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Code of practice for the planning, design, setting up and use of temporary suspended access equipment

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Foreword

Publishing information

This British Standard is published by BSI and came into effect on 31 March 2010. It was prepared by Subcommittee B/514/39, *Suspended access equipment*, under the authority of Technical Committee B/514, *Access and support equipment*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 5974:1990, which is withdrawn.

Information about this document

This is a full revision of the standard, and introduces changes as a result of the following.

- Changes in legislation, in particular the introduction of the Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 [1].
- Advances in technology.

Use of this document

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

The word "should" is used to express recommendations of this standard. The word "may" is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word "can" is used to express possibility, e.g. a consequence of an action or an event.

Notes and commentaries are provided throughout the text of this standard. Notes give references and additional information that are important but do not form part of the recommendations. Commentaries give background information.

WARNING This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Attention is drawn to:

The Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 [1];

The Health and Safety at Work etc. Act 1974 [2];

The Provision and Use of Work Equipment Regulations (PUWER) 1998 [3];

The Management of Health and Safety at Work Regulations 1999 [4];

The Construction (Design and Management) Regulations 2007 [5];

The Work at Height Regulations 2005 [6];

The Machinery Directive (2006/42/EC) [7];

The Manual Handling Operations Regulations 1992 [8];

The Workplace (Health, Safety and Welfare) Regulations 1992 [9];

The Shipbuilding and Ship-repairing Regulations 1960 [10];

The Supply of Machinery (Safety) Regulations 1992 [11];

The Personal Protective Equipment Regulations 2002 [12].

Introduction

Temporarily suspended access equipment (TSAE) is used to support or contain workers working at height on engineering and construction sites. This British Standard gives guidance and recommendations to enable TSAE to be installed (erected, altered and dismantled), maintained, examined and used in a safe manner. It also sets out the responsibilities of all parties involved with those activities.

NOTE Attention is drawn to the Machinery Directive [7].

TSAE can be a working platform or platforms, work cage or chair suspended from a suspension rig which would be assembled at the place of work, used to carry out specific tasks, and then dismantled and removed from the place of work when the specific tasks are completed to be used elsewhere.

The equipment referred to in this Code of Practice is typically suspended from steel wire ropes that are attached to the outriggers of a suspension rig or other suitable high-level anchor point. It is capable of being raised or lowered by means of a winch or climbing device that can be attached either to the working platform(s), work cage or chair or be incorporated into the suspension rig. The lifting appliance or appliances can be manually or power operated. In certain instances, the TSAE can be incorporated into a system that allows it to be traversed horizontally.

1 Scope

This code of practice makes recommendations for the selection, design, installation, inspection, use and maintenance of temporarily installed suspended access equipment/systems (TSAE), as defined in BS EN 1808. Non-standard installations are covered by this code.

Steeplejacks and steeplejack operations are not covered in this standard.

This British Standard does not cover permanently installed suspended access equipment, that equipment is covered by BS 6037-1.

Requirements for slung scaffolds, being working platforms on scaffold tubes or wire ropes but which cannot be raised or lowered by the user, are contained in BS EN 12811-1.

NOTE BS EN 1808 specifies the design and construction requirements relating to the safety of suspended access equipment and is a harmonized standard supporting the provisions of the Machinery Directive [7]. BS EN 1808 is not retrospective and therefore does not relate to equipment manufactured before its introduction in 1999.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 4293, *Specification for residual current-operated circuit-breakers*

BS 4444, *Guide to electrical earth monitoring and protective conductor proving*

BS 5268-2, *Structural use of timber – Part 2: Code of practice for permissible stress design, materials and workmanship*

BS 6399-2, *Loading for buildings – Part 2: Code of practice for wind loads*

BS 7375, *Code of practice for distribution of electricity on construction and building sites*

BS 7671, *Requirements for electrical installations – IEE Wiring Regulations – Seventeenth edition*

BS 7883, *Code of practice for the design, selection, installation, use and maintenance of anchor devices conforming to BS EN 795*

BS EN 74-1, *Couplers, spigot pins and baseplates for use in falsework and scaffolds – Part 1: Couplers for tubes – Requirements and test procedures*

BS EN 795, *Protection against falls from a height – Anchor devices – Requirements and testing*

BS EN 1808:1999, *Safety requirements on suspended access equipment – Design calculations, stability criteria, construction – Tests*

BS EN 12811-1, *Temporary works equipment – Part 1: Scaffolds – Performance requirements and general design*

BS EN 60309-2, *Plugs, socket-outlets and couplers for industrial purposes – Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories*

BS EN 60529:1992+A2:2000, *Specification for degrees of protection provided by enclosures (IP code)*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN 1808 and the following apply.

3.1 aerial transfer
changing or the repositioning of a suspension system whilst the platform remains suspended

3.2 bay
section of a platform between any two adjacent suspension points

3.3 building
completed building, building under construction, engineering construction or any works or face serviced by the TSAE

3.4 cantilever
length of the outrigger which extends unsupported

*NOTE 1 See also **3.16** and **3.25**.*

NOTE 2 This length usually exceeds the portion of the suspension rig projecting beyond the building/structures façade.

3.5 climbing device
lifting appliance, manually or power operated, through which the suspension rope passes, controlled either by a friction gripping device or by turns of the steel wire rope around drum/s within the appliance

NOTE 1 In the case of a device using a friction gripping system, the lower end of the wire rope is not anchored to the climbing device.

NOTE 2 For the design and manufacture of climbing devices, see BS EN 1808.

3.6 competent person (thorough examination)
person who has practical and theoretical knowledge and experience of the TSAE which enables them to detect defects or weaknesses and to assess their importance in relation to the safety and continued use of the TSAE

3.7 counterweight
weight or series of weights to counterbalance the overturning forces on the suspension rig and provide the required factor of safety

NOTE This usually comprises the self-weight of the inboard portion of the suspension rig plus added kentledge.

3.8 demonstrator
person trained (and authorized by the supplier-appointed person) to demonstrate the controls and functions of the TSAE to trained operators

3.9 double wire rope suspension system
suspension system which has two ropes at each end of an independent platform or platform, or at each end and the hinge positions of a continuous platform, each carrying a portion of the total suspended load

3.10 factor of safety against overturning
coefficient by which the maximum overturning moment of the TSAE is multiplied to ensure safety against overturning, being the ratio of the righting moments to the maximum overturning moment

3.11 fulcrum point
point of pivoting nearest to the outboard edge of the suspension rig about which the balancing moments of the suspension rig are calculated

3.12 functional testing
operation of each motion of the TSAE without load applied in order to determine whether the equipment performs as the manufacturer intended

3.13 hinged continuous working platform
working platform comprising several sections joined together with a hinge arrangement enabling the user(s) to walk from one section to another

3.14 inboard portion of the suspension rig (tail back)
portion of the suspension rig which is on the inboard side of the fulcrum point

*NOTE See also **3.4** and **3.25**.*

3.15 installer
person, authorized by the supplier-appointed person, responsible for the installation, modification, relocation, and dismantling of TSAE

3.16 jockey block/beam trolley
wheeled block for suspending a platform below a track and incorporating anchor points for the suspension system and connection points for tie bars and traversing systems

3.17 lever arms
distances between the fulcrum point and the centre of gravity of all components, including the self-weight of the components of the suspension rig

NOTE These lengths are shorter than the whole length of the inboard or the outboard portion of the suspension rig.

3.18 lifting gear
chains, ropes, slings, rings, hooks, shackles, girder clamps, swivels, eyebolts, girder runners, beam trolleys and similar devices

NOTE For examples, see LOLER 1998 [1].

3.19 method statement
document produced by the appointed person to describe how the installation or operation is to be carried out

3.20 minimum breaking load of rope
minimum value reached in a tensile test before destruction

NOTE Wire ropes are marked with their guaranteed load by the manufacturer.

3.21 mobile suspension rig
suspension rig which is capable of horizontal movement, usually mounted on wheels or casters

3.22 non-destructive testing/examination
testing carried out on the structure of the TSAE equipment to establish the presence, location and extent of any defects that might affect the integrity of that structure

NOTE The techniques employed for non-destructive testing are such that they do not damage or alter the material under test.

3.23 operator
trained person, authorized by the user-appointed person, who operates the TSAE controls during its intended use and ensures that it is carried out in accordance with the appointed person's safe system of work

3.24 outboard portion of the suspension rig (outreach)
portion of the suspension rig which is on the outboard side the fulcrum point

*NOTE See also **3.4** and **3.16**.*

3.25 outrigger
portion of the suspension rig which projects beyond the fulcrum point

3.26 overspeed safety device
mechanical device for stopping the platform and holding it stationary on a secondary rope, in the case of overspeeding

3.27 overspeeding
travelling at a speed above the rated speed

3.28 person(s) in control of the premises
person(s) with control over the management of the premises and responsibility for the health and safety of all operations under their control

3.29 platform
rigid decked unit with toe boards, guardrails and attachment points for either climbing devices or suspension wire ropes

3.30 platform-mounted winch
winch mounted on the platform with the free end of the suspension rope attached to the suspension rig

3.31 projection length
distance between the fulcrum point and the suspension point

*NOTE 1 See also **3.25**.*

NOTE 2 This length is greater than the distance from the vertical part of the suspension rope to the building.

NOTE 3 The projection length is the length which is to be used in the calculation of moments for stability.

3.32 rated load (RL)
maximum load allowed on the working platform(s) or bay, work cage, platform or suspended chair during use

NOTE The rated load is also affected by distribution of people/equipment on the platform.

3.33 rated speed
maximum designed travel speed of the platform

3.34 roof-mounted winchwinch
which is mounted to the suspension rig or roof trolley with the free end of the suspension rope attached to the platform, work cage or chair

3.35 secondary rope (safety rope)
rope not normally carrying the weight of the platform but rigged in conjunction with a safety device to come into operation in the event of a failure of the suspension rope(s)

3.36 secondary safety device
device or devices, acting on a separate safety wire rope, which arrest and sustain a TSAE in the event of the failure of a suspension rope

3.37 single wire rope suspension system
suspension system which has one suspension rope carrying the TSL, or a portion thereof, at each end of an independent platform or platform, or at each end and the hinge positions of a continuous platform

3.38 static rig
suspension rig which is assembled at roof level or such other appropriate point and requires to be dismantled and re-assembled when the TSAE needs to be re-positioned

3.39 stop end (stop quandrant)
attachment used at or near the end of a rail or track, or at an intermediate point, to prevent further traversing of the platform

3.40 straight hire (bare lease)
hire of equipment only, without any assembly or installation

3.41 supplier organization
entity, corporate body or individual manufacturing or supplying the TSAE to the user organization

3.42 supplier-appointed person
person appointed by the supplier organization with the training, practical and theoretical knowledge and experience needed to act on behalf of the TSAE supplier and has control of the specification of the TSAE, the planning and execution of the installation, modification, maintenance and dismantling of the TSAE

3.43 suspended chair
appliance suitable for one person to use to carry out their tasks whilst in a sitting position

3.44 suspension gear
assembly of lifting appliances/accessories, which joins the working platform to the suspension rig

3.45 suspension rig
portion of the equipment (excluding any track) mounted above the working position, to support and position the TSAE

3.46 suspension ropes
rope carrying the weight of the TSAE and the imposed loads thereon

3.47 temporary suspended platform (TSP)
suspended access equipment installed on a building or structure for specific task(s) and dismantled and removed from site on completion of the work for which they were installed

3.48 thorough examination
examination by a competent person (thorough examination) in such depth and detail as the competent person (thorough examination) considers necessary to enable them to determine whether the equipment being examined is safe to continue in use

NOTE The thorough examination is not part of the maintenance regime for the equipment but provides owners with information which could be used to determine the effectiveness of the regime. The competent person (thorough examination) might require supplementary tests as part of thorough examination.

3.49 total suspended load (TSL)
maximum calculated force which can be imposed on the suspension rig, including the RL on the platform, the self-weight of the platform and the suspension and secondary safety wire ropes, together with any portion of means of suspension system extra forces resulting from the operation of the equipment and environmental loads

3.50 track
rail or rails which are installed to support and guide the jockey block/beam trolley or a mobile suspension rig

3.51 traversing
moving laterally across the face of the building either manually or power operated

3.52 traversing rope
rope rigged for the purpose of traversing the platform horizontally along a track system and not carrying any of the suspended load

3.53 user
person, company or organization which uses the TSAE to carry out the tasks that the TSAE was intended for

3.54 user organization
entity, corporate body or individual that procures the TSAE for its intended operation

NOTE This can be the principal contractor on a construction site, the site management on an industrial site, a building facilities management company, the owner or landlord of a building, or a sub-contractor of any of these.

3.55 user-appointed person
person appointed by the user with the training, practical and theoretical knowledge and experience needed to act on behalf of the user organization and have control of the management of the operation of the TSAE

3.56 winch
lifting appliance, manually or power operated, used to raise or lower the platform, work cage or suspended chair by means of a suspension rope reeled onto a drum

3.57 work cage
working platform which is suspended from one suspension system

3.58 working load limit (WLL)
maximum load which a piece of equipment is authorized to sustain as designed by the manufacturer and specified by the manufacturer

3.59 working platform (WP)
suspended equipment from which the operator(s) works, including work cages and suspended chairs

4 Identifying hazards

*COMMENTARY ON CLAUSE **4***
BS EN 1808 specifies the design and construction requirements relating to the safety of suspended access equipment and is a harmonized standard supporting the provisions of the Machinery Directive [7]. BS EN 1808 is not retrospective and therefore does not relate to equipment manufactured before its introduction in 1999.

Attention is also drawn to the CDM 2007 [5] mentioning that a risk assessment is carried out. A list of potential hazards and hazardous situations identified (by risk assessments) as being significant for suspended access equipment is given in BS EN 1808.

4.1 Installation, use and maintenance

A method statement should be prepared by the supplier organization covering the design, installation, use and dismantling of the TSAE [see **7.1**a)]. The method statement should include the findings of the risk assessment and the measures required to control or eliminate risk.

NOTE The appointed person can delegate the task of preparing the method statement to another person; however, they retain responsibility for the method statement.

The method statement should be signed and dated by the user- and supplier-appointed persons before it is issued for use to signify approval of the method statement contents. All operators should be made aware

of the findings of the risk assessment by the supplier organization and given adequate training prior to operating the TSAE.

A system should be put in place to cover all planned installation, use, inspection and maintenance of the TSAE.

4.2 Pre-installation

Before the TSAE is installed, site-specific hazards and hazardous situations should be identified and the actions required to eliminate or reduce the associated risks should be incorporated in the risk assessment.

NOTE Attention is drawn to the Management of Health and Safety at Work Regulations 1999 [4].

4.3 Hazards associated with operation of TSAE

Some hazards associated with operation of TSAE that should be considered include:

a) hazards arising from unauthorized modifications, alterations or additions to the TSAE;

b) hazards from inappropriate loading of the TSAE, e.g. eccentric loading, unsecured loading, point loading, loads protruding outside the confines of the carrier;

c) hazards from access or egress from the TSAE, at positions or routes other than intended;

d) moving parts of the TSAE which could strike a person or in which they could become trapped or entangled;

e) moving parts of the TSAE which could trap a person between the TSAE and a fixed obstruction such as the building or a piece of scaffolding;

f) uncontrolled ascent or descent of the TSAE;

g) hazards arising from failure to operate, maintain or inspect the TSAE in accordance with the manufacturer's instructions;

h) environmental hazards such as low lighting levels, extremes of temperature, rain and wind;

i) hazardous situations arising from other work being carried out in the vicinity;

j) injury to others from falling objects;

k) persons stranded on the TSAE;

l) damage to power cables;

m) unauthorized use of the TSAE.

5 Planning and exchange of information

5.1 General

The installation, operation, maintenance, modification and dismantling of TSAE installation should be properly planned, appropriately supervised and carried out in a safe manner.

The configuration of the suspended access equipment should be based on advice and guidance prepared by a competent person who has knowledge of the various types of system available.

The dimensions and characteristics of suspended access equipment should be appropriate for the nature of the task(s) to be performed.

The general details should be settled by detailed site investigation and agreement between the hirer and the supplier organization.

Persons involved in the planning and exchange of information can include:

- client/building owner (or their representative);
- user-appointed person;
- equipment manufacturer;
- supplier-appointed person;
- architect or designer (or their representative(s));
- structural engineer;
- CDM co-ordinator;
- principal contractor;
- local authority.

NOTE 1 The prime responsibility for ensuring that access for building maintenance is safe lies with the user organization.

NOTE 2 Persons involved in the planning and exchange of information can vary from one installation to another and can include persons not mentioned in the list, which is therefore not exhaustive.

Using the list of potential hazards drawn up from **4.2** and **4.3**, the persons exchanging information should agree steps which should be taken to minimize the likelihood and effect of these hazards.

5.2 Organizational arrangements

The user organization has overall responsibility for the management of the installation including operation and maintenance and any modification and the eventual dismantling of the TSAE; the user organization could be the principal contractor on a construction site, the site management on an industrial site or office building or a subcontractor; persons not directly employed by the user organization might be authorized to use the TSAE. The user organization should include details of all expected trades and activities in the information provided to the supplier organization.

*NOTE 1 A specialist hire company usually supplies the TSAE. The safe installation, modification and dismantling of TSAE needs the input of specialist knowledge and experience from the TSAE supplier, together with knowledge of the site and intended use of the TSAE. It might be useful (in order to ensure clear lines of communication) for the two principal organizations to each appoint one person, the "user-appointed person" and the "supplier-appointed person", respectively, with the responsibilities defined in **6.2** and **6.3**.*

NOTE 2 It is recognized that the user-appointed person might need to draw upon the experience, expertise and knowledge of the supplier-appointed person to assist them in the fulfilment of their responsibilities.

Regular effective liaison should be maintained between the supplier and the user at all times.

NOTE 3 This is particularly vital during the selection and planning of the TSAE installation, when detailed site-specific information and preparation of the site is required. It is also important with large projects and non-standard configurations of equipment.

Where appropriate, the appointed persons can delegate tasks to other person(s), taking into account the ability, competence and authority of the person(s) concerned.

NOTE 4 This does not relieve the appointed persons of their responsibility for ensuring that these tasks are completed effectively.

5.3 Exchange of information

5.3.1 Information for the supplier organization

The user organization should advise the supplier organization of the TSAE on such matters as:

a) the location and purpose(s) for which the TSAE is to be used, including the load and number of persons;

b) the parts of the building which are to be accessed by the equipment;

c) the allowable loads which might be imposed on the building by the TSAE;

d) any special requirements as set out by the local authority and the requirements of any local bylaws that apply;

e) the wind loading for which the building is designed and any other relevant environmental factors;

f) any items identified in the health and safety file as being necessary to fulfil the requirements of CDM 2007 [5];

g) any special hazards (e.g. working over water, roads or public areas);

h) any special building features (e.g. flagpoles, CCTV cameras, mobile phone and communication aerials and dishes, boiler flues, adjacent buildings, illuminated signs, chiller units, cooling towers);

i) any special requirements (e.g. independent hoisting for glazing/cladding installation/replacement);

j) the safe means of access/egress to the TSAE.

The user organization should also provide building plans and other relevant information to enable the manufacturer or supplier organization to select the most appropriate equipment.

5.3.2 Information for the user organization

The TSAE supplier organization should provide the user organization with the following information.

a) The type and RL of the c and the number of systems;

NOTE The use of manual hoisting equipment is not recommended where the operating height exceeds 15 m.

b) Dimensions and clearances necessary for the installation and operation of the TSAE;

c) The maximum and minimum distances between the building façade and the suspended platform;

d) The maximum static and dynamic loads that the equipment will impose on the building;

e) The requirements for anchoring the TSAE to the building;

f) Electrical power supply requirements and the preferred location of power supply points;

g) Period of time required for design calculations, the preparation and approval of relevant drawings;

h) The procedure for the delivery and installation of the equipment;

i) A sample checklist for use in the inspection schedules.

The information provided to the user organization should be compiled for each site and for each hire, as the information might vary from one installation to another; each set of information might therefore include items not mentioned in this list, which should not be assumed to be exhaustive.

6 Responsibilities

6.1 Responsibilities of the user organization

The user organization should ensure that:

a) any necessary planning permission or wayleave is agreed and all control measures are in place before TSAE is erected;

b) a responsible and experienced company supplies equipment which is fit for the intended use;

c) a risk assessment is carried out prior to work commencing;

d) only trained and experienced staff use TSAE in accordance with a previously agreed method statement.

6.2 Responsibilities of the user-appointed person

The user-appointed person should act on behalf of the user organization and should have control of the management of the operation of the TSAE.

This appointment does not remove any legal responsibility from the management of the user organization but enables them to use this person's expertise to better fulfil their responsibilities. The person appointed can have other duties and need not be an employee of the user organization, but should have such training, knowledge of theory and experience to enable these duties to be carried out competently (see Table 1).

The user-appointed person should, as a minimum:

a) identify the user organization's requirements, including TSAE type, RL, height of travel, platform length and configuration, types of work to be completed from the TSAE, length of time for which the installation is required and frequency of use;

b) identify the access and egress positions and the methods to be used for loading and unloading the materials and tools;

c) identify the TSAE location(s);

d) specify the most appropriate TSAE and select a suitable TSAE supplier;

e) identify the organization(s) that will be using the TSAE;

f) identify the person(s) who will be operating the TSAE;

g) assess competency and identify the training needs of the operator(s) and arrange for the provision of any necessary additional training;

h) plan the TSAE installation including pre-installation activities;

i) ensure that:

   1) the supplier organization nominates the supplier-appointed person;

   2) site surveys are carried out;

   3) planning is carried out for installation, modification and dismantling of the TSAE and its removal from the site;

   4) pre-installation activities are undertaken in a timely manner (including, delivery and unloading the TSAE, provision of power, provision of safe access);

   5) only trained and experienced staff erect and use the TSAE in accordance with a previously agreed method statement.

j) arrange for thorough examination (including testing as appropriate) to be carried out before the TSAE is put into use for the first time and ensure the competence of those undertaking this task;

k) ensure that the supplier organization performs the hand-over to the user organization, demonstrates the TSAE to the nominated operator(s) and supplies information for its safe use;

l) carry out day-to-day management of the TSAE operation including emergency procedures;

m) arrange for maintenance, inspection and in-service thorough examinations of the TSAE installation and ensure the competence of those undertaking these tasks;

n) manage any modifications of the TSAE installation or changes of use;

o) review the dismantling plan with the supplier-appointed person;

p) collaborate with the supplier-appointed person to draw up a safe system of work for the installation, modification and dismantling of the TSAE;

q) in collaboration with the supplier-appointed person, draw up a safe system of work for the operation, inspection, thorough examination and maintenance of the TSAE.

6.3 Responsibilities of the supplier-appointed person

The supplier-appointed person should have control of the contracted technical details of the TSAE (as agreed with the user), the planning and execution of the installation, modification, maintenance and dismantling of the TSAE.

This appointment does not remove any legal responsibility from the management of the TSAE supplier but enables them to use their expertise to better fulfil their responsibilities. The person appointed can have other duties and need not be an employee of the TSAE supplier but should have such training, theoretical knowledge and experience as to enable these duties to be carried out competently. See also Table 1.

In consultation with the user-appointed person, the supplier-appointed person should (at least):

a) identify the user organization's requirements, including TSAE type, RL, height of travel, platform width, types of work to be completed, length of time for which the installation is required and frequency of use;

b) identify the methods to be used for loading and unloading the TSAE and tools;

c) identify the TSAE location(s);

d) specify the appropriate TSAE;

e) identify the organization(s) that will be using the TSAE;

f) identify the person(s) who will be operating the TSAE;

g) assess competency and identify the training needs of the installers and arrange for the provision of any additional training as necessary;

h) carry out site surveys;

i) supply all necessary technical information to the user-appointed person, e.g. power requirements;

j) plan the installation of the TSAE including pre-installation activities;

k) plan the installation, modification and dismantling of the TSAE and its removal from the site;

l) work with the user-appointed person to ensure that the pre-installation activities are undertaken in a timely manner (including site preparation, delivery and unloading of the TSAE, provision of power and safe access);

m) ascertain from the user-appointed person who will conduct the thorough examination (including testing as appropriate) before the TSAE is put into use for the first time;

n) ensure that the hand-over to the user organization is carried out, including the supply of information for safe use, including inspection and maintenance requirements, and demonstration to nominated operator(s);

o) supply information on emergency procedures to the user-appointed person;

p) remind the user-appointed person of the need to ensure that maintenance, inspections and in-service thorough examinations of the TSAE installation are carried out;

q) ascertain from the user-appointed person who will carry out maintenance, inspection and in-service thorough examination of the TSAE installation;

r) ascertain from the user-appointed person the requirements for any modifications of the TSAE installation or changes of use of the TSAE;

s) review the plans for dismantling and conduct a site survey before the start of dismantling;

t) draw up a safe system of work for the installation, modification and dismantling of the TSAE, in collaboration with the user-appointed person.

6.4 Duties of the supplier of the TSAE

The supplier of the TSAE should ensure that:

a) all equipment supplied is fit for use;

b) a risk assessment is carried out prior to work commencing (see Clause **4**);

c) only trained and experienced staff install TSAE in accordance with the method statement and risk assessment (see Clause **4**);

d) if required, a person is appointed to act as the supplier-appointed person.

6.5 Duties of the user organization's employees

To ensure the correct and safe use of TSAE, the user and all persons under their control should:

a) acquaint themselves and their employees with the safety apparatus and systems that have been installed and be fully aware of the procedures for use and ensure that any person using the equipment is similarly instructed;

b) only carry out work from a TSAE with persons who are competent in the use of the equipment and have been instructed in the correct operation of the equipment and its safety devices;

c) recognize that TSAE is designed for specific loads and to be operated in the manner specified by the supplier organization and cannot perform correctly and might be dangerous if it is overloaded or operated incorrectly;

d) not disconnect safety devices or prevent from working for any reason; if, in the case of a system using a 3-phase power supply, the winches/climbing devices operate in the reverse direction to that stated on the control buttons the platform should be taken out of service until a qualified person rectifies the "phase reversal" situation;

e) only carry out the work for which the TSAE was installed;

f) ensure that the TSAE is thoroughly examined following installation, significant alteration, after exceptional circumstances and periodically whilst in service by a competent person;

g) inspect the equipment before each use and at least every week with a permanent record kept of these inspections;

h) ensure that the supplier-appointed person is consulted over any intended changes in operating conditions/use of the TSAE that could affect the safety of the installation;

i) inspect, or arrange for a competent person (thorough examination) to inspect on their behalf, every unit of the equipment to see that it has been maintained in a serviceable condition;

j) ensure that all the necessary notices with regard to the working load limit (WLL) have been fixed in place at the time of installation and subsequently, each day, before operation is commenced;

k) carry out "pre-use" inspections, inspect the equipment, including the suspension rig, whenever they start to use the system, to ensure that it is "as erected" and has not been interfered with in any way; at sites where unauthorized interference might occur additional inspections might be necessary;

l) ensure that safe access and egress is available for operatives;

m) keep the equipment clean and, in particular, wash it down if aggressive chemicals have been used and clean it from paint or other materials that might cause persons to slip or fall;

n) ensure that only persons willing and confident to work at heights work in a TSAE; no person liable to attacks of vertigo, epilepsy or having any physical or mental problem that might affect that person's safety or that of others should attempt to work on a TSAE (see Table 1);

o) monitor wind speeds and ensure that when winds give rise to unsatisfactory working conditions, all work from the TSAE is stopped until the wind subsides; the user should see that the necessary precautions are taken;

NOTE 1 In strong winds, the TSAE and its suspension and secondary safety wire ropes could cause damage to the building or structure it is serving; necessary precautions to prevent such damage can include use of fenders or tie wires or struts.

p) cease working on a TSAE when there is a risk of lightning; the structure/components of TSAE can not usually be connected to the permanent lightning conductor system of the building or structure it is serving and therefore, if the equipment is struck by lightning, the operatives might be at risk;

q) tie the TSAE to the building in such a manner that it cannot sway and create a hazard, both during and between periods of work where specified in the supplier organization's method statement;

r) ensure that the TSAE including any hanging tackle and electrical gear is out of reach and the power supply is isolated when the platform is left unattended at night; specific instructions should be given to the users to carry out this operation;

s) ensure that the persons using the TSAE do not attempt to put right any malfunction or suspected defect themselves, but should communicate with the supplier organization/installer of the equipment (or persons authorized by the supplier organization/installer) for technical assistance;

t) arrange the electrical power supply so that the electrical power cannot be switched on or off except by authorized persons;

u) refrain from reckless or careless actions and from creating any circumstances that might result in a hazard and should pay particular attention to projecting features on the building that could impede the movement of the platform;

v) ensure that no materials other than those for which the equipment is designed are stored on the temporary suspended platform (TSP); a TSAE should not be used as a means of transferring workpeople from place to place as a primary function;

w) ensure that one of the trained TSAE operators is designated as responsible for supervising the raising, lowering or travelling operations and no movement should be started by any person without reference to that person;

x) not attach supplementary lifting tackle to the TSAE for the purpose of raising or lowering materials to and from it or to and from any other part of the building or structure unless the TSAE has been designed for such operations;

y) when it has served its purpose and needs to be moved along to another portion of the face of the building (or to another face), instruct the supplier organization to carry out the move, unless the user organization is specifically authorized in writing to move the TSAE, and has personnel who have been trained and assessed as competent and available to complete the work; mobile suspension rigs should not be moved while workpeople are on the TSAE, unless the system is specifically designed to allow this operation;

z) ensure that all operatives on the TSAE wear personal protective equipment, including clothing identified in the risk assessment;

aa) ensure suitable fire extinguishers are attached to or carried on the platform when a TSAE is being used for operations in close proximity to heat sources such as gas burning, metal cutting equipment and/or welding equipment;

bb) put special precautions in place when electric arc welding and/or cutting is being carried out from a TSAE to prevent stray welding currents being carried by suspension and safety ropes which could impair their strength or cause their fracture; such ropes should be insulated from the structure and the metalwork of the TSAE; the minimum length of suspension rope needed should be exposed to such contact and all excess rope stored in an insulated container on the platform.

cc) provide each operator with a personal safety system when secondary wire ropes are not provided; this should comprise a suitable safety line of appropriate length that should be securely fastened to a safe anchorage point on the building, safety harness and rope grab. The system should be:

1) independent of the support structure;

2) independent of the platform itself;

3) positioned at all times at a level higher than the place of work.

NOTE 2 The selection of a suitable harness or line and its position can be a matter for specialist advice, refer, for example, to BS EN 361 for harnesses.

dd) ensure that suitable warning notices and protection are placed below working areas where appropriate;

ee) designate a responsible person and be able to summon help in cases of emergency; an emergency procedure should be drawn up and all users briefed and trained on the contents (in some circumstances this might require that an additional person is in attendance at all times in order to provide or summon assistance if needed).

Table 1 **Personnel description and tasks**

Job title/function	Duties and responsibilities	Attributes
User appointed person	See **5.2**	a) Minimum 2 years relevant experience. b) Basic mechanical and electrical awareness. c) Working knowledge of the principles and practice of health and safety legislation. d) Awareness of personal responsibilities under the law (civil and criminal) for their own safety and that of others. e) Awareness of all other activities on the site. f) Ability to exercise the authority given to them to fulfil their responsibilities. g) Thorough knowledge of the specific site conditions.
Supplier appointed person	See **5.3**	a) Minimum 2 years relevant experience. b) Physically capable of carrying out all aspects of the work and to undertake site survey. c) Basic mechanical and electrical awareness. d) Working knowledge of the principles and practice of health and safety legislation. e) Awareness of personal responsibilities (under the law civil and criminal) for their own safety and that of others. f) Knowledge of the TSAE and the TSAE manufacturer's manual. g) Understanding of basic mechanical and electrical parameters of the TSAE installation.

Table 1 **Personnel description and tasks** *(continued)*

Job title/function	Duties and responsibilities	Attributes
Installer	a) To communicate effectively with both the supplier appointed person and the user appointed person before and during the task to be carried out. b) To understand the manufacturer and model specific TSAE configuration parameters. c) To become familiar with the site and the task to be carried out using the method statement provided by the supplier appointed person. d) To install and to dismantle the TSAE or TSAEs safely according to the manufacturer's instructions and the site specific method statement. e) To carry out thorough visual inspections. f) To operate the TSAE.	a) Physically capable of carrying out all aspects of the work, particularly with regard to eyesight (corrected if necessary), hearing (corrected if necessary) and reflexes, to operate the TSAE safely and able to judge distances, heights and clearances. b) Basic mechanical and electrical awareness. c) Basic health and safety awareness. d) Awareness of personal responsibilities under the law (civil and criminal) for their own safety and that of others. e) Ability to work confidently and safely at heights using appropriate fall protection equipment and other personal protection equipment. f) Ability to estimate or establish weights. g) Knowledge of slinging and signalling and the selection and safe use of the appropriate lifting gear. h) Knowledge and practical experience of the installation, alteration and dismantling of the particular TSAE and the setting and testing of all safety devices. i) Thorough knowledge of all components and safety systems on the TSAE.
Demonstrator	a) To communicate effectively with both the supplier appointed person and the user appointed person before and after the task to be carried out. b) To demonstrate (to trained operators only) the following: 1) the controls and functions of the TSAE; 2) the emergency lowering procedures on the TSAE. c) To explain all the safety and emergency systems on the TSAE; d) To provide information and/or explanation on the daily pre use checks and weekly inspections to the competent person (thorough examination) nominated to carry them out.	a) Physically capable of carrying out all aspects of the work, particularly with regard to eyesight (corrected if necessary), hearing (corrected if necessary) and reflexes, to operate the TSAE safely and able to judge distances, heights and clearances. b) Basic mechanical and electrical awareness. c) Awareness of personal responsibilities under law (civil and criminal) for their own safety and that of others. d) Ability to work confidently and safely at heights. e) Ability to convey information in a comprehensible manner. f) Knowledge of the TSAE and of the TSAE manufacturer's manual. g) Practical experience of the normal and emergency operation of the TSAE types being demonstrated.

Table 1 **Personnel description and tasks** *(continued)*

Job title/function	Duties and responsibilities	Attributes
Operator	a) To communicate effectively with both the supplier appointed person and the user appointed person before and during the task to be carried out. b) To operate the TSAE correctly in accordance with the manufacturer's instructions and with regard to the site conditions. c) To carry out daily pre use checks.	a) Physically capable of carrying out all aspects of the work, particularly with regard to eyesight (corrected if necessary), hearing (corrected if necessary) and reflexes, to operate the TSAE safely and able to judge distances, heights and clearances. b) Basic health and safety awareness. c) Awareness of personal responsibilities under the law (civil and criminal) for their own safety and that of others. d) Ability to work confidently and safely at heights. e) Training in the operation of the type of TSAE being operated and a working knowledge of the use of the emergency release procedures for passenger carrying TSAEs. f) Knowledge of the TSAE and its safety systems.
Competent person (thorough examination) carrying out thorough examination	a) To communicate effectively with both the supplier appointed person and the user appointed person before and during the task to be carried out. b) To carry out thorough examinations of the TSAE. c) To report on the findings of the thorough examinations.	a) Physically capable of carrying out all aspects of the work, particularly with regard to eyesight (corrected if necessary), hearing (corrected if necessary) and reflexes. b) Working knowledge of the principles and practice of health and safety legislation. c) Awareness of personal responsibilities under law (civil and criminal), for their own safety and that of others. d) Practical experience of working on sites. e) Ability to work confidently and safely at heights using appropriate fall protection equipment and other personal protection equipment. f) Knowledge of the principles and practice of carrying out thorough examinations (including testing) in accordance with the requirements of LOLER 1998 [1]. g) Sufficient theoretical knowledge and practical experience regarding the TSAE to enable him to detect defects or weaknesses and to assess their importance in relation to the safety of the TSAE and its fitness for continued use.

7 Health and safety

7.1 Safe systems of work

Following completion of a risk assessment (see **4.4**, **6.1** and **6.4**):

- the supplier-appointed person, in collaboration with the user-appointed person, should draw up a safe system of work for the installation, modification, and dismantling of the TSAE;
- the user-appointed person, in collaboration with the supplier-appointed person, should draw up a safe system of work for the operation, inspection, thorough examination and maintenance of the TSAE.

Safe systems of work can be established for an individual TSAE or for a group of TSAEs. The safe systems of work might also include contributions from other people, including the providers of scaffolding, lifting equipment, and means of access, foundations and power. These contributions should be collated by the supplier-appointed person and the user-appointed person to produce the relevant safe systems of work and should be recorded in a series of documented method statements.

The safe systems of work should include:

a) method statements for the installation, modification, dismantling, operation and maintenance of the TSAE installation;

b) procedures for ensuring that the supporting structure can accommodate the loads applied by the TSAE;

c) procedures for ensuring that the entry and egress points are suitably designed, constructed and maintained;

d) procedures for ensuring that the TSAE installers have been trained and assessed for competence;

e) procedures for ensuring that the TSAE is serviceable;

f) procedures for ensuring that the TSAE operators have been assessed for competence, and provided with familiarization or training as appropriate;

g) plans for loading and unloading materials, equipment and tools to and from the TSAE;

h) procedures for rescuing persons trapped in the TSAE at height;

i) procedures for the inspection and maintenance of the TSAE in accordance with the supplier organization's instructions;

j) procedures for provision of adequate supervision of the TSAE installation, modification, operation and dismantling by properly trained, competent and authorized personnel;

k) procedures to prevent unauthorized operation of TSAE at all times;

l) procedures for ensuring the safety of all persons not involved in TSAE operation;

m) arrangements for the effective monitoring of wind speed;

n) procedures for ensuring that appropriate information is effectively communicated to all parties concerned;

o) procedures for ensuring that a thorough examination of the TSAE is carried out before first use;

p) procedures for ensuring that all necessary instructions, manuals, thorough examination reports, other relevant documents, and warning and information signs are provided;

q) procedures for handover of the TSAE to the user-appointed person;

r) procedures for ensuring that all personnel involved have been made aware of their statutory duties;

s) procedures for ensuring that third parties and excluded from the working area, and for reducing the risk of falling objects;

t) procedures for ensuring that personnel involved with in any way with the TSAE are not under the influence of alcohol or drugs.

NOTE 1 These procedures can form part of the principal contractor's site health and safety plan and attention is also drawn to the responsibilities of contractors in CDM 2007 [5].

NOTE 2 Attention is also drawn to the requirements of the Manual Handling Operations Regulations 1992 [8] and the Workplace (Health, Safety and Welfare) Regulations 1992 [9].

NOTE 3 Attention is drawn to the sections in the Management of Health and Safety at Work Regulations 1999 [4] concerning the duty holder or their representative ensuring that all operators are equipped with and use any personal protective equipment (PPE) necessary when carrying out their work.

NOTE 4 Attention is drawn to the Personal Protective Equipment Regulations 2002 [12].

7.2 Safe access and egress

NOTE 1 Attention is drawn to CDM 2007 [5] and the Management of Health and Safety at Work Regulations 1999 [4].

All operatives should be provided with and made aware of a safe means of access and egress to and from all areas of a building where maintenance or other work is to be carried out. Where determined as necessary by the risk assessment, anchor devices conforming to BS EN 795 should be installed in accordance with BS 7883.

The user organization should therefore ensure that a designated route to and from all parts of the suspended access equipment and the areas of the building it is designed to access is provided for the following persons.

a) TSAE installers.

b) Persons carrying out examinations, inspections and maintenance of the TSAE.

c) TSAE users.

NOTE 2 It is likely that the TSAE installers and persons carrying out examinations, inspections and maintenance of the TSAE will need to gain access to and egress from more areas of the building than the users of the TSAE.

8 Types of temporary suspended access equipment (TSAE)

8.1 Suspension rigs

8.1.1 Classes

Suspension rigs should be considered as falling into two classes.

a) Those which rely on counterweights for their stability.

b) Those which are structurally attached to the roof or other part of the building or structure.

NOTE Either type can be fixed or traversing. The two methods of attachment can occasionally be combined.

When caster wheels are incorporated into the design of a mobile suspension rig, a means should be provided to ensure that the wheels cannot leave the running surface.

8.1.2 Proprietary modular suspension rigs

There are several modular suspension rig systems on the market which are designed to be easily assembled in various configurations. They usually consist of jib sections made of two sizes of rectangular hollow section (RHS). The sizes of RHS used are such that the smaller section will slide into the larger section to give a form of "telescopic" adjustment to the length of a jib assembly. The jib system is usually complete with an end attachment to allow the suspension and secondary safety wire ropes to be attached to the outboard portion of the jib, and a "tail end" adaptation point for the attachment of the counterweight. Some proprietary systems also incorporate adaptation points for frames with castor wheels to be attached to provide horizontal movement to the jib assembly, thus forming a mobile suspension rig.

8.1.3 Scaffold tube static and mobile rigs

Standard scaffold tubes and couplers should be used in accordance with their safe working loads. Critical tension joints in tubes should be lapped with the appropriate number of couplings in accordance with BS EN 12811-1. The coefficient of friction of a steel tube on any other surface is low, so that the tendency of a tube to slip over its seating should be countered by means of lacing and bracing with other tubes and fittings. A competent person should properly design the spans and cantilevers of scaffold tube rigs and provide the drawings, sketches and calculations. Aluminium scaffold tube can also be used to form the suspension rig, but should not be mixed with steel components (see **9.2.2**).

8.1.4 Suspension systems incorporating other structural sections

The use of joists or other structural sections for outriggers might be necessary where heavy loads are to be carried. Such systems should be designed by a person qualified as a competent person (thorough examination) and drawings/sketches and calculations provided.

8.1.5 Steel wire rope rigs

Suspension rigs which use steel wire ropes as major structural elements of that system should be designed by a competent person. Assembly drawings/sketches on which the loads carried by the wire rope components should be indicated.

8.1.6 Suspension systems for travelling platforms where there are two or more platforms on the same track

Such systems should be specifically designed by a competent person for the project they are to be installed on. The design should accommodate the situation where two platforms might be working "side by side" on one section of track. Drawings/sketches and calculations should be provided by the competent person.

8.1.7 Non-standard designs

It is not possible to give an example of every access problem that could be encountered by roof or façade design/construction. Where special suspension rigs are required, a competent person should carry out the design of the suspension rig in accordance with the requirements of good structural engineering practice. Drawings/sketches and calculations should be provided by the competent person.

8.2 Temporary suspended platforms (TSPs)

8.2.1 General

The designer should ensure that all working platforms (WPs):

a) are designed to be of sufficient dimensions to permit the safe passage of persons and the safe use of any plant or materials required to be used and to provide a safe working area having regard to the work being carried out there;

b) be so constructed that the floor of the WP has no gap:

   1) through which a person could fall;

   2) through which material or objects could fall and injure a person; (see BS EN 1808, preventing the passage of a sphere of 15 mm diameter);

   3) giving rise to other risk of injury to any person, unless measures have been taken to protect persons against such risks (e.g. protection fans and exclusion zones below the workplace).

c) be so installed, used and maintained in such condition as to prevent:

   1) the risk of slipping or tripping;

   2) any person being caught between the working platform and any adjacent structure.

The dimensions of a standard WP should be in accordance with BS EN 1808. In certain circumstances and where a risk assessment has been carried out beforehand dimensions might have to be changed to suit the requirements of a particular job.

All primary suspension point connections should be bolted and not pinned.

End units can be attached which project the WP beyond the end point of support; these cantilever units should be limited in length to that allowed by the manufacturer and to that which will not overload the suspension rig outriggers carrying the weight.

Provision can be made for adding additional decks one below the other, but should be only when the load ratings are adjusted and such installations are so designed.

NOTE The inner guardrail and toe board can be removed when the platform is fixed to the building and the building itself forms a barrier at that level.

At the request of the user a protective covering can be fixed to the platform (this can consist of a single vertical sheet on the outside of the platform or a hood over the top or both); the increased wind forces that will result from the provision of such a covering should be taken into account.

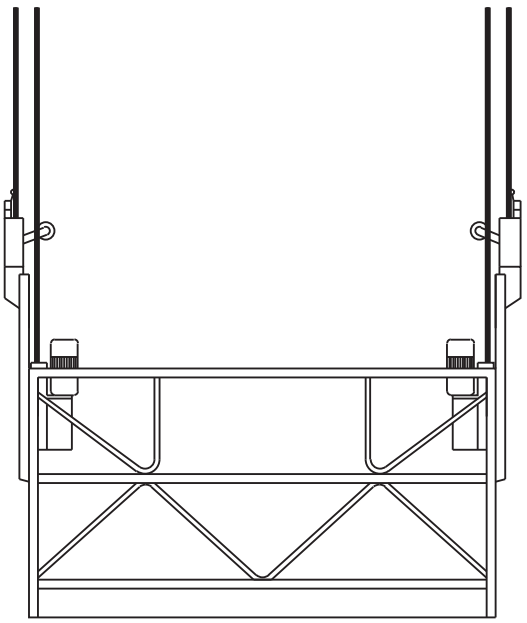
8.2.2 Types of platform

NOTE 1 Attention is drawn to the Shipbuilding and Ship-repairing Regulations 1960 [10] for TSAE intended for use in shipyards.

NOTE 2 Special safety precautions are required for platforms suspended from steel wire ropes in the construction of metal structures where electric arc welding and cutting is employed.

There are several types of platform, each suitable for different access purposes. Figure 1, Figure 2 and Figure 3 illustrate some platforms not shown in BS EN 1808.

Figure 1 **Individual platforms, single tiered platform**

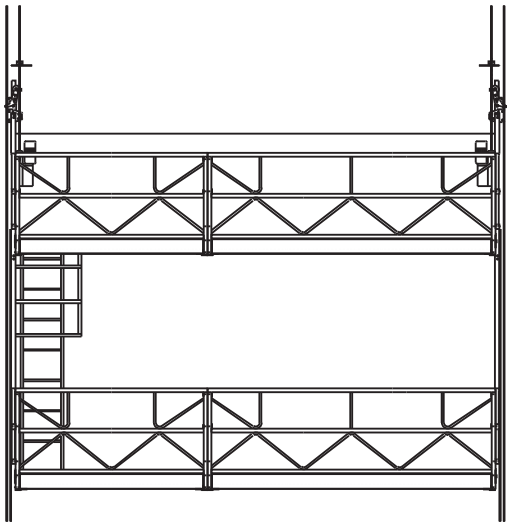


NOTE These are single rigid-deck WPs. The number of suspension systems used depends on the design of the platform. They can be fabricated in separate sections that are not hinged together but are assembled rigidly to form one structure.

All platform types can be manually or power operated, but the use of manual TSAE is not recommended where the operating height exceeds 15 m.

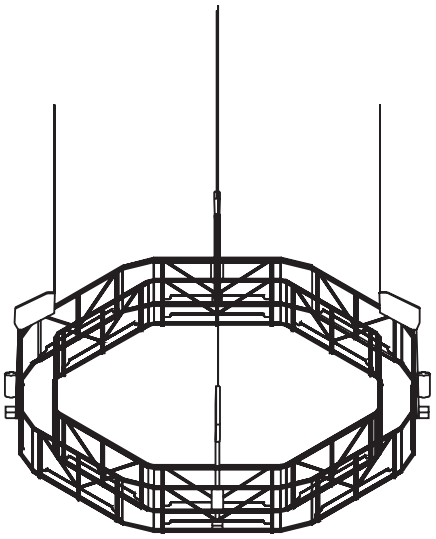
Platforms can be further divided into those having roof-mounted winches or climbing devices and those having platform-mounted winches or climbing devices.

Figure 2 **Multideck rigid platform**



NOTE These WPs have more than one deck beneath each other. The number of suspension systems used depends on the design of the platform.

Figure 3 **Multipoint suspension platform, annular/faceted platform**



NOTE These can be circular, square, internal or external.

9 Materials and component selection

9.1 General

All materials and components used in the assembly of TSAE should satisfy the requirements of the relevant Standards.

Systems made up of equipment/components designed, supplied and taken into service prior to the existence of harmonized standards should be in accordance with the British Standards in force at the time of the equipment's manufacture and this standard, BS 5974:2010. The standards used should be detailed in a risk analysis for the specific installation.

If no standards exist, the materials should be of sound construction, adequate for the purpose for which they are intended and their details also included in the risk analysis of the installation.

All parts of the equipment should be capable of being erected, operated/used, dismantled and re-erected in a safe manner.

9.2 Scaffold tubes and fittings

9.2.1 Steel

When steel scaffold tube and fittings are used as component parts of a suspension rig and/or the supporting structure of a suspension rig, then these should be checked to have been manufactured in accordance with the relevant standard. Precautions should be taken against rust staining of the building when this is of consequence (e.g. by applying plastic caps to the tube ends).

9.2.2 Aluminium

Aluminium scaffold tube and other aluminium sections can be used in WPs and suspension rigs; aluminium scaffold tube should not be mixed with steel scaffold tube in the same suspension rig or WP, owing to the difference in its strength and deflection under load, unless specific design calculations have been carried out and the details recorded.

Only fittings suitable for aluminium tube should be used.

9.2.3 Scaffold couplers

Scaffold couplers should be used at a factor of safety of not less than 2.

9.3 Steel wire ropes

Steel wire suspension and safety ropes, when used with winches and/or rope climbing devices, should be of the diameter, specification and construction specified by the winch/climbing device manufacturer/supplier. Such wire rope should be of good quality and should be replaced when damaged only by ropes of the same specification. Wire ropes should be free from significant defects arising from previous use or any other causes (i.e. site damage, mishandling, incorrect storage or corrosion due to the environment the rope has previously worked in).

Wire ropes should have an identification number and working load limit marked thereon.

*NOTE Wire ropes are subject to inspection and registration in accordance with LOLER 1998 [1]. For safety factors, see **9.7**.*

9.4 Traverse ropes

9.4.1 Use of traverse ropes

Traverse ropes are intended to move TSAE horizontally; traverse ropes should not be used for anchoring or restraining the TSAE, unless the designer of the TSAE system has included this use in a method statement.

9.4.2 Natural fibre ropes

Natural fibre ropes can be used for the traversing lines of a TSAE; they should be of adequate strength to sustain the load applied by the user when traversing is undertaken.

Natural fibre ropes should not be used where they might subject to attack from aggressive chemicals; man-made fibre ropes are more suitable for this type of environment.

Heat sources can also cause embrittlement in natural fibre ropes and this should be borne in mind when selecting ropes.

9.4.3 Man-made fibre ropes

Appropriate man-made fibre ropes can be used for the traversing lines of a TSAE; they should be of adequate strength to sustain the load applied by the user when traversing is undertaken.

NOTE Man-made fibre ropes have a lower fire performance than natural fibre ropes and care needs to be taken when selecting ropes that might come into contact with any heat source, including lighting.

9.5 Traversing track

Traversing track should be constructed to a design and from materials in accordance with harmonized European or British Standards.

9.6 Lifting gear, appliances and devices

9.6.1 General

Lifting gear and all associated appliances and devices should be in good order, properly maintained and subjected to registration and inspection.

NOTE Attention is drawn to LOLER 1998 [1].

9.6.2 Steel wire ropes

Each suspension and safety rope should have a coefficient of utilization of not less than 8 based on the WLL of the winch or climbing device. Wire rope terminations should be suitable for their purpose and should have a strength of not less than 80% of the minimum breaking load of the rope. Any free rope ends should be finished to prevent un-laying.

9.6.3 Stop end fitting (climbing device)

The end of a suspension rope that passes through a climbing device but does not reach the ground should be suitably terminated to prevent the end of the rope passing completely through the gripping mechanism of the climbing device.

9.6.4 Stop end fitting (drum winch)

The end of a suspension rope feeding into a drum winch should be secured to the drum of the winch in the manner specified by the manufacturer. The rope should also have at least three full turns left on the drum when the platform is at its lowest level.

9.6.5 Counterweights

Counterweights can be of any suitable material capable of being fixed to the inboard portion of the suspension rig in a manner that does not permit accidental displacement or displacement without appropriate tools. Materials which might be susceptible to site damage or deterioration should not be used.

Weights should have carrying handles and not exceed 25 kg in mass.

9.6.6 Pulleys

When wire ropes pass over pulleys or round drums in winches/climbing devices, these pulleys or drums should have a pitch circle diameter as stated in BS EN 1808. Guide pulleys which work under load but are external to the winch or climbing device should have a pitch circle diameter as stated in BS EN 1808. Reverse bending around pulleys and/or drums at close centres should be avoided wherever possible.

9.6.7 Safety ropes

Steel wire ropes as specified by the manufacturer of the secondary safety device should be fitted on all TSAE except where:

a) the TSAE is supported on two independent suspension wire ropes at each end of a single platform or at each hinge of a continuous platform such that, in the event of the failure of one suspension rope, the other rope is capable of sustaining the total suspended load of the platform;

b) the introduction of a secondary safety wire rope would introduce overriding safety hazards.

The secondary safety rope should have a separate anchorage point from that of its associated suspension rope.

9.6.8 Alternative safety arrangements

A safety wire rope system should be used, but if this is not possible, the following safety precautions should be taken.

a) Where the suspension wire rope is anchored to the suspension rig it should be supplemented by a second short length of wire rope attached to the suspension wire rope and separately anchored to the suspension rig, bypassing the suspension wire rope attachment.

b) An automatic safety device mounted on the suspension wire rope above the winch or lifting device should be fitted with a short length of wire rope attached to a separate anchor point on the platform bypassing the winch or lifting device.

c) An independent safety anchor line, suitable fall arrest harness and lanyard should be provided for each occupant of the platform. The safety lines should be secured to separate anchor points.

d) The by-pass ropes referred to in **9.6.8**a) and **9.6.8**b) should be as taut as practicable in order to reduce the dynamic loads imposed on the system should they be required to come into operation. Their design and installation should be appropriate to the particular equipment in use.

Any single rope suspension system should incorporate a primary safety device that would act on the suspension rope in case of failure of the TSAE/winch mechanism. In addition, all operatives using the suspended platform should each have a dedicated independent safety line system.

9.6.9 Winches and climbing devices

Power driven winches/climbing devices should incorporate a mechanical means of manual operation for use in the event of power failure.

Winches which are directly driven by a petrol or diesel engine should not be used on TSAE. Manual, hydraulic, pneumatic and electrically operated climbing devices/winches are admissible. Mechanical speed changing devices should not be fitted and the TSAE should be both raised and lowered under power. Where the TSAE platform has to have an internal combustion engine sited on it for other purposes, special precautions should be taken (e.g. against fire, hot surfaces, fumes and so on).

9.7 Proprietary components and equipment

Proprietary equipment should be of good and sound construction and suitable for repeated use for the purpose and period for which it is intended. Characteristics should be adequately described in data sheets from the supplier-organization.

9.8 Other materials

Where other materials are used, they should conform to the appropriate European or British Standard. Where no Standard exists, special attention should be given to the quality, strength and durability of the materials having regard for the duty cycle and environment in which the materials might be expected to work. Timber should be used in accordance with the recommendations of BS 5268-2 according to the grade of materials used in the structure.

10 Righting and overturning moments

10.1 Overturning moments

The maximum overturning moment should be calculated from the summation of the moment about the fulcrum point of the working

load limit at its projection length and the moment about the fulcrum point of the self-weight of the outboard portion of the suspension rig acting at its centre of gravity.

10.2 Righting moments

10.2.1 Counterweighted suspension rigs

For suspension rigs depending for their stability on weight only, the righting moment should be calculated using the method in Annex A.

NOTE The minimum factor of safety against overturning to be used when calculating the amount of counterweight needed for the system is three.

10.2.2 Structurally attached suspension rigs

The righting moment of suspension rigs which depend for their stability on bolted or other structural fixings of the inboard section of the suspension rig to the building should be calculated from the summation of the moments of self-weight of the inboard portion of the suspension rig acting at its centre of gravity and the lesser of the ultimate limits of the structural fixings or their anchoring substrate, acting at their lever arms.

When structural/roof fixings are relied upon as the sole means of achieving stability, they should be capable of providing a factor of safety of three against uplift forces generated by the WLL of the winch or climbing device. Where a roof is insufficiently strong to provide this factor of safety, the holding down ability of the roof should be assessed and counterweights added to provide an overall factor of safety of three against overturning.

Roof fixing systems should be designed according to the allowable stresses appropriate to the materials used.

10.3 Methods of achieving stability

*COMMENTARY ON **10.3** and **10.4**.*
These subclauses describe the means of ensuring stability. Annex A shows the worked example of a stability calculation.

Where counterweights are used to provide stability or when any mass of the structure is relied upon to contribute to the stability, the counterweights or mass should be firmly attached to the suspension rig in such a manner that they cannot become accidentally dislodged. At sites where unauthorized interference might occur, additional special precautions should be taken to ensure that the weights are secure. Where it is proposed to provide some part of the restraining force by the use of roof fixings, the combined factor of safety should still be at least three.

Where spreaders or pads are inserted to distribute the load that acts on a roof or parapet, the pad material should be such that a proper distribution of the load is achieved and that the pad is protected from deterioration due to exposure or being dislodged and to minimize damage to the roof membrane.

10.4 Lateral stability

In addition to having adequate stability against overturning the suspension rig, outriggers and any traversing track should have sufficient lateral strength or be adequately braced against lateral sway parallel to the face of the building. The forces producing lateral sway are wind forces, surge and braking forces on the traversing lines. Wind forces should be estimated for the maximum exposed out position of the equipment and guidance should be obtained from BS EN 1808 and BS 6399-2.

11 Design criteria of the TSAE and installation

11.1 General

Once the purpose and performance of the TSAE have been established, the structural design and assembly of the components (i.e. a temporary suspension rig and platform installation) should be chosen to conform to the manufacturer's instructions in the case of proprietary systems or to a recognized structural design standard.

All TSAE systems should be erected to either standard design solutions or to drawings prepared specifically for the system being erected by a competent design engineer. All anchoring forces/counterweights and the permitted RL of the TSAE should be indicated on the drawings together with the expected loads imposed on the building/structure.

In all cases, the WLL of the winch/climbing device should be used to calculate the overturning moment and the magnitude of the counterweight or the strength of the mechanical anchorage required.

BS EN 1808 should be consulted for the permissible loads to be used on the decking of the platform itself.

The assembly of the suspension rig should be designed with the factors of safety normally applied to the individual components that are covered by BS EN 1808 (i.e. permitted deflections under load and permissible stresses allowed for the material being used). No component in the system should be required to sustain a load greater than that recommended by the manufacturer.

NOTE 1 Factors of safety (coefficients of utilization) for the various components of TSAE are to be found in BS EN 1808.

NOTE 2 For equipment designed, manufactured and taken into service prior to BS EN 1808, refer to the manufacturer's specification.

11.2 Maximum total suspended load

Whatever the arrangement of the suspension system, its suspension rope, its pulley system or its track assembly, the maximum total suspended load should be the maximum load at the top of the system which could apply an overturning moment to the assembly or a direct pull on the suspension rig. The maximum suspended load/rope tension should be taken as the WLL of the winch/TSAE and modified where necessary to take into account any pulleys used in the system with the following additions.

a) The weight of any travelling track, trolleys and suspension gear.

b) The additional loads which might result from the difference in spacing of the outriggers from the spacing of the suspension ropes which might occur in travelling systems and fixed jib systems.

c) The increased loads derived from two suspension ropes/trolleys from two TSAEs suspended together under one outrigger. This situation can be avoided by the fitting of intermediate travel stops on a trolley track and/or mounting two outriggers above them, each with its own counterweight system.

The suspension system above a trolley track need not be designed to take into account the redistribution of loads due to the continuity of the travelling track beams.

11.3 Grouping of loads at one end of the platform or bay

In the case of an individual platform with the suspension points at the ends, the design of all parts of the installation should take account of the possible grouping of the persons using the platform at one end. In the case of a platform with the suspension points sited inboard of the ends of the platform, account should be taken of the possible grouping of persons using the bay of the platform beyond the suspension point. It should be recognized that persons could be either adjacent to a point of suspension, centred outside this point or on the extreme end of the cantilevered end extension of the platform.

11.4 Rope tension

The rope tension calculated from the loading conditions stated in a) to c) determines the capacity/WLL of the lifting device/winch to be used in the assembly of the TSAE. The selection of the lifting device/winch should be based on the summation of the following.

a) That portion of the self-weight of the TSAE and any lifting appliance attached to it acting on the suspension rope plus the self-weight of any suspension rope hanging below its suspension point. It should also include the self weight of any wire rope reelers, power supply cable and any other ancillary attached to the platform.

b) The maximum load resulting in the suspension rope from the approved number of operatives and associated imposed loads grouped together or adjacent to it or in a cantilevered portion of the deck of the TSAE.

c) The allowance for dynamic loads resulting from the operation of the lifting device/winch as recommended by the manufacturer but with the minimum factor as stated in BS EN 1808. The criteria given in a) and b) should also be used when determining the requirements of the secondary safety rope.

Under no circumstances should the secondary safety wire rope be of a smaller diameter and WLL than that of the main suspension rope.

11.5 Suspension ropes reeved through pulleys

Where a suspension rope is reeved through a pulley(s), the calculation of the rope tension should take into account the cumulative friction losses arising from the rope reeving system. The calculation should

also take into consideration the number of falls of rope in the reeving system and the location of the lifting device/winch that could be on the TSAE, on the roof or on the ground.

11.6 Design criteria for modular suspension rigs

11.6.1 General

The supplier of a modular suspension rig system should have a data sheet readily available giving details of the maximum unsupported outreach that can be used when erecting the modular jib assembly. This distance varies according to the foreseen maximum line load that could be applied via the suspension or secondary rope, winch/climbing device and the operation of any secondary safety device.

11.6.2 Wire-reinforced jib system (bending stress lowering)

To enable a proprietary modular jib system to cover as wide a range of requirements as possible, some systems are designed to have a rope anchor point bracing system. This allows greater outreach of the jib to be achieved from the cross section of the standard jib. Where a modular jib assembly is supplied with a system to lower or eliminate the bending stress imposed on the outboard section of the jib, the data sheet should show what the maximum outreach of the jib assembly is for a given suspended load with the bracing system fitted (see BS EN 1808:1999, Figure 15).

11.6.3 Counterweighting of modular suspension rigs

The supplier of a modular suspension rig system should have a data sheet available giving details of the magnitude of counterweight to be used. The data sheet should cover the extreme condition or when the configuration of the jib is such that the rope anchor point of the jib is at its maximum designed outreach from the fulcrum point and the minimum "tail back" length is used. The data sheet may also include examples of various configurations of the telescopic jib with the possible variations of outreach, "tail back" and magnitude of the counterweight required in any of the variations shown. The counter weighting arrangement of the modular jib assembly should incorporate a system to ensure that the counterweight cannot be removed accidentally.

11.6.4 Adaptations of modular suspension rigs

Modular suspension rigs are used extensively by hire companies in the temporary platform rental industry. Due to the versatility of their design, the majority of site conditions/requirements can be met by this equipment with adaptations used to overcome obstacles such as high parapets, plant rooms, vent stacks, roof lights. A competent person (thorough examination) should design the adaptations to the rig and drawings/sketches and calculations should be provided. Whenever the proprietary suspension rig is to be adapted in any way, a site-specific sketch/design should be produced to ensure the rigger has all the relevant information they need to effect a safe installation of the suspension rig.

The sketch/design should incorporate the details of:

a) the maximum line load which will be generated by the winch/climbing device;

b) the outboard distance from the fulcrum point that this force will be applied;

c) the inboard distance from the fulcrum at which the counterweight will operate;

d) the magnitude of the counterweight to be used.

Where the adaptation of the modular suspension rig is to incorporate scaffold tube, scaffold fittings or other standard scaffolding components, the materials used should conform to BS EN 74-1.

12 Identification and registration of components and marking of working load limits

12.1 General

Counterweights should be marked with their mass stated in kilograms (kg).

The TSAE, when rigged and ready for use, should also be marked in easily-readable letters and/or pictograms and include the following:

a) the RL limit in kilograms for the specified task;

b) the maximum number of persons (excluding materials) allowed to be on the platform or any given length or bay of it;

c) safety harness anchor points when fitted;

d) name of supplier organization and contact details.

12.2 RL of individual platform

The RL of an individual platform is the maximum load that can be placed on the platform, and should consider its strength and the value and distribution of the load. Under no circumstances should the distribution of the load be such that the load transferred to the lifting device/winch exceeds the WLL of the lifting device/winch. The supplier should check that the RL of the platform in kilograms and the number of persons is clearly marked on the platform.

12.3 Suspension and safety ropes

Steel wire ropes used as suspension and secondary safety ropes should be marked with a means of identification and the WLL of the rope. If the rope is not detachable from the winch/climbing device, the inspection testing and registering of the machine should include the rope. If this has been done within the last six months, the rope need not be treated separately.

12.4 Unique identification

All lifting equipment (e.g. hoists, safety devices, wire ropes, lifting accessories) should be marked with a unique identifying mark, such as a manufacturer's serial number or owner's mark.

13 Electrical requirements

13.1 General

TSAE should be regarded as heavy duty mobile plant and fall within the rules governing this type of equipment when used on construction sites.

All equipment and wiring should be suitable for use with one of the following power supplies.

a) 380/440 V, 3 phase 50 Hz.

b) 240 V, single phase 50 Hz.

c) 110 V, 3 phase 50 Hz.

d) 110 V, single phase 50 Hz.

The electrical equipment and wiring should have protection against overloads, short circuits and earth faults. Any interruption of electrical supply should not result in damage to equipment or create any dangerous condition, e.g. the ropes should not be able to pass through the climbing device or unwind from the drum of a winch if the power is lost. All electrical equipment and wiring should be selected for the foreseeable conditions of use including accidental impact and environmental damage. Additional mechanical protection should be provided where necessary. Enclosures for electrical equipment should be of a rating not less than IP 54 according to BS EN 60529:1992+A2.

13.2 Main power supply

An independent electrical power supply should be provided by the user at the place of work, in consultation and agreement with the supplier organization of the power operated suspended platform. This electrical supply should be of adequate capacity in terms of voltage and current.

NOTE Guidance on the design and installation of this supply can be found in the current edition BS 7671.

The supply should be provided with appropriate overload, short circuit, and earth-fault electrical protection. It should provide an efficient and effective earth connection back to the main earth connection at the main point of electrical supply.

The supply at the place of work should be provided with a suitably rated isolating and disconnecting switch controlling a socket outlet to BS EN 60309-2, with a degree of protection not less than IP 54 according to BS EN 60529:1992+A2 or equivalent means. The power supply point should be labelled to provide identification as a temporary platform supply and should be accessible at all times.

The design and installation of the electrical power supply should be carried out in accordance with the requirements of the current edition of BS 7671 and BS 7375.

13.3 Earthing

The protective conductors (earth circuit) of the equipment should be connected to the electrical supply earth terminal only when it has been verified that this terminal provides an efficient, effective

and reliable earth path. Where WPs or suspended scaffolds use mains voltage on structures and buildings under construction, it is recommended that one of the following apply.

a) The mains electrical supply is provided with a residual current device (a current operated earth leakage circuit breaker) conforming to BS 4293, with a rated tripping current not exceeding 60 mA.

b) A circulating current earth monitoring system conforming to BS 4444.

NOTE The contract for supply of TSAE does not normally include provision for earthing the main power supply.

13.4 Pendant control power supply cables

Cables feeding power from the main power supply point to the suspended platform should be of adequate length to allow for the planned movements of the TSAE.

Any pendant control cables of roof-mounted TSAE should be of adequate length to allow for the planned movements of the WP or suspended scaffold installation. They should be sufficiently robust to permit repeated use and of such a nature and be so placed that they do not cause a hazard or become subject to mechanical damage. Any armouring of these cables should be of the braided type to permit flexing. These armoured cables should be terminated with the appropriate fittings that ensures the adequate earthing of the armouring. Any plugs and sockets should be placed to minimize the risk of being damaged by the intended movement of the platform or by the accidental swinging of the WP against the building.

Where power supply cables pass over parapets, edges of roofs, or the corners of beams or slabs, they should be protected from abrasion or other mechanical damage. All cables should be provided with means of support when they hang in free air from buildings or structures; suitable means include cable socks of appropriate size held by support wires or cables.

Cables terminating in a control unit on the platform should be of such a length that the control unit is within easy reach of the operatives working on the platform. The correct arrangement of the electric parts of the power-operated platform, platform or suspended scaffold should be made clear by instructions to the person erecting/using the equipment. The connection arrangements (e.g. plugs and sockets) between the various parts should be arranged and placed so that they cannot be incorrectly assembled.

13.5 Hoist control units

NOTE Three common categories of hoist control are the hoist-mounted control, the central control (two or more hoists are operated from a platform mounted control station) and the hand-held pendant control station.

All control units and pendant controls should be clearly marked so that there is no confusion between the various controls as to their purpose and the direction of travel resulting from their operation. The voltage in pendant controls should be limited to a maximum of 125 V. The electric supply for any circuit where a contactor is used should not be provided by a centre-tapped earth system via a transformer

or otherwise. Pendant controls should be so placed or fixed that they cannot be damaged by the intended movement of the platform or by the accidental swinging of the platform against the building. The control button or levers should be robust and require continuous pressure to maintain powered movements and the control units should be designed so as to prevent them being operated accidentally, e.g. by the provision of shrouds, etc.

13.6 Electrical safeguards

The control system should be designed so that an electrical supply failure, or the failure or malfunction of any electrical component, will "fail to safety" and not cause any danger or failure to the building, structure or job site. Electrical protection should also be provided against phase reversal in a 3-phase system. No live parts should be exposed when the equipment is assembled and in use. Access to control circuit panels and other items of electrical equipment (other than interconnecting cables and control units) should be via doors fitted with locks or via panels requiring some form of tool other than a coin to open. Where locks are provided, the keys should be retained or controlled by an electrically-competent person. Protection against the ingress of water and dust into electrical equipment should be achieved by provision of enclosures with a rating of not less than IP 54 according to BS EN 60529:1992+A2.

A gland system should be used to maintain this degree of integrity where cables, etc., are taken into enclosures.

13.7 Electrical instructions

Clear instructions should be available to all persons concerned with the installation, testing, maintenance and use of TSAE with regard to the correct methods of installation, and the use of the safety devices, including the correct method of connection to the mains electrical supply.

Electrical connections should preferably be the plug and socket type connection conforming to BS EN 60309-2.

13.8 Maintenance, testing and inspection

Maintenance instructions and spares parts should be available for the electrical installation either from the supplier organization or the user organization. The supplier organization should ensure that documents are available describing adequate and appropriate instructions, advice and guidance on maintenance, testing and inspection of the equipment both for when it is in use and when it is dismantled. These instructions, advice and guidance should be made available to each user organization, purchaser, hirer or user by the supplier organization as necessary to ensure the safe use of the equipment.

14 Protection against lightning

Because TSAE is often operated in exposed conditions, the requirements for protecting the whole suspended access system against lightning should be taken into account by the supplier

organization and (if considered necessary) protective measures should be commissioned from a lightning protection specialist.

NOTE Guidance on protection of structures against lightning is given in BIP 2118.

15 Installation, commissioning, handover and dismantling

15.1 Access

15.1.1 Access to the site

The user organization should ensure that safe access and egress throughout the site is available for operatives authorized to install and dismantle the TSAE.

15.1.2 Access to the workplace (platform)

The user and supplier organization should work together to ensure safe day-to-day access. Access to the suspended platform should preferably be from ground level. Where it is necessary to enter or leave a suspended platform at roof level the design of the suspension rig should take this into account and allow adequate headroom.

The method of safe entry and egress to the platform should be detailed on a method statement written by the user.

NOTE Information and advice might be available from the supplier organization.

Under no circumstances should any person be allowed to climb up or down the suspension or secondary safety ropes to gain access or egress to the platform/system.

15.2 Installation, moving and dismantling

The procedure for erecting, moving and dismantling TSAE should be carried out in accordance with a method statement or data sheet provided by the supplier organization, so that at no time is there an unstable condition. If it is necessary to move TSAE to another location (as detailed in a method statement or data sheet provided by the supplier organization), the user should instruct the supplier organization to carry out the move, unless the user has suitably trained and competent personnel able to undertake such work.

Care should be taken in the handling of materials and components during dismantling. No component should be dropped or thrown to the ground. Items should be lowered in safe and orderly fashion or brought down by crane, hoist, lift, gin wheel or other suitable means.

The counterweight of the suspension rig and all other critical components should receive special attention and be secured in such a way that unauthorized removal is not easily possible.

15.3 Inspections and operational test

The supplier organization should inspect all items of equipment comprising TSAE before being delivered to the site.

Every time a TSAE is installed at a new site or in a new location, it should undergo inspection and operational test under site conditions by a competent person. This should be carried out after installation and before being put into use for the first time or after relocation. Following the installation, it should be thoroughly examined in accordance with **16.2**.

Until TSAE is ready for use, it should be marked and/or locked off to deter unauthorized use.

15.4 Functional tests

Where possible, the tests should be carried out with the TSAE near ground level.

The competent person should test the following components for correct operation:

a) residual current device (RCD) and the isolator switch;

b) electrical control and safety circuits of the platform including the operating controls, alarms and emergency stop controls;

c) any other controls;

d) all trailing cable restraint and storage systems;

e) ultimate stopping switches or devices and their activating devices.

15.5 Handing over

The adequacy of the TSAE installation should be subject to assessment by a person competent to carry out such an assessment. A handover report confirming the adequacy of the installation should be provided by the installer following the initial installation and every site move of TSAE and given to the hirer. A copy of the handover report should be kept on site and made available to the competent person undertaking the thorough examination in accordance with Clause **16**.

16 Maintenance, thorough examination and testing of TSAE

16.1 Maintenance of TSAE

16.1.1 General

TSAE should be maintained in accordance with the manufacturer's instructions to prevent deterioration of the installation. Maintenance intervals should be set to take into account such factors as the intensity of use, the operating environment and the consequences of TSAE malfunction or failure occurring in a high risk location. It is important that sufficient time is allowed in the site work programme for maintenance to be carried out effectively.

Maintenance should only be carried out by persons who are both familiar with the equipment and competent to carry out the work, or who are in the process of gaining experience and are working under supervision. In some circumstances, the TSAE operator can also be trained and authorized to carry out maintenance activities.

NOTE For further information on maintenance management techniques, see HSE L22 [13], paragraph 125.

It is generally more appropriate to carry out major maintenance on TSAE while they are not installed or in use: TSAE should be serviced, inspected and any defects rectified prior to installation.

16.1.2 Maintenance records

Records of repairs and maintenance should be retained for the life of the TSAE in order to identify repeated defects or trends. This provides evidence that maintenance has been carried out and can be useful in planning future maintenance schedules.

NOTE There is no legal requirement for the keeping of records of maintenance; however, PUWER 1998 [3], Regulation 5, states that when any maintenance log is kept, it should be kept up to date.

16.2 Thorough examination

16.2.1 Scope of thorough examination

The thorough examination, inspecting and testing of TSAE should include:

a) inspection and testing of individual TSAE components in a workshop environment prior to despatch to site;

NOTE 1 Testing could include non-destructive testing of critical components, function tests and load tests.

b) functional testing of the installed TSAE on site;

c) load testing if specified by the competent person (through examination);

d) thorough examination of the installed TSAE.

Where applicable, the recommendations in Annex B should be applied but the scope and extent of a particular examination should be at the discretion of the competent person drawing up the scheme of examination and should be based on knowledge of the TSAE, equipment history, known failure modes and weaknesses, the environment and type of application where the TSAE is being used. The competent person completing the thorough examination can request supplementary tests to be completed and should be provided with copies of any inspection and test reports completed prior to delivery to site or that have been completed on site following installation. It is recommended that the scope of thorough examination is recorded.

The purpose of a thorough examination is to determine:

1) whether the TSAE has been installed correctly and is safe to operate;

2) any deterioration of the TSAE after it has been installed by the careful scrutiny of its condition and to assess the significance of any deterioration for the continuing safe operation of the TSAE;

3) whether any alteration or major repair to the TSAE has been carried out correctly and that the TSAE is safe to operate;

4) information about the adequacy of the inspection and maintenance regime.

The TSAE should be thoroughly examined:

i) following installation at a new site and before the TSAE is handed over to the user and put into service;

ii) following reconfiguration or alteration on site where additional parts have been utilized that were not subject to a thorough examination following installation and before the TSAE is handed back to the user and put back into service;

NOTE 2 A thorough examination would not normally be required if the TSAE is relocated from one location to another location on the same site and reinstalled using the same components in the same configuration. At the time of the first thorough examination following initial installation (1) the competent person (thorough examination) should examine each location that the TSAE is to be used to ensure that the TSAE would be safe to operate in each location. Details of the locations that have been examined should be included on the report of thorough examination periodically to detect any deterioration that might have occurred during use.

iii) following occurrence of exceptional circumstances.

The user organization is responsible for ensuring that the equipment has been handed over and thoroughly examined before entering into service.

NOTE 3 The user often delegates the thorough examination to the supplier organization.

16.2.2 Thorough examination following TSAE installation

The on-site thorough examination of TSAE should be divided into two parts; firstly, the components should be examined as separate units and, secondly, the installation as a whole should be examined.

The first characteristic of the complete installation to be confirmed is the stability of the suspension rig against overturning when the maximum suspended load is applied; the competent person (thorough examination) inspecting the TSAE should ascertain the weights of the suspended equipment and the WLL of the hoists and should then ascertain that a stability factor of safety of three is met, for example, by reference to load tables, drawings or calculations provided by the supplier organization.

16.2.3 Supplementary testing of TSAE

The competent person carrying out the thorough examination decides the requirement and extents of any supplementary testing that is required as part of the thorough examination; the scope of any supplementary testing or examination should be recorded in a written scheme of examination. It is recommended that the scope should include:

a) functional tests in accordance with the operating instructions from the supplier organization;

b) functional testing of the load control devices;

c) an examination of the electrical installation;

d) functional testing of the safety devices.

16.2.4 Thorough examination following reconfiguration or alteration on-site

The re-configuration of any TSAE should be carried out by a competent person and the new configuration inspected and a record of that inspection/handover certificate kept on-site.

The scope and nature of this examination is at the discretion of the competent person (thorough examination) and it is recommended that the service history of the TSAE and the previous thorough examination report should be taken into account when the reconfiguration work or alteration is planned. The thorough examination should concentrate on the integrity of any additional parts and/or those parts of the TSAE installation that have been altered.

16.2.5 Thorough visual inspections following occurrence of exceptional circumstances

The competent person (thorough examination) should exercise their judgement to tailor the scope and nature of the inspection to suit the exceptional circumstances that have occurred, taking into account the service history of the TSAE and the results of the previous inspections.

Exceptional circumstances, however, might necessitate a thorough examination and might include:

a) modification and/or significant repairs to the TSAE including the replacement of load bearing parts;

b) occurrence of an overload during use;

c) occurrence of structural damage;

d) an accident or dangerous occurrence;

e) failure of a load bearing component.

16.2.6 Periodic thorough examinations of TSAE

The scope and nature of each periodic thorough examination is at the discretion of the competent person (thorough examination). The competent person (thorough examination) should consider imposing shorter intervals than the LOLER 1998 [1] specified maximum intervals between periodic thorough examinations, owing to such factors as:

a) high levels of usage;

b) harsh environmental conditions;

c) severe deterioration reported during maintenance;

d) recorded re-occurring problems.

NOTE 1 LOLER 1998 [1] provides the option to have either a "specified period" or an "examination scheme" approach to examination. Attention is particularly drawn to the use of pre-use checks (Regulation 8) and weekly inspections [Regulation 9(3) (b)].

NOTE 2 The "specified period" scheme is usual for TSAE, as it is most unlikely that an examination scheme approach will be suitable for TSAE owing to their modular construction i.e. not every component (e.g. platform sections) will be used on each installation and the stresses imposed on each component will vary from installation to installation depending on where it is positioned.

16.3 Reporting and rectification of defects found during thorough examination

16.3.1 General

NOTE 1 The competent person who carries out the thorough examination has duties under LOLER 1998 [1], Regulation 10, to produce a written report of the state of the equipment at the time of the thorough examination and to supply copies of this to the user of the TSAE and to the TSAE supplier (if the TSAE is hired). The report is required to contain the particulars listed in LOLER 1998 [1], Schedule 1.

It is strongly advised that any repairs carried out relating to the thorough examination are recorded on the service record and kept with the report of thorough examination.

NOTE 2 Thorough examinations under LOLER 1998 [1] are undertaken to:

- *ensure that equipment has been installed correctly and is safe to operate;*
- *ensure, when in service, the TSAE remains in good working order and that any deterioration likely to result in dangerous situations can be detected and remedied.*

NOTE 3 The Health and Safety at Work etc. Act 1974 [2], Section 3, imposes a duty on the competent person to inform the user of any obvious hazards found in the course of the thorough examination.

16.3.2 Reporting of defects posing imminent risk of serious personal injury

NOTE If a defect poses an imminent risk of serious personal injury, requiring the TSAE to be taken out of service immediately, under LOLER 1998 [1], Regulation 10 (1) (a) the competent person is required to notify the relevant enforcing authority (Health and Safety Executive or Local Authority), the user and the TSAE supplier. This applies even if the defect has been immediately remedied, otherwise a potentially dangerous situation would be disguised. The user, having received such a report, is required to ensure that the TSAE is not used until the defect has been rectified.

A record of remedial work carried out on defects posing imminent risk of serious personal injury should be attached to the report of the thorough examination.

Failures that could pose such a risk include:

- failure of a safety device;
- incomplete guarding;
- exposed electrical conductors;
- significant wear or misalignment of components;
- excessive corrosion or damage to structural items.

16.3.3 Defects that need rectification within a specified period of time

When a defect needs to be rectified within a specified period of time, as given by the competent person on the report of the thorough examination, the user and the TSAE supplier should be informed and the information recorded on the report of the thorough

examination. This applies even if the defect was repaired during the thorough examination.

16.3.4 Other observations

The report of the thorough examination should also be used to record any other conditions that are observed that could lead to the equipment deteriorating over time; this is to assist the competent person who carries out the next thorough examination.

16.3.5 Responsibility for rectification of defects

NOTE Where the competent person identifies defects affecting the continued safe use of the TSAE, the responsibility for the rectification of these defects rests with the employer of the person controlling the use of the TSAE. (See HSE L113 [14], paragraphs 38 to 43.) In all cases, the appointed person (user) needs to assure themselves that, before a TSAE is used, all the defects recorded in the report of the thorough examination have been rectified. On a construction site where TSAE are often hired in, any rectification of defects is normally carried out by the TSAE supplier. However, the user organization is responsible for ensuring that the work has been done.

If the user organization owns the TSAE, they should make arrangements for the work to be done.

If the TSAE has been hired under a straight hire or bare lease agreement, the user organization should make arrangements for the work to be done.

If the TSAE has been cross-hired, the parties involved should determine who is responsible for the work, prior to the commencement of the hire.

16.4 Record retention

16.4.1 General

Records should be kept for the life of the TSAE as they can assist in identifying repeated defects or indicating trends, for example of wear or damage. Periodic review of this information should be part of the management arrangements for controlling the TSAE.

16.4.2 Retention of records of inspections and thorough examinations

*COMMENTARY ON **16.4.2***
LOLER 1998 [1], Regulation 11 requires records of inspections and thorough examinations to be kept. Under the provisions of LOLER 1998 [1], the records can be in writing or electronic provided they are secure and can be reproduced as necessary.

The retention period for records of inspections and thorough examinations depends on the circumstances in which the relevant inspection or thorough examination was conducted and should be as follows.

- After the thorough examination of the TSAE before it is first put into service, retain until the TSAE is taken out of use.
- After the subsequent thorough examinations of the TSAE, retain until the next report is made, or 2 years, whichever is longer.

- After the inspections at intervals between thorough examinations, retain until the next report is made.
- After the thorough examination of the TSAE after assembly and before use on a new site, retain until the TSAE is no longer used on that site.

17 Using TSAEs

17.1 Operation

The means of suspending the platform, its operation between working levels and its use should be strictly in accordance with the manufacturer's/supplier organization's instructions. Similarly, the operation and use of the controls and safety devices should be strictly in accordance with the manufacturer's/supplier organization's instructions.

The maximum slope at which a TSAE can be used for working operations should be ascertained from the manufacturer and should not exceed 15 °. In particular, when rigid suspension stirrups are incorporated, the platform should not be inclined or suspended in such a manner that the stirrups cannot accommodate the forces imposed on them. Any recommendations in this respect by the manufacturer of the equipment should be made available to the supplier organization and user organization.

Between periods of use, the TSAE and its controls should not be left in a position where unauthorized persons could readily gain access.

No modifications should be made to any TSAE by the user organization. Any adaptations/incorporations or extra equipment incorporated or attached to TSAE should only be made after consultation with the manufacturer/supplier organization.

The means to adapt/store specific tools to a suspended chair should be provided or approved by the supplier organization prior to being taken into use; all operator tools, etc. should be stored safely on the TSAE.

17.2 Tying in

When stationary or when left in place between periods of work, the platform should be "tied" into the building/structure at each end to prevent undue movement. Care should be taken to ensure that the trailing ends of (wire) ropes cannot be easily reached by unauthorized persons or accidentally snagged by others.

Use can be made of permanent guides or other fixings on the building provided these are properly designed; the connections between the platform and the permanent guides should have sufficient tolerance to accommodate the lateral displacement occurring when the platforms are sloping.

17.3 Aerial transfer

Aerial transfer should only be carried out where it is not possible to lower the platform to the ground, or such other area where its weight can be supported and when no other safe practical method of platform repositioning is possible. Only competent riggers under

adequate supervision should carry out such work which should be carried out to a prepared method statement.

All materials should be removed from the TSAE prior to an aerial transfer being carried out and no other person should be allowed on the TSAE during the operations other than the installers actually carrying out the work. The area under the TSAE and its new working position should be protected by appropriate signing and barriers to prevent unintentional access.

The repositioning should be carried out using the platform's secondary safety system as a positive anchor. All operatives should be harnessed to structurally sound independent anchor points when carrying out an aerial transfer.

Calculations should be provided to determine the minimum allowable vertical distance between the double or single wire rope suspension points and the platform when an aerial transfer is undertaken.

17.4 Pre-use checks and weekly inspections

The user organization should inspect the equipment (in accordance with the supplier organization's instructions) before each use and at least every week.

A permanent record should be kept of these inspections and any defects found should be reported to the supplier organization.

18 Care of materials and equipment in store

18.1 General

NOTE Temporarily installed platforms, suspension rigs and accessories are specialist equipment and it is particularly important that such equipment is manufactured from materials of known quality. It is equally important that such equipment and accessories are maintained to the highest standards.

The user should ensure that, when not in use, materials and equipment should be kept in a suitable storage area; chemicals/paints etc should be kept separate from platforms, ropes and other lifting equipment to minimize the risk of chemical attack. Any items which might have been subject to corrosive atmosphere/agents or have been cleaned with corrosive agents should be closely inspected by a competent person and rejected if suspected of being corrosively attacked.

18.2 Decking

Timber decks and thin sheet metal decks are particularly subject to rapid deterioration and should be closely inspected.

18.3 Joints

All welds and other joints should be closely inspected and, if suspect, should be re-formed or the component rejected.

18.4 Safety components

All lock nuts, cotter pins, fixings and other retaining pins should be replaced if found to be defective.

18.5 Glass reinforced plastics and similar materials

Any components that might deteriorate under UV light should be stored away from sunlight, be carefully inspected for cracks and other defects and repaired or replaced as necessary.

18.6 Wire ropes

Wire ropes should be stored under dry cover when not in use, off the ground and kept away from corrosive materials or prolonged damp or heat.

19 Personnel and training

19.1 Selection of personnel

Personnel selected should be suitably trained, competent and experienced to carry out all the required duties safely. Records of their training and experience should be examined to assist in this selection.

Persons responsible for selection should ensure that all persons are aware of their duties. Persons associated with the installation, alteration and dismantling and the operation, inspection, thorough examination and maintenance of TSAE include:

a) supplier-appointed person;

b) user-appointed person;

c) installer;

d) demonstrator;

e) operator;

f) maintenance personnel;

g) competent person (thorough examination) carrying out thorough examinations.

NOTE 1 Attention is drawn to the Management of Health and Safety at Work Regulations 1999 [4].

19.2 Minimum attributes of personnel

The duties and responsibilities of every person involved with the supply, installation and use of TSAEs and the minimum attributes that they should have are listed in Table 1.

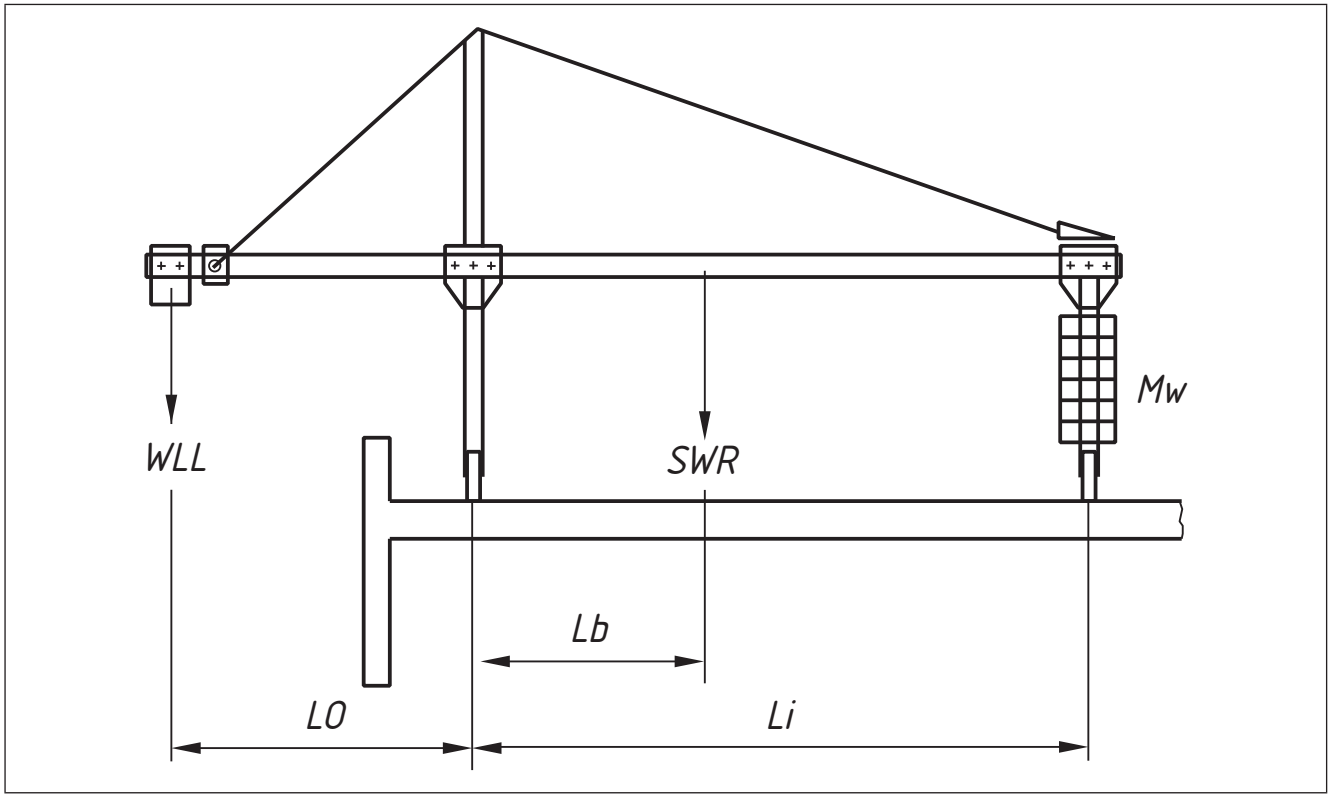
Annex A (normative)

Stability calculations

A suspension beam may be regarded as adequately stable if, referring to the most unfavourable fulcrum, the stability moment is equal to or greater than three times the overturning moment.

Figure A.1 illustrates some of the terms used in the calculation.

Figure A.1 **Stability calculation for counterweighted suspension beam**



The stability of the suspension beam, where the working coefficient for suspension rig (Cwr) is greater than or equal to three should be verified using the equation:

$$(Cwr \times WLL \times Lo) + (SSW \times Lo) \leqslant Mw \times Li + SWR \times Lb$$

where:

Cwr is the working coefficient for a suspension rig (as described in BS EN 1808);

WLL is the Working Load Limit (as described in BS EN 1808);

Lo is the distance of the fulcrum to the suspension points;

SSW is the total weight of the safety wire rope and tension weight;

Mw is the counterweight required;

Li is the distance of the fulcrum to the counterweights;

SWR is the self-weight of the internal portion of the suspension rig;

Lb is the distance of the fulcrum to the centre of gravity of inboard portion of the suspension rig.

EXAMPLE
A platform is supported on two suspension rigs. The WLL has been established in accordance with ***11.4****.*

WLL = 500 kg

SSW = 40 kg (25 kg + 15 kg)

Lo = 0.75 m

Cwr = 3

Li = 5.2 m

Lb = 5.2 m [that is, 2.6 m × 2]

Mw = to be determined

To find the correct counterweights to satisfy the criteria using the equation:

$(Cwr \times WLL \times Lo) + (SSW \times Lo)$	$\leqslant$	$(Mw \times Li) + (SWR \times Lb)$
$(3 \times 500 \times 0.75) + (40 \times 0.75)$	=	$(Mw \times 5.2) + (70 \times 2.6)$
$\Rightarrow (1\,125) + (30)$	=	$(Mw \times 5.2) + (182)$
$\Rightarrow 1\,155$	=	$(Mw \times 5.2) + 182$
$\Rightarrow 1\,155 - 182$	=	$Mw \times 5.2$
$\Rightarrow 973$	=	$Mw \times 5.2$
$\Rightarrow \frac{973}{5.2}$	=	Mw
$\Rightarrow 187.115$	=	Mw [to three decimal places]
$\Rightarrow Mw$	$\approx$	187 kg

NOTE This represents the minimum amount of counterweight required at Mw.

Annex B (normative) Scope and nature of thorough examinations

NOTE This Annex aims to identify the best practice in relation to the thorough examination of TSAE, but is not a checklist. The manufacturer's recommendations will be useful in performing through examinations.

B.1 Structural examination

The load bearing parts of the TSAE, including all modular components of the platform should be examined for cracking, corrosion, permanent deformation and loosening of, or damage to, connections. A visual examination should be supplemented by non-destructive testing if the competent person (thorough examination) considers this to be necessary.

Bolted connections should be examined for signs of corrosion from fasteners or clamped joints and that fasteners have not come loose or become damaged. Attention should be paid to bolt holes to ensure that they have not become worn or damaged. Depending on criticality, individual fasteners should be removed for closer examination to check for thread damage, cracking or permanent deformation.

B.2 Examination of mechanical drives

Drive drums, pulleys, gear boxes, transmissions, motors, brakes, guide rollers, counter rollers and the emergency lowering system should be examined for undue wear and malfunction.

B.3 Examination of safety components

Safety components, including the overspeed safety device, load control device, manual lowering device, ultimate limit switches, terminal stopping switches, handrails and guards should be examined for correct functioning and any evidence of deterioration.

B.4 Examination of wire ropes and associated components

A detailed examination should be made of wire ropes, if fitted, with special regard to broken wires, surface wear, excessive stretching, unequal rope tensions, variations in diameter, kinks, localized crushing, "bird caging" due to mis-spooling and surface rust and corrosion. Associated components, including pulleys and sheaves, wire rope terminations, the slack rope device, the drum spooling device, and counterweights and their guides, should also be examined. It is not possible to recommend the age at which wire suspension ropes should be taken out of service because of the many variables affecting the ageing process. Special care should be exercised during examination if a wire rope is more than two years old.

NOTE A useful reference for wire rope discard criteria is BS ISO 4309.

B.5 Examination of platform

The platform decking, toe board and guard rails should be examined for correct functioning and mechanical integrity. Special attention should be paid to connections between sections including any hinges.

B.6 Checking of signs and legends

The TSAE installation should be checked to determine whether the signs giving the RL and maximum number of persons, operating instructions, safety information and warnings are in place and legible. The legends on the operating controls should also be checked for legibility.

B.7 Load control device tests

Load control devices should be tested according to the manufacturer's instructions.

B.8 Examination of the electrical installation

Before the TSAE is delivered, the integrity of the TSAE electrical system should be confirmed prior to delivery; it is often more convenient to carry out any tests at the supplier organization's workshops. The following tests should be performed (in the order stated) to assess the functional integrity of those parts of the control circuit that cannot be examined visually.

a) Continuity test;

b) Earth bond test;

c) Insulation resistance test (at a minimum of twice rated operating voltage) to assess the integrity of electrical insulation;

d) Functional test of each safety related control system from sensor through to final actuator, to determine whether the whole system is working satisfactorily.

The following checks should also be carried out.

- A check that the ratings of the fuses and miniature circuit breakers installed are as stated in the TSAE manufacturer's instruction manual;
- Visual examination of the condition of solenoids and contactors, if the competent person (thorough examination) has concerns about the integrity of the electrical control circuit.

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