



Freestanding Guardrail System

Operation & Maintenance Manual



Specification

Free Standing Edge Protection - System Specification



General Description

Our freestanding edge protection system is a cantilevered guardrail system that does not require any mechanical fixing into the roof surface. This system has been designed and manufactured to fully comply with current H.S.E regulations.

Material

The main and intermediate uprights are fabricated from 2mm hot dipped galvanised steel equivalent to BS EN ISO 1461, with the upper and lower cross rails manufactured from 1.5mm x 48.3mm external diameter galvanised steel.

The rubber counterweight is manufactured from 100% recycled PVC compound with the fixing screws manufactured from zinc-coated steel.

Safety Standards

Our freestanding guardrail is designed in accordance with and/or tested to the following safety standards:

- HSG-33 Health and safety in roof work.
- HSE INDG 284 "Working on roofs".
- EN ISO 14122 Part 3.
- EN 13374-2013 Class A.
- BS 6399: Part 2 1995 Wind Code.

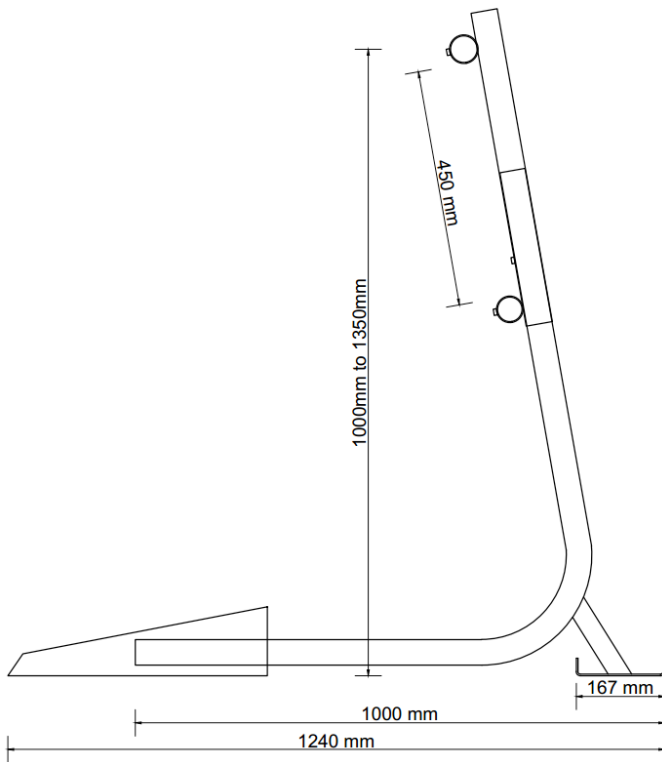
Test Procedure

Our freestanding guardrail has been tested to EN ISO 13374-2013 Class A by Satra Technology Ltd

- All testing was carried out on a bituminous mineral roof felt and single ply membranes in both wet and dry conditions.
- All testing was carried out on a standard 5m run of guardrail.
- A 0.3kN load was applied to the top and middle rail at the end of a 5m run without moving more than 55mm at the base
- A 1.2kN load was applied to the top and middle rail between the uprights, the tube deflection did not exceed 300mm.
- The testing was carried out on four independent samples.

Components

Free Standing Edge Protection - System Components



MSUP - Main Support Upright

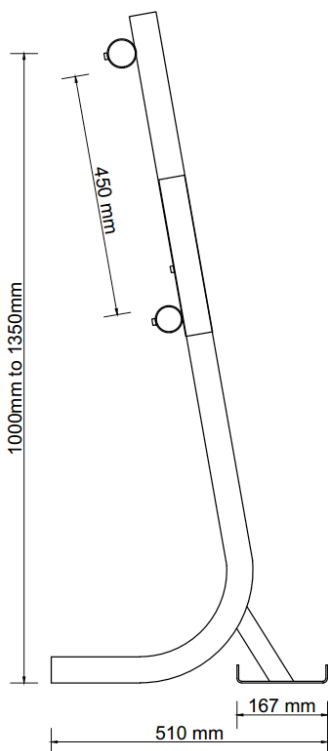
The main upright sits on the roof and has a 20kg counterbalance weight attached, and the adjustable top riser unit.

The foot of the upright which rests on the roof is protected by a rubber isolation pad. By loosening the fixing screws in the body of the top riser, the unit can be moved up and down the main upright to adjust the height of the top and middle rails or to raise and lower the main upright.

Materials

The main upright is manufactured from 2mm x 48.30mm steel tube, which has a hot dipped galvanised coating. It is also available powder coated to any RAL colour.

Please note: The main upright shown here has a counterweight attached to help give the full dimensions when installed. The counterweight is sold separately.



ISUP - Intermediate Support Upright

The intermediate upright is a shortened version of the main upright and is designed to be installed un-weighted as an intermediate support. Just as with the long upright, this component consists of two separate components but is delivered pre-assembled ready to install.

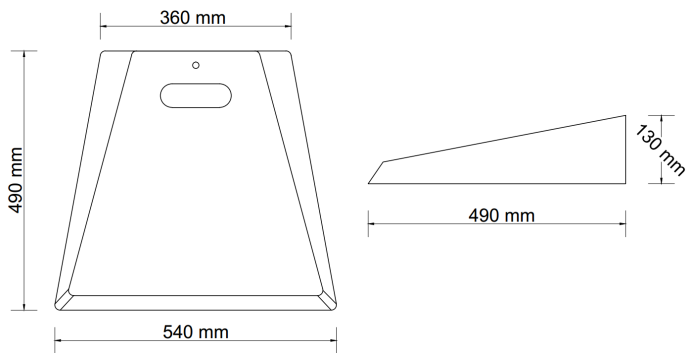
The intermediate upright also features the protective rubber pad to isolate the foot from the roof membrane.

Materials

The intermediate upright is manufactured from 2mm x 48.30mm steel tube, which has a hot dipped galvanised coating. It is also available powder coated to any RAL colour.

Components

Free Standing Edge Protection - System Components



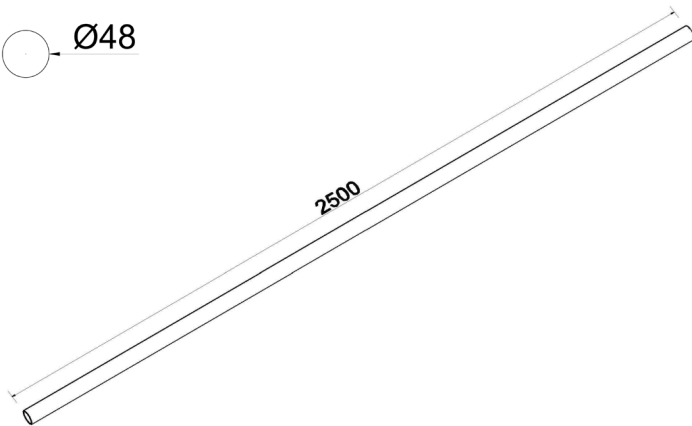
CW20 - 20kg Counterweight

The weight is designed to be attached to each of the main uprights, and is fixed in place with a small zinc coated grub screw which provides the necessary counterbalance weight to prevent the system from being moved.

Materials

The 20kg weight is manufactured from 100% recycled PVC compound.

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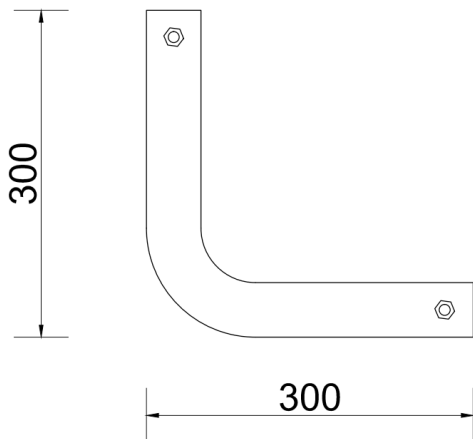
CR2.5 - 2.5m Cross Rail

The main cross rail is supplied pre-cut to 2.50m in length for ease of installation. This fixed length means there is no need to measure or cut the tubes to ensure the uprights are spaced evenly.

Materials

The lightweight main rail is manufactured from 1.5mm light gauge steel making it easy to cut and transport. It is galvanised coated to BS EN ISO 1461 and is also available powder coated to any RAL colour.

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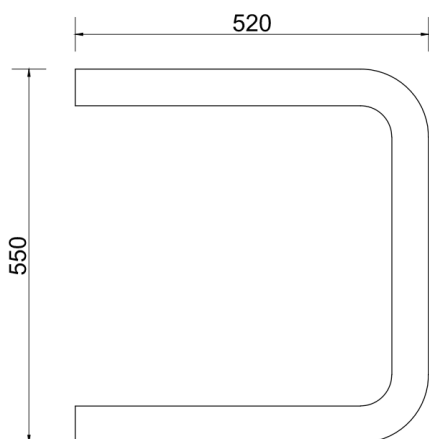
SC90 - 90° Swept Bend

The SC90 is an ergonomically designed 90° swept bend. This flexible pre-formed component can be used for both horizontal and vertical bends. The fitting incorporates zinc coated grub screws for easy installation.

Materials

The swept bend is manufactured from 2mm x 48.30mm steel tube, which has a hot dipped galvanised coating. It is also available powder coated to any RAL colour.

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DE180 - D-End Termination

The pre-formed 180° bend inserts into the top riser and is a quick and convenient way of terminating a run of guardrail. This flexible pre-formed component can be used for both horizontal and vertical terminations.

Materials

The 'D' end's are manufactured from 2mm steel and is galvanised coated equivalent to BS EN ISO 1461. These are also available powder coated to any RAL colour.

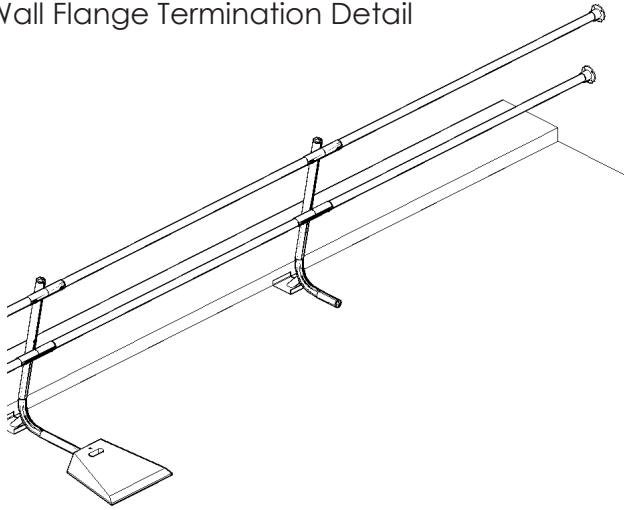
Configuration

Freestanding Edge Protection - System Configuration

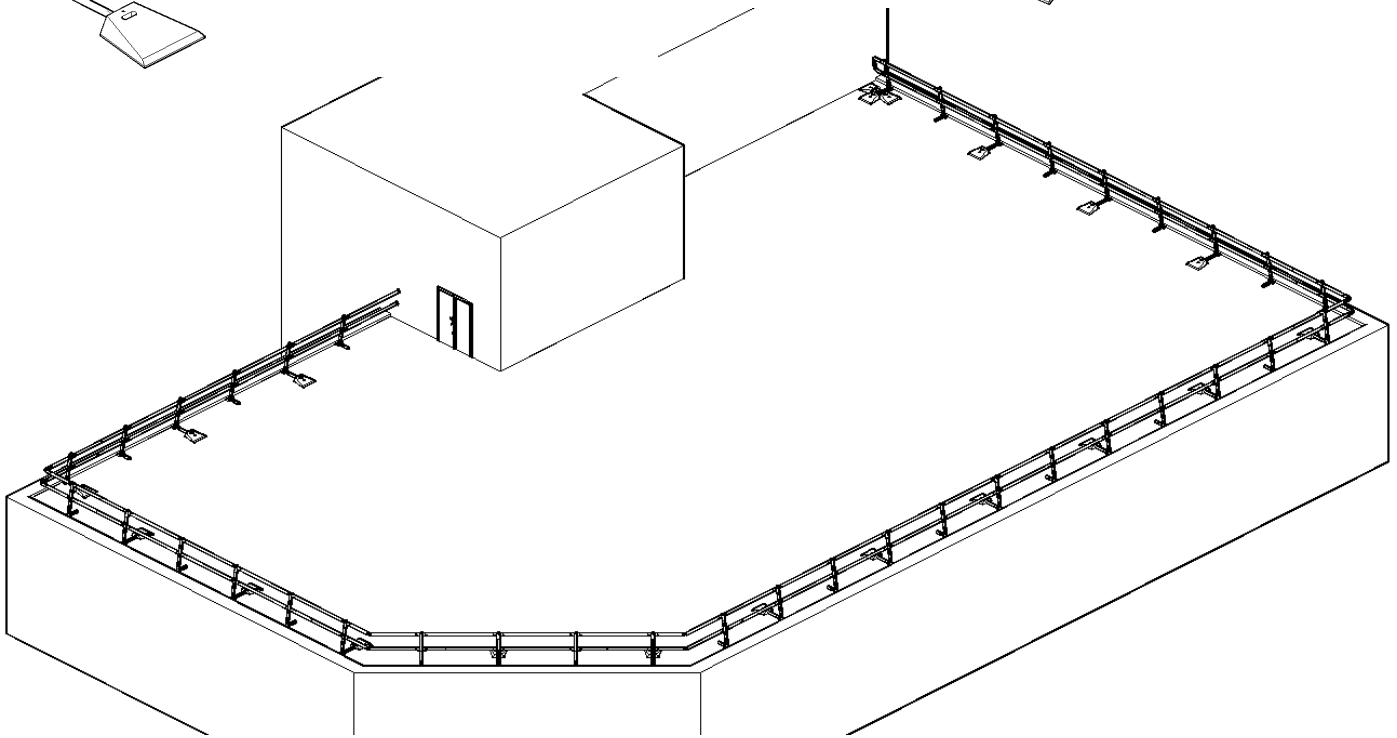
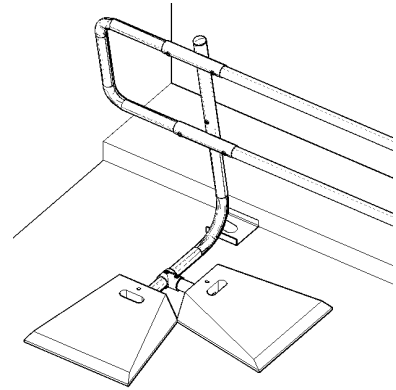


Typical Layout - PVC Single Ply Roof

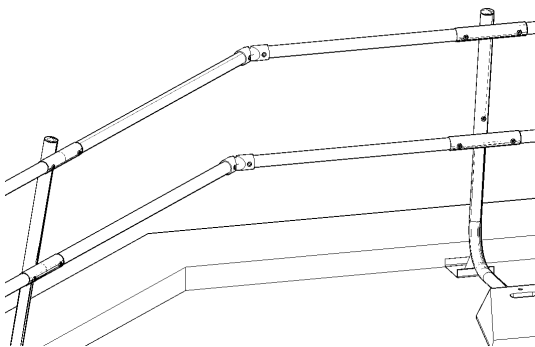
Wall Flange Termination Detail



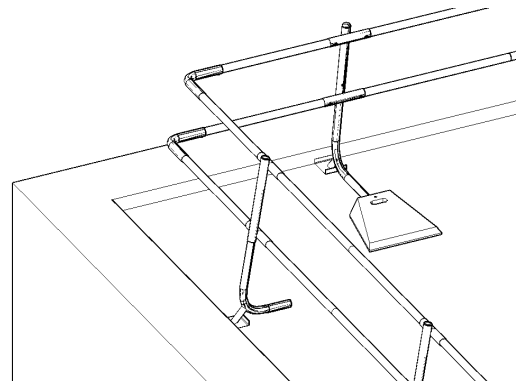
D-End Termination Detail



Variable Corner



90 Degree Corner



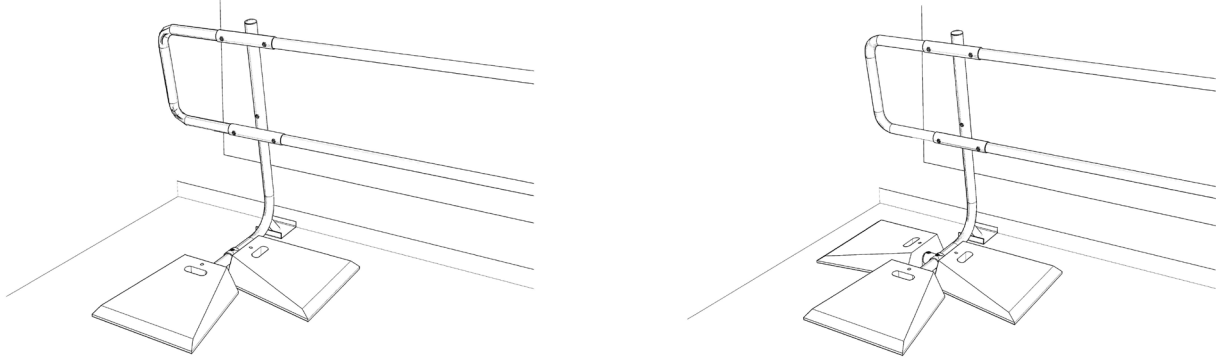
Configuration

Freestanding Edge Protection - System Configuration



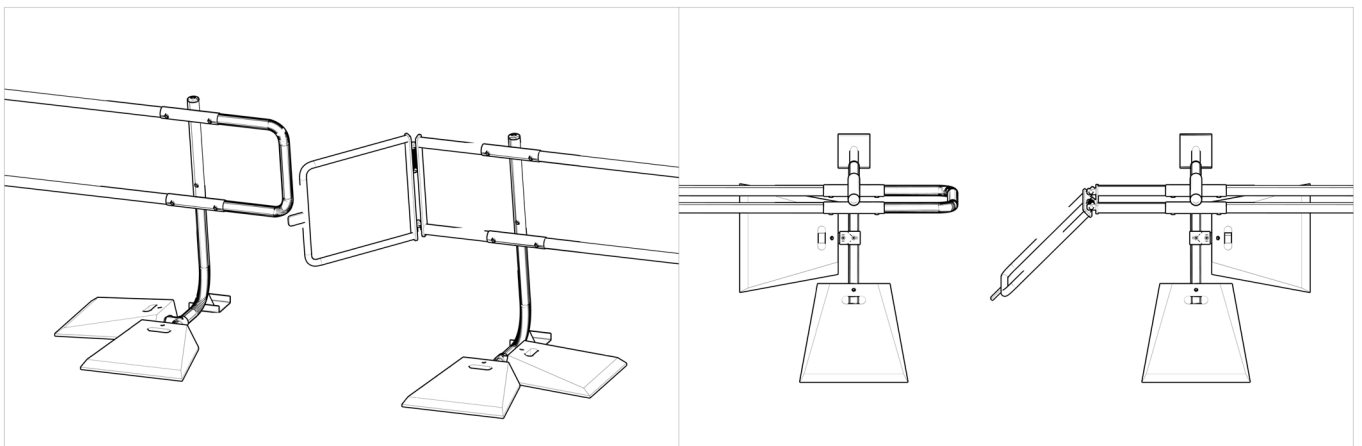
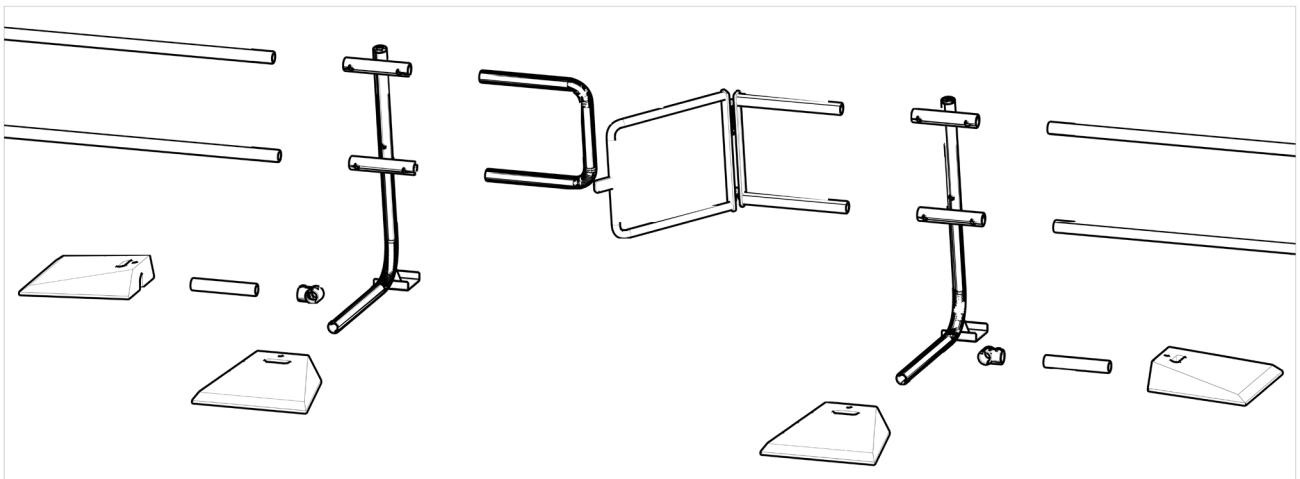
Typical Layout - Freestanding End

The amount of counterweights installed on a freestanding end is determined by the roof covering. On a Bituminous Felt, Asphalt, EPDM, or Concrete roof, the system requires two weights with one being attached with a short tee and short length of tube. On a PVC / TPO Singly Ply or Liquid Coated roof, three weights are required which is done by using a two socket cross and two short lengths of tube.



Typical Layout - Spring Loaded Gate

When installing a spring loaded gate it creates two freestanding ends and therefore the system must finish on a weighted main upright, and have the appropriate amount of weights depending on the roof covering (see above). The gate has two welded tubes that fit into the top riser section of the upright. A D-End is installed on the opposing side for the gate to close onto. The gate should always open inwards towards the user on the roof.



Installation

Free Standing Edge Protection - System Installation

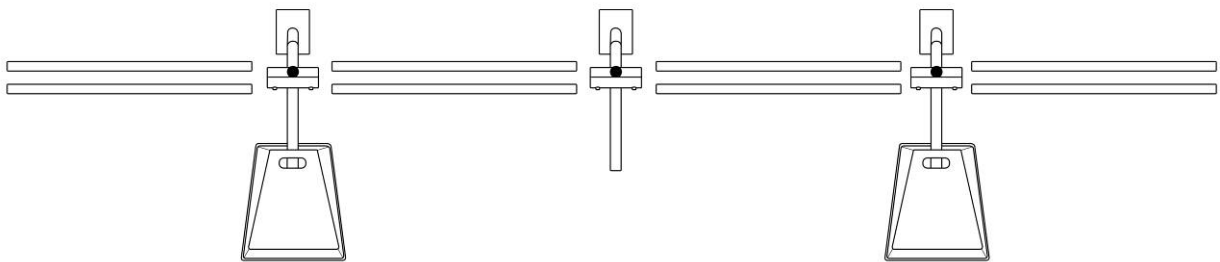


Wherever possible the starting point for all installations should be the end termination, or at a corner for perimeter systems, remembering to carry out the initial setting out a minimum distance of 2m from the edge of the roof.

Step 1 - Setting out

Starting at a termination if a straight run or a corner is a perimeter system, place the 2.5m CR2.5's end to end in pairs along the length of the roof. Then alternate an MSUP and an ISUP between each pair of CR2.5's.

Once the MSUP and ISUP's are in place connect a CW20 counterweight to each MSUP.

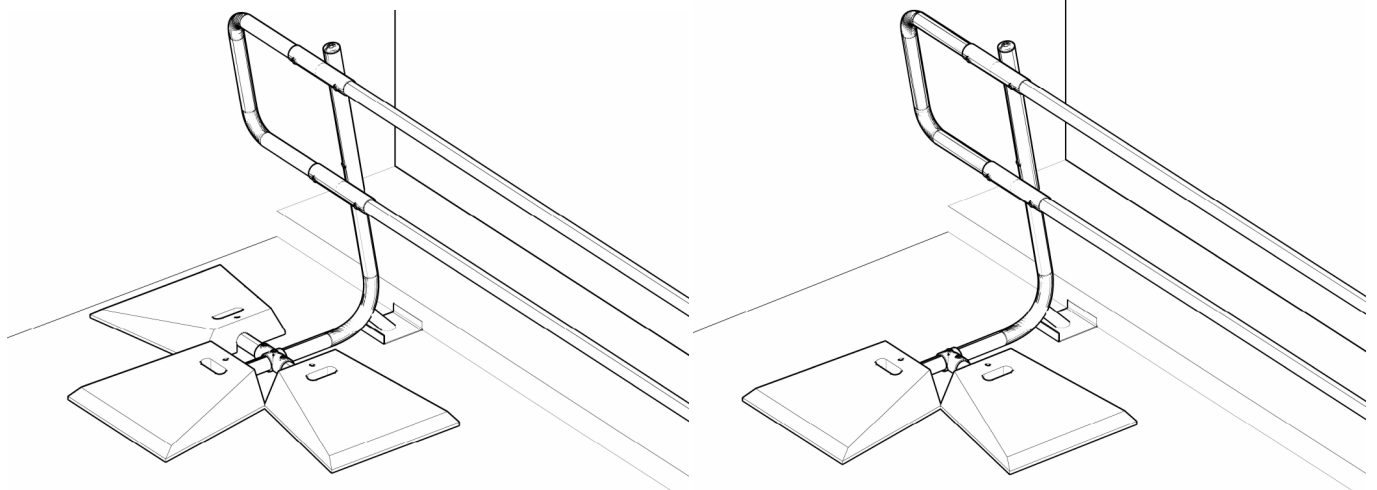
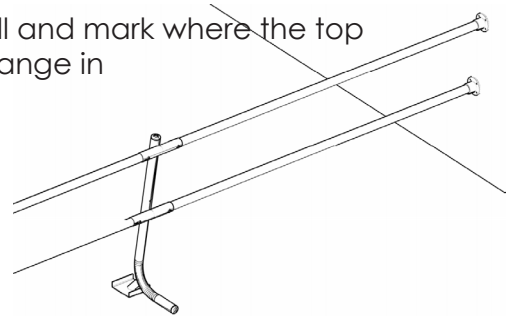


Step 2 - End Termination

Once the setting out is complete, start by assembling the first end termination.

For a wall flange termination, place an ISUP against the wall and mark where the top and bottom tubes will finish. Then drill and attach the wall flange in the area marked. The first 2.5m tube and ISUP can now be assembled and attached.

For a D-End Termination, attach a D-End to an MSUP and then make sure you have the correct amount of 20kg Counterweights and components to weight the end correctly. If the system is being installed on a PVC Single Ply roof then the D-End Termination needs three weights. If the system is being installed on a Bituminous Membrane roof then the D-End Termination only requires two weights.



Installation

Free Standing Edge Protection - System Installation

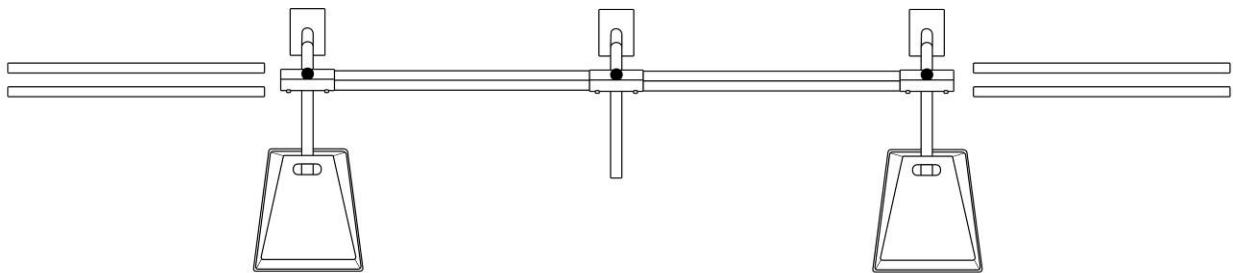


Step 3 - Section Assembly

Once the setting out and end terminations are complete, continue to assemble the first two bay section by connecting the second and third pair of CR2.5's to the first and second MSUP's and fully tighten the screws.

Join these two MSUP assemblies together using an ISUP. You now have a completed two bay section.

Repeat the above process until all the two bay sections are assembled.



Step 4 - Corner Assembly

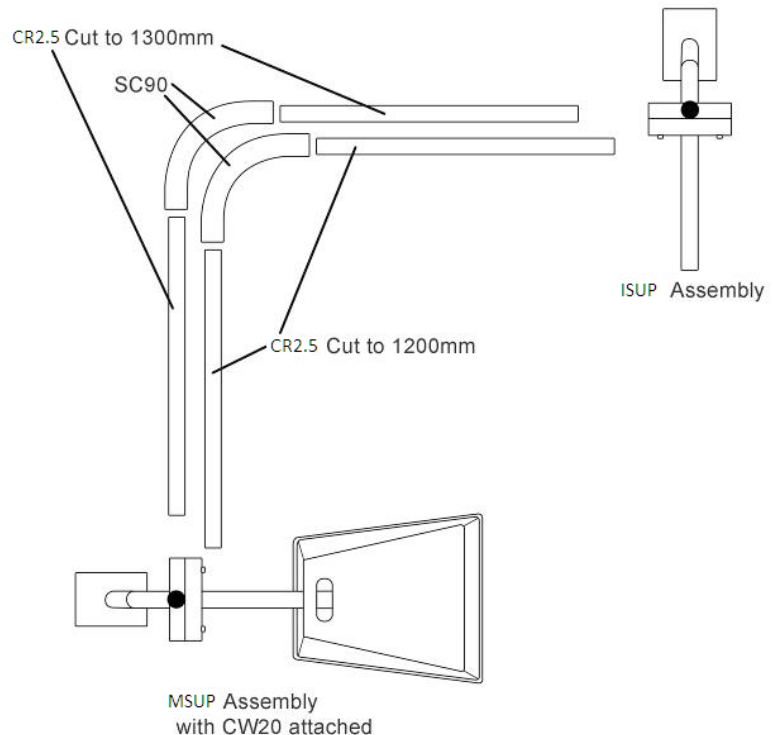
Begin by assembling a complete corner unit consisting of one MSUP, one ISUP, one CW20, two SC90 and two CR2.5's cut to length.

Cut two CR2.5's down to form two tubes at 1200mm and two at 1300mm.

Take the MSUP's and connect a CW20, insert one 1200mm tube into the top of the TRS, and one 1300mm tube into the bottom of the TRS, fully tightening the screws as you do so. Repeat the process for connecting the cut tubes to the ISUP.

Join the MSUP and ISUP assemblies using two SC90's ensuring that all the screws are fully tightened.

Using two people carry the corner assembly to the roof edge, being careful to remain behind the assembly at all times.



Installation

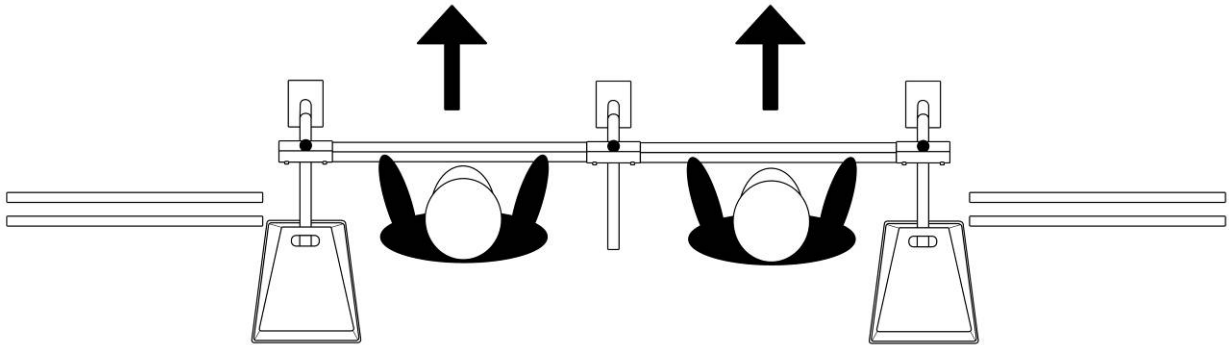
Free Standing Edge Protection - System Installation



Step 5 - Positioning

Using at least two people positioned behind the assembly, carefully carry a two bay into position at the edge of the roof.

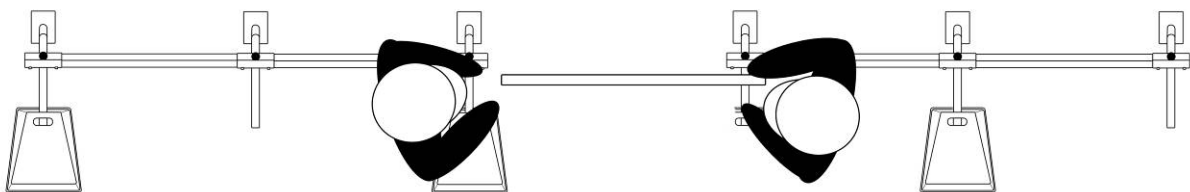
The two bay sections should be positioned leaving a single bay between each one.



Step 6 - Final Assembly

The remaining 2.5m Cross Rails are now attached in between the two bay assemblies.

By placing one person either side of the opening behind the existing handrail assemblies, connect the remaining CR2.5's into the top and bottom of the TRS on each upright fully tightening the screws as you go.



Maintenance

Free Standing Edge Protection - System Maintenance



The system is maintenance free, however if cleaning is required, use only a mild detergent and water (such as a domestic washing up liquid) in order not to damage any of the galvanised coating.

Re-Certification

Free Standing Edge Protection - System Re-Certification

- We recommend that the guardrail installation should be inspected periodically by a competent person. The frequency of these inspections will depend upon the environment, location, and utilisation, but should be at least every twelve months.
- Visual inspection of the complete installation in accordance with the current needs of the client. Check if any new equipment has been installed on the roof that may require further guardrail protection.
- Check against the original installation drawing to see if any part of the installation has been modified.
- Check that all counterweights are installed.
- Check all screws and fixings are in place and sufficiently tightened.
- Check the height of the top rails and that they are level.



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Technical Report

Subject: LIMITED TESTING OF TWO STYLES OF GUARD RAIL IN ACCORDANCE
WITH EN 13374: 2013

Our ref: SPC0225082/1421 Issue 2

Date: 19th July 2014

This replaces report reference SPC0225082/1421 dated 9th July 2014

Conditions of Issue:

This report may be forwarded to other parties provided that it is not changed in any way. It must not be published, for example by including it in advertisements, without the prior, written permission of SATRA.

Results given in this report refer only to the samples submitted for analysis and tested by SATRA. Comments are for guidance only.

A satisfactory test report in no way implies that the product tested is approved by SATRA and no warranty is given as to the performance of the product tested. SATRA shall not be liable for any subsequent loss or damage incurred by the client as a result of information supplied in the report.

Report signed by: D Harrison
Position: PPE Technologist
Department: Safety Product Centre

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A handwritten signature in black ink that reads "D Harrison". The signature is written in a cursive style with a large, looped initial "D".

EN 13374: 2013 CLAUSE / TEST	EN 13374: 2013 REQUIREMENT	RESULT / COMMENT	UoM (See note 1)	PASS / FAIL
5.1.4 Toe board	The upper edge of the toe board shall be at least 150 mm above the working surface	Not assessed – No toe board supplied	N/A	Not assessed
	The toe board shall be designed to avoid gaps between it and the working surface on normally a flat working surface	Not assessed – No toe board supplied		Not assessed
	If there are gaps, a sphere with a diameter of 20 mm shall not pass through them	Not assessed – No toe board supplied		Not assessed
	For other situations for example where the working surface is not flat, any gaps should be maintained as small as practicable	Not assessed – No toe board supplied		Not assessed

Report by: Dan Harrison

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19th July 2014

Signed: D Harrison
PPE Technologist
Safety Product Centre
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EN 13374: 2013 CLAUSE / TEST	EN 13374: 2013 REQUIREMENT	RESULT / COMMENT	UoM (See note 1)	PASS / FAIL
5.2.1 Additional requirements – Edge protection system class A	The inclination of edge protection system class A shall not deviate from the vertical by more than 15 °	Angle of inclination: 8.5°		PASS
	If an intermediate guardrail is provided, any gap shall be so dimensioned that a sphere of 470 mm diameter will not pass through the protection	Distance between principal guardrail and intermediate guardrail: 470 mm Distance between intermediate guardrail and toe board: Not assessed	N/A	Not fully assessed
	If there is no intermediate guardrail or if it is not continuous, the edge protection system shall be so dimensioned that a sphere with a diameter of 250 mm will not pass through it	Not applicable		N/A

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PPE Technologist
Safety Product Centre
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EN 13374: 2013 CLAUSE / TEST	EN 13374: 2013 REQUIREMENT	RESULT / COMMENT	UoM (See note 1)	PASS / FAIL																								
6.3.2 Static loads – Serviceability limit state	<p>Loads F_{T1} shall act as follows</p> <ul style="list-style-type: none"> Perpendicular to the edge protection system in the outward direction Downwards parallel to the edge protection system <p>The loads shall act separately and on posts, guardrails and toe boards.</p> <p>For posts and guardrails, $F_{T1} = 300N$</p> <p>For toe boards, $F_{T1} = 200N$</p> <p>Max 55mm elastic deflection</p>	<p>Direction: Perpendicular to edge protection</p> <table border="1"> <thead> <tr> <th>Position tested</th> <th>Force applied (N)</th> <th>Elastic deflection (mm)</th> </tr> </thead> <tbody> <tr> <td>Post near end stop</td> <td>400</td> <td>< 55mm</td> </tr> <tr> <td>Centre of principal guardrail</td> <td>400</td> <td>< 55mm</td> </tr> <tr> <td>Central post</td> <td>400</td> <td>< 55mm</td> </tr> </tbody> </table> <p>Direction: Parallel to edge protection</p> <table border="1"> <thead> <tr> <th>Position tested</th> <th>Force applied (N)</th> <th>Elastic deflection (mm)</th> </tr> </thead> <tbody> <tr> <td>Post near end stop</td> <td>400</td> <td>< 55mm</td> </tr> <tr> <td>Centre of principal guardrail</td> <td>400</td> <td>< 55mm</td> </tr> <tr> <td>Central post</td> <td>400</td> <td>< 55mm</td> </tr> </tbody> </table>	Position tested	Force applied (N)	Elastic deflection (mm)	Post near end stop	400	< 55mm	Centre of principal guardrail	400	< 55mm	Central post	400	< 55mm	Position tested	Force applied (N)	Elastic deflection (mm)	Post near end stop	400	< 55mm	Centre of principal guardrail	400	< 55mm	Central post	400	< 55mm	± 50 N See note 2	PASS
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Centre of principal guardrail	400	< 55mm																										
Central post	400	< 55mm																										
6.3.7 Static loads – Ultimate limit state with accidental loads	<p>Load F_D shall act downwards within an angle of $\pm 10^\circ$ to the face of the edge protection system, anywhere along the top edge of the guardrails and toe boards. This also applies to any other component of the edge protection system, such as a fencing structure, which has gaps in excess of 100mm width.</p> <p>$F_D = 1.25 \text{ kN}$</p> <p>Max 300mm deflection during load</p>	<p>Position: Post near end stop 1.8 kN sustained for 1 minute without failure Deflection: < 300mm</p> <p>Position: Centre of principal guardrail 1.8 kN sustained for 1 minute without failure Deflection: < 300mm</p> <p>Position: Central post 1.8 kN sustained for 1 minute without failure Deflection: < 300mm</p>	± 50 N See note 2	PASS																								

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Signed: D Harrison
PPE Technologist
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ADDITIONAL INFORMATION / NOTES

Note 1 – 'UoM' denotes estimated Uncertainty of Measurement for stated test results. This uncertainty value is based on a standard uncertainty multiplied by a coverage factor $k = 2$, which provides for a confidence level of approximately 95%

Note 2 – Estimated uncertainty of measurement applied at point of test (e.g. to applied force or to tolerance limits) to ensure product meets requirements of the standard

***** END OF REPORT *****



Report by: Dan Harrison

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