

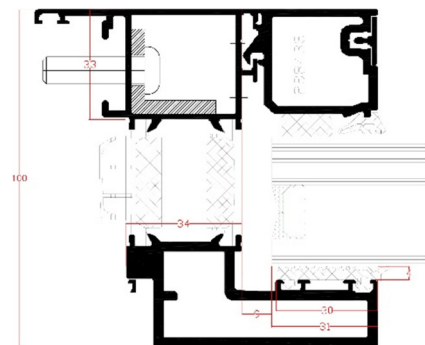
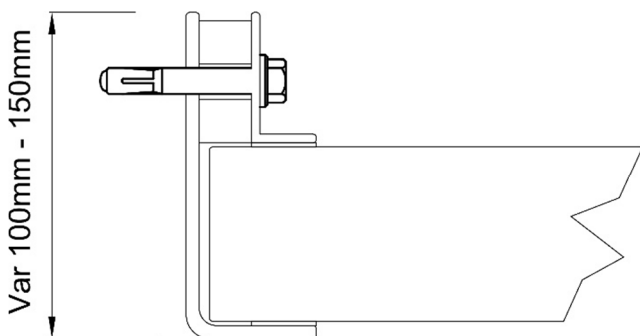


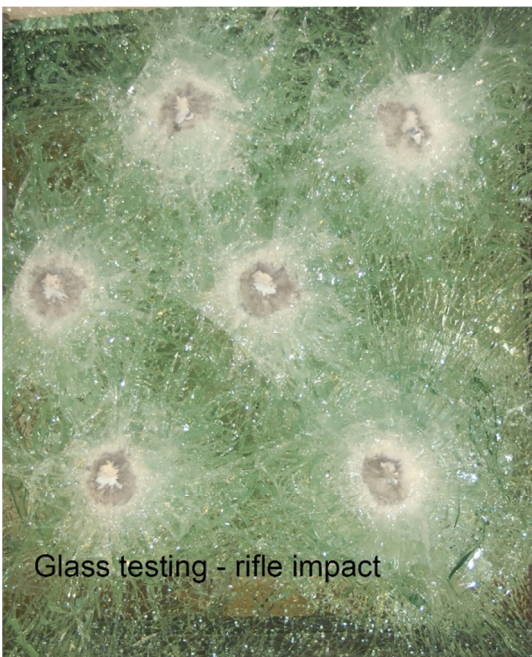
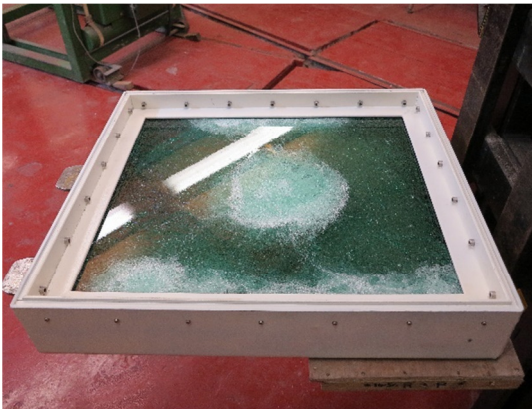
Blast rated ballistic window

Ballistic and Blast Steel and Aluminium Window Systems

- Designed primarily for commercial and military environments.
- PPC or anodised factory applied finishes in a wide range of RAL colours
- For internal and external applications
- Extensive range of testing
- Configurations – Single and multiple combined units
- Can be upgraded to offer higher levels of protection in the future should current threat levels change

Typical steel and aluminium frame profiles – see accompanying details for further information





Glass testing - rifle impact

Frame profile	
✓	Available as steel window profile
✓	Available as aluminium profile
✓	Minimum frame depth/wall thickness 100mm - 150mm
Finishes	
✓	Factory applied Polyester Powder Coat
✓	Galvanised
✓	Prime paint finish
✓	Anodised
Available sizes	
✓	Minimum 200mm width x 200mm height
✓	No maximum single pane size but suggest < 1.5m ² due to weight
✓	With additional units - indefinite
Glass	
✓	Low iron
✓	Tinted
✓	Double glazed units
Glazing thicknesses	
✓	Minimum 7.5mm for blast protection
✓	Generally 50mm - 82mm offering blast and also ballistic protection
✓	Maximum single glass pane size 4000mm x 3000mm
Certified Ballistic Standards	
✓	BS EN1522/23/1063 - FB7/BR7
✓	BS EN1522/23/1063 - FB6/BR6
✓	BS EN1522/23/1063 - FB5/BR5
✓	BS EN1522/23/1063 - FB4/BR4
✓	BS EN1522/23/1063 - FB3/BR3
✓	NIJ 0108.01 IV
✓	UL752 Level 9
✓	UL752 Level 5
✓	UL752 Level 3
✓	AK47
Blast ratings	
✓	Arena testing 100 kg @15m with ballistic protection
✓	Protecting against fragmentation - grenades and pipe bombs
Options	
✓	Thermally broken
✓	Fire rated 60 minutes
Weights	
✓	Frame profiles approx. 8kg/m - 15kg/m
✓	Glass from 32kg/m ² to 196kg/m ²
Packing	
✓	Supplied in international crates for dispatch



Both frames and glazing are tested together as a system whether for blast or ballistic applications

United Kingdom Ministry of Defence approved test centres

Blast Testing – Report extract

CONFIDENTIAL

DNV · GL

100KG TEST FOR BLAST & BALLISTIC LTO

100kg Blast Test of BR6 Window

Blast & Ballistic Ltd

Report No.: Rev. 1

Date: 20th July 2015



CONFIDENTIAL

Project name: 100kg Test for Blast & Ballistic Ltd
Report title: 100kg Blast Test of BR6 Window
Customer: Blast & Ballistic Ltd
Contact person: John Bowden
Date of issue: 3/7/2015
Project No.:
Organisation unit: Spadeadam Test Site
ReportNo.: ,Rev. 1

DNVGL
Spadeadam Test Site
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Tel: 016977 47404

Task and objective:

Prepared by:

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Paul Francis
Head of Section

Verified by:

[Signature]

Approved by:

[Signature]
Business Development Manager

[Name]
[title]

[Name]
[title]

[Name]
[title]

[Name]
[title]

- Keywords:
- Unrestricted distribution (internal and external)
 - Unrestricted distribution within DNV GL
 - Limited distribution within DNV GL after 3 years
 - No distribution (confidential)
 - Secret

Reference to part of this report which may lead to misinterpretation is not permissible.

7015-7-70 Filed Issue

5 CONCLUSIONS

This report describes the blast testing of a BR6 ballistically rated window installed in a Guard Hut. The window was exposed to the blast effects of a 100kg TNT charge at a 15m stand-off. The window was cracked but no fragments were released from the window. **Based on this performance the window attained a classification of EXVI5(B) for the 15016933:2007 standard.**

DNV GL - Report No. , Rev. 1 - www.dnvgl.com

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Window before and after blast testing

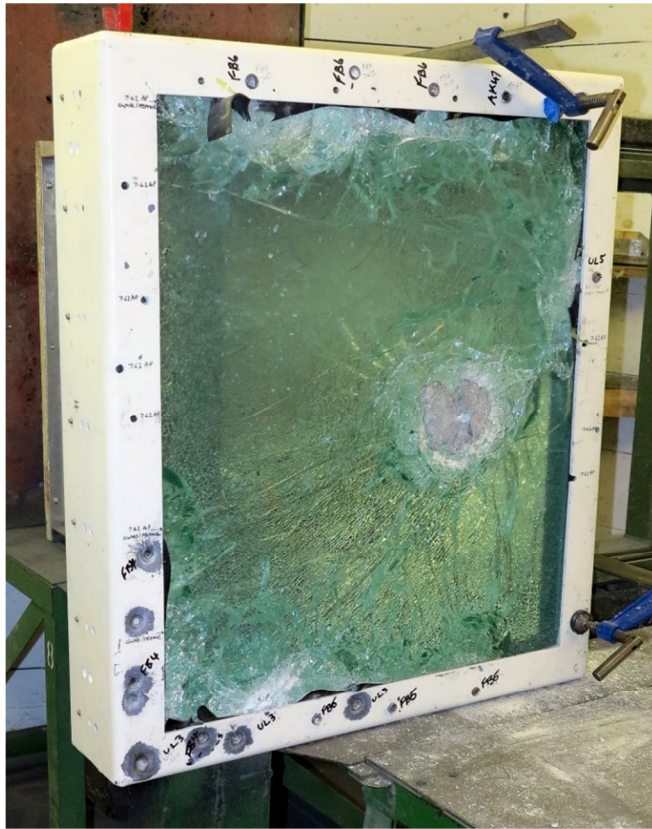
Ballistic charts showing the relationship between weapons and ammunition

CLASS	WEAPON TYPE	CALIBRE	AMMUNITION TYPE	MASS (G)	RANGE (M)	VELOCITY (M/S)	STRIKE PATTERN
BR1	Rifle	 22lr	 Lead round nose	2.6+/-0.1	10+/-0.5	360+/-10	3 x 120+/-10
BR2	Handgun	 9mm Luger	 Full steel jacket, plated round nose, soft core (lead)	8.0+/-0.1	5+/-0.5	400+/-10	3 x 120+/-10
BR3	Handgun	 .357 Magnum	 Full steel jacket, plated coned bullet, soft core (lead)	10.2+/-0.1	5+/-0.5	430+/-10	3 x 120+/-10
BR4	Handgun	 .44 Remington Magnum	 Full copper alloy jacket, flat nosed, soft core (lead)	15.6+/-0.1	5+/-0.5	44+/-10	3 x 120+/-10
BR4+	Rifle	 7.62 x 39 Twist Length 240mm	 Full jacket, pointed bullet Soft/FE-Core 3.6 gram	8.0+/-0.1	10+/-0.5	720+/-10	3 x 120+/-10
BR5	Rifle	 5.56 x 45 Twist Length 178mm +/- 10	 Full copper alloy jacket pointed bullet, soft core (lead) and steel penetrator (Type SS109)	4.0+/-0.1	10+/-0.5	950+/-10	3 x 120+/-10
BR6	Rifle	 7.62 x 51	 Full steel jacket, plated pointed Bullet, soft core (lead)	9.5+/-0.1	10+/-0.5	830+/-10	3 x 120+/-10
BR7	Rifle	 7.62 x 51 twist Length 254mm +/- 10	 Full copper alloy jacket pointed bullet, steel hard core, mass 3.7mm +/-0.1g hardness more than 63HRG	9.8+/-0.1	10+/-0.5	820+/-10	3 x 120+/-10

Above: BS EN 1522/23 and BS EN1063

Below: UL 752 comparisons

Rating	Ammunition	Weight (grains)	Weight (grams)	min fps	max fps	Number of shots
Level 1	9mm Full Metal Copper Jacket with Lead Core	124	8.0	1175	1293	3
Level 2	.357 Magnum Jacketed Lead Soft Point	158	10.2	1250	1375	3
Level 3	.44 Magnum Lead Semi-Wadcutter Gas Checked	240	15.6	1350	1485	3
Level 4	.30 Caliber Rifle Lead Core Soft Point (.30-06 Caliber)	180	11.7	2540	2794	1
Level 5	7.62mm Rifle Lead Core Full Metal Copper Jacket Military Ball (.308 Caliber)	150	9.7	2750	3025	1
Level 6	9mm Full Metal Copper Jacket with Lead Core	124	8.0	1400	1540	5
Level 7	5.56mm Rifle Full Metal Copper Jacket with Lead Core (.223 Caliber)	55	3.56	3080	3383	5
Level 8	7.62mm Rifle Lead Core Full Metal Copper Jacket Military Ball (.308 Caliber)	150	9.7	2750	3025	5
Level 9	.30-06 caliber rifle, steel core, lead point filler, FMJ (APM2)	166	10.8	2715	2987	1
Level 10	.50 caliber rifle, lead core FMCJ Military Ball (M2)	709.5	45.9	2810	3091	1
Shotgun	12-Gauge Rifled Lead Slug	1 Oz.	28.3	1585	1744	3
	12-Gauge 00 Buckshot (12 pellets)	1.5oz	42	1200	1320	3



Window systems are extensively tested against a wide range of both ballistic and blast threats producing a cost effective product and solution for all applications



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TEST REPORT
10474b - WBS-05/001/2016
01 January 2016

Blast and Ballistics Ltd
26 Birmingham Road
Walsall
West Midlands
WS1 2JZ

Trial Number	10474b	Range Temp (°C)	16.0
Trial Date	05/01/2016	Range Humidity (%)	88
Trial Start Time	09:00	Range Pressure (mBar)	971
Trial Finish Time	13:00	Range Technician	Ben Smith
		Range Technician	James Philbrook
		Range Technician	

Report Completed James Philbrook Approved Signatory Sharon Pileggi-Taylor

BALLISTIC TEST DETAILS

UL 752 Level 5; UL 752 Level 3; EN 1522/23 and EN 1063 FB/BR 3, 4, 5 and 6.

Shot No.	Velocity m/s	Trauma/Spall	Comments	Area of Assembly	Test
1	861.10	No Spall	Level 5	Frame System	Pass
2	835.94	No Spall	Level 5	Glass	Pass
3	420.20	No Spall	Level 3	Frame System	Pass
4	419.74	No Spall	Level 3	Frame System	Pass
5	N/R	No Spall	Level 3	Frame System	Pass
6	425.68	No Spall	Level 3	Frame System	Pass
7	431.85	No Spall	Level 3	Glass	Pass
8	430.28	No Spall	Level 3	Glass	Pass
9	430.26	No Spall	Level 3	Glass	Pass
10	831.46	No Spall	FB6	Frame System	Pass
11	824.33	No Spall	FB6	Frame System	Pass
12	829.05	No Spall	FB6	Frame System	Pass
13	953.74	No Spall	FB5	Frame System	Pass
14	954.56	No Spall	FB5	Frame System	Pass
15	958.68	No Spall	FB5	Frame System	Pass
16	427.42	No Spall	FB4	Frame System	Pass
17	N/R	No Spall	FB4	Frame System	Pass
18	475.08	No Spall	FB4	Frame System	Pass
19	468.24	No Spall	FB4	Frame System	Pass
20	434.07	No Spall	FB4	Frame System	Pass
21	432.21	No Spall	FB3	Frame System	Pass
22	437.18	No Spall	FB3	Frame System	Pass
23	432.11	No Spall	FB3	Frame System	Pass
24	830.08	No Spall	BR7	Glass	Pass
25	676.64	No Spall	AK47	Frame System	Pass

Summary of test data from trial No. 10474b carried out on 5th January 2016 on behalf of Blast and Ballistics Ltd.

Ballistic test report extract – see data table for comprehensive performance specifications