

2022 GUIDE FOR POWERED ASCENDER USE ON ANTENNA SUPPORTING STRUCTURES

Safety Equipment Manufacturers Committee (SEMC)



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Acknowledgement

Organizations Represented

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1. Background and Purpose

This telecommunications industry consensus document is intended to address the use of Powered Ascenders in conjunction with a fixed synthetic rope for personnel ascending, descending and work positioning on telecommunications structures. There is not a recognized standard in the United States applicable for the use of Powered Ascenders utilizing synthetic rope; the only relevant reference material available is the European Machinery Directive 2006/42/EC. As a proactive approach to the safe use of Powered Ascenders in the industry, this document was created to provide guidance for the use of Powered Ascenders on telecom structures regardless of Powered Ascender manufacturer or design type.

Recent advances in technology have made Powered Ascenders a more prevalent and viable tool for access to work at height. These devices benefit the industry by reducing worker fatigue, increasing efficiency, productivity, and reducing injury potential from repetitive motion injuries, thus increasing worker longevity.

This document is intended to address Powered Ascenders on a fixed synthetic rope, where the Powered Ascender moves along the rope. It will not address the configurations of the Powered Ascender being anchored and the rope moving, or the use of a Powered Ascender to hoist materials. This consensus document is only intended to apply to antenna supporting structures that are governed by the ANSI/TIA-222 standard, as adopted by the International Building Code (IBC) and other jurisdictional building codes.

2. Definitions

Anchorage – A secure connecting point or a terminating component of a fall protection system or rescue system capable of safely supporting the impact forces applied by a fall protection system or anchorage subsystem.

Contaminants – A physical object or chemical substance that may compromise the performance of the Powered Ascender System. Examples may include but are not limited to paint, grease, gas, oil, tape, butyl, gravel, sand, dust, dirt, and debris.

Fall Arrestor – A device that travels on a Vertical Lifeline and will automatically engage and lock onto the Lifeline in the event of a fall.

Mainline – A vertically suspended synthetic line used for ascending/descending and/or work positioning.

Powered Ascender – A powered device designed and approved by the manufacturer for personnel ascending, descending, and suspended work positioning on a synthetic rope system by mechanical or electrical means.

Powered Ascender System – A two-rope system comprised of a Powered Ascender, Mainline, Vertical Lifeline, Fall Arrestor, Personal Fall Arrest System (PFAS), Anchorages, and Anchorage Connectors.

Simple Worksite – A scope of work that is unaffected by adjusted work or trades, where the Powered Ascender System follows a simple path from Anchorage to ground, does not require the user to pass knots, does not pass deviations greater than 20°, and where rescues can be carried out to ground level.

Vertical Lifeline (VLL) – A vertically suspended synthetic line along which a Fall Arrestor travels.

3. Pre-Use Inspection of Powered Ascender System

This section is intended to be used in conjunction with the equipment manufacturer's specifications. The inspection guidelines below are recommended for all Power Ascenders (where applicable) and associated system components. Additional inspections may be required per the manufacturer. If the Powered Ascender or components of any system does not pass these inspections, the system shall not be used until corrected.

A. Ropes

1. Mainline diameter and construction shall be compatible with the Powered Ascender.
2. Vertical Lifeline diameter and construction shall be compatible with the Fall Arrestor.
3. Shall be free from excessive wear, abrasion, and damage, including ultraviolet (UV) deterioration.
4. Shall be uniform in diameter and show no signs of core damage.
5. Shall be uniform in texture, free from fraying and glazing (heat damage).
6. Shall be free from excessive Contaminants.
7. Shall be free from tape, knots, kinks, or user modifications that impede the use of the Powered Ascender.

B. Anchorage

1. Anchorage used for the Mainline and Vertical Lifeline shall have the capacity of 5,000 lbs. for an improvised anchor or 3,600 lbs. for an engineered anchor per attached line.
2. User must inspect the Anchorage for structural integrity and potential defects including but not limited to; signs of a fall arrest event, weld cracks, deformations, degradation, and excessive corrosion/wear.

C. Personal Fall Arrest System (PFAS)

1. All components of the PFAS shall be inspected prior to use and meet the requirements of ANSI/ASSP Z359, including but not limited to:
 - i. Full body harness
 - ii. Fall Arrestor
 - iii. Fall arrestor lanyard
 - iv. Work positioning device
 - v. Connecting devices
 - vi. Anchorage connectors

D. Powered Ascender

1. Visual inspection
 - i. Ensure all manufacturer's labeling is present and legible
 - ii. Inspect the device for corrosion, wear, cracks, missing parts, and deformation
 - iii. Inspect rope guides and drives for cracks, distortion, corrosion, scratches or gouges, sharp edges, or rough areas that might abrade the rope

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2. Power Source (battery/fuel)
 - i. Verify battery turns on and has appropriate power levels for the scope of work
 - ii. Do a visual inspection of all batteries checking for damage or swelling
 - iii. Check battery connection points for debris, corrosion, or foreign objects on terminals
 - iv. Ensure the battery fully connects and is locked into place
 - v. Ensure the intake filter is free of dirt, dust, or debris
 - vi. Check fuel and oil levels
 - vii. Check for leaks
 - viii. Check for damage to gas lines and wiring connections
 3. Function tests
 - i. Turn on the engine or battery and run the Powered Ascender for a few seconds to ensure it is operating as expected.
 - ii. Install the Powered Ascender on the mainline and verify it ascends/descends the rope as expected, including variable speeds.
 - iii. Verify functionality of emergency controls; this may include emergency stop buttons, stop lever, double action controls, anti-panic switches, and emergency descent.
 - iv. At ground level or area with no risk of fall, proof-load Powered Ascender with the weight of the user to verify it does not slip or auto-descend unexpectedly.

E. JHA (Job Hazard Analysis)

1. Powered Ascender System inspection must be documented daily, prior to use.
2. The site-specific rescue plan must address the potential for rescue from the Powered Ascender System.
3. Hazards shall be documented on the JHA based on the scope of work with the use of a Powered Ascender.

4. Use

The section below details usage considerations applicable to all Powered Ascenders regardless of the manufacturer's drive type. Additional actions may be required per the manufacturer's specifications. A minimum of two certified Competent Climbers/Rescuers must be onsite for all Powered Ascender operations.

A. Ropes

1. Ropes shall be selected based on compatibility with manufacturer requirements for rope type, diameter, and construction.
2. The ropes used with the Powered Ascender and Fall Arrester shall be maintained to protect against abrasion or damage at all times.
3. Ensure the ropes used with the Powered Ascender and Fall Arrester do not become intertwined/twisted with each other or the structure.

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4. The ropes used with both the Powered Ascender and Fall Arrestor shall be installed in a manner to ensure a clear path for ascending/descending.
 5. Rope terminations shall be made by the rope manufacturer or by a competent person in accordance with local, state, federal regulations, standards, and manufacturer specifications.

B. Anchorage system

1. Separate Anchorage should be used for the Mainline/Vertical Lifeline (VLL) systems and attached directly to the telecommunications structure. Appurtenances are not approved for use as anchorage system.
 - i. If a single anchor is utilized, then separate anchorage connectors are required.
2. Anchorage shall be installed to reduce the potential of a swing fall.

C. Fall protection

1. All equipment used as part of the fall protection plan shall meet the requirements of ANSI/ASSP Z359.
2. Fall arrestor lanyard shall only allow a maximum free fall distance up to 24 inches when attached to the sternal D-ring.
3. Vertical Lifeline separation shall not exceed a distance of 36" horizontally from the Mainline when in use. Due to anchor separation, a redirect may be required to obtain the line management spacing.

D. Ascending, descending, or work positioning

1. User shall keep hands, hair, and any loose items or equipment away from moving parts of the Powered Ascender.
2. User shall maintain control and avoid excessive swing to prevent shock loading the Powered Ascender System, impact into the structure, or Fall Arrestor accidental engagement.
3. While utilizing the Powered Ascender for work positioning, the user shall ensure that all stop functions are engaged and the Powered Ascender does not have unintended travel.
4. While ascending/descending, the user should visually monitor the system for proper functionality.
5. While ascending/descending, the user should maintain situational awareness to mitigate potential hazards.

E. Transitioning to and from the Powered Ascender to a structure at height

1. The user shall ensure the Fall Arrestor is locked on the Vertical Lifeline or the fall arrest twin-leg lanyard is anchored on the structure at the highest possible location in order to reduce freefall distances and potential shock loading onto the Powered Ascender System.
2. The user's attachment point should be at the same level or below the Powered Ascender attachment point when connecting/disconnecting to limit potential shock loading.

5. Environmental Conditions

Environmental conditions may affect the functionality of the Powered Ascender System and increase wear on the components. Existing site conditions shall be evaluated for potential hazards and documented as part of the JHA. The items identified shall be compared to the Powered Ascender Ingress Protection (IP) ratings for use compatibility.

Ingress Protection (IP) Ratings

Connectors may be susceptible to ingress of foreign materials such as moisture or dust, particularly in the non-sealed condition. Protection from this ingress is provided for connectors by their housing and the seal between the plug, jack, and cable or between a jack and a panel. The IP standard rating system defines the degree of protection provided. The standard IEC 60529 has specified the degree of protection and divided it into several levels, defines by the IP number, which has letters IP followed by two digits. The first digit defines the protection against the ingress of dust particles, the second digit defines the protection against the ingress of water. The tables below show IP ratings for electrical connectors:

IP67

1st Digit	Definition
0	No Protection against contact and ingress of objects
1	Protected against any large surface of the body, such as the back of a hand. Protected against solid objects greater than 50mm in size.
2	Protected against access to hazardous parts by a finger or similar object. Protected against solid objects greater than 12.5mm in size.
3	Protected against access to hazardous parts with a tool or thick wire. Protected against solid objects greater than 2.5mm in size.
4	Protected against access to hazardous parts with a wire, screw, etc. Protected against solid objects greater than 1mm in size.
5	Protected against hazardous parts. Dust protected.
6	Protected against access to hazardous parts. Dust-tight.

2nd Digit	Definition
0	No Protection
1	Protected against water drops.
2	Protected against water drops at a 15 degree angle.
3	Protected against water splashing from any angle.
4	Protected against water splashing from any angle.
5	Protected against water jets from any angle.
6	Protected against powerful water jets and heavy seas.
7	Protected against the effects of temporary submersion in water. Test requires 30 minutes at 1 meter depth.
8	Protected against the effects of temporary submersion. Customer specification applies and specific testing may be required.
9K	Protects against high pressures associated with steam cleaning.



A. Rain – Moisture – Humidity

1. Operation of the Powered Ascender in wet/rainy environments shall be based on the manufacturer's specific IP rating.
2. Excessively wet ropes may affect the performance and/or internal components of the Powered Ascender.
3. Moisture or wet ropes may affect the functionality of the Fall Arrestor.
4. As ropes become wet or damp their conductivity increases, therefore increasing a potential for a shock/electrical hazard when utilized near an electrical source.

B. Ice

1. Remove ice from the rope before going through the Powered Ascender.
2. Avoid using Powered Ascenders with visibly accumulated ice.
3. Frozen ropes may affect the performance and/or internal components of the Powered Ascender.
4. Frozen ropes or accumulated ice on the system may affect the functionality of the Fall Arrestor.

C. Temperature

1. The typical operating temperature for Powered Ascenders ranges between -5°C/23°F to 40°C/104°F. Powered Ascenders may have integral control measures to prevent overheating or freezing. The ambient temperature ranges directly affect the operating temperature of the Powered Ascender.
2. Operating temperature affects the performance output of battery-operated Powered Ascenders.
3. Confirm manufacturer requirements for operating temperature are met prior to use.

D. Contaminants

1. Dusty or dirty environments may affect the performance of the Powered Ascender.
2. Dirt, dust, or debris in/on the rope may affect the components of the Powered Ascender due to abrasion.
3. Excessive dirt on the progress capture mechanism may cause the rope to slip.
4. Avoid debris and Contaminants (ex. tape, paint, other environmental debris) in or on the Powered Ascender.
5. Grease or oil on the drive mechanism may cause the Powered Ascender to slip.

E. Wind

1. When wind speed (sustained or gusts) exceeds 20 mph, a competent person must determine if it is safe to operate the Powered Ascender.
2. Adjustments to the line management system may be needed due to wind conditions.

6. Rescue

The site-specific rescue plan must address the potential for rescue from the Powered Ascender System. Users shall refer to the manufacturer for the safe operation of the Powered Ascender in rescue situations. Prior to rescue, the user shall be trained in accordance with Section 7 of this guideline.

7. Training

- A. Users shall be trained in compliance with the NATE Climber/Rescuer Training Standard (CRTS).
- B. Users shall be trained with the awareness of Simple Worksite (see definition) per ANSI/ASSP Z459.1.
- C. Users shall complete manufacturer-authorized training, specific to the Powered Ascender in use.
- D. Proof of Powered Ascender training must be available upon request.

8. User Warnings and Recommendations

- A. The use of different color ropes for different rope systems (Mainline/Vertical Lifeline) is recommended to improve safety by means of visual identification to prevent improperly attaching Powered Ascenders to non-compatible ropes.
- B. End user shall follow all local, state, and federal regulations when transporting or shipping Powered Ascender batteries by air, highway, rail, or water.
- C. End user shall follow all local, state, and federal regulations for disposal of batteries.
- D. A Y-style harness with a sternal attached lanyard and Fall Arrester is preferred by Powered Ascender manufacturers to accommodate the unique configurations of attaching to the Powered Ascender.
 - 1. The sternal attachment point D-ring maximum arresting force is 1,350 lbf with a maximum freefall distance of 24”.
 - 2. A Y-style harness is specifically designed to transfer the forces of a fall event from the sternal D-ring to the pelvic/sub-pelvic.
 - 3. An H-style harness may present a “crushing” hazard when utilizing a sternal attachment point.
- E. The user shall take necessary precautions to limit impact to the Mainline and Powered Ascender.
- F. The Powered Ascender and/or batteries shall be tethered to prevent a dropped object incident when disconnected/connected at height.
- G. User shall protect the Powered Ascender System from work that has the potential to produce arcs, sparks, flames, heat, or other sources of ignition.
- H. When using a gas-operated Powered Ascender, the user shall ensure proper ventilation.
- I. The user shall follow the manufacturers’ specific maintenance requirements. Some manufacturers require the Powered Ascender to be sent to a service center annually.

9. References

- **Battery Transportation**

- o 49 CFR Subchapter C, Part 171 – Hazardous Material Regulations

- **Environment**

- o IEC 60529 – Degrees of Protection Provided by Enclosure (Ingress Protection Code)

- **Fall Protection/Rescue**

- o NATE CRTS – NATE Climber/Rescuer Training Standard (CRTS)
- o ANSI/ASSP Z459.1-2021 – Safety Requirements for Rope Access Systems
- o ANSI/ASSP Z359 – Fall Protection Code

- **JHA**

- o ANSI/ASSP A10.48 – Criteria For Safety Practices With The Construction, Demolition, Modification And Maintenance Of Communication Structures

- **Manufacturer**

- o Harken, Web: www.harkenindustrial.com, Ph: 262-691-3320



- Battery: www.harkenindustrial.com/gallery/fb96337a-7e35-4129-bb5a-ffb750e4aaf2.pdf
- Gas: www.harkenindustrial.com/gallery/e0f620f9-b90e-4c4a-8293-a01459794688.pdf

- o Ronin, Web: www.roninpowerascender.com, Ph: 657-444-2557



- Battery: www.roninpowerascender.com/wp-content/uploads/2022/03/Ronin-Lift-User-Manual_V3.pdf

- o SKYLOTEC, Web: www.skylotec.com/nam_en, Ph: 303-544-2120



- Battery: www.skylotec.com/eu_en/actsafe-acx-power-ascender-poa-001.html
- Gas: www.skylotec.com/eu_en/actsafe-pmx-power-ascender-poa-006.html

- **Structure**

- o ANSI/TIA-222 – Structural Standard for Antenna Supporting Structures and Antennas