

Munitions Safety Information Analysis Center

Supporting Member Nations in the Enhancement of their Munitions Life Cycle Safety



AIMS Advanced Insensitive Munitions Search IMEMTS 2013 – San Diego, CA, USA

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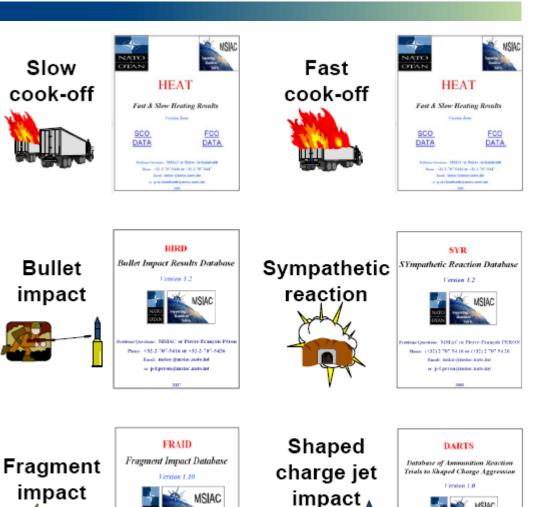


The past

Phase: 132-3-707-5446 or 133-2-707-5428

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- Over the years, MSIAC has developed 6 databases of IM test results:
 - One base per IM threat
 - Easy to populate and use
 - Inclusion of comments and pictures
- Updated every 2 years
- Use of open literature only



na: MSIAC or Pletty-Francois PERC

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Migration

- Excel format well adapted for these data but ...
 - The large quantity of data makes it time consuming to find results
 - Need to look through six databases
- Database migration to a web-based environment:
 - Available from anywhere and always up-to-date
 - Unique and powerful search engine to look in all databases with only a few clicks
 - More intuitive search interface compared to excel
 - More information provided
- Contract signed with a company specialized in web application (EMC – SASO):
 - Work started in February 2012 with SYR
 - Final deployment on MSIAC server in January 2013
 - Upgrade contract already granted for the next 3 years



Web Based Platform

Supporting Munitions Safety

AIMS	IM Databases -	Other Databases -	Databases Search	References	Test Standards	Help
	Fast Cook-off Slow Cook-off Bullet Impact	EMC NEWGATES	Search through all			
	Fragment Impact Sympathetic Reaction Shaped Charge Jet	Generic Test Units Shaped Charge Threats	databases	Username Password		
					Log in	

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Access to a Database

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Lis	st of SR Tes	sts (681)											ment	
SR	Test	Donor (D) and	Acceptor (A) Chara	cteristics			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	
ID 1	Munition 4.5" Mk8 IA Shell	Energetic	Composition 60% RDX 40% TNT	Diameter/ Thickness	Material and Thickness	Packaging Packaged			Configuration One on One Buffered	Donor to			Ref 9	
		Energetic Material	60% RDX	Diameter/ Thickness (mm)	Material and Thickness (mm) Steel		Concept	(mm)	One on One	Donor to Acceptor	Mechanism			
1	4.5" Mk8 IA Shell	Energetic Material Comp B Rowanex-	60% RDX 40% TNT 88% RDX	Diameter/ Thickness (mm) 114.3	Material and Thickness (mm) Steel 18-12-6 Steel	Packaged	Concept GRP Tube	(mm) 20.0	One on One Buffered	Donor to Acceptor 114.3	Mechanism DDT	Type	9	
1	4.5" Mk8 IA Shell 4.5" Mk8 IA Shell	Energetic Material Comp B Rowanex- 1100	60% RDX 40% TNT 888% RDX 12% HTPB 60% RDX	Diameter/ Thickness (mm) 114.3 114.3	Material and Thickness (mm)Steel 18-12-6Steel 18-12-6Steel Steel	Packaged Packaged	Concept GRP Tube GRP Tube GRP Tube	(mm) 20.0 20.0 6.0	One on One Buffered One on One Buffered One on One	Donor to Acceptor 114.3 114.3	Mechanism DDT SDT	Type I ND	9	- - -
1 2 3	4.5" Mk8 IA Shell 4.5" Mk8 IA Shell 4.5" Mk8 IA Round	Energetic Material Comp B Rowanex- 1100 Comp B	60% RDX 40% TNT 88% RDX 12% HTPB 60% RDX 40% TNT 60% RDX	Diameter/ Thickness (mm) 114.3 114.3 114.3	Material and Thickness (mm)Steel 18-12-6Steel 18-12-6Steel 18-22-6Steel 18-12-6Steel 18-12-6	Packaged Packaged Packaged	Concept GRP Tube GRP Tube GRP Tube	(mm) 20.0 20.0 6.0	One on One Buffered One on One Buffered One on One Buffered One on Many	Donor to Acceptor 114.3 114.3 207.0 0.0 0.0	Mechanism DDT SDT SDT	Type I ND NR I (x35	9 9 38	



Browse a Database

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S	Sympa	athetic	React	tion	Test ID 1	137 - 4.5"	Mk8 IA	Shell			🖨 Print	Ł Export	Comment	t / Edit
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r	Name			Category	Fire C	apability		Submun	itions	Purpose		Effects		
4	4.5" Mk8 I/	A Shell		Artillery	Sea to	air/ground/sea		No		General Purpose		Blast Fr	ragmentation	
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	Donor (D)	and Accept	tor (A) Teste	ed Item Cha	aracteristics									
	Tested Item	Main Er Material	-	Туре	Composition	Initiation/Ignitio Material	on Energetic	Туре	Composition	External Diameter (mm)	Case Th (mm)	nickness	Case Material	Packaging
N	Warhead	Comp B	(Cast)	Melt- cast	60% RDX 40% TNT	Debrix-18AS			95.3% RDX 2.5% Wax 2.2% HDK	114	18-12-6		Steel	None
r	Mitigation					Test Setup Dista	ance				Re	esults		
c	Concept	Material	Thickness (mm)	Widt (mm		Arrangement	Donor to Acceptor	(mm)	Donor to Mitigation (mm	Acceptor to) Mitigation (mi	115233	itiation echanism	Reaction Type	IM Test
20	Container Plate	GRP Water	3 x2 100		1.0	One on One Buffered	207.0				S	т	NR	Yes
			4.5" Impn	omment			erences			n 4.5" Mk 8 IA Shells in their ition B and Mitigated with V		0		
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Search a Database

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				Exte		Case										
			ain Iergetic			Material and Thickness		Material /	Thickness		Distance Donor to	Initiation	Reaction			
ID	Munition			position (mn		(mm)	Packaging	Concept	(mm)	Configuration		Mechanism	Туре	Ref		
23	34 155 mm HE L15 (I		wanex- 88% I		5	Steel	Packaged			One on One		SDT	VI	123		
		11	00 12%	нтрв						Unbuffered						
25	51 155 mm M107 She	ell Co	omp B 60% F			Steel	Bare	-	-	Stack on	22900.0	SDT	ND (x6	92		~
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Save Results

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			sts resu	Donor (D) a		External Diameter/ Thickness	stics Case Material and		or a po	-		Print ·	ل Export ال	Reaction	Ref	
	SR T	est		Donor (D) a Main Energetic	and Acceptor (External Diameter/ Thickness	tics Case Material and Thickness		Or a po Mitigation Material / Concept	df Thickness	Test Setup	Print : Distance Donor to	Export 4	Reaction		
	SR T	est Munition		Donor (D) a Main Energetic Material	Composition 98.5% RDX 1.5% Stearic	External Diameter/ Thickness (mm)	stics Case Material and Thickness (mm)	Packaging	Or a pc Mitigation Material /	df Thickness (mm)	Test Setup Configuration	Distance Donor to Acceptor	Export Results	Reaction Type	Ref	
	SR T	est Munition	DPIGM Shell	Donor (D) a Main Energetic Material Comp A-	Composition 98.5% RDX	External Diameter/ Thickness (mm)	stics Case Material and Thickness (mm)	Packaging	Or a po Mitigation Material / Concept	df Thickness (mm)	Test Setup Configuration One on One	Distance Donor to Acceptor	Export Results	Reaction Type	Ref	

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Bullet Impact Database

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Munitions																
Name					Cate	јогу	Fire Capabili	ty		Submuni	tions	Pu	rpose	Effec	ts	
Tomahawk	Missile - W	/DU-25B Warl	head		Cruise	e Missile	Sea to sea			No		Ant	i-ship	Blast	Fragmentation	
Tested Iter	• Charact	nistios														
Tested Item		nergetic	Туре	Compo	sition	Initiation/Ignitio Material	on Energetic	Туре	Com	position	External Diam (mm)	eter	Case Thio (n n)	kness	Case Material	Packaging
Warhead	Picratol H-6 (Dual)	20 20 20 20 20 20 20 20 20 20 20 20 20 2	Melt-cast/ Melt-cast	Picrato 48% TN 52% Am Picrate H-6	т	Not Documented	1				419				Steel	Bare
Mitigation				Test Setu	p									Results	ŝ.	
Concept	Material	Thickness (m.m.)	p (g/cm³)	Bullet Type	Initial Velocity (m/s)	Firing Distance (m)	Im pact Velocity (m/s)		rst or igle	Burst Timing (nu/s)	Ain Point		est andard	N um ber Tests	of Reactio Type	n IM Test
None				12.7 AP			850 ± 60	Bur	st	50 ± 10) Center	59984	IL-STD- 05A	4	l (x3) NR (x1)	Yes
		Comment , Mk40 mod 0 ed of two con	17. C	atol and H-6	References 130 255	TOMAHAV	VK (BGM-109 B/C and Hazard	-2) Sympat Arc Detern	hetic Deto nination	onation Test	ing					

Done



Slow Cook-Off Database

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AIMS	IM Databases -	 Other Databases 	- Database	es Search	References	Test Standard	rds Help Ad	dmin				Emmanuel	Schultz Log	g out
Slo	w Cook-C	Search or Clear se	earch							•	Filling Ing	ability /		
SCO T	est	Tested Item Charact	teristics				Mitigation	Test Setu	ир		Filling Ing Energetic	gredient 3 c Material Ty	/pe rgetic Materia	əf
ID	Munition (Tested Item)	Energetic Material	Composition	External Diameter/ Thickness (mm)	Case Material and Thickness (mm)	Pack.	Family / Name / Material	Heating rate (°C/Hr)	Preheating T° (°C)	, It C	External Case Thi Case Ma Packagir IM Tests	Size ickness aterial ng		əf
3846	105 mm M915 DPICM Shell (Warhead)	PAX-2A	85% HMX 9% BDNPA/F 6% CAB	105	Steel	Packaged	Container / PA117 / Steel	27.8	65	۲	Referenc Mitigation Mitigation	n Concept n Material		;
3847	105 mm M915 DPICM Shell (Warhead)	Comp A-5	98.5% RDX 1.5% Stearic Acid	105	Steel	Packaged	Container / PA117 / Steel	27.8	59	F	Heating Reaction			;
3849	105 mm Modular Charge - Denel (Gun Propellant)	SSE-075	NC DNT	105	Combustible	Bare	None / /			Но	orizontal	v	127	435



Databases Search

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Common search interface to look through all the databases at the same time

	 Other Databases - Databases Search 	References Test Standards	Help Admin		Guest L	-9 c
	Search or Clear search					
0 Fast Cook-off 0 SI	w Caok-off 10 BI Tests 6 FI Tests	8 SR Tests 0 Shaped Charge Je	et			
	Donor (D) and Acceptor (A) Characteristi	ine .	Mitigation	Test Setup	Results	
SR Test	Bonor (B) and Asseptor (A) onalaotensi		wingation	Test Setup	resens	Re

ID	Munition (Tested Item)	Energetic Material	Composition	Thickness (mm)	and Thickness (mm)	Packaging	Concept / Thickness (mm)	Configuration	Donor to Acceptor	Initiation Mechanism	Reaction Type	Re
1366	120 mm M934A1 Mortar (Warhead)	Comp B (Cast)	60% RDX 40% TNT	120	High Fragmentation Steel ~13.5		Container	One on Many Buffered		SDT SDT DSDT USDT	1	25 27 89
1365	120 mm XM1101 EFSS Mortar (Warhead)	PBXW-128	77% HMX 23% Binder	120	Steel 8 (estimated)		Container	One on Many Buffered		SDT SDT DSDT	ND	83
1371	120 mm MECAR Mortar (Warhead)	Comp B (Cast)	60% RDX 40% TNT	120	Steel		GRP Container	One on Many Buffered		SDT	Ш	75
1370	120 mm Smoke EFSS Mortar (Warhead)	White Phosphorous	White Phosphorous	120	Steel		Container	One on Many Buffered		SDT SDT DSDT	ND	83
1367	120 mm M934A1E1	HBU-88 B	12% HTPB	120	High		GRP	One on Many		SDT	ND	25



Display by IM Signature

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AIMS IM Databases -	Other Databa	ases - Databases	Search R	leferenc	es	Test Sta	andards	Help A	dmin		Emmanuel Schultz Log out
External Size	Diameter	\$ fr	rom 81				to	81		mm	Remove
Ba	ased on the iter	n shape: diameter for	a cylinder and	thickne	ss for a	paralle	piped.				
IM Tests Only	·	ts carried out in accord	dance with IM	STANAG	às are d	lisplaye	d.				
											Select a criteria
	Search or Cle	ear search									
4 FCO Tests 6 SCO Tests	4 BI Tests	3 FI Tests 15 S	SR Tests 3	SCJ Te	sts	13 IM S	Signature	es			L Export
				IM Te	st Resi	ults					
Munition	Item	Main Energetic Material	Packaging	FCO	sco	в	FI	SR	SCJ	Comments	
81 mm HE Mortar	Warhead	Comp B	Bare			IV		l (x2)		BI - 850 m/s SR H-V-	-D (mm) = 203.2 - N/A - N/A
81 mm HE Mortar	Warhead	TBI-60	Bare		v					SCO - N/A °C/Hr	
81 mm HE Mortar	Warhead	TBI-60	Packaged	V		NR (x3)	NR (x3)	NR		FCO - Fuel Fire BI - 8 (mm) = N/A - N/A - N	850 m/s Fl - 2400 (m/s) SR H-V-D /A
81 mm M816 Infrared Illuminating Mortar	Gun Propellant	M-38	Bare		V (x2)					SCO - 3.3 °C/Hr	
81 mm M816 Infrared Illuminating Mortar	Gun Propellant	M-38	Packaged	IV						FCO - Bonfire	



Generic Test Units (GTU)

Provides a list of commonly used Generic Test Units Chinese Pipe Nipple Bomb (PNB-C)

AIM	S IM Databases - Other Data	bases 👻 🛛	Databases Searc	h F		7777	108mm		Emmanuel Sch	hultz Log out
Lis	at of Generic Test	Units			Shot line	<u>ATAIL</u>	1111111	III III		
ID ↑	Designation	Acronym	Country	Shot Line		mm		\$.32.55 \$	Overall Length mm)	Reference
1	3.2" Generic Shaped Charge Test Unit	3.2" GSCTU	USA	Radia					193.0	40
2	6.9" Generic Shaped Charge Test Unit	6.9" GSCTU	USA	Radia						40
3	Chinese Generic Test Unit	CGTU	China	Axial					127.0	132
4	Chinese Pipe Nipple Bomb	PNB-C	China	Radial	Steel	3.0	52.5	58.5	102.0	138
5	EMTAP Pipe Nipple Bomb	PNB-E	UK	Radial	Steel	9.5	57.0	76.0	120.0	332
6	GEMO 3 Liters Thick Wall Test Unit	GEMO 3L	France	Radial	Steel	10.0	123.0	143.0	260.0	15
7	GEMO 90 Gun Propellant Combustible Cartridge	GEMO Poudre C	France	Radial	Combustible Case	3.3	87.5	94.1	360.0	258



Shaped Charge Threats

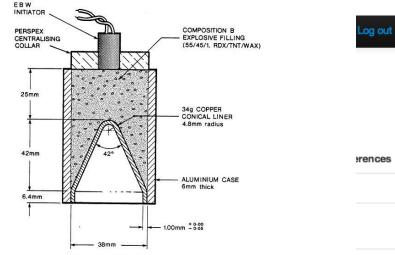
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Provide a description of commonly used Shaped Charges

AIMS IM Databases -	Other Databases 👻	Databases Search	References
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List of Shaped Charge Threats

ID	Designation	Munition Type	Country	Charge Diameter (mm)	Charge Caliber (mm)	Charge Weight (g)	Explosive Name	Expl Mas	42
1	Rockeye	Bomblet	USA	53.6	50	600	Comp B	174	6.
2	MRL 38	Laboratory	Australia	50	38		Comp B		
3	SC 25	Laboratory	Germany	26	21		RDX based	18	
4	M9A1	Laboratory	USA	55.6	41				44
5	DM1348	Bomblet	Germany	42.3	33	292	Comp A5	43.5	Copper
6	DM1383	Bomblet	Germany	42.2	36	293	Comp A5	43.5	Copper
7	GE-PG7 Mock-up	Rocket	Germany		75				Copper



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Reference View

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AIMS IM Databases - Other Databases - Databases Search References Test Standards Help Admin
List of References (437)

Development and Assessment of Low Sensitive Melt-cast and Pressed Explosives

Authors: Mesnil R. and Aumasson R. Symposium, Report Number: IMEMTS Year: 2004

This reference is used for the following Bullet Impact Test Results:

Test ID	Munition Name (Tested Item)	Main Energetic Filling	Material / Concept / Thickness (mm)	Bullets Characteristics (Velocity)	Reaction Type
1035	155 mm LU211-M Shell (Warhead)	XF-13333		12.7 AP (850 m/s)	V (x1) NR (x6)

This reference is used for the following Fragment Impact Test Results:

Test ID	Munition Name (Tested Item)	Main Energetic Filling	Material / Concept / Thickness (mm)	Fragment Characteristics (Velocity)	Reaction Type
1557	155 mm LU211-M Shell - GEMO 3L GTU (Warhead)	XF-13333		Φ 31.6 mm Steel Cube Flat Shape (2000 m/s)	III (x1)



Test Standards

Access to NATO standard related to IM

AIMS	IM Databases 👻	Other Databases 👻	Databases Search	References	Test Standards	Help Admi	in		Emmanuel Schultz Log out
Test	Standard	s							
Title						Standard	Edition	PDF in English	PDF in French
POLICY F	OR INTRODUCTION A	ND ASSESSMENT OF IN	SENSITIVE MUNITIONS			STANAG4439	3	POF	
GUIDANC	E ON THE ASSESSME	INT AND DEVELOPMEN	FOF INSENSITIVE MUNI	TIONS		AOP-39	3	POF	
LIQUID FU	JEL / EXTERNAL FIRE,	MUNITION TEST PROC	EDURES			STANAG4240	2	POF J	
SLOW HE	ATING, MUNITIONS TE	EST PROCEDURES				STANAG4382	2	POF J	
BULLET IN	MPACT, MUNITION TE	ST PROCEDURES				STANAG4241	2	POF J	
FRAGMEN	NT IMPACT, MUNITION	IS TEST PROCEDURES				STANAG4496	1	POF J	
SYMPATH	IETIC REACTION, MUN	NITION TEST PROCEDUR	RES			STANAG4396	2	ک	POF

SHAPED CHARGE JET, MUNITIONS TEST PROCEDURES

STANAG4526 2

POF

PDF



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Merci pour votre attention