

Standards & Regulations Guide
for burglary / ballistic / blast resistance

GUNNEBO
For a safer world®



Which level of security is suitable for your needs?

Vandalism, burglary, 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.



Burglary 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 burglary.
- Draft European standard PR EN 1627, for burglar resistance of windows, doors and shutters.



PR EN 1627 Burglary Resistance of pre-hung door units

To determine the burglary resistance of pre-hung door units, standard PR EN 1627 provides for three resistance tests:

- Resistance to static loading in accordance with standard PR EN 1628
- Resistance to dynamic loading in accordance with standard PR EN 1629
- Resistance to manual burglary attempts in accordance with standard PR EN 1630

Standard PR EN 1630 resistance classification	Tools	Resistance time (min)
1	no manual attempted burglary	
2	A2 (manual)	3
3	A3 (manual)	5
4	A4 (manual + drilling machine)	7
5	A5 (manual + electric tools)	10
6	A6 (manual + electric tools)	15










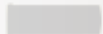
EN 356 glazing resistance against thrown objects or attempted burglary

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	Munitions	Mass (g)	Illustrations of munitions	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	Soft core (lead)	10.2		5
		0.44 Rem Magnum		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	Soft core (lead)	9.5		10
		7.62 x 51		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	Munitions	Mass (g)	Illustrations of munitions	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

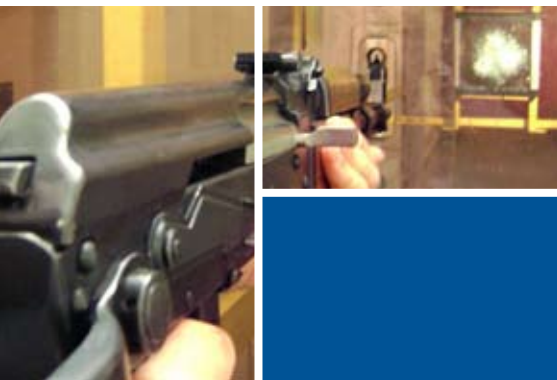
Ballistic resistance European standards have been defined by a group of international experts, composed of manufacturers, consumers, consultants, engineers and public authorities. It is the result of a number of years of observation and analysis (statistics and experience in the field) on the resistance 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 burglary and ballistic resistant product ranges

	Material	Gunnebo Offering	Standards
Attack with weapons of war*	Aluminium framing	C120/C160	
	Impenetrable filling	Up to 100mm thick with finishing	EN 1522
	Security glazing	Up to 100mm thick laminated	EN 1063
Ballistic attacks	Steel modular walling	CityWall	
	Steel doors	Citadel**	
	Aluminium doors and framing	P80/C80	EN 1522
	Impenetrable filling	Up to 40mm thick	
	Security glazing	Up to 40mm thick laminated	EN 1063
Burglary	Steel modular walling	CityWall	
	Aluminium doors and framing	P80/C80	PR EN 1627
	Impenetrable filling	Up to 40mm thick with finishing	
	Security glazing	Up to 40mm thick laminated	EN 356
Vandalism	Aluminium doors and framing	P60/C60	PR 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

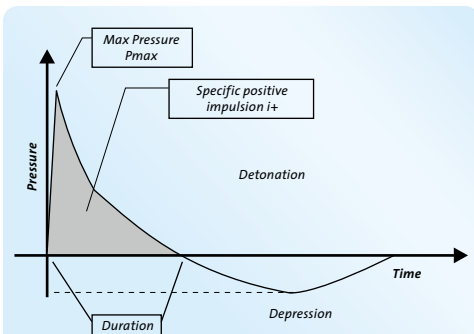
What is an explosion?

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.

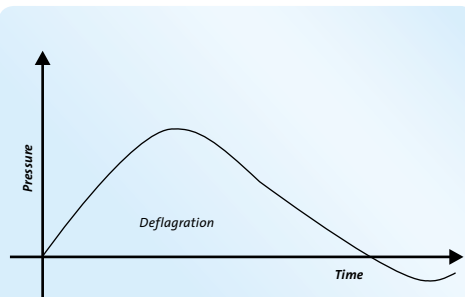
Pressure units:
1 bar = 10t/m²*
 Time unit: millisecond (ms)

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

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.

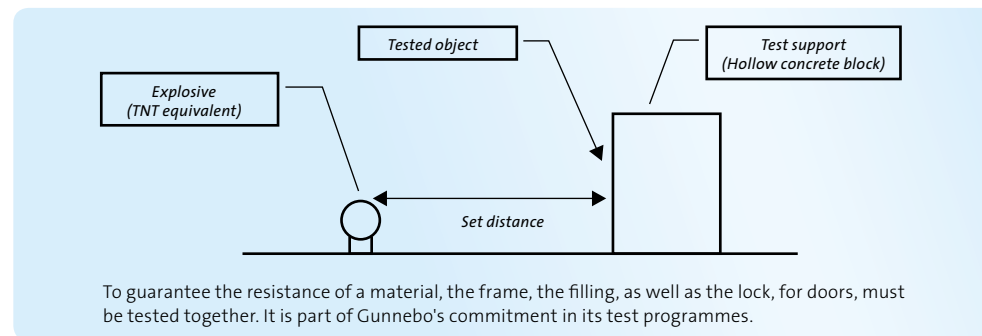
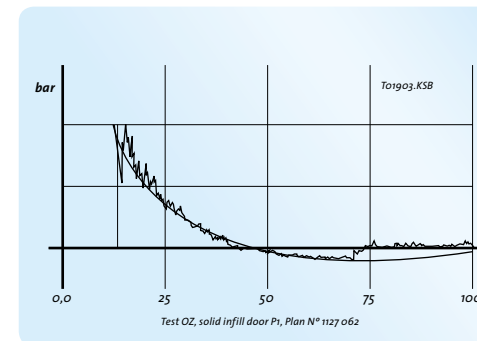
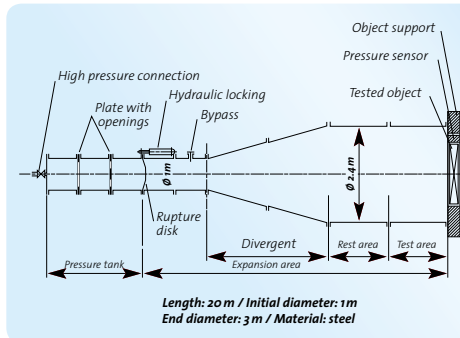
Tests with shock tube
 A volume of air is kept under pressure in a chamber and released via a tube at the end of which is located the hardware to be tested



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



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:

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

- 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 given distance**

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.

** With reference to the international standard ISO 16933

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

- Blast resistant aluminium or steel profile
- Prefabricated steel or stainless steel frame
- Negative 1 or 2 Points SeRitz 3000 lock
- Insulating double glazing
- Panic bar
- Single DetoRitz door
- Double DeflaRitz door
- Fixed ExploRitz frame and ExploRitz window
- Additional security equipment
- Single passage system
- Automatic door check
- Access control
- Biometrics
- Interlocking control system



An exhaustive offering that combines mechanical resistance with electronic technology



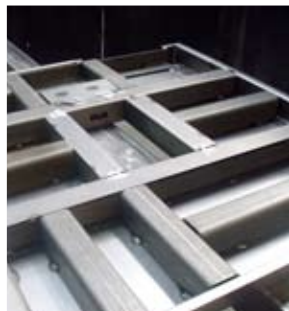
The blast resistant product range

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 5: 5 product ranges for risk types

- Citadel steel door ranges: products designed to resist explosion attacks with an equivalent of up to 100 kilograms of TNT at a distance of 12 metres.
- 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.
- DeflaRitz aluminium product ranges: products validated through detonation for up to 6.5 tonnes/m² suppressions over a period of 200 milliseconds.
- DetoRitz aluminium product ranges: products validated through detonation for up to 15 tonnes/m² suppressions over a period of 20 milliseconds (EPR3).
- ExploRitz aluminium product ranges: products designed to resist explosion attacks with an equivalent of up to 100 kilograms of TNT at a distance of 25 metres.



Synoptic table of blast resistant product ranges

Product ranges	Classification level	
Citadel	Up to an equivalent of 100kg TNT at 12m	
CityWall	Up to an equivalent of 100kg TNT at 12m	
DeflaRitz	Up to 200ms, with test report in accordance with standards EN13123/4-1	
DetoRitz	Up to EPR3 in accordance with standards EN 13123/4-1	
ExploRitz	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, in accordance with thermal regulation 2000/2005.
Equipment	3-point mechanical lock. 1 or 2-locking-point negative, motorised electric lock, with emergency mechanical unlocking system. Panic bar.	

Certified installation

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.

Gunnebo security group supplies integrated security solutions for banking, retail and other sectors requiring high-security protection. Our experience and presence make your world safer.

For more information and contact details of your local sales organisation please visit: www.gunnebo.com

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