

## European Manufacturing Industry

Fabio Sgarzi, session chairman

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**The relevant companies of the  
European Defence Industry  
have joined forces  
to promote the use of  
Insensitive Munitions  
in the different European Armed Forces**

One selected Focus for this IM Day:

***"How to achieve actual logistics benefits with Insensitive Munitions?"***

Dr. Helmut Muthig, VP IMEMG



### The Challenge

It is now widely acknowledged that **Insensitive Munitions (IM)** provide **enhanced safety** for the soldiers, equipments, platforms, civilians,...



... and that they must be introduced and employed to the most possible extent

### HOWEVER,

Although much safer, in general, IM must be **transported** and **stored** the same way **as ordinary (non-IM)** munitions (HD 1.1)









### THIS MEANS,

even if the munitions have successfully passed IM tests like FCO, SCO, BI, SD they cannot be assigned as HD 1.6, which would allow for real benefits in logistics



## International Authorities and Hazard Classification

International Organisation	Authority	Reference documentation
<p><b>United Nations</b></p> 	 <p>U.N. Economic Commission for Europe (UNECE) - <b>Transport Division</b></p>	<p>UN Recommendations on the <b>Transport</b> of Dangerous Goods, Model Regulations</p> <p><b>"Orange Book"</b> <small>UNITED NATIONS</small></p> <p>(UN ST/SG/AC.10/Rev.14)  <small>Secretariat</small></p>  <p><small>COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS</small></p>
<p><b>N.A.T.O.</b></p> 	 <p><i>CNAD Ammunition Safety Group (AC/326)</i></p> <p>Ammunition Safety Group (AC/326)</p>	<p>Manual of NATO Safety Principles for the <b>Storage</b> of Military Ammunition and Explosives</p> <p>AASTP-1 Ed. 1 of 08/1997</p>

## Consideration of IM and Hazard Divisions: UN approach

- United Nations (UN) have a globally accepted classification scheme for **packaged explosives** (among other dangerous goods)
- This scheme arises from the hazards the explosives or articles present if exposed to typical stimuli associated with **transport** accidents
- All explosives are assigned to UN Class 1, there are 6 Class Divisions (C/Ds), CD 1.1 to CD 1.6
- By conducting a series of defined tests, the expected risks and consequences of packaged explosives during transport are identified
- Based on the test results the test items are assigned to the appropriate C/D or **Hazard Division** (HD) that reflects their predominant hazard (i.e. blast, fragments, fire, or minimal hazard)

in acc. with: Relationships between UN Transportation Test and NATO SsD 1.2.3 and IM Tests;  
Eric Deschambault (IMEMTS 2006); MSIAC Reference = O-106

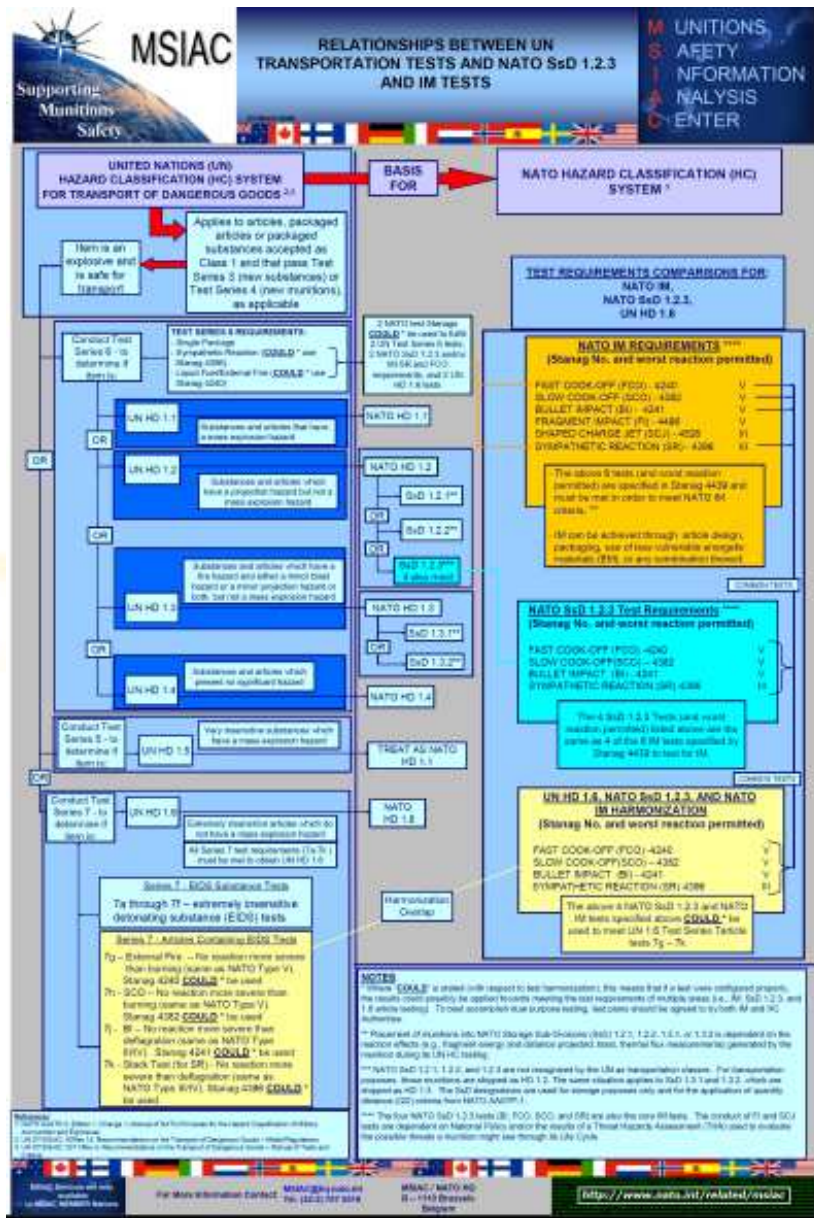


## Consideration of IM and Hazard Divisions: NATO approach

- NATO utilizes the same UN hazard classification system as a basis for their own safety rules for transportation and for **storage** of munitions
- NATO additionally breaks down UN HD 1.2 and 1.3 into **Storage Sub-Divisions** (SSDs) to define expected risks and consequences associated with an inadvertent initiation of munitions of these two HDs
- Additionally, NATO has issued a six-test protocol to assign a munition as **Insensitive Munition** (IM) / Munition a Risques Atténués (MURAT) (STANAG 4439, AOP-39)
- An IM is less susceptible to inadvertent initiation when exposed to unplanned stimuli, and, if inadvertently initiated, hazard effects and severity are strongly reduced compared to a similar non-IM
- NATO has specifically established **SSD 1.2.3** to earmark a HD 1.2 munition that is less susceptible to inadvertent initiation, but if it initiates, the severity of the event will be greatly reduced and be limited to one munition ("unit risk")
- To qualify as NATO SSD 1.2.3, a HD 1.2 munition must successfully pass four of the six IM tests mentioned above.



# Comparison of NATO und UN Classifications

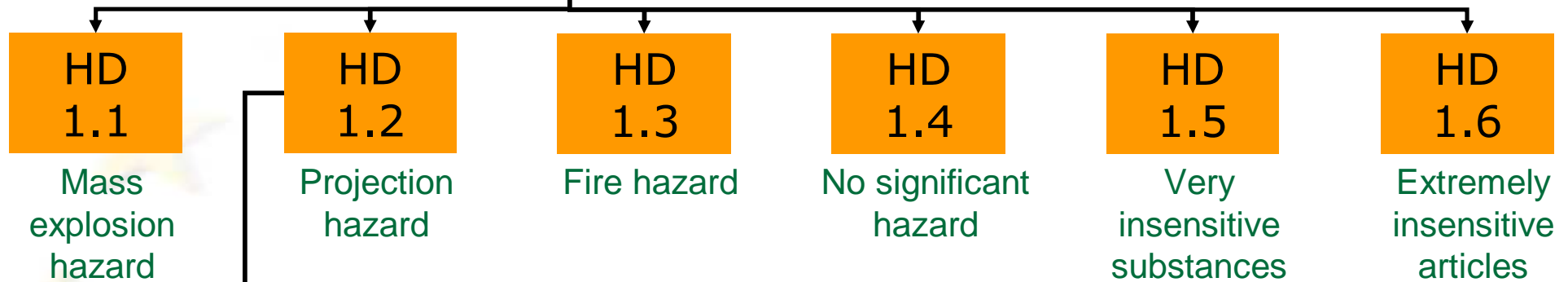


Relationships between UN Transportation Test and NATO Ssd 1.2.3 and IM Tests;

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**EXPLOSIVE  
ITEM**

**NATO 1.2.3. Hazard Division (Storage)**



**NATO**

**SSD  
1.2.1**

NEQ > 1.6 lbs (0.71 kg)

**SSD  
1.2.2**

NEQ ≤ 1.6 lbs (0.71 kg)

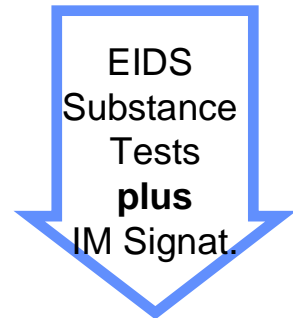
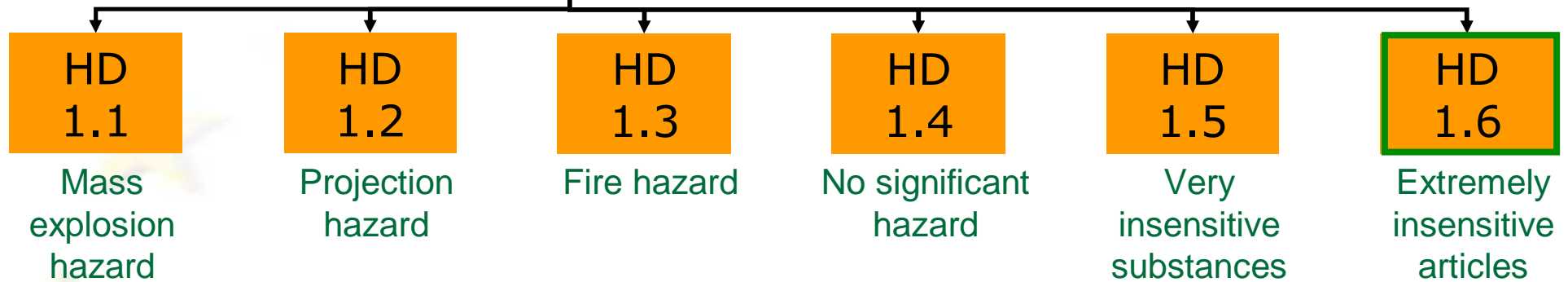
**SSD  
1.2.3**

for HD 1.2  
with this  
IM signature:

Testing	Reaction
Fast cook-off	<b>V</b>
Slow cook-off	<b>V</b>
Bullet impact	<b>V</b>
Sympathetic reaction	<b>III</b>

**EXPLOSIVE  
ITEM**

**UN 1.6. Hazard Division (Transport)**



**UN HD 1.6:**  
 For **Extremely Insensitive Detonating Substances** (EIDS) without mass explosion hazard

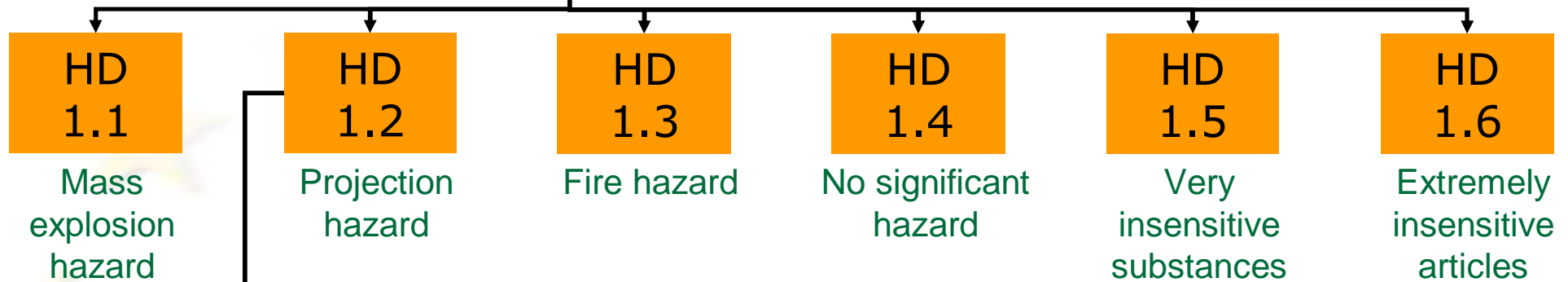
**Test Series 7: EIDS Tests**  
 7a – 7f: EIDS tests on substance

7g: External Fire (FCO): Type V  
 7h: Slow Cook Off( SCO): Type V  
 7j: Bullet Impact (BI): Type IV  
 7k: Stack Test (SR): Type IV

Testing	Reaction
Fast cook-off	<b>V</b>
Slow cook-off	<b>V</b>
Bullet impact	<b>IV</b>
Sympathetic reaction	<b>IV</b>

**EXPLOSIVE  
ITEM**

**NATO 1.2.3. Hazard Division (Storage)**



SSD 1.2.1

NEQ > 1.6 lbs (0.71 kg)

SSD 1.2.2

NEQ ≤ 1.6 lbs (0.71 kg)

SSD 1.2.3

HD 1.2 is with the IM signature:

for comparison

Testing	Reaction
Fast cook-off	<b>V</b>
Slow cook-off	<b>V</b>
Bullet impact	<b>V</b>
Sympathetic reaction	<b>III</b>

## Logistical Benefits provided by these two HDs

- **NATO SSD 1.2.3** (compared to HD 1.1D)
  - > Distances between buildings can be reduced by a 50% minimum (in other words: 4 times more quantities in the same space!)
- **UN HD 1.6**
  - > Road transport:
    - Constraints similar to HD 1.3 or HD 1.4 for maximum mass
    - e.g. transport under waiver:  $133 \text{ kg} / 20 \text{ kg} = 6$  times more
    - e.g. EXII truck:  $5000 \text{ kg} / 1000 \text{ kg} = 5$  times more
  - > Sea transport:
    - Constraints similar to HD 1.3
    - General logistical benefits (ships, harbours, routes, escorts,...)
    - Transport cost would take into account this advantage

### • NATO SSD 1.2.3

- > NATO regulation, not UN, therefore not universal, only for Armed Forces
- > Not applicable to transport
- > Still marked as “1.2D” (projection hazard)

### • UN HD 1.6

- > Limited to items **exclusively** containing Extremely Insensitive Detonating Substances (EIDS)
  - almost no real munitions is fully compliant to EIDS (fuzes, boosters, ...)
  - this is regrettable, because in many cases the safety levels required for being assigned HD 1.6 (FCO, SCO, BI, SD) are achievable today
  - Possible evolution in the near future

## The situation where we are trapped today

- Although having passed all tests and being assigned an **Insensitive Munition**, no **actual advantage** can be taken **for logistics** so far, as
  - **UN HD 1.6** is in practise out of reach (restricted to complete EIDS only)
  - **NATO HD 1.2.3** remains applicable to **storage** for armed forces only
    - » no UN acceptance for **transport**
    - » no benefits for **industry**
  - therefore, 1.1 HD is still the most commonly used classification



## New approach for UN HD 1.6: *Draft in progress*

- A proposal for the evolution of this HD had been submitted to UN Experts for the Transport of Hazardous Goods
- Action led by NATO/UK MoD, with the support of USA, France, Germany, ...
- Main facts of the proposal:
  - Main charge has still to be EIDS, but boosters / fuzes can be non-EIDS (up to a maximum allowable mass),
  - Criteria for vulnerability threat responses become equivalent to IM / MURAT
  - European Industry is not participating in this process yet!

## Conclusion & Recommendation:

- **Insensitive Munitions** can lead to significant logistical benefits for both **storage** and **transport**
- In order to allow both, **armed forces** and **industry**, to take complete advantage of the benefits of IM we propose to join our efforts together with NATO and UN
- In conclusion, we propose to merge the advantages of SSD 1.2.3 and HD 1.6 into a **new** common HD standard:

**new 1.6\* or 1.7D**