FOR
SAFE
SCAFFOLDS

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CODE OF PRACTICE FOR ACCESS AND WORKING SCAFFOLDS

Published in 2007 by the Health and Safety Authority, Metropolitan Building, James Joyce Street, Dublin 1.

1. Introduction

1.1. Background

This code of practice is the result of a joint initiative, which involved the Health and Safety Authority, the Construction Industry Federation and the Irish Congress of Trade Unions, to improve the standard of scaffolding. The code was drafted in consultation with the organisations that were represented on the Advisory Committee on Construction Safety. (See acknowledgements)

1.2. 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 general public consultation through it's website, and with the consent of Mr Billy Kelleher, 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 12 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 structure) 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 XXXXXXXXX. Notice of its publication was published in the Iris Oifigiúil of XXXXXXXXX. It replaces the Code of Practice entitled "Code of Practice for Access and Working Scaffolds" which was 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

1.3. Scope of Code of Practice

This code 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 of practice 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.

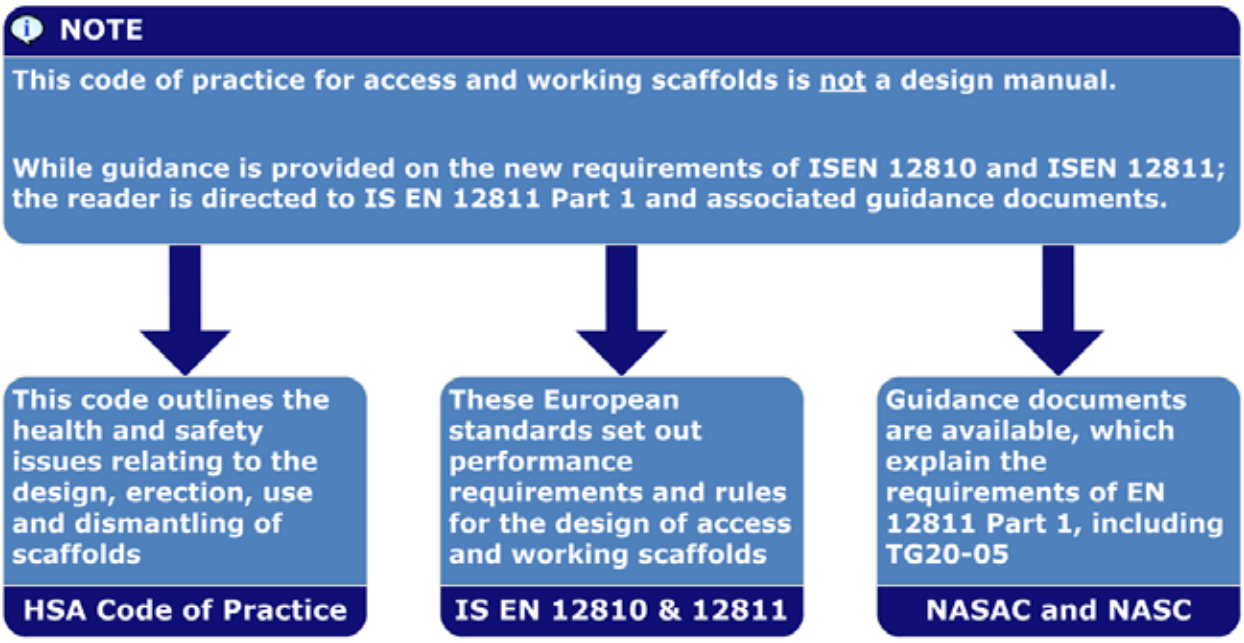
The code deals mainly with system scaffolds as these are the most common scaffolds used in Ireland. It also contains outline guidance on the erection of basic tube and fitting scaffolds. The code does not give detailed recommendations or guidance on special scaffolds such as cantilever, truss-out or slung scaffolds. The previous code of practice 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 IS EN 12811 Part 1, 2004: *Temporary works equipment - scaffolds – performance requirements and general design*.

IS 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 structure relies on the adjacent structures for stability. In general these requirements also apply to other types of working scaffolds. This European Standard also specifies structural design rules when certain materials are used and general rules for prefabricated equipment.

The main changes in IS EN 12811 Part 1, 2004 from the 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;
- The definition of two headroom classes, where the distance between platforms is a minimum of 1.90m;
- It is required that the gaps between platform units do not exceed 25mm;
- A 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;
- Tie patterns and their design are not included.



Information on scaffolding materials and testing requirements is provided in IS EN 12811 Part 2, 2004: *Temporary Works Equipment Part 2 – Information on Materials* and IS EN 12811 Part 3, 2003: *Temporary Works Equipment Part 3 – Load Testing*.

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

1.4. 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 or to protect persons working below from falling objects.

Falling from a height is one of the most common cause of accidental death and

serious injury in the construction industry. Scaffolding which is adequately erected and maintained can prevent many such accidents.

1.5. 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, use and reduced labour requirements. A system scaffold is a scaffold made of prefabricated elements and designed and manufactured in accordance with IS 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.

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.

PROPRIETARY SCAFFOLDS / SYSTEM SCAFFOLDS

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

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

TUBE AND FITTING SCAFFOLDS

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

- **IS EN 12811 Part 1, 2004: Performance requirements and general design**
- **IS EN 12811 Part 2, 2004: Information on materials**
- **IS EN 12811 Part 3, 2003: Load testing**

1.6. Scaffolding Hazards

WARNING

Poorly erected or maintained scaffolds can fail, sometimes catastrophically!

Where a scaffold has inadequate foundations, tying or bracing or 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.

1.7. Risk Assessment

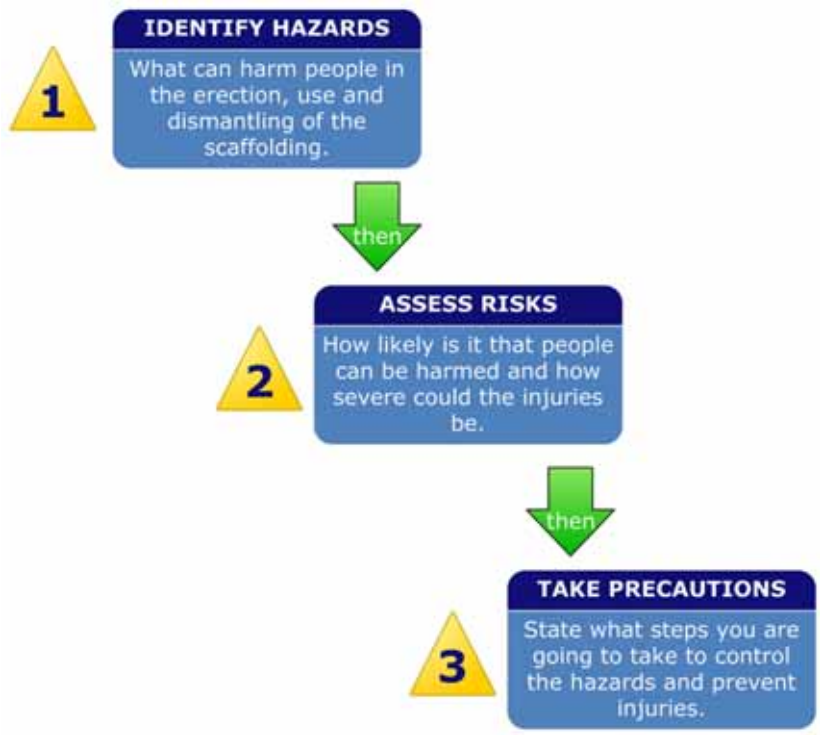


Figure 1: Risk Assessment Process

Project supervisors, designers and contractors have legal obligations in relation to risk assessment. Each should seek to avoid risks, but where the risks can not 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 injury could be.

The greater the likelihood and/or the severity will increase the 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 you should seek to take full account of the General Principles of Prevention, which are contained in Schedule 3 of the Safety, Health and Welfare at Work Act, 2005. These are general principles which are set out in a hierarchy of control measures that apply to all places of work.

GENERAL PRINCIPLES OF PREVENTION

General Principles of Prevention	How it can be applied to scaffolding
1. The avoidance of risks	Specifying a scaffolding systems, which remove a hazard or hazards during erection, while the scaffold is in use or maintained or during the dismantling of the scaffold, which would otherwise have existed.
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), Safety and Health Plan (PSCS), and the Safety File (PSDP). 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-in measures to accommodate collective fall protection, such as nets (during construction) rather than facilities for the protection of the individual using harnesses
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.

1.8. Statutory Duties

A range of persons 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, the provisions listed below:

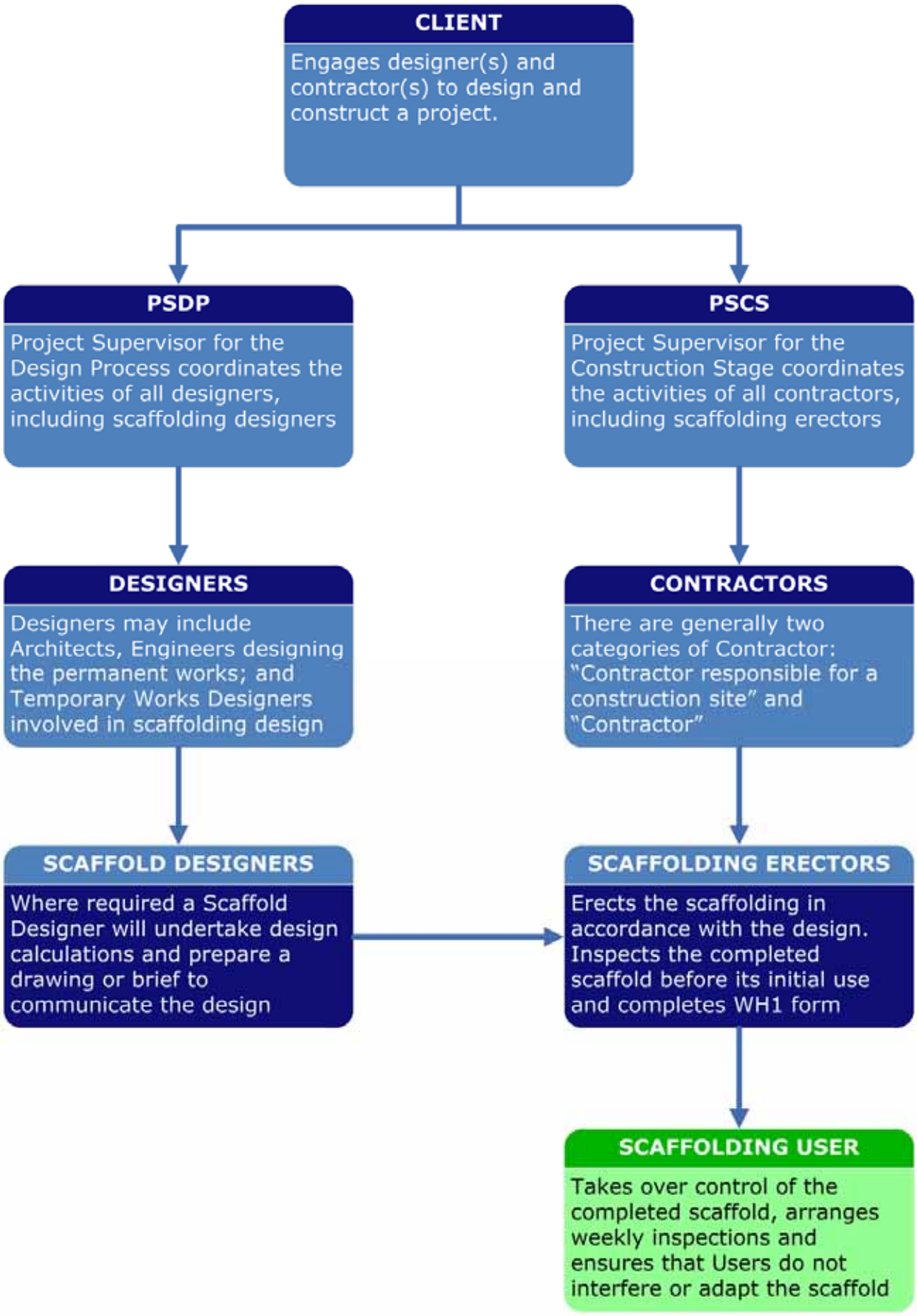
Safety, Health and Welfare at Work Act, 2005	
Section 8.	General duties of employer
Section 9.	Information for employees
Section 10.	Instruction, training and supervision of employees
Section 11.	Emergencies and serious and imminent dangers
Section 12.	General duties of employers to persons other than 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 & 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, designers of scaffold structures, project supervisor for the construction stage, contractors and workers.

The interaction between these duty holders is represented in the chart overleaf.


CLIENT
Engages designer(s) and contractor(s) to design and construct a project.
PSDP
Project Supervisor for the Design Process coordinates the activities of all designers, including scaffolding designers
PSCS
Project Supervisor for the Construction Stage coordinates the activities of all contractors, including scaffolding erectors
DESIGNERS
Designers may include Architects, Engineers designing the permanent works; and Temporary Works Designers involved in scaffolding design
CONTRACTORS
There are generally two categories of Contractor: "Contractor responsible for a construction site" and "Contractor"
SCAFFOLD DESIGNERS
Where required a Scaffold Designer will undertake design calculations and prepare a drawing or brief to communicate the design
SCAFFOLDING ERECTORS
Erects the scaffolding in accordance with the design. Inspects the completed scaffold before its initial use and completes WH1 form
SCAFFOLDING USER
Takes over control of the completed scaffold, arranges weekly inspections and ensures that Users do not interfere or adapt the scaffold

1.8.1. Project Supervisor for the Design Process

The duties of the project supervisor for the design process's duties include:

- Identify hazards arising from the design or from the technical, organisational, planning, or time related aspects of the project;
- Where possible, eliminate the hazards or reduce the risk;
- Communicate necessary control measures, design assumptions, or remaining risks to the PSCS so they can be dealt with in the Safety and Health Plan;
- Ensure that the work of designers is co-ordinated to ensure safety;
- Organise co-operation between designers;
- Prepare a written safety and health plan for any project where construction will take more than 500 person days or 30 working days or there is a Particular Risk and deliver it to the client prior to tender;
- Prepare a safety file for the completed structure and give it to the client;
- The PSDP may issue directions to designers or contractors or others;
- Notify the Authority and client of non-compliance with any written directions issued.

1.8.2. Designers

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

- Identify any hazards that your design may present during construction and subsequent maintenance;
- Where possible, eliminate the hazards or reduce the risk;
- Communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the Safety and Health Plan;
- Co-operate with other designers and the PSDP or PSCS;
- Take account of any existing safety and health plan or safety file;
- Comply with directions issued by the PSDP or PSCS;
- Where no PSDP has been appointed, inform the client that a PSDP must be appointed;
- The Safety Health and Welfare at Work Act 2005 requires designers to

ensure that the project is capable of being constructed to be safe, can be maintained safely and complies with all relevant health and safety legislation.

1.8.3. Project Supervisor for the Construction Stage

The project supervisor for the construction stage has significant duties in relation to the safety of scaffolding. These duties include:

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

For example, the project supervisor for the construction stage should ensure that arrangements are in place to communicate the requirements of the scaffold users to the scaffold erectors.

1.8.4. Contractors

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

- Co-operate with the PSCS;
- Provide a copy of your safety statement and relevant information to the PSCS;
- Promptly provide the PSCS with information required for the safety file;
- Comply with directions of Project Supervisors;
- Report accidents to the Authority and to the PSCS where an employee can not perform their normal work for more than three days;
- Comply with site rules and the safety and health plan and ensure that your employees comply;
- Identify hazards, eliminate the hazards, or reduce risks during construction;
- Facilitate the Site Safety Representative;
- Ensure that relevant workers have a safety awareness card and a construction skills card where required;
- Provide workers with site specific induction;
- Appoint a safety officer where there are more than 20 on site or 30 employed;
- Consult workers and Safety Representatives;
- Monitor compliance and take corrective action.

NOTE

Every contractor using a scaffold should satisfy himself, 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 form WH1, (*Report of results of inspections of Work Equipment for Work at a Height*), has been completed.

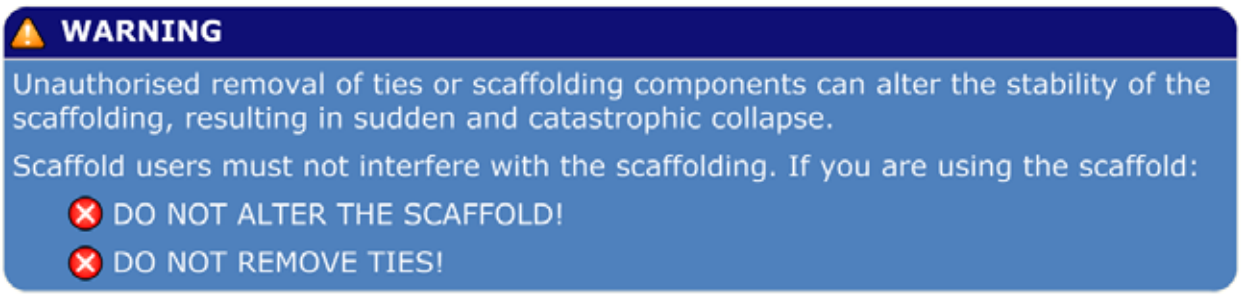
Where a scaffolding contractor is engaged by another contractor to construct, maintain or dismantle a scaffold, then each contractor will assume a number of

duties under the regulations. The agreement between contractors should clearly state which contractor is responsible for fulfilling specific duties. For example, the agreement should be clear as to which contractor is responsible for performing inspections of the scaffold.

1.8.5. Workers

Workers, including scaffold erectors, have responsibilities under the relevant statutory provisions which include:

- Taking care for 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 or other protective equipment provided;
- Reporting to his employer defects in the scaffold or in the system of work which may endanger health and safety;
- Not interfering with or misusing the scaffold.



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

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

1.9. Illustrations

The illustrations used in this code show a type of system scaffold which 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. Such instructions should always be referred to.

1.10. Definitions

For the purposes of this Code of Practice, the following definitions apply (see figure 2 on page 19):

1.10.1. Types and Dimensions of Scaffolds

Base Lift: A lift erected near the ground.

Bay: The space between the centre lines of two adjacent standards along the face of a scaffold.

Bay Length: The distance between the centres of two adjacent standards, measured horizontally along the face of a scaffold.

Height: The height measured from the foundation to the top assembly of ledgers and transoms (cf. *Lift Height*).

Length: The length of a scaffold between its extreme standards, sometimes designated by the number of bays (cf. *Bay Length*).

Lift: The assembly of ledgers and transoms forming each horizontal level of a scaffold.

Lift Height: The vertical distance between two lifts, measured centre to centre.

Scaffold: A temporarily provided structure which provides access, on or from which persons work or which is used to support materials, plant or equipment.

Free Standing Scaffold: A scaffold which is not attached to any other structure and is stable against overturning on its own account or, if necessary, assisted by guys or rakers and anchors.

Independent Tied Scaffold: A scaffold, which has two lines of standards, one line supporting the outside of the deck and one the inside (see figure 2 on page 19). It is not free-standing being connected to the building.

Slung Scaffold: A scaffold hanging on tubes, ropes or chains from a structure overhead. It is not capable of being moved or lowered.

Suspended Scaffold: A scaffold hanging on ropes which is capable of being suspended or raised or lowered.

System Scaffold: a service and working scaffold made of prefabricated elements and designed and manufactured in accordance with IS EN 12810 Part 1, 2004 or an equivalent standard.

Width: The width of a scaffold measured at right angles to the ledgers from centre to centre of the uprights.

1.10.2. Structural Members

Brace: A tube placed diagonally with respect to the vertical or horizontal members of a scaffold and fixed onto them to afford stability.

Cross Brace: See *Ledger Brace.*

Façade Brace: A brace parallel to the face of a building.

Knee Brace: 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: A brace at right angles to the building in a vertical plane.

Plan Brace: A brace in a horizontal plane.

Transverse Brace: A brace generally in the plane of the shorter dimension of the scaffold.

Bridle: 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 Tube: A tube, which butts up against the facade of a building or other surface to prevent the scaffold moving towards that surface.

Guard-Rail: A member incorporated in a scaffold to prevent the fall of a person from a platform or access way.

End Guard-Rail: A guard-rail placed across the end of a scaffold or used to isolate an un-boarded part.

Ledger: A longitudinal tube normally fixed parallel to the face of a building in the direction of the larger dimensions of the scaffold.

Raker: An inclined load-bearing tube.

Reveal Tube: 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.

Standard: A vertical or near vertical tube.

Tie or Tie Assembly: The components attached to an anchorage or the building or framed around a part of it or wedged or screwed into it with a tie tube. Used to secure the scaffold to the structure.

Movable Tie: A tie, which may be temporarily moved for the execution of work.

Non-Movable Tie: A tie, which will not be moved during the life of a scaffold, as agreed between the user and the scaffold erector.

Reveal Tie: 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.

Through Tie: A tie assembly through a window or other opening in a wall.

Transom: A tube spanning across ledgers to form the support for boards or units forming the working platform or to connect the outer standards to the inner standards.

Butting Transom: A transom extended inwards to butt the building to prevent the scaffolding moving towards the building.

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

1.10.3. Scaffold Fittings

Base Jack: A base plate, which has a means of vertical adjustment.

Base Plate: A metal plate with a spigot for distributing the load from a standard or raker or other load-bearing tube.

Coupler: A component used to fix scaffold tubes together.

Check Coupler or Safety Coupler: A coupler added to a joint under load to give security to the coupler(s) carrying the load.

Right Angle Coupler: A coupler used to join tubes at right angles.

Sleeve Coupler: An external coupler used to join one tube to another coaxially.

Supplementary Coupler: Coupler(s) 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.

Swivel Coupler: A coupler for joining tubes at an angle other than a right angle.

Cantilever Bracket or Stage Bracket: A bracket usually attached to the inside of a scaffold to enable boards to be placed between the scaffold and the building.

Joint Pin: An expanding fitting placed in the bore of a tube to connect one tube to another coaxially (see *Spigot*).

Reveal Pin: A fitting used for tightening a reveal tube between two opposing surfaces.

Sole Board: A timber, concrete or metal spreader used to distribute the load from a standard or base plate to the ground.

Spigot: An internal fitting to join one tube to another coaxially (see *Joint Pin*).

Spigot Pin: A pin placed transversely through the spigot and the scaffold tube to prevent the two from coming apart.

1.10.4. Other Terms in General Use

Anchorage: Component cast or fixed into the building for the purpose of attaching a tie.

Brick Guard: 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.

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

Design: conception and calculation to produce a scheme for erection.

Kentledge: Dead weight, built-in or added to a structure to ensure adequate stability.

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

Sheeting: Horizontal, vertical or inclined sheets of material, such as corrugated metal or plastic sheets or netting, attached to a scaffold in order to provide protection from the effects of weather or alternatively to protect the surrounding area from the effects of works being carried out from the scaffold structure.

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

End Toe-board: A toe-board at the end of a scaffold or at the end of a boarded portion of it.

Working Platform: The deck from which building operations are carried out.

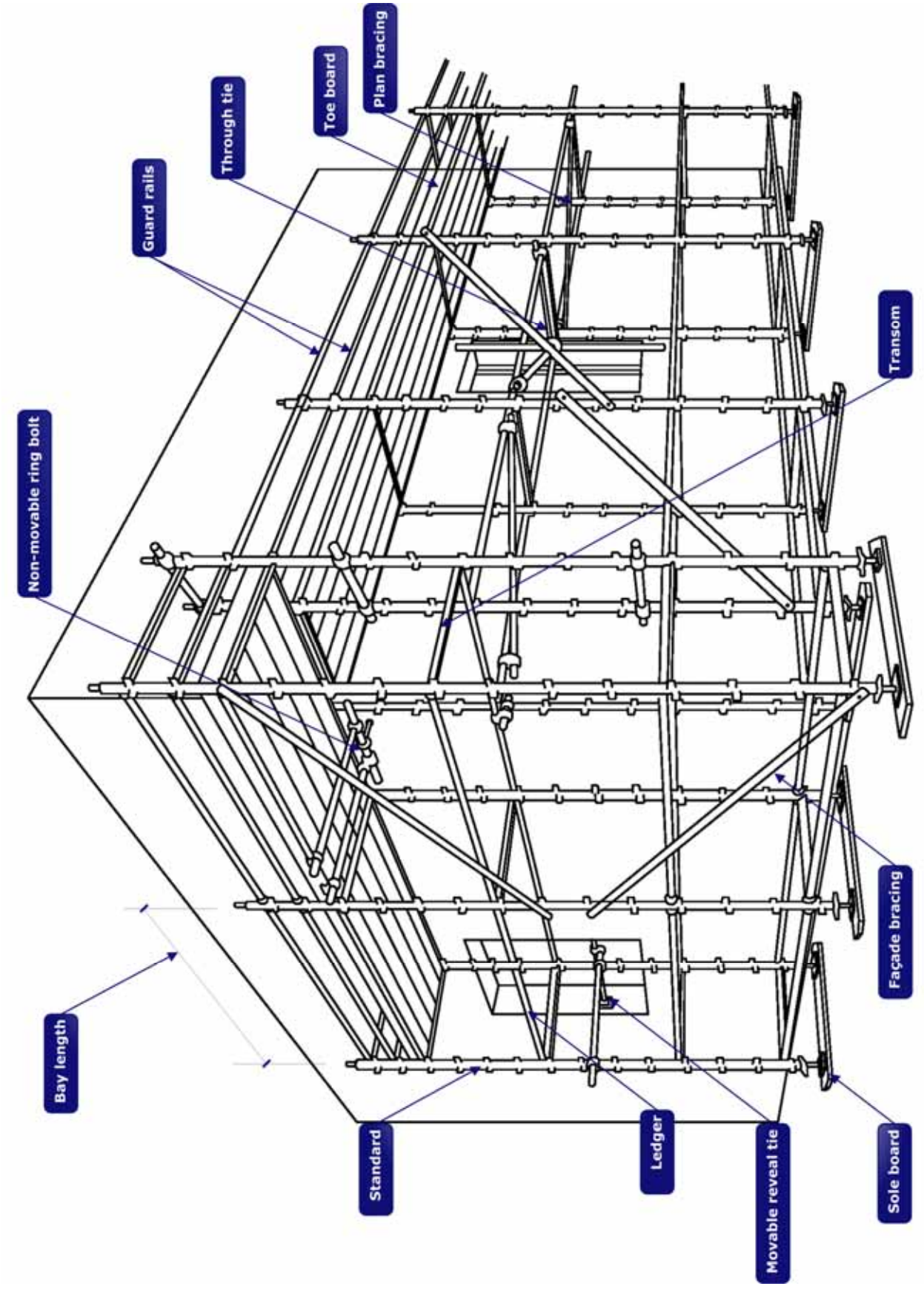


Figure 2: Example of an independent tied system scaffold

2. Management and Control of Scaffolding

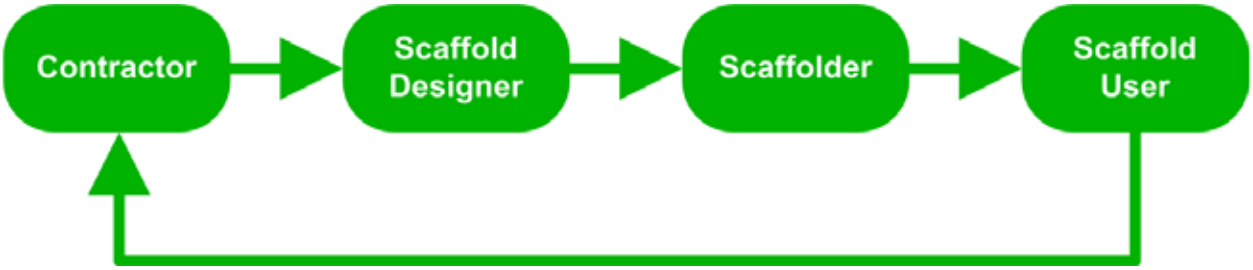
2.1. Management of Scaffolding Activities

NOTE

Maintaining scaffolding in a safe condition requires active management.

The high rate of activity and change on construction sites, together with the high risk associated with scaffolding work requires a high level of safety management to prevent accidents and ill-health. The five steps listed below provide a practical template for the systematic management of scaffolding operations.

Figure 3: Scaffolding Management



The contractor should define a policy in relation to scaffolding. This 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;
- Clearly place the management of scaffolding as a prime responsibility of site management;
- Include a commitment to provide appropriate resources to implement the scaffolding policy.

The scaffolding erection, use and dismantling stages should be planned so as to minimise the risks involved. The planning process involves the contractors who will use the scaffolding, the scaffolding designer, and the scaffolding erector. The planning process should address the areas listed below:

- **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. For example a contract should be prepared by the contractor, 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 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**
  In reducing the risk the preferred solutions are collective controls, e.g. protective barriers that protect everybody from falling; less preferred are administrative controls which seek to reduce risk by adherence to instructions or procedures, and least preferred are solutions which rely solely on the use of personal protective equipment, e.g. harnesses or safety helmets, or safety signs.

- **The identified hazards and the necessary precautions should be written down**
  These should be written in the safety statements or site specific amendments to the safety statements and where a safety and health plan is required, incorporated into it.

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

- **Site Survey**
  The scaffolder should undertake a survey where they do not have prior

knowledge of the site or 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 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 is contravening the requirements of the Safety, Health and Welfare at Work Act, 2005.

Written Scaffolding Brief To Be Issued To Scaffolding Contractor

- 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 hers 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 id 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 plan is transformed into action in the implementation step. Successful implementation requires that the issues listed below are 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 scaffolder. 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 the design maximum tie spacing and those erecting the scaffold will need to have copies of the system scaffold erection instructions available.

- **Documentation**
  Appropriate documentation should be maintained on site. This will include safety statements, safety and health plans, inspection records including form WH1 “Report of results of inspections of Work Equipment for Work at a Height” forms, etc.

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:

1. Before it is taken into use
2. Since any modifications, exposure to bad weather or periods without use
3. At least every seven days, if scaffolding is higher than 2m

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

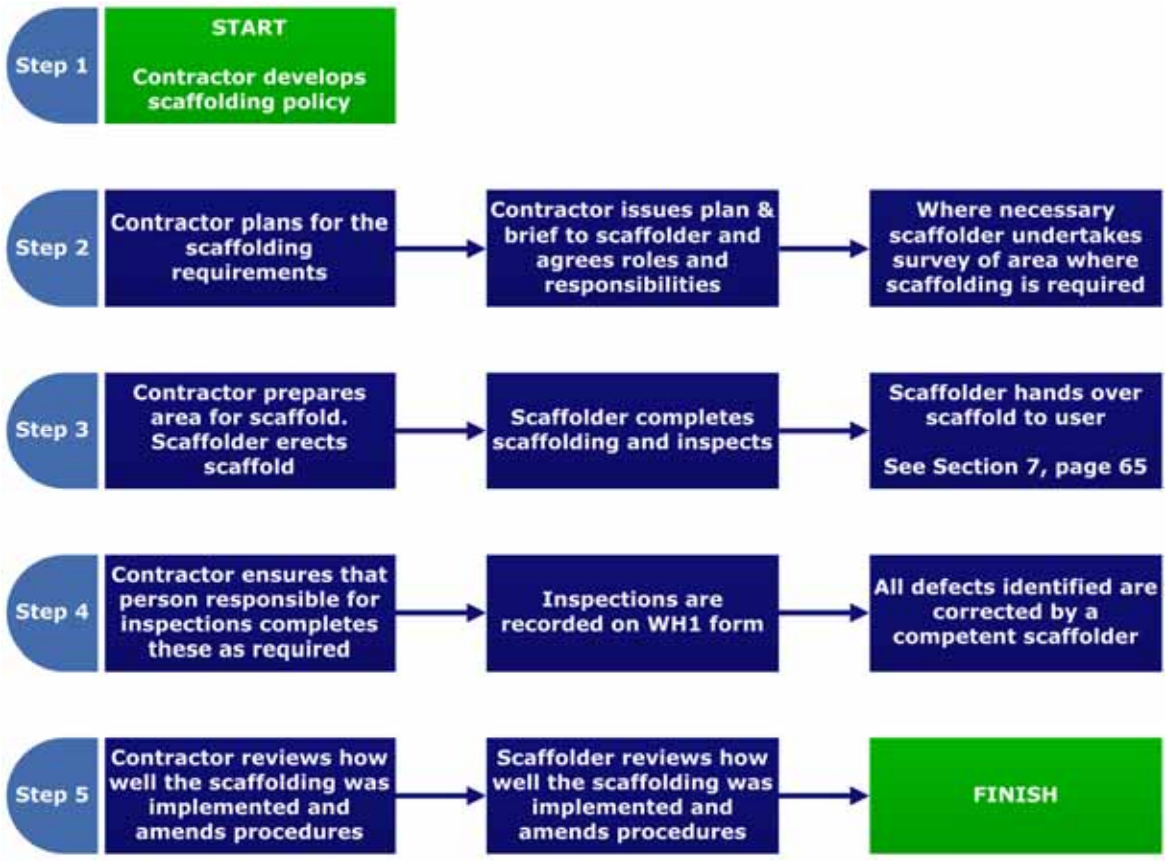
Where defects are found they should be rectified and the root causes of serious or recurring defects should be identified and corrective action taken to prevent a recurrence

Step 5 **Reviewing the Work** Contractor Scaffolder

This step helps to make each job a learning experience so that the next job can be done 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?

The five steps are summarised below.



2.2. Choice of Scaffolding Equipment

Scaffolding equipment should be selected on the basis of a risk assessment, which takes account of the nature of the work to be performed, the loads to be withstood and the height from which falls may occur.

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 points listed below should be considered:

- 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

System scaffolds, designed and manufactured in accordance with IS EN 12810 Part 1, 2004 or an equivalent standard, may be constructed without further calculations provided they are constructed in accordance with the system scaffolding manufacturer's instructions and restrictions.

Basic simple un-sheeted tube and fitting scaffolds may be constructed to a height of 50m without calculations provided they are constructed in accordance with Sections 2 and 3 of this code and do not carry greater loads nor have greater bay lengths than those given in Table A1: *Load Classes for Access and Working Scaffolds made from Tube and Fitting Scaffolding* in Appendix A.

Loading bays should be incorporated into the scaffolding at appropriate locations, where the contractor intends to load materials onto the scaffold by crane or teleporter. 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 person such as a chartered structural engineer with appropriate experience or by another competent person.

Sections 6 and 10 of IS EN 12811 Part 1; 2004 provides 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 IS 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 un-sheeted scaffolds and 25m for sheeted scaffolds;
- Scaffolds with temporary roofs;
- 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, temporary buildings and roofs;
- Scaffolds where the required bracing is omitted;
- Scaffolds where the allowable bearing pressure of the ground may not be adequate to support the scaffold.

NASC TG20:05 is a technical guidance on the use of EN 12811 Part 1 and include a range of tables for the design of basic scaffolds.

WARNING

The designer should have a full working knowledge of IS EN 12810 and IS EN 12811 and be competent to undertake a scaffolding design. Reference should be made to other relevant guidance, for example NASC TG20:05

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 project supervisor for the design process and the project supervisor for the construction stage 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 and project supervisors should co-ordinate these matters.

For example, project supervisors should ensure that information on the proposed location of adjacent drains or other excavations is available 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 to ensure that the activities of an individual trade do not endanger the scaffold or the users of the scaffold. The scheduling issues listed below 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 issues listed below 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 brick layers 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 maintained on site to allow modifications to be made in good time. This will usually require the full-time attendance of at least one competent scaffolder 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 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.

2.7. Information to Users of Scaffolding Equipment

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

- Conditions for use of the equipment, including instructions for its safe use and, where appropriate, assembly and dismantling plans;
- Any unusual conditions which can be foreseen;
- 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 the risk of contact with overhead electric lines.

The scaffolding contractor should carry out a risk assessment relating to the type of scaffolding operations to be carried out 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 safety harnesses and anchorages.

Collective safeguards should be specified in the safety statement and/or safety and health plan. These will normally include, as far as is 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, for example, nets, harnesses and safety lines, should be used to supplement the collective safeguards.

Construction of certain scaffold types or construction which 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;
- Work out of man baskets or cradles.

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.

NASC safety guidance SG4:05 sets out clear recommendations for preventing falls in scaffolding and falsework.

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 and these should include:

- Other workers and the public should be effectively excluded from the work areas by signs and/or barriers.
- Where persons can not 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 danger that it will be used to gain access 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. Inspection Prior to Use

All materials should be inspected before use. The inspection should be performed before despatch to the site or upon arrival at the site. An area should be set aside for damaged or defective material.

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

3.2.2. Standards

Standards are the vertical tubular 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 spacing between standards given in *Table A1: Load Classes for Access and Working Scaffolds made from Tube and Fitting Scaffolding* in Appendix A should not be exceeded.

3.2.3. Transoms

Transoms run at right angles to the structure, joining the inside and outside ledgers and supporting the scaffold boards. 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 run along the inside and outside of the scaffold joining each pair of standards to another pair. They 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 3.2.3.) Tube and fitting ledgers should be joined with sleeve couplings or with expanding joint pins where tension is not likely to occur.

3.2.5. Couplers

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. Fittings for which there is no standard should only be used in accordance with the recommendations and data provided by the manufacturer or supplier.

IS 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.

Table 1: Classes of Couplers

Type of Coupler	Class of Coupler			
	A	B	AA	BB
Right angle coupler	☐	☐	☐	☐
Swivel coupler	☐	☐	---	---
Parallel coupler	☐	☐	---	---
Swivel 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 IS EN 74-1 2005.

The Characteristic values of the resistances for couplers, listed below, apply to couplers marked with EN 74 and where appropriate 'A' or 'B'.

Table 2: 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					

Table C.1 from IS EN 12811-1:2004.

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 and live loads from construction materials, workers and tools, dynamic loads from material placement and wind loads.

Where failures occur, large areas of scaffolding can collapse quite suddenly. 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 issues, listed below, should be addressed:

- The foundations should be adequate (see 3.3.1);
- The scaffold should be tied to the permanent structure or to buttresses (see 3.3.2);
- The scaffold should be braced (see 3.3.4);
- The scaffold should not be overloaded (see 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 the surface is a hard asphalt or similar surface with sufficient bearing capacity. Where the bearing surface is soil, compacted gravel, tarmacadam, hardcore, paving slabs or a similar surface, 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.

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

Timber sole boards under any one standard should be at least 35 mm thick and at least 220mm wide and 1,000cm2 in area (e.g. 220mm wide by 500mm long). Where practicable, sole boards should support two standards. Larger sole boards should be used where the ground is soft. 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 150 mm 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 which 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 standards unless adequate arrangements have been made to support the standards. 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 Material

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 toward or away from the building
- 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 which 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.

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

Ties should be securely coupled to both standards or to both ledgers, and 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. These include freestanding 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 other types such as 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 of at least 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 = 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 only is sufficient.

A minimum of 3 anchors shall be tested and at least 5% (1 in 20) of the total job. 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). Refer to Table 3 overleaf.

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 < 5%. 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 3: 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.

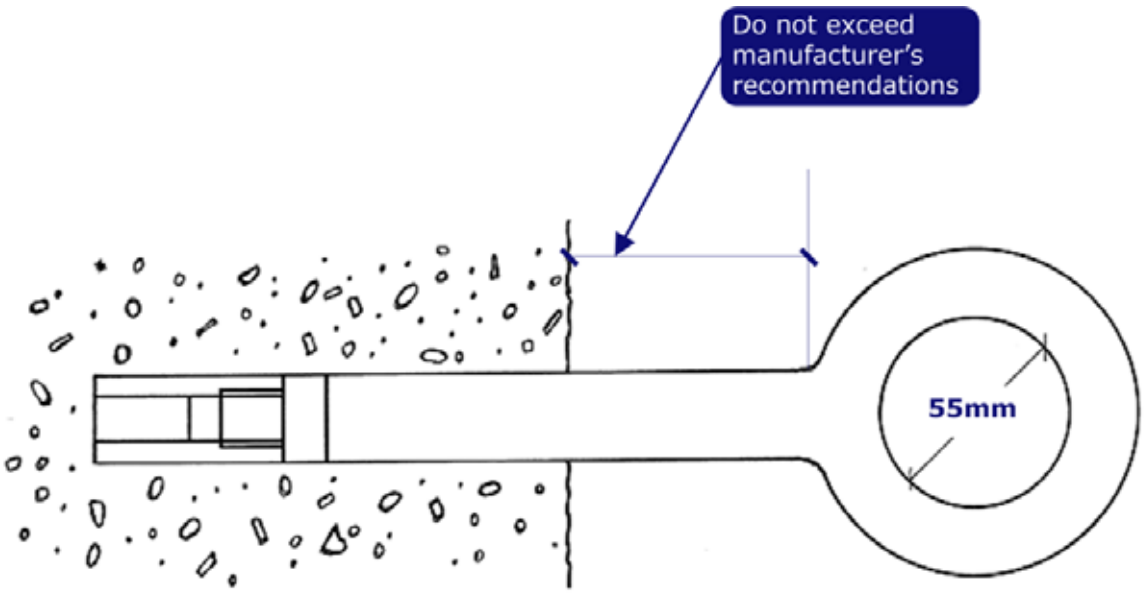


Figure 4: Typical ring bolt anchorage

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.

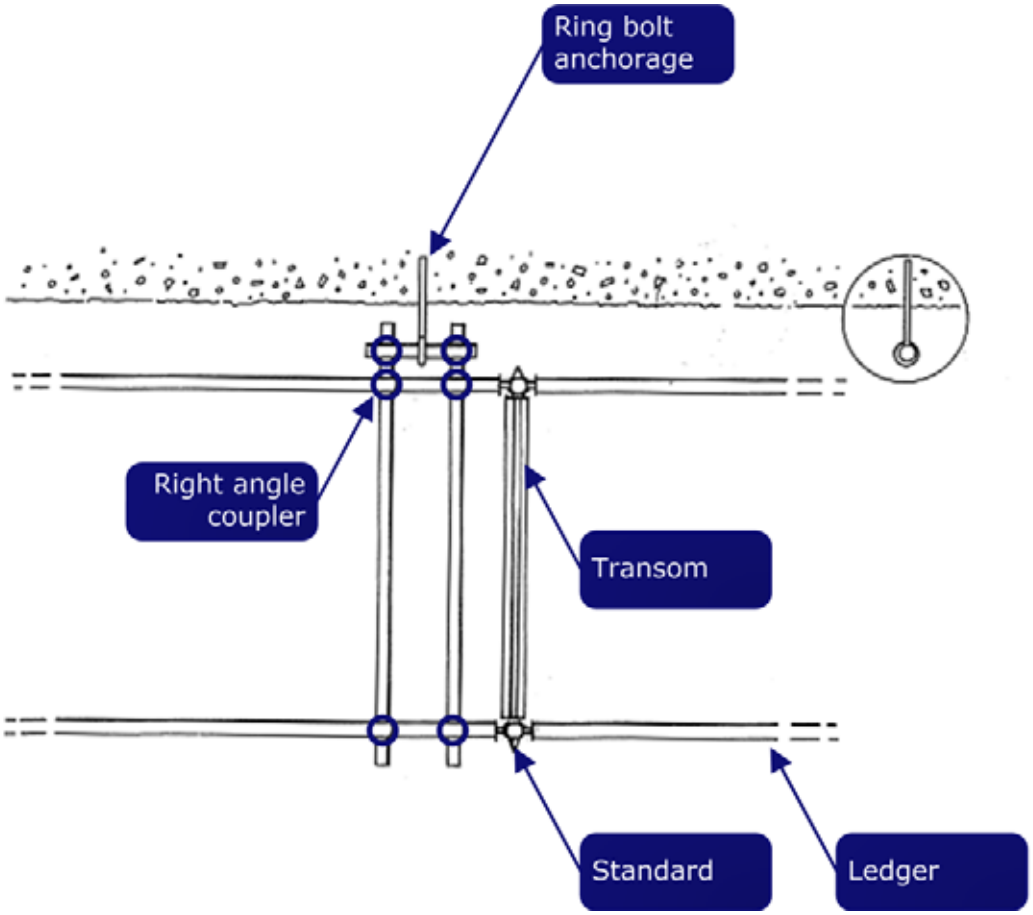


Figure 5: Example of ring bolt anchorage and tie

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 rest 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.

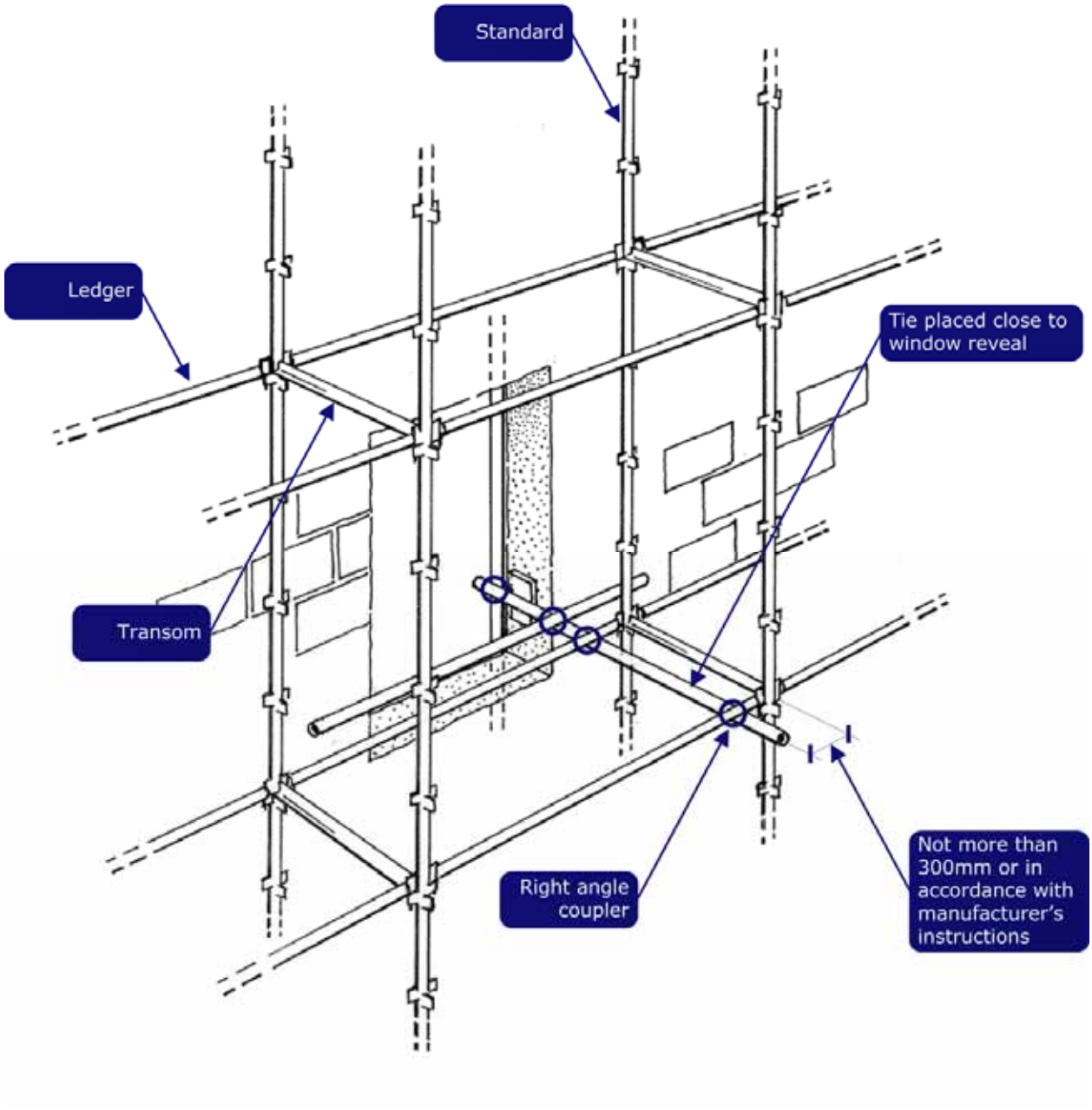


Figure 6: Through tie for tied scaffolds

3.3.2.3. Reveal Ties

Reveal ties may be used where it is impracticable 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 150 mm from the reveal and at the opposite end from the reveal pin.

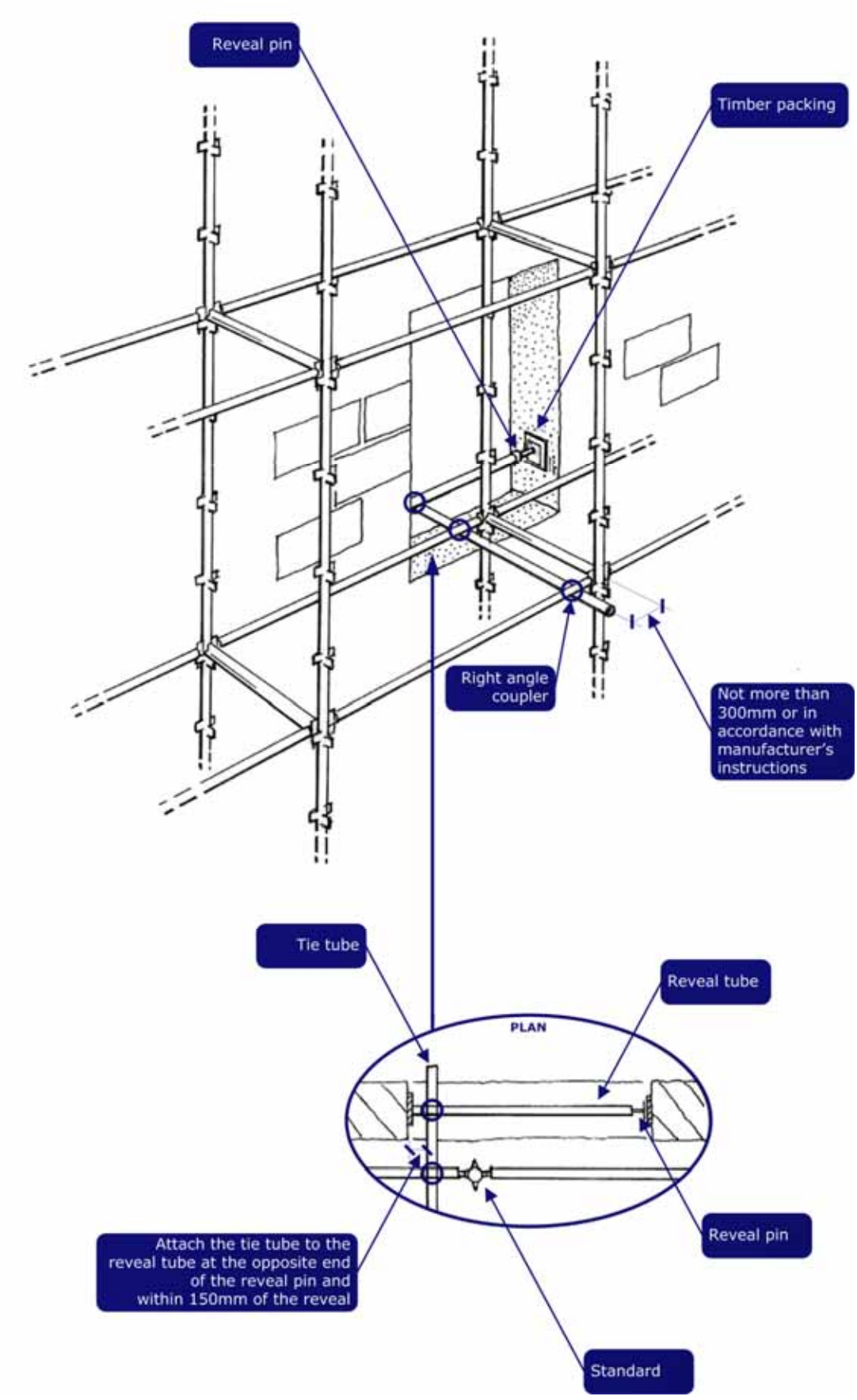


Figure 7: Reveal tie for tied scaffolds

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.

3.3.2.4. Returns

Where a system scaffold is returned around the corner of building facades, it should be regarded as providing an adequate attachment of the scaffold to the facade for a 3m length of the scaffold, measured from the end of the building. Plan bracing of ledgers would be required to provide tying to adjacent standards. Returns of tube and fitting scaffolds can be regarded as providing attachment of the scaffold to the facade for a 3 metre 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 3 metre 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 6 metre intervals and tied back to the scaffold at the foot may be considered as providing adequate stability in the direction toward 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.

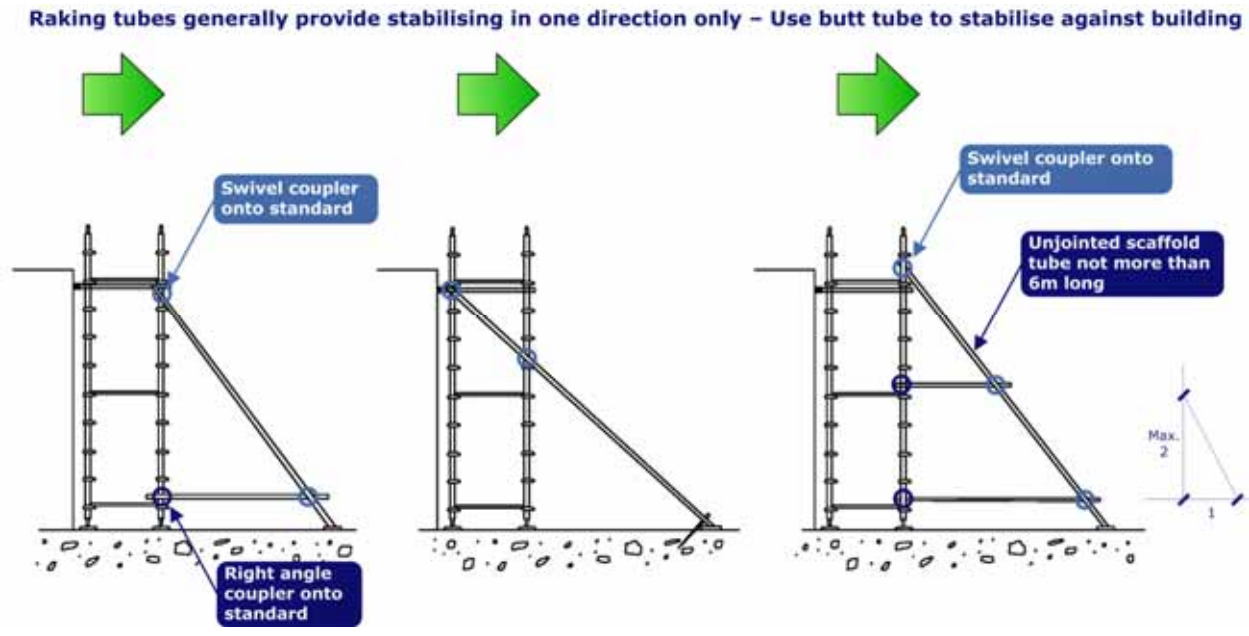


Figure 8: Stabilising a scaffold less than 6m. high – Raking Tubes

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 then so does the number of ties required. The system manufacturer's instructions for tie spacing should be followed and 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 scaffold during use.

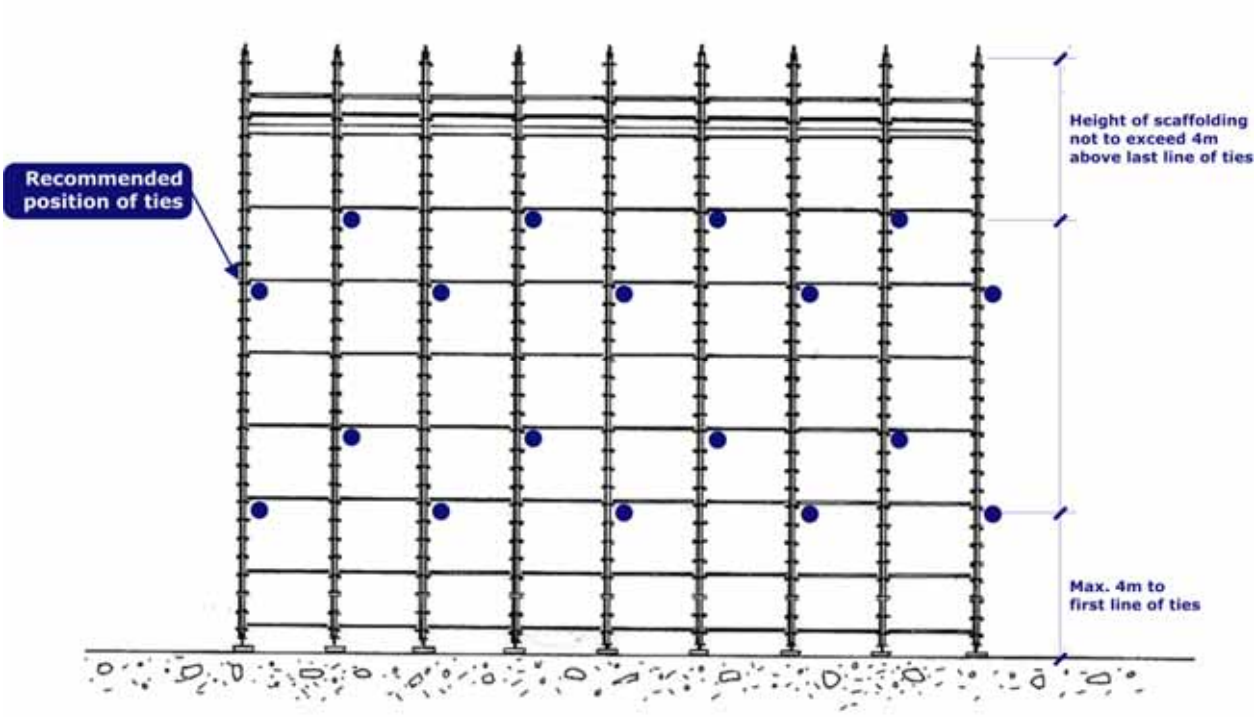


Figure 9: Example of a tie pattern for a lightly loaded scaffold

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 then the manufacturer may permit plan or cross bracing to be provided between ties to provide 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 designer, in accordance with the requirements of IS EN 12811 Part 1, 2004. When tying sheeted scaffolds ensure that the coupler capacity is adequate and ensure 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. Swaying can cause instability, cracking of welds, and it can over stress the standards. 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. Couplers should be capable of sustaining a load of 5kN (510kg).

3.3.4.1. Facade Bracing

Facade bracing runs parallel to the building and examples of façade bracing include:

- (A) A series of parallel diagonal tubes placed one above the other;
- (B) In long facades, a continuous diagonal tube from bottom to top; or
- (C) A zigzag pattern

Refer to Figure 10 overleaf.

System scaffolding should be braced in accordance with the manufacturer's recommendations. The recommended facade brace spacing for some system scaffolds ranges from a maximum of 3 unbraced bays to a maximum of 8 unbraced bays, depending on the system.

Tube and fitting scaffolds should braced at least every 30m, unless movement along the building is prevented by other means.

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

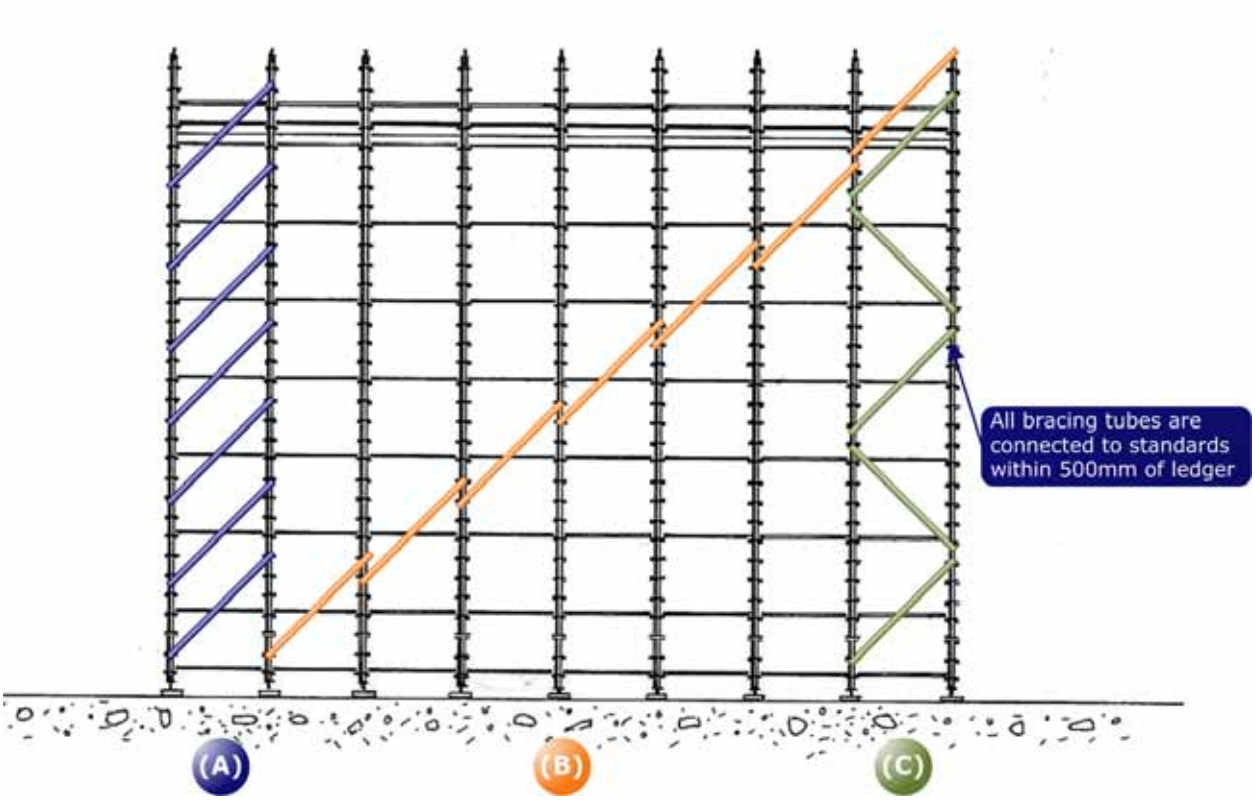


Figure 10: Examples of facade bracing

3.3.4.2. Cross Bracing (also known as Ledger Bracing)

Cross bracing runs at right angles to the facade and is in a vertical plane.

Some types of system scaffolds 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 cross 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 cross bracing is required.

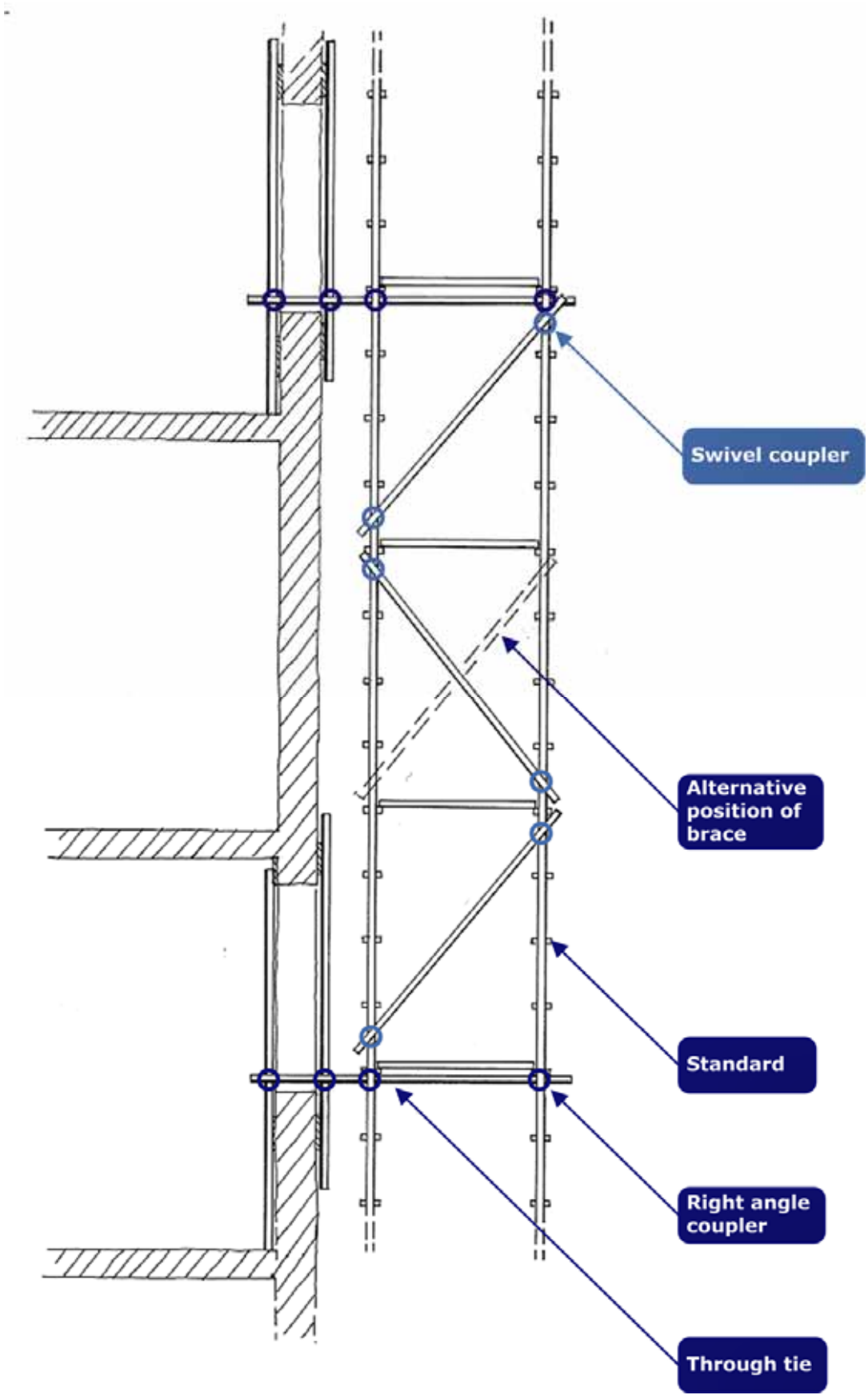


Figure 11: Section showing example of cross bracing

Cross 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. 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 which 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 can not 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 externally plan braced off the scaffold.

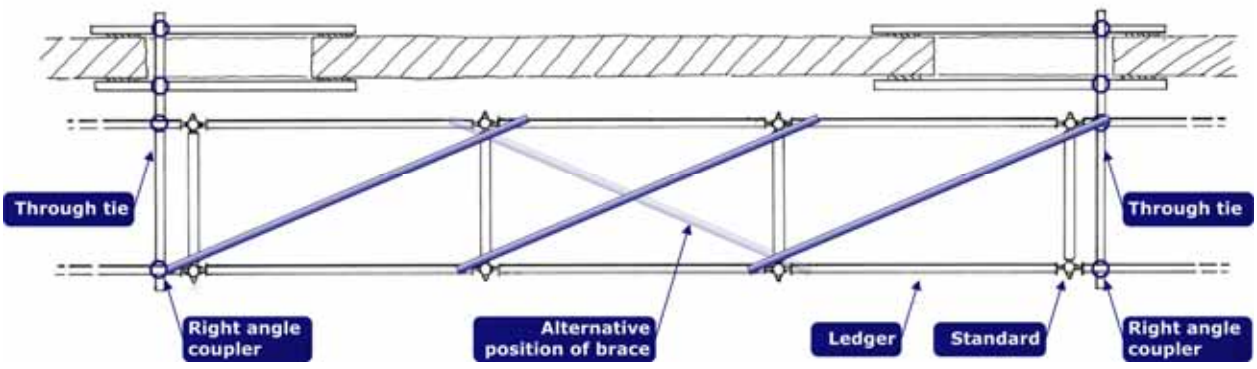


Figure 12: Plan showing example of plan bracing

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.

Where a person could fall a distance liable to cause personal injury, the working platform should be of the widths given in Table 4*: Widths of Access Scaffold Platforms.* A clear passageway of at least 430 mm wide should be maintained for persons between stored materials and the side of the platform.

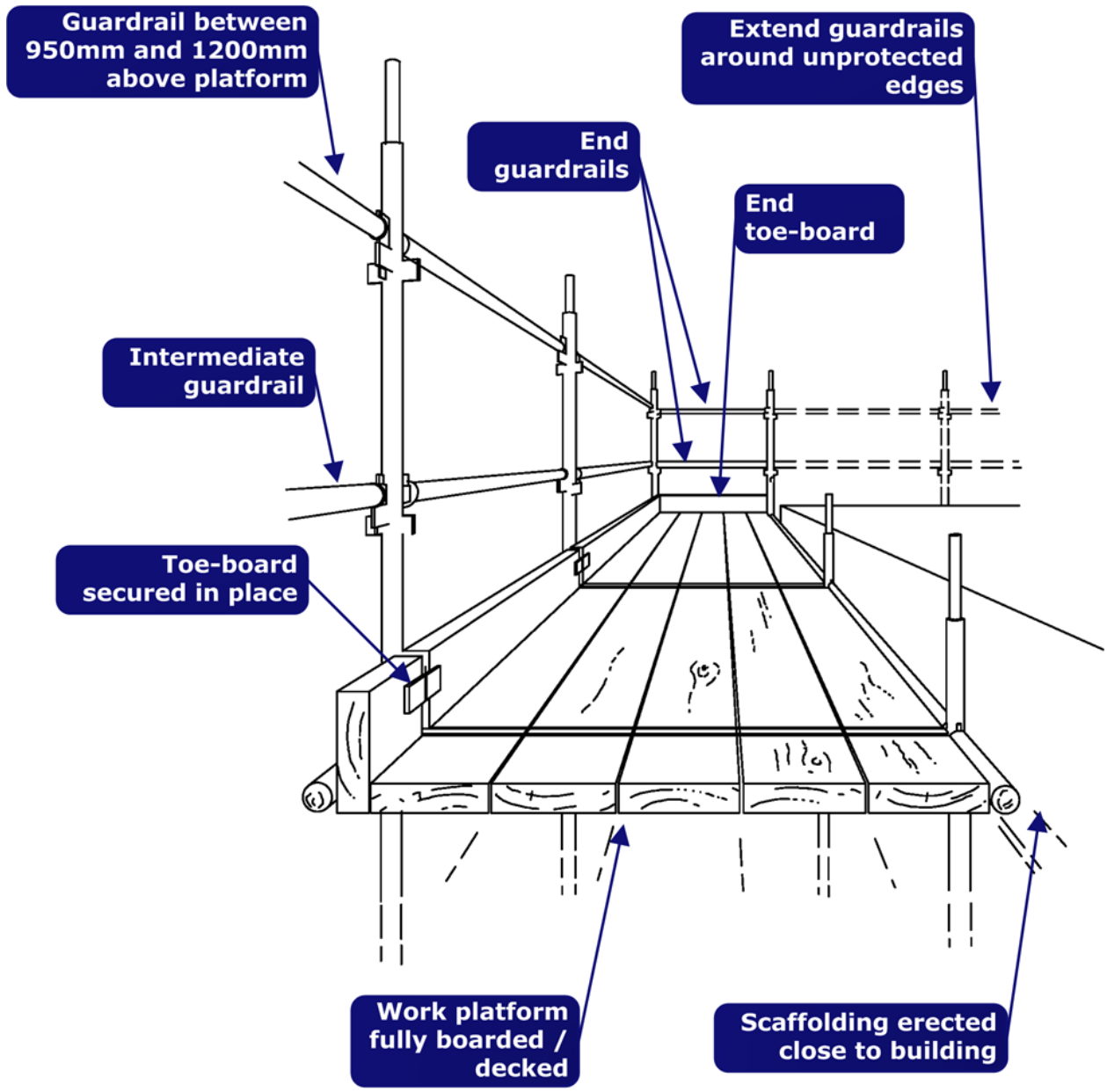


Figure 13: Working platform

Table 4: Widths of Access Scaffold Platforms

Purpose	Minimum Clear Width (mm)	Minimum number of 225mm nominal width boards (Nr.)
For access, inspection, gangways and runs (1)	430mm	2 boards
Working platforms for operatives without materials or only for the passage of materials	600mm	3 boards
For operatives and materials provided there is 430mm left clear for the passage of operatives if barrows are used	800mm	4 boards
For carrying trestles or other similar higher platforms (2)	1050mm	5 boards
For use in dressing or roughly shaping stone (3)	1300mm	6 boards
For use to support a higher platform where the supporting scaffold is also used for dressing and roughly shaping stone (3)	1500mm	7 boards

(1) Where internal ladders are incorporated, the minimum width may be 430mm, i.e. 2 boards;
(2) Provided that operatives are protected from falling;
(3) These scaffolds should be specifically designed

Based on IS EN 12811 Part 1

3.4.1. Decking

Decking may consist of timber boards or proprietary decking units. Where timber boards are used they should comply with IS 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 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 50 mm 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.

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 150 mm 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 as practicable to the finished structure. The maximum gap between the scaffold and the structure should be 300 mm 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 the tie 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 platforms, including 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 and the maximum gap between toe board and the guard rail above it should be 800mm.

An intermediate guard-rail should be provided such that the maximum distance between the rails and between the lower rail and the toe board does not exceed 470mm. Refer to Figure 13.

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.

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.

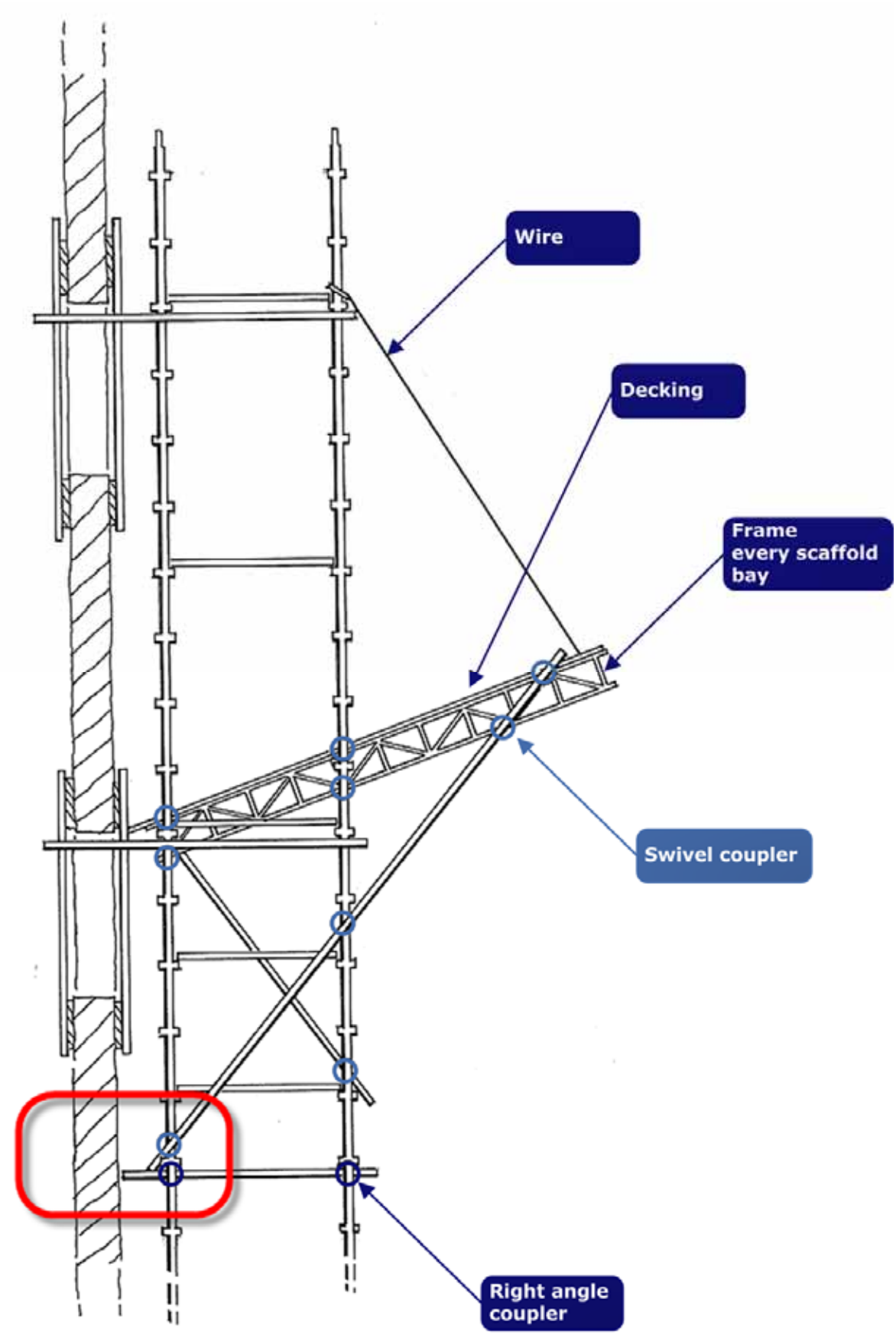


Figure 14: Example of a medium duty fan

3.7. Access to the Scaffold

A safe means of access to the scaffold should be provided. This may include gang-ways, 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 tubes to gain access to or egress from their place of work.

3.7.1. Ladder Access

Scaffold access ladders should meet the minimum standards listed below:

- 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 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 fastenable in the closed position;
- Landings should be provided with guard-rails and toe-boards.

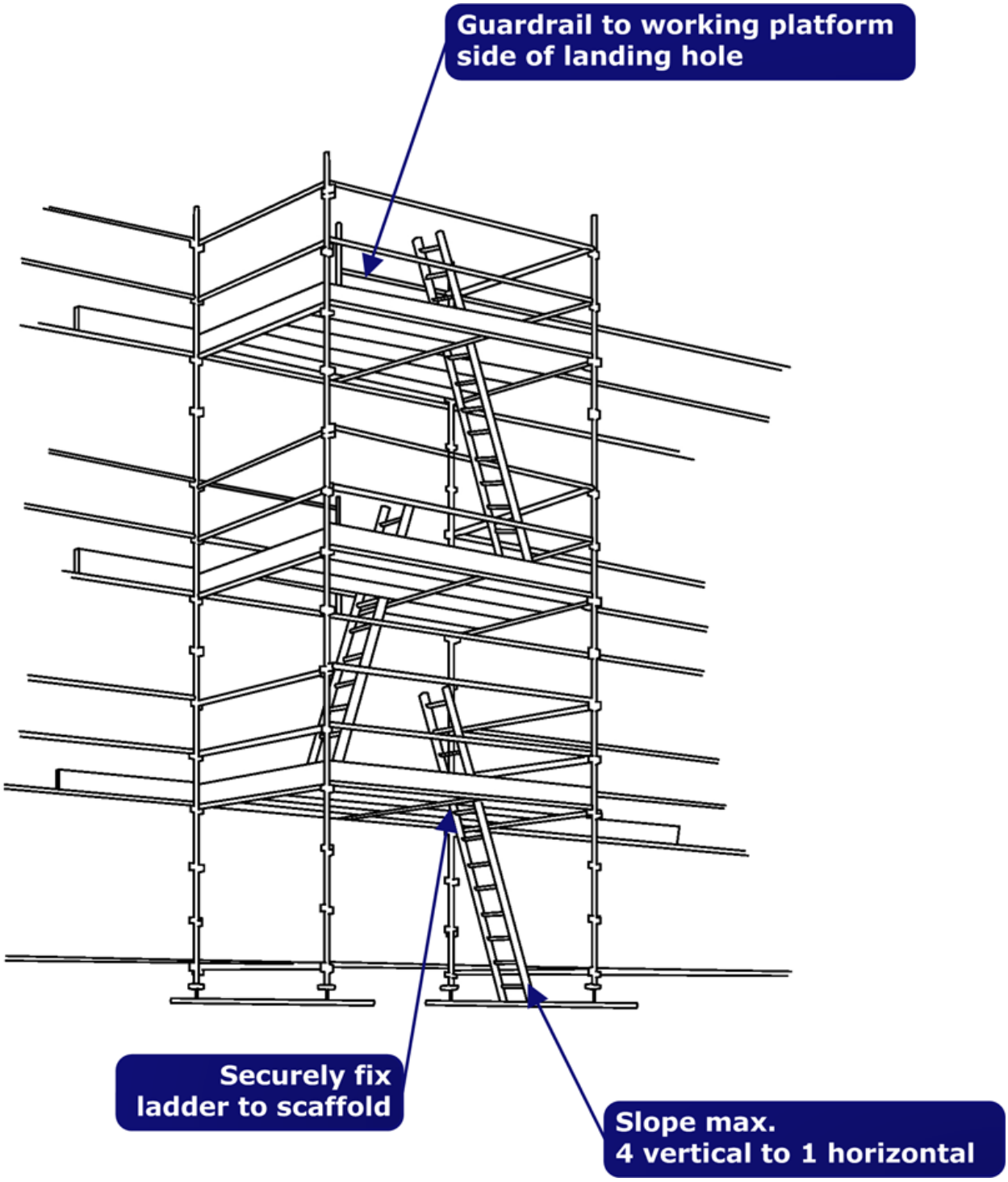


Figure 15: Example of ladder access tower

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. Refer to Figure 16 overleaf.

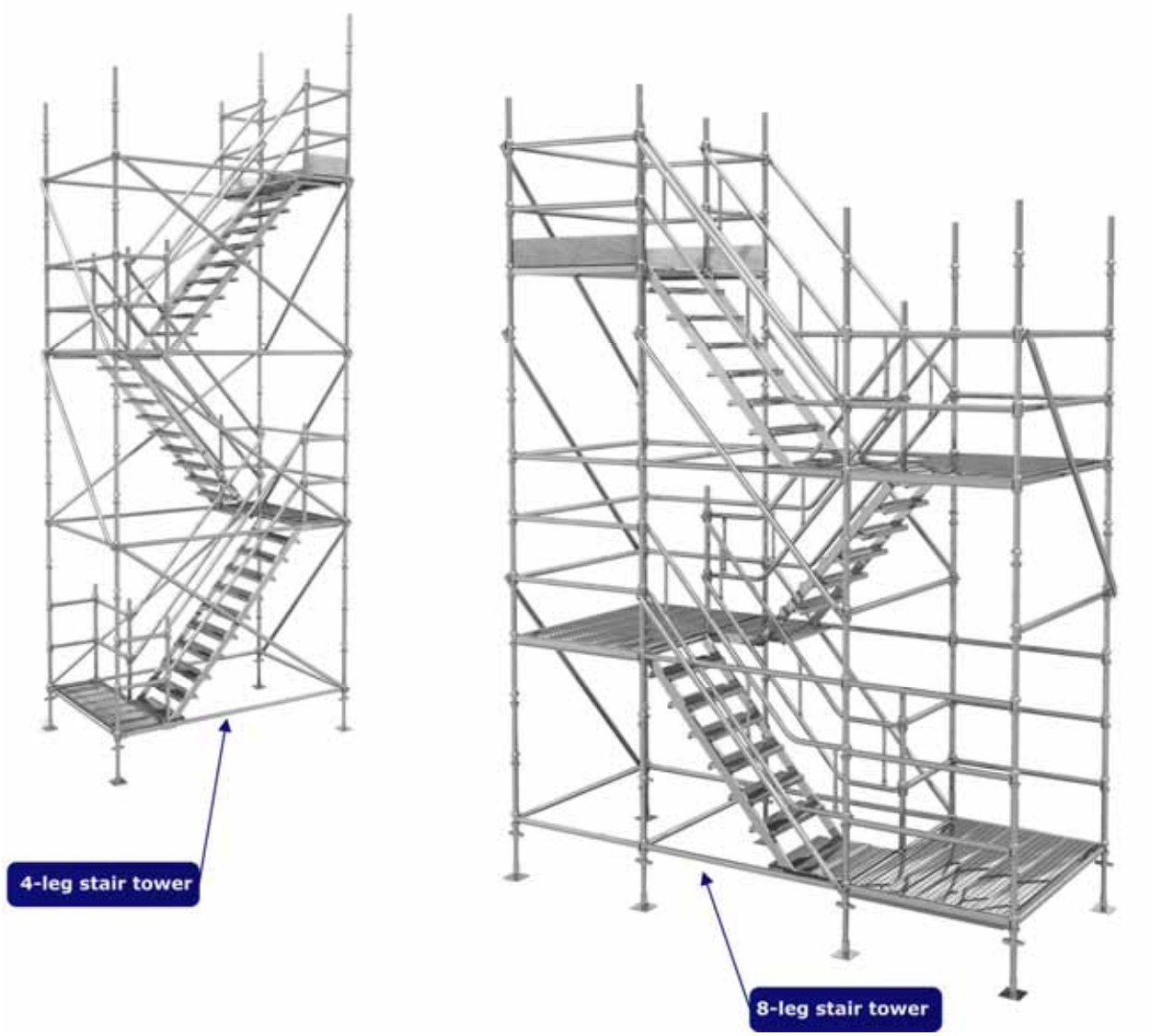


Figure 16: Example of stair access towers

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. Refer to Figures 17 and 18 overleaf.

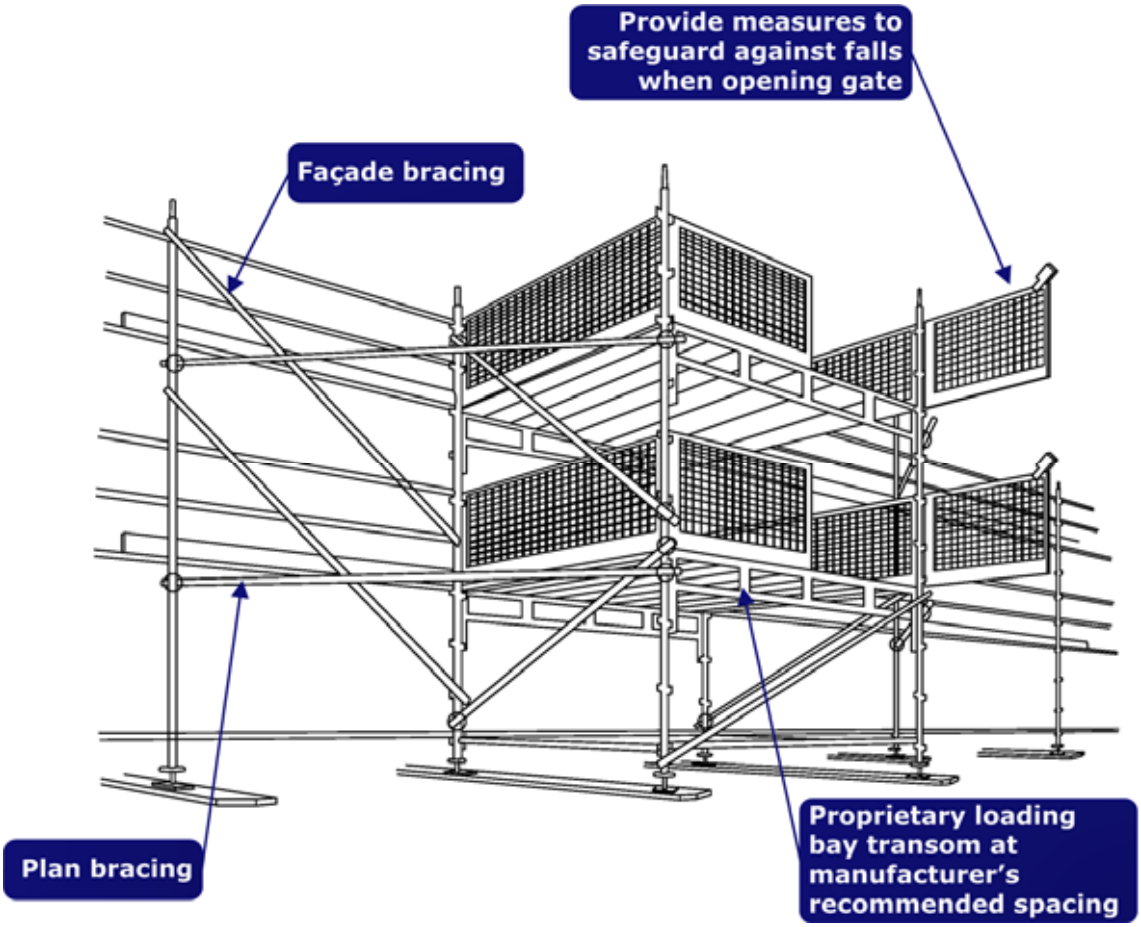


Figure 17: Example of a loading bay for use with a teleporter

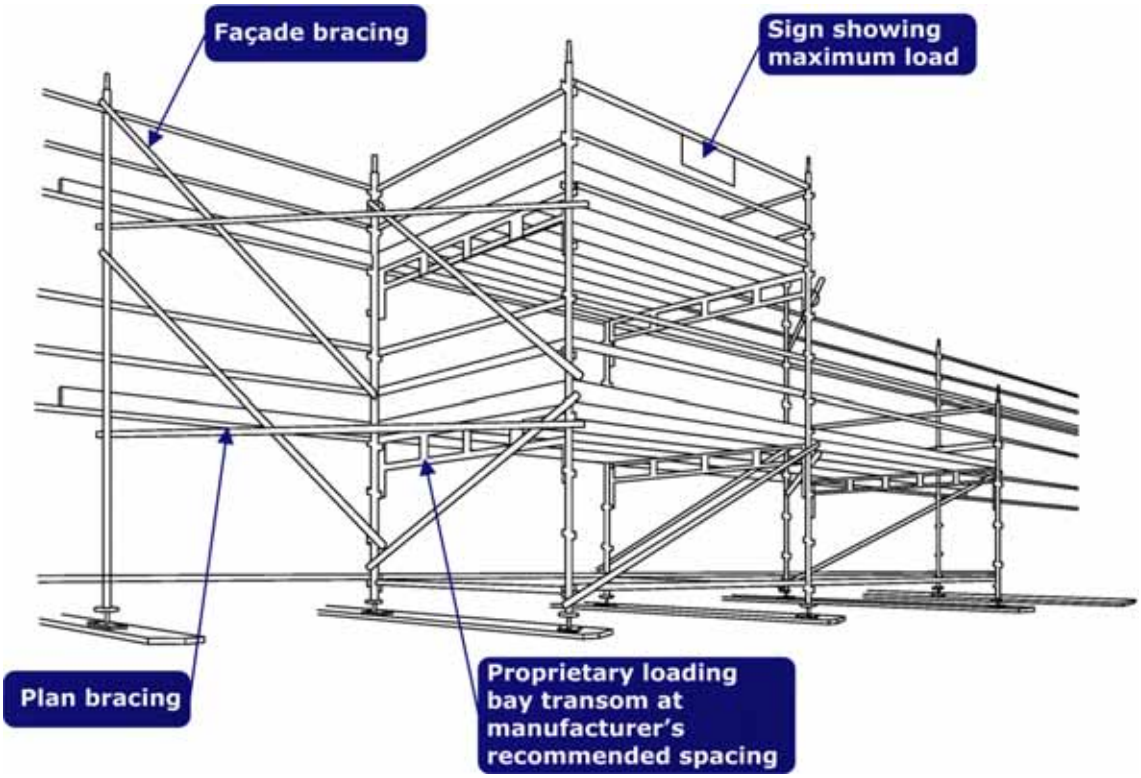


Figure 18: Example of a loading bay for use with a crane

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 facade 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 which 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, hand holds, safety belts or 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 19: Example of Sign for Working Platform with SWL of 2.5 kN/m²

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. For example the weights of the pallets of bricks and blocks, scaffold boards and standards, mortar skips etc. This 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 two main types of tower in use are prefabricated aluminium alloy 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.

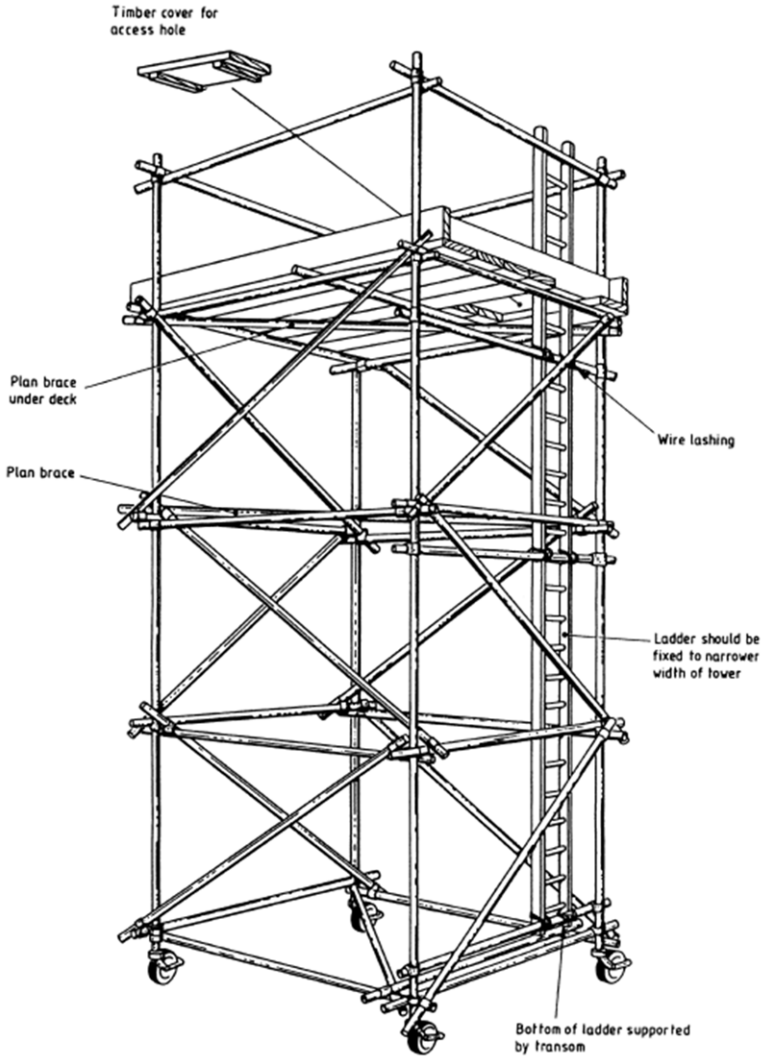


Figure 20: Tube and Fitting tower with internal ladder

IS EN 1004, 2005: *Mobile Access and Working Towers made of Prefabricated Elements - Materials, Dimensions, Design Loads, Safety and Performance Requirements* gives guidance on standard mobile prefabricated towers not exceeding 8m platform height when used externally or 12m when used internally.

3.9.2. Manufacturer's Instructions

The manufacturers and suppliers of prefabricated and system tower scaffolds should provide instructions for the erection and use of the scaffold. These instructions should be available to persons erecting and using these scaffolds and they should be followed.

3.9.3. 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 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).

EXAMPLE

The stability of free-standing towers which 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.

3.9.4. 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.

3.9.5. 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.

3.9.6. Castors

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

3.9.7. 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 over-loaded.

3.9.8. Tower Access

Access should be provided to the tower by using vertical or integral ladders, inclined internal ladders or stairways erected in accordance with the manufacturers' 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 which is capable of being closed and secured.

3.9.9. Overhead Electricity Lines

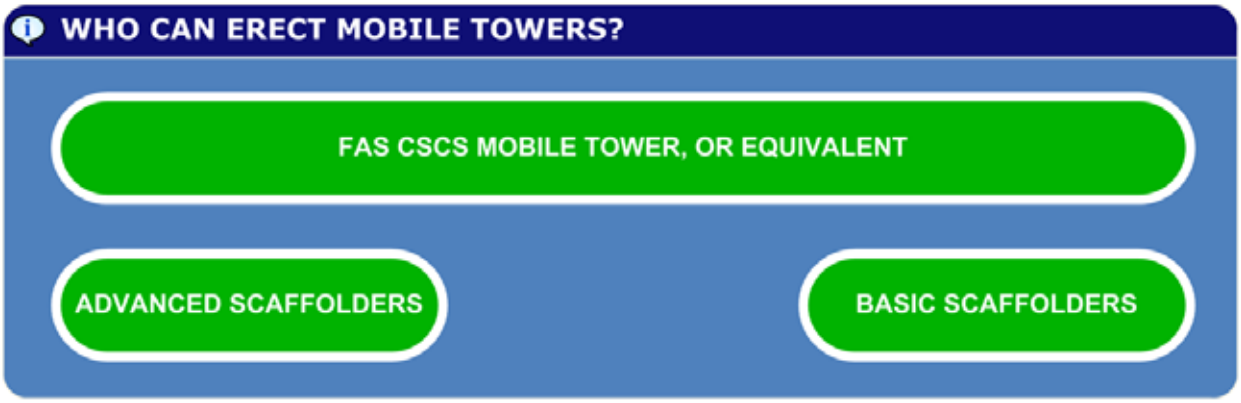
Mobile access towers should not be used adjacent to overhead power lines. Where mobile access towers are being used in the same general area as overhead

electricity lines, physical barriers and warning notices should be provided to prevent them coming close to the lines.

3.9.10. Instruction, Training and Supervision

Prefabricated towers such as aluminium alloy towers may only be erected by 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 May 2008, the Safety, Health and Welfare at Work (Construction) Regulations, 2006 require persons who erect mobile towers to have successfully completed the FÁS CSCS course for the mobile tower scaffolds, or equivalent. 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.

3.9.11. Tower Use

Vertical or horizontal forces capable of over-turning 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 from 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 WH1 *Report of results of inspections of Work Equipment for Work at a Height* should be completed before using it.

Warning notices should be placed on incomplete towers.

3.9.11.1. Prefabricated Aluminium Towers

Aluminium 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 tower will, however, be less stable than a heavier steel tower of the same dimensions.

Prefabricated towers designed and constructed in compliance with IS 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 the tower being blown over. Work on prefabricated towers should cease when wind speeds exceed 27.5km/h (7.7 m/s) unless the manufacturer's or supplier's instructions explicitly permit such work.

The manufacturer's instructions should be followed and the maximum height to base ratios should not be exceeded. The necessary stabilisers and outriggers should be correctly installed.

3.9.11.2. 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 of practice is 8.0m; mobile towers higher that this should be designed.

Towers outside are usually exposed and are therefore subject to wind forces. Frequently towers with a height to the least base dimension ratio less 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

Where a scaffold will be erected adjacent to overhead lines then precautions should be taken to prevent persons or components coming into contact with such lines or from coming close to them.

Such precautions should be based on a risk assessment, detailed in the safety statement and/or the health and safety plan and will normally include one or more of the following, in order of preference: rerouting the lines, having the power turned off, installing barriers or insulation between the scaffold and the lines.

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

3.10.2. Portable Electrical Equipment

Portable tools used in construction should operate at no more than 125 Volts A.C. 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

The erection and use of scaffolding adjacent to public streets creates hazards similar to those encountered by workers. The precautions will, however, need to be greater because of the large numbers 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.
The public should be excluded from the area around the work during erection, modification and dismantling. This may involve getting permission to close streets or footpaths while the scaffold is being erected or dismantled. Where the public can not 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. Access to the scaffold by the public should, so far as is practicable, be made difficult by the provision of 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.

3.11.1. Through Access

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

- There should be sufficient headroom;
- There should be no projections which may injure the public or their clothing;
- A sound walking surface should be provided and maintained;
- Adequate lighting should be provided.

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 prevented 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.

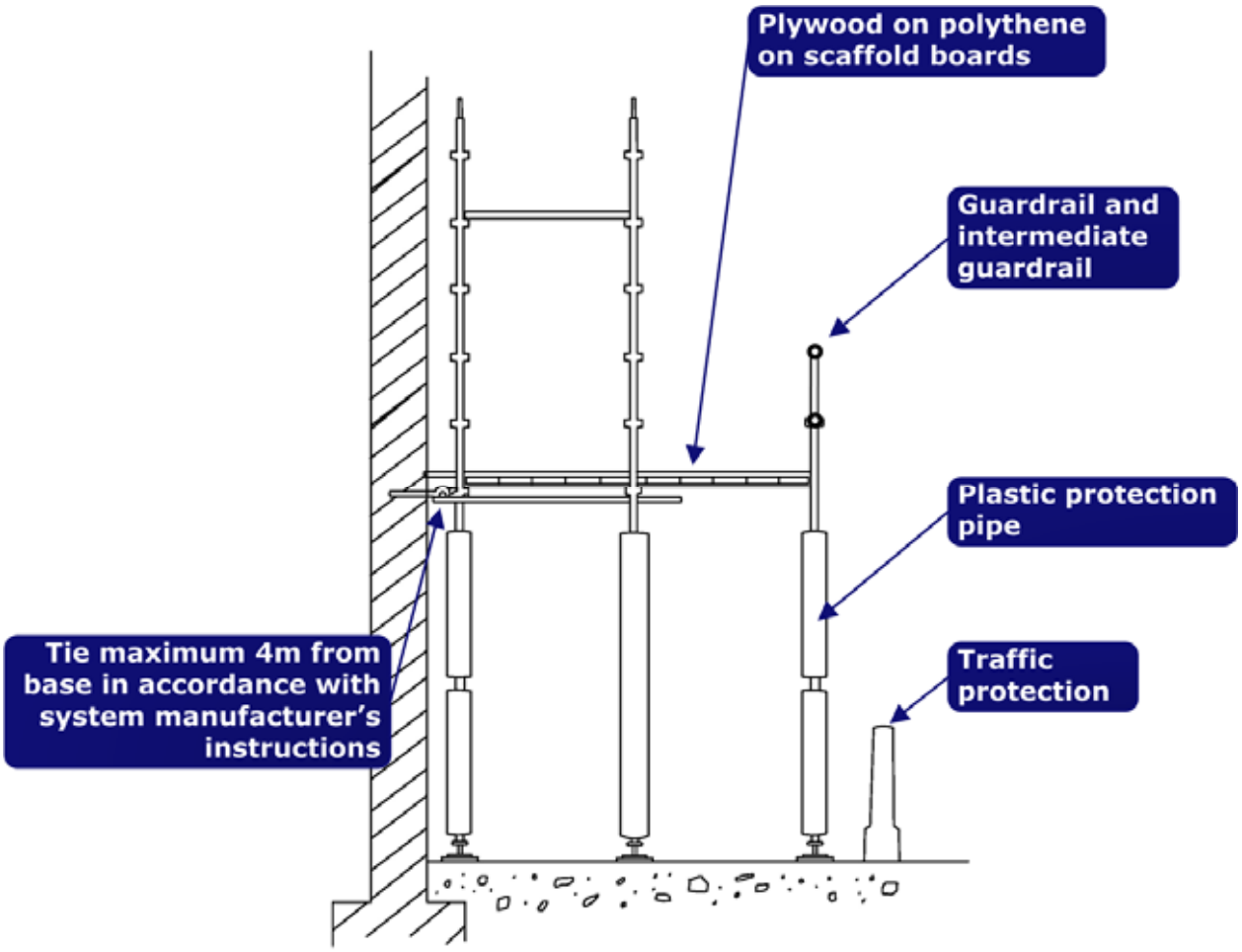


Figure 21: Example of pedestrian through-access

4. Inspection and Hand-Over

An adequate hand-over 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 hand-over procedure will include the points listed below:

- The areas of the scaffold which have been handed over should be clearly identified;
- The maximum capacity of the loading bays and working platforms and the tie spacing should be clearly stated;
- The entire area of the scaffold should be inspected 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;
- *"Scaffold incomplete"* warning notices should be removed from the finished scaffold;
- A report of the inspection should be made on Form WH1 "*Report of results of inspections of Work Equipment for Work at a Height*" and a copy of the report should be retained on site;
- The person responsible for further modifications and inspections of the scaffold should be identified.

Figure 22 (overleaf) show a flowchart, which outlines the steps that you should following when handing over the control of the scaffold to the end-user.

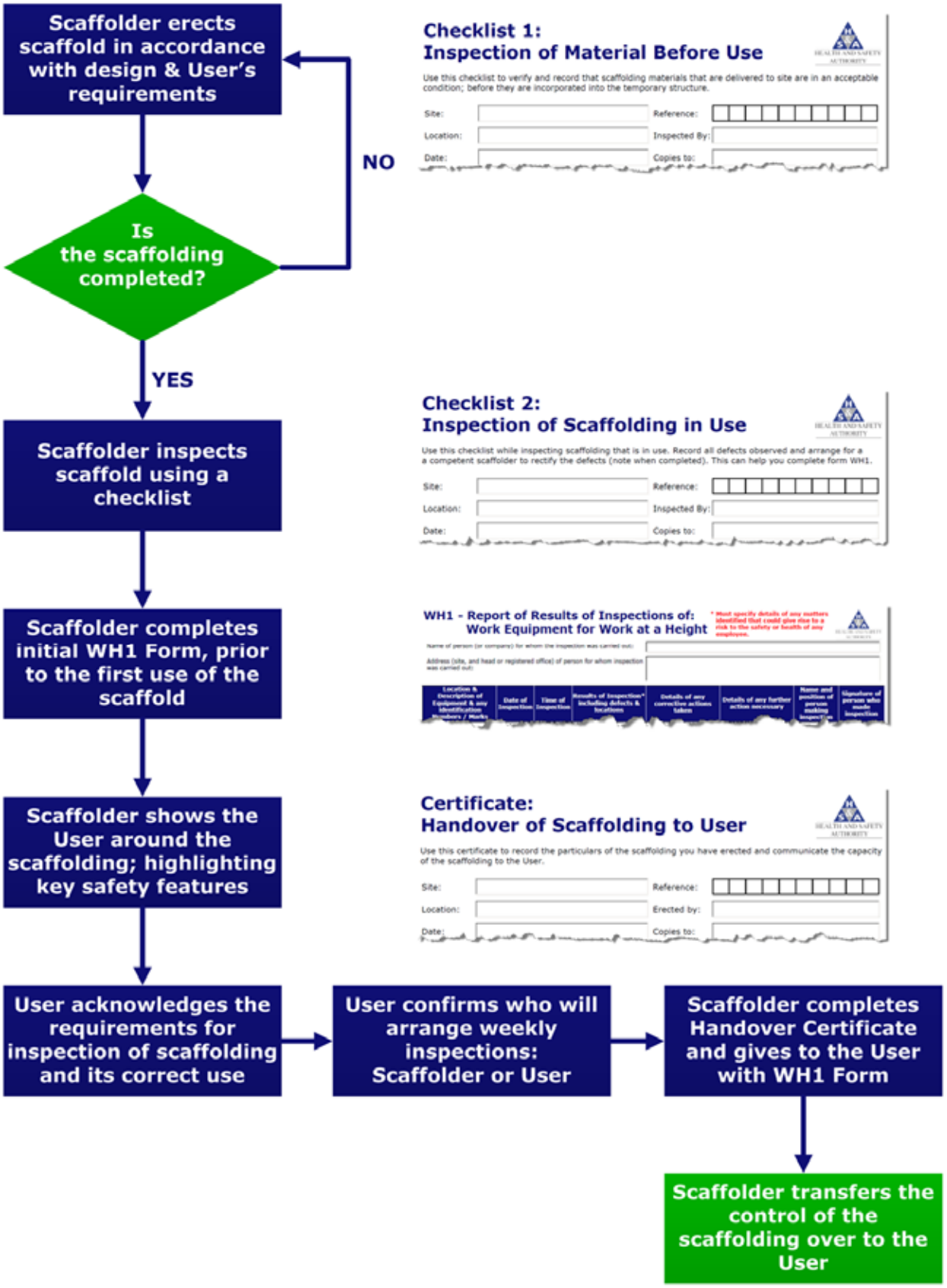


Figure 22: Handover procedure for Scaffolds

5. Use, Modification & 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 WH1 "*Report of results of inspections of Work Equipment for Work at a Height*" has been completed.

Each contractor (including sub-contractors and the self-employed) should satisfy themselves (personally or through a servant or agent) that the scaffold is stable; that the materials used in its construction are sound and that it is safe to use. Each contractor should satisfy himself that the scaffold has been inspected by a competent person and that form WH1 "*Report of results of inspections of Work Equipment for Work at a Height*" has been completed before use.

Users (including contractors and workers) 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;
- 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 2.5)

Only competent persons who have been trained and are experienced in the 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. They should be instructed in 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 2.5 Planning for Use and Maintenance.

5.4. Inspection Before and During Use

Scaffolds should be inspected before use and at least every seven 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;
- 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 form WH1 "*Report of results of inspections of Work Equipment for Work at a Height*" 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 will not become unstable, 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 23 below.

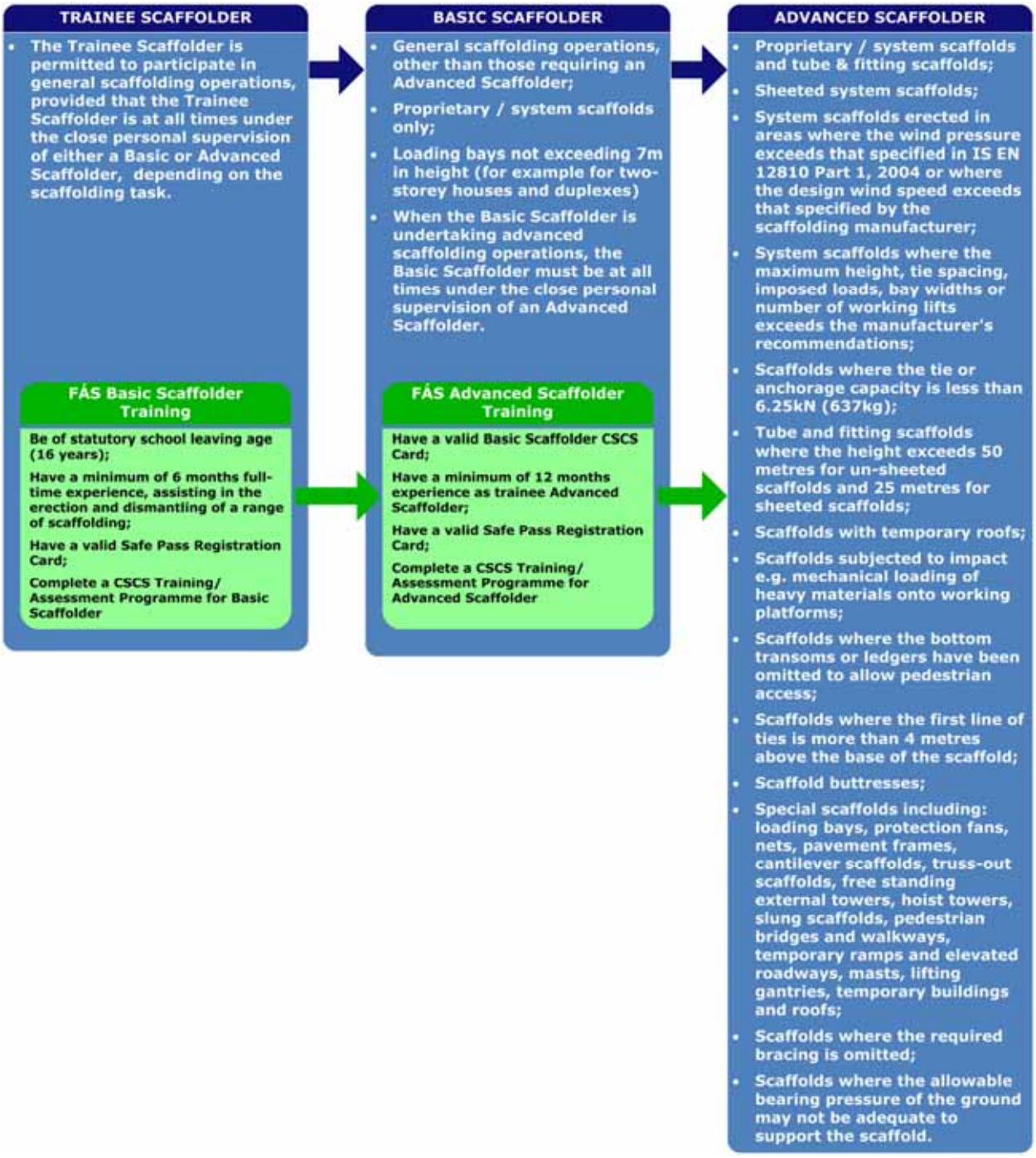


Figure 23: Achieving Competency

7.1. Competence of Scaffolders

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

- By Basic or Advanced Scaffolders trained and experienced in the kind of work; or
- By Trainee Scaffolders under the immediate supervision of a competent person (either a basic scaffolder or an advanced scaffolder, depending on the nature and complexity of the scaffold). Immediate supervision means on a one-to-one basis, where a trained scaffolder is supervising a trainee scaffolder.

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 training 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 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 have introduced a programme to assess scaffolders' competence, to issue certificates to those with the necessary skills and to keep a register of qualified scaffolders.

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 certification 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.

7.2.1. Training for Inspection

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 would be 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 induction which all persons who are likely to use the scaffold, either as access or as a working platform, should receive.

7.3.1. Contents of Induction

The induction of scaffold users should cover at least the areas listed below:

- Users should be able to recognise when a scaffold is complete, e.g. full boarding, guard- rails and toe-boards present;
- The meaning of warning signs or scaffold tagging systems in use;
- That users should not interfere or make modifications to scaffolding. Modifications may only be made by a competent person with the appropriate training and certification;

- The maximum loading capacity of the scaffold working platforms and loading towers, illustrated with specific comprehensible examples relating to the materials in use on the site;
- That users should report defects to a designated person;
- That materials should not be thrown from the scaffold;
- That users should use the designated access points and should 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, have received training and assessment and received certification. FÁS provides training courses for equipment operators and assesses, certifies and registers 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 as the materials or scaffold lay-out changes.

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 IS EN 12811 Part 1, 2005, *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 4 lists four of the six distributed load classes specified in IS EN 12811 Part 1. The requirements for concentrated and partial area loads are not included but details of these can be found in Table 3 of IS EN 12811 Part 1. Their effect for load class 4 is to reduce the span of the scaffold board and Table 4 reduces the spacing of board transoms from 1200 to 900 for load class 4.

In the absence of wind, in addition to vertical imposed loads, IS 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.

Further, references should be also made to clause 6.2.9 of IS 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 4 in this code of practice or from Table 3 in IS EN 12811 Part 1.

The following tables listed below are derived from IS EN 12811 Part 1, 2005.

Table A1: Load Classes for Access and Working Scaffolds made from Tube and Fitting Scaffolding

Load Class	Duty	Likely use of platform	Uniformly distributed load on platform (kN/m^2)	Maximum number of platforms in use, with associated UDL (kN/m^2)	Maximum bay lengths (m)	Maximum spacing board transoms (mm)	Maximum number of boards (Nr.)	Width Class
1	Inspection and very light duty	Inspection, painting, stone cleaning, light cleaning and access	0.75kN/m^2	One full (0.75) and One 50% (0.375)	2.7m	1200mm	3	W06
2	Light duty	Plastering, painting, stone cleaning, glazing and pointing.	1.50 kN/m^2	One full (1.50) and One 50% (0.75)	2.4m	1200mm	4	W09
3	General purpose	General building work including brickwork, window and mullion fixing, rendering and plastering.	2.00 kN/m^2	One full (2.00) and One 50% (1.00)	2.1m	1200mm	5	W09
3i			2.00 kN/m^2		2.1m	1200mm	4 + 1	W09
4	Heavy duty	Masonry work, concrete block work, and very heavy cladding	3.00 kN/m^2	One full (3.00) and One 50% (1.50)	1.8m	900mm	5	W09
4i			3.00 kN/m^2		1.8m	900mm	4 + 1	W09

(1) Load classes 3i and 4i have been introduced into this code of practice to identify scaffolds with one board on the inside of the inside standard.
(2) Platform units for scaffolds of load class 1 shall be capable of supporting class 2 loads.

Based on IS EN 12811 Part 1

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

Appendix B

Example Checklists

Checklist 1:
Inspection of Scaffolding Materials Before Use

HEALTH AND SAFETY AUTHORITY

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			☐	☐
Base Plates			☐	☐
Base Jacks			☐	☐
Standards			☐	☐
Ledgers			☐	☐
Transoms			☐	☐
Intermediate Transoms			☐	☐
Right Angle Couplers			☐	☐
Swivel Couplers			☐	☐
Sleeve Couplers			☐	☐
Scaffold Tube			☐	☐
Decking / Scaffold Boards			☐	☐
Diagonal Brace			☐	☐
Access Stairs / Ladders			☐	☐
Cantilever / Stage Brackets			☐	☐
Bridging Ledgers			☐	☐
Anchorage / Ties			☐	☐
Brick Guards			☐	☐
Sheeting / Netting			☐	☐
Erection & Use Instructions			☐	☐
Scaffolding Signs & Tags			☐	☐
Other Component			☐	☐

Source: Health and Safety Authority's Code of Practice for Access & Working Scaffolds (2007)

Checklist 2:
Inspection of Scaffolding in Use

HEALTH AND SAFETY AUTHORITY

Use this checklist while inspecting scaffolding that is in use. Record all defects observed and arrange for a a competent scaffolder to rectify the defects (note when completed). This can help you complete form WH1.

Site:		Reference:	
Location:		Inspected By:	
Date:		Copies to:	

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		

Source: Health and Safety Authority's Code of Practice for Access & Working Scaffolds (2007)

Certificate:
Handover of Scaffolding to User

HEALTH AND SAFETY AUTHORITY

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:		Reference:	
Location:		Erected by:	
Date:		Copies to:	

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-stnadard bays in kg/m^2)	
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 WH1 Form (attached)	☐

You must: (tick to confirm you uderstand)	
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 WH1 form)	☐

Signed: Scaffolding Erector; or Scaffolding Company		Signed: Scaffolding User; or Contractor	

Source: Health and Safety Authority's Code of Practice for Access & Working Scaffolds (2007)

Appendix C

Form WH1 Report of results of inspections of Work Equipment for Work at a Height

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

WH1 - 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.**

HEALTH AND SAFETY AUTHORITY

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

WH1 - Report of Results of Inspections of: Work Equipment for Work at a Height

NOTES

HEALTH AND SAFETY AUTHORITY

This form may be used to assist in compliance with the Safety Health and Welfare at Work (Work at Height) Regulations 2006 Regulation 11 – Inspection of Work Equipment of 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. Other equivalent forms may also be used. This form does not substitute for reports of thorough examination of lifting equipment that may be required under other statutory provisions.

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.

Appendix D

Weights of Typical Building Materials

Mass of Scaffolding Materials

The following tables have been derived from BS 5973, 1993 and IS EN 12811, with reference to NASC TG20:05.

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, 63mm thick } 225mm wide	6kg/m or 25kg/m^2 8kg/m or 33kg/m^2 10kg/m or 41kg/m^2

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

Based on BS 5973, 1993

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^2
Ladders and fixings	8kg/m
500 bricks	1,375kg
500 concrete bricks (15N/mm^2)	1,750kg
50 concrete blocks (100x215x440, 5N/mm^2)	1,020kg
Timber (softwood)	500kg/m^3 to 650kg/m^3
180 litres of water or liquids in containers	200kg
Packaged flooring tiles, ceramic tiles, roofing tiles, slates	1,600kg/m^3

Based on BS 5973, 1993

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. Guardrails 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 unboarded 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

Based on BS 5973, 1993

Table D5: Additional weight of a boarded lift (with imposed service load) one bay long

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

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^2	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

Based on BS 5973, 1993

Appendix E

Information Sources

Statutory Provisions

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 (General Application) Regulations, 2007

Irish Standards

www.nsai.ie

• IS EN 39, 2001:	Loose steel tubes for tube and coupler scaffolds – technical delivery conditions
• IS EN 74-1, 2005:	Couplers, spigot pins and baseplates for use in falsework and scaffolds – Part 1: couplers for tubes – requirements and test procedures
• IS EN 354, 2002	Personal protective equipment against falls from a height. Lanyards
• IS EN 355, 2002	Personal protective equipment against falls from a height. Energy absorbers
• IS 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
• IS EN 361, 2002	Personal protective equipment against falls from a height. Full body harnesses
• IS EN 362, 2005	Personal protective equipment against falls from a height. Connectors
• IS EN 363, 2002	Personal protective equipment against falls from a height. Fall arrest systems
• IS EN 364, 1993	Personal protective equipment against falls from a height. Test methods

• IS EN 365, 2006	Personal protective equipment against falls from a height. General requirements for instructions for use, maintenance, periodic examination, repair, marking and packaging
• IS 745, 1986:	Machine-graded home grown timber scaffold boards
• IS EN 1065, 1999	Adjustable telescopic steel props. Product specifications, design and assessment by calculation and tests
• IS EN 1263 Part 1, 2002	Safety nets – Part 1: Safety requirements, test methods
• IS EN 1263 Part 2, 2002	Safety nets – Part 2: Safety requirements for the positioning limits
• IS EN 10210 Parts 1 & 2, 2006	Hot finished structural hollow sections of non-alloy and fine grain steels
• IS EN 12385 Parts 1 & 2, 2002	Steel wire ropes. Safety. General requirements
• IS EN 12810 Part 1, 2004:	Façade scaffolds made of prefabricated components - Part 1:Products specifications
• IS EN 12810 Part 2, 2004:	Façade scaffolds made of prefabricated components – Part 2: Particular methods of structural design
• IS EN 12811 Part 1, 2004:	Temporary works equipment - scaffolds – performance requirements and general design
• IS EN 12811 Part 2, 2004:	Temporary Works Equipment Part 2 – Information on Materials
• IS EN 12811 Part 3, 2003:	Temporary Works Equipment Part 3 – Load Testing
• IS EN 12812, 2004:	Falsework - Performance requirements and general design

British Standards

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 5268	Structural use of timber
• 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

- 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 Safety in Roofwork
- Safe Use of Work Platform / Trestles - Information Sheet

Health and Safety Executive (UK) Guidance

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

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

Building Research Establishment (UK)

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

- “Wind forces on unclad tubular”, Constructional Steel Research and Development Organisation, 1975. Constrado ; publication 1/75