

American Safe Room

Explosion Resistant Pre-hung Double Leaf Blast Door



**Drawing number: ASR-50-DBL-BD
Revision: C
September 19, 2019**

The American Safe Room Double Leaf Blast Door



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Description

ASR-50-DBL-BD Blast Door is a pre-hung, explosion resistant blast door that offers outstanding 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 events of up to 7,200 pounds per square foot — 50 pounds per square inch (PSI).

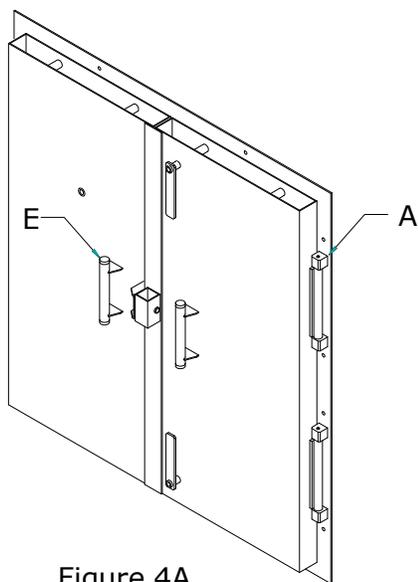


Figure 4A

Hinges (A)

The four vault style 1.1/2-inch diameter steel hinge pins are machined and polished from 1.1/2" diameter alloy steel (1), rotating in lubricated 60-60 bronze bearing blocks (2, 3) with re-grease able fitting (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 1/4-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 pre drilled for the included concrete anchoring studs, and serves as a drilling template for locating the drill holes.

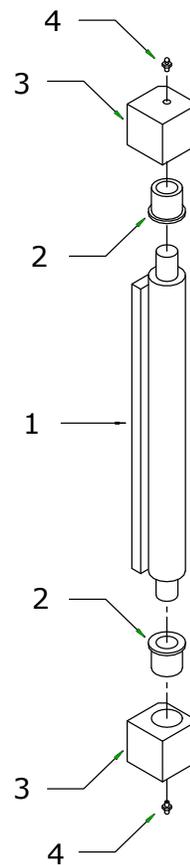


Figure 4B

Inside cam latches (D)

The two inside cam latches draw and lock the door tight to the gas seal. The upper and lower latch handles are provided with a built in friction safety clutch to insure that the latch handles do not unintentionally creep from the open condition to the closed or latched condition.

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.

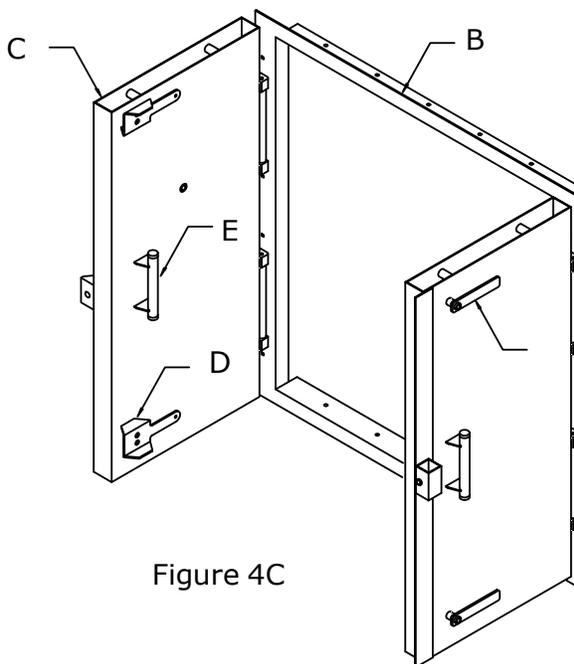
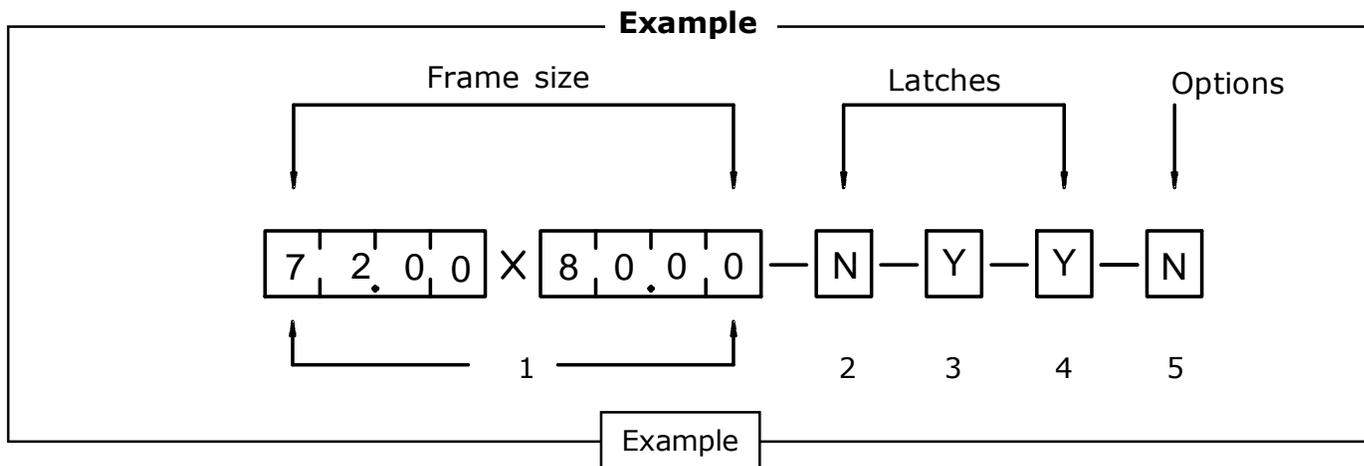


Figure 4C

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 a 72-inch wide x 80-inch high frame size, without outside operators, with assault resistant cam latches and wall capture brackets, with outside security hasp assembly, and without the viewer. You can fill out the part number block at the bottom to show the exact blast door you require.



Hand, Frame and Size

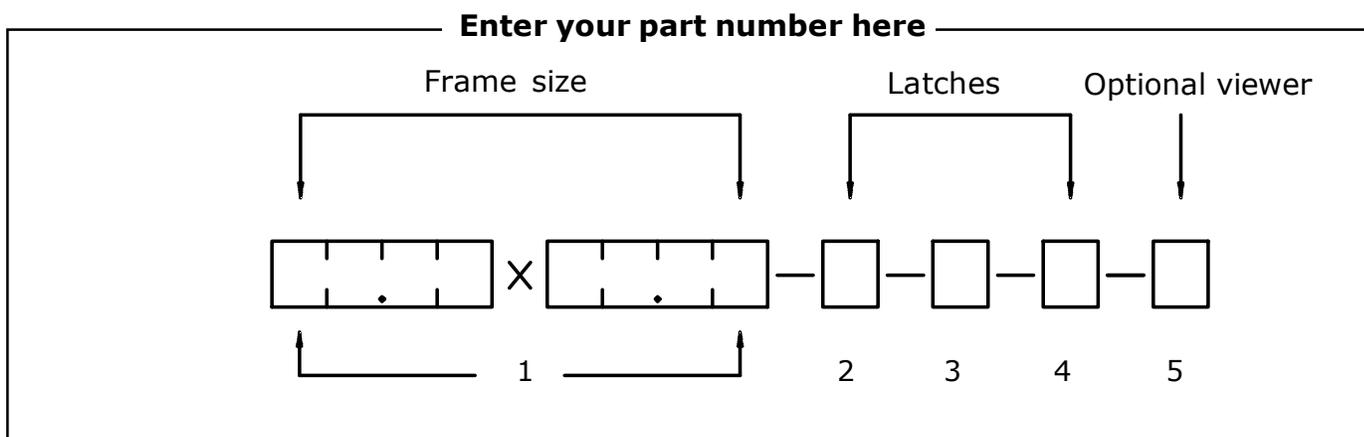
- Size in inches, width (##.##) x height (##.##), see page 7
 72.00 x 80.00 and 96.00 x 80.00 are the standard door sizes.
 Nonstandard door sizes will be charged an engineering fee.
 American Safe Room has built many custom doors and will build to fit your existing opening.

Latches

- Outside operators, (Y-N), see page 8
- Assault resistant cam latches and wall capture brackets, (Y-N), see page 9
- Outside security hasp assembly, (Y-N), see page 10

Options

- Viewer, (Y-N), see page 10



Swing geometry

All blast doors must open toward the blast. This is because the extreme forces produced in a high energy explosion must be transmitted directly to the door frame and wall connection.

Note that swing out is 8" greater than 1/2 the of the door width.

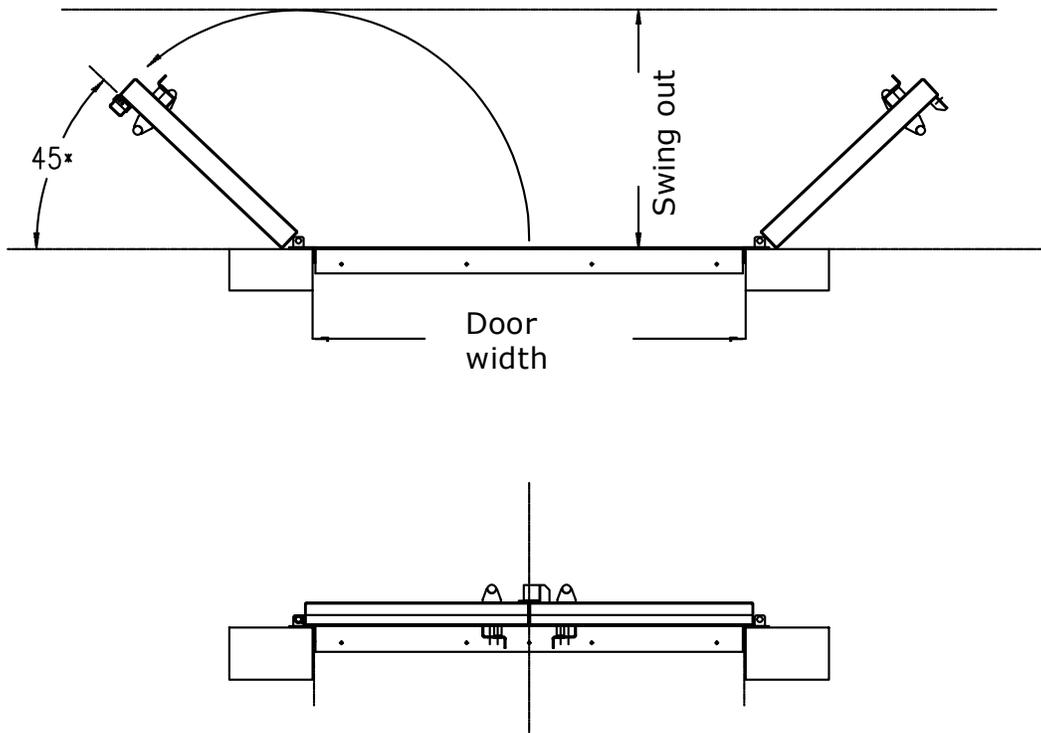


Figure 6

Door and wall opening size

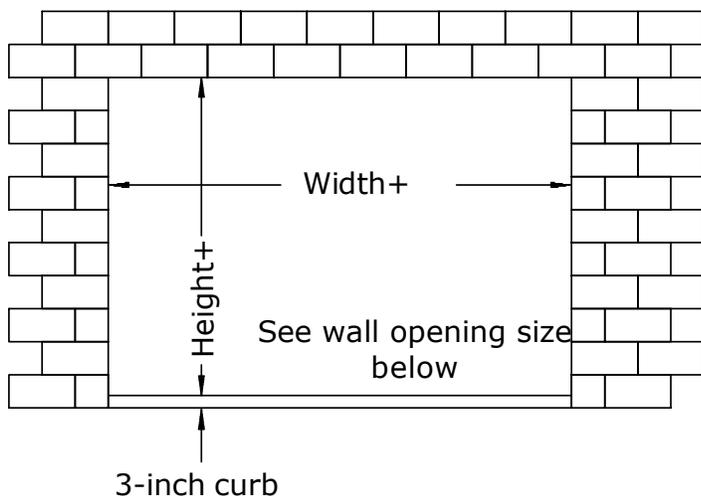


Figure 7A

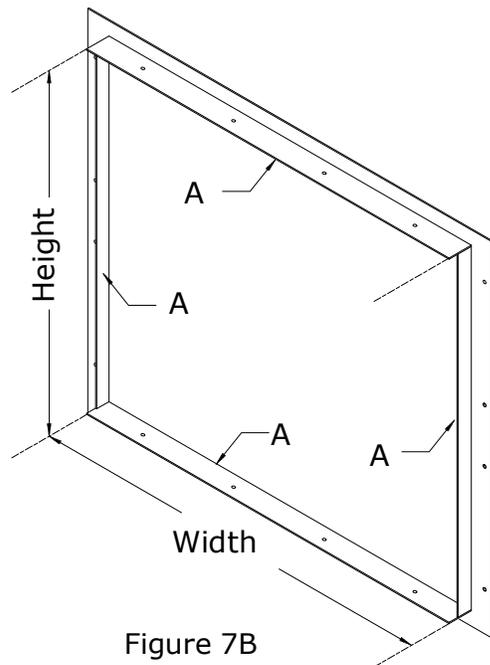


Figure 7B

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

Standard door sizes

- 72 inches wide by 80 inches high
- 96 inches wide by 80 inches high
- Custom sizes made to order

Rough opening

The outside to outside dimension 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 rough opening in the wall should be made at least $\frac{1}{2}$ " wider and taller than the frame lip. Example: a 72" x 80" door should have an opening of at least 72- $\frac{1}{2}$ " x 80- $\frac{1}{2}$ ". Note that the height dimension starts at the top of the concrete or block threshold as shown above.

Clear opening

The clear opening is the maximum opening dimension of the frame. It will determine what can fit through the door after it is installed. The free opening width is $\frac{1}{2}$ " under the order width and the clear opening height is 1 $\frac{1}{2}$ " less than the order height.

Caution

See the section on wall suitability on page 12.

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.

The outside operator (number 1, below and 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. This option should not be used for secure shelters. Interior blast doors and industrial sites are the most common installations that require the occupant to open and close the door from either side.

To add this option, enter "Y" in box 2 of the part number form on page 5.

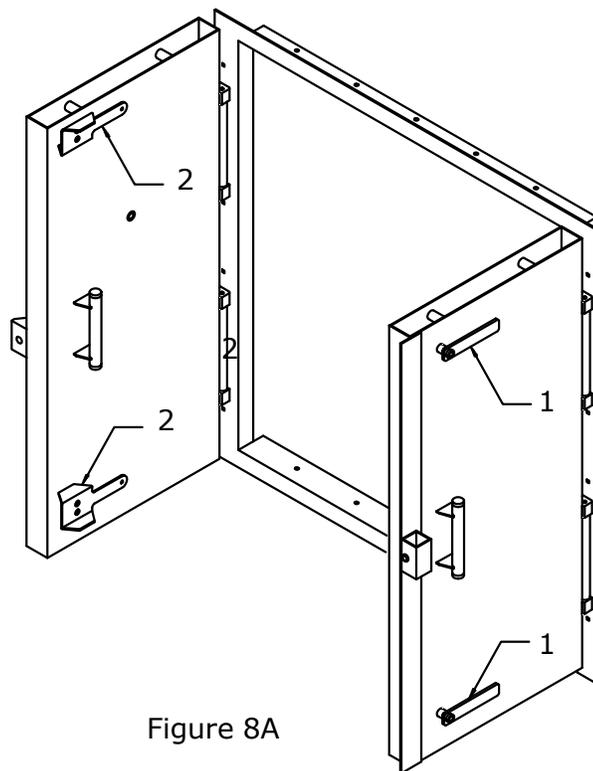


Figure 8A

ITEM NO.	Part Name	DESCRIPTION	QTY.
1	Operator Sleeve	1018 CR	1
2	Operator sleeve bushing	Bronze, oil impregnated	2
3	Operator Shaft	1018 CR	1
4	Square Nut	Parallel to operator shaft milled faces	1
5	Outside handle	Plasma cut ASTM-A36	1
6	Outside handle positioning tube		1
7	Grease zirk	1/4-28	1
8	3/4" spring washer		2
9	Lock nut		1
10	Cam latch handle	Plasma cut, formed ASTM-A36	1
11	D-washer	Plasma Cut ASTM-A36	1
12	Support stud	1018 CR	1
13	Outside handle bolt		1

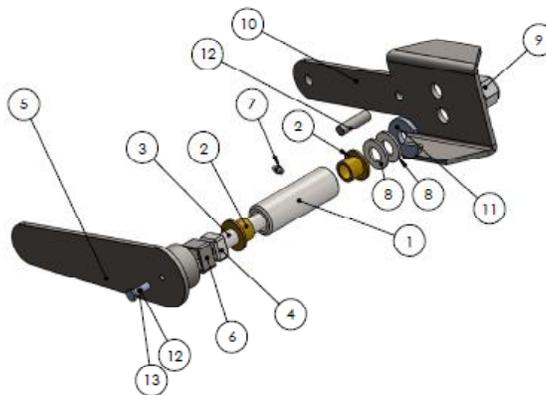


Figure 8C

The outside operator handles (5) may be removed when outside access is not desired.

The assembly transmits outside rotational force directly to the internal cam latch (10) by means of a 3/4 inch alloy steel shaft (3) carried by two 60-60 bronze bushings (2) housed inside of the air tight lubrication sleeve (1) with re-grease able fitting (7).

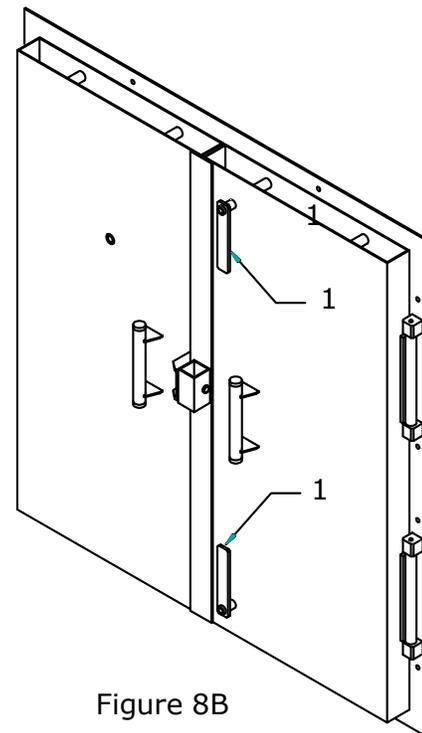


Figure 8B

Assault resistant security latches and wall capture brackets

The assault resistant security latches are two additional cam latches (items A, below) on the hinge side of the door leaf and an anti-slip bracket (Item B, below) 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 (items C, below) are steel angles that go from the door frame lip to the inside of the wall. They need to be welded onto the frame lip and fastened to the inside wall **at time of installation**. They fit walls from 6 to 12.5 inches thick. See page 16 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 3 of the part number form on page 5.

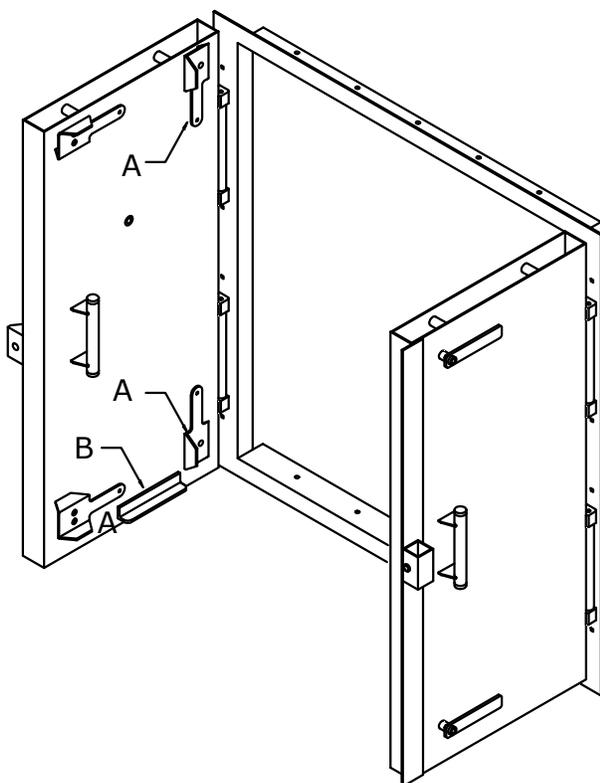


Figure 9A
Door viewed from the outside
A - assault resistant cam latches
B - anti slip bracket

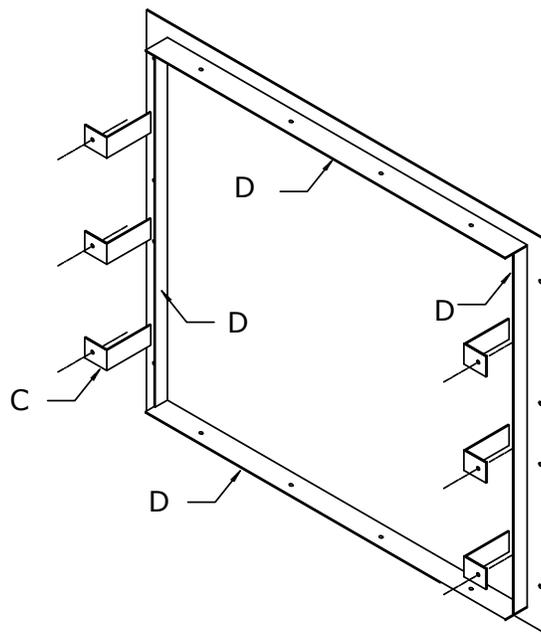
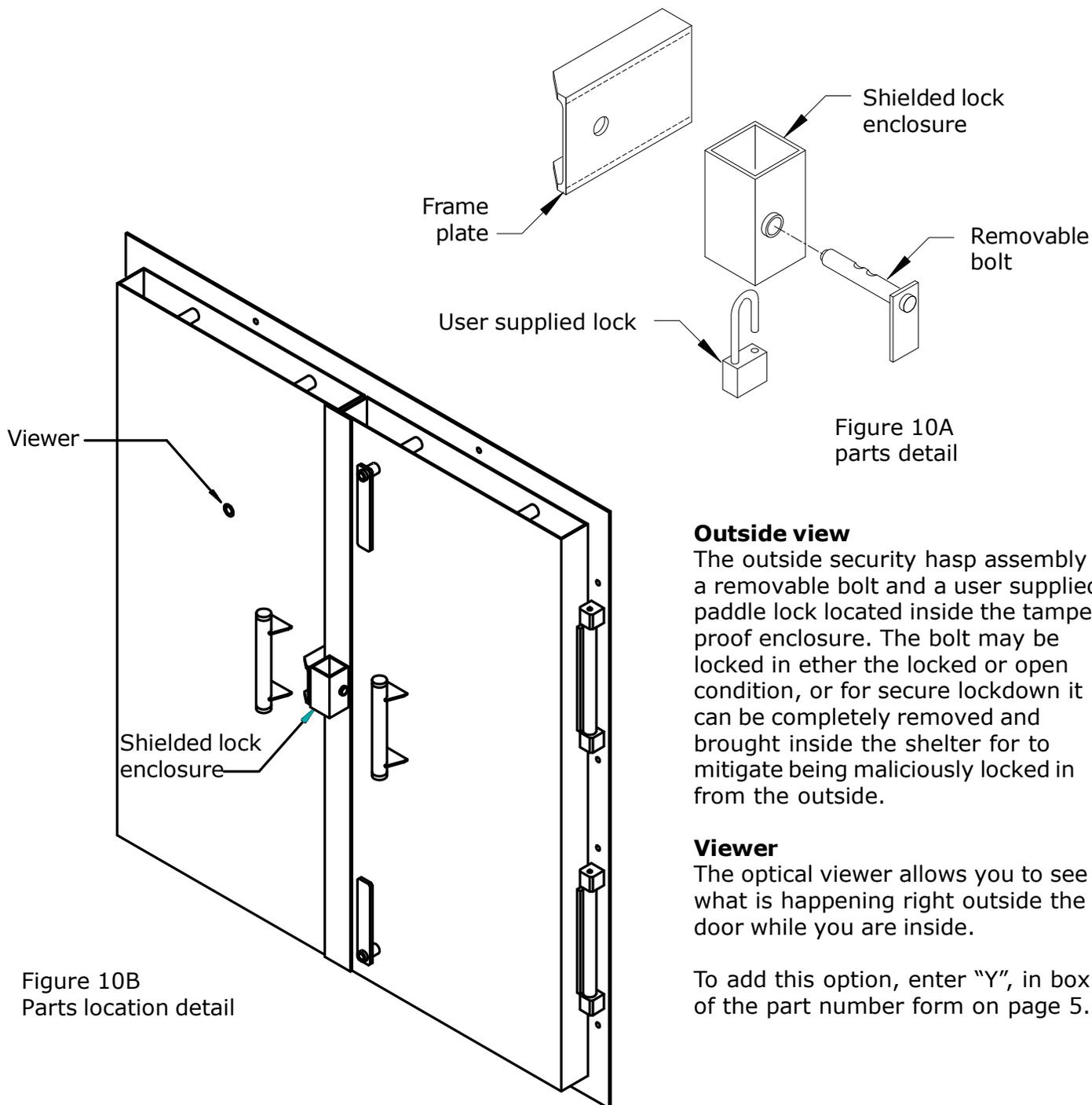


Figure 9B
Door frame viewed from the inside
C - wall capture brackets
D - frame lip

Outside security hasp assembly

The outside locking assembly requires a user supplied paddle lock. For your safety the paddle lock and bolt assembly are lockable in both the unlocked and locked condition — you can lock the shelter door closed when it is unoccupied or lock the bolt in the open position if you are in your shelter, but not in lockdown. When you go into lockdown in your shelter, you take the removable bolt and the paddle lock with you inside the shelter to make it harder for a malicious person to lock you inside.

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



Outside view

The outside security hasp assembly is a removable bolt and a user supplied paddle lock located inside the tamper proof enclosure. The bolt may be locked in either the locked or open condition, or for secure lockdown it can be completely removed and brought inside the shelter for to mitigate being maliciously locked in from the outside.

Viewer

The optical viewer allows you to see what is happening right outside the door while you are inside.

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

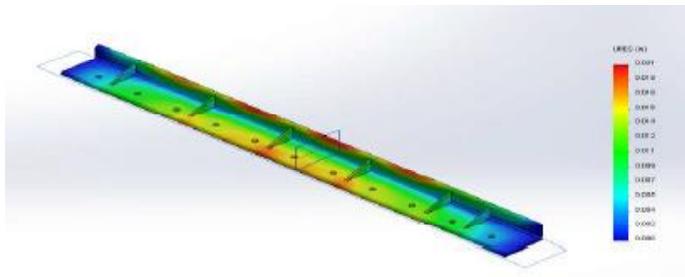
Custom options

Please contact American Safe Room at telephone 541-459-1806 or email sales@AmericanSafeRoom.com for more information about these options.



Engineered steel threshold

For existing structures without a poured threshold, we can fabricate an integral bottom frame member that gives a secure seat against blast loads.



Shear latches on a flat threshold

These bottom latches drop into sockets that are welded under the 3/8" high flat threshold. We also put an adjustable rubber sweep on each door leaf. This requires a protrusion into the floor slab, but it makes it much easier to roll equipment or vehicles through the doorway.



Inset deadbolt cam latch

This is a steel box that is welded onto the inside of the door leaf. There is a pipe welded through the door leaf that gives access to it from the outside. The deadbolt is thrown into a slot in a sliding angle that prevents the cam latches on the active leaf from rotating.



Closing and latching the blast door

Closing and latching the door

The doors are drawn into the closed cell EPDM seal by the rotating cam latches (A and B) engaging the cam bars (C).

The active leaf has an astragal on it and it must be closed last and opened first. An astragal is a piece of steel that covers the gap between the door leaves. Below, the active leaf is the one on the right.

You can specify which leaf you would like to be the active leaf at time of ordering.

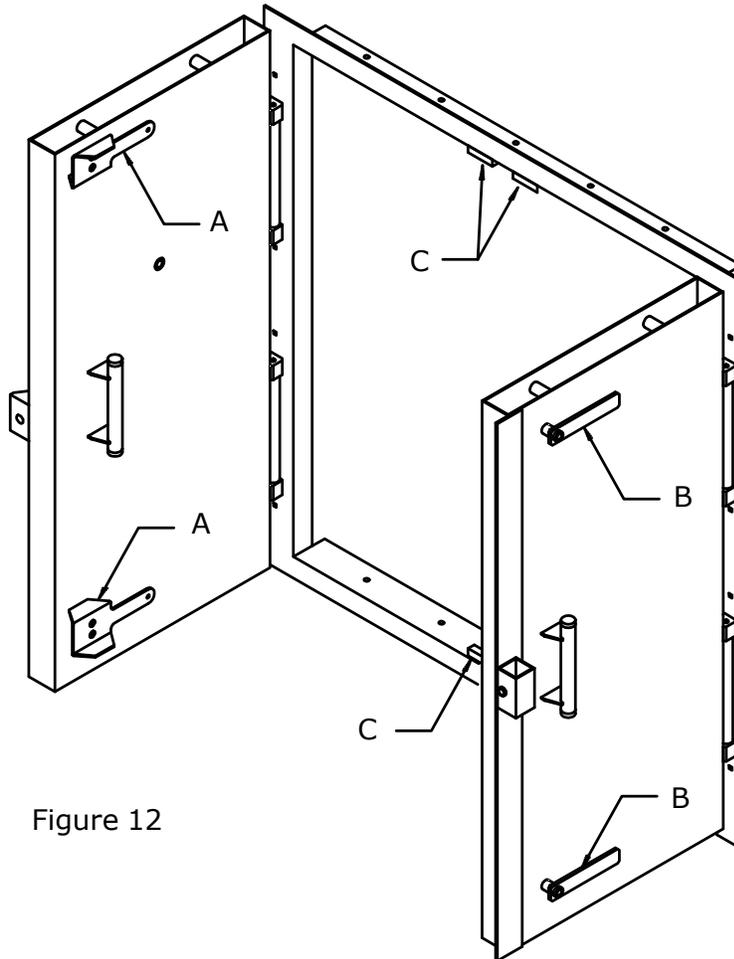


Figure 12

Installation — preparing the rough opening

Insure that opening is suitable to accept and hang door.

- Top of curb or slab must be flat and level (item A, below).
- Sides of opening must be parallel and plumb to the slab (item B, below).
- The outside face of the opening at the edges must be flat and square (item C, below).

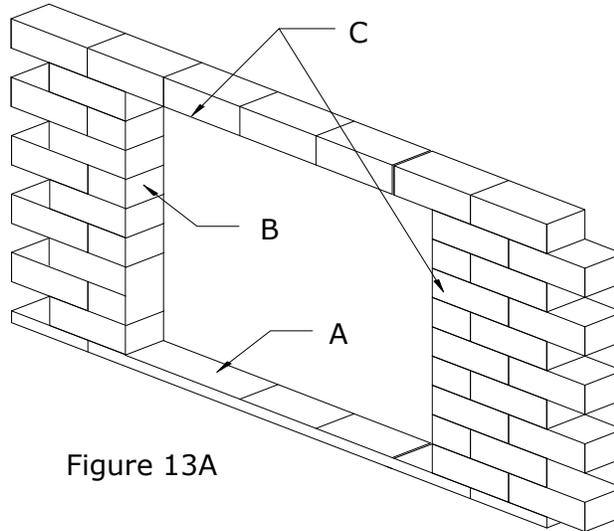


Figure 13A

Installation — placing the first leaf assembly

Note - this installations shows the frame in two pieces in order so we can ship the door by less expensive LTL truck in a van trailer. We can keep the frame a single piece, but we have to ship by flatbed truck. The installation for a one piece frame is almost identical to the two piece frame shown here. Be sure and read this entire section prior to installation.

This pre-hung blast door is constructed with two lifting points inside the door envelope.

Use only lifting equipment approved for overhead lifting and hardware for this task.

Always secure the door leaf shut with the cam latches:

- While handling and lifting
- While filling with concrete
- While the concrete cures

Lift first half 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.

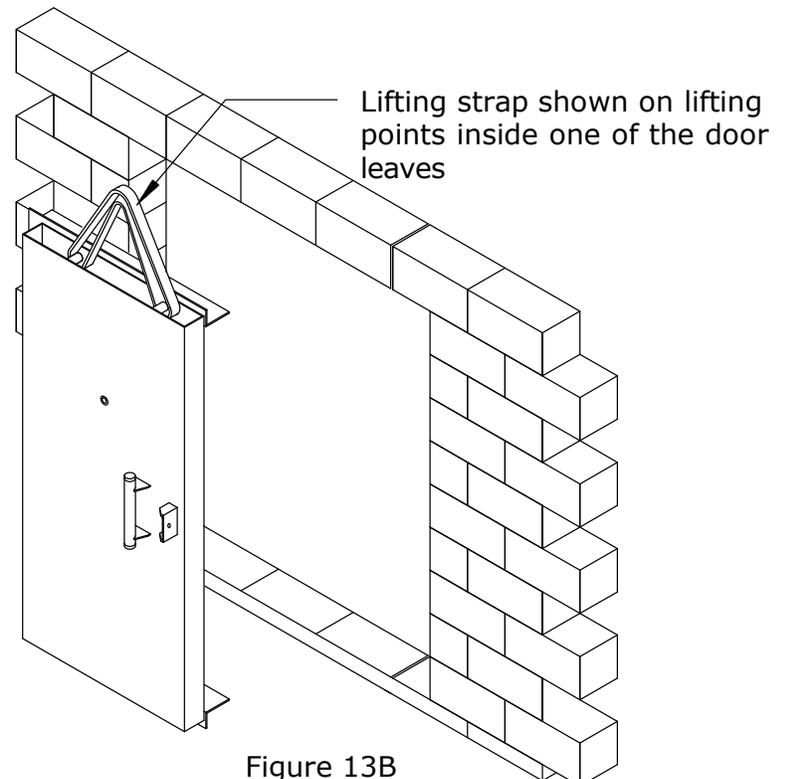


Figure 13B

Installation — adjusting the leaf assembly for proper alignment

1. Insure that the door frame assembly sits flat on the bottom curb or slab and nests squarely to the vertical wall.
2. Using a plumb line or laser level insure that the closing edge of the door is vertically plumb.
3. Inspect the door to frame fit at the upper and lower gasket for a parallel distance separation or gap of 1/4"-3/16"
4. Install the provided anchor studs as per instruction in this manual (item A below)

It is sometimes necessary to grout or shim the door frame assembly so that the above conditions can be satisfactorily met.

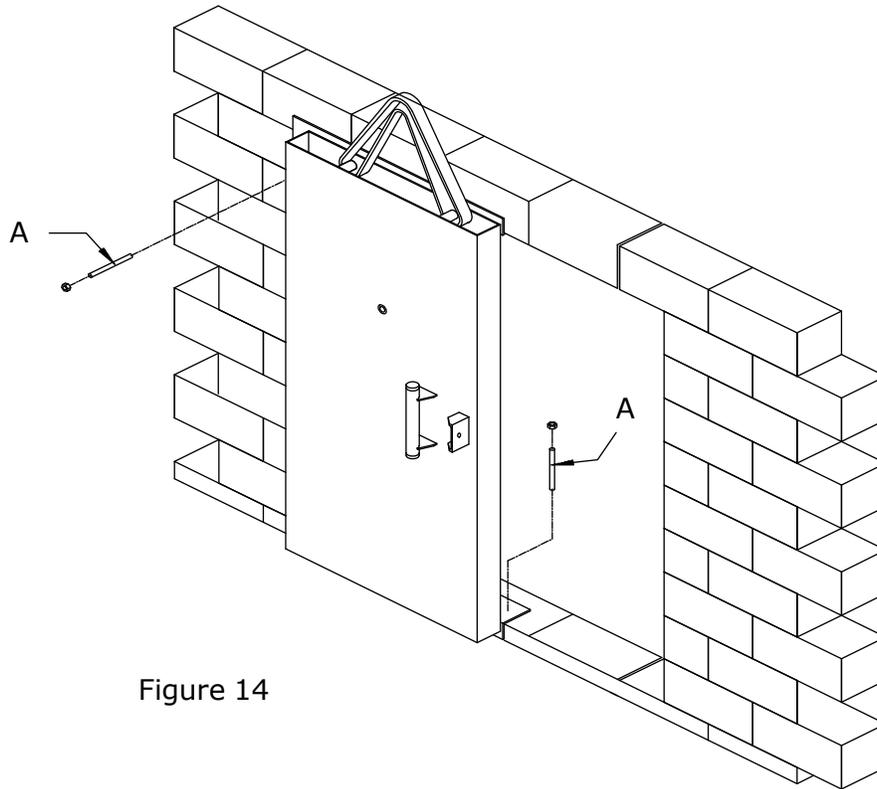


Figure 14

Installation — setting and adjusting the second leaf

- Set the second door half in place following the steps shown on pages 13 and 14.
- Set the gap distance between the doors edges as shown figure 16B using two 3/16" thick metal shim bars as spacers.
- Install the provided anchor studs as per the instructions on page 18.

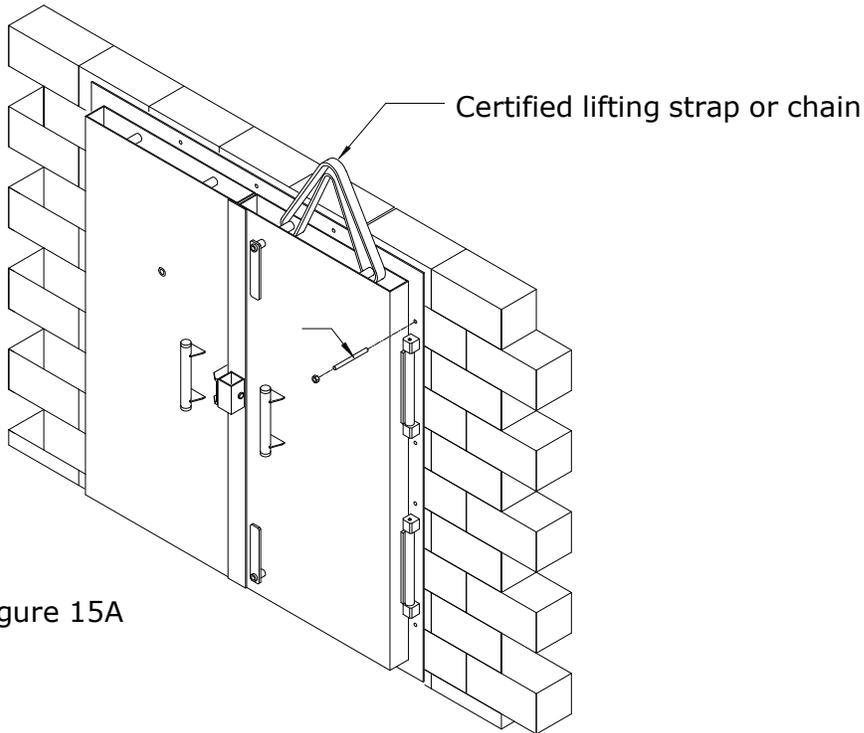


Figure 15A

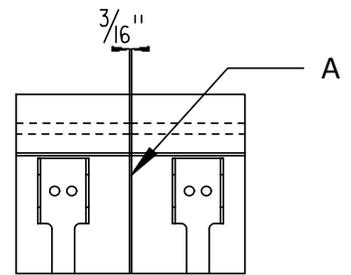


Figure 15B

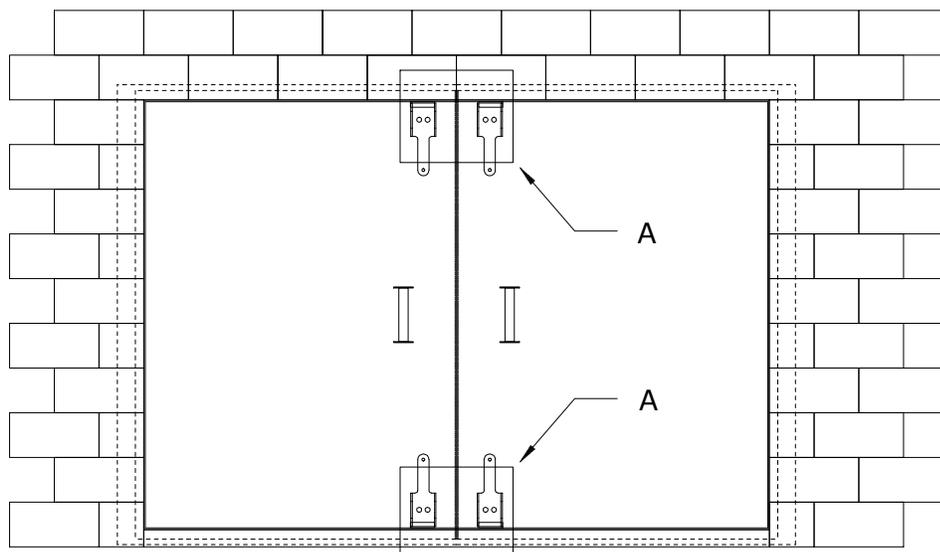


Figure 15C

Wall capture brackets

The angle 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 15.

Make a full length 1/4 inch vertical fillet weld the across the 4-inch wide strap and the door frame.

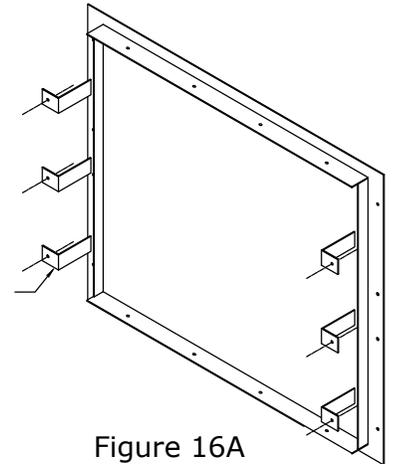


Figure 16A

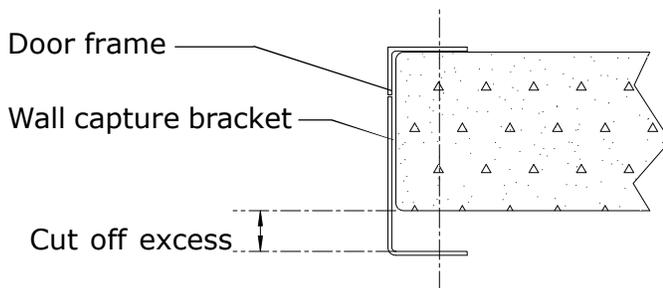


Figure 16B

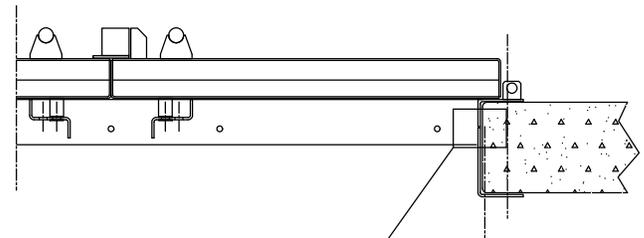
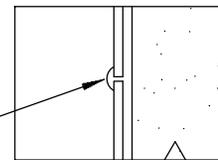


Figure 16C

1/4 inch fillet weld



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 caulking between the inner door frame lip and the sill area.

Filling the door cavities with concrete

The door envelope is ready for pouring the concrete. It must be secured in the closed position before filling and while the concrete is curing — the door must not be opened for at least 4 days while the concrete cures.

If there is no other entrance to the shelter, the door may be secured in the shut position without closing the cam latches — but it must not sag outward after the door leaves are filled with concrete.

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.

Professional engineer certified calculations

Cover letter - page 1 of 4

This door engineer certified for 7,200 pounds per square foot (50 pounds per square inch) in the seated condition and 2,088 pounds per square foot (14.5 pounds per square inch) in the unseated condition (rebound response).

Maurice E Farr
Professional Engineer
23811 105th Street Court East
Buckley, WA 98321-8410

March 30, 2015

To Whom it may concern:

American Safe Room blast doors, double leaf series, ASR-50-DBL-BD with an 80 inch span distance, inside height are certified to withstand a force of 50 PSI in the seated direction and 14.5 PSI in the unseated direction.

Reference drawings:

1. ASR-DD-3: 50 PSI blast load in the seated direction
2. ASR-1.2A: rebound load on cam latch assembly
3. 6033-41: cam latch detail

Drawings were prepared under my direct supervision.

Maurice E Farr, P.E.

Maurice E Farr, PE



Expires 6-15-2016

Professional engineer certified calculations

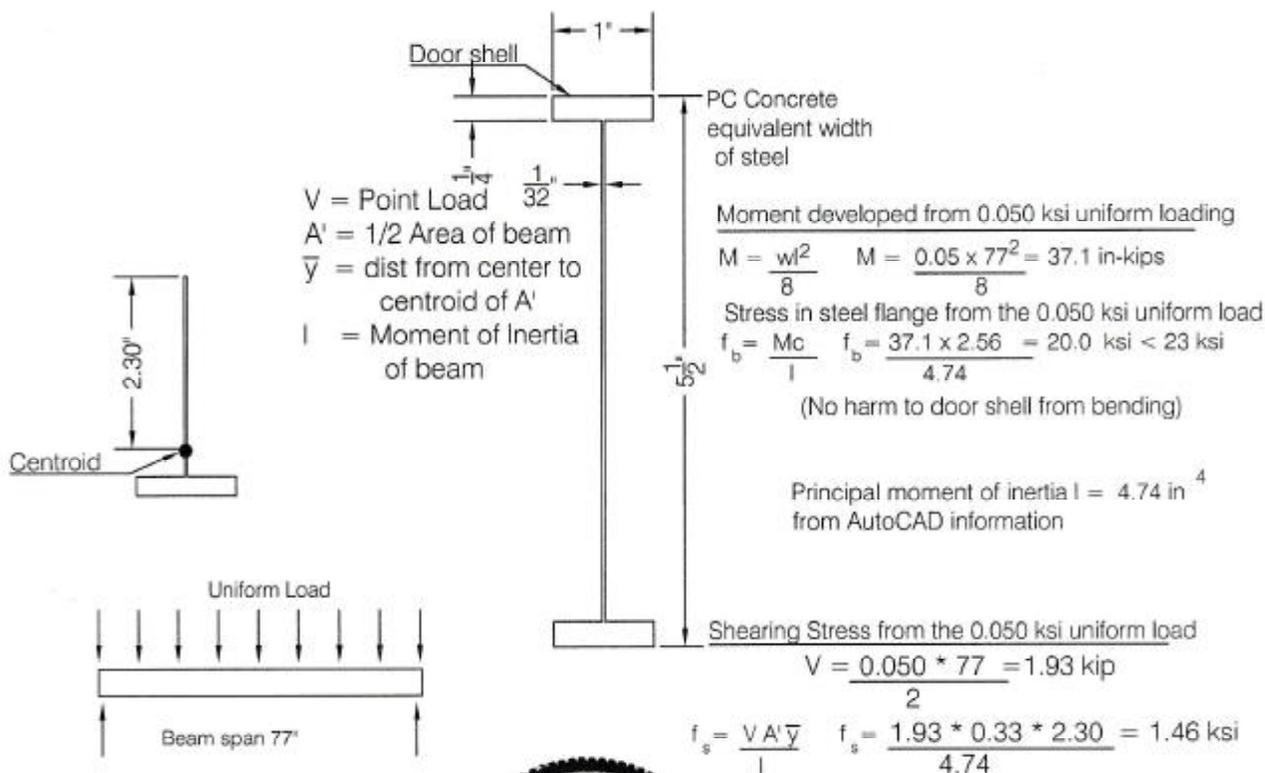
Blast load calculations - page 2 of 4

The composite door leaf is being considered as a steel beam with 1" flanges and a concrete equivalent width of steel (1/32").

80" Span, 5-1/2" Depth, 1/4" Skin
 Double Leaf Door

Supported Uniform Load

5" inside, 1/4" thick door shell, 1" width



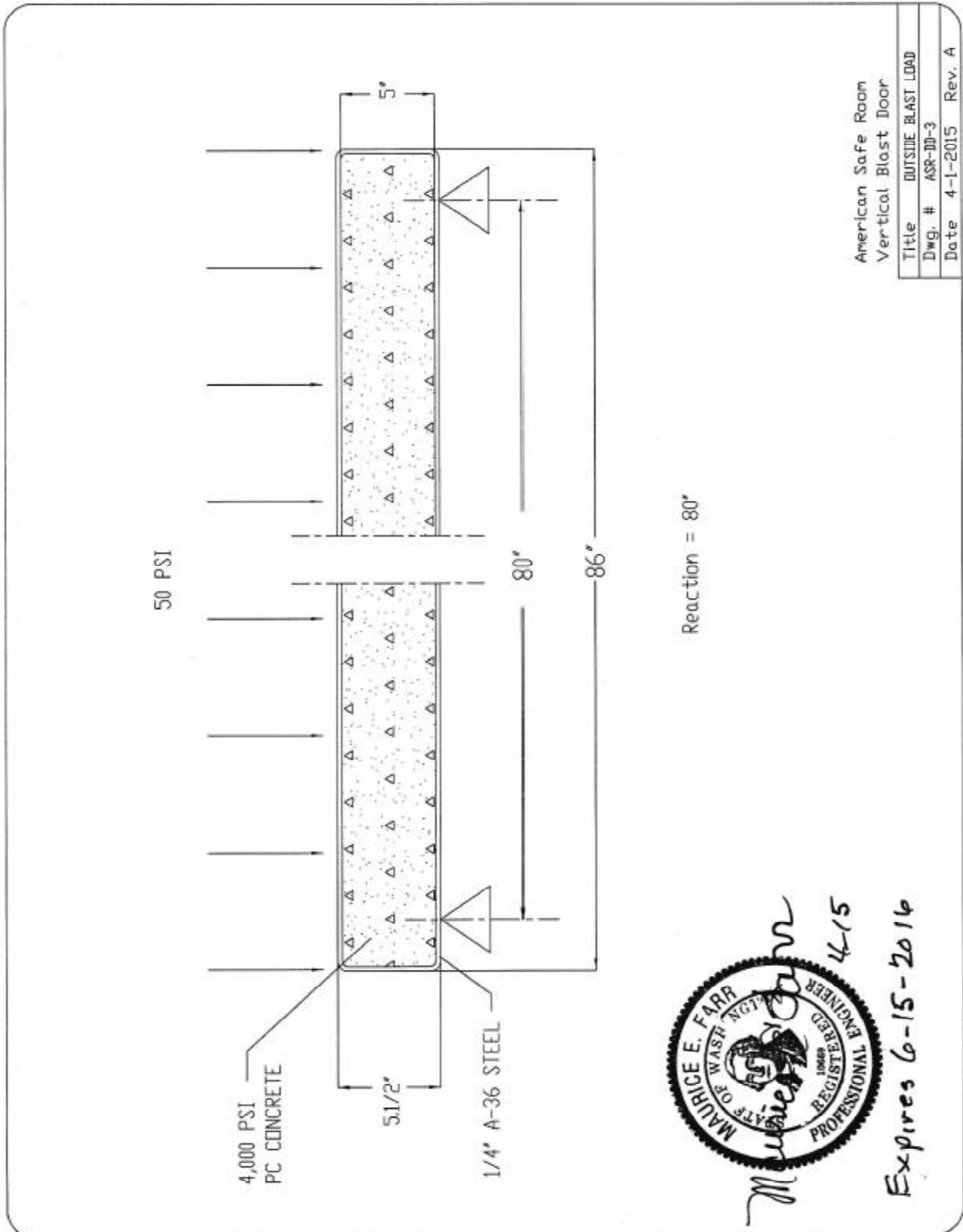
Maurice E Farr, PE

Expires 6-15-2016

Professional engineer certified calculations

Door leaf span - page 3 of 4

This certification is for doors with a span distance of up to a 80 inches - top to bottom.



Professional engineer certified calculations

Cam latch load rating - page 4 of 4

The cam latches are the first mode of failure in the rebound response.
 They are rated for 14,816 pounds each.

