

An introduction to BS 13700:2021



Permanent Counterweighted
Guardrail Systems – Specification

This overview details the introduction of BS13700:2021 and latest guidance for the Recertification of Permanent Counterweighted Guardrail Systems (PCGS), from the perspective of the Duty Holder (normally the Building Occupier).

This latest guidance provides critical safety information for the provision & use of (PCGS) for those accessing your roof, to which you have a duty of care!

Compliance with the current standard helps separate people from hazards and keeps your systems safe and serviceable.

For many reasons falls from height remain statistically amongst the largest cause of occupational fatalities within the workplace. An important way to reduce these fatalities is to ensure, beyond doubt, the (PCGS) used to protect against falls from height are inspected properly, in perfect working condition and recorded as such.

In a continuous drive to improve the Occupational Safety & Health (OSH) within our industry, British Standards Committee (BS14) was formed, drawing on the knowledge and wisdom of many work at height Industry experts, including professionals from within our Company.

The new standard – BS 13700 released in Spring 2021, constitutes a long overdue specific standard for (PCGS). This best practice document provides comprehensive guidance for those designing, testing, maintaining, and inspecting, (PCGS).



OVER THE LAST FIVE YEARS
FALLS
FROM HEIGHT
have accounted for **26% of all fatal accident injuries** (an average of 37 fatal injuries per year).

OVER
60% OF DEATHS
when working at height involve falls from **ladders, scaffolds, working platforms and roof edges** and through fragile roofs.

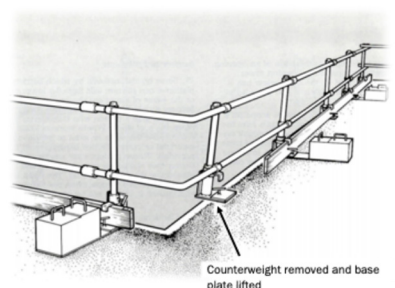
Historic Overview

Over the last forty years numerous cantilever edge protection systems have been launched in the UK and across the globe.

These products were initially developed to provide temporary cantilevered edge protection for those carrying out flat roof refurbishments/repairs and featured a lifting base foot and interchangeable cantilever weight, thus allowing work at the edge to continue unhindered while the guardrail remains in position. The early products were featured in HS-G33 published in 1987 (see below) and tested and conformed to the Health & Safety Executive – Technology Division – Specialist Inspectors Report – Design Loadings for Temporary Roof & Floor Edge Protection (HSE/SIR 15 – 1988).

The free-standing features of these temporary cantilevered edge protection systems offer key advantages over traditionally fixed guardrails principally because they eliminate the requirement to drill/weather into the floor/roof slab which would otherwise increase the likelihood of water ingress. This significant advantage led to many manufacturers launching cantilever edge protection systems and demand significantly increased with the introduction of the Workplace (Health Safety and Welfare) Regulations 1992 requiring: "ACOP 108 "Secure fencing should be provided wherever possible at any place where a person might fall 2 metres or more."

40 WORKERS
suffered fatal injuries as a result of falling from height – **that's 27% of all UK fatalities in the workplace**, and five more deaths than in 2017-18.



Above: Flat Roof Edge Protection: Proprietary counterweight guardrail system

British and European Standards

During the mid-90s edge protection systems complied with the following: –

Permanent Systems – BS 6180: 1982 Protective Barriers in and about Buildings

Temporary Systems - HSE Specialist Inspectors Report – Design Loadings for Temporary Roof & Floor Edge Protection (HSE/SIR 15 – 1988) – Superseded by EN 13374 2004 Temporary edge protection systems. Product specification, test methods.

Based on the above, an important question remained unanswered. Which Standard applies to permanent counter balanced edge protection that is not physically connected to the building?

The truth of the matter is neither Standard is truly appropriate. EN 13374 is a Standard for temporary edge protection and does not specify the correct height criteria of 1100mm for permanent products. Equally the wind loading of 600 N/m² is inappropriate for sites generally to the North of London. However, the suggested serviceability and ultimate limit state loadings are appropriate for the intended protection of a few persons carrying out maintenance tasks as opposed to BS 6180 which specifies much higher loadings that are beyond the necessary requirements for the intended protection of a few persons carrying out maintenance tasks. (Please see Technical Paper – OVERVIEW OF LEGAL REQUIREMENTS FOR PERMANENT AND TEMPORARY EDGE PROTECTION – for full comparison).

Hence the requirement for a new, appropriate Standard to remove the current ambiguity, BS 13700 – Permanent Counterweighted guardrail systems (PCGS). The specification, published in Spring 2021, finally provides a specific standard for permanent counterweighted guardrail systems (PCGS).

The key features of BS 13700 include:

- Serviceability and ultimate limit state loadings are the same as EN 13374 Temporary edge protection systems – Product specification, test methods.
- This new Standard will be introduced to provide comprehensive guidance for those manufacturing counter balanced guardrail systems that are permanently installed.
 - a) Testing at 5-degree pitch
 - b) No provision for upstand/parapet during testing
 - c) Testing in both dry and wet conditions
 - d) Horizontal perpendicular and parallel loads – Vertical (up & down) loads applied to:-
 - i. Principal guardrail
 - ii. Intermediate guardrail
 - iii. Intermediate support
 - iv. Toe-board (where option is required)
 - e) Working Wind & Combined load
- A significant requirement of this new Standard is that every proposed quotation and final installation will require a site-specific wind speed calculation conforming to wind loading criteria in accordance with BS EN 1991-1-4:2005+A1:2010.
- This standard requires all guardrail installations to be designed for specific wind speed calculation in relation to the location, height of building and exposure level. All manufacturers will have to provide calculations or software programs to comply with this requirement.
- The standard has also introduced the requirement for annual recertification of counter balanced guardrails installed permanently and provides an examination scheme.

Thorough Examination Requirements

Section 9.3 of the standard reads "The PCGS shall be inspected annually, or after a significant event e.g. severe damage, by a competent person in accordance with the manufacturer's recommendations."

Under Section 9.3 "thorough examination requirements" there is an advisory note recommending that all (PCGS) be retrospectively wind speed calculated to verify the original design. This is a significant recommendation that is intended to ensure systems installed many years ago are still safe to remain in place.

The following checks shall be undertaken during the thorough examination:

- a) system information – comprising System Technical File, specification, test reports/certification, installation drawings, load calculations including wind speed (see Annex A & B of the standard), examination scheme (retained by Client/Duty Holder) and signage & labelling recommendations for access/egress points;
- b) signs of unauthorised modifications or missing components;
- c) unauthorised additions to (PCGS) e.g. clamped plant & equipment, banners, infill panels, netting etc;
- d) height of guardrail set correctly at 1100 mm;
- e) configuration of the PCGS in accordance with manufacturers O&M manual;
- f) bay centres (distance between vertical leg/support) in accordance with manufacturers O&M manual
- g) intermediate cantilever tubes/plates position and specification i.e. length/diameter in accordance with manufacturers O&M manual;
- h) intermediate counterweight/plates position and quantity in accordance with manufacturers O&M manual;
- i) freestanding end cantilever tubes/plates position and specification i.e. length/diameter in accordance with manufacturers O&M manual;
- j) freestanding end counterweight/plates position and quantity in accordance with manufacturers O&M manual;
- k) friction/protection elements present on all components and in contact with roof surface;
- l) end terminations of principal & intermediate guardrails (as appropriate) i.e. mechanical anchors (into concrete); chemical anchors (into masonry);
- m) fixings/clamps to ladders, gates present
- n) tubes and castings free from damage i.e. cracks, stress fractures;
- o) accessible fixings i.e. grub screws/fastenings present and torque set;
- p) Inspect all components for signs of corrosion; and
- q) review & update system label in accordance with manufacturer's requirements, including as a minimum:
 - 1) manufacturer
 - 2) installer details
 - 3) product standard to which the system conforms, i.e. BS 13700:2021
 - 4) reference/serial number
 - 5) date of inspection
 - 6) next inspection due date
 - 7) pictorial instructions referring to manufacturer's O&M manual; and
 - 8) manufacturer's warnings.

Inspections and Results

The inspection criteria adopted provides four categories of inspection results:

PASS: Satisfies all relevant recommendations, allowing the (PCGS) and to remain in service.

CONDITIONAL PASS: Satisfies the recommendations of a previous standards or code of practice and does not represent an immediate safety concern but does not meet all recommendations in accordance with BS 13700:2021, this includes the absence or missing information contained within the System Technical File. The (PCGS) should be labelled as remaining in service with a detailed inspection report produced and issued to the Duty Holder with remedial recommendations and timescale for completion.

CONDITIONAL FAIL: Satisfies the recommendations of a previous standards or code of practice but represents an immediate safety concern which is capable of improvement, subsequently the (PCGS) does not satisfy the recommendations in accordance with BS 13700:2021. The (PCGS) should be labelled as taken out of service with a detailed inspection report produced and issued to the Duty Holder with remedial recommendations and timescale before the (PCGS) is re-inspected and returned to service.

FAIL: Does not satisfy the recommendations of a previous standard or code of practice and represents an immediate safety concern which is beyond improvement or repair, subsequently the (PCGS) does not satisfy the recommendations in accordance with BS 13700:2021. The (PCGS) should be labelled as taken out of service, The roof area, where the (PCGS) is providing protection, should be closed to access and all access routes labelled "DO NOT ENTER AREA –", and where possible the Duty Holder immediately advised with a subsequent inspection report produced and issued to the Duty Holder.



System Technical File

Following the "best practice" requirements of BS 7883:2019 every installation should have a "System Technical File".

This evidence-based document is produced by the System Designer for forward transmission to the Duty Holder and should be placed, where appropriate, in the health & safety file required under the Construction (Design & Management) Regulations 2015.

The Duty Holder must then retain the file and ensure it is available to anyone who may need it for as long as it is relevant – normally the lifetime of the building – to enable them to comply with health and safety requirements during any subsequent work/inspection. The System Technical File shall include the system design and layout, design calculations, and wind speed calculations permitting compatibility, safety, and operational suitability to be assessed and verified.



Should any of the above information be absent at the time of an inspection then we can assist Duty Holders with completing a full system review and where applicable, undertaking supplementary inspections to establish how the product was structurally anchored into the base material.

Examination Scheme

As the global leader within our industry we have embraced BS 13700 and created an examination scheme and ability to produce wind speed calculations as part of the annual inspection.

We inspect all systems and their technical file. Any deficiencies are categorised in a standard format (pass, conditional pass, conditional fail or fail), with full explanation, photographic evidence and any necessary solutions and time frame recommendations.

We have invested in the latest field-based technology which is fully aligned with the new standards requirements and the appropriate examination scheme.

Our system provides the Duty Holder and Recertification Technician with clarity and consistency of approach and interpretation of the specific product standards and their complexities.

Duty Holders receive a full inspection visit report, including a summary of their building's edge protection equipment condition. Reports are submitted in an electronic format and for multiple site inspections these can be hosted on our online portal, allowing access to all building/site reports in one safe place.

“ Our system provides the Duty Holder and Recertification Technician with clarity and consistency of approach and interpretation of the specific product standards and their complexities. ”



Conclusion

The introduction of this new Standard – BS 13700:2021 at last provides a standard for permanent counter balanced edge protection.

This brings clarity and consistency for the manufacturer, designer, Duty Holder and Recertification Technician, ensuring these safety critical edge protection systems are designed, installed, inspected, and maintained to the highest standard.

A certificate is no longer sufficient to prove that all is compliant and safe. Specific details of all inspection criteria must be supplied to the Duty Holder, for them to justify to themselves that all is safe.

It is no longer reasonable to assume "it must have been designed and installed correctly in the first place" and there must be evidence of how any edge protection system has been wind speed calculated for the given location of installation. If this information is not available, BS 13700 requires this to be completed during the thorough annual examination of the system.

The introduction of requirements for wind speed calculations and an annual inspection is designed to ensure all crucial elements of a counter balanced edge protection system installation are properly recorded and remain available to facilitate the safe operation and maintenance of the edge protection system.

Our detailed recertification inspection of edge protection systems is aligned with the requirements of BS 13700 2021. This ensures the safety equipment has been subject to a rigorous inspection process and is safe for continual use. Where it is established that the equipment requires remedial repair/replacement, we take it as our duty to provide a comprehensive evidenced report complete with photographs and quotation to return the system to service.

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