

# Aerial and Scissor Lift Safety

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## University of Tennessee Safety Procedure GS-135

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### Purpose

Aerial/scissor lifts pose a serious safety hazard if not used properly. It is the policy of the University of Tennessee Knoxville campus to train employees on the hazards of operating aerial/scissor lifts and to ensure such equipment is safely maintained.

This program has been established to:

- Ensure the safe operation of aerial and scissor lifts.
- Ensure that work units understand and comply with safety standards related to aerial/scissor lifts.
- Assign responsibilities to personnel which are necessary for successful implementation.

### Scope and Applicability

- This program applies to all employees at all UTK locations.
- This program covers every type of aerial/scissor lift used by UTK employees.

### Abbreviations and Definitions

#### Abbreviations

**EHS:** Environmental Health and Safety

**OSHA:** Occupational Safety and Health Administration

#### Definitions

**Aerial Lifts:** Any powered, mobile, vehicle-mounted device that may elevate, telescopically extend, articulate and may (or may not) rotate around a substantial axis in order to raise and support personnel to elevated job sites.

Aerial lifts include extendible boom platforms; vehicle-mounted aerial ladders; articulating, rotating boom platforms; vertical self-elevating towers; cherry pickers; bucket trucks and any other equipment built in accordance with either ANSI-A92.2 (1990), Vehicle-Mounted Elevating and Rotating Aerial Devices, or ANSI-A92.5 (1992), Boom Supported Elevating Work Platforms.

**Scissor Lifts:** Any powered, mobile device that has a personnel work platform which is mechanically raised vertically above the carriage by means of controls on the work platform. This equipment is designed and fabricated according to either ANSI-A92.6 (1990), Self-Propelled Elevating Work Platforms, or ANSI-A92.3 (1990), Manually Propelled Elevating Aerial Platforms.

**Anchorage:** A secure point of attachment to be used with personal fall protection equipment.

**Certified Operator:** Certification of aerial/scissor lift operators at UTK is a three- step process consisting of

classroom instruction, hands-on training and hands-on evaluation. Once the employee has successfully completed all three steps they are considered to be a certified operator.

**Competent Trainer:** An employee who has successfully completed a Train-the-Trainer or equivalent type of training program and is familiar with the type of aerial/scissor lift in their work unit. A contractor or equipment vendor who has experience training aerial/scissor lift safety and operation and is familiar with the equipment is also permitted to be a Competent Trainer.

**Competent Evaluator (Hands-on):** An employee in the department/work unit who is experienced and competent with the aerial/scissor lift. An employee must be familiar with the equipment and its safe operation. In order to be considered competent in regard to conducting the evaluation portion of the aerial/scissor lift training, an employee must have successfully completed the classroom portion of aerial/scissor lift training. This employee could be but is not limited to a certified operator, supervisor/manager or safety officer.

**Familiarization:** Providing information regarding the control functions and safety devices for the aerial/scissor lift to an operator of the equipment.

**Insulated Platform:** A platform designed and tested to meet the specific electrical insulation ratings consistent with the manufacturer's identification plate.

**Outriggers:** Devices that increase the stability of the aerial lift platform and that are capable of lifting and leveling the aerial/scissor lift platform.

**Rated Work Load:** The designated capacity of the aerial platform as specified by the manufacturer.

**Stabilizers:** Devices that increase the stability of the aerial lift platform but are not capable of lifting or leveling the aerial/scissor lift platform.

## Roles and Responsibilities

### Environmental Health and Safety shall:

- Assist work units in implementing the provisions of this program.
- Approve aerial/scissor lift trainers.
- Periodically review and update this written program.
- Periodically evaluate the overall effectiveness of this program.

### Supervisors shall:

- Be thoroughly informed of the contents of this program and its application to their areas of responsibility and authority.
- Ensure employees comply with all provisions of this program.
- Ensure employees receive training appropriate to their assigned tasks and maintain documentation of such training.
- Ensure employees are provided with and use appropriate protective equipment.
- Take prompt corrective action when unsafe conditions or practices are observed.
- Investigate injuries and incidents within their work unit related to aerial/scissor lift usage.

### Employees who use aerial and scissor lifts shall:

- Follow the work practices described in this program, including the use of appropriate protective

equipment.

- Attend all training required by this program.
- Immediately report any unsafe conditions or concerns related to aerial/scissor lift safety to their supervisor

## Procedures

### General Requirements:

- Operators shall review and follow the manufacturer's operating manual. A copy of the manual must be located on the equipment.
- Only certified operators shall operate an aerial/scissor lift.
- Operators shall follow safe work practices when operating an aerial/scissor lift; a list of common safe work practices are summarized in Appendix F.

### Pre-Use Inspections (i.e. Frequent Inspections):

- Every aerial/scissor lift must undergo a pre-use inspection each first time use, daily, and prior to use (each shift).
- The criteria for pre-use inspections includes: checking for visual damage, ensuring controls are clearly marked; safety devices are functional (including alarms); and a test of range of capabilities must be conducted.
- Pre-use inspections should be documented using an appropriate checklist for the aerial/scissor lift similar to the one in Appendix A. Refer to the manufacturer's inspection requirements for complete inspection details.
- Completed checklists will be kept on file for a period not less than a year.
- The pre-use inspection will identify conditions that could affect the safe use of the aerial/scissor lifts. If any unsafe conditions exist, the aerial/scissor lift shall be removed from service. To remove an aerial/scissor lift from service, the operator shall remove the keys and place an "Out of Service" tag near the operator control panel.
- Operators must immediately report any unsafe aerial/scissor lift conditions to their supervisor. When an aerial/scissor lift has been removed from service, the operator must give the keys to the supervisor for safekeeping. The supervisor is then responsible for ensuring the necessary arrangements are made for repair.
- Only authorized personnel shall perform aerial/scissor lift repairs and adjustments. All replacement parts shall be the same design as the original or an equivalent design as designated by the manufacturer.

### Periodic Inspections:

- Annual inspections must be performed by a person qualified as a mechanic on the specific type of aerial platform, or one having similar design characteristics.
- The inspections must be performed no later than thirteen (13) months from the date of the prior annual inspection.
- Aerial lifts must be labeled when the periodic inspection was performed or when the next periodic inspection is due.
- Documentation of periodic inspections must be maintained for 5 years.

### Personal Protective Equipment:

Fall protection equipment must be used as follows when operating aerial/scissor lifts:

- ***Operators shall be secured to the anchor point provided by the equipment manufacturer by either a self-retracting lanyard or by a lanyard short enough to prevent the employee from being ejected.***
- Operators must follow manufacturer's recommendations as to which fall protection system to use.
- Scissor lift – The guardrail system provides fall protection. If the manufacturer has installed an anchorage point, a fall protection system (restraint, positioning, personal fall arrest system) as designated by the manufacturer's instructions must be utilized.
- Tying a lanyard off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted.
- Other types of personal protective equipment (PPE), such as head, eye and hand protection, shall be worn according to the task specific personal protective equipment hazard assessment.

## Training and Information

Training must be completed prior to any use of the aerial/scissor lift. Certification of aerial/scissor lift operators at UTK is a three-step process consisting of classroom instruction, hands-on training and hands-on evaluation.

Classroom instruction, hands-on training and hands-on evaluation can be conducted by either a competent trainer in the work unit, equipment manufacturer, safety consultant and/or a vendor who specializes in aerial/scissor lift training.

Hands-on training and hands-on evaluation portions of the training can also be conducted by an employee in the department/work unit who is experienced and competent with the aerial/scissor lift. This person could be a certified operator, supervisor/manager or safety officer. EHS must approve trainers. Training must be specific to the type of aerial/scissor lift being used.

### Training must cover the following:

- The purpose and use of the equipment manuals.
- That operating manuals are an integral part of the lift and must be properly stored on the vehicle.
- A pre-start inspection.
- Responsibilities associated with problems or malfunctions affecting the operation of the lift.
- Factors affecting stability.
- The purpose of placards and decals.
- Workplace inspection.
- Applicable safety rules and regulations.
- Authorization to operate.
- Operator warnings and instructions.
- Proper use of personal fall protection equipment.
- Hands-on operation.

Employees shall not be allowed to operate rented equipment unless they have been previously certified on similar equipment. Operators are also required to review the owner's manual and shall be given ample time to become familiar with the equipment and its controls before operation is permitted. The vendor is required to

review equipment with the user when the user is not familiar with the type of aerial/scissor lift.

Trainees must successfully complete hands-on training and a hands-on evaluation before being allowed to operate an aerial/scissor lift independently. Trainees will be given adequate supervision and time to learn basic operating skills.

Initial operator hands-on evaluations must be completed using the checklist found in Appendix D or equivalent.

Documented re-evaluation of each aerial/scissor lift operator will be completed at least once every three years using Appendix D or equivalent.

Re-evaluations can be conducted by an employee in the department/work unit who is experienced and competent with the aerial/scissor lift. This person could be a certified operator, Supervisor/Manager or safety officer.

### **Refresher training**

Refresher training in relevant topics will be provided to an aerial/scissor lift operator when any of the following occur:

- The operator has been observed to be using the aerial/scissor lift in an unsafe manner.
- The operator has been involved in an accident or a near-miss incident.
- The operator has received an evaluation that reveals the operator is not using the aerial/scissor lift safely.
- The operator is assigned to operate a different type of equipment.
- A condition in the workplace changes in a manner that could affect safe operation of the equipment.

### **Maintenance**

- The manufacturer's instructions regarding maintenance must be followed. (Such instructions are typically included in the owner's manual for the aerial/scissor lifts).
- An annual inspection is required and must be conducted by an authorized person qualified as a mechanic on the type of aerial/scissor lift or one having similar design characteristics.
- Any aerial/scissor lift with an identified safety issue will be immediately removed from service.
- Maintenance performed by certified aerial/scissor lift operators will be limited to replacing/disconnecting/connecting batteries, changing fuel cylinders, adding water to batteries, replacing light bulbs and replacing stickers and decals.
- No aerial/scissor lift with a leak in the fuel system will be operated until the leak has been eliminated. Repairs to the fuel and ignition system that involve fire hazards will be conducted in a location (non-flammable) designated for such repairs.
- Any aerial/scissor that emits hazardous sparks or flames from the exhaust system will be immediately removed from service and not returned to service until the cause has been eliminated.
- Only replacement parts equivalent to the original parts are to be used.

### **Recordkeeping**

Each work unit is responsible for maintaining the following records in order to meet the requirements of this program:

- A listing of all aerial/scissor lifts owned by the work unit.
- A record of training which includes: (Use Appendix C or equivalent)
  - Name of operator.
  - Date of classroom training.
  - Date of hands-on training.
  - Date of hands-on evaluation.
- Identity of the person(s) performing the training and/or evaluation.
  - Make and model of aerial/scissor lift.
  - Copies of all pre-use inspection records for one year after completion.
  - Copies of annual inspection records for at least four years.
  - Copies of repair records for at least four years.
  - EHS is responsible for maintaining the following records in order to meet the requirements of this program:
- EHS will retain training records for training they have provided indefinitely.

## Contract Employees

Contractors are required to follow all applicable OSHA regulations and manufacturer's instructions.

## References

- OSHA Standard - Vehicle-mounted elevating and rotating work platform – 29 CFR 1910.67
- OSHA Standard - Aerial lifts – 29 CFR 1926.453
- ANSI/SIA, Boom Supported Elevating Work Platforms – A92.5 – 2006
- ANSI/SIA, Self-Propelled Elevating Work Platforms – A92.6- 2006
- ANSI/SIA, Vehicle-Mounted Elevating and Rotating Aerial Devices – A92.2 – 2001
- ANSI/SIA, Manually Propelled Elevating Aerial Platforms – A92.3 - 2006
- Association of Equipment Manufacturers - Aerial Platform Safety Manual

## Appendices

Appendix A: Pre-use Aerial/Scissor Lift Inspection Checklist

Appendix B: Examples of Aerial/Scissor Lifts

Appendix C: Aerial/Scissor Lift Training Certification

Appendix D: Aerial/Scissor Lift Hands-on Operator Training Evaluation Form

Appendix E: Aerial/Scissor Lift Evaluator Guidelines

Appendix F: Safe Work Practices

## Disclaimer

The information provided in these guidelines is designed for educational use only and is not a substitute for specific training or experience.

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## Appendix A

### Pre-Use Aerial/Scissor Lift Inspection Checklist

**Equipment Make/Model:** \_\_\_\_\_ **Serial Number:** \_\_\_\_\_

- Owner’s manual legible and stored inside the container located on the platform.
- All decals legible and in place.
- Fluid levels checked. (Hydraulic oil, engine oil, coolant, etc.)
- Structural and other critical components present and all associated fasteners and pins in place.
- Battery packs in place, properly connected and not leaking.
- Compartment covers in place.

Check the following components or areas for damage, modifications, and improperly installed or missing parts:

- Electrical components, wiring, and electrical cables
- Hydraulic power unit, reservoir, hoses, fittings, cylinders, and manifolds
- Drive and turntable motors and torque hubs
- Boom wear pads
- Tire and wheels
- Limit switches, warning alarms, and horn
- Nuts, bolts, and other fasteners
- Gauges
- Beacon and lights
- Fall Protection Devices (railing, gates, toe boards, anchor/connecting points, etc.)

Check entire machine for:

- Cracks in welds or structural components
- Dents or damage to machine
- Test all controls for proper operation

Comments:

**Month:** \_\_\_\_\_ **Year:** \_\_\_\_\_

<b>Date</b>										
<b>Initials</b>										



## Appendix B

### Examples of Aerial/scissor Lifts



#### Vehicle Mounted Aerial Lift / Bucket Truck

The lift platform is an integral part of an over the road vehicle.



#### Articulating Boom Aerial Lift

This aerial lift has at least 2 hinged sections which are used to increase mobility.



#### Man Lift / Cherry Picker

This piece of equipment lifts personnel vertically, but not horizontally.



#### Scissor Lift

This piece of equipment lifts personnel vertically, but not horizontally.



#### Extendable / Telescoping Aerial Lift

This aerial lift has a boom that extends horizontally and vertically.

## Appendix C

### Aerial/Scissor Lift Training Certification Form

**Name of Classroom Trainer (print & sign):** \_\_\_\_\_

**Name of Evaluator (if different) (print & sign):** \_\_\_\_\_

**Make and model of aerial/scissor lift(s):** \_\_\_\_\_

<i>Participant Name (Print)</i>	<i>Classroom training date</i>	<i>Hands-on training date</i>	<i>Hands-on evaluation date</i>	<i>Participant (Signature)</i>

<i>Participant Name (Print)</i>	<i>Classroom training date</i>	<i>Hands-on training date</i>	<i>Hands-on evaluation date</i>	<i>Participant (Signature)</i>



## Appendix D

## Aerial/Scissor Lift Hands-On Operator Training Evaluation Form

<b>Trainee Name:</b>	<b>Work Unit:</b>
<b>Evaluator Name:</b>	<b>Department:</b>
<b>Equipment Manufacturer:</b>	<b>Date:</b>
<b>Model:</b>	

*NOTE: Hands-On Operator Training must be completed for **each type** of aerial lift utilized.*

<b>Step</b>	<b>Evaluation</b>	<b>N/A</b>	<b>Pass</b>	<b>Fail</b>
<b>1. Pre-use equipment inspection</b>	Including but not limited to: safety devices, air/hydraulic/fuel system for leaks, cable/wiring harnesses for damage, loose/missing parts, tires and wheels, placards/warnings/and control markings, outriggers/stabilizers and other structures, guardrail system, <b>other items as specified in owner's manual.</b>			
<b>2. Inspect Worksite</b>	Including but not limited to: drop-offs or holes, slopes, bumps and floor obstructions, debris, overhead obstructions and electrical hazards, inadequate surface and support to withstand all load forces, wind and weather conditions, presence of bystanders, other unsafe conditions.			
<b>3. Function test of lower control station.</b>	Done to determine if there are any malfunctions.			
<b>4. Utilize fall protection equipment</b>	Face the machine. Maintain 3 point contact with ladder/hand rails (two hands, one foot OR two feet, one hand).			
<b>5. Function test of bucket / platform/ basket control station.</b>	Done to determine if there are any malfunctions.			
<b>6. Drive and creep/ inch forward and reverse.</b>	Move approximately 10 feet in a driving mode. Creep approximately 5 feet. Verify unit balance and stability.			

<b>Step</b>	<b>Evaluation</b>	<b>N/A</b>	<b>Pass</b>	<b>Fail</b>
<b>7. Turn vehicle 360 degrees right and left.</b>	Minimum disturbance of aerial lift platform. Verify unit balance and stability.			
<b>8. Boom up &amp; down, in &amp; out.</b>	Fully extend, fully raise. Minimum disturbance of aerial platform. Verify unit balance and stability.			
<b>9. Rotate/swing boom 360 degrees in each direction.</b>	Minimum disturbance of aerial platform. Verify unit balance and stability.			
<b>10. Tilt platform in each direction.</b>	Minimum disturbance of aerial platform. Verify unit balance and stability.			
<b>11. Turn off machine using emergency stop function.</b>	Locate and use emergency stop function.			
<b>12. Park and shutdown aerial lift.</b>	Minimum disturbance of aerial platform. Verify unit balance and stability.			
<b>13. Dismount safely. Face the machine when dismounting.</b>	Maintain 3 point contact with ladder/handrails (two hands, one foot OR two feet, one hand)			
<b>14. Deploy/setup and store outriggers.</b>	Follow manufacturer's guidance. Refer to owner's manual.			
<b>15. Comments</b>	<i>Must be included for all "Failed" tasks. If task is failed the evaluator must explain what was done incorrectly and have the trainee repeat the task until it is completed correctly.</i>			
<b>Trainee Signature</b>				
<b>Evaluator Signature</b>				

## Appendix E

### Evaluator Guidelines - Aerial/scissor lift

*Note: The evaluation can be done in-house using an experienced and competent UTK employee or an outside vendor/safety consultant may be used.*

#### **1) Pre-Requisites:**

- Complete the classroom portion of an aerial/scissor lift training class.
- Review and become familiar with the UTK Aerial/Scissor Lift written program.
- Be experienced with the equipment you will be training on.
- Review owner's manual.

#### **2) Choose safe location:**

- Open area
- Away from vehicle and pedestrian traffic
- Flat surface on solid ground
- If necessary barricade area with orange cones or equivalent to keep vehicles and pedestrians out of the training area.

#### **3) Review features of specific aerial/scissor lift with student:**

- On/off
- Bucket, boom, steering
- Deck extensions
- Stop/Go
- Outriggers
- Safety devices (guardrail gate, anchor points)
- Emergency boom/bucket lowering mechanism
- Fueling/charging ports
- Fueling/charging locations at site

#### **4) Review site specific working conditions/hazards/safety concerns:**

- Ramps/Slopes
- Dock plates/dock levelers
- Overhead obstructions
- Pedestrian traffic areas
- Vehicle restricted areas (unstable surface, narrow aisles, etc.)
- Hazardous locations (flammable, chemical, etc.)
- Any other unique situations/areas
- PPE

- 5) Allow student to learn/practice actual operation of the equipment while supervised.**
- 6) After the student gets comfortable with the equipment operation, begin the evaluation.**
- 7) Use the “Aerial/Scissor Lift Hands-On Training Evaluation Form” found in Appendix D of the UTK Aerial/Scissor Lift Program. Have employee complete each task on the form which applies to the equipment.**
- 8) File evaluation form with supervisor/manager/safety officer.**

## Appendix F

### Safe Work Practices

#### General

- Operators shall not wear any loose clothing or any accessory that can catch in moving parts.
- Before machine is started, the operator must walk completely around the machine to ensure everyone and everything is clear of the machine.
- Articulating boom and extendable boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls. Upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the employee in the lift, except in case of emergency.
- Modifications and additions that may affect the capacity or safe operation of an aerial/scissor lift are strictly prohibited without the manufacturer's written approval. Capacity, operation, and maintenance instruction markings will be changed as necessary if the manufacturer approves a modification.
- EHS must be notified before modification takes place.
- The insulated portion (if applicable) of an aerial/scissor lift shall not be altered in any manner that might reduce its insulating value.
- Any signs, plates, or decals which are missing or illegible must be replaced.
- Welding operations on aerial/scissor lifts shall be conducted per UTK's Hot Work Permit Program.
- If the aerial/scissor lift becomes disabled, a "out of service" tag or equivalent shall be attached to the controls inside the platform in a conspicuous location.
- Aerial/scissor lift devices with noted, reported deficiencies shall not be operated until repairs are made and equipment is authorized for use.

#### Safe Work Practices Before Operation

- Consideration shall be given to the amount of wind. Follow the manufacturer's instruction regarding operation in windy conditions. As a general rule aerial/scissor lifts shall not be operated in winds exceeding 25 MPH although this can vary depending on the model of equipment.
- Guardrails must be installed and access gates or openings must be closed before raising the platform.
- Boom and platform load limits specified by the manufacturer shall not be exceeded.
- Before moving an aerial/scissor lift for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position.
- Consideration shall be given to the protection of bystanders via barricading, having another employee keep bystanders at a safe distance or by other means.
- Aerial/scissor lifts shall not be operated from trucks, scaffolds, or similar equipment.

#### Safe Work Practices During Operation

- Attention shall be given towards the direction of travel, clearances above, below and on all sides.
- Employees shall not sit or climb on the guardrails of the aerial/scissor lift.
- Planks, ladders or other devices shall not be used on the work platform.
- An aerial/scissor lift shall not be moved when the boom is elevated in a working position with employees in the basket, except for equipment which is specifically designed for this type of operation.
- Aerial/scissor lift shall not be placed against another object to steady the elevated platform.



- Aerial/scissor lift shall not be used as a crane or other lifting device.
- Aerial/scissor lift devices shall not be operated on grades, side slopes or ramps that exceed the manufacturer's recommendations.
- The brakes shall be set and outriggers, when used, shall be positioned on pads or a solid surface.
- Speed of aerial/scissor lift devices shall be limited according to the conditions of the ground surface, congestion, visibility, slope, location of personnel and other factors that may cause hazards to other nearby personnel.
- Stunt driving and horseplay shall not be permitted.
- Booms and elevated platform devices shall not be positioned in an attempt to jack the wheels off the ground.
- The area surrounding the elevated platform shall be cleared of personnel and equipment prior to lowering the elevated platform.
- On boom-type machines, drive controls shall not be used to maneuver in close to an obstacle. The swing and boom functions shall be used for maneuvering.
- Operators are to call for assistance if the platform or any part of the machine becomes entangled.
- The operator shall maintain a clear view of the path of travel and a safe distance from other obstacles such as: debris, drop offs, holes, depressions, slopes, and overhead hazards. The following approach distances to energized electrical lines must be maintained:

<i>Voltage Range (Phase to Phase)</i>	<i>Minimum Safe Approach Distance (feet)</i>
0 to 300V	Avoid Contact
300V to 50 KV	10
>50KV to 200KV	15
>200KV to 350KV	20
>350KV to 500KV	25
>500KV to 750KV	35
>750KV to 1000KV	45

### Safe Work Practices After Operation

- Safe shutdown shall be achieved by utilizing a suitable parking area, placing the platform in the stowed position, placing controls in neutral, idling engine for gradual cooling, turning off electrical power, and taking the necessary steps to prevent unauthorized use.
- Aerial/scissor lifts shall be shut off prior to fueling. Fueling must be completed in well ventilated areas free of flames, sparks or other hazards which may cause fires or explosions.