

## Editing a Template in the Laboratory Program

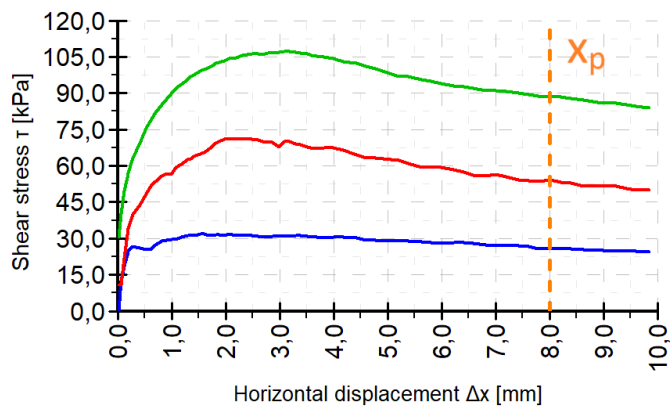
Program: Laboratory  
File: Demo\_manual\_52.gsg

This manual describes advanced work with formulas and graphs in templates using the example of editing the Shear Box Test. **Basic formula work is explained in Engineering Manual No. 51. This manual requires the knowledge covered in Manual No. 51.**

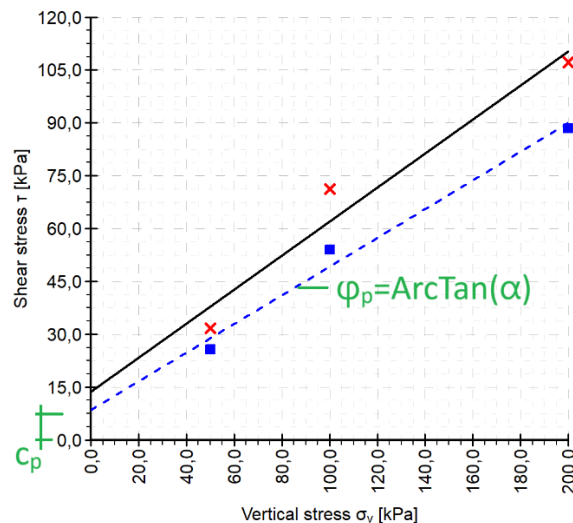
Our goal is to determine the values of the angle of internal friction  $\varphi_p$  and cohesion  $c_p$  at any point during the test (for the displacement specified by us at the test point  $x_p$ ).

In our case, we will consider  $x_p = 8 \text{ mm}$ .

The calculation procedure is the same as for the standard peak strength. From the stress graph of individual tests, we read the stress values at point  $x_p$ .




We then fit a straight line through the obtained points and calculate the values  $\varphi_p$  and  $c_p$ .



*Note: We usually look for the stated value of the shear parameters in the part of the test beyond its peak in an attempt to find residual shear strength parameters. However, since the shear box test is not suitable for determining the actual residual parameters, we present the derived shear parameters for the selected deformation.*

Output report of the shear box test of the template set "Laboratory - EN-Standard" has the following form:

 <b>GEO5 Laboratory</b>	<b>Shear Box Test</b>			
	Project: Apartment building "Moonlighting" - Survey for building permit			
Test ID: Shear box test		Project ID: 2022/3548		
Supplier: GEO5 Laboratory Ltd.		Customer: Survey ABC Ltd.		
Date of measurement: 27.03.2023		Performed by: John Young		

<b>Sample</b>	
Field test: BH5	Sample type: undisturbed
Sample index: VA1/1254	Geotechnical type: GT2
Depth from: 7,00 m	Description:
Depth to: 7,80 m	Clay with low plasticity, stiff, gray-blue color

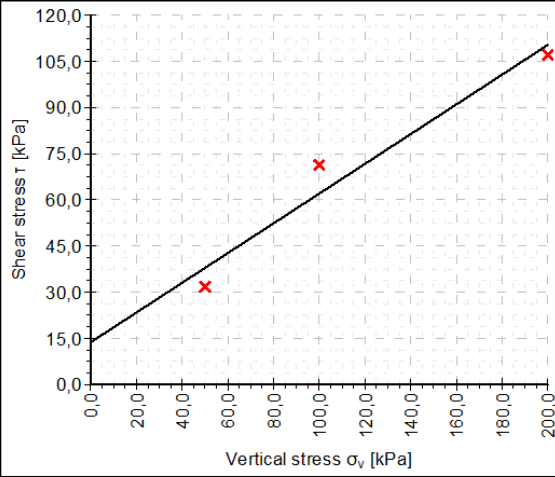
  

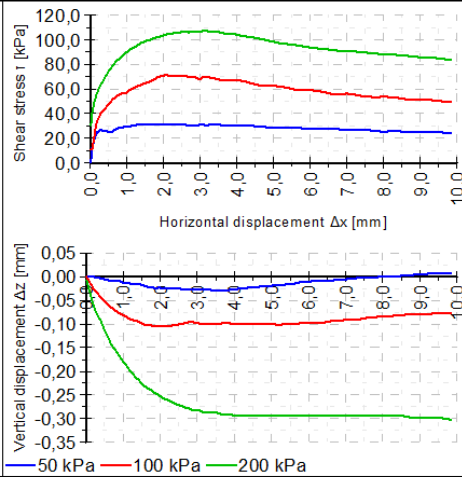
<b>Specimen</b>				
Specimen ID: VA1/1254-12		Consolidation time: 24,0 hour		
Depth: 7,35 m		Shear rate: 0,001 mm/min		
	<b>Before test</b>	<b>Specimen Nr. 1</b>	<b>Specimen Nr. 2</b>	<b>Specimen Nr. 3</b>
Dimensions (width/height) [mm]	-	60,00 / 21,00	60,00 / 21,00	60,00 / 21,00
Moisture content [%]	22,45	24,40	24,30	22,10
Consolidation (before test) [mm]	-	0,210	0,550	1,170
Vertical stress [kPa]	-	50	100	200
Max. shear stress [kPa]	-	31,7	71,3	107,2
Wet unit weight [kg/m <sup>3</sup> ]	1802,0	1848,0	1921,0	1967,0
Dry unit mass [kg/m <sup>3</sup> ]	1472,2	1485,5	1545,4	1610,9
Displacement at failure [mm]	-	1,530	2,061	3,080

<b>Measured values and results</b>
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<b>Test results:</b>	<b>Angle of internal friction <math>\phi_{ef}</math> [°]</b>	<b>Cohesion <math>c_{ef}</math> [kPa]</b>
<b>Peak values:</b>	<b>25,8</b>	<b>13,8</b>

<b>Notes</b>		Stamp and signature
<p>Specimens were flooded with water during the test. Moisture content indicated for the test specimens is after the end of the test (moisture content determined according to EN ISO 17892-01).</p> <p>Specimen supplied by the customer, test results refer to the sample as received. Test equipment: hydraulic shear device. Test performed in accordance with EN ISO 17892-10.</p>		
Verified by: Peter Filmer	Date of issue: 28.03.2023	

The required form of the protocol is this:

 <b>GEO5 Laboratory</b>		<b>Shear Box Test</b>		
Project: Apartment building "Moonlighting" - Survey for building permit				
Test ID: Shear box test		Project ID: 2022/3548		
Supplier: GEO5 Laboratory Ltd.		Customer: Survey ABC Ltd.		
Date of measurement: 27.03.2023		Performed by: John Young		

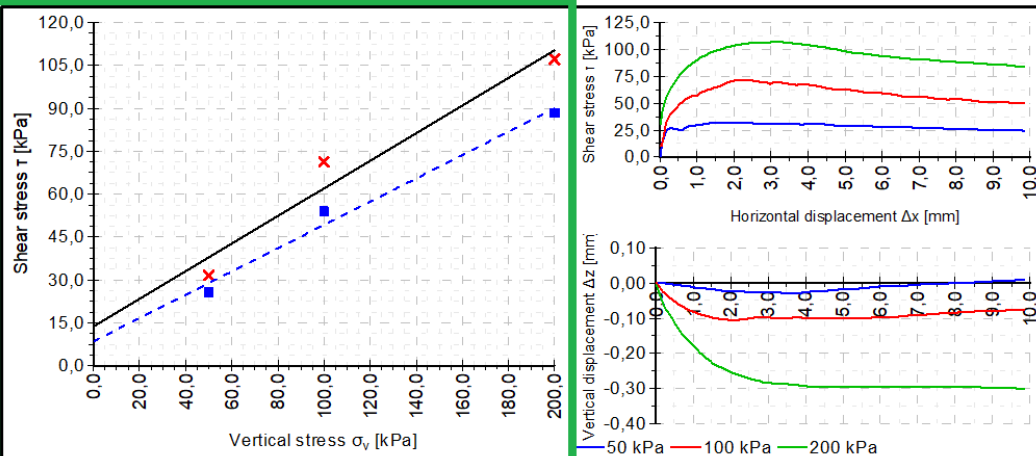
  

<b>Sample</b>	
Field test: BH5	Sample type: undisturbed
Sample index: VA1/1254	Geotechnical type: GT2
Depth from: 7,00 m	Description:
Depth to: 7,80 m	Clay with low plasticity, stiff, gray-blue color

<b>Specimen</b>				
Specimen ID: VA1/1254-12		Consolidation time: 24,0 hour		
Depth: 7,35 m		Shear rate: 0,001 mm/min		
	<b>Before test</b>	<b>Specimen Nr. 1</b>	<b>Specimen Nr. 2</b>	<b>Specimen Nr. 3</b>
Dimensions (width/height) [mm]	-	60,00 / 21,00	60,00 / 21,00	60,00 / 21,00
Moisture content [%]	22,45	24,40	24,30	22,10
Consolidation (before test) [mm]	-	0,210	0,550	1,170
Vertical stress [kPa]	-	50	100	200
Max. shear stress [kPa]	-	31,7	71,3	107,2
Wet unit weight [kg/m <sup>3</sup> ]	1802,0	1848,0	1921,0	1967,0
Dry unit mass [kg/m <sup>3</sup> ]	1472,2	1485,5	1545,4	1610,9
Displacement at failure [mm]	-	1,530	2,061	3,080

<b>Measured values and results</b>	
	

Test results:	Angle of internal friction $\phi_{ef}$ [°]	Cohesion $c_{ef}$ [kPa]
<b>Peak values:</b>	<b>25,8</b>	<b>13,8</b>
<b>Post peak values at displacement 8,0 mm:</b>	<b>22,1</b>	<b>8,5</b>

<b>Notes</b>	
Specimens were flooded with water during the test. Moisture content indicated for the test specimens is after the end of the test (moisture content determined according to EN ISO 17892-01). Specimen supplied by the customer, test results refer to the sample as received. Test equipment: hydraulic shear device. Test performed in accordance with EN ISO 17892-10.	
Verified by: Peter Filmer	Date of issue: 28.03.2023
Stamp and signature	

### Solution:

Edit the template with the demo file - Demo01.gla, which you can find in Fine online examples. Name the newly created template set EM 52 and save it in the Template Administrator for further use. We introduce the term “Post peak parameters” for the required parameters within the solution of this manual.

We will divide the solution of the problem into several parts:

1. Define the data type “Displacement for post peak strength” and fill in its value
2. Define other data types needed for calculation and plotting in the graph
3. Input formulas for automatic calculations
4. Edit the output log and desktop preview to include the new data

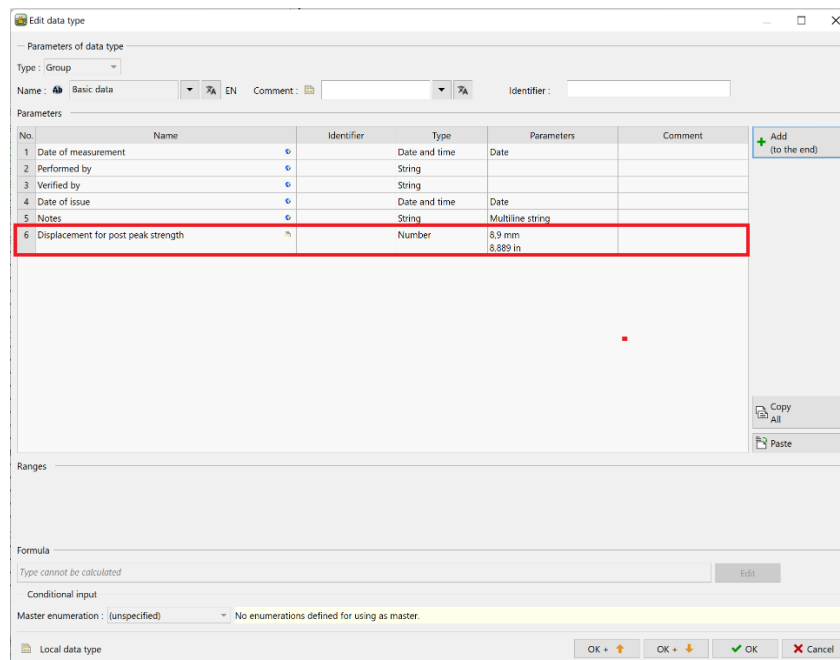
### Part 1

First, open the Demo01.gla file, which contains the data we will be working from. In the Templates frame, check if we have set the template set we want to edit – “Laboratory - EN-Standard”. Press the “Edit copy of current template set and add it into the Administrator” button to open the template set editing window.

Assign a name to the created set of templates and save it in the administrator as a user template.

Open the template for the shear box test and add a new local data type into the “Basic data” group, name it **“Displacement for post peak strength”** and assign the following parameters:

- Type: Number
- Unit type: length
- Name: Displacement for post peak strength
- Symbol: -
- Empty text: -
- Metric unit: mm, 1 decimal place
- Imperial unit: in, 3 decimal places



Parameters of data type

Type: Group

Name: Basic data EN Comment: Identifier:

No.	Name	Identifier	Type	Parameters	Comment
1	Date of measurement		Date and time	Date	
2	Performed by		String		
3	Verified by		String		
4	Date of issue		Date and time	Date	
5	Notes		String	Multiline string	
6	Displacement for post peak strength		Number	8.9 mm 8.889 in	

Ranges

Formula

Type cannot be calculated

Conditional input

Master enumeration: (unspecified) No enumerations defined for using as master.

Local data type

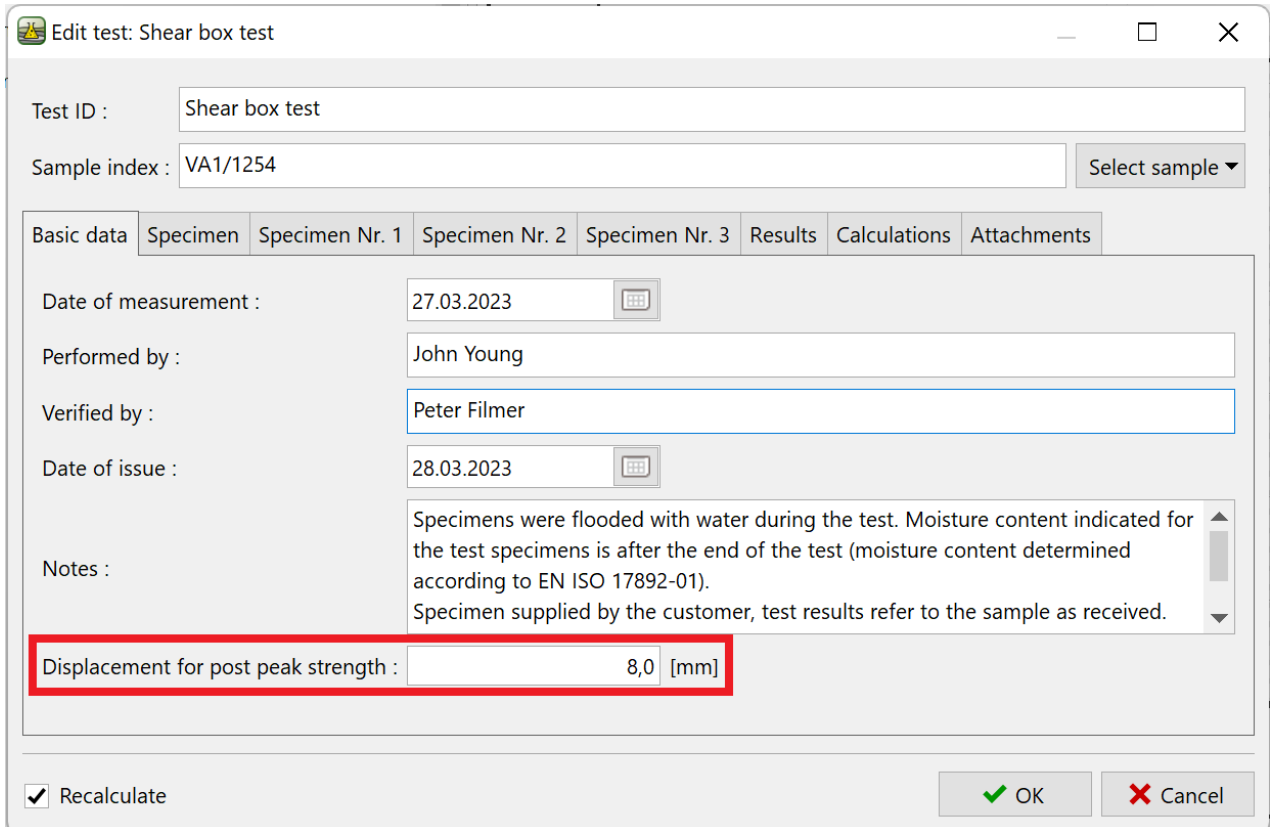
OK + OK + OK Cancel

*Note: Creating local data types and basic work with templates is described in detail in Engineering Manual 51.*

Save the edited template and proceed into the “shear box test” frame and open the already input test.

In the window, we see a new field for the data type we created, “Displacement for post peak strength”. We will fill in 8 mm according to the specifications. We will then use this value in further calculations.

*Note: by having this value already filled in, we will see previews of specific calculations when creating formulas. This will make our work easier.*



Edit test: Shear box test

Test ID : Shear box test

Sample index : VA1/1254 Select sample ▼

Basic data | Specimen | Specimen Nr. 1 | Specimen Nr. 2 | Specimen Nr. 3 | Results | Calculations | Attachments

Date of measurement : 27.03.2023

Performed by : John Young

Verified by : Peter Filmer

Date of issue : 28.03.2023

Notes :

Specimens were flooded with water during the test. Moisture content indicated for the test specimens is after the end of the test (moisture content determined according to EN ISO 17892-01).

Specimen supplied by the customer, test results refer to the sample as received.

Displacement for post peak strength : 8,0 [mm]

☒ Recalculate OK Cancel

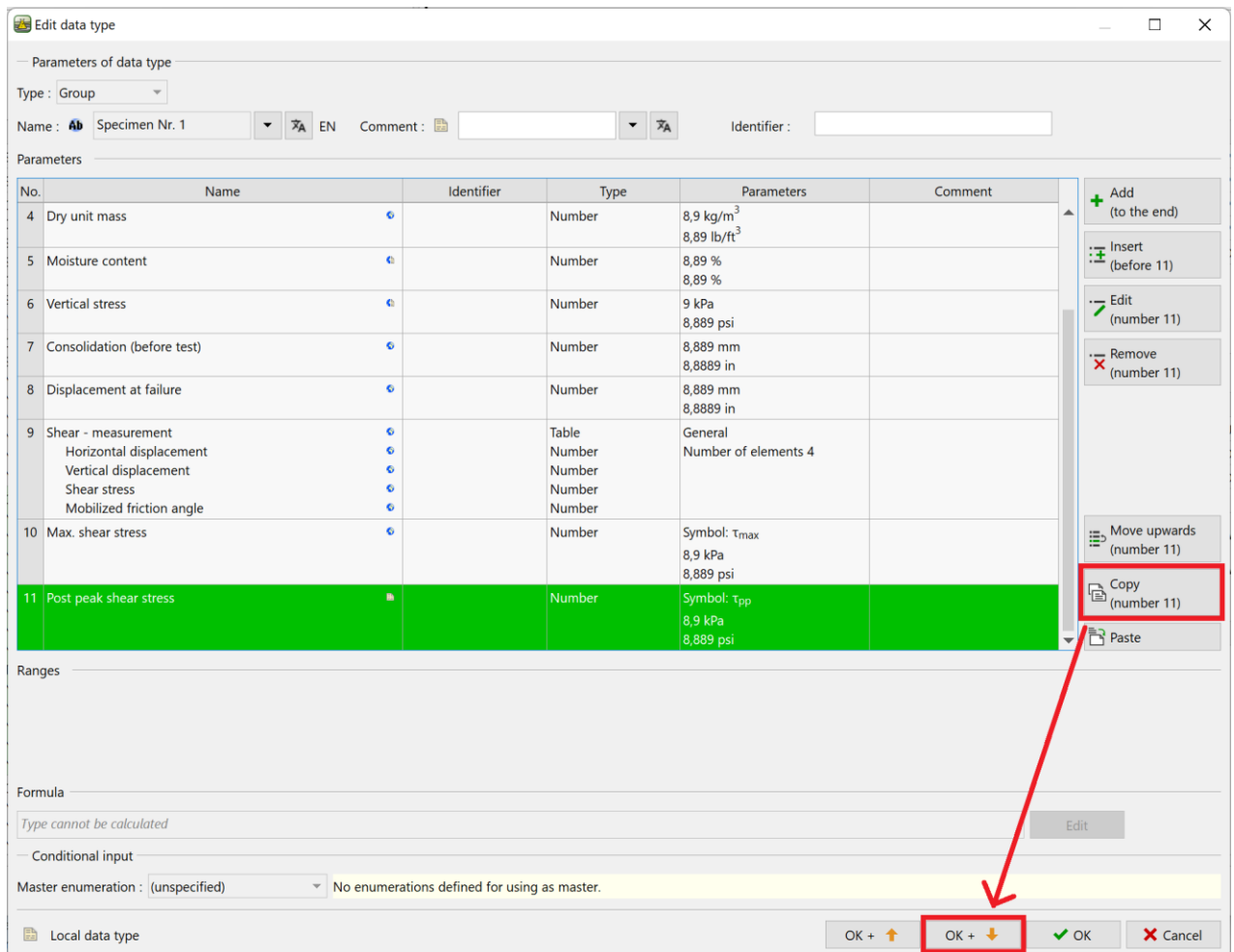
## Part 2

Now return to the template modification and into group “Specimen Nr. 1” add another local data type “Post peak shear stress” with the following parameters:

- Type: Number
- Unit type: pressure
- Name: Post peak shear stress
- Symbol:  $\tau_{pp}$
- Empty text: -
- Metric unit: kPa, 1 decimal place
- Imperial unit: psi, 3 decimal places

This data type will not be entered by the user, but we will assign a formula to it for automatic calculation.

We need the same data type in the group for specimens 2 and 3. To save ourselves the work, we can now copy the created item and press the “OK + down arrow” button to go straight to the “Specimen Nr. 2” group, where we simply paste the item.



Parameters of data type

Type: Group

Name: Specimen Nr. 1 EN Comment: Identifier:

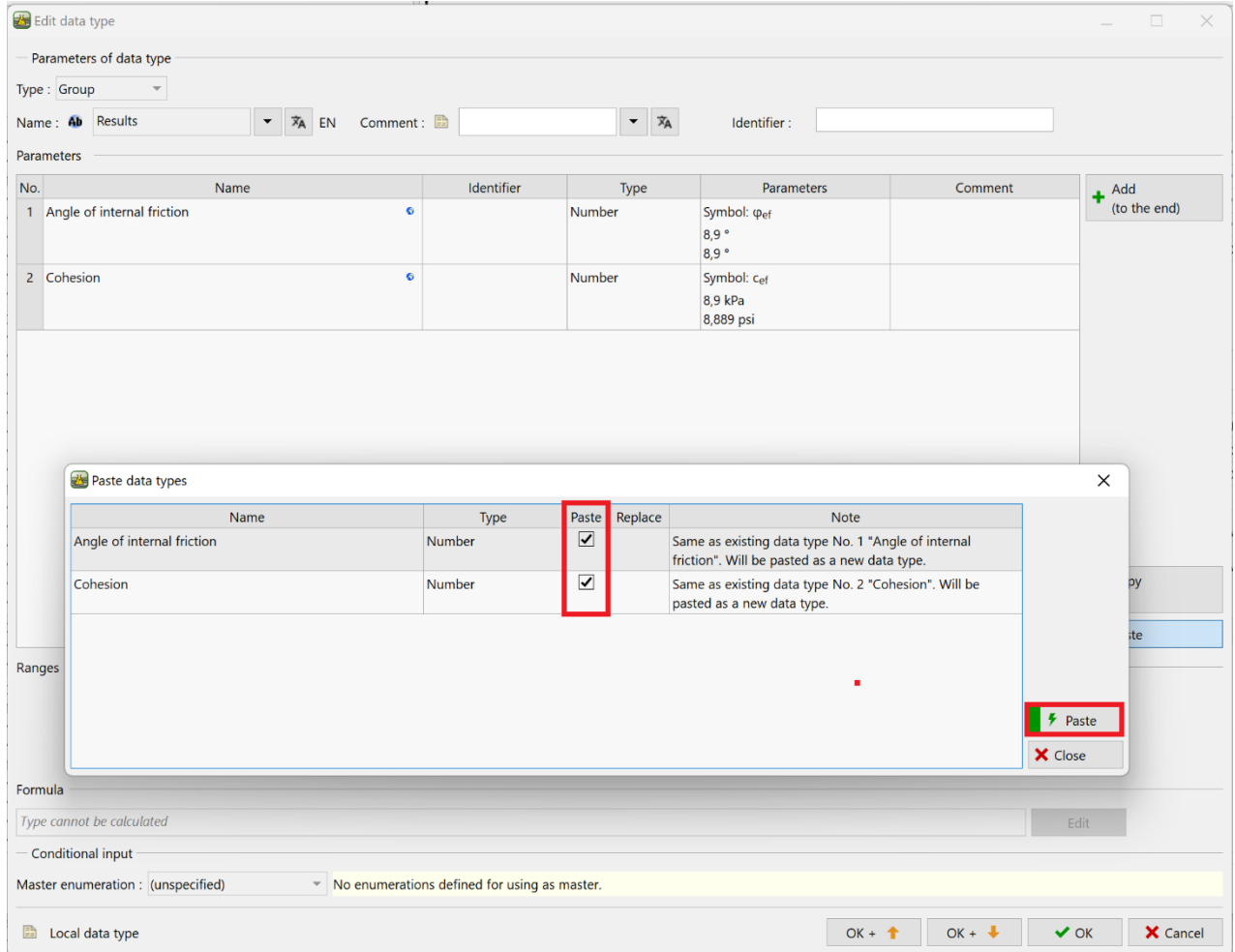
Parameters

No.	Name	Identifier	Type	Parameters	Comment
4	Dry unit mass		Number	8,9 kg/m <sup>3</sup> 8,89 lb/ft <sup>3</sup>	
5	Moisture content		Number	8,89 % 8,89 %	
6	Vertical stress		Number	9 kPa 8,889 psi	
7	Consolidation (before test)		Number	8,889 mm 8,8889 in	
8	Displacement at failure		Number	8,889 mm 8,8889 in	
9	Shear - measurement		Table	General	
	Horizontal displacement		Number	Number of elements 4	
	Vertical displacement		Number		
	Shear stress		Number		
	Mobilized friction angle		Number		
10	Max. shear stress		Number	Symbol: $\tau_{max}$ 8,9 kPa 8,889 psi	
11	Post peak shear stress		Number	Symbol: $\tau_{pp}$ 8,9 kPa 8,889 psi	

OK + OK + down arrow OK Cancel

Continue by also pasting it into the group “Specimen Nr. 3”.

Next, we continue by creating data types for the calculations and output logs. In the “Results” group we already have two data types for the results in the peak values. We can now copy and then re-paste these two data types into the same group. The program will warn us that the same data types are already in the group, yet we select to paste them again.







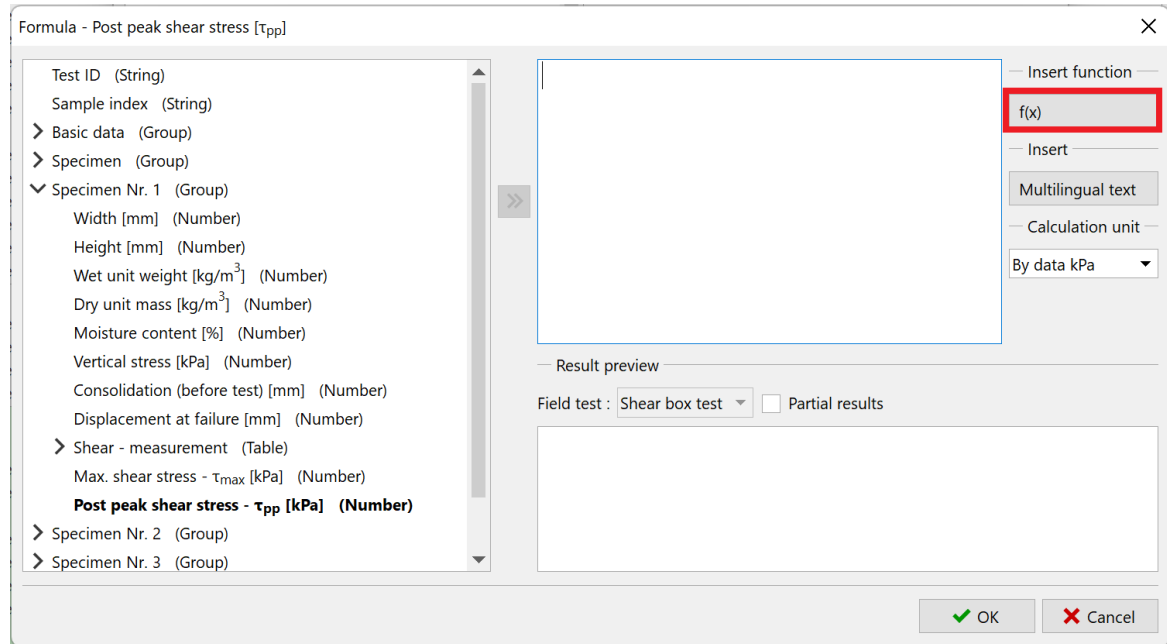


### Part 3

Now we will continue by entering the formulas.

*Note: Basic work with formulas is explained in Engineering Manual 51.*

In the tree, find the newly created data "Post peak shear stress" under the group "Specimen Nr. 1" and open the window for adding the formula. Here we press the button to add a function.



The basic version of the shear box test template works with the "Shear - Measurement" table, in which the user enters the Horizontal displacement, vertical displacement and shear stress. For the peak parameters, the maximum entered shear stress is considered. In the task specification, we have defined that we will consider the surface parameters for the specified horizontal displacement - in this task we consider 8 mm. Using the linear interpolation function, we must therefore calculate the given shear stress for the selected horizontal displacement.

The function can be found in the list under "LINEARINTERPOLATION".

The function calculates the stress value (y) for the specified displacement (x) from the "Shear - Measurement" table.

The variables in the function are:

- x – Displacement for post peak strength
- Coordinates x – "Horizontal displacement" in the Shear – measurement table
- Coordinates y – "Shear stress" in the Shear – measurement table

The notation of the function is as follows:

Formula - Post peak shear stress [ $\tau_{pp}$ ]

Height [mm] (Number)  
Wet unit weight [ $\text{kg/m}^3$ ] (Number)  
Dry unit mass [ $\text{kg/m}^3$ ] (Number)  
Moisture content [%] (Number)  
Vertical stress [kPa] (Number)  
Consolidation (before test) [mm] (Number)  
Displacement at failure [mm] (Number)  
✓ Shear - measurement (Table)  
*Number of row*  
Horizontal displacement -  $\Delta x$  [mm] (Number)  
Vertical displacement -  $\Delta z$  [mm] (Number)  
Shear stress -  $\tau$  [kPa] (Number)  
Mobilized friction angle -  $\varphi_{\text{mob}}$  [°] (Number)  
Max. shear stress -  $\tau_{\text{max}}$  [kPa] (Number)  
**Post peak shear stress -  $\tau_{pp}$  [kPa] (Number)**  
> Specimen Nr. 2 (Group)  
> Specimen Nr. 3 (Group)  
> Results (Group)

**LINEARINTERPOLATION(**  
{Displacement for post peak strength};{ $\Delta x$ };{ $\tau$ })

— Insert function —  
f(x)  
— Insert —  
Multilingual text  
— Calculation unit —  
By data kPa

— Result preview —  
Field test : Shear box test ☐ Partial results  
25,7

✓ OK ☐ Cancel

Enter the formulas for the post peak shear stress for specimens 2 and 3 in the same way.

The correctness of the input can be verified at any time in the test input window, where we can see the calculated values of the surface shear stress for our selected displacement of 8 mm.

Edit test: Shear box test

Test ID : Shear box test

Sample index : VA1/1254
Select sample

Basic data Specimen Specimen Nr. 1 Specimen Nr. 2 Specimen Nr. 3 Results Calculations Attachments

Width : 60,00 [mm]

Height : 21,00 [mm]

Wet unit weight : 1921,0 [kg/m<sup>3</sup>]

Dry unit mass : 1545,4 [kg/m<sup>3</sup>]

Moisture content : 24,30 [%]

Vertical stress : 100 [kPa]

Consolidation (before test) : 0,550 [mm]

Displacement at failure : 2,061 [mm]

Shear - measurement :

No.	Horizontal displacement $\Delta x$ [mm]	Vertical displacement $\Delta z$ [mm]	Shear stress $\tau$ [kPa]	Mobilized friction angle $\varphi_{mob}$ [°]
1	0,023	0,000	10,746	6,1
2	0,055	-0,005	10,746	6,1
3	0,118	-0,014	21,692	12,2
4	0,172	-0,020	31,542	17,5
5	0,196	-0,025	34,030	18,8
6	0,284	-0,032	39,934	21,8
7	0,408	-0,044	43,980	23,7
8	0,520	-0,053	48,259	25,8

+ Add  
(to the end)

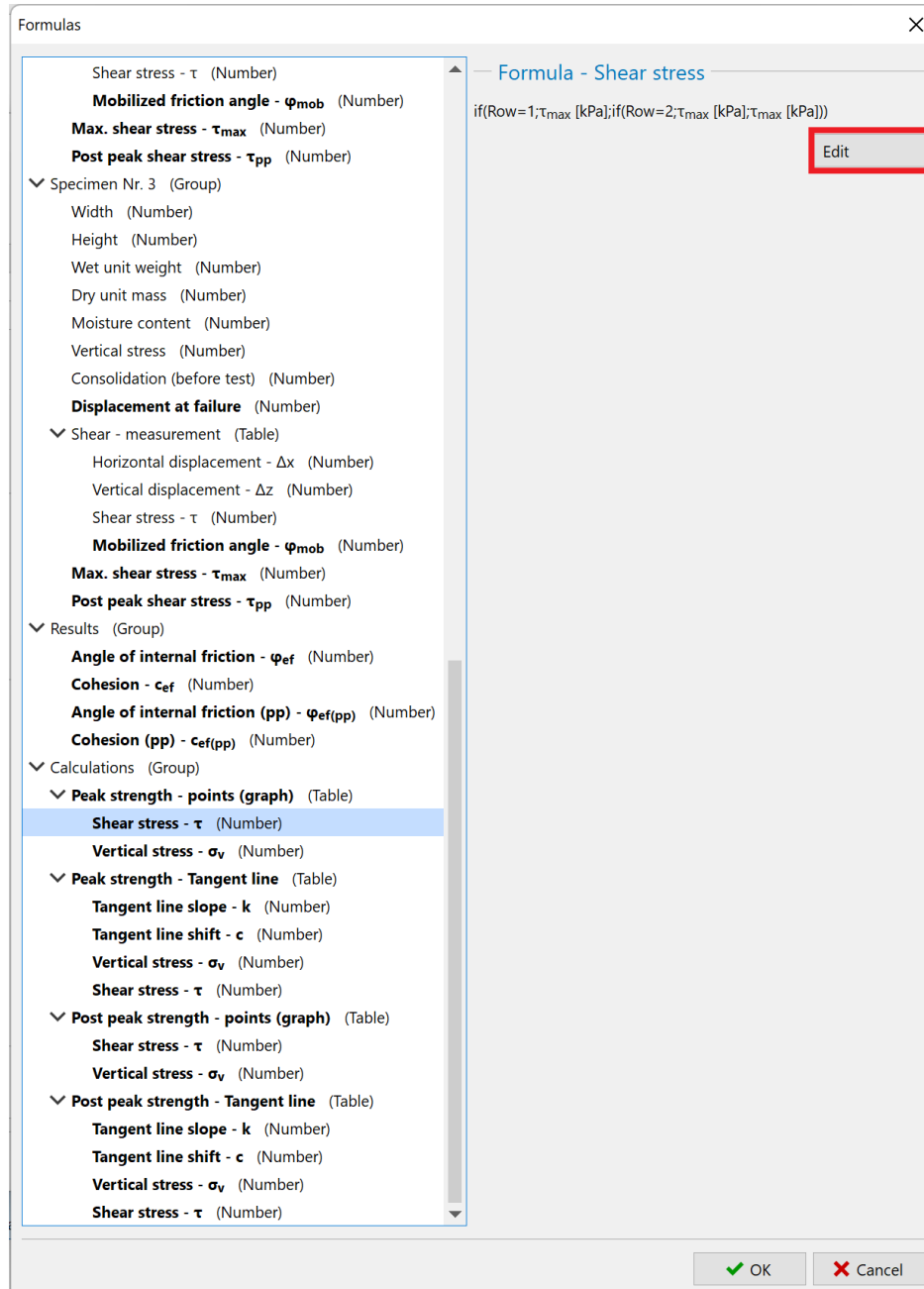
Max. shear stress :  $\tau_{max}$  = 71,3 [kPa]

Post peak shear stress :  $\tau_{pp}$  = 54,0 [kPa]

☒ Recalculate
OK Cancel

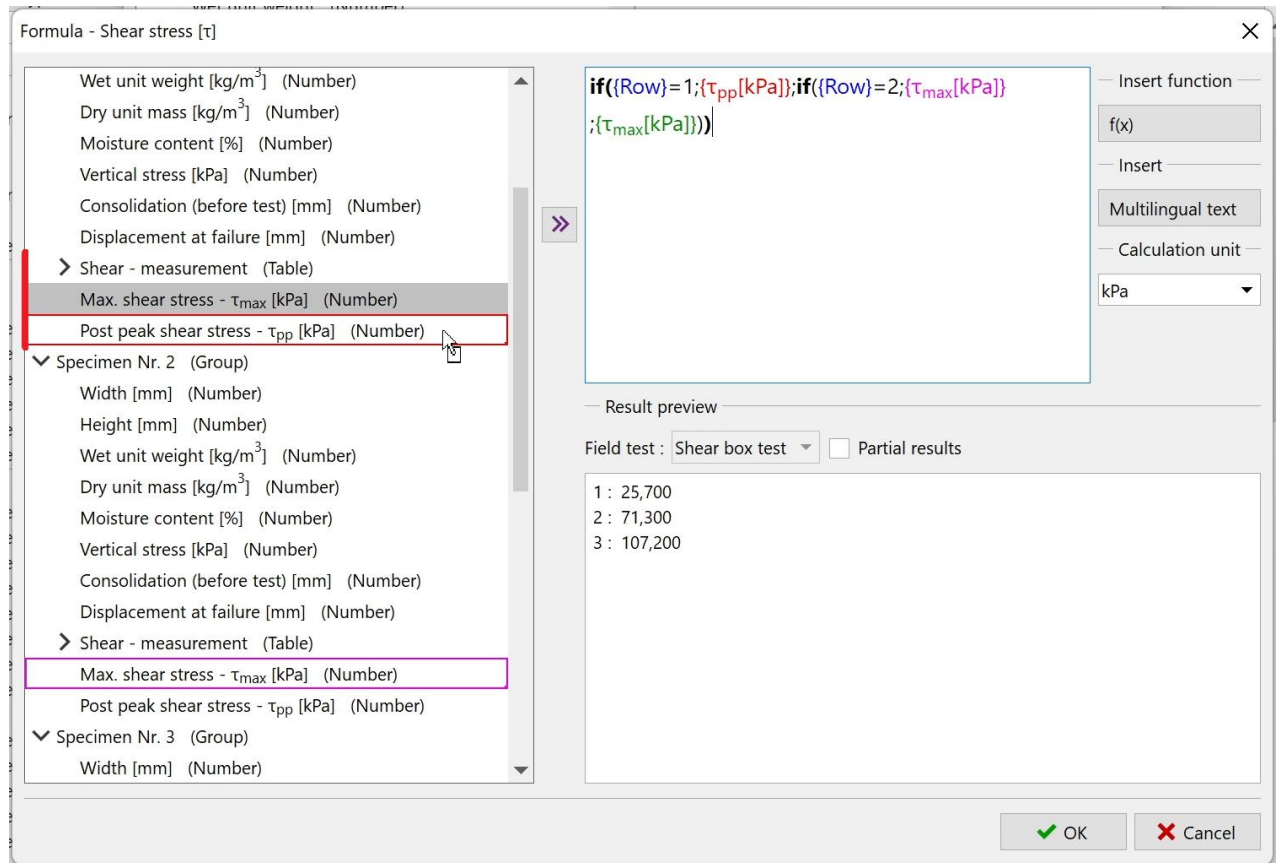
Next, we continue by entering the formulas for plotting the graph. We have prepared two tables in the data. The first plots the points in the graph, the second plots the line (trend line). As we can see in the tree of the formula editing window, the data we copied was copied including the formulas.

We start by editing the table plotting the points. The "Vertical stress" column is the same as the one in the table for the peak parameters, so we don't need to modify it. Therefore we will modify the formula for the "Shear stress" column.

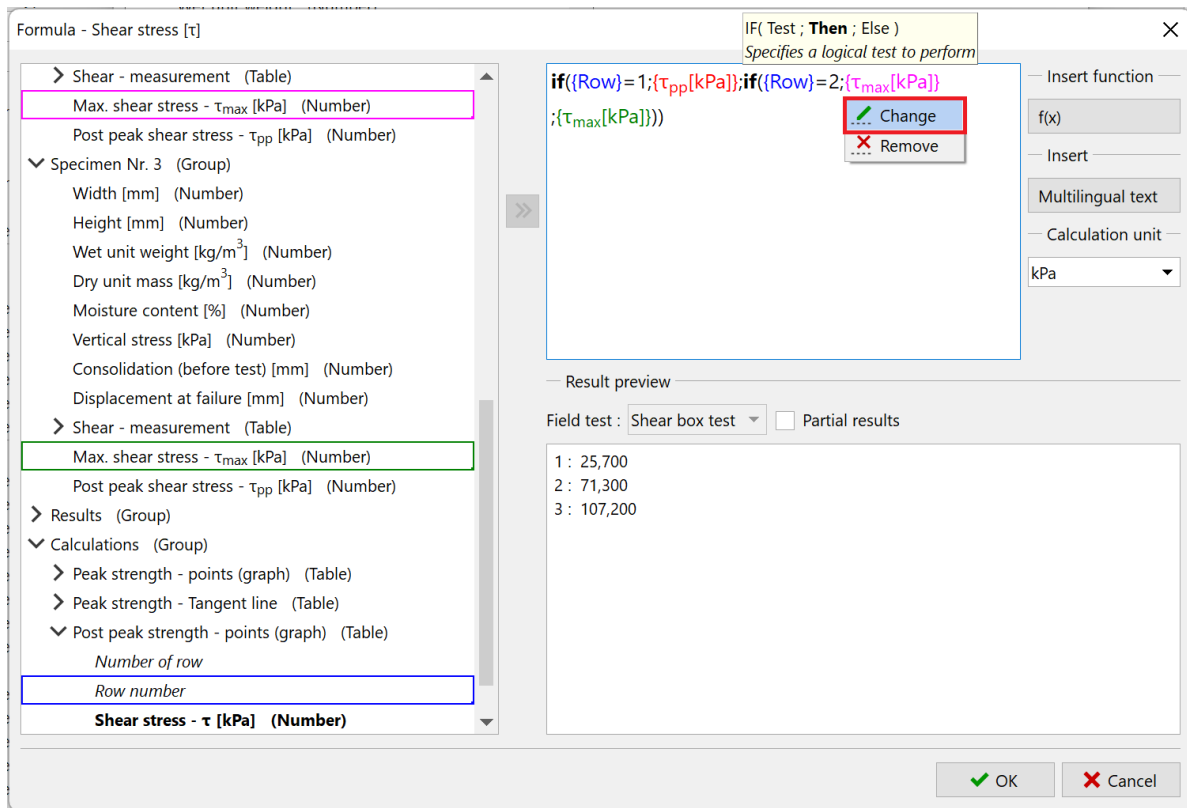


Here we see that we use the IF formula to fill the table in a way, so that the first row of the table is filled with the data of the first specimen, the second row with the data of the second specimen, and the third row with the data of the third specimen.

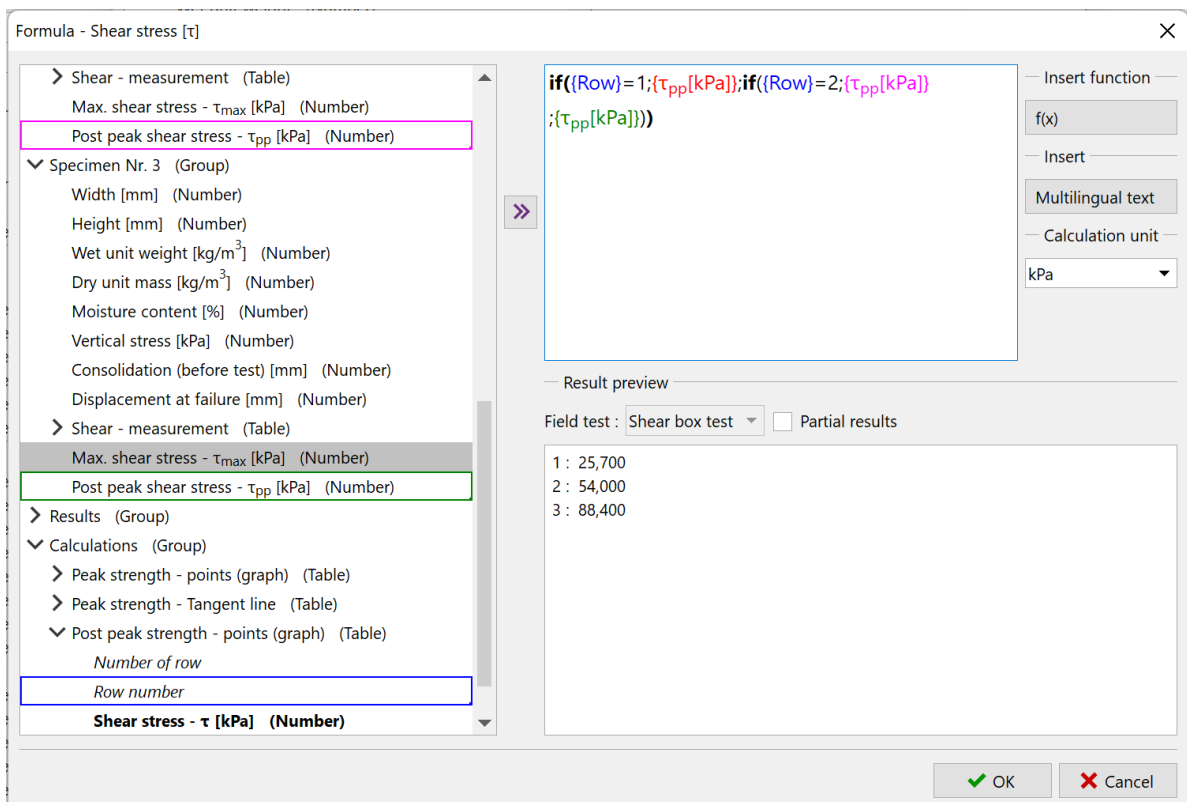
In the formula, we just need to replace the references to Max. shear stress with references to Post peak shear stress, always for the respective specimens. We can do this simply by pressing the left mouse button on the red framed item (which corresponds to the red reference in the formula), holding it down, and moving the mouse to the new item. This will change the link to match the newly selected data type.



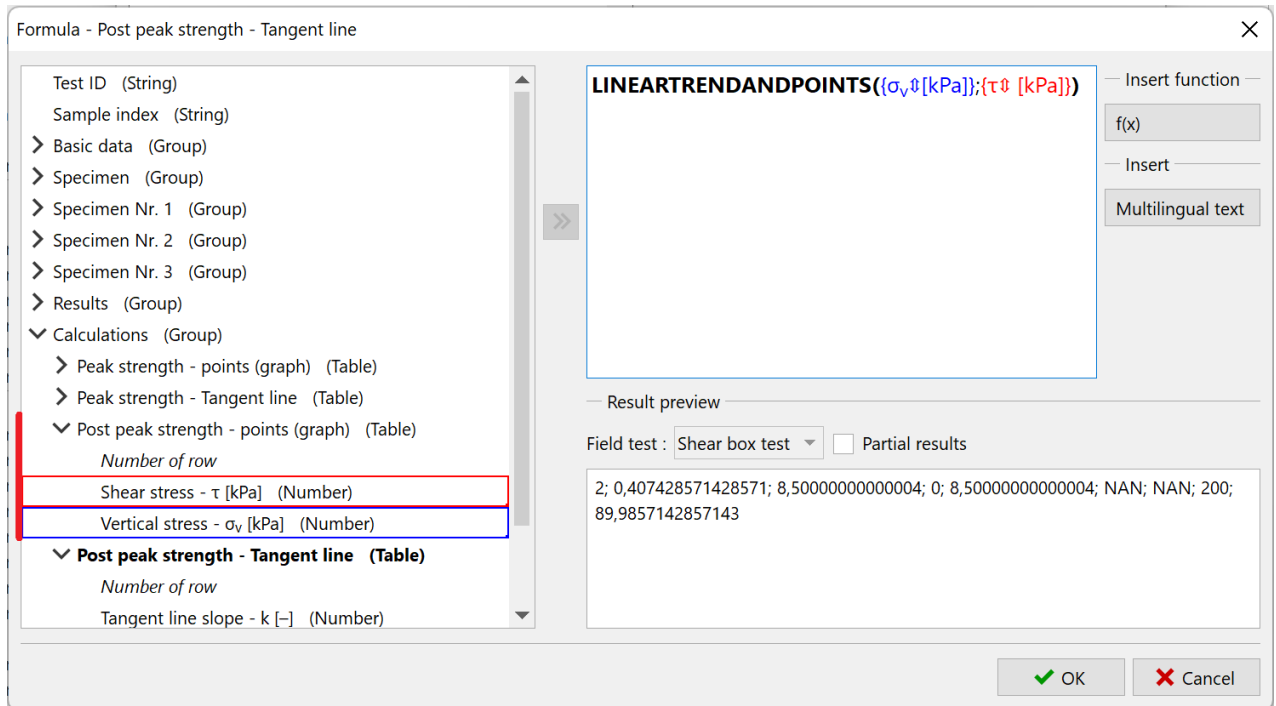
The second option is to right-click on the link in the formula and press the "Change" option to select a new data type from the tree.



The resulting formula has the following form:



The formula for the trendline should be adjusted automatically when copying. Nevertheless, we open it and check that the data links match the post peak strength.





The final formulas we need to modify are in the "Results" group. In them, again, we just replace the references from the peak strength table to the post peak strength table.

Formulas

Shear stress -  $\tau$  (Number)

Mobilized friction angle -  $\varphi_{mob}$  (Number)

Max. shear stress -  $\tau_{max}$  (Number)

Post peak shear stress -  $\tau_{pp}$  (Number)

Specimen Nr. 3 (Group)

Width (Number)

Height (Number)

Wet unit weight (Number)

Dry unit mass (Number)

Moisture content (Number)

Vertical stress (Number)

Consolidation (before test) (Number)

Displacement at failure (Number)

Shear - measurement (Table)

Horizontal displacement -  $\Delta x$  (Number)

Vertical displacement -  $\Delta z$  (Number)

Shear stress -  $\tau$  (Number)

Mobilized friction angle -  $\varphi_{mob}$  (Number)

Max. shear stress -  $\tau_{max}$  (Number)

Post peak shear stress -  $\tau_{pp}$  (Number)

Results (Group)

Angle of internal friction -  $\varphi_{ef}$  (Number)

Cohesion -  $c_{ef}$  (Number)

Angle of internal friction (pp) -  $\varphi_{ef(pp)}$  (Number)

Cohesion (pp) -  $c_{ef(pp)}$  (Number)

Calculations (Group)

Peak strength - points (graph) (Table)

Shear stress -  $\tau$  (Number)

Vertical stress -  $\sigma_v$  (Number)

Peak strength - Tangent line (Table)

Tangent line slope -  $k$  (Number)

Tangent line shift -  $c$  (Number)

Vertical stress -  $\sigma_v$  (Number)

Shear stress -  $\tau$  (Number)

Post peak strength - points (graph) (Table)

Shear stress -  $\tau$  (Number)

Vertical stress -  $\sigma_v$  (Number)

Post peak strength - Tangent line (Table)

Tangent line slope -  $k$  (Number)

Tangent line shift -  $c$  (Number)

Vertical stress -  $\sigma_v$  (Number)

Shear stress -  $\tau$  (Number)

Formula - Angle of internal friction (pp)


ATAN(k/l)

Edit

OK

Cancel

This completes the work with formulas. After returning to the test input window, we can check if the calculated values are correct.


Edit test: Shear box test

Test ID :

Sample index :  Select sample ▼

Basic data	Specimen	Specimen Nr. 1	Specimen Nr. 2	Specimen Nr. 3	Results	Calculations	Attachments
<div> Angle of internal friction : <math>\varphi_{ef}</math> = <input type="text" value="25,8"/> [°] </div> <div> Cohesion : <math>c_{ef}</math> = <input type="text" value="13,8"/> [kPa] </div> <div> Angle of internal friction (pp) : <math>\varphi_{ef(pp)}</math> = <input type="text" value="22,1"/> [°] </div> <div> Cohesion (pp) : <math>c_{ef(pp)}</math> = <input type="text" value="8,5"/> [kPa] </div>							

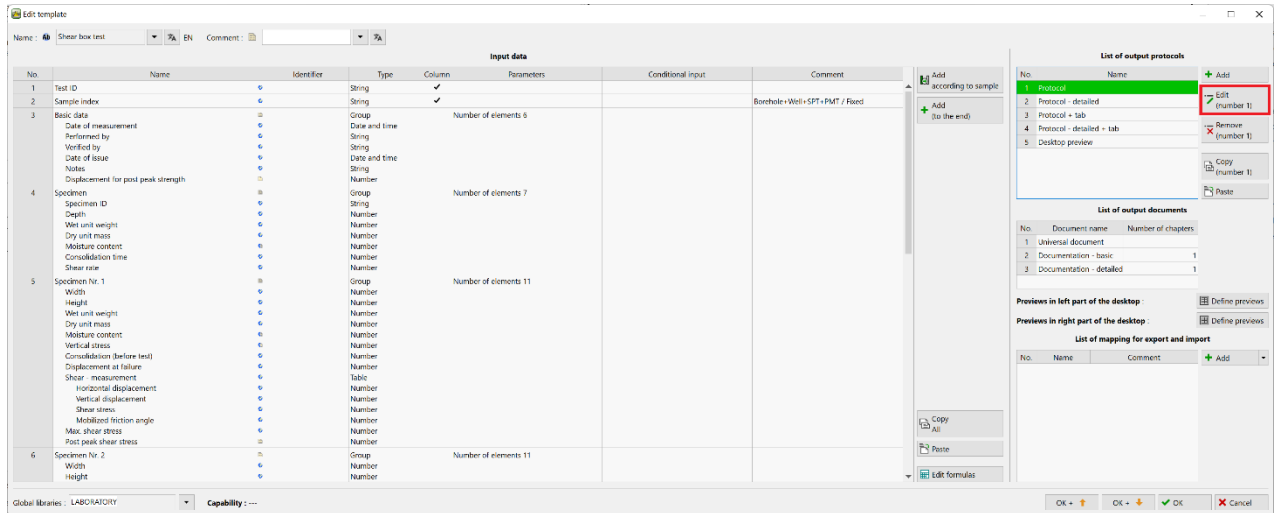
☒ Recalculate

## Part 4

In the next stage, we modify the graph and protocol to include the newly created data.

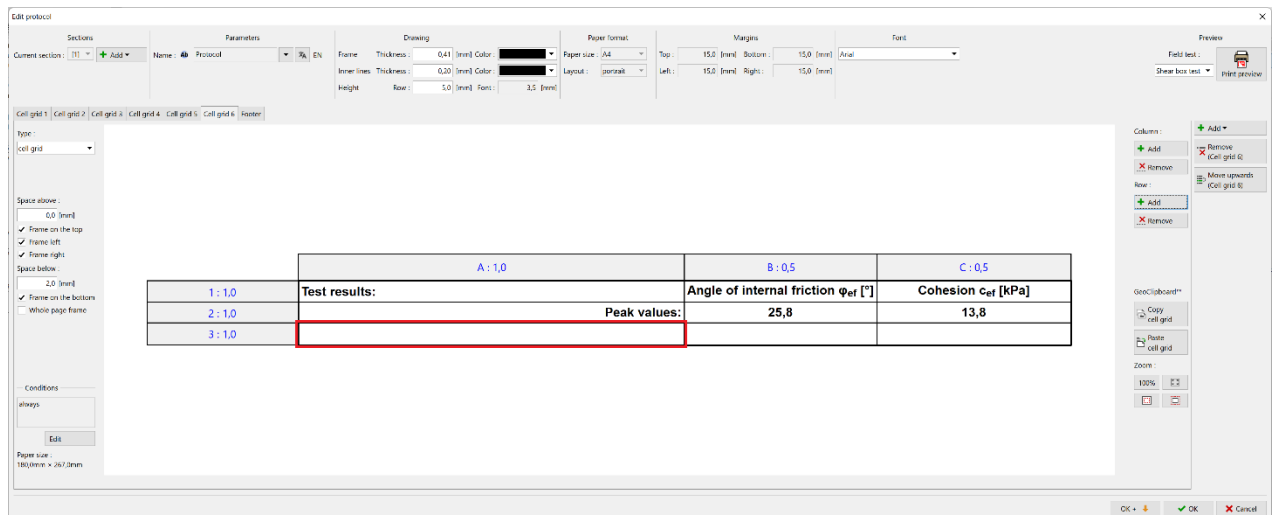
*Note: Basic log editing work is described in Engineering Manual 51.*

We'll start by modifying the protocol:



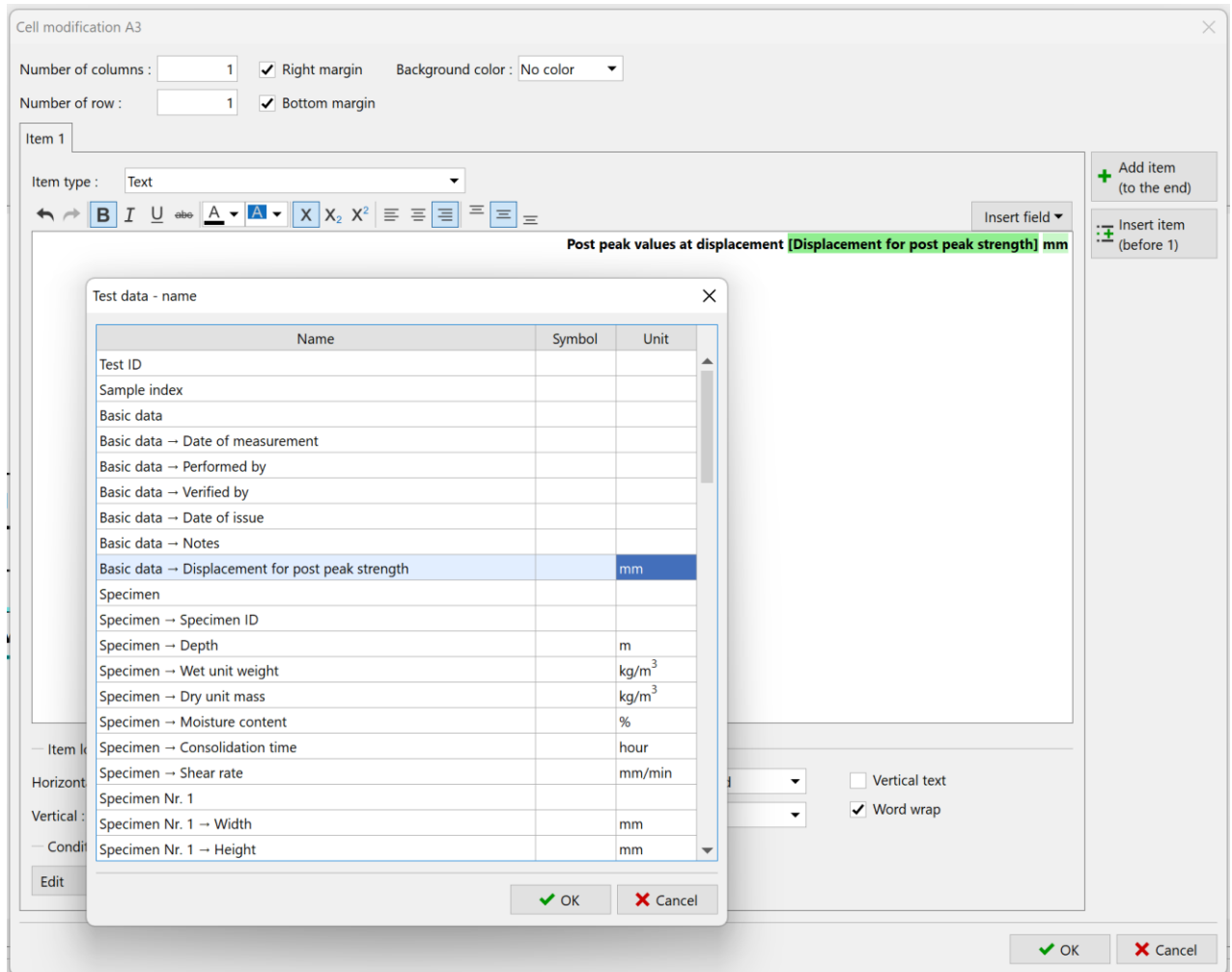
No.	Name	Identifier	Type	Column	Parameters	Conditional input	Comment
1	Test ID		String				
2	Sample index		String				Borehole + Well + SPT + PMT / Fixed
3	Basic data		Group		Number of elements 6		
	Date of measurement		Date and time				
	Performed by		String				
	Verified by		String				
	Date of issue		Date and time				
	Notes		String				
	Displacement (or post peak strength)		Number				
4	Specimen		Group		Number of elements 7		
	Specimen ID		String				
	Depth		Number				
	Wet unit weight		Number				
	Dry unit mass		Number				
	Moisture content		Number				
	Consolidation time		Number				
	Shear rate		Number				
5	Specimen No. 1		Group		Number of elements 11		
	Width		Number				
	Height		Number				
	Wet unit weight		Number				
	Dry unit mass		Number				
	Moisture content		Number				
	Vertical stress		Number				
	Consolidation (before test)		Number				
	Displacement at failure		Number				
	Shear measurement		Table				
	Horizontal displacement		Number				
	Vertical displacement		Number				
	Shear stress		Number				
	Mobilized friction angle		Number				
	Max. shear stress		Number				
	Post peak shear stress		Number				
6	Specimen No. 2		Group		Number of elements 11		
	Width		Number				
	Height		Number				

In the "Cell grid 6" tab, where the resulting values are shown, add a row.



	A : 1,0	B : 0,5	C : 0,5
Test results:			
Angle of internal friction $\phi_{int}$ [°]			
Cohesion $c_{int}$ [kPa]			
Peak values:		25,8	13,8

In the newly created cell, type the text "Post peak values at displacement", modify the formatting and add a link to the displacement data type we have chosen. The number itself can be added via the "Test data - data" option, the unit can be added via the "Test data - name" option. This will ensure that if we change the unit in the data to e.g. cm, there will be a change in the output report as well.



*Note: in case we would like to use the protocol in more languages, it is possible to insert "Multilingual text" via the "Insert field" option, where the text can be translated into other languages.*

Then insert the corresponding data into the remaining cells. Select "Test data - data" via the "Insert field" option.

The screenshot shows the GEO5 software interface with the 'Test results' table. The table has three columns: 'A: 1.0', 'B: 0.5', and 'C: 0.5'. The rows are labeled '1: 1.0', '2: 1.0', and '3: 1.0'. The table contains the following data:

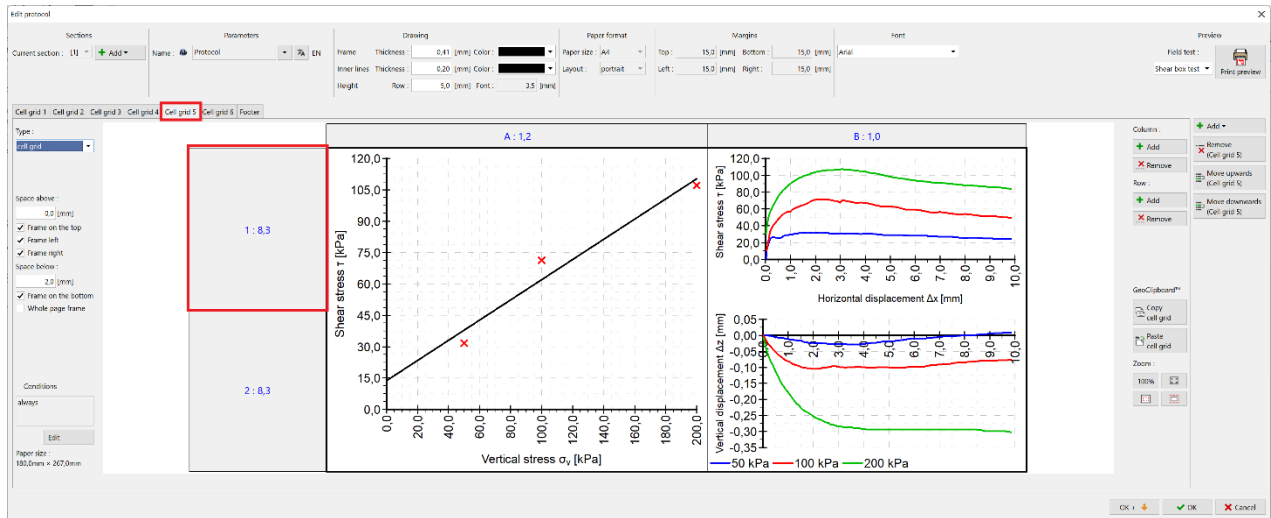
	A: 1.0	B: 0.5	C: 0.5
Test results:		Angle of internal friction $\phi_{ef}$ [°]	Cohesion $c_{ef}$ [kPa]
		Peak values:	25.8
		Post peak values at displacement 8.0 mm:	22.1
			8.5

The 'Print Preview' button is highlighted in the top right corner of the interface.

Using the "Print Preview" button, you can view the modified report in print form. Here we can see that since we have added a line, everything no longer fits on one page.

The screenshot shows the 'Print Preview' window of the GEO5 software. The window displays a multi-page report. The first page shows the 'Test results' table, which is the same as the one in the previous screenshot. The second page shows a graph of 'Shear stress [kPa]' versus 'Vertical stress  $\sigma_v$  [kPa]'. The graph shows three curves for different test conditions (1: 1.0, 2: 1.0, 3: 1.0). The third page shows a table of 'Test results' with the same data as the first page. The fourth page shows a table of 'Test results' with the same data as the first page. The fifth page shows a table of 'Test results' with the same data as the first page. The sixth page shows a table of 'Test results' with the same data as the first page. The seventh page shows a table of 'Test results' with the same data as the first page. The eighth page shows a table of 'Test results' with the same data as the first page. The ninth page shows a table of 'Test results' with the same data as the first page. The tenth page shows a table of 'Test results' with the same data as the first page. The eleventh page shows a table of 'Test results' with the same data as the first page. The twelfth page shows a table of 'Test results' with the same data as the first page. The thirteenth page shows a table of 'Test results' with the same data as the first page. The fourteenth page shows a table of 'Test results' with the same data as the first page. The fifteenth page shows a table of 'Test results' with the same data as the first page. The sixteenth page shows a table of 'Test results' with the same data as the first page. The seventeenth page shows a table of 'Test results' with the same data as the first page. The eighteenth page shows a table of 'Test results' with the same data as the first page. The nineteenth page shows a table of 'Test results' with the same data as the first page. The twentieth page shows a table of 'Test results' with the same data as the first page. 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The forty-first page shows a table of 'Test results' with the same data as the first page. The forty-second page shows a table of 'Test results' with the same data as the first page. The forty-third page shows a table of 'Test results' with the same data as the first page. The forty-fourth page shows a table of 'Test results' with the same data as the first page. The forty-fifth page shows a table of 'Test results' with the same data as the first page. The forty-sixth page shows a table of 'Test results' with the same data as the first page. The forty-seventh page shows a table of 'Test results' with the same data as the first page. The forty-eighth page shows a table of 'Test results' with the same data as the first page. The forty-ninth page shows a table of 'Test results' with the same data as the first page. The fiftieth page shows a table of 'Test results' with the same data as the first page. The fifty-first page shows a table of 'Test results' with the same data as the first page. The fifty-second page shows a table of 'Test results' with the same data as the first page. The fifty-third page shows a table of 'Test results' with the same data as the first page. The fifty-fourth page shows a table of 'Test results' with the same data as the first page. The fifty-fifth page shows a table of 'Test results' with the same data as the first page. The fifty-sixth page shows a table of 'Test results' with the same data as the first page. The fifty-seventh page shows a table of 'Test results' with the same data as the first page. The fifty-eighth page shows a table of 'Test results' with the same data as the first page. The fifty-ninth page shows a table of 'Test results' with the same data as the first page. The sixtieth page shows a table of 'Test results' with the same data as the first page. The sixty-first page shows a table of 'Test results' with the same data as the first page. The sixty-second page shows a table of 'Test results' with the same data as the first page. The sixty-third page shows a table of 'Test results' with the same data as the first page. The sixty-fourth page shows a table of 'Test results' with the same data as the first page. The sixty-fifth page shows a table of 'Test results' with the same data as the first page. The sixty-sixth page shows a table of 'Test results' with the same data as the first page. The sixty-seventh page shows a table of 'Test results' with the same data as the first page. The sixty-eighth page shows a table of 'Test results' with the same data as the first page. The sixty-ninth page shows a table of 'Test results' with the same data as the first page. The seventieth page shows a table of 'Test results' with the same data as the first page. 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The eighty-first page shows a table of 'Test results' with the same data as the first page. The eighty-second page shows a table of 'Test results' with the same data as the first page. The eighty-third page shows a table of 'Test results' with the same data as the first page. The eighty-fourth page shows a table of 'Test results' with the same data as the first page. The eighty-fifth page shows a table of 'Test results' with the same data as the first page. The eighty-sixth page shows a table of 'Test results' with the same data as the first page. The eighty-seventh page shows a table of 'Test results' with the same data as the first page. The eighty-eighth page shows a table of 'Test results' with the same data as the first page. The eighty-ninth page shows a table of 'Test results' with the same data as the first page. The ninetieth page shows a table of 'Test results' with the same data as the first page. The ninety-first page shows a table of 'Test results' with the same data as the first page. The ninety-second page shows a table of 'Test results' with the same data as the first page. The ninety-third page shows a table of 'Test results' with the same data as the first page. The ninety-fourth page shows a table of 'Test results' with the same data as the first page. The ninety-fifth page shows a table of 'Test results' with the same data as the first page. The ninety-sixth page shows a table of 'Test results' with the same data as the first page. The ninety-seventh page shows a table of 'Test results' with the same data as the first page. The ninety-eighth page shows a table of 'Test results' with the same data as the first page. The ninety-ninth page shows a table of 'Test results' with the same data as the first page. The hundredth page shows a table of 'Test results' with the same data as the first page.

To solve this, for example, reduce the size of the graph in the "Grid cell 5" tab - each row by 0.5.



Reduce the size by 0.5 - to 7.8 for both rows.

Row height 1

Input mode :

row count

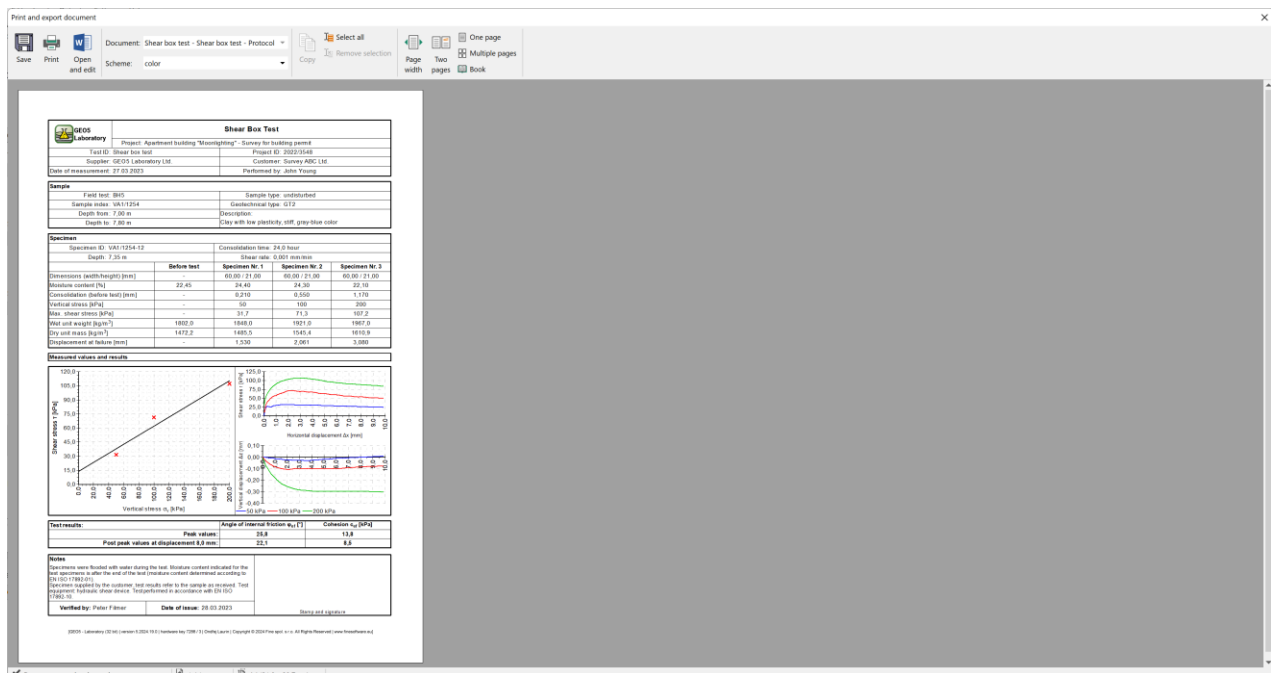
Height :

7,8 [rows]

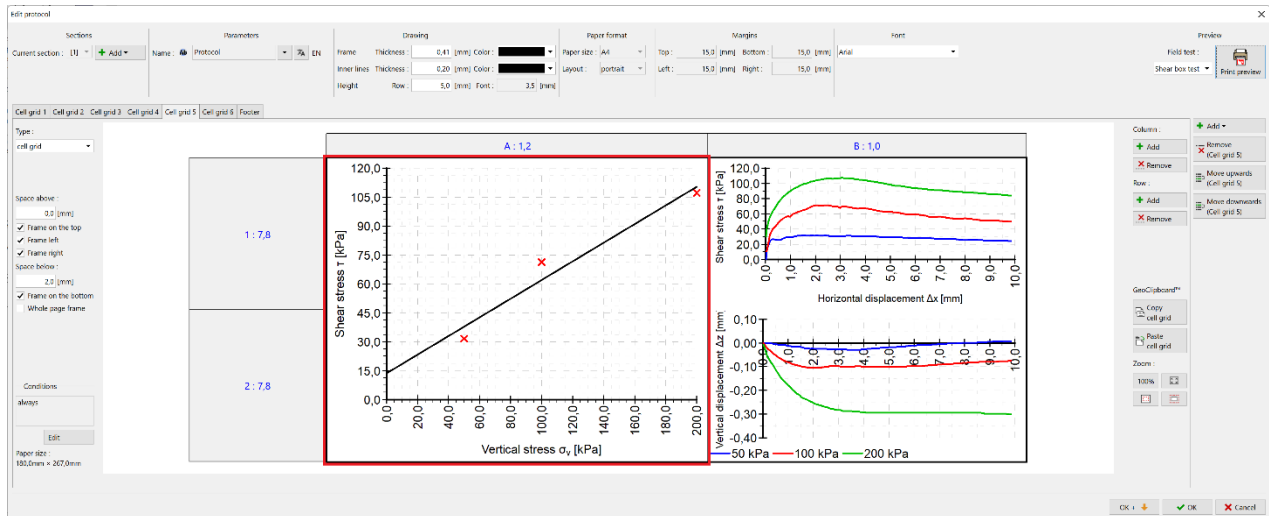
OK

Cancel

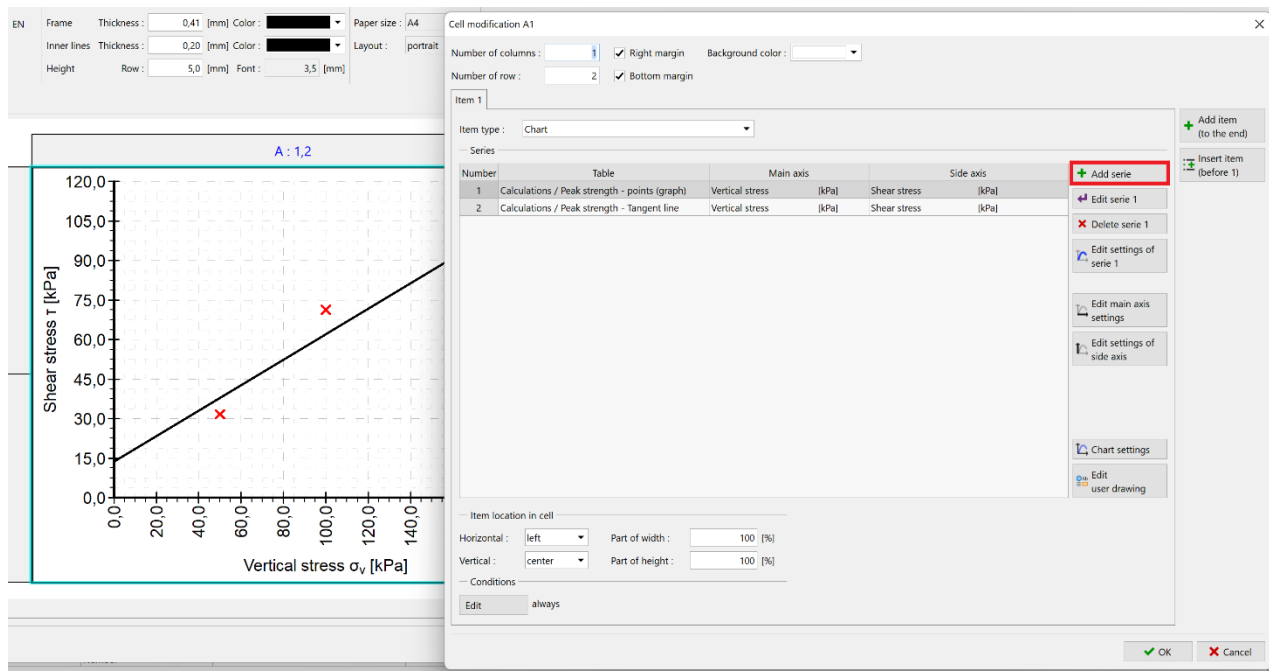
Now we can see that the protocol fits on one page again.



Last remaining task is to add the new data to the graph. Click on the graph and open the editing window.



Press the "Add series" button.



Select the table "Post peak strength - points", the main axis "Vertical stress" and the secondary axis "Shear stress".

Cell modification A1

Number of columns :

☒ Right margin

Background color :

Number of row :

☒ Bottom margin

Item 1

Item type :

Series

Number	Table	Main axis	Side axis
1	Calculations / Peak strength - points (graph)	Vertical stress [kPa]	Shear stress [kPa]
2	Calculations / Peak strength - Tangent line	Vertical stress [kPa]	Shear stress [kPa]

+ Add item (to the end)

+ Insert item (before 1)

+ Add series

Edit series 1

Delete series 1

Edit settings of series 1

Edit main axis settings

Edit settings of side axis

Chart settings

Edit user drawing

Add series

Data source

Table :

Main axis :

Side axis :

Chart settings

Side axis :

+ Add

- Cancel

Item location in cell

Horizontal :

Part of width :  [%]

Vertical :

Part of height :  [%]

Conditions

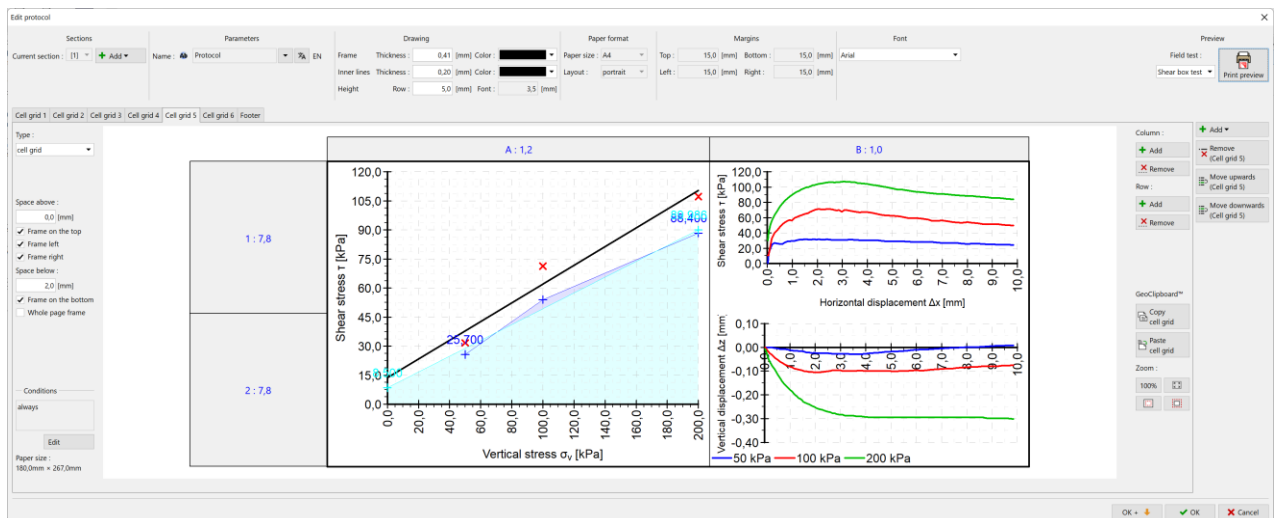
Edit

always

OK

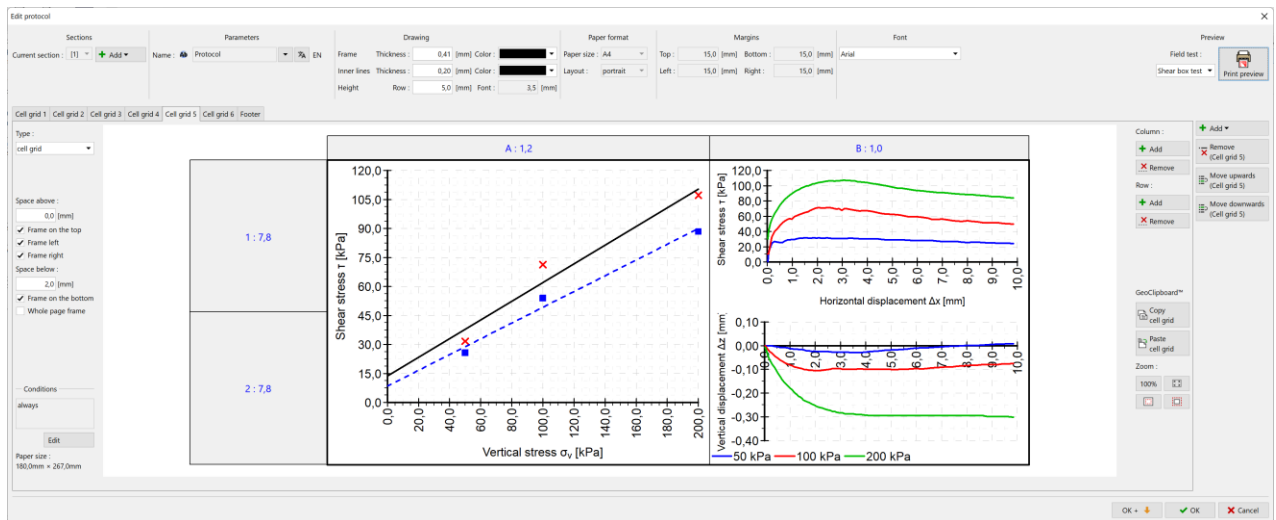
Cancel

Add the post peak strength trendline in the same way. We can see the two new series in the graph:






Finally, we modify the visualization of the two new series to suit our requirements:



*Note: The editing of graphical visualization of the graphs is explained in Engineering Manual 51.*

This modified protocol corresponds to the specification.

 <b>GEO5 Laboratory</b>	<b>Shear Box Test</b>			
	Project: Apartment building "Moonlighting" - Survey for building permit			
Test ID: Shear box test		Project ID: 2022/3548		
Supplier: GEO5 Laboratory Ltd.		Customer: Survey ABC Ltd.		
Date of measurement: 27.03.2023		Performed by: John Young		

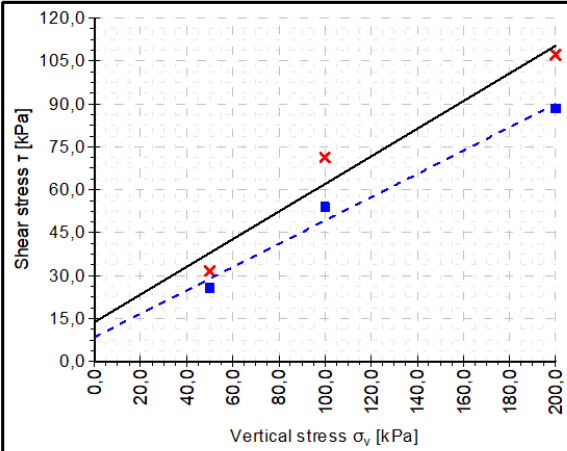
<b>Sample</b>	
Field test: BH5	Sample type: undisturbed
Sample index: VA1/1254	Geotechnical type: GT2
Depth from: 7,00 m	Description:
Depth to: 7,80 m	Clay with low plasticity, stiff, gray-blue color

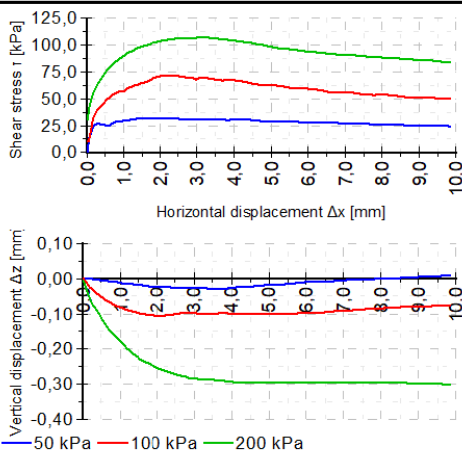
  

<b>Specimen</b>				
Specimen ID: VA1/1254-12		Consolidation time: 24,0 hour		
Depth: 7,35 m		Shear rate: 0,001 mm/min		
	<b>Before test</b>	<b>Specimen Nr. 1</b>	<b>Specimen Nr. 2</b>	<b>Specimen Nr. 3</b>
Dimensions (width/height) [mm]	-	60,00 / 21,00	60,00 / 21,00	60,00 / 21,00
Moisture content [%]	22,45	24,40	24,30	22,10
Consolidation (before test) [mm]	-	0,210	0,550	1,170
Vertical stress [kPa]	-	50	100	200
Max. shear stress [kPa]	-	31,7	71,3	107,2
Wet unit weight [kg/m <sup>3</sup> ]	1802,0	1848,0	1921,0	1967,0
Dry unit mass [kg/m <sup>3</sup> ]	1472,2	1485,5	1545,4	1610,9
Displacement at failure [mm]	-	1,530	2,061	3,080

<b>Measured values and results</b>	
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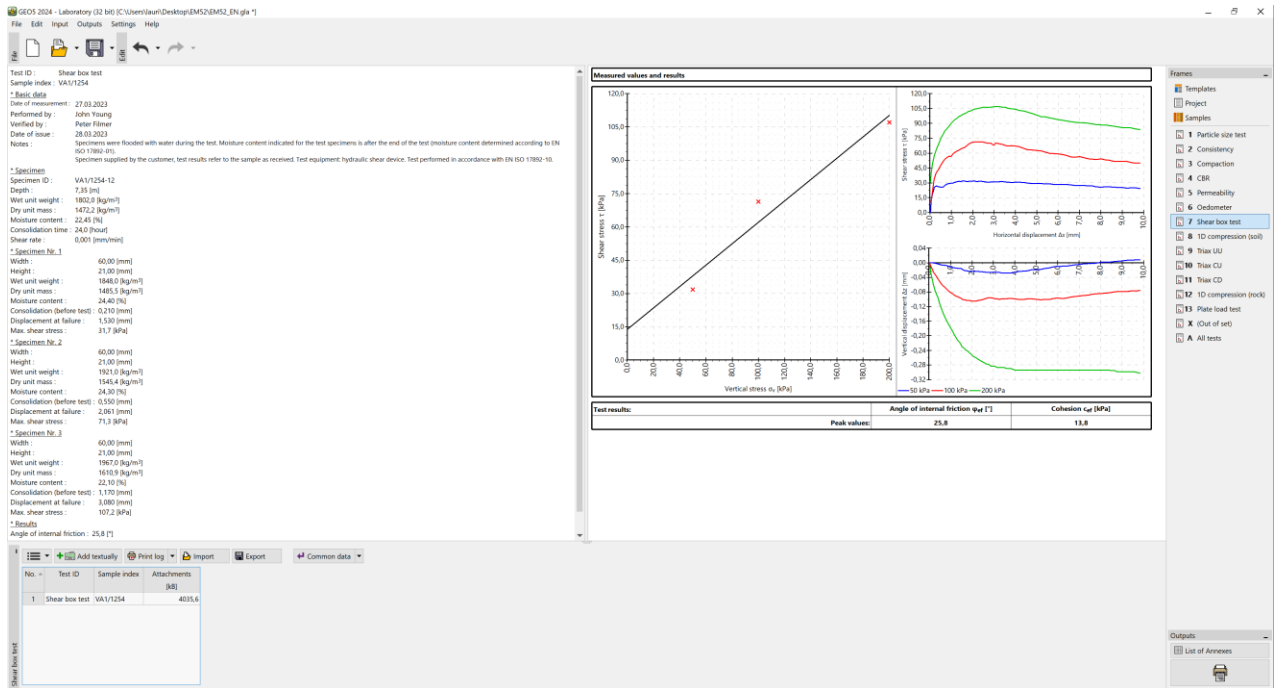
  

<b>Test results:</b>	<b>Angle of internal friction <math>\phi_{ef}</math> [°]</b>	<b>Cohesion <math>c_{ef}</math> [kPa]</b>
	<b>Peak values:</b>	<b>25,8</b>
<b>Post peak values at displacement 8,0 mm:</b>	<b>22,1</b>	<b>8,5</b>

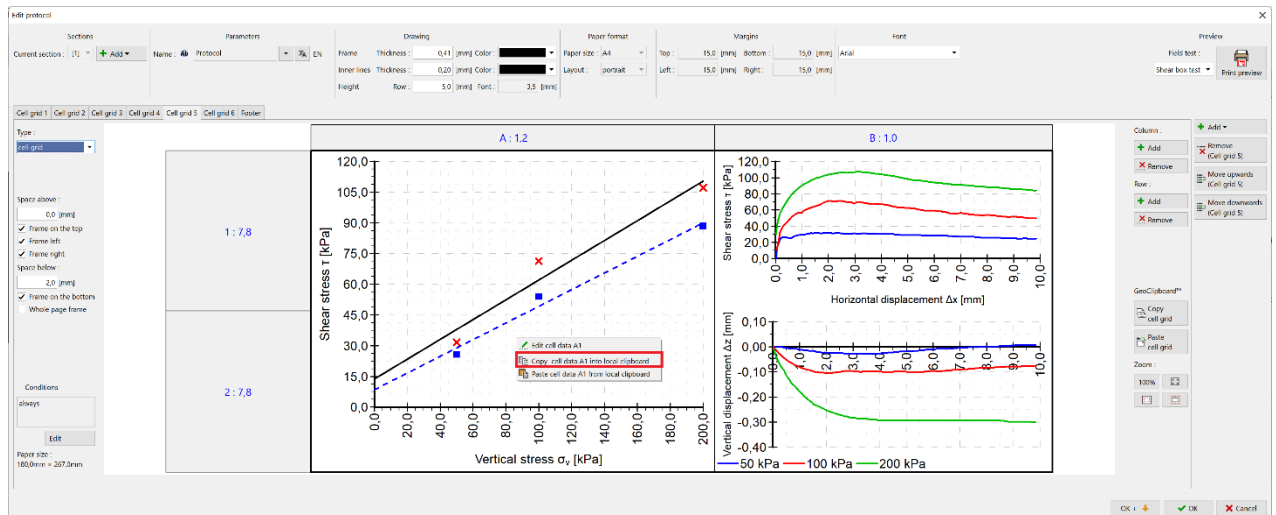
  

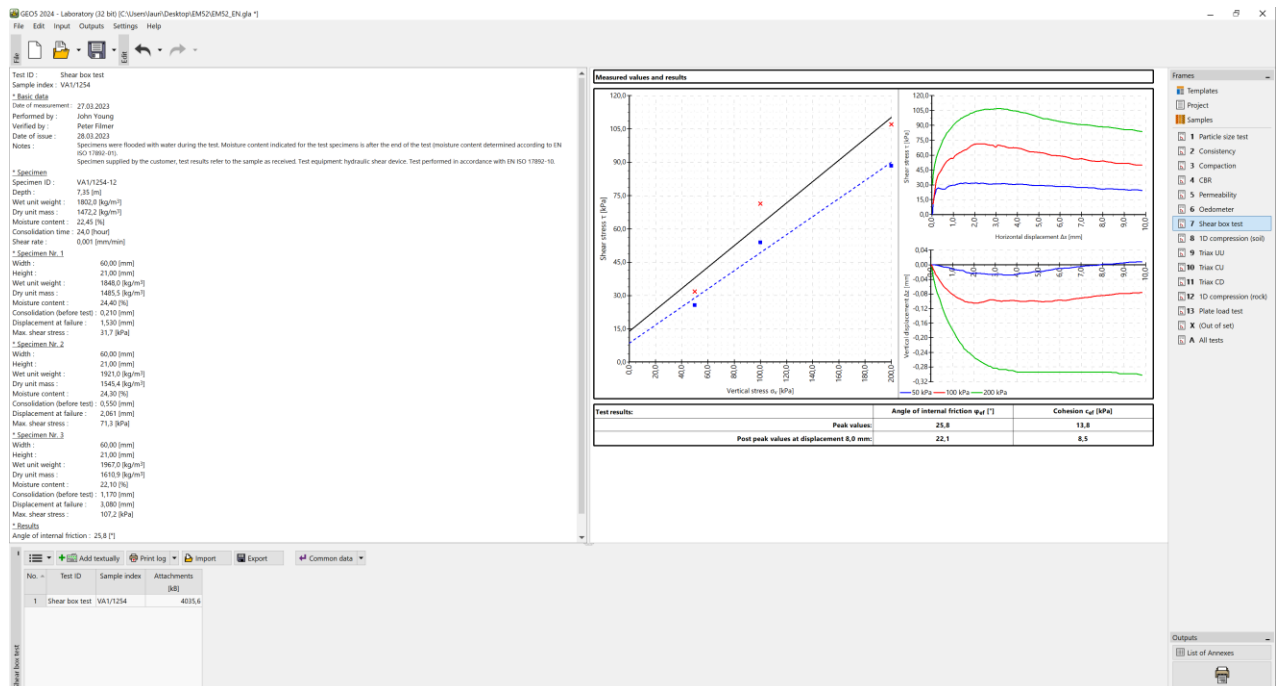
<b>Notes</b>	
Specimens were flooded with water during the test. Moisture content indicated for the test specimens is after the end of the test (moisture content determined according to EN ISO 17892-01). Specimen supplied by the customer, test results refer to the sample as received. Test equipment: hydraulic shear device. Test performed in accordance with EN ISO 17892-10.	
Verified by: Peter Filmer	Date of issue: 28.03.2023  <div style="text-align: right;">Stamp and signature</div>

However, if we go back to the main program window, we see that the graph has remained unchanged. The graph here is displayed from the output protocol called "Desktop Preview", so we need to modify it as well.



Just copy and paste the graph and the result table into the preview.





Other protocols can be modified in the same way.