



Part 32.

Aerial Work Platforms

Student Materials
MTI Level Two Compliance Course
Consultation Education & Training Division
Michigan Occupational Safety & Health Administration
Michigan Department of Licensing and Regulatory Affairs
www.michigan.gov/miosha
(517) 284-7720

Aerial Work Platform Safety

Part 32

MIOSHA Training Institute (MTI)
Compliance Course

Presented By:

Consultation Education & Training (CET) Division
Michigan Occupational Safety & Health Administration
Michigan Department of Licensing and Regulatory Affairs

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(517) 284-7720



Objectives

- Recognize the major hazards associated with aerial work platforms by:
 - Identifying the various types of aerial work platforms.
 - Discussing the various applications of the differing types of aerial work platforms.
 - Identifying the exposure to falls, electrical contact, struck by, and crushed by/caught between hazards.

Objectives

- Apply the rules and regulations pertaining to aerial work platforms by:
 - Reviewing applicable MIOSHA standards (Aerial Work Platforms, Fall Protection, Personal Protective Equipment, Signs, Signals, Tags, & Barricades).
 - Discussing and reviewing aerial work platform case studies.
 - Discussing preoperational and operational procedures.

3

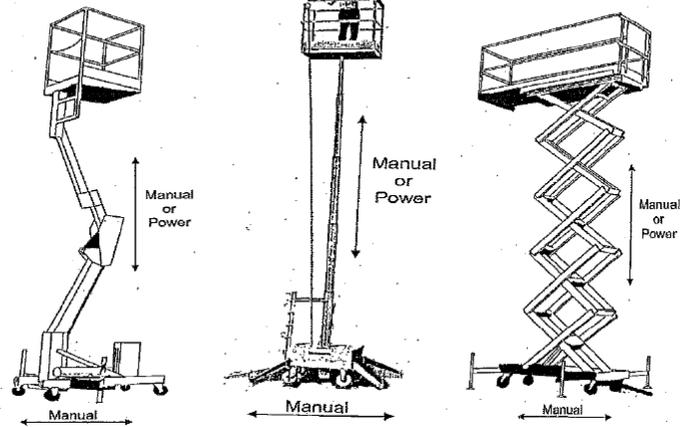
Objectives

- Identify the criteria and components of aerial work platform training by:
 - Reviewing the components/criteria of operator training/permitting.
 - Identifying the training/permit issuing entity.
 - Discussing training and application to safety programs.

4

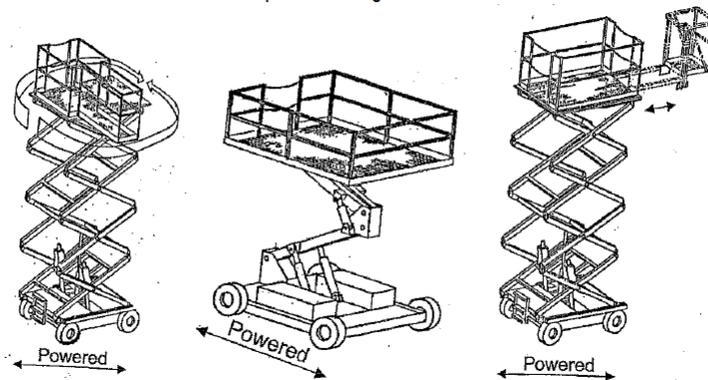
Types of AWP: Scissor

Figure 2
Manually Propelled Elevating Work Platform



Types of AWP: Scissor

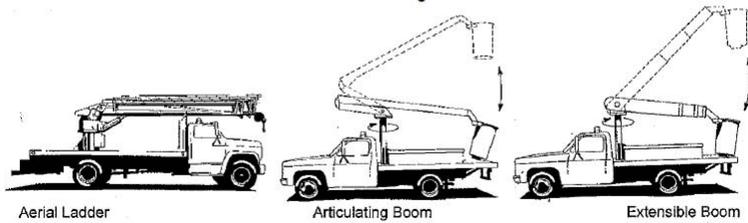
Figure 4
Self-Propelled Elevating Work Platform



Types of AWP: Boom

R 408.43220 Figures.
Rule 3220. Figures 1 to 4 are as follows:

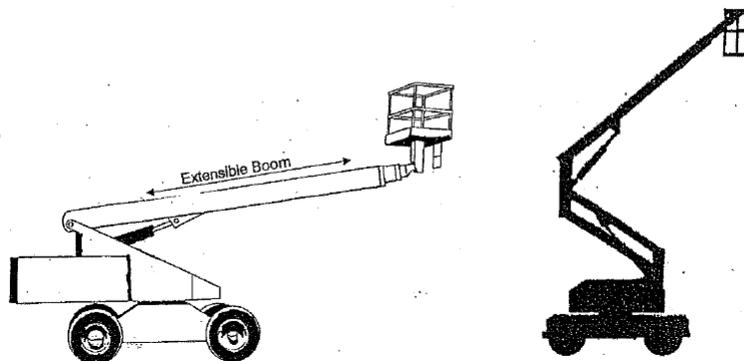
Figure 1
Vehicle-Mounted Elevating Work Platform



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Types of AWP: Boom

Figure 3
Boom-Supported Elevating Work Platform



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Who Needs Them?





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12

The Big Stuff!



13

WOW



14



15

Deaths from Aerial Lifts in Construction (US)

**The BLS database indicated that in
2007 24 fatal accidents occurred.**

<http://www.bls.gov/iif/oshwc/foi/cftb0226.pdf>

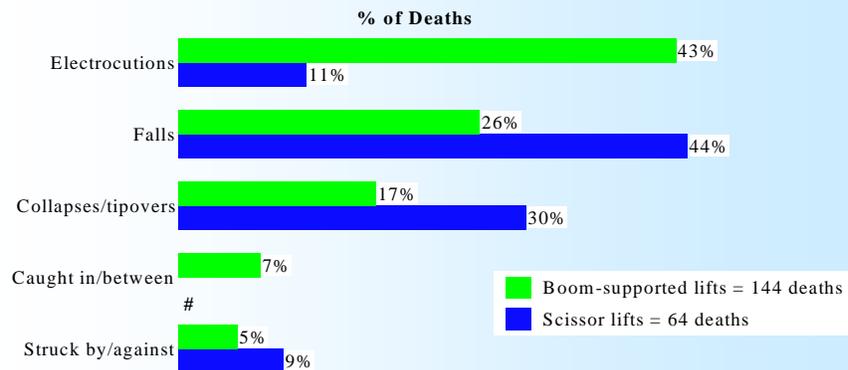
16

Deaths from Aerial Lifts in Construction

- From 1992-1999 there were, on average, 26 deaths/year from lifts in construction accounting for approximately 3% of all construction fatalities.
- About 2/3 of the fatalities involved boom-supported lifts.

17

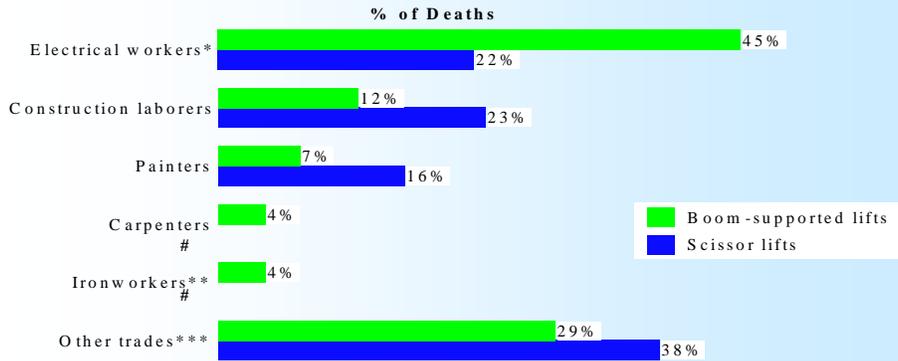
Causes of Death from Aerial Lifts in Construction, 1992-99



Source: U.S. Bureau of Labor Statistics data

18

Deaths from Aerial Lifts in Construction, by Trade, 1992-99



Data from scissor lifts does not meet Bureau of Labor Statistics publication criteria
 * Electricians, electrician apprentices, power installers, and their supervisors
 ** Structural metal workers and welders and cutters
 *** Includes plumbers, pipefitters and steam fitters, brickmasons and stonemasons, drywall installers

Source: U.S. Bureau of Labor Statistics data

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Boom-Supported Lifts

Electrocutions

- Most all due to overhead power lines.
- Half of electrocutions involved body contact with overhead power lines.
- One-third involved overhead power lines contacting lift booms or buckets.

Falls

- 1/2 of fatal falls involved ejection from the bucket after worker or lifts was struck by vehicles, cranes or objects.
- 1/6 occurred while transferring to or from the bucket at a height.

Collapses/tipovers

- 2/5 of deaths involved collapse of boom.
- Almost one-third were due to tipovers.
- 1/4 involved collapses of bucket.

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Boom-Supported Lifts

Caught in /between

Most involved the worker getting caught between the bucket edge and a roof joist or beam.

Struck by/against

Mostly involved workers being struck by collapsing materials, girders, etc.



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Scissor Lifts

Falls

- 1/5 of deaths involved ejections, after being struck by object.
- Cause of fall unknown in 3/5 of deaths.
- Other causes included removal of chains, standing on or leaning over railings.

Tip over

- Caused almost 1/3 of scissor lift deaths.
- Mostly while elevated over 15 feet.
- 1/4 of tip over occurred where lift hit a hole or curb while moving.

Electrocutions

- 1/2 involved overhead power lines.



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Exposure to Falls

- By their very nature aerial work platforms expose their operators to the hazard of falls.
- Inappropriate use exposes AWP operators to unnecessary fall hazards.
- Unexpected occurrences also expose AWP operators to fall hazards.

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Contact with Electricity

- Electrical infrastructure has been installed at elevations to be out of reach generally. AWP are designed to get to those “out of reach” locations.
- Aerial work platforms are conductive unless specifically designed, rated, and maintained to be electrically insulated/isolated.

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Struck By

- Aerial work platforms are used in construction to install equipment or materials at heights.
- During installation things go wrong and can fall down onto employees.

25

Crushed by/Caught between

- Aerial work platforms move/travel.
- AWP flexibility and size allow them to be operated in close proximity to personnel.
- Poor pre-operation inspections can lead to AWP coming in contact with fixed objects.

26

We're all exposed!

- Break into groups and describe 3 scenarios.
- Scenarios
 - 3 different styles of aerial work platform
 - 3 different trades
 - 3 different hazards

Be creative!!!

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Scope

Rule 3201. These rules apply to the construction, operation, maintenance, and inspection of aerial work platforms with either manual or powered mobility as used in construction operations as defined by 1974 PA 154, MCL 408.1001 to MCL 408.1094.

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Standards Referenced

- Part 6. Personal Protective Equipment
- Part 10. Lifting and Digging Equipment
- Part 13. Mobile Equipment
- Part 22. Signals, Signs, Tags, and Barricades (Specifically Part 6 of the MMUTCD)
- Part 45. Fall Protection

29

3205.2

Aerial work platforms shall not be field-modified for uses other than those intended by the manufacturer.



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2

ANSI Standard reference

3205 (1) Aerial work platforms shall be designed, constructed, and tested so as to be in compliance with the requirements of the following applicable American national standards institute standards:

- (a) ANSI standard A92.2, 2002 edition, "Vehicle-Mounted Elevating and Rotating Aerial Devices."
- (b) ANSI standard A92.3, 2006 edition, "Manually Propelled Elevating Aerial Platforms."
- (c) ANSI standard A92.5, 2006 edition, "Boom-Supported Elevating Work Platforms."
- (d) ANSI standard A92.6, 1999 edition, "Self-Propelled Elevating Work Platforms."

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ANSI Standard requirements

Directional controls shall be in compliance with all of the following provisions:

- a) Be of the type that will automatically return to the off or neutral position when released.
- b) Be protected against inadvertent operation.
- c) Be clearly marked as to their intended function.
- d) An overriding control shall be provided in the platform which must be continuously activated for platform directional controls to be operational and which automatically returns to the off position when released.

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3205.3

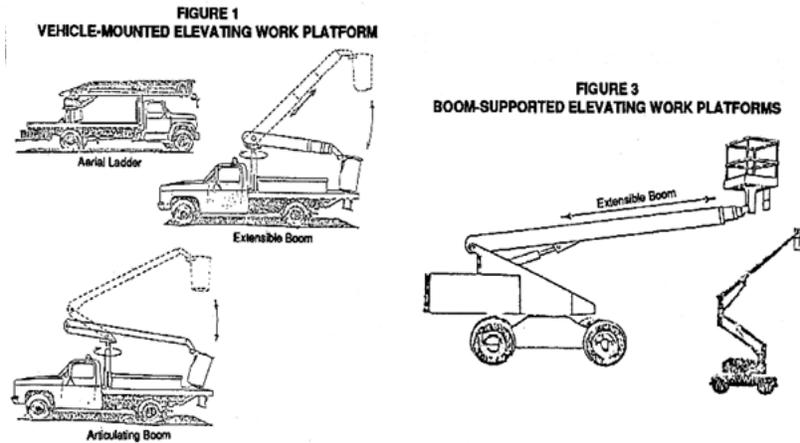
Aerial work platforms shall be equipped with emergency controls at ground level.

3205.5

Attachment points shall be provided for fall protection devices for personnel who occupy the platform on aerial work platforms described in R 408.43202 (a) and (c). (See figures 1 and 3).

38

Types of AWP: Boom



39

Fall Protection

3214.1

Occupants of vehicle mounted & boom supported work platforms shall wear a safety harness.



40

Boom Supported AWP lack of Fall Protection



41

Boom Supported AWP lack of Fall Protection



42



43

Harnesses and Lanyards



44

Fall Protection

3214.3

Belting (tying) off to adjacent poles, structures or equipment is prohibited.



45

3208.2

(2) Any overhead wire shall be considered to be an energized line until the owner of the line, his or her authorized representative, or a utility representative assures either of the following:

(a) The line is de-energized and has been visibly grounded.

(b) The line is insulated for the system voltages and the task will not compromise the insulation of the conductor and/or cause an electrical hazard.

(Overhead power lines are not insulated as a general rule.)

46

3209.1

Table 1

The employer shall ensure that an aerial work platform shall be operated so that the distances from energized power lines and equipment prescribed in Table 1 are maintained.

Voltage	Clearance w/ boom raised	Clearance w/ boom lowered
< 50kv	10 feet	4 feet
> 50kv	10 feet + .4 in./1kv over 50kv	10 feet
50 to 345kv	--	10 feet
346 to 750kv	--	15 feet

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3209.2

A qualified lineman or a qualified line clearance tree trimmer shall maintain distances as prescribed in Table 2 when performing work from an aerial work platform on or near an exposed power line unless any of the following conditions exist:

- a) The employee is insulated or guarded from the energized part by gloves or gloves and sleeves, as provided for and prescribed in Construction Safety Standard **Part 6. Personal Protective Equipment.**

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3209.2

A qualified lineman or a qualified line clearance tree trimmer shall maintain distances as prescribed in Table 2 when performing work from an aerial work platform on or near an exposed power line unless any of the following conditions exist:

- (b) The employee is insulated, isolated, or guarded from any other conductive part.
- (c) The energized part is insulated from the employee.

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Table 2
Minimum Working Distances for
Qualified Line-Clearance Tree Trimmers and Qualified Linemen

Voltage Range Phase to Phase (kilovolts)	Minimum Working Distance
2.1 to 15.0	2 feet 0 inches (61 cm)
15.1 to 35.0	2 feet 4 inches (71 cm)
35.1 to 46.0	2 feet 6 inches (76 cm)
46.1 to 72.5	3 feet 0 inches (91cm)
72.6 to 121.0	3 feet 4 inches (102 cm)
138.0 to 145.0	3 feet 6 inches (107 cm)
161.0 to 169.0	3 feet 8 inches (112 cm)
230.0 to 242.0	5 feet 0 inches (153 cm)
345.0 to 362.0	*7 feet 0 inches (213 cm)
550.0 to 552.0	*11 feet 0 inches (335 cm)
700.0 to 765.0	*15 feet 0 inches (457 cm)

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R 408.40650 Design requirements for specific types of electrical protective equipment.

R 408.40655 Design requirements for other types of electrical protective equipment.

R 408.40660 In-service care and use of electrical protective equipment.

Electrical Protective Equipment must bear a permanent mark to show the manufacturer's name or trademark and certification of compliance with the appropriate ASTM standard.

IT MUST BE RATED FOR THE VOLTAGE BEING EXPOSED TO

51

3209.3

(3) A qualified telecommunications employee shall maintain the distances prescribed in Table 3 when working from an aerial lift, unless the employee is insulated, isolated, or guarded from any other conductive part or the energized part is insulated from the employee.

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Table 3
Minimum Approach Distances for
Qualified Telecommunications Employees

Voltage Range (Nominal Phase to Phase)	Minimum Approach Distances
300 V and less	1 foot - 0 inches (30.5 cm)
Over 300 V, not over 750 V	1 foot - 6 inches (46 cm)
Over 750 V, not over 2 kV	2 feet - 0 inches (61 cm)
Over 2 kV, not over 15 kV	3 feet - 0 inches (91 cm)
Over 15 kV, not over 37 kV	3 feet – 6 inches (107 cm)
Over 37 kV, not over 87.5 kV	4 feet – 0 inches (122 cm)
Over 87.5 kV, not over 121 kV	4 feet – 6 inches (137 cm)
Over 121 kV, not over 140 kV	--

53

3209.4

(4) Employees shall use insulated bucket, gloves and sleeves that are rated at more than the voltage to be worked on or that with which they might come into contact, to comply with subrules (2) and (3) of this rule.

54

3212.4

An employer shall ensure that operators of an aerial work platform over or adjacent to any public or private roadway maintain adequate clearances of all portions of the aerial work platform to prevent being struck by vehicular traffic.



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3212.5

When aerial work platforms are in use, all traffic control requirements shall be in compliance with Part 6 of the 2011 Michigan Manual on Uniform Traffic Control Devices (MMUTCD), which is adopted in R 408.43204a, and Construction Safety Part 22. Signals, Signs, Tags, & Barricades, as referenced in R 408.43204a.

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MMUTCD Part 6

[MMUTCD 2011 Part 6](#)

57

3214.4

An employer shall not allow employees to exit an elevated aerial work platform, except where elevated work areas are inaccessible or hazardous to reach. Employees may exit the platform with the knowledge and consent of the employer. When employees exit to unguarded work areas, fall protection shall be provided and used as required in construction safety standard **Part 45. Fall Protection.**

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Inappropriate Exiting



59

Inappropriate Exiting



60

AWP Operating Procedures

3216.2 Do not exceed load capacities

Pay special attention when transferring loads to the platform while elevated.



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3216.3

The guardrail system of the platform shall not be used to support any of the following:

- Materials
- Other work platforms
- Employees

62

3216.3



63



3216.3



65

3216.4

Employees shall maintain firm footing on the platform while working on the platform. The use of railings, planks, ladders, or any other devices on the platform for achieving additional height is prohibited.



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3216.5

Only aerial work platforms that are equipped with a manufacturer's installed platform controls for horizontal movement shall be moved while in the elevated position.

67

3216.6

Before and during driving while elevated, an operator shall:

- Look in the direction of travel, keep a clear view, make sure path is firm and level.
- Maintain a safe distance from drop-offs, holes, electrical, and other hazards.



68



3216.7

Outriggers or stabilizers, when provided, and are to be used in accordance with the manufacturer's instruction. Brakes shall be set and outriggers and stabilizers shall be positioned on pads or a solid surface.

3216.7



71

3216.12

Platform gates shall be closed while the platform is in an elevated position.



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3216.12



73

3216.12



74

Hazard Recognition



75

Hazard Recognition



Hazard Recognition



Hazard Recognition



Inspection & Maintenance

3205.2

Aerial work platforms shall not be field-modified for uses other than those intended by the manufacturer, unless the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in compliance with the applicable ANSI standard and this rule, and to be at least as safe as the equipment was before modification.

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Testing

3206 Insulated AWP

- (a) The test shall be performed not less than annually.
- (b) Written, dated, and signed test reports shall be made available by the employer for examination by a department representative.
- (c) The insulated portion of an aerial device shall not be altered in any manner that might reduce its insulating value.

80

Permits

3207

- 1) An **employer** shall provide the operator of an aerial work platform with an aerial work platform permit.

- 4) A permit shall indicate the type of aerial work platforms an operator has been trained on and is qualified to operate.

81

Permits

- 5) A permit to operate an aerial work platform is valid only when performing work for the employer who issued the permit. A permit shall be issued for a period of not more than 3 years.

82

3207. (8) AWP Training

Employer shall provide training on:

- a) Intended purpose and function of each of the controls.
- b) Manufacturer's operating instructions and safety rules.
- c) Decals, warnings, and instructions displayed on the AWP.
- d) MIOSHA Part 32 rules.

Documentation required onsite

- 3207 (3) Operators permit required to be on the jobsite.
- 3207 (9) Manufacturer's operating instructions and safety rules shall be provided on each unit.

83

Qualified Person

Means a person who possesses a recognized degree, certificate, professional standing, or skill and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems relating to the subject matter, the work, or the project.

84

Manufacturer's Require Pre-operational inspections

Before each work shift a visual inspection shall be performed for:

- Cracks, broken, leaks, loose, or worn stiff.
- Tire conditions (inflation).



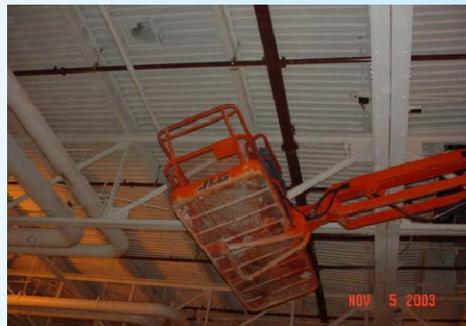
85

Manufacturer's Require Pre-operational inspections

Before each work shift a visual inspection shall be performed for:

- Proper function of controls platform and ground.
- Ditches, holes, debris, soil conditions overhead obstructions and powerlines.

2003 fatal – worker trapped between truss and guard rail.
Key in door to controls was broke off in the lock.



86

Pre-op Inspection

Manuals

87

Safety Program

- Identify person responsible for training employees concerning AWP.
- Identify contact person that will respond to questions regarding operation, maintenance, and all other questions concerning AWP in the workplace.
- Basic Do's and Don'ts governing how the **employer** expects its employees to utilize AWP's.

88

What are your rules?

- Provide at least 7 basic rules that you want your employees to remember when using AWP's.
- Use at least 3 rules that go over and above what the standard requires.

89

Recent Michigan 2003 Fatalities

LIVONIA STATE JOURNAL - THURSDAY NOV 06 2003

Ford worker crushed to death in Livonia

LIVONIA — An electrician at a Ford Motor Co. transmission plant was crushed to death between a pipe and the guardrail of the aerial lift in which he was working.

Edward Stienke, 55 and a 32-year Ford employee from Livonia, was pinned against a fire system pipe Monday as he maneuvered the lift to remove wiring from the ceiling.

Ford spokesman Joe Koenig said company officials were unsure what caused the accident. The Michigan Department of Consumer and Industry Services is investigating. The state agency has fined the company three times since 2000 for safety violations.

90

Maintenance Man

FALL - MAINTENANCE MAN – AGE 47 - COMMERCIAL
SEPTEMBER 4, 2001 - 2:30 P.M. SIC CODE: 1742

Two employees were working from a Scissor Lift Aerial Work Platform. While installing exterior plastering material to the face of the building overhang, the victim stepped off the unprotected side of the elevated work platform. The guardrail on the platform had been removed prior to start of work. The victim fell 14 ft. to the ground. Accident occurred in Saginaw County.

408.40114(1)	Accident Prevention Program
408.43205(2)	Removing Guardrail From The Aerial Work Platform
408.43202(2)	No Operators Permit
408.43206(a)	Platform Not Maintained In Working Order ADM408.22111(2) Log 200

91

Struck By Overhead Crane

Electrician - Industrial
Age 55 July 19, 2008 6:30AM NAICS: 238210

Employee was installing a speaker system from a scissor lift when a bridge crane struck the scissor lift.

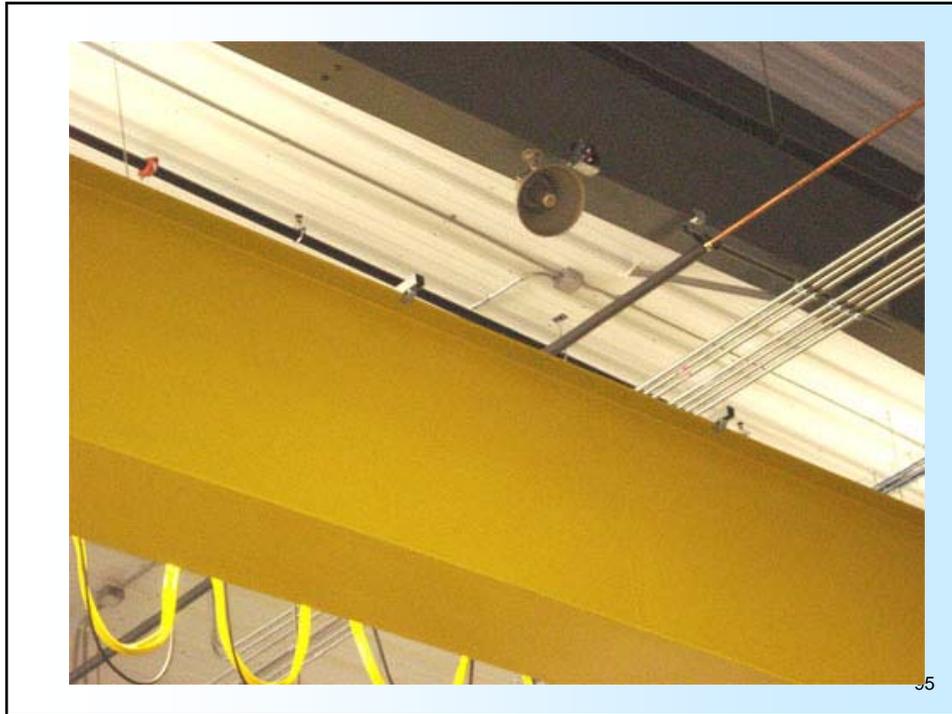
92



93



94



Citations Issued

408.40114 (2) (b) Instruction to employees on operating procedures and hazards of equipment used.

408.40114 (2) (c) Inspection of construction site, tools, and equipment for unsafe conditions.

408.43207 (8) No permit provided by employer for operating aerial work platforms.



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Assessment

- The purpose of this assessment is to validate the knowledge learned in class.
- Passing score of 70% correct is required.
- Class reference materials/books are not allowed to be used during the assessment.
- Collaboration/discussion with others is not allowed during the assessment.
- Answers will be reviewed after everyone completes and submits their assessment.

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Online Transcript

<https://webadvisor.macomb.edu>

What?

- Check individual courses – Proficient / Not Proficient
- Track courses taken through the MTI
- Request a transcript to show certification
- Manage account information

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- Key in the Last Name and SS# or Macomb ID
- Select *Log In*
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Thank You For Attending This Presentation

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Part 32. Aerial Work Platforms

Student Resources

MIOSHA Standards:

[Part 32. Aerial Work Platforms](#)

MIOSHA Fact Sheets:

[Aerial Work Platforms & Lifting Equipment](#)

Other Resources:

[Scaffold into Powerlines](#)



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