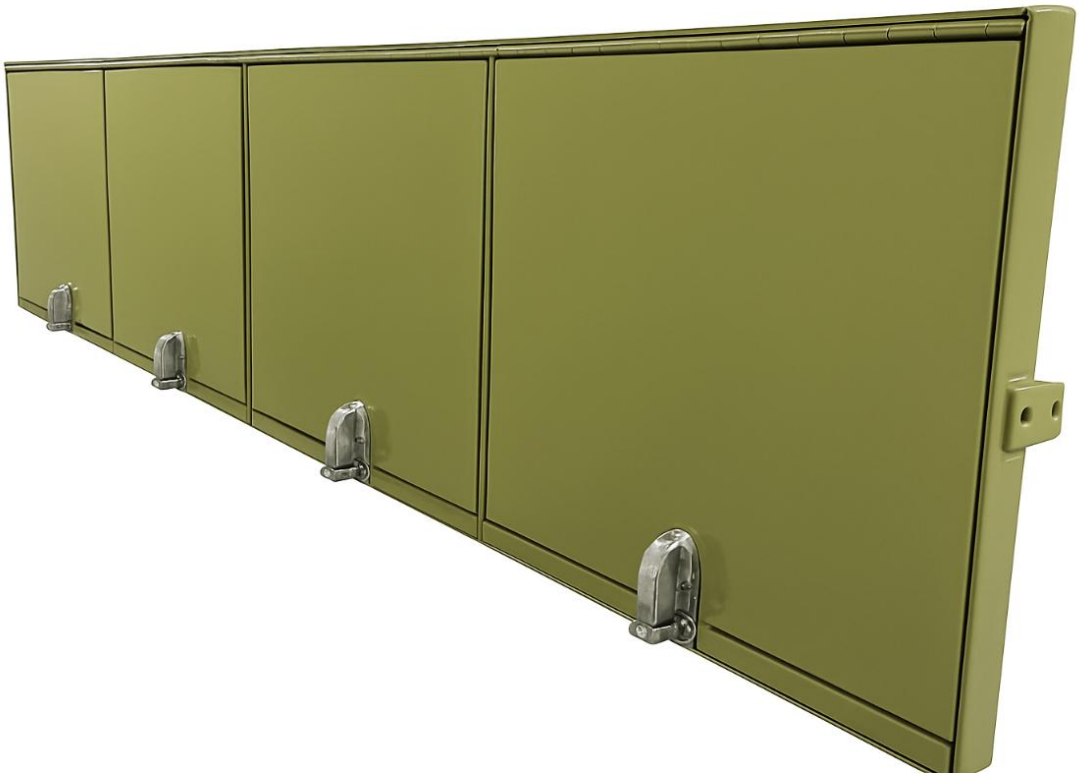
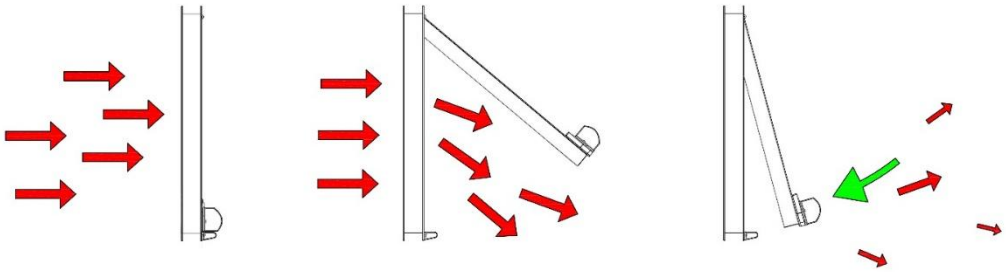
Explosion & Blast Release Vents

Technical Data Sheet





Product Description

Our Blast Release Vents are bespoke products, manufactured to customer dimensions. The vents can be manufactured as single or multiple units and fixed into masonry or steel apertures.

Advantages

The vent can be re-used after an event by shutting the vent panel and setting the latch back in place. The vent incorporates a Brixon Release Latch which offers reliable and consistent performance, in-line with NFPA 68 guidelines.

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Our Blast Release Vents are intended to protect the structural integrity of a building in the event of an explosion or overpressure event. The vent opens at a pre-determined and adjustable pressure to suit the customer's individual requirements and applications.

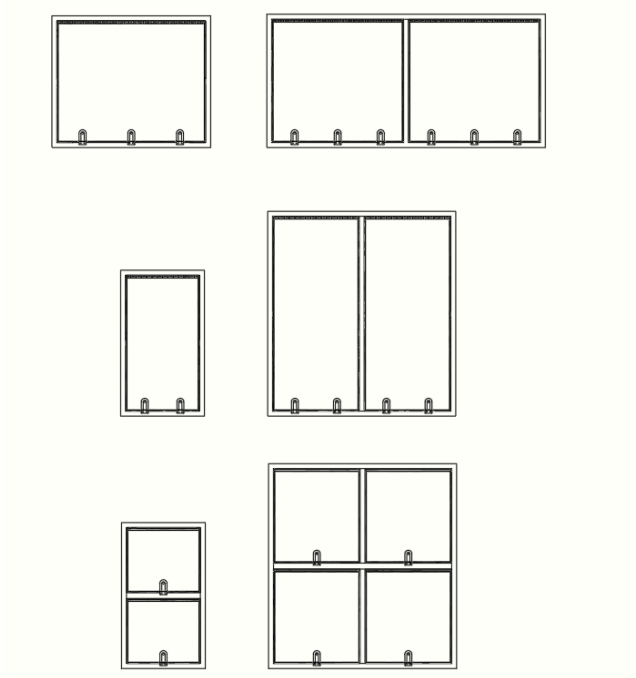
Features

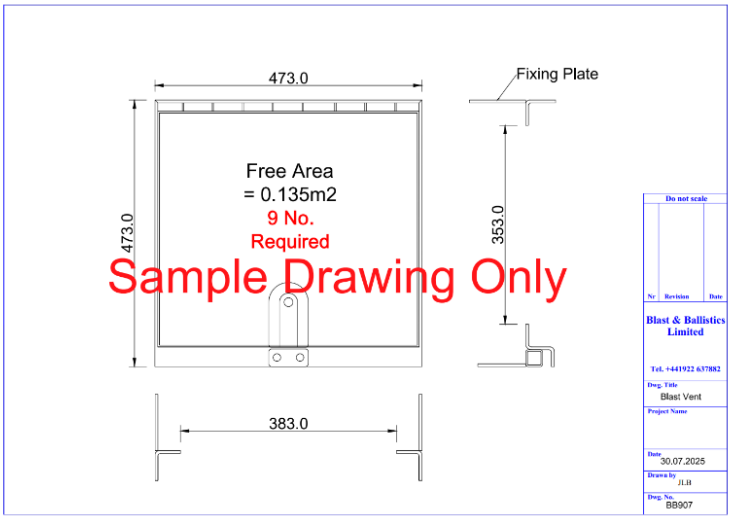
- We use a Brixon Release Latch which is re-usable after an event (unless undergoing an unintended overpressure from catastrophic events) and allows for changes to release pressure for updated threats and applications.
- The vents can be easily installed via fixing tabs attached to the frame. See below for details
- Available in RAL PPC finish and special finishes/colours on request.

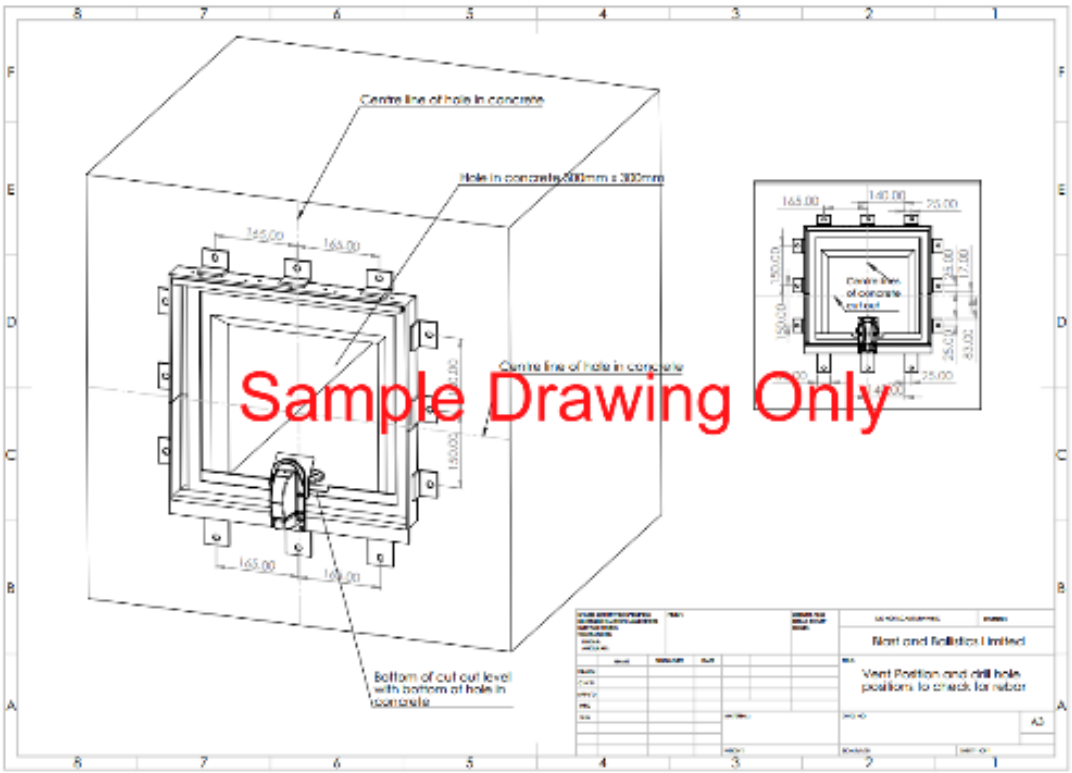
Specification

FRAME PROFILE	
✓	Manufactured from Aluminium, Steel, Stainless Steel
✓	Minimum frame depth/wall thickness 80 - 100mm
✓	Reveal and Face Fix options available
FINISHES	
✓	Factory finish RAL Polyester Powder Coat (PPC) or Mill Finish
✓	Special finishes and colours available on request
AVAILABLE SIZES	
✓	Bespoke sizes available along with multiple units to allow for an indefinite effective size
WEIGHTS	
✓	Frame profiles approximately 3kg/m – 15kg/m
✓	Vent panels approximately 12kg/m2 – dependant upon configuration and sizes
INSULATION	
✓	Available with insulation
✓	Available without insulation
RELEASE VALUES	
✓	Minimum release value of 0.65kPa (0.0065 bar)
✓	Factory set if required and can also be adjusted to customer's required release pressure
✓	The release can be easily adjusted on site to accommodate updated blast requirements
OVERALL THICKNESS	
✓	Generally 45mm overall and upwards depending upon wall details– other sizes by special order

Sample Drawings

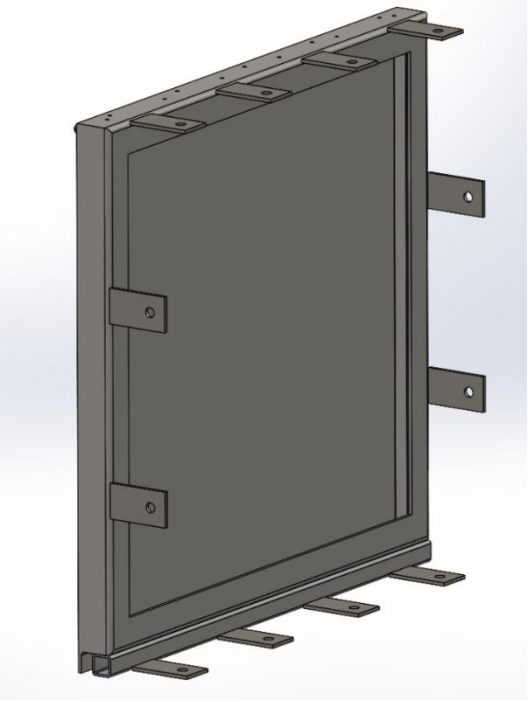


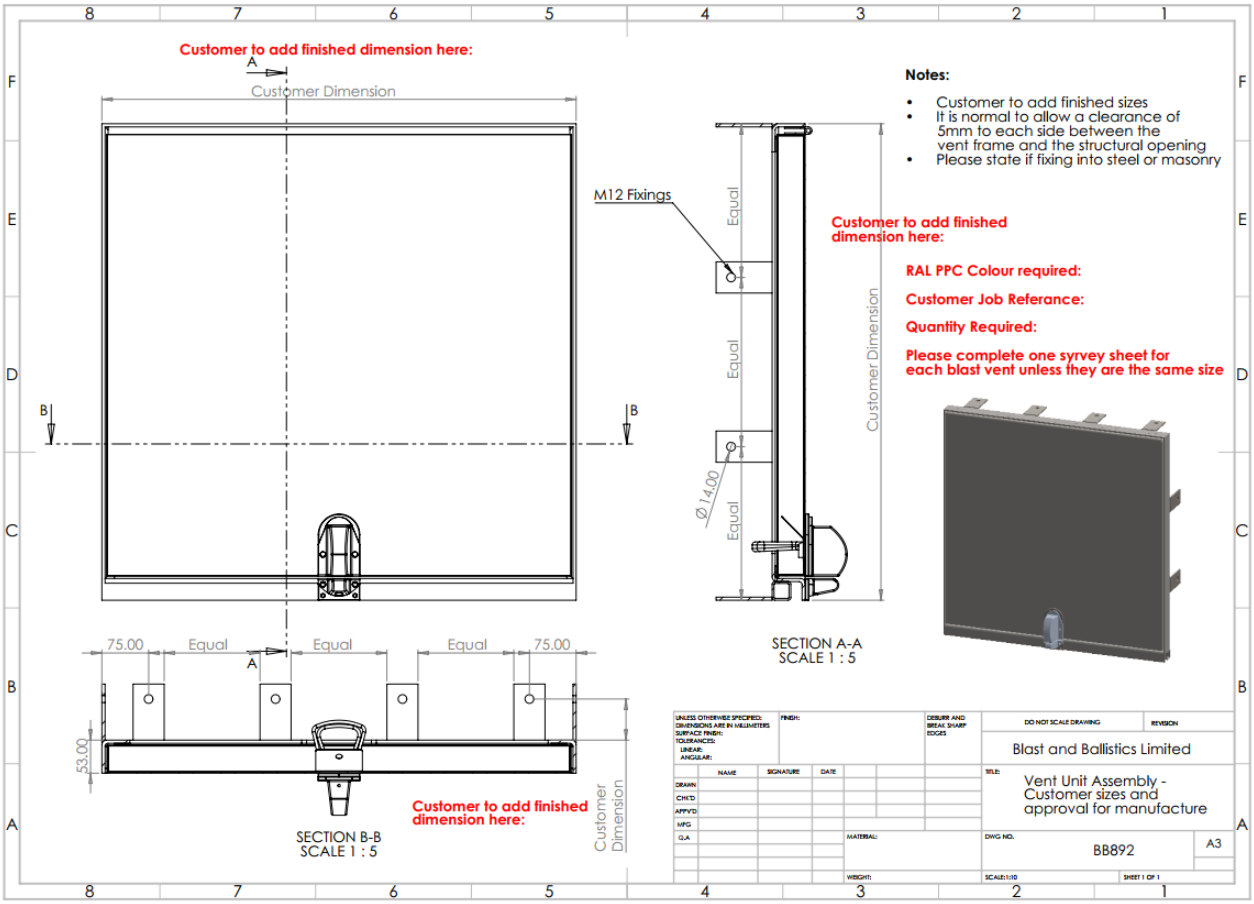




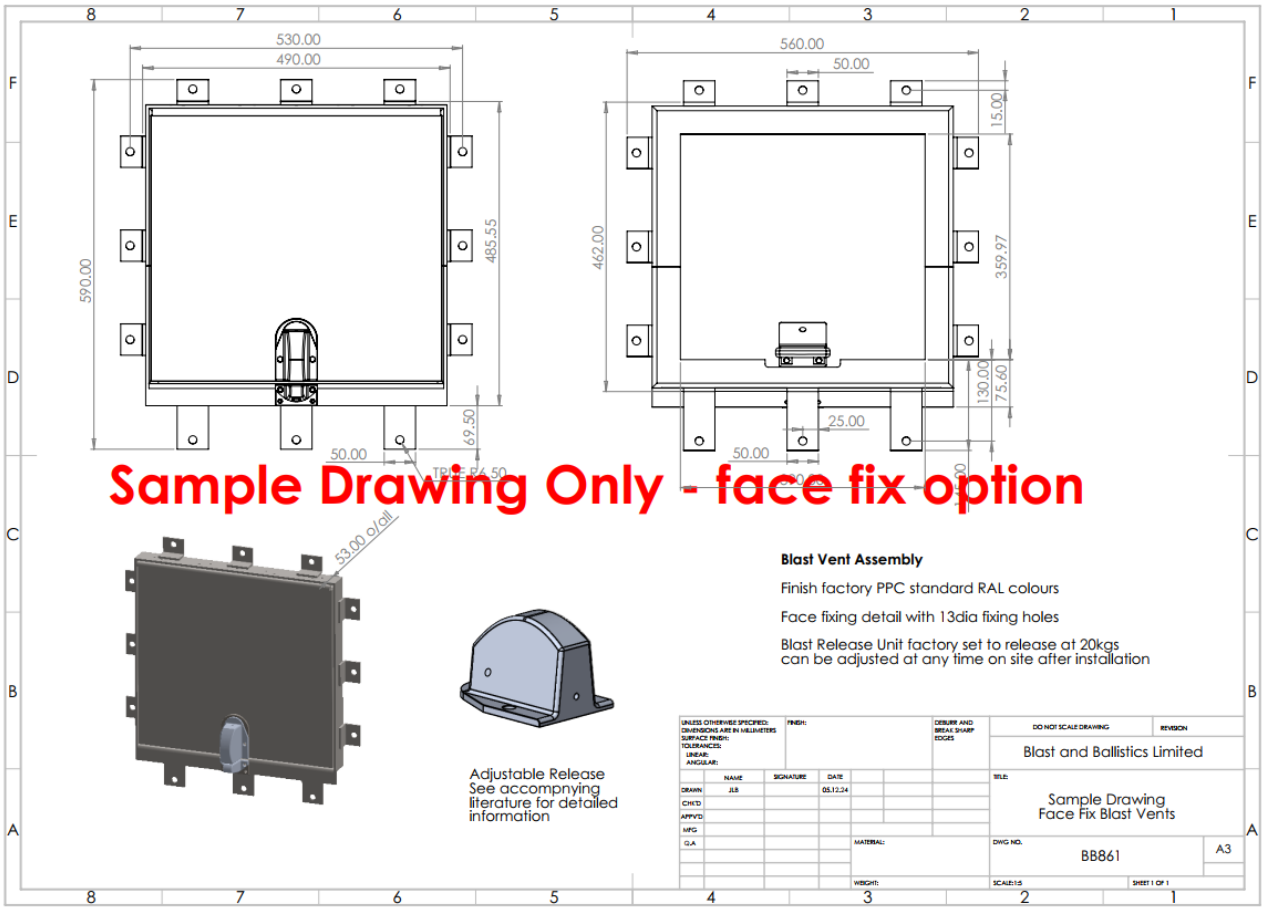
Approval drawings are supplied for customer review before manufacture and at which time modifications can also be incorporated.

Reveal Fix Option





Face Fix Option



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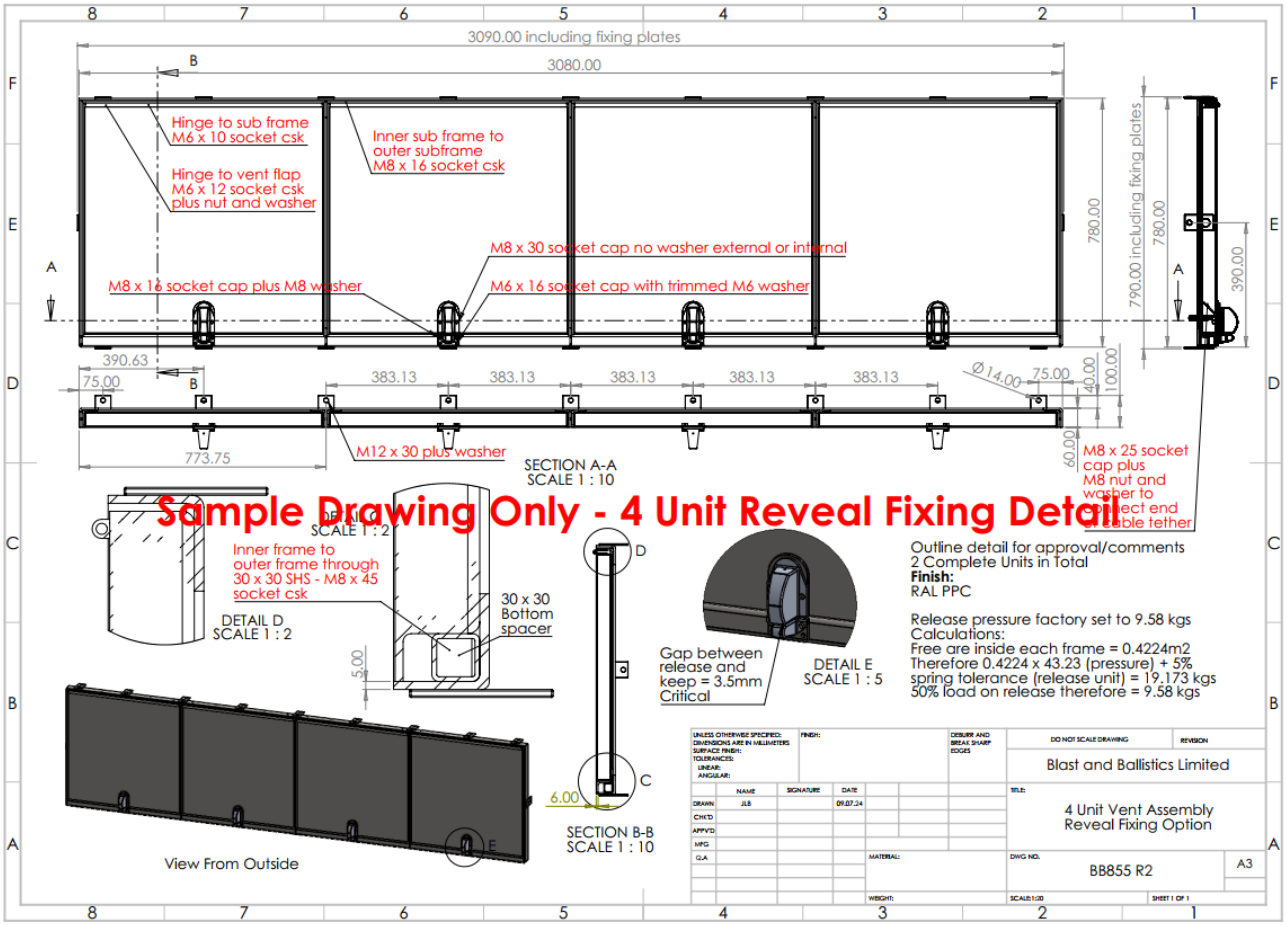
Multiple Unit Options



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Areas of Application

- Chemical Production
- Petroleum Industry
- Paint, Varnish Manufacturers
- Energy/ Mining Industry
- Co-Generation Plants
- Recycling Centres
- Sewage Treatment (by-product recycling)
- Automotive (air bag, mfg. Plant lines)
- Grinding/Pulverizing processes (airborne dusts)
- Ink Manufacturers
- Energy Storage Systems (ESS)
- Industrial Processing Equipment
- Paper Process (solvent use/storage)
- Laboratory Test Facilities
- Hospitals (gas and/or flammable storage areas)
- Brewery Facilities (grain storage/processing)
- Fossil Fuel Plants (coal dusts)
- Food Processing (airborne dust)
- University Labs (chemical lab store rooms)
- Grain Milling Facilities (airborne dusts)
- Nuclear Power Stations
- Printing Companies (solvent use/storage)
- Gas/Vapour Handling Equipment
- Dust Collection Systems

Additional Information

Selecting a Release Pressure

State the minimum required opening/release pressure. This can be factory set. Note – it may be necessary when stating this to consider local climatic conditions to allow for wind and other salient external effects which may exceed the release pressure and cause the vent to open when not required.

Under normal operating conditions the vent can be closed after having been released and will be ready to operate again upon closure. It should be checked for correct operation however to ensure the blast pressure that the unit has vented has not been greater than anticipated and in consequence could have damaged or misaligned the vent unit or an uneven or quasi static pressure wave may have twisted the unit.

Choosing the product and its response time:

Within the hinged vent range there are several options which provide various levels of resistance and performance. Primarily, the vent panel is used to mitigate blast damage by opening and then allowing the build up of blast and gas pressure to escape. They should not be used as an ongoing 'safety valve' for equipment or operations that regularly cause incidences of pressure build up. The root cause of the problem should be addressed first and the vents considered as a fall back if all else fails. Protecting the building is more important than worrying about protecting the panel.

What that means is as long as the blast vent panel opens at the required pressure, then any buckling or bending of the panel, thus preventing future operation, is not really a problem when compared to potential damage to the building fabric. Having said that however, some customers ask for hinged blast vents that can withstand or offer greater resistance to such damage. That is accommodated by a variety of construction methods and materials. The downside of creating greater physical resistance with regard to hinged blast vents however is that they become heavier. That in turn can decrease the initial opening time.

That may not necessarily be a problem however because some detonations/deflagrations happen more slowly than others and as a manufacturer we are not privy to the full scale of what that may be as there are so many influencing factors that go behind the blast wave as it makes its way towards the blast vent. Other considerations are things like room size, shape of room, construction of the room, where the incident within the room occurred, so many considerations. This is why we always say that customers should always take independent advice as to the suitability of our products for their application and why we have written calculations for them to consider and advise of its suitability in their required application.

We here provide some information of typical response times of 3 different blast vent panels, to provide an outline and understanding of how things may vary. To do this we take a simple example of say 1kg of TNT placed at a horizontal range 5m away from a blast vent measuring 1300mm wide x 2400mm high. Vent panels can be manufactured to open at a whole range of blast pressures so do not confuse that with panel resistance or response time. A lightweight panel and a heavier panel can both be similarly configured to open at the same pressure. We also stress

that this is an example to illustrate response times and may not be the same type of incident in any particular circumstance.

The opening times in this sort of scenario (when the panel breaks free and starts to open at a point at say 0.1m away) is generally 8msec for a 1kPa lightweight panel, 15msec for a 1.46 kPa panel and 17msec for a 2.5 Kpa blast vent panel. So dependant upon customers requirements there is wide spread of panel resistance/opening/response times within our range. Again, do not confuse panel construction/resistance with opening force they are different things. For instance they can all be configured to open when a pressure reaches 1 kPa they just offer a variation of opening times and robustness of the panel itself.

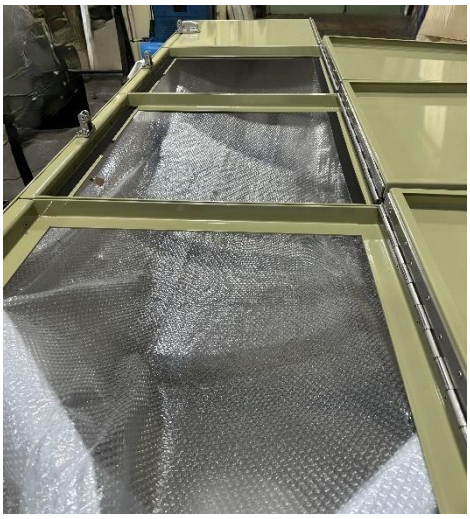
The assessment of these opening times assume that the blast wave strikes the vent panel perpendicular and that the panel is uniformly loaded by the blast wave. In reality this is unlikely to be the case as in most cases the blast wave would hit the bottom of the vent panel first and so the actually opening times also have the potential to be longer but this generally demonstrates the point that we make.

Alternatively, if a panel was 1.2m high having the same mass per square metre, then the opening times in theory would be the same as those referenced above based on uniform loading of the panel. In reality, this is unlikely to be the case as in most instances the blast wave may hit the bottom of the panel first, and although the actual opening time would be slightly longer it would also be slightly quicker than the “real” 2.4m high vent panels. Because of the sometimes unpredictable nature of internal explosions, we always suggest to take advice from an independent consultant who can confirm the suitability of these products in your application. We also suggest over engineering the mitigation measures by installing as much vent area as possible, not just with larger vent panels but with more units of smaller sizes to provide a wider area of response should the blast wave be unpredictable or non uniform.

Fitting Instructions

Preparing the unit for installation – single and multi-unit systems

The vent panels and outer frame are usually delivered as a single item. Unless specifically requested otherwise, the outer frame will already be prepared on site for fixings. Ensure that the fixings that are going to be used are aligned with suitable fixing points in the wall aperture. Do not fix into thin sheet metal or cladding materials.

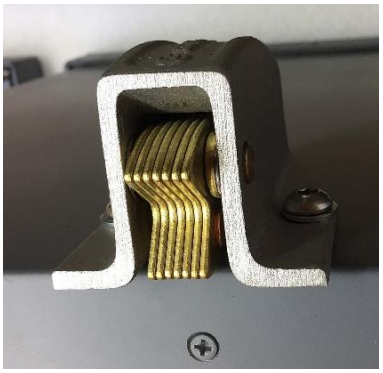


When the unit is fixed into the wall aperture the vent panels should open and close freely. Ensure that the unit is not fitted in twist and is well packed around each fixing point to avoid stretching or compressing the clearances around the hinged panels. These will have been factory checked before dispatch. The fixing tabs around the outer main frame are factory prepared for fixings. They project inwards (or sideways for surface fixing) enabling the whole assembly to be installed without the need to dismantle components. The face fix option is to be installed on the surface of the wall construction.

The assembly can be broken down into smaller components, but this is not recommended if it can be avoided. Realigning components on site is much more difficult than in a factory environment. In addition, the inner frame assemblies are sometimes bedded on sealant, and this would have to be broken and reinstated making the entire process arduous.

Pressure Release Mechanism


Pressure Release Assembly


Pressure Release Main Body


Pressure Release Strike

The Pressure Release Mechanism is a two-part assembly consisting of the Pressure Release Main Body and the Pressure Release Strike. These are factory fitted but can be easily removed for service and can also be adjusted to vary the point at which the vents will open. Adjustment instructions for this unit are shown later in this document. Regularly check and grease the release unit when in use.

If the Release Vents have been supplied prime painted only, then it may be preferred to remove these units before top coat on site. Instructions for removal are detailed below. However, if the units are not intended to be removed then the moving components/contact points (brass coloured elements) can be greased in situ with a proprietary grease. This is important to ensure correct operation of the Release Unit. If the Vent Units are supplied pre-finished in top coat paint or PPC then the Release Units will be factory lubricated before dispatch when requested. Applying lubricants to prime finish products may result in grease contaminating primer coats and subsequently compromising the final top coat. Mill finish or PPC factory finish is not affected.

Removing the FM Factory Mutual Global Release Unit

If the two smaller bolts are removed from the Pressure Release Strike, then the whole of the strike assembly can be removed

Following that, release the two securing screws and remove the Main Release Body. **Note – the latch itself is similar to a rocker switch, ensure that it is in the open or closed position when re fitting into the strike**

Refitting is a reversal of removal

Note – No.2 Model

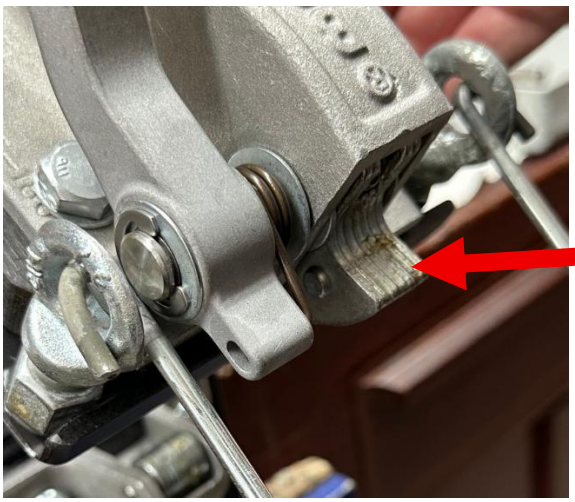
If the latch is in the position as shown on the left when the vent is open, then reset as shown on the right before closing the panel.

Note: Always check that the latch is in the open position when closing the vent panel. If not, manually move the latch into the correct position. See images left.

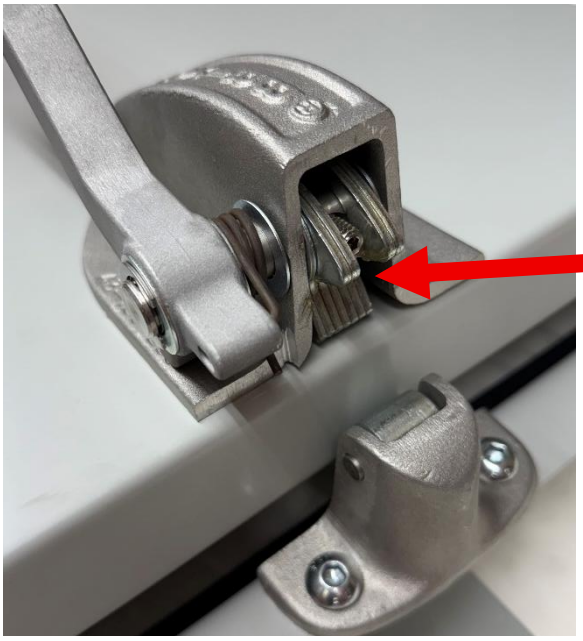
Blast Release Vents No.3 & No.4 Models

The No.3 and No.4 blast release mechanisms have a handle to assist in repositioning the latch. When the handle is pulled forwards, the latch will move into the position shown below and after releasing the handle, the vent panel and the latch are ready to be firmly closed.

Lifting the handle to 90 degrees ensures that the latch is in the reset position.

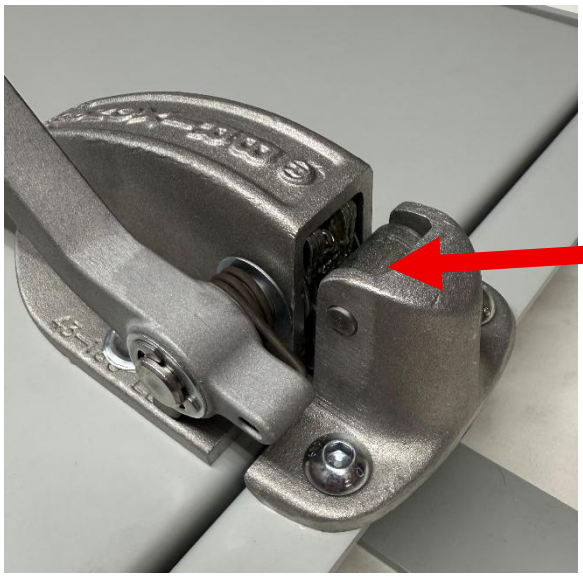


If the latch on the release is ever in this position, it means that it will not close. In this instance, use the handle, pull forwards, and this will reset the latch as shown below.



After pulling the handle, the latch will assume this position and the blast release vent panel is ready to be closed. Firmly close the panel and the release will engage as shown below.

ENSURE THAT THE STRIKE IS IN THIS POSITION BEFORE ATTEMPTING TO CLOSE THE VENT PANEL.



The latch is now fully engaged and the vent panel is closed.

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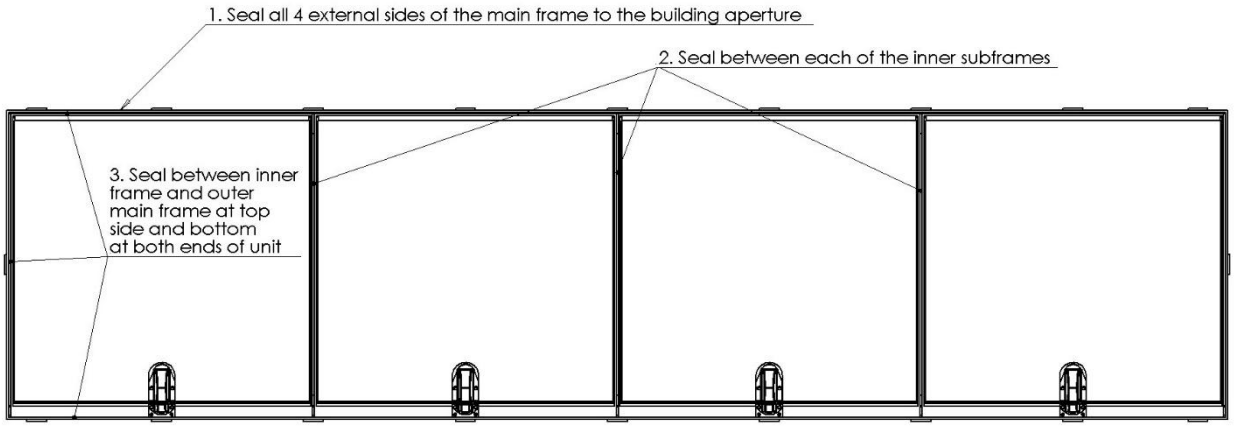
Hinges

Hinges are factory fitted and are fabricated in stainless steel. They require little maintenance other than lubrication with general purpose oil after installation. Lubricating the hinge on a regular basis can also be carried out at the same time as regularly re-applying fresh grease to the Release Mechanism. Regular checking and maintenance is very important. Check all fixing and retaining bolts especially after an event.

Cable Restraint

The cable restraint is fitted last, after the whole assembly has been installed into the building aperture. This is a steel wire cable wrapped in a plastic sheath to minimise scuffs and scratches to the local paint finish.

Fit one end to one of the outer assembly fixing bolts (suitable for M12 fixings) and the opposite end to the angled plate which is bolted through underneath the inner pull handle. This will accept an M8 nut and bolt with washer.
Loop the cable generally as shown and test the panel to ensure that the cable does not snag on anything when opened.
The cable restraint is intended to minimise the travel of the opening vent flap in the event of a catastrophic failure should the panel break away from the frame and also act as a further restraint should the panel begin to fail due to excessive overpressure. It is not a guaranteed solution to the potential of catastrophic failure due to excessive overpressure or resultant quasi static forces often



Use a propriatory external sealant after installation. The inner sub frames have been bedded onto the main frame during factory assembly. The external gaps as shown above have not been sealed in case the inner frames might need to be removed on site but it is not recommended and should be avoided if possible. Removing and re fitting the inner frames would not compromise the unit but it is difficult to do this on site

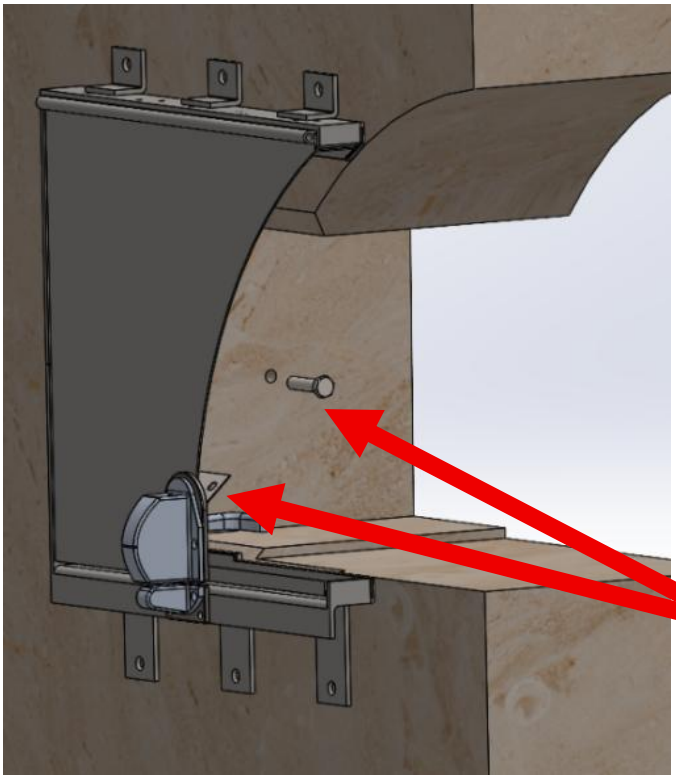
resulting from internal blast and gas pressures.

Reveal Fix

For a reveal fix blast vent, the cable restraint needs to be attached as indicated below.

1. One end of the cable is to be attached to the supporting plate on the inner face of the vent panel with the nut and bolt provided.
2. The other end is to be attached to one of the fixing tabs as shown below.

Face Fix



For a face fix blast vent, the cable restraint needs to be attached at one end as shown in bullet point 1 and the associated image.
The other end of the cable must then be attached to the inside of the reveal as illustrated left.

Attach the restraint cable here, held in place with nuts and bolts.

Seal all gaps after installation

Note:

Larger vent panels will have tether points prepared towards the top of the panel. Connect one end of the tether cable to these points and as previous, the other end of the tether cable to one of the main fixings into the wall. Neatly coil the tether when the vent flap is closed and hold with the Velcro tape.

Alternative factory fitted tether point

General Notes

Under normal operating conditions the blast vent may open and close many times and each time the unit should be checked for damage or distortion which can always occur should the internal blast loading be more onerous than anticipated or the unit undergo a non-uniform blast load. Check that the vent itself has not become loose around its fixings into the wall, that all screws and fixing bolts are tight and that the vent itself closes and seats into the outer frame. Also look at the Release Unit clearances and adjustments as detailed separately. Although not a direct component of the Pressure Release Vent it is always worth checking that all mastics and sealants are intact and show no sign of degradation either following an incident or as just part of the maintenance regime. All of these points should be included within the company maintenance programme. Finally, after installation and as ongoing maintenance, clean the unit with a non-abrasive proprietary cleaning agent to protect the surface coating of the units. Continue to check the surface finishes regularly and reinstate immediately to prevent rust forming or debris collecting and trapping water.

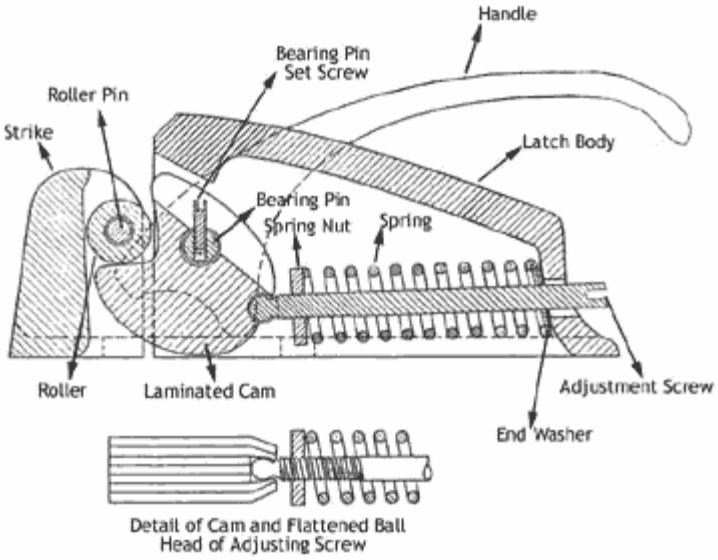
Note: Local risk assessments should always be undertaken when installing blast vents to protect both members of Staff and also the General Public. A Blast Vent can open suddenly and without prior warning when releasing internal blast pressures. It is also possible that parts of the unit under higher than anticipated blast pressures can break free. Insufficient venting area of the building can also increase localised pressure on release vents. Any of these types of instances can cause injury and it is important to provide sufficient space where blast vents are installed to accommodate and mitigate this potential for injury. Consideration should be given to incorporating warning signs and suitably cordoned areas as just one means of providing personnel protection. Use signage to warn persons that there is the potential of an explosion in the immediate vicinity. In addition to the vent unit suddenly opening and releasing gas pressure there is always the risk of catastrophic failure of the vent components and other building items such as windows, doors, roof and walls. Any of these items can produce fragmentation and become a potential hazard. It is always advisable to carry out an independent risk and product risk assessment in these areas. This is very important.

Typical Signage

Adjustment & Latch Selection Help – Latch Release Force

Brixon latches are designed to operate under a wide variety of conditions with a variety of options available to suite particular purposes. The user must insure that the latches are appropriate for the particular application. Any questions regarding model selections should be referred to the factory.

It is recommended that the latch release force be adjusted prior to mounting when the internal components are visible. The pressure setting should allow the latch to open at an internal pressure slightly higher than that encountered under normal operation circumstances. Caution: Factory Mutual Global requires that latches open at a maximum internal pressure of 50 lbs/ft2 (244.1 kg/m2), while NFPA (National Fire Protection Association) recommends 30 lbs/ft2 (146.5 kg/m2): in general, the lowest practical setting should be used.



Note: Precise pressure adjustment is not possible due to the location of the strike, the amount of gasket compression, friction, etc. The listed values are a guide only, and if the release pressure is critical, the pressure must be measured directly at the door after installation for more accuracy. The estimated variance is plus or minus 2 full turns.

Note: Precise pressure adjustment is not possible due to the location of the strike, the amount of gasket compression, friction, etc. The listed values are a guide only, and if the release pressure is

critical, the pressure must be measured directly at the door after installation for more accuracy. The estimated variance is plus or minus 2 full turns.

To adjust, have the latch in the door closed position (see illustration above), wherein one rivet which holds the laminated cam together is exposed.

Turn the adjusting screw counter-clockwise to its loosest position, making sure that the square nut does not come off the ball pin and the nut has full thread engagement. Using the Latch Release Force Adjustment Chart (below) as a guide, tighten the adjusting screw clockwise a half turn at a time until the desired pressure setting is reached. It should be possible to feel the adjusting screw slipping into the relaxed position at each half turn. For example, if you wanted 107 lbs. pressure setting on a #4 latch, you would tighten the adjusting screw 10 half turns (10 x 4.935) + (58 lbs. min.) = 107 lbs.

If the latch is mounted, adjustment can be made by turning the adjustment screw to its tightest position and backing off to the desired setting. Latches can be factory adjusted upon request for additional cost. For example, if you wanted 107 lbs pressure setting on a #4 latch, you tighten the adjustment screw clockwise to its maximum position. Then you would loosen the adjustment screw counter-clockwise 36 half turns {285 lbs max. - (36 x 4.935)} = 107 lbs

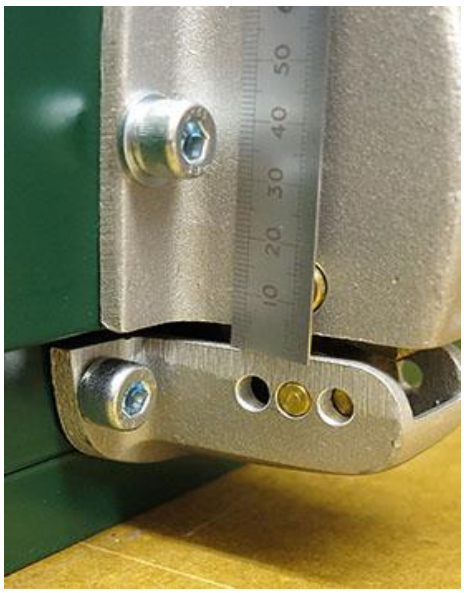
Latch Release Force Adjustment Charts

LATCH RELEASE FORCE ADJUSTMENT CHARTS - IMPERIAL					
	Release Pressure (lbs)				
Latch Model	Minimum	Maximum	Pressure (lbs) Per Turn	Pressure (lbs) Per ½ Turn	Full Turns Available
*1	3.9	17	1.50	.75	8.75
91	3.9	17	1.5	0.750	8.75
2	10	45	2.50	1.250	14
3	43	180	5.96	2.980	23
83	43	180	5.96	2.980	23
93	43	180	5.96	2.980	23
4	58	285	9.87	4.935	23
84	58	285	9.87	4.935	23
94	58	285	9.87	4.935	23

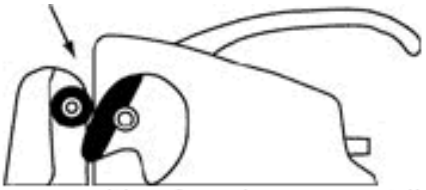
LATCH RELEASE FORCE ADJUSTMENT CHARTS - METRIC					
	Release Pressure (kgs)				
Latch Model	Minimum	Maximum	Pressure (kgs) Per Turn	Pressure (kgs) Per ½ Turn	Full Turns Available
*1	1.8	7.7	0.67	0.0335	8.75
91	1.8	7.7	0.67	0.0335	8.75
2	4.5	20.4	1.14	.570	14
3	19.5	81.6	2.70	1.350	23
83	19.5	81.6	2.70	1.350	23
93	19.5	81.6	2.70	1.350	23
4	26.3	129.3	4.48	2.240	23
84	26.3	129.3	4.48	2.240	23
94	26.3	129.3	4.48	2.240	23

The latch and strike assembly must be securely mounted so that the cam is centred on the strike roller and the assembly is perpendicular to the door-frame line. The distance between the latch and strike housing should be 1/16” to 3/32” for #91 models and #1 models (#1 model no longer for sale).

The distance between the latch and strike is 1/8” to 5/32” for the #2 model. #3, #83, #93, #4, #84 and #94 latches and strikes should be spaced 1/8” to 3/16” apart.



Adjust the Release Unit Assembly as per accompanying instructions but for the No. 2 Release Unit this is usually 3.5mm for optimum performance



(#3) Cam in wrong position from improper strike mounting

This is most likely to happen when the door is slammed (excessively) and/or the latch mechanism is dirty or corroded. In this event, the door may be more difficult to open, either by hand or in the event of an explosion. It is also a warning that maintenance is required and that a hazardous situation exists.

Because of the rather large tolerances involved in casting, each latch/strike combination must be individually aligned, and alignment must be rechecked whenever latches are replaced to avoid possible malfunctions as listed below.

In mounting the 3H, 83H, 93H, 4H, 84H, 94H or 4HD latches, it may be found that the handle stops interfere with the mounting nuts, when studs are used. If you intend to use studs, consult the manufacturer for information on modifications that may be necessary.

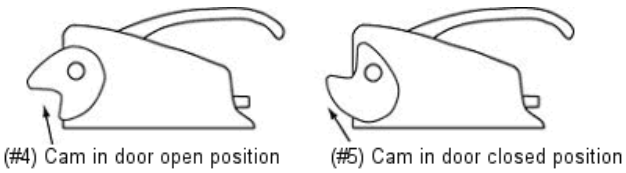
Operation

The Brixon latch operates in a manner similar to a toggle switch. When the door and latch are in the closed position, the latch will hold the door closed unless enough pressure is applied to compress the spring sufficiently to cause tripping of the cam into the open position. When the cam is in the open position, the door is free to open.

Closing is essentially the reverse of the above, with the force to reset the cam being supplied by the closing door.

The forces required for operation depend upon the settings of the latch (see ADJUSTMENT) - The higher the setting and the larger the latch, the greater the required force.

The recommended procedure for closing a door equipped with the 3H, 83H, 93H, 4H, 84H or 94H latches is to fold the handle back immediately prior to closing or, better, to first open and then close the handles. When folding the handles back, the cam should remain in the “open” position (illustration #4). If for any reason the cam is in the “closed” position (illustration #5) while the door is open, the latch and/or its mounting is defective, and the door would rebound open instead of latching.



In the event of an explosion, the latch will begin to open when the internal pressure equals the setting of the latch. However, due to inertia in the latch-door system, there will be a slight delay between application of pressure and the opening of the door (See NFPA No. 68). This might allow a considerable pressure build-up, depending upon the oven size, type, and amount of material

exploding, and the time lag involved. In the event of an explosion of maximum violence, the effectiveness of the latches is reduced. However, most explosions are not of maximum violence (FM Global Approval Guide, 1998 8-1).

Summary & Cautions For Operators

1. Violent slamming is potentially hazardous and must be avoided.
2. For reasons listed above, the door may not latch when closing; beware of rebound.
3. Keep clear of the arc of the door.
4. Keep clear of the operating parts of the latch and handle, particularly the laminated cam, strike roller, both ends & handle stop of the heavy duty handles, and the stops for standard 3H, 4H, 83H, 84H, 93H, & 94H handles.

Factory Setting of The Release Latch:

It is always more convenient for the customer to have the release latches factory set at the onset.

When factory set, the Release Unit is tested with a force gauge, but the Release Unit can also be set and adjusted on site without this type of equipment – see elsewhere in this document.

See Terms and Conditions, available upon request.