



SAFETY AT THE HIGHEST LEVEL

# KeeGuard Contractor Operation & Maintenance Manual







## SAFETY GUARDRAIL SYSTEMS

The Company's guardrail system KEEGUARD has been designed specifically to provide permanent edge protection for areas where regular access for maintenance and inspection is required.

## UNIQUE SYSTEMS

Each system's unique design provides permanent edge protection without the need to mechanically fix the system through the roofing membrane or building's structure. Their simple cantilever principle provides unrivalled strength, stability and safety and overcomes the problems associated with traditional systems such as having to drill and puncture the roof membrane which can lead to potential penetrative water damage and noise disturbance during installation. Similarly, high levels of insulation included within warm deck and inverted flat roof designs often mean it is virtually impossible to fix through, as with traditional systems, without causing cold bridging. This may then cause interstitial condensation to form within the flat roof construction, causing the roof to deteriorate and eventually require replacement. When it is not appropriate to use counter balanced systems, such as modern industrial cladded pitched roofs, KeeGuard Topfix may be an alternative to traditionally fixed systems.



## DURABLE SYSTEMS

The Company's guardrail components are supplied with a galvanised finish carried out to BS EN ISO 1461 and ASTM A53: Hot Dip Galvanised Coatings Specification and Testing Methods, giving an average coating of between 65-85 microns. All products are also available in aluminium. All cast clamps have Threadcoat applied to all tapped holes. All grub screws are carbon steel and have Keekoat protection applied to ensure minimal maintenance.

## COMPONENT BASED SYSTEMS

All systems consist of galvanised/aluminium tubing joined together using the KEE KLAMP method of connection. KEEGUARD, raked, radiused and folding systems' base feet connect to the 100% recycled PVC counter weight, giving the system its strength & stability.



## VERSATILE SYSTEMS

All systems have been specially designed to fit any shape and size of flat and pitched roofs, even circular designs. The systems can also cope with changes in levels, roof falls and difficult details such as ductwork passing over the roof edge and cable trays/plant mounted at the roof edge. The flexibility of the counter weight & KEE KLAMP design allows the systems to be used on plant congested or complex detailed roofs. The product range has been extended to suit specific requirements and includes the standard design with vertical legs, raked and radiused systems, as well as a folding version for areas where a more discreet form of protection is required. KeeGuard Topfix has also been added to the range to provide collective protection solutions for industrial cladded pitched roofs.



## MEMBRANE PROTECTION SYSTEMS

Each system is installed with rubber matting bonded to the underside of metal components which come into contact with the roof membrane. In some cases the counter weight and base foot have sacrificial pads placed between the edge protection components and the roof membrane. This protects the roof membrane from damage via heat transfer or direct contact with components. On warm deck roof construction specifications pedestrian tiles are recommended to be placed where base feet and counter weights are in contact with the roof membrane. Where KeeGuard Topfix is installed a butyl strip is used where the Base Plates are fixed, via rivets, to the roof cladding.

## TESTING & CERTIFICATION

Tested in accordance with:-  
 EN 13374 Class A.  
 BS 13700, Permanent counterweighted guardrail systems – Specification  
 EN ISO 14122 Part 3.  
 NF E85-003  
 EN 1991-1-4  
 BS 6399 : Part 2 Code of Practice for Wind Load.



## WIND CALCULATED

Wind loading is the most likely regular and demanding force a free standing roof guardrail will encounter during its lifetime. The Company has developed a computerised programme to calculate the design to ensure compliance with the relevant wind loadings relating to the topography, height and location of the project throughout the World.

## OFFICIAL DOCUMENTATION

All Systems comply with the following:-  
 Work at Height Regulations.  
 HSG 33 "Health & Safety in Roof work"  
 HSE Construction Sheet No. 21 "Working on flat roofs protection against falls."  
 European Union Directives together with requirements of CDM Regulations.



## AESTHETICS

The smooth lines of the standard galvanised/aluminium finish can be further enhanced by the application of powder coating to BS 6497 Specification for Powder Organic Coatings, EU Codes with bespoke colour produced to special order. Counter weights are available in black or other colours at an additional cost. Where a more discreet form of protection is required, raked and radiused systems, as well as a folding version are welcomed by Planning Officers due to their improved aesthetics.

## SYSTEMS DISTRIBUTORS

All systems are available as a supply and installation service or component supply only. Products are available from The Company directly or one of its licensed distributors.

## INDUSTRIAL CLADDED ROOFS

The Company has developed a new collective roof edge protection system, KeeGuard Topfix specifically for metal profile and standing seam roofs up to 45°. Pitched cladded roofs have traditionally been protected using personal fall protection systems which are lower in the hierarchy of controls.

## PRODUCT SPECIFICATION USA & Canada

**FEATURES** :- Free Standing **Non Counter** Weight System.

### GENERAL

KeeGuard® systems do not require physical fixing into the roof's structure/membrane. The complete system's design, manufacture, testing and installation has been externally assessed.

### TESTING

All systems have been tested to:-  
 OSHA Reg 29 CFR 1910.23 (E) (1); (E) (3) (IV).  
 OSHA Reg 29 CFR 1926.501 (b) (1); (b) (2) (ii)  
 OSHA Reg 29 CFR 1926.502 (B) (1) – (B) (14)  
 Canadian National Building Code 4.1.10.1(1)(e), 4.1.10.1(2), 4.1.10.1(4)  
 Ontario Building Code Section 4.1.10.1(1)(b), 4.1.10.1(2), 4.1.10.1(4)

### MATERIALS

Gatorshield Tubing  
 Base Metal: ASTM A-500 Carbon Steel.  
 Zinc Spelter - ASTM B-6 High Grade Special High Grade Zinc.  
 Chemical Composition - ASTM A-500.  
 Material Testing - ASTM-500 and ASTM E-8.  
 Guardrail top and intermediate rails are produced in steel - 1.9" external diameter (Wall thickness 0.109").  
 The vertical support legs are produced in steel - 1.9" external diameter (Wall thickness 0.109").  
 Bases are manufactured from recycled PVC. They are produced in two halves.  
 All cast clamps have Threadcoat applied to all tapped holes. All grub screws are carbon steel and have Keekoat protection applied to ensure minimal maintenance.  
 All cast clamps used to join the guardrail are galvanised malleable cast iron produced to ASTM A47-77-32510.  
 Where tubing is cut on site zinc rich paint is applied to the cut end of the tube.

### LAYOUT

Height of guardrail is set at 42". All vertical supports are set at maximum 10' centres depending on the system utilised (See KeeGuard Contractor Layout illustration). Each vertical leg is inserted into the Recycled PVC Base. The vertical leg is secured in place by tightening the collar inserted within the mould. All stop ends have returns or triple counter weighted, using standard KeeGuard® components or supported by way of a wall/ladder clamp.

### WIND LOADING

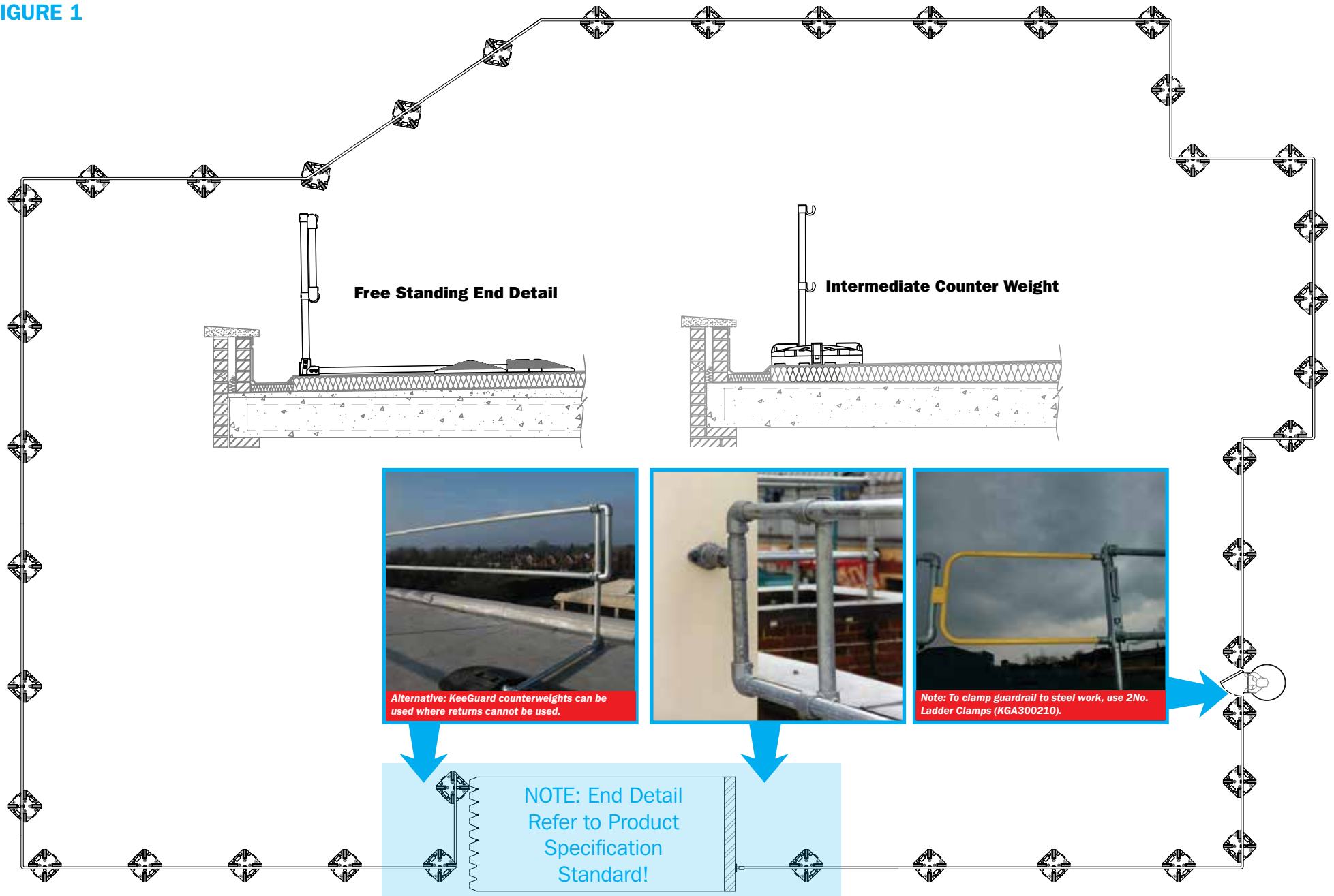
All installations are wind speed calculated to ASCE7 - The American Society of Civil Engineers design standard: "Minimum Design Loads for Buildings and Other Structures"

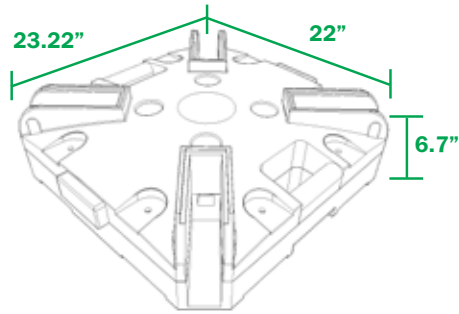


USA & CANADA							
Roof Type	Max Pitch	Tube Size	Tube Thickness (inches)	End Return (feet)	First Bay Length (feet)	Subsequent Bay Length (feet)	Weight Configuration
<b>Mineral Grade Felt</b>							
Unrestrained	5°	8	0.109"	5'	5'	10'	x4 total in any position in 1 <sup>st</sup> bay & return
<b>TPO – Single Ply Membrane</b>							
Unrestrained	5°	8	0.109"	5'	5'	10'	x3 in 1 <sup>st</sup> bay

# Typical Edge Protection System Layout

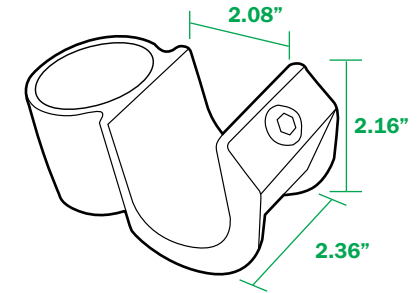
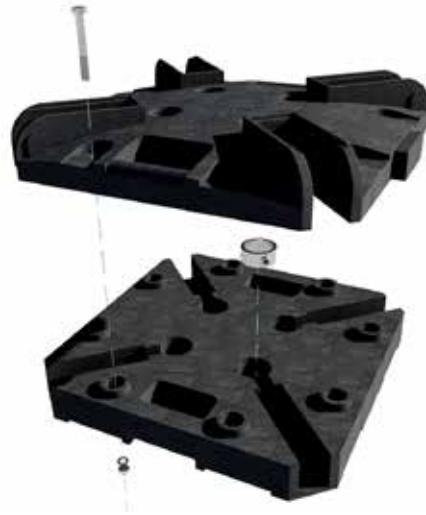
FIGURE 1





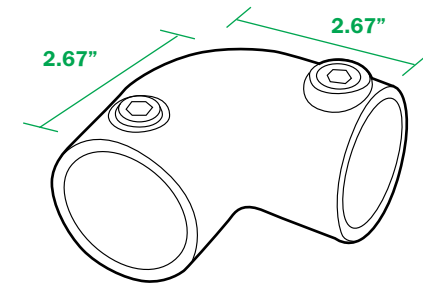
### RECYCLED PVC BASE FOOT - 220-8

This unique component provides support to the system and allows the system to be set at 90°. Vertical Support Legs are inserted into the Base Foot and secured by tightening the collar. This component is easily split into two parts for manual handling compliance.  
Material : Recycled PVC. Net weight : 88lb 3oz



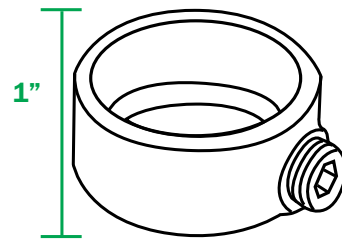
### \*SADDLE CLAMP - 135-8

This open cup fitting provides the method of linking the horizontal Main Rail Tubes to the Support Legs. Material : Malleable cast iron to ASTM A47-77-32510 and galvanised to ASTM 153. Net weight : 1lb 11oz.



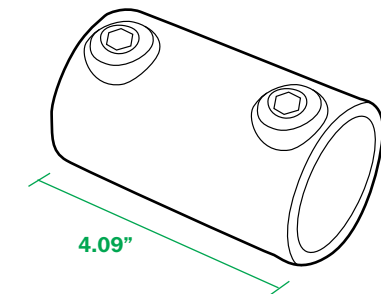
### 90° ELBOW - 15-8

This provides the means of dealing with corners and changes in level. Material : Malleable cast iron to ASTM A47-77-32510 and galvanised to ASTM 153. Net weight : 1lb 11oz.



### COLLAR - 75-8

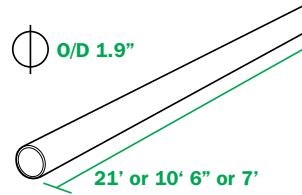
Once the Vertical Support Leg is inserted into the Recycled PVC Base Foot. Slide the collar on to the bottom of the upright and tightened to secure.  
Material : Malleable cast iron to ASTM A47-77-32510 and galvanised to ASTM 153. Net weight : 7oz



### STRAIGHT COUPLING - 14-8

This component provides the method to link the horizontal Main Rail Tubes. Material : Malleable cast iron to ASTM A47-77-32510 and galvanised to ASTM 153. Net weight : 1lb 5oz.

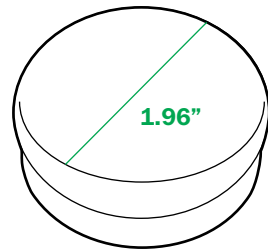
**\* Sold as replacement parts only**



### MAIN RAIL TUBE (Cut to size - G150GS12GA)

Supplied in three sizes for convenience, these components provide the horizontal rails of the system. Guardrail top and intermediate rails are produced in steel - 1.9" external diameter (Wall thickness 0.109").

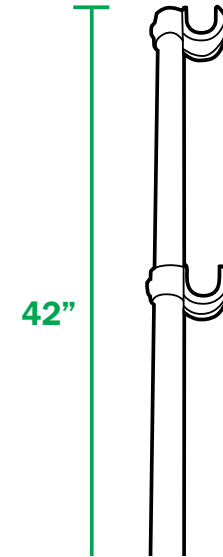
Material : Gatorshield ASTM A-500 Carbon Steel. Zinc Spelter - ASTM B-6 High Grade Special High Grade Zinc. Net weight : 50lb 7oz, 25lb 4oz. & 16lb 12oz.



### PLASTIC CAP - SL105

This component is fitted to the top of the Support Leg to prevent water ingress.

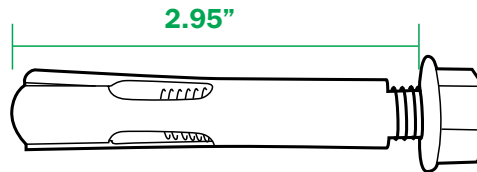
Material : PVC. Net weight : 1/3oz.



### STANDARD SUPPORT LEG - KGUC

This component allows for standard 90° installation. The Vertical Support Legs are produced in steel - 1.9" external diameter. (Wall thickness 0.109")

Material : Gatorshield ASTM A-500 Carbon Steel. Zinc Spelter - ASTM B-6 High Grade Special High Grade Zinc. Net weight : 11lb 6oz



### WALL FIXING - SL110

The wall fixing is used in pairs in conjunction with a Wall Clamp

Material : Stainless steel. Net weight : 2oz.

**CANTILEVERED ROOF EDGE PROTECTION**  
SEPARATING PEOPLE FROM HAZARDS

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(w) www.keesafety.co.uk

- THIS GUARDRAIL IS TESTED TO OSHA & OBC
- DO NOT REMOVE, TAMPER, ADJUST, REMOVE OR ALTER IN ANY WAY THE GUARDRAIL INSTALLATION WITHOUT FIRST CONSULTING KEE SAFETY.
- NO LANYARD LIFE LINE OR FALL ARREST PRODUCTS TO BE ATTACHED TO THE GUARDRAIL AT ANY TIME.
- DO NOT ATTACH PLASTIC SHEETING OR ANYTHING THAT WOULD INCREASE THE WIND LOADING ON THE GUARDRAIL.
- IF YOU FIND THE GUARDRAIL HAS BEEN ALTERED OR TAMPERED WITH, CONTACT KEE SAFETY IMMEDIATELY.

• RE-TEST ONLY TO BE CARRIED OUT BY AUTHORISED SERVICE AGENT.

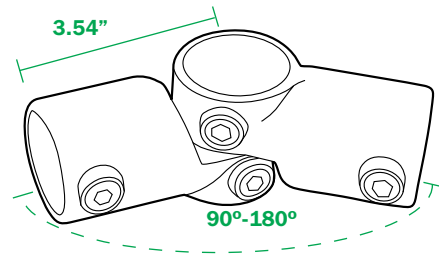
### SYSTEM PLAQUE - SL 111

Provides details of the system and approvals.

Material : Plastic.

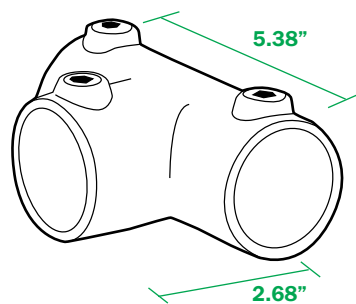
Net weight : 0.085kg.





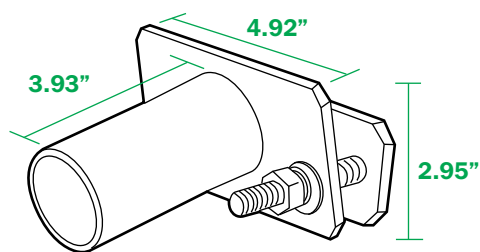
### ADJUSTABLE SIDE OUTLET TEE ELBOW - 19-8

Used in pairs these components deal with angles 90°-180° and changes in level.  
 Material : Malleable cast iron to ASTM A47-77-32510 and galvanised to ASTM 153.  
 Net weight : 2lb 3oz.



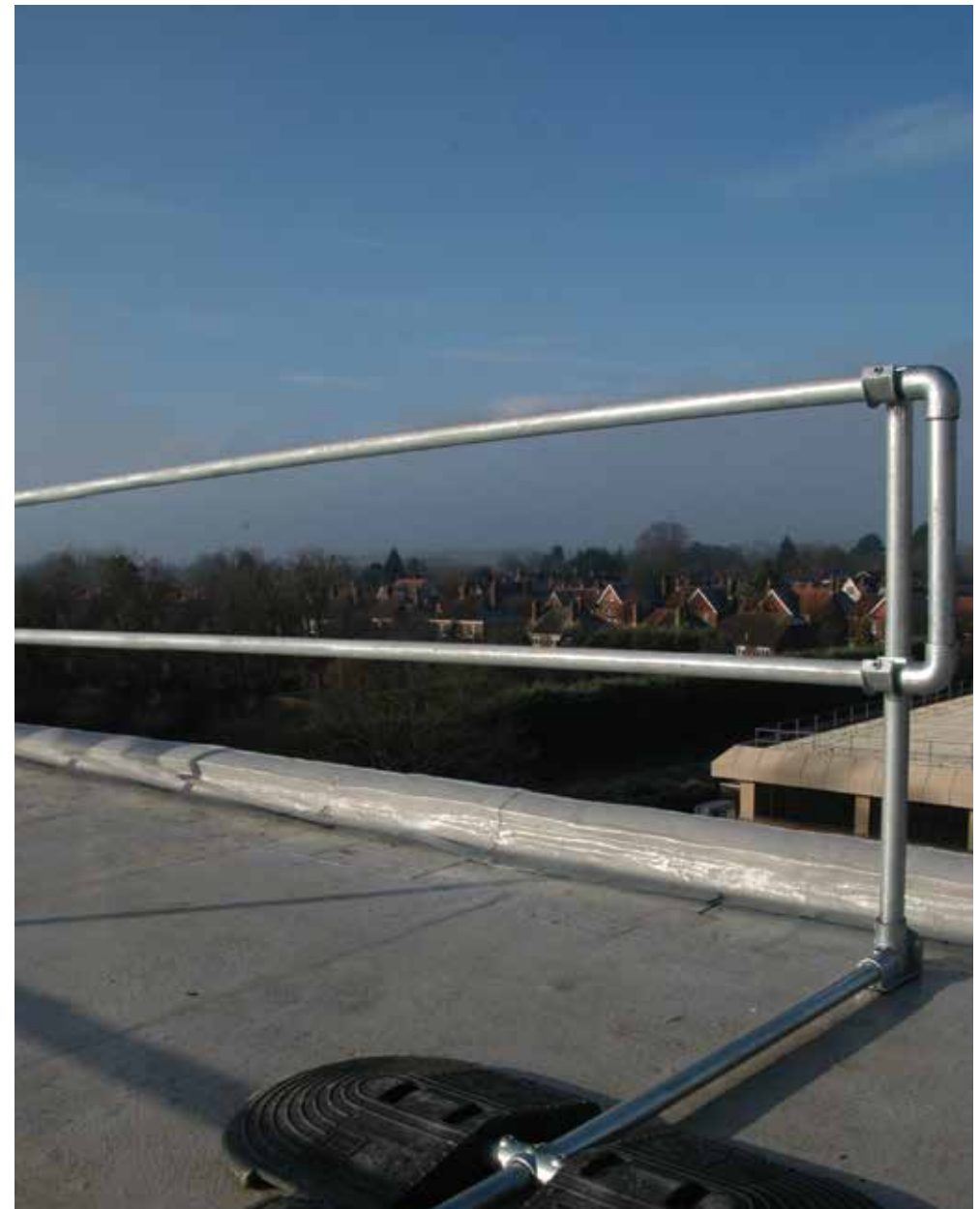
### THREE SOCKET TEE CONNECTOR - 25-8

This component can be used in many different instances, for example, changes in level.  
 Material : Malleable cast iron to ASTM A47-77-32510 and galvanised to ASTM 153.  
 Net weight : 2lb 6oz.

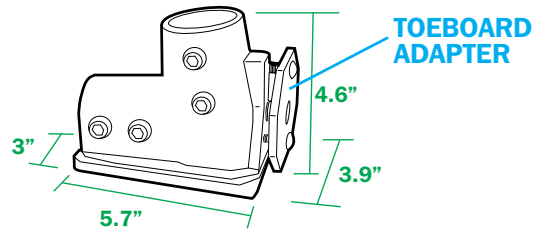


### WALL/LADDER CLAMP - SL109C

This component provides the means to terminate the system against a façade or clamp the system to a cat ladder/structure where the stringer is a maximum of 2.75\"/>



*Alternative: KeeGuard counterweights can be used where returns cannot be used.*

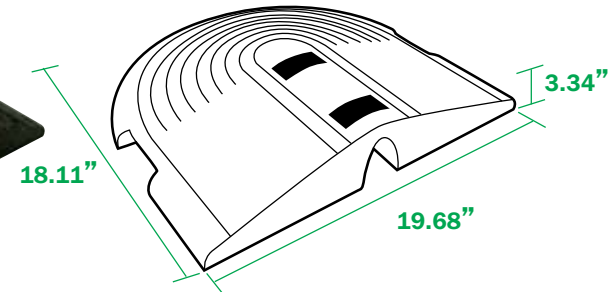


**\*BASE FOOT - 11308-7510 (T1308-7510-TOE-BOARD-OPTION)**

This unique component provides support to the system and allows the system to be set at 90° or raked back at 11°. The Base Foot connects the Cantilever Tubes and Counter Weights. The base is bonded with fluted rubber matting for membrane protection.

Material : Malleable cast iron to ASTM A47-77-32510 and galvanised to ASTM 153 Net weight : 4lb 3oz.

**REPLACEMENT RUBBER PAD - K1351-4080**



**\*RECYCLED PVC COUNTER WEIGHT - 440-7**

This component provides the stability to the system.

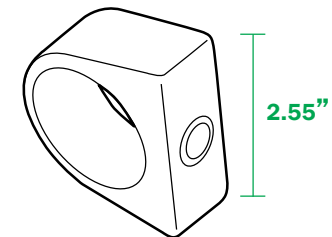
Material : Recycled PVC Net weight : 29lb 5oz.



**CANTILEVER TUBE - (42.32" - CBT1) (62" - CBT2)**

This component provides the link between the Counter Weight and Base Foot.

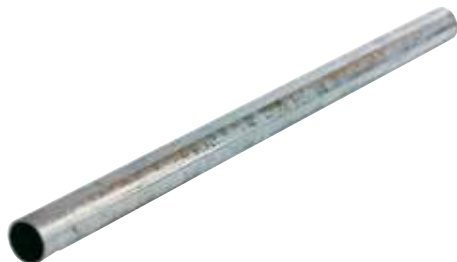
Material : Gatorshield ASTM A-500 Carbon Steel. Zinc Spelter - ASTM B-6 High Grade Special High Grade Zinc. Cantilever tubes are produced in steel – 1.66" external diameter. (Wall thickness 0.109") First/last Cantilever tube length 62" Net weight : 9lb 14oz Intermediate cantilever tube length 42.32" Net weight : 7lb 3oz.



**COLLAR - 74-7**

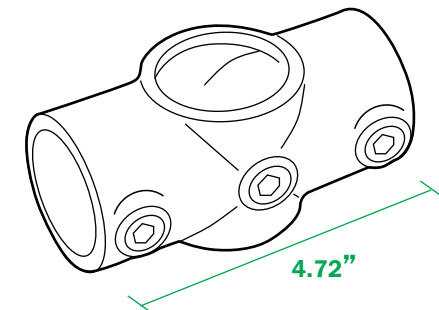
This component is inserted in the first slot of the recycled PVC Counter Weight. The cantilever tube is pushed through this fitting and the grub screw is then tightened. This component provides the connection between the Cantilever Tube and the Counter Weight.

Material : Malleable cast iron to ASTM A47-77-32510 and galvanised to ASTM 153. Net weight : 8oz.



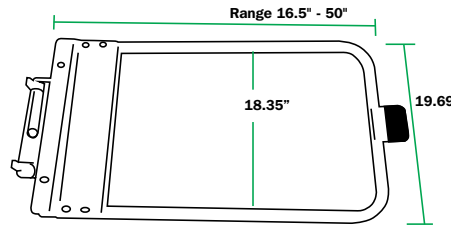
**SMALL CANTILEVER TUBE/COUNTER WEIGHT LINK - CBT3**

Used in pairs at the end details these components provide the link between the Counter Weights and the Cantilever Tube via the Two Socket Cross fitting. Material : Gatorshield ASTM A-500 Carbon Steel. Zinc Spelter - ASTM B-6 High Grade Special High Grade Zinc. Tubes are produced in steel – 1.66" external diameter. (Wall thickness 0.109") Net weight : 1lb 5oz.



**TWO SOCKET CROSS - 26-7**

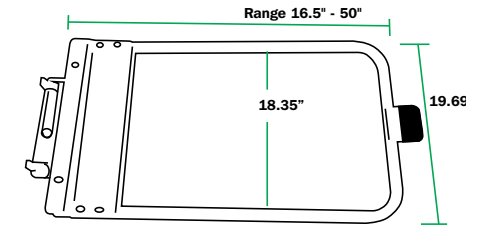
This component is used where two recycled PVC Counter Weights need to be joined together to form a counter weight end detail. Material : Malleable cast iron to ASTM A47-77-32510 and galvanised to ASTM 153. Net weight : 1lb 6oz.



### NORTH AMERICAN GATE - GALVANISED

Spring Loaded, self-closing safety gate for North America. Each model can be adjusted on site without need for cutting or welding. Complete with fixing pack.

Material : Galvanised steel to ASTM A53.



### NORTH AMERICAN GATE - POWDER COATED

Spring Loaded, self-closing safety gate for North America. Each model can be adjusted on site without need for cutting or welding. Complete with fixing pack.

Powder Coated USA - AAMA 2603-2605.

Material : Galvanised steel to ASTM A53.

#### IMPERIAL

Single Safety Gate - Imperial					
Part No.	Description	Min (in)	Mid (in)	Max (in)	Weight (lbs)
SGNA018GV	18" Gate - Galvanised	16.5	18	20	37lbs 10oz
SGNA018PC	18" Gate - Powder Coated				
SGNA021GV	21" Gate - Galvanised	19.5	21	23	38lbs 11oz
SGNA021PC	21" Gate - Powder Coated				
SGNA024GV	24" Gate - Galvanised	22.5	24	26	38lbs 13oz
SGNA024PC	24" Gate - Powder Coated				
SGNA027GV	27" Gate - Galvanised	25.5	27	29	39lbs 15oz
SGNA027PC	27" Gate - Powder Coated				
SGNA030GV	30" Gate - Galvanised	28.5	30	32	41lbs oz
SGNA030PC	30" Gate - Powder Coated				
SGNA033GV	33" Gate - Galvanised	31.5	33	35	41lbs 3oz
SGNA033PC	33" Gate - Powder Coated				
SGNA036GV	36" Gate - Galvanised	34.5	36	38	42lbs 5oz
SGNA036PC	36" Gate - Powder Coated				
SGNA040GV	40" Gate - Galvanised	38.5	40	42	43lbs 3oz
SGNA040PC	40" Gate - Powder Coated				
SGNA048GV	48" Gate - Galvanised	46.5	48	50	44lbs 15oz
SGNA048PC	48" Gate - Powder Coated				

#### METRIC

Single Safety Gate - Metric					
Part No.	Description	Min (mm)	Mid (mm)	Max (mm)	Weight (kg)
SGNA018GV	18" Gate - Galvanised	418	457	508	16.8
SGNA018PC	18" Gate - Powder Coated				
SGNA021GV	21" Gate - Galvanised	494	533	584	17.2
SGNA021PC	21" Gate - Powder Coated				
SGNA024GV	24" Gate - Galvanised	570	610	660	17.5
SGNA024PC	24" Gate - Powder Coated				
SGNA027GV	27" Gate - Galvanised	647	686	737	17.9
SGNA027PC	27" Gate - Powder Coated				
SGNA030GV	30" Gate - Galvanised	723	762	813	18.3
SGNA030PC	30" Gate - Powder Coated				
SGNA033GV	33" Gate - Galvanised	799	838	889	18.6
SGNA033PC	33" Gate - Powder Coated				
SGNA036GV	36" Gate - Galvanised	875	914	965	19.0
SGNA036PC	36" Gate - Powder Coated				
SGNA040GV	40" Gate - Galvanised	977	1016	1067	19.4
SGNA040PC	40" Gate - Powder Coated				
SGNA048GV	48" Gate - Galvanised	1180	1219	1270	20.3
SGNA048PC	48" Gate - Powder Coated				

Before starting, check you have all the individual parts. Select a suitable location for installation and remove any grease, oil or debris from the roof.

Standard chipping coverage depth is 0.5", should the chipping coverage exceed this, longer upright tubes will be required to maintain the 42" top rail height.

#### Tools Required

- Ratchet & Hex socket bit size 5/16" AF
- 12" Extension Bar to suit above
- Torque wrench 10-60 Nm approx



Premium Recycled PVC Base Foot (220-8)

Note: It is recommended that Spartan or Elastomer tiles are placed under all PVC Base Feet in order to distribute the weight of the system over a greater area to protect asphalt and mineral felt roofs from damage.

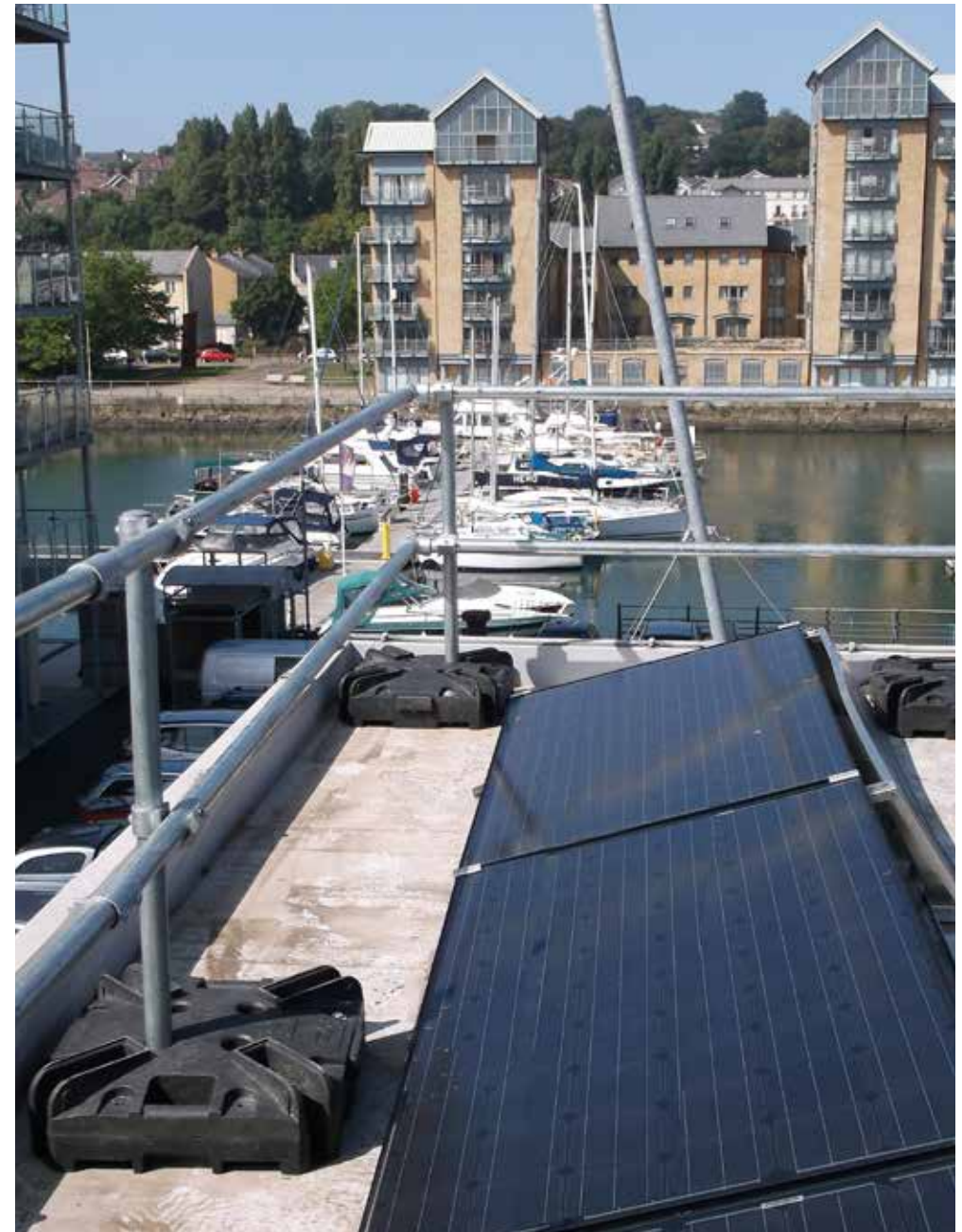
The guardrail must always end on a Weighted Leg, the only exception to this rule is if the guardrail can be fixed to a suitable structure i.e. brick/concrete walls.



#### WALL CLAMP

Extra components

- 1No. End piece
- 1No. Three Socket Tee Connector (25-8)
- 1No. Wall/Ladder clamp (SL109C)
- 2No. 90° Elbows (15-8)
- 2No. Wall fixings (SL110)



## STAGE 1

Lay out the equipment in approximately the positions shown in figure 1 below. Always ensure that you and the equipment are at a safe distance from the roof edge. The recommended distance is no less than 6'6" (See KeeGuard Premium/Contractor Layout illustrations).

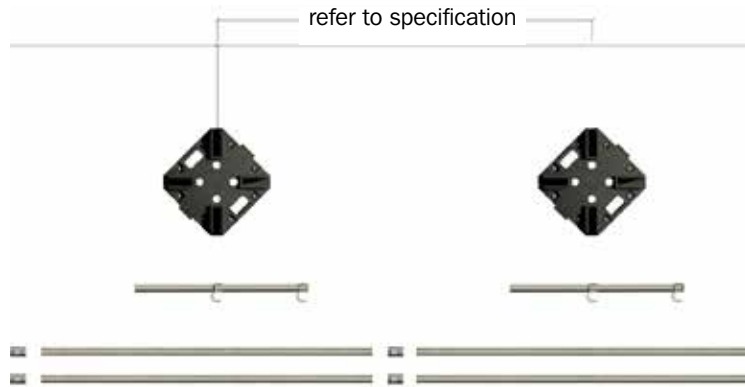


Figure 1.

## STAGE 2

While tethered to the anchorage device, move the Premium PVC Base Feet to the exposed edge working from the centre of the run of guardrail towards the corner or Free Standing End (Refer to technical specification for the exact recommended centres.). Ensure point A faces the roof edge (figure 2).

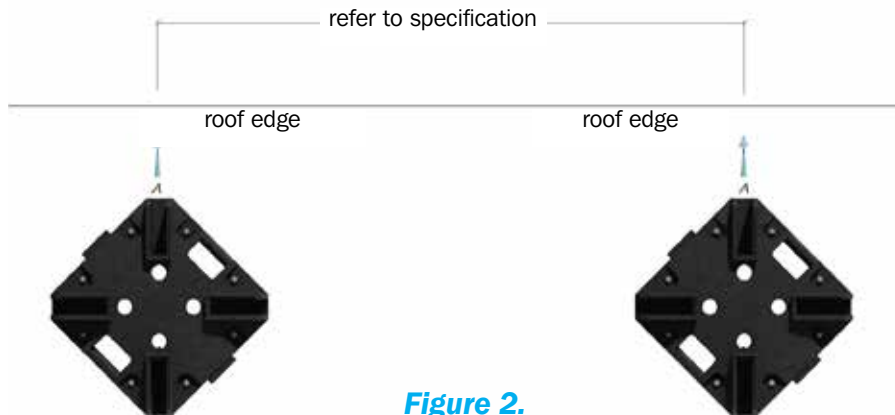


Figure 2.

## STAGE 3

Fit each support leg (KGUC) into each PVC Base Foot, slotting the leg into the hole closest to the roof edge. Ensure the support legs are in line with each other and are fully located at the bottom of the hole. DO NOT tighten the Locking Collar (75-8) at this stage.

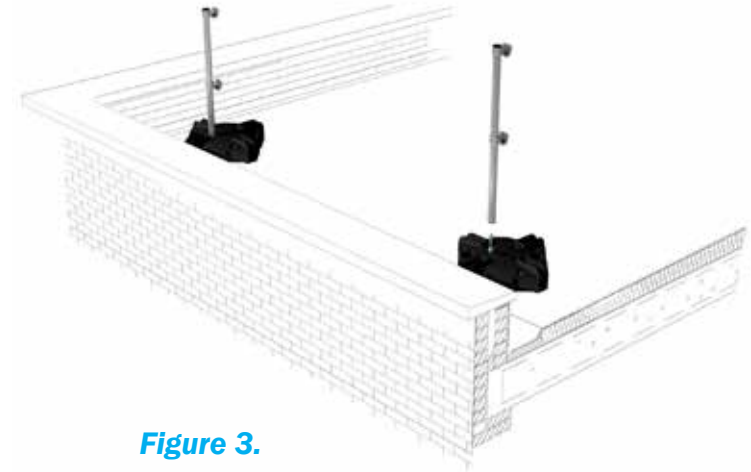


Figure 3.

## STAGE 4

Place a Main Rail Tube (8610) into the bottom Saddle Clamp (135-8) of each of the legs. Position the tube so there is at least 2.5" protruding from the Saddle Clamp and tighten the grub screw. These are located on the front of the Saddle Clamp. Place the second Main Rail Tube into the top Saddle Clamp, positioning the tube as before, leaving at least 2.5" of the tube protruding from the Saddle Clamp and tighten the grub screw of the Saddle Clamp.

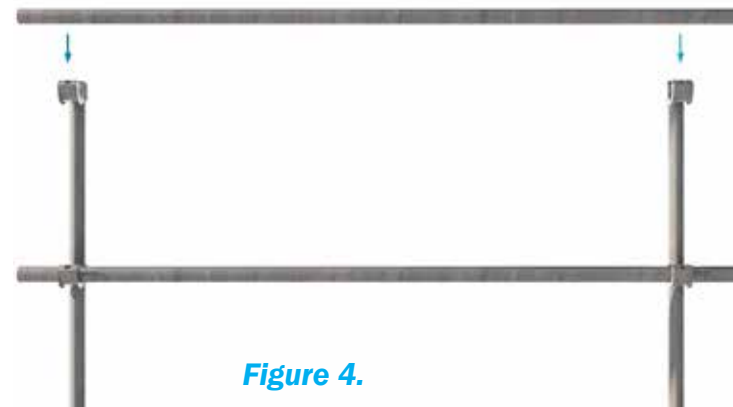


Figure 4.

## 6A RETURN DETAIL

Where possible a 5' return can be used to terminate the system.

Form a corner via connect 1No 90° Elbows (15-8) to each of the top and bottom Main Rail Tubes (8610).

Place a PVC Base Foot (220-8) in the desired position and fit a support leg (KGUC) into the one of the holes. Ensure the support legs are in line with each other and are fully located at the bottom of the hole. **DO NOT** tighten the Locking Collar (75-8) at this stage.

Slide a Main Rail Tube into the top Saddle Clamp and 90° Elbow.

Slide a Main Rail Tube into the bottom Saddle Clamp and 90° Elbow

Tighten the grub screws of all clamps.

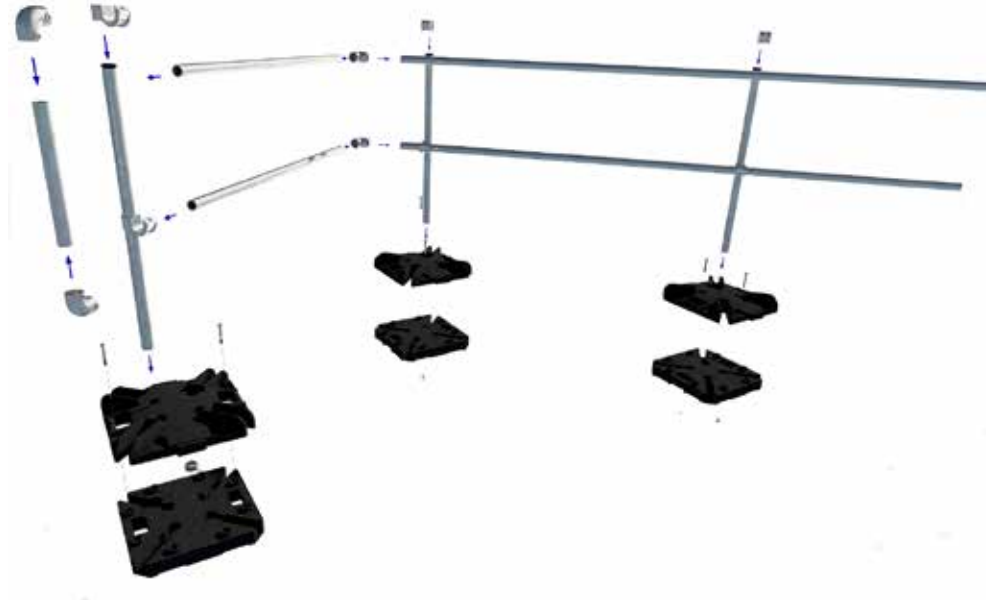


Figure 7a.

## STAGE 7

Finally, tighten all the securing screws, including the Locking Collar within Premium Base, by applying a tightening torque

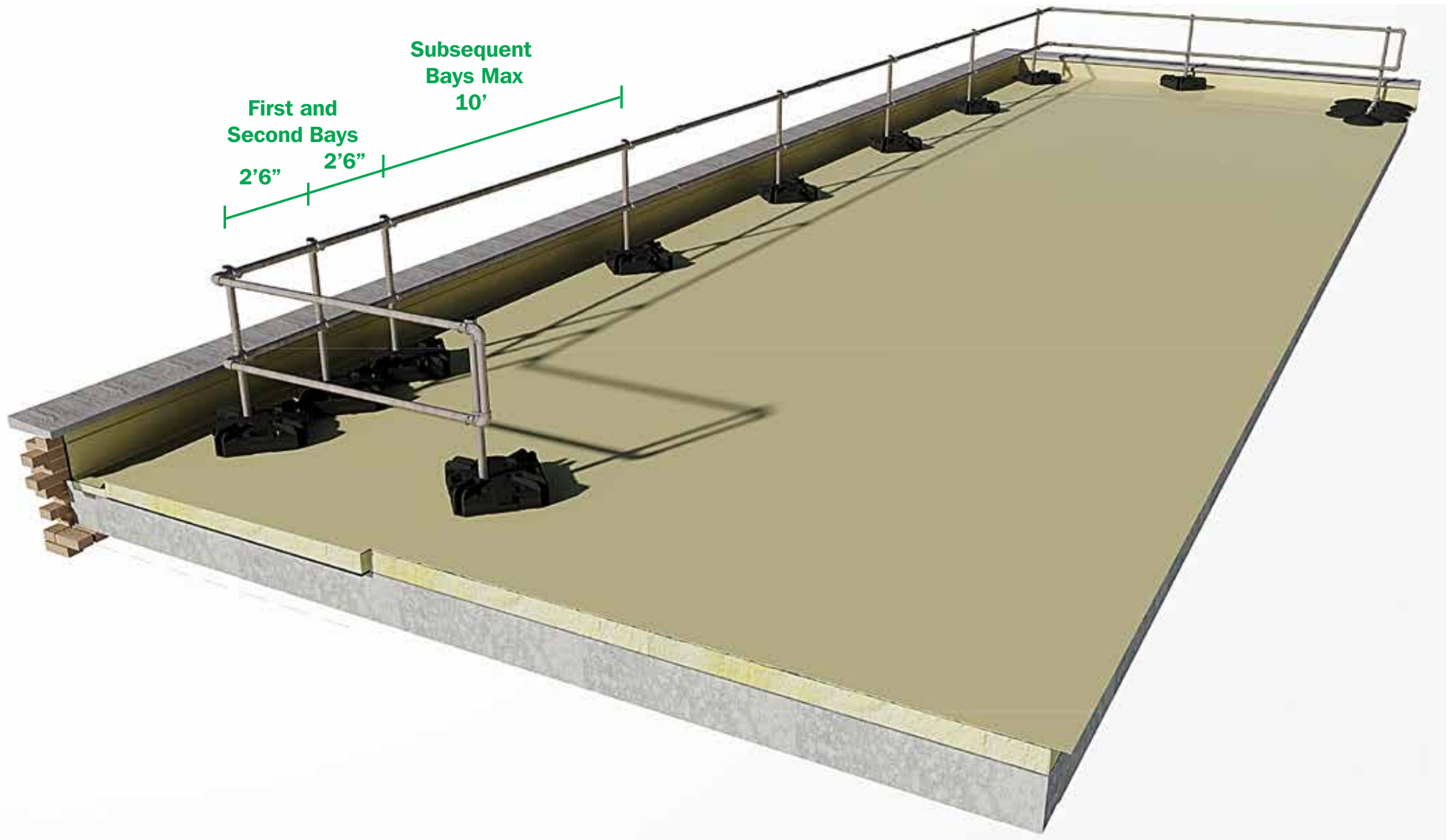


Figure 8.

## WARNING

Under no circumstances should any person be anchored to the system for fall arrest purposes. Further, components such as timber infill, advertising boards, polyethylene sheets must not be fixed to the system.

For installation guidance on to pitch single ply membrane roofs with a parapet or up-stand, please contact KeeSafety.



# Guardrail Systems Recertification

- Periodic inspections by a competent person are recommended by the manufacturer. The frequency will depend upon the environment, location and usage but should be at least every 12 months.
- Walk and visually inspect the complete installed system in relation to the general client's needs. Establish if any modifications and/or additional products are required to reflect any refurbishment requirements or additional plant & equipment which have been installed and require access.
- Check installation configuration is complete as per the original installation drawing/plan.
- Ensure the system has not been modified or tampered with by unauthorised persons.
- Check all base feet are in contact with the roof membrane.
- Check all counter weights are in place as per the original drawing. This is essential for wind loading calculations.
- Check all grub screws are in place, greased and sufficiently torque.
- Check that the general height and level of the system including the leg centres.  
(This only tends to be an issue if the system has been tampered with between inspections).
- Any galvanised components showing signs of corrosion should be wire brushed thoroughly and galvanised spray/paint applied as appropriate.  
If rusted significantly, take digital photographs and include these in the inspection report.
- Where toe-boards are fitted check the brackets that support the toe-board are in place, greased and sufficiently torqued.
- Where applicable, check fixings to walls/structures including cat ladder clamps are in place, greased and sufficiently torqued.
- Check system plaque position & mark up to reflect date of the next required inspection. Establish if additional plaques are required due to any refurbishment works.







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