ارامكو السعودية
Saudi Aramco

Scaffold Safety Workshop

Loss Prevention Department

Rules to follow:

- **Be on time after coffee & lunch breaks**
- **Pagers, mobile phones & other electronic devices must be set to silent mode or shut-off**
- **Minimize side conversations.**
- **Be aware of emergency procedures for fire evacuation.**
- **Know the locations of smoking areas, toilets, etc.**

Schedule

- 0730: Introduction
- 0745: Scaffold Components
- 0830: Exercise: Scaffold Terminology
- 0845: Coffee Break
- 0900: Harness/Lanyard Inspection & Use
- 0915: Exercise: Full-body Harness Use
- 1000: Coffee Break
- 1015: Scaffold Inspection and Tagging
- 1130: Lunch Break
- 1230: Scaffold User’s Checklist
- 1330: Coffee Break
- 1345: Scaffold General Requirements
- 1430: Short Examination

Presentation Outline

- **Introduction**
- **Scaffold Components**
- **Harness/Lanyard Inspection & Use**
- **Scaffold Inspection and Tagging**
- **Scaffold User's Checklist**
- **Scaffold General Requirements**

Workshop Objectives

- **Learn the different types of scaffold & its components**
- **Learn how to inspect & use a full body harness & lanyard**
- **Learn how to inspect and tag a safe or unsafe scaffold**
- **Learn how to use the Scaffold User's Safety Checklist**
- **Learn the scaffold general safety requirements**

أرامكو السعودية
Saudi Aramco

Scaffold Safety Workshop

Part - 1

INTRODUCTION &

SCAFFOLD COMPONENTS

Think...

- **What is a scaffold?**
- **When is scaffold needed?**
- **Where do we need scaffold?**
- **How scaffold is built?**

What is a Scaffold?

Scaffold – is a temporary elevated platform and its supporting components used for supporting workmen, materials or both.

When is scaffold needed?

A scaffold is needed to provide temporary access & platform when work activities will be perform on plant equipment, building, or structure that are located above ground level

How scaffold is built?

Scaffold is built by connecting several components such as posts, runners, bearers etc. using either by ‘couplers’ or system ‘connectors’

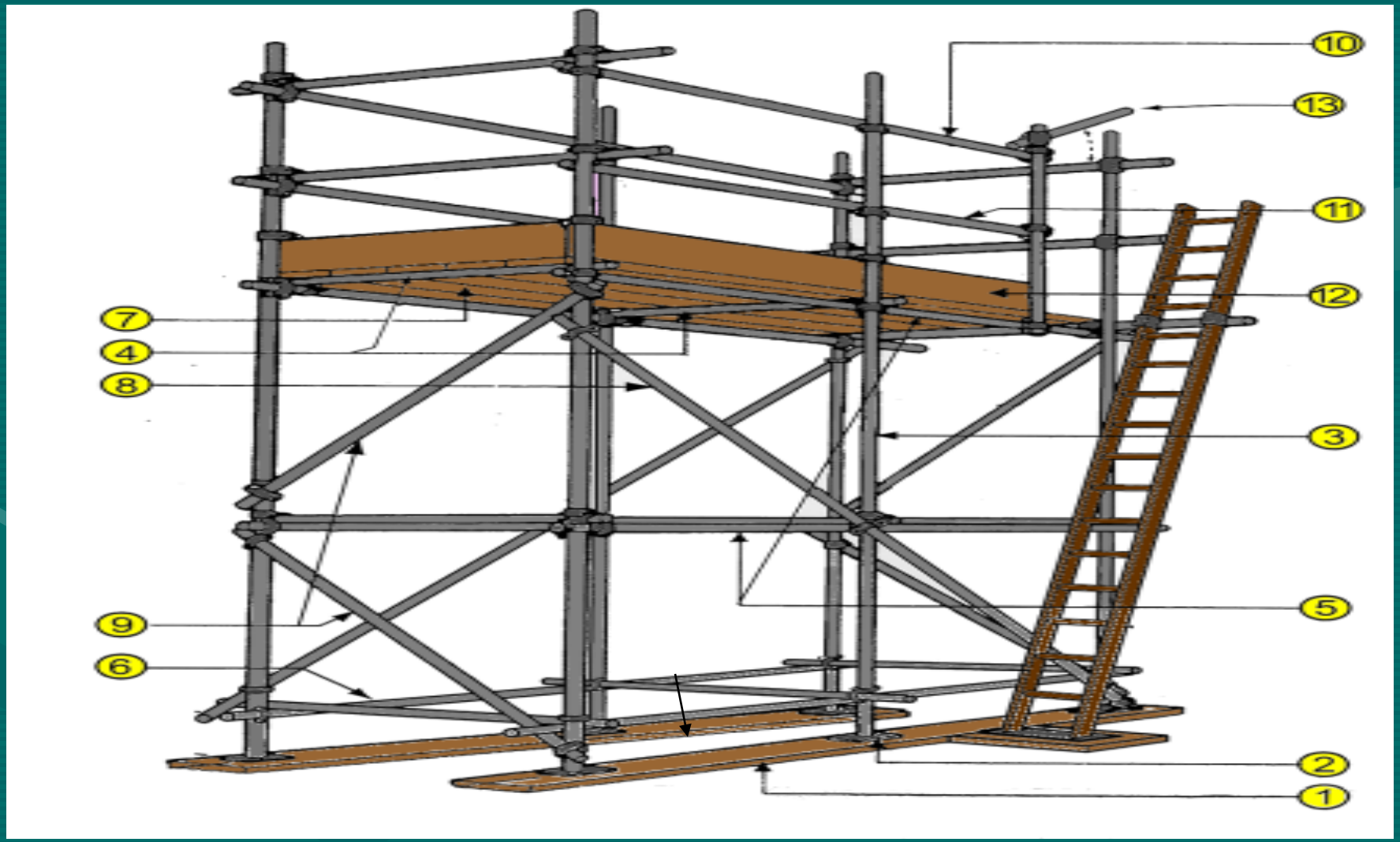
Unsafe Work Platform

- **We have all seen unsafe working practices**
- **This man is at a big risk of a fall !**
- **If he fell the risk of injury is very high**

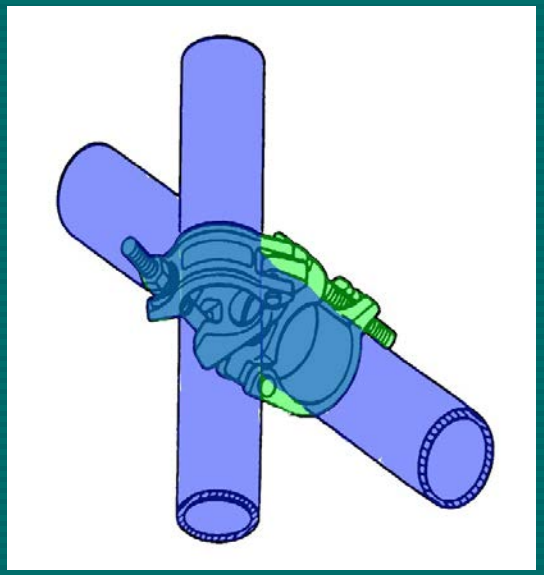
Exercises

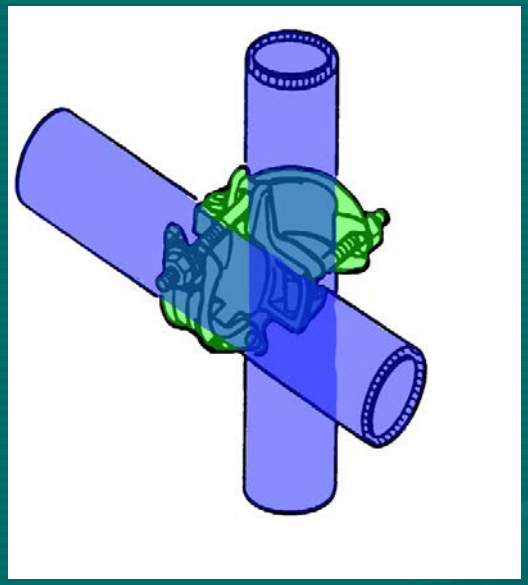
The following scaffold exercises are just to establish baseline information of your knowledge and skills regarding basic scaffolding

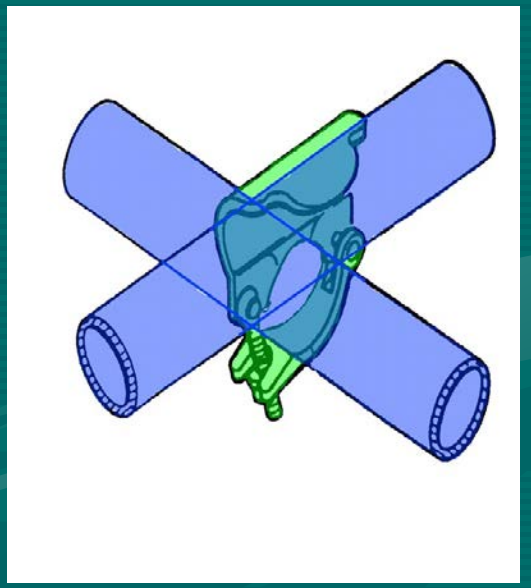
Exercise: Identify Components

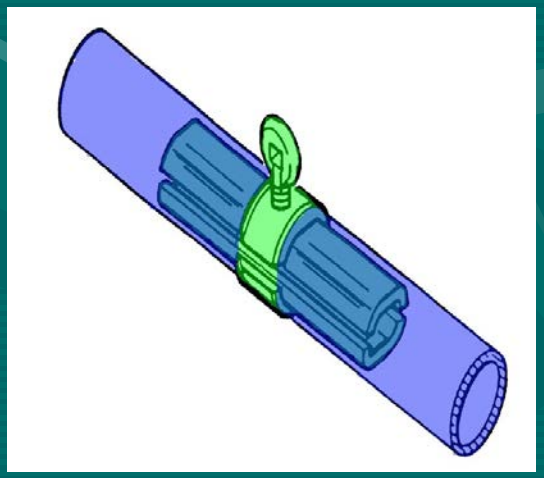


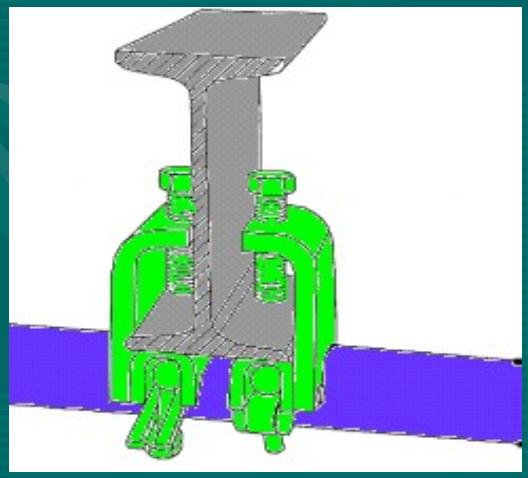
Exercise: Identify Couplers

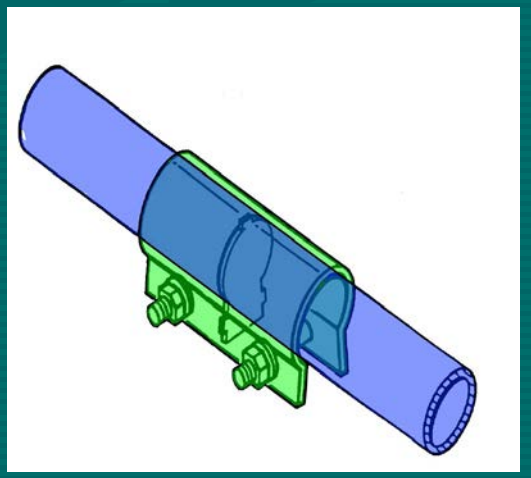










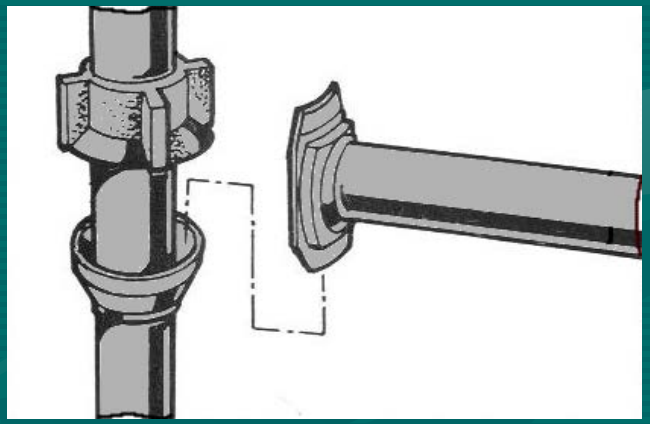


Types of Scaffold Construction

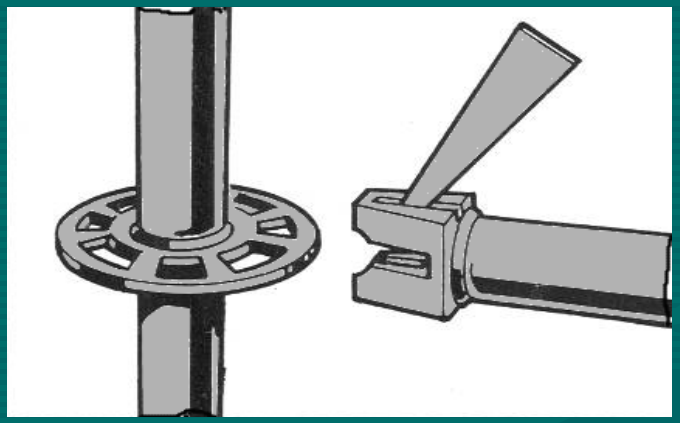
- **System type – is a type of scaffold whose scaffold components are connected by fixed connectors**
- **Tube & Coupler type – is a type of scaffold whose scaffold components are connected by couplers**

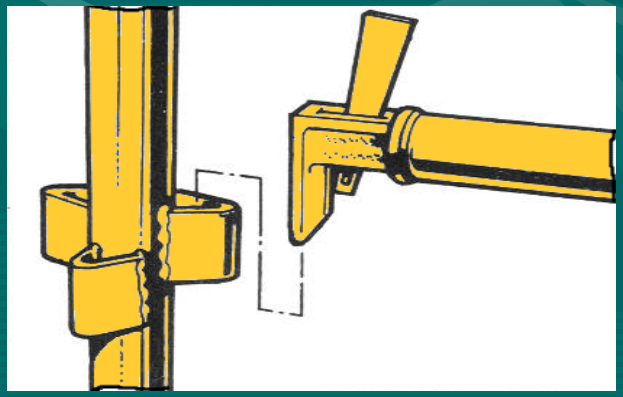
Types of ‘System’ Connections

Cuplok Connections



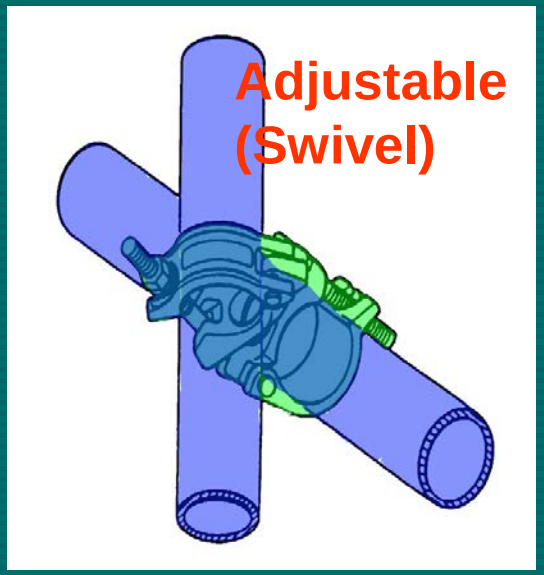
Rosette Connections

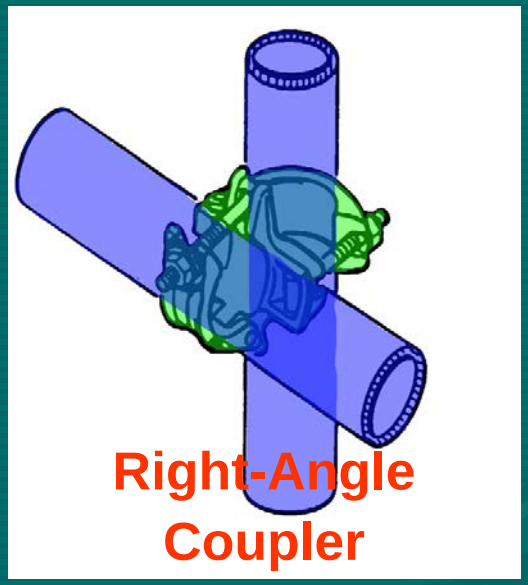


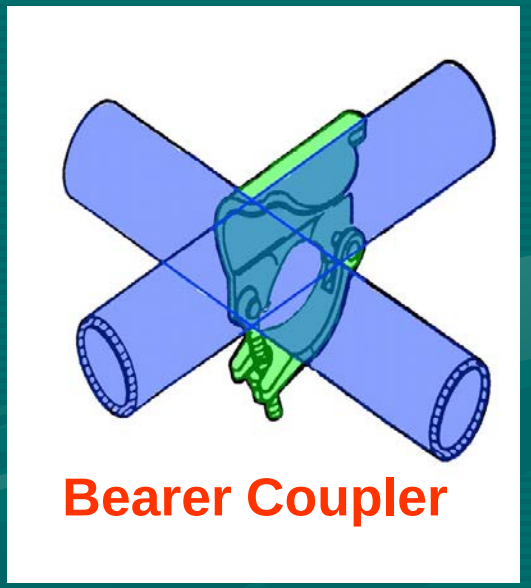


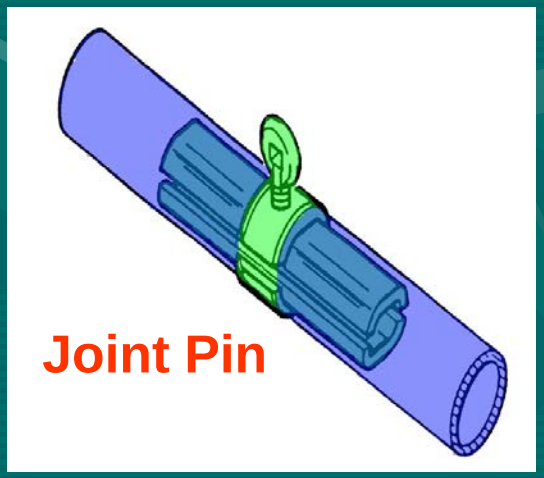
Wedge Connections

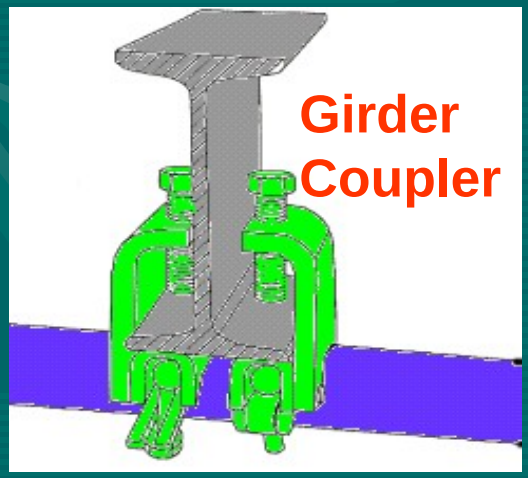
Types of 'Tube' Connectors

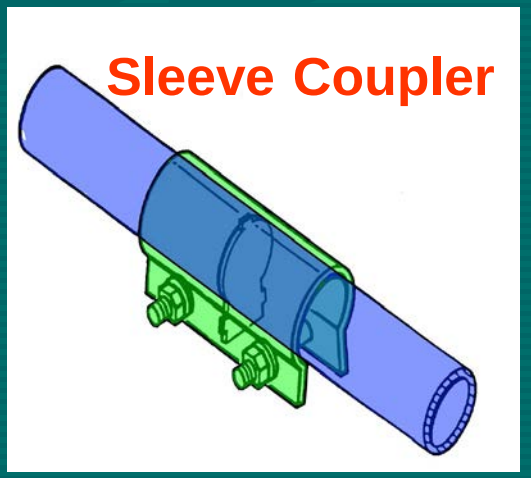












Tube & Coupler Connections

Think…

- **What is a Post?**
- **What is a Runner?**
- **What is a Bearer?**
- **What is a Board Bearer**
- **What is a Plank?**
- **What is a Base Plate?**
- **What is a Sole Board?**

Scaffold Components

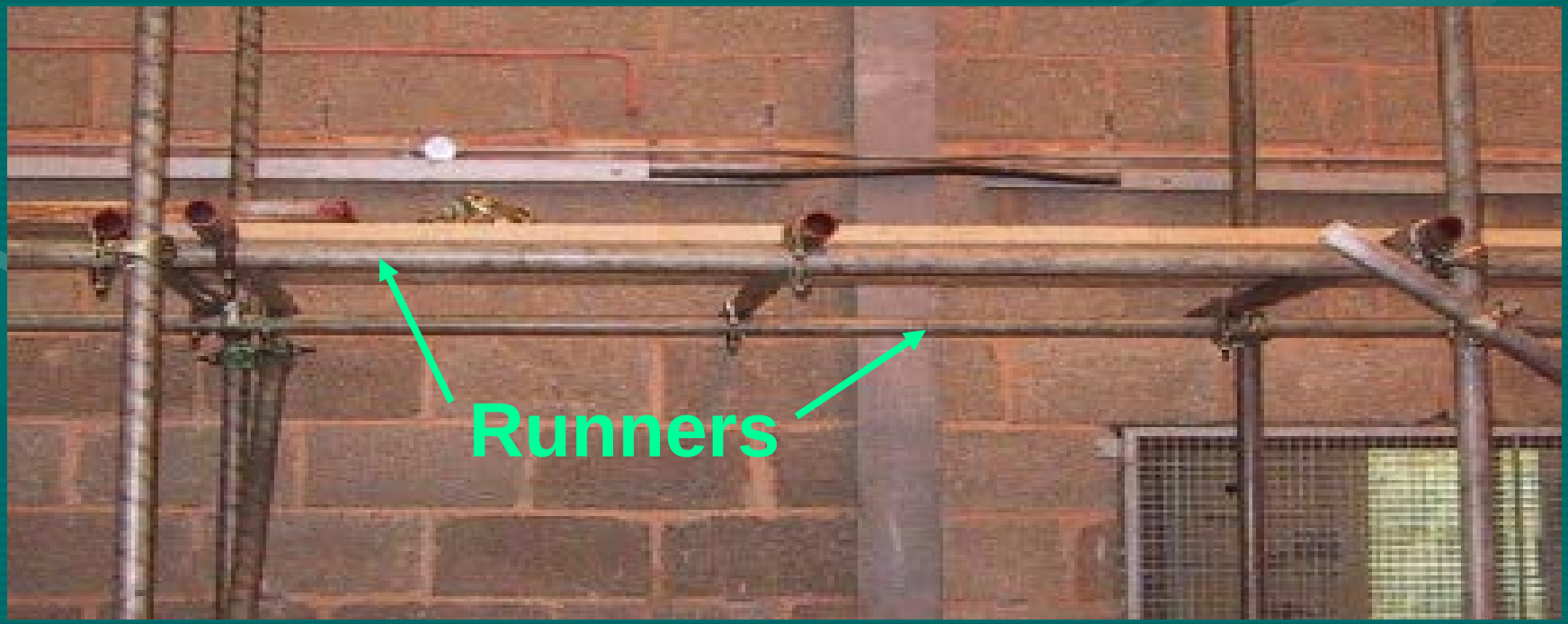
- ***Post***

  A vertical tube that carries the weight of the scaffold.

Scaffold Components

- ***Runner***

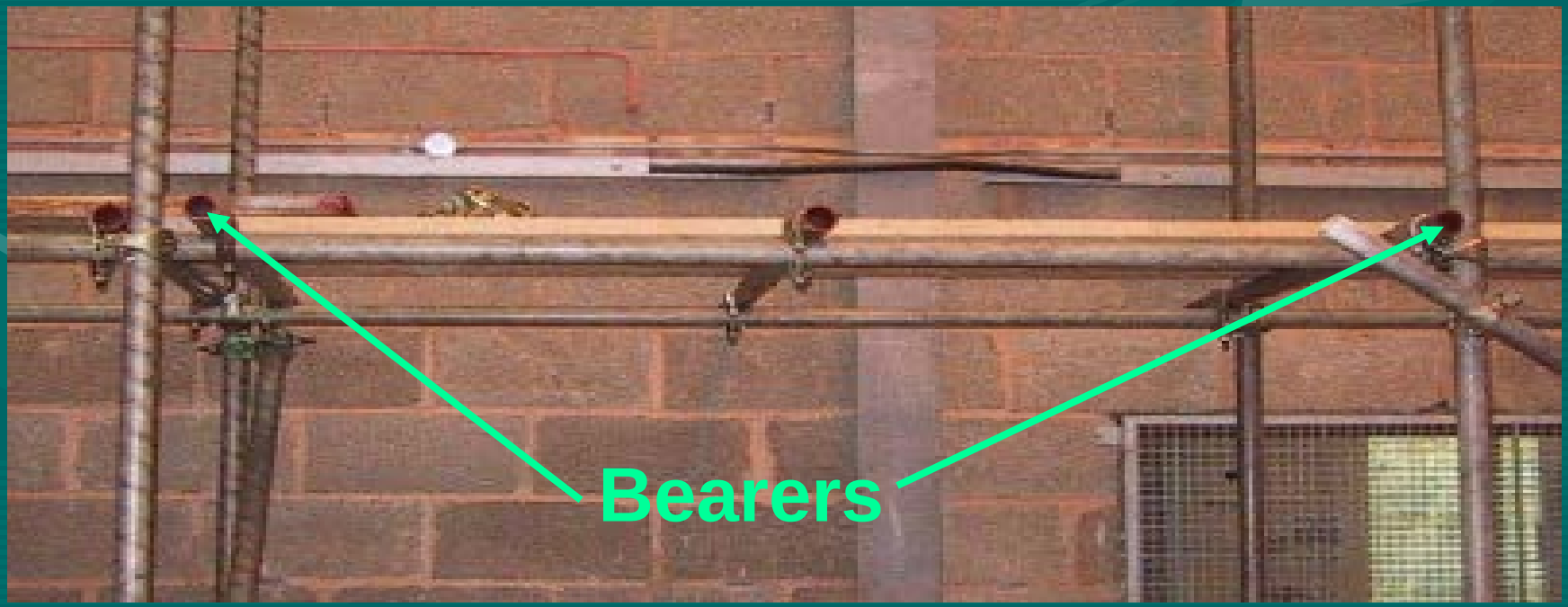
  Horizontal scaffold tube that extends from post to post and supports the bearers.



Scaffold Components

- ***Bearer***

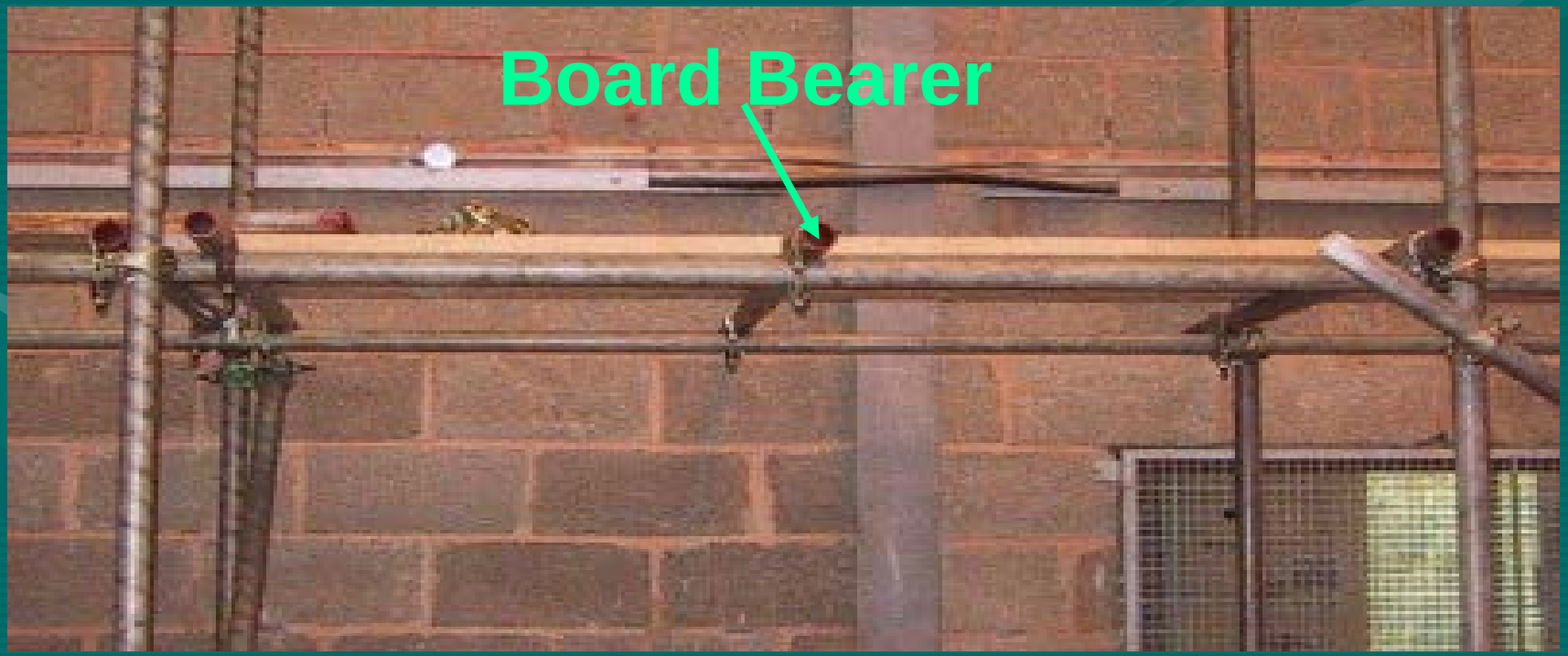
  Horizontal tube fixed on top of at least 2 runners (at or near a pair of posts) and supports the weight of the planks.



Scaffold Components

- ***Board Bearer***

  Like a bearer, but not fixed to the posts. It helps the support planks at mid-span.



Scaffold Components

- ***Plank***

  An individual timber board that serves as flooring member of a work platform.

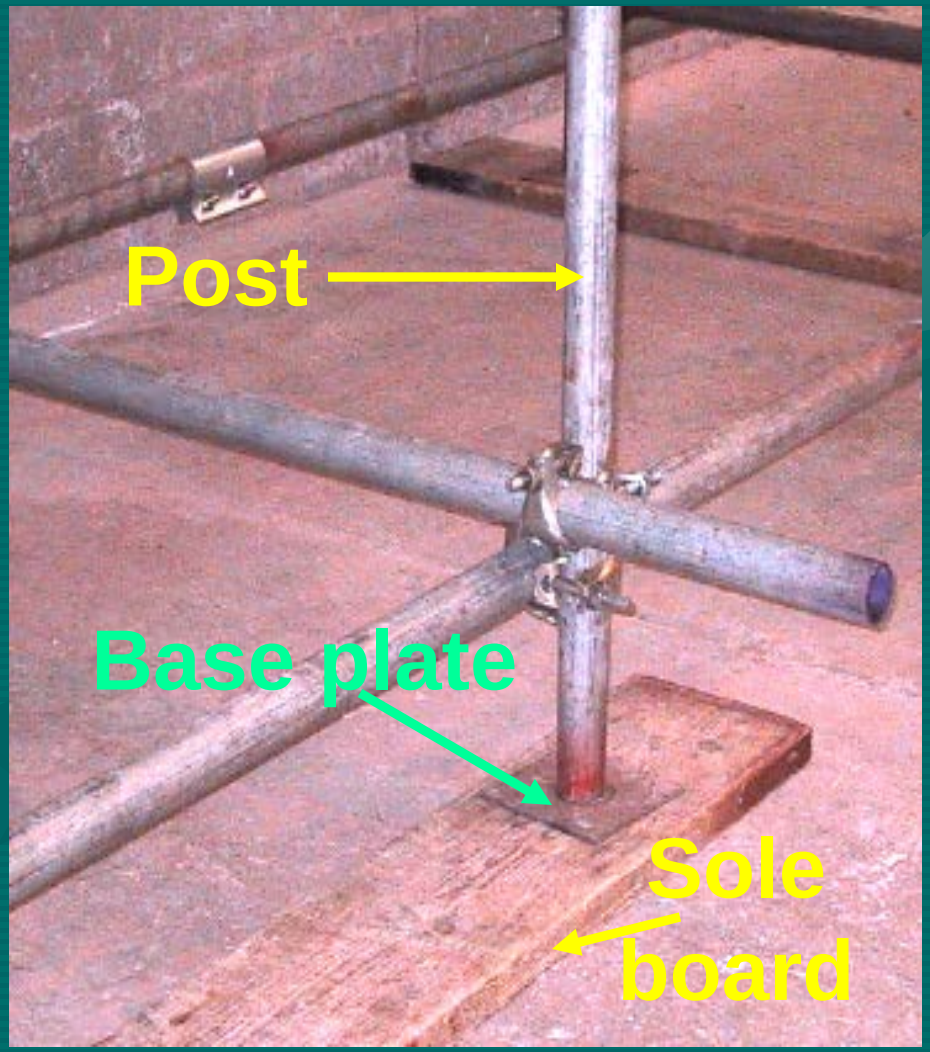
Scaffold Components

- **Laminated Veneer Lumber (LVL) Planks**
- **38 mm x 225 mm or 45 mm x 225 mm**
- **Typical required “OSHA” stamp for LVL planks**

Scaffold Components

- ***Base plate***

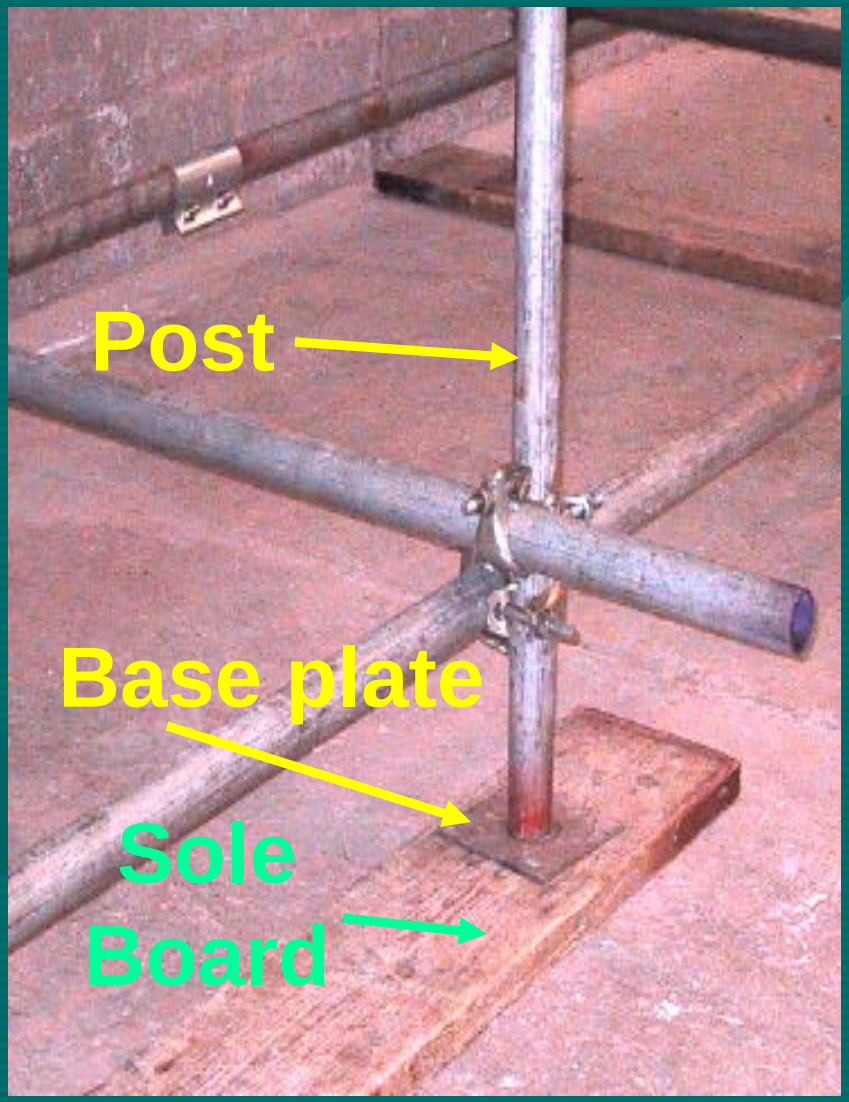
  A steel plate measuring 6” by 6” used for distributing the load from the post.



Scaffold Components

- ***Sole Board***

  A board that measures 9” by 1 ½ “ thick lumber used to distribute weight from the base plate to ground.



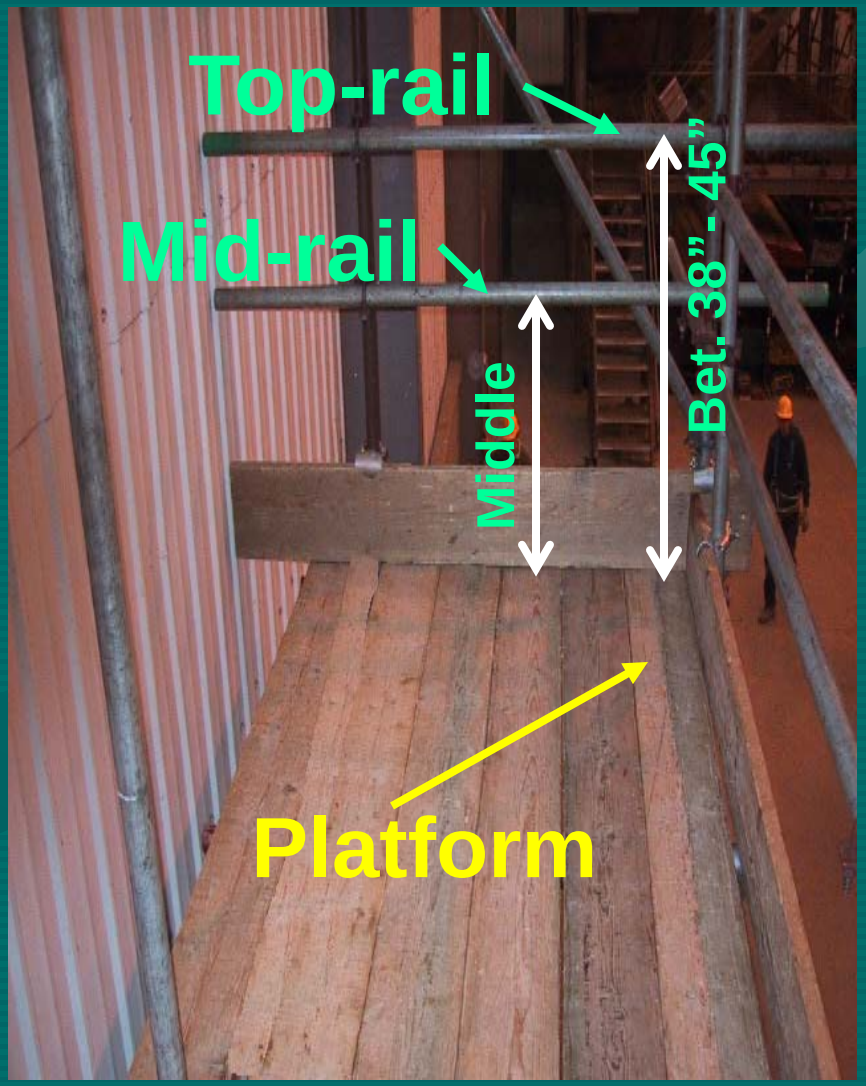
Think...

- **What is a guardrail system?**
- **Why installed a guardrail system?**
- **What is the purpose of a toe-board?**
- **How are bracings installed?**
- **Why there is a need for bracing?**

Scaffold Components

Guardrail System

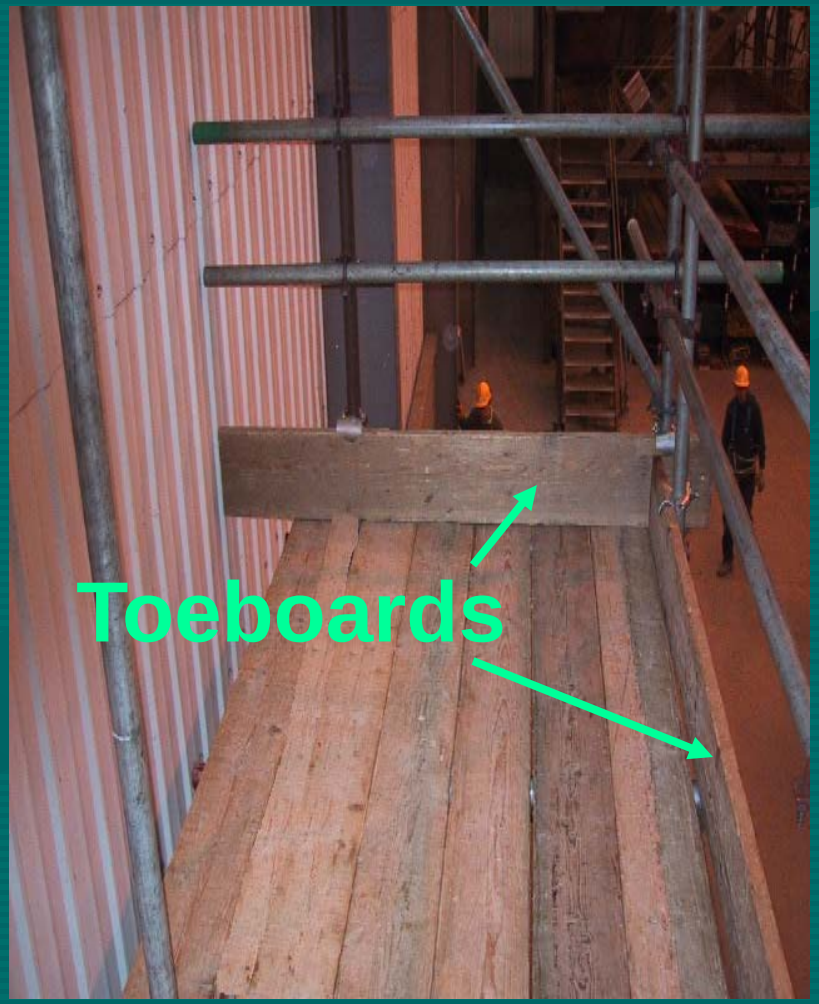
- ***Top-rail***: **installed between 38”-45”platform**
- ***Mid-rail:*** **installed between top-rail & platform**
- **To prevent the workers from falling off the platform**



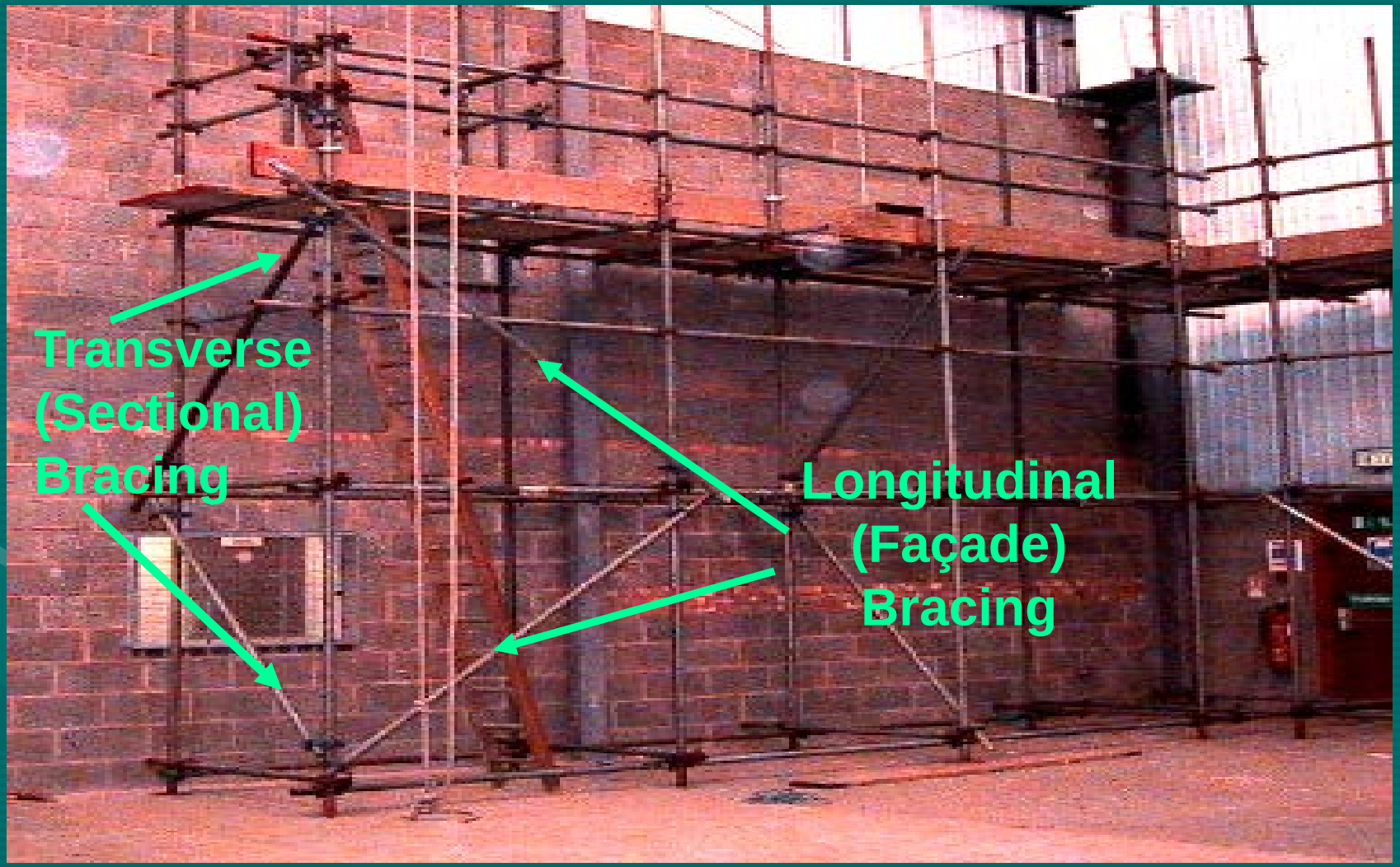
Scaffold Components

- ***Toe-boards***

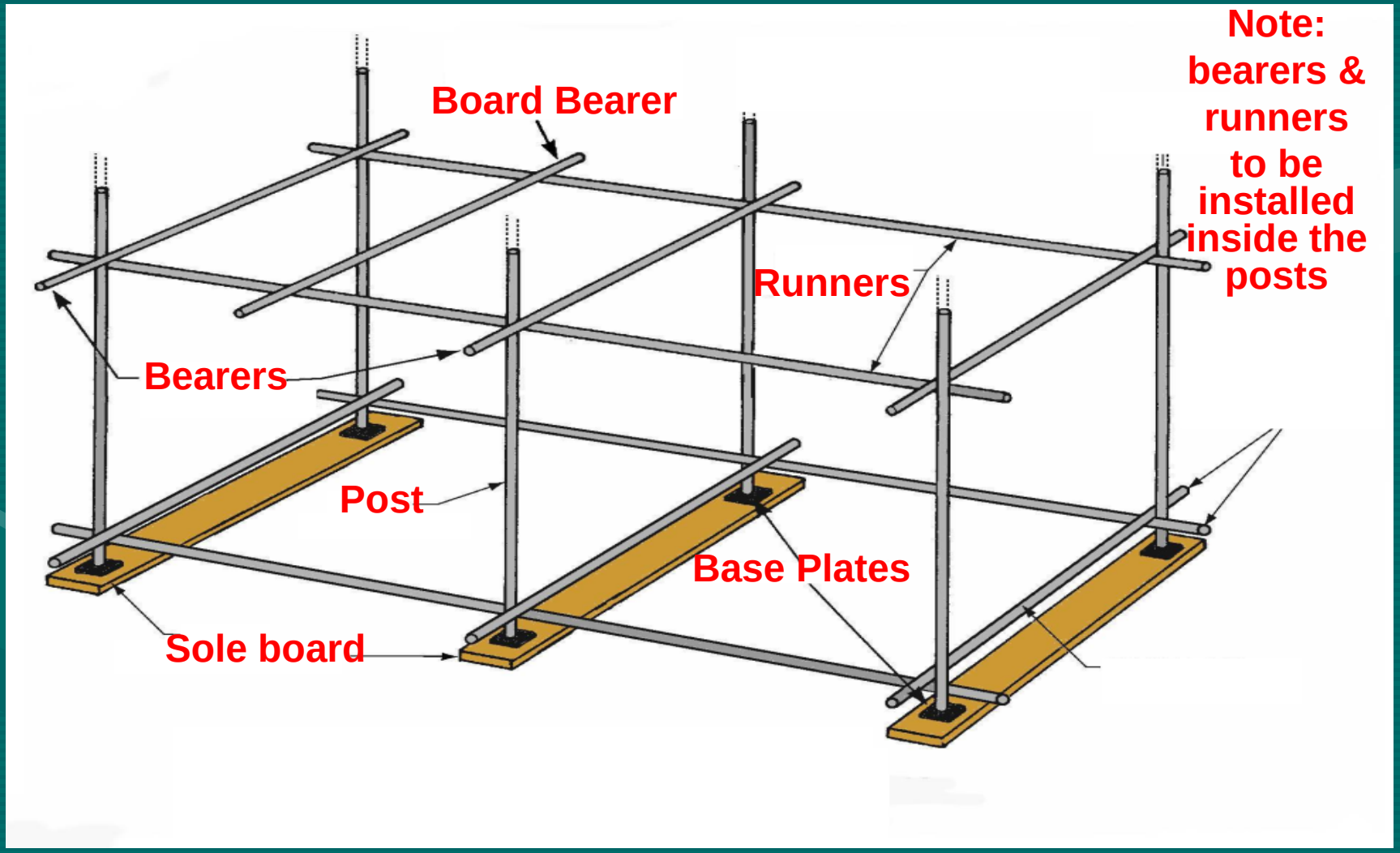
  Are required to prevent objects from falling onto workers below the platform.



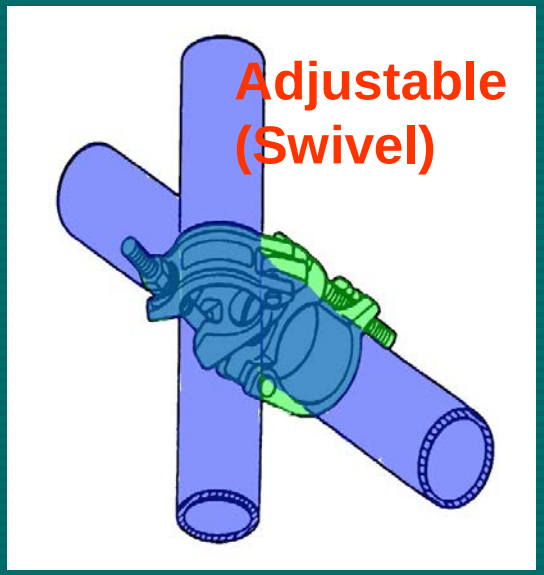
Scaffold Components

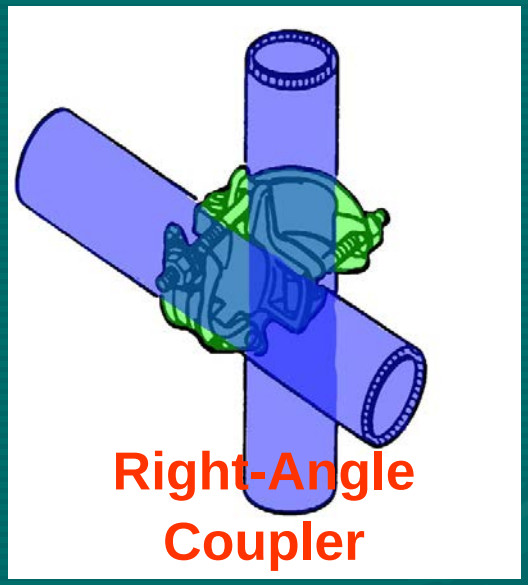


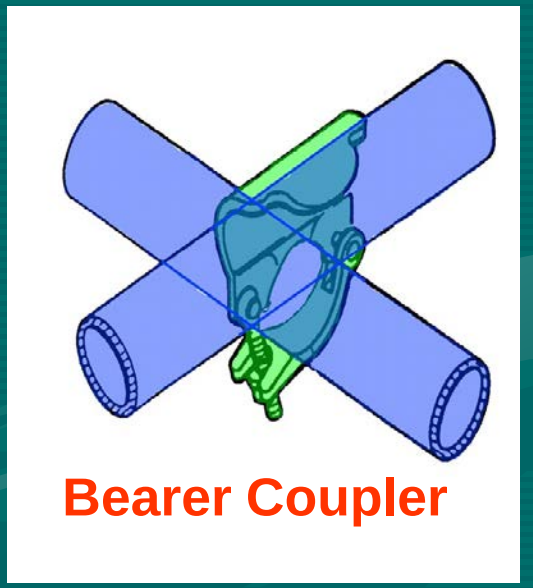
Scaffold Components Summary

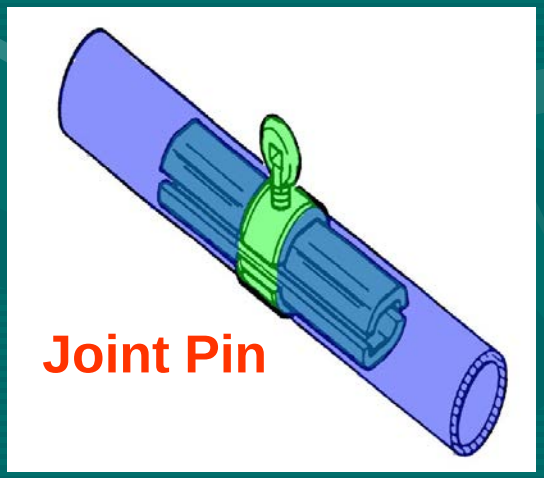


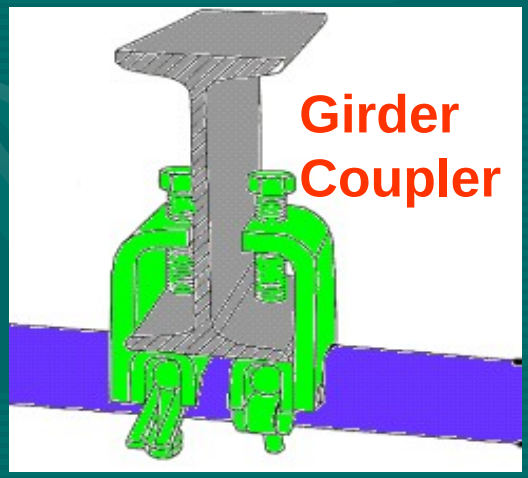
Types of Scaffold Couplers

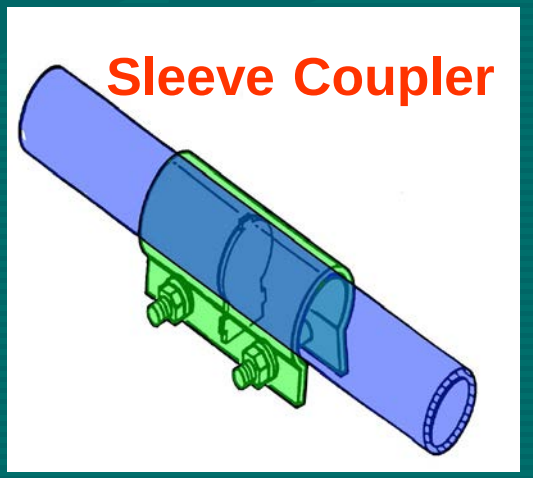








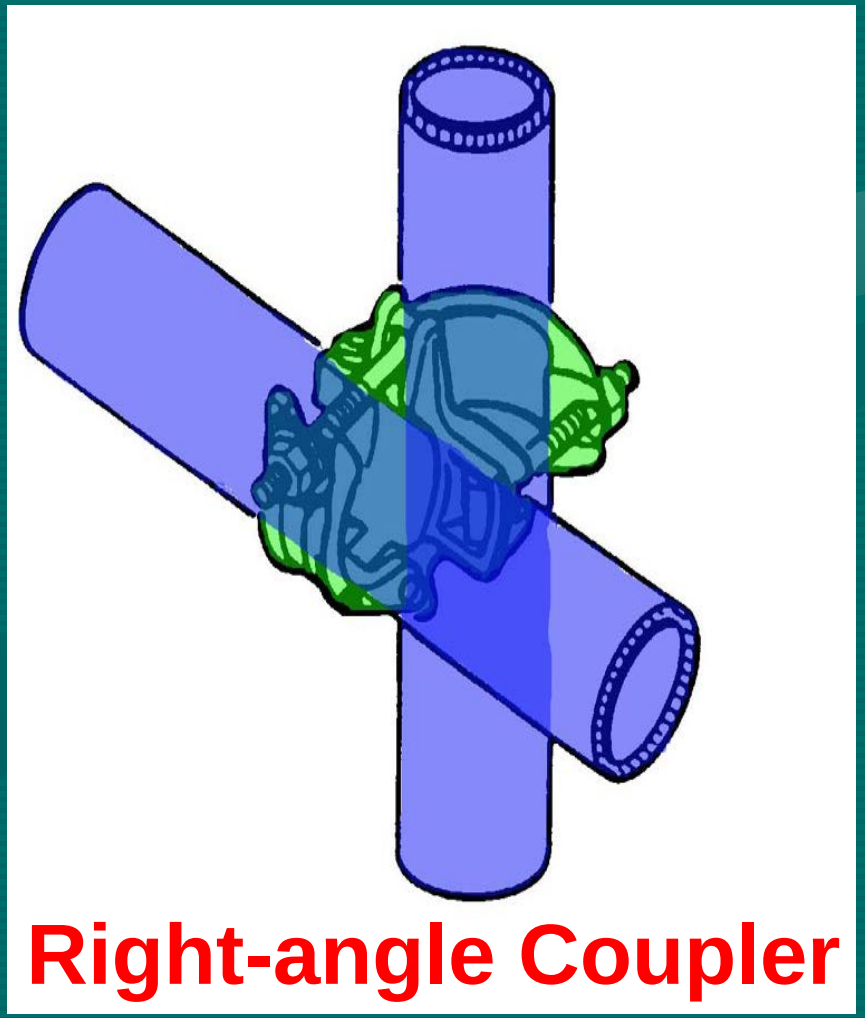




Scaffold Couplers

Right Angle Coupler

- **Coupler used to connect tube at right angles**
- **Used to connect runners to posts**
- **Used for fixing of scaffold ties**

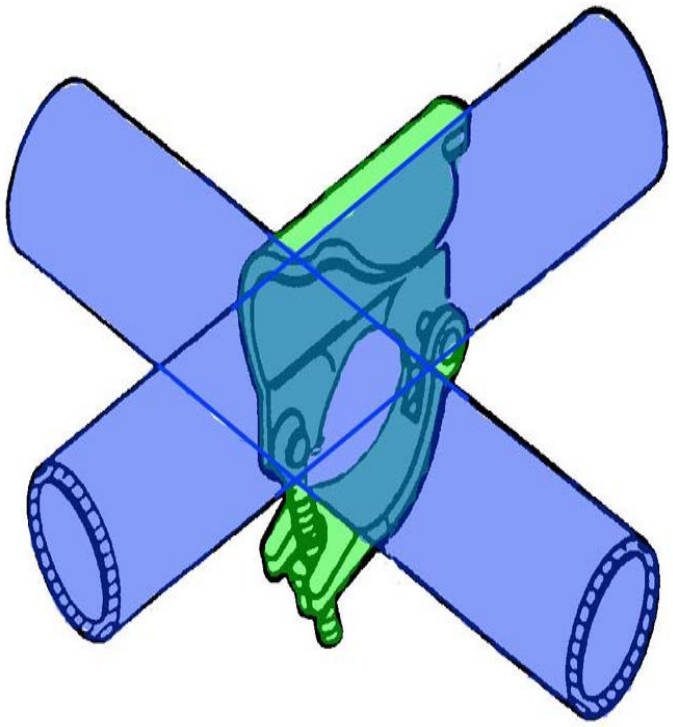


Right-angle Coupler

Scaffold Couplers

Bearer Coupler

- **Used to fix a bearer to a runner**
- **Used to connect scaffold tube use as guardrail to a post**
- **Must not be turned upside down**

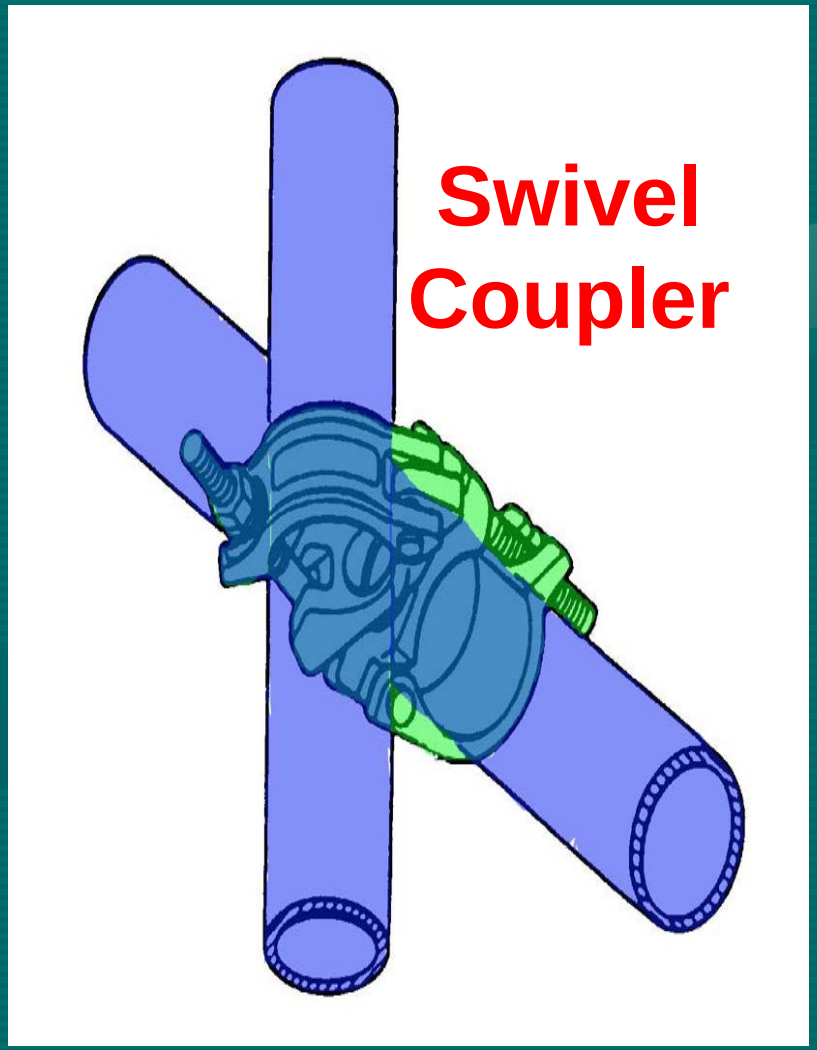


Bearer Coupler

Scaffold Couplers

Swivel Coupler

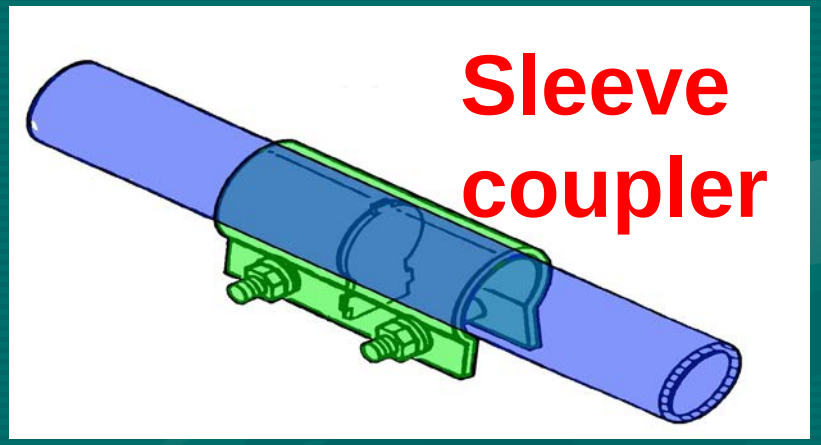
- **Used to fix tubes together at various angles**
- **Used to fix braces**
- **Not to be used to fix scaffold ties**



Scaffold Couplers

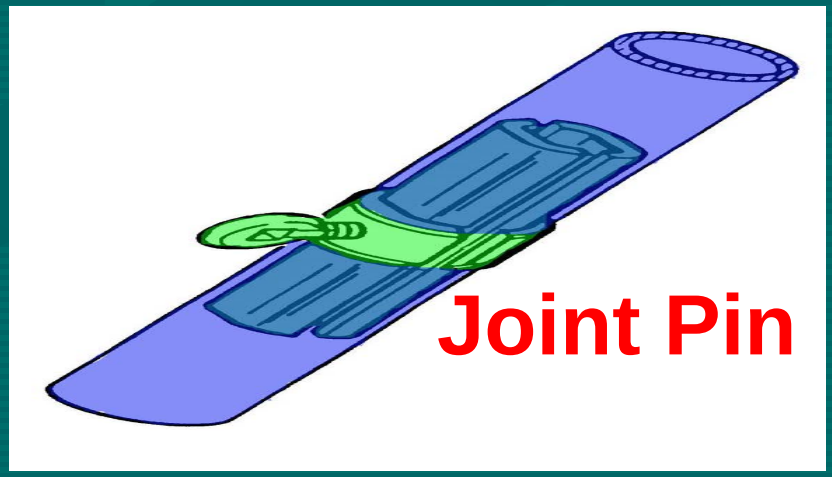
Sleeve Coupler

Used for externally joining 2 scaffold tubes co-axially end to end.



Joint Pin

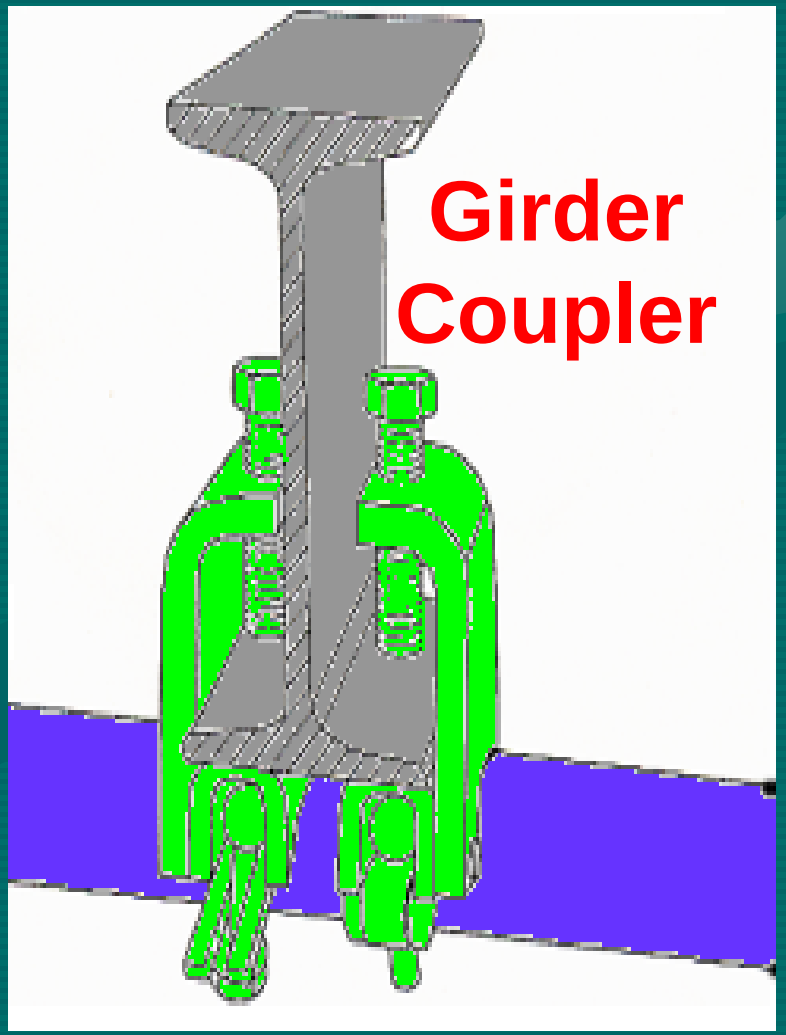
Used for posts (vertical) connections only



Scaffold Couplers

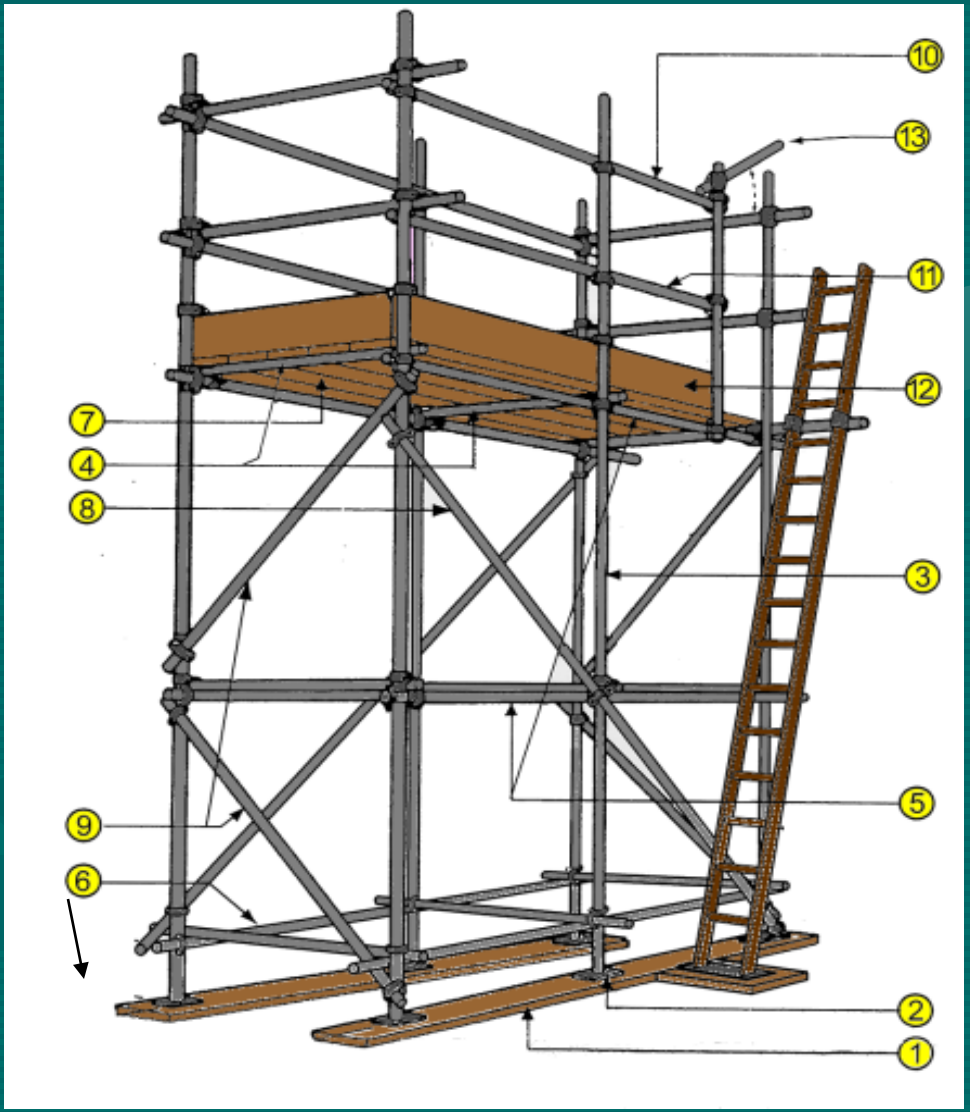
Girder Coupler

- **Used to fix scaffolds to steelwork**
- **Must be used in pairs**
- **Can be used to "tie" scaffolds to steel-work**



Review Questions

1. Sole Board
2. Base plate
3. Post
4. Bearers
5. Runners
6. Base Lift
7. Planks
8. Longitudinal bracing
9. Transverse bracing
10. Toprail
11. Midrail
12. Toeboard
13. Drop Bar



End of Part 1

أرامكو السعودية
Saudi Aramco

Scaffold Safety Workshop

Part - 2

FULL-BODY HARNESS & LANYARD

INSPECTION & PROPER USE

Think...

- **What is a Personal Fall-Arrest System?**
- **What is a Full-body Harness?**
- **What is a “Shock-Absorbing” Lanyard?**
- **How and Where to anchor a Lanyard?**
- **What is the safe height at which to anchor a lanyard to avoid hitting the ground?**

Full-body Harness

Rear
“D” Ring

Front
“D” Ring

Personal Fall Arrest System

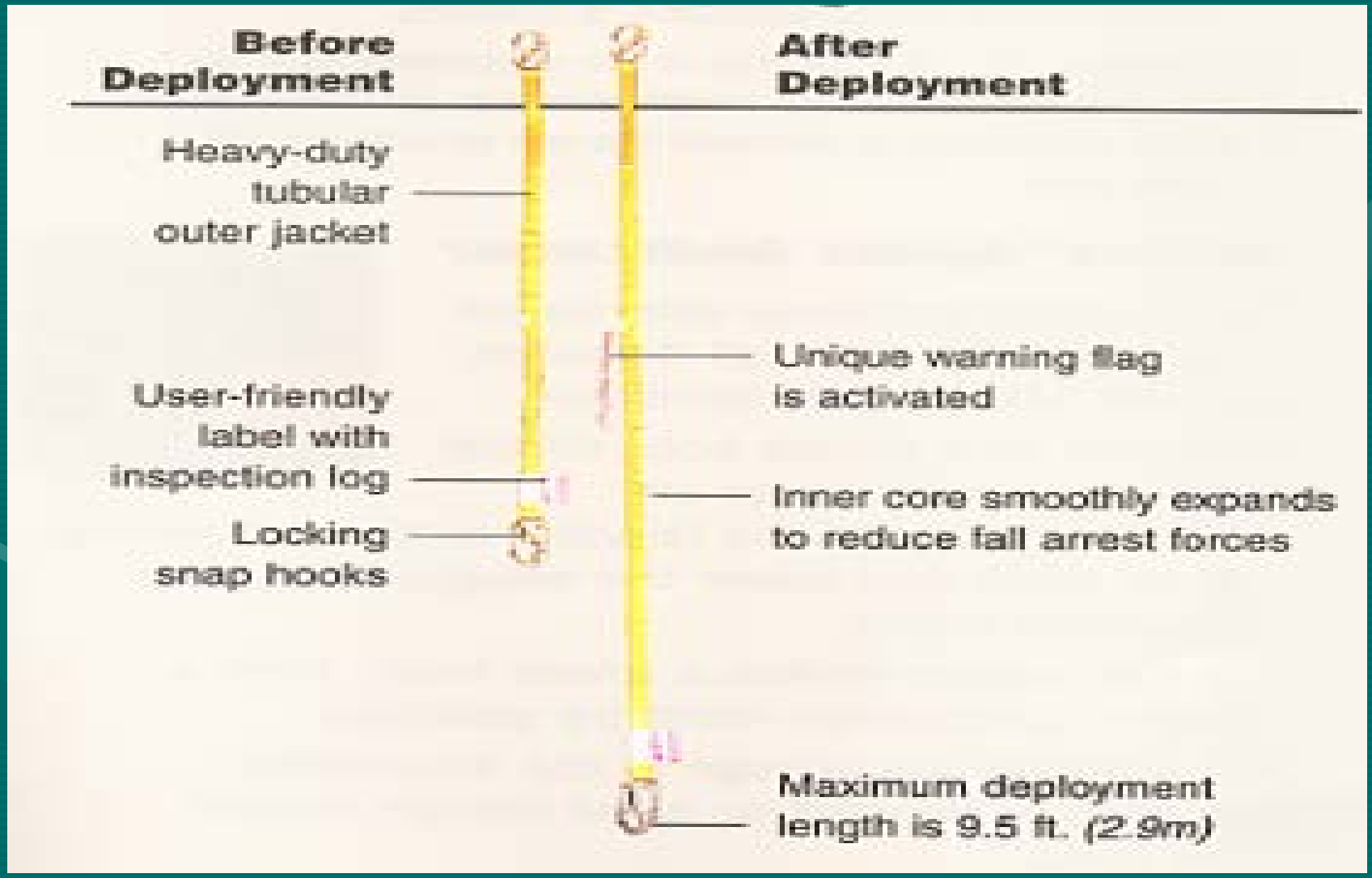
- **Full-Body Harness**
- **Shock Absorbing Lanyard**
- **Anchorage**

Personal Fall Arrest System

Each scaffold craftsman shall continuously wear a full body harness with a shock-absorbing lanyard while erecting, altering, or dismantling a scaffold.

Full-body Harness

Shock Absorbing Lanyard



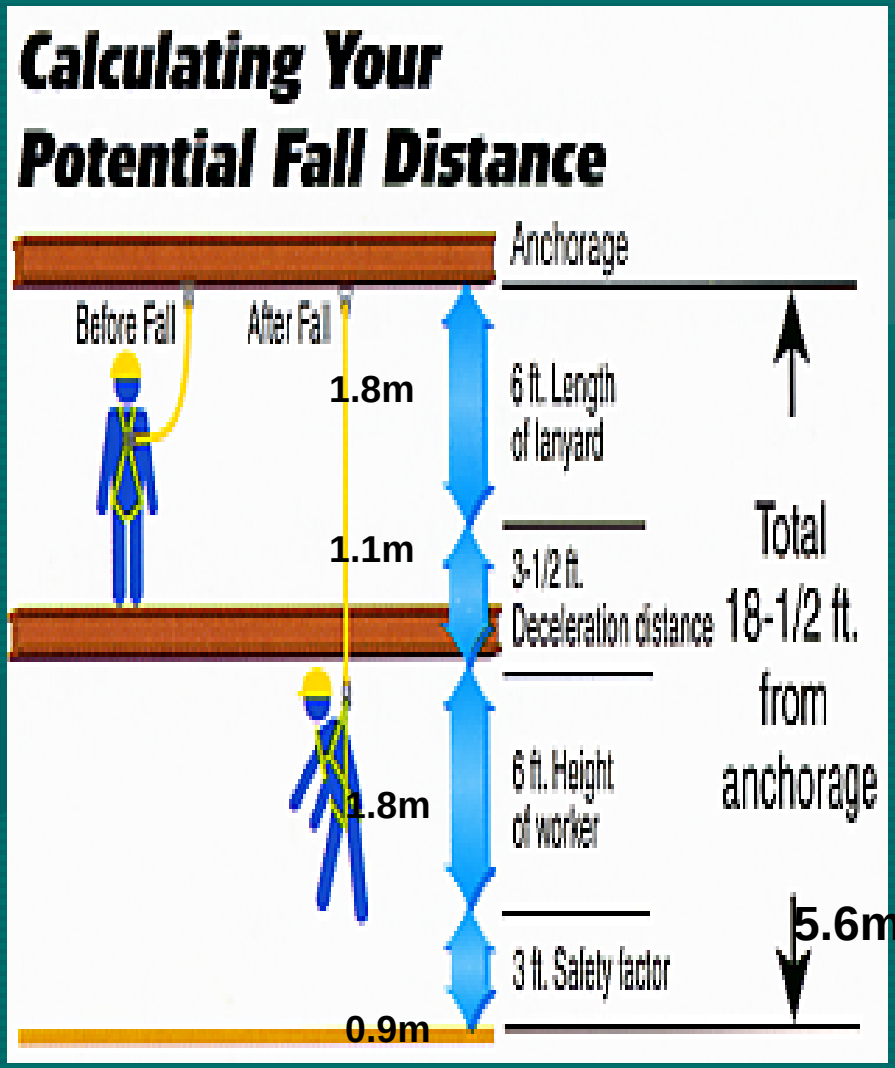
Anchorage Connectors

Cross-Arm Strap

Wire Hook

Fall Distance

A total of **5.6 m** (18½ ft) is the **safe height** at which to anchor a lanyard to avoid contact with the level below



Harness & Lanyard Inspection

Frayed webbing

Stitching pulled apart

Harness & Lanyard Inspection

Frayed webbing

Cuts in the webbing or lanyard

Use of Harness - Step 1

- **Hold harness by back D-ring**
- **Shake harness to allow straps to fall into place**
- **Identify where is the front and back**

Use of Harness - Step 2

- **If chest, leg and/or waist straps are buckled, release them and unbuckle at this time**

Use of Harness - Step 3

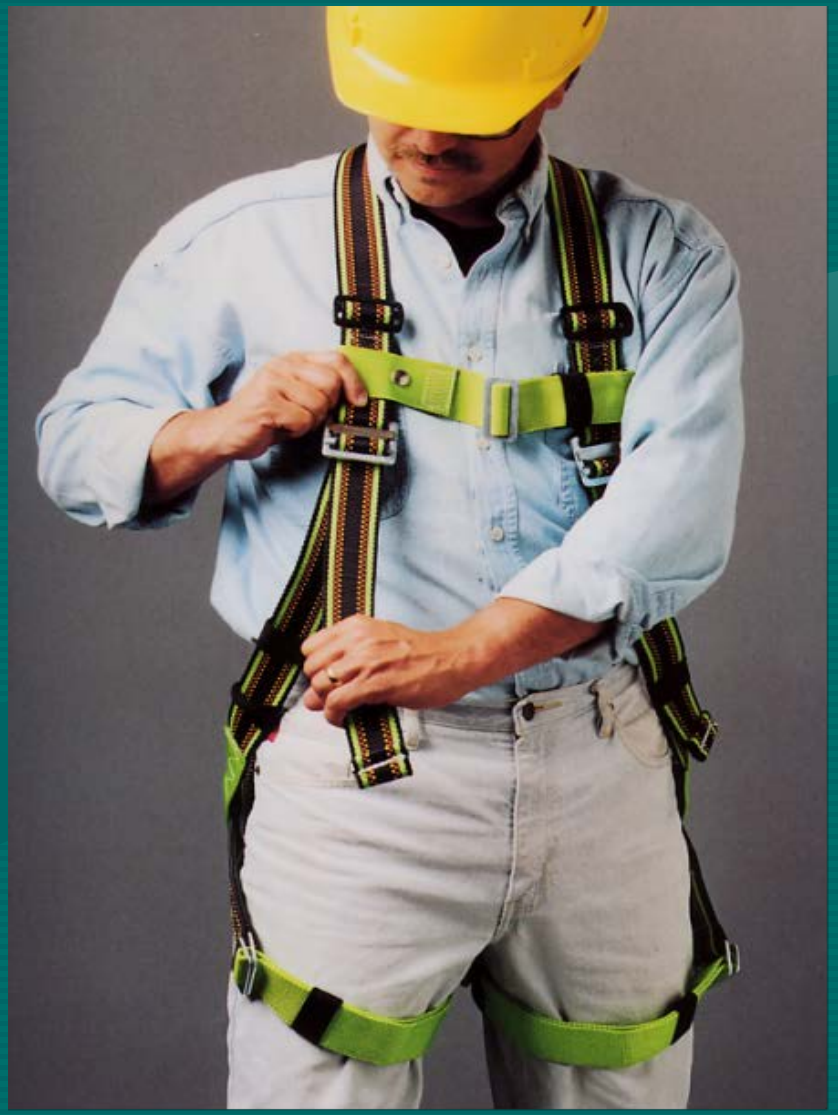
- **Slip straps over shoulders, or in our case pull over your head, so that the D-ring is located in middle of your back between your shoulder blades**

Use of Harness - Step 4

- **Pull leg strap between legs and buckle to its other end**
- **Repeat with second leg strap**

Use of Harness - Step 5

- **After all straps have been buckled, tighten all buckles so that harness fits snug but allows full range of movement**
- **Pass excess strap through loop keepers**



Exercise: Wearing of Harness

Rear
“D” Ring

Front
“D” Ring

End of Part 2

Scaffold Safety Workshop

Part - 3

SCAFFOLD

INSPECTION & TAGGING

Pre-Use Inspection

- **Before we learn how to do a scaffold pre-use inspection**
  - **Let's see what Scaffold Supervisors and Inspectors must do, and**
  - **How they communicate scaffold safety requirements to us through scaffold tags**
  - **So we may know if things are being done properly and safely**

Think...

- **Who are Scaffold Supervisors?**
- **What are the responsibilities of being a Scaffold Supervisor?**
- **What are the different levels of Scaffold Supervisors?**
- **Who are Scaffold Inspectors?**
- **What are the responsibilities of being a Scaffold Inspector?**

Who are Scaffold Supervisors?

- **Immediate supervisors of scaffold craftsmen**
- **Responsible for safety of erected scaffold**
- **Must passed the Scaffold Supervisor certification test given by Saudi Aramco Training Dept.**
- **Could be Saudi Aramco or contractor employee**

Supervisor Certification Levels

- **Certified Scaffold Supervisor I**
  - **All scaffolds**
- **Certified Scaffold Supervisor II-T**
  - **Only Tube and Coupler**
  - **Less than 12.2 meters (40 feet)**
- **Certified Scaffold Supervisor II-S**
  - **Only System Scaffolds (Cuplok, Kwikstage, etc.)**
  - **Less than 12.2 meters (40 feet)**

Who Are Scaffold Inspectors ?

- **Responsible in identifying scaffold hazards and verify compliance with Saudi Aramco scaffolding standards**
  - **For scaffolds over 6 m. (20 feet) tall**
  - **And, for “Special Scaffolds”**
- **Must passed the Scaffold Inspector certification test given by Saudi Aramco Training Dept.**
- **Could be Saudi Aramco or contractor employee**

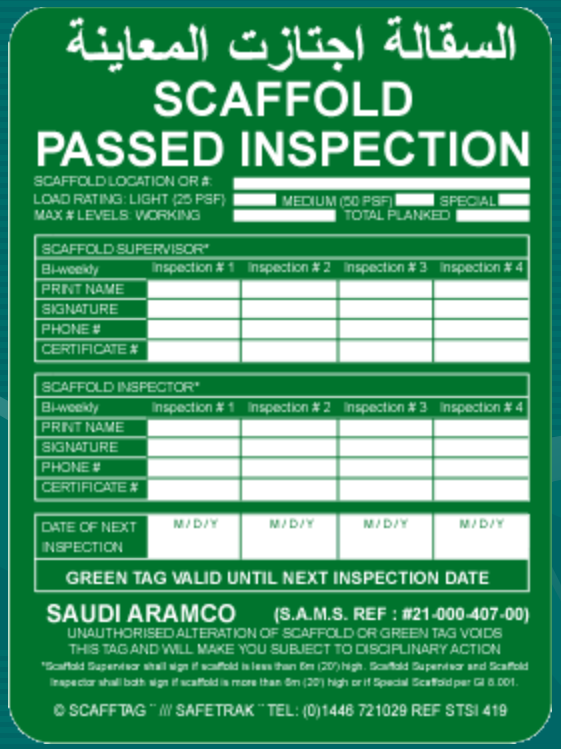
Reminder

- **Scaffold Inspectors Only Required to Inspect:**
  - **Scaffolds over 6 m. (20 feet) tall, or**
  - **"Special Scaffolds"**
- **We will now learn the new Saudi Aramco scaffold tagging system**

Think...

- **How many types of scaffold tags used in Saudi Aramco?**
- **What is the meaning of a Red Tag?**
- **What is the meaning of a Green Tag?**
- **What is the meaning of a Yellow Tag?**
- **Why Tag on a Scaffold?**
- **When to Tag a Scaffold?**
- **How to Tag a Scaffold?**

Saudi Aramco Scaffold Tagging System



Red Scaffold Tag (Holder)

Indicates the scaffold has *not* been inspected or is not safe for use (by anyone other than scaffold craftsmen)

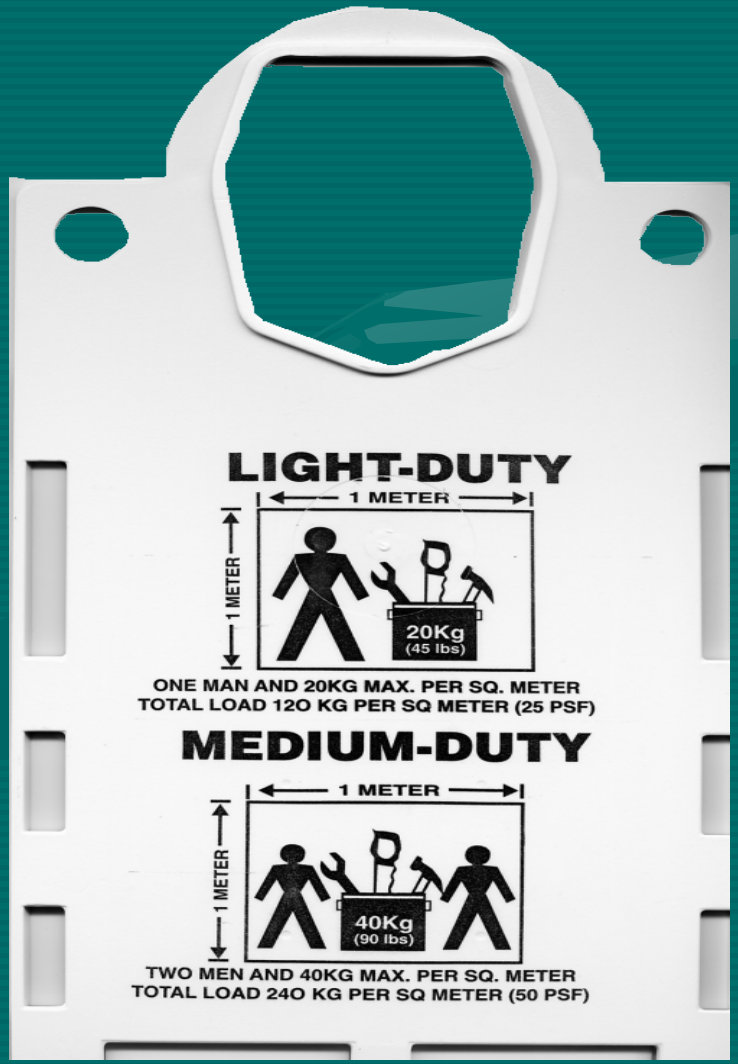
Red Scaffold Tag (Holder)

Unique ID (serial) number printed on front & back of all new holders

ID number written on green or yellow tags (inserts) must be same as ID number printed on its holder. Why?

Red Scaffold Tag (Holder)

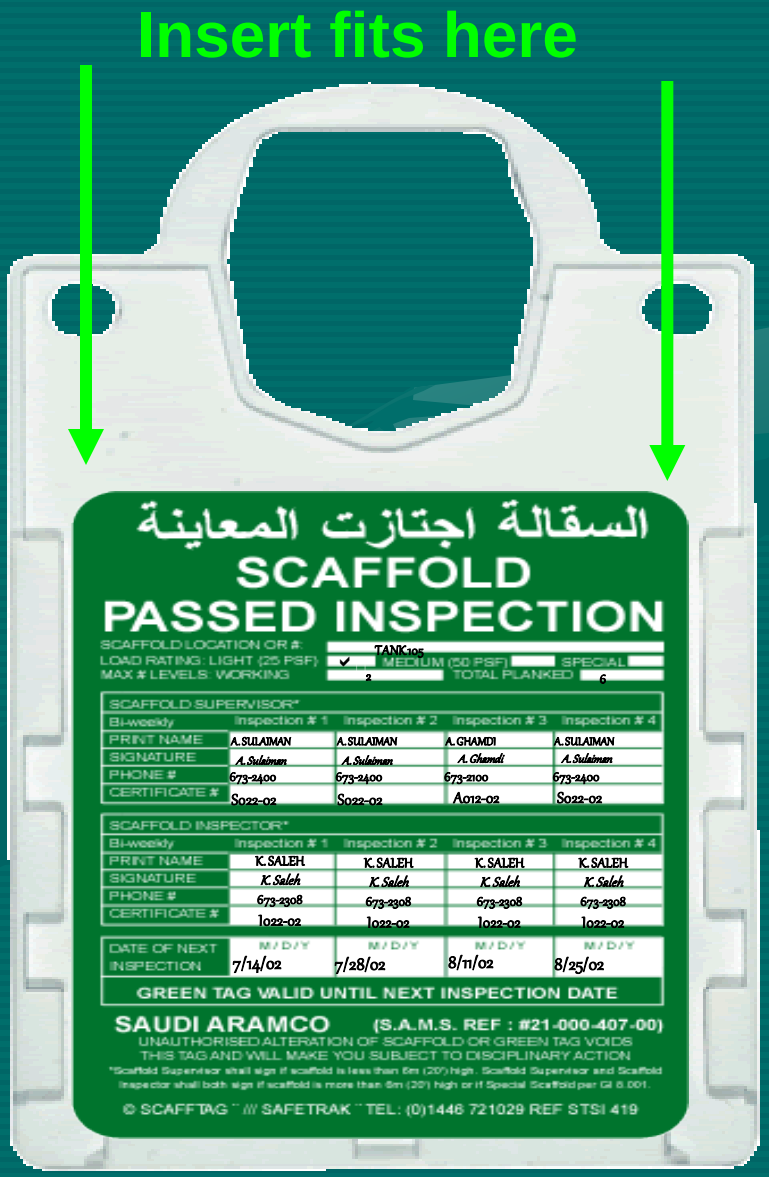
- At the back of scaffold tag holder shows what “light duty” & “medium duty” scaffolding loading means
- Acts as a guide for users to ensure that they are not at risk of overloading the scaffold



Green Scaffold Tag (Insert)

Indicates scaffold is complete, has been inspected, and is safe for use at the time of inspection

GREEN scaffold tag valid for a maximum of two weeks



Yellow Scaffold Tag (Insert)

Insert fits here

Indicates scaffold has been inspected and may be used *only* by workers wearing a properly anchored full body harness and lanyard

YELLOW scaffold tag valid for two weeks maximum

Why Tag a Scaffold ?

- **To be able to identify a scaffold on-site (ID#)**
- **To show on-site that a scaffold is either safe or not safe to use**
- **To give an on-site warning that the use of full body harness is required**
- **To be able to confirm on-site that a scaffold has been inspected**

When to Tag a Scaffold

- **After a work permit has been issued**
- **As soon as construction of scaffold starts using a Red Scaffold Tag**
- **All the time that a scaffold remains on site**

How to Tag a Scaffold?

- **RED scaffold tag (holder) must be built into scaffold, near each access.**
- **RED scaffold tag must be fixed by a tube placed through holder (not fixed with string, wire etc).**

Think...

- **When must a Scaffold Supervisor & Inspector inspect a Scaffold**
- **When must a Scaffold Supervisor sign a scaffold tag?**
- **How a scaffold green tag is filled-in, if scaffold is less than 6 m (20 feet)?**
- **How a scaffold green tag is filled-in, if scaffold is more than 6 m (20 feet)?**

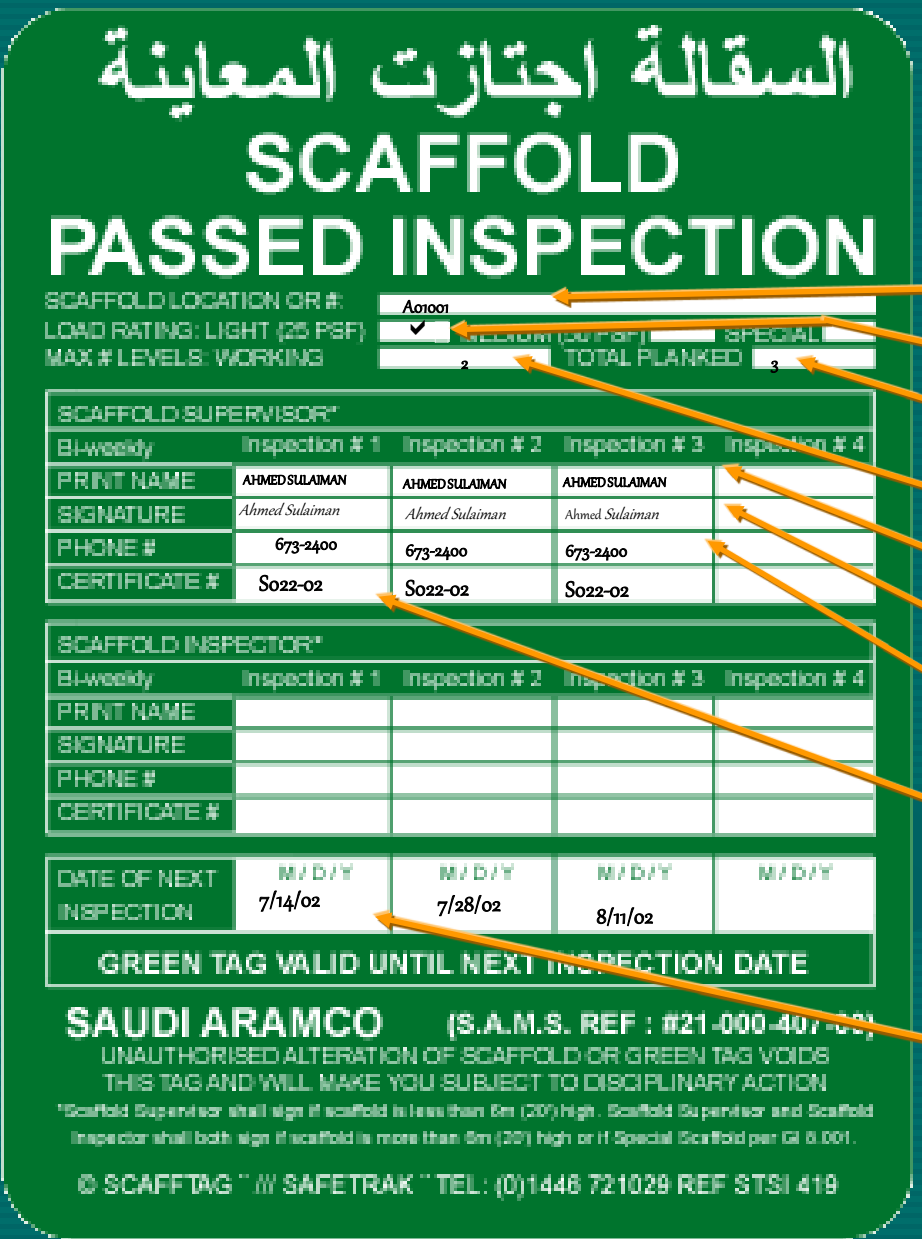
Scaffold Inspection

- **When must Scaffold Supervisors and Inspectors Inspect a Scaffold ?**
  - **After scaffold is completely built**
  - **After scaffold has been altered, and before it maybe use by others**
  - **After high winds, impact damage or anything likely to have affected scaffold's strength**
  - **At regular intervals to check that it is still safe to use (every 2 weeks)**

Scaffold Tagging

- **If Scaffold Supervisor thinks scaffold is safe to use, he will fill in & sign, either:**
  - **GREEN (Passed Inspection) or**
  - **YELLOW (Full Body Harness Required) scaffold tag**

How GREEN Scaffold Tags are filled in


السقالة اجتازت المعاينة

SCAFFOLD

PASSED INSPECTION

SCAFFOLD LOCATION OR #: A01001

LOAD RATING: LIGHT (25 PSF) ✔ MEDIUM (50 PSF) SPECIAL

MAX # LEVELS: WORKING 2 TOTAL PLANKED 3

SCAFFOLD SUPERVISOR*				
Bi-weekly	Inspection # 1	Inspection # 2	Inspection # 3	Inspection # 4
PRINT NAME	AHMED SULAIMAN	AHMED SULAIMAN	AHMED SULAIMAN	
SIGNATURE	Ahmed Sulaiman	Ahmed Sulaiman	Ahmed Sulaiman	
PHONE #	673-2400	673-2400	673-2400	
CERTIFICATE #	S022-02	S022-02	S022-02	

SCAFFOLD INSPECTOR*				
Bi-weekly	Inspection # 1	Inspection # 2	Inspection # 3	Inspection # 4
PRINT NAME				
SIGNATURE				
PHONE #				
CERTIFICATE #				

DATE OF NEXT INSPECTION	M/D/Y 7/14/02	M/D/Y 7/28/02	M/D/Y 8/11/02	M/D/Y

GREEN TAG VALID UNTIL NEXT INSPECTION DATE

SAUDI ARAMCO (S.A.M.S. REF : #21-000-407-02)

UNAUTHORISED ALTERATION OF SCAFFOLD OR GREEN TAG VOIDS THIS TAG AND WILL MAKE YOU SUBJECT TO DISCIPLINARY ACTION

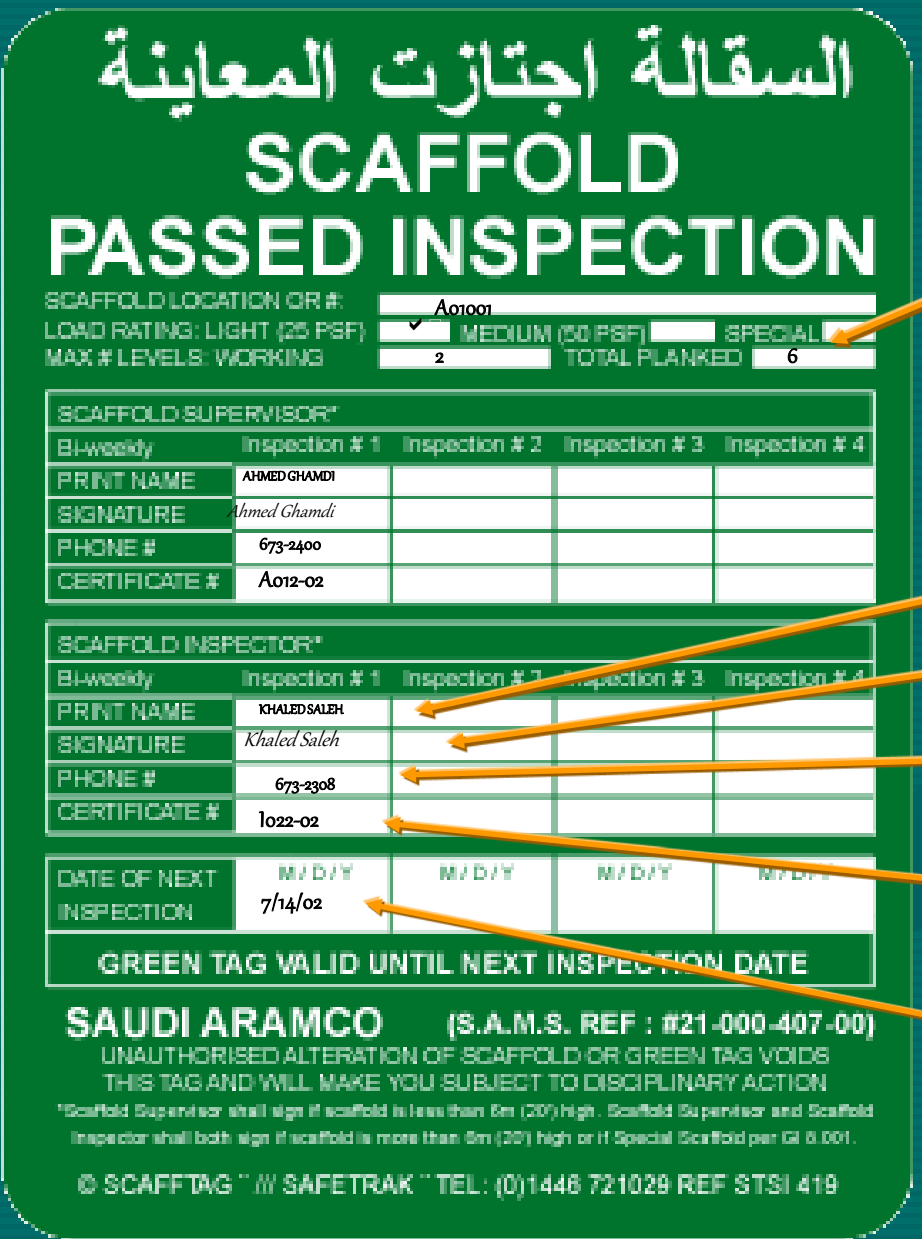
*Scaffold Supervisor shall sign if scaffold is less than 6m (20') high. Scaffold Supervisor and Scaffold Inspector shall both sign if scaffold is more than 6m (20') high or if Special Scaffold per GI 8.001.

© SCAFFTAG ™ /// SAFETRAK ™ TEL: (0)1446 721029 REF STSI 419

SCAFFOLD LESS THAN 6m (20 ft) AND NOT A "SPECIAL SCAFFOLD"

- Unique ID number (same red holder)
- Load rating of scaffold
- Total number of planked levels (max.)
- Maximum number of working levels
- Supervisor PRINTS his name
- Supervisor's actual signature
- Supervisor enters his phone #
- Supervisor enters his Saudi Aramco certificate number
- Date of next inspection - to be entered by Supervisor.

How GREEN Scaffold Tags are filled in


السقالة اجتازت المعاينة

SCAFFOLD

PASSED INSPECTION

SCAFFOLD LOCATION OR #: A01001

LOAD RATING: LIGHT (25 PSF) ✓ MEDIUM (50 PSF) SPECIAL

MAX # LEVELS WORKING: 2 TOTAL PLANKED: 6

SCAFFOLD SUPERVISOR*				
Bi-weekly	Inspection # 1	Inspection # 2	Inspection # 3	Inspection # 4
PRINT NAME	AHMED GHAMDI			
SIGNATURE	Ahmed Ghamdi			
PHONE #	673-2400			
CERTIFICATE #	A012-02			

SCAFFOLD INSPECTOR*				
Bi-weekly	Inspection # 1	Inspection # 2	Inspection # 3	Inspection # 4
PRINT NAME	KHALED SALEH			
SIGNATURE	Khaled Saleh			
PHONE #	673-2308			
CERTIFICATE #	1022-02			

DATE OF NEXT INSPECTION	M/D/Y	M/D/Y	M/D/Y	M/D/Y
	7/14/02			

GREEN TAG VALID UNTIL NEXT INSPECTION DATE

SAUDI ARAMCO (S.A.M.S. REF : #21-000-407-00)

UNAUTHORISED ALTERATION OF SCAFFOLD OR GREEN TAG VOIDS THIS TAG AND WILL MAKE YOU SUBJECT TO DISCIPLINARY ACTION

*Scaffold Supervisor shall sign if scaffold is less than 6m (20') high. Scaffold Supervisor and Scaffold Inspector shall both sign if scaffold is more than 6m (20') high or if Special Scaffold per GI 8.001.

© SCAFFTAG ™ /// SAFETRAK ™ TEL: (0)1446 721029 REF STSI 419

SCAFFOLD MORE THAN 6m (20 ft) TALL OR A "SPECIAL SCAFFOLD"

Supervisor enters all information on top part of GREEN insert

- However, Supervisor does *not* enter "Date of Next Inspection"or insert tag in holder
- Supervisor gives tag to Inspector

Inspector PRINTS his name

Inspector's actual signature

Inspector enters his phone number

Inspector enters his Saudi Aramco certificate number

Date of next inspection - to be entered by Scaffold Inspector

Work Permit Issuer's Role?

- **Do not issue a Work Permit for workers (sandblasters, painters, etc.) to USE a scaffold if:**
  - **GREEN or YELLOW scaffold tags *not* in place**
  - **GREEN or YELLOW scaffold tags *not* signed**
  - **"Date of Next Inspection" has passed (tag "expired")**

Work Permit Receiver's Role?

- **If you're a Work Permit Receiver, or user of an erected scaffold**
  - **Obtain Work Permit before using a scaffold**
  - **Check and verify that:**
    - **GREEN or YELLOW scaffold tags are signed and in place**
    - **"Date of Next Inspection" has not passed**

End of Part 3

Scaffold Safety Workshop

Part - 4

SCAFFOLD

USER'S CHECKLIST

Scaffold User's Checklist

Why have Scaffold User's Safety Checklist?

- For your safety in making sure the scaffold is safe to use.
- Just because the scaffold has a green tag does not mean it is safe
  - Scaffold could have changed since last inspection
- A convenient "Pre-Use Inspection" tool that you can use in the field

Scaffold User's Checklist

SCAFFOLD USER'S SAFETY CHECKLIST

FOUNDATION	Timber sills are used to support scaffolds on soft surfaces (sand, asphalt, etc.)? Sills are at least 765mm (30") long, 225mm (9") wide and 38mm (1-1/2") thick? Screwjacks, if used, are adjusted to not more than 2/3 of their threaded length?
POSTS (STANDARDS)	Posts (standards) are plumb and straight, not bent or damaged? Posts are not near the edge of any excavation, including trenches? Posts are mounted on at least 150 x 150mm (6"x 6") steel base plates?
POSTS FOR TUBE AND COUPLER SCAFFOLDS	Light-duty scaffold - posts not more than 1.2m (4') apart along width of scaffold? Light-duty scaffold - posts not more than 2.7m (9') apart along length of scaffold? Medium-duty - posts not more than 1.2m (4') apart along width of scaffold? Medium-duty - posts not more than 1.8m (6') apart along length of scaffold? Joints in adjacent posts do not occur within the same lift height? Joints in posts are connected with joint pins or sleeve couplers?
RUNNERS (LEDGERS) AND BEARERS (TRANSOMS)	Runners and bearers are free from defects and not deflected or bent? Runners and bearers are spaced vertically not more than 2 meters (6'-6") apart? Bearers are installed on top of, not underneath, their supporting runners? Bearers extend at least 100mm (4") beyond the runner and post centerline? Bottom runners and bearers are located as close as possible to scaffold base?
TUBING AND COUPLERS	Couplers or system connections are free from detrimental rust or defects? Only embossed (stamped) steel tubing used for Medium-duty and Special-duty? All couplers are fully tightened (no fitting is loose when tested by hand)? Threads on all coupler bolts are fully engaged?
PLANKS AND WORKING PLATFORMS	Working levels are fully planked, with no gaps larger than 25mm (1")? Planks are free from damage, decay, defects, cracks, paint and twist? Wood planks are at least 38mm (1-1/2") thick and 225mm (9") wide? Supports for 38mm (1-1/2") thick wood planks are not more than 1.5m (5') apart? Supports for 50mm (2") thick wood planks are not more than 2.4m (8') apart? Planks are firmly secured against movement at both ends? Planks overhang their end supports between 150mm (6") and 300mm (12")? Ends of all planks placed end-to-end are independently supported? Length of lap for overlapped planks is at least 300mm (12") and over a support?
GUARDRAILS AND TOEBOARDS	Toprails, midrails and toeboards installed on all open platform sides and ends? Toprails are between 0.95m (38") and 1.15m (45") above all platforms? Toprails, midrails and toeboards are fixed to the inside of the support posts?
STABILITY	Ties are provided if the scaffold height is over 4 times minimum base dimension? Scaffold is vertically braced in both directions for the full height of the scaffold? Horizontal (plan) braces are installed on tower and mobile scaffolds? Braces are attached as close as possible to post/runner/bearer intersections?
ACCESS	Working platforms have access by ladder, stair, ramp, or walkway? Ladders are free from defects, missing rungs, or broken side rails? Ladders extend at least 0.9m (3') above the landing or platform? Both side rails of straight and extension ladders are secured in place?

ALWAYS RETURN THIS GREEN SCAFFOLD TAG TO ITS SCAFFTAG HOLDER

SCAFFOLD USER'S SAFETY CHECKLIST

FOUNDATION	Timber sills are used to support scaffolds on soft surfaces (sand, asphalt, etc.)? Sills are at least 765mm (30") long, 225mm (9") wide, and 38mm (1-1/2") thick? Screwjacks, if used, are adjusted to not more than 2/3 of their threaded length?
POSTS (STANDARDS)	Posts (standards) are plumb and straight, not bent or damaged? Posts are not near the edge of any excavation, including trenches? Posts are mounted on at least 150 x 150mm (6"x 6") steel base plates?
POSTS FOR TUBE AND COUPLER SCAFFOLDS	Light-duty scaffold - posts not more than 1.2m (4') apart along width of scaffold? Light-duty scaffold - posts not more than 2.7m (9') apart along length of scaffold? Medium-duty - posts not more than 1.2m (4') apart along width of scaffold? Medium-duty - posts not more than 1.8m (6') apart along length of scaffold? Joints in adjacent posts do not occur within the same lift height? Joints in posts are connected with joint pins or sleeve couplers?
RUNNERS (LEDGERS) AND BEARERS (TRANSOMS)	Runners and bearers are free from defects and not deflected or bent? Runners and bearers are spaced vertically not more than 2 meters (6'-6") apart? Bearers are installed on top of, not underneath, their supporting runners? Bearers extend at least 100mm (4") beyond the runner and post centerline? Bottom runners and bearers are located as close as possible to scaffold base?
TUBING AND COUPLERS	Couplers or system connections are free from detrimental rust or defects? Only embossed (stamped) steel tubing used for Medium-duty and Special-duty? All couplers are fully tightened (no fitting is loose when tested by hand)? Threads on all coupler bolts are fully engaged?
PLANKS AND WORKING PLATFORMS	Working levels are fully planked, with no gaps larger than 25mm (1")? Planks are free from damage, decay, defects, cracks, paint and twist? Wood planks are at least 38mm (1-1/2") thick and 225mm (9") wide? Supports for 38mm (1-1/2") thick wood planks are not more than 1.5m (5') apart? Supports for 50mm (2") thick wood planks are not more than 2.4m (8') apart? Planks are firmly secured against movement at both ends? Planks overhang their end supports between 150mm (6") and 300mm (12")? Ends of all planks placed end-to-end are independently supported? Length of lap for overlapped planks is at least 300mm (12") and over a support?
GUARDRAILS AND TOEBOARDS	Toprails, midrails and toeboards installed on all open platform sides and ends? Toprails are between 0.95m (38") and 1.15m (45") above all platforms? Toprails, midrails and toeboards are fixed to the inside of the support posts?
STABILITY	Ties are provided if the scaffold height is over 4 times minimum base dimension? Scaffold is vertically braced in both directions for the full height of the scaffold? Horizontal (plan) braces are installed on tower and mobile scaffolds? Braces are attached as close as possible to post/runner/bearer intersections?
ACCESS	Working platforms have access by ladder, stair, ramp, or walkway? Ladders are free from defects, missing rungs, or broken side rails? Ladders extend at least 0.9m (3') above the landing or platform? Both side rails of straight and extension ladders are secured in place?

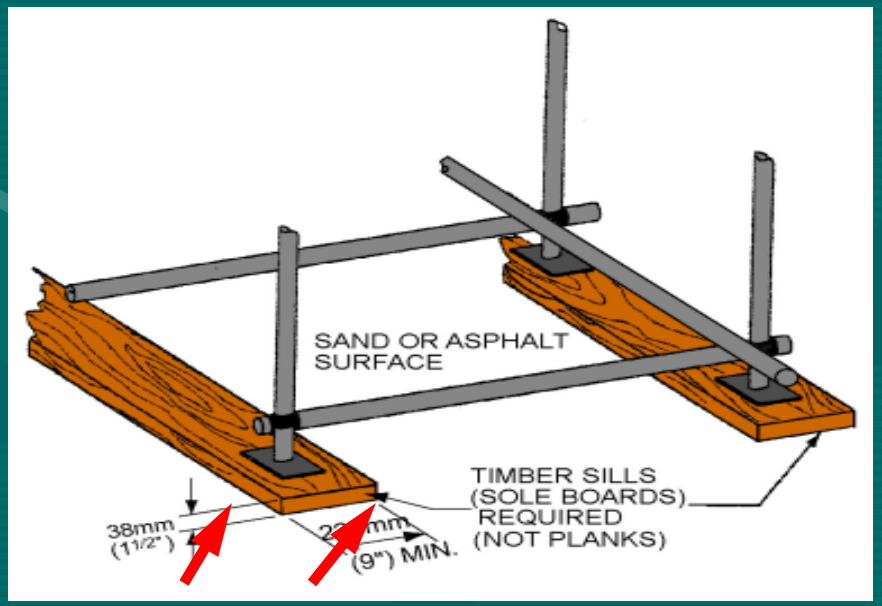
ALWAYS RETURN THIS YELLOW SCAFFOLD TAG TO ITS SCAFFTAG HOLDER

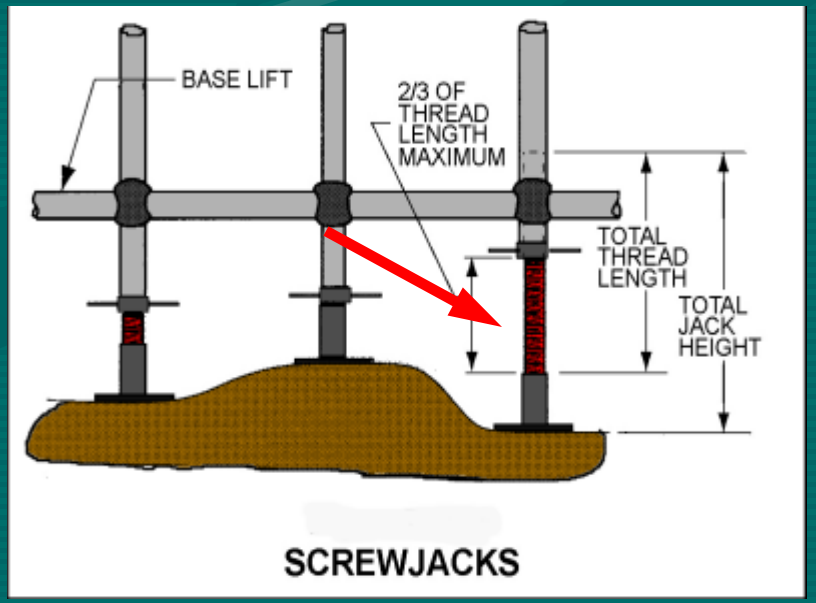
Scaffold User's Checklist

- **Foundation**
- **Posts**
- **Posts for Tube & Coupler Scaffold**
- **Runners & Bearers**
- **Tubing & Couplers**
- **Planks & Working Platforms**
- **Guardrails & Toeboards**
- **Stability**
- **Access**

Foundation

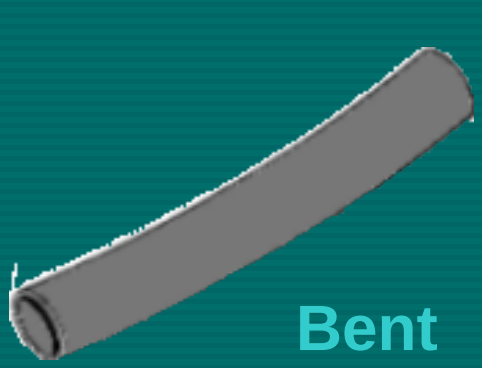
FOUNDATION	Timber sills are used to support scaffolds on soft surfaces (sand, asphalt, etc.)? Sills are at least 765mm (30") long, 225mm (9") wide and 38mm (1-1/2") thick? Screwjacks, if used, are adjusted to not more than 2/3 of their threaded length?



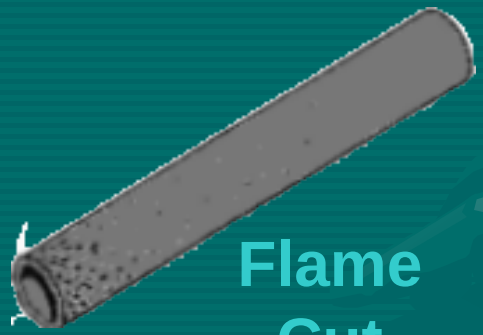


Post (Standard) Quality

POSTS (STANDARDS)	Posts (standards) are plumb and straight, not bent or damaged?



Bent

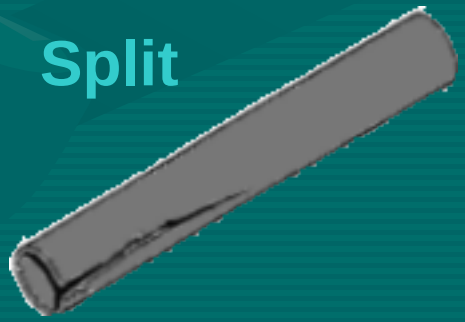


Flame Cut

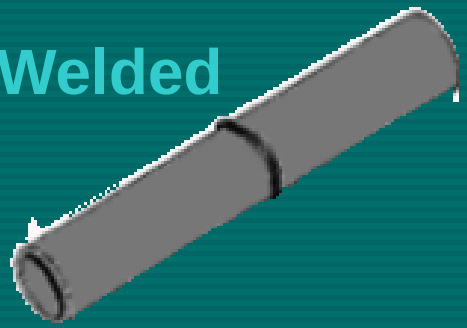
Cross Cut

Mushroom Head

Split



Welded

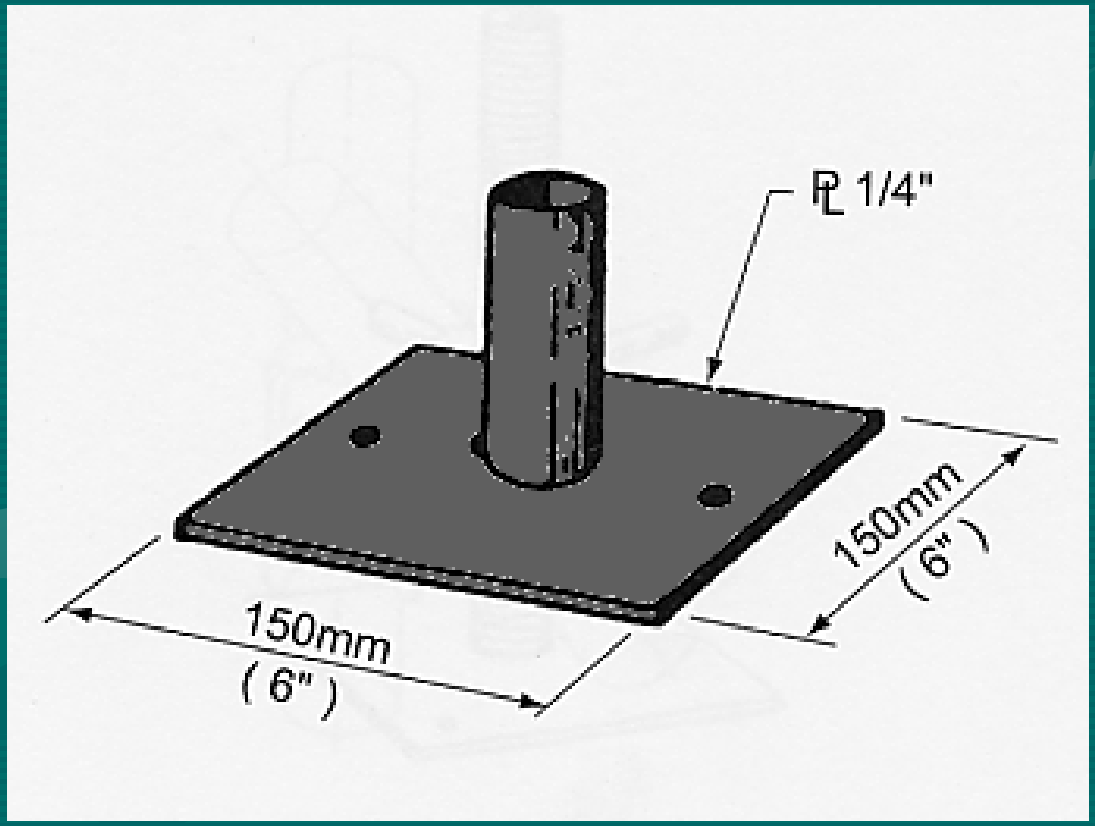


Scaffold Post Position

POSTS (STANDARDS)	Posts are not near the edge of any excavation, including trenches?

Scaffold Base Plate

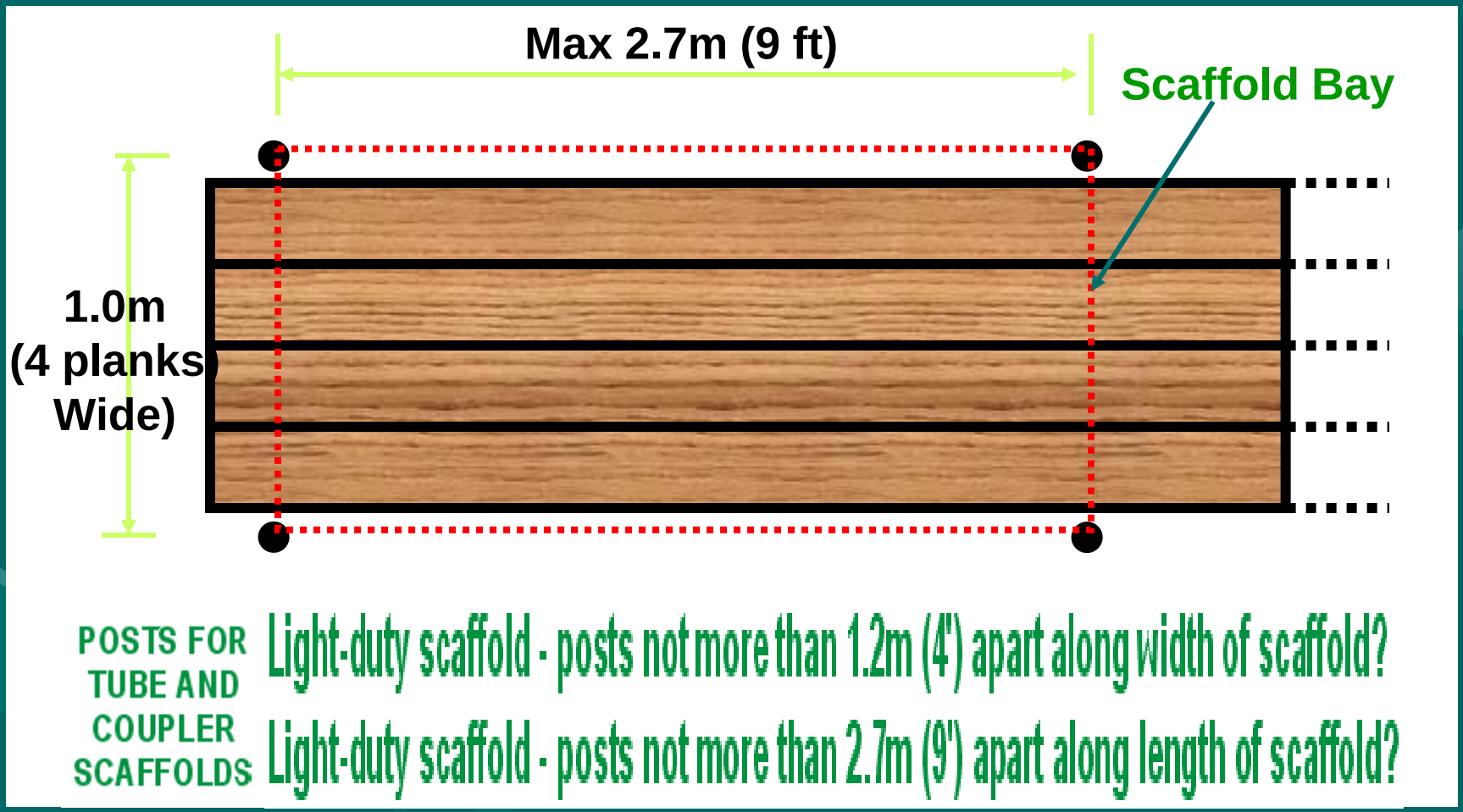
POSTS (STANDARDS)	Posts are mounted on at least 150 x 150mm (6" x 6") steel base plates?



Scaffold Posts Spacing

POSTS FOR TUBE AND COUPLER SCAFFOLDS	Light-duty scaffold - posts not more than 1.2m (4') apart along width of scaffold?
	Light-duty scaffold - posts not more than 2.7m (9') apart along length of scaffold?

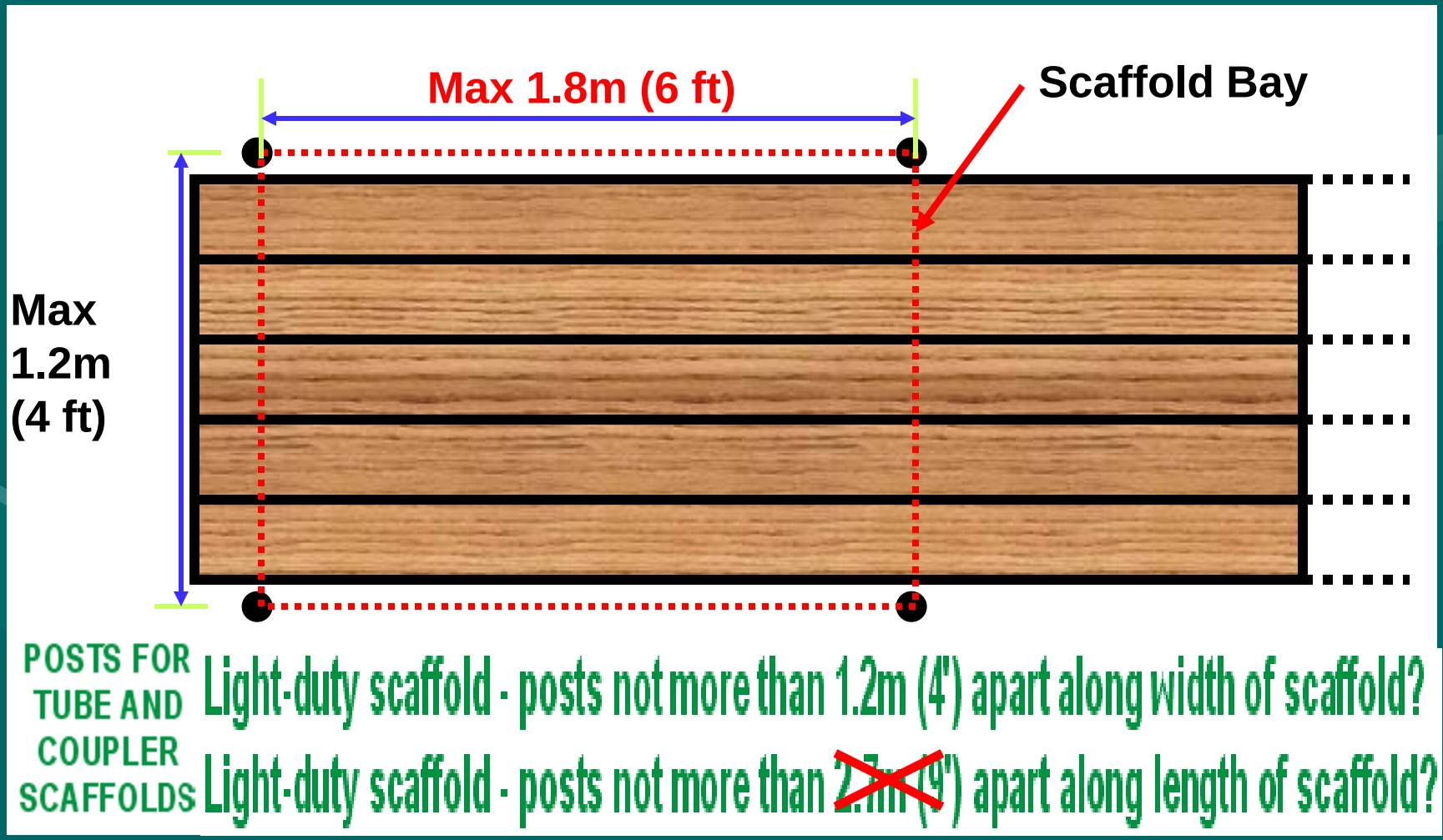
Light-duty Scaffold



Only if embossed tubing is used !

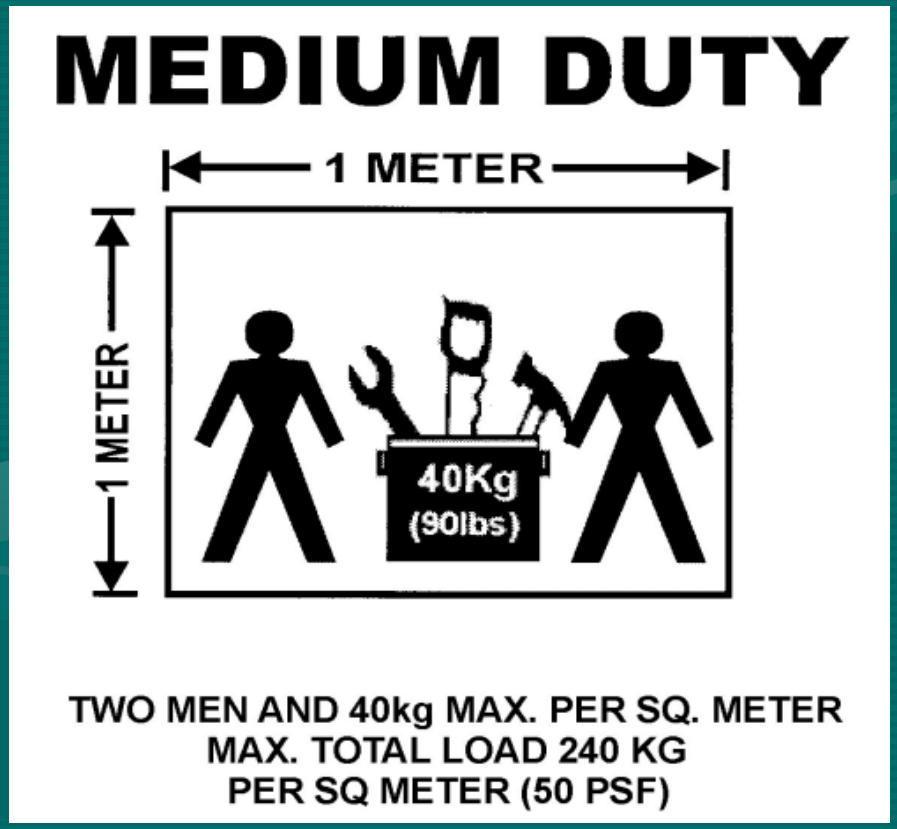
Embossed Scaffold Tubing

Light-duty Tubular Scaffold for NOT Embossed Tubing

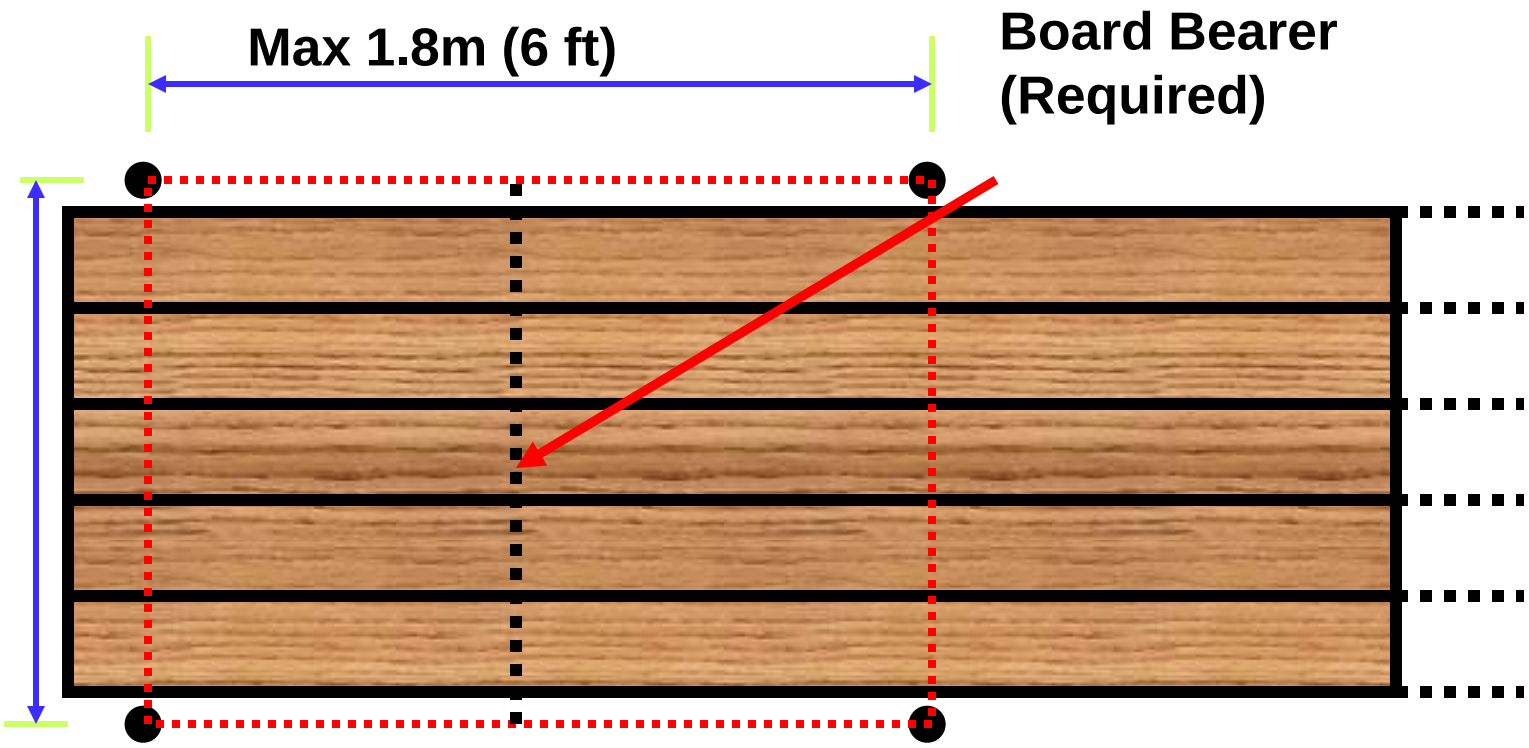


Medium Duty Tubular Scaffold

POSTS FOR TUBE AND COUPLER SCAFFOLDS	Medium-duty - posts not more than 1.2m (4') apart along width of scaffold?
	Medium-duty - posts not more than 1.8m (6') apart along length of scaffold?



Medium Duty Tubular Scaffold



POSTS FOR TUBE AND COUPLER SCAFFOLDS

Medium-duty - posts not more than 1.2m (4') apart along width of scaffold?

Medium-duty - posts not more than 1.8m (6') apart along length of scaffold?

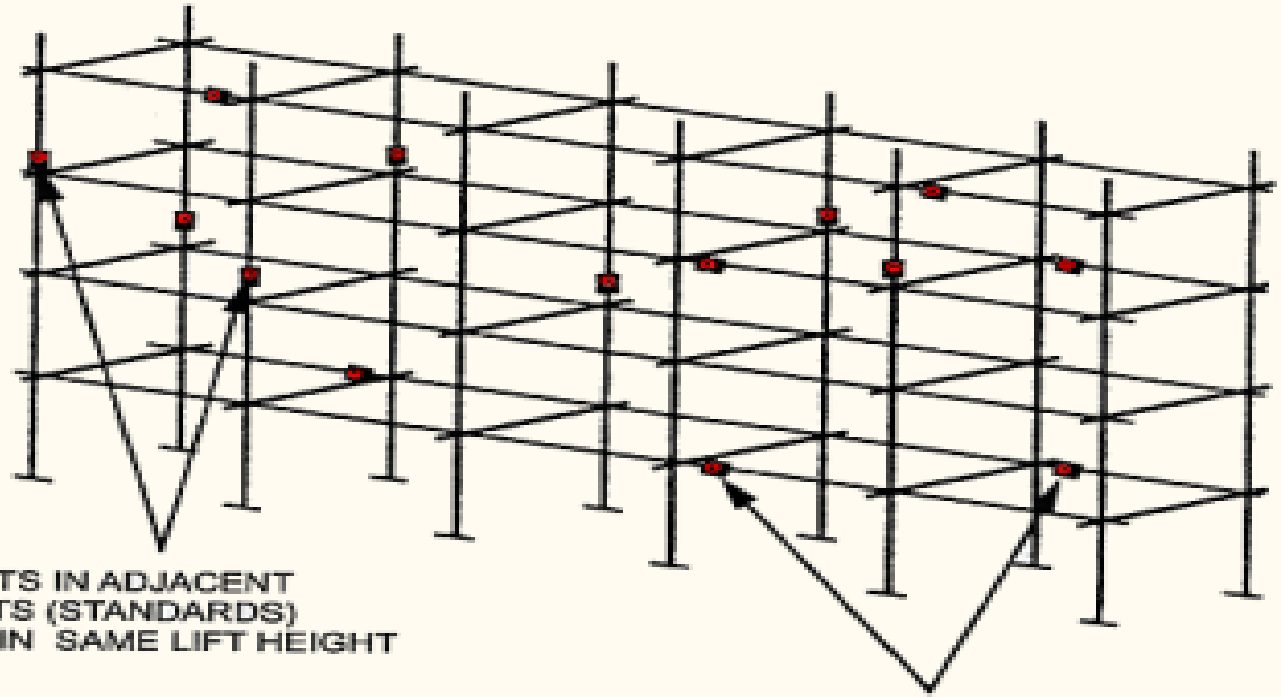
Must all be Embossed tubing

Joints in Posts

POSTS FOR TUBE AND COUPLER SCAFFOLDS

Joints in adjacent posts do not occur within the same lift height?

Joints in posts are connected with joint pins or sleeve couplers?

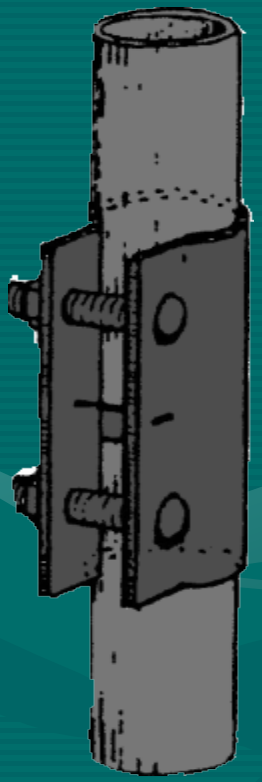


JOINTS IN ADJACENT POSTS (STANDARDS) NOT IN SAME LIFT HEIGHT

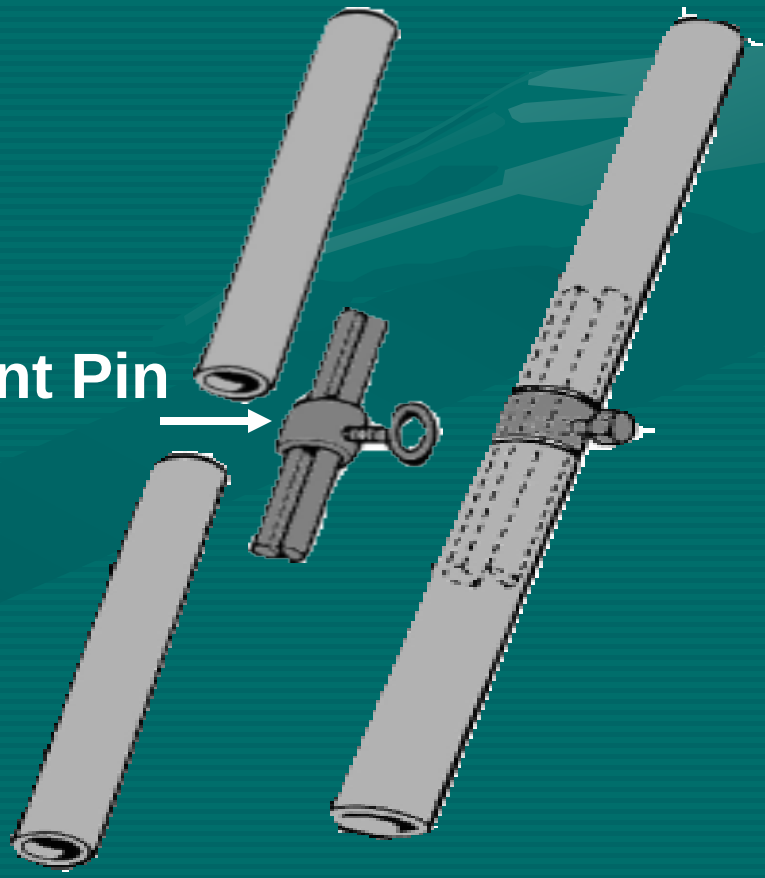
JOINTS IN ADJACENT RUNNERS (LEDGERS) NOT IN SAME BAY

Posts Connectors

POSTS FOR TUBE AND COUPLER SCAFFOLDS Joints in posts are connected with joint pins or sleeve couplers?

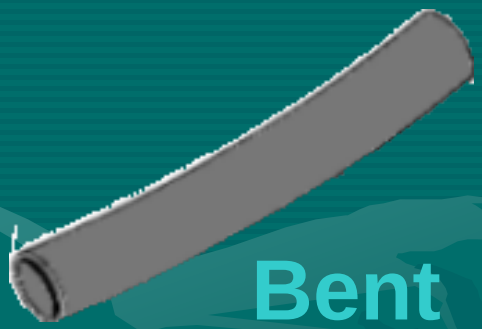


Sleeve Coupler



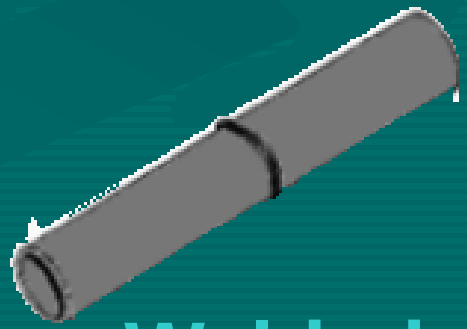
Runners & Bearers Check

RUNNERS (LEDGERS) AND BEARERS (TRANSOMS)	Runners and bearers are free from defects and not deflected or bent?



Bent

Split

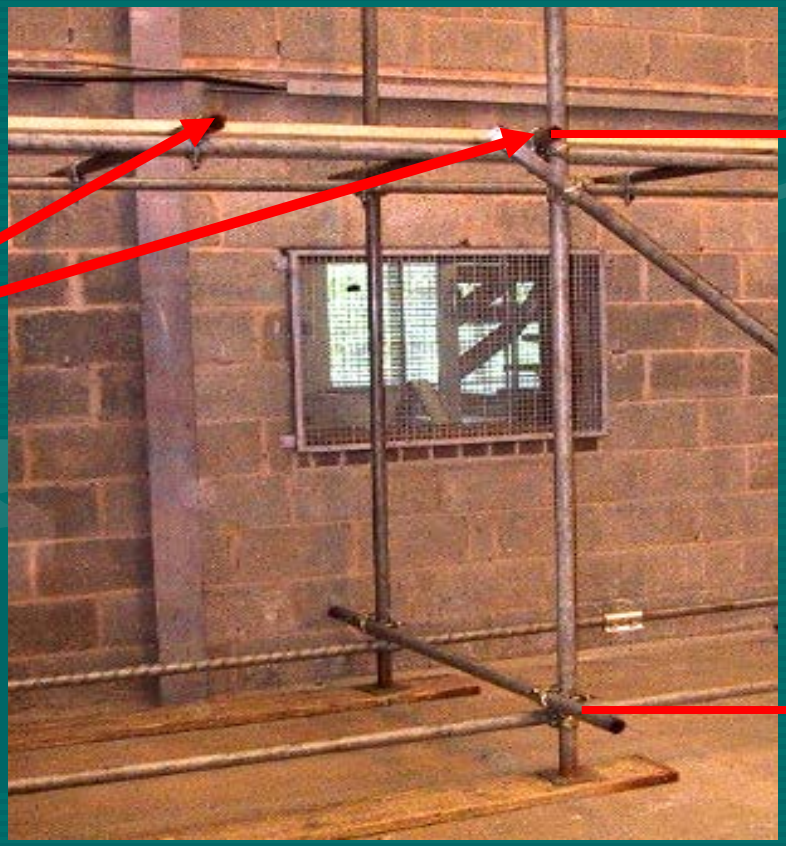


Welded

Runners & Bearers Spacing

RUNNERS (LEDGERS) AND BEARERS (TRANSOMS)	Runners and bearers are spaced vertically not more than 2 meters (6'-6") apart? Bearers are installed on top of, not underneath, their supporting runners?

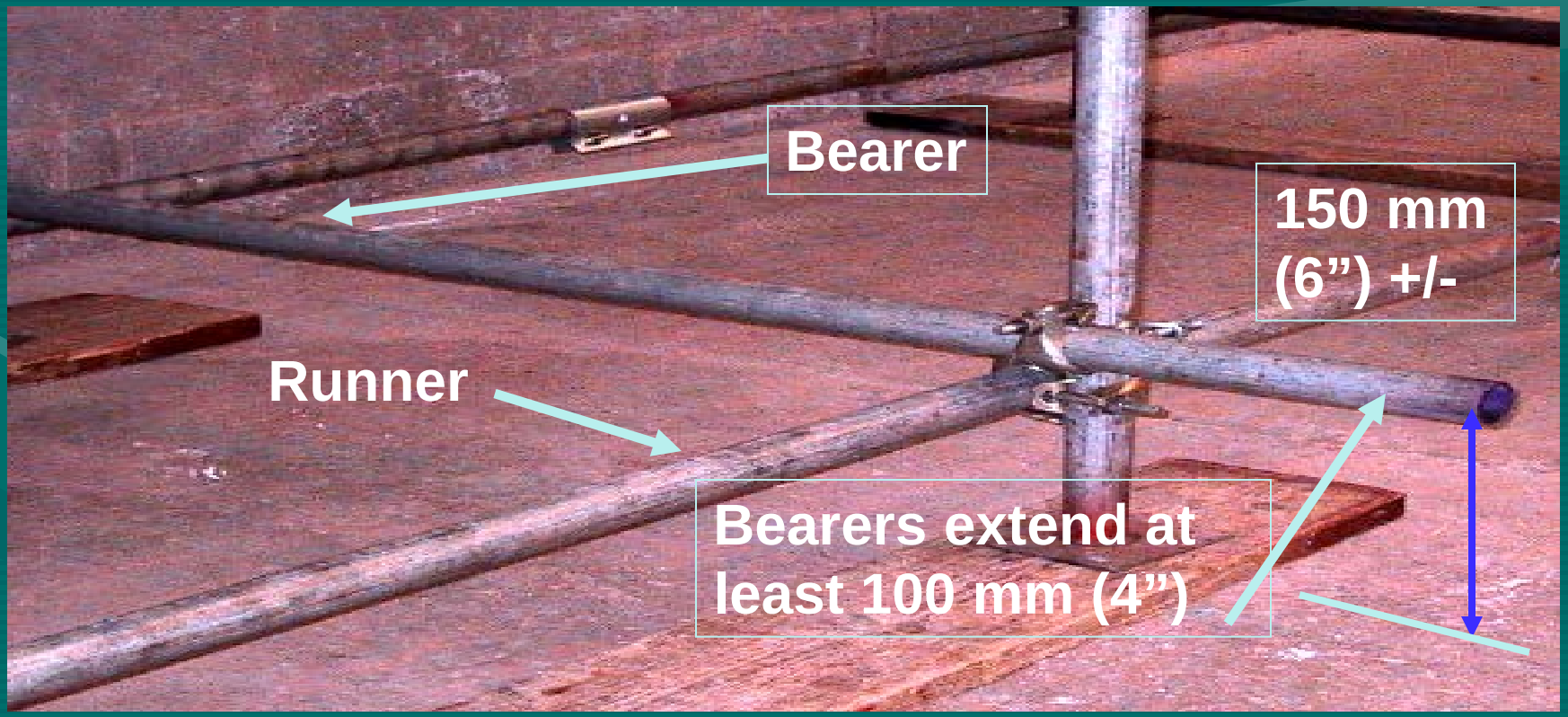
Bearers on-top of Runners



Max 2 m (6'-6")

Bearers location

RUNNERS (LEDGERS) AND BEARERS (TRANSOMS)	Bearers are installed on top of, not underneath, their supporting runners? Bearers extend at least 100mm (4") beyond the runner and post centerline? Bottom runners and bearers are located as close as possible to scaffold base?

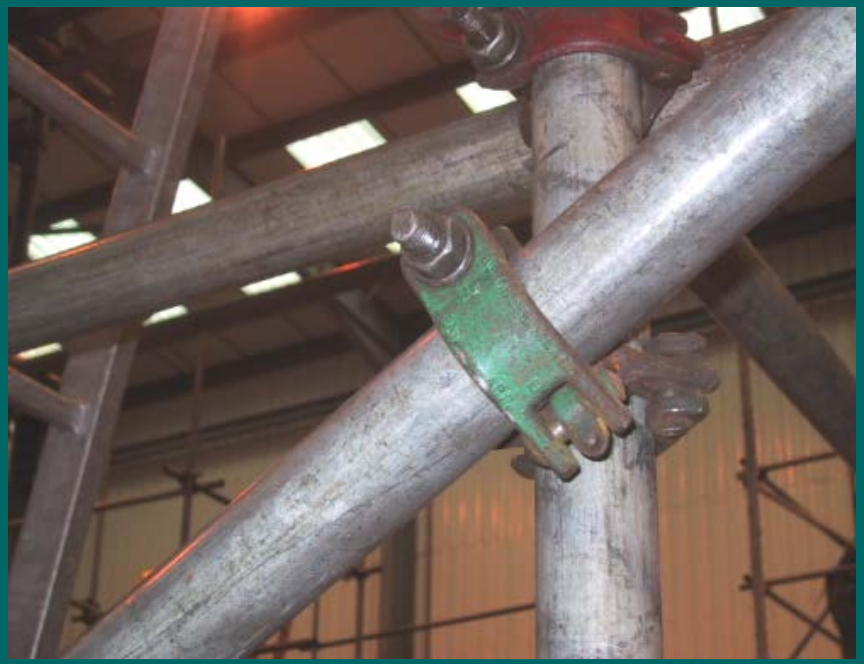


Scaffold Tubing Specs

TUBING AND COUPLERS	Only embossed (stamped) steel tubing used for Medium-duty and Special-duty?

Couplers Quality

TUBING AND COUPLERS	Couplers or system connections are free from detrimental rust or defects? All couplers are fully tightened (no fitting is loose when tested by hand)? Threads on all coupler bolts are fully engaged?



Good Coupling

Bad Coupling

Working Platforms Quality

PLANKS AND WORKING PLATFORMS

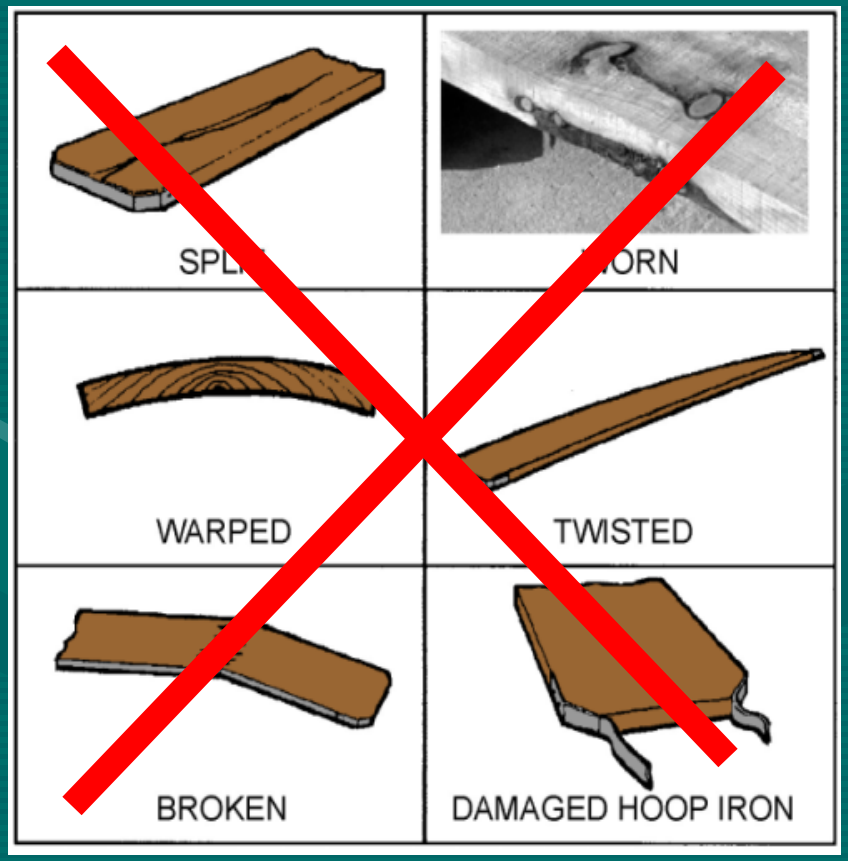
Working levels are fully planked, with no gaps larger than 25mm (1")?

All levels that are to be worked on need planks across the full width and length of the scaffold

Planks Quality Check

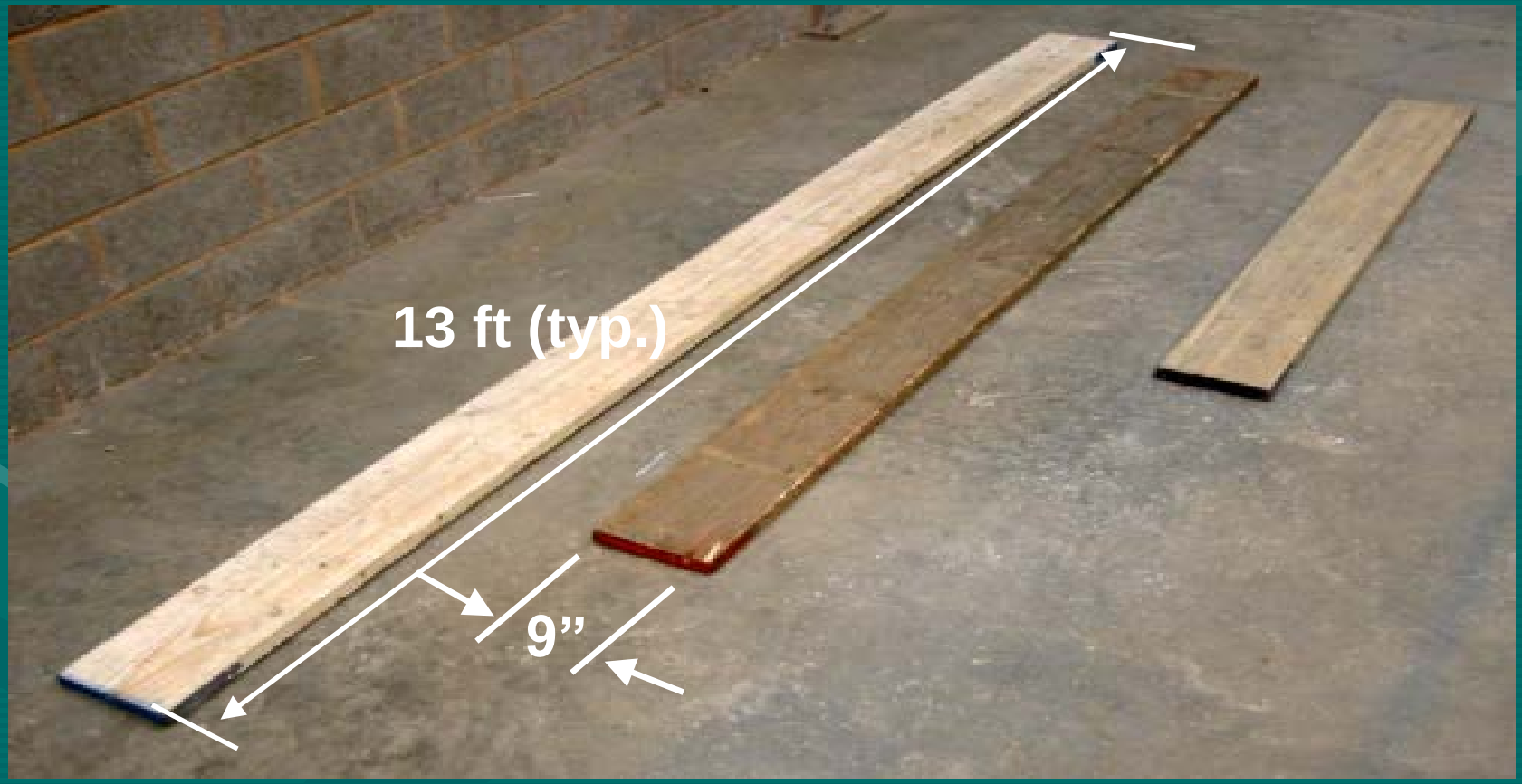
PLANKS AND WORKING PLATFORMS

Planks are free from damage, decay, defects, cracks, paint and twist?



Planks Dimensions

PLANKS AND WORKING PLATFORMS	Wood planks are at least 38mm (1-1/2") thick and 225mm (9") wide?

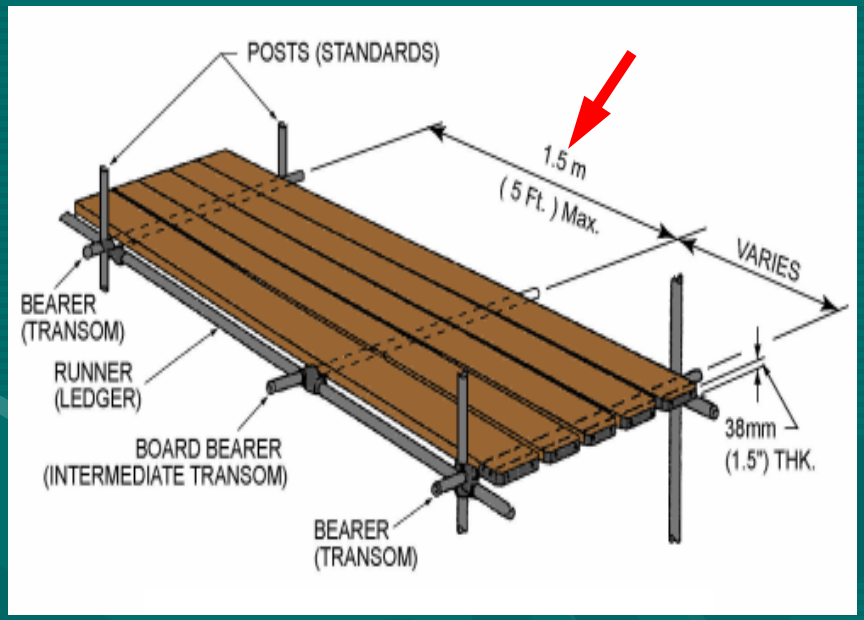


Planks Support Spacing

PLANKS AND WORKING PLATFORMS

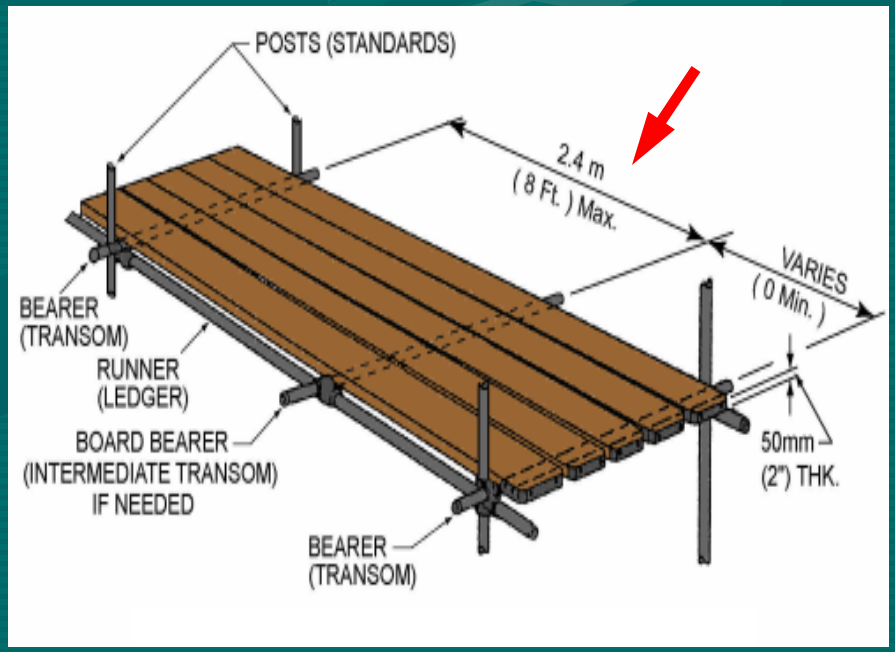
Supports for 38mm (1-1/2") thick wood planks are not more than 1.5m (5') apart?

Supports for 50mm (2") thick wood planks are not more than 2.4m (8') apart?



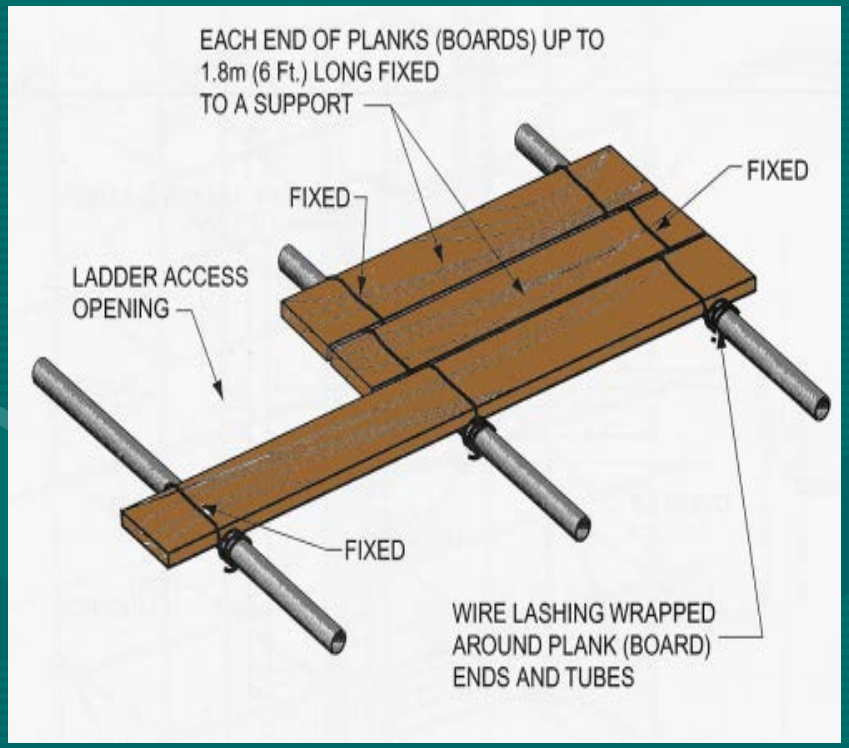
38mm (1½") Planks
1.5m (5') max support

50mm (2") Planks
2.4m (8') max support



Planks Installation

PLANKS AND WORKING PLATFORMS	Planks are firmly secured against movement at both ends?

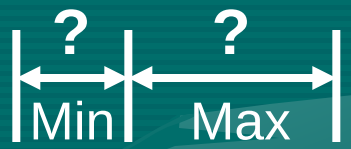


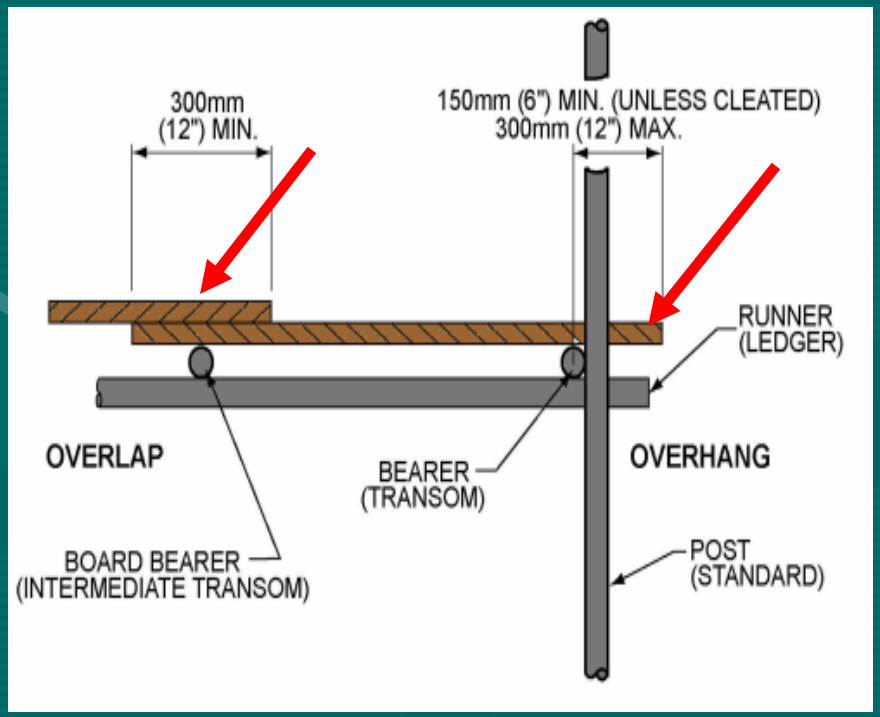
Planks lashed down

Planks trapped by toeboard

Planks Installation

PLANKS AND WORKING PLATFORMS	Planks overhang their end supports between 150mm (6") and 300mm (12")? Ends of all planks placed end-to-end are independently supported? Length of lap for overlapped planks is at least 300mm (12") and over a support?

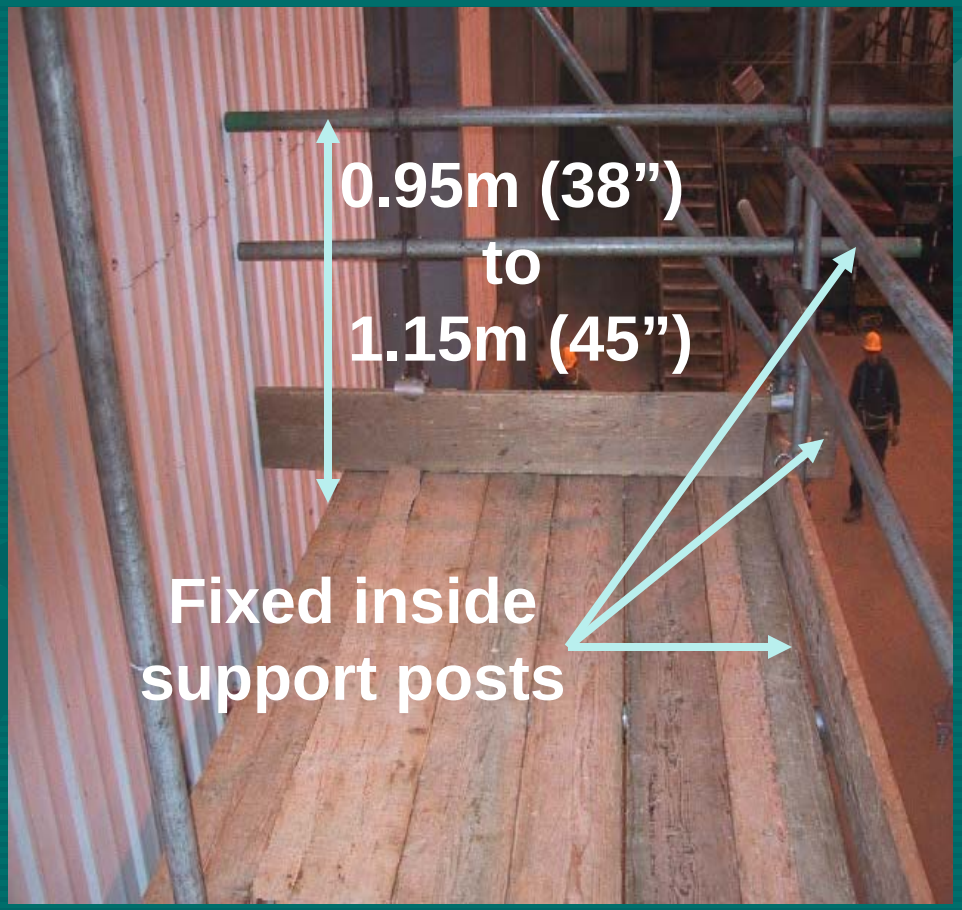




Guardrail System

GUARDRAILS AND TOEBOARDS	Toprails, midrails and toeboards installed on all open platform sides and ends? Toprails are between 0.95m (38") and 1.15m (45") above all platforms? Toprails, midrails and toeboards are fixed to the inside of the support posts?

- **Guardrails to stop <u>workers</u> from falling off the platform**
- **Toeboards to stop <u>materials</u> from falling off the platform**



Scaffold Stability

STABILITY	Ties are provided if the scaffold height is over 4 times minimum base dimension?

A freestanding scaffold cannot be higher than 4 times its width at the base

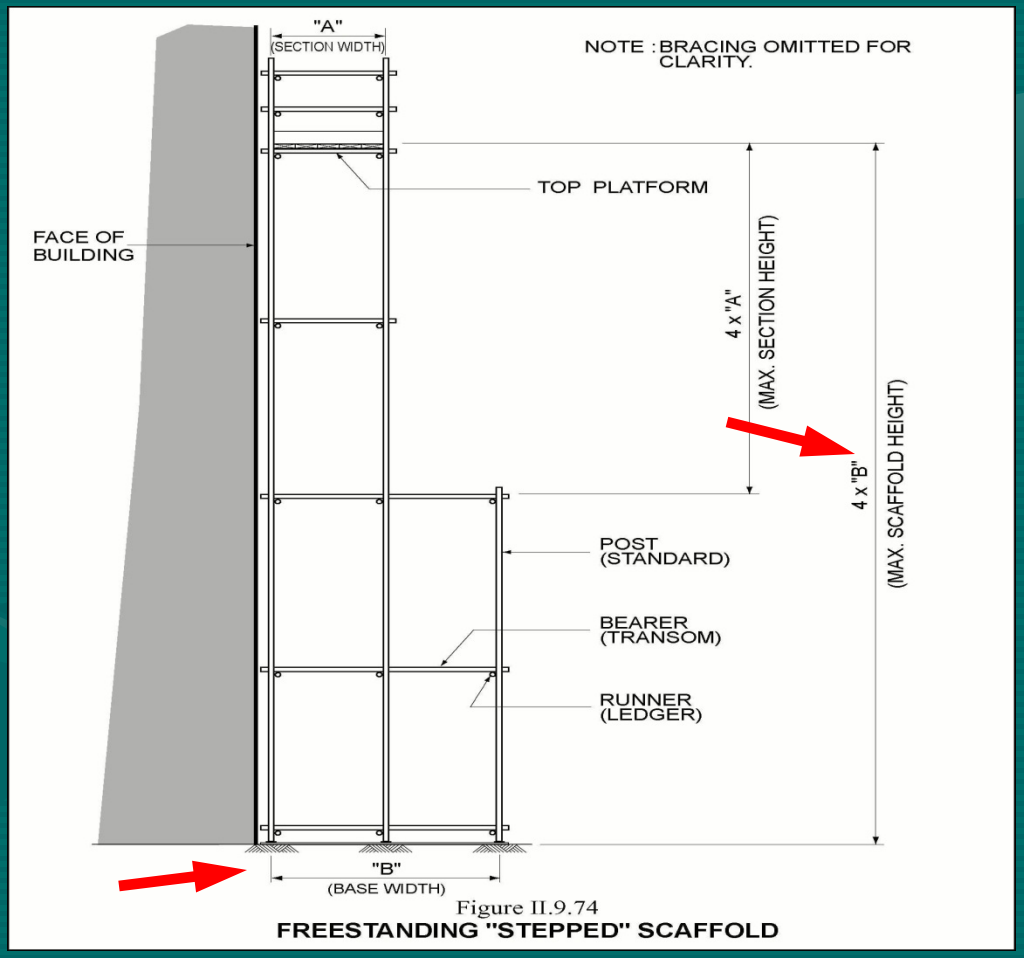
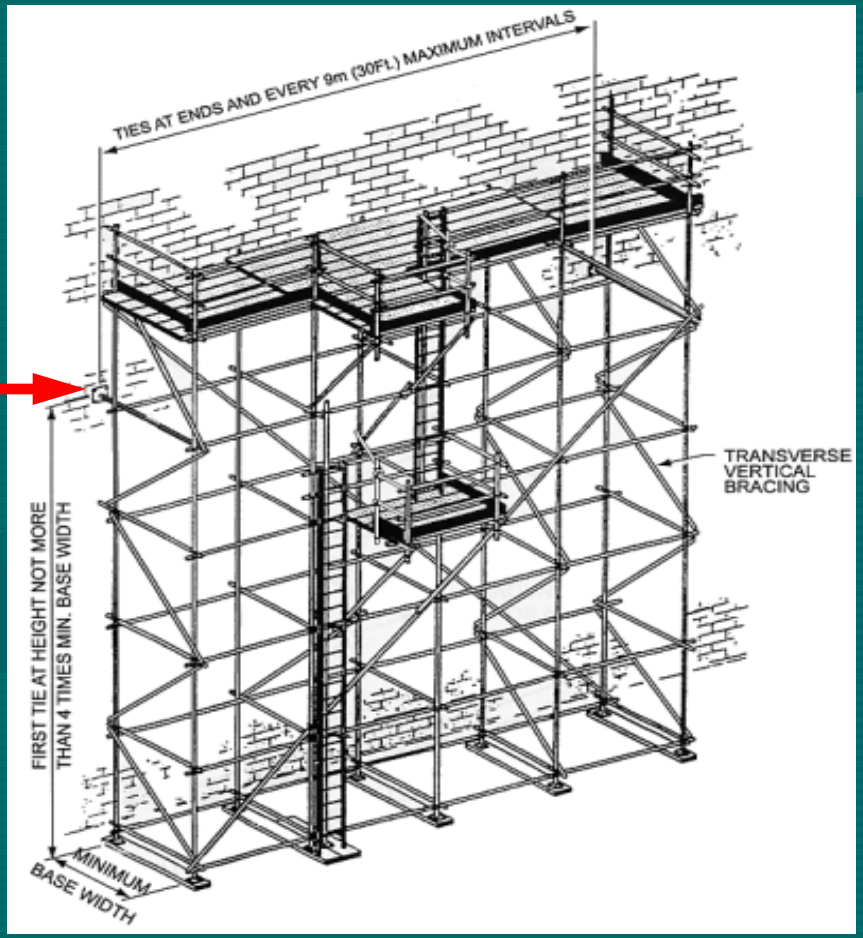


Figure II.9.74
FREESTANDING "STEPPED" SCAFFOLD

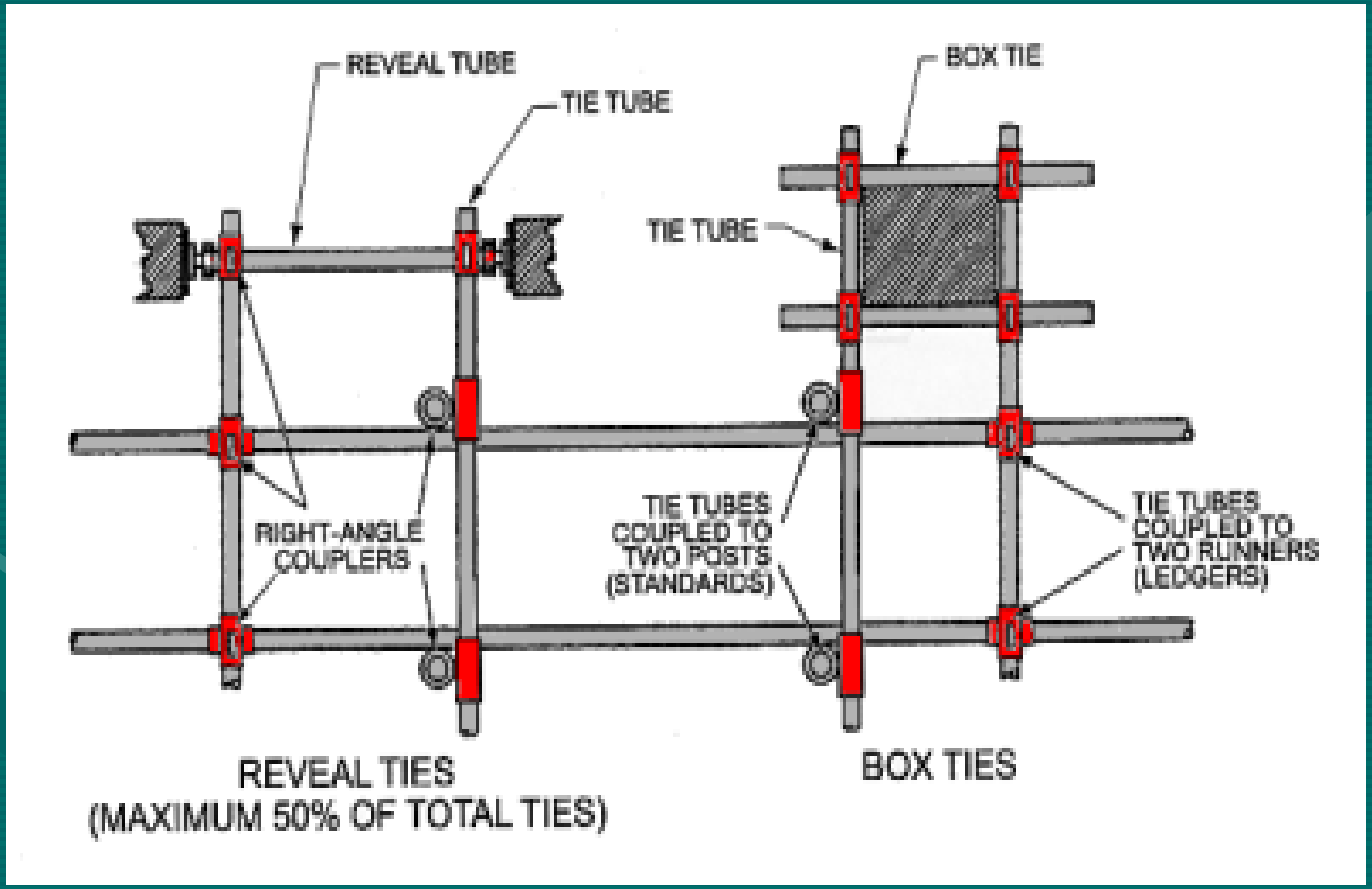
Scaffold Stability

STABILITY	Ties are provided if the scaffold height is over 4 times minimum base dimension?

- If a scaffold is higher than 4 times its base width, then it must be prevented from tipping by ties, etc.
- Ties to structure, rakers, etc. are used to prevent scaffold tipping over



Types of Scaffold Ties



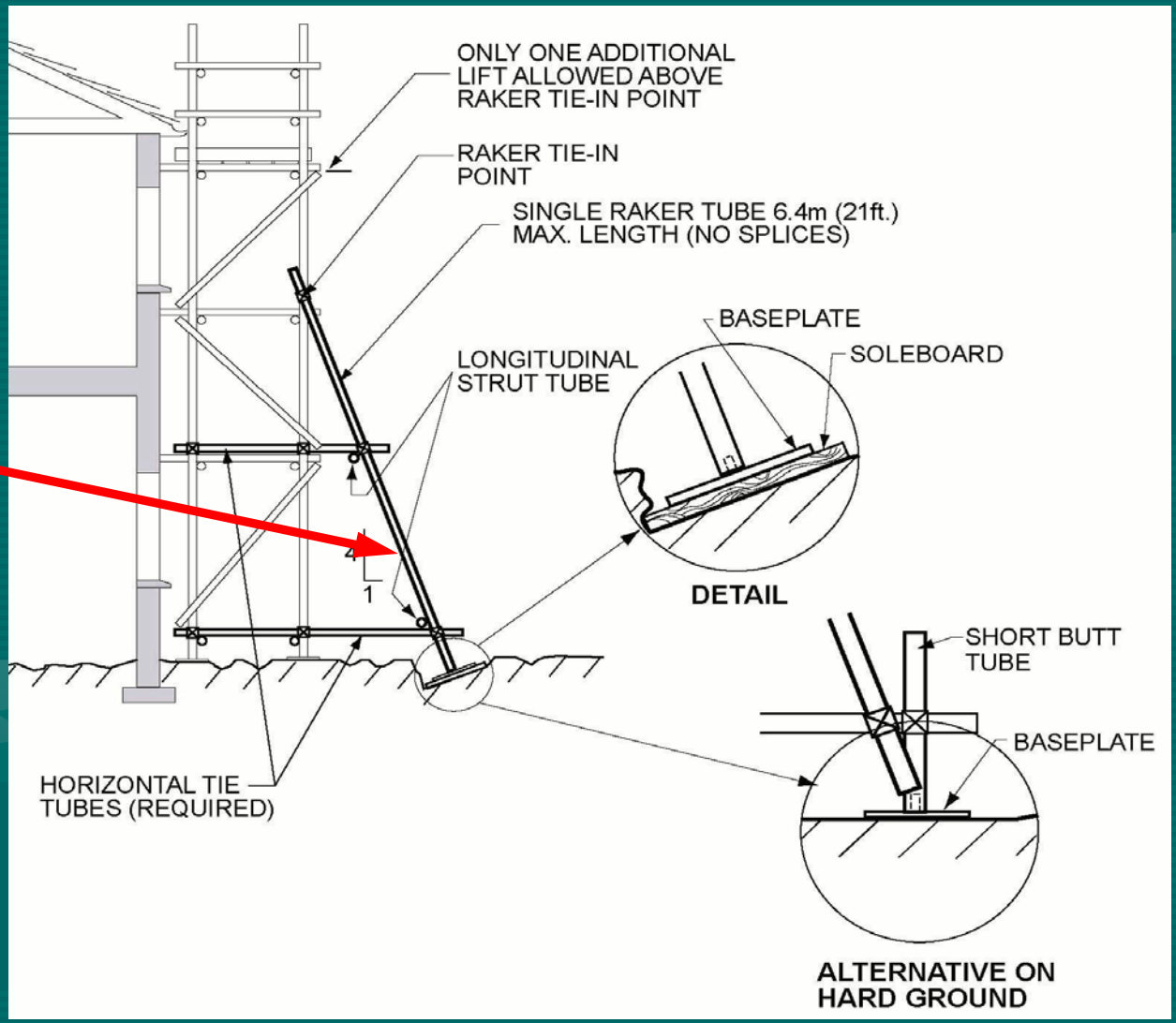
Types of Scaffold Ties

Box Tie

Tie to Steel-work

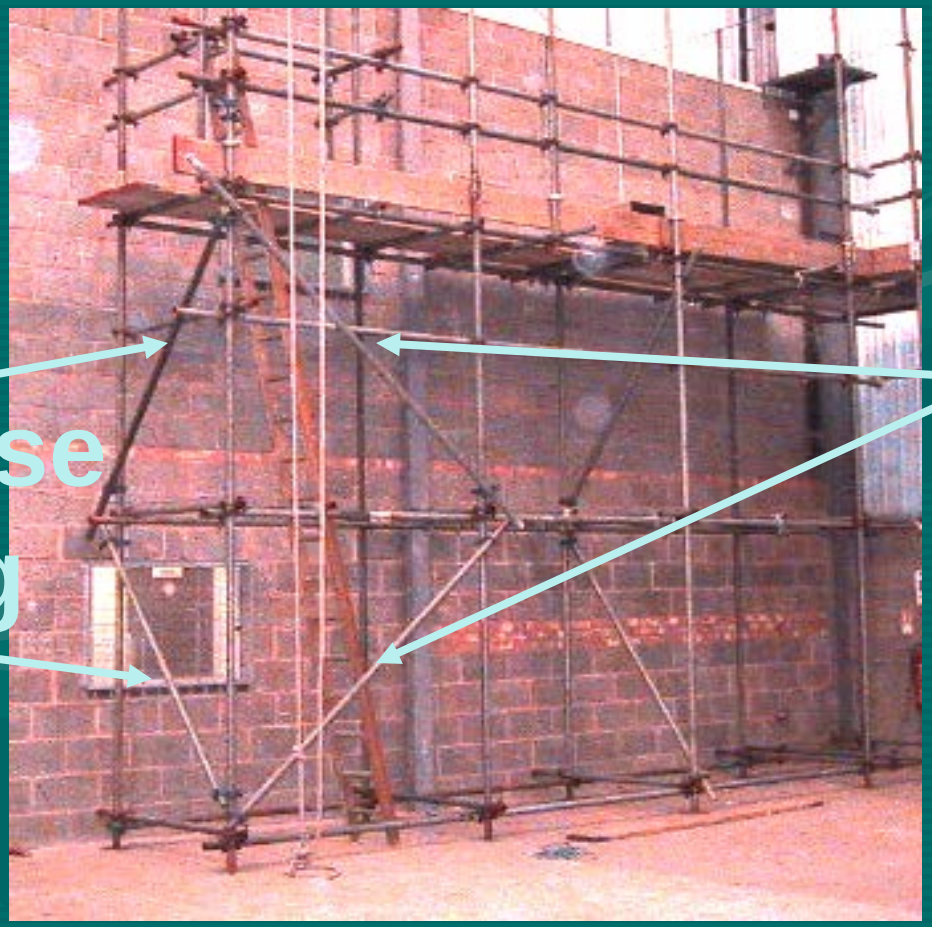
Tip-Over Prevention

Raker



Vertical Bracing

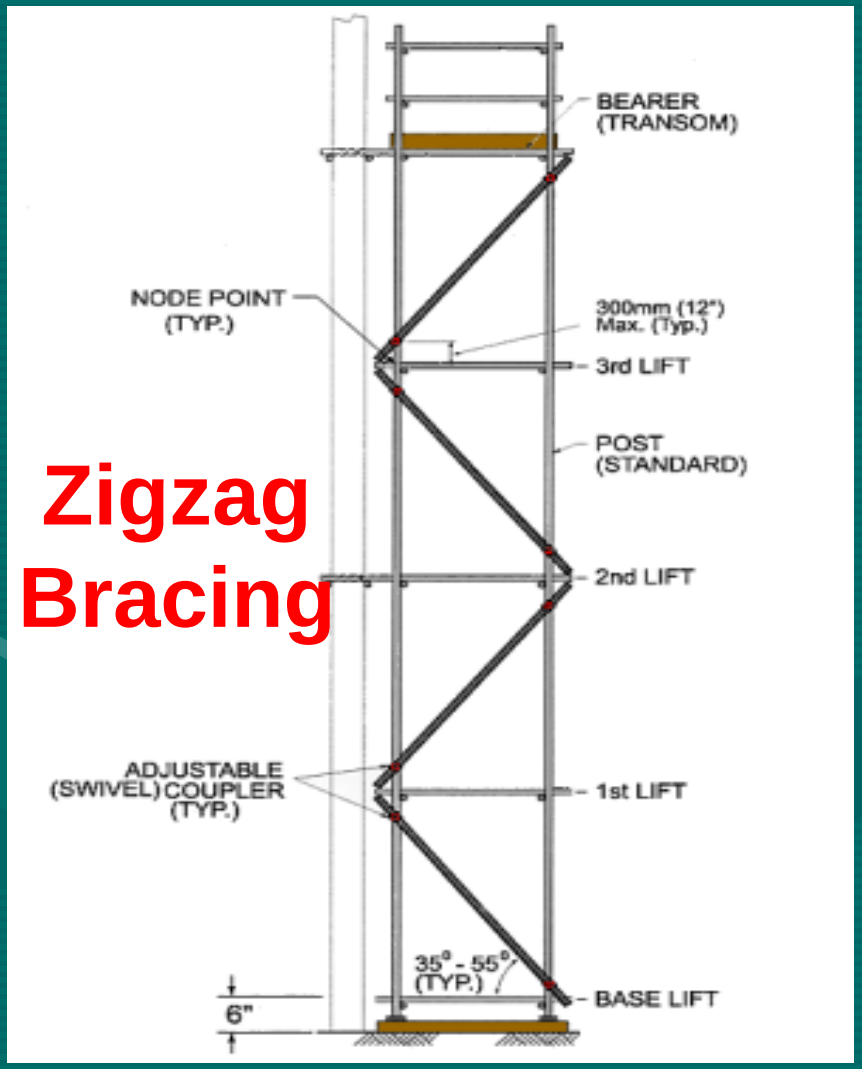
STABILITY	Scaffold is vertically braced in both directions for the full height of the scaffold?



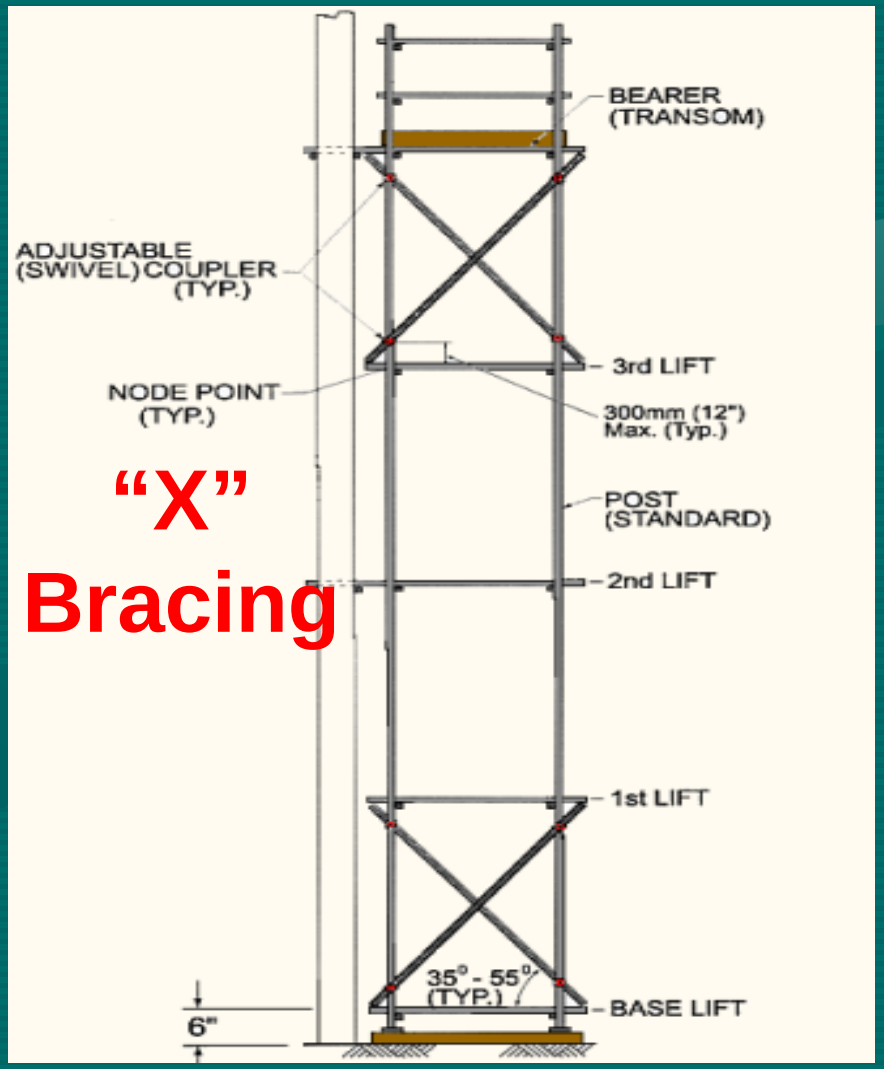
Transverse Bracing

Longitudinal Bracing

Transverse Bracing



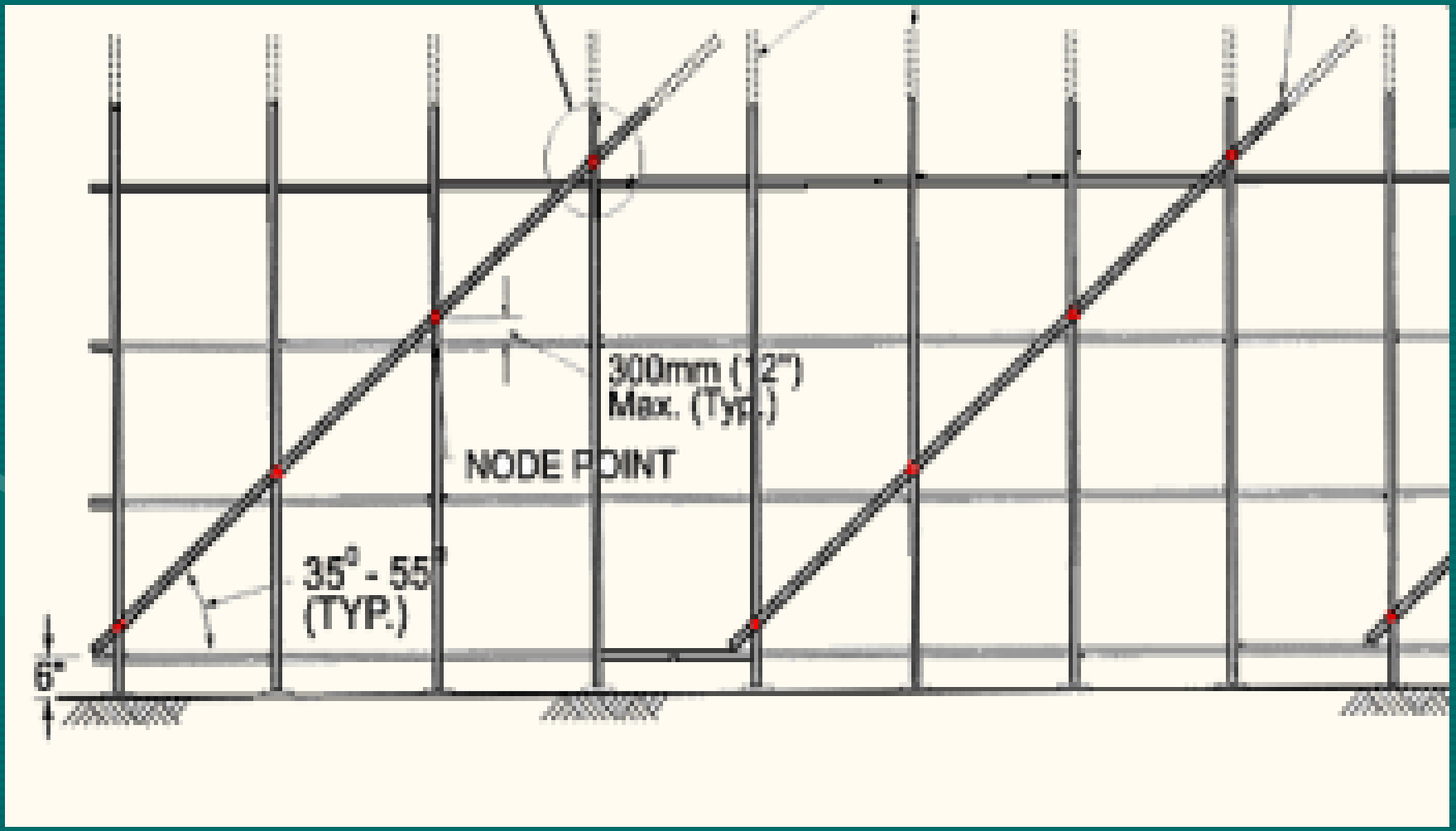
Zigzag Bracing



"X" Bracing

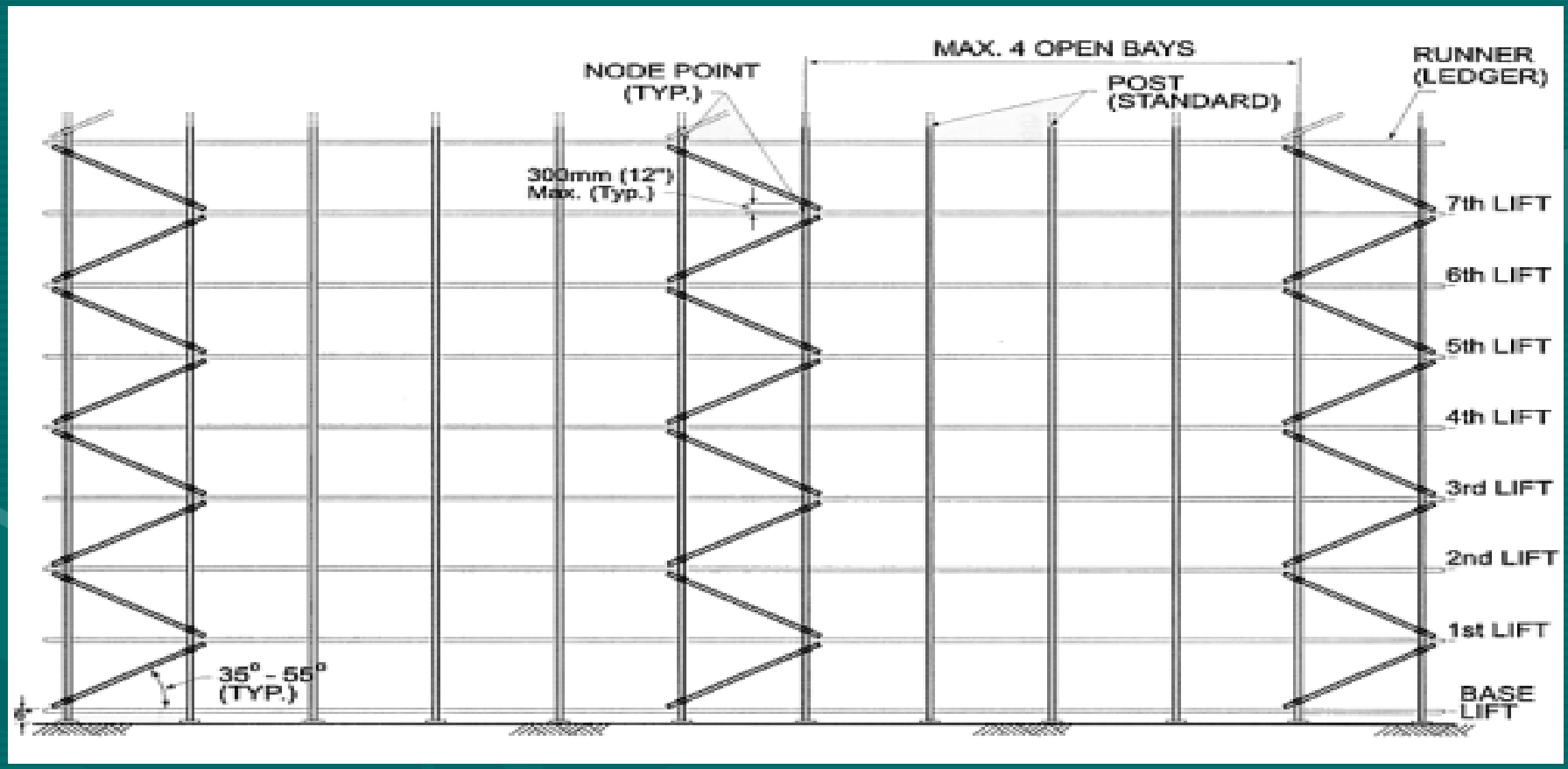
Longitudinal Bracing

Used for independent run scaffold



Longitudinal Bracing

Used for multiple bays on a birdcage scaffold

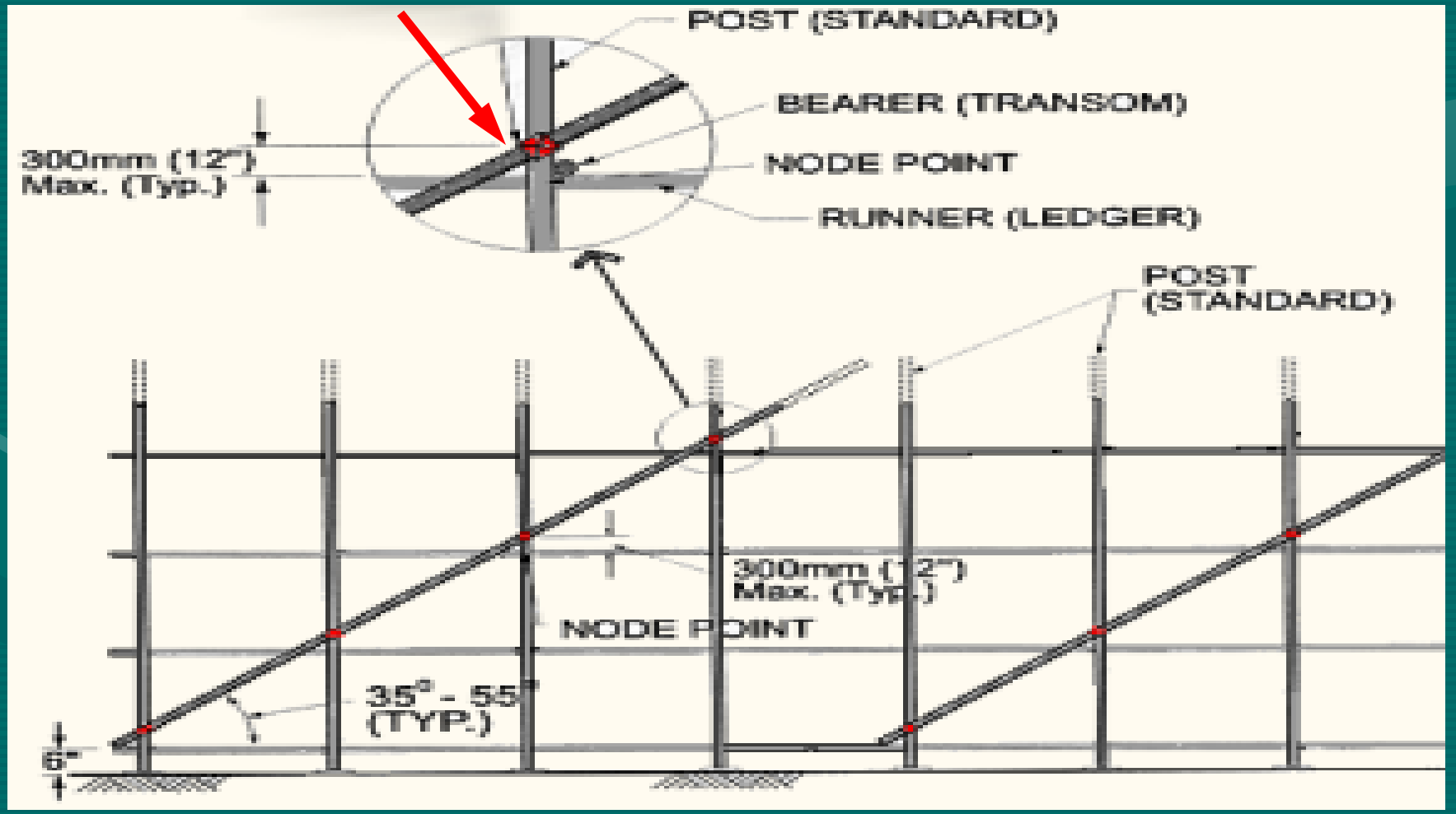


No more than 4 open bays along length of scaffold

Node Point

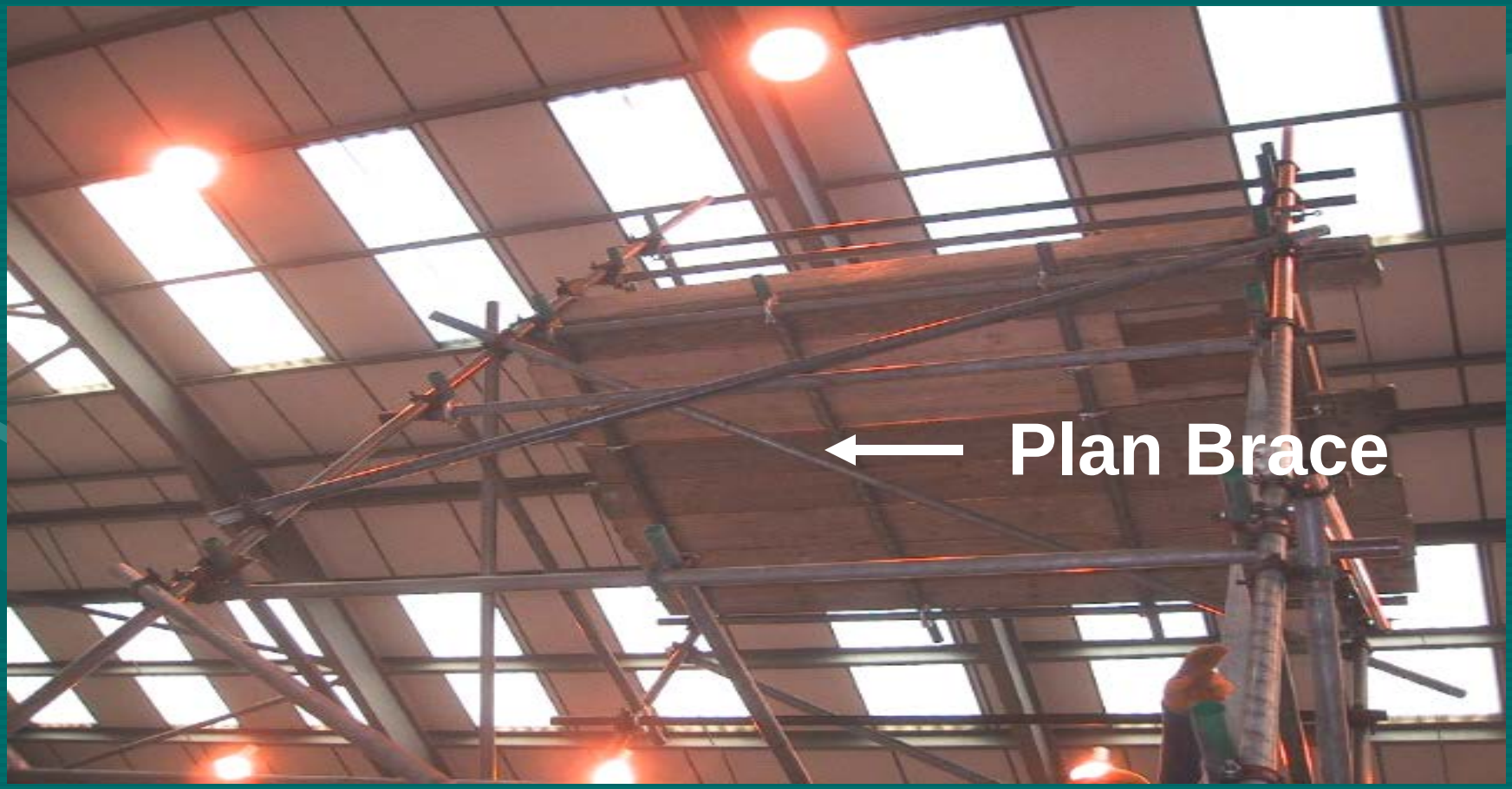
STABILITY

Braces are attached as close as possible to post/runner/bearer intersections?



Plan Braces

STABILITY	Horizontal (plan) braces are installed on tower and mobile scaffolds?



External Access Ladder

ACCESS	Working platforms have access by ladder, stair, ramp, or walkway?

Internal Access Ladder

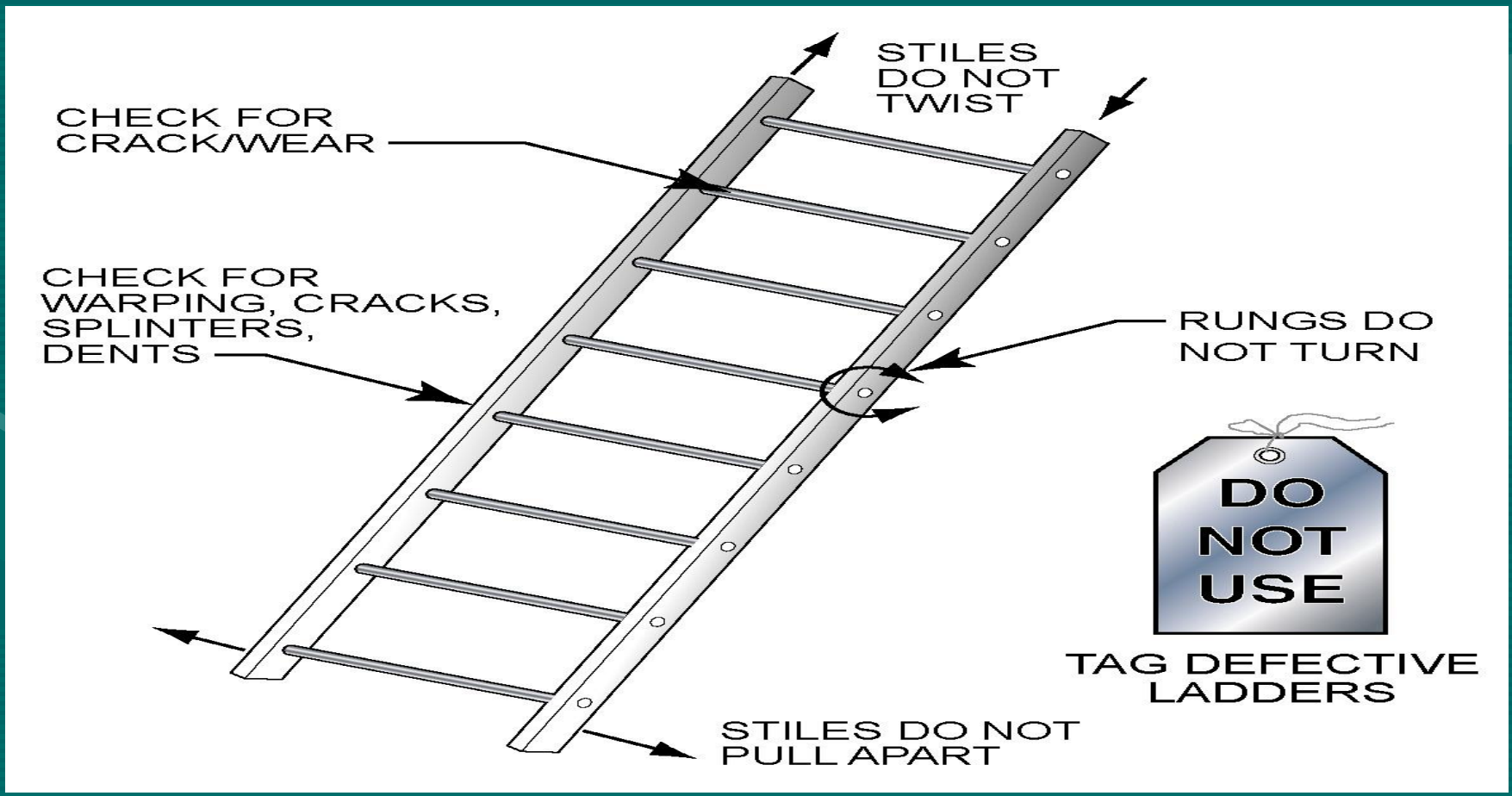
ACCESS	Working platforms have access by ladder, stair, ramp, or walkway?

Temporary Stairs

ACCESS	Working platforms have access by ladder, stair, ramp, or walkway?

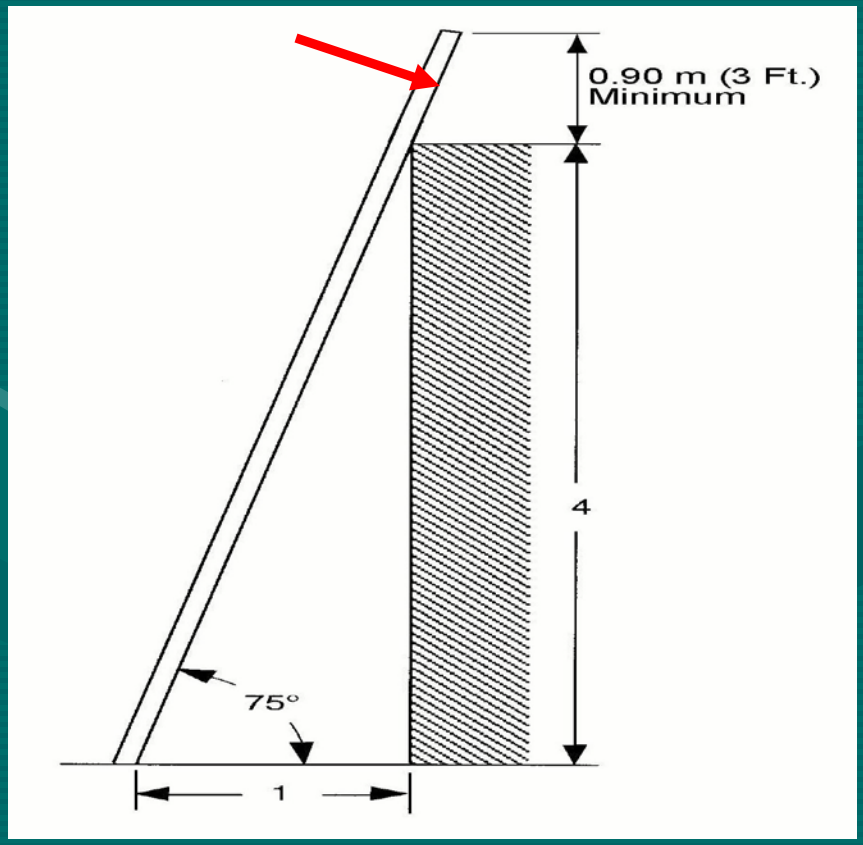
Ladder Condition

ACCESS	Ladders are free from defects, missing rungs, or broken side rails?



Ladder Position

ACCESS	Ladders extend at least 0.9m (3') above the landing or platform? Both side rails of straight and extension ladders are secured in place?



You should now know how to use the safety checklist on the back of the green and yellow scaffold tags !

Any questions?

ارامكو السعودية
Saudi Aramco

Scaffold Safety Workshop

Part - 5

SCAFFOLD

GENERAL REQUIREMENTS

Think…

- **When is scaffold plan required?**
- **Who are only authorized to erect scaffolds more than 40 feet or “special” scaffolds?**
- **Who signs the scaffold tags, if the scaffold is more than 20 feet tall?**
- **What are basic scaffold work flow components?**

Scaffold Responsibility Matrix

Scaffold Height	Scaffold Plan (SP) Required?	SP To Be Revwd By Proponent And LP Area Office?	SP To Be Revwd By CSD?	Scaffold To Be Erected By:	Scaffold Field Inspection Checklist Completed By:	Scaffold Tag Signed By:
0 – 6m (0 - 20 ft.)	No	No	No	Qualified Scaffold Erector	Scaffold Supervisor Only	Scaffold Supvr Only
6 - 12.2m (20 – 40 ft.)	No	No	No	Qualified Scaffold Erector	Scaffold Supervisor & Inspector	Scaffold Supvr & Inspector
12.2 - 38m (40 – 125 ft.)	Yes	Yes	No	Specialized Scaffold Erector	Scaffold Supervisor & Inspector	Scaffold Supvr & Inspector
Special Scaffold, including > 38m (125 ft.)	Yes	Yes	Yes	Specialized Scaffold Erector	Scaffold Supervisor & Inspector	Scaffold Supvr & Inspector

Types of Scaffold

- **Tower Scaffold**
- **Birdcage Scaffold**
- **Independent Run Scaffold**
- **Mobile Scaffold**
- **Suspended Scaffold**
- **Bracket Scaffold**

Reminder

- **Scaffold Inspectors Only Required to Inspect:**
  - **Scaffolds over 6 meters (20 feet) tall,**

    or
  - **"Special Scaffolds"**

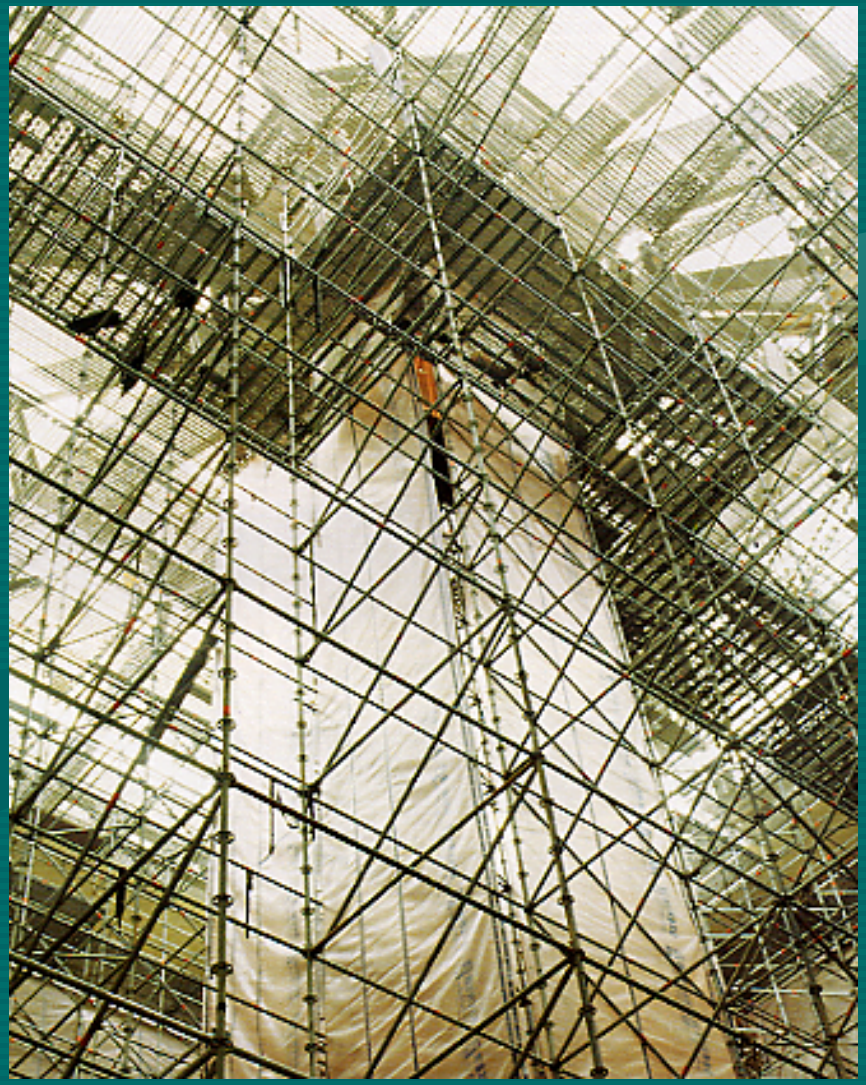
What is a "Special Scaffold" ?

- **Higher than 38 meters (125 feet)**
- **Cantilevered (extended outward) by more than 3 meters (10 ft)**
- **Over 30m² (320 ft²) platform area & supported by or hung from an existing structure**
- **Supporting loads greater than 240 kg/m² (50 psf), such as piping or equipment**

Special Scaffolds

Birdcage Scaffold

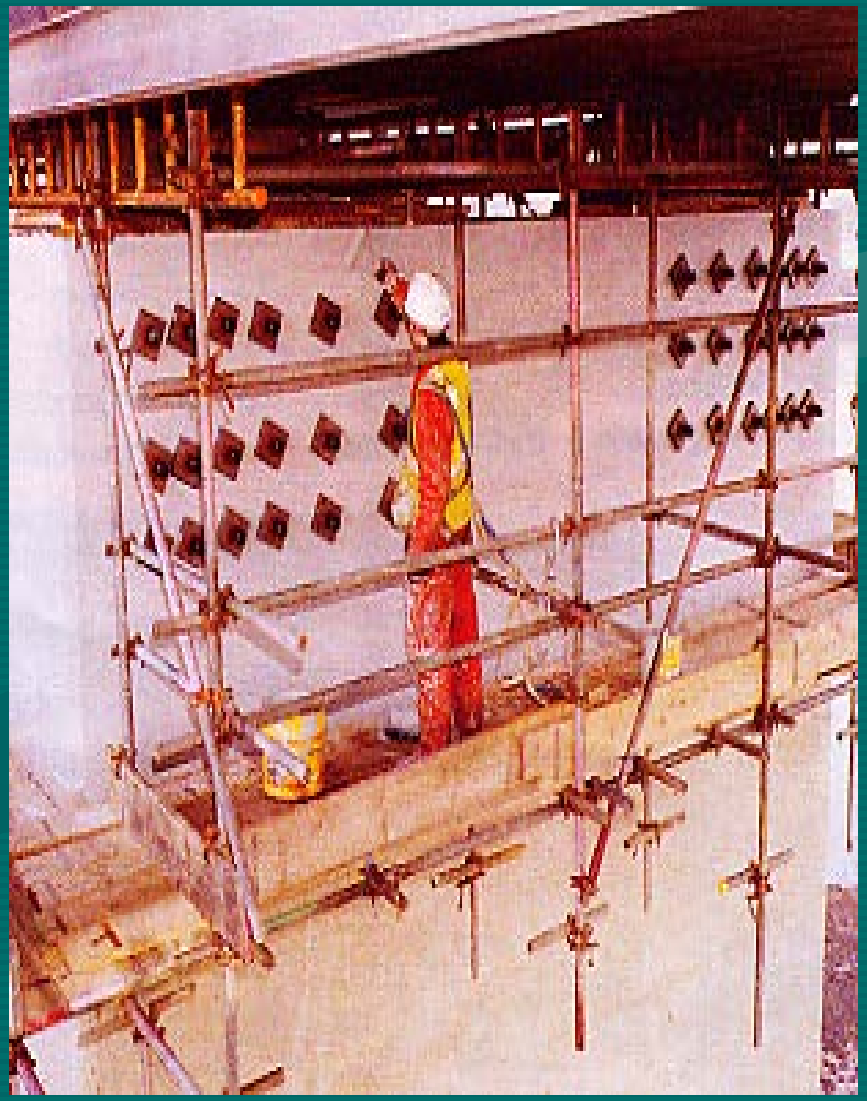
Scaffolds over 38 meters (125 feet) tall



Special Scaffolds

Suspended Scaffold

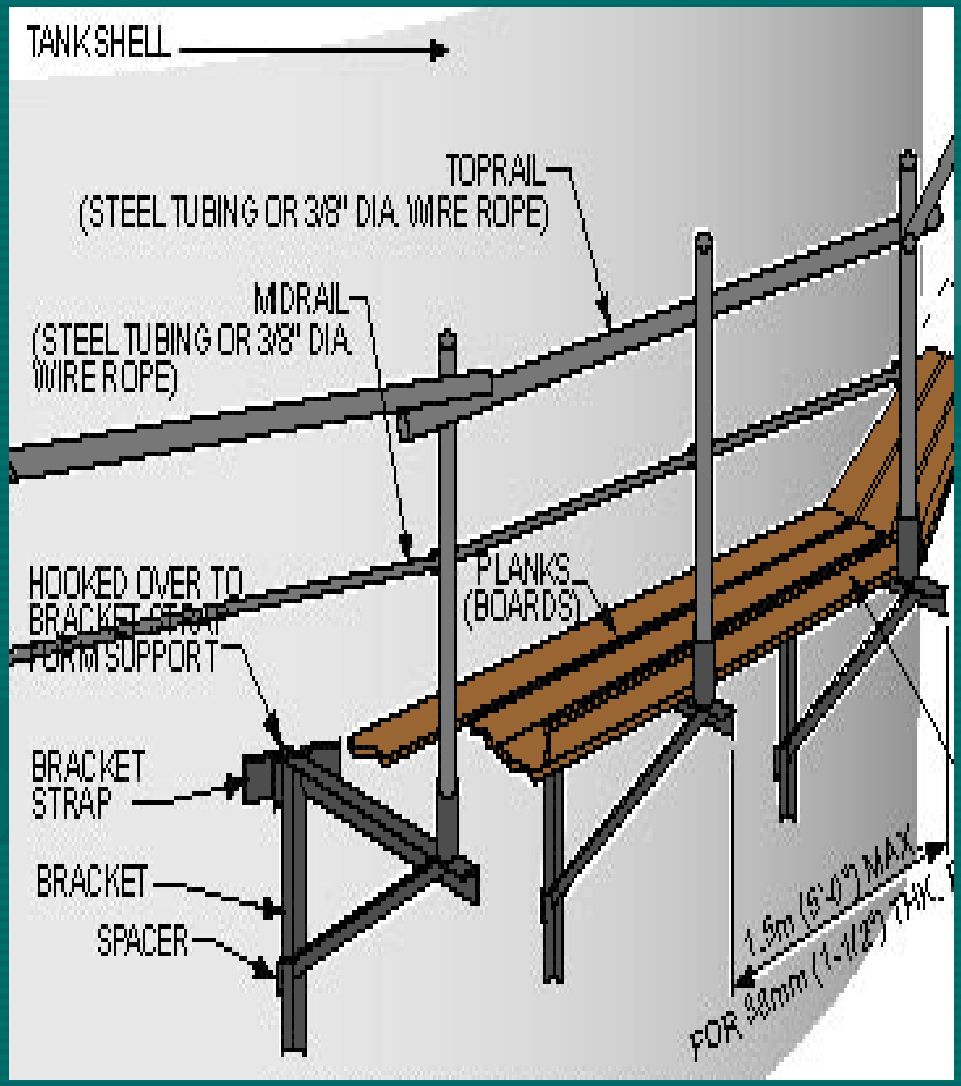
Scaffold suspended by fixed length of wire ropes or scaffold tubes to an overhead structures whose total platform area is over 30 sq m.



Special Scaffolds

Bracket Scaffold

- **Used by tank builders**
- **Bracket straps welded to tank shell to support the bracket**



Scaffold Work Flow

Scaffold Plan is Only Required for

- Scaffolds over 12.2 m (40 feet) tall, or

- "Special Scaffolds"

Scaffold Work Flow

Plan Preparation

- **If scaffold is over 12.2 meters (40 ft.) tall, or a "special" scaffold, a scaffold plan is required**

Scaffold Work Flow

Plan Review

- **Scaffold plan will be reviewed by both Loss Prevention Dept. (LPD) & Consulting Services Dept. (CSD)**
- **Work Permit Issuer must make sure LPD & CSD "concurred with" the scaffold plan**

Scaffold Work Flow

Scaffold Construction

- **Issuer must write on the "Precautions" section of the Work Permit (for scaffold craftsmen to build, alter, or dismantle a scaffold) the following words:**
  - **"All scaffold craftsmen shall always wear a full-body harness with SHOCK-ABSORBING lanyard and shall properly anchor their lanyards."**

Scaffold Work Flow

Scaffold Inspection

- **Scaffold Supervisors and Inspectors must inspect a Scaffold?**
  - **After scaffold is completely built**
  - **After scaffold has been altered**
  - **After high winds or anything likely to have affected scaffold's strength**
  - **At regular intervals to check that it is still safe to use (every 2 weeks)**

Scaffold Work Flow

Scaffold Tagging

- **If Scaffold Supervisor thinks scaffold is safe to use, he will fill in & sign, either:**
  - **GREEN (Passed Inspection) or**
  - **YELLOW (Full Body Harness Required) scaffold tag**

Scaffold Potential Hazards

Do not interfere with scaffolds

- **Do not take out ties !**
- **Do not take out braces !**
- **Do not remove planks or guardrails !**
- **Do not remove ladder access !**
- **Do not exceed scaffold loading !**

If you need a scaffold to be altered, ask your supervisor to arrange for a scaffold craftsman to carry out the work. do not do it yourself!

Scaffold Potential Hazards

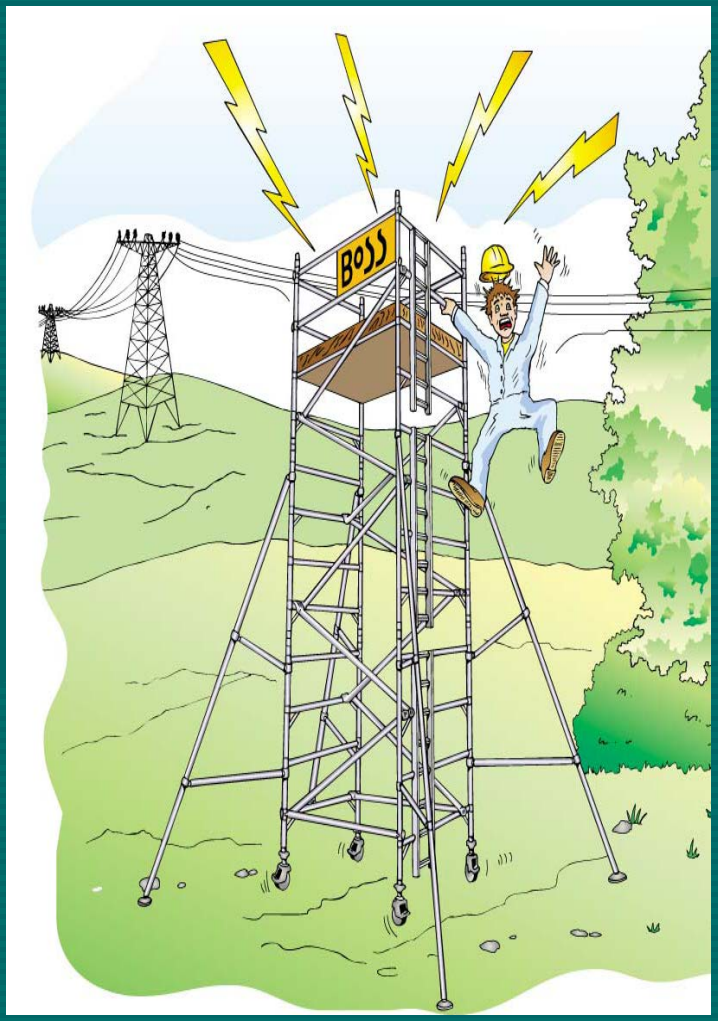
Guardrails Missing & Platform Gaps

- **Missing guardrails and toeboards along with a tripping hazard could lead to a fall**
- **Gaps in the planks could cause materials to drop through**

Scaffold Potential Hazards

Electrical Hazards

- **Keep away from power lines**
- **Make sure any conductive materials (e.g., scaffold tubing) cannot get closer than 3 m (10 ft) from a live power line**



Scaffold Potential Hazards

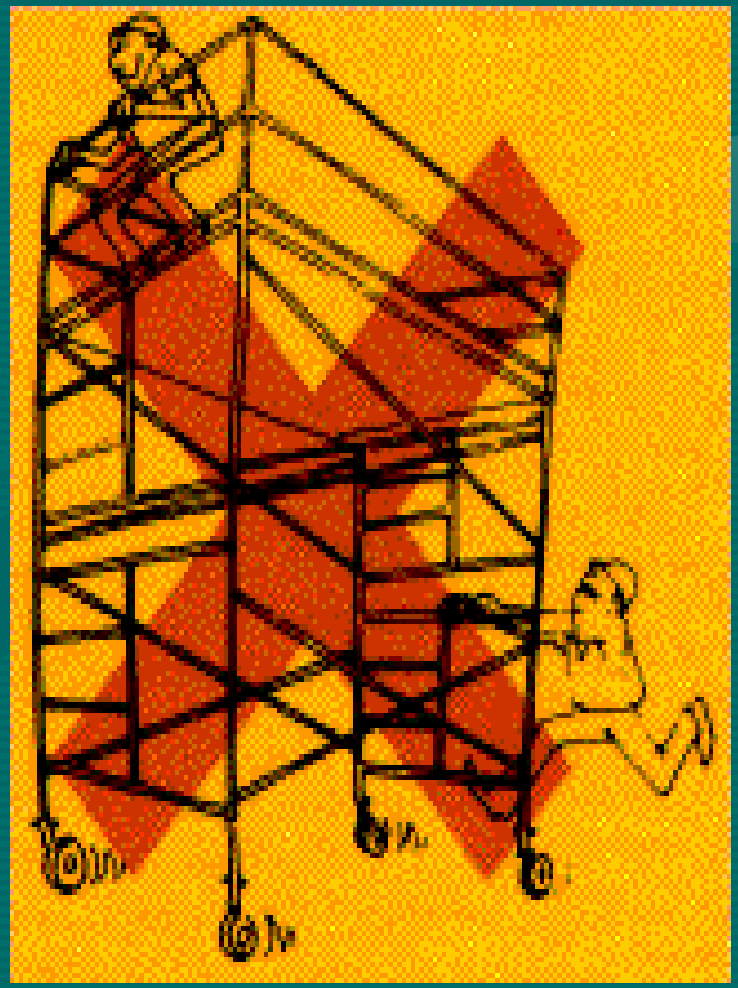
High Winds & Lightning Hazards

- **It's not safe to work on a scaffold in high winds or when lightning is possible**
- **Workers shall not be up on a scaffold when the wind speed is more than 65 kph (40 mph)**

Scaffold Potential Hazards

Mobile Scaffold Hazards

- **All wheels of mobile scaffolds must be locked when in use**
- **Do not ride on mobile scaffolds when they are being moved**



Scaffold Potential Hazards

Overloading Scaffold

- **Never load a scaffold beyond its rated load**

Safe Loading on Platforms

- **You must check on the scaffold tag to see what load the scaffold will take & ensure you don’t put too much load on the platform**
- **Be aware what things weigh, including the number of workers**
- **The following slide shows some typical weights**

Weights of materials

- **Scaffold tube: 4 kg/m (4 lb/ft)**
- **Worker: 100 kg (225 lb)**
- **Scaffold fitting: 1-1.5 kg each (2-3.5 lbs)**
- **Water: 1 kg/litre (10 lb/gallon)**
- **Steel: 7.8 tons/m^3**
- **Concrete: 2400 kg/m^3**
- **100 bricks: 275 kg (620 lbs)**

Note:- all weights approximate

Loading Calculations

A light duty scaffold 1.2 m wide & 2.4 m long bays is to have a load of 2 men, a 75 kg valve and 50 kg of tools in one bay of the scaffold. Is the scaffold safe to use with these loadings?

Loading Calculations

1.2 m x 2.4 m = 2.88 m² x 120 kg/m² = 345 kg is allowed per bay

2 men x 100 kg = 200 kg + 75 kg valve + 50 kg tools = 325 kg

Allowable load is GREATER than the Actual load

Therefore the scaffold is safe to use

Loading Calculations

A light duty scaffold 1.2m wide with 1.8m long bays is to have a load of 2 men, 70kg of steel and 20kg of tools in one bay of the scaffold. Is the scaffold safe to use with these loadings?

Loading Calculations

1.2 m x 1.8 m = 2.16 m² x 120 kg/m² = 260 kg allowed per bay

2 men x 100 kg = 200 kg + 70 kg steel + 20 kg tools= 290 kg

Allowable load is LESS than the Actual load

Therefore the scaffold is UNSAFE to use

Exercise: Loading Calculations

A medium-duty scaffold 1.2m wide with 1.8m long bays is to have a load of 2 men, 2 bags of grit material weighing 50 kg/bag for abrasive blasting, and 100 bricks for the masonry works of the other crew. All are loaded in one bay of the scaffold. Is the scaffold safe to use with these loadings?

Loading Calculations

1.2 m x 1.8 m = 2.16 m² x 240 kg/m² = 518 kg allowed per bay

2 men x 100 kg = 200 kg + 100 kg grit + 275 kg bricks= 575 kg

Allowable load is LESS than the Actual load

Therefore the scaffold is UNSAFE to use

Any Questions?

Thank you for attending this workshop