



UNIVERSITEIT  
GENT

# FINAL FACTUAL LABORATORY REPORT

XI.23.01 CLAYTECTONICS

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# 1 INTRODUCTION

The present project was subcontractor to the Geotechnical Laboratory of UGent by Vrije Universiteit Brussel in the context of the CLAYTECTONICS research project. The project was classified under the internal code number XI.23.01.

This factual report is the second revision of the factual report, after completion of all tests.

This project included a series of index tests:

- 38no natural water content tests
- 47no Atterberg limit tests of which 35 with the Casagrande cup and 11 with the fall cone
- 44no hydrometer and 19no sieving tests
- 23no pocket penetrometer tests

In addition to the index testing, 2 compressibility tests in the oedometer, 6 Constant Rate of Strain (CRS) one-dimensional compression tests, 1 CU triaxial tests, 6 direct shear tests with re-shear cycles and 15 Direct Simple Shear (DSS) tests were carried out. The test program is summarized in Appendix A.

All samples were undisturbed samples in 10cm diameter sample tubes. The samples were extracted from a location just outside the clay quarry in Rumbeke and were transported to the laboratory immediately after completion of the drilling works. The drilling program is described in Section 2. CT scanning was performed on all samples to reveal the internal structure of the sample. The CT scans are shown in Section 2.2.

Visual inspection of the samples was performed for each of the samples (Appendix B).

## 2 SITE INVESTIGATION PROGRAM

### 2.1 Drilling program

The drilling campaign was aimed at obtaining a sample of a fault which was previously observed in the clay pit in Rumbeke (personal communication by Jan Maertens). The observed fault is shown in Figure 1. When the CLAYTECTONICS research project started, the location of the observed fault was no longer as accessible as the pit had already been backfilled with asbestos waste.



*Figure 1. Picture of the fault as observed in the clay pit in Rumbeke (image source: Jan Maertens)*

Nevertheless, an opportunity was identified to drill a borehole next to the clay pit which would encounter the fault zone if it continued laterally from the observed location in the pit. Satellite imagery was used to identify the location of the borehole as shown in Figure 2.

Drilling took place on 20 June 2023 at location B1 with Lambert coordinates X: 62883.82 Y: 179006.97 and elevation 24.201mTAW. Although drilling was also planned at a second location, the campaign had to be terminated because of thunderstorms.



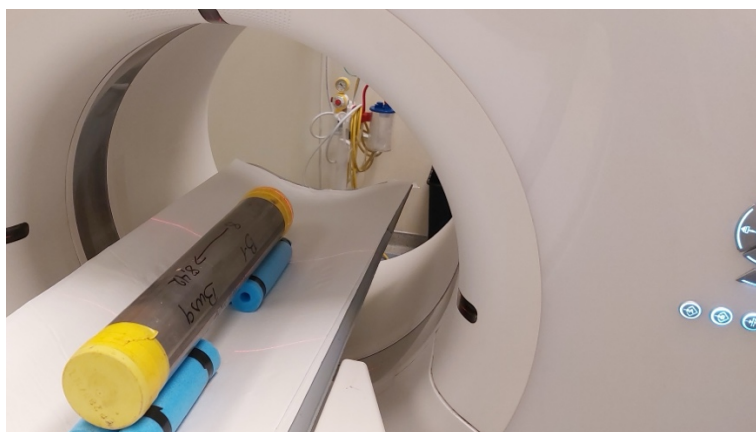
Figure 2. Extrapolation from the observed fault to the identified drilling locations

The first 4m, destructive drilling was employed with an auger since clay of the Kortrijk formation was not expected at these depths. From 4m to 10m below ground surface, 12 push samples of 0.5m length and 10cm diameter were taken. These samples are called *undisturbed* samples but the processing of pushing in the samples and the relaxation of stresses on the top and bottom of the sample during sample retrieval will always induce some disturbance. These samples were transported to the geotechnical laboratory of UGent after completion of the drilling. The samples were stored in a room at 10°C temperature with a high humidity. The drilling record is included in Appendix C.

## 2.2 CT scanning

All samples were scanned using a medical CT scanner to identify the internal structure of the samples after drilling. Figure 3 shows a sample during the scanning. The scans were performed by Prof. Maarten Van Daele from the Geology Department of UGent.

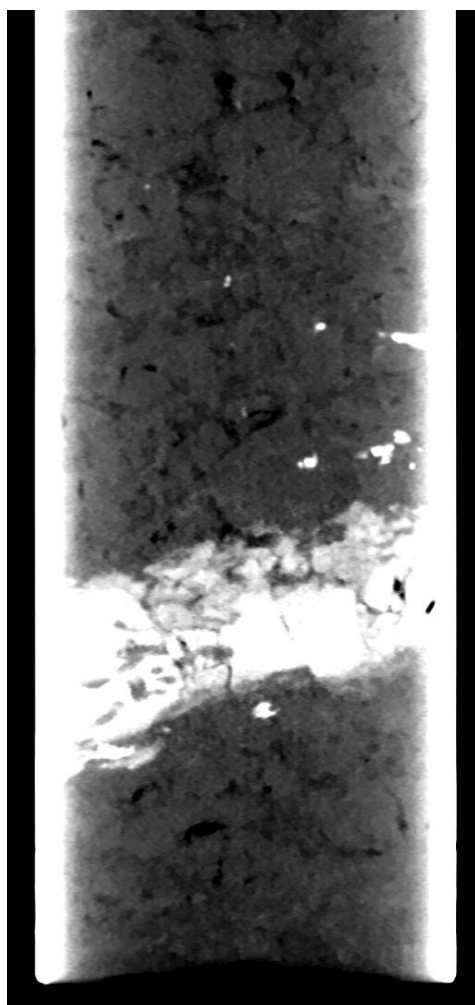
CT scanning is an increasingly common technique to identify the structure of geotechnical samples (e.g. Otani et al., 2010 and (Cnudde and Boone, 2013)).



*Figure 3. Push sample in the medical CT scanner*

The scanning images are provided in Appendix D for each sample. The images reveal that the clay of the Kortrijk formation is first encountered in Bus 4. Above that, the material appears more sandy.

In sample Bus 6, a zone of higher density (lighter color) appears as shown in Figure 4. In a wide zone around this artifact (>1m above and below), the clay has a brecciated appearance. Centimeter-scale fissures are observed in all samples (darker areas) but the fissures are more pronounced in the samples closer to Bus 6.



*Figure 4. CT image of the zone of interest in sample Bus 6*

The images of the CT scans were used to guide the selection of samples for geotechnical testing. Because the zone with higher density material in Bus 6 was limited in thickness, only index testing was performed on this material. After index testing, the material was handed over to the Geology department of UGent (Prof. Stijn Dewaele) for further mineralogical testing using X-Ray Diffraction (XRD).

## 3 TESTING PROCEDURES

### 3.1 Natural water content test

The natural water content is measured to determine the moisture content of the soil in situ. Drying out of the sample should be prevented because of this. The moisture content of the soil controls its behavior to a large extent.

The natural water content is measured in accordance with ASTM D2216. The natural water content is a very simple test in which the mass of soil + container is weighed. Afterwards, the container with the soil is placed in the oven at 105°C for 24hr to allow all water to evaporate.

### 3.2 Atterberg limit tests

For soils which exhibit plastic behavior, this plastic behavior is only observed when the natural water is between two limits; the liquid limit above which the sample behaves like a liquid and the plastic limit below which the sample crumbles (and thus no longer behaves plastically). These limits are called the Atterberg limits.

Atterberg limits are determined in accordance with ASTM D4318. The Atterberg limits are determined from two tests:

- Liquid limit: The coarse fraction of soil (passing the 425 $\mu$ m sieve) is first removed from the sample and water is then added until the sample approaches the liquid limit. The water content is progressively reduced from this initial water content by exposing the sample to hot air. Four water contents are selected for testing with the Casagrande cup. The number of blows required for closing a groove is counted. The liquid limit (*LL*) is found as the water content at which the groove closes following 25 blows.
- Plastic limit: The water content at which 3mm threads of soil will just start to crumble is the plastic limit (*PL*).

From the Atterberg limit tests, the plasticity index (*PI*) can be derived:

$$PI = LL - PL$$

Knowledge of the natural water content (*w*) of the sample allows the derivation of the liquidity index (*LI*):

$$LI = \frac{w - PL}{PI}$$

### 3.3 Sieving

A sieving test is conducted to determine the grain size distribution of a granular sample, revealing the amount of particles of a given size as a cumulative distribution curve. The sieving test is performed according to ASTM D422. The test takes place in two parts. First, 500 – 5000gr of the fraction > 2mm is passed through a stack of sieves with progressively finer mesh size. Subsequently, the same principle is applied to ~115gr for sandy soil or ~65gr of silty soil of the fraction between 0.063 and 2mm. The mass retained on each sieve is recorded and the grain size distribution can be derived from the test.

For this project, organic and calcareous material was not removed from the sample.

### 3.4 Hydrometer

When a sample contains a significant amount of fine particles, sieving can no longer be used to determine the grain size distribution as adhesion of the fine particles ( $<63\mu\text{m}$ ) to the sieves influences the results.

To determine the grain size distribution of fine-grained soils, the hydrometer test is carried out according to ASTM D422. An amount of soil is brought into suspension and the settlement of grains from suspension is observed over time. Stokes' law is used to calculate the settlement of particles from suspension. The assumption of spherical particles is an inherent limitation of Stokes' law but is acceptable for most engineering purposes.

### 3.5 Oedometer

The compressibility of soil under varying stress levels can be tested using the oedometer test (ASTM D2435). A sample of soil is compressed vertically and confined radially. Load is applied in a step-wise manner and the settlement of the soil as a result of drainage of the pore fluid is measured over time. The measured settlements can be converted to void ratio  $e$  if the dry density ( $\rho_d$ ) and density of solids ( $\rho_s$ ) is known ( $H$  is the height of the sample at any given time and  $H_o$  is the initial height of the sample).

$$e = \frac{H \cdot \rho_s}{H_o \cdot \rho_d} - 1$$

A number of indices can be derived from the void ratio or axial strains and the stress level at the beginning and end of each load step:

- Compression index  $C_c = -\frac{e_2 - e_1}{\log_{10} \frac{\sigma'_{v,2}}{\sigma'_{v,1}}}$
- Compression constant  $C = \frac{\ln \left( \frac{\sigma'_{v,2}}{\sigma'_{v,1}} \right)}{\frac{\varepsilon_{z,2}}{\varepsilon_{z,1}}}$
- Compression ratio  $CR = C_{c,\varepsilon} = \frac{\frac{\varepsilon_{z,2}}{\varepsilon_{z,1}}}{\log_{10} \frac{\sigma'_{v,2}}{\sigma'_{v,1}}}$
- Coefficient of compressibility  $a_v = -\frac{e_2 - e_1}{\sigma'_{v,2} - \sigma'_{v,1}}$
- Modulus of volume compressibility  $m_v = \frac{\varepsilon_{z,2} - \varepsilon_{z,1}}{\sigma'_{v,2} - \sigma'_{v,1}}$
- Constrained modulus  $M = \frac{1}{m_v}$

For the secondary compression, the secondary compression modulus can be defined as

$$C_\alpha = -\frac{e_t - e_p}{\log_{10} \left( \frac{t}{t_p} \right)}$$

This is the slope of the secondary compression line in plot of void ratio vs log time. The point  $p$  is defined as the point for 100% primary consolidation and can be derived using the log-time method.

The log-time method as outlined in §12.3.1 of ASTM D2435 is also used to determine the coefficient of consolidation  $c_v$ . If the coefficient of consolidation and the modulus of volume compressibility are known for a load step, the vertical permeability  $k$  can be calculated:

$$k = \gamma_w \cdot c_v \cdot m_v$$

Where  $\gamma_w$  is the unit weight of water.

Plotting the void ratio at the end each load step vs the logarithm of applied vertical stress shows a curve from which the preconsolidation pressure  $p'_c$  can be derived using the construction outlined in §12.4.6 of ASTM D2435.

### 3.6 Constant rate of strain (CRS) one-dimensional compression tests

A constant rate of strain (CRS) compression test can be used to determine the rate and magnitude of consolidation for a test specimen. The specimen is built into a CRS mould between two porous stones. The mould is then placed into a cell which allows the application of a pressure on top of the sample. Pressure can also be applied to the bottom of the sample and during the saturation phase, the sample pressure and cell pressure are increased to 500kPa. After saturation is complete, the base drainage valve is closed and the sample pressure at the bottom of the sample is measured. The specimen is restrained laterally and compression is applied by imposing a controlled axial deformation rate. During axial deformation, the axial load on the sample is measured. The deformation rate needs to be chosen such that the excess pore pressure at the base of the sample is between 3% and 30% of the applied vertical stress. The test is carried out according and interpreted according to ASTM D4186. Further details are included in the test results.

### 3.7 Direct shear test

The drained strength properties of cohesive soil samples can be tested in a direct shear test (shearbox). The test is carried out according to ASTM D3080. The sample is placed in the mould by extruding a 60mm x 60mm subsample using a cutting ring. Water is added to a bath surrounding the mould to ensure that the sample is always in contact with water.

Following saturation, the sample is consolidated by applying a vertical load to the top cap. The vertical displacement of the top cap is recorded and consolidation is completed when changes in the vertical displacement are not observed. For cohesive samples, this test stage can take a long time.

Finally, a drained shearing episode is started in which the top half of the shear box is moved relative to the bottom half. The lateral displacement, vertical displacement and lateral reaction are recorded. Since the test is displacement controlled, shearing continues after the peak strength has been reached until a given lateral displacement strain is reached (typically 6mm lateral displacement). Shear stress is calculated by dividing the lateral load by the sample cross-sectional area. The shearing rate is chosen to allow excess pore pressures to drain from the sample during shearing. This resulted in a very low shearing rate of 0.048mm/hr being selected for this project.

Because shearing on existing failure planes is of interest for this project, a re-shear stage was performed after each initial shearing stage. After the initial shearing, the two halves of the shearbox were reset to their initial position and the sample was consolidated again. After completion of the reconsolidation, the sample was sheared again, which would reactivate the shearing planes which were formed during the initial shearing stage.

The direct shear test with re-shearing is repeated for three subsamples, each consolidated to a different vertical stress. For the current tests, consolidation stress of 50kPa, 100kPa and 200kPa were used. The graphs of shear stress vs lateral displacement allow the selection of a failure point. These failure points can be plotted in a Mohr diagram to identify the effective stress properties (effective cohesion  $c'$  and effective friction angle  $\varphi'$ ).

## 3.8 CU Triaxial

The undrained response of cohesive soil samples can be tested in a consolidate undrained (CU) triaxial test. The test is carried out according to ASTM D4767. The sample is first saturated using a pressure differential between the cell pressure and the backpressure. The completeness of saturation is verified using a B-check.

Following saturation, the sample is consolidated isotropically by applying a given difference between cell pressure and backpressure. The volume of water expelled from the sample is recorded vs time to check when consolidation is complete.

Finally, an undrained shearing episode is started in which the axial displacement is steadily incremented until failure of the sample is reached. Since the test is displacement controlled, shearing continues after the peak deviator stress has been reached until a given axial strain is reached (typically 20% axial strain).

The test can be processed to interpret the peak deviator stress for a given consolidation pressure and the corresponding Mohr circle.

## 3.9 DSS test

### 3.9.1 General concepts

The monotonic undrained direct simple shear (DSS) test was conducted in accordance with the general principles of ASTM D6528-17 to determine the undrained shear strength of the soil specimens. The specimens were obtained from the sample tubes after extrusion by carefully inserting a cutting ring into the sample. Each specimen was enclosed within a stack of thin horizontal rings, which allowed shear deformation while maintaining lateral confinement. A vertical load was applied through a rigid loading cap, and horizontal displacement was imposed at a constant rate. The influence of the presence of pins in the base and top porous stones was examined, first on Kaolin clay samples and then on stiff clay samples from the borehole.

### 3.9.2 Saturation Procedure

Following placement in the apparatus, the specimen was brought into contact with water. As the clays have a very low permeability, saturation would require a back-pressure system which is not available on the DSS device. Instead, the standard recommends contact with water from the top and bottom of the sample.

### 3.9.3 Consolidation Stage

After saturation, the specimen was consolidated to the target normal stress, with vertical displacement recorded continuously throughout this stage. The consolidation pressure was increased incrementally over 1 to 2 minutes until the target pressure was reached. The post-consolidation height was determined by subtracting the change in height measured during consolidation (consolidation settlement) from the initial sample height.

### 3.9.4 Shearing Stage

Upon completion of consolidation, shearing was performed under undrained conditions while maintaining a constant specimen height. The constant-volume module was active during the shearing stage of the tests. This module prevented volume change during shearing. The shearing stage was conducted in displacement-control mode, with horizontal displacement applied at a constant rate of **0.017 mm/min** until the target shear strain (approximately **25%**) was reached.

Shear stress, shear strain, vertical stress, and vertical displacement were all recorded throughout the shearing stage.

## 4 RESULTS AND DISCUSSION

All results were processed and results are supplied as appendices to this report in pdf format and are stored as digital data in *owimetadatabase*. The dataset for this project is openly available but login credentials need to be requested from the report authors. A summary of the test results and important observations during test execution are given below.

### 4.1 Natural water content tests

The natural water content measurements are summarized in Figure 5. The difference between the more sandy material with lower water content in the top 5m and the cohesive material with high water content is clearly observed. There is one notably lower water content in Sample B6 6.9m depth. This water content was measured for the higher density material from Bus 6 (lighter colored material in Figure 4).

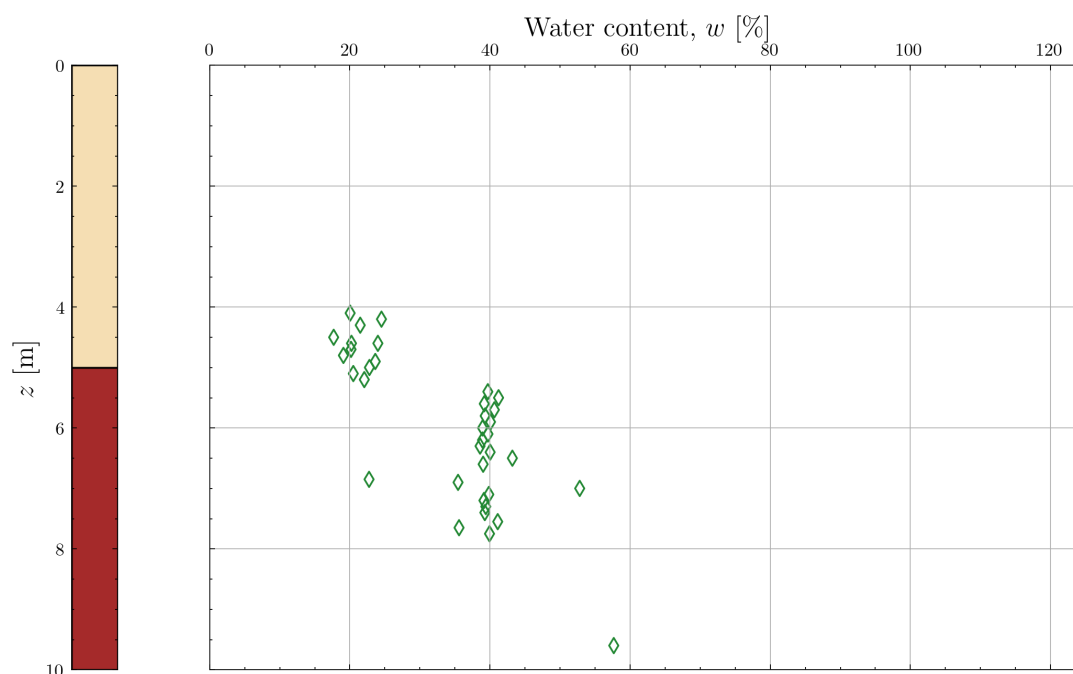


Figure 5. Natural water content for push samples from Rumbeke

### 4.2 Atterberg limit tests

The results of the Atterberg limit tests can be summarized in the plasticity chart (Figure 1). Atterberg limit testing with the Casagrande cup was not possible for the more sandy/silty material above 5m. The data obtained for samples Bus 1, Bus 2 and Bus 3 was obtained from fall cone testing. The data from the clay layer plots close to the A-line and shows increasing plasticity with depth. The material can be considered as a clay with high plasticity. This corresponds to the observations for the Kortrijk Formation made by Spagnoli et al. (2014).

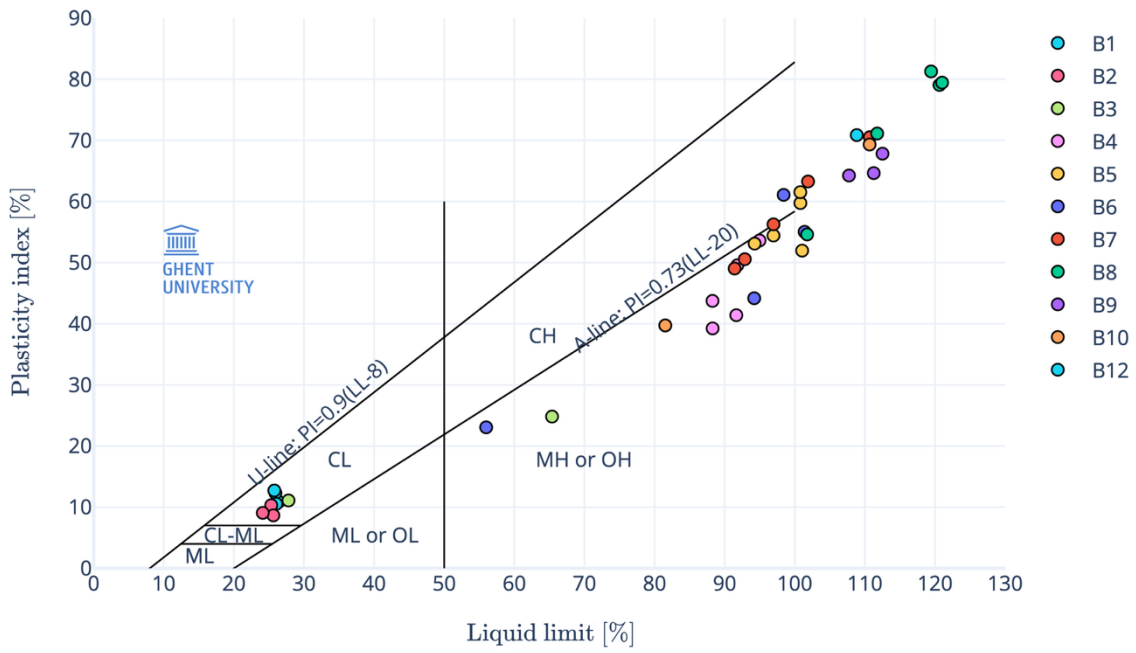


Figure 6. Plasticity chart summarizing the individual tests

The natural water content of the samples can also be plotted with the plastic and liquid limit of the material to check where the natural water content is situated relative to those limits. Figure 7 shows that the natural water content of the samples is nearly equal to the plastic limit in the clay layer. In the zone with higher density, the natural water content is below the plastic limit.

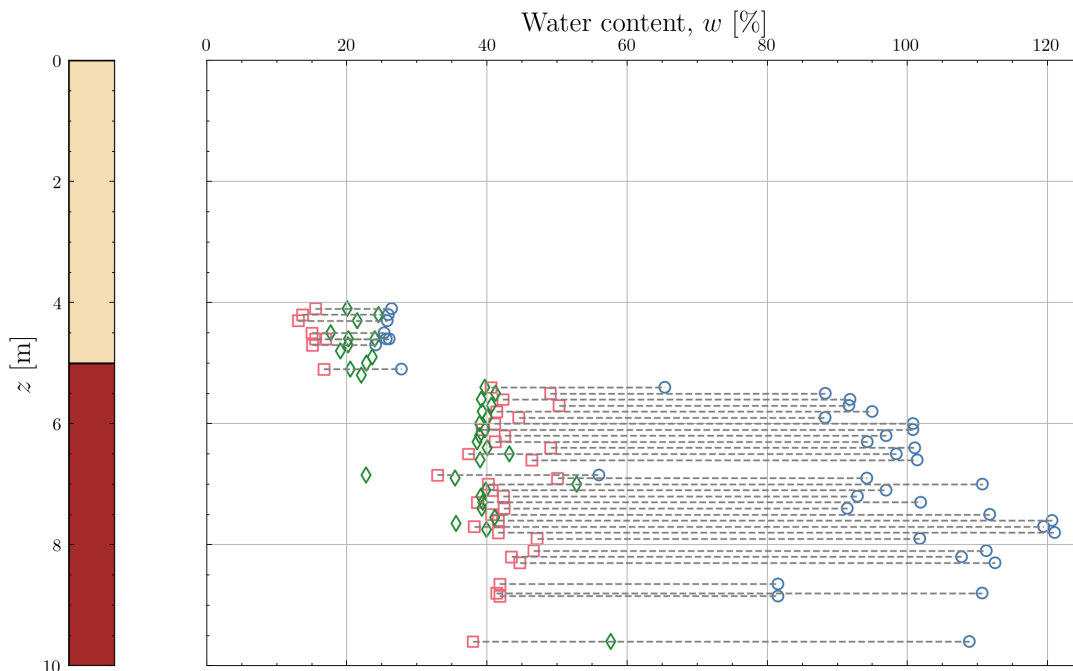


Figure 7. Atterberg limits relative to the natural water content of the soil

Detailed test results from the Atterberg limit tests are given in Appendix E.

### 4.3 Sieving and hydrometer results

The grain size distribution of was determined using a sieving for most samples. When a significant fines content was found (>10% of particles less than 75 $\mu$ m), a hydrometer test was performed on the fines. Vice-versa, if the Shelby tube samples (on which only hydrometer testing was specified) showed significant sand content, a sieving test was performed.

The grain size distribution curves from the sieving and hydrometer tests sometimes do not always show a smooth transition (a slight jump in grain sizes). The hydrometer test is carried out in the fraction of material < 2mm. The assumptions associated with the grain settlement calculation can partially explain the lack of smooth transition.

The values of  $d_{10}$ ,  $d_{30}$ ,  $d_{50}$  and  $d_{60}$  shown in the figure are taken from the combined sieving and hydrometer curve. For the calculation of  $C_c$  and  $C_u$ , the minimum measured grain size of 2 $\mu$ m was used.

Particle size distribution curves are given in the Appendix F.

The grain size distribution curves confirm that the material below 5m depth is mostly clayey with around 50% of the grains in the clay fraction. The material above 5m depth is silty sand.

Detailed test results from the sieving and hydrometer tests are given in Appendix F.

### 4.4 Oedometer results

The initial load steps of the oedometer tests indicate that the samples were initially disturbed. Some swelling was also observed during the first load step. The samples were slightly overconsolidated. After overcoming the preconsolidation pressure, the effect of initial sample disturbance was overcome and the response was more regular. The sample disturbance can be quantified using the change in void ratio when consolidating back to the in-situ vertical effective stress (Lunne et al., 2008). Based on this criterion, the samples are in the *Poor* quality category ( $\Delta e/e_0=0.05 - 0.10$ ) close to the boundary with the *Good to Fair* category ( $\Delta e/e_0=0.03 - 0.05$ ).

The calculation of the coefficient of consolidation showed that the clay of the Kortrijk Formation has a very low coefficient of consolidation so drainage will take a long time. This was also noticed during the consolidation phase of the CU triaxial tests.

The results for oedometer testing are provided in Appendix G.

Test	Preconsolidation pressure [kPa]	In-situ vertical effective stress [kPa]	OCR [-]	$e_0$ [-]	$\Delta e/e_0$	Sample quality class	$c_v$ at the in-situ vertical effective stress [m/s]
Bus 4	151.9	51.3	3.0	1.21	0.053	Poor	7.04E-08
Bus 12	180.2	87.3	2.1	1.23	0.064	Poor	2.08E-07

Table 1: Summary of oedometer test results

## 4.5 Direct shear test results

The direct shear tests were performed on subsamples from three sample tubes. Each subsample was consolidated to a different consolidation pressure and the results from both the initial shearing test and the research test were recorded. Detailed test results are given in Appendix H.

Sample	Test	Stage	Consolidation pressure [kPa]	Shear strength [kPa]	Comments
Bus 4	B4-1	Initial	50.1	25.0	
Bus 4	B4-1	Reshear 1	50.1	19.2	
Bus 4	B4-2	Initial	103.0	64.2	
Bus 4	B4-2	Reshear 1	103.1	50.1	
Bus 4	B4-4	Initial	202.0	36.1	Peak not reached
Bus 4	B4-4	Reshear 1	201.9	55.5	
Bus 5	B5-1	Initial	50.1	35.3	
Bus 5	B5-1	Reshear 1	50.1	13.2	
Bus 5	B5-2	Initial	103.0	53.0	
Bus 5	B5-2	Reshear 1	103.1	32.8	
Bus 5	B5-3	Initial	203.7	86.2	
Bus 5	B5-3	Reshear 1	201.9	44.7	
Bus 6	B6-1	Initial	50.1	33.8	
Bus 6	B6-1	Reshear 1	50.1	21.0	
Bus 6	B6-2	Initial	103.1	68.5	
Bus 6	B6-2	Reshear 1	103.1	33.7	
Bus 6	B6-3	Initial	201.9	91.5	
Bus 6	B6-3	Reshear 1	201.9	43.2	
Bus 7	B7-2	Initial	50.1	26.5	
Bus 7	B7-2	Reshear 1	50.1	19.1	
Bus 7	B7-3	Initial	103.1	52.3	
Bus 7	B7-3	Reshear 1	103.1	32.1	
Bus 7	B7-4	Initial	201.9	71.7	
Bus 7	B7-4	Reshear 1	201.9	44.3	
Bus 8	B8-2	Initial	50.1	29.9	
Bus 8	B8-2	Reshear 1	50.1	23.5	
Bus 8	B8-3	Initial	103.1	53.3	
Bus 8	B8-3	Reshear 1	103.1	33.1	
Bus 8	B8-4	Initial	201.9	79.7	
Bus 8	B8-4	Reshear 1	201.9	51.1	
Bus 9	B9-1	Initial	50.1	-	Not completed
Bus 9	B9-1	Reshear 1	50.1	22.2	
Bus 9	B9-2	Initial	103.1	-	Unreliable data
Bus 9	B9-2	Reshear 1	103.1	45.0	

Sample	Test	Stage	Consolidation pressure [kPa]	Shear strength [kPa]	Comments
Bus 9	B9-5	Initial	201.9	88.9	
Bus 9	B9-5	Reshear 1	201.9	52.1	
Bus 10	B10-2	Initial	50.1	29.8	
Bus 10	B10-2	Reshear 1	50.1	20.6	
Bus 10	B10-3	Initial	103.1	54.4	
Bus 10	B10-3	Reshear 1	103.1	40.1	
Bus 10	B10-4	Initial	201.9	93.3	
Bus 10	B10-4	Reshear 1	201.9	52.5	

Table 2: Summary of direct shear test results

It is insightful to plot the failure shear stress from the initial shearing and re-shearing phase together with the effective stress failure criteria for intact material and pre-sheared material proposed by Josseume (1998).

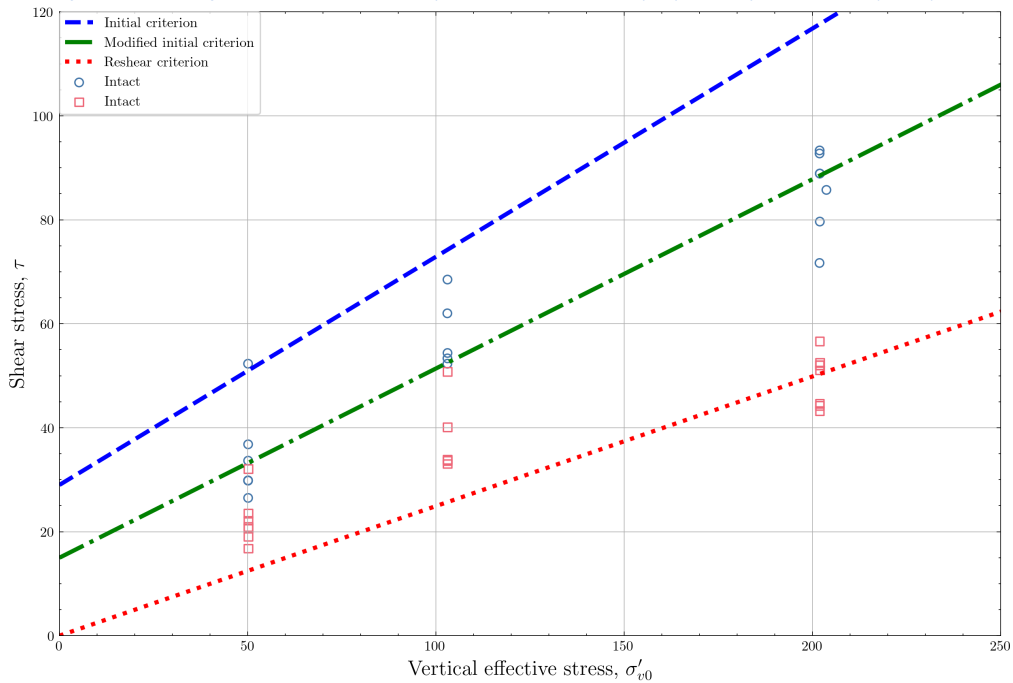


Figure 8 shows that the initial strength criterion proposed by Josseume ( $c'=29\text{kPa}$ ,  $\varphi'=23.7^\circ$ ) is an upper bound compared to the data. Therefore, the criterion was adjusted to the available data. A drained cohesion of  $15\text{kPa}$  and an effective friction angle of  $20^\circ$  are proposed.

The strength criterion for pre-sheared material proposed by Josseume ( $c'=0\text{kPa}$ ,  $\varphi'=14^\circ$ ) appear appropriate when looking at the data, although for stresses lower than  $200\text{kPa}$ , the strength appears to be higher.

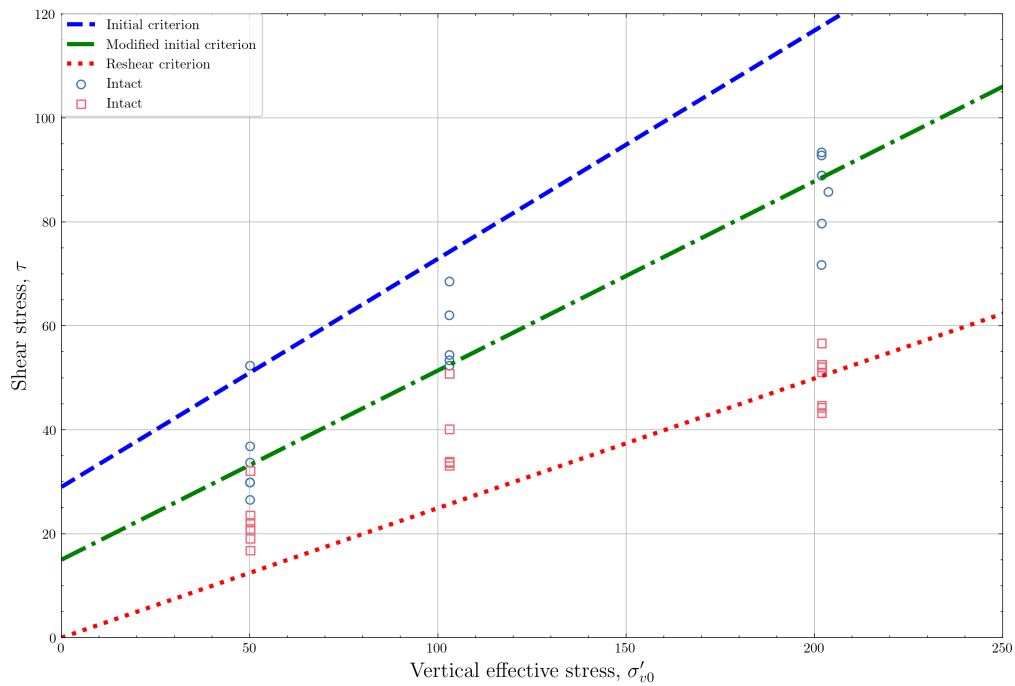


Figure 8. Failure points from the initial and reshear phases compared to the strength criteria proposed by (Josseaume, 1998). A modified strength criterion for the initial shearing phase is proposed in green

## 4.6 CU Triaxial results

One CU triaxial tests was carried out on subsamples from Bus 12. Three subsamples samples were saturated until a B-coefficient greater than 0.8 was reached after which the three subsamples were consolidated at 50kPa, 100kPa and 200kPa respectively. Consolidation was carried out until sample volume changes indicated that primary consolidation was complete. The shearing of the samples indicated noise on the load cell signal. The data was smoothed during post-processing.

The CU triaxial tests characterize the intact strength of the clay, at least if failure does not occur along pre-existing fissures or fractures. The rupture surfaces for the three subsamples shown in Appendix I shows that the rupture happens at an angle of  $\sim 45^\circ$  to the vertical which is expected for shearing through intact material. The pictures however reveal a number of fissures but the rupture surfaces did not align with those.

The effective stress strength criterion can also be derived from the CU triaxial test. The effective strength criterion derived from the test results and the criteria proposed by Josseaume for intact and pre-sheared material are shown in Figure 9. The test results indicate a strength criterion which is below the intact criterion from Josseaume but above the strength criterion for pre-sheared material.

The effective stress parameters derived from the CU test are summarized in Table 3. These show a slightly lower drained cohesion then for the direct shear tests but a higher effective friction angle.

Mohr circles Bus 12,  $c' = 8\text{kPa}$ ,  $\phi' = 22^\circ$

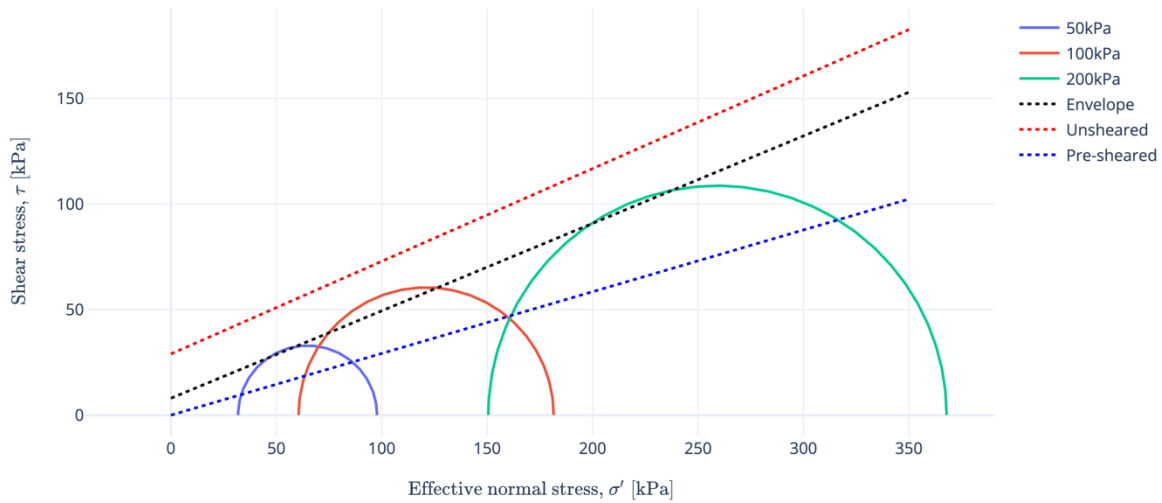


Figure 9. Effective stress Mohr circles for the CU triaxial tests compared to the strength criteria proposed by (Josseume, 1998).

Test	$c'$ [kPa]	$\phi'$ [°]
Bus 12	8	22

Table 3: Summary of CU triaxial test result

## 4.7 Direct simple shear tests

A series of direct simple shear tests was executed to measure the undrained shear strength of the material. It was rapidly noticed that the stiff clays of the Kortrijk Formation showed slippage at the interface between the sample and the top or bottom plate. To prevent this from happening, gripper plates with pins to grip the sample were purchased and used. The effect of using the gripper plates was examined.

Following successful testing of the gripper plates, the shearing response of a slurried sample of Kortrijk Formation clay was compared to the response of intact samples. The intact samples were consolidated at 50kPa, 100kPa and 150kPa and were taken in horizontal and vertical directions respectively to reveal the effect of anisotropy. The tests show that the effect of fissures is most visible at lower consolidation pressures. At higher consolidation pressures, these pressures seem to suppress the activation of fissures.

Figure 10 illustrates the difference in response between an intact and a slurried sample. Because of the internal structure of the intact clay, the initial strength and stiffness are higher, but at larger strains, when internal fissures get activated structure gets destroyed, the response converges to the response of the slurried sample. In terms of pore pressure, the fissure activation leads to a drop in pore pressure compared to the slurried sample.

The effect of specimen orientation is illustrated in Figure 11. In the vertical orientation, the sample shows higher strength and stiffness. As the clay was loaded and unloaded vertically, any fissures would be expected to be more perpendicular to that load orientation. For the horizontal sample, the shear loading is aligned with the expected fissure direction which means

that the shearing will activate the existing fissures. For vertically oriented samples, the shear loading is oriented perpendicular to the expected fissure direction. This hypothesis could explain the stronger response for the vertically oriented sample.

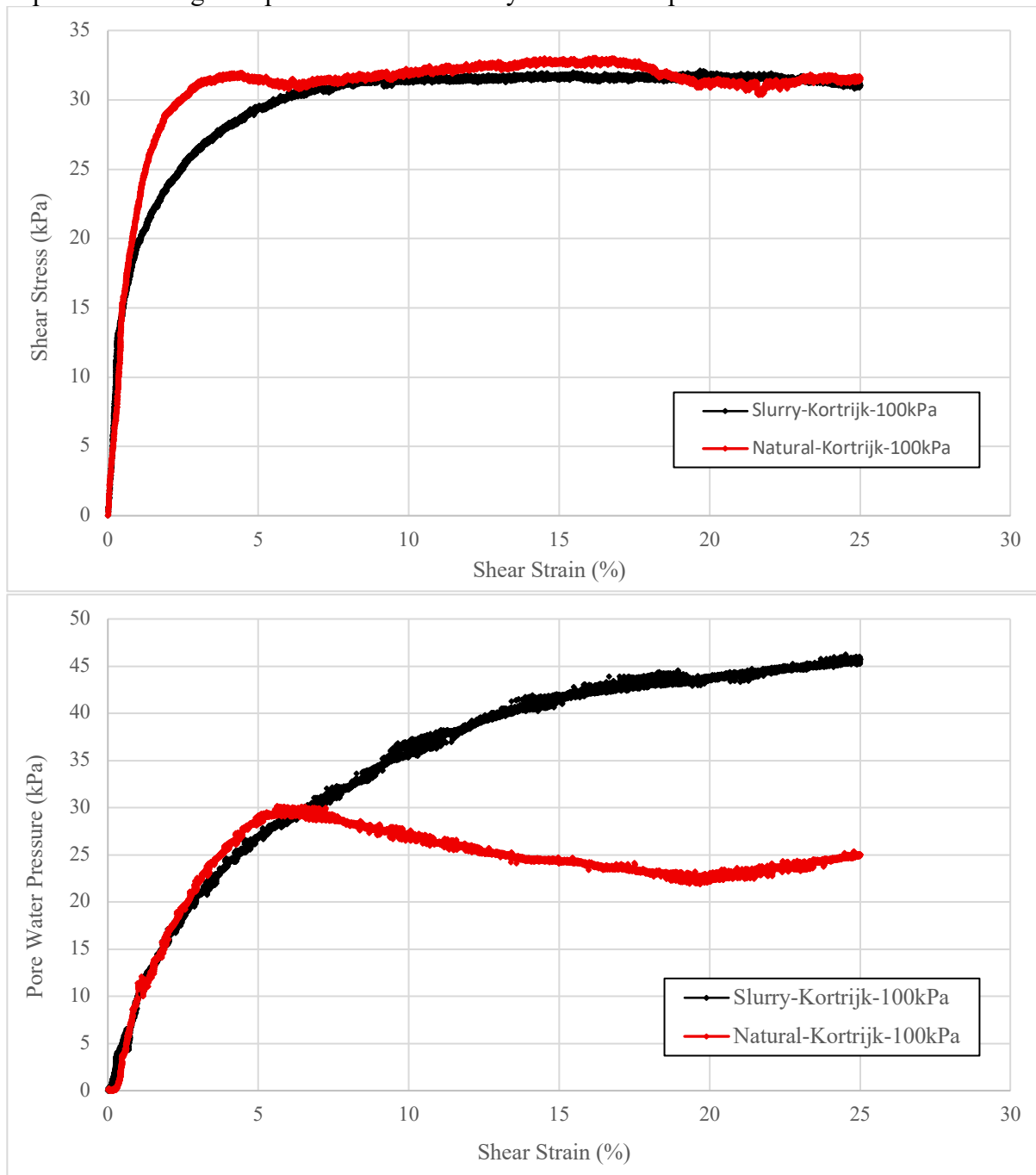


Figure 10. Slurrified vs intact sample of Kortrijk Formation clay

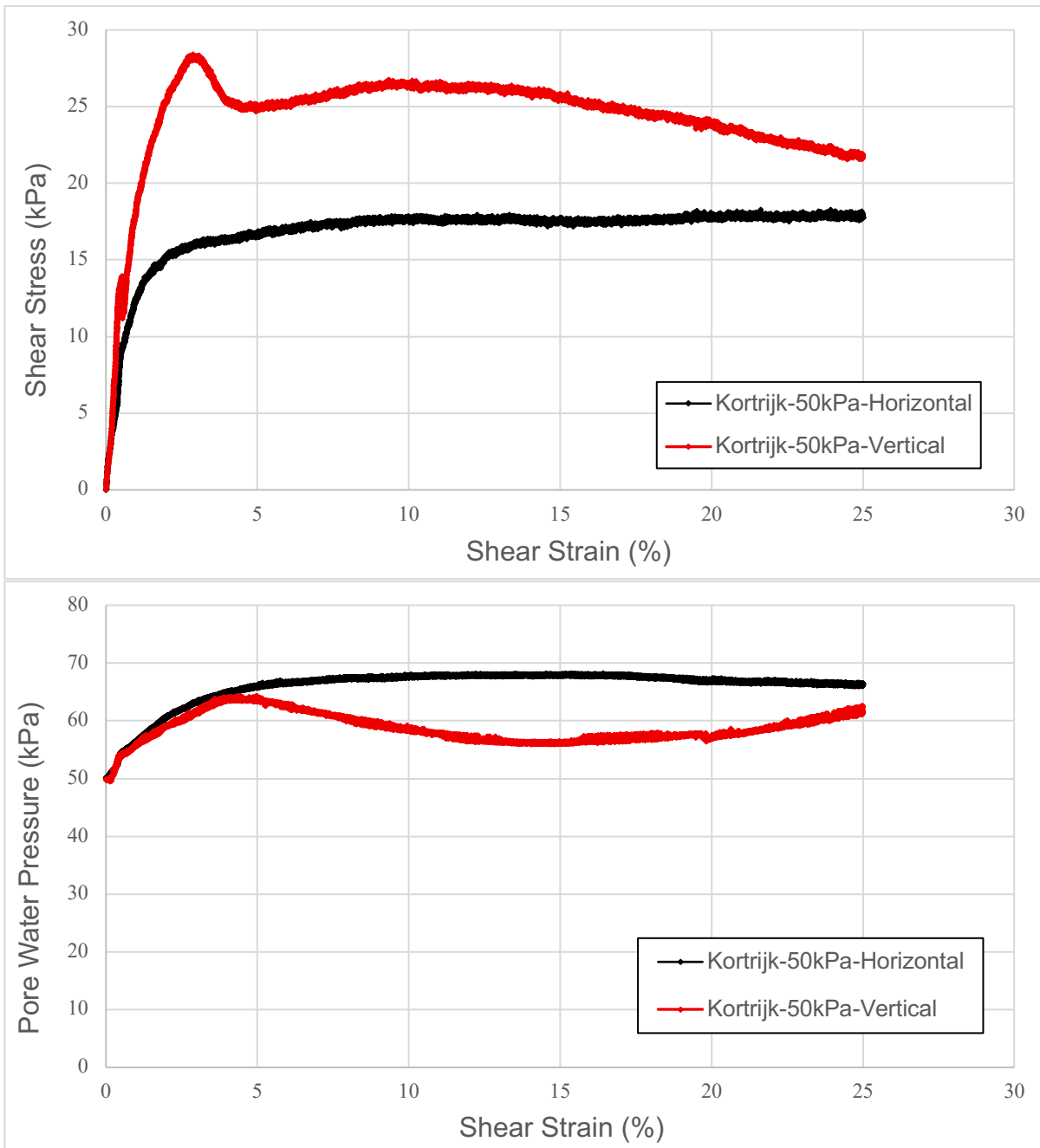


Figure 11. DSS results for a horizontally oriented vs vertically oriented specimen of Kortrijk Formation clay

## 4.8 CRS oedometer tests

CRS testing on fully slurrified samples of Kortrijk Formation clay was performed to investigate the virgin compression behavior of this material and allow further interpretation in the context of the Intrinsic Compression Framework theory (Burland, 1990). The clay was tested at different strain rates. In the first two tests, the strain rate was kept constant. For the unload-reload loop, the direction of displacement was reversed but the strain rate was maintained at the same absolute magnitude. For the third and fourth test, the strain rate was varied during the test to investigate the strain rate dependence. The tests with varying strain rate showed a movement to the right in  $e\text{-log}(p')$  space when the strain rate increased, which is in line with

expectations. The isotaches drawn for the different strain rates did not converge, which is not in line with expectations (Vergote and Devrieze, 2024). The accuracy of the test setup may influence these results and further testing is recommended.

Test	Strain rate [mm/min]	Backpressure [kPa]
1	0.05	500
2	0.005	500
3	0.05 / 0.005	500
4	0.005 / 0.05	500

Table 4: Summary of CRS tests

## 5 CONCLUSIONS AND RECOMMENDATIONS

This report presents the available factual data from laboratory testing on samples from a borehole targeted at reaching the clays of the Kortrijk Formation. The report will be updated when all tests have been performed. While index testing on the first two sample tubes revealed silty material, the remaining 10 samples contained stiff clay of high plasticity with a natural water content close to the plastic limit. The combination of a low natural water content and a relatively high undrained shear strength explains the blocky appearance of the samples when they are cut with a cutting wire.

The zone of high density identified in Bus 6 from CT scanning showed a water content below the plastic limit.

In addition to index testing, one-dimensional compression tests (oedometers) were carried out to characterize the compressibility of the samples. These tests showed a low permeability and an overconsolidation ratio (OCR) between 2.1 and 3.0.

Strength testing of selected samples with the shear box and CU triaxial test showed that the drained shearing properties reported in the literature form encompass the observed test results. It is likely that the effect of small fissures reduces the strength from the intact properties observed in the literature. The strength of the fracture infill material could not be tested but it is likely that slurrified samples have similar properties to the infill material (Verastegui-Flores et al., 2023).

## REFERENCES

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- Vergote, T., Devrieze, Y., 2024. Viscoplasticity and large strain consolidation modelling with converging isotaches. Presented at the 18th European Conference on Soil Mechanics and Geotechnical Engineering (ECSMGE2024), ISSMGE, Lisbon, Portugal. <https://doi.org/10.1201/9781003431749-674>

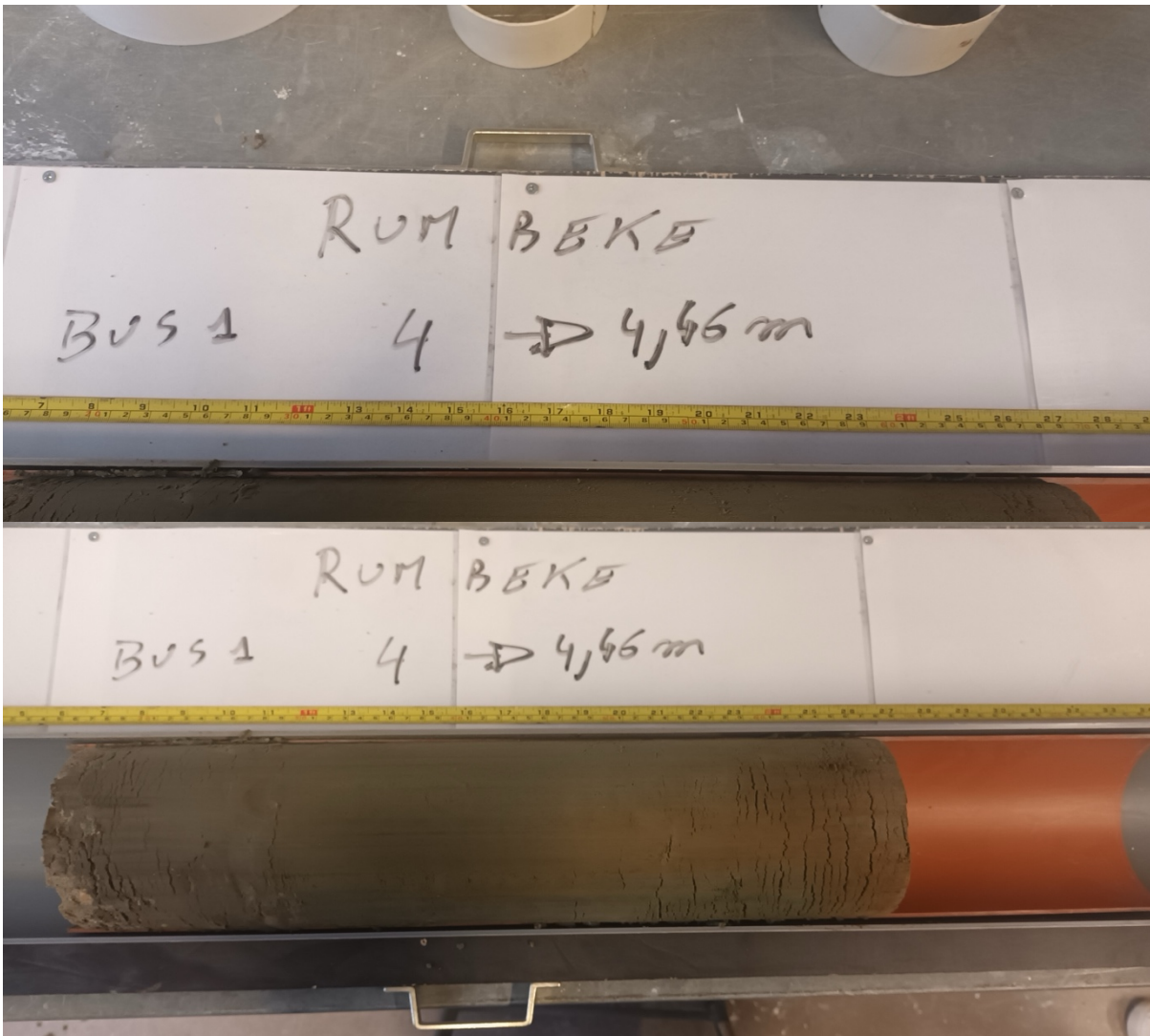
## APPENDIX A – TEST PROGRAM

Sample no	Depth below ground surface from [m]	Depth below ground surface to [m]	Depth [mTAW]	Subsample number	Natural water content	Atterberg limits/ fall cone	Sieving (PSD)	Hydrometer	Direct shear on intact sample	Direct shear on pre-sheared sample	CU triaxial test	DSS	Oedometer
BUS1	4.00	4.10	24.201	1-1									
	4.10	4.20	24.10	1-2	X	X	X	X					
	4.20	4.30	24.00	1-3	X	X	X	X					
	4.30	4.40	23.90	1-4	X	X	X	X	X				
	4.40	4.50	23.80	1-5	X	X	X	X					
BUS2	4.50	4.60	23.70	2-1									
	4.60	4.70	23.60	2-2	X	X	X	X					
	4.70	4.80	23.50	2-3	X	X	X	X					
	4.80	4.90	23.40	2-4	X	X	X	X					
	4.90	5.00	23.30	2-5	X	X	X	X	X				
BUS3	5.00	5.10	23.20	3-1	X	X	X	X	X				
	5.10	5.20	23.10	3-2	X	X	X	X	X				
	5.20	5.30	23.00	3-3	X	X	X	X	X				
	5.30	5.40	22.90	3-4	X	X	X	X					
	5.40	5.50	22.80	3-5	X	X	X	X					
BUS4	5.50	5.60	22.70	4-1	X	X	X	X	X	X			
	5.60	5.70	22.60	4-2	X	X	X	X	X	X			
	5.70	5.80	22.50	4-3	X	X	X	X					X
	5.80	5.90	22.40	4-4	X	X	X	X	X	X			
	5.90	6.00	22.30	4-5	X	X	X	X					
BUS5	6.00	6.10	22.20	5-1	X	X	X	X					
	6.10	6.20	22.10	5-2	X	X	X	X	X	X			
	6.20	6.30	22.00	5-3	X	X	X	X	X	X			
	6.30	6.40	21.90	5-4	X	X	X	X	X	X			
	6.40	6.50	21.80	5-5	X	X	X	X				X	
BUS6	6.50	6.60	21.70	6-1	X	X	X	X	X	X			
	6.60	6.70	21.60	6-2	X	X	X	X	X	X			
	6.70	6.80	21.50	6-3	X	X	X	X	X	X			
	6.80	6.90	21.40	6-4	X	X	X	X					
	6.90	7.00	21.30	6-5	X	X	X	X					

Sample no	Depth below ground surface from [m]	Depth below ground surface to [m]	Depth [mTAW]	Subsample number	Natural water content	Atterberg limits/ fall cone	Sieving (PSD)	Hydrometer	Direct shear on intact sample	Direct shear on pre-sheared sample	CU triaxial test	DSS	Oedometer
BUS7	7.00	7.10	21.20	7-1	X	X		X				X	
	7.10	7.20	21.10	7-2	X	X		X	X	X			
	7.20	7.30	21.00	7-3	X	X		X	X	X			
	7.30	7.40	20.90	7-4	X	X		X	X	X			
	7.40	7.50	20.80	7-5	X	X		X				X	
BUS8	7.50	7.60	20.70	8-1	X	X		X				X	
	7.60	7.70	20.60	8-2	X	X		X	X	X			
	7.70	7.80	20.50	8-3	X	X		X	X	X			
	7.80	7.90	20.40	8-4	X	X		X	X	X			
	7.90	8.00	20.30	8-5	X	X		X				X	
BUS9	8.00	8.10	20.20	9-1	X	X		X	X	X			
	8.10	8.20	20.10	9-2	X	X		X	X	X			
	8.20	8.30	20.00	9-3	X	X		X			X		
	8.30	8.40	19.90	9-4	X	X		X				X	X
	8.40	8.50	19.80	9-5	X	X		X	X	X			
BUS10	8.50	8.60	19.70	10-1	X	X		X				X	
	8.60	8.70	19.60	10-2	X	X		X	X	X			
	8.70	8.80	19.50	10-3	X	X		X	X	X			
	8.80	8.90	19.40	10-4	X	X		X	X	X			
	8.90	9.00	19.30	10-5	X	X		X				X	
BUS11	9.00	9.10	19.20	11-1	X	X		X					
	9.10	9.20	19.10	11-2	X	X		X	X	X			
	9.20	9.30	19.00	11-3	X	X		X	X	X			
	9.30	9.40	18.90	11-4	X	X		X	X	X			
	9.40	9.50	18.80	11-5	X	X		X					
BUS12	9.50	9.60	18.70	12-1									
	9.60	9.70	18.60	12-2	X								
	9.70	9.80	18.50	12-3		X					X		X
	9.80	9.90	18.40	12-4									
	9.90	10.00	18.30	12-5									

## APPENDIX B – SAMPLE PHOTOGRAPHS

Bus 1



Bus 2



Bus 3



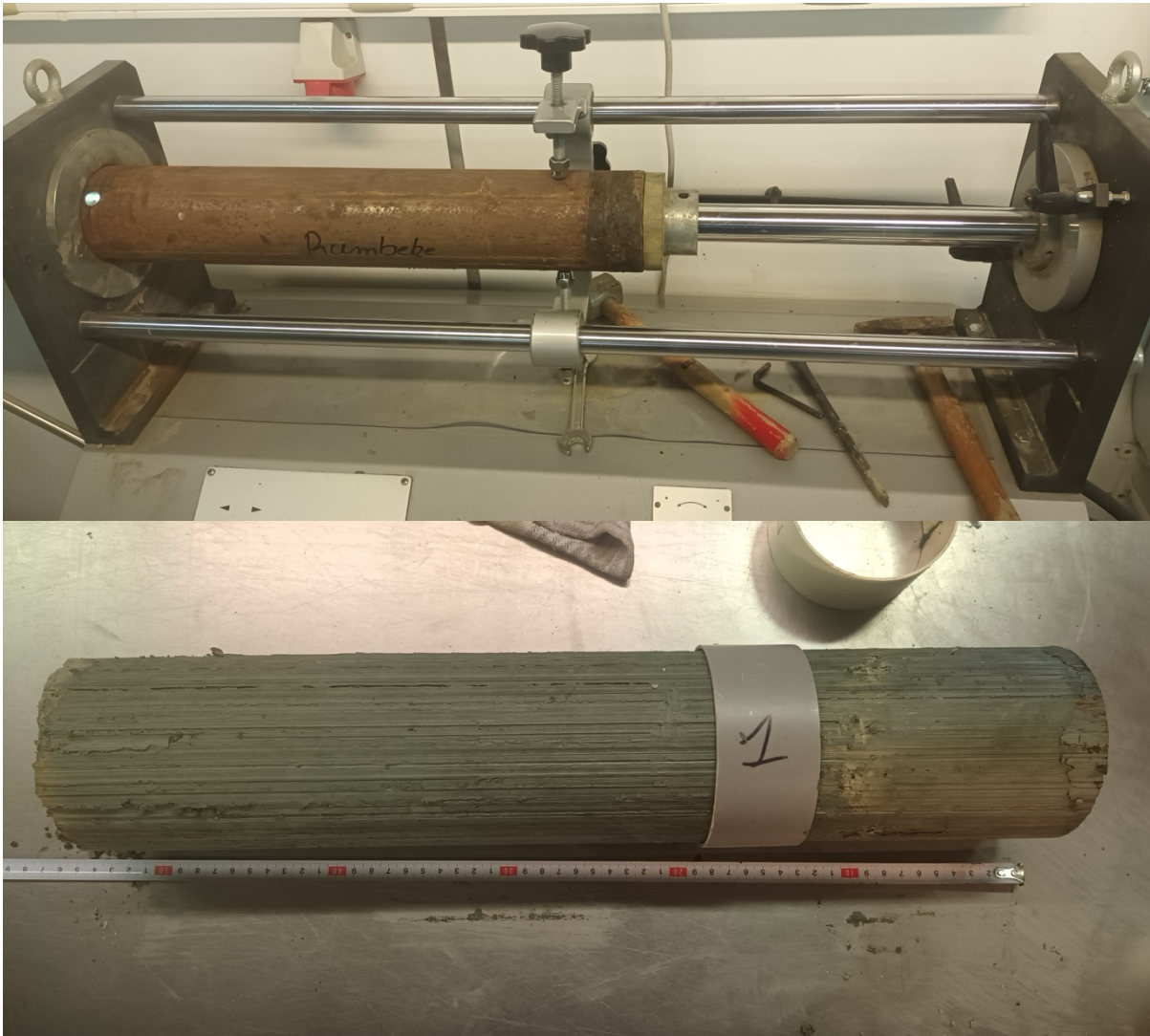
Bus 4



Bus 5



Bus 6







Bus 7



Bus 8



Bus 10



Bus 12



# APPENDIX C – DRILLING RECORD



Project: UniversiteitGent		Project Nr: ORGEO2300117				
Boorplaats: Roeselare		Boring nr: B1				
		Datum: 20/06/2023				
Grondwater (m-Mv)	Peilbuisconstructie	Diepte (m-Mv)	Profiel	Beschrijving grondsoort	Grens (m-Mv)	Geologische en/of organoleptische waarnemingen
				<b>Zeer fijn zand, zeer sterk silthoudend, vochtig, bruin</b>		
				<b>Zeer fijn zand, sterk silthoudend, weinig vochtig, donkerbruin</b>	0,50	
		1		<b>Silt, fijn zandhoudend, vochtig, roestbruin</b>	1,00	
				<b>Zeer fijn zand, silthoudend, vochtig, roestbruin</b>	1,50	
		2		<b>Fijn zand, silthoudend, zeer vochtig, bruin</b>	2,00	
				<b>Fijn zand, silthoudend, verzadigd, bruin</b>	2,50	
		3		<b>Fijn zand, silthoudend, verzadigd, grijs-bruin</b>	3,00	
				<b>Zeer fijn zand, zeer sterk silthoudend, verzadigd, grijs</b>	3,50	
		4		<b>Ongeroerd monster</b>	4,00	
				<b>Boorgat gekuist</b>	4,46	
				<b>Ongeroerd monster</b>	4,50	
		5			5,00	

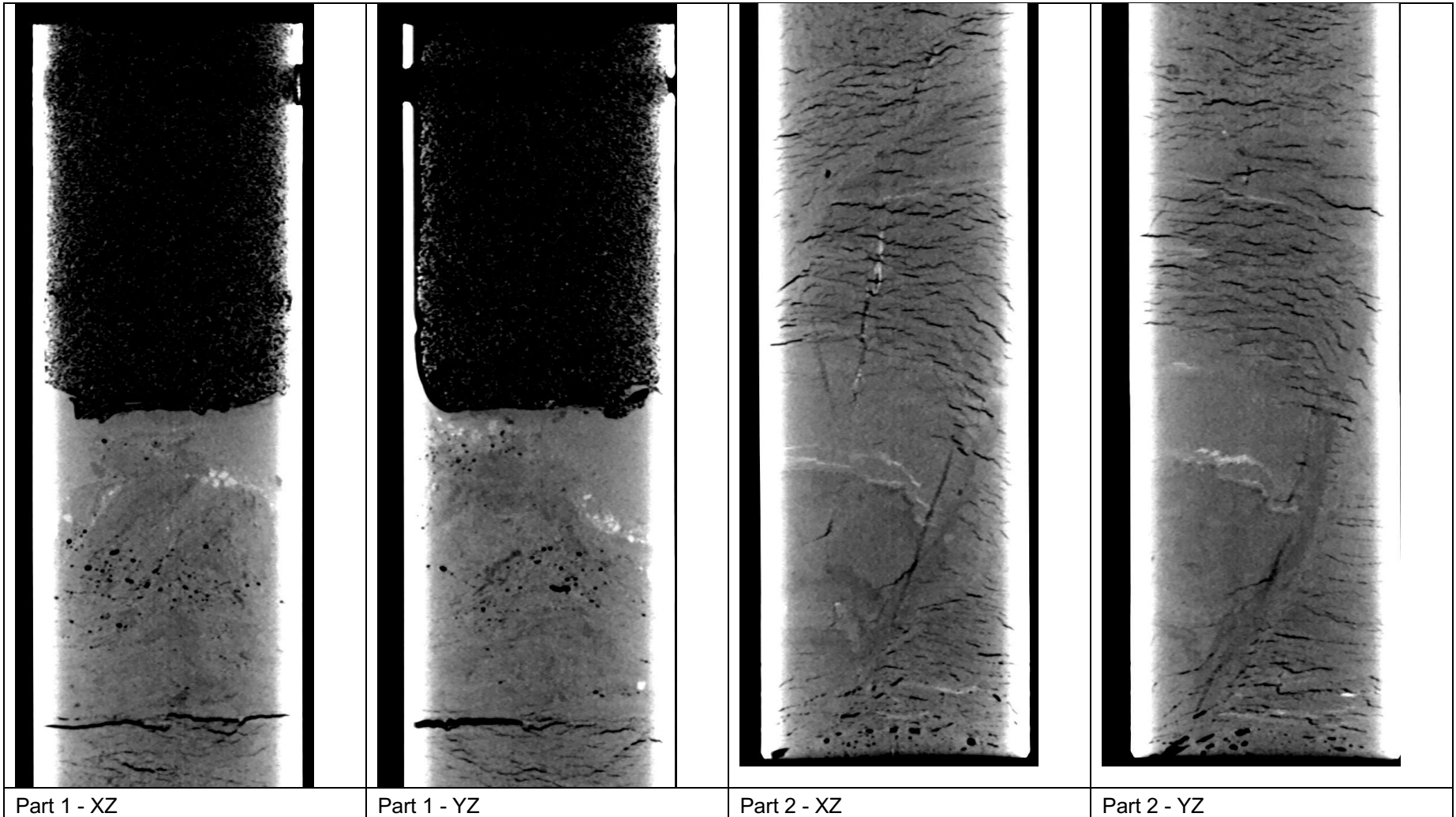


Project: UniversiteitGent      Project Nr: ORGEO2300117  
 Boorplaats: Roeselare      Boring nr: B1      Datum: 20/06/2023

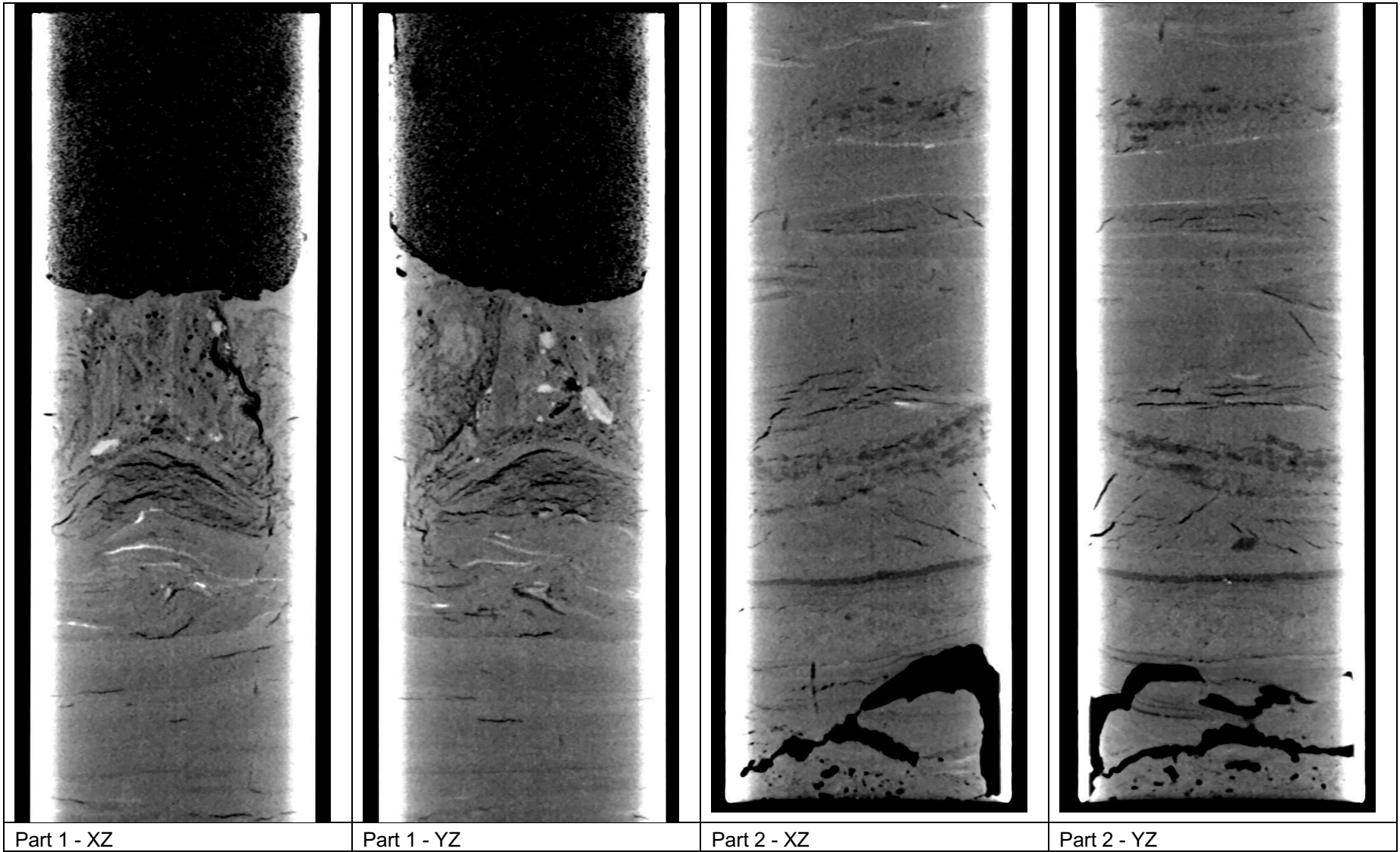
Grondwater (m-Mv)	Peilbuisconstructie	Diepte (m-Mv)	Profiel	Beschrijving grondsoort	Grens (m-Mv)	Geologische en/of organoleptische waarnemingen
				Ongeroerd monster	5,30	
				Boorgat gekuist	5,42	
				Ongeroerd monster	5,50	
		6		Ongeroerd monster	6,00	
				Ongeroerd monster	6,50	
		7		Ongeroerd monster	7,00	
				Ongeroerd monster	7,50	
		8		Boorgat gekuist	7,87	
				Ongeroerd monster	8,00	
				Boorgat gekuist	8,42	
				Ongeroerd monster	8,50	
		9		Ongeroerd monster	9,00	
				Ongeroerd monster	9,50	
		10			10,00	

## APPENDIX D – CT SCANNING IMAGES

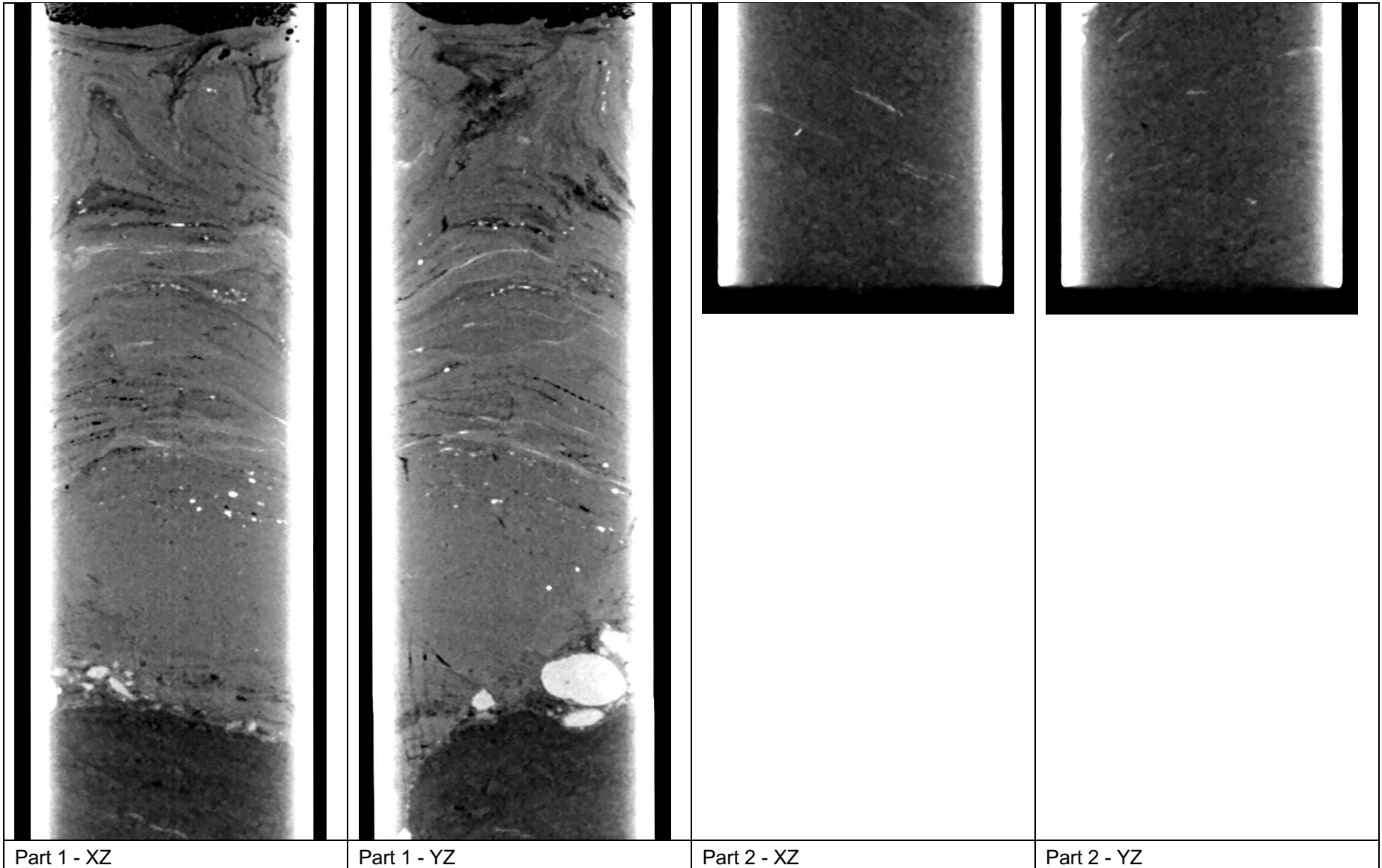
Bus 1



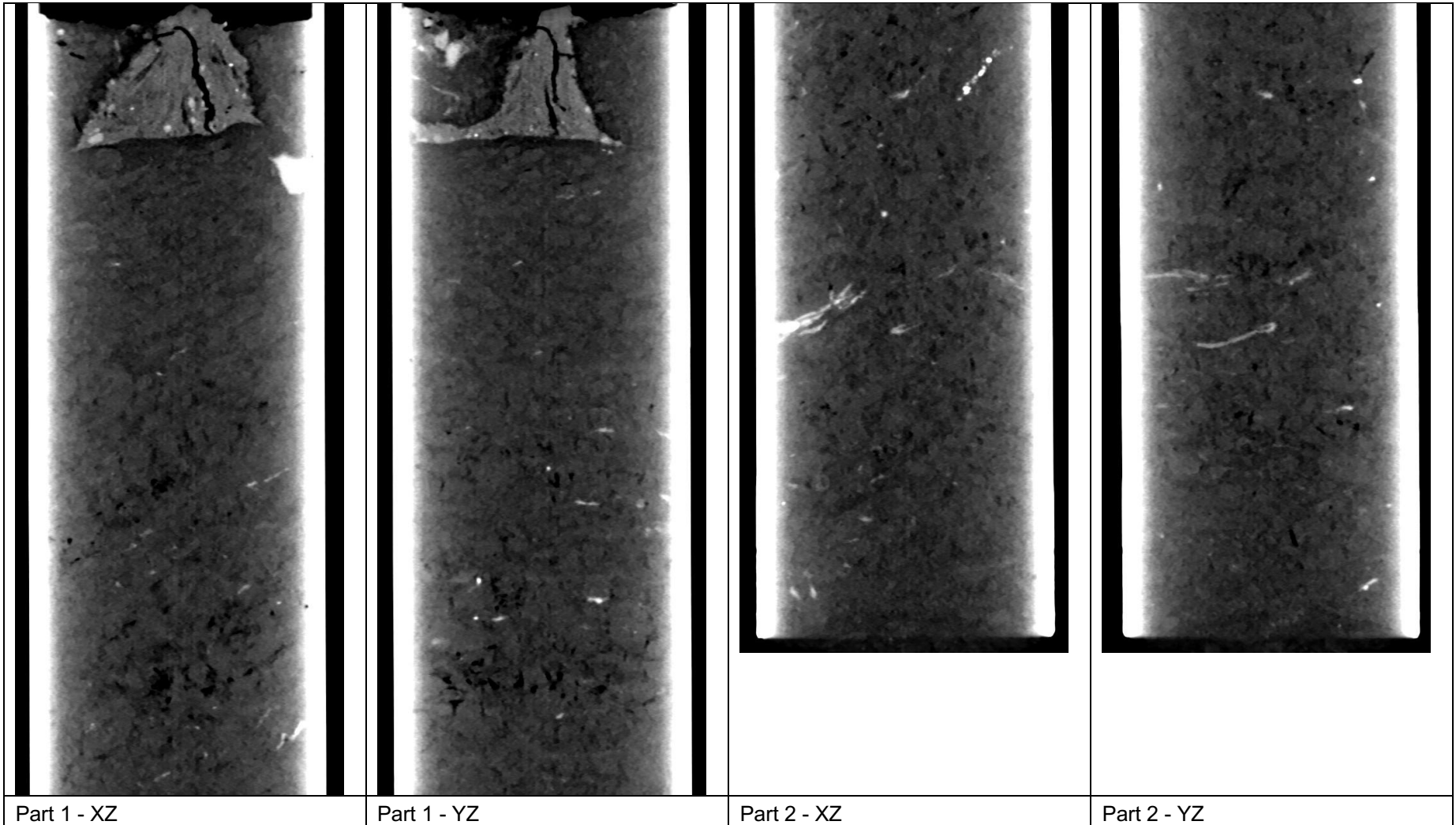
Bus 2



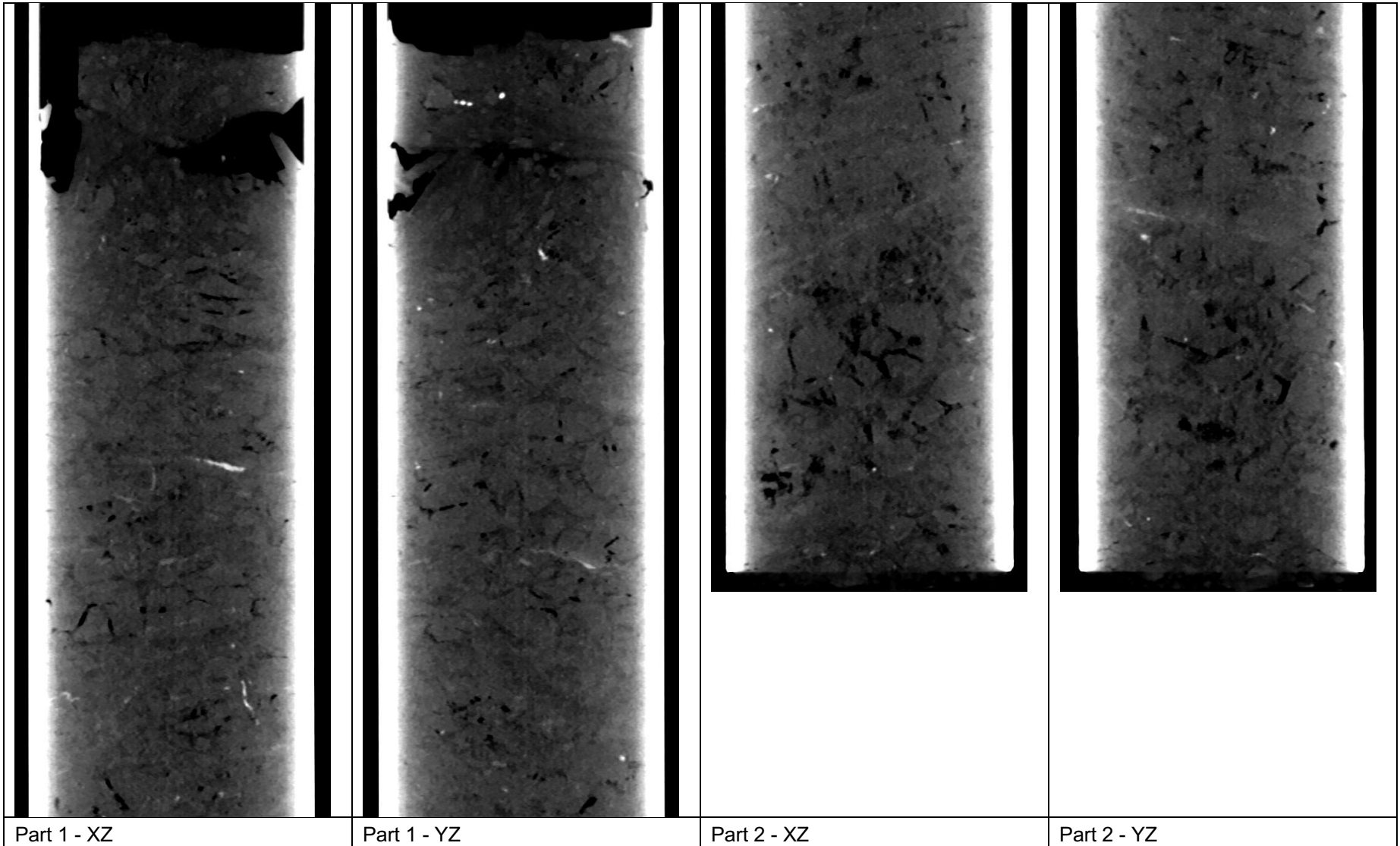
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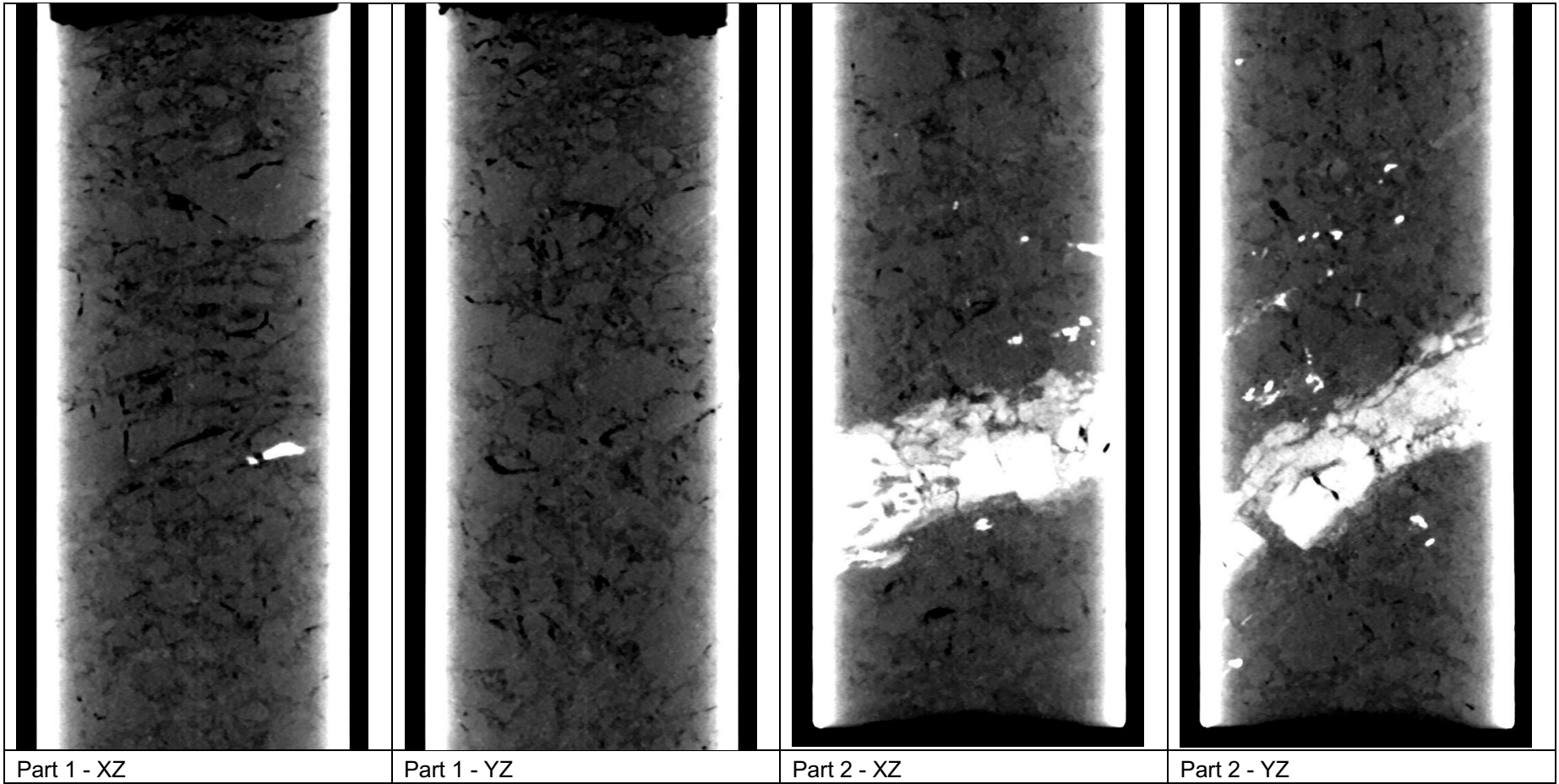
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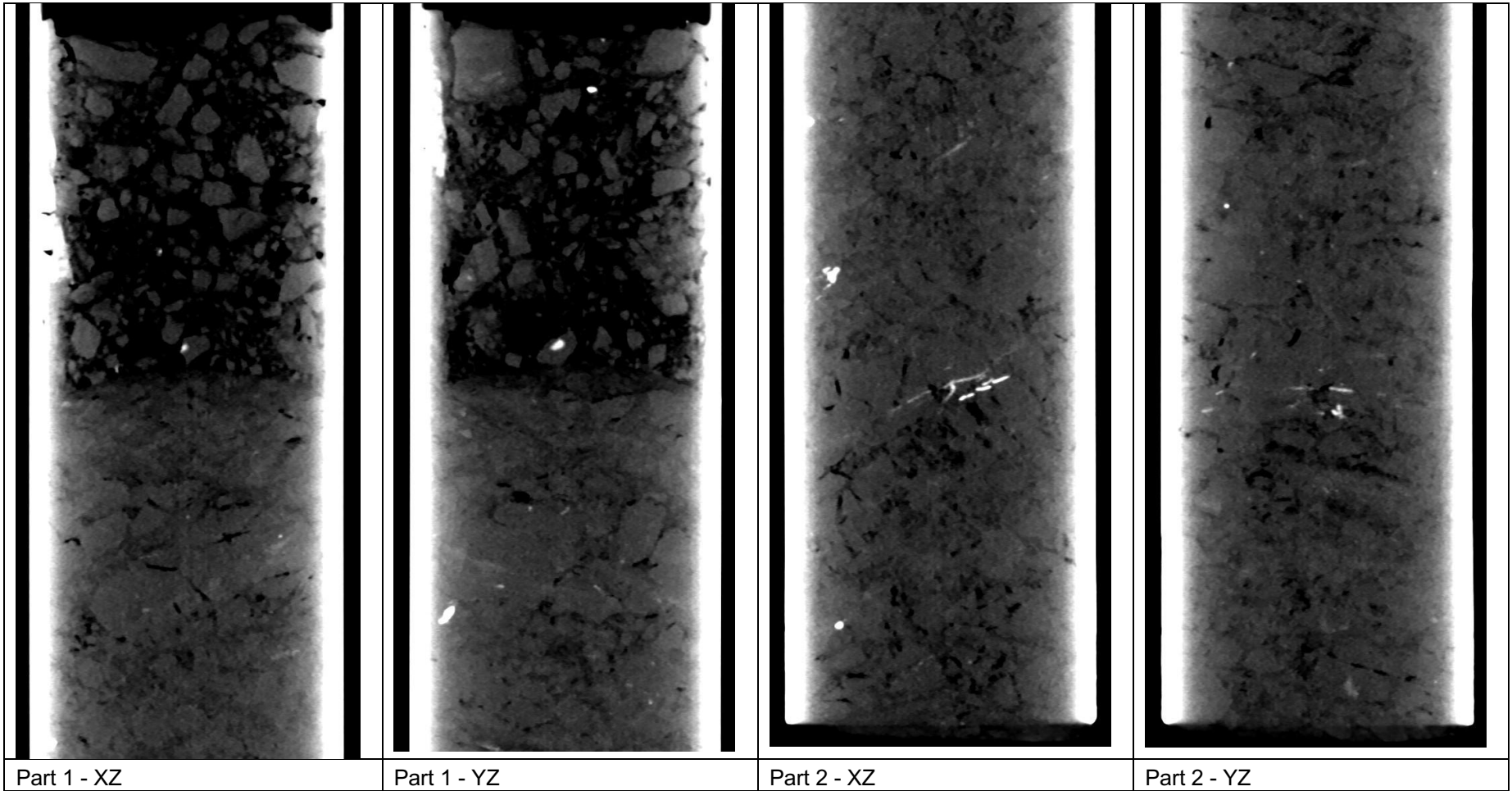
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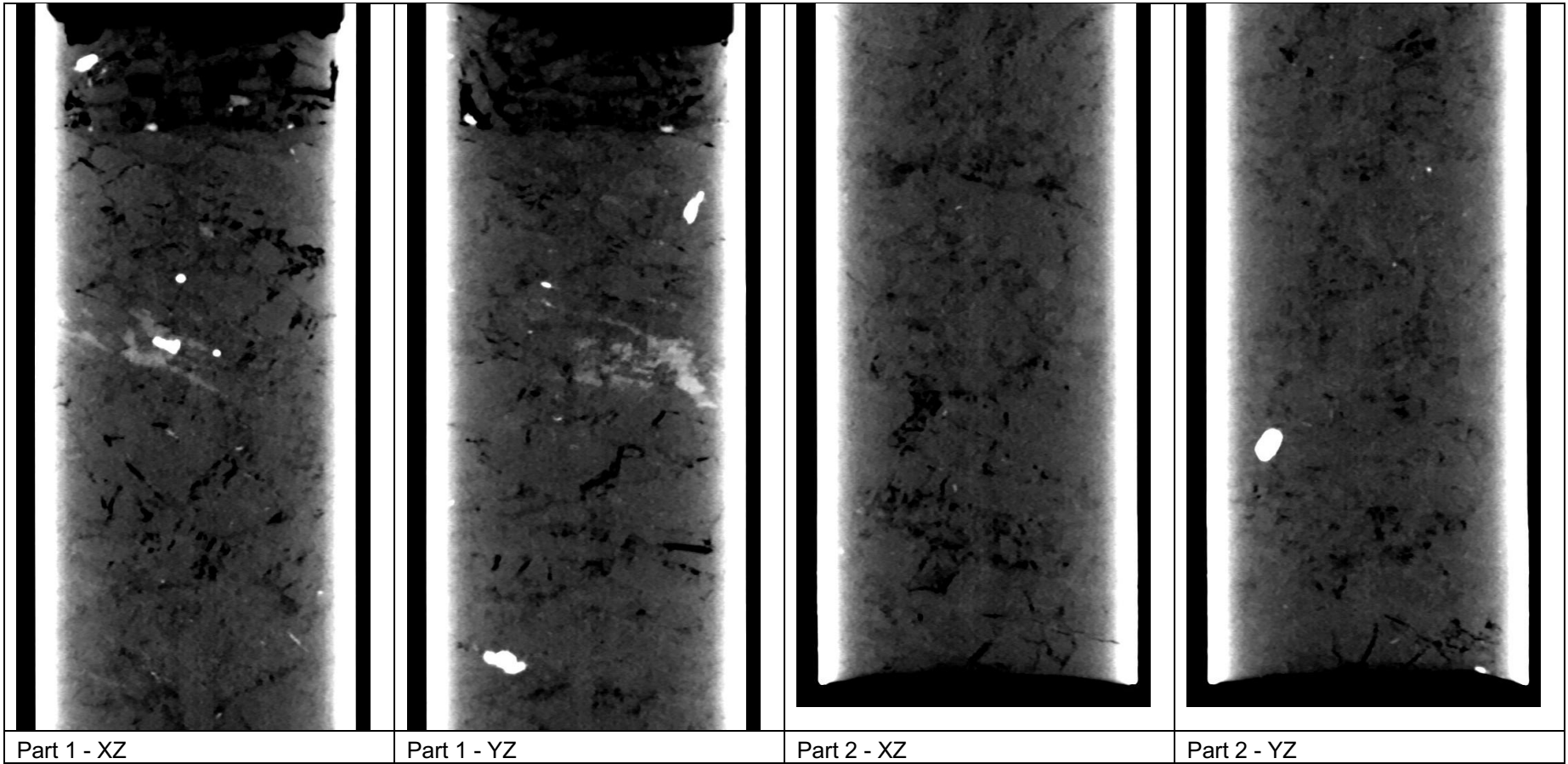
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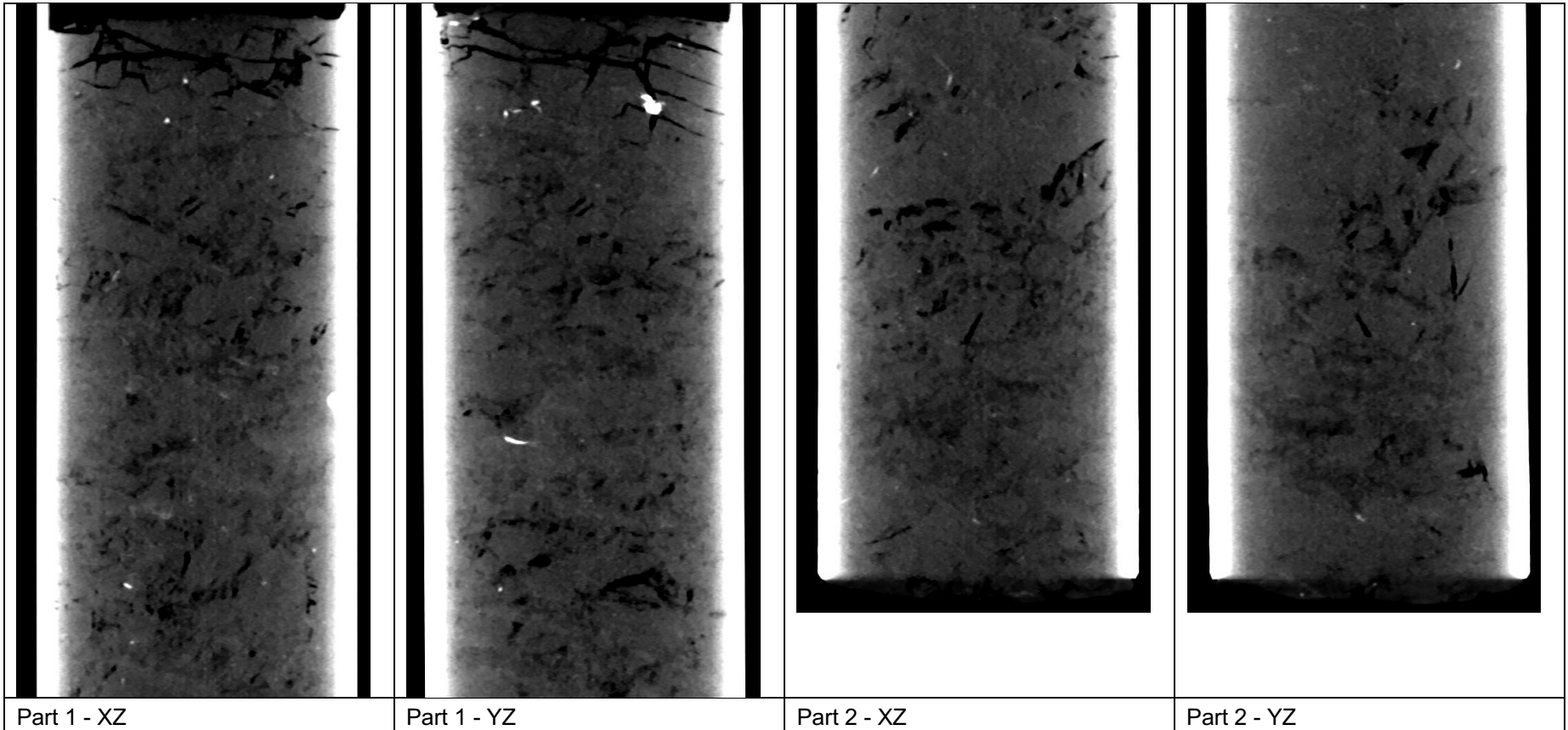
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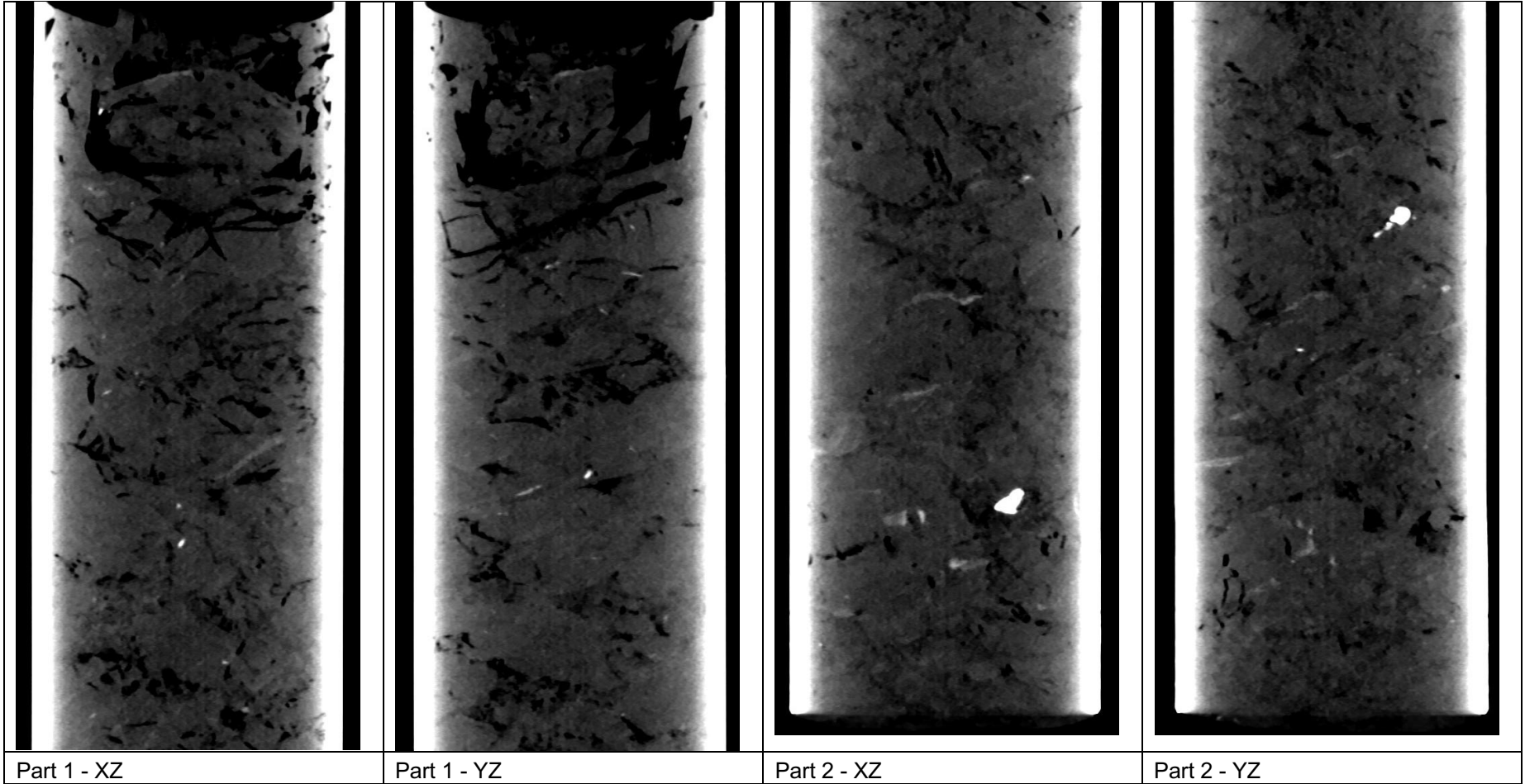
Bus 8



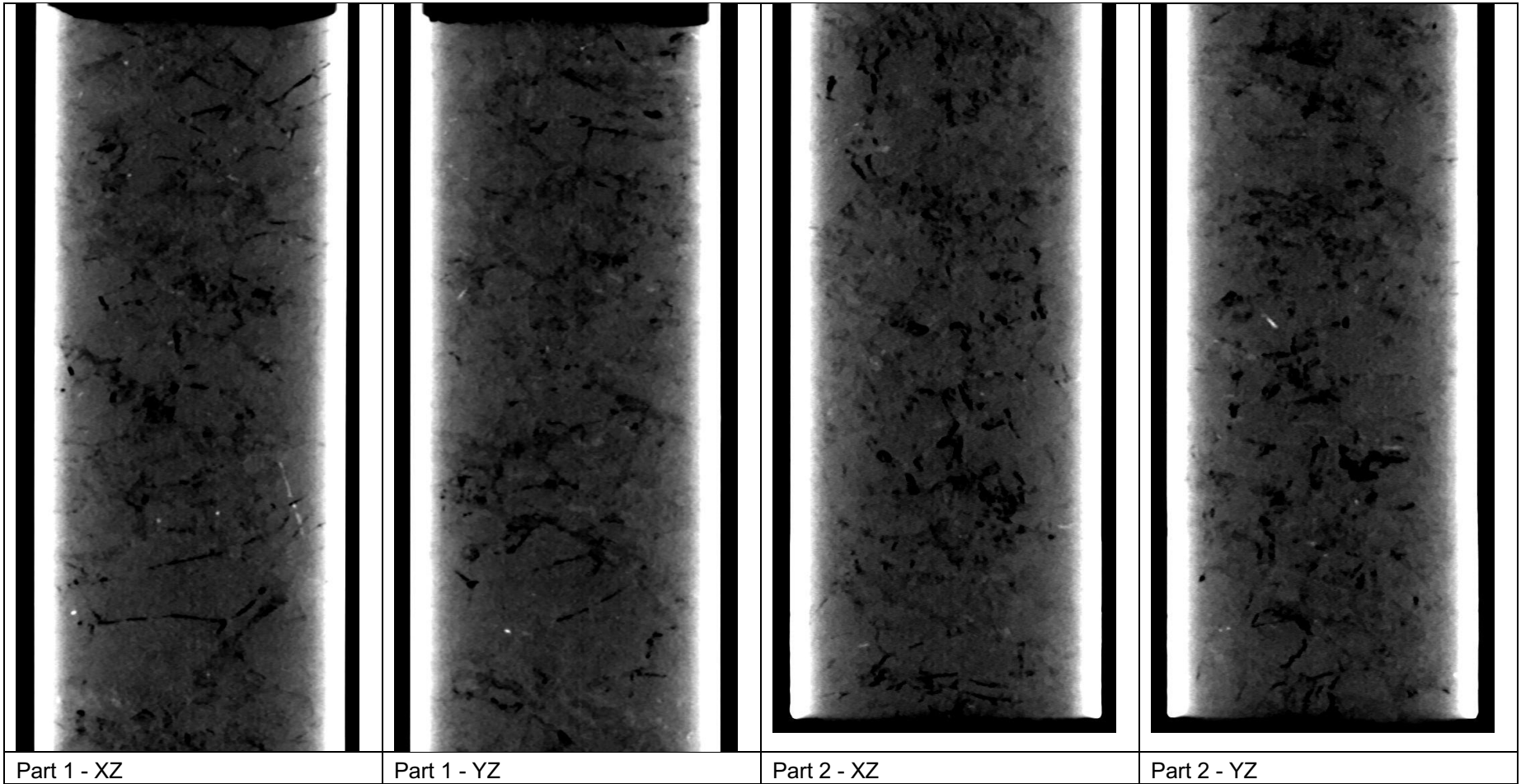
Bus 9



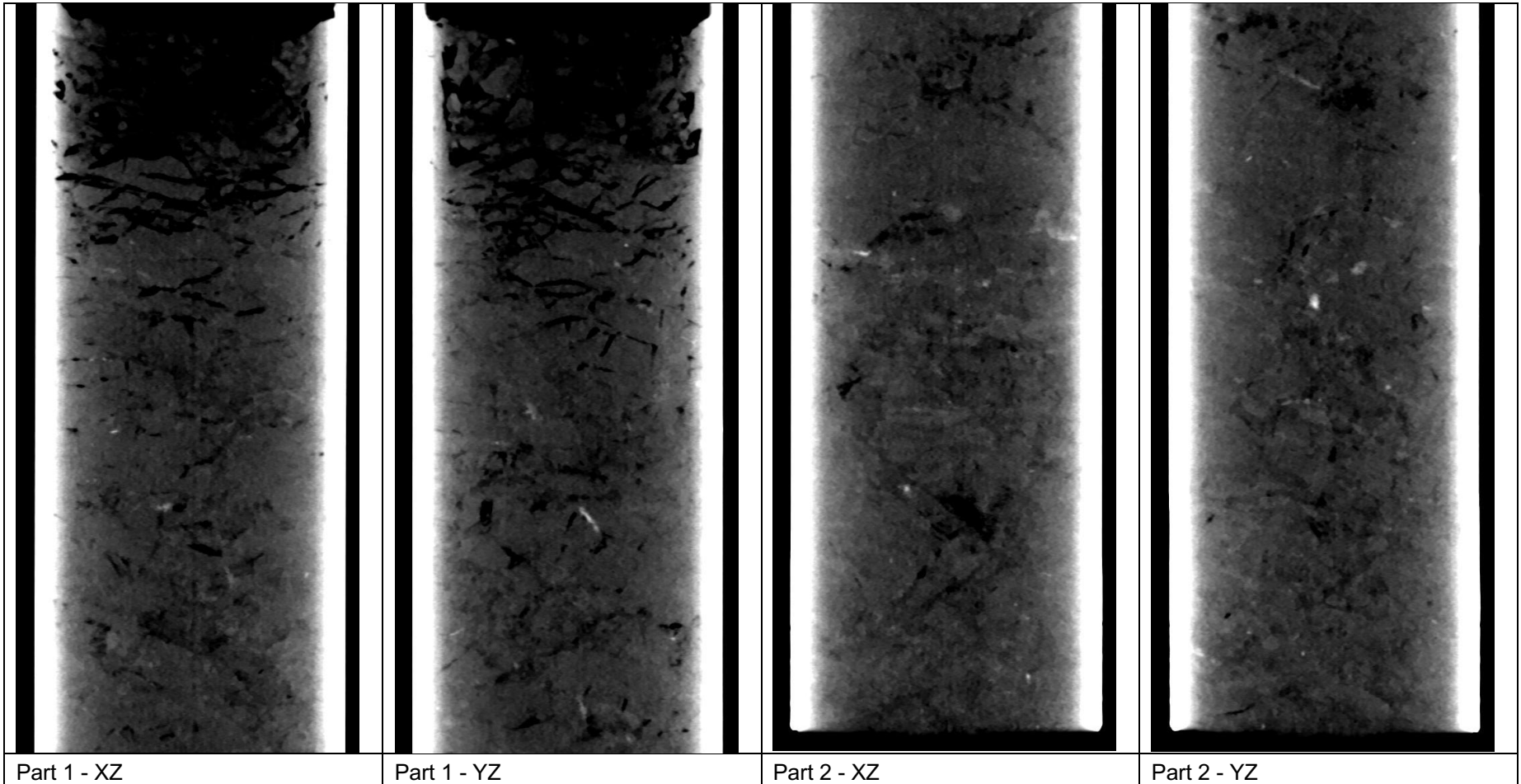
Bus 10



Bus 11

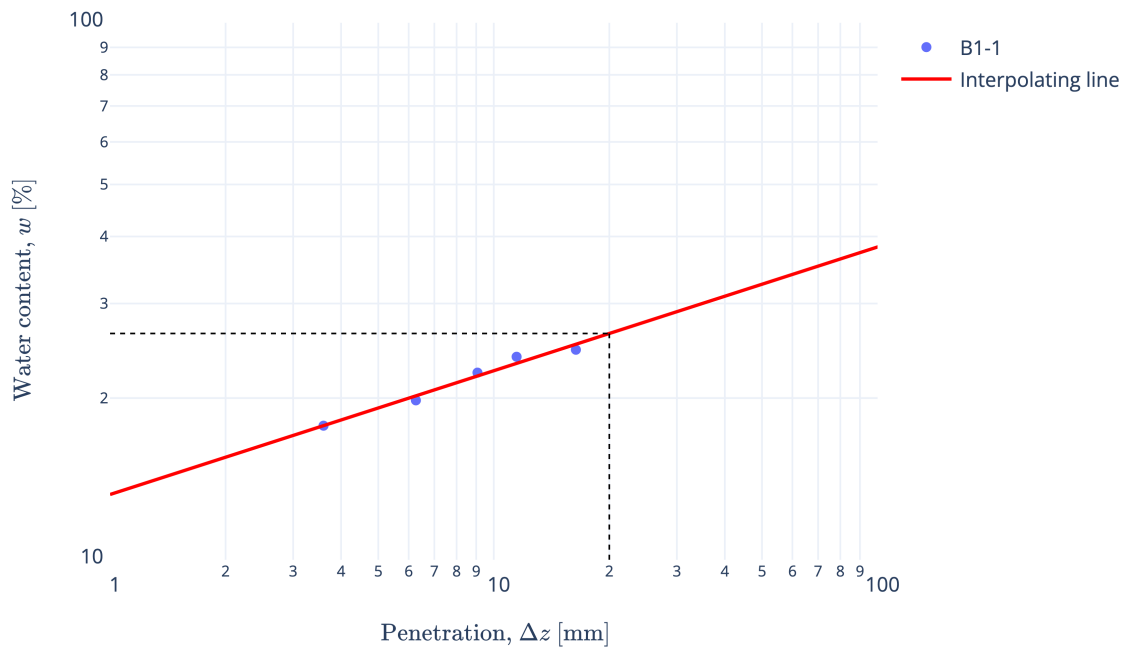


Bus 12



# APPENDIX E – ATTERBERG LIMIT TEST RESULTS

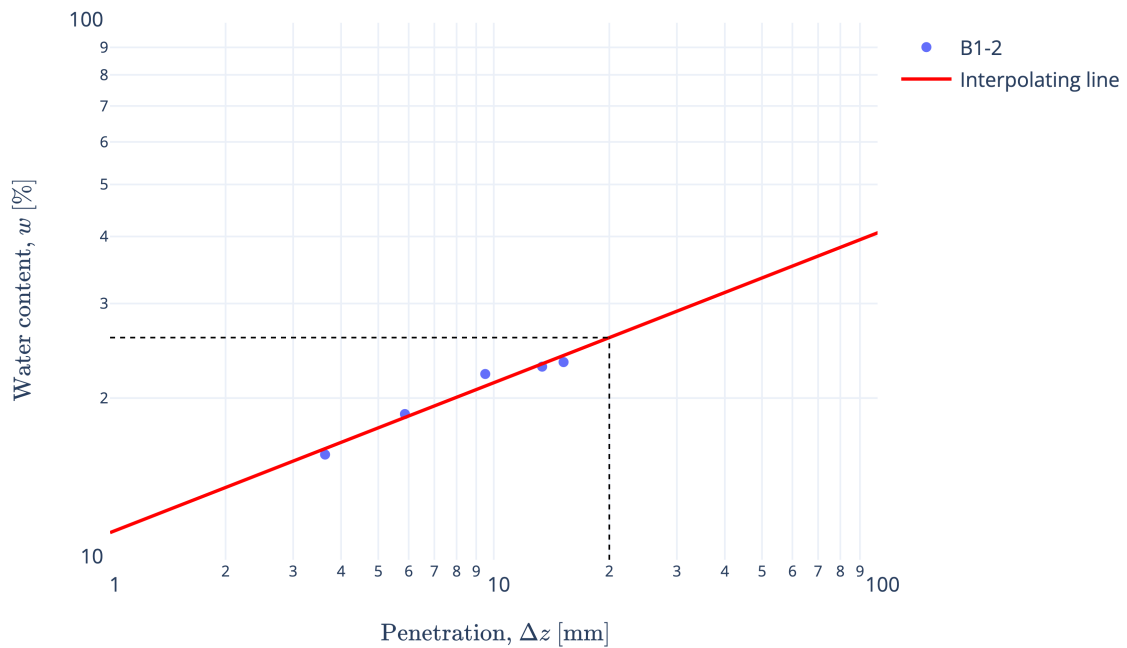
B1-1 - Liquid limit test (Fall cone)



### Test Summary

Liquid limit [%]	26.4	
Plastic limit [%]	15.5	
Plasticity index [%]	10.9	
Remarks		
Borehole:	Sample: B1-1	Specimen:
Depth:		

## B1-2 - Liquid limit test (Fall cone)



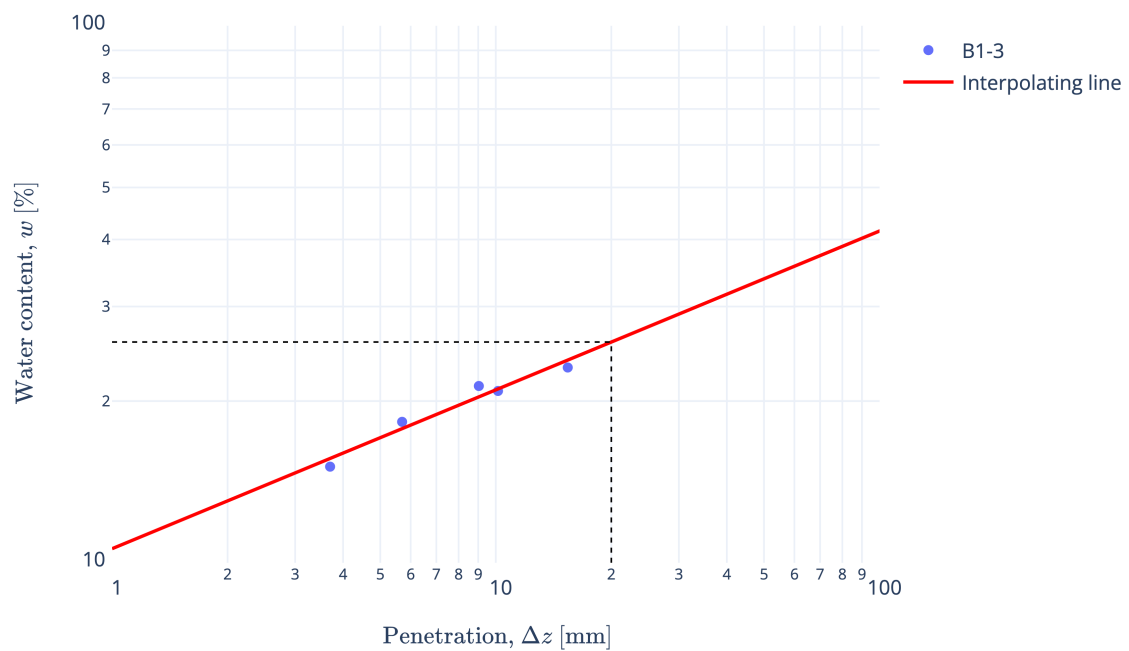
### Test Summary

Liquid limit [%]	25.9
Plastic limit [%]	13.6
Plasticity index [%]	12.3

Remarks

Borehole:	Sample: B1-2	Specimen:
Depth:		

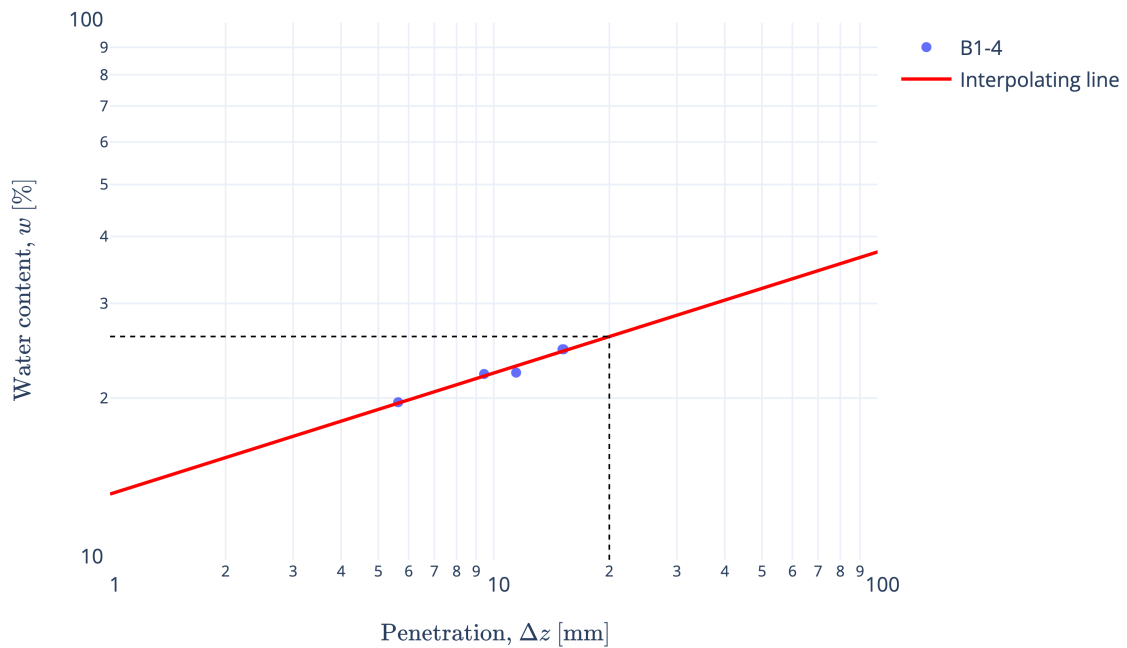
## B1-3 - Liquid limit test (Fall cone)



### Test Summary

Liquid limit [%]	25.8	
Plastic limit [%]	13.0	
Plasticity index [%]	12.7	
Remarks		
Borehole:	Sample: B1-3	Specimen:
Depth:		

## B1-4 - Liquid limit test (Fall cone)



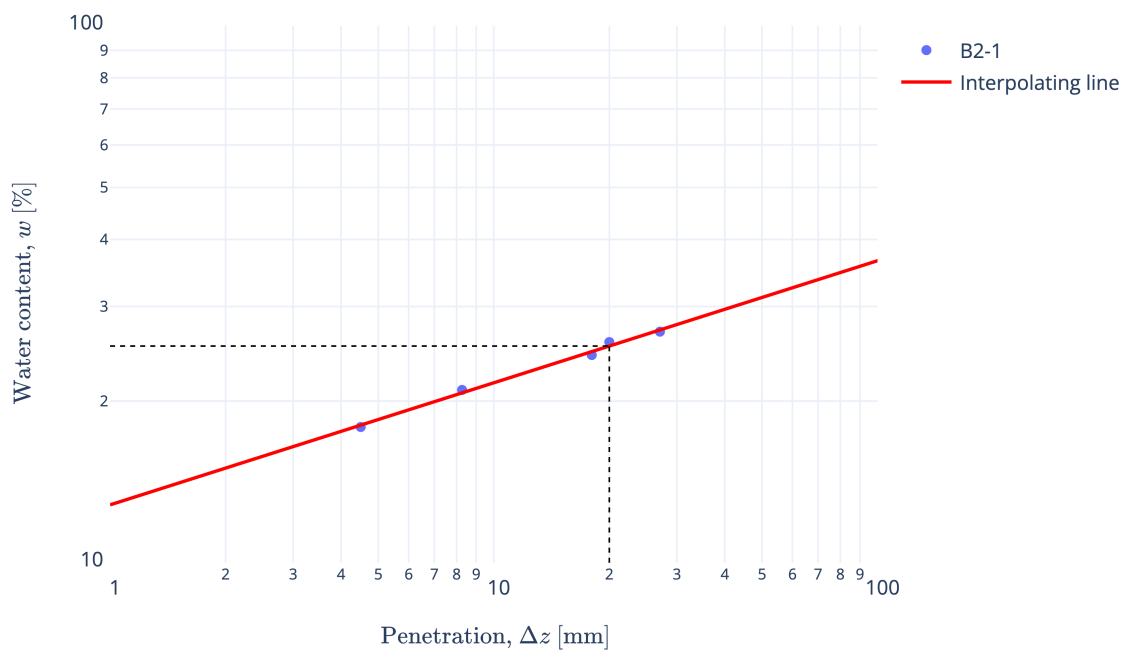
### Test Summary

Liquid limit [%]	26.0
Plastic limit [%]	15.5
Plasticity index [%]	10.5

Remarks

Borehole:	Sample: B1-4	Specimen:
Depth:		

## B2-1 - Liquid limit test (Fall cone)



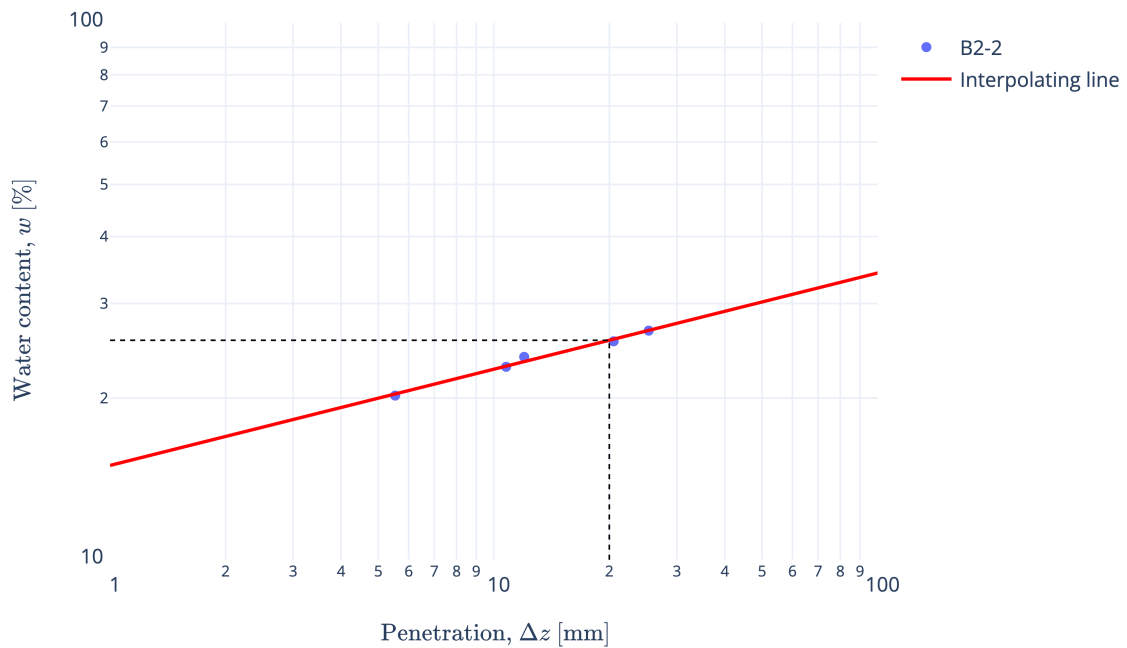
### Test Summary

Liquid limit [%]	25.3
Plastic limit [%]	15.0
Plasticity index [%]	10.3

Remarks

Borehole:	Sample: B2-1	Specimen:
Depth:		

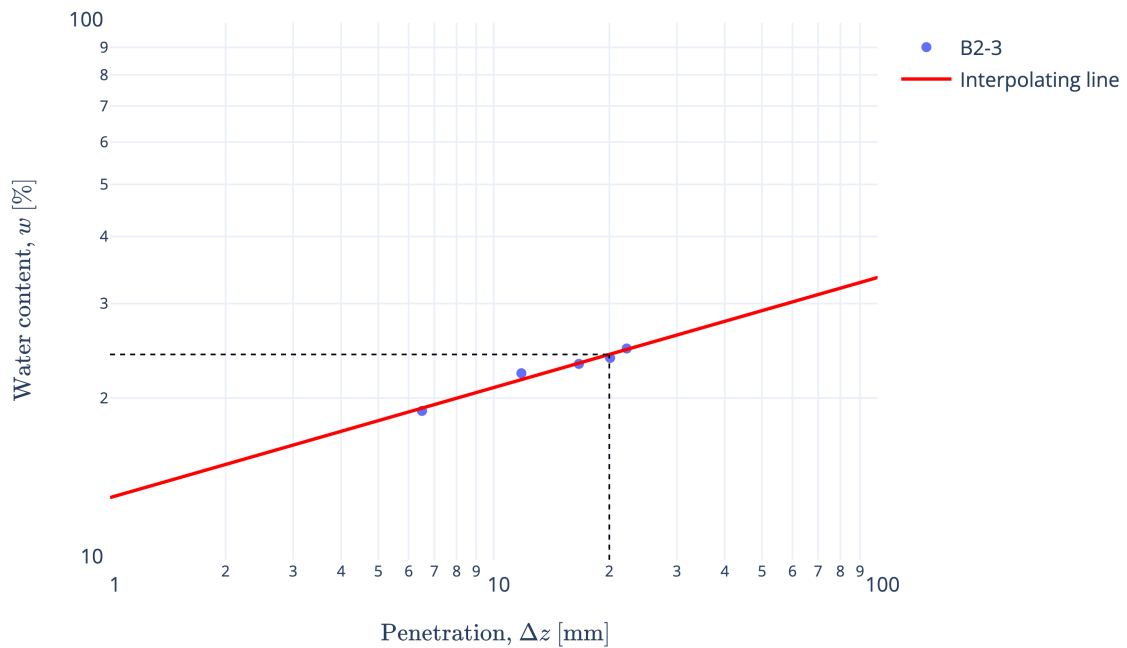
## B2-2 - Liquid limit test (Fall cone)



### Test Summary

Liquid limit [%]	25.6	
Plastic limit [%]	17.0	
Plasticity index [%]	8.7	
Remarks		
Borehole:	Sample: B2-2	Specimen:
Depth:		

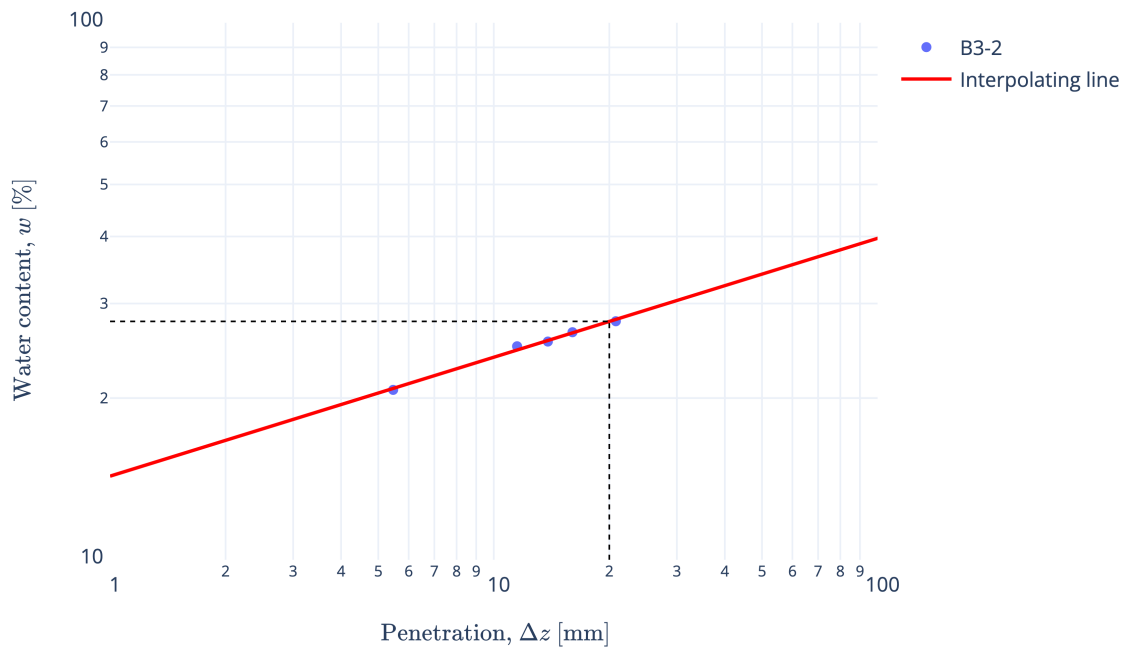
## B2-3 - Liquid limit test (Fall cone)



### Test Summary

Liquid limit [%]	24.1	
Plastic limit [%]	15.0	
Plasticity index [%]	9.1	
Remarks		
Borehole:	Sample: B2-3	Specimen:
Depth:		

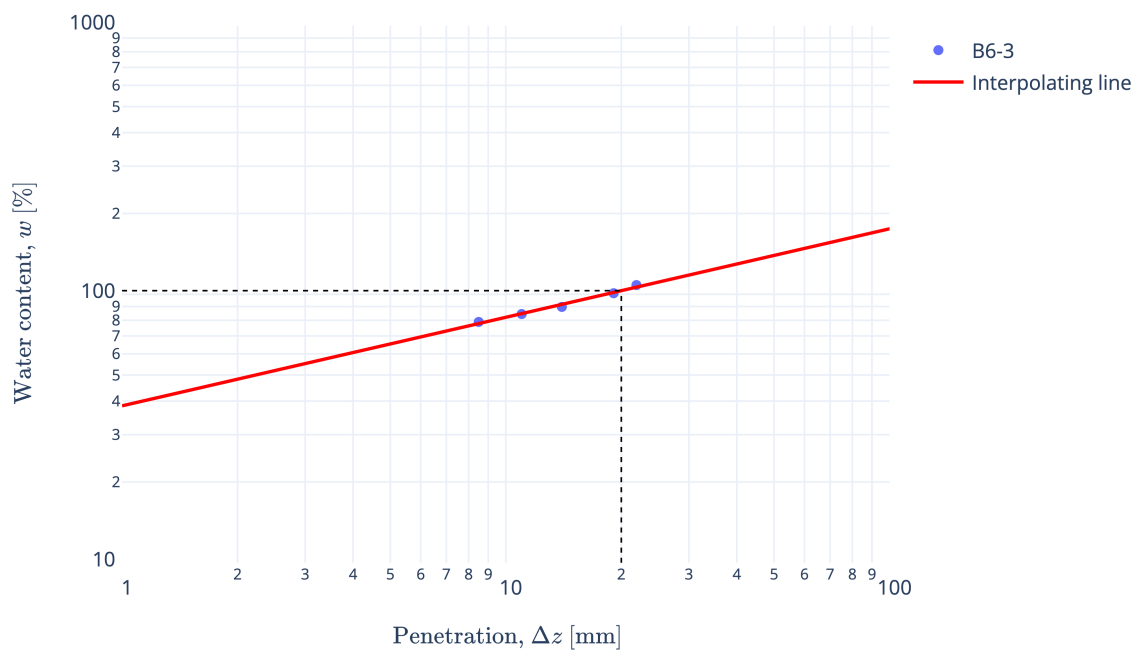
## B3-2 - Liquid limit test (Fall cone)



### Test Summary

Liquid limit [%]	27.8	
Plastic limit [%]	16.7	
Plasticity index [%]	11.1	
Remarks		
Borehole:	Sample: B3-2	Specimen:
Depth:		

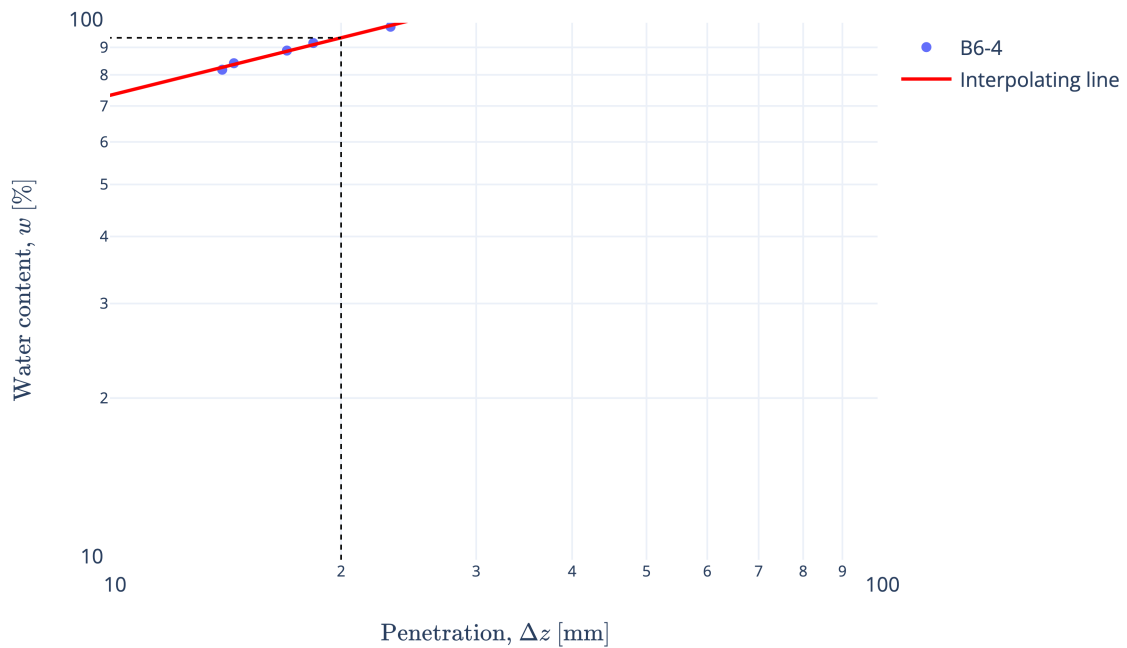
## B6-3 - Liquid limit test (Fall cone)



### Test Summary

Liquid limit [%]	103.1	
Plastic limit [%]	48.3	
Plasticity index [%]	54.8	
Remarks		
Borehole:	Sample: B6-3	Specimen:
Depth:		

B6-4 - Liquid limit test (Fall cone)



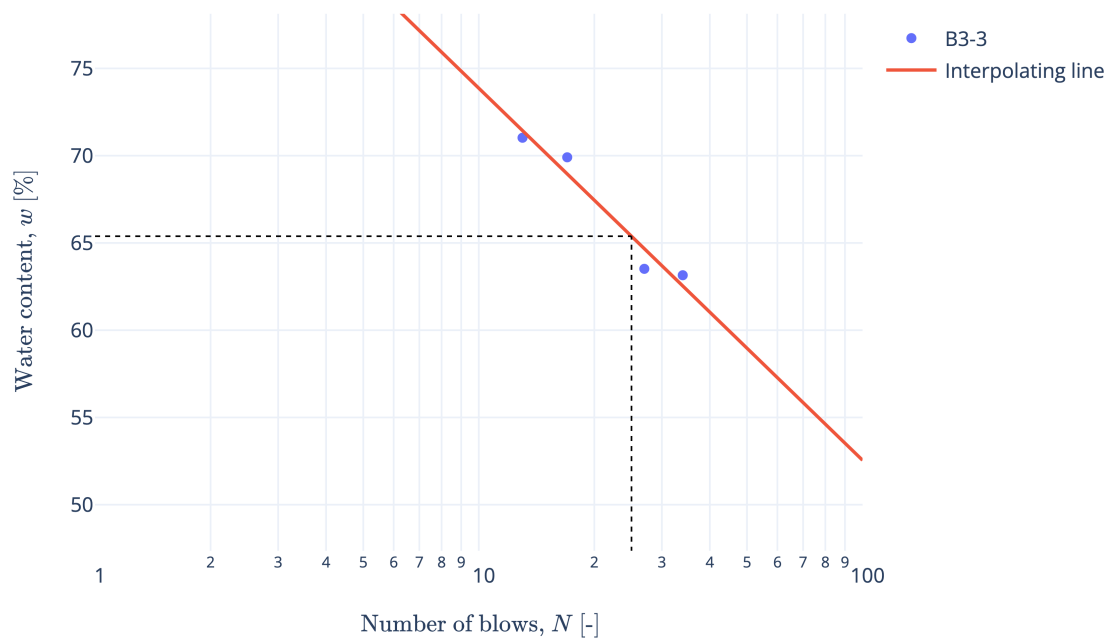
### Test Summary

Liquid limit [%]	93.8
Plastic limit [%]	41.3
Plasticity index [%]	52.4

Remarks

Borehole:	Sample: B6-4	Specimen:
Depth:		

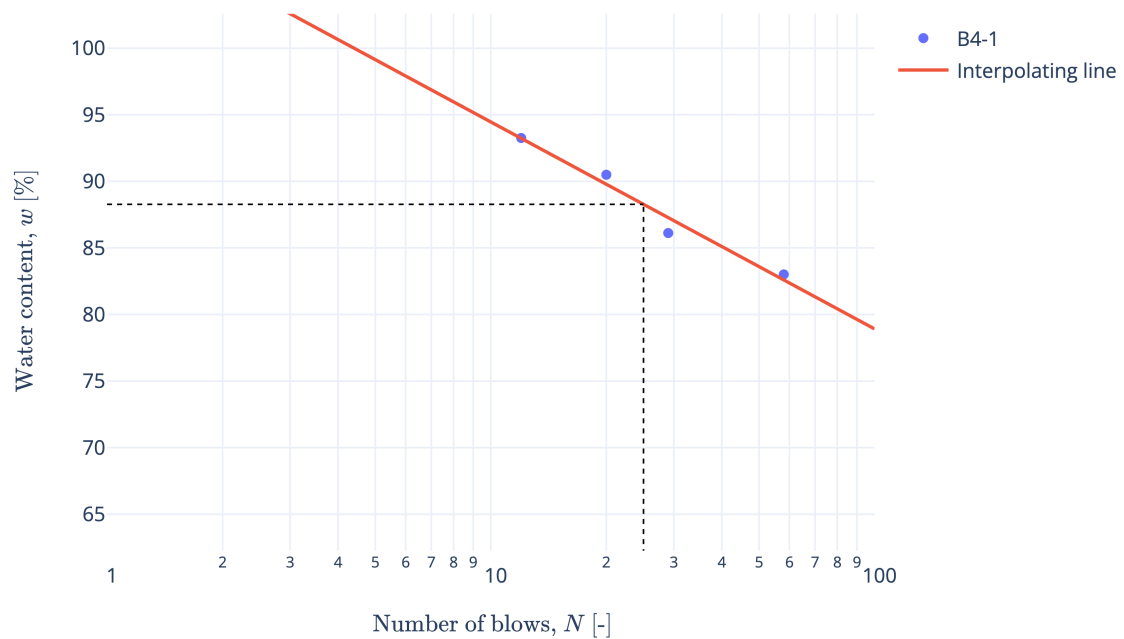
## B3-3 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	65.4	
Plastic limit [%]	40.6	
Plasticity index [%]	24.8	
Remarks		
Borehole:	Sample: B3-3	Specimen:
Depth:		

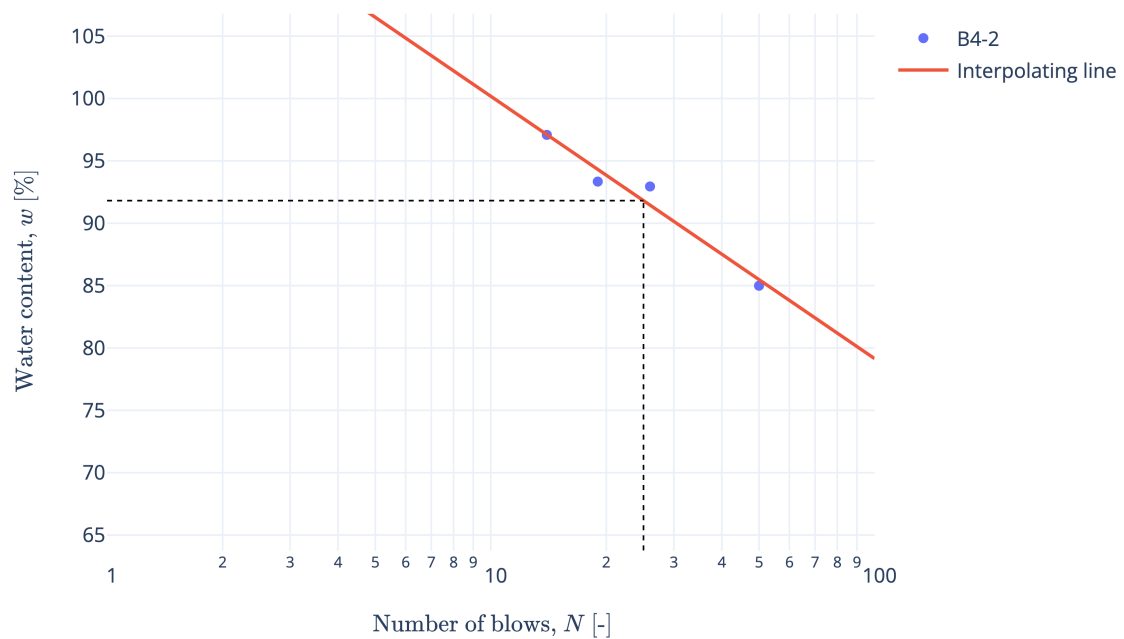
## B4-1 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	88.3	
Plastic limit [%]	49.0	
Plasticity index [%]	39.2	
Remarks		
Borehole:	Sample: B4-1	Specimen:
Depth:		

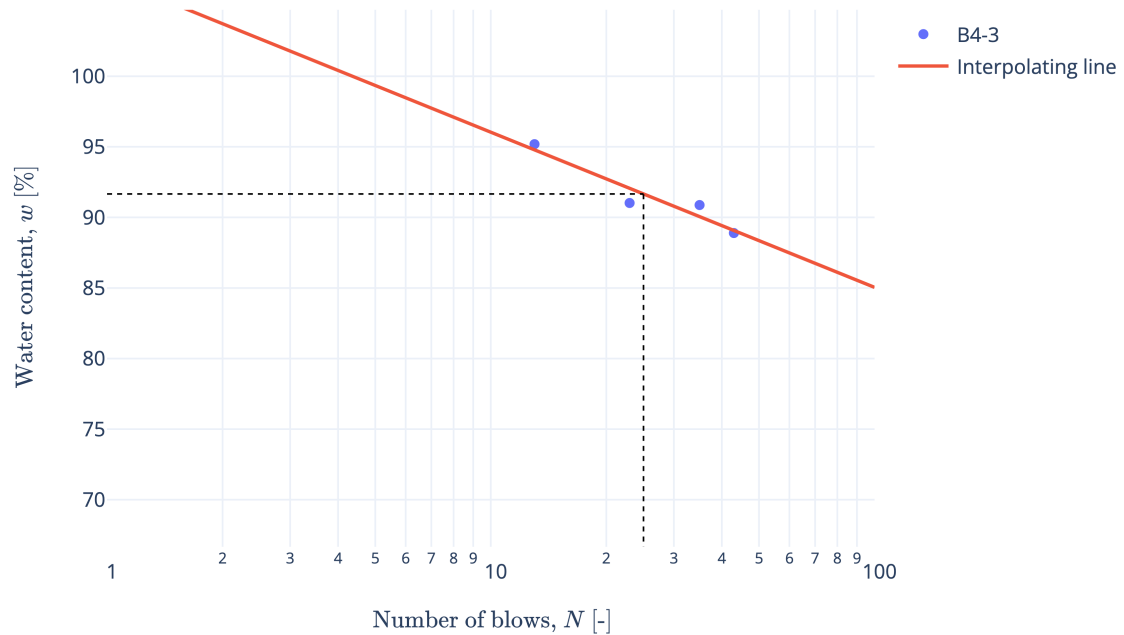
B4-2 - Liquid limit test (Casagrande cup)



## Test Summary

Liquid limit [%]	91.8	
Plastic limit [%]	42.2	
Plasticity index [%]	49.6	
Remarks		
Borehole:	Sample: B4-2	Specimen:
Depth:		

B4-3 - Liquid limit test (Casagrande cup)



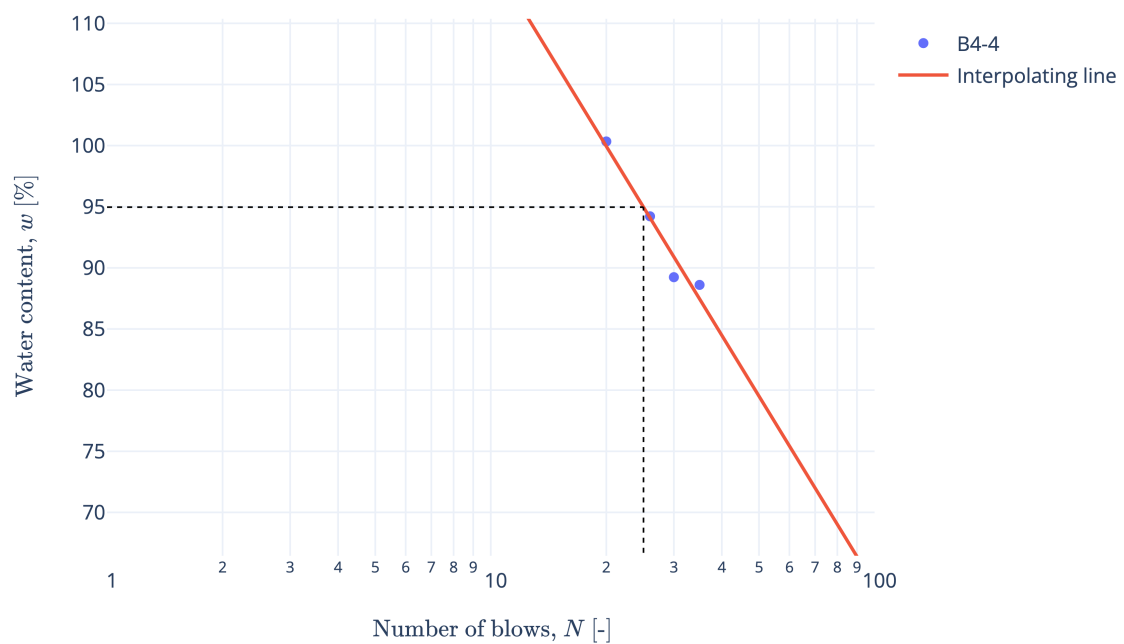
### Test Summary

Liquid limit [%]	91.7
Plastic limit [%]	50.3
Plasticity index [%]	41.4

Remarks

Borehole:	Sample: B4-3	Specimen:
Depth:		

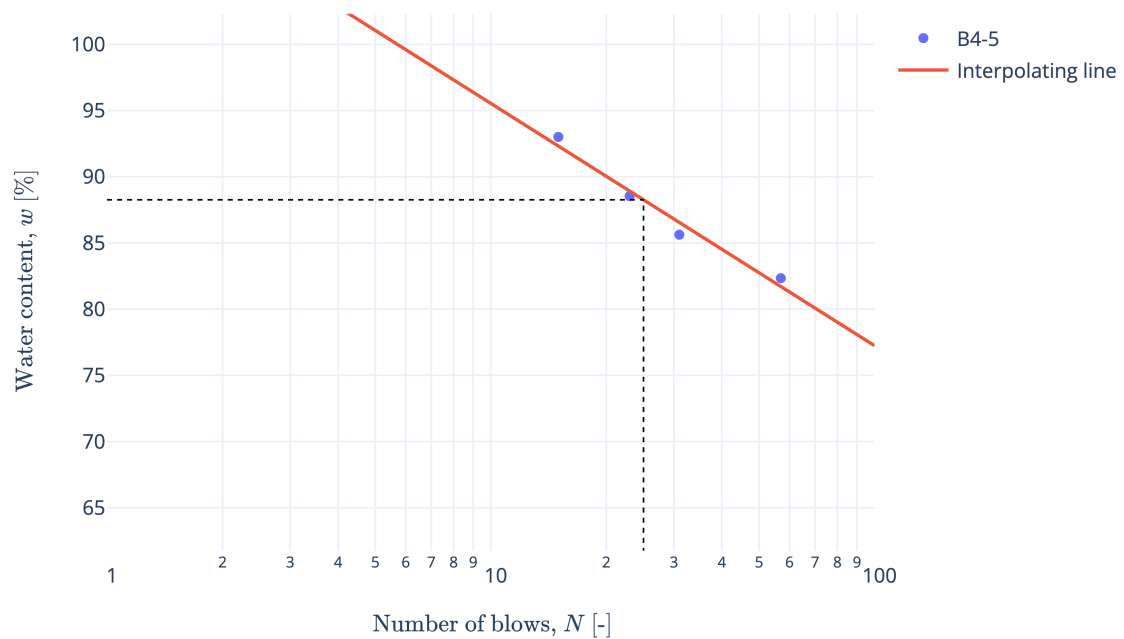
## B4-4 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	95.0	
Plastic limit [%]	41.4	
Plasticity index [%]	53.6	
Remarks		
Borehole:	Sample: B4-4	Specimen:
Depth:		

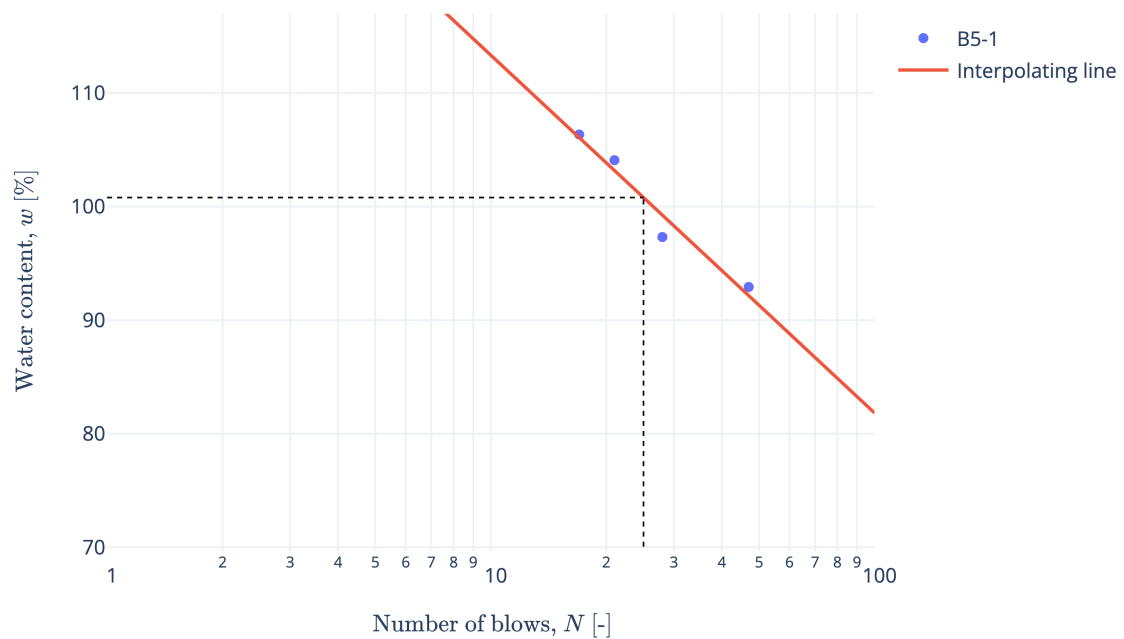
## B4-5 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	88.3	
Plastic limit [%]	44.5	
Plasticity index [%]	43.7	
Remarks		
Borehole:	Sample: B4-5	Specimen:
Depth:		

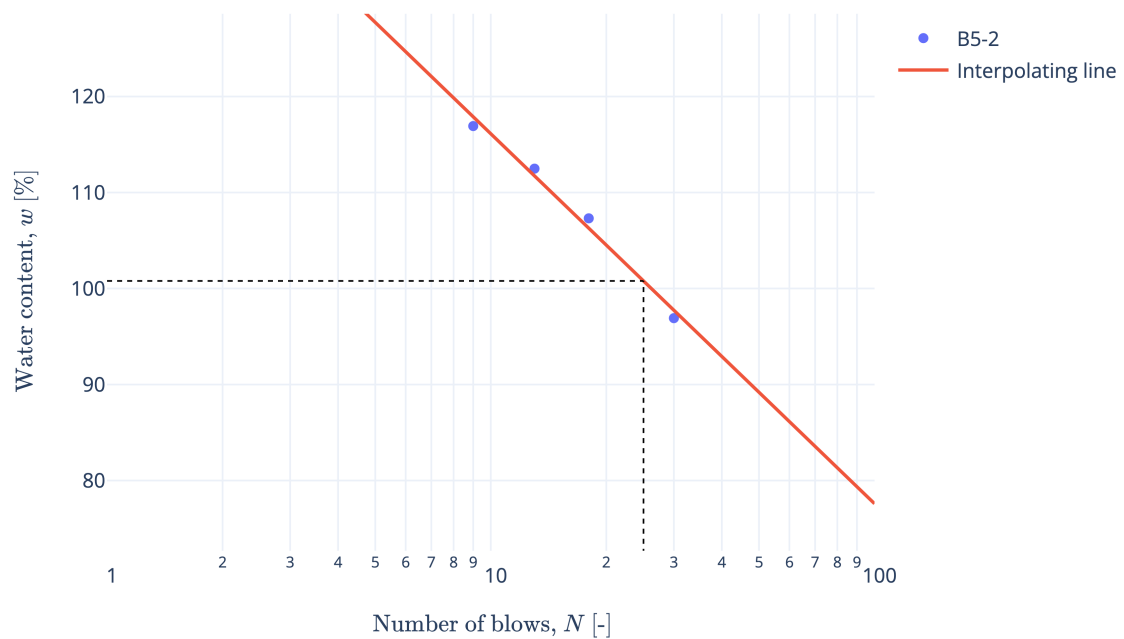
B5-1 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	100.8	
Plastic limit [%]	41.1	
Plasticity index [%]	59.7	
Remarks		
Borehole:	Sample: B5-1	Specimen:
Depth:		

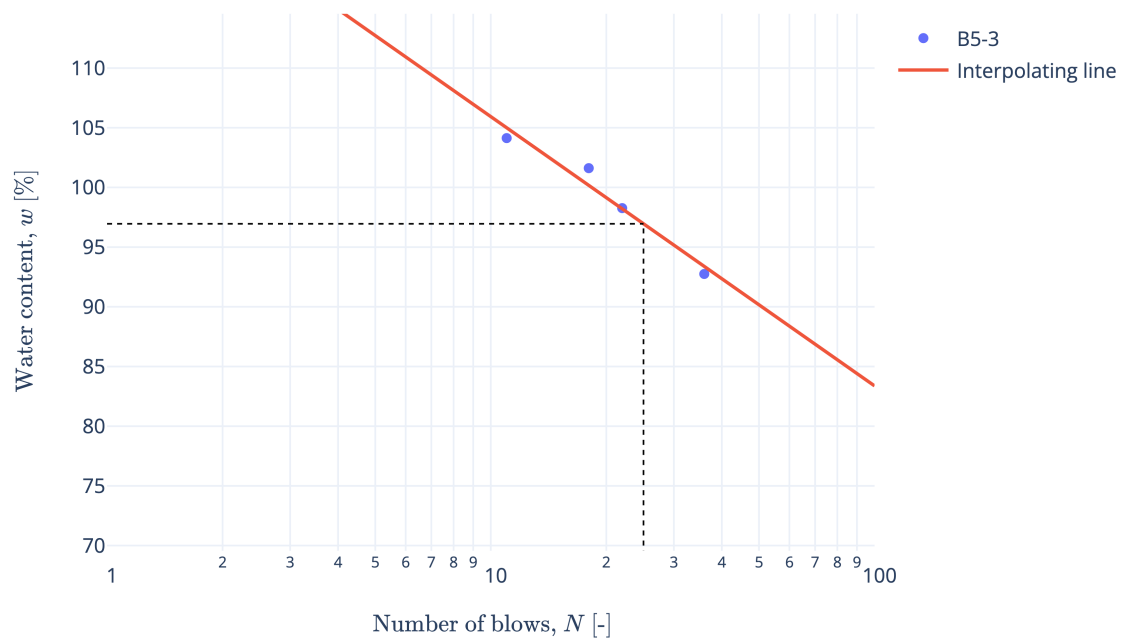
B5-2 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	100.8	
Plastic limit [%]	39.3	
Plasticity index [%]	61.5	
Remarks		
Borehole:	Sample: B5-2	Specimen:
Depth:		

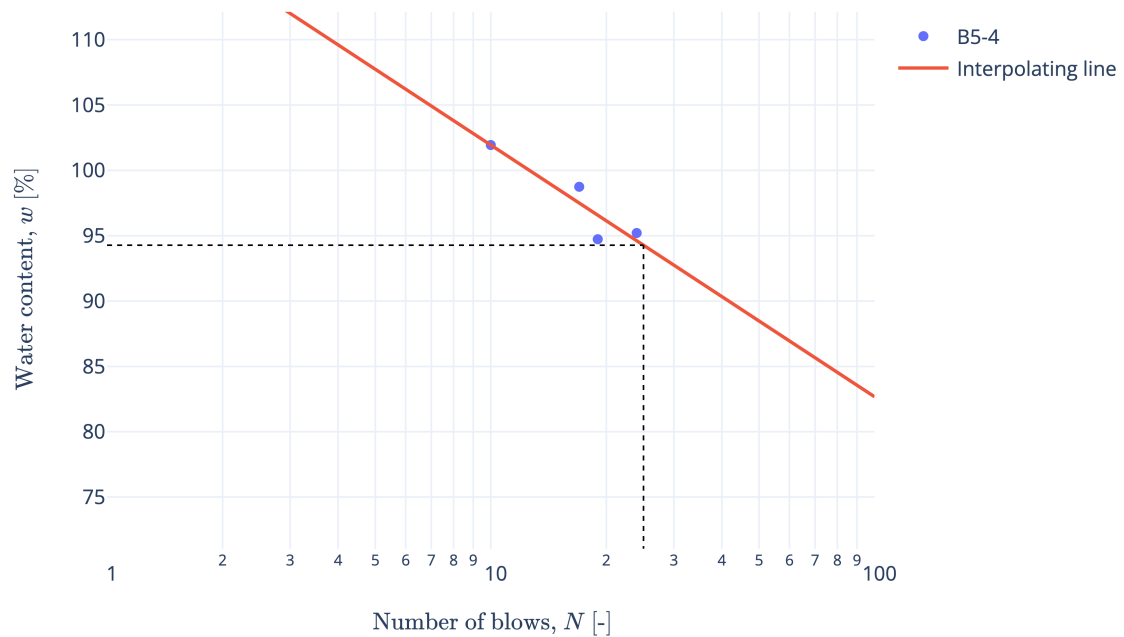
## B5-3 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	97.0	
Plastic limit [%]	42.5	
Plasticity index [%]	54.4	
Remarks		
Borehole:	Sample: B5-3	Specimen:
Depth:		

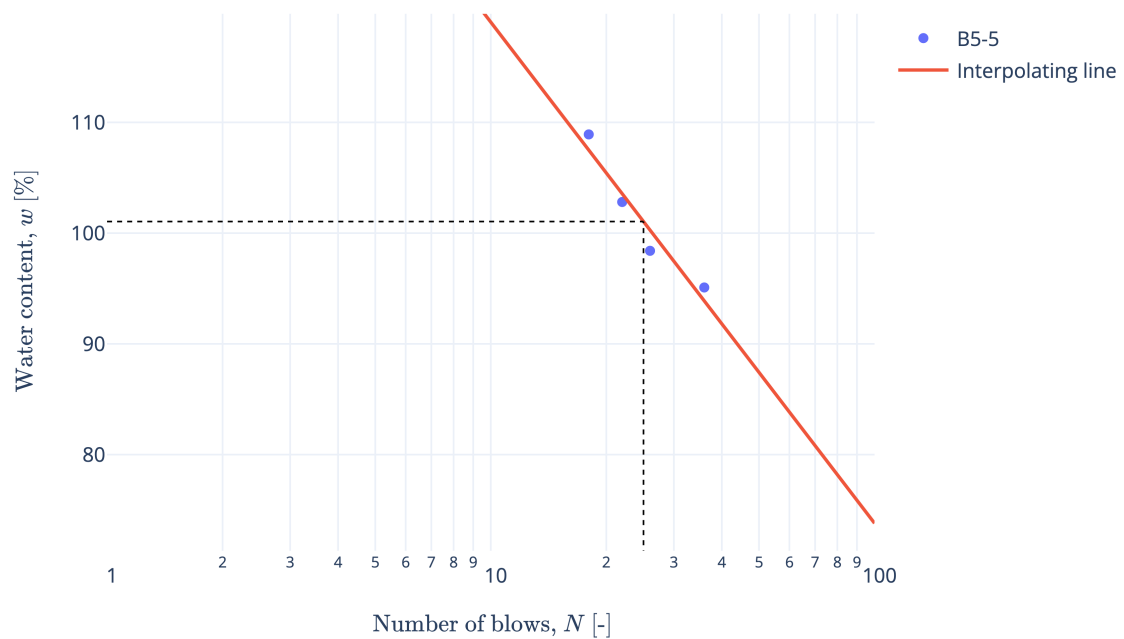
B5-4 - Liquid limit test (Casagrande cup)



## Test Summary

Liquid limit [%]	94.3	
Plastic limit [%]	41.2	
Plasticity index [%]	53.1	
Remarks		
Borehole:	Sample: B5-4	Specimen:
Depth:		

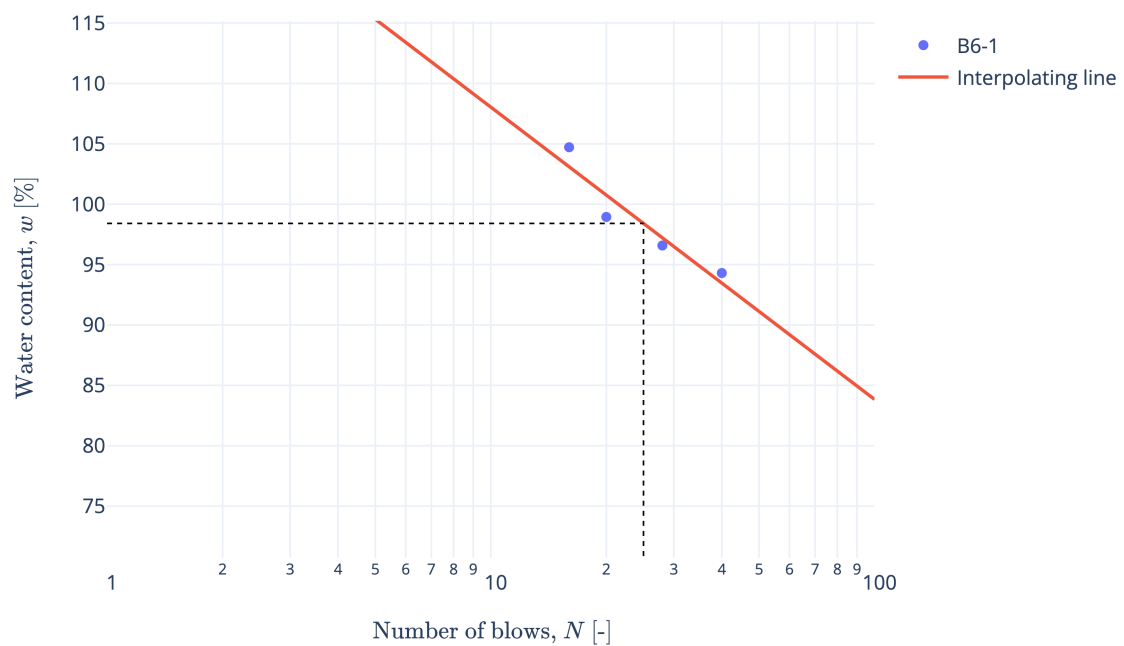
B5-5 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	101.0	
Plastic limit [%]	49.1	
Plasticity index [%]	52.0	
Remarks		
Borehole:	Sample: B5-5	Specimen:
Depth:		

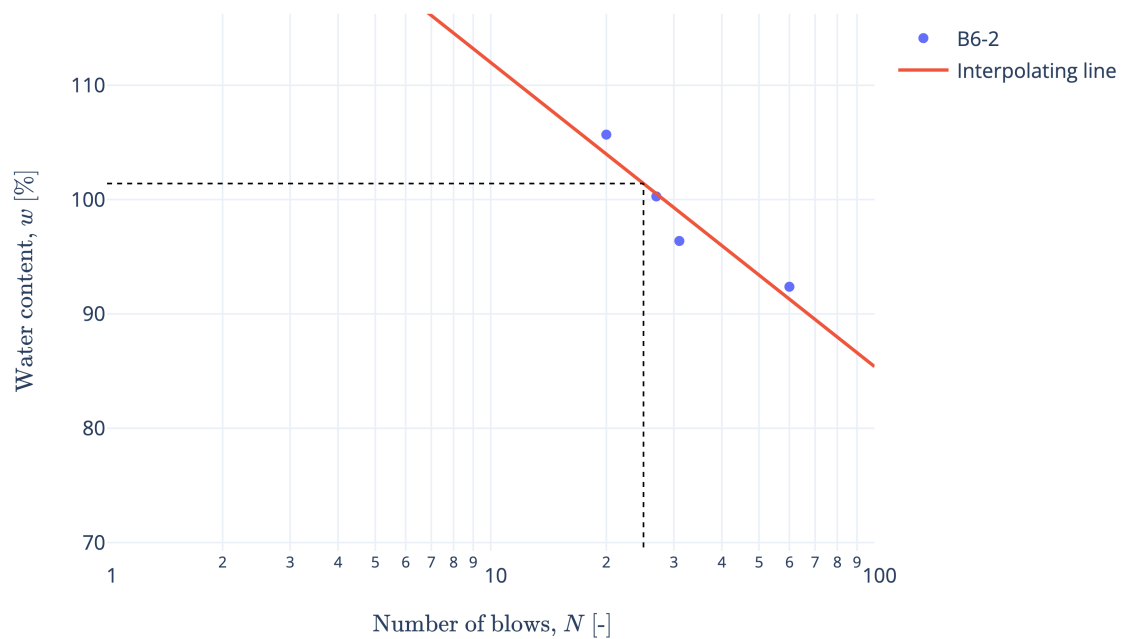
## B6-1 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	98.4	
Plastic limit [%]	37.3	
Plasticity index [%]	61.1	
Remarks		
Borehole:	Sample: B6-1	Specimen:
Depth:		

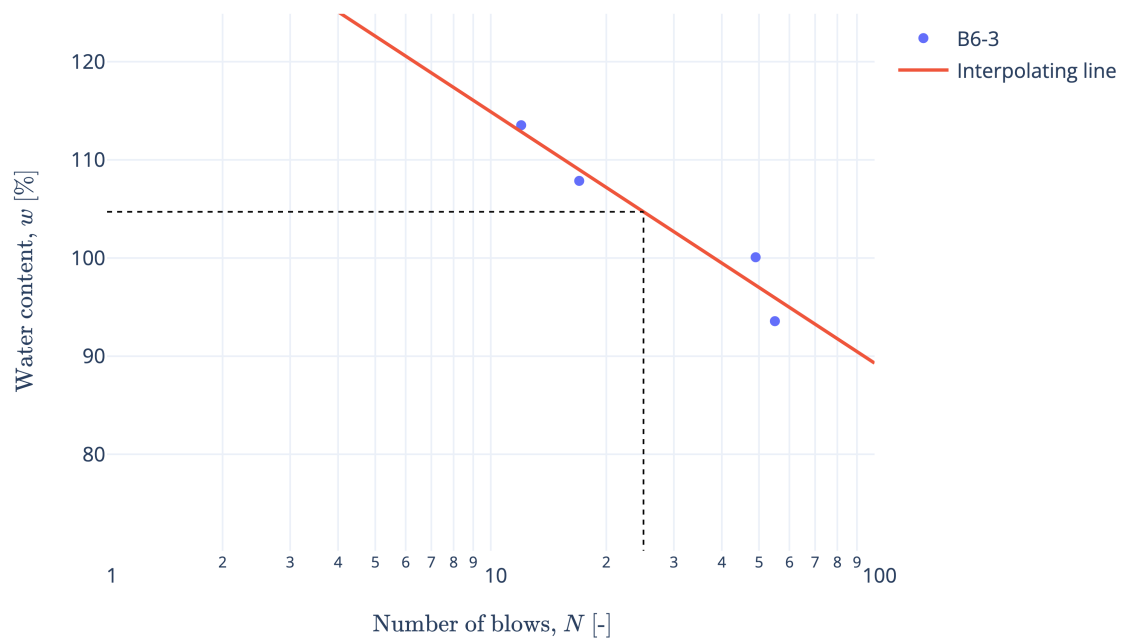
## B6-2 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	101.4	
Plastic limit [%]	46.4	
Plasticity index [%]	55.0	
Remarks		
Borehole:	Sample: B6-2	Specimen:
Depth:		

B6-3 - Liquid limit test (Casagrande cup)



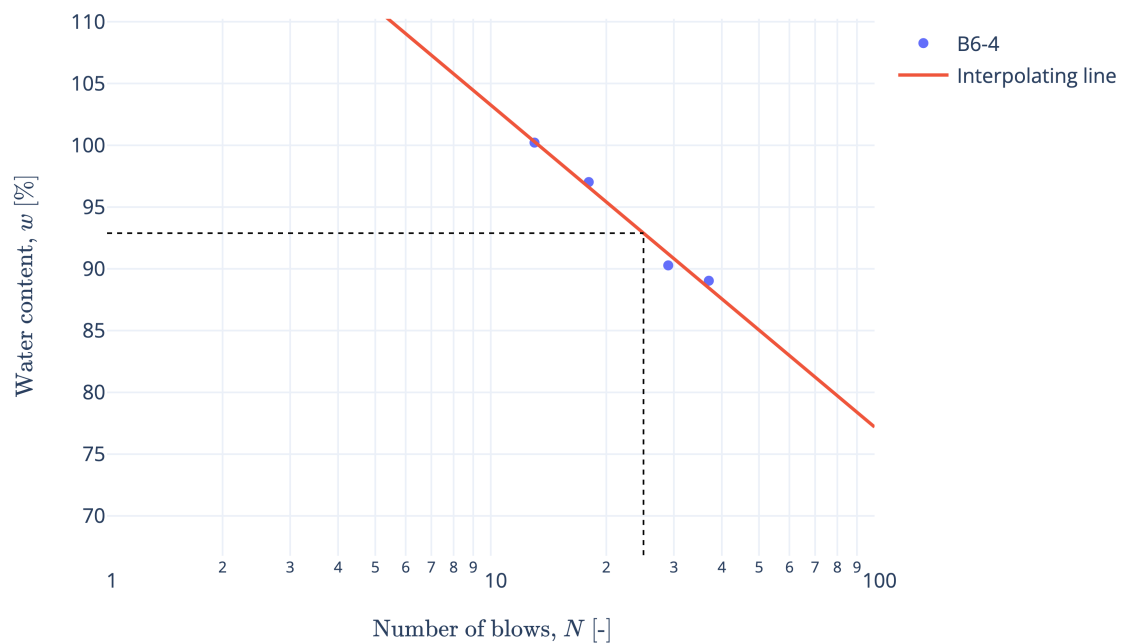
### Test Summary

Liquid limit [%]	104.7
Plastic limit [%]	44.1
Plasticity index [%]	60.6

Remarks

Borehole:	Sample: B6-3	Specimen:
Depth:		

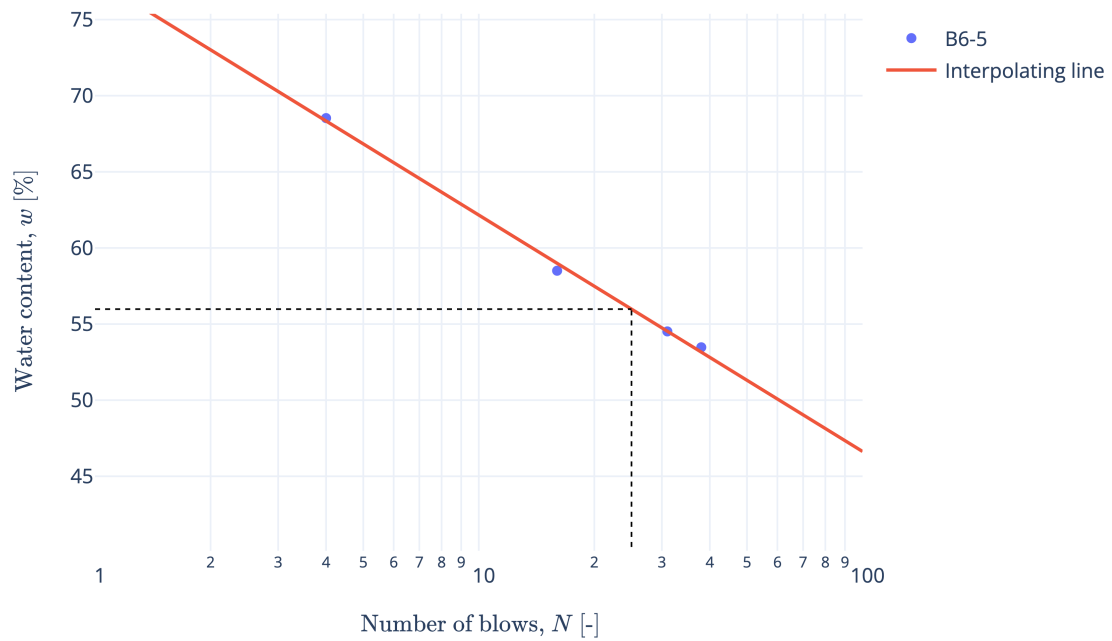
## B6-4 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	92.9	
Plastic limit [%]	36.5	
Plasticity index [%]	56.4	
Remarks		
Borehole:	Sample: B6-4	Specimen:
Depth:		

B6-5 - Liquid limit test (Casagrande cup)



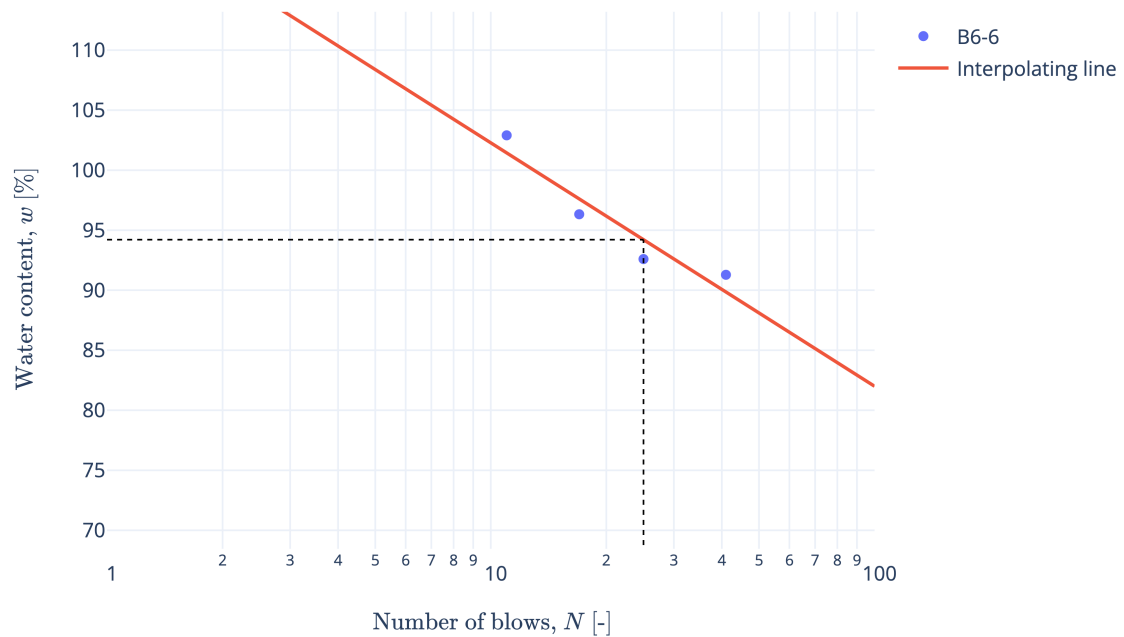
### Test Summary

Liquid limit [%]	56.0
Plastic limit [%]	32.9
Plasticity index [%]	23.1

Remarks

Borehole:	Sample: B6-5	Specimen:
Depth:		

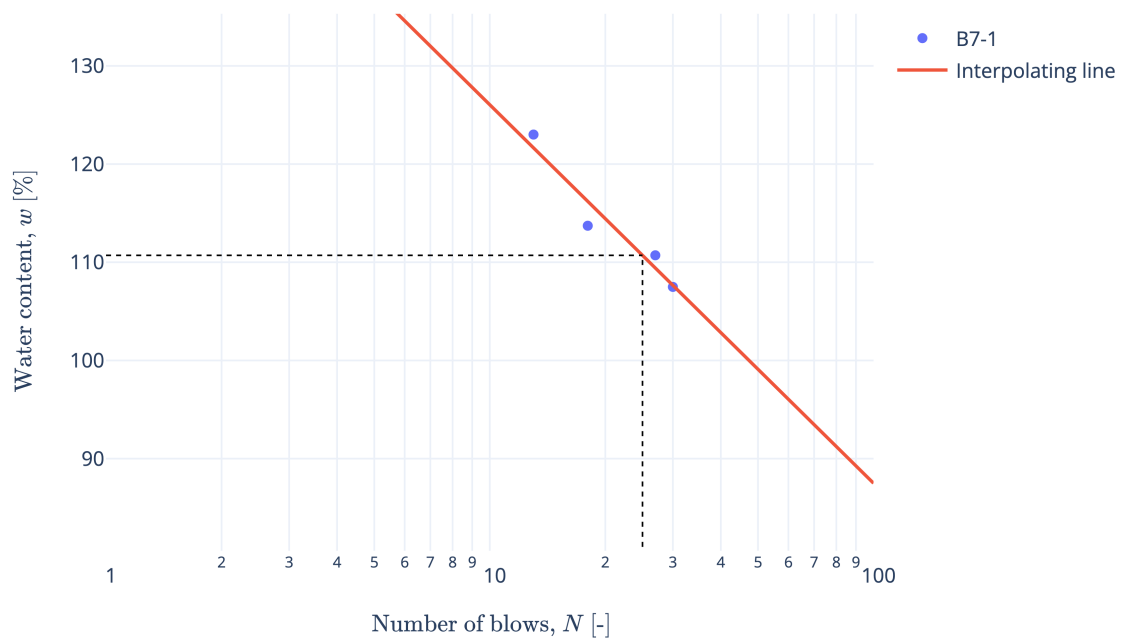
B6-6 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	94.2	
Plastic limit [%]	50.0	
Plasticity index [%]	44.2	
Remarks		
Borehole:	Sample: B6-6	Specimen:
Depth:		

## B7-1 - Liquid limit test (Casagrande cup)



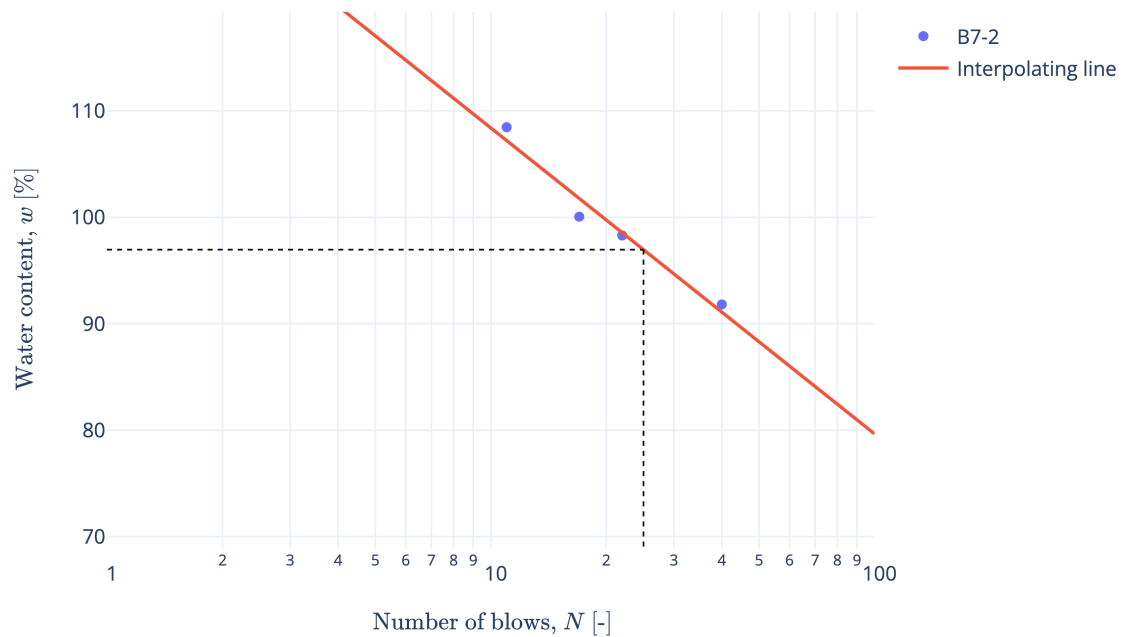
### Test Summary

Liquid limit [%]	110.7
Plastic limit [%]	40.2
Plasticity index [%]	70.5

Remarks

Borehole:	Sample: B7-1	Specimen:
Depth:		

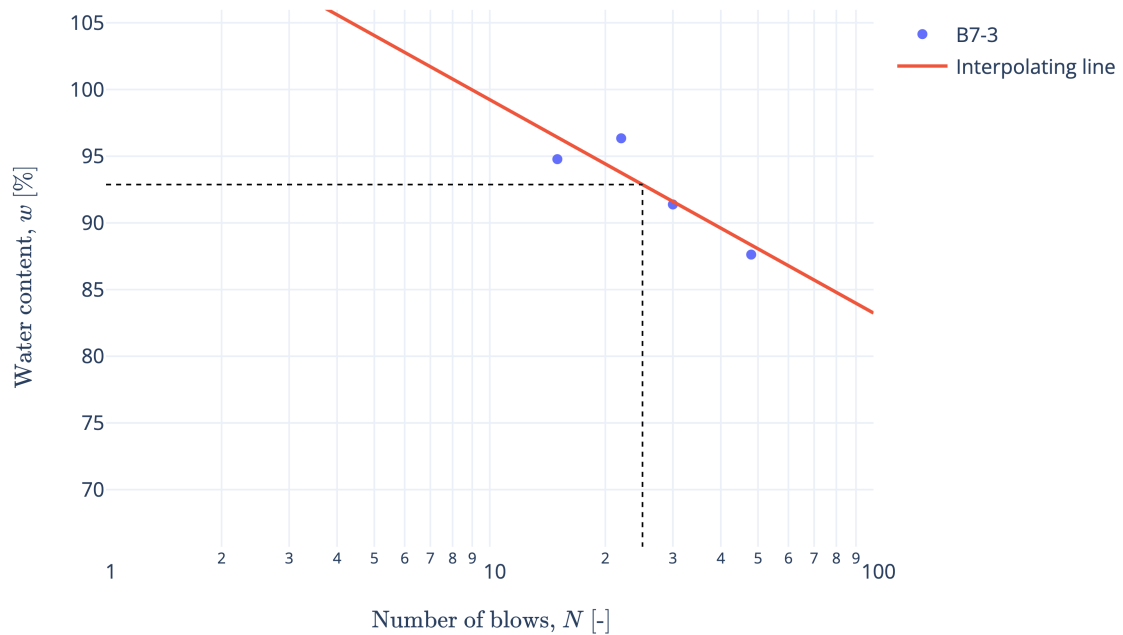
B7-2 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	97.0	
Plastic limit [%]	40.7	
Plasticity index [%]	56.3	
Remarks		
Borehole:	Sample: B7-2	Specimen:
Depth:		

B7-3 - Liquid limit test (Casagrande cup)



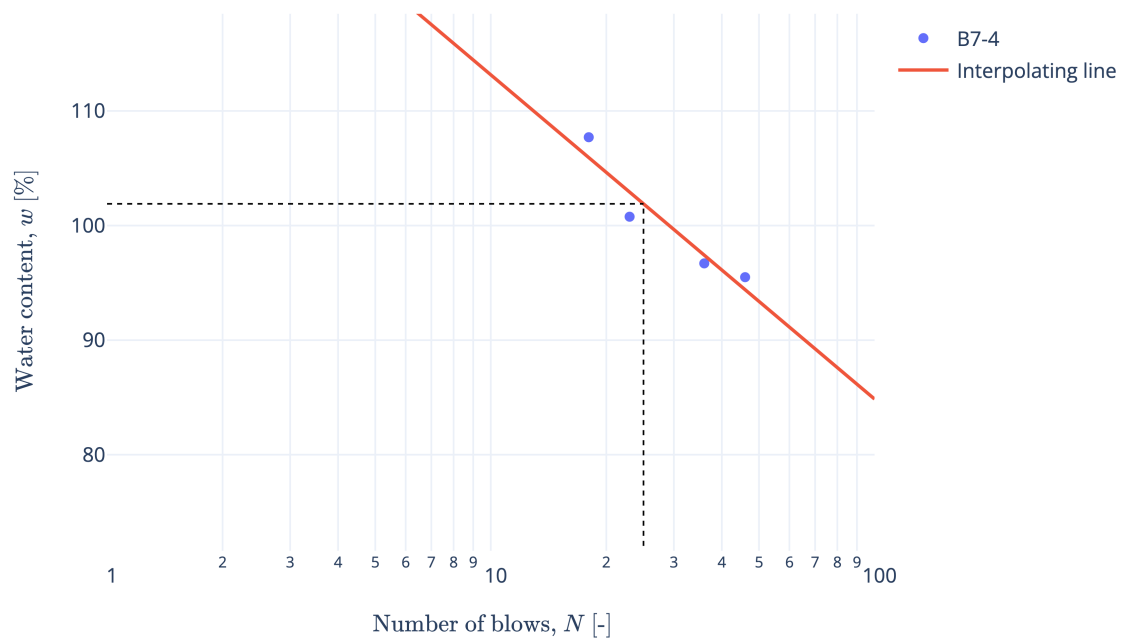
### Test Summary

Liquid limit [%]	92.9
Plastic limit [%]	42.3
Plasticity index [%]	50.6

Remarks

Borehole:	Sample: B7-3	Specimen:
Depth:		

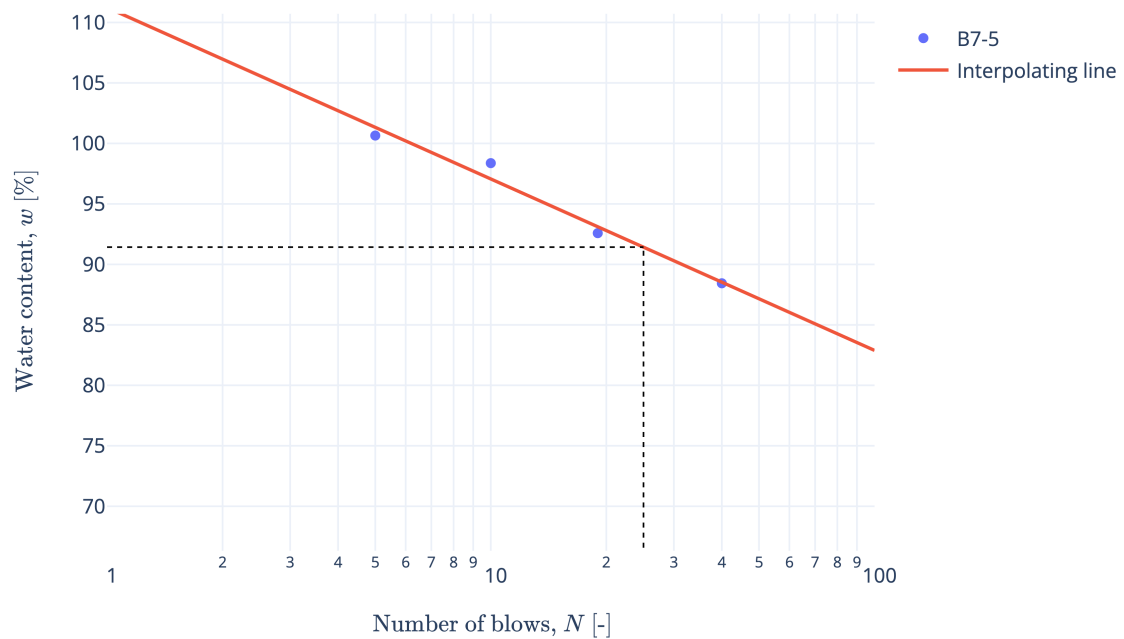
## B7-4 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	101.9	
Plastic limit [%]	38.6	
Plasticity index [%]	63.3	
Remarks		
Borehole:	Sample: B7-4	Specimen:
Depth:		

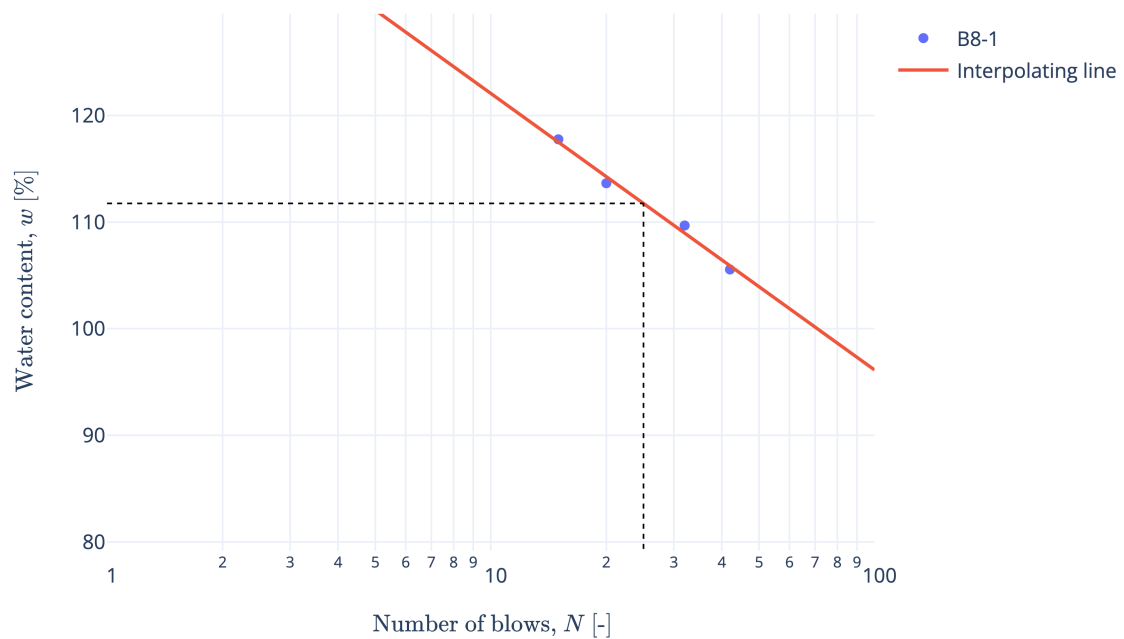
B7-5 - Liquid limit test (Casagrande cup)



## Test Summary

Liquid limit [%]	91.4	
Plastic limit [%]	42.4	
Plasticity index [%]	49.0	
Remarks		
Borehole:	Sample: B7-5	Specimen:
Depth:		

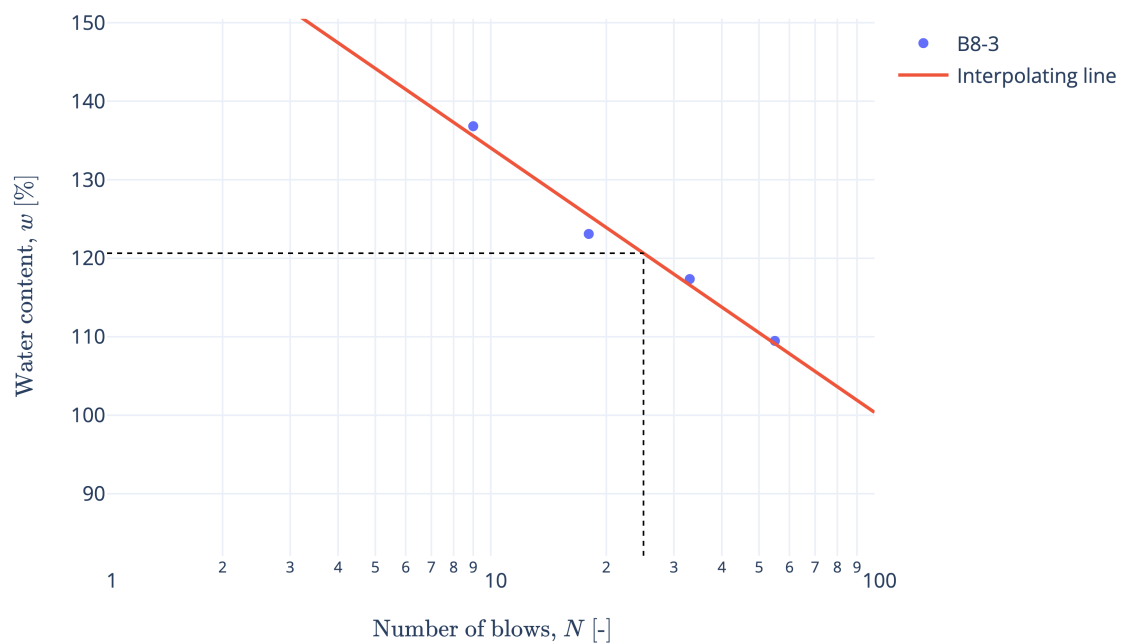
## B8-1 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	111.8	
Plastic limit [%]	40.6	
Plasticity index [%]	71.1	
Remarks		
Borehole:	Sample: B8-1	Specimen:
Depth:		

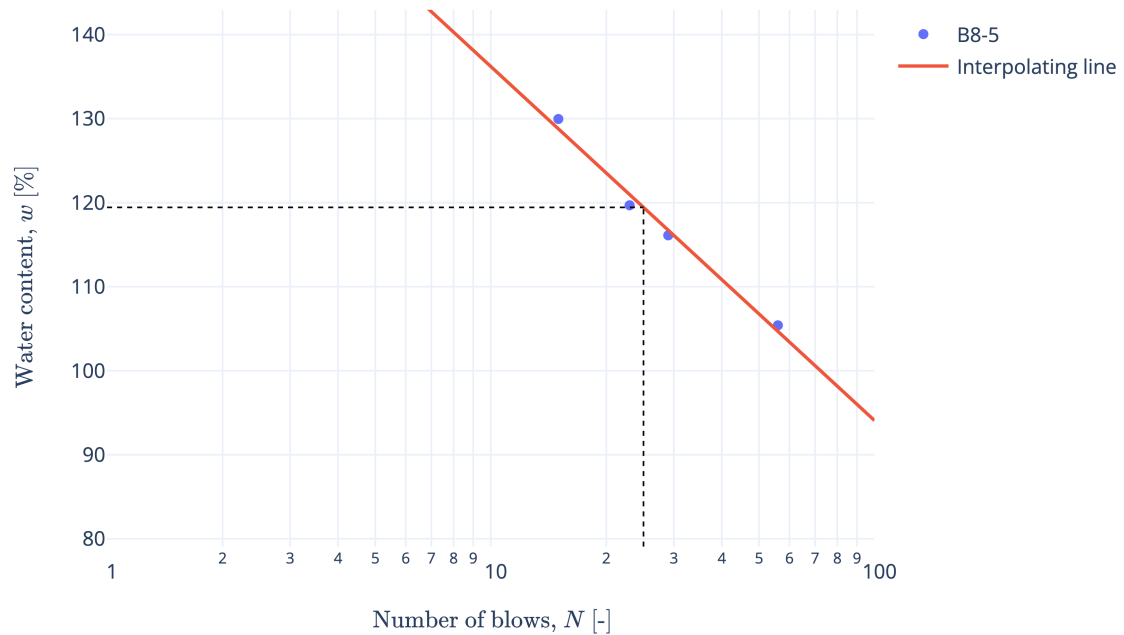
## B8-3 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	120.6	
Plastic limit [%]	41.6	
Plasticity index [%]	79.1	
Remarks		
Borehole:	Sample: B8-3	Specimen:
Depth:		

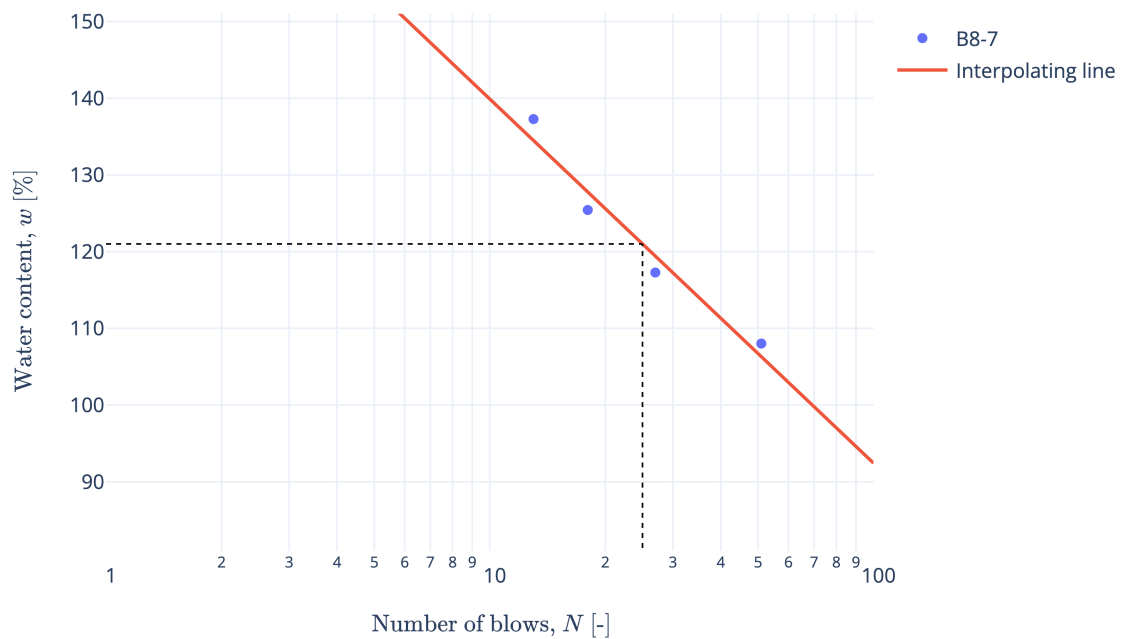
B8-5 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	119.4	
Plastic limit [%]	38.2	
Plasticity index [%]	81.3	
Remarks		
Borehole:	Sample: B8-5	Specimen:
Depth:		

B8-7 - Liquid limit test (Casagrande cup)



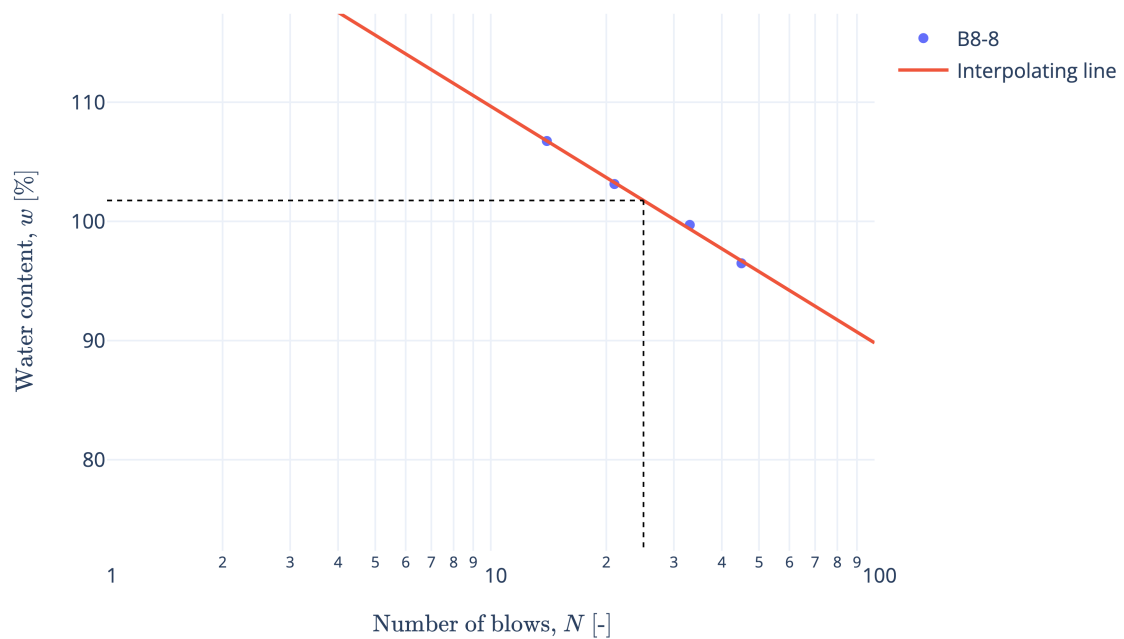
### Test Summary

Liquid limit [%]	121.0
Plastic limit [%]	41.6
Plasticity index [%]	79.4

Remarks

Borehole:	Sample: B8-7	Specimen:
Depth:		

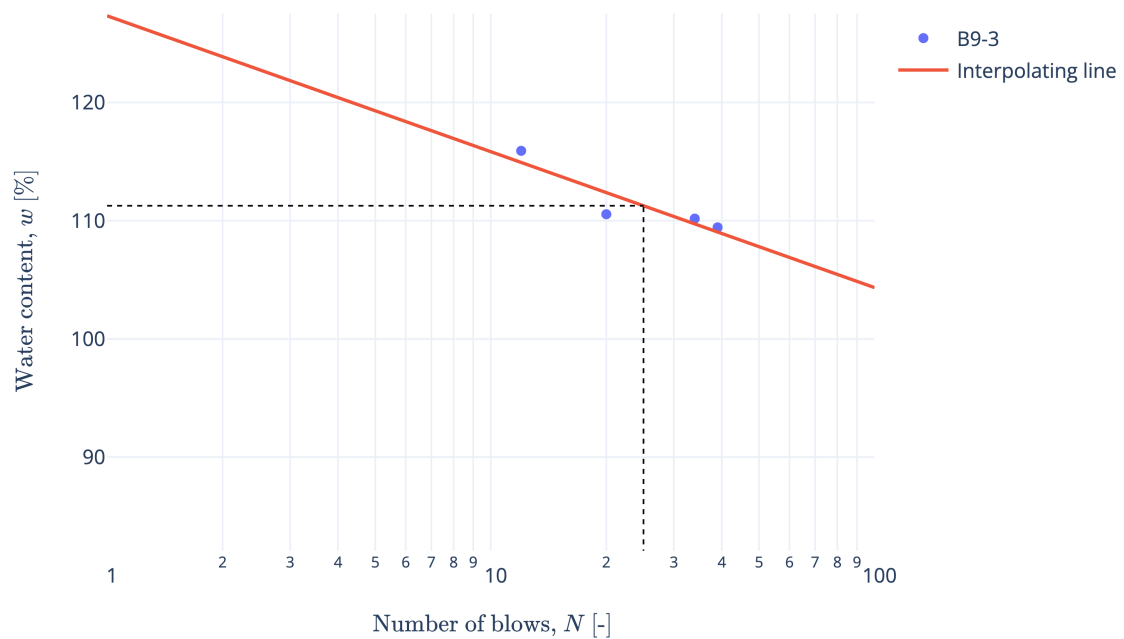
B8-8 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	101.8	
Plastic limit [%]	47.1	
Plasticity index [%]	54.6	
Remarks		
Borehole:	Sample: B8-8	Specimen:
Depth:		

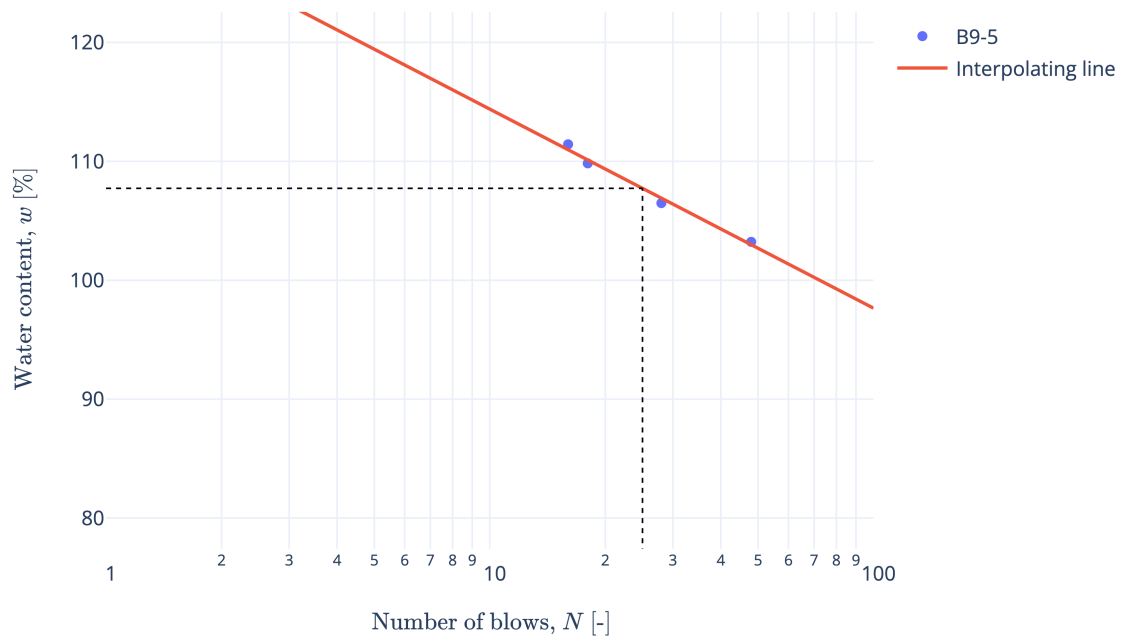
B9-3 - Liquid limit test (Casagrande cup)



## Test Summary

Liquid limit [%]	111.3	
Plastic limit [%]	46.6	
Plasticity index [%]	64.6	
Remarks		
Borehole:	Sample: B9-3	Specimen:
Depth:		

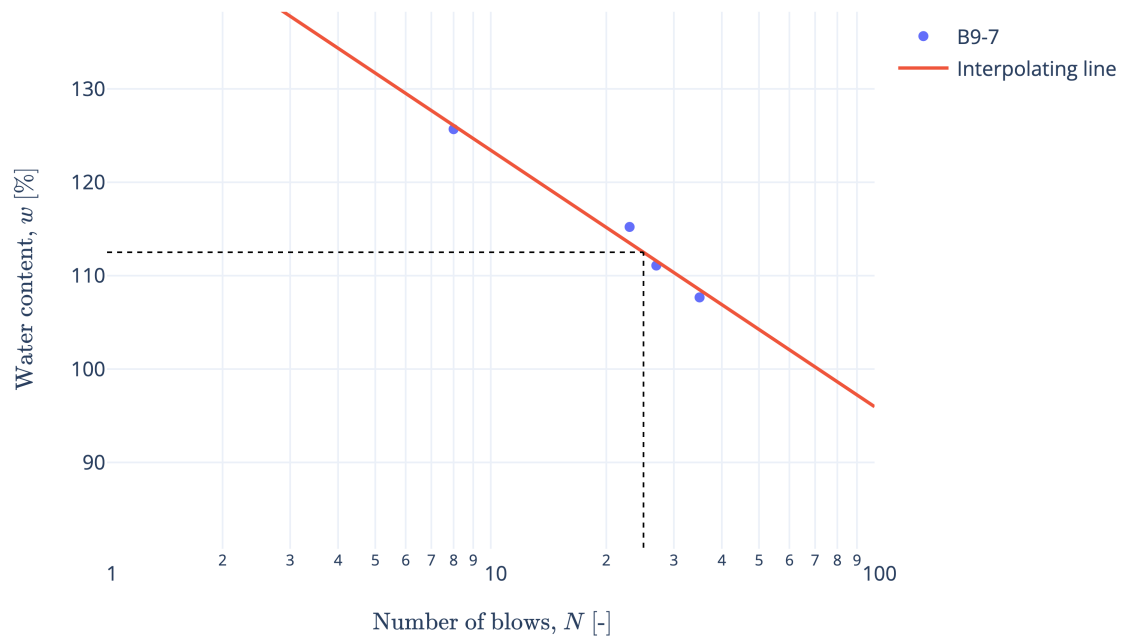
B9-5 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	107.7	
Plastic limit [%]	43.5	
Plasticity index [%]	64.2	
Remarks		
Borehole:	Sample: B9-5	Specimen:
Depth:		

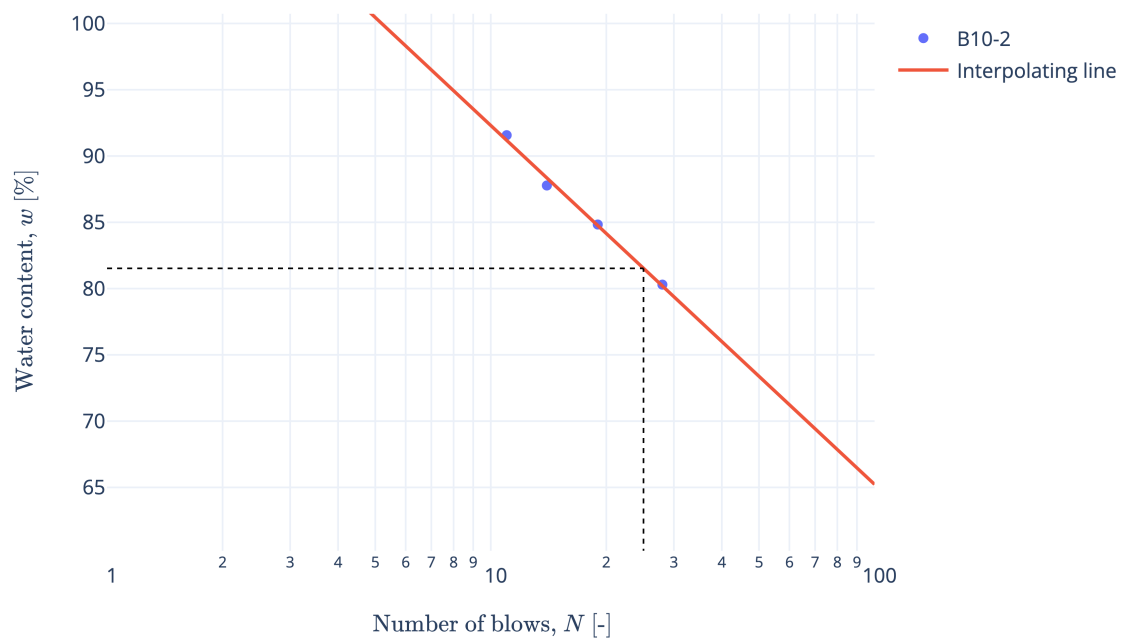
B9-7 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	112.5	
Plastic limit [%]	44.7	
Plasticity index [%]	67.8	
Remarks		
Borehole:	Sample: B9-7	Specimen:
Depth:		

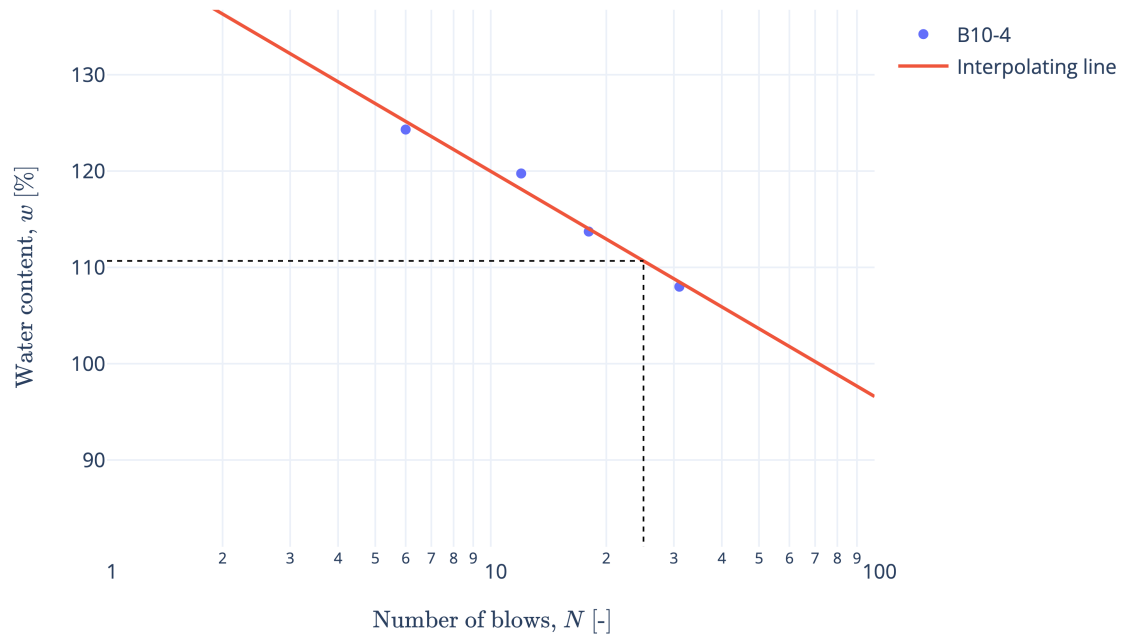
B10-2 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	81.5	
Plastic limit [%]	41.8	
Plasticity index [%]	39.7	
Remarks		
Borehole:	Sample: B10-2	Specimen:
Depth:		

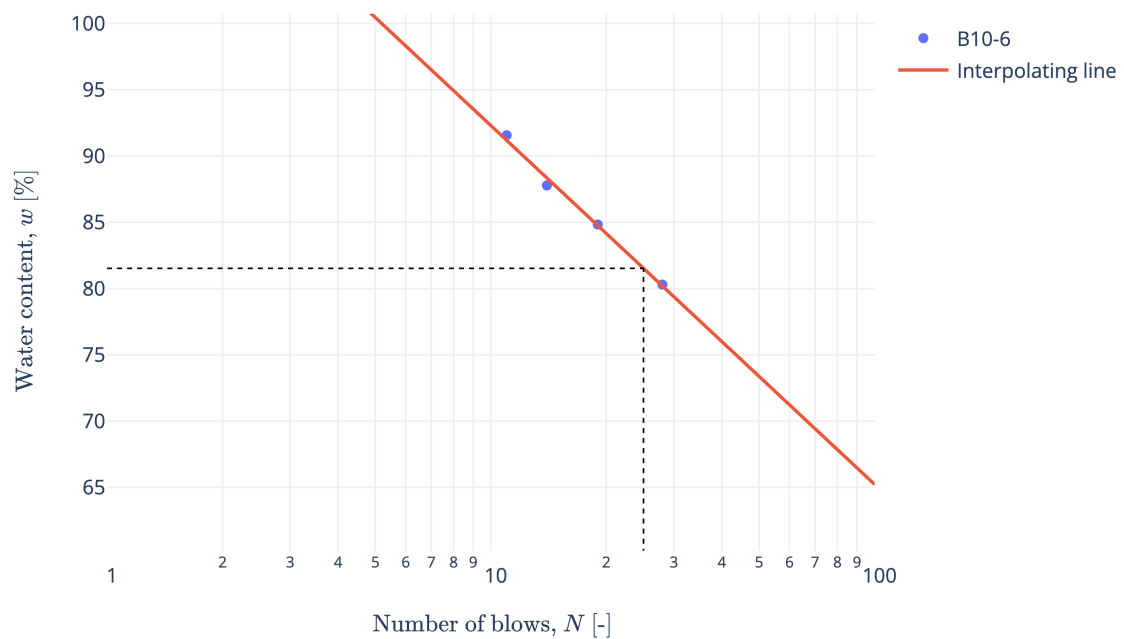
B10-4 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	110.7	
Plastic limit [%]	41.4	
Plasticity index [%]	69.3	
Remarks		
Borehole:	Sample: B10-4	Specimen:
Depth:		

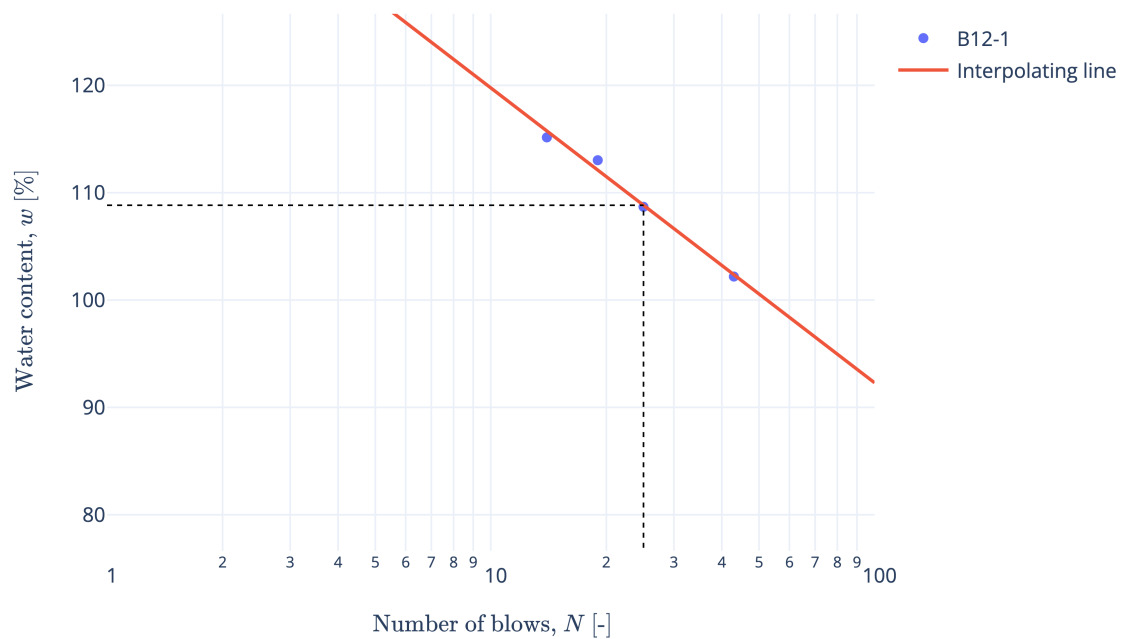
B10-6 - Liquid limit test (Casagrande cup)



### Test Summary

Liquid limit [%]	81.5	
Plastic limit [%]	41.8	
Plasticity index [%]	39.7	
Remarks		
Borehole:	Sample: B10-6	Specimen:
Depth:		

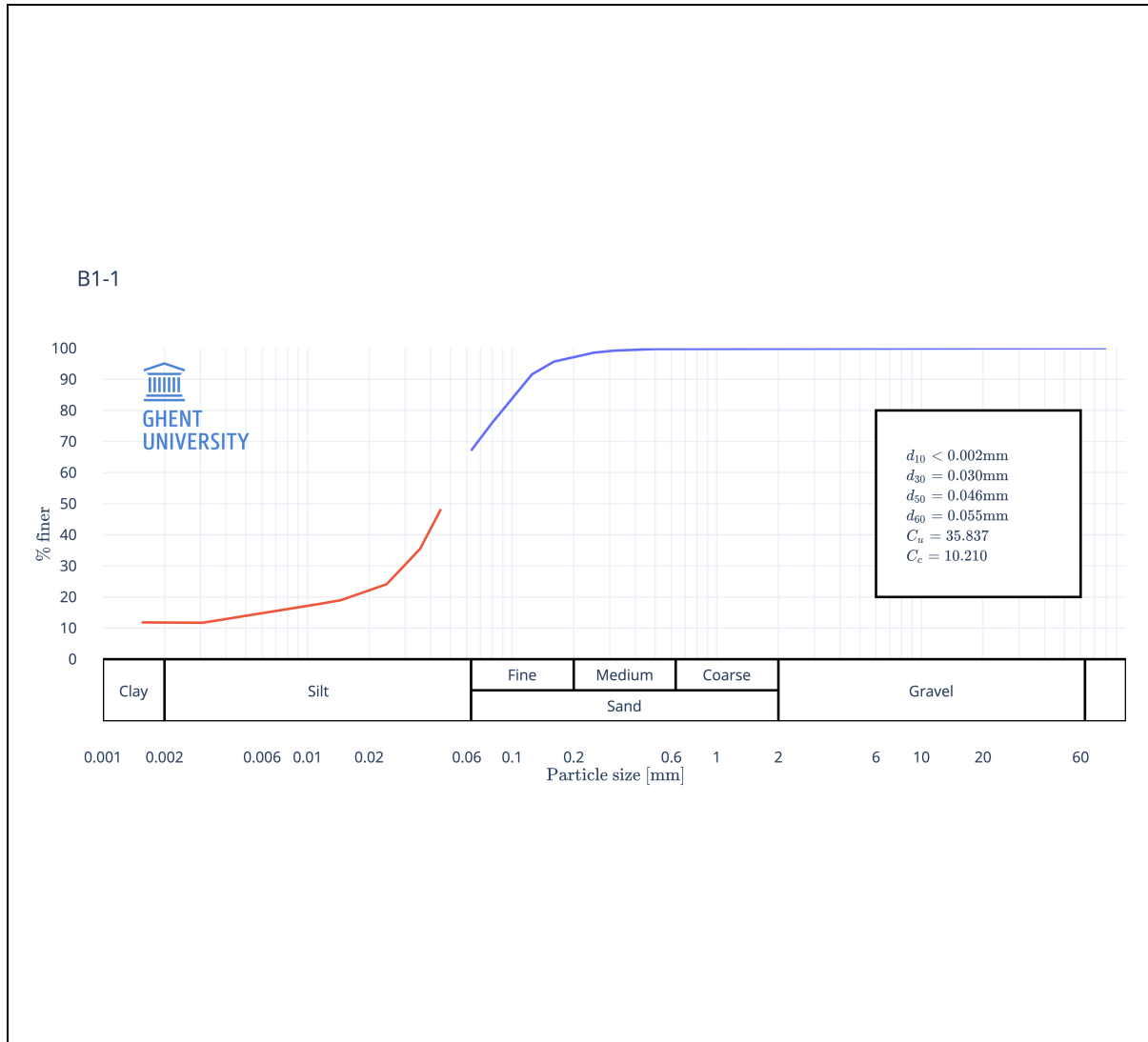
B12-1 - Liquid limit test (Casagrande cup)



### Test Summary

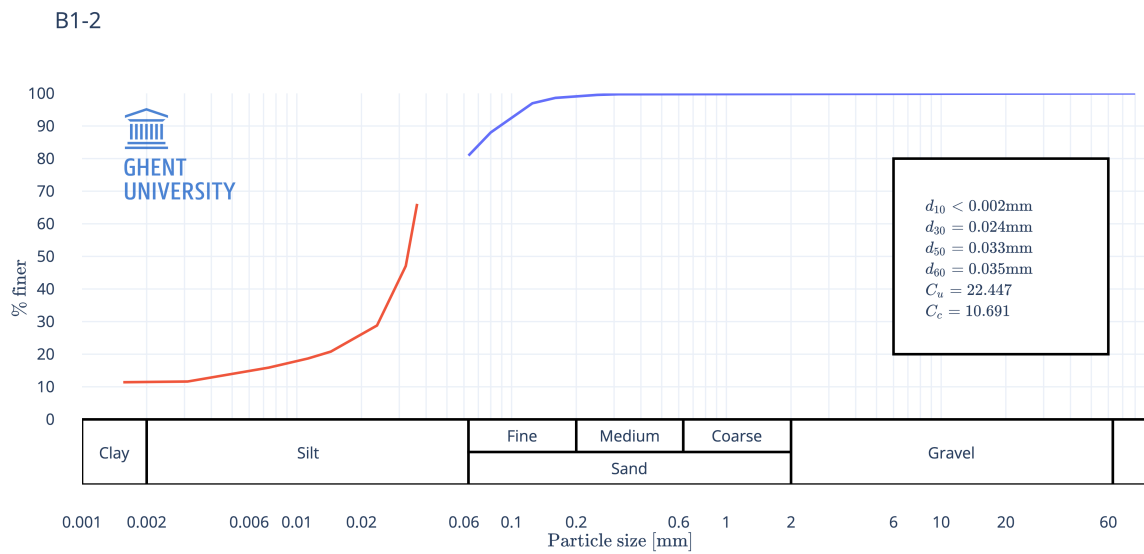
Liquid limit [%]	108.8	
Plastic limit [%]	38.0	
Plasticity index [%]	70.9	
Remarks		
Borehole:	Sample: B12-1	Specimen:
Depth:		

# APPENDIX F – SIEVING AND HYDROMETER RESULTS



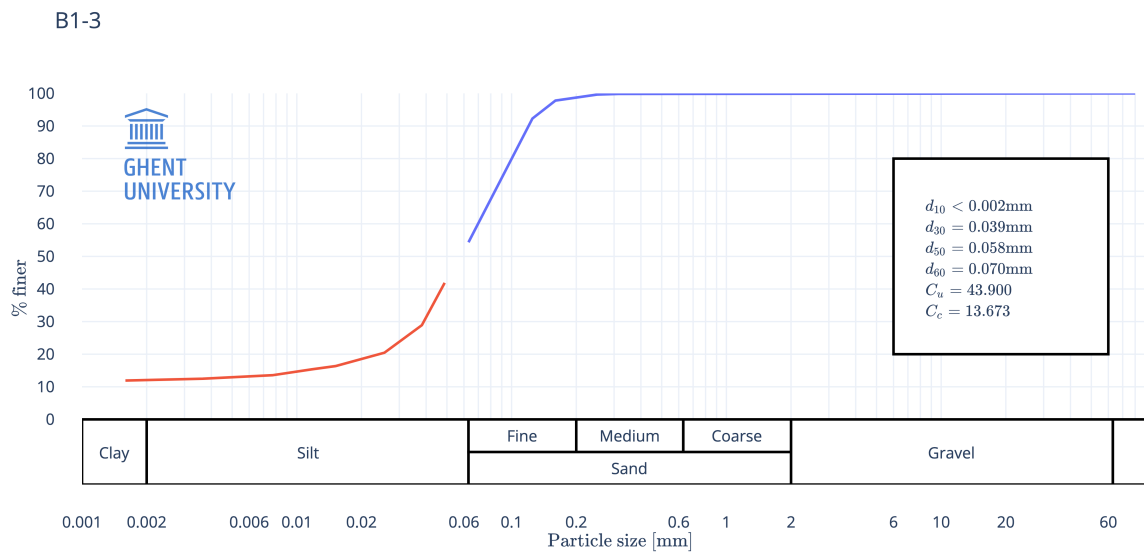
### Test Summary

$d_{10}$ [mm]	0.002		
$d_{30}$ [mm]	0.03		
$d_{50}$ [mm]	0.046		
$d_{60}$ [mm]	0.055		
$C_u$ [-]	35.837		
$C_c$ [-]	10.21		
Fines content [%]	73.4		
Borehole:		Sample: B1-1	Specimen:
Depth:			



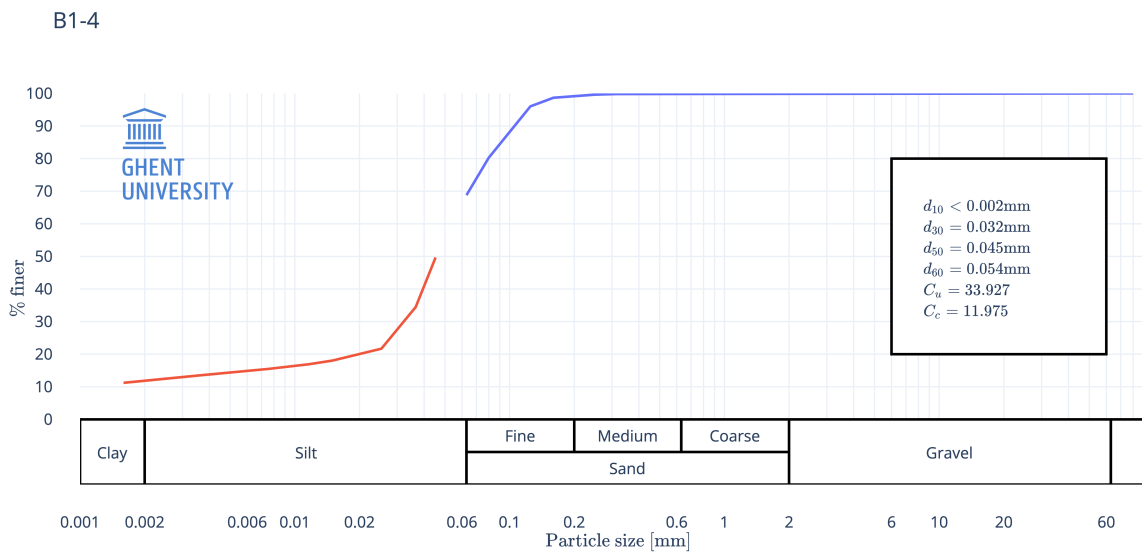
### Test Summary

$d_{10}$ [mm]	0.002	
$d_{30}$ [mm]	0.024	
$d_{50}$ [mm]	0.033	
$d_{60}$ [mm]	0.035	
$C_u$ [-]	22.447	
$C_c$ [-]	10.691	
Fines content [%]	85.9	
Borehole:	Sample: B1-2	Specimen:
Depth:		



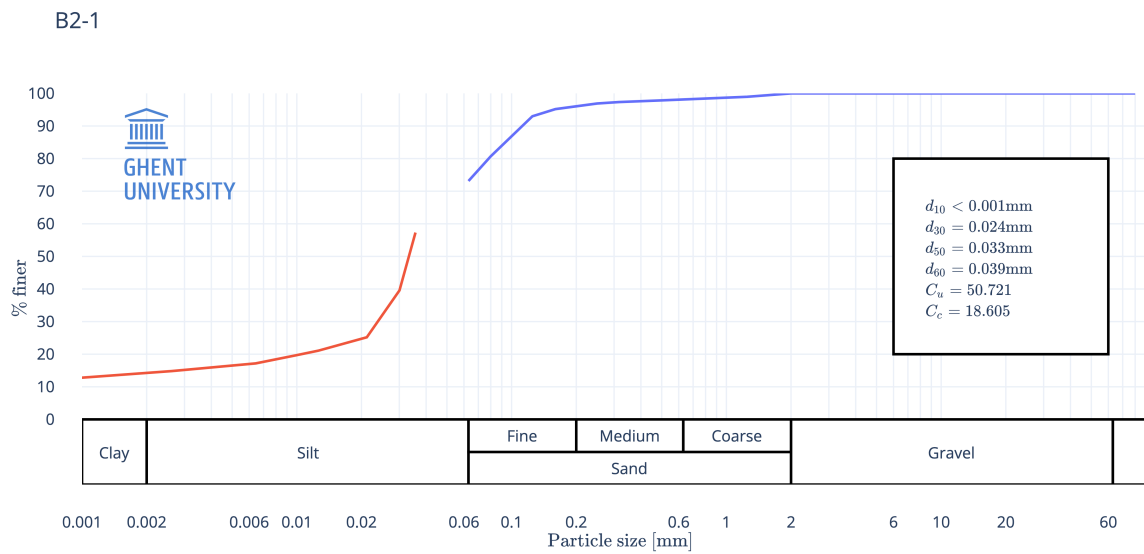
### Test Summary

$d_{10}$ [mm]	0.002	
$d_{30}$ [mm]	0.039	
$d_{50}$ [mm]	0.058	
$d_{60}$ [mm]	0.07	
$C_u$ [-]	43.9	
$C_c$ [-]	13.673	
Fines content [%]	63.5	
Borehole:	Sample: B1-3	Specimen:
Depth:		



### Test Summary

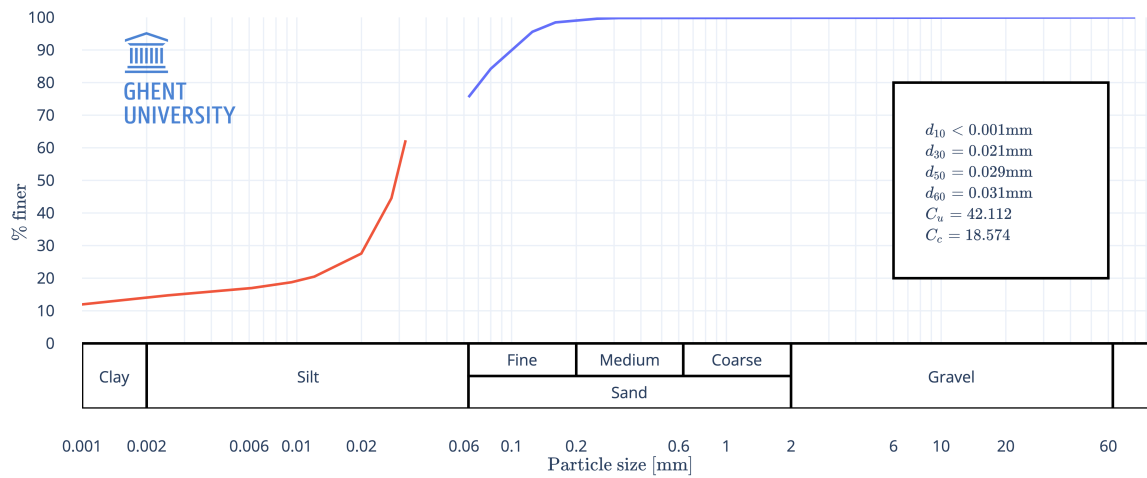
$d_{10}$ [mm]	0.002	
$d_{30}$ [mm]	0.032	
$d_{50}$ [mm]	0.045	
$d_{60}$ [mm]	0.054	
$C_u$ [-]	33.927	
$C_c$ [-]	11.975	
Fines content [%]	76.9	
Borehole:	Sample: B1-4	Specimen:
Depth:		



### Test Summary

$d_{10}$ [mm]	0.001		
$d_{30}$ [mm]	0.024		
$d_{50}$ [mm]	0.033		
$d_{60}$ [mm]	0.039		
$C_u$ [-]	50.721		
$C_c$ [-]	18.605		
Fines content [%]	78.5		
Borehole:		Sample: B2-1	Specimen:
Depth:			

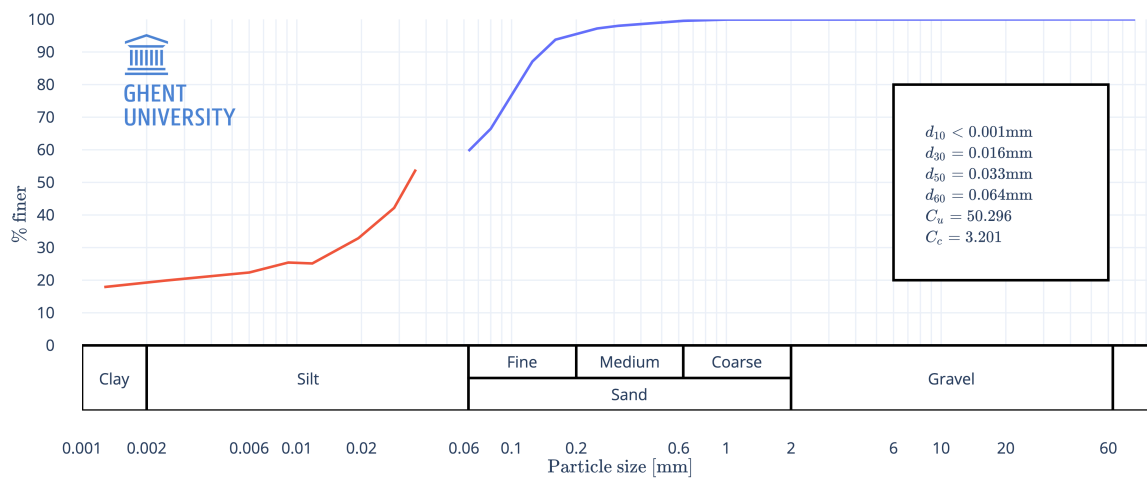
B2-2



### Test Summary

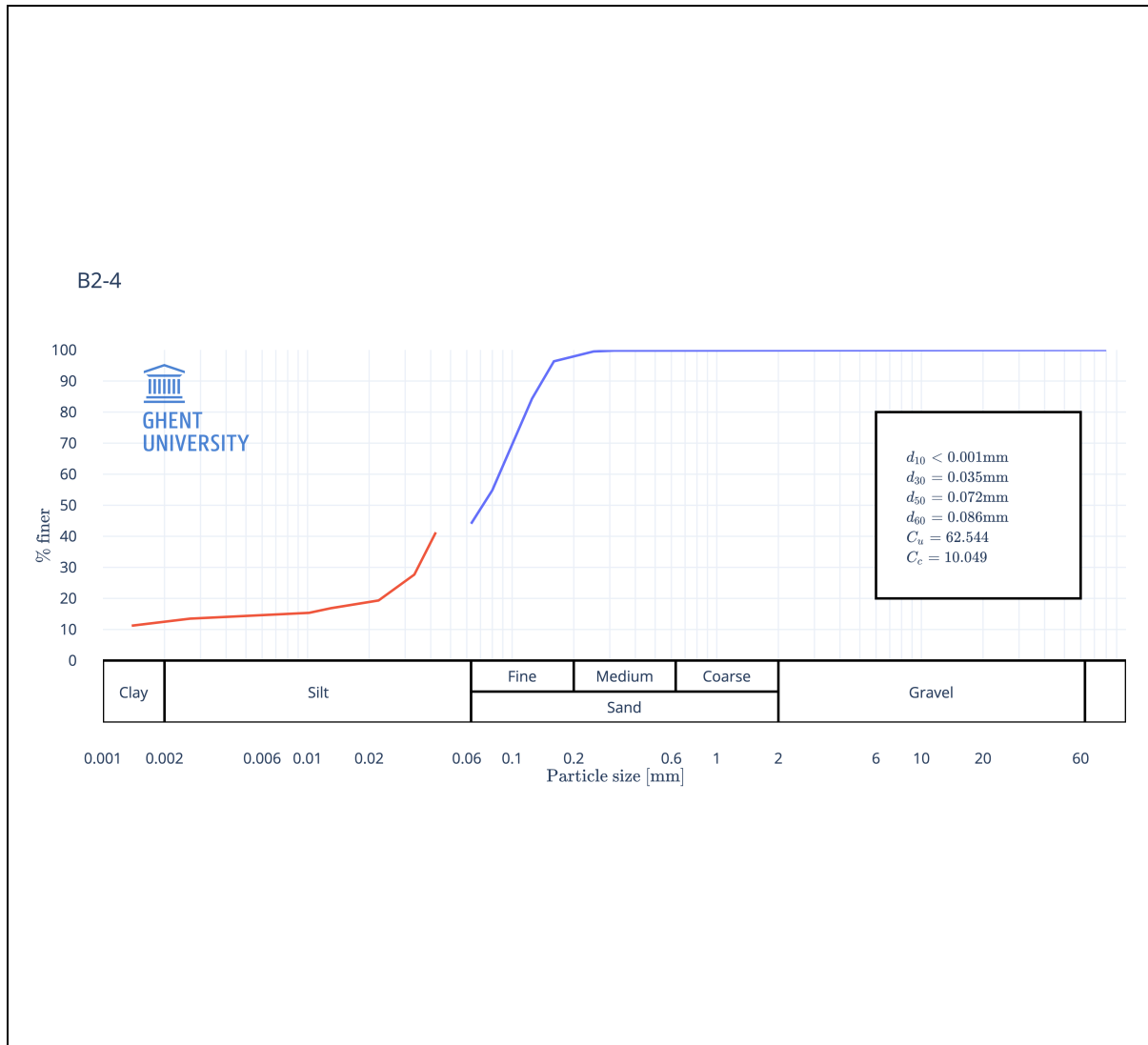
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.021	
$d_{50}$ [mm]	0.029	
$d_{60}$ [mm]	0.031	
$C_u$ [-]	42.112	
$C_c$ [-]	18.574	
Fines content [%]	81.7	
Borehole:	Sample: B2-2	Specimen:
Depth:		

B2-3



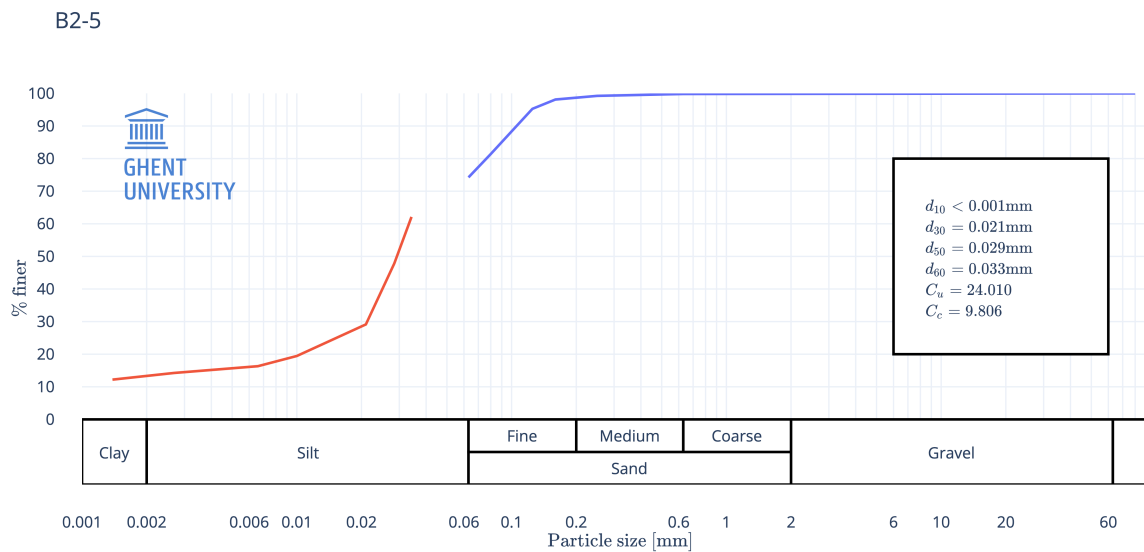
### Test Summary

$d_{10}$ [mm]	0.001		
$d_{30}$ [mm]	0.016		
$d_{50}$ [mm]	0.033		
$d_{60}$ [mm]	0.064		
$C_u$ [-]	50.296		
$C_c$ [-]	3.201		
Fines content [%]	64.5		
Borehole:		Sample: B2-3	Specimen:
Depth:			



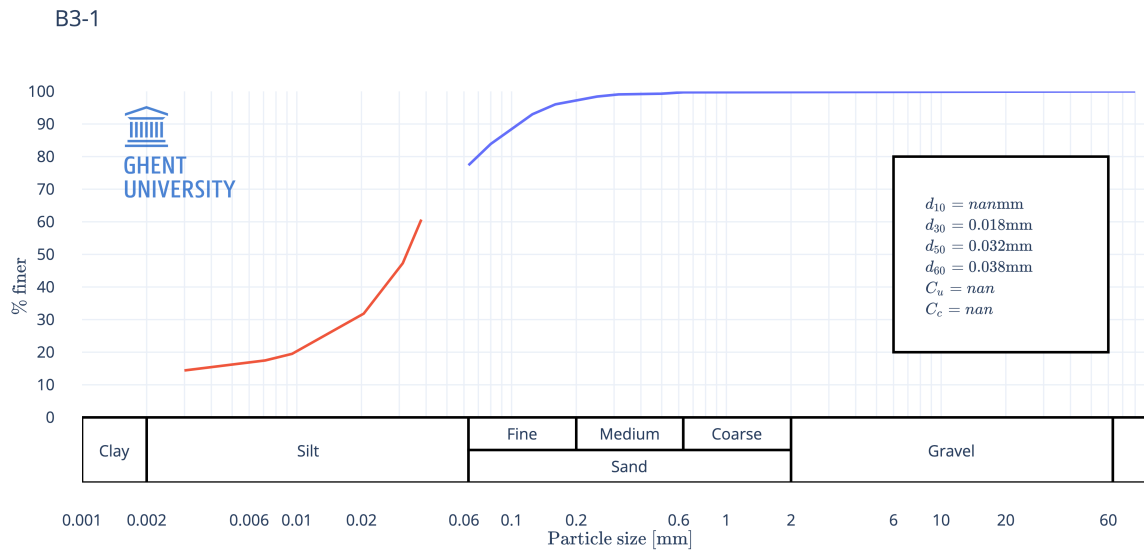
### Test Summary

$d_{10}$ [mm]	0.001				
$d_{30}$ [mm]	0.035				
$d_{50}$ [mm]	0.072				
$d_{60}$ [mm]	0.086				
$C_u$ [-]	62.544				
$C_c$ [-]	10.049				
Fines content [%]	51.7				
Borehole:		Sample: B2-4		Specimen:	
Depth:					



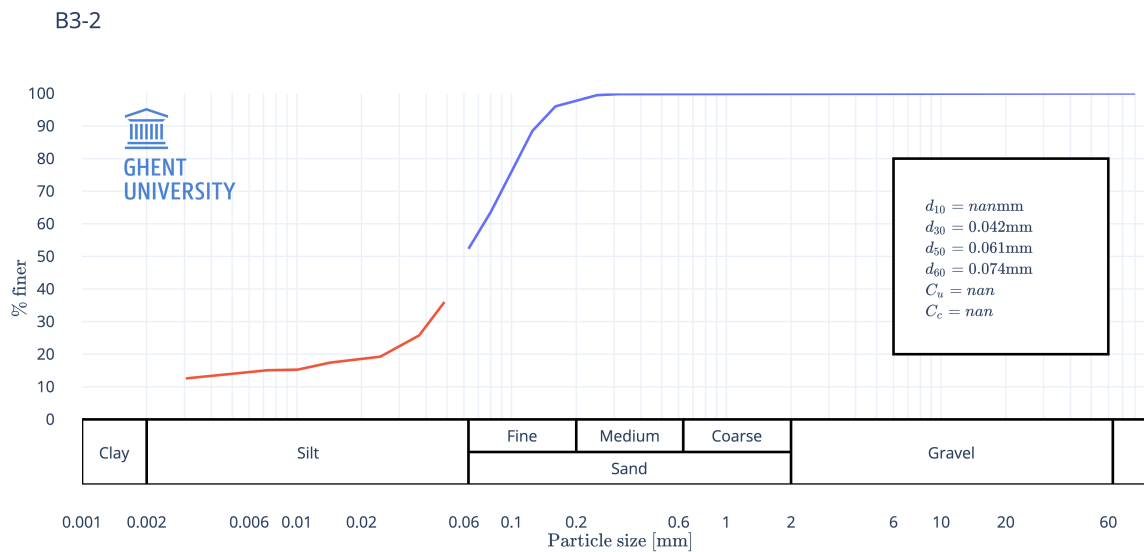
### Test Summary

$d_{10}$ [mm]	0.001		
$d_{30}$ [mm]	0.021		
$d_{50}$ [mm]	0.029		
$d_{60}$ [mm]	0.033		
$C_u$ [-]	24.01		
$C_c$ [-]	9.806		
Fines content [%]	79.3		
Borehole:		Sample: B2-5	Specimen:
Depth:			



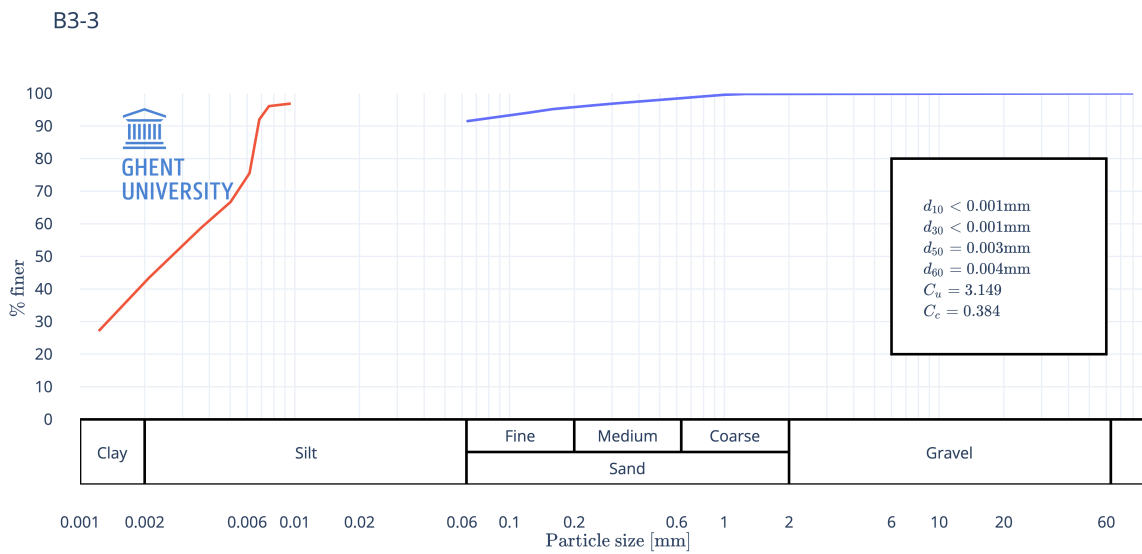
### Test Summary

$d_{10}$ [mm]	0.003	
$d_{30}$ [mm]	0.018	
$d_{50}$ [mm]	0.032	
$d_{60}$ [mm]	0.038	
$C_u$ [-]	12.548	
$C_c$ [-]	2.959	
Fines content [%]	82.0	
Borehole:	Sample: B3-1	Specimen:
Depth:		



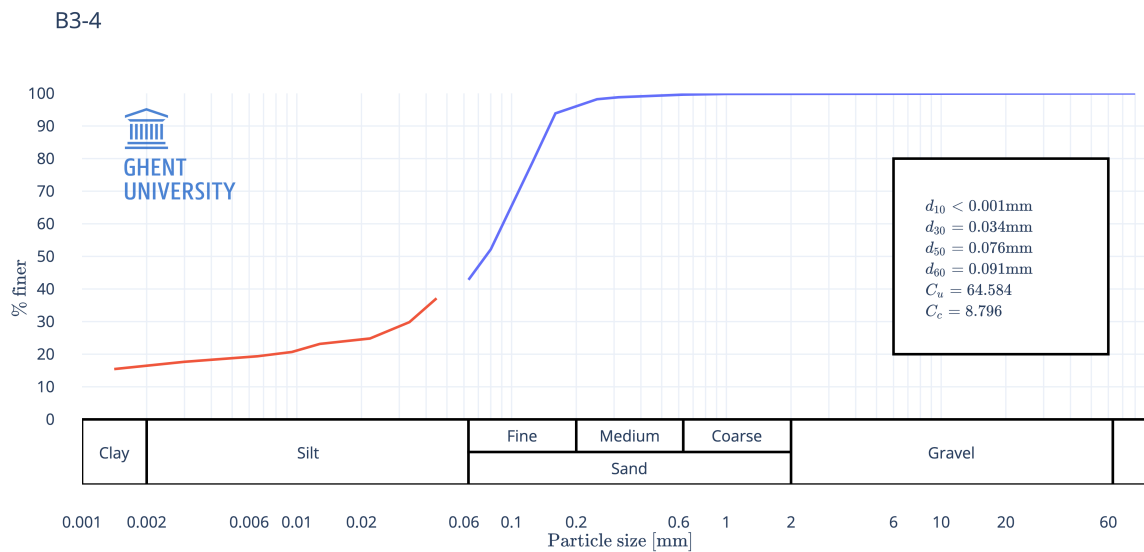
### Test Summary

$d_{10}$ [mm]	0.003		
$d_{30}$ [mm]	0.042		
$d_{50}$ [mm]	0.061		
$d_{60}$ [mm]	0.074		
$C_u$ [-]	24.354		
$C_c$ [-]	7.645		
Fines content [%]	60.3		
Borehole:		Sample: B3-2	Specimen:
Depth:			



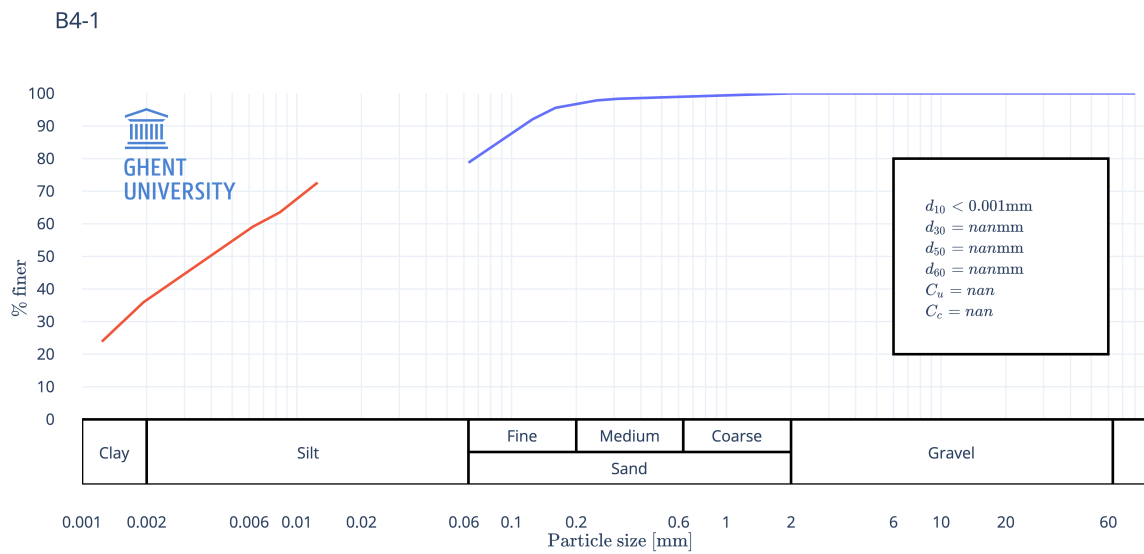
### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.003	
$d_{60}$ [mm]	0.004	
$C_u$ [-]	3.149	
$C_c$ [-]	0.384	
Fines content [%]	92.1	
Borehole:	Sample: B3-3	Specimen:
Depth:		



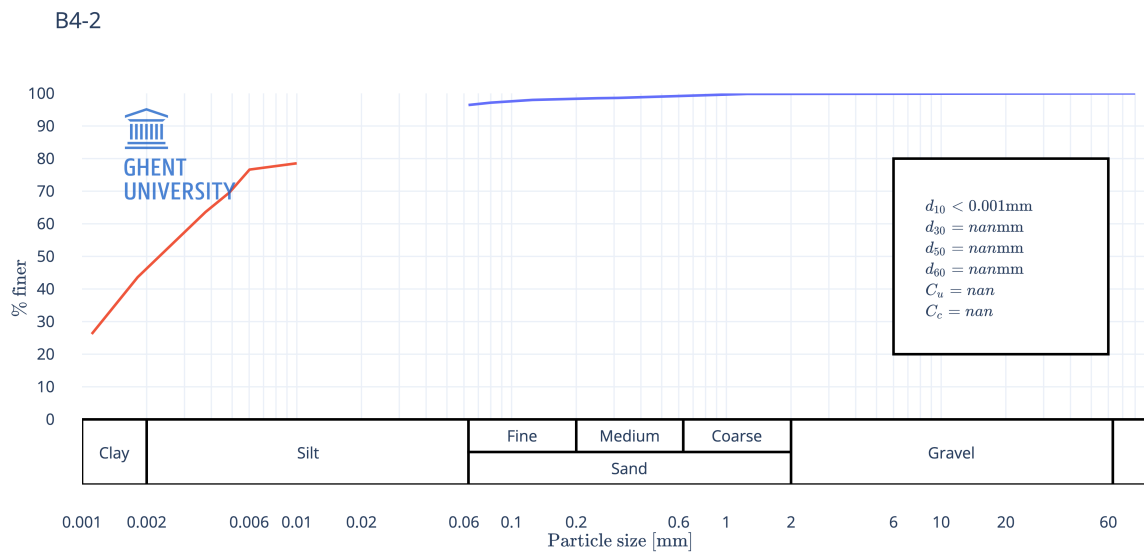
### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.034	
$d_{50}$ [mm]	0.076	
$d_{60}$ [mm]	0.091	
$C_u$ [-]	64.584	
$C_c$ [-]	8.796	
Fines content [%]	49.4	
Borehole:	Sample: B3-4	Specimen:
Depth:		



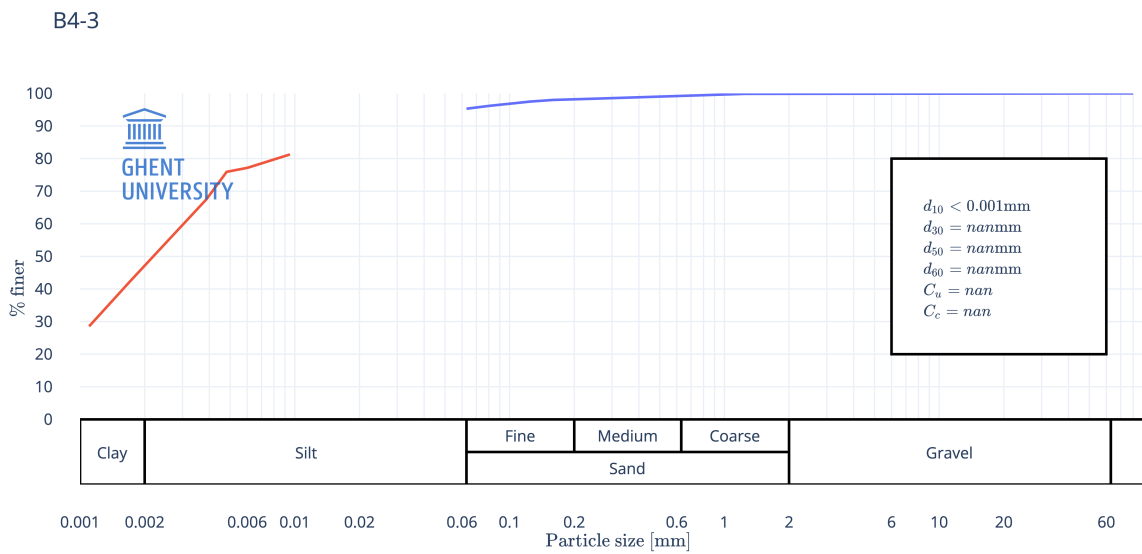
### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.002	
$d_{50}$ [mm]	0.004	
$d_{60}$ [mm]	0.007	
$C_u$ [-]	5.351	
$C_c$ [-]	0.294	
Fines content [%]	81.9	
Borehole:	Sample: B4-1	Specimen:
Depth:		



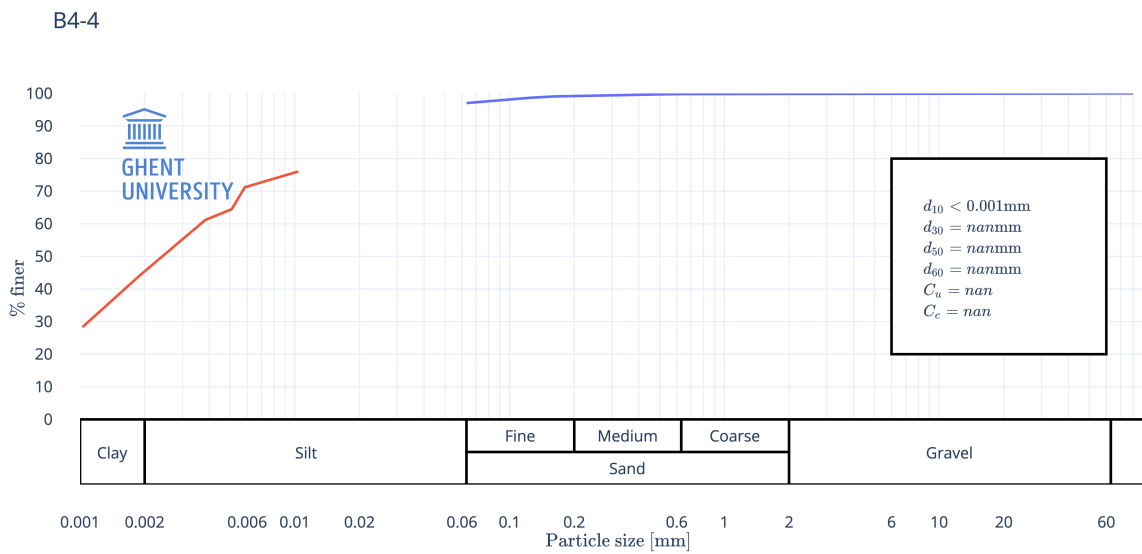
### Test Summary

$d_{10}$ [mm]	0.001		
$d_{30}$ [mm]	0.001		
$d_{50}$ [mm]	0.002		
$d_{60}$ [mm]	0.003		
$C_u$ [-]	2.971		
$C_c$ [-]	0.417		
Fines content [%]	96.9		
Borehole:		Sample: B4-2	Specimen:
Depth:			



### Test Summary

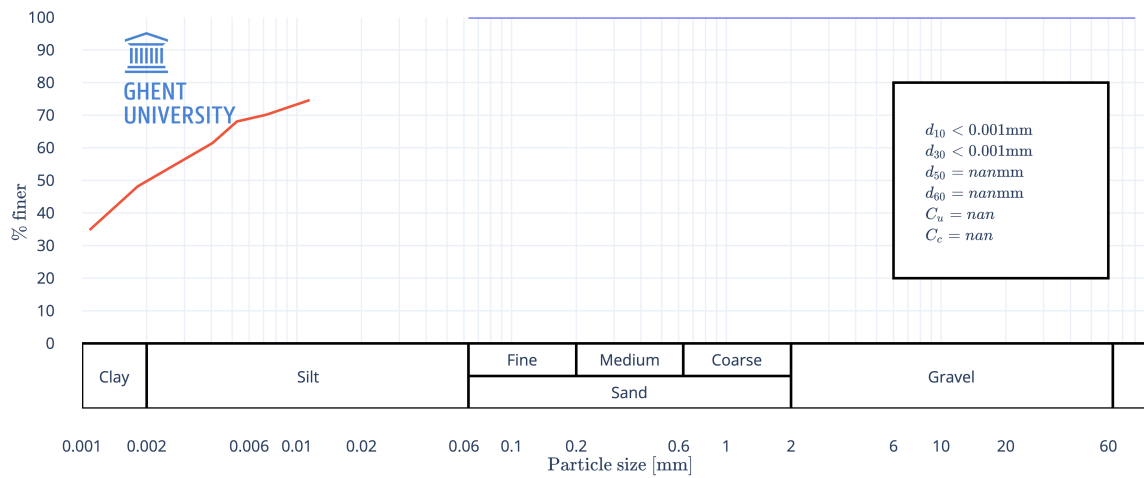
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.002	
$d_{60}$ [mm]	0.003	
$C_u$ [-]	2.754	
$C_c$ [-]	0.398	
Fines content [%]	95.9	
Borehole:	Sample: B4-3	Specimen:
Depth:		



### Test Summary

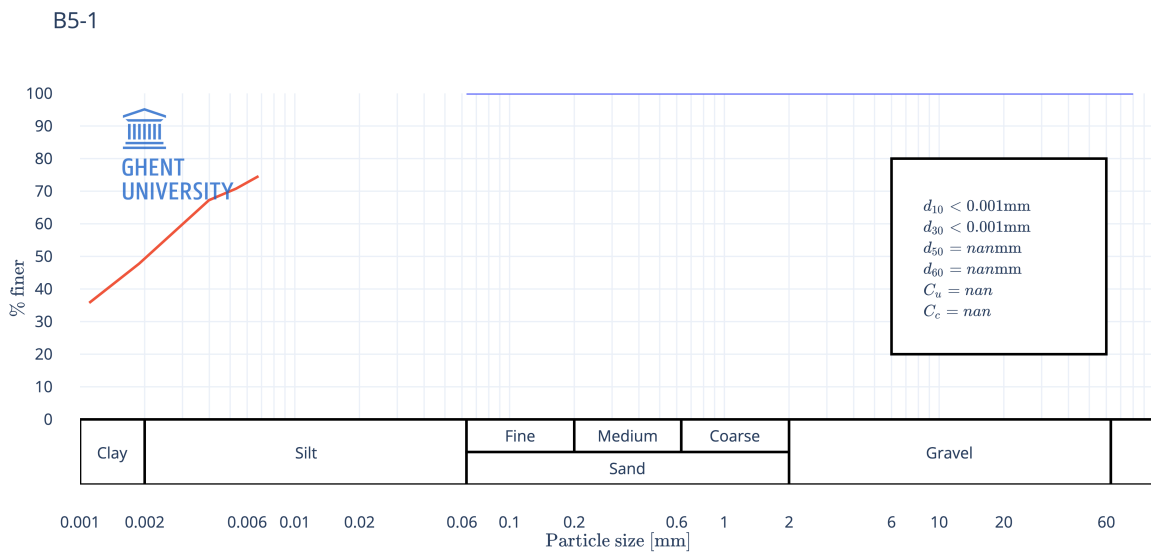
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.002	
$d_{60}$ [mm]	0.004	
$C_u$ [-]	3.557	
$C_c$ [-]	0.321	
Fines content [%]	97.6	
Borehole:	Sample: B4-4	Specimen:
Depth:		

B4-5



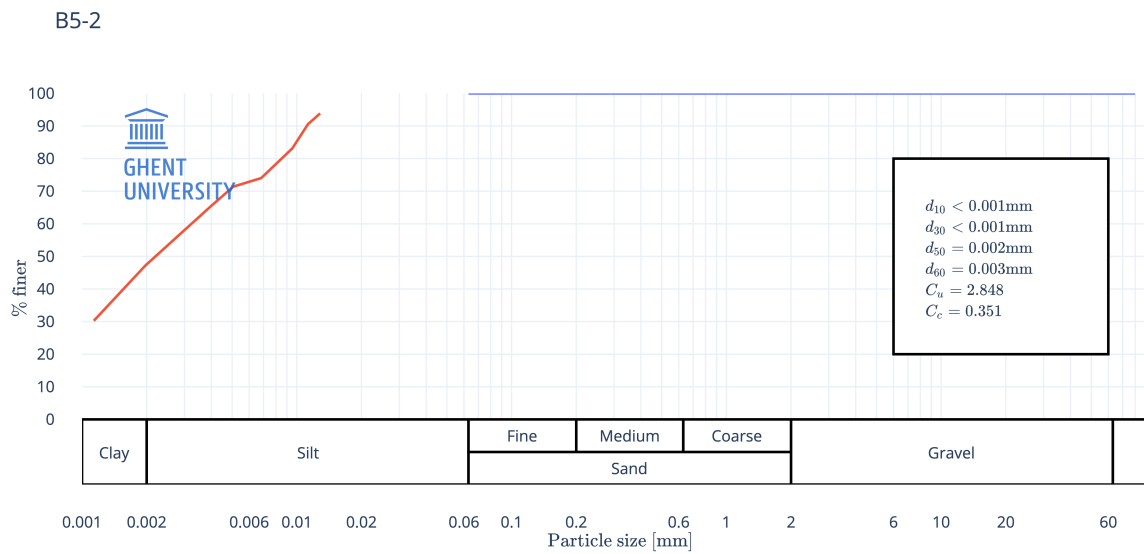
### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.002	
$d_{60}$ [mm]	0.004	
$C_u$ [-]	3.419	
$C_c$ [-]	0.292	
Fines content [%]	100.0	
Borehole:	Sample: B4-5	Specimen:
Depth:		



### Test Summary

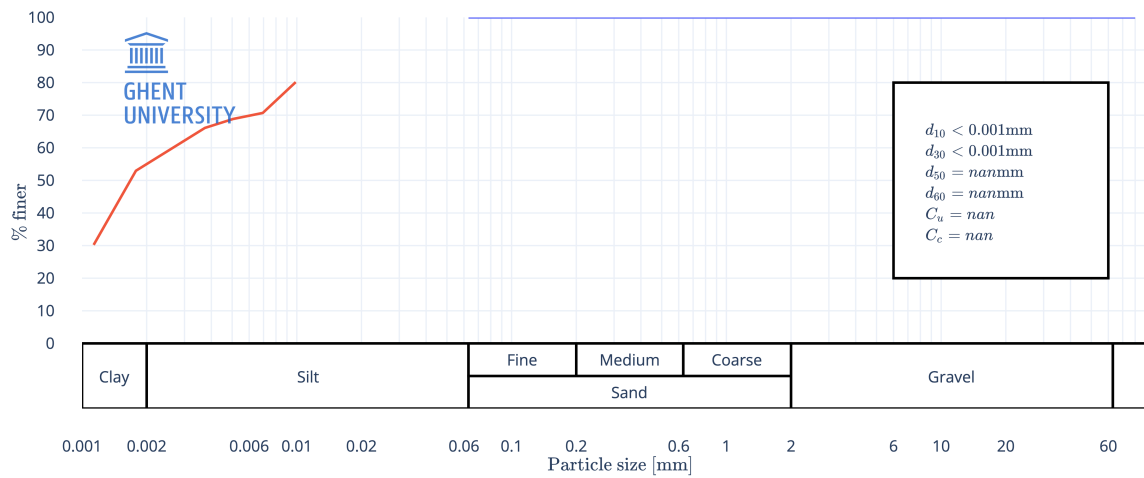
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.002	
$d_{60}$ [mm]	0.003	
$C_u$ [-]	2.733	
$C_c$ [-]	0.366	
Fines content [%]	100.0	
Borehole:	Sample: B5-1	Specimen:
Depth:		



### Test Summary

$d_{10}$ [mm]	0.001
$d_{30}$ [mm]	0.001
$d_{50}$ [mm]	0.002
$d_{60}$ [mm]	0.003
$C_u$ [-]	2.848
$C_c$ [-]	0.351
Fines content [%]	100.0
Borehole:	
Sample: B5-2	
Specimen:	
Depth:	

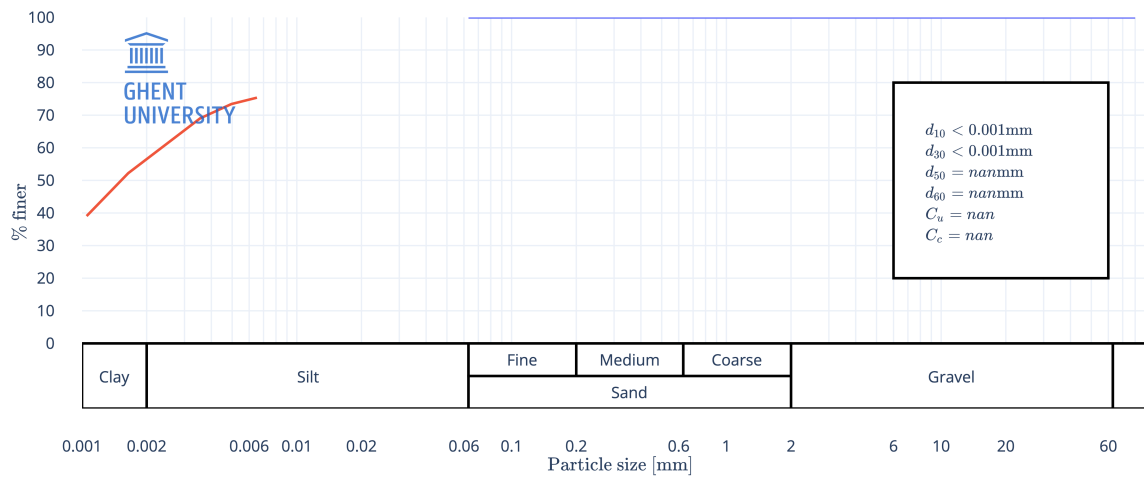
B5-3



### Test Summary

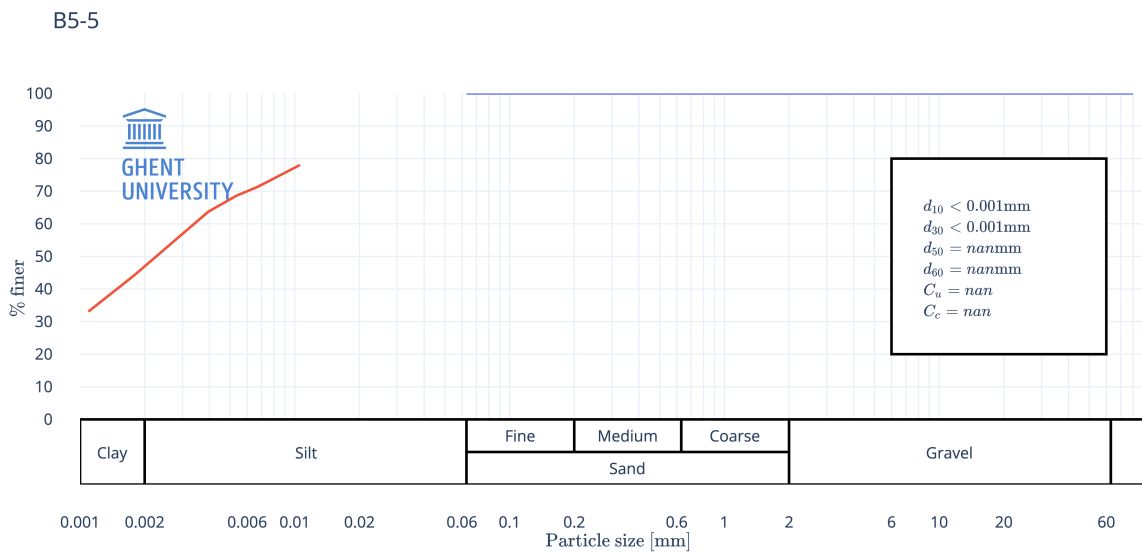
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.002	
$d_{60}$ [mm]	0.003	
$C_u$ [-]	2.338	
$C_c$ [-]	0.428	
Fines content [%]	100.0	
Borehole:	Sample: B5-3	Specimen:
Depth:		

B5-4



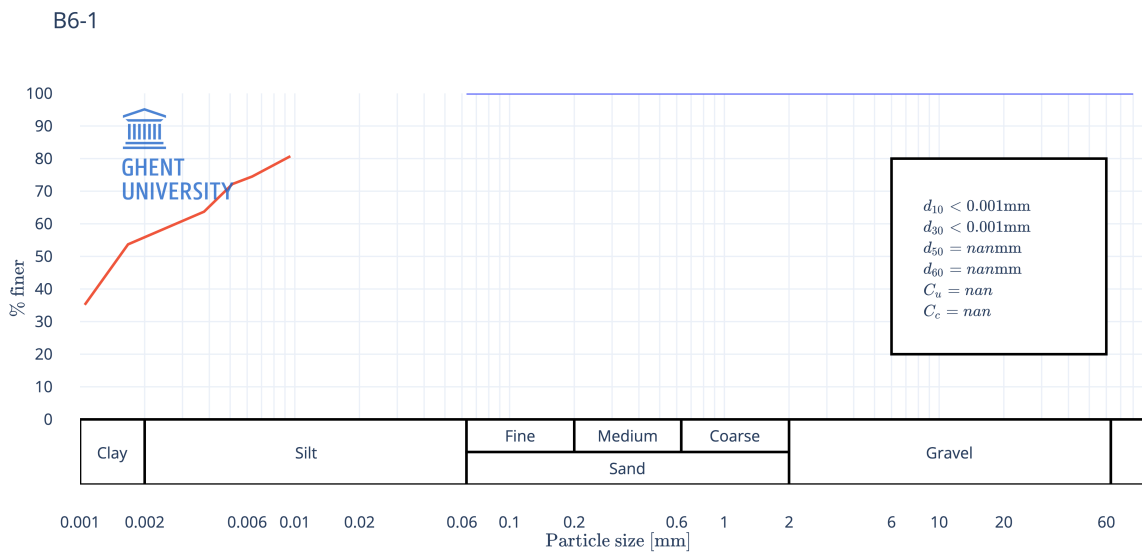
### Test Summary

$d_{10}$ [mm]	0.001		
$d_{30}$ [mm]	0.001		
$d_{50}$ [mm]	0.002		
$d_{60}$ [mm]	0.002		
$C_u$ [-]	2.231		
$C_c$ [-]	0.448		
Fines content [%]	100.0		
Borehole:		Sample: B5-4	Specimen:
Depth:			



### Test Summary

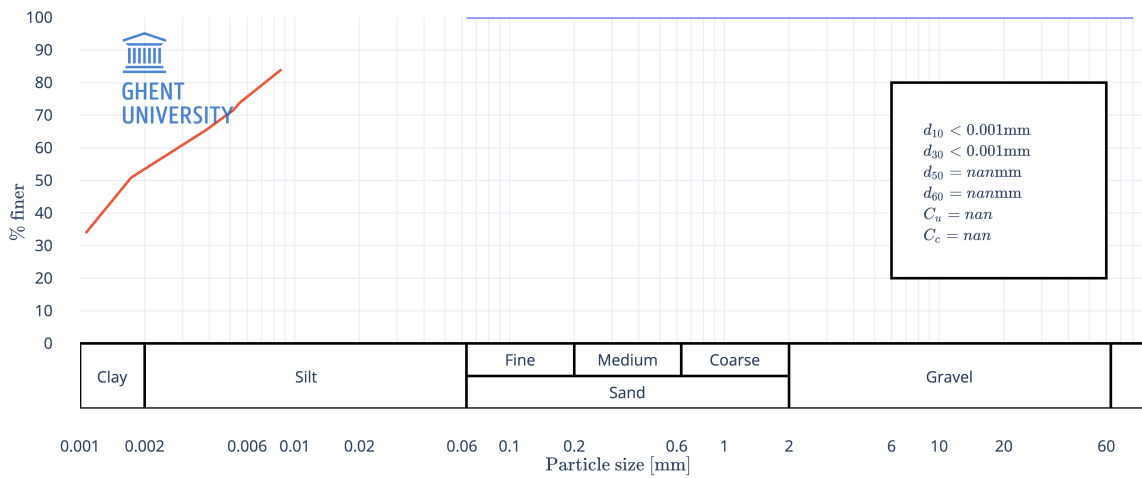
$d_{10}$ [mm]	0.001		
$d_{30}$ [mm]	0.001		
$d_{50}$ [mm]	0.002		
$d_{60}$ [mm]	0.003		
$C_u$ [-]	3.111		
$C_c$ [-]	0.321		
Fines content [%]	100.0		
Borehole:	Sample: B5-5	Specimen:	
Depth:			



### Test Summary

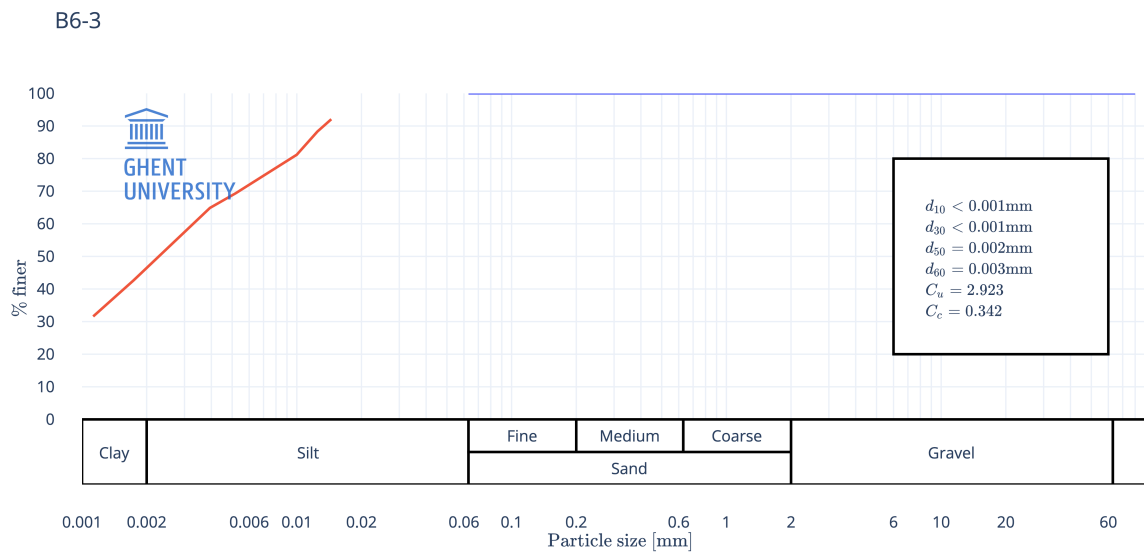
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.002	
$d_{60}$ [mm]	0.003	
$C_u$ [-]	2.657	
$C_c$ [-]	0.376	
Fines content [%]	100.0	
Borehole:	Sample: B6-1	Specimen:
Depth:		

B6-2



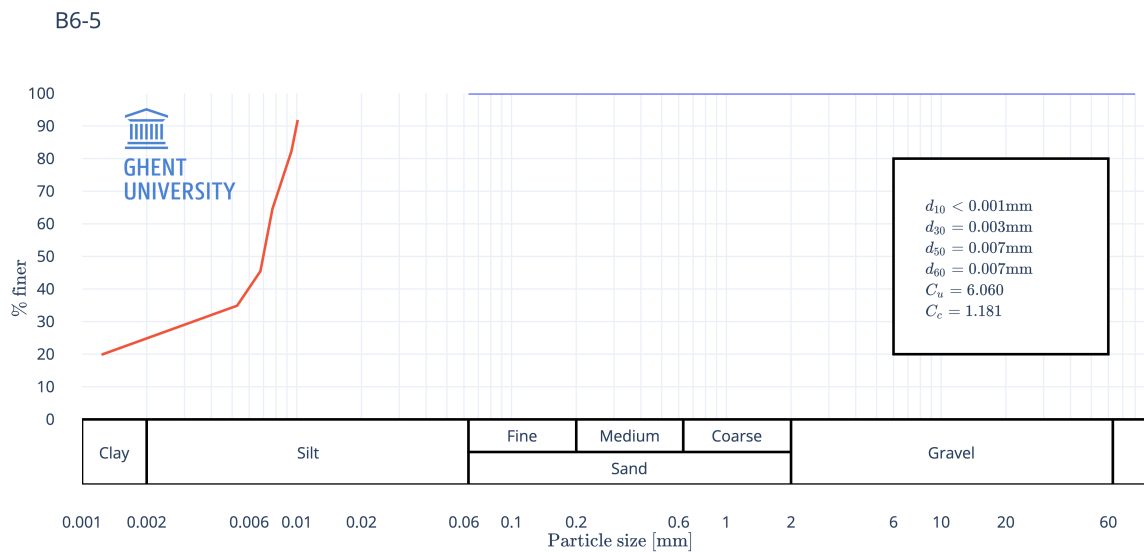
### Test Summary

$d_{10}$ [mm]	0.001		
$d_{30}$ [mm]	0.001		
$d_{50}$ [mm]	0.002		
$d_{60}$ [mm]	0.003		
$C_u$ [-]	2.692		
$C_c$ [-]	0.372		
Fines content [%]	100.0		
Borehole:		Sample: B6-2	Specimen:
Depth:			



### Test Summary

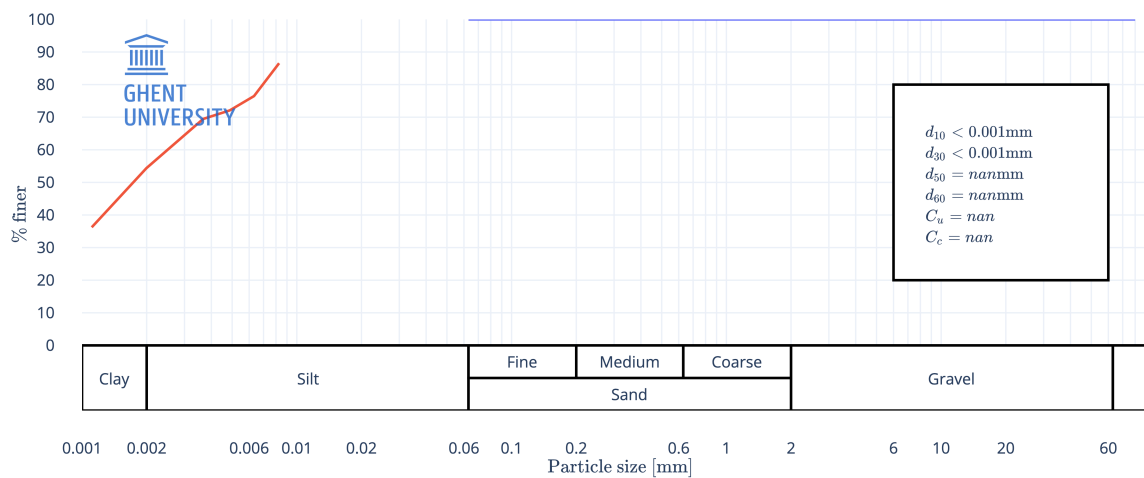
$d_{10}$ [mm]	0.001				
$d_{30}$ [mm]	0.001				
$d_{50}$ [mm]	0.002				
$d_{60}$ [mm]	0.003				
$C_u$ [-]	2.923				
$C_c$ [-]	0.342				
Fines content [%]	100.0				
Borehole:		Sample: B6-3		Specimen:	
Depth:					



### Test Summary

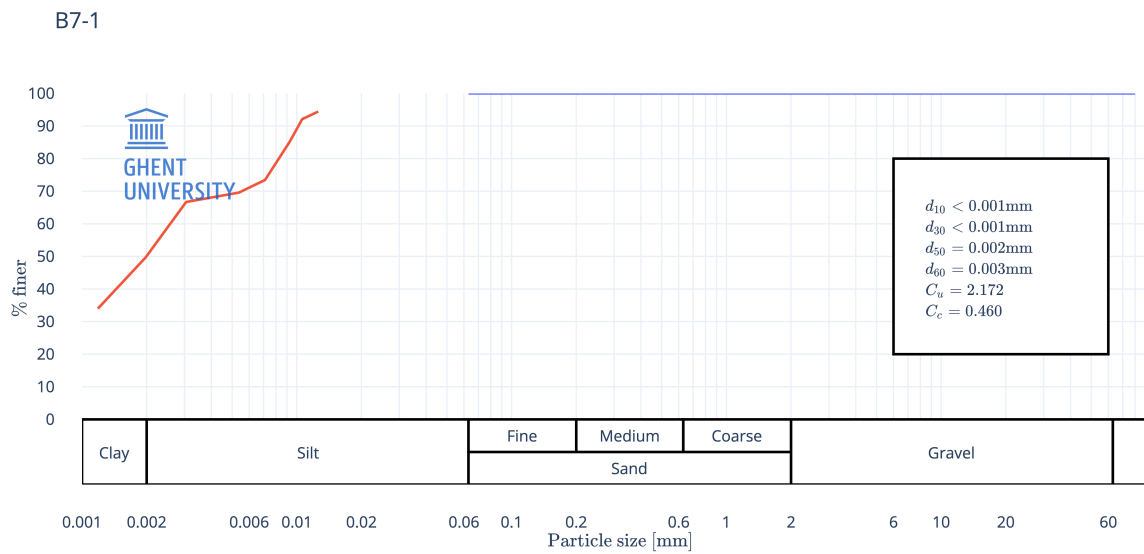
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.003	
$d_{50}$ [mm]	0.007	
$d_{60}$ [mm]	0.007	
$C_u$ [-]	6.06	
$C_c$ [-]	1.181	
Fines content [%]	100.0	
Borehole:	Sample: B6-5	Specimen:
Depth:		

B6-6



### Test Summary

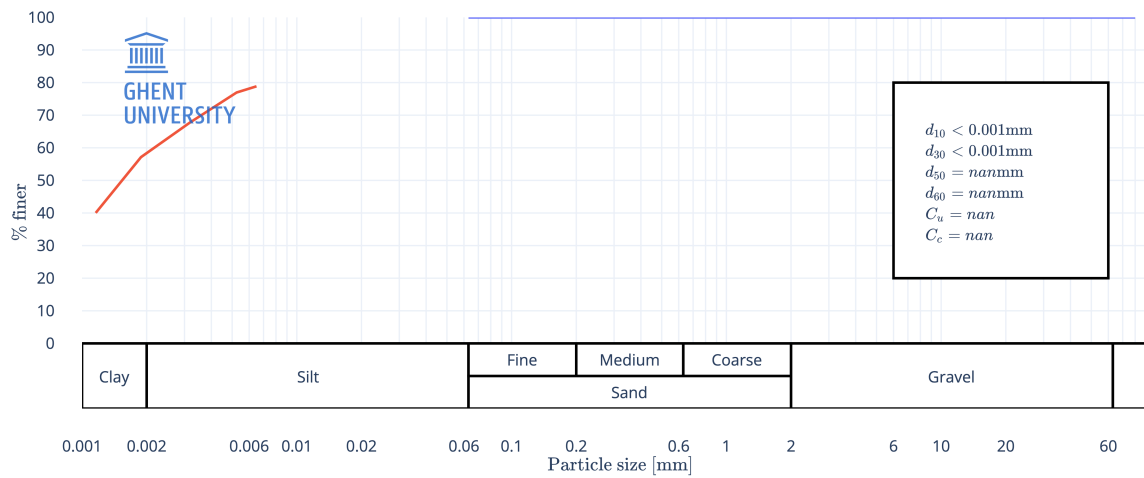
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.002	
$d_{60}$ [mm]	0.003	
$C_u$ [-]	2.255	
$C_c$ [-]	0.443	
Fines content [%]	100.0	
Borehole:	Sample: B6-6	Specimen:
Depth:		



### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.002	
$d_{60}$ [mm]	0.003	
$C_u$ [-]	2.172	
$C_c$ [-]	0.46	
Fines content [%]	100.0	
Borehole:	Sample: B7-1	Specimen:
Depth:		

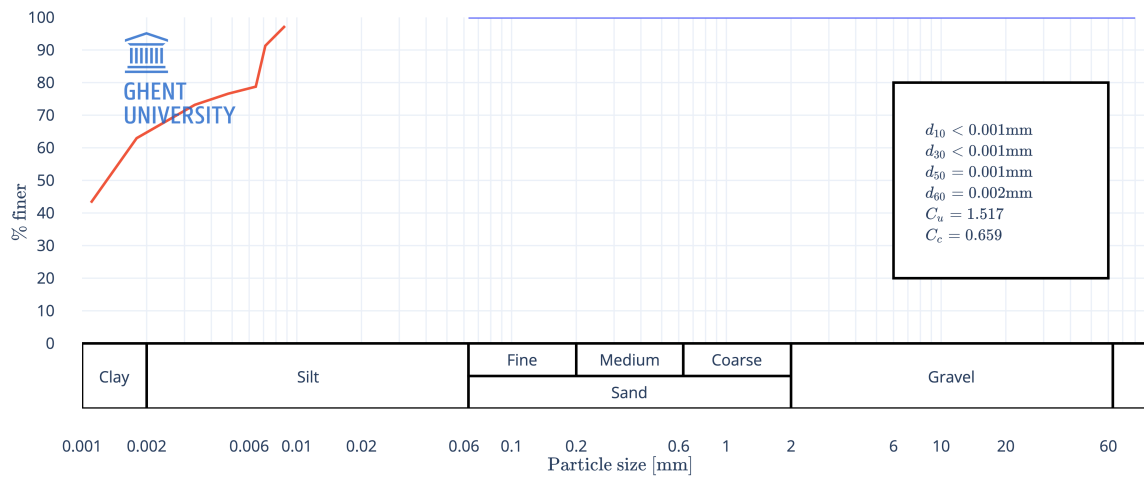
B7-2



### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.002	
$d_{60}$ [mm]	0.002	
$C_u$ [-]	1.872	
$C_c$ [-]	0.534	
Fines content [%]	100.0	
Borehole:	Sample: B7-2	Specimen:
Depth:		

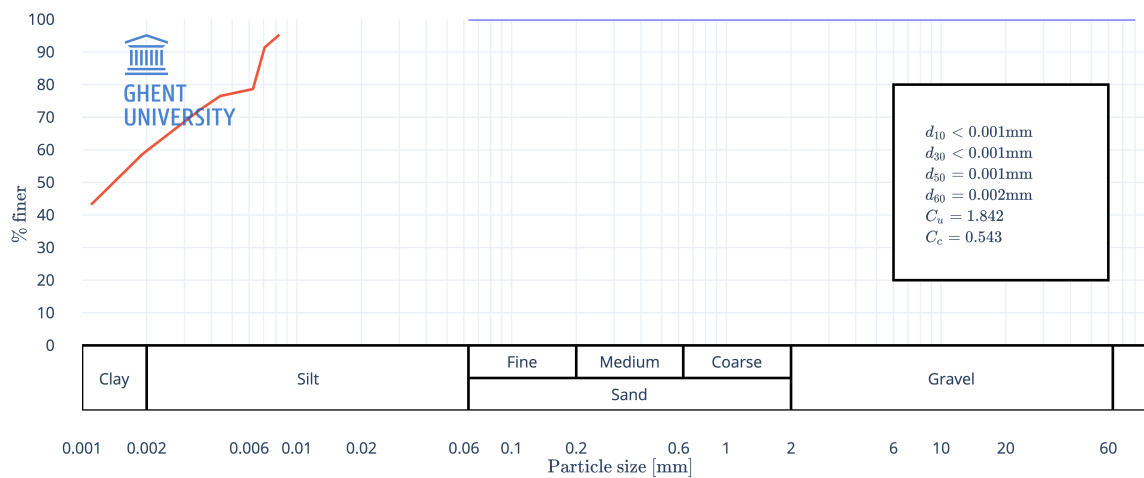
B7-3



### Test Summary

$d_{10}$ [mm]	0.001				
$d_{30}$ [mm]	0.001				
$d_{50}$ [mm]	0.001				
$d_{60}$ [mm]	0.002				
$C_u$ [-]	1.517				
$C_c$ [-]	0.659				
Fines content [%]	100.0				
Borehole:		Sample: B7-3		Specimen:	
Depth:					

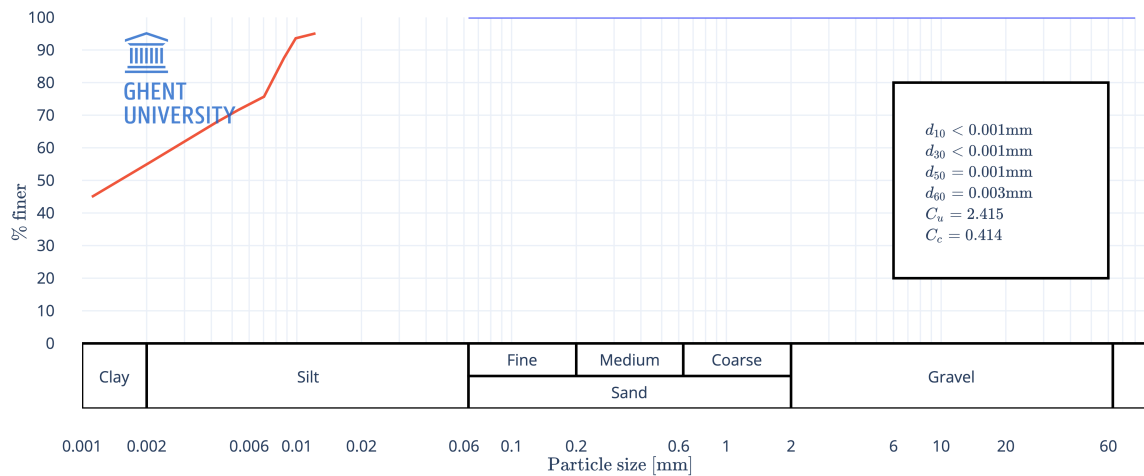
B7-4



### Test Summary

$d_{10}$ [mm]	0.001
$d_{30}$ [mm]	0.001
$d_{50}$ [mm]	0.001
$d_{60}$ [mm]	0.002
$C_u$ [-]	1.842
$C_c$ [-]	0.543
Fines content [%]	100.0
Borehole:                      Sample: B7-4                      Specimen:	
Depth:	

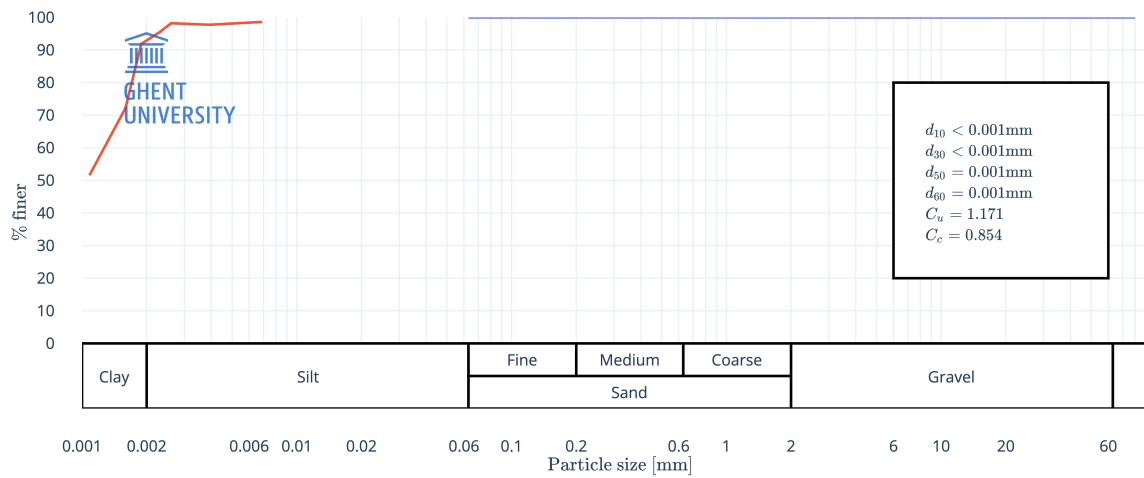
B7-5



### Test Summary

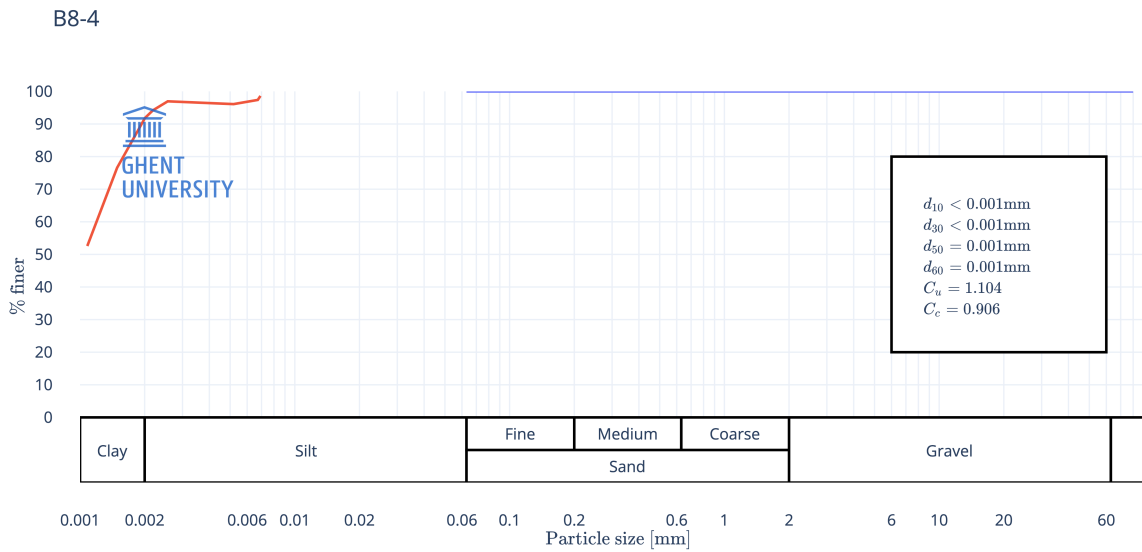
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.001	
$d_{60}$ [mm]	0.003	
$C_u$ [-]	2.415	
$C_c$ [-]	0.414	
Fines content [%]	100.0	
Borehole:	Sample: B7-5	Specimen:
Depth:		

B8-2



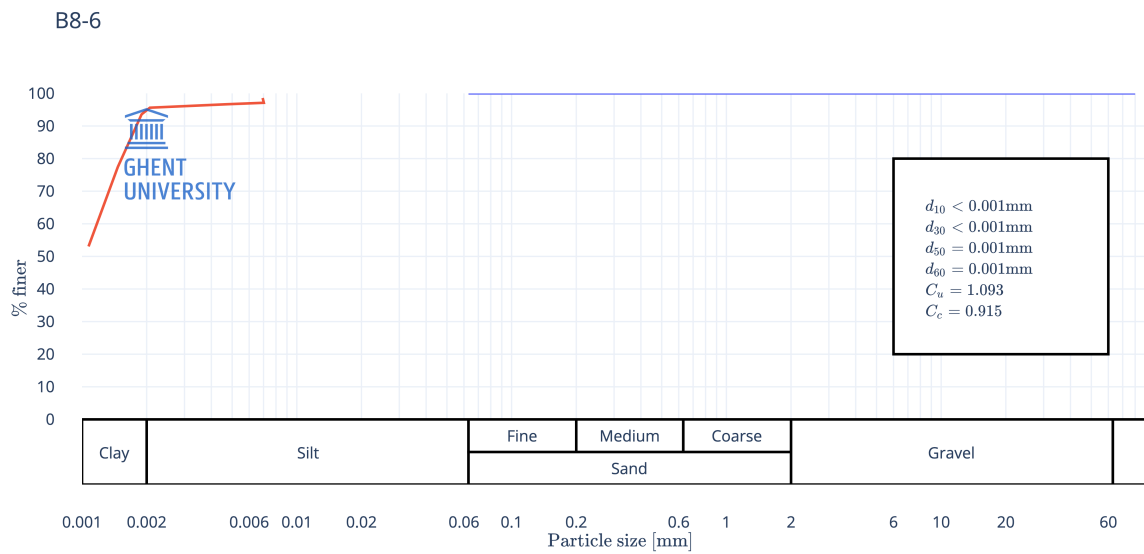
### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.001	
$d_{60}$ [mm]	0.001	
$C_u$ [-]	1.171	
$C_c$ [-]	0.854	
Fines content [%]	100.0	
Borehole:	Sample: B8-2	Specimen:
Depth:		



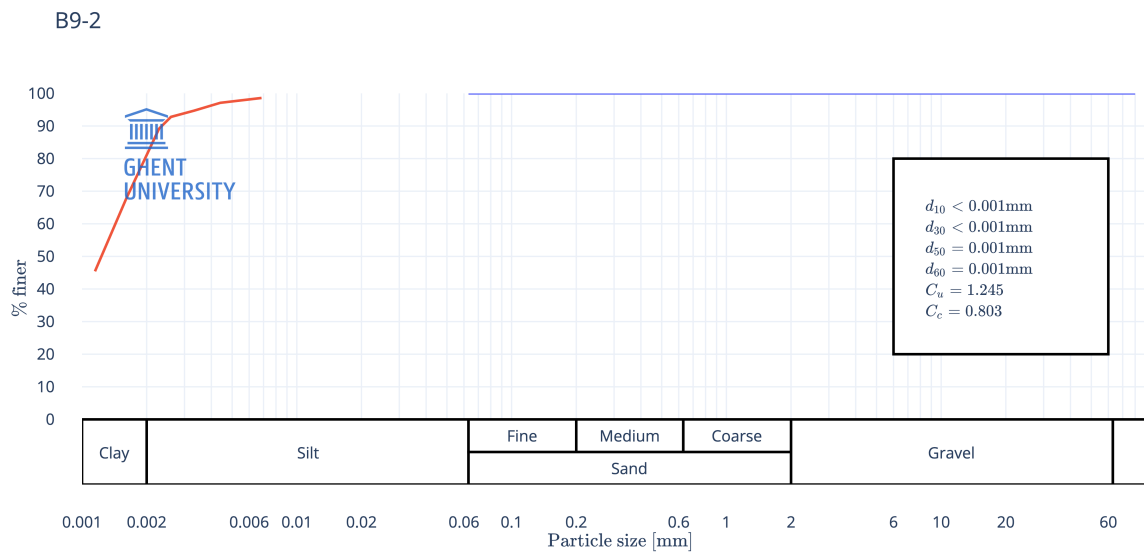
### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.001	
$d_{60}$ [mm]	0.001	
$C_u$ [-]	1.104	
$C_c$ [-]	0.906	
Fines content [%]	100.0	
Borehole:	Sample: B8-4	Specimen:
Depth:		



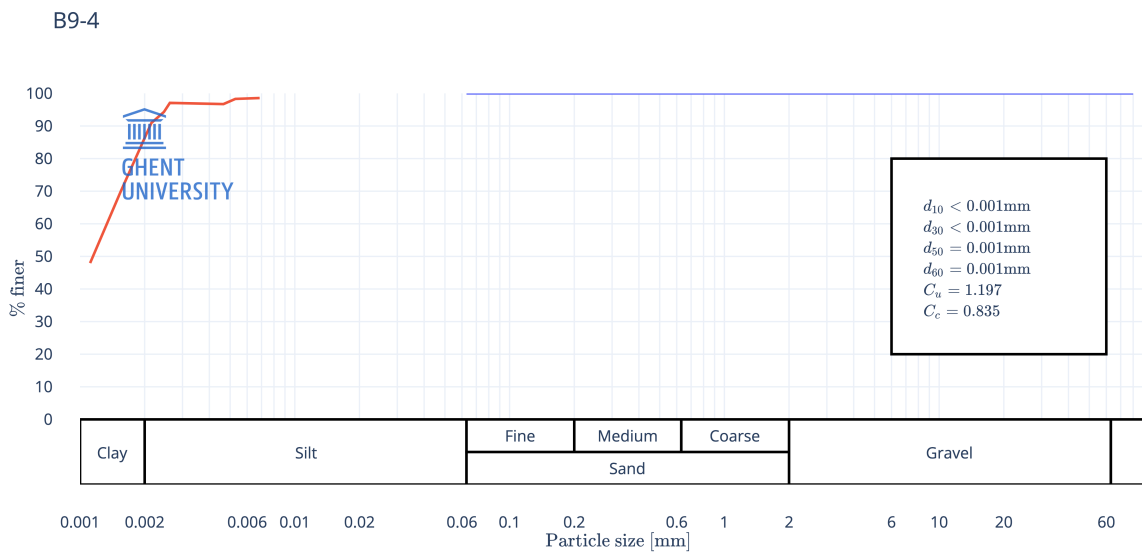
### Test Summary

$d_{10}$ [mm]	0.001				
$d_{30}$ [mm]	0.001				
$d_{50}$ [mm]	0.001				
$d_{60}$ [mm]	0.001				
$C_u$ [-]	1.093				
$C_c$ [-]	0.915				
Fines content [%]	100.0				
Borehole:		Sample: B8-6		Specimen:	
Depth:					



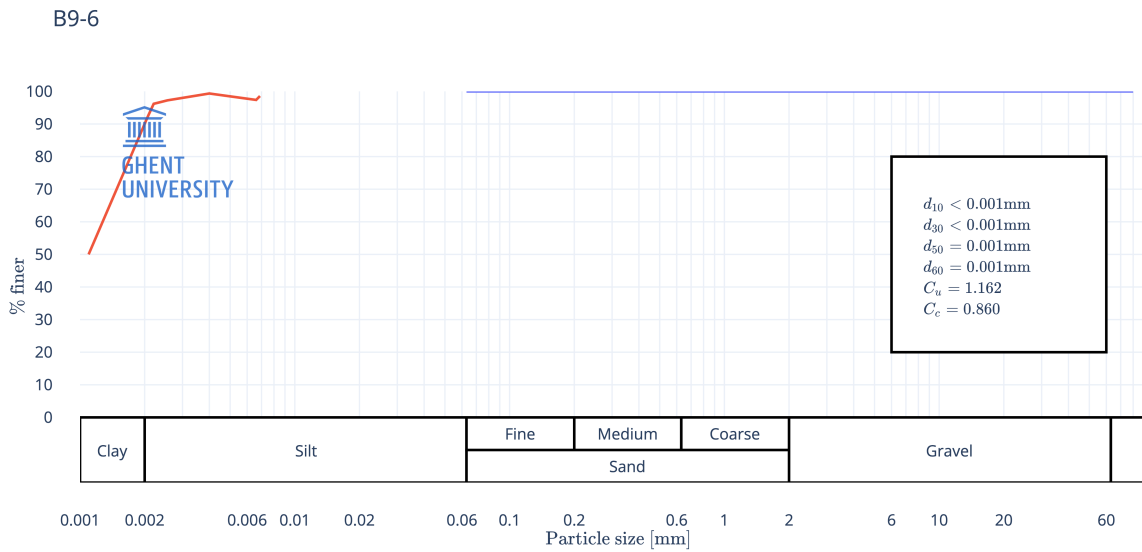
### Test Summary

$d_{10}$ [mm]	0.001
$d_{30}$ [mm]	0.001
$d_{50}$ [mm]	0.001
$d_{60}$ [mm]	0.001
$C_u$ [-]	1.245
$C_c$ [-]	0.803
Fines content [%]	100.0
Borehole:	
Sample: B9-2	
Specimen:	
Depth:	



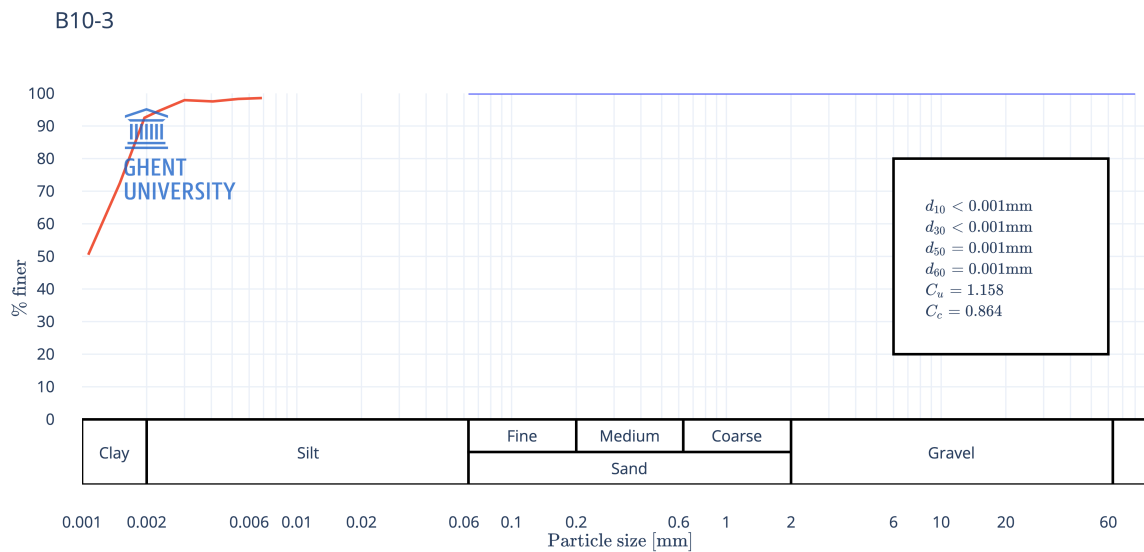
### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.001	
$d_{60}$ [mm]	0.001	
$C_u$ [-]	1.197	
$C_c$ [-]	0.835	
Fines content [%]	100.0	
Borehole:	Sample: B9-4	Specimen:
Depth:		



### Test Summary

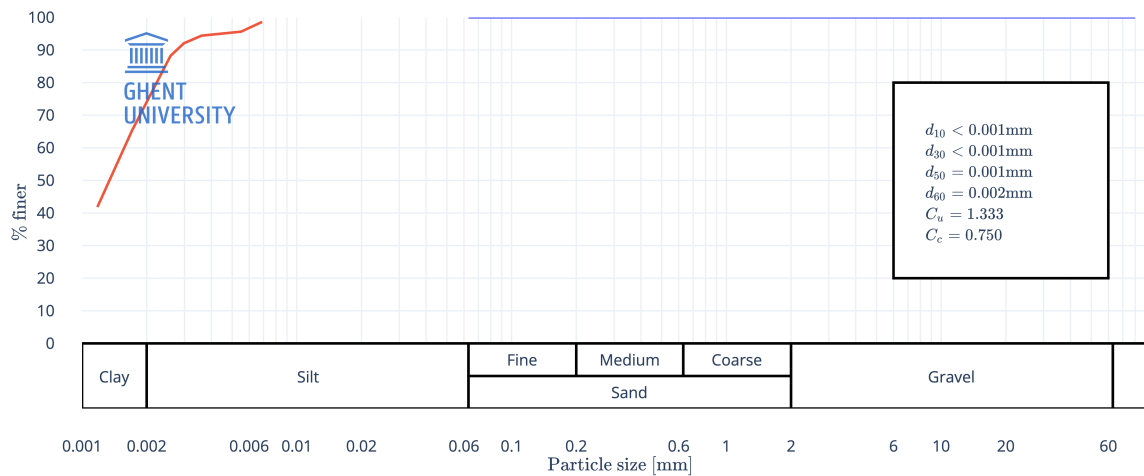
$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.001	
$d_{60}$ [mm]	0.001	
$C_u$ [-]	1.162	
$C_c$ [-]	0.86	
Fines content [%]	100.0	
Borehole:	Sample: B9-6	Specimen:
Depth:		



### Test Summary

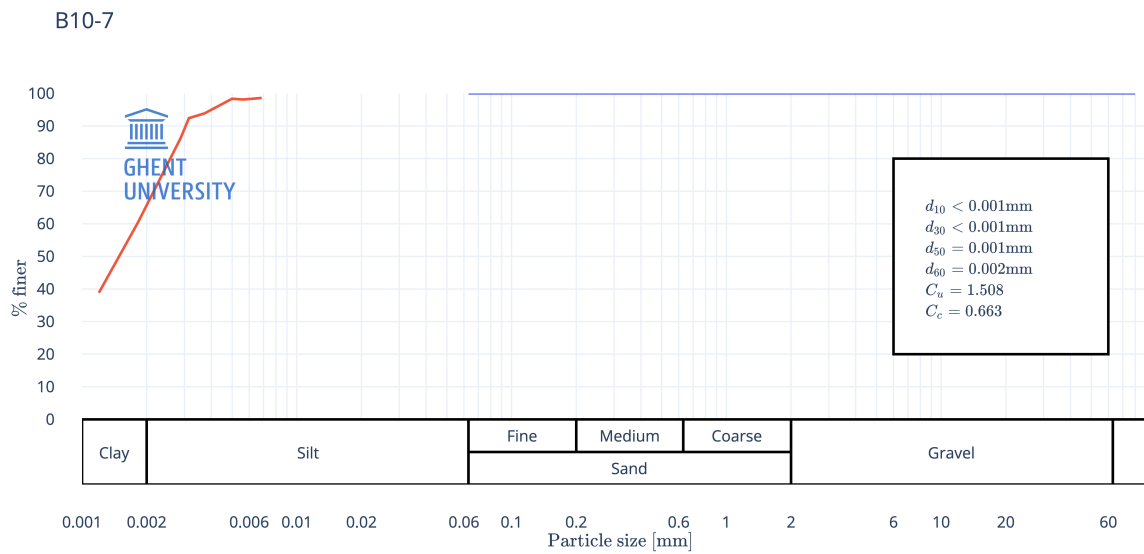
$d_{10}$ [mm]	0.001				
$d_{30}$ [mm]	0.001				
$d_{50}$ [mm]	0.001				
$d_{60}$ [mm]	0.001				
$C_u$ [-]	1.158				
$C_c$ [-]	0.864				
Fines content [%]	100.0				
Borehole:		Sample: B10-3		Specimen:	
Depth:					

B10-5



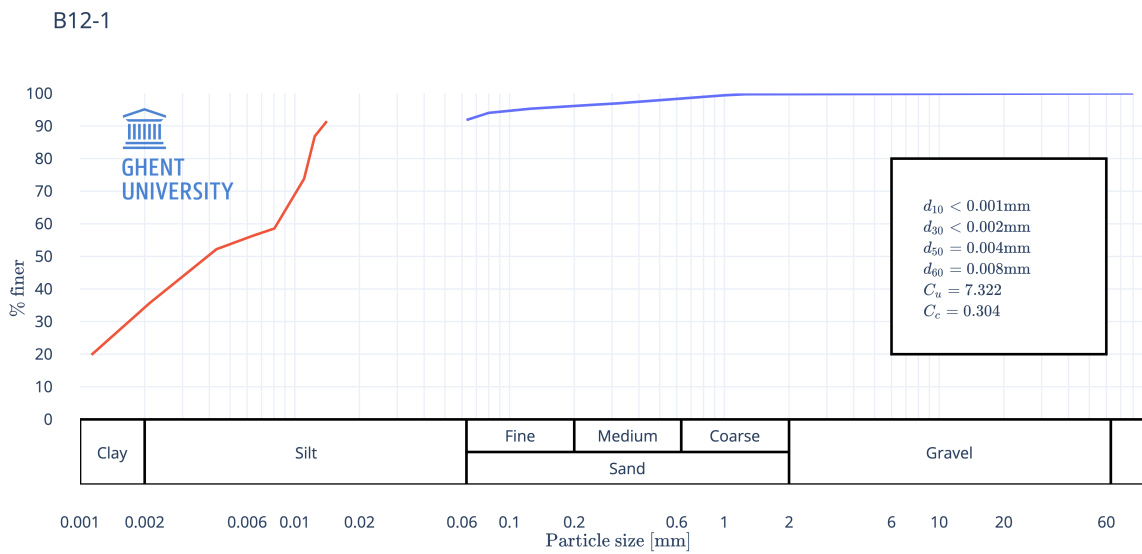
### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.001	
$d_{60}$ [mm]	0.002	
$C_u$ [-]	1.333	
$C_c$ [-]	0.75	
Fines content [%]	100.0	
Borehole:	Sample: B10-5	Specimen:
Depth:		



### Test Summary

$d_{10}$ [mm]	0.001	
$d_{30}$ [mm]	0.001	
$d_{50}$ [mm]	0.001	
$d_{60}$ [mm]	0.002	
$C_u$ [-]	1.508	
$C_c$ [-]	0.663	
Fines content [%]	100.0	
Borehole:	Sample: B10-7	Specimen:
Depth:		



### Test Summary

$d_{10}$ [mm]	0.001
$d_{30}$ [mm]	0.002
$d_{50}$ [mm]	0.004
$d_{60}$ [mm]	0.008
$C_u$ [-]	7.322
$C_c$ [-]	0.304
Fines content [%]	93.4
Borehole:	
Sample: B12-1	
Specimen:	
Depth:	

## APPENDIX G – OEDOMETER TEST RESULTS

○ Bus 4

Summary table

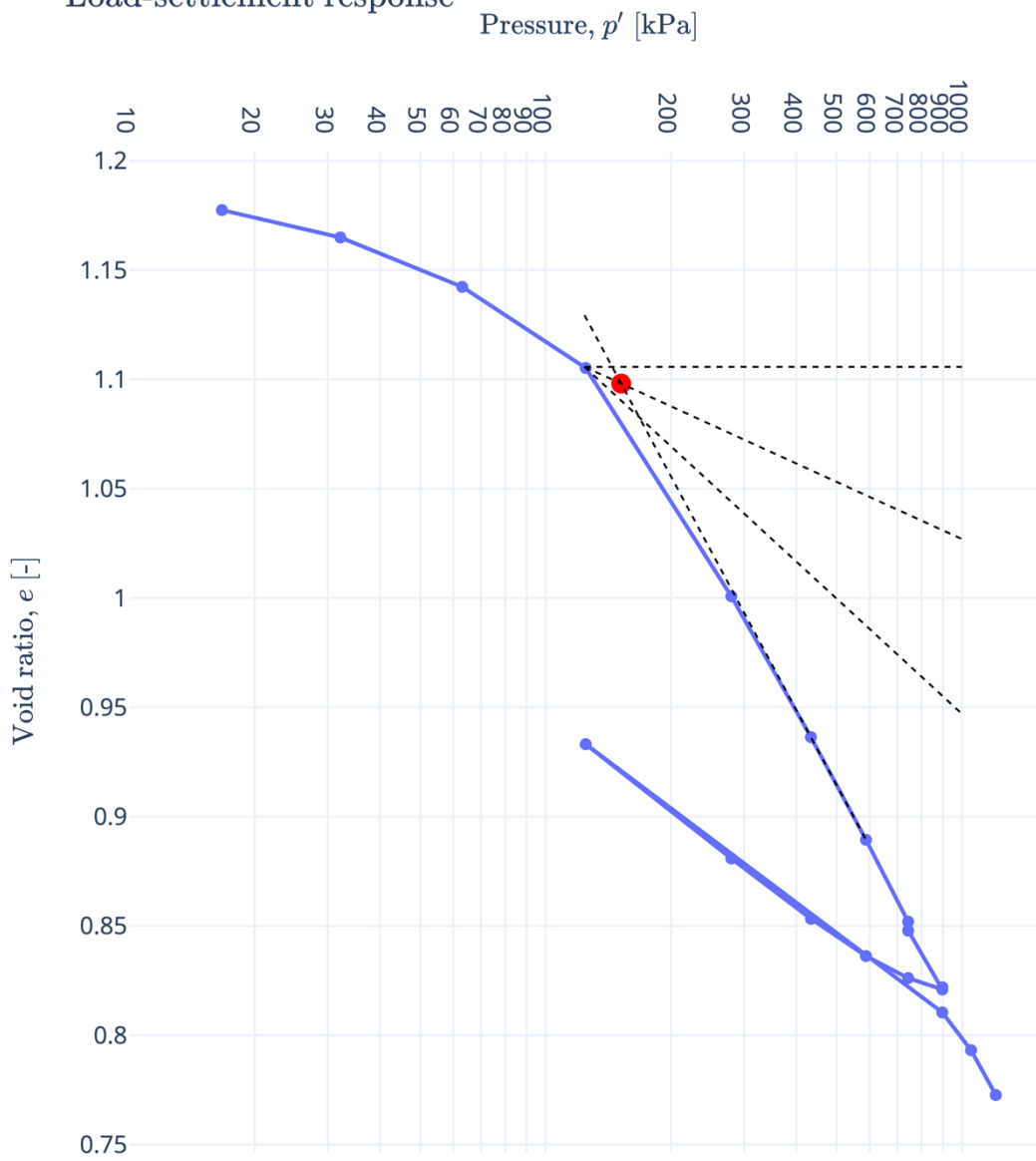
step	p start [kPa]	p end [kPa]	Void ratio [-]	Axial strain [-]	C [-]	C <sub>R</sub> [-]	C <sub>c</sub> [-]	M [kPa]	c <sub>v</sub> [m <sup>2</sup> /s]	k [m/yr]
3	1.26	16.70	1.18	0.017	156.226	0.015	0.033	933	3.39E-06	1.15E+00
4	16.70	32.15	1.16	0.022	115.834	0.020	0.044	2732	1.53E-07	1.77E-02
5	32.15	63.03	1.14	0.032	65.987	0.035	0.077	3027	1.02E-07	1.07E-02
6	63.03	124.81	1.11	0.049	40.763	0.056	0.125	3686	1.11E-07	9.53E-03
7	124.81	279.26	1.00	0.096	17.071	0.135	0.299	3274	2.45E-08	2.36E-03
9	433.70	588.14	0.89	0.147	14.362	0.160	0.355	7281	6.10E-09	2.62E-04
10	588.14	742.59	0.85	0.164	13.790	0.167	0.370	9134	3.60E-09	1.24E-04
18	897.03	742.59	0.83	0.175	80.364	0.029	0.063	65688	1.63E-08	7.83E-05
19	742.59	588.14	0.84	0.171	51.220	0.045	0.100	33927	8.20E-09	7.65E-05
20	588.14	433.70	0.85	0.163	39.541	0.058	0.129	20048	5.30E-09	8.40E-05
21	433.70	279.26	0.88	0.151	35.342	0.065	0.144	12399	3.30E-09	8.36E-05
22	279.26	124.81	0.93	0.127	34.107	0.068	0.149	6541	2.50E-09	1.19E-04
23	124.81	897.03	0.81	0.182	35.583	0.065	0.143	13932	4.90E-09	1.11E-04

Test conditions

Sample	Bus 4
Borehole	Boring B1
Depth [mBGL]	5.7
Initial void ratio [-]	1.21
Dry unit weight [kN/m <sup>3</sup> ]	16.51
Final water content [%]	29.06
Initial water content [%]	40.63
Effective unit weight [kN/m <sup>3</sup> ]	6.51
Equivalent height of solids [mm]	9.03

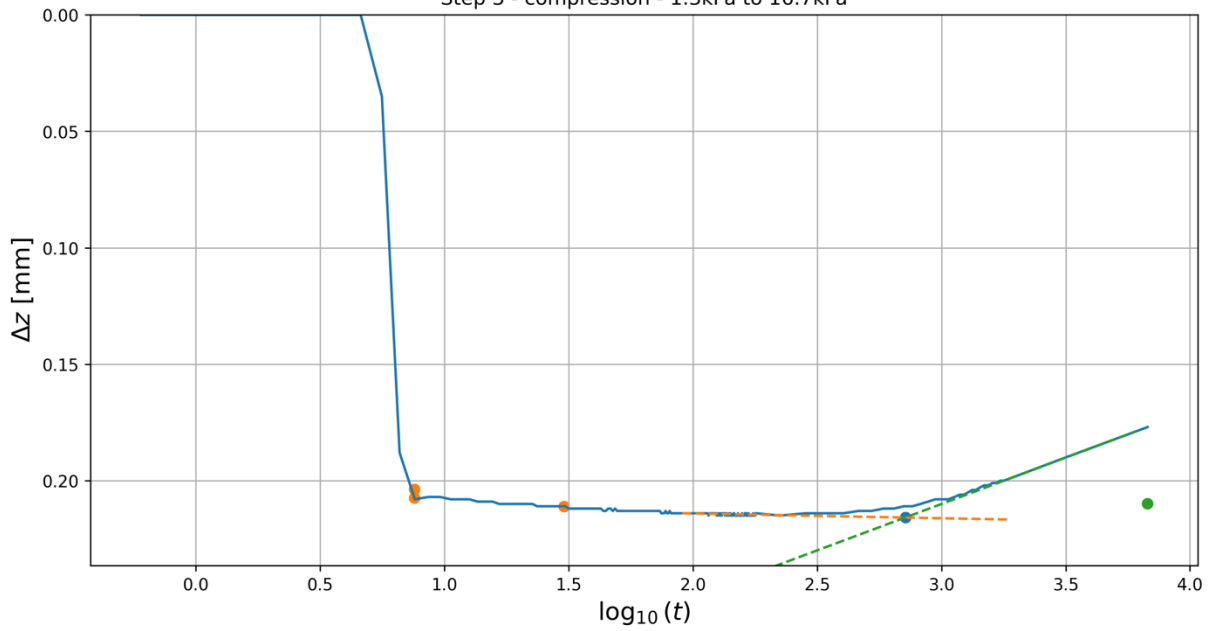
Compressibility chart and determination of preconsolidation pressure

Load-settlement response

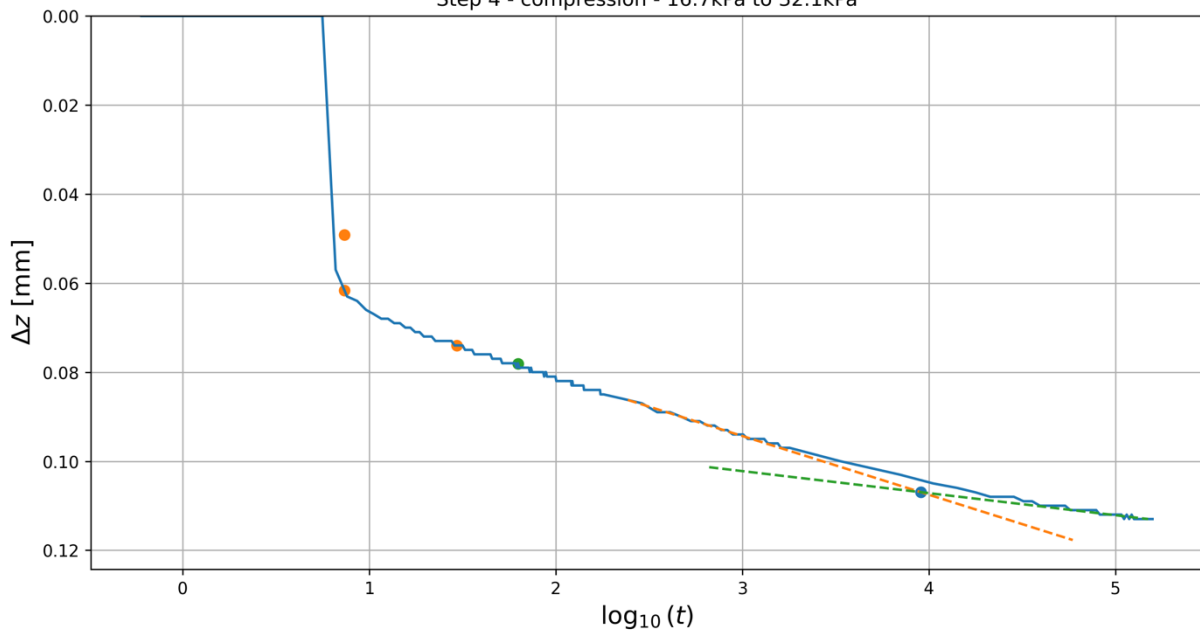


# Determination of consolidation coefficient

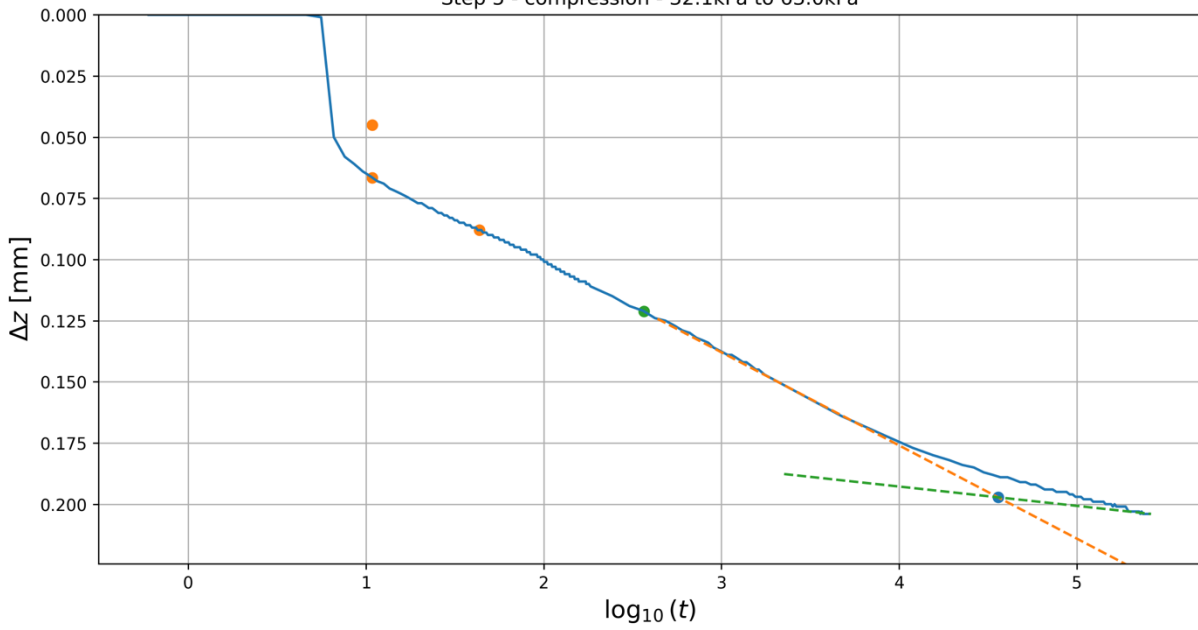
## Step 3 - compression - 1.3kPa to 16.7kPa



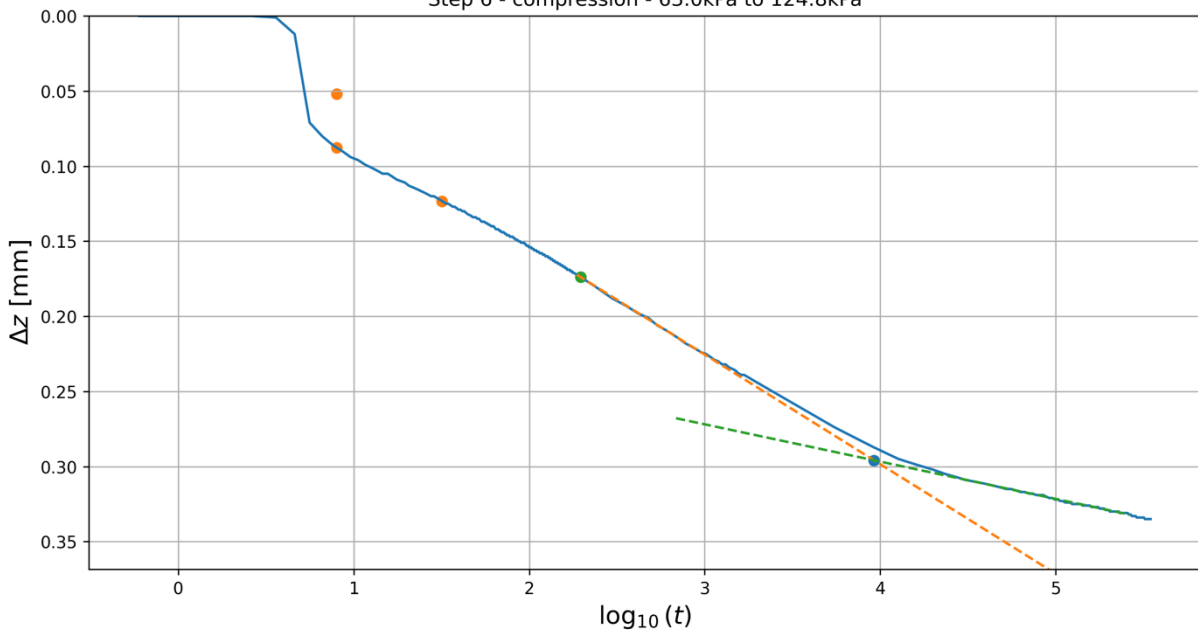
## Step 4 - compression - 16.7kPa to 32.1kPa

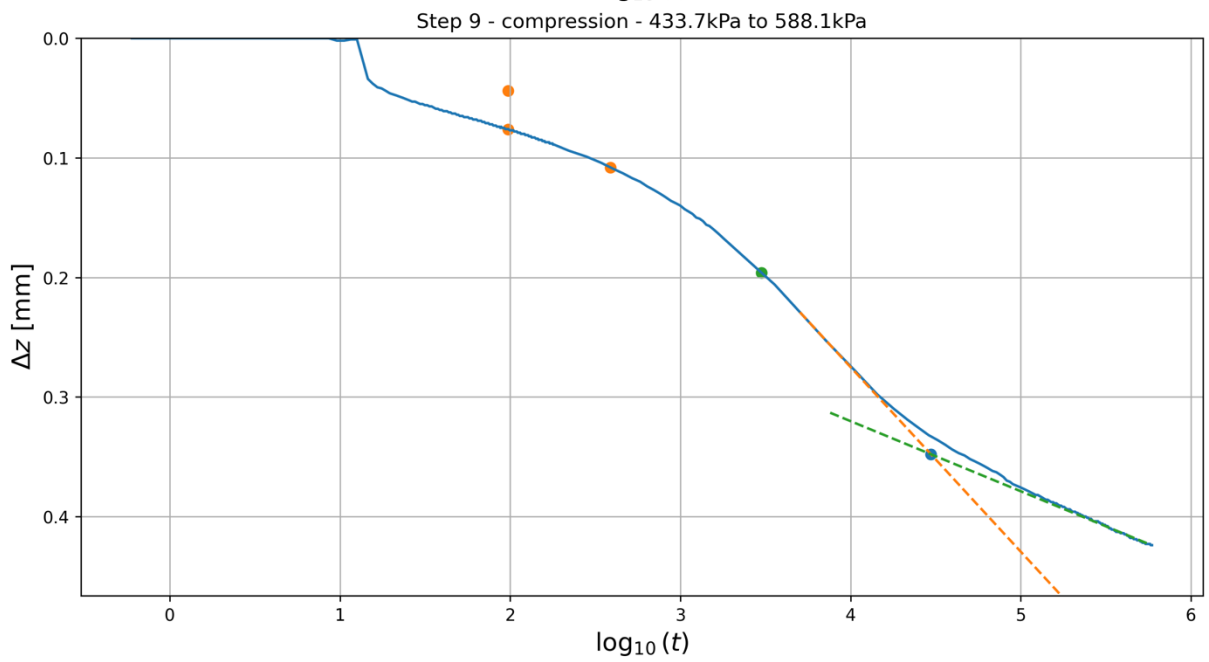
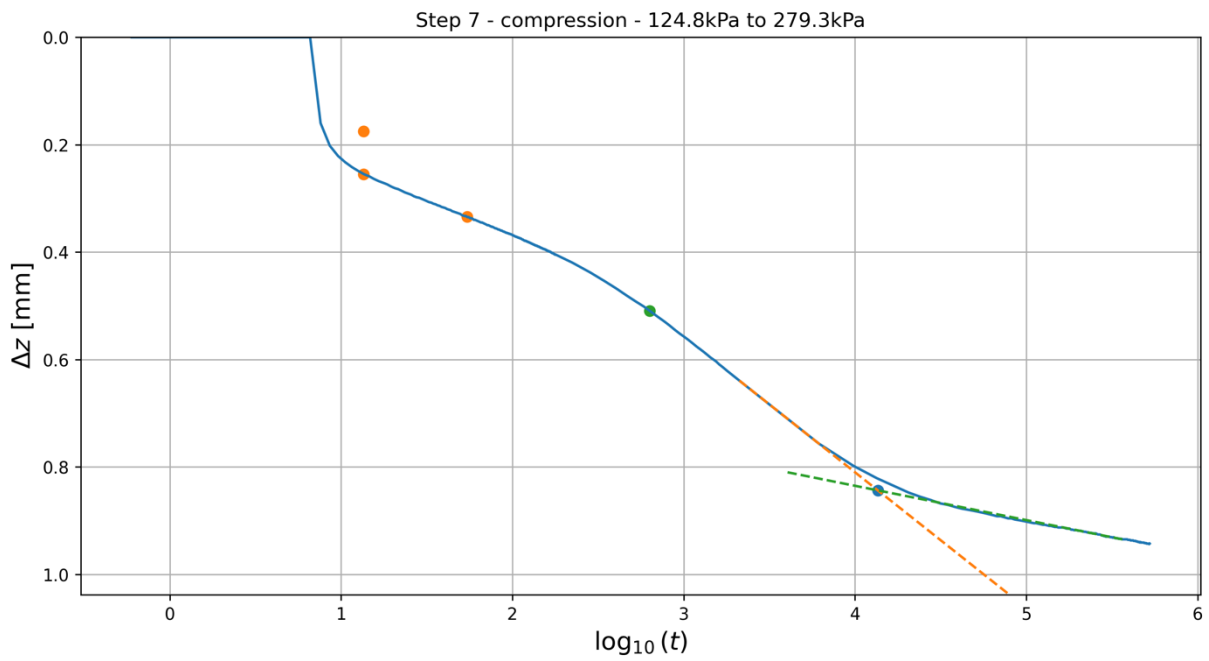


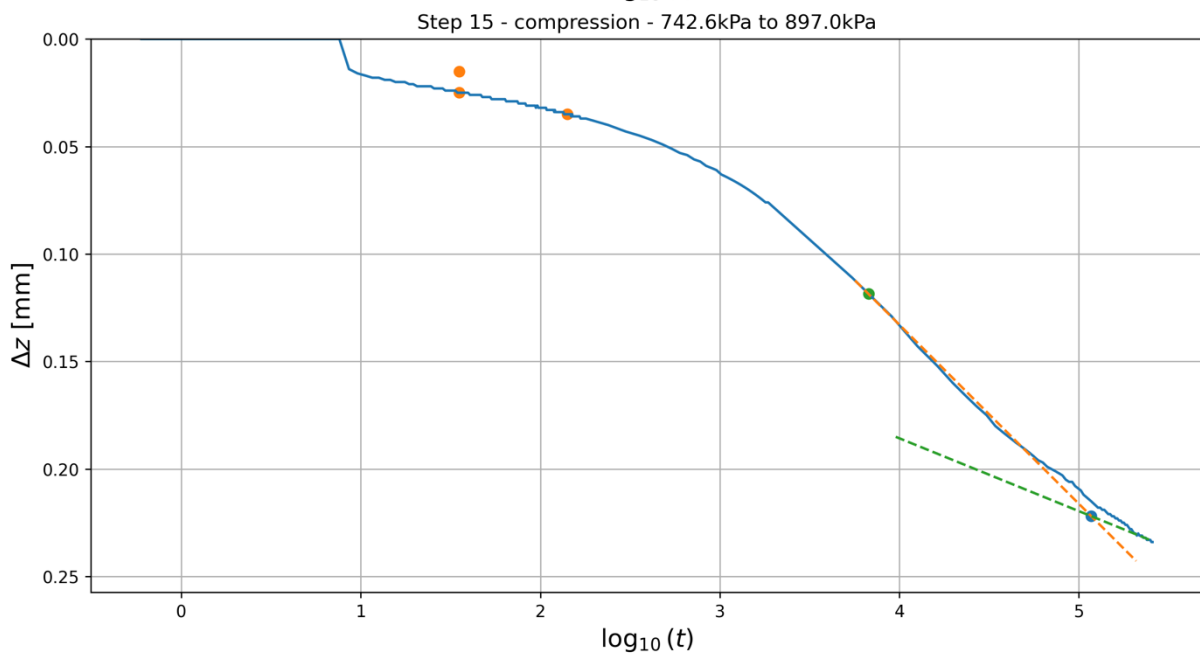
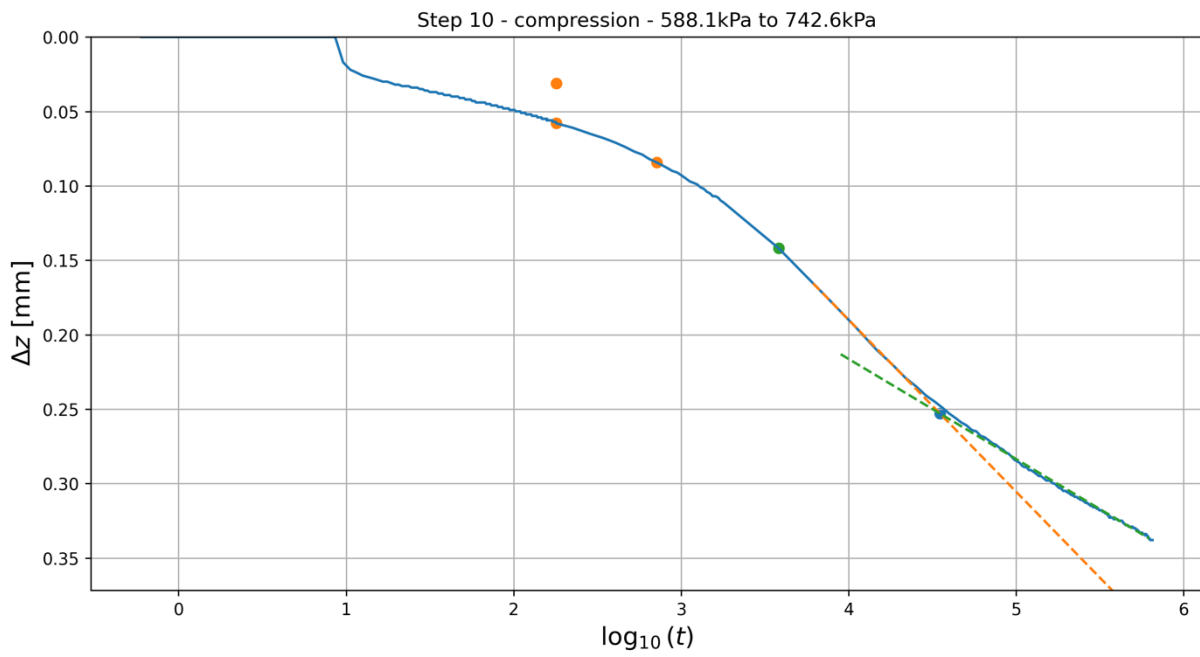
Step 5 - compression - 32.1kPa to 63.0kPa

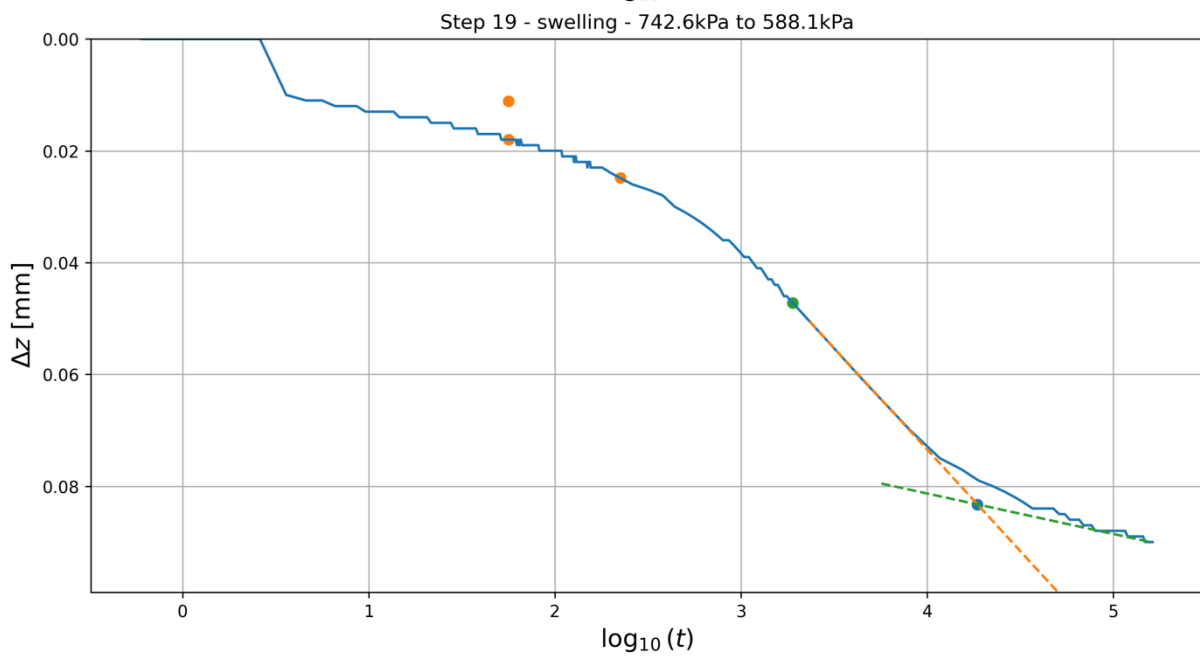
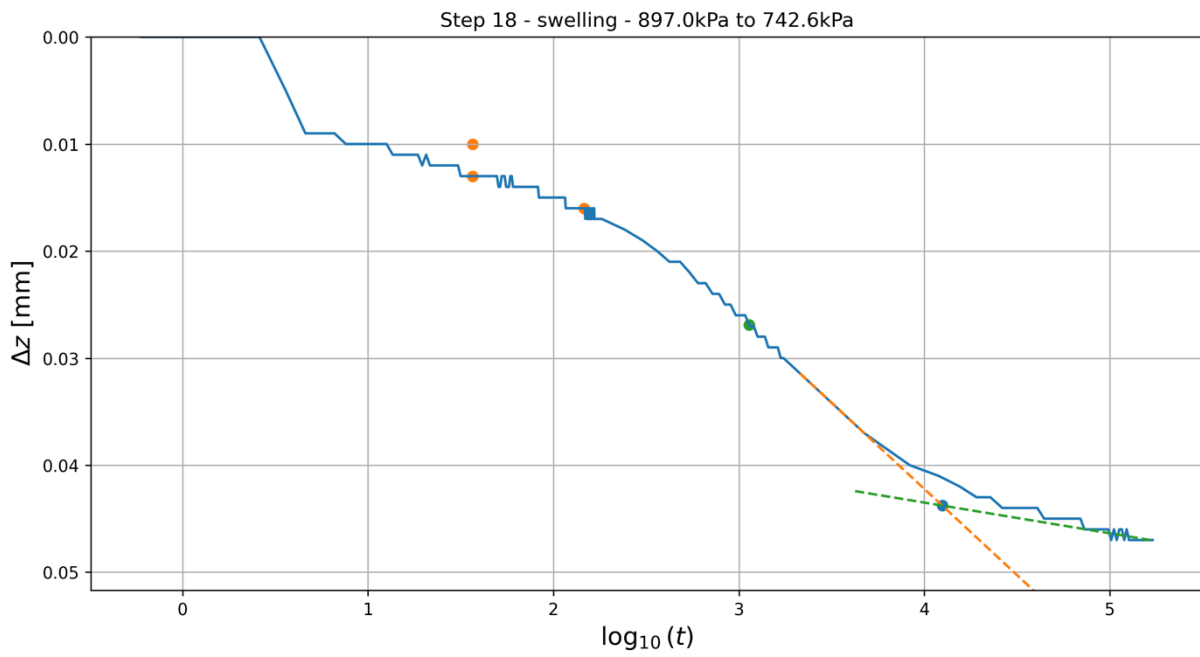


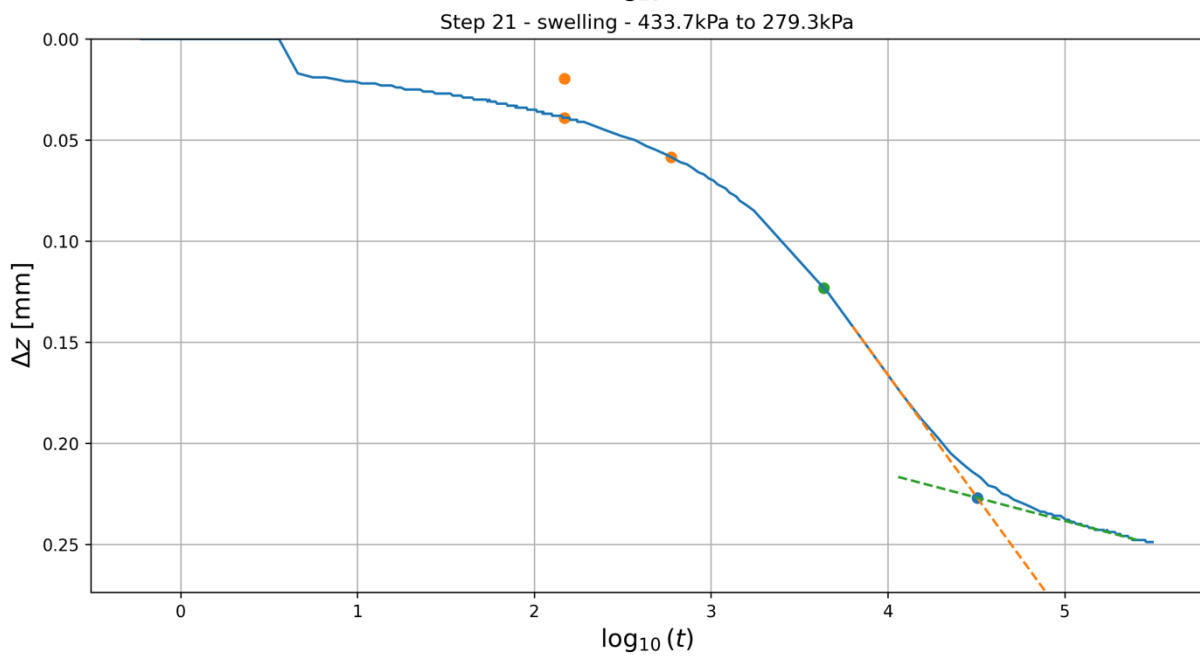
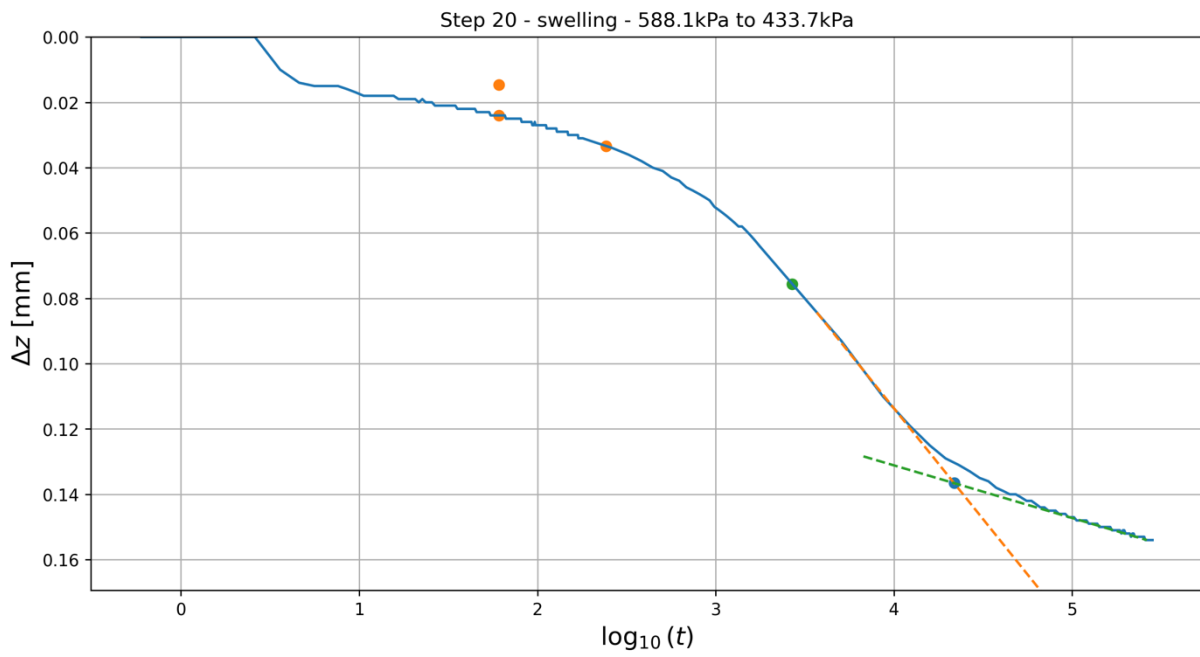
Step 6 - compression - 63.0kPa to 124.8kPa

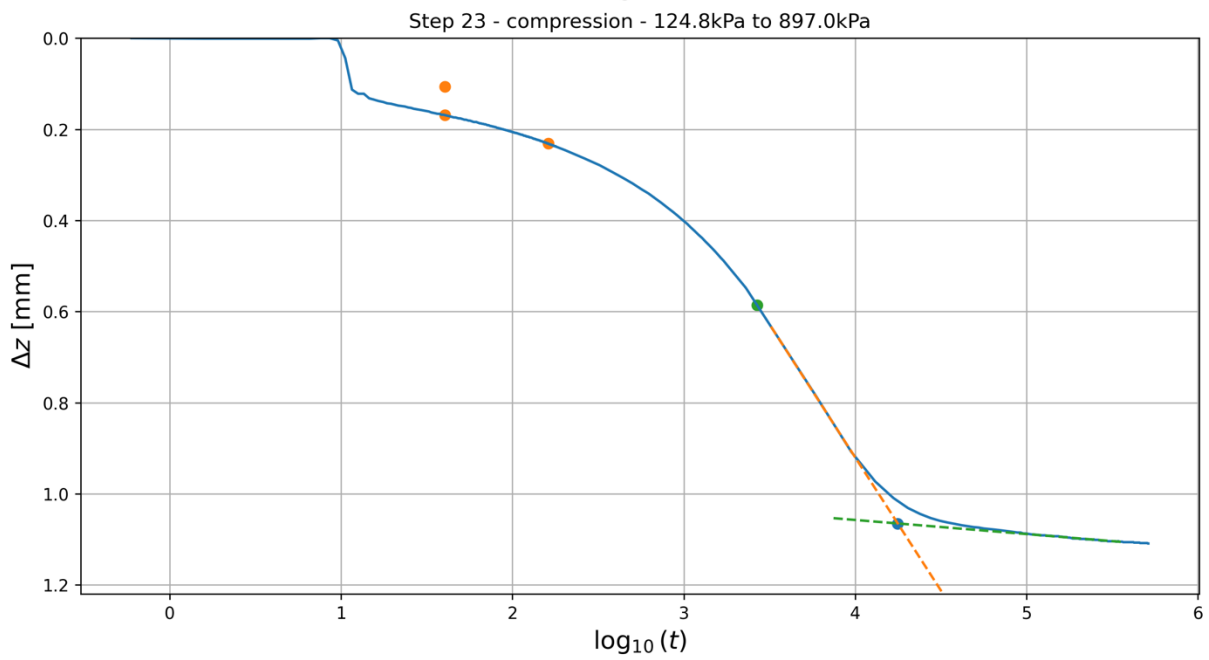
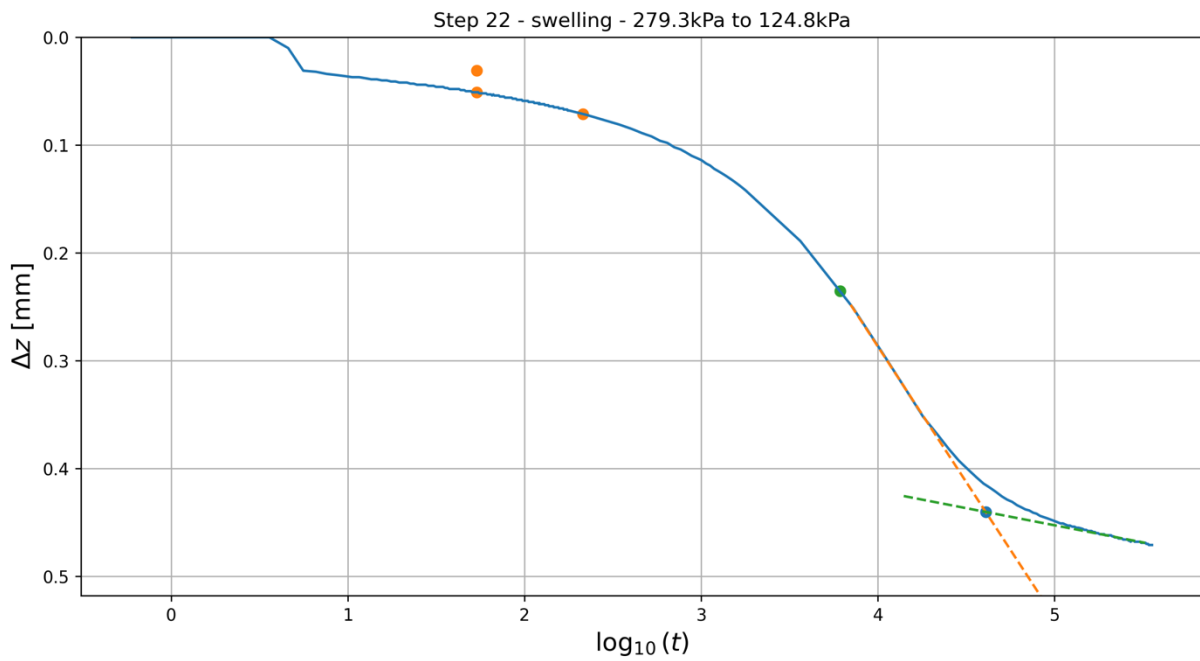


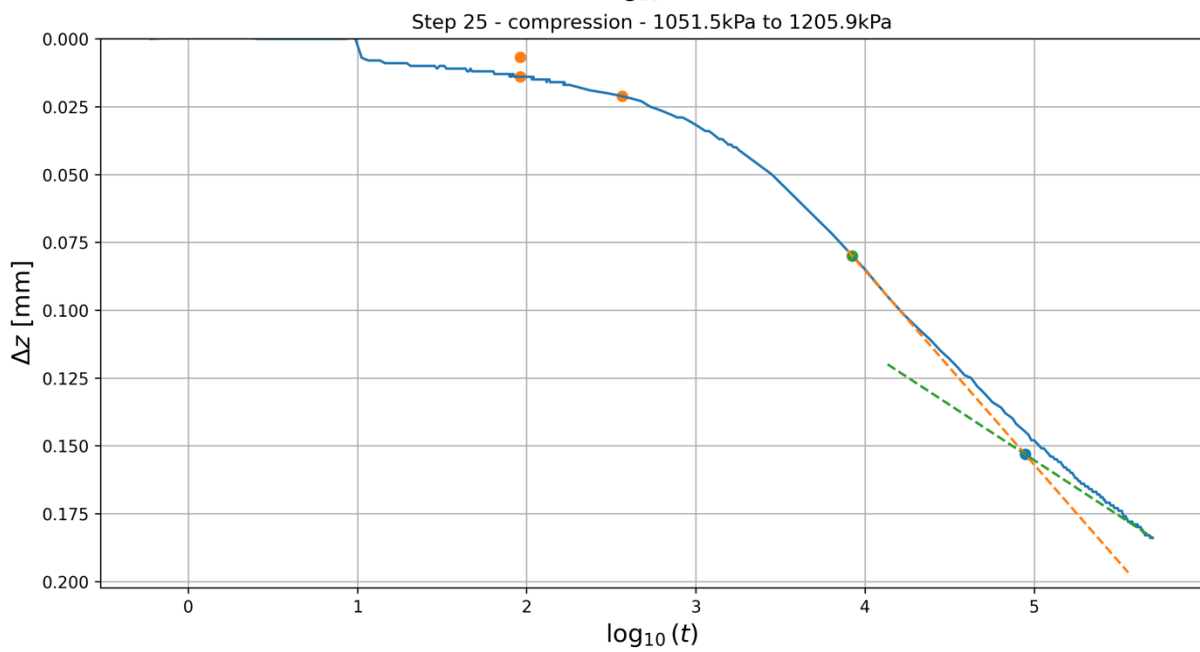
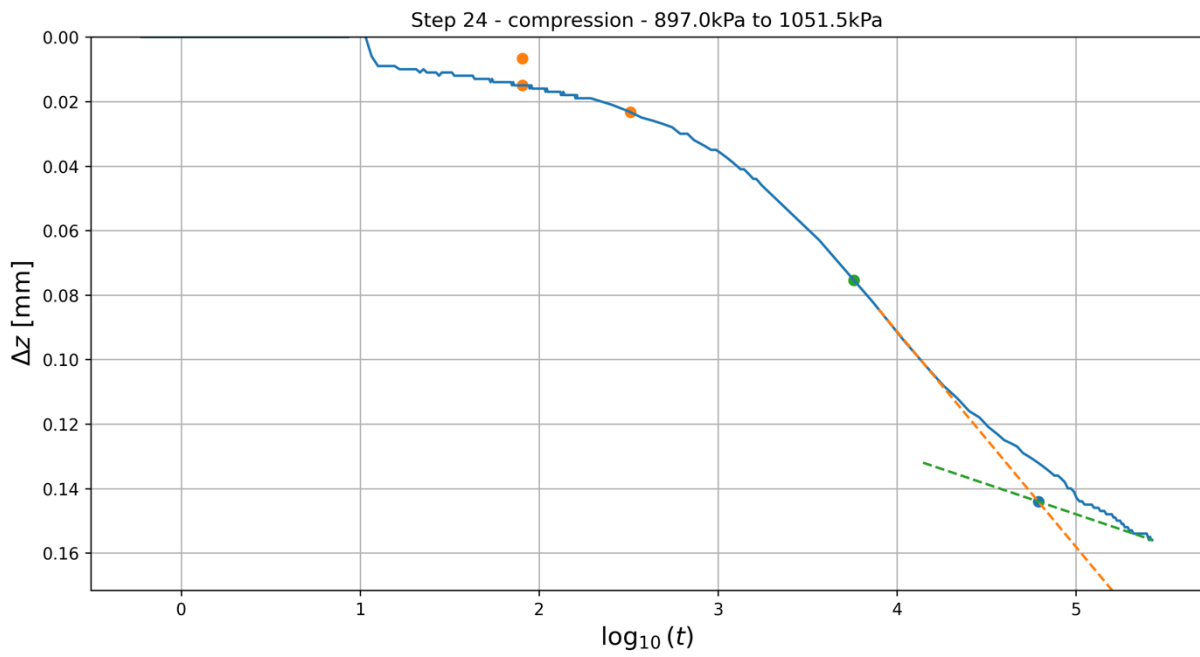












○ Bus 12

Summary table

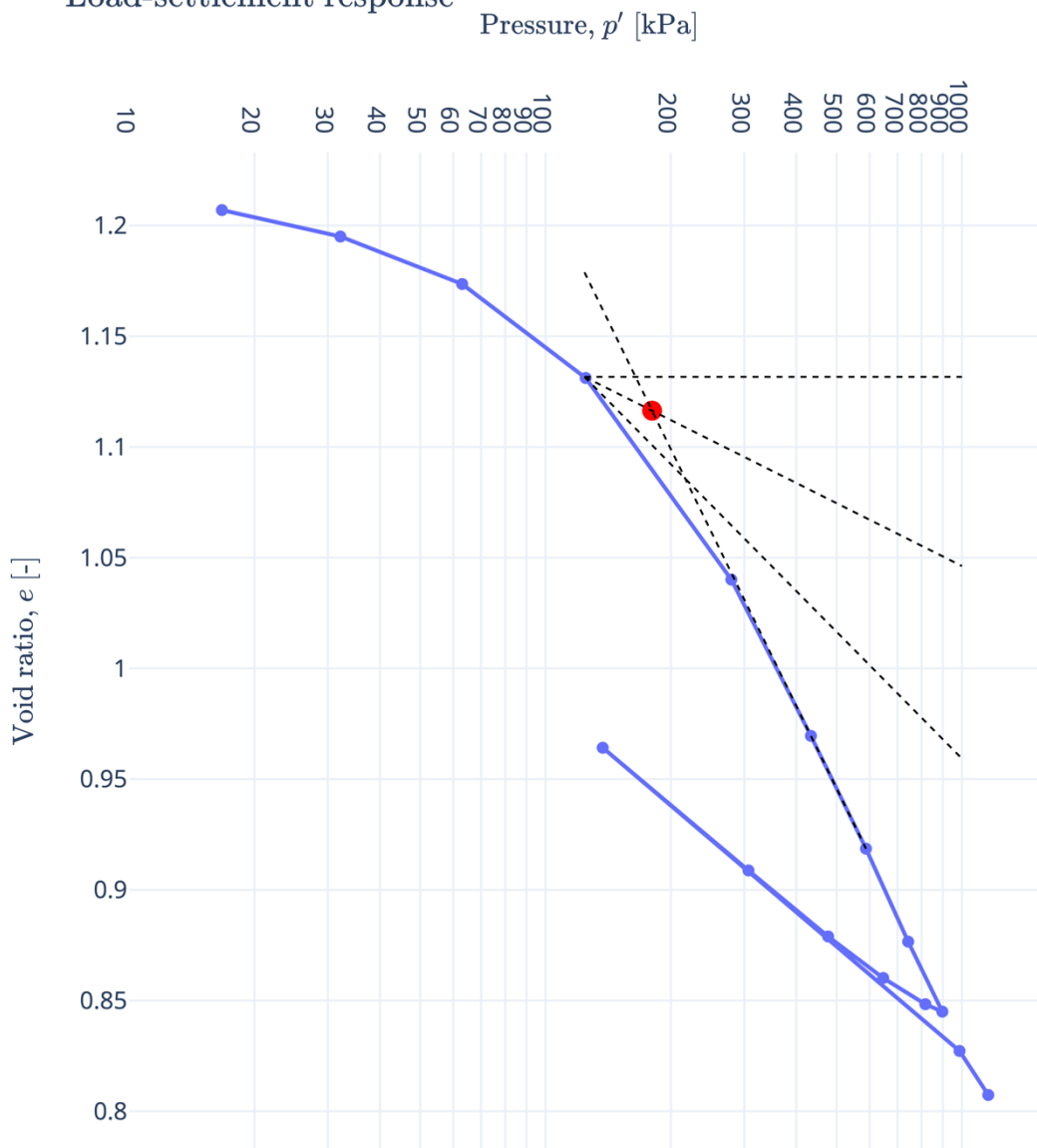
step	p start [kPa]	p end [kPa]	Void ratio [-]	Axial strain [-]	C [-]	C <sub>R</sub> [-]	C <sub>c</sub> [-]	M [kPa]	c <sub>v</sub> [m <sup>2</sup> /s]	k [m/yr]
3	1.26	16.70	1.21	0.012	223.955	0.010	0.023	1337	2.39E-06	5.65E-01
4	16.70	32.14	1.20	0.017	122.338	0.019	0.042	2885	1.24E-06	1.36E-01
5	32.14	63.03	1.17	0.027	70.114	0.033	0.073	3216	2.08E-07	2.04E-02
6	63.03	124.81	1.13	0.046	35.937	0.064	0.143	3250	1.22E-07	1.18E-02
7	124.81	279.25	1.04	0.086	19.753	0.117	0.260	3788	3.14E-08	2.61E-03
8	279.25	433.70	0.97	0.118	13.924	0.165	0.369	4885	8.60E-09	5.55E-04
9	433.70	588.14	0.92	0.141	13.354	0.172	0.385	6770	4.90E-09	2.30E-04
10	588.14	742.59	0.88	0.160	12.396	0.186	0.415	8211	3.50E-09	1.33E-04
11	742.59	897.03	0.84	0.174	13.347	0.173	0.385	10909	2.10E-09	6.21E-05
13	986.61	816.72	0.85	0.172	68.685	0.034	0.075	61747	1.11E-08	5.65E-05
14	816.72	646.83	0.86	0.167	43.980	0.052	0.117	32038	5.40E-09	5.32E-05
15	646.83	476.94	0.88	0.158	36.254	0.064	0.142	20215	3.90E-09	6.14E-05
16	476.94	307.05	0.91	0.145	32.970	0.070	0.156	12719	2.70E-09	6.62E-05
17	307.05	137.17	0.96	0.120	32.477	0.071	0.158	6847	2.00E-09	9.24E-05
18	137.17	986.61	0.83	0.182	32.171	0.072	0.160	13850	4.20E-09	9.58E-05
19	986.61	1156.50	0.81	0.191	17.842	0.129	0.288	19079	2.70E-09	4.49E-05

Test conditions

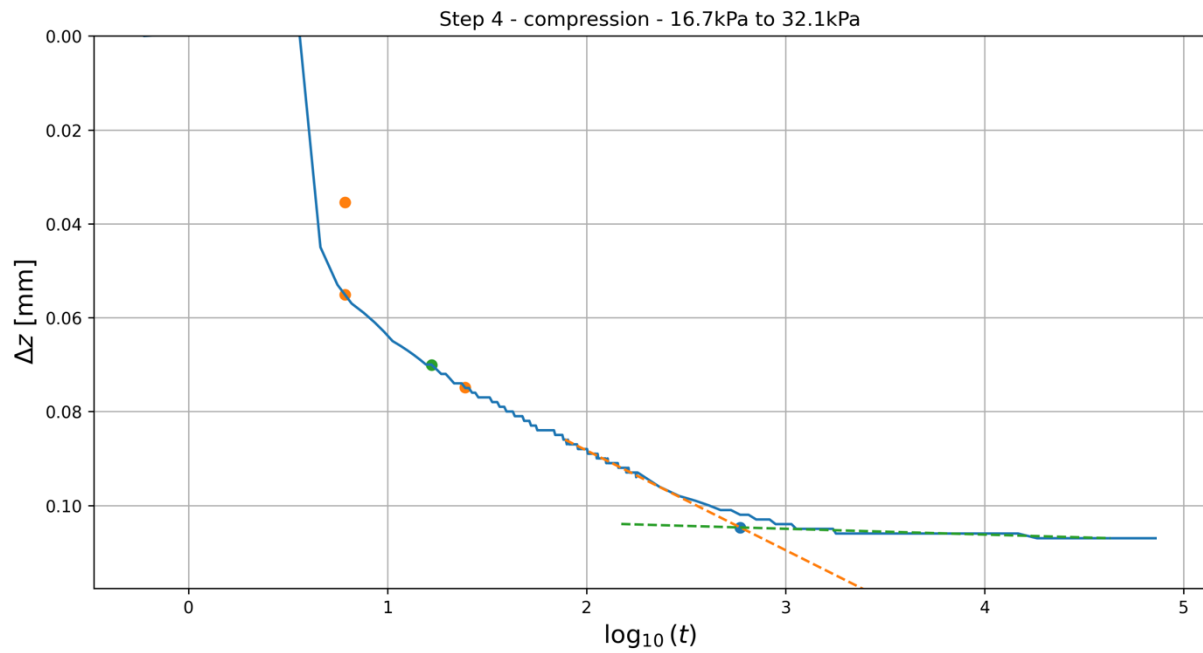
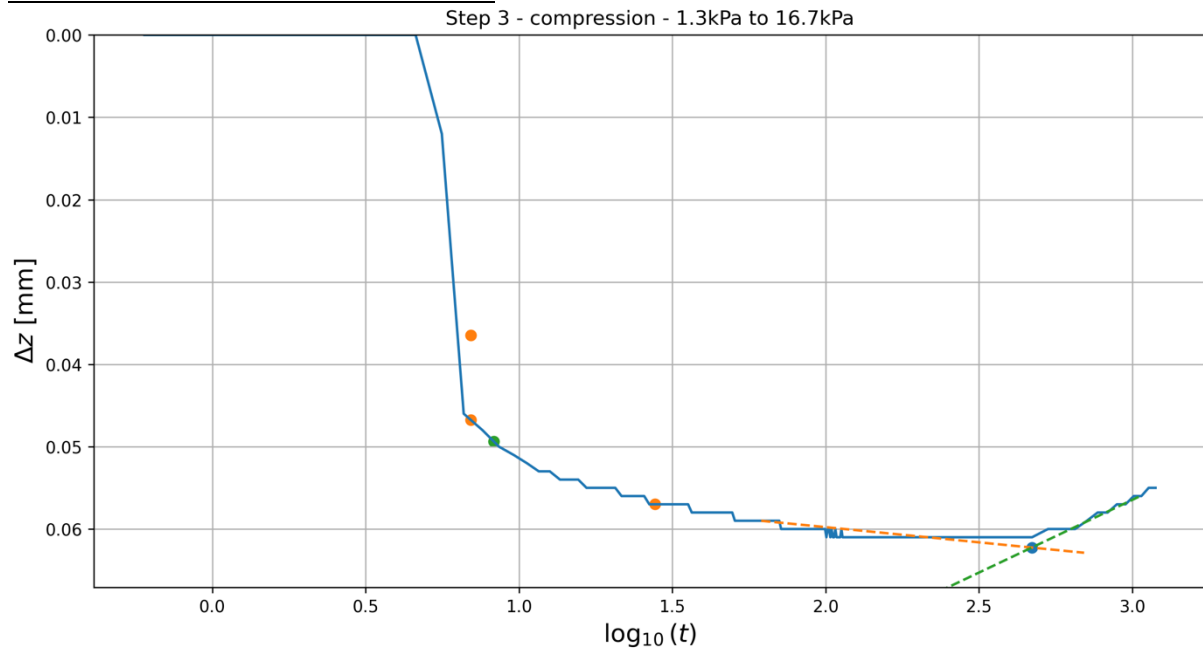
Sample	Bus 12
Borehole	Boring B1
Depth [mBGL]	9.7
Initial void ratio [-]	1.23
Dry unit weight [kN/m <sup>3</sup> ]	16.51
Final water content [%]	37.95
Initial water content [%]	41.8
Effective unit weight [kN/m <sup>3</sup> ]	6.51
Equivalent height of solids [mm]	8.95

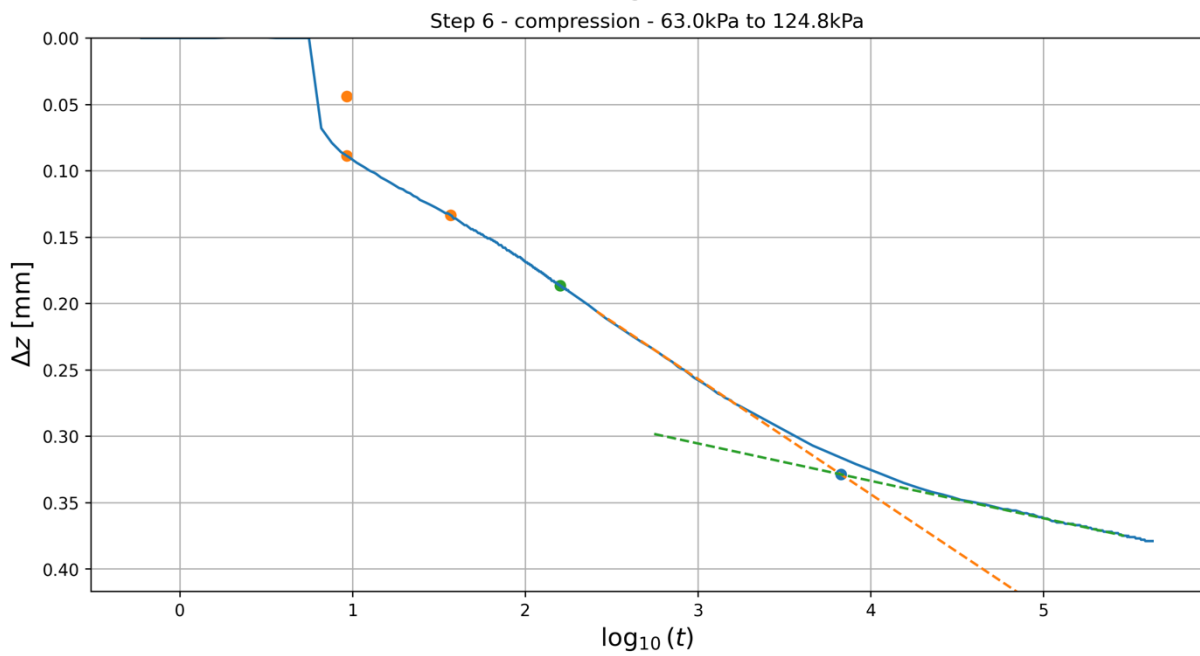
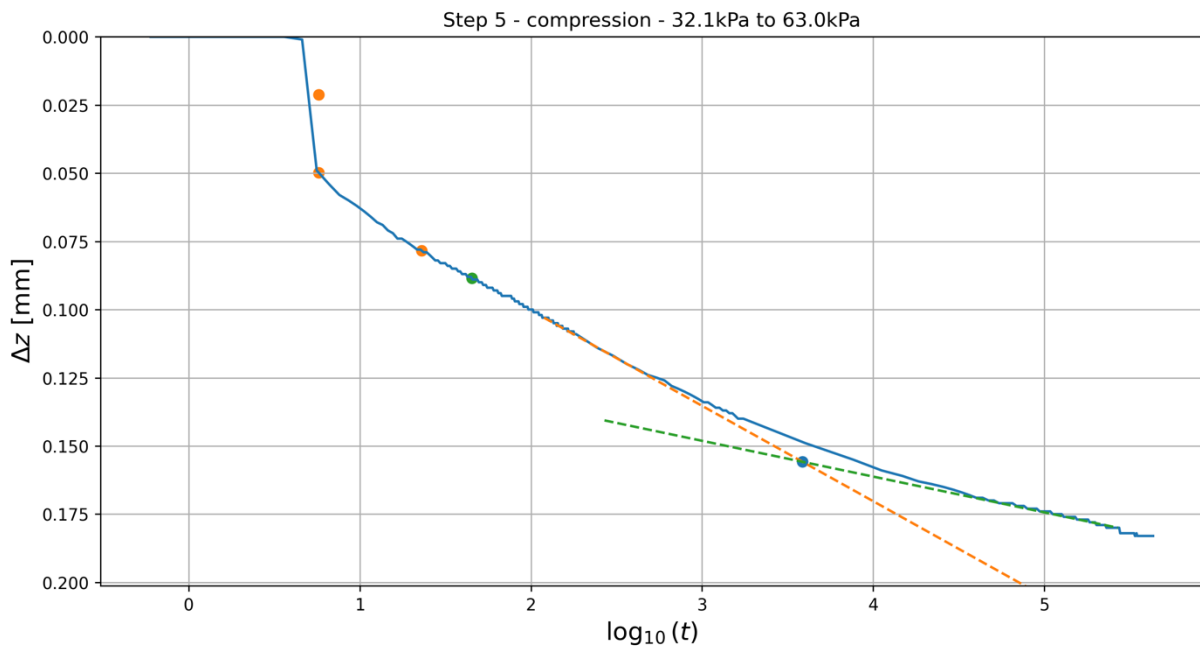
Compressibility chart and determination of preconsolidation pressure

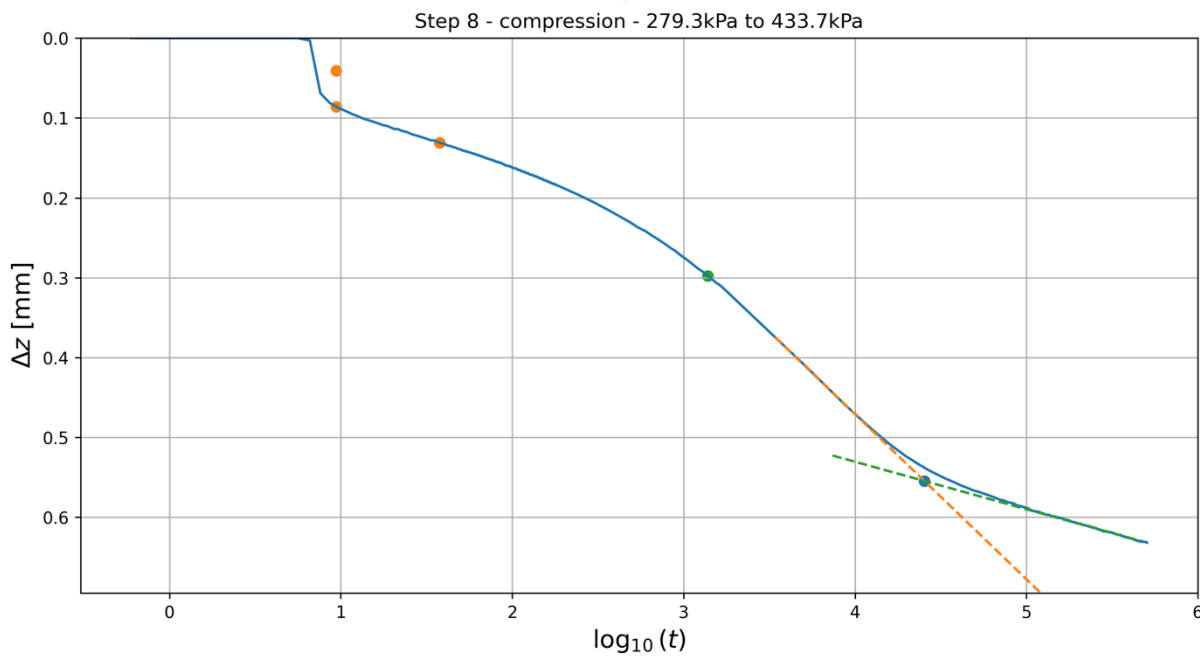
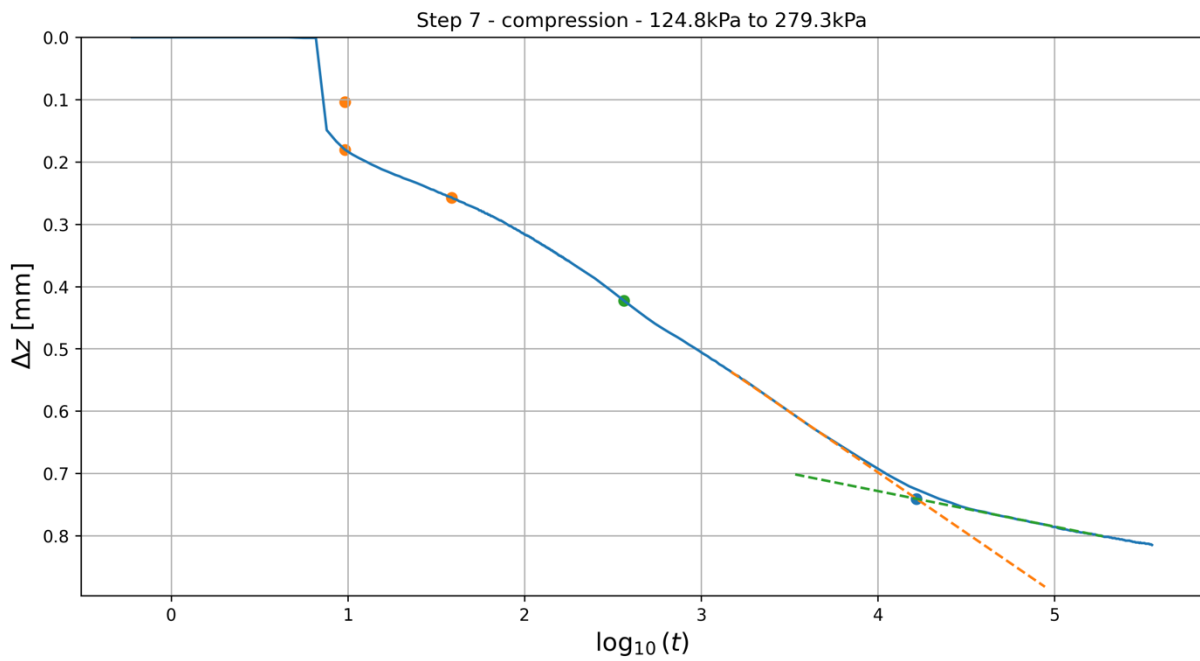
Load-settlement response

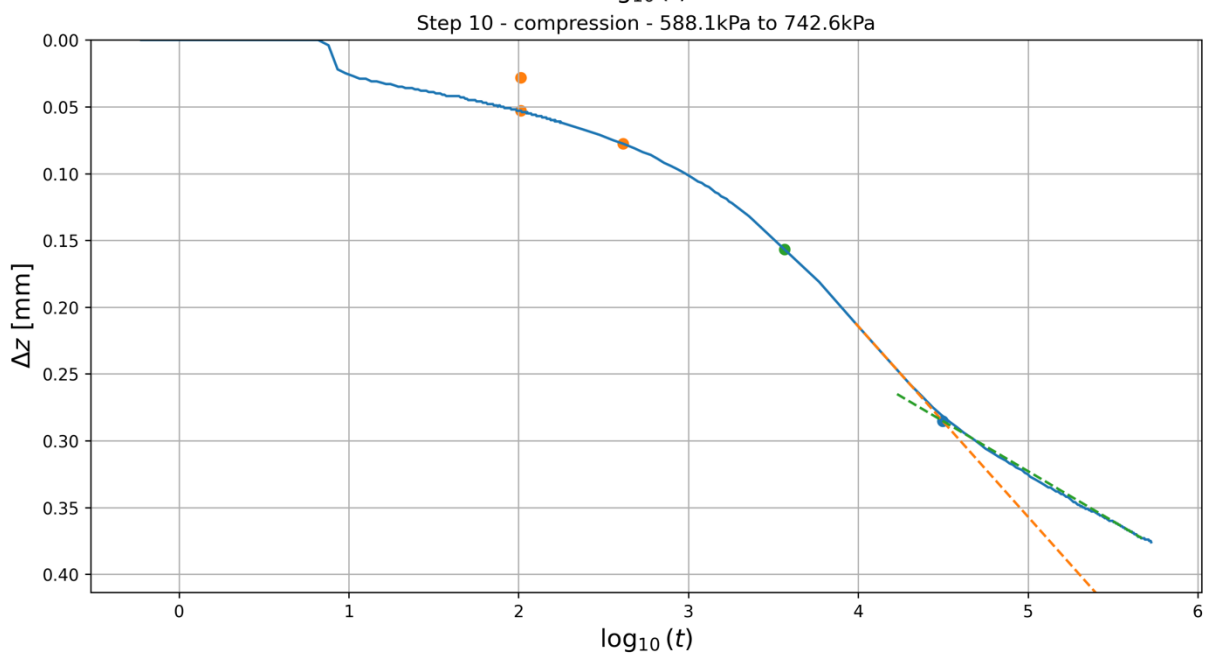
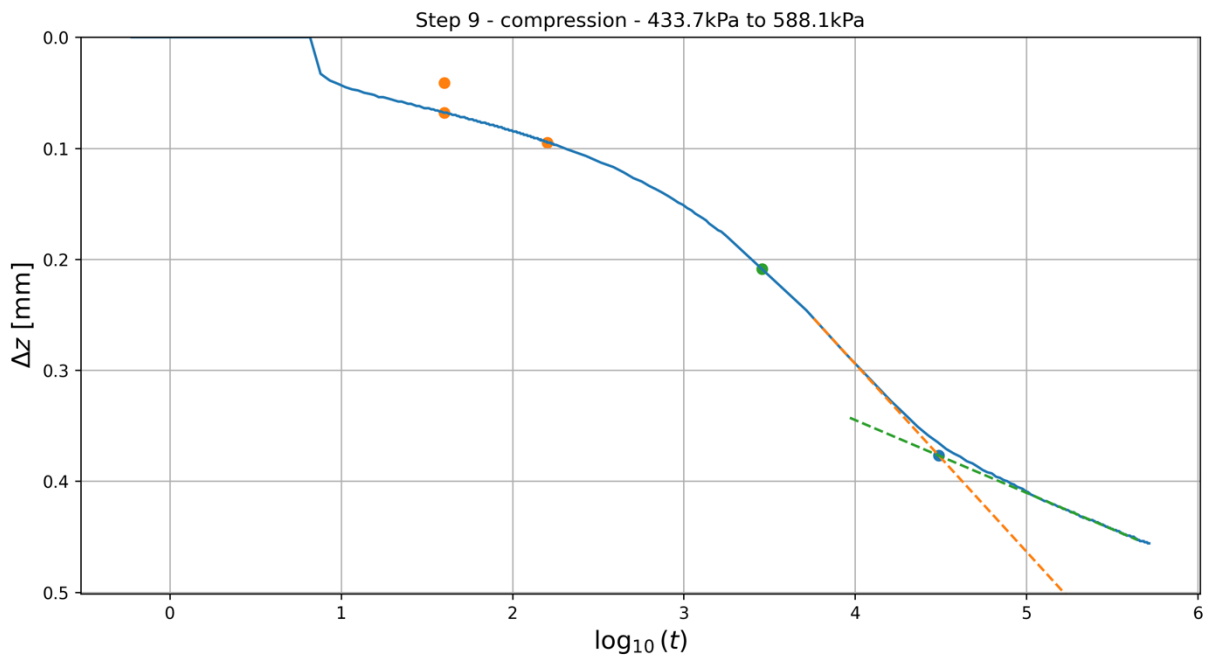


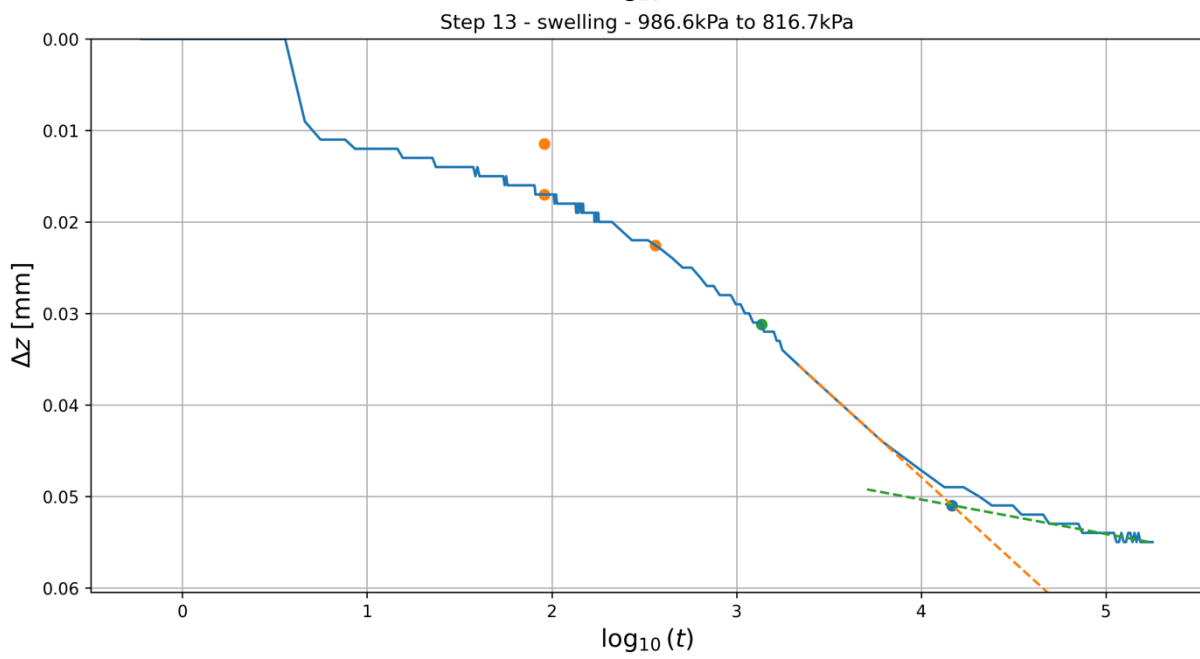
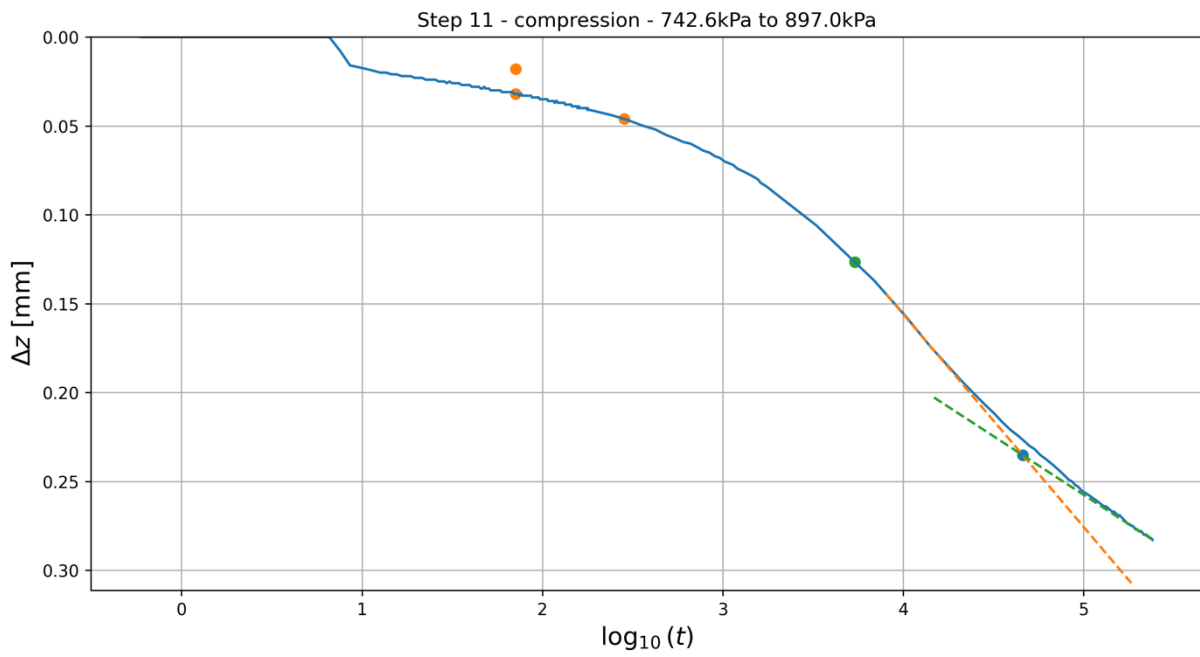
### Determination of consolidation coefficient

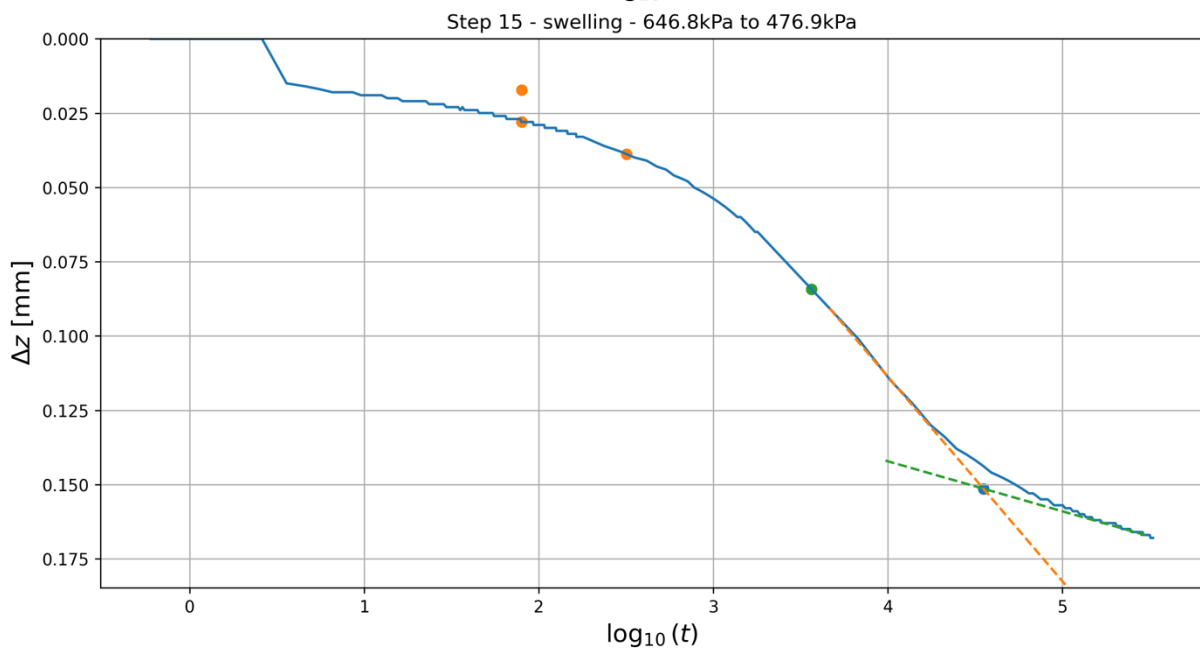
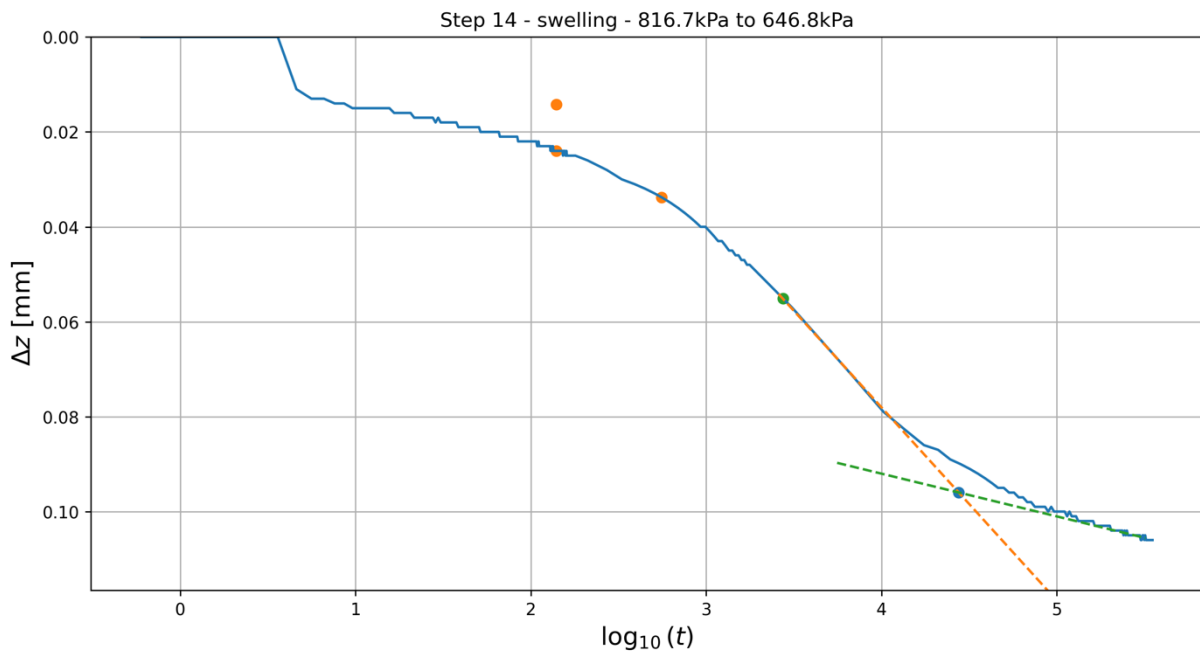


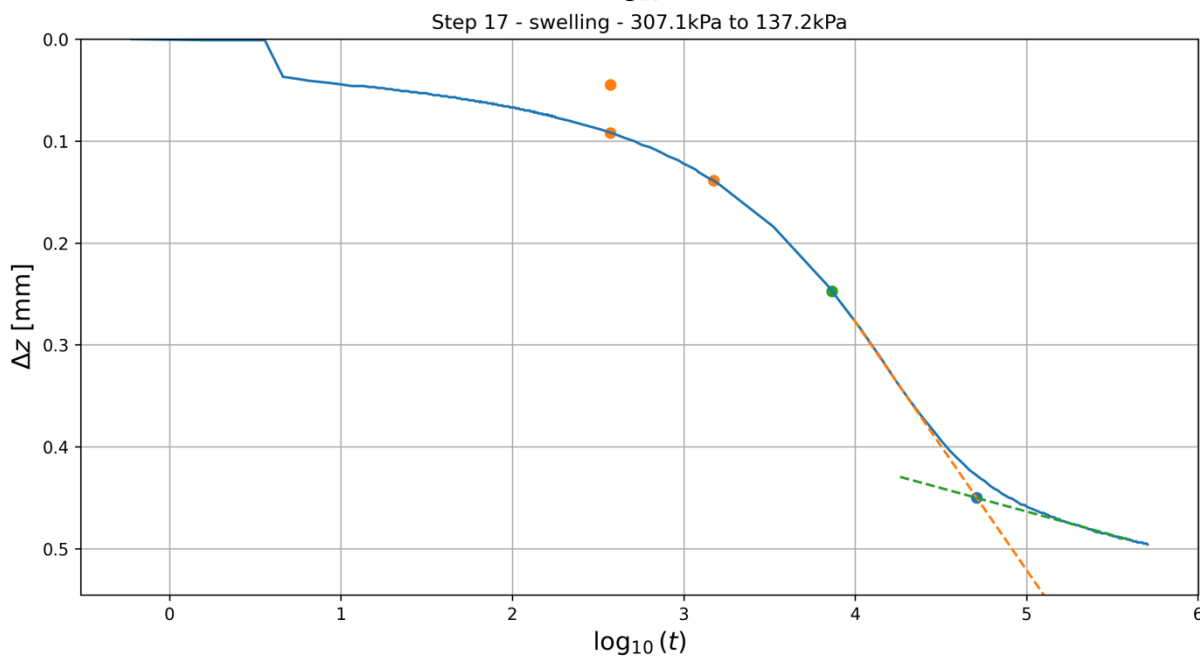
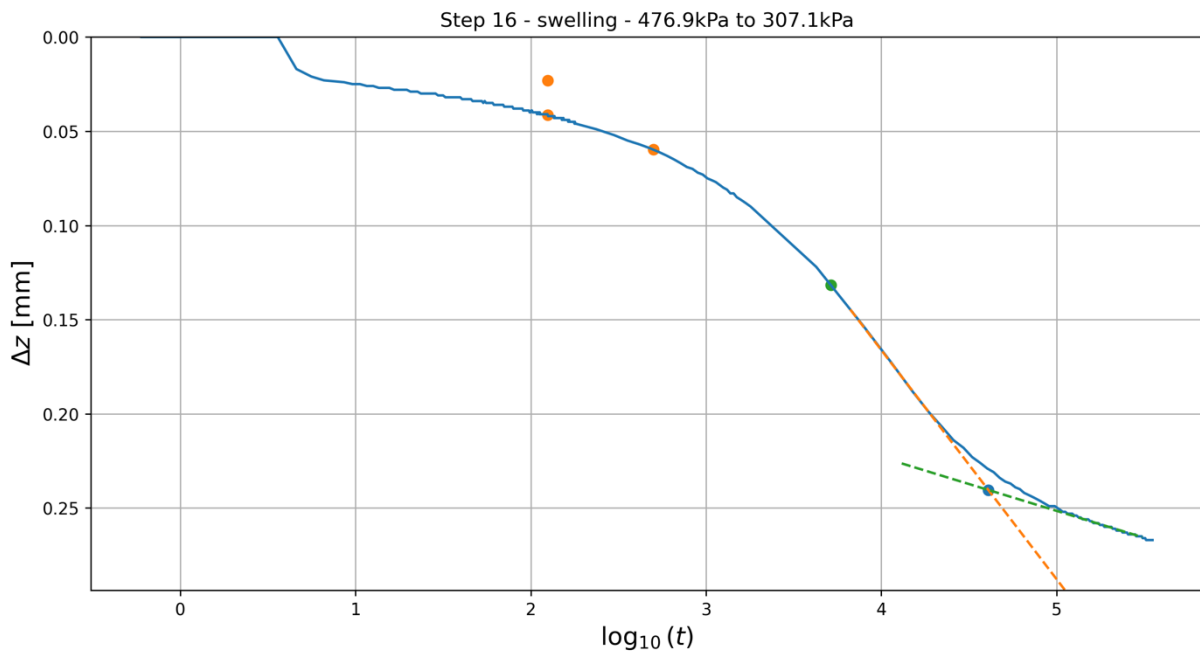


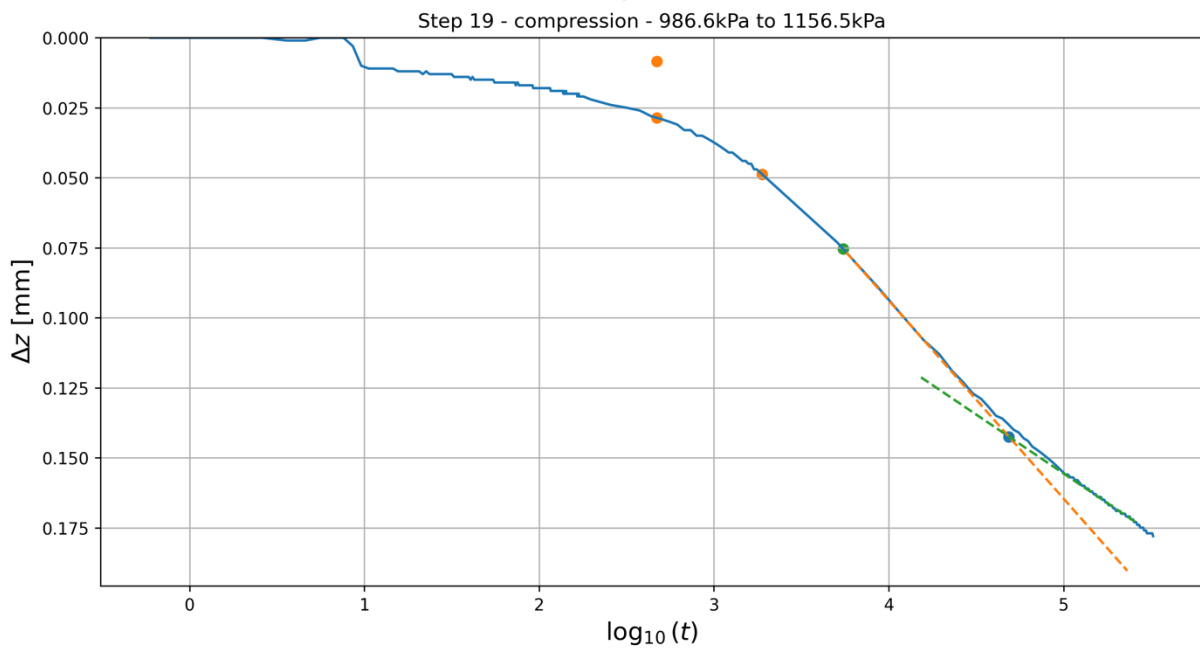
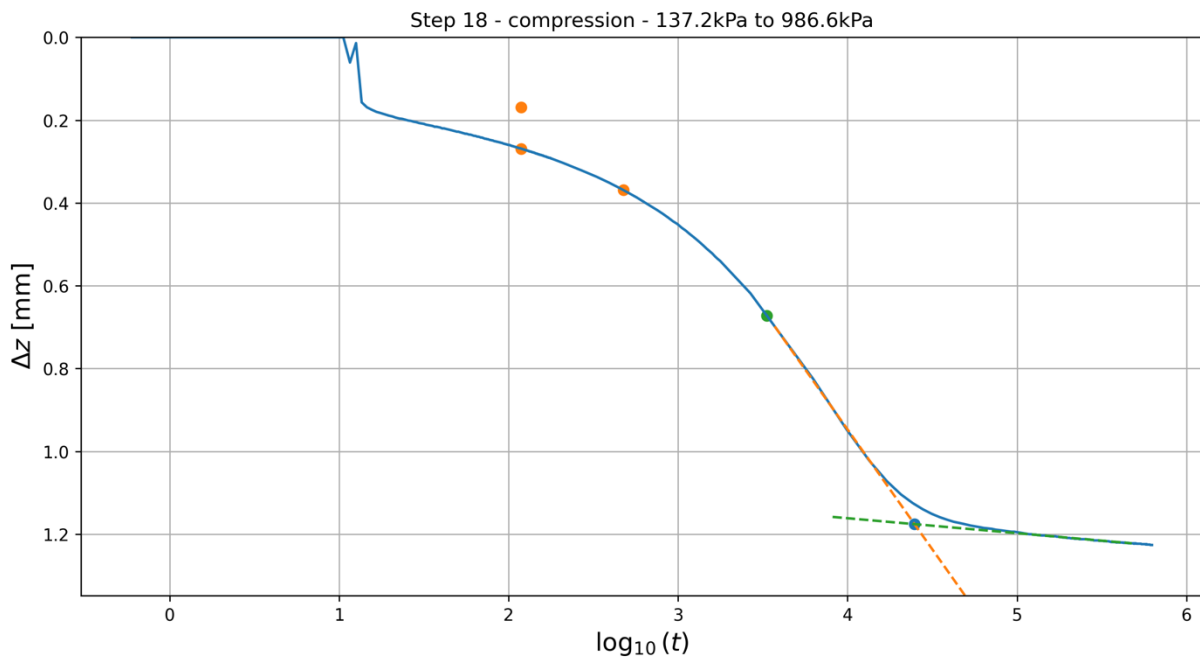








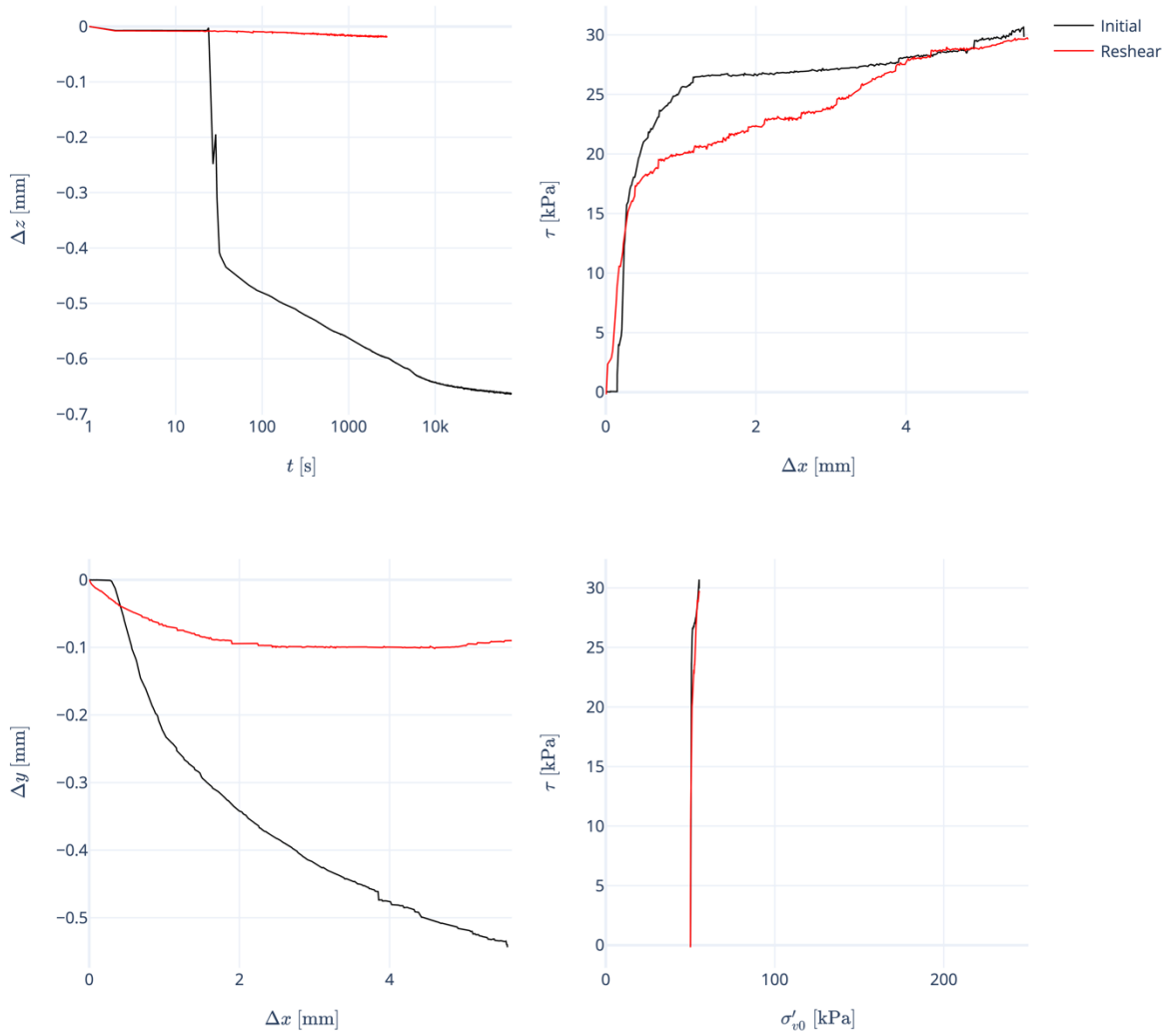




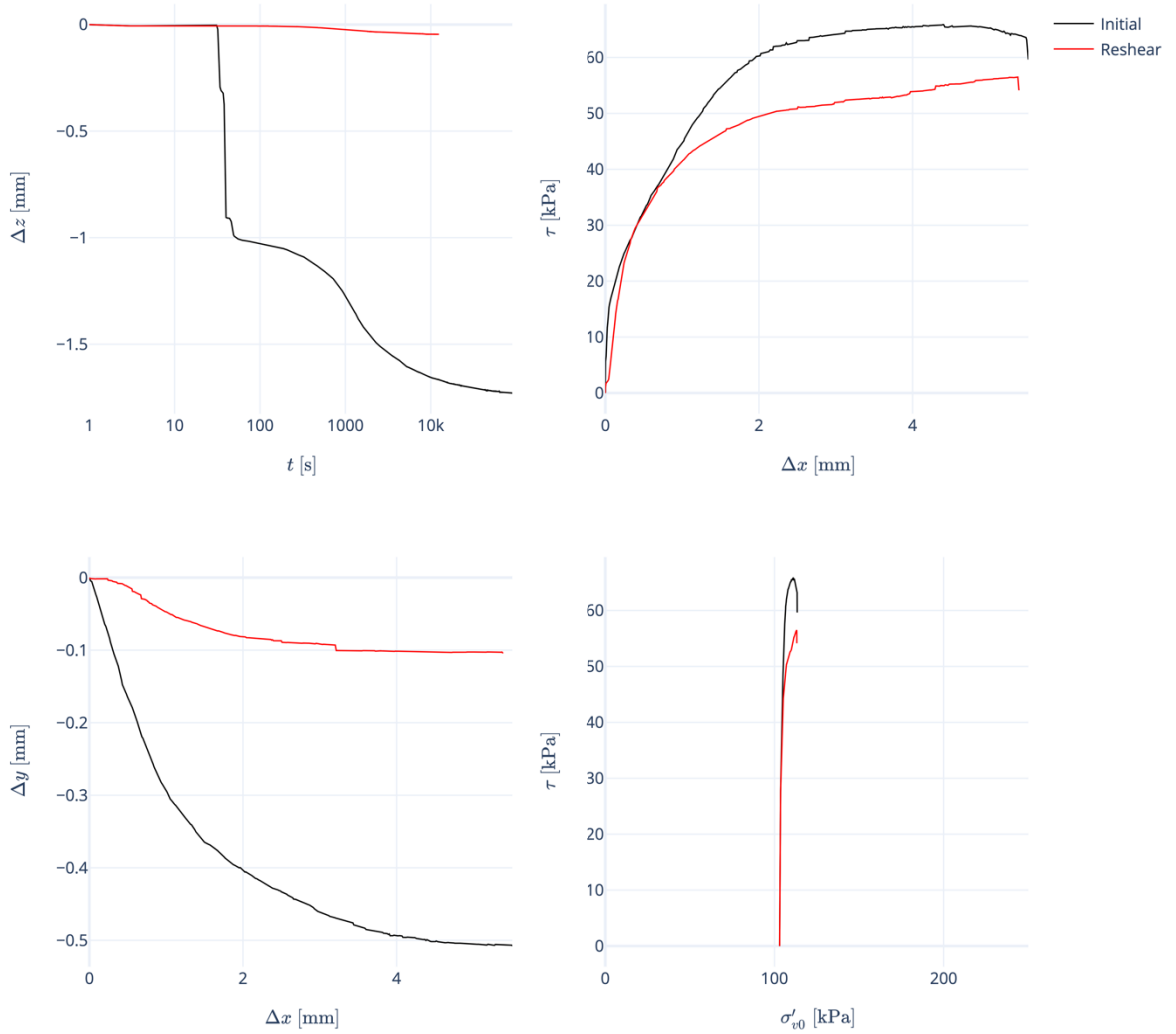
# APPENDIX H – DIRECT SHEAR TEST RESULTS

- Bus 4

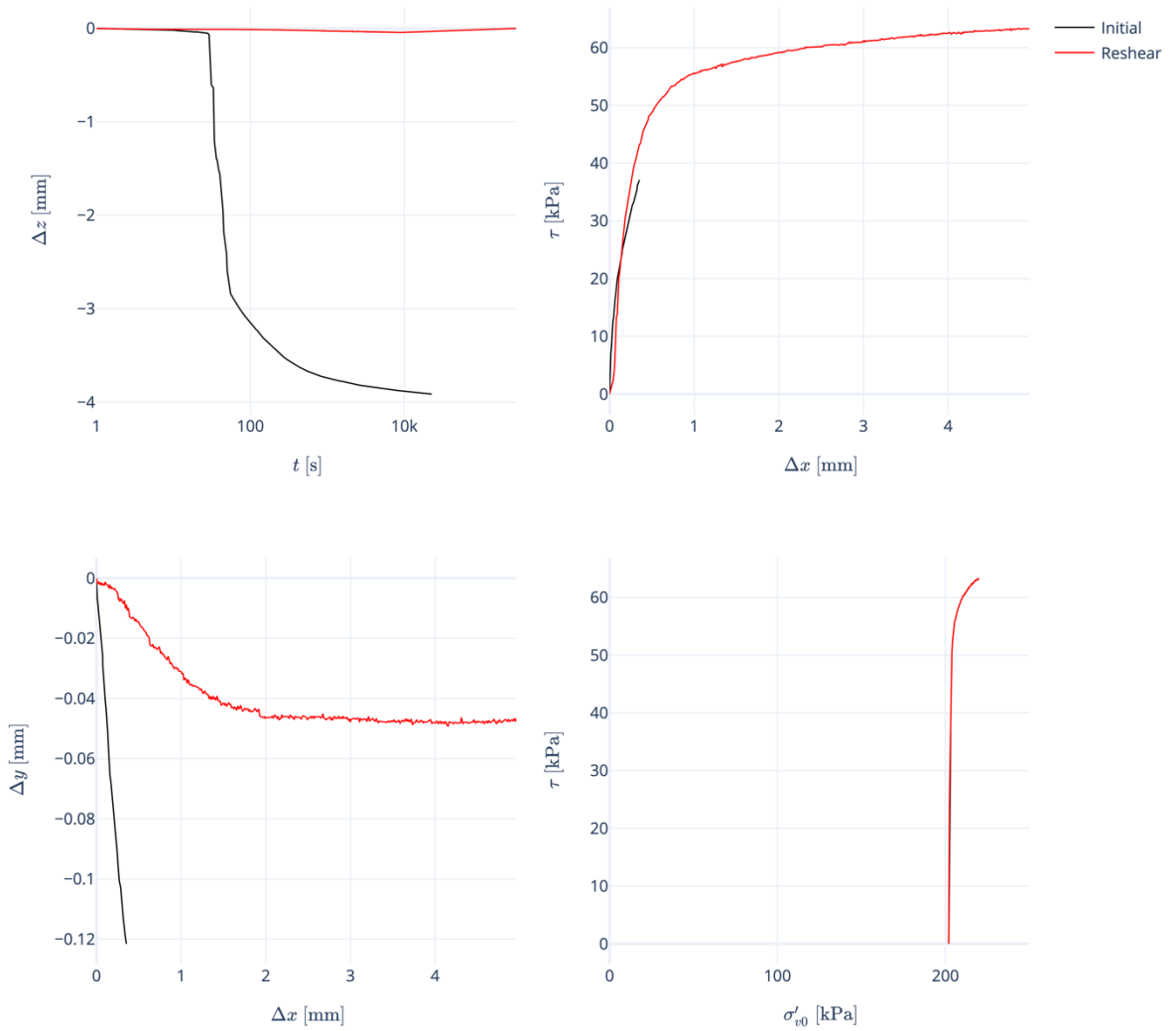
Bus 4 - Consolidated to 50.1kPa



Bus 4 - Consolidated to 103.0kPa

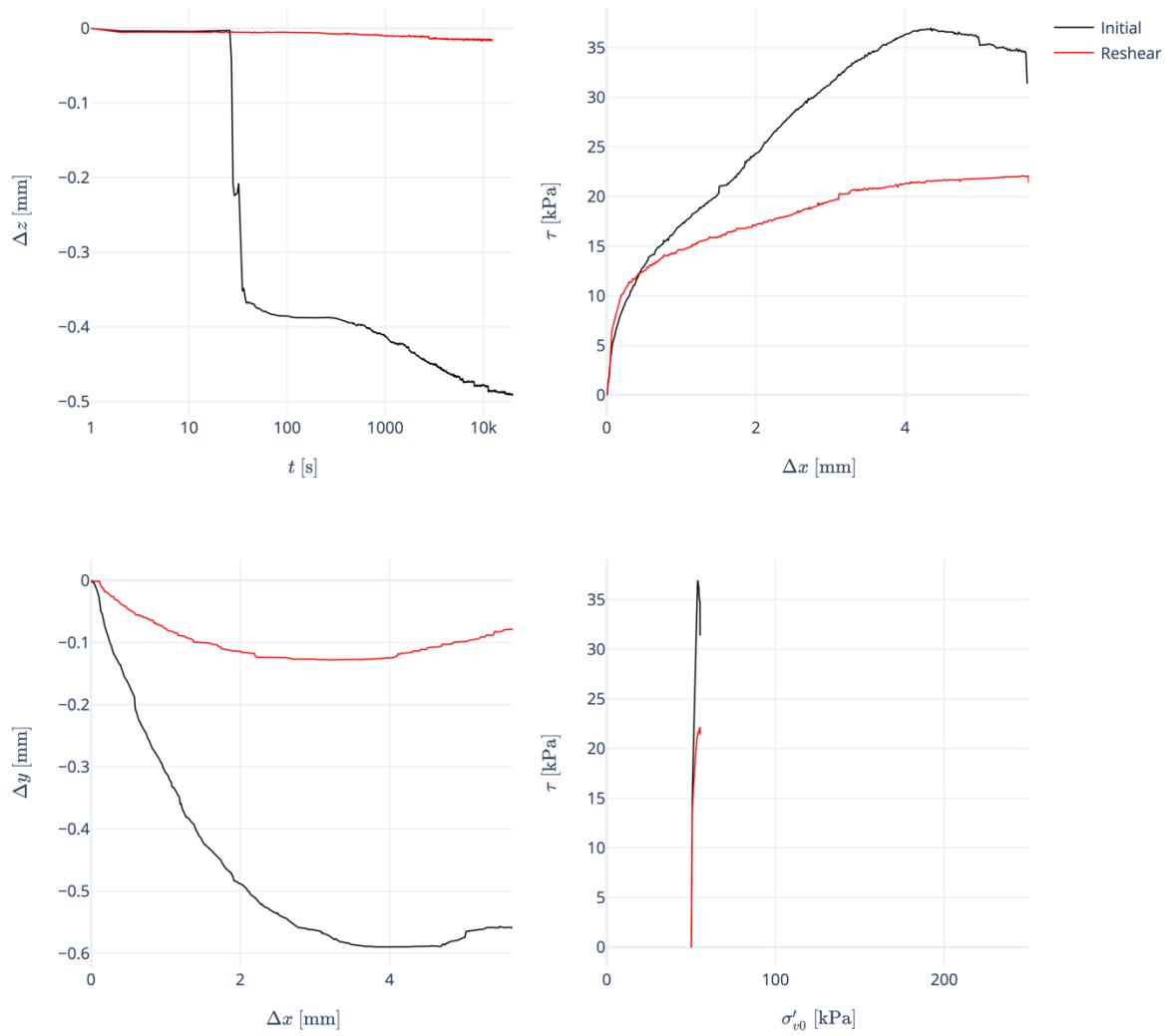


Bus 4 - Consolidated to 202.0kPa

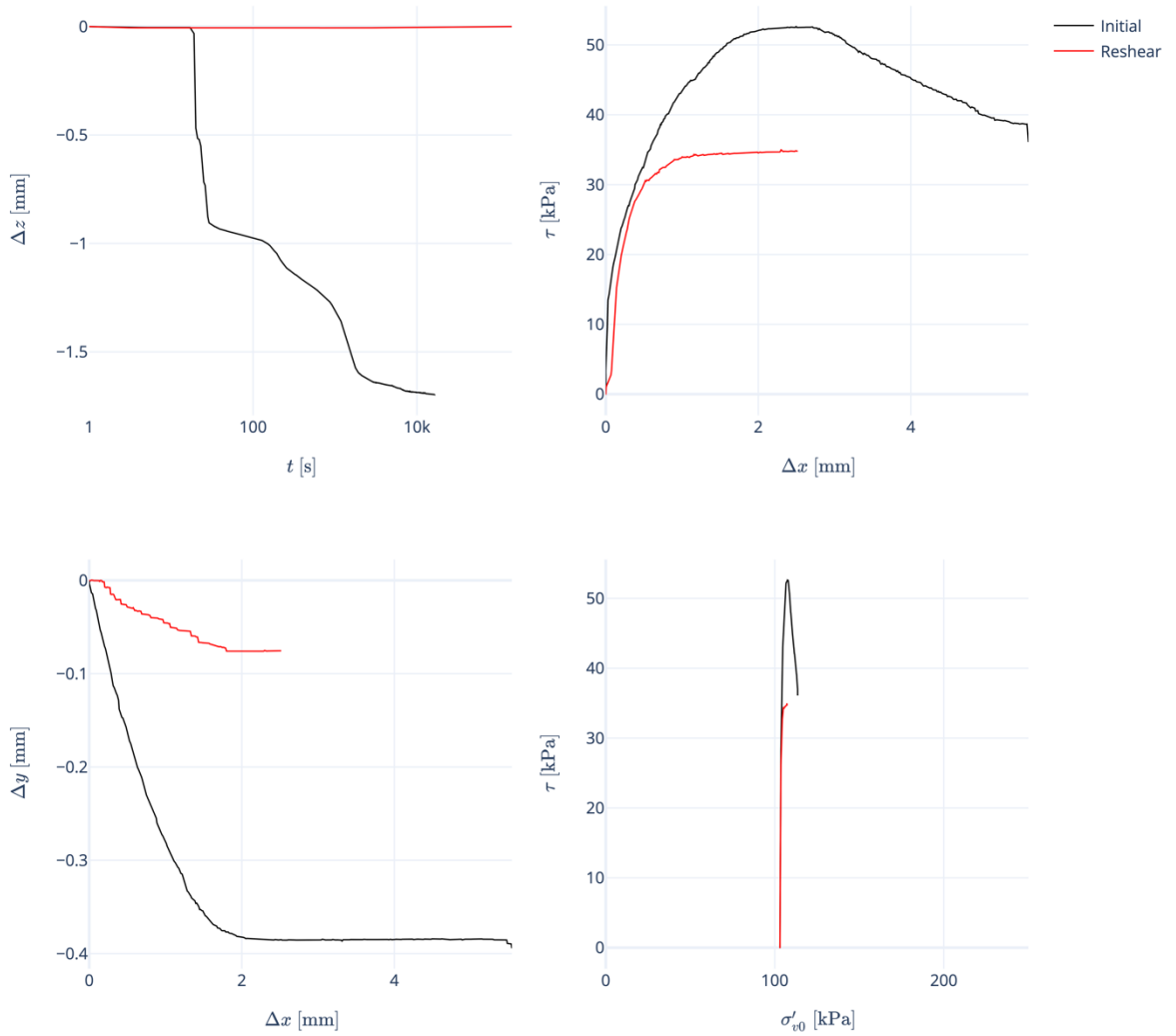


○ Bus 5

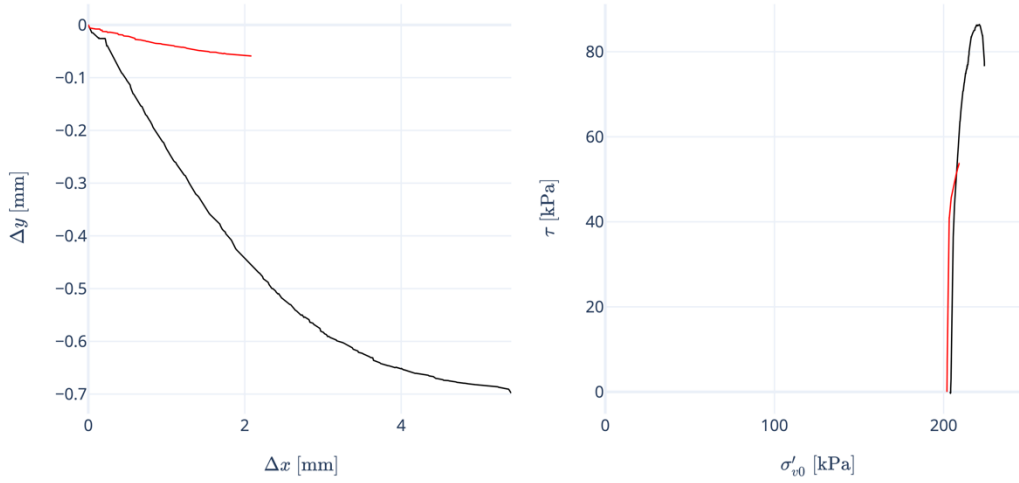
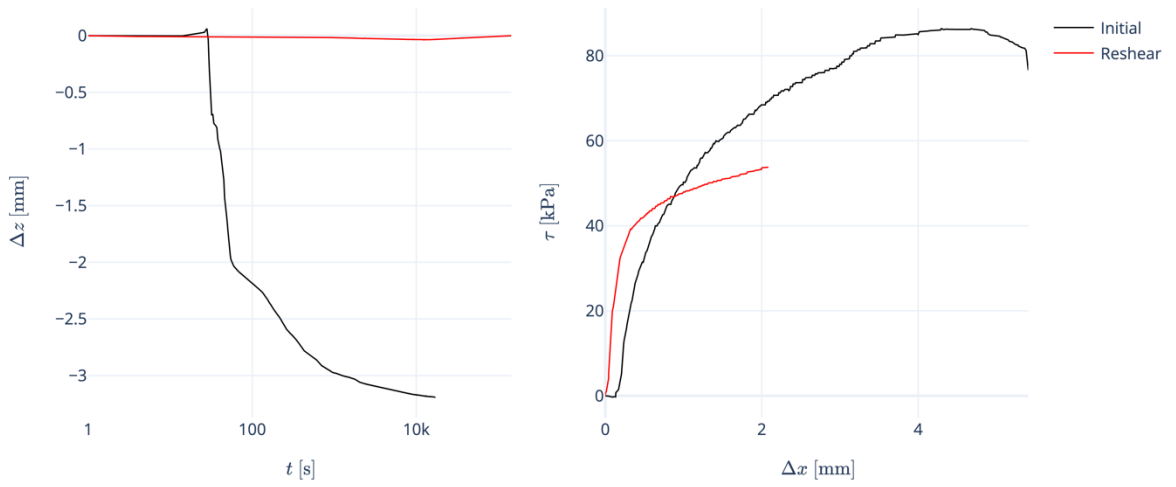
Bus 5 - Consolidated to 50.1 kPa



Bus 5 - Consolidated to 103.0kPa

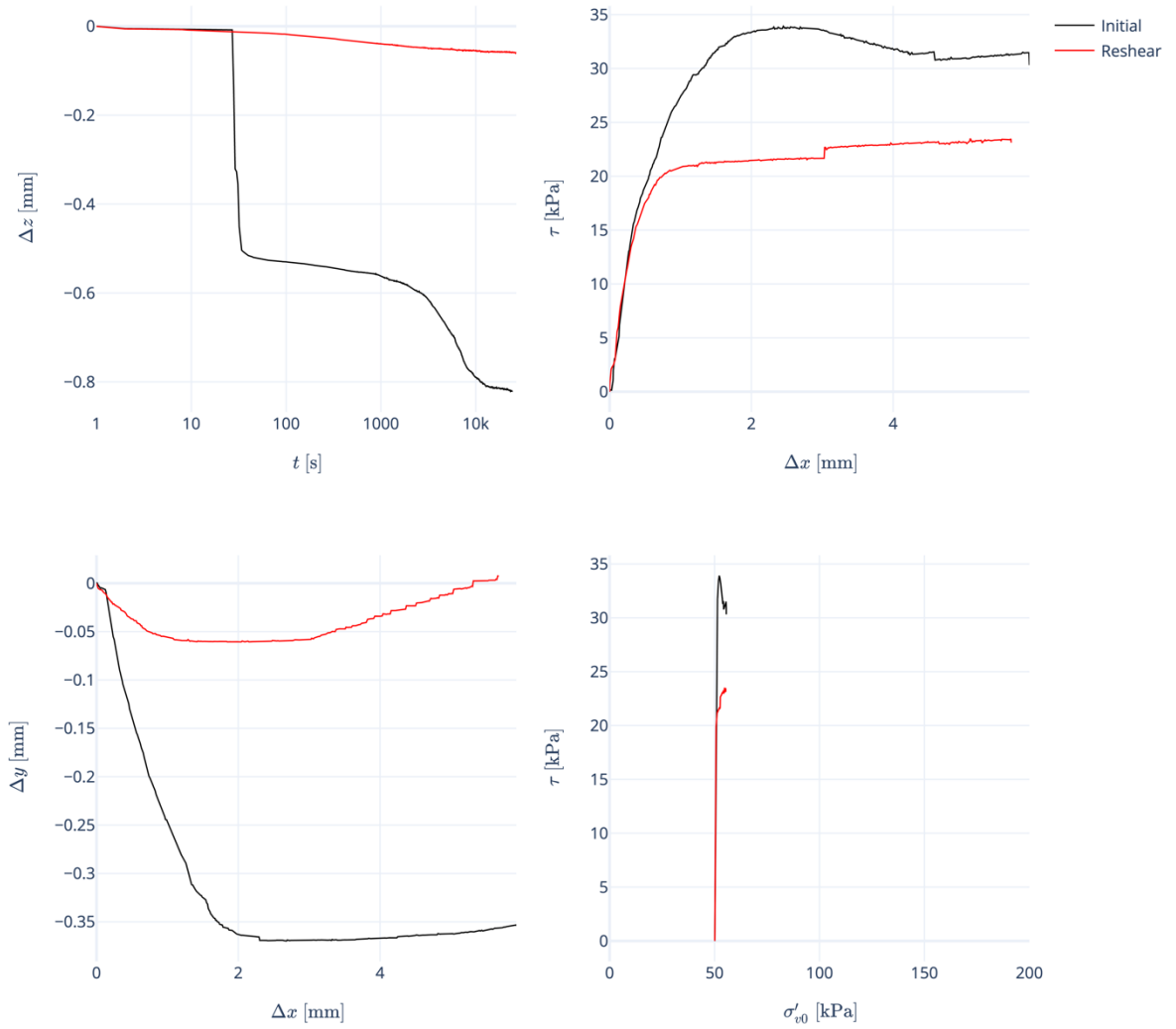


Bus 5 - Consolidated to 203.7kPa

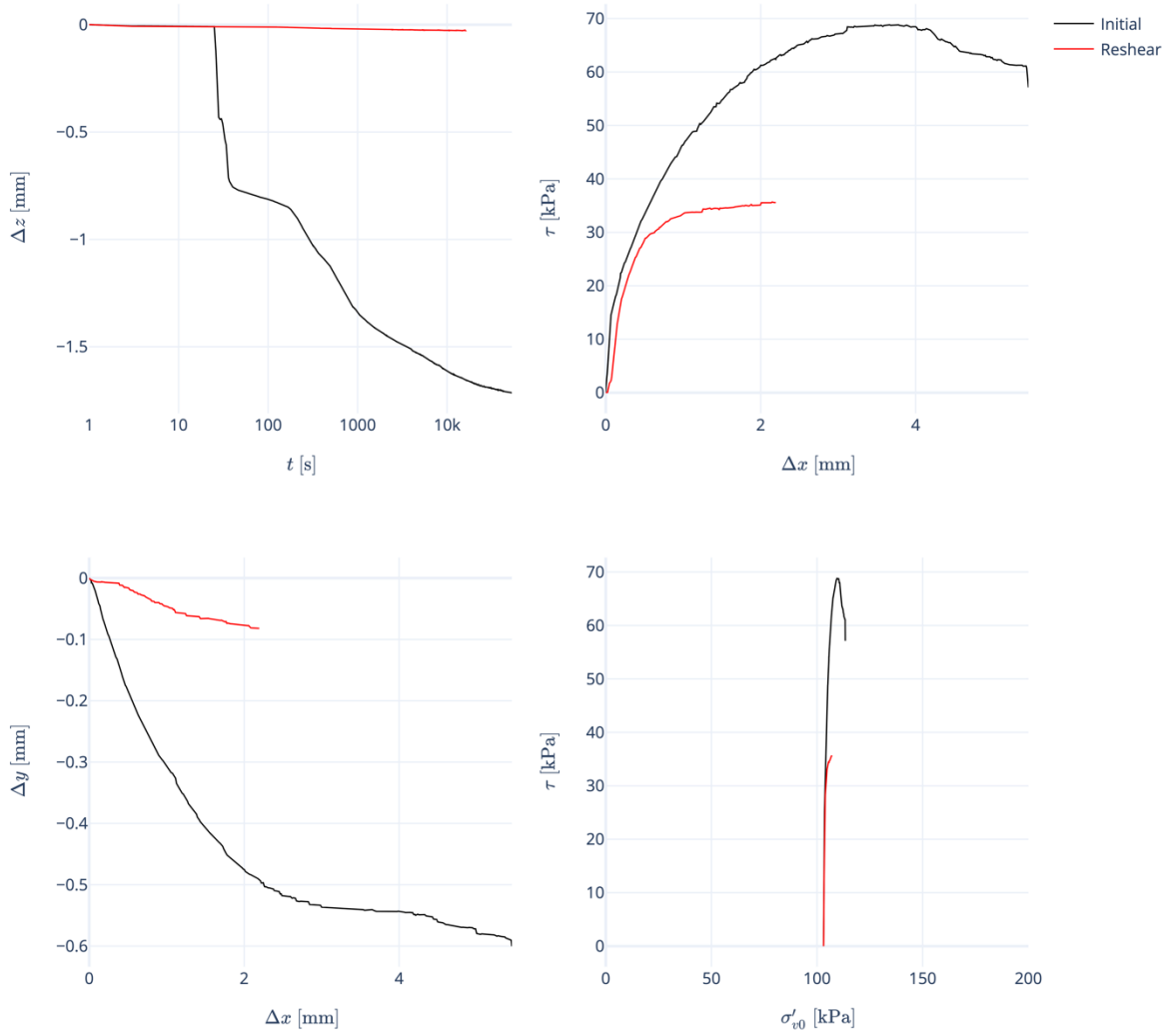


○ Bus 6

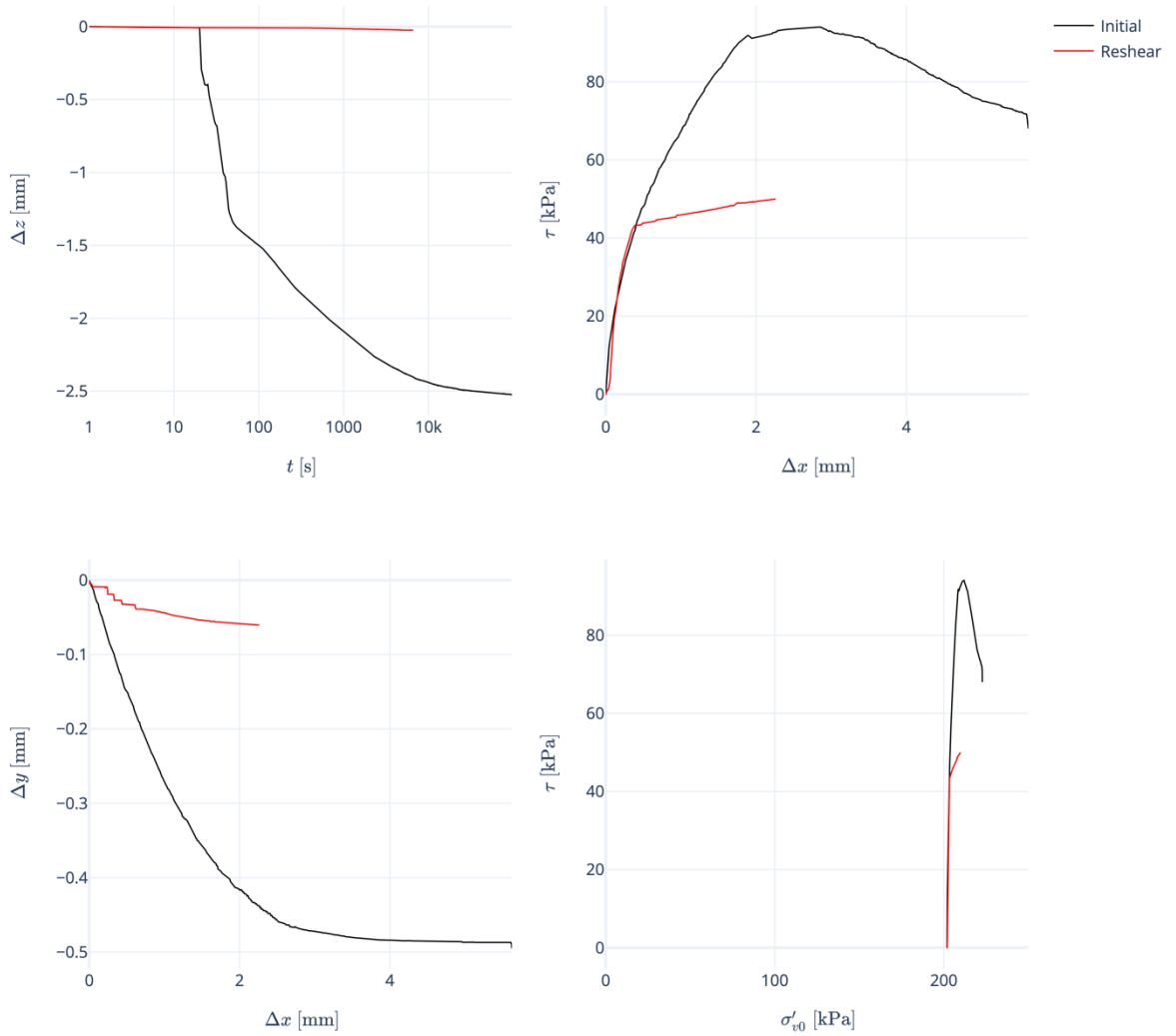
Bus 6 - Consolidated to 50.1 kPa



Bus 6 - Consolidated to 103.1kPa

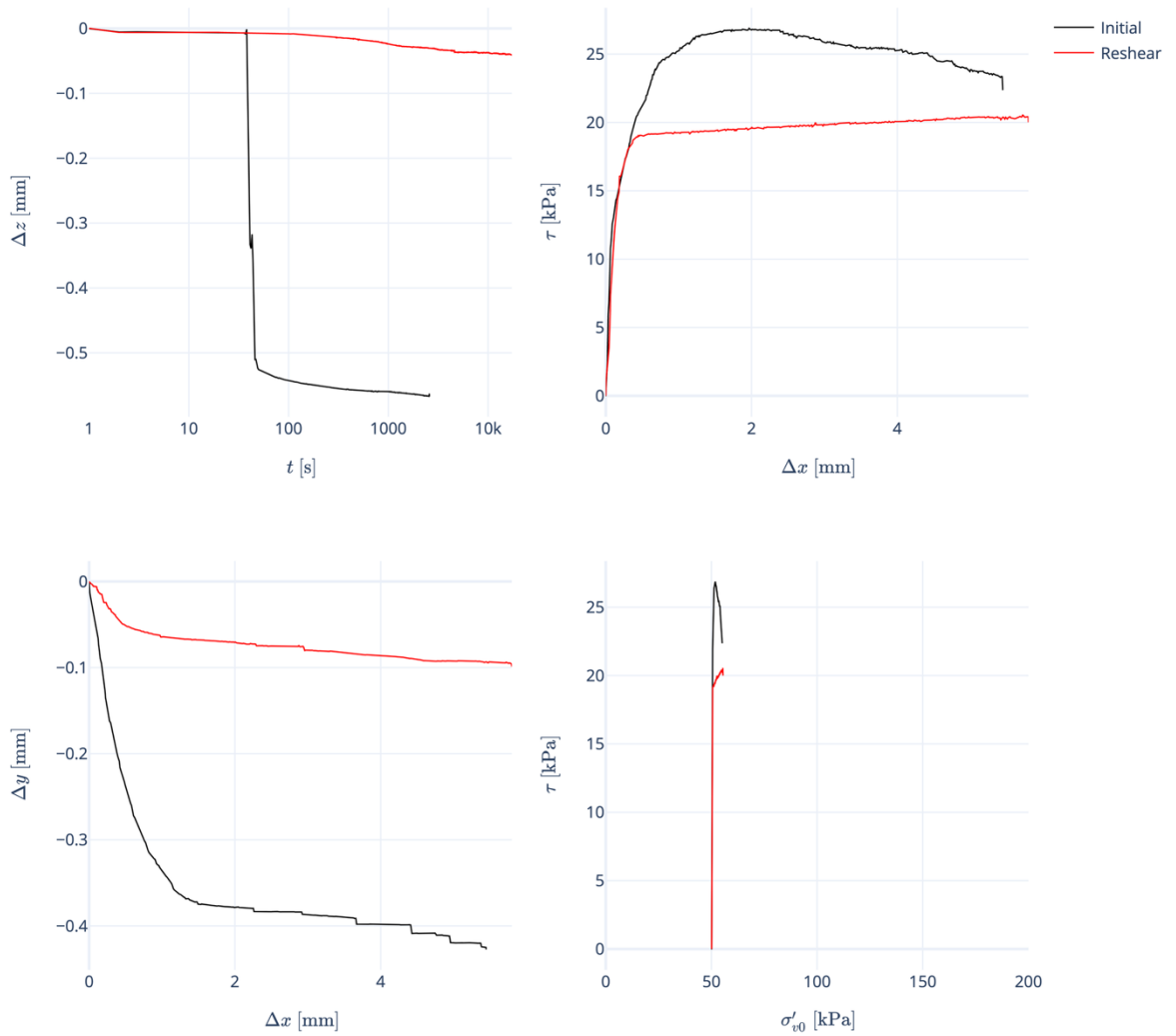


Bus 6 - Consolidated to 201.9kPa

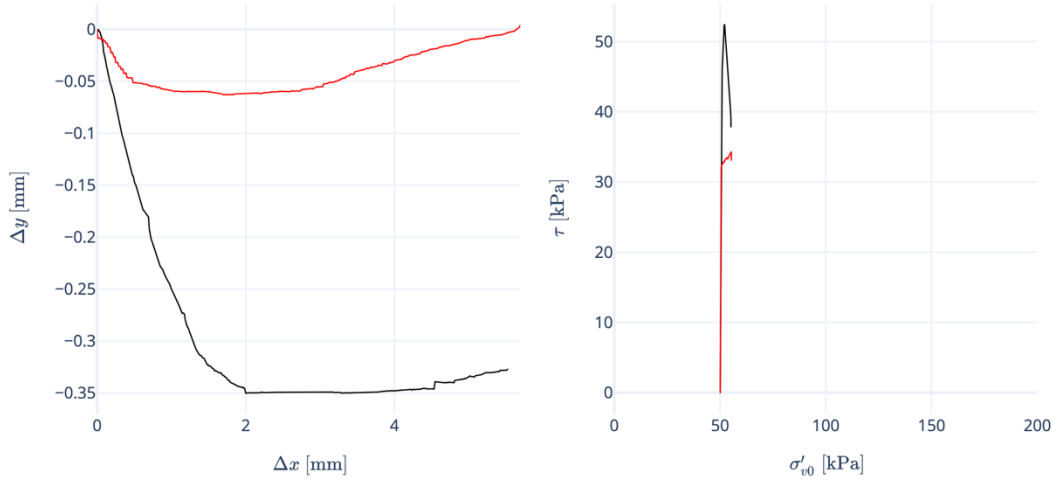
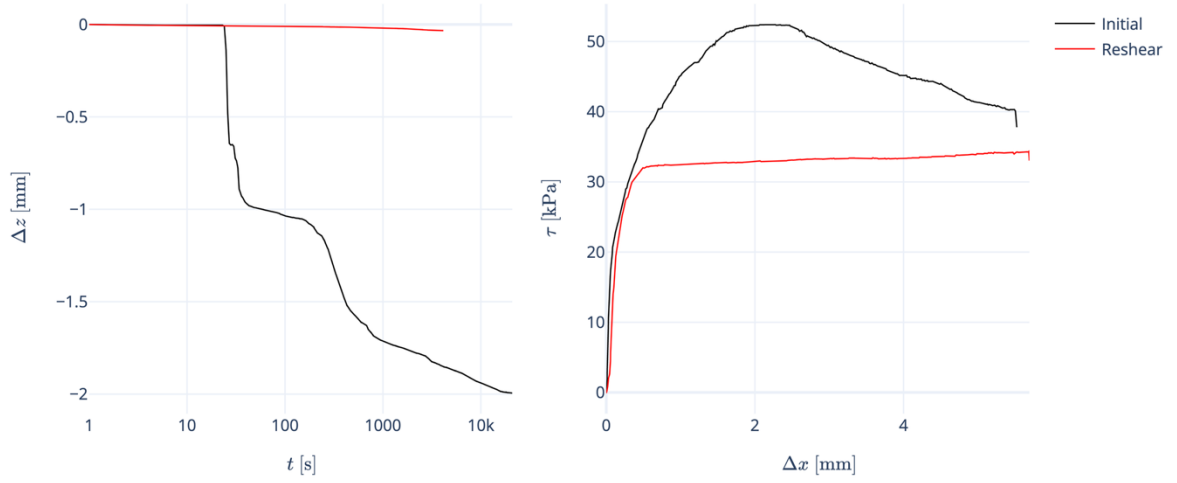


○ Bus 7

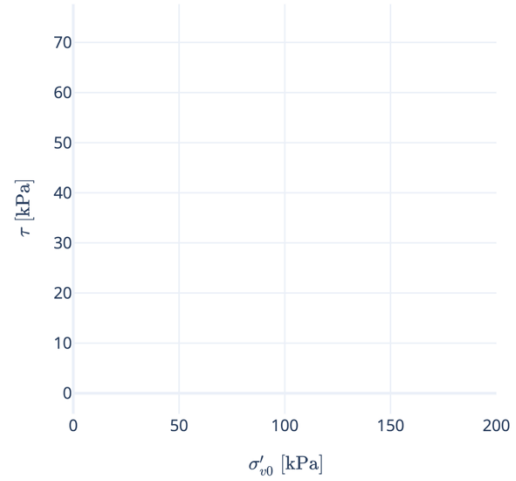
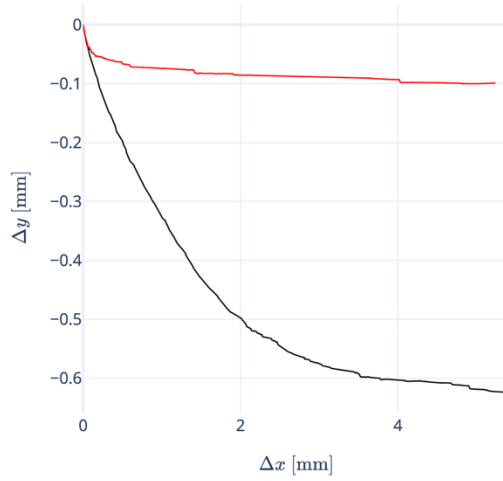
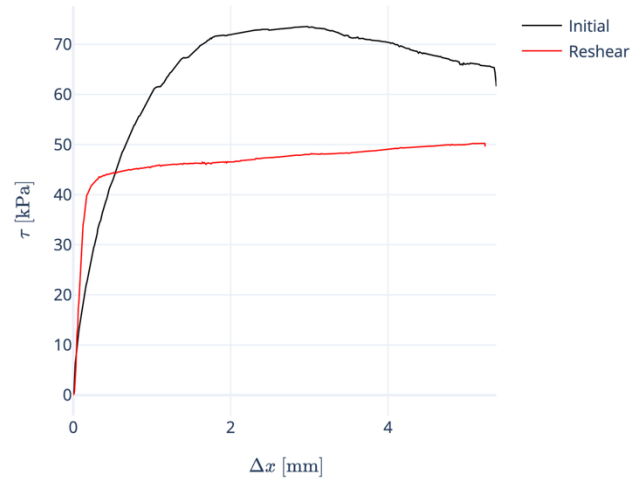
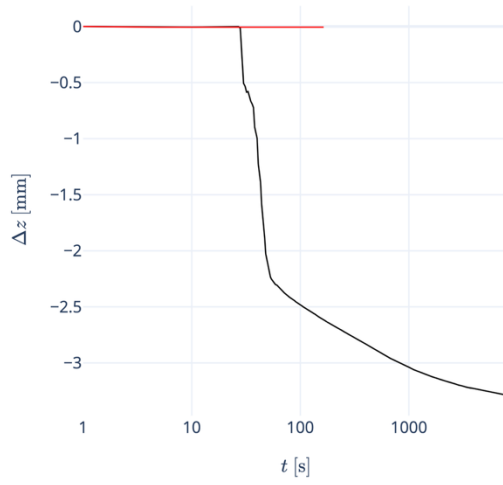
Bus 7 - Consolidated to 50.1 kPa



Bus 7 - Consolidated to 100.0kPa

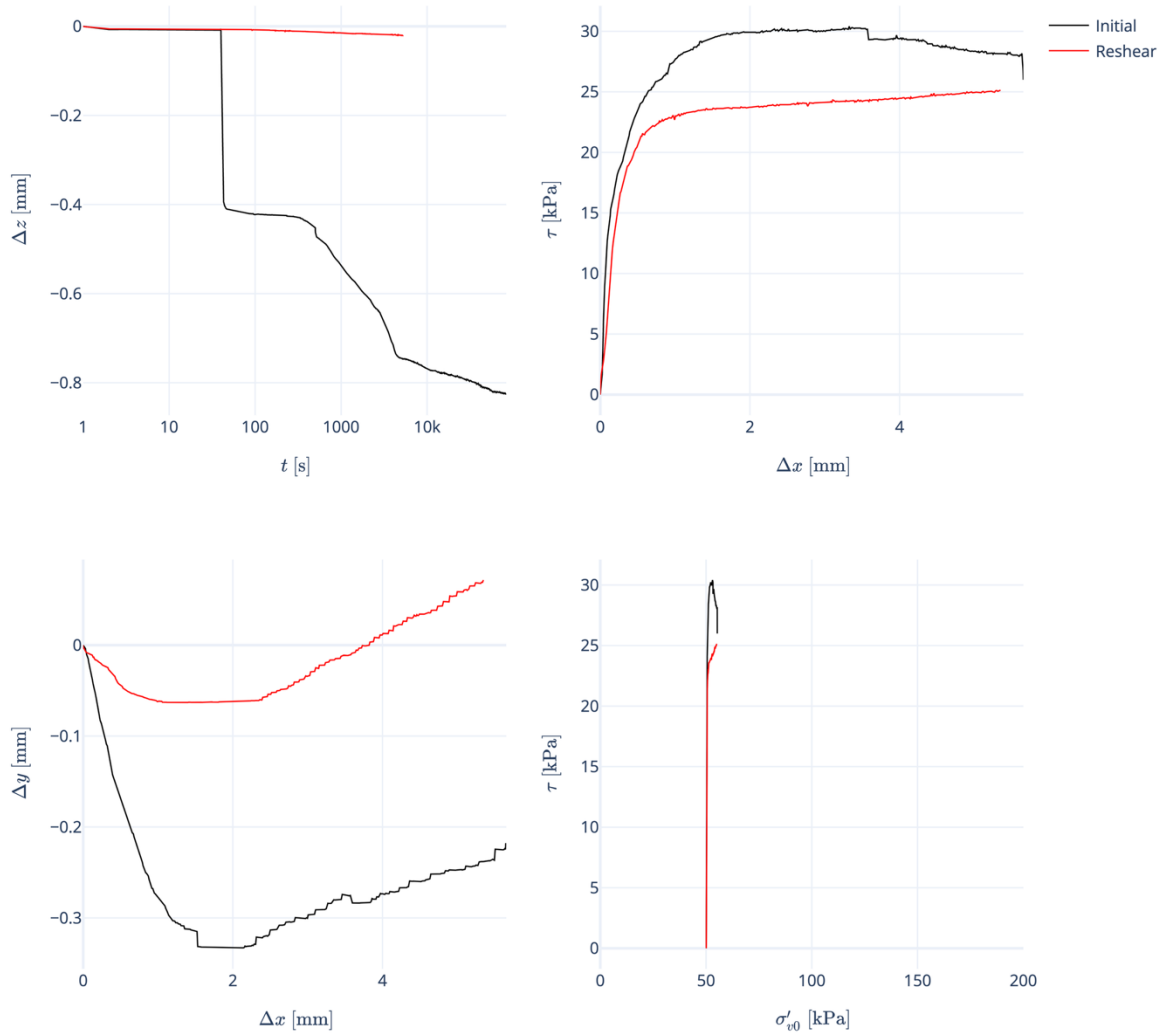


Bus 7 - Consolidated to 201.9kPa

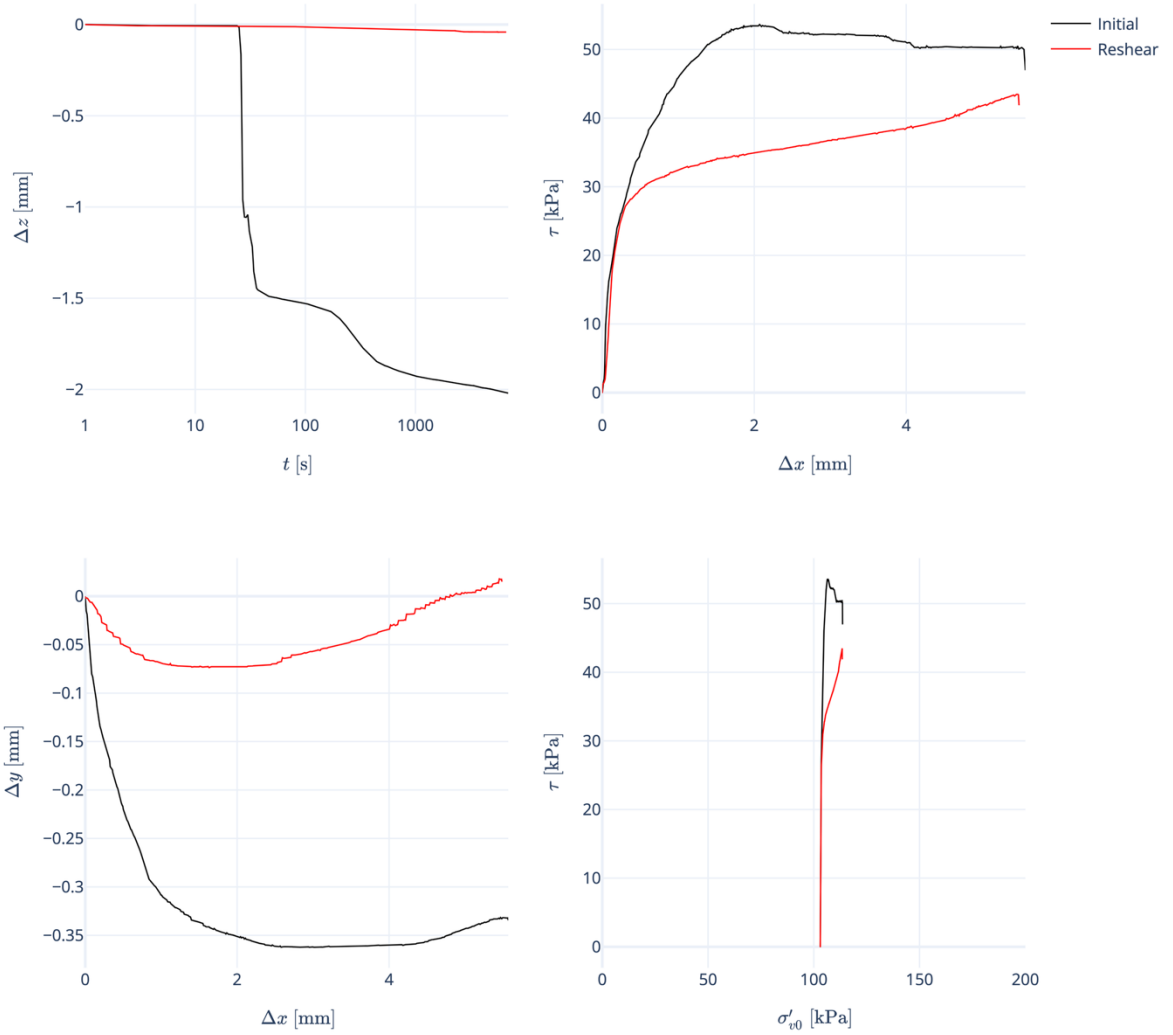


○ Bus 8

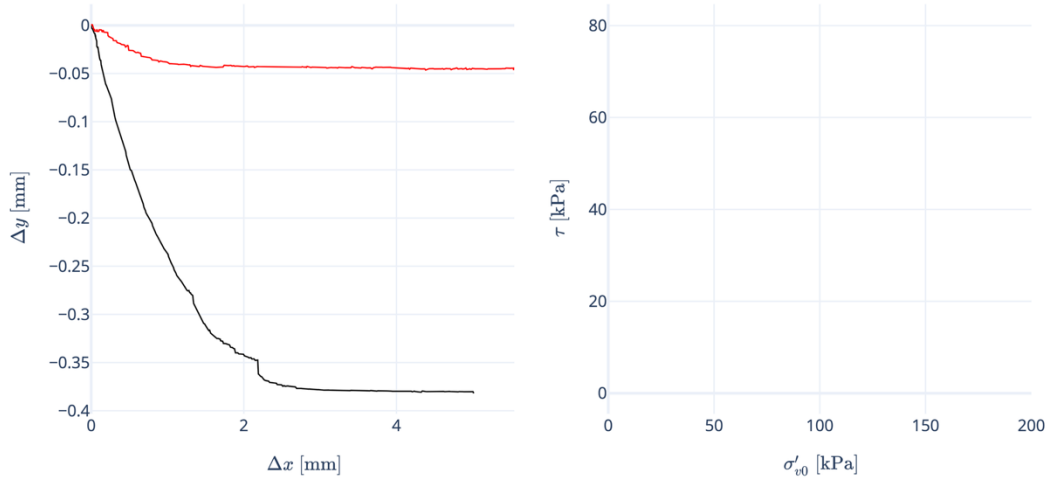
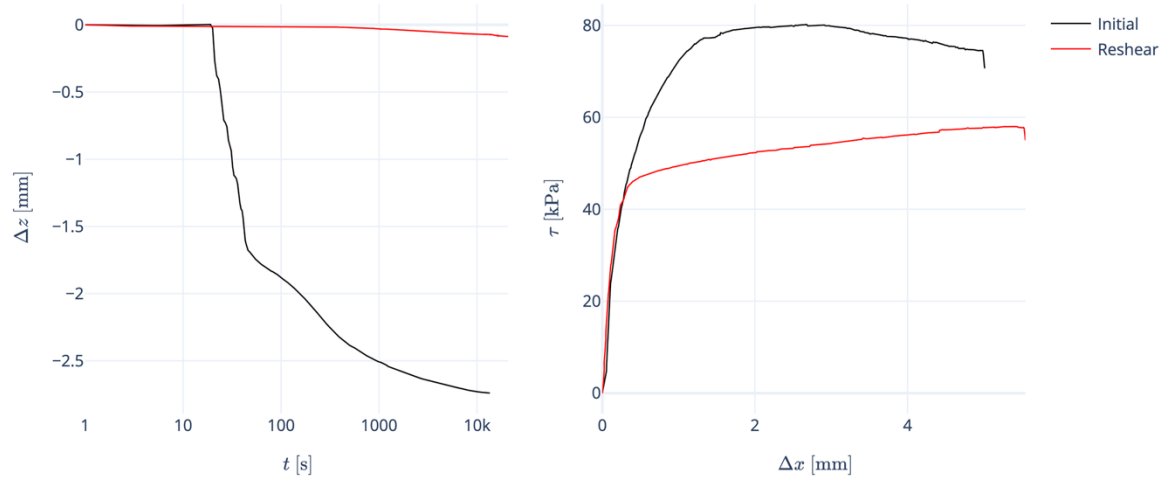
Bus 8 - Consolidated to 50.1 kPa



Bus 8 - Consolidated to 103.1kPa

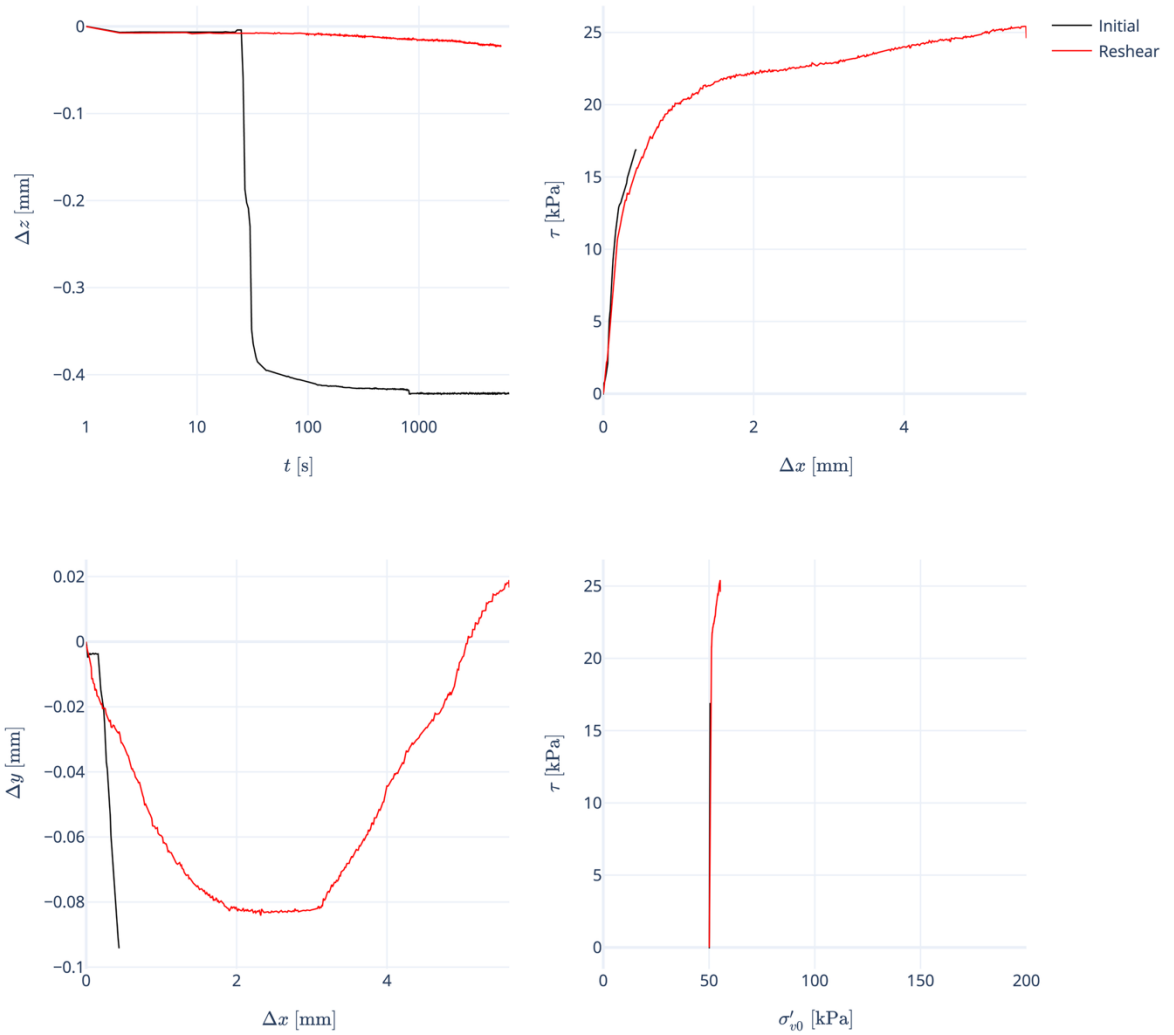


Bus 8 - Consolidated to 202.0kPa

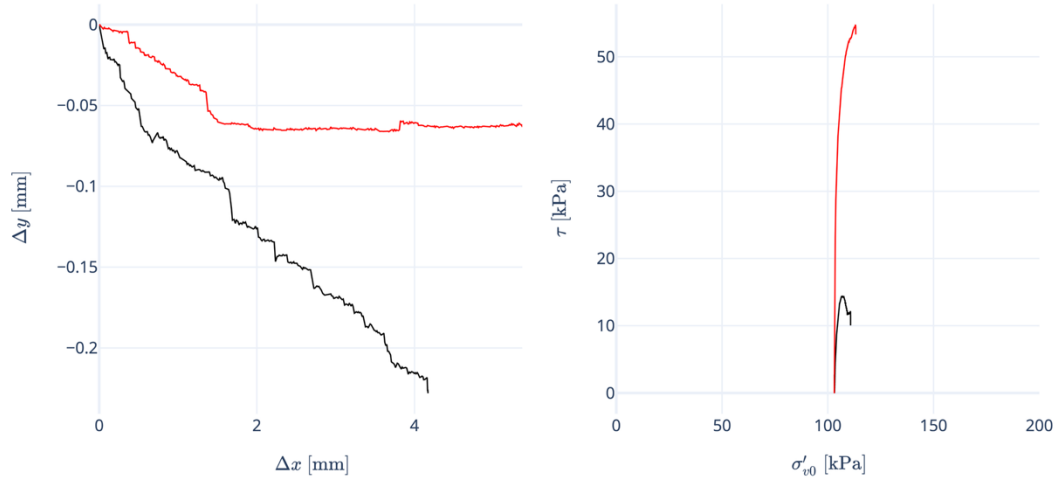
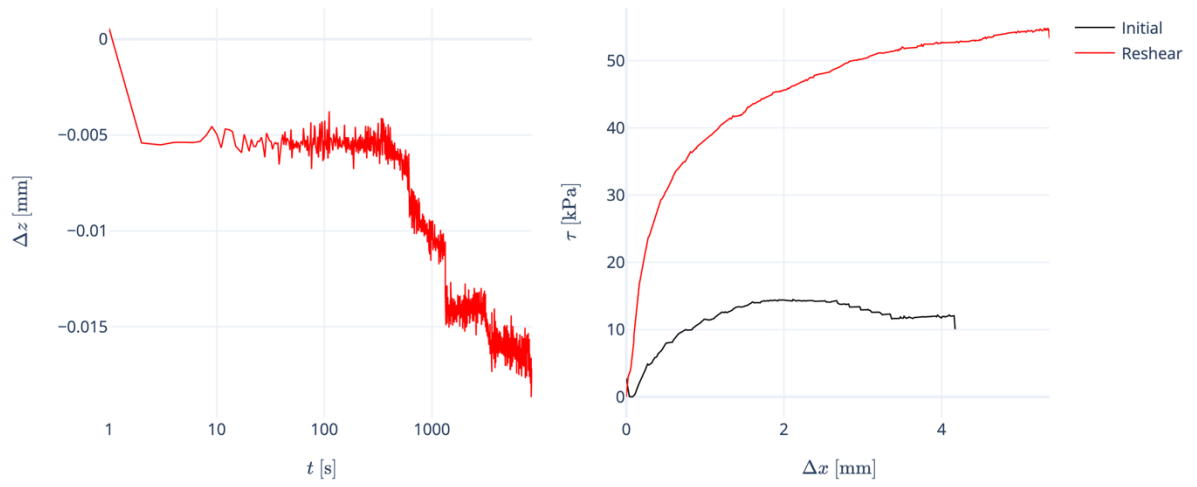


○ Bus 9

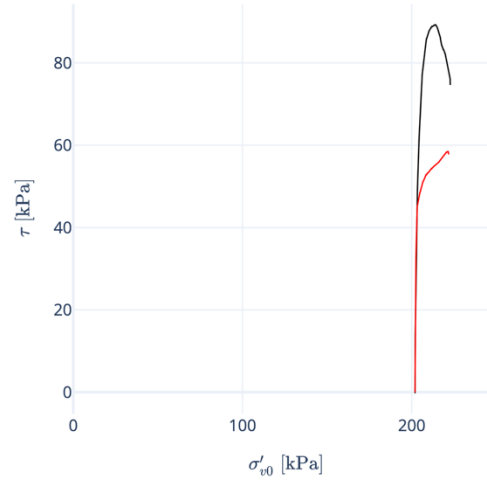
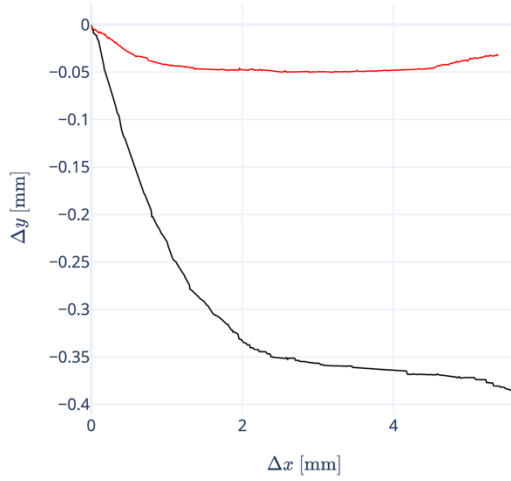
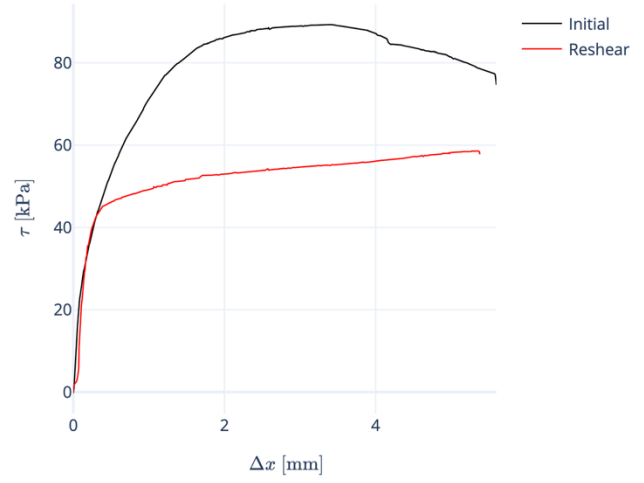
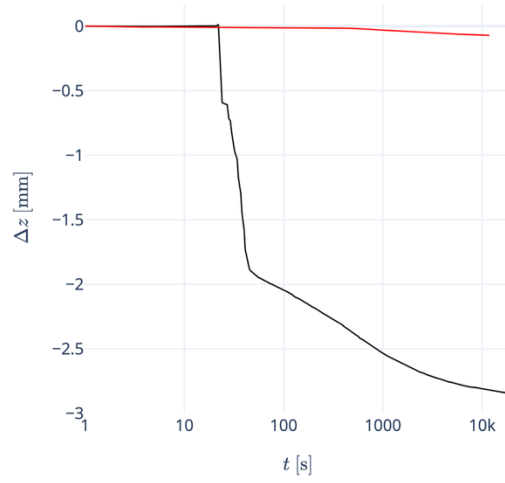
Bus 9 - Consolidated to 50.1 kPa



Bus 9 - Consolidated to 103.1kPa

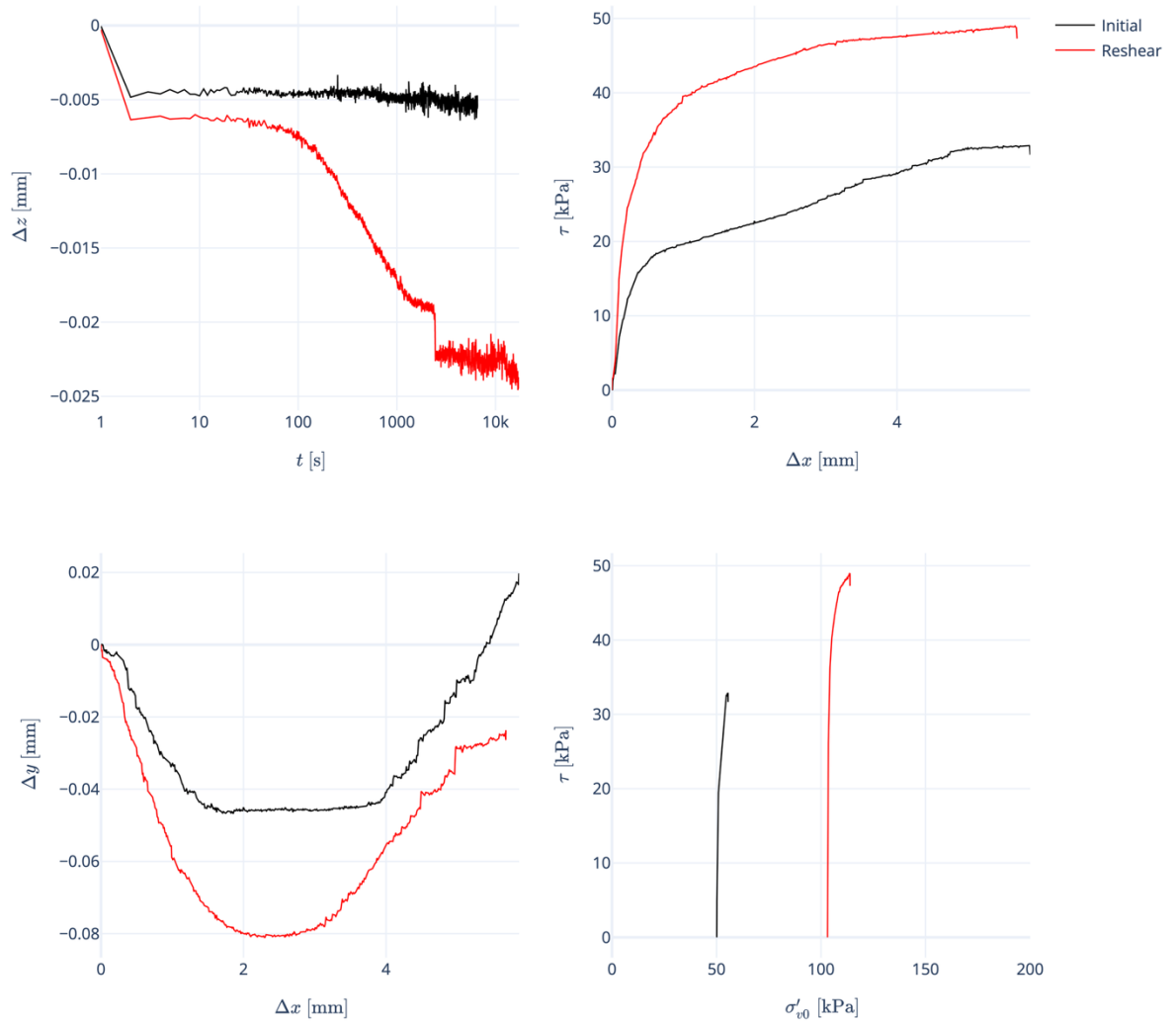


Bus 9 - Consolidated to 202.0kPa

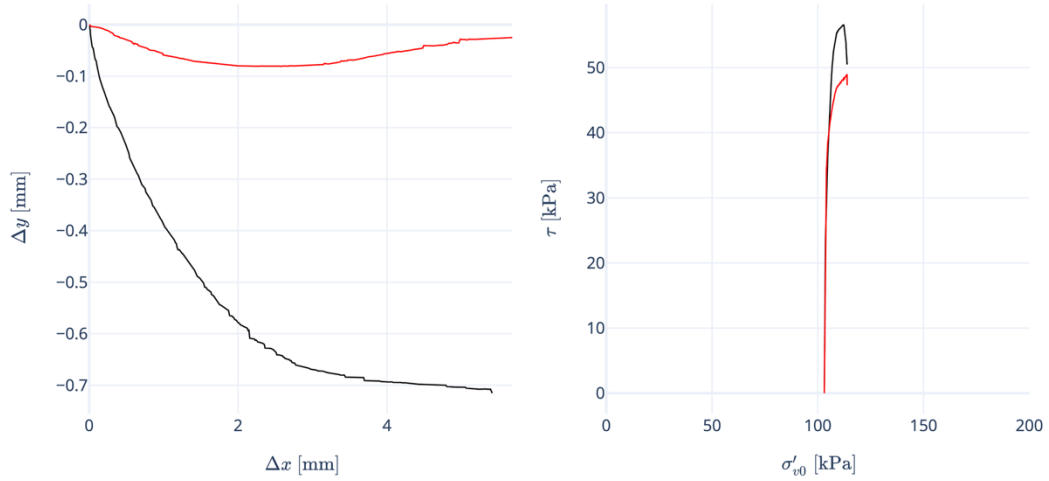
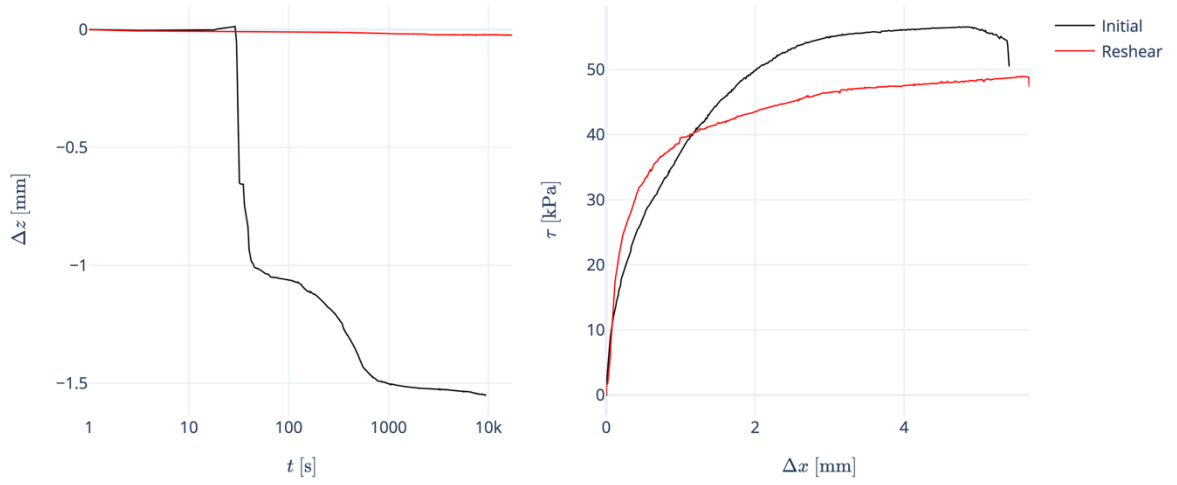


○ Bus 10

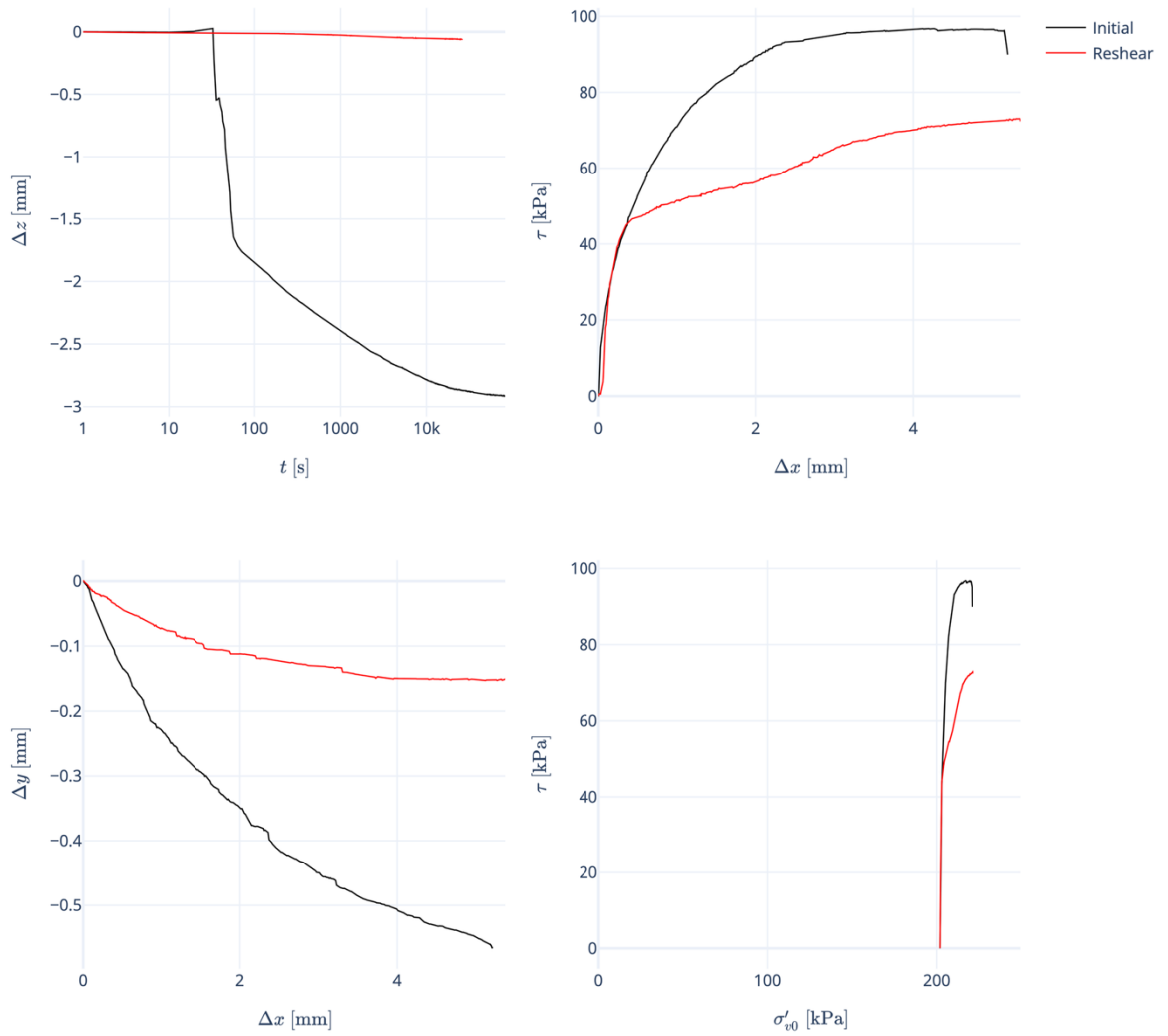
Bus 10 - Consolidated to 50.1 kPa



Bus 10 - Consolidated to 100.0kPa



Bus 10 - Consolidated to 201.9kPa



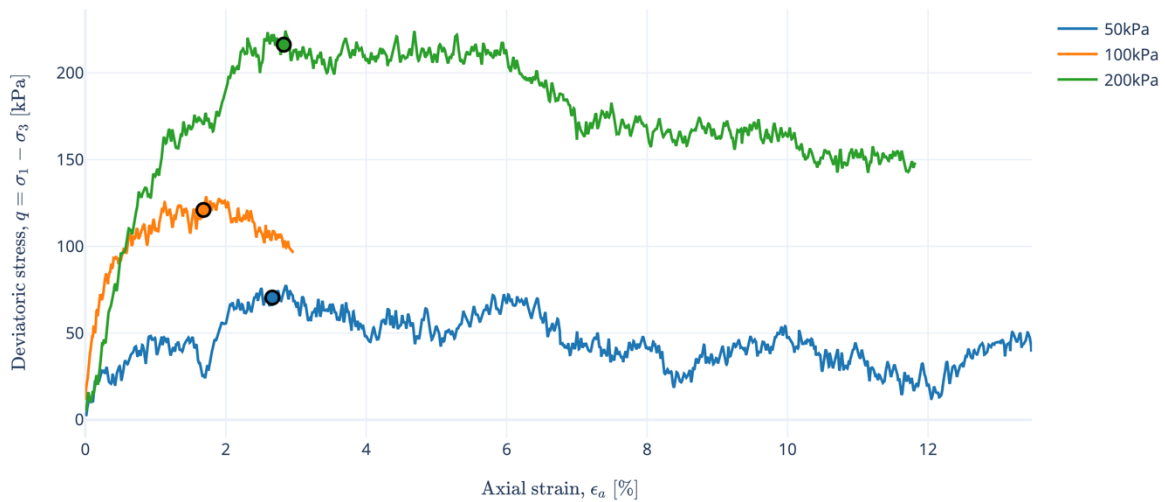
# APPENDIX I – CU TRIAXIAL TEST RESULTS

Bus 12

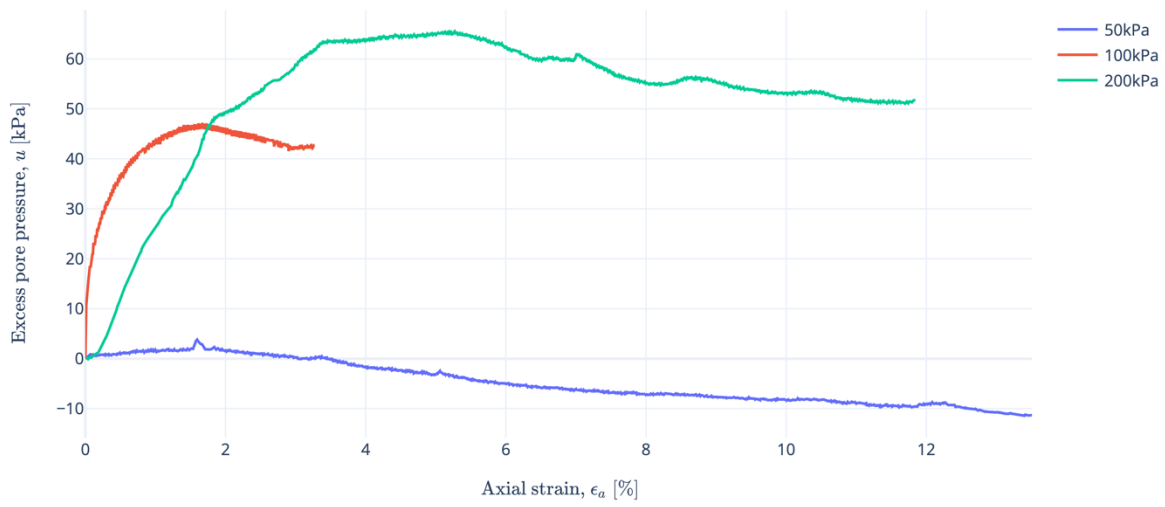
## Test conditions

Test no	Consolidation stress [kPa]	Sample diameter [mm]	Sample height [mm]	Water content before test [%]	Water content after test [%]
Bus 12-1	50	37.83	85.10	55.45	40.62
Bus 12-2	100	38.14	85.10	55.45	39.85
Bus 12-3	200	38.01	85.04	55.45	37.15

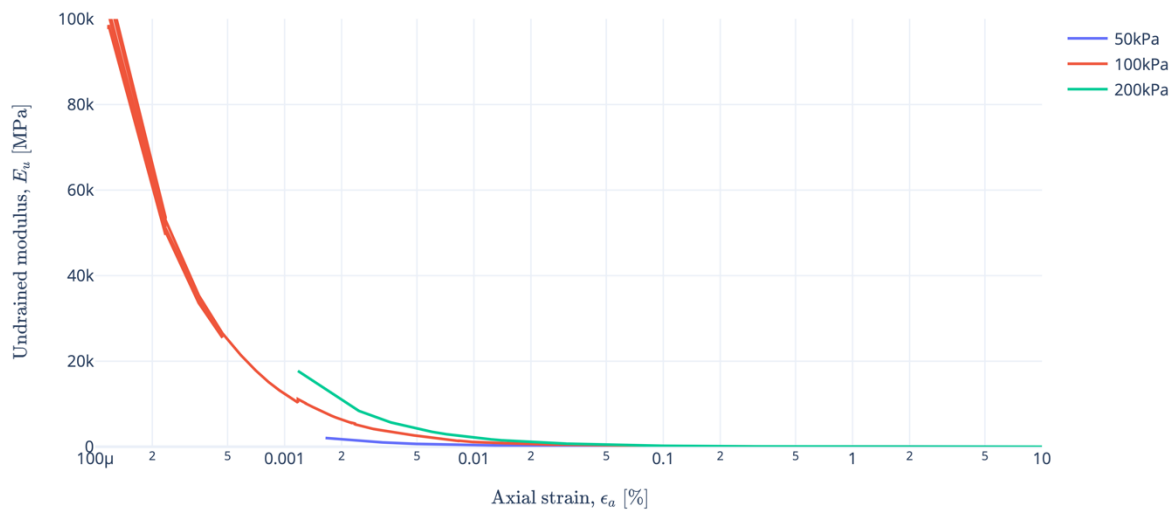
## Deviatoric stress vs axial strain



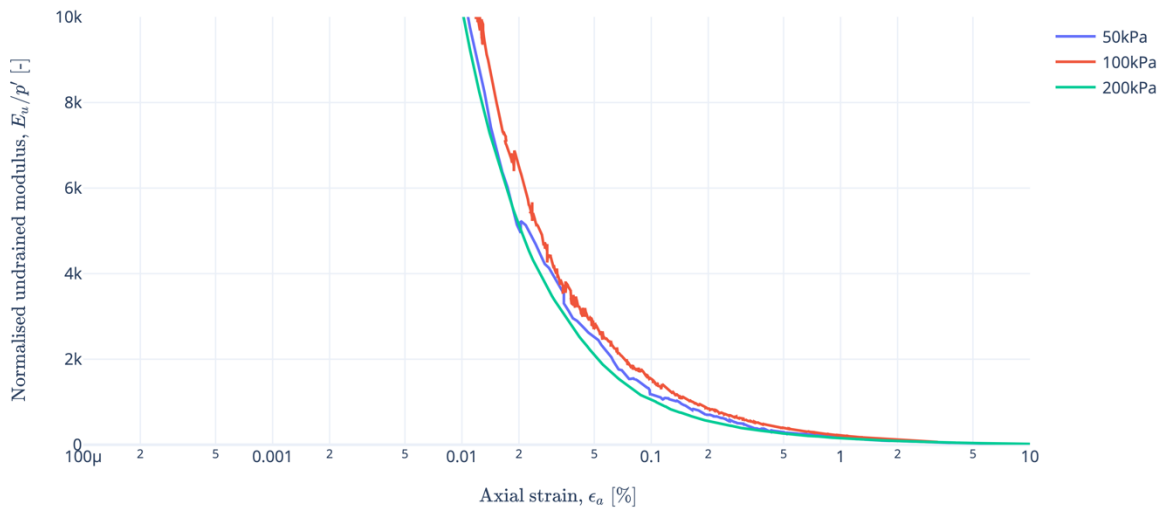
Excess pore pressure vs axial strain



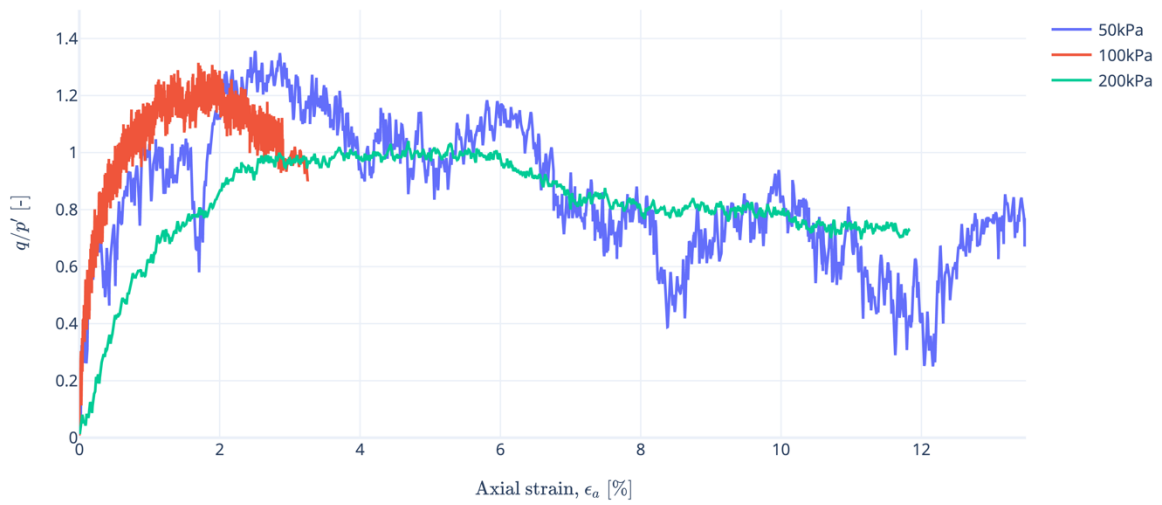
Undrained modulus vs axial strain



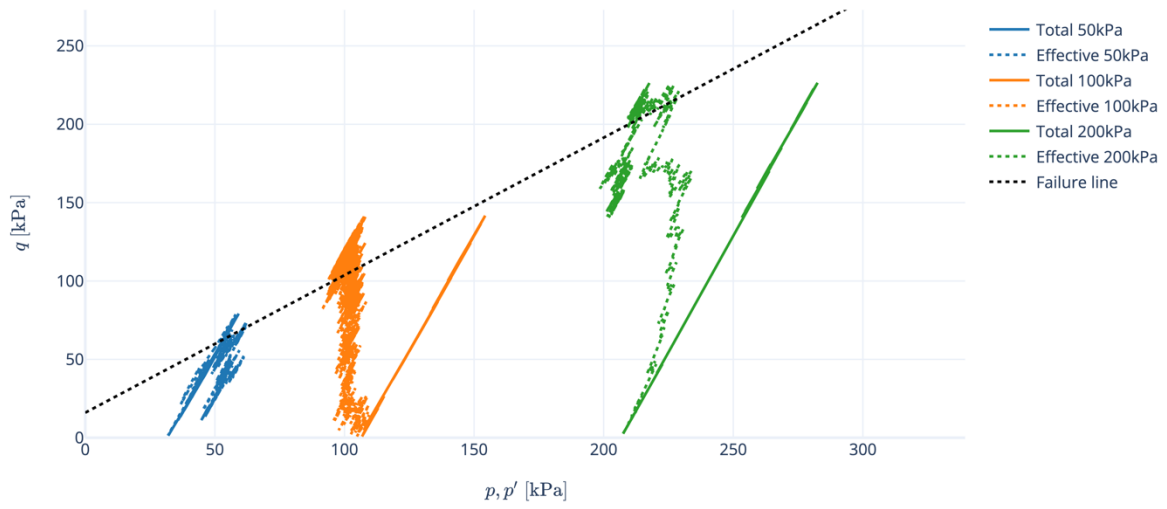
# Normalised undrained modulus vs the logarithm of axial strain



# Principal effective stress ratio vs axial strain

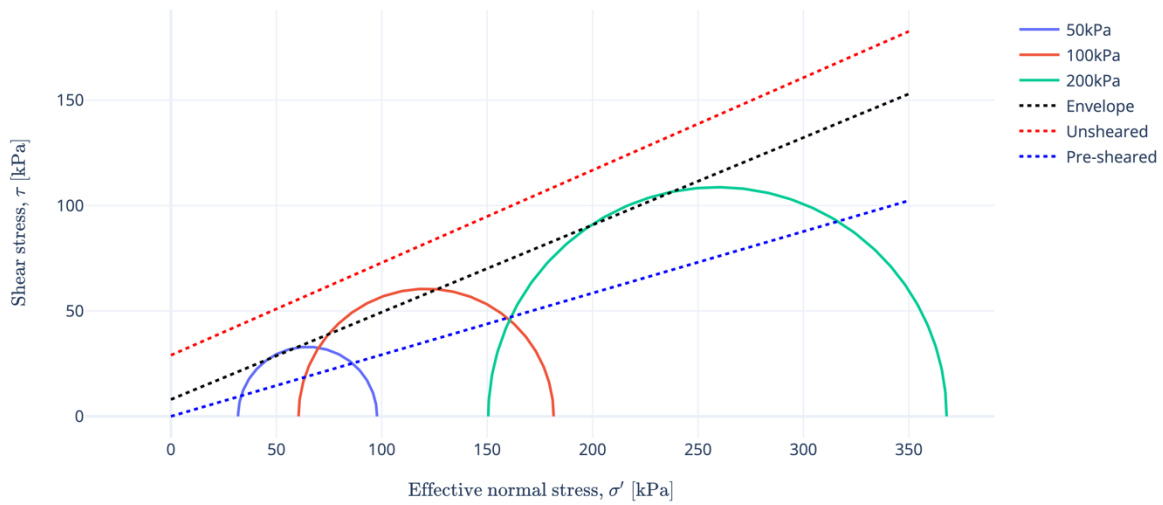


## Stress paths



## Effective stress Mohr circles

Mohr circles Bus 12,  $c' = 8\text{kPa}$ ,  $\phi' = 22^\circ$



## Rupture shapes



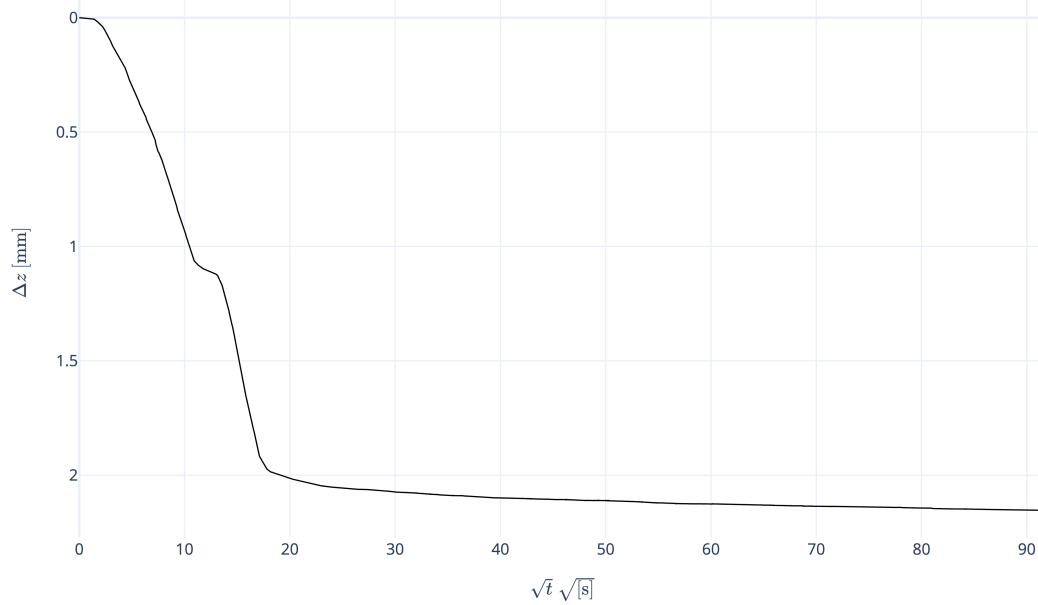
# APPENDIX J – DSS TEST RESULTS



## DSS test according to ASTM D6528-17

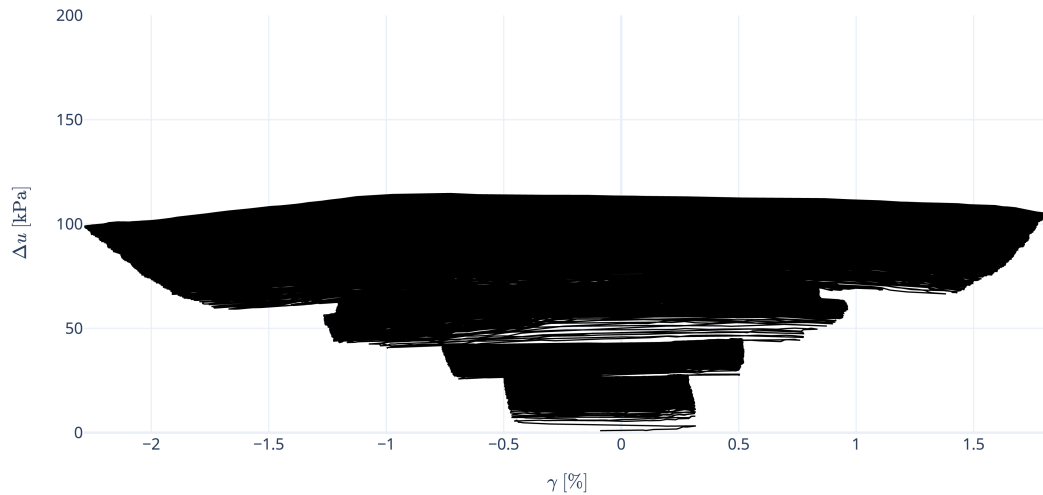
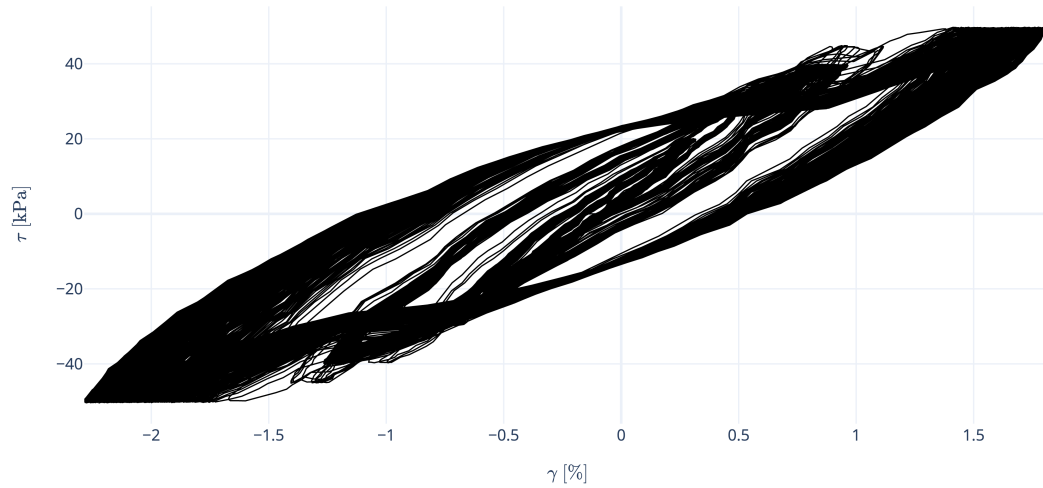
Test ID: Claytectonics/-/Kaolin 1 trial - Cyclic	Sample type: Reconstituted
<b>Initial conditions</b>	
Sample height [mm]	19.70
Sample diameter [mm]	71.37
Initial water content [%]	33.4
Initial void ratio [-]	0.812
Initial saturation [%]	108.8
Bulk density [Mg/m <sup>3</sup> ]	1.90
Dry density [Mg/m <sup>3</sup> ]	1.43
Specific gravity [-]	2.65
<b>Consolidation phase</b>	
Consolidation stress [kPa]	200
Consolidation settlement [mm]	2.289
Root-time method t <sub>95</sub> [s]	8032.8
<b>Shearing phase</b>	
Shear stress amplitude [kPa]	50
Average shear stress [kPa]	0
<b>Final conditions</b>	
Final water content [%]	-

Consolidation phase



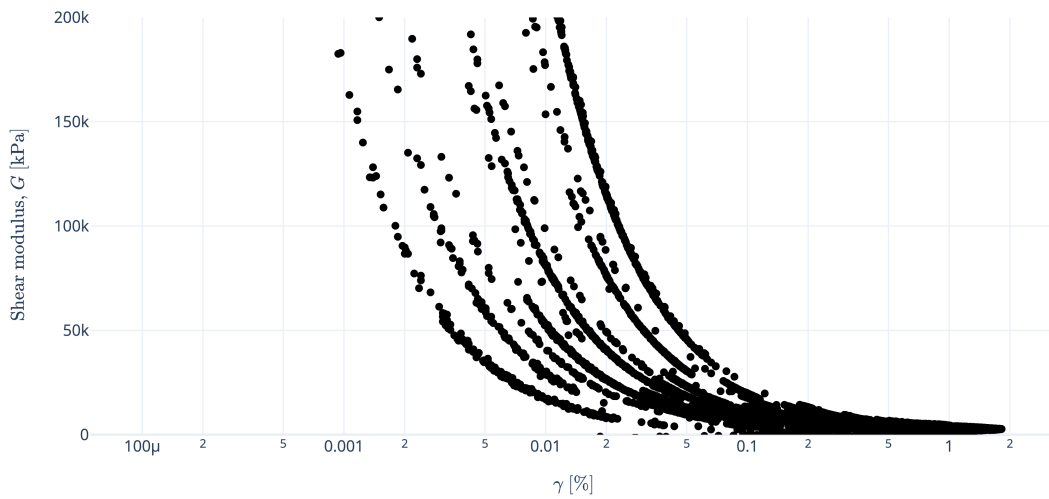
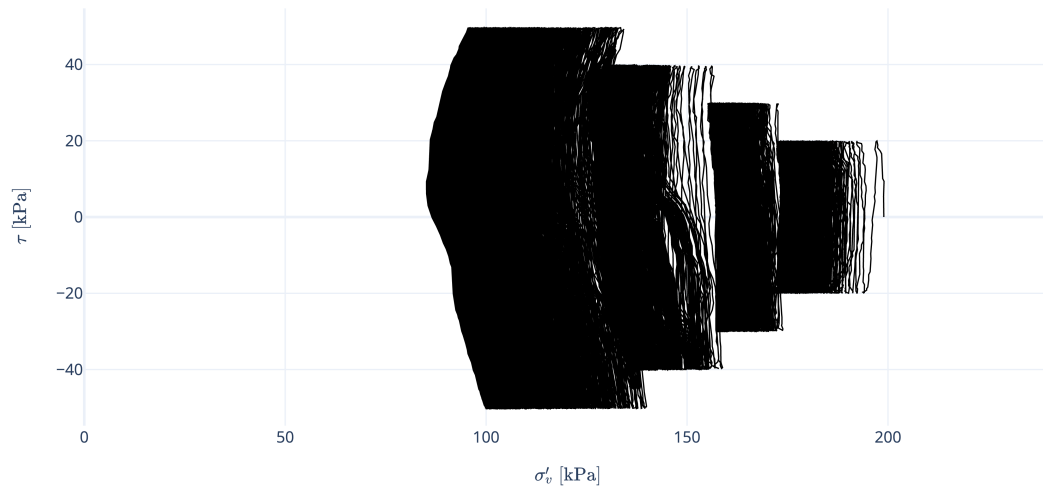
Claytectonics/-/Kaolin 1 trial

Shearing phase



Claytectonics/-/Kaolin 1 trial

Shearing phase – Continued



Claytectonics/-/Kaolin 1 trial



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kaolin 2 trial

Sample type: Reconstituted

### Initial conditions

Sample height [mm]	19.70
Sample diameter [mm]	71.37
Initial water content [%]	33.4
Initial void ratio [-]	0.871
Initial saturation [%]	101.5
Bulk density [Mg/m <sup>3</sup> ]	1.90
Dry density [Mg/m <sup>3</sup> ]	1.43
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	0.539
Root-time method t <sub>95</sub> [s]	390.0

### Shearing phase

Strain rate [%/s]	0.001
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### Final conditions

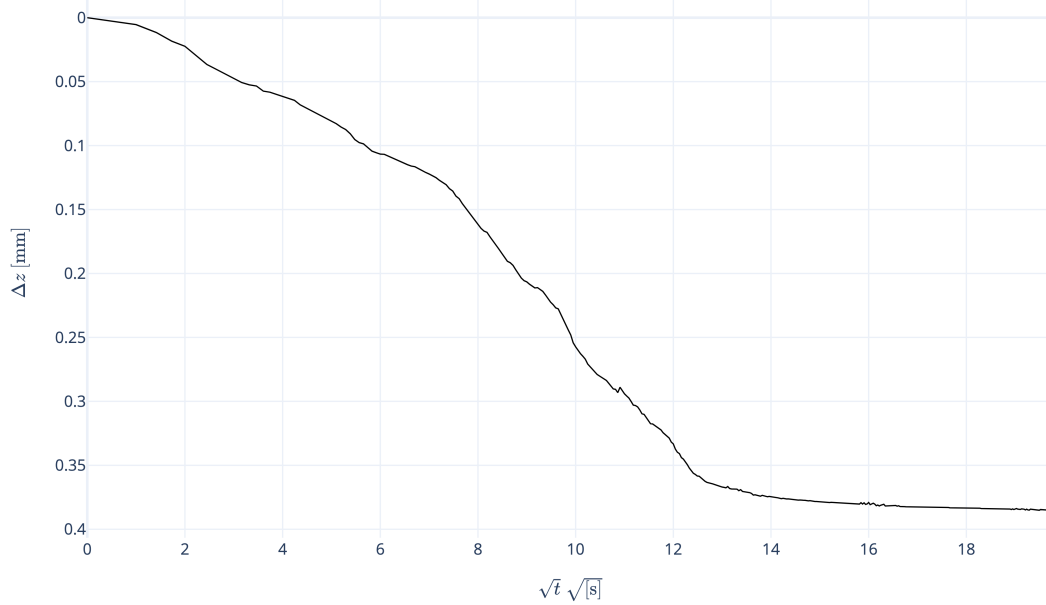
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

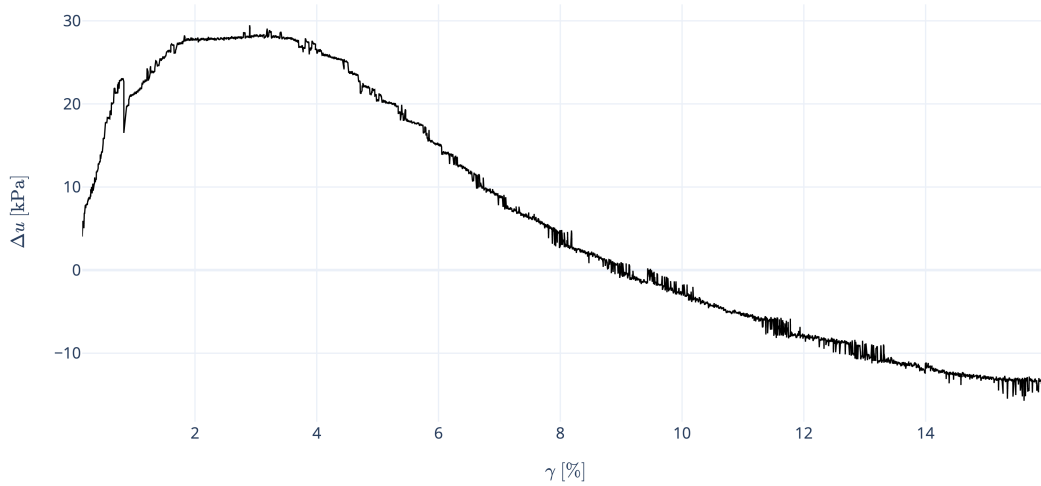
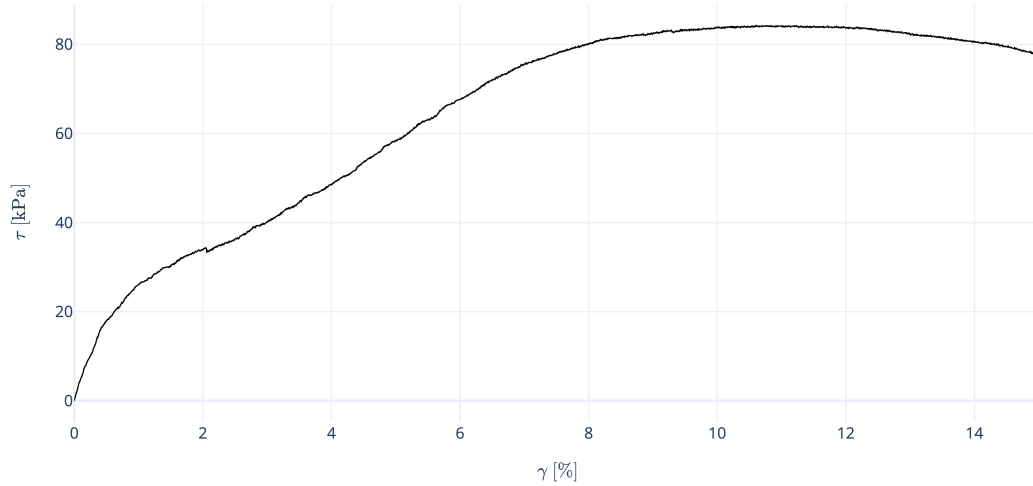
Checked by: MPA

Consolidation phase



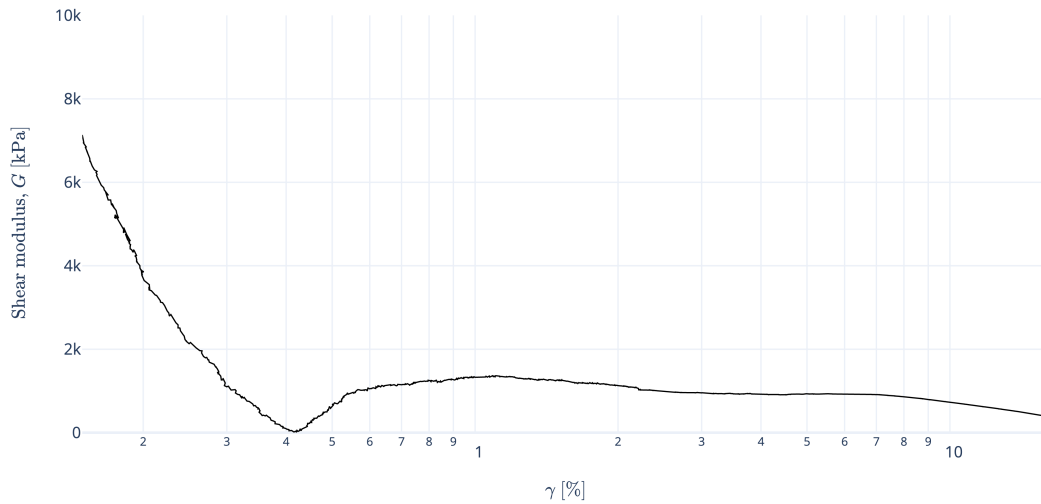
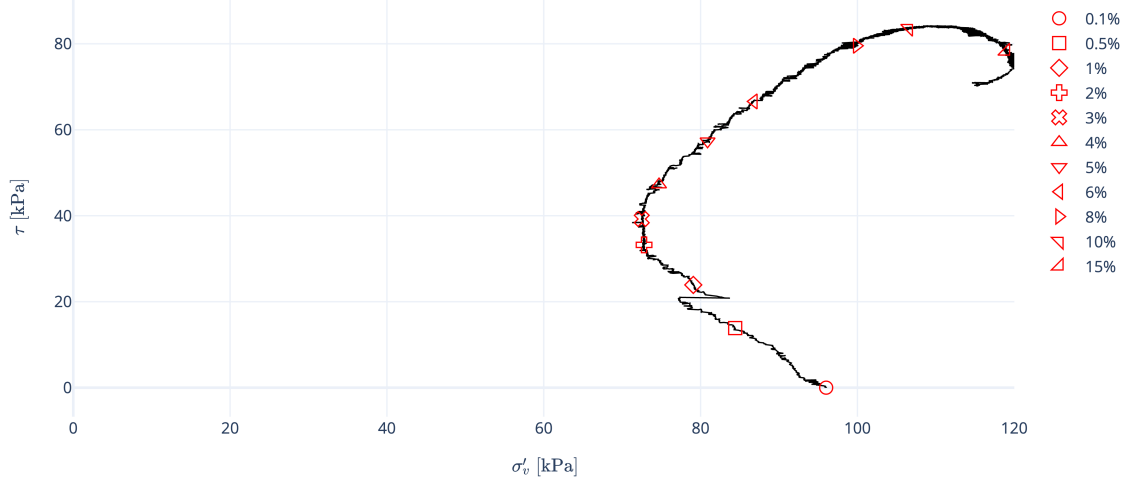
Claytectonics/-/Kaolin 2 trial

Shearing phase



Claytectonics/-/Kaolin 2 trial

Shearing phase – Continued



Claytectonics/-/Kaolin 2 trial



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kaolin 3 -  
Gripper plates - 10kPa - cyclic

Sample type: Reconstituted

### Initial conditions

Sample height [mm]	19.68
Sample diameter [mm]	70.79
Initial water content [%]	53.9
Initial void ratio [-]	1.430
Initial saturation [%]	99.9
Bulk density [Mg/m <sup>3</sup> ]	1.68
Dry density [Mg/m <sup>3</sup> ]	1.09
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	3.112
Root-time method t <sub>95</sub> [s]	336.3

### Shearing phase

Shear stress amplitude [kPa]	10
Average shear stress [kPa]	0

### Final conditions

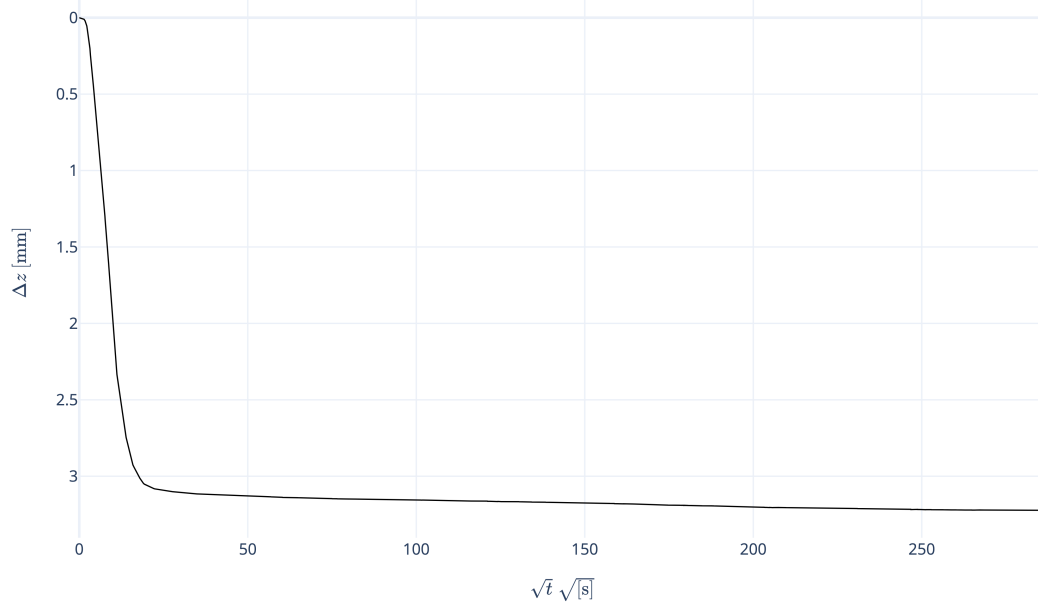
Final water content [%]	nan
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Date: 24/03/2026

Created by: BST

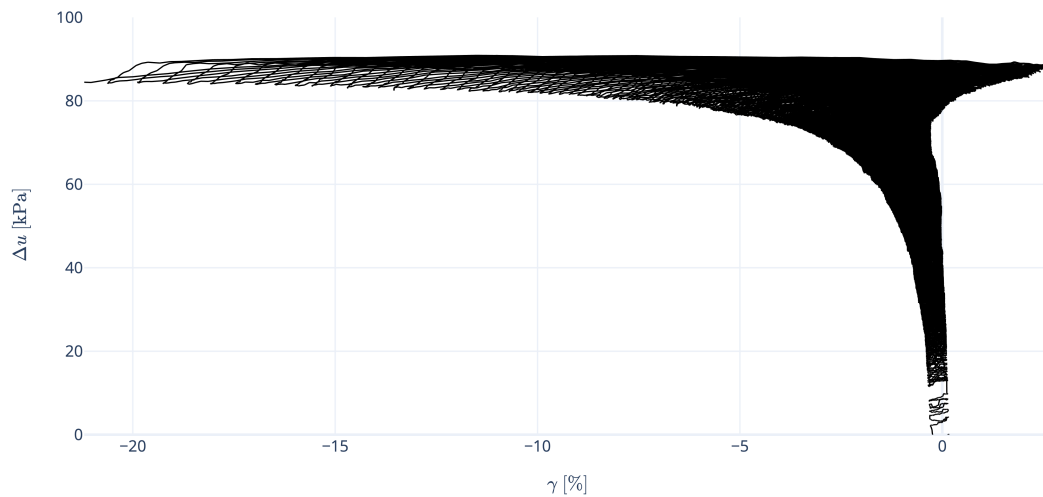
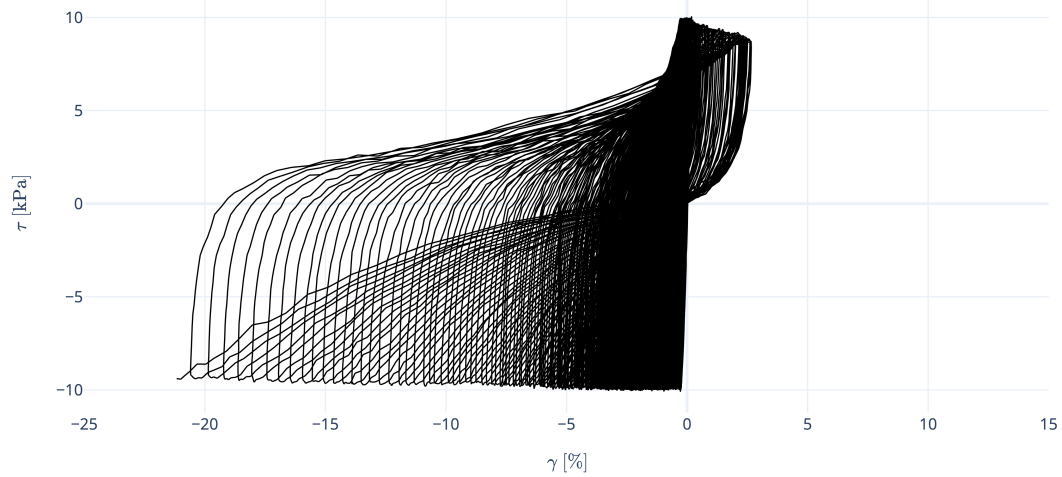
Checked by: MPA

Consolidation phase



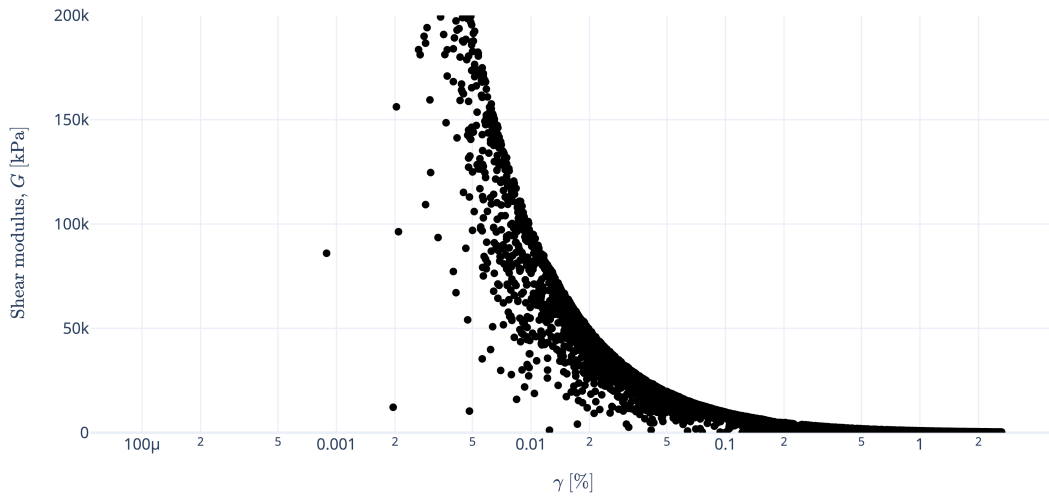
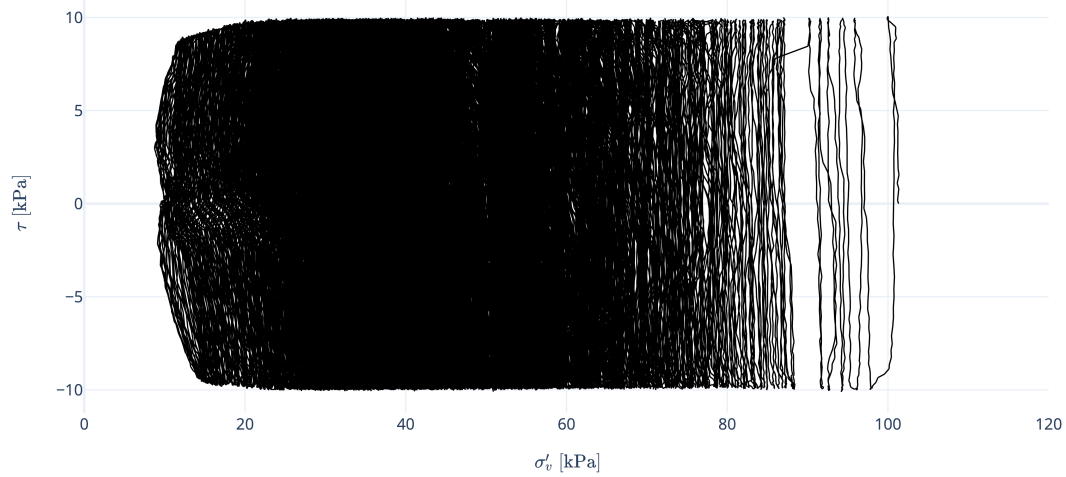
Claytectonics/-/Kaolin 3 - Gripper plates - 10kPa

Shearing phase



Claytectonics/-/Kaolin 3 - Gripper plates - 10kPa

Shearing phase – Continued



Claytectonics/-/Kaolin 3 - Gripper plates - 10kPa



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kaolin 4 -  
Gripper plates - 15kPa - Cyclic

Sample type: Reconstituted

### Initial conditions

Sample height [mm]	19.70
Sample diameter [mm]	70.71
Initial water content [%]	52.8
Initial void ratio [-]	1.428
Initial saturation [%]	98.0
Bulk density [Mg/m <sup>3</sup> ]	1.67
Dry density [Mg/m <sup>3</sup> ]	1.09
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	3.107
Root-time method t <sub>95</sub> [s]	584.0

### Shearing phase

Shear stress amplitude [kPa]	15
Average shear stress [kPa]	0

### Final conditions

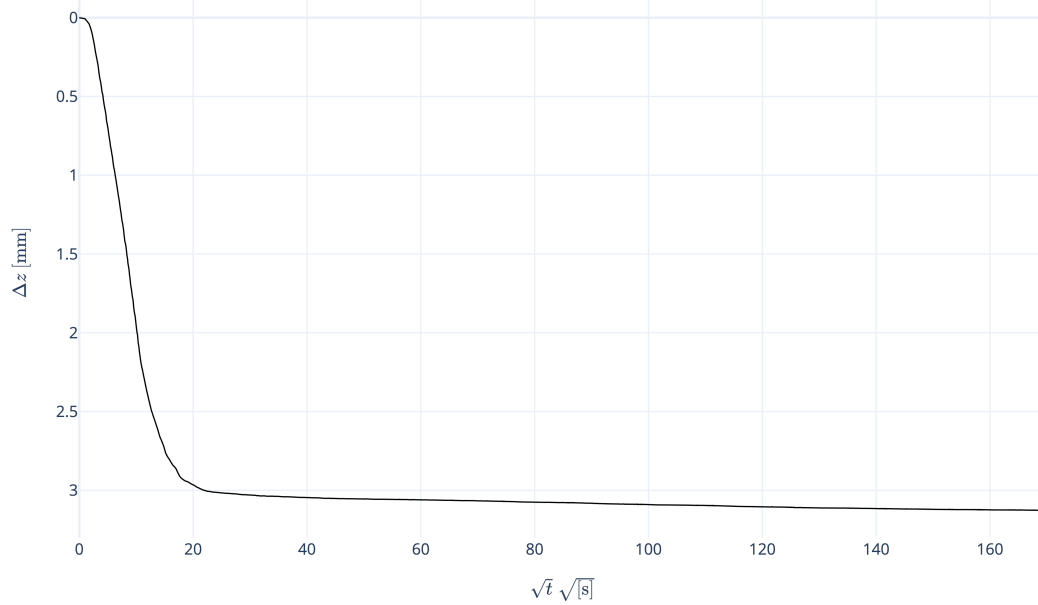
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

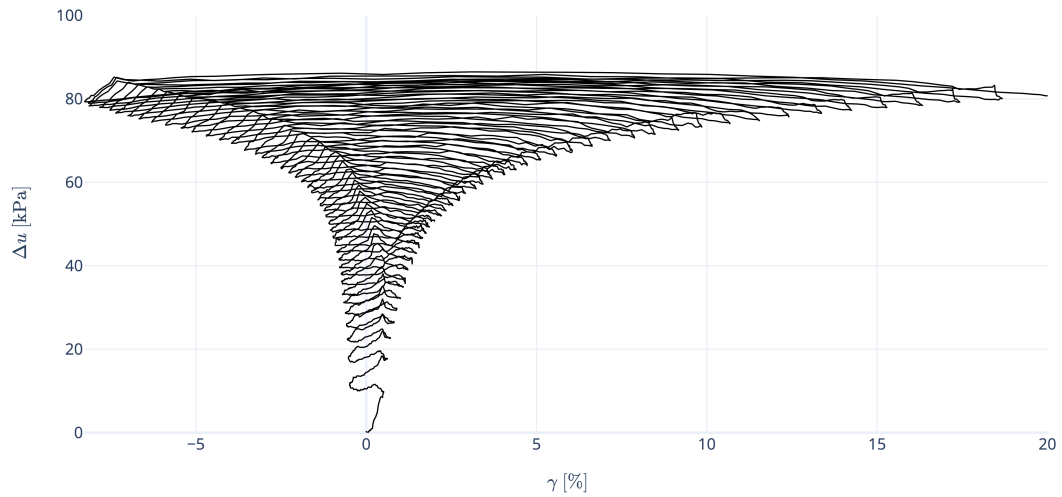
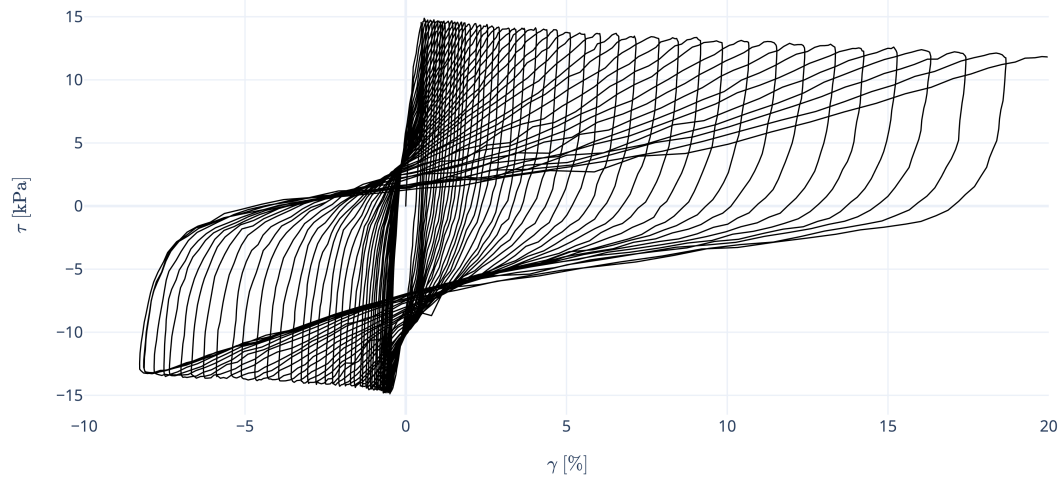
Checked by: MPA

Consolidation phase



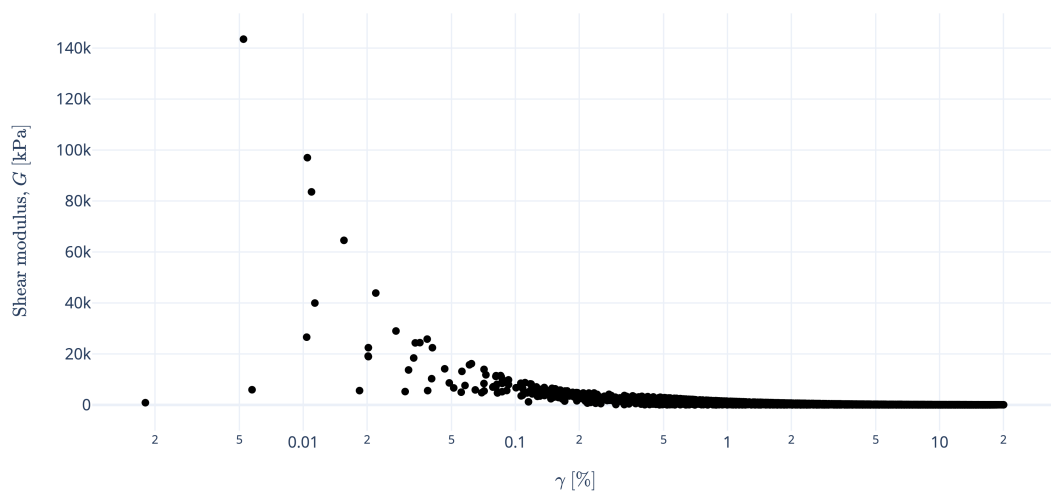
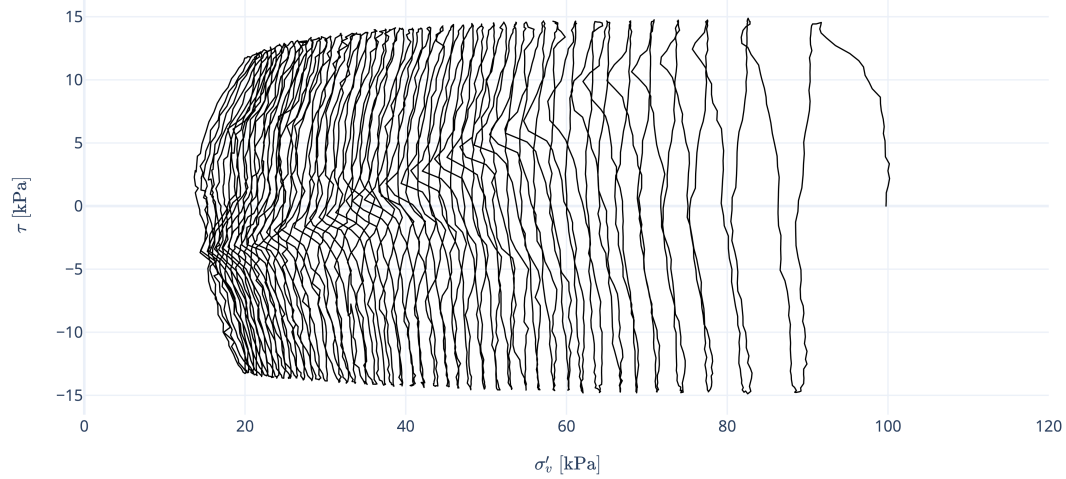
Claytectonics/-/Kaolin 4 - Gripper plates - 15kPa

Shearing phase



Claytectonics/-/Kaolin 4 - Gripper plates - 15kPa

Shearing phase – Continued



Claytectonics/-/Kaolin 4 - Gripper plates - 15kPa



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kaolin 5 -  
Normal plates - 10kPa - Cyclic

Sample type: Reconstituted

### Initial conditions

Sample height [mm]	19.65
Sample diameter [mm]	70.83
Initial water content [%]	48.2
Initial void ratio [-]	1.270
Initial saturation [%]	100.7
Bulk density [Mg/m <sup>3</sup> ]	1.73
Dry density [Mg/m <sup>3</sup> ]	1.17
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	1.911
Root-time method t <sub>95</sub> [s]	4720.4

### Shearing phase

Shear stress amplitude [kPa]	10
Average shear stress [kPa]	0

### Final conditions

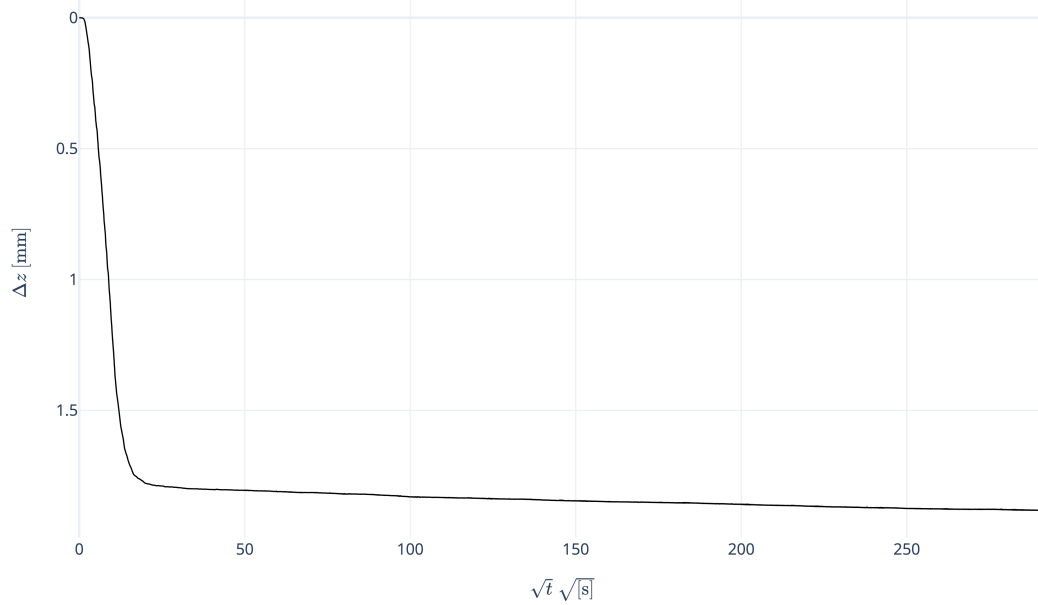
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

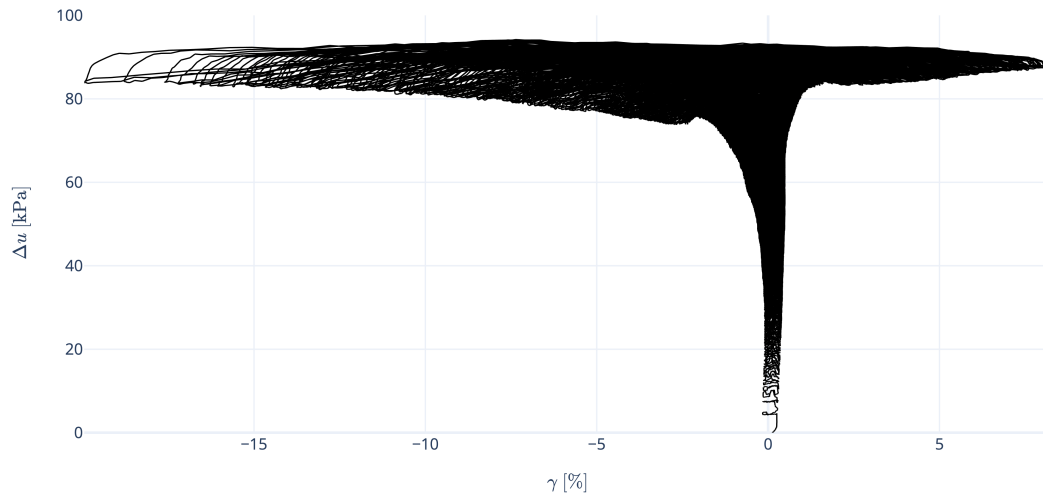
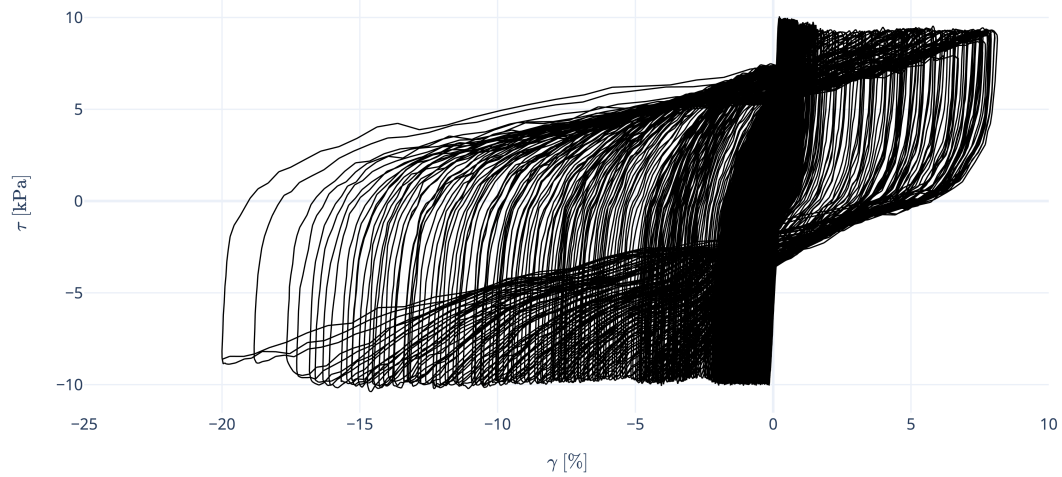
Checked by: MPA

Consolidation phase



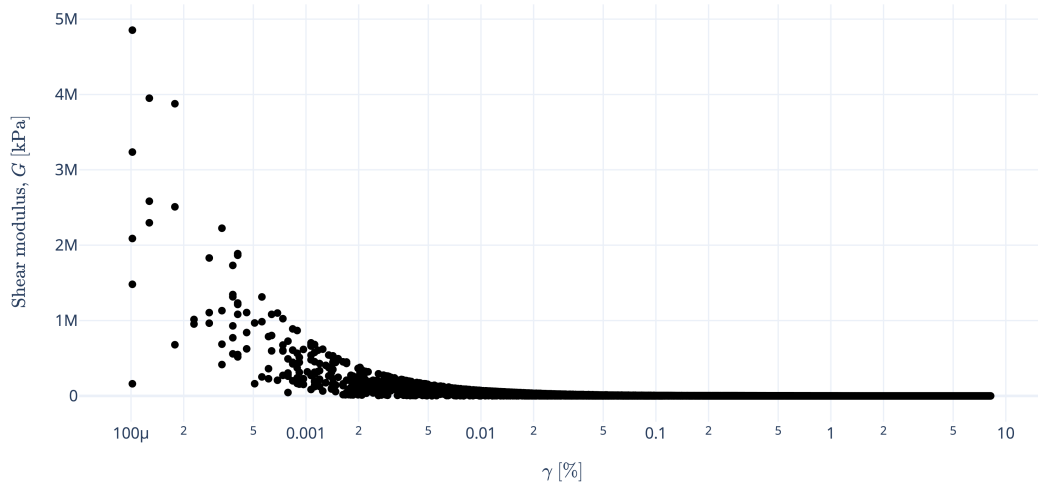
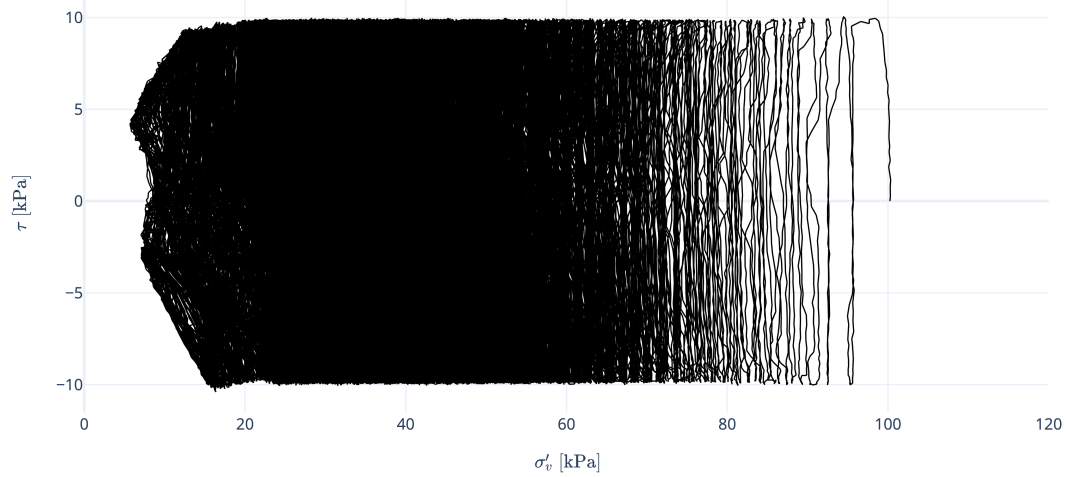
Claytectonics/-/Kaolin 5 - Normal plates - 10kPa

Shearing phase



Claytectonics/-/Kaolin 5 - Normal plates - 10kPa

Shearing phase – Continued



Claytectonics/-/Kaolin 5 - Normal plates - 10kPa



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kaolin 6 -  
Normal plates - 15kPa - Cyclic

Sample type: Reconstituted

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	48.4
Initial void ratio [-]	1.303
Initial saturation [%]	98.5
Bulk density [Mg/m <sup>3</sup> ]	1.71
Dry density [Mg/m <sup>3</sup> ]	1.15
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	1.782
Root-time method t <sub>95</sub> [s]	441.6

### Shearing phase

Shear stress amplitude [kPa]	15
Average shear stress [kPa]	0

### Final conditions

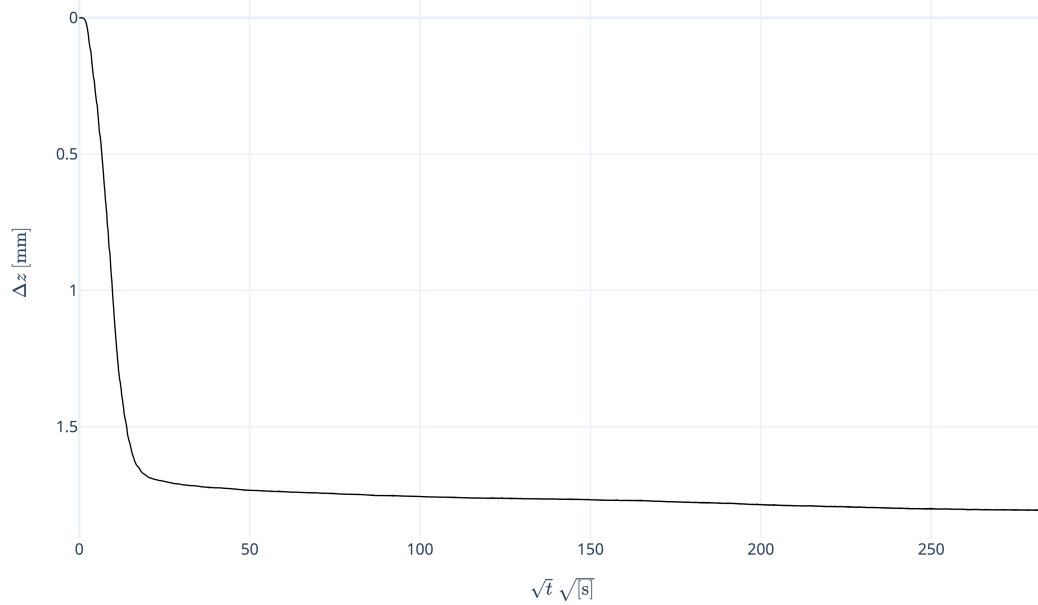
Final water content [%]	40.8
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Date: 24/03/2026

Created by: BST

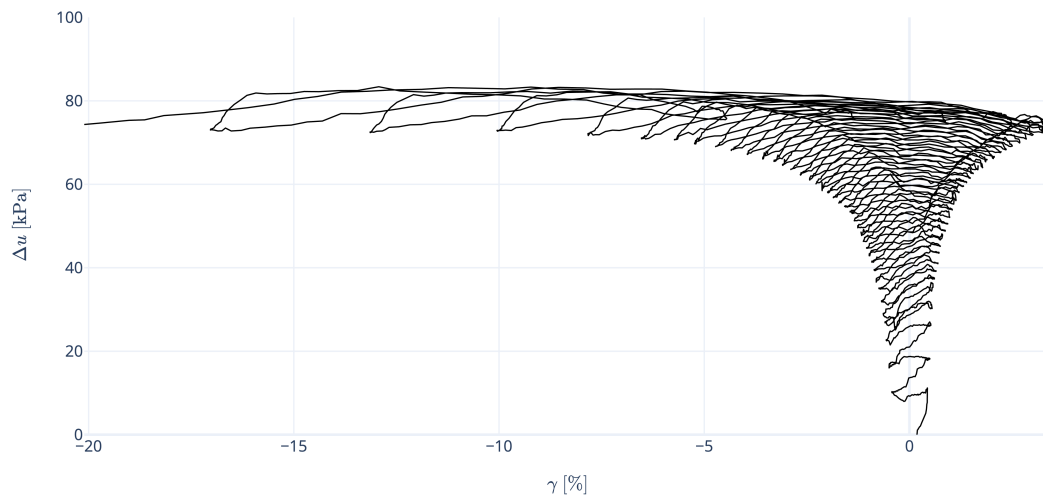
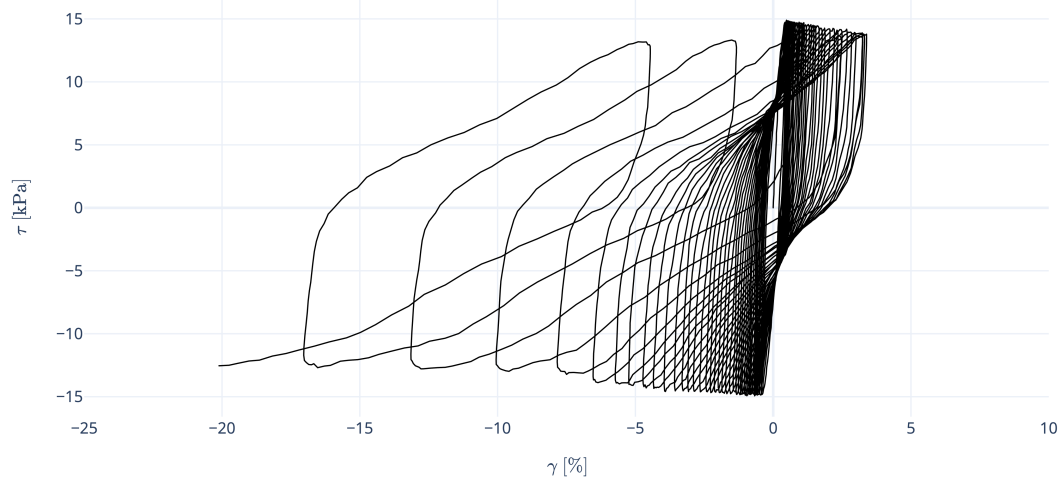
Checked by: MPA

Consolidation phase



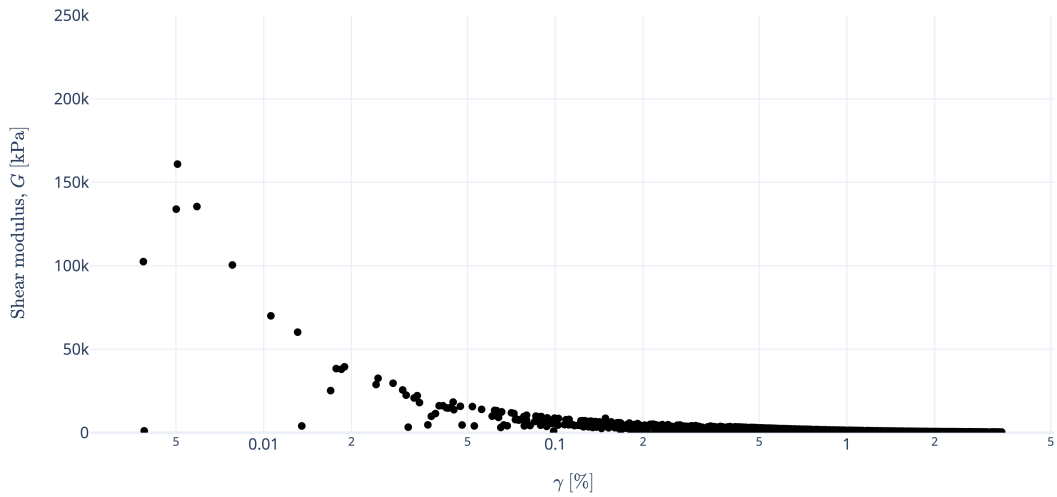
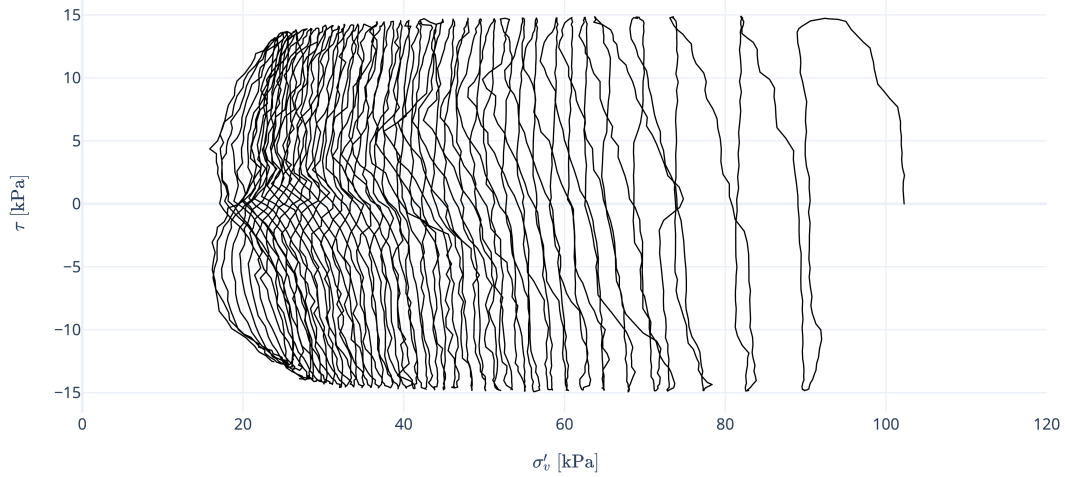
Claytectonics/-/Kaolin 6 - Normal plates - 15kPa

Shearing phase



Claytectonics/-/Kaolin 6 - Normal plates - 15kPa

Shearing phase – Continued



Claytectonics/-/Kaolin 6 - Normal plates - 15kPa



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kaolin 7 -  
Normal plates - Monotonic

Sample type: Reconstituted

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	50.2
Initial void ratio [-]	1.348
Initial saturation [%]	98.6
Bulk density [Mg/m <sup>3</sup> ]	1.69
Dry density [Mg/m <sup>3</sup> ]	1.13
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	2.289
Root-time method t <sub>95</sub> [s]	27310.0

### Shearing phase

Strain rate [%/s]	0.001
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### Final conditions

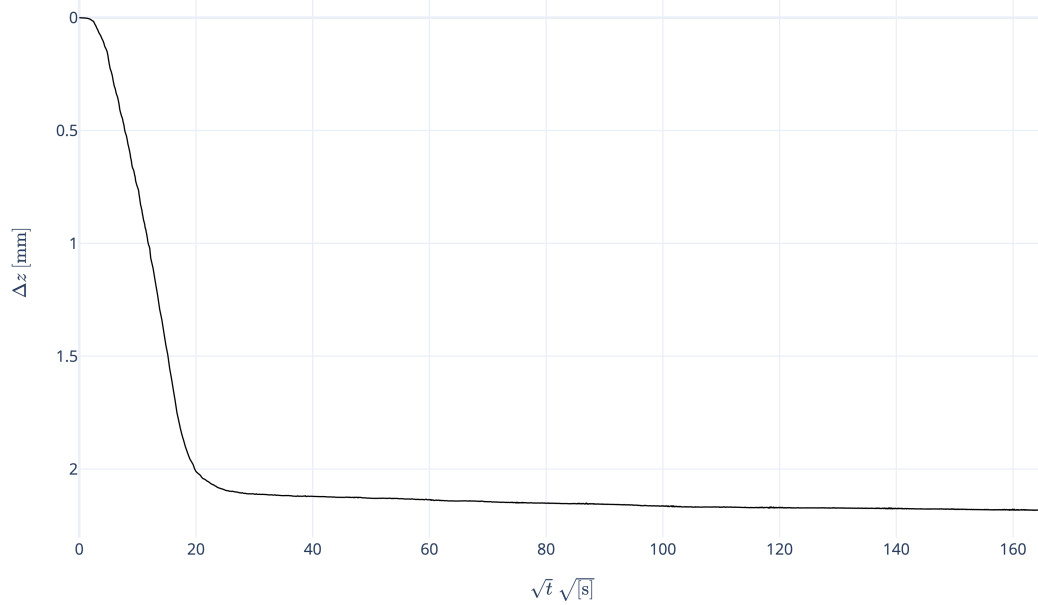
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

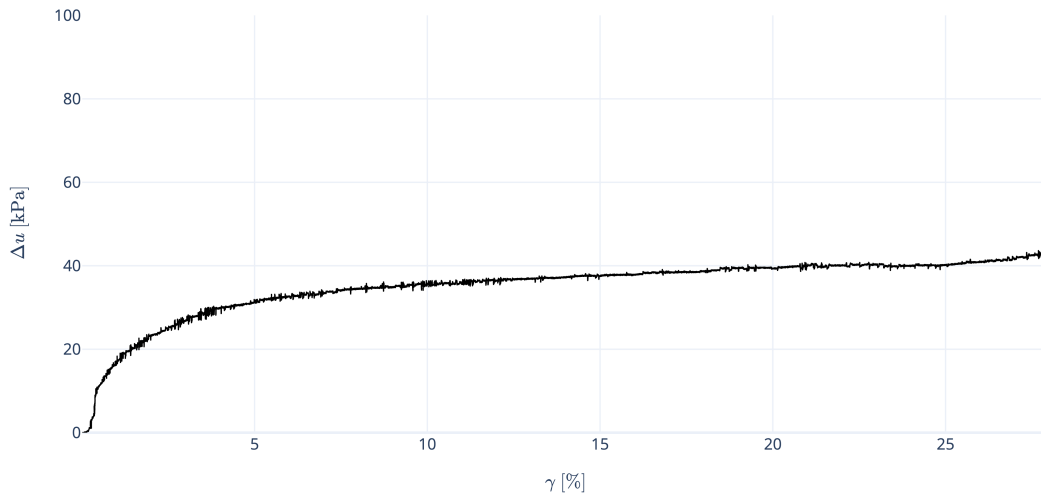
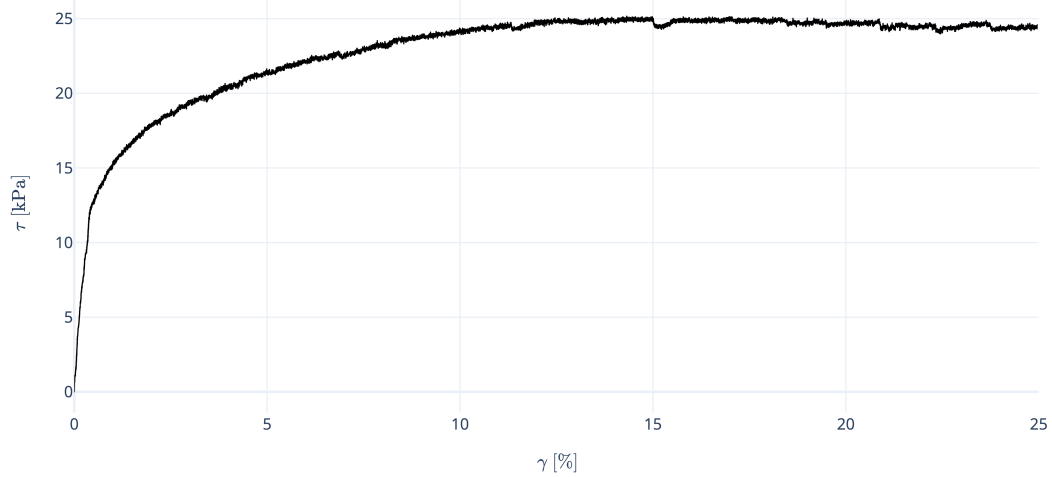
Checked by: MPA

Consolidation phase



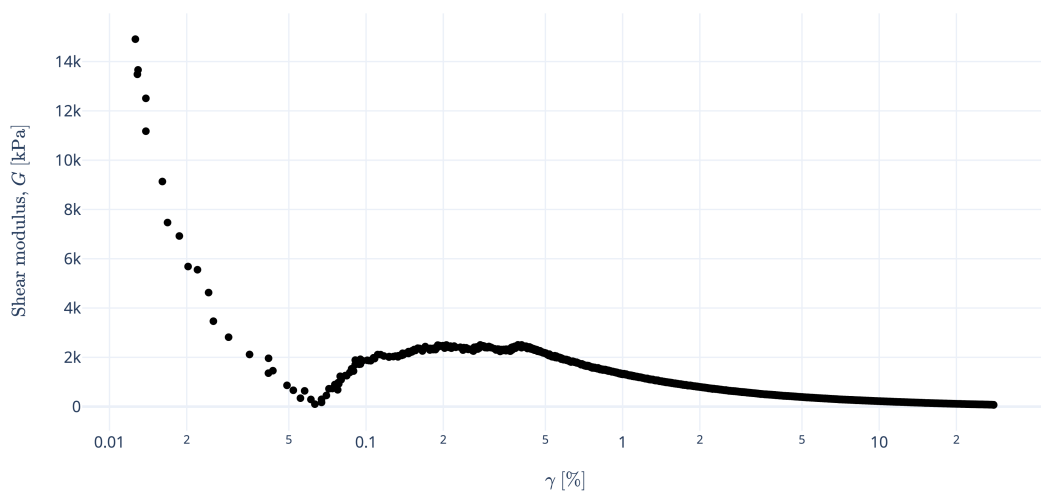
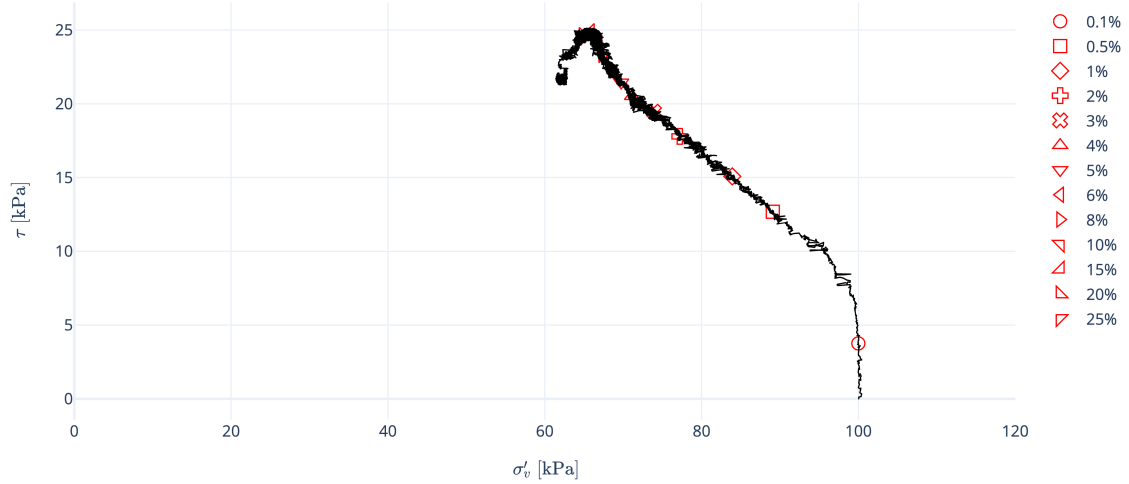
Claytectonics/-/Kaolin 7 - Normal plates - Monotonic

Shearing phase



Claytectonics/-/Kaolin 7 - Normal plates - Monotonic

Shearing phase – Continued



Claytectonics/-/Kaolin 7 - Normal plates - Monotonic



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kaolin 8 -  
Gripper plates - Monotonic

Sample type: Reconstituted

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	50.3
Initial void ratio [-]	1.352
Initial saturation [%]	98.5
Bulk density [Mg/m <sup>3</sup> ]	1.69
Dry density [Mg/m <sup>3</sup> ]	1.13
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	2.620
Root-time method t <sub>95</sub> [s]	811.9

### Shearing phase

Strain rate [%/s]	0.002
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### Final conditions

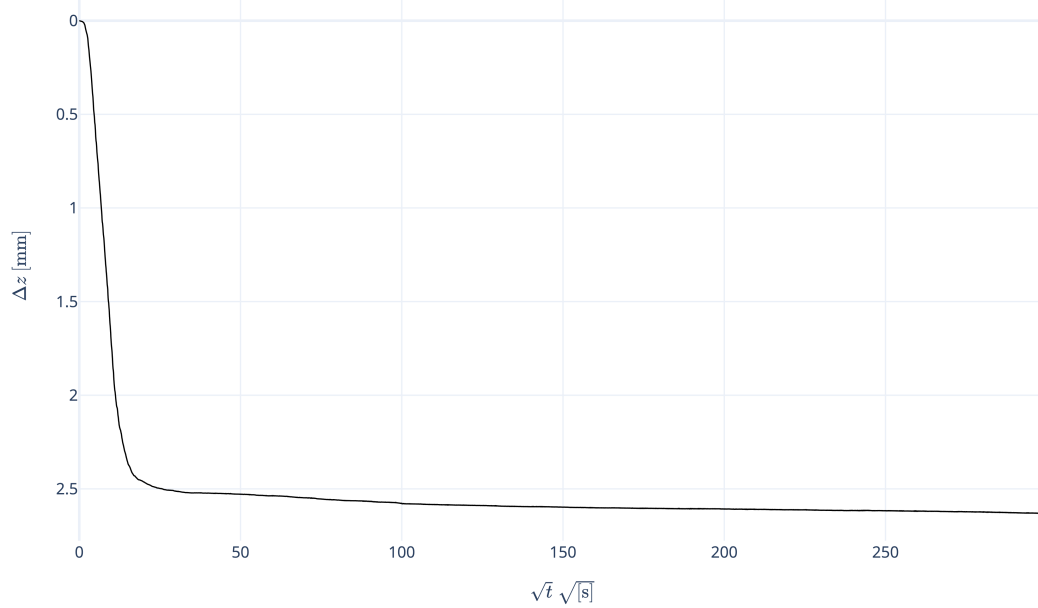
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

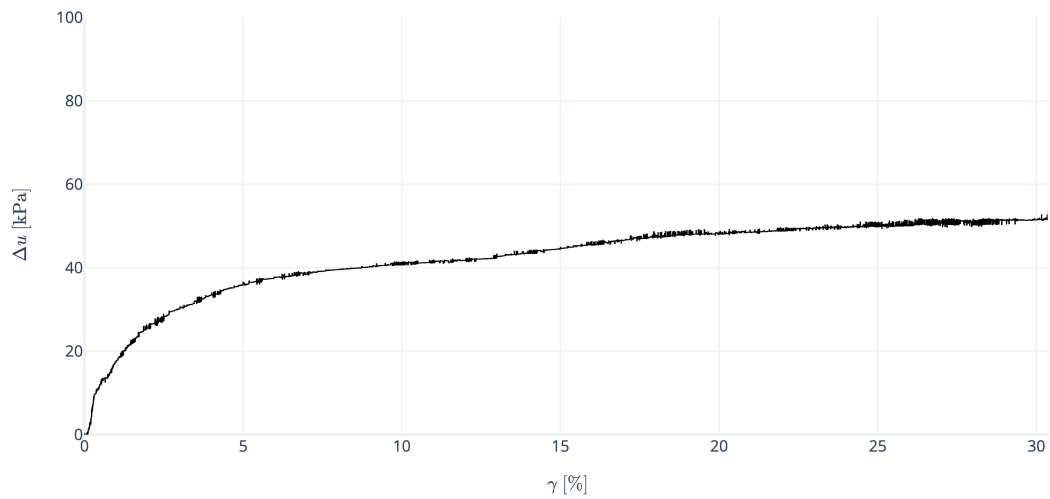
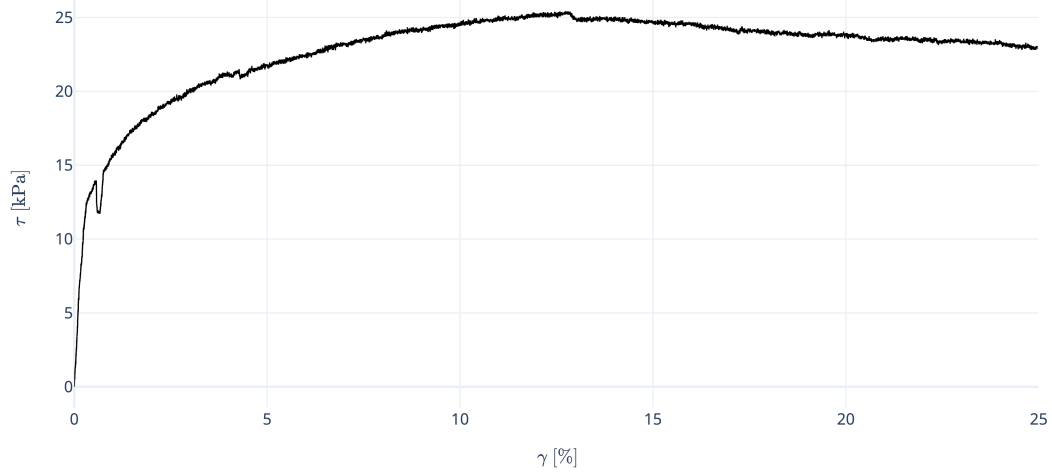
Checked by: MPA

Consolidation phase



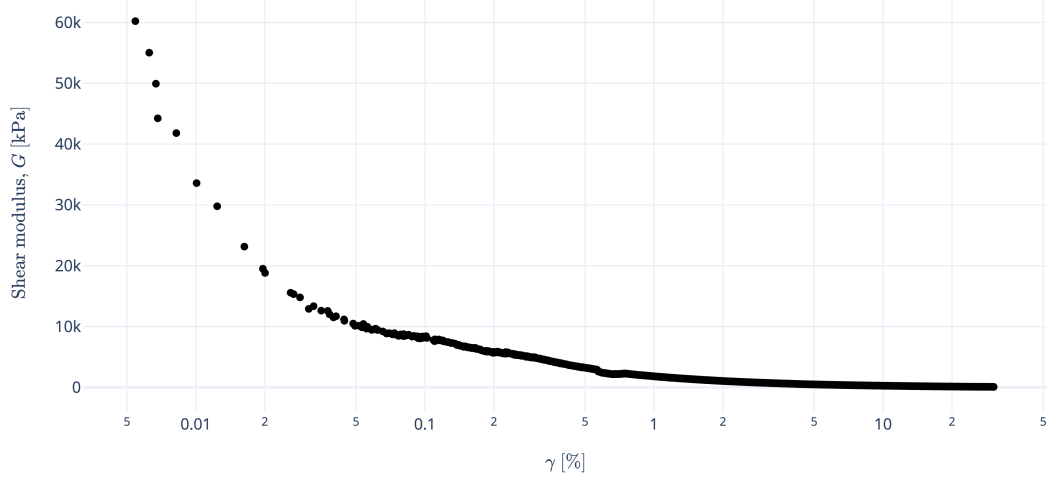
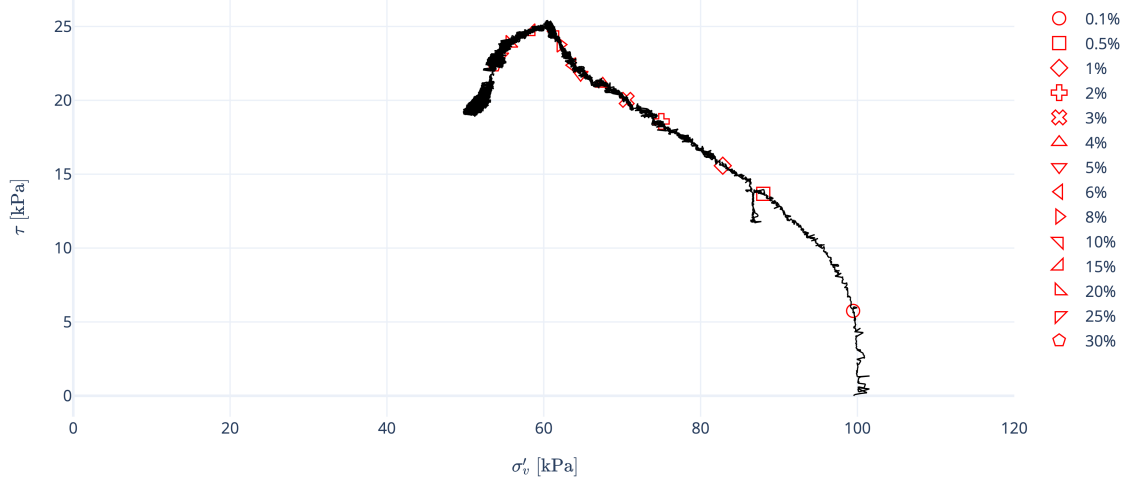
Claytectonics/-/Kaolin 8 - Gripper plates - Monotonic

Shearing phase



Claytectonics/-/Kaolin 8 - Gripper plates - Monotonic

Shearing phase – Continued



Claytectonics/-/Kaolin 8 - Gripper plates - Monotonic



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kortrijk 9 -  
Slurrified - Monotonic

Sample type: Reconstituted

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	40.1
Initial void ratio [-]	1.066
Initial saturation [%]	99.6
Bulk density [Mg/m <sup>3</sup> ]	1.80
Dry density [Mg/m <sup>3</sup> ]	1.28
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	1.696
Root-time method t <sub>95</sub> [s]	219.4

### Shearing phase

Strain rate [%/s]	0.002
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### Final conditions

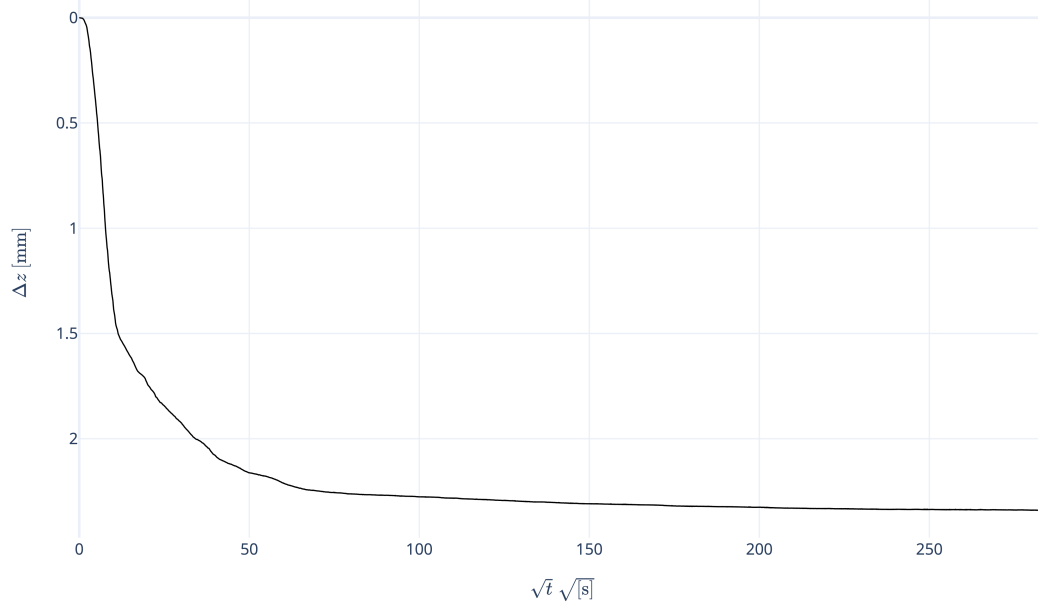
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

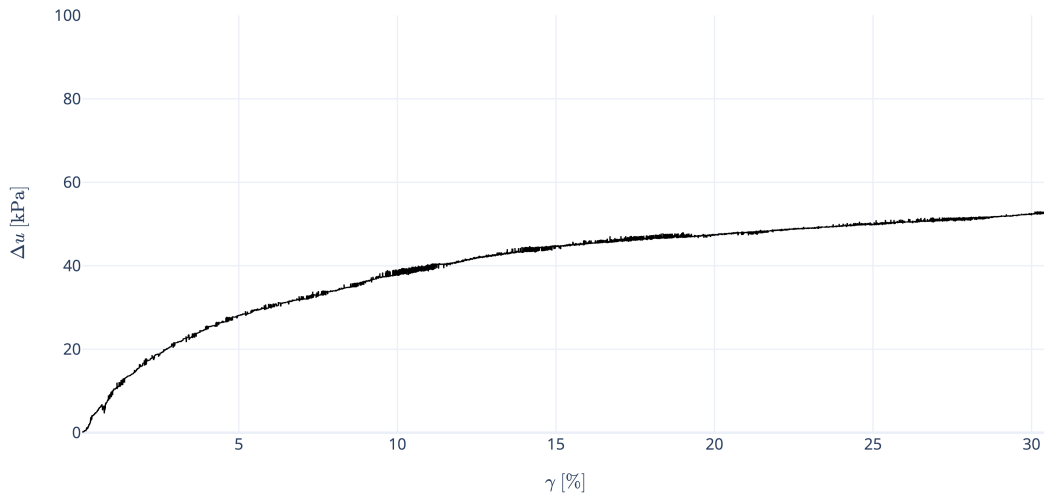
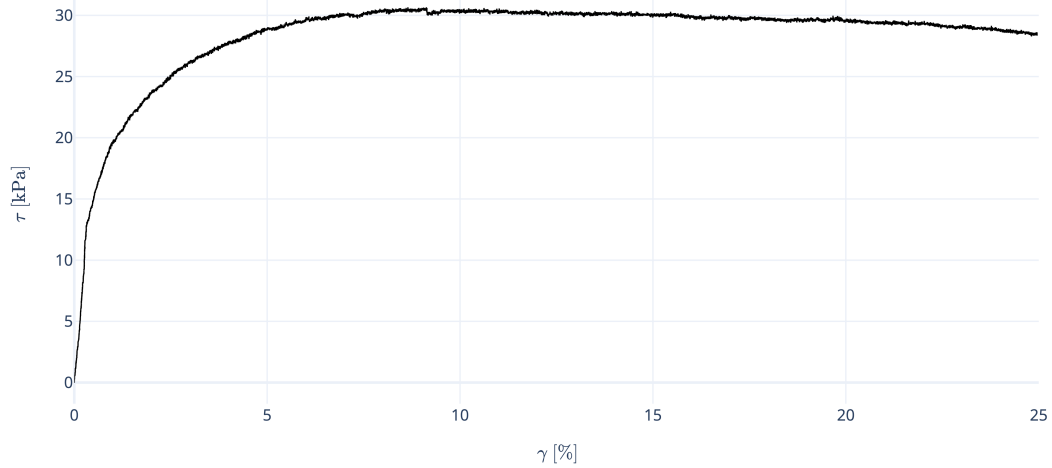
Checked by: MPA

Consolidation phase



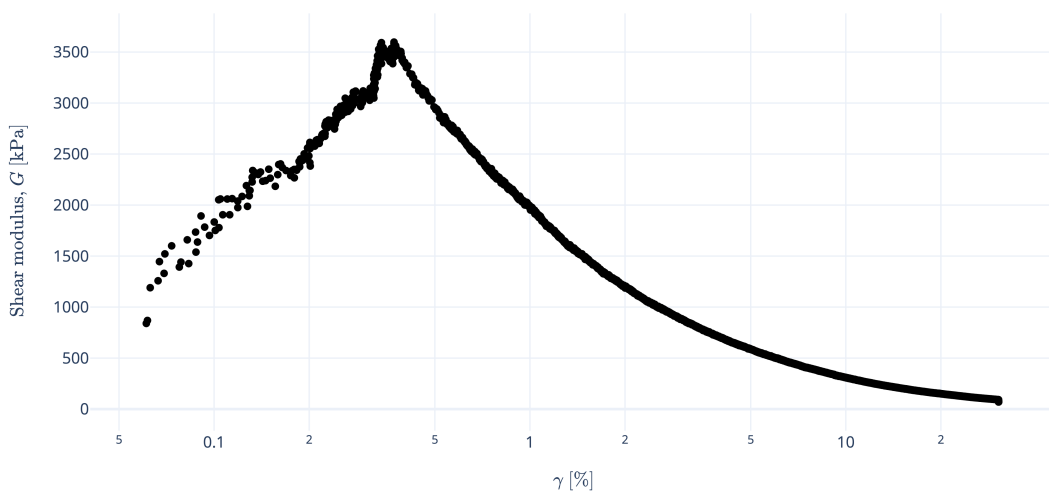
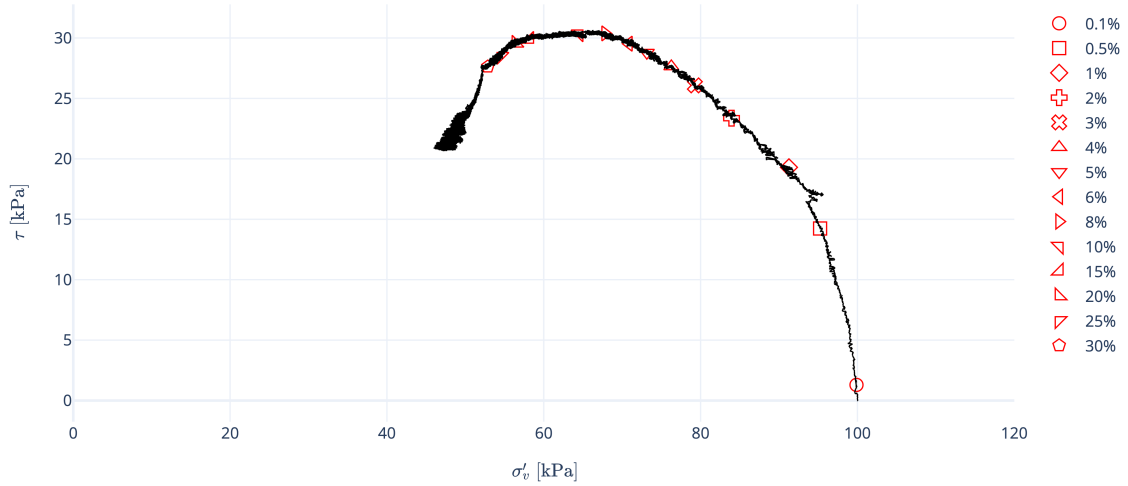
Claytectonics/-/Kortrijk 9 - Slurrified - Monotonic

Shearing phase



Claytectonics/-/Kortrijk 9 - Slurrified - Monotonic

Shearing phase – Continued



Claytectonics/-/Kortrijk 9 - Slurrified - Monotonic



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kortrijk 10  
- Undisturbed - Monotonic

Sample type: Intact

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	43.0
Initial void ratio [-]	1.140
Initial saturation [%]	99.9
Bulk density [Mg/m <sup>3</sup> ]	1.77
Dry density [Mg/m <sup>3</sup> ]	1.24
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	1.484
Root-time method t <sub>95</sub> [s]	966.9

### Shearing phase

Strain rate [%/s]	0.007
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### Final conditions

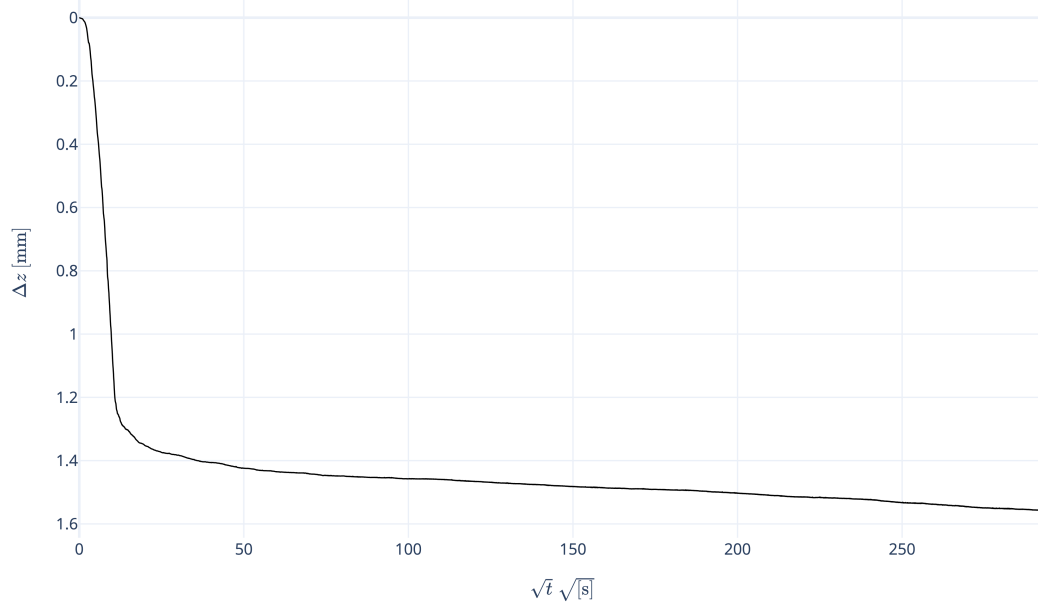
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

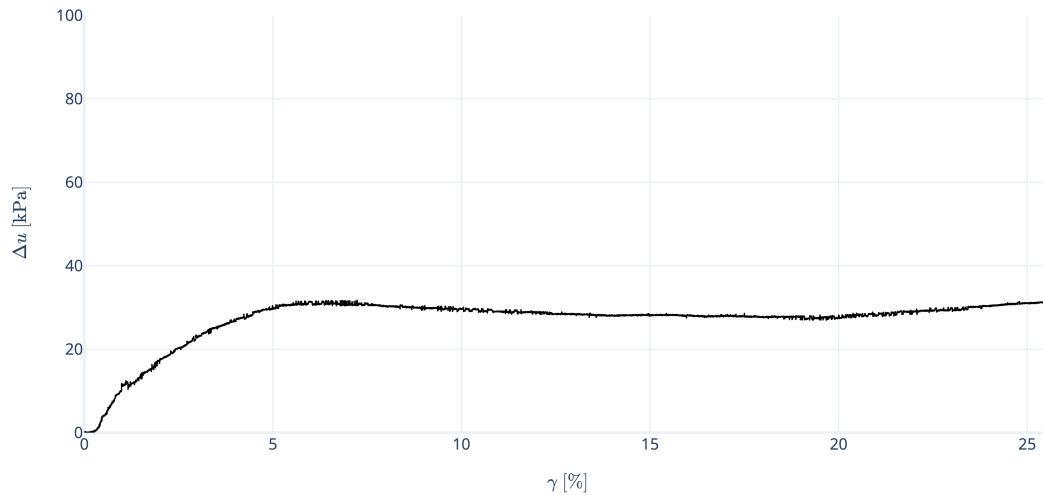
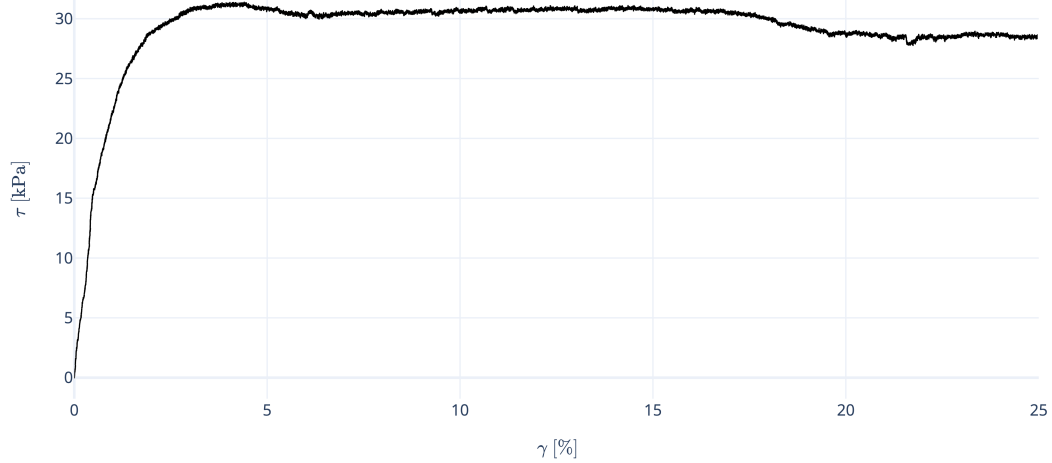
Checked by: MPA

Consolidation phase



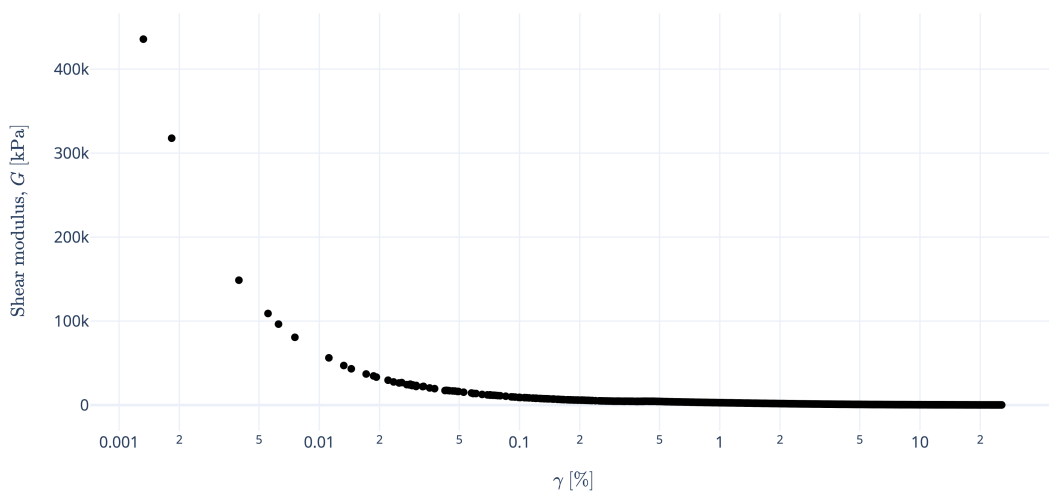
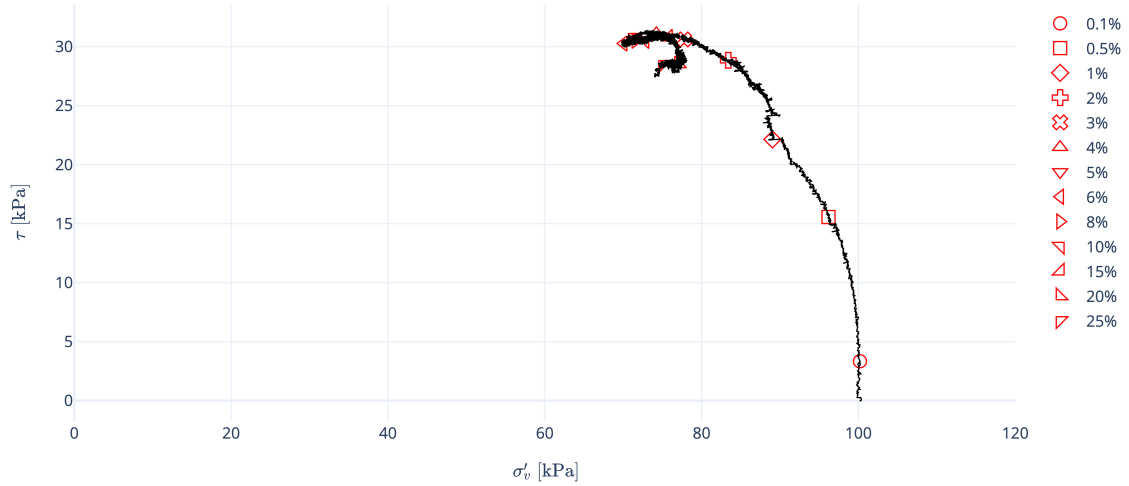
Claytectonics/-/Kortrijk 10 - Undisturbed - Monotonic

Shearing phase



Claytectonics/-/Kortrijk 10 - Undisturbed - Monotonic

Shearing phase – Continued



Claytectonics/-/Kortrijk 10 - Undisturbed - Monotonic



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kortrijk 11 -  
Undisturbed - Monotonic

Sample type: Intact

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	42.4
Initial void ratio [-]	1.116
Initial saturation [%]	100.7
Bulk density [Mg/m <sup>3</sup> ]	1.79
Dry density [Mg/m <sup>3</sup> ]	1.25
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	50
Consolidation settlement [mm]	0.958
Root-time method t <sub>95</sub> [s]	505.1

### Shearing phase

Strain rate [%/s]	0.001
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### Final conditions

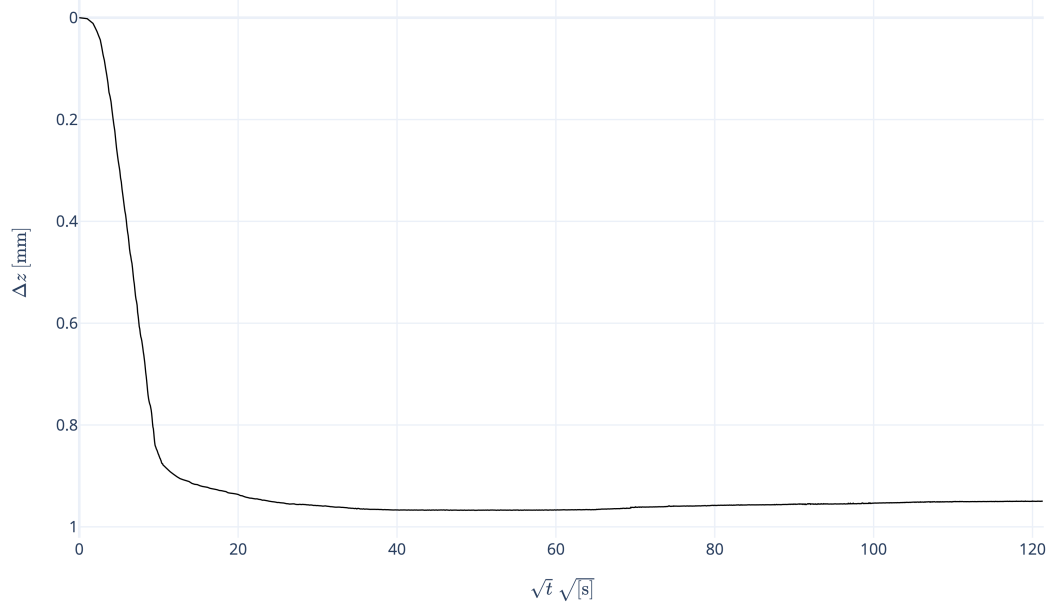
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

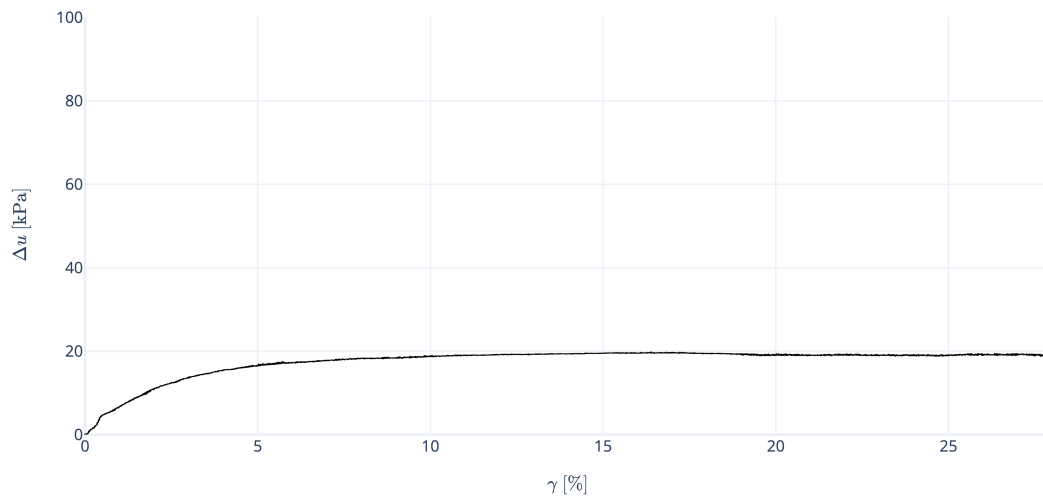
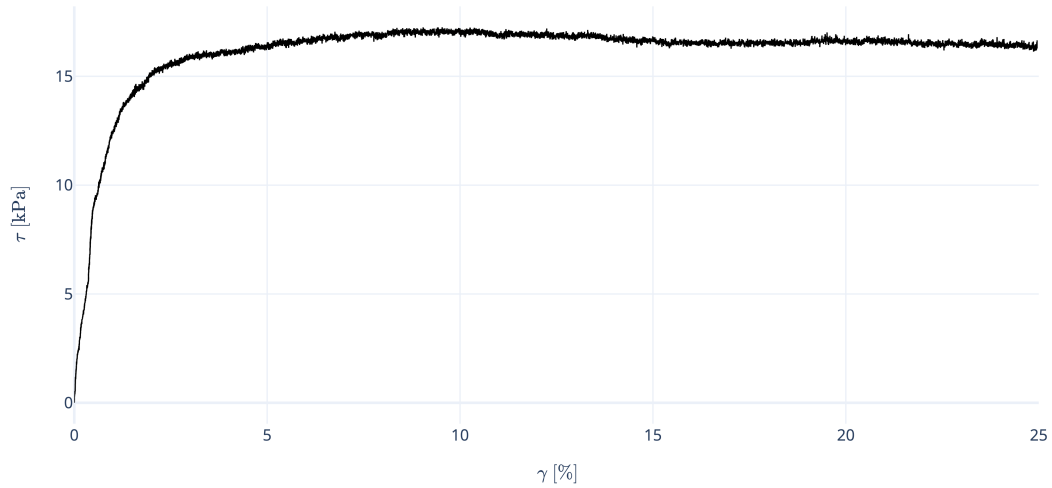
Checked by: MPA

Consolidation phase



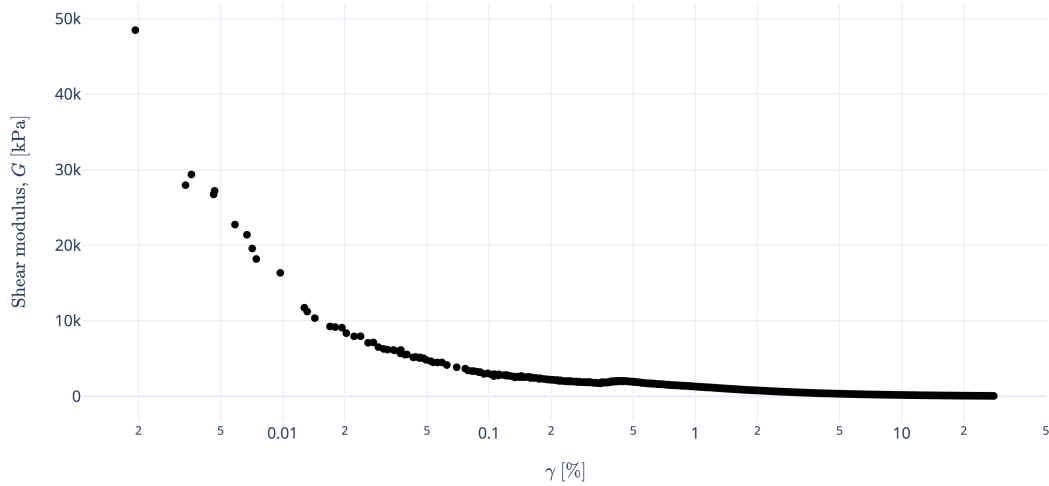
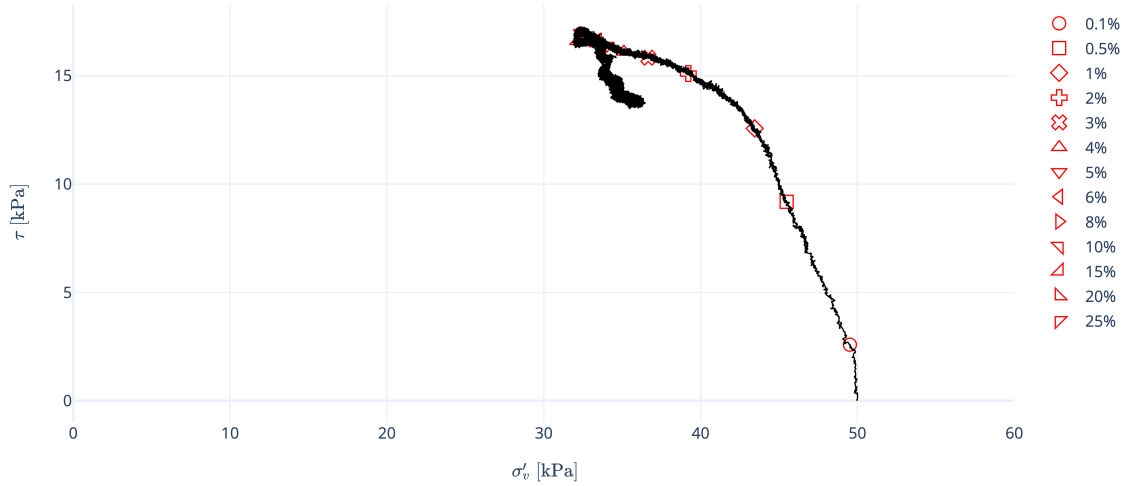
Claytectonics/-/Kortrijk 11 - Undisturbed - Monotonic

Shearing phase



Claytectonics/-/Kortrijk 11 - Undisturbed - Monotonic

Shearing phase – Continued



Claytectonics/-/Kortrijk 11 - Undisturbed - Monotonic



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kortrijk 12  
- Undisturbed vertical- Monotonic

Sample type: Intact

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	43.0
Initial void ratio [-]	1.140
Initial saturation [%]	99.9
Bulk density [Mg/m <sup>3</sup> ]	1.77
Dry density [Mg/m <sup>3</sup> ]	1.24
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	50
Consolidation settlement [mm]	0.696
Root-time method $t_{95}$ [s]	293.3

### Shearing phase

Strain rate [%/s]	0.002
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### Final conditions

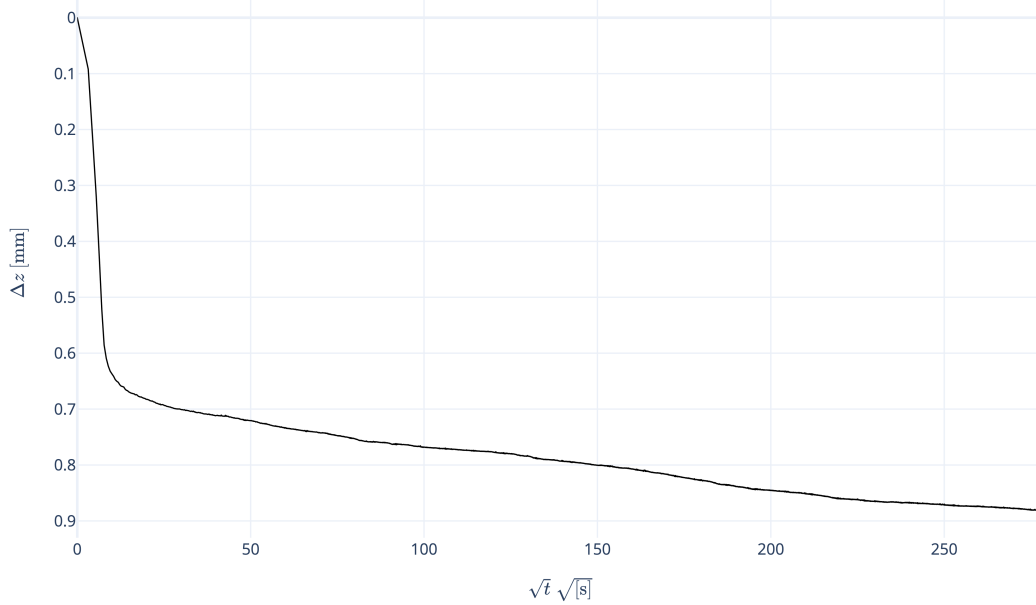
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

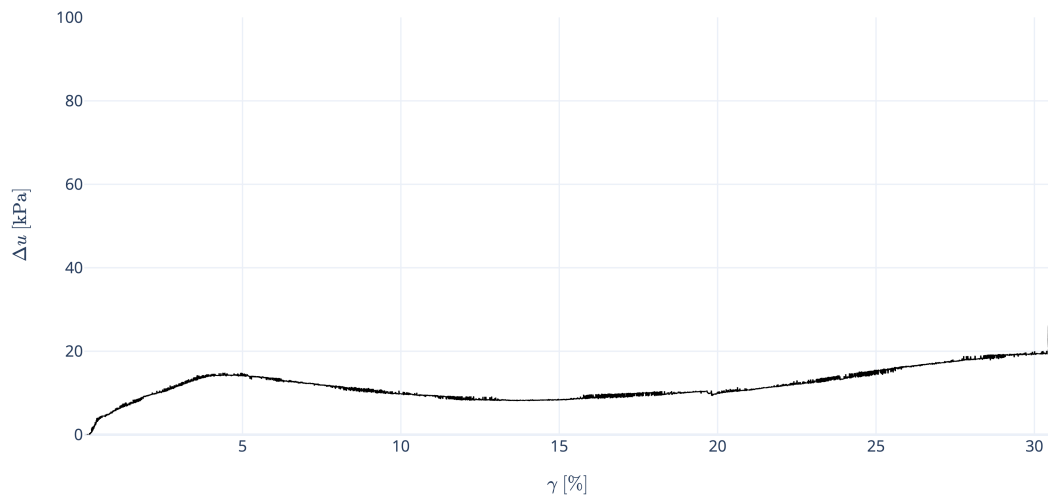
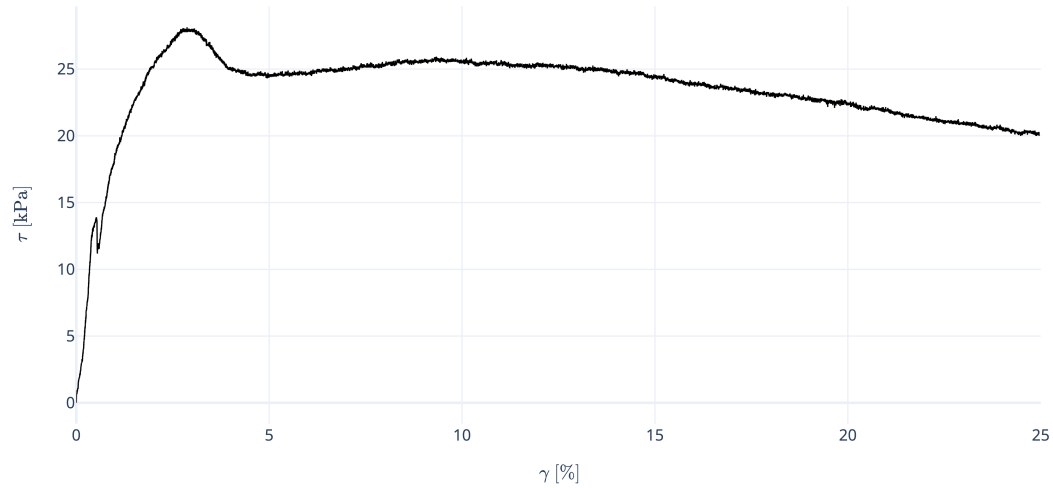
Checked by: MPA

Consolidation phase



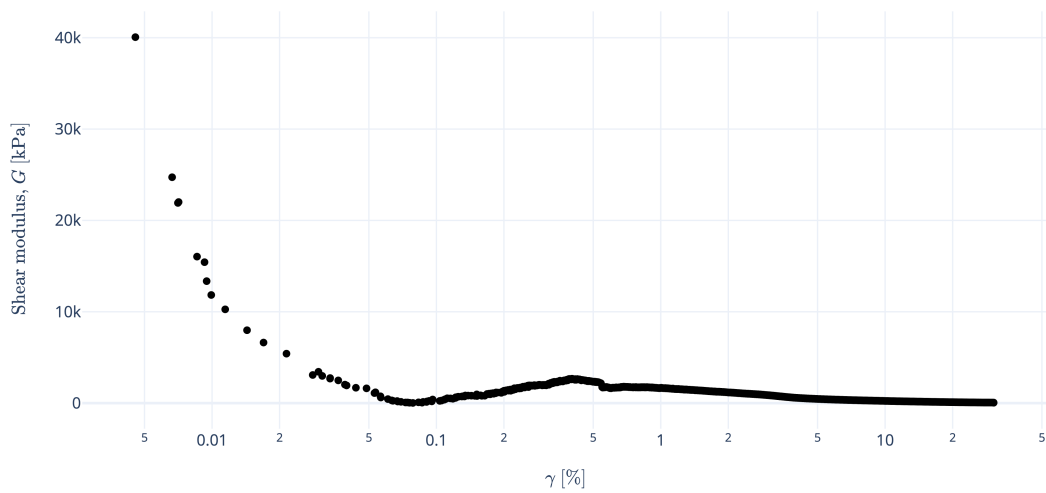
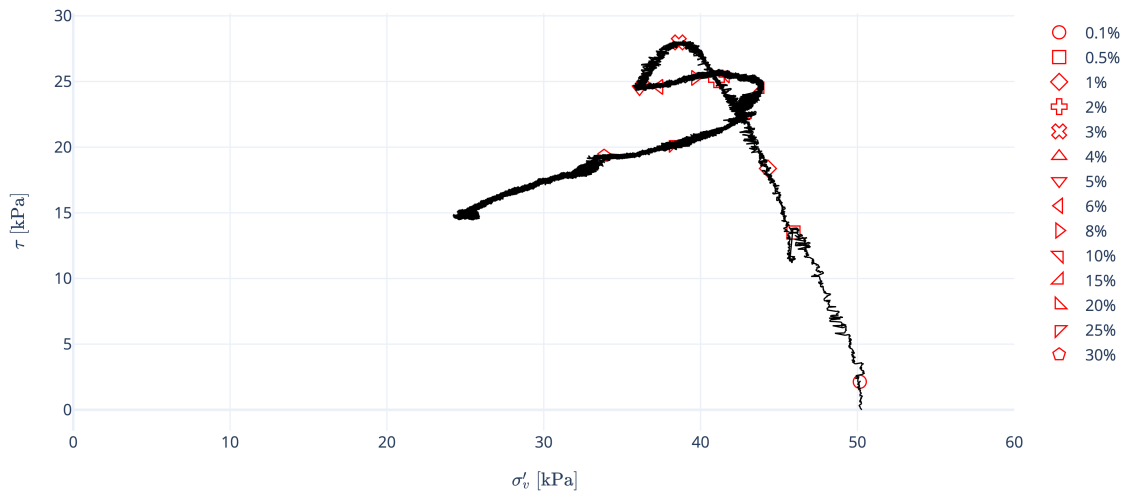
Claytectonics/-/Kortrijk 12 - Undisturbed vertical- Monotonic

Shearing phase



Claytectonics/-/Kortrijk 12 - Undisturbed vertical- Monotonic

Shearing phase – Continued



Claytectonics/-/Kortrijk 12 - Undisturbed vertical- Monotonic



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kortrijk 13  
- Undisturbed vertical- Monotonic

Sample type: Intact

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	41.8
Initial void ratio [-]	1.104
Initial saturation [%]	100.2
Bulk density [Mg/m <sup>3</sup> ]	1.79
Dry density [Mg/m <sup>3</sup> ]	1.26
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	100
Consolidation settlement [mm]	0.312
Root-time method t <sub>95</sub> [s]	109.0

### Shearing phase

Strain rate [%/s]	0.009
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### Final conditions

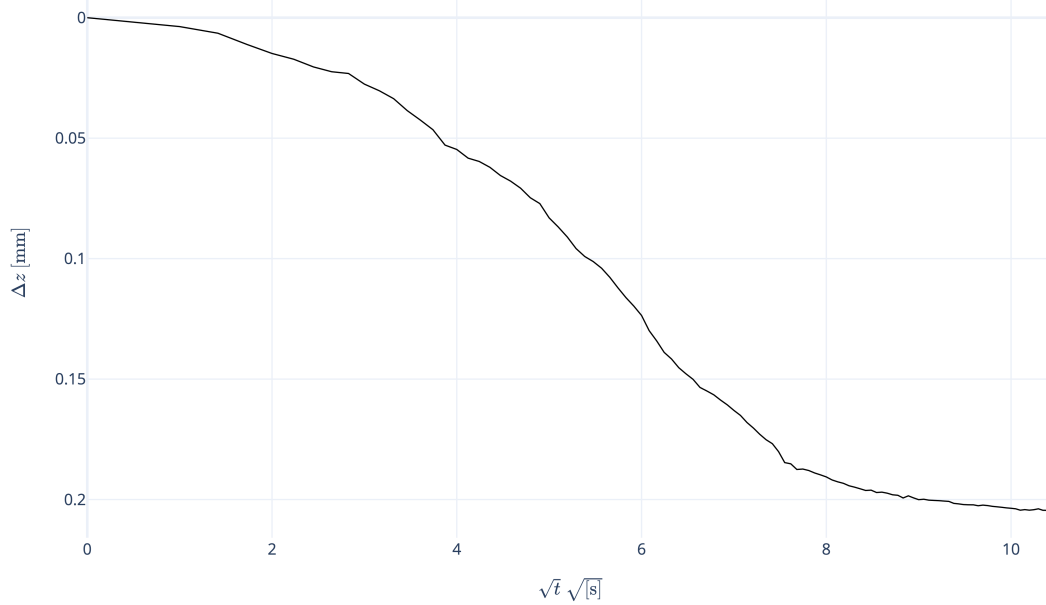
Final water content [%]	-
-------------------------	---

Date: 24/03/2026

Created by: BST

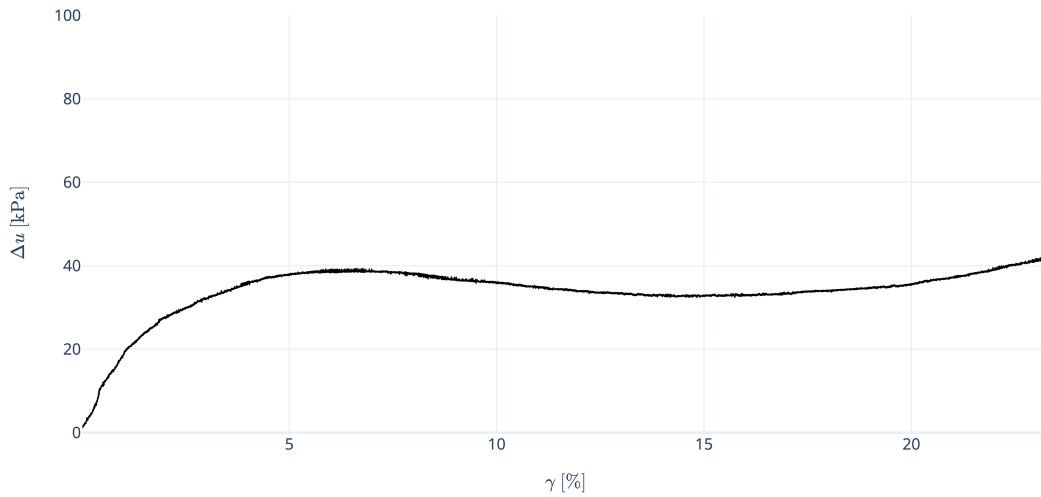
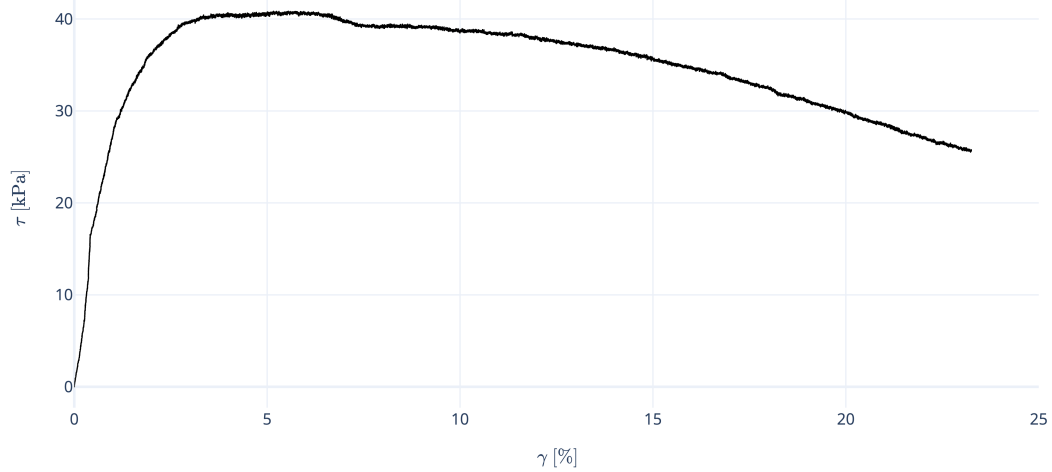
Checked by: MPA

Consolidation phase



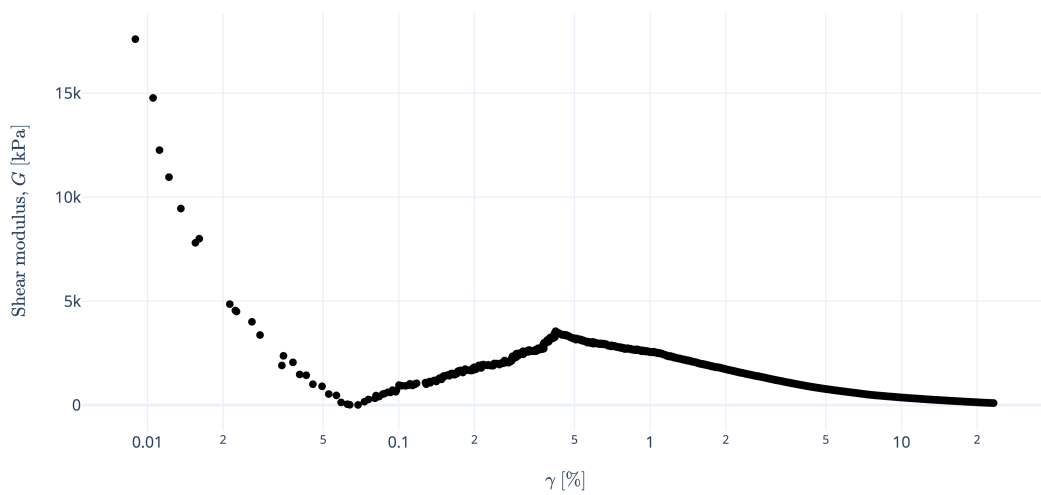
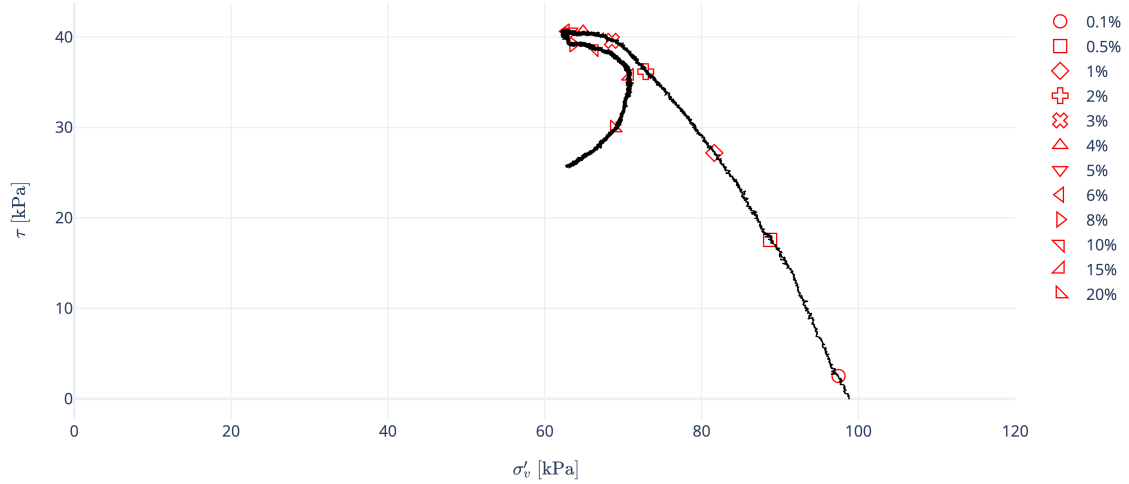
Claytectonics/-/Kortrijk 13 - Undisturbed vertical- Monotonic

Shearing phase



Claytectonics/-/Kortrijk 13 - Undisturbed vertical- Monotonic

## Shearing phase – Continued



Claytectonics/-/Kortrijk 13 - Undisturbed vertical- Monotonic



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kortrijk 14  
- Undisturbed - Monotonic

Sample type: Intact

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	31.8
Initial void ratio [-]	0.838
Initial saturation [%]	100.4
Bulk density [Mg/m <sup>3</sup> ]	1.90
Dry density [Mg/m <sup>3</sup> ]	1.44
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	150
Consolidation settlement [mm]	1.871
Root-time method $t_{95}$ [s]	1567.1

### Shearing phase

Strain rate [%/s]	0.004
-------------------	-------

### Final conditions

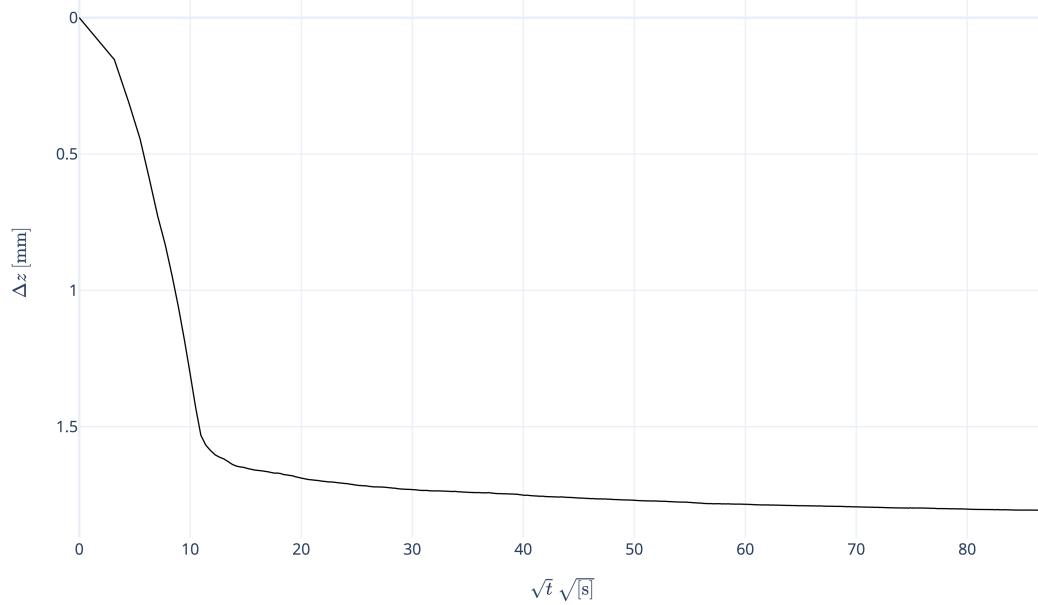
Final water content [%]	-
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Date: 24/03/2026

Created by: BST

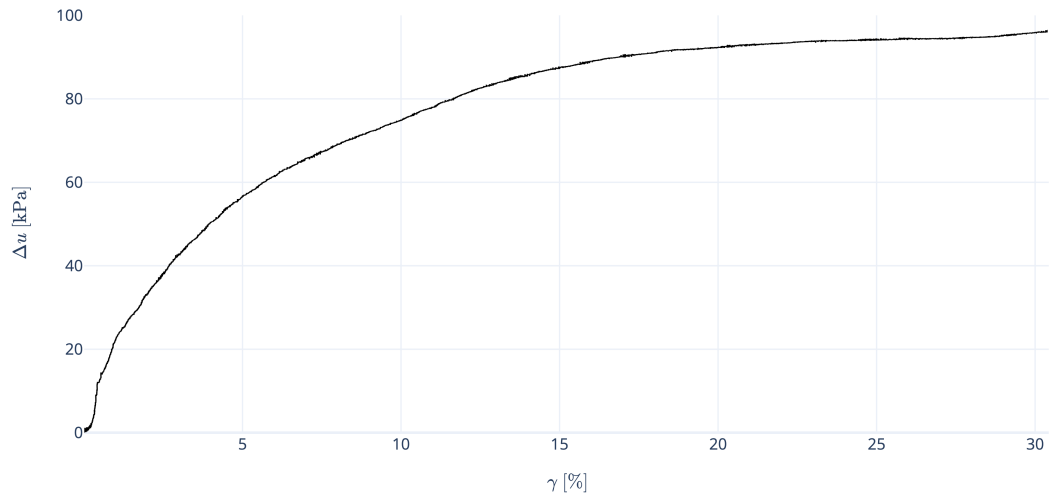
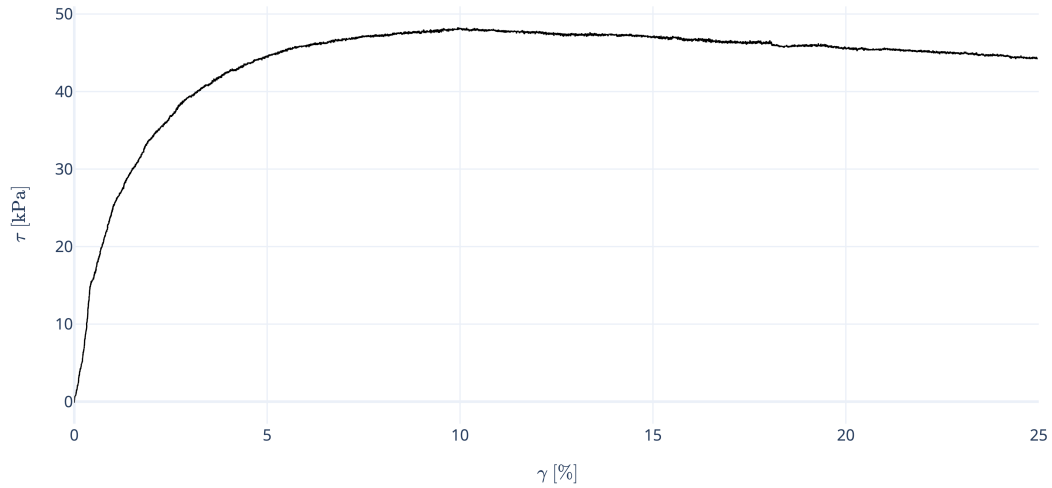
Checked by: MPA

Consolidation phase



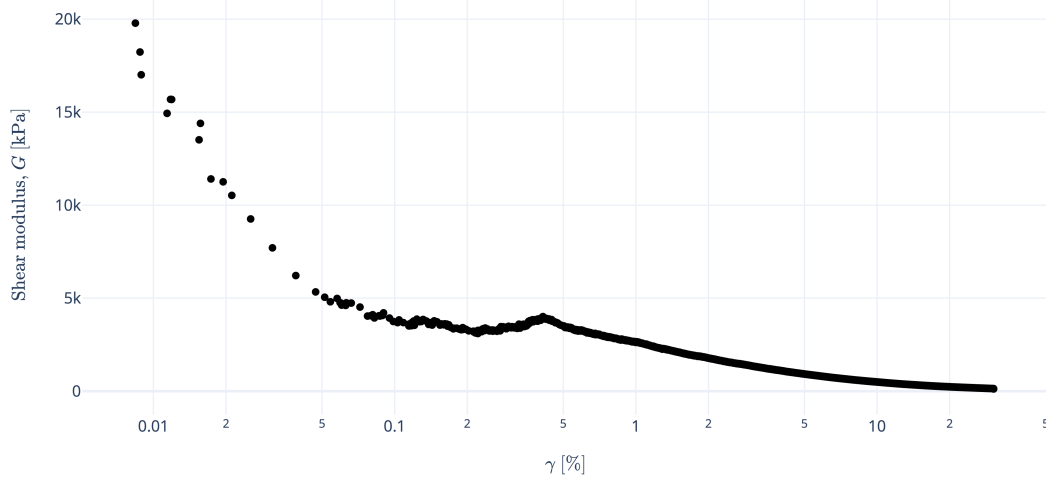
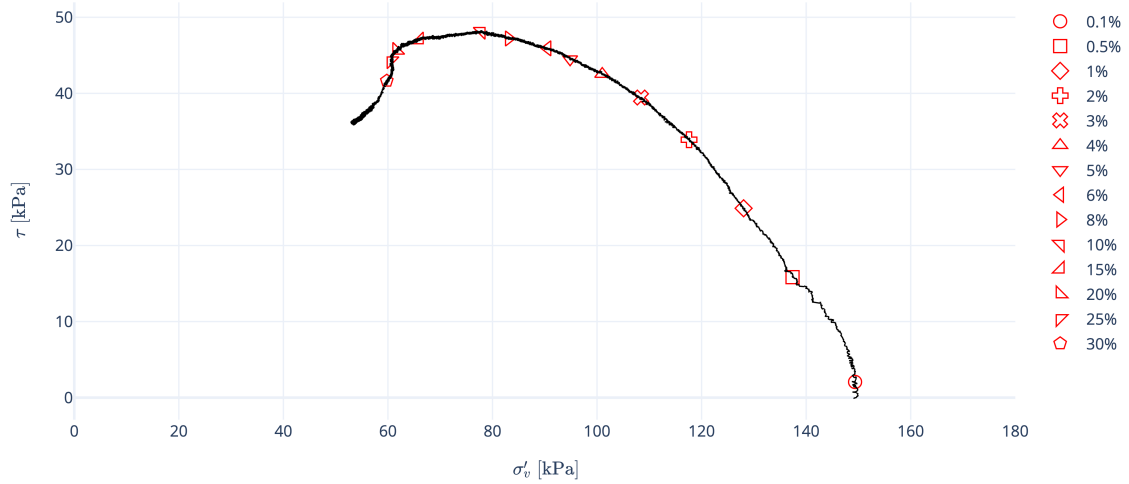
Claytectonics/-/Kortrijk 14 - Undisturbed - Monotonic

Shearing phase



Claytectonics/-/Kortrijk 14 - Undisturbed - Monotonic

## Shearing phase – Continued



Claytectonics/-/Kortrijk 14 - Undisturbed - Monotonic



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kortrijk 15  
- Undisturbed vertical -  
Monotonic

Sample type: Intact

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	44.0
Initial void ratio [-]	1.171
Initial saturation [%]	99.6
Bulk density [Mg/m <sup>3</sup> ]	1.76
Dry density [Mg/m <sup>3</sup> ]	1.22
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	150
Consolidation settlement [mm]	1.949
Root-time method $t_{95}$ [s]	2977.0

### Shearing phase

Strain rate [%/s]	0.003
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### Final conditions

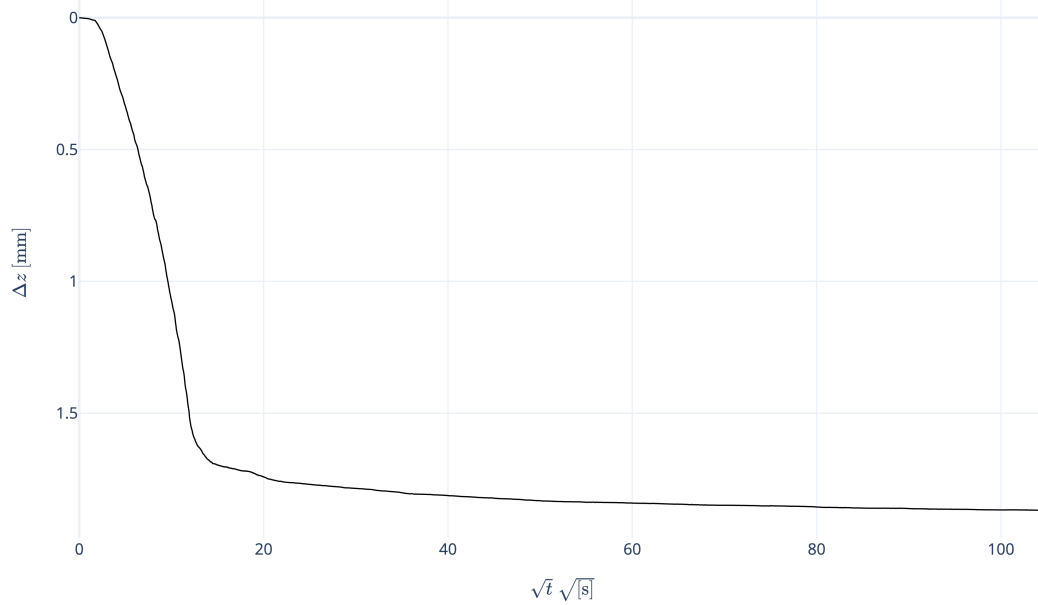
Final water content [%]	-
-------------------------	---

Date: 24/03/2026

Created by: BST

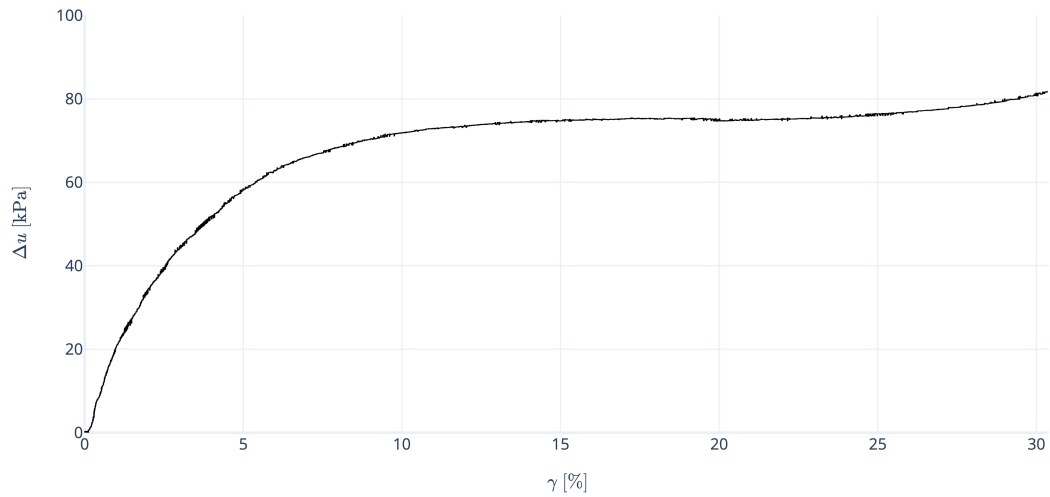
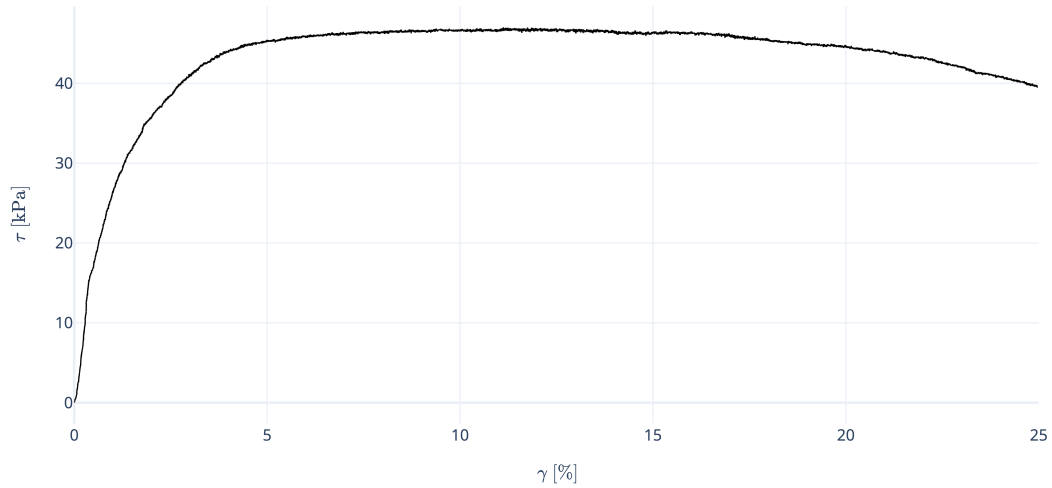
Checked by: MPA

Consolidation phase



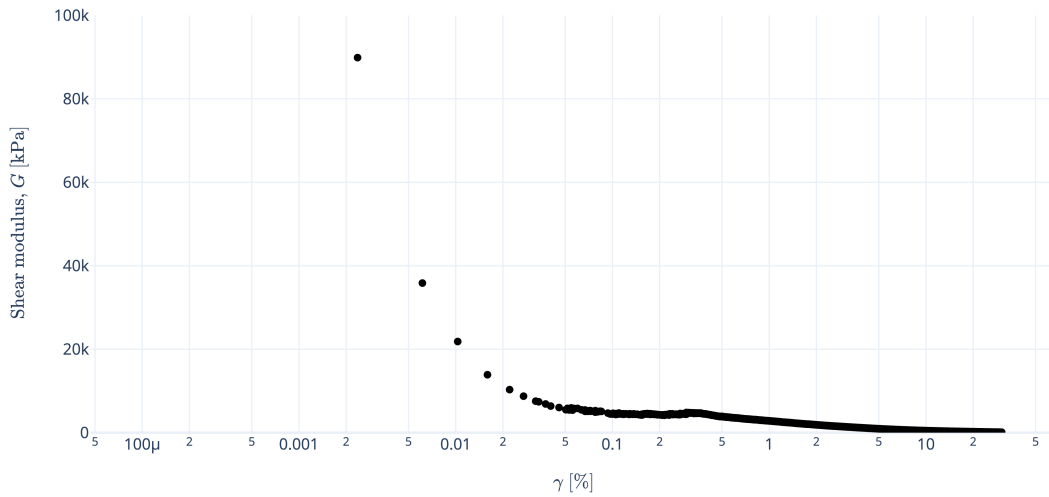
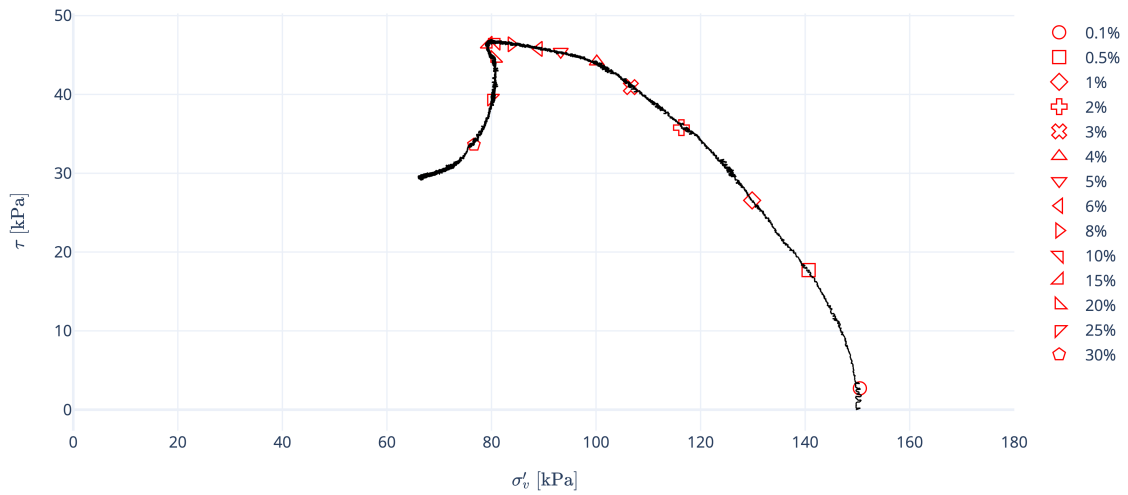
Claytectonics/-/Kortrijk 15 - Undisturbed vertical - Monotonic

Shearing phase



Claytectonics/-/Kortrijk 15 - Undisturbed vertical - Monotonic

Shearing phase – Continued



Claytectonics/-/Kortrijk 15 - Undisturbed vertical - Monotonic



## DSS test according to ASTM D6528-17

Test ID: Claytectonics/-/Kortrijk 16  
- Slurrified - Monotonic

Sample type: Remoulded

### Initial conditions

Sample height [mm]	19.66
Sample diameter [mm]	70.75
Initial water content [%]	61.6
Initial void ratio [-]	1.630
Initial saturation [%]	100.2
Bulk density [Mg/m <sup>3</sup> ]	1.63
Dry density [Mg/m <sup>3</sup> ]	1.01
Specific gravity [-]	2.65

### Consolidation phase

Consolidation stress [kPa]	50
Consolidation settlement [mm]	0.975
Root-time method t <sub>95</sub> [s]	113.5

### Shearing phase

Strain rate [%/s]	0.001
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### Final conditions

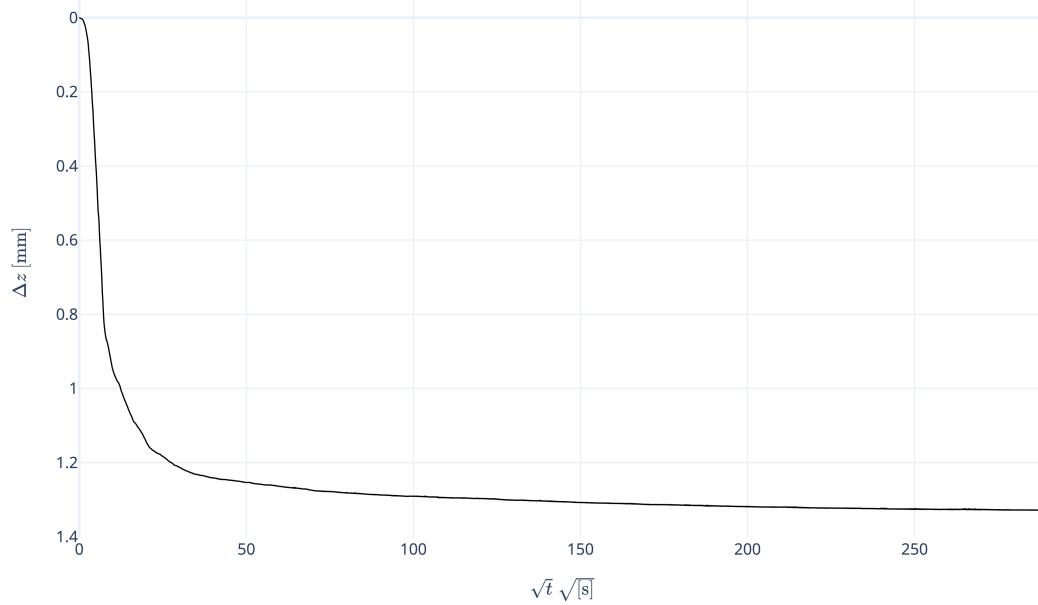
Final water content [%]	-
-------------------------	---

Date: 24/03/2026

Created by: BST

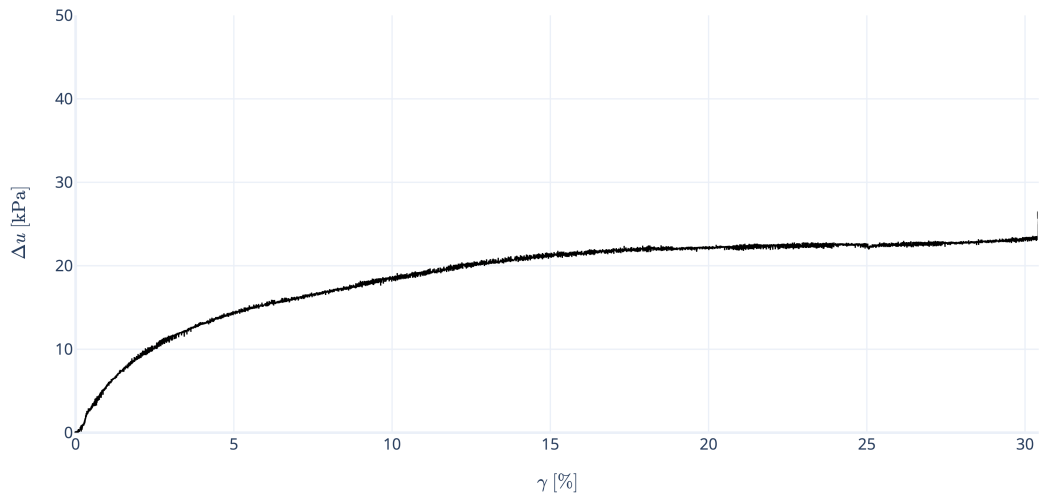
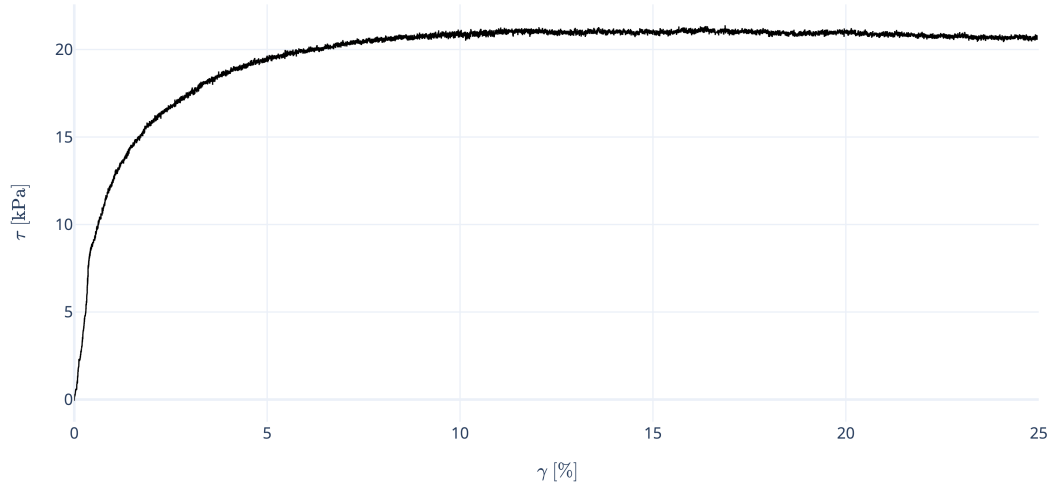
Checked by: MPA

Consolidation phase



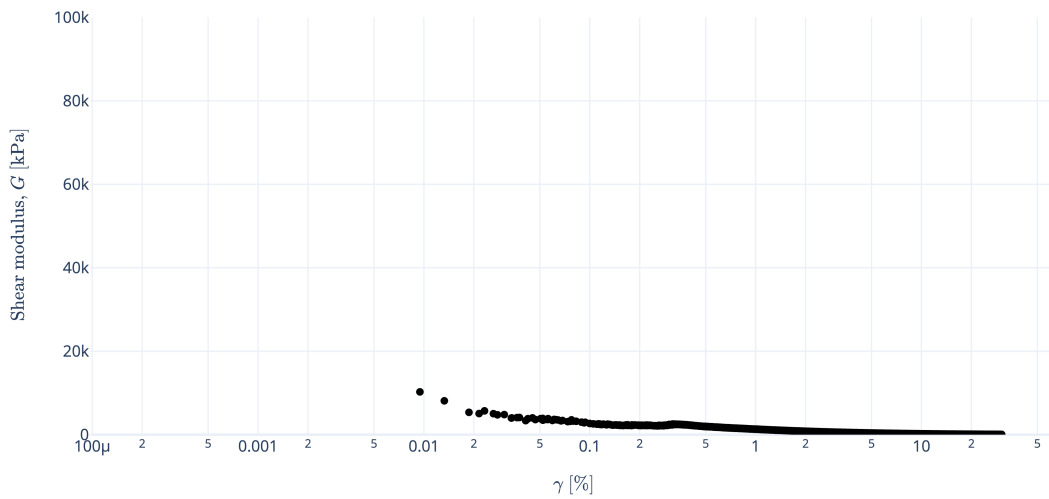
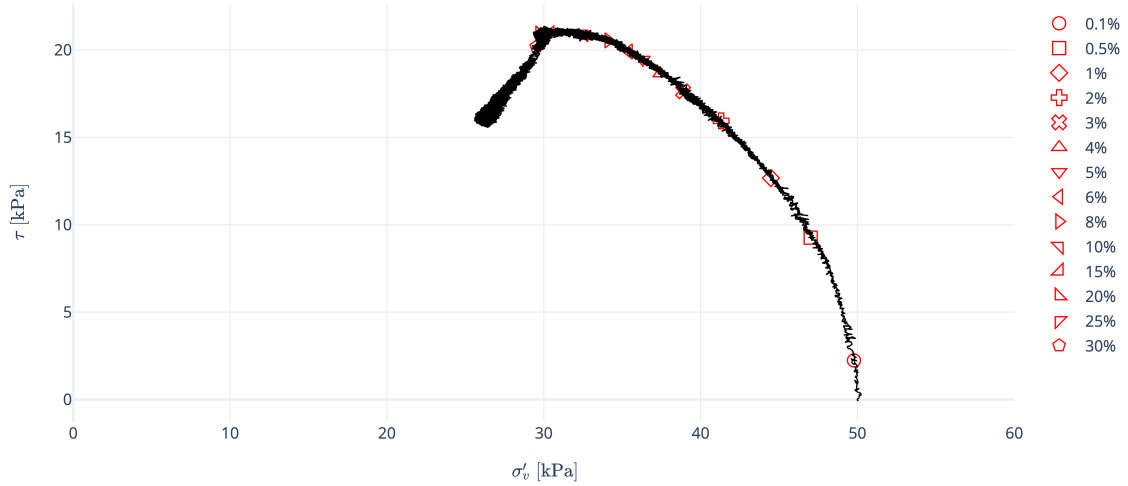
Claytectonics/-/Kortrijk 16 - Slurrified - Monotonic

Shearing phase



Claytectonics/-/Kortrijk 16 - Slurrified - Monotonic

Shearing phase – Continued



Claytectonics/-/Kortrijk 16 - Slurrified - Monotonic

# APPENDIX K – CRS TEST RESULTS



## CRS test according to ASTM D4186

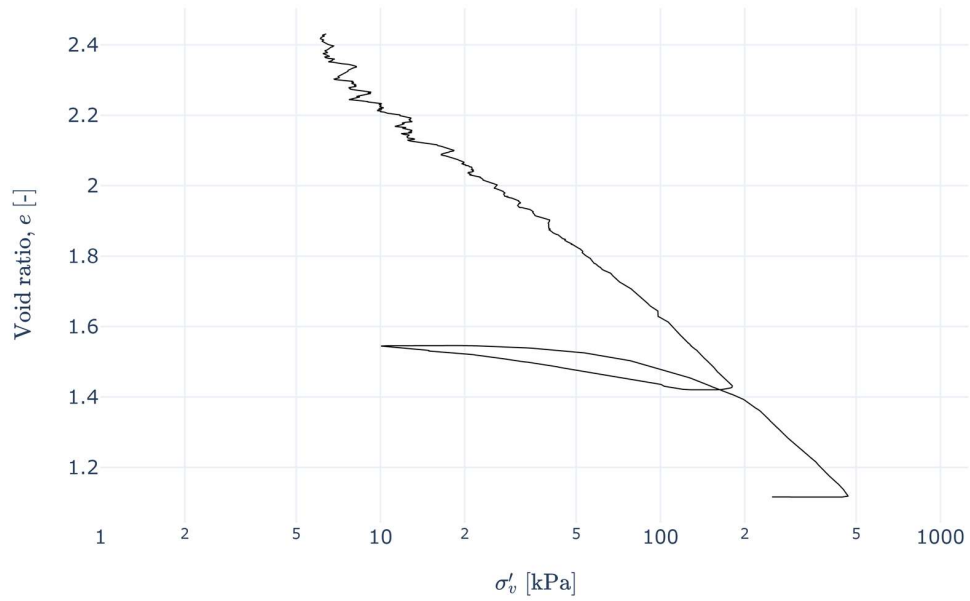
Test ID: Helena DEME Kortrijk 0,05 13Mar P2	Sample type: Reconstituted (from slurry)
<b>Initial conditions</b>	
Sample height [mm]	24.80
Sample diameter [mm]	75.79
Initial water content [%]	103.3
Initial void ratio [-]	2.737
Initial saturation [%]	1.0
Bulk density [Mg/m <sup>3</sup> ]	1.47
Dry density [Mg/m <sup>3</sup> ]	0.72
Specific gravity [-]	2.65
<b>Final conditions</b>	
Final water content [%]	50.0
<b>Test conditions</b>	
Backpressure [kPa]	500
Strain rate [mm/min]	0.05

Date: N/A

Created by: N/A

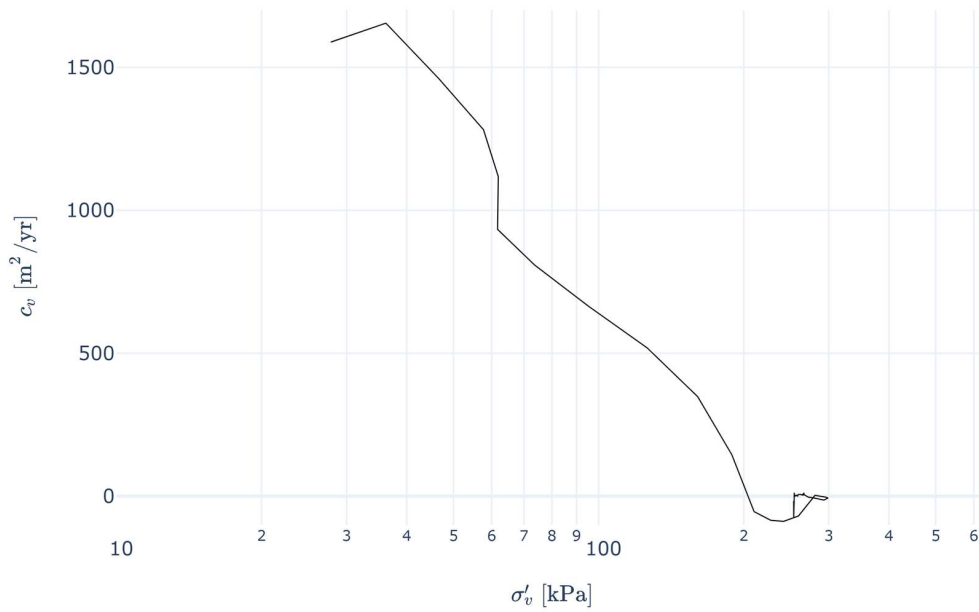
Checked by: N/A

Void ratio vs Effective stress



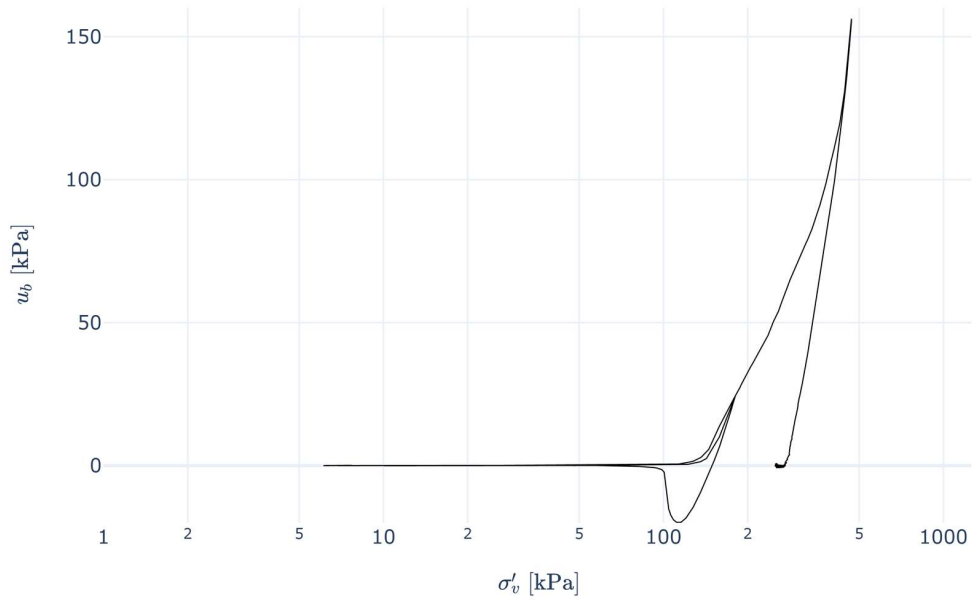
Helena DEME Kortrijk 0,05 13Mar P2

cv vs Effective stress

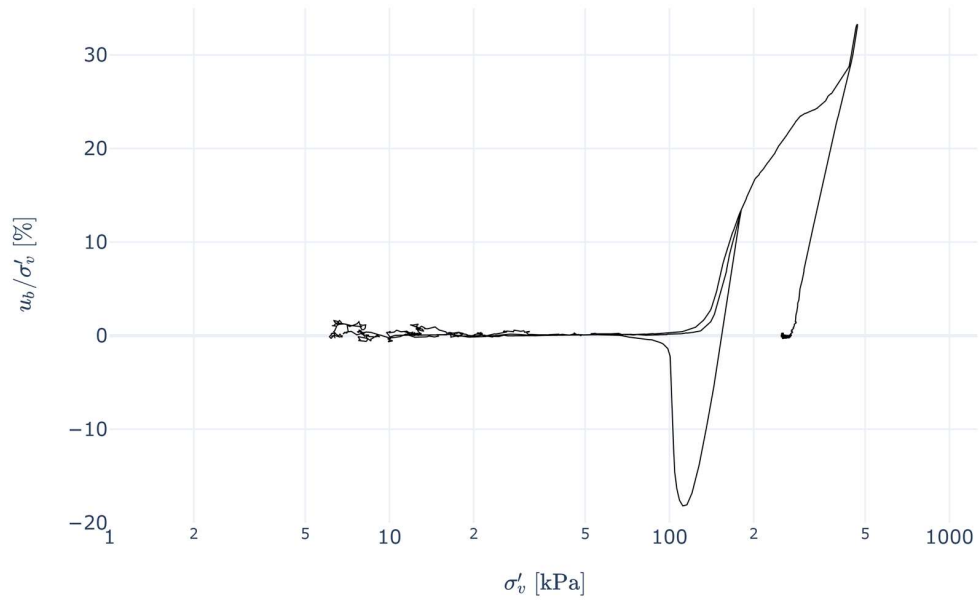


Helena DEME Kortrijk 0,05 13Mar P2

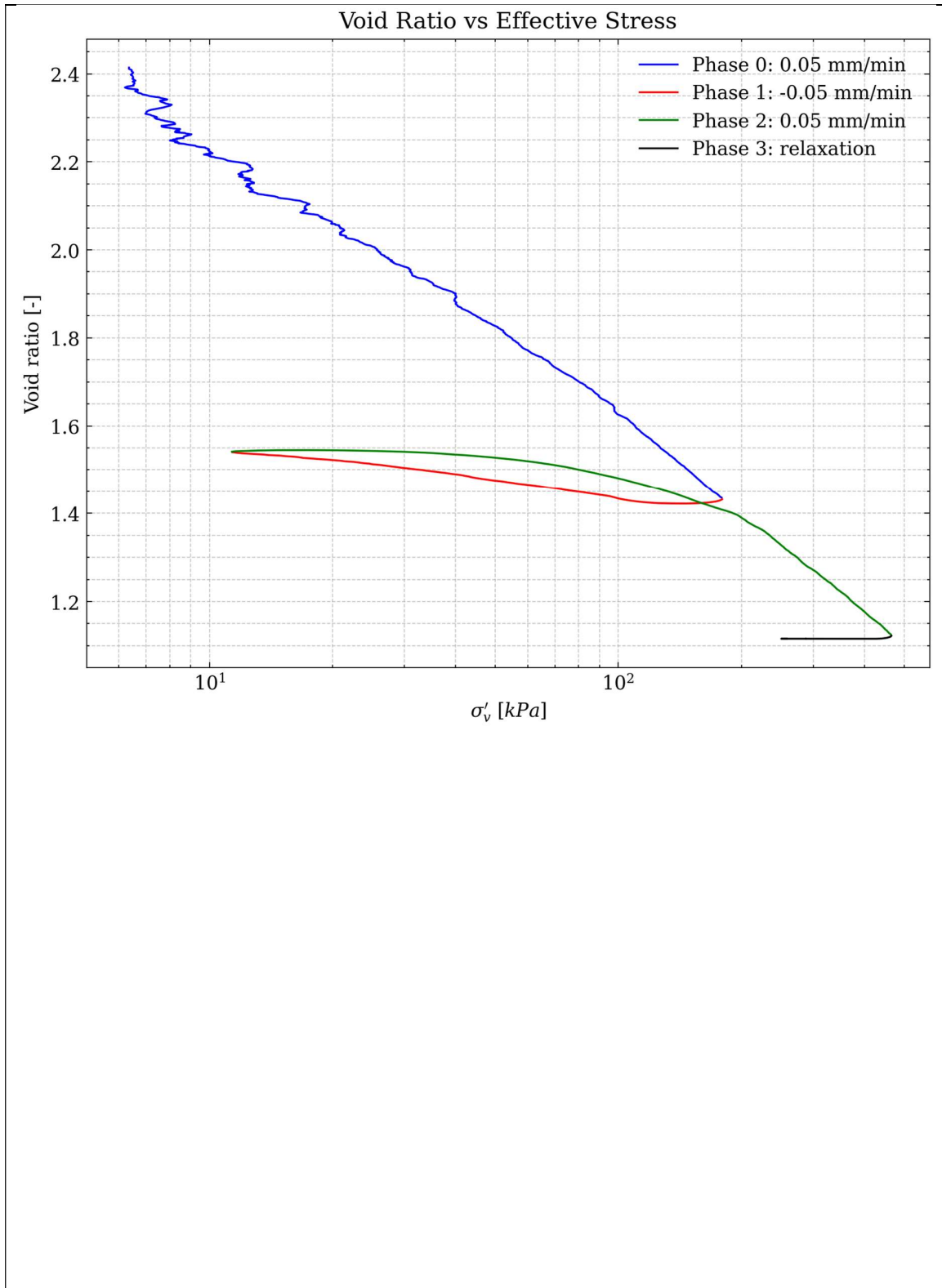
Excess pore pressure vs Effective stress



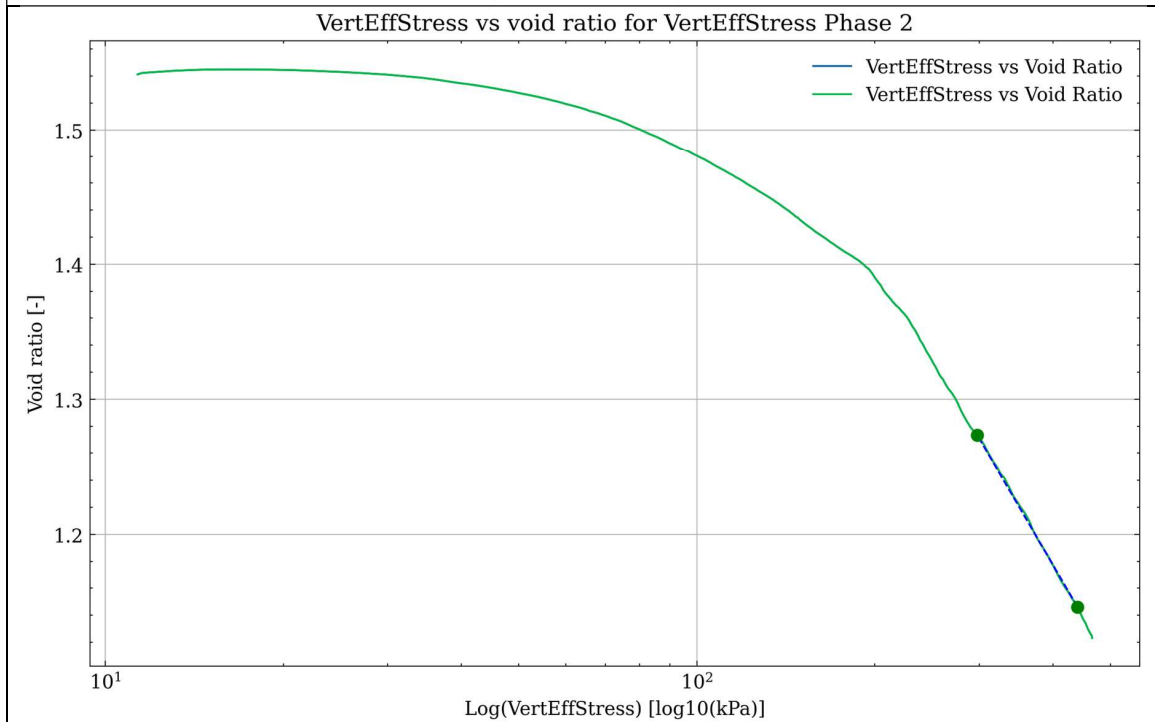
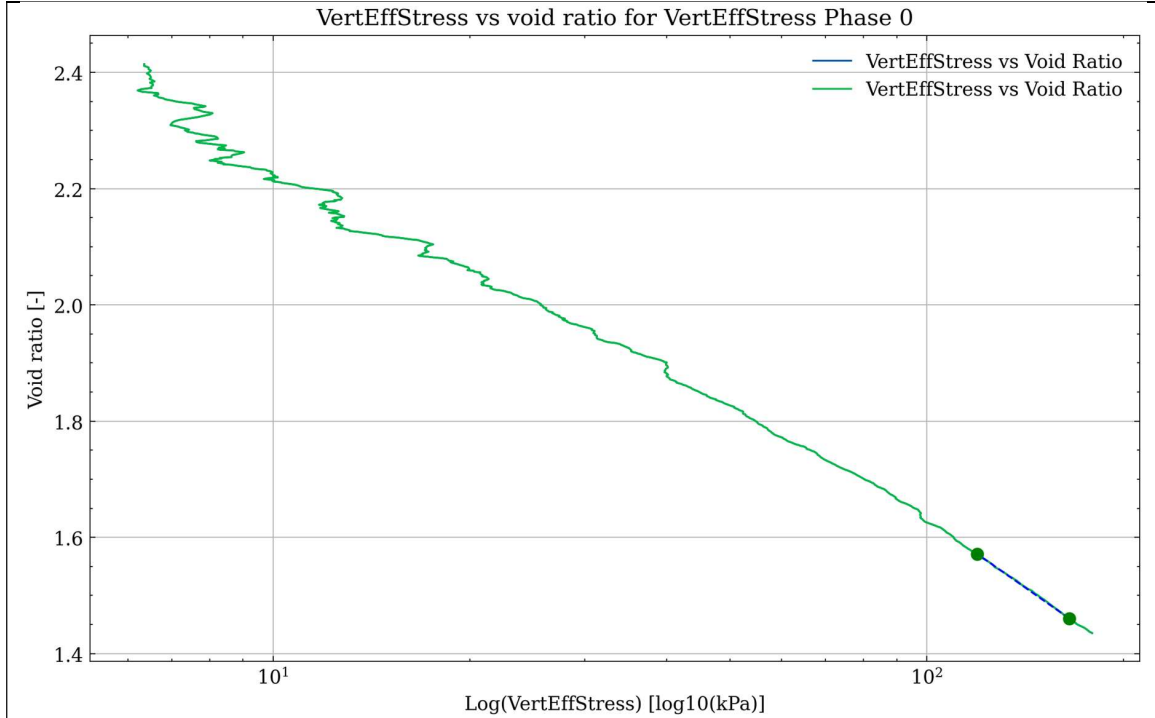
Pore pressure ratio vs Effective stress



Helena DEME Kortrijk 0,05 13Mar P2



Helena DEME Kortrijk 0,05 13Mar P2



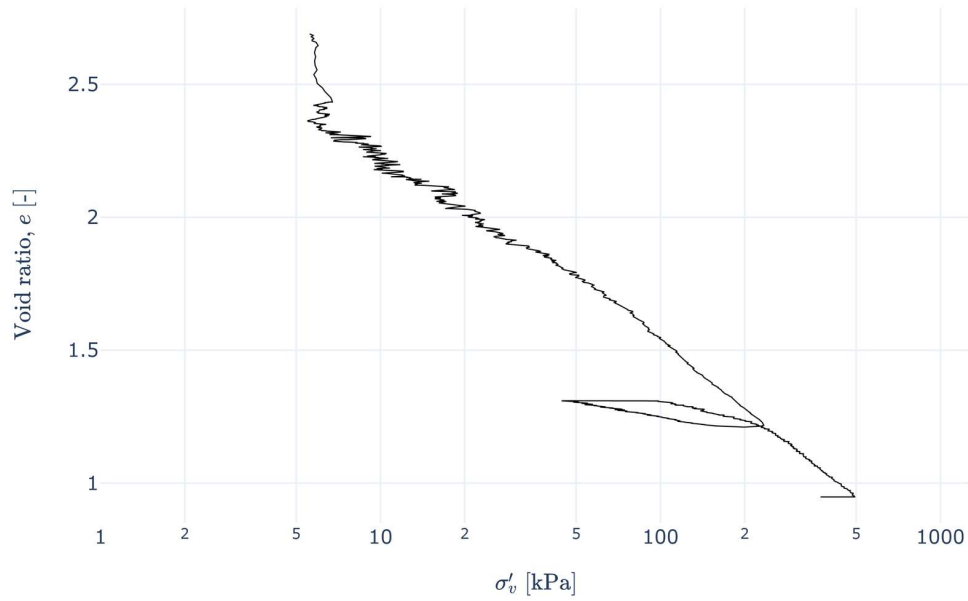


## CRS test according to ASTM D4186

Test ID: Helena DEME Kortrijk 0,005	Sample type: Reconstituted (from slurry)
<b>Initial conditions</b>	
Sample height [mm]	24.80
Sample diameter [mm]	75.72
Initial water content [%]	106.1
Initial void ratio [-]	2.811
Initial saturation [%]	1.0
Bulk density [Mg/m <sup>3</sup> ]	1.46
Dry density [Mg/m <sup>3</sup> ]	0.71
Specific gravity [-]	2.65
<b>Final conditions</b>	
Final water content [%]	47.5
<b>Test conditions</b>	
Backpressure [kPa]	500
Strain rate [mm/min]	0.005

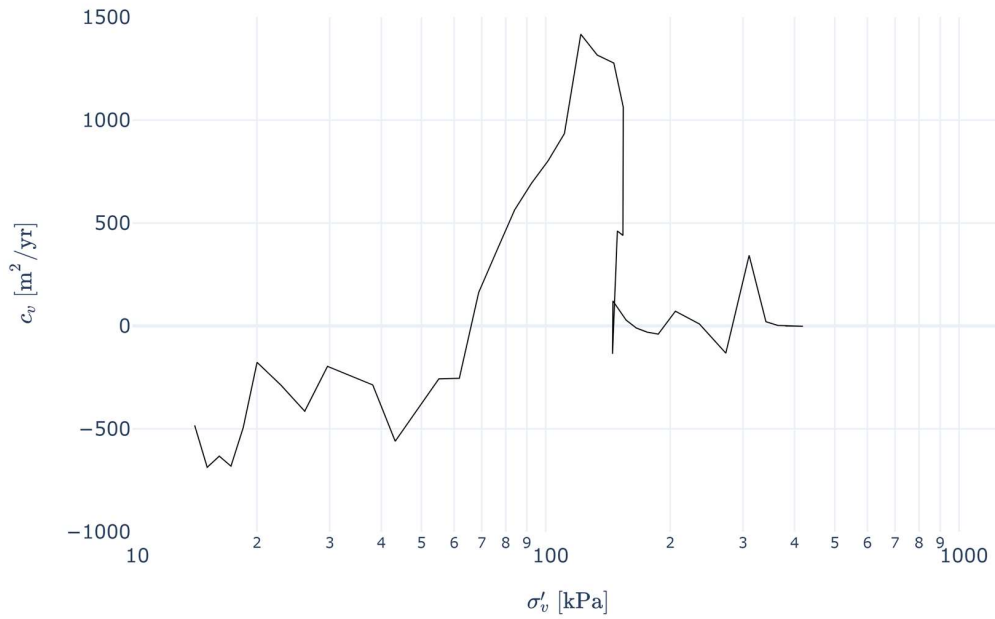
Date: N/A	Created by: N/A	Checked by: N/A
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Void ratio vs Effective stress



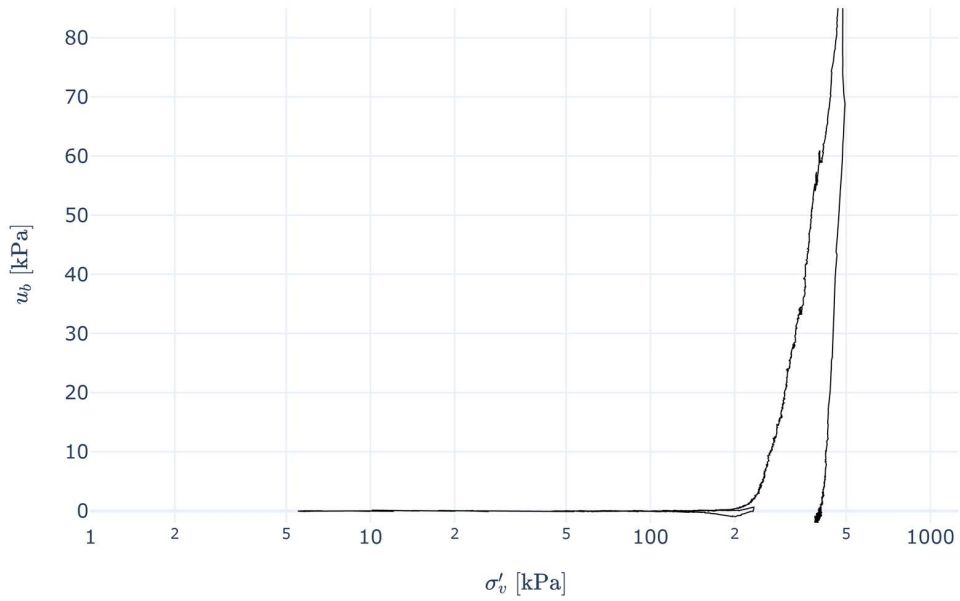
Helena DEME Kortrijk 0,005

cv vs Effective stress

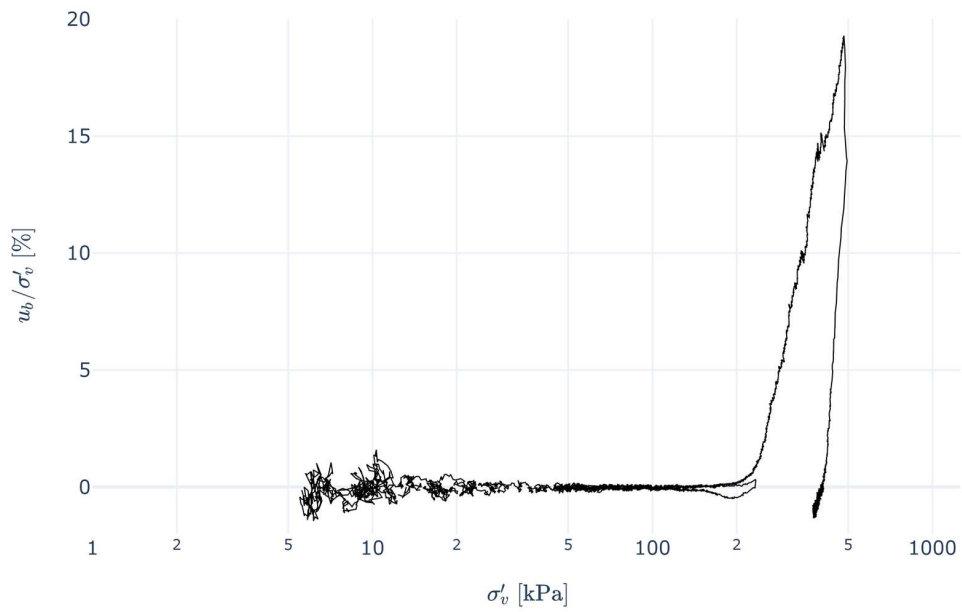


Helena DEME Kortrijk 0,005

Excess pore pressure vs Effective stress



Pore pressure ratio vs Effective stress

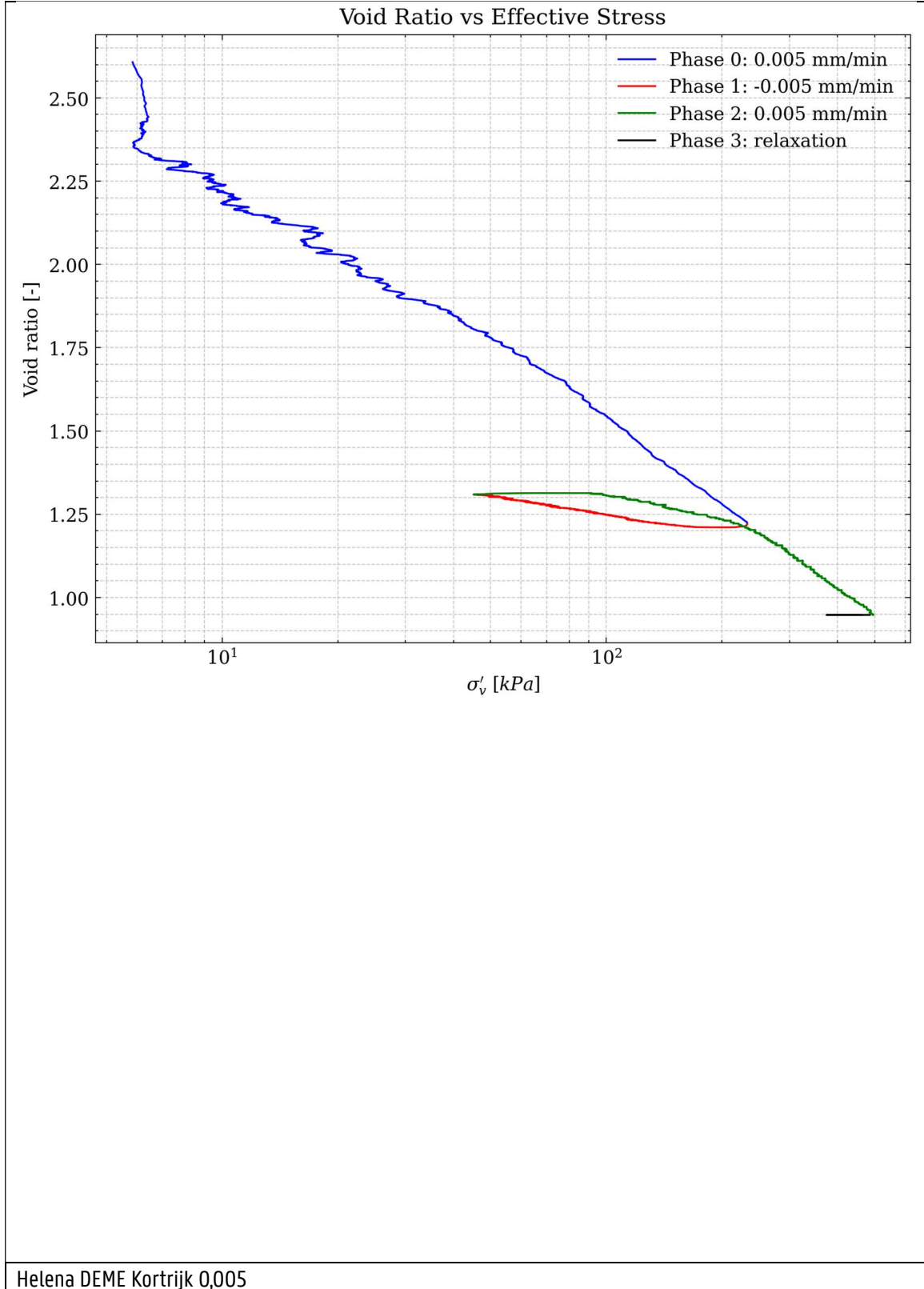


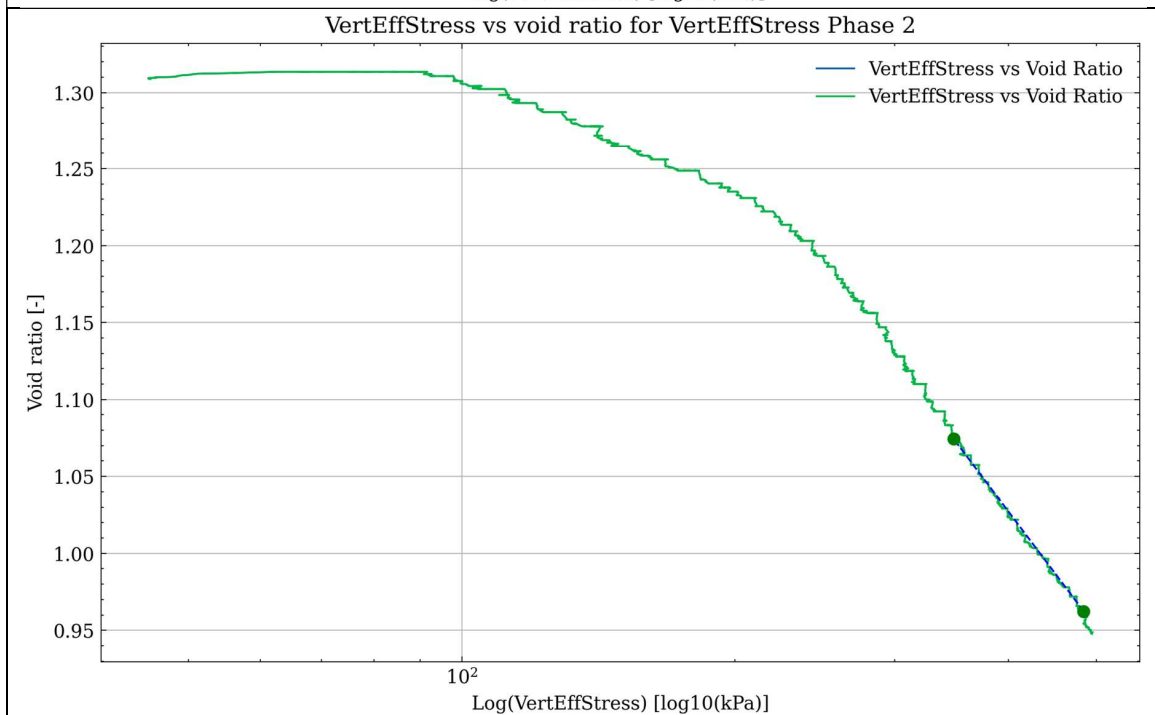
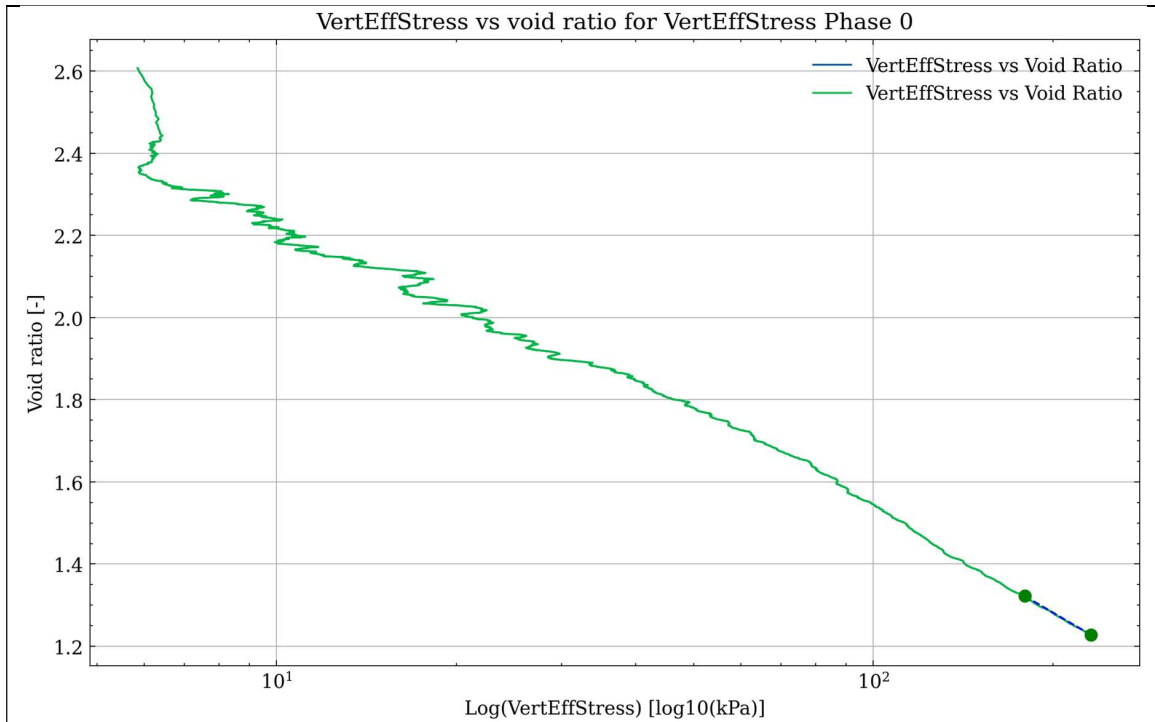
Helena DEME Kortrijk 0,005

Date: N/A

Created by: N/A

Checked by: N/A







## CRS test according to ASTM D4186

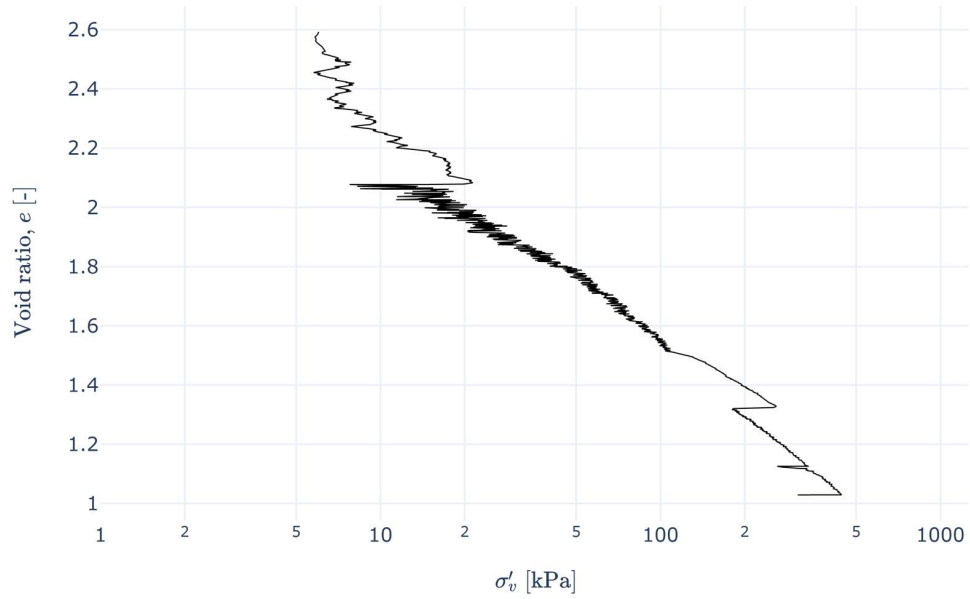
Test ID: Helena DEME Kortrijk var. 14Mar	Sample type: Reconstituted (from slurry)
<b>Initial conditions</b>	
Sample height [mm]	25.54
Sample diameter [mm]	75.86
Initial water content [%]	102.1
Initial void ratio [-]	2.706
Initial saturation [%]	1.0
Bulk density [ $\text{Mg}/\text{m}^3$ ]	1.47
Dry density [ $\text{Mg}/\text{m}^3$ ]	0.73
Specific gravity [-]	2.65
<b>Final conditions</b>	
Final water content [%]	49.4
<b>Test conditions</b>	
Backpressure [kPa]	500
Strain rate phase 0 [mm/min]	0.05

Date: N/A

Created by: N/A

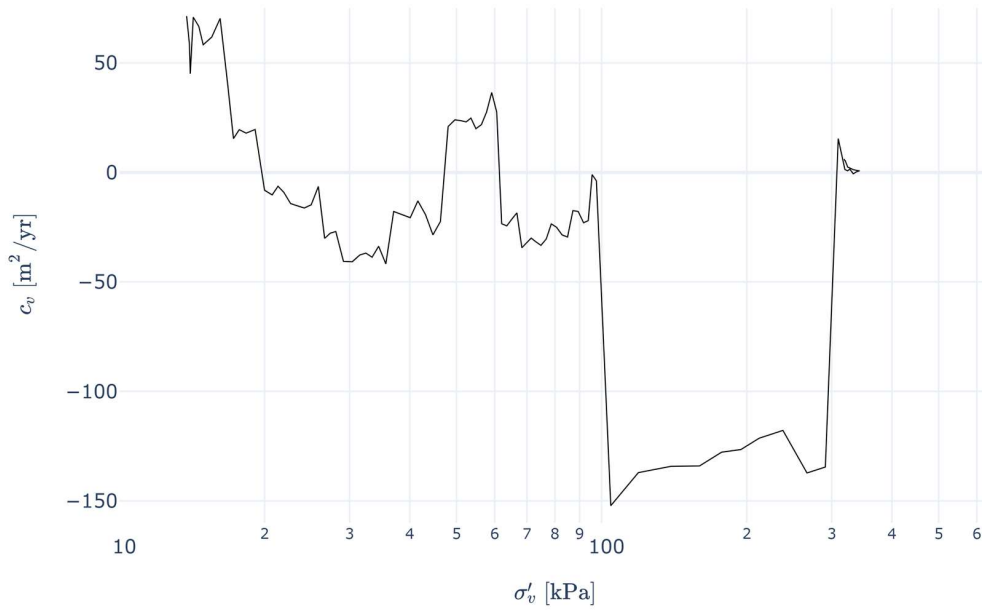
Checked by: N/A

Void ratio vs Effective stress



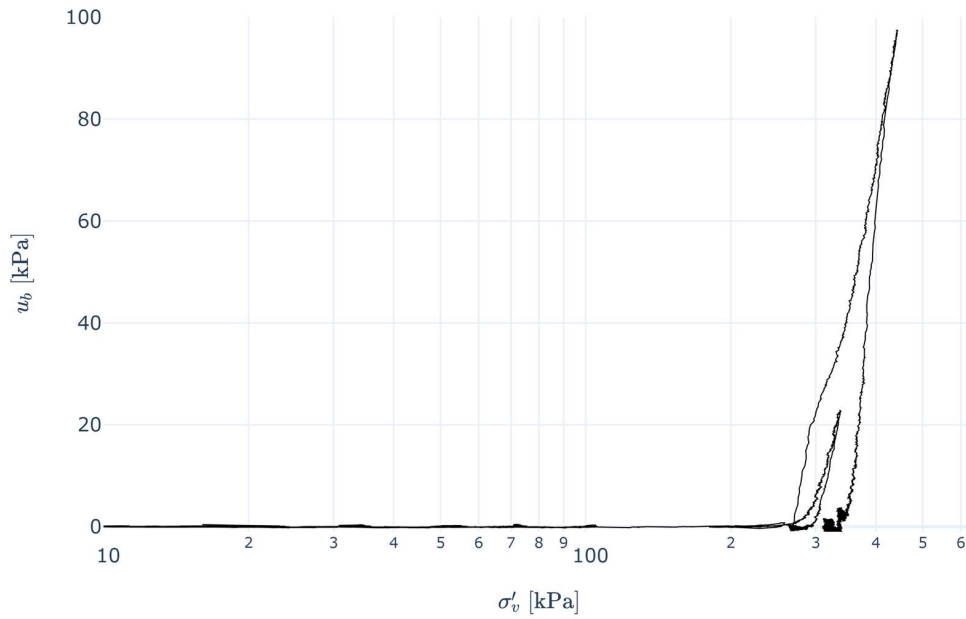
Helena DEME Kortrijk var. 14Mar

cv vs Effective stress

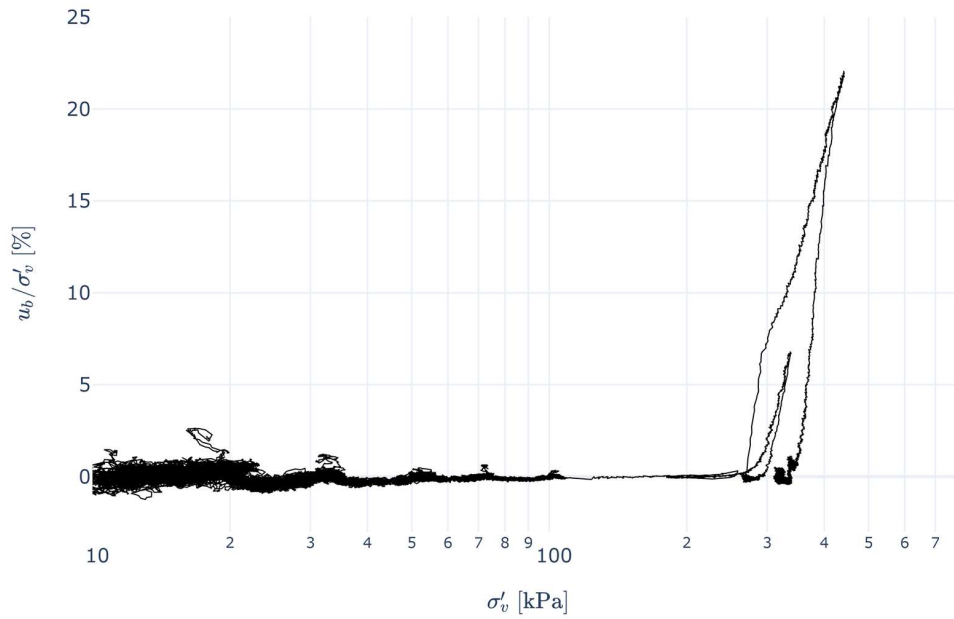


Helena DEME Kortrijk var. 14Mar

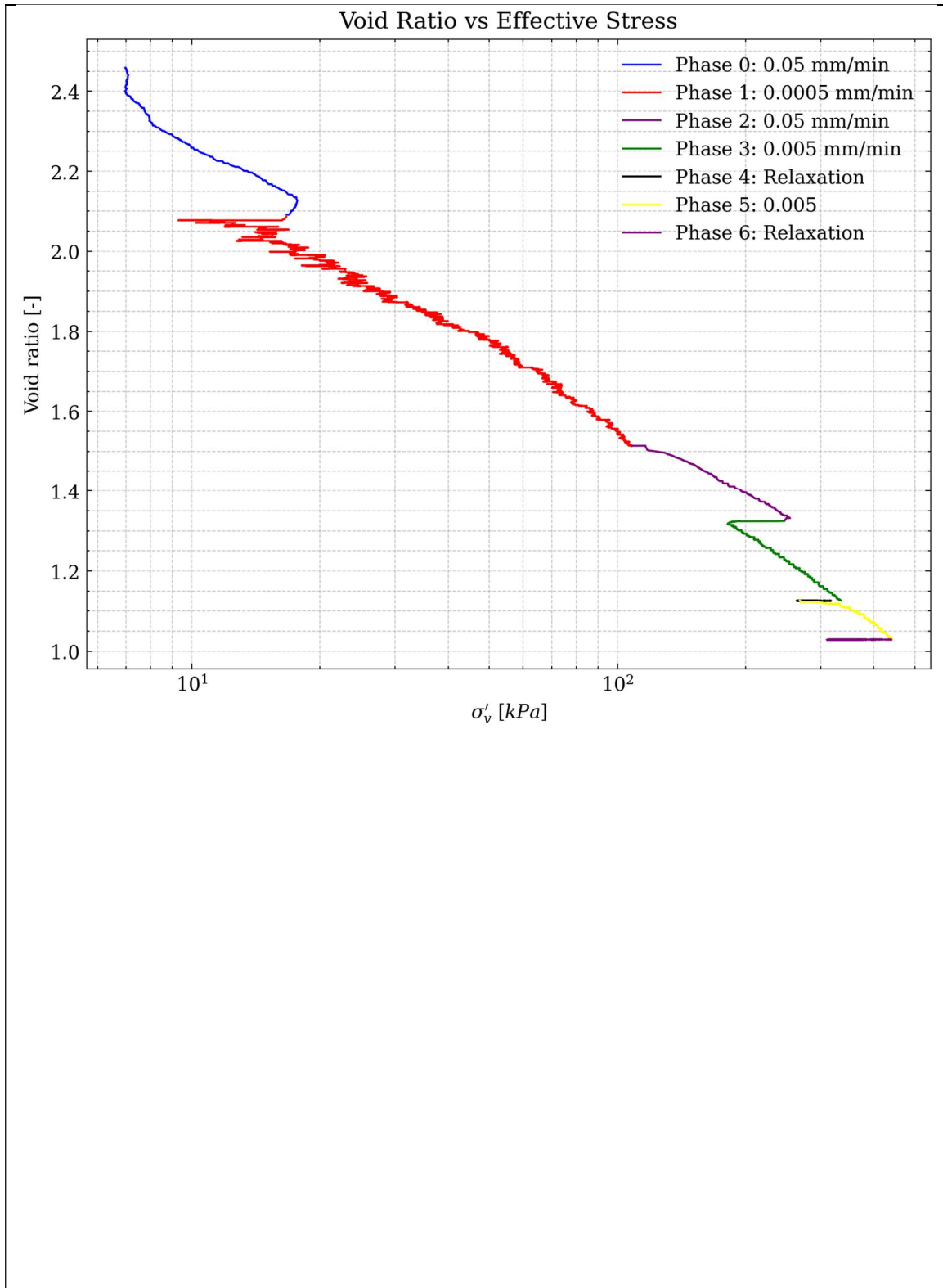
Excess pore pressure vs Effective stress



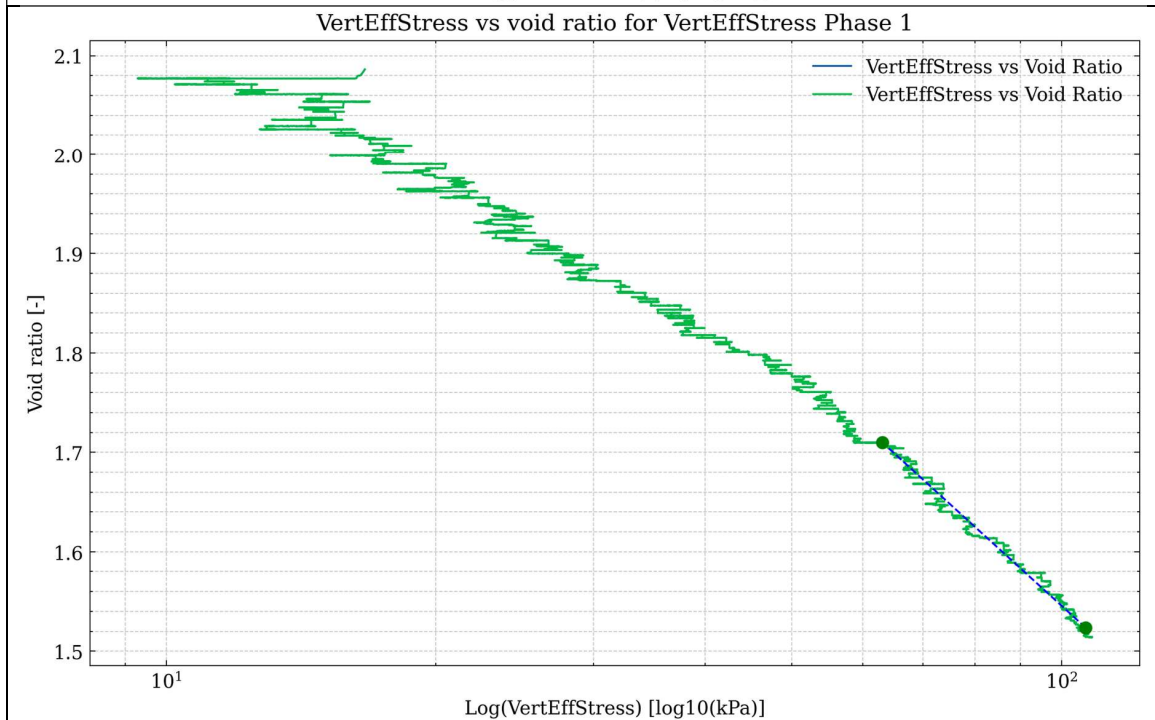
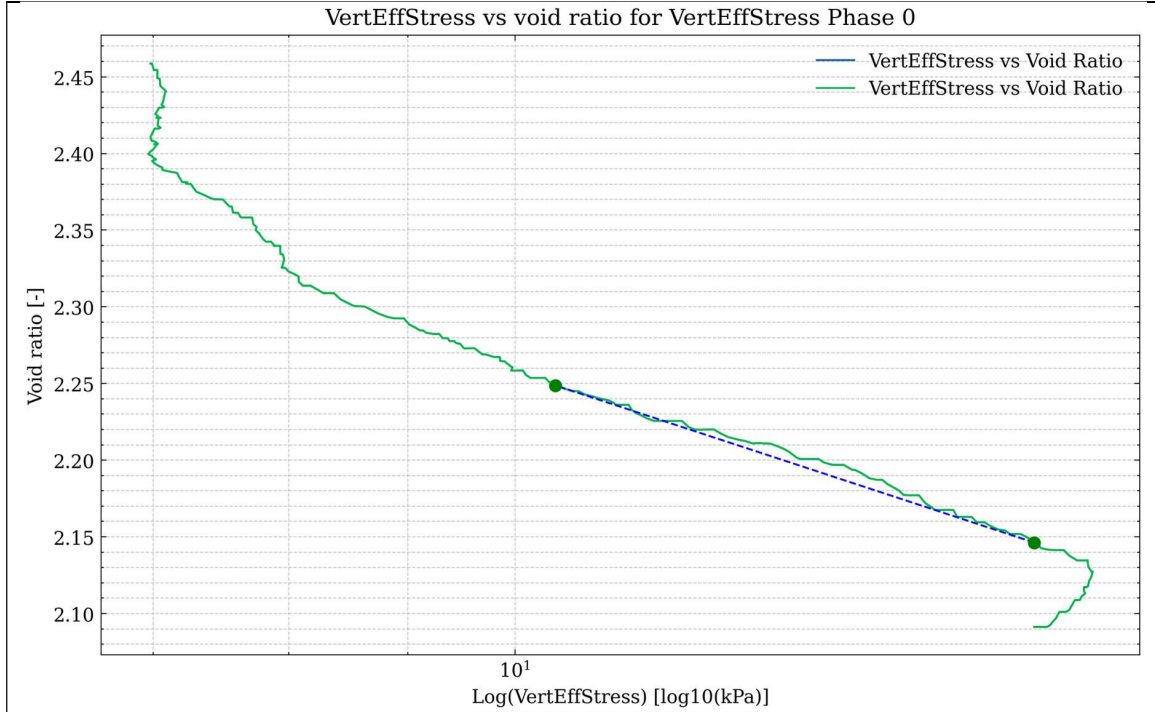
Pore pressure ratio vs Effective stress

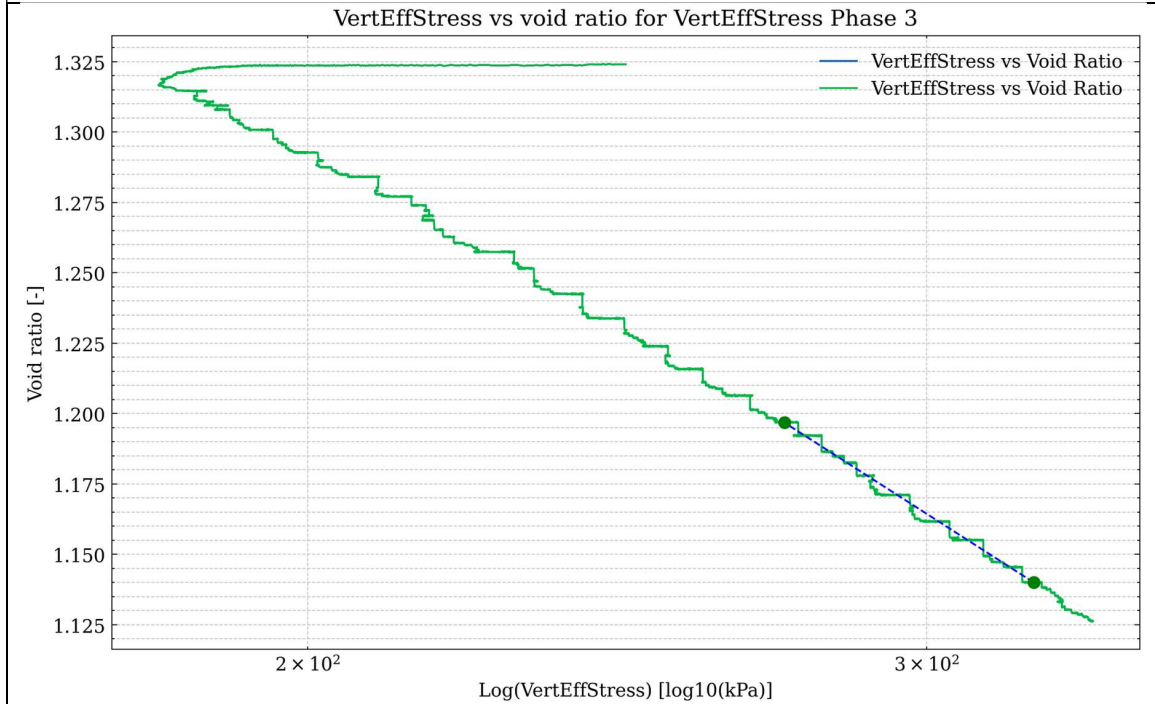
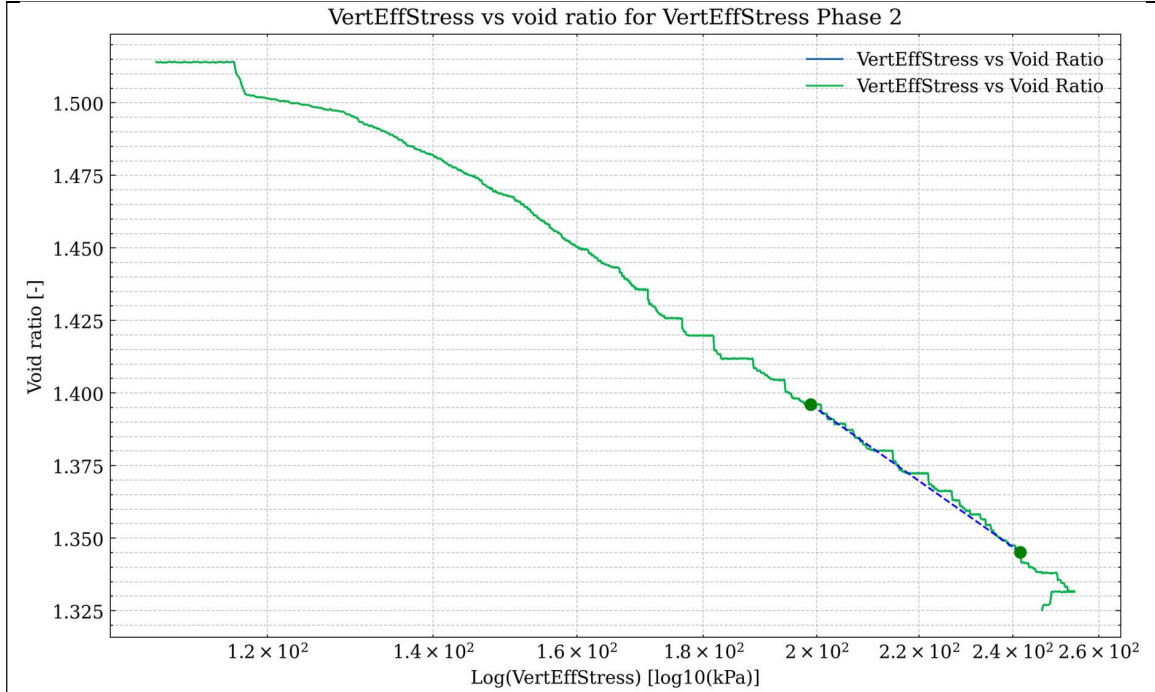


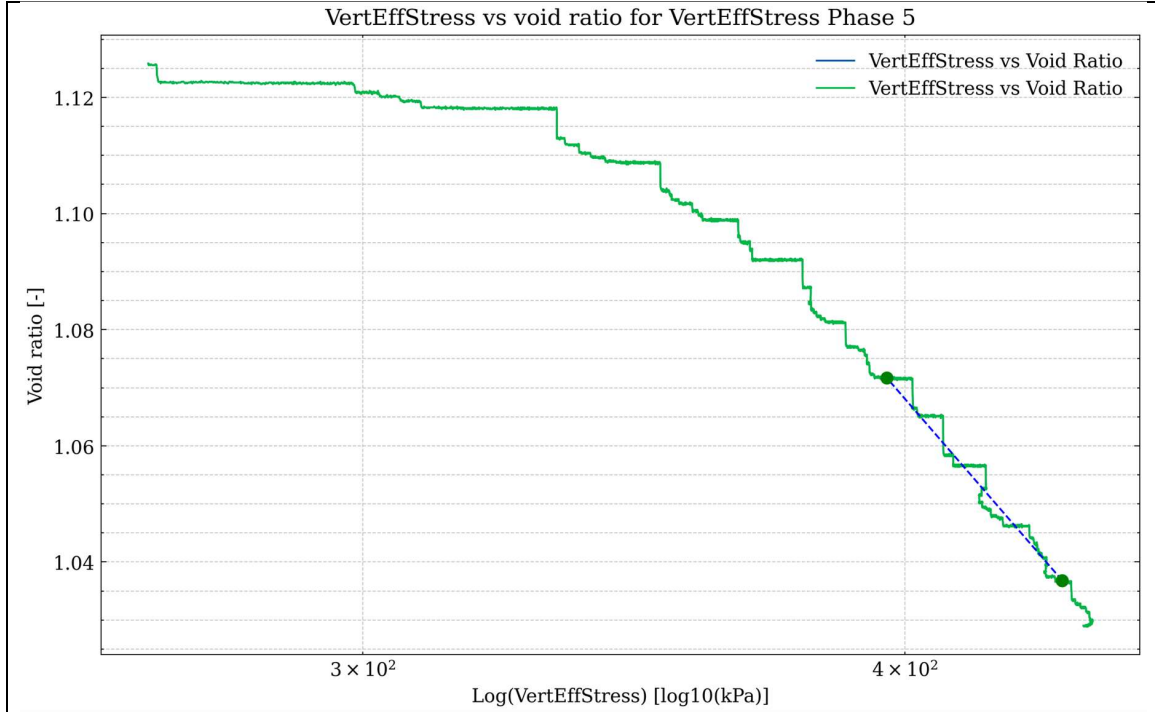
Helena DEME Kortrijk var. 14Mar



Helena DEME Kortrijk var. 14Mar









## CRS test according to ASTM D4186

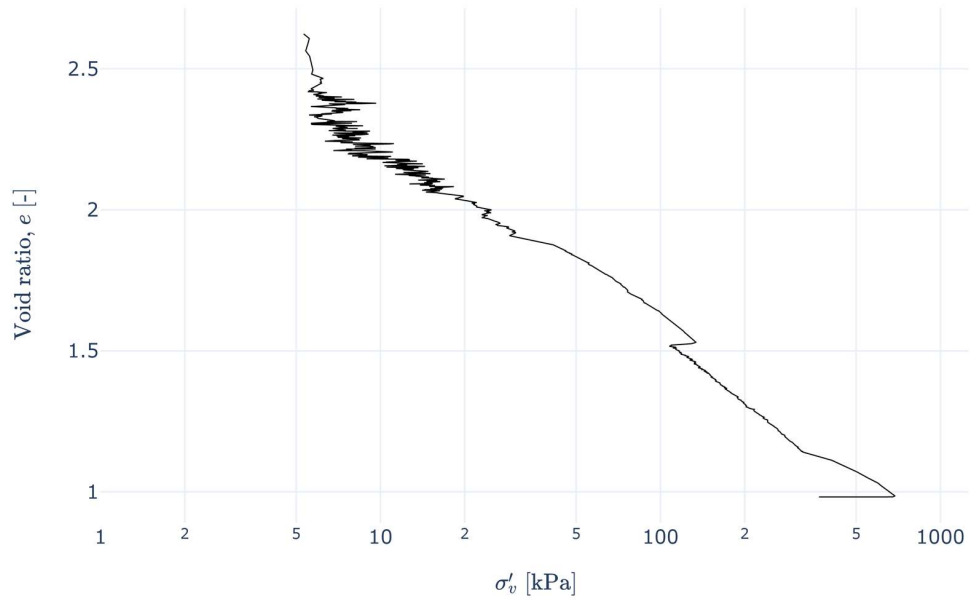
Test ID: Helena DEME Kortrijk var. 23Mar	Sample type: Reconstituted (from slurry)
<b>Initial conditions</b>	
Sample height [mm]	24.85
Sample diameter [mm]	75.86
Initial water content [%]	106.5
Initial void ratio [-]	2.822
Initial saturation [%]	1.0
Bulk density [Mg/m <sup>3</sup> ]	1.46
Dry density [Mg/m <sup>3</sup> ]	0.71
Specific gravity [-]	2.65
<b>Final conditions</b>	
Final water content [%]	48.2
<b>Test conditions</b>	
Backpressure [kPa]	500
Strain rate phase 0 [mm/min]	0.005

Date: N/A

Created by: N/A

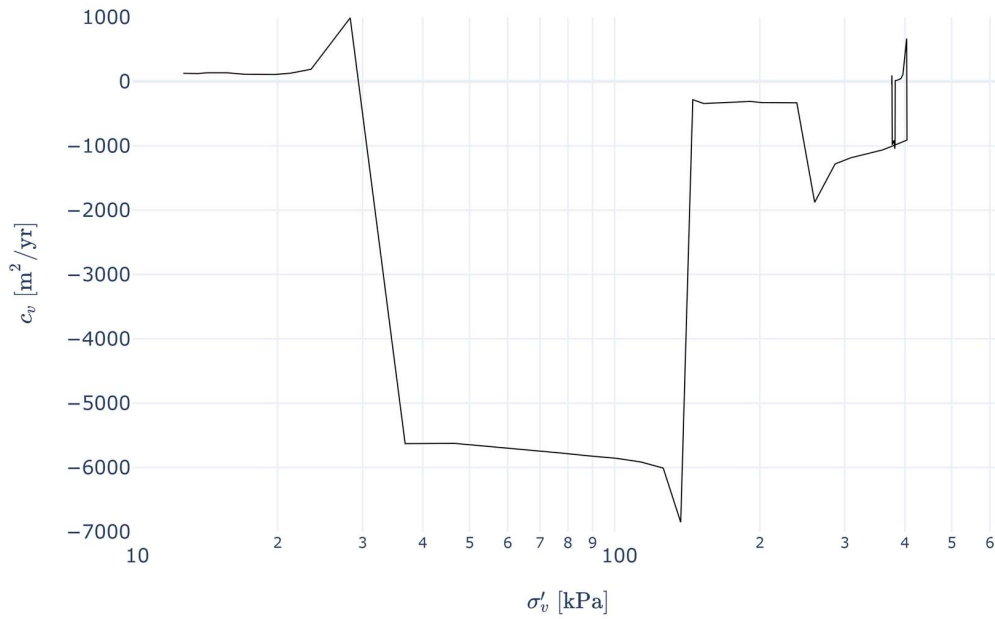
Checked by: N/A

Void ratio vs Effective stress



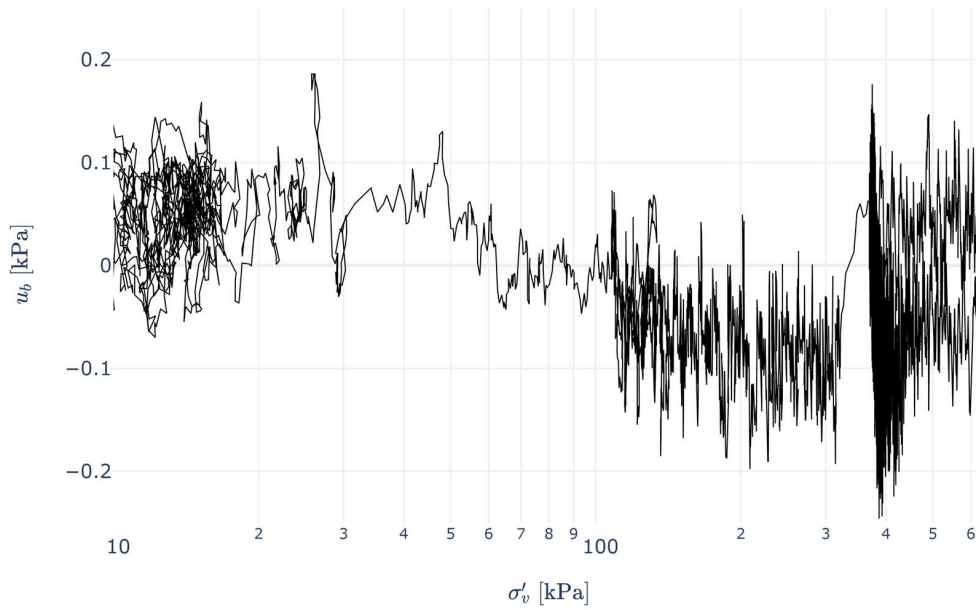
Helena DEME Kortrijk var. 23Mar

cv vs Effective stress

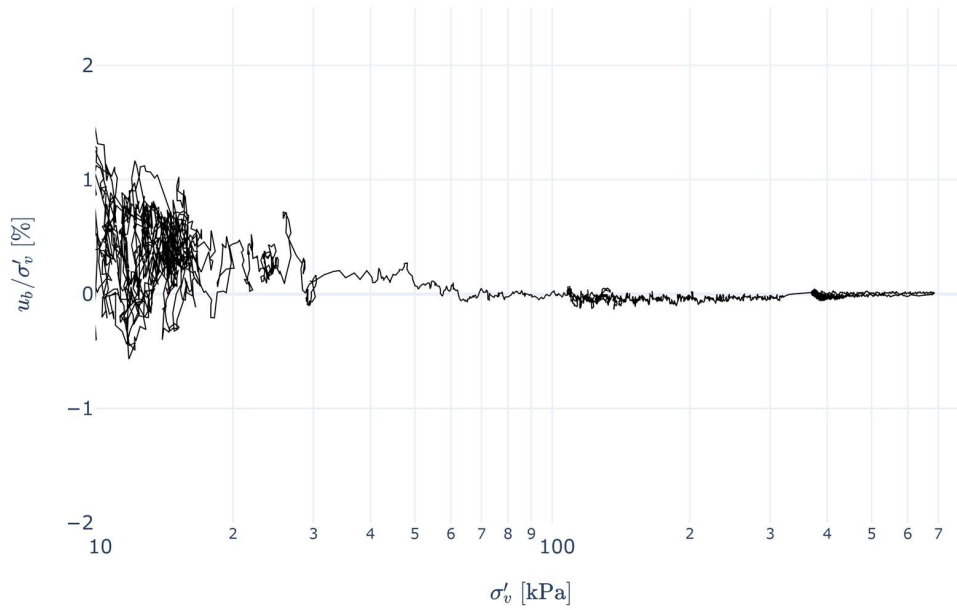


Helena DEME Kortrijk var. 23Mar

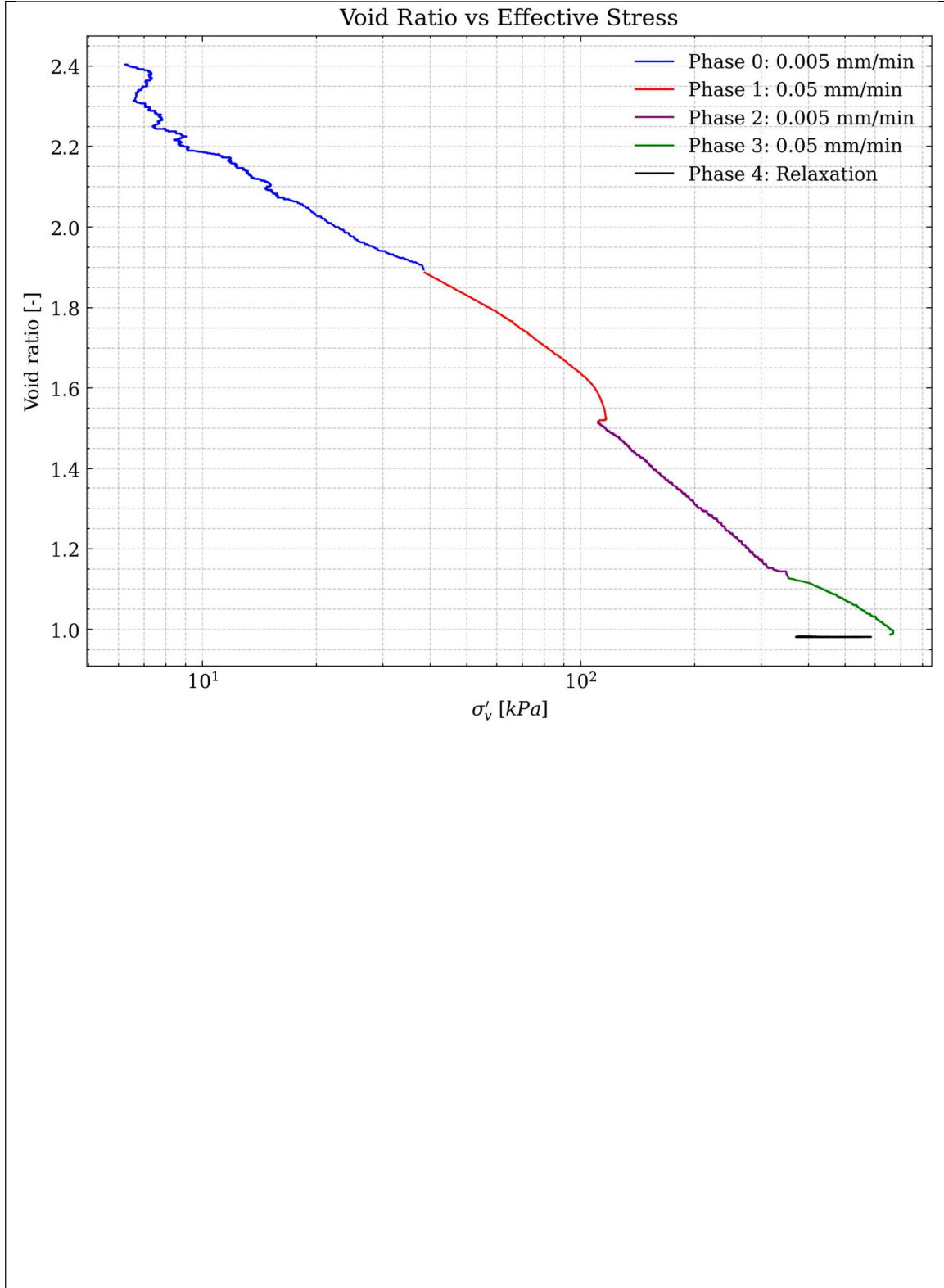
Excess pore pressure vs Effective stress



Pore pressure ratio vs Effective stress



Helena DEME Kortrijk var. 23Mar



Helena DEME Kortrijk var. 23Mar

