

STANDARDS & REGULATIONS GUIDE

For manual attacks/ballistic/blast resistance



GUNNEBO[®]
For a safer world



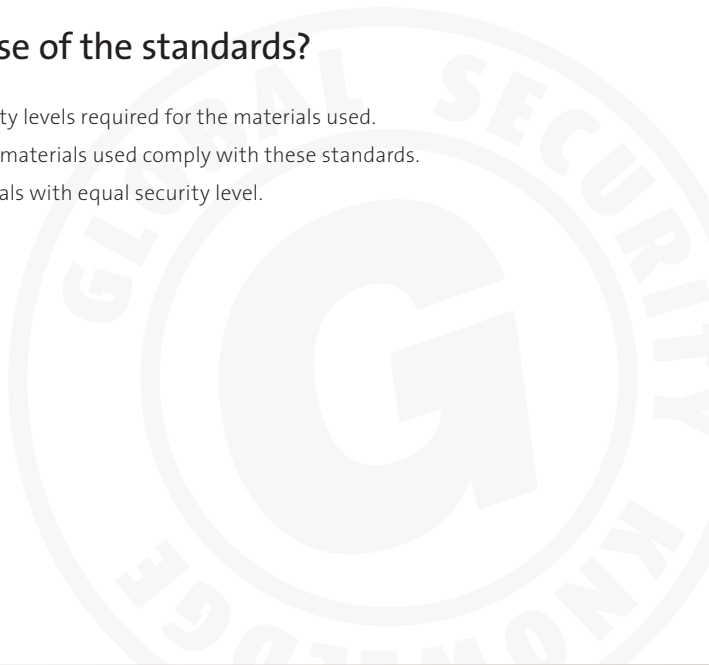
Which level of security is suitable for your needs?

Vandalism, manual attacks, ballistic attacks, explosions, you need to protect yourself with the right products against the identified risk. You should never be in doubt about the quality and effectiveness of your chosen

security solution. In order to support you in your selection of security products Gunnebo is delighted to provide you with the following information on security standards.

What is the purpose of the standards?

- To have a guide for the security levels required for the materials used.
- To have a guarantee that the materials used comply with these standards.
- To be able to compare materials with equal security level.



Manual attacks resistance

The same as the ballistic resistance standards, these are the results of many years of collective tests and work and are recognized as a good base of comparison within European and non-European countries.

Today there exists:

- European standard EN 356 for testing and classifying security glazing, with a resistance to manual attacks.
- European standard EN 1627, for manual attacks resistance of windows, doors and shutters.

EN 1627 Manual Attacks Resistance of pre-hung door units

To determine the manual attacks resistance of side-hung door sets, standard EN 1627 provides for three resistance tests:

- Resistance to static loading in accordance with standard EN 1628
- Resistance to dynamic loading in accordance with standard EN 1629
- Resistance to manual attacks in accordance with standard EN 1630



Standard EN 1630 resistance classification	Tools	Resistance time (min)
1	no manual attempted manual attacks	
2	A2 (manual)	3
3	A3 (manual)	5
4	A4 (manual + drillingmachine)	10
5	A5 (manual + electric tools)	15
6	A6 (manual + electric tools)	20















EN 356 glazing resistance against thrown objects or attempted manual attacks

Classification	Height of fall (mm)	Energy (joule)	Number of impacts
P1A	1500 ± 50	60	3 in a triangle
P2A	3000 ± 50	120	3 in a triangle
P3A	6000 ± 50	240	3 in a triangle
P4A	9000 ± 50	360	3 in a triangle
P5A	9000 ± 50	360	3x3 in a triangle


Classification	Number of blows (mass)	Mini number of blows from an axe	Total number of impacts
P6B	12	18	30 to 50
P7B	12	39	51 to 70
P8B	12	59	> 70

Ballistic resistance classification

Classification of doors and frames in accordance with standard EN 1522

Classification	Weapon types	Calibre	Ammunition	Mass (g)	Ammunition illustrations	Set distance (m)
FB2	 Pistol	9 mm Luger	Soft core (lead)	8		5
FB3	Pistol	0.357 Magnum	Soft core (lead)	10.2		5
FB4	Pistol	0.357 Magnum 0.44 Rem Magnum	Soft core (lead)	10.2 15.6	 	5
FB1	 Rifle	0,22LR	Lead bullet	2.6		10
FB7	Rifle	7.62 x 51	Hard steel core	9.8		10
FB5	 Assault rifle	5.56 x 45	Soft core (lead)	4		10
FB6	Combination rifle-assault rifle	5.56 x 45 7.62 x 51	Soft core (lead)	9.5 9.8	 	10
FSG	 Shotgun	Cal. 12/70	Massive lead bullet	31		10

Classification of glazing in accordance with standard EN 1063

Classification	Weapon types	Calibre	Ammunition	Mass (g)	Ammunition illustrations	Set distance (m)	Number of impacts
 BR2	Pistol	9 mm Luger	Soft core (lead)	8		5	3
BR3	Pistol	0.357 Magnum	Soft core (lead)	10.2		5	3
BR4	Pistol	0.44 Rem Magnum	Soft core (lead)	15.6		5	3
 BR1	Rifle	0.22LR	Lead bullet	2.6		10	3
BR5	Rifle	5.56 x 45	Soft core (lead)	4		10	3
BR6	Rifle	7.62 x 51	Soft core (lead)	9.5		10	3
BR7	Rifle	7.62 x 51	Hard steel core	9.8		10	3
 SG1	Shotgun	Cal. 12/70	Massive lead bullet (Brenneke)	31		10	1
SG2	Shotgun	Cal. 12/70	Massive lead bullet (Brenneke)	31		10	3

Ballistic resistance

Ballistic resistance European standards have been defined by a group of international experts, composed of manufacturers, consumers, consultants, engineers and public authorities. It is the result of a number of years of observation and analysis (statistics and experience in the field) on the resistance of a huge number of products as well as the means by which the attackers operate. Therefore these are a well recognized uniform classification in European countries and in many other regions as a base of comparison.

EN 1522

Windows, doors, shutters and blinds –
Ballistic resistance – requirement and
classification (EN 1523 for test methods)

EN 1063

Security glazing – Test method and
classification of resistance to ballistic
attacks



EN 1522 Windows, doors, shutters and blinds – resistance to ballistic attacks

Standard EN 1522 defines 7 resistance levels for pistols, rifles and assault rifles (FB1 to FB7) and for shotguns (FSG).

EN 1063 Security glazing – resistance to ballistic attacks

European standard EN 1063 defines 7 resistance levels for pistols and for pistols and rifles (BR1 to BR7) and 2 for shotguns (SG1 and SG2).

If the level numbers are followed by an S, this means the glazing failed the projection test (with splinters), if followed by NS it passed the test (without splinters).

Synoptic table of manual attacks and ballistic resistant product ranges

	Material	Gunnebo Offering	Standards
Attack with weapons of war*	Aluminium framing	DarTek A partitions	
	Impenetrable filling	Up to 100mm thick with finishing	EN 1522
	Security glazing	Up to 100mm thick laminated	EN 1063
	Security Airlocks	SkySas EV / CU, UniSas BA / EV	EN 1522
	Steel modular walling	CityWall	
Ballistic attacks	Aluminium doors and framing	DarTek A	
	Impenetrable filling	Up to 40mm thick	
	Security glazing	Up to 40mm thick laminated	EN 1063
	Security Airlocks	SkySas EV / CU, UniSas BA / EV	
	Steel modular walling	CityWall	
Manual attacks	Aluminium doors and framing	MagTek A	EN 1627
	Impenetrable filling	Up to 40mm thick with finishing	
	Security glazing	Up to 40mm thick laminated	EN 356
	Security Airlocks	SkySas BA, CompacSas EV	
Vandalism	Aluminium doors and framing	MagTek A	EN 1627
	Impenetrable filling	Up to 37mm thick with finishing	
	Security glazing	Up to 37mm thick laminated	EN 356

* Test also performed with Kalashnikov type weapons (non standard)

** In-house tested

What is an explosion?

A pressure/time: any explosion creates a shock wave or blast effect (so-called incident pressure) when it meets an obstacle, creates a pressure peak, also called reflected pressure (about twice the incident pressure), for a certain duration. It is this reflected pressure that is taken into account in standards. After the shock wave comes a depression (negative pressure) equivalent to about 1/3 of the reflected pressure peak.

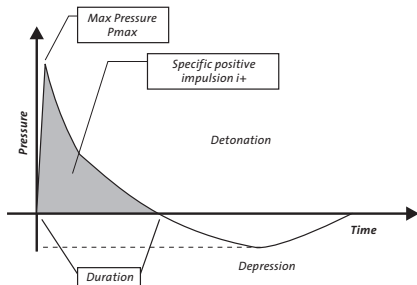
Tests with shock tube
A volume of air is kept under pressure in a chamber and released via a tube at the end of which is located the hardware to be tested.



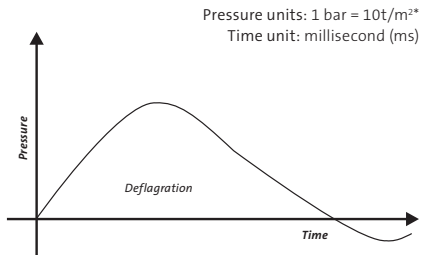
Outdoor test
Equivalent of a TNT explosive charge placed at a given distance of the tested material.



Two types of explosion



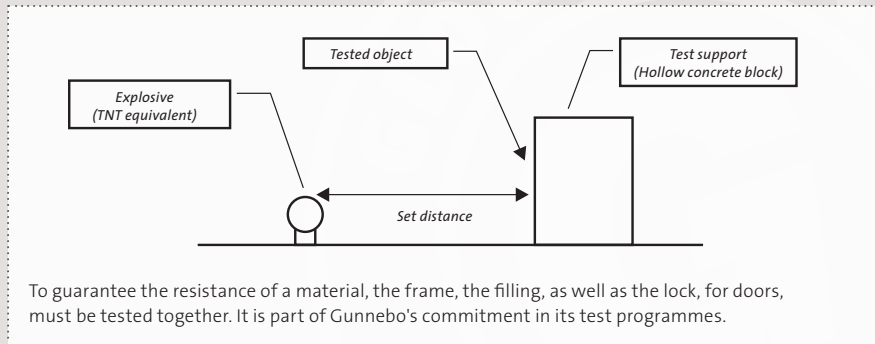
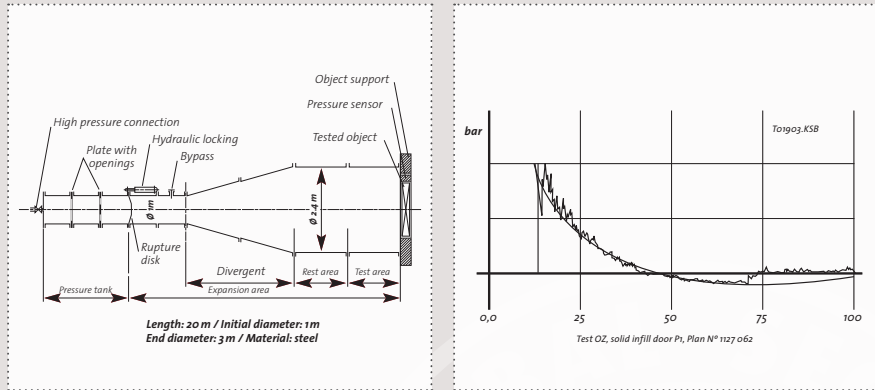
Detonation: short explosion (lasting about 5 to 20ms)



Deflagration: long explosion (lasting about 200ms or more) often found in industrial areas during inflammation of gaseous clouds.

* = 100 000 Pa = 100 kPa = 1000 hPa = 100kN/m²

Hardware qualification



Existing standards

Standard DIN 52 290 was the only standard used to certify all the materials tested from 1987 to 2000. Since then, European standards have been used to qualify sets of structures (structure with its filling and locks). These standards are: **EN 13123/124-1** and **EN 13123/124-2**. When the existing European standards cannot be used to classify a material, reference is made:

- In industries, to the actual need. For example: 5 tonnes/m² for 180 milliseconds
- For risk of terrorist attacks, to an equivalent of 100 kg of TNT at a stand-off range (meters)**

Standards EN 13123/124-1

They concern windows, doors and enclosures. Specification on and classification of tests performed with shock tube (2001).

Resistance classification	Reflected pressure (bar)	Positive impulse I+ (bar.ms)	Duration (ms)
EPR1 (S/NS)*	0.5	3.7	≥20
EPR2 (S/NS)	1	9	≥20
EPR3 (S/NS)	1.5	15	≥20
EPR4 (S/NS)	2	22	≥20

* S/NS = Spall or not spall

Standards EN 13123/124-2

They concern windows, doors and enclosures. Specification on and classification of outdoor tests (2004).

Resistance classification	Mass of TNT explosive charge (kg)	Distance (m)	Reflected pressure (bar)	Positive impulse I+ (bar.ms)
EXR1 (S/NS)	3	5	2.5	3
EXR2 (S/NS)	3	3	8	5
EXR3 (S/NS)	12	5.5	7	7
EXR4 (S/NS)	12	4	16	10
EXR5 (S/NS)	20	4	28	15

** With reference to the international standard ISO 16933

Thanks to its long experience on sensitive markets that are exposed to the risks of accidental or terrorist explosions, Gunnebo has developed a wide range of fixed or aluminium doors, windows and frames. These materials are certified in accordance with the aforementioned standards. This offering is described in the next pages.

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Expertise

Gunnebo products are developed by our research office according to the needs of the market, and are manufactured in our specialised security fabrication units. Before being brought into market, all our products are subjected to tests which guarantee their resistance to blast pressure following an explosion.

Tests

- Shock tube and outdoor tests
- Products tested for a better guarantee
- More than 50 tests in 7 test programmes
- A commitment to results

Two types of tests – tests with shock tube, or outdoor tests – are performed to validate our products' resistance level.

To guarantee the resistance of a material, the frame, the fillings, as well as the lock, for doors must be tested together. It is all part of Gunnebo's commitment in its test programmes.

Our offer which is blast-resistant certified in accordance with standards EN 13123/4-1

Resistance to blast also depends on the quality of the installation of our equipment. Therefore, Gunnebo has specialised engineers to guarantee the quality of your installation. A certificate of compliance is also issued for our equipment's installation, fully in keeping with the report. Furthermore, high-level maintenance is guaranteed by offering regular training to our engineers.

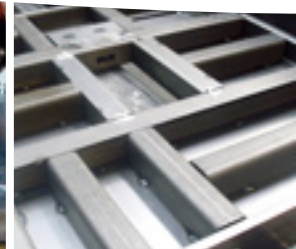
The blast resistant product range

Gunnebo offers a full range of blast doors and partitions to satisfy the ever-increasing market demands to protect personnel, property and assets from theft and attack.

The product range is constructed from either armoured steel plate or reinforced aluminium with specialist safety glazing depending upon the level of specified protection.

Evidence by 4: 4 product ranges for risk types

- **CityWall steel modular walling ranges:**
products designed to resist explosion attacks with an equivalent of up to 100 kilograms of TNT at a distance of 12 metres.
- **BlasTek AF aluminium product ranges:**
products validated through detonation for up to 6.5 tonnes/m² overpressures over a period of 200 milliseconds.
- **BlasTek AT aluminium product ranges:**
products validated through detonation for up to 15 tonnes/m² overpressures over a period of 20 milliseconds (EPR3).
- **BlasTek AX aluminium product ranges:**
products designed to resist explosion attacks with an equivalent of up to 100 kilograms of TNT at a stand-off range of 25 metres.




Synoptic table of blast resistant product ranges

Product ranges	Classification level	
SkySas CU	Up to EPR3 in accordance with standards EN 13123/41	
CityWall	Up to an equivalent of 100kg TNT at 12m	
BlasTek AF	Up to 200ms, with test report in accordance with standards EN13123/4-1	
BlasTek AT	Up to EPR3 in accordance with standards EN 13123/4-1	
BlasTek AX	Up to an equivalent of 100kg TNT at 25m	
Filling	Solid	Steel plate the thickness of which depends on the required resistance, with aluminium, melamine, or plywood finishing boards.
	Glazed	Single or double glazing, depending on the required resistance and insulation levels.
Equipment	3-point mechanical lock. 1 or 2-locking-point fail-lock, motorised electric lock, with emergency mechanical unlocking system. Panic bar.	

Certified installation

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Gunnebo is a leading provider of efficient and innovative security solutions and services to customers around the globe. It employs 5 800 people in 31 countries across Europe, Asia, Africa, Australia and the Americas, and has a turnover of €585m. Gunnebo focuses its offering on Bank Security & Cash Handling, Secure Storage, Global Services and Entrance Control.

We make your world safer.

www.gunnebo.com

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