

**SESSION 2**

**REGULATION & LEGAL FRAMEWORK**

*IM Policies & Implementations*

National implementation

Session chair

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CONSTRUISONS **ENSEMBLE**  
LA DÉFENSE DE DEMAIN

# Specifying IM Requirements The French Approach

IM Day 2017 - Amsterdam



# The Updated French MURAT Policy: DEF 211893

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

**Specification of MURAT level for new acquisitions**

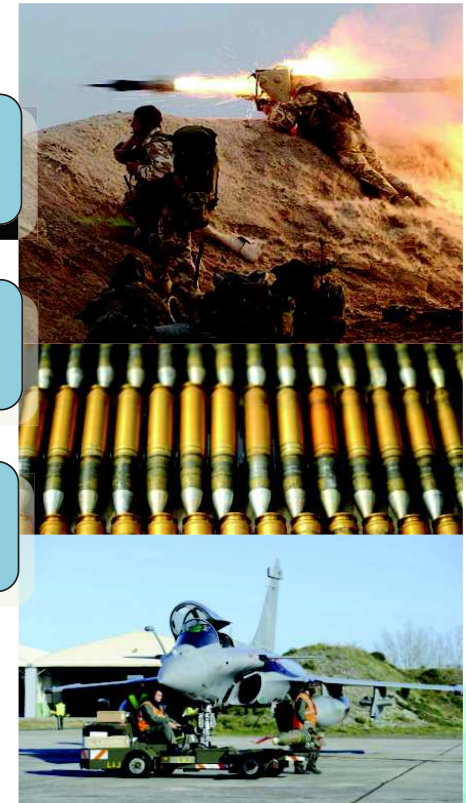
IPE Instruction n°1184 (20/12/2012)

**MURAT signature assessment**

IPE Instruction n°1187 (06/12/2013)

**MURAT signature database management**

IPE Instruction n°1190 (08/07/2015)

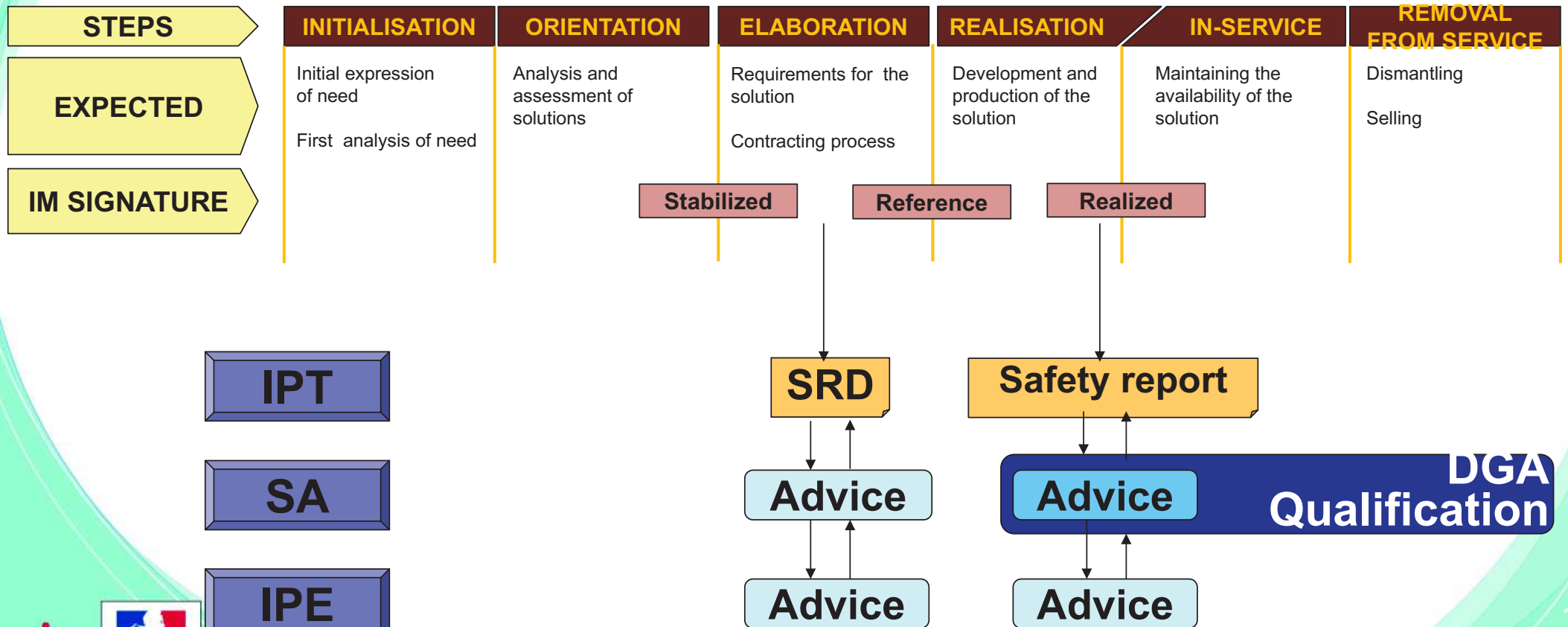


# MURAT Specification for New Acquisition

## ■ 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- MURAT Specification for New Acquisition



# Step 1: Initial military requirements

- **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



## Step 2: “Stabilized” MURAT signature

- **Signature defined by the group of experts before bid solicitation:**
  - Signature based on hazard acceptance (consequences of munition reaction)
    - Determination of munition life cycle phases and munition configurations in the different phases (tactical, logistical, etc.)
    - Evaluation of the munition reaction level to avoid for each aggression a hazard with catastrophic consequences (hazard analysis)  
*(MURAT aggressions of the instruction n°211893)*
  - Determination of the MURAT State of the Art for the considered munition type
  - Evaluation of potential logistic constraint reduction (DR 1.2 Unitary Risk, SsD 1.2.3, etc.)

## Step 2: “Stabilized” MURAT signature

- Consequences of munition reaction

Hazard severity	Persons	Class 1 equipment	Class 2 equipment	Class 3 equipment	Environment
Catastrophic (Cat)	Several deaths	Loss	-	-	Severe damage
Critical (Crit)	Single death and/or multiple severe injuries	Severe damage	Loss	-	Major damage
Marginal (Marg)	Single severe injury and/or multiple minor injuries	Minor damage	Severe damage	Loss	Minor damage
Negligible (Neg)	At most a single minor injury	No effect	Minor damage	Severe damage	No effect

- Equipment classes :

- Class 1 - Major facility, ship, submarine, aircraft, or helicopter
- Class 2 - Minor facility, boat, armoured personnel carrier or major system
- Class 3 - Major component or support equipment

## Step 2: “Stabilized” MURAT signature

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## Step 2: “Stabilized” MURAT signature

- Example of a 120 mm HE mortar munition
  - Life cycle phases

Life cycle phase		Environment	Configuration
Storage	National	Peacetime (P)	Pallet
	Logistical Storage	Operations (O)	Pallet
	Tactical Storage	O	Tactical
Transport	Road	P	Box
	Road	P	Pallet
	Road	O	Tactical
	Rail	P	Pallet
	Sea	P	Pallet
	Air (Aircraft)	O	Pallet
	Air (Helicopter)	O	Box
	Training	P	Tactical
Fire	Combat (vehicle)	O	Tactical



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*(MURAT aggressions defined in the instruction n°211893)*
  - Determination of the MURAT State of the Art for the considered munition type
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## Step 2: “Stabilized” MURAT signature

- Example of a 120 mm HE mortar munition

Life cycle phase		Environment	Configuration
Storage	<b>National</b>	Peacetime (P)	Pallet
	Logistical Storage	Operations (O)	Pallet
	Tactical Storage	O	Tactical
Transport	Road	P	Box
	Road	P	Pallet
	Road	O	Tactical
	Rail	P	Pallet
	Sea	P	Pallet
	Air (Aircraft)	O	Pallet
	Air (Helicopter)	O	Box
	Training	P	Tactical
	<b>Combat (vehicle)</b>	O	Tactical

- Persons : 0
- Class 1 equipment : 0
- Class 2 equipment : 0
- Class 3 equipment : 0
- Environment : storage

- Persons : 5
- Class 1 equipment : 0
- Class 2 equipment : vehicles
- Class 3 equipment : mortar systems
- Environment :



## Step 2: “Stabilized” MURAT signature

- **Example of a 120 mm HE mortar munition**

- Hazard evaluation for personnel, equipment and environment as a function of munitions reaction
  - *Example of firing in a combat phase (vehicle)*

Exposition		Type I	Type III	Type IV	Type V
Category	Description				
Personnel	5 persons	Cat	Cat	Crit	Neg
Equipment	Vehicle (class 2)	Crit	Crit	Marg	Neg
	Mortar (class 3)	Marg	Marg	Marg	Neg
Environment	Inhabited area	Neg	Neg	Neg	Neg

- Hazard for the life cycle phase considered as the most severe among personnel, equipment and environment categories

		Type I	Type III	Type IV	Type V
Fire	Combat (vehicle)	Cat	Cat	Crit	Neg

## Step 2: “Stabilized” MURAT signature

- Example of a 120 mm HE mortar munition

Life cycle phase		Environment	Configuration	Type I reaction	Type III reaction	Type IV reaction
Storage	National	Peacetime (P)	Pallet	<b>Crit</b>	<b>Marg</b>	<b>Marg</b>
	Logistical Storage	Operations (O)	Pallet			
	Tactical Storage	O	Tactical			
Transport	Road	P	Box			
	Road	P	Pallet			
	Road	O	Tactical			
	Rail	P	Pallet			
	Sea	P	Pallet			
	Air (Aircraft)	O	Pallet			
	Air (Helicopter)	O	Box			
Fire	Training	P	Tactical			
	Combat (vehicle)	O	Tactical	<b>Cat</b>	<b>Cat</b>	<b>Crit</b>

## Step 2: “Stabilized” MURAT signature

- Example of a 120 mm HE mortar munition

Life cycle phase		Environment	Configuration	Type I reaction	Type III reaction	Type IV reaction
Storage	National	Peacetime (P)	Pallet	Crit	Marg	Marg
	Logistical Storage	Operations (O)	Pallet	Cat	Crit	Marg
	Tactical Storage	O	Tactical	Cat	Marg	Marg
Transport	Road	P	Box	Cat	Marg	Marg
	Road	P	Pallet	Cat	Marg	Marg
	Road	O	Tactical	Cat	Crit	Marg
	Rail	P	Pallet	Cat	Marg	Marg
	Sea	P	Pallet	Cat	Marg	Marg
	Air (Aircraft)	O	Pallet	Cat	Cat	Crit
	Air (Helicopter)	O	Box	Cat	Crit	Crit
Fire	Training	P	Tactical	Cat	Crit	Marg
	Combat (vehicle)	O	Tactical	Cat	Cat	Crit

## Step 2: “Stabilized” MURAT signature

- Example of a 120 mm HE mortar munition
  - IM signature coming from hazard analysis

	FCO	SCO	BI	FI <sub>light</sub>	FI <sub>heavy</sub>	SD	SCJ
Signature	IV	IV	IV	IV	III	III	III

## Step 2: “Stabilized” MURAT signature

- **Signature defined by the group of experts before bid solicitation:**
  - Signature based on hazard acceptance (consequences of munition reaction)
    - Determination of munition life cycle phases and munition configurations in the different phases (tactical, logistical, etc.)
    - Evaluation of the munition reaction level to avoid for each aggression a hazard with catastrophic consequences (hazard analysis)  
*(MURAT aggressions of the instruction n°211893)*
  - Determination of the MURAT State of the Art for the considered munition type
  - Evaluation of potential logistic constraint reduction (DR 1.2 Unitary Risk, SsD 1.2.3, etc.)

## Step 2: “Stabilized” MURAT signature

- Example of a 120 mm HE mortar munition

- MURAT State-of-the-Art

	FCO	SCO	BI	FI <sub>light</sub>	FI <sub>heavy</sub>	SD	SCJ
Signature	V	V	V	IV	III	III	I

- Reduction of Logistic constraints

- Operational benefit of a NATO SsD 1.2.3 Storage sub-Division
    - Relevant because the small deviation between the signature from the danger analysis and MURAT signature is technologically achievable

	FCO	SCO	BI	FI <sub>light</sub>	FI <sub>heavy</sub>	SD	SCJ
Signature SsD 1.2.3	V	V	V			III	

## Step 2: “Stabilized” MURAT signature

Hazard Analysis Signature	FCO	SCO	BI	FI <sub>light</sub>	FI <sub>heavy</sub>	SD	SCJ
	IV	IV	IV	IV	III	III	III
State of the Art Signature	FCO	SCO	BI	FI <sub>light</sub>	FI <sub>heavy</sub>	SD	SCJ
	V	V	V	IV	III	III	I
Logistic Constraints Signature SsD 1.2.3	FCO	SCO	BI	FI <sub>light</sub>	FI <sub>heavy</sub>	SD	SCJ
	V	V	V			III	

- Proposed Stabilized Signature for a 120 mm HE mortar munition

	FCO	SCO	BI	FI <sub>light</sub>	FI <sub>heavy</sub>	SD	SCJ
Signature	V	V	V	IV	III	III	I

## Step 2: “Stabilized” MURAT signature

- **Justification report for the "stabilized" MURAT signature :**
  - Report written by the group of experts
  - Describe and justify the information used to define the "stabilized" MURAT signature
  - If the “stabilized” signature is downgraded compared to the signature obtained with hazard analysis : evaluation of consequences
  - Official IPE advice requested on the report before validation of the "stabilized" MURAT signature by the concerned Armed Force Staff

## Step 2: “Stabilized” MURAT signature

Signature	FCO	SCO	BI	FI <sub>light</sub>	FI <sub>heavy</sub>	SD	SCJ
Stabilized	V	V	V	IV	III	III	I
After bidding process	V	IV	V	III	III	III	I

- **Based on the signature resulting from the bidding process:**
  - Analysis of the deviation from the "stabilized" MURAT signature
    - Performed by the group of experts
    - Differences compared through a **risk analysis**
    - Proposal of corrective and preventive actions for risk levels judged as "inacceptable"
  - Justification report for the "reference" MURAT signature based on these elements
  - Official IPE advice requested on the report before validation of the “Reference” MURAT signature by the concerned Armed Force Staff

# Step 3: “reference” MURAT signature

## ■ Risk assessment

Hazard severity	Persons	Class 1 equipment	Class 2 equipment	Class 3 equipment	Environment
Catastrophic (Cat)	Several deaths	Loss	-	-	Severe damage
Critical (Crit)	Single death and/or multiple severe injuries	Severe damage	Loss	-	Major damage
Marginal (Marg)	Single severe injury and/or multiple minor injuries	Minor damage	Severe damage	Loss	Minor damage
Negligible (Neg)	At most a single minor injury	No effect	Minor damage	Severe damage	No effect

**Consequences  
of munition  
reaction**

**Mishap  
probability  
levels**

Probability level	Probability designation	Specific individual equipment
Probable	P	Likely to occur several times
Occasional	O	Likely to occur sometime
Remote	R	Unlikely but possible to occur in the life of an item
Improbable	I	Possible but so unlikely that occurrence is not expected

# Step 3: “reference” MURAT signature

## ■ Risk assessment

Hazard \ Likelihood	Catastrophic	Critical	Marginal	Negligible
Probable	A	A	B	C
Occasional	A	B	C	C
Remote	B	C	C	C
Improbable	C	C	C	C

**Risk level  
matrix**

**Risk  
management**

Risk level	Interpretation
<b>Class A</b>	Inacceptable except in extraordinary circumstances
<b>Class B</b>	Undesirable but can be accepted by the Armed Force Staff if no risk reduction is possible
<b>Class C</b>	Acceptable

# Step 3: “reference” MURAT signature

- Example of a 120 mm HE mortar munition
  - Risk analysis for fragment aggression

Life cycle phase		Environment	Configuration	Mishap Probability	Type III reaction		Type IV reaction	
					Hazard severity	Risk	Hazard severity	Risk
Storage	National	Peacetime (P)	Pallet	R	Marg	C	Marg	C
	Logistical Storage	Operations (O)	Pallet	O	Crit	B	Marg	C
	Tactical Storage	O	Tactical	O	Crit	C	Marg	C
Transport	Road	P	Box	R	Crit	C	Marg	C
	Road	P	Pallet	R	Marg	C	Marg	C
	Road	O	Tactical	P	Crit	A	Marg	B
	Rail	P	Pallet	R	Marg	C	Marg	C
	Sea	P	Pallet	R	Marg	C	Marg	C
	Air (Aircraft)	O	Pallet	R	Cat	B	Crit	C
	Air (Helicopter)	O	Box	P	Crit	A	Crit	A
Fire	Training	P	Tactical	I	Crit	C	Marg	C
	Combat (vehicle)	O	Tactical	P	Cat	A	Crit	B

## Step 3: “reference” MURAT signature

Signature	FCO	SCO	BI	FI <sub>light</sub>	FI <sub>heavy</sub>	SD	SCJ
Stabilized	V	V	V	IV	III	III	I
After bidding process	V	IV	V	III	III	III	I

- **Based on the signature resulting from the bidding process:**
  - Analysis of the deviation from the "stabilized" MURAT signature
    - Performed by the group of experts
    - Differences compared through a **risk analysis**
    - Proposal of corrective and preventive actions for risk levels judged as "inacceptable"
  - Justification report for the "reference" MURAT signature based on these elements
  - Official IPE advice requested on the report before validation of the “Reference” MURAT signature by the concerned Armed Force Staff

# QUESTIONS ?

