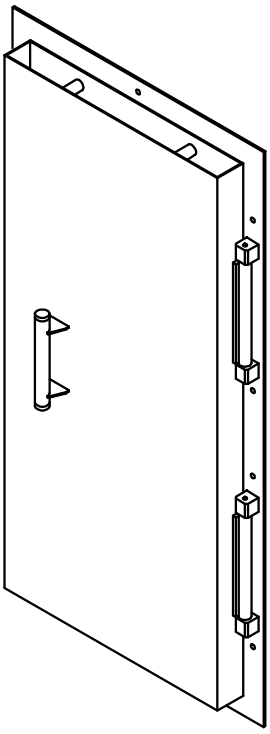
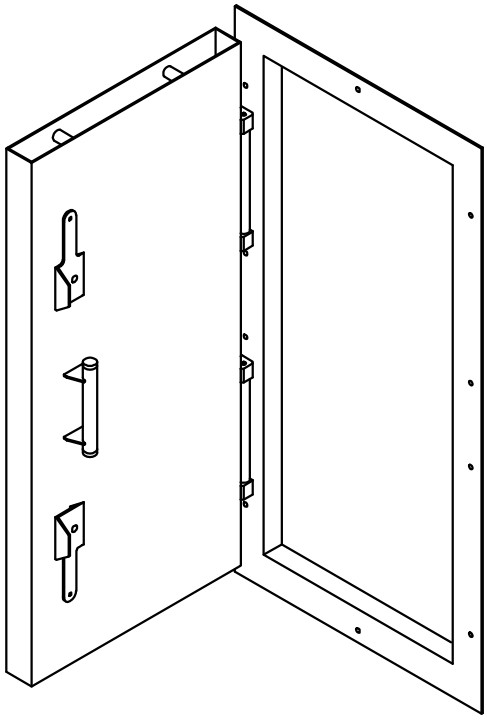
American Safe Room

Explosion Resistant
Pre-hung
Blast Door





Drawing number: ASR-50-BD
Revision: J
December 16, 2010

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Contact information

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Description

ASR-50-BD Blast Door is a pre-hung, explosion resistant blast door that offers excellent protection from extremely high pressure blast waves like those produced by a large conventional or nuclear device detonated in relatively close proximity. This door is rated to withstand high pressure waves up to 7,200 pounds per square foot — that is 50 pounds per square inch (PSI). Additionally, the step over threshold option (page 8) offers a compression seal between the door and the frame allowing for the use of a positive pressure NBC filtration system inside the shelter.

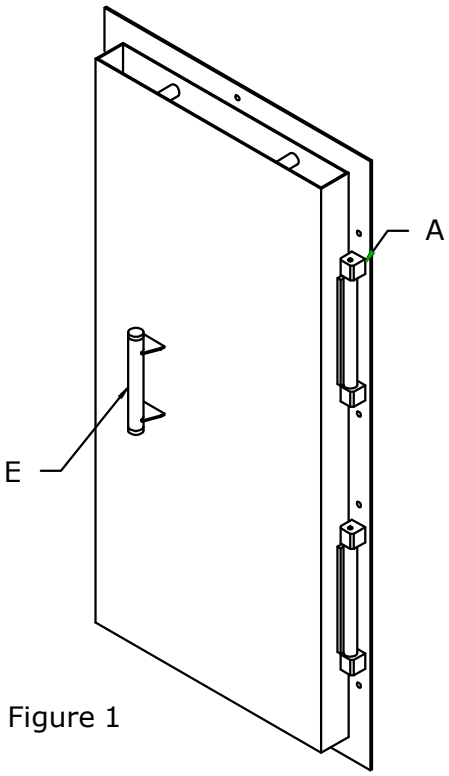
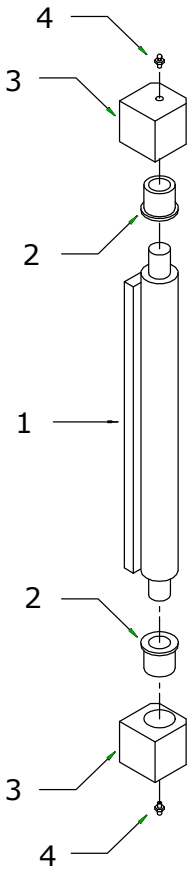


Figure 1

Hinges (A)
The two vault style 1.1/2-inch diameter steel hinge pins are machined and polished alloy steel (1), rotating in lubricated 60-60 bronze hat bushings (2) that are embedded in steel bearing blocks (3) with standard grease fittings (4).

This robust assembly allows for both high strength and precise closure to insure the proper alignment and compression of the gas seal.



Door frame (B)
The heavy steel frame is constructed from 5 inch by 3 inch by ¼-inch thick steel L-shaped angle with the 3 inch leg serving as the centering guide for hanging the door. The 5 inch leg is predrilled for the included concrete anchoring studs, and serves as a drilling template for locating the drill holes.

Inside cam latches (D)
The two inside cam latches draw closed and lock the door, compressing the gas seal.

Heavy duty pull handles (E)
Large two handed grip heavy duty handles constructed from steel tube and plate are located on both the inside and outside of the door.

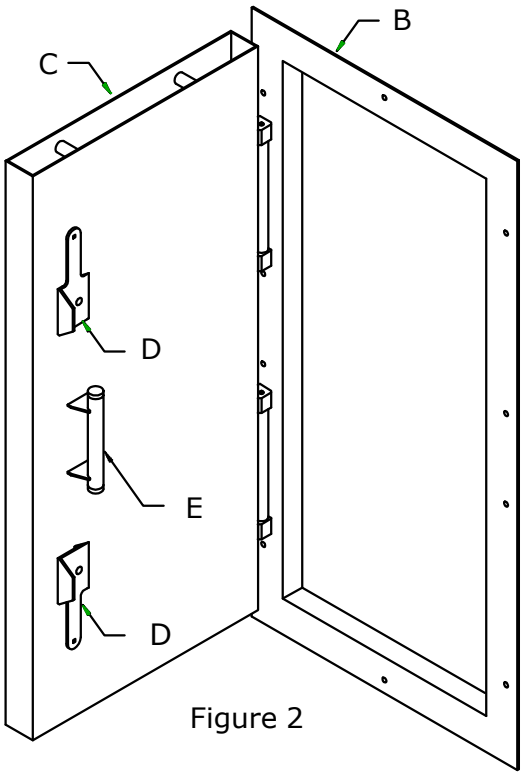


Figure 2

Strength

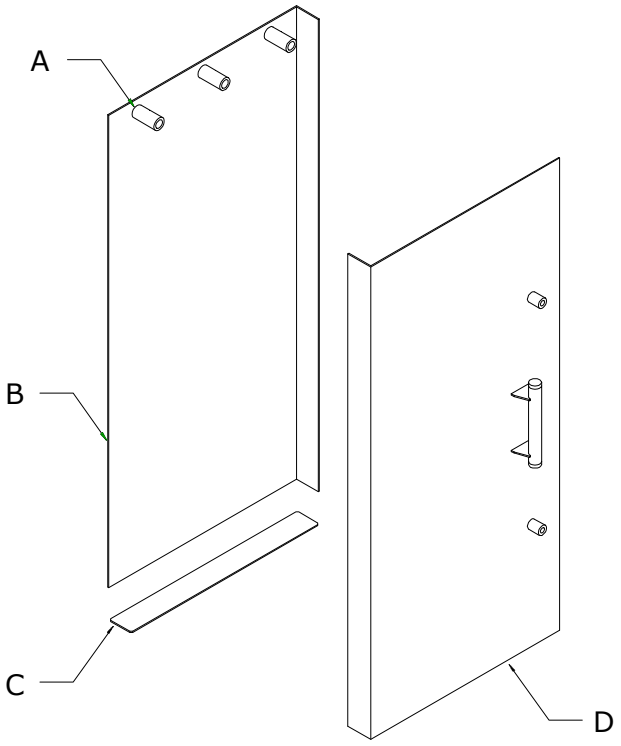
The ASR blast door features a stronger door leaf design that is a full 5 sided envelope fabricated from 3/16 inch steel plate - to be filled with concrete after hanging. This outer skin envelope design (A, B, C, D) affords a greater strength to weight ratio than does early style rebar reinforced poured in place doors of the 1950's. The reason is that the outer skin of the envelope becomes the reinforcement steel, this is the element that stiffens the door against failure due to crumbling and buckling.

Example:
An ASR blast door leaf that is 36 x 80 inches is constructed from 1,200 cubic inches of steel, having a pre-fill weight of 340 pounds of steel.

A standard 36 x 80 inch 1950's style rebar reinforced door that is imported from Europe has as it's structure: no steel skins and two courses of ½-inch rebar placed on 6-inch centers (5 vertical and 13 horizontally) for 145 feet of total length of rebar which yields a steel weight of weight of 85 pounds.

The 1950's door will take about 2,000 pounds of concrete fill, add this to the rebar weight of 85 pounds for a total leaf weight of approximately 2,085 pounds. The ASR door will take about 1000 pounds of concrete fill, add this to the envelop weight of 340 pounds yielding a total leaf weight of approximately 1340 pounds — **the same strength at almost half the weight.**

In short, the ASR blast door features more steel, less concrete, and equal or better strength. This less weight means less stress on the hinges, latches and walls. Add to that the ease of installation - no need to pour the frame in place or make your own plywood forms for the door leaf.



Door construction

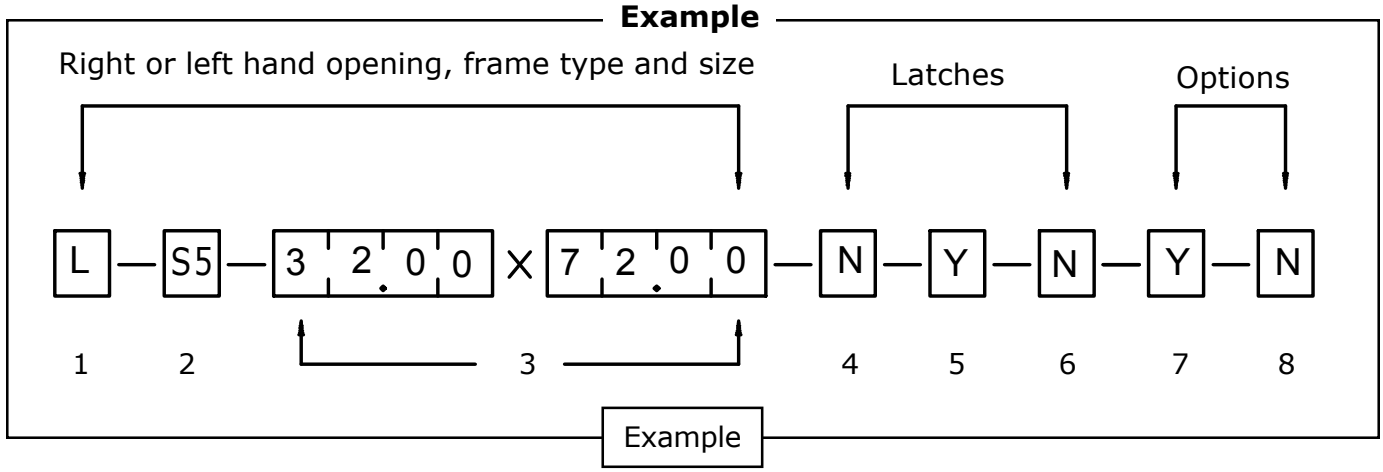
A	Lifting point spacers
B	Inside door skin
C	Door floor
D	Outside door skin

Part number

The first step to ordering a blast door is to determine which options are required and create a part number. Every option is explained in this manual on the page numbers references below.

The part number example shown below represents left hand swing door, with a 5 inch step over threshold, a 32-inch wide x 72-inch high frame size, without outside operators, with assault resistant security latches, without outside operators, with viewer, and without differential pressure gauge. You can fill out the part number block at the bottom to show the exact blast door you require.

Example



Hand, Frame and Size

1. Right or Left Hand opening, (R-L), see page 6
2. Frame type, (S-F), see pages 7 through 10
3. Size in inches, width (##.##) x height (##.##), see pages 8 through 10
   32.00 x 72.00 and 36.00 x 80.00 are the standard door sizes.
   Nonstandard door sizes will incur a engineering fee.
   American Safe Room has built many custom doors and will build to fit your existing opening.

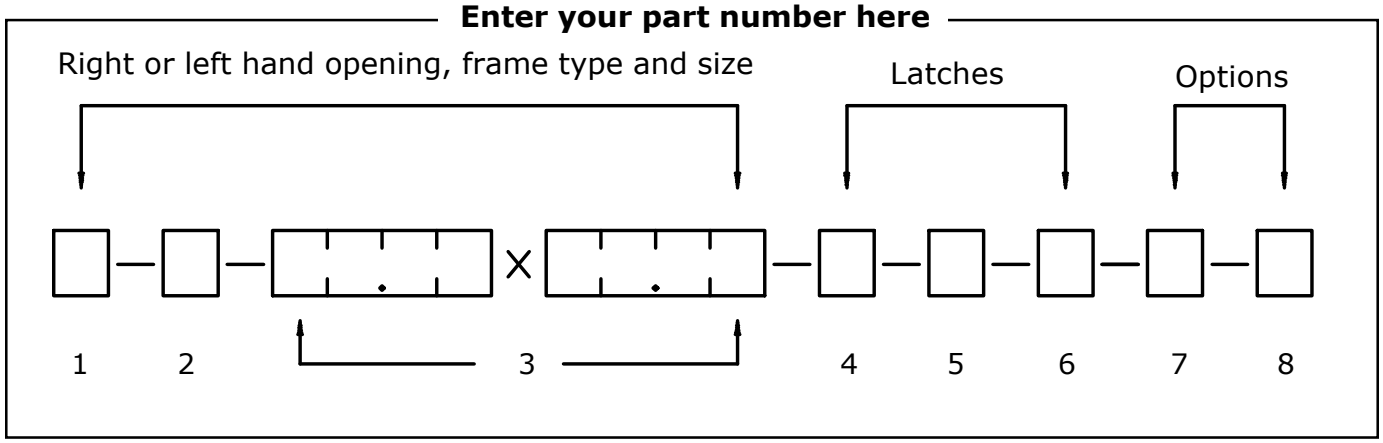
Latches

4. Outside operators, (Y-N), see page 11
5. Assault resistant security latches and wall capture brackets, (Y-N), see page 12
6. Outside deadbolt lock assembly, (Y-N), see figures page 13

Options

7. Viewer, (Y-N), see figures 14
8. Differential pressure gage, (Y-N), see page 14

Enter your part number here



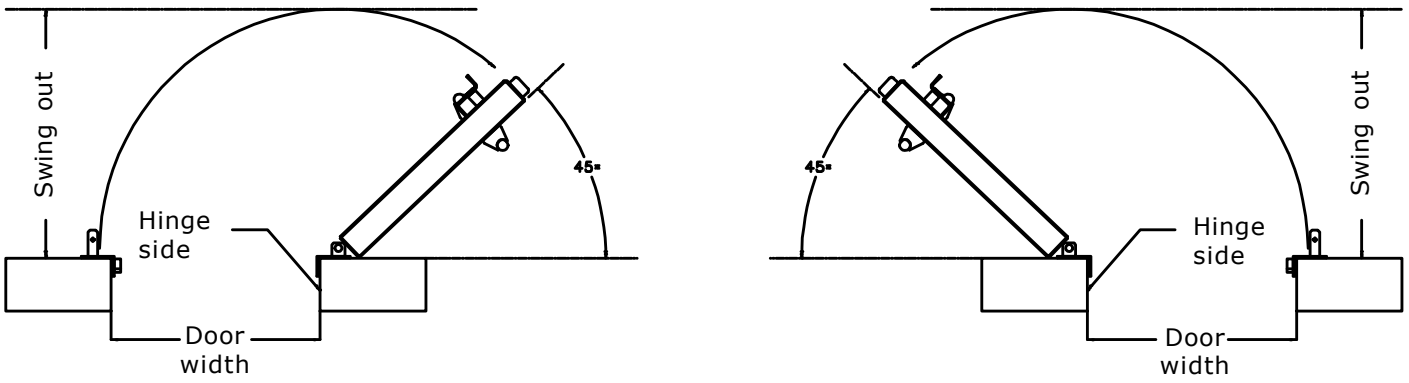
Opening direction

All blast doors must open outward. This is so the extreme forces produced in a high energy explosion will be transmitted directly to the door frame and wall connection — not through the hinges and latches to the door frame and wall.

Doors can be ordered from American Safe Room in either right hand or left hand opening configuration.

To determine which opening direction is suitable for your needs, picture yourself standing inside the door frame with your back to the hinge side. If the door swings to your right it is a right hand door, if the door swings to your left it is a left hand door.

Enter an "L" for a left hand opening door or a "R" for a right hand opening door in box 1 on page 5.



Right hand door shown from top

Left hand door shown from top

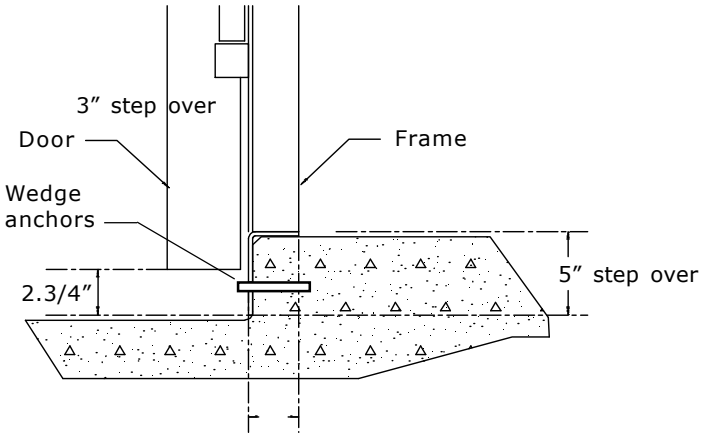
Figure 3

Note:
- Swing out is always 6" greater than the door width. Example: a 36 inch door width will have a swing out of 42 inches.
- Clear opening (inside door frame) is always 1/2-inch less than frame size.

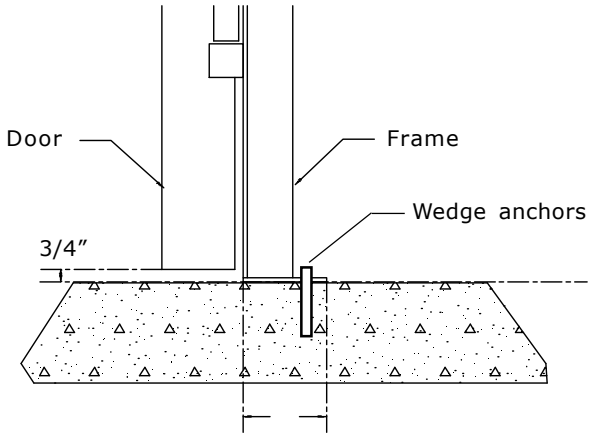
Frame styles

There are four styles of frames to choose from. See the side elevations below and the door size drawings on the next three pages.

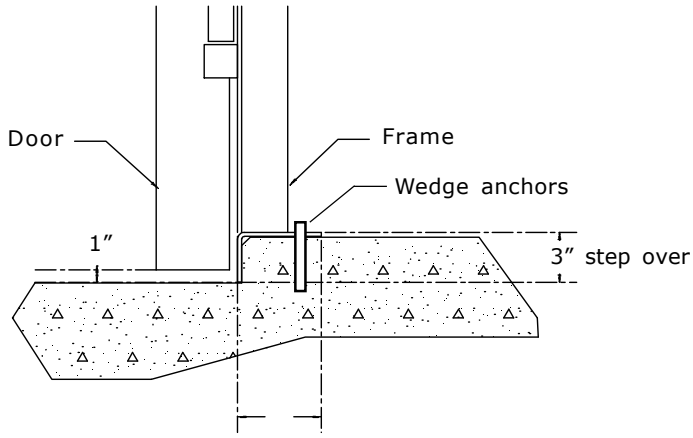
Note that in order to have a door that seals you must have mating surfaces on the door leaf and the frame that compress the seal around all four edges of the door leaf. Because of this, the flat threshold will not completely seal — the bottom has a ¾ inch gap.



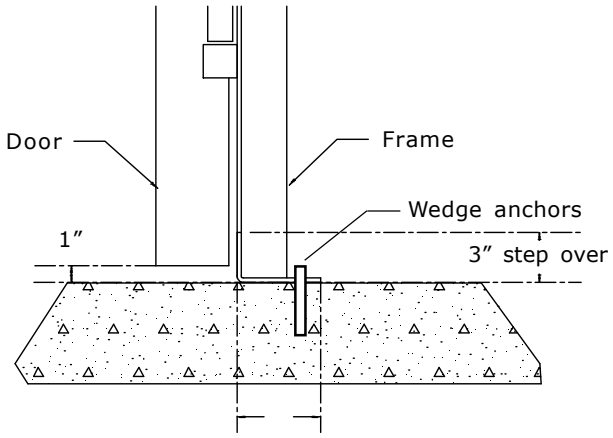
S5: Step over threshold - 5 inch height
- Complete seal all around the door leaf
- Bottom anchor studs inserted into the wall and through the face of the frame
- 2.3/4 inch door/floor clearance



FT: Flat threshold
- Seal on three sides — the bottom has a ¾ inch open gap that does not seal
- Bottom anchor inserted into the floor and up through the lip of frame
- ¾ inch door/floor clearance



S3: Step over threshold - 3 inch height
- Complete seal all around the door leaf
- Bottom anchor studs inserted into the threshold (the bottom of the rough opening) and up through the lip of the frame
- One inch door/floor clearance



SF: Step over frame
- Complete seal around door leaf
- Bottom anchor inserted into the floor and up through the lip of frame
- One inch door/floor clearance

Door size — step over threshold

FRAME STYLE (S)

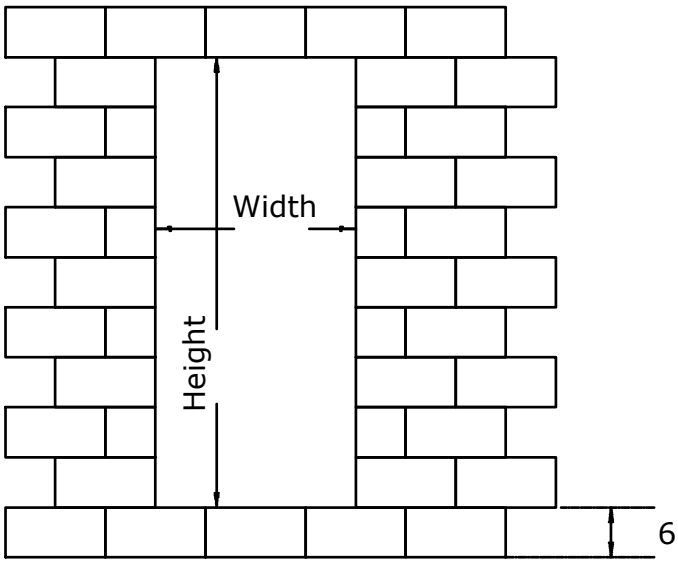


Figure 4A

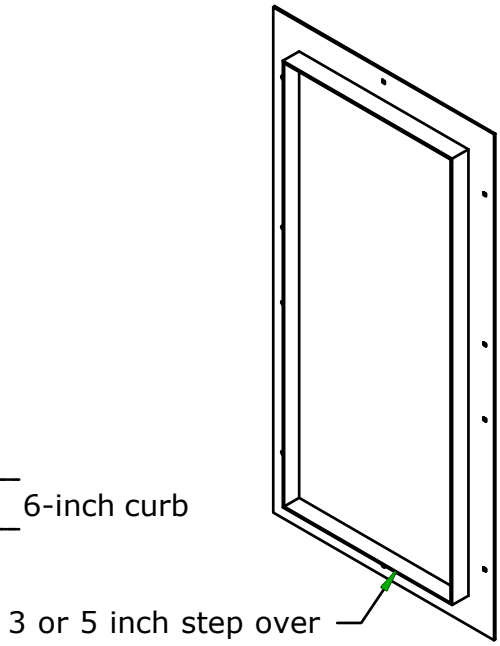


Figure 4B

Step over threshold, 5 inch — frame style "S5"
The step over threshold must have a curb at least 5 inches high as shown above.
Enter style code "S5" in box 2 of the part number form on page 5.
Enter the size (in inches decimal) in box 3 of the part number form.

Step over threshold, 3 inch — frame style "S3"
The step over threshold must have a curb at least 3 inches high as shown above.
Enter style code "S5" in box 2 of the part number form on page 5.
Enter the size (in inches decimal) in box 3 of the part number form.

Standard door sizes

- 32 inches wide by 72 inches high
- 36 inches wide by 80 inches high

Custom sizes

- Please contact American Safe Room to get a quote on a custom door size.

Wall opening size
The outside of the door frame lip (that fits into the wall opening) is made to the exact size of the door ordered. To insure a proper fit the wall opening should be made at least ½ inch wider and taller than the door frame lip. Example: a 32 x 72 inch door should have an opening of at least 32.½ x 72.½ inches.

Door size — step over frame

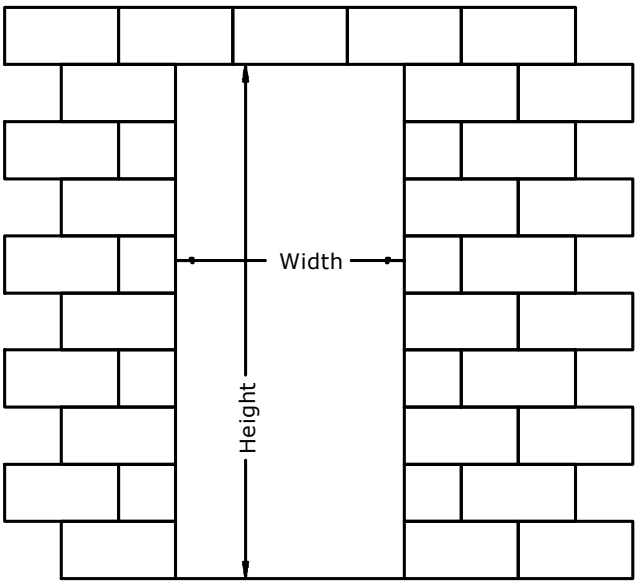


Figure 4C

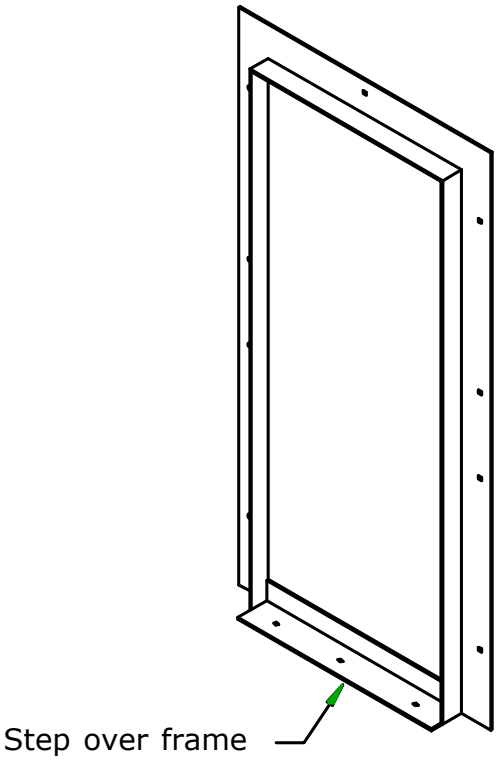


Figure 4D

Flat threshold — frame style "SF"
The flat threshold sits directly on the floor.

Enter style code "SF" in box 2 of the part number form on page 5.

Enter the size (in inches decimal) in box 3 of the part number form.

Standard door sizes

- 32 inches wide by 72 inches high
- 36 inches wide by 80 inches high

Custom sizes

- Please contact American Safe Room to get a quote on a custom door size.

Wall opening size
The outside of the door frame lip (that fits into the wall opening) is made to the exact size of the door ordered. To insure a proper fit the wall opening should be made at least ½ inch wider and taller than the door frame lip. Example: a 32 x 72 inch door should have an opening of at least 32.½ x 72.½ inches.

Door size — flat threshold

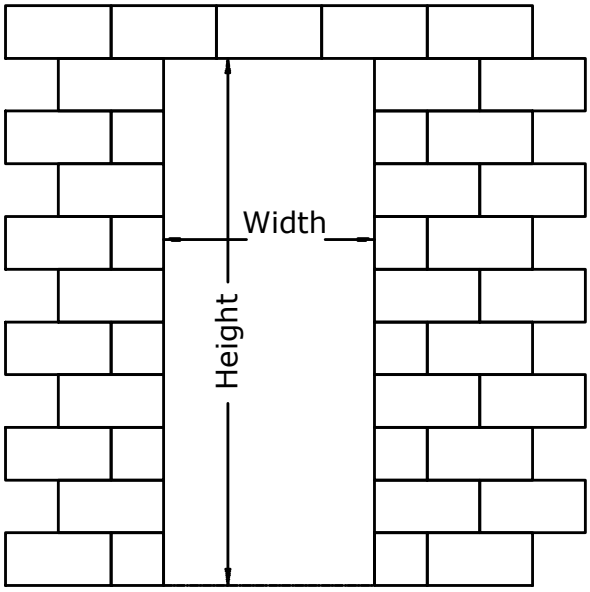
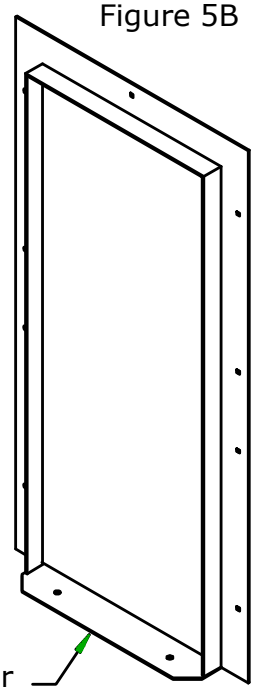


Figure 5A

Figure 5B



Flat threshold — frame style "FT"
The flat threshold sits directly on the floor.

Enter style code "FT" in box 2 of the part number form on page 5.

Enter the size (in inches decimal) in box 3 of the part number form.

Note that this frame style does not provide a gas tight seal because there are no mating surfaces at the bottom to compress a gasket.

Standard door sizes

- 32 inches wide by 72 inches high
- 36 inches wide by 80 inches high

Custom sizes

- Please contact American Safe Room to get a quote on a custom door size.

Wall opening size
The outside of the door frame lip (that fits into the wall opening) is made to the exact size of the door ordered. To insure a proper fit the wall opening should be made at least ½ inch wider and taller than the door frame lip. Example: a 32 x 72 inch door should have an opening of at least 32.½ x 72.½ inches.

Outside operators

Outside operators are latch handles on the outside of the door that rotate with the inside latches. This option allows you to latch and unlatch the blast door from both the inside and outside. Interior blast doors and industrial sites are the most common installations that require the occupants to open and close the door from either side. It is not suitable for a blast door on the outside of a shelter where security is a concern.

The outside operator (number 1, below right) works in unison with the inside latch (number 2, right). If you rotate the outside operator, it will rotate the inside cam latch — they are on a common shaft.

To add this option, enter "Y" in box 4 of the part number form on page 5.

Note: the outside operator handles are shipped separately and must be installed when the door is installed.

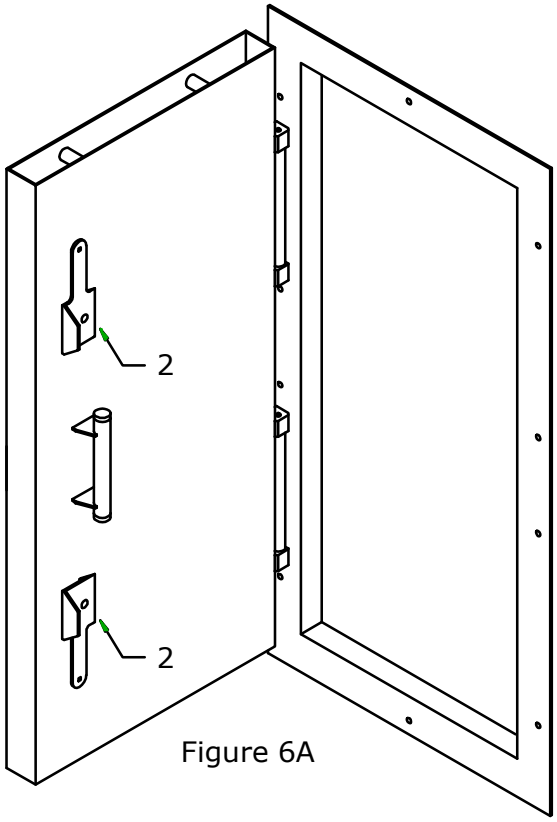


Figure 6A

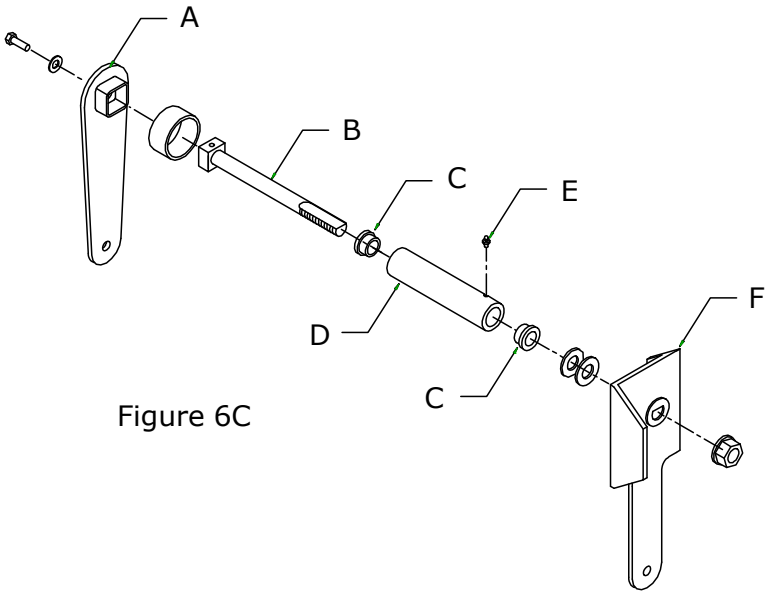


Figure 6C

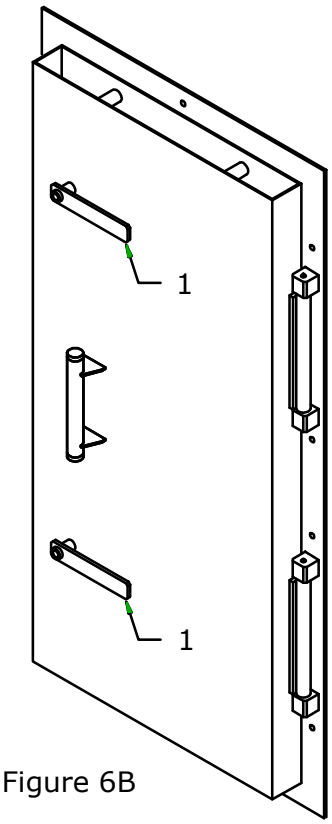


Figure 6B

The outside operator handles (A) may be removed when outside access is not desired.
The assembly transmits outside rotational force directly to the internal cam latch (F) by means of a ¾-in alloy steel shaft (B) carried by two 60-60 bronze bushings (C) housed inside of the air tight lubrication sleeve (D) with re-grease able fitting (E).

Assault resistant security latches and wall capture brackets

The assault resistant security latches are two additional cam latches on the hinge side of the door (letter A, figure 7A - below) and an anti-slip bracket that keeps the door from slipping downward if the hinges are cut. It's purpose is to hold the door in place even if the outside hinges are attacked by a malicious person trying to gain entrance to your shelter.

The wall capture brackets are steel angles that go from the door frame lip to the inside of the wall. They need to be cut to length and welded onto the frame lip and fastened to the inside wall. They fit walls from 6 to 12.5 inches thick. See page 18 for installation instructions.

With this option, the blast door is highly resistant to being defeated from the outside. The door itself is resistant to cutting with a torch due to being filled with concrete. The hinges can be cut off with a torch - and the door will stay in place. The frame fasteners can be cut off with a torch - and the frame will stay in place. **This gives the security of a poured-in-place door frame, with the ease of installation of a bolt-on blast door frame.**

To add this option, enter "Y", in box 5 of the part number form on page 5.

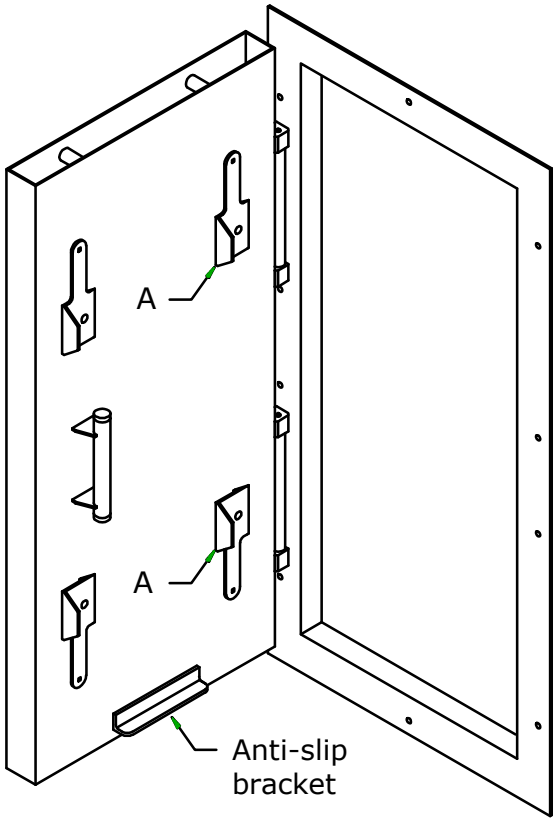


Figure 7A
Door viewed from the outside
A - assault resistant cam latches

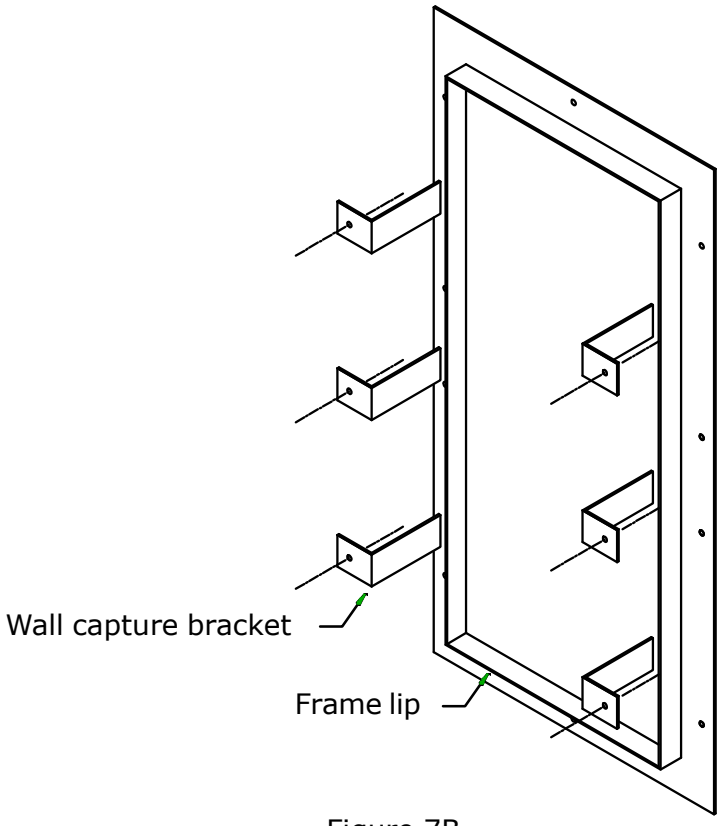


Figure 7B
Door frame viewed from the inside

Outside deadbolt lock assembly

The optional deadbolt assembly consists of a steel box with an industrial grade deadbolt and a corresponding latch plate on the frame. Both parts are securely welded in place. Two original keys are provided — they are shipped attached to the manual binder.

On most hasp assemblies, there are two holes that line up. These holes could allow a malicious person to easily lock the occupants of a shelter inside by sliding a rod through the holes. This deadbolt assembly does have two holes that line up, but when the deadbolt is retracted, it fills up the hole in the lock box, preventing a rod from being inserted.

To add this option, enter "Y", in box 6 of the part number form on page 5.

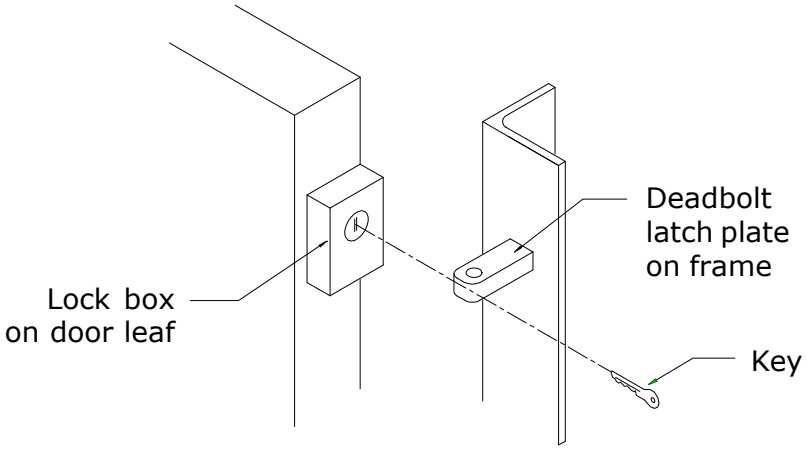


Figure 8A
Deadbolt lock detail

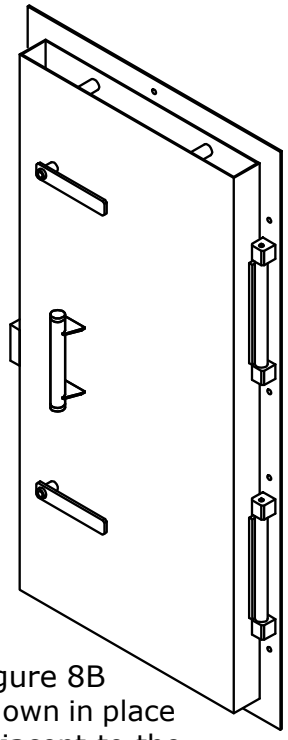


Figure 8B
Shown in place adjacent to the handle on the latch side of the door

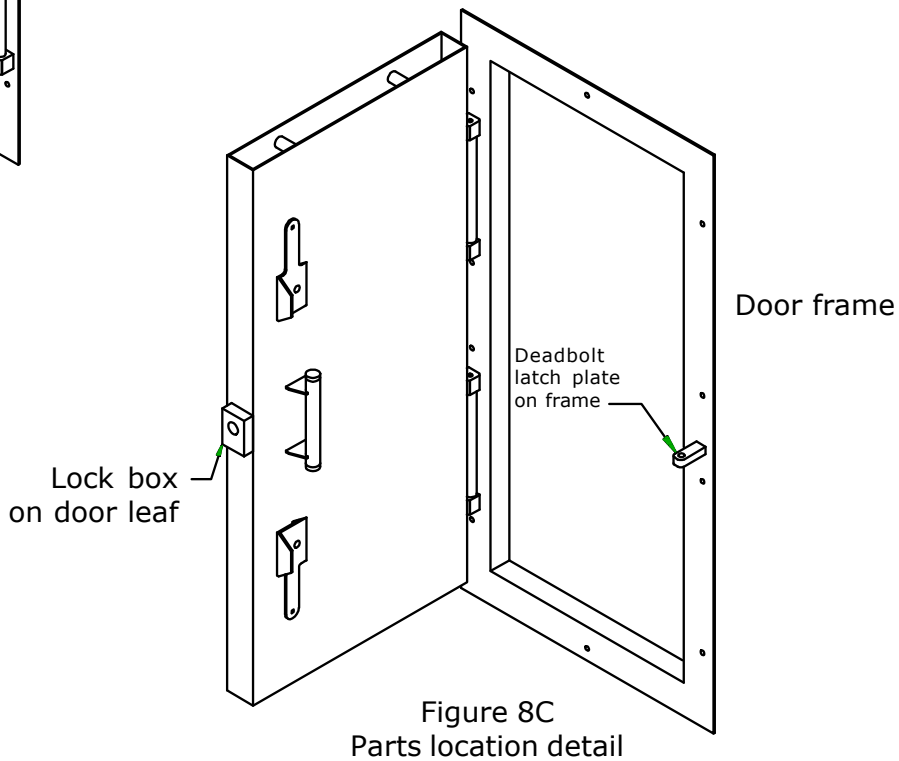


Figure 8C
Parts location detail

Security viewer

The security viewer allows you to see what is happening outside the shelter from the inside. It has a panoramic view that gives you a wide field of view — item A below.

To add this option, enter "Y" in box 7 of the part number form on page 5.

Differential pressure gauge

The differential pressure gauge takes a constant sampling of the air pressure both inside and outside the shelter and displays the difference in air pressure in inches of water column (1 pound per square inch = 27.68 inches of water column). The door is a great place to mount the gauge because we install a sampling tube through the door when we manufacture it. You do not have to install a sampling tube through the wall or ceiling of your shelter. See item B below.

Important: ensure that there are four 10-24 machine screws in the threaded holes on the inside of the door before filling it with concrete. Remove these screws after the concrete has cured and mount the pressure gauge.

For more detail see the differential pressure monitor, see the installation manual available at www.AmericanSafeRoom.com.

To add this option, enter "Y" in box 8 of the part number form on page 5.

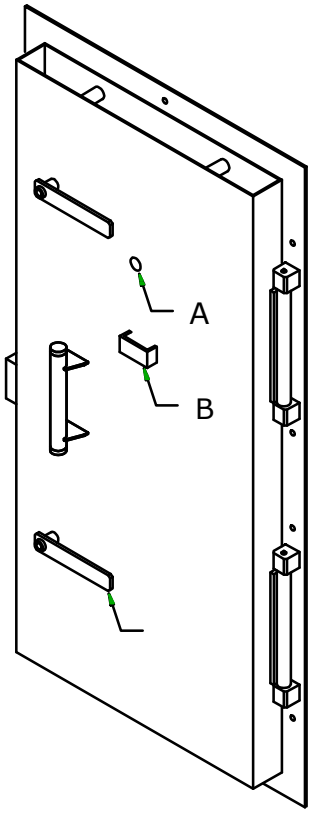


Figure 9A
Outside

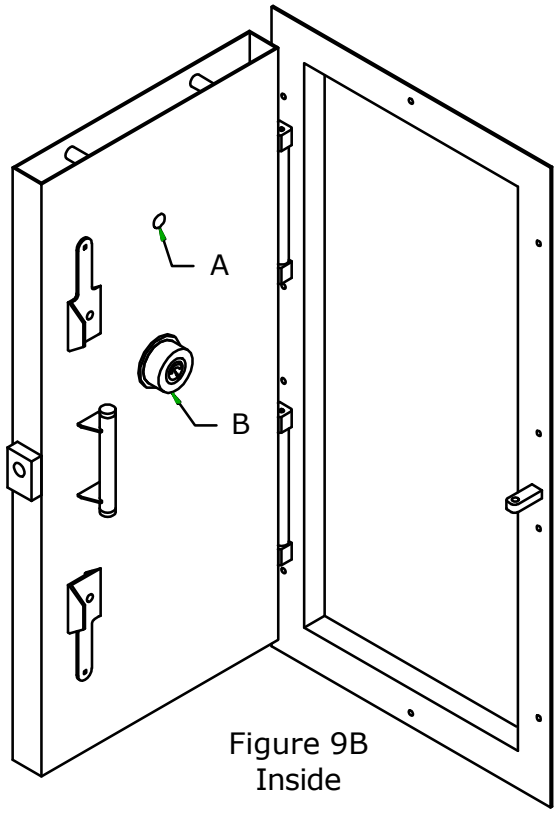


Figure 9B
Inside

Lock and latch operation

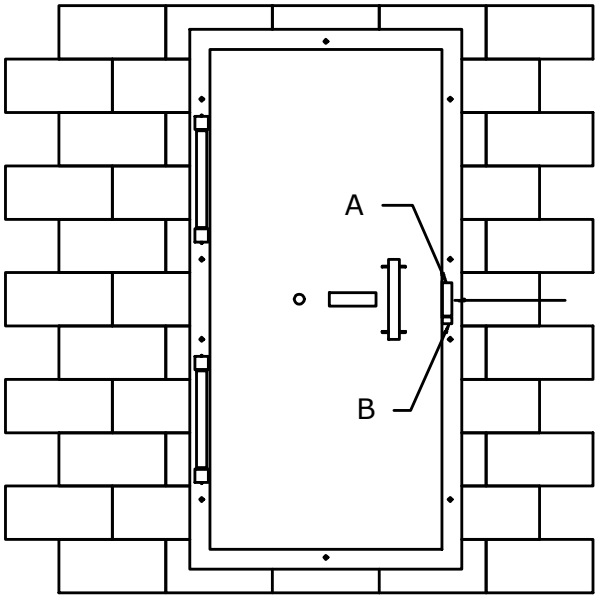


Figure 10A

Outside view
The outside security hasp assembly is a steel box with a deadbolt lock welded to the door envelope (A), and latch plate welded to the frame (B). The bolt may be locked in either the locked or open condition.

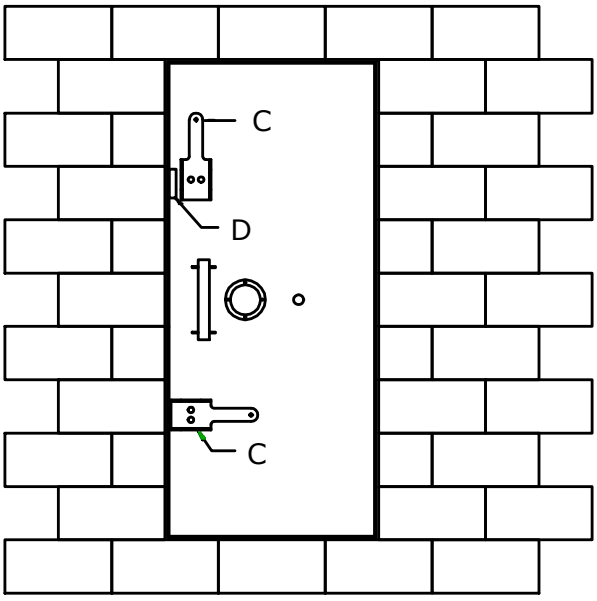


Figure 10B

Inside view
The two cam lock levers (C) draw the door tight to the gas seal by means of tightening against the cam plate (D). In the open position the lever ends point up and down or away from each other. In the closed or locked position the lever ends are parallel pointing across the door to the hinged side. Figure 10B shows the top lever in the open or unlatched position, and the bottom lever in the closed or latched position.

Installation — hanging the door

The pre-hung blast door is constructed with two lifting points inside the door envelope. Use only lifting equipment and hardware approved for overhead lifting for this task.

Preparing the door for installation

If the door has outside operators (page 8), secure the door shut with the cam latches. If the door does not have outside operators, but has the deadbolt lock assembly (page 13), secure the door shut with the lock. If the door does not have either one of these options, ensure the door is drawn tight up to the frame when it is being lifted — and especially when the concrete is being poured and while it is being cured. If the door is installed with the inside latches secured in an unoccupied shelter, the door and frame must be removed to gain access. This door is designed to deny entry to people outside the shelter.

Lift the door into place

Lift door frame assembly into the wall opening and push the door so that the frame lip is fully captured inside the boundaries of the opening. Brace or otherwise secure the door frame assembly so that it can not fall out of the opening.

Caution

Take care to not pinch body parts between the door and any obstructions. When swinging the door closed use only the provided door handles. Read and understand these instructions thoroughly before attempting to hang this blast door. American Safe Room strongly recommends that this door be installed by a qualified installer with the proper tools and equipment. A licenced general contractor should be able to follow these directions and complete the installation properly.

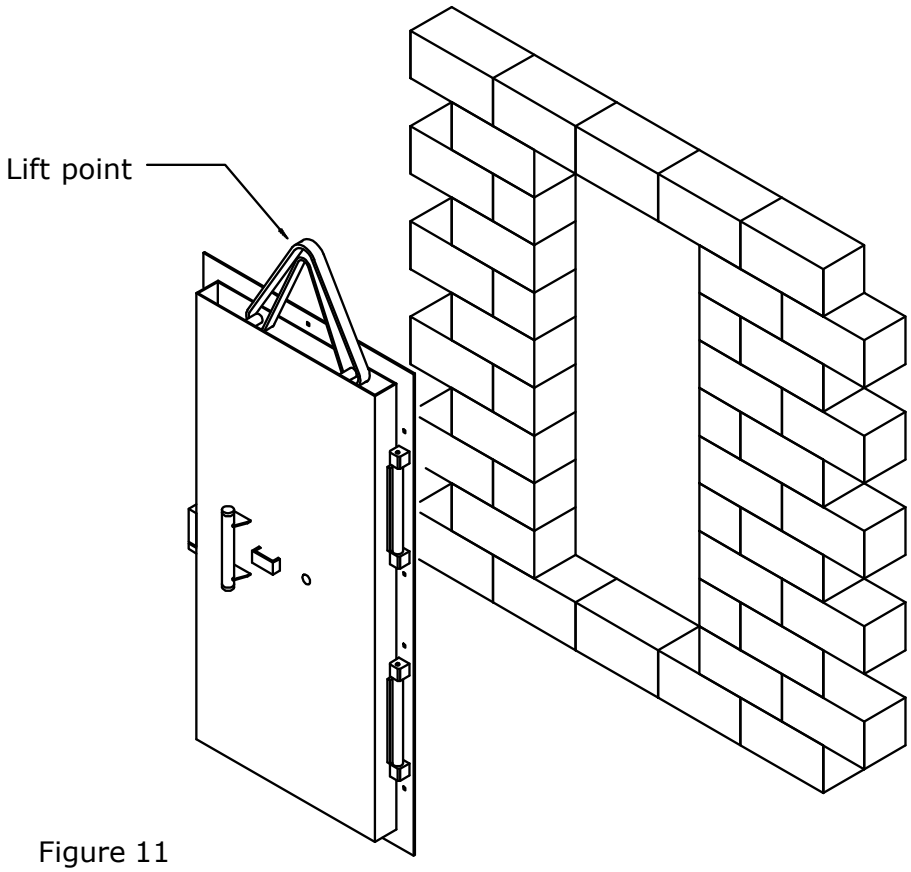


Figure 11

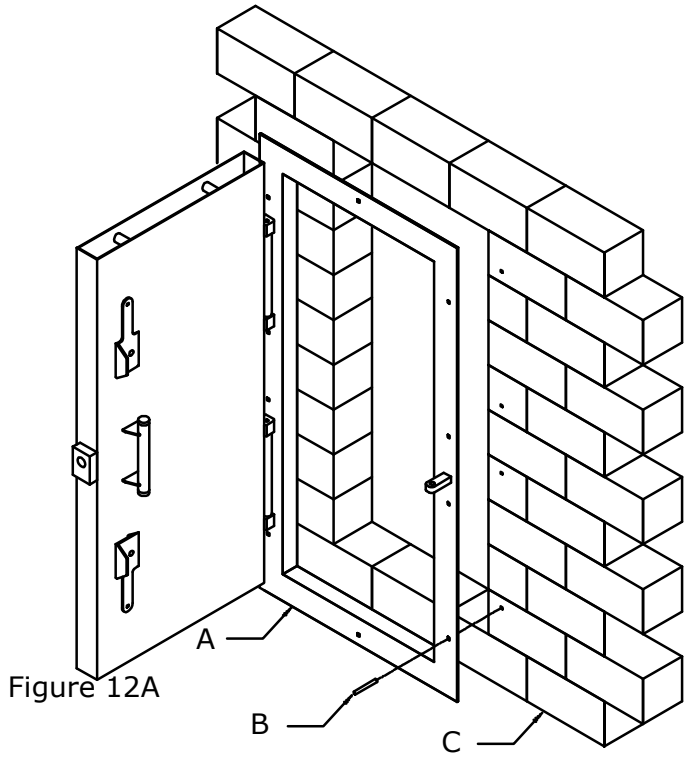


Figure 12A

Installing the anchors

Using the included ½-inch masonry bit, drill the mounting anchor stud holes using the predrilled holes in frame (A) as a template.

They are Concrete Wedge Anchor "Thunder Studs©" that are ½-inch diameter by 4.1/4-inch length (B).

See page 17 for the technical information for this fastener system.

Concrete Fasting Systems
Wedge Anchor, Thunder Stud©
1231 E. 26th Street
Cleveland, Ohio 44114

Phone 888-498-5747
Fax 216-357-7435
7:30 – 5:00 Eastern Time

www.confast.com

Grouting the door frame

In order for the door to close, latch, and seal correctly it is necessary for the outer door frame flange to nest flat against the wall surface (C).

If the wall is not perfectly straight, the door frame will bend when the nuts are tightened on the wedge anchor studs, so it is imperative that the wall be grouted to the frame. Do not tighten the frame to an uneven wall — it will warp the frame and the door will not seal.

In cases where the wall is not square or flat with the door frame it will be necessary to use cement grouting to create a flat surface between the frame and well. This is accomplished by creating a ½-inch wide void between the door frame and wall surface and filling it with wet cement grout.

Using the door frame and wall surface as a vice evenly clamp a number of ½-inch thick shims or spacers between the door frame and wall surface by lightly tightening the anchor bolts.

When the cement grout is dry remove the shims and tighten the anchor bolts to full torque, this will provide the door frame with a flat mounting surface.

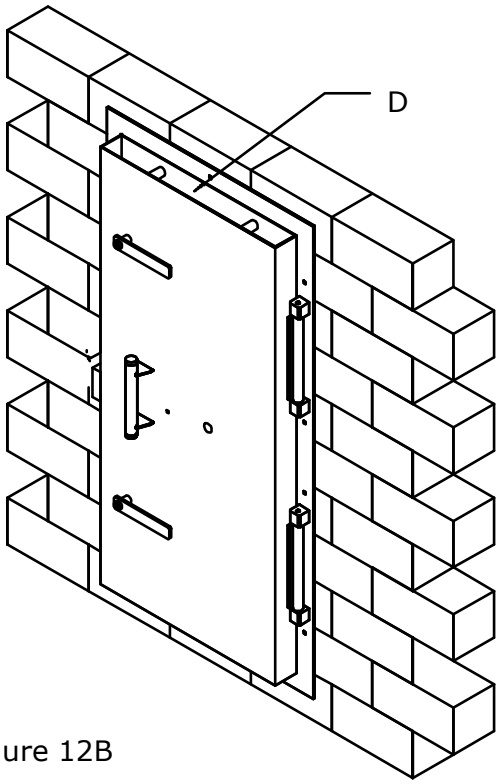


Figure 12B

Wall capture brackets

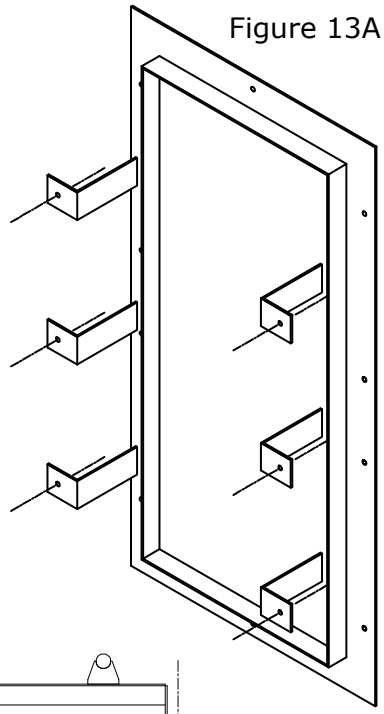
The wall capture brackets are designed to provide extra security and strength to door loads in the unseating condition. Smaller doors will have four brackets, not six - as shown.

Position angle bracket as shown and cut off the long leg leaving a 1/8-inch weld gap between the frame leg and the angle bracket.

Locate the angle brackets between the door frame anchor studs to avoid interferences of the anchors, and install the provided anchor studs as described on page 16.

Make a full length ¼ inch vertical fillet weld the across the 4 inch wide strap and the door frame.

Figure 13A



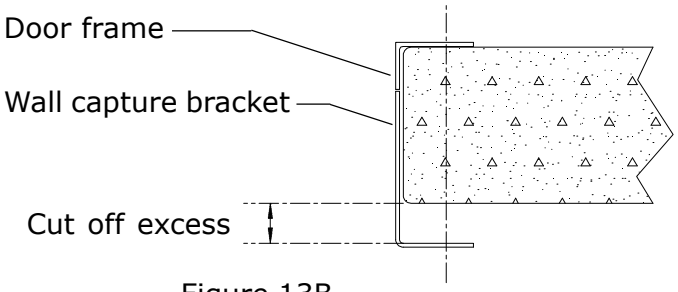


Figure 13B

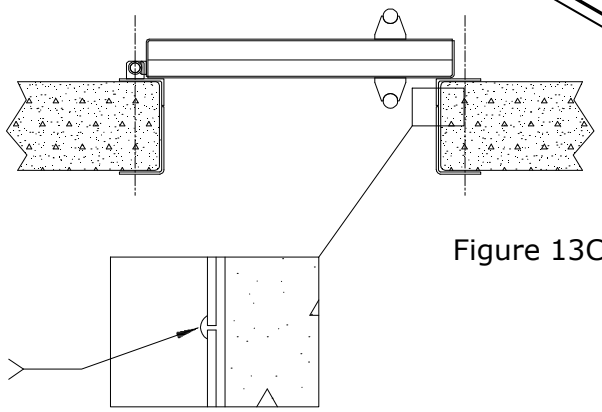


Figure 13C

Sealing the inside door frame lip

After the cement grout is dry and the door frame anchor bolts have been tightened apply a liberal amount of silicon sealant, caulking between the inner door frame lip and the sill area.

Filling the door cavity with concrete

The door envelope (item D on page 17) is ready for pouring the concrete.

Fill the door with concrete.

The door must not be opened for at least 4 days while the concrete cures.

The amount of concrete required will depend on the door size ordered.

The formula for calculating the needed fill amount of concrete in cubic feet is the height of the door in inches times the width of the door in inches times the thickness of the door in inches divided by 1,728 (one cubic foot in inches).

Concrete wedge anchor - technical information

The ThunderStud® wedge anchor consists of two pieces, permanently pre-assembled into a single unit. The carbon steel rod is threaded for a portion of its length. The extreme end of the threaded portion is rounded to protect the threads from damage while the anchor is being driven into the hole drilled in the concrete. The other end of the rod has a necked down diameter, which runs for a short distance, at the end of which it tapers outwardly to the full diameter of the rod. A precision formed universal clip made of carbon steel is permanently assembled around the necked down diameter to complete the anchor. Each package contains the correct number of nuts and washers.

Concrete Wedge Anchor - Approvals
Listed by Underwriters Laboratories (UL), International Conference of Building Officials (ICBO) carbon steel only, Board of Standards and Appeals (BSA), City of L.A. Meets or exceeds U.S. Government G.S.A. Specifications FF-S-325 Group 11, Type 4, Class

Concrete Wedge Anchor - Applications
Medium to heavy duty into concrete.

Concrete Wedge Anchor - Installation
(1) Drill hole into concrete with a carbide tipped masonry drill bit conforming to ANSI B94, 12-77, the same size as the ThunderStud® wedge anchor. If the fixture being fastened is in place and being used as a template to locate the ThunderStud® anchor, the mounting hole in the fixture should afford clearance for the universal wedge clip on the stud. (2) Clean hole, place the ThunderStud® wedge anchor through the hole in the fixture or directly into the concrete and hammer it in to the drilled hole until the threads are below the surface of the fixture/concrete. (3) Turn the nut by hand until the unit is snugged up. Tighten the nut with a wrench, approximately three or four full turns, to complete the fastening.

Concrete Wedge Anchor - Anchor Length
Minimum embedment, plus fixture, plus nut and washer. The ThunderStud® wedge anchor requires no maximum hole depth. The depth of the hole in the concrete should be the length of the wedge anchor minus the thickness of the material being fastened. This will result in some extra depth to accommodate a minor amount of concrete cutting which may not be able to be cleaned out of hole.