

Temporary Edge Protection System

Class A Static Tests

Test carried out by:

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Test carried out in:



1. Introduction

Temporary edge protection systems are used in construction work, primarily to prevent persons and objects from falling to a lower level from roofs, edges, stairs and other areas where protection is required. The temporary edge protection can in some situations also act as a handrail for people to hold onto when working or walking close to an edge.

The European Standard EN 13374:2004(E) specifies the requirements and test methods for temporary edge protection systems for use during construction or maintenance of buildings and other structures. Class A protection, classification of edge protection systems, provides resistance to static loads only, based on the requirements to:

- Support a person leaning on the protection or provide a handhold when walking beside it.
- Arrest a person who is walking or falling towards the protection.

Static test 'Class A' to be carried out in accordance with EN 13374:2004(E) as shown in figures 1.



Figure 1, Edge Protection System (King size post with top barrier and bottom barrier)

2. Test Method

Test to be carried out in accordance with EN 13374:2004(E) – A for different static loading conditions, as in following:

2.1 Horizontal load (acting perpendicular to the edge protection system). Each edge protection system shall be designed to withstand a static load of 0.3 kN applied perpendicular to the axis of the post, as indicated in figure 2, where maximum deflection should not exceed 55 mm.

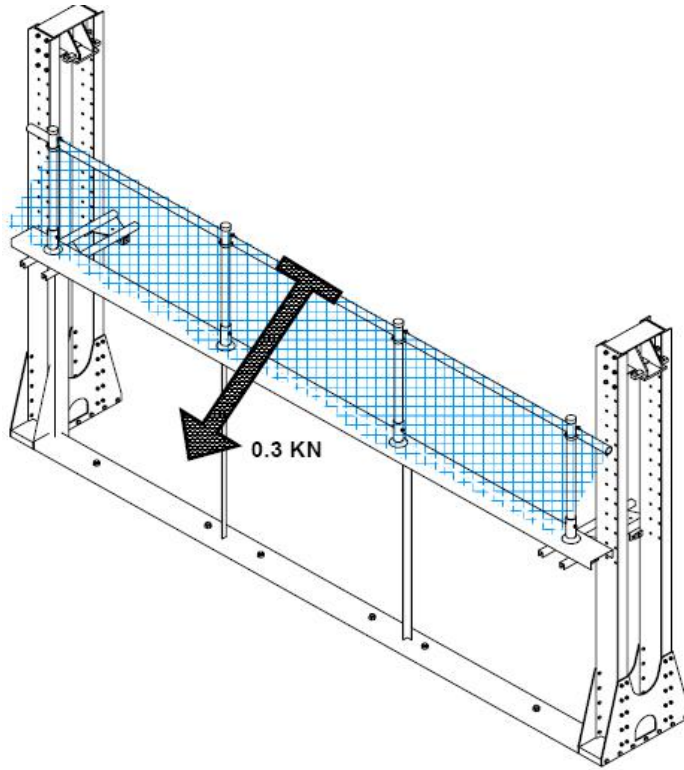


Figure 2, Edge Protection System with horizontal static load of 0.3 kN

2.2 Parallel load to the guardrail, each edge protection system shall severally be capable of withstanding a horizontal force of 0.2 kN at the most onerous point, as shown in figure 3, where maximum deflection not to exceed 55 mm.

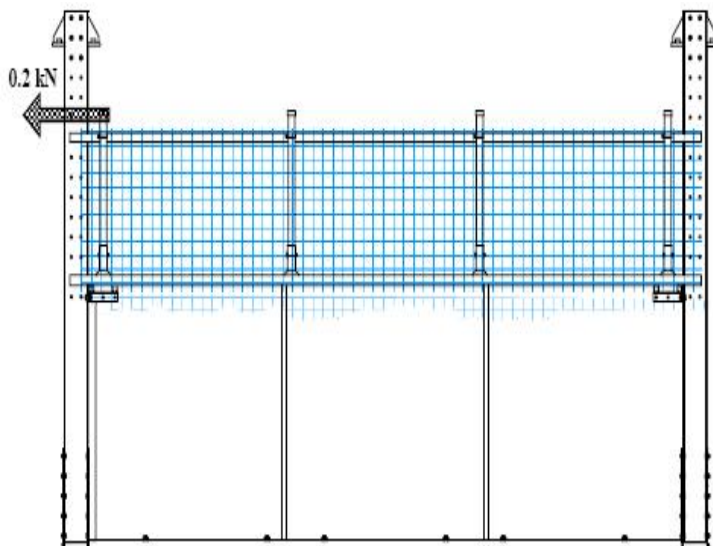


Figure 3, Edge Protection System with parallel (horizontal) static load of 0.2 kN

2.3 Accidental loading (Vertical), any guardrail or intermediate guardrail in the edge protection system, regardless of its support, shall be capable of resisting a downwards point load (vertical) of 1.25 kN and 6 kN on a length of 100 mm. This load shall be applied in the most unfavourable position of the edge protection system in downward direction within a sector of $\pm 10^\circ$ from vertical. A. Guardrail Mid Point, 1.25 kN, as shown in figure 4

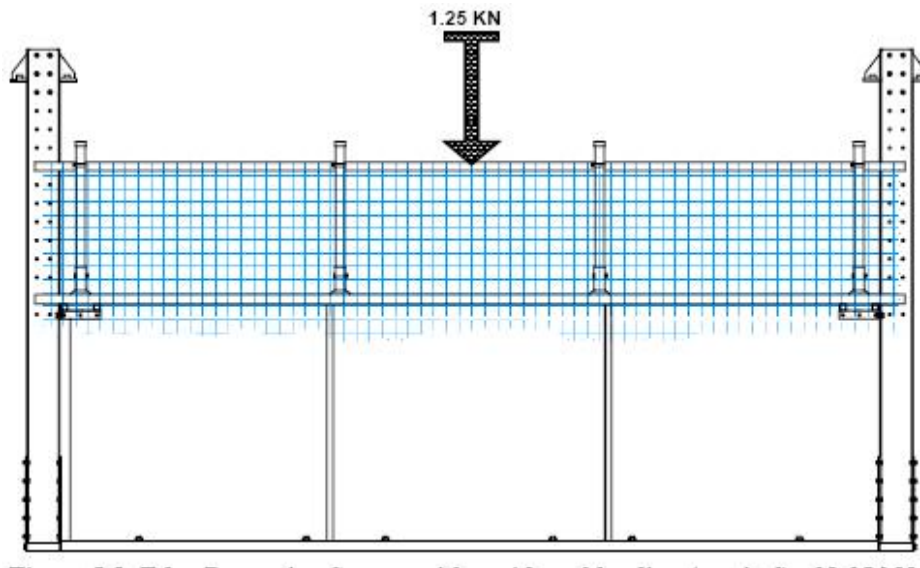


Figure 4, Edge Protection System with accidental loading (vertical) of 1.25 kN

3. Description of Test Procedure

All tests were carried out under the client instruction and request, which is according to the British Standard EN 13374:2004 – A. All tests were conducted in accordance with the loading conditions described in section 2. Same test procedure was used on both structures (single and ladder guardrails). The test procedure for each loading condition will be described as follows:

- Horizontal Loading

A hydraulic terminal with dial gauge was used to apply a horizontal pulling force of 0.3 kN or 30kg on the mid point of the guardrail. The procedure undertaken is as follows:

- Apply a preliminary load of 0.1 kN or 10 kg, the purpose of this load is to ensure that the system is properly bedded and that any looseness is taken out.
- The position of the guardrail was measured and recorded.
- The pulling force applied on the structure was increased up to 0.3 kN or 30 kg in equal increments.
- The deflection on the guardrail was measured from the mid point.
- The pulling force was reduced to 0.1 kN or 10 kg gradually then the mid point deflection was measured.
- The steps C, D and E were repeated twice in order to establish an accurate deflection measurement.



Figure 5, Horizontal loading and deflection measurement

- Parallel Loading to Guardrail

A hydraulic terminal with dial gauge was used to apply a pulling force of 0.2 kN or 20kg parallel to the guardrail by applying a pulling force at right angle to the top end of the post. The procedure undertaken is as follows:

- A preliminary load of 0.1 kN or 10 kg was applied and observations were made for any damage that occurred and the displacement of the post at each end was measured.
- The pulling force was increased by an increment of 0.1 kN or 10 kg each time up to 0.5 kN or 50 kg.
- Observations for any structure damage and the displacement of the post at each end was measured.



Figure 6, Parallel loading
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- Accidental loading (Vertical)

The temporary edge protection system was subjected to two different vertical accidental loading conditions, where each load was applied on separate occasion.

A vertical load of 1.25 kN or 125 kg was applied on guardrail mid point gradually using a hydraulic terminal with dial gauge and observations were made for any damage that occurred on the structure. Figure 16 shows the loading apparatus and structure under loading.



Figure 7, Accidental loading vertical onto mid point

4. Test Results

The test procedures described in section 5 were implemented for both types of the temporary edge protection system and all results were recorded accordingly. The details of the test results are presented as follows:

A. Horizontal

The test procedure was carried out under the instructions of the client and the regulations set by the British Standard EN 13374:2004 – A. The results are presented in table 1.

	Displacement measured (mm)		
	Test no.1	Test no. 2	Test no. 3
Horizontal load (0.1 kN)	10	11	10
Horizontal load (0.3 kN)	35	37	36
Deflection measured (mm)	25	26	26

Table 1, Test results for horizontal loading

B. Load Parallel to the Guardrail

The test procedure was carried out under the instructions of the client and the regulations set by the British Standard EN 13374:2004 – A. A preliminary horizontal pulling force parallel to guardrail of 0.1 kN, was applied and the displacement at the positions A and B were recorded. The displacement at A was 152 mm, and at B was 157mm. There was no indication of structural damage to the system. The pulling force was increased gradually up to 0.5 kN and thereafter the displacement at positions A and B were measured. The displacement at A was 155 mm, and at B was 160 mm. There also, was indication of structural damage to the system that was evident. Figure 8 demonstrate the loading and displacement measurements

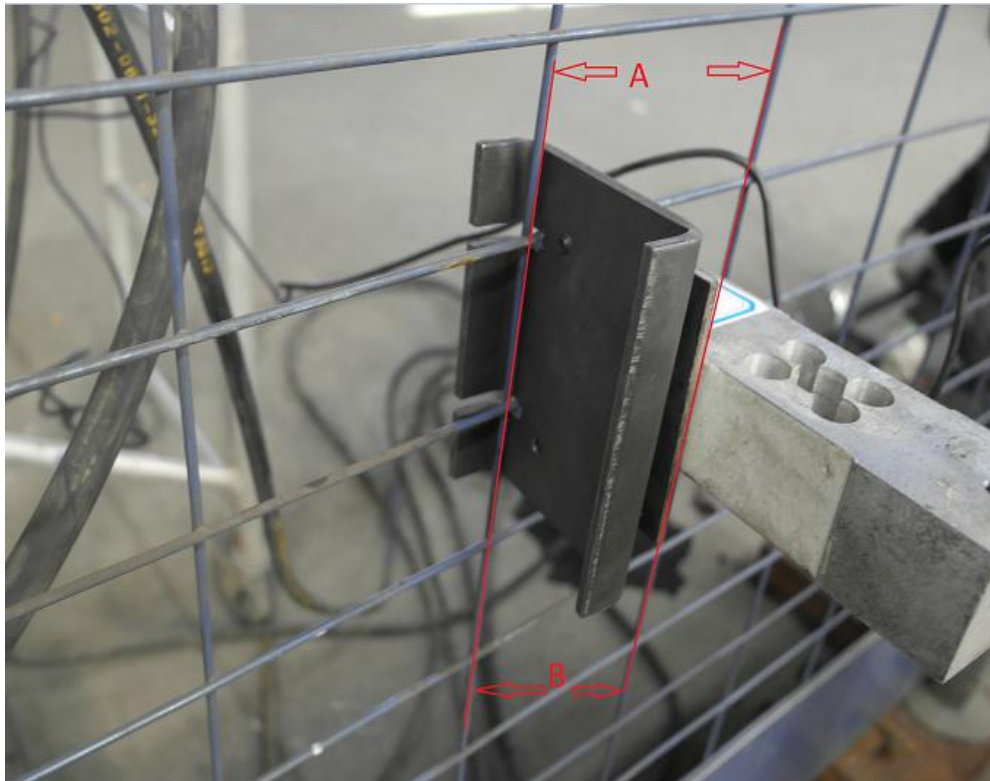


Figure 8, Load parallel to the mesh panel

C. Horizontal loading to the toeboard

The test procedure was carried out under the instructions of the client and the regulations set by the British Standard EN 13374:2004 – A.

A horizontal load of 0.2 kN (20 kg) was applied on mid point of toeboard gradually using a hydraulic terminal with dial gauge. The structure was able to withstand the load applied without experiencing any damage.

Horizontal Loading

The test procedure was carried out under the instructions of the client and the regulations set by the British Standard EN 13374:2004 – A. The results are presented in table 2.

	Displacement measured (mm)		
	Test no.1	Test no. 2	Test no. 3
Horizontal load (0.1 kN)	14	13	15
Horizontal load (0.3 kN)	40	41	40
Deflection measured (mm)	26	28	25

Table 2, Test results under Horizontal loading
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The average deflection calculated was 26.3 mm, which is lower than the maximum deflection permitted by the British Standard EN 13374:2004 – A.

D. Accidental loading (Vertical)

The test procedure was carried out under the instructions of the client and the regulations set by the British Standard EN 13374:2004 – A.

Only a vertical load of 1.25 kN or 125 kg was applied on guardrail mid point gradually using a hydraulic terminal with dial gauge. The structure was able to withstand the load applied without experiencing any damage, as shown in figure 9



Figure 9, Accidental loading vertical onto mid point

5. Test Confirmation

The temporary edge protection system with both single and ladder guardrail and all its attachments met the requirements set by the British Standard EN13374:2004 Class 'A' Static and accidental loading.

6. Reference:

1. British Standard BSi, European Standard EN, BS EN 13374:2004, English version of temporary edge protection systems – Product specification, test methods, June 2004,

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