**This guide provides compliance information to help the metal and nonmetal mining industry comply with the requirements of the Mine Safety and Health Administration's (MSHA's) ladder standards. This document is intended to enhance awareness of ladder safety for miners, mine operators, miners' representatives, independent contractors and MSHA's Metal and Nonmetal enforcement personnel.**

**The following symbol denotes a generally compliant condition:**

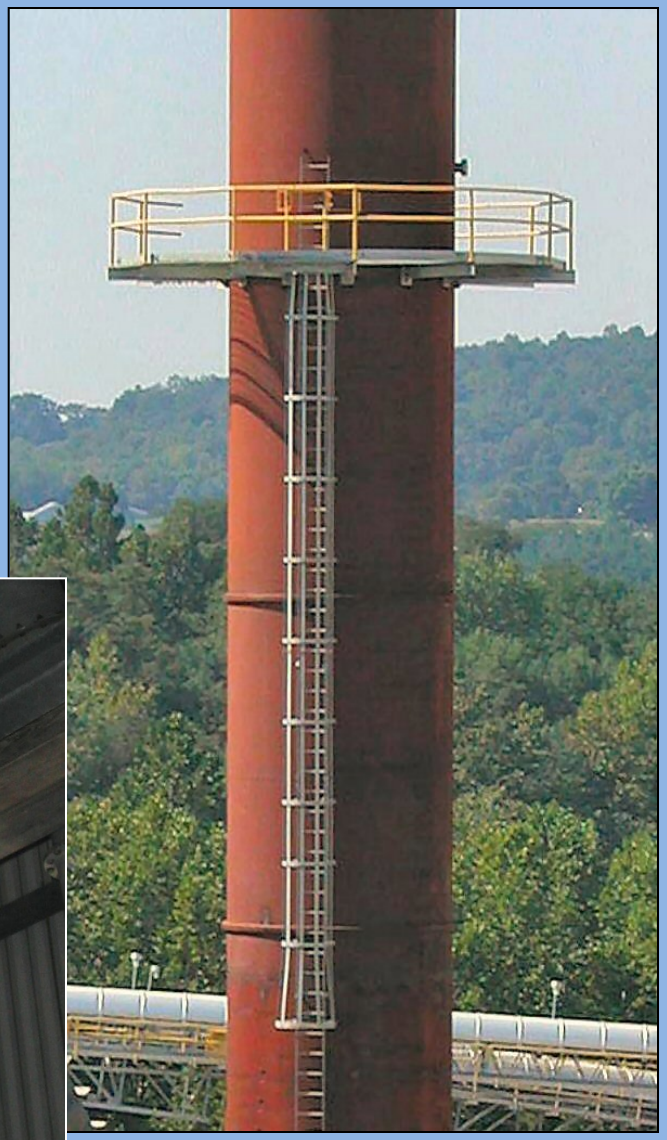

**The following symbol denotes a generally noncompliant condition:**

# Navigating this Presentation

Most of the slides in this presentation have explanatory notes that are critical to understanding the content. If using the PowerPoint® version, be sure to adjust the display on your computer screen to be able to read the notes, or print the slides using the "Notes Pages" option. If using the PDF version, the notes can be read by hovering your cursor over or clicking on the orange icon in the upper left corner of the slide.

# Ladder Safety Standards

## Metal and Nonmetal Mine Safety and Health



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# Ladders

MSHA's standards do not define a ladder.

MSHA accepts the common dictionary definition of a ladder.

MSHA's standards categorize ladders as either **fixed** or **portable.**

Some ladders also have additional descriptive designations based upon their special use or design.

# Categories of Ladders

1. **Fixed ladders** – are not defined in MNM standards. They are permanently attached to buildings, structures or equipment
2. **Portable ladders** – not fixed (extension, step)

► **Special ladders** – fixed or portable, unusual design or use

Fixed Ladders

Extension Ladders

Step Ladders

# Ladder Construction and Maintenance

# 30 CFR §§ 56/57.11003
## Construction and maintenance of ladders

Ladders shall be of substantial construction and maintained in good condition.

**MSHA has no ladder construction specifications. If a ladder is damaged or its physical condition makes its use unsafe, MSHA will cite 30 CFR §§ 56/57.11003 – Construction and maintenance of ladders.**

# Ladder Design and Installation

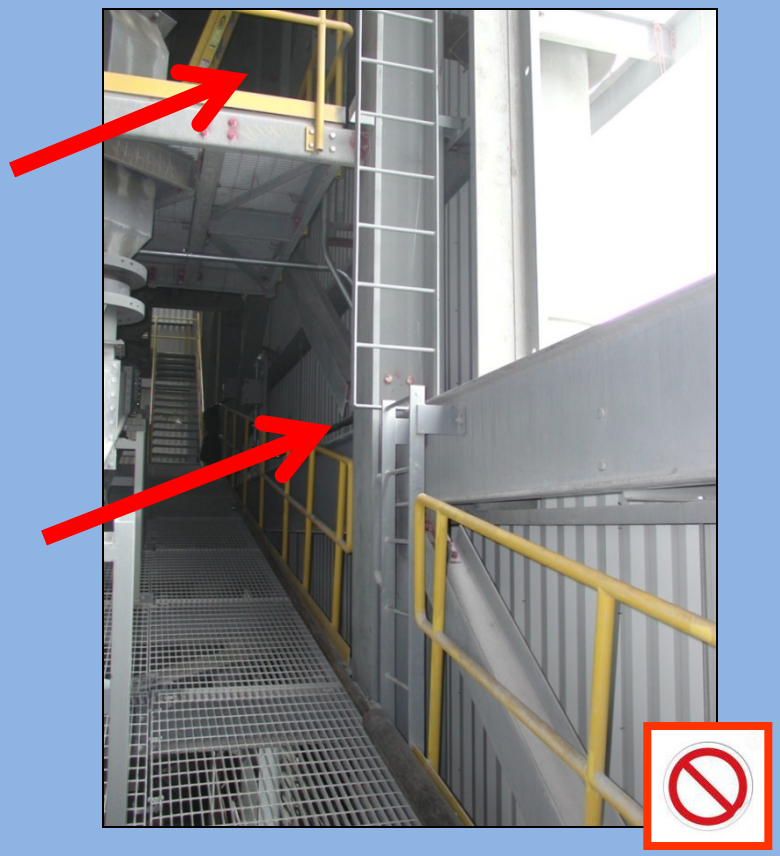
**Potential fixed ladder defects:**

- Narrow width ladders
- Narrow opening at top
- High first rung
- Uneven or wide rung spacing
  - Typically, rungs are evenly spaced @ approx. 12 inches
- Size, shape or interference with use of uprights or rungs makes gripping or climbing difficult

**MSHA has no ladder construction specifications. If a ladder's design or its arrangement in the workplace makes its use unsafe, MSHA would cite 30 CFR §§ 56/57.11001 – Safe Access.**

# More Ladder Issues

Very high first rung



Ladder access and divided ladder sections

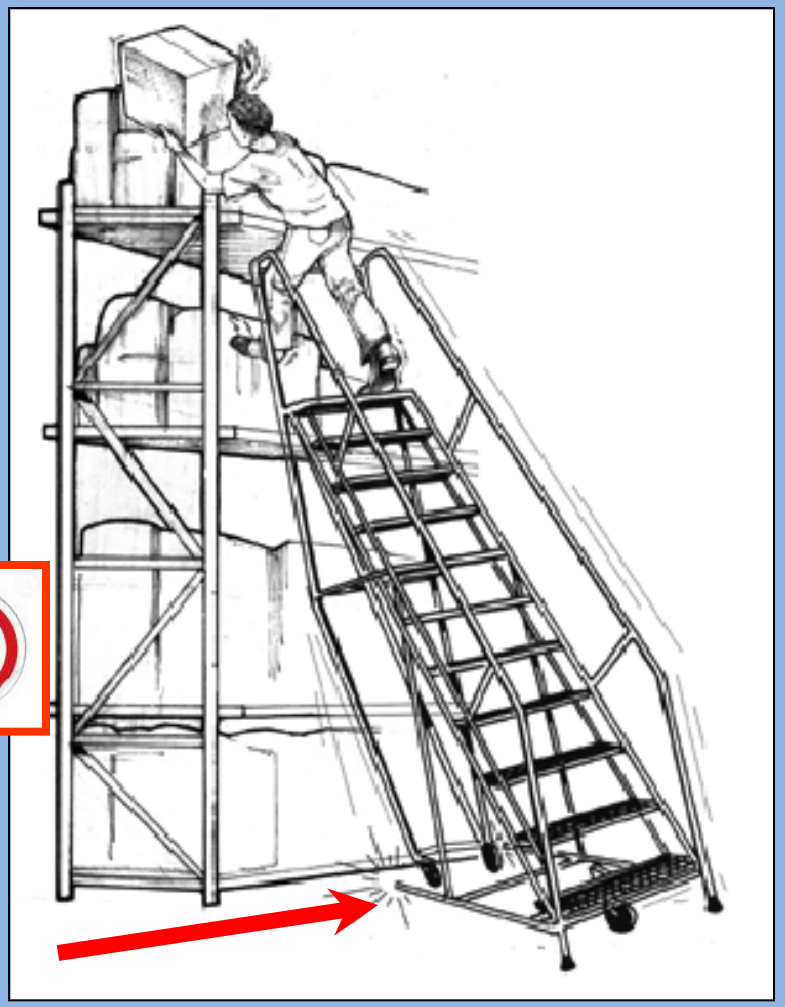
**If conditions such as those shown in the photos make access unsafe, MSHA would cite 30 CFR §§ 56/57.11001 – Safe Access.**

# Not Substantial

# Not Maintained

Weak, broken and bent rungs and side rails

# Not Maintained

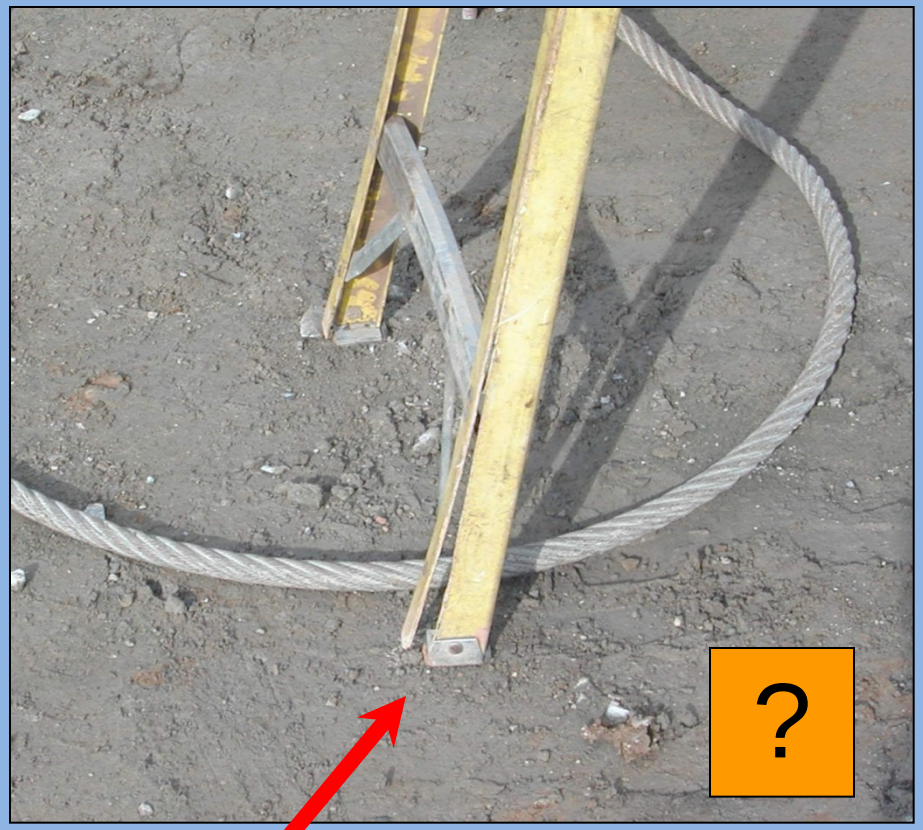


Bent and broken ladder structural support elements

# Not Maintained

Broken and bent ladder rungs and braces

# Not Maintained



Broken ladders

# Maintenance vs. Safe Access

- Fixed ladder: The iced-over condition presents a slip and fall hazard if climbed. This condition is an example of lack of ladder maintenance.
- The portable ladder inserted through the handrail as an alternate means of access does not provide safe access.

# 30 CFR § 56/57.11007

Wooden components of ladders shall not be painted except with a transparent finish.

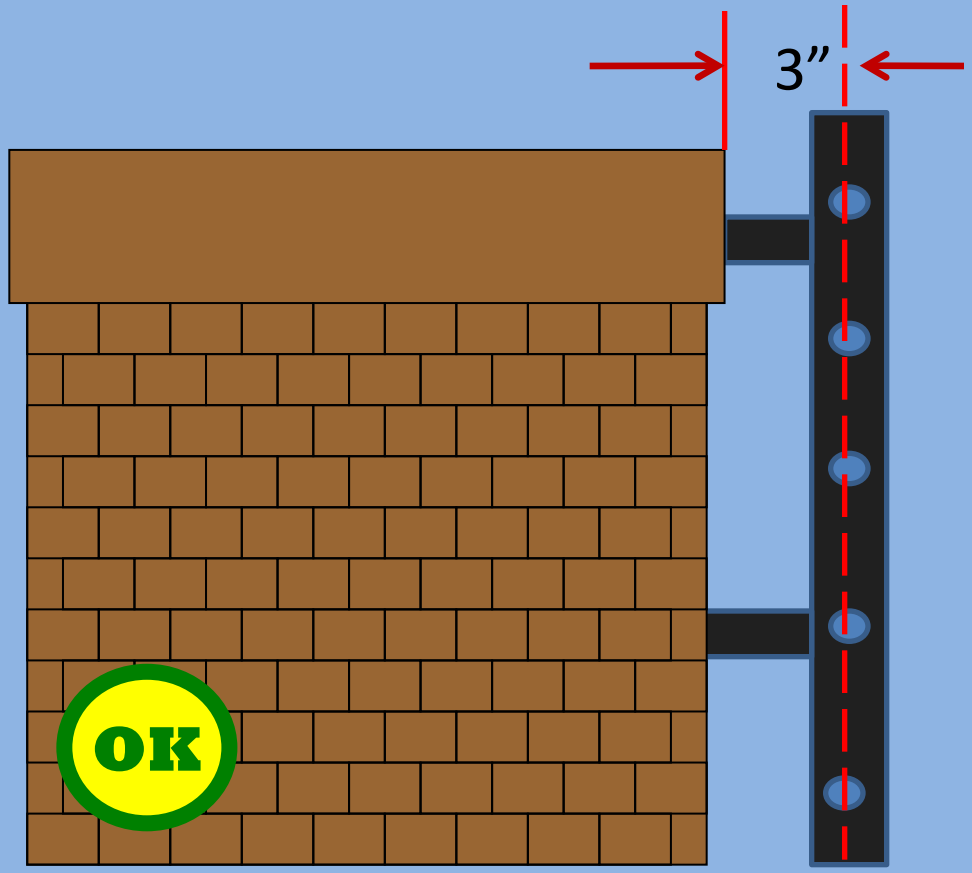
OK

The purpose of this requirement is to ensure a wooden ladder has no hidden defects and can be visibly inspected for cracks, splits or other damage.

# Fixed Ladders

# Anchorage and Toe Clearance

**30 CFR §§ 56/57.11005 ---** Fixed ladders shall be anchored securely & installed to provide at least 3 inches of toe clearance.

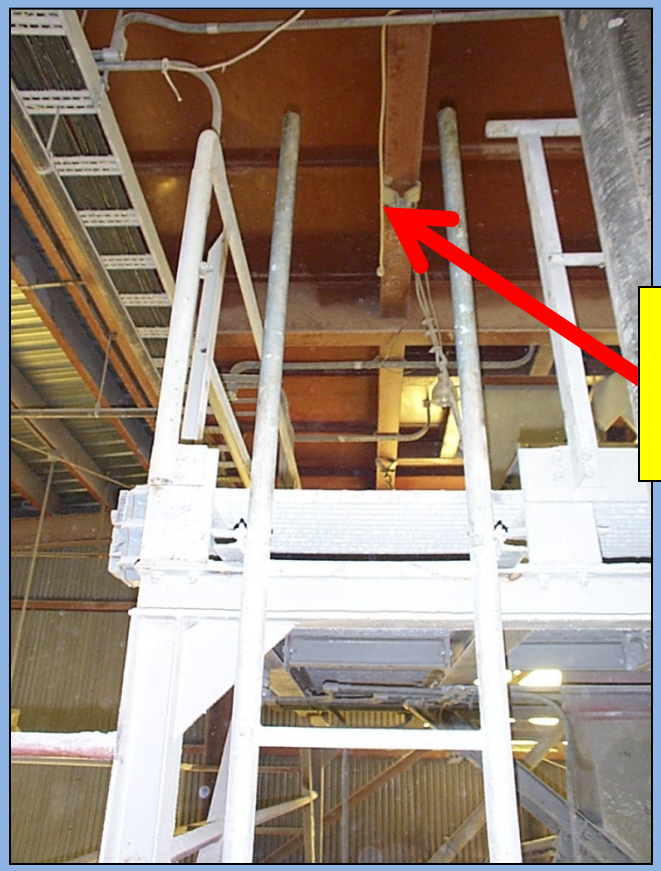


# 30 CFR § 56.11006

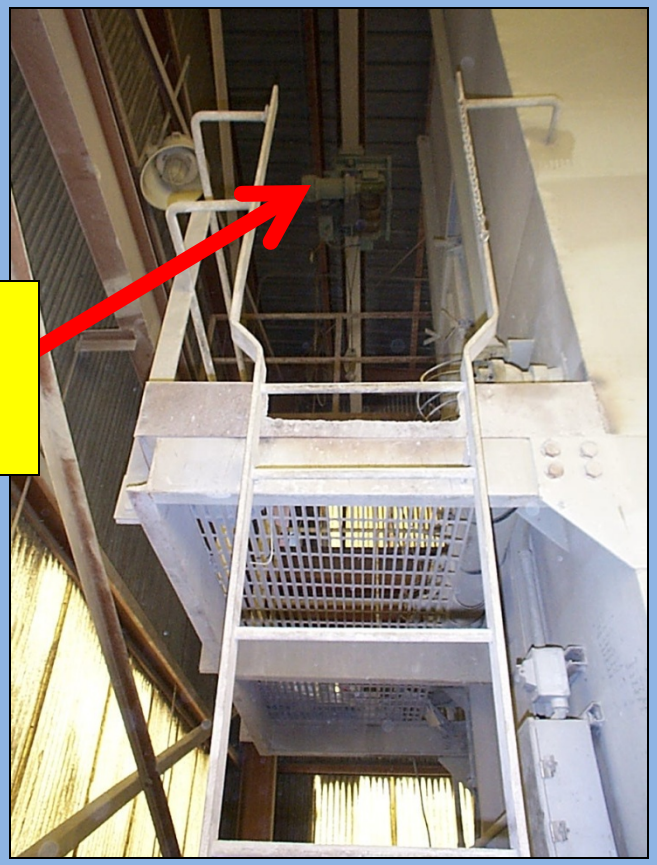
**Fixed ladders** shall project at least 3 feet above landings, or substantial handholds shall be provided above the landings.

**30 CFR §§ 56/57.11006 does not apply to portable ladders. Portable ladders that do not extend a sufficient distance above the upper landing, or are used without substantial handholds may violate 30 CFR §§ 56/57.11001 – Safe access.**

# Fixed Ladder Landings: 3-Feet Extensions or Handholds



**Fall protection chains provided, but not attached.**



The widened opening at the top of the right ladder is considered a best practice because persons can pass more easily through it than the narrower opening on the left. Both ladders require a barrier such as bar, gate or substantial chain across the opening at the upper level to protect persons from the fall hazard (30 CFR §§ 56/57.11012).

# 30 CFR §§ 56/ 57.11017

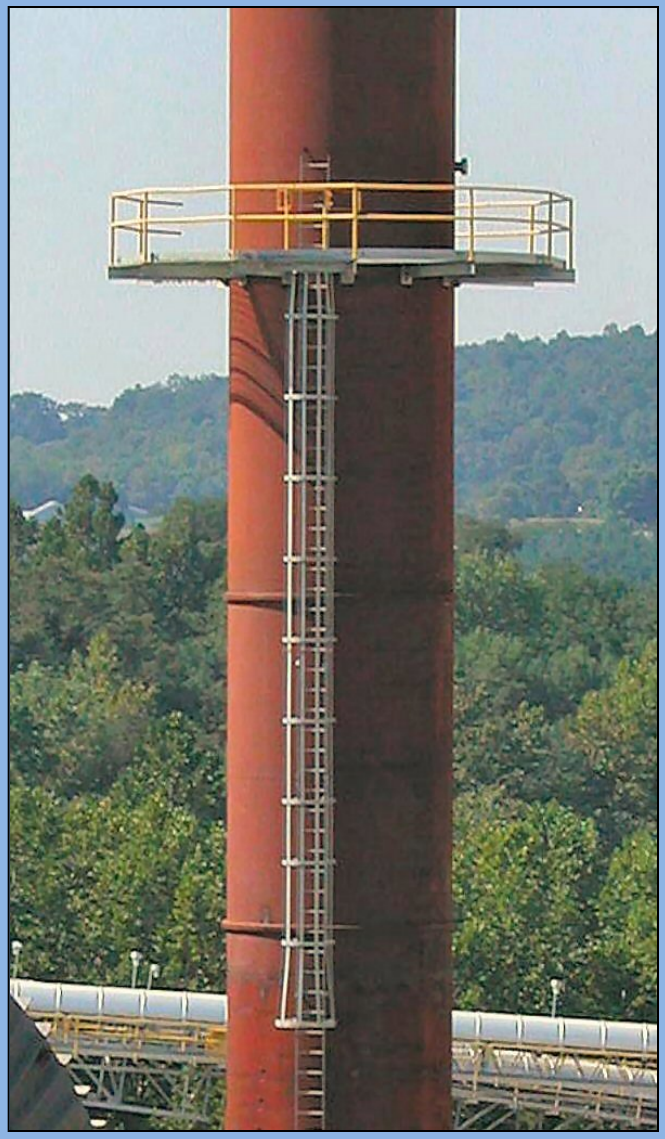
Fixed ladders shall not incline backwards.

**This ladder inclines slightly forward. It is compliant with 30 CFR §§ 56/57.11017.**

# 30 CFR § 56/57.11025

## Railed landings, back-guards, and other protection for fixed ladders.

Fixed ladders, except on mobile equipment, shall be offset and have substantial railed landings at least every 30 feet, unless back-guards or equivalent protection such as safety belts and safety lines, are provided.



# 30 CFR § 56/57.11025

Fixed ladders, except on mobile equipment, shall be offset and have substantial railed landings at least every 30 feet, unless back-guards or equivalent protection such as safety belts and safety lines, are provided.

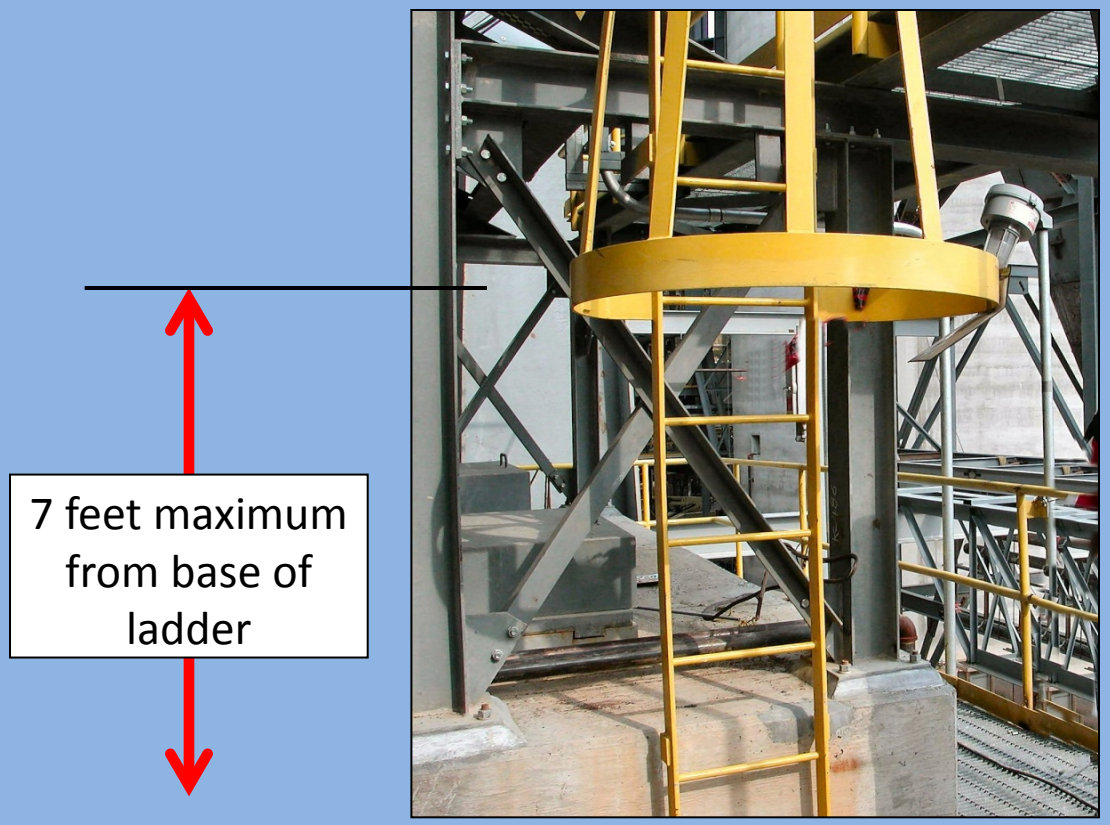
Compliant

Compliant

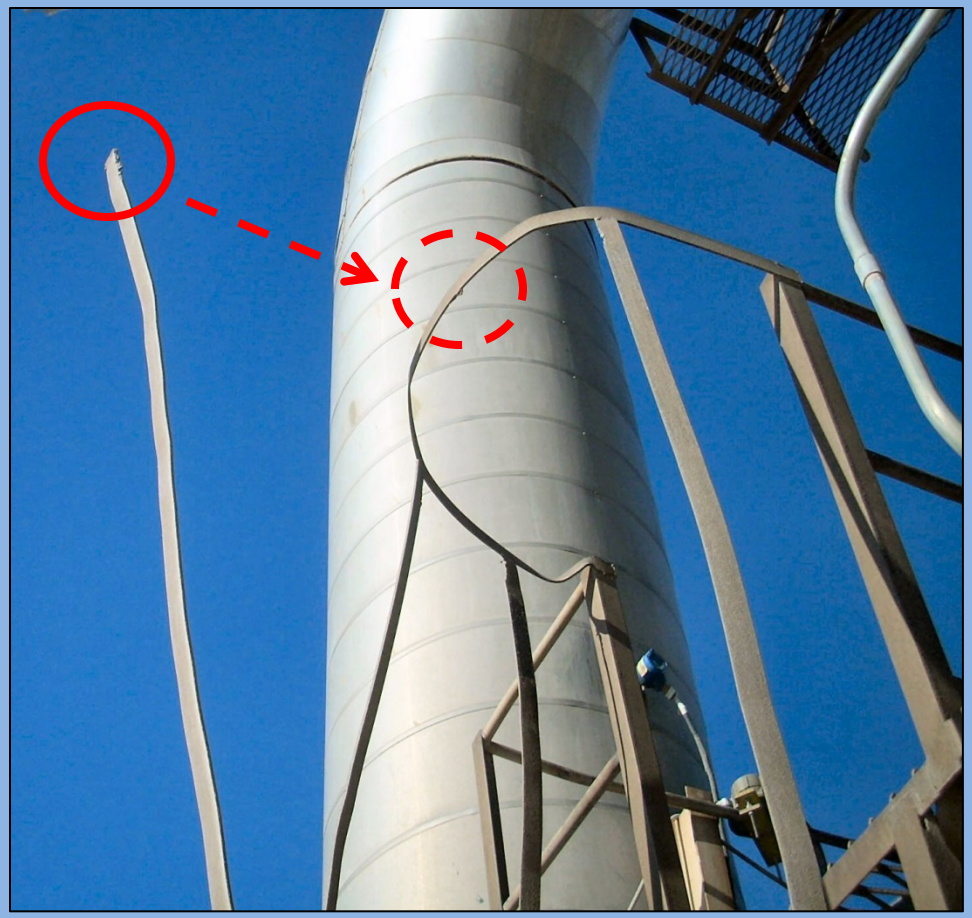
Compliant

# 30 CFR §§ 56/ 57.11026

Fixed ladders, 70 degrees to 90 degrees from the horizontal and 30 feet or more in length, shall have backguards, cages or equivalent protection, starting at a point not more than seven feet from the bottom of the ladders.



# Damaged Backguards



A backguard is not considered part of a ladder. A damaged ladder backguard may be cited, depending on the type and extent of damage.

# 30 CFR §§ 56/57.11012

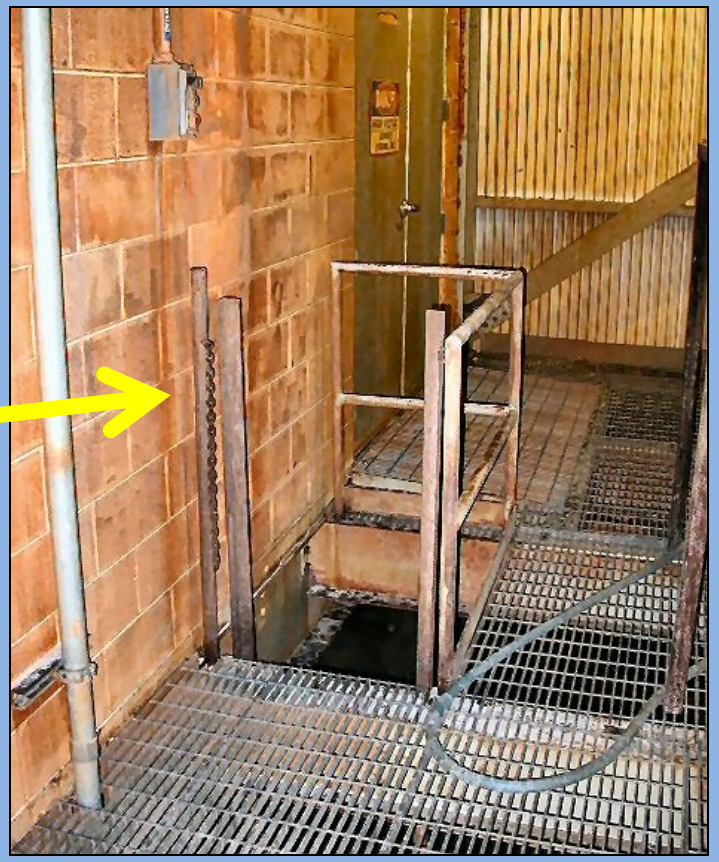
**Protection for openings around travelways**. Openings above, below, or near travelways through which persons or materials may fall shall be protected by railings, barriers, or covers. Where it is impractical to install such protective devices, adequate warning signals shall be installed.

Spring-loaded (left photo) and gravity-closing gates (right photo) are acceptable. They are the preferred solution because they self-close.

# 30 CFR §§ 56/57.11012

## Protection for openings around travelways.

**Chains not in place**



**Chains are effective fall prevention barriers if they are substantial, in good condition and in place.**

# Portable Ladders

# Stepladders

Shown below are the parts of a stepladder.

Top

Front rail

Step

Non-slip shoes / feet

Shelf

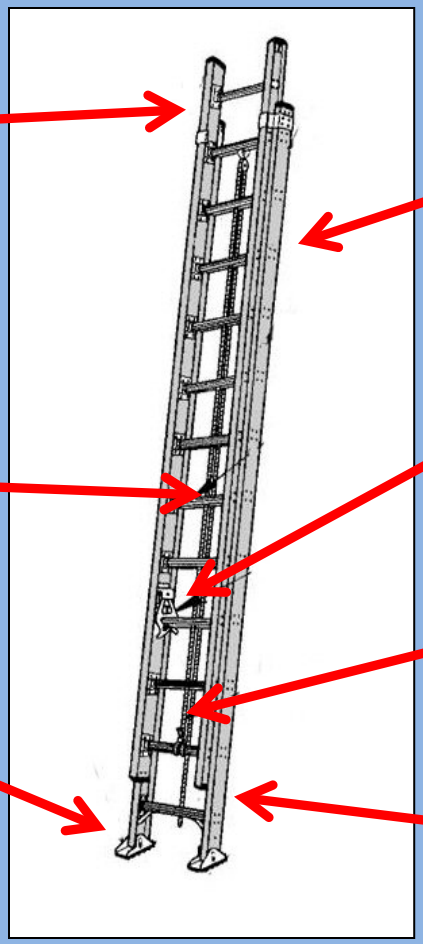
Rear rail

Spreader and spreader lock

Brackets

# Extension Ladders

Shown below are the parts of an extension ladder.



Fly (upper) section

Side rail

Rung locks

Rung

Rope and pulley system

Non-slip shoes / feet

Base section

# **Portable Ladders:**
Step and Extension

# 30 CFR §§ 56/57.11004

## Portable rigid ladders

Portable rigid ladders shall be provided with suitable bases and placed securely when used.

Portable ladders are most stable when set with a 4:1 rise-to-run ratio.

# 30 CFR §§ 56/57.11004
# Portable rigid ladders

Stepladders may be used in the folded configuration,
but they must be placed securely.

# 30 CFR §§ 56/57.11004
# Portable rigid ladders

Missing slip-resistant bases, missing rungs

# 30 CFR §§ 56/57.11011

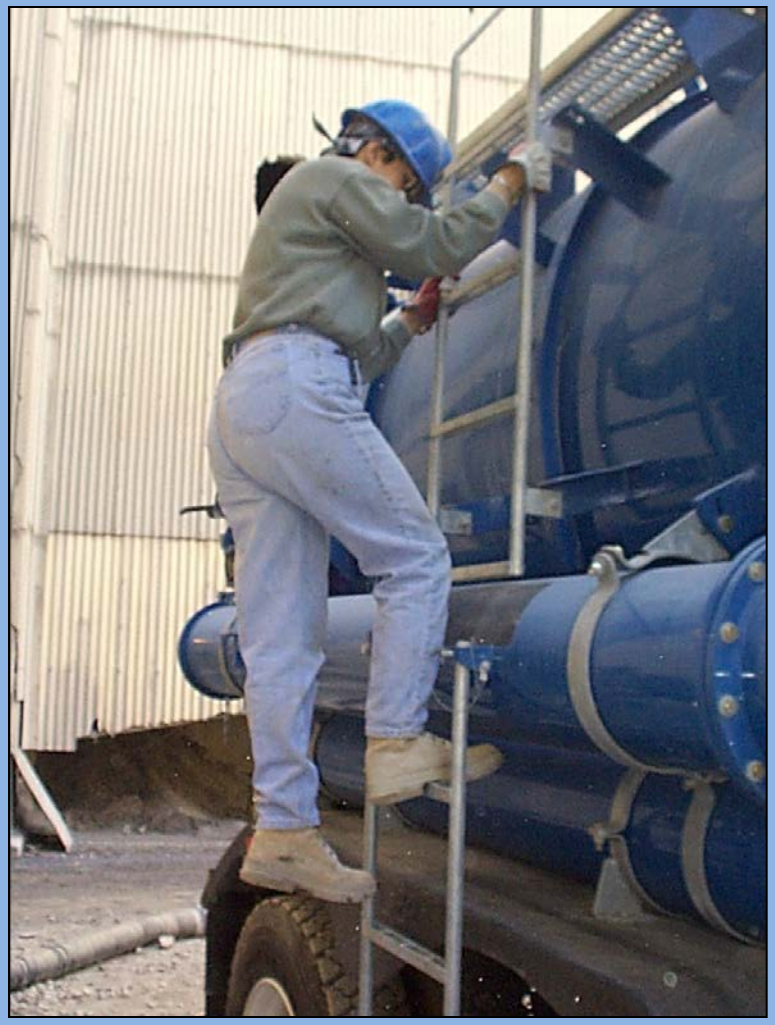
**Use of ladders -** Persons using ladders shall face the ladders and have both hands free for climbing and descending.

OK

# Special Ladders

# Fixed Mobile Equipment Ladders

- Fixed mobile equipment ladders are included in the fixed ladder category.
- Mobile equipment ladders are not required to be offset or have railed landings at least every 30 feet; they are exempted from §§ 56/57.11025.



# Mobile Equipment Ladders

Walkway
Ladder
Step

Walkway
Ladder
Step

# Mobile Equipment Access

Ladder

Steps

Missing Step

High Rung

# Alternating Tread Ladders

Fixed and rolling alternating tread ladders are used to reduce ladder run-to-rise ratios.

# Dual-Sided Ladders

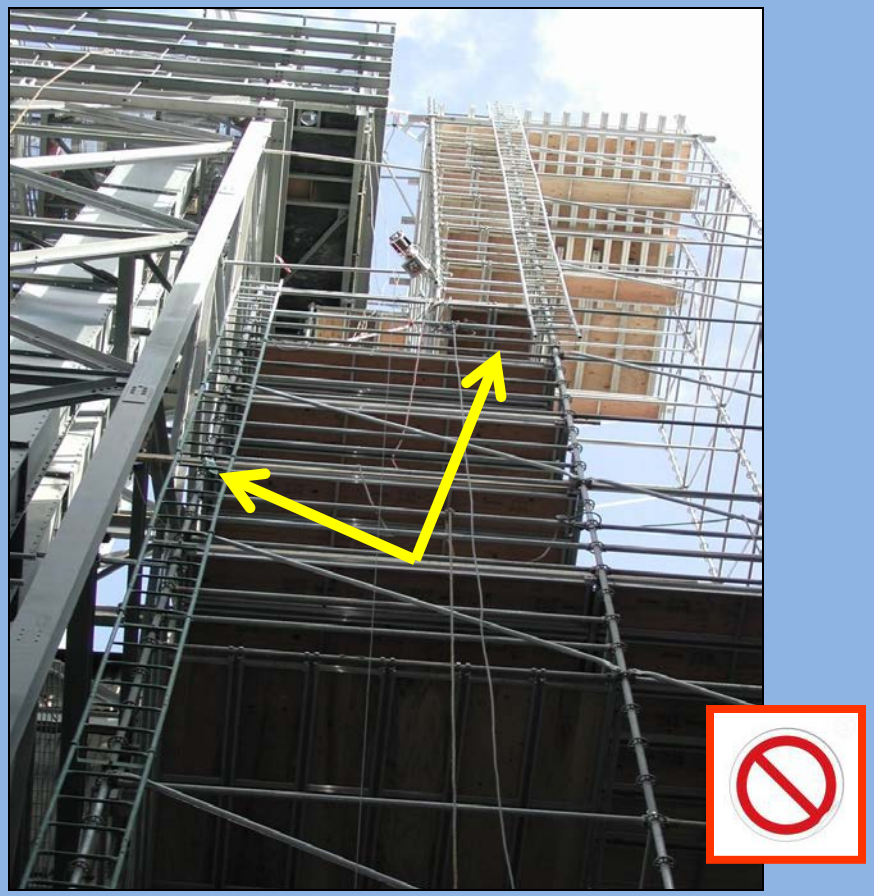
- 30 CFR §§ 56/57.11004 Portable rigid ladders.
- Dual-sided ladders are variations of portable ladders.
- They are designed by the manufacturer to support one person on each side.

# Ladders must be used correctly

This is **NOT** a dual-sided ladder and should not be used backwards. The braces on the off-side of this stepladder are not designed for climbing or standing on.

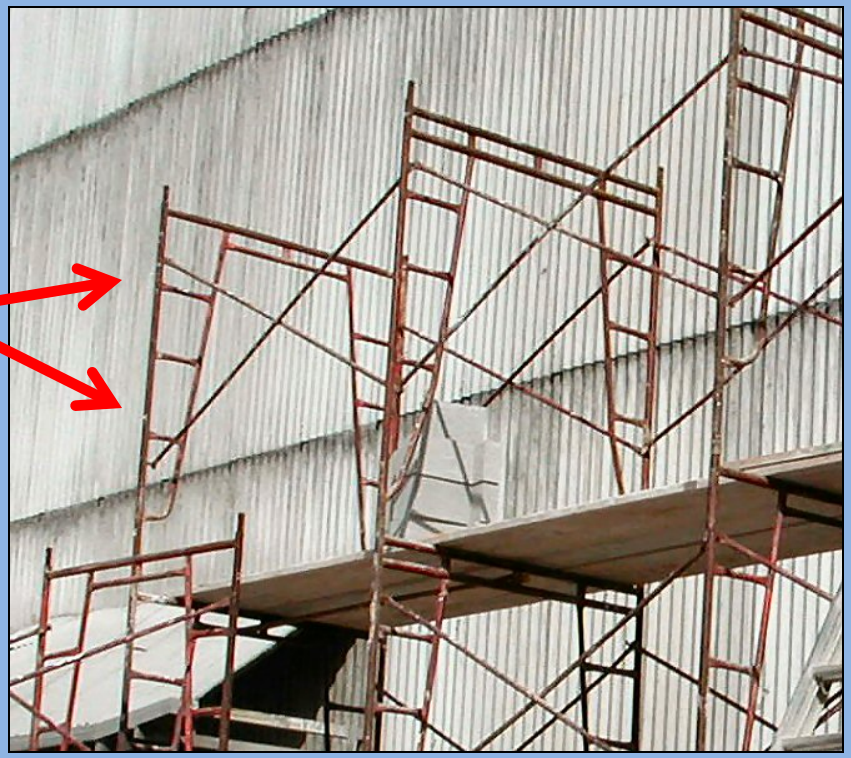
30 CFR §§ 56/57.14205 violation

# Clarification - Scaffold Ladders for Tube and Coupler Scaffolds



Ladders for tube and coupler scaffolds are considered fixed ladders. They may require offset platforms, railed landings or equivalent protection, such as safety harnesses, lanyards and anchorages.

# Clarification - Scaffold Ladders for Fabricated Frame Scaffolds



Rungs on the end frames of fabricated frame scaffolds are not considered ladders. Portable ladders or fixed stairs are typically used to provide access to the working level of scaffolds.

# Underground Ladders and Travelways

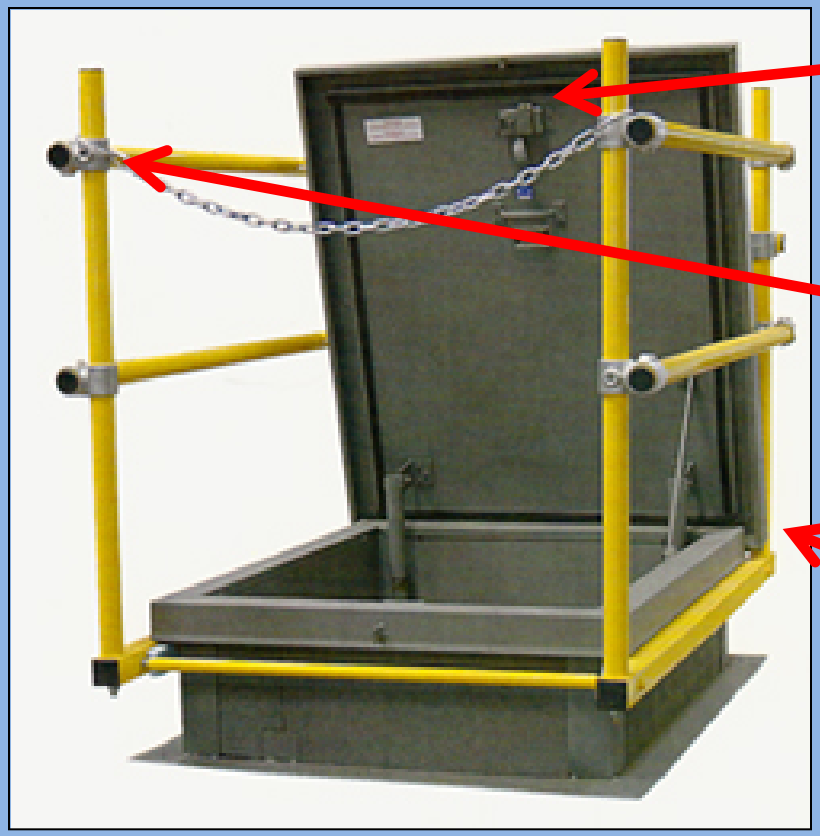
# 30 CFR § 57.11036

Trap doors or adequate guarding shall be provided in ladderways at each level. Doors shall be kept operable.

Adequate handrail system with functional gate

# 30 CFR § 57.11036

Trap doors or adequate guarding shall be provided in ladderways at each level. Doors shall be kept operable.



Hasps, latches, and keepers are not frozen, and can be operated

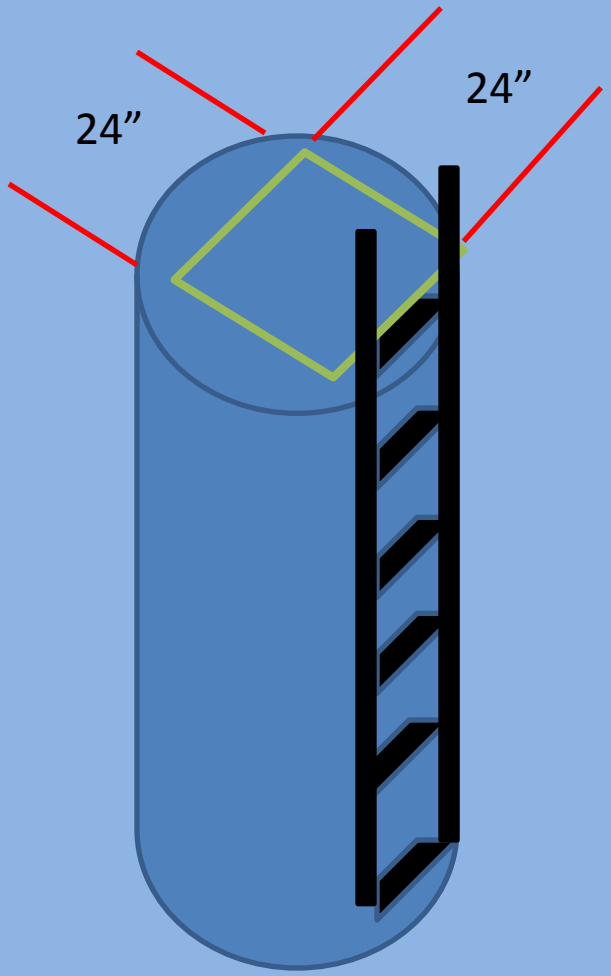
Chain rails, swing gates move freely and have positive latching connections

Hinges and keepers move freely, and operate as designed.

If doors are covered with material that hinders or prevents them from opening from the inside, they are not considered operable.

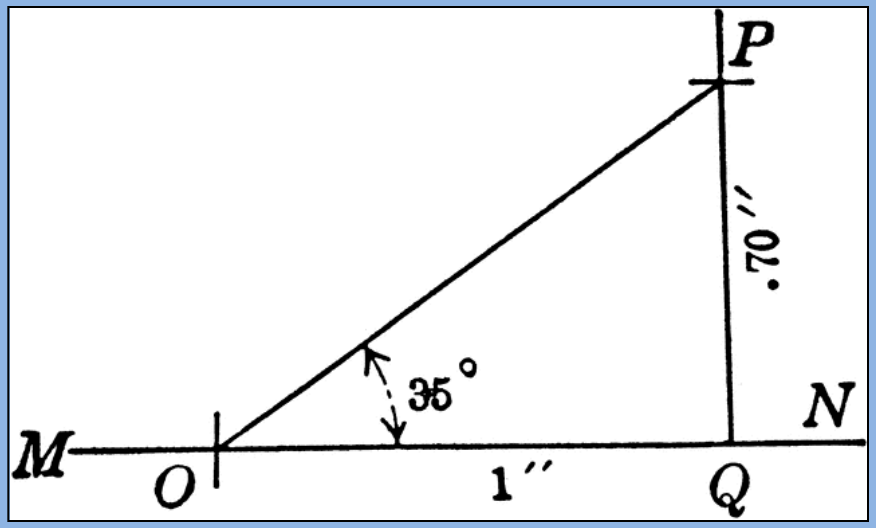
# 30 CFR § 57.11037

Ladderways constructed after November 15, 1979, shall have a minimum unobstructed cross-sectional opening of 24 inches by 24 inches measured from the face of the ladder.



# 30 CFR § 57.11040

Travelways steeper than 35 degrees from the horizontal shall be provided with ladders or stairways.



# 30 CFR § 57.11041

Fixed ladders with an inclination of more than 70 degrees from the horizontal shall be offset with substantial landings at least every 30 feet or have landing gates at least every 30 feet.

- This 30 CFR Part 57 standard applies underground only.
- 30 CFR § 57.11041 is violated only if a ladder is greater than 30 feet in height, and at greater than a 70 degree angle.
- This is not a violation of 57.11025 – Railed landings and backguards, which applies only on surface areas of underground mines.

# 30 CFR § 57.11055

Any portion of a designated escapeway which is inclined more than 30 degrees from the horizontal and that is more than 300 feet in vertical extent shall be provided with an emergency hoisting facility.

Program Policy Manual: § 57.11055 - Inclined Escapeways.

"This standard requires an emergency hoisting facility only for that portion of a designated escapeway which is ***inclined more than 30 degrees and that is more than 300 feet in vertical extent.*** The vertical extent refers only to a continuous portion of a designated escapeway, and not to a composite of portions each less than 300 feet but more than 300 feet when combined."

# Ladder Use and Safety

# Ladders and Fall Protection

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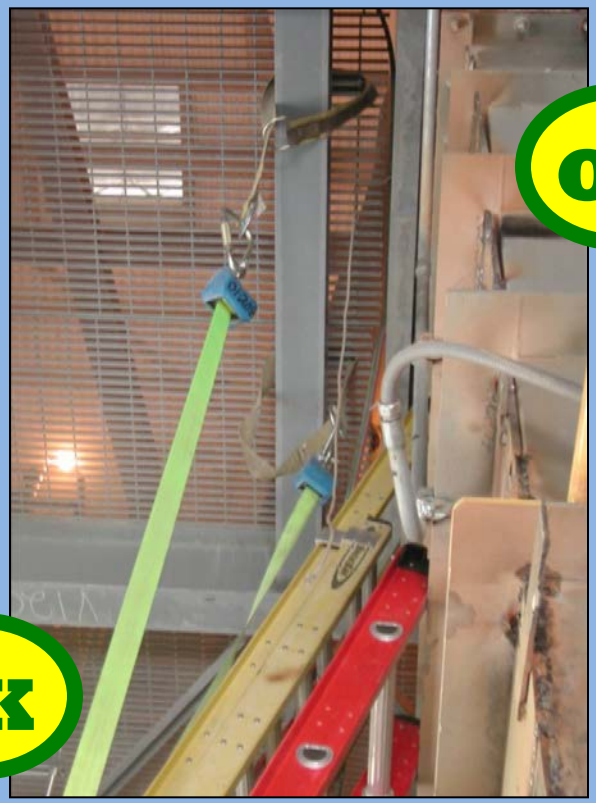

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When stationary on a ladder, personal fall arrest equipment is sometimes, but not always, required. The need depends on the type of ladder, the position of the ladder, the task performed, and the need to reach from or move on the ladder. When applicable, MSHA will cite §§ 56/57.15005 – fall protection.

# Ladder Best Practices

OK

Best ladder practices include the use of nonconductive ladders when working around electrical hazards, not standing on the top two steps of stepladders or the top four rungs of extension ladders, steadying ladders for coworkers, and keeping ladders and ladder work areas clean and free of slippery substances.

# Fatal Stepladder Accident

A person fell from stepladder and over handrail, a total of 47 feet. A citation was issued for not using fall protection, as required under 30 CFR § 56.15005.

# Fatal Extension Ladder Accident

Extension ladder sections were separated and upper section (w/o bases) was used. The bottom of the ladder's uprights slid on the concrete floor. A person fell from the ladder over nearby handrail, a total of 39 feet.

# Frequently Asked Questions

# Frequently Asked Questions

**FAQ1: If a ladder in storage is found with a defect, is it citable?**

**A1: 30 CFR §§ 56/57.11003 requires ladders to be maintained in good condition. MSHA will cite a defective ladder in storage unless it has been tagged out of service or placed in a designated area to prevent use. Other factors will be considered, including:**

a) **Operator's pre-use inspection and out-of-service requirements.**
b) **Is there evidence the defective ladder was used?**
c) **Is this the only ladder available for use?**
d) **How often is use required?**

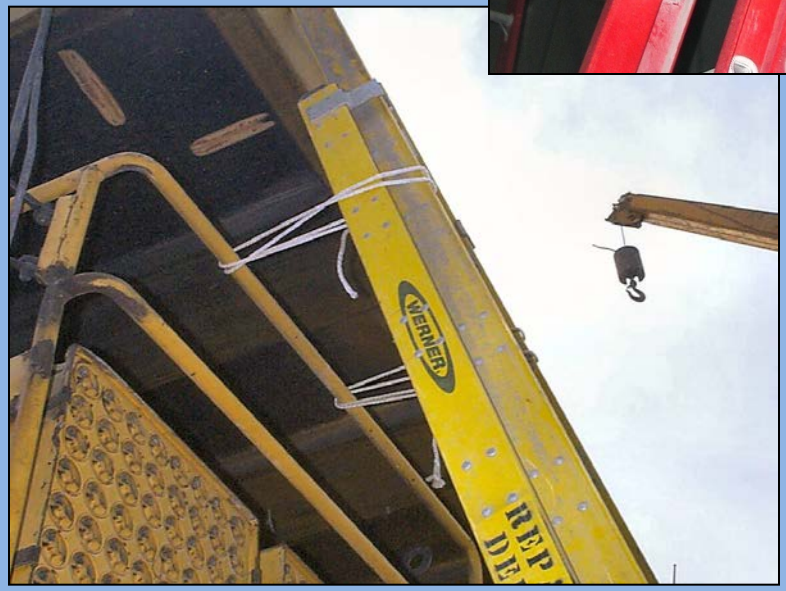
**Supporting information must be documented in the body of the citation.**

**FAQ2: Do ladders need to be secured at the top, or tied off?**

**A2: If ladders are properly angled, set securely with anti-slip shoes, (as required in 30 CFR §§ 56/57.11004,) it is not a violation. What matters is whether the ladder is placed securely. Being tied at the top is a best practice.**

# 30 CFR § 56/57.11004 - Tying ladders at the top is a good practice, not a requirement

OK



# FAQs continued

**FAQ3: If a ladder is observed in use and is damaged, can an additional citation be issued for safe access?**

**A3: Generally, MSHA's practice is to cite the more specific standard for a violation. For example, a damaged ladder will generally be cited as a violation of 30 CFR §§ 56/57.11003 – Construction and maintenance of ladders, rather than 30 CFR §§ 56/57.11001 – Safe access.**

**FAQ4: Can an appropriately repaired ladder comply with 30 CFR §§ 56/57.11003 – Construction and maintenance of ladders?**

**A4: Yes.**

**FAQ5: How do you determine if a ladder is "substantially" constructed?**

**A5: If defects are visible, 30 CFR §§ 56/57.11003 may be cited. When citing this standard, mine inspectors are expected to document why a ladder is not substantially constructed.**

# FAQs continued

**FAQ6: If a fixed ladder mounted on the portable crusher is damaged, should it be cited as a § 56.14100(b) violation?**

**A6: No. Generally, the appropriate standard cited would be § 56.11003 (ladder not maintained).**

**FAQ7: If the mounting brackets on a fixed ladder are corroded, how do we know if they are a hazard?**

**A7: If the brackets do not appear to be substantially weakened, photos of the inspector's concerns should be discussed with the field office supervisor. Comments from the District Office, the National Office or Technical Support may be required. If the inspector believes the brackets would fail easily, the appropriate action should be issued to protect the miners.**

**FAQ8: What should be given for termination time on a citation issued for a damaged fixed ladder attached to the side of a building or silo?**

**A8: Termination times must be determined according to the degree of risk posed to miners. If the mine operator takes effective measures to prevent any exposure, an extension may be issued.**