Best Practice Guidance for AWPs

Avoiding Trapping / Crushing Injuries to People in the Platform

Strategic Forum for Construction
Plant Safety Group

US Edition – Prepared by the:
International Powered Access Federation

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Foreword

IPAF exists to promote the safe use of powered access equipment, and its members and councils have worked tirelessly over decades to encourage safe use and reduce death and serious injury. The industry has done much to improve its performance but there is always room for improvement. Our industry is innovative and equipment is constantly evolving and developing so that construction processes can become increasingly efficient. This has consequences for site management who must ensure that operators are competent, capable of operating equipment safely and are following safe working procedures.

An aerial work platform (often referred to as an AWP) saves time and makes work at height efficient, effective and safer than using traditional methods of access. When used safely, AWPs significantly reduce the risk of injuries through falling from height.

Unfortunately there have been a number of fatal accidents involving the use of AWPs in which the operator has been crushed against fixtures or other obstacles while working at height. IPAF believes such incidents can be prevented by correct planning, preparation and selection of appropriate machinery to be used correctly.

This guidance was originally produced by a group of British organizations collectively known as the Strategic Forum for Construction which included IPAF and HSE (the UK's Health and Safety Executive). It was prepared by the industry to provide clarity about the safe use of AWPs including planning, equipment selection, training, provision of information, familiarization, safe use, supervision and rehearsal of rescue procedures, together with monitoring of the whole process.

The UK document has been available on IPAF, and AWPT's, web sites for some time. AWPT training centers and IPAF members, including the IPAF Manufacturers' Technical Committee, have requested that the document be reviewed for American use. There are no substantive changes to the document, and any changes are limited to items that are legislative or standard specific and 'language' related.

I hope that this document focuses thinking, and actions, with regard to the avoidance of 'crushing' accidents on AWPs, and that it helps to focus collective industry thinking on a strategic preventative approach.

Kevin O'Shea
Chairman of the North American Regional Council of the
International Powered Access Federation www.ipaf.org

Contents

Introduction

The use of aerial work platforms (AWPs) is increasing as the benefits for productivity and safety are recognized. They are acknowledged by many to be the safest and most efficient means of providing temporary access to height for many work activities.

The increased use of AWPs in construction, maintenance and other applications where trapping risks are present has led to accidents in which people on the platform have been trapped between the platform (often referred to as a cage or basket) and objects in the work area. In some cases these accidents involved fatality. Managers must take a lead in identifying when trapping risks are present in the work activities they control. Where trapping risks are present extra care is needed and all involved must understand what they need to do to avoid or reduce the risks involved.

Accidents can be avoided if safe use practice is encouraged and followed. The basis of preventing trapping accidents must be task, site and equipment **specific** risk assessment. All involved in the management and operation of AWPs need to understand how to minimize the risks of someone being trapped in the basket and the importance of having effective rescue procedures should such an entrapment occur.

How to use this guidance

This guidance has been produced by the Strategic Forum for Construction Plant Safety Group. It has been split into two parts. Part 1 is aimed at planners, managers, and trainers. It provides information on hazards, risk assessment, controls and responsibilities. The annexes to Part 1 provide detailed information which can assist in the identification of trapping risks and in the planning and managing of work activities to protect against entrapment accidents.

Part 2 is aimed at those using and supervising AWPs and responsible for rescuing anyone trapped on a AWP platform. Part 2 has been designed to be used in briefings or toolbox talks for supervisors and AWP operators.

There may appear to be some repetition in Parts 1 and 2 of this document. This is deliberate to allow Parts 1 and 2 to be used either together or independently. Each part of the document is self contained but one complements the other.

Note that this document is not intended to be complete guidance on all aspects of AWP operation.

Operators of AWPs must at all times be trained and competent.

Best Practice Guidance for AWPs
Avoiding Trapping / Crushing Injuries to People in the Platform

Part 1: Guidance for planners, managers and trainers

1. Purpose of Part 1

Anyone involved in planning work with AWPs, specifying equipment, managing work and organizing training for those working with AWPs should read Part 1, which includes guidance on the hazards to be considered and ways of controlling risk.

Note that this document is not intended to be complete guidance on all aspects of AWP operation.

Operators of AWPs must at all times be trained, familiarized and qualified.

2. Typical hazards, causal factors and control measures

2.1 **Annexes 1 and 2** give typical hazards that may be present. They describe causal factors for such hazards, such as overhead obstructions in the path of the AWP, or leaning over the guard rails. The guidance identifies measures which can help to protect against the hazards identified and should be considered as part of the risk assessment. The list is comprehensive but not exhaustive.

3. Planning

3.1 Method of work

3.1.1 Consideration should be given to:
- the need for carrying out the work at height, e.g. whether or not the work could be carried out at ground level,
- sequencing activities to avoid the presence of obstructions that could cause trapping risks, and
- adopting alternative working methods that avoid or reduce trapping risks when using an AWP.

3.1.2 **Annex 3** lists factors that need to be taken into account when planning work at height that involves trapping risks, e.g. identifying the range of work and selecting equipment to minimize the chances of trapping occurring.

3.2 Risk assessment

3.2.1 The hazards referred to in **Annexes 1 & 2** and guidance in **Annex 3** should be taken into account when formulating safe methods of working. Risk assessment should cover:-
- travelling to and from the work area,
- accessing the work area, and
- working at height.

3.2.2 Particular attention should be given to lighting levels – additional task or personal lighting may be necessary but it needs careful design.

3.2.3 The risk assessment should be recorded. It should also be reviewed and revised, as necessary, while work is carried out.

3.3 AWP selection

3.3.1 Selecting an AWP with the right operating characteristics can substantially reduce the risk of entrapment. When selecting an AWP, account should be taken of the manufacturer's instructions and, in particular the operating parameters and limits specified.

3.3.2 Vertical lift, articulated boom and telescopic boom AWPs allow a wide variety and different sequences of platform movements to be performed. The information provided by the risk assessment (*see section 3.2*) on the nature of trapping risks and when the risks occur will aid decisions on the type and model of AWP best suited to avoid trapping risks.

3.3.3 Many AWPs have a guard above the platform control panel to prevent the operator's hands being trapped against overhead objects. On some AWPs this guard may prevent the operator's upper body being pushed downwards onto the controls but it can create a trapping risk if the operator leans over it while moving the platform. A stand-off bar is fitted on some AWPs in front of the control panel which prevents the operator's lower body being pushed horizontally against the controls. Control panels may have the controls sunk into the top of them and they may have features that prevent objects placed on the panel contacting the controls. There is no one feature that prevents the operator contacting the controls but a combination of the above can reduce the risk.

3.3.4 **Annex 4** lists important factors that need to be taken into account when selecting an AWP for use, e.g. use on rough terrain or indoor/outdoor use.

3.3.5 Wherever planners/managers are uncertain about the best AWP for the work they should seek further expert advice, e.g. from a rental company (dealer)or manufacturer.

3.3.6 When selecting an AWP for use, the circumstances in which it will be used must be taken into account. If this assessment indicates that the installation of additional equipment or devices may overall improve the safe use of the AWP during the task, then before installation, the process in **Section 6** should be followed. This will help ensure that full consideration is given to both the positive and negative health and safety effects of installing the device and legal considerations.

3.4 Safe system (method statement) of work

3.4.1 A safe system of work (SSW) should be devised to ensure that work tasks can be carried out safely. Key elements of the SSW should be written down. This could take the form of a safety method statement as commonly used in the construction industry or any other appropriate record.

3.4.2 The SSW should be based on risk assessment (*see section 3.2*) and identify the

- type of AWPs to be used (*see* **Annex 4**),
- hazards that need to be taken into account (*see* **Annexes 1 & 2**) when travelling to, accessing or working in the work area,
- control measures to be adopted (*see* Annexes 1 and 2),
- proficiency and training requirements (*see Section 5*) for those involved in the work, and
- emergency rescue plan arrangements (see *section 3.5*).

3.4.3 The SSW should be communicated to all persons involved in the planning and management of the work tasks.

3.4.4 The hazards identified and control measures to be adopted should be communicated to those who supervise and carry out the work tasks.

3.5 Emergency plan and drills

Rescue Plans

3.5.1 It is a requirement to plan for emergencies and rescue when anyone is working at height. Rescuing quickly someone who has become trapped can make a very significant difference to the injuries sustained – it may be the difference between life and death. There must always be someone at ground level that is able to take action in the event of an emergency while an AWP is in use and trapping risks are present.

3.5.2 A suitable rescue plan must be developed to ensure that emergency recovery can be carried out safely and quickly in the event of an operator or anyone else becoming trapped between the platform and an adjacent object.

3.5.3 AWP operators, supervisors and others involved should be briefed on and practice the emergency procedures to follow if someone becomes trapped.

Locating emergency controls

3.5.4 The location of the operator's instruction manual should be identified in the emergency plan so those people who are authorized to operate the ground and emergency controls can refer to it,.

3.5.5 The International Powered Access Federation (IPAF) has developed an "Emergency Descent" decal (*see* **Annex 5**). This can be used in conjunction with existing manufacturer's symbols on the AWP to aid location of the emergency controls.

Periodic drills

3.5.6 The emergency descent controls and systems are often specific to individual machines. As such, periodic drills should be required for those who have on-site responsibility for the rescue of a trapped person. These drills must include practising the use of the ground controls and emergency controls for each machine in use.

3.6 Co-ordination with other activities and preparation of work areas

3.6.1 AWPs will rarely be used in isolation from other work activities and preparations are likely to be required to enable them to be used safely in work areas where trapping risks are present. The work should be planned taking these issues into account. The people responsible for the following activities should be identified and their responsibilities defined in the safe system of work:

- identifying overhead objects on any designated travel route that AWPs are expected to use,
- preparing and maintaining the ground that AWPs are expected to work on,
- managing the areas below and around the work at height, and
- taking control of emergency operations.

4. Supervision and monitoring

4.1 Supervisors should be instructed in and supplied with SSWs for the work they are expected to control.

4.2 Supervisors should monitor the performance of AWP operators, supervise their work to ensure conformance with SSWs and provide advice for the review and revision of the risk assessments and SSWs as the work progresses.

4.3 It is recommended that supervisors are familiar with the contents of **Part 2** of this guidance.

5. Competency and training

5.1 Competency

5.1.1 A competent person must be involved in:

- risk assessment,
- planning,
- managing,
- supervising, and
- carrying out the work tasks, including rescue operations,

should have sufficient:

- training,
- knowledge,
- experience,
- can identify existing and predictable hazards in the surroundings or working conditions and
- has authority from their employer to take prompt corrective measures to eliminate hazards

to enable them to identify trapping risks and carry out their duties safely at the level of responsibility assigned to them.

5.1 2 The person who formulates the SSW should:-

- understand the AWP characteristics and the nature of the work to be carried out;
- be capable of identifying site hazards that could lead to trapping accidents (*See* **Annexes 1 and 2**);
- have the ability to communicate the results of their findings to those responsible for managing AWP activities. This can be on-site management, contractor's staff and/or principal contractor's staff depending on the arrangements that are in place to ensure that the risk assessment is understood and implemented.

5.2 Training

Site Management

5.2 1 Managers with responsibility for work where people on the platform may be trapped between the platform and objects in the work area should have knowledge of the factors that should be considered before selecting an AWP for use. They should also understand the risks involved in the work when AWPs are in use

5.2.2 An "*AWPs for Managers*" training course [5] is available for people who manage work activities involving AWPs.

Supervisors

5.2.3 Supervisors should be instructed in the hazards, causal factors, and control measures identified in the task specific risk assessments for the work to be carried out (**Annexes 1 and 2**). They should be familiar with the plans for the work to be carried out (**Annex 3**) and take part in regular on site emergency lowering drills (**Annex 7**). In addition, it is recommended that supervisors are familiar with the contents of **Part 2** of this guidance.

AWP operators

5.2.4.1 Operators must:

- be qualified to operate the AWP in the working conditions to which they are exposed,
- be warned & instructed in potential hazards and provided means to protect against them, and explained consequences of not following proper site rules,
- have attended a recognized basic AWP operator training course, and
- be familiaraized with the make and model of AWP they are authorized to operate.

5.2.4.2 It is important to ensure that the operator has received basic training in the correct category of AWP that they will use (see **Annex 6**).

5.2.4.3 In addition to basic AWP operator training, operators should be familiarized with the controls, characteristics, safety devices, decals and emergency rescue systems on the AWPs they are authorized to operate. Before operating a particular make and model of AWP, the operator should be able to prove that they have received familiarization on that type of machine, for example through entries in his/her log book (or similar). If this cannot be demonstrated then the operator should undergo familiarization, or if they are authorized to do so by their employer, self-familiarize themselves using the manufacturer's operation manual. Further advice on familiarization is given in Technical Guidance Note F1/08/07[6].

5.2.4.3 It is recommended that operators are familiar with the contents of **Part 2** of this guidance

Rescuers

5.2.5.1 Rescuers must:

- be trained to lower the AWP platform using the ground/emergency controls in the work situations to which they are exposed;
- be instructed in local hazards and site rules;
- be familiar with the rescue procedures for the type of AWP they are authorized to operate;

5.2.5.2 Rescuers at ground level do not need to be trained as AWP operators but they must be trained by their employer and be qualified to carry out rescue operations. They should be familiarized with the safety devices on the AWP in use, its emergency lowering systems and ground controls. They should check the emergency lowering functions with the operator during the daily pre-use checks.

5.2.5.3 Rescuers should be trained in the procedures to follow when rescuing people (**Annex 7**) and take part in on site emergency lowering drills

5.2.5.4 It is recommended that rescuers are familiar with the contents of **Part 2** of this guidance.

5.3 Records

Records should be kept of the training received.

6. Installing additional "anti-trapping" devices or equipment on AWPs

6.1 Task specific risk assessment may indicate that installing additional equipment or device(s) to an AWP may provide additional safety in particular types of work. If you wish to install additional equipment or devices then you should obtain advice from a person or body who is qualified to assess whether or not such a modification to the AWP will compromise its safety. You should always consult the AWP manufacturer to obtain written permission on the fitting of additional equipment or devices on their products.

6.2 There are specific requirements which need to be understood and followed by anyone who installs or directs others to install additional equipment or device(s) on an AWP. ANSI A92.5 defines responsibilities for dealers, owners, users and operators of boom-supported elevating work platforms. Each are required to obtain written permission from the aerial lift manufacturer for any modification, alteration or remanufacturing of the aerial platform. Specific wording can be found under the title 'modification' in the standard.

Additional devices or equipment

6.2.6 If additional devices or equipment are proposed to be fitted to an AWP then further risk assessment is required before such a change is made. You will need to have available all relevant technical details of the AWP and for the additional devices or equipment that you intend to install. Risk assessment must show that the proposed change protects against the trapping risks identified and that, at least, it does not:

- increase the consequences of injury in a trapping accident
- create new or additional risks that outweigh the trapping risks addressed (taking account of all the ways in which the AWP is used including areas where trapping risks are not present)
- adversely affect the:
  - operation of controls and any AWP movements
  - performance and reliability of control systems
  - reliability of components
- cause ergonomic hazards for the AWP operator or anyone else in the platform
- cause distractions to the operator that could affect safe operation of the AWP
- encourage bad operating practices that could affect the safety of the AWP in use
- restrict access to the platform controls, particularly in an emergency
- prevent the AWP from being used for applications in which it is acknowledged to be safe

Responsibility

6.2.7 The responsibility for any adaptation, addition or modification and the associated risk assessment lies with the person who modifies the AWP. The safety of the adaptation, addition or modification and the safety of any parts of the AWP that it may affect must be ensured. Under these circumstances the original manufacturer is not liable for the adaptation, addition or modification or any effects it has on the safety and performance of the AWP. The person carrying out the adaptation, addition or modification takes on these responsibilities and may become liable for the safety of the complete AWP.

Consultation with the manufacturer and your insurers

6.2.8. Written recommendation and guidance provided by the AWP manufacturer on the adaptation, addition or modification you propose or the additional devices or equipment that you wish to fit must be followed.

6.2.9 It is recommended that you discuss the installation of the additional devices or equipment with your insurer if you think that they could be classed as modifications that could affect your insurance.

Annex 1: Hazards, Causal Factors and Control Measures: Travelling to and from the work area

Note: the Table does not imply any priority order for the hazards, causal factors and examples of control measures

Hazard	Typical causal factors	Examples of control measures
Overhead obstructions in the path of the AWP	Overhead obstructions that come close to the top of the platform while the AWP is travelling can cause an operator to become trapped between the platform and the obstruction	Choose an appropriate size of model and type of AWP for the access route required Where possible, choose a route that avoids overhead obstructions. Ensure sufficient clearance when travelling under or past overhead obstructions taking account of the platform movements that can occur when travelling. Do not use excessive speed when close to obstructions. On AWPs with platforms controls that can be operated remote from the platform use the remote control rather than squeeze past obstructions and stand sufficiently clear of movement
Leaning over the platform guardrails or control panel	Leaning over the platform guardrails or control panel to view the AWP base, wheels or tracks while travelling distracts the operator's view of overhead obstructions	Thoroughfares for AWPs should be kept clear.
Losing control of the platform controls	Trapping of the operator against the platform controls while the AWP is travelling prevents the operator from controlling AWP movements and increases the likelihood of serious injury in a trapping incident	Do not lean over the platform controls while moving. Avoid distractions, e.g. use of mobile phone, while travelling or moving the platform. Don't put objects on the platform control panel that could move and activate the controls. Do not place materials on the guard rails

Hazard	Typical causal factors	Examples of control measures
		that could move and distract the operator.
Lighting conditions making overhead obstructions in the path of the AWP difficult to see	Poor/inadequate lighting of the vehicle route in areas where overhead obstructions exist can make it difficult for the AWP operator to notice the obstructions	Provide adequate background and task lighting where necessary, taking into account weather, time of day, seasonal changes and the work environment. Additional lighting needs careful design.
Pedestrians or vehicles in the path of and around the AWP	Pedestrians or other vehicles around or in the path of the AWP can distract the AWP operator while approaching an overhead obstruction	Segregate traffic routes so far as possible. Use a ground person (lookout) whenever necessary in areas where pedestrians will be present. Pedestrians should wear high visibility clothing.
Uneven ground, steps, trenches etc.	Travelling over uneven ground, steps, open trenches and objects on the ground causes vertical work platform movements that may trap operators against overhead obstructions	Ensure the ground conditions are suitable for the AWP to travel on. When travelling on boom AWPs, adjust the platform position to give adequate view of the AWP base/wheels and to minimize vertical platform movements. Travel at a speed that ensures platform movements are controlled.
Objects on the ground in the path of the AWP	Operators may lean over the platform guardrails or control panel to view objects on the ground while travelling thus distracting their view of overhead obstructions	Before gaining access walk the route and remove obstacles.

Annex 2: Hazards, Causal Factors and Control Measures: Accessing the work area and working at height

Note: the Table does not imply any priority order for the hazards, causal factors and examples of control measures

Hazard	Typical causal factors	Examples of control measures
Overhead obstructions adjacent to the path that the platform needs to follow while being raised into the work area at height	Using the wrong type or size of AWP for the nature of access required Mistakes, rushing to get the job done and lack of concentration can cause the AWP operator to drive the platform into overhead obstructions using the lift, slew and/or travel controls	Telescopic boom, articulated boom and vertical lift AWPs have different access characteristics and the most suitable type should be chosen for the work tasks to be carried out and the environment in which it is used Plan/synchronize work tasks to avoid the presence of unnecessary obstructions
Overhead obstructions while working in the work area	Overhead objects close to the work platform can present immediate trapping risks when the platform or AWP is moved using the lift/lower, slew or travel controls Obstructions below head height can present immediate risks when starting to move the platform Operator not moving the platform sufficiently clear of an obstruction before operating the AWP travel or slew controls *[NOTE : rapid platform movements can be created when the slew and main boom lift controls are operated]*	When close to obstructions use the controls in the following general sequence:- - drive - elevate - slew - telescope - fine control Always ensure adequate vertical clearance between the highest point of the platform and any obstruction when driving or elevating/slewing the platform

Hazard	Typical causal factors	Examples of control measures
Uneven ground, steps, trenches etc.	Manoeuvring and setting up the AWP on uneven ground, steps, open trenches and objects on the ground can cause substantial platform movements at height that may trap people against overhead obstructions that are close to the platform	Provide and maintain ground in a condition suitable for the AWP to operate on Do not raise the platform: - on soft ground, - adjacent to steps - over voids or service ducts and use spreaders as necessary
Leaning over or against the control panel while operating the AWP	Leaning over the platform guardrails or control panel to view the AWP base, wheels or tracks while manoeuvring distracts the operator's view of adjacent obstructions and can encourage the operator to squeeze past overhead objects	Leaning over guard rails to view the AWP base, wheels or tracks while manoeuvring the AWP and not looking for adjacent obstructions or squeezing past overhead objects are bad practices that should be prohibited.
Losing control of the platform controls	Trapping of the operator against the platform controls while the AWP is travelling prevents the operator from controlling AWP movements and increases the likelihood of serious injury in a trapping incident	Do not lean over the platform controls while moving. Avoid distractions, e.g. use of mobile phone, while travelling or moving the platform. Don't put objects on the platform control panel that could move and activate the controls. Do not place materials on the guard rails that could move and distract the operator.
Operating a boom type AWP which is slewed at nominally 90 degrees to the AWP forward and reverse travel directions	Operator can suffer disorientation with respect to the expected direction of movement of the AWP when operating the platform travel controls	Always check the direction of movement of the AWP with reference to the direction arrows on the AWP base and platform controls before activating the control.
Poor/inadequate lighting	Lighting that makes objects adjacent to the platform that are positioned adjacent to and above the top of the platform guard rails difficult to see	Provide adequate background and task lighting where necessary, taking into account weather, time of day, seasonal changes and the work environment. Additional lighting needs careful design.
Pedestrians or other vehicles at ground level	Operator having to lean over the guard rails to view pedestrians or other vehicles at ground level when moving the AWP	Cordon off the work area to prevent collisions and keep pedestrians at a safe distance

Hazard	Typical causal factors	Examples of control measures
Objects on the ground in the area that the AWP needs to manoeuvre	Leaning over the guard rails to view objects on the ground distracts the operator from watching out for overhead obstructions while the platform is being raised or the AWP position manoeuvred	Before using the AWP remove obstacles, as necessary, from the area in which you will manoeuvre
Operator error when using the AWP platform controls	Mistakes, rushing to get the job done and lack of concentration of AWP operator, distractions caused by others or work that the AWP operator has to carry out	Take your time and don't be rushed unnecessarily

Annex 3: Important factors in planning

Note that this section assumes that risk assessment has identified that work at height cannot be avoided and that an AWP is the most suitable way of doing it.

1. Identify the range of work which is to be done from AWPs and the means by which they will reach the work position. Plan to remove hazards as far as possible to limit reliance on methods of work and operator actions to control risk. In other words design out hazards as far as possible.

2. Consider for all activities what the potential might be for operators becoming trapped against objects. You will need to consider carefully the presence of objects against which someone could become trapped at all stages of the work. For example, working in a roof space with many existing obstructions (structural supports/services etc) may present a high possibility of an operator becoming trapped. **Annexes 1 and 2** provide guidance on trapping potential when moving across site, and then up and into the work position.

3. Select equipment to minimize the chances of trapping occurring. In particular consider any relevant dimensional constraints to, from and at the work position and choose equipment appropriately – not too small or too big and with the most appropriate manoeuvring characteristics (scissor/telescoping/articulated). The aim should be to select a machine in which it is as difficult as possible for the operator to get himself trapped.

4. Consider the layout and characteristics of the machine control panel and the potential for the operator to be trapped against the controls in the specific work situation for which it has been selected. The aim should be to select a machine in which it is as difficult as possible for the operator to get himself trapped. See **Annex 4** for more detailed advice.

5. Consider what tools and materials will be needed and plan how they will be carried/stored on/within the AWP.

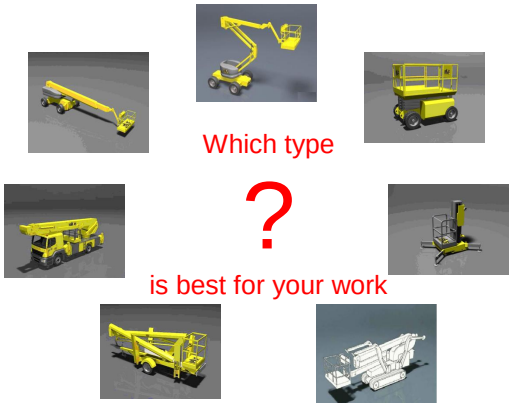
6. Ensure the ground is properly prepared and maintained on routes to and at working positions

7. Liaise with all relevant parties as part of your planning including others on site who will be affected by or will themselves affect AWP activities.

8. Identify and specify the levels of competence/qualification which will be required of those doing the work.

9. Make detailed rescue/emergency plans.

Annex 4: Important Factors when Selecting an AWP



NOTE: Selection of the AWP must be done by a competent person - see section 3.3 above

Requirement	***AWP characteristic***	***Comment***
Use on rough terrain or poor ground conditions	If the AWP is to be used anywhere other than on prepared level surface or on a level and smooth floor, such as the concrete base or floors of the building under construction (that are strong enough to support the AWP), then the AWP should be a rough terrain type.	Non-rough terrain types should not be used on rough terrain.
Use outdoors or indoors (e.g. open walkways and loading areas) where wind or strong draughts could be present	If used in windy or draughty conditions, the AWP should have and be marked with a specified maximum wind speed in which it can be used.	AWPs intended only for use indoors are designed for zero wind conditions and should not be used outdoors or in strong drafts.
AWP platform movement/boom flex should be minimized when the AWP and its lifting structure are stationary.	The AWP lifting structure should be sufficiently stiff to avoid excessive platform movements due to boom flexing that could cause trapping accidents while work is being carried out.	This can affect the decision on whether to use a vertical lift, telescopic boom or articulated boom AWP and the amount of outreach required.
Avoidance of unsafe working practices while working in the work area	It is important to select AWPs that have sufficient reach and flexibility of platform movements to allow all work positions to be accessed and allow the operators to carry out their necessary work tasks while standing on the platform floor.	The variety of platform positions in the work area that are achievable using vertical lift AWPs and telescopic and articulated booms with and without extension platforms will affect the decision on the type of AWP required for the work.

Requirement	***AWP characteristic***	***Comment***
Separation distances from adjacent objects while accessing and working in the work area at height	Limited size platforms and pedestal, end or top mounted platforms can provide greater separation distances from adjacent objects while working in the work area at height	The physical size of the platform and nature of the mounting structure on some AWPs can create obstacles to accessing and moving the platform in the work area at height
Separation distances from adjacent objects while raising the platform to access the work area at height	Boom AWPs with fly jibs can decrease the risk of contacting objects while raising the platform to access the work area at height	Fly jibs allow a greater flexibility of platform positions when raising the platform to access the work area
Fine adjustments of platform position while working at height	Boom AWPs with, for example, platform rotation features and scissor lifts with extension platforms can provide fine control when adjusting the position of the platform at height	Fine control can reduce the need to change the AWP position or to use main boom movement controls while working at height
Self-levelling and over-run characteristics	AWPs can have self-levelling features and different over-run characteristics	Familiarization is essential for operators and rescuers to understand the operational characteristics of different AWPs
Completely open control panels with exposed controls	Some AWPs may have completely open control panels with exposed controls	Exposed controls do not provide protection against the operator being pushed over them.
Preventing platform movements if the operator is pushed over the platform controls	Some AWPs have a trip device that is fully integrated into the platform and control panel structure, which cuts power if the operator is pushed over the controls.	Trip devices cut out powered platform movements as the operator is pushed over the controls
Protecting platform controls from being activated by objects placed on the platform control panel	Storage trays may be fitted in platforms that are either a part of the platform or control panel structure or supplied as accessories by the manufacturer.	Placing objects on the control panel is bad practice. Storage trays provide safe storage areas for tools and other small objects

Annex 5: Emergency Descent Decal

Decals can be obtained free from www.ipaf.org.

Annex 6: AWP Categories

Scissor

IPAF
- Mobile Vertical (3a)
ANSI A92.6

Vertical

IPAF
- Static Vertical (1a)
ANSI A92.3

(NOTE : AWP travels under power)

Telescopic Boom

IPAF
- Mobile boom (3b)
ANSI A92.5

Articulated Boom

IPAF
- Mobile boom (3b)
ANSI A92.5

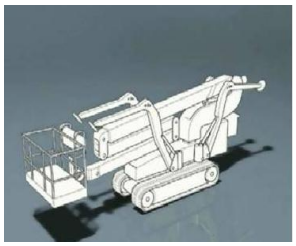
Truck mounted boom

IPAF
- Static boom (1b)
ANSI A92.2

Van mounted boom

IPAF
- Static Boom (1b)
ANSI A92.2

Pedestrian controlled tracked boom



IPAF
- Static boom (1b)
ANSI A92.5

Trailer mounted boom

IPAF
- Static Vertical (1b)
ANSI A92.2

Push around vertical*

IPAF
- Static Vertical (PAV)
ANSI A92.3

*(NOTE : AWP is manually propelled while travelling)

Annex 7: Emergency Procedures

Incapacitated operator
If an operator is trapped and cannot be communicated with, the emergency services should be called immediately.

Rescue procedure
Emergency rescue should be attempted using the following sequence:-

1) If the operator cannot take control of the situation, e.g. because they are incapacitated, then people in the platform who are authorized by their employer and have been trained and familiarized as an operator may take control of the AWP using the platform controls.
2) If the above is not possible then a person at ground level can lower the AWP **provided** they have been:
    - familiarized with the use of the emergency lowering systems and ground controls on the AWP,
    - instructed through appropriate emergency drills and in the procedures to follow under the emergency plan (Section 3), and
    - authorized to carry out rescue at ground level by their employer.

Lowering the platform
Scan the travel path of the platform and check for any obstruction that could prevent the platform from being lowered or that the platform could contact while it is being lowered. Take into account the position of any platform extension deck.

Ground controls may not have the same sensitivity and overrun characteristics as the platform controls. Use the controls that provide the best control of movements and take special care when the platform is close to any obstruction. Follow the sequence telescope, elevate/slew, drive so far as possible when using controls.

Ground control key
It is important to ensure that the keys remain in the base unit during normal operation. This is necessary because the ground controls normally provide a much quicker way of bringing the platform to ground level than using the emergency controls.

In situations where keeping the key in the base is not ideal, e.g. when working on or adjacent to public highways, additional control measures should be implemented. These may include the provision of a second key to be held by the designated person who is authorized to act in the event of an emergency.

References

1. ANSI/SIA A92.5 Boom-Supported Elevating Work Platform

2. AWPs for Managers Training Course - International Powered Access Federation (IPAF)

3. Technical Guidance Note F1/08/07, Familiarization - International Powered access Federation (IPAF)

Best Practice Guidance for AWPs - Avoiding Trapping / Crushing Injuries to People in the Platform

Part 2: Guidance for Trained Operators and Rescuers

How to use this guidance

This is the second part of guidance produced by the Strategic Forum for Construction Plant Safety Group and edited by IPAF for use in the US. **Part 1** is aimed at planners, managers, and trainers. It provides information on hazards, risk assessment, controls and responsibilities. The annexes to Part 1 provide detailed information which can assist in the identification of trapping risks and in the planning and managing of work activities to protect against entrapment accidents.

Part 2 is aimed at those using AWPs and those responsible for rescuing anyone trapped on an AWP platform. Part 2 has been designed to be used in briefings or toolbox talks.

Note that this document is not intended to be complete guidance on all aspects of AWP operation.

Operators of AWPs must at all times be trained and competent.

The Trapping/Crushing Risk

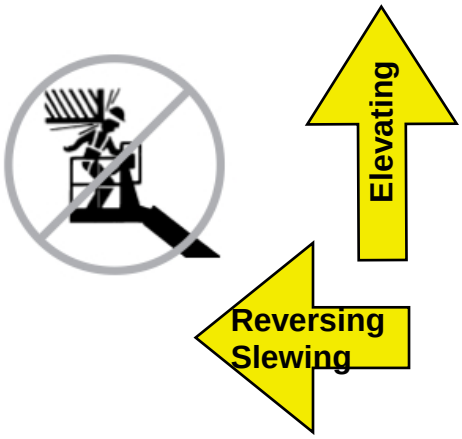
AWPs are acknowledged to be the safest and most efficient means of providing temporary access at height for many work activities.

In some work situations, however, AWP operators, particularly of boom-type AWPs, have been trapped/crushed between the AWP platform/basket and an overhead obstruction. This has resulted in a significant number of serious accidents, including several deaths, in the recent years. In some of these accidents, the operator's body was trapped/crushed over the control panel, trapping the controls in the "on position" and making the crushing worse.

This Best Practice Guidance has been produced by the Strategic Forum for Construction Plant Safety Group, to raise awareness of this risk among AWP **operators, supervisors and rescuers**. For more detailed information please refer to the **Part 1** of this document.

What causes the risk?

Common reasons for accidents include any of the following while operating an AWP close to an overhead obstruction:



- **Reversing, Slewing or Elevating** into an obstruction
- **Unexpected movement of the boom** near to an obstruction

What factors increase the risk?

The factors listed below may ***increase*** risk when operating an AWP close to an overhead obstruction. Guidance on ways to reduce these risks is given on page 29.

- Poor AWP route planning
- Poor AWP selection
- Insufficient AWP familiarization
- Uneven ground
- Poor visibility at height
- Distractions when operating AWP
- Objects placed on the control panel
- High drive speeds, or lack of care...
- Overriding AWP controls
- Using faulty or poorly maintained AWPs

Note: AWPs should only be operated by trained and familiarized operators

Common Rescue Problems

Once trapped, rescue can often be hampered because:

- No-one knows the person is trapped
- No emergency rescue plan
- No key in ground level controls:
  This limits the ability to use ground level controls in an emergency
- Lack of familiarity with ground / emergency descent controls:
  Ground operatives who have never practiced using the ground/rescue controls, and cannot therefore safely bring the basket down in an emergency.
- Overload cell has been activated:
  This can affect the operation of the controls.
- Emergency stop has been activated:
  This can restrict the ability of the operator to be rescued.
- Complicated boom manoeuvre

If someone is being crushed and can't breathe...

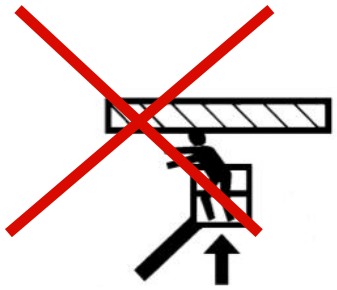
React Immediately!

you only have a <u>few minutes</u> to rescue and resuscitate them ... <u>every second counts</u>!

10 Ways to Reduce the Risk

Working close to overhead structures should be regarded as a “higher risk” AWP operation. If you are expected to carry out this sort of work, you should ensure that the following issues have been properly addressed, and that management has explained the steps taken to minimize trapping/crushing risks in a pre-start briefing.
If in doubt, ask!

☑ Plan the AWP route carefully



a) Keep a sensible distance from obstructions

The route taken by the AWP should ideally be planned so as to keep a ***sensible distance*** between the AWP and any overhead obstruction. This distance will need to be greater for a boom-type AWP being driven at height to allow for the possible “bounce” and “see-saw” effects.

b) Avoid the drive / elevate / slew controls when close to an obstruction

If working close to an overhead obstruction is unavoidable, it is strongly recommended that, where possible, only the fine-positioning controls of a boom-type AWP should be used. Once the AWP is close to the obstruction ***the “coarser” drive, elevate and slew controls should be avoided.***

Movements should always be slow, deliberate and planned. This is achieved by careful use of the AWP’s proportional controls.

The sequence of control use given below is recommended:

WHEN ELEVATING ↑	WHEN DESCENDING ↓
5. Fine Control	1. Fine Control
4. Telescope	2. Telescope
3. Slew	3. Slew
2. Elevate	4. Descend
1. Drive	5. Drive

c) Driving at height should be the last resort

Driving a boom-type AWP at height should be the maneuver of last resort when positioning the platform close to an overhead obstruction since it can create unexpected movements that make fine adjustment of the platform position difficult to achieve..

If driving at height is considered the least risk option, booms should be driven at their ***slowest speeds*** (this is of particular relevance at lower heights, when drive speeds are faster).

☑ Select AWP carefully

It is important to ensure the AWP selected is ***suitable for the specific maneuver to be carried out if working close to an overhead obstruction***.

Particular attention should be given to the choice of:

- **Reach** of machine - ideally, it is better not to operate close to the limit of the machine's "operating envelope"
- **Clearance** - ensure AWP and platform are not too large for the spaces in which the machine must be operated

☑ Ensure familiarization is specific

It is essential that appropriately trained operators receive a ***familiarization that is specific to the AWP they plan to use***, conducted in a low-risk area away from overhead structures.

In addition to familiarity with the normal operating controls of the AWP, the minimum standard for each operator is to fully understand:

- **Emergency Descent Controls** – how to use the emergency lowering controls, both under power and auxiliary modes including how the controls work *once the load cell has been activated*
- **"Dead Man" Controls (e.g. foot pedals)** – what happens if you remove your foot from the foot pedal and re-insert in a simulated "slumped over the controls" situation?
- **Operating Past the 90 Degree Position:** how do the controls work when a boom-type AWP is slewed past the 90 degree position?

Personnel on the ground, who are competent to lower the AWP in an emergency, should undergo familiarization with the emergency and ground controls and ***practice emergency lowering procedures*** at regular intervals in accordance with the emergency rescue plan.

☑ Ensure good ground conditions

Ground conditions should be suitable for the safe operation of the machine. The ground should where possible be relatively level and compacted with ***no obstructions in the operating zone***.

All trenches, column bases and pits should be identified and protected.

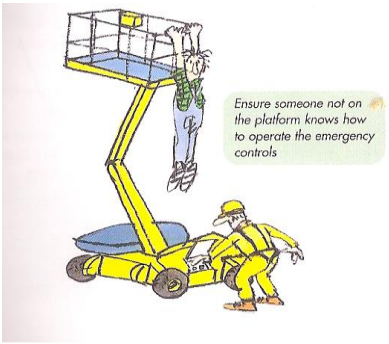
If ground conditions are poor, do not operate the AWP.

☑ Ensure good visibility at height

When working inside the building, and at times of low light (e.g. in winter months or in poor weather), ***adequate lighting should be provided*** or work suspended.

☑ Minimize distractions

Distractions in the platform/basket, such as mobile phones and trailing cables should be strongly discouraged. Loose materials on the AWP handrails or in the basket of the AWP should be prohibited and should be carried in approved containers and/or using approved materials handling attachments.



Distractions on the ground (people or objects near the AWP base) should be removed before operating and exclusion zones complied with.

☑ Do not obstruct AWP controls

Basket controls: basket/platform hand and foot controls should not be obstructed. Tools and materials which could obstruct the controls should not be placed on the AWP control panel but stored in approved containers and and/or using approved materials handling attachments.

Once in position, consider isolating the power until you need to re-position to reduce the risks of accidental operation.

Emergency lowering controls: these controls could be required to affect an emergency rescue and should not be obstructed by objects on the ground (e.g. operating AWP close to a wall with emergency controls facing the wall).

☑ Slow down, don't crouch over the controls and look!

- Slow drive speeds should be used, particularly when reversing
- Crouching over the controls significantly reduces the operator's margin of safety
- Scan the area for obstructions both before and during AWP operation
- Do not lean over the guard rails while operating the AWP

☑ Do not override the AWP controls or use faulty AWPs

- Check that the AWP has a current annual inspection
- Always perform daily checks
- Report all faults
- Any faults must be rectified before using AWP
- Do not override the controls

☑ Rehearse rescue procedure

The following points should have been considered before using the AWP. In extreme cases, and/or where an operation involves repeatedly working close to an obstruction, an observed "dry run" could be appropriate, to look for potential entrapment risks that could result in a rescue being required.

- **Ensure ground key available**:
  The ground key for the AWP should ideally be left in the base unit where this is practicable, or at least quickly available at ground level if not.
- **Appoint a ground rescue person**:
  While the AWP operation is taking place at least one (and as many as is appropriate) designated ground rescue person should be appointed who knows the rescue procedure and has been familiarized with the AWP being used (including emergency rescue controls). They should always be readily available in the event of an emergency.
- **Consider how to raise the alarm**:
  A system must be in place to identify that an operator may have become trapped, particularly for lone workers working close to an overhead structure. This needs very careful consideration if the operator cannot be seen from the ground. Operators must take advice if such a system has not been put in place when a risk of entrapment is present.
- **Decide who should effect the rescue and how:**
  This depends on the complexity of the operation and therefore the relative risk of effecting a rescue from the ground compared to the risk of an operator, possibly in a state of panic, trying to rescue himself. It also depends on how the controls for the specific AWP being used function.

  The order of priority should be:

  1. Operator: the operator, or other competent people in the basket, should try to rescue themselves by re-tracing the steps they took in reverse order.

  2. Ground staff: if visibility and understanding of situation from the ground are good, ground staff should effect a rescue using the ground controls in the following order:
  - ***auxiliary power*** at first which gives the slowest and most controlled maneuver of the boom until it is obvious that the basket is clear of any obstructions at height.
  - ***powered descent***: once clear of obstructions, it is then recommended to switch to powered descent to maximize the speed of recovery.

  3. Another AWP: In some situations the use of another AWP to gain access to the platform may be the safest option. This will only be acceptable if such rescue has been planned and includes means of transferring between platforms which prevents anyone falling.

Further Guidance:
For more details about preventing trapping accidents please refer to **Part 1** of this Best Practice Guidance document.

Working Group Membership

Strategic Forum for Construction Plant Safety Group: Best Practice Guidance for MEWPs (AWPs) - Working Group membership included:

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