

Construction
Design Handbook

**Guidance on the Design and Use of
Temporary Scaffold Guards**

DH 25

Issue 1

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1 PURPOSE AND SCOPE

This document gives guidance for the design, construction, maintenance and protection of temporary scaffold guards and where applicable nylon or polypropylene netting. It shall be used at Overhead line crossings of Roads, Railways, Waterways, Power lines, buildings and other obstacles requiring installation of scaffold guards. This guidance is intended to ensure that safety of the public, workers, livestock etc is provided at all times for the duration of the works. Best endeavour shall be used to maintain traffic flow at road, railway and waterway crossings during the installation, maintenance and removal of overhead line conductors. Similarly, at power line crossings, protection to the lower line if not removed or undergrounded shall be maintained at all times during work on the upper line.

When assessing scaffold requirements during walk over surveys at the early stages of the project, an assessment of the work method and risk assessment shall be undertaken with regard to minor roads to identify whether there is a requirement for a protection scaffold or other suitable methods of control. Other innovative protection structures can be utilised where their suitability can be demonstrated for the type of crossing under consideration.

2 GENERAL REQUIREMENTS

The design of scaffold structures for work on National Grid overhead lines shall meet the parameters set out in this document and shall comply with all relevant standards and any applicable National Grid Technical Specifications, Policies, Business Procedures and Safety Rules listed in section 4.

Temporary works design is subject to National Grid's design assurance process and shall comply with the requirements of TP 184 and 188. Guidance on design assurance activities carried out on national Grid schemes is presented in Design Handbook (DH) 24.

It is a requirement under Construction Design and Management (CDM) Regulations 2007 that construction hazards and risks be identified at the very early stages of design process. On National Grid projects, these are addressed during HAZID and design review meetings as required by TP188.

The elimination and reduction of hazards and risks process is outlined in TP189 "Safety by Design" and shall be adhered to throughout the design and construction stages of the project.

2.1 Statutory Requirements

2.1.1 Electrical Clearances

All work below or adjacent to overhead electrical conductors and equipment, is subject to National Grid's approved electrical clearances as stated in the latest edition of National Grid's Safety Rules.

Clearances from the scaffold structure, netting and catenary wires to live conductors of the upper overhead line shall be not less than those listed in Table 1.

Voltage Of Overhead Line	Minimum Clearance from live Conductors to scaffold guard, netting and catenary wires (on which a person can stand)*	Minimum Clearance from live Conductors to scaffold guard, netting and catenary wires (on which a person can not stand)
	Vicinity Zone (see Appendix B)	Live Zone (see Appendix B)
132kV	3.6m	1.4
275kV	4.6m	2.4
400kV	5.3m	3.1

Table 1 - Clearances to Scaffold Guards

* Including ladders, access platforms etc.

The clearances specified in Table 1 must not be infringed at the specified maximum conductor temperature with the conductors, including suspension insulators when installed – hanging vertically in still air or deflected at any angle up to 45 degrees from the vertical towards the object, unless otherwise specified in a safety document. In situations where the above clearances when assessed at 45° swing are infringed, the actual conductor swing could be estimated by calculation taking into consideration the geographical location and topography of the scaffold guard site. The method of calculation shall be agreed with National Grid.

Note: The most onerous conductor sag between existing and new conductors shall be considered for clearance checks as appropriate.

For each scaffold guard design, the “Details and Review Form” in TP184 shall be produced and completed. It shall also contain all key information relevant to the design of scaffold guard including project and location details, circuit information and all design reference documents produced by the Overhead Line (OHL) Design Engineer.

The Scaffold guard designer shall be required to produce a design brief as detailed in BS 5975. This brief shall be used as the basis for all design work carried out and shall list any documents and drawings referred to, assumptions or design methods adopted and agreed, specifications, codes & standards used in the design of scaffold guard structures.

The checking of the scaffold guard design shall be carried out by a competent Engineer of an independent organisation who shall sign the “Checked by” entry of the Details and Review Form. The “Approved by” entry shall be signed by the OHL contractor’s Lead Design Verification Engineer (LDVE) as a confirmation that the scaffold guard design and details are in compliance with the OHL design and clearances stated on the appropriate drawings.

National Grid SAP’s role is to address safety from the system and shall only sign the Details and Review Form once the scaffold guard design signatures are implemented. If in the opinion of the SAP that the stated clearances were unsatisfactory or may be infringed during construction works, he may consider further survey and/or design checks be carried out or ultimately stop the works until such clearances are satisfactory and compliant with National Grid Safety Rules.

All work carried out by or on behalf of National Grid which may have the potential to infringe safety clearances on or near overhead lines must be carried out under appropriate safety documentation. The Senior Authorised Person will assess the means of achieving safety from the system as required.

2.1.2 Earthing of Temporary Guards

All scaffold structures and fencing where installed shall be earthed at the early stages of construction and shall comply with the requirements of BS 7430. Where possible, the resistance to earth of each scaffold shall not be more than 1.0 k ohm. If the earth resistance cannot be achieved with driven tubes fixed to the scaffold structure, alternative earthing systems shall be used to

achieve the required earth resistance and shall be secured electrically and mechanically to the scaffold by flexible conducting leads of minimum 50 mm² Aluflex. Lead terminations and clamps shall be corrosion resistant and comply with the requirements of BS 951. The earth resistance achieved from the tests shall be recorded.

All parts of the scaffold shall be adequately interconnected to provide electrical continuity.

If any part of a scaffold structure is within 2.0 m of any tower steelwork or its attachments, the scaffold shall be fully bonded to that tower. Two separate bonds are to be applied: one between a base tube and the lowest accessible point on the tower leg and the other between the top of the scaffold and the same tower leg.

The bond shall be as a minimum 50 mm² Aluflex with approved terminations as above and be kept as short and as straight as possible. It shall be applied as soon as practicable and only removed at the final stage of dismantling.

2.1.3 Anti-Climbing and Danger Notices

Anti-climbing devices or other means of protection shall be provided around all structures. Where anti-climbing devices are used, due consideration shall be given to the specific site conditions, i.e. location and terrain etc. If a barbed wire is required, it must as a minimum be in accordance with the scheme illustrated in Appendix A.

Other alternatives of scaffold protection such as Heras fencing may be used in lieu of anti-climbing devices. Where Heras fencing is adopted, it shall fully enclose the scaffold guard and working areas and provide a minimum of 2m clearance around the scaffold structure. Double clips facing inwards shall be used to secure the fence panels. Any protection system to be adopted for the site under consideration shall be agreed with National Grid.

All structures shall be fitted with danger warning plates in accordance with the Electricity Safety, Quality and Continuity Regulations 2002, at intervals of not more than 6 m along all faces immediately above the anti-climbing device. A minimum of one plate per face shall be fitted.

Anti-climbing devices where used shall be fitted as soon as reasonably practicable and no scaffold shall be left unattended without an anti-climbing device fitted.

2.2 Design and Site Specific Requirements

2.2.1 Position and Height of Scaffold Guards

Scaffold guards shall be positioned such that they extend not less than 5.0 m beyond the outermost conductors of the upper overhead line measured at right angles to the line. Not more than 2.0 m of this projection on the structures may take the form of a catcher guard inclined not more than 45° from vertical.

Netted crossings shall where possible be parallel to and opposite each other and where reasonably practicable be parallel to the crossing they are providing protection to.

Where scaffold guards are erected at 90 degrees to the line above for reasons such as to overcome any issues related to reduced clearances, the design shall take into consideration any implications caused by conductors falling directly onto the netting.

Informative: diagonal catenaries may be installed to ensure that conductors fall onto the catenaries in lieu of netting

Scaffold guard positions shall be agreed with all affected parties or Authorities and any clearances specified by these shall be adhered to. Clearances shown in Table 2 are for guidance purposes and shall be used where no specific clearances are available. These clearances shall be substituted by those specified by the affected party or Authority.

All works associated with scaffold guards shall take into consideration any third party services and shall comply with all affected party requirements. All applicable legislation including Health and Safety Executive (HSE) requirements shall be adhered to.

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