



HEALTH AND SAFETY  
AUTHORITY

# CODE OF PRACTICE FOR ACCESS AND WORKING SCAFFOLDS



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# Foreword

The Health and Safety Authority (by virtue of section 60 of the Safety, Health and Welfare at Work Act 2005), following consultation with the statutory Advisory Committee on Construction Safety (referred to as the Construction Safety Advisory Committee), the Construction Industry Federation, the Irish Congress of Trade Unions and the general public (through the Authority's website), and with the consent of Mr Billy Kelleher TD, Minister of State at the Department of Enterprise, Trade and Employment, publishes this Code of Practice entitled "Code of Practice for Access and Working Scaffolds".

The aim of this Code of Practice is to provide practical guidance to scaffold erectors, contractors and users of scaffolding on the requirements and prohibitions set out in the relevant statutory provisions.

In particular, but not exclusively, this Code of Practice provides practical guidance as to the observance of the provisions of:

- (i) Chapter 1 of Part 2 (sections 8 to 12 in relation to the general duties of employers) and Chapter 2 of Part 2 (sections 13 to 14 in relation to the general duties of employees etc.) of the Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005);
- (ii) Part 2 (Regulations 6 to 23 in relation to design and management), Part 3 (Regulations 24 to 29 in relation to the general duties of contractors and others) and Part 4 (Regulation 30 in relation to site safety and access to construction sites, Regulation 35 in relation to protection from falling material and protective safety helmets, Regulation 40 in relation to lighting of work places, Regulation 42 in relation to projecting nails and loose material, Regulation 43 in relation to construction of temporary structures and Regulation 44 in relation to avoidance of danger from collapse of structures) of the Safety, Health and Welfare at Work (Construction) Regulations 2006 (S.I. No. 504 of 2006); and
- (iii) Chapter 2 of Part 2 (Regulations 27 to 59 in relation to the use of work equipment), Chapter 3 of Part 2 (Regulations 62 to 67 in relation to personal protective equipment), Part 3 (Regulations 74 to 93 in relation to electricity) and Part 4 (Regulations 94 to 119 in relation to work at height) of the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007) as amended by the Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2007 (S.I. No. 732 of 2007).

This Code of Practice comes into effect on 1<sup>st</sup> January 2009. Notice of publication was published in the Iris Oifigiúil of 2<sup>nd</sup> December 2008. It replaces the Code of

Practice for Access and Working Scaffolds issued by the Authority in 1999 in accordance with the Safety, Health and Welfare at Work Act 1989.

As regards the use of Codes of Practice in criminal proceedings, section 61 of the 2005 Act provides as follows:

61. (1) Where in proceedings for an offence under this Act relating to an alleged contravention of any requirement or prohibition imposed by or under a relevant statutory provision being a provision for which a code of practice had been published or approved by the Authority under section 60 at the time of the alleged contravention, subsection (2) shall have effect with respect to that code of practice in relation to those proceedings.
- (2)(a) Where a code of practice referred to in subsection (1) appears to the court to give practical guidance as to the observance of the requirement or prohibition alleged to have been contravened, the code of practice shall be admissible in evidence.
- (b) Where it is proved that any act or omission of the defendant alleged to constitute the contravention—
- (i) is a failure to observe a code of practice referred to in subsection (1), or
  - (ii) is a compliance with that code of practice, then such failure or compliance is admissible in evidence.
- (3) A document bearing the seal of the Authority and purporting to be a code of practice or part of a code of practice published or approved of by the Authority under this section shall be admissible as evidence in any proceedings under this Act.

**Robert Roe**  
**Assistant Chief Executive Officer and Secretary to the Board**

# 1. Introduction

## 1.1. Background

The Code of Practice for Access and Working Scaffolds was first published in 1999. The Code was the result of a joint initiative by the Health and Safety Authority, the Construction Industry Federation and the Irish Congress of Trade Unions to improve the standard of scaffolding. It was drafted in consultation with the organisations represented on the Advisory Committee on Construction Safety.

This revised edition of the Code of Practice takes into account technical progress and recent changes to health and safety legislation.

## 1.2. Scope of Code of Practice

This Code of Practice applies to all places of work where scaffolds are used to provide working platforms, protection from falls or means of access during construction work.

The Code gives recommendations and practical guidance on the erection, use, inspection and dismantling of simple access and working scaffolds. It also gives recommendations and practical guidance on the training and instruction of those erecting, dismantling and using scaffolds.

The Code deals mainly with system scaffolds as these are the most common scaffolds used in Ireland. It also contains outline guidance on the erection of basic tube and fitting scaffolds. The Code does not give detailed recommendations or guidance on special scaffolds such as cantilever, truss-out or slung scaffolds.

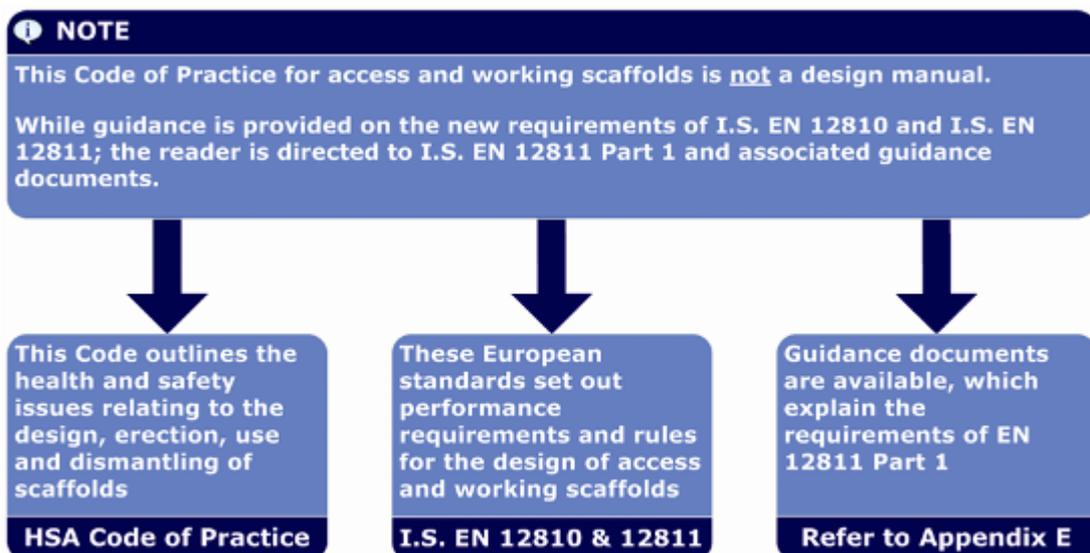
The previous Code was in line with the recommendations of BS 5973, 1993: *Code of practice for access and working scaffolds and special scaffold structures in steel*. This standard was withdrawn in 2004 and replaced by I.S. EN 12811 Part 1, 2004: *Temporary works equipment – Scaffolds – Performance requirements and general design*.

I.S. EN 12811 Part 1, 2004 specifies performance requirements and methods of structural and general design for access and working scaffolds, in particular where the scaffold relies on the adjacent structure for stability. In general these requirements also apply to other types of working scaffold. This European standard also specifies structural design rules when certain materials are used and general rules for prefabricated equipment.

The main changes in I.S. EN 12811 Part 1, 2004 from BS 5973, 1993 include:

- the definition of six service load classes, some with partial area loads;

- the definition of seven width classes or “ranges” whose minima range from 0.6m to 2.4m. The range of each class is typically 0.3m. Compliance with the requirements of this clause precludes the use of ledger bracing, which is generally used on tube and fitting scaffolds;
- the definition of two headroom classes, where the distance between platforms is a minimum of 1.9m;
- the requirement that the gaps between platform units do not exceed 25mm;
- the requirement for a minimum unimpeded area along the full length of the working area;
- a reduction in the number of working platforms in use for light duty, general purpose and heavy duty scaffolds. When in use a scaffold is considered to have one platform with 100% of the service load and one adjacent platform (above or below) with 50% of the service load;
- the definition of an in-service condition and an out-of-service condition for boarded out platforms;
- in the absence of wind, a scaffold shall have applied at the working area, on every bay, a notional horizontal load applied separately parallel and perpendicular to the bay;
- wind loading on scaffolds can be calculated in accordance with BS 6399-2; and
- tie patterns and their design are not included in this code of practice. For tube and fitting scaffolds, refer to the design standards for an appropriate tie pattern. For proprietary or system scaffolds, follow the erection manual from the scaffold manufacturer.



Information on scaffolding materials and testing requirements is provided in I.S. EN 12811 Part 2, 2004: *Temporary works equipment – Part 2: Information on materials* and I.S. EN 12811 Part 3, 2002: *Temporary works equipment – Part 3: Load testing*.

The requirements for façade scaffolds are dealt with in I.S. EN 12810 Part 1, 2004: *Façade scaffolds made of prefabricated components – Part 1: Products specifications* and I.S. EN 12810 Part 2, 2004: *Façade scaffolds made of prefabricated components – Part 2: Particular methods of structural design*.

### 1.3. Scaffolding in Construction

Scaffolding performs several important functions during the construction process. It provides a temporary working platform to enable work to be performed at a height. It is also used to protect persons working at a height from falling and to protect persons working below from the dangers of falling objects.

Falling from a height is one of the most common causes of accidental death and serious injury in the construction industry. Scaffolding that is adequately erected and maintained can prevent many such accidents.

### 1.4. Types of Scaffold

There are currently two main types of scaffolding in use in Ireland: system scaffolds and tube and fitting scaffolds

System scaffolding has become the most common type of scaffolding in use due to its ease of erection, ease of use and reduced labour requirements. A system scaffold is a scaffold made of prefabricated elements and designed and manufactured in accordance with I.S. EN 12810 Part 1, 2004 or an equivalent standard. Each type of system scaffolding consists of a range of components such as standards, ledgers, transoms and base plates and has its own specific erection requirements.

#### **❗ PROPRIETARY SCAFFOLDS / SYSTEM SCAFFOLDS**

All system scaffolds (using prefabricated components) must follow the requirements of I.S. EN 12810 *Façade scaffolds made of prefabricated components and associated standards*.

- I.S. EN 12810 Part 1, 2004: *Products specifications*
- I.S. EN 12810 Part 2, 2004: *Particular methods of structural design*

Tube and fitting scaffolding is constructed from steel tubing and several types of couplers. Properly constructed, it forms a robust structure since the ledgers and standards are usually continuous across several bays or lifts.

### **TUBE AND FITTING SCAFFOLDS**

All tube and fitting scaffolds must follow the requirements of I.S. EN 12811 Temporary works equipment - scaffolds and associated standards.

- I.S. EN 12811 Part 1, 2004: Performance requirements and general design
- I.S. EN 12811 Part 2, 2004: Information on materials
- I.S. EN 12811 Part 3, 2002: Load testing

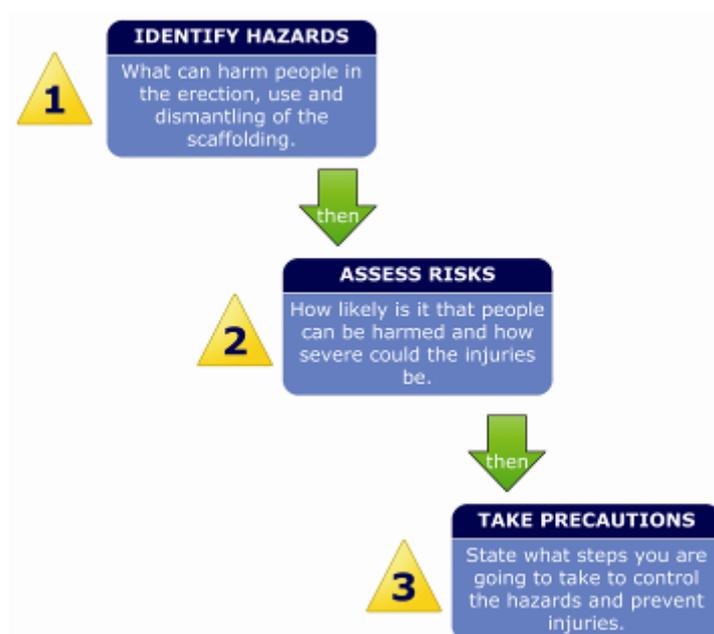
## 1.5. Scaffolding Hazards

### **WARNING**

Poorly erected or maintained scaffolds can fail, sometimes catastrophically!

Where a scaffold has inadequate foundations, tying or bracing, or if it is overloaded, it can collapse, endangering workers and the public. Where scaffold boards or guard-rails are missing, workers can suffer severe injuries due to falls. Scaffolders will be at risk where a safe system of work is not in place to protect them from falls.

## 1.6. Risk Assessment



**Figure 1: Risk Assessment Process**

Project supervisors, designers and contractors have legal obligations in relation to risk assessment and each should seek to avoid risks.

Where the risks cannot be avoided, a risk assessment should be performed. The risk assessment should be based on the hazards in relation to the specific scaffold, e.g. adjacent overhead power lines, poor ground conditions or vulnerability to vehicle impact. It should assess how serious the risks are.

The risk assessment should take account of the nature of the work to be carried out, the loads and the height from which falls may occur.

The person undertaking the risk assessment needs to consider two aspects of the scaffold:

- the likelihood that someone could be injured during the erection, use or dismantling of the scaffold; and
- how severe the potential injury could be.

The greater the likelihood and/or severity will result in an increased risk that someone could be injured.

Appropriate precautions should then be taken to control the risk and to prevent injury. These precautions should be detailed in the safety statement and/or the safety and health plan as appropriate.

Throughout the risk assessment process full account should be taken of the General Principles of Prevention, which are contained in Schedule 3 of the Safety, Health and Welfare at Work Act 2005 and reproduced in Table 1. These general principles set out a hierarchy of control measures that apply to all places of work.

**Table 1 General Principles of Prevention**

<b>✓ GENERAL PRINCIPLES OF PREVENTION</b>	
<b>General Principles of Prevention</b>	<b>How it can be applied to scaffolding</b>
1. The avoidance of risks	Select a scaffolding system that will remove hazards that would otherwise exist during erection, use, maintenance and dismantling of scaffolds.
2. The evaluation of unavoidable risks	Erection and dismantling of scaffolding is a high-risk activity and while it is difficult to completely avoid risks, unavoidable risks must be assessed so that control measures may be implemented to reduce the risks to an acceptable level.
3. The combating of risks at source	This principle indicates that it is better to design out, or minimise, risks where practicable rather than leave them to be dealt with on site.
4. The adaptation of work to the individual, especially as regards the design of places of work, the choice of work equipment and the choice of systems of work, with a view in particular to alleviating monotonous work and work at a predetermined work rate and to reducing their effect on health	This principle refers to the design of places of work and ergonomic considerations of the individual, for example the scaffolding design should take into consideration the site operatives who will be working at height, when the scaffolding is in use.
5. The adaptation of the place of work to technical progress	This principle refers to the duty to maintain pace with technical progress, as scaffolding systems develop and safety is improved.
6. The replacement of dangerous articles, substances, or systems of work by non-dangerous or less dangerous articles, substances, or systems of work	The scaffolding designer and erector should consider the choice of materials and/or scaffolding systems available in achieving a scheme that reduces the risks as far as practicable (see 2 above).
7. The development of an adequate prevention policy in relation to safety, health and welfare at work, which takes account of technology, organisation of work, working conditions, social factors, and the influence of factors related to the working environment	The management of safety and health throughout the construction project can be documented through the Preliminary Safety and Health Plan (PSDP) and the Safety and Health Plan (PSCS). As a contractor, the scaffolding erector must provide information to the PSCS for inclusion in the Safety and Health Plan and communicate their control measures to other contractors that may be affected by the erection, use or dismantling of the scaffold.
8. Priority to be given to collective protective measures over individual protective measures	Reducing the risk to everyone exposed should be given preference to measures that only protect individuals. This might be done by designing measures to accommodate collective fall protection, such as nets (during construction), rather than facilities for the protection of the individual using fall arrest equipment.
9. The giving of appropriate training and instructions to employees	All employers are required to give appropriate training and instruction to their employees – including scaffolding erectors, so that they may discharge their duties under the Construction Regulations 2006 and other relevant statutory provisions.

The risk assessment for most scaffolding erection, use and dismantling will show that the level of risk is high unless there is a good standard of planning, design, equipment, training, supervision and checking to ensure safety.

## 1.7. Statutory Duties

Different people have specific duties in relation to the supply, design, construction and use of scaffolds. These duties are set out in the relevant statutory provisions, including in particular, but not exclusively:

### **Safety, Health and Welfare at Work Act 2005**

Section 8.	General duties of employer
Section 9.	Information for employees
Section 10.	Instruction, training and supervision of employees
Section 11.	Emergencies and serious and imminent dangers
Section 12.	General duties of employers to persons other than their employees
Section 16.	General duties of designers, manufacturers, importers and suppliers of articles and substances
Section 17.	Duties related to construction work

### **Safety, Health and Welfare at Work (Construction) Regulations 2006**

Part 2.	Design and Management
Part 3.	General Duties of Contractors and Others
Part 4.	General Safety Provisions
Schedule 4.	Construction Skills Certification Scheme

### **Safety, Health and Welfare at Work (General Application) Regulations 2007**

Part 2.	Workplace and Work Equipment
Part 4.	Work at Height

The main duty holders for any project involving scaffold structures include suppliers, project supervisor for the design process (PSDP), designers of scaffold structures, project supervisor for the construction stage (PSCS), contractors and workers.

The interaction between these duty holders is represented in Figure 2.

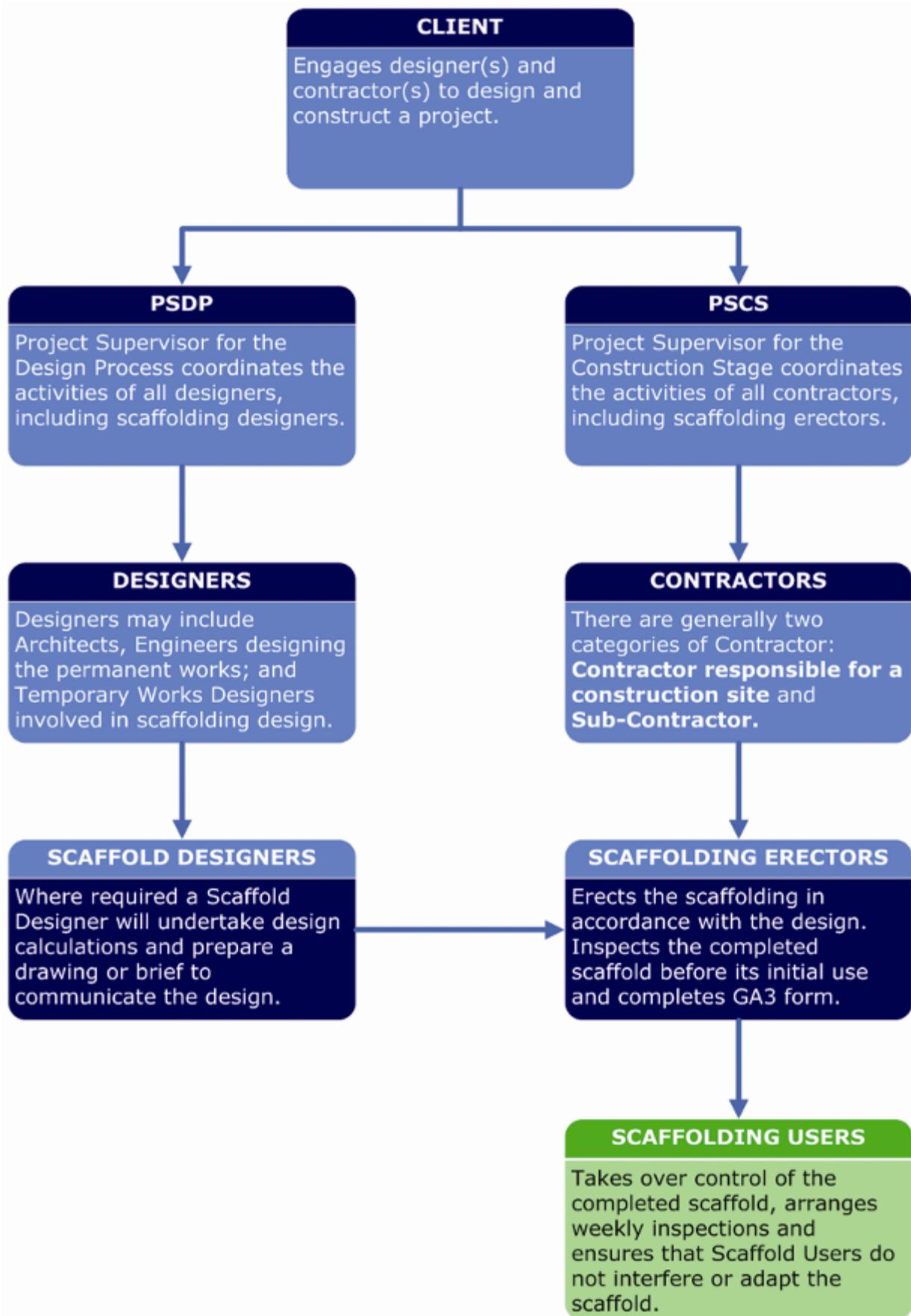


Figure 2: Duty Holders

### 1.7.1. Project Supervisor for the Design Process (PSDP)

The duties of the PSDP include:

- identifying hazards arising from the design or from the technical, organisational, planning or time-related aspects of the project;
- where possible, eliminating the hazards or reducing the risk;
- communicating necessary control measures, design assumptions or remaining risks to the PSCS so they can be dealt with in the Safety and Health Plan;
- ensuring that the work of designers is co-ordinated to ensure safety;
- organising co-operation between designers;
- preparing a written safety and health plan for any project where construction will take more than 500 person days or 30 working days or where there is a Particular Risk and deliver it to the client prior to tender;
- preparing a safety file for the completed structure and giving it to the client;
- when appropriate, issuing directions to designers, contractors or others; and
- notifying the Authority and client of non-compliance with any written directions issued.

### 1.7.2. Designers

Designers of permanent structures and temporary scaffolds have duties which include:

- identifying any hazards that their design may present during construction and subsequent maintenance;
- where possible, eliminating the hazards or reducing the risk;
- communicating necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the Safety and Health Plan;
- co-operating with other designers and the PSDP or PSCS;
- taking account of any existing safety and health plan or safety file;
- complying with directions issued by the PSDP or PSCS;
- where no PSDP has been appointed, informing the client that a PSDP must be

appointed; and

- ensuring that the project: is capable of being constructed to be safe, can be maintained safely and complies with all relevant health and safety legislation, as required by the Safety, Health and Welfare at Work Act 2005.

### 1.7.3. Project Supervisor for the Construction Stage (PSCS)

The PSCS has significant duties in relation to the safety of scaffolding. These duties include:

- co-ordinating the implementation of the construction regulations by contractors;
- organising co-operation between contractors and providing information;
- co-ordinating the reporting of accidents to the Authority;
- notifying the Authority before construction commences where construction is likely to take more than 500 person days or 30 working days;
- providing information to the site safety representative;
- co-ordinating the checking of safe working procedures;
- co-ordinating measures to restrict entry to the site;
- co-ordinating the provision and maintenance of welfare facilities;
- co-ordinating arrangements to ensure that craft, general construction and security workers have a Safety Awareness card, e.g. Safe Pass, and a Construction Skills card where required;
- co-ordinating the appointment of a site safety representative where there are more than 20 persons on site;
- appointing a safety adviser where there are more than 100 persons on site;
- providing all necessary safety file information to the PSDP;
- monitoring the compliance of contractors and others, and taking corrective action where necessary;
- when appropriate, issuing directions to designers or contractors; and
- notifying the Authority and the client of non-compliance with any written directions issued.

For example the PSCS should ensure that arrangements are in place to communicate the requirements of the scaffold users to the scaffold erectors.

#### 1.7.4. Contractors

Contractors, including sub-contractors and specialist scaffolding contractors, have a very significant range of responsibilities under the relevant statutory provisions.

These duties include:

- co-operating with the PSCS;
- providing a copy of their safety statement and relevant information to the PSCS;
- providing the PSCS with information required for the safety file, for forwarding to the PSDP;
- complying with the directions of Project Supervisors;
- reporting accidents to the Authority and to the PSCS where an employee can not perform his or her normal work for more than three days;
- complying with site rules and the safety and health plan and ensuring that their employees comply;
- identifying hazards and either eliminating them, where possible, or reducing risks during construction;
- facilitating the Site Safety Representative;
- ensuring that relevant workers have a safety awareness card and a construction skills card where required;
- providing workers with site-specific induction;
- appointing a safety officer where there are more than 20 persons on a site or more than 30 employed in total directly by the contractor;
- consulting workers and Safety Representatives; and
- monitoring compliance and taking corrective action.

**NOTE**

Every contractor using a scaffold should be satisfied, before using the scaffold, that it is stable, that the materials are sound and that the safeguards required by the regulations are in place.

A contractor may not use a scaffold unless it has been inspected before use and within the previous seven days and the results of the inspections have been recorded. You can use either your own form for recording the inspections or the sample form GA3 provided by the Health and Safety Authority in Appendix C.

Where a scaffolding contractor is engaged by another contractor to construct, maintain or dismantle a scaffold, then each contractor will assume a number of duties under the regulations. The agreement between contractors should clearly state which contractor is responsible for fulfilling which specific duties. For example, while the contractor responsible for the site must ensure that the scaffolding is inspected, the agreement should be clear as to which contractor is going to carry out the inspections of the scaffold. Refer to the Scaffolding Handover Form in Appendix B and form GA3 in Appendix C.

Ultimately the day-to-day management of the scaffolding is the responsibility of the contractor responsible for the site.

All contractors using a scaffold must be satisfied that an inspection has been undertaken, as required. This can be achieved by looking at the report of inspections.

#### 1.7.5. Workers

Under the relevant statutory provisions, workers, including scaffold erectors, have responsibilities such as:

- taking care of their own safety and the safety of others;
- co-operating with their employer and taking account of training and instruction given by the employer;
- making full use of harnesses, helmets and other protective equipment provided;
- reporting to their employer defects in the scaffold or in the system of work that may endanger health and safety; and
- not interfering with or misusing the scaffold.

**⚠ WARNING**

Unauthorised removal of ties or scaffolding components can alter the stability of the scaffolding, resulting in sudden and catastrophic collapse.

Scaffold users must not interfere with the scaffolding. If you are using the scaffold:

- ❌ DO NOT ALTER THE SCAFFOLD!
- ❌ DO NOT REMOVE TIES!

Scaffold erectors should ensure that, at the time of handing over the scaffold to the contractor, the scaffold is fit for its intended purpose and is in a safe and stable condition.

Any subsequent alteration that may be required during the use of the scaffolding should only be undertaken by a trained and competent scaffolder.

## 1.8. Illustrations

The illustrations used in this Code of Practice show a type of system scaffold that is in common use in Ireland. The illustrations are intended to apply to simple access and working scaffolds in general. They do not supersede or replace the illustrations or arrangements contained in the system manufacturer's erection instructions.

The illustrations are schematic and in some cases may not show all of the scaffolding components. For example toe-boards have been omitted in some figures for clarity.

Scaffolding erectors and users must refer to the appropriate European standard and the manufacturer's instructions.

## 1.9. Definitions

For the purposes of this Code of Practice, the following definitions apply (see also Figure 3).

### 1.9.1. General Scaffolds

**Anchorage** means inserted in, or attached to, the structure for attaching a tie member. Note: the effect of an anchorage may be achieved by the tie being connected to a part of the structure primarily intended for other purposes.

**Base jack** is a base plate that has a means of vertical adjustment.

**Base plate** is a plate used for spreading the load in a standard over a greater area.

**Birdcage scaffold** is a scaffold structure comprising a grid of standards and a decked area usually intended for working or storage.

**Bracing in horizontal plane** is an assembly of components that provides shear stiffness in the horizontal planes, e.g. by decking components, frames, framed panels, diagonal braces and rigid connections between transoms and ledgers or other items used for horizontal bracing. Also known as **plan brace**.

**Bracing in vertical plane** is an assembly of components that provides shear stiffness in the vertical planes, e.g. by closed frames with or without corner bracing, open frames, ladder frames with access openings, rigid or semi-rigid connections between horizontals and the vertical components, diagonal bracing, or other items used for vertical bracing.

**Cladding** is a material normally intended to provide weather and dust protection, typically sheeting or netting.

**Coupler** is a device used to connect two tubes.

**Design** means conception and calculation to produce a scheme for erection.

**Ledger** is a horizontal member normally in the direction of the larger dimension of the working scaffold.

**Modular system** is a system in which transoms and standards are separate components where the standards provide facilities at predetermined (modular) intervals for the connection for other scaffold components.

**Netting** is a pervious cladding material.

**Node** is a theoretical point where two or more members are connected together.

**Parallel coupler** is a coupler used for connecting two parallel tubes.

**Platform** is one or more platform units in one level within a bay.

**Platform unit** is a unit (prefabricated or otherwise) that supports a load on its own and that forms the platform or part of the platform and may form a structural part of the working scaffold.

**Right angle coupler** is a coupler used for connecting two tubes crossing at a right angle.

**Sheeting** is an impervious cladding material.

**Side protection** is a set of components forming a barrier to protect people from the risk of falling and to retain materials.

**Sleeve coupler** is a coupler used for joining two tubes located co-axially.

**Standard** is an upright member.

**Swivel coupler** is a coupler used for connecting two tubes crossing at any angle.

**Tie member** is a component of the scaffold that connects it with an anchorage at the structure.

**Transom** is a horizontal member normally in the direction of the smaller dimensions of the working scaffold.

**Working area** is the sum of the platforms in one level, which provides an elevated safe place for people to work on and to have access to their work.

**Working scaffold** is the temporary construction that is required to provide a safe place of work and the necessary access for the erection, maintenance, repair or demolition of buildings and other structures.

### 1.9.2. System Scaffolds

**Scaffold system** is:

- a) a set of interconnecting components, mostly purpose-designed for the scaffold system;
- b) the assessed standard set of system configurations; and
- c) the product manual.

**Component** is a part of a scaffold system that cannot be dismantled further, e.g. diagonal or vertical frame.

**Configuration** is a particular arrangement of connected components.

**Connection device** is a device that connects two or more components.

**Element** is an integral (e.g. welded) part of a component, such as a transom of a vertical frame.

**System configuration** is a configuration of the scaffold system comprising a complete scaffold or a representative section from it.

A **standard set of system configurations** is a specified range of system configurations for the purpose of structural design and assessment.

**System width (SW)** is the maximum width class of Table 1 of I.S. EN 12811-1, 2004 that can be realised between the standards.

**Assessment** is the checking process establishing whether everything complies with the requirements specified in this standard.

### 1.9.3. Other Common Scaffolding Terms

**Brick guard** is a metal or other fender filling the gap between the guard-rail and the toe-board, and sometimes incorporating one or both of these components.

**Bridle** is a tube fixed across an opening or parallel to the face of a building to support the inner end of a transom or tie tube.

**Butting transom** is a transom extended inwards to butt the building to prevent the scaffolding moving towards the building.

**Butting tube** is a tube that butts up against the façade of a building or other surface to prevent the scaffold moving towards that surface.

**Cantilever bracket** or **stage bracket** is a bracket usually attached to the inside of a scaffold to enable boards to be placed between the scaffold and the building.

**Castor** is a swivelling wheel secured to the base of a vertical member for the purpose of mobilising the scaffold.

**Check coupler or safety coupler** is a coupler added to a joint under load to give security to the coupler(s) carrying the load.

**End guard-rail** is a guard-rail placed across the end of a scaffold or used to isolate an unboarded part of the scaffold.

**End toe-board** is a toe-board at the end of a scaffold or at the end of a boarded portion of it.

**Façade brace** is a brace parallel to the face of a building.

**Guard-rail** is a member incorporated in a scaffold to prevent the fall of a person from a platform or access way.

**Joint pin** is an expanding fitting placed in the bore of a tube to connect one tube to another coaxially (see also *Spigot*).

**Kentledge** is a dead weight, built in or added to a structure to ensure adequate stability.

**Knee brace** is a brace across the corner of an opening in a scaffold to stiffen the angles or to stiffen the end support of a beam.

**Ledger brace** is a brace at right angles to the building in a vertical plane.

**Movable tie** is a tie that may be temporarily moved for the execution of work.

**Non-movable tie** is a tie that will not be moved during the life of a scaffold, as

agreed between the user and the scaffold erector.

**Plan brace** is a brace in a horizontal plane.

**Raker** is an inclined load-bearing tube.

**Reveal pin** is a fitting used for tightening a reveal tube between two opposing surfaces.

**Reveal tie** is the assembly of a reveal tube with wedges or screwed fittings, and pads, if required, fixed between opposing faces of an opening in a wall together with the tie tube.

**Reveal tube** is a tube fixed by means of a threaded fitting or by wedging between two opposite surfaces of a structure, e.g. between two window reveals, to form an anchor to which the scaffold may be tied.

**Scaffold board** is a softwood board generally used with similar boards to provide access, working platforms and protective components such as toe-boards on a scaffold.

**Sole board** is a timber, concrete or metal spreader used to distribute the load from a standard or base plate to the ground.

**Spigot** is an internal fitting to join one tube to another coaxially (see also *Joint pin*).

**Spigot pin** is a pin placed transversely through the spigot and the scaffold tube to prevent the two from coming apart.

**Supplementary coupler** is a coupler added to a joint to back up the main coupler taking the load when the estimated load on the joint is in excess of the safe working load of the main coupler.

**Sway transom** is a transom extended inwards in contact with a reveal or the side of a column to prevent the scaffold moving sideways.

**Through tie** is a tie assembly through a window or other opening in a wall.

**Toe-board** is an up-stand at the edge of a platform, intended to prevent materials or operatives' feet from slipping off the platform.

#### 1.9.4. Definitions in Safety, Health and Welfare at Work (General Application) Regulations 2007, Part 4: Work at Height

**Access** and **egress** include ascent and descent.

**Fragile surface** means a surface, including fittings that would be liable to fail if a person's weight were to be applied to it in reasonably foreseeable circumstances.

---

**Ladder** includes a fixed ladder and a stepladder.

**Line** includes rope, chain or webbing.

**Personal fall protection system** means—

- (a) a fall prevention, work restraint, work positioning, fall arrest or rescue system, other than a system in which the only safeguards are collective safeguards, or
- (b) rope access and positioning techniques.

**Scaffold** means any temporary structure, including its supporting components, whether fixed, suspended or mobile, that is used—

- (a) for supporting employees and materials, or
- (b) to gain access to any structure, and includes a working platform, a working stage, a gangway, a run and a ladder or stepladder (other than an independent ladder or stepladder that does not form part of such a structure), together with any guard-rail, toe-board or other such safeguard and all fixings thereon, but does not include—
  - (i) lifting equipment, or
  - (ii) a structure used only to support another structure or equipment (including lifting equipment), and “scaffolding” shall be construed accordingly.

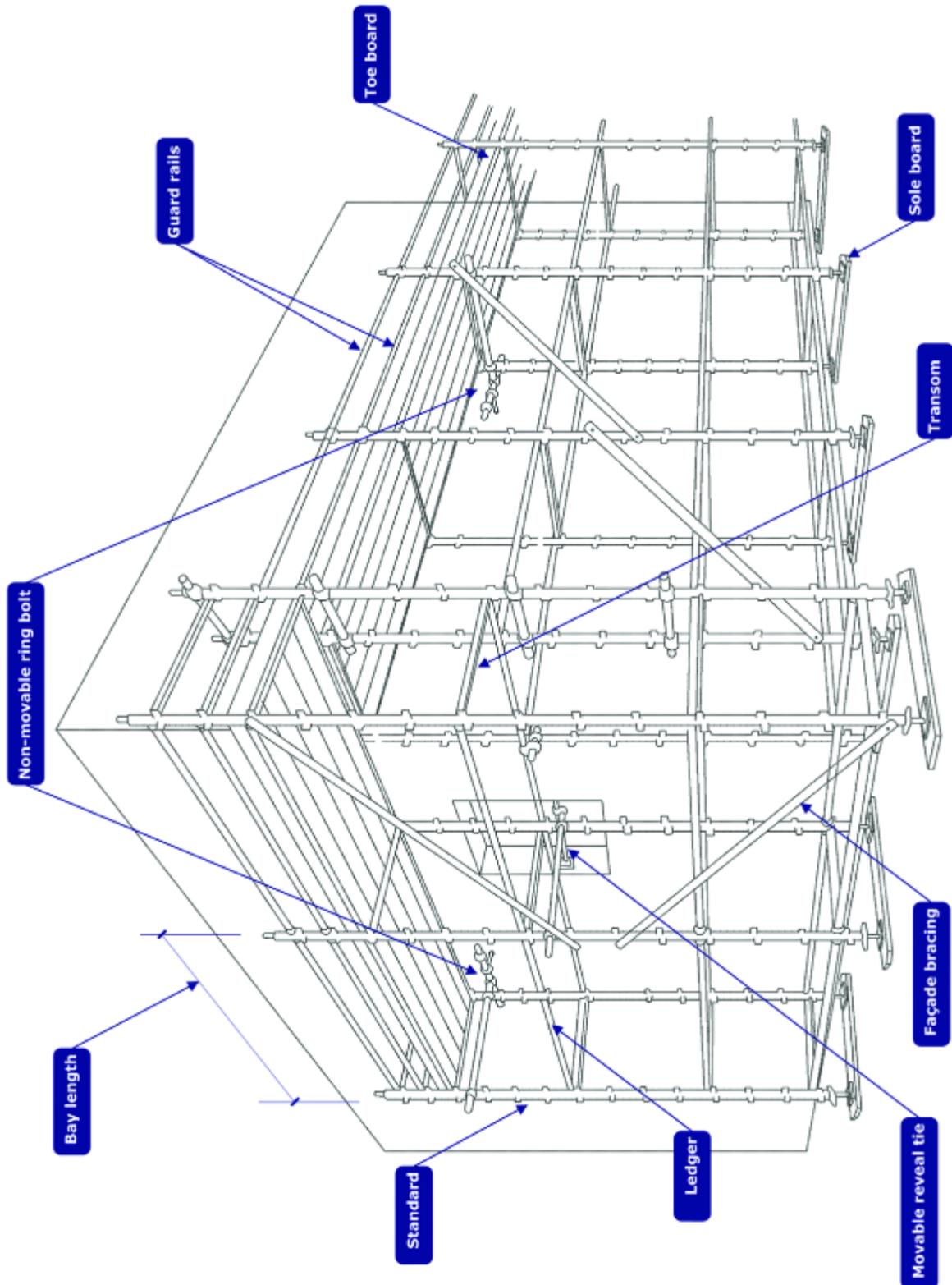
**Supporting structure** means any structure used for the purpose of supporting a working platform and includes any plant used for that purpose.

**Work at height** means work in any place, including a place—

- (a) in the course of obtaining access to or egress from any place, except by a staircase in a permanent place of work, or
- (b) at or below ground level, from which, if measures required by this Part were not taken, an employee could fall a distance liable to cause personal injury and any reference to carrying out work at height includes obtaining access to or egress from such place while at work.

**Work equipment** means any machine, appliance, apparatus, tool or installation for use at work (whether exclusively or not) and includes anything to which Regulations 101 to 114 apply.

**Working platform** means any platform used as a place of work or as a means of access to or egress from a place of work, including any scaffold, suspended scaffold, cradle, mobile platform, trestle, gangway, gantry and stairway that is so used.



**Figure 3: Common Components of an Independent Tied System Scaffold**  
(note: tie patterns to be in accordance with manufacturer's instructions)

## 2. Management and Control of Scaffolding

### 2.1. Management of Scaffolding Activities

**NOTE**

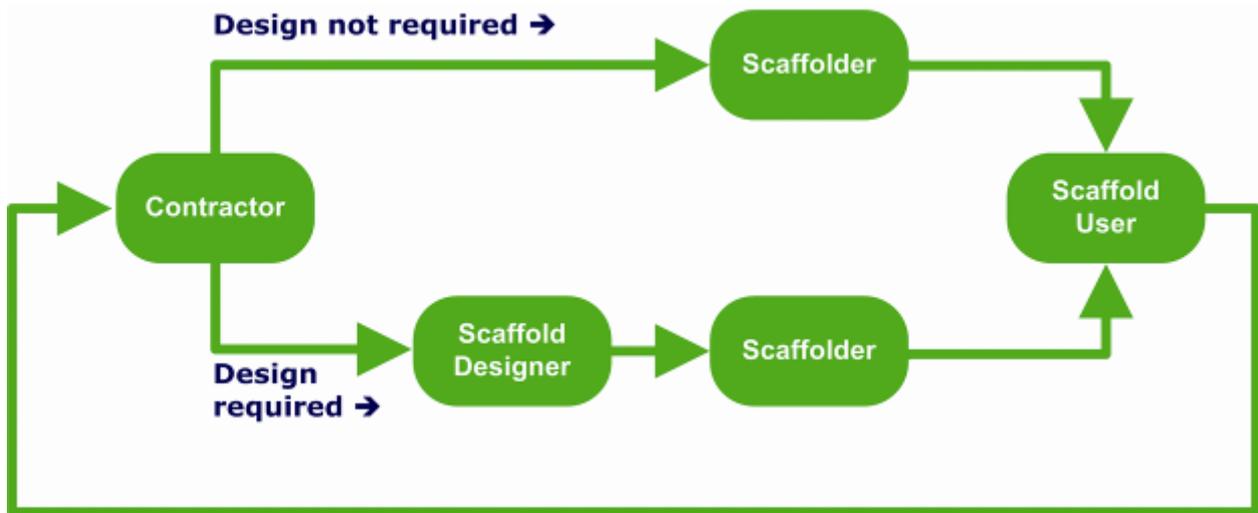
Maintaining scaffolding in a safe condition requires active management.

The high rates of activity and change on construction sites, together with the high level of risk associated with scaffolding work, require a correspondingly high level of safety management to prevent accidents and ill health. The five steps listed in this section provide a practical template for the systematic management of scaffolding operations.



*Figure 4: Scaffolding Management*

Not all scaffolding requires a design. General access scaffolding, erected in accordance with the manufacturer's instructions, does not require any further design. However, if a design is required (see Section 2.3.2), then a competent scaffold designer must be engaged to design the scaffold. The project supervisor for the design process (PSDP) should co-ordinate this scaffold design with the permanent works design team.



**Figure 5: Design Process**



The contractor should define a policy in relation to scaffolding. This written scaffolding policy should:

- include a commitment to put measures in place to protect employees, others at work and members of the public from the risks associated with scaffolding;
- require that competent persons be employed to erect, maintain and dismantle scaffolds;
- include a commitment to comply with relevant health and safety legislation, including the Safety, Health and Welfare at Work (Construction) Regulations 2006, the Safety, Health and Welfare at Work (General Application) Regulations 2007 and relevant codes of practice and guidelines;
- list who is responsible for choosing the type of scaffold to be used on site and give a procedure for determining the situations where a scaffolding design would be required;

- require that competent persons be employed to inspect scaffolds that are in use;
- clearly place the management of scaffolding as a prime responsibility of site management; and
- include a commitment to provide appropriate resources to implement the scaffolding policy.

## Step 2

## Planning

Contractor

Designer

Scaffolder

The scaffolding erection, use and dismantling stages should be planned so as to minimise the risks involved.

The written plan should deal with the assembly, use and dismantling of the scaffold. The plan may be in the form of a standard plan supplemented by information on the particular scaffolding in question. The plan should be kept on site in the Safety and Health Plan.

A copy of the plan, including any instructions it may contain, must be kept available to persons concerned in the assembly, use, dismantling or alteration of scaffolding until it has been fully dismantled.

The planning process involves the contractors who will use the scaffolding, the scaffolding designer and the scaffolding erector. The planning process should address the following areas.

- **The relevant legal and other requirements should be identified**  
The major legal requirements that apply to scaffolding are included in the Safety, Health and Welfare at Work Act 2005; the Safety, Health and Welfare at Work (Construction) Regulations 2006; and the Safety, Health and Welfare at Work (General Application) Regulations 2007. Where system scaffolds are used, the manufacturer's requirements should be identified and complied with.
- **The job should be defined**  
The ground preparation, layout, scheduling, loading, access, tying arrangements and other requirements of the particular job should all be defined by the contractor. The contractor should prepare a contract stating the exact scope of works.
- **Responsibilities should be assigned**  
Organisations or individuals with responsibility for performing specific tasks

and duties relating to the control of scaffolding should be identified and agreed between the contractor and the scaffold erector.

- **Hazards should be identified**

A hazard is anything that can cause harm. Hazards should be systematically identified for each project. This requirement applies to everyone involved in the scaffolding process, from the contractor requesting the scaffolding to the scaffolding designers and erectors.

- **Risks should be assessed**

When assessing the risks associated with the identified hazards, account should be taken of both the likelihood of harm occurring and the severity of the resulting injuries (see Section 1.7).

- **Risks should be eliminated or reduced**

Preferred solutions for reducing risks involve collective controls, e.g. protective barriers that protect everybody from falling. Administrative controls, which seek to reduce risk by adherence to instructions or procedures, are less effective. The least preferred solutions rely solely on the use of safety signs and personal protective equipment, e.g. harnesses or safety helmets.

- **The identified hazards and the necessary precautions should be written down**

Precautions to be taken in respect of identified hazards should be written in the safety statement or site-specific amendments to the safety statement, and incorporated into the safety and health plan where one is required.

- **Clear performance standards should be set**

The contractor should dictate safety standards on the site. For example the scaffolding policy could state that all edges will be protected by guard-rails and toe-boards.

- **Site survey**

Where they do not have prior knowledge of the site, a competent person or scaffolder should undertake, on behalf of the scaffolding contractor, a survey of the location where the scaffolding is to be erected. The survey should be carried out before the design or erection of the scaffold and should consider the risks that exist on site.

- **Recommendations**

Where a scaffolder makes reasonable recommendations to the contractor in relation to the scaffold, the contractor should implement these. If a contractor fails to fully apply the recommendations given by a competent scaffolder, then the contractor may be contravening the requirements of the Safety, Health and Welfare at Work Act 2005.

### **1 Written Scaffolding Brief To Be Issued To Scaffolding Contractor**

The written scaffolding brief issued to the scaffolding contractor should include:

- Site location;
- Duty of scaffold including anticipated usage and loads to be carried including the nature of any plant that might be used on it;
- Height and length of the scaffold;
- Time required to be in place and time it is to remain in place;
- Establish the roles and responsibilities between the contractor and the scaffolder. For example who will be responsible for arranging the inspection and maintenance of the scaffold;
- The nature of the supporting ground and any supporting structures as far as the contractor is aware;
- The presence of any hidden hazards that might create unexpected risks to the scaffolding contractor, his or her workforce or other people;
- Whether there is a need for a loading bay or specially strengthened portion of the scaffold to receive loads that are placed by mechanical handling equipment or which consist of packaged materials;
- Whether there is a need for temporary cladding and whether grit blasting or similar operations will be carried out;
- Whether the decking should be clear of any lapping boards and whether it should be sheeted over with plywood or similar materials and the necessity to be covered with anti-slip strips;
- Whether stair access should be provided instead of ladders;
- The preparation of the "assembly / use / dismantling" plan for the scaffold.

### **Step 3 Implementation**

Contractor

Scaffolder

User

The written plan is transformed into action during the implementation stage. Successful implementation requires that the following issues be addressed.

- **Responsibilities**

Individual responsibilities should be clearly communicated by the contractor and the scaffolder. Persons should be given the authority and resources to carry out their responsibilities and individuals should be held accountable for their successes or failures in performing their duties.

- **Instruction, training and competence**

Both the contractor and the scaffolder are required to provide information, instruction, training and supervision to their own employees. The instruction and training that is required for design and erection of the scaffolding should be identified by the scaffolding contractor. The instruction and training that

is required for safe use of the scaffolding should be identified by the contractor. In each case, persons performing the work should have the appropriate level of competence.

- **Communication**

Relevant information relating to design, scheduling, loading etc. or contained in safety statements or the safety and health plan should be communicated to those who need that information. For example those performing periodic safety inspections need to know the maximum design imposed load and tie spacing, and those erecting the scaffold need to have copies of the system scaffold erection instructions available.

- **Documentation**

Appropriate documentation must be kept available on site. Such documentation will include safety statements, safety and health plans, scaffolding plans and inspection records, e.g. "Report of results of inspections of Work Equipment for Work at a Height" (see Appendix C). Any defect or issue noted in a scaffolding inspection record must be signed off as rectified when the particular item is attended to and made safe.

## Step 4

### Checking and Corrective Action

Contractor

Scaffolder

User

Periodic checking is necessary to determine if performance standards are being met and to enable early corrective action to be taken.

#### Scaffolding must be inspected by a competent person:

- 1 Before it is taken into use
- 2 Following any modifications (see Section 5.2), exposure to bad weather or periods without use
- 3 After impact or damage
- 4 At least every seven days, if scaffolding is higher than 2m and used for construction work

More frequent inspections will be required where there is evidence of recurring deficiencies, unauthorised modification or other circumstances that might affect the strength and stability of the scaffold.

Where defects are found they should be rectified. The root cause of serious or recurring defects should be identified and corrective action taken to prevent further recurrence.

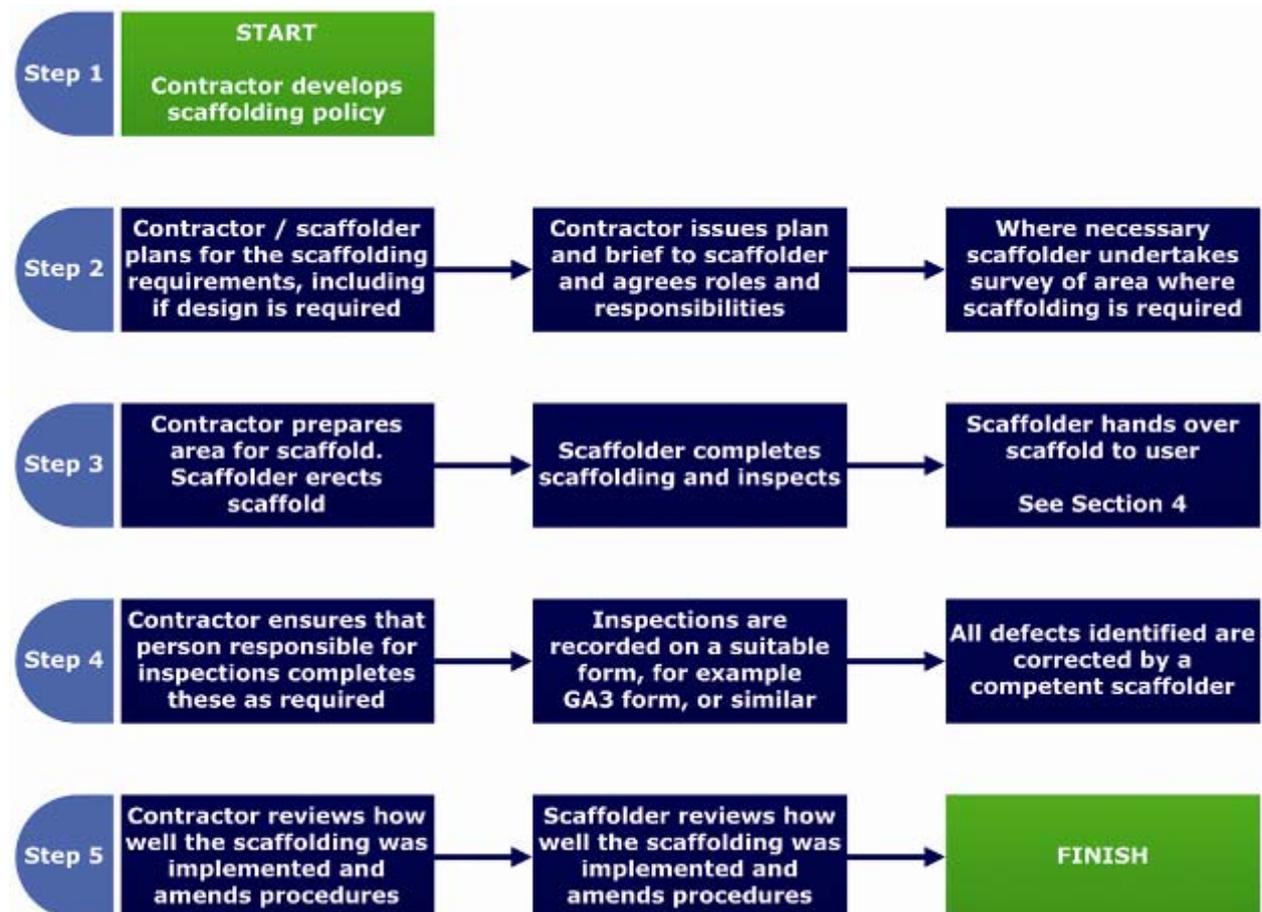
**Step 5****Reviewing the Work**

Contractor

Scaffolder

The review stage helps to make each job a learning experience so that the next job can be performed more effectively. The following questions should be asked:

- Was the planning adequate or were there unwelcome surprises?
- Was the implementation adequate so that the job was completed as planned?
- Were the planned checks carried out and did the necessary corrective action take place?
- What changes will be necessary for the next job?



*Figure 6: Five Steps for the Management of Scaffolding Operations*

## 2.2. Choice of Scaffolding Equipment

Scaffolding equipment should be selected on the basis of a risk assessment that takes account of the nature of the work to be performed, the loads to be withstood and the height from which falls may occur. The decision may also be affected by the shape of the building; the environment that the scaffolding is to be erected in; the capacity of the foundations; the duration that the scaffolding is to remain in place; and the ability to provide ties to the scaffolding.

## 2.3. Layout and Design

A well laid-out scaffold will require the minimum amount of modification during its life and will be capable of being erected, used and dismantled in safety.

### 2.3.1. Layout

The initial layout will have a significant impact upon the safety of the completed scaffold. When considering the layout the following points should be remembered.

- The scaffold should be laid out so as to reduce the gap between the structure and the scaffold to a minimum, except where guard-rails will be erected adjacent to the structure.
- The standards should be positioned so as to avoid manhole lids or shallow drains, which may not be able to sustain the scaffold loading.

### 2.3.2. Structural Design of Scaffolds

Strength and stability calculations for scaffolding should be carried out unless:

- a record of the calculations covering the structural arrangements contemplated is available; or
- the scaffolding is to be assembled in conformity with a generally recognised standard configuration.



#### **WARNING**

The designer should have a full working knowledge of I.S. EN 12810 and I.S. EN 12811 and be competent to undertake a scaffolding design. Reference should also be made to other relevant guidance listed in Appendix E.

Scaffolding contractors must specify the system of scaffolding in use, and provide copies of the manufacturer's guidelines to the Contractor and the Project Supervisor for the Construction Stage (PSCS).

Where the contractor intends to load materials onto the scaffold by crane or

teleporter, loading bays should be incorporated into the scaffolding at appropriate locations. If material has to be loaded directly onto the working platform, the risks of overloading or destabilising the scaffold must first be assessed by the contractor and the loading controlled.

All other forms of scaffold, including special scaffolds, should be subject to design and calculation by a competent designer.

Sections 6 and 10 of I.S. EN 12811 Part 1, 2004 provide technical data for the structural design of scaffolds.

For illustrative purposes, typical examples where design and calculation may be necessary include:

- sheeted system scaffolds;
- system scaffolds erected in areas where the wind pressure exceeds that specified in I.S. EN 12810 Part 1, 2004 or where the design wind speed exceeds that specified by the scaffolding manufacturer;
- system scaffolds where the maximum height, tie spacing, imposed loads, bay widths or number of working lifts exceeds the manufacturer's recommendations;
- scaffolds where the tie or anchorage capacity is less than 6.25kN (637kg);
- tube and fitting scaffolds where the height exceeds 50m for unsheeted scaffolds and 25m for sheeted scaffolds;
- scaffolds subjected to impact, e.g. mechanical loading of heavy materials onto working platforms;
- scaffolds where the bottom transoms or ledgers have been omitted to allow pedestrian access;
- scaffolds where the first line of ties is more than 4m above the base of the scaffold;
- scaffold buttresses;
- special scaffolds including: loading bays, protection fans, nets, pavement frames, cantilever scaffolds, truss-out scaffolds, free-standing external towers, hoist towers, slung scaffolds, pedestrian bridges and walkways, temporary ramps and elevated roadways, masts, lifting gantries, and temporary buildings and roofs;
- scaffolds where the required bracing is omitted; and

- scaffolds where the allowable bearing pressure of the ground may not be adequate to support the scaffold.

Refer to Appendix E for a range of guidance documents on the use of I.S. EN 12811 Part 1.

 **WARNING**

The designer should have a full working knowledge of I.S. EN 12810 and I.S. EN 12811 and be competent to undertake a scaffolding design. Reference should also be made to other relevant guidance listed in Appendix E.

### 2.3.3. Building Design and Scaffold Erection

The design of the temporary works can be affected by, or can affect, the design of the permanent works. For example many system scaffolds require that every standard be tied to the structure under construction or to some other substantial structure. The best arrangement is where the ties can be left in place until final dismantling of the scaffold.

The PSDP and the PSCS should, at an early stage, seek the co-operation of building designers in permitting the attachment of non-movable ties to the building structure where such attachment is reasonably practicable.

Timely provision of adequate details of the proposed permanent works is necessary in order to properly schedule the construction of the temporary works. Project supervisors should co-ordinate these matters, for example they should provide information on the proposed location of adjacent drains or other excavations to the temporary works designer or contractor so that they can ensure that the foundations of the relevant scaffolds are not undermined. Where such information is not received in a timely manner, the project supervisors should ensure that adequate time is allowed for the safe completion of the project.

## **2.4. Erection Scheduling**

Proper scheduling of activities is necessary in order to ensure that the scaffold is available and safe to use when it is needed and that the activities of an individual trade do not endanger the scaffold or the users of the scaffold. The following scheduling issues should be considered.

- Where scaffolds are providing edge protection, e.g. during form-work

erection or block laying at the edges of concrete floor slabs, the platform should be maintained as close as practicable to the working level.

- Where movable ties are provided, replacement ties should be installed before existing ties are removed to facilitate plasterers, glaziers or other trades.
- The particular needs of scaffold users or specific trades should be determined in advance so that adequate scaffolding provision can be made before they commence working.
- Adjacent excavations, which could undermine the scaffold foundation, should be back-filled before scaffold erection or the excavations should be deferred until after the scaffold has been dismantled.

## 2.5. Planning for Use and Maintenance

A scaffold rarely stays the same between initial erection and final dismantling. There is therefore a need to plan how the scaffold will be modified, inspected and maintained. The following issues should be considered when planning for use and maintenance.

- The particular needs of different trades working on the scaffold. Imposed loads, scheduling (painters, plasterers and bricklayers work at significantly different rates), cantilever brackets, adjustments to ties and guard-rails etc. should be identified and provision made to meet these needs before the work is planned to start.
- A competent person with responsibility for modifying, inspecting and maintaining the scaffold should be appointed.
- An adequate number of competent scaffolders should be available to the site to allow modifications to be made in good time. The full-time attendance of at least one competent scaffolder may be required on sites where modifications are likely to be frequent.
- The restrictions on imposed loads and unauthorised modifications to the scaffold should be communicated to users. The contact person for complaints or requests for scaffolding modifications should be identified. This should be done as part of the normal health and safety induction, which everybody on site should receive.

## **2.6. Information to Purchasers or Hirers of Scaffolding Equipment**

The manufacturers and suppliers of system scaffolds and components have a duty to supply information to the purchaser. Those supplying system scaffolds and components for hire or lease also have a duty to supply information to the hirer or lessee.

The information should include the use for which the scaffold has been designed or tested, and any information necessary to ensure that the scaffolding may be erected, dismantled and used safely. The supplier should provide a complete set of instructions that are sufficient to ensure the safe erection, use and dismantling of the scaffold.

Scaffolding contractors must specify the system of scaffolding in use, and provide copies of the manufacturer's guidelines to the contractor and the PSCS.

## **2.7. Information to Users of Scaffolding Equipment**

Workers should receive sufficient and, if appropriate, written information on the scaffold equipment, including safety and health information on:

- conditions for use of the equipment, including instructions for its safe use
- where appropriate, assembly and dismantling plans;
- any unusual conditions that can be foreseen; and
- any conclusions to be drawn from experience of using the type of scaffold equipment.

The information provided should be comprehensible to the workers concerned.

## 3. Erection of Scaffolds

### 3.1. Safe Erection and Dismantling

#### **NOTE**

Scaffolding should be erected and dismantled so that the risks to the scaffolders, other workers and the public are eliminated or minimised.

#### 3.1.1. Safety of Scaffolders

The major life-threatening hazards facing scaffolders are the risk of falls from a height, falling scaffold components and contact with overhead electric lines.

The scaffolding contractor should carry out a risk assessment relating to the type of scaffolding operations to be conducted at the site. The safety statement of the scaffold erection contractor and, where appropriate, the site safety and health plan should identify the hazards that erecting a scaffold on the site is likely to present and specify the necessary precautions.

The Safety, Health and Welfare at Work (Construction) Regulations 2006 and the Safety, Health and Welfare at Work (General Application) Regulations 2007 require persons at work to be protected from the danger of falling, either by the provision and use of collective safeguards such as adequate working platforms and guard-rails or, where this is not practicable, by the provision and use of safety nets or personal protective equipment such as suitable fall arrest systems (incorporating safety harnesses, lanyards and anchorages).

The General Principles of Prevention (see Section 1.7) set out the hierarchy of control measures that designers, contractors and employers should implement.

Collective safeguards should be specified in the safety statement and/or safety and health plan. These will normally include, where possible, the use of ladders or stairs and the placing of decking and guard-rails on each platform before scaffolders go onto it or else as soon as practicable. Where scaffolders will be working on a standard-width scaffold for only a very short time, they may work off a three-board-wide platform provided that guard-rails are installed immediately following the installation of the boards.

Where the necessary collective safeguards will be inadequate during certain phases of the work, personal protective equipment, e.g. nets, fall arrest systems, should be used to supplement the collective safeguards.

Construction of certain scaffold types or construction work that includes certain

activities may present difficulties in providing collective safeguards throughout all phases of the work. Such work will normally require the supplementary use of personal protective equipment, including the fixing of anchorages, until collective safeguards become adequate. Examples of such work include:

- cantilever loading bays;
- cantilever scaffolds;
- truss-out scaffolds;
- slung scaffolds;
- protection fans and nets;
- bridges and walkways;
- work on temporary buildings and roofs;
- fragile roof work;
- work over or near water;
- work in confined spaces such as sewers, deep excavations, lift wells and shafts, deep basements or sumps, where rescue may be required; and
- work out of integrated person baskets or mobile elevated working platforms.

Where personal protective equipment is to be used, the contractor should specify in the safety statement, and the project supervisor should incorporate into the safety and health plan, the means of personal protection, how it is to be used, the means of attachment and the rescue procedures. The contractor should provide adequate training, instruction and supervision to ensure that the personal protective equipment is used properly at all relevant times.

The references provided in Appendix E offer further guidance on working at height.

### 3.1.2. Safety of Other Workers and Persons

Other workers or members of the public may be placed at risk during the erection of scaffolding. Adequate precautions should be taken to eliminate or reduce the risk.

Other workers and the public should be effectively excluded from the work areas by signs and/or solid barriers. Where persons cannot be excluded from the working area, they should be protected by the provision of properly constructed sheeting or fans.

### 3.1.3. Incomplete Scaffolding

A scaffold should be constructed so that it is left complete and is properly tied, braced and decked and has adequate guard-rails and toe-boards. Where a scaffold is left incomplete, there is a risk that it will be used while it is in a dangerous condition.

Where a scaffold is partly erected or dismantled, a prominent warning notice should be placed at each potential access point and barriers should be placed to prevent access. Such notices should be removed when they are no longer required.

The most effective way of preventing access to an incomplete scaffold is by removing all decking and ladders. Incomplete scaffolds should be completed or dismantled as soon as practicable.

## **3.2. Materials**

### 3.2.1. Scaffolding Provider's Inspection Prior to Use

Scaffolding materials should be inspected by the scaffolding provider, prior to their use on site. This inspection can be carried out before the materials are delivered to the site. An area should be set aside for damaged or defective materials.

Signs should be erected indicating that the material is defective and is not to be used. A checklist is provided in Appendix B (Checklist 01: *Inspection of Scaffolding Materials Before Use*) to assist this examination.

If it is determined during the erection of the scaffold that an element is defective, the scaffolder should put this defective part to the side and not incorporate it into the scaffolding.

### 3.2.2. Standards

Standards are upright members that transmit the vertical loads of the scaffold to the foundations. The spacing of system scaffolding standards should follow the recommendations in the manufacturer's erection instructions.

For tube and fitting scaffolds, the service loads for working areas is provided in Table A1 in Appendix A.

### 3.2.3. Transoms

Transoms are horizontal members normally in the direction of the smaller dimensions of the working scaffold. Intermediate transoms may be required to support the scaffold platform between main transoms.

The lowest transom should be installed as close as possible to the bottom of the

standards, otherwise the load-carrying capacity of the scaffold will be significantly reduced. The bottom transom is sometimes omitted to permit pedestrians to walk through the scaffold; however in this event the scaffolding must be designed to reflect the omitted transom. Alternatively the risk assessment and safety and health plan may indicate other solutions, such as erection of a protected hoarding outside the scaffold, which do not compromise the strength of the scaffold.

#### 3.2.4. Ledgers

Ledgers are horizontal members normally in the direction of the larger dimension of the working scaffold. Ledgers also support any intermediate transoms. The load-carrying capacity of the scaffold will be significantly reduced where it is not possible to place the first ledger at the base of the standards (see Section 3.2.3). Tube and fitting ledgers should be joined with sleeve couplings positioned no more than one-third of the bay length from a standard and staggered on alternate lifts.

#### 3.2.5. Couplers

Couplers are devices used to connect two tubes. Couplers are used in conjunction with system scaffolds mainly for the attachment of ties, plan bracing and cross (ledger) bracing. The proper use of appropriate couplers is therefore important to the stability of the scaffold. Couplers, when new, should comply with the requirements of the relevant European Standard.

I.S. EN 74 Part 1, 2005: *Couplers, spigot pins and baseplates for use in falsework and scaffolds – Part 1: Couplers for tubes – Requirements and test procedures* specifies four classes of couplers (see Table A3 in Appendix A).

The characteristic values of the resistances for couplers are listed in Table A4 in Appendix A. These values only apply to couplers marked with EN 74 and, where appropriate, 'A' or 'B'.

### **3.3. Stability**

A scaffold is a temporary structure that is subjected to a wide range of loading during erection, use and dismantling. It should support its own dead load; live loads from construction materials, workers and tools; dynamic loads from material placement; and wind loads.

Where failures occur, large areas of scaffolding can suddenly collapse. Scaffolds can collapse because of poor construction or misuse leading to them being loaded beyond their safe capacity to support the load.

**WARNING**

Common faults include:

- ✘ poor foundations;
- ✘ inadequate tying and bracing;
- ✘ overloading; and
- ✘ the removal of ties and bracing.

Scaffold stability depends on carefully following the system scaffold manufacturer's instructions and the provisions of this Code or other equivalent standards. In particular, the following issues should be addressed:

- the foundations should be adequate (see Section 3.3.1);
- the scaffold should be tied to the permanent structure or to buttresses (see Section 3.3.2);
- the scaffold should be braced (see Section 3.3.4); and
- the scaffold should not be overloaded (see Section 3.8).

### 3.3.1. Foundations

The foundations of a scaffold should be adequate to support the load imposed by each standard and the scaffold as a whole throughout the life of the scaffold.

#### 3.3.1.1. Ground Surfaces

- **Concrete and steel surfaces**  
Metal base plates should be used on concrete or steel surfaces of adequate bearing capacity.
- **Other surfaces**  
Metal base plates should be used where there is a hard asphalt or similar surface with sufficient bearing capacity. Where the bearing surface is soil, compacted gravel, tarmacadam, hardcore, paving slabs or similar, sole boards of timber or another suitable material should be used. Where the surface has been disturbed or back-filled, or is soft, it should be compacted.

The contractor should prepare the ground in advance of the scaffolding being erected. The scaffolder should seek written confirmation from the contractor as to the bearing pressure. Guidance on allowable bearing pressures for various soils and fill materials is given in BS 5975, 1996: *Code of practice for falsework*.

#### 3.3.1.2. Sole Boards

Where practicable, timber sole boards should support two standards. A timber sole board under any one standard should be at least 35mm thick, at least 220mm wide and 1,000cm<sup>2</sup> in area (e.g. 220mm wide by 500mm long). Larger sole boards (minimum 1,700cm<sup>2</sup>, e.g. 220mm wide by 775mm long) should be used where the ground is soft or disturbed. Previously used sole boards should never be used as scaffold boards, they should be marked so that they are readily distinguishable, e.g. the ends should be cut at an angle.

#### 3.3.1.3. Base Plates

Base plates should be placed on the centre of sole boards and not less than 150mm from either end. Adjustable base plates incorporate screw jacks to allow the scaffold to be easily levelled: they should not be extended beyond the manufacturer's recommendations.

#### 3.3.1.4. Sloping Foundations

Many scaffolds are erected on sloping surfaces, e.g. footpaths and roadways. Using normal base jacks on such surfaces may induce bending in the bottom standards and reduce the loading capacity of the scaffold. Base plates that permit adequate rotation should be used or other measures should be taken to ensure that the capacity of the standards is adequate to sustain the design loads.

Special precautions may be necessary to ensure the stability of the scaffold where the ground slope exceeds 1 vertical to 10 horizontal.

#### 3.3.1.5. Adjacent Excavations and Underground Services

Scaffolds should not be erected close to the edge of open excavations, and excavations should not be made close to the scaffold in a manner likely to undermine the stability of the scaffold. Scaffold standards should not be erected over shallow drains or manhole covers unless adequate arrangements have been made to carry the load over them.

Where excavations will affect only one standard, the load may be transferred to adjacent standards by using proprietary beams or A-frames. The adjoining standards should not be overloaded.

#### 3.3.1.6. Blocks, Bricks and Other Materials

Loose blocks or bricks or similar materials should not be used to support scaffold standards as they may split, slip out or fall over. Adjustable base plates should be used instead of such materials.

### 3.3.2. Ties

#### General

Ties connect the scaffold to the structure being built. Ties perform a dual function:

- they stabilise the entire scaffold to prevent it from falling towards or away from the building; and
- they stabilise the individual scaffold standards to prevent them from buckling. As the load on a scaffold increases, more ties may be needed to prevent the standards from buckling.

There are a number of different tie types. Those types of tie that are non-movable should be chosen, where reasonably practicable, as they present fewer difficulties with maintenance or interference. Non-movable ties are assumed to be cast or drilled into the structure and will not need to be moved until final dismantling of the scaffold.

#### WARNING

Scaffolding fitted with debris netting or sheeting requires additional ties. Refer to the manufacturer's erection manual and verify that the ties are installed as per these recommendations before the debris netting or sheeting is installed onto the scaffold.

Ties should resist movement towards the building and away from the building. Where a tie cannot resist movement towards the building, e.g. through ties, long bolts and wire ties, the tie should be supplemented by other measures, e.g. tubes butted against the building.

Ties should be securely coupled to both standards or to both ledgers, and be as near to a node point as possible. Where ties are attached to the ledgers, they should be attached not more than 300mm from a standard. Where this hinders access along a working platform, attachment to the inside ledger or standard only is permissible.

System scaffold manufacturers may have different requirements relating to the maximum distance of ties from standards and node points. Where it is not possible to meet these distances, the manufacturer may permit plan bracing to be installed between the tie and the standards.

The vertical interval between ties should be determined in the scaffolding design and communicated to the scaffolding erector. In the case of system scaffolds, reference should be made to the manufacturer's instructions.

Scaffolds of normal width of 1.25m should not be erected 4m higher than the highest line of ties, unless the scaffold has been cross braced between ledgers (cross bracing) and the ties and scaffold are capable of taking the extra loads.

### 3.3.2.1. Cast-in and Drilled Anchorages

Where lateral support is to be provided by the structure served, both the structural adequacy of that structure and the attachment of the anchorages shall be verified. If the base material is too weak to support an anchor, or if the structure as a whole is too weak, other means of access should be considered, including free-standing designed scaffolds or mobile elevated work platforms (MEWP).

These anchorages, which are cast or drilled into the permanent structure, can usually be left in place until the scaffold is being dismantled. They are not subject to the degree of interference associated with, for example, through ties. These anchorages and their components should have a safe working capacity of at least 6.25kN (637kg) in both tension and compression.

Workers installing anchorages should be instructed in the manufacturer's recommendations for each type of anchorage and these recommendations should be strictly complied with.

The anchorage capacity should be established by either proof load testing or by testing to failure a representative sample of anchorages. The manufacturer's recommendations in relation to the safe working capacity for your base material and testing should be followed.

Testing should be carried out on all projects.

A sample of anchors to be used shall be tested to a load between 1.2 and 1.5 times the required tensile load. In the case of ties requiring 6.1kN tensile capacity, this means a test load of 9.2kN (where a tie load of 12.2kN is required the proof load equals 18.3kN). It is assumed that the allowable load of the anchor is in all cases greater than or equal to the working load. The pass criterion is that no significant movement of the anchor is apparent; a visual check is sufficient.

A minimum of 3 anchors shall be tested and at least 5% (1 in 20) of the total job (see Table 2). If any anchors fail to satisfy this test requirement then the reason for failure should be investigated and the rate of proof testing at least doubled, i.e. at least 6 tests and 1 in 10 overall.

If significant numbers of anchors fail this test, then the overall safety margin is in doubt and the specification and installation method should be reviewed before the scaffold is passed for use.

Site tests should be carried out by suitably competent personnel (other than the actual installer of the fixings tested) using a test meter with a gauge calibrated within the last twelve months to an accuracy of >95%. Test equipment should apply the load through suitable couplers and be arranged such that the reaction loads are taken sufficiently far from the anchor so as not to influence the result, typically this means ensuring the feet of the bridge do not rest on the masonry unit being tested.

**Table 2: Number of Proof Tests of Anchorages Used for Scaffold Ties**

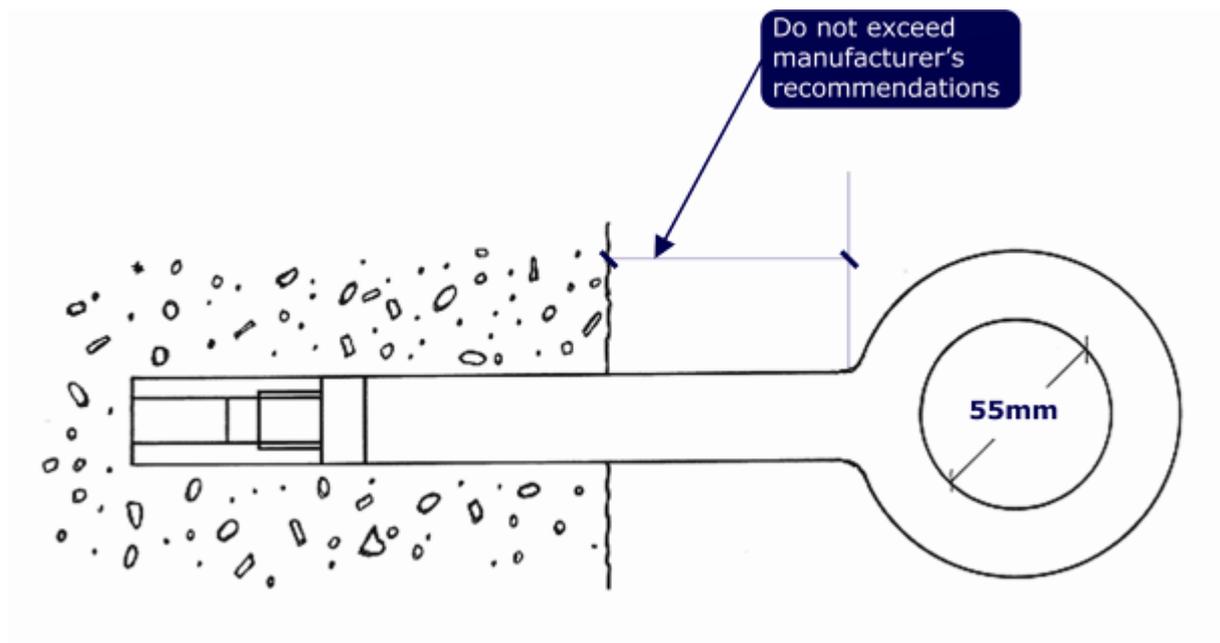
Total ties on the job	Number of proof tests
0 - 60	3 tests
61 - 100	5 tests
101 - 120	6 tests
121 - 140	7 tests
141 - 160	8 tests
161 - 180	9 tests
181 - 200	10 tests
201 - 220	11 tests
221 - 240	12 tests

**NOTE**

Test certificates / results for anchorages should be attached to the Scaffolding Handover Certificate

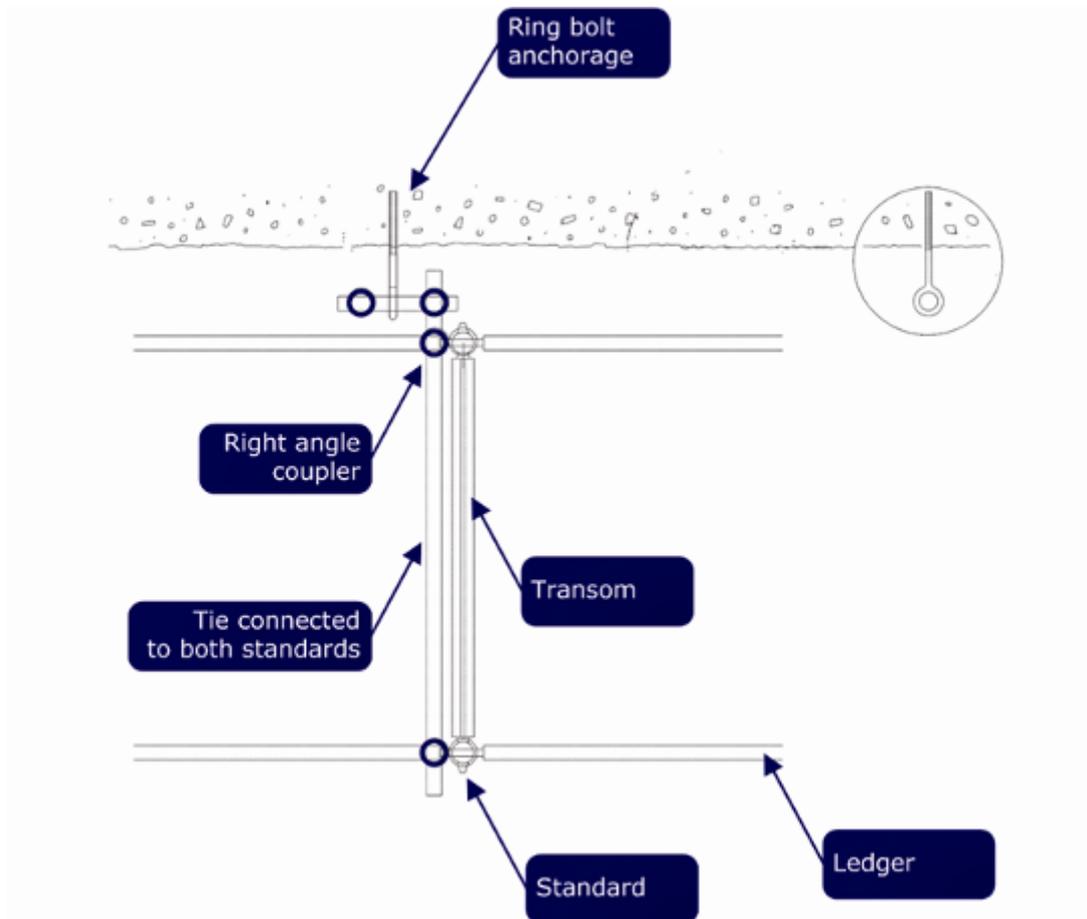
Source: Construction Fixings Association and the National Access and Scaffolding Confederation - TG4:2004

Most cavity walls, cladding panels and many parapets and other architectural features will be unsuitable for the attachment of anchorages. Where refurbishment work is being undertaken, the capacity of the building fabric to withstand the anchorage loads should be assessed.

**Figure 7: Typical Ring Bolt Anchorage**

A ring bolt may be used by passing a scaffold tube through the ring and connecting it to the scaffold.

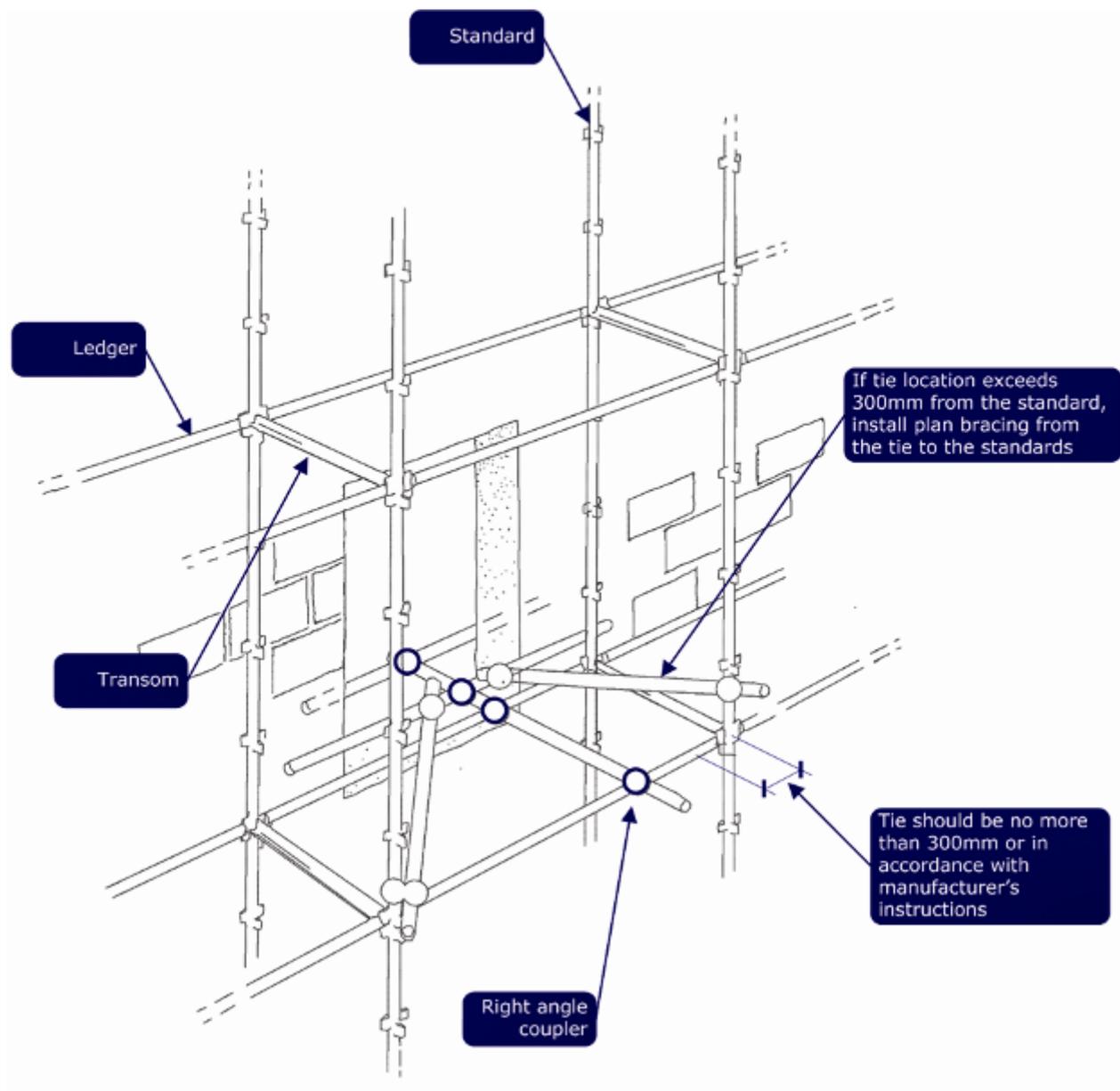
The exposed length of ring-bolt shank or other bolts should be kept short and it should not be extended beyond what is permitted in the manufacturer's written recommendations for bolts in compression. Where no written recommendations are available, the capacity of the tie in compression should be established by testing.



**Figure 8: Example of Ring Bolt Anchorage and Tie**

### 3.3.2.2. Through Ties

Through ties are attached to a tube across the inside and outside of an opening such as a window. It is preferred that this tube be vertical to prevent slipping and damage caused by workers standing on the tube and that the tie tube rests on or just above the lintel and close to the nearest standard. Other arrangements may be used where this is not practical. The inside tube should be supplemented by an outside tube or by a butting tube.



**Figure 9: Through Tie for Tied Scaffolds**

### 3.3.2.3. Reveal Ties

Reveal ties may be used where it is impractical to bolt into the fabric of the building or through open windows. These ties rely on friction and consequently require frequent inspection to ensure that the friction is maintained. Timber packing should be used, of approximately 10mm thickness (to minimise shrinkage), alternatively 9mm or 18mm plywood may be used. The end plates of the tube should be expanded onto the reveals by tightening a nut on the reveal pin. The tie tube should be fixed to the reveal tube not more than 150mm from the reveal and at the opposite end from the reveal pin.

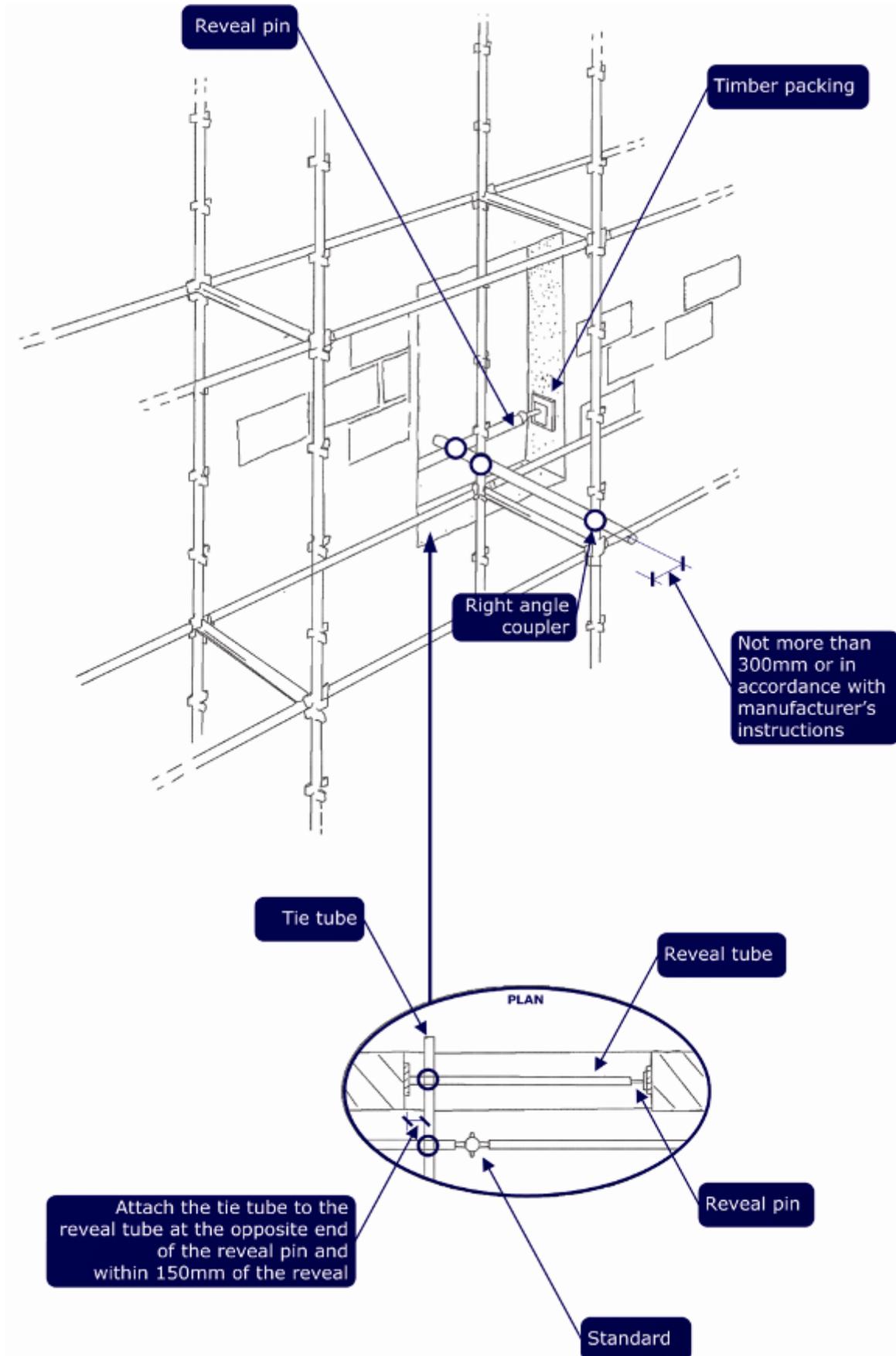


Figure 10: Reveal Tie for Tied Scaffolds

Where reveal ties are used, a greater number of ties are required. Where practicable, no more than 50% reveal ties should be used unless they are supplemented by permanent bolted or cast-in anchorages and a high level of maintenance.

Reveal ties are not suitable for use on sheeted scaffolds.

#### 3.3.2.4. Returns

Where a system scaffold is continually and correctly returned around the corner of a building, it can be regarded as being equal to a tie to the first pair of standards in each direction from the quoin (e.g. the ties can commence from the second pair of standards back from the return). It should be noted that if a correct and continuous return is not in place, then each elevation should be regarded as separate and must then be tied at each end. Plan bracing of ledgers would be required to provide tying to adjacent standards.

Returns of tube and fitting scaffolds may be regarded as providing attachment of the scaffold to the façade for a 3m length measured from the end of the building.

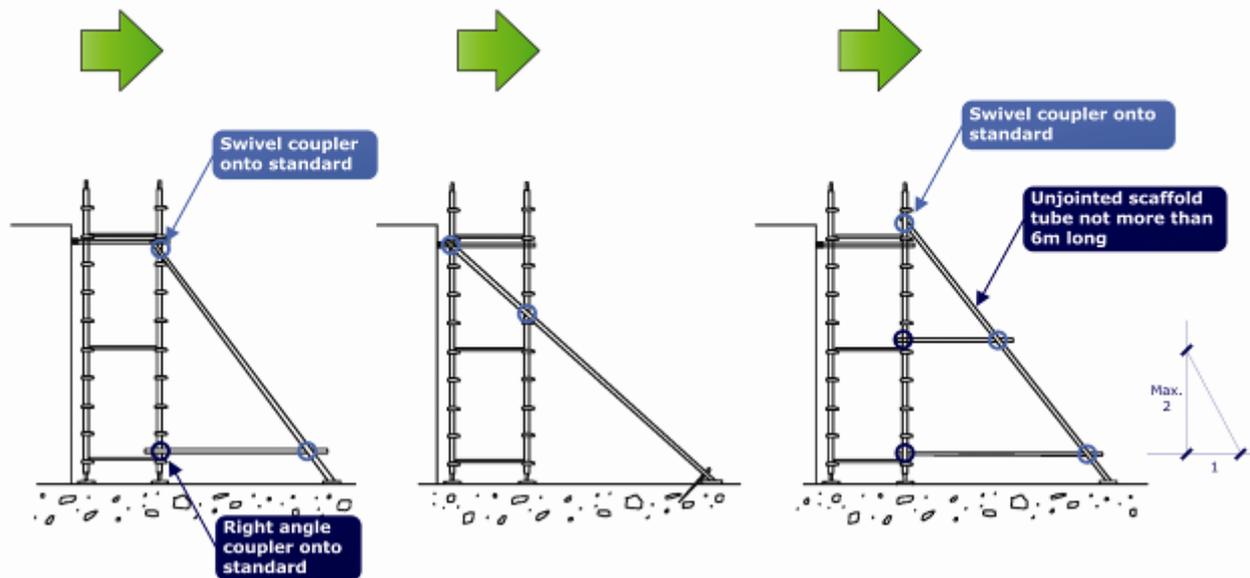
#### 3.3.2.5. Structurally Designed Buttresses

Structurally designed buttresses provide tying to those system scaffolding standards directly connected to the buttresses. Plan bracing is required to provide tying to adjacent system standards. Buttresses connected to tube and fitting scaffolding may be regarded as providing attachment of the scaffold to the facade for a 3m length measured from each side of the buttress.

#### 3.3.2.6. Single Unjointed Raking Tubes

Single unjointed raking tubes coupled to the scaffold at 6m intervals and tied back to the scaffold at the foot may be considered as providing adequate stability in the direction of the raker for scaffolds up to 6m high. The tube should be at an angle of not more than 2 vertical to 1 horizontal and not more than 6m in length. Plan bracing is required to provide tying to adjacent system standards between the rakers.

Raking tubes generally provide stabilising in one direction only – Use butt tube to stabilise against building



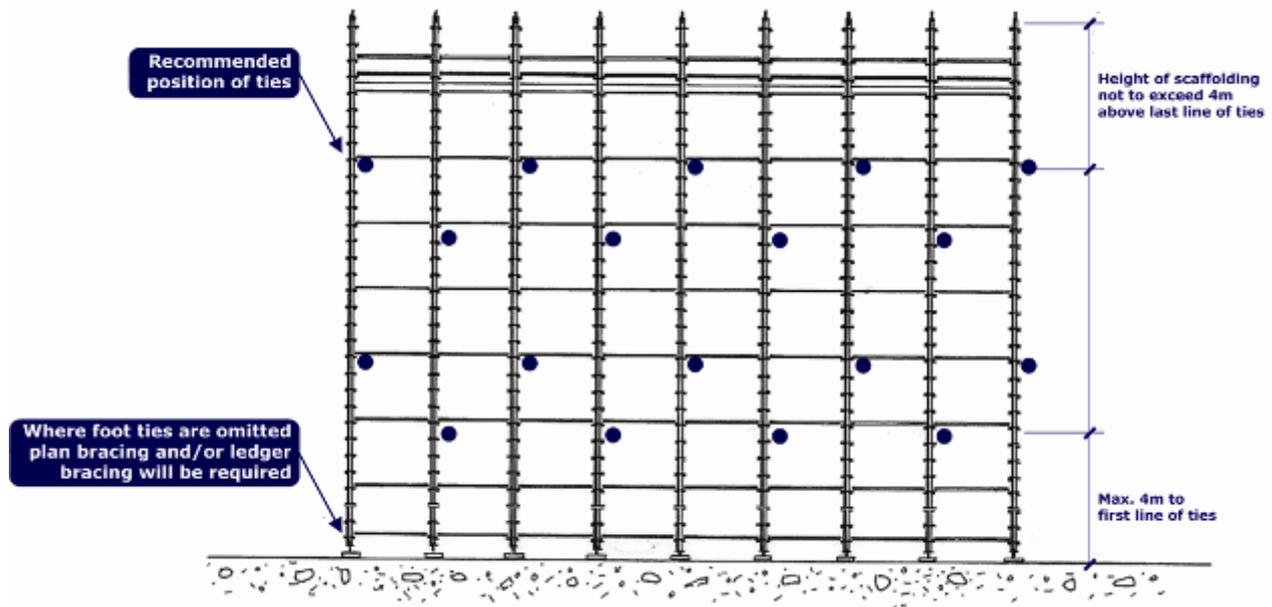
**Figure 11: Stabilising a Scaffold Less than 6m High – Raking Tubes**  
(refer to manufacturer's instructions)

### 3.3.3. Tie Spacing

The spacing of ties is determined mainly by the loading and layout of the scaffold. As the loading, height, number of working platforms or number of boarded platforms or the wind loading increases, so does the number of ties required. The system manufacturer's instructions for tie spacing should be followed; for tube and fitting scaffolds, the spacing of the ties determined by the designer must be followed.

#### 3.3.3.1. System Scaffold Ties

Each type of system scaffold has a characteristic tying pattern recommended by the manufacturer. These patterns should be followed unless structural design calculations show any proposed variations to be safe. The system scaffolding manufacturer's recommended tying arrangements should be available to the scaffolders. The recommended tying arrangements should also be provided to the persons responsible for inspecting the system scaffold during use.



**Figure 12: Example of a Tie Pattern for a Lightly Loaded Scaffold**  
(refer to manufacturer's instructions)

Many system scaffolds require every standard to be tied and for the first level of ties to be no more than 4m above the base plate. Where this is required but is not possible for an individual standard, the manufacturer may permit plan or cross bracing to be provided between ties to give stability to the untied standard. Such bracing will transfer more load to the existing ties, these ties should be able to resist the increased loading and at least two couplers should provide restraint in each direction at both the scaffold and the wall end of the tie.

#### 3.3.3.2. Tube and Fitting Scaffold Ties

The number of ties must be determined by the designer, in accordance with the requirements of I.S. EN 12811 Part 1, 2004. When tying sheeted scaffolds the top lift must be tied. In addition, ensure that the coupler capacity is adequate and that there are at least two couplers providing restraint in each direction at both the scaffold and the wall end of the tie.

#### 3.3.4. Bracing

Bracing is required to stiffen the scaffold and prevent it from swaying. In system scaffolds swaying can cause instability, weld deterioration and can over stress the standards. Refer to the manufacturer's erection manual for specific requirements for bracing.

In tube and fitting scaffolds, each plane of the scaffold should be braced by installing diagonal tubes that divide it into a complete series of triangles from the bottom to the top of the scaffold. The braces should be fixed as close as possible to the standard–ledger intersections. Refer to Table A4 in Appendix A for the

characteristic values of the resistances for couplers.

### 3.3.4.1. Façade Bracing

Façade bracing runs parallel to the building and examples include:

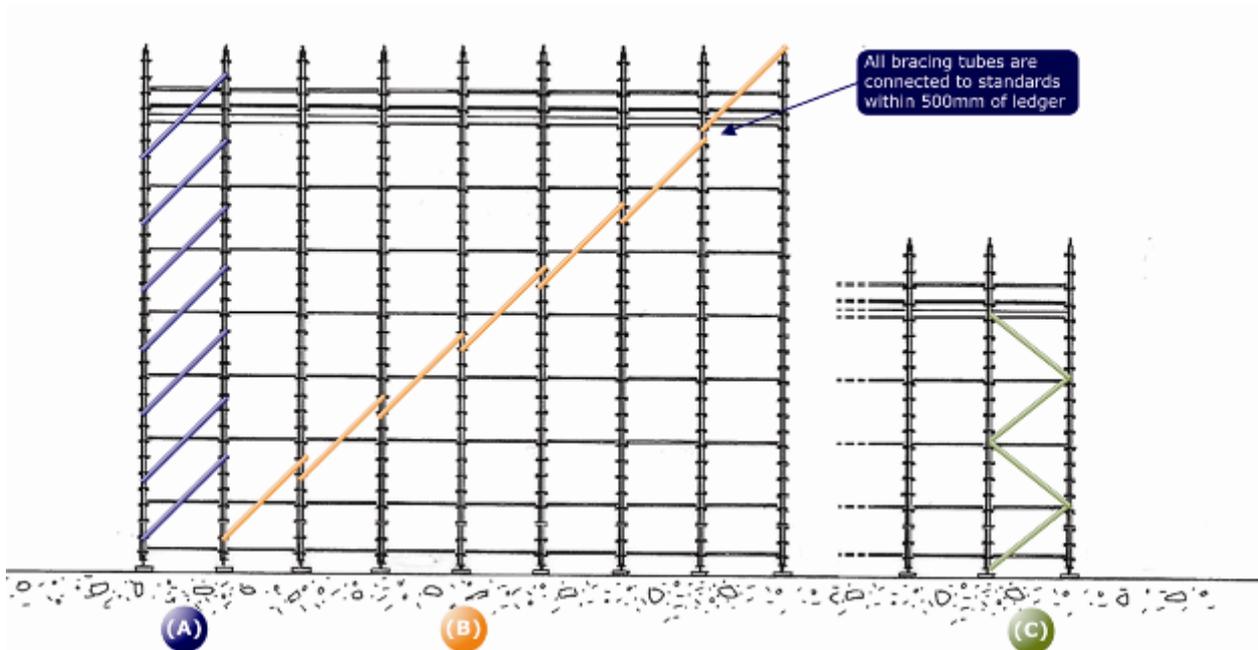
- (A) a series of parallel diagonal tubes placed one above the other;
- (B) in long façades, a continuous diagonal tube from bottom to top; or
- (C) a zigzag pattern (for scaffolds with a maximum of 4 lifts).

The scaffold should incorporate one type of façade bracing (see Figure 13).

System scaffolding should be braced in accordance with the manufacturer's recommendations. The recommended maximum façade brace spacing for system scaffolds ranges from 3 unbraced bays to 8 unbraced bays; however this depends on the system used and the manufacturer's erection manual must be referred to.

Tube and fitting scaffolds should be braced at least every 5 bays, unless movement along the building is prevented by other means.

Bracing should be fixed as near to the standard–ledger intersections as possible. The bracing should extend to the bottom of the scaffold with no breaks.



**Figure 13: Examples of Façade Bracing (use A or B or C as appropriate)**

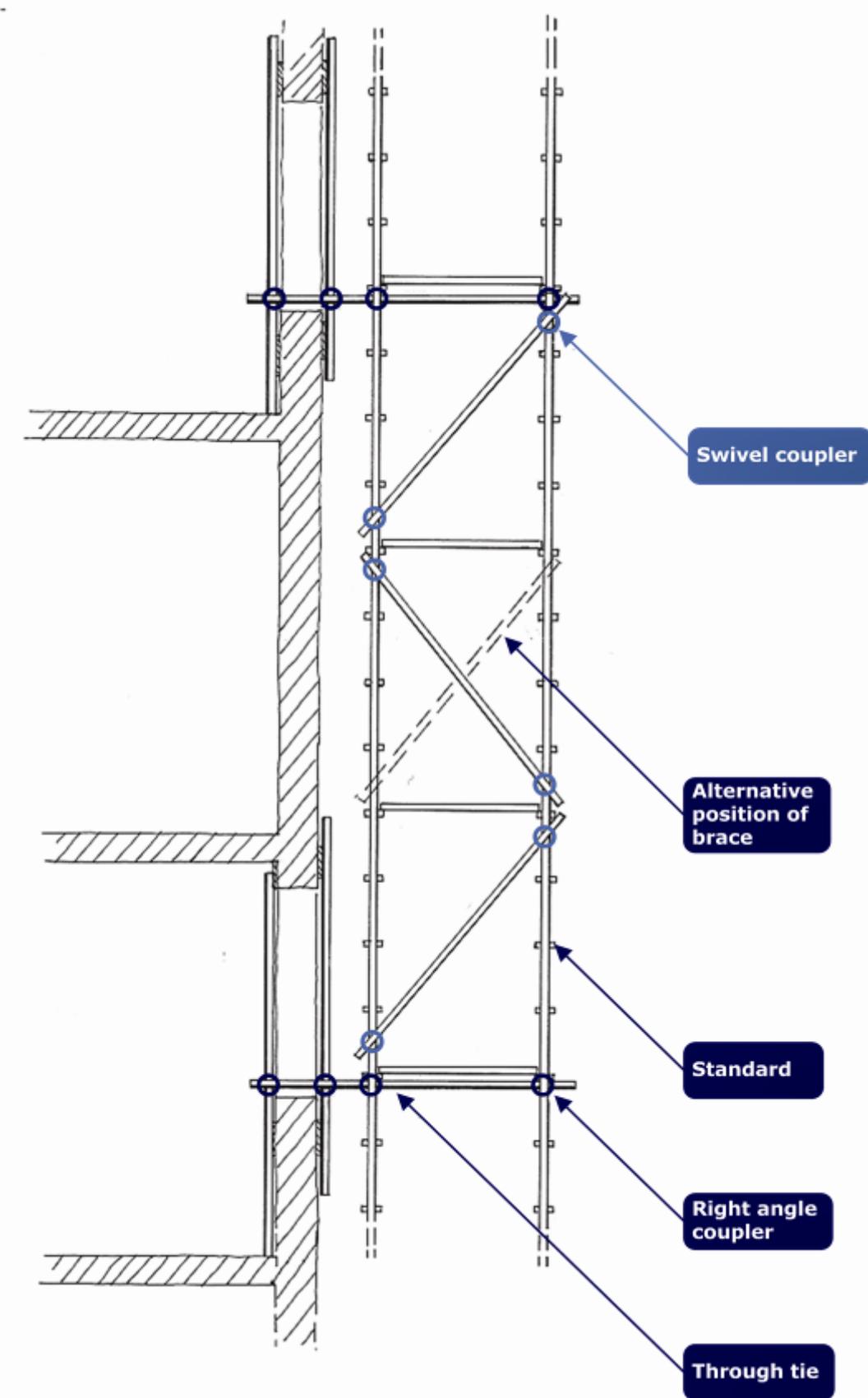
#### 3.3.4.2. Ledger Bracing

Ledger bracing runs at right angles to the façade and is in a vertical plane.

Some types of system scaffold do not require cross bracing unless:

- ties cannot be located as required by the manufacturer or are liable to be removed; or
- the height of the scaffold is 4m or more above the last line of ties.

Where ledger bracing is installed for the above reasons, the loads on the adjacent ties will be increased. The system manufacturer's instructions should be consulted to determine whether ledger bracing is required.



**Figure 14: Section Showing Example of Ledger Bracing**  
(refer to manufacturer's instructions for ledger bracing requirements)

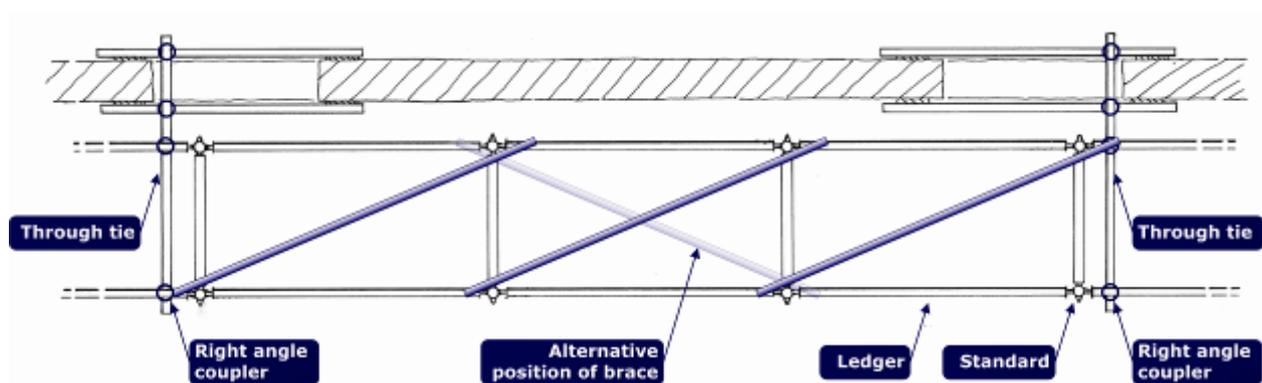
Ledger bracing should be installed on tube and fitting scaffolds. Brace alternate pairs of tube and fitting standards, ensuring that the bracing forms a complete series of triangles from bottom to top of the scaffold. Install the bracing from ledger to ledger or from standard to standard. For tube and fitting scaffolds, brace each pair of standards where the bracing is installed from the inside ledger to the guard-rail of the lift below to allow access along a boarded lift.

When clear access is required on base lifts of tube and fitting scaffolds, the cross bracing may be omitted on the base lift provided the first lift does not exceed 2.7m, or the lift is knee braced. In either case, the loading capacity of the scaffold will be reduced.

#### 3.3.4.3. Plan Bracing

Plan bracing should be installed on those horizontal planes of the scaffold that are not stabilised against lateral distortion. The bracing should be connected from standard to standard, forming a complete series of triangles. Examples where plan bracing is required include:

- **Missing ties**  
Where an individual tie cannot be installed at the manufacturer's recommended spacing, plan bracing may be used to help span the extended distance between the adjacent ties. Note that the loading on the ties will be increased.
- **Lateral loading**  
Where loading bays are connected to the scaffold, the bays should be wing plan braced off the scaffold.



**Figure 15: Example of Plan Bracing**

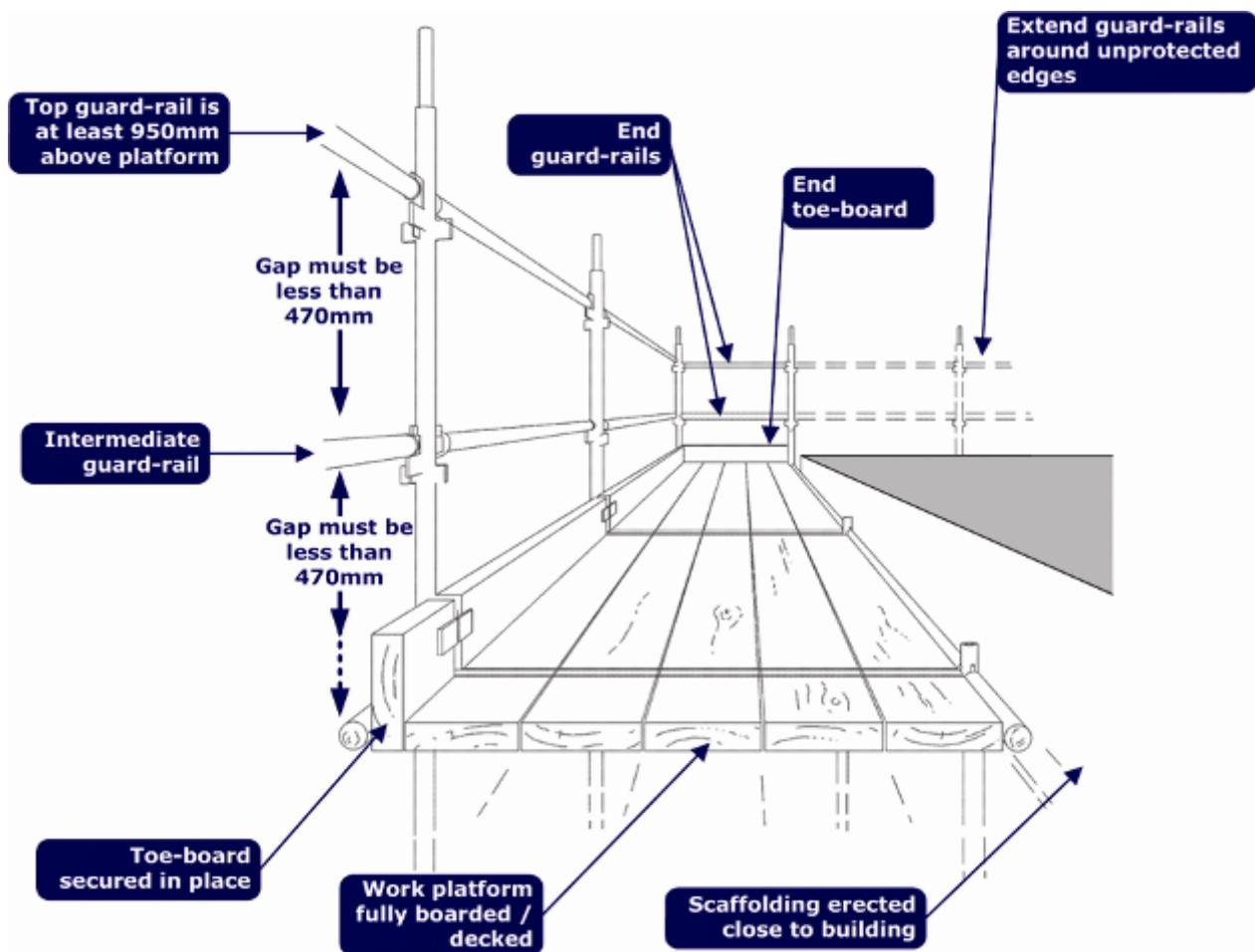
*(refer to manufacturer's instructions for plan bracing requirements)*

### 3.4. Working Platforms

Working platforms should be wide enough and be sufficiently boarded out to allow safe passage of persons along the platform. They should also be capable of resisting the loads imposed upon them, including high wind loads that could dislodge the scaffold boards.

Where a person could fall a distance liable to cause personal injury, the working platform should be of the widths given in Table A5, Appendix A.

A clear passageway, at least 430mm wide, should be maintained for persons to pass between stored materials and the side of the platform.



*Figure 16: Working Platform*

#### 3.4.1. Decking

Decking may consist of timber boards or proprietary decking units. Where timber boards are used they should comply with I.S. 745, 1986 *Machine-graded home-grown timber scaffold boards* or BS 2482, 1981 *Specification for timber scaffold boards*. The scaffold boards should not exceed the spans given in Table A2 in Appendix A. These spans may need to be reduced to accommodate heavy loading.

The transoms of many system scaffolds are constructed to provide a secure support for standard-length boards.

Where the transoms do not positively restrain the boards from moving or tipping, the boards should be installed so that they overhang the transoms by at least 50mm but by no more than 4 times their thickness. Boards that are nominally 38mm thick and less than 2.13m long should not be used unless they are positively restrained to prevent moving or tipping.

Platforms should be maintained in a fully boarded or decked condition. Where a platform has not been fully boarded or has lost boards, either all boards should be removed or it should be fully boarded as soon as possible. Immediate steps should be taken to prevent access to partially boarded platforms by removing ladders, placing barriers across access points (including windows) and placing "scaffold incomplete" warning signs at all potential entry points.

The use of the scaffold should be monitored so as to ensure that the manner in which the works are being undertaken is not damaging the working platform, e.g. through the use of abrasive wheels on scaffold boards.

#### 3.4.2. Toe-Boards

Toe-boards help prevent materials from falling and they also help prevent persons falling between the guard-rail and platform. Toe-boards and end toe-boards should be fixed to all working platforms where a person could fall a distance liable to cause personal injury. The toe-boards should have a height of at least 150mm above the platform and they should be securely fixed to the standards.

#### 3.4.3. Maximum Gap between Building and Platform

The scaffold should be erected as close to the finished structure as is practicable. The maximum gap between the scaffold and the structure should be 300mm where workers are required to sit on the edge of the platform nearest the structure and where ropes or chains provide a safe and secure handhold. Where practicable, the gap should be closed by using cantilever platform brackets at platform level.

#### 3.4.4. Cantilever Platform (Stage) Brackets

Cantilever platform (stage) brackets may be used to fill the gap between the scaffold and structure and are available up to three boards wide. Some system

cantilever brackets require a stabilising tie to be installed. It is essential to fit this tie, as without it the bracket can swivel on the standard and the boards can become dislodged.

Account should be taken of the extra load imposed by cantilever brackets on the inside line of standards. Fitting cantilever platform brackets will generally reduce the working platform service load and reduce the allowable number of boarded lifts and working lifts.

### **3.5. Guard-Rails**

Guard-rails should be provided on all working platforms, including boarded trestles, where a person could fall a distance liable to cause personal injury. Part 4 of the Safety, Health and Welfare at Work (General Application) Regulations 2007 details the requirements for guard-rails. The height of the guard-rail should be at least 950mm above the working platform.

An intermediate guard-rail must be provided such that the maximum distance between the rails and between the lower rail and the toe-board does not exceed 470mm (see Figure 16).

Guard-rails should be capable of resisting reasonably foreseeable horizontal and vertical loadings. In any case, guard-rails should be capable of resisting a downward load of not less than 1.25kN (127kg) without breaking, disconnecting or deflecting more than 200mm and they should be capable of resisting a point load of 0.3kN (30.5kg) without an elastic deflection of more than 35mm.

### **3.6. Falling Object Protection**

Measures should be taken to prevent materials from falling from working platforms. A risk assessment will identify the most appropriate precautions for different areas of the site. Areas above pedestrian traffic, particularly those areas above entrances into the structure or above where persons are working, will present the highest risk and will require the greatest precautions.

#### 3.6.1. Brick Guards

Brick guards may be hung from the guard-rails and secured to prevent outward movement.

#### 3.6.2. Sheeting

Sheeting may consist of netting, corrugated sheets or timber sheets. It should be fixed securely to prevent materials from passing through the sheeting. Sheeting should be inspected regularly, particularly after strong winds. Sheeting will

significantly increase the wind loading on a scaffold and on the ties and tie couplers.



**WARNING**

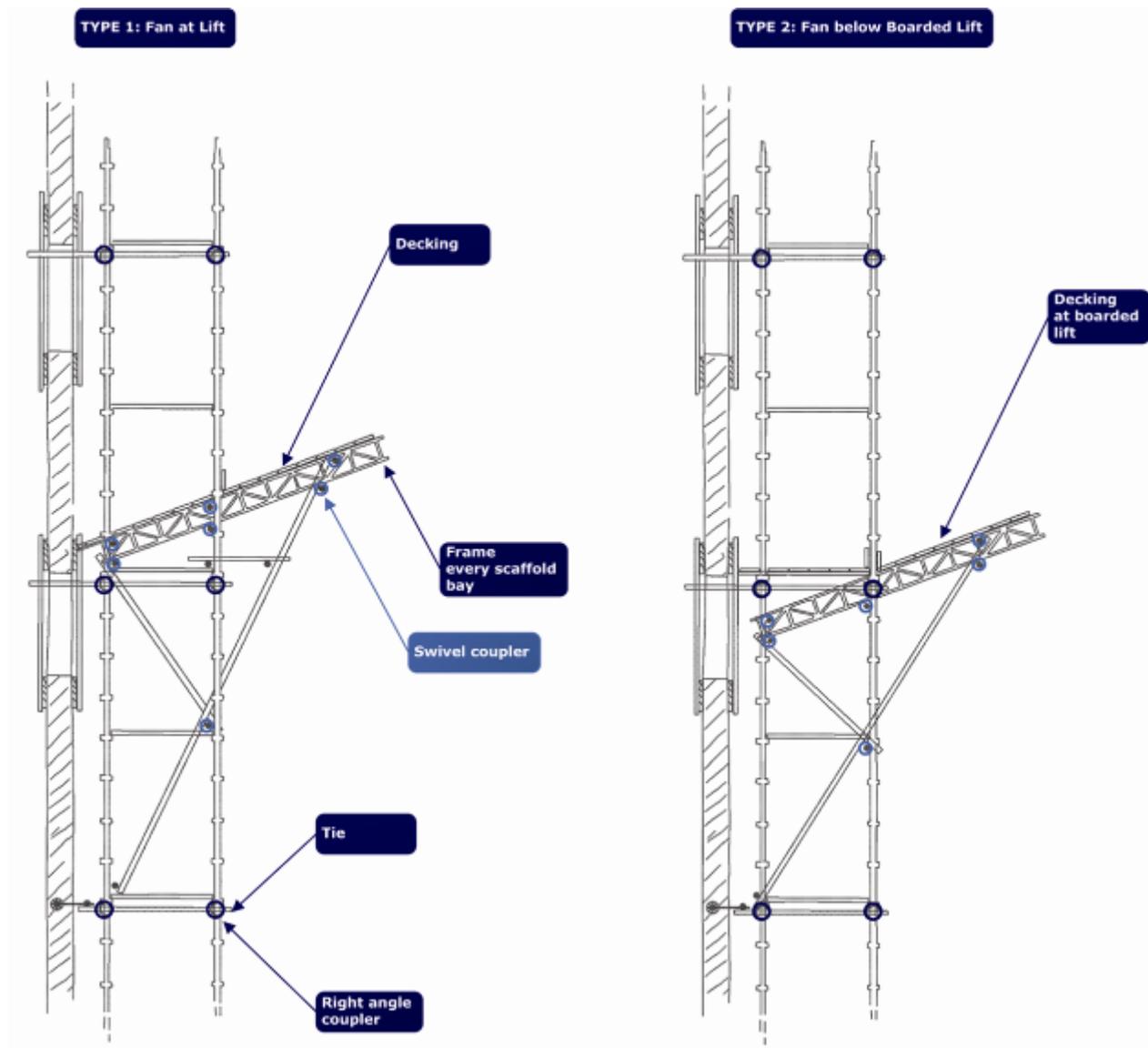
Scaffolding fitted with debris netting or sheeting requires additional ties. Refer to the manufacturer's erection manual and verify that the ties are installed as per these recommendations before the debris netting or sheeting is installed onto the scaffold.

### 3.6.3. Fans

Fans normally consist of an inclined support extending from the building and covered in decking. Fans are often the most suitable method of protecting pedestrian traffic areas and access points into the structure.

The loads imposed on a scaffold by a fan, i.e. dead load, impact load and wind load, are usually substantial. The top of the fan should be tied to the scaffold where it is tied to the permanent structure and the bottom tube of the fan should be propped against the structure.

Figure 17 shows two different arrangements for protection fans. Type 1 is where the fan is at a lift level. For Type 2 the fan is detailed at a lower level, in order to pass under a boarded lift. Note that in both cases additional toe-boards should be used to prevent material rolling off the fan.



**Figure 17: Examples of Medium Duty Fans**

### 3.7. Access to the Scaffold

A safe means of access to all working platforms on the scaffold should be provided. This may include gangways, stairways, landings, ladders, ramps or hoists.

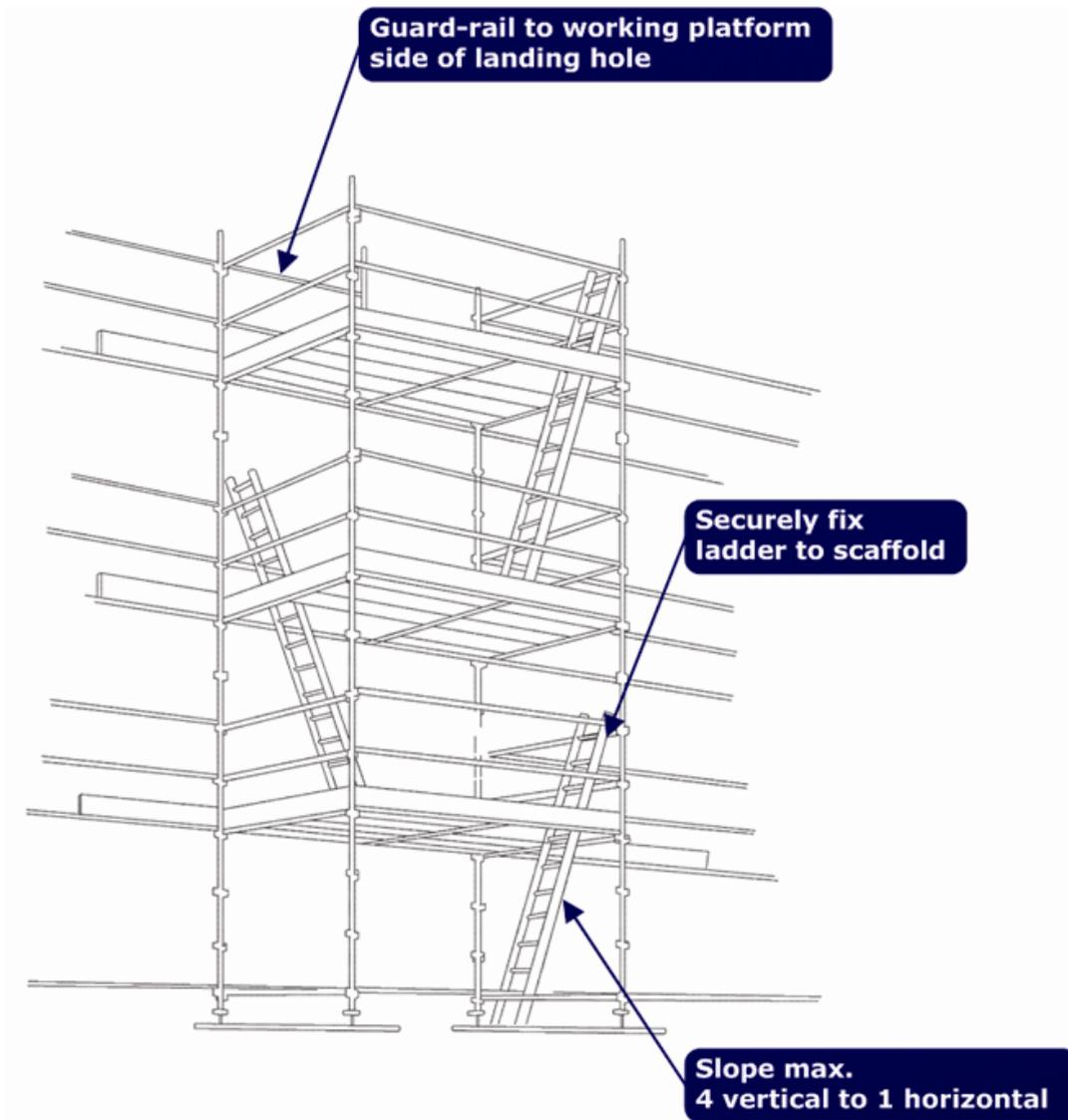
Sufficient access points should be provided so that workers may easily gain access to their place of work.

An inadequate number of access points may lead to unsafe practices such as workers climbing scaffold components to gain access to or egress from their place of work.

### 3.7.1. Ladder Access

Scaffold access ladders should meet the following minimum standards:

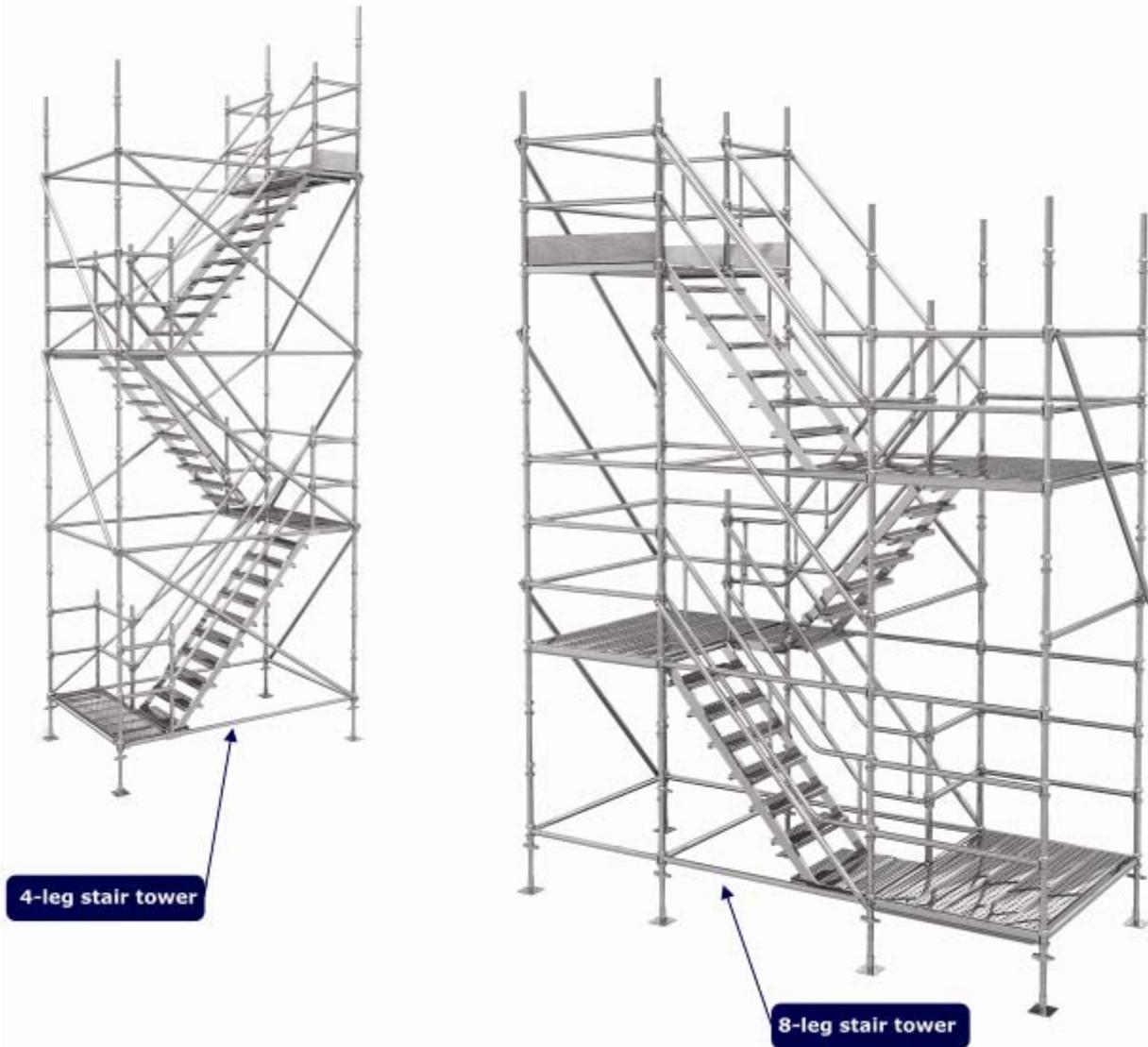
- ladder access towers, fixed to the outside of the scaffold, should be erected, where practicable;
- the top of ladder stiles should be securely fixed to the scaffold by lashings;
- the ladder should be set, where practicable, at an angle of not more than 4 vertical to 1 horizontal;
- each stile should be equally supported on a firm and level footing;
- the ladder should extend at least 1m above the landing point or some other adequate handhold should be provided;
- the maximum vertical distance between landings should be 9m;
- the clear dimensions of an access opening in a platform shall be at least 450mm wide, measured across the width of the platform, and 600mm long. If it is not reasonable or practicable to close the opening by means of a permanently attached trapdoor, a protective guard-rail should be installed. If a trapdoor is used to protect operatives from the access opening, then it shall be capable of being fastened in the closed position; and
- landings should be provided with guard-rails and toe-boards.



**Figure 18: Example of Ladder Access Tower**

*(note: above six lifts, there may be a requirement for double standards, tied at each lift. Refer to manufacturer's instructions)*

The provision of staircase towers or ramps should be considered when justified by the frequency of passage, height to be negotiated, duration of use or evacuation requirements (see Figure 19).



(Courtesy of SGB Scafform)

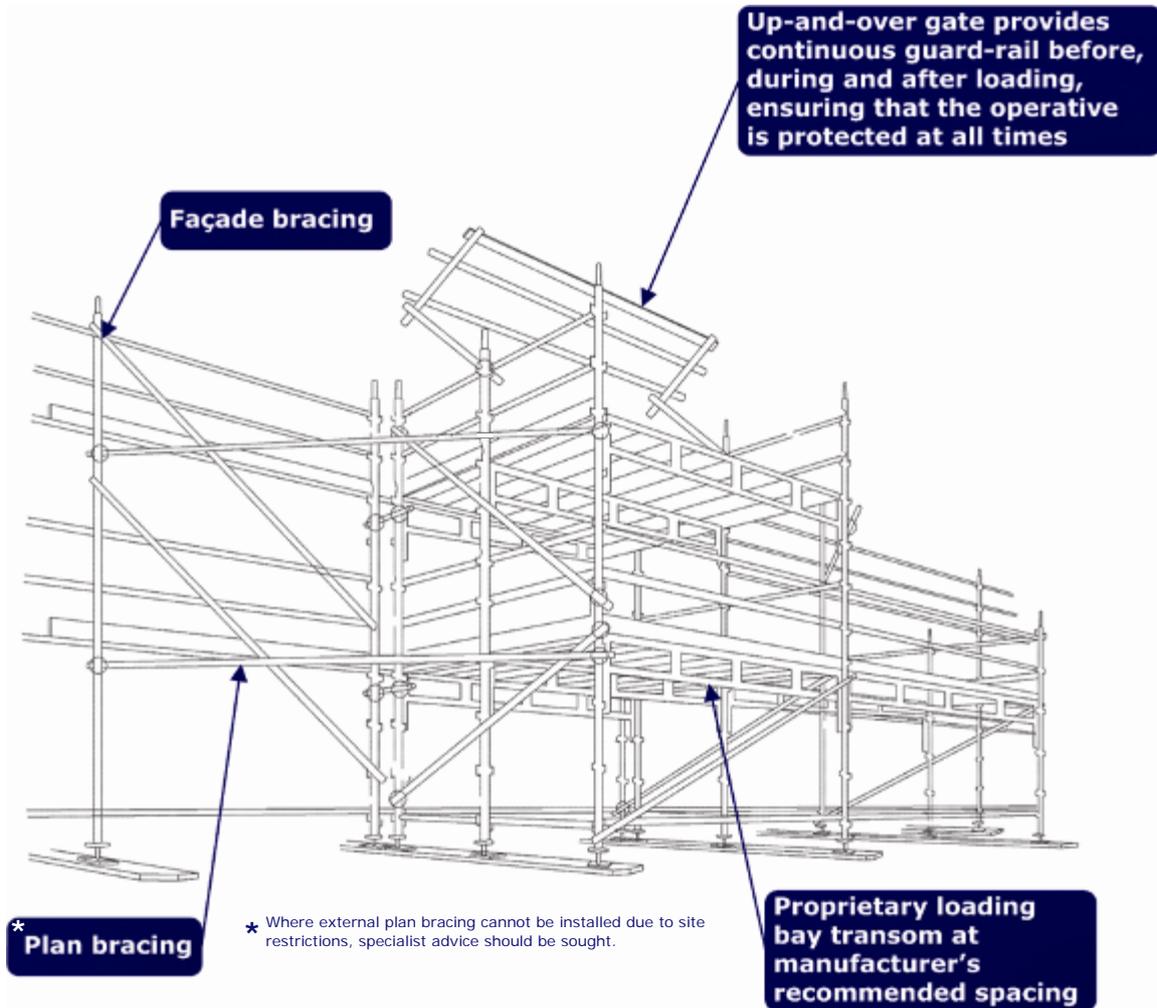
**Figure 19: Example of Stair Access Towers (toe-boards omitted for clarity)**

### 3.8. Loading of the Scaffold

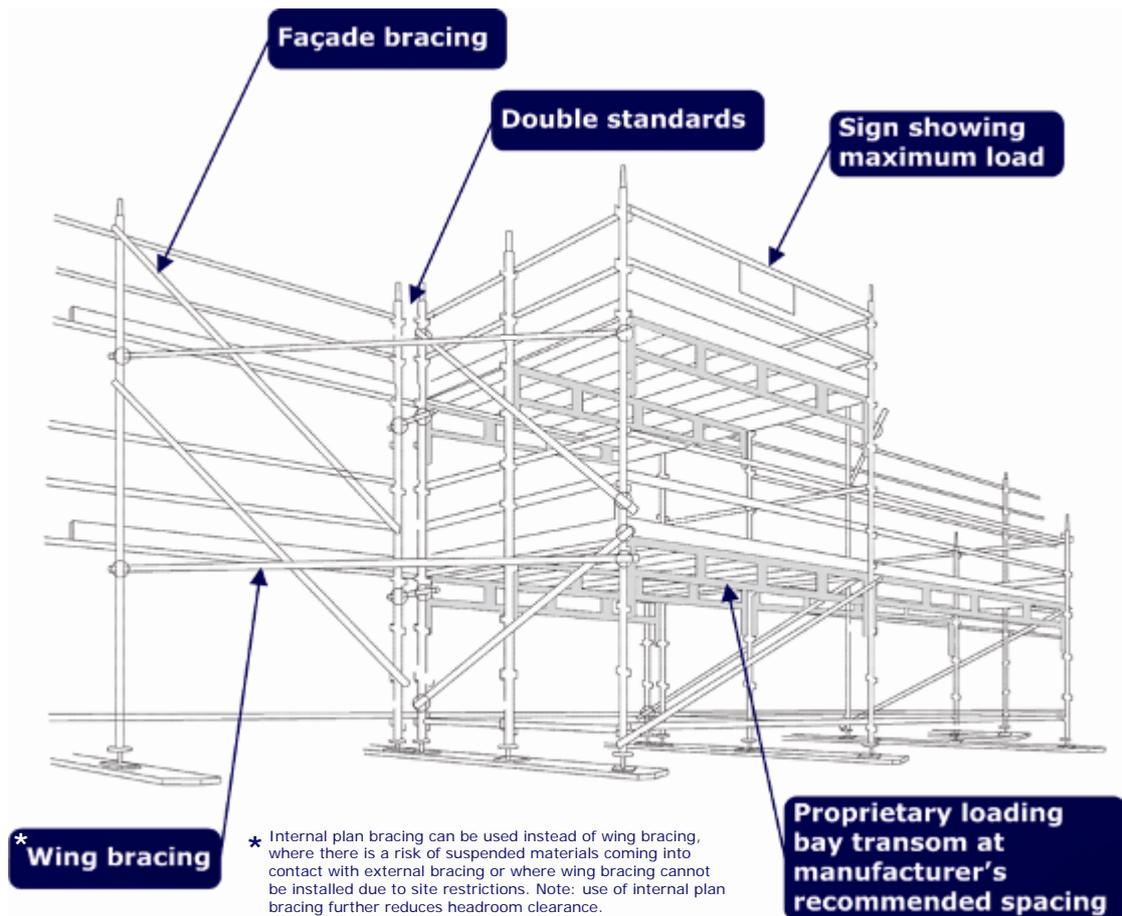
#### 3.8.1. Loading Bays

The weights of pallets of building materials such as blocks and bricks are usually in excess of the recommended load ratings of the system scaffold manufacturers. A loading bay will therefore be required where it is necessary to lift pallets of heavy materials onto a scaffold. The provision of properly constructed loading bays can avoid the excessive loading of access scaffolds and the obstruction of gangways that can otherwise occur.

The type of loading bay required will vary depending on the chosen method for transporting materials around the site and loading materials onto the scaffolding. A loading bay designed for use by a teleporter is different to a loading bay for use with a crane (see Figures 20 and 21).



*Figure 20: Example of a Loading Bay for Use with a Teleporter*



**Figure 21: Example of a Loading Bay for Use with a Crane**

Refer to the system manufacturer's instructions for the erection of loading bays.

Loading bays should be diagonally braced on all four sides or braced in compliance with the system manufacturer's recommendations. Where the internal façade bracing hinders access onto the scaffold from the loading bay, the brace may be placed on the main scaffold adjacent to the loading bay or in accordance with the system manufacturer's recommendations. Issues that require consideration include:

- Standard transoms at standard spacings and timber deckings at standard spans are not usually adequate to carry the higher loadings in a loading bay. System scaffold loading bays incorporate special load-bearing transoms, often at reduced spacing.
- Where load-bearing transoms are directly connected to the outside face of a scaffold, the capacity of the standards to support the combined loads imposed by the working platforms and the load-bearing transoms should be assessed.

- Plan bracing should be installed from the outside corner of a loading bay to the main access scaffold and the main scaffold should be tied to the building with supplementary ties opposite these braces at intervals not exceeding 3m.
- Where guard-rails must be removed temporarily to facilitate loading, effective compensatory measures to prevent falls should be provided. These measures may include movable guard-rails or panels, handholds or safety harnesses affording an equivalent standard of protection as guard-rails.

Temporarily unguarded openings or edges should not be left unattended and guard-rails should be replaced as soon as practicable.

### 3.8.2. Signs

Easily comprehensible signs showing the safe working load, for each working lift, should be placed on scaffolds and loading bays.



*Figure 22: Example of Sign for Working Platform with UDL of 2.5 kN/m<sup>2</sup>*

Warning signs must also be erected on a scaffold that is not available for use, including during its assembly, dismantling or alteration and, where appropriate, the scaffolding should be protected, by barriers or other suitable means, from unauthorised access or use.

### 3.8.3. Loading Charts

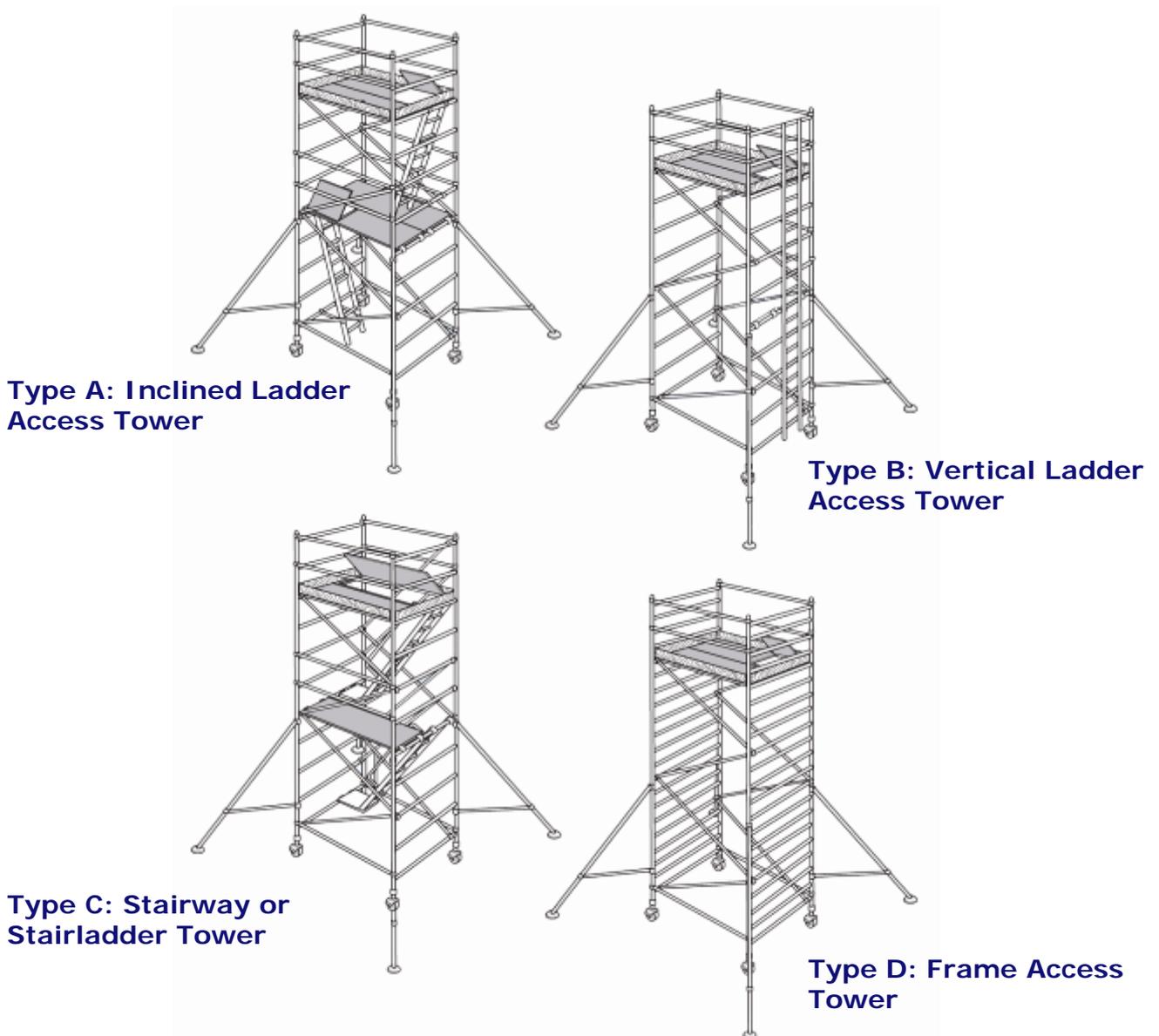
Supervisors and equipment operators, e.g. crane and telescopic fork-truck drivers, should be provided with easily comprehensible loading charts showing the weights of the typical materials used on the site, e.g. weights of the pallets of bricks and blocks, scaffold boards and standards, mortar skips. This information will enable them to estimate the load they are placing on the scaffold and ensure that it is less than the safe working load indicated on the signs.

### 3.9. Free-Standing and Mobile Access Towers

Free-standing and mobile access towers can provide a safe means of working at a height provided that they are properly constructed and used. Access towers have, however, been associated with serious accidents due to overturning or contact with overhead electricity lines.

#### 3.9.1. Types of Tower

The main types of tower in use are aluminium alloy towers, GRP (Glass Reinforced Plastic) towers and steel towers. Components may include prefabricated frames, platforms, bracing, castor wheels and outriggers. Steel towers are constructed from system scaffold components or from tube and fitting components.



(Courtesy of PASMA)

**Figure 23: Examples of Mobile Towers with Different Access Methods to the Working Platform**

I.S. EN 1004, 2005: *Mobile access and working towers made of prefabricated elements – Materials, dimensions, design loads, safety and performance requirements* gives minimum specifications for standard mobile prefabricated towers with platform heights from 2.5m to 8.0m when used externally and 2.5m to 12.0m when used internally.

### 3.9.2. Manufacturer's Instructions

The manufacturers and suppliers of prefabricated tower scaffolds should provide instructions (which comply with I.S. EN 1298, 1996: *Mobile access and working towers – Rules and guidelines for the preparation of an instruction manual*). These instructions should be available to persons assembling and using these scaffolds and they must be followed.

### 3.9.3. Falls from a Height – During Assembly and Dismantling

There are currently two methods of providing a safer environment during the assembly, altering and dismantling of mobile access towers. These methods take account of the need to prevent falls during these processes.

- **Advanced Guard-Rails**

This method uses an additional set of equipment allowing guard-rails to be placed ahead of the platform from the safety of the level below so that collective fall prevention measures are in place before the operative stands on the platform (see Figure 24 – toe-boards omitted for clarity).

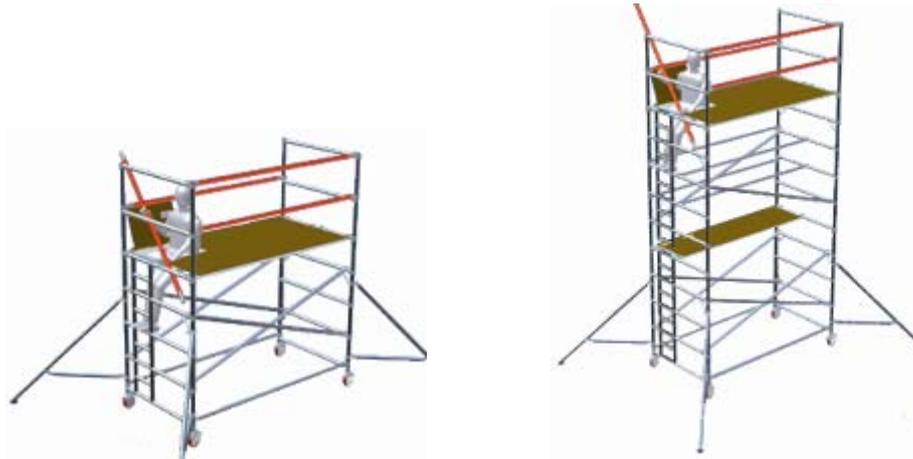


(Courtesy of PASMA)

**Figure 24: Advanced Guard-Rail Method for Erection of Mobile Towers**

- **3T – Through the Trapdoor**

This method allows the operatives to position themselves through the trapdoor of the platform and place horizontal braces ahead of themselves so that collective fall prevention measures are in place before they stand on the platform (see Figure 25 – toe-boards omitted for clarity).



(Courtesy of PASMA)

**Figure 25: Through the Trapdoor Method for Erection of Mobile Towers**

### **SAFE ERECTION AND DISMANTLING OF TOWER SCAFFOLDS**

One method of erection is the 'through-the-trapdoor' (3T). This allows the person erecting the tower to take up a position of minimum risk during the installation of guard-rails to the next level. It involves the operator taking up a working position in the trapdoor of the platform, from where they can add or remove the components which act as the guard-rails on the level above the platform. It is designed to ensure that the operator does not stand on an unguarded platform, but installs the components to a particular level while positioned within the trapdoor of that same level.

The 3T method makes use of standard tower components.

#### 3.9.4. Falls from a Height – Personal Fall Protection Equipment

It is recommended that you do **not** attach safety harness lanyards to mobile access towers. In the event of an arrested fall, you are likely to cause the tower to overturn, not only increasing the risk of further injury to yourself, but also putting others in the vicinity in danger from the falling tower.

#### 3.9.5. Stability

The conditions of use of the tower and environmental forces such as wind can adversely affect tower stability. Where the conditions of use or the wind forces are likely to be different from those covered by the manufacturer's instructions or this Code, or where the tower is erected in a location exposed to high winds, the overturning forces should be calculated by a competent person. Appropriate measures should be taken to ensure that the tower has a factor of safety against overturning of at least 1.5 in any direction (see Section 2.3.2).

**NOTE**

The stability of free-standing towers that are likely to be exposed to high winds, other significant horizontal loads or where loads will be hoisted outside of the middle third of the base width should be evaluated. Where there is a danger of overturning, an adequate safety factor against overturning in any direction should be obtained by the provision of stabilisers, outriggers, kentledge, guys or ties to adjoining structures as per the designer's advice.

### 3.9.6. Ground Surface

The ground surface should be suitable for the type of tower to be used. Where castors are to be used, the surface should be even and holes, ducts, pits or gratings should be securely fenced or covered. Where the surface is sloping, the tower should be prevented from slipping. Base plates and sole boards should be used where the ground is soft.

### 3.9.7. Bracing

Prefabricated towers should be braced in accordance with the manufacturer's instructions. Where the tower is constructed of tube and fitting components, it should be adequately braced on all four sides and be braced in plan at every alternate lift.

### 3.9.8. Castors

Castors should be fitted with adequate brakes and they should be securely fixed to each leg of the tower to prevent accidental uncoupling.

### 3.9.9. Working Platform

The deck units or boards should be securely fixed to the frame. Toe-boards and guard-rails should be provided. The platform should not be overloaded.

### 3.9.10. Tower Access

Access should be provided to the tower using vertical or integral ladders, inclined internal ladders or stairways erected in accordance with the manufacturer's directions. Ladders should be attached to the shorter side of rectangular towers and within the base area of the tower. External ladders should not be used with aluminium towers. Access to the platforms should be through a hatch that is capable of being closed and secured.

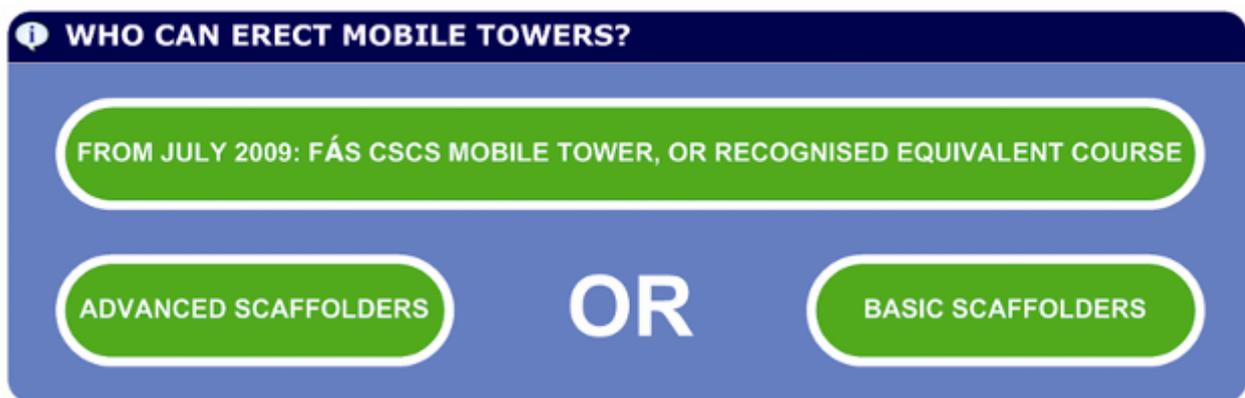
### 3.9.11. Overhead Electricity Lines

Mobile access towers should not be used in locations adjacent to overhead power lines. Where mobile access towers are being used in the same general area as overhead electricity lines, physical barriers and warning notices should be provided to prevent them coming close to the overhead electricity lines.

### 3.9.12. Instruction, Training and Supervision

Prefabricated towers such as aluminium alloy towers may only be erected by competent workers with adequate skills and training. Workers should be provided with adequate and comprehensible instructions both for the erection and checking of the tower.

From July 2009 the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2008 require persons who erect mobile towers to have successfully completed the FETAC (or recognised equivalent) course and to be in possession of a FÁS Construction Skills Certification Scheme (CSCS) card for mobile tower scaffolds. A basic or advanced scaffolder is already deemed to be competent to erect mobile towers.



Competent supervision should be provided to ensure that towers are safely erected, checked and used.

### 3.9.13. Tower Use

Vertical or horizontal forces capable of overturning a tower should not be applied. Such forces may arise from pulling or pushing the tower along at a high level, lifting loads up the outside of the tower or hauling heavy ropes or cables. Using hand tools such as drills can cause an additional horizontal force on the tower.

The tower should not be moved with workers or materials anywhere on the tower. It should be moved manually, pushing the tower at or near the base. Mechanical means should not be used to push towers.

The tower or its platforms should not be overloaded.

The castors should always be locked, except when moving the tower. Chocks should be used where there is any doubt about the adequacy of the brakes.

Standard-width scaffold couplers should not be used on aluminium alloy towers.

The access tower should be inspected and form GA3 (see Appendix C), or some

other suitable method of recording the required information, should be completed before using the tower.

Warning notices should be placed on incomplete towers.

#### 3.9.13.1. Prefabricated Aluminium or GRP Towers

Aluminium and GRP towers are light. This lightness is a positive advantage in relation to ease of erection and use and may help to avoid manual handling injuries. A light aluminium or GRP tower will, however, be less stable than a heavier steel tower of the same dimensions.

Prefabricated towers designed and constructed in compliance with I.S. EN 1004, 2005 should be stable in winds below 45km/h (12.5m/s). Where winds approaching this speed are expected, precautions should be taken such as tying the tower to adjoining structures or dismantling the tower to prevent it being blown over. Work on prefabricated towers should cease when wind speeds exceed 27.5km/h (7.7m/s) unless the manufacturer's or supplier's instructions explicitly permit such work. Towers should be inspected after high wind events and the results of the inspection should be recorded.

The manufacturer's instructions should be followed and the tower should not be assembled to a height above that recommended by the manufacturer for the specified stabilisers or outriggers, which must be installed correctly and at the appropriate point in the assembly sequence.

#### 3.9.13.2. Steel Towers

The height to least base dimension ratio for unsheeted mobile towers should not be greater than 3. When used in exposed situations, the tower should be tied to the building it is serving. The maximum height in this Code is 8m; mobile towers higher than this should be designed.

Towers outside are usually exposed and are therefore subject to wind forces. Frequently towers with a height to least base dimension ratio greater than 3.5 are unstable in locations exposed to high winds. For these circumstances, the wind forces should be calculated and the tower restrained by kentledge or guys, to give a factor of safety against overturning of 1.5 in any direction.

In calculating the height to base ratio, measure the height from ground level to the working deck or top lift and measure the base width as the least base dimension, centre to centre, of the shortest side of a rectangular tower.

## 3.10 Electrical Dangers

### 3.10.1. Overhead Electricity Lines

Overhead electricity lines can present a serious safety risk, particularly in areas where construction activities are being carried out, unless appropriate measures are taken to identify and control the risk.

The erection and removal of scaffolding in the vicinity of overhead lines can present particular risks as scaffolding materials are normally good conductors of electricity, are handled manually and may have the potential to come into contact with or come within arcing distance of the live overhead line conductors. Furthermore, once scaffolding has been erected, work activities being carried out on the scaffolding can present similar safety risks, especially while materials are being handled or long handle tools are being used. Risks can also arise in windy conditions from live conductors blowing towards or making contact with the scaffold and thereby making the entire scaffold assembly live.

#### **WARNING**

In situations where any part of the scaffold, if erected, would be within the "Hazard Zone" for the line voltage involved (i.e. normally 6 metres for lines supported on single wood pole or steel pole supports), then ESB Networks should be consulted in advance to agree the arrangements necessary to facilitate the scaffolding.

Appropriate control measures should be based on a site-specific risk assessment and detailed in the safety statement and/or the safety and health plan. These measures will normally include one or more of the following, in order of preference: rerouting the lines, having the lines switched out and earthed and installing barriers or insulation between the scaffold and the lines.

In addition, scaffolds erected adjacent to overhead lines should be earthed.

The ESB Networks/HSA *Code of Practice for Avoiding Danger from Overhead Electricity Lines* gives practical guidance on how to carry out work safely in the vicinity of overhead lines. Any party who has a responsibility for design, erection, dismantling or use of scaffolding near overhead electricity lines should refer to it (see Appendix E). It gives the appropriate "Hazard Zone" and "Exclusion Zone" dimensions that apply for the different voltage levels of overhead lines. In situations where any part of the scaffold, if erected, would be within the "Hazard Zone" for the line voltage involved (i.e. normally 6m for lines supported on single wood pole or steel pole supports), ESB Networks should be consulted in advance to agree the arrangements necessary to facilitate the scaffolding.

In the particular case of LV overhead lines (i.e. where the voltage is less than 1,000 volts), it may be feasible for ESB Networks to replace bare, open wire conductors with insulated, aerial bundled conductors or to temporarily insulate the conductors by applying approved temporary shrouding and other protection to the

conductors to facilitate scaffolding and certain work activities within the “Hazard Zone” of such lines.

Where LV overhead line conductors have been temporarily shrouded or appear to be insulated, it does not mean that they are safe to touch. The effectiveness of the shrouding or insulation will depend on conditions such as the prevailing weather.

Where insulation or shrouding has been provided by ESB Networks as a means of temporarily reducing the risk of inadvertent contact by a third party working near a live LV overhead line, the third party should ensure that if the protection is damaged or dislodged that all work within 3m of the damaged area is stopped and that ESB Networks is notified immediately. All control measures specified by ESB Networks should be implemented and all relevant employees and sub-contractors should be aware of the safety requirements.

In the event of an accident or an emergency with an overhead electricity line or underground cable, contact ESB Networks’ 24-hour emergency telephone number.

#### 3.10.2. Portable Electrical Equipment

Portable tools rated less than 2kV amperes and used in construction should operate at no more than 125V AC and be centre tapped to earth.

#### 3.10.3. Lightning

Scaffolds on the roofs of high buildings or associated with some topographical features are susceptible to being struck by lightning. Such scaffolds should be earthed.

### **3.11. Erection on Public Streets/Places**

The erection and use of scaffolding adjacent to public streets/places creates hazards for the public that are similar to those encountered by site workers. The precautions will, however, need to be greater because of the large numbers of people who may be at risk, their unfamiliarity with the dangers and their curiosity about the work. High standards of physical protection and effective systems of work and supervision should be provided to protect the public.

Particular requirements are outlined in Regulation 97 of the Safety, Health and Welfare at Work (Construction) Regulations 2006.

The public should be excluded from the area around the work during scaffold erection, modification and dismantling. This requirement may involve getting permission to close streets or footpaths while the scaffold is being erected or dismantled. Where the public cannot be excluded, effective physical protection should be provided to prevent persons being struck by falling tools or materials.

Where footpaths are closed, adequate provision should be made to protect pedestrians from traffic. Public access to the scaffold should, so far as is practicable, be made difficult by providing hoardings and/or sheeting and by removing or preventing the use of access ladders at a lower level. Local Authorities may require a contractor to apply for a hoarding licence and a scaffolding licence.

#### 3.11.1. Through Access

Where members of the public are permitted to walk through the base of the scaffold, precautions should include:

- provision of sufficient headroom;
- ensuring there are no projections that may injure people or damage their clothing;
- provision and maintenance of a sound walking surface; and
- provision and maintenance of adequate lighting.

Where ledger bracing is omitted from the bottom lift up to a height of 2.7m (typically for scaffolding erected on a footpath), the scaffold must either be tied at the top of the bottom lift or stabilised by other means, such as outside rakers. Ties should be fitted at alternate standards.

#### 3.11.2. Adjacent Parking or Traffic

The scaffold should be protected from traffic by the use of appropriate warning signs, lights, barriers or traffic cones. Where vehicles are permitted to park adjacent to the scaffold, the risk of damage to the scaffold is high, particularly so if the vehicles park nose-in or tail-in to the scaffold. Vehicle damage should be avoided by preventing such parking or by providing barriers. Where this is not practicable, the scaffold should be inspected frequently so that damage may be detected and remedied quickly.

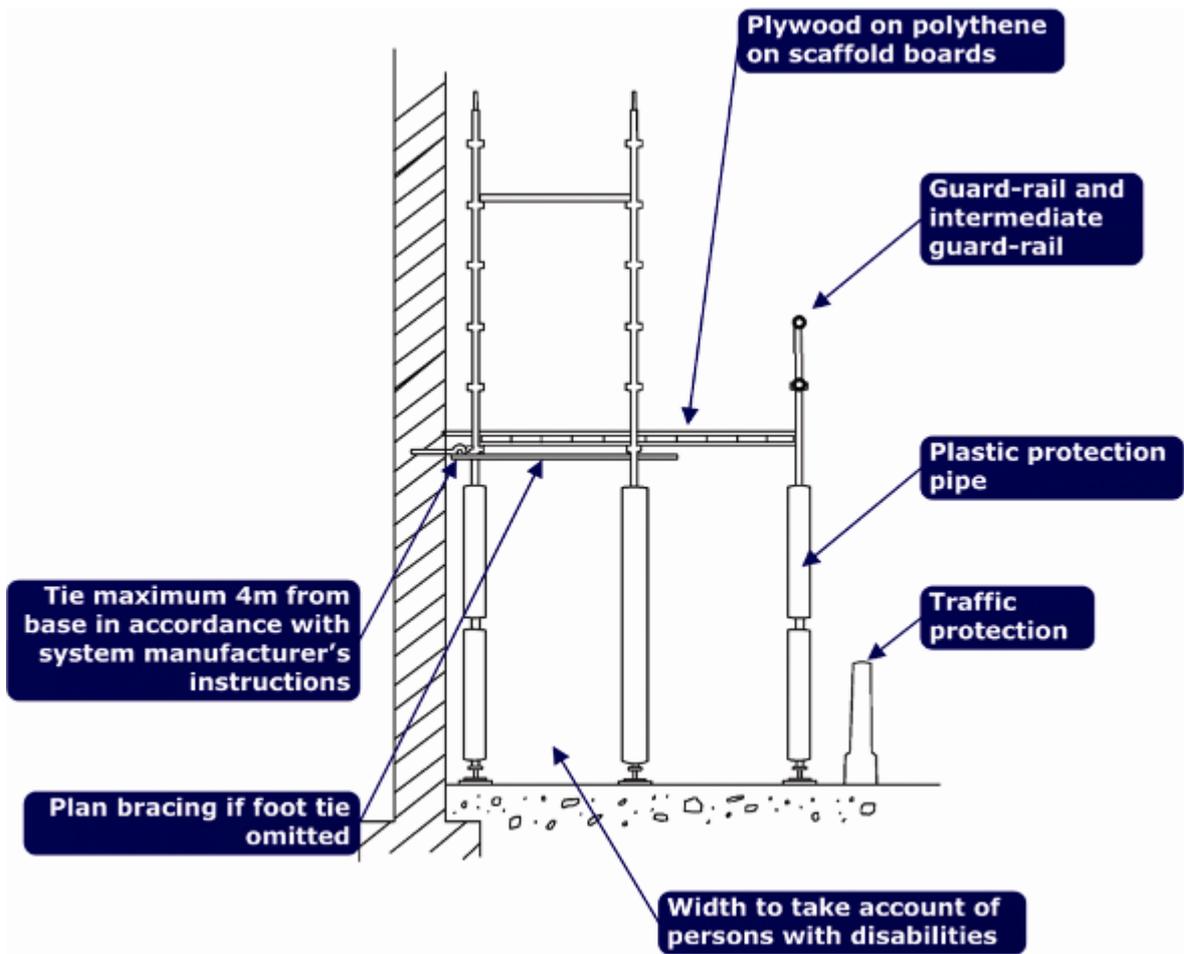


Figure 26: Example of Pedestrian Through Access

## 4. Inspection and Handover

An adequate handover procedure for transferring control of the scaffold from the erector to the user is an important part of managing scaffold safety. Both the scaffold erector and the user should be satisfied that the scaffold can provide a safe working platform and can carry the imposed loads safely. An adequate handover procedure will include:

- clearly identifying the areas of the scaffold that have been handed over;
- clearly stating the maximum capacity of the loading bays and working platforms and the tie spacing;
- inspecting the entire area of the scaffold before it is taken into use. The scaffold inspection checklist given in Appendix B (Checklist 02: *Inspection of Scaffolding in Use*) or another suitable checklist may be used;
- removing “scaffold incomplete” warning notices from the finished scaffold;
- preparing a report of the inspection, e.g. using form GA3 “Report of results of inspections of Work Equipment for Work at a Height” (see Appendix C) or similar. A copy of the report should be retained on site; and
- identifying the person responsible for further modifications and inspections of the scaffold.

Figure 27 outlines the steps that a scaffolder should follow when handing over the control of the scaffold to the end-user.

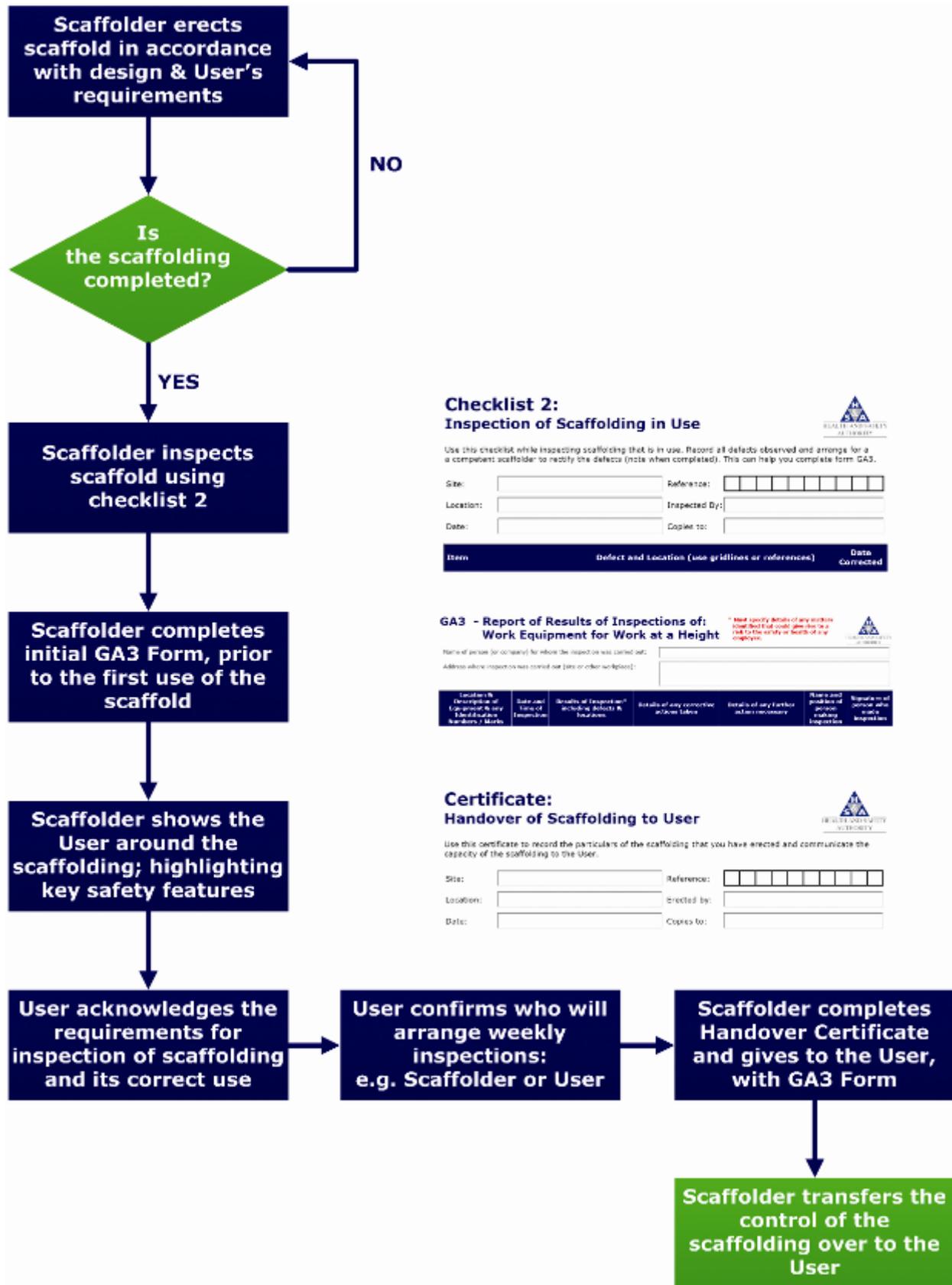


Figure 27: Handover Procedure for Scaffolders

## 5. Use, Modification and Maintenance

### 5.1. Scaffold Users

A scaffold should not be used unless it is properly constructed and is suitable for the purpose for which it is required, has been inspected and form GA3 "Report of results of inspections of Work Equipment for Work at a Height" (see Appendix C) has been completed.

Where the scaffolding exceeds 2m in height, each contractor (including sub-contractors and the self-employed) should be satisfied that the scaffold has been inspected by a competent person within the previous 7 days and should therefore ask to see the report of the inspection, which can be form GA3 or any alternative form that contains the required information.

Users (including contractors and workers) who discover a serious defect in a scaffold, which may adversely affect their or another's safety, should stop using that scaffold and report the defect to the site management.

Users should:

- be provided with relevant information on the conditions of use of the scaffold, including the loading capacity of the scaffold, in a comprehensible form;
- not overload the scaffold either locally or in general;
- not interfere with or misuse the scaffold;
- promptly report defects in the scaffold to whoever is in control of the scaffold; and
- not leave a scaffold in a hazardous condition for current or subsequent users.

### 5.2. Modification

Uncontrolled modification of a scaffold, particularly if carried out by persons without adequate competence, can lead to instability and an increased risk of persons falling from the scaffold. Modifications to ties, bracing, ledgers, transoms and decking should be identified, requested and made in good time (see Section 2.5). Only competent persons who have been trained and are experienced in this kind of

work may make modifications to scaffolds.

A sufficient number of competent scaffolders should be available to ensure that modifications are made in good time.

Guard-rails and toe-boards in a single bay may be temporarily removed by persons who have been appropriately instructed in the safe means of removing and replacing the guard-rail. Such persons should be instructed about the legal requirement to remain in attendance at the location of the removed guard-rail or toe-board until it has been replaced.

### **5.3. Maintenance**

The scaffold should be maintained in a safe condition for the entire period of its use (see Section 2.5).

### **5.4. Inspection Before and During Use**

Scaffolds should be inspected before use and again at least every 7 days and after any circumstance that might affect the stability or safety of the scaffold. Such circumstances include:

- modification;
- period without use;
- exposure to bad weather; and
- damage, including impact of traffic or site equipment with the scaffold.

The scaffold inspection checklist given in Appendix B or another suitable checklist may be used. A report of the inspection should be made on a suitable form, such as form GA3 (see Appendix C), and a copy of the report should be retained on site.

## 6. Dismantling

Dismantling a scaffold can place large loads on the scaffold unless the work is planned to keep the amount of material stored on the scaffold to a minimum. The work should be planned so that the scaffold remains stable, workers are prevented from falling from the scaffold and others are protected from the risk of falling materials.

### 6.1. Stability

The scaffold should be examined to ensure that the foundation is adequate and that all ties and braces are in position and are effective.

Any defects found in the scaffold should be made good before commencing dismantling.

The dismantling should be planned so that stability is assured by providing adequate bracing and ties and by restricting the imposed loads due to stacked scaffold components.

Where the scaffold must be used to temporarily store large amounts of components, it should be strengthened and stabilised, e.g. by providing extra standards, ties or rakers.

Prominent warning notices should be placed and access to the danger zone should be prevented.

### 6.2 Protection from Falls

Workers should be protected from falling during dismantling of scaffolding (see Section 3.1).

### 6.3. Protection from Falling Objects

Workers and members of the public should be protected from the risk of being struck by falling scaffold components (see Section 3.6).

## 7. Competence

The risks associated with the erection, use and dismantling of scaffolding are potentially very high. Persons given the task of erecting, altering, using or dismantling scaffolding should have the necessary competence to perform their tasks safely, as outlined in Figure 28.

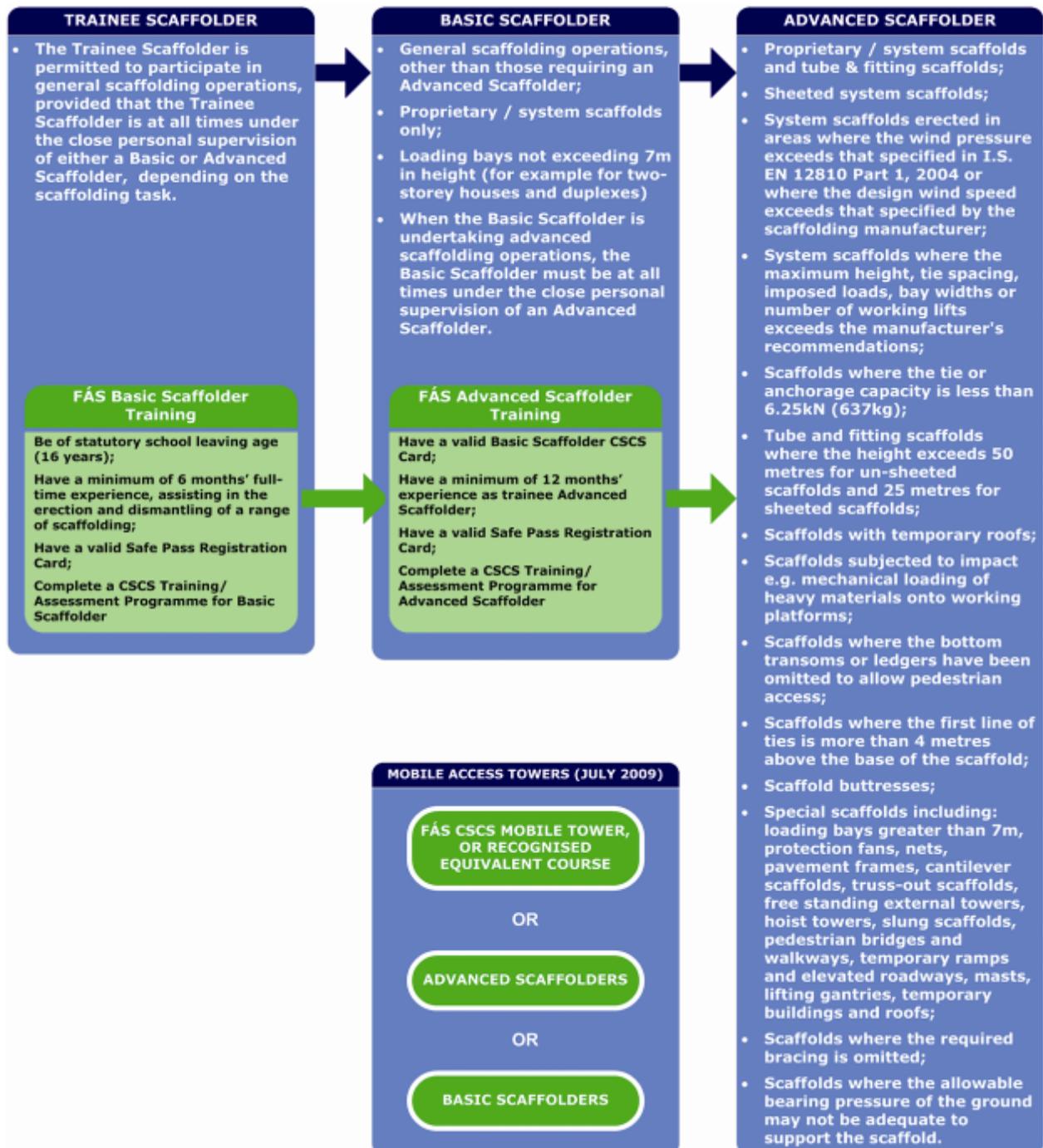


Figure 28: Achieving Competency

## 7.1. Competence of Scaffolders

A scaffold should not be erected, substantially added to, altered or dismantled unless the work is performed by:

- basic or advanced scaffolders trained and experienced in that kind of work; or
- trainee scaffolders under the **close personal supervision** of a competent person (either a basic or an advanced scaffolder, depending on the nature and complexity of the scaffold).

In the case of scaffolding, close personal supervision is intended to ensure that the trainee's safety is protected at all times and that the skills necessary to safely complete the job are comprehensively communicated and demonstrated. To achieve this, the supervising scaffolder must ensure that the trainee scaffolder can be organised, directed, observed, communicated with and monitored at all times.

In considering the nature, scale and complexity of the scaffolding activities, the scaffolding contractor must at all times ensure that the trainee scaffolder is undertaking work that is within his or her training, knowledge, experience and capabilities.

Under no circumstances should a trainee scaffolder be performing duties without close personal supervision.

A competent person is a person who has been fully trained, has acquired the necessary knowledge and practical experience and has received the necessary instructions for the erection, alteration or dismantling of the type of scaffold.

### 7.1.1. Training

Formal training is required for those who erect, substantially add to, alter or dismantle a scaffold. The training should include instruction on any risks involved. The extent of training required will depend on the type of work normally undertaken and on the type of scaffold. The minimum acceptable standard of training is the approved FÁS Construction Skills Certification Scheme (CSCS) for Basic Scaffolders, or an equivalent training programme accredited by FÁS. Scaffolding activities beyond the range of general access scaffolds require the erector to be trained to an advanced level.

#### **NOTE**

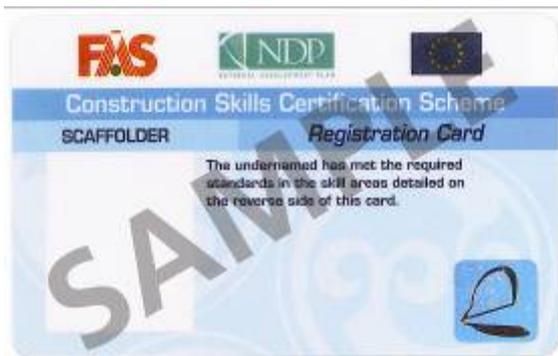
Scaffolders must be trained as Basic Scaffolders or Advanced Scaffolders, taking into account the type, nature and scale of the scaffolding that they are erecting.

### 7.1.2. Experience

A competent and experienced person should supervise the erection, alteration or dismantling of a scaffold. The person should be experienced in the kind of work being undertaken.

### 7.1.3. Assessment, Certification and Registration

In order to help employers, contractors and project supervisors determine whether scaffolders have the necessary competence to erect or dismantle scaffolding, FÁS has introduced a programme to assess scaffolders' competence, to issue certificates to those with the necessary skills and to keep a register of qualified scaffolders.



(Courtesy of FÁS)

**Figure 29: Sample CSCS Scaffolder Cards**

On successful completion of the training, each scaffolder is given a logbook, which is intended to provide scaffolders with a means of recording their subsequent work experience.

Employers, contractors and project supervisors for the construction stage should satisfy themselves that persons erecting scaffolding have the necessary training by seeking evidence of FÁS certification or an equivalent qualification accredited by FÁS.

## 7.2. Competence for Inspection

The designated person inspecting a scaffold should be competent. A competent person is a person who is fully trained, has acquired the necessary knowledge and practical experience and has received the necessary instructions for the inspection of the type of scaffold.

While it is relatively easy to inspect for certain defects such as missing guard-rails,

an untrained person may not be able to form an opinion on the stability of the scaffold.

Those performing simple scaffold inspections should have received at least one day of formal training in scaffold inspection and be competent. Extra training is required for the inspection of complex scaffolds.

Employers, contractors and project supervisors should seek evidence of appropriate certification of training in order to verify that training has been received. Periodic refresher training should be provided where appropriate.

### **7.3. Training and Instruction for Scaffold Users**

All scaffold users should receive training and instruction in the use of the scaffold. It is important to provide this training and instruction because the users may not otherwise realise when they are at risk, may not request modifications in time and may interfere with the scaffold, putting themselves and others at risk.

This training may be provided as part of the site-specific induction that all persons who are likely to use the scaffold, either for access or as a working platform, should receive.

Induction training should ensure that scaffold users:

- are able to recognise when a scaffold is complete, e.g. full boarding, guard-rails and toe-boards present;
- know the meaning of warning signs or scaffold tagging systems in use;
- do not interfere or make modifications to scaffolding. Modifications may only be made by a competent person with the appropriate training and certification;
- know the maximum loading capacity of the scaffold working platforms and loading towers (the training should provide specific comprehensible examples relating to the materials in use on the site);
- report defects to a designated person;
- do not throw materials from the scaffold; and
- use the designated access points and do not climb the scaffold.

## 7.4. Training and Instruction of Equipment Operators

The mechanical placing of materials on a scaffold can give rise to significant impact loads and overloading of the scaffold can provoke a general collapse of the scaffold.

Equipment operators such as crane drivers and telescopic fork-truck drivers as well as signallers (banksmen) should be competent and have received training, assessment and certification. FÁS or FÁS-approved providers offer training courses for equipment operators and assess, certify and register trained operators. Other appropriately qualified bodies may apply to FÁS for accreditation of courses.

Lifting equipment operators should be informed of the safe working load of the scaffold working platforms and loading bays. Comprehensible examples relating to the materials in use on the site should be provided. It may be necessary to review the information provided if the materials or scaffold layout change.

Excavation close to the scaffold can undermine it. Excavator operators should be informed of the minimum distances that they should observe when excavating in the vicinity of the scaffold.

# Appendix A

## Tube and Fitting Scaffolds

## Tube and Fitting Scaffolds

Tube and fitting scaffolds form only a small proportion of scaffolds erected in Ireland. Refer to I.S. EN 12811 Part 1, 2004: *Temporary works equipment – Scaffolds – Performance requirements and general design* for comprehensive information on the design and erection of tube and fitting scaffolds.

Access and working scaffolds may be specifically designed and constructed for any particular distributed or point load and for a variety of purposes. Table A1 lists the six distributed load classes specified in I.S. EN 12811 Part 1. The requirements for concentrated and partial area loads are also included. Further details of these can be found in Table 3 of I.S. EN 12811 Part 1.

In the absence of wind, in addition to vertical imposed loads, I.S. EN 12811 Part 1 requires a notional horizontal load applied to each bay of the scaffold of not less than 2.5% of the total uniformly distributed service load on that bay or 0.3kN, whichever is greater. It should be separately applied parallel and perpendicular to the bay at the level of the working platform.

Reference should also be made to clause 6.2.9 of I.S. EN 12811 Part 1 for the design load combinations to be used. If the specifier quotes no load rating, it is recommended that the selection be made from either Table A1 in this Code of Practice or from Table 3 in I.S. EN 12811 Part 1.

The following tables are derived from I.S. EN 12811 Part 1, 2004 and I.S. EN 74 Part 1, 2005.

**Table A1: Service Loads on Working Areas**

Load Class	Uniformly distributed load on platform (kN/m <sup>2</sup> )	Concentrated load on area 500mm x 500mm (kN)	Concentrated load on area 200mm x 200mm (kN)	Partial area load	
				(kN/m <sup>2</sup> )	Partial Area Factor <sup>(1)</sup>
1	0.75 kN/m <sup>2</sup> <sup>(2)</sup>	1.50 kN	1.00 kN	-	-
2	1.50 kN/m <sup>2</sup>	1.50 kN	1.00 kN	-	-
3	2.00 kN/m <sup>2</sup>	1.50 kN	1.00 kN	-	-
4	3.00 kN/m <sup>2</sup>	3.00 kN	1.00 kN	5.00 kN/m <sup>2</sup>	0.4
5	4.50 kN/m <sup>2</sup>	3.00 kN	1.00 kN	7.50 kN/m <sup>2</sup>	0.4
6	6.00 kN/m <sup>2</sup>	3.00 kN	1.00 kN	10.00 kN/m <sup>2</sup>	0.5

(1) Each platform of load class 4, 5 and 6 shall be capable of supporting a uniformly distributed partial area loading. Refer to I.S. EN 12811 Part 1 for further information.

(2) For working scaffolds of load class 1, all platform units shall be capable of supporting class 2 service load, but this shall not apply to the scaffold structure in its entirety.

Based on I.S. EN 12811 Part 1, reproduced with permission from NSAI

**Table A2: Maximum Span of Scaffold Boards**

Nominal Board Thickness (mm)	Maximum span between transoms (m)
38mm	1.5m
50mm	2.6m
63mm	3.25m

Based on BS 2482, 1981

**Table A3: Classes of Couplers**

Type of Coupler	Class of Coupler			
	A	B	AA	BB
Right angle coupler	■	■	■	■
Swivel coupler	■	■	---	---
Parallel coupler	■	■	---	---
Sleeve coupler friction type	■	■	---	---

■ Specified class

**NOTE**

Classes A and B differ in transmissible internal forces and moments and in values of load bearing capacity and stiffness. Couplers of classes AA and BB, used as single couplers have the same characteristics as couplers of classes A and B respectively, but they may also be used to increase slipping capacity if two identical couplers AA+AA or BB+BB are positioned touching each other.

Table 2 from I.S. EN 74-1 2005, reproduced with permission from NSAI.

**Table A4: Characteristic Values of the Resistances for Couplers**

Type of Coupler	Resistance	Characteristic Value			
		Class A	Class B	Class AA	Class BB
Right angle coupler (RA)	Slipping force $F_{s,k}$ in kN	10.0	15.0	15.0	25.0
	Cruciform bending moment $M_{B,k}$ in kNm	---	0.8	---	---
	Pull apart force $F_{p,k}$ in kN	20.0	30.0	---	---
	Rotational moment $M_{T,k}$ in kNm	---	0.13	---	---
Friction type sleeve coupler (SF)	Slipping force $F_{s,k}$ in kN	6.0	9.0	---	---
	Bending moment $M_{B,k}$ in kNm	---	2.4	---	---
Swivel coupler (SW)	Slipping force $F_{s,k}$ in kN	10.0	15.0	---	---
Parallel coupler (PA)	Slipping force $F_{s,k}$ in kN	10.0	15.0	---	---

For symbols see Figure C.3 and C.4 (refer to I.S. EN 12811-1, 2004)

Table C.1 from I.S. EN 12811-1-2004, reproduced with permission from NSAI.

**Table A5: Widths of Access Scaffold Platforms**

Width Class	Minimum Full Width (m)
W06	$0.6\text{m} \leq \text{width} < 0.9\text{m}$
W09	$0.9\text{m} \leq \text{width} < 1.2\text{m}$
W12	$1.2\text{m} \leq \text{width} < 1.5\text{m}$
W15	$1.5\text{m} \leq \text{width} < 1.8\text{m}$
W18	$1.8\text{m} \leq \text{width} < 2.1\text{m}$
W21	$2.1\text{m} \leq \text{width} < 2.4\text{m}$
W24	$2.4\text{m} \leq \text{width}$

**Note:**

When equipment or materials are placed on the working area, consideration should be given to maintaining space for work and access.

*Table 1 from I.S. EN 12811 Part 1, reproduced with permission from NSAI*

# Appendix B

## Example Checklists

# Checklist 1: Inspection of Scaffolding Materials Before Use

Use this checklist to verify and record that scaffolding materials that are delivered to site are in an acceptable condition; before they are incorporated into the temporary structure.

Site:  Reference:

Location:  Inspected By:

Date:  Copies to:

Item	Quantity	Comments	Acceptable	
			Yes	No
Sole Boards			<input type="checkbox"/>	<input type="checkbox"/>
Base Plates			<input type="checkbox"/>	<input type="checkbox"/>
Base Jacks			<input type="checkbox"/>	<input type="checkbox"/>
Standards			<input type="checkbox"/>	<input type="checkbox"/>
Ledgers			<input type="checkbox"/>	<input type="checkbox"/>
Transoms			<input type="checkbox"/>	<input type="checkbox"/>
Intermediate Transoms			<input type="checkbox"/>	<input type="checkbox"/>
Right Angle Couplers			<input type="checkbox"/>	<input type="checkbox"/>
Swivel Couplers			<input type="checkbox"/>	<input type="checkbox"/>
Sleeve Couplers			<input type="checkbox"/>	<input type="checkbox"/>
Scaffold Tube			<input type="checkbox"/>	<input type="checkbox"/>
Decking / Scaffold Boards			<input type="checkbox"/>	<input type="checkbox"/>
Diagonal Brace			<input type="checkbox"/>	<input type="checkbox"/>
Access Stairs / Ladders			<input type="checkbox"/>	<input type="checkbox"/>
Cantilever / Stage Brackets			<input type="checkbox"/>	<input type="checkbox"/>
Bridging Ledgers			<input type="checkbox"/>	<input type="checkbox"/>
Anchorage / Ties			<input type="checkbox"/>	<input type="checkbox"/>
Brick Guards			<input type="checkbox"/>	<input type="checkbox"/>
Sheeting / Netting			<input type="checkbox"/>	<input type="checkbox"/>
Erection & Use Instructions			<input type="checkbox"/>	<input type="checkbox"/>
Scaffolding Signs & Tags			<input type="checkbox"/>	<input type="checkbox"/>
Other Component			<input type="checkbox"/>	<input type="checkbox"/>

# Checklist 2: Inspection of Scaffolding in Use

Use this checklist while inspecting scaffolding that is in use. Record all defects observed and arrange for a competent scaffolder to rectify the defects (note when completed). This can help you complete form GA3.

Site:	<input type="text"/>	Reference:	<input type="text"/>								
Location:	<input type="text"/>	Inspected By:	<input type="text"/>								
Date:	<input type="text"/>	Copies to:	<input type="text"/>								

Item	Defect and Location (use gridlines or references)	Date Corrected
Foundations		
Sole Boards		
Base Plates & Base Jacks		
Standards		
Ledgers		
Transoms		
Tie Spacing & Capacity		
Anchorage Test Results		
Facade Bracing		
Plan Bracing		
Cross Bracing		
Guard Rails		
Toe Boards		
Decking / Scaffold Boards		
Scaffolding Signs & Tags		
Loading in line with design		
Access onto Scaffolding		
User Behaviour & Housekeeping		
Unauthorised Alterations		
Anticipated Hazards next 7 days		
Other (traffic/public/electricity)		
Observations		

# Certificate: Handover of Scaffolding to User

Use this certificate to record the particulars of the scaffolding that you have erected and communicate the capacity of the scaffolding to the User.

Site:	<input type="text"/>	Reference:	<input type="text"/>
Location:	<input type="text"/>	Erected by:	<input type="text"/>
Date:	<input type="text"/>	Copies to:	<input type="text"/>

Description of section of scaffolding to be handed over  
(use grid line and/or references to identify section)

Maximum loading capacity of Working Platforms  
(in kg/bay, or for non-standard bays in kg/m<sup>2</sup>)

Maximum number of Working Platforms provided  
(do not exceed this number)

Number and loading capacity of Loading Platforms  
(include details of location & use restrictions - if any)

Identify the person responsible for making periodic  
inspections (to be agreed with the User / Client)

Identify the person responsible for authorising  
modifications (to be agreed with the User / Client)

Results of pull-out tests undertaken on ring bolt  
anchors (where used)

Detail the design information necessary to enable  
other competent persons to make a full inspection of  
the scaffold during use (i.e. type and spacing of ties;  
plan bracing; ledger bracing; facade bracing)

## We have: (tick when done)

Erected the scaffolding in accordance with the  
details above and our quotation: \_\_\_\_\_

Inspected the scaffolding in accordance with  
our scaffolding inspection procedures

Inspected the scaffolding and completed GA3  
Form, or similar (attached)

## You must: (tick to confirm you understand)

Make sure that the scaffolding is used in  
accordance with the details above

Not alter the scaffolding or overload the  
scaffolding during use

Make arrangements to have the scaffolding  
inspected at least every 7 days (see GA3 form)

Signed:   
Scaffolding Erector; or  
Scaffolding Company

Signed:   
Scaffolding User; or  
Contractor

# Appendix C

## Form GA3 Report of Results of Inspections of Work Equipment for Work at a Height

This form may be used to record the results of inspections of work equipment for work at a height, as set out in the Safety, Health and Welfare at Work (General Application) Regulations 2007. The HSA produced this form to facilitate the recording of information, as per Regulation 119. This is not an approved or statutory form. Reports of inspections of work equipment for work at a height may be produced in other formats.

# GA3 - Report of Results of Inspections of: Work Equipment for Work at a Height

**\* Must specify details of any matters identified that could give rise to a risk to the safety or health of any employee.**



Name of person (or company) for whom the inspection was carried out:

Address where inspection was carried out (site or other workplace):

Location & Description of Equipment & any Identification Numbers / Marks	Date and Time of Inspection	Results of Inspection* including defects & locations	Details of any corrective actions taken	Details of any further action necessary	Name and position of person making inspection	Signature of person who made inspection

**Day to day management of the scaffolding is the responsibility of the contractor responsible for the site.**

# GA3 - Report of Results of Inspections of: Work Equipment for Work at a Height

**NOTES**



This form may be used to assist in compliance with the Safety Health and Welfare at Work (General Application) Regulations 2007 Regulation 119 – Inspection of Work Equipment in relation to scaffolds, guard-rails, toe-boards, barriers or similar means of protection, fixed and mobile working platforms, nets, airbags or other collective safeguards for arresting falls, personal fall protection systems, work positioning systems, rope access and positioning techniques, fall arrest systems, work restraint systems and ladders. This is not an approved or statutory form. Reports of Inspection may be produced in other formats. This form does not substitute for reports of thorough examination of lifting equipment that may be required under other statutory provisions (see GA1 and GA2).

## **Safety, Health and Welfare at Work (General Application) Regulations, 2007 - Part 4 - Regulation 119**

- 119.** (1) An employer shall ensure that, as regards work equipment to which Regulations 101 to 114 apply—
- (a) where the safety of the work equipment depends on how it is installed or assembled, it is not used after installation or assembly in any position unless it has been inspected in that position,
  - (b) without prejudice to paragraphs (a) and (c), work equipment exposed to conditions causing deterioration which is liable to result in dangerous situations is inspected—
    - (i) at suitable intervals, and
    - (ii) where exceptional circumstances have occurred that are liable to jeopardise the safety of the work equipment, as soon as practicable following these exceptional circumstances, and
  - (c) without prejudice to paragraph (a), a working platform—
    - (i) used for construction work, and
    - (ii) from which an employee could fall 2 m or more, is not used in any position unless it has been inspected in that position within the previous 7 days or, in the case of a mobile working platform, inspected on the site, within the previous 7 days.
- (2) A person carrying out an inspection of work equipment to which paragraph (1)(c) applies shall—
- (a) promptly prepare a report containing the particulars as set out in Schedule 5, and
  - (b) within 24 hours of completing the inspection, provide the report, or a copy thereof, to the person on whose behalf the inspection was carried out.
- (3) An employer receiving a report under paragraph (2) shall keep the report or a copy of the report—
- (a) at the site where the inspection was carried out until the construction work is completed, and
  - (b) thereafter, at an office of the employer.
- (4) An employer shall ensure that—
- (a) no work equipment under the employer's control is used in another place of work unless it is accompanied by evidence that the last inspection required to be carried out under this Regulation has been carried out, and
  - (b) the result of an inspection under this Regulation is recorded and kept available for inspection by an inspector for 5 years from the date of inspection.

**Day to day management of the scaffolding is the responsibility of the contractor responsible for the site.**

# Appendix D

## Weights of Typical Building Materials

## Mass of Scaffolding Materials

The following tables have been derived from BS 5973, 1993 and its replacement I.S. EN 12811, 2004 (reproduced with permission from NSAI) and from guidance documents referenced in Appendix E.

**Table D1: Mass of Scaffolding Materials**

Scaffolding Materials	Mass
Steel scaffold tube 48.3mm diameter	4.37kg/m
Steel couplers and fittings	1.00kg to 2.25kg
Boards 38mm thick } 50mm thick } 225mm wide 63mm thick }	6kg/m or 25kg/m <sup>2</sup> 8kg/m or 33kg/m <sup>2</sup> 10kg/m or 41kg/m <sup>2</sup>

*Based on BS 5973, 1993*

**Table D2: Mass of Quantities of Scaffolding Materials**

Mass (tonne)	Length of steel tube (m)	Approximate number of steel fittings (average 1.8kg)	Number of boards (63mm x 225mm of length 3.9m)
1	228	560	46
2	457	1,120	92
3	685	1,680	138
4	915	2,240	184
5	1,143	2,800	230
7	1,600	3,920	322
10	2,286	5,600	460
15	3,430	8,400	690
20	4,570	11,200	920
25	5,720	14,000	1,150

**Table D3: Mass of Persons and Materials**

Item	Mass
Person (average)	80kg
Person with small tools (average)	90kg
Spot board and mortar	30kg
Wheelbarrow full of mortar	150kg
Tarpaulins and fixings	1kg/m <sup>2</sup>
Ladders and fixings	8kg/m
500 bricks	1,375kg
500 concrete bricks (15N/mm <sup>2</sup> )	1,750kg
50 concrete blocks (100x215x440, 5N/mm <sup>2</sup> )	1,020kg
Timber (softwood)	500kg/m <sup>3</sup> to 650kg/m <sup>3</sup>
180 litres of water or liquids in containers	200kg
Packaged flooring tiles, ceramic tiles, roofing tiles, slates	1,600kg/m <sup>3</sup>

**Table D4: Mass of Unboarded 2m Lift One Bay Long**

(including two standards, two ledgers, two transoms and a portion of bracing, ties and fittings. Guard-rails are not included)

Width of Scaffold	Length of bay (m)						
	1.2	1.5	1.8	2.0	2.1	2.4	2.7
	Weight (s) of <u>unboarded</u> 2m lift						
m	kN	kN	kN	kN	kN	kN	kN
3 boards	0.55	0.57	0.60	0.62	0.63	0.65	0.68
4 boards	0.56	0.58	0.61	0.63	0.63	0.66	0.69
5 boards	0.57	0.59	0.62	0.64	0.64	0.67	0.70
6 boards	0.58	0.60	0.63	0.65	0.65	0.68	0.71

**Table D5: Additional Weight of a Boarded Lift (with imposed service load) One Bay Long**

(this includes the additional weight of one boarded lift: the boards, the toe-board, the principle and intermediate guard-rails, fittings and the service imposed load on the lift. The figures do not include weight of the scaffold itself, which is given in Table D4)

Width of Scaffold	Service imposed load	Length of bay (m)						
		1.2	1.5	1.8	2.0	2.1	2.4	2.7
		Extra weight (w) of boarded lift						
m	kN/m <sup>2</sup>	kN	kN	kN	kN	kN	kN	kN
3 boards	0.00	0.48	0.58	0.67	0.73	0.76	0.93	1.02
3 boards	0.75	1.09	1.33	1.58	1.74	1.82	2.14	2.39
4 boards	0.00	0.56	0.67	0.78	0.85	0.89	1.08	1.19
4 boards	0.75	1.37	1.68	1.99	2.20	2.30	2.70	3.01
4 boards	1.50	2.18	2.69	3.21	3.55	3.72	4.32	4.83
4 boards	2.00	2.72	3.37	4.02	4.45	4.67	5.40	6.05
5 boards	0.00	0.63	0.76	0.89	0.97	1.01	1.23	1.36
5 boards	0.75	1.65	2.03	2.40	2.66	2.78	3.26	3.64
5 boards	1.50	2.66	3.29	3.92	4.35	4.56	5.28	5.91
5 boards	2.00	3.33	4.13	4.94	5.47	5.74	6.63	7.43
5 boards	2.50	4.01	4.98	5.95	6.60	6.92	7.98	8.95
5 boards	3.00	4.68	5.82	6.96	7.72	8.10	9.33	10.47
6 boards	0.00	0.71	0.85	1.00	1.09	1.14	1.38	1.53
6 boards	2.00	3.95	4.90	5.85	6.49	6.81	7.86	8.82
6 boards	2.50	4.76	5.91	7.07	7.84	8.23	9.48	10.64
6 boards	3.00	5.57	6.93	8.28	9.19	9.64	11.10	12.46

**Note:**

All boards are 225mm wide x 38mm thick

The values for 4 and 5 board lifts are the same when one board is fitted on the inside face, i.e. 3+1 and 4+1

# Appendix E

## Information Sources

## Statutory Provisions

[www.hsa.ie](http://www.hsa.ie)

- Safety, Health and Welfare at Work Act 2005
- Safety, Health and Welfare at Work (Construction) Regulations 2006
- Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2008
- Safety, Health and Welfare at Work (General Application) Regulations 2007

## Irish Standards

[www.nsai.ie](http://www.nsai.ie) | [www.standards.ie](http://www.standards.ie)

- I.S. EN 39, 2001  
Loose steel tubes for tube and coupler scaffolds – technical delivery conditions
- I.S. EN 74-1, 2005  
Couplers, spigot pins and baseplates for use in falsework and scaffolds – Part 1: Couplers for tubes – Requirements and test procedures
- I.S. EN 354, 2002  
Personal protective equipment against falls from a height – Lanyards
- I.S. EN 355, 2002  
Personal protective equipment against falls from a height – Energy absorbers
- I.S. EN 358, 2000  
Personal protective equipment for work positioning and prevention of falls from a height – Belts for work positioning and restraint and work positioning lanyards
- I.S. EN 361, 2002  
Personal protective equipment against falls from a height – Full body harnesses
- I.S. EN 362, 2005  
Personal protective equipment against falls from a height – Connectors
- I.S. EN 363, 2002  
Personal protective equipment against falls from a height – Fall arrest systems

- I.S. EN 364, 1993 Personal protective equipment against falls from a height – Test methods
- I.S. EN 365, 2006 Personal protective equipment against falls from a height – General requirements for instructions for use, maintenance, periodic examination, repair, marking and packaging
- I.S. 745, 1986 Machine-graded home-grown timber scaffold boards
- I.S. EN 1004, 2005 Mobile access and working towers made of prefabricated elements – Materials, dimensions, design loads, safety and performance requirements
- I.S. EN 1065, 1999 Adjustable telescopic steel props – Product specifications, design and assessment by calculation and tests
- I.S. EN 1995-1-1, 2005 Design of timber structures
- I.S. EN 1263 Part 1, 2002 Safety nets – Part 1: Safety requirements, test methods
- I.S. EN 1263 Part 2, 2002 Safety nets – Part 2: Safety requirements for the positioning limits
- I.S. EN 1298, 1996 Mobile access and working towers – Rules and guidelines for the preparation of an instruction manual
- I.S. EN 10210 Parts 1 & 2, 2006 Hot finished structural hollow sections of non-alloy and fine grain steels
- I.S. EN 12385 Parts 1 & 2, 2002 Steel wire ropes – Safety – General requirements
- I.S. EN 12810 Part 1, 2004 Façade scaffolds made of prefabricated components – Part 1: Products specifications
- I.S. EN 12810 Part 2, 2004 Façade scaffolds made of prefabricated components – Part 2: Particular methods of structural design

- I.S. EN 12811 Part 1, 2004 Temporary works equipment – Scaffolds – Performance requirements and general design
- I.S. EN 12811 Part 2, 2004 Temporary works equipment – Part 2: Information on materials
- I.S. EN 12811 Part 3, 2002 Temporary works equipment – Part 3: Load testing
- I.S. EN 12812, 2004 Falsework – Performance requirements and general design

## British Standards

[www.bsonline.bsi-global.com](http://www.bsonline.bsi-global.com)

- BS 648, 1964 Schedule of weights of building materials
- BS 1129, 1990 Specification for portable timber ladders, steps, trestles and lightweight stagings
- BS 1139 Parts 1 to 5 Metal scaffolding
- BS 2482, 1981 Specification for timber scaffold boards
- BS 2830, 1994 Specification for suspended access equipment (suspended chairs, traditional steeplejack's seats, work cages, cradles and platforms) for use in the building, engineering, construction, steeplejack and cleaning industries
- BS 4978, 2007 Visual strength grading of softwood. Specification
- BS 5973, 1993 Code of practice for access and working scaffolds and special scaffold structures in steel (*withdrawn*)
- BS 5975, 1996 Code of practice for falsework
- BS 6180, 1999 Barriers in and about buildings. Code of practice
- BS 6399 Part 1, 1996 Loading for buildings. Code of practice for dead and imposed loads

- BS 6399 Part 2, 1997 Loading for buildings. Code of practice for wind loads
- BS 6399 Part 3, 1988 Loading for buildings. Code of practice for imposed roof loads

## Health and Safety Authority Guidance

[www.hsa.ie](http://www.hsa.ie)

- Guidance to the Safety, Health and Welfare at Work Act 2005
- Guidance to the Safety, Health and Welfare at Work (Construction) Regulations 2006
- Guidance to the Safety, Health and Welfare at Work (General Application) Regulations 2007
- Code of Practice for Avoiding Danger from Overhead Electricity Lines
- Code of Practice for Safety in Roofwork
- Safe Use of Work Platforms/Trestles – Information Sheet

## Electricity Supply Board

[www.esb.ie/esbnetworks](http://www.esb.ie/esbnetworks)

- Code of Practice for Avoiding Danger from Overhead Electricity Lines

## Foras Áiseanna Saothair (FÁS)

<http://www.fas.ie/en/>

## Health and Safety Executive (UK) Guidance

[www.hse.gov.uk](http://www.hse.gov.uk)

- HSG33 Safety in Roofwork
- INDG402 Guide on the Safe Use of Ladders and Stepladders

- CIS10 Tower Scaffolds
- CIS56 Safe Erection, Use and Dismantling of Falsework

## **National Access and Scaffolding Confederation (UK)**

[www.nasc.org.uk](http://www.nasc.org.uk)

- SG4:05 Preventing Falls in Scaffolding and Falsework
- TG20:05 Guide to Good Practice for Scaffolding with Tube and Fittings

## **Prefabricated Access Suppliers' and Manufacturers' Association (UK)**

[www.pasma.co.uk](http://www.pasma.co.uk)

- PASMA Operator's Code of Practice
- DVD – Guide to the Safe Use of Mobile Access Towers
- DVD – Don't Fall for It!

## **Building Research Establishment (UK)**

[www.bre.co.uk](http://www.bre.co.uk)

- BRE Digest 284 Wind Loads on Canopy Roofs
- BRE Digest 346 Parts 1 to 8, Assessment of Wind Loads
- BRE Digest 436 Parts 1 to 3, Wind Loads on Buildings

## **Other**

- H. B. Walker (1975), *Wind Forces on Unclad Tubular Structures*, Croydon: Constructional Steel Research and Development Organisation, Constrado publication 1/75

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