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SAFETY BULLETIN NO. 49: POWERED ASCENDERS: THE HAZARDS

A safety bulletin aimed at raising awareness of hazards in the rope access industry. The text may be of use as part of a toolbox talk.

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This safety bulletin - including, where given, any conclusions - is not as a result of any investigation undertaken by IRATA. The case study is based on information provided by a member company. IRATA does not attribute any blame; nor provide opinion on any root causes. Neither is any opinion expressed or implied on liability or culpability. The advice given is general in nature and provided to assist others in their use of powered ascenders.

1 INTRODUCTION

1.1 There have been a number of incidents reported following the use of powered ascenders.

1.2 The recommendations made in the IRATA ICOP do not cover powered ascenders, e.g. powered by battery or petrol, although it is noted that, "… the principles that apply to the safe use of manually-operated descending devices are likely to apply also to powered versions" (**2.7.5**).

1.3 This safety bulletin is designed to give general advice about the hazards associated with the use of powered ascenders. The information supplied by the manufacturer should be consulted.

1.4 It is essential that the probability of foreseeable misuse and the consequences of such misuse are assessed. When such an assessment has been made, a residual risk of misuse may exist, which should be addressed by identifying and applying specific control measures, such as the selection of alternative equipment, extra training, modification of work practices, increased supervision or a combination of these.

Case study

A rope access company undertook a contract carrying out repair work within a deep shaft. Due to the restricted nature of the worksite operatives needed to be clear of the shaft when lifting and lowering equipment and materials.

To improve safety and work efficiency, a powered ascender was rigged from a gantry on the surface with the capability of being operated remotely by operatives within the shaft (when required).

The work within the shaft itself created dirt and grit. This contaminated the working lines resulting in accelerated wear of the powered ascender. This caused a sharp edge to form on the device, resulting in extensive damage to a rope during an ascent controlled remotely by an operative.

No failure of the rope occurred. However, the rope sheath was completely cut through and the core damaged.

2 WHAT IS A POWERED ASCENDER?

2.1 A powered ascender is an item of equipment that allows a technician to ascend or descend a rope by mechanical means, thereby reducing the physical effort required to ascend. The device may be electrical or fuel-powered and should be used as part of a two rope system.

2.2 Ascenders offer various options for the method of ascent, relationship to the user (e.g. mounting) and secondary uses (e.g. lifting, hauling and tensioning).

3 WHAT ARE POWERED ASCENDERS USED FOR?

3.1 Powered ascenders have many uses. These include assisting in jobs that require:

- numerous ascents (both vertical and diagonal);
- long ascents;
- multi-user ascents;
- controlled descents;
- the transport and use of materials;
- the lifting and lowering of an operative by mechanical means;
- rescue provision (including rig-to-rescue).

4 TYPES OF POWERED ASCENDER AVAILABLE

4.1 There are many different types of powered ascender on the market, offering different means of interaction with the end user:

(a) Seat type

The user sits on a suspended seat and operates the device to ascend and descend. The operative still wears a harness, but the seat supports the user, so the user is not directly suspended in their harness.

(b) Suspended type

The user connects their harness directly to an anchor point on the device, sitting in their harness suspended below the device.

(c) Fixed type

The device is anchored at a location and controls the rope rigged via a pulley, with the user attached to the rope.

(d) Dual (multi) type

A device that can be deployed in different configurations, e.g. (a), (b) and (c); (b) and (c).

4.2 Some powered ascenders can be set up as a hauling device. The rope passes through the device and the device is anchored separately from the user. This allows the user to be raised or lowered remotely.

4.3 Operating powered ascenders can differ between model and type. Some can be, for example, operated directly via a throttle or push-button. Others can be operated remotely.

5 HOW DO POWERED ASCENDERS WORK?

5.1 The design of powered ascenders differs between manufacturers. In essence, however, they all share the following elements:

(a) Power source (e.g. DC battery, AC power or fuel)

This drives a motor or engine that is controlled by the user. The motor or engine operates through a gear box in order to control the output speed of a driven pulley or winch.

(b) Drive

The interaction between the rope and the drive pulley or winch is a key focal point for the compatibility of powered ascenders and rope. This also affects the rope care and lifespan. Some units have a small contact surface area which generates a lot of heat and wear on the rope, some have larger contact areas or can be adjusted.

(c) Control panel

This controls the speed of ascent and descent. There may be variable or single speed control. Some devices also offer remote control. Descent of the units also varies. Some devices have powered descent whilst others rely on friction (in a similar way to a manual descender).

5.2 Different products offer different specifications and capabilities in respect of range, speed (ascent and descent) and load capacity. The setup and maintenance requirements differ between devices, as does the product certification. Therefore, safety considerations for operational use also differ. All devices include direct attachment of the user, via a karabiner or sling, to ensure they are connected to the primary anchor line.

6 WHAT ARE THE BENEFITS OF USING POWERED ASCENDERS?

6.1 The benefits of using powered ascenders include (depending upon the device):

- a reduction in climber fatigue through assisted ascent (the unit does the work);
- a faster speed of ascent, i.e. there is a saving in operational time;
- improved technician positioning thus reducing stress on body and fatigue;
- capacity for two-person loading;
- multi-role capability, reducing logistical and equipment costs;
- a reduced operational footprint on sites compared to cranes and other powered access.

7 TYPICAL SIGNIFICANT HAZARDS AND CONTROL MEASURES

7.1 There are a number of typical significant hazards and control measures to be considered when using powered ascenders (see Table 1):

NOTE:

This list should not be considered exhaustive and should only be considered as the starting point of reference for undertaking a comprehensive risk assessment.

Table 1: Typical hazards and control measures		
Hazard	**Risk**	**Example control measure(s)**
1. **Incorrectly loading the rope into the powered ascender.**	Fall from height and/or uncontrolled descent. There may be sufficient friction for the device to maintain its position but then drop when loaded, resulting in impact or an uncontrolled descent.	Follow the manufacturer's guidance and instructions when loading the rope into the device. Most devices are single setup and cannot be operated incorrectly. Technicians should be competent in the use of the device being used (to include adequate training). Always undertake pre-use checks before a device is used. Before carrying out a full functional check, ensure that stopper knots and/or lock off devices are placed on the rope to prevent an uncontrolled descent
2. **Wear on part(s) of the device; or the device itself causing damage to the rope.**	Damage to the rope. Rope failure, resulting in an uncontrolled descent and/or impact.	Technicians should be competent in the use of the device being used. Carry out daily inspections and pre-use checks before using equipment. Before use, ensure that any guards and protection measures are in place and functioning correctly. If required, wear suitable protective gloves. Wear suitable protective clothing. Keep all items clear of the device/mechanism as these have the potential to be drawn in. Technicians should be competent in the use of the device being used.

3. **Technician being struck whilst in suspension and with the powered ascender suspended from their harness/back- up device.**	Main line rope failure resulting in the 'casualty' and powered ascender being suspended on their backup device. Personal injury by being struck by the powered ascender. Additional impact on the body through dynamic loading from of unit falling past the technician. Increased static mass suspended on the casualty's harness.	Ropes must be rigged and protected in accordance with the IRATA ICOP, **Annex P** (and the hierarchy of edge protection). Ensure the correct selection of back-up device. The rescue plan must take into account any additional risk posed by the potential for an additional mass to be suspended from the casualty. The method of work should protect the user from being struck and injured by the equipment in the event of a rope failure. Consider the use of a separate back-up system for the device. Ensure appropriate personal protective equipment, e.g. helmet. Use the connector recommended/provided by manufacturer between the device and the user's harness. Technicians should be competent in the use of the device being used.
4. **Rope being drawn through the device.**	Fingers, gloves or clothing being drawn into the device. Personal injury.	Follow the manufacturer's guidance and instructions when using the device. Alternative methods of use must be approved by the manufacturer. Always undertake daily inspections and pre-use checks before a device is used. Before use, ensure that any guards and protection measures are in place and functioning correctly If required, wear suitable protective gloves. Wear suitable protective clothing. Keep items clear of the device's mechanism, to avoid them being drawn in. Technicians should be competent in the use of the device being used.

5. **Snagging the load (item or person) during ascent or descent.**	Personal injury. Damage to structures or property. Dropped objects.	Follow the manufacturer's guidance and instructions when using the device. Alternative methods of use must be approved by the manufacturer. During ascent and descent, keep items clear of any potential snagging points. Ensure good visibility and awareness during ascent and descent. Maintain a controlled ascent and descent at all times. If using device(s) for remote lifting and/or lowering operations ensure that control is maintained. The user should remain vigilant to prevent continued ascent/descent in the event of snagging. Technicians should be competent in the use of the device being used. Ensure that any user instructions and/or manual are read and present on job.
6. **Incorrect rope selection.**	Rope damage to anchor line. Uncontrolled descent.	Follow the manufacturer's guidance and instruction on the selection and use of rope. NOTE: In some instances the manufacturer recommends that the rope is pre-conditioned in cold water and thoroughly dried, before first use.
7. **Incorrect use by untrained incompetent technician.**	Uncontrolled descent.	Technicians should be competent in the use of the device being used. Follow the manufacturer's guidance and instructions when using the device. Alternative methods of use must be approved by the manufacturer.
8. **Additional mass.**	The anchor and/or device strengths may be exceeded. Additional complications to rescue procedure. Manual handling.	Ensure that all anchors and devices are suitable for any additional mass of equipment. NOTE: Some powered ascenders are in excess of 20kg. Ensure that all rescue plans take into account the additional mass of the device. See guidance in IRATA ICOP **Part 3** and **Annex M.4**, Bulky, awkward or heavy equipment. Work in accordance with any local manual handling legislative requirements.

9. **Fuel type.**	Flammable liquids and hazardous substances.	Carry out any assessment on any hazardous substance(s), as required, and follow the recommendations in any material data safety sheet(s). Ensure the correct fuel type. Fuelling areas and spill kits to be available, as required. Fuel level checks and fuel availability. To avoid fire risk while refuelling, refuel only when components are cool and have fire suppression equipment available.

8 SOURCES OF INFORMATION

8.1 Sources of information include the following manufacturer's instructions:

Harken

https://www.harkenindustrial.com/en/home/

https://www.harkenindustrial.com/en/harkenindustrialcom/powerseat-ascenders/

ActSafe

http://www.actsafe.se/

http://www.actsafe.se/file_uploads/actsafe%20safety%20notice%2020141202%20djs.pdf

Ronin

https://roninpowerascender.com/

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8.2 For a list of current (and past) 'safety communications' by IRATA, see www.irata.org

9 RECORD FORM

9.1 An example *Safety Bulletin: Record Form* is given below. Members may have their own procedure(s) for recording briefings to technicians and others.

IRATA SAFETY BULLETIN – RECORD FORM			
Site:			
Date:			
Topic(s) for discussion:		Safety Bulletin No. 49: Powered ascenders: the hazards (002)	
Reason for talk:			
Start time:		**Finish time:**	
Attended by *Please sign to verify understanding of briefing*			
Print name:		**Signature:**	
Continue overleaf (where necessary)			
Matters raised by employees:		**Action taken as a result:**	
Continue overleaf (where necessary)			
Briefing leader *I confirm I have delivered this briefing and have questioned those attending on the topic discussed.*			
Print name:		**Signature:**	**Date:**
Comments:			