Scaffolding Update Including TG20:13

Ray Johnson BSc
Joint Managing Director
Unsafe Working Practices
Competence of Scaffolders?

- Scaffolders trained to CISRS/PASMA Standards
System Scaffold Product Training Scheme (SSPTS)

- System product training for existing CISRS Card Holders (min. Part 1)
- 2-Day Product Training Course
- Not available to new entrants
- Card endorsed with specific product
  - Genuine Kwikstage
  - K-Lok
  - Cuplok
  - Layher Allround
  - Haki Universal
  - Peri Up Rossett Flex
  - DSL Climastage
  - GenLock
  - Plettac Contur
  - Plus 8
  - TRADLok
  - Scafom-rux
  - Ringscraff
NASC Safety Guidance Note SG4:10

“Preventing Falls In Scaffolding”
What is the Scaffolders safe zone?

1. A fully boarded and correctly supported platform without gaps where someone could fall; and,

2. A single main guardrail (950mm above platform) where there is a risk of fall (inside edge, window openings & stop ends) to remain in place on all lifts ready for dismantle.

3. When within 1m of unprotected edge Scaffolders are considered “at risk” and personal fall arrest equipment must be used…
What is available to create a Scaffolders Safe Zone?

Scaffolders Safe Zone” – Proprietary Systems
SG4 Compliant?

- SG4:10 Prevention of Falls in Scaffolding
- Safe System of Work at height for Scaffolders.
- Single guardrails on non working lifts
- Intermediate transoms for support of board
- Fall arrest Equip worn at all times
- Collective protection 1st Priority
Case Study 1 - Cardiff
Case Study 2 – Milton Keynes
Key Causes of Accidents Involving Scaffolding

Why do accidents involving scaffolding occur?

- Poor design
- Poor construction
- Poor quality materials
- Inadequate ties or sub-structure
- Undermining or subsidence
- Adverse weather – High Winds
- Overloading or interference
- Vehicle or plant impact
- Lack of training

Or a combination…
TG20 :08 Technical Guidance on the use of BS EN 12811-1
Introducing NASC TG20:13

Now Available to purchase from NASC

‘A comprehensive guide to good practice for tube and fitting scaffolding’
TG20:13 – Component Parts

- Operational Guide
- Design Guide
- eGuide
- User Guide
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Introduction to TG20:13

The comprehensive guide to good practice is intended for all those involved in the procurement, supply and use of tube and fitting scaffolding.

TG 20 has been produced by the National Access & Scaffolding Confederation (NASC), as the recognised U K trade body, with the involvement of the Health and Safety Executive in response to the introduction of BS EN 12811.

It provides generally recognised standard configurations of scaffolding, as defined by the Work at Height Regulations, which have been designed by structural calculation and for which additional bespoke design is not required.

Note: TG20:08 will be withdrawn from July 2014
Introduction to TG20:13

Industry support

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 TG20:13 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

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
TG 20 Operational Guide

The guide provides clear definitions for TG 20 compliant scaffolding as common scaffolding structures that have been designed by structural calculation to BS EN 12811.

These definitions are presented as TG 20 compliance sheets, which are scaffolding design sheets that may be used to demonstrate that a scaffold does not require a bespoke design.
TG 20 eGuide

The TG 20 Management Guide is supplemented by an electronic guide for the generation of TG 20 compliance sheets.

The TG 20 eGuide provides compliance sheets for a range of typical scaffolds to demonstrate that they do not require bespoke design, including standard configurations of independent scaffolding, putlog scaffolding, loading bays, towers, chimney-access scaffolding and interior birdcages.

The electronic guide also provides compliance sheets for a range of independent scaffolding variations that have traditionally required bespoke design, including bridge beams, protection fans, cantilevered platforms and prefabricated structural transom units, thereby providing design solutions for many typical scaffolds.
The TG 20 Design Guide provides comprehensive technical guidance for the interpretation and application of BS EN 12811 and the related structural design standards.

It is intended for use by scaffolding designers, temporary works engineers and all those concerned with the design and manufacture of scaffolding structures and equipment.
What scaffolding requires design and why?

The Work at Height Regulations 2005 state that: “Strength and stability calculations for scaffolding shall be carried out unless [...] it is assembled in conformity with a generally recognised standard configuration.”

The European Standard BS EN 12811-1 does not contain such a standard configuration, implying that all scaffolding structures need to be individually designed. Since this is not workable in practice, the NASC has developed TG 20 to reintroduce the concept of standard configurations of scaffolding.
The concept of standard configurations is achieved by providing definitions for ‘TG 20 compliant’ scaffolding.

Compliant scaffolds are standard configurations of scaffolding that have been designed by structural calculation to BS EN 12811 and are demonstrated through the use of TG 20 Compliance Sheets.
TG 20 Compliance Sheets

Several standard TG 20 compliance sheets are provided in the Management Guide, which are appropriate for commonly-used scaffolds.

The complete range of compliance sheets is available from the eGuide, including those for complex scaffolds that have traditionally required bespoke engineering design.
What scaffolding requires design and why?

A bespoke design or suitable design advice should be sought for any scaffold outside the scope of a TG 20 compliance sheet.
Types of TG 20 compliant scaffolding
Types of TG 20 scaffolding

**Tied independent scaffolding**

Independent façade access scaffolding that is tied to a permanent structure, erected with two parallel rows of standards supported by suitable foundations.
Types of TG 20 scaffolding

Interior access birdcage scaffolding
A scaffolding structure erected with a grid of standards, ledgers and transoms, decked to provide an access platform.
Types of TG 20 scaffolding

Chimney-stack scaffolding
A scaffolding platform that extends from a tied tower or independent scaffold to provide access to a chimney stack.
Types of TG 20 scaffolding

Loading bay
A special scaffolding structure, reinforced with beams and bracing, which provides a safe loading and storage area for materials.
Types of TG 20 scaffolding

Ladder-access tower
A tower of scaffolding that provides access to an independent scaffold as an alternative to incorporating ladder-access points within the working area or using a staircase.
Types of TG 20 scaffolding

Free-standing independent scaffolding
Independent façade scaffolding for building and maintaining domestic properties, supported with raking tubes or buttresses where necessary
Types of TG 20 scaffolding

Towers
A scaffolding structure with four standards that may be free-standing, tied or butted.
Types of TG 20 scaffolding

Tied putlog scaffolding
A scaffold erected with one row of standards in which the working platforms are supported by putlog blades inserted into the building.
TG 20 structural scaffolding features
TG 20 structural scaffolding features

**Bridges**
Independent scaffolding may include a bridged section around an opening, supported by beams, with additional bracing required to stabilise the scaffolding.
TG 20 structural scaffolding features

Prefabricated transom units
Independent scaffolding may be erected with prefabricated structural transom units that permit scaffold ledger bracing to be omitted in the specific circumstances stated by a TG 20 compliance sheet.
TG 20 structural scaffolding features

Cantilevered protection fans
Independent scaffolding may incorporate a light-duty cantilevered fan that protects those below from falling materials.

Other forms of fan require a bespoke design.
TG 20 structural scaffolding features

Inside-board bracket platforms
Independent scaffolding may provide inner platforms supported by inside-board brackets, which may be vertically offset from the main working platform by up to 0.5 m.
TG 20 structural scaffolding features

Pavement lifts
Independent scaffolding erected over a public pavement requires safety measures that include increased headroom of 2.5 – 2.7 m and no ledger bracing below the first lift.
TG 20 structural scaffolding features

Cantilevered access platforms
Independent scaffolding may provide a single-lift cantilevered platform at the inner face of the scaffold supported by raking tubes and couplers.
The purpose of the eGuide is to generate *TG 20 compliance sheets*: These are recognised standard configurations of scaffolding exempt from bespoke design.

Several variations of TG 20 compliance sheet are available from the eGuide that are not available in the Management Guide.

The compliance sheets for independent scaffolding in the Management Guide are suitable for typical scaffolds up to a height of 16m in order to provide straightforward guidance. The TG 20 eGuide provides several alternative designs to achieve greater heights including reduced bay lengths, alternative tie configurations and doubled standards.
STOP

SHOW eGuide Demo
Selecting the scaffold type

The first step is to select the required scaffold type from the available options, as shown.

Note that TG 20 compliance sheets for ladder-access towers and loading bays, which are add-on scaffold towers, can be obtained by first selecting the ‘Independent scaffolding’ option.
Selecting scaffold options

Once the scaffold type has been chosen a number of options are presented by the TG 20 eGuide that depend on the scaffold type. Some typical options are to select the width of the scaffold and to select its required working load.
Selecting add-ons

Independent scaffolding can include add-ons, including bridges, pavement lifts, cantilevered protection fans and cantilevered platforms supported by raking tubes or inside-board brackets. Add-ons are selected as shown.
Selecting add-ons

As each add-on is selected, an additional screen may be presented by the eGuide to select further options related to the add-on.

For example, if a bridge is required an options screen may be provided to select the number of lifts to be supported by it, as shown.

Note: It is also possible to specify whether an independent scaffold will include an add-on scaffold tower, which may be a loading bay or ladder-access tower, in a similar way.
Selecting the site location

**Country**
The site is in open countryside.

**City**
In a city with average building heights of 15 m, at least 2 km from open areas.

**Town or woodland**
The site is at least 2 km into a town or woodland with average building or tree heights of 8 m.

**Sea**
The site is within 2 km of the coastline.
Compliance sheet & add-ons

The maximum safe height and required tie duty reported by the TG 20 compliance sheet for the main access scaffold will include the effects of any add-ons, for example a cantilevered protection fan may decrease the maximum height of the scaffold or increase its required tie duty in some circumstances.

A TG 20 compliance sheet is also provided for each add-on, specifying its design and assembly requirements.
Selecting the site location

The site location must be specified if the scaffold is to be situated in any location exposed to the wind.

The TG 20 eGuide provides an interactive wind map, that automatically calculates the wind exposure by assessing official meteorological data, the site altitude and topography, the height of the scaffold, and the extent to which the wind exposure is reduced at inland sites.

Note: An Internet connection is required to use this feature.
The interactive map displays three gauges at the RH side of the screen.

The first displays the *TG 20 wind factor*: a calculated measure of the site wind exposure described further in the TG 20 Design Guide.

The second gauge displays the *topography* at the site, which is automatically assessed by the TG 20 eGuide to determine its effect on the wind exposure.

The third gauge can be clicked or pressed to cycle between the *seasons* over which the scaffold will be standing, resulting in reduced wind exposure during the spring or summer.
A simple wind classification system is provided to be used with the basic TG 20 compliance sheets in the guide. A more accurate wind analysis, which can result in improved safe heights and reduced tie duties, is available from the TG 20 e Guide and further advice for scaffolding designers is provided in the TG 20 Design Guide.
Selecting the site location

Wind exposure is classified as ‘moderate’, ‘high’ or ‘extreme’

Only small areas of the British Isles are regarded as “Extreme” wind zones

Extreme wind
Selecting the preferred design

Once all of the required scaffolding and site options have been selected a TG 20 compliance sheet is displayed that meets the specified criteria, if one is available.

If add-ons or add-on scaffolding towers are required a TG 20 compliance sheet will be provided for each add-on in addition to the compliance sheet for the main scaffold.
Selecting the preferred design

In some circumstances a TG 20 compliance sheet may not be found, for example if the required scaffolding height cannot be achieved with the selected options. In these cases the problem is reported, as shown.
Selecting the preferred design

Alternatively, several candidate designs may be available. For example, it may be necessary to reduce the bay length of the scaffolding or use an arrangement of ties with tie positions at every lift in order to achieve the required height. In these cases the alternative designs are presented, as shown so the preferred TG 20 compliance sheet can be selected.
TG 20 compliance sheets

Standard unciad independent

Design height
- Minimum height: 1000 mm
- Maximum height: 2000 mm

Maximum opening
- Open height: 850 mm
- Open width: 1000 mm

Location
- Inside the frame

Others
- To be installed above the window

Signature
- Company: [signature]
- Name: [signature]
- Date: [signature]

TYG 20 compliant for [signature]...
START

Re-Start PowerPoint
TG20 Compliance Sheets

The purpose of the TG 20 compliance sheets is to clearly and concisely summarise the dimensions and other criteria to which a scaffold must conform in order to be TG 20 compliant and exempt from bespoke design.

A compliance sheet is required for each scaffold, or each group of similar scaffolds, on a project to demonstrate that they conform to a TG 20 standard configuration. It is recommended that, as part of the planning phase, either a TG 20 compliance sheet or a bespoke design is provided for each scaffold as part of the project method statement.
TG20 Compliance Sheets

Two important points:

TG20 Compliance Sheets must always be read and interpreted in conjunction with the Operational Guide.

The diagrams featured on the TG20 Compliance sheets should not to be interpreted as the “design” for the structure, but only as an indicative criteria.
One compliance sheet is required for every scaffold, or group of scaffolds, that conform to the design.

Every such scaffold must conform to the criteria described on the sheet. The TG20 guide provides detailed information for each criteria and should be consulted for further details.

The footer area defines the scaffolding that the compliance sheet corresponds with. Spaces are provided for a responsible, competent individual to sign the sheet and confirm that the scaffolding will correspond with the requirements of the compliance sheet.
Standard unclad independent

An unclad tube and fitting tied independent scaffold with 2.0m maximum lift heights.

Design height
- Maximum height: 16m to the top lift;
- Maximum leg load: 16.2kN.

Maximum loading
- One lift loaded, plus one lift 50% loaded, per legade with:
  - General purpose (load class 3): 2.0kN/m²;
  - Heavy duty (load class 4): 3.0kN/m²;
  - Overlay boards loaded to 0.75kN/m² at the working lift.

Ties
- 1 x light-duty 0.5kN (per 16m²);
- Max 45m between tie lines (less required at alternate lifts);
- Max 4.0m horizontal distance between vertical tie lines.

Location
Valid in the British Isles where the site wind exposure is not extreme as defined in TG20-13 chapter 05.

Criteria
To be erected as a TG20-compliant tied independent scaffold as described by TG20-13 chapter 06:
- Boarded at any number of lifts, 3 - 5 main boards and up to 2 inside boards wide;
- Maximum lift height: 3.0m;
- Maximum bay length: 2.0m (load class 2), 1.8m (load class 4);
- Maximum transom spandrel: 1.2m (load class 3), 0.9m (load class 4);
- Unclad or with wire or plastic bridle guard;
- Tied to an impermeable façade (no significant openings).

Add-on features
- This scaffold may optionally include a TG20-compliant bridge, pavement lift and conderiver fan with an accompanying compliance sheet for each.

Facade braced in every elevation, one set per six bays;
- Ledger braced at alternate standards and at end frames;
- Double guard rails at boarded lifts (fixed guard rail permitted at the top lift);
- Single guard rails at unboarded lifts;
- Internal edge protection provided where required;
- Tied in accordance with the guidance in TG20-13 chapter 07.

Signature
I confirm that this is an accurate description of the following scaffold:

Maximum working load
- EnSite reference:

Company: ___________________________ Name: ___________________________
Position: ___________________________ Signature:

2.0kN/m² [ ] 3.0kN/m² [ ]

Date: ___________________________
TG20 Compliance Sheets

Maximum Safe (Design) Height

This is the maximum height to which a scaffold may be erected, measured to the top lift.

If it is necessary to erect a taller scaffold a different compliance sheet may be available, typically a sheet printed from the TG 20 e Guide, or it may be necessary to seek design advice.
Ties

The tie specification defines the strength of ties that are required (the tie duty), the number of ties required per square metre of scaffolding (the tie density) and the maximum distance between lines of ties.

The compliance sheets also provide guidance for the fixing of tie tubes and state when the effects of the site wind necessitate additional stabilisation methods.
TG20 Compliance Sheets

Maximum Loading

Compliance sheets specify the maximum working load that the scaffold is designed to support.

The compliance sheets also specify the maximum number of platforms that may be loaded at any time, per elevation of scaffolding, as it is normal practice for one platform to be actively used, with another platform for the temporary light storage of tools and materials, even if more scaffold lifts are boarded.
TG20 Compliance Sheets

Maximum Dimensions

TG 20 compliant scaffolding must conform to certain maximum dimensions that are stated by the compliance sheets.

These are primarily the maximum bay length (the distance between adjacent pairs of standards), the lift height (the vertical distance between platforms) and the maximum transom spacing (the maximum spacing between board-bearing transoms). In general, heavier-duty loads require reduced bay lengths and transom spacing.
TG 20 Compliance Sheets

Add-ons and Structural Features

The TG 20 compliance sheets for independent scaffolding state whether they are designed to include add-ons or other structural features such as a bridge, cantilever protection fan, cantilever working platform or pavement lift.

TG 20 compliance sheets should be provided for the main scaffold and for each structural feature not included in the basic specification.

Cont’d.
TG20 Compliance Sheets

Add-ons and Structural Features

In some cases a structural feature may change the design of the main scaffold, for example the maximum safe height of a scaffold may be reduced by providing a cantilever protection fan or stair tower.

To accommodate this, the compliance sheets for the majority of special features are printed from the e Guide rather than being provided in the operations guide so that the safe height and tie duty reported on the compliance sheets can be customised.
TG20 Compliance Sheets

Independent scaffolding variations

TG20 compliance sheets are provided in the TG20 eGuide for several variations of independent scaffolding, including options to erect up to 50 m depending on the site conditions, storey-height lifts of up to 3.0 m, and alternative construction materials including high-tensile steel tubes.
**TG20 Compliance Sheets**

**Erection tolerances**

The dimensions reported on the TG 20 compliance sheets are subject to the following erection tolerances:

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<th>Feature</th>
<th>Erection tolerance</th>
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<td>Standards</td>
<td>Vertical to within ± 20mm in 2m, to a maximum total deviation of 50mm.</td>
</tr>
<tr>
<td>Ledgers</td>
<td>Level to within ± 20mm in 2m, to a maximum total deviation of 50mm.</td>
</tr>
<tr>
<td>Transoms</td>
<td>+ 100mm on the target spacing.</td>
</tr>
<tr>
<td>Bay length</td>
<td>+ 200mm on the designated lengths.</td>
</tr>
<tr>
<td>Lift height</td>
<td>+ 100mm on the designated height.</td>
</tr>
</tbody>
</table>

*Note: Lift heights, bay lengths and transom spacing's may be reduced below the stated values to suit site conditions.*
TG20 Compliance Sheets
Standard debris-netted independent

**Ties**
- ✓ 1 x light duty (3.5 kN) tie per 16 m² (*moderate* wind sites);
- ✓ 1 x standard duty (6.1 kN) tie per 16 m² (*high* wind sites);
- ✓ Max 4.0 m between tie lines (ties required at alternate lifts);
- ✓ Max 4.0 m horizontal distance between vertical tie lines;
- ✓ Tied at the top lift at ledger-braced standards.

- ✓ Structural transoms at ledger-braced frames when the scaffold height exceeds 14 m and the site wind is *high*.

**Wind exposure:**
- □ Low or moderate
- □ High
TG20 Compliance Sheets
Standard sheeted independent

**Ties**
- 1 x standard duty (6.1 kN) tie per 16 m² (moderate wind);
- 1 x standard duty (6.1 kN) tie per 13 m² or 1 x Class B standard duty (9.1 kN) tie per 16 m² or (high wind);
- Max 4.0 m between tie lines (ties required at alternate lifts);
- Max 4.0 m horizontal distance between vertical tie lines;
- Tied at the top lift at ledger-braced standards.

- Structural butting transoms are required at every node point connected to the inner and outer ledgers with right-angle couplers or equivalent.

**Wind exposure:**  [ ] Low  [ ] Moderate  [ ] High
Structural Transoms

Putlog couplers only have a limited capacity to form structural connections. In certain cases it is necessary to provide additional transoms connected with right-angle couplers known as *structural transoms*.

Structural transoms are required for all TG 20 compliant *sheeted* independent scaffolds. A structural transom should be fixed to the ledgers within 300 mm of each node point at every lift. The remaining transoms may be connected with putlog couplers as usual.

Structural transoms may also be required for some *debris-netted* independent scaffolding. In these cases structural transoms should be provided within 300 mm of each ledger-braced pair of standards at each lift.
TG20:13 Management Guide

The client brief

The client brief is the starting point for the contract between the client and the contactor. It should be written in a language that is understood by both parties. It should cover:

- The scope of works
- The schedule of works
- The contract conditions
- The payment terms
- The contract duration

Handover certificates

Once the contract has been completed, the client receives a certificate of completion. This certificate should be signed by both parties. It should be based on the contract conditions.

Protection of the public

Scaffolding is usually required in areas where members of the public can be exposed to the risk of falling. The public have a right to feel safe and protected. The use of scaffolding is a legal requirement in many countries. The public have a right to feel safe and protected. The use of scaffolding is a legal requirement in many countries.

Training

Scaffolding contractors must ensure that their employees are trained and competent. This includes training in the use of scaffolding equipment. The training should be provided by a qualified trainer.
Questions?

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