

## Energy Absorbing Post Selection

Once the decision has been made to move forward with a top fix post solution over a rigid post, the next step will be to select the proper post and post attachment for the roofing utilized in the application. A number of different posts with a number of different attachment methods employed.

An overview is provided below to familiarize engineers and architects with some solutions that are available, but it is prudent to request the feedback from a specialist company such as Flexible Lifeline Systems for this selection as the potential loadings on the roof structure through a fall on this type of system must be resolved through engineering.

## Standing Seam

One of the easiest roof panels to retrofit with a fall restraint or fall arrest solution is that of a roof clad in standing seam panels. These panels with their exposed joints allow for the fitment of a specialty clamp to affix the Energy Absorbing posts. These clamps, made by either S5 or the manufacturer, are truly a non-penetrating solution. They require only basic hand tools to install. The key is to select the right post for the right standing seam profile and width of panel.

## What if a post is not available to fit the particular profile of my panel?

With dozens, if not hundreds of roof panels utilized worldwide, there may be a case when the dimensions of your post are outside that of the current offering from the manufacturer. What are the options? For a project that utilizes a number of posts, it may be possible to have a special run performed of the special size to suit your needs. More often than not, it is a more cost effective and time saving solution to use a secondary base plate. This would be a hot dipped galvanized plate that is sheared to the proper dimensions to fit the roof profile and the post of a smaller dimension is then bolted to that. For short runs, this is fast, inexpensive and effective.

## R Panel (metal deck)

In the states, the term for a metal deck panel is "R" panel. In the southern US, these are often utilized for single ply industrial roof skins and if insulation is required, it is often roll type that is affixed to the inside surface (under) the roof. For northern (cold) states, these "R" panels may be of a laminated construction with a pair of metal panels with foam sandwiched between them.

The Energy Absorbing post utilized in this application is affixed with a series of 16 each "Tec" screws or self tappers. The process starts with peeling back some sealing tape on the underside of the post and positioning it on the ridges of the R panel. This tape seals



between the post and the roof. You then install the 16 screws provided with sealing washers to the specified torque.

How does this work? How does this hold with only self tapping screws? The toppling post bring the moment of the force close to the roof deck. In the event of a fall, a rigid post compresses on the leading edge and applies tension on the trailing edge. The self tappers would not be strong enough to hold a static post. When utilizing the Energy Absorbing post, the fasteners are put into shear rather than tension and compression as the post topples and elongates as energy is absorbed. The screws and the panel are strong enough to maintain integrity and provide the required two-to-one safety factor.

### **Built up on site (buos)**

This concept can be taken much further with a built up on site roof. This often starts with bar joist, then a metal deck layer (pan deck) and perhaps topping this with lightweight concrete. On top of this can be a layer of insulation and then an elastomeric layer. It could be that this roof has also utilized tar and a final layer of gravel to protect the tar from UV breakdown. Anchoring an Energy Absorbing post to this type of roof is not difficult, FLS has commissioned a special toggle bolt just for this application. These toggles allow a true top side installation in an application that once meant a full roof penetration and attachment of the post to underlying structure.

The procedure is outlined in detail in the instructions for these posts and there is also a quick movie of this in the video section, but the procedure is basically as follows:

First you clean back any gravel and mark the position of the post on the roof. Then, utilizing a small hole saw on a drill motor, you drill through the buos roofing until you pierce the metal deck. You then use a slightly larger drill bit to cut out a small pocket in the insulation. The post is outfitted with four stainless toggles, which are passed through the roof from above. When tightened from the top, the toggle flips and catches the back side of the metal deck.

After tightening, a plastic cap is then placed over the head of the hex head of the toggle bolt to protect any elastomeric roofing material. The roofers then use regular protocols to seal the room elastomeric to the post and then return any gravel around the post.

### **What is blocking?**

In the event that there is a significant thickness of foam insulation utilized on a buos roof, the foam can compress under an Energy Absorbing post, potentially allowing the post base to shift, which can lead to tension and compression of the toggle fasteners holding the base to the metal deck. A solution to this is replacing the foam under the post with treated wooden blocking suitably sized to allow the post to firmly rest on this base. This eliminates the compression of the foam as the base is now solid and the forces are once again in the direction of shear.



## Membrane

Depending on the type of elastomeric, the method of sealing to the post varies. In the case of an EPDM type material, the post can actually be ordered with a coating of the same material. When it is time to seal up the post, a strip of the material can be fused to the membrane roof and the post with a heat gun and roller. This provides a very finished look on the roof.

## Concrete

In the event that the roof is made up of structural concrete (not lightweight concrete), the standard four fastener type post as was used earlier with the toggles may be utilized, with a change in fastener. Suitable anchor bolts must be selected to handle the load requirements of the system. Four holes are drilled in the concrete deck to the required depth as outlined by the anchor bolt manufacturer and the anchors are fitted.

In the case of epoxy type or drop in wedge type anchors, each must be tested as outlined by the manufacturer. These tests are performed by using a tester produced by Hydrajaws or equivalent.

## Freestanding

There are cases when roof penetrations or attachment directly to the roof surface are not possible. A freestanding Energy Absorbing post might be a good solution. This is essentially an energy absorbing post, that is mounted to a base of stacked weights. The bottom set of plates is coated with rubber to increase the level of friction between the weights and the roofing material.

While not a good candidate for areas of frequent snow and ice, this is a good solution in warmer climates or colder climates, where roof access is only performed when snow and ice are not on the ground.



