



PDHonline Course G362 (2 PDH)

Ladder Safety for Engineers

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Ladder Safety

For Engineers

Presented by:
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Ladder Safety - Introduction

- Indispensable tools
- One of simplest, easy to use tools in existence
- Many sizes, shapes
- 300 workers killed annually
- 65,000 workers seriously injured annually
- Over 200,000 emergency room visits from ladder use annual
- Most injuries: fall of less than 10 feet

Ladder Safety - Introduction

- Why?
- Most falls involve portable ladders
 - Move, tilt, shift during climbing
 - Unstable/slippery base surfaces
 - Misstep/slip of foot
 - Loss of balance (overreach)
 - Struck by vehicle

Ladder Safety - Introduction

- To reduce ladder fall risks:
 - Frequently inspect and maintain ladders
 - Match tasks to appropriate ladders
 - Set up ladders correctly
 - Climb and descend ladders properly.
- Employers - responsibility to train workers

Ladder Ratings

- 4 ratings
- Based on maximum working load

Rating	Working Load
Extra heavy duty (I-A)	300 pounds
Heavy duty (I)	250 pounds
Medium duty (II)	225 pounds
Light duty (III)	200 pounds

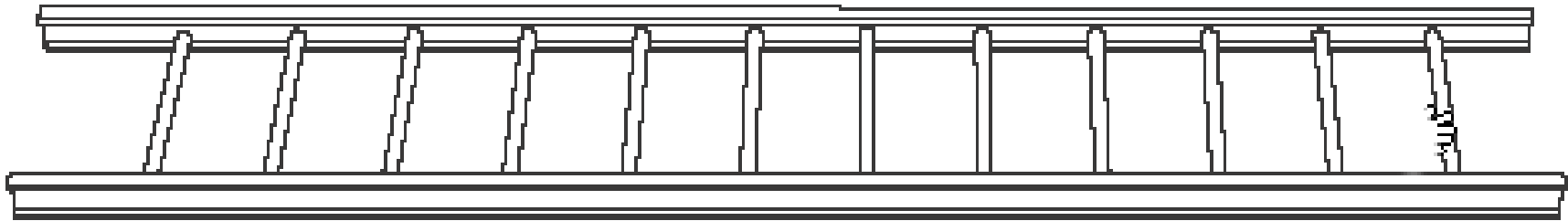
Types of Portable Ladders

- Non-self-supporting ladders
 - Two types
- Self-supporting ladders
 - 5 types

Non-self-supporting ladders

- **Single portable or straight ladder**
 - Slip-resistant feet
 - 30 foot maximum length
 - One worker
 - Wood, metal, fiberglass

Straight ladder

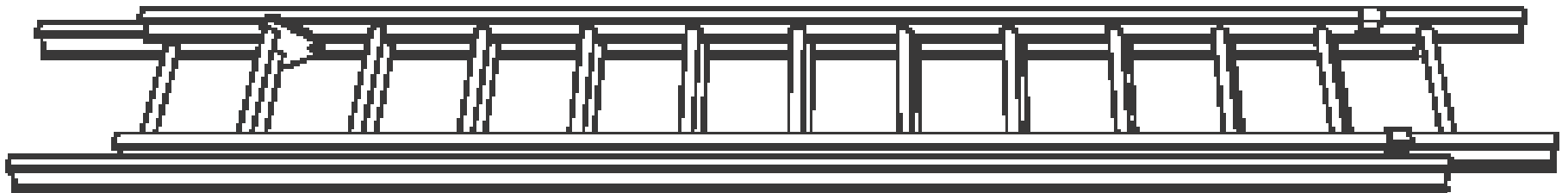


Non-self-supporting ladders

- **Extension or section ladder**

- Two or more sections
- Upper section on top
- Minimum section overlap
- Wood, metal, fiberglass

- One person



Non-self-supporting ladders

- **Extension or section ladder**
 - Maximum length of ladder 72 feet
 - Wood ladder \leq 60 feet
 - Individual sections \leq 30 feet
 - Non-slip base – tie off top

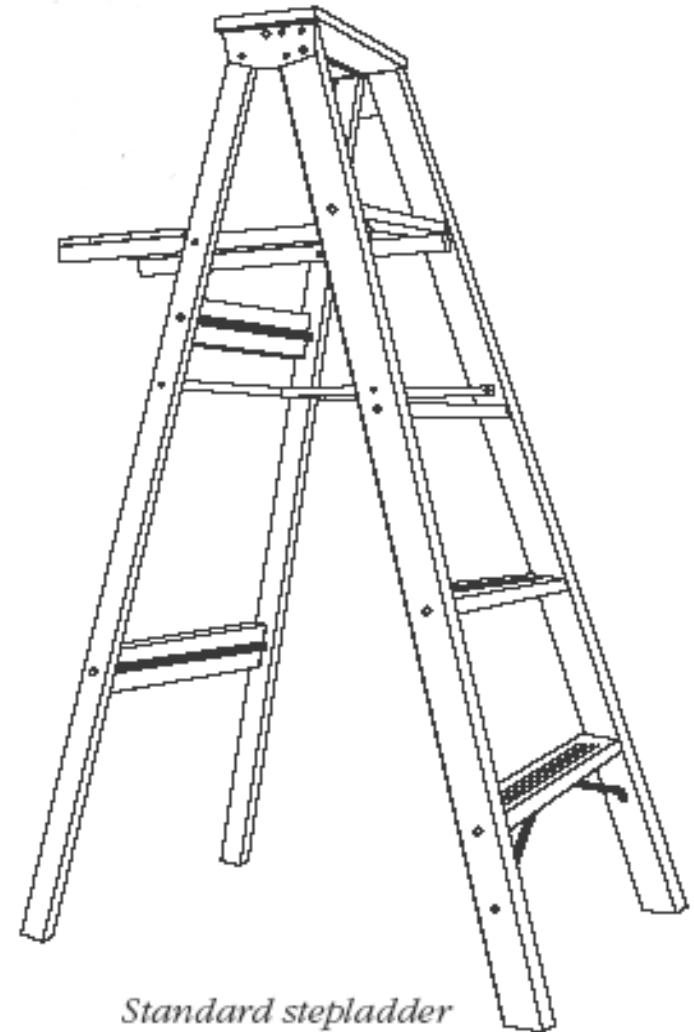
Ladder Length	Overlap
Up to and including 36 feet	3 feet
Over 36 through 48 feet	4 feet
Over 48 through 60 feet	5 feet

Install positive stops on individual ladder sections to ensure required overlap.

Self-supporting ladders

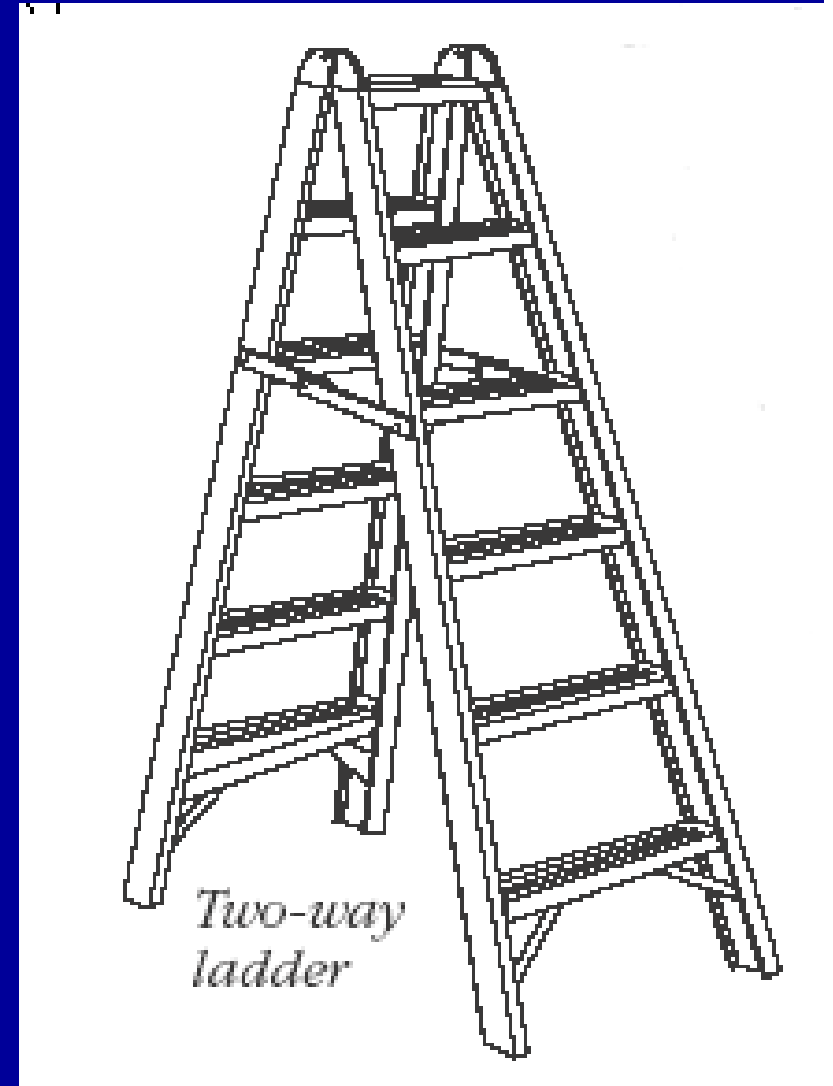
- **Standard stepladder**

- Flat steps, hinged back
- Use on firm level footing
- Metal, wood, fiberglass
- One worker
- Metal spreader or locking arms
- No work from top step
- 20 feet maximum length



Self-supporting ladders

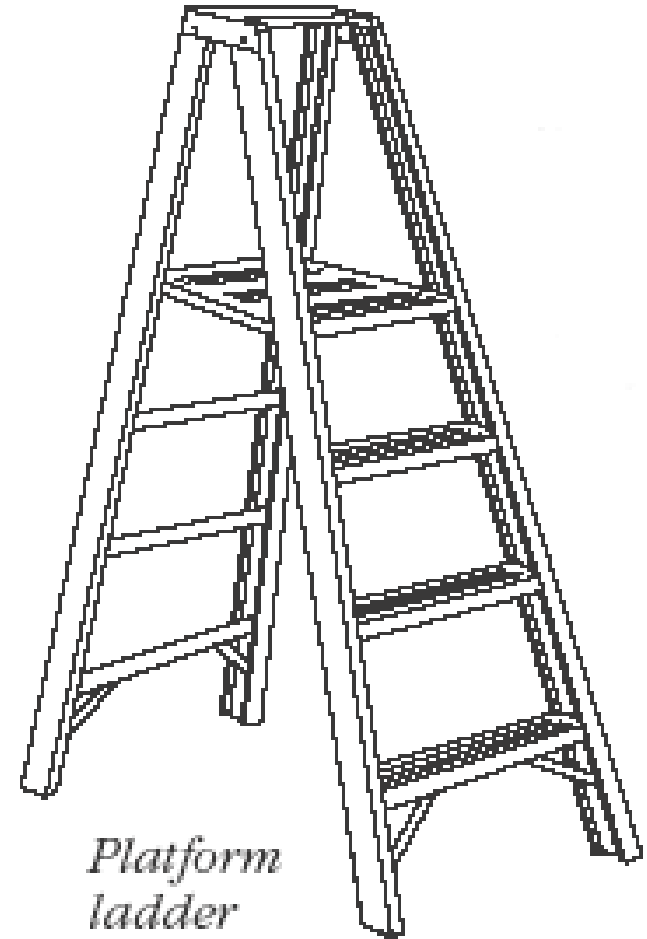
- **Two-way stepladder**
 - Similar to standard
 - Steps on both sides
 - Two people
 - ≤ 20 feet





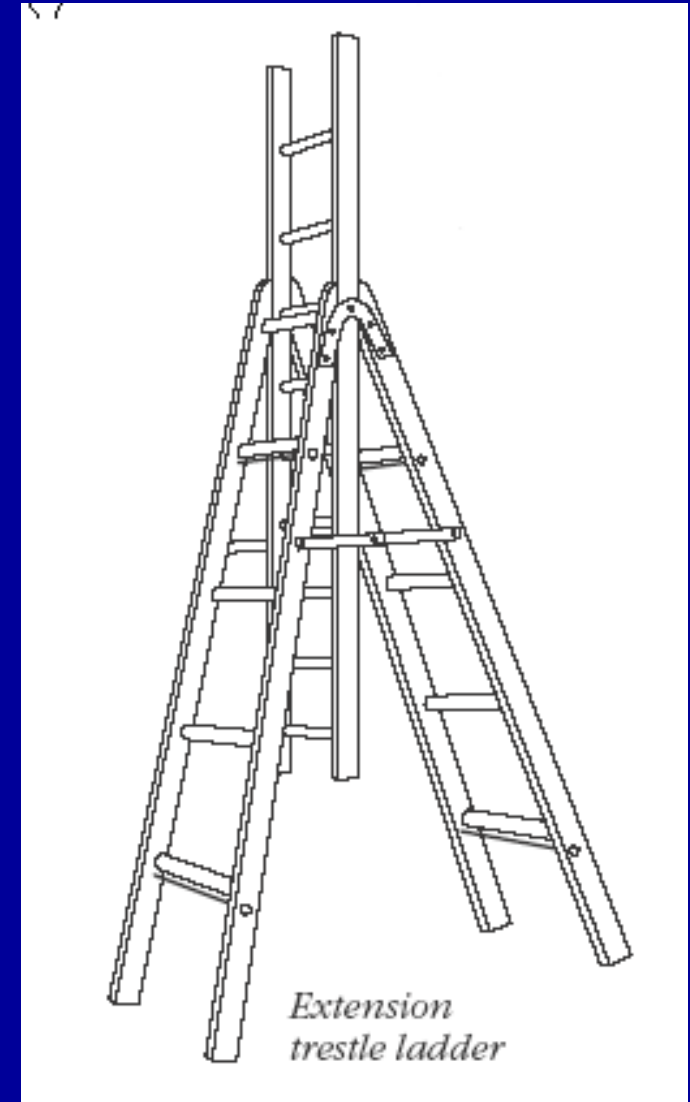
Self-supporting ladders

- **Platform ladder**
 - Special purpose
 - ≤ 20 feet to platform
 - Stable platform is highest working height



Self-supporting ladders

- **Trestle ladder**
 - Two sections, hinged
 - Used in pairs to support planks or staging
 - Angle of spread = 5.5 inches per foot of length
 - ≤ 20 feet
 - Spreaders required





Selecting Ladders

- **Other ladders for special needs**
 - platform
 - trolley
 - side-rolling
 - shaft
 - Manhole
- **Choose the right ladder for the job!**

Selecting Ladders

- Considerations
 - How Much Room?
 - Will electricity pose a hazard?
 - Will the Ladder be resting on an uneven surface?
 - Are obstructions overhead?

Selecting Ladders

- Evaluating Physical Requirement of Job
 - How much room to position ladder?
 - How much weight – combining the user, tools and materials?
 - How long will the ladder need to be?
- Other Consideration (if non-conductivity is not important)
 - Weight (aluminum, fiberglass, wood)

Using Ladders

- **Accidents happen:**
 - fail to inspect
 - place inappropriately
 - ignore safe practices when climbing

Using Ladders

- **Beginning a job**
 - select appropriate ladder for task (work type, ladder type)
 - inspect ladder –
 - clean
 - Undamaged
 - Inspect area for overhead wires/obstructions
 - Clear clutter
 - Block off area
 - Place sign if near corner or lock/block doorway

Using Ladders

- **Placing a ladder**

- near work
- proper angle
 - extend $\frac{1}{4}$ the ladder length
 - minimum slope 50 degrees
- solid rest across openings
- protect base from bumps

- *Avoid...*

- *placing ladder in front of unlocked/unguarded door*
- *placing ladder on boxes, table, trucks or other movable objects*



Using Ladders

- **Securing a ladder**

- nail/lash in place
- extend at least 36 inches above access area

- *Avoid*

- *exposed areas during storm or wind*
- *ladders covered with ice or snow*
- *using ladder if stairway can be used instead*



Using Ladders

- **Ascending and descending**
 - face the ladder
 - grasp rails with both hands
 - raise/lower heavy loads with hand line or hoist
 - attach light tools to ladder or person
- *Avoid*
 - *sliding down ladder*
 - *climbing with slippery hands/shoes*
 - *using hands to carry items*
 - *carrying awkward loads*

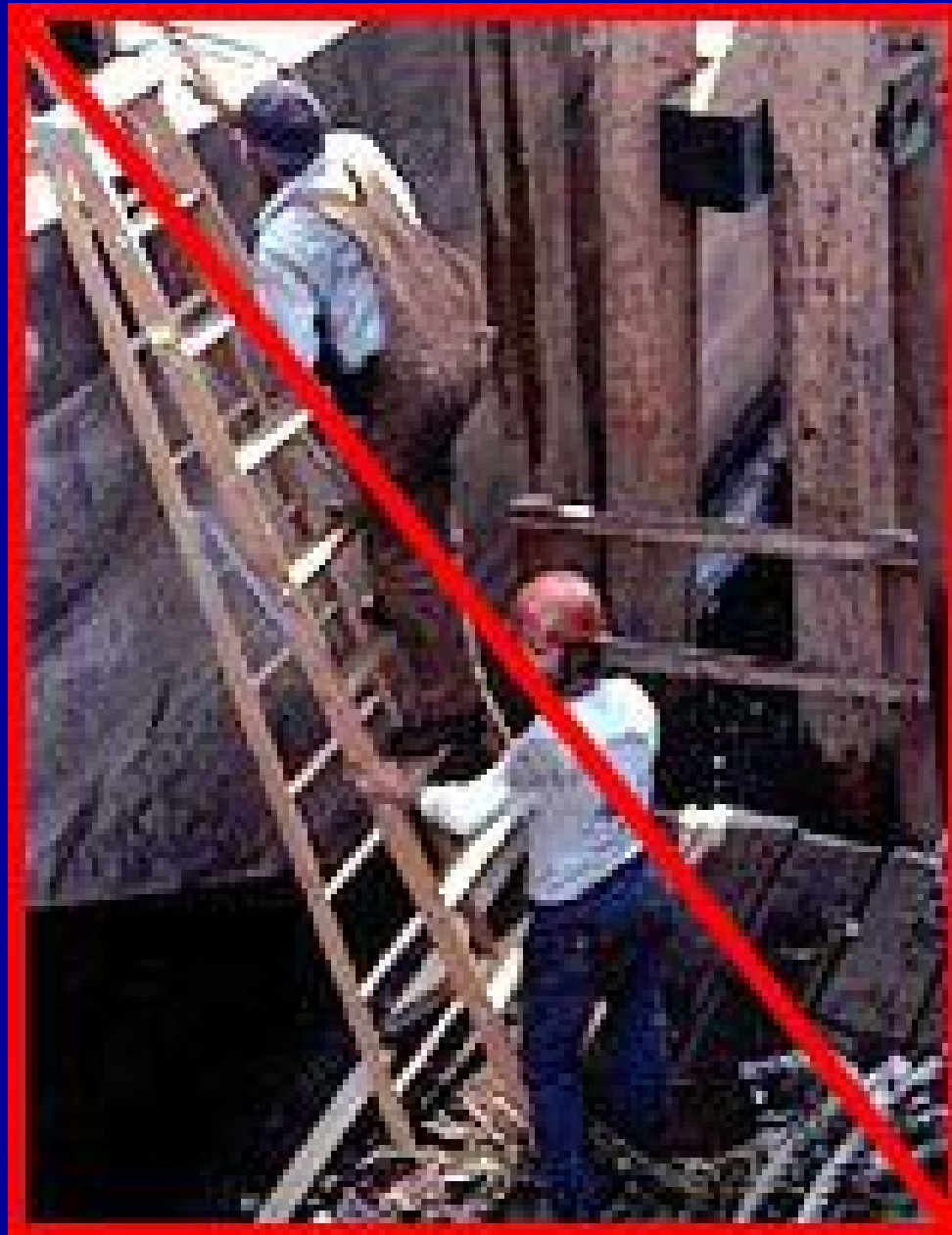
Using Ladders

- **Ascending and descending**
 - **Wear heavily soled shoes**
 - **Clean shoes to give maximum traction**
 - **Keep belt buckle positioned between rail**
 - **Climb slowly and surely**
 - **If climbing onto a roof, do not step over top of ladder. Step sideways onto the roof**



Using Ladders

- **Securing equipment**
 - use strong bail hook on picker bucket
 - when not using limb hook, secure it to ladder or nearby limb
- *Avoid*
 - *placing tools/materials on ladder if they could fall off*



Using Ladders

- **Metal ladders**

- skid resistant surface on steps, rungs
 - corrugated
 - knurled
 - dimpled
 - coated
- “WARNING — Do Not Use Around Energized Electrical Equipment.”

- *Avoid*

- *using ladders with conductive rails near exposed, energized equipment*



Using Ladders

- **Precautions**

- both feet firmly on rungs and steps
- one person only on standard ladders
- inspect ladder that has collapsed, tipped, or exposed to harsh chemicals
- extend extension ladder \geq 36 inches above access
- keep area around ladder free of debris
- keep load on ladder (including worker) below maximum load capacity

Using Ladders

- Do NOT

- paint ladders; use transparent preservative
- use ladders with broken, patched, oily parts
- use ladder as guy, brace, or skid
- stand or sit on top 2 steps of stepladder
- Move ladder while in use
- reach out over side rails, lean, turn
- use self-supporting ladders without spreader or locking device
- load ladder beyond maximum load capacity

Using Ladders

- Do NOT
 - Use boxes/boards to give added height
 - Use a ladder on scaffolding
 - Lean an extension ladder against boxes or other unstable surfaces
 - Leave a ladder setup and unattended
 - Climb a ladder under the influence of drugs/alcohol
 - Allow children to climb a ladder
 - Use a ladder for anything but its intended purpose

Transporting Ladders

- Hand carry
 - elevate front end
- Vehicle transport
 - parallel to bed
 - don't toss or throw into bed
 - support ladder so it won't bend or sag
 - secure ladder to vehicle
 - drive slowly over rough terrain

Storing Ladders

- Well ventilated area
- Limit exposure to moisture/excessive heat
- Store straight/extension ladder on flat racks or wall brackets – no sagging
- Store stepladder and orchard ladder vertically in closed position
- Store promptly after use
- Limit exposure of wood and fiberglass to moisture and sunlight

Maintaining Ladders

- Neglected ladders quickly become unsafe ladders
- Maintenance – regular inspection, tighten step bolts and fastenings
- Clean rungs and steps
- Do not paint wooden ladder – hides defects
- Store extension ladders by handing horizontally

Repairing Ladders

- Wooden ladder: replace lower steps when $\frac{1}{4}$ of step is worn away
- Non-skid surface reduces wear
- Don't use cleats to repair rung ladder
- Do not paint wooden ladder
- Stock repair parts – ladder bolts, lower steps, related hardware

Improve Slip Resistance

- Cloth-backed mineral abrasive
- Anti-slip abrasive surfacer
- Coarse-ground walnut shells
- Sand
- Re-dimpling (for metal ladders)

Thank You

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