Introducing TG20:13
Terry Roberts, CADS
Introduction

• Thank you for joining us for this presentation of TG20:13, the good practice guidance for tube and fitting scaffolding from the NASC

• This presentation summarises the purpose of TG20:13 and how it aims to raise awareness of good practice in scaffolding across the construction industry

• The imminent update to TG20:13 will be demonstrated, plus news about the future plans for the guidance
About CADS

- A global construction services company for 40 years

- 500+ employees including structural engineers, detailers and software developers.

- Develop and support software for BIM, structural analysis and design, detailing and scaffolding

- SMART Scaffolder, CADS RC, SCIA Engineer, Revit, AutoCAD

- Customer base of 5000+ consulting engineers, contractors and scaffolders across 70 countries

Terry Roberts
BSc (Hons) MSc (Oxon) CITP MBCS
What is TG20:13?

- TG20:13 is a guide to good practice for tube and fitting scaffolding

- It is supplied in 3 books for contractors, designers and operatives plus an electronic guide

- TG20:13 is underpinned by structural research and is designed to conform to the European standard for scaffolding: BS EN 12811
A brief history

- The European standard for scaffolding BS 12811-1:2003 replaced the withdrawn British Standard BS 5973:1993

- Unlike BS 5973, BS EN 12811 is a performance document for the design of scaffolding by calculation and not a practical guide

- NASC developed TG20:05 and then TG20:08 in the style of BS 5973 to ease the transition to the European standard

- NASC and CADS redeveloped TG20:13 as new guidance for the wider industry to eliminate the need for bespoke scaffolding design for typical projects
Requirements for scaffolding design

“Strength and stability calculations for scaffolding shall be carried out unless [...] it is assembled in conformity with a generally recognised standard configuration.”

Work at Height Regulations 2005, Schedule 3 Part 2 (Additional Requirements for Scaffolding), Regulation 7

- TG20:13 introduces standard configurations of scaffolding recognised by the HSE and designed by strength and stability calculations to BS EN 12811
- These are TG20 compliant scaffolds
TG20:13 Operational Guide

• Guidance for TG20 compliant scaffolds is provided in the Operational Guide: a full colour 226 page book

• Its guidance is supported by structural research and calculations

• Guidance is provided for a wide range of common scaffolding structures, including many that have traditionally required bespoke design
TG20:13 Operational Guide

- Guidance is provided for independent scaffolding, birdcages, loading bays, ladder-access and free-standing towers, and chimney scaffolds

- Typical features such as bridges, protection fans, inside board brackets, cantilevered platforms and pavement lifts are included

- Variations including floor-level lifts and double standards provide flexibility

- Guidance is provided for the first time for structural transom units
TG20 Compliance Sheets

- **TG20 compliance sheets** provide a clear summary of the requirements for TG20:13 scaffolding

- TG20:13 scaffolding has been designed by structural calculation and does not need further design

- ‘Basic’ TG20 compliance sheets are provided in the Operational Guide

- The full set is provided in the TG20 eGuide
TG20:13 User Guide

- A new pocket **User Guide** has been written for site operatives

- It clearly summarises the principal rules for TG20 compliant scaffolding in 26 pages

- Each page is illustrated in full colour and explained with brief text
Structural research

- The TG20 compliance sheets are supported by new structural research.

- Bespoke research software was developed to prove that ‘BS 5973 style’ scaffolding is Eurocode compliant, which required an extremely accurate computer model.

  ✓ Single-bay façade bracing can be used without plan bracing.

  ✓ Structural transoms are not required for unclad and ‘basic’ debris-netted scaffolding.

  ✓ Guidance is provided for tying to the inner face of the scaffold.

  ✓ Triangulating ties with inside boards only in exceptional circumstances.
Wind map research

• The site wind exposure has a significant effect on the scaffold design

• Extensive research has been completed to study the wind exposure in the UK

• This enables a simple treatment of wind exposure to be provided in the guidance that is supported by calculation

• It also allows an automated wind map to be provided in the TG20 eGuide for a refined wind assessment

\[
S_{wind} = \max \{dir | 0.30..270 \cdot S_{\text{wind,dir}} \}
\]

\[
S_{\text{wind,dir}} = V_{b,\text{map}} \times T_{\text{wind,dir}} \times \left(1 + 0.001 \cdot 4 \left(\frac{10}{\max(z,10)}\right)^{0.2}\right) \times C_{\text{season}} \times C_{\text{dir}} \times \frac{C_{e}(z) \cdot C_{e,T}}{C_{e}(z) \cdot C_{e,max}}
\]
Transom unit research

• The NASC has invested in the testing and structural modelling of prefabricated structural transom units

• In many cases scaffolding with these transoms can be erected without ledger bracing

• The NASC has developed a minimum structural performance standard and test specification because an applicable British or European standard is not available

• Manufacturers and suppliers are certifying their transoms as TG20 compliant

• TG20 compliance sheets are available for scaffolds with TG20 compliant transom units
High tensile tubes

• TG20:13 Supplement 1 provides a definition for TG20 compliant 3.2mm wall thickness high-tensile steel tubes to BS EN 10210-1

• Tubes manufactured by a hot-rolling process or a cold-formed process are supported

• Specific TG20 compliance sheets are available that allow for the lower axial load capacity of cold-formed high-tensile 3.2mm tubes

• Mixed stocks of type 4 and high-tensile steel tubes are permitted using these compliance sheets
TG20:13 Design Guide

- The technical guidance from TG20:08 Volumes 1 and 2 has been combined into the TG20:13 Design Guide

- It provides straightforward design advice in the style of BS 5973

- New tables and calculations have been provided for TG20:13 compliant scaffolds

- The TG20:13 basis for design is explained
TG20 eGuide

• The **TG20:13 eGuide** calculates and prints compliance sheets for TG20 compliant scaffolding

• It allows TG20 to incorporate a wide range of scaffolding configurations without becoming complicated

• The eGuide accurately calculates safe heights, tie duties and leg loads for TG20 scaffolding
Next steps

• A consultation exercise was held in May – June 2016 to gather feedback from purchasers and users of TG20:13

• Responses were received from 65 companies, with responses from Contractors, Engineers and Safety Professionals

• A total of 144 separate requests were received and reviewed
TG20 2017 update

- The most requested feedback: adding to the TG20 compliance sheets:
  - Automatic site location
  - Permitted standing seasons
  - Checker name and signature
  - Company logo

- A software update to the TG20:13 eGuide will be released this month

- Free to all purchasers of the eGuide.

A tied independent scaffold with 2.0 m maximum lift heights, unclad, assembled from tubes and fittings.

Design height
  ✓ Maximum height: 16.0 m to the top lift.

Maximum loading
  ✓ One lift loaded, plus one lift 50% loaded, per façade to a maximum of: 2.0 kN/m²;
  ✓ Inside boards loaded to a maximum of 0.75 kN/m² at the working lift;
  ✓ Foundation design leg load (for the client): 15.4 kN.

Ties
  ✓ 1 x 1.39 kN (very light duty) tie per 16.0 m²;
  ✓ Max. 4.0 m between tie lines (tied at alternate lifts);
  ✓ Max. 4.0 m horizontal distance between vertical tie lines.

Location
Suitable for sites with a wind factor of 20.0 (low wind exposure), during any season.

Criteria
To be erected as a TG20 compliant tied independent scaffold as described in TG20:13 chapter 06:
✓ 3 – 5 main boards and up to 2 inside boards wide;
✓ Maximum lift height: 2.0 m;
✓ Maximum bay length: 2.0 m;
✓ Maximum transom spacing: 1.2 m;
✓ The scaffold will not be clad with debris-netting or sheeting;
✓ Boarded at any number of lifts;
✓ Tied to an impermeable façade (no significant openings);
✓ Façade braced in every elevation, one set per six bays;
✓ Ledger braced at alternate standards and at end frames;
✓ Double guard rails and toe boards at boarded lifts (triple permitted at top);
✓ Single guard rails at unboarded lifts;
✓ Internal edge protection provided where required;
✓ Tied in accordance with TG20:13 chapter 07. Tie tubes may be connected only to the inner face of the scaffold.

Sign-off

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Notes:

(*) Use of this NASC document does not infer NASC membership. Go to www.nasc.org.uk to confirm membership. Illustrations are indicative.

(?) The checker is responsible for reviewing the input information.
Looking to the future

• The TG20 Working Group is reviewing the feedback to plan the future of TG20

• Still in discussion! But:
  
  • Major software update likely
  
  • Additional TG20 compliant scaffolds
  
  • Updates to the books to include current guidance and good practices
Falls from height remain the dominant cause of fatal and serious injuries in the construction industry. Properly designed and constructed scaffolding has a key role to play in reducing that toll of injuries.

The Work at Height Regulations 2005 (WAHR) require that strength and stability calculations are carried out for all scaffold structures unless they conform to a recognised standard. The responsibility for ensuring that this duty is met falls to both the scaffolding contractor and his client.

HSE is pleased to acknowledge that the NASC has written TG 20:13 to provide a standard for traditional tube and fitting scaffolds to help industry manage safety risks effectively in the scaffolding and wider construction sector.

HSE recognises that this guidance contains some advice that may go further than the minimum needed to comply with health and safety law.

Heather Bryant, HM Chief Inspector of Construction, Health and Safety Executive
Industry support at the TG20 launch

We applaud and support the work of the NASC which will no doubt result in safer scaffolding structures being installed and thus reduce the frequency of scaffolding failures, which at present occur far too frequently across the industry.

The UKCG recommend the adoption and standardised use of TG20:13 to the wider industries that utilise scaffolding structures both within and outside the construction sector.

Stephen Ratcliffe, Director, UK Contractors Group

TG20 compliance sheets are now endorsed by Build UK and every compliance sheet includes their logo.
Thank you

Questions?