Forced Entry Resistant Door Assemblies

Steel Door Institute www.steeldoor.org



Standards As Tough As Steel.™

Every building requires protection against forced entry — and doors & frames are the first line of defense. This presentation covers the door systems that have been tested to keep bad guys out.

There's a misconception that forced entry resistant doors look like detention doors, but they actually look just like standard steel doors because the heavier gauge steel and hardware reinforcements aren't obvious to the casual observer.



Reducing the Risk of Forced Entry

Although each facility's security needs are unique, virtually every type of building requires safeguards against forced entry to ensure protection of people and property.



Hospitality



Commercial / Retail





Educational

Government



Motives for Forced Entry

- There are a number of motives for forced entry:
 - Vandalism
 - Petty theft
 - Sophisticated burglary
 - Intent to harm individuals
- A door assembly is often a building's first line of defense. Forced entry resistant opening can be extremely challenging to breach.





Motives for Forced Entry

- **Government buildings** such as police stations, military barracks, and embassies tend to be more at risk for physical attacks.
- Retail and commercial tenants are more concerned with theft, such as burglary or armed robbery.
- The security needs of **schools** are more complex and are often a hybrid of burglary prevention and safety.



Gauging the Risk

- Steel doors rated with high levels of blast, bullet, and forced entry resistance may be appropriate for high risk government facilities and potential terrorist targets such as dams or nuclear power plants.
- But what is appropriate for corporate offices or retail locations where owners are more concerned with burglary? How do the security needs of a warehouse differ from those of a jewelry store?



Items to Consider

- The <u>budget</u>
- How much protection is appropriate for the building's use and location?
- What types of threats might this building face? (ie. vandalism, burglary, physical attack)





Architects Should Consider

- If <u>bullet resistant doors</u> would make sense?
- For existing buildings, would <u>retrofitting the windows and</u> <u>doors</u> be sufficient?





Avoid Over-Specifying

- In the aftermath of any violent act such as a terrorist attack or school shooting, people are often left feeling vulnerable. As a result, there can be a reflexive push to implement as much security as possible.
- Over-specifying security products means unnecessary costs.



Forced Entry Tests

<u>Wood and FRP doors are not good choices for security</u>. They fail to meet ASTM and US Department of State forced entry tests. Steel is the only door material to pass these tests.



Testing to ASTM F3038 - Failing to open a steel door with a battering ram



Addressing the Threats

Burglaries and physical attacks are addressed quite differently.



- Ironically, it's often more challenging to determine the appropriate level of security for buildings with lower levels of risk.
- Seamless edge welds, heavy-gauge hardware reinforcements, and steel stiffeners are often used for burglary prevention.



Addressing the Threats

- Physical attacks tend to be more planned and sophisticated.
- Architects may specify bulletresistant doors with laminated glass that is shatter-resistant.
- These doors often have proprietary cores and heavier gauge steel face sheets.





 Assemblies are often tested to UL 752 and assigned a level from 1-10 that affirms how resistant the door is to gun fire.

 Often used in government buildings, schools, banks, or other structures where increased protection is desired.



Countless types of buildings can benefit from bullet resistance.

- Banks
- Box Offices
- Convenience Stores
- Courtrooms
- Firearm & Ammunition Storage Facilities
- Gas Stations
- Military Facilities
- Police Stations

- Prisons
- Public Utility Unmanned Field Buildings
- Railway Switching Stations
- Schools
- Shooting Ranges
- Sporting Arenas
- Telephone Switching Stations
- Ticket Booths



- Steel doors are generally available up to level 8.
- Typically constructed with heavy gauge steel face sheets around a custom engineered core.
- It is only necessary to specify a UL 752 level and not a specific core material.

| LEVEL | BULLET | CALIBER | SHOTS |
|--------|--------|-----------------------------|-------|
| 1 | | 9mm (124g) FMJ | 3 |
| 2 | | .357 Magnum (158g) SP | 3 |
| 3 | | .44 Magnum (244g) SP | 3 |
| 4 | | .30 Caliber Rifle (180g) SP | 1 |
| 5 | | 7.62mm Rifle (150g) FMJ | 1 |
| 6 | | 9mm Multi (124g) FMJ | 5 |
| 7 | | 5.56mm Rifle (55g) | 5 |
| 8 | | 7.62 Multi Rifle (150g) FMJ | 5 |
| 8 (AP) | | 30-06 Rifle (166g) AP | 5 |



- While people sometimes assume that "more is better," a level 2 or 3 BR assembly offers plenty of protection for most applications.
- A level 8 assembly costs substantially more than a level 1.





Bullet Resistant Options

- The doors may be flush or have glazed vision lights. They are available in single-swing and paired openings.
- Bullet resistant assemblies can be fire rated up to three hours and are available with forced entry or sound control capabilities as well.





Bullet Resistant Specifications

Here is a sample bullet resistant door requirement:

- ✓ Size: 3'0" x 7'0"
- ✓ Hinges: Continuous stainless steel
- ✓ Vision: 24" x 60" Visible
- ✓ Complies with UL 752 level 3
- ✓ 20 minute fire rating



- Blast resistant door assemblies protect people and property from detonations resulting from high explosives, vapor clouds, fine dust clouds, chemical reactions, and more.
- They are specified for buildings where security is a concern or an explosive event would be possible, such as military bases, government offices, and industrial facilities.

Steel door manufacturers can provide assemblies that can withstand a blast event with a peak reflected pressure up to 50psi, depending on the duration.

You can see a 13 second video of a passed and failed blast test on the <u>Videos page</u> of the SDI website.



Explosion risk



Blast Door Standards

- ASTM F2247 and ASTM F2927 are commonly specified test methods for blast doors.
- UFC 4-010-01 is one of the primary specifications required for <u>all</u> Department of Defense related construction.
- ASCE (Design of Blast Resistant Buildings in Petrochemical Facilities) and PIP STC01018 are primarily used for petrochemical and offshore facilities.



Blast Categories

Response categories following the blast event for doors can generally be defined as:

- Category I: undamaged
- Category II: permanent plastic damage but operable
- **Category III**: non-catastrophic failure (inoperable but remains a barrier to blast)
- **Category IV**: limited hazard failure (may rebound open)
- Category V: high hazard failure (door may be a flying debris hazard)



Blast Resistant Assembly Specification

Sample Blast Requirement

- ✓ Size: 3'0" x 7'0"
- ✓ Vision: 12" x 12" Visible
- ✓ Peak Pressure: 4 psi
- ✓ Duration: 200 ms
- ✓ Door Configuration: Seated
- ✓ Rebound: 50%
- ✓ Damage Level Category: II per ASTM F2247-11

Reference <u>SDI-133 - Blast Information</u> for definitions and how to properly request a quote or specify blast resistant assemblies



Specifying Forced Entry Resistance

Rather than get bogged down with the details of door construction, there are a few standards that can be specified to ensure the desired level of safety.





ASTM F1233

Standard Test Method for Security Glazing Materials and Systems

- Most commonly specified test criteria for non-government forced entry installations. Products are assigned a resistance rating using Roman numerals I through V.
- The test for a Class I rating consists of the product being hit with a ballpein hammer 10 times. Class II is another 10 impacts.
- To achieve a Class V designation, entries must withstand 41 assaults including 50 impacts with a fire axe.



ASTM F3038

Standard Test Method for Timed Evaluation of Forced-Entry-Resistant Systems

- Typically specified for high risk buildings.
- Allows for the specification of a duration of forced entry prevention: 5, 15, 30, or 60 minutes.
- Test is comprised of six men attacking the door assembly with everything from sledgehammers and pry bars to battering rams. If the attackers breach the door, the product fails.



US Department of State SD-STD-01.01 Forced Entry and Ballistic Resistance of Structural Systems

- Specific to government facilities
- This test is similar to ASTM F3038 in that it allows for the specification of a duration of forced entry resistance.





Scenarios

- Perhaps ASTM F1233 Class II should be specified for the half glass door of a high-end retailer to withstand 20 blows of a hammer?
- Specifying 30 minutes of protection in accordance to ASTM F3038 for a water treatment plant could thwart a potential terrorist.
- Door assemblies that can withstand 60 minutes of SD-STD-01.01 and are bullet and blast resistant could make all the difference in the world to a distant US embassy under attack.



Forced Entry Openings Specification

Sample Forced Entry Requirement

- ✓ Size: 8'0" x 8'0"
- ✓ Complies with UL 752 level 7 bullet resistance
- ✓ Laminated glass
- ✓ Complies with ASTM F3038 15 minutes



Life Safety vs. Security

- Security should never come at the expense of life safety.
- Barricades and security gadgets often do not meet the most essential life safety concepts, such as the ability to egress in one operation without special knowledge or effort.
- It's important that architects and building owners stick to tested and approved door assemblies that won't have the local Fire Marshal steaming.



Examples of Security Gadgets









Hey Good Lookin'

- Steel door and frame manufacturers often hear, "But this looks just like a regular door!" It's as if people expect forced entry resistant doors to have imposing steel bars and bulky hardware.
- Distributors should inform their customers that secure doors look just like the rest. That way when they see the door, they'll know it's the performance that counts.



Hey Good Lookin'











Additional Resources

- Steel door and frame manufacturers
- Steel Door Institute (SDI) <u>steeldoor.org</u>
- Architectural Testing (ATI) <u>archtest.com</u>
- Intertek Testing Service (ITS) <u>intertek.com</u>
- Underwriter's Laboratories (UL) <u>ul.com</u>
- ASTM International <u>astm.org</u>

