

NASC SIMIAN RISK



Scaffolding Loading Towers

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Who are Simian?



Occupational Health & Safety Consultants

- Scaffolding & Work at Height Specialists
- Access industry safety experts
- Independent Scaffold Inspection Service



Training Provider

- CISRS Scaffolding Training Centre
- CSCS Test Centre
- Construction Skills – Apprentices, SSSTS, SMSTS



Supply-chain Scaffolding Support

- Pre-qualifications, Procurement, Specifications



Scaffolder Safety Equipment & Consumables

- Spanners, Tools, Harnesses, Rescue Kits etc...

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Loading Towers





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Work at Height Regulations 2005

Schedule 3 – part 2 additional requirements for scaffolding

7) Strength & stability calculations for scaffolding shall be carried out unless...

- A note of calculations, covering the structural arrangements contemplated is available; or,
- It is assembled in conformity with a generally recognised standard configuration.

What is a generally recognised standard configuration? – Discuss.


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HSE Press Release: June 2010

"As from 1st January 2011 the Health and Safety Executive will no longer acknowledge BS5973:1993 as a recognised standard for the design of tube and fitting scaffolding structures"

Philip White
Chief Inspector of Construction
Health and Safety Executive






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New TG20:08

- NASC Technical Guidance (TG)
- Guide to Good Practice for Scaffolding with Tubes & Fittings
- Technical guidance on the use of BS EN 12811-1: 2003
- Introduced November 2008
- 2 Volumes
 - Volume 1 – Includes Basic Scaffolds fully ledger braced without design
 - Volume 2 – Technical Information for the design of scaffolds outside of Volume 1.



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TG20:08 Benefits



- Applies to whole British Isles (BS 5973 Wales & England only)
- Wider range of standard scaffolds in section 2 than BS5973 (e.g. inside boards, debris netting)
- Ledger Bracing retained unless designed (Volume 2)
- Includes putlog scaffolds with a reasonable duty (Class 1-4)
- Façade bracing every 6 bays (BS5973 30m & TG20:05 5 bays)
- 6 new standard tie pattern options (1 previously)
- Includes unclad, debris netting and solid sheeting
- Maximum height calculation simplified (from 16 tables to 3)

TG20:08 Scope



- Recommendations for the design, construction and use of common access scaffolds in steel tubes and fittings, used for:
 - Construction
 - Maintenance
 - Repair
 - Demolition
- Excludes falsework and formwork
- Not legislation, but a guide to good practice
- Limit State Design (BS EN 1993: 1992)

TG20:08 Standard Scaffolds



Section 2 (volume 1) Standard Scaffolds

- Only applies to Independent Tied Scaffolds & Putlog Scaffolds!

'The scaffolds are not subjected to the loading of materials, by mechanical means such as by rough terrain forklift trucks. Loading bays should be specially designed, see Clause 20'

- Therefore, TG20 and WAHR requires all other scaffolds to be designed and calculated (also see HSE Scaffold Checklist)

Loading bays founded on the ground



Section 5 (volume 1) Special scaffolds [Clause 20]

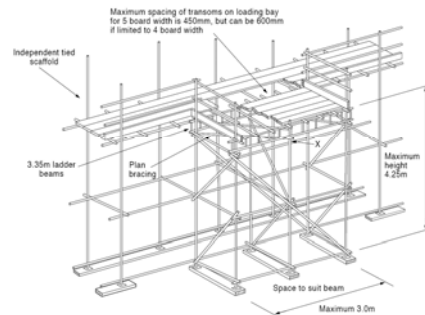


Figure 23. Typical loading bay for 10 kN/m²

Loading bays founded on the ground



Loadings

- Loads typically in excess of load class 4 (3kN/m²)
- Loading bay should be designed for the minimum load class of the access scaffold it services (e.g. heavy duty Class 4 3kN/m²)
- For palletised materials - design for a uniformly distributed load (UDL) of 10kN/m² or the actual weight of the load.
- Consider the nature of loading (point or distributed)
- Impact load from mechanical handling equipment (e.g. crane, forklift etc.) allow:
 - 25% increase of the largest individual load.
 - 10% of the weight horizontally in any possible direction.
- **Fatal Accident Learning!**

Loading bays founded on the ground



Loadings – Decking

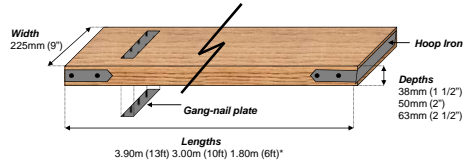
- Choose the length of a loading bay in modules of standard scaffold board lengths (e.g. 13ft/3.9m or 10ft/3m)
- Avoid the need for short boards as these may easily be dislodged by heavy loads.
- Note for imposed loads considered, the tube transom is often the critical item, not the scaffold board spanning between the transoms.
- Note (fig 23) max transom spacing is 450mm for 5 board wide or 600mm for 4 board wide. Some designs specify transom clusters.

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Loadings – Decking

- Only BS2482 scaffold boards should be used to conform to TG20!



- BS 2482 : 2009 Specification for timber scaffold boards
- Max Spans 38mm = 1.5m MG board, 1.2 VG and 63mm = 3.25m
- 38mm boards supported on 4 transoms, but of less than 3.35m support on 3 transoms.
- Short boards less than 2.13m should be tied down to prevent tipping.

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Loadings – Decking

- Properties of scaffold boards differ when a palletised (rigid) load is spread across a minimum of 4 boards (Table 18 Volume 2).
- Data based on max load duration of 5 days and minimum of 27% moisture content.
- Approximately 32% greater moment of resistance across 4 boards than a single board.
- Scaffold boards may be doubled, but layers of boards must be parallel (i.e. same direction across the transoms).
- Transoms should not project beyond the outer face.

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Lifts

- Loading towers can be fully erected (2m lifts) or progressive (brickwork lifts 1.35m to 1.5m).
- Max lift height typically 2m.
- Loading platforms required at floor levels with the building – the design should restrict the length of standards with supplementary lifts (dummy) to give the necessary load carrying capacity in the standards... (e.g. 3m floor heights could be divided into 2m + 1m lifts)

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Vertical Bracing

- Should be braced diagonally on all four sides.
- Loading bay bracing *may* be considered as contributing to the longitudinal (façade) bracing of the access scaffold (see c.6.3).
- Inside bracing that hinders access to the loading bay may be placed outside of the tower on the main scaffold (zigzag formation).
- The external face bracing may be modified (omitted) to give access (e.g. multiple level loading bays).
- Bracing must intersect the node within 300mm.

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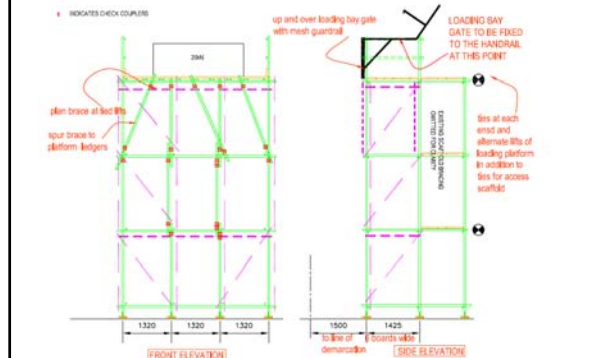
Plan Bracing

- Loading bays should be plan braced at alternate lifts.
- Plan bracing may be external (wing or wind braces) to the access scaffold. Note extra ties may be specified (within 3m's)!
- Plan braces should be fixed with right-angle couplers (EN74) to the standards (within 300mm of the node).
- Where proprietary beams are used special consideration should be given where plan bracing is fixed to the bottom cords (i.e. with swivel couplers (EN 74)).

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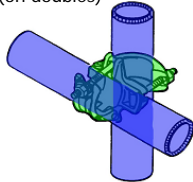
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Couplers

- Right-angle couplers (EN74) should be used throughout to fix:
 - Ledgers to standards
 - Transoms to ledgers or standards (except board transoms)
 - Guardrails to standards
 - Vertical Braces to ledgers and transoms (on doubles)
 - Beams to standards



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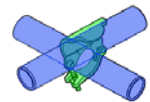
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Couplers

- Supplementary transoms fixed with right-angle couplers should be specified where putlog clips (singles) are used to fix board transoms.
- Load bearing 'band and plate' couplers may be used instead.
- *Fatal Accident Learning!*



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Couplers

- Swivel couplers (EN74) may be used to fix:
 - Braces to standards
 - Spurs to ledgers or standards
 - Plan braces to beam cords
 - To splice joints (as parallel couplers)
- Spigot pins may be used to joint standards only, however sleeve couplers are recommended throughout.
- Supplementary couplers (checks) may be specified in the design to increase slip resistance.



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Couplers

- Design to specify which class of coupler should be used if greater capacity is required (e.g. BS EN 74 – 1 : 2005 Class 'B')
- Otherwise standard Class 'A' couplers are assumed.
- For example BS EN 74 Right-angle couplers have safe loads specified in TG20:08 of...
 - Class 'A' = 6.1kN
 - Class 'B' = 9.1kN

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Joints & Staggers

- Joints in ledgers, transoms and braces should be avoided, where possible.
- Standards should staggered so that no more than 3 joints appear in the same lift per bay.
- Joint positions must be considered in the design and calculations.

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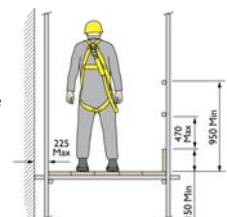
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Guardrails

- Guardrail protection must be provided on all faces of the platform where there is a risk of falling.
- Main guardrail at a minimum of 950mm above the platform surface.
- No gap greater than 470mm between guardrails or toeboard.
- Toeboards at least 150mm high should be fixed to the outer faces
- Toeboards should be fixed at a minimum of two points.



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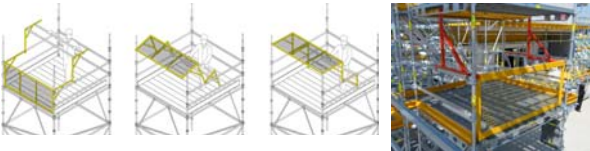
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Loading Bay Gates

- Guardrail protection must be maintained unless suitable compensatory measures are taken (e.g. PFPE).
- Where guardrails are removed for the passage of a load they must be for the shortest time necessary and reinstated ASAP.
- Loading bay gates should be provided that maintain collective fall protection – engineering solutions before systems of work.
- *Fatal Accident Learning!*



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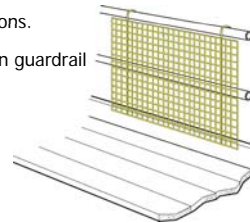
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Falling object protection

- Brickguards should be fitted where materials could fall between guardrails or toeboards.
- If netting or sheeting is added then the extra wind load must be considered in the design and calculations.
- Materials stacked higher than the main guardrail need to be assessed.



- *Fatal Accident Learning!*

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Other considerations

- Consider the adequacy of foundations
- Tying of the loading bay.
- Commissioning, handover and statutory inspection
- Signage e.g. Maximum load rating (in telehandler operator speak)



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Other considerations

- Don't fix passenger or goods hoists to loading bays.
- Hoists must be tied independently to the building.



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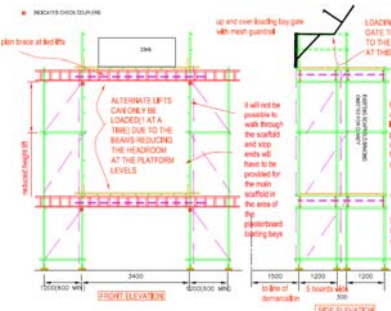
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Other considerations

- Multi-level loading bays



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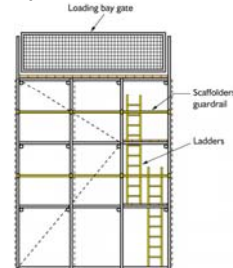
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Other considerations

- Safe erection, altering & dismantle (SG4:10)
- Standalone loading bays to floor slabs



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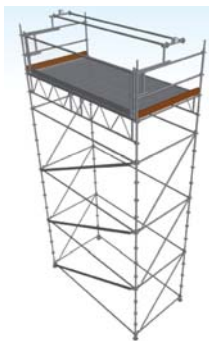
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Proprietary Loading Bays

- System scaffolding offers significant advantages over tube and fitting:
 - Standard configurations
 - Greater loading capacity
 - Faster construction / adaption
 - Compatible with T&F
- Must be assembled in accordance with the manufacturers instructions.
- Scaffolders should have received specific training in the particular system (ideally SSPTS).



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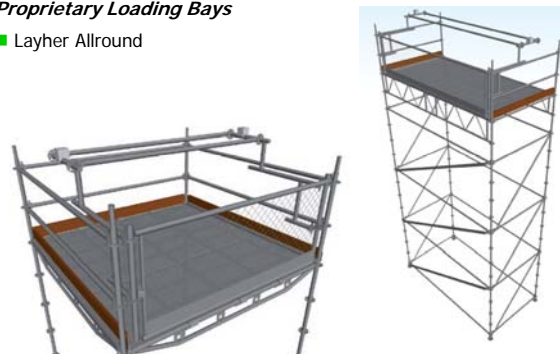
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Proprietary Loading Bays

- Layher Allround



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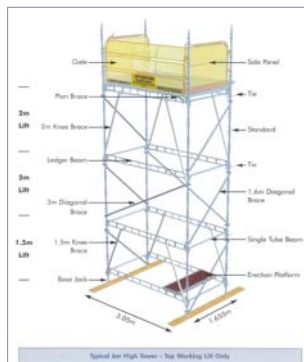
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Proprietary Loading Bays

- Haki Universal



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Proprietary Loading Bays

- Cuplok



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Proprietary Loading Bays

- PERI Up



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Case Study 1



- Materials or objects safely stored to prevent:
 - Collapse
 - Overturning
 - Unintended movement



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Case Study 2



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Case Study 2



- Loading Bay
- £122,000 fines plus costs

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Case Study 3



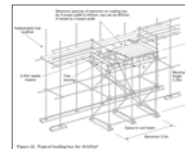
- Subcontractor Paul Laidlaw fell approximately 5m when a loading bay collapsed in Edinburgh May 2005.
- He survived but sustained major injuries.
- HSE investigation identified:
 - Failure to design the structure
 - Failure to provide safe loading information
 - Failure to control the loading of materials
- Scaffolding Contractor and Principal Contractor prosecuted with fines totalling £132,000.

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Questions



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