

Height Safety Solutions

Kingspan now offers its own range of Personal Fall Protection Systems (PFPSs).

These are the only Personal Fall Protection Systems Approved for use on Kingspan panels.

Kingspan's range of PFPSs includes:

Saferidge – a rigid rail system which is integrated into the ridge cap – the most discreet PFPS on the market

Safetraxx – a rigid rail which can be located anywhere – again very discrete and effective for wider and steeper roofs

Safepro2 – a steel cable system which allows layout flexibility – the energy absorbing posts reduce arrest loads applied to the roof panel

Compliance with Standards

There are many PFPSs available, but there are concerns that many of these are not capable of arresting the fall of a worker attached to them.

The current standard for PFPSs is EN795 and while some PFPSs claim compliance with this standard, in fact only parts of the systems are compliant.

If a PFPS is fixed directly to primary structure, then it is relatively simple for it to comply with EN795 as the substrate is so strong.

But where the PFPS is fixed to a roof panel, it is essential that the system can absorb energy and so reduce loads applied back to the roof panel.

The ability of a PFPS to perform on a specific roof panel can only be proven by testing on the specific roof panel concerned.

Kingspan's PFPSs have been tested on a wide range of Kingspan panels and proven to work.

When testing a PFPS on a roof, it is important that the roof sample is representative of how a roof would be constructed in reality.

Often PFPSs have been tested while fixed to small sample roofs which are unrealistically fixed to solid structures. It is not simple or cheap to correctly test PFPSs.

It is also critical that PFPSs are tested with representative spans between anchor posts. Forces generated in longer spans are higher.

Designer's Guide for Fall Protection Systems

The ACR's Magenta Book sets out good practice on testing roof anchors for cable PFPSs. Kingspan's PFPSs comply with the requirements of the Magenta Book.

Work Restraint Systems

Some suppliers of PFPSs claim that the system they are offering does not need to comply with EN795, as it is intended for use only as a "Work Restraint" system.

Whilst it is preferable to provide a "Work Restraint" solution, it is not possible to do so with a cable system where access to the edge of a fall hazard, such as a gutter, is required.

This is because the cable will deflect when under restraint loads and allow a worker to reach past the fall edge.

All PFPSs should be designed to arrest falls and all of Kingspan's PFPSs are proven to do this.

Additionally, Saferidge and Safetraxx are rigid rail systems, so they do not deflect under restraint load and so can provide effective "Work Restraint" protection.

Fall Arrest Forces

Although a worker may weigh only 1kN (100kg or 15st 10lbs), the force required to arrest their fall will depend on how suddenly they are brought to a stop.

If arrest is very quick, the arrest force could be huge. This could injure the worker, or cause their PPE to break.

To prevent the danger of a sudden arrest, workers should always use a lanyard that includes an energy absorber" (a.k.a. shock absorber).

Even if it is planned to work in restraint, the lanyard energy absorber will not deploy or cause any other problem under restraint loading.

The lanyard energy absorber will limit the arrest force to a maximum of 6kN. This is the maximum force the worker will experience.

This 6kN force will be applied to the PFPS. In a cable-based PFPS, the level of cable tension generated will depend on how far the cable

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deflects during the arrest. This is because the angle between the cable and the lanyard determines how these forces are “resolved”.

If the cable deflection is large, then cable tension will be low. If the cable deflection is small, then cable tension could be very high. So allowing the cable to deflect is key to managing forces.

For longer spans between anchor posts, cable deflection will cause smaller angles and so cable tension will be higher. So spans between anchor posts should be limited.

Where PFPSs are fixed only to roof panels, which are not as strong as the primary structure, forces applied to anchors posts must be kept within the capacity of the roof panel.

Kingspan Safepro2 limits the forces generated by including energy absorbers within the anchor posts. These posts deploy and continue to extend until the worker’s fall is fully arrested.

The deployment force of the energy absorber in a Safepro2 post is less than 5.3kN. This is the maximum force which is applied to the roof panel and minimises damage to the roof panel.

This low force also requires fewer penetrative fixings to fully transfer the force from the anchor post to the roof panel.

No other PFPS can limit the force applied to the roof panel to such a low maximum and so there is an increased risk of panel damage or failure of fixings with other PFPSs.

Safepro2 anchor posts also deploy in such a way that the force is applied close to roof plane, meaning that the fixings are loaded in shear, the mode in which they perform most effectively in thin sheet metal.

Other PFPSs have anchor posts which do not deploy in this way and the load causes the post to rotate, putting a prying action on the fixings, the mode in which they are least effective.

Designer’s Guide for Fall Protection Systems

System Layouts

Where possible PFPS layouts should be designed to minimise the risk of the worker falling, i.e. they should be restrained wherever possible.

For simple low pitch (<10°) roofs a PFPS fixed around the perimeter of the roof is most effective and suitable for workers with low competency in working at height.

The perimeter PFPS should be fixed around 2.5m back from the edge of the roof and any worker going within 5m of the roof edge should connect to the PFPS using a 2m long lanyard.

If the worker is more than 5m from the edge of the simple low pitch roof, there is no need for them to be attached to a PFPS as there is a very low risk of a fall from height.

Where there are other fall hazards such as fragile roof lights or vents, the PFPS should be laid-out to provide protection to these locations.

An alternative approach is to have a centrally located PFPS, which the worker should connect to with a rope & grab.

The rope & grab allows the worker to adjust the length of their connection to the PFPS.

It is essential that the rope & grab is always adjusted to the correct length. Hence, systems designed to use ropes & grabs are only suitable for workers who have higher competency in work at height.

In addition to a central PFPS, Single Point Anchors (SPAs) should be included in each corner to reduce the potential for a swing fall.

For higher pitch roofs (>20°) rigid rails are more suitable than cables as they are stiff and will not deploy when loaded by workers pulling on their rope & grab as they move up or down the slope.

Further Information

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