containing a primary explosive substance and containing two or more effective protective features
Group E	Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids)
Group F	Article containing a secondary detonating explosive substance with its own means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids) or without a propelling charge.
Group G	Pyrotechnic substance, or article containing a pyrotechnic substance, or article containing both an explosive substance and an illuminating, incendiary, tear- or smoke-producing substance (other than a water-activated article or one containing white phosphorus, phosphides, a pyrophoric substance, a flammable liquid or gel, or hypergolic liquids)
Group H	Article containing both an explosive substance and white phosphorus
Group J	Article containing both an explosive substance and a flammable liquid or gel
Group K	Article containing both an explosive substance and a toxic chemical agent
Group L	Explosive substance or article containing an explosive substance and presenting a special risk (e.g., due to water activation or presence of hypergolic liquids, phosphides or a pyrophoric substance) and needing isolation of each type
Group N	Articles which contain only extremely insensitive detonating substances
Group S	Substances or articles so packed or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prohibit fire-fighting or other emergency response efforts in the immediate vicinity of the package.

2.3.5. Notes on Compatibility Groups

a) Compatibility Group D applies only when secondary detonating explosive (high explosive) or black powder is properly packed in a dust-tight container. Otherwise, special precautions are essential and Compatibility Group L would apply.

b) Compatibility Group D or E may apply to ammunition which is fuzed or packed together with fuzes, if the fuzes are adequately protected. See the definitions of "With/without its (own) Means of Initiation" in AOP-38.

c) Compatibility Group F does not necessarily apply to ammunition which is fuzed or packed together with fuzes, if the fuzes are adequately protected. See the definitions of "With/without its (own) Means of Initiation" in AOP-38.

d) Compatibility Group N applies only to HD 1.6. The potential administrative advantage of Compatibility Group N ammunition will be lost when mixed with other hazard divisions and/or compatibility groups.

Section IV - Classification Codes

2.4.1. General

This section explains how the classification code can be used to simplify the labeling of ammunition, the entries in storage and transport documents and the formulation of safety regulations.

2.4.2. Classification Code

The classification code is composed of the number of the hazard division (see Section II) and the letter of the compatibility group (see Section III), for example "1.1 B". Guidance on the practical procedure of classifying an item by hazard division and compatibility group is given in Chapter 3.

2.4.3. Number of Classification Codes

Table 2 lists only 35 classification codes, although, at first sight, the 6 hazard divisions and 13 compatibility groups should give 78 combinations. Table 1 shows that 43 combinations do not exist, because the definitions of the division and the compatibility group are mutually exclusive, or do not occur in practice because the resultant characteristics would be highly improbable or useless for ammunition.

2.4.4. Use of classification codes

Classification codes are very useful because they are so concise and present no language problems. The 35 codes shown in tables 1 and 2 summarize the significant characteristics, for safe storage and transport, of the whole range of types of ammunition. These advantages can be exploited as follows:

1. Ammunition can be marked or labeled with classification codes to facilitate identification. Various national systems have been used for many years. The objective is to use one system world-wide for both commercial and military explosives, and the system is to resemble the method used for other dangerous goods. The codes of the U.N. International System of Classification are well suited to this aim.

2. Documents relating to storage and transport of ammunition can use classification codes to convey the majority, and sometimes the whole, of technical information needed to ensure safe handling, permitted mixed storage or stowage, required segregation, a suitable building or vehicle and appropriate fire-fighting techniques.

3. Safety regulations for storage and transport of ammunition can be formulated more simply and concisely by framing them in terms of classification codes. The codes have been selected so as to harmonise with the requirements of the various nations and individual modes of transport. Although the requirements may differ, the regulations can all use the same codes to promote standardization of concepts and terminology.

2.4.5. Serial Number and Authorised short Name

On top of the classification code, ammunition receive a “serial number” allocated by the United Nations for the U.N. International system of Classification and an “authorised short name” (proper shipping name), written in capital letters, for use on packages and in transport document. Some examples are given in reference 3.

TABLE 1 - CLASSIFICATION CODE

Description of substance or article to be classified	Compatibility Group	Classification Code
Primary explosive substance	A	1.1A
Article containing a primary explosive substance and not containing two or more effective protective features	B	1.1B 1.2B 1.4B
Propellant explosive substance or other deflagrating explosive substance or article containing such explosive substance	C	1.1C 1.2C 1.3C 1.4C
Secondary detonating explosive substance or black powder or article containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or article containing a primary explosive substance and containing two or more effective protective features	D	1.1D 1.2D 1.4D 1.5D
Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids)	E	1.1E 1.2E 1.4E
Article containing a secondary detonating explosive substance with its own means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids) or without a propelling charge	F	1.1F 1.2F 1.3F 1.4F
Pyrotechnic substance, or article containing a pyrotechnic substance, or article containing both an explosive substance and an illuminating, incendiary, tear- or smoke-producing substance (other than a water-activated article or one containing white phosphorus, phosphides, a pyrophoric substance, or a flammable liquid or gel, or hypergolic liquids)	G	1.1G 1.2G 1.3G 1.4G

Description of substance or article to be classified	Compatibility Group	Classification Code
Article containing both an explosive substance and white phosphorus	H	1.2H 1.3H
Article containing both an explosive substance and a flammable liquid or gel	J	1.1J 1.2J 1.3J
Article containing both an explosive substance and a toxic chemical agent	K	1.2K 1.3K
Explosive substance or article containing an explosive substance and presenting a special risk (e.g., due to water activation or presence of hypergolic liquids, phosphides or a pyrophoric substance) and needing isolation of each type	L	1.1L 1.2L 1.3L
Articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation	N	1.6N
Substances or articles so packed or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prohibit fire-fighting or other emergency response efforts in the immediate vicinity of the package	S	1.4S

TABLE 2 - COMBINATION OF HAZARD DIVISIONS AND COMPATIBILITY GROUPS

	Compatibility Group													
Hazard Division	A	B	C	D	E	F	G	H	J	K	L	N	S	A-S Σ
1.1	1.1A	1.1B	1.1C	1.1D	1.1E	1.1F	1.1G		1.1J		1.1L			9
1.2		1.2B	1.2C	1.2D	1.2E	1.2F	1.2G	1.2H	1.2J	1.2K	1.2L			10
1.3			1.3C			1.3F	1.3G	1.3H	1.3J	1.3K	1.3L			7
1.4		1.4B	1.4C	1.4D	1.4E	1.4F	1.4G						1.4S	7
1.5				1.5D										1
1.6												1.6N		1
1.1-1.6 Σ	1	3	4	4	3	4	4	2	3	2	3	1	1	35

CHAPTER 3 - HAZARD CLASSIFICATION OF AMMUNITION AND EXPLOSIVES

Section I - Classification Procedures

3.1.1. Introduction

Having determined that the substance or article belongs to Class 1, the purpose of the hazard classification is to assign the correct HD. The tests determine which HD (1.1, 1.2, 1.3, 1.4, 1.5, or 1.6) corresponds most closely to the behaviour of the ammunition or explosive if it should be involved in an accidental fire or explosion, resulting from internal or external sources during storage or transport.

3.1.2. Classification procedure

The classification procedure must be undertaken before a new product is offered for transport. In this context a new product is one which, in the opinion of the competent authority, involves any of the following:

1. A new explosive substance or a combination or a mixture of explosive substances which is considered to be significantly different from other combinations or mixtures already classified.

2. A new design of article or an article containing a new explosive substance or a new combination or mixture of explosive substances.

3. A new design of package for an explosive substance or article including a new type of inner packaging. The importance of this can be overlooked unless it is realized that a relatively minor change in an inner or outer packaging can be critical and can convert a lesser risk into a greater risk (e.g., mass fire into mass explosion).

4. A unit load unless all the packages have an identical hazard classification code. The resultant classification code should be applied to the unit load as a whole, treating it as if it were a package for the purposes of marking and labeling.

3.1.3. The producer or other applicant for classification of a product must provide adequate information concerning the names and characteristics of all explosive substances in the product and must furnish the results of all relevant tests which have been done. It is assumed that all the explosive substances in a new article have been properly tested and then approved.

3.1.4. In practice, the compatibility group is assigned first, and the HD is assigned next, as shown in Table 1. This table summarizes the relevant characteristics of the whole range of ammunition in terms of

the Classification Codes. Assignment of the appropriate compatibility group is usually obvious from the description of the ammunition. Where there is doubt about the interpretation of the definition of the compatibility groups, it may be helpful to consult lists of classification of existing, similar types of ammunition. Compatibility Groups N and S are exceptional in that testing or other assessment of the effect of explosion in the article or package is a prerequisite for assignment to these Groups.

3.1.5. Table 1 shows that usually an article or package complying with the definition of a particular compatibility group can have alternative Classification Codes dependent upon the hazard. The hazard depends on the nature and quantity of explosive substance, the type of packaging and other factors.

3.1.6. Although it is helpful to predict the hazard by reference to similar ammunition, undue reliance on such an expedient can be dangerously misleading. An apparently minor difference in construction or packaging can be critical and make a significant difference to the effect of explosion, thus necessitating a change in the hazard assessment and Classification Code. It is for this reason that great importance must be attached to actual tests.

3.1.7. Reclassification

The hazard classification of a particular type of ammunition or explosive must be reviewed when a modification has been effected which is recognized as significant by the relevant competent National Authority. This usually means the introduction of:

1. A new design of article or an existing article containing a new explosive substance or mixture of explosive substances, or

2. A new design of package for an explosive article, including a new type of inner packaging. A relatively minor change in inner or outer packaging can be critical and may convert a single article risk into a mass explosion risk.

Section II – Classification Tests

3.2.1 Application

1. The tests must be applied to packaged ammunition or explosives, in the condition and form in which they are offered for storage and transport. Where ammunition is to be carried without packaging, the tests must be applied to the non-packaged ammunition.

2. Except as written in paragraph 3.2.3. below, all types of ammunition or explosives of HD other than HD 1.1 must be subjected to the appropriate tests.

3.2.2. Effect of Package on Classification

As the packaging may have a decisive effect on the classification, particular care must be taken to ensure that the correct classification is determined for each configuration in which ammunition and explosives are stored or transported. Therefore every significant change in the packaging (e.g., degradation) may well affect the classification awarded.

3.2.3. Waiving of Tests

The classification tests may be waived if:

1. The ammunition or explosive and the packaging can be unambiguously assigned to a hazard division on the basis of results from other tests or of available information; or

2. The packaged explosives are assigned to HD 1.1.

3.2.4. Safety Precautions

a) Test location:

The tests must be carried out at an adequately equipped explosives laboratory or test station by trained scientists or technicians under the direction of an experienced explosives expert. Prior to carrying out the programmme of hazard classification, it may be desirable to carry out preliminary laboratory tests. Data as to design and filling may generally be available from acceptance tests, particularly for military items. However, if not, preliminary tests may therefore have to be done in order to ascertain the physical and explosive nature of the product to be tested.

b) Test precautions:

Special safety measures should be taken to secure ammunition which can take flight in the course of tests (e.g., rockets, rocket motors). A cage of adequate size and strength is a suitable means.

c) Observations on blast and projections:

When reasonably practicable, it is recommended that observations on blast and projections be made during the tests, in order to improve the basis of the "Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives (AASTP-1)". Such data should be reported together with the results of the tests.

3.2.5. Test Report

The results shall be recorded in accordance with the requirements of the national authorities but should be in a format to permit easy extraction of the required data.

3.2.6. Information

Where a nation wishes to obtain supporting information on any particular classification, they should apply to the appropriate National Competent Authority of the nation responsible for the original classification (see Annex D).

3.2.7. Procedure for Assignment of HD

The scheme is given by Figure 3. The test series are listed in Annex C.

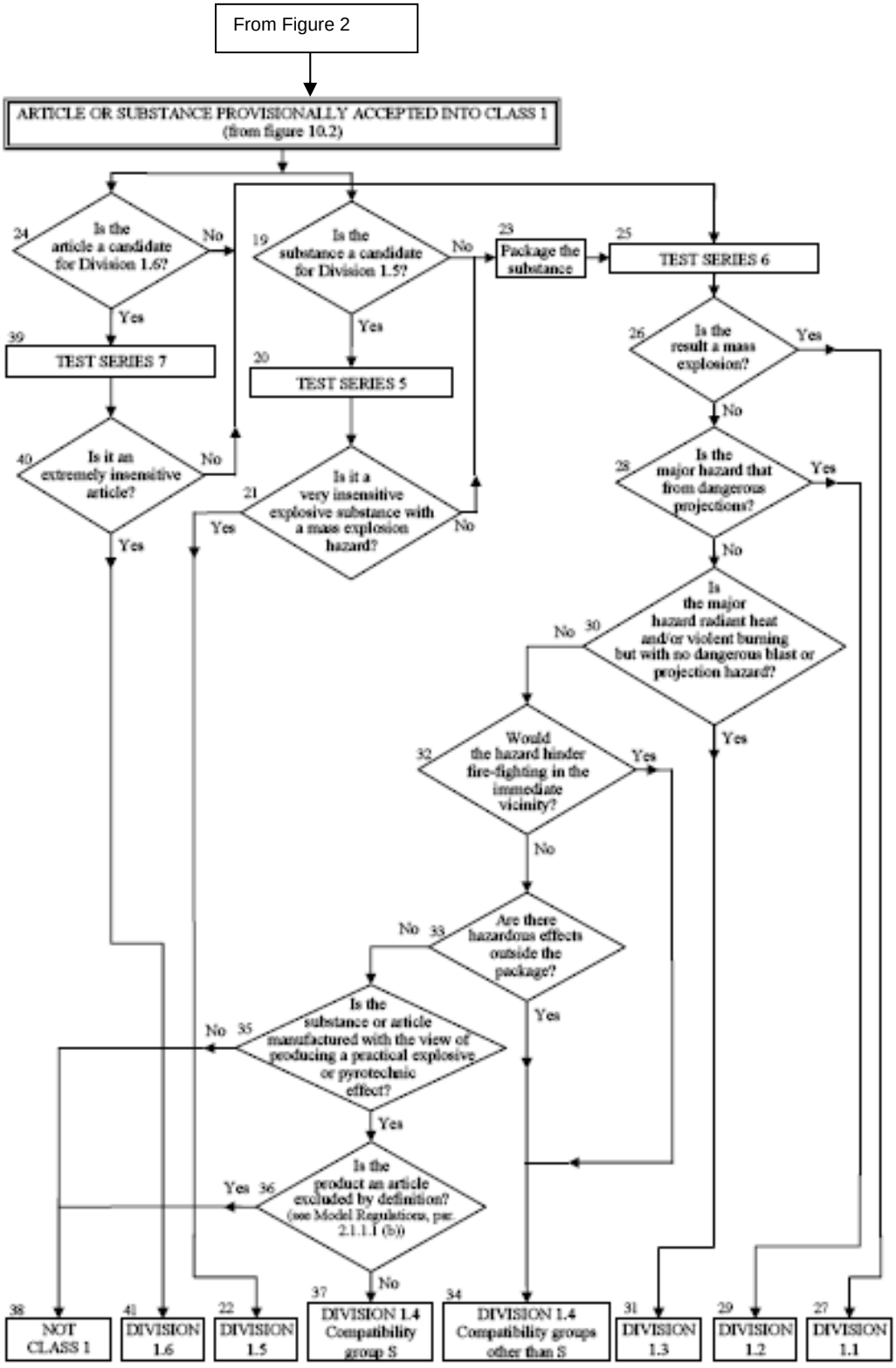

Figure 3 - Procedure for assignment of hazard division
(taken from reference document 3, U.N. Recommendations on the Transport of Dangerous Goods, Model Regulations, Volumes I and II, 16th Revised Edition, 2009)

Section III - Assessment of Test Results

3.3.1. U.N. Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (reference 4)

It should be noted that reference 4 is neither a text book on explosive testing nor is it a concise formulation of testing procedure that will unerringly lead to a proper classification of ammunition or explosives. It therefore assumes competence on the part of the testing authority and leaves responsibility for the act of classification with the National Competent Authority. The competent authority has the discretion to dispense with certain tests, to vary the details of tests, and to require additional tests when this is justified to obtain reliable and realistic assessments of the hazard of the ammunition or explosives. In each NATO country there is a competent authority responsible for the classification of military explosives (see Annex E).

3.3.2. Assessment of results

Ammunition and explosives are classified in light of the test results, of the sentencing criteria contained in reference 4 and of other relevant data in accordance with the characteristics of the divisions of Class 1. Sometimes the observed hazard effects may vary among replicate tests or may not correspond exactly to the definitions. When this occurs, the competent authority uses its judgment or arranges for further testing. It is prudent to err on the side of caution, particularly in the crucial decision as to whether or not an article is susceptible to mass explosion.

3.3.3. Assignment to Hazard Divisions

a) An ammunition item or explosive shall be assigned to the HD which corresponds to the results of the tests to which the item or explosive as packed for storage and transport, has been subjected. Other test results, and data assembled from accidents which have occurred, may also be taken into account.

b) Ammunition or explosive as packed for storage and transport shall be assigned to HD 1.1, if in the stack or external fire test, an explosion of virtually the entire contents occurs practically instantaneously.

c) Ammunition or explosive shall be assigned to HD 1.2, if in the stack or external fire test:

1. Only a few items explode at one time, and

2. Dangerous projections present the major hazard

d) Ammunition or explosive shall be assigned to HD 1.3, if in the single package, the stack or external fire tests:

1. Violent burning occurs, and
2. No dangerous blast or projections are produced , and
3. Radiant heat constitutes the major hazard

e) Ammunition or explosive shall be assigned to HD 1.4, if during the stack or external fire test:

1. Burning of low violence with moderate radiation of heat occurs, and
2. No dangerous blast or projections are produced

f) Ammunition or explosives so packaged or designed that any hazardous effects arising from accidental functioning are confined within the package, unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder fire-fighting or other emergency response efforts in the immediate vicinity of the package, are assigned to HD 1.4, Compatibility Group S.

g) A packaged substance that passes all three Test Series 5 type tests will be assigned to HD 1.5. For storage purposes, HD 1.5 is treated as HD 1.1.

h) Articles and their explosives contents that pass all applicable Test Series 7 type tests will be assigned to HD 1.6.

Section IV - Assignment to Proper Shipping Name and UN-Number

3.4.1. After being assigned to a HD and compatibility group in conformity with Chapter 3 Sections II and III, the combination of Classification Code and Proper Shipping Name permits identification of the appropriate UN-Number for the substance or article. Specific definitions of Proper Shipping Names can be found in reference document 3.

Section V - Special Cases

3.5.1. Inert Ammunition

Ammunition which does not contain any explosive or other dangerous goods (for instance dummy bombs, cartridges and projectiles) is excluded from the system of hazard classification.

3.5.2. Toxic Ammunition

Ammunition containing an explosive dispersing charge and a toxic chemical agent is assigned to the appropriate hazard division on the basis of the explosive hazard. If the toxic hazard is the dominant effect the ammunition is assigned to Class 6 of the U.N. International System of Classification for transport purposes. For storage purposes such items may be assigned to an appropriate hazard division and Compatibility Group K with a subsidiary risk label.

3.5.3. Pyrotechnic Ammunition

Chemical ammunition containing tear-gas, a corrosive smoke agent, white phosphorus, Napalm etc. without explosives is assigned to the appropriate class (6, 8 etc.) of the U.N. International System of Classification for transport purposes. For storage purposes such items may be assigned to HD 1.3 or HD 1.4 as appropriate and a compatibility group.

3.5.4. Depleted Uranium (DU) Ammunition

Ammunition containing DU in the form of a penetrator or projectile is assigned to the Hazard Classification appropriate to the explosives content of the ammunition only. The normal storage rules associated with the Hazard Classification may need to be modified to take account of the slight radioactivity and chemical toxicity of DU and therefore rules may be prescribed for DU ammunition as a separate class of ammunition, or for specific types of DU ammunition (see reference 6, AASTP-1).

3.5.5. Classification of Unit Loads

Unit Loads or transport units which contain ammunition of mixed Compatibility Groups C, D and E and mixed HD (e.g., HD 1.1D, HD 1.2D and HD 1.3C) must be allocated an overall classification code for the unit load or transport unit. The appropriate HD (e.g., 1.1 through1. 6) is determined by applying the mixing rules as contained in Chapter 5 of this Manual.

3.5.6. Sensitivity Group (SG) Assignments for HD 1.1 and HD 1.2 Ammunition and Explosives

1. Sensitivity group is a classification category used to describe the susceptibility of HD 1.1 and HD 1.2 AE to sympathetic detonation (SD). The five sensitivity group (SG) categories are: Robust, Non-Robust, Fragmenting, Cluster bombs/ dispenser munitions, and SD Sensitive.

2. For the purpose of storage within specific structures (e.g., US High Performance Magazine) or where walls are used to prevent, or at least substantially delay, transmission of explosion between ammunition and explosives on opposite sides of the wall, all HD 1.1 and HD 1.2 ammunition can be assigned (based on their physical attributes) to one of the five SG listed in Table 3, using the assignment methodology given in figure 4. Reassignment to a different SG is appropriate, provided specific testing or analyses support the move.

3. Directional (focused) HE effect ammunition greater than 38.1 mm in diameter is further identified by assigning the suffix "D" following the SG designation (e.g., SG2D), as shown in Figure 5. Directional (focused) HE effect ammunition characteristics include a high-speed, molten metal jet and slug designed to penetrate very thick structural elements composed of dense material. The jet and slug may impact and cause detonation of acceptor ordnance. The severity of this hazard increases as warhead size and explosive weight increase.

4. Background. Flyer plate impact tests were conducted by the USA to determine reaction threshold limits for groups of HD 1.1 and 1.2 ammunition and explosives items with similar sensitivities. Those limits identify acceptor ammunition and explosives' maximum, allowable unit impulse and energy loads to prevent sympathetic detonation (see Table 4). This is turn lead to the development of sympathetic detonation design criteria for the five Sensitivity Groups based on allowable unit impulse loads, the unit kinetic energy of the wall used to prevent propagation, and the velocity of that wall, the sum of which must all be less than or equal to the threshold limits of the acceptor ordnance in order to prevent SD.

5. Reference 6 (AASTP-1) provides information on the application of sensitivity groups. Assignment of sensitivity groups is important for those siting scenarios that desire to take advantage of reduced separation distances because of the presence of ammunition that may be less vulnerable to those effects which cause sympathetic detonation.

TABLE 3. HD 1.1 AND 1.2 AMMUNITION SENSITIVITY GROUP ASSIGNMENT[2]

Sensitivity Group	Criteria	Typical Types
1 - Robust[1]	High Explosive Weight (HEW)/empty warhead or projectile case weight < 1.0 Warhead or projectile minimum case thickness > 1.0 cm Scaled warhead or projectile minimum case thickness (minimum case thickness/$NEQ^{1/3}$)> 1.65 $cm/kg^{1/3}$	20 mm, 25 mm, and 30 mm cartridges Mk80 Series General Purpose Bombs
2 – Non-Robust	Does not meet the criteria for assignment to SG1, SG3, SG4 or SG5, or HD 1.2 cluster bombs/ dispenser munitions	Missiles, rockets and underwater mines
3 – Non-Robust, Fragmenting	Does not meet the criteria for assignment to SG1, and warhead or projectile case designed for specific fragmentation	Air-to-air missiles with preformed fragment warheads, scored warhead cases, or continuous rod warheads
4 - Cluster bombs/ dispenser munitions	Munitions containing sub-munitions	CBU-87 and CBU-97
5 – SD Sensitive	Ammunition (acceptors) not afforded protection by non-propagation walls (i.e., sympathetic detonation sensitive ammunition) or where such susceptibility is unknown, and very thin-skinned ammunition where scaled warhead or projectile minimum case thickness (minimum case thickness/$NEQ^{1/3}$) < 0.132 $mm/kg^{1/3}$	Detonators and other similar initiating devices, demolition explosives, sheet explosives, and bare explosives

Notes:

1. Ammunition and explosives (AE) must meet two of the three criteria for consideration as SG1.
2. Sensitivity to external stimuli generally increases as the sensitivity group number increases.

Figure 4. Sensitivity Group Assignment Methodology

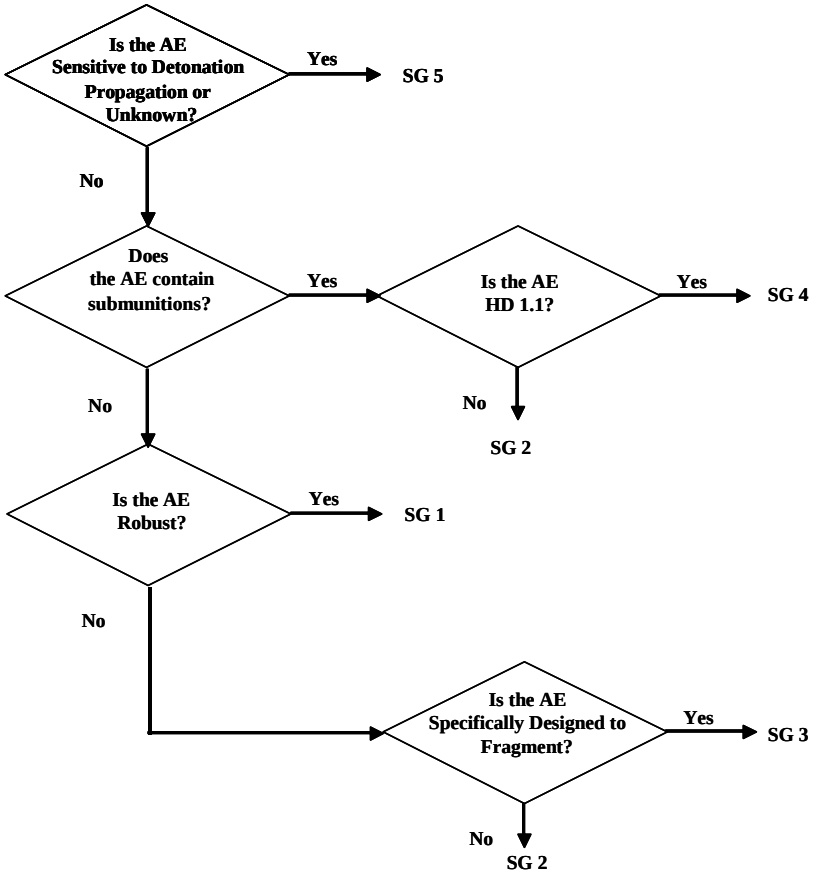

Figure 5. Directional (focused) HE Effect Designator Assignment Methodology

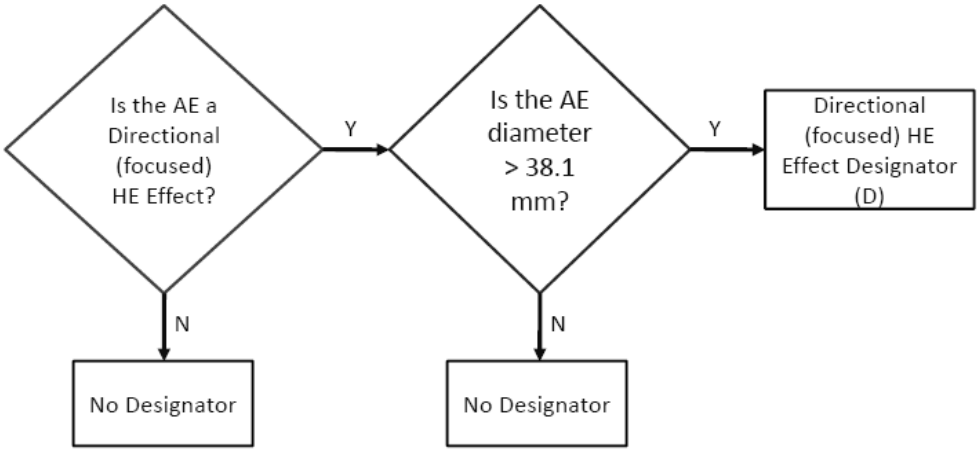

Table 4 – Summary of Sympathetic Detonation Threshold Criteria for Sensitivity Groups

SENSITIVITY GROUP NUMBER	GROUP DESCRIPTION	UNIT LOADS	
		IMPULSE	ENERGY
		(kPa-s)	MJ/m^2)
1	Robust	310.3	51.5
2	Non-Robust	462.0	51.5
3	Fragmenting	365.4	17.9
4	Cluster Bombs/ Dispenser Munitions	176.5	7.93
5	SD Sensitive	36.1	0.63

CHAPTER 4 - DETERMINATION OF THE NET EXPLOSIVES QUANTITY

Section I - Introduction

4.1.1. NEQ determination is a necessary and important part of the assessment of the hazards induced by a single munition or a set of them (unit load or transport unit or storage place).

4.1.2.

a) For the purpose of storage, it is necessary to determine the amount of explosive substance to use for computing Quantity-Distances, and this amount must be expressed in such a way that it is possible to use the Quantity-Distances (Q/D) tables (see reference 6, AASTP-1) to determine the distances required.

b) The Quantity-Distances (Q/D) tables give the minimum distances between a Potential Explosion Site (PES) and an Exposed Site (ES). These are necessary to determine whether an acceptable risk exists in case of an explosion for persons and materiel assets that would be exposed.

For instance, the tables will provide the minimum distance to ES, such as inhabited buildings (Inhabited Building Distance, IBD), or to public roads (Public Traffic Route Distance, PTRD) from a PES.

c) The tables have been determined by using data from accidents or tests where the PES was a charge in a certain configuration, called reference charge (e.g., a bare charge of TNT in case of HD 1.1). Thus the amount of explosive substance contained in the munition should be expressed in terms of equivalent charges whenever it is possible.

d) The Net Explosives Quantity (NEQ) is the total explosives content of the ammunition unless it has been determined that the effective quantity is significantly different from the actual quantity. It does not include such substances as white phosphorus, war gases or smoke and incendiary compositions unless these substances contribute significantly to the dominant hazard of the hazard division concerned.

4.1.3. For the purpose of transport the Net Explosives Mass (NEM) or Net Explosives Weight (NEW) is regarded to be the total net mass (in kg) of explosive substances, or in the case of explosive articles, the total mass (in kg) of explosive substances contained in all the articles.

Section II - General rules

4.2.1. Determination of the NEQ of a single munition

The NEQ of a single munition is the total explosive contents (NEM) of the munition unless it has been determined (e.g., by testing) that the explosive effects of the munition significantly differ from the explosive effects expected from that quantity (e.g., there is no contribution from a rocket motor in an all-up missile).

4.2.2. Determination of the NEQ of a set of munitions

The NEQ of a set of identical munitions (e.g., unit load) is obtained by adding together the NEQ of each munition, unless it has been determined (e.g., by testing) that the explosive effects of the set significantly differ from the explosive effects expected from that quantity.

The NEQ of a set of munitions of different classifications (e.g., a storage unit) depends on the classification of ammunition. The mixing rules for hazard divisions and compatibility groups are given in Chapter 5. Determination of the NEQ is then obtained as explained above.

Section III - Net Explosives Quantity in storage

4.3.1. The NEQ and NEM do not include such substances as white phosphorus, war gases or smoke and incendiary compositions, unless these substances contribute significantly to the dominant hazard of the hazard division concerned.

4.3.2. Where two or more PES are not separated by the appropriate inter-magazine distances, they are considered as a single site, and the aggregate net explosives quantity is used for determining Quantity - Distances. If two or more hazard divisions are involved, the principles in Chapter 5 apply.

CHAPTER 5 - RULES FOR THE MIXING OF AMMUNITION

5.1. Introduction

For practical needs in transport and storage, it may be contemplated to mix ammunition or explosives of different hazard divisions and different compatibility groups. A proper balance of the interest of safety against the other relevant factors must be observed. Rules hereafter are given for transport (Section I) and for storage (Section II).

Section I - Transport

5.1.1. Principles

Ammunition and explosives must not be loaded together with other goods, which may increase the danger (e.g., flammable, oxidising, corrosive and combustible materials). The cargo space should be clean, dry and well ventilated. Adjacent cargo spaces not containing ammunition may only be loaded with non-flammable goods. The required transportation rules are defined in reference 8, AASTP-2.

Mixing of compatibility group can/will vary depending on the type of transportation being used (e.g., truck, rail, barge, or ship). Because most transport is with truck, Table 5 reflects this means of transportation; however, refer to National regulations to ensure that all requirements are being met. When shipping between or through Nations, it's important to meet requirements of all Nations involved. Reference 8, AASTP-2, provides additional guidance in this area.

5.1.2. Transport of Compatibility Groups

The transport of ammunition containing both an explosive and a toxic chemical agent (CG K) is prohibited in all modes of transport except for sea transport. The transport of the articles must be left to the discretion of the nation's national authorities as it is subject to waivers to be granted nationally, and to international special agreements. Nations will give appropriate information in their national annexes.

5.1.3. Mixed loads - Compatibility groups

Ideally ammunition and explosives belonging to the same compatibility group should be loaded together, however, when this is not possible to achieve, loading is permissible in accordance with Table 5.

Table 5 - Mixing of Compatibility Groups in Transport

Compatibility group	A	B	C	D	E	F	G	H	J	K	L	N	S
A	X												
B		X		1	1	1							X
C			X	2	2		3					4	X
D		1	2	X	2		3					4	X
E		1	2	2	X		3					4	X
F		1				X							X
G			3	3	3		X						X
H								X					X
J									X				X
K										X			X
L											5		
N			4	4	4							6	7
S		X	X	X	X	X	X	X	X	X		7	X

X = mixed loading authorised.

1. Quantities as required meeting all foreseen operational requirements, hazard division 1.1 compatibility group B fuzes may be transported with other items of ammunition in compatibility groups D, E or F of which the fuzes are components. When so loaded, the compatibility group is to be that of the assembled item.

2. Any combination of explosives from compatibility groups C, D, or E is assigned to compatibility group E.

3. Explosive articles in compatibility group G, other than fireworks and those requiring special stowage, may be stowed with articles of compatibility groups C, D and E, provided no explosive substances are carried in the same vehicle.

4. Any combination of explosives from compatibility groups C, D, or E with those in compatibility group N is assigned to compatibility group D.

5. Ammunition and explosives of Compatibility Group L shall not be loaded together with ammunition and explosives of other Compatibility Groups. Furthermore ammunition and explosives of Compatibility Group L should only be loaded with the same type of ammunition and explosives within Compatibility Group L.

6. It is allowed to mix HD 1.6N ammunition. The compatibility group of the mixed set remains N if the ammunition belongs to the same family or if it has been demonstrated that, in case of a detonation of one munition, there is no instant transmission to the munitions of another family. If this is not the case the whole set of ammunition should be considered as having the characteristics of compatibility group D and the compatibility groups mixing rules apply accordingly.

7. A mixed set of ammunition HD 1.6N and HD 1.4S may be considered as having the characteristics of compatibility group N.

5.1.4. Mixed loads - Hazard divisions

It is permissible to load ammunition and explosives of different hazard divisions into the same vehicle, providing the conditions of paragraph 5.1.3 are met. The mixed load as a whole shall be treated as if it belonged to the most dangerous hazard division in the order HD 1.1, HD 1.5, HD 1.2, HD 1.3, HD 1.6 and HD 1.4. However, the net mass of explosives of compatibility group S shall not count towards the limitation of quantities carried.

Where substances of HD 1.5 are carried in one transport unit with substances and articles of HD 1.2, the entire load shall be treated for carriage as if it belonged to HD 1.1.

5.1.5. Prohibition of Mixed Loading in a Container

a) The prohibition of mixed loading of goods laid down in paragraph 5.1.3 shall apply within each container.

b) The provisions of paragraph 5.1.3 shall apply as between the dangerous goods in a container and the other dangerous goods loaded on the same vehicle, whether or not the latter goods are enclosed in one or more containers.

5.1.6. Prohibition of Mixed Loading with other Dangerous Goods

Packaging bearing a label for ammunition and explosives (Class 1) shall not be loaded together in one vehicle or container with packages bearing a label assigned for goods of Class 2 to 9.

Section II - Storage

5.2.1. Mixed storage

Ammunition and explosives of different hazard divisions may be stored together if compatible. The required quantity-distances and the permitted quantities must be determined in accordance with AASTP-1.

5.2.2. Storage limitations

The rules which apply to the mixing of hazard divisions and compatibility groups in above ground storage are detailed below. Special rules apply to underground storage.

The basic rules are given in the form of two tables as follows:

TABLE 6: Aboveground Storage - Mixing and Aggregation Rules for Hazard Divisions and Storage Sub-Divisions.
TABLE 7: Mixing of Compatibility Groups in Aboveground Storage.

Special circumstances are addressed at paragraph 5.2.3 and suspect ammunition and explosives at paragraph 5.2.5.

Mixed Hazard Divisions (HD) and Storage Sub-divisions (SsD) should be aggregated as shown below in the Table 6:

Table 6 - Aboveground Storage - Mixing and Aggregation Rules for Hazard Divisions and Storage Sub-Divisions

HD/SsD	1.1	1.2.1	1.2.2	1.2.3	1.3.1	1.3.2	1.4	1.5	1.6
1.1	1.1	1	1	1	1.1	1.1	3	1.1	1.1
1.2.1	1	1.2.1	2	2	2, 6	2, 6	3	1	4
1.2.2	1	2	1.2.2	2	2, 6	2, 6	3	1	4
1.2.3	1	2	2	1.2.3	2	2	3	1	4
1.3.1	1.1	2, 6	2, 6	2	1.3.1	5	3	1.1	4
1.3.2	1.1	2, 6	2, 6	2	5	1.3.2	3	1.1	4
1.4	3	3	3	3	3	3	1.4	3	3
1.5	1.1	1	1	1	1.1	1.1	3	1.1	1.1
1.6	1.1	4	4	4	4	4	3	1.1	1.6

NOTES:

1) Select the larger QD associated with the following:

   a) Aggregate the NEQ for the HD 1.1 or HD 1.5 material and the HD 1.2 material and treat as HD 1.1.
   b) Consider only the HD 1.2 NEQ and apply appropriate HD 1.2 criteria.

2) The NEQ of the mixture is the NEQ of the sub-division requiring the largest QD. Do not aggregate the various SsD present, but determine QD for each individually.

3) HD 1.4 may be stored with any other HD without aggregation of the NEQ.

4) Treat the HD 1.6 material as SsD 1.2.3 and apply Note 2.

5) Sum the NEQ and use the larger QD associated with the following:

   a) Treat as SsD 1.3.1.
   b) Treat as SsD 1.3.2.

6) There is a significant risk that, in certain circumstances, a mix of SsD 1.2.1 and 1.2.2 and HD 1.3 will behave as an aggregated quantity of HD 1.1.

   If any of the following circumstances exists the mix must be aggregated as HD 1.1 unless relevant trials or analyses indicate otherwise:

   a) The presence of HD 1.2 shaped charges
   b) High energy propellants (e.g., as used in some tank gun applications)
   c) High loading density storage of HD 1.3 in conditions of relatively heavy confinement
   d) HD 1.2 articles with an individual NEQ > 5 kg

   There may also be other circumstances, not yet defined, under which the mix should be aggregated as HD 1.1.

Compatibility groups may be mixed in aboveground storage as shown in the following table:

Table 7 – Mixing of Compatibility Groups in Aboveground Storage

Compatibility Group	A	B	C	D	E	F	G	H	J	K	L	N	S
A	X												
B		X	1	1	1	1	1						X
C		1	X	X	X	2	3					5	X
D		1	X	X	X	2	3					5	X
E		1	X	X	X	2	3					5	X
F		1	2	2	2	X	2, 3						X
G		1	3	3	3	2, 3	X						X
H								X					X
J									X				X
K										X			
L											4		
N			5	5	5							7	6
S		X	X	X	X	X	X	X	X			6	X

LEGEND: X = Mixing permitted

NOTES

1) Compatibility Group B fuzes may be stored with the articles to which they will be assembled, but the NEQ must be aggregated and treated as Compatibility Group F.
2) Storage in the same building is permitted if effectively segregated to prevent propagation.

3) Mixing of articles of Compatibility Group G with articles of other compatibility groups is at the discretion of the National Competent Authority.

4) Compatibility Group L articles must always be stored separately from all articles of other compatibility groups as well as from all other articles of different types of Compatibility Group L.

5) Articles of compatibility N should not in general be stored with articles of other Compatibility Groups except S. However if such articles are stored with articles of Compatibility Groups C, D and E, the articles of Compatibility Group N should be considered as having the characteristics of Compatibility Group D and the compatibility groups mixing rules apply accordingly.

6) A mixed set of munitions HD 1.6N and HD 1.4S may be considered as having the characteristics of Compatibility Group N.

7) It is allowed to mix HD l.6N ammunition. The Compatibility Group of the mixed set remains N if the ammunition belongs to the same family or if it has been demonstrated that, in case of a detonation of one munition, there is no instant transmission to the munitions of another family (the families are then called “compatible”). If it is not the case the whole set of ammunition should be considered as having the characteristics of Compatibility group D and the compatibility groups mixing rules apply accordingly.

5.2.3. Mixed Storage - Special Circumstances

a) There may be special circumstances where the above mixing rules may be modified by the National Competent Authority subject to adequate technical justification based on tests where these are considered to be appropriate.

b) Very small quantity HD 1.1 and large quantity HD 1.2.

It should be possible to arrange storage in such a manner that the mixture will behave as HD 1.2.

c) Mixing of HD 1.1, HD 1.2 and HD 1.3.

The quantity distance to be applied in these unusual circumstances is that which is the greatest when considering the aggregate NEQ as HD 1.1, HD 1.2 or HD 1.3.

d) With the exception of substances in Compatibility Group A, which should not be mixed with other compatibility groups, the mixing of substances and articles is permitted as shown in Table 7.

5.2.4. Determination of the NEQ of a set of munitions of different classifications

See Chapter 4, Section II.

5.2.5. Suspect Ammunition and Explosives (Mixed storage)

Suspect ammunition and explosives must not be stored with any other ammunition and explosives.

ANNEX A - RESERVED

ANNEX B - TESTS AND CRITERIA FOR ASSESSING CLASS 1

The tests for acceptance in class 1 are grouped into four series of tests (further tests relate to the determination of the correct hazard division; see annex C).

The numbering of these tests relates to the sequence of assessing results rather than the order in which the tests are conducted. Nevertheless it is important for the safety of experiments that certain preliminary tests using small quantities be conducted first, before proceeding to experiment with larger quantities. The result of such preliminary tests may also be used in the classification procedure.

THE TESTS AND SENTENCING CRITERIA ARE FULLY DETAILED IN RELATED DOCUMENT NO. 4 AND THIS DOCUMENT SHOULD ALWAYS BE REFERRED TO. A BRIEF DESCRIPTION OF THE TESTS AND THEIR PURPOSE IS GIVEN BELOW. A COMPLETE LISTING OF NATO-ACCEPTED TESTS IS GIVEN LATER IN THIS ANNEX.

TESTS SERIES

Acceptance Tests

a) Test Series 1.

Applied to substance and designed to answer the question "Is it an explosive substance?" Consists of three types of tests as follows:

(1) Type 1(a): for determining propagation of detonation;

(2) Type 1(b): for determining the effect of heating under confinement;

(3) Type 1(c): for determining the effect of ignition under confinement.

b) Test Series 2.

Applied to substance and designed to answer the question "Is the substance too insensitive for acceptance in class 1?". Consists of three types of tests as follows:

(1) Type 2(a): for determining sensitivity to shock;

(2) Type 2(b): a test to determine the effect of heating under confinement;

(3) Type 2(c): for determining the effect of ignition under confinement.

NOTE: Test series 2 trials are essentially the same as those for test series 1. Series 2 tests have different pass/fail criteria from test series 1.

c) Test Series 3.

Applied to substances and designed to answer the question "Is the substance too hazardous for transport (in the form in which it was tested)?". Consists of four types of tests as follows:

(1) Type 3(a): for determining sensitiveness to impact;

(2) Type 3(b): for determining sensitiveness to friction (including impacted friction);

(3) Type 3(c): for determining thermal stability of a substance;

(4) Type 3(d): for determining the response of a substance to fire.

d) Test Series 4.

Applied to packaged and unpackaged ammunition and to packaged explosives and designed to answer the question "Is the article, packaged article or packaged substance too hazardous for transport?". This Test Series consists of two types of tests as follows:

(1) Type 4(a): a test of thermal stability for articles;

(2) Type 4(b): a test to determine the danger from dropping.

ANNEX B
AASTP-3
(Edition 1)

LISTING OF NATO ACCEPTED TESTS

Test No.	Test Name	Country of origin	Reference to UN Test Manual	
			Section	Page
Test Series 1				
Type 1(a):				
	UN Gap Test for Solids and Liquids	UN	11.4.1	32
Type 1(b):				
	Koenen Test	DEU	11.5.1	35
Type 1(c):				
(i)	Time/pressure Test	GBR	11.6.1	41
(ii)	Internal Ignition Test	USA	11.6.2	48
Test Series 2				
Type 2(a):				
	UN Gap Test for Solids and Liquids	UN	12.4.1	51
Type 2(b):				
	Koenen Test	DEU	12.5.1	54
Type 2(c):				
(i)	Time/pressure Test	GBR	12.6.1	60
(ii)	Internal Ignition Test	USA	12.6.2	67
Test Series 3				
Type 3(a):				
(i)	Bureau of Explosives Impact Machine	USA	13.4.1	71
(ii)	BAM Fallhammer	DEU	13.4.2	76
	STANAG 4489, Edition 1, BAM Impact Machine - Acceptable alternate Test, with the appropriate criterion being: "+" (i.e., positive/fail) occurring when E-bar/10^(log(E-bar)-A*s) $\leq$ 2 J. Where "s" is the standard deviation on a logarithmic scale as determined by the Bruceton analysis given in STANAG 4489. In the equation given above, the value for "A" = 1.			
(iii)	Rotter Test	GBR	13.4.3	84

STANAG 4489, Edition 1, Rotter Impact Machine - Acceptable alternate test using hazard classification test dimensions and pass/fail criteria.

(iv)	30 kg Fallhammer Test	FRA	13.4.4	91
(v)	Modified Type 12 Impact Tool	CAN	13.4.5	94
(vi)	Impact Sensitivity Test	RUS	13.4.6	98

Type 3(b):

(i)	BAM Friction Apparatus	DEU	13.5.1	105

STANAG 4487, Edition 1, BAM Friction Machine - Acceptable alternate test using hazard class pass/fail criterion of 80N. If the determination of the initial load for Bruceton protocol, per STANAG 4487, yields a value less than 80N, the material is considered to have failed the friction test.

(ii)	Rotary Friction Test	GBR	13.5.2	109

STANAG 4487, Edition 1, Rotary Friction Machine - Acceptable alternate test using hazard classification test dimensions and pass/fail criteria. The Figure of Friction (F of F) for the material being tested, calculated as directed in STANAG 4487, should be no less than the Running Mean (RM) value for Standard RDX measured on the apparatus.

(iii)	Friction Sensitivity Test	USA	13.5.3	112

Type 3(c):

	Thermal Stability Test @75º C	FRA/ USA	13.6.1	117

Type 3(d):

	Small Scale Burning Test	FRA/ USA	13.7.1	120

Test Series 4

Type 4(a):

	Thermal Stability Test for Unpackaged Articles and Packaged Articles	USA	14.4.1	123

Type 4(b):

(i)	Steel Tube Drop Test for Liquids	FRA	14.5.1	125
(ii)	12 Metre Drop Test for Articles, Packaged Articles and Packaged Substances	USA	14.5.2	127

STANAG 4375 Edition 2, Safety Drop Test - Acceptable alternate test using hazard classification test dimensions and pass/fail criteria.

ANNEX C - TESTS AND CRITERIA FOR ASSESSING HAZARD DIVISIONS

After ensuring that the substance or article is appropriately placed in Class 1 (see Annex B), Test Series 5, 6 and 7 are then used for determining the appropriate hazard division. The numbering of these tests relates to the sequence of assessing results rather than the order in which the tests are conducted.

a. Test Series 5 is used to determine whether a substance can be assigned to Hazard Division 1.5.

b. Test Series 6 is used for the assignment of substances and articles to Hazard Divisions 1.1, 1.2, 1.3 and 1.4.

c. Test Series 7 is used for the assignment of articles to Hazard Division 1.6.

Assessment of the correct hazard division is usually made on the basis of test results. A substance or article shall be assigned to the hazard division which corresponds to the results of the tests to which the substance or article, as offered for transport, has been subjected. Other test results, and data assembled from accidents which have occurred, may also be taken into account. From a safety perspective, it is important to consider that certain preliminary tests using small quantities may be necessary first, before proceeding to experiment with larger quantities. The results of such preliminary tests may also be used in the classification procedure.

With the exception of the sentencing criteria for SsD 1.2.3 specified herein, the tests and sentencing criteria are fully detailed in reference 4, which should always be referred to. Descriptions of the tests and their purpose are given below and a complete listing of NATO accepted tests is included in this annex.

Tests to determine the hazard division

a) Test series 5:

Applied to substances and designed to answer the question "Is it a very insensitive explosive substance (with a mass explosion hazard)?". Any candidate for HD 1.5 must pass all of the following three types of tests:

(1) Type 5(a): a shock test to determine the sensitivity to intense mechanical stimulus;
(2) Type 5(b): thermal tests to determine the tendency of transition from deflagration to detonation;
(3) Type 5(c): a test to determine if a substance, when in large quantities, explodes when subjected to a large fire.

b) Test Series 6:

Tests to determine the correct hazard division (between 1 through 4) to be applied to packaged and unpackaged ammunition and to packaged explosives. Generally consists of the four types of tests below; however, reference 17 (STANAG 4396) and reference 10 (STANAG 4240) are preferred substitutes for Types 6(b) and 6(c) testing, respectively, and reference 11 (STANAG 4241) and reference 13 (STANAG 4382) are additionally applicable when attempting to achieve an SsD 1.2.3 classification.

(1) Type 6(a) (Single Package Test): a test on a single package to determine if there is mass explosion of the contents.

(2) Type 6(b) (Stack Test): a test on packages of an explosive substance or explosive articles, or non-packaged explosive articles, to determine whether an explosion is propagated from one package to another or from a non-packaged article to another.

(3) Type 6(c) (External Fire (Bonfire) Test): a test on packages of an explosive substance or explosive articles, or non-packaged explosive articles, to determine whether there is a mass explosion or a hazard from dangerous projections, radiant heat and/or violent burning or any other dangerous effect when involved in a fire.

(4) Type 6(d) (Unconfined Packaged Test): a test on an unconfined package of explosives articles to which special provision 347 of Chapter 3.3 of the UN Model Regulations (reference document 3) applies, to determine if there are hazardous effects outside the package arising from accidental ignition or initiation of the contents (see Note 4 below).

NOTES:

1. Types 6(a) and 6(b) are carried out at least three times unless explosion of the entire contents occurs earlier. Type 6(c) is normally performed once only, but if the wood or other fuel used for the fire is all consumed leaving a significant quantity of unconsumed explosives substance in the remains or in the vicinity or the hearth, then consideration should be given to performing the test again using more fuel or a different method to increase the intensity and/or duration of the fire. If the results of the recommended number of tests do not enable the hazard division to be determined the number of tests is increased.
2. Solid propellant rocket motors for which it is impractical to conduct the hazard classification Test Series 6 tests present special concerns. Guidance for conducting acceptable alternative testing is provided in ANNEX D.

3. For rocket motors and artillery propelling charges carry out Type 6(a) and 6(b) testing by initiating the donor with an external source approved by the National Competent Authority for hazard classification.
4. Test type 6 (d) is a test used to determine whether a 1.4S classification is appropriate and is used only if special provision 347 of Chapter 3.3 of reference document 3 applies. The results of test series 6 (c) and (d) indicate if assignment of 1.4S is appropriate, otherwise the classification is 1.4 other than S. (This test was added by UN ST/SG/AC.10/36/Add.2 of 12 March 2009).

c) Test Series 7.

Applied to articles to answer the question "Is it an extremely insensitive article?". Any candidate, including the explosive substance, for HD 1.6 (articles, explosives, extremely insensitive) must pass each of the following 10 types of tests comprising the series. The first six types of tests (7(a) through 7(f)) are used to establish if a substance is an Extremely Insensitive Detonating Substance (EIDS) and the remaining four types of tests (7(g), 7(h), 7(j), and 7(k)) are used to determine if an article containing an EIDS may be assigned to Hazard Division 1.6.

(1) Type 7(a): a shock test to determine sensitivity to intense mechanical stimulus;.
(2) Type 7(b): a shock test with a defined booster and confinement to determine sensitivity to shock;
(3) Type 7(c): a test to determine the sensitivity of the explosive substance to deterioration under the effect of an impact;
(4) Type 7(d): a test to determine the degree of reaction of the explosive substance to impact or penetration resulting from a given energy source;
(5) Type 7(e): a test to determine the reaction of the explosive substance to an external fire when the material is confined;
(6) Type 7(f): a test to determine the reaction of the explosive substance in an environment in which the temperature is gradually increased to 365 ºC;
(7) Type 7(g): a test to determine the reaction to an external fire of an article which is in the condition as presented for transport;
(8) Type 7(h): a test to determine the reaction of an article in an environment in which the temperature is gradually increased to 365 ºC.
(9) Type 7(j): a test to determine the reaction of an article to impact or penetration resulting from a given energy source;
(10) Type 7(k): a test to determine if an article will detonate a similar item adjacent to it which is in the condition as presented for transport.

NOTES:

1. A substance intended for use as the explosive filling in an article of HD 1.6 should be tested in accordance with both Test Series 3 and 7 in the form (i.e., composition, granulation, density, etc.) in which it is to be used in the article.

2. An article being considered for inclusion in HD 1.6 should not undergo Tests Series 7 until after its explosives filling has undergone Test 7(a) to 7(f) inclusive to determine whether it is an extremely insensitive detonating substance (EIDS).

3. To determine whether the article with an EIDS filling is in HD 1.6, tests 7(g) to 7(k) need to be completed. These tests are applied to articles in the condition and form in which they are to be stored and transported, except that non-explosive components may be omitted or simulated if the National Competent Authority is satisfied that this does not invalidate the results of the test.

LISTING OF NATO ACCEPTED TESTS

Test No.	Test Name	Country of origin	Reference to UN Test Manual	
			Section	Page
TEST SERIES 5				
Type 5(a):	Cap Sensitivity Test	DEU/USA	15.4.1	130
Type 5(b):				
(i)	DDT Test	FRA	15.5.1	134
(ii)	DDT Test	USA	15.5.2	136
(iii)	Deflagration to Detonation Test	USA	15.5.3	138
Type 5(c):	External Fire Test for Hazard Division 1.5	UN	15.6.1	140
TEST SERIES 6				
Type 6(a):	Single Package Test	UN	16.3.2	145
Type 6(b):	Stack Test	UN	16.4.2	147
NOTE: To obtain SsD 1.2.3 hazard classification, use Harmonized Insensitive Munitions/Hazard Classification Test: STANAG 4396, Edition 2 - Sympathetic Reaction, Munition Test Procedure				
Type 6(c):	External Fire (Bonfire) Test	UN	16.5.2	149
NOTE: To obtain SsD 1.2.3 hazard classification, use Harmonized Insensitive Munitions/Hazard Classification Test: STANAG 4240, Edition 2 - Liquid Fuel / External Fire, Munition Test Procedures				
Additional Harmonized Insensitive Munitions/Hazard Classification Tests needed to obtain SsD 1.2.3 Hazard Classification:				
STANAG 4241, Edition 2 - Bullet Impact, Munition Test Procedures STANAG 4382 Edition 2 - Slow Heating, Munition Test Procedures				
Type 6(d):	Unconfined Package Test	UN	16.7.1 (ref UN ST/SG/AC.10/36/Add. 2 of 12 March 2009	
TEST SERIES 7: TESTS ON SUBSTANCES				
Type 7(a):	EIDS Cap Test	DEU/USA	17.4.1	157

Type 7(b):	EIDS Gap Test	USA	17.5.1	158

Acceptable alternate test: Expanded Large Scale Gap Test (using hazard classification test dimensions and pass/fail criteria) of STANAG 4488, Edition 1. The data obtained using the procedure in Annex C of STANAG 4488 is acceptable, with a pass/fail criterion of P50 less than 35.3 kbar. When a pentolite donor is used, the pass/fail criterion is equivalent to a gap greater than 70 mm for the 50% point. When an RDX/wax donor is used, this is equivalent to a gap of greater than 77 mm.

Type 7(c):				
(i)	Susan Test	USA	17.6.1	161
(ii)	Friability Test	FRA	17.6.2	165
Type 7(d):				
(i)	EIDS Bullet Impact Test	USA	17.7.1	167
(ii)	Friability Test	FRA	17.7.2	168
Type 7(e):	EIDS External Fire Test	UN	17.8.1	169

Acceptable alternate Test: Harmonize with STANAG 4491, Edition 1 - Tube Test (FCO) (5 tubes used in each of three tests) and using test hardware and pass/fail criterion of the UN test given above.

Type 7(f):	EIDS Slow Cookoff Test	USA	17.9.1	170

Acceptable alternate Test: Harmonize with STANAG 4491, Edition 1 - Tube Test (SCO), ensuring that the test is performed at 3.3°C/hour and using test hardware and pass/fail criterion of the UN test given above.

TEST SERIES 7: TESTS ON ARTICLES

Type 7(g):	1.6 Article External Fire Test	UN	17.10.1	172

Acceptable alternate Test: Harmonized Insensitive Munitions/Hazard Classification Test: STANAG 4240, Edition 2 - Liquid Fuel/External Fire, Munition Test Procedures

Type 7(h):	1.6 Article Slow Cook-off Test	USA	17.11.1	173

Acceptable alternate Test: Harmonized Insensitive Munitions/Hazard Classification Test: STANAG 4382 Edition 2 - Slow Heating, Munition Test Procedures

Type 7(j):	1.6 Article Bullet Impact Test	USA	17.12.1	174

Acceptable alternate Test: Harmonized Insensitive Munitions/Hazard Classification Test: STANAG 4241, Edition 2 - Bullet Impact, Munition Test Procedures

Type 7(k):	1.6 Article Stack Test	UN	17.13.2	175

Acceptable alternate Test: Harmonized Insensitive Munitions/Hazard Classification Test: STANAG 4396, Edition 2 - Sympathetic Reaction, Munition Test Procedures

ANNEX D - ALTERNATE HAZARD CLASSIFICATION TEST PROCEDURES FOR SOLID PROPELLANT ROCKET MOTORS

For solid propellant rocket motors, for which it is impractical (because of motor size or limited number of motors produced) to conduct the hazard classification test series 6 tests, the testing authority may elect not to perform tests 6a and 6b. In that case, one of the three shock sensitivity tests described below may be conducted, followed by test 6c. For motors that are only transported singly, test 6c may be conducted with a single article as it is configured for transportation, to include any packaging.

(1) Shock Sensitivity Test, Option 1

(*a*) Super Large-Scale Gap Test (SLSGT). Figure D-1 presents a schematic of the SLSGT that shall be used. Preparation of the sample must be such that motor propellant is accurately represented. The witness plate shall not be placed directly on a rigid surface that would impede deformation of the plate. One test shall be conducted at a zero gap.

1. Criteria: Propellants that maintain a stable detonation as evidenced by the velocity pins and the witness plate are hazard classified as HD 1.1. To be a HD 1.3 candidate, the propellant must exhibit a decaying reaction approaching sonic velocity. A hole in the witness plate or significant fracturing of the witness plate is evidence of HD 1.1.

2. Reporting Requirements: Document and report test and sample set-up (diagram and photographs), propellant description (formulation, sample density), raw pin data, reaction velocity vs. pin distance plots, witness plate and recovered case fragment photographs. If available, also provide video/film records, and blast gauge data.

(2) Shock Sensitivity Test, Option 2

(*a*) This option requires that you first establish a sample size at or above Critical Diameter (CD) followed by 70 Kbar shock sensitivity testing at or above one-and-a-half times that size. The 70 Kbar shock level is the same criterion used with the U.N. Test 1(a) (3.65 cm inside diameter) for distinguishing whether a substance has a HD 1.1 or HD 1.3 response to a shock stimulus.

(*b*) Unconfined Critical Diameter Test. This test provides data that will be used in determining the diameter for the following Gap Test. Figure D-2 presents a schematic of the Unconfined Critical Diameter Test that shall be used. Preparation of the sample must be such that motor propellant is accurately represented. The witness plate shall not be placed directly on a rigid surface that would impede deformation of the plate. One test shall be conducted.

1. Criteria: For any sample diameter at which a stable detonation occurs as evidenced by the velocity pins and the witness plate, that diameter is considered to be at or above CD.

2. Reporting Requirements: Document and report test and sample set-up (diagram and photographs), booster material and configuration, propellant description (formulation, sample density), raw pin data, reaction velocity vs. pin distance plots, and witness plate photographs. If available, also provide video/film records, and blast gauge data.

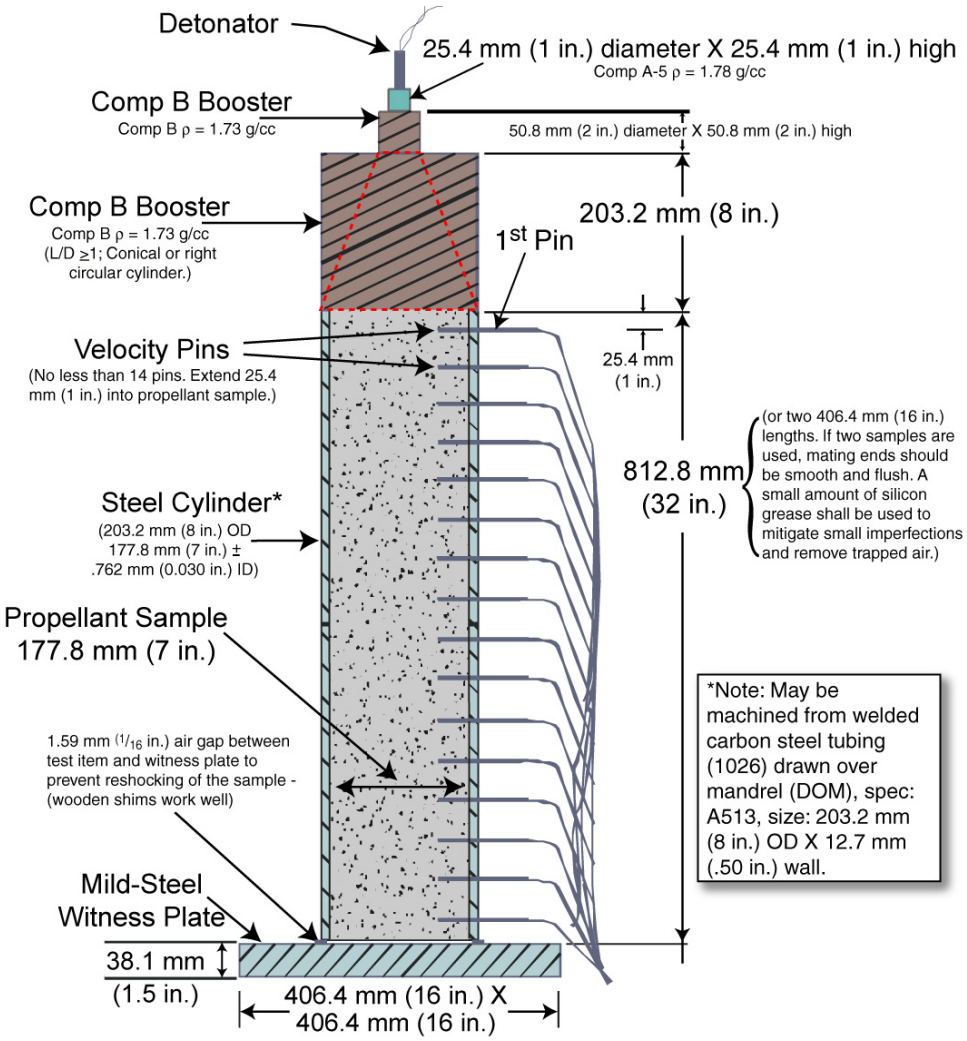

Figure D 1: Super large-scale gap test configuration

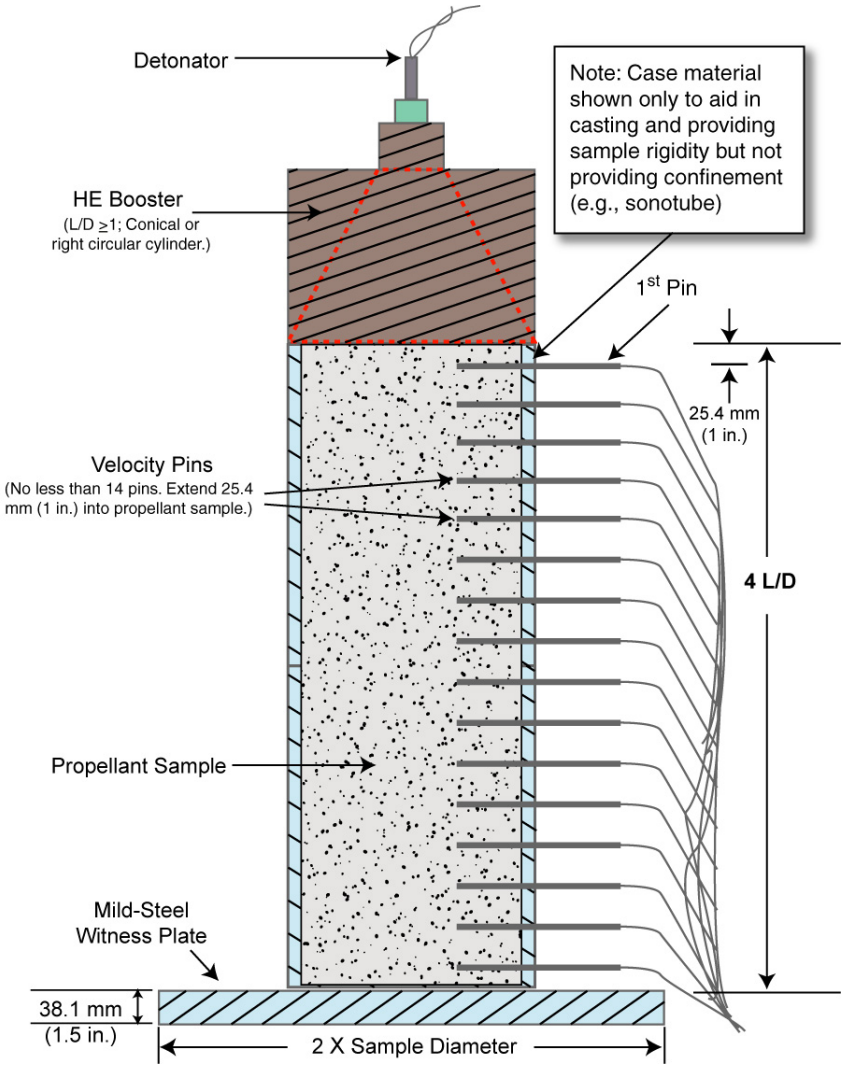

Figure D 2: Unconfined critical diameter test configuration

(*c*) Gap Test. Figure D-3 presents a schematic of the Gap Test that shall be used. Sample diameter shall be a minimum of 127 mm (5 inches), or at least 150% of the unconfined critical diameter of the propellant (demonstrated as specified above), whichever is greater. Preparation of the sample must be such that motor propellant is accurately represented. The sample must be contained in a case that affords confinement equivalent to that of the rocket motor case. The witness plate shall not be placed directly on a rigid surface that would impede deformation of the plate. One test shall be conducted at 70 Kbar shock pressure at the output end of the gap material (as input to the propellant sample under test).

1. Criteria: Propellants that maintain a stable detonation as evidenced by the velocity pins and the witness plate are hazard classified as HD 1.1. To be a HD 1.3 candidate, the propellant must exhibit a decaying reaction approaching sonic velocity. A hole in the witness plate or significant fracturing of the witness plate is evidence of HD 1.1.

2. Reporting Requirements: Document and report test and sample set-up (diagram and photographs), propellant description (formulation, sample density), identification of booster material, booster/attenuator calibration, raw pin data, reaction velocity vs. pin distance plots, witness plate and recovered case fragment photographs. If available, also provide video/film records, and blast gauge data.

(3) Shock Sensitivity Test, Option 3

(*a*) Gap Test. Figure D-3 presents a schematic of the Gap Test that shall be used. Sample diameter shall be that of the motor diameter. Preparation of the sample must be such that motor propellant is accurately represented. The sample must be contained in a case that affords confinement equivalent to that of the rocket motor case. The witness plate shall not be placed directly on a rigid surface that would impede deformation of the plate. One test shall be conducted at 70 Kbar shock pressure at the output end of the gap material (as input to the propellant sample under test).

1. Criteria: Propellants that maintain a stable detonation as evidenced by the velocity pins and the witness plate are hazard classified as HD 1.1. To be a HD 1.3 candidate, the propellant must exhibit a decaying reaction approaching sonic velocity. A hole in the witness plate or significant fracturing of the witness plate is evidence of HD 1.1.

2. Reporting Requirements: Document and report test and sample set-up (diagram and photographs), propellant description (formulation, sample density), identification of booster material, booster/attenuator calibration, raw pin data, reaction velocity vs. pin distance plots, witness plate and recovered case fragment photographs. If available, also provide video/film records, and blast gauge data.

(4) Any accident data arising during development that documents a motor's reactivity characteristics shall be included in the hazard classification data package.

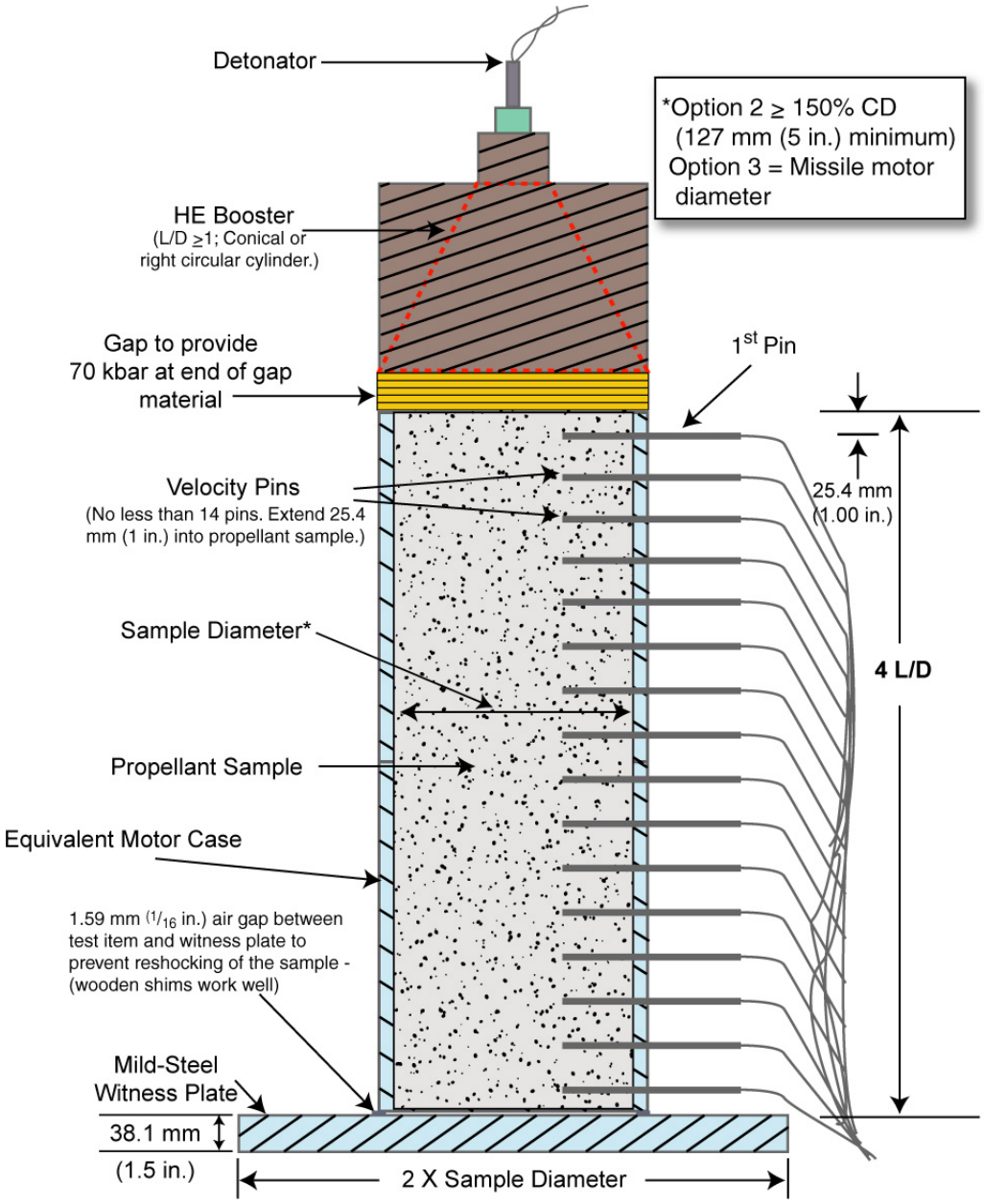

Figure D 3: Gap test (≥150% CD or Missile Diameter) configuration

ANNEX E - NATIONAL COMPETENT AUTHORITIES FOR THE CLASSIFICATION OF AMMUNITION AND EXPLOSIVES

Country	National Authority for Military Ammunition	National Authority for Non-military Ammunition	Remarks
AUSTRIA	Bundesministerium f. Landesverteidigung Abt. Fur Waffen, Gerat und Munition Vorgartenstrasse 225 A-1024 Wien Austria Tel: +43-1.72761 4947 Fax: +43-1.72761 17138		
BELGIUM	Belgian Defence Forces DGMR-Mgt-R/Mun Kw Koningin Elisabeth Eversestraat 1 1140 Brussels Tel: +32-2-701 1804 Fax: +32-2-701 3736	Ministère des Affaires Economiques Administration des Mines Service des Explosifs Rue J H De Mot 28-30 1040 Bruxelles 4 Belgique	
CANADA	Director Ammunition & Explosives Management & Engineering 101 Colonel By Drive Ottawa, Ontario, Canada K1A 0K2 Tel: +1-819-994-2411 Fax: +1-819-994-9508	Chief Inspector of Explosives National Resources Canada 1431 Merivale Road Ottawa, Ontario, Canada K1A 0G1 Tel: +1-613-948-5200 Fax: +1-613-948-5195	Military explosives are those explosives deemed to be under the direction or control of the Minister of National Defense and include ammunition and explosives of visiting armed forces.
CZECH REPUBLIC	VOP-026 Sternberk Military Institute for Weapons & Ammunition Technology Dlouhá 300 763 21 SLAVICIN Tel: +420 577 341 253 Fax: +420 577 341 252	Cesky Lodni a Prumyslovy registr Sobeslavska 2063/46 130 00 Praha 3 Tel: +420 2 67 31 37 36 Fax:+420 2 67 31 45 84	Classification of dangerous goods of all classes, except class 7 – Radioactive materials
DENMARK	Danish Defence Acquisition and Logistics Organization. Lautrupbjerg 1 - 5. 2750 Ballerup. Tel: +45 72575990 Fax: +45 72575120	Ministry of Justice Civilkontoret Slotsholmsgade 10 DK - 1260 Copenhagen K Tel: +45 33 92 33 40 Fax: +45 33 93 35 10	
FINLAND	Finnish Defence Forces Defence Command Technical Inspection Div. PO Box 919 FI-00131 Helsinki	Safety Technology Authority (TUKES) PO Box 123 FI-00181 Helsinki	For international transportation purposes the Safety Technology Authority (TUKES) approval is required
FRANCE	Inspecteur de l'Arment pour les poudres et Explosifs B.P.20 92211 Saint Cloud-Cedex France Tel: +33 14771 4393 Fax:+ 33 14771 4322	INERIS BP No. 2 Verneuil-en-Halatte (OISE) - France Tel: +33 44 55 6677 Fax: +33 44 55 6699	Ammunition used by the French Armed Forces: IPE exclusively. Ammunition not used by the French Armed Forces: IPE or INERIS Non-military ammunition: INERIS exclusively

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Country	National Authority for Military Ammunition	National Authority for Non-military Ammunition	Remarks
GERMANY	Wehrtechnische Dienststelle für Waffen und Munition WTD 91 Am Schießplatz 49716 Meppen Tel: +49 5931 43-0 Fax: +49 5931 43-2091 e-mail: WTD 91@bundeswehr.org	Bundesanstalt für Materialforschung und -prüfung (BAM) Fachgruppe II.3 Unter den Eichen 87 D-12205 Berlin Tel:+49 30 8104-1230 Fax: +49 30 8104 1237	
GREECE	Ministry of National Defense Defense Industry Dir. Production Development Dept. Ammunition Office Holargos - Athens	Ministry of Public Order Greek Police National Security Directorate Katehaki Street Athens	
ITALY	Ministero della Difesa Direzione Generale degli Armamenti Terrestri Ufficio Generale Coordinamento Tecnico 3° Ufficio- Servizio Omologazione Via Marsala, 104 00185 Roma	Ministero dell'interno Dipartimento della P.S Direzione Centrale Affari Generali Servizio di Polizia Administrativa Area Armi ed Esplosivi Via Cesare Balbo, 39 00184 Roma	The Military authority can give NATO classification on behalf of the civil authority, who is responsible for the certification that a substance or an article is explosive and for classification according to the national legislation.
NETHERLANDS	Military Committee on Dangerous Goods DMKL/Sie HWZ, Mil, NBC-Coodinatie PO Box 90822 2509 LV The Hague The Netherlands Tel: +3170316 5090 Fax: +3170316 5091	Prins Maurits Laboratory TNO PO Box 45 2280 AA Rijswijk The Netherlands Tel: +31 15 842842 Fax: +31 15 843991	
NORWAY	Army Haerens forsyningskommandos ammunisjonskontroll (HFK-AMK) Boks 24 N2831 Raufoss Norway Tel: +47 611 91230 Air Force Luftforsvarets forsyningskommando (LFK) Boks 10 N2007 Kjeller Norway Tel: +47 63 808000 Navy Sjoforsvarets forsyningskommando (SFK) Boks 3 N5078 Haakonsvern Norway Tel: +47 55 502020	Direktoratet for Brann og eksplosjonsvern (DBE) Boks 355 3101 Tonsberg Norway Tel: +47 33 398800	

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Country	National Authority for Military Ammunition	National Authority for Non-military Ammunition	Remarks
POLAND	General Staff of the Polish Armed Forces Material Department 218 Niepodleglosci St 00-911 Warsaw 62 Tel: (00-48) 22 6844786 Fax: (00-48) 22 6844786		
PORTUGAL	Commissao Tecnica Permanente de Municoes e Substancias Explosivas das Forcas Armadas (COTEPMEFA) Estado-Major General das Forcas Armadas Av. Ilha da Madeira 1499 Lisboa	Inspeccoes de Explosivos Ministerio da Administracao Interna Av. Duque de Loulé 90-4°, Esq Lisboa	
SLOVAKIA	Ammunition and Special Works Centre Ammunition Base Duklianska 1 972 71 Novaky Slovakia Tel: +421-960 345205 Fax: +421-960 345366 Marian.Goga@mil.sk	Ministry of Transport, Posts and Telecommunications of the Slovak Republic Námestie Slobody č.6 810 05 Bratislava Tel: +421-2-5949 4111 Fax: +421-2-5249 4794	
REPUBLIC OF SLOVENIA	Armament Department Ministry of Defense Republic of Slovenia Kazdeljeva PLOSCAD 26 Slovenia		
SWEDEN	Swedish Civil Contingencies Agency SE- 651 81 Karlstad Sweden Tel: +46(0)771-240240 Fax: +46(0)10-2405600 e-mail: registrator@msbmyndigheten.se	Swedish Civil Contingencies Agency SE- 651 81 Karlstad Sweden Tel: +46(0)771-240240 Fax: +46(0)10-2405600 e-mail: registrator@msbmyndigheten.se	The Swedish Civil Contingencies Agendy is the National Authority for classification of all ammunition and explosives, but information about products used by the Swedish Armed Forces can also be received from: Swedish Defence Material Administration SE- 115 88 Stockholm Sweden Tel: +46(0)8 7824000 Fax: +46(0)8 6675799 e-mail: registrator@fmv.se
SWITZERLAND	armasuisse Wissenschaft und Technologie Analysen und Systeme Feuerwerkerstrasse 39 CH-3602 Thun Tel: +41 (0) 33 228 29 11	Bundesamt für Polizei Hauptabteilung für Analyse und Prävention Nussbaumstrasse 29 CH-3003 Bern Tel: +41 (0) 31 322 46 98	Classification for Transport of Ammunition and Explosives: Eidg. Gefahrgutinspektorat (EGI) Richtistrasse 15/Postfach CH-8304 Wallisellen Tel: +41 (0) 44 877 61 11

Country	National Authority for Military Ammunition	National Authority for Non-military Ammunition	Remarks
TURKEY	Milli Savunma Bakanligi (Turkish Ministry of National Defence) MSB Tek.Hiz.D.Bsk.ligi AR-GE Kislasi Bakanliklar ANKARA-TURKEY Tel: +90 (312) 410 6121 Fax: +90 (312) 417 5488 epalas@kkk.tsk.mil.tr	Icisleri Bakanligi (Turkish Ministry of Internal Affairs) Icisleri Bakanligi Bakanliklar ANKARA-TURKEY Tel: +90 (312) 419 5009 Fax: +90 (312) 417 4966 bilgiislem@icisleri.gov.tr	
UNITED KINGDOM	Secretary ESTC, Defence Equipment & Support, Defence Ordnance Safety Group, Fir3a, #4304, MOD Abbey Wood, Bristol, BS34 8JH Tel: +44 (0) 30 679 35592 Fax: +44 (0) 117 9135903	Chief Inspector of Explosives, Health & Safety Executive, Redgrave Court, Merton Road, Bootle, Merseyside, L20 7HS Tel: +44 (0) 151 951 4025	In broad terms, for the purpose of UK legislation on the term “Military Explosives” means explosives belonging to the UK Secretary of State for Defence or explosives which have been certified by UK Secretary of State for Defence as being for the UK Ministry of Defence’s use.
UNITED STATES	The DoD Explosives Safety Board, Room 856C, Hoffman Building 1 2461 Eisenhower Ave Alexandria VA 22331-0600 USA Tel: +01 703-325-1375 Fax: +01 703-325-6227	U.S. Department of Transportation (DOT), Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Hazardous Materials Safety Attn: International Standards / PHH-70 1200 New Jersey Ave, SE East Building, 2nd Floor Washington, DC 20590 Tel: +01 202-366-0656 Fax: +01 202-366-3753	Military Ammunition is DOD titled ammunition and explosives