



MSIAC IM Databases Benefits of Web-based Migration



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- **General Information on the MSIAC IM Test Results Databases**
- **Database Example: Sympathetic Reaction**
- **Migration in Web-based Environment**
- **Application Features**



Slow cook-off



HEAT
Fast & Slow Heating Results
Version Beta

[SCO DATA](#) [FCO DATA](#)

Problems/Questions: MSIAC or Pierre Archambault
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Fast cook-off

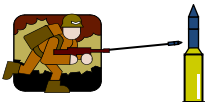


HEAT
Fast & Slow Heating Results
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Bullet impact



BIRD
Bullet Impact Results Database
Version 1.2

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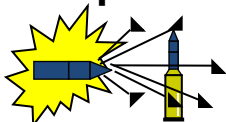
Sympathetic reaction



SYR
Sympathetic Reaction Database
Version 1.2

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Fragment impact



FRAID
Fragment Impact Database
Version 1.10

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Shaped charge jet impact



DARTS
Database of Ammunition Reaction Trials to Shaped Charge Aggression
Version 1.0

Problems/Questions: MSIAC or Pierre-François PERON
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- Databases available for each IM test
- Databases developed under Excel:
 - Easy to populate and use
 - Inclusion of comments and pictures
 - Creation of charts
- Updated every 2 years
- User guide documentation
- More than 4,000 test configurations
- Over 500 references

	Fast cook-off	Slow cook-off	Bullet impact	Fragment impact	Sympathetic reaction	Shaped charge jet impact
Database name and version	HEAT v1.0	HEAT v1.0	BIRD v1.4	FRAID v1.10	SYR v1.2	DARTS v1.0
Number of energetic materials	100	100	200	111	101	86
Number of test configurations	239	223	786	2003	670	354
Number of references	96	40	185	175	109	53
Number of pictures	0	0	0	120	200	93



- IM databases toolbox:
 - Unique
 - Useful
 - Large scope of applications:
 - Design
 - Modelling
 - Procurement
 - Testing



- Excel spreadsheet
- > 650 results
- Wide range of
 - explosive compositions
 - munitions / barriers
- Searchable



SYR
SYmpathetic Reaction Database
Version 1.2

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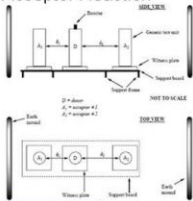


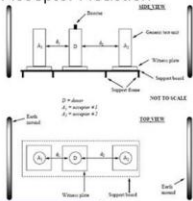


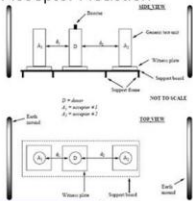


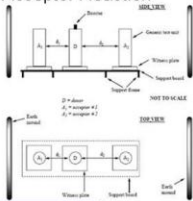


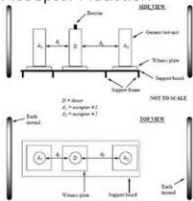
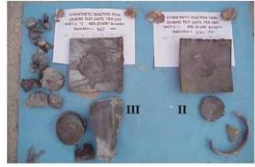
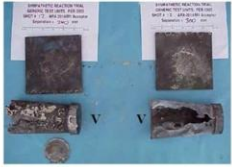
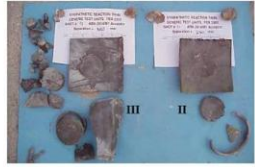
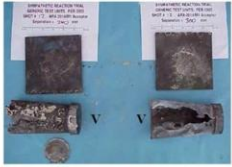
2008

SYR v1.2 released in October 2008

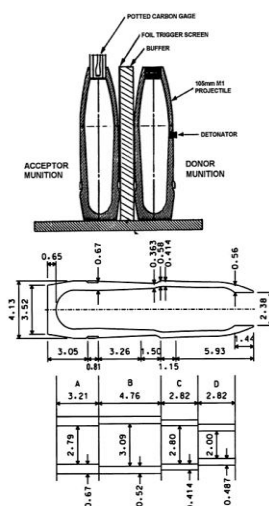
Version	Number of compositions	Number of results	Number of references
1.2	101	670	109



	A	B	C	D	E	F	G	H	I	O	P	Q	R	S	T	U	V	W	X
	Donor (D) and Acceptor (A) Charge Features						Mitigation			Test Set up			Results			Information			
	Munition	Energetic Material	External Diameter (mm)	Case Thickness (mm)	Case Length (mm)	Case Material	Mitigation Material	Mitigation Thickness (mm)	ρ (g/cm ³)	Distance Donor Skin to Acceptor Skin (mm)	Distance Skin of Donor to Mitigation (mm)	Distance Skin of Acceptor to Mitigation (mm)	Initiation Mechanism	Reaction Type	Configuration	References	General Comments		
41	GTU	PBXN-109 (Dyno RDX)	120.66	9.53	300	Mild-Steel	-	-	-	360			SDT	II, IV	One on One Unbuffered	6 4	Evaluation of RS-RDX influence on sympathetic reaction results		
42	GTU	PBXN-109 (ADI RS-RDX)	120.66	9.53	300	Mild-Steel	-	-	-	360			SDT	III, IV	One on One Unbuffered	6 4	Evaluation of RS-RDX influence on sympathetic reaction results		
43	GTU	PBXN-109 (Dyno RDX)	120.66	9.53	300	Mild-Steel	-	-	-	420			SDT	IV	One on One Unbuffered	6 4	Evaluation of RS-RDX influence on sympathetic reaction results		
44	GTU	PBXN-109 (Dyno RDX)	120.66	9.53	300	Mild-Steel	-	-	-	600			SDT	V	One on One Unbuffered	6 4	Evaluation of RS-RDX influence on sympathetic reaction results		
45	GTU	PBXN-109 (Dyno RDX)	120.66	9.53	300	Mild-Steel	-	-	-	960			SDT	V	One on One Unbuffered	6 4	Evaluation of RS-RDX influence on sympathetic reaction results		
60	105 mm M1 shell	Comp B (D) Pentolite (A)	105	17-10.2-10.5	346	Steel	Polyethylene	70	0.93	70			SDT	I (x1) ND (x1)	One on One Buffered	56	Polyethylene plate 510 mm high and 203 mm wide Steel plate behind the acceptor (confinement)		
76	4.5" N36	Rowanex 1100	114.3	-	-	-	10 mm GRP + air + 10 mm GRP	-	-	228.6 (Center to Center)			Undefined	-	One on One Buffered	9	Rowanex 3601 booster Shell burst open one the opposite side to donor No fragment penetration in the acceptor		
102	60 mm MAPAM	PBXN-110	60	10	153	Plastic resin and ϕ 4 mm steel spheres	-	-	-	Not indicated but few mm for adjacent			Undefined	IV	One on Many Buffered	14 14 a	Test performed in the logistic box (6 mortars) 1 donor - 1 adjacent acceptor - 1 diagonal acceptor - 3 inert Charge features measured on drawings		
103	LU-211M	XF 13 333	155	16.4 15 8	560	Steel	-	-	-	35 113			SDT DSDT	IV	One on Many Unbuffered	15 15 a 15 b	8 rounds in a half pallet configuration 1 donor and 2 active acceptors Distance measured on a picture		
104	LU-211M	XF 13 333	155	16.4 15 8	560	Steel	-	-	-	35 113			SDT DSDT	IV	One on Many Unbuffered	15 15 a 15 b	16 rounds in a pallet configuration 1 donor and 2 active acceptors inside the pallet Distance measured on a picture		

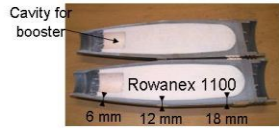
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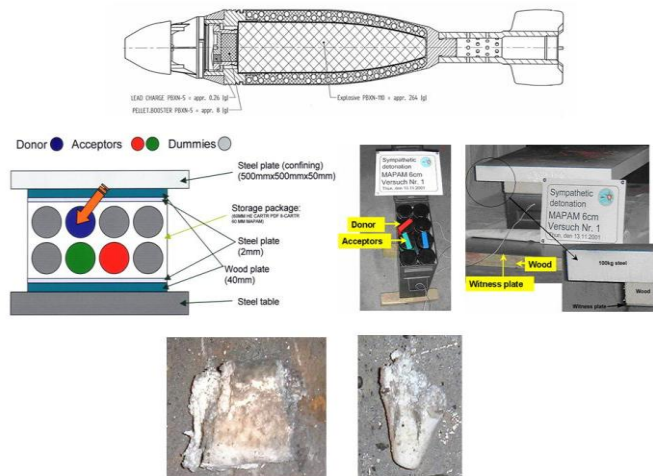


MATERIAL	THICKNESS (mm)	RESULT
MILD STEEL	<38	4 GOs NOGO
	38	NOGO
	>38	3 NOGOs
RHA	<51	2 GOs GO
	51	NOGO
	51	NOGO
	>51	3 NOGOs
POLYETHYLENE	<70	5 GOs GO
	70	GO
	70	NOGO
	76	NOGO
	76	NOGO
	>76	3 NOGOs

	A	B	C	D	E	F	G	H	I	O	P	Q	R	S	T	U	V	W	X
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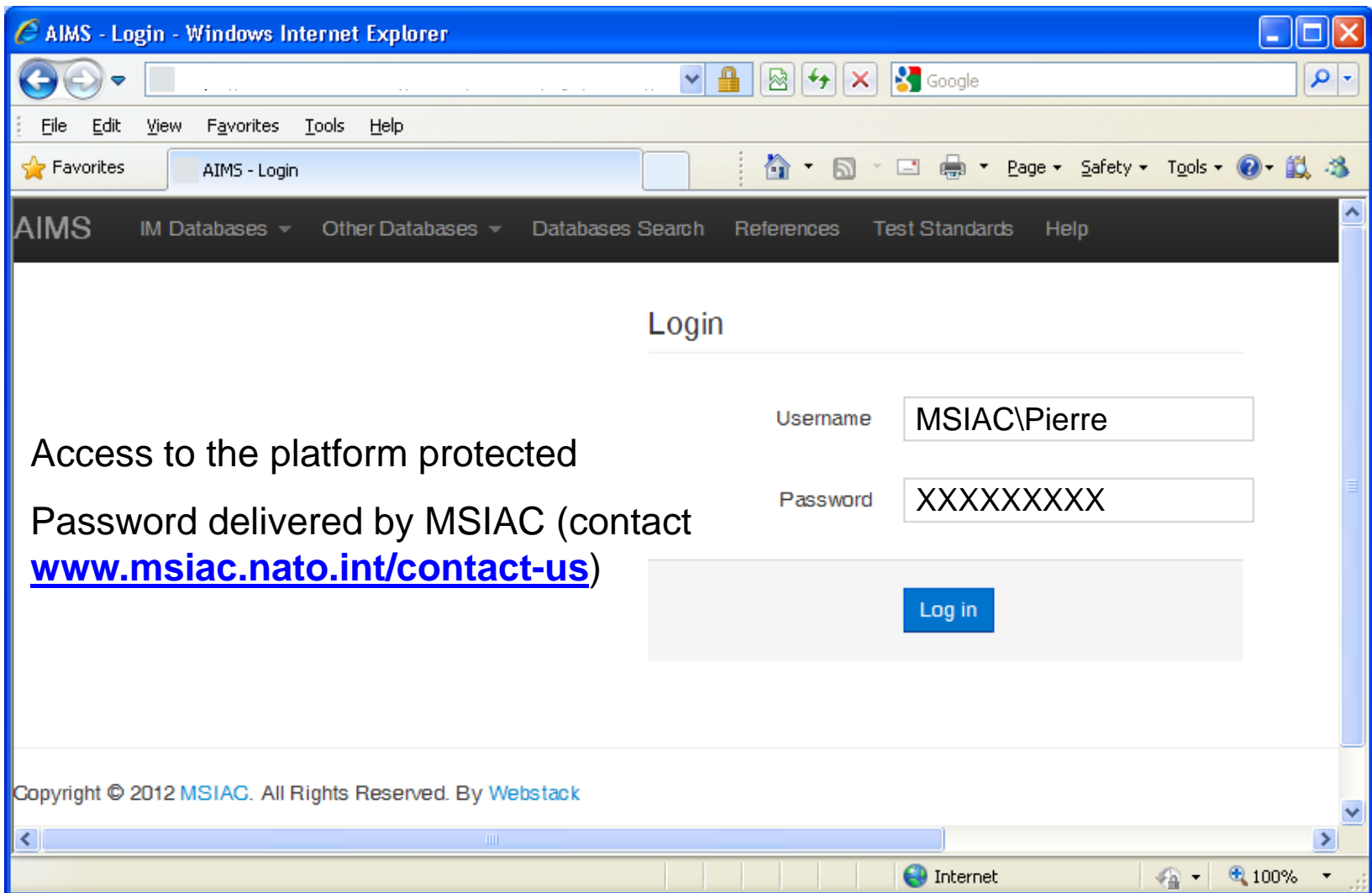


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- **Excel format well adapted for these data but ...**
 - **Need to look through six databases**
- **Databases migration to a web-based environment**
 - Available from anywhere and always up-to-date
 - Unique and powerful search engine to look in all databases within few clicks
 - More intuitive search interface compared to Excel
- **Contract signed with a company specialized in web applications**
 - Work started in February 2012 with SYR
 - All six databases to be migrated in the next months
 - Prototype presented in the next slides



AIMS - Login - Windows Internet Explorer

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Login

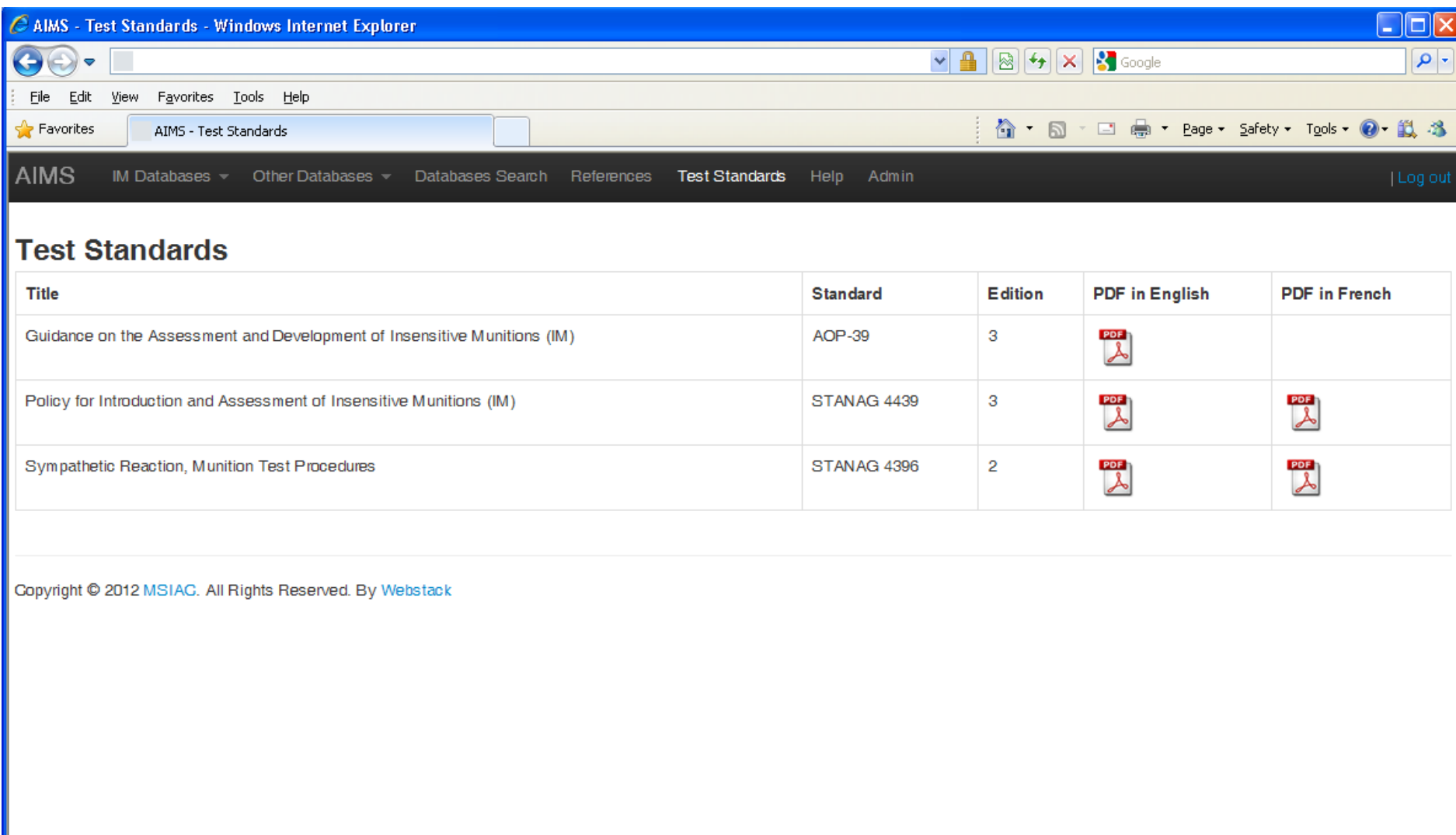
Username

Password

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Password delivered by MSIAC (contact www.msiac.nato.int/contact-us)








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Test Standards

Title	Standard	Edition	PDF in English	PDF in French
Guidance on the Assessment and Development of Insensitive Munitions (IM)	AOP-39	3		
Policy for Introduction and Assessment of Insensitive Munitions (IM)	STANAG 4439	3		
Sympathetic Reaction, Munition Test Procedures	STANAG 4396	2		

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AIMS - SYR - List - Windows Internet Explorer

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Add criteria :

or

List of SR Tests (681)

SR Test		Donor (D) and Acceptor (A) Characteristics					Mitigation		Test Setup		Results		Ref
ID	Munition	Main Energetic Material	Composition	External Diameter/ Thickness (mm)	Case Material and Thickness (mm)	Packaging	Material / Concept	Thickness (mm)	Configuration	Distance Donor to Acceptor	Initiation Mechanism	Reaction Type	Ref
1	4.5" Mk8 IA Shell	Comp B	60% RDX 40% TNT	114.3	Steel 18-12-6	Packaged	GRP Tube	20.0	One on One Buffered	114.3	DDT	I	9
2	4.5" Mk8 IA Shell	Rowanex-1100	88% RDX 12% HTPB	114.3	Steel 18-12-6	Packaged	GRP Tube	20.0	One on One Buffered	114.3	SDT	ND	9
3	4.5" Mk8 IA Round	Comp B	60% RDX 40% TNT	114	Steel 18-12-6	Packaged	GRP Tube Water Plate	6.0 100.0	One on One Buffered	207.0	SDT	NR	38
4	4.5" Mk8 IA Round	Comp B	60% RDX 40% TNT	114	Steel 18-12-6	Bare	-	-	One on Many Unbuffered	0.0 0.0 47.0	SDT	I (x35 shells)	110
5	4.5" Mk8 IA Round	Comp B	60% RDX 40% TNT	114	Steel 18-12-6	Packaged	GRP Tube	6.0	One on Many Unbuffered	114.3 114.3 114.3	SDT	I (x15 shells) ND (x20 shells)	110

Done Internet 100%

AIMS - SYR - Test ID 3 - Windows Internet Explorer

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AIMS - SYR - Test ID 3

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Test ID 3 - 4.5" Mk8 IA Round

Print Export Comment Edit


Munitions					
Name	Category	Fire Capability	Submunitions	Purpose	Effects
4.5" Mk8 IA Round	Artillery	ground to ground	No	General Purpose	Blast Fragmentation

Donor (D) and Acceptor (A) Tested Item Characteristics										
Tested Item	Main Energetic Material	Type	Composition	Initiation/Ignition Energetic Material	Type	Composition	External Diameter (mm)	Case Thickness (mm)	Case Material	Packaging
All-up-round	Comp B	Melt-cast	60% RDX 40% TNT	Debrix-18AS	Pressed	95.3% RDX 2.5% Wax 2.2% HDK	114	18-12-6	Steel	Packaged

Mitigation					Test Setup Distance				Results		
Concept	Material	Thickness (mm)	Width (mm)	ρ (g/cm ³)	Arrangement	Donor to Acceptor (mm)	Donor to Mitigation (mm)	Acceptor to Mitigation (mm)	Initiation Mechanism	Reaction Type	IM Test
Tube Plate	GRP Water	6.0 100.0	-	1.0	One on One Buffered	207.0			SDT	NR	Yes

Comment	References
4.5" Improved Ammunition Simultaneous detonation of 3 packaged donors in a stack and 1 packaged acceptor separated by a water barrier Dimensions measured on a test set up picture	38

Sympathetic Reaction Test with 4.5" Mk 8 IA Shells in their Container Shells Filled with Composition B and Mitigated with Water



4.5" Mk 8 IA shell and GRP container

Water barrier

Done

Internet 100%

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AIMS IM Databases Other Databases Databases

Select a criteria

Munition type

Search or Clear search

List of SR Tests (691)

Munition Characteristics

ID	Munition	Main Energetic Material	Composition
1	4.5" Mk8 IA Shell	Comp B	60% RDX 40% TNT
2			JX TPB
3			JX VT
4	4.5" Mk8 IA Round	Comp B	60% RDX VT
5			JX VT

Mitigation Test Setup Results Reference

(A) Chara

Munition
Fire Capability
Category
Purpose
Effect
Item
Energetic Material
Filling Ingredient 1
Filling Ingredient 2
Filling Ingredient 3
Energetic Material Type
Initiation/Ignition Energetic Material
External
Case Thickness
Case Material
Packaging
Mitigation
Mitigation Thickness
Mitigation Width
Arrangement
Initiation Mechanism
IM Tests Only
IM Standard Reactions
Reaction Type
Reference

Add criteria : Select a criteria

Test Setup

Thickness (m)	Configuration	Distance Donor Accept			
0	One on One Buffered	114.3			
0	One on One Buffered	114.3			
0.0	One on One Buffered	207.0	SDT	NR	38
	One on Many Unbuffered	0.0 0.0 47.0	SDT	I (x35 shells)	110
	One on Many Unbuffered	114.3 114.3 114.3	SDT	I (x15 shells) ND (x20 shells)	110

Log out

Internet 100%

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Munition contains 155 mm Remove

Filling Ingredient 1 contains RDX
 Percent from 0 to 100
 Remove

Reaction Type SR from 3 to 6
 Remove

Add criteria: Select a criteria

- Select a criteria
- Munition
- Fire Capability
- Category
- Purpose
- Effect
- Item
- Energetic Material
- Filling Ingredient 1
- Filling Ingredient 2
- Filling Ingredient 3
- Energetic Material Type
- Initiation/Ignition Energetic Material
- External
- Case Thickness
- Case Material
- Packaging
- IM Tests Only
- IM Standard Reactions
- Reaction Type
- Mitigation
- Mitigation Thickness
- Mitigation Width
- Arrangement
- Initiation Mechanism
- Reference

Search or Clear search

List of SR Tests results (41)

SR Test		Donor (D) and Acceptor (A) Characteristics					Mitigation		Test Setup		Ref
ID	Munition	Main Energetic Material	Composition	External Diameter/ Thickness (mm)	Case Material and Thickness (mm)	Packaging	Material / Concept	Thickness (mm)	Configuration		Ref
295	155 mm M483A1 DPICM Shell	Comp A-5	98.5% RDX 1.5% Stearic acid	155	Steel	Bare	Polyethylene Bar	25.4	One on One Buffered		66
298	155 mm M483A1 DPICM Shell	Comp A	98.5% RDX	155	Steel	Bare	Polyethylene	25.4	One on One		66

AIMS - SYR - List - Windows Internet Explorer

https://intranet.webstack.fr/phoenix/syr/list/?sort=d_horizontal&ingredient_1_m=C&ingredient_1_v=1&muniton_v=155+mm&muniton_m=C&rt_vmax=6&ingredient_1_vmin=0&inc

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Muniton contains 155 mm Remove

Filling Ingredient 1 contains RDX

Pourcent from 0 to 100 Remove

Reaction Type SR from 3 to 6 Remove

Add criteria: Select a criteria

Search or Clear search

Print Export Comment

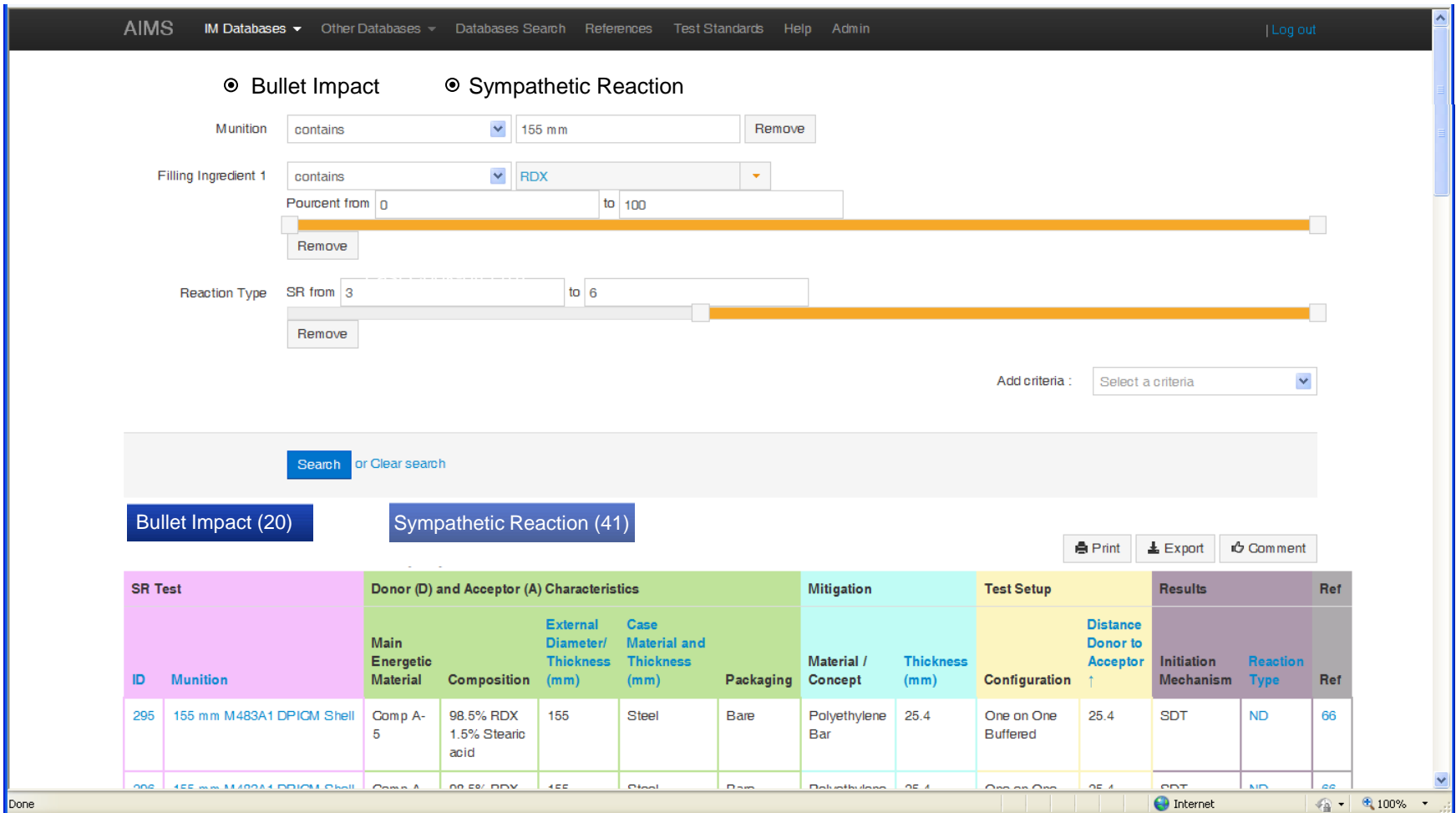
Excel file with pictures

Print a paper copy or a pdf

List of SR Tests results (41)

SR Test		Donor (D) and Acceptor (A) Characteristics					Mitigation		Test Setup		Results		Ref
ID	Muniton	Main Energetic Material	Composition	External Diameter/ Thickness (mm)	Case Material and Thickness (mm)	Packaging	Material / Concept	Thickness (mm)	Configuration	Distance Donor to Acceptor ↑	Initiation Mechanism	Reaction Type	Ref
295	155 mm M483A1 DPICM Shell	Comp A-5	98.5% RDX 1.5% Stearic acid	155	Steel	Bare	Polyethylene Bar	25.4	One on One Buffered	25.4	SDT	ND	66
296	155 mm M483A1 DPICM Shell	Comp A	98.5% RDX	155	Steel	Bare	Polyethylene	25.4	One on One	25.4	SDT	ND	66

- Add BIRD (Bullet Impact) database
 - and create a common search interface to look through one or two databases at the same time



The screenshot shows the AIMS web application interface. At the top, there are navigation tabs: AIMS, IM Databases, Other Databases, Databases Search, References, Test Standards, Help, Admin, and a Log out link. Below the navigation, there are two radio buttons for selecting a search type: "Bullet Impact" (selected) and "Sympathetic Reaction".

The search criteria are defined as follows:

- Munition:** contains 155 mm (Remove button)
- Filling Ingredient 1:** contains RDX (Remove button). A range slider is set from 0 to 100 percent.
- Reaction Type:** SR from 3 to 6 (Remove button). A range slider is set from 3 to 6.

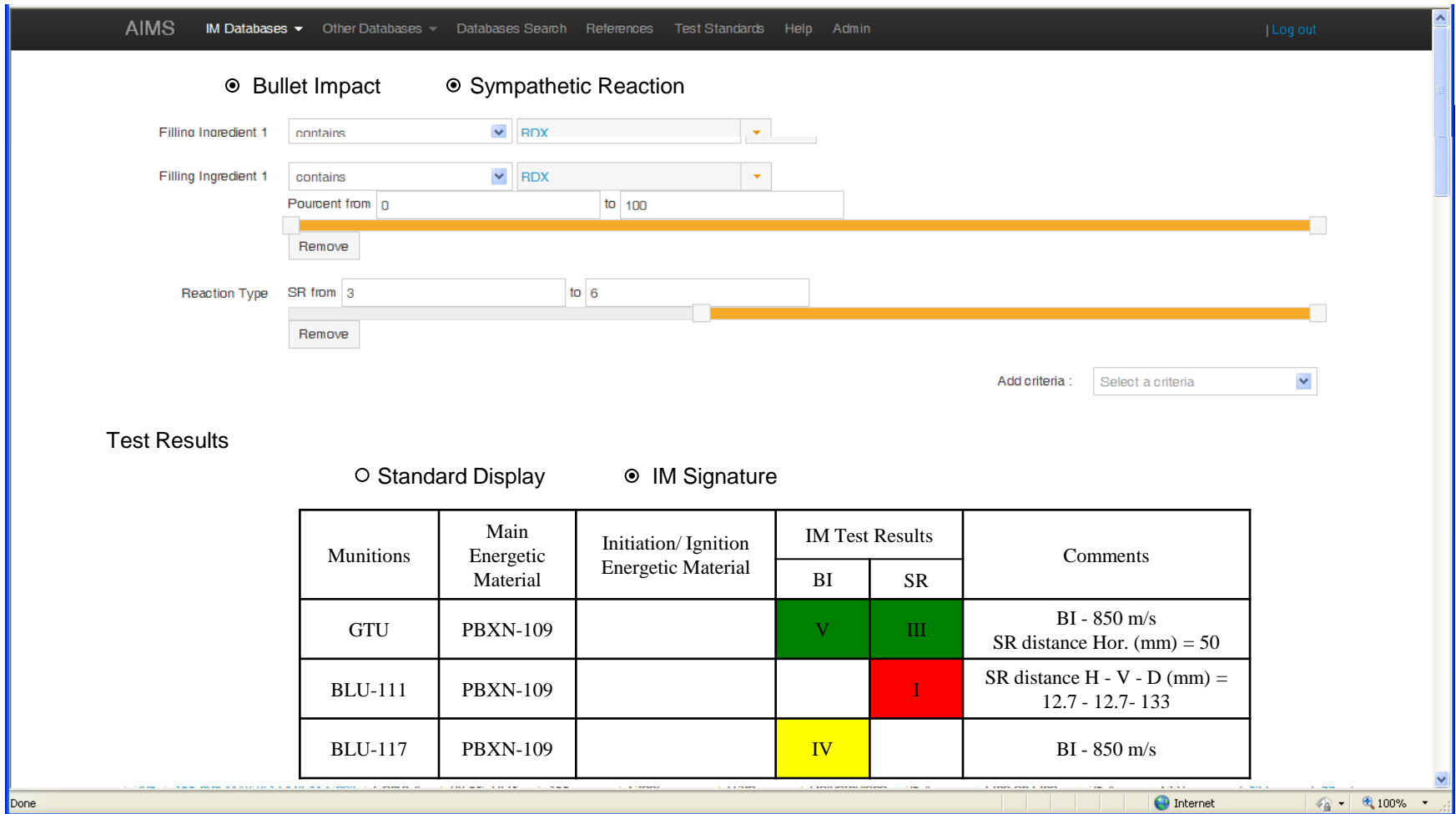
There is an "Add criteria" dropdown menu set to "Select a criteria". Below the search criteria is a "Search" button and a "Clear search" link.

Below the search bar, there are two buttons: "Bullet Impact (20)" and "Sympathetic Reaction (41)". To the right of these buttons are "Print", "Export", and "Comment" icons.

The search results are displayed in a table with the following columns:

SR Test		Donor (D) and Acceptor (A) Characteristics					Mitigation		Test Setup		Results		Ref
ID	Munition	Main Energetic Material	Composition	External Diameter/Thickness (mm)	Case Material and Thickness (mm)	Packaging	Material / Concept	Thickness (mm)	Configuration	Distance Donor to Acceptor ↑	Initiation Mechanism	Reaction Type	Ref
295	155 mm M483A1 DPICM Shell	Comp A-5	98.5% RDX 1.5% Stearic acid	155	Steel	Bare	Polyethylene Bar	25.4	One on One Buffered	25.4	SDT	ND	66
296	155 mm M483A1 DPICM Shell	Comp A	98.5% RDX	155	Steel	Bare	Polyethylene	25.4	One on One	25.4	SDT	ND	66

- Create an additional interface to compare tests performed according to IM standard procedures



The screenshot shows the IMSIAC web application interface. At the top, there is a navigation bar with links for 'AIMS', 'IM Databases', 'Other Databases', 'Databases Search', 'References', 'Test Standards', 'Help', 'Admin', and a 'Log out' button. Below the navigation bar, there are two radio buttons for selecting a test type: 'Bullet Impact' (selected) and 'Sympathetic Reaction'. Under 'Bullet Impact', there are two search filters for 'Filling Ingredient 1'. The first filter is set to 'contains' and 'RDX'. The second filter is also set to 'contains' and 'RDX'. Below these filters, there is a range slider for 'Percent from' (0 to 100) and a 'Remove' button. The 'Reaction Type' filter is set to 'SR from 3 to 6' with a 'Remove' button. An 'Add criteria' dropdown menu is set to 'Select a criteria'. Below the filters, there is a 'Test Results' section with two radio buttons: 'Standard Display' and 'IM Signature' (selected). The test results are displayed in a table with the following data:

Munitions	Main Energetic Material	Initiation/ Ignition Energetic Material	IM Test Results		Comments
			BI	SR	
GTU	PBXN-109		V	III	BI - 850 m/s SR distance Hor. (mm) = 50
BLU-111	PBXN-109			I	SR distance H - V - D (mm) = 12.7 - 12.7- 133
BLU-117	PBXN-109		IV		BI - 850 m/s

- **Test results databases available for each IM threat**
 - **Excel databases**
- **Migration in a web-based environment of the database suite**
 - **User-friendly navigation and full search capability**
 - **Worked started with SR database and to be continued with BI and then FI, SCJ, FCO and SCO**
- **First version of the platform to be released by end of June 2012**
 - **Look for volunteers to test the platform in the next weeks**



M Munitions
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A Analysis
C Center

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