HSE TECHNICAL STANDARD
SCAFFOLDING SAFETY

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Document Change Note

Rev. No	Rev. Date	Comments / Changes
00	14-11-2022	First issue

Table of Content

1. Purpose

This procedure establishes the minimum safety requirements of scaffolding for the erection, usage, alteration and dismantling. The purpose is to prevent fall of workmen, materials and collapse of scaffold due to deviations from the procedures.

2. Scope

This standard applies to all the company and contractor personnel involved in the erection, usage, alteration and in dismantling of scaffold at AM/NS project site.
The scope encompasses the requirements of:

a) The BOCW Act, 1996 [1]

b) Gujarat State BOCW Rules, 2003 [2]

c) IS2750:1995 – Specification for Steel Scaffolding [3]

d) IS4014:2013 Part 1 and 2 – Code of Practice for Tubular Steel Scaffolding [4]

e) IS3696 : 1991 Part 1 and 2 – Code of Safety – Scaffolds and Ladders [5]

f) EN, EN74 Part 1 and 2 couplers, spigot pins and base plates for use in false work and scaffolds., 2005

g) EN, EN39 –Loose steel tube and coupler scaffolds - technical delivery condition, 2001.

h) BS, BS-12811(A European Standard that specifies performance requirements and methods of structural and general design for access and working scaffolds.) & 12810 Part 1 and 2 -Temporary Works Equipment, London: BS, 2003.

i) BS TG 20:13 – Technical Guidelines(A guide to good practice for tube and fitting scaffolding)

Out of Scope

This procedure does not cover rescue techniques for emergency rescue.

3. Definitions and Abbreviations

3.1. Definitions

- **Sole Plate / Board:** A timber, Concrete or metal spreader used to distribute the load from a standard & base plate to the ground. (As shown in figure -1)
- **Baseplate**: A metal plate used to distribute the load from the standard to the sole board. (as shown in figure-2)
- **Screw Jack:** Adjustable baseplate to compensate the ground variations. Shall extended up to 2/3rd of threaded part (As shown in figure -3)
- **Scaffolding Tube:** Steel tube (Galvanized) / Black tube heavy class welded seamless tube with 40mm bore with the maximum length of 6.40 meter and shorter with OD 48.3mm & Wall thickness of 4mm.

Figure 1 Sole Board (Minimum of 450mm X 225mm X 38 mm thick)

Figure 2 Base Plate

Figure 3 Screw Jack

- **Standard (Post):** A vertical tube used for scaffolding work (As shown in figure-4)
- **Ledger:** Horizontal tube normally in the direction of larger dimension of the working scaffold work (As shown in figure-5 – Thick lines)
- **Transom:** Horizontal tube normally in the direction of smaller dimension of the working scaffold work (As shown in figure-6- Thick lines)

Figure 4 Standards

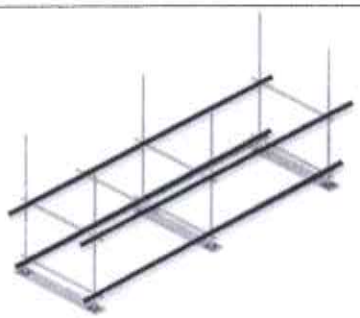


Figure 5 Ledgers

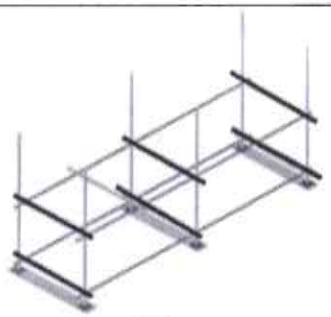


Figure 6 Transoms

- **Intermediate Transom:** Transom used to prevent the board sagging / A transom used between the main transom (As shown in figure – 7- Thick lines)
- **Right Angle Coupler:** Coupler used to join tubes at right angles for tube and coupler scaffolding materials (As shown in figure – 8)
- **Swivel Coupler:** Coupler used to join tubes at other angles for fixing bracings (As shown in figure – 9)
- **Putlog Coupler:** A coupler used for fixing a putlog or transom to a ledger (on the boarding lift), or to connect a tube used only as a guardrail (As shown in figure – 10)
- **End to End Sleeve coupler:** An external coupler used to join one tube to another coaxially (As shown in figure – 11)
- **Board Retaining Coupler:** A device used to retain two boards together (As shown in fig -12)
- **Girder Coupler:** A device used to connect the tubes with beams (As shown in figure – 13)
- **Ladder Clamp:** Clamp used to connect the ladder with tube (As shown in figure – 14)
- **Putlog Adaptor:** Fitting to provide a putlog blade on the end of scaffold tube (Shown in fig-15)
- **Toe Board Clip**: Clip used for attaching toe boards to tubes (As shown in figure – 16)

- **Free Standing Scaffold:** A scaffold which is not attached to any other structure and is stable against overturning on its own account or, if necessary, assisted by guys or Rakers and anchors (As shown in figure – 17)
- **Tower Scaffold:** A scaffold which has only four standards one line supporting the outside and the other on the inside (As shown in figure – 18)
- **Independent Tied Scaffold:** A scaffold which has two standards on its least dimension and more than two standards on its longitudinal side. (As shown in figure – 19)
- **Bird Cage Scaffold:** Scaffold which has more than two lines of standards on its longitudinal as well as its transverse. (As shown in figure – 20)
- **Putlog Scaffold:** Scaffold which has one line of standards to support the outside edge of the deck and utilizes the wall being built or the building to support the inside edges. (As shown in figure – 21)

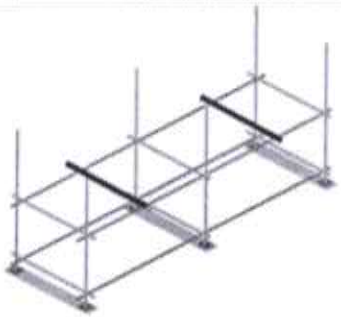


Figure 7 Intermediate Transom

Figure 8 Right Angle Coupler

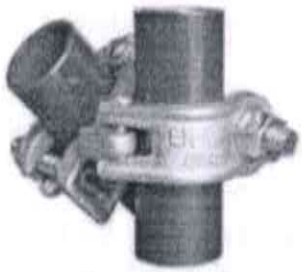


Figure 9 Swivel Coupler

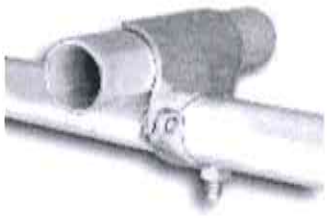


Figure 10 Putlog / Single Coupler

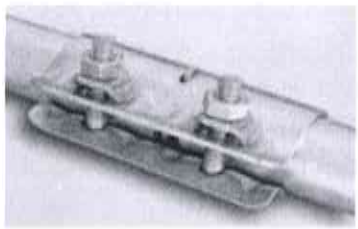


Figure 11 End to End Sleeve Coupler

Figure 12 Board Retaining Coupler

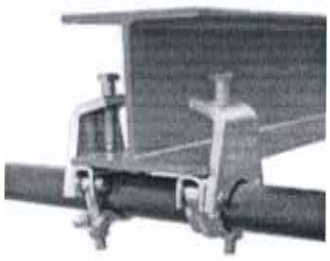


Figure 13 Girder Coupler

Figure 14 Ladder Clamp

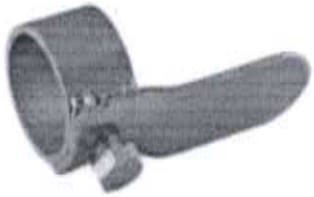


Figure 15 Putlog Adaptor

Figure 16 Toe Board Clamp

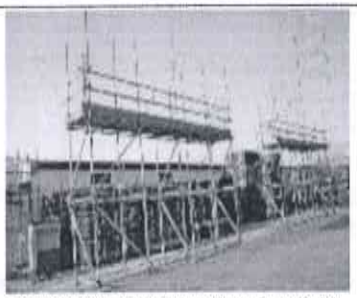


Figure 17 Free Standing Scaffold

Figure 18 Tower Scaffold

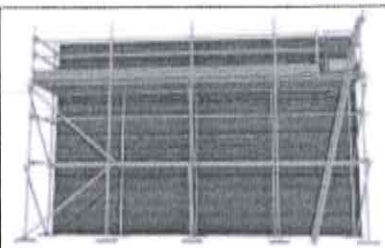


Figure 19 Independent Scaffold

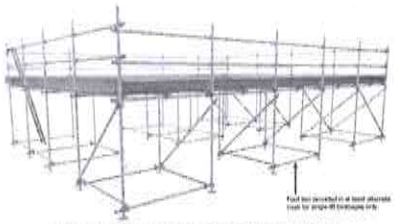


Figure 20 Bird Cage Scaffold

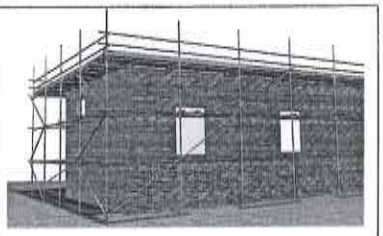


Figure 21 Putlog Scaffold

- **Cantilever Scaffold:** Cantilever scaffold is an independent tied scaffold constructed in accordance with this code but erected on beams cantilevering out from a building. It is used in cases where it is impracticable or undesirable to found the scaffold on the ground. (As shown in figure – 22)
- **Truss out Scaffold:** Truss out scaffold is an independent tied scaffold and not erected from the ground, but supported by a scaffold structure projecting from the face of a building or structure. (As shown in figure – 23)
- **Mobile Scaffold:** A scaffold based / supported on the caster wheels. (As shown in figure – 24)
- **Bracket / Tank Builders Scaffold:** A scaffold supported by bracket straps welded to the tank wall. Upright brackets are hooked to the straps. (As shown in figure – 25)
- **Under hung Scaffold:** A Scaffold erect from the elevated level towards ground by the use of girder coupler. (As shown in figure – 26)
- **Scaffold Board:** A softwood board / metal plank generally used with similar boards to provide access, working platforms and protective components such as toe boards on a scaffold. (As shown in figure – 27)

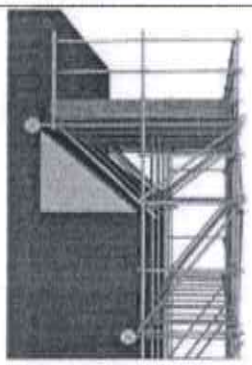


Figure 22 Cantilever Scaffold

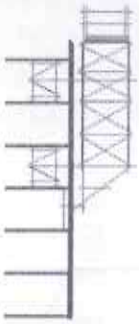


Figure 23 Truss Out Scaffold

Figure 24 Mobile Scaffold

Figure 25 Bracket Scaffold

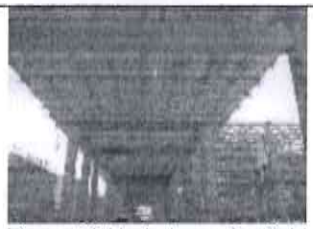


Figure 26 Underhung Scaffold

Figure 27 Scaffold Metal Plank

- **Inside Board:** A Board placed between the scaffold and the building on extended transoms. (As shown in figure – 28)
- **Guard Rail:** A barrier consisting of top rails, mid rails, toe boards and supporting uprights, erected to prevent the users from falling off an elevated work area and to prevent objects from falling onto workers. (As shown in figure – 29)
- **Top Rail:** The uppermost horizontal rail of a guard rail system. (As shown in figure – 30)
- **Mid Rail:** A horizontal rail approximately midway between the top rail of a guard rail system and the platform. (As shown in figure – 31)
- **Toe Board:** A barrier secured along the sides and the ends of a platform to guard against the falling of material, tools and other objects. (As shown in figure – 32)
- **Mesh Guard:** A mesh / net provided on guard rails to prevent the material falling. (As shown in figure – 33)
- **Brace:** A tube placed diagonally with respect to the vertical or horizontal members of a scaffold and fixed to them to afford Integrity.
- **Longitudinal Brace:** A brace generally in the plane of the longer dimension of the scaffold.it is known as also as sway brace, wind brace, face brace brace. (As shown in figure – 34)
- **Transverse Brace:** A brace generally in the plane of the shorter dimension of the scaffold. (As shown in figure – 35)
- **Knee Brace:** A brace across the corner of an opening in a scaffold to stiffen the angles or to stiffen the end support of a beam. (As shown in figure – 36)

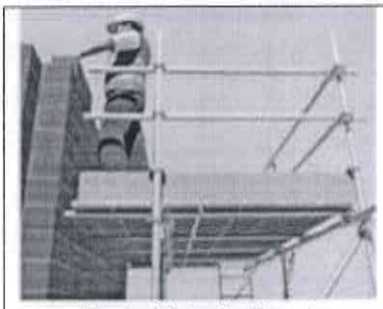


Figure 28 Inside Board

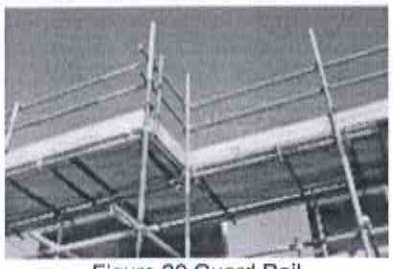


Figure 29 Guard Rail

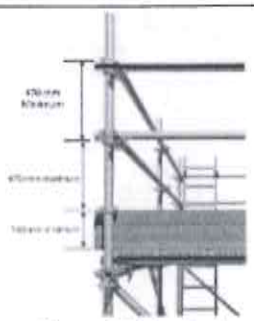


Figure 29 Top Rail

Figure 30 Mid rail

Figure 31 Toe Board

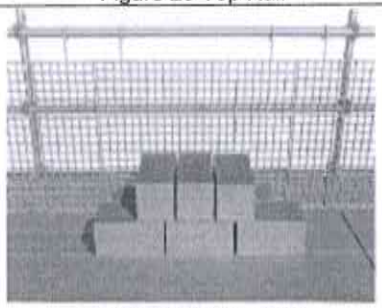


Figure 32 Mesh Guard

- **Ledger Brace:** A brace at right angles / width to the scaffolding on the ledgers to ledgers. (As shown in figure – 37)
- **Plan Brace:** A brace in a horizontal plane. (As shown in figure – 38)
- **Scaffolding Length:** The length of a scaffold between its extreme standards, sometimes designated by the number of bays. (As shown in figure – 39)
- **Scaffolding Height:** The height measured from the foundation to the top. (Ref figure - 40)
- **Scaffolding Width:** The short dimension of the scaffold usually right angle to the length. (As shown in figure – 41)
- **Lift:** The assembly of ledgers and transoms forming each horizontal level of a scaffold. (As shown in figure – 42)

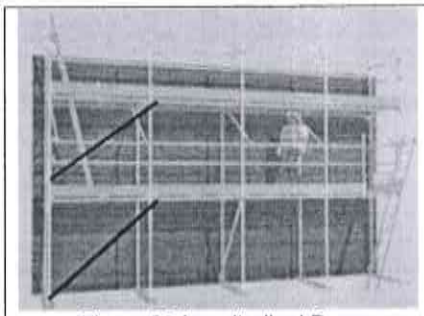


Figure 33 Longitudinal Brace

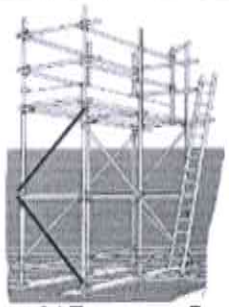


Figure 34 Transverse Brace

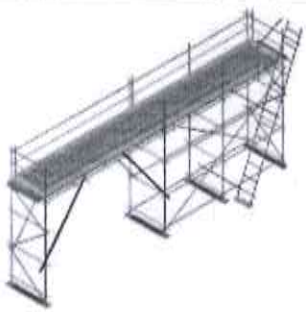


Figure 35 Knee Bracing

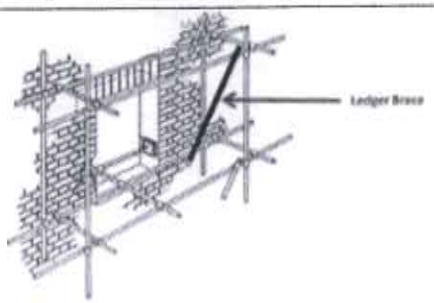


Figure 36 Ledger Brace


Figure 37 Plan Brace

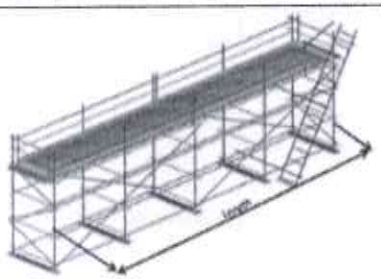


Figure 38 Scaffold Length

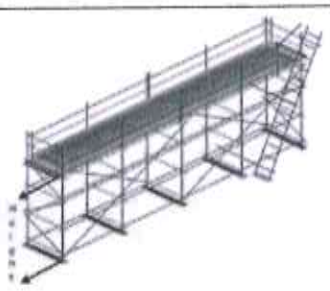


Figure 39 Scaffold Height

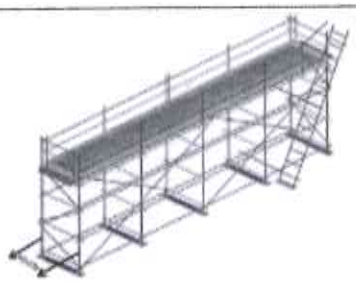


Figure 40 Scaffold Width

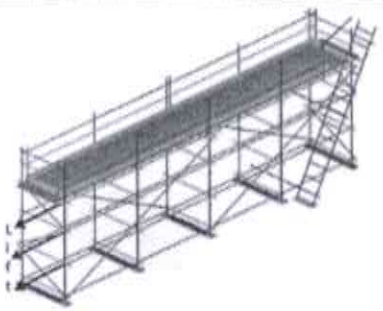


Figure 41 Lift

- **Bay:** The space between the centrelines of adjacent posts (standards) along the face of a scaffold. (As shown in figure – 43)
- **Bay Length:** The horizontal, longitudinal distance between centres of two adjacent posts (standards). (As shown in figure – 44)
- **Base / Foot / Kicker Lift:** A lift erected near to the ground. (As shown in figure – 45)

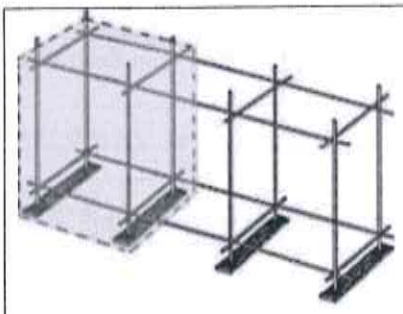


Figure 42 Bay

Figure 43 Bay Length

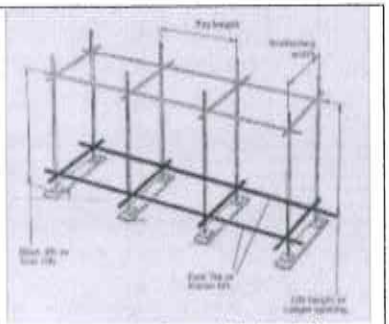


Figure 44 Base / Kicker Lift

- **Lift Head Room:** The clear distance between a platform and the tubular assembly of the lift above. (As shown in figure – 46)
- **Node Point:** The 300 mm vertical & horizontal area where the Ledger & Transom coupled. (Simply the area intersection points of Ledger & Transom). (As shown in figure – 47)
- **Longitudinal:** The long direction of the scaffold, usually parallel to the scaffold's planks. (As shown in figure – 48)

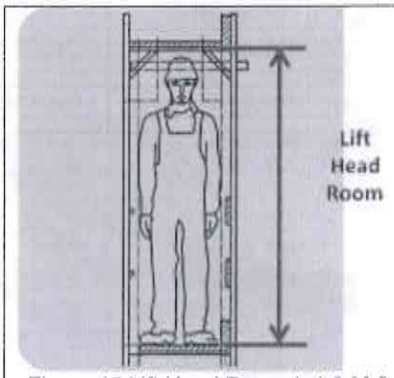


Figure 45 Lift Head Room (>1.9 M & up to 2.7M)

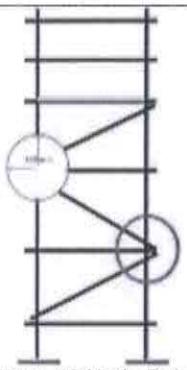


Figure 46 Node Point

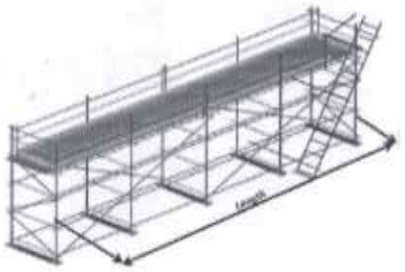


Figure 47 Longitudinal/ face/ sway/ wind

- **Transverse:** The short direction of the scaffold, usually perpendicular to the scaffold's planks. (As shown in figure – 49)
- **Box Tie:** An assembly of tubes and couplers forming a frame round a part of a building. (As shown in figure – 50)
- **Lip Tie:** An assembly of tubes forming an L or J shaped hook round an inside surface of a building. (As shown in figure – 51)


Figure 48 Transverse

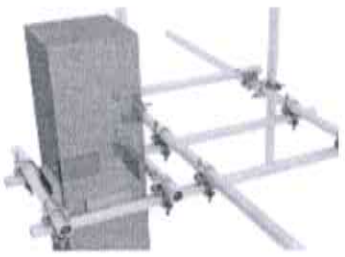


Figure 49 Box Tie

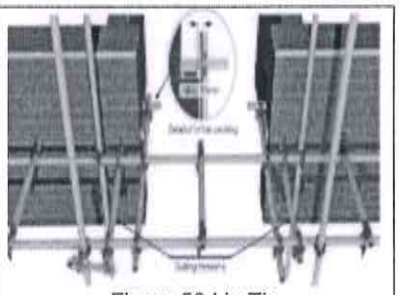


Figure 50 Lip Tie

- **Prop Tie:** An assembly of telescopic props and / or scaffold tube jacked or wedged between the floors of a story inside a building and including a tie tube. (As shown in figure – 52)
- **Reveal Tie:** The assembly of a reveal tube with wedges or screwed fittings, and pads, if required, fixed between opposing faces of an opening in a wall together with the tie tube. (As shown in figure – 53)
- **Through Tie:** A Tie assembly through a window or other opening in a wall. (Ref figure - 54)

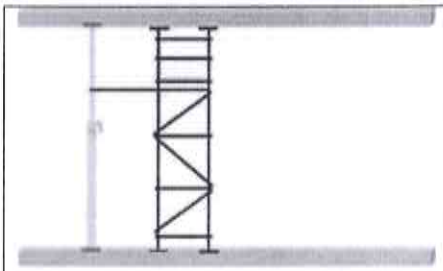


Figure 51 Prop Tie

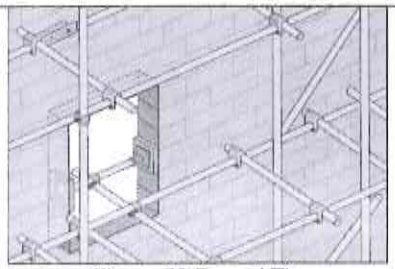


Figure 52 Reveal Tie

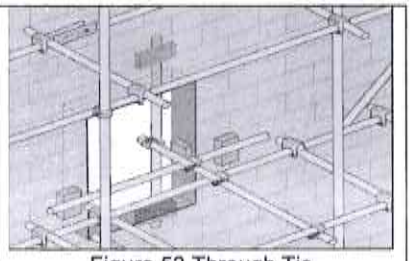


Figure 53 Through Tie

- **Screw / Anchor Tie:** An assembly of nuts, bolts, anchors, rings or tubes fixed into the surface of a building. (As shown in figure – 55)
- **Raker:** An Inclined load bearing tube. (As shown in figure – 56)
- **Out Rigger:** An extended base of the scaffold to compensate the base width ratio. (As shown in figure – 57)

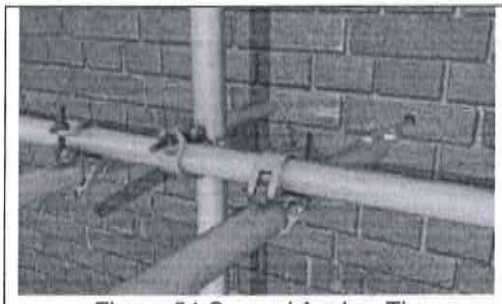


Figure 54 Screw / Anchor Tie

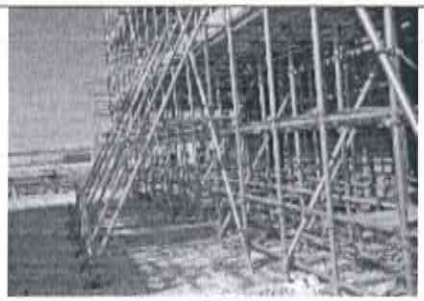


Figure 55 Raker

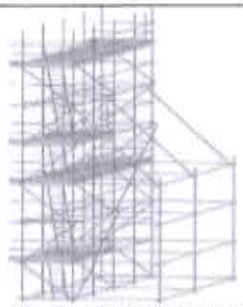


Figure 56 Out Rigger

- **Guys:** Tension members (i.e. wire ropes) used between the scaffold and the ground, building or structure to enhance the scaffold's lateral stability. (As shown in figure – 58)

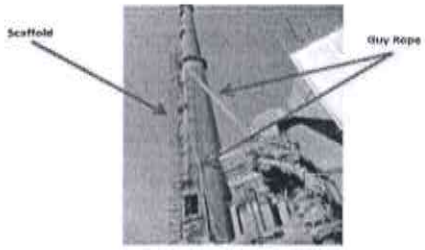


Figure 57 Guys

3.2. Abbreviation

WAH	:	Working at Height
PPE	:	Personal Protective Equipment
SCAFTAG	:	Scaffolding Tag
HSE	:	Health, Safety & Environment
TBT	:	Tool Box Talk
PM	:	Project Manager
SIMOP	:	Simultaneous Operation
BOCW	:	Building and Other Construction Worker
IS	:	Indian Standard
BS EN	:	British Standard European Norms
BBS	:	Behavioural Based Safety

4. Roles & Responsibilities

4.1. Project Head

- Project Head is responsible for implementation of this standard.
- It is the responsibility of Project Head to ensure required resources like, standard scaffolding materials and competent Scaffolders are provided; carried out scaffolding tasks under competent supervision and inspected and green tagged scaffolds only to be used by users.

4.2. Area Engineers/ Supervisors

- Conduct risk assessment for each such elevated work area and identify potential hazards and control measures required.
- Obtain PTW for erection/ modification/ dismantling of scaffolds
- Conduct survey, identify places where scaffolding activity is to be performed
- Provide personal and work specific protective equipment (PPE)
- Ensure area is barricaded with signage (SCAFFOLDING ERECTION IN PROGRESS-KEEP AWAY/ SCAFFOLDING DISMANTLING IN PROGRESS-KEEP AWAY)
- Ensure implementation of Permit to Work system for all kind of job which meets scaffolding work criteria. Ensure that those involved in such activities are medically fit, appropriately trained and competent. Ensure that all management personnel are aware of and follow the requirements of the working at height and scaffolding.

4.3. Line Managers

- To ensure that all provisions and requirement for controlling the risks involved in scaffolding, are implemented including validation of requirement for the permit to work if required in such jobs.

4.4. Scaffolders

- Follow the standard scaffold erection/ modification/ dismantling procedure
- Never work standing on scaffolding pipes (ledgers/ transoms) Minimum two planks must be used while erection/ dismantling
- Always anchor safety harness while working at height
- Use lifting bags provided for handling of scaffolding components (couplers/ nuts/bots/ spanners)
- Use hand lanyard while using hand tools (Hammer/ Spanner/ spirit level/ etc)
- Use Gin wheel to lift/ lower scaffolding tubes

4.5. Scaffolding Inspector

- Ensure that the scaffolding erected is meeting task requirements including load bearing capacity.

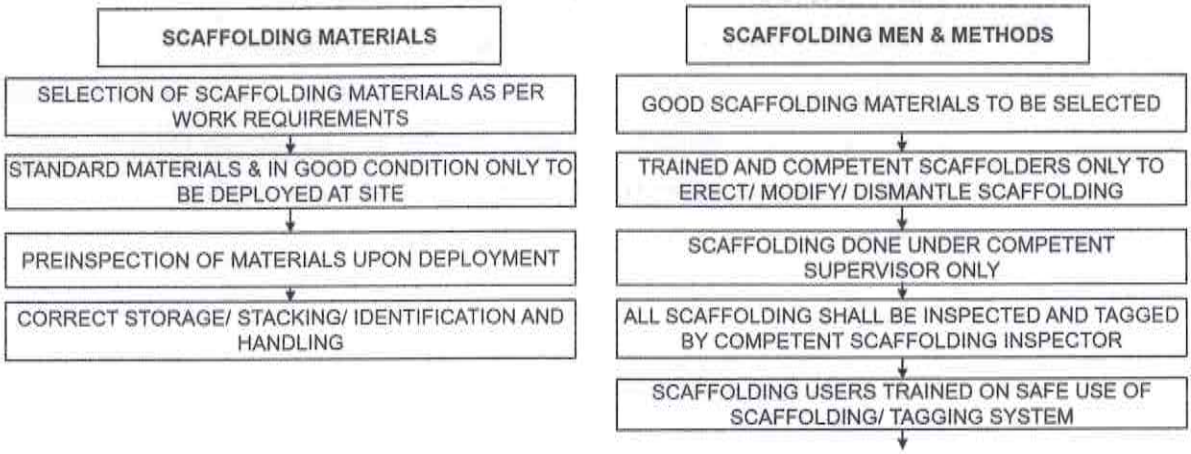
- Ensure scaffolding is done as per scheme if applicable
- Check the scaffolding is ready for use by checking as per applicable checklist(s)
- Carry out daily inspection of scaffold to assess its integrity visually
- Carry out daily inspection of scaffold to assess its integrity visually
- Carry out weekly thorough inspection of scaffold to assess its integrity and mark the SCAFTAG on rear side accordingly
- Provide SCAFTAG (GREEN) up on found the scaffolding is fit for use
- Ensure each scaffold is identified by unique number covering area/ location/ specific purpose and maintain the status in log sheet

4.6. Project HSE Manager

- Provide advice on this standard, and oversight inspections to verify compliance.
- Verify that this procedure is implemented by all personnel;
- Ensure training of employees in Scaffolding Safety, usage of fall prevention equipment, erection & dismantling of scaffoldings
- Monitor the compliance and enforce the requirements of the procedure.
- Conduct Scaffolding inspections and monitor the medical fitness of the work at height employee with the aid of medical team.
- Undertake periodic inspections of implementation of Scaffolding by using the Inspection and Audit Checklist

5. Scaffolding Safety Management Description

Scaffolding assurance flow chart



5.1 Scaffolding Materials / Component:

Steel Tubes

- Steel tubes for scaffolding shall be heavy class welded or seamless tubes of 40mm nominal bore confirming to IS-1161 [6] or BS EN – 39 [2] or equivalent enough. (Refer figure – 59)

- Values for the properties of scaffolding tubes of 40 mm nominal bore are given below

Outer diameter	Nominal wall thickness	Mass per linear m	Cross-sectional area (A)	Moment of inertia (I)	Modulus of elasticity E	Elastic modulus z	Radius of gyration r	Minimum yield strength	Maximum allowable stress in bending P_{bc}	Maximum allowable stress in axial compression P_c	Maximum allowable shear stress	Maximum allowable stress in axial tension P_t	Stiffness EI
mm	mm	kg/m	cm^2	cm^4	N/mm^2	cm^3	cm	N/mm^2	N/mm^2	N/mm^2	N/mm^2	N/mm^2	N/mm^2
48.3 ± 0.5	4.0	4.37[b]	5.57	13.8	210 000	5.70	1.57	210	139[a]	See Table 14	93	127	$2\,898 \times 10^7$
48.3 ± 0.5	4.0	4.37[b]	5.57	13.8	210 000	5.70	1.57	235	155		104	142	$2\,899 \times 10^7$

Table 1 - Properties of Tubes [21]

- Tubes shall be straight to the eye and shall be free of cracks, splits, excessive corrosion, or other defects. The ends shall be cut square with the axis of the tube and confirm to relevant Indian standard. No tubes, unit frame or system scaffold materials will be painted (exception for colour coding at the end). The only acceptable coating will be galvanized.

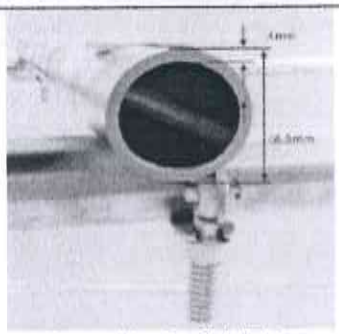


Figure 58 - Scaffold Tube

a) Contractor shall furnish the test certificate for scaffold materials such as tubes, couplers & metal planks before storing in plant / construction facilities. Such certificate shall be inspected by client Scaffolding expert / Inspector.

b) Steel tubes shall be 1.2m, 1.5m, 1.8m, 2.1m, 2.5m, 3m, 4m, 5m & 6m long

c) Steel tubes shall not cut by using cutting torch, tubes should only cut by tube cutter or hacksaws and the edges shall be chamfered to prevent injuries from sharp edges.

Couplers

- Any couplers found to be broken or damaged or found to have damaged threads will be discarded immediately from the plant premises. Couplers will be sorted by type. And, shall have regular maintenance, they will be lightly oiled to prevent rust. (As shown in figure – 60)

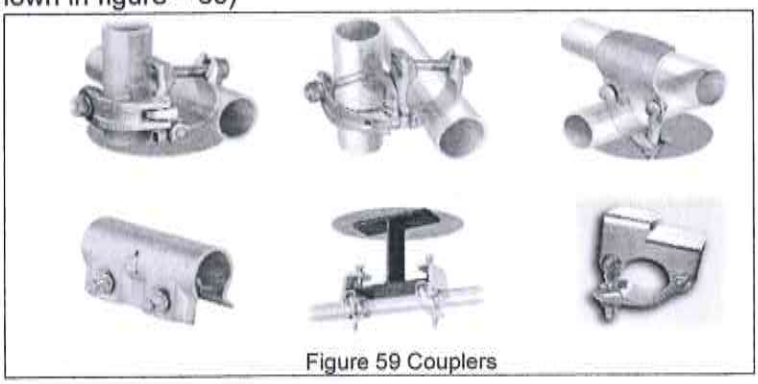


Figure 59 Couplers

a) All Scaffolding couplers/fittings will be sound of construction and adequate strength and will be manufactured as per IS or BS EN 74 standards.

b) It is preferred to use forged drop couplers.

c) Use only scaffold spanners to tighten the couplers, no cheater bars are allowed to tight the couplers

Wooden Planks (Boards)/anti-skid board

- Metal planks of similar width and thickness (225 mm X 38mm) will be used to deck out individual scaffolds and supported every1.2 meters to 1.5 meters maximum by transom.

Figure 60 Metal Plank

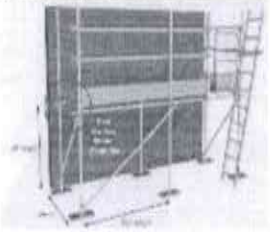


Figure 61 Plank Overhung

Figure 62 Metal Plank Secured by BRC

a) Minimum Over hung of the planks shall be minimum 50mm and maximum of 150mm.or 4 times of the thickness of planks.

b) Scaffold planks shall be secured with board retaining couplers or with fibre ropes

c) Scaffold planks/anti-skid shall be free from Splits, cracks, bents, & cut outs. If so, the same has to discarded form site premises immediately

d) Scaffold planks should not be painted as it will be slippery and conceal defects

e) Scaffold Planks are not acceptable if they have crack or damaged ends

f) Warped planks shall not be used on scaffolding platform

Platform

a) All the planks / gratings shall be butted without any gaps.

b) Minimum width of platform shall be 900mm for inspection and very light weight jobs. (As shown in figure 65) Minimum width of platform shall be of 1200mm for general purpose works

c) Metal planks of similar width and thickness (250mm X 38mm) will be used to deck out individual scaffolds and supported every 1.5meters maximum by transom

d) Guard rails (top rail, mid rail & toe board) must be available to all the scaffoldings which is 2m height from the ground level.

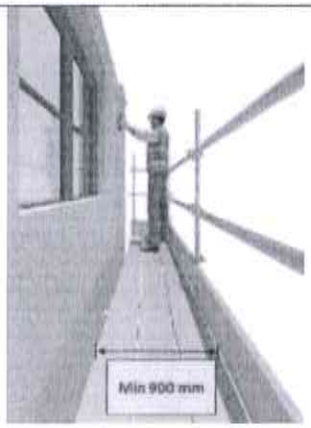


Figure 63 - Minimum Width of Working Platform

Guard Rails:

a) Top rail shall be minimum 950mm to 1150mm from the working platform. (Ref fig 66)

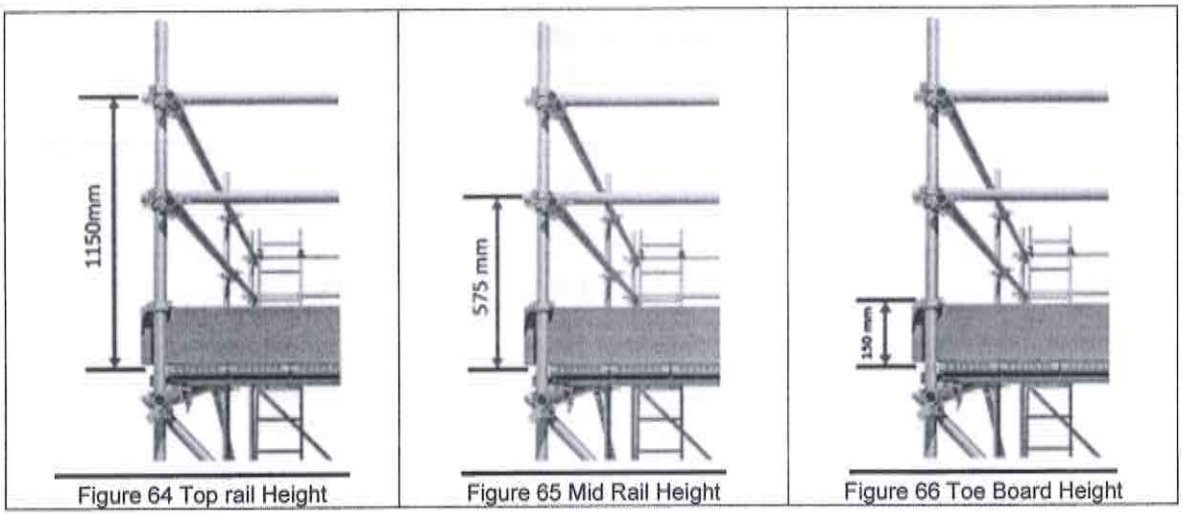


Figure 64 Top rail Height | Figure 65 Mid Rail Height | Figure 66 Toe Board Height

b) Mid rail shall be halfway between the working platform and top rail, However, height of mid rail from the top of toe board shall not be more than 470mm. (Ref figure 67)

c) Toe Board shall be at least 150mm height from the platform. (Ref figure 68)

Storage of Scaffold Materials

a) All scaffolding materials will be neatly stored in scaffold racks or similar kind of arrangements. No materials should store directly to the ground. (Ref figure 69)

b) Tubes shall be sorted and stored by its length.

c) Couplers shall be stored by its types in box or similar arrangements. (Ref figure 70)

d) Scaffold Gratings will be stored by thickness and length, And no more than 1.5-meter height from the ground limit

e) All scaffolding materials will be sorted for conformance and colour coded for verification. Non - confirming materials shall not be stored in the same location and shall be quarantined to avoid inadvertent use of defective materials.

Figure 67 Scaffold Tubes Storage

Figure 68 Scaffold Coupler Storage Box

5.2 General Requirements for Scaffolding

Foundation / Base for Scaffold:

a) The ground or in the beam where the scaffold will be erected the place shall be inspected carefully prior to erect the scaffold. Base of the scaffold should take without failure of dead load + four times of intended load (D+4L)

b) Footings shall be level, sound, rigid and capable of supporting the intended load to the scaffold without setting or displacement.

c) Scaffold standards should be pitched on a base plate 150 X 150 mm and thickness of at least 6mm on plan, typical steel base plates to IS, BS or OSHA standards. (As shown in figure 70)

d) Sole Boards may be omitted if the scaffold is founded on a hard surface, such as steel or structural concrete, that is even level and of adequate thickness to prevent the penetration of the scaffold tubes. However, it is recommended that base plates are used routinely. (As shown in figure 71)

e) Base lift is essential for all the scaffolds, such base lift shall be erected as close as possible (i.e. 150mm) to the ground or floor level. (As shown in figure 72)

f) Base lift is not necessary where scaffold erected on pavement, near door way or where person needs to walk or cross over. Such lifts shall erect 2.44m of clear head room, But should not be more than 2.7m. (As shown in figure 73)

g) To prevent an insecure base for scaffold legs the use of bricks, concrete blocks or other unstable materials shall not be used.

h) Screw jack shall be used to compensate the ground variations. Such screw jack shall not be extended 2/3 of its total threaded length. (As shown in figure 74)

Figure 69 Base Plate

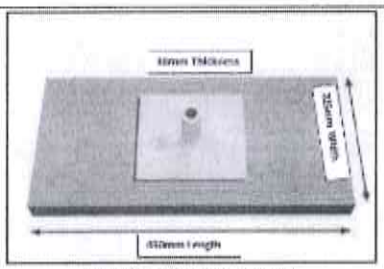


Figure 70 Sole Board

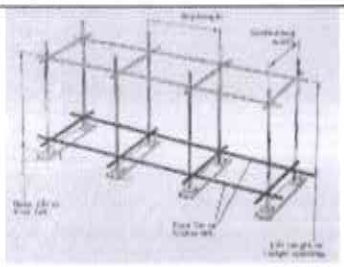


Figure 71 Base Lift

Figure 72 Pavement Gantry

Two third of threaded part.
Figure 73 Screw Jack

Sole Board / Plate is necessary where the ground is soft / slippery area. Such boards shall be at least as per given below,

Table 2 - Sole Board Sizes

Particulars	Area	Min. Width & Thickness
Single Standard	1000 cm^2	225 X 38 mm
Double Standard	3400 cm^2	225 X 38 mm
Soft Ground (one Standard)	1700 cm^2	225 X 38 mm

Sloping Foundation / Nearby Excavation:

a) Within 1 vertical to 10 Horizontal sloping ground can be compensate with screw jack arrangement, such screw jack shall not be extended more than 2/3 of its threaded portion.

b) Where the scaffold is sited adjacent to an excavation, edge of a slope or embankment, the sole boards must be set back at least 1.5times depth from the edge. (As shown in figure 75)

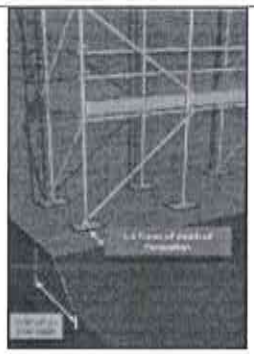


Figure 74 - Scaffold near slope or excavation

Standards:

a) Each standard should be supported by a suitable foundation, unless it is specially designed.

b) All joints should made with end-to-end sleeve couplers only. Joints in standards should be staggered, so that adjacent standards are not joined with the same lift level. (Ref figure -76).

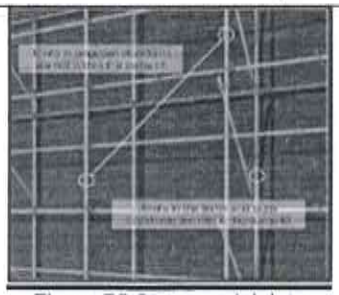


Figure 75 Staggered Joints

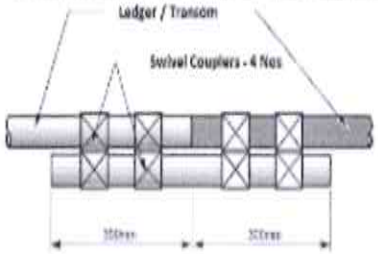


Figure 76 Tube Splicing

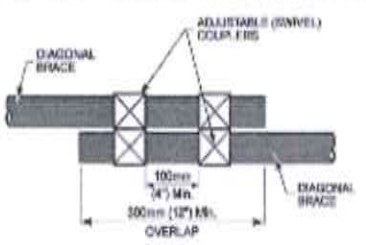


Figure 77 Tube Overlap

c) An alternation patters of joints is often used to achieve this, as shown in below illustration. Any pair of inner and outer standards should also not be joined within the same lift.

d) It is necessary to join all four standards comprising a bay within the same lift, two of the joints must be spliced (As shown in figure -77).

e) If the scaffold extends above the building, joints should be avoided in the projection area to avoided in the projection area to avoid it 'lifting off'. In these cases, and when erecting any free-standing scaffolding, the standards should be joined in a manner that prevents this, for example by splicing the points

f) A mixture of longer and shorter tubes shall be used when constructing long ledgers, transom or tall standards.

Ledgers:

a) All the ledgers shall be coupled with right angle couplers only.

b) All the ledgers shall be connected inside to the standards.

c) Ledgers shall overhang minimum 50mm and maximum 150mm

d) All the ledgers shall be in plumb with no deflections in place

e) Joints in legers shall staggered (As per given figure – 79)

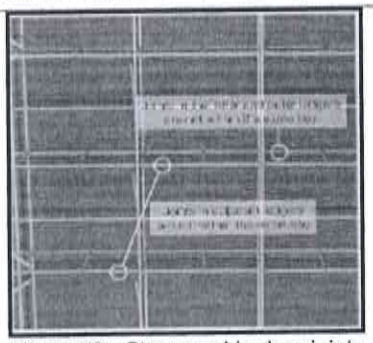


Figure 78 - Staggered Ledger joints

Transom:

a) All the transoms shall be coupled with right angle couplers, except on boarding level. At boarding / platform level (only) single / putlog coupler shall be used.

b) All the transoms shall be connected to inside the standards.

c) Transoms shall have overhung minimum of 50mm and maximum of 150mm or maximum 4 times thickness of boards or gratings.

d) The transom tubes should be sufficiently long to span the width of the scaffold, allowing a minimum projection of 25mm beyond the couplers

e) Spacing of transoms shall be minimum of 900mm and maximum of 1.5m according to the load specifications

f) Transoms may be extended inwards and outwards, as necessary, for the purpose of butting the face of the building and fixing the longitudinal bracing if these are intended.

g) When transoms are required to support one or two inside boards each transom should provide full support to the boards

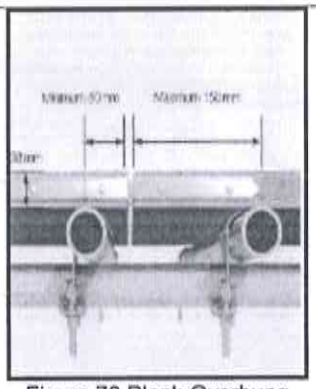


Figure 79 Plank Overhung

Bracing:

a) Bracings shall be in the form of façade, longitudinal, transverse, and ledger to ledger or plan bracing.

b) All the bracing must be connected with in the node point.

c) Bracings shall be all the four sides up to the full height of the scaffold.

d) Longitudinal bracing shall be in the form of a zig-zag arrangements of tube running from the bottom to the top of the scaffold between a pair of adjacent standards. (As per given figure- 81)

e) Ledger to ledger bracing shall be coupled with right angle coupler from one level to adjacent another level ledger. (As per given figure- 82)

f) A plan brace shall be provided in the direction of plane. Plan bracing shall be coupled to standards to standards with right angle couplers. Such plan bracing shall be essential to mobile and tower scaffolds.

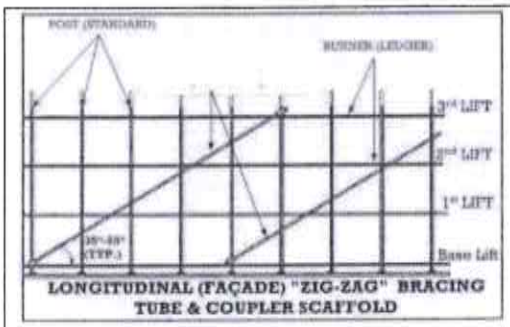


Figure 80 Longitudinal Brace

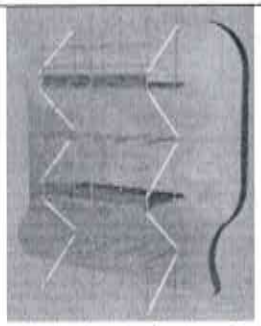


Figure 81 Ledger to Ledger Bracing

Figure 82 Plan Bracing

Lift Height:

a) Lift height shall be planned by considering the intended use of the scaffold.

Figure 83 Lift Head Room

b) A lift height of 1.8 to 2 meter is typical if the scaffold is required for walkthrough access, as this is sufficient for most personal to walk along the platforms with unhindered headroom. (As per given figure- 84)

c) When providing scaffold for bricklaying and similar trades where the scaffold is raised with the progress of the work. Such scaffold typically requires a lift height between 1.35m to 1.5m as this is the greatest height at which the work can be undertaken comfortably without introducing another lift.

Entry & Exit:

a) All the boarded lifts and boarded section or platform should be protected with guard rail system without any compromise.

b) Access opening shall at least 450mm wide & 650mm length for entry from inside ladders. Such opening shall be closed by top rail arrangement to secure users from fall. (As per given figure- 85)

c) Or, Self-close drop bar also be used at top rails or Gate arrangement can be made, however entry & exit point should not be kept open as to prevent fall from the working / landing platform. (As per given figure- 86)

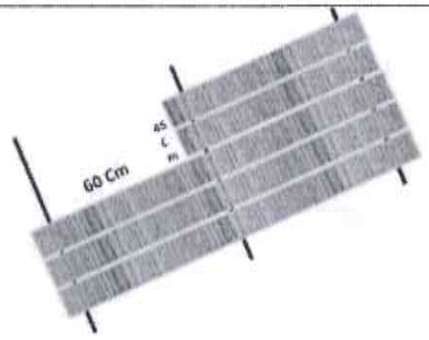


Figure 84 Access Opening

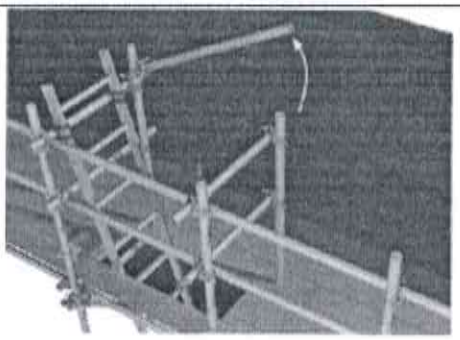


Figure 85 Self Closing Drop bar

5.3 Types of Scaffold:

Tube & Coupler Scaffold

a) Scaffold shall be designed by a qualified person and shall be constructed and loaded in accordance with that design.

b) Scaffolds shall be erected, moved, dismantled or altered only under the supervision and direction of a competent person qualified in Scaffold Erection, moving dismantling or alternation.

c) Only experienced and trained employee selected for such work by the competent person shall perform such activities. Training card or sticker certifying the level of training and qualification of the individual shall designate employees who have been trained.

d) Each scaffold and scaffold component shall be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it.

e) Supported scaffolds with a height to base width ratio of more than four to one i.e. 4:1 shall be restrained from tipping by ties, buttress, rakers or guys or equivalent means.

Internal Static Tower	External Static Tower
1: 4	1: 3.5

Table - 3 Base to Height Ratio (Stationary Tower)

f) Where persons are required to work or pass under Scaffolds, it shall be provided with a safety netting or protection fan or equal kind of arrangements. The netting must be attached in such a way as to be secure and strong enough to hold expected load requirements. Barricades may be substituted if necessary.

g) Platform shall be fully butted without any gap. And the maximum gap in working platform shall be 25mm. this is applicable for when use of scaffold planks. (As per given figure- 87)

h) Scaffolds should not block or prevent access to fire protection and / or safety equipment

i) Scaffolds should be identified either by green, yellow or red tags. (Ref figure- 88)

j) Scaffold erectors shall comply with fall protection requirements as outlined in the company safety standards, fall prevention / protection while erecting scaffolding.

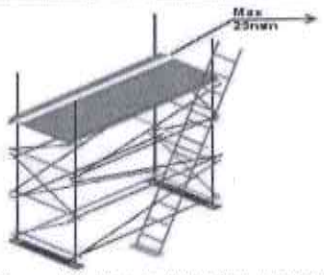


Figure 86 Gap in Working Platform


Figure 87 - Scaffold Tags

k) Practical training for scaffolders working at heights is incorporated in the scaffolders training program. All safety harnesses utilized on the project must be uniquely identified with an identification number. All inspection shall take note of the number and serve to verify status and condition. This will also serve as records to identify the person who respects the safety harness.

l) To prevent an insecure base for scaffold legs the use of bricks, concrete blocks or other unstable material shall not be used.

m) Scaffolds should be properly braced with cross braces and / or diagonal braces to laterally secure vertical members. The length of cross braces should automatically square and align vertical – members so the erected scaffolds are always plum, square and rigid.

n) Scaffolds should be cleaned off upon completion of daily work by the craft using the scaffold

o) A toe board should never be used to aid access to a working platform

p) Tools or materials shall be removed or secured from mobile scaffolds, so they cannot fall or roll of when a scaffold is moved

q) The responsible supervisors using the scaffold should ensure tools, materials, and debris does not accumulate in quantities that create a falling objects or tripping hazard.

r) Scaffolds should be visually checked before use by the user, physically inspected by competent person every seven days, for quality/safety and tags signed/ updated accordingly

s) All the scaffolds shall be subject to revalidate after adverse weather condition and after any modifications carried out

t) When dismantling scaffold structures, materials should not be thrown down. The material should be lowered to prevent damage to scaffold materials and danger to the surrounding area or personnel

u) Access scaffolds shall not be used to store materials.

Underhung Scaffold;

a) Suspension points of hanger tubes shall be securely fixed to prevent their being dislodged by all potential forces acting upon them

b) Only standard scaffold materials (i.e. tube, LVL plank / gratings and coupler) should be used on underhung scaffolds.

c) When a hanger tube is coupled to a horizontal tube that is placed across the top of a supporting beam, a second horizontal tube shall be attached underneath the supporting beam with a pair of girder couplers. Both horizontal tubes shall be attached to the hanger tube with right-angle couplers. (As per given figure- 89)

d) No damaged materials are allowed to use in underhung scaffold.

e) Only one working platform allowed on underhung scaffold, if more than one platform, such scaffold should be designed by a competent person. Whenever possible vertical hanger tubes should be in one length. Where joints are necessary, the tubes should be single lapped using at least four couplers.

f) Scaffold shall not be permitted to coupled or supported with permanent hand railings

g) Proper access and egress should be provided to all the underhung scaffold.

h) Plan bracing shall be provided to underhung scaffold and the same should be coupled with right angle coupler

i) Each hanger tube, including connecting hardware, used on scaffolds shall be capable of supporting without failure at least 6 times the maximum intended load applied or transmitted to that hanger.

j) A competent person prior to each work – shift and after every occurrence that could affect a hanger integrity shall inspected hangers for defects.

k) Ledgers and transoms shall be coupled to hanger tubes using right- angle (not swivel) couplers only.

l) A check coupler should be installed at top of hanger, bottom of the platform and under the trapeze tube.

m) Only drop-forged girder couplers shall be used for the support of hanging scaffolds. Pressed type girder couplers shall not be used for the support of hanging scaffolds

n) Hanger tube spacing shall comply with the tube and coupler post spacing requirements for the load duty of scaffold.

o) Trapeze tubes shall be installed approximately 600 mm below the ledgers to assist in erection, modification and dismantling, and also to serve as a secondary support should the runner slip. (As per given figure- 90)

p) At least one intermediate transom shall be installed when the hanger tube spacing is more than 1.5 meters apart in the longitudinal direction. See above picture,

q) While performing welding from underhung scaffold, the scaffold shall be separately earthed. No welding earth / return cable shall be connected to any part of scaffold

r) Boards / gratings should be secured at both ends of each boards / grating. There should not be any gaps allowed at working platforms. If so, beneath the scaffold shall be cordoned off by hard barricades.

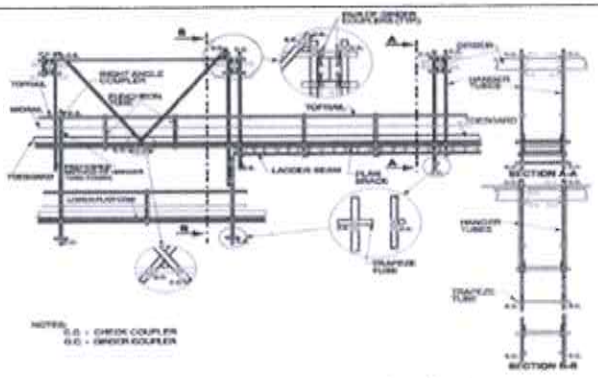


Figure 88 Underhung Scaffold

Figure 89 Trapeze Tube

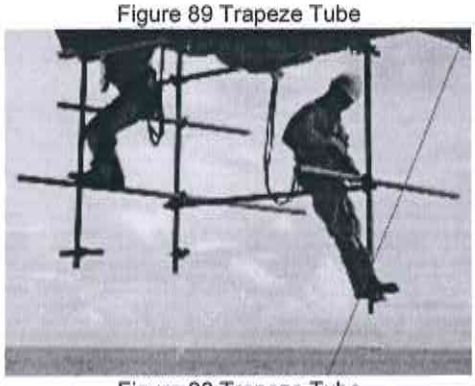


Figure 90 Trapeze Tube

System Scaffold (Cup Lock Scaffolding):

a) All the system scaffold erection / dismantle, and alteration shall be carried out as per manufacturer instructions.

b) Correct lengths of ledgers, transoms and lift heights shall be used required for load rating of the scaffold. The applied loads on posts (standards), ledgers, transoms and diagonal braces shall not exceed the load carrying capacity of the manufacture's specifications

c) Unless otherwise justified and stated in writing by the system scaffold manufacturer, the maximum number of working levels and total planked levels shall also apply to system scaffolds with the applicable load rating.

d) Components from different scaffold manufacturers shall not be intermixed.

e) U-head Jack should not be used under the bottom of cup lock vertical standard as a base Jack.

f) Unless otherwise specified in manufacturer's instructions, all system scaffolds shall be vertically braced in both directions with diagonal braces (as close to 45 degrees as possible) to its full height for each 10 meters of run.

g) Bracing for system scaffolds shall be specially designed for the grid size of the scaffold. However, where specially designed system bracing cannot be used, tube and coupler scaffold components may be used for bracing of system scaffolds

h) All cup lock standard must be made of 48.3 mm diameter x 3.2 mm minimum thickness with high grade steel.

i) Lower fixed cups of standard should be at 500 mm intervals (not to be at 1 meter) and top cup should accommodate four components.

j) Spigots pin should be 150 mm long with two locking pins (bolts) for two standard connections or splicing (handmade spigot pin not allowed)

k) Lowest bottom cup of standard must be at 80 mm from the bottom to improve structural strength

Mobile Scaffold;

a) Scaffolds shall be plumb and erect in firm level and squared and should rest on a level surface. All brace connections shall be secured.

b) Scaffold casters and wheel shall be locked with positive wheel and or wheel and swivel locks, or equivalent means, to prevent movement of the scaffold while the scaffold is used in a stationary manner. Where feasible, mobile scaffold should be tied off.

c) Scaffolds shall be braced by cross, horizontal or diagonal braces, or combination thereof, to prevent racking or collapse of the scaffold and secure vertical members together laterally so as to automatically square and align vertical members.

d) The height to base width ratio shall not more than mentioned in below table.

Internal Mobile Tower	External Mobile Tower
1: 3.5	1: 3

Table - 4, Base to width ratio - Mobile Scaffold

e) Plan (horizontal) bracing shall be installed at the base, at the top, and at least every third lift of all mobile and tower scaffolds to prevent racking (twisting). (Ref figure-91)

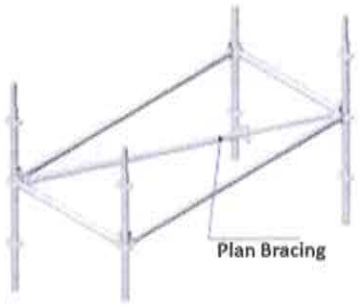


Figure 90 Plan Bracing

f) A ladder or stairway shall be provided for proper access and egress and shall be affixed or built into the scaffold and so located that when in use it will not have a tendency to tip the scaffold.

g) Ladder shall be preferred to fix from inside to control the collapse of scaffold. (As per given figure- 92)

h) The working area of any platform shall not extend outside the scaffold base dimensions. Cantilevered working areas are not permitted for mobile or tower scaffolds. (Ref figure- 93)

Figure 91 Inside Ladder in Mobile Tower

Figure 92 Cantilever Platform (Not Permitted)

i) All the caster wheel shall be in locked position during person working on or using mobile scaffold.

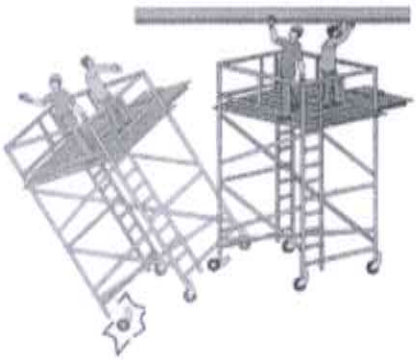


Figure 93 - Mobile Scaffold Safety

The work platform height shall not exceed 3.5 times the minimum base dimension of any mobile or tower scaffold. Where the basic scaffold does not meet this requirement, outriggers shall be installed on the scaffold to achieve this least base dimension, or provisions (such as guys, ties, or rakers) shall be taken to stabilize the scaffold against tipping

j) Employees shall not be allowed to travel / over reach from scaffold and on scaffolds while they are being moved from one location to another. (As per given figure- 94)

5.4 Stability of Scaffolding

Stability;

a) The prevention of inward & outward movement of a scaffold shall be achieved by the use of ties being in place every 4meters (16 m^2) in vertical as well as horizontally.

b) All the ties should be made only with Right Angle Coupler / Girder couplers

c) Ties shall be staggered in location wherever the building surface permits

d) Ties shall be in the form of below listed,

- Box Tie
- Lip Tie
- Reveal Tie
- Through Tie
- Anchor Tie

Box Tie;

a) The most common form of box tie is comprising four tubes connected around the column with right angle-angle couplers. (As per given figure- 95)

b) Box ties shall be connected to inner as well as outer standards / ledgers.

c) Box ties should be connected with right angle coupler / Girder couplers in steel work

d) Packing shall be used to protect the surface (if required)

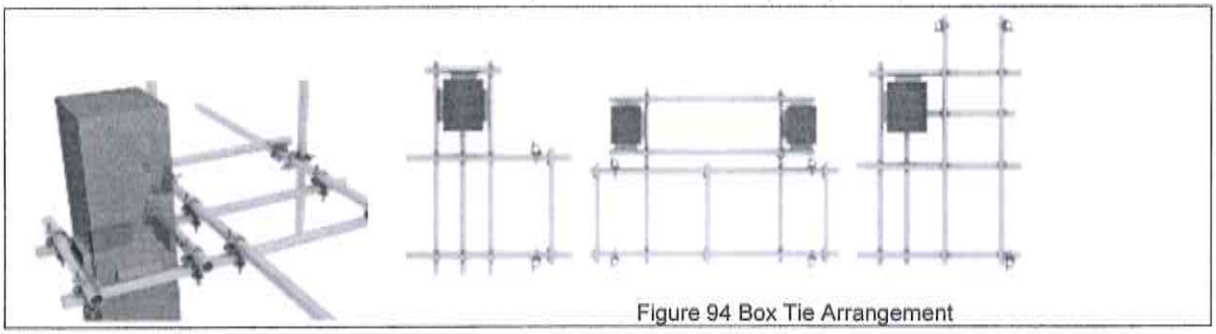


Figure 94 Box Tie Arrangement

Lip Tie

a) Lip ties may be used where it is not possible to provide box ties or through ties. A lip ties is an "L" shaped arrangement of tubes and fittings that hooks around part of the building structure. (As per given figure- 96)

b) Care should be taken to ensure that the strength of any building feature used to support a lip tie is adequate, particularly if it is a parapet or similar structure. Coping stones on parapets are not normally sufficiently stable to safety support a scaffold tie. Cavity parapets are especially vulnerable.

c) Lip ties resist outward movement, but not movement of the scaffold toward the building, so they should be used in conjunction with butting structural transom connected with right – angle couplers

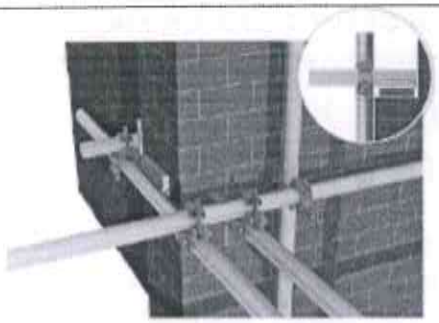


Figure 95 Lip Tie

Reveal Tie;

a) Reveal ties may be used in cases where it is not possible or practical to use other tying methods, for example when it is not practical to open a window to fit a through or box tie.

b) Reveal ties are only suitable as light duty ties. As they rely entirely on friction to prevent the inward and outward movement of the scaffold, reveal ties should comprise no more than 50% or the ties to a façade and regular checks should be made throughout the life of the scaffold to ensure they remain tight.

c) The tie tube should be fixed to the reveal tube with a right-angle coupler within 150mm of the face of the opening opposite to the reveal pin. It should also be fixed to the scaffold with right angle couplers. (As per given figure- 97)

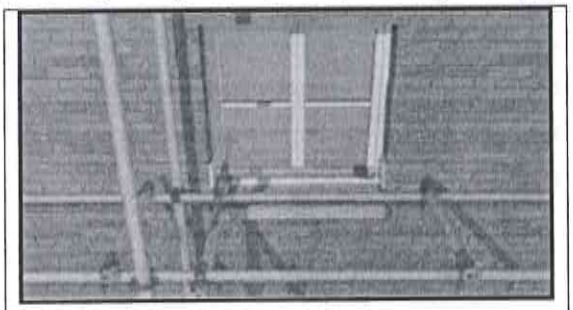


Figure 96 Reveal Tie

Through Tie;

a) Are fitted through windows or other openings. They rely on the tube at the inside of the opening to prevent outward movement and a similar tube at the outside of the opening to prevent movement inwards. (As per given figure- 98)

b) The inside tube should preferably be placed vertically and rest on the floor so that it cannot slip downward, although it may be places horizontally. The tie tube should rest on the sill for the same reason, although it can instead be placed under the lintel. The tie tube should be placed as close to one of the edges of the opening as possible.

c) When it is not possible to place an outside tube, an adjacent structural transom should butt the outside surface of the wall.

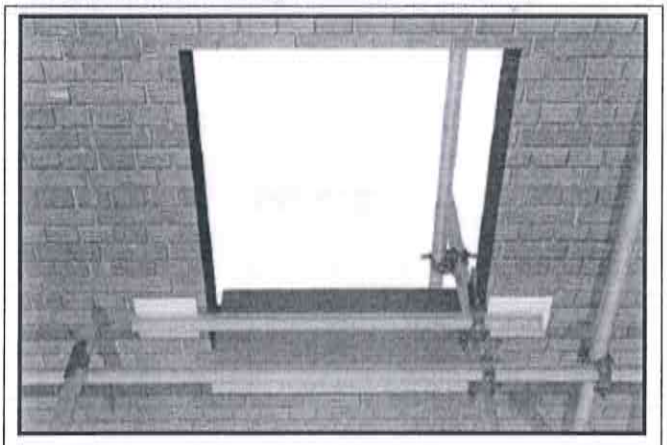


Figure 97 Through Tie

Anchor Tie;

a) Drilled or cast-in anchorages attach scaffolding to a façade with components installed directly into the building fabric such as self-tapping screws or threaded sockets. (Ref figure- 99)

b) All the anchor ties shall be installed as per manufacturer guidelines.

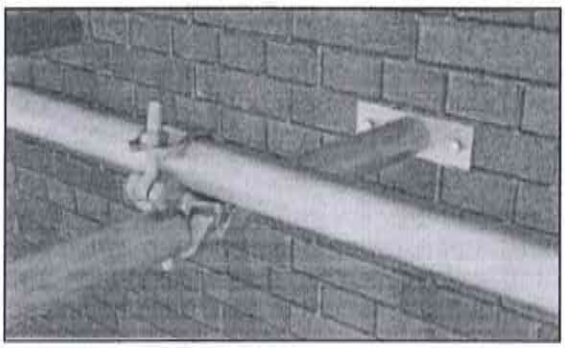


Figure 98 Screw / Anchor Tie

Rakers;

a) Rakers can provide adequate stability for unclad independent scaffolding up to 6-meter height and may be used in the place of ties for such scaffolds following the guidance in this section.

b) For scaffolds greater than 6-meter in height, raking tubes may be used in place of ties at the first or second lift if the required tie duty of the scaffold does not exceed 2.7kN which is the safe load capacity of a raker in the horizontal direction.

c) The rakers must be suitably restrained at their base to prevent outward and settlement movement. Typically, this will require a vertical tube driven into the ground to resist outward movement together with a longitudinal tube connected to the raker with a right-angle coupler to resist downward movement. A pair of sole boards may be placed either side of the raker to support the longitudinal tube.

d) Each raker shall be a single piece of scaffold tubing not more than 6.4 meters in length. Rakers shall not be joined (spliced) together. The raker angle above horizontal shall not be greater than 75 degrees (4:1) or less than 65 degrees. Only one additional lift may be installed on the scaffold above the raker tie-in point. The top of the raker shall be coupled to the scaffold no higher than the third lift. (Ref figure- 100)

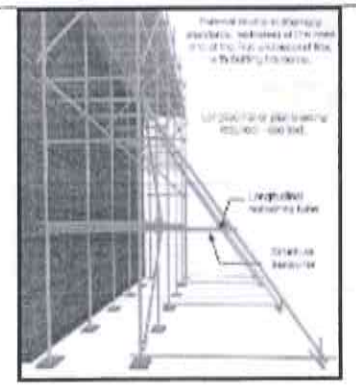


Figure 99 Raker Arrangement

Access & Egress;

Three types of ladders can be allowed to use inside the premises,

- Fibre Ladder
- Aluminium Ladder
- Metal Ladder

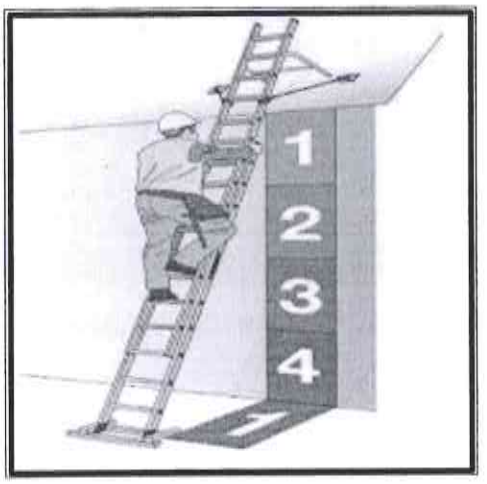


Figure 100 Ladder Arrangement

a) All the ladder shall be provided inside the platform except the 1st Ladder from the ground or floor level

b) Single ladders or Extension ladders only permitted in scaffold work

c) Damaged ladders should not be permitted inside the construction site premises.

d) If damaged ladders found at scaffold, the same should be discarded from the scaffold and sent to quarantine immediately

e) All Straight ladders and shall be placed at a slope of 4:1 (for every 4 meters of vertical rise, the base set 1 meter out. And, the ladder should extend at least 1 meter or 3 rungs from the platform to get safe access and egress (As per given figure- 101)

f) If Scaffold exceeding 15meter in length there shall be another ladder access shall be provided. i.e. every 15 meter the scaffold should have 2 access

g) If 3-meter Ladder, should be secured at least in 2 places i.e. top & bottom. If above 3-meter ladder use it shall be secured at 3 places i.e. top, middle and bottom.

h) Ladders shall have uniformly spaced rungs (all rungs shall be the same distance apart), between 250 mm and 360 mm on centre. A rung spacing of 300 mm is preferable.

i) The rungs of portable metal ladders shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize the possibility of slipping

j) The base supports of all ladders shall be equally supported on a firm level surface. Boxes, blocks, barrels, etc., shall not be used as a means of support.

k) The bottom rung of ladders shall not be more than 600 mm above the lower level used to mount the ladder.

l) The area at the base of a ladder shall be kept clear at all times

m) Ladders shall not be used in a horizontal position as platforms, walkways, or scaffolds

n) Ladders shall not be supported on their rungs. Rungs shall not be used to support scaffold planks.

o) Both side rails of a ladder shall be evenly supported at the upper resting-place. Side rails should be securely tied off to prevent movement. Where secure fixing is impractical, other measures shall be taken to prevent movement by securing at the base, using side guys, or stationing a man at the base.

p) When a ladder could be struck by moving vehicles or equipment, a flagman shall be stationed to warn off drivers, or a substantial barricade with flashers erected around the ladder base

q) If a ladder is erected near a doorway, the door shall either be locked shut, or secured in the open position with a man on guard to prevent anyone from using the door.

r) The minimum vertical toe clearance shall be 100 mm (4 inches) above the top edge of the rung. (As per given figure- 102)

s) Metal ladders, ladders with metal reinforced side rails, and ladders that are wet shall not be used near electrical equipment or while using electrical tools. Only wooden or fiberglass ladders shall be used for electrical applications. Portable metal ladders shall have a warning notice attached to guard against use near electrical equipment

t) Only one person shall be on a single-rung ladder at a time. Worker shall use three points of contact any time i.e. one leg two hands or one hand two legs while ascending & descending ladders. (As per given figure- 103)

u) Workers shall not carry tools and materials in their hands when climbing a ladder. Tools may be carried in secure pockets or on special tool belts. Material or heavy tools shall be raised and lowered by rope. (As per given figure- 104)

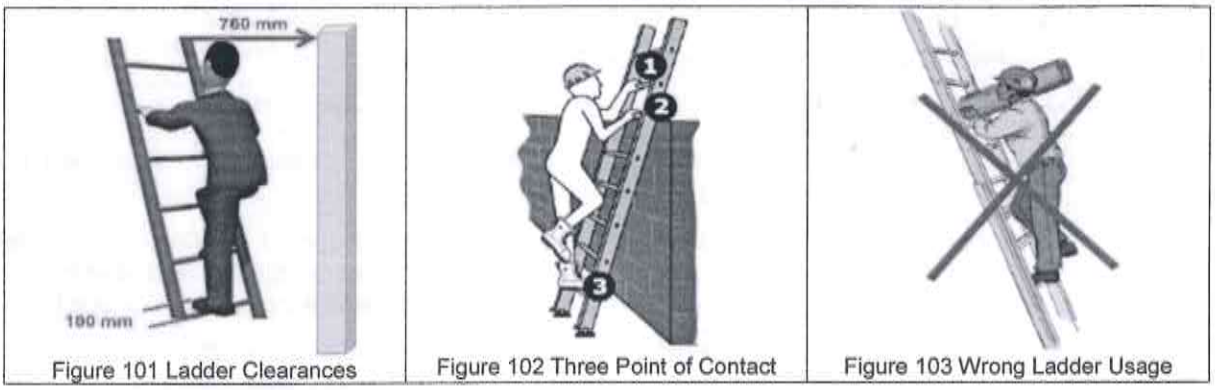


Figure 101 Ladder Clearances | Figure 102 Three Point of Contact | Figure 103 Wrong Ladder Usage

Load Capacity & Design;

a) Each scaffold and scaffold component shall be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it. Materials shall be evenly distributed on platforms and not concentrated in one area. Access platform must not be used to store materials such as cable, shuttering materials, beams etc…

b) All scaffolds shall have a specified load rating, corresponding to the maximum intended load, of either Light-duty, Medium-duty, General Purpose or Special-duty. For design, the maximum intended load (live load) shall be taken as the scaffold's load rating

c) The maximum deflection for platform units shall not exceed 1/60th of the span length when supporting any of the above (un-factored) concentrated or uniformly distributed maximum intended loads.

d) Caster rating on mobile scaffolds may be the limiting factor in calculating the maximum allowable load for scaffolds. Because caster ratings vary, the manufacturer's specifications for the rating of casters in use should be checked.

e) All the load calculation / Plan shall be carried out by the contractor structural engineer who has at least 8 years of experience in his field. And the same shall be submitted to client at least 72 hours prior to start scaffold erection for approval.

f) Un sheeted access scaffold and working platform may be constructed up to the height of 15m without design calculation provided that they are constructed in accordance with the recommendations of this procedure and that they are not carry greater loads nor have greater bay lengths that those given in this procedure.

g) Load class chart shall be as per given table (Table – 3, 4 & 5)

Tower Scaffold;

Table 3 Tower Scaffold Specifications

Load Class	Minimum Dimensions (L & W)	Maximum Dimension (L & W)	Maximum Load
1 – Very Light Duty	1.2 m X 1.2 m	2.7 m X 2.7 m	75 Kgs / M^2
2 – Light Duty	1.2 m X 1.2 m	2.1 m X 2.1 m	150 Kgs / M^2
3 – Heavy Duty	1.2 m X 1.2 m	1.8 m X 1.8 m	200 Kgs / M^2

Independent Scaffold;

Table 4 Independent Scaffold Specifications

Load Class	Maximum Dimension (L & W)	Maximum Load
1 – Light Duty	2.4 m X 1.2 m	150 Kgs / M^2
2 – General Purpose	2.4 m X 1.2 m	200 Kgs / M^2
3 – Heavy Duty	1.8 m X 1.8 m	300 Kgs / M^2

Bird Cage Scaffold;

Table 5 Bird-cage Scaffold Specifications

Load Class	Maximum Dimension (L & W)	Maximum Load
1 – Very Light Duty	2.1 m X 2.1 m	75 Kgs / M^2
2 – Light Duty	1.9 m X 1.9 m	150 Kgs / M^2
3 – General Purpose	1.7 m X 1.7 m	200 Kgs / M^2

Raising & Lowering Scaffold Materials;

a) Many scaffolds require a lifting device to raise materials during their construction, which may sometimes be left in place for the users of the completed scaffold.

b) Gin wheels (small pulleys) are the most widely used type in scaffold works / industry.

c) Several types of gin wheel are available, but a typical variety is the right-type gin wheel, which provides a ring fitting that slides over a supporting tube. The gin wheel is held in position with a right-angle coupler at each side of the ring. The rope should be of the correct diameter to fit within the rim of the gin wheel, typically 18mm and marked with its safe working load

d) When using a gin wheel with an independent scaffold, the horizontal tube supporting the gin wheel should be connected to two standards extending above the top lift, one at the inner face of the scaffold and one at the outer, using right angle couplers.

e) The suspension point of the gin wheel should be no more than 750mm beyond the outer standard to avoid overloading the horizontal tube. (As per given figure – 105)

f) The loading on a gin wheel should not exceed 50 kgs in any manner. (As per given figure – 106)

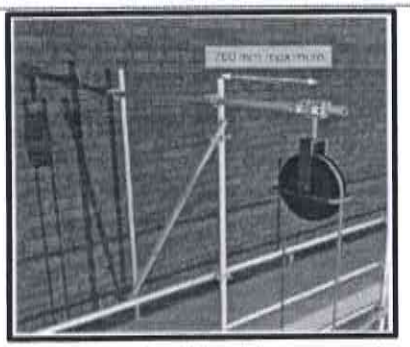


Figure 104 Gin Wheel Arrangement

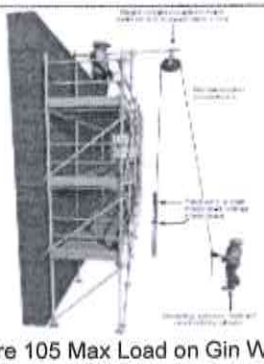


Figure 105 Max Load on Gin Wheel

g) **KNOTS:** Normally while lifting of scaffold materials the following knots are being used.

h) **Half Hitch:** The half hitch is a simple overhand knot, where the working end of a line is brought over and under the standing part. Insecure on its own, it is a valuable component of a wide variety of useful and reliable hitches, bends, and knots. (As per given figure – 107)

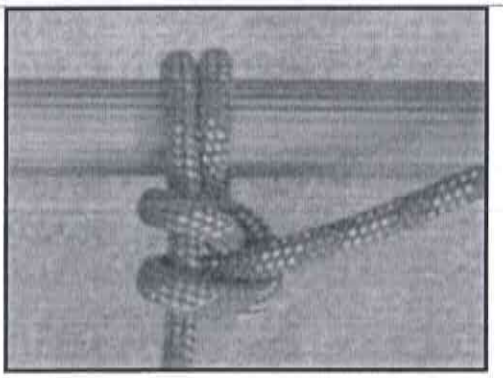


Figure 106 Half Hitch

i) **Rolling Hitch:** The rolling hitch is a knot used to attach a rope to a rod, pole, or another rope. A simple friction hitch, it is used for lengthwise pull along an object rather than at right angles. The rolling hitch is designed to resist lengthwise movement for only a single direction of pull. (As per given figure – 108)

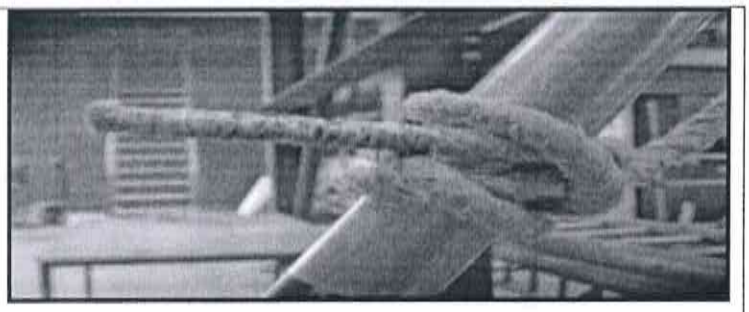


Figure 107 Rolling Hitch

j) **Figure 8 Knot:** The figure-eight knot or figure-of-eight knot is a type of stopper knot. It is a method of stopping ropes from running out of retaining devices. (Ref fig - 109)

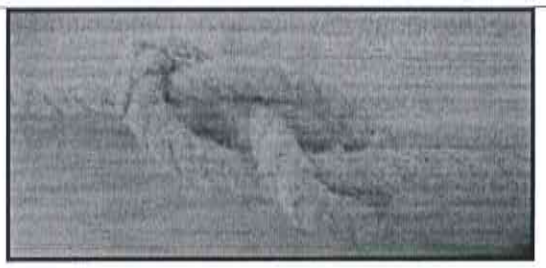


Figure 108 – figure-eight knot

a) **Timber Hitch:** The timber hitch is a knot used to lift a single length of rope to a scaffold planks. Secure while tension is maintained, it is easily untied even after heavy loading. (Ref fig – 110)

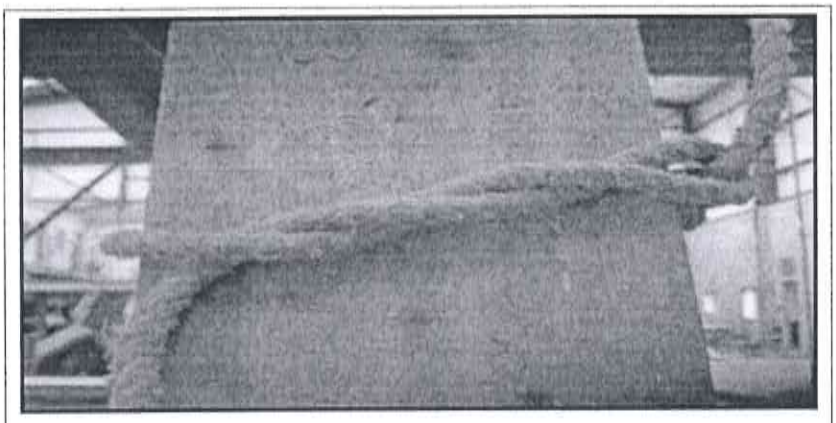


Figure 109 Timber Hitch

5.5 Scaffolding Design

Scaffoldings to be erected which are falling under the list below shall be designed and scheme has to be prepared by Qualified Persons.

- ❖ Scaffold over 20 meters (65 feet) tall
- ❖ Hanging scaffolding over 6 meters (20 feet) wide
- ❖ Cantilever Scaffolding over 1.8 meters (6 feet) wide
- ❖ Heavy duty Access Scaffolding with a Load Capacity exceeding 300 Kg/m2
- ❖ Any complex Scaffolding as defined by AMNS Project team or Scaffolding Specialists.

- Qualified Persons will plan, design, or modify scaffold systems. Special job needs (configuration, location of access, material handling) will be communicated to the Qualified Person by Project concerned Site in-charge to prepare the design specifications for a scaffold system.
- A qualified scaffolding design engineer shall design taking in to consideration of technical calculations and prepare scaffolding scheme which shall be adhered by scaffolding supervisor while erecting scaffold

5.6 Scaffold Inspection

a) A competent person shall inspect scaffold components for visible defects as they are being used for erection, alteration or dismantling or in the scaffold storage place / yard, and after any occurrence that could affect a scaffold's structural integrity. Any defective components shall be immediately discarded.

b) Scaffold should be inspected when, before the first-time use, after any modification carried out, adverse weather changed (i.e. heavy rain, heavy wind) and after every 07 (seven) days without fail.

c) Before erecting and while dismantling scaffold, the Qualified Person shall inspect the components. Scaffold components must be straight and free from bends, kinks, dents and severe rusting. Any defective components shall be immediately discarded. Inspections should include the following components.

I. Scaffold Tube
II. Scaffold Planks(anti skid)
III. Couplers and fittings
IV. Ladders
V. 'H' Frame
VI. Cup lock Materials (Vertical, Bracing, Ledgers and Intermediate Transoms)
VII. All the system scaffold components

Scaffold Tagging System;

a) The use of scaffold tagging is mandatory. A competent person shall tag all the scaffolds at site. No one shall work on an untagged scaffold. Untagged scaffold shall be "off limits" to all personnel not authorized to erect, dismantle, or make repairs.

b) Normally Green, Yellow & Red colour tags shall be used at scaffolds. All the tag shall be fixed and filled only by scaffold inspector. No one authorized (except scaffold inspector) to modify or fix the scaffold tags.

c) Alternate or equivalent tagging systems are allowed provided they meet the intent and requirements of this procedure.

d) Tag holder shall be place at near & visible area near to the access, Tag holder shall be place on the scaffold overhung tube with any coupler secured. i.e. accidently the tag holder shall not be removed the coupler nut shall be tightened.

e) **Green Tag:** "Safe for use" to be placed to scaffolds at the access points that comply with all AMNS and regulatory requirements. Green tag shall be filled / written by the competent scaffolding inspector only. (As per given figure – 111)

f) **Yellow Tag:** "Safe for use – Under conditional" to be placed to scaffolds at the access point that comply with all AMNS and regulatory requirements. Yellow tag should by filled / written by competent scaffolding inspector only. (As per given figure – 112)

g) Scaffold user should wear full body harness and follow 100 % Tie off procedure while using yellow tag scaffold. The components in yellow tag scaffold may be removed according to the work requirements. But at the same time from missing components, the scaffold structural integrity should not be compromised at any time.

h) **Red Tag:** "Not Safe for Use" to be placed on scaffolds that are damaged, defective, during altering, being constructed or being dismantle where no access is permitted by any personnel except trained scaffolder. Red tag shall be located on visible location preferably at the access point. Red tag should be placed once the base lift will be completed, normally placing the red tag is the duty of Scaffolding supervisor / area safety steward or officer. (As per given figure – 113)

Figure 110 Green Tag

Figure 111 Yellow Tag

Figure 112 Red Tag

5.7 Personnel involved in Scaffolding

Scaffolders:

- All scaffoldings are to be erected/ modified/ dismantled by trained and certified scaffolders only.
- All scaffolders are required to attend work at height training & possess height pass.
- Use tools bag and gin wheel for lifting scaffolding components

- ❖ Use tools lanyard to prevent fall of tools

Scaffolding Supervisor

- ❖ Only approved Supervisor to carry out scaffolding supervision
- ❖ All scaffolding erection/ modification/ dismantling shall be carried out under PTW
- ❖ Must have knowledge of applicable scaffolding standards and regulations.
- ❖ Able to understand scaffolding scheme and interpret instructions by designer.
- ❖ Knowledge in selection of suitable scaffolding material.
- ❖ Assess the area for suitability and stability of ground and location for intended scaffolding erection
- ❖ Prepare the location where scaffolding to be erected by barricades and signage
- ❖ Maintain the scaffolding identification system through scaffolding log register

Scaffolding Inspector

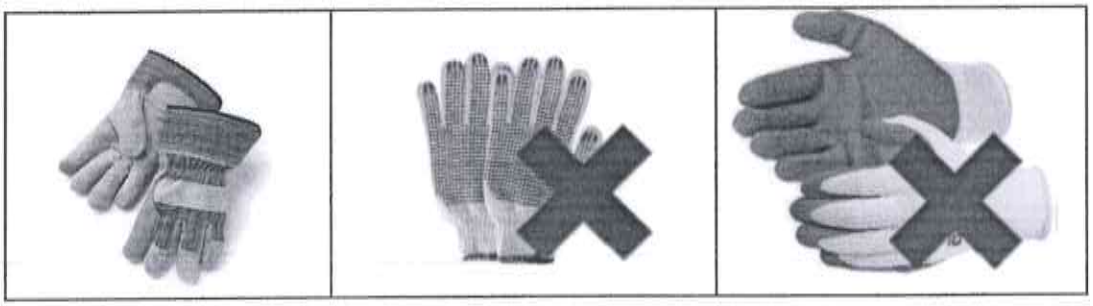
- ❖ Only certified and authorised persons shall act as Scaffolding Inspectors
- ❖ Scaffolding inspectors should not be part of scaffolding supervision
- ❖ Able to thoroughly check and suggest any rectification required prior to GEEN tagging
- ❖ Maintain the scaffolding log register detailing date/ location/ purpose/ dismantling details and with unique identification system of each scaffold
- ❖ Carry out weekly thorough inspection and revalidate GREEN tag
- ❖ If the scaffold is approved for a week or more, ensure that the scaffold is inspected on daily basis to ascertain its integrity

Scaffolding Users

- Scaffold users shall be trained in hazards and control measures associated with the type of scaffold being used including visual inspection of scaffolding defects
- If any defects found, should stop using scaffolding and report to permit holder/ job supervisor
- All users of scaffolding shall be trained in working at height and possess valid height pass
- Use of fall protection and fall protection systems (erecting, maintaining, and disassembling)
- Should not load the scaffolding more than intended capacity

5.8 Personal Protective Equipment (PPE)

- Right type of PPE Should be provided to all personnel involved in Scaffolding task.
- Scaffolding Users are required to wear anti slip/ cut resistant nitrile gloves or leather hand gloves along with mandatory PPE
- Should use full body harness with double lanyard with shock absorber



DOs & DON'Ts IN Scaffolding erection, dismantling & Use

Only qualified / trained personal (Certified by third party) should be allowed for erection & dismantling activities.

a) Use only standard scaffold materials. As per mentioned IS and BS standard.

b) Damaged scaffold materials shall be painted in fluorescent orange colour and the same shall be removed from site at least by weekly basis

c) All the scaffold shall be identified (i.e. Red, Yellow or Green Tags)

d) Take special precautions while working in vicinity of mobile cranes or electrical overhead lines

e) Always use ladders to climb on scaffolds

f) Wear full body harness with double lanyard / personal fall arrest system or other equally effective means while working on yellow tagged scaffold

g) Carryout a route survey if you plan to move any mobile scaffold at site.

h) Hard barricading with proper signage required during scaffold erection & dismantling activities

i) Always do house keep the area before and after the scaffold erection & dismantle activities.

Don'ts;

a) Do not use any part of operational line or piping as support or tie-in point for scaffold.

b) Do not permit mixing of scaffold types i.e. Tube & coupler & cup lock system scaffold.

c) Do not work or climb on scaffold during a thunderstorm / winds >36KMPH

d) Do not use bracings, Ledgers and Transoms as access purpose

e) Do not over load the scaffold more than it is specified in green tag

f) Do not keep tools & materials in scaffold or near to the access and egress area

g) Unauthorized alteration or modification of scaffold and accessories not allowed

h) Do not throw tools or materials from scaffold during scaffold erection and dismantling activities.

i) Do not use any incomplete or red tagged scaffold

6. Checking, Corrective and Preventive Action

Periodic audits shall be carried out to assess the compliance to the procedure and effectiveness of the controls. Any deviations shall be reported to Project Manager/ Head of Department for corrective/preventive actions if needed.

7. Training

- All personnel who are executing Scaffolding erection & dismantling works should be given practical training on the same prior to engaging them on work site.
- Project site shall have a process in place for the training of personnel who are involved in Scaffolding work and who may be affected by Working at height hazards, hazardous gases / substances, falling objects, electrocution or any other accident scenario.
- Work sequence shall not be violated without deviation approval from the concern authorities.

8. Records

- Project sites shall ensure that documented information generated during the Scaffolding Erection and dismantling Management Program implementation are maintained. Some examples are:
  - ❖ Training Records;
  - ❖ Inspection Records
  - ❖ Scaffolding Design as per site requirement

S. No.	Record Name	Maintained by	Retention period
01	Scaffolding Site Permit and Audit checklists	HSE, Project Site Office	1 Year
02	Periodical Inspection checklist	HSE, Project Site Office	1 Year
03	Incident Records related to Scaffolding Activity	HSE, Project Site Office	1 Year
04	Mock Drill related to Scaffolding work	HSE, Project Site Office	1 Year
05	Scafftag (Green, Red, Yellow)	HSE, Project Site Office	1 Year

9. Reference documents

Format No.	Standard Name
AMNS/Project/TS/HSEM/01	Excavation Safety
AMNS/Project/TS/HSEM/02	Formwork, Concreting and Masonry Operations
AMNS/Project/TS/HSEM/04	Working at height
AMNS/Project/TS/HSEM/07	Hand Tools & Portable power tools Safety
AMNS/Project/TS/HSEM/14	Personal Protective Equipment
AMNS/Project/TS/HSEM/15	Working in confined space
AMNS/Project/TS/HSEM/18	(SIMOP) Simultaneous Operations

10. Annexures

AMNS/Project/TS/HSEM/03/F01 - Static Scaffold Inspection Checklist
AMNS/Project/TS/HSEM/03/F02 - Scaffold Log Register
AMNS/Project/TS/HSEM/03/F03 - Scaffold Couplers – SWL
AMNS/Project/TS/HSEM/03/F04 - Scaffold Request Form
AMNS/Project/TS/HSEM/03/F05 - Certificate of Fitness for Scaffolding
AMNS/Project/TS/HSEM/03/F06 - Scaffold Material Inspection Checklist
AMNS/Project/TS/HSEM/03/F07 - Suspended Scaffolding Inspection checklist

b	Correct no of ties installed					
c	Type of the tie – Box, Lip, Reveal, Through, Buttress, Anchor, Raker or Guys					
d	Horizontal distance _____ Meter					
e	Vertical distance _____ Meter					
f	Ties made with right angle couplers					
9	**Platform Unit**					
a	Platform Fully decked					
b	Intermediate Transom provided					If yes, What is the Distance
c	Inside Boards					If Yes How may boards
d	Gaps (if any)Covered Properly					
10	**Handrails & Toe Boards**					
a	Top Rail at 900 – 1.1 Meter					
b	Mid rail					
c	Toe board					
11	**Raker**					
a	In correct angle					
b	Connected near to the standard at node point					
c	Joints in raker tube					
d	Strut Tubes					
e	Coupled in correct coupler					
f	Supplementary coupler installed					
12	**Guys**					
a	Guys connected at all the four sides					
b	Angle of guys _____ Deg					
13	**Ladder**					
a	Installed in Correct slope					
b	Any Missing Rungs					
c	Any Damaged Rugs / Stiles					
d	Secured Correctly					
e	Extended above working or landing platform					
	Tag System					
	Green ☐ Yellow ☐ Red ☐					

Number of Lifts ☐

Number of Bays ☐

Size of the Scaffold ☐ (Length/Widht/Height – All in meter)

Scaffold Duty

V. L. Duty ☐ Light Duty ☐ General Purpose ☐ Heavy Duty ☐

AM/NS INDIA	STATIC SCAFFOLD INSPECTION CHECKLIST	AMNS/Project/TS/HSEM/03/F01
		Rev : 00
		Date: 14 Nov 2022
		Page 1 of 3

Project Name:		**Area**	
Contractor Name:		**Location**	
Inspection Date & Time:			

Sl. No.	CHECK POINTS	Yes	No	NA	Recommendations / Remarks
1	**Scaffolding Design**				
a	Is Scaffolding design required for the job?				
b	Is Scaffolding design prepare by qualified design engineer and available?				If yes Mention Design Document Number.
c	Is Scaffolding design reviewed by AMNS Construction Manager? (Attach Copy)				
2	**Footing**				
a	Adequate Foundation/ground support				
b	Sole Boards / mud sill				
c	Base plate				
d	Base lift				
3	**Standard**				
a	Plumb with in the tolerance				
b	Joints occurred in same lift height				
c	Bay Length _____Meter				
d	Standard extended using correct coupler				
4	**Ledger**				
a	All ledger connected to inside the standards				
b	Ledgers are level				
c	Joints occurred in same bay				
d	Wrong Coupler Installed				
e	Sufficient Overhung of Ledgers				
5	**Transom**				
a	All transom connected to inside the standards				
b	Transoms are level				
c	Joints occurred in same bay				
d	Wrong Coupler Installed				
e	Sufficient Overhung of Transom				
6	**Lift**				
a	Lift Height _____ Meter				
b	Lift Head Room _____Meter				
7	**Bracings**				
a	Longitudinal bracing provided				
b	Transverse bracing provided				
c	Connected at node point				
d	Covered all the four sides up to the full height				
8	**Ties**				
a	Scaffold tied with suitable structure				

Contractor Scaffold Inspector	AMNS Area Engineer
Inspected by :	Received by :
Signature :	Signature :
Date :	Date :

AM/NS INDIA	SCAFFOLD LOG REGISTER	AMNS/Project/TS/HSEM/03/F02
		Rev : 00
		Date: 14 Nov 2022
		Page 1 of 1

Project Name:		Contractor Name:	

S. No	Tag #	Date Erected	Types	Scaffold Dimensions	Scaffold Built Area	Location of Scaffold	Tag Status	Date Dismantled	Remarks

Project Name:		Contractor Name:	

Type of Coupler	Parameter	Value kN
Right Angle – Class A	Slip Force	6.1 kN
Right Angle – Class B	Slip Force	9.1 kN
Swivel Coupler – Class A	Slip Force	6.1 kN
Swivel Coupler – Class B	Slip Force	9.1 kN
Putlog Coupler	Slip Force Along Transom	0.63 kN
Putlog Coupler	Slip Force Along Ledger	3.9 kN
Parallel Coupler – Class A	Slip Force	6.1 kN
Parallel Coupler – Class B	Slip Force	9.1 kN
Sleeve Coupler – Class A	Slip Force	3.6 kN
Sleeve Coupler – Class B	Slip Force	5.5 kN
Joint Pin	Slip Force	0.0 kN

AM/NS INDIA	SCAFFOLD REQUEST FORM	AMNS/Project/TS/HSEM/03/F04
		Rev : 00
		Date: 14 Nov 2022
		Page 1 of 1

Project Name		Area	
Contractor Name		Exact Location	

Request Date : _____ Requester Name : _____ Department _____

New : _____ Modification: _____ Dismantle : _____ Tag : _____

Project: _____ Shutdown: _____ Maintenance: _____ Operation : _____

Department

Civil :_____ Mechanical : _____ Electrical: _____ Maintenance: _____

Electrical Isolation Required: _____ Mechanical Isolation Required: _____

Compaction Required: _____

Details of Scaffold:

Area: _____ Exact Location: _____ Name of Contractor: _____

Types of Scaffold : _____ Sizes of Scaffold:_____ (LxWxH)

Nature of Job: _____ Number of Person : _____ Confined Space:_____

Duty of Scaffold:

Light / Medium / Heavy Duty / Special Purpose:_____

Tower / Underhung / Independent / Bird cage / Bridge / Cantilever: _____

Nos.of Platform required:_____ Scaffolding Design Required: _____

Scaffold Department Use

Manpower Details:

Scaffolder : _____, Scaffolding Supervisor : _____ Scaffolding Inspector: _____

Scaffolding Erected Date : _____ Scaffolding Dismantled Date : _____

Name & Sign of Scaffolding supervisor **Name & Sign of Scaffolding Inspector**

AM/NS INDIA	CEERTIFICATE OF FITNESS FOR SCAFFOLDING	AMNS/Project/TS/HSEM/03/F05
		Rev : 00
		Date: 14 Nov 2022
		Page 1 of 1

Project Name:		Contractor Name:	

I hereby certify that the scaffolding (Ref. No:.....) erected against the PTW No: ..... is fond fit and ready for use for the Light Duty / Medium Duty / Heavy Duty / Special purpose (Strike that is not applicable) and fit for the load of kg per meter run

Area Engineer	Scaffold Inspector
Inspected by : Signature : Date & Time :	Inspected by : Signature : Date & Time :

AM/NS INDIA	SCAFFOLD MATERIAL INSPECTION CHECKLIST	AMNS/Project/TS/HSEM/03/F06
		Rev : 00
		Date: 14 Nov 2022
		Page 1 of 2

Project Name:		Contractor Name:	

Material	Check List	Yes	No	Remarks
Pipes	Rust Free Pipes			
	No welding / local repair			
	No Bends, Cuts, Holes, spilt,			
	No Sharp edge, pipe end condition			
	Pipe thickness 4 mm , -10% (Max tolerance)			
	Painted / galvanized pipes			
	Deviation from straight line not more than 1 /600			
	Any other (Specify)			
Ladder	Rail and Rungs not damaged (bend, cracked, deformed, loose, cut or any visual damage etc.)			
	Rust free & Properly Painted Ladder.			
	Equal spacing between rungs (max 300 mm).			
	Ladder width greater than(300 mm.)			
	No Sharp edge. shoe pad missing.			
	No Oil, Grease and other slippery items sticked.			
	Bottom non-skid pad damaged/missing			
	Top and bottom rung tie rod provided			
	Any other (Specify)			
Plank/Board	Any spacing/gap maximum 25 mm.			
	All hooks of Planks not damaged.			
	No Cut or any other Physical damage.			
	Not depressed beyond 15 mm.			
	Rust free and painted properly (metal planks).			
	Any other (Specify)			
Clamps	Rust free and properly galvanized.			
	No cut/cracks or wide gap physical damage.			
	No lubrication.			

	No Eyebolts bent.			
	Thread condition/Nut condition.			
	No welding / local repair			
	Any other(Specify)			
Base plate and Sole board	Rust free and properly designed (150x150x5)			
	No bend.			
	No Cut, Hole or physical damage.			
	Flat Bottom portion.			
	Any other (Specify)			

Contractor Scaffold Inspector	AMNS Area In-charge
Inspected by : Signature : Date & Time :	Inspected by : Signature : Date & Time :

AM/NS INDIA	SUSPENDED SCAFFOLD INSPECTION CHECKLIST	AMNS/Project/TS/HSEM/03/F07 Rev : 00 Date: 14 Nov 2022 Page 2 of 2

GUARDRAILS	Are toprails, midrails, and toeboards installed along all open sides and ends of platforms where a person could fall over 1.8 meters (6 feet)?			
	Is a guardrail system provided along all edges of platforms that are more than 360 mm (14 inches) from the face of a wall or structure? Are toprails located between 0.95 meter (38 inches) and 1.15 meters (45 inches) above the platform walking/working surface?			
	Are midrails located half way between the toprails and the platform walking/working surface?			
	Are toprails, midrails, and toe boards secured to the inside of support uprights that are spaced not more than 2.7 meters (9 feet) apart?			
	Are guardrails sufficiently anchored and strong enough to stop a fall?			
	If some toprails, midrails, or planks cannot be completely installed, is a yellow scaffold tag attached near all points of access?			
	If yellow scaffold tag is used, are there adequate and strong enough anchorages to attach full body harness lanyards for all workers?			
	Are all working levels fully planked with scaffold planks or fabricated platform units?			
PLATFORMS	Are there any openings or gaps between planks or platform units that are more than 25 mm (1 inch) wide?			
	Are gaps between planks less than 600 millimeters (2 feet) wide covered with 20 mm (3/4-inch) thick plywood held in place with cleats?			
	Are gaps between planks that are larger than 600 millimeters (2 feet) wide covered with cross planks (not nailed in place)?			
	Are all wood scaffold planks at least 38 mm (1-1/2 inches) thick and 225 mm (9 inches) wide?			
	Are there any damaged, decayed, defective, cracked, painted (which can hide defects), or twisted planks used for working platforms?			
	If plank ends are split, are cracks less than 300 mm (12 inches) long if the end is banded or less than 25 mm (1 inch) without banding?			
	Are all planks firmly secured in place at both ends against movement?			
	Do planks extend over their end support bearer(s) by at least 150 mm (6 inches), unless cleated?			
	Do planks extend over their end support bearer(s) by not more than 300 mm (12 inches)?			
	For planks placed end-to-end (not overlapped), is each end independently supported by bearers or board bearers (intermediate transoms)?			
	When planks are overlapped, are the overlaps at least 300 mm (12 inches) long and occur over supporting bearers or board bearers?			
	Are work platforms clean, free of oil, sand, or other slippery surfaces and tripping hazards?			
	Is there adequate room on every platform for men to pass other men or materials?			
	Is safe access provided to all working platforms by ladders, stairs, ramps, or walkways?			
ACCESS	Are ladders free from defects, missing rungs, or broken side rails?			
	If not, are straight ladders positioned vertically and both side rails rigidly attached at the top, middle, and bottom of the ladder?			
	Are ladder or stair landings fully decked and a proper guardrail system provided?			
	NA means the requirement is not applicable to the scaffold being inspected.			

Contractor Scaffold Inspector	AMNS Area In-Charge
Inspected by : Signature : Date & Time :	Inspected by : Signature : Date & Time :

AM/NS INDIA	SUSPENDED SCAFFOLD INSPECTION CHECKLIST	AMNS/Project/TS/HSEM/03/F07 Rev : 00 Date: 14 Nov 2022 Page 1 of 2

SCAFFOLD DESCRIPTION / LOCATION:					
INSPECTED BY: (Signature)	Name:	DATE (M/D/Y):	SCAFFOLD DIMENSIONS (meters)	Platform Width	Platform Length
SCAFFOLD ACCEPTED & TAGGED WITH: (Please check the appropriate box)	□ Green Tag	□ Yellow Tag			

	FIELD INSPECTION CHECKLIST FOR AN UNDERHUNG (SUSPENDED OR SLUNG) SCAFFOLD	Yes	No	NA
UNDERHUNG SCAFFOLD CONSTRUCTION	Are only tube and coupler scaffold components used for underhung scaffolds? (Note: system scaffold components shall not be used.)			
	Are all scaffold components (including couplers) in good condition, and free of defects and detrimental corrosion?			
	Are only drop-forged (and not pressed) girder couplers used to support an underhung scaffold?			
	Are there any joints in vertical hanger tubes used to hang the scaffold platform(s)? (Note: Joints in hanger tubes should be avoided.)			
	Are only right-angle couplers (not adjustable couplers) used to attach runners (ledgers) and bearers (transoms) to hanger tubes?			
	Where bearers (transoms) are coupled to hanger tubes, do the bearer's couplers rest directly on the runners' couplers?			
	Where transoms are coupled to ledgers, are they coupled not more than 300 mm (12") from the vertical hanger tubes?			
	Do bearers and board bearers (intermediate transoms) extend at least 100 mm (4 inches) beyond the supporting runner (ledger) centerline?			
	Are suspension points of hanger tubes securely fixed to prevent their being dislodged by all potential forces acting upon them?			
	Are trapeze tubes installed approximately 600 mm (2 feet) below the lowest runners (ledgers)?			
	Are additional check couplers (safety couplers) installed at the top and bottom of all hanger tubes (to prevent slippage)?			
	Is at least one board bearer (intermediate transom) installed when the longitudinal distance between hangers is more than 1.5 meters (5 ft.)?			
	Is plan (horizontal) bracing installed below the working platform(s) to prevent racking (twisting)?			
HANGER TUBE SPACING	If transverse hanger spacing is 1 meter and embossed tubing is used, are hangers spaced not over 2.7 meters (9 feet) apart longitudinally?			
	If transverse spacing is 1 meter and non-embossed tubing is used, are hangers spaced not over 2.3 meters (7'-6") apart longitudinally?			
	If transverse spacing is 1.2 meters and embossed tubing is used, are hangers spaced not over 2.4 meters (8 feet) apart longitudinally?			
	If transverse spacing is 1.2 meters and non-embossed tubing is used, are hangers spaced not over 1.8 meters (6 feet) apart longitudinally?			
	For Medium-duty tube and coupler scaffold, are all tubes embossed with ASTM A500 (Gr. B), ASTM A53 (Gr. B), BS1139 or EN 10219?			
	For Medium-duty, are hanger supports spaced not over 1.2 m (4 feet) apart transversely and not over 1.8 m (6 feet) apart longitudinally?			
	For Medium-duty, is at least one board bearer (intermediate transom) installed in each bay of every platform (planked) level?			