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SAND - Structural Analysis and Design, & SCALE - Structural CALculations Ensemble, Information sheet 50; Jan 2024.

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.

Eurocodes.

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

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 2023 (Latest version is 7.26).

- 25 new SPADE proformas, and modifications to over 300 existing proformas to fix issues identified when testing using proformas 44 and 47, major changes to proformas are listed below.
- Updated the version number to SCALE 7 as SCALE is now built with the latest Microsoft Visual Studio 2022 compiler. This compiler has the latest security fixes and improvements, and provides the most comprehensive development and debugging facilities. SCALE 7 runs on all 32-bit and 64-bit versions of Windows 11, Windows 10, Windows 8.1, and Windows 7 (introduced in 2009). SCALE 7 will not install or run on Windows Vista nor Windows XP.

Changeable working directory and installation details

- SCALE 7 introduces the ability to easily switch between different working directories. SCALE stores the current working directory in the AppData directory e.g. in file C:\Users\Ian\AppData\Local\Fitzroy\SCALE\directory.ini. You can change the working directory at any time by using Option 12 "Change the working directory". Use Option 12's "Browse" button to quickly select any directory on your computer, or type in directly e.g. C:\SAND
- When first run, if SCALE has not found a previous shortcut, it will prompt for a working directory, this will be pre-filled with C:\SAND, but this can be changed to any other directory with the "Browse" button, or by typing directly e.g. C:\SWORK
- SCALE checks that it can write to the current working directory, both when SCALE launches and

when the working directory is changed with Option 12. If SCALE can not write to the current working directory, Option 12 is then presented to the user with a message saying that SCALE can not write to the chosen directory and to choose another.

- On first installation, if no existing shortcuts are found, C:\SAND will be offered as the installation directory. Installation to "Program Files" is fully supported if you wish to browse to that directory yourself e.g. C:\Program Files (x86)\SAND.
- The installation and working directories can be on different drives, and can contain spaces in their pathnames.
- When first run, if SCALE can not find your L.NAM licence file, it will present you with a screen to enter your Licence number and a password that has been provided to you. This should make installation easier as you don't need to work out where to save your L.NAM file. SCALE will then generate and save your "L.NAM" licence file for you. This screen also has a "Browse" button which will let you alternatively browse to the location where you have saved your previous "L.NAM" licence file. SCALE will then copy the "L.NAM" to your settings directory for future use.
- A new shortcut to SCALE 7 is now installed, you can delete any existing shortcuts to SCALE 6 and SCALE 5.
- To quickly access the contents of SCALE's AppData settings directory, select the new top menu option Help─>Settings Directory... to open Windows Explorer directly on the directory e.g. C:\Users\Ian\AppData\Local\Fitzroy\SCALE.
- Your L.NAM licence file, any SCALE and SCP(Printing) settings, and any company logos are also stored in the settings directory, such that they do not need to be moved around when you change working directories.
- The program remains scale.exe, there are no fundamental changes from 6 to 7.
- The installer 2024.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, these files are available as a separate download from the update website.

Stack files

- We have fixed a bug where SCALE would sometimes omit saving a variable to the stack file! This bug was introduced in Feb 2021, when extending the line count of SCALE proformas beyond 32000. This caused problems with picking up previous values when re-running some proformas.
- To reduce any further problems with stack files we have now introduced regression testing for stack files, to check that all values are being saved correctly.
- Option 44 now has an option ans=2 which will automatically run through all the default answers listed in sc044.pro two times, the second run using the stack files saved by the first run. The stack and calculation files for these two runs are saved into sub-directories 44stk1, 44cal1, 44stk2 and 44cal2, for easy comparison using windiff etc. to check that the results are unchanged.
- For the proformas in Version 7.10, for sc044 with ans=2, there were initially 430 different .cal and .stk files out of 7112 .cal and .stk files.
- The latest version now provides identical results between the first and second runs for all proformas except sc097, sc099, sc756, sc757, sc758, due to their iterative nature. Option 44 ans=2 re-runs these proformas for a third time using the stack file from the second run, and gets identical calcs file and stack file output between the second and third runs.
- Proforma 44 extended to build the combined indexed and outlined/bookmarked pdf files in one go direct from the calcs files, viz. scalesample_all.pdf and scalesample_summaries.pdf. These no longer need any external programs to combine individual pdfs. The associated lists and indexes required are included in the update in the files sc044.pro and sc044*.txt, to enable building these

files on any computer.

- Added Option 47 - automated parametric checking of all examples. This option simulates a user running ans=1 after they, or someone else, has already run the proforma.
- The data held in the stack file takes precedence over default values listed before 'START' in a proforma, so where the default example (ans=1) relies on the values listed before 'START' then this can create problems if those values are overwritten by the stack values. Proforma sc044.pro, which runs through all the examples to build scalesample_all.pdf, has been extended with an extra column. This column indicates which parametric table to use for generating multiple stack files for each example. Option 47 then uses sc044.pro, combined with proforma 42, and the existing .prm parametric checking files, to test the proformas with multiple .stk files, but with ans=1,2,3 etc. set.
- Option 47 then performs a second run through all the examples, but with a bare bones stack file, and places the output into directories 47cal1, 47stk1, 47cal2, 47stk2. The files from the second run are copied multiple times, so that every file, for every ans=, for every code=, for every parametric increment, and every parametric pattern, has a matching file to make comparison straightforward.
- SCALE Option 47 parametric testing now done for 6 patterns of 5 increments, we now have 3435 examples running correctly for calc and stack file output, when fed parametrically generated stack files. This represents testing of 3435 x 30 x 2 x 2 = 412,200 calc and stack files, totalling 40GB. There are 92 remaining examples that need adjustment or new parametric files, these will be fixed in 2024.

Multithreaded testing

- To speed up testing of multiple SCALE proformas at once, when running proforma 44, on 64-bit Windows, SCALE will now launch up to 24 threads if memory allows, to process 24 proforma runs simultaneously.
- This has required substantial internal changes to make SCALE, NL-STRESS, NL-PLOT, SCP (for saving to pdf and docx) thread-safe, and to accommodate dynamic memory allocation for each instance.
- For efficiency, SCALE will launch as many threads as there are logical processors, so if there are 8 logical processors then SCALE will launch 8 threads.
- On 32-bit Windows, SCALE will stick to 1 thread.
- For sc044's ans=2 two pass approach, this reduces the run time from 71m53s to 7m10s, i.e. 10 times faster, for a Core i7-13700 machine with 24 logical processors and 32GB RAM (£700+VAT from Dell Outlet). SCALE dynamically grows its memory usage up to 3.4GB, which is then freed up and drops back to 300KB when sc044 finishes. This speed up will be very useful when extended to further parametric testing of proformas in 2024.

Miscellaneous SCALE improvements.

- On the screen to select proforma numbers directly, the Fast Forward button has been replaced with a Files button, to enable you to select from a list of .pro files in the current working directory.
- On the screen to select proforma numbers directly, a /A option has been added in addition to the /P option. The /A option also displays the proforma itself showing its structure, but with all included files expanded in place, and line numbers displayed in the margin. The /A option is useful in tracking down line numbers reported in proforma errors.
- Extended the maximum size of an array entered at an EDIT box from 100 rows to 200 rows to fix problems with sp801 ans=3,4,5,6.
- Fixed a bug where any variable ending in "ans" would be reset to zero when SCALE saves the stack file, now only the variable "ans" itself is reset to zero. Affected d2ans in sc090, sc091, sc092,

sc104.

- Fixed a bug when running proformas under option 44, where the number of significant figures output would switch from 5 to 6 if the previous SCALE run before running option 44 was a LUCID or SPADE run.
- Modified SCALE so that any string variables declared before START are only saved to the stack file if changes are made to them, this now matches the behaviour of number variables.
- Renamed "DOS" command to "CMD" command in the proformas for the file operations "del" and "copy".
- Fixed behaviour of "◀◀ Redo Stage" so SCALE entry now correctly goes back to the previous occurrence of ">" in the proforma file. This had not been working properly.
- Altered behaviour of "Restart ▲".
- If "Restart ▲" clicked in the middle of a proforma, the entry screen now goes back to the first entry in the actual proforma, i.e. the first entry after the stack file page, this preserves any values entered in response to prompts, and any other values that haven't yet been called up from the stack file.
- Previously the proforma would have restarted at the beginning, and used the old stack file, losing all entered values.
- Behaviour of clicking on "Restart ▲" when viewing the final calcs is unchanged: entry goes back to the Proforma Number screen with the current proforma number, as the stack file has already been saved.
- Behaviour of clicking on "Restart ▲" on initial screens up to and including the stack file screen is unchanged: entry goes back to the Proforma Number screen with the current proforma number.
- Fixed a crash in File─>Print a File.
- Fixed saving of printed page width settings, in File─>Page Setup, you can now select e.g. -25, -25 for left and right margins for an extremely stretched page. All hpgl (LUCID/SPADE/NL-PLOT) always drawn to scale, unstretched.
- Fixed starting window position to remember its last position.
- Added nls.dat template data file, and sc001.pro, under "NL-STRESS - Run NL-STRESS" index.
- Adjusted SCALE launch to fix any erroneous window sizes.
- Modified shortcut.exe to run on Windows XP and Windows Vista but to provide a polite message saying that SCALE 7 will not install.
- Revamped bottom toolbars to eliminate flickering between the "Fast Fwd" and "Files" button and other occurrences.
- SCALE pdf output modified to increase the maximum number of pages from 8,191 to 819,100.

NL-STRESS GUI

- Fixed GUI Draw Structure crashing when fed Member Incidences like 3 THRU 3 RANGE 3 4 3 4 from sc891.pro.
- The GUI Draw Structure's initial sizing now starts with a better match for tall structures.

NL-VIEW

- NL-VIEW: added section outlines for CONIC (Circular and Elliptical) and OCTAGON sections.
- Fixes for screenshots from NL-VIEW.
- Changes to TAPE and NL-VIEW toolbars to make any disabled buttons visible when using Stardock WindowBlinds 11 on Windows 11, for users who like borders on their windows!

- NL-VIEW, after going to Settings, the bottom toolbar disappeared, now fixed.
- NL-VIEW, toolbar and top menu, now display "STAGE 1", "STAGE 2", and "STAGE 3" as appropriate after running 2 and 3 stage SCALE and NL-STRESS proformas. Click on these buttons or menu options to switch between viewing the results of each stage in NL-VIEW.
- Switched NL-VIEW panning and rotating mouse actions, to match the panning in TAPE and NL-STRESS GUI Draw Structure, i.e. left clicking and dragging with the mouse will pan the view.
- NL-VIEW: to rotate the model, click with both left and right mouse buttons and drag to rotate up/left/down/right.
- New keyboard shortcuts for NL-VIEW: use the arrow keys to pan the view up/left/down/right.
- New keyboard shortcuts for NL-VIEW: use the WASD keys to rotate the model up/left/down/right.
- Added text for the keyboard shortcuts described above and mouse actions, and for mouse-wheel and +/- to zoom in and out, to the top menus for NL-VIEW, TAPE and NL-STRESS GUI Draw Structure, for easier discovery.
- NL-VIEW screenshot, the "Key: DS" text has been changed from white to black to make it visible.

NL-PLOT

- Added a check to NL-PLOT that the structure type is read from the arrays file correctly, if not will go back to menu rather than battle on.
- Fixed top line of NL-PLOT data entry screen which was overwritten by the filename when coming back from the plot.

LUCID/SPADE

- Fixed a printing problem affecting lu130, and possibly other LUCID and SPADE details.
- LUCID and SPADE numerical output changed to no longer remove the leading zero before a decimal point.

TAPE

- TAPE, select a region, copy, paste, then move selected, this had trouble selecting, now fixed as TAPE looks through all items under cursor for any selected items.
- Fixed grey bars appearing on right and bottom when resizing the SCALE window, they disappeared on the next screen but were distracting.
- Tape displaying an NL-VIEW screenshot, the lines in the colour chart now have square ends, to match printed and pdf output.

Help

- SCALE's interactive help is now incorporated into the main SCALE window.
- Select Help─>Help to display the Help window, this will open at a page relevant to the particular topic.
- When displaying Help, the top menu changes to a drop-down table of contents for easy navigation.
- The User's Manual is still available as a pdf file, select the menu option Help─>Launch pdf User's Manual... to view with your default pdf viewer.

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 11.2 onwards: all iPad Pros, all iPad Airs, iPad 5 onwards, and iPad Mini 2 onwards. The SCALE app also now runs on all Macs with Apple Silicon, M1, M2 and M3 onwards. 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 2024.

- Add multithreading to proforma sc042, verifying the correctness of SCALE proformas; and to proforma sc047, parametric testing of all SCALE examples.
- Expand proforma sc042, verifying the correctness of SCALE proformas, to run through proformas two times, re-using the stack files from the first run. Much work in 2023 identified instances where some variables were being used for presenting output despite the variables not being set by the actual inputs for that run. In 2024 we plan to identify and eliminate any further occurrences of this.
- Expand use of pdf outlines (bookmarks) that SCALE can now add to pdfs.
- Add pdf outlines to sc042, verifying the correctness of SCALE proformas, for building a report with the distribution of parameters.
- Investigate adding pdf outlines for building a report on proforma sc820.
- Investigate adding pdf outlines when appending files, or for a new option for collating multiple files together.
- Add further SPADE proformas, if anyone has any structural drawings they would like to be automated using SPADE please email ian@fitzroy.com with details.
- 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 thumbnail view scrollbar along the bottom of the calcs window, and a text search facility.
- There are still many intermediate files being saved to disk. Now that all of SCALE runs from one executable these files could be stored in memory to speed up the program, reduce conflict with antivirus checkers and cloud storage, and allow multiple instances of SCALE to run from one directory without clashes.
- Combine the NL-STRESS GUI's steel section table selector so 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 removed before viewing the file in the NL-STRESS GUI, so an alternative would be useful.
- Add feature to import DXF and possibly PDF drawings to the NL-STRESS GUI to use as templates for creating a structure.
- Encode NL-VIEW screenshot .png files into the .cal file so the two files don't become separated.
- 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.

New proformas.

sp203 Timber joist hangers. This option will detail the following timber joist hangers:

- Roof joists supported on R-Type hangers,
- Floor joists supported on R-Type hangers,
- Roof joists supported on saddle hangers,
- Floor/roof joists supported on saddle hangers.

sp205 Timber shear wall. This option will detail a shear wall with either vertical or horizontal sheathing. Connection straps to resist wall uplift are proposed by this option. Galvanised straps are assumed to be fixed to stud and floor joist or noggin.

sp270 Miscellaneous timber details. This option will detail twelve typical timber details as listed here: Typical eaves detail, Typical eaves detail at RC Beam/Lintel, Typical eaves detail at steel lintel, Typical rafter/ridge wall detail, Typical rafter/ridge or hip detail, Typical rafter/timber ridge detail, Eaves detail with tie bolted to rafter, Eaves detail at RC beam/lintel with tie bolted to rafter, Eaves detail at steel lintel with tie bolted to rafter, Typical rafter/internal wall detail, Typical rooflight detail and Typical rafter/external wall detail.

sp271 Flitched beam fully restrained. The following flitched beam types are considered by the proforma:

- Two timber joists with one steel plate extending the full length of timber joists are tightly bolted together to form a composite beam
- three timber joists with two steel plates extending the full length of timber joists are tightly bolted together to form a composite beam.

sp272 Base of timber column. This option will detail a timber column base with a galvanised steel shoe. A steel stub column is provided with a top bearing plate fixed central on base within a galvanised steel shoe. The base plate of the stub column is fixed to the concrete floor using HD bolts or chemical anchors.

sp273 Top of timber column. This option will detail a timber column top with a galvanised steel shoe. A steel stub column welded central to a galvanised steel shoe and a top bearing plate form part of the detail.

sp459 Steel beam over padstone detail. This option will detail four typical steel beam over padstone details (Option=1 to Option=3).

sp508 CHS column base plate. This option will detail a column base plate and holding down bolts.

sp509 SHS or RHS column base plate. This option will detail a column base plate and holding down bolts.

sp602 Typical reinforced ground beam. This option will detail two reinforced ground beam details as listed below:

- Typical internal ground beam
- Typical edge ground beam.

sp603 Typical detail of mesh reinforced suspended slab. This option will detail a suspended ground bearing slab reinforced top and bottom with mesh. The supports could be either a wall or a ground beam. Laps in top mesh within the middle third and laps in bottom mesh within the end quarter are recommended by the proforma.

sp604 Typical ground bearing slab. This option will detail the following ground bearing slab details:

- Slab internal thickening
- Slab of constant depth reinforced top and bottom
- Slab edge thickening
- Internal slab detail at changing depth.

sp621 Typical detail for step down of strip footing. This option will detail a step in a strip footing with a recommendation on the minimum dimension for the step width.

sp660 Typical pilecap arrangement. This option will detail six pilecap arrangements as listed below:

- Typical 1-Pile arrangement
- Typical 2-Pile arrangement
- Typical 3-Pile arrangement
- Typical 4-Pile arrangement
- Typical 5-Pile arrangement
- Typical 6-Pile arrangement.

sp670 Ancon Windposts/Parapet posts:

- WP1 Windpost - Channel post
- WP2 Windpost - L-post
- WP3 Windpost - Channel post
- WP4 Windpost - Flat plate post
- WP2 Parapet post - L-post.

sp671 Ancon Windpost/Parapet post connections:

- WP2 Windpost bolted to a steel beam at the top and fixed to concrete at the base.
- WP3 Windpost fixed using expansion bolts into concrete at the top and bottom. Three top connection types are offered with this option.
- WP4 Windpost fixed using expansion bolts into concrete at the top and bottom. A steel beam at the top in lieu of a concrete slab is offered as an alternative with WP2 Parapet post fixed using expansion bolts/chemical anchors into concrete or bolted to column capping plate using 4No. bolts.

sp677 Purlin supporting services. Two options are offered by the proforma as listed below:

- Detail at purlin supporting services with snow drifting or without snow drifting
- Detail at purlin supporting fire sprinkler pipework or other heavy services.

sp680 Typical handrail details. Three options are offered by the proforma as listed below:

- Typical handrail detail - concrete option
- Typical handrail detail - steelwork option 1
- Typical handrail detail - steelwork option 2.

sp710 Typical kerb details. Six typical precast concrete kerb details are offered as listed below:

- Kerb type HB2 as Q10 (top soil/gravel)
- Kerb type HB2 as Q10 (pavement)
- Kerb as Q10
- Kerb type BN as Q10
- Kerb type EF as Q10
- Kerb type CD as Q10.

sp720 Typical car park details. This option will detail a typical driveway construction for cars Option=1 is selected and a typical service yard construction for delivery vehicles Option=2 is selected.

sp730 Typical soakaway detail. This option will detail a perforated pipe surrounded in single size aggregate. Geotextile membrane e.g. 'Terram' or similar approved is also included as part of the detail.

sp731 Typical land drain detail. This option will detail a UPVC land drain in granular bed and surround. Geotextile membrane e.g. 'Terram' or similar approved is also included as part of the detail.

sp732 Concreting of drains laid near to foundations. This option will detail the concreting of drains laid near to foundations for:

- Fill drain trench to foundation bottom.
- Take concrete base down to 300 mm below 30ø line and fill drain trench to a level below the foundation base.

sp733 Drain passing under foundation. This option will detail a rocker pipe passing through a low density expanded polystyrene sleeve with dowel bars to specification.

sp734 Miscellaneous concrete details. This option will detail the concrete details listed below:

- Section through concrete plinth - isolated plinth
- Sections through concrete plinth/upstand and plan on concrete plinth/upstand.

Changes to SCALE proformas.

In addition to the changes detailed above, we have made amendments to over 300 proformas, the main changes are listed below:

ec3com added steel Grade=460 to routine fyval and fyrhs, added routine stnote.

ec3sec updated routines Ubdp, Ucdp, Hsdp & Hrdp and COLD FORMED DIMENSIONS & PROPERTIES for CHS, SHS & RHS, updated Hsdp routine (added 40x40x3 SHS section).

ec3t added steel Grade=420 & 460 to Table 310.

ec5r2 replaced Gg with Gh where appropriate.

lu130 added step dimensions when type=3 and sref=1.

sc159 user defined csw is now required.

sc189 changes so ans= overrides stack file, updated routine A13b, added further text, removed example unused default values, added lowest nominal cover to routine A13b proforma updated to BS8500-1:2015+A2:2019, BS8500-2:2015+A2:2019 and BS EN 206:2013+A2:2021, replaced variable name Mgc with Mg, update clause BS references in routine SPConc, added Ex14 & Ex15, removed AC=41, AC=31 and AC=2.

sc190 added missing dimension to Shape code 35.

sc258 moved defaults before start, modified behaviour of ans9, changes so ans= overrides stack file, introduced variable name btype (code=1 & code=2).

sc269 added several scenarios relating to ans1 and ans2, added euscr routine used when ans1=5.

sc350 added steel grade S460 & S420 sections, added WARNING relating to section availability.

sc372 when ans4=1 the flange thickness (tf) is now defined by the user.

sc392,396,407,409,416,418,419,421,422,423,424,425,426,427,455,460,462,466, 467,470,474,476,480,482,483,484,486,487,488,489,490,491,492,494, 495,498,499, added steel grade S460 sections.

sc412 updated example default values.

sc444 added steel grade S460 & S 420 sections, added Table 255 & 256 before START.

sc452 added steel grade S460 sections and Table 255 before START, changes so ans= overrides stack file, added IF MyEd=0 OR MzEd=0 and reference to proforma 450 instead.

sc453 added steel grade S460 & S420 sections, added Table 255 & 256 before START.

sc468 added more diagrams relating to stype=3, leg=0 when heel=0 and stype=3, leg=1 when heel=1 and stype=3.

sc477 added steel grade S460 and S420 sections, added further // at start of lines, updated 'Application limits check', CHS brace in compression is now checked to be Class 1 and not Class 2.

sc478 added steel grade S460 and S420 sections, updated 'Application limits check', added scenario IF kn<1, added Ex5, updated 'Classification of cross section' for knee joint (i.e. for joint=3), added K to interaction equation (when joint=3), added option to select CHS welded knee joints and added missing chkrng.
sc479 added steel grade S460 and S420 sections, updated expression for in-plane moment resistance when gusset=3, changed example default values, added more text & NOTE1, updated 'Application limits check' added scenario IF n<0.
sc481 added steel grade S460 and S420, changes so ans= overrides stack file, set e4=e1 when nn=0. (code=1), added more text relating to controlling dimension e.
sc485 added steel grade S460 and S420 and FtRdu=TABLE(7.5,twc,db).
sc493 added steel grade S460 and S420 sections, updated 'Application limits check'.
sc538 variables Sunits and mortd are now user defined and fk is evaluated by program, modified some chkrng.
sc775 made expressions for Nq, Nc and Ng visible, added command DIGITS 4, added more hidden text for future program development.
sc861a, sc862a, sc863a, sc864a, sc865a, sc866a removed extraneous $100 assignment, updated loading cases.
sc4030 added Table 7.5 and 7.6, added proforma date on line 1.
sc4860 added steel grade S460 and S420.
sp203 added option to include straps for Option=1 and Option=3, added 'Drawing title'.
sp204 added routine shade1 & shade2, added Option=8, 9 & 10, made cosmetic changes, updated Option=10 drawing tittle, added missing default value rt=50 to Option=9 (Ex2), replaced mm with crs and Rafter on wall plate with Eaves detail, replaced cavblock with blbl, updated Option=3, added missing wall hatching Option=3 when wct=3 and rtype=2, enhanced Option=3 added Option=11 & 12 and routine proforma sp004.pro, added ‘Drawing title'.
sp270 added 'Drawing title', define descriptions moved from sp005.pro to spdesc.pro. renamed Option=10, added Option=12.
sp271 added more text and redefined $10.
sp272 updated arrow for note 4.
sp510 made enhancements, added Option=2 and Option=3, repositioned weld symbol and 'Grouting holes' text.
sp580 enhanced to accept 1 & 2 layers of board, added Ex2 and Ex3, updated proforma Title, added more text, added ZZZZZ1=1 and ZZZZZ1=0.
sp582 added further examples, updated proforma Title (line 3), added more text, added new variable names ithk, mthk, othk and missing EDIT, added ZZZZZ1=1 and ZZZZZ1=0, replaced variable name nlayers with nlayrs to enable program to run to the end.
sp604,646 revised line 1.
sp608 revised line 1, replaced ew with ew1 added ew2, enhanced diagrams, added more text and routine dpch, added missing vertical line at the end of insulation on LHS when rd is not a multiple of 75 (e.g. rd=200), added further examples.
sp610 updated $11 and $12, revised line 1, updated DPM in section entitled "DRAW MEMBRANE BETWEEN RAFT AND SLAB IF REQUIRED".
Sp612 updated $11, $12, and arrow to screed, revised line 1.
sp622 removed scd dimension.
sp644 removed duplicate staplt calls, added Option=3 & 4, made cosmetic changes.
sp645 removed duplicate staplt calls, revised line 1, added Option=7.
sp647 added Option=9, updated Option=8 when st1=1, removed duplicate staplt calls, added $10 line before ZZZZZ1=0, revised line 1.

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sp648  added Options=4 to 6, only one Tie1 is now used when st1=1 in
       Option=2, removed duplicate staplt calls, added $10 line before
       ZZZZZ1=0, revised line 1.
sp660  corrected proforma number.
sp670  define descriptions moved from sp005.pro to spdesc.pro. Removed
       extraneous $10 and chkrndefg, fixed diagrams, added Option=5,
       Updated proforma Title (line 3), removed general routine proforma
       spdesc.pro.
sp671  define descriptions moved from sp005.pro to spdesc.pro. Removed
       extraneous $10 and chkrndefg, added L= to Option=2 defaults, added
       Option=4 relating to Parapet post, renamed/added routines, added
       minimum baseplate thickness/bottom plate Option=1, 2 and 3, removed
       general routine proforma spdesc.pro, updated chkrng in Option=1.
sp730-733  added 'Drawing title'.
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Installation.

The 2024 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 and working directories. 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.

SAND and SCALE version 4 are available as a separate download from the update website for users who are familiar with their interfaces. Any existing shortcuts you have to them remain unchanged, shortcuts to the previous versions can be created on new computers to the programs scale32.exe and sand32.exe respectively. Each front screen includes a button which will launch SCALE version 7 if required.

Downloading updates during 2024.

Further updates in 2024 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 2024.EXE.

Ian Brown 01/01/24.