

GGU-SIEVE manual

Sieve & sedimentation analysis (grain size distribution)

Exported on 23.7.2026

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Theorie. Und Praxis.

Geotechnische Softwarelösungen können so einfach sein. Denn Theorie und Praxis lassen sich mit **GGU-Software** und den neuen Angeboten der **civilserve Academy** prima kombinieren: Knackige theoretische Aufgaben lösen und als Sahnehäubchen Ihr

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vertiefen!**

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1 GGU-SIEVE: Preface

The **GGU-SIEVE** program system allows evaluation and presentation of (combined) sieve and hydrometer analyses according to DIN EN ISO 17892-4:2017-04. The soil type can be determined according to DIN 4022, DIN EN ISO 14688-1 or ASTM.

10 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 100 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 to enhance the boundary areas.

The program includes convenient data input. The system is permanently displayed on the screen. Every change to the data is displayed on the screen, so that optimum control of the input data is guaranteed.

There are "?" and "**Info**" buttons in the dialog boxes for many technical and program-specific questions. Click on the "?" buttons or "**Info**" buttons to obtain the necessary information.

The graphic output supports the true type fonts provided by WINDOWS, so that an excellent layout is guaranteed. Colour output and numerous graphic formats (BMP, TIF, JPG etc.) are supported. PDF and DXF files can also be imported via the integrated **Mini-CAD** system (see "**Mini-CAD**" manual).

The program has been extensively tested. No errors 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 GGU-SIEVE: Licence protection

To protect the GGU software from unauthorised access, each GGU program is equipped with the **CodeMeter software protection system** from WIBU-Systems. Each GGU program is bound to a so-called **CmContainer** via a licence with the corresponding product code.

To be able to use the GGU licences in a CmContainer, a runtime environment, the **CodeMeter Runtime Kit**, must be installed on your computer via driver software. You can obtain the current version from [Software for Users - Wibu-Systems](#) (CodeMeter User Runtime for Windows).

You can work with the following CmContainer types on your PC with the CodeMeter Runtime Kit installed (= **CodeMeter licence server**):

- **CmStick**
The licence for your GGU program is stored in a USB dongle.
- **CmActLicense** (soft licence, not for virtual PC/servers)
The licence for your GGU program is stored in a licence file that is linked to the hardware of a computer.
- **CmCloudContainer**
The licence is located on a CmCloud server of WIBU-Systems and is mirrored to your CodeMeter licence server. The advantages of this type of licence binding are described on the following website: [Licence binding | GGU Software](#).

The GGU programs check at start-up and during runtime whether a corresponding license is available in a CmContainer.

3 GGU-SIEVE: Language selection

The GGU programs can be used in German and English. The program always starts with the language in which it was terminated.

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

4 GGU-SIEVE: Starting the program

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

File

Info

After clicking on the "**File**" menu, a previously entered test can be loaded by means of the "**Load**" menu item, or a new one created using "**New**".

After clicking on "File/New" an empty form is shown on the screen. Five menus now appear at the top of the window:

- File
- Edit
- Graphics preferences
- Output preferences
- Special
- Info

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

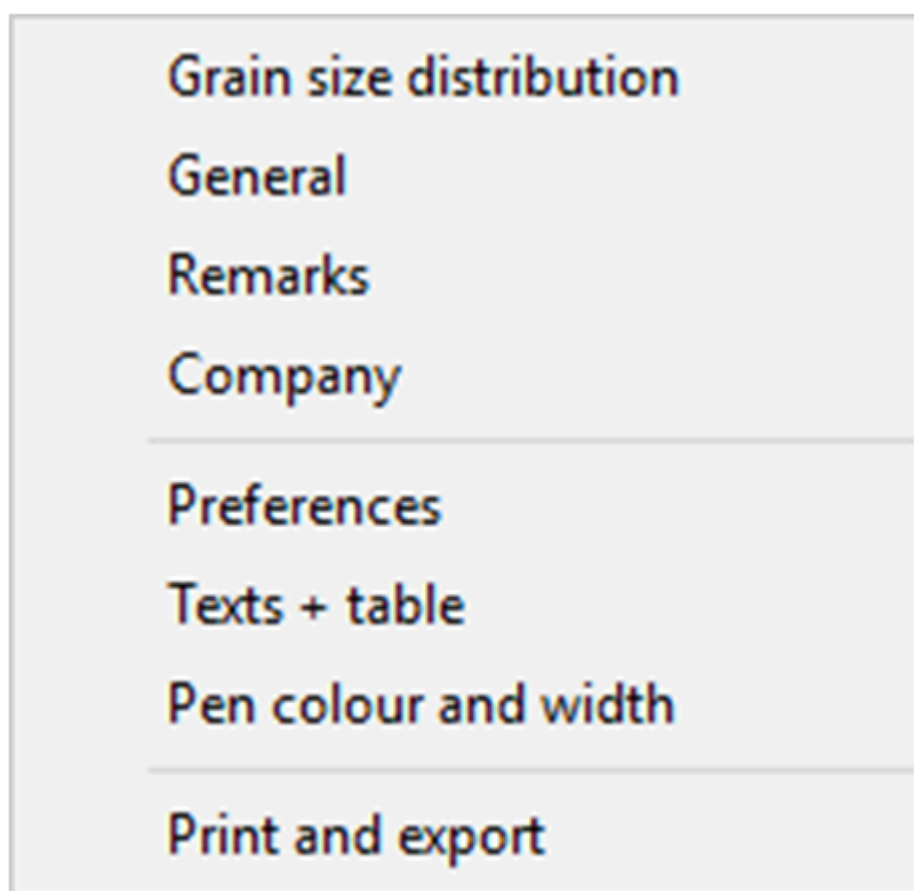
The program works on the principle of ***What you see is what you get***. This means that the screen presentation represents, overall, what you will see on your printer. In the last consequence, this would mean that the screen presentation would have to be refreshed after every alteration you make. For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

If you would like to refresh the screen contents, press either [F2] or [Esc]. The [Esc] key also resets the screen display to your current image zoom, which is usually preset to 1.0, which corresponds to an A3 or A4 sheet in most GGU programs (see menu item "**Graphics preferences/Refresh and zoom**").

5 Tips and tricks

5.1 GGU-SIEVE: Keyboard and mouse

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 legends or **Mini-CAD** objects, the editor for the selected element immediately opens, allowing it to be edited.

If you double-click in the system graphics with the left mouse button you will see a message box with the results at the selected depth. This gives you a quick overview of the results for any desired depth.

In most dialog boxes, the buttons for leaving the box or buttons for decisive functions are marked thickly and can be reached by clicking the **[Enter]/[Return]** key.

In dialog boxes in which you have to make entries, e.g. change soil properties, the quickest way to jump to the next input box is to use the **[Tab]** key. The previous value is marked and can be overwritten directly with the new entry. You do not have to move to the box with the mouse and delete the old entry in advance.

In input boxes with numerical values, you can use the calculation operations listed in “**Tips and tricks: Mathematical functions in input boxes with numbers**” to change them.

You can scroll the screen with the keyboard using the cursor keys and the [Page up] and [Page down] keys. After activating the zoom functions, click on an area of the screen to enlarge or reduce the display by a factor of 2. Alternatively, by clicking and dragging the mouse while holding down the [Ctrl] key, you define a window section which is then displayed in full screen. By clicking and dragging the mouse while holding down the [Shift] and [Ctrl] keys, you zoom into your system graphic, i.e. you change the scale of your system representation.

You can also use the mouse wheel to zoom in or out or to move the screen display. When the program is started for the first time, the default setting for mouse wheel operation is activated according to Windows conventions:

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

[Strg] + mouse wheel down = reduce screen image (zoom out)

From a zoomed representation you return to the full screen with [Esc].

5.2 GGU-SIEVE: Calculation operations in input boxes with numbers

In input boxes for numerical values, you can use the following calculation operations, also in combinations, to determine the desired value or to adjust the existing value. After pressing the [Return] or [Enter] key, the determined value is inserted.

Task		Input
Add:		
$5 + 12,18$	→	$5 + 12,18$
Subtract:		
$25,74 - 12,18$	→	$25,74 - 12,18$
Multiply:		
$5,23 \cdot 4,18$	→	$5,23 * 4,18$
$\pi \cdot 2,5^3$	→	$PI * 2,5^3$
Divide:		
$5,23 / 4,18$	→	$5,23 / 4,18$ or $5,23 : 4,18$
Exponentiate:		
2^5	→	2^5
Radify:		
Root from 27	→	$w(27)$ or $27^{(1/2)}$
5. root from 81,5	→	$81,5^{(1/5)}$
Sine, cosine, tangent, etc.		
$\sin(32^\circ)$	→	$\sin(32)$
$\cos(5,23^\circ)$	→	$\cos(5,23)$
$\tan(45^\circ)$	→	$\tan(45)$
$\arctan(1,0)$	→	$atan(1,0) = 45^\circ$
Logarithm naturalis		
$\ln(4,53)$	→	$\ln(4,53) = 1,5107$
Exponential function:		
$e^{1,5107}$	→	$ep(1,5107) = 4,53$

5.3 GGU-SIEVE: 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 content and resets the screen section to your current image zoom, which is preset to 1.0. This is useful, for example, if you have used the magnifying glass function to display sections of the drawing on the screen and want to quickly return to the overall view.
- **[F1]** opens the manual file.
- **[F2]** refreshes the screen without altering the current magnification.

- **[F11]** activates the menu item **"Move objects"**, which appears in the GGU programs under various menu titles, e.g. **"Page size + margins"**, **"Graphics preferences"** or **"Output preferences"**.

In this GGU program, the following function keys are also assigned to program functions:

5.4 GGU-SIEVE: File extensions

In the GGU-SIEVE program, you can save or open files containing certain settings and data at a number of points. Files marked by * are always opened when the program starts if they are saved at the program level using the name GGU-SIEVE.

.kvs *All input, settings and Mini-CAD objects*

-> **"File/Save"/"File/Load"**

.ekv *The sieving and/or hydrometer analysis data of an individual grain size distribution*

-> **"Edit/Grain size distribution"** -> Button with GSD no. -> Grain size distribution editor

-> Buttons **"Load GSD"/"Save GSD"**

.aer* *Hydrometer data for a variety of hydrometers*

-> **"Edit/Grain size distribution"** -> Button with GSD no. -> Grain size distribution editor

-> Button **"Hydrometer values"** -> Buttons **"Load"/"Save"**

.scä* *Time and temperature specifications for a hydrometer analysis*

-> **"Edit/Grain size distribution"** -> Button with GSD no. -> Grain size distribution editor

-> Button **"Edit hydrometer analysis data"** -> Buttons **"Load"/"Save"**

.sbe* *Sieve combination (activated sieves and their diameters)*

-> **"Edit/Grain size distribution"** -> Button with GSD no. -> Grain size distribution editor

-> Button **"Edit sieving data"** -> Buttons **"Load"/"Save"**

.stf* *Grain size distribution pen settings*

"GGU-SIEVE.stf": Diagram table grain size distributions

-> **"Graphics preferences/Pen colour and width"** -> Buttons **"Load"/"Save"**

"EXTRAKVS.stf": Extra grain size distributions in the menu **"Special"**

-> **"Special/Extra GSDs preferences"** -> Button **"Extra GSDs pens"**

-> Buttons **"Load"/"Save"**

.alg* *Preferences under "Graphics preferences/Preferences" and menu items in menu "Output preferences"*

-> **"Graphics preferences/Load graphics preferences"/"Graphics preferences/Save graphics preferences**"**

.ktx *Texts and allocations for diagram table*

-> **"Output preferences/Texts + table"** "Diagram table" group box

-> Button **"Edit texts and allocation"** -> Buttons **"Load"/"Save"**

.xkv All extra grain size distributions entered in the "Special" menu with the associated preferences for hatching and pens

-> "Special/Load extra GSDs" / "Special/Save extra GSDs"

5.5 GGU-SIEVE: "Copy/print area" icon

A dialog box opens when the "Copy/print area" icon

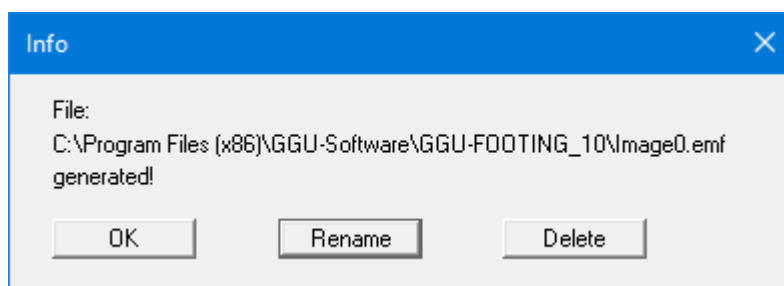


in the menu toolbar is clicked, describing the options available for this function. For example, using this icon it is possible to either copy areas of the screen graphics and paste them into the report, or send them directly to a printer.

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 appears after defining the area, shown here as an example for the GGU-FOOTING program:



The default location of the file is the folder from which the program is started (here: GGU-FOOTING_10) 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.

6 File menu

6.1 GGU-SIEVE: "New" menu item

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

6.2 GGU-SIEVE: "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.

6.3 GGU-SIEVE: "Add 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.

6.4 GGU-SIEVE: "Save" menu item

You can save data entered or edited during program use to a file, 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.

6.5 GGU-SIEVE: "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.

6.6 GGU-SIEVE: "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**" 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.



- "**Output preferences**" group box

Using the "**Edit**" button the current output 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.

6.7 GGU-SIEVE: "Save XMLfile" menu item

As with the previous menu item, you can output a results log of all tests, but in this case as an XML file.

6.8 GGU-SIEVE: "Output preferences" menu item

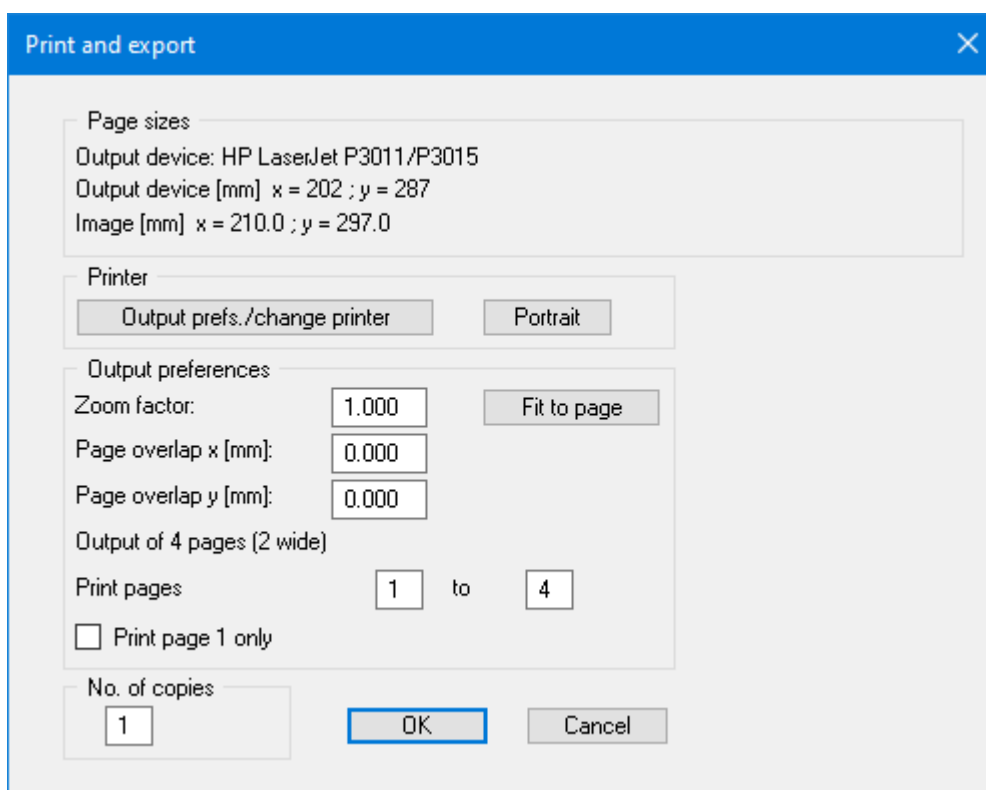
You can edit output preferences (e.g. swap between portrait and landscape) or change the printer in accordance with WINDOWS conventions.

6.9 GGU-SIEVE: "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 (**graphical representation**) to the WINDOWS standard printer or to any other printer selected using the menu item "**File/Output preferences**". But you may also select a different printer in the following dialog box by pressing the "**Output 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, 4). 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. You can also print only the 1st page with zoom factor = 1.0, in which case the bottom left-hand area is printed. 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.
- **"GGU-CAD file"**
allows output of the graphics to a file, in order to enable further processing with the **GGU-CAD** 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



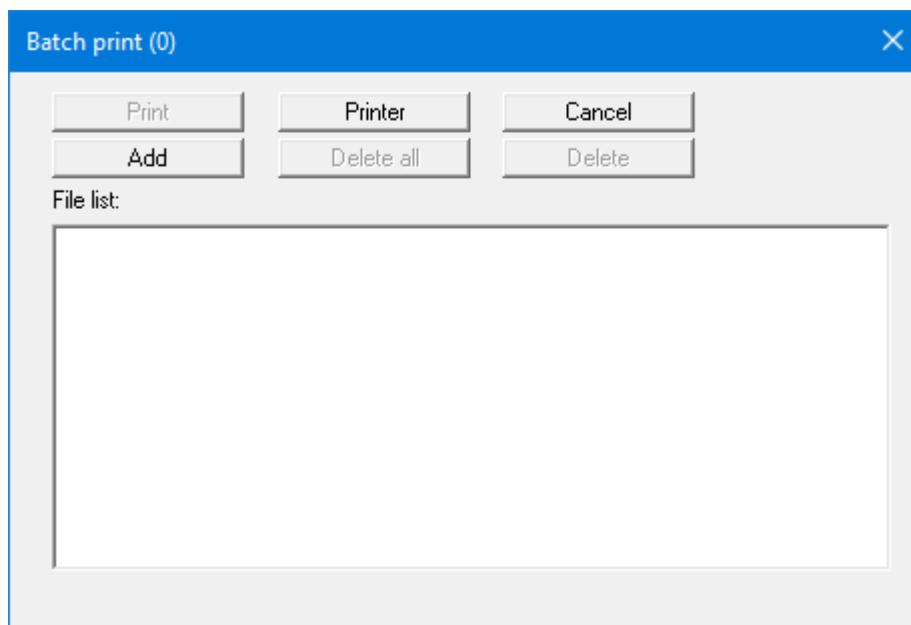
from the toolbar, you can copy parts of the graphics to the clipboard or save them to an EMF file. Alternatively you can send the marked area directly to your printer (see **"Tips and tricks"**).

Using the **"Mini-CAD"** program module you can also import EMF files generated using other GGU applications into your graphics (see menu item **"Graphics preferences/Mini-CAD"**).

- **"Mini-CAD"**
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.

6.10 GGU-SIEVE: "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.

6.11 GGU-SIEVE: "Exit" menu item

After a confirmation prompt, you can quit the program.

6.12 GGU-SIEVE: "1, 2, 3, 4" menu items

If you have not stored a working directory for the program icon, the program jumps to the program directory after starting to load or save a file.

Under the menu items of the File menu, the most recently edited files are listed with the respective storage path ("**1, 2, 3, ...**"). Selecting one of these files loads the selected file. The next time the **"File/Load"** or **"File/Save"** menu items are called up in the same program session, the program automatically jumps to the directory of the last file loaded.

7 Edit menu

7.1 GGU-SIEVE: "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 "**Sieving input via summed weights**" is activated later, the residues entered for the individual sieves are added for existing sieve analyses.

If you are working with partial sieving, you can activate "**Partial sieving according to DIN EN 933-1**" here. When entering the sieving data, you will then receive an extended input box for partial sieving.

7.2 "Grain size distribution" menu item

7.2.1 GGU-SIEVE: 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**". 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.

The screenshot shows the 'GSD no. 3' dialog box. Red boxes highlight the following elements:

- Top section:** A red box encloses the 'Evaluation to DIN EN ISO 17892-4' checkbox (checked), and input fields for 'Designation: Ex. 3', 'Soil type: U, t', fs', ms', gs', fg'', 'Soil type 2: cgrcsamsafgrfsaclm', 'Depth: 5.00 - 6.00 m', and 'Sampling location: RKS 5'. Buttons 'OK', 'Cancel', 'Determine soil type', and 'Further input' are also visible.
- Signature no.:** A red box highlights the dropdown menu showing '3'.
- Hydrometer values:** A red box highlights the 'Ip, wL for soil group' button.
- Bottom section:** A large red box encloses a group of buttons: 'Delete GSD', 'Duplicate GSD', 'Print GSD', 'Determine spec. values', 'Load GSD', and 'Save GSD'. Below these are checkboxes for 'Display filter rules' (Terzaghi, USBR) and a section for 'kf value output preferences' with a dropdown set to 'Automatic'.

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 **"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:

- **"Evaluation to EN ISO 17892-4"**

If the check box is activated, input and evaluation are compliant with EN ISO 17892-4.

- **"OK"/"Cancel"**

You exit the dialog box. Any changes made are accepted using the "OK" and rejected using the **"Cancel"** button.

- **"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"**. If the designation is to be displayed on the test buttons, deactivate the **"Editor with GSD no."** check box in the **"Graphics preferences/ Preferences"** menu item.

- **"Soil type"/"Soil type 2"**

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'.

- **"Determine soil type"**

After entering your test data two soil types can be determined by the program in accordance with the user-selected standard by pressing this button. The soil types are automatically included in the **"Soil type"** and **"Soil type 2"** input boxes and subsequently entered in the diagram table (see Section **"Diagram table"** group box).

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".

- **"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.

- **"Signature no.:"**

If you want to assign a specific signature to each grain size distribution, you can choose between 10 signatures. The selection menu is only displayed if you have previously deactivated the **"Assign signature automatically"** check box in the **"Graphics preferences/Preferences"** menu item.

- **"Further input"**

You will see this button for entering additional texts only if the **"Free text"** option was used when defining the texts in the diagram table using the menu item **"Output preferences/Texts + Table"**, **"Edit texts and allocations"** button.

- **"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.

The coefficient of plasticity IP and the liquid limit wL **must** be provided for **cohesive soils** in order to identify the soil group to DIN 18196 (see the following dialog box). Otherwise, nothing will be displayed in the diagram table on the output form.

You can achieve visualisation of the DIN 18196 soil group for a filled soil, e.g. [GW], if the **"Soil is filled"** check box is activated.

- **"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. 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"**.

- **"Display filter rules" group box "Terzaghi" and "USBR"**

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.

- "kf value output preferences" group box

If you have activated the "kf value determination via "Edit/Grain size distribution"" check box in the "Output preferences/Texts + table" menu item "Edit texts and allocation" button, you can define the kf value determination method separately for each grain size distribution. The "Automatic" setting is helpful, as the program then searches for the appropriate method.

7.2.2 GGU-SIEVE: Sieve analysis input

For a sieve analysis activate the "Evaluate sieve arm" check box in the dialog box. The relevant input boxes are then activated accordingly.

GSD no. 1

☒ Evaluation to DIN EN ISO 17892-4

Designation:

Soil type:

Soil type 2:

Depth:

Sampling location:

Dry mass (hydrometer analysis) [g]: ☐ Adjust

Specific gravity [g/cm³]:

Dry mass (sieving) [g]:

Signature no.:

Sieving with partial mass

☐ With partial mass:

Partial mass (sieving) [g]:

From sieve diameter [mm]:

☐ Evaluate hydrometer arm ☒ **Evaluate sieve arm**

Display filter rules

☐ Terzaghi ☐ USBR

kf value output preferences

kf value determination after:

- **"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"**

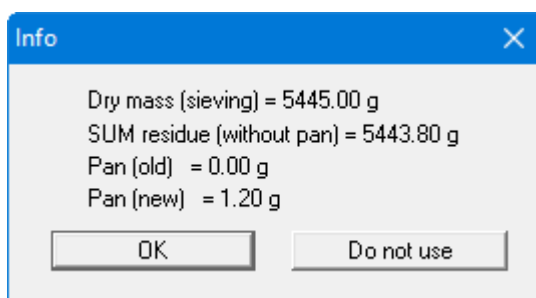
If you press this button you will arrive at the following dialog box, allowing you to enter sieve test data:



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 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:



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.

7.2.3 GGU-SIEVE: 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.

GSD no. 1

☒ Evaluation to DIN EN ISO 17892-4

Designation:

Soil type:

Soil type 2:

Depth:

Sampling location:

Dry mass (hydrometer analysis) [g]: ☐ Adjust

Specific gravity [g/cm³]:

Dry mass (sieving) [g]:

Sieving with partial mass

☒ With partial mass:

Partial mass (sieving) [g]:

From sieve diameter [mm]:

☐ Evaluate hydrometer arm ☒ Evaluate sieve arm

Display filter rules

☐ Terzaghi ☐ USBR

kf value output preferences

kf value determination after:

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 ' * '.

Test to DIN EN ISO 17892-4 - 5.2 Sampling location: RKS 1 Depth: 0.20 - 0.40 m Soil type: G, gs, ms' Cu/Cc: 11.1/1.2 Clay/Silt/Sand/Gravel [%]: - / 0.1 / 27.2 / 72.6 / 0.0 Ip/L: 0.0 / 0.0 d ₂₀ [mm]: 1.3460 d ₁₀ /d ₃₀ /d ₆₀ [mm]: 0.632 / 2.273 / 6.989 Sieve analysis: Dry mass [g]: 5732.00 Partial mass [g]: 300.00			
Sieve analysis: (*evaluated with partial mass)			
Grain size [mm]	Residue [g]	Residue [%]	Sieving passages [%]
63.0	0.00	0.00	100.00
31.5	75.24	1.31	98.69
20.0	457.52	7.98	90.71
16.0	444.45	7.75	82.95
8.0	1045.75	18.24	64.71
4.0	103.62 *	22.35	42.36
2.0	71.99 *	15.53	26.83
1.0	57.15 *	12.33	14.50
0.5	32.97 *	7.11	7.39
0.25	16.98 *	3.66	3.73
0.125	15.83 *	3.41	0.31
0.063	0.87 *	0.19	0.13
Pan	0.59 *	0.13	0.00
Total	5732.00		
Sieving loss	0.00		

Of the original total weight of 5732 g, only 3709.04 g remain after sieve 8.0. Only 300 g of this residual mass is sieved further. The 103.62 g residue determined on sieve 4.0 corresponds to 1281.1 g relative to the residual mass of 3709.04 g. And these 1281.1 g correspond to a percentage residue of 22.35% relative to the total mass of 5732 g.

7.2.4 GGU-SIEVE: Hydrometer analysis input

For a pure hydrometer analysis (sedimentation), activate the "Evaluate hydrometer arm" check box in the dialog box. The relevant input boxes are then activated accordingly.

GSD no. 2

☒ Evaluation to DIN EN ISO 17892-4

Designation:

Soil type:

Soil type 2:

Depth:

Sampling location:

Dry mass (hydrometer analysis) [g]: ☐ Adjust

Specific gravity [g/cm³]:

Dry mass (sieving) [g]:

Signature no.:

Sieving with partial mass

☐ With partial mass:

Partial mass (sieving) [g]:

From sieve diameter [mm]:

☒ Evaluate hydrometer arm ☐ Evaluate sieve arm

Display filter rules

☐ Terzaghi ☐ USBR

kf value output preferences

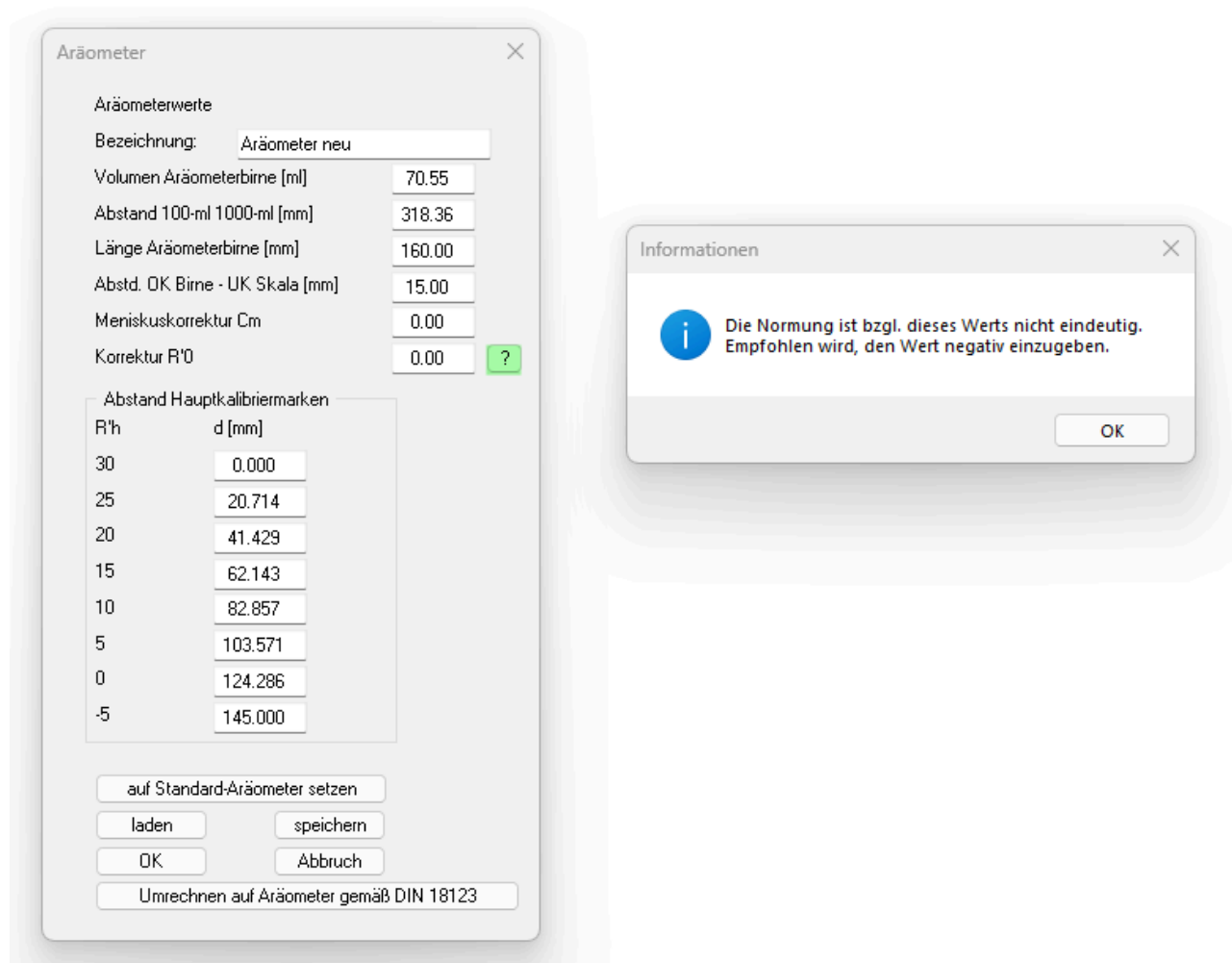
kf value determination after:

- **"Dry mass (hydrometer 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.



Two correction factors are determined when calibrating the hydrometer according to the instructions in EN ISO 17892-4, the meniscus corrections C_m , (see EN ISO 17892-4 A.3.9.3) and R'_0 (see EN ISO 17892-4 5.3.3.1). The program automatically corrects the reading values R'_h using the factors given above.

The standardization for correction factor R'0 is not entirely clear. The application assumes that the value will be entered as negative, but does not prevent a positive entry.



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"**.

If you wish to continue evaluation using the DIN 18123 hydrometer method, you can switch back and forth using the lower check box or deactivate the **"Evaluation to EN ISO 17892-4"** check box in the previous hydrometer analysis editor box.

- **"Evaluate hydrometer arm"**

Hydrometer analysis data can only be entered and evaluated if this check box is activated.

- **"Edit hydrometer analysis data"**

If you press this button you will arrive at the following dialog box, allowing you to enter hydrometer analysis data:

Hydrometer analysis [X]

Edit hydrometer 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 starting the test in hours and minutes as well as the corresponding temperature. 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 uncorrected hydrometer reading R'h is entered in accordance with EN ISO 17892-4, Section 5.3.1.5, i.e. for a reading of 1,0300, 30.0 is entered. The program automatically calculates the corrected reading value using the correction factors 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.

7.2.5 GGU-SIEVE: 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, both the **"Evaluate hydrometer arm"** and the **"Evaluate sieve arm"** check boxes must be activated in the **"Edit/Grain size distribution"** dialog box.

GSD no. 3

☒ Evaluation to DIN EN ISO 17892-4

Designation:

Soil type:

Soil type 2:

Depth:

Sampling location:

Dry mass (hydrometer analysis) [g]: ☒ Adjust

Specific gravity [g/cm³]:

Dry mass (sieving) [g]:

Signature no.:

Sieving with partial mass

☐ With partial mass:

Partial mass (sieving) [g]:

From sieve diameter [mm]:

☒ Evaluate hydrometer arm ☒ Evaluate sieve arm

Display filter rules

☐ Terzaghi ☐ USBR

kf value output preferences

kf value determination after:

Test value input for the combined sieve/hydrometer analysis is as described in the previous sections dealing with the input for sieving and hydrometer analyses. 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 hydrometer analysis using different sample quantities, the "**Adjust**" check box must be activated. For input of the dry mass then:

- **Sieving after sedimentation:**

The coarse component > 0.125 mm is sieved after sedimentation.

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

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

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

Sieving before sedimentation:

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 (hydrometer 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 (hydrometer analysis) [g] = Total dry mass of the sample used for the hydrometer 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 hydrometer analysis to the percentage fines from sieving.

7.3 GGU-SIEVE: "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.

7.4 GGU-SIEVE: "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.

7.5 GGU-SIEVE: "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.

7.6 GGU-SIEVE: "Edit all GSDs" menu item

Using this menu item, you can delete several existing grain size distributions in one step or adapt the hydrometers for all existing grain distributions.

7.7 GGU-SIEVE: "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:

Mix

Components of an existing sieving can form a new GSD by mixing.

Save new GSD in:

GSD no. 1 ▼

- GSD no. 1
- GSD no. 2
- GSD no. 3
- New GSD

Input

New weight [g] 1000.00

GSD no.	Parts [-]
1	15.00
2	55.00
3	30.00

OK Cancel

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.

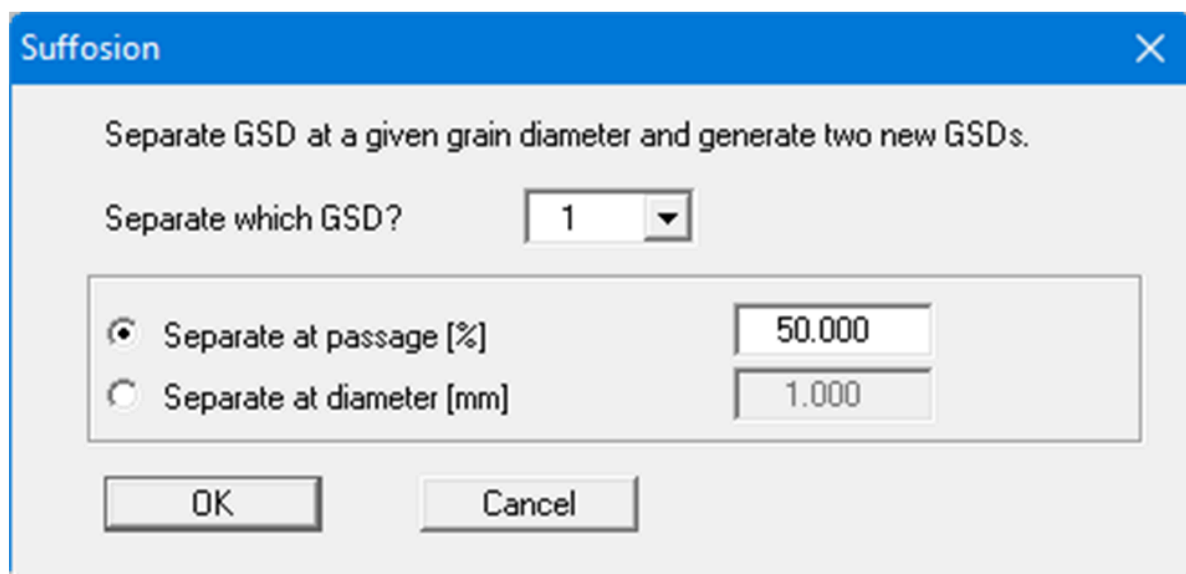
The program identifies the mixed grain fractions and enters them in the sieving data for the selected GSD. To further edit the mixed GSD, click the menu item **"Edit/Grain size distribution"** and then the corresponding test button or double-click directly in the table area containing the required grading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

7.8 "Suffosion" menu item

7.8.1 GGU-SIEVE: Suffosion safety by separating a grading curve

For verification of suffosion safety in accordance with the *Merkblatt Anwendung von Kornfiltern an Bundeswasserstraßen (MAK)* (Fact Sheet for the Application of Grain Filters on Waterways), published by the Bundesanstalt für Wasserbau (BAW) in Karlsruhe (2013), 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.



Suffosion

Separate GSD at a given grain diameter and generate two new GSDs.

Separate which GSD? 1

☒ Separate at passage [%] 50.000

☐ Separate at diameter [mm] 1.000

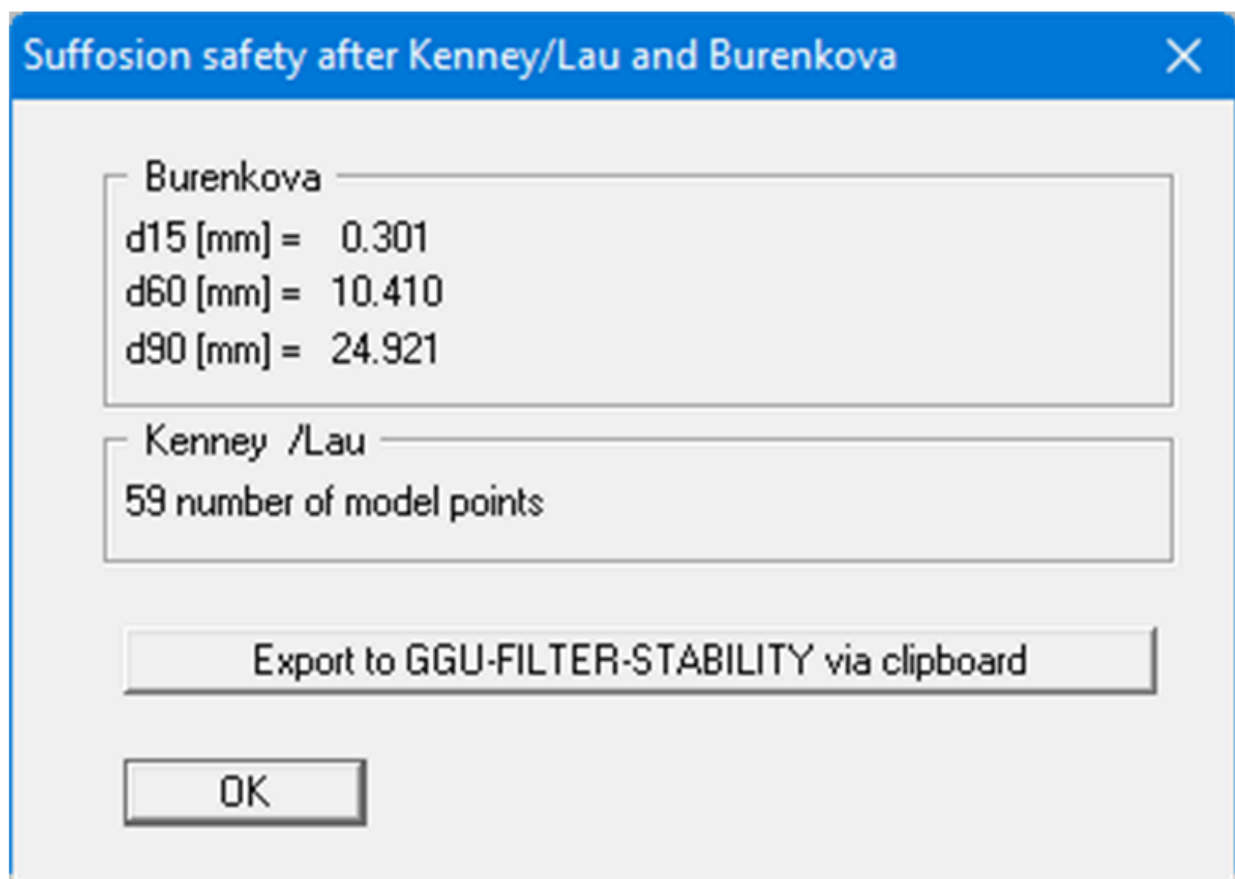
OK Cancel

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.

7.8.2 GGU-SIEVE: 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.

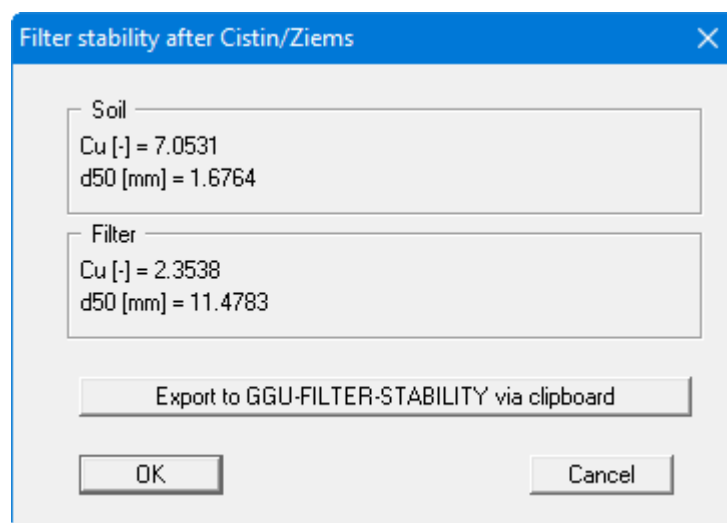
7.9 "Filter stability" menu item

7.9.1 GGU-SIEVE: Examine filter stability after Cistin/Ziems

o examine the necessity of a filter layer in accordance with the *Merkblatt Anwendung von Kornfiltern an Bundeswasserstraßen (MAK)* (Fact Sheet for the Application of Grain Filters on Waterways), published by the *Bundesanstalt für Wasserbau (BAW)* in Karlsruhe, 2013 (Annex 2), the necessary soil properties (uniformity coefficients U and passage d50) 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.



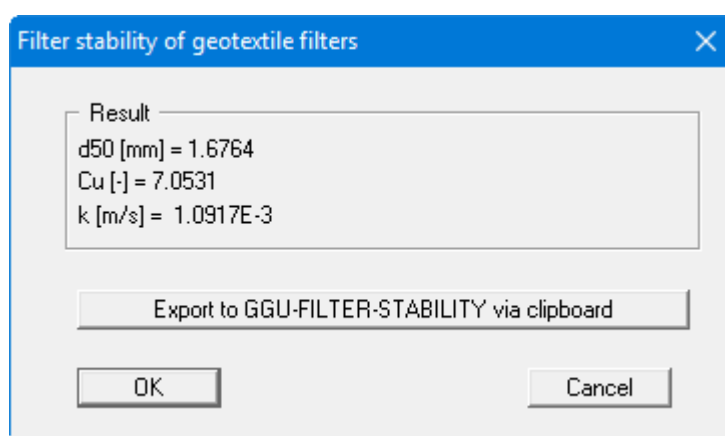
After clicking the export button, the program first offers advice on the procedure for using the data copied to the clipboard in the **GGU-FILTER-STABILITY** program. After confirming the text the original dialog box opens again allowing the relevant grain size distributions to be selected. Exit the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

7.9.2 GGU-SIEVE: Examine filter stability of geotextile filters

With regard to examining the filter stability of geotextile filters to Fact Sheet DWA-M 511 use this menu item to determine the necessary soil properties (grain size at d50 and uniformity coefficient Cu) from the grading curve of the relevant soil, which is selected in a dialog box if several grain size distributions are present.



The program then displays the determined values in a message 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.

7.10 GGU-SIEVE: "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.

Project (1st line):	Examples to DIN 18123
Project (2nd line):	Soil type to EN ISO 14688-1
Project (3rd line):	
Edited by:	Mr. Nobody
Processing date:	10.09.2018
Test no.:	1234
Date of sampling:	09.09.2018
Type of sampling:	disturbed
Method:	Comb. sieve and hydrometer analysis
Report:	2018
Annex:	9.9

OK Cancel

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

7.11 GGU-SIEVE: "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 image shows two instances of the 'Annex numbers' dialog box. The left instance shows the 'Generate' button being clicked. The right instance shows the result after clicking 'Generate', where the output table page numbers are automatically generated from 4.1 to 4.10.

Field	Value
Graphics	3
Output table page 1	4.a
Output table page 2	4.b
Output table page 3	4.c
Output table page 4	4.d
Output table page 5	4.e
Output table page 6	4.f
Output table page 7	4.g
Output table page 8	4.h
Output table page 9	4.i
Output table page 10	4.j

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 like this one:

The image shows the 'Generate annex number for output table' dialog box. It contains the following fields and options:

- Text (front): 4.
- ☒ 1st number (rear): 1
- ☐ 1st letter (rear): a

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).

7.12 GGU-SIEVE: "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.

7.13 GGU-SIEVE: "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.

7.14 GGU-SIEVE: "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.

7.15 GGU-SIEVE: "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.

7.16 GGU-SIEVE: "Preferences" menu item

You can activate or deactivate the undo functions.

8 Graphics preferences menu

8.1 GGU-SIEVE: "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**".

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. 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.

8.2 GGU-SIEVE: "Preferences" menu item

After selecting this menu item, a dialog box appears, in which you can edit preferences for graphical presentation. All preferences made here can be saved at the program level using the "**Graphics preferences/Save graphics preferences**" menu item in a file named "**GGU-SIEVE.alg**". The preferences are then automatically loaded when the program is started.

Preferences

Curve presentation:

☒ Connect points ☐ Curves with markers

☒ Curves with meas. values ☐ Curves with numbers

Marker size [mm]:

☒ Assign signature automatically

Smoothing out method

Method 2

Control parameter (method 3 only):

Minimum grain size for grading curve

☒ 0.001 mm ☐ 0.06 mm ☐ 2.0 mm

Maximum grain size for grading curve

☒ 100 mm ☐ 200 mm ☐ 500 mm

☐ 630 mm (DIN EN ISO 14688-1)

DIN 1045

☐ Sieve diameter boundaries to DIN 1045

ASTM

☐ Sieve diameter boundaries to ASTM

☐ Dashed auxiliary lines for boundaries

Achsen

☐ Sieve diameters increase from right to left

☒ Show mass fractions of grains from bottom to top

Protokoll

☐ Output table with 'Test to DIN EN ISO 17892-4 ..'

Residue decimal places (output table):

Editor

☒ Editor with GSD no.

- "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.

If you want to define yourself which marker/signature should be used to display a grading curve, deactivate the "Assign signature automatically" check box. A selection menu then appears in the editor for each grain size distribution, which can be used to assign 10 different signatures.

- **"Smoothing out method"** group box

You can choose between 4 methods, which are explained in the info box.

No smoothing = no smoothing

Method 1 = strict Bezier spline

Method 2 = "loose" Bezier spline

Method 3 = rational spline interpolation

Smoothing out methods 2 and 3 produce very round curves. The deviations between the measured values and the displayed grading curves become visible when the measured values of the test are marked.

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

If you display the proportions T/U/S/G [%] in the diagram table, the proportions are determined from the curve. To obtain a more accurate approximation, change the Smoothing out method here or switch to **"No smoothing"**.

- **"Minimum grain size for grading curve"** group box

For coarse sample material, you can reduce the evaluation range for the fine grain component in the graphics in order to be able to select a better representation of the coarse grain range.

- **"Maximum grain size for grading curve"** group box

For very coarse sample material you have the option of extending the evaluation range for the coarse grain component shown in the graphics. Additionally, it is possible to activate a display containing the grain component up to 630 mm diameter to EN ISO 14688-1 (= blocks).

- **"DIN 1045"** group box

If you activate the "Sieve diameter boundaries to DIN 1045" check box, the [mm] specifications in the "Maximum grain size for grading curve" area above are adjusted according to the values from DIN 1045. You can then select the desired maximum grain size. The display of the grading curve in accordance with DIN 1045 always starts at 0 mm.

- **"ASTM"** group box

After activating the **"Sieve diameter boundaries to ASTM"** check box the diameter boundaries can be displayed to suit the requirements of the **American Society for Testing and Materials* (ASTM)**. **As a guidance aid you can also use dashed reference lines to mark the boundaries. If you have not used this previously, once you have activated the ASTM visualisation you will be asked whether the soil types and soil groups should also be determined compliant with ASTM. If you agree, the program automatically sets the corresponding check boxes, which you will find in the "Output preferences/Texts + table**" menu item, to ASTM .**

- **"Axes"** group box

You can use the two check boxes **"Diameter increase from right to left"** and **"Show mass proportions from bottom to top"** to redesign the graphic according to your requirements

- **"Output table"** group box

If the **"Output table with 'Test to EN ISO 17892-4 ..'"** check box is activated, the DIN EN ISO 17892-4 test type is displayed on the output table sheets.

You can specify the number of decimal places for the residue in the output table.

- "Editor" group box

The buttons for the tests entered via "Edit/Grain size distribution" are labelled with the corresponding test number. If you deactivate the "Editor with GSD no." check box, the buttons are labelled with the entered designation. However, only the first 8 characters are used for this.



8.3 GGU-SIEVE: "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. image-20240920-121835.png A zoom factor between 0.4 and 8.0 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 "0.4", "0.6", 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.

8.4 GGU-SIEVE: "Zoom info" menu item

An info box informs you about the activation and options of the zoom function.

The quickest way to enlarge a specific section of the screen is to open a zoom window by holding down the [Ctrl] key and the mouse button.

8.5 GGU-SIEVE: "Pen colour and width" menu item

In order to enhance the clarity of the graphics you can preset the pen settings for various graphic elements in the GGU programs

You can change the pen widths for the elements listed in the dialog box and adjust the pen and/or fill colours by clicking on the button with the element name. In some GGU programs you can also define a line colour for selected elements.

For the graphic output of colours on **monochrome printers** (e.g. laser printers), colours are replaced by an equivalent shade of grey. In the case of very light colours, the corresponding graphic elements are then barely visible on the printer. In such cases, it makes sense to change the colour setting to darker colours.

8.6 GGU-SIEVE: "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.

8.7 GGU-SIEVE: "Font size selection" menu item

You can edit font sizes of texts [in mm] within the various input areas.

8.8 GGU-SIEVE: "Mini-CAD toolbar" menu item

Using this menu item you can add free text, lines, circles, polygons and images (e.g. files in formats BMP, JPG, PSP, TIF, etc.) to the main program graphics. PDF files can also be imported as images. A pop-up menu opens, the icons and functions used are described in more detail in the Mini-CAD manual saved in the '**C:\Program Files (x86)\GGU-Software\ Manuals**' folder during installation..

8.9 GGU-SIEVE: "Toolbar preferences" menu item

By clicking on the tools (smart icons) for the menu items 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 cannot be called up via normal menu titles and menu entries.

Not all of the icons described below are available in all GGU programs.



"Next page"/"Previous page"

You can use these icons to scroll forwards and backwards between individual pages. In many GGU programs, you can use this in the **output table representation**.



"Select page" or "Diagram/Output table"

If you are in the **output table representation**, you can use this symbol to jump to a specific page or switch back to the normal display, i.e. your graphic display.

**"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.

**"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"**).

**"Colour on/off" or "Colour/hatching"**

If you want to remove the colour from the system display, e.g. to create a black and white printout, you can do this using this on/off switch.

In several GGU programs, 4 colour and hatching settings are possible via this icon, which you can click through in sequence. A colour filled representation is the default setting, the next click shows the hatching, then coloured and hatched. The fourth click shows a representation with neither colour nor hatching. The next click starts again.

**"Move object"**

Use this icon to position legends and diagrams at the desired position on the output sheet.

**"Undo move object"**

By clicking this icon the last performed movement of graphical elements made using the [F11] function key or the menu item **"Output preferences/Move objects"** can be undone.

**"Restore move object"**

By clicking this symbol, the last object movement undo carried out using "Undo move object" can be restored.

**"Construction phase back"/"Construction phase forward"**

If you are in the display of construction phases, you can use these icons to scroll back and forth between the individual construction phases.

8.10 GGU-SIEVE: "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.

8.11 GGU-SIEVE: "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**".

9 Output preferences menu

9.1 GGU-SIEVE: "Page size" menu item

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

9.2 "Texts + table" menu item

9.2.1 GGU-SIEVE: Central preferences

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



- **"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.

The **"Reset"** buttons in the **"Diagram header"**, **"Date/edited by"** and **"Silt and clay etc."** dialog boxes reset the labelling to the defaults. If you have retroactively changed the language, you will get the internal program translations.

9.2.2 GGU-SIEVE: "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.

Diagram table + output table texts

Line	Text	Enter what?
1	Signature:	Signature
2	Sampling location:	Sampling location
3	Depth:	Depth
4	Sampling date:	Free text
5	Soiltype to DIN 4022:	Soil type
6	Soil type DIN EN ISO 1	Soil type 2
7	Cu/Cc:	Cu/Cc
8	Clay/Silt/Sand/Gravel	Components
9	kf value [m/s]:	kf value
10	d17 [mm]:	d (arbitrary 1) [mm]
11	Nr 11	None

OK
Cancel
Reset
Save
Load

Adopt for:
Diagram + t

If kf value entry is selected, then:

☒ kf value determination via "Edit/Grain size distribution" ?

Search sequence

kf after Seiler ?

☒ Display kf value and method together

☒ Observe validity rules

Components preferences

☐ Components with stones

Percentages for d (arbitrary)

Value (1) [%] = 17.00

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.

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.

GSD no. 1

☒ Evaluation to EN ISO 17892-4

Designation: Sample 1

Soil type: G, gs, ms'

Soil type 2: msacsaGr

Depth: 4.30 m

Sampling location: RKS 1

OK Cancel

Determine soil type

Further input

GSD no. 1

Sampling date: 23.06.2018

OK Cancel

In the **Free texts** you can make input with superscript or subscript numbers or letters using the conventions described below. To start the text, enter two '~' characters. Superscripts and subscripts are activated using the backslash combinations '\h' and '\t'. If you need to use normal characters again following the superscripts or subscripts, follow them by '\e' before continuing normally (see file "**Free texts with superscript-subscript.kvs**").

GSD no. 1

Free text 1: ~4.6 · 10\h-3

Free text 2: ~10\h-7\e m/s

Free text 3: ~5,2\t max

OK Cancel



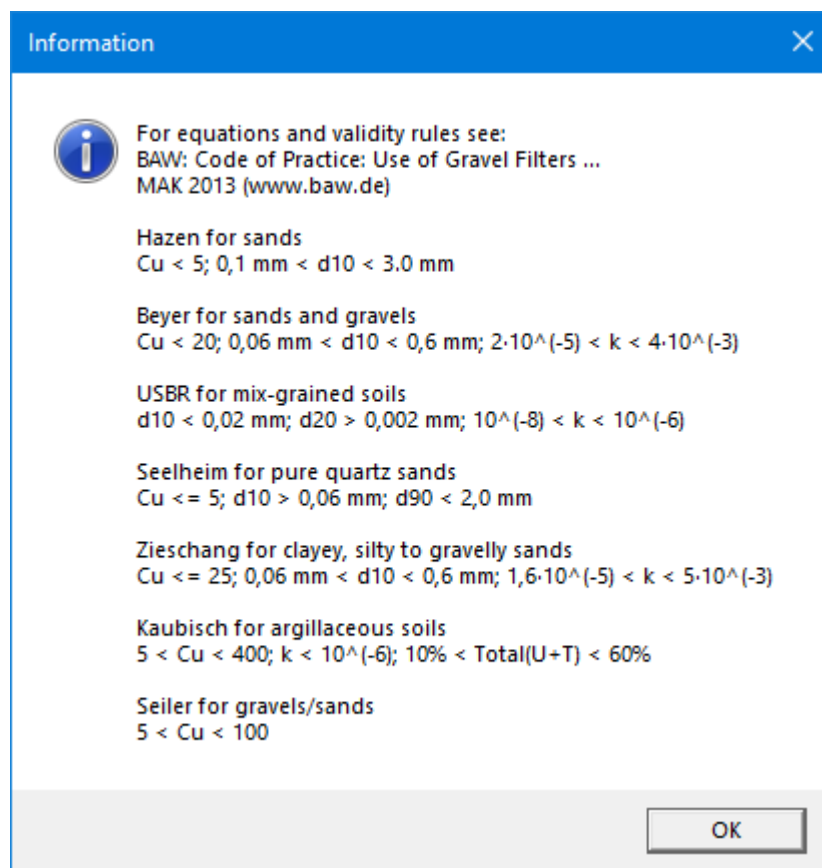
$4.6 \cdot 10^{-3}$
10^{-7} m/s
$5,2_{\text{max}}$

The **kf value is determined** in accordance with the *Merkblatt Anwendung von Kornfiltern an Bundeswasserstraßen (MAK)* (Fact Sheet for the Application of Grain Filters on Waterways), published by the Bundesanstalt für Wasserbau (BAW) in Karlsruhe (2013).

If you want to display the k_f value in the diagram table, you can select one of the various determination methods for all grain size distributions in the following group box. However, the check box " **k_f value determination via "Edit/ Grain size distribution"**" is activated by default. You can then select different methods in the editor of the respective grain size distribution or, if "**Automatic**" is set there, have the system search for the appropriate method. You can change the search sequence by clicking on the corresponding button.

If you leave the "**Display k_f value and method together**" check box activated, the method used is also displayed when a k_f value entry is made in the diagram table. The respective validity rules should be observed, which is why the check box is activated by default.

More detailed explanations of the methods can be found in an info box, which you can access by clicking on the "?" button:



If you are working in the stone area, you can expand the automatic display of the soil components in the diagram table accordingly by activating the "**Components with stones**" check box. You must adapt the table text "**Clay/Silt/Sand/Gravel [%]:**" manually.

Visualisation of the passages at d_{10} , d_{30} , d_{50} and d_{60} 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.

The **"Reset"** button resets the labelling and allocations of the results table to the defaults. If you have retroactively changed the language, you will get the internal program translations. Your texts and allocation can be saved in a **"*.ktx"** file using the **"Save"** button and opened again using the **"Load"** 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:

Inner friction angle can be determined approximately from gradation curve (after Lang/Huder). The following settings apply to all gradation curves.

$$\phi = 1/7 * \text{weight \% (< 0.002 mm)} + 1/5 * \text{weight \% (0.002 - 0.01 mm)} + 1/3 * \text{weight \% (0.01 - 0.2 mm)} + 1/2.5 * \text{weight \% (> 0.2 mm)}$$

Surcharges and reductions for:

Gradation:

Bedding:

Grain shape:

- **"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.

9.2.3 GGU-SIEVE: "Identify soil type" 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 the 2006 or 2020 edition. In addition, the soil types can be determined using the SEP (**S*chichten 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**).

- **"Second soil type to:"**

You can visualise two soil types in the diagram table, for example to old and new DIN. Choose the standard for determining the second soil type here.

- Both input boxes are available in the editor box for each grain size distribution. However, the soil types are only shown in the diagram table if **"Soil type"** and **"Soil type 2"** have been allocated a table row in the **"Edit texts and allocations"** dialog box.

- **"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 0.060 mm in the diagram according to DIN. If the final value is entered for the 0.063 mm sieve for a pure sieving, the transition to silt would not be reached and the program would not take the silt component into consideration when determining the soil type. By activating this check box, the silt content is determined at 0.063 mm. The graphic is adjusted accordingly.

- **"Gravel-stone boundary at 63 mm"**

The program determines the stone component at the gravel-stone transition, which is 60 mm in the diagram according to DIN. The boundary transition is moved to 63 mm by activating this check box.

9.2.4 GGU-SIEVE: "Soil group + frost resistance" group box

Further 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 group/frost resistance after:"**

Here, it is possible to choose between **DIN 18196/ZTV E-StB**, **SN 670 008a** (Swiss Norm) or **USC** (Unified Soil Classification) as the method of determination.

- **"Soil group (SN 670 008a) in long text"**

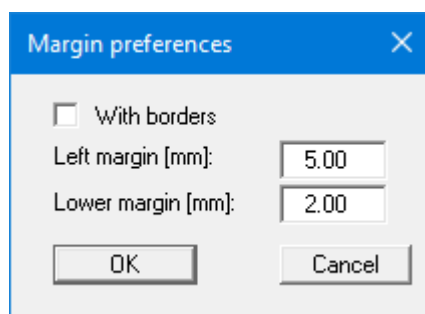
If you are using the Swiss standard a long text version of the soil group can be specified here.

- **"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".

9.3 GGU-SIEVE: "Margins" menu item

In the default program preferences, the form 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 is necessary to also adapt the page height and width .

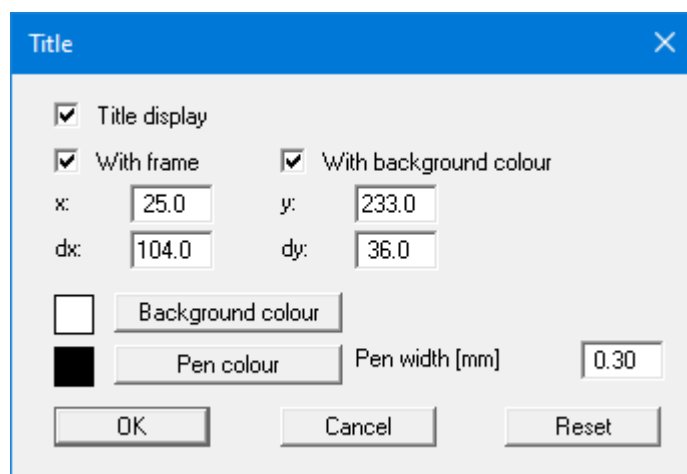
If you also deactivate the **"With margins"** check box, the thicker border around all the graphic elements on the output sheet will be removed. You can create a completely new arrangement on the form by moving the individual graphic elements.

9.4 GGU-SIEVE: "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.

9.5 GGU-SIEVE: "Title (change position)" menu item

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").

The heading shown in the title element can be edited in the menu item "Output preferences/Texts+table", "Diagram header" button. The texts "Project (1st line)" to "Project (3rd line)" are entered immediately after double-clicking the element or using the menu item "Edit/General".

9.6 GGU-SIEVE: "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 "Title (change position)" menu item". 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.

9.7 GGU-SIEVE: "Company" menu item (output)

You will see an almost identical dialog box with the same settings options as described in the menu item "Output preferences/Title (change position)". Proceed as described there if you want to make changes to the position or layout of the element in this menu item.

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

9.8 GGU-SIEVE: "Examination no. etc." menu item

Almost the same dialog box opens with the same preference options as that described in the "Output preferences/Title (change position)" menu item. To edit the "Examination 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"** . 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 .

9.9 GGU-SIEVE: "Annex and report" menu item

You will see an almost identical dialog box with the same settings options as described in the menu item **"Output preferences/Title (change position)"**. Proceed as described there if you want to make changes to the position or layout of the element in this menu item.

The input for this element can be edited immediately after double-clicking on the element or via the menu item **"Edit/General"**. 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. 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.

9.10 GGU-SIEVE: "Diagram table" menu item

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

9.11 GGU-SIEVE: "Remarks" menu item

This menu item is invisible if you are in the output table view. Almost the same dialog box opens with the same preference options as that described in the **"Output preferences/Title (change position)"** menu item. 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"** . 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.

9.12 GGU-SIEVE: "Edited by + date" menu item

This menu item is invisible if you are in the output table view. Almost the same dialog box opens with the same preference options as that described in the **"Output preferences/Title (change position)"** menu item. 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"**. 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.

9.13 GGU-SIEVE: "Output table (results)" menu item

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

9.14 GGU-SIEVE: "Output table (sieve analysis)" menu item

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

9.15 GGU-SIEVE: "Output table (hydrometer analysis)" menu item

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

9.16 GGU-SIEVE: "General" menu item

Almost the same dialog box opens with the same preference options as that described in the "**Output preferences/Title (change position)**" menu item. 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.

9.17 GGU-SIEVE: "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.

9.18 GGU-SIEVE: "Move objects" menu item

If you select this entry, you can then use the mouse to move the various objects and legends. Move the mouse over the object of your choice. If you are over a movable object, the mouse pointer will take on the shape of a cross. Now press the left mouse button and drag the object to the desired position while holding down the button.

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

If you want to edit several objects, you can also activate the function more quickly by pressing the [F11] key or the symbol



. An info box will then no longer appear.

In many GGU programs you can also alter the size of an object using this menu item or the [F11] function key. If you are positioned over the frame of a resizable object after activating the function, the mouse takes on the shape of a double arrow. Hold down the left mouse button and drag the frame until the object has reached the desired size. Drag a corner to maintain the aspect ratio of the sides. If you drag on one side, the object becomes taller or wider.

Using the [Back] key or by clicking on the icon



you can undo the last change to the position or size of an object.

In programs in which you can position the diagrams yourself (menu item "**System/Graph positioning preferences**"), the result diagrams can also be moved using this function if you have switched to "**Manual graph positioning**".

10 Special menu

10.1 GGU-SIEVE: 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 100 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.

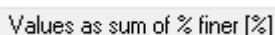
10.2 GGU-SIEVE: "Enter extra GSDs" menu item

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 and need not therefore be further explained here. A total of 100 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



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



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

10.3 GGU-SIEVE: "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**".

10.4 GGU-SIEVE: "Save extra GSDs" menu item

Extra GSDs can be saved separate from the primary grain size distribution to have them available for other primary records. In this way it is possible to create several 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").

10.5 GGU-SIEVE: "Delete extra GSDs" menu item

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

10.6 GGU-SIEVE: "Extra GSDs preferences (1)" menu item

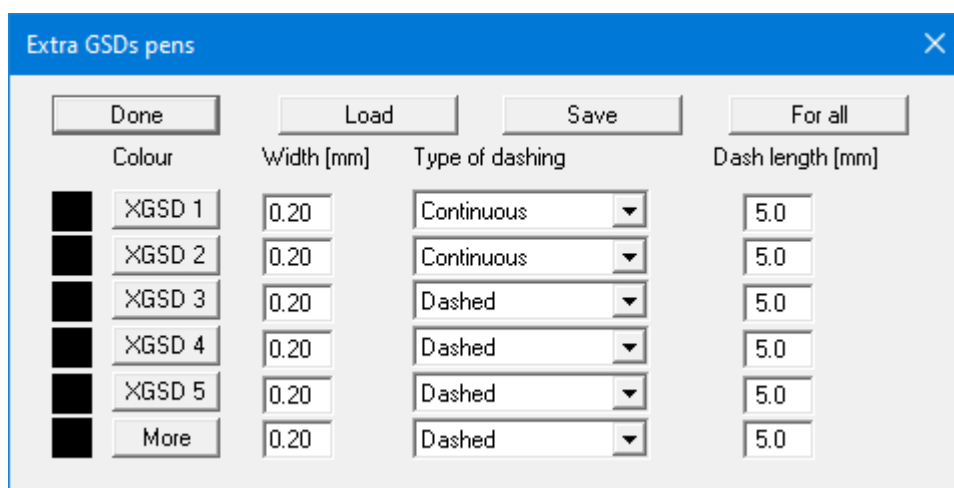
With this menu item you can define important preferences for extra GSDs. You will see the following dialog box:



In the "**Curve representation**" group box 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**".

For the display of the extra GSDs, you can decide whether the grain distribution curve should be displayed as a line and/or with markers on the measured values.

You can use the "**Extra GSDs pens**" button at the bottom of the dialog box to set different pen colours, widths and, if required, dashing for the display of the first 5 extra grain size distributions (see figure below).



Use the "**More**" button to specify a common display type for all subsequent extra grain size distributions (6 - 100). Use the "**For all**" button to select a common colour for all 100 extra grain size distributions in one step.

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.

	Angle [°]	Distance [mm]	Offset [mm]	Length [mm]	Pen width [mm]	Type [-]
☒ Top (1)	-45	4	0	4	0.2	Continuous
☐ Top (2)	45	4	0	4	0.2	Continuous
☒ Bottom (1)	-45	4	0	4	0.2	Continuous
☐ Bottom (2)	45	4	0	4	0.2	Continuous
☒ Middle (1)	-45	4	0	4	0.2	Continuous
☐ Middle (2)	45	4	0	4	0.2	Continuous

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.

10.7 GGU-SIEVE: "Extra GSDs preferences (2)" menu item

This menu item is available if you would like to emphasise a 2nd area between 2 grain lines differently. You will see the following dialog box:



You can set a desired colour and hatching line for this 2nd hatching area. You can also assign a different colour, pen width or hatching line to the selected boundary hatching lines using the "**Extra-KVS pens**" button.

10.8 GGU-SIEVE: "Extra GSDs output table" menu item

In complete analogy to the "**File/Print 'simple' output table**" menu item , an extra GSDs output table can be printed.

10.9 GGU-SIEVE: "Load 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.

10.10 GGU-SIEVE: "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.

10.11 GGU-SIEVE: "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).

10.12 GGU-SIEVE: "Check grading curve range" menu item

You can define a grading curve range with 2 extra grain size distributions. Using this menu item, you can determine and display any deviation from the defined range for all existing grading curves and extra grading curves.

11 Info menu

11.1 GGU-SIEVE: "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 the GGU program.

11.2 GGU-SIEVE: "GGU on the web" menu item

Using this menu item, you can access the [GGU Software website](#).

Check the page of your program module at regular intervals for information about updates and changes. On the "**Changelogs**" subpage, you can also subscribe to an e-mail notification that informs you of all changes on a monthly basis.

11.3 GGU-SIEVE: "GGU support" menu item

This menu takes you directly to the [GGU Software Support Portal](#).

Here you can enter your support request directly and upload your edited GGU program file.

11.4 GGU-SIEVE: "Maxima" menu item

Here you can check the defaults for maximum values of the program.

11.5 GGU-SIEVE: "Help" menu item

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

11.6 GGU-SIEVE: "What's new?" menu item

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

11.7 GGU-SIEVE: "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.