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TEST REPORT

Title : **Testing of KeeGuard Roof Edge Protection System with 440-7 Counter Weights to EN 13374:2004 in a Restrained and Unrestrained Format**

Laboratory No. : **084505-26418**

Client : 
Kee Safety Ltd
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For Attention of : **Philip Higgs**

Your Reference : **Kee-Guard with 440-7 counter weights**

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TESTING OF KEE-GUARD 440-7 ROOF EDGE PROTECTION SYSTEMS TO EN 13374:2004 IN A RESTRAINED AND UNRESTRAINED FORMAT

1.0 INTRODUCTION

Kee Safety Ltd supplied a free standing roof edge protection system referenced as Kee-Guard using 440-7 counter weights, for static load testing in a restrained and unrestrained format to EN 13374:2004 Temporary edge protection systems. Product specification, test methods.

2.0 SAMPLES

2.1 Kee-Guard 440-7 Restrained

The test sample was a freestanding counterbalance system made up of free end counterbalance arms of Ø42.4mm x 3.2mm thick galvanised steel tube. The intermediate counter-balance arms are 1075mm long. They are secured to the tubes using 75.7 collars. The Uprights are made from Ø 48.3mm x 4.0mm thick Galvanised Steel tube.

Uprights were positioned at 2000mm centres. Two horizontal guardrails were fixed onto the inside of the uprights. These consisted of Ø48.3mm x 3.2mm thick galvanised steel and were fixed at 590mm and 1100mm above the base. The free end counterbalance consisted of 2 no. nominally 13.5kg weights, the intermediate counterbalance consisted of 1 no. nominally 13.5kg weights. A 6m run was set-up as shown in Figure 1.

2.2 Kee-Guard 440-7 Unrestrained

The test sample was a freestanding counterbalance system made up of free end counterbalance arms of Ø42.4mm x 3.2mm thick galvanised steel tube 2000mm long, intermediate arms set in 2000mm, of the same material 1075mm long. The free end counterbalance consisted of 7 no. nominally 13.5kg weights, the intermediate counterbalance consisted of 1 no. nominally 13.5kg weights. The weights were secured to the tubes using 75.7 collars. Two horizontal guardrails were fixed onto the inside of the uprights. These consisted of Ø48.3mm x 3.2mm thick galvanised steel and were fixed 590mm and 1100mm above the base. The uprights were Ø48.3mm x 4.0mm thick galvanised steel.

A 6m run was set-up as shown in Figure 2.

3.0 TEST PROGRAMME

Testing was carried out on each system set on an orientated strand board (OSB) surface with a coefficient of friction of less than 0.4. The OSB surface was fixed 10° to the horizontal. The system was tested in a restrained and unrestrained mode such that when it was restrained it was butted up against a 150mm high parapet and when unrestrained it was positioned 300mm back from the parapet.

A load was applied to the systems at 1100mm above the base in the positions as detailed below and shown in Figures 1 and 2:

- Free end upright
- Mid -span of end bay
- Intermediate upright with intermediate counterbalance
- Mid-span, central bay

4.0 TEST METHOD

A 1.2m x 2.4m x 125mm thick panel sheathed with OSB was fixed to the structures laboratory strong floor at each upright position at 10° to the horizontal. A 150mm high parapet wall was butted up to the toe of the OSB panel and rigidly fixed to the laboratory strong floor. The KeeGuard systems were then set-up as detailed in section 2 above and as shown in Figure 1.

Using a hydraulic ram and load cell, a preload of 100N was applied at the horizontal test positions and held for 1 minute. The load was then released and a linear voltage displacement transducer was positioned on an independent frame to measure deflection of the system at the load position. The transducer was zeroed and a load of 300N was applied and held for 1 minute. The deflection reading was taken and the load was released. A second static load of 495N was applied and the deflection reading taken immediately, the load was then held for 1 minute and released and a residual deflection was recorded. A final static load of 594N was applied, no deflection readings were required.

The test was repeated at each horizontal load position.

A vertical load of 1.25kN was applied to the top horizontal rail at the mid-span of the central bay over a 100mm spreader beam using a hydraulic ram and load cell.

5.0 RESULTS

The maximum deflection recorded at each test position for the Kee-Guard 440-7 system when unrestrained is given in Table 1 and restrained in Table 2. General views of the test arrangement are shown in Plates 1-2.

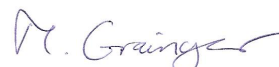
6.0 SUMMARY

According to EN 13374, the system under a static load must achieve a displacement after 1 minute of no more than 55mm at the first static load of 300N. Under the 2nd static load of 495N, the residual deflection shall not be greater than 10% of the maximum instantaneous recorded deflection. The system shall be able to sustain the final static load of 594N.

The system shall be able to withstand the 1.25kN vertical load applied at the most onerous position.

For each test position the maximum deflection was measured as less than 30mm. The residual deflection after the 2nd static load of 495N was less than 10% and the system withstood every 594N loads and 1.25kN vertical load.

Authorised by: .



MATTHEW GRAINGER
Testing Co-ordinator, CBT



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TABLES

Table 1

Maximum Recorded Deflections after load applications for KeeGuard 440-7
Unrestrained

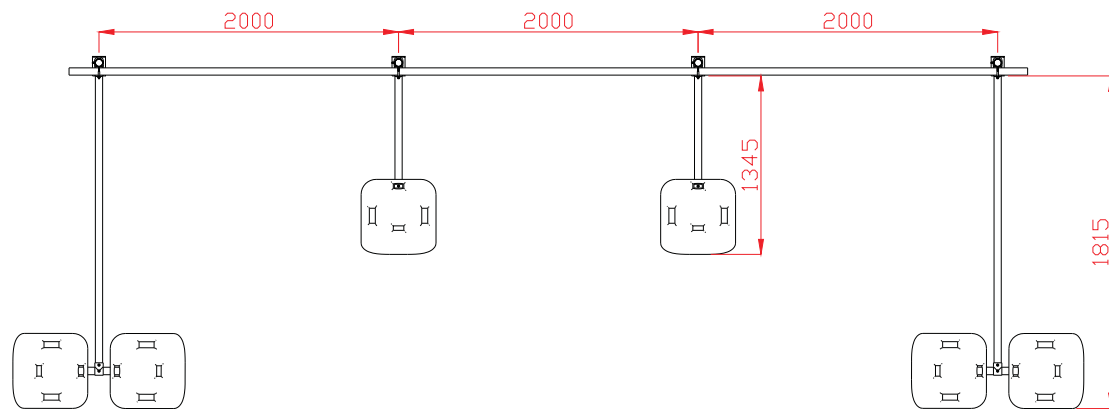
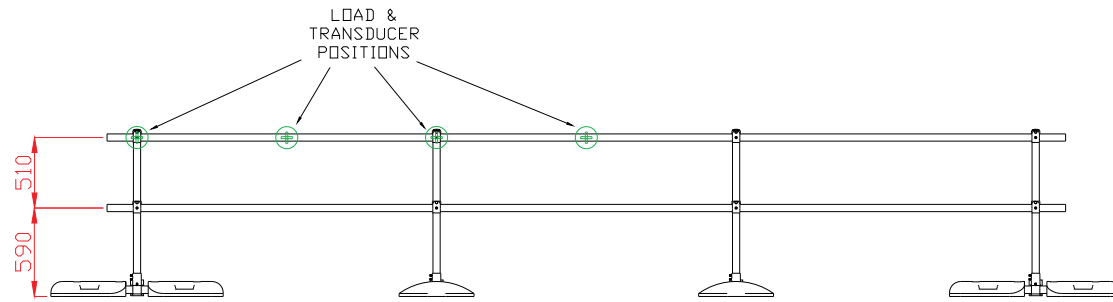
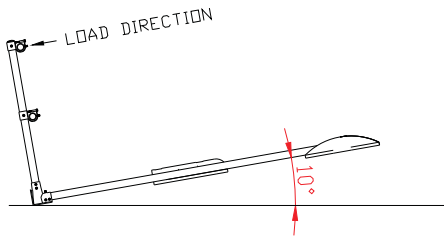
Load Position	Deflection (mm) at 300N	Deflection (mm) at 495N		Withstand a 594N Load	Withstand a 1.25kN Vertical Load
		Initial	Residual		
Free-end Upright	10.80	20.98	1.92	✓	✓
Mid-span of End-bay	11.15	19.41	1.50	✓	✓
Intermediate Upright	12.32	24.07	2.26	✓	✓
Mid-Span of Central Bay	11.27	21.77	1.26	✓	✓

Table 2

Maximum Recorded Deflections after load applications for KeeGuard 440-7
Restrained

Load Position	Deflection (mm) at 300N	Deflection (mm) at 495N		Withstand a 594N Load	Withstand a 1.25kN Vertical Load
		Initial	Residual		
Free-end Upright	10.62	16.80	1.08	✓	✓
Mid-span of End-bay	7.59	13.24	0.58	✓	✓
Intermediate Upright	7.06	15.12	0.52	✓	✓
Mid-Span of Central Bay	8.43	13.07	0.67	✓	✓

FIGURES



DWG. N°: **Figure 1** SCALE: NOT TO SCALE DATE DRAWN: 27/08/2008 DRAWN BY: A. BELLAMY

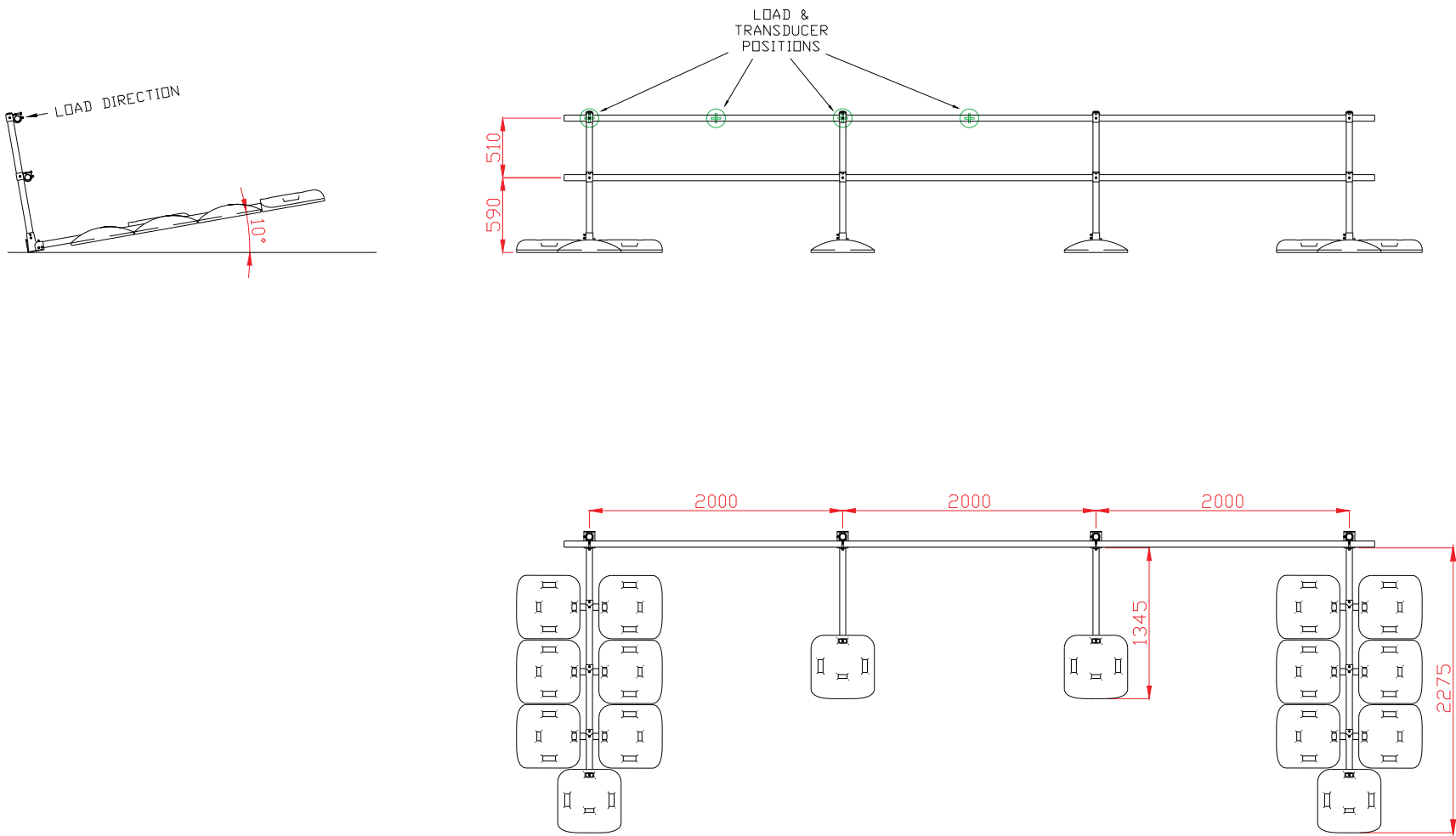
TITLE:
Detail and dimensions for restrained system tested to EN13374:2004



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DWG. N°: **Figure 2** SCALE: NOT TO SCALE DATE DRAWN: 27/08/2008 DRAWN BY: A. BELLAMY

TITLE: Detail and dimensions for un-restrained system tested to EN13374:2004



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PLATES



Plate 1

Load application arrangement at an upright position for Keeguard Unrestrained



Plate 2

Load application arrangement at an intermediate upright position for Keeguard Restrained