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RÉPUBLIQUE FRANÇAISE

MINISTERE DE LA DEFENSE

FRENCH MURAT (IM) POLICY

A NEW IMPETUS

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DGA
DIRECTION GÉNÉRALE DE L'ARMEMENT

OUTLINE

- Background
- The Necessary New Impetus
- The New Policy
- The Implementation Guides

French MURAT Policy: a 20 Years Old History

- End of the 80's, first thoughts within NATO through munitions interoperability work
- 1989: Recommendation of CGA (general MoD controller) for a concerted endeavour of both Forces and DGA on the IM/MURAT concept
- DGA letter n° 100816 (March 1992) and DGA/IPE MURAT policy instruction n° 260 (July 1993)
- Assignment of MURAT labels by the Inspector for Propellants and Explosives (IPE)
- MURAT massive investment for the nuclear aircraft carrier Charles de Gaulle
- Ratification of STANAG 4439 edition 1 in 1999 and successive revisions (now edition 3)

Why to Give a New Impetus ?

- IM/MURAT is more and more a prime necessity concept in our evolving world:
  - Interoperability requirements in joint operations
  - Drastic increase of operational and logistical constraints

- Benefits of IM/MURAT not clearly understood:
  - Lack of guidelines for collateral damage assessment, MURAT signature specification and link with S3

- Initial French policy not coercive:
  - Policy only described in a DGA document
  - A stand alone DGA/IPE instruction with no link to munition acquisition document
  - Incitation to develop MURAT munitions but insertion of MURAT requirements in contracts not mandatory

The Updated French MURAT Policy

- Is a policy document signed at the Ministry of Defence level

- Was prepared by a team involving
  - IPE (chairing the team)
  - Armed Forces joint staff
  - SIMu (ammunition joint office)
  - DGA (IPTs and Technical Experts)

- Was issued on 21st July 2011 under reference DEF n° 211893

The Updated French MURAT Policy

Key points of the Policy

- Reference (STANAG) requirements are specified in all new acquisitions
- Any waiver to the MURAT reference requirements must be justified using hazard and risk based analysis methods
- IM signature assessment is generalized to inventory Munitions to give Forces better knowledge on explosive hazards in operations
- Implementation of the policy should create a MoD common dialogue tool to insure the coherence between operational needs, necessary retrofits and R&T priorities

The Updated French MURAT Policy

Implementation of the policy is described in 3 additional IPE instructions (technical guides):

Specification of MURAT level for new acquisitions

IPE Instruction n°1184 (20/12/2012)

MURAT signature assessment

IPE Instruction to be released by the end of 2013

MURAT signature database management

1- Specification of MURAT Level for New Munition Acquisition

- **General Principles of the process:**
  - Systematic search of the highest "reasonably" achievable safety level in accordance with STANAG 4439 and more generally the national safety policy on personnel and assets
  - Approval given by the Inspector for Propellants and Explosives (IPE) on the enforcement of the MURAT specification process
  - Specified MURAT signature officially approved by the concerned Armed Forces staff
  - Waiver process milestones linked to programme management phases and approval at each milestone by the concerned Armed Forces staff

1- Specification of MURAT Level for New Munition Acquisition

- **Step 1: Initial military requirements**
  - include STANAG 4439 and Instruction n°211893 in the list of standards to be applied
  - The concerned Armed Force staff sets up a group of experts in charge of defining the MURAT requirements
  - The experts are from Armed Force(s), IPE, DGA/technical directorate



1- Specification of MURAT Level for New Munition Acquisition

Step 2: Definition of a "stabilized" MURAT signature

- Proposed by the group of experts
  - MURAT signature for each munition configuration (logistical, tactical, etc.)
- Approved by the concerned Armed Force staff after IPE validation of the process
- Specified in the request for proposal (RFP) / bid solicitation
- Stabilized MURAT signature :
  - based on hazard analysis of the consequences of munition reaction through munition life cycle phases
    - assessment of the reaction level preventing catastrophic consequences
  - takes into account the MURAT state of the art for the considered munition type
  - considers the potential logistical constraints reduction

	FCO	SCO	BI	FI_{light}	FI_{heavy}	SD	SCJ
Signature example	IV	IV	V	IV	III	III	I

1- Specification of MURAT Level for New Munition Acquisition

- **Step 3: Definition of the "reference" MURAT signature**
  - Proposed by the group of experts based on the proposals resulting from the bidding process
  - Based on a risk analysis for the deviations from the stabilized signature and proposing corrective and preventive actions for risk levels judged as "inacceptable"
  - Approved by the concerned Armed Force staff after IPE advice on the process
  - Specified in the contract

	FCO	SCO	BI	FI_{light}	FI_{heavy}	SD	SCJ
Signature example	V	IV	V	III	III	III	I




2- MURAT Signature Assessment

- **MURAT signature:**
  - is based on the 6 threats identified in STANAG 4439 + Heavy Fragment Impact (250 g)
  - gives, for each threat, the type of response when subjected to the standard MURAT aggressions

- **MURAT assessment programme:**
  - evaluates the reaction type of with a “good” confidence level (body of evidence)
  - justifies by analysis no type I or type II response within the domain of analysis as recommended in AOP 39

2- MURAT Signature Assessment

Threat	Standardized aggression	Full scale test	Domain of analysis	Comments
Fire	Fuel fire with an average temperature above 850°C Temperature of 550°C reached in no more than 30 s from ignition of the fire	To be carried out in accordance with STANAG 4240	Temperature range: average temperature of the fire between 550°C and 800°C Temperature of 550°C reached in no more than 30 s from ignition of the fire	Temperature maintained until all the munition reactions are completed
Slow heating	Temperature rate of 3.3°C/h	To be carried out in accordance with STANAG 4382	Regular increase in temperature in the range 3.3°C to 30°C per hour starting from ambient temperature until munition reaction	Temperature maintained until all the munition reactions are completed
Bullet impact	12.7 mm AP bullet at 850 m/s (no burst)	To be carried out in accordance with STANAG 4241	12,7 mm AP bullet Velocity range: 400 m/s to 850 m/s	
Sympathetic reaction	Donor detonation in an appropriate configuration	To be carried out in accordance with STANAG 4396		If solid-fuel motors or artillery propellant charges, donor initiated by an external source consisting in a shaped-charge jet type approved by IPE
Light fragment impact	NATO fragment (18.6 g and 160° conical tip) at 1830 m/s	To be carried out in accordance with STANAG 4496	NATO fragment (18.6 g and 160° conical tip) Velocity range: 0 m/s to 1830 m/s	
Heavy fragment impact	Parallelepiped fragment (250 g and 31.7 mm cube side) at 1650 m/s	To be carried out in accordance with NF T 70-512	Parallelepiped fragment (250 g - 31.7 mm cube side) Velocity range: 0 m/s to 1650 m/s	French requirement
Shaped charge jet	CCEB 62 shaped charge	To be carried out in accordance with STANAG 4526		

2- MURAT Signature Assessment

- **Evaluation programme:**
  - Describe the work planned to evaluate and justify the MURAT signature (body of evidence):
    - Full scale tests (not mandatory if other relevant data available)
    - Test results on similar munitions
    - Tests on small scale items
    - Numerical simulations
    - Data on energetic materials (shock sensitivity, friability, etc.)

- **Dossier proposing the MURAT signature :**
  - Gathers data obtained during the program to propose and justifies the MURAT signature

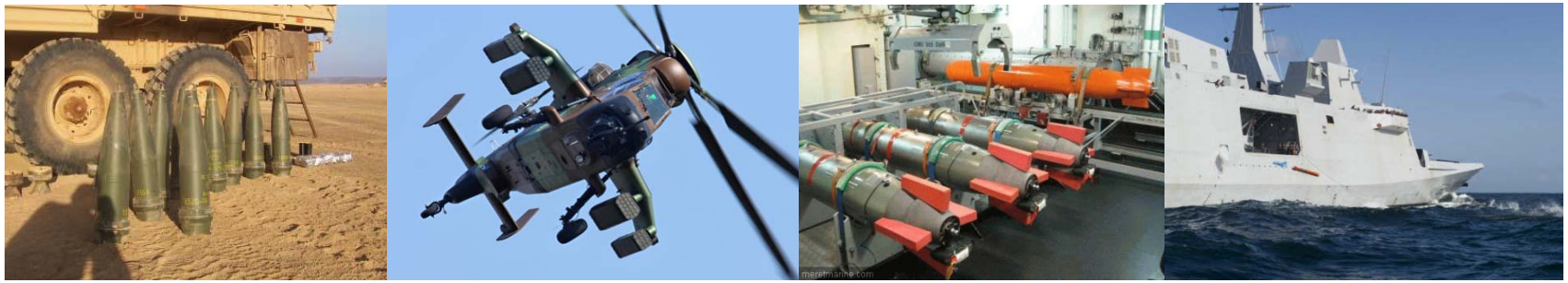
2- MURAT Signature Assessment

- **IPE/Munitions Safety Office and DGA MURAT experts:**
  - Review and validate the relevance of the evaluation
  - Analyse the test results and other assessment information
  - Propose to IPE a MURAT signature taking into account:
    - confidence level on the type of reaction
    - validity of the assessment for the domain of analysis

- **French Inspector for Propellants and Explosives (IPE):**
  - Officially scores MURAT signature
  - Could assign MURAT label

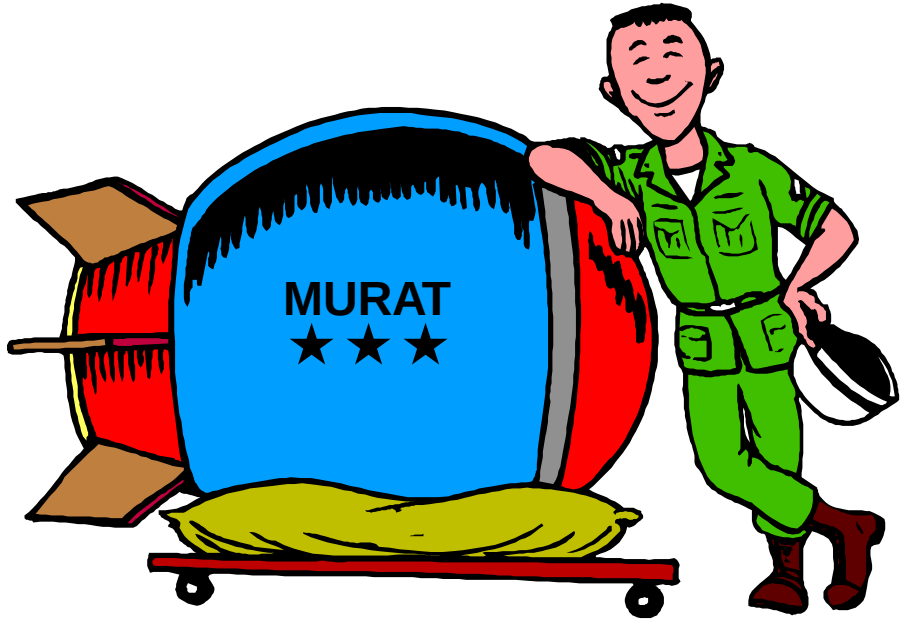
3- MURAT Signature Database Management

- For munitions already in service, MURAT signature will be evaluated by DGA experts and validated by IPE
- The effort on MURAT signature assessment of existing munitions is managed by IPE according to the priorities jointly defined with the Armed Forces
- The inventory should become a MoD common dialogue tool to ensure the consistency between operational needs and R&T priorities
- The inventory should give Forces a better knowledge on explosive hazards in operations (especially in joint NATO operations)



QUESTIONS ?

Application example of the MURAT policy to the procurement of 120 mm HE mortar round in a companion presentation
Session 6B – 9:40 AM



Principles of Instruction n°211893

Evolutions of MURAT labels

Agression		Test procedure	STANAG 4439	**Instruction n° 260 (**1993)			**Instruction n° 211893** (2011)		
				★	★★	★★★[3]	★	★★	★★★[3]
Fast heating	FCO	4240	V	IV[1]	V[2]	V[2]	IV[1]	V[2]	V[2]
Slow heating	SCO	4382	V	III	V	V	III	V	V
Bullet impact	BI	4241	V	III	III	V	III	**V**	V
Sympathetic reaction	SR	4396	III	III	III	IV	III	III	**III**
Light fragment impact	FI light	4496	V	I	III	V	I	**V**	V
Heavy fragment impact	FI heavy			I	III	IV	I	III	**III**
Shaped charge jet impact	SCJ	4526	III	I	I	III	I	**III**	III

[1] *without propulsion*
[2] *At the earliest 5 minutes after the start of the fire*
[3] *Energetic materials that comply with the criteria of test series 7 (UN Manual of Tests and Criteria - Orange Book)*