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Hooped ladders (aka 'caged' ladders)
Briefing note to assist those undertaking risk assessment

Background

On 10th July 2012 the Health and Safety Executive (HSE) issued a Safety Notice, Bulletin No: CCID 1-2012, *Hooped ladders and the use of personal fall-arrest systems* (Link: HSE). The safety notice was issued to remind duty holders of the need to fully assess the risks from work at height activities (and to provide context and explanation for Research Report 657[1] published on its website). HSE notes that, "The report contains useful information … and HSE is taking action on many of the report findings. It is, however, important to note that claims and conclusions presented in the report are not representative of HSE policy".

Research Report 657 follows on from an earlier report, Research Report 258[2]. The two reports conclude that:

1. There is no evidence that hoops (also known as cages) on ladders provide any positive fall arrest capability.
2. The mode of a how a person falls and their interaction with the ladder hoops in many cases interfered detrimentally with the operation of personal fall-arrest systems installed in them.
3. The results showed that in most cases there was a risk of serious injury[3].
4. The new BS 4211: 2005 +A1: 2008, published since the second report was first commissioned, specifies that hooped ladders should have 5 rather than 3 vertical slats[4].
5. The EN standards for certain types of fall-arrest equipment, which could be used with bare ladders or hooped ladders, do not address foreseeable modes of fall (e.g. backwards falls) and interaction with the ladder and hoops[5].

The bulletin states that users should be aware of the possible limitations of personal fall-arrest equipment used inside a hooped ladder to arrest a fall and the nature of the risks it may present. Users should, "make appropriate provision as part of their risk assessment" and duty holders, "should also consider their rescue plan and the use of climbing helmets to reduce the risk of injury from striking the hoops".

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1 Research Report 657, *Investigation into the fall-arresting effectiveness of ladder safety hoops, when used in conjunction with various fall-arrest systems* (Link: HSE).

2 Research Report 258, *Preliminary investigation into the fall-arresting effectiveness of ladder safety hoop*s (Link: HSE).

3 The text continues, "The fall-arrest systems tested represented a good sample - all conforming to the relevant standards. The ladder also conformed to the relevant standard".

4 The text continues, "The report's author could find no paper to justify the reason for this and believes that BS 4211 gives a false impression that caged ladders confer superior protection to that of personal fall-arrest systems".

5 Guided type fall arresters to EN353-1: 2002 are the subject of a 'safeguard action' and the 'withdrawal of presumption of conformity' (Link: OJ).

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It is noted that, "The HSE is not seeking to prohibit hooped ladders, to recommend the blanket removal of hoops from ladders (which would probably increase overall risk), or to prohibit the use of personal fall-arrest systems within hooped ladders". While the report concludes that hoops alone do not provide positive fall arrest capability, they may provide other safety benefits that the report does not explore[6].

The bulletin requires that:

(a) Duty holders should carry out risk assessments to see whether work at height can be avoided or if the provision of a safer means of access is reasonably practicable. Risk assessments should take into account this latest guidance.

(b) If an existing EN 353-1: 2002 guided type fall arrest system on a rigid line is present on a hooped ladder, duty holders should consult *the manufacturer or supplier* regarding its effectiveness to safely arrest a fall, in respect of safety warnings in 2004[7] and 2007[8].

Introduction

Whilst the number of incidents of falling from within hooped ladders is relatively few (the incidence rate is not known), it has been known to have fatal consequences. The selection of appropriate and suitable access/egress must be 'risk based'. For example, the control measures considered appropriate for a 3m occasional climb up to an internal mezzanine floor are different to those required for a frequent climb up an external 50m mast.

Legal

Work at Height Regulations 2005

The Regulations set out a simple hierarchy[9] for managing and selecting equipment for work at height. Duty holders must:

- **Avoid** work at height where they can;
- Use work equipment or other measures to **prevent** falls where they cannot avoid working at height; and
- Where they cannot eliminate the risk of a fall, use work equipment or other measures to **minimise** the distance and consequences of a fall should one occur;
- Finally, use work equipment or other measures that do none of the above but that, through **instruction, training and supervision**, minimise the risk of a fall occurring.

Schedules to the Regulations

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6 *heightec* considers these issues to include 'human factors', e.g. ergonomics, psychological aspects, etc. It is commonly felt that hoops provide, for example, a 'comfort factor' and enable the user to pause, lean back and rest.

7 HSE Safety warning: BS EN 353-1: 2002, Press Release: E074:04 - 1 June 2004 (Link: HSE)

8 HSE Safety warning: HACA fixed rail vertical fall arrest system type 0529.7102 (Link: HSE)

9 INDG401, *The Work at Height Regulations 2005 A brief guide* (Link: HSE)

Schedule 6, *Requirements for ladders*, states:

"1. Every employer shall ensure that a ladder is used for work at height only if a risk assessment under regulation 3 of the Management Regulations[10] has demonstrated that the use of more suitable work equipment is not justified because of the low risk and (a) the short duration of use; or (b) existing features on site which he cannot alter".

Also:

"9. Where a ladder or run of ladders rises a vertical distance of 9 metres or more above its base, there shall, where reasonably practicable, be provided at suitable intervals sufficient safe landing areas or rest platforms".

Guidance

The guidance leaflet *Safe use of ladders and stepladders - An employers' guide* (HSE, INDG402)[11] does not apply to 'fixed ladders'. However, it is worth noting that in the context of ladders and stepladders it states:

"As a guide, **only** use a ladder or stepladder: in one position for a maximum of 30 minutes; for 'light work' - they are not suitable for strenuous or heavy work …".

Furthermore, reference is made to the need to:

- Maintain three points of contact (hands and feet) at the working position;
- Avoid holding items when climbing (e.g. by using tool belts);
- Ensuring there are no visible defects (e.g. a pre-use check each working day); and
- Ensuring the ladder is maintained and has a current detailed visual inspection (in accordance with the manufacturer's instructions).

In general terms, it is considered good practice to maintain 'three points of contact' when climbing a vertical ladder[12]. If work needs to be undertaken from a vertical ladder then appropriate work positioning equipment should be utilised, with a backup system (e.g. energy absorbing lanyard).

OSHA[13] CFR 1910.27, *Fixed Ladders*, notes:

"Ladder safety devices. Ladder safety devices may be used on tower, water tank, and chimney ladders over 20 feet in unbroken length in lieu of cage protection …".

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10 Management of Health and Safety at Work Regulations 1999, (Link Legislation.gov.uk)

11 This guidance does not apply to fixed ladders (on buildings, plant or vehicles), other types of fixed access (step irons, etc.), specialist rescue ladders used by the fire service, roof ladders, step stools, warehouse steps/mobile stairs, or temporary or permanent stairs.

12 By way of background information INDG402 gives advice on maintaining three points of contact (hands and feet) at the 'working position' (as opposed to when 'climbing'). Note, however, that this guidance does not apply to fixed ladders.

13 OSHA CFR 1910.27, *Fixed Ladders* (Link: OHSA).

Advice on 'fixed access' is given by the Canadian National Occupational Safety and Health Resource (see **Appendix**).

Workplace (Health Safety and Welfare) Regulations 1992[14]

The ACoP (Para. 119) states:

"Fixed ladders should not be provided in circumstances where it would be practical to install a staircase … Fixed ladders or other suitable means of access or egress should be provided in pits, tanks and similar structures into which workers need to descend. In this Code a 'fixed ladder' included a steep stairway (a staircase which a person normally descends facing the treads or rungs".

It goes on to say (120):

"Fixed ladders should be of sound construction, properly maintained and securely fixed. Rungs of a ladders should be horizontal, give adequate foothold and not depend solely upon nails, screws or similar fixings for their support …"

and (122):

"Fixed ladders installed after 31 December 1992 with a vertical distance of more than 6 m should normally have a landing or other adequate resting platform at every 6 m point. Each run should, where possible, be out of line with the last run, to reduce the distance a person might fall. Where it is not possible to provide such landings, for example on a chimney, the ladders should only be used by specially trained and proficient people".

Furthermore (124):

"Fixed ladders at an angle of less than 15 degrees to the vertical (a pitch of more than 75 degrees) which are more than 2.5 m high should where possible be fitted with suitable safety hoops or permanently fixed fall arrest systems …".

British Standard

BS 4211: 2005[15], Clause 5.5.1, states that:

"A passive protection system, for example, a safety cage … shall be the preferred choice. Where it is not possible to use a cage, individual protective equipment shall be provided. A fall arrester shall be provided only where low[16] frequency and specialized access (e.g. maintenance) is required."

and includes the following note:

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14 NOTE: Reg. 13(1) to (4) of the WHSR has been revoked by the *Work at Height Regulations 2005* (and the ACoP material mostly superseded). However, the ACoP/Guidance presents requirements previously set out within the UK.

15 BS 4211:2005+A1:2008, *Specification for permanently fixed ladders*

16 This statement is considered to be in error. It is considered that it should state "high frequency" on the basis that the more ladders are climbed the greater the number of control measures that should be considered.

"NOTE: A fall arrester is only effective if the user chooses to use it. If a harness with an incompatible sliding system is used with a guided type fall arrester, there will be a risk".

Advice

Research Report 258 has shown no evidence that hoops, also known as 'cages', on ladders provide any positive fall arrest capability, i.e. they may not be considered effective in minimising the height and consequences of a fall.

A hooped ladder has traditionally been considered to provide 'collective' protection, with the hoops being 'passive', i.e. something that does not rely on intervention by the user. However, the use of the term 'collective' is now questionable[17]. Hoops are, however, often considered to provide some psychological protection (and, for those of larger build, an opportunity to lean back and rest).

In deciding whether hooped ladders are required, or appropriate, a hierarchical approach should be adopted:

Avoid

You should try to eliminate the need for a vertical ladder. For example, a building owner and/or facilities manager and/or designer[18] should consider whether the task for which vertical hooped ladder access is required, e.g. to access instrumentation, can be undertaken at a lower level, e.g. at ground level, or from within an already protected work area.

Prevent

Rather than providing a hooped ladder it may be possible to provide a stair with handrails (e.g. 30 to 42 degrees pitch). Preference should be given to stairs (BS 5395[19]) ahead of companion way ladders (e.g. 65 to 75 degrees) and fixed vertical ladders (e.g. 75 to 90 degrees) (see also BS 4211). However, this may not always be appropriate, e.g. on tall masts and towers (where factors such as wind loading become significant). Hooped ladders inclined increasingly towards 75° from the vertical are felt to offer better 'climbability' than fully vertical ladders[20].

Mitigate

Where the risk of a fall cannot be eliminated and work at height is required it may be possible, particularly for very infrequent access, to position equipment so that it can be accessed via

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17 Indeed, they might more appropriately be considered *pseudo-collective*, viz. Adjective: 1. Not actually but having the appearance of; pretended; false or spurious; sham. 2. Almost, approaching, or trying to be".

18 A building owner and/or facilities manager and/or designer should be able to demonstrate that a vertical hooped ladder is the most appropriate item of equipment for access and/or egress, for the particular location and circumstances.

19 *Stairs, ladders and walkways* (In several parts).

20 An interesting reference in this respect is Australian Standard, AS 1657—1992, *Fixed platforms, walkways, stairways and ladders — Design, construction and installation, sets out requirements for the design*.

other means, e.g. a mobile elevating work platform (MEWP). This would be in preference to the use of personal fall protection equipment.

Risk assessment

When choosing between different forms of access/egress, and assessing the use of a hooped ladder (with or without personal fall protection equipment), consideration should to be given to the following issues:

Planning

- Whether stairways, or other forms of access, are more suitable.
- The frequency of access/egress, e.g. occasional or frequent.
- The type of access, e.g. vertical hooped ladder with platforms at 6m spacing, tall vertical ladder with vertical rail or cable fall arrest systems and rest platforms.
- The availability and type of rest platform(s) and landings.
- Site and/or task-related hazards, e.g. microwave radiation.
- Rescue technique(s) and equipment.

Site

- The height of the climb, e.g. 3m, 6m, 20m or 100m.
- The operation to be undertaken, e.g. access/egress or maintenance.
- The condition of structure and/or access way.
- Inspection regime[21].
- The environment, e.g. indoors or outdoors.
- The prevailing weather conditions, e.g. rain, wind.
- The exposure conditions, e.g. wind chill, heat.
- Factors that may be introduced if the ladder is 'below ground', e.g. in a narrow shaft.

Worker

- Worker experience, e.g. 'occasional' climber or 'skilled'.
- Training, e.g. 'familiarisation', formal climbing/rigging course, etc.
- Refresher training, e.g. number of climbs per year.
- Height aptitude, e.g. ease with working at height on mast and towers.
- Health and fitness, e.g. the demand on stamina and strength (physical stamina, muscle strength and aerobic fitness which decline naturally with age).
- Additional skills, e.g. first aid and emergency, rescue and recovery.

Equipment

- Safe access and/or egress at the top of a ladder:
  - e.g. by providing a hand hold.

[21] There should be inspection by a competent person for visible defects (e.g. oil, grease, damaged or corroded rungs) on a periodic basis and, where these could affect their safe use after any incident. Defective ladders should be withdrawn from use and 'tagged' to indicate that they should not be used.

  - e.g. ensuring, preferably, that it takes place within a protected area, i.e. a guardrail.
- Availability and use of personal protective equipment and clothing.
- Availability of work equipment, including that for rescue.
- That head protection and suitable footwear are worn at all times, i.e. a climbing helmet is recommended[22].
- Communications between the climbing team at all times.
- Ergonomics, e.g. the repetitive action of opening/closing karabiner gates with twin-legged lanyards.

Management

- The need for, and frequency of, a medical assessment.
- The location and availability of emergency support services.
- The need to ensure that the site is clearly delineated, e.g. risk of being struck by falling objects.
- The team composition, e.g. ensuring that an adequate number of personnel are present.
- Supervision, e.g. climbing with an experienced worker.
- The need for pre-use checks, including the use of 'permit to climb' procedures.
- Periodic detailed inspection of the hooped ladder and any fall arrest equipment; related to use and environment but usually at least every 12 months
- Climbing procedures, e.g. that work practices follow a 'safe system of work' (and take account or weather changes, structural defects, prevention of objects falling, hatches/trapdoors are closed).

Other issues

It is suggested that:

(a) The personal fall protection equipment considered most appropriate for use within caged ladders is:

(i) sliding fall-arresters on rails and cables (to EN 353-1); and then

(ii) twin-legged lanyards[23].

(b) For hooped ladders up to a height of 6m[24], personal fall protection in addition to ladder hoops will not generally be expected (subject to adequate inspection, maintenance and hazard awareness training).

(c) Where there is an extensive run of successive 6m ladders with rest platforms, consideration should be given to personal fall protection since those climbing will be subject to fatigue.

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22 See BS EN 12492: 2012, *Mountaineering equipment. Helmets for mountaineers. Safety requirements and test methods*

23 There should be consultation with the manufacturer of the vertical anchor line to see whether there will be any incompatibility between the personal fall protection system and the cage.

24 Based upon the former requirement to have a landing or rest platform at every 6m (see Para. 122, Workplace (Health, Safety and Welfare) Regulations 1992). Portable ladders are also available in the range of 6 to 9 metres.

(d) Subject to a suitable and sufficient inspection regime, existing ladder hoops need not be removed. However, if undertaking major refurbishment work, clients should determine whether a hooped ladder remains the most appropriate form of access/egress, and whether additional fall protection is required.

Conclusion

Hooped ladders without personal fall protection are most appropriate for low heights and infrequent use only. A fall sustained within a hooped ladder is likely to result in injuries, even if personal fall protection equipment is used. Arguably it would be more appropriate, on long climbs, to provide a ladder with personal fall protection equipment and no hoops. Any use of ladders, with or without hoops, should consider rescue and recovery.

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Appendix

Fixed ladders – Advice from CCOHS

Advice on 'fixed access' is given by the Canadian National Occupational Safety and Health Resource[25]:

When should you inspect fixed ladders?

- Inspect the fixed ladder before each use.
- Inspect fixed ladders periodically, once every three months.
- Report any defect promptly.
- Keep the record of every inspection.

What should you check for when inspecting access ladders?

- Loose, worn and damaged rungs or side rails.
- Damaged or a corroded cage.
- Corroded guards, bolts and rivet heads.
- Damaged or corroded handrails and brackets on platforms.
- Broken or loose anchorages.
- Weakened or damaged rungs on brick or concrete slabs.
- Defects in climbing devices[26], including loose or damaged carrier rails or ropes.
- Slippery surfaces from oil and ice.
- Clutter obstructing the base of ladder or platform.

What should you do when climbing a fixed ladder?

- Wait until the other person has exited before ascending or descending.
- Use the appropriate safety devices (e.g. restraint belt[27], travelling fixture).
- Maintain three-point contact by keeping two hands and one foot, or two feet and one hand on a ladder always.
- Face ladder and use both hands to grip the rungs firmly.
- Place feet firmly on each rung.
- Wear footwear with heels. Ensure that footwear is in good condition.
- Clean muddy or slippery boot soles before mounting a ladder.
- Rise or lower tools and materials using a hand-line.

What should you avoid when climbing a fixed ladder?

- Avoid climbing with wet soles.
- Do not carry tools or materials in your hand while climbing. Carry small tools in a tool pouch.
- Do not jump from a ladder. Check footing before descending a ladder.

25 www.ccohs.ca/oshanswers/safety_haz/ladders/fixed.html
26 In the UK, referred to as fall arrest devices
27 For fall arrest, this should be a full body harness to EN 361. A work positioning lanyard may also be carried, in order to undertake additional task(s).

- Do not hurry up or slide down a ladder.

/End

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