



MIOSHA Construction - Part 45 Fall Protection

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

Fall Protection

MIOSHA Part 45
OSHA 1926 Subpart M
Effective date: April 6, 2015

MIOSHA Training Institute (MTI)

Presented By:

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

www.michigan.gov/miosha

517-284-7720



Objectives

- Brief intro to MIOSHA
- Discuss importance of fall protection
- Determine when fall protection is needed
- Discuss different fall protection systems
- Provide basic instruction on personal fall arrest systems
- Determine where each fall protection system is appropriate
- Describe training requirements
- Identify residential construction fall protection requirements

What is MIOSHA?

Act 154, MIOSHA Act

- Passed in 1974.
- MIOSHA is responsible for worker safety and health protection in Michigan.
- General Duty Clause: Furnish employees employment free of recognized hazards that are causing, or likely to cause death or serious physical harm.



3

What does MIOSHA/OSHA do?

Encourage companies and workers to reduce workplace hazards and improve safety programs.

Develops and enforces safety and health standards.

Maintains a recordkeeping system to monitor job-related injuries and illnesses.

Provides assistance, training, and other support to help employers and workers.



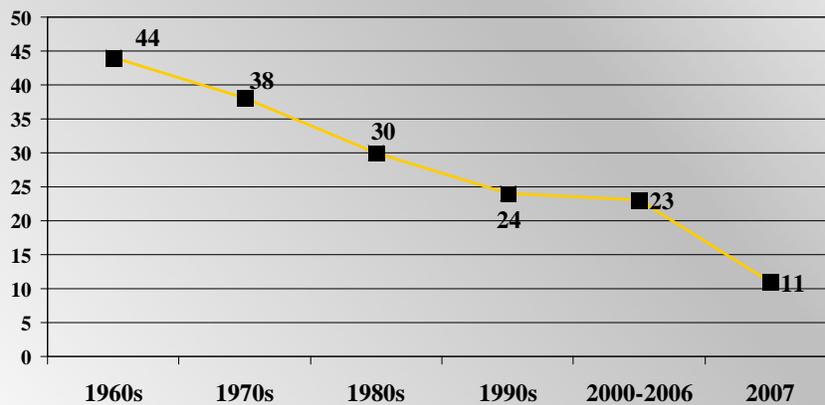
4

MICHIGAN

- Public Act 89 of 1963 Construction Safety Act
- Federal OSHA 1970
- Michigan Occupational Safety & Health Act of 1974

5

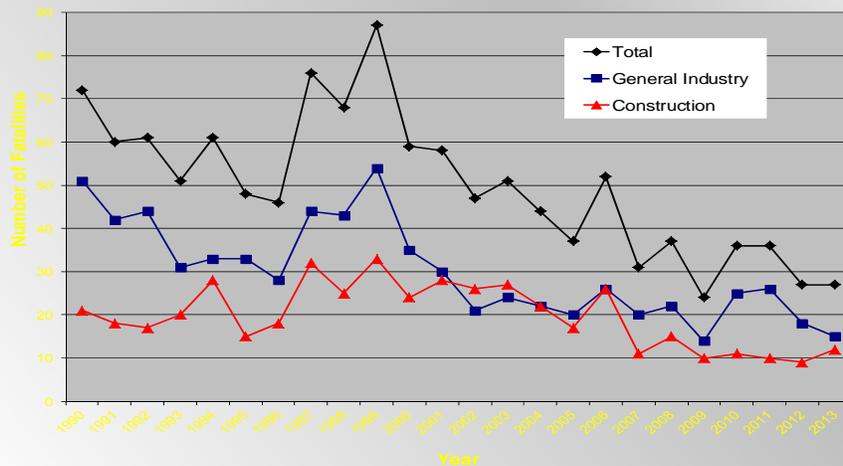
Long Term Construction Fatality Trend in Michigan



6

Fatalities in Michigan 1990-2013

Work-Related Fatalities in Michigan



Falls in Construction

- Falls are the leading cause of death in construction.
- Falls from as little as 4 to 6 feet can cause serious lost-time accidents and sometimes death.
- Falls from 11 feet result in death 50% of the time.
- Every worker on a job site is at risk of a fall.

The Fall

- A fall starts from the moment your feet leave the surface you were standing on.
- If you are using a conventional Personal Fall Arrest System (PFAS), the fall is measured from the anchorage point to the end of the lanyard when the fall is completely stopped.

9

Defining the Fall

A **free fall** is defined as the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

When a fall is experienced using a PFAS, the fall is referred to as a free fall up until the **deceleration device** starts to arrest the fall.

It's similar to a parachute jumper pulling the ripcord to the parachute. The fall doesn't stop, but the fall **begins** to stop once the rip cord is pulled.

MIOSHA rules allow no more than a 6 foot **free fall** distance.

1926.502(d)(16)(iii)

Any additional distance the person falls beyond the free fall is added to the free fall distance and referred to as the **total fall distance**. This is the measurement of the fall from start to stop.

10

How Long Does it Take to Fall?

<u>Height</u> (feet)	<u>Time</u> (seconds)
4	0.5
16	1.0
36	1.5
64	2.0
100	2.5
144	3.0
256	4.0
576	6.0
1600	10.0

© 1995 Courtesy of J. Nigel Ellis-Dynamic Scientific Controls

11

When the fall does come to a complete stop the action is referred to as the **fall rest**. Tremendous force is imposed on the body during the fall arrest. This force imposed during the arrest is known as the **arrest force**. Forces imposed in a fall can exceed 3800 lb. depending on the type of system in use.

ARREST = THE STOPPING ACTION

ARREST FORCE = The force imposed when the stop occurs.

Subpart M/Part 45 sets limits on the **Maximum Arrest Force**, or MAF, which can be imposed on a body during a fall. The law prohibits the use of a safety belt and allows only **1800 lb.** when using a full body harness. 1926.502(d)(16)(ii)

12



Part 45 Scope: Covers All Fall Hazards
EXCEPT:

- Inspections
- Working on a Scaffold - Part 12
- Working on Cranes & Derricks - Part 10
- Performing Steel Erection - Part 26
- Tunneling Operations - Part 14
- Electric Transmission - Part 16
- Ladders & Stairways - Part 11 & 21

13



Part 45 Scope: Covers All Fall Hazards
EXCEPT:

- Inspections
 - 1926.500(a)(1) These rules do not apply where an employee is making an inspection, an investigation, or an assessment of workplace conditions **before** the actual start of construction work or **after all** construction work has been completed.

14

Part 45 - Fall Protection Divided Into 3 Parts:

1926.501	Duty to have fall protection
1926.502	Fall protection systems criteria and practices
1926.503	Training requirements
Appendices	A - E

15

1926.501 Duty to Have Fall Protection

- Protection at 6 feet or more
 - Stated in several rules 501 (b)(1), 501 (b) (2), 501 (b) (3), etc.
- Employers shall provide and install all fall protection systems necessary.
- **1926.501 (a)(2)** All walking / working surfaces inspected before work begins



16

1926.501(a)(2) The employer shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely. Employees shall be allowed to work on those surfaces only when the surfaces have the requisite strength and structural integrity.



17

1926.501 Duty to Have Fall Protection

Fall Protection Options depending on **Activity** and **Location**.

1. Unprotected sides and edges
2. Leading edges
3. Hoist areas
4. Holes
5. Formwork and reinforcing steel
6. Ramps, runways, and other walkways
7. Excavations
8. Dangerous equipment
9. Overhand bricklaying and related work
10. Roofing work on Low-slope roofs
11. Steep roofs
12. Precast concrete erection
13. Residential construction
14. Wall openings
15. Walking/working surfaces not otherwise addressed

18

1. 1926.501(b)(1)

501(b)(1)“Unprotected sides and edges.” Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of **guardrail systems, safety net systems, or personal fall arrest systems.**

19

1. Unprotected Sides & Edges 1926.501(b)(1)



Solution?

- Guardrails, PFAS, Safety Nets

20

1. Unprotected Sides & Edges

Important Definition

Means any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches high.

1. Unprotected Sides & Edges





2. Leading Edge 1926.501(b)(2)

Important Definition

Means the edge of a floor, roof, or formwork for a floor or other walking/working surface (such as a deck) which changes locations as additional floor, roof, decking, or formwork sections are placed, formed or constructed.

25



1926.501(b)(2) Leading edges

- Each employee who is constructing a leading edge 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems.
 - **Exception:** When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.
 - **Note:** There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with 1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

26

2. Leading edges



27

2. Leading edges



28

3. Hoist areas 1926.501(b)(3)

Each employee in a hoist area shall be protected from falling 6 feet or more to lower levels by **guardrail systems or personal fall arrest systems**. If guardrail systems, [or chain, gate, or guardrail] or portions thereof, are removed to facilitate the hoisting operation (e.g., during landing of materials), and an employee must lean through the access opening or out over the edge of the access opening (to receive or guide equipment and materials, for example), that employee shall be protected from fall hazards by a personal fall arrest system.



See COM 4-2 for interpretation

29

4. 1926.501(b)(4)

(4) “Holes.” (i) Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than 6 feet (1.8 m) above lower levels, by **personal fall arrest systems, covers, or guardrail systems** erected around such holes.

(ii) Each employee on a walking/working surface shall be protected from tripping in or stepping into or through holes (including skylights) by covers.

(iii) Each employee on a walking/working surface shall be protected from objects falling through holes (including skylights) by covers.

30

4. Holes, Including Sky Lights 1926.501 (b)(4)

Solution? Covers



Holes



Solution?

- Cover completely and securely and mark with the words “Hole” or “Cover.”
- If no cover, guard with a guardrail.



33



34

5. Formwork and Reinforcing Steel

1926.501 (b)(5)

Each employee on the face of formwork or reinforcing steel shall be protected from falling 6 feet or more to lower levels by **personal fall arrest systems, safety net systems, or positioning device systems.**

35



5. Formwork and Reinforcing Steel

EXCEPTION – provided in COM 4-2 General Interpretation

Because of the way rebar is transported to a work location (workers carry the rebar by cradling it in their arms), it is not feasible, or would create a greater hazard, to constantly connect and disconnect fall protection devices while climbing the rebar assemblies. For this reason and because rebar assemblies are **similar to a fixed ladder**, only those employees who are actively involved in constructing rebar assemblies are allowed to climb without fall protection up to 24-feet. Once employees reach their work location or climb to heights above 24-feet, they must use a personal fall arrest system or a positioning device system.

37

5. Concrete Forms and Rebar



Solution?

- Use PFAS when working on formwork or rebar.
- Cover or cap protruding rebar.

38

6. 1926.501 (b)(6)

(6) “Ramps, runways, and other walkways.”

Each employee on ramps, runways, and other walkways shall be protected from falling 6 feet (1.8 m) or more to lower levels by **guardrail systems**.

39

6. Ramps, runways, and other walkways 1926.501 (b)(6)



40

6. Ramps, Runways, and Other Walkways



Solution?

- Guardrails

41

7. Excavations 1926.501(b)(7)

Each employee at the edge of an excavation 6 feet or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier



42

7. Excavations

Solution?

- Barriers or guardrails when not readily seen

OR

- at edge of
 - Well
 - Pit
 - Shaft
 - Or similar excavation

Each employee at the edge of a well, pit, shaft, and similar excavation 6' or more in depth shall be protected from falling by **guardrail systems, fences, barricades, or covers.**



8. Dangerous Equipment 1926.501(b)(8)

- If **LESS** than 6' above dangerous equipment, then **guardrails or equipment guards.**
- If **MORE** than 6' above dangerous equipment, then **guardrails, PFAS, or safety nets.**

9. Overhand bricklaying and Related Work 1926.501(b)(9)

Except as otherwise provided in paragraph (b) of this section, each employee performing overhand bricklaying and related work 6 feet or more above lower levels, shall be protected from falling by **guardrail systems, safety net systems, personal fall arrest systems, or shall work in a controlled access zone.**



45

10. Low Slope Roofs 1926.501(b)(10)



Means a roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

46

10. Roofing work on Low-slope Roofs

- Except as otherwise provided in paragraph (b) of this section, each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by:
 - guardrail systems,
 - safety net systems,
 - personal fall arrest systems,
 - or a combination of:
 - warning line system and guardrail system
 - warning line system and safety net system
 - or warning line system and personal fall arrest system
 - or warning line system and safety monitoring system.

Or, on roofs 50-feet or less in width (see Appendix A to subpart M of this part), the use of a safety monitoring system alone [i.e. without the warning line system] is permitted.



11. Steep Roof

1926.501(b)(11)



Means a roof having a slope greater than 4 in 12 (vertical to horizontal).

49

11. Steep Roof

Each employee on a steep roof with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by **guardrail systems with toeboards, safety net systems, or personal fall arrest systems.**

50



Roofs 1926.501 (b)(10,11)



Solution?

- Steep slope: PFAS, catch platforms

53

12. Precast Concrete Erection 1926.501(b)(12)

- Each employee engaged in the erection of precast concrete members (including, but not limited to the erection of wall panels, columns, beams, and floor and roof “tees”) and related operations such as grouting of precast concrete members, who is 6 feet (1.8 m) or more above lower levels shall be protected from falling by **guardrail systems, safety net systems, or personal fall arrest systems** UNLESS another provision provides for alternative fall protection measures.

54

Precast Concrete Erection 1926.501(b)(12)

- Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.

55

13. Residential Construction 1926.501(b)(13)

Each employee engaged in residential construction activities 6 feet or more above lower levels shall be protected by **guardrail systems, safety net system, or personal fall arrest system** unless another provision in paragraph (b) of this section provides for an alternative fall protection measure.



56

13. Residential Construction 1926.501(b)(13)

Exception: **When the employer can demonstrate that it is infeasible or creates a greater hazard** to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of 1926.502.



57

13. Residential Construction

NOTE: **There is a presumption that it is feasible and will not create a greater hazard** to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with 1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.



58

- Employers must:
 - Provide fall protection by using:
 - Guardrail systems**
 - Safety net systems**
 - Personal fall arrest systems**
 - Other fall protection methods listed in 29 CFR 1926.501(b)



59

- To comply with 1926.501(b)(13), employers who do not provide conventional fall protection must:
 - Demonstrate that the conventional fall protection is infeasible
 - Prepare a fall protection plan in accordance with 29 CFR 1926.502(k)

60

- 
- The fall protection plan must meet the requirements of 1926.502(k):
 - Prepared by a qualified person
 - Written
 - Site-specific
 - Up to date
 - Maintained on site

61

Definition of Residential Construction

For a structure to be considered residential construction, it must meet the following requirements:

Residence Requirement

- The end-use of the structure being built must be as a home (i.e., a dwelling)

AND

Wood Frame Construction Requirement

- The structure being built must be constructed using traditional wood frame construction materials and methods.

62

“Residential Construction”

Cold-formed metal studs

will be considered within the bounds of “traditional” wood frame construction materials and methods.



63

“Residential Construction”



The construction of residences (homes) built with wood framed and masonry **brick or block walls** will be considered to meet the Wood Frame Construction Requirement.

64

Nursing Homes, Hotels, and Similar Facilities



- In **most** cases, nursing homes, hotels, and similar structures will **not** be considered residential construction
- These structures usually include materials not used in wood frame construction.

65

Nursing Homes, Hotels, and Similar Facilities

- Examples of materials that disqualify a structure from being residential construction:
 - Precast concrete.
 - Steel I-beams (beyond the use of a single I-beam used in conjunction with wood framing).
 - Rebar and Poured concrete when integral to the **frame** of the structure.

66

2103672
Single-mount Sheet Metal Roof Anchor with D-ring

- 22" long when flat
- Nail to secure

2103673 **Removable/ Reusable Roof Anchor**

- Chain and O-ring
- 25" long
- Nail or bolt into place

2104540
Detachable Roof Anchor

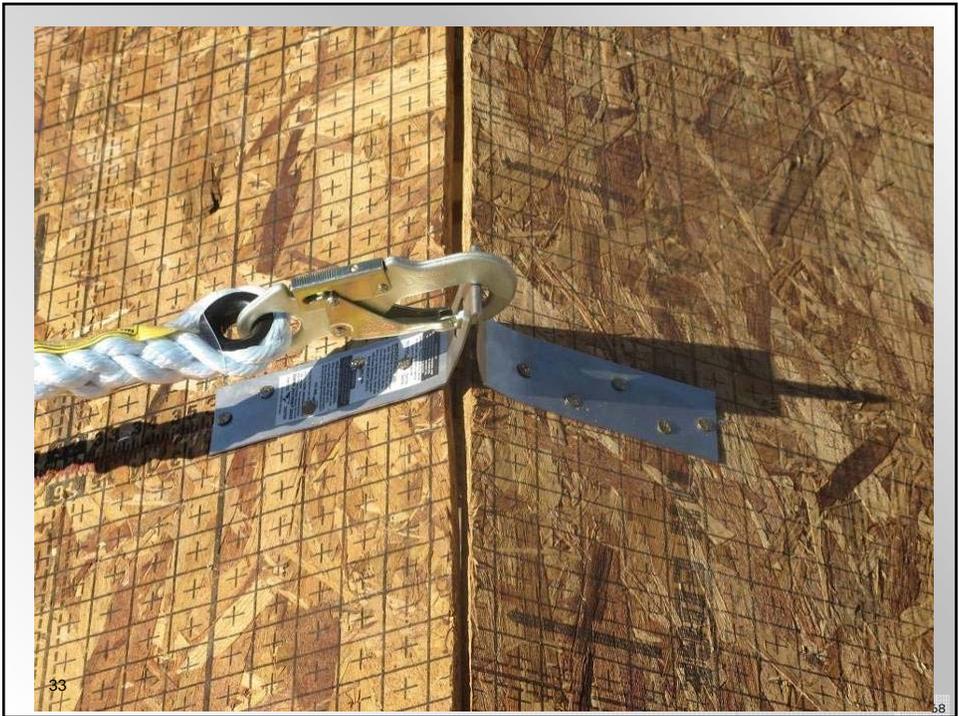
- For open trusses, joists and rafters
- Removable D-ring and clamp assemblies
- Fits 2x4 roof truss, joist, rafter
- Complete with flashing

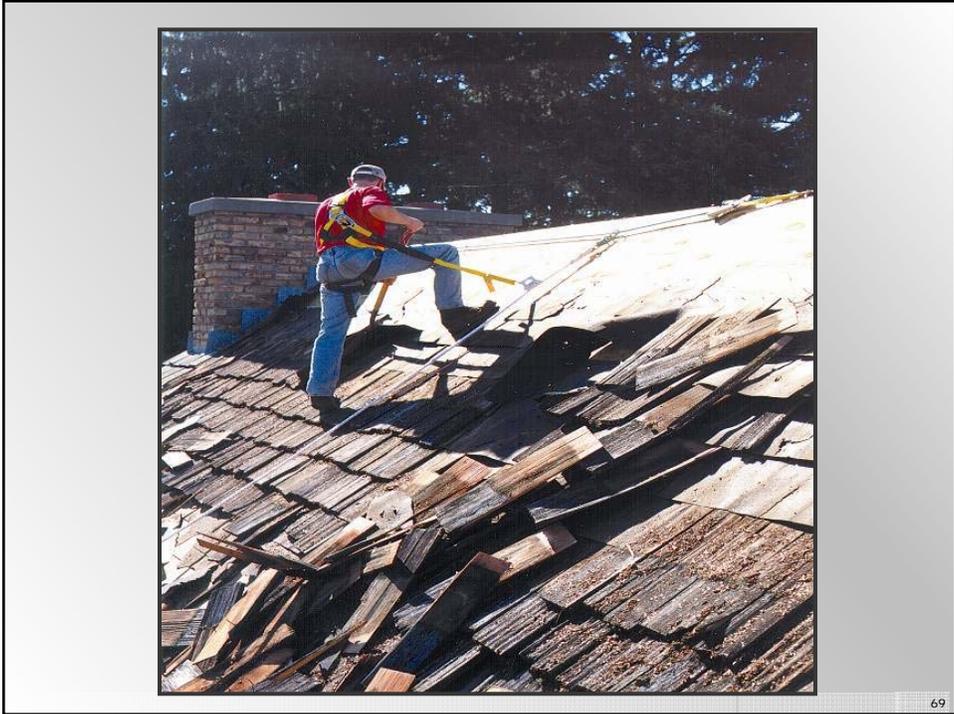
Similar Models:
2104541: fits 2x6 to 2x8
2104542: fits 2x10 to 2x12

2103670
U-bolt Permanent Roof Anchor

- Fits up to 2x8
- Complete with flashing

Similar Model:
2103671: fits 2x10 to 2x12





Guardrails are available for residential jobs.

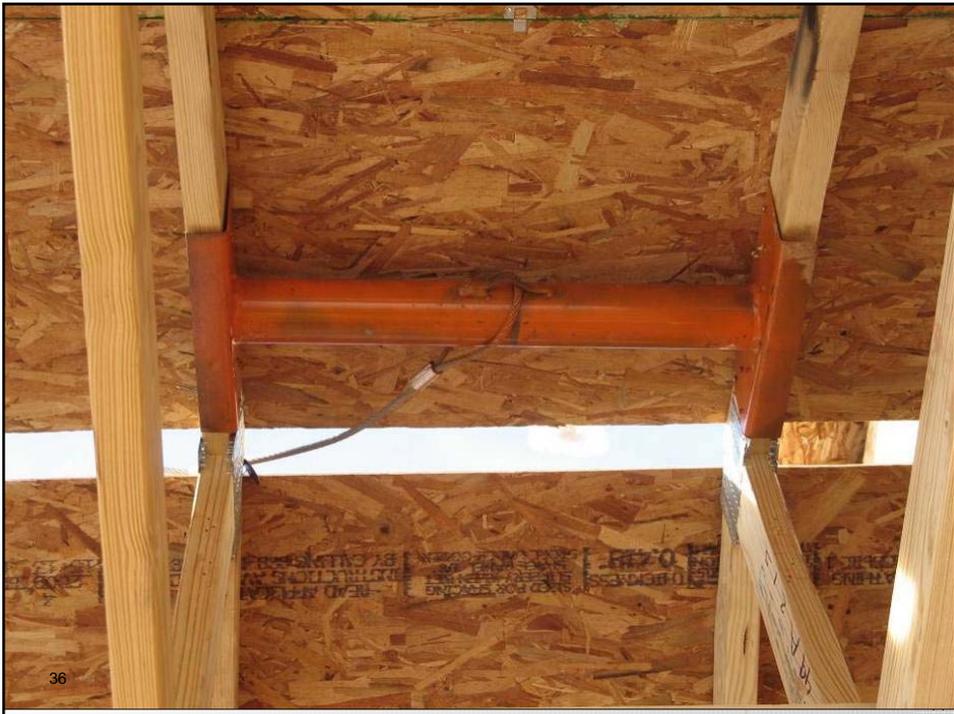


71



3

72





37



36

76





Wrong



81



82

No Good



83

14. 1926.501.(b)(14)

(14) “Wall openings.” Each employee working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is 6 feet (1.8 m) or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches (1.0 m) above the walking/working surface, shall be protected from falling by the use of a **guardrail system, a safety net system, or a personal fall arrest system.**

84

Wall Opening Definition

- Opening means a gap or void 30 inches (76 cm) or more high and 18 inches (48 cm) or more wide, in a wall or partition, through which employees can fall to a lower level.

85

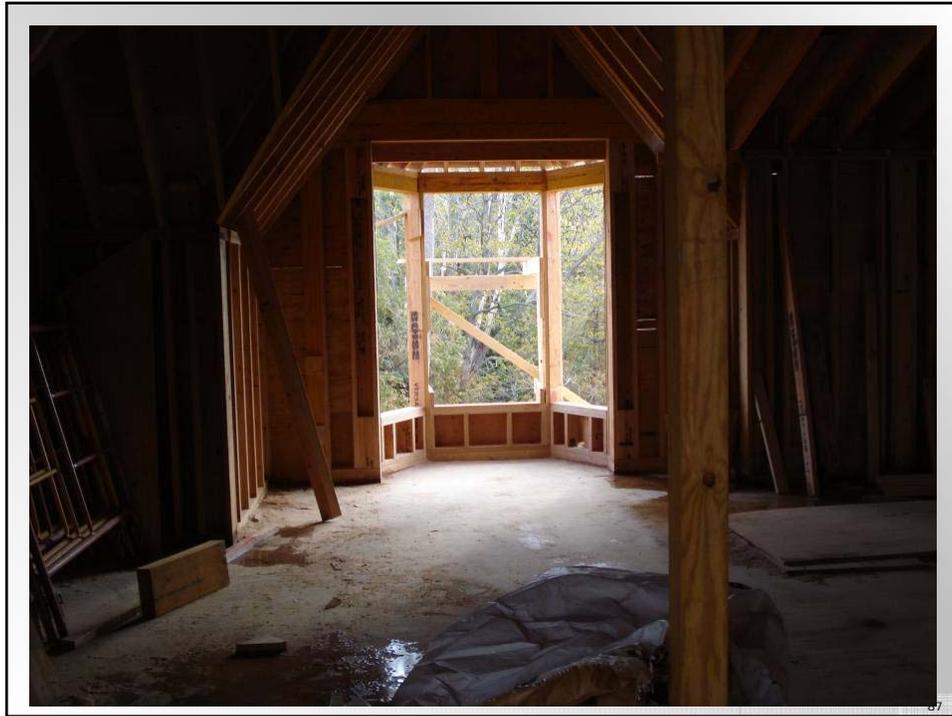
14. Wall Openings 1926.501(b)(14)



Solution?

- Guardrails

86



15. Walking/working Surfaces Not Otherwise Addressed 1926.501(b)(15)

Except as provided in 1926.500(a)(2) or in 1926.501 (b)(1) through (b)(14), each employee on a walking/working surface 6 feet or more above lower levels shall be protected from falling by a **guardrail system, safety net system, or personal fall arrest system.**

In other words, if you can not categorize it into 1 through 14, then use conventional fall protection.



1926.502 Nine Types of Fall Protection

Part 45 discusses these Nine types:

1. Guardrails
2. Safety Nets
3. Personal fall arrest system
4. Covers
5. Positioning device systems
6. Warning line systems
7. Controlled access zones
 - leading edge, precast concrete, overhand bricklaying
8. Safety monitoring
9. Fall protection plans

1926.502 Nine Types of Fall Protection

1. Guardrails
2. Safety nets
3. Personal fall arrest system
4. Covers

Conventional
Fall Protection
Systems

- These 4 systems should be used for most situations
- The other 5 systems are for:
 - Some unique situations have unique fall protection methods
 - Sometimes conventional fall protection is infeasible

5. Positioning device systems
6. Warning line systems
7. Controlled access zones
 - leading edge, precast concrete, overhand bricklaying
8. Safety monitoring
9. Fall protection plans

91

1. Guardrails

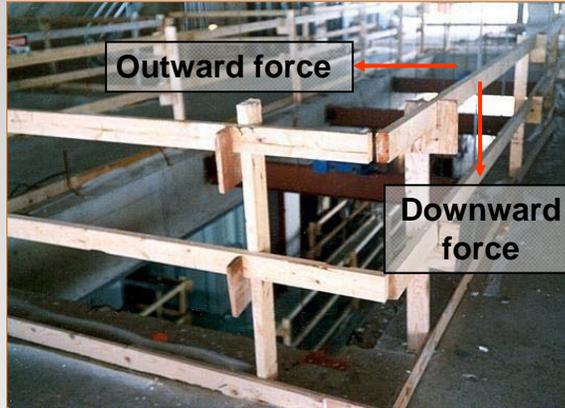


Top Rail
Mid- Rail
Toeboard

- Top rails 42 inches high, plus or minus 3 inches 1926.502(b)(1)
- Midrails half-way 1926.502(b)(2)

92

1. Guardrails



- Must withstand 200 lbs outward and 200 lbs downward force
1926.502(b)(3)
- Vertical intermediate member openings. No greater than 19" opening.
1926.502(b)(2)(iv)

93

1. Guardrails



- Wire rope must not deflect greater than 3 inches outward or downward with 200 lbs pressure
1926.502(b)(4)
- Flagged every 6 feet
1926.502(b)(9)

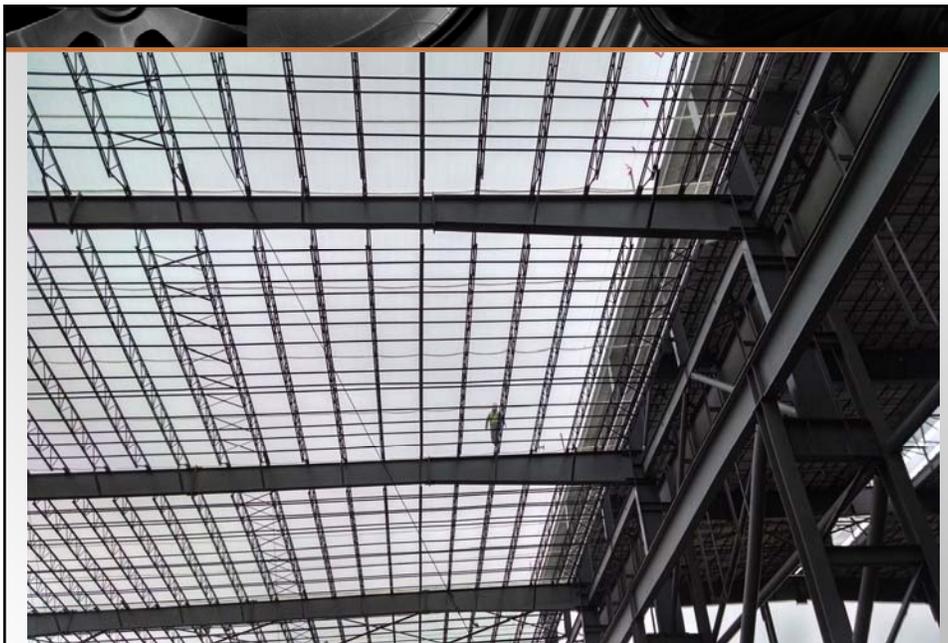
94

2. Safety Net System

- Installed as close as possible under walking/working surface. No more than 30 feet below. 1926.502(c)(1)
- Extend outward from edge at least 8 feet, more if over 5 feet below workers. 1926.502(c)(2)
- Inspected for wear and damage. 1926.502(c)(5)
- Items that fall into the net removed ASAP. 1926.502(c)(6)



95



96

3. Covers and Holes

- Hole is a gap or void 2” or more in its least dimension. 1926.500(b)
- All holes must be covered. 1926.501(b)(4)(i)
- Secured. 1926.502(i)(3)
- Marked with “HOLE” or “COVER”. 1926.502(i)(4)
- Support twice the weight imposed. 1926.502(i)(1)(2)



4. Personal Fall Arrest Systems

A system used to arrest an employee in a fall from a working level.

1. Anchorage
 2. Connectors
 3. Lifeline or Lanyard
 4. Deceleration device
- + 5. Body harness
= PFAS



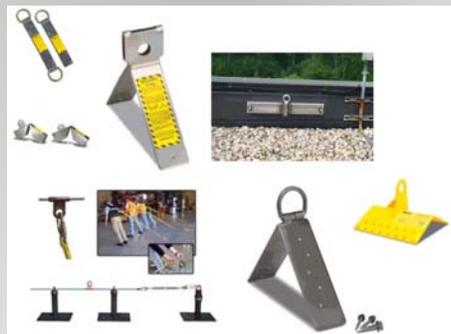
Faces of Safety Video



99

Anchorage

A secure point of attachment for lifelines, lanyards, or deceleration devices.



100

Anchorage

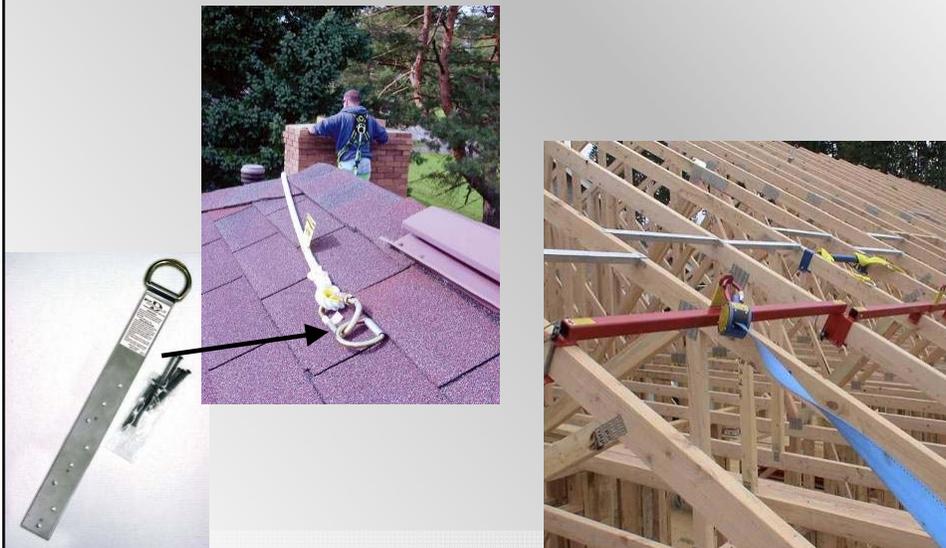
- Must support 5000 pounds

1926.502(d)(15)



101

Some Anchor Point Options



More Anchor Point Options



103

More Anchor Point Options



104



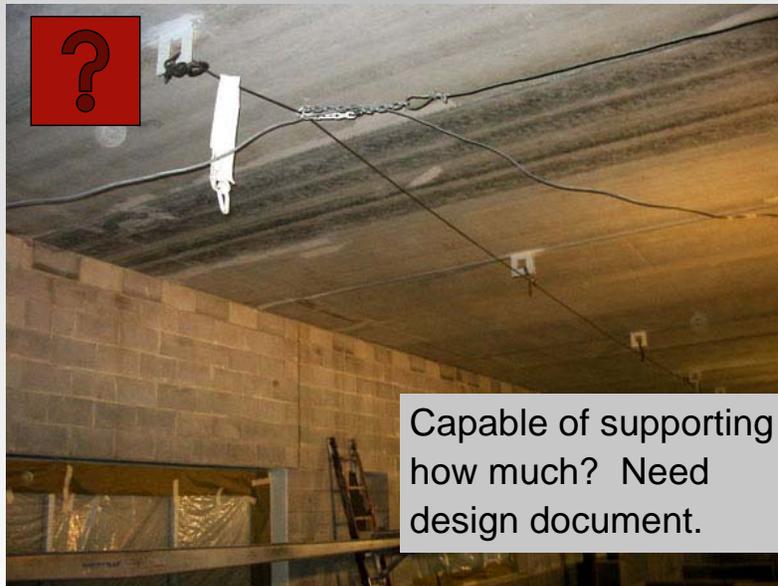
051 1 2004

Anchorage

- 1926.502 (d)(15) Anchorages used for attachment of personal fall arrest equipment shall be
- Independent of any anchorage being used to support or suspend platforms
- Capable of supporting at least 5,000 lbs
 - OR
- Shall be **designed**, installed, and used as follows:
 - As part of a complete fall arrest system which maintains a safety factor of **at least two**
 - Under the supervision of a qualified person
 - Documentation of this design must be available.

107

Anchorage



108

Horizontal Lifelines

- 1926.502 (d)(8) Horizontal lifelines shall be designed, installed, and used, under the supervision of a **qualified person**, as part of a complete personal fall arrest system, which maintains a **safety factor of at least two**.



109

Horizontal Lifelines

- Wire rope or synthetic rope.



110

Horizontal Lifelines

- Understand the tension requirements.
- Understand the shear forces (on eyebolts, etc.)
- One or two users
- Can you connect a retractable?



111

Connectors

- Includes snaphooks, carabiners, and D-rings.
- Nonlocking snaphooks cannot be part of personal fall arrest systems. 1926.502(d)(5)
- Never tie a knot for a connection.



112

Lanyard or Retractable Lifeline

- Single leg or double leg.
- Need double for 100% tie-off.
- Web, rope, or cable.



113

Deceleration Device

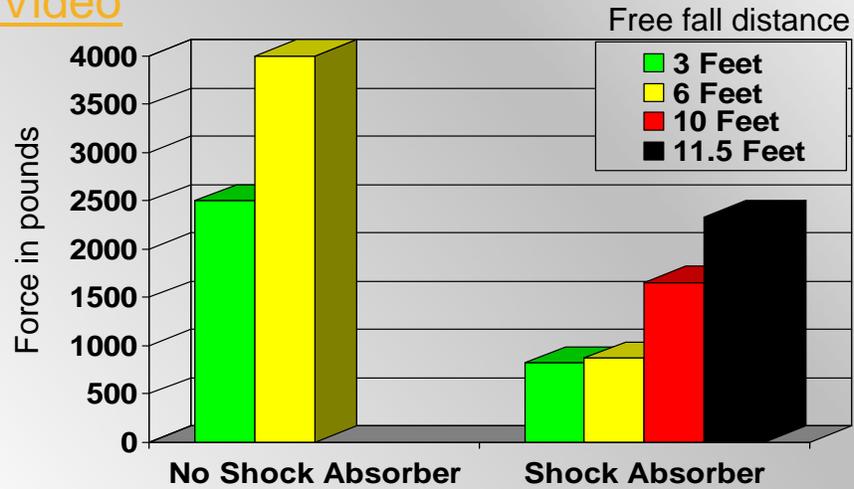
- 1926.502 (d)(16)(iv) Limit deceleration distance to 42"
- 1926.502 (d)(16)(ii) Limit arresting force to 1800 lbs.



114

Fall Arrest Forces

[Video](#)



115

Harness

- Must fit snug: 2 fingers tight
- Must be worn properly
 - Chest strap across chest
 - 1926.502 (d)(17) "D"-ring in center of back near shoulder level



116

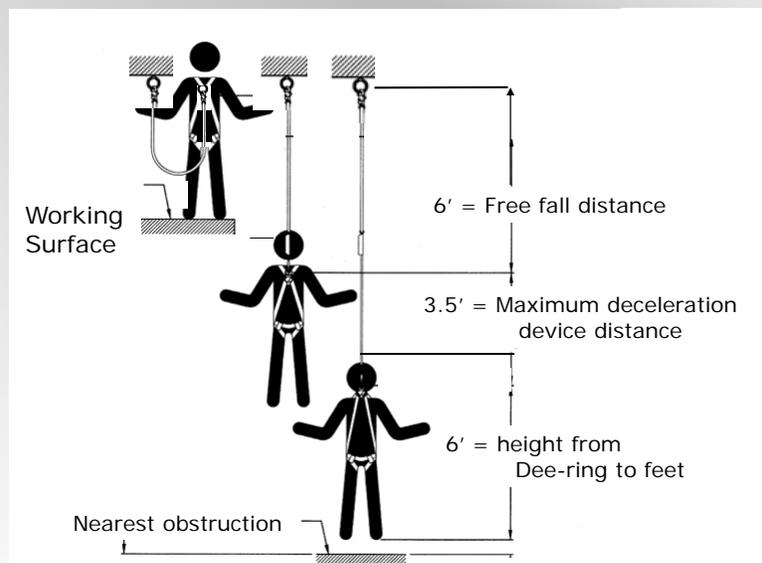
Personal Fall Arrest System

- Inspected prior to each use (daily) 1926.502(d)(21)
- Must limit arresting force to 1800 lbs 1926.502(d)(16)(ii)
- Designed for a maximum of 310 lb worker (typical)
- Removed from service if impact loaded 1926.502(d)(19)
- Must provide for prompt rescue in event of a fall 1926.502(d)(20)



117

Fall Distance Calculation



118

PFAS Testimonial



119

1926.502 Nine Types of Fall Protection

Part 45 discusses these nine types:

1. ~~Guardrails~~
2. ~~Safety Nets~~
3. ~~Covers~~
4. ~~Personal fall arrest system~~
5. Positioning device systems
6. Warning line systems
7. Controlled access zones
8. Safety monitoring
9. Fall protection plans

120

5. Positioning Device Systems

- A body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.
- Cannot free fall more than 2 feet. 1926.502(e)(1)
- Used on rebar and formwork.



121

6. Warning Line Systems

- A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge.
- Rope, wire, or chain and supporting stanchions. 1926.502(f)(2)
- Flagged every 6'. 1926.502(f)(2)(i)
- 34" to 39" high. 1926.502(f)(2)(ii)
- Workers must stay inside warning line. 1926.502(f)(3)



122

6. Warning Line Systems

- 6 feet back from edge for roofers only. 1926.502(f)(1)(i)
- 15 feet back for all others (Federal OSHA Interpretation).
- 10 feet back if mechanical equipment for roofers only.
1926.502(f)(1)(ii)
- Points of access, hoisting areas must be connected to work area by an access path with 2 warning lines.
1926.502(f)(1)(iii)



123

7. Controlled Access Zones

- An area in which certain work may take place without the use of guardrails, PFAS, or safety nets.
- Used for:
 - Precast concrete
 - Overhand bricklaying
 - Leading edge



124

7. Controlled Access Zones

- Control lines run the length of the unprotected edge.
1926.502(g)(1)(iii)
- Lines are 6-25 feet away from unprotected edge. 1926.502(g)(1)(i)
 - 6 to 60 feet back for precast concrete. 1926.502(g)(1)(ii)
 - 10 to 15 feet back for overhand bricklaying. 1926.502(g)(2)(i)
- Control line connected on each side to a guardrail or wall.
1926.502(g)(1)(iv)
- 39" to 45" high. 1926.502(g)(3)(ii)
- Flagged every 6'. 1926.502(g)(3)(i)

125

8. Safety Monitoring System 1926.502(h)

- 1926.502 (h)(1)(i,ii) A competent person is responsible for recognizing and warning employees of fall hazards.
- 1926.502 (h)(3) Keeps unauthorized workers out of work area.
- 1926.502 (h)(4) Workers promptly comply with safety monitor.
- 1926.502 (h)(1)(iii) On same level as workers.
- 1926.502 (h)(3)(iv) Close enough to communicate with workers.
- 1926.502 (h)(3)(v) No other duties.
- Uses:
 - Low slope roofs



126

9: Fall Protection Plan

- Available only to:
 - Leading edge work
 - Precast concrete erection work
 - Residential construction work
- ONLY if they can demonstrate that it is infeasible or creates a greater hazard to use conventional fall protection systems. 1926.502(k)(5)

127

9. Fall Protection Plan

Precast concrete



Leading edge

Residential

128

9. Fall Protection Plan

- Written document 1926.502(k)(3)
- Prepared by a qualified person 1926.502(k)(1)
- Explains why conventional fall protection is not feasible 1926.502(k)(5)
- Describes how other measures will be taken, such as safety monitoring 1926.502(k)(6)
- Implemented by a competent person 1926.502(k)(4)

129

Activity

- Work in groups of 3-5
- Complete all of the 4 scenarios
- For the 4 scenarios:
 - Select the “501(s)” that apply(ies)
 - Choose the Fall Protection system to use - If you choose an unconventional system explain why conventional was not chosen
 - Identify 5 critical criteria (“502s”) to determine & ensure during the process.

130

Scenario 1

- Performing various construction activities in the “finishing” stage of the new construction of an apartment building. Windows are installed; interior drywall is installed.
- The month is August.
- The openings formed when the windows are open measure 20” wide x 40” tall for the horizontally sliding windows and 24” wide x 32” tall for the vertically sliding windows.
- The sill height on all of the windows is 22” above the floor.

131

Scenario 2

- Receiving materials @ the 7th floor of new hospital construction.
- Iron workers have enclosed all floors with 5/8” wire rope at 42” above the finished floor.
- Materials being received include electrical switchgear, masonry and associated materials, carpentry materials, etc.
- Expectation is that the wire rope will be in the way of receiving these materials.

132

Scenario 3

- Roofing work on 3:12 main roof with 3 sections that rise 20' @ 14:12 pitch.
- Main roof is 35' from finished grade.
- Roofing work entails full tear off and rubber membrane install.
- Possible access point could be from penthouse in center of roof.

133

Scenario 4

- Metal Stud Truss Erection for a hotel.
- 95% gable style roof.
- 1' overhang on each end of triangular trusses.
- Truss height 12' from bottom cord to peak.
- 3 story building; 30' to unfinished grade from top of wall that trusses are being set on.

134

Training

The employer shall provide a training program to each employee to recognize the hazards of falling and train them in procedures to follow to minimize these hazards. 1926.503(a)(1)

135

1926.503 Training requirements

- Training Program 1926.503(a)
- Certification of training 1926.503(b)
- Retraining 1926.503(c)



136

1926.503(a) Training

- Training of employees by a competent person in the following areas:
 - Hazards in the work area 1926.503(a)(2)(i)
 - Procedures for proper installation, use, and operation of fall protection systems 1926.503(a)(2)(ii)&(iii)
 - The role of employees while using a safety monitoring system or fall protection plan 1926.503(a)(2)(iv)&(vii)
 - The rules contained in Part 45 1926.503(a)(2)(viii)



1926.503(b) Certification of Training

- The employer shall verify training by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer.
- If the employer relies on training conducted by another employer or completed prior to the effective date of this section, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of actual training.

1926.503(c) Retraining

- When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by paragraph (a) of this section, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:
 - 1926.503(c)(1) Changes in the workplace render previous training obsolete; or
 - 1926.503(c)(2) Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or
 - 1926.503(c)(3) Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

139

2006

RESIDENTIAL-Carpenter

AGE 62

1:00 PM

The employee was installing siding. The roof jack anchors pulled and collapsed. The employee slid down and off the roof edge, ***falling*** 12 feet to the asphalt driveway striking his head. Kent Co.

140

R408.22139(1)	Failure to report fatal within 8 hours
R408.40114(1)	Accident Prevention Program
R408.41112(1)	Ladder training
R408.41209(2)	Scaffold training
1926.503(a)(1)	Fall protection training
R408.41253(2)	Roof bracket spacing
R408.41253(3)	Working planking
R408.41253(4)	Roof bracket anchorage
R408.41122(3)	Ladder use
1926.501(b)(13)	Fall protection





143

2006

RESIDENTIAL-Carpenter
AGE 51
1:00 PM

Employees were on the house roof conducting carpentry operations and cleaning up. As he was sweeping and picking up debris he stepped **backwards, falling** off the roofs edge. Midland Co.

408.4114(1) No Accident Prevention Program
1926.501(b)(14) No fall protection

144



2009

- Roofing employees were wrapping up for the night installing a tarp on a steep roof
- Worker stepped onto the tarp causing him to slip
- Fell 19 feet to the ground level
- Happened in Eaton County

2009



147

2009



148

2009

Citations issued?

- | | |
|---------------|---|
| 1. 114(1)(a) | No Accident Prevention Program |
| 2. 115 | No fall protection training |
| 3. 132(3) | No one on site was first aid certified |
| 4. 622(1) | No hard hats |
| 5. 45(12) | Steep roof with no use of fall protection |
| 6. 1121(3)(a) | Split side rails of ladder |
| 7. 1124(5) | Ladder not extended 3 feet past landing |
| 8. 1139(1) | No report of fatality within 8 hours |
| 9. 1862(3) | Plastic gas can |

149

Why not...



150

2010

AGE 31 November 24, 2010 9:30 AM

An employee engaged in roofing activities was working on the walking/working surface of the roof. An incident occurred and the employee made contact with the roof hole cover. The cover did not support the weight of the employee causing the employee to fall through the cover approximately 50-foot to the concrete floor below. Happened in Wayne Co.

151



152



153



154





157

Citations Issued

- R408.40114(1) Accident prevention program
- Part 45 1926.502(i)(2) Hole covers 2 time the intended load
- Part 45 1926.502(8)(3) Hole covers not secured

158

2011

Age: 50 Location: Allegan Co.

Date & Time: 4/21/11 12:00 p.m.

Employee fell 30 feet to the ground while setting wooden roof trusses on pole barn type building. Trusses were being set with a crane when employee attempted to disconnect the cranes load line from the truss.

159





Citations Issued

- 408.40114 (1) No accident prevention program developed
- 408.40622 (1) No head protection worn
- 408.40624 (1) No eye protection worn
- 408.41113 (1) No use of ladder to access elevated location
- 1926.501 (b) (1) No fall protection in use
- 1926.503 (a) (1) No fall protection training provided
- ACT 154 General Duty clause – inadequately braced roof trusses

163

Why not...

- Build modular sections allowing for more formidable anchorage points for fall arrest systems or providing for a foundation for scaffolding within the upper portions of the trusses.

164



165

Good Work Practices

- Plan for fall protection from the start
- Perform work at ground level if possible
- Tether or restrain workers so they can't reach the edge
- Install guardrails and hole covers
- Use conventional fall protection whenever feasible
- Train your workers



166

Fall Protection Summary

- 6 foot rule
- 9 types of fall protection
- A safe method for every situation – The best solutions are generally conceived by the workers performing the work.
- Find protection that is more conducive to getting the job done



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.

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

How?

- Select *What's My User ID?*
- Key in the Last Name and SS# or Macomb ID
- Select *Log In*
- If you need help call 586-498-4106 or email mti@macomb.edu

169

Thank You For Attending This Presentation

Michigan Occupational Safety & Health Administration
Consultation Education & Training Division
525 W. Allegan Street, P.O. Box 30643
Lansing, Michigan 48909-8143

To request consultation, education
and training services, call 517-284-7720

or

www.michigan.gov/miosha



MIOSHA Construction - Part 45 Fall Protection

Student Resources

MIOSHA Lending Library: mioshavidoes@michigan.gov

[Part 45. Fall Protection Standard](#)

[CPWR](#)

[CPWR Success Stories](#)

[CPWR Toolbox talks](#)

[CPRW You Tube channel](#)

[PR20 Roof Jack System](#)

[Hitch Clip](#)

[The Ridge Pro](#)

[Safety Pole](#)

[PR600](#)

[Tool Box Talk – Guardrails for Fall Protection](#)

[Tool Box Talk – Holes on the Jobsite](#)

[Tool Box Talk – Personal Fall Arrest Systems](#)

[Residential Fall Protection \(SP #35\)](#)

[Fall Protection – General Interpretations \(COM-04-2R2\)](#)

[Residential Fall Protection Compliance Criteria \(COM-04-1R2\)](#)

[Construction Industry Threshold Heights \(CET-0172\)](#)

[CDC Prevention Through Design](#)



Michigan Department of Licensing and Regulatory Affairs
Michigan Occupational Safety & Health Administration
Consultation Education & Training Division
525 W. Allegan St., P.O. Box 30643
Lansing, Michigan 48909-8143

For further information or to request consultation, education and training services
call (517) 284-7720

or

visit our website at www.michigan.gov/miosha



www.michigan.gov/lara

LARA is an equal opportunity employer/program. Auxiliary aids, services and other reasonable accommodations are available upon request to individuals with disabilities.