

BSIF Overview - BS 13700:2021



BS 13700:2021 provides long-awaited guidance for the design, performance, testing, inspection, marking and instructions for permanent counterweighted guardrail systems (PCGS).

- Clarification on testing requirements during manufacturing
- Requirement for site specific wind load calculation for each installation
- Introduces requirement for annual inspection of systems

Forward

Over the past 40 years, the concept of edge protection has evolved considerably from the original scaffold poles to the more traditional fixed edge protection and today's popular cantilever edge protection systems.

While these types of guardrail systems provide valuable protection for those working at height on roofs, there has been confusion on the design and specification front. Particularly, which standards apply to counterweighted protection systems that are not physically fixed to the building.

As there was no specific standard for permanent counterweighted guardrail systems, BSI committee B514, consisting of fall protection and work at height industry experts and professionals, formed a small Working Group to produce a standard.

The long overdue new standard, BS 13700 was published in June 2021 and provides comprehensive guidance for those designing, testing, maintaining and inspecting permanent counterweighted guardrail systems (PCGS).

The following is an overview of the new standard for BSIF members and highlights best practice and the key aspects of the standard. Please refer to the full version of BS 13700 for comprehensive information on the requirements of the new standard.

Introduction

Falls from height continue to be one of the biggest causes of workplace fatalities and major injuries. With roofs being accessed regularly by a range of workers including service engineers, surveyors, site managers, contractors and builders, it's no surprise that falls from roofs account for over a quarter of fatalities in construction.

Under the Work at Height hierarchy of control measures, if work cannot be avoided then the next preferred option is to use an existing safe place of work that does not require additional equipment to prevent a fall. In other words, ideally a flat roof with permanent edge protection.



35 fatal injuries
were due to falls from height - that's 25% of all worker deaths during 2020 - 2021 (HSE).



47% of deaths
in the construction sector over the past 5 years were due to falls from height.

Counterweighted Guardrail: An Overview

Cantilever edge protection was originally designed to provide temporary protection for those carrying out flat roof repairs or refurbishment. The systems typically featured lifting base feet and interchangeable counterweights which allowed work to be carried out unhindered at the roof edge.

The free-standing system design also offered a further benefit over fixed guardrails as it avoided the need to penetrate the floor/roof slab, avoiding the likelihood of costly roof leakage.

Free-standing counterweighted systems became the preferred method of edge protection, and when the Workplace (Health Safety and Welfare) Regulations 1992 stated that "ACOP 108 "Secure fencing should be provided wherever possible at any place where a person might fall 2 metres or more," we saw an influx of systems being launched onto the market.

British and European Standards

During the mid-90s when we all became more conscious of the importance of regulations and standards, edge protection was designed to comply with existing standards including the following:

- EN 13374 2004 Temporary edge protection systems. Product specification, test methods (*preceded by Temporary Systems - HSE Specialist Inspectors Report – Design Loadings for Temporary Roof & Floor Edge Protection (HSE/SIR 15 – 1988)*)
- Permanent Systems - BS 6180: 1982 Protective Barriers in and about Buildings

Although it is always preferable to have standards to work to, these standards did lead to confusion, particularly which one should be followed:

- BS 13374 relates to temporary edge protection
- It does not specify the correct height requirements of 1100mm for permanent guardrails
- The wind loading requirements of 600 N/m² are fine for certain locations, but if you install systems north of London, this value is not sufficient
- The suggested serviceability and ultimate limit state loadings are appropriate for the intended protection of a few workers carrying out maintenance tasks
- On the other hand, the higher loadings specified in BS 6180 are more than the necessary loadings required to protect people carrying out maintenance tasks

There was also the important question of which standard applied to **permanent** counterweighted edge protection that is not physically connected to the building?

BS 13700:2021

The new standard has been specifically written for manufactured permanent counterweighted guardrail systems (or free-standing permanent guardrails), which are not fixed to a structure.

These systems rely on mass and friction and are designed to protect workers from a fall hazard.

Key Elements of BS 13700:2021

Manufacturing Design & Testing

- Serviceability and ultimate limit state loadings are the same as EN 13374 Temporary edge protection – Product specification, test methods
- Testing to be undertaken at 5° pitch
- Test surface cannot include parapets or other supports that would assist the product's performance during the test programme
- Testing to be undertaken in both wet and dry conditions

- Horizontal perpendicular loads to be applied to:
 - o Principal guardrail
 - o Intermediate guardrail
 - o Intermediate support
 - o Toe-board (where option is required)
- Horizontal parallel loads to be applied to:
 - o Principal guardrail
 - o Intermediate guardrail
 - o Toe-board (where option is required)
- Vertical (up & down) loads to be applied to:
 - o Principal guardrail
 - o Intermediate guardrail
 - o Intermediate support
 - o Toe-board (where option is required)
- Working wind and combined load

Installation design

- Each installation will require a site specific wind speed calculation that conforms to wind loading criteria in accordance with BS EN 1991-1-4:2005+A1:2010
- The final installation must conform to wind loading criteria recommended in BS EN 1991 as above
- All PCGS installations must be designed according to the specific wind speed calculations in relation to location, height of building and exposure level
- Manufacturers will need to provide calculations or software programmes to comply with this requirement

System technical file

- Following best practice guidance requirements of BS 7883:2019, each installation must have a “System Technical File.” This should be produced by the system designer and passed on to the duty holder for the life of the system. If applicable this should be kept in the health & safety file as required under the CDM Regulations 2015
- The System Technical File should include system design and layout, design calculations, wind speed calculations to confirm compatibility, safety inspection and test requirements
- The file must be made available to anyone carrying out future inspection and maintenance of the edge protection system

Inspection and maintenance

- Pre-use checks, inspections, maintenance and testing must be carried out in accordance with the manufacturer’s or supplier’s recommendations
- BS 13700 has introduced the requirement for annual inspection of permanently installed counter balanced guardrail to the manufacturer’s recommended examination regime
- The examination scheme recommends that a wind speed calculation is retrospectively applied to verify the original product’s wind design during the annual inspection
- Duty holders must be provided with a full inspection visit report, including a summary of the condition of the building’s edge protection system

Conclusion

BS 13700:2021 is the first standard to provide concise best practice requirements for permanent counterweighted guardrail systems.

The new standard addresses the ambiguity over other standards and provides consistency for manufacturers, designers, duty holders and inspection technicians.

In future, specific evidence must be provided relating to the design of the system, wind calculations and inspection regimes in order to ensure that these critical safety systems have been designed, installed, inspected and maintained to the highest standards.



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