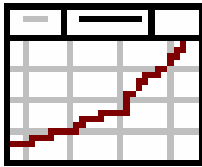


Evaluation and presentation of sieve and hydrometer
analysis to German Standard DIN 18123

GGU-SIEVE

VERSION 15



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Technical implementation and sales: Civilserve GmbH, Steinfeld

Contents:

- 1 Preface 5**
- 2 Licence protection and installation 5**
- 3 Language selection 6**
- 4 Starting the program 6**
- 5 Description of menu items..... 7**
 - 5.1 File menu..... 7
 - 5.1.1 "New" menu item..... 7
 - 5.1.2 "Load" menu item..... 7
 - 5.1.3 "Append file" menu item 7
 - 5.1.4 "Save" menu item 7
 - 5.1.5 "Save as" menu item 7
 - 5.1.6 "Print 'simple' output table" menu item..... 8
 - 5.1.7 "Printer preferences" menu item..... 9
 - 5.1.8 "Print and export" menu item 9
 - 5.1.9 "Batch print" menu item 11
 - 5.1.10 "Exit" menu item..... 11
 - 5.1.11 "1, 2, 3, 4" menu items..... 11
 - 5.2 Edit menu 12
 - 5.2.1 "Sieving weight preferences" menu item..... 12
 - 5.2.2 "Grain size distribution" menu item..... 12
 - 5.2.2.1 Central data input 12
 - 5.2.2.2 Sieve analysis input 15
 - 5.2.2.3 Sieving input with partial masses 17
 - 5.2.2.4 Hydrometer analysis input..... 18
 - 5.2.2.5 Combined sieve and hydrometer analysis input 21
 - 5.2.3 "Individual soil type" menu item 22
 - 5.2.4 "Swap GSDs" menu item..... 22
 - 5.2.5 "Edit GSDs graphically" menu item 22
 - 5.2.6 "Delete all GSDs" menu item 22
 - 5.2.7 "Mix GSDs" menu item..... 23
 - 5.2.8 "Suffosion" menu item..... 24
 - 5.2.8.1 Suffosion safety by separating a grading curve..... 24
 - 5.2.8.2 Suffosion safety after Kenney/Lau and Burenkova..... 25
 - 5.2.9 "Filter stability" menu item..... 25
 - 5.2.9.1 Examine filter stability after Cistin/Ziems 25
 - 5.2.9.2 Examine filter stability of geotextile filters 26
 - 5.2.10 "General" menu item..... 27
 - 5.2.11 "Annex numbers" menu item..... 28
 - 5.2.12 "Remarks" menu item 29
 - 5.2.13 "Company" menu item..... 29
 - 5.2.14 "Undo" menu item 29
 - 5.2.15 "Restore" menu item..... 29
 - 5.2.16 "Preferences" menu item..... 29

5.3	Graphics preferences menu	30
5.3.1	"View output table"/"View diagram" menu items	30
5.3.2	"Preferences" menu item.....	31
5.3.3	"Refresh and zoom" menu item	32
5.3.4	"Zoom info" menu item	33
5.3.5	"Pen colour and width" menu item	33
5.3.6	"Legend font selection" menu item.....	33
5.3.7	"Font size selection" menu item.....	34
5.3.8	"Mini-CAD toolbar" menu item	34
5.3.9	"Toolbar preferences" menu item	34
5.3.10	"Load graphics preferences" menu item	35
5.3.11	"Save graphics preferences" menu item.....	35
5.4	Output preferences menu	36
5.4.1	"Page size" menu item	36
5.4.2	"Texts + table" menu item	36
5.4.2.1	Central preferences.....	36
5.4.2.2	"Diagram table" group box.....	37
5.4.2.3	"Soil type, soil group, frost" group box.....	39
5.4.3	"Margins" menu item	40
5.4.4	"Position info" menu item.....	40
5.4.5	"Title (change position)" menu item.....	41
5.4.6	"Grading curve" menu item	41
5.4.7	"Company" menu item.....	41
5.4.8	"Test no. etc." menu item.....	42
5.4.9	"Annex and report" menu item	42
5.4.10	"Diagram table" menu item.....	42
5.4.11	"Remarks" menu item	42
5.4.12	"Edited by + date" menu item	43
5.4.13	"Output table (results)" menu item	43
5.4.14	"Output table (sieve analysis)" menu item.....	43
5.4.15	"Output table (wet analysis)" menu item	43
5.4.16	"General" menu item.....	43
5.4.17	"Reset all" menu item	43
5.4.18	"Move objects" menu item.....	44
5.5	Special menu	45
5.5.1	General notes	45
5.5.2	"Enter extra GSDs" menu item	45
5.5.3	"Load extra GSDs" menu item	45
5.5.4	"Save extra GSDs" menu item	45
5.5.5	"Delete extra GSDs" menu item	46
5.5.6	"Extra GSDs preferences" menu item.....	46
5.5.7	"Extra GSDs output table" menu item	48
5.5.8	"Open GSDs as extra GSDs" menu item	48
5.5.9	"Extra GSDs legend" menu item	48
5.5.10	"Inner friction angle legend" menu item.....	49

5.6	? menu	50
5.6.1	"Copyright" menu item	50
5.6.2	"GGU on the web" menu item	50
5.6.3	"GGU support" menu item.....	50
5.6.4	"Maxima" menu item.....	50
5.6.5	"Help" menu item	50
5.6.6	"What's new?" menu item.....	50
5.6.7	"Language preferences" menu item.....	50
6	Tips and tricks.....	51
6.1	Keyboard and mouse.....	51
6.2	Function keys	51
6.3	"Copy/print area" icon.....	52
7	Index.....	53

1 Preface

The **GGU-SIEVE** program system allows evaluation and presentation of (combined) sieve and hydrometer analyses according to German Standard DIN 18123. The soil type can be determined according to DIN 4022, DIN EN ISO 14688-1 or ASTM.

Ten tests can be edited and presented simultaneously by the program. Notes and the results of these ten tests are presented in a table on the output form (diagram table). It is necessary to restrict the table to ten tests for space reasons; more tests will not fit in the table.

Input of further fifty tests is possible with the "**Special**" menu. For these tests (to be called extra grain size distributions or extra GSDs), no entry in the table is made. Only a legend will be shown, making possible an allocation of line type and test designation. Using the extra GSDs, it is also possible to define boundary curves. Further to this, hatching can be created in order to enhance the boundary areas.

Data input is in accordance with WINDOWS conventions and can therefore be learned almost without a manual. Graphics output supports the true-type fonts supplied with WINDOWS, so that excellent layout is guaranteed. Colour output and any graphics (e.g. files in formats BMP, JPG, PSP, TIF, etc.) are supported. DXF files can also be imported by means of the integrated Mini-CAD module (see the "**Mini-CAD**" manual).

The program has been successfully used in a large number of projects by renowned consultancies and institutes, and has been thoroughly tested. The program system has been thoroughly tested. No faults have been found. Nevertheless, liability for completeness and correctness of the program and the manual, and for any damage resulting from incompleteness or incorrectness, cannot be accepted.

2 Licence protection and installation

In order to guarantee a high degree of quality, a hardware-based copy protection system is used for the **GGU-SIEVE** program.

The GGU software protected by the *CodeMeter* copy protection system is only available in conjunction with the *CodeMeter stick* copy protection component (hardware for connection to the PC, "*CM stick*"). Because of the way the system is configured, the protected software can only be operated with the corresponding CM stick. This creates a fixed link between the software licence and the CM stick copy protection hardware; the licence as such is thus represented by the CM stick. The correct Runtime Kit for the CodeMeter stick must be installed on your PC.

Upon start-up and during running, the **GGU-SIEVE** program checks that a CM stick is connected. If it has been removed, the program can no longer be executed.

For installation of GGU software and the CodeMeter software please refer to the information in the *Installation notes for GGU Software International*, which are supplied with the program.

3 Language selection

GGU-SIEVE is a bilingual program. The program always starts with the language setting applicable when it was last ended.

The language preferences can be changed at any time in the "?" menu, using the menu item "Spracheinstellung" (for German) or "Language preferences" (for English).

4 Starting the program

After starting the program, you will see two menus at the top of the window:

- File
- ?

After clicking the "File" menu, either an existing file can be loaded by means of the "Load" menu item, or new tests can be entered using "New". After clicking "File/New" an empty form is displayed on the screen. Then, the menu bar will show six menus:

- File
- Edit
- Graphics preferences
- Output preferences
- Special
- ?

After clicking one of these menus, the menu items roll down, allowing you access to all program functions.

The program works on the principle of *What you see is what you get*. This means that the screen presentation represents, overall, what you will see on your printer. In the last consequence, this would mean that the screen presentation would have to be refreshed after every alteration you make. For reasons of efficiency and as this can take several seconds for complex screen contents, the GGU-SIEVE screen is not refreshed after every alteration.

If you would like to refresh the screen contents, press either [F2] or [Esc]. The [Esc] key additionally sets the screen presentation back to your current zoom, which has the default value 1.5, corresponding to an A4 sheet in landscape format.

5 Description of menu items

5.1 File menu

5.1.1 "New" menu item

All data entered are deleted after a confirmation prompt. New tests can then be entered.

5.1.2 "Load" menu item

You can load a file with test data, which was created and saved at a previous sitting, and then edit the test data.

5.1.3 "Append file" menu item

Using this menu item it is possible to load the results of a number of tests, stored on disk as separate files, in order to visualise them together on one sheet. The tests contained in the added file will be appended to the current record.

Please note that the information concerning the page format, general entries (e.g. company name, project description, report no.) and preferences (e.g. grading curve pens) are not imported with the appended file.

Any annotations or settings should therefore be defined after appending or be present in the last opened file.

5.1.4 "Save" menu item

You can save data entered or edited during program use to a file, in order to have them available at a later date, or to archive them. The data is saved without prompting with the name of the current file. Loading again later creates exactly the same presentation as was present at the time of saving.

5.1.5 "Save as" menu item

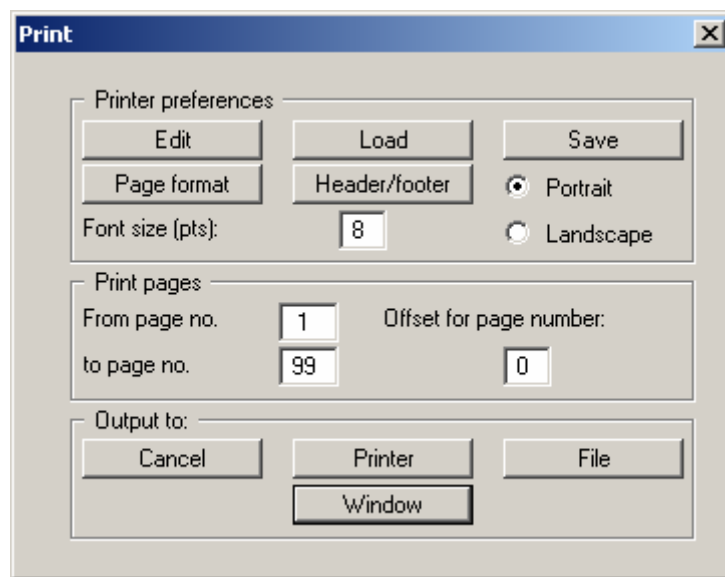
You can save data entered during program use to an existing file or to a new file, i.e. using a new file name. For reasons of clarity, it makes sense to use ".kvs" as file suffix, as this is the suffix used in the file requester box for the menu item "**File/Load**". If you choose not to enter an extension when saving, ".kvs" will be used automatically.

5.1.6 "Print 'simple' output table" menu item

A result table containing the results of all current tests can be printed or saved in a file (e.g. for further editing in a word processing application). Output consists of a type of laboratory protocol of all sieve and hydrometer analyses, as entered in the menu item "**Edit/Grain size distribution**". By going to the menu item "**Graphics preferences/View output table**" (see Section 5.3.1) you can view and print the laboratory output table for individual tests in the shape of a submission quality output sheet.

After going to this menu item you can decide whether the special data (e.g. the diameter of certain percentage passages, derived quantities such as k or the coefficient of curvature, grain fraction percentages, etc.) are also printed.

You will then see the following dialog box for specifying output preferences.



- "**Printer preferences**" group box
Using the "**Edit**" button the current printer preferences can be changed or a different printer selected. Using the "**Save**" button, all preferences from this dialog box can be saved to a file in order to have them available for a later session. If you select "**GGU-SIEVE.drk**" as file name and save the file in the program folder (default), the file will be automatically loaded the next time you start the program.

Using the "**Page format**" button you can define, amongst other things, the size of the left margin and the number of lines per page. The "**Header/footer**" button allows you to enter a header and footer text for each page. If the "#" symbol appears within the text, the current page number will be entered during printing (e.g. "**Page #**"). The text size is given in "**Pts**". You can also change between "**Portrait**" and "**Landscape**" formats.
- "**Print pages**" group box
If you do not wish pagination to begin with "**1**" you can add an *offset number* to the check box. This offset will be added to the current page number. The output range is defined using "**From page no.**" "**to page no.**".

- **"Output to:"** group box
Start direct log output by clicking the **"Printer"** button. Start output to an **".erg"** result file by pressing the **"File"** button. The file name can then be selected from or entered into the box. If the **"Window"** button is selected the results are sent to a new window and can be edited there at will. Using this window's menu the edited logs can be saved to a **".txt"** text file or printed or an existing text file be opened.

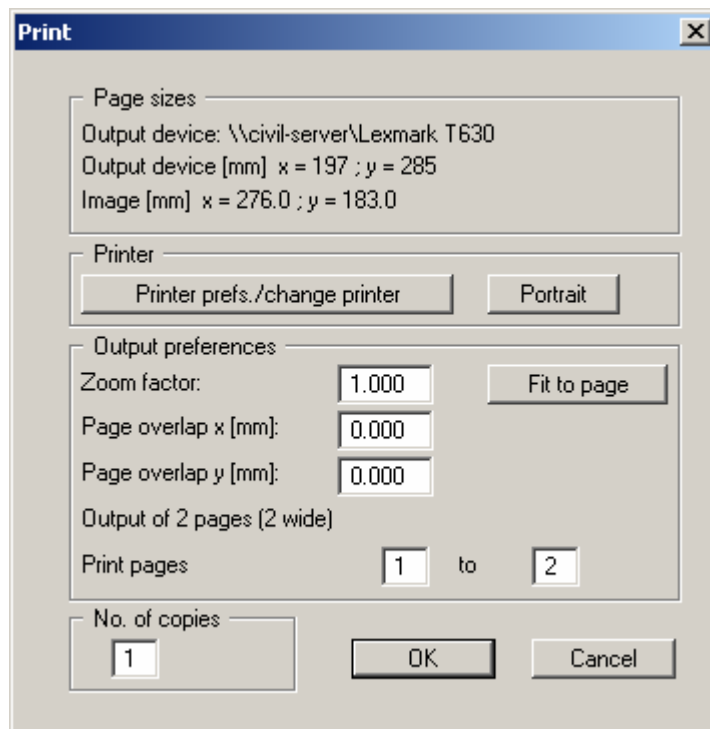
5.1.7 "Printer preferences" menu item

You can edit printer preferences (e.g. swap between portrait and landscape) or change the printer in accordance with WINDOWS conventions.

5.1.8 "Print and export" menu item


You can select your output format in a dialog box. You have the following possibilities:

- **"Printer"**
allows graphic output of the current screen contents. to the WINDOWS standard printer or to any other printer selected using the menu item **"File/Printer preferences"**. But you may also select a different printer in the following dialog box by pressing the **"Printer prefs./change printer"** button.



In the upper group box, the maximum dimensions which the printer can accept are given. Below this, the dimensions of the image to be printed are given. If the image is larger than the output format of the printer, the image will be printed to several pages (in the above example, 2). In order to facilitate better re-connection of the images, the possibility of entering an overlap for each page, in x and y direction, is given. Alternatively, you also have the possibility of selecting a smaller zoom factor, ensuring output to one page (**"Fit to page"** button). Following this, you can enlarge to the original format on a copying machine, to ensure true scaling. Furthermore, you may enter the number of copies to be printed.

- **"DXF file"**
allows output of the graphics to a DXF file. DXF is a common file format for transferring graphics between a variety of applications.
- **"GGUCAD file"**
allows output of the graphics to a file, in order to enable further processing with the **GGUCAD** program. Compared to output as a DXF file this has the advantage that no loss of colour quality occurs during export.
- **"Clipboard"**
The graphics are copied to the WINDOWS clipboard. From there, they can be imported into other WINDOWS programs for further processing, e.g. into a word processor. In order to import into any other WINDOWS program you must generally use the *"Edit/Paste"* function of the respective application.
- **"Metafile"**
allows output of the graphics to a file in order to be further processed with third party software. Output is in the standardised EMF format (Enhanced Metafile format). Use of the Metafile format guarantees the best possible quality when transferring graphics.

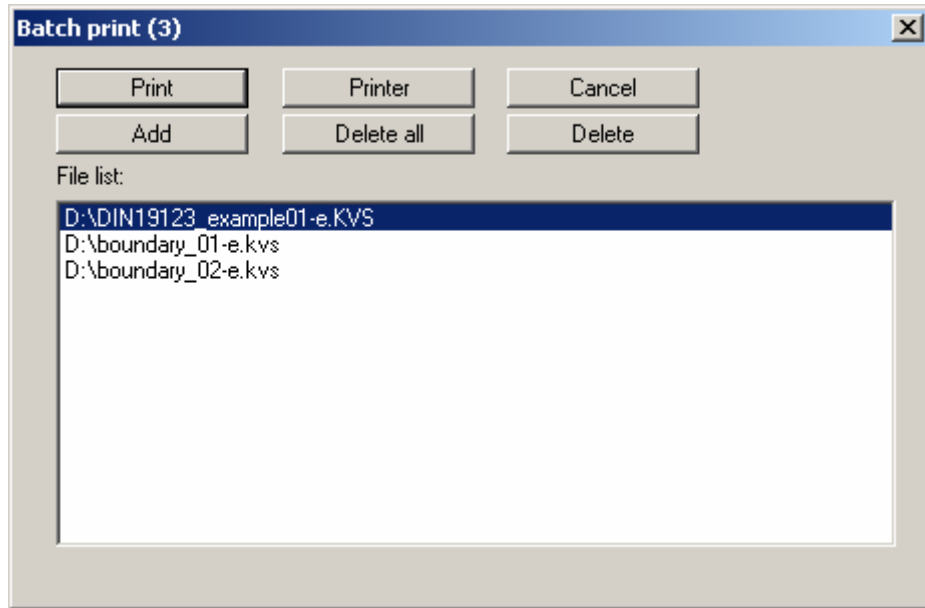
If you select the **"Copy/print area"** tool  from the toolbar, you can copy parts of the graphics to the clipboard or save them to an EMF file. Alternatively you can send the marked area directly to your printer (see **"Tips and tricks"**, Section 6.3).

Using the **"Mini-CAD"** program module you can also import EMF files generated using other GGU applications into your graphics.

- **"MiniCAD"**
allows export of the graphics to a file in order to enable importing to different GGU applications with the **Mini-CAD** module.
- **"GGUMiniCAD"**
allows export of the graphics to a file in order to enable processing in the **GGUMiniCAD** program.
- **"Cancel"**
Printing is cancelled.

5.1.9 "Batch print" menu item

If you would like to print several appendices at once, select this menu item. You will see the following dialog box:



Create a list of files for printing using "Add" and selecting the desired files. The number of files is displayed in the dialog box header. Using "Delete" you can mark and delete selected individual files from the list. After selecting the "Delete all" button, you can compile a new list. Selection of the desired printer and printer preferences is achieved by pressing the "Printer" button.

You then start printing by using the "Print" button. In the dialog box which then appears you can select further preferences for printer output such as, e.g., the number of copies. These preferences will be applied to all files in the list.

5.1.10 "Exit" menu item

After a confirmation prompt, you can quit the program.

5.1.11 "1, 2, 3, 4" menu items

The "1, 2, 3, 4" menu items show the last four files worked on. By selecting one of these menu items the listed file will be loaded. If you have saved files in any other folder than the program folder, you can save yourself the occasionally onerous *rummaging* through various sub-folders.

5.2 Edit menu

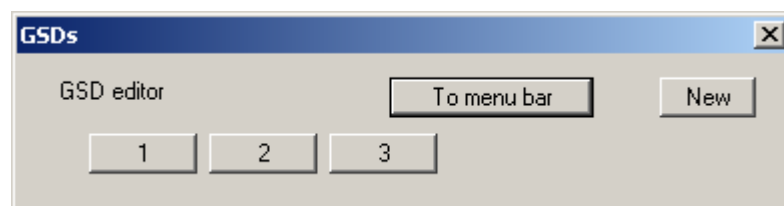
5.2.1 "Sieving weight preferences" menu item

The sieving residue determined for a sieve analysis can be entered as a cumulative weight. This function is deactivated by default. If the check box is activated later, the residues entered for the individual sieves are added for existing sieve analyses.

5.2.2 "Grain size distribution" menu item

5.2.2.1 Central data input

This point represents the program's central menu item. Almost all the sieving and/or hydrometer test data are entered here. As an example, after clicking this menu item the following dialog box opens:



Three tests are already present in this example. The tests are automatically numbered and the test numbers ("1, 2, 3, ...") shown on the respective buttons. The following actions are possible:

- **"To menu bar"**
You return to the original menu bar.
- **"New"**
You can now enter data for a new test.
- **"1", "2", ...**
By clicking the buttons labelled with the test numbers you can open and edit the data for the corresponding test.

Presentation of the grading curves and the corresponding columns or rows in the diagram table always follows the sequence of the test numbers.

The presentation sequence can be altered by going to **"Edit/Swap GSDs"** (see Section 5.2.4). The selected tests are then assigned the specified new test numbers.

After clicking on **"New"** or on the button of an existing test a dialog box opens for entering the test data. You can access the editor quickly by double-clicking in the table region containing the required grading curve. The input boxes and command boxes *marked* in red in the following dialog box must be filled in or selected regardless of the type of test. The *unmarked* command boxes and input boxes in the following dialog box are activated or filled in dependent on the test type. They are therefore described in the following sections in accordance with the test type (see Sections 5.2.2.2 to 5.2.2.5).

The texts in the input boxes in the upper marked region can, if required, be shown in the table on the output form (see Section 5.4.2.2 "**Output preferences/Texts + table**" menu item, button "**Edit texts and allocations**").

The following input or actions can be carried out regardless of the type of test:

- **"OK"**
You exit the dialog box. Any changes made are accepted using the "OK" and rejected using the "Cancel" button.
- **"Determine soil type"**
After entering your test data the soil type can be determined by the program in accordance with the user-selected standard by pressing this button (see Section 5.4.2.3). If you hover above the button with the mouse pointer, the currently selected standard will be displayed. The soil type is automatically included in the "**Soil type**" input box and subsequently entered in the diagram table.

The overline shown on accessory soil types with a constituent proportion of more than 30-45% (e.g. soil type: very silty) is affected by entering "@" in front of the letter to be overlined.

The "@u" character string in the "**Soil type**" input box is thus displayed on the form on the screen and in print as "ū".

- **"Designation"**
You can enter any designation for the test. If it is a newly created test, the program initially awards the next test number in sequence. For example, if two tests already exist the next new test is given the designation "3".

- **"Soil type"**
You can enter the soil type by hand or edit the soil type determined by the program, e.g. by entering U, s in place of U, gs', ms', fs'.
- **"Depth"**
You can enter information on the depth from which your sample was taken. The unit must also be entered as text.
- **"Sampling location"**
You can enter a more detailed description of the sampling point, e.g. Sampling point 1.
- **"Further input"**
If the **"Free text"** option was used (see Section 5.4.2.2, page 38) when defining the texts in the diagram table using the menu item **"Output preferences/Texts + Table"**, **"Edit texts and allocations"** button, you will see this button for entering the additional texts.
- **"Ip, wL for soil groups"**
The program identifies the soil groups to DIN 18196 from the given test data if this function has been activated in **"Output preferences/Texts + Table"**, **"Edit texts and allocations"** button (see Section 5.4.2.2).

The coefficient of plasticity I_p and the liquid limit w_L must be provided for cohesive soils in order to identify the soil group to DIN 18196. Otherwise, nothing will be displayed in the diagram table on the output form.

- **"Delete GSD"**
After a confirmation prompt the currently displayed test is deleted.
- **"Duplicate GSD"**
The currently displayed test is duplicated. You are automatically relocated to the next test (= new test designation). All the data used in the old test are transferred to the new one and can be edited.
- **"Print GSD"**
The current test's data can be output as a laboratory log. If the **"Normal"** button is selected in the opened dialog box, proceed as described in the **"File/Print 'simple' output table"** menu item (see Section 5.1.6). After clicking the **"ASCII"** button the current test's data are saved in a **".txt"** file. This may then be edited in a word processor, for example.
- You can print the data for the current test as a laboratory output table or save it as a file. Further details on output can be taken from.
- **"Determine spec. values"**
Special values (grain diameters for given percentages, uniformity coefficient, kf, etc.) are calculated for the current test and displayed on the screen in message boxes.
- **"Load GSD"** and **"Save GSD"**
You can save the data for the current grading curve in a separate file with the extension **".ekv"** or load a previously saved grading curve. All the input data in the above **"Grain size distribution"** dialog box are included in the file and the test data for the hydrometer and/or sieving tests.

If you choose to **"Load GSD"**, the data for the test being currently edited will be overwritten.

If you would like to add a further test using **"Load GSD"**, you must therefore first create a new test using the **"New"** button in **"Edit/Grain size distribution"** and then click **"Load GSD"**.

- **"Plot Terzaghi filter rules" and "Plot USBR filter rules"**
By selecting these boxes it is possible to display the Terzaghi and USBR (United States Bureau of Reclamation) filter rules for the current grading curve.

5.2.2.2 Sieve analysis input

For a sieve analysis (to DIN 18123-5), activate the **"Evaluate sieve arm"** check box in the dialog box. The relevant input boxes are then activated accordingly.

- **"Dry mass (sieving) [g]"**
Enter the dry mass of the sample in [g].
- **"Evaluate sieve arm"**
Sieving data can only be entered and evaluated if this check box is activated.
- **"Edit sieve data"**
If you press this button you will arrive at the following dialog box, allowing you to enter sieve test data:

Enter horizontally			Values as residue in [g]		
d [mm]	Residue [g]	<input type="checkbox"/>	d [mm]	Residue [g]	<input type="checkbox"/>
100.000	0.00	<input type="checkbox"/>	1.000	706.60	<input checked="" type="checkbox"/>
63.000	0.00	<input checked="" type="checkbox"/>	0.630	0.00	<input type="checkbox"/>
40.000	0.00	<input type="checkbox"/>	0.500	407.60	<input checked="" type="checkbox"/>
31.500	0.00	<input checked="" type="checkbox"/>	0.250	210.00	<input checked="" type="checkbox"/>
20.000	0.00	<input type="checkbox"/>	0.125	195.70	<input checked="" type="checkbox"/>
16.000	842.40	<input checked="" type="checkbox"/>	0.063	10.80	<input checked="" type="checkbox"/>
8.000	1059.80	<input checked="" type="checkbox"/>	0.040	0.00	<input type="checkbox"/>
4.000	1222.90	<input checked="" type="checkbox"/>	Pan	0.00	
2.000	788.00	<input checked="" type="checkbox"/>	(dry weight - SUM residues) as pan		

All sieves are initially activated for a new grading curve, i.e. all possible ticks are applied to the third column. Adapt the predefined sieve diameters in the "**d [mm]**" column to suit the sieve diameters actually used. Unused sieves, or those without residue, can be removed from the sieve set by unticking the boxes.

To ensure that the grading curve does not end in the graphics at the final value, but instead is displayed up to 100%, the next-larger sieve following the last sieve containing residue should always be additionally activated.

After adapting the sieve diameters the sieve residues for the individual sieves are entered corresponding to the test data. Press the "**(dry weight - SUM residues) as pan**" button to calculate the pan residue. The following box is displayed:

Info

Dry mass (sieving) = 5445.0 g
SUM residue (without pan) = 5443.80 g
Pan (old) = 0.00 g
Pan (new) = 1.20 g

OK Do not use

The changes are accepted after pressing "**OK**". If you would prefer to keep the manually entered value, exit the box by pressing "**Do not use**".

It is generally useful to have the program calculate the pan, because input errors are more easily recognised.

Using the "Enter horizontally"/"Enter vertically" change-over switch dictates horizontal or vertical progress when pressing [TAB]. It is generally useful to enter vertically if only the test data is to be edited. However, you can also navigate these input boxes using the cursor keys [Arrow left], [Arrow right], [Arrow up] and [Arrow down].

If you already have a grading curve (e.g. from a different report) and would like to visualise it using the GGU-SIEVE program, it is much simpler if only the percentages are given for certain diameters. To facilitate this, click the "Values as residue in [g]" in the above dialog box. The text changes to "Values as sum of % finer". All numerical input following the sieve diameters are now entered as sum of the passage in percent. The input value for "Dry mass (sieving) [mm]" is therefore irrelevant. It must only be greater than 0.0.

You can save a special sieve set using "Save". It is thus possible to create separate files for sieve combinations for different purposes. Depending on the test carried out you can open the corresponding sieve set using the "Load" button. If you use the file name "GGU-SIEVE.sbe" for a sieve set and save this file in the program folder, it will be automatically opened when the program starts. The sieves are automatically put into the correct size sequence by pressing the "Sort" button.

5.2.2.3 Sieving input with partial masses

If you need to sieve large quantities due to the coarseness of the material, it is possible to sieve a partial mass from a smaller sieve diameter. In the example in the following dialog box only 300 g are sieved on the 4 mm sieve, from an original mass of more than 5 kg.

The screenshot shows a dialog box titled "GSD no. 2". It contains the following fields and buttons:

- Designation: Ex. 2
- Soil type: G, gs, ms'
- Depth: 0.20 - 0.40 m
- Sampling location: B 1
- Dry mass (wet analysis) [g]: 0.00
- Specific gravity [g/cm³]: 2.65
- Dry mass (sieving) [g]: 5445.00
- With partial mass (sieving) [g]: 300.00
- From sieve diameter [mm]: 4.000
- Buttons: OK, Cancel, Determine soil type, Adjust, Hydrometer values, Ip, wL for soil group, Evaluate wet arm, Evaluate sieve arm, Edit wet analysis data, Edit sieve data, Delete GSD, Duplicate GSD, Print GSD, Determine spec. values, Load GSD, Save GSD, Plot Terzaghi filter rules, Plot USBR filter rules.

Activate the "With partial mass (sieving) [g]" check box and enter the partial mass in [g] in the following input box; in the example above 300 g. Enter the sieve diameter starting at which the partial mass was sieved in the input box below this; in the example above this is the 4 mm sieve diameter.

Click the "**Edit sieve data**" button and enter the residues on the large sieves in the dialog box and the partial sieving residues for the 4 mm and smaller sieves. Press the "**(Dry weight - SUM residues) as pan**" button to calculate the pan weight for the partial sieving.

If you would like to have both the output table sheets output and the graphical visualisation of the grading curve, the residues determined by way of weighing the partial sums are marked in the table by an asterisk ' * '.

5.2.2.4 Hydrometer analysis input

For a pure hydrometer analysis (sedimentation to DIN 18123-6), activate the "**Evaluate wet arm**" check box in the dialog box. The relevant input boxes are then activated accordingly.

The screenshot shows a dialog box titled "GSD no. 3". It contains several input fields and buttons. The "Evaluate wet arm" checkbox is checked and highlighted with a red box. Other fields include "Designation" (Ex. 3), "Soil type" (T, @u), "Depth" (6.70 - 7.50 m), and "Sampling location" (B 2). Input fields for "Dry mass (wet analysis) [g]" (31.90) and "Specific gravity [g/cm³]" (2.69) are also highlighted with a red box. Buttons for "Hydrometer values", "Evaluate wet arm", and "Edit wet analysis data" are also highlighted with a red box.

- "**Dry mass (wet analysis) [g]**"
Enter the dry mass of the sample in [g].
- "**Specific gravity**"
Enter the specific gravity of your sample in [g/cm³].

- **"Hydrometer values"**
A dialog box opens for entering the data for the hydrometer used in the test. The default values are those used by the DIN 18123.

The deviation for each hydrometer is determined in accordance with the instructions in DIN 18123, Section 6.5.3. You determine the reading difference between your hydrometer and the DIN hydrometer. This returns the hydrometer constant, which is entered in the dialog box, for example:

DIN hydrometer is at 1.000 for zero reading.
Your hydrometer is at 0.9985 for zero reading.
→ Constant $C_m = (1.000 - 0.9985) * 10^3 = 1.5$

If you have made any changes and would like to restore the DIN hydrometer values, press the **"Set to DIN hydrometer"** button. The current values can be stored in a file using the **"Save"** button. If you use **"GGU-SIEVE.aer"** as the file name and save the file in the program folder, the hydrometer values will be active at the next program start. Previously stored hydrometer values can be opened again using **"Load"**.

- **"Evaluate wet arm"**
Hydrometer analysis data can only be entered and evaluated if this check box is activated.
- **"Edit wet analysis data"**
If you press this button you will arrive at the following dialog box, allowing you to enter wet analysis data:

Wet analysis [X]

Edit wet analysis data of Ex. 2 (negative time to finish)

OK Cancel Load Save Sort

Hrs.	Min	T [°C]	Reading	Enter horizontally			
0	0.50	20.7	19.3	6	0.00	20.4	13.3
0	1.00	20.7	18.8	24	0.00	21.3	11.1
0	2.00	20.7	18.5	-1	0.00	0.0	0.0
0	5.00	20.7	18.1	0	0.00	0.0	0.0
0	15.00	20.7	17.0	0	0.00	0.0	0.0
0	45.00	20.6	15.8	-1	0.00	20.0	0.0
2	0.00	20.5	14.5	-1	0.00	20.0	0.0

In this box you enter the time of measurement after commencing the test in hours and minutes. If readings have been taken in second intervals they must be converted to and entered in decimal minutes, i.e. 15 seconds = 0.25 minutes, 30 seconds = 0.5 minutes, etc. In addition, the temperature and the uncorrected hydrometer reading are entered ($R' = (\rho' - 1) * 10^3$). The program automatically calculates the corrected value $R = R' + C_m$ using the hydrometer constant C_m you entered.

If the same reading intervals are used every time, the sequence can be stored in a file using "Save". This file can be opened again using "Load". If a sequence is saved with the name "GGU-SIEVE.scä" in the program folder, the file is loaded automatically when the program is started. The times are automatically put into the correct time sequence by pressing the "Sort" button.

Using the "Enter horizontally"/"Enter vertically" change-over switch dictates horizontal or vertical progress when pressing [TAB]. It is generally useful to enter vertically if only the reading data is to be edited. However, you can also navigate these input boxes using the cursor keys [Arrow left], [Arrow right], [Arrow up] and [Arrow down]. Negative time input signals the end of the table.

5.2.2.5 Combined sieve and hydrometer analysis input

If, because of the quality of the sample, the grain size distribution was determined by sieving and by sedimentation (test to DIN 18123-7), both the "Evaluate wet arm" and the "Evaluate sieve arm" check boxes must be activated in the "Edit/Grain size distribution" dialog box.

Test value input for the combined sieve/hydrometer analysis is as described in the previous sections dealing with the input for sieving (5.2.2.2) and hydrometer analyses (5.2.2.4). However, when entering dry weights it should be noted that the program takes the pan weight as a percentage from sieving into consideration for evaluating the hydrometer data. If you perform a sieve and wet analysis using different sample quantities, the "Adjust" check box must be activated. For input of the dry mass then:

- **Sieving after sedimentation (DIN 18123; Section 7.3.1):**

The coarse component > 0.125 mm is sieved after sedimentation.

Dry mass (wet analysis) [g] = Total dry mass of sample

Dry mass (sieving) [g] = Total dry mass of sample

The program determines the percentage wet analysis component automatically from the pan weight given for sieving.

- **Sieving before sedimentation (DIN 18123; Section 7.3.2):**

The coarse component > 0.125 mm is sieved before sedimentation.

1. Input when testing with one sample:

The entire fines from the tray are adopted for sedimentation.

Dry mass (wet analysis) [g] = Total dry mass of sample

Dry mass (sieving) [g] = Total dry mass of sample

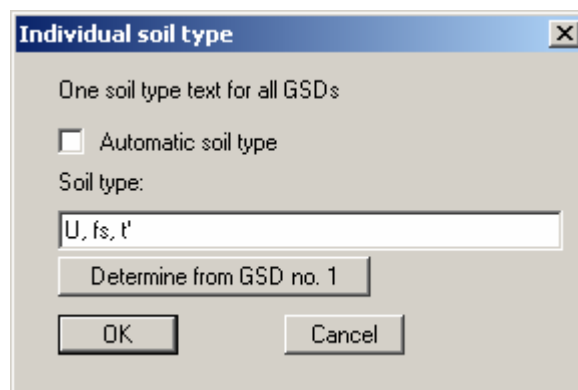
2. Input when testing with two separate samples:

Dry mass (wet analysis) [g] = Total dry mass of the sample used for the wet analysis
Dry mass (sieving) [g] = Total dry mass of the sample used for sieving

The "Adjust" check box must be activated. The program converts the mass used for wet analysis to the percentage fines from sieving.

5.2.3 "Individual soil type" menu item

Normally, the soil type is determined automatically for every test entered. The default setting for the "Automatic soil type" check box in the dialog box below is therefore activated.



If this check box is deactivated, the soil type rows for the individual grading curves in the diagram table are amalgamated and the soil type entered in the dialog box input is used for all grading curves. The soil type can also be entered by the program by pressing the "Determine from GSD no. 1" button.

5.2.4 "Swap GSDs" menu item

Important grading curve data (e.g. sampling point, depth) are displayed in the table below the diagram. For several grading curves, the presentation sequence corresponds to the input sequence, from left to right. If you would like to change this sequence you can do so after selecting this menu item.

5.2.5 "Edit GSDs graphically" menu item

After selecting this menu item you will see information on the functions and can select the curve to be edited. With this function you can move individual points on the curve.

5.2.6 "Delete all GSDs" menu item

After a security request, all tests will be deleted.

5.2.7 "Mix GSDs" menu item

A new curve can be created from existing grading curves, mixed from specified proportions of the existing curves. However, *at least two pure sieving tests with identical sieve sets* must have been entered. You will see the following dialog box:

GSD no.	Parts [-]
1	1.00
2	1.00
3	0.00

You must first select the test in which the data for the new, mixed grading curve will be saved. Click on "**New**" if the original grading curves are to be retained. The program then automatically creates a new test. If 10 tests already exist, one of these must be selected in order to save the mixed grading curve.

Enter a weight for the new grading curve in the mixing dialog box above. This will be adopted as the "**Dry mass (sieving)**". Below this, the proportions of the original grading curves are entered. Portions of grain size distribution curves not to be included in the mix (GSD no. 3 in the example above) are set to zero.

The program identifies the mixed grain fractions and enters them in the sieving data for the selected GSD. To further edit the mixed GSD, click the menu item "**Edit/Grain size distribution**" and then the corresponding test button or double-click directly in the table area containing the required grading curve.

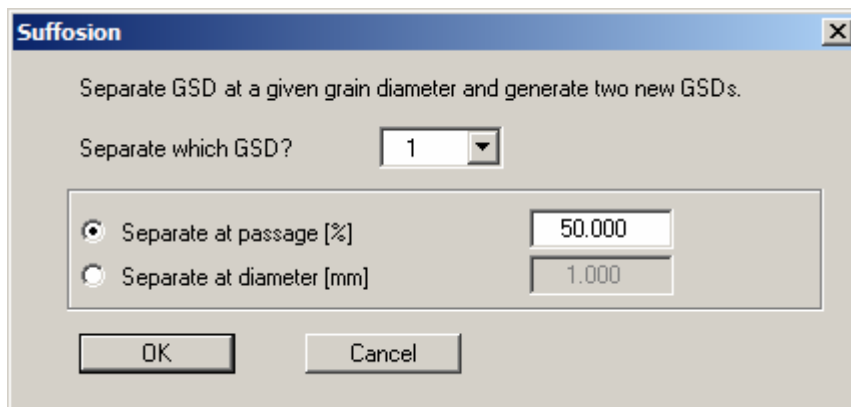
5.2.8 "Suffosion" menu item

You can choose between two methods.

5.2.8.1 Suffosion safety by separating a grading curve

For verification of suffosion safety in accordance with the *Merkblatt Anwendung von Kornfiltern an Wasserstraßen (MAK)* (Fact Sheet for the Application of Grain Filters on Waterways), published by the Bundesanstalt für Wasserbau (BAW) in Karlsruhe (1989), it is necessary to divide the grading curves into 2 new curves at a given grain diameter.

In this menu item's dialog box, select the grading curve to be divided and specify the passage or grain size at which it is to be separated.

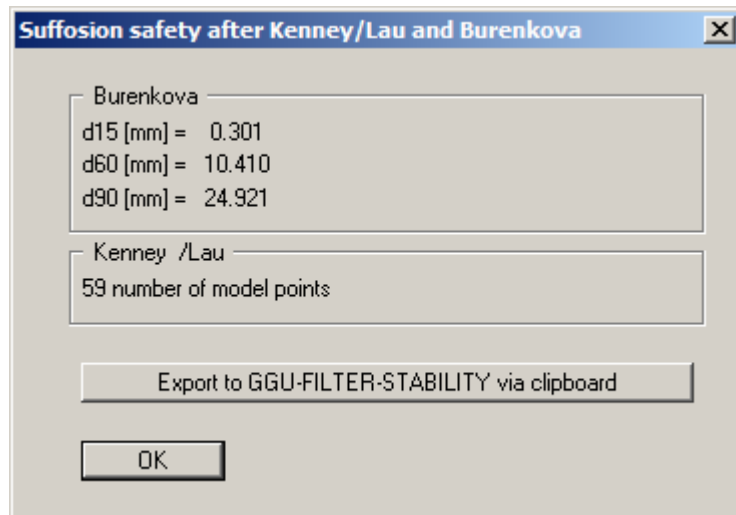


The program now displays a message box with the grain diameter or the % . passage If you adopt the values, the selected grading curve is separated. A further message box is then displayed with information on the passages of the new grain size distribution. This can be copied directly into the clipboard. After closing the box the two new grain size distributions are displayed in the graphics.

The suffosion safety of these soils can then be examined via an analysis of the filter stability after Cistin/Ziems (see Section 5.2.9.1).

5.2.8.2 Suffosion safety after Kenney/Lau and Burenkova

This method is described in the *Merkblatt Materialtransport im Boden (MMB)* (Fact Sheet Material Transport in the Soil) published by *Bundesanstalt für Wasserbau (BAW)* in Karlsruhe (2013). Here, too, you must first decide which grading curve to evaluate. You are then presented with a message box containing the determined parameters.



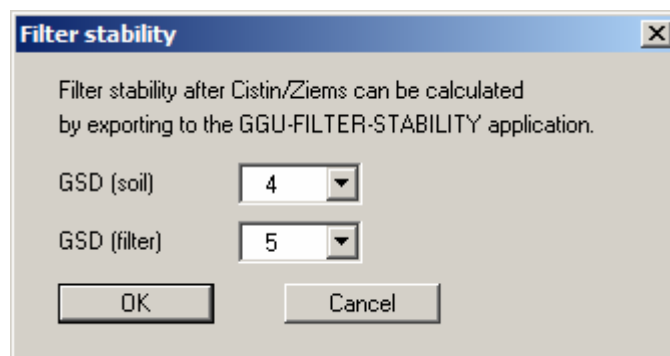
After clicking the export button the program first offers advice on the procedure for using the data copied to the clipboard in the **GGU-FILTER-STABILITY** program. After confirming the message text the data are copied to the Windows clipboard and you return to the menu bar.

5.2.9 "Filter stability" menu item

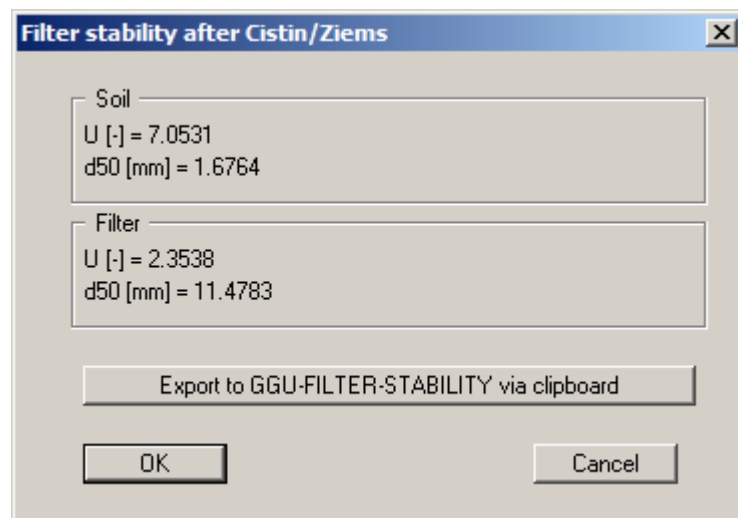
This menu item provides you with two export options for transferring the soil parameters to the **GGU-FILTER-STABILITY** program.

5.2.9.1 Examine filter stability after Cistin/Ziems

To examine the necessity of a filter layer in accordance with the *Merkblatt Anwendung von Kornfiltern an Wasserstraßen (MAK)* (Fact Sheet for the Application of Grain Filters on Waterways), published by the *Bundesanstalt für Wasserbau (BAW)* in Karlsruhe, 1989 (Annex 1), the necessary soil properties (uniformity coefficients U and passage d_{50}) can be determined from existing grain size distribution curves for the relevant soils using this menu item. To do this, select the grain size distributions representing the soil and the filter from the dialog box.



The program then displays the determined values in a message box. The data can be transferred to the **GGU-FILTER-STABILITY** program via the Windows clipboard using the appropriate button.



After clicking the export button the program first offers advice on the procedure for using the data copied to the clipboard in the **GGU-FILTER-STABILITY** program. After confirming the text the original dialog box opens again allowing the relevant grain size distributions to be selected. Exit the dialog box above by pressing "**Cancel**".

5.2.9.2 Examine filter stability of geotextile filters

With regard to examining the filter stability of geotextile filters, Dr.-Ing. M. Heibaum's draft Fact Sheet, *Das neue DWA-Merkblatt zu geotextilen Filtern* (The new DWA Fact Sheet on geotextile filters), was presented at the BAW 'Filter und hydraulische Transportvorgänge im Boden' (Filtering and hydraulic transport processes in the ground) colloquium on 28 Jan. 2014 in Hanover.

Use this menu item to determine the necessary soil properties (grain size at d_{50} and uniformity coefficient U) from the grading curve of the relevant soil, which are displayed in a dialog box. The data can be copied to the Windows clipboard in the usual way using the button "**Export to GGU-FILTER-STABILITY via clipboard**". If no additional grading curves need to be examined, exit the dialog box by clicking the "**Cancel**" button.

5.2.10 "General" menu item

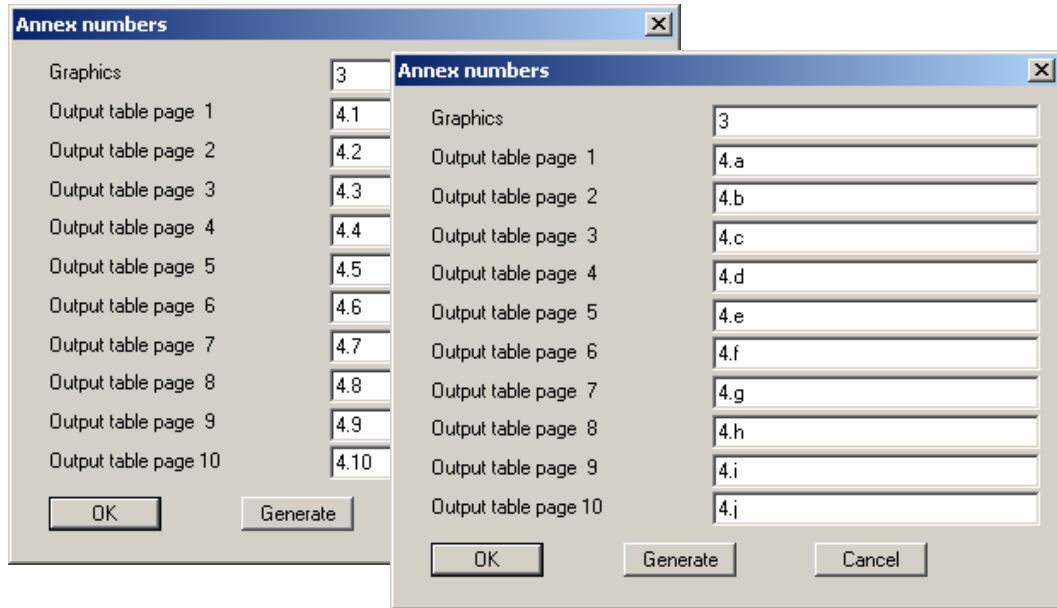
Go to this menu item to enter general data such as the project identification, report number, annex number, sampling date, etc. This data is displayed in the correct elements of the output sheet.

Field	Value
Project (1st line):	German Standard DIN 18123
Project (2nd line):	Examples 1 to 3
Project (3rd line):	
Edited by:	Mr. D. E. Fault-User
Processing date:	10.09.1993
Test number:	1234
Sample taken on:	09.01.1999
Type of sampling:	disturbed
Type of test:	Sieving and wet analysis
Report:	9999 /99
Annex:	9.9

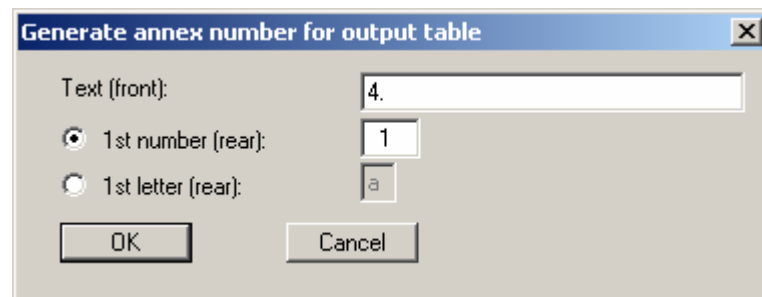
The marked texts in the dialog box also appear in the output sheet. Input boxes can be altered or switched off such as "Test no.:" as shown in the above dialog box by going to the menu item "Output preferences/Texts + table" and pressing the "Diagram header" button (see Section 5.4.2).

5.2.11 "Annex numbers" menu item

Here it is possible to define the numbering of the grading curve annexes and output table sheets. The numbers can be either user-defined or determined automatically by the program.



The number for the graphics is awarded by the program automatically if an annex number has already been entered in "Edit/General". The numbers for the output sheets can be easily generated by the program using the "Generate" button. You will then see a dialog box similar to this one:



Enter the text to appear in front of the automatic numbering in the first input box; this can be a different number to the annex number for the graphics. It is then possible to select between numbering with numerals or a letter sequence. Activate the required command button and enter the first number or letter (in lower or upper case).

5.2.12 "Remarks" menu item

You can enter remarks to the tests in four lines. These lines will be entered at the bottom right of the form. In the dialog box you can enter the position of the text and the font size. The "**Remarks**" heading can be edited or deleted by going to the menu item "**Output preferences/Texts + table**" and pressing the "**Silt and clay etc.**" button (see Section 5.4.2).

5.2.13 "Company" menu item

You can enter your company address in four lines. These lines will be entered at the top left of the form. Additionally, you can enter the position of the text and the font size.

5.2.14 "Undo" menu item

If you have carried out any changes to dialog boxes or moved objects to a different position on the screen after selecting the "**Output preferences/Move objects**" menu item or using the [F11] function key, this menu item will allow you to undo the movements. This function can also be reached by using the key combination [Alt] + [Backspace] or the appropriate tool in the toolbar (see Section 5.3.9).

5.2.15 "Restore" menu item

When this menu item is selected the last change made in a dialog box or the last change in the position of objects, which you undid using the menu item "**Edit/Undo**" will be restored. This function can also be reached by using the key combination [Ctrl] + [Backspace] or the appropriate tool in the toolbar (see Section 5.3.9).

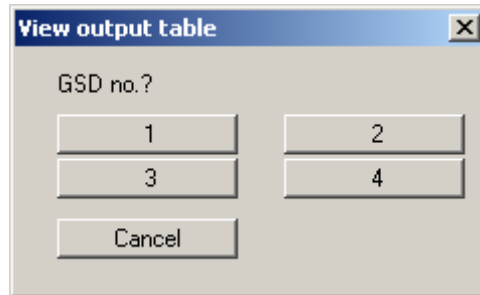
5.2.16 "Preferences" menu item

You can activate or deactivate the undo functions.




5.3 Graphics preferences menu

5.3.1 "View output table"/"View diagram" menu items

The default screen visualisation is the grading curve graphics. If you go to the "View output table" menu item, the following dialog box opens:

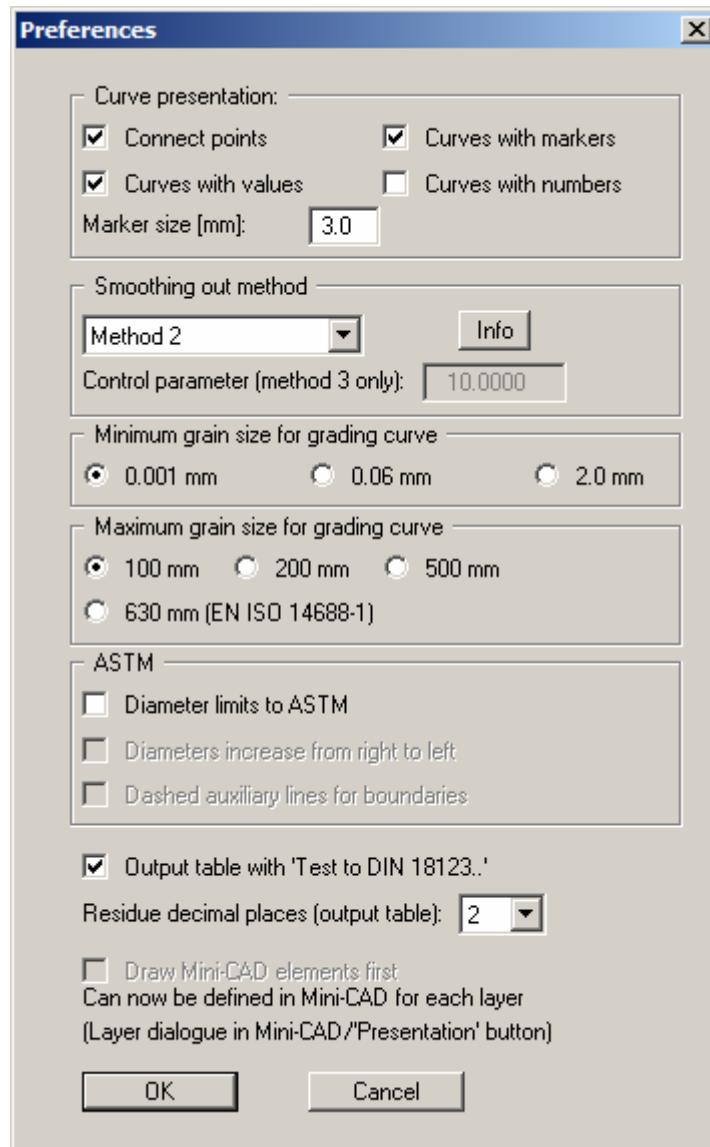


The "1", "2" etc. buttons represent the tests entered. A log page displaying the most important test data opens for each test. They can be printed via the menu item "File/Print and export" (see Section 5.1.8).

If you are viewing the output table you can navigate between the output tables for the individual tests using the arrow tools   in the toolbar. In order to return to the graphical visualisation of the grading curves, click on the now active menu item "View diagram" or simply on the  tool. You can move between the output table and the graphical visualisation using this tool.

5.3.2 "Preferences" menu item

After selecting this menu item a dialog box appears, in which you can edit preferences for graphical presentation.



- **"Curve presentation"** group box:
By activating the appropriate check boxes the measured data can be visualised as a grading curve, provided with markers at given intervals or directly attached to the measured data. Each grading curve uses a different marker, thus ensuring simple differentiation between several grading curves, even on monochrome printouts. The marker size is user-defined. Instead of markers, the curves can also be labelled at their start and finish with the test numbers they represent.
- **"Smoothing out method"** group box
You can select from four smoothing out methods:
 - No smoothing = no smoothing
 - Method 1 = strict Bezier spline
 - Method 2 = "loose" Bezier spline
 - Method 3 = rational spline interpolation

The measured data and the visualised grading curves may deviate for smoothing out methods 2 and 3 (see below), which becomes visible at the test's measured data markers.

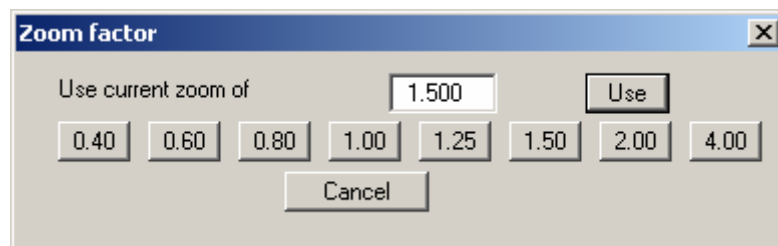
For method 3, smoothing can be influenced with the "**Control parameter**". The value of the control parameter may only be in the range between > -1.0 and < 1000 .

- "**Minimum grain size for curve**" group box
The evaluation range shown on the output sheet for the fines component can be reduced in order to facilitate better presentation of the coarse grain range for coarse sample material.
- "**Maximum grain size for curve**" group box
For very coarse sample material you have the option of extending the evaluation range for the coarse component shown on the output sheet. Additionally, it is possible to activate a display containing the grain component up to 630 mm diameter to EN ISO 14688-1 (= blocks).
- "ASTM" group box
After activating the "**Diameter limits to ASTM**" check box the graphics can be adapted to suit the requirements of the *American Society for Testing and Materials* (ASTM). After closing the box you will be queried whether the soil type is also to be determined to ASTM. If you agree, the program automatically sets the "**Soil type to:**" check box, which you will find in the "**Output preferences/Texts + table**" menu item, to ASTM (see Section 5.4.2.3).
- "**Output table with test to DIN 18123 ..**"
If this check box is activated, the result will be shown on the output sheets in accordance with the testing type valid for the respective grading curve in DIN 18123. The number of decimal places to be shown in the output table can be specified for the residue.

5.3.3 "Refresh and zoom" menu item

The program works on the principle of *What you see is what you get*. This means that the screen presentation represents, overall, what you will see on your printer. In the last consequence, this would mean that the screen presentation would have to be refreshed after every alteration you make. For reasons of efficiency and as this can take several seconds for complex screen contents, the screen is not refreshed after every alteration.

If, e.g., after using the zoom function (see below), only part of the image is visible, you can achieve a complete view using this menu item.



A zoom factor between 0.40 and 4.00 can be entered in the input box. By then clicking on "Use" to exit the box the current factor is accepted. By clicking on the "0.40", "0.60", etc. buttons, the selected factor is used directly and the dialog box closed.

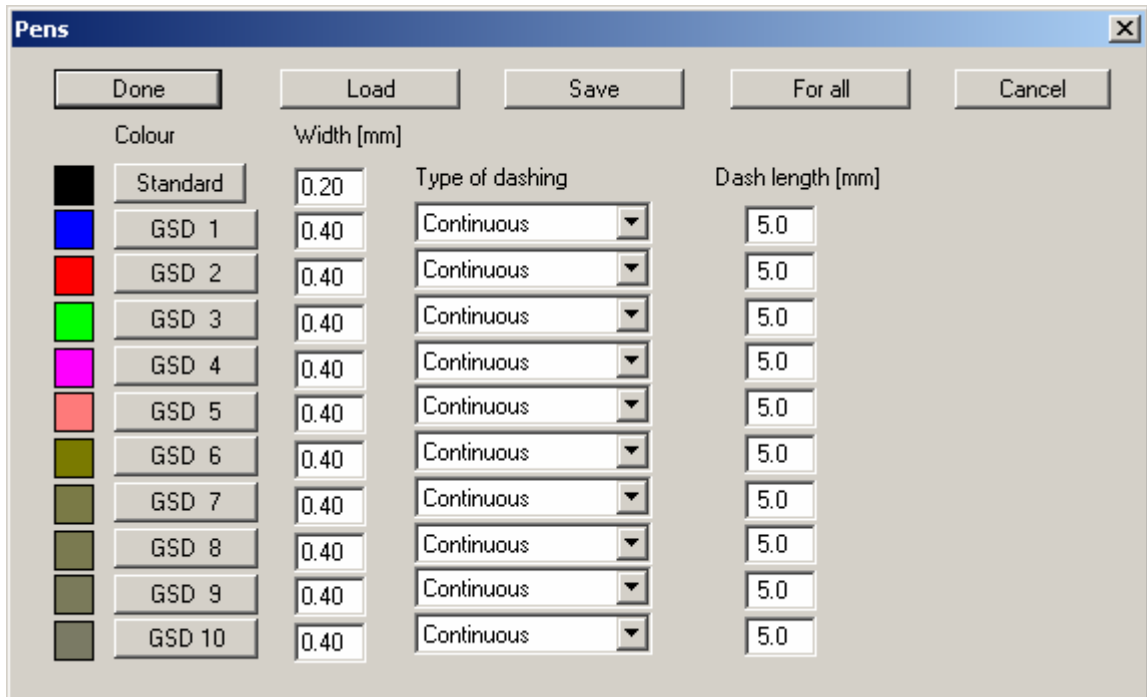
It is much simpler, however, to get a complete overview using [Esc]. Pressing [Esc] allows a complete screen presentation using the zoom factor specified in this menu item. The [F2] key allows screen refreshing without altering the coordinates and zoom factor.

5.3.4 "Zoom info" menu item

By clicking two diametrically opposed points you can enlarge a section of the screen in order to view details better. An information box provides information on activating the zoom function and on available options.

5.3.5 "Pen colour and width" menu item

For reasons of clarity, different colours are used as default for graphic presentation of the gradation curves, as well as the type of dashing. With this menu item you can alter the preferences to suit your wishes.



The pen width, line type and dashing can be edited for the grading curves and, after clicking the buttons with the GSD numbers, the pen colours be adapted. If the same line colour is to be used for all grading curves, press the "For all" button and specify the required colour. The pen preferences can be saved as an ".stf" file, or be loaded from such, using "Save" and "Load", in order to give a variety of pen combinations.

On *monochrome printers* (e.g. laser printers), colours are shown in a corresponding grey scale. Graphic elements employing very light colours may be difficult to see. In such cases it makes sense to edit the colour preferences.

5.3.6 "Legend font selection" menu item

With this menu item you can switch to a different true-type font. All available true-type fonts are displayed in the dialog box.

5.3.7 "Font size selection" menu item

You can edit font sizes of text within the various graphic elements.

5.3.8 "Mini-CAD toolbar" menu item

Using this menu item you can add free text to the graphics and add lines, circles, polygons and graphics (e.g. files in formats BMP, JPG, PSP, TIF, etc.). A pop-up menu opens; the icons and functions used are described in more detail in the "**Mini-CAD**" manual provided.

5.3.9 "Toolbar preferences" menu item

After starting the program a horizontal toolbar appears below the program menu bar. If you would rather work with a popup window with several columns, you can specify your preferences using this menu item. The smart icons can also be switched off.

At the bottom of the program window you find a status bar with further information. You can also activate or switch off the status bar here. The preferences will be saved in the "**GGU-SIEVE.alg**" file (see menu item "**Graphics preferences/Save graphics preferences**") and will be active at the next time the program is started.

By clicking on the tools (smart icons) you can directly reach most of the program functions. The meaning of the smart icons appears as a text box if you hover with the mouse pointer over the tools. Some of the tool functions can be activated from the normal menu items.



"Zoom out"

If you have previously *zoomed in*, this tool returns to a full screen display.



"Zoom (-)"/"Zoom (+)"

With the zoom functions you can zoom in or out of parts of the image, by clicking the left mouse button.



"Undo"

If you have carried out any changes to dialog boxes or edited the position or size of an element on the output sheet ([F11] or used "**Output preferences/Move objects**"), you can undo the last change with this tool.



"Restore"

If you have previously undone a change, you can restore with this tool.



"Copy/print area"

Use this tool to copy only parts of the graphics in order to paste them, e.g. to a report. You will see information on this function and can then mark an area, which is copied to the clipboard or can be saved in a file. Alternatively you can send the marked area directly to your printer (see "**Tips and tricks**", Section 6.3).



"Diagram/output table"

By clicking on this icon you can switch between the *tabular representation* and the *graphics representation*.



"GSD output table up"/"GSD output table down"

Using this icon, you can navigate between the individual pages in the *tabular representation*.

5.3.10 "Load graphics preferences" menu item

You can reload a graphics preferences file into the program, which was saved using the "**Graphics preferences/Save graphics preferences**" menu item. Only the corresponding data will be refreshed.

5.3.11 "Save graphics preferences" menu item

Some of the preferences you made with the menu items of the "**Graphics preferences**" menu as well as the inputs using the "**Edit/Company**" menu item can be saved to a file. If you select "**GGU-SIEVE.alg**" as file name, and save the file on the same level as the program, the data will be automatically loaded the next time the program is started and need not be entered again.

If you do not go to "**File/New**" upon starting the program, but open a previously saved file instead, the preferences used at the time of saving are shown. If subsequent changes in the general preferences are to be used for existing files, these preferences must be imported using the menu item "**Graphics preferences/Load graphics preferences**".

5.4 Output preferences menu

5.4.1 "Page size" menu item

The default page set-up is A4 (landscape) when the program is started. You can edit the page format in the dialog box.

5.4.2 "Texts + table" menu item

5.4.2.1 Central preferences

After clicking on this menu item the following dialog box appears:

The dialog box "Texts on form" contains the following elements:

- Buttons: Diagram header, Date/edited by, Silt and clay etc., Edit texts and allocation, Edit widths, Inner friction angle, OK, Cancel.
- Radio buttons: Arrange horizontally (selected), Arrange vertically.
- Checkboxes: Wrap too long texts, Consider principal soil types only, Accessory soil types with ' and * for EN ISO 14688-1, Silt-sand boundary at 0.063 mm, Gravel-stone boundary at 63 mm, Soil group (SN 670 008a) in long text, Long text with 'silt'.
- Dropdown menus: Soil type to: (DIN 4022), Soil group/frost resistance after: (DIN).

- **"Diagram header"**
You can edit, or accept, the default wording, e.g. the heading, report no. and annex number. Further to this, you can rotate the alignment of the report number and the annex number.
- **"Date/edited by"**
The default terms for **"Date"** and **"Edited by"** can be altered.
- **"Silt and clay etc."**
If this button is pressed the headings of the grain size distribution diagram and the **"Remarks"** element can be altered.

5.4.2.2 "Diagram table" group box

In the "Diagram table" group box in the above "Texts + table" dialog box the required texts, text allocations and type of visualisation can be edited.

- "Edit texts and allocation"

A dialog box opens for specifying the parameters and properties to be displayed in the diagram table. It is possible to display up to a maximum of 11 lines. The sequence corresponds to the numbering in the following dialog box.

Line	Text	Enter what?
1	Designation:	Designation
2	Soil type:	Soil type
3	Depth:	Depth
4	Sampling date:	Free text
5	Sampling location:	Sampling location
6	U/Cc	U/Cc
7	Clay/Silt/Sand/Gravel	Constituents
8	k [m/s] (Hazen):	kf value
9	Ip/wL:	Ip/wL
10	d20 [mm]:	d (arbitrary 1) [mm]
11	No. 11	None

If insertion of kf values selected then:
 kf after Hazen Observe validity rules

Percentages for d (arbitrary)
 Value (1) [%] = 16.00
 Value (2) [%] = 84.00

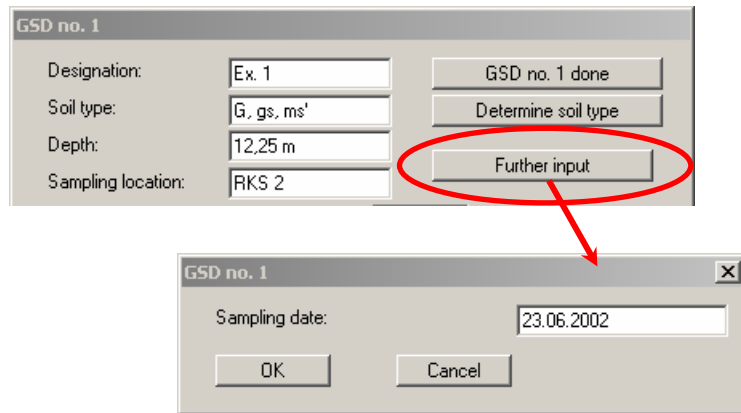
Decimal places for d10, etc.
 No. of places: 4

In the "Text" boxes a text must be entered by hand which is later used as a description. After clicking the arrows in the "Enter what?" column the values or text in the drop-down list entered or determined by the program can be allocated to the rows of the diagram table. Lines with a "None" allocation are not displayed.

Different methods of determining the kf value can be selected in the second to last group box, with or without consideration of the respective validity rules. The text designation (in line 8 in the example) must be appropriately adjusted or "k-value after:" selected for a further table line in the allocation list. The selected method is then automatically entered into this line.

Visualisation of the passages at d10, d30, d50 and d60 can be selected from the list. It is also possible to display the passages for any two percentage values. To do this, select the text allocation "d (arbitrary 1) [mm]" (see line 10 in the above dialog box) and enter the required percentage in the bottom group box. The text in the left column must be adjusted accordingly. The number of places after the decimal point can be selected for displaying the passages.

If information needs to be added to the table that is not found in the default texts in the table, a **"Free text"** can be used. In the menu item **"Edit/Grain size distribution"** you will then see an additional **"Further input"** button and can enter text according to your requirements in the dialog box.



Your texts and allocation can be saved in a **"*.ktx"** file using the **"Save"** button and opened again using the **"Load"** button. The program default texts or allocations can be restored using the **"Reset"** button. In addition, you can specify whether the current texts and properties allocations are applied to the diagram and/or the output table.

- **"Edit widths"**
If the table is arranged vertically, a fixed width for each column can be defined using this button. Please note, however, that the total width of the table needs to fit into the layout of your output sheet. In order to achieve a uniform distribution within the specified total width, e.g. as defined using [F11], click the **"All the same width"** button.
- **"Inner friction angle"**
If the program is to estimate the inner friction angle, surcharges and reductions can be taken into consideration here.
- **"Arrange horizontally"/"Arrange vertically"**
This command button defines the alignment of the diagram table.
- **"Wrap too long texts"**
The program adapts the font size of the texts in the columns and rows automatically to the space available. The text may therefore appear very small for long input. If this check box is activated, the font size remains constant, but the text is wrapped and shown on several lines if necessary.

5.4.2.3 "Soil type, soil group, frost" group box

Preferences for the evaluation and visualisation of the test results can be defined in this group box in the above "Texts + table" dialog box.

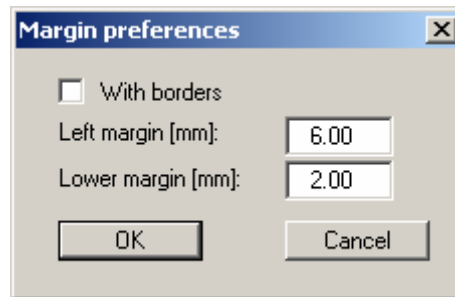
- **"Soil type to:"**
The soil type can be determined to the **DIN 4022** or the **EN ISO 14688-1**. In addition, the soil types can be determined using the **SEP** (*Schichten Erfassungs Programm*) system of the *Niedersächsisches Landesamt für Bodenforschung* (Geological Survey of the State of Lower Saxony) or to **ASTM** (*American Society for Testing and Materials*).
- **"Consider principal soil types only"**
Normally, when determining the soil type, the program also gives the subdivisions for the sand and gravel ranges as fine/medium/coarse sand or fine/medium/coarse gravel. Activate this check box to suppress this function. Sand or gravel components are then summarised as one fraction in the soil type.

If you have made any changes here the **"Determine soil type"** button must be pressed again in the respective test number for existing grain size distributions.

- **"Accessory soil types with ' and * for EN ISO 14688-1"**
If the soil types are determined to the EN ISO 14688-1 the accessory soil types can be further differentiated into slightly (') and heavily (*) by activating this check box. This is not provided for in the new standard, but adds clarity.
- **"Silt-sand boundary at 0.063 mm"**
The program determines the silt component at the silt-sand transition, which is at 0.060 mm in the diagram. When the final value is entered for the 0.063 mm sieve in a pure sieve analysis, the transition to silt is not achieved and the program does not take the silt component into consideration when determining the soil type. If this check box is activated the silt component is determined at 0.063 mm.
- **"Gravel-stone boundary at 63 mm"**
The program determines the stone component at the gravel-stone transition, which is at 60 mm in the diagram. The boundary transition is moved to 63 mm by activating this check box.
- **"Soil group/frost resistance after:"**
Here, it is possible to choose between **DIN, SN 670 008a** (*Swiss Norm*) or **USC** (*Unified Soil Classification*) as the method of determination.
- **"Soil group (SN 670 008a) in long text"**
If you are using the Swiss standard a long text version of the soil group can be specified here.
- **"Long text with 'silt'"**
If the soil group is displayed as a long text according to the Swiss standard the usual Swiss term "silt" can be used instead of the German "Schluff".

5.4.3 "Margins" menu item

In the default program preferences the output sheet is shown with cutting borders. For output to an A4 printer, a reduction of the printer output is generally necessary, as proprietary printers cannot fully cover an A4 page. The margin preferences can be defined in the following dialog box.



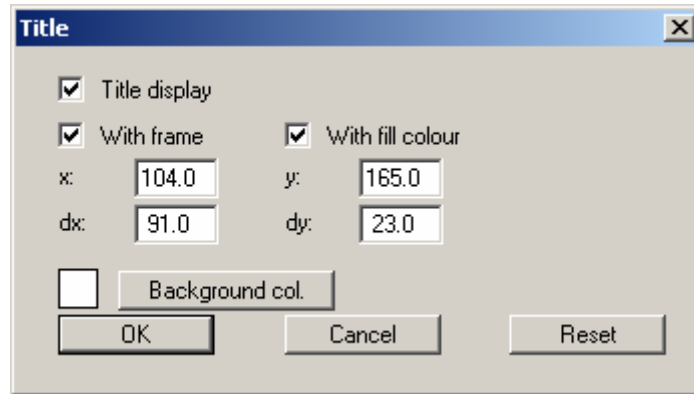
By deactivating the "**With borders**" check box and with an appropriate choice of left and lower margins, it is generally possible to create a non-reduced printer output. It may be necessary to also adapt the page height and/or width on some printers (see Section 5.4.1).

5.4.4 "Position info" menu item

The positions and layout of the individual elements on the output sheet can be altered using the following menu items. This menu item provides information on the options for altering the position and layout more quickly using the mouse.

5.4.5 "Title (change position)" menu item

This menu item is invisible if you are in the output table view. The position and layout of the title element can be altered via the dialog box for this menu item, if the "Title display" check box is activated.



The position of the element on the output sheet and its size can be defined or edited by means of the variables "x" and "y", "dx" and "dy". The element can be provided with a frame and a background colour to suit your personal requirements. If the element needs to be returned to its original condition, this can be done using the "Reset" button. Alternatively, you can alter the size and shape of the element using the mouse (see menu item "Output preferences/Move objects", Section 5.4.18).

The heading shown in the title element can be edited in the menu item "Output preferences/Texts + table", "Diagram header" button (see Section 5.4.2). The texts "Project (1st line)" and "Project (2nd line)" are entered immediately after double-clicking the element or using the menu item "Edit/General" (see Section 5.2.10).

5.4.6 "Grading curve" menu item

A dialog box opens that is almost identical to that for the previous menu item. The same preferences can be specified in this box as in that described in Section 5.4.5. Because the grading curve is the central graphical element, it cannot be switched off. Proceed as described above to alter the position or layout of the "Grading curve" element.

5.4.7 "Company" menu item

Almost exactly the same dialog box opens with the same preference options as that described in the "Output preferences/Title (change position)" menu item (see Section 5.4.5). Simply proceed as described there to edit the "Company" element.

The input for this element can be edited immediately after double-clicking on the element or via the menu item "Edit/Company" (see Section 5.2.13).

5.4.8 "Test no. etc." menu item

Almost exactly the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item (see Section 5.4.5). To edit the "**Test no. etc.**", element, simply proceed as described there.

The input for this element can be edited immediately after double-clicking on the element or via the menu item "**Edit/General**" (see Section 5.2.10). For this element you also have the option of adapting the texts in front of the input boxes to suit your needs. Go to the menu item "**Output preferences/Texts + table**", "**Diagram header**" button (see Section 5.4.2.1).

5.4.9 "Annex and report" menu item

Almost exactly the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item (see Section 5.4.5). To edit the "**Annex and report**" element, simply proceed as described there.

The input for this element can be edited directly by double-clicking the element or by going to the menu item "**Edit/General**" (see Section 5.2.10). Here, you can also alter the texts in front of the input boxes to suit your needs. This is also possible by going to the menu item "**Output preferences/Texts + table**", "**Diagram header**" button (see Section 5.4.2.1). Using the latter item it is also possible to rotate the texts by 90°, but can also be achieved by opening the element directly by double-clicking.

5.4.10 "Diagram table" menu item

This menu item is invisible if you are in the output table view. Almost exactly the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item (see Section 5.4.5). To edit the "**Diagram table**" element, simply proceed as described there.

5.4.11 "Remarks" menu item

This menu item is invisible if you are in the output table view. Almost exactly the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item (see Section 5.4.5). To edit the "**Remarks**" element, simply proceed as described there.

The input for this element can be edited immediately after double-clicking on the element or via the menu item "**Edit/Remarks**" (see Section 5.2.12). The "**Remarks**" heading can be edited or deleted by going to the menu item "**Output preferences/Texts + table**" and pressing the "**Silt and clay etc.**" button (see Section 5.4.2).

5.4.12 "Edited by + date" menu item

This menu item is invisible if you are in the output table view. Almost exactly the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item (see Section 5.4.5). To edit the "**Edited by + date**" element, simply proceed as described there.

The input for this element can be edited immediately after double-clicking on the element or via the menu item "**Edit/General**" (see Section 5.2.10). For this element you also have the option of adapting the texts in front of the input boxes to suit your needs. Go to the menu item "**Output preferences/Texts + table**", "**Date/edited by**" button (see Section 5.4.2.1).

5.4.13 "Output table (results)" menu item

This menu item is invisible if you are in the grading curve graphics view. Almost exactly the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item (see Section 5.4.5). To edit the "**Output table (results)**" element, simply proceed as described there.

5.4.14 "Output table (sieve analysis)" menu item

This menu item is invisible if you are in the grading curve graphics view. Almost exactly the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item (see Section 5.4.5). To edit the "**Output table (sieve analysis)**" element, simply proceed as described there.

5.4.15 "Output table (wet analysis)" menu item

This menu item is invisible if you are in the grading curve graphics view. Almost exactly the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item (see Section 5.4.5). To edit the "**Output table (wet analysis)**" element, simply proceed as described there.

5.4.16 "General" menu item

Almost exactly the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item (see Section 5.4.5). To edit the "**General**" element, simply proceed as described there.

In the program default setting this element is deactivated. If the "**General display**" check box is activated in the dialog box for this menu item, the element is displayed in the graphical visualisation of the grading curves on the output sheet. The text can be edited by double-clicking within the element. An editor box opens in which a heading can be entered and the type of presentation of the file name be selected.


5.4.17 "Reset all" menu item

With this button, all preferences for the aforementioned elements, which may have been edited with the previous menu item, will be reset to the program defaults.


5.4.18 "Move objects" menu item

When you go to this item you can move the various objects with the aid of the mouse. Move the mouse over the object to be moved. When you are located above a moveable object the mouse pointer appears in the shape of a cross. You can now press and hold the left mouse button and drag the object to the required position.

After going to this menu item only one object at a time can be moved using the mouse or its size be altered.

In order to move or edit several objects, this function can be more quickly activated by pressing **[F11]** or the  icon.

The size of an object can also be altered using this menu item or the **[F11]** key. If you move over the frame of a changeable object after activating this function the mouse assumed the shape of a double-headed arrow. Hold the left mouse button and move the frame until the object has reached the required size. To retain the ratio of the sides, pull at one corner only. If on one side only is pulled the object will become higher or wider.

The last change made in the position or size of an object can be undone using **[Back]** or by clicking the  icon.

5.5 Special menu

5.5.1 General notes

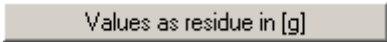
A maximum of 10 tests can be edited and presented using the "**Edit/Grain size distribution**" menu item. A limit of ten tests is necessary, as more than this will not fit in the diagram table on the form, together with the remarks to the tests.

An input of further 50 tests is possible using the "**Special**" menu. For these tests (to be called extra grain size distributions or extra GSDs), no entry in the diagram table is made. Only a legend will be shown, making possible an allocation of line type and test designation.

5.5.2 "Enter extra GSDs" menu item

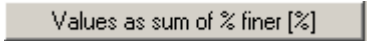
Using this menu item you can enter extra GSDs. Input is almost completely the same as described in the "**Edit/Grain size distribution**" menu item (see Section 5.2.2), and need not therefore be further explained here. A total of 50 extra GSDs can be entered.

If you would like to enter boundary curves, it is much simpler to enter certain diameters as percentage values. For this purpose, the button



Values as residue in [g]

is available for sieving data input. If you click this button with the mouse, the text on the button will change to



Values as sum of % finer [%]

All numerical input following the sieve diameters then corresponds to the sum of the passage in percent (also see Section 5.2.2.2, page 17, menu item "**Edit/Grains size distribution**", Sieve analysis input).

5.5.3 "Load extra GSDs" menu item

Extra grain size distributions previously saved using the menu item "**Special /Save extra GSDs**" can be opened separate from the primary record. If extra GSDs (".xkv") are already open they can be replaced by a new one by pressing the "**New**" button or appended to the existing grain size distribution using "**Add**".

5.5.4 "Save extra GSDs" menu item

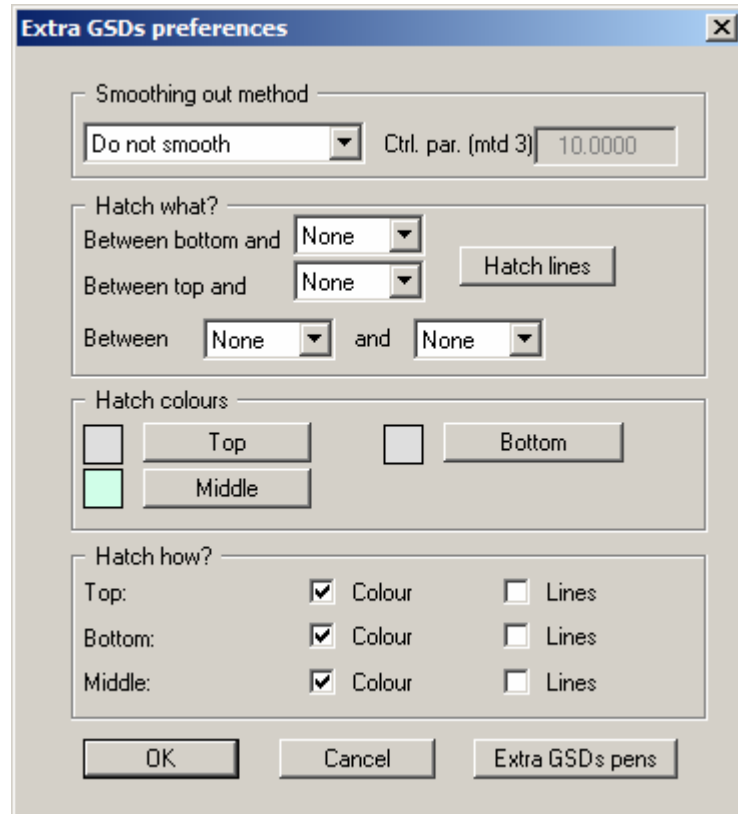
Extra GSDs can be saved separate from the primary grain size distribution in order to have them available for other primary records. In this way it is possible to create a number of templates, for example for certain boundary ranges, which can be used as a **background** for examining grain size distributions (see the example file "**boundary_01-e.xkv**").

5.5.5 "Delete extra GSDs" menu item

After a confirmation prompt, you can delete all extra GSDs.

5.5.6 "Extra GSDs preferences" menu item

With this menu item you can define important preferences for extra GSDs. You will see the following dialog box:

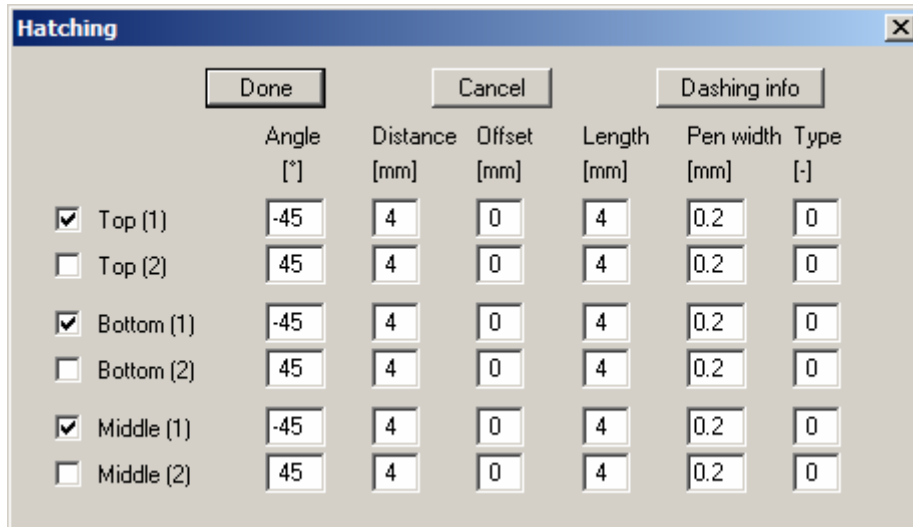


In the upper area you can specify the smoothing out procedure with which the GSDs are to be presented. A further explanation can be found in the menu item "**Graphics preferences/Preferences**" in Section 5.3.2.

It is often desirable when visualising boundary curves to hatch areas. The hatching is defined in the "**Hatch what**" in the dialog box shown above. Here you can define 3 areas to be hatched, by selecting the desired GSD for the hatch boundary from the input boxes:

- Hatch between the lower diagram edge and an extra GSD.
- Hatch between the upper diagram edge and an extra GSD.
- Hatch between two extra GSDs .

Upon selecting "**None**", no hatching will be entered for this area. With the "**Hatch lines**" button varying hatch lines can be created.

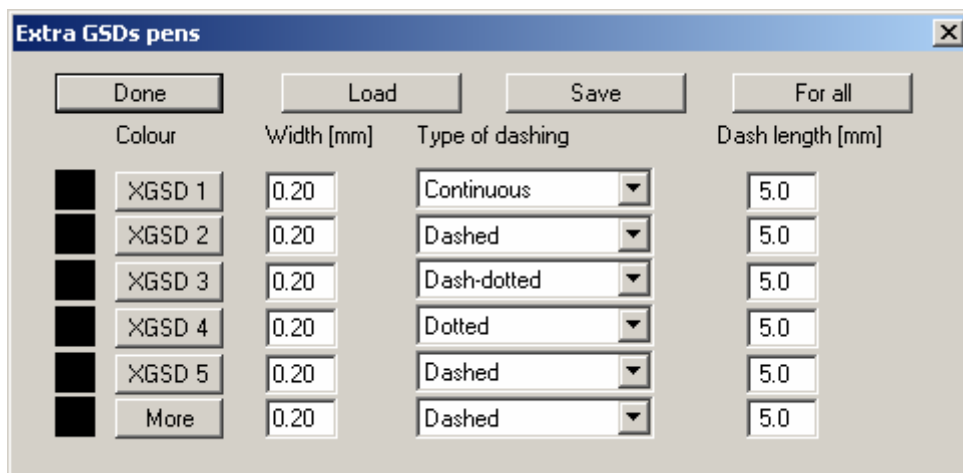


Hatching can consist of two lines, e.g. in order to create a cross-hatch. The curves for the required ranges are activated using the check boxes. Further information is available by pressing the 'Dashing info'.

Alternatively, it is possible to fill the areas with a certain colour. The colour is defined in the "Hatch colours" group box of the Extra GSD box. Click on the corresponding buttons and select the required colour from the colour dialog box. The current colour is shown in the small box beside the buttons.

The preferences described above for line and/or colour hatching are only active if the requisite check box is activated in the "Hatch how?" group box.

The "Extra GSDs pens" button allows the pen colours, widths and, if required, the type of hatch to be defined for visualisation of the extra grain size distributions (see Section 5.3.5), analogous to the menu item "Graphics preferences/Pen colour + width".



Separate pens can be defined for the first 5 extra GSDs. Using the "More" button, a common colour can be defined for all subsequent extra GSDs.

5.5.7 "Extra GSDs output table" menu item

In complete analogy to the "File/Print 'simple' output table" menu item (see Section 5.1.6), an extra GSDs output table can be printed.

5.5.8 "Open GSDs as extra GSDs" menu item

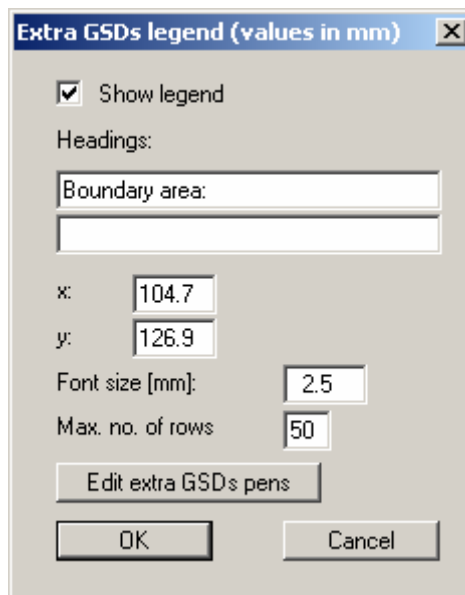
Grain size distributions already entered as normal grain size distributions and saved as ".kvs" files can be imported as extra grain size distributions using this menu item. This allows you to collate all grading curves to a grading band.

First decide whether the grading curves are to be opened as new extra grain size distributions or appended to the existing extra grain size distributions.

Then select the required file in the file selector box. It is also possible to mark and open several files at once. You will see a message on the number of files imported and the grading curves they contain.

5.5.9 "Extra GSDs legend" menu item

If extra grain size distributions have been entered, a legend containing all extra GSDs can be displayed. If the "Show extra GSDs legend" check box is activated you can edit the position and representation in the dialog box for this menu item.

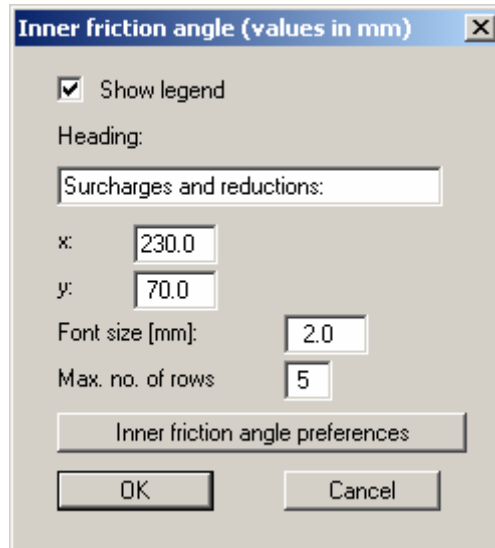


You can define and edit the position of the legend using the values "x" and "y". The size of the legend is controlled using "Font size" and "Max. no. of rows"; where necessary, several columns are used. The fastest way to modify the position of the legend is to press the [F11] function key and then to drag and drop the legend to the new position holding the left mouse button.

The names and defined line types (colour, dotted, etc.) of the extra grain size distributions are displayed below the heading in the legend. The preferences for the pens can be edited in the above dialog box using the "Edit extra GSDs pens" button, analogous to the menu item "Special/Extra GSD s preferences", "Extra GSDs pens" button (see Section 5.5.6, page 47).

5.5.10 "Inner friction angle legend" menu item

Using this menu item you can define a legend for the surcharges and reductions for the inner friction angle, if you have activated the "**Show legend**" check box. The legend can only be displayed if automatic estimation of the friction angle is activated in "**Edit texts and allocations**", one row below "**Enter what?**" in the menu item "**Output preferences/Texts + table**".



You can define and edit the position of the legend using the values "**x**" and "**y**". You control the size of the legend using "**Font size**" and "**Max. no. of rows**"; where necessary, several columns are used. The fastest way to modify the position of the legend is to press the **[F11]** function key and then to pull the legend to the new position with the left mouse button pressed.

After going to this menu item it is possible to edit the surcharges using the "**Inner friction angle preferences**" button (see menu item "**Output preferences/Texts + table**", "**Inner friction angle**" button, Section 5.4.2.2, page 38).

5.6 ? menu

5.6.1 "Copyright" menu item

You will see a copyright message and information on the program version number.

The "**System**" button shows information on your computer configuration and the folders used by GGU-SIEVE.

5.6.2 "GGU on the web" menu item

Using this menu item you can access the GGU Software website: www.ggu-software.com. Keep in touch with new program versions and the regular *download* offers.

If you would like to be automatically notified about program innovations, please register for the Newsletter in our Knowledge Base. Go to the following website: <http://kbase.civilserve.com>.

5.6.3 "GGU support" menu item

This menu item takes to the GGU-Software [Support area](http://www.ggu-software.com/support) at www.ggu-software.com.

5.6.4 "Maxima" menu item

You will see information on the default program maxima.

5.6.5 "Help" menu item

The GGU-SIEVE manual is opened as a PDF document. The help function can also be accessed using the [F1] function key.

5.6.6 "What's new?" menu item

You will see information on program improvements in comparison to older versions.

5.6.7 "Language preferences" menu item

This menu item allows you to switch the menus and the graphics from German to English and vice versa. To work in German, deactivate the two check boxes "**Dialoge + Menüs übersetzen (translate dialogues, menus)**" und "**Graphiktexte übersetzen (translate graphics)**".

Alternatively, you can work bilingually, e.g. with German dialog boxes but with graphic output in English. The program always starts with the language setting applicable when it was last ended.

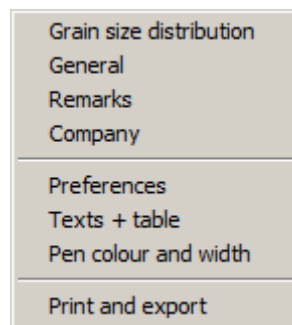
6 Tips and tricks

6.1 Keyboard and mouse

You can scroll the screen with the keyboard using the cursor keys and the [**Page up**] and [**Page down**] keys. By clicking and pulling with the mouse, with [**Ctrl**] pressed, you activate the zoom function, i.e. the selected section will fill the screen. Furthermore you can use the mouse wheel to zoom in/out or scrolling the screen presentation. The following mouse wheel functions are available:

- Mouse wheel up = move screen image up
- Mouse wheel down = move screen image down
- [**Ctrl**] + mouse wheel up = enlarge screen image (zoom in)
- [**Ctrl**] + mouse wheel down = shrink screen image (zoom out)
- [**Shift**] + mouse wheel up = move screen image right
- [**Shift**] + mouse wheel down = move screen image left

If you click the right mouse button anywhere on the screen a context menu containing the principal menu items opens.




By double-clicking the left mouse button on output sheet elements or **Mini-CAD** objects, the editor for the selected object immediately opens, allowing it to be edited. By double-clicking output sheet elements while holding the [**Shift**] key, the preferences for the position, size and appearance of the element open for editing in the editor.

6.2 Function keys

Some of the function keys are assigned program functions. The allocations are noted after the corresponding menu items. The individual function key allocations are:

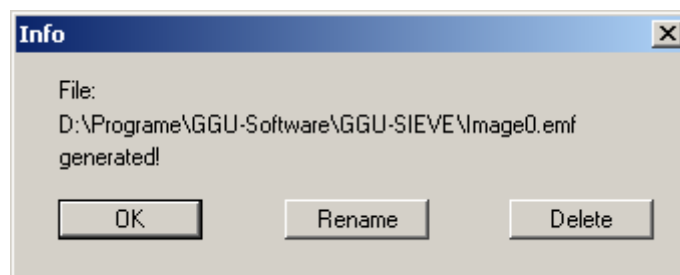
- [**Esc**] refreshes the screen contents and sets the screen back to the given format (A4 landscape). This is useful if, for example, you have used the zoom function to display parts of the screen and would like to quickly return to a complete overview.
- [**F1**] opens the manual file.
- [**F2**] refreshes the screen without altering the current magnification.
- [**F11**] activates the menu item "**Output preferences/Move objects**".

6.3 "Copy/print area" icon

A dialog box opens when the "Copy/print area" icon  in the menu toolbar is clicked, describing the options available for this function. For example, using this icon it is possible to either copy areas of the screen graphics and paste them into the report, or send them directly to a printer.

In the dialog box, first select where the copied area should be transferred to: "Clipboard", "File" or "Printer". The cursor is displayed as a cross after leaving the dialog box and, keeping the left mouse button pressed, the required area may be enclosed. If the marked area does not suit your requirements, abort the subsequent boxes and restart the function by clicking the icon again.

If "Clipboard" was selected, move to the MS Word document (for example) after marking the area and paste the copied graphics using "Edit/Paste". If "File" was selected, the following dialog box opens once the area has been defined:



The default location of the file is the folder from which the program is started and, if several files are created, the file is given the file name "Image0.emf" with sequential numbering. If the "Rename" button in the dialog box is clicked, a file selector box opens and the copied area can be saved under a different name in a user-defined folder. Saving can be aborted by pressing the "Delete" button.

If the "Printer" button was pressed in the first dialog box, a dialog box for defining the printer settings opens after marking the area. Following this, a dialog box for defining the image output settings opens. After confirming the settings the defined area is output to the selected printer.

7 Index

A

Accessory soil types, define representation	
preferences	39
Accessory soil types, overline for old DIN.....	13
Alignment, diagram table	38
American Society for Testing and Materials	39
Annex number, edit element.....	42
Annex number, enter for GSD diagram.....	27
Annex number, generate for	
output table sheets.....	28
Annex number, rotate by 90°.....	36, 42
ASTM, define graphical visualisation	32
ASTM, select for soil type determination.....	39

B

Blocks, consider in soil type determination.....	32
Borders, turn on/off	40
Boundary curves, define	45

C

Clipboard	10
CodeMeter stick.....	5
Coefficient of plasticity, enter	14
Colours, extra GSDs pens.....	47
Colours, grading curve pens	33
Column width, diagram table	38
Company, edit element.....	41
Company, enter address.....	29
Context menu, open.....	51
Control parameter, smoothing GSDs.....	32
Copy/print area	10, 34, 52
Cumulative weight, activate	12

D

Dashing, grain range.....	47
Decimal places, specify for passages.....	37
Decimal places, specify for residues in	
output table.....	32
Delete, all extra GSDs	46
Delete, all GSDs	22
Delete, individual GSDs.....	14
Diagram header, change texts of input boxes ...	36
Diagram header, edit element	41
Diagram header, input	27
Diagram table, alignment	38
Diagram table, define entries.....	37
Diagram table, edit element.....	42
Diagram table, edit text allocation.....	37
Diagram table, load/save text allocation.....	38
Diagram table, text length	38
DIN 18123-5, display testing type in	
output table.....	32
DIN 18123-5, input of sieve analysis	15
DIN 18123-6, display testing type in	
output table.....	32
DIN 18123-6, input of hydrometer analysis	18

DIN 18123-7, display testing type in	
output table.....	32
DIN 18123-7, input of combined	
sieve/hydrometer analysis	21
DXF file, export.....	10
DXF file, import	5

E

Editor window, output table	9
EMF format	10
EN ISO 14688-1, activates block display	32
Evaluation range of GSD, reduce/extend.....	32
Extra GSDs, combine existing GSDs	48
Extra GSDs, delete all	46
Extra GSDs, display as boundary curves.....	46
Extra GSDs, display as grain range	48
Extra GSDs, enter.....	45
Extra GSDs, preferences.....	46
Extra GSDs, save/load	45

F

File, combine several to one	48
File, display name in legend.....	43
File, load/save.....	7
Filter rules, display Terzaghi/USBR.....	15
Filter stability verification,	
after Cistin/Ziems.....	25
Filter stability verification,	
of geotextile filters	26
Font selection.....	33
Font size, define for graphic elements	34
Free text, define input box in diagram table	38
Free text, enter.....	14
Frost resistance, select determination method ..	39
Function keys	51

G

GGUCAD file, export.....	10
GGU-FILTER-STABILITY,	
export possibilities	25, 26
GGUMiniCAD file, export.....	10
Grading curves, edit values graphically.....	22
Grading curves, pen preferences.....	33
Grading curves, smoothing out methods	32
Grain filters, application on waterways	24, 25
Graphics, add via Mini-CAD.....	34
Gravel-stone boundary, define.....	39
GSD diagram, activate representation	30
GSD diagram, edit element.....	41
GSD diagram, edit grain labelling etc.	36
GSDs (= Grain size distributions), enter/edit....	12
GSDs, combine from several files	48
GSDs, delete all	22
GSDs, delete individual	14
GSDs, load together.....	7
GSDs, mix	23
GSDs, specify sequence	12
GSDs, swap sequence.....	22

H	
Hatching, define for extra GSDs	46
Hydrometer, determine constant.....	19
Hydrometer, enter reading.....	20
Hydrometer, load/save reading intervals	20
Hydrometer, save/load individual values.....	19

I	
Individual test, delete.....	14
Individual test, duplicate	14
Individual test, load/save	14
Individual test, output as ASCII file	14
Individual test, output as table.....	14
Individual test, save as ASCII file	14
Inner friction angle, activate determination.....	37
Inner friction angle, define surcharges/reductions	38
Inner friction angle, display surcharges/reductions in legend	49
Installation	5
IP, enter	14

K	
kf value, display in a message box for all methods	14
kf value, select determination method	37
Knowledge Base, access.....	50

L	
Language preferences	6, 50
Layout, define for output sheet.....	36
Legend, alter position/size using mouse	44
Legend, extra GSDs.....	48
Legend, inner friction angle.....	49
Licence protection	5
Liquid limit, enter.....	14

M	
Manual, open as PDF file	50
Margins, define.....	40
Marker, change preferences.....	31
Maximum grain size for curves, extend evaluation range	32
Measured data, display	32
Metafile, export	10
Mini-CAD file, export	10
Mini-CAD, use	34
Minimum grain size for curves, reduce evaluation range	32
Mouse click functions.....	51
Mouse wheel functions.....	51

N	
Navigation, output table	35

O	
Objects, alter position/size using mouse.....	44

Output sheet, alter position/size of individual elements using mouse	40, 44
Output sheet, reset all elements to defaults.....	43
Output sheet, reset individual elements to defaults	41
Output table, activate representation	30
Output table, automatic entry of test type to DIN 18123	32
Output table, marking partial sum weighing.....	18
Output table, print for all GSDs.....	8
Output table, print for an individual GSD	30
Output table, print for extra GSDs.....	48
Overline for accessory soil types.....	13

P	
Page format, define	36
Page section, copy/print.....	34, 52
Pagination, automatic	8
Pan weight, calculate	16
Partial mass sieving, enter	17
Passages, display in a message box for all percentages.....	14
Passages, select percentages for display	37
Pen preferences, extra GSDs	47, 48
Pen preferences, grading curves	33
Print, graphics.....	9
Print, output table	8
Print, section.....	10, 34, 52
Print, several files	11
Printer preferences.....	8, 9
Program, load/save preferences	35
Program, show default maximum values.....	50
Program, show improvements	50
Program, show information	50

R	
Remarks, edit element	42
Remarks, edit labelling	36
Remarks, enter.....	29
Report number, edit element.....	42
Report number, enter for GSD diagram.....	27
Report number, rotate by 90°	36, 42

S	
Scroll the screen	51
SEP Schichten Erfassungs Programm	39
Sieve analysis, activate input fields	15
Sieve analysis, activate partial mass sieving	17
Sieve analysis, enter/edit test data	15
Sieve data, as residue in [g]	17
Sieve data, as sum of passage in [%]	17, 45
Sieve data, enter as cumulative weight.....	12
Sieves, save/load combination.....	17
Silt-sand boundary, define.....	39
Simple output table, print for all GSDs	8
Simple output table, print for an individual GSD.....	14
Smart icons, menu items.....	34
Smoothing out methods, grading curves.....	32
Soil groups to DIN 18196, define I_p/w_L	14
Soil groups, select determination method.....	39

Soil properties, determine for export to GGU-FILTER-STABILITY	25, 26
Soil type, determined by the program.....	13
Soil type, enter the same for all GSDs.....	22
Soil type, select determination method.....	39
Special values, determine/display.....	14
Status bar main program, activate	34
Suffosion safety verification, after Kenney/Lau and Burenkova	25
Suffosion safety verification, by separating a GSD	24
Swiss standard SN 670 008a.....	39
System, show information	50

T

Terzaghi, display filter rules	15
Test number, edit element	42
Test numbers, activate labelling with	31
Test numbers, sequence	12
Test results, save in file	8
Texts in diagram table, define length/size	38
Texts in diagram table, enter/edit	37
Toolbar, edit for menu items	34
Translation, activate	50
True-type font.....	33

U

Uniformity coefficient U, display in a message box	14
USBR, display filter rules.....	15
USC Unified Soil Classification, select for soil group determination	39

V

Version number, show	50
----------------------------	----

W

Wet analysis, activate input boxes.....	19
Wet analysis, enter/edit test data	19
What you see is what you get	32
wL, enter.....	14

Z

Zoom factor, define for full-screen display	32
Zoom function, activate	33, 34, 51