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SAND - Structural Analysis and Design, & SCALE - Structural CALculations Ensemble, Information sheet 52; Jan 2026.

Support.

(1) **Technical support**, for technical support for all aspects of SAND and SCALE please email a marked up copy of the calculations in question to Dr Ian Brown ian@fitzroy.com.

(2) **Accounts**, if you have changed address or if there is a new contact person, please email: Jeanette Brown, jeanette@fitzroy.com or post to Lark Lodge, Fornham St Martin, Bury St Edmunds, Suffolk IP31 1SR.

First-Generation Eurocodes.

All proformas now show full calculations to the First-Generation Eurocodes or full calculations to the British Standards, or are analytical and applicable to both codes.

Second-Generation Eurocodes.

Publication of the Second-Generation Eurocodes has started. The BSI state that they plan to update the Eurocodes and National Annexes, and then withdraw the First-Generation Eurocodes in March 2028. Currently very few National Annexes, and none for loading have appeared.

In 2025 Fitzroy has continued updating the proformas towards the goal of being fully compliant with the Second-Generation Eurocodes. This work is still at an early stage as no Second-Generation Eurocodes can be used without their accompanying National Annexes, and it is highly recommended that engineers do not mix First-Generation and Second-Generation Eurocodes.

SCALE options 44 and 48, and the update webpage, now display a bar chart showing the progress of updating the proformas to the Second-Generation Eurocodes, viz.:

Green highlight: "Second-Generation Eurocode ready".
Number of files: 485 / 793 (61%)

Orange highlight: "Second-Generation Eurocode awaiting National Annexes".
Number of files: 41 / 793 (5%)

Blue highlight: Work in progress, neither string included in proforma.
Number of files: 267 / 793 (34%)

Black highlight: Work has not yet started on the proforma.
Number of files: 0 / 793 (0%)

Most proformas currently have a prompt at the start to select between code=1 (British Standards) and code=2 (Eurocodes). We have extended this to add the option code=3 for the Second-Generation Eurocodes. In due course this will be presented to the user when sufficient National Annexes are published.

Where necessary the proformas have separate parallel sections of "IF code=2" and "IF code=3" to accommodate any differences. Having separate sections allows SCALE to present an easy-to-view comparison between the two versions using SCALE option 48. Many differences will be minor, with just different clause and table numbers, however some proformas will have significant methodology changes.

Windows 11.

All programs in the SAND and SCALE suites are fully supported, tested and operational on all 32-bit and 64-bit desktop/laptop versions of Windows 11, Windows 10, Windows 8.1, Windows 8 and Windows 7.

Main changes to SCALE program in 2025 (Latest version is 7.52).

- Modifications to 777 proforma files and 288 parametric files to progress work on the Second-Generation Eurocodes.
- Increased the number of permitted tables in a proforma from 50 to 100, and the number of permitted table entries from 32,000 to 100,000 to facilitate adding extra tables and remove the need to unload tables for the Second-Generation Eurocodes.
- Updated sc044, which runs through all SCALE examples, to now colourise the index according to the progress of the Second-Generation Eurocode implementation in SCALE, and added an index page to the pdf explaining the progress.
- Updated sc190 and lu910 to use BS 8666:2020.
- Modified the update script to add progress towards the Second-Generation Eurocodes to the website automatically.
- Modified the update script to build the inline help manual and the help pdf automatically, these help manuals now include up-to-date summaries of all proformas, the version number is now displayed on the cover page and at the start of Section 9 (Summaries).
- Fixed issues for ascii characters 7, 11 and 12 in the inline help manual and the help pdf.
- Restructured multi-threading for the testing proformas 41, 44, 45, 46, 47, 49, to maximise number of threads. This typically increases the number of threads from 14 to 22 simultaneous instances of SCALE/NL-STRESS/NL-PLOT.
- Modifications to proformas and parametric files such that option 47 runs correctly without any errors for code=1, code=2 and code=3. Option 47 provides a quick check that every example runs correctly regardless of what variables are already stored in the stack file at the start of the run from any previous run. Using the default npat=6 zni=5 option 47 creates 700,000 files totalling 50GB!
- Updated the code=3 Second-Generation Eurocode versions of the Masonry proformas to the recently released NA to BS EN 1996-1-1:2022.
- Aesthetic improvements to harmonise all proformas to the house style: one space between words, two spaces after a full stop, replaced deg. with °, replaced re-run with rerun.
- The following orphaned proformas have not been used by SCALE for a while, and have been removed from the update: bs4000, bucber, ec2cmt, ec4, flowchart, hpshapes, mshapes, nlspro, sc100anh, sc100anm, sc100aoh, sc100aom, sc100cnh, sc100cnm, sc100coh, sc100com, sc100rnh, sc100rnm, sc100roh, sc100rom, sc375, sc376, sc3810, sc4050, sc558, sc645, sshapes, wshapes.
- Added new index files sc044indexpdf2.txt and sc048indexpdf.txt.

Parametric testing

- Parametric testing has been added to SCALE over the last 15 years to help detect any errors in proforma logic. This testing is especially useful when there are large scale changes to multiple shared proformas to help stop any undesired changes from creeping in.
- SCALE option 44 runs through all 5737 examples and benchmarks, for code=1, code=2 and code=3, without any errors.
- SCALE option 45 runs through all 3602 examples in "Summary" mode, for code=1, code=2 and code=3, without any errors.
- SCALE option 46 provides a quick check that the stack files are being saved correctly between runs. This option first runs through all the ans= default answers for the SCALE, LUCID, SPADE and NL-STRESS proformas listed in file sc044.pro using multiple threads. Then it re-runs these tests using the stack files created by the first run. This option then checks for differences between the .cal files and .stk files between the first two runs, and automatically re-runs a third time if different. Option 46 creates the bookmarked and hyperlinked file scalesample_diffs.pdf, highlighting any differences between runs 1 and 2, and runs 2 and 3. Output is saved into directories: 46stk1, 46stk2, 46stk3, 46cal1, 46cal2, 46cal3 and 46diffs.

  All 5601 examples of all proformas for code=1, code=2 and code=3, now run without any problems reported for testing SCALE option 46 (for checking stack file is correctly saved and reloaded, only the iterative proformas sc099 and sc756/757/758 show differences between runs 1 and 2, and no differences between runs 2 and 3).
- SCALE option 47 provides a quick check that every example runs correctly regardless of what variables are already stored in the stack file at the start of the run from any previous run. Option 47 combines aspects of the parametric checking from options 40 to 42, with the checking of all default examples from options 43 to 46. Run 1 consists of a reference set of calcs using bare bones stack files. Run 2 builds and then runs multiple stack files for every line for the SCALE, LUCID, SPADE and NL-STRESS proformas listed in sc044.pro using multiple threads, creating a complete range of inputs derived from the parametric .prm files. With npat=6 and zni=5, all 164,460 test cases (56GB of files) for all examples of all proformas for code=1, code=2 and code=3, now run without any problems reported for testing SCALE option 47.
- SCALE option 48 produces a progress report bar chart as shown at the start of this newsletter, work has now started on all proformas, no errors are reported.
- SCALE option 49 displays the proforma logic with structural indentation for every proforma with output to a bookmarked and hyperlinked 72,235 page pdf file scalesample_logic.pdf. No logic errors are detected.

SCALE available on the Apple App Store.

SCALE is available on the Apple App Store. Monthly and annual in-app renewable subscription options are available. The SCALE app runs on iPads running iOS 12 onwards: all iPad Pros, all iPad Airs, iPad 5 onwards, and iPad Mini 2 onwards. The SCALE app also runs on all Macs with Apple Silicon, M1/M2/M3/M4. The SCALE app includes the full versions of SCALE, LUCID, SPADE, NL-STRESS, NL-VIEW, NL-PLOT, the NL-STRESS GUI, TAPE and SCP (for creating pdf and docx output). Click on the link on the fitzroy.com website, or search for "SCALE Structural Calculations" on the Apple App Store.

Plans for 2026.

- Continue updating the proformas for the Second-Generation Eurocodes.
- Add a way of parametrically and automatically testing the NL-STRESS GUI and NL-VIEW to track down any potential bugs.
- Expand use of pdf outlines (bookmarks) that SCALE can now add to pdfs.

- Create training videos for all aspects of SCALE, LUCID, SPADE, NL-STRESS, NL-PLOT, NL-VIEW, TAPE, and the NL-STRESS GUI, and place them on the website.
- Add zoom facilities to the viewing calcs screen at the end of the proforma.
- Add a thumbnail view scrollbar along the bottom of the viewing calcs screen, and a text search facility.
- Combine the NL-STRESS GUI's steel section table selector so that it's available from within the SCALE proformas.
- Combine aspects of the NL-STRESS GUI with the NL-VIEW results viewer, so the user can easily make changes to the model and re-analyse on the fly.
- Introduce new NL-STRESS commands to generate plots using NL-PLOT and possibly NL-VIEW. Currently plots are achieved by the NL-STRESS proformas using parametric commands, but these commands are hard to follow and are currently removed before viewing the file in the NL-STRESS GUI, so an alternative would be useful.
- Encode NL-VIEW screenshot .png files into the .cal file so the two files can't become separated.
- When editing calcs, add a way of deleting pages out of a set of calcs.
- TAPE's dimension line, dashed line and centreline properties could be saved into the hpgl of the .cal file, and hence could retain those attributes, rather than be converted into normal lines.

Installation.

The 2026 update installs a desktop shortcut named "SCALE 7" (to launch program scale.exe), for both SAND and SCALE licences. For new installations of SCALE 7, the installer now looks for previous versions of SCALE 6, then SCALE 5, then SCALE 4 shortcuts to get the previous installation directory. You can delete any existing shortcuts to SCALE 5 and 6, as the target is the same.

As SCALE now includes all the NL-STRESS features that were previously only included in the SAND suite, there is no longer a separate front screen for SAND.

SCALE version 7 retains the familiar scale ruler icon with a red stripe. The icon for SCALE version 4 is the same scale ruler but with a blue stripe to differentiate between the old and new versions.

The installer 2026.EXE no longer contains the executable files for SAND and SCALE version 4, as these Fortran versions have not received the last 15 years of improvements. A final version of both of these, and the Multipad text editor, can be downloaded from the update webpage, from a SCALE4.EXE link at the bottom of the first section. Download and run the executable to install the files into your SAND installation directory. To use version 4, please create a shortcut to sand32.exe or scale32.exe and copy your L.NAM licence file into your installation directory.

When SCALE 7 is first run on a computer, and no directory.ini file has been setup to store the current working directory, then SCALE will present option 12 to the user with C:\SAND as the default.

If you pay online, your online receipt will contain a PIN code to type into SCALE when prompted to create your L.NAM if installing on a new computer.

Downloading updates during 2026.

Further updates in 2026 will be posted to the download website at the beginning of April, July and October, please visit the download website for the latest version of 2026.EXE.

Ian Brown 01/01/26.