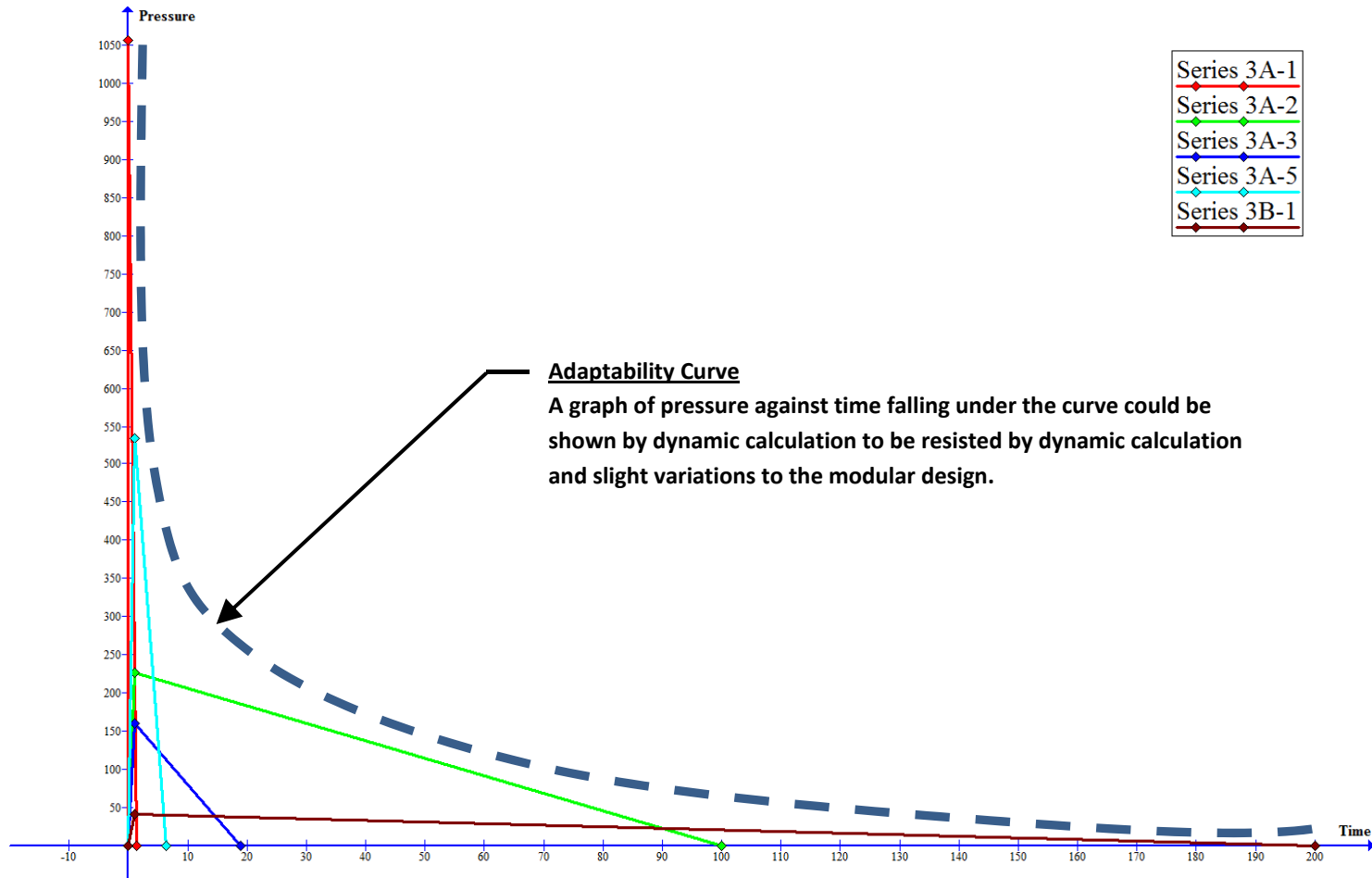


Protectex Door Matrix

The following table is a brief overview of our protectex range of doors showing typically high blast levels. The Series 3 Protectex range of doors can however be tailored to suit project specific requirements where doors and windows are required to provide a high level of protection from various threats. The range is in continual development and improvement as shown in the table under “planned development”.

■	Proven	Quick reference					Glazing / Panel				Blast			Fire		Ballis tic	Forced Entry
	Planned development																
Series	Description	Blast	Fire	Ballistic	Forced Entry	Thermal break	Solid	Vision panel	Half Glazed	Fully Glazed	Peak (kPa)	Duration (msec)	Impulse (kPa msec)	Integrity (minutes)	Insulation (minutes)	level	Level
3A-1	Steel Blast Door	■	□	■	■	□	■	■			1056	1.4	728			BR7	
3A-2	Steel Blast Door	■	□	■	■	□	■	■			227	100	11350			BR6	US DOS 60 minute 15 with VP
3A-3	Steel Blast Door	■	□			□	■			■	160	19	1500				
3A-4	Steel Blast Window	■	□	■	□	□	■			■	227	100	11350			BR7	
3A-5	Steel Blast Door	■	□	■	■	□	■	■			534	6.4	1707			BR4	
3B-1	Steel Blast and Fire Door	■	■	■		□	■	■	■	■	41	200	4100	136	28	BR4	

Series 3 Pressure / Time Graphs



Series 3a-3 Steel Blast Door (160/19)

Designed as a variation of the series 3A-2 steel blast door. This door provides blast resistance to a medium high level in a fully glazed door and has been successfully installed in line with Pensher Skytech glazed curtain wall system on an UK MOD site.

- Calculated to resist a blast with peak pressure of 160 kPa and duration of 19msec

Executive Summary

TPS was commissioned by Pensher in January 2010 to carry out Blast Resistance Calculations on a "Protectex" glazed blast door. The loading and initial design information were supplied by Pensher.

The purpose of this appointment was to assess the initial blast door design and alter where necessary to resist the specified threat. The loading information is detailed below:

- Peak Pressure = 160 kPa
- Impulse = 1500 kPa.msecs

The blast door has been designed to meet the design parameters detailed in TMS – 1300 (Structures to resist the effects of accidental explosions). The elements of the door are restricted to a support rotation of 12 degrees and ductility ratio of 20. The glazed element of the door is not to exceed the "Low Hazard" criteria stipulated in ISO 16933 (Glass in building – Explosion resistant security glazing – Test and clarification for arena air blast loading).

The door is approximately 2281mm high by 1277mm wide and is essentially glazed with a steel RHS frame supporting it. The frame is made up of welded 80 x 40 RHS steel grade S355 box sections which transfer the load to the supporting structure. To restrict deflection, the vertical post, supporting the glazing, was increased in thickness to 8mm. The horizontal members also were increased to a 6.3mm wall while the outer frame members remained with the 5mm wall. The frame was still too slender, so a number of stiffeners were introduced to make the frame more robust. The members transfer the load through 4mm continuous fillet welds at each connection. Figure 1 illustrates the member layout and sizes.

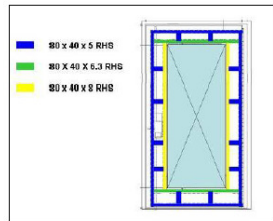


Figure 1: Door Frame layout and sizes



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