Report
P-20-25
May 2021

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Jordi Delgado-Martín
Andrea Muñoz-Ibáñez
Miguel Herbón-Penabad
Leandro R Alejano

SVENSK KÄRNBRÄNSLEHANTERING AB

SWEDISH NUCLEAR FUEL
AND WASTE MANAGEMENT CO

Box 3091, SE-169 03 Solna
Phone +46 8 459 84 00
skb.se

SVENSK KÄRNBRÄNSLEHANTERING

ISSN 1651-4416
SKB P-20-25
ID 1919417
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Jordi Delgado-Martín, Andrea Muñoz-Ibáñez, Miguel Herbón-Penabad
Civil Engineering School, University of A Coruña

Leandro R Alejano, Department of Natural Resources and Environmental Engineering, University of Vigo

Keywords: Uniaxial compressive strength, Indirect tensile strength, Ultrasonic velocities, Elastic moduli, Crack stress, Scale effects.

This report concerns a study which was conducted for Svensk Kärnbränslehantering AB (SKB). The conclusions and viewpoints presented in the report are those of the authors. SKB may draw modified conclusions, based on additional literature sources and/or expert opinions.

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Abstract

This study investigates the existence and scope of scale effects over several geomechanical and geophysical properties of intact rock: uniaxial compressive strength, tensile strength, static moduli, ultrasonic pulse velocities and dynamic moduli. The study is focused in two relevant rocks of the Forsmark site and includes several experimental surveys, the corresponding data analysis as well as a simplified statistical assessment addressing similitudes and differences among specimen size-groups and rock types. The results show the existence of limited scale effects for which the grain size of each rock appear to play a significant role. The analyses identify threshold sizes below or above which some properties should be (or not) considered representative of the tested rocks. Based on that, representative values for dry density, porosity, uniaxial compressive and tensile strengths, dynamic and static moduli, wave propagation velocities, etc are reported.

Sammanfattning

Denna studie undersöker förekomsten och omfattningen av skaleffekter för ett flertal geomekaniska och geofysiska egenskaper hos intakt berg: Enaxiell tryckhållfasthet, draghållfasthet, statisk deformationsmodul, ultrasonisk pulshastighet och dynamisk deformationsmodul. Studien fokuserar på två relevanta bergarter för Forsmarksområdet och inkluderar flera olika undersökningar, den korresponderande dataanalysen såväl som enkel statistisk utvärdering för att identifiera likheter och skillnader mellan prover med olika storlek och bergart. Resultatet visar på att det finns begränsade skaleffekter där kornstorleken hos bergarten verkar spela en avgörande roll. Analysen identifierar gränsvärden på provstorlek under och över vilka vissa egenskaper kan (eller inte kan) anses vara representativa för studerad bergart. Baserat på detta rapporteras representativa värden för torrdensitet, porositet, enaxiell tryckhållfasthet, draghållfasthet, dynamisk och statisk deformationsmodul, vågutbredningshastighet etc.

Contents

1 Introduction

Scale effects arise pervasively in rock engineering practice in the determination of rock, joint and rock mass properties, and they impact the engineering judgement in the extrapolation of test data to the real scale of rock engineering projects. Early attempts to study scale effects on rock strength were carried out by Bieniawski (1967) to study coal samples and pillars, and by Pratt et al. (1972) and Hoek and Brown (1980) to study hard rock samples. After these seminal studies, relevant information was gathered in both International Workshops on Scale Effects in Rock Masses hold in Loen (Norway) and Lisbon (Portugal) in 1990 and 1993, which served to establish a basic understanding of scale effects in rock mechanics. Recent investigations by a number of authors (Yoshinaka et al. 2008, Pierce et al. 2009, Martin et al. 2014) have produced some relevant advances regarding the fact that scale effects may differ significantly in different rock types according to their strength, texture, occurrence of micro-flaws (pores, open cracks, veins), weathering/alteration or spatial variation of micro-properties. They also showed that it is possible to estimate strength and deformation characteristics of actual-scale rock by means of laboratory tests.

More recently, based on uniaxial compressive tests, Masoumi et al. (2015) have put forward the fact that the size-effect behaviour in small samples does not follow the commonly assumed size-effect model, in which the strength decreases as the sample size increases. This important observation was not discussed in earlier investigations (Hoek and Brown 1980), and no comprehensive investigation has been conducted so far to asses this behaviour from an analytical viewpoint.

Likewise, scale effect has not been so far taken reliably into account when performing numerical models of rock masses. However, it is possible now to carry out practical determinations of mechanical design parameters based on the above considerations. Recent approaches (Le Goc et al. 2015) have shown that it is possible to develop and test Synthetic Rock Mass (SRM) models based on rock specimens that are able to reflect the scale effect by means of the use of relations between properties and based on multi-Gaussian random fields (CRF) parameters. However, to carry out this task, it is first necessary to have developed a significant experimental strength database for different rocks in a variety of scales.

Taking the previous context into account, the main goal of this study was to perform a wide number of non-destructive (ultrasonic P- and S-wave propagation velocities) and destructive (uniaxial compressive (UCS) and indirect (Brazilian) tensile (ITS or BTS) strength tests) using rock specimens of different size (15 to 100 mm diameter) which were obtained from two selected granitic (s.l.) lithologies relevant to SKB within the context of the future underground radioactive waste repository of Forsmark.

The information obtained is multifaceted and provides a background for realistic scale law assessment amenable to be used either in analytical approaches or for matching numerical models. Furthermore, both aspects contribute to a better understanding of the behaviour of granitic rocks in Forsmark within the context of the ongoing engineering and safety studies for the disposal of spent nuclear fuel conducted by SKB.

2 Materials and methods

2.1 Rock blocks

Eight equal-size parallelepipeds or slab-like rock pieces (40 × 30 × 22.5 cm) were received at the facilities of the Rock Mechanics Laboratory (LaMeRoc) on March 18th, 2019 (Figure 2-1).

Each block was labelled according with the corresponding rock group ID (RFM029 and RFM045) and block number (A, B, C and D). The blocks were sawed from large size rock boulders at the ground surface collected in the area of domains RFM029 and RFM045, respectively. According to SKB (2013), each rock domain encompasses a group of lithologies presenting significant variations in mineralogy, grain size, texture and fabric (rock units). Based on SKB expert judgement, the likely rock unit associated with the blocks from RFM029 is 101057 while 101058 (or 111058) would be the unit encompassing the samples from domain RFM045.

From the petrological standpoint, rock 101057 has been affected by penetrative ductile deformation under amphibolite-facies metamorphism. It is a fine- to medium-grained metagranodiorite (to granite) with a moderately to strongly developed planar (to some extent linear) mineral fabric. It is characterised by a texture of stretched, monomineralic domains and a content of ferromagnesian minerals ranging up to 10 vol.% (SKB 2013).

According to the general description of rock 101058 (SKB 2013), this shows the effect of coupled deformation (weakly developed linear mineral fabric and locally a planar mineral fabric) and metamorphism (albitization). It is a fine- to medium-grained granite, with a general low content of ferromagnesian minerals (< 5 vol.%) and locally associated with pegmatitic granite (101061).

At first glance, all the rock blocks received looked like solid and massive although a closer inspection revealed the existence of randomly oriented interlocked cracks cross-cutting some of the blocks.

Figure 2-1. *Rock blocks as received from block in domain RFM029 (rock type 101057) on the left and from domain RFM045 (rock type 101058) on the right.*

2.2 Core drilling, cutting and trimming

With the exception of rock block RFM029-A (that is macroscopically inhomogeneous and was preserved untouched), the seven remaining blocks were used to obtain the cylindrical specimens used in this study. Coring was performed with the aid of a WEKA DK32 diamond drill motor attached to a mast located above the rock blocks (Figure 2-2). The motor was equipped with a diversity of diamond drill cores (Marathon Diamond Tools) useful to cover a range of plug sizes going from 15 to 100 mm diameter. Care was taken to avoid oversampling in particular blocks or to concentrate certain plug sizes in specific ones. Table 2-1 summarizes the distribution of samples associated to each received block.

Table 2-1. Number of test specimens obtained from each rock block.

Diameter		15 mm	21 mm	30 mm	42 mm	54 mm	63 mm	100 mm
RFM029 (101057)	**A**	-	-	-	-	-	-	-
	B	5	5	3	4	4	11	1
	C	5	5	3	5	8	8	4
	D	5	5	4	8	5	6	2
RFM045	**A**	4	4	3	3	3*	3**	-
(101058)	**B**	4	4	2	2	2*	2**	2
	C	4	4	3	3	3*	3**	1
	D	3	3	2	2	2	2***	-

Notes: * = 50 mm; ** = 60 mm; *** = 60 and 63 mm.

Coring was an especially challenging task in the case of the 100 mm-diameter samples and, in particular, for rock RFM045. In this regard, not all the obtained large-size plugs were suitable for testing as they failed to comply with the dimensional tolerances required by the tests.

The obtained cores were cut to lengths compatible with the requirements established in the reference procedures for UCS and ITS testing (see later). Plugs were cut with a 350-mm diamond saw disk (Carat P-3500) and then trimmed with an automatic diamond mill (SAE Ibertest) providing a nominal flatness of ±0.05 mm. In the particular case of ITS samples, we used a manual drill (Optimum BF-16V) equipped with a lapping diamond disk to ensure the required flatness and parallelism between faces (Figure 2-2).

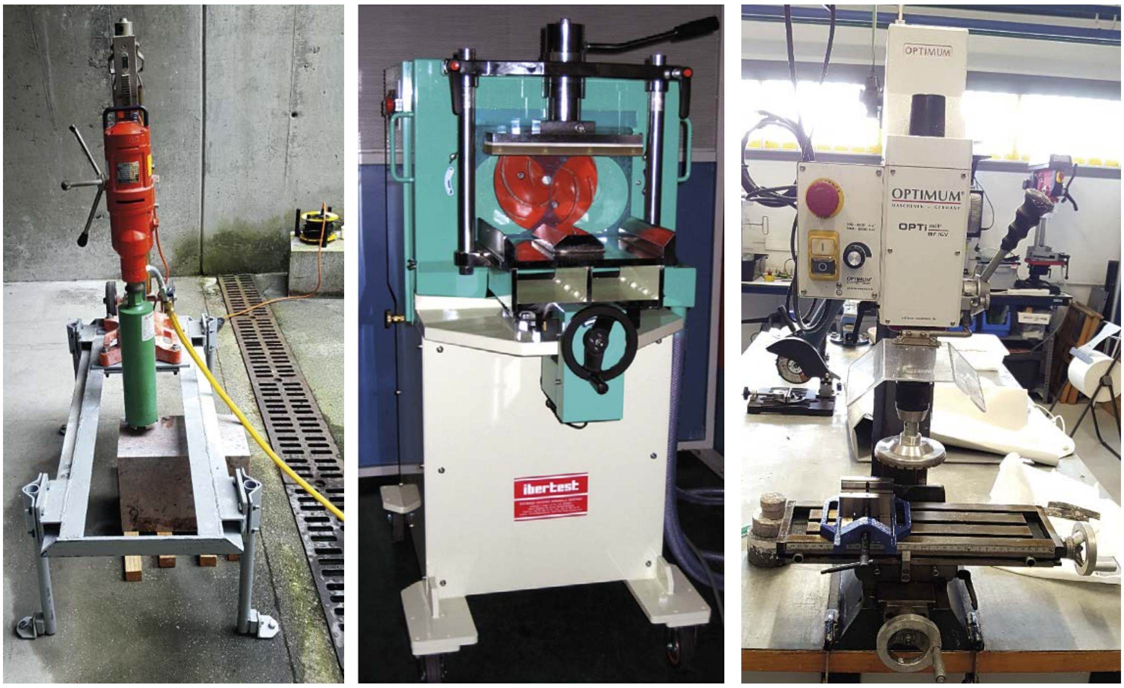


Figure 2-2. Core drill (left), automatic trimming machine (center), and manual drill used to elaborate the plugs used in the tests.

For all the drilling, cutting and grinding operations, tap water was used as cooling fluid. Figure 2-3, Figure 2-4 and Figure 2-5 illustrate the core plugs used to perform the non-destructive and destructive tests described in the present document.

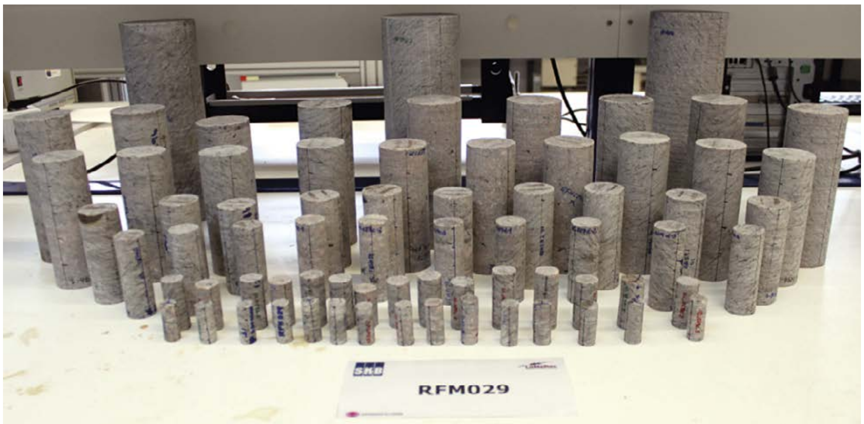


Figure 2-3. *Summary view of the core plugs of rock RFM029 (101057) used in UCS tests.*

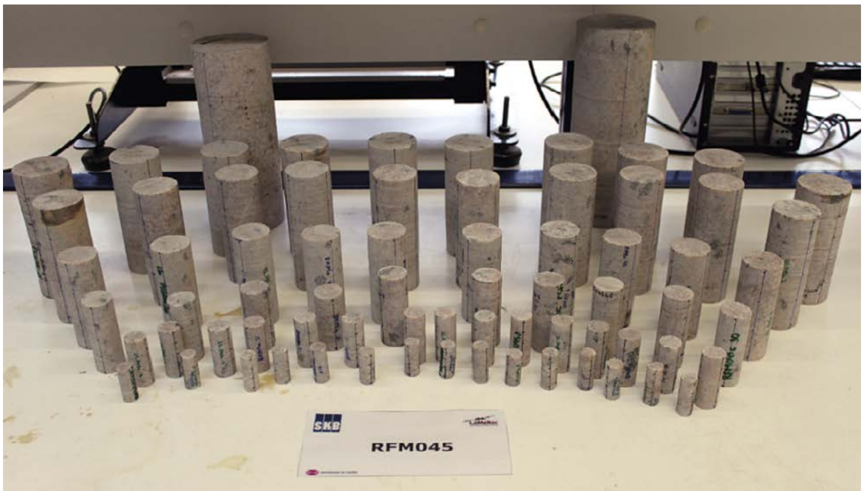


Figure 2-4. *Summary view of the core plugs of rock RFM045 (101058) used in UCS tests.*

Figure 2-5. *Summary view of the core plugs of rock RFM029 (101057) used in ITS tests.*

2.3 Core plug handling

Core plugs were managed according to SKB's procedures described in the SKB method descriptions SKB MD 190.001e, version 4.0 and SKB 190.004e, version 3.0 (SKB 2007a, b) for UCS and ITS testing, respectively. In essence, these documents provide with a reference QC/QA framework concerning the best recommended practices of SKB when conducting UCS (ISRM 1999) and ITS (ASTM 1995b) tests over intact rocks. They also provide with guidelines for developing a sampling strategy, to properly prepare specimens, to calibrate testing equipment, to execute the tests and to report data accuracy and results.

Based on that, the cored samples were: a) cut to lengths consistent with the testing standard or recommendation (length/diameter, L/D = 2.5 for UCS and L/D = 0.5 for ITS), b) dry and wet-weighted; c) submersed in tap water at room temperature during more than 7 days (Figure 2-6); and d) dimensionally verified, as per standard ASTM D4543-01 (ASTM 2001) (Figure 2-7).

2.3.1 Geometrical properties of the samples

Plug dimensions were determined with the aid of a Vernier calliper (Mitutoyo mod. 500-197-20; resolution = 0.01 mm) and a precision digital height gage (Shahe mod. 5324-150A; resolution = 0.01 mm). Before the determinations, the measuring equipment was checked using a reference standard plug of 50.8 mm length and 22.05 mm diameter. All the measurements were conducted in a 400 × 400 mm flatness table (Unceta Lan-Flat®; flatness error = 2.9 µm) and, for cylindricity measurements, by supporting samples in a precision V-block.

Figure 2-6. *Specimens of rocks 101057 (left) and 101058 (right) submersed in tap water prior to testing.*

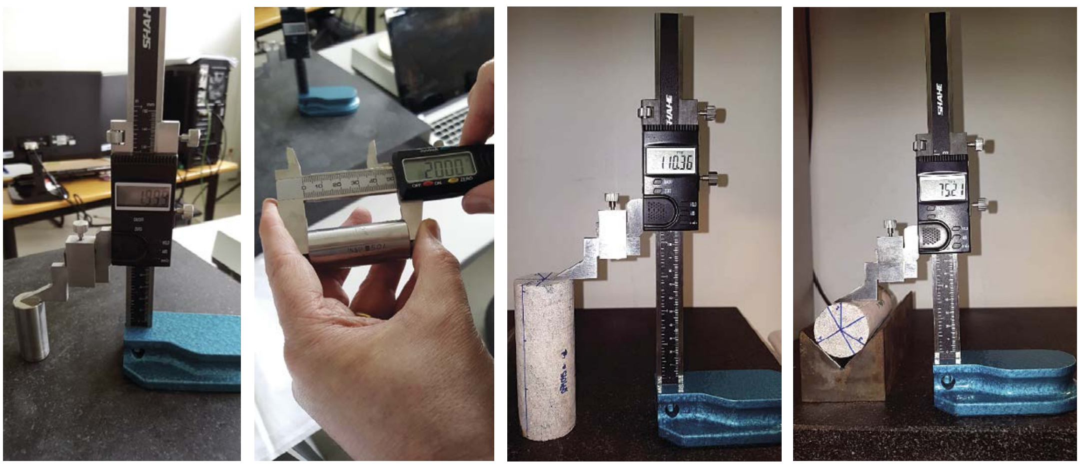


Figure 2-7. *Metrological equipment used to determine the geometric compliance of plugs according to the ASTM D4543-01 (ASTM 2001) standard. Two images on the left: Precision digital height gage and Vernier calliper calibrated against a standard reference plug (2" length). Two images on the right: Plug checking over the flatness table.*

The mean length (L) of each plug was averaged from 5 measurements taken at an angular increment of ~72º. Likewise, the corresponding average diameter (D) was measured in equally-spaced sections (3 and 5 for ITS and UCS specimens, respectively) distributed between the top and bottom faces of the samples.

2.3.2 Density, water absorption and porosity

The weight of the tested samples was determined with the aid of an internally calibrated digital precision scale (*Sartorius Entris 4502*; precision = 0.01 g) which was further verified with a reference standard weight. The weight of the samples was measured dry (after drying in an oven at 110ºC for more than 24 h) and moist (after immersion in water during more than 7 days).

2.4 Testing equipment

2.4.1 Ultrasonic pulse (V_P and V_S) velocity determinations

Ultrasonic pulse velocities (V_P and V_S) were determined by capturing waveforms with the aid of two *ErgoTech Ltd*. 1.5" (38.1 mm) titanium-faced compression platens (Figure 2-8).

This system is equipped with acoustic ultrasonic emitter/receivers whose central frequency is 1.3 MHz. The PZT5a piezoelectric stack of the emitter is excited with a high-voltage source located in a quadratic pulse generator also manufactured by *ErgoTech Ltd.* The receiver unit is identical to the emitter so their role can be exchanged.

Figure 2-8. *Platens and load frame used to conduct the ultrasonic pulse velocity determinations.*

The transducers make possible the observation of the travel time of compressional (P) and two orthogonally-polarized shear waves (S_1, S_2). For each sample and wave-type (either P, S_1 or S_2) a total of 32 waveforms were recorded, digitized, stacked (to reduce noise) and processed with the aid of a *Pico Technology 5252B*, 200 MHz bandwidth digital oscilloscope and the *PicoScope*® software (ver. 6.14.5.4585).

To conduct the measurements, the specimens were installed between the transducer platens which, in turn, are mounted in a dedicated load frame equipped with a hand-operated hydraulic actuator (*Enerpac RC106*) and a 100 kN load cell (*AEP Transducers mod. CCBS8210T5*). In order to improve contact and travel of seismic waves, all the samples were loaded to a corresponding stress of 1 MPa (i.e., correcting the load according to the surface of the specimen). Furthermore, to enhance the physical contact, a thin layer of *Olympus SWC-2* shear wave couplant was used to improve shear wave detection. When the quality of the waveform was observed to be poor, a supplementary 16 µm-thick aluminium foil was inserted between the transducers and the sample. The experimental method makes possible the determination of the time-of-flight (TOF) of an ultrasonic pulse traveling through the tested rock.

There is no SKB recommended procedure to evaluate ultrasonic velocities in core plugs. However, there are two main standard procedures applicable to measurements in rocks: ASTM D2845-05 standard (ASTM 2005), and the suggested method of the ISRM (Aydin et al. 2014). While the standard ASTM D2845-05 provides with technical guidelines, it does not include any provision for checking the performance of the transducer elements. On the other hand, the ISRM suggested method emphasizes the importance of TOF correction due to the delay imposed by the presence of face plates and provides with several ways to account for it. None of them make any consideration with respect to the methodology for the picking of the first arrival of P and S waves which is, in fact, the most critical aspect in order to determine ultrasonic velocities. In summary, it must be stated that there are no strict recommendations or standard guidelines for the verification of transducers and the procedures followed at LaMeRoc conform to best practices based on the experience. They are based on two main procedures and checks and they are aimed at ensuring the highest reliability in the obtained waveforms. They are summarized next:

Procedure to check the good operation of the transducers

To check the good performance of the ultrasonic transducers, a preliminary test was performed to assess the TOF value associated with the direct contact of the platens (i.e., without the presence of any sample). The measured TOF can be compared with the data stated by the manufacturer at the time of the reception of the equipment (see Appendix 1, Table A1-1). Although this determination should constitute an instrumental constant, the periodical check of the transducers provides information about the eventual drift associated with damage in some of the crystals of the transducer stack. It is interesting to note that the manufacturer of the equipment (*ErgoTech Ltd.*) used a hand-picking methodology to identify the corresponding TOF. This is different to the process normally used in LaMeRoc, that it is based on an automatic Akaike Information Criterion (AIC)-type picker.

Procedure to verify the adequate performance of transducers with internal reference materials

A series of internal verification plugs are available at LaMeRoc. They are made of different materials (aluminum and steel alloys, brass, *Delrin*®) with different diameters and lengths. This verification procedure consists in the comparison of the obtained V_P and V_S values with the expected ones for the corresponding materials. In the case of the tests performed, we used a 6082-T6 (UNE L-3453) aluminum alloy plug of 38.1 mm diameter and equal length. There is no literature available about the specific wave velocity values of this particular alloy although it is well known that aluminum alloys typically have a V_P of ~6300 m/s and V_S of ~3100 m/s. A summary of the properties of this reference material is provided in Table 2-2.

Table 2-2. Selected properties of the aluminum alloy 6082-T6 (UNE L-3453) used to check the ultrasonic transducers.

Chemical composition (%)		Geometrical and mechanical properties	
Si	0.70–1.30	**Young's modulus**	69.5 GPa
Fe	0.50	**Poisson's ratio**	0.33
Cu	0.10	**Density**	2710 kg/m^3
Mn	0.40–1.00	**Yield strength**	270 MPa
Mg	0.60–1.20	**Brinell hardness (HBS)**	94
Cr	0.25		
Zn	0.20	**Diameter**	38.1 mm
Others	0.10	**Length**	38.1 mm

Comparative performance of the ultrasonic transducers

At the time of the reception of the ultrasonic transducers in LaMeRoc, *ErgoTech Ltd*. provided with a chart comparing the performance of their transducers with other commercially available ones. The comparison made by the manufacturers is based on the use of the same internal standard (titanium, aluminium and brass) with the specific set of transducers. The reported results illustrate their excellent performance compared with other commercial references (Appendix 1, Table A1-1).

Acquisition conditions

The conditions for waveform acquisition consider the following settings: a) Lowpass (1 MHz) filtering; b) 4 MS/s sampling; c) 15-bit resolution; d) 10 and 20 µs/div acquisition times (for P and S waves, respectively); e) 32 averaged stacked waveforms.

Waveform processing

All the waveforms (see Appendix 3, Figure A3-1 to Figure A3-12) were acquired and processed in the same way. For each P, S_1 and S_2 measurement, a total of 32 waveforms are recorded. After their acquisition, the set of 32 waveforms was stacked and averaged to reduce noise. The averaged waveform was then amplitude-normalized (x') by its mean ($\bar{x}$) according to the following formula:

$$x' = \frac{x - \bar{x}}{x_{max} - x_{min}}$$

In order to reduce the bias inherent to the manual picking of the TOF, we have applied a semi-automatic picking algorithm based on the Auto Regressive Akaike Information Criterion (AR-AIC) (Akaike 1973). By applying the AIC method, it is assumed that the intervals before and after wave-phase arrival (either P or S) correspond to two different stationary processes separated by an onset (arrival time) where the AIC characteristic function (CF) attains a minimum value (Figure 2-9).

Before computing CF, the normalized waveform is smoothed by applying a median filter to the normalized waveform. The general formulation of the AIC model is as follows:

$$AIC(k) = (k - M) \cdot \log(\sigma^2_{1,max}) + (N - M - k) \cdot \log(\sigma^2_{2,max}) + C_2$$

where M is the length of the auto-regressive filter, $\sigma^2_{1,max}$ and $\sigma^2_{2,max}$ are the variances of the time series in intervals [M+1,k] and [k+1,N−M], and C_2 is a constant.

In our case, the AIC characteristic function has been computed following the method described in Maeda (1985). This is obtained directly from the waveform without computing the coefficients M and C_2 through the following expression:

$$AIC(k) = k \cdot \log\{var(x[1,k])\} + (N - k - 1) \cdot \log\{var(x[k + 1,N])\}$$

where var(x[1,k]) is the variance of the time series x(1), x(2),…, x(k), and var(x[k+1,N]) is the variance of the time series x(k+1), x(k+2), …, x(N). The previous computations were implemented in a Microsoft® Excel® worksheet where the time window of interest (i.e., where the pulse arrival is expected to occur) is defined by the operator as an "educated guess".

Once the arrival time is known, TOF can be computed and corrected by subtracting the delay time (T_{blank}) associated to the travel of the pulse through the thickness of the transducer platens previously obtained from a face-to-face measuring test. The corresponding velocity formula is the following:

$$V = \frac{TOF - T_{blank}}{L_{mean}}$$

where V is the computed velocity (either P or S) and L_{mean} the length of the travel path.

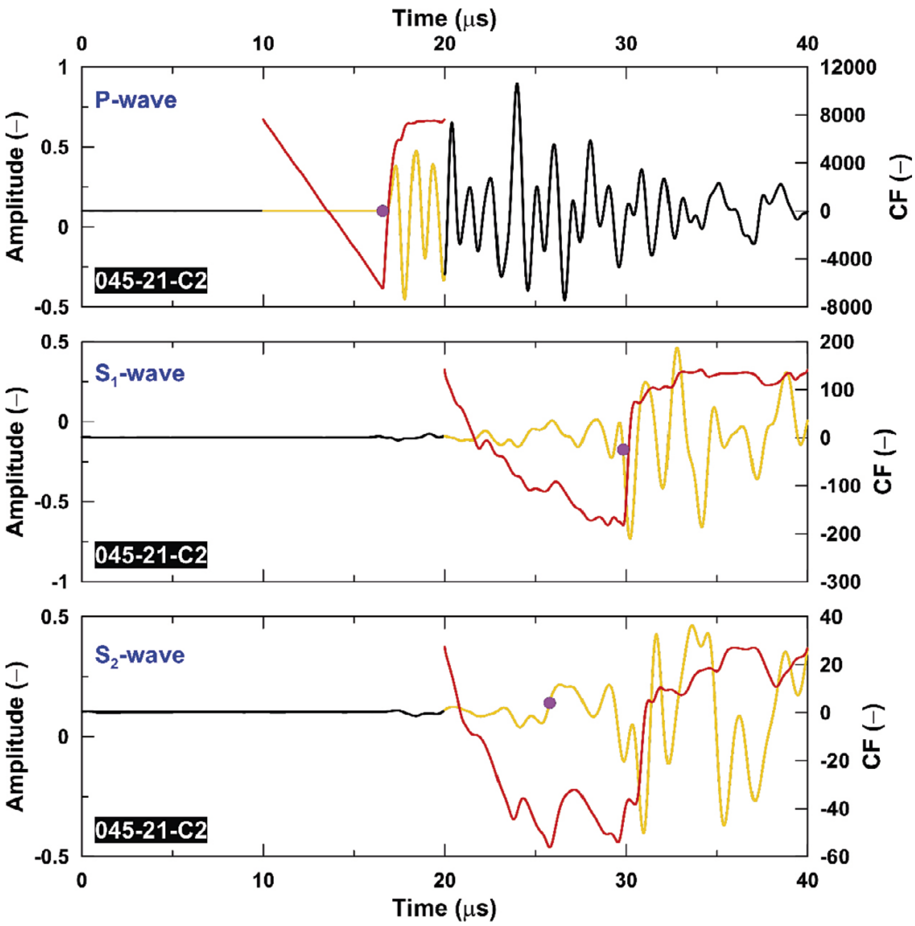


Figure 2-9. Example application of the AIC picking methodology described in the text. The black line corresponds to the normalized waveform and the yellow one overlaps the defined time window of interest. The red line represents the dimensionless AIC characteristic function (CF) and the pink dot the obtained arrival time. The example corresponds to a 21 mm diameter plug of the rock 101058.

Assessment of dynamic moduli

The computation of dynamic moduli is based on the experimental measurements and the formulas described in the standard ASTM D2845-05 (ASTM 2005). These are the followings:

- Dynamic Young's modulus:

$$E_{dyn} = 3\rho_{app}V_S^2 \frac{V_P^2 - \frac{4}{3}V_S^2}{V_P^2 - V_S^2}$$

- Dynamic Poisson's ratio:

$$\upsilon_{dyn} = \frac{1}{2}\left\{1 - \frac{1}{\left(\frac{V_P}{V_S}\right)^2 - 1}\right\}$$

- Dynamic shear modulus:

$$G_{dyn} = \rho_{app}V_S^2$$

- Dynamic bulk modulus:

$$K_{dyn} = \rho_{app}\left(V_P^2 - \frac{4}{3}V_S^2\right)$$

where ρ_{app} represents the apparent density of the rock, V_P the longitudinal (compressional) velocity and V_S the shear pulse velocity. If density units are given in kg/m^3 and velocities in m/s, the corresponding units for the Young's, shear and bulk moduli are N/m^2.

Assessment of instrumental effects in velocity measurements

The standard ASTM D2845-05 (ASTM 2005) points out some caveats applicable to ultrasonic measurements in rocks considering minimum sample sizes and grain size restrictions. This is to be materialized through the specific transducers used in the survey and the corresponding wavelengths. The standard indicates that the wavelength (λ) corresponding to the dominant frequency of the pulse train in the rock is approximately related to the natural resonance frequency of the transducer (f) and the pulse-propagation velocity (V, either compressional or shear) through the following expression:

$$\lambda = \frac{V}{f}$$

Taking into account that the transducers used have a resonant frequency of 1.3 MHz and that the maximum V_P and V_S are expected to be ~5 000 to 6 000 and ~2 000 to 3 000 m/s respectively (Schön 2015), the P- and S-pulse wavelengths would be of ~3.8 to 4.6 mm and ~1.5 to 2.3 mm. In order to reduce attenuation due to pulse scattering and poorly defined first arrivals at the receiver, the standard indicates that wavelength shall be at least 3 times the average grain size of the rock. Assuming a typical grain size range for rocks 101057 and 101058 between 5 and 10 mm, we see that the transducers used provide with wavelengths smaller than the optimum for these particular rocks. Although this factor does not affect directly the quality of the measurement, it hampers identification of arrival times due to the significant reduction of amplitude, especially in the case of larger plugs.

Table 2-3. Compliance of the tested plugs with the geometrical constraints of the ASTM D2845-05 standard (ASTM 2005).

D (mm)	L (mm)	Grain size x10 (mm)	λ_P x5 (mm)	λ_S x5 (mm)
*15**	*37.5***	50–100	19–23	7.5–11.5
*21**	*52.5***	50–100	19–23	7.5–11.5
30	75**	50–100	19–23	7.5–11.5
42	105**	50–100	19–23	7.5–11.5
54	135	50–100	19–23	7.5–11.5
63	157.5	50–100	19–23	7.5–11.5
100	250	50–100	19–23	7.5–11.5

Notes: * = Do not comply with the 5 x λ constraint; ** = Do not comply with the 10 x grain size constraint.

In what concerns plug length and diameter, the standard recommends that the ratio of the pulse-travel distance (L) to the minimum lateral dimension (D) must not exceed 5 in order to have reliable velocities. This condition is met by our samples as their corresponding slenderness ratio (L/D) has been constrained to ~2.5. However, this requirement is further constrained by the grain size of the sample because the standard considers that the minimum sample length must be at least 10 times the average grain size. Moreover, it also states that the minimum lateral dimension of the test specimen shall be at least 5 times the wavelength. This is due to the fact that the grain size of the rock sample, the natural resonance frequency of the transducers, and the minimum lateral dimension of the specimen are interrelated factors that affect test results.

Table 2-3 summarizes the application of the dimensional criteria provided by the standard to the tested specimens. We observe that, the grain size to length restriction mainly affects the samples with smaller diameters (15, 21 and 30 mm; 42 mm would be in the limit) while the most restrictive wavelength condition (that corresponding to the P-waves) is not satisfied by plugs of 15 and 21 mm. Therefore, wave velocities associated with the measurements corresponding to 15, 21, 30 and 42 mm samples should not be considered reliable. Further considerations in this line will be provided when discussing actual results.

2.4.2 Uniaxial compressive strength testing

The uniaxial compressive strength and indirect tensile strenght tests have been performed in a *Servosis S.L.* 3 000 kN universal testing machine equipped with a dual load cell configuration (Figure 2-10). The main loading system is based on a 1 500 kN load cell (*Servosis S.L.*) built in the cross bar of the frame. The secondary one is a removable 30 tons (490.5 kN) device (*AEP Transducers mod. CTC416550T3*).

The electronics of the frame (based on the PCD 2K software) allow to work under the control of the main or secondary load cell systems, integrating the signal of up to 32 analogue acquisition or mathematical channels. This system can operate either on force, displacement or strain controls, with programmable monotonic/cyclic procedures and control switching (i.e., from load to strain control). It is able to acquire with high-frequency the signals provided by a variety of sensors (force, displacement, temperature, pressure, strain gages, etc).

For the present work, the control mode was set to displacement and monitoring included the record of the applied load, hydraulic cylinder displacement, local strains (associated with the change in resistivity of 1 to 4 strain gages glued to the surface of the tested specimens) and global strains (up to 4 LVDTs measuring diametric and face-to-face displacements). The data files obtained after each test were later filtered and post-processed in order to obtain the required properties. Post processing was performed with the aid of different *MicrosoftTM Excel*® worksheets and then plotted with the software *Grapher*® 12.7 by *Golden Software Inc.*

__Figure 2-10.__ On the left side, universal load frame used to conduct the UCS tests. On the right side, strain gage and LVDT conditioning modules (top) and heat-treated load platens (bottom).

Performance checking

All the measurement devices used in the present study were checked in order to evaluate their adequate performance and sensitivity. Checks were conducted at the instrumental and electronic levels. With respect to the first approach, the load frame and control devices were calibrated by an external accredited service.

The results of the calibration are presented in Appendix 1 and, as a summary, the UCS testing equipment conforms to Class 1 force according to the standard UNE-EN ISO 7500-1:2018 (UNE 2018), and Class A displacement according to the standard ASTM E2309-18 (ASTM 2018). Based on the previous calibration, secondary internal calibrations were performed with the relevant measuring devices. For instance, Figure 2-11 illustrates the result of the calibration of the 30-ton load cell used to determine the applied load to small size plugs (15, 21, 30 mm-diameter) with the 1 500 kN primary load cell of the equipment.

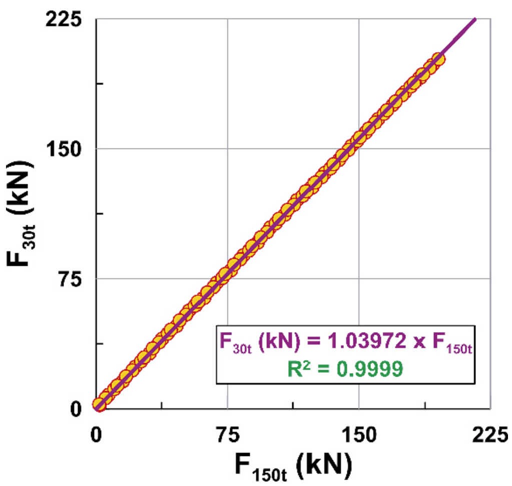


__Figure 2-11.__ Check of the performance of the secondary 30 ton load cell used for the determination of the load applied to small size plugs.

In order to check the good operation of the signal conditioning modules, we employed several calibration/verification devices which are illustrated in Figure 2-12.

Finally, two dummy cylinders (made of AISI 304 and AISI 1045 steel) where instrumented with the same strain gages that were planned to use with the rocks of interest and we conducted a verification of the operational procedures and computations by comparing the expected Young's modulus and Poisson's ratio with the ones obtained with the testing equipment. The results of these verifications are illustrated in Figure 2-13 and Figure 2-14. It is worth to note that while the elastic moduli computed with strain gages compares very well with the reference values, for those derived from LVDTs measurements the results differ significantly (i.e., lower and non-linear values). This is a reasonably outcome according to the measuring technique (local versus global strain) and, for the sake of this report, although LVDT-derived strain data were obtained, they will not be further analyzed.

Figure 2-12. Calibration/verification instruments for checking the performance of the signal conditioning units of the load cells (left: Interface Measurements Ltd. mod. AS600) and Wheatstone bridges (right: Vishay Strain Indicator Calibrator 1550A).

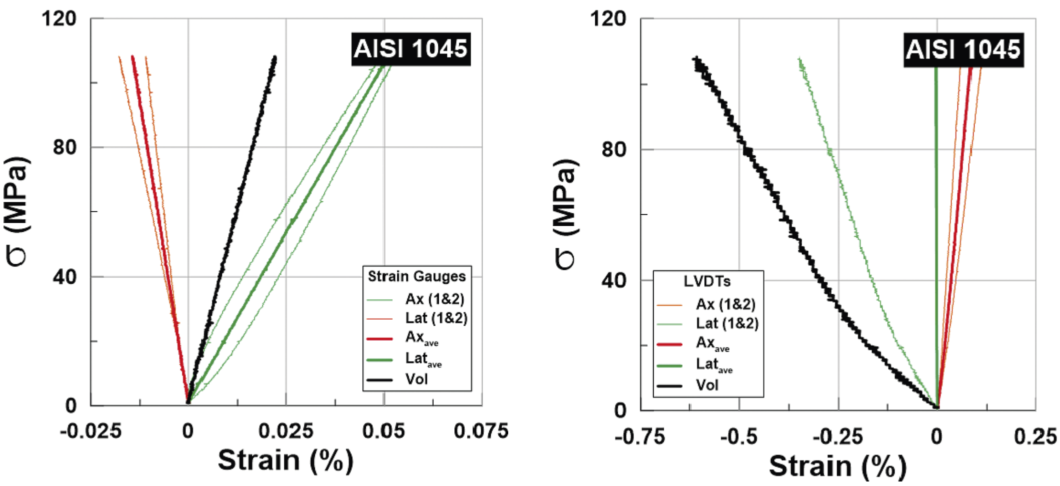


Figure 2-13. Results of a compression test performed with an internal reference standard made of AISI 1045 steel. The left plot illustrates elastic deformation using strain gages (local strain) while the right plot shows the result associated with LVDTs (global strain). Notes: Ax(1&2) = axial strain measured with strain gages (left) or LVDTs (right) 1&2; Lat(1&2) = lateral strain measured with strain gages (left) or LVDTs (right) 1&2; Ax$_{ave}$ = average axial strain; Lat$_{ave}$ = Average lateral strain; Vol = volumetric strain.

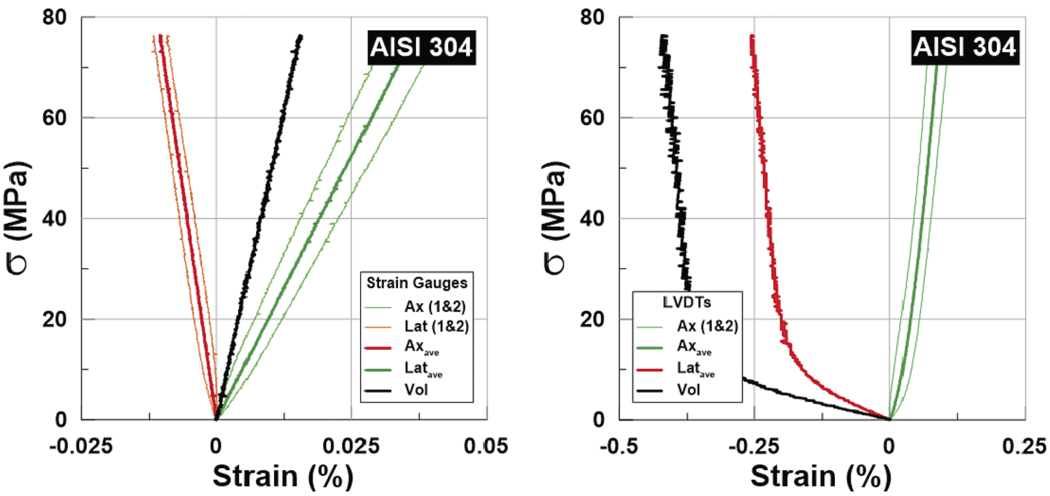
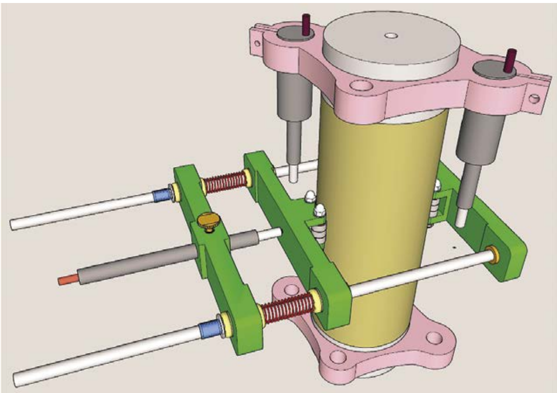


__Figure 2-14.__ Results of a compression test performed with an internal reference standard made of AISI 304 steel. The left plot illustrates elastic deformation using strain gages (local strain) while the right plot shows the result associated with LVDTs (global strain). Notes: Ax(1&2) = axial strain measured with strain gages (left) or LVDTs (right) 1&2; Lat(1&2) = lateral strain measured with strain gages (left) or LVDTs (right) 1&2; Ax$_{ave}$ = average axial strain; Lat$_{ave}$ = Average lateral strain; Vol = volumetric strain.

Testing procedures

In order to minimize end effects at the interface of loading platens and the samples, seven different pairs (one pair for each diameter) of heat-treated steel compression platens (UNE F-1140/AISI 1045) were manufactured to conduct the mechanical tests. The final Rockwell HRC hardness of the platens was 60, a value greater than 58 that is the one suggested by ISRM (1999) and prescribed by the standard ASTM D2938-95 (ASTM 1995a).



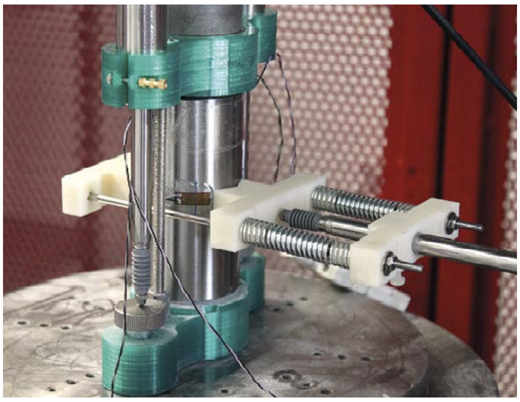


__Figure 2-15.__ 3D-printed LVDT support frames used to perform global strain measurements.

The characterization of the strain experienced by the samples up to their failure was based on two complementary measurements:

- For local strain measurements, we employed 120-ohm foil strain gages glued with epoxy (*Ceys Araldite® Cristal*) to the surface of the specimens. With the exception of the 15 and 21 mm-diameter specimens, all the remaining samples were equipped with four strain gages:
  – Two of them were disposed parallel and the other two orthogonal to the loading axis.

  With this configuration it is possible to doubly-assess the axial strain (and Young's modulus) and the circumferential/radial strain (and Poisson's ratio) of the samples.

  In the case of the 15 and 21 mm-diameter plugs, due to size constraints, only one (parallel) or two (one parallel and the other perpendicular) strain gages could be installed, respectively.

  Foil strain gages were commensurate with respect the length of the tested specimens. Thus, we used a size of 6 mm for plugs of 15, 21 and 30 mm-diameter, 10 mm for plugs of 42, 50 and 54 mm-diameter, 20 mm for the plugs of 60 and 63 mm-diameter, and 50 mm for those of 100 mm-diameter.

  During data assessment, each strain gage channel was checked independently for mutual consistency in the redundant sensors. If the data was found to be consistent it was then averaged to increase precision. In the case that one of the channels was inconsistent with the companion, an educated guess about which strain gage should be retained for further computations was done.
- For global strain we used LVDT-type devices (*Solartron G-type AX/5/S*), two of them disposed axially and one more radially. Special devices were 3D-printed to support the displacement transducers in the required configuration (Figure 2-15).

UCS tests were carried out according to the internal procedures outlined in SKB (2007a), which is based on the ISRM (1999) suggested method. This is summarized in Table 2-4. All the recorded parameters were acquired at a sampling frequency of 50 Hz.

Table 2-4. UCS testing procedure.

Step	Description
1	Digital photos of the specimen are taken before the mechanical testing. Strain gages have been previously epoxy-glued to its outer surface.
2	The specimen is emplaced and centered between the two hardened steel load platens.
3	Devices for measuring axial and diametric global deformations are installed in the load platens and the specimen.
4	The cross-head of the load frame is lowered to a short distance (~ 1 mm) of the top load platen.
5	Strain gage plugs are connected to the signal conditioning unit and checked for good operation.
6	LVDTs are connected to the corresponding electronic box and checked for good operation.
7	The frame piston is brought into contact with the specimen up to attain an axial stress of 1 MPa.
8	Each LVDT is independently adjusted by means of a set screw to the right initial position.
9	One load/unload cycle (going from 1 to 5 MPa and back again) is conducted to ensure good mechanical coupling between the specimen and the loading system.
10	Centring of the sample and the good operation of the sensors are checked again.
11	The strain measurement channels (strain gages and LVDTs) are zeroed in the data acquisition software.
12	The beginning of the test is concurrent to recording. The test is executed in strain-mode control using a monotonic ramp of 0.025 % per min. No control on the post-peak branch is set.
13	The test is stopped either manually (switch off) or electronically (a failure condition is met) after peak load has been observed or failure has occurred.
14	Digital photos of the broken specimen are taken and the remnants recovered for provisional storage, if possible.
15	The system is disassembled and carefully cleaned for the next test.

Data processing

The experimental record of each test allows for the computation of different properties of the samples. This is summarized next:

- Axial stress:

$$\sigma = \frac{P}{A_0}$$

where σ is the axial stress (N/mm^2 or MPa), P the axial load at any instant of time (N) and A_0 the initial specimen cross-sectional area (mm^2).

- Ultimate uniaxial compressive strength:

$$UCS\ or\ \sigma_c = \frac{P_{peak}}{A_0}$$

where UCS (or σ_c) represents the ultimate axial compressive strength (MPa), P_{peak} the axial load at failure (N) and A_0 the initial specimen cross-sectional area (mm^2).

- Axial strain:

$$\varepsilon_{ax} = \frac{\Delta l}{l_0}$$

where ε_{ax} is the axial strain (m/m), Δl the change in the length of the specimen (m) and l_0 its initial length (m).

- Lateral strain:

$$\varepsilon_{lat} = \frac{\Delta d}{d_0}$$

where ε_{lat} is the lateral strain (m/m), Δd is the change in diameter of the specimen (m) and d_0 its initial diameter (m).

- Volumetric strain:

$$\varepsilon_{vol} = \varepsilon_{ax} + 2\varepsilon_{lat}$$

where ε_{vol} is the volumetric strain and ε_{ax} and ε_{lat} the axial and lateral strains, respectively.

- Static Young's modulus:

$$E = \frac{\sigma_{50}}{\varepsilon_{50}}$$

where E is the tangent static Young's modulus at 50 % of peak strength (GPa), σ_{50} is the stress at 50 % of the peak strength (MPa) and ε_{50} the strain at 50 % of the peak strength (m/m).

- Static Poisson's ratio:

$$\upsilon = \frac{E_{ax}}{E_{lat}}$$

where υ is the Poisson's ratio and E_{ax} and E_{lat} are the slopes of the axial and lateral stress-strain curves at 50 % of the peak strength, respectively.

The computation of the peak strength of each sample was performed through the identification of the peak load at failure and normalizing it by the reference area of the sample.

Tangent Young's modulus and Poisson's ratio were determined at a strength level equal to 50 % of UCS. The experimental data is fit to a 3rd order polynomial ($y = ax^3 + bx^2 + cx + d$) and, for the corresponding strain at the 0.5 × UCS, we compute its first derivative ($y' = 3ax^2 + 2bx + c$) to assess the corresponding tangent slopes for the axial and radial stress-strain curves. This allows a smoother assessment than just by taking the experimental records.

Crack damage (σ_{CD}) and crack initiation (σ_{CI}) stresses were computed following the Lateral Strain Response (LSR) Method proposed by Nicksiar and Martin (2012). This method assesses the deviation between the experimental stress-strain curve and the theoretical linear response of an ideally elastic material. This difference is plotted as a function of axial stress and the maximum deviation is considered to occur at the onset of crack initiation (i.e., σ_{CI}). The assessment procedure is as follows:

- Determine where the volumetric strain reversal occurs (i.e., the maximum volumetric strain). This is the onset where unstable crack growth (σ_{CD}) occurs.
- Determine the linear lateral strain reference line. This is obtained from the conversion of the maximum volumetric strain into radial (lateral) strain associated to the same axial stress: The line joining this point with the origin provides its slope.
- Compute the difference in radial strain (Δ_{LSR}), which is the difference between the experimental and the linear reference line.
- Plot the axial stress *vs.* Δ_{LSR} and assess the maximum change in lateral strain difference and the associated axial stress. This point corresponds with the crack initiation stress σ_{CI}.

Although all the tests were evaluated, not all of them provided with useful results.

2.4.3 Indirect tensile strength testing

The indirect tensile strength tests have been performed in a computer-controlled, servo-hydraulic multi-purpose machine able to perform tests under a variety of control settings. This is a Class I load equipment, according to the standard UNE-EN ISO 7500-1:2018 (UNE 2018), including a high-stiffness load frame (Figure 2-16) that stands forces up to 1 500 kN in compression and it is equipped with a 50 ton (490.5 kN) load cell (*AEP Transducers mod. CTC416550T5*). The hydraulic group of the load frame is also equipped with a sensitive pressure transducer (*Dynisco IDA-330-7C*) whose signal, as an alternative to load cell control, allows an accurate operation of the axial actuator of the load frame.

Different load cells are available for this system (300, 500, 1 000 kN) and, with the pressure transducer the applied load cell may reach 1 177.2 kN. In both cases the measurement precision is equal or better than 0.1 % in the load range comprised between 0 to 120 tons. The control of the system is based on the same PCD 2K software (*Servosis S.L.*) described in a previous section.

The data files obtained after each test were later filtered and post-processed in order to obtain the required properties. Post processing was performed with the aid of different *Microsoft™ Excel®* worksheets and plotting with the software *Grapher®* 12.7 by *Golden Software Inc.*

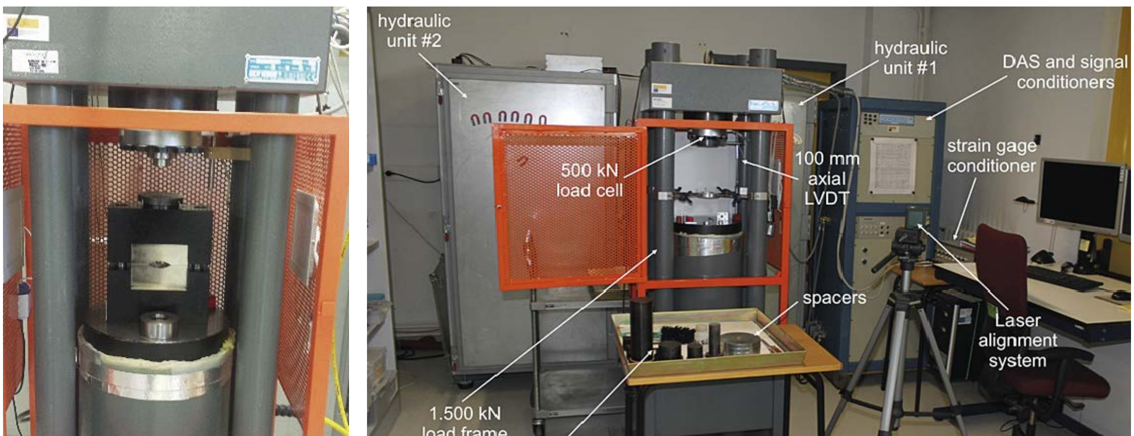


Figure 2-16. *Load frame and loading jaws (left) used to conduct the ITS tests.*

Performance checking

Like for the UCS system, the performance of this testing equipment was based on an external calibration and internal procedures. The external calibration indicated that this system is a force Class 0.5 according to the standard UNE-EN ISO 7500-1:2018 (UNE 2018), and Class A in displacement according to the standard ASTM E2309-18 (ASTM 2018). Internal checking procedures were the same previously described.

Testing procedures

The indirect tensile strength tests were carried out according to the internal SKB procedures outlined in SKB (2007b), which is broadly based on the standard ASTM D3967-95a (ASTM 1995b). In order to account for the presence of foliation in the tested rocks and to reduce uncertainties due to its unacknowledged presence, the tested plugs were observed to identify this feature. The angle of foliation with respect the plug axis was measured with the aid of a protractor and the strike line of the foliation planes in the plugs was marked in the flat face of each specimen with a blue line. The perpendicular direction to this line was marked with a green line and selected as loading direction (Figure 2-17).

Tests were performed with the aid of a frame allowing exchangeable HRC 58 loading jaws manufactured by *MTS Systems Co*. Loading jaws are reported by *MTS* to be grounded flat to less than 0.0005 mm/mm. In order to ensure that the prescribed contact area does not exceed 15º, two series of load jaws were used: a) For 42 and 54 mm diameter samples, jaws with end arc radii of 75 mm; b) For 63 and 100 mm diameter samples, jaws with end arc radii of 112.5 mm.

The standard ASTM D3967-95a (ASTM 1995b) prescribes the use of bearing strips (or cushion pads) between the loading jaws and the tested rock. This cushion pad is made of cardboard whose thickness must be proportional to the diameter of the sample (0.01D). In the tests performed, cardboard strips of 0.25 mm thickness where used: one strip for the 42 mm-diameter plugs; two strips for the 54 mm-diameter specimens; three strips for the 63 mm ones and four strips for the 100 mm cylinders.

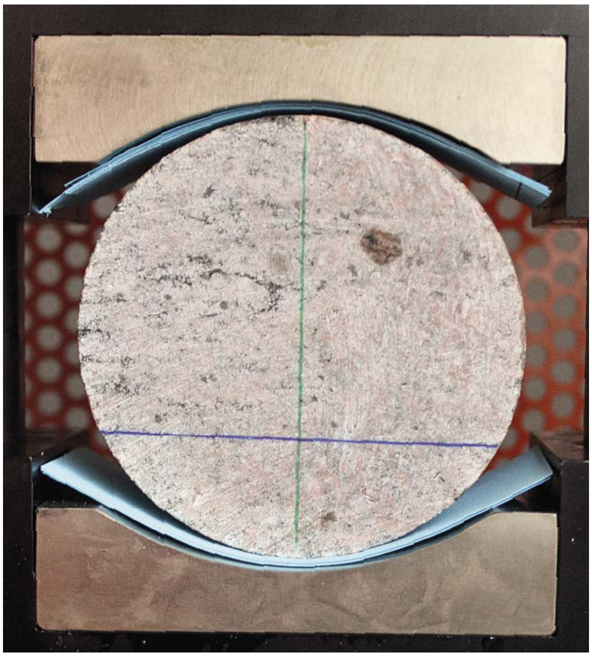


Figure 2-17. *On the left, one of the tested specimens located between the loading jaws and cushion cardboard strips. On the right, foliation line marked on the side of the tested plug. The green line corresponds to the loading direction which was selected to be orthogonal to foliation.*

The tests were performed in load-mode control at a constant loading rate of 0.2 MPa/s. This is between the minimum (0.05 MPa/s) and maximum (0.35 MPa/s) rates given by the standard ASTM D3967-95a (ASTM 1995b). Because the natural control system of the frame is force, in order to correct the applied load to the corresponding sample size we equated it based on the target stress of 0.2 MPa/s. This resulted in the following loading rates:

a) For D = 100 mm: $\Delta P/\Delta t$ = 1.570 kN/s

b) For D = 63 mm: $\Delta P/\Delta t$ = 0.625 kN/s

c) For D = 54 mm: $\Delta P/\Delta t$ = 0.455 kN/s

d) For D = 42 mm: $\Delta P/\Delta t$ = 0.275 kN/s

The testing procedure is summarized in Table 2-5.

Table 2-5. ITS (or BTS) testing procedure.

Step	Description
1	Digital photos of the specimen are taken before conducting the test.
2	The specimen is emplaced and free-centered within the load jaws of the testing device.
3	The actuator raises the testing device with the sample to a close distance (~1 mm) of the top load platen. Load and displacement channels are zeroed at this time.
4	The frame piston is brought into contact with the specimen with a small load (100 N) to ensure mechanical stability.
5	The beginning of the test is concurrent to recording. The test is executed in load-mode control at a constant loading rate of 0.2 MPa/s.
6	The test is stopped manually (switch off) after peak load was observed or failure occurs.
7	Digital photos are taken of the specimen upon completion of each test.
8	The testing device is disassembled and carefully cleaned for the next test.

Data processing

For the indirect tensile strength tests the only property measured is the value of the peak load at failure (P_{peak}) that, taking into account the geometry of the sample, can be equated into tensile stress (σ_T) according to the following formula:

$$T \ or \ \sigma_T = \frac{2P_{peak}}{\pi L_{mean} D_{mean}}$$

where L_{mean} and D_{mean} are the average length and diameter of the tested specimens, respectively.

2.5 Statistic treatment and data reduction

Upon completion of the acquisition and processing of the experimental results, the data was assessed with the aim of determining its statistical significance and investigating representativeness and repeatability. Two complementary approaches have been followed to present the results: Graphical (or semi-quantitative) and statistical. The graphical approach is based on the construction of selected histograms, comparison with normal distributions, and box and whisker plots. Although this is a good way to illustrate similitude, variability and differences, it lacks the power to state the associated significance.

The statistical analysis was conducted with the aid of the free software *Past* 4.04 (Hammer et al. 2001). This is a powerful software for scientific data analysis, with functions for data manipulation, plotting, univariate and multivariate statistics, ecological analysis, time series and spatial analysis, morphometrics and stratigraphy. Although *Past* was initially conceived for use of the paleontological community, along the past 20 years it has grown into a comprehensive statistics package used in many fields of the life and earth sciences, engineering and economics.

The experimental data obtained in this study was assessed based on a systematic approach. Rock types (101057 and 101058) were separated in the analysis and, before conducting any general descriptive statistical analysis, we kept separated the sample groups associated with the different plug diameters. Then, we performed within-group and between-group assessments.

The within-group analysis was focused in the assessment of normality and we selected the non-parametric Shapiro-Wilk test as reference. This returns a test statistic W (which lies between 0 and 1 and is small for non-normal samples), and a probability p value. The Shapiro-Wilk test is adequate for small sample populations (< 50 originally) although it can be safely used up to sizes of ~2 000 samples. Non-normal populations were further explored in order to identify mixed populations. This was performed with the aid of the modelling module of *Past* (mixture analysis).

The between-groups check was focused in the comparison of means through a one-way analysis of variance (ANOVA) and the non-parametric Mann-Whitney pairwise test. For this (and the other tests/analyses conducted) we used a significance level of 95 % (a = 0.05) so that the rejection of the null hypothesis (H_0) can be verified if the p-level is below this significance.

3 Results

3.1 General properties of specimens

Figure 3-1 (histograms) and Figure 3-2 (box and whisker plots) show the slenderness ratio (L/D) corresponding to the tested UCS and ITS specimens. The summary statistics as well as results of normality tests are presented in Table A2-1, Table A2-2 and A2-31 of Appendix 2.

Only three groups of samples (30 and 63 mm for rock 101057, and 30 mm for rock 101058) do not attain the significance level (a = 0.05) of the Shapiro-Wilk test. Basic statistics of the mixed populations include mean slenderness values of 2.56 ± 0.03 (UCS specimens of rock 101057; n = 72), 2.60 ± 0.02 (UCS specimens of rock 101058; n = 72) and 0.49 ± 0.01 (ITS specimens of rock 101057; n = 28) and coefficients of variation (CV) of 9.51, 6.11 and 6.29 %, respectively. These figures are satisfactory from the point of view of sample size requirements prescribed by ISRM (1999) and the standard ASTM D3967-95a (ASTM 1995b): 2 to 3 for UCS, and 0.2 to 0.75 for ITS.

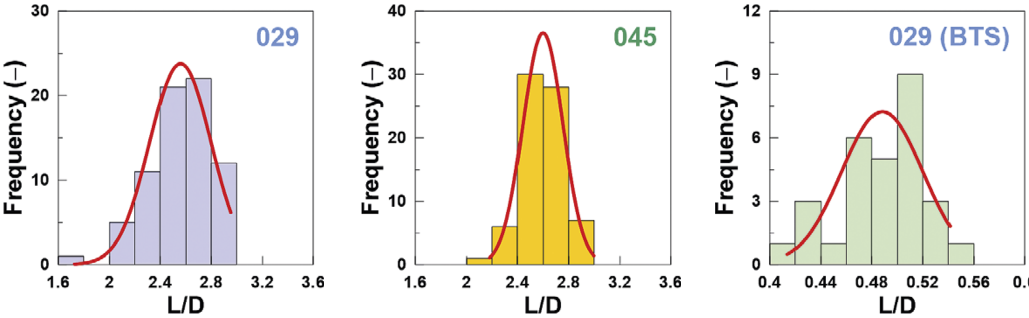


Figure 3-1. *Histogram distribution of the slenderness ratio (L/D) of the tested UCS (lilac and yellow) and ITS (green) plugs. The red line represents a normal distribution fit.*

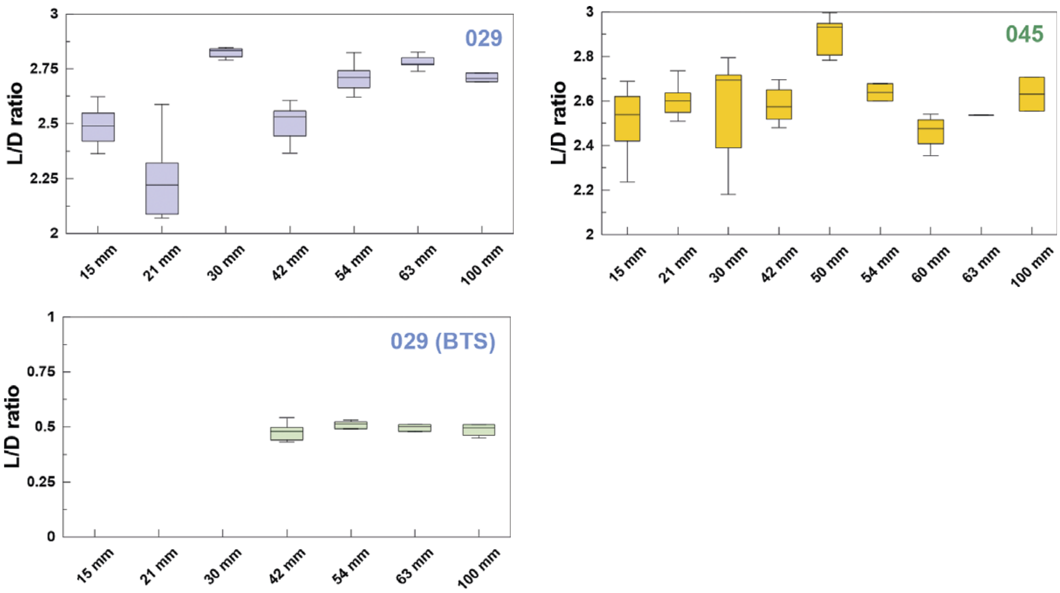


Figure 3-2. *Box and whisker plots of the slenderness (L/D) ratio of the tested UCS and ITS specimens of rocks from RFM029 (101057; lilac and green) and from RFM045 (101058; yellow) as a function of their corresponding diameter.*

Figure 3-3 graphically depicts the within- and between-group relative variability of length and diameter of the tested specimens. We observe that, on average, this between-group value is below 0.5 % for all the samples, including both length and diameter. The exception is the thickness of the ITS specimens for which that value may reach up to 2 %.

The parallelism of end faces of the tested plugs does not diverge more than 0.5 %, with the exception of the 15 mm-diameter plugs (which were difficult to trim). With the same exception, the cylindricity of the plugs (as per the ΔD/D ratio) is better than 1 %.

Based on sample size and dry weight, the dry density of the tested samples (UCS and ITS) was determined and the results are presented in Figure 3-4. For all samples tested, the Shapiro-Wilk test results show that the within-group distribution conforms to Gaussian. In addition, with the exception of the 15 mm-diameter plugs, the ANOVA analysis indicates that the mean of remaining groups is comparable. Representative dry density value for UCS samples in rock type 101057 (from RFM029) is 2 639.9 ± 1.8 kg/m^3 (n = 57; CV = 0.51) and in the case of 101058 (from RFM045) this value is 2 614.9 ± 1.7 kg/m^3 (n = 57; CV = 0.48). In the case of ITS plugs of rock 101057 (from RFM029), their average dry density is 2 635.7 ± 3.0 (n = 28; CV = 0.60), that is equal to the UCS ones within the uncertainty limits. Wet density was also measured for all the samples tested. However, due to the low water absorption and porosity of the two rock types (as will be discussed below), values were almost identical (~0.1 % difference) to those reported for dry density and, therefore, are not further discussed.

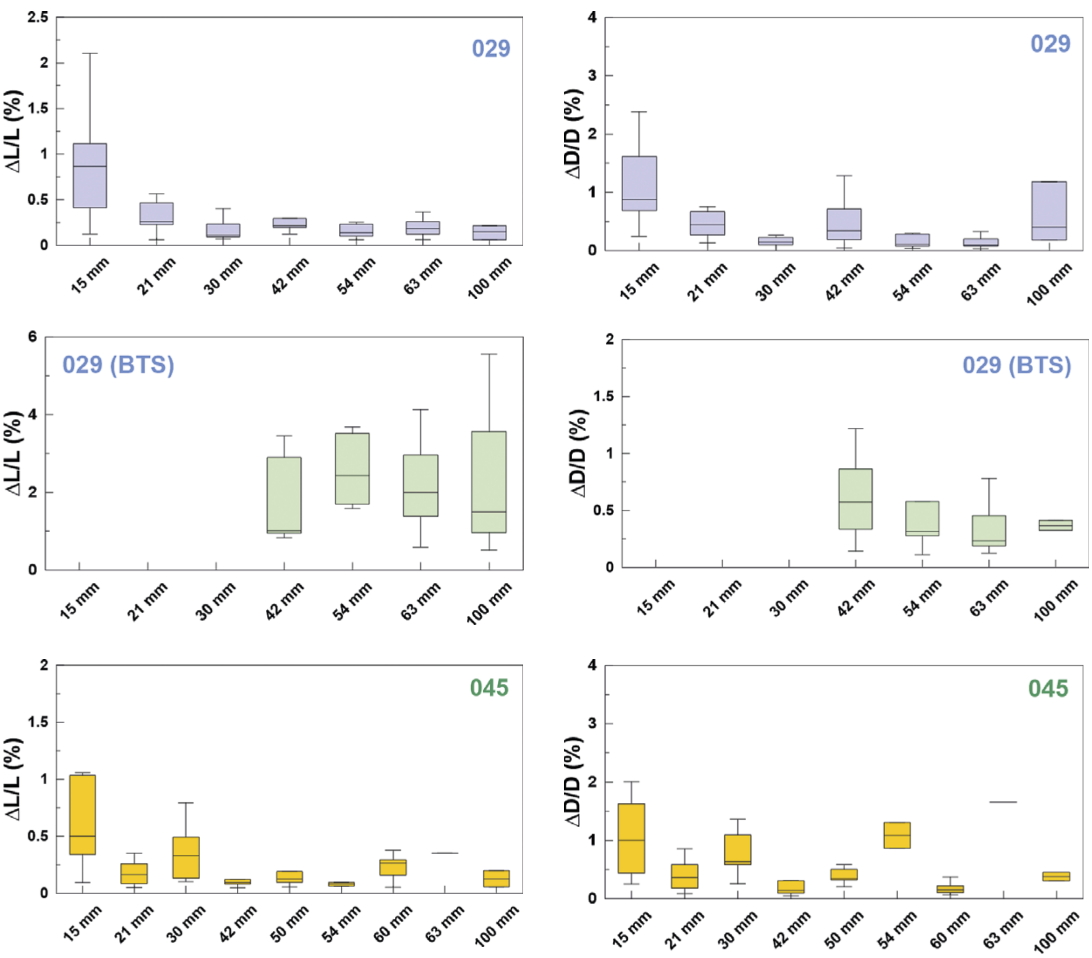


Figure 3-3. *Box and whisker plots of the relative variability of length and diameter (ΔL/L and ΔD/D) of the tested UCS and ITS specimens of rocks from RFM029 (101057; lilac and green) and from RFM045 (101058; yellow) as a function of their corresponding diameter.*

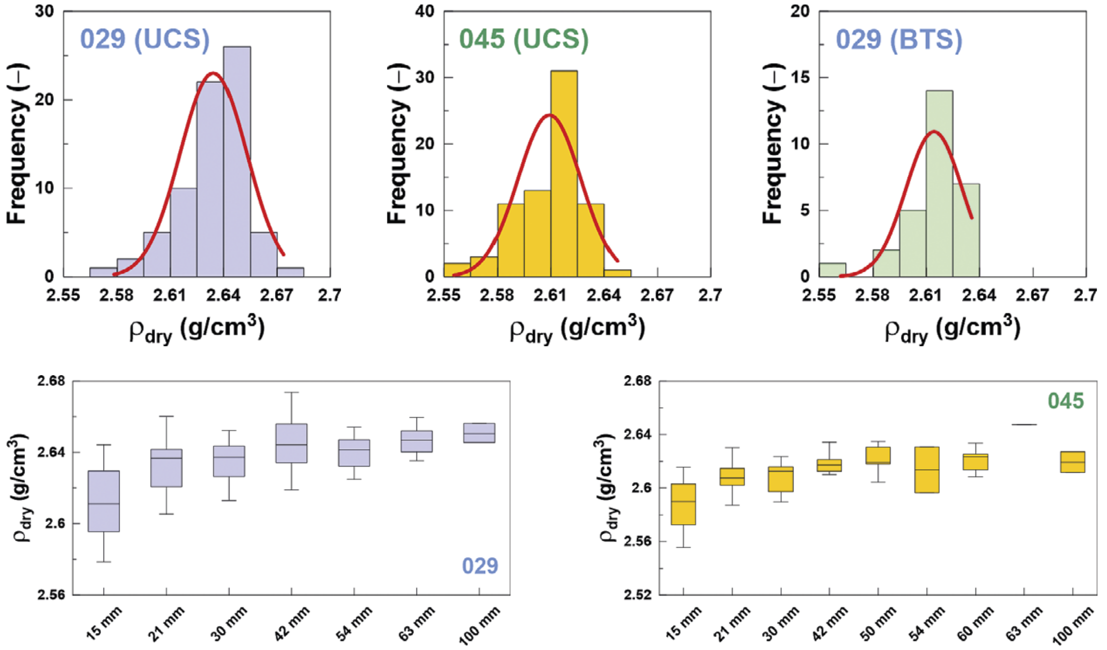


Figure 3-4. *Histograms (top) and box and whisker plots (bottom) of dry density of the tested UCS and ITS specimens of rocks RFM029 (101057; lilac and green) and RFM045 (101058; yellow). The red line represents a normal distribution fit.*

The amount of water absorbed during immersion was also recorded before the tests, and this data was later used to assess accessible porosity. Figure 3-5 and Figure 3-6 illustrate both properties. Due to the low estimated permeability of RFM rocks, it is unlikely that the samples will have attained full saturation after water immersion irrespective of the time the plugs were left to saturate under water. Thus, the porosity assessment should be considered as a minimum value of the true accessible porosity of these rocks.

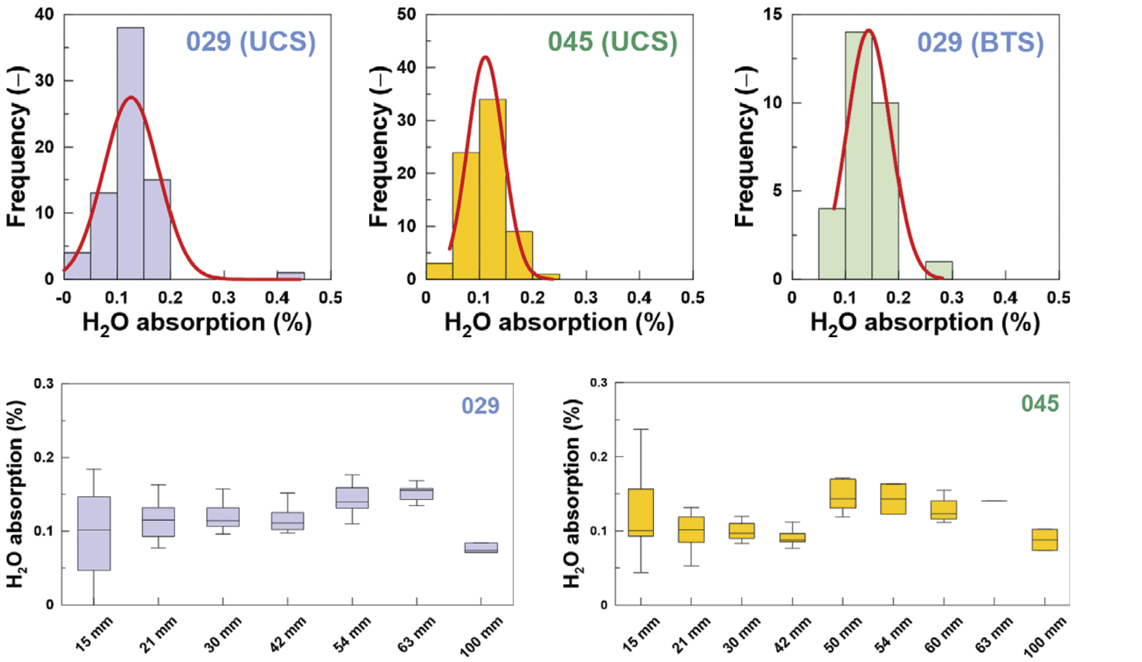


Figure 3-5. *Histograms and box and whisker plots of water absorption of the tested UCS and ITS specimens of rocks RFM029 (101057; lilac and green) and RFM045 (101058; yellow). The red line represents a normal distribution fit.*

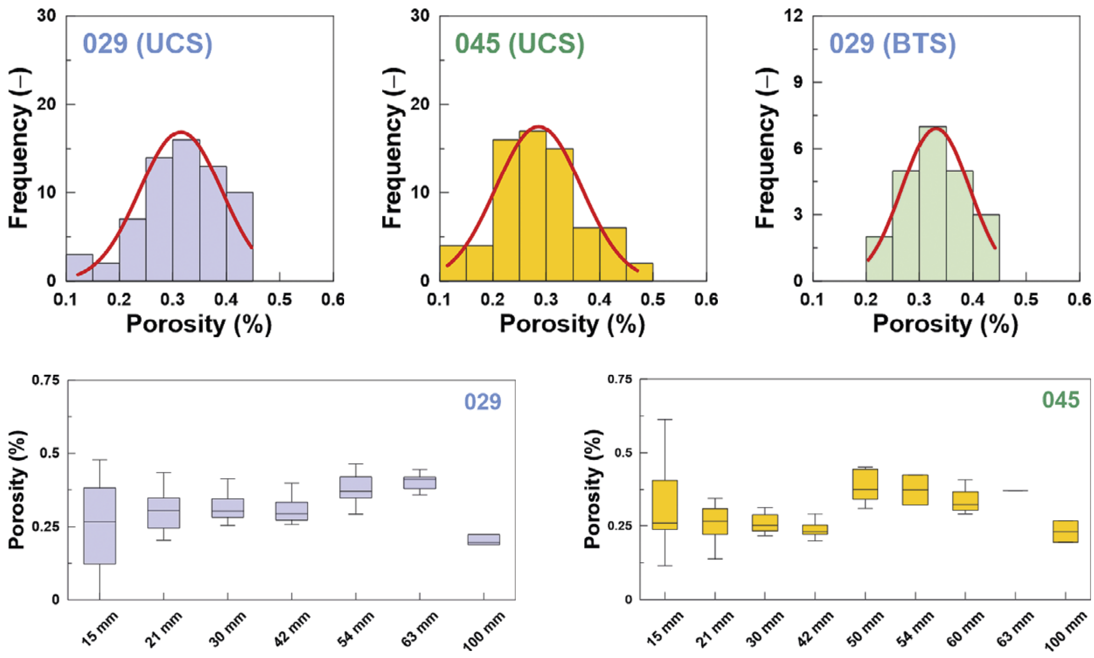


Figure 3-6. *Histograms and box and whisker plots of porosity of the tested UCS and ITS specimens of rock RFM029 (101057; lilac and green) and RFM045 (101058; yellow). The red line represents a normal distribution fit.*

The within-group distribution of water absorption (and porosity) is consistent with a normal distribution. However, the Mann-Whitney test results do not show consistent between-group mean values. In fact, the low absolute saturation values and the transient nature of the immersion process makes this property highly variable (what can be observed from the relatively high coefficients of variation).

Because it is not possible to provide sound values for these two properties, we prefer to quote only the non-parametric median value associated with the whole of 101057 (0.12 % water absorption and 0.32 % porosity) and 101058 (0.11 % water absorption and 0.28 % porosity) samples.

3.2 Ultrasonic pulse velocities and dynamic moduli

Figure 3-7 illustrates the ultrasonic pulse velocities measured for rock samples 101057 and 101058. V_P corresponds to the longitudinal (compressional) waves while V_{S1} and V_{S2} are two orthogonally-polarized shear waves. The study did not include the investigation of anisotropy or wave propagation directionality and the data obtained show similar results in both measurement directions. Therefore, in order to present results, we will consider the average value of the two measurements and this will be referred to as V_S. The descriptive statistics of the samples is summarized in Tables A2-7, A2-8, A2-9 and A2-10 of Appendix 2.

At first glance, we observe a very significant difference in P-wave propagation velocity of the two rock types while this is not so notorious in the case of the S-wave. In a previous section we commented on the circumstance that smaller diameter samples (15 to 42 mm) did not comply with the dimensional prescriptions of the standard ASTM D2845-05 (ASTM 2005), in particular to have a length of, at least, 10 times the average mineral grain size. The sharp velocity boundary observed (especially for the P-waves) supports the perception that, with the transducers used, the minimum diameter for the plugs providing acceptable results is above 42 mm.

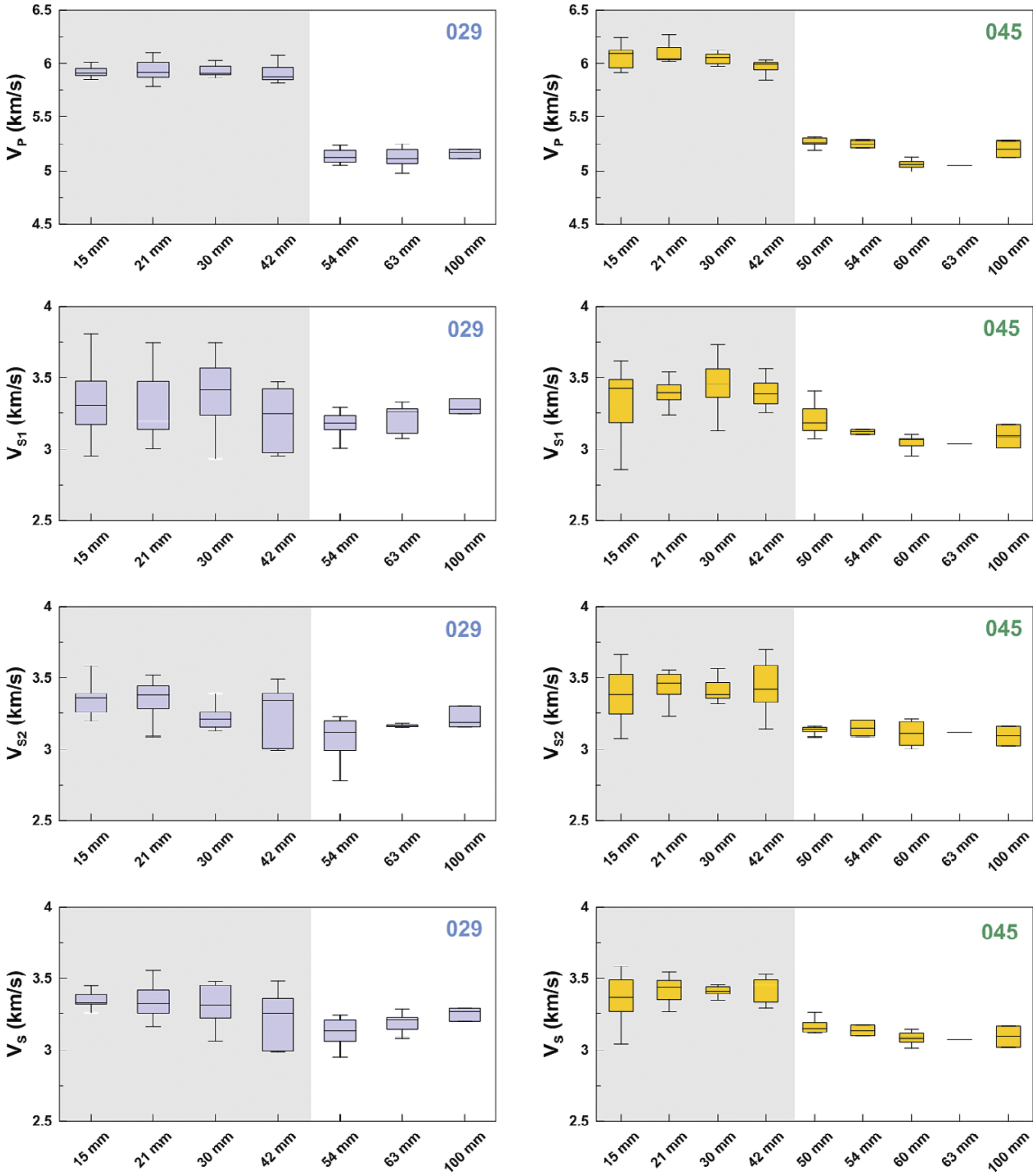


Figure 3-7. *Box and whisker plots of the ultrasonic pulse velocities of the tested UCS specimens of rocks RFM029 (101057; lilac) and RFM045 (101058; yellow) as a function of their corresponding diameter.*

By plotting the transit (or fist arrival) time of the P-wave for the different specimens as a function of their length and diameter (Figure 3-8) it is possible to observe a significant grouping of data with faster arrivals (i.e., lower slope) for the shortest-length and smaller-diameter plugs (15–42 mm) than for the larger ones (50–100 mm). It is interesting to note that the sensitivity of P-wave velocity determination is bigger with respect to diameter than with respect to length.

The reason for the observed greater pulse velocities in the smallest size plugs may be connected with the larger contribution of the mineral frame (instead of the interfaces among them) to the dynamic propagation of elastic waves. In this regard, it is relevant to quote that the V_P of quartz is 6 050 m/s (Schön 2015), a value very close to the ones observed for the smaller RFM specimens.

Taking into account the previous observations, it appears reasonable to perform velocity comparisons considering only the samples whose diameters are larger than 42 mm as they represent better the properties of the studied rocks.

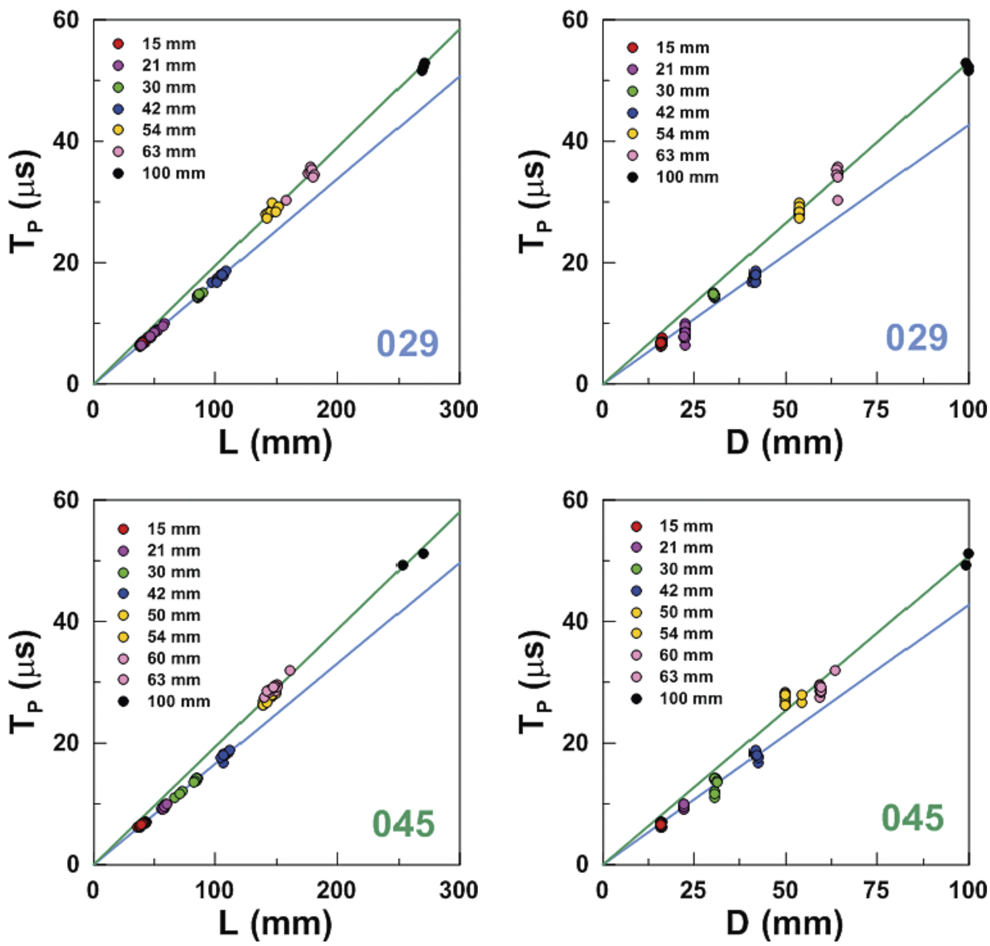


Figure 3-8. *Corrected transit time (i.e., first arrival) of the P-wave (T_P) as a function of specimen length (L) and diameter (D) of rocks RFM029 (101057) and RFM045 (101058). Blue lines represent best linear fits to the 15–42 mm-diameter group samples and the green ones are for the 50–100 mm-diameter group samples.*

Shapiro-Wilk tests for normality indicate that, for the two rocks and for both V_P and V_S, the large size samples conform to normal distributions. Likewise, the Mann-Whitney tests for the equality of means of V_P and V_S are successful for rock RFM029 but not for rock RFM045. This would suggest that, between 54–100 mm-diameter and 135–250 mm-length no scale effect is perceived in V_P and V_S for rock RFM029. Thus, their representative values of V_P and V_S would be 5.13 ± 0.02 and 3.17 ± 0.02 km/s, with coefficients of variations of 1.72 and 2.80, respectively. In the case of rock RFM045, the same test is not successful (i.e., no significant mean equality) but, after carefully observing Figure 3-7, if there exist a sample size effect this must be very weak (a likely reduction of V_P and V_S velocity when increasing diameter). For this rock the range of V_P and V_S values are 4.99–5.31 and 2.91–3.26 km/s, respectively. It is interesting to note that the mean values of the given ranges for samples from RFM045 coincide with the results for the rock samples from RFM029.

Based on the velocity measurements, Figure 3-9 shows the V_P/V_S ratio associated to the two rocks as a function of specimen diameter. Summary statistics are presented in Appendix 2 (Tables A2-11 and A2-12). Although the within-group sample distribution is normal according to the results of the Shapiro-Wilk test, the ANOVA analyses of the two rocks points out that the corresponding means are not comparable. Therefore, we should conclude a sample size effect although, like in the previous V_P and V_S case of rock 101058, we conclude that this effect is weak.

Figure 3-10 shows the relationship existing between V_P and V_S, for the bigger diameter plugs of rocks RFM029 and RFM045. The correlation coefficient (R^2) obtained is moderate. The range of V_P/V_S values covering the data available of rock 101057 is 1.59 (100 mm-diameter) to 1.64 (54 mm-diameter) while for rock 101058 this is much narrow and with not obvious size-dependence (1.65 for the 63 mm-diameter, and 1.68 for the 54 and 100 mm-diameter). In any case, the values obtained are consistent with the ones expected for average "*crystalline*" rocks (Schön 2015).

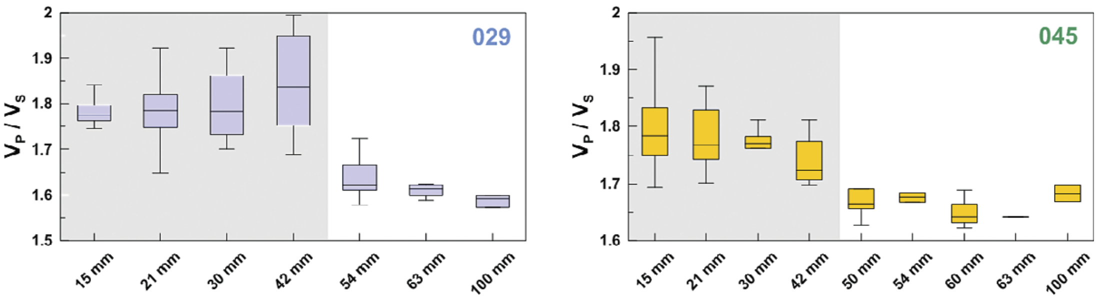


Figure 3-9. *Box and whisker plots of the V_P/V_S ratio of the tested UCS specimens of rocks RFM029 (101057; lilac) and RFM045 (101058; yellow) as a function of their corresponding diameter.*

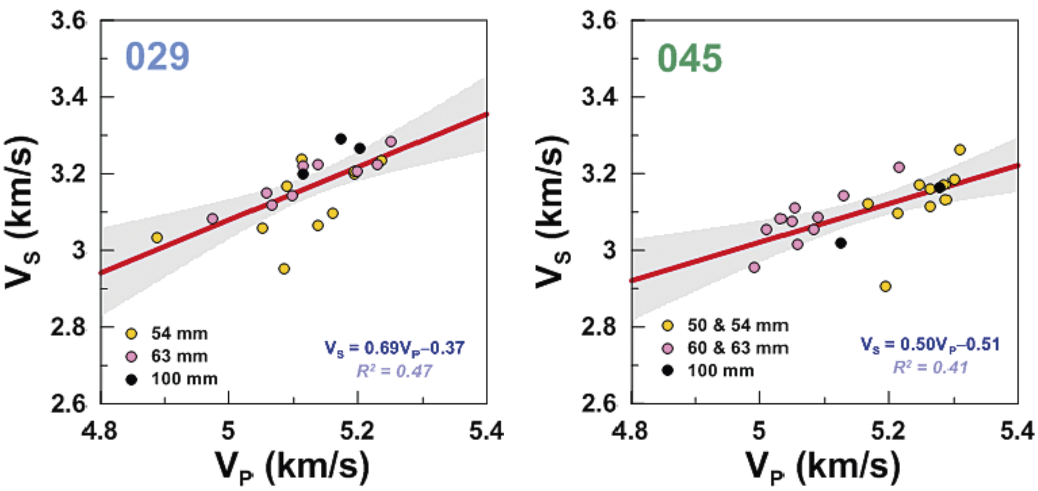


Figure 3-10. *Relationship between V_P and V_S measured in rocks RFM029 (101057; left) and RFM045 (101058; right) between 50 and 100 mm diameter. Red lines represent best linear fits, and the shaded areas the corresponding confidence intervals.*

The ultrasonic pulse velocities were used to compute the dynamic elastic moduli illustrated in Figure 3-11. The corresponding summary statistics are compiled in Appendix 2 (Tables A2-13 to A2-20). The within-group statistics conform to normal distributions but, in general, between-group means are not comparable. The range of values of dynamic Young's modulus of the studied rocks are 60.1–66.6 GPa (101057) and 56.3–67.1 GPa (101058) while the dynamic Poisson's ratios are 0.17–0.19 (101057) and 0.19–0.27 (101058). Incidentally, it is interesting to note that the average dynamic Young's moduli of the rock specimens whose diameters is comprised between 15 and 30 mm are 74.1 ± 0.6 (101057) and 76.6 ± 0.6 (101058) GPa while the same property for quartz is between 97 (∥ to c axis) and 76.5 (⊥ to c axis) GPa what is consistent with our perception that small-size plug properties could be mainly constrained by mineral properties.

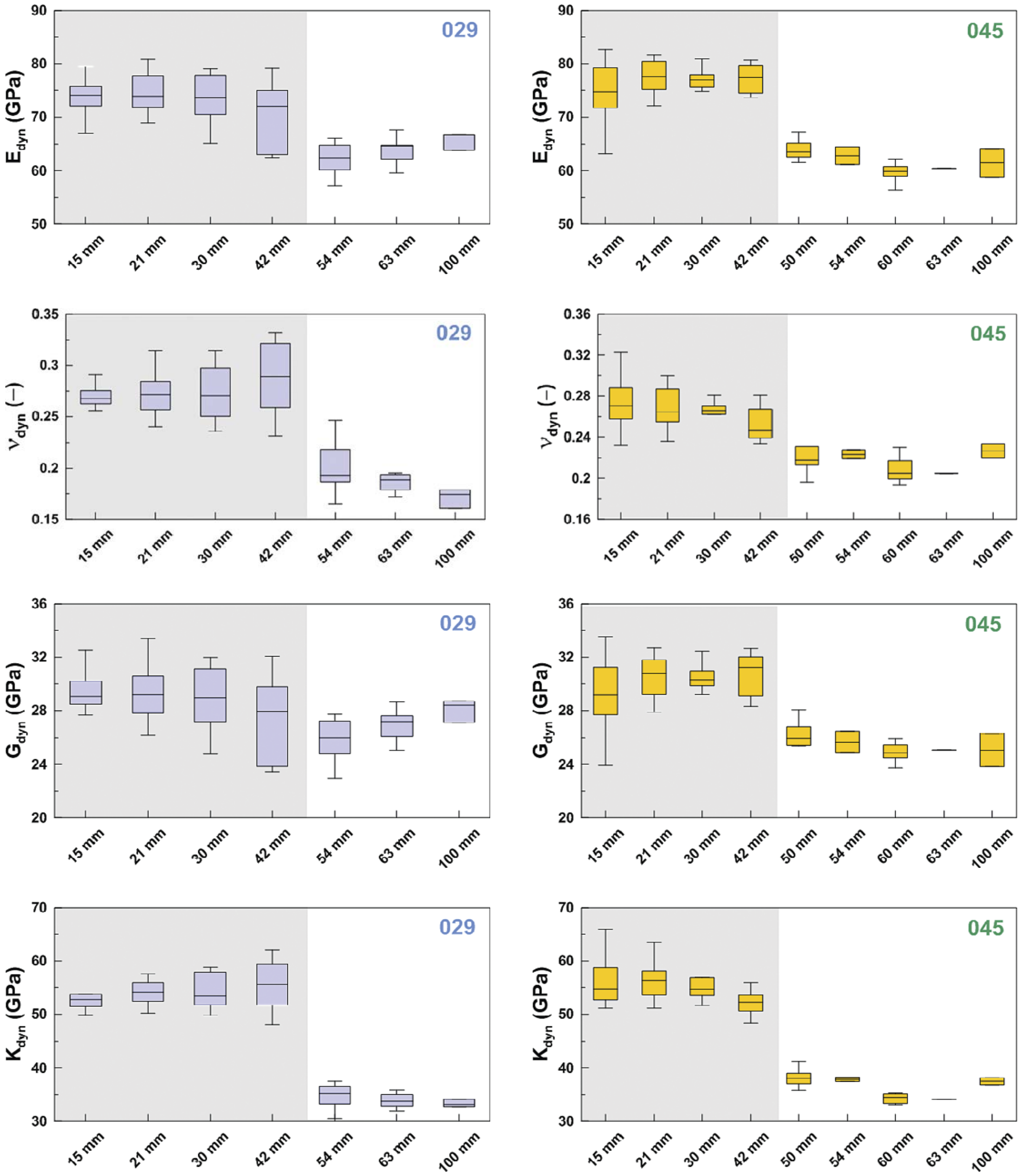


Figure 3-11. *Box and whisker plots of the dynamic moduli of the tested UCS specimens of rocks RFM029 (101057; lilac) and RFM045 (101058; yellow) as a function of their corresponding diameter.*
Notes: E_{dyn}: Dynamic Young's modulus; v_{dyn} = Dynamic Poisson's ratio; G_{dyn} = Dynamic shear modulus; K_{dyn} = Dynamic bulk modulus.

3.3 UCS, static moduli and crack stresses

Appendix 4 compiles the specific experimental results of the UCS survey conducted. Likewise, Figure 3-12 shows a representative plot of the experimental curves associated to two of the tested 101058 (from RFM045) plugs.

The tests were conducted according to the indications of the ISRM (1999) recommendation for UCS testing and Figure 3-13 illustrates the time required to attain failure for the two investigated rocks. This is recommended to be between 5 and 15 minutes after the beginning of load application and we observe that this condition was fulfilled by the survey.

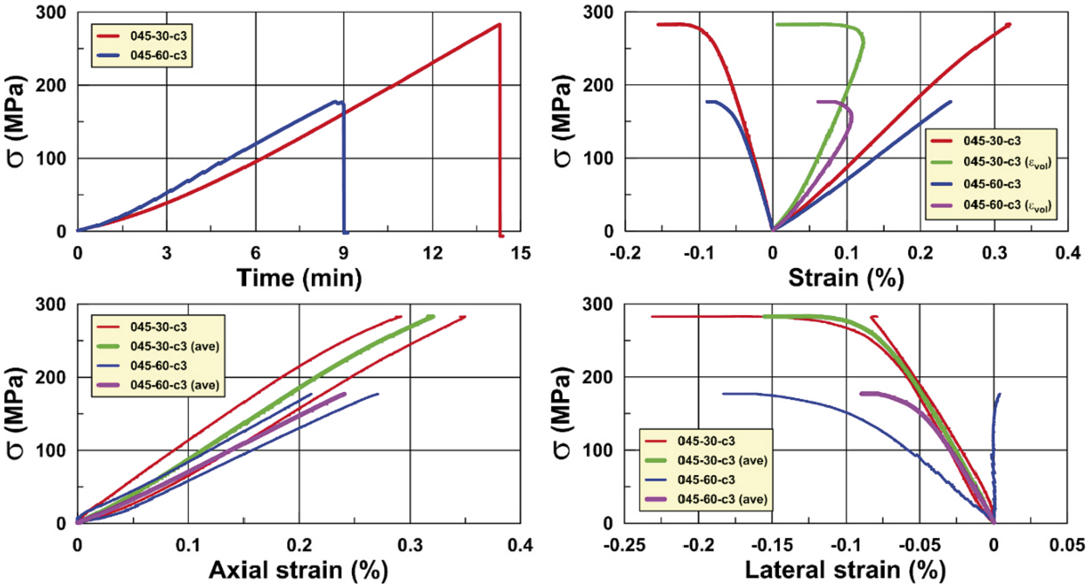


Figure 3-12. Representative plots of two UCS tests performed with rock 101058 (specimens 30-c3 and 60-c3).

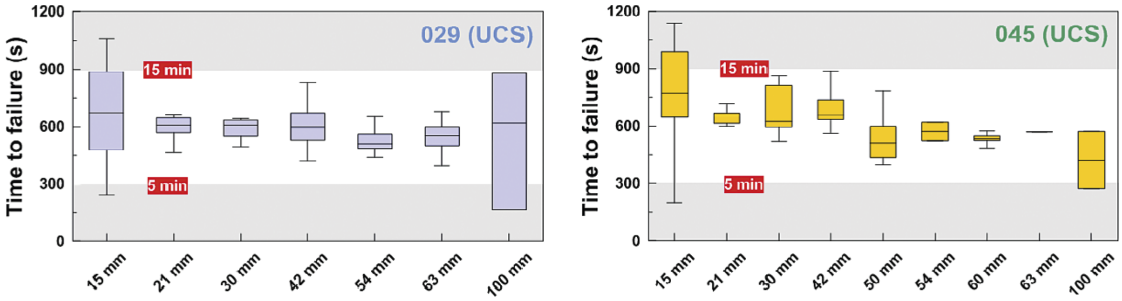


Figure 3-13. Time to failure associated with the UCS tests for specimens of rocks RFM029 (101057; left) and RFM045 (101058; right) as a function of its diameter. The grey boxes bound the time recommended by ISRM (1999) to complete UCS tests.

Figure 3-14 shows the results of the uniaxial compressive strength of the tested rocks as a function of specimen diameter, and the summary statistics is presented in Appendix 2 (Tables A2-21 and A2-22). The within-group Shapiro-Wilk test of normality is satisfactory for all the diameter groups of rock 101057 (from RFM029) while for 101058 (form RFM045) the normality test fails for diameters 15 and 30 mm. The between-group Mann-Whitney test shows that, with the exception of 15 mm plugs, the mean values for different samples sizes are comparable. This is true for both rock types although the variation is larger for the RFM045 block samples. Thus, average values are calculated for the diameter range going from 21 to 100 mm. The average UCS of rock 101057 is 166.0 ± 4.6 MPa (n = 57; CV = 20.81), and for rock 101058 UCS is 189.7 ± 7.0 MPa (n = 57, CV = 27.86).

Figure 3-15 displays the results of the static Young's modulus and Poisson's ratio of the two investigated rocks. The reported properties correspond to the tangent properties computed for a stress level equal to 50 % the UCS value. At first glance, the spread of the values tends to become reduced as the diameter of the sample increases.

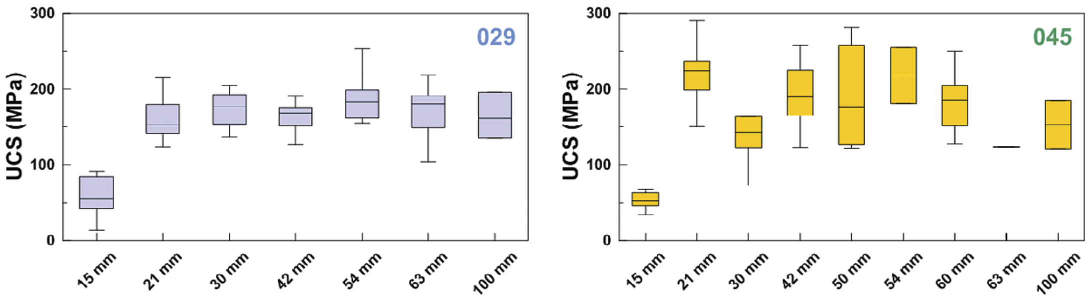


***Figure 3-14.** Box and whisker plots of the UCS results of rock type 101057 (from RFM029; left) and 101058 (from RFM045; right) as a function of the diameter of the specimen.*

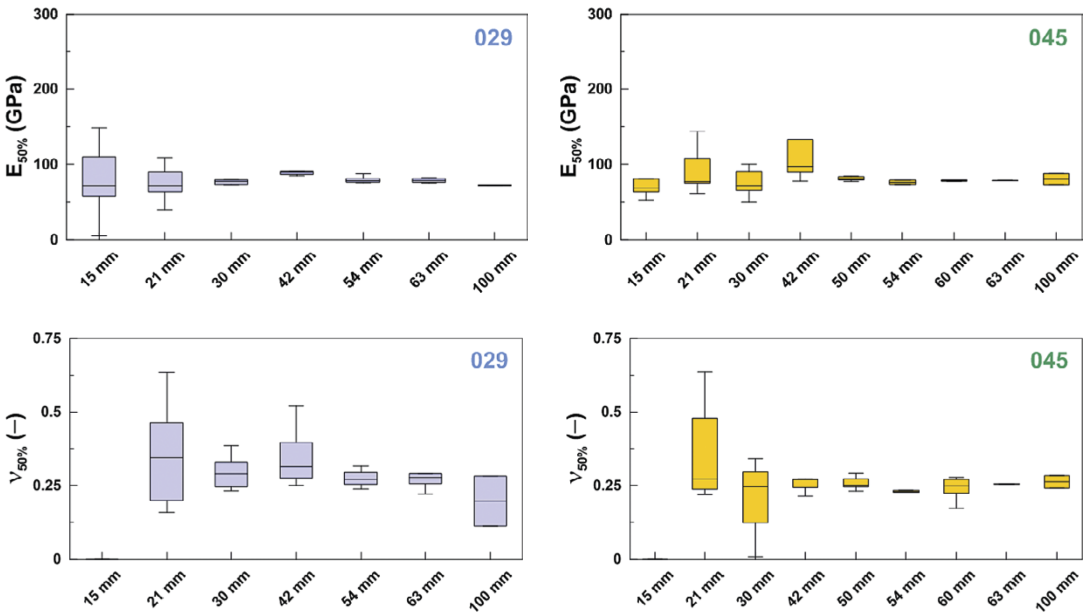


***Figure 3-15.** Box and whisker plots of the computed tangential (50 % UCS) Young's modulus and Poisson's ratio of rock type 101057 (from RFM029; left) and 101058 (from RFM045; right) as a function of the diameter of the specimen.*

Like in the case of UCS, the within-group normality analysis is successful for all groups of rock RFM029 and fails for the 21 and 42 mm-diameter sets of rock RFM045. The between-group check confirms that means are similar. The average E value for rock RFM029 is 86.7 ± 4.7 GPa (n = 56; CV = 40.87) and for rock RFM045 89.7 ± 4.6 GPa (n = 55; CV = 38.02). The corresponding Poisson's ratio are 0.31 ± 0.02 (n = 55; CV = 41.56) and 0.28 ± 0.02 (n = 55; CV = 51.11), respectively.

Figure 3-16 illustrates the results corresponding to the assessment of the crack initiation (σ_{CI}) and crack damage (σ_{CD}) stresses and the statistical summary is presented in Tables A2-27 to A2-30 of Appendix 2. Although all the within-group data conform to normal distributions, the limited number of observations available for the different diameters of the two rock types constrains the applicability of the ANOVA analysis. Taking all the data available for a single rock type as a single group, we observe that they also conform to a normal distribution. Therefore, we present the corresponding mean values for the two populations as the representative ones of these two properties. In the case of rock type 101057 (from RFM029) the crack initiation stress is 90.3 ± 6.3 MPa (n = 18; CV = 29.5), while the crack damage stress is 157.2 ± 7.8 MPa (n = 18; CV = 21.14). For rock type 101058 (from RFM045) the corresponding values are 120.0 ± 10.1 MPa (n = 14; CV = 31.54) for crack initiation stress and 185.7 ± 13.4 MPa (n = 14; CV = 27.00) for crack damage stress.

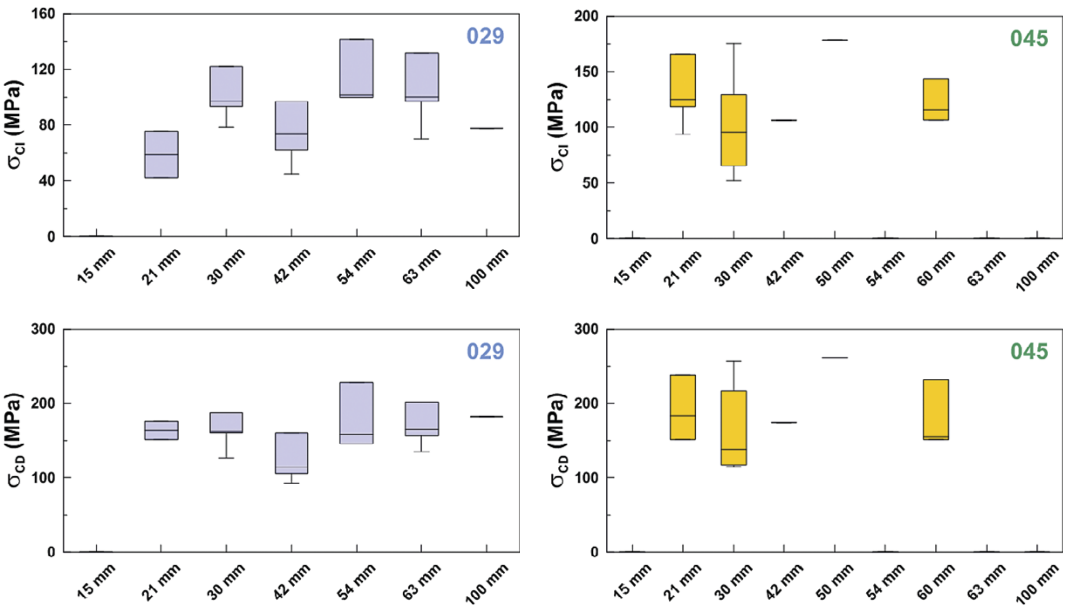


Figure 3-16. *Box and whisker plots of the computed crack initiation (σ_{CI}) and crack damage (σ_{CD}) stresses of rocks RFM029 (left) and RFM045 (right) as a function of the diameter of the specimen.*

3.4 Tensile strength

Indirect tensile strength tests were conducted according to the standard ASTM D3967-95a (ASTM 1995b) and the experimental curves are presented in Figure 3-17. Appendix 4 compiles the record sheets with all the relevant information about the tested samples.

Figure 3-18 (left) presents the reference time frame for all the tests performed. While the standard prescribes that failure of the tested rock should occur within 1 and 10 minutes since the beginning of the loading, in this plot we observe that some of the samples (especially those with smaller diameter) failed before the prescribed 60 seconds minimum time. This should not be a critical issue when analysing the results, but it suggests that one has to be cautious when designing tests for rocks of unknown properties, due to the lack of specific prescriptions on the time frame to carry out tests.

Figure 3-18 (rigth) illustrates the computed tensile strength of the tested samples of rock RFM029 as a function of the 4 selected reference diameters (42, 54, 63 and 100 mm). The Shapiro-Wilk test confirm within-group normality and the Mann-Whitney test also supports the mean similitude between groups. Therefore, we cannot conclude that there exists any significant scale effect on that property. The representative value for the tensile strength of rock 101057 (from RFM029) is 14.2 ± 2.1 MPa (n = 28, CV = 14.70).

Although there is no discernible scale effect on the tested specimens in terms of tensile strength, the load applied to produce failure is a function of the diameter of the sample, as it can be observed in Figure 3-19**.** This figure also illustrates the fact that failure load increases in line with sample diameter. This supports the fact that the one-to-two slenderness ratio (L/D) is adequate in order to obtain acceptable data according to loading geometry and analytical solution for stress computation. This is illustrated in Figure 3-20, clearly showing that, in the performed tests, tensile strength is independent of sample diameter or thickness.

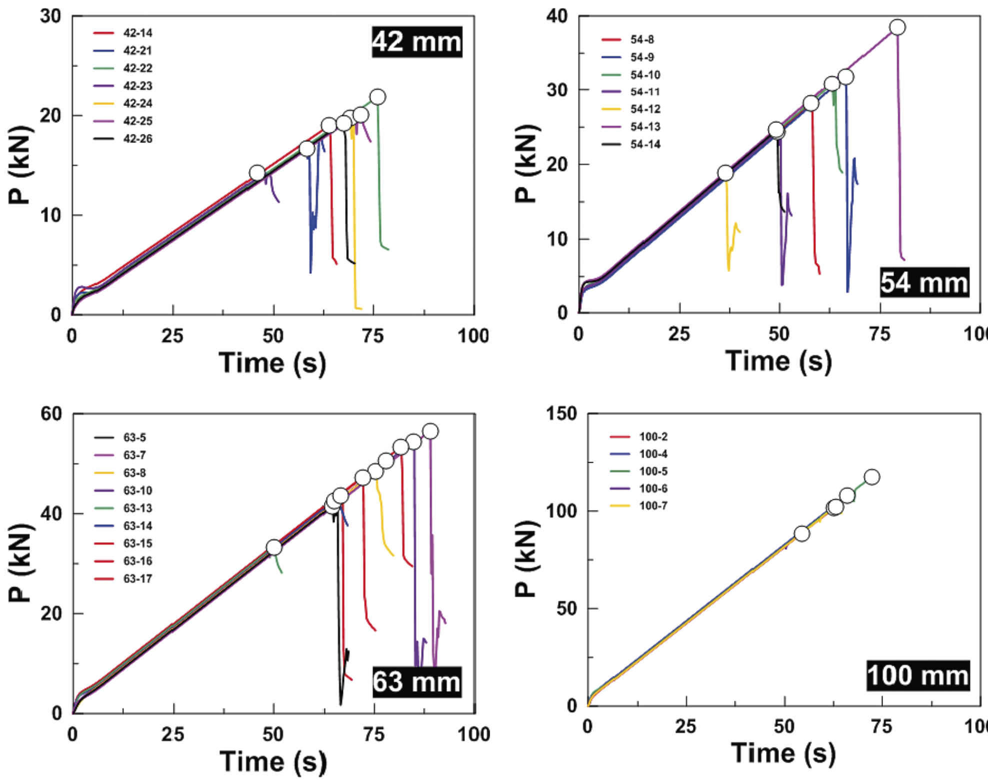


Figure 3-17. *Experimental curves corresponding to the ITS tests performed with specimens of 42, 54, 63 and 100 mm-diameter of rock101057. Dots represent the peak load for each test.*

Because the variability in the orientation of foliation may potentially affect the results of tensile strength, it was decided to conduct the tests in a loading direction orthogonal to the strike of foliation. However, the plunge of foliation may still change and this particular variable is illustrated in the histogram of Figure 3-21. We observe that the tested specimens cover a plunge range going from 20 to nearly 70º. However, in the same figure (right) we cannot identify any derived effect over the obtained values of tensile strength.

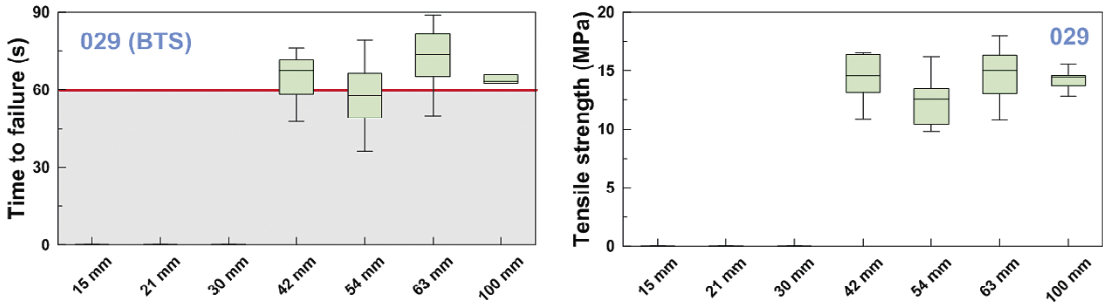


Figure 3-18. *Time to failure (left) associated with the ITS tests for specimens of rock RFM029 as a function of its diameter and determined tensile strength (right). The standard ASTM D3967-95a (ASTM 1995b) prescribes that tests should be completed between 1 and 10 min after the beginning of load application.*

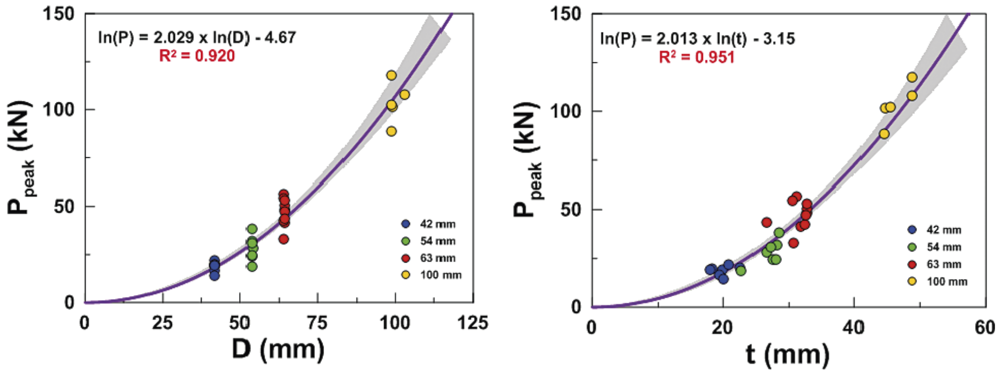


Figure 3-19. *Peak load as a function of specimen diameter (left) and thickness (right) of the ITS tests performed with rock 101057.*

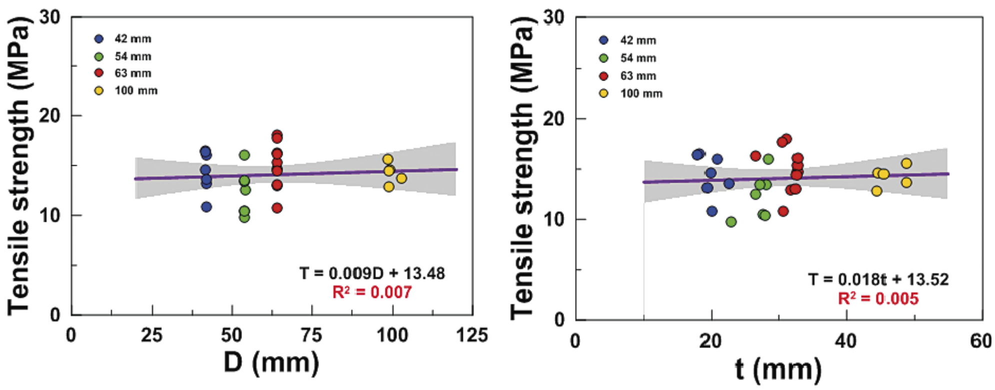


Figure 3-20. *Tensile strength as a function of specimen diameter (left) and thickness (right) of the ITS tests performed with rock 101057.*

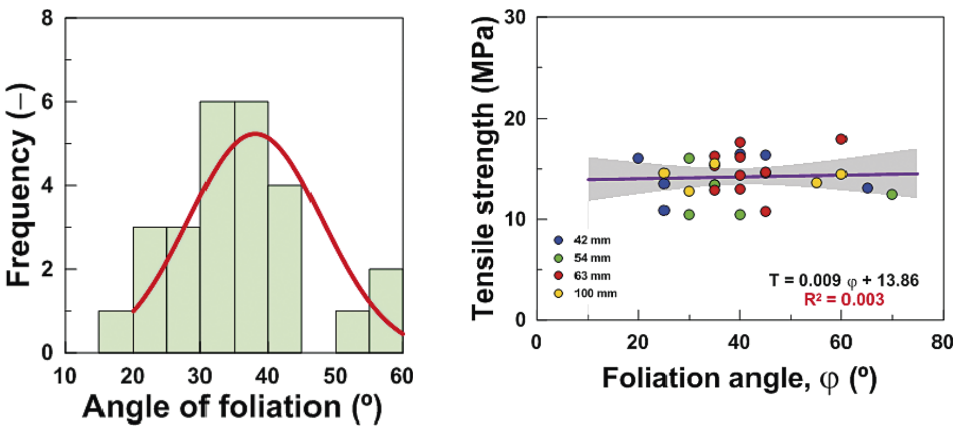


Figure 3-21. Histogram with the distribution of plunge angle of foliation of the ITS specimens (left) and its relationship with tensile strength (right).

3.5 Summary of results

Based on the results presented in the previous sections, Table 3-1 to Table 3-4 summarize the relevant physical, geomechanical and geophysical properties of the rocks tested. In these tables the values are reported as mean value plus/minus the corresponding standard error of the mean (when the within- or between-group distribution is normal and mean values comparable, as per Shapiro-Wilk and Mann-Whitney tests) or in terms of median and range of variation (when the previous conditions are not fulfilled).

Table 3-1. Representative values of dry density (ρ_{dry}), water absorption (H_2O) and porosity (ϕ) of the rocks tested in this study.

Rock	ρ_{dry} (kg/m³)	H_2O (%)	ϕ (%)
RFM029	2639.9 ± 1.8	0.12 (*0.00–0.44*)	0.32 (*0.00–1.16*)
RFM045	2614.9 ± 1.7	0.11 (*0.04–0.61*)	0.28 (*0.11–1.58*)

Table 3-2. Representative values of the ultrasonic compressive (V_P) and shear (V_S) velocities as well as their corresponding ratio of the rocks tested in this study.

Rock	V_P (m/s)	V_S (m/s)	V_P/V_S
RFM029	5126 ± 19	3166 ± 19	1.62 (*1.57–1.72*)
RFM045	5181 (*4992–5308*)	3113 (*2906–3263*)	1.66 (*1.62–1.79*)

Table 3-3. Representative values of the elastic dynamic moduli of the rocks tested in this study.

Rock	E_{dyn} (GPa)	ν_{dyn} (-)	G_{dyn} (GPa)	K_{dyn} (GPa)
RFM029	64.1 (*57.2–67.5*)	0.19 (*0.16–0.25*)	27.1 (*23.0–28.7*)	34.0 (*30.6–37.5*)
RFM045	61.4 (*56.3–67.1*)	0.22 (*0.19–0.27*)	25.4 (*22.1–28.1*)	36.3 (*33.1–41.2*)

Notes: E_{dyn} = dynamic Young's modulus; ν_{dyn} = dynamic Poisson's ratio; G_{dyn} = dynamic shear modulus; K_{dyn} = dynamic bulk modulus.

Table 3-4. Representative strength and static dynamic values of the rocks tested in this study.

Rock	UCS (MPa)	T (MPa)	E (GPa)	ν (-)	σ_{CI} (MPa)	σ_{CD} (MPa)
RFM029	166.0 ± 4.6	14.2 ± 2.1	86.7 ± 4.7	0.31 ± 0.02	90.3 ± 6.3	157.2 ± 7.8
RFM045	189.7 ± 7.0	-	89.7 ± 4.6	0.28 ± 0.02	120.0 ± 10.1	185.7 ± 13.4

Notes: UCS = uniaxial compressive strength; T = tensile strength; E = static Young's modulus; ν = static Poisson's ratio; σ_{CI} = crack initiation stress; σ_{CD} = crack damage stress.

4 Discussion and conclusions

A careful and detailed study has been conducted over two selected igneous lithologies of the Forsmark site (RFM029 and RFM045) in order to assess the existence, importance and impact of scale effects over two geomechanical properties (UCS and ITS) as well as selected geophysical properties of the rocks of interest. In general, the samples from block RFM045 (probably rock type 101058) is coarser grained and more heterogeneous than the samples in RFM029 (101057) which is reflected in a slightly greater variability of the property parameters determined.

Data distribution shows that, for nearly all the properties determined, data follow normal distributions when this is observed within groups of equal plug size, but the corresponding mean values are not comparable. That suggest the existence of scale effects, at least for certain properties.

The measured physical properties of the tested plugs (dry density, water absorption, and accessible porosity) illustrate a discrete scale effect, more pronounced in the case of dry density and for rock RFM029. To this respect, the smaller size specimens have a lower dry density value that then increases slightly up to a threshold value of 30–42 mm. It is likely that the explanation is connected with an eventually higher microcrack density (volume percentage) in the smaller plugs compared with the larger ones. This conjecture would be supported by the notoriously lower UCS strength observed in the 15 mm-diameter plugs as well as the comparatively wider scatter in water content results for the same plug population.

The water content of the tested plugs reflects suction/capillary effects and the recorded values do not likely represent full specimen saturation. That means that the value of porosity presented should be taken with caution and, as a general remark, it is likely that true accessible porosity will be larger than the reported values.

The analysis of ultrasonic pulse velocities (as well as the derived dynamic moduli) illustrates well a particular type of scale effect that is partly due to the characteristics of the rock type (in particular grain size and, probably, foliation). That determines that data derived from the smaller size plugs (15 to 42 mm-diameter) should not be considered representative of the rock as they do not attain the size sufficient to guarantee determinations of satisfactory quality. This problem may be partly solved by performing the ultrasonic determinations with sets of transducers matching better the characteristics of the rock (e.g. wavelength) although this would require a specific instrumental assessment. It appears more reasonable to perform similar studies with plug sizes of diameter bigger than 50 mm and lengths greater that the 10x grain size prescription of the standard ASTM D2845-05 (ASTM 2005).

UCS results illustrate well also a scale effect in which the smallest-diameter specimens (15 mm) result in a lower UCS value compared to values for samples of 21–100 mm diameter. An explanation for this behaviour would be the more prominent contribution of a reduced number of big-size crystals and their comparatively reduced bearing capacity due to the small traverse section of the plug. In turn, static Young's modulus does not show any conspicuous scale effect although it is interesting to observe that the spread of the data tends to decrease as the diameter of the specimen increases.

Finally, tensile strength does not show evidences of scale effects for the range of diameters (42–100 mm) and the rock type tested. Considering a loading direction perpendicular to the strike of foliation, the variation of the dip angle has no apparent influence on the tensile strength obtained.

References

SKB's (Svensk Kärnbränslehantering AB) publications can be found at www.skb.com/publications. SKBdoc documents will be submitted upon request to document@skb.se.

Akaike H, 1973. Information theory and an extension of the maximum likelihood principle. In Petrovand B N, Caski F. Proceedings of the 2nd International Symposium on Information Theory, Budapest, 1973. Budapest: Akadémiai Kiadó.

ASTM, 1995a. D2938-95: Standard test method for unconfined compressive strength of intact rock core specimens. West Conshohocken, PA: ASTM International.

ASTM, 1995b. D3967-95a: Standard test method for splitting tensile strength of intact rock core specimens. West Conshohocken, PA: ASTM International.

ASTM, 2001. D4543-01: Standard practice for preparing rock core specimens and determining dimensional and shape tolerance. West Conshohocken, PA: ASTM International.

ASTM, 2005. D2845-05: Standard test Method for laboratory determination of pulse velocities and ultrasonic elastic constants of rock. West Conshohocken, PA: ASTM International.

ASTM, 2018. E2309-18: Standard practices for verification of displacement measuring systems and devices used in material testing machines. West Conshohocken, PA: ASTM International.

Aydin A, 2014. Upgraded ISRM suggested method for determining sound velocity by ultrasonic pulse transmission technique. Rock Mechics and Rock Engineering 47, 255–259.

Bieniawski Z T, 1967. The effect of specimen size on compressive strength of coal. International Journal of Rock Mechanics and Mining Sciences 5, 325–335.

Hammer Ø, Harper D A T, Ryan P D, 2001. Past: Paleontological statistics software package for education and data analysis. Paleontologia Electronica 4, 1–9.

Hoek E, Brown E T, 1980. Underground excavations in rock. London: Institution of Mining and Metallurgy.

ISRM, 1999. ISRM suggested method for the complete stress-strain curve for intact rock in uniaxial compression. International Journal of Rock Mechanics and Mining Sciences 36, 279–289.

Le Goc R, Bouzeran L, Darcel C, Mas Ivars D, 2015. Using correlated random fields for modeling the spatial heterogeneity of rock. In Schubert W, Kluckner A (eds). Future development of rock mechanics: Proceedings of the ISRM Regional Symposium EUROCK 2015 & 64th Geomechanics Colloquium, Salzburg, 7–10 October 2015. Salzburg: Austrian Society for Geomechanics.

Maeda N, 1985. A method for reading and checking phase times in auto-processing system of seismic wave data. Zisin 38, 365–379. (In Japanese with English abstract.)

Martin D, Lu Y, Lan H, Christiansson R, 2014. Numerical approaches for estimating the effect of scale on rock mass strength. In Proceedings of the 7th Nordic Grouting Symposium and 2nd Nordic Rock Mechanics Symposium, Gothenburg, 13–14 November 2014. Stockholm: BeFo, 93–106.

Masoumi H, Saydam S, Hagan P C, 2015. Unified size-effect law for intact rock. International Journal of Geomechanics 16, 04015054. doi:10.1061/(ASCE)GM.1943-5622.0000543

Nicksiar N, Martin D, 2012. Evaluation of methods for determining crack initiation in compression tests on low-porosity rocks. Rock Mechanics and Rock Engineering 45, 607–617.

Pierce M, Gaida M, DeGagné D, 2009. Estimation of Rock Block Strength. In Diederichs M, Grasselli G (eds). ROCKENG09: Proceedings of the 3rd CANUS Rock Mechanics Symposium, Toronto, 9–15 May 2009, 91–93.

Pratt H R, Black A D, Brown W S, Brace W F, 1972. The effect of the specimen size on the mechanical properties of unjointed diorite. International Journal of Rock Mechanics and Mining Sciences 9, 513–529.

Schön J, 2015. Physical properties of rocks. 2nd ed. Amsterdam: Elsevier. (Developments in Petroleum Science 65)

SKB, 2007a. SKB MD 190.001e. Method description for uniaxial compression test for intact rock. SKBdoc 1189344 ver 4.0, Svensk Kärnbränslehantering AB.

SKB, 2007b. SKB MD 190004e. Method description for indirect test of tensile strength. SKBdoc 1189429 ver 3.0, Svensk Kärnbränslehantering AB.

SKB, 2013. Site description of the SFR area at Forsmark at completion of the site investigation phase. SDM-PSU Forsmark. SKB TR-11-04, Svensk Kärnbränslehantering AB.

UNE, 2018. UNE-EN ISO 7500-1:2018: Metallic materials – Callibration and verification of static uniaxial testing machines – Part 1: Tension/compression testing machines – Calibration and verification of the force-measuring system. Madrid: UNE.

Yoshinaka R, Osada M, Park H, Sasaki T, Sasaki K, 2008. Practical determination of mechanical design parameters of intact rock considering scale effect. Engineering Geology 96, 173–186.

Appendix 1

Calibration and Standard Certificates

Table A1-1. Manufacturer's reference time-of-flight (TOF) associated with the face-to-face (T_{blank}) configuration and with interposed standard reference samples (T_{sample}) associated with the ultrasonic platens used in the study.

ACOUSTIC RESULTS – MTS SETUP

ErgoTech IPO: 101018

Description: Ø1.5" / 38.1mm Acoustic P-S1-S2 Axial Platens (1.3 MHz resonant frequency) for use with MTS Triaxial Cell and Existing University of La Coruna Hoek-Franklin Type Cell

ErgoTech
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Core Analysis
Petrophysics
Rock Mechanics
Rock Physics
ErgoTech Ltd
Unit 3
Cae Ffwt Business Park
Glan Conwy
Conwy LL28 5SP
United Kingdom
Website: www.ergotech.co.uk - e-mail: info@ergotech.co.uk - Tel: +44 (0) 1492 592 684 - Fax: +44 (0) 1492 592 685

Core Sample	Waveform	Tblank microsec	Tsample microsec	Lsample mm	Sonic Velocity m/sec	Slowness usec/ft	Slowness usec/mm
Titanium Ti 6Al 4V	P	7.52	15.72	50.02	6100	50.0	0.1639
	S1	12.59	28.82	50.02	3082	98.9	0.3245
	S2	13.5	29.11	50.02	3204	95.1	0.3121
Aluminium Alloy	P	7.52	15.42	50.00	6329	48.2	0.1580
	S1	12.59	28.69	50.00	3106	98.1	0.3220
	S2	13.5	29.53	50.00	3119	97.7	0.3206
Brass	P	7.52	18.62	49.99	4504	67.7	0.2220
	S1	12.59	36.37	49.99	2102	145.0	0.4757
	S2	13.5	37.41	49.99	2091	145.8	0.4783
17/4 PH St.Steel (H1150)	P	7.52	16.1	50.00	5828	52.3	0.1716
	S1	12.59	28.2	50.00	3203	95.2	0.3122
	S2	13.5	29.06	50.00	3213	94.9	0.3112
316 St.Steel	P	7.52	16.29	50.03	5705	53.4	0.1753
	S1	12.59	28.58	50.03	3129	97.4	0.3196
	S2	13.5	29.48	50.03	3131	97.4	0.3194

JECT\La Coruna (MTS)\IPO 101018 - LaCoruna Acoustic Results - Summary.doc Page 5

Table A1-2. Manufacturer's performance comparison of the ultrasonic platens used in the study with other commercial references.

ACOUSTIC RESULTS – MTS SETUP

ErgoTech IPO: 101018

Description: Ø1.5" / 38.1mm Acoustic P-S1-S2 Axial Platens (1.3 MHz resonant frequency) for use with MTS Triaxial Cell and Existing University of La Coruna Hoek-Franklin Type Cell

ErgoTech
Technoleg ac Arloesedd
ErgoTech
Geo Engineering Instrumentation
Core Analysis
Petrophysics
Rock Mechanics
Rock Physics
ErgoTech Ltd
Unit 3
Cae Ffwt Business Park
Glan Conwy
Conwy LL28 5SP
United Kingdom
Technology innovation
Website: www.ergotech.co.uk - e-mail: info@ergotech.co.uk - Tel: +44 (0) 1492 592 684 - Fax: +44 (0) 1492 592 685

Core Sample	Waveform	Tblank microsec	Tsample microsec	Lsample mm	Sonic Velocity m/sec	Slowness usec/ft	Slowness usec/mm
Annealed PEEK	P	7.52	26.83	50.00	2589	117.7	0.3862
	S1	12.59	55.93	50.00	1154	264.2	0.8668
	S2	13.5	56.79	50.00	1155	263.9	0.8658

Previously quoted for comparison

Industry Standard P-wave velocities (m/s):

Material	Technisonic	Panametrics	ErgoTech
Titanium	6100	6100	6100
Aluminium	6300	6320	6329
Brass	4300	4430	4504

Industry Standard S-wave velocities (m/s):

Material	Technisonic	Panametrics	ErgoTech
Titanium	3100	3120	3143
Aluminium	3100	3130	3112
Brass	2000	2120	2096

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Table A1-3. Calibration certificate of force of the equipment used to perform the UCS tests.

comercial@servosis.com

SERVOSIS S.L. - Laboratorio de Calibración
C/ Fuentevieja, 8-10. Pol Ind La Estación
28320 Pinto - Madrid – Spain
Tlf +34 91 691 68 61

RESULTADOS

Escala calibrada: 1471 kN
Sentido: Compresión
Resolución: 0,1 kN

Fuerza nominal (kN)	Lectura 1 (kN)	Lectura 2 (kN)	Lectura 3 (kN)	Lectura 4 (kN)	Media (kN)
300,0	300,9	300,2	300,4		300,50
450,0	450,8	450,9	452,2		451,30
600,0	601,1	601,3	604,2		602,20
750,0	751,9	751,9	753,9		752,57
900,0	903,1	903,0	905,0		903,70
1000,0	1003,4	1003,3	1005,5		1004,07
1200,0	1203,9	1203,7	1205,0		1204,20
1350,0	1355,1	1355,2	1355,4		1355,23
1400,0	1405,4	1405,9	1405,4		1405,57
1400,0	1405,4	1405,9	1405,4		1405,57
Vuelta a cero:	0,500	0,500	0,900		

Punto de Calibración	Error relativo de indicación (q)	Error relativo de repetibilidad (b)	Resolución relativa (a)
300,000	-0,17%	0,23%	0,03%
450,000	-0,29%	0,31%	0,02%
600,000	-0,36%	0,51%	0,02%
750,000	-0,34%	0,26%	0,01%
900,000	-0,41%	0,22%	0,01%
1000,000	-0,40%	0,22%	0,01%
1200,000	-0,35%	0,11%	0,01%
1350,000	-0,39%	0,02%	0,01%
1400,000	-0,40%	0,04%	0,01%
1400,000	-0,40%	0,04%	0,01%

Error relativo de cero (f_0):	Lectura 1	Lectura 2	Lectura 3
	0,036%	0,036%	0,064%

Clase 1 para todo el rango calibrado. La Clase se ha determinado según EN-7500-1 Tabla 2.

La Incertidumbre asociada para todo el rango es del 0,9 %. Esta incertidumbre ha sido calculada multiplicando la incertidumbre típica de medida por el factor de cobertura k=2, que para una distribución normal corresponde a una probabilidad de cobertura de aproximadamente el 95%. La incertidumbre típica de medida se ha determinado según Norma 7500-1:2018 Anexo C.

Table A1-4. Calibration certificate of displacement of the equipment used to perform the UCS tests.

comercial@servosis.com

SERVOSIS S.L. - Laboratorio de Calibración
C/ Fuentevieja, 8-10. Pol Ind La Estación
28320 Pinto - Madrid – Spain
Tlf +34 91 691 68 61

Certificado Número: CC140

6- RESULTADOS

Escala calibrada: 200 mm.
Sentido: Incremento.
Resolución: 0,001 mm.

Desplazam nominal	Lectura 1	Lectura 2	Media
(mm)	(mm)	(mm)	(mm)
20,000	20,001	20,024	20,013
40,000	39,979	40,055	40,017
60,000	59,978	60,057	60,018
80,000	79,969	80,055	80,012
100,000	99,989	100,064	100,027
120,000	119,973	120,031	120,002
140,000	139,954	140,075	140,015
160,000	159,969	160,085	160,027
180,000	179,951	180,094	180,023
200,000	199,934	200,101	200,018

	Resolución		Error		
Punto de Calibración	Absoluta (mm)	Relativa (%)	Absoluto (mm)	Relativo (%)	Error de repetibilidad
20,000	0,0010	0,01%	0,012	0,06%	0,11%
40,000	0,0010	0,00%	0,017	0,04%	0,19%
60,000	0,0010	0,00%	0,017	0,03%	0,13%
80,000	0,0010	0,00%	0,012	0,02%	0,11%
100,000	0,0010	0,00%	0,026	0,03%	0,07%
120,000	0,0010	0,00%	0,002	0,00%	0,05%
140,000	0,0010	0,00%	0,014	0,01%	0,09%
160,000	0,0010	0,00%	0,027	0,02%	0,07%
180,000	0,0010	0,00%	0,023	0,01%	0,08%
200,000	0,0010	0,00%	0,018	0,01%	0,08%

Clase A según ASTM E2309 para todo el rango calibrado.

La Incertidumbre asociada para todo el rango es de 0,19%. Esta incertidumbre ha sido calculada multiplicando la incertidumbre típica de medida por el factor de cobertura k=2, que para una distribución normal corresponde a una probabilidad de cobertura de aproximadamente el 95%. La incertidumbre típica de medida se ha determinado según ASTM E2309-16 Apéndice X2.

Table A1-5. Calibration certificate of force of the equipment used to perform the ITS tests.

comercial@servosis.com

SERVOSIS S.L. - Laboratorio de Calibración
C/ Fuentevieja, 8-10. Pol Ind La Estación
28320 Pinto - Madrid – Spain
Tlf +34 91 691 68 61

RESULTADOS

Escala calibrada: 500 kN
Sentido: Compresión
Resolución: 0,01 kN

Fuerza nominal (kN)	Lectura 1 (kN)	Lectura 2 (kN)	Lectura 3 (kN)	Lectura 4 (kN)	Media (kN)
50,00	49,96	49,98	49,98		49,973
100,00	99,91	99,93	99,93		99,923
150,00	149,60	149,61	149,59		149,600
200,00	199,87	199,90	199,89		199,887
250,00	249,33	249,31	249,29		249,310
300,00	299,61	299,62	299,61		299,613
350,00	349,71	349,70	349,72		349,710
400,00	399,86	399,85	399,89		399,867
450,00	449,81	449,80	449,89		449,833
470,00	469,92	469,93	469,92		469,923
Vuelta a cero:	0,08	0,02	0,05		

Punto de Calibración	Error relativo de indicación (q)	Error relativo de repetibilidad (b)	Resolución relativa (a)
50,00	0,05%	0,04%	0,02%
100,00	0,08%	0,02%	0,01%
150,00	0,27%	0,01%	0,01%
200,00	0,06%	0,02%	0,01%
250,00	0,28%	0,02%	0,00%
300,00	0,13%	0,00%	0,00%
350,00	0,08%	0,01%	0,00%
400,00	0,03%	0,01%	0,00%
450,00	0,04%	0,02%	0,00%
470,00	0,02%	0,00%	0,00%

Error relativo de cero (f_0):	Lectura 1	Lectura 2	Lectura 3
	0,017%	0,004%	0,011%

Clase 0.5 para todo el rango calibrado. La Clase se ha determinado según EN-7500-1 Tabla 2.

La Incertidumbre asociada para todo el rango es del 0,08 %. Esta incertidumbre ha sido calculada multiplicando la incertidumbre típica de medida por el factor de cobertura k=2, que para una distribución normal corresponde a una probabilidad de cobertura de aproximadamente el 95%. La incertidumbre típica de medida se ha determinado según Norma 7500-1:2018 Anexo C.

Table A1-6. Calibration certificate of displacement of the equipment used to perform the ITS tests.

servosis Testing Machines
comercial@servosis.com

SERVOSIS S.L. - Laboratorio de Calibración
C/ Fuentevieja, 8-10. Pol Ind La Estación
28320 Pinto - Madrid – Spain
Tlf +34 91 691 68 61

6- RESULTADOS

Escala calibrada: 100 mm.
Sentido: Incremento.
Resolución: 0,01 mm.

Desplazam nominal (mm)	Lectura 1 (mm)	Lectura 2 (mm)	Media (mm)
5,00	4,98	4,98	4,98
10,00	9,92	9,93	9,93
20,00	19,83	19,83	19,83
30,00	29,75	29,77	29,76
40,00	39,62	39,64	39,63
50,00	49,59	49,58	49,59
60,00	59,53	59,56	59,55
70,00	69,63	69,61	69,62
80,00	79,23	79,22	79,23
90,00	89,19	89,20	89,20

	Resolución		Error		
Punto de Calibración	Absoluta (mm)	Relativa (%)	Absoluto (mm)	Relativo (%)	Error de repetibilidad
5,00	0,0100	0,20%	-0,020	-0,40%	0,00%
10,00	0,0100	0,10%	-0,075	-0,75%	0,10%
20,00	0,0100	0,05%	-0,170	-0,85%	0,00%
30,00	0,0100	0,03%	-0,240	-0,80%	0,07%
40,00	0,0100	0,03%	-0,370	-0,92%	0,05%
50,00	0,0100	0,02%	-0,415	-0,83%	0,02%
60,00	0,0100	0,02%	-0,455	-0,76%	0,05%
70,00	0,0100	0,01%	-0,380	-0,54%	0,03%
80,00	0,0100	0,01%	-0,775	-0,97%	0,01%
90,00	0,0100	0,01%	-0,805	-0,89%	0,01%

Clase A según ASTM E2309 para todo el rango calibrado.

La Incertidumbre asociada para todo el rango es de 0,19%. Esta incertidumbre ha sido calculada multiplicando la incertidumbre típica de medida por el factor de cobertura k=2, que para una distribución normal corresponde a una probabilidad de cobertura de aproximadamente el 95%. La incertidumbre típica de medida se ha determinado según ASTM E2309-16 Apéndice X2.

Table A1-7. Calibration certificate of flatness table.

Certificado Nº 09 / 2017

RESULTADOS DE LA CALIBRACIÓN

MESA DE PLANITUD

REFERENCIA :	**2A507**
Dimensiones :	400 x 400 mm
Marca :	LAN - FLAT®
Error de planitud :	2,9 μm
Incertidumbre :	2 μm
Grado de precisión :	0 UNE 82.309/97
Temperatura :	20 º C
Fecha de Calibración :	30 / 04 / 2009

PROCEDIMIENTO DE CALIBRACIÓN

Calibración efectuada con nivel electrónico (certificado de trazabilidad ENAC 91710, 10/09/08, TEKNIKER), considerando las inclinaciones angulares, espaciadas en 50 mm y utilizando el método "Moody" o doble cruz. Se ha seguido el procedimiento PC-1.04.

Los valores que figuran en el **Gráfico Numérico** (pág. 2) están expresados en micras y las fracciones en décimas de micra, considerando cero el punto más bajo.

El **Gráfico Isométrico** (pág. 2) muestra la configuración de estas alturas en las líneas en las que se ha realizado la medición.

El **Mapa de Curvas de Nivel** (pág. 3) da una visión 2D del resultado de la calibración.

Por último, el **Mapa de SuperficieTridimensional** (pág. 3) da una visión 3D del estado global de la mesa de planitud.

LAN - FLAT
PEREZ BILBATUA,
MESAS DE PLANITUD
DE GRANITO

JOSEBA PEREZ BILBATUA
Lcdo. CIENCIAS FISICAS

Appendix 2

Summary Statistics

Table A2-1. Summary statistics of the L/D ratio measured in UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*3*
Min_i	2.36	1.73	2.79	2.37	2.62	2.46	2.69
Max_i	2.78	2.59	2.95	2.61	2.82	2.83	2.73
Σ_i	37.44	33.29	28.35	25.04	27.12	24.72	8.12
Ave	2.50	2.22	2.84	2.50	2.71	2.75	2.71
SE_i	0.029	0.055	0.014	0.024	0.019	0.037	0.012
σ_i^2	0.01	0.04	0.00	0.01	0.00	0.01	0.00
σ_i	0.11	0.21	0.05	0.08	0.06	0.11	0.02
Med_i	2.49	2.22	2.83	2.53	2.71	2.77	2.70
Q_1	2.42	2.09	2.80	2.44	2.66	2.76	2.69
Q_3	2.55	2.32	2.84	2.56	2.75	2.80	2.73
Skew	1.114	−0.270	2.044	−0.465	0.357	−2.695	1.293
Kurt	1.833	1.306	5.327	−0.710	−0.239	7.702	−2.333
GM_i	2.49	2.21	2.83	2.50	2.71	2.74	2.71
CV_i	4.432	9.555	1.588	3.002	2.265	4.021	0.769
W_i	0.918	0.929	0.780	0.946	0.967	0.611	0.923
p(0.05)	*0.181*	*0.260*	*0.008*	*0.620*	*0.860*	*1.28E−4*	*0.463*
A_i	0.367	0.494	0.866	0.327	0.214	1.585	0.277
p(0.05)	*0.386*	*0.182*	*0.016*	*0.452*	*0.793*	*1.00E−4*	*0.334*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-2. Summary statistics of the L/D ratio measured in UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	2.24	2.51	2.18	2.48	2.60	2.35	2.56
Max_i	2.69	2.74	2.79	2.70	3.00	2.54	2.71
Σ_i	37.85	39.08	25.91	25.84	28.44	24.67	5.27
Ave	2.52	2.61	2.59	2.58	2.84	2.47	2.64
SE_i	0.032	0.015	0.067	0.022	0.042	0.023	0.075
σ_i^2	0.02	0.00	0.04	0.01	0.02	0.01	0.01
σ_i	0.12	0.06	0.21	0.07	0.13	0.07	0.11
Med_i	2.54	2.60	2.70	2.58	2.87	2.50	2.64
Q_1	2.42	2.55	2.38	2.52	2.76	2.40	2.56
Q_3	2.62	2.64	2.73	2.66	2.95	2.53	2.71
Skew	−0.774	0.627	−1.147	0.321	−0.701	−0.502	0.000
Kurt	0.241	0.476	−0.139	−0.804	−0.559	−1.566	−2.750
GM_i	2.52	2.60	2.58	2.58	2.84	2.47	2.63
CV_i	4.885	2.302	8.123	2.738	4.645	2.936	4.025
W_i	0.930	0.965	0.808	0.956	0.904	0.865	1.000
p(0.05)	*0.276*	*0.786*	*0.018*	*0.740*	*0.241*	*0.087*	*1.000*
A_i	0.421	0.253	0.937	0.248	0.465	0.589	0.251
p(0.05)	*0.282*	*0.686*	*0.010*	*0.669*	*0.197*	*0.092*	*0.227*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-3. Summary statistics of the dry density measured in UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*3*
Min_i	2578	2605	2613	2619	2625	2635	2645
Max_i	2644	2660	2652	2674	2654	2660	2656
Σ_i	39188.30	39492.39	26344.86	26460.34	26403.33	23819.36	7952.24
Ave	2613	2633	2634	2646	2640	2647	2651
SE_i	5.37	3.58	4.01	5.28	3.19	2.68	3.14
σ_i^2	433	193	161	279	102	64	30
σ_i	21	14	13	17	10	8	5
Med_i	2611	2637	2637	2644	2641	2647	2650
Q_1	2596	2621	2624	2634	2631	2638	2645
Q_3	2630	2642	2644	2659	2648	2652	2656
Skew	−0.005	−0.124	−0.632	0.203	−0.291	−0.016	0.255
Kurt	−1.020	0.151	−0.448	−0.392	−1.103	−0.743	−2.333
GM_i	2612	2633	2634	2646	2640	2647	2651
CV_i	0.797	0.527	0.481	0.631	0.382	0.303	0.205
W_i	0.962	0.978	0.929	0.982	0.951	0.955	0.998
p(0.05)	*0.732*	*0.957*	*0.440*	*0.975*	*0.681*	*0.746*	*0.906*
A_i	0.184	0.235	0.358	0.142	0.211	0.235	0.192
p(0.05)	*0.892*	*0.750*	*0.377*	*0.956*	*0.804*	*0.707*	*0.618*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-4. Summary statistics of the dry density measured in UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	2556	2587	2590	2610	2596	2608	2612
Max_i	2616	2630	2624	2634	2635	2647	2627
Σ_i	38809.55	39113.52	26084.73	26186.37	26189.92	26237.34	5238.859
Ave	2587	2608	2608	2619	2619	2624	2619
SE_i	4.75	3.19	3.68	2.37	3.72	3.52	7.75
σ_i^2	339	153	135	56	138	124	120
σ_i	18	12	12	8	12	11	11
Med_i	2590	2608	2612	2617	2619	2624	2619
Q_1	2572	2602	2596	2612	2614	2613	2612
Q_3	2603	2615	2617	2623	2631	2628	2627
Skew	−0.279	0.077	−0.523	0.925	−0.645	0.835	0.000
Kurt	−0.893	−0.208	−1.064	0.703	0.228	1.305	−2.750
GM_i	2587	2608	2608	2619	2619	2624	2619
CV_i	0.711	0.475	0.446	0.287	0.449	0.425	0.419
W_i	0.957	0.959	0.923	0.927	0.922	0.924	1.000
p(0.05)	*0.637*	*0.674*	*0.386*	*0.417*	*0.374*	*0.392*	*1.000*
A_i	0.268	0.272	0.371	0.299	0.418	0.403	0.251
p(0.05)	*0.631*	*0.618*	*0.350*	*0.517*	*0.264*	*0.288*	*0.227*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-5. Summary statistics of the porosity assessed for UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*3*
Min_i	0.000	0.204	0.128	0.258	0.292	0.316	0.189
Max_i	0.478	0.519	0.413	1.163	0.464	0.444	0.224
Σ_i	4.040	4.698	3.006	3.860	3.761	3.566	0.609
Ave	0.269	0.313	0.301	0.386	0.376	0.396	0.203
SE_i	0.039	0.021	0.024	0.087	0.018	0.013	0.011
σ_i^2	0.023	0.007	0.006	0.076	0.003	0.002	0.000
σ_i	0.152	0.082	0.076	0.276	0.056	0.039	0.019
Med_i	0.267	0.304	0.302	0.294	0.370	0.410	0.196
Q_1	0.124	0.245	0.276	0.270	0.336	0.369	0.189
Q_3	0.382	0.347	0.35175	0.349	0.426	0.421	0.224
Skew	−0.522	1.159	−1.036	3.031	0.056	−1.162	1.458
Kurt	−0.569	1.879	2.617	9.361	−0.623	1.176	−2.333
GM_i	0.000	0.304	0.289	0.340	0.372	0.394	0.202
CV_i	56.564	26.067	25.415	71.565	14.965	9.847	9.123
W_i	0.928	0.912	0.914	0.495	0.956	0.904	0.893
p(0.05)	*0.250*	*0.144*	*0.308*	*0.000*	*0.743*	*0.276*	*0.363*
A_i	0.407	0.491	0.441	2.284	0.225	0.453	0.312
p(0.05)	*0.306*	*0.186*	*0.229*	*0.000*	*0.754*	*0.205*	*0.249*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-6. Summary statistics of the porosity assessed for UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	0.114	0.138	0.217	0.152	0.311	0.293	0.194
Max_i	1.575	0.346	0.314	0.292	0.451	0.408	0.267
Σ_i	5.698	3.894	2.596	2.320	3.788	3.433	0.461
Ave	0.380	0.260	0.260	0.232	0.379	0.343	0.231
SE_i	0.092	0.015	0.010	0.012	0.018	0.013	0.037
σ_i^2	0.128	0.003	0.001	0.001	0.003	0.002	0.003
σ_i	0.358	0.058	0.032	0.039	0.055	0.042	0.052
Med_i	0.259	0.266	0.253	0.231	0.376	0.344	0.231
Q_1	0.238	0.221	0.231	0.217	0.323	0.304	0.194
Q_3	0.406	0.310	0.291	0.258	0.429	0.378	0.267
Skew	2.970	−0.548	0.395	−0.600	0.067	0.224	0.000
Kurt	10.006	−0.278	−0.979	1.306	−2.064	−1.684	−2.750
GM_i	0.295	0.253	0.258	0.229	0.375	0.341	0.228
CV_i	94.245	22.220	12.496	16.682	14.635	12.361	22.394
W_i	0.633	0.947	0.956	0.959	0.862	0.894	1.000
p(0.05)	*5.18E−05*	*0.481*	*0.735*	*0.771*	*0.081*	*0.187*	*1.000*
A_i	1.926	0.373	0.210	0.269	0.616	0.483	0.251
p(0.05)	*3.42E−05*	*0.371*	*0.806*	*0.597*	*0.078*	*0.176*	*0.227*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-7. Summary statistics of the ultrasonic V_P measured for UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*15*
Min_i	5.847	5.786	5.863	5.817	4.887	4.974	5.847
Max_i	6.166	6.099	6.025	6.077	5.238	5.252	6.166
Σ_i	89.160	89.173	59.294	59.021	51.151	46.128	89.160
Ave	5.944	5.945	5.929	5.902	5.115	5.125	5.944
SE_i	0.025	0.024	0.017	0.025	0.031	0.030	0.025
σ_i^2	0.009	0.009	0.003	0.006	0.010	0.008	0.009
σ_i	0.096	0.093	0.054	0.080	0.099	0.090	0.096
Med_i	5.909	5.916	5.907	5.877	5.125	5.114	5.909
Q_1	5.887	5.874	5.892	5.842	5.076	5.062	5.887
Q_3	5.957	6.009	5.982	5.966	5.194	5.215	5.957
Skew	1.696	0.367	0.701	1.279	−1.319	−0.093	1.696
Kurt	2.083	−0.693	−0.768	1.381	2.575	−0.615	2.083
GM_i	5.943	5.944	5.929	5.902	5.114	5.125	5.943
CV_i	1.621	1.565	0.903	1.350	1.935	1.755	1.621
W_i	0.762	0.938	0.915	0.880	0.903	0.967	0.958
p(0.05)	*0.001*	*0.353*	*0.318*	*0.130*	*0.237*	*0.865*	*0.605*
A_i	1.493	0.418	0.432	0.514	0.397	0.188	0.237
p(0.05)	*4.55E−04*	*0.287*	*0.242*	*0.144*	*0.299*	*0.864*	*0.459*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-8. Summary statistics of the ultrasonic V_P measured for UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	5.929	6.024	5.980	5.846	5.167	4.992	5.124
Max_i	6.259	6.278	6.131	6.346	5.308	5.217	5.279
Σ_i	91.232	91.393	60.518	60.064	52.533	50.714	10.403
Ave	6.082	6.093	6.052	6.006	5.253	5.071	5.202
SE_i	0.027	0.019	0.017	0.042	0.015	0.020	0.078
σ_i^2	0.011	0.005	0.003	0.017	0.002	0.004	0.012
σ_i	0.106	0.073	0.052	0.132	0.047	0.064	0.110
Med_i	6.105	6.057	6.063	5.998	5.265	5.056	5.202
Q_1	5.974	6.041	6.001	5.935	5.209	5.028	5.124
Q_3	6.139	6.160	6.098	6.017	5.290	5.100	5.279
Skew	−0.007	1.359	0.033	2.058	−0.747	1.289	0.000
Kurt	−1.017	1.345	−1.358	5.841	−0.584	2.177	−2.750
GM_i	6.081	6.092	6.052	6.005	5.253	5.071	5.201
CV_i	1.750	1.205	0.863	2.194	0.901	1.272	2.107
W_i	0.937	0.822	0.938	0.767	0.919	0.908	1.000
p(0.05)	*0.343*	*0.007*	*0.530*	*0.006*	*0.347*	*0.270*	*1.000*
A_i	0.375	1.080	0.300	1.023	0.369	0.407	0.251
p(0.05)	*0.368*	*0.005*	*0.515*	*0.006*	*0.353*	*0.282*	*0.227*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-9. Summary statistics of the ultrasonic V_S measured for UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*3*
Min_i	3.143	3.159	3.061	2.985	2.951	3.082	3.199
Max_i	3.533	3.555	3.478	3.481	3.239	3.284	3.290
Σ_i	50.152	50.034	33.077	32.242	31.253	28.652	9.757
Ave	3.343	3.336	3.308	3.224	3.125	3.184	3.252
SE_i	0.023	0.030	0.043	0.060	0.031	0.021	0.027
σ_i^2	0.008	0.013	0.019	0.035	0.010	0.004	0.002
σ_i	0.090	0.115	0.137	0.188	0.098	0.064	0.047
Med_i	3.33	3.32	3.3085	3.2505	3.133	3.208	3.268
Q_1	3.315	3.251	3.2115	2.99	3.0525	3.13	3.199
Q_3	3.384	3.417	3.44925	3.38175	3.213	3.224	3.29
Skew	−0.052	0.319	−0.376	−0.157	−0.417	−0.142	−1.323
Kurt	1.606	−0.715	−0.760	−1.410	−1.005	−0.735	−2.333
GM_i	3.342	3.334	3.305	3.219	3.124	3.183	3.252
CV_i	2.682	3.444	4.132	5.842	3.139	2.006	1.460
W_i	0.958	0.973	0.942	0.904	0.921	0.950	0.918
p(0.05)	*0.652*	*0.898*	*0.573*	*0.241*	*0.369*	*0.688*	*0.447*
A_i	0.387	0.191	0.272	0.369	0.357	0.311	0.282
p(0.05)	*0.344*	*0.879*	*0.587*	*0.352*	*0.379*	*0.483*	*0.319*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-10. Summary statistics of the ultrasonic V_S measured for UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	3.042	3.267	3.346	3.290	2.906	2.955	3.020
Max_i	3.583	3.545	3.537	3.531	3.263	3.216	3.163
Σ_i	50.641	51.256	34.183	34.209	31.317	30.795	6.183
Ave	3.376	3.417	3.418	3.421	3.132	3.080	3.092
SE_i	0.038	0.022	0.017	0.028	0.029	0.022	0.072
σ_i^2	0.021	0.007	0.003	0.008	0.009	0.005	0.010
σ_i	0.146	0.085	0.052	0.088	0.092	0.071	0.101
Med_i	3.365	3.437	3.409	3.453	3.147	3.080	3.092
Q_1	3.269	3.351	3.388	3.329	3.109	3.044	3.020
Q_3	3.489	3.485	3.443	3.491	3.175	3.120	3.163
Skew	−0.669	−0.200	1.207	−0.348	−1.591	0.237	0.000
Kurt	0.561	−0.881	2.387	−1.709	4.413	1.141	−2.750
GM_i	3.373	3.416	3.418	3.420	3.130	3.079	3.091
CV_i	4.315	2.501	1.532	2.569	2.946	2.292	3.271
W_i	0.959	0.953	0.919	0.886	0.841	0.974	1.000
p(0.05)	*0.668*	*0.575*	*0.346*	*0.153*	*0.045*	*0.924*	*1.000*
A_i	0.235	0.299	0.386	0.544	0.730	0.237	0.251
p(0.05)	*0.748*	*0.538*	*0.319*	*0.119*	*0.038*	*0.712*	*0.227*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-11. Summary statistics of the ultrasonic V_P/V_S ratio measured for UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*3*
Min_i	1.674	1.649	1.700	1.690	1.579	1.589	1.573
Max_i	1.912	1.922	1.922	1.995	1.723	1.625	1.599
Σ_i	26.684	26.761	17.953	18.359	16.377	14.491	4.764
Ave	1.779	1.784	1.795	1.836	1.638	1.610	1.588
SE_i	0.014	0.017	0.023	0.034	0.013	0.005	0.008
σ_i^2	0.003	0.004	0.005	0.011	0.002	0.000	0.000
σ_i	0.054	0.064	0.074	0.107	0.042	0.014	0.013
Med_i	1.775	1.785	1.783	1.8355	1.6215	1.614	1.592
Q_1	1.762	1.747	1.73075	1.738	1.61	1.5965	1.573
Q_3	1.796	1.821	1.8615	1.95075	1.66875	1.622	1.599
Skew	0.572	−0.031	0.362	0.083	0.839	−0.447	−1.220
Kurt	2.454	1.201	−1.195	−1.131	0.620	−1.608	−2.333
GM_i	1.778	1.783	1.794	1.833	1.637	1.610	1.588
CV_i	3.026	3.592	4.130	5.808	2.554	0.848	0.847
W_i	0.921	0.979	0.932	0.940	0.936	0.885	0.934
p(0.05)	*0.198*	*0.959*	*0.467*	*0.552*	*0.505*	*0.178*	*0.503*
A_i	0.635	0.219	0.342	0.256	0.371	0.466	0.265
p(0.05)	*0.079*	*0.799*	*0.413*	*0.642*	*0.348*	*0.189*	*0.369*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-12. Summary statistics of the ultrasonic V_P/V_S ratio measured for UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	1.697	1.704	1.728	1.699	1.627	1.622	1.669
Max_i	1.961	1.873	1.813	1.929	1.787	1.689	1.697
Σ_i	27.070	26.766	17.707	17.571	16.787	16.472	3.366
Ave	1.805	1.784	1.771	1.757	1.679	1.647	1.683
SE_i	0.021	0.013	0.008	0.022	0.013	0.007	0.014
σ_i^2	0.006	0.003	0.001	0.005	0.002	0.001	0.000
σ_i	0.080	0.051	0.026	0.071	0.042	0.023	0.020
Med_i	1.786	1.77	1.7715	1.7255	1.667	1.641	1.683
Q_1	1.753	1.746	1.75475	1.7075	1.65575	1.63	1.669
Q_3	1.836	1.831	1.7865	1.78425	1.68875	1.6675	1.697
Skew	0.813	0.208	−0.372	1.830	1.998	0.844	0.000
Kurt	0.014	−0.964	0.068	3.573	5.398	−0.416	−2.750
GM_i	1.803	1.784	1.771	1.756	1.678	1.647	1.683
CV_i	4.439	2.870	1.490	4.030	2.531	1.382	1.176
W_i	0.919	0.964	0.933	0.787	0.788	0.904	1.000
p(0.05)	*0.187*	*0.761*	*0.476*	*0.010*	*0.010*	*0.240*	*1.000*
A_i	0.475	0.238	0.370	0.844	0.908	0.428	0.251
p(0.05)	*0.205*	*0.738*	*0.351*	*0.019*	*0.013*	*0.247*	*0.227*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-13. Summary statistics of the dynamic Young's modulus measured for UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*3*
Min_i	66.92	68.84	65.14	62.51	57.21	59.60	63.87
Max_i	79.48	80.83	79.04	79.14	66.07	67.50	66.67
Σ_i	1 111.89	1 116.42	734.52	707.87	620.52	573.54	197.18
Ave	74.13	74.43	73.45	70.79	62.05	63.73	65.73
SE_i	0.856	0.977	1.445	1.960	0.990	0.811	0.928
σ_i^2	10.98	14.33	20.89	38.43	9.81	5.92	2.59
σ_i	3.31	3.79	4.57	6.20	3.13	2.43	1.61
Med_i	74.070	73.920	73.540	72.060	62.460	64.690	66.640
Q_1	72.08	71.82	70.11	63.05	59.51	61.98	63.87
Q_3	75.83	77.78	77.96	75.65	64.85	65.35	66.67
Skew	−0.287	0.196	−0.443	−0.265	−0.453	−0.196	−1.731
Kurt	0.418	−0.873	−0.726	−1.453	−1.078	−0.418	−2.333
GM_i	74.06	74.34	73.32	70.54	61.98	63.69	65.71
CV_i	4.470	5.086	6.222	8.758	5.047	3.816	2.446
W_i	0.970	0.962	0.944	0.901	0.923	0.961	0.758
p(0.05)	*0.851*	*0.728*	*0.598*	*0.226*	*0.385*	*0.809*	*0.018*
A_i	0.215	0.184	0.255	0.413	0.318	0.275	0.478
p(0.05)	*0.812*	*0.892*	*0.645*	*0.272*	*0.477*	*0.567*	*0.062*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-14. Summary statistics of the dynamic Young's modulus measured for UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	63.26	72.16	74.84	73.71	56.34	56.43	58.83
Max_i	82.80	81.78	80.95	80.74	67.13	64.90	64.19
Σ_i	1 130.46	1 160.96	772.25	771.75	629.61	601.85	123.02
Ave	75.36	77.40	77.23	77.18	62.96	60.19	61.51
SE_i	1.333	0.787	0.562	0.907	0.915	0.722	2.680
σ_i^2	26.65	9.29	3.16	8.22	8.38	5.22	14.36
σ_i	5.16	3.05	1.78	2.87	2.89	2.28	3.79
Med_i	74.820	77.710	76.980	77.420	63.550	60.100	61.510
Q_1	71.77	75.20	75.73	74.32	61.49	58.79	58.83
Q_3	79.31	80.53	78.20	79.79	64.69	61.17	64.19
Skew	−0.660	−0.306	0.842	−0.069	−1.201	0.589	0.000
Kurt	0.731	−0.746	0.952	−2.165	2.716	1.520	−2.750
GM_i	75.19	77.34	77.21	77.13	62.90	60.15	61.45
CV_i	6.850	3.937	2.300	3.715	4.597	3.795	6.162
W_i	15.000	15.000	10.000	10.000	10.000	10.000	2.000
p(0.05)	*0.955*	*0.947*	*0.948*	*0.840*	*0.915*	*0.958*	*1.000*
A_i	0.610	0.472	0.644	0.044	0.317	0.764	1.000
p(0.05)	*0.250*	*0.270*	*0.258*	*0.711*	*0.412*	*0.295*	*0.251*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-15. Summary statistics of the dynamic Poisson's ratio measured for UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*3*
Min_i	0.22	0.21	0.24	0.23	0.16	0.17	0.16
Max_i	0.31	0.31	0.31	0.33	0.25	0.20	0.18
Σ_i	4.02	4.03	2.73	2.83	2.00	1.67	0.51
Ave	0.27	0.27	0.27	0.28	0.20	0.19	0.17
SE_i	0.005	0.006	0.008	0.011	0.008	0.003	0.006
σ_i^2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
σ_i	0.02	0.02	0.03	0.04	0.03	0.01	0.01
Med_i	0.270	0.270	0.270	0.285	0.190	0.190	0.170
Q_1	0.26	0.26	0.25	0.25	0.19	0.18	0.16
Q_3	0.28	0.28	0.30	0.32	0.22	0.19	0.18
Skew	−0.443	−0.875	0.166	−0.329	0.560	−0.214	0.000
Kurt	2.118	1.947	−1.854	−0.865	0.569	0.144	−2.333
GM_i	0.27	0.27	0.27	0.28	0.20	0.19	0.17
CV_i	7.621	8.771	9.466	12.471	12.693	4.753	5.882
W_i	0.912	0.937	0.888	0.919	0.936	0.913	1.000
p(0.05)	*0.146*	*0.348*	*0.160*	*0.344*	*0.509*	*0.338*	*1.000*
A_i	0.751	0.455	0.522	0.344	0.422	0.518	0.190
p(0.05)	*0.039*	*0.231*	*0.138*	*0.409*	*0.257*	*0.135*	*0.631*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-16. Summary statistics of the dynamic Poisson's ratio measured for UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	0.23	0.24	0.25	0.23	0.20	0.19	0.22
Max_i	0.32	0.30	0.28	0.32	0.27	0.23	0.23
Σ_i	4.13	4.04	2.67	2.58	2.24	2.06	0.45
Ave	0.28	0.27	0.27	0.26	0.22	0.21	0.23
SE_i	0.007	0.005	0.003	0.009	0.006	0.004	0.005
σ_i^2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
σ_i	0.03	0.02	0.01	0.03	0.02	0.01	0.01
Med_i	0.270	0.270	0.270	0.245	0.220	0.200	0.225
Q_1	0.26	0.26	0.26	0.24	0.21	0.20	0.22
Q_3	0.29	0.29	0.27	0.27	0.23	0.22	0.23
Skew	0.273	−0.040	−0.659	1.394	1.596	0.583	0.000
Kurt	−0.480	−0.973	−0.406	1.886	3.897	−0.756	−2.750
GM_i	0.27	0.27	0.27	0.26	0.22	0.21	0.22
CV_i	9.791	6.941	3.968	10.623	8.470	6.553	3.143
W_i	15.000	15.000	10.000	10.000	10.000	10.000	2.000
p(0.05)	*0.951*	*0.944*	*0.846*	*0.839*	*0.843*	*0.896*	*1.000*
A_i	0.534	0.428	0.051	0.043	0.048	0.198	1.000
p(0.05)	*0.326*	*0.352*	*0.753*	*0.706*	*0.680*	*0.520*	*0.251*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-17. Summary statistics of the dynamic shear modulus measured for UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*3*
Min_i	25.51	26.19	24.78	23.46	22.96	25.07	27.09
Max_i	32.50	33.42	31.99	32.08	27.72	28.63	28.70
Σ_i	438.89	440.41	289.01	276.26	258.51	241.87	84.18
Ave	29.26	29.36	28.90	27.63	25.85	26.87	28.06
SE_i	0.432	0.521	0.752	0.998	0.518	0.371	0.493
σ_i^2	2.80	4.07	5.66	9.95	2.68	1.24	0.73
σ_i	1.67	2.02	2.38	3.15	1.64	1.11	0.85
Med_i	29.060	29.180	28.950	27.950	26.010	27.180	28.390
Q_1	28.46	27.79	27.06	23.85	24.64	25.97	27.09
Q_3	30.20	30.59	31.20	30.23	27.31	27.60	28.70
Skew	−0.191	0.382	−0.294	−0.084	−0.441	−0.136	−1.479
Kurt	1.140	−0.390	−1.036	−1.319	−1.066	−0.655	−2.333
GM_i	29.21	29.30	28.81	27.46	25.80	26.85	28.05
CV_i	5.720	6.869	8.230	11.418	6.334	4.146	3.044
W_i	0.967	0.981	0.947	0.922	0.916	0.957	0.888
p(0.05)	*0.805*	*0.973*	*0.631*	*0.371*	*0.323*	*0.770*	*0.349*
A_i	0.315	0.141	0.264	0.310	0.383	0.278	0.318
p(0.05)	*0.509*	*0.964*	*0.613*	*0.502*	*0.325*	*0.559*	*0.238*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-18. Summary statistics of the dynamic shear modulus measured for UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	23.93	27.89	29.20	28.31	22.14	22.93	23.84
Max_i	33.55	32.74	32.43	32.69	28.06	27.19	26.31
Σ_i	443.79	457.46	305.20	306.94	257.46	249.26	50.15
Ave	29.59	30.50	30.52	30.69	25.75	24.93	25.08
SE_i	0.665	0.412	0.284	0.515	0.488	0.368	1.235
σ_i^2	6.64	2.55	0.81	2.65	2.38	1.35	3.05
σ_i	2.58	1.60	0.90	1.63	1.54	1.16	1.75
Med_i	29.190	30.790	30.325	31.240	25.960	24.910	25.075
Q_1	27.70	29.20	29.87	29.02	25.27	24.30	23.84
Q_3	31.27	31.82	31.02	32.06	26.54	25.58	26.31
Skew	−0.465	−0.143	0.864	−0.311	−1.264	0.273	0.000
Kurt	0.270	−1.021	1.354	−1.814	3.379	1.077	−2.750
GM_i	29.48	30.46	30.51	30.65	25.70	24.90	25.04
CV_i	8.708	5.235	2.947	5.308	5.988	4.665	6.965
W_i	15.000	15.000	10.000	10.000	10.000	10.000	2.000
p(0.05)	*0.969*	*0.933*	*0.950*	*0.878*	*0.892*	*0.973*	*1.000*
A_i	0.846	0.302	0.673	0.124	0.177	0.915	1.000
p(0.05)	*0.212*	*0.374*	*0.277*	*0.573*	*0.524*	*0.238*	*0.251*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-19. Summary statistics of the dynamic bulk modulus measured for UCS specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*9*	*3*
Min_i	47.75	46.34	49.79	48.09	30.55	31.89	32.75
Max_i	59.77	61.82	58.82	62.12	37.53	35.83	34.13
Σ_i	801.13	810.33	541.90	554.81	347.41	304.36	100.02
Ave	53.41	54.02	54.19	55.48	34.74	33.82	33.34
SE_i	0.877	0.939	1.033	1.459	0.697	0.434	0.411
σ_i^2	11.53	13.23	10.67	21.30	4.86	1.70	0.51
σ_i	3.40	3.64	3.27	4.61	2.20	1.30	0.71
Med_i	52.740	54.160	53.400	55.645	35.230	33.740	33.140
Q_1	51.44	52.42	51.66	51.16	32.93	32.78	32.75
Q_3	53.78	55.98	58.06	59.39	36.61	35.10	34.13
Skew	0.733	−0.033	0.365	−0.321	−0.800	0.200	1.165
Kurt	0.191	1.159	−1.462	−0.957	−0.108	−1.012	−2.333
GM_i	53.31	53.91	54.10	55.31	34.68	33.80	33.33
CV_i	6.358	6.734	6.028	8.318	6.347	3.852	2.134
W_i	0.891	0.975	0.900	0.952	0.935	0.962	0.941
p(0.05)	*0.069*	*0.921*	*0.216*	*0.694*	*0.499*	*0.818*	*0.530*
A_i	0.817	0.242	0.457	0.246	0.322	0.216	0.257
p(0.05)	*0.026*	*0.723*	*0.208*	*0.679*	*0.463*	*0.776*	*0.393*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-20. Summary statistics of the dynamic bulk modulus measured for UCS specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*
Min_i	51.54	51.41	51.81	48.49	35.78	33.12	36.86
Max_i	66.45	63.89	57.20	67.58	41.22	35.33	38.20
Σ_i	846.39	843.77	549.43	536.73	380.68	343.42	75.06
Ave	56.43	56.25	54.94	53.67	38.07	34.34	37.53
SE_i	1.077	0.835	0.572	1.677	0.469	0.276	0.670
σ_i^2	17.40	10.45	3.27	28.12	2.20	0.76	0.90
σ_i	4.17	3.23	1.81	5.30	1.48	0.87	0.95
Med_i	55.110	56.620	54.900	52.385	38.020	34.515	37.530
Q_1	53.08	53.85	53.64	50.64	37.00	33.28	36.86
Q_3	59.14	58.48	57.09	54.34	38.87	35.20	38.20
Skew	1.044	0.771	−0.135	2.321	0.746	−0.413	0.000
Kurt	0.934	0.851	−0.802	6.252	1.545	−1.509	−2.750
GM_i	56.29	56.17	54.92	53.46	38.04	34.33	37.52
CV_i	7.393	5.746	3.291	9.881	3.898	2.539	2.525
W_i	15.000	15.000	10.000	10.000	10.000	10.000	2.000
p(0.05)	*0.915*	*0.960*	*0.922*	*0.737*	*0.957*	*0.878*	*1.000*
A_i	0.162	0.687	0.377	0.002	0.756	0.123	1.000
p(0.05)	*0.431*	*0.242*	*0.351*	*1.091*	*0.248*	*0.475*	*0.251*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-21. Summary statistics of the UCS values measured for specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100	21–100
n	*14*	*15*	*10*	*10*	*10*	*9*	*3*	*57*
Min_i	13.6	60.6	82.0	127.0	154.8	103.9	135.1	60.6
Max_i	91.4	215.0	204.8	190.7	253.0	218.3	195.8	253.0
Σ_i	820.55	2277.5	1679.16	1644.55	1865.93	1500.07	492.19	9459.4
Ave	58.6	151.8	167.9	164.5	186.6	166.7	164.1	166.0
SE_i	6.3	10.6	11.6	5.7	9.7	12.2	17.6	4.6
σ_i^2	559.8	1678.8	1335.9	320.2	933.3	1342.7	926.6	1191.6
σ_i	23.7	41.0	36.5	17.9	30.5	36.6	30.4	34.5
Med_i	54.9	152.4	177.5	168.4	183.1	180.6	161.4	170.0
Q_1	40.8	141.7	149.2	151.0	160.4	138.2	135.1	149.6
Q_3	85.1	180.0	193.3	175.3	203.6	193.8	195.8	188.3
Skew	−0.102	−0.913	−1.621	−0.865	1.221	−0.428	0.395	−0.720
Kurt	−0.599	1.058	2.831	1.131	1.379	−0.643	−2.333	1.696
GM_i	53.0	145.1	163.2	163.5	184.5	162.8	162.2	161.6
CV_i	40.369	26.986	21.767	10.881	16.372	21.984	18.554	20.801
W_i	0.944	0.918	0.848	0.935	0.893	0.957	0.994	0.952
p(0.05)	*0.468*	*0.179*	*0.055*	*0.497*	*0.182*	*0.769*	*0.854*	*0.024*
A_i	0.328	0.566	0.615	0.369	0.431	0.257	0.196	0.849
p(0.05)	*0.474*	*0.119*	*0.078*	*0.354*	*0.243*	*0.628*	*0.600*	*0.027*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-22. Summary statistics of the UCS values measured for specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100	21–100
n	*15*	*15*	*10*	*10*	*10*	*10*	*2*	*57*
Min_i	11.4	150.3	72.8	122.3	121.6	123.2	120.8	72.8
Max_i	114.1	290.4	283.1	257.8	281.0	250.0	184.7	290.4
Σ_i	778.64	3295.01	1613.68	1905.87	1933.86	1756.75	305.48	10810.65
Ave	51.9	219.7	161.4	190.6	193.4	175.7	152.7	189.7
SE_i	6.2	9.2	21.9	13.6	19.8	13.0	32.0	7.0
σ_i^2	577.5	1261.7	4782.9	1844.8	3932.4	1697.2	2046.7	2792.3
σ_i	24.0	35.5	69.2	43.0	62.7	41.2	45.2	52.8
Med_i	52.4	224.0	143.0	189.6	197.9	181.5	152.7	188.7
Q_1	45.5	198.5	120.6	158.0	126.5	132.5	120.8	136.8
Q_3	63.5	236.9	193.5	229.1	255.4	206.0	184.7	233.1
Skew	0.665	−0.351	1.133	−0.020	0.044	0.277	0.000	0.035
Kurt	2.960	0.659	0.515	−0.545	−1.914	−0.642	−2.750	−0.918
GM_i	45.3	216.8	149.6	186.0	183.9	171.3	149.4	182.0
CV_i	46.294	16.170	42.858	22.536	32.427	23.451	29.619	27.861
W_i	0.877	0.928	0.830	0.967	0.875	0.945	1.000	0.964
p(0.05)	*0.043*	*0.256*	*0.033*	*0.857*	*0.114*	*0.611*	*1.000*	*0.091*
A_i	0.814	0.627	0.823	0.207	0.518	0.258	0.251	0.663
p(0.05)	*0.027*	*0.083*	*0.021*	*0.816*	*0.141*	*0.636*	*0.227*	*0.079*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-23. Summary statistics of the 50 % tangent Young modulus of specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	*12*	*15*	*10*	*10*	*10*	*9*	*2*
Min_i	5.0	39.4	27.2	79.1	75.4	49.1	71.8
Max_i	148.4	194.4	224.7	160.8	87.6	128.8	72.6
Σ_i	933.12	1234.07	1002.93	957.46	789.8	727.97	144.45
Ave	77.8	82.3	100.3	95.7	79.0	80.9	72.2
SE_i	11.8	9.2	20.7	7.4	1.2	6.9	0.4
σ_i^2	1663.7	1278.6	4275.2	547.9	14.4	423.4	0.3
σ_i	40.8	35.8	65.4	23.4	3.8	20.6	0.6
Med_i	71.6	71.7	77.3	89.3	78.1	78.3	72.2
Q_1	50.2	63.5	73.3	86.2	76.1	75.5	71.8
Q_3	110.0	89.7	113.7	92.5	81.3	81.7	72.6
Skew	−0.011	2.345	1.500	2.899	1.454	1.433	0.000
Kurt	−0.407	7.232	1.095	8.783	1.950	4.843	−2.750
GM_i	61.6	76.9	85.1	93.8	78.9	78.8	72.2
CV_i	52.455	43.463	65.194	24.448	4.803	25.440	0.773
W_i	0.944	0.918	0.848	0.935	0.893	0.957	0.994
p(0.05)	*0.468*	*0.179*	*0.055*	*0.497*	*0.182*	*0.769*	*0.854*
A_i	0.328	0.566	0.615	0.369	0.431	0.257	0.196
p(0.05)	*0.474*	*0.119*	*0.078*	*0.354*	*0.243*	*0.628*	*0.600*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-24. Summary statistics of the 50 % tangent Young modulus of specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	*9*	*14*	*10*	*9*	*10*	*10*	*2*
Min_i	52.2	61.1	24.3	77.6	73.5	68.6	73.0
Max_i	185.6	178.4	100.1	218.6	84.8	94.1	87.8
Σ_i	779.94	1356.57	720.66	1103.63	796.5	794.68	160.83
Ave	86.7	96.9	72.1	122.6	79.7	79.5	80.4
SE_i	14.4	10.1	7.3	17.8	1.0	2.2	7.4
σ_i^2	1875.7	1440.2	533.0	2851.8	10.6	49.6	109.1
σ_i	43.3	37.9	23.1	53.4	3.3	7.0	10.4
Med_i	68.4	76.8	71.8	97.2	79.5	78.1	80.4
Q_1	61.2	74.8	61.5	86.2	77.6	76.9	73.0
Q_3	104.6	116.9	92.4	169.5	81.8	81.4	87.8
Skew	1.877	1.330	−0.817	1.292	−0.140	0.957	0.000
Kurt	3.171	0.483	0.809	0.116	0.593	1.560	−2.750
GM_i	79.6	91.3	67.6	114.2	79.6	79.2	80.1
CV_i	49.976	39.164	32.036	43.549	4.084	8.864	12.988
W_i	0.748	0.783	0.937	0.776	0.964	0.857	1.000
p(0.05)	*0.005*	*0.003*	*0.515*	*0.011*	*0.829*	*0.071*	*1.000*
A_i	1.026	1.379	0.276	0.923	0.241	0.845	0.251
p(0.05)	*0.006*	*0.001*	*0.575*	*0.011*	*0.695*	*0.019*	*0.227*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-25. Summary statistics of the Poisson's ratio of specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	-	*14*	*10*	*10*	*10*	*9*	*2*
Min_i	-	0.159	0.087	0.250	0.238	0.123	0.112
Max_i	-	0.915	0.385	0.520	0.316	0.407	0.282
Σ_i	-	5.296	2.756	3.400	2.732	2.475	0.394
Ave	-	0.378	0.276	0.340	0.273	0.275	0.197
SE_i	-	0.056	0.026	0.026	0.008	0.026	0.085
σ_i^2	-	0.044	0.007	0.007	0.001	0.006	0.014
σ_i	-	0.209	0.081	0.083	0.024	0.079	0.120
Med_i	-	0.344	0.289	0.314	0.271	0.277	0.197
Q_1	-	0.195	0.242	0.272	0.252	0.239	0.112
Q_3	-	0.468	0.332	0.399	0.294	0.321	0.282
Skew	-	1.351	−1.299	1.160	0.262	−0.305	0.000
Kurt	-	2.188	2.807	1.211	−0.554	1.501	−2.750
GM_i	-	0.332	0.259	0.332	0.272	0.263	0.178
CV_i	-	55.318	29.548	24.396	8.879	28.698	61.019
W_i	-	0.879	0.903	0.903	0.979	0.942	1.000
p(0.05)	-	*0.057*	*0.236*	*0.237*	*0.962*	*0.603*	*1.000*
A_i	-	0.538	0.427	0.395	0.136	0.384	0.251
p(0.05)	-	*0.137*	*0.249*	*0.302*	*0.965*	*0.314*	*0.227*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-26. Summary statistics of the Poisson's ratio of specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	-	*14*	*10*	*9*	*10*	*10*	*2*
Min_i	-	0.219	0.008	0.136	0.227	0.173	0.241
Max_i	-	0.996	0.340	0.542	0.291	0.352	0.284
Σ_i	-	5.405	2.104	2.469	2.497	2.498	0.525
Ave	-	0.386	0.210	0.274	0.250	0.250	0.263
SE_i	-	0.061	0.034	0.037	0.006	0.015	0.022
σ_i^2	-	0.051	0.012	0.012	0.000	0.002	0.001
σ_i	-	0.227	0.108	0.110	0.020	0.049	0.030
Med_i	-	0.272	0.246	0.270	0.246	0.252	0.263
Q_1	-	0.236	0.116	0.229	0.233	0.218	0.241
Q_3	-	0.514	0.299	0.273	0.262	0.273	0.284
Skew	-	1.782	−0.693	1.986	0.988	0.605	0.000
Kurt	-	3.060	−0.538	5.666	0.453	1.647	−2.750
GM_i	-	0.342	0.155	0.259	0.249	0.246	0.262
CV_i	-	58.713	51.400	39.950	8.111	19.419	11.583
W_i	-	0.751	0.932	0.736	0.917	0.953	1.000
p(0.05)	-	*0.001*	*0.468*	*0.004*	*0.330*	*0.705*	*1.000*
A_i	-	1.371	0.323	1.166	0.357	0.285	0.251
p(0.05)	-	*0.001*	*0.461*	*0.002*	*0.380*	*0.550*	*0.227*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-27. Summary statistics of the crack initiation stress of specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	-	*2*	*4*	*4*	*3*	*4*	*1*
Min_i	-	42.4	78.5	44.7	99.9	70.2	77.7
Max_i	-	75.7	122.1	97.0	141.4	131.9	77.7
Σ_i	-	118.1	394.96	289	342.6	402.3	77.7
Ave	-	59.1	98.7	72.3	114.2	100.6	77.7
SE_i	-	16.7	9.1	11.7	13.6	12.7	0.0
σ_i^2	-	554.4	330.2	549.0	555.4	640.8	0.0
σ_i	-	23.5	18.2	23.4	23.6	25.3	0.0
Med_i	-	59.1	97.2	73.7	101.3	100.1	77.7
Q_1	-	42.4	82.2	49.0	99.9	76.9	77.7
Q_3	-	75.7	116.8	94.1	141.4	124.7	77.7
Skew	-	0.000	0.474	−0.239	1.725	0.110	0.000
Kurt	-	−2.750	0.801	−2.535	−2.333	1.229	0.000
GM_i	-	56.7	97.5	69.2	112.7	98.1	77.7
CV_i	-	39.876	18.403	32.429	20.636	25.169	0.000
W_i	-	1.000	0.986	0.963	0.775	0.980	-
p(0.05)	-	*1.000*	*0.938*	*0.796*	*0.057*	*0.902*	-
A_i	-	0.251	0.184	0.200	0.456	0.207	-
p(0.05)	-	*0.227*	*0.761*	*0.692*	*0.074*	*0.660*	-

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-28. Summary statistics of the crack initiation stress of specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	-	*4*	*5*	*1*	*1*	*3*	-
Min_i	-	93.8	52.4	106.1	178.6	106.3	-
Max_i	-	166.0	175.3	106.1	178.6	143.8	-
Σ_i	-	509.82	518.8	106.1	178.6	366.1	-
Ave	-	127.5	103.8	106.1	178.6	122.0	-
SE_i	-	15.0	22.3	0.0	0.0	11.2	-
σ_i^2	-	904.6	2488.8	0.0	0.0	378.9	-
σ_i	-	30.1	49.9	0.0	0.0	19.5	-
Med_i	-	125.0	95.7	106.1	178.6	116.0	-
Q_1	-	100.0	59.0	106.1	178.6	106.3	-
Q_3	-	157.4	152.6	106.1	178.6	143.8	-
Skew	-	0.456	0.645	0.000	0.000	1.261	-
Kurt	-	0.761	−0.788	0.000	0.000	−2.333	-
GM_i	-	124.8	94.4	106.1	178.6	121.0	-
CV_i	-	23.598	48.080	0.000	0.000	15.950	-
W_i	-	0.987	0.949	-	-	0.928	-
p(0.05)	-	*0.943*	*0.728*	-	-	*0.481*	-
A_i	-	0.182	0.210	-	-	0.271	-
p(0.05)	-	*0.770*	*0.710*	-	-	*0.349*	-

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-29. Summary statistics of the crack damage stress of specimens of rock RFM029.

Diameter	15	21	30	42	54	63	100
n	-	*2*	*4*	*4*	*3*	*4*	*1*
Min_i	-	151.5	126.9	93.1	146.0	135.1	182.4
Max_i	-	176.0	187.3	160.4	228.2	202.0	182.4
Σ_i	-	327.5	638.82	481.8	532.9	666.8	182.4
Ave	-	163.8	159.7	120.5	177.6	166.7	182.4
SE_i	-	12.3	12.4	14.6	25.5	14.1	0.0
σ_i^2	-	300.1	618.7	852.1	1958.1	799.2	0.0
σ_i	-	17.3	24.9	29.2	44.3	28.3	0.0
Med_i	-	163.8	162.3	114.2	158.7	164.9	182.4
Q_1	-	151.5	135.4	96.3	146.0	140.4	182.4
Q_3	-	176.0	181.5	150.9	228.2	194.9	182.4
Skew	-	0.000	−0.613	1.080	1.573	0.343	0.000
Kurt	-	−2.750	1.632	0.964	−2.333	−0.122	0.000
GM_i	-	163.3	158.2	118.0	174.2	164.9	182.4
CV_i	-	10.580	15.575	24.235	24.911	16.959	0.000
W_i	-	1.000	0.952	0.938	0.863	0.994	-
p(0.05)	-	*1.000*	*0.731*	*0.642*	*0.275*	*0.978*	-
A_i	-	0.251	0.259	0.249	0.348	0.163	-
p(0.05)	-	*0.227*	*0.489*	*0.514*	*0.184*	*0.845*	-

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-30. Summary statistics of the crack damage stress of specimens of rock RFM045.

Diameter	15	21	30	42	54	63	100
n	-	*4*	*5*	*1*	*1*	*3*	-
Min_i	-	151.6	114.6	174.3	261.3	151.3	-
Max_i	-	238.5	257.4	174.3	261.3	231.6	-
Σ_i	-	782.5	844.3	174.3	261.3	537.9	-
Ave	-	195.6	168.9	174.3	261.3	179.3	-
SE_i	-	18.5	28.9	0.0	0.0	26.2	-
σ_i^2	-	1366.6	4174.0	0.0	0.0	2054.9	-
σ_i	-	37.0	64.6	0.0	0.0	45.3	-
Med_i	-	196.2	138.1	174.3	261.3	155.0	-
Q_1	-	159.6	116.0	174.3	261.3	151.3	-
Q_3	-	231.1	237.2	174.3	261.3	231.6	-
Skew	-	−0.079	0.740	0.000	0.000	1.719	-
Kurt	-	−0.669	−2.015	0.000	0.000	−2.333	-
GM_i	-	192.9	159.6	174.3	261.3	175.8	-
CV_i	-	18.897	38.260	0.000	0.000	25.282	-
W_i	-	0.998	0.848	-	-	0.785	-
p(0.05)	-	*0.992*	*0.187*	-	-	*0.078*	-
A_i	-	0.155	0.420	-	-	0.444	-
p(0.05)	-	*0.871*	*0.186*	-	-	*0.082*	-

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-31. Summary statistics of the L/D ratio measured for specimens of rock RFM029.

Diameter	42	54	63	100
n	7	6	10	5
Min_i	0.43	0.49	0.41	0.45
Max_i	0.54	0.53	0.51	0.51
Σ_i	3.33	3.07	4.91	2.42
Ave	0.48	0.51	0.49	0.48
SE_i	0.014	0.006	0.010	0.012
σ_i^2	0.00	0.00	0.00	0.00
σ_i	0.04	0.01	0.03	0.03
Med_i	0.48	0.52	0.51	0.49
Q_1	0.44	0.50	0.48	0.46
Q_3	0.50	0.52	0.51	0.51
Skew	0.605	−0.418	−2.310	−0.340
Kurt	0.229	−0.859	5.899	−2.692
GM_i	0.47	0.51	0.49	0.48
CV_i	7.852	2.877	6.329	5.770
W_i	0.958	0.958	0.674	0.865
p(0.05)	0.800	0.804	*4.26E−4*	0.246
A_i	0.208	0.220	1.289	0.361
p(0.05)	0.777	0.708	0.001	0.280

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-32. Summary statistics of the dry density measured for ITS specimens of rock RFM029.

Diameter	42	54	63	100
n	*7*	*6*	*10*	*5*
Min_i	2562	2587	2600	2607
Max_i	2631	2629	2636	2623
Σ_i	18256.5	15680.44	26216.21	13076.04
Ave	2608	2613	2622	2615
SE_i	8.75	5.83	3.99	2.55
σ_i^2	536	204	159	32
σ_i	23	14	13	6
Med_i	2612	2615	2621	2615
Q_1	2603	2606	2610	2611
Q_3	2628	2624	2634	2620
Skew	−1.457	−1.454	−0.393	−0.274
Kurt	2.760	2.957	−1.053	1.639
GM_i	2608	2613	2622	2615
CV_i	0.888	0.547	0.481	0.218
W_i	0.867	0.872	0.917	0.955
p(0.05)	*0.174*	*0.234*	*0.331*	*0.775*
A_i	0.447	0.449	0.348	0.268
p(0.05)	*0.191*	*0.173*	*0.400*	*0.510*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-33. Summary statistics of the porosity assessed for ITS specimens of rock RFM029.

Diameter	42	54	63	100
n	*7*	*6*	*10*	*5*
Min_i	0.320	0.350	0.230	0.200
Max_i	0.490	0.740	0.400	0.410
Σ_i	2.890	2.940	3.090	1.520
Ave	0.413	0.490	0.309	0.304
SE_i	0.022	0.057	0.018	0.034
σ_i^2	0.003	0.019	0.003	0.006
σ_i	0.059	0.140	0.056	0.076
Med_i	0.440	0.485	0.300	0.310
Q_1	0.360	0.365	0.258	0.240
Q_3	0.450	0.568	0.355	0.365
Skew	−0.471	1.231	0.209	0.054
Kurt	−0.682	2.048	−1.209	1.275
GM_i	0.409	0.475	0.304	0.296
CV_i	14.242	28.484	18.272	24.900
W_i	0.957	0.959	0.923	0.927
p(0.05)	*0.637*	*0.674*	*0.386*	*0.417*
A_i	0.268	0.272	0.371	0.299
p(0.05)	*0.631*	*0.618*	*0.350*	*0.517*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Table A2-34. Summary statistics of the tensile strength measured for specimens of rock RFM029.

Diameter	42	54	63	100
n	*7*	*6*	*10*	*5*
Min_i	10.9	10.4	10.8	12.9
Max_i	16.5	16.2	18.0	15.6
Σ_i	101.1	76.51	149.42	71.23
Ave	14.4	12.8	14.9	14.2
SE_i	0.8	0.9	0.7	0.5
σ_i^2	4.3	4.7	5.1	1.1
σ_i	2.1	2.2	2.3	1.0
Med_i	14.6	13.0	15.0	14.5
Q_1	13.2	10.5	13.0	13.3
Q_3	16.4	14.2	16.7	15.1
Skew	−0.750	0.494	−0.377	−0.152
Kurt	−0.185	−0.006	−0.282	−0.018
GM_i	14.3	12.6	14.8	14.2
CV_i	14.397	16.997	15.101	7.225
W_i	0.908	0.912	0.968	0.980
p(0.05)	*0.380*	*0.448*	*0.867*	*0.936*
A_i	0.318	0.313	0.174	0.187
p(0.05)	*0.434*	*0.422*	*0.898*	*0.802*

Notes: n = number of samples; Min_i = minimum sample value; Max_i = maximum sample value; Σ_i = sum; Ave = mean; SE_i = standard error of the mean; σ_i^2 = variance; σ_i = standard deviation; Med_i = median; Q_1 = 1st quartile (25 %); Q_3 = 3rd quartile (75 %); Skew = skewness; Kurt = kurtosis; GM_i = geometric mean; CV_i = coefficient of variation; W_i = Shapiro-Wilk test; A_i = Anderson-Darling test; p(0.05) = normal distribution probability for a significance level of 95 %.

Waveforms of the Tested Specimens

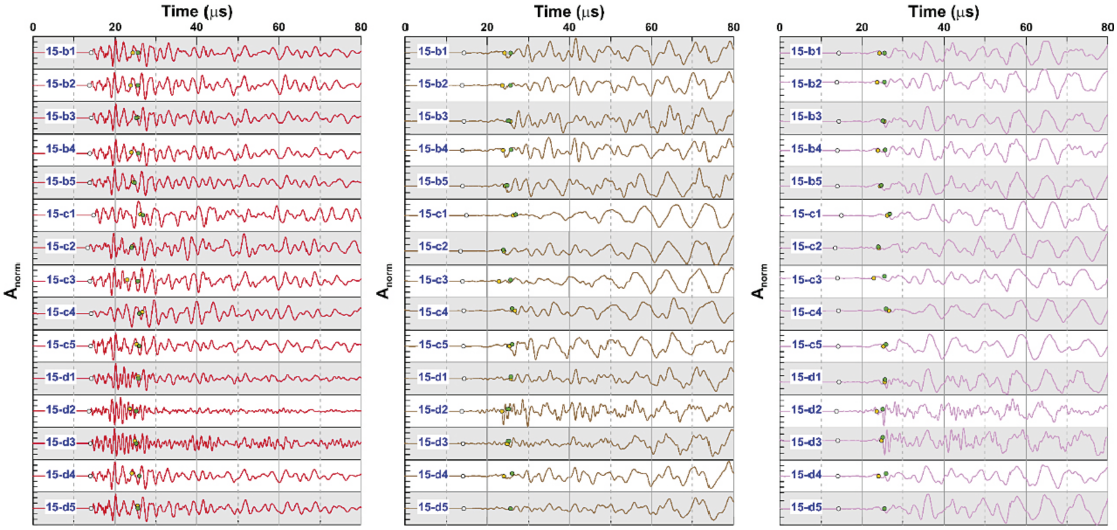

Figure A3-1. *Amplitude-normalized P, S1 and S2 waveforms of the 15 mm-diameter specimens of rock RFM029. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

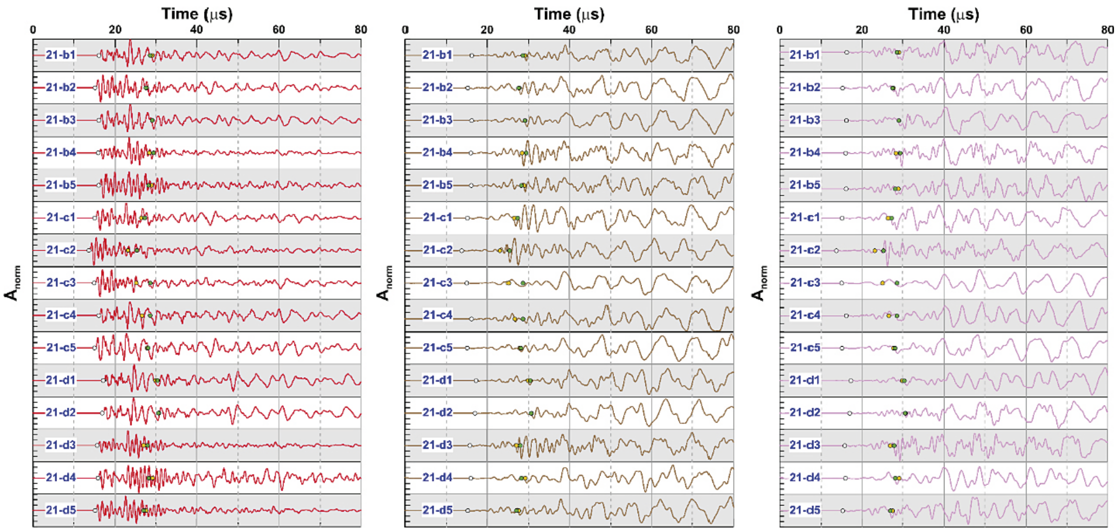

Figure A3-2. *Amplitude-normalized P, S1 and S2 waveforms of the 21 mm-diameter specimens of rock RFM029. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

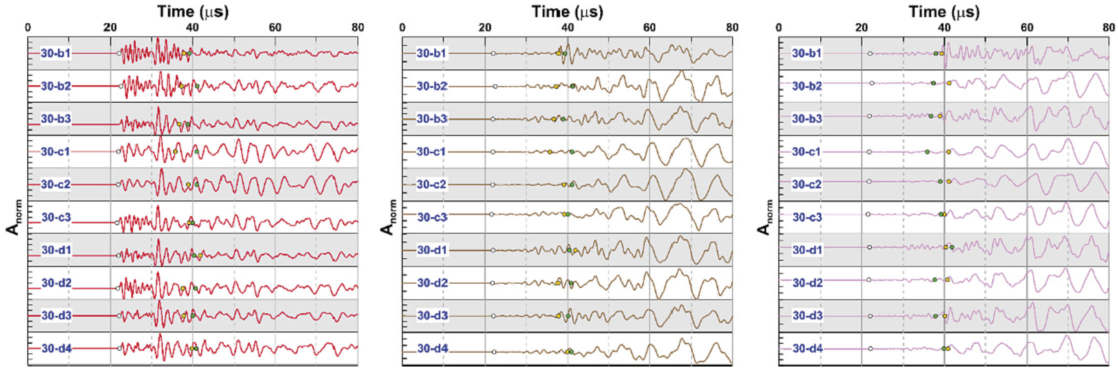

Figure A3-3. *Amplitude-normalized P, S1 and S2 waveforms of the 30 mm-diameter specimens of rock RFM029. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

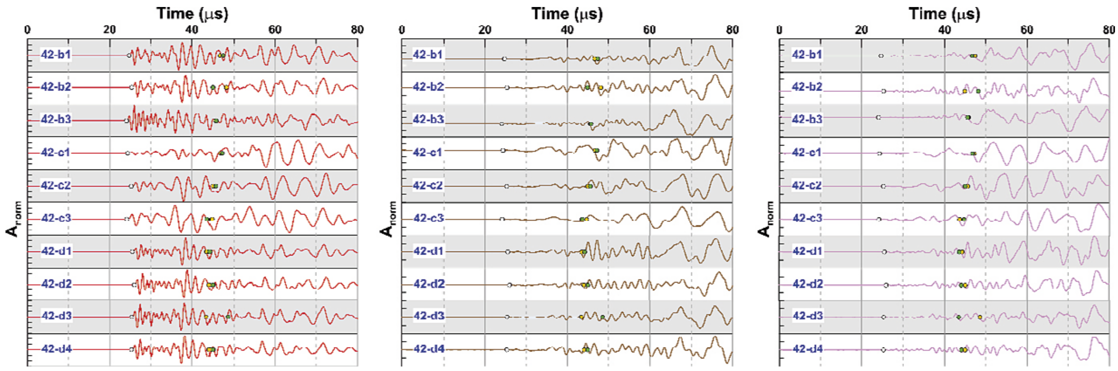

Figure A3-4. *Amplitude-normalized P, S1 and S2 waveforms of the 42 mm-diameter specimens of rock RFM029. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

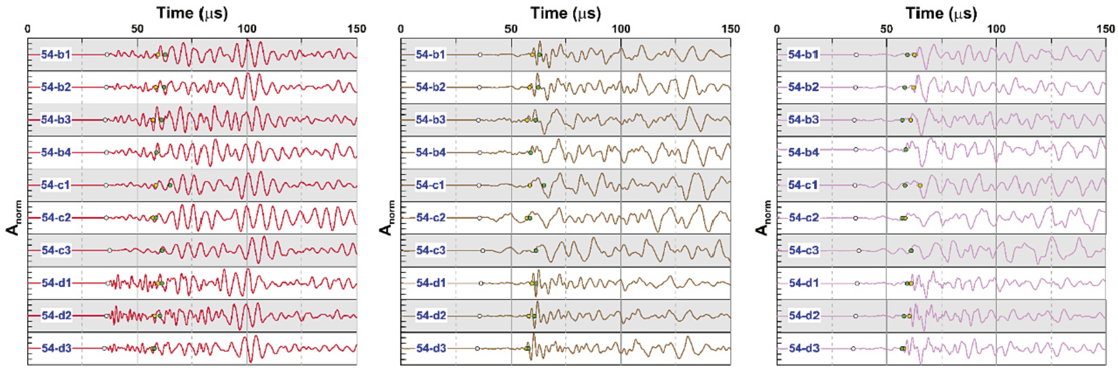

Figure A3-5. *Amplitude-normalized P, S1 and S2 waveforms of the 54 mm-diameter specimens of rock RFM029. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

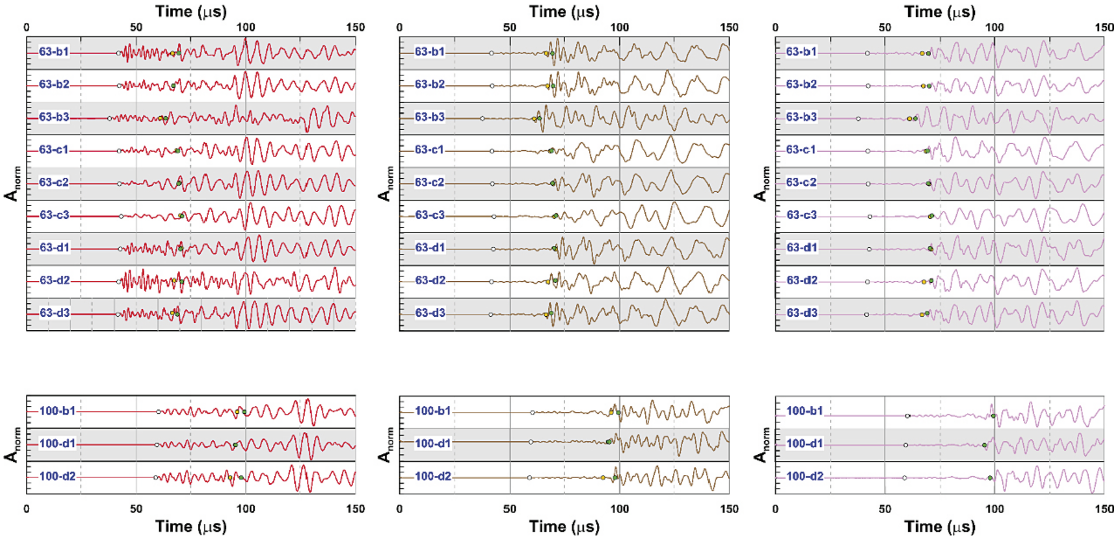

__Figure A3-6.__ Amplitude-normalized P, S1 and S2 waveforms of the 63 and 100 mm-diameter specimens of rock RFM029. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.

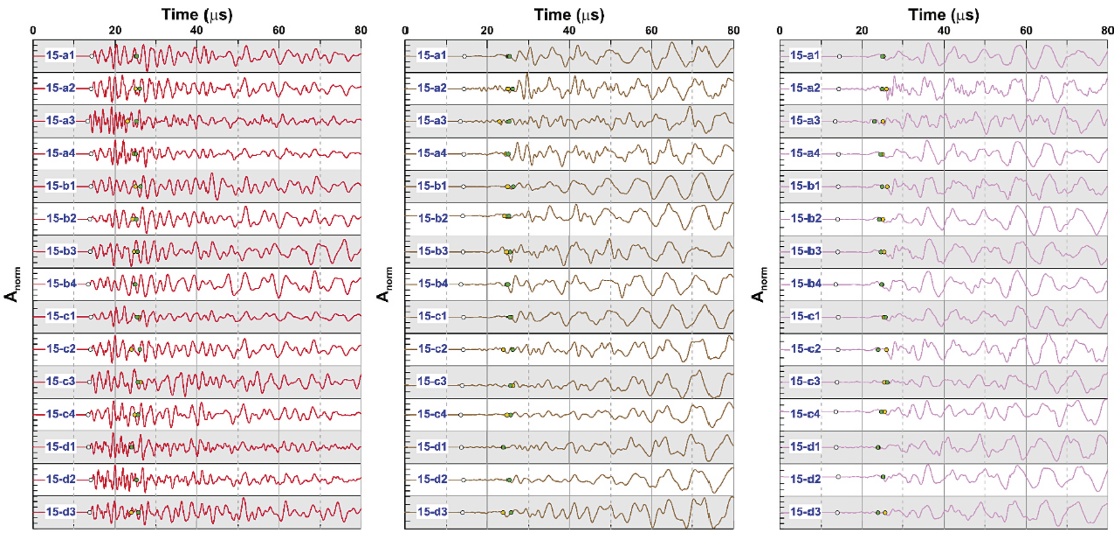

__Figure A3-7.__ Amplitude-normalized P, S1 and S2 waveforms of the 15 mm-diameter specimens of rock RFM045. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.

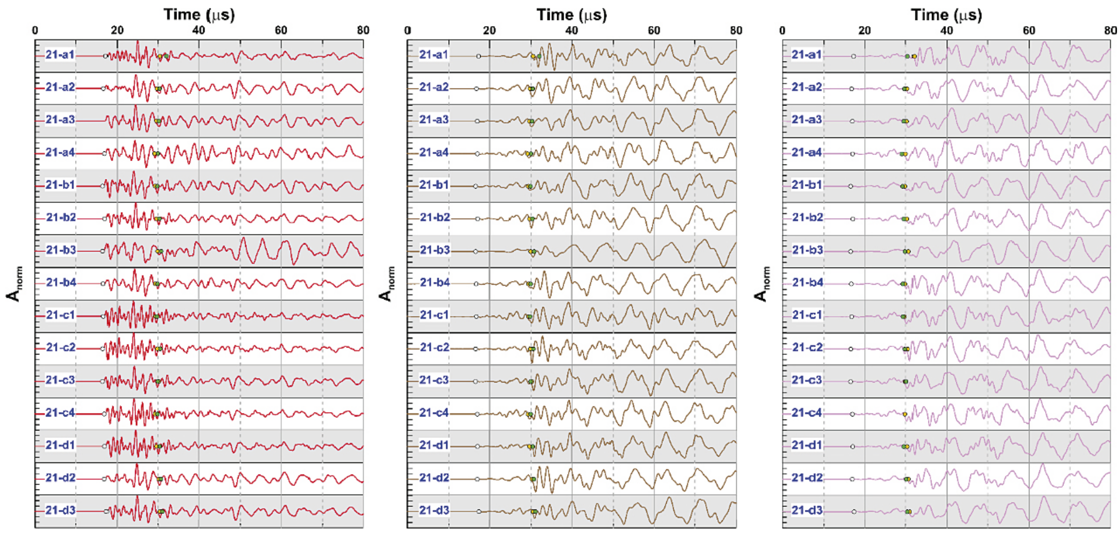

Figure A3-8. *Amplitude-normalized P, S1 and S2 waveforms of the 21 mm-diameter specimens of rock RFM045. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

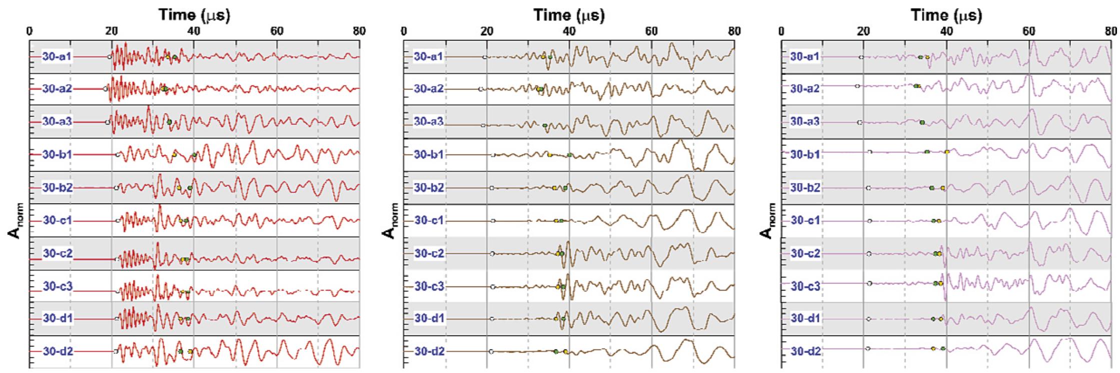

Figure A3-9. *Amplitude-normalized P, S1 and S2 waveforms of the 30 mm-diameter specimens of rock RFM045. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

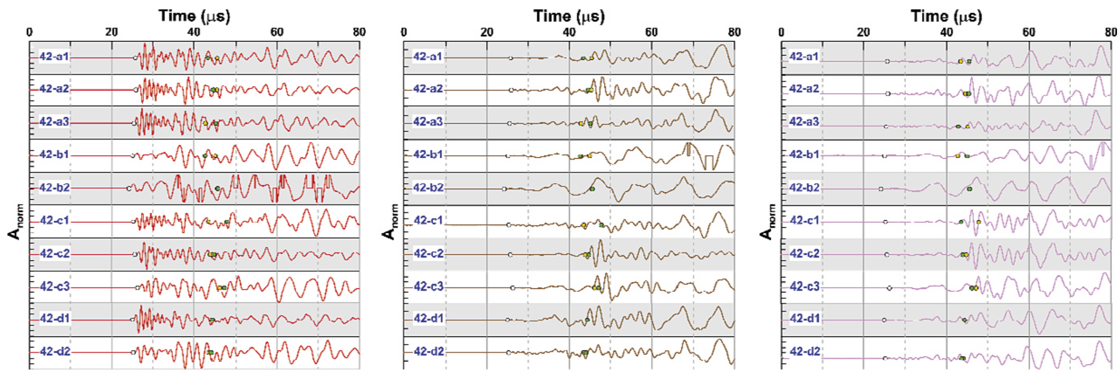

Figure A3-10. *Amplitude-normalized P, S1 and S2 waveforms of the 42 mm-diameter specimens of rock RFM045. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

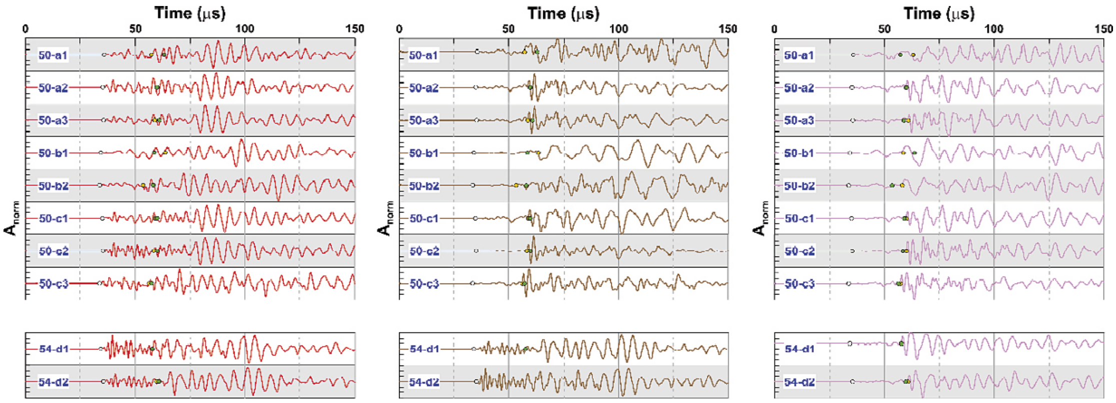

Figure A3-11. *Amplitude-normalized P, S1 and S2 waveforms of the 50 and 54 mm-diameter specimens of rock RFM045. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

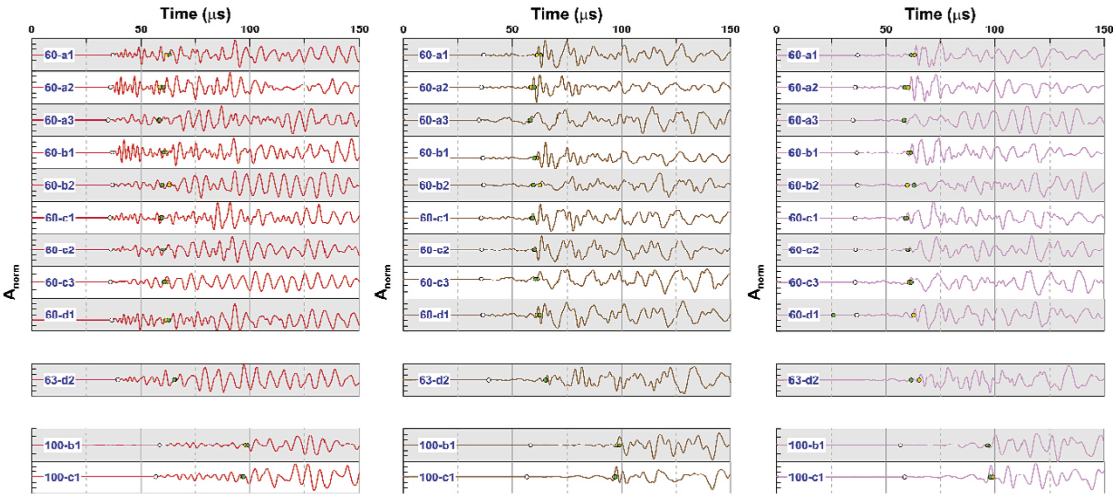

Figure A3-12. *Amplitude-normalized P, S1 and S2 waveforms of the 60, 63 and 100 mm-diameter specimens of rock RFM045. The corresponding arrival times are indicated with white (P), yellow (S1) and green (S2) dots.*

Appendix 4

Experimental Results and Photograph Survey

This appendix presents the test report data sheets (left page), photographs and the stress and displacement versus time curves (right page) for each of the tested samples in this study.

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	15_029b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	40.95	40.82	40.79	40.84	40.89	**Mean length, L (mm)**	40.86	**Dry mass, M_d (g)**	21.81
Diameter (mm)	15.97	16.01	16.09	16.07	-	**Mean diameter, D (mm)**	16.04	**Dry density, ρ_d (kg/m^3)**	2643

L/D ratio	2.55	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.81
Water content (%)	0.00	**Porosity, n (%)**	0.00	**Bulk density, ρ (kg/m^3)**	2643
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	378			**Temperature (ºC)**	22.0
F_{max} (kN)	18.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	91.4	**$UCS_{1:2}$ (MPa)**	94.5	**UCS_{50} (MPa)**	77.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	109.9	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.890	**V_{S1} (km/s)**	3.505	**V_{S2} (km/s)**	3.386	**V_S (km/s)**	3.445
	Dynamic moduli	**E_{dyn} (GPa)**	77.8	**ν_{dyn}**	0.24	**V_P/V_S**	1.71
		G_{dyn} (GPa)	31.4	**K_{dyn} (GPa)**	49.9		
Notes (6)							

PICTURES AND PLOTS

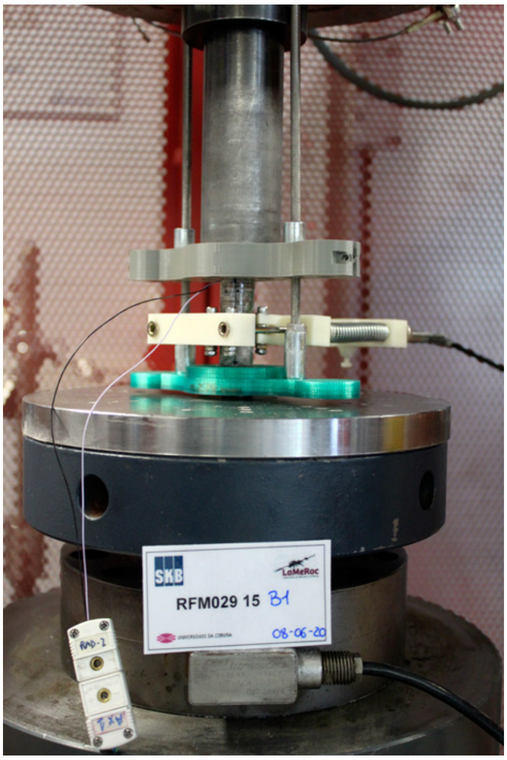

Figure 1. Sample before the test

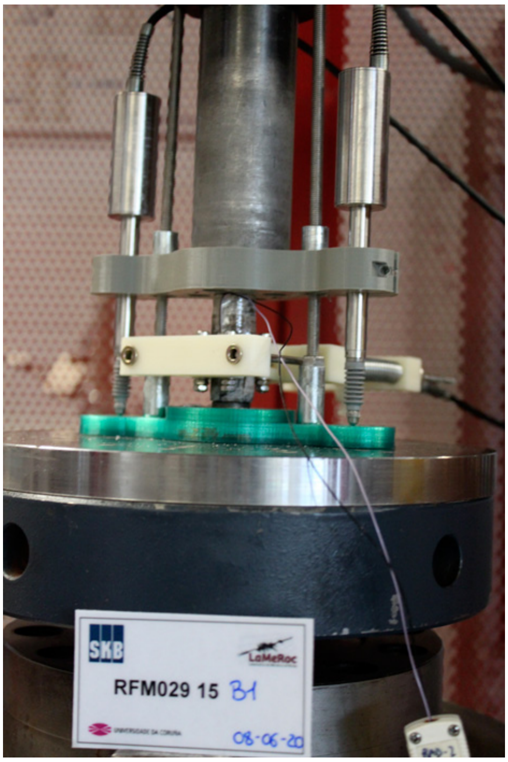

Figure 2. Sample after the test

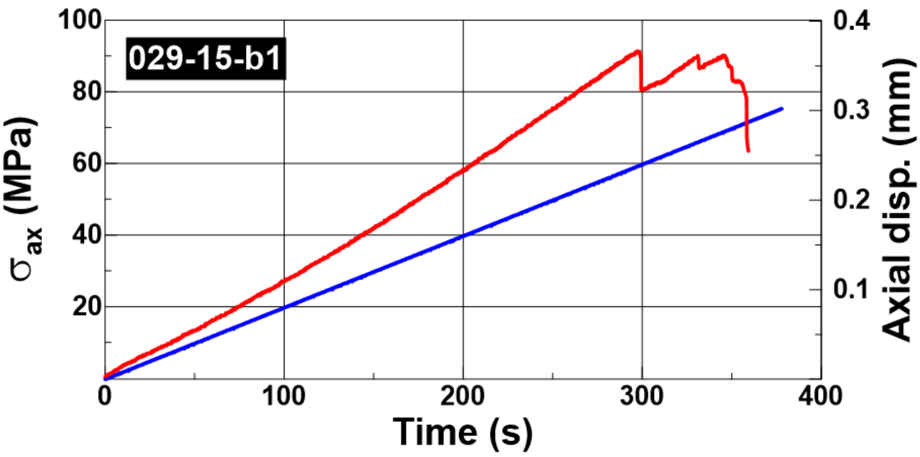

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	15_029b_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	38.34	38.25	38.54	38.56	38.29	**Mean length, L (mm)**	38.40	**Dry mass, M_d (g)**	20.45
Diameter (mm)	16.10	16.11	16.08	16.12	-	**Mean diameter, D (mm)**	16.10	**Dry density, ρ_d (kg/m^3)**	2615
L/D ratio	2.38		**Permeability, k (mD)**	-		**Bulk mass, M (g)**	20.48		
Water content (%)	0.15		**Porosity, n (%)**	0.38		**Bulk density, ρ (kg/m^3)**	2619		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020		**Control mode (Force/Strain)**	Strain	
LDT model	Solartron AX/5/s		**Loading rate (N/s)**	-	
Strain gauge type	BX120-6AA		**Strain rate (s^{-1})**	4.17E-06	
Load cell	Built-in 1500 kN		**Shear rate (mm/s)**	-	
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	502	**Temperature (ºC)**	22.0		
F_{max} (kN)	10.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	52.2	**$UCS_{1:2}$ (MPa)**	53.7	**UCS_{50} (MPa)**	43.8	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	77.0	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.909	**V_{S1} (km/s)**	3.465	**V_{S2} (km/s)**	3.195	**V_S (km/s)**	3.330
	Dynamic moduli	**E_{dyn} (GPa)**	73.6	**ν_{dyn}**	0.27	**V_P/V_S**	1.77
		G_{dyn} (GPa)	29.0	**K_{dyn} (GPa)**	52.7		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

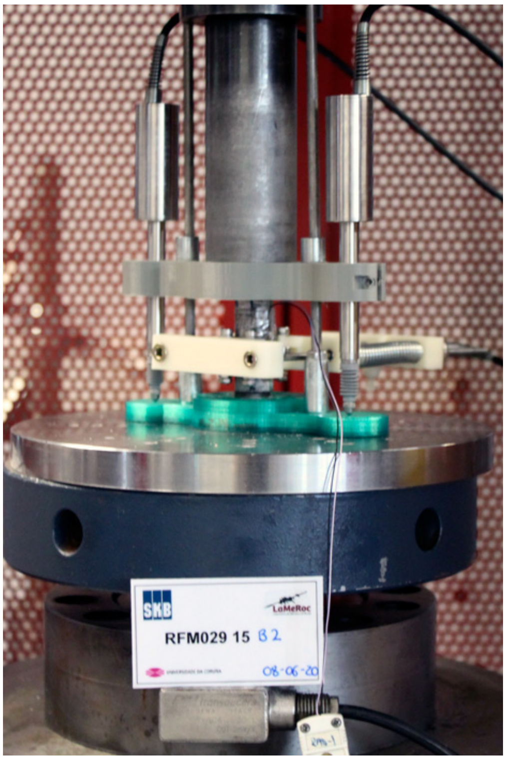

Figure 1. *Sample before the test*

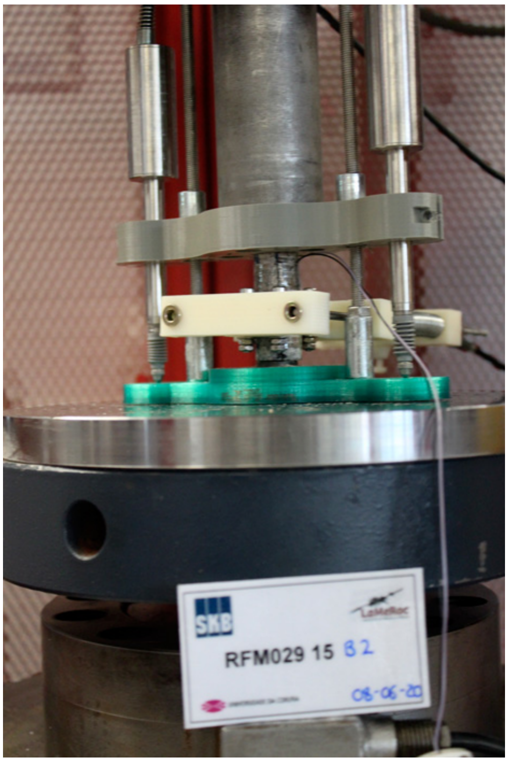

Figure 2. *Sample after the test*

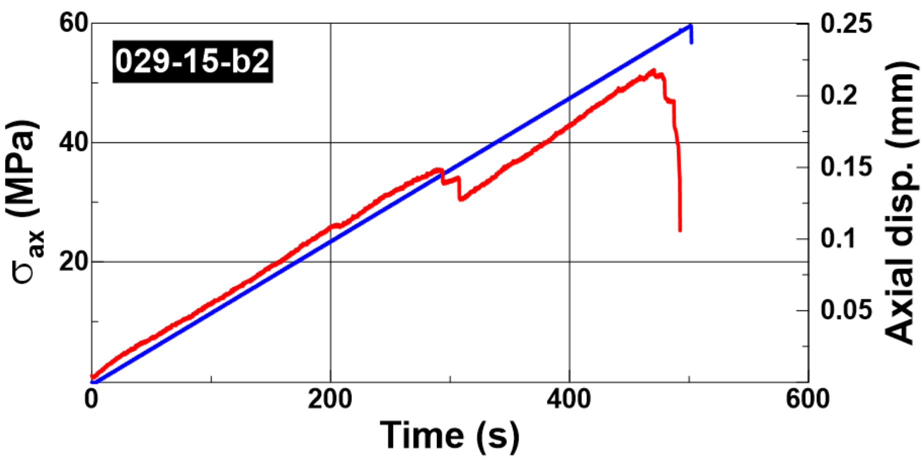

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	15_029b_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	40.80	40.56	40.41	40.61	40.43	**Mean length, L (mm)**	40.56	**Dry mass, M_d (g)**	21.63
Diameter (mm)	16.07	16.12	16.11	16.11	-	**Mean diameter, D (mm)**	16.10	**Dry density, ρ_d (kg/m^3)**	2619
L/D ratio	2.52	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.65				
Water content (%)	0.09	**Porosity, n (%)**	0.24	**Bulk density, ρ (kg/m^3)**	2621				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	732	**Temperature (ºC)**	22.0		
F_{max} (kN)	11.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	54.5	**$UCS_{1:2}$ (MPa)**	56.3	**UCS_{50} (MPa)**	45.9	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	96.4	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.847	**V_{S1} (km/s)**	3.157	**V_{S2} (km/s)**	3.479	**V_S (km/s)**	3.318
Dynamic moduli		**E_{dyn} (GPa)**	72.9	**ν_{dyn}**	0.26	**V_P/V_S**	1.76
		G_{dyn} (GPa)	28.9	**K_{dyn} (GPa)**	51.1		
Notes (6)							

PICTURES AND PLOTS

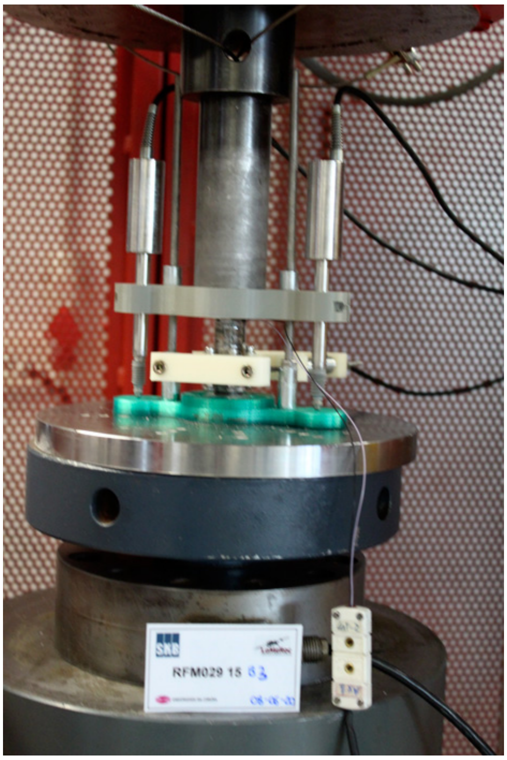

Figure 1. *Sample before the test*

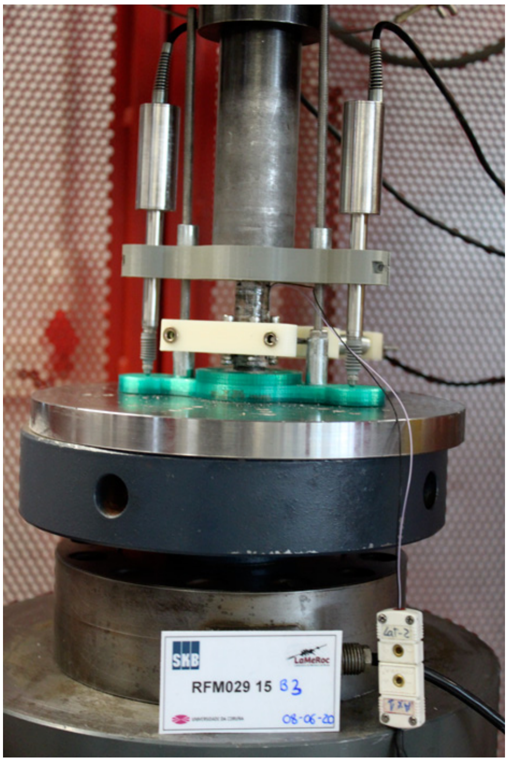

Figure 2. *Sample after the test*

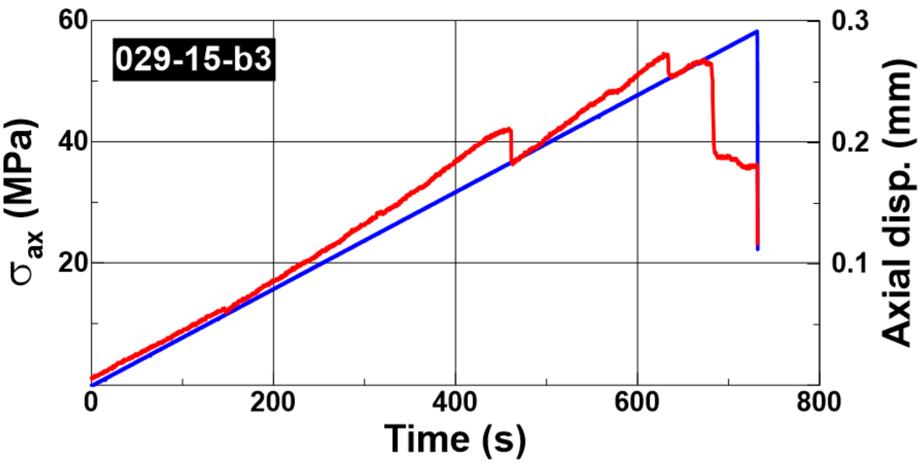

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	15_029b_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	38.87	38.97	38.84	38.81	38.95	**Mean length, L (mm)**	38.89	**Dry mass, M_d (g)**	20.85
Diameter (mm)	16.12	16.10	16.09	15.96	-	**Mean diameter, D (mm)**	16.07	**Dry density, ρ_d (kg/m^3)**	2644

L/D ratio	2.42		**Permeability, k (mD)**	-		**Bulk mass, M (g)**	20.88
Water content (%)	0.14		**Porosity, n (%)**	0.38		**Bulk density, ρ (kg/m^3)**	2648
Notes (4)							

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020		**Control mode (Force/Strain)**	Strain	
LDT model	Solartron AX/5/s		**Loading rate (N/s)**	-	
Strain gauge type	BX120-6AA		**Strain rate (s^{-1})**	4.17E-06	
Load cell	Built-in 1500 kN		**Shear rate (mm/s)**	-	
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	470			**Temperature (ºC)**	22.0
F_{max} (kN)	12.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	62.9	**$UCS_{1:2}$ (MPa)**	64.8	**UCS_{50} (MPa)**	52.8	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	148.4	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.912	**V_{S1} (km/s)**	3.443	**V_{S2} (km/s)**	3.194	**V_S (km/s)**	3.319
Dynamic moduli		**E_{dyn} (GPa)**	74.1	**ν_{dyn}**	0.27	**V_P/V_S**	1.78
		G_{dyn} (GPa)	29.2	**K_{dyn} (GPa)**	53.7		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

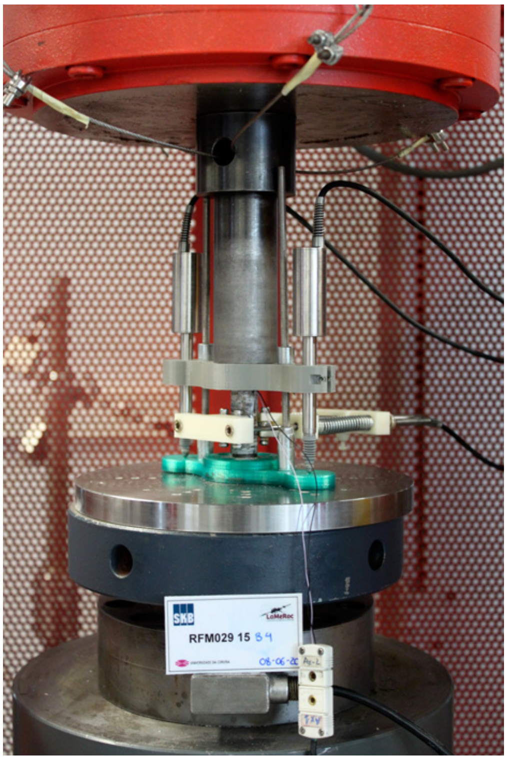

Figure 1. *Sample before the test*

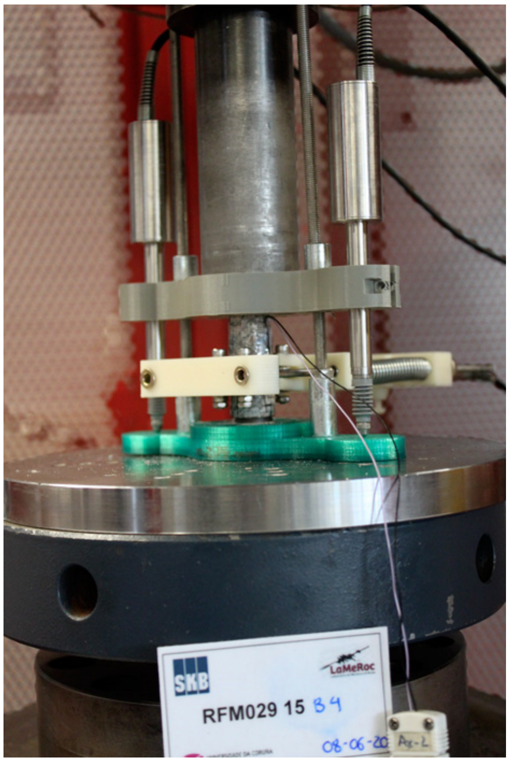

Figure 2. *Sample after the test*

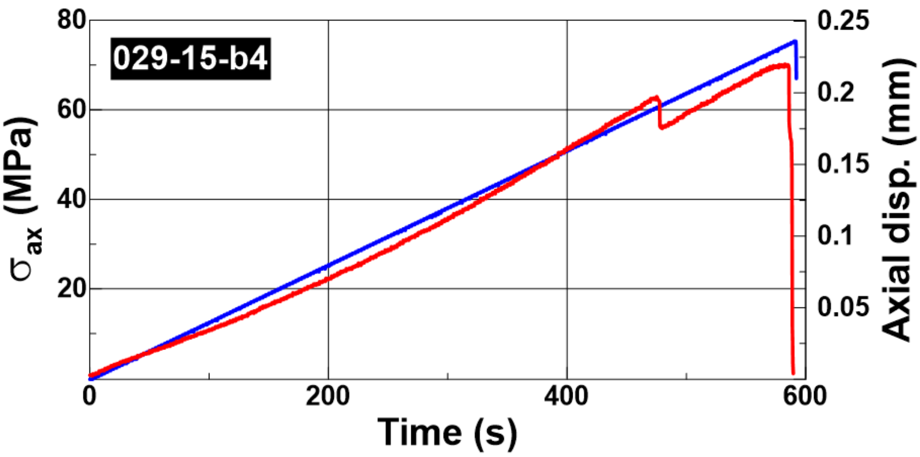

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	15_029b_5
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	38.95	38.92	38.92	38.85	39.08	**Mean length, L (mm)**	38.94	**Dry mass, M_d (g)**	20.89
Diameter (mm)	16.11	16.15	16.16	15.98	-	**Mean diameter, D (mm)**	16.10	**Dry density, ρ_d (kg/m^3)**	2635

L/D ratio	2.42	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	20.91
Water content (%)	0.10	**Porosity, n (%)**	0.25	**Bulk density, ρ (kg/m^3)**	2637
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	479	**Temperature (ºC)**	22.0		
F_{max} (kN)	8.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	42.0	**$UCS_{1:2}$ (MPa)**	43.3	**UCS_{50} (MPa)**	35.3	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	47.5	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.905	**V_{S1} (km/s)**	3.303	**V_{S2} (km/s)**	3.464	**V_S (km/s)**	3.384
Dynamic moduli		**E_{dyn} (GPa)**	75.8	**ν_{dyn}**	0.26	**V_P/V_S**	1.75
		G_{dyn} (GPa)	30.2	**K_{dyn} (GPa)**	51.7		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

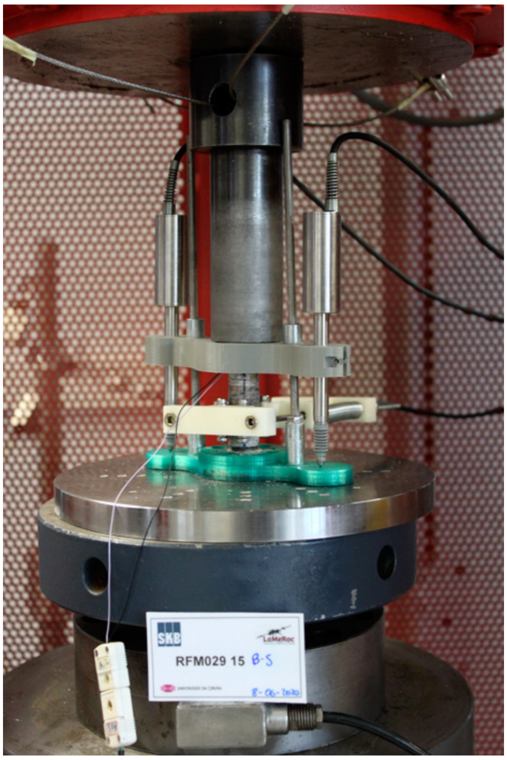

Figure 1. *Sample before the test*

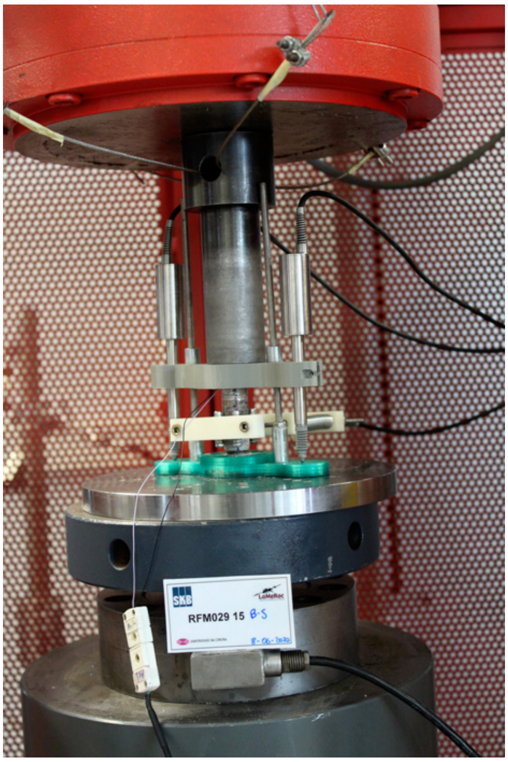

Figure 2. *Sample after the test*

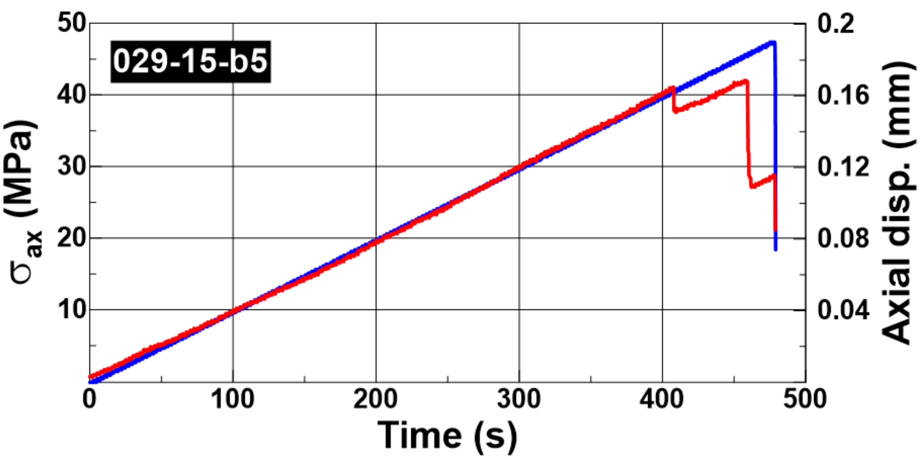

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	15_029c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	45.17	44.47	44.44	44.92	44.23	**Mean length, L (mm)**	44.65	**Dry mass, M_d (g)**	23.66
Diameter (mm)	16.11	16.09	16.10	16.00	-	**Mean diameter, D (mm)**	16.08	**Dry density, ρ_d (kg/m^3)**	2611
L/D ratio	2.78	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	23.69		
Water content (%)	0.13	**Porosity, n (%)**	0.33			**Bulk density, ρ (kg/m^3)**	2615		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	244	**Temperature (ºC)**	22.0		
F_{max} (kN)	2.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	13.6	**$UCS_{1:2}$ (MPa)**	14.2	**UCS_{50} (MPa)**	11.6	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.907	**V_{S1} (km/s)**	3.295	**V_{S2} (km/s)**	3.355	**V_S (km/s)**	3.325
	Dynamic moduli	**E_{dyn} (GPa)**	73.3	**ν_{dyn}**	0.27	**V_P/V_S**	1.78
		G_{dyn} (GPa)	28.9	**K_{dyn} (GPa)**	52.7		
Notes (6)							

PICTURES AND PLOTS

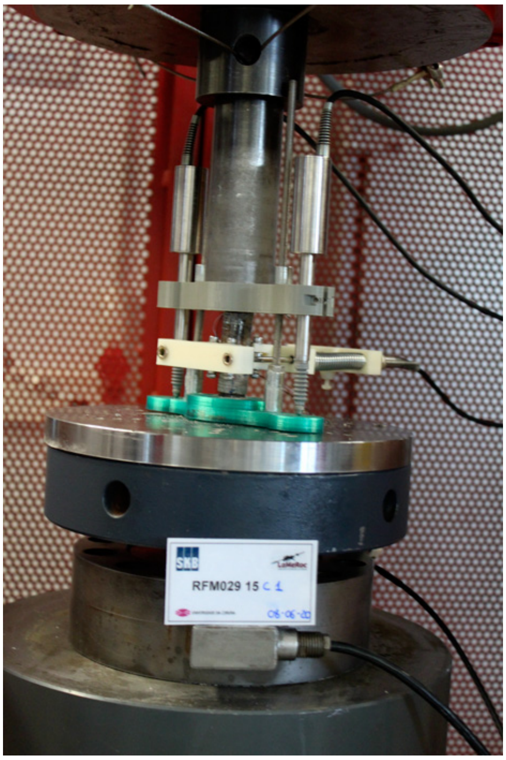

Figure 1. *Sample before the test*

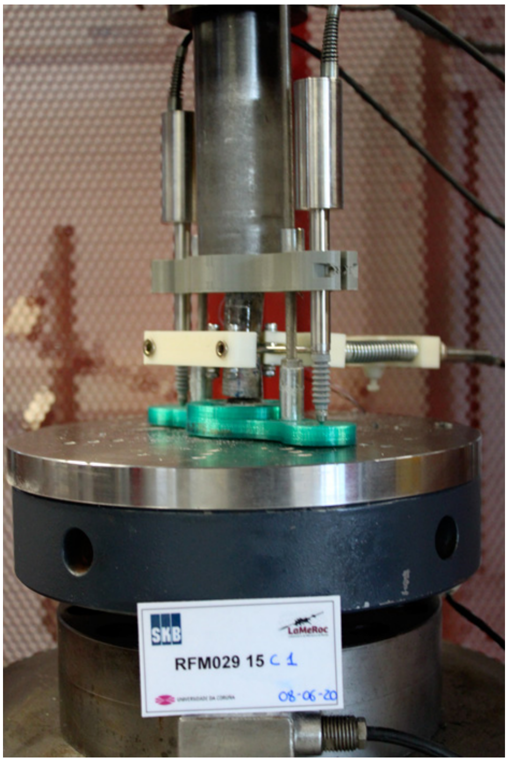

Figure 2. *Sample after the test*

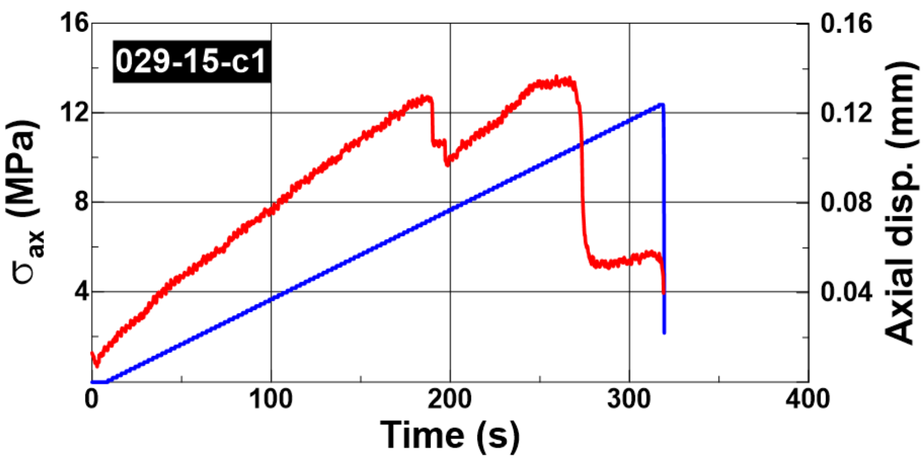

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	15_029c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	37.66	37.93	37.51	37.53	37.86	**Mean length, L (mm)**	37.70	**Dry mass, M_d (g)**	19.69
Diameter (mm)	15.46	16.04	16.05	16.07	-	**Mean diameter, D (mm)**	15.91	**Dry density, ρ_d (kg/m^3)**	2629

L/D ratio	2.37	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	19.71
Water content (%)	0.10	**Porosity, n (%)**	0.27	**Bulk density, ρ (kg/m^3)**	2632
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	990	**Temperature (ºC)**	22.0		
F_{max} (kN)	6.3	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	31.6	**$UCS_{1:2}$ (MPa)**	32.4	**UCS_{50} (MPa)**	26.4	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.166	**V_{S1} (km/s)**	3.282	**V_{S2} (km/s)**	3.583	**V_S (km/s)**	3.433
Dynamic moduli		**E_{dyn} (GPa)**	79.1	**ν_{dyn}**	0.28	**V_P/V_S**	1.80
		G_{dyn} (GPa)	31.0	**K_{dyn} (GPa)**	58.7		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. Sample before the test

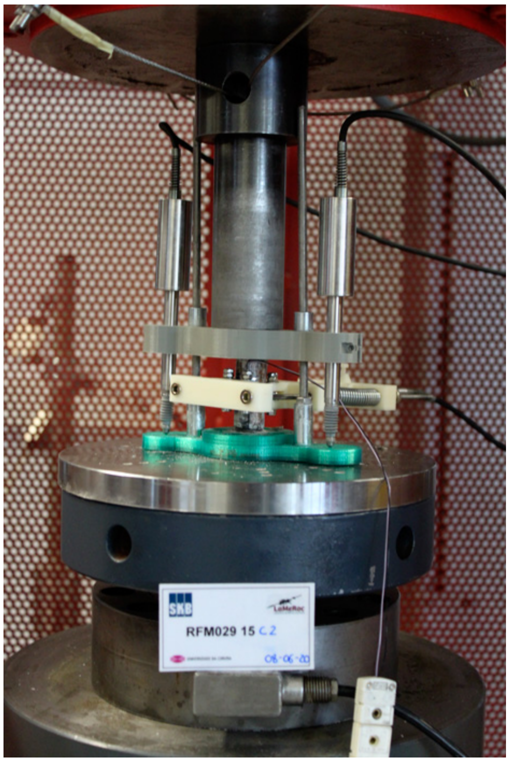

Figure 2. Sample after the test

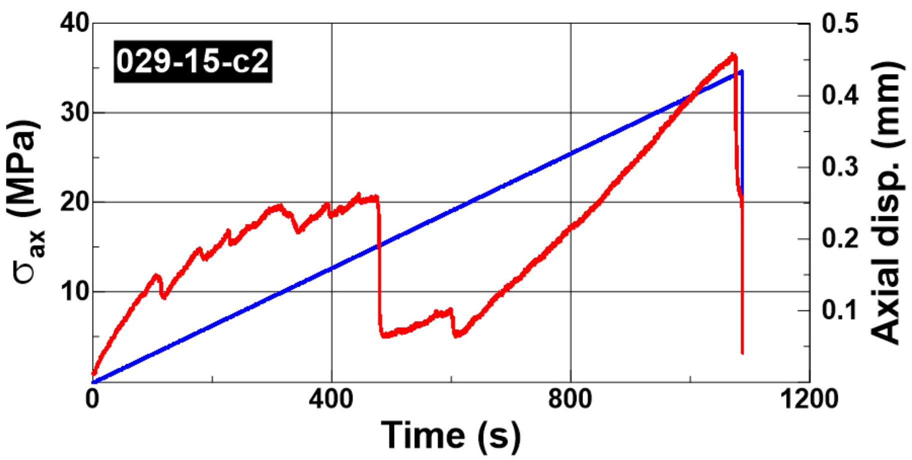

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	Specimen		Ref. LaMeRoc	15_029c_3
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	39.29	39.09	39.38	39.43	39.21	Mean length, L (mm)	39.28	Dry mass, M_d (g)	20.44
Diameter (mm)	15.88	16.02	15.94	16.01	-	Mean diameter, D (mm)	15.96	Dry density, ρ_d (kg/m^3)	2600

L/D ratio	2.46	Permeability, k (mD)	-	Bulk mass, M (g)	20.47
Water content (%)	0.15	Porosity, n (%)	0.38	Bulk density, ρ (kg/m^3)	2604
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	Time to failure (s)	887	Temperature (ºC)	22.0		
F_{max} (kN)	11.1	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	55.4	$UCS_{1:2}$ (MPa)	57.1	UCS_{50} (MPa)	46.5	σ_{CI} (MPa)	-
	Static moduli	$E_{50\%}$ (GPa)	33.4	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.914	V_{S1} (km/s)	3.809	V_{S2} (km/s)	3.257	V_S (km/s)	3.533
	Dynamic moduli	E_{dyn} (GPa)	79.5	ν_{dyn}	0.22	V_P/V_S	1.67
		G_{dyn} (GPa)	32.5	K_{dyn} (GPa)	47.8		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

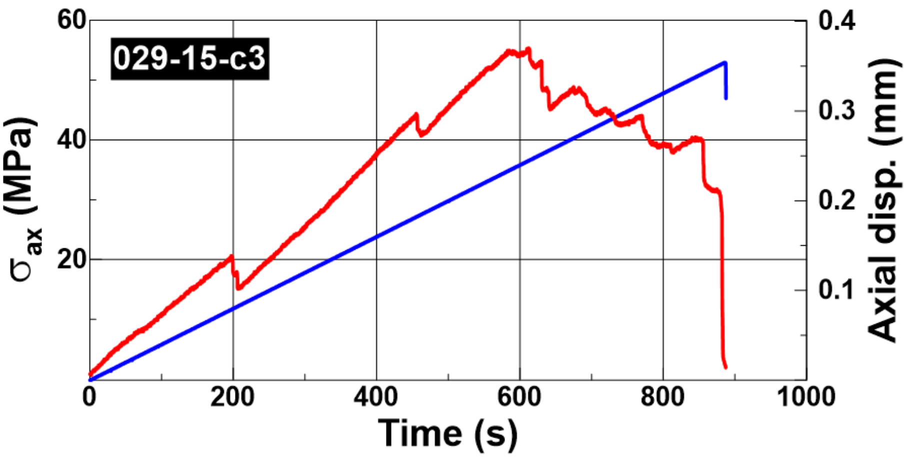

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	15_029c_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	41.06	41.49	41.38	41.18	41.55	**Mean length, L (mm)**	41.33	**Dry mass, M_d (g)**	21.69
Diameter (mm)	16.08	16.12	16.15	16.04	-	**Mean diameter, D (mm)**	16.10	**Dry density, ρ_d (kg/m^3)**	2578

L/D ratio	2.57	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.72
Water content (%)	0.14	**Porosity, n (%)**	0.36	**Bulk density, ρ (kg/m^3)**	2582
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	912	**Temperature (ºC)**	22.0		
F_{max} (kN)	7.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	37.2	**$UCS_{1:2}$ (MPa)**	38.5	**UCS_{50} (MPa)**	31.4	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	5.0	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.009	**V_{S1} (km/s)**	2.954	**V_{S2} (km/s)**	3.332	**V_S (km/s)**	3.143
Dynamic moduli		**E_{dyn} (GPa)**	66.9	**ν_{dyn}**	0.31	**V_P/V_S**	1.91
		G_{dyn} (GPa)	25.5	**K_{dyn} (GPa)**	59.2		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

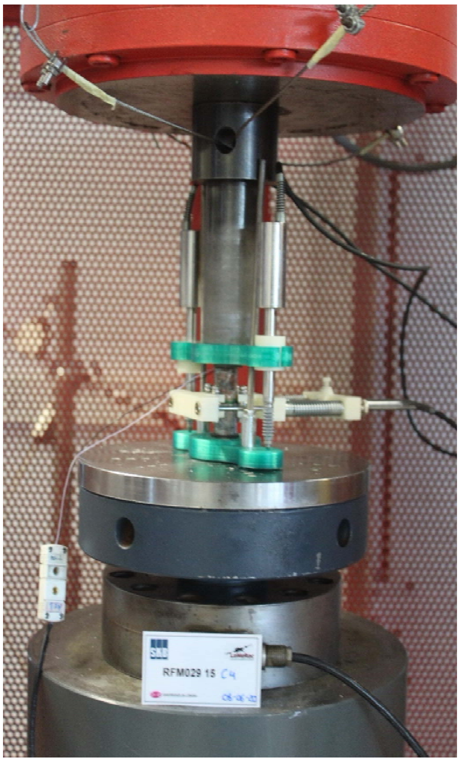

Figure 1. *Sample before the test*

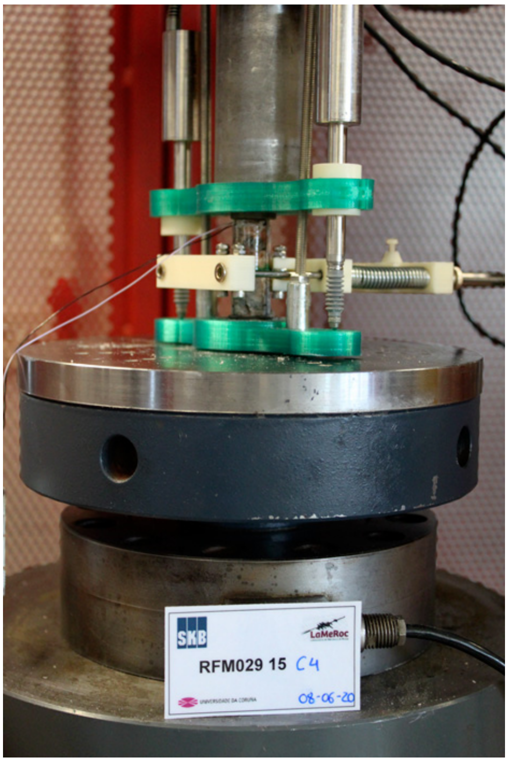

Figure 2. *Sample after the test*

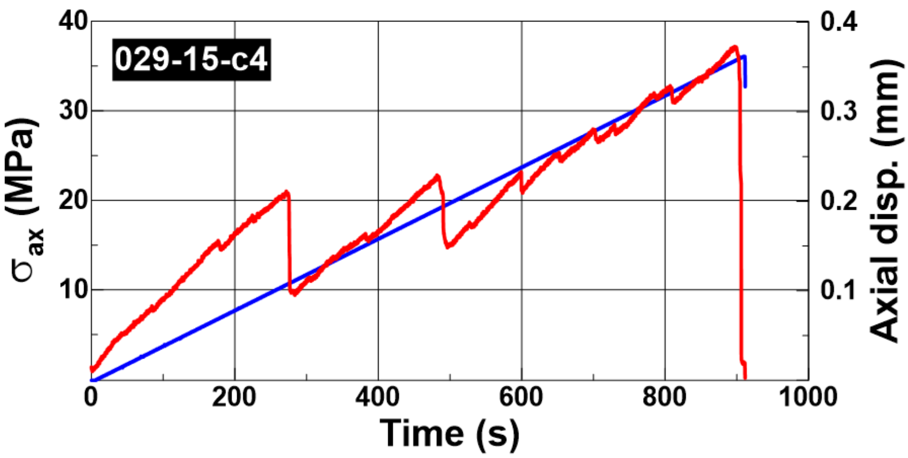

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	15_029c_5
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	41.82	41.86	41.91	41.84	41.81	**Mean length, L (mm)**	41.85	**Dry mass, M_d (g)**	21.71
Diameter (mm)	15.69	16.05	16.07	16.00	-	**Mean diameter, D (mm)**	15.95	**Dry density, ρ_d (kg/m^3)**	2596

L/D ratio	2.62	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.75
Water content (%)	0.18	**Porosity, n (%)**	0.48	**Bulk density, ρ (kg/m^3)**	2600
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	612	**Temperature (ºC)**	22.0		
F_{max} (kN)	17.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	88.9	**$UCS_{1:2}$ (MPa)**	92.2	**UCS_{50} (MPa)**	75.1	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	60.0	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.155	**V_{S1} (km/s)**	3.315	**V_{S2} (km/s)**	3.370	**V_S (km/s)**	3.343
	Dynamic moduli	**E_{dyn} (GPa)**	75.0	**ν_{dyn}**	0.29	**V_P/V_S**	1.84
		G_{dyn} (GPa)	29.1	**K_{dyn} (GPa)**	59.8		
Notes (6)							

PICTURES AND PLOTS

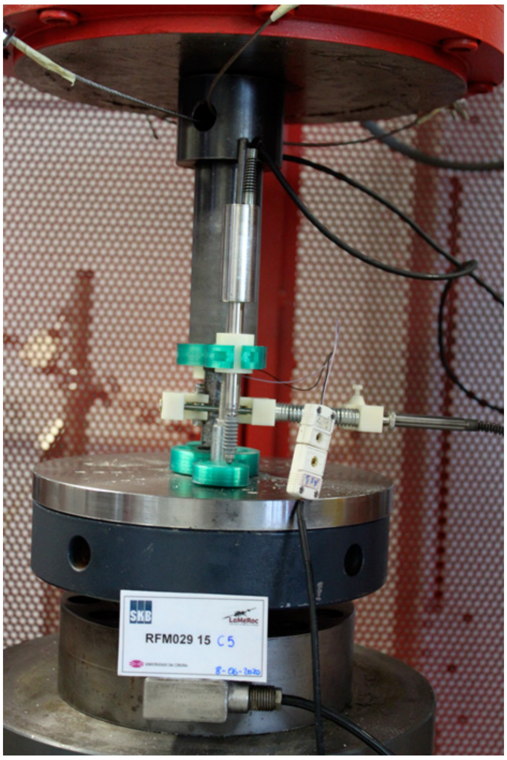

Figure 1. Sample before the test

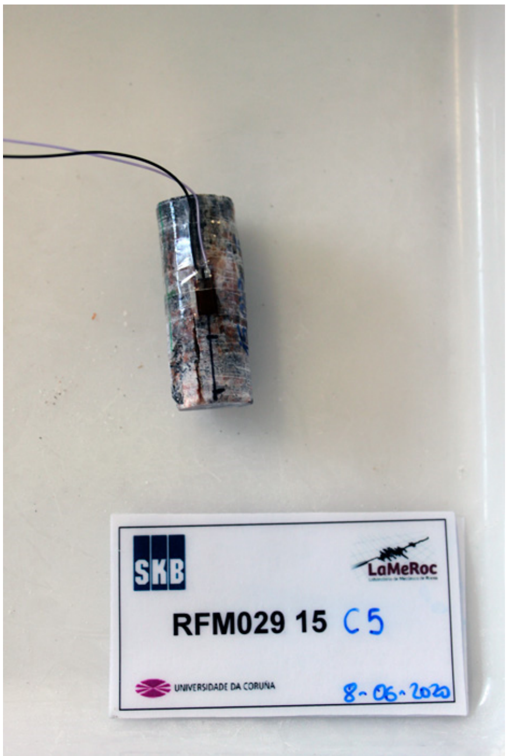

Figure 2. Sample after the test

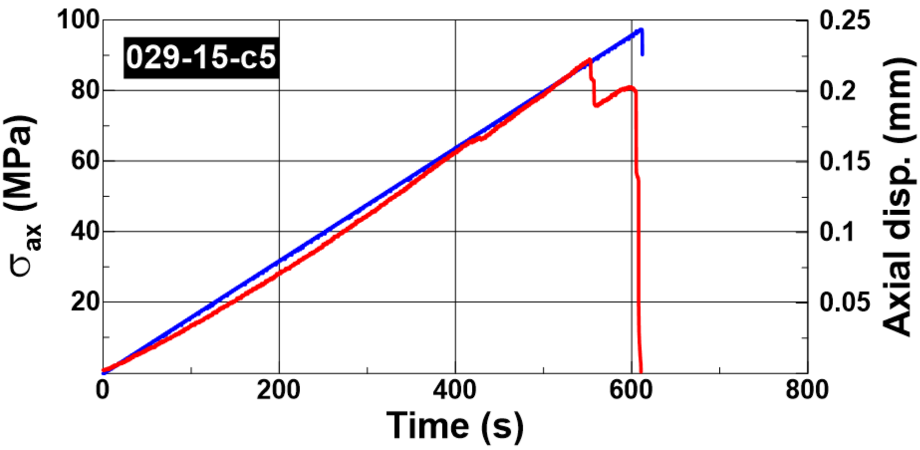

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		Report date	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	Specimen		Ref. LaMeRoc	15_029d_1
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	41.02	41.25	41.00	41.18	40.87	Mean length, L (mm)	41.06	Dry mass, M_d (g)	21.78
Diameter (mm)	16.37	16.17	16.10	16.00	-	Mean diameter, D (mm)	16.16	Dry density, ρ_d (kg/m^3)	2586

L/D ratio	2.54	Permeability, k (mD)	-	Bulk mass, M (g)	21.82
Water content (%)	0.18	Porosity, n (%)	0.47	Bulk density, ρ (kg/m^3)	2591
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	Time to failure (s)	-	Temperature (ºC)	22.0		
F_{max} (kN)	-	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	-	$UCS_{1:2}$ (MPa)	-	UCS_{50} (MPa)	-	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	-	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.871	V_{S1} (km/s)	3.168	V_{S2} (km/s)	3.378	V_S (km/s)	3.273
Dynamic moduli		E_{dyn} (GPa)	70.8	ν_{dyn}	0.27	V_P/V_S	1.79
		G_{dyn} (GPa)	27.8	K_{dyn} (GPa)	52.3		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

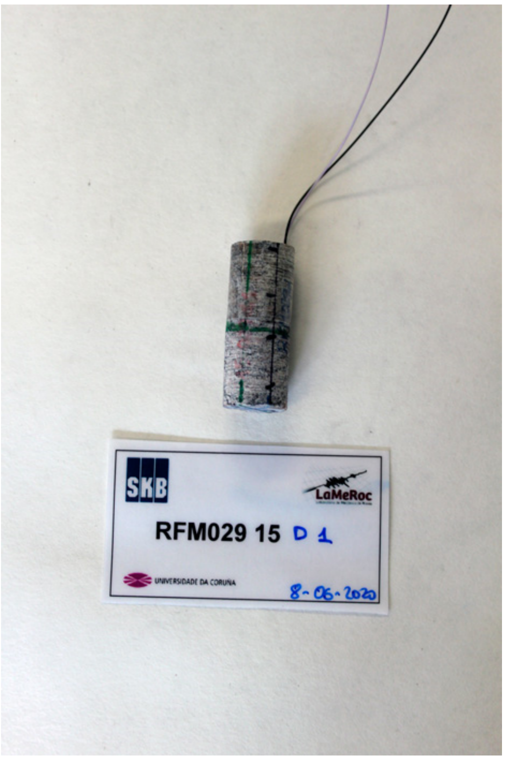

Figure 1. *Sample before the test*

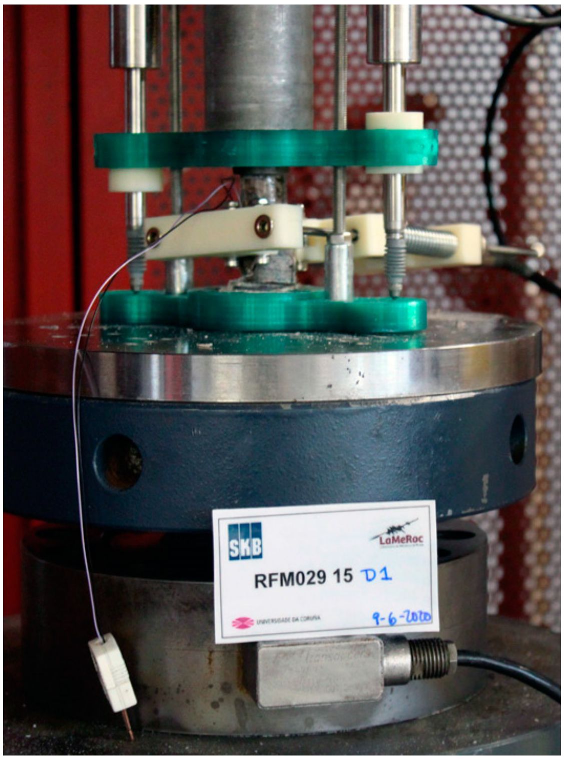

Figure 2. *Sample after the test*

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	15_029d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	38.17	38.03	38.09	38.14	38.00	**Mean length, L (mm)**	38.09	**Dry mass, M_d (g)**	20.24
Diameter (mm)	16.14	16.13	15.96	16.22	-	**Mean diameter, D (mm)**	16.11	**Dry density, ρ_d (kg/m^3)**	2606

L/D ratio	2.36	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	20.24
Water content (%)	0.00	**Porosity, n (%)**	0.00	**Bulk density, ρ (kg/m^3)**	2606
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	850	**Temperature (ºC)**	22.0		
F_{max} (kN)	17.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	83.9	**$UCS_{1:2}$ (MPa)**	86.1	**UCS_{50} (MPa)**	70.2	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	121.2	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.957	**V_{S1} (km/s)**	3.476	**V_{S2} (km/s)**	3.278	**V_S (km/s)**	3.377
	Dynamic moduli	**E_{dyn} (GPa)**	75.1	**ν_{dyn}**	0.26	**V_P/V_S**	1.76
		G_{dyn} (GPa)	29.7	**K_{dyn} (GPa)**	52.9		
Notes (6)							

PICTURES AND PLOTS

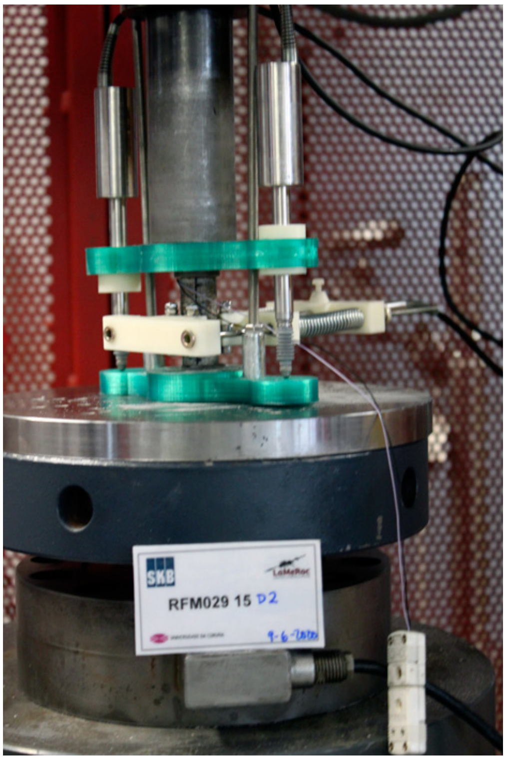

Figure 1. *Sample before the test*

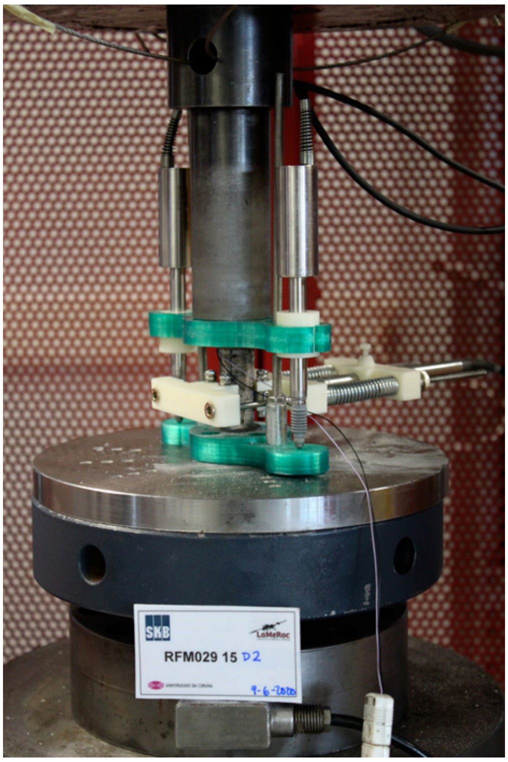

Figure 2. *Sample after the test*

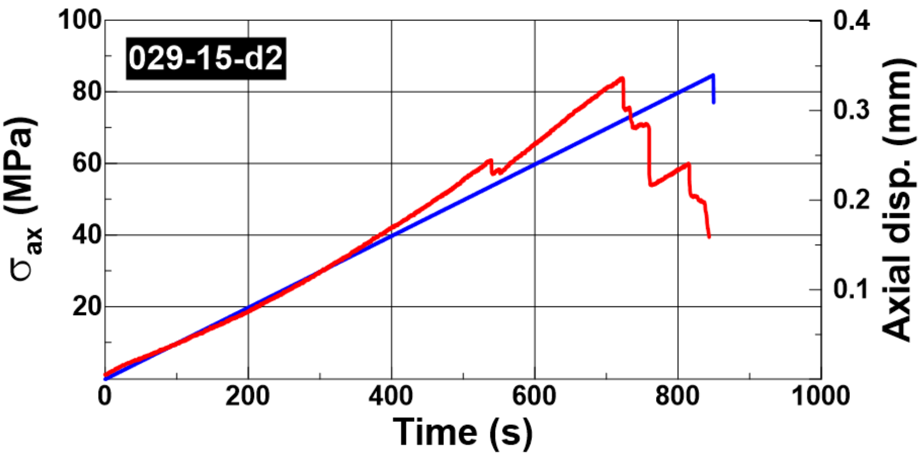

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	Specimen		Ref. LaMeRoc	15_029d_3
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	39.34	39.44	39.84	39.60	39.54	Mean length, L (mm)	39.55	Dry mass, M_d (g)	21.07
Diameter (mm)	16.17	16.29	16.16	16.15	-	Mean diameter, D (mm)	16.19	Dry density, ρ_d (kg/m^3)	2587

L/D ratio	2.44	Permeability, k (mD)	-	Bulk mass, M (g)	21.09
Water content (%)	0.09	Porosity, n (%)	0.25	Bulk density, ρ (kg/m^3)	2589
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	Time to failure (s)	1059	Temperature (ºC)	22.0		
F_{max} (kN)	10.7	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	52.1	$UCS_{1:2}$ (MPa)	53.6	UCS_{50} (MPa)	43.8	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	66.2	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.875	V_{S1} (km/s)	3.240	V_{S2} (km/s)	3.390	V_S (km/s)	3.315
Dynamic moduli		E_{dyn} (GPa)	72.1	ν_{dyn}	0.27	V_P/V_S	1.77
		G_{dyn} (GPa)	28.5	K_{dyn} (GPa)	51.4		
Notes (6)							

PICTURES AND PLOTS

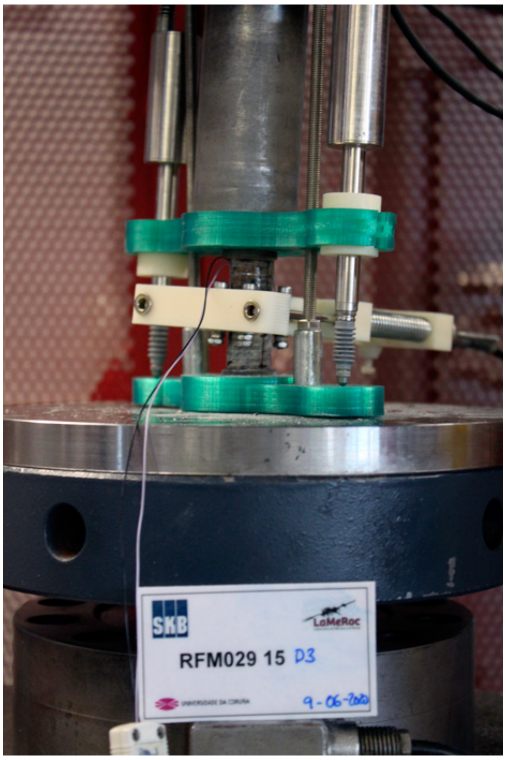

Figure 1. *Sample before the test*

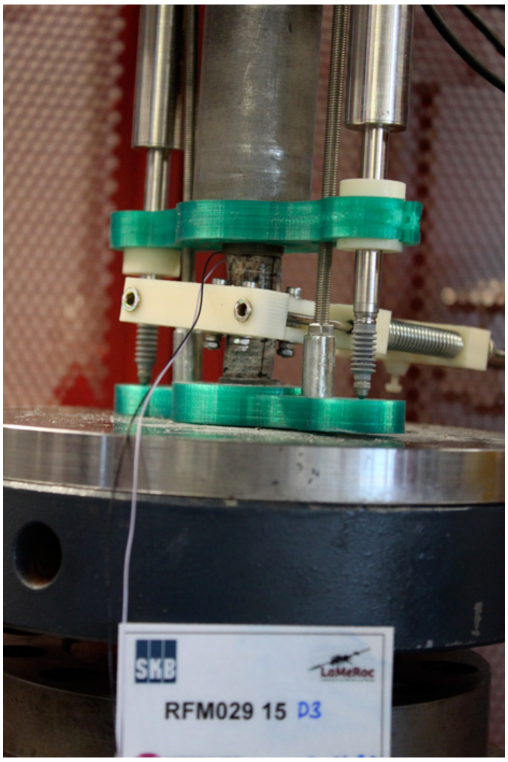

Figure 2. *Sample after the test*

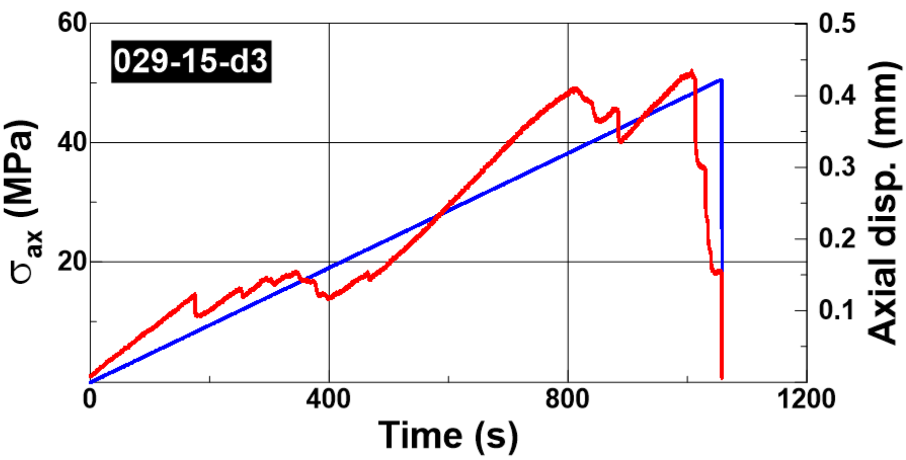

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	15_029d_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	39.99	39.94	39.96	39.98	39.97	**Mean length, L (mm)**	39.97	**Dry mass, M_d (g)**	21.29
Diameter (mm)	16.15	16.07	16.04	15.98	-	**Mean diameter, D (mm)**	16.06	**Dry density, ρ_d (kg/m^3)**	2630
L/D ratio	2.49	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.30				
Water content (%)	0.05	**Porosity, n (%)**	0.12	**Bulk density, ρ (kg/m^3)**	2631				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	754	**Temperature (ºC)**	22.0		
F_{max} (kN)	18.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	90.1	**$UCS_{1:2}$ (MPa)**	92.9	**UCS_{50} (MPa)**	75.8	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	110.0	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.956	**V_{S1} (km/s)**	3.493	**V_{S2} (km/s)**	3.222	**V_S (km/s)**	3.358
Dynamic moduli		**E_{dyn} (GPa)**	75.2	**ν_{dyn}**	0.27	**V_P/V_S**	1.77
		G_{dyn} (GPa)	29.7	**K_{dyn} (GPa)**	53.8		
Notes (6)							

PICTURES AND PLOTS

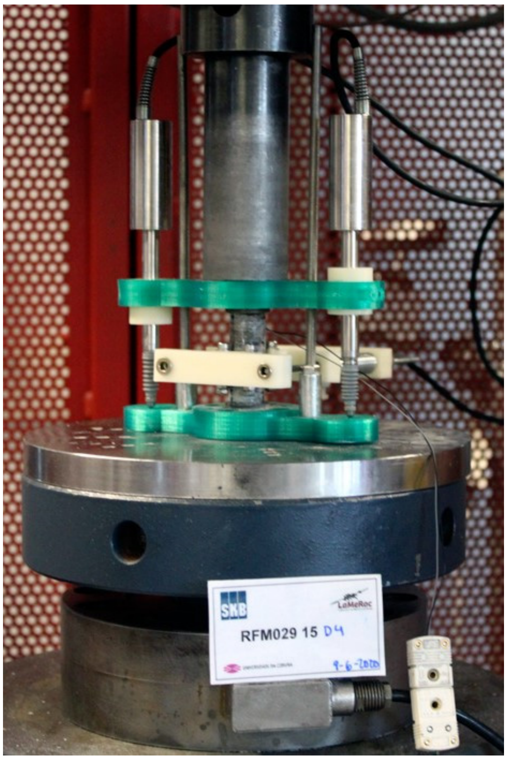

Figure 1. *Sample before the test*

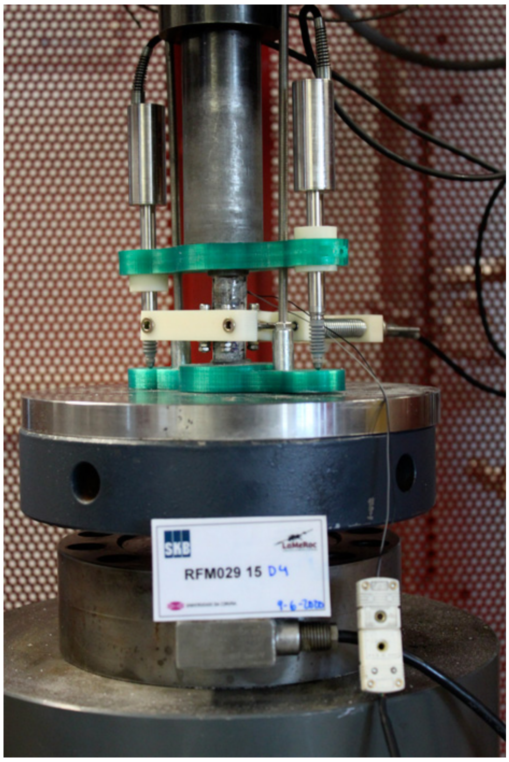

Figure 2. *Sample after the test*

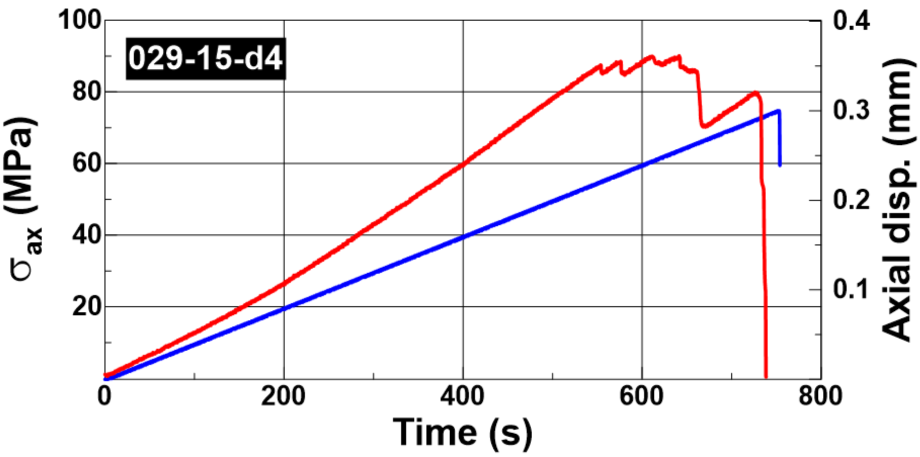

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	15_029d_5
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	40.21	40.64	40.56	40.34	40.61	**Mean length, L (mm)**	40.47	**Dry mass, M_d (g)**	21.4
Diameter (mm)	16.06	16.12	16.07	16.01	-	**Mean diameter, D (mm)**	16.07	**Dry density, ρ_d (kg/m³)**	2609

L/D ratio	2.52	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.41
Water content (%)	0.05	**Porosity, n (%)**	0.12	**Bulk density, ρ (kg/m³)**	2610
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	9/6/2020	**Time to failure (s)**	498	**Temperature (°C)**	22.0		
F_{max} (kN)	13.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	64.8	**$UCS_{1:2}$ (MPa)**	66.9	**UCS_{50} (MPa)**	54.6	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	58.2	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (°)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (°)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.887	**V_{S1} (km/s)**	3.153	**V_{S2} (km/s)**	3.359	**V_S (km/s)**	3.256
Dynamic moduli		**E_{dyn} (GPa)**	70.8	**ν_{dyn}**	0.28	**V_P/V_S**	1.81
		G_{dyn} (GPa)	27.7	**K_{dyn} (GPa)**	53.6		
Notes (6)							

PICTURES AND PLOTS

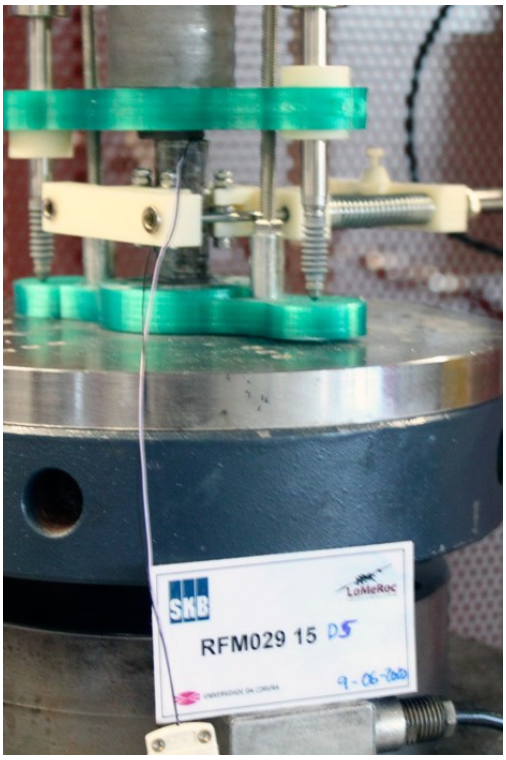

Figure 1. Sample before the test

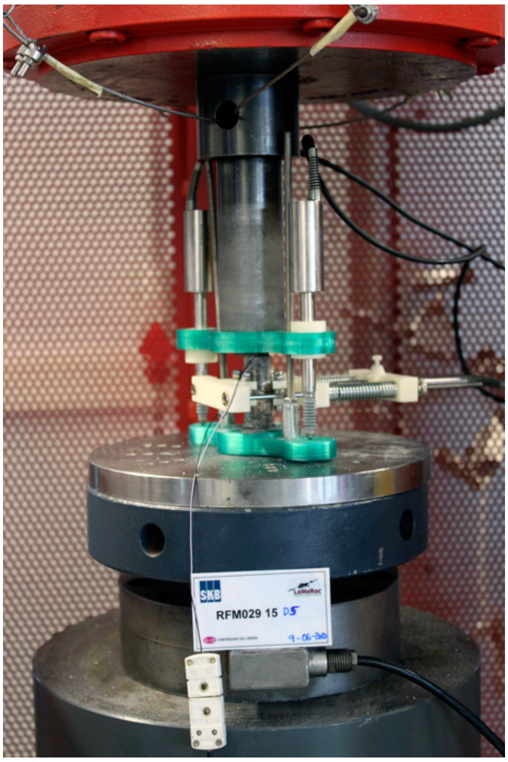

Figure 2. Sample after the test

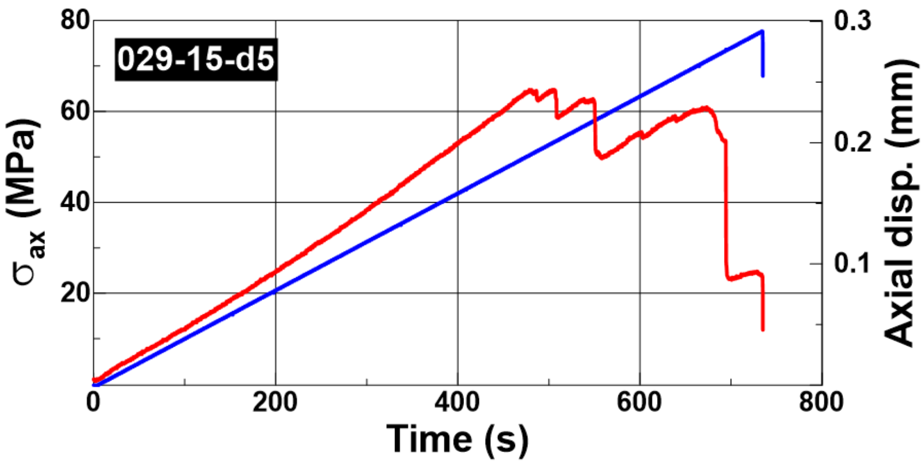

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	21_029b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	52.08	52.15	52.21	52.20	52.12	**Mean length, L (mm)**	52.15	**Dry mass, M_d (g)**	54.64
Diameter (mm)	22.44	22.55	22.40	22.43	-	**Mean diameter, D (mm)**	22.46	**Dry density, ρ_d (kg/m³)**	2646

L/D ratio	2.32	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	54.69
Water content (%)	0.09	**Porosity, n (%)**	0.24	**Bulk density, ρ (kg/m³)**	2648
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	464	**Temperature (ºC)**	22.0		
F_{max} (kN)	60.4	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	152.4	**$UCS_{1:2}$ (MPa)**	156.2	**UCS_{50} (MPa)**	135.3	**σ_{CI} (MPa)**	42.4
Static moduli		**$E_{50\%}$ (GPa)**	62.7	**$\nu_{50\%}$**	0.18	**σ_{CD} (MPa)**	151.5
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.884	**V_{S1} (km/s)**	3.176	**V_{S2} (km/s)**	3.463	**V_S (km/s)**	3.320
Dynamic moduli		**E_{dyn} (GPa)**	73.9	**ν_{dyn}**	0.27	**V_P/V_S**	1.77
		G_{dyn} (GPa)	29.2	**K_{dyn} (GPa)**	52.8		
Notes (6)							

PICTURES AND PLOTS

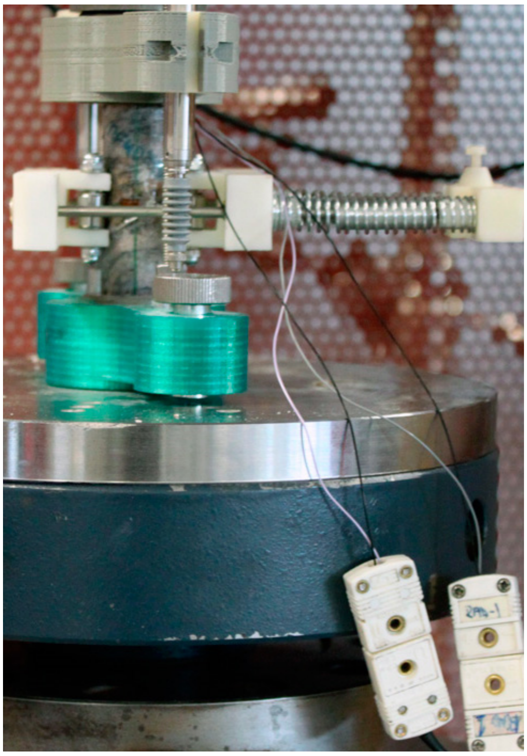

Figure 1. *Sample before the test*

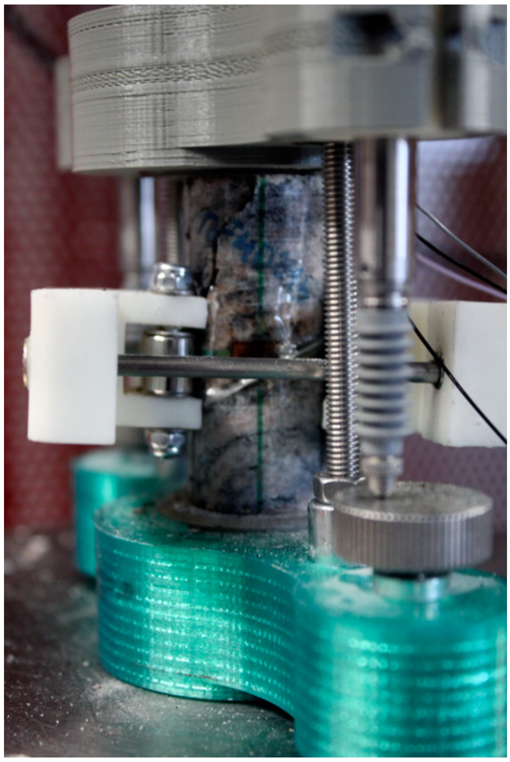

Figure 2. *Sample after the test*

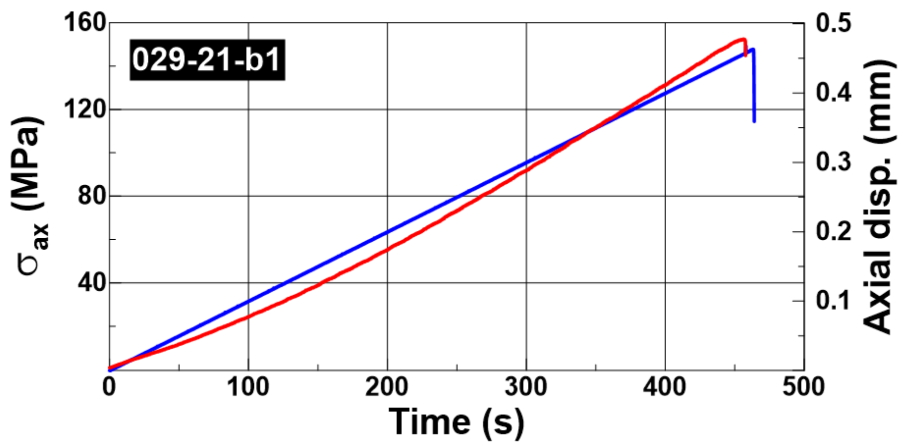

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		Report date	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	Specimen		Ref. LaMeRoc	21_029b_2
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	47.23	47.23	47.30	47.31	47.26	Mean length, L (mm)	47.27	Dry mass, M_d (g)	49.23
Diameter (mm)	22.50	22.49	22.44	22.45	-	Mean diameter, D (mm)	22.47	Dry density, ρ_d (kg/m^3)	2627

L/D ratio	2.10	Permeability, k (mD)	-	Bulk mass, M (g)	49.28
Water content (%)	0.10	Porosity, n (%)	0.27	Bulk density, ρ (kg/m^3)	2629
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	Time to failure (s)	584	Temperature (ºC)	22.0		
F_{max} (kN)	85.3	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	215.0	$UCS_{1:2}$ (MPa)	218.2	UCS_{50} (MPa)	188.9	σ_{CI} (MPa)	75.7
	Static moduli	$E_{50\%}$ (GPa)	70.6	$\nu_{50\%}$	0.28	σ_{CD} (MPa)	176.0
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.999	V_{S1} (km/s)	3.136	V_{S2} (km/s)	3.366	V_S (km/s)	3.251
	Dynamic moduli	E_{dyn} (GPa)	71.8	ν_{dyn}	0.29	V_P/V_S	1.85
		G_{dyn} (GPa)	27.8	K_{dyn} (GPa)	57.6		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

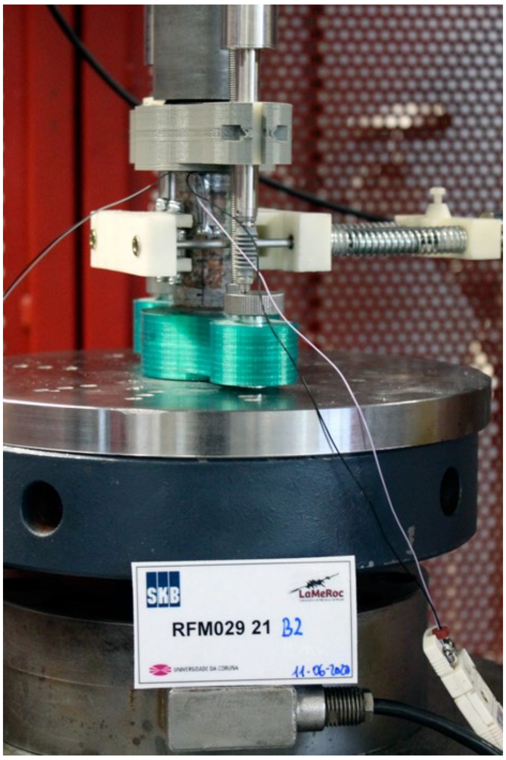

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

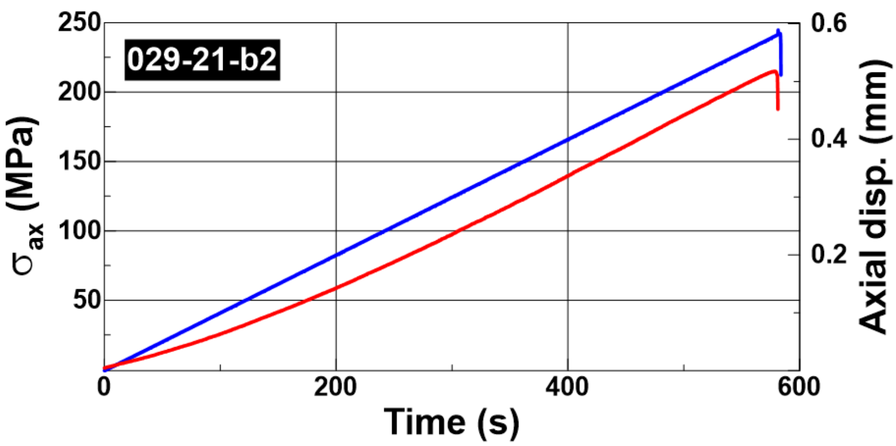

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	21_029b_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	52.46	52.53	52.56	52.57	52.50	**Mean length, L (mm)**	52.52	**Dry mass, M_d (g)**	55.18
Diameter (mm)	22.44	22.43	22.39	22.43	22.43	**Mean diameter, D (mm)**	22.42	**Dry density, ρ_d (kg/m^3)**	2660

L/D ratio	2.34	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	55.27
Water content (%)	0.16	**Porosity, n (%)**	0.43	**Bulk density, ρ (kg/m^3)**	2664
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	548	**Temperature (ºC)**	22.0		
F_{max} (kN)	59.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	151.7	**$UCS_{1:2}$ (MPa)**	155.6	**UCS_{50} (MPa)**	134.7	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	63.5	**$\nu_{50\%}$**	0.16	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.949	**V_{S1} (km/s)**	3.192	**V_{S2} (km/s)**	3.376	**V_S (km/s)**	3.284
	Dynamic moduli	**E_{dyn} (GPa)**	73.6	**ν_{dyn}**	0.28	**V_P/V_S**	1.81
		G_{dyn} (GPa)	28.7	**K_{dyn} (GPa)**	56.0		
Notes (6)							

PICTURES AND PLOTS

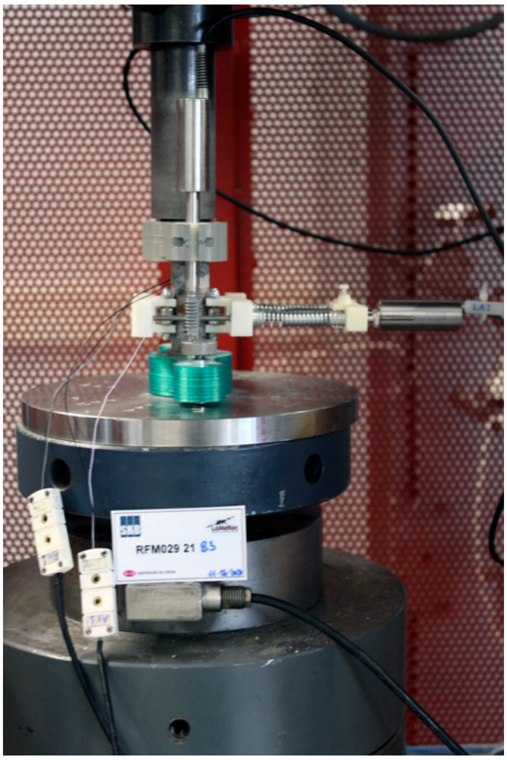

Figure 1. *Sample before the test*

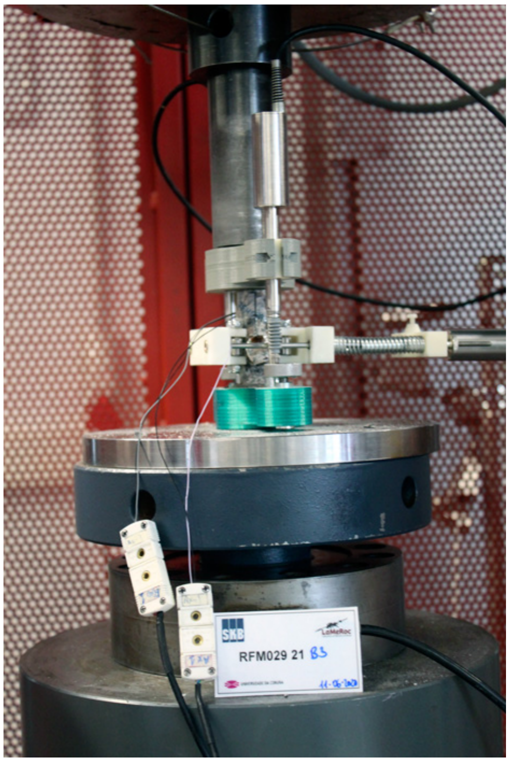

Figure 2. *Sample after the test*

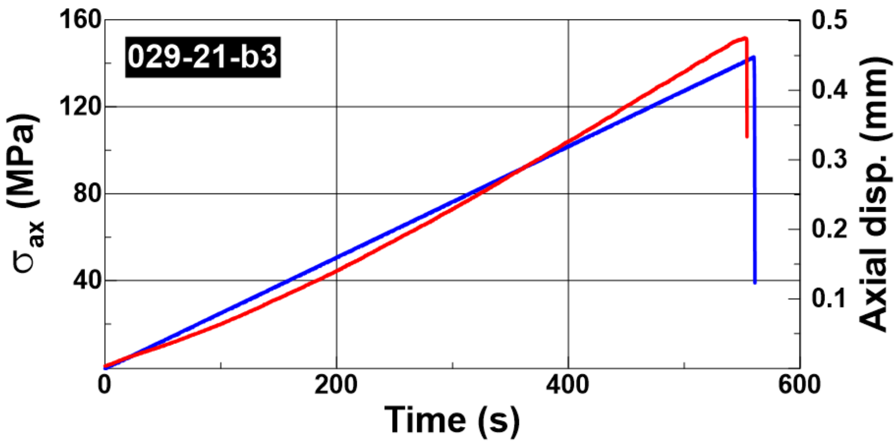

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	21_029b_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	51.09	51.07	51.00	50.90	50.96	**Mean length, L (mm)**	51.00	**Dry mass, M_d (g)**	53.21
Diameter (mm)	22.41	22.44	22.47	22.45	22.41	**Mean diameter, D (mm)**	22.44	**Dry density, ρ_d (kg/m^3)**	2639

L/D ratio	2.27	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	53.27
Water content (%)	0.11	**Porosity, n (%)**	0.30	**Bulk density, ρ (kg/m^3)**	2642
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	609	**Temperature (ºC)**	22.0		
F_{max} (kN)	62.4	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	157.9	**$UCS_{1:2}$ (MPa)**	161.5	**UCS_{50} (MPa)**	139.8	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	89.7	**$\nu_{50\%}$**	0.38	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.899	**V_{S1} (km/s)**	3.239	**V_{S2} (km/s)**	3.202	**V_S (km/s)**	3.220
	Dynamic moduli	**E_{dyn} (GPa)**	70.6	**ν_{dyn}**	0.29	**V_P/V_S**	1.83
		G_{dyn} (GPa)	27.4	**K_{dyn} (GPa)**	55.4		
Notes (6)							

PICTURES AND PLOTS

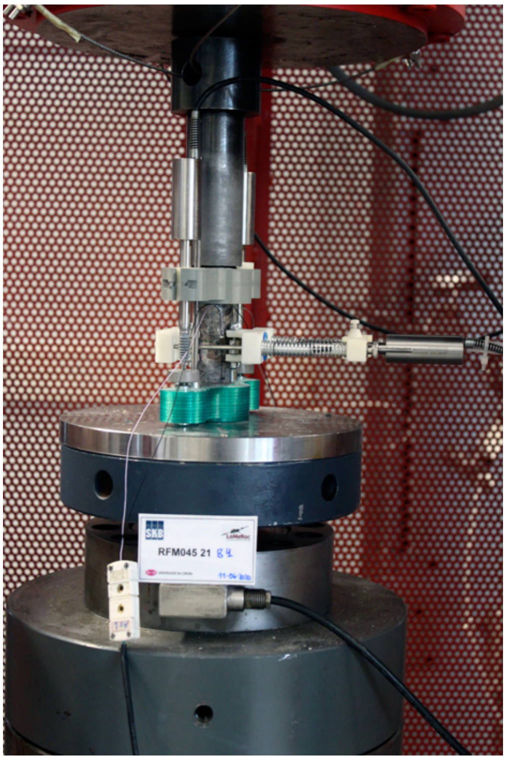

Figure 1. *Sample before the test*

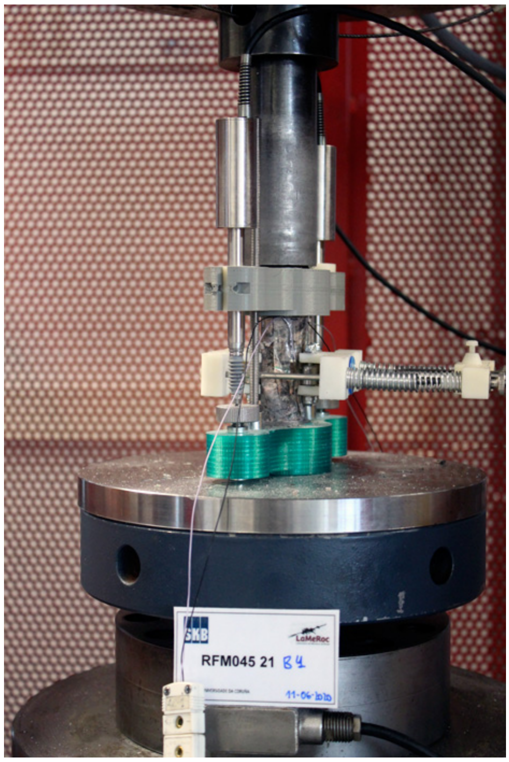

Figure 2. *Sample after the test*

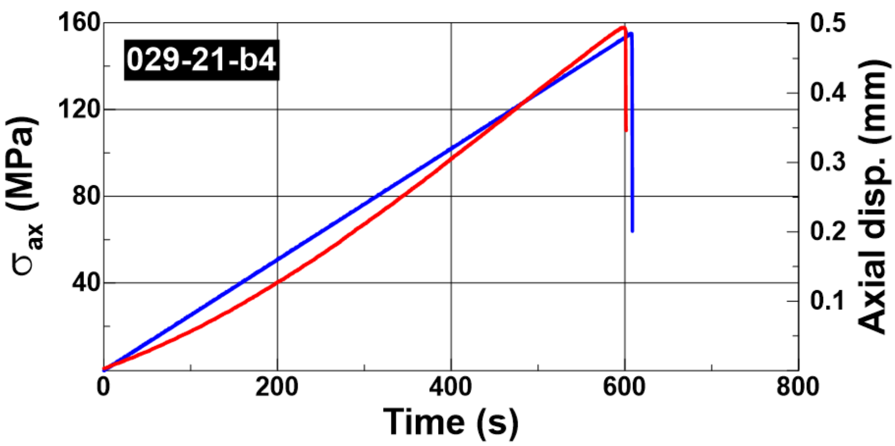

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	21_029b_5
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	51.45	51.65	51.71	51.56	51.74	**Mean length, L (mm)**	51.62	**Dry mass, M_d (g)**	53.81
Diameter (mm)	22.40	22.39	22.47	22.46	22.43	**Mean diameter, D (mm)**	22.43	**Dry density, ρ_d (kg/m^3)**	2638

L/D ratio	2.30	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	53.87
Water content (%)	0.11	**Porosity, n (%)**	0.29	**Bulk density, ρ (kg/m^3)**	2641
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	622	**Temperature (ºC)**	22.0		
F_{max} (kN)	64.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	163.6	**$UCS_{1:2}$ (MPa)**	167.6	**UCS_{50} (MPa)**	145.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	71.7	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.894	**V_{S1} (km/s)**	3.168	**V_{S2} (km/s)**	3.515	**V_S (km/s)**	3.342
	Dynamic moduli	**E_{dyn} (GPa)**	74.5	**ν_{dyn}**	0.26	**V_P/V_S**	1.76
		G_{dyn} (GPa)	29.5	**K_{dyn} (GPa)**	52.4		
Notes (6)							

PICTURES AND PLOTS

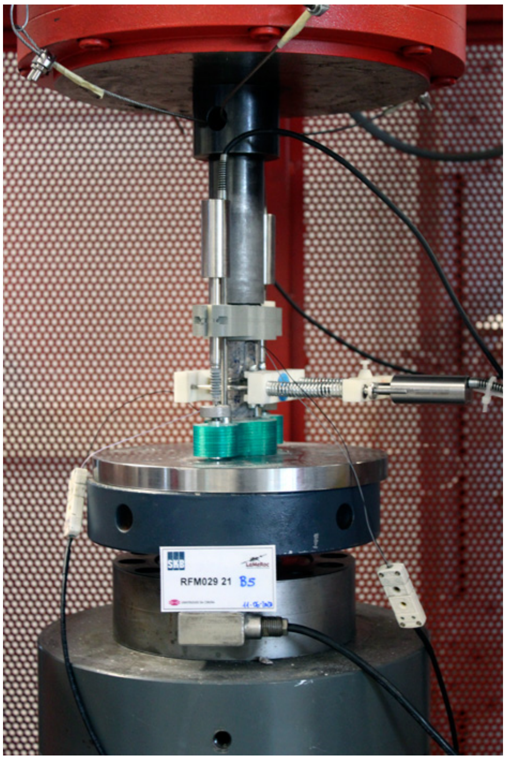

Figure 1. *Sample before the test*

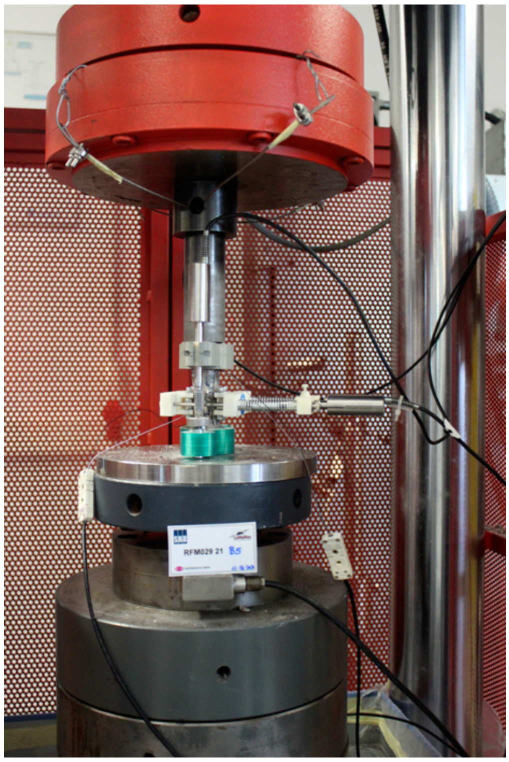

Figure 2. *Sample after the test*

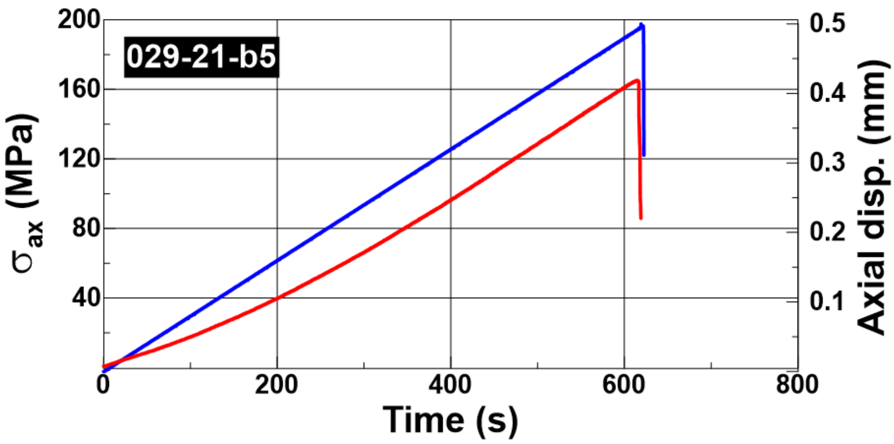

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	21_029c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	46.65	46.78	46.74	46.67	46.64	**Mean length, L (mm)**	46.70	**Dry mass, M_d (g)**	48.04
Diameter (mm)	22.41	22.42	22.42	22.44	-	**Mean diameter, D (mm)**	22.42	**Dry density, ρ_d (kg/m^3)**	2605

L/D ratio	2.08	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	48.1
Water content (%)	0.12	**Porosity, n (%)**	0.33	**Bulk density, ρ (kg/m^3)**	2609
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	611	**Temperature (ºC)**	22.0		
F_{max} (kN)	68.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	174.4	**$UCS_{1:2}$ (MPa)**	176.8	**UCS_{50} (MPa)**	153.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	194.4	**$\nu_{50\%}$**	0.64	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.009	**V_{S1} (km/s)**	3.392	**V_{S2} (km/s)**	3.393	**V_S (km/s)**	3.393
	Dynamic moduli	**E_{dyn} (GPa)**	76.0	**ν_{dyn}**	0.27	**V_P/V_S**	1.77
		G_{dyn} (GPa)	30.0	**K_{dyn} (GPa)**	54.2		
Notes (6)							

PICTURES AND PLOTS

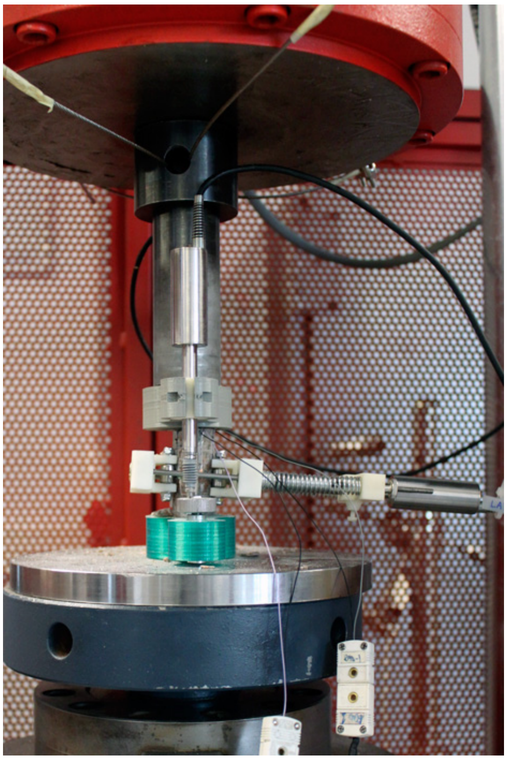

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

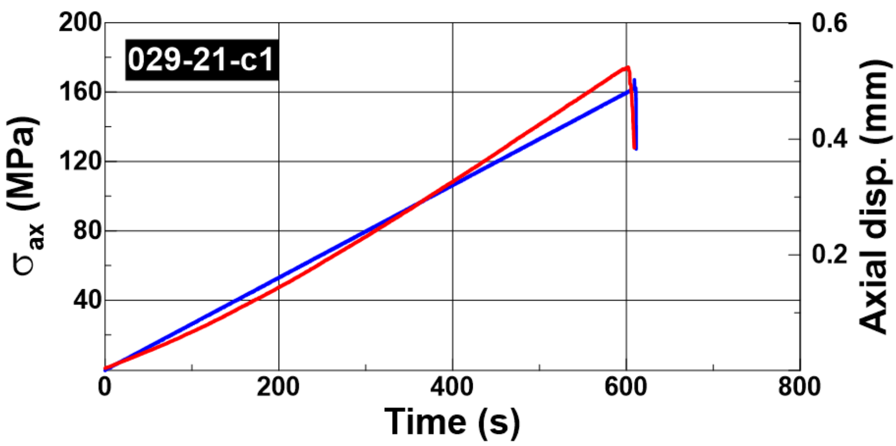

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	21_029c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	38.80	38.80	38.83	38.90	38.88	**Mean length, L (mm)**	38.84	**Dry mass, M_d (g)**	40.37
Diameter (mm)	22.40	22.55	22.52	22.43	-	**Mean diameter, D (mm)**	22.48	**Dry density, ρ_d (kg/m^3)**	2620
L/D ratio	1.73	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	40.45		
Water content (%)	0.20	**Porosity, n (%)**	0.52			**Bulk density, ρ (kg/m^3)**	2625		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	644	**Temperature (ºC)**	22.0		
F_{max} (kN)	71.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	180.2	**$UCS_{1:2}$ (MPa)**	178.7	**UCS_{50} (MPa)**	154.7	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	69.3	**$\nu_{50\%}$**	0.20	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.093	**V_{S1} (km/s)**	3.690	**V_{S2} (km/s)**	3.283	**V_S (km/s)**	3.487
	Dynamic moduli	**E_{dyn} (GPa)**	80.2	**ν_{dyn}**	0.26	**V_P/V_S**	1.75
		G_{dyn} (GPa)	31.9	**K_{dyn} (GPa)**	54.9		
Notes (6)							

PICTURES AND PLOTS

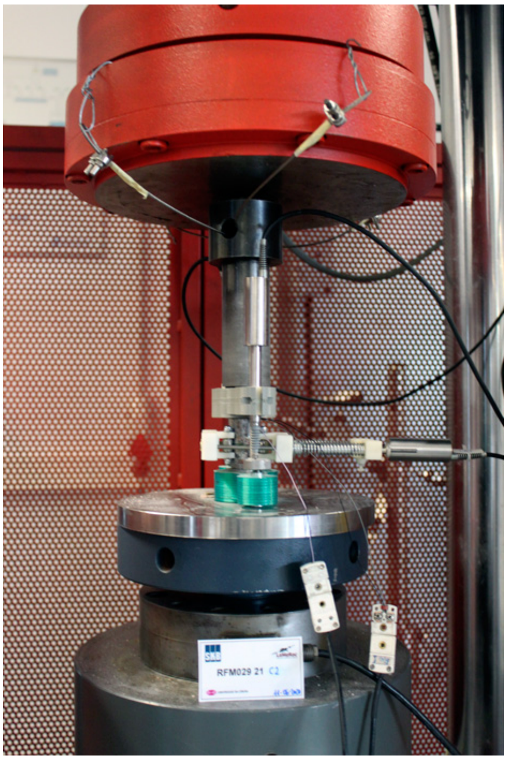

Figure 1. *Sample before the test*

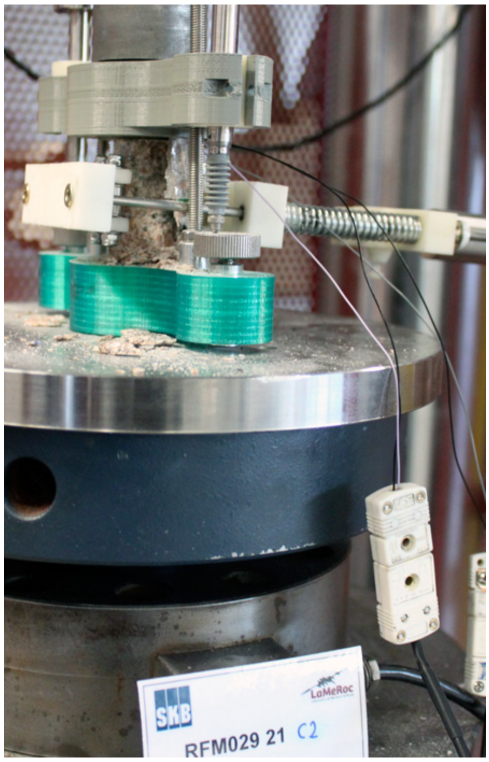

Figure 2. *Sample after the test*

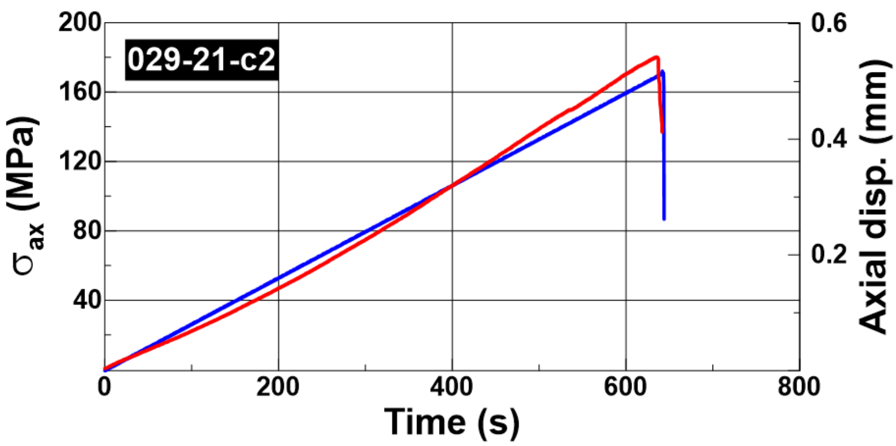

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

LaMeRoc
Laboratorio de Mecánica de Rocas

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	21_029c_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	46.85	46.86	46.60	46.70	46.85	**Mean length, L (mm)**	46.77	**Dry mass, M_d (g)**	48.22
Diameter (mm)	22.40	22.36	22.40	22.44	-	**Mean diameter, D (mm)**	22.40	**Dry density, ρ_d (kg/m³)**	2616

L/D ratio	2.09	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	48.28
Water content (%)	0.12	**Porosity, n (%)**	0.33	**Bulk density, ρ (kg/m³)**	2619
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	663	**Temperature (°C)**	22.0		
F_{max} (kN)	30.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	77.6	**$UCS_{1:2}$ (MPa)**	78.7	**UCS_{50} (MPa)**	68.1	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	108.9	**$\nu_{50\%}$**	0.46	**σ_{CD} (MPa)**	-
ϕ_{dry} (°)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (°)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.099	**V_{S1} (km/s)**	3.746	**V_{S2} (km/s)**	3.089	**V_S (km/s)**	3.417
	Dynamic moduli	**E_{dyn} (GPa)**	77.8	**ν_{dyn}**	0.27	**V_P/V_S**	1.78
		G_{dyn} (GPa)	30.6	**K_{dyn} (GPa)**	56.7		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

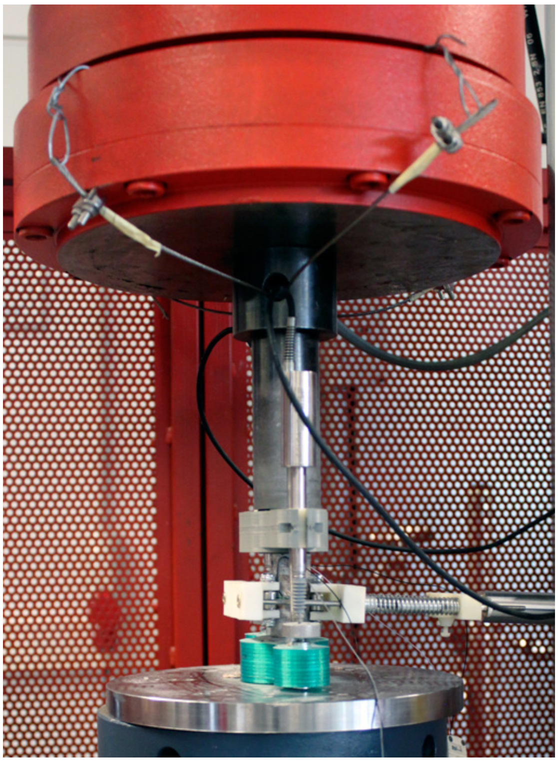

Figure 1. Sample before the test

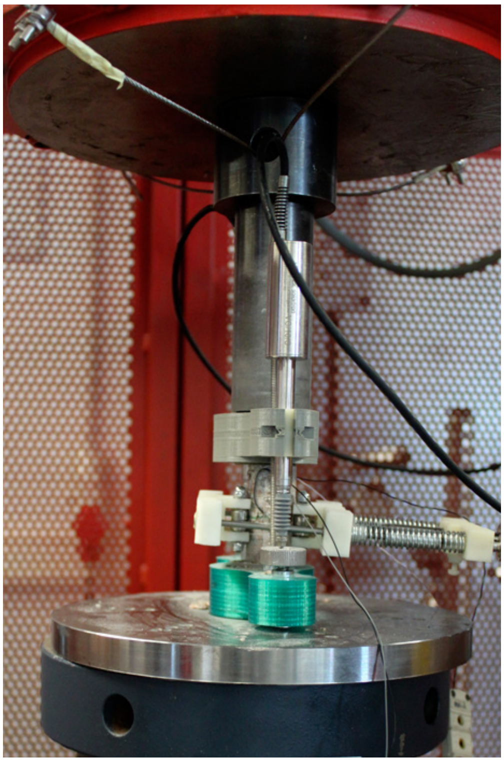

Figure 2. Sample after the test

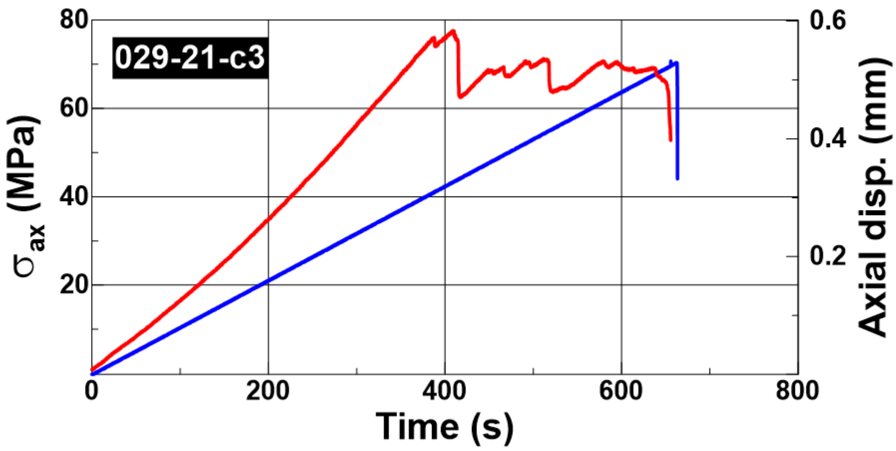

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	21_029c_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	51.66	51.60	51.46	51.42	51.55	**Mean length, L (mm)**	51.54	**Dry mass, M_d (g)**	53.81
Diameter (mm)	22.37	22.47	22.46	22.43	-	**Mean diameter, D (mm)**	22.43	**Dry density, ρ_d (kg/m^3)**	2642

L/D ratio	2.30	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	53.86
Water content (%)	0.09	**Porosity, n (%)**	0.25	**Bulk density, ρ (kg/m^3)**	2644
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	591	**Temperature (ºC)**	22.0		
F_{max} (kN)	48.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	123.1	**$UCS_{1:2}$ (MPa)**	126.0	**UCS_{50} (MPa)**	109.1	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	39.4	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.863	**V_{S1} (km/s)**	3.692	**V_{S2} (km/s)**	3.418	**V_S (km/s)**	3.555
Dynamic moduli		**E_{dyn} (GPa)**	80.8	**ν_{dyn}**	0.21	**V_P/V_S**	1.65
		G_{dyn} (GPa)	33.4	**K_{dyn} (GPa)**	46.3		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

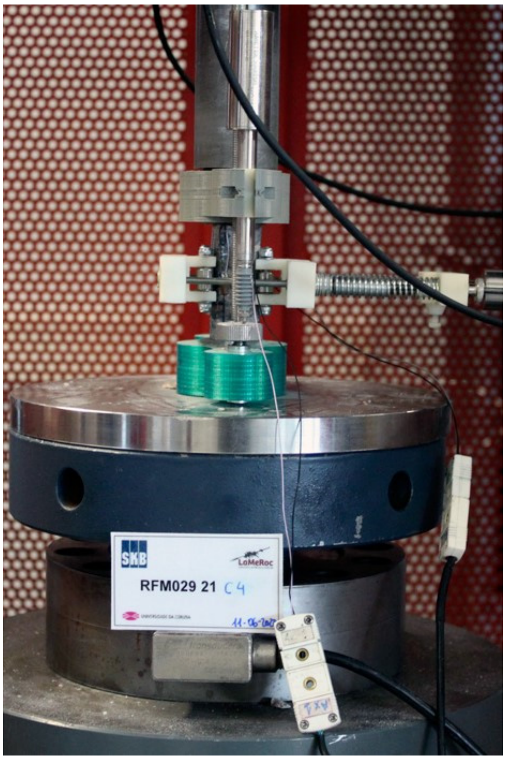

Figure 1. *Sample before the test*

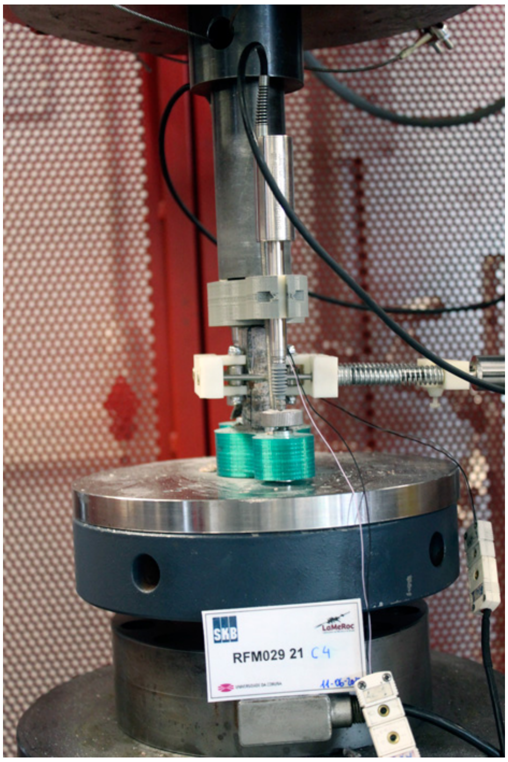

Figure 2. *Sample after the test*

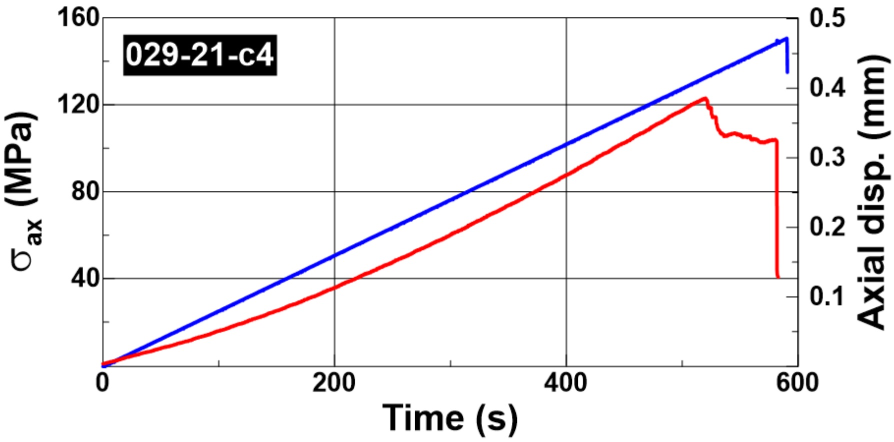

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	21_029c_5
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	46.97	46.96	46.96	47.02	46.90	**Mean length, L (mm)**	46.96	**Dry mass, M_d (g)**	48.88
Diameter (mm)	22.50	22.59	22.44	22.42	-	**Mean diameter, D (mm)**	22.49	**Dry density, ρ_d (kg/m^3)**	2621

L/D ratio	2.09		**Permeability, k (mD)**	-		**Bulk mass, M (g)**	48.94
Water content (%)	0.12		**Porosity, n (%)**	0.32		**Bulk density, ρ (kg/m^3)**	2624
Notes (4)							

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	569	**Temperature (ºC)**	22.0		
F_{max} (kN)	59.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	149.0	**$UCS_{1:2}$ (MPa)**	151.0	**UCS_{50} (MPa)**	130.8	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	85.6	**$\nu_{50\%}$**	0.48	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.072	**V_{S1} (km/s)**	3.105	**V_{S2} (km/s)**	3.213	**V_S (km/s)**	3.159
	Dynamic moduli	**E_{dyn} (GPa)**	68.8	**ν_{dyn}**	0.31	**V_P/V_S**	1.92
		G_{dyn} (GPa)	26.2	**K_{dyn} (GPa)**	61.8		
Notes (6)							

PICTURES AND PLOTS

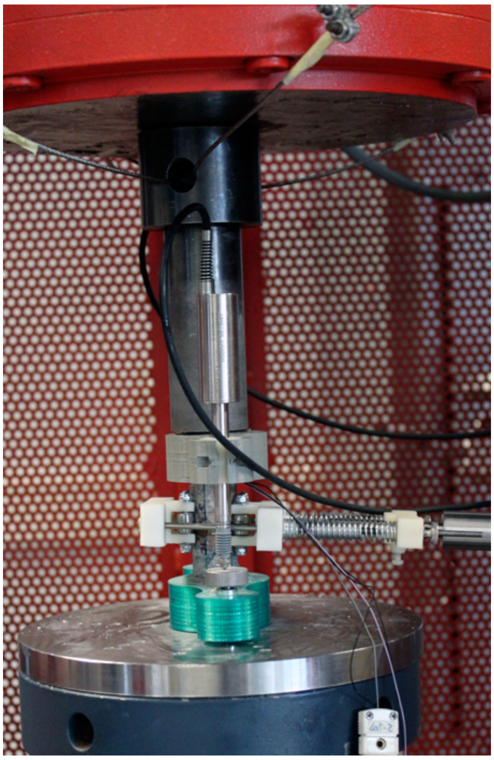

Figure 1. *Sample before the test*

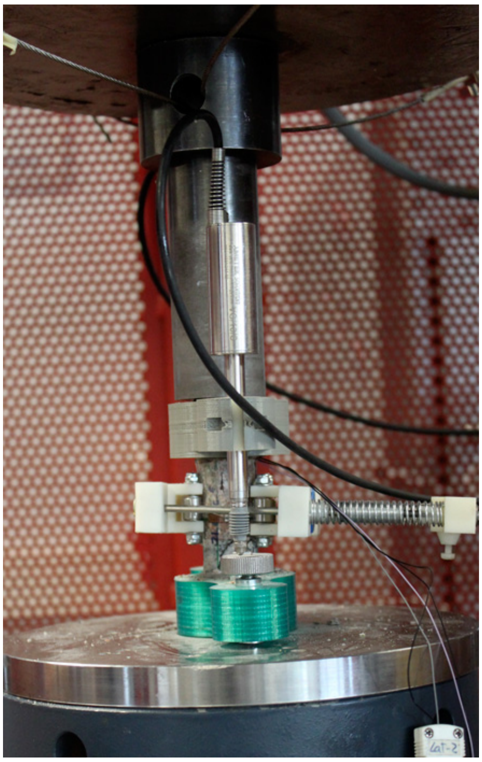

Figure 2. *Sample after the test*

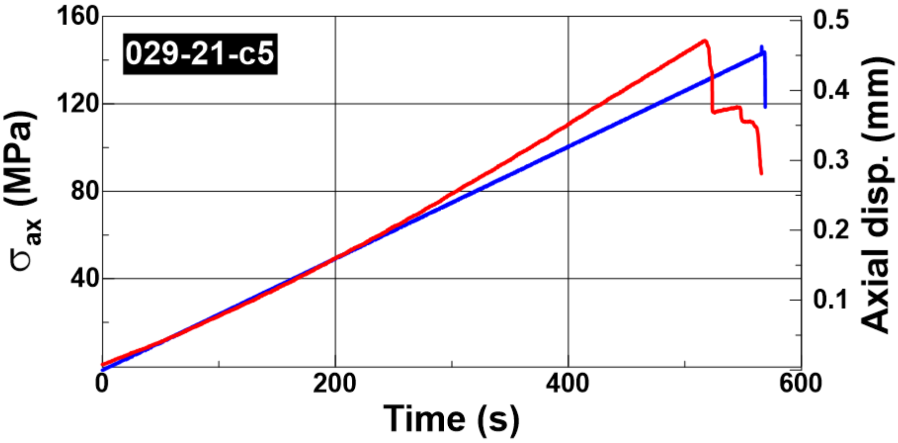

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	21_029d_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	58.10	58.20	58.08	58.06	58.15	**Mean length, L (mm)**	58.12	**Dry mass, M_d (g)**	60.65
Diameter (mm)	22.50	22.55	22.45	22.42	22.40	**Mean diameter, D (mm)**	22.46	**Dry density, ρ_d (kg/m^3)**	2633

L/D ratio	2.59	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	60.73
Water content (%)	0.13	**Porosity, n (%)**	0.35	**Bulk density, ρ (kg/m^3)**	2637
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	561	**Temperature (ºC)**	22.0		
F_{max} (kN)	56.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	141.7	**$UCS_{1:2}$ (MPa)**	146.7	**UCS_{50} (MPa)**	127.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	68.2	**$\nu_{50\%}$**	0.43	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.874	**V_{S1} (km/s)**	3.369	**V_{S2} (km/s)**	3.441	**V_S (km/s)**	3.405
	Dynamic moduli	**E_{dyn} (GPa)**	76.2	**ν_{dyn}**	0.25	**V_P/V_S**	1.72
		G_{dyn} (GPa)	30.6	**K_{dyn} (GPa)**	50.2		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

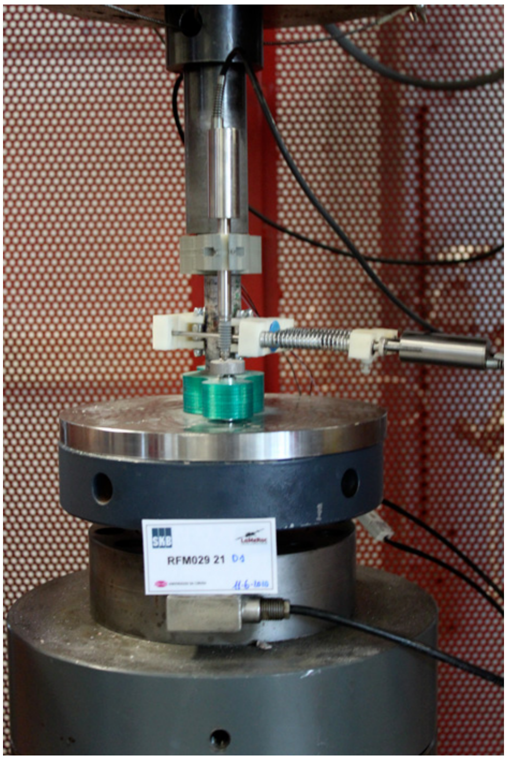

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

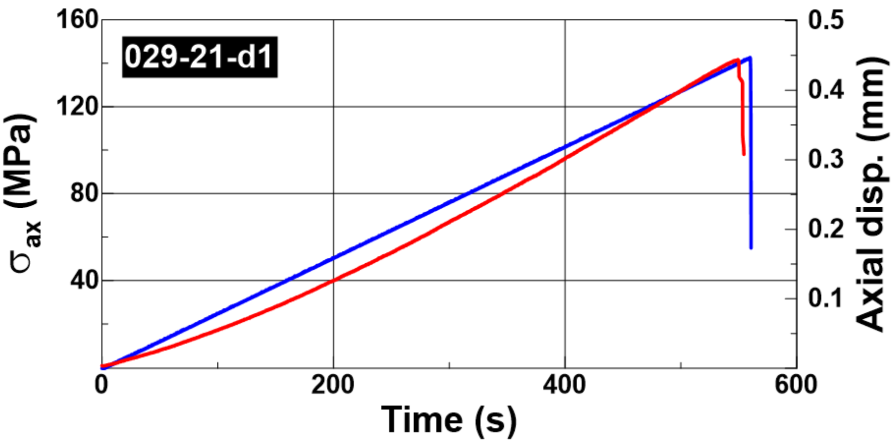

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	21_029d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	57.55	57.55	57.68	57.60	57.56	**Mean length, L (mm)**	57.59	**Dry mass, M_d (g)**	59.62
Diameter (mm)	22.42	22.47	22.45	22.36	22.32	**Mean diameter, D (mm)**	22.40	**Dry density, ρ_d (kg/m^3)**	2626

L/D ratio	2.57	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	59.7
Water content (%)	0.13	**Porosity, n (%)**	0.35	**Bulk density, ρ (kg/m^3)**	2630
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	589	**Temperature (ºC)**	22.0		
F_{max} (kN)	58.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	149.1	**$UCS_{1:2}$ (MPa)**	154.2	**UCS_{50} (MPa)**	133.5	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	99.2	**$\nu_{50\%}$**	0.92	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.966	**V_{S1} (km/s)**	3.184	**V_{S2} (km/s)**	3.369	**V_S (km/s)**	3.276
Dynamic moduli		**E_{dyn} (GPa)**	72.5	**ν_{dyn}**	0.28	**V_P/V_S**	1.82
		G_{dyn} (GPa)	28.2	**K_{dyn} (GPa)**	56.0		
Notes (6)							

PICTURES AND PLOTS

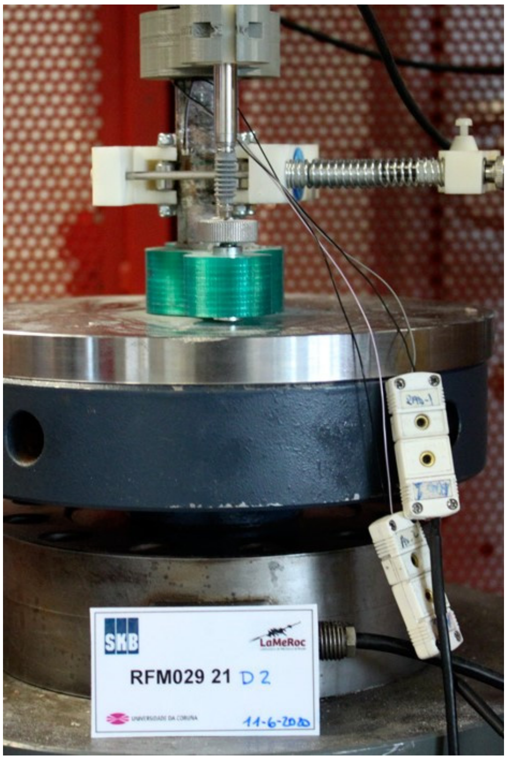

Figure 1. *Sample before the test*

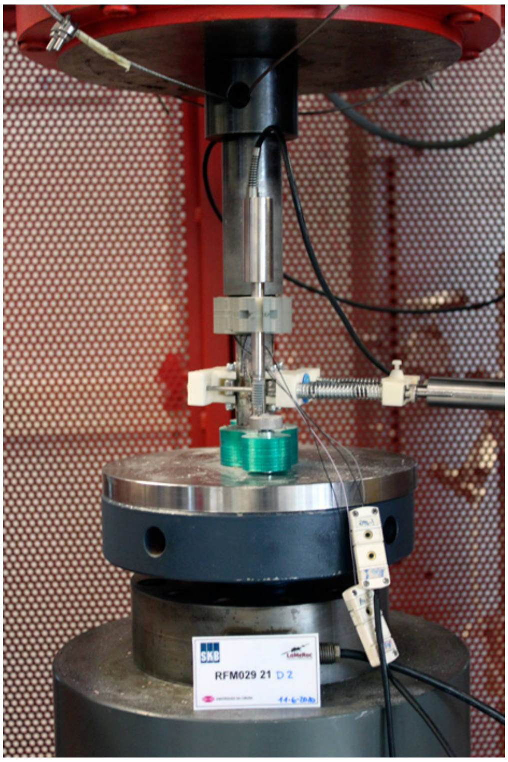

Figure 2. *Sample after the test*

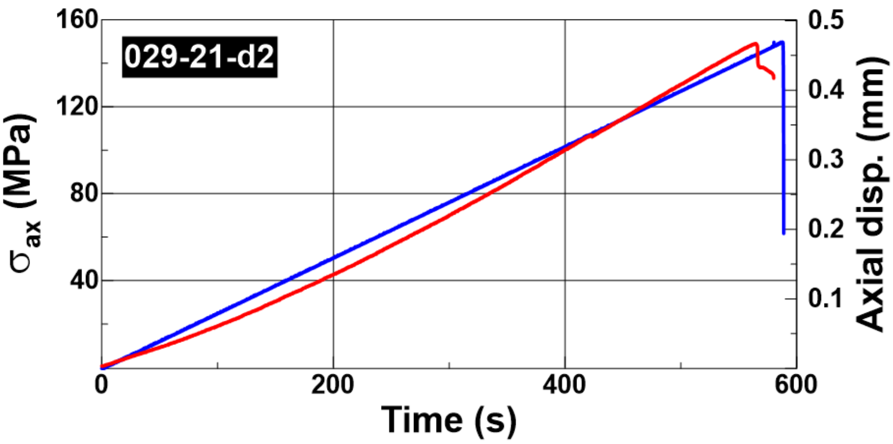

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	21_029d_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	49.86	49.85	49.88	49.86	49.86	**Mean length, L (mm)**	49.86	**Dry mass, M_d (g)**	52.09
Diameter (mm)	22.40	22.54	22.42	22.46	-	**Mean diameter, D (mm)**	22.46	**Dry density, ρ_d (kg/m^3)**	2638

L/D ratio	2.22	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	52.15
Water content (%)	0.12	**Porosity, n (%)**	0.30	**Bulk density, ρ (kg/m^3)**	2641
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	663	**Temperature (ºC)**	22.0		
F_{max} (kN)	79.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	201.3	**$UCS_{1:2}$ (MPa)**	205.4	**UCS_{50} (MPa)**	177.8	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	83.8	**$\nu_{50\%}$**	0.44	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.916	**V_{S1} (km/s)**	3.475	**V_{S2} (km/s)**	3.448	**V_S (km/s)**	3.462
Dynamic moduli		**E_{dyn} (GPa)**	78.5	**ν_{dyn}**	0.24	**V_P/V_S**	1.71
		G_{dyn} (GPa)	31.6	**K_{dyn} (GPa)**	50.2		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

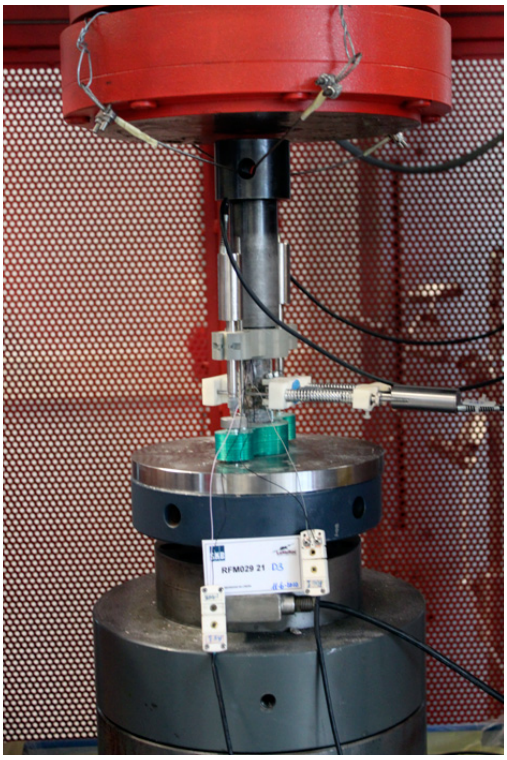

Figure 1. Sample before the test

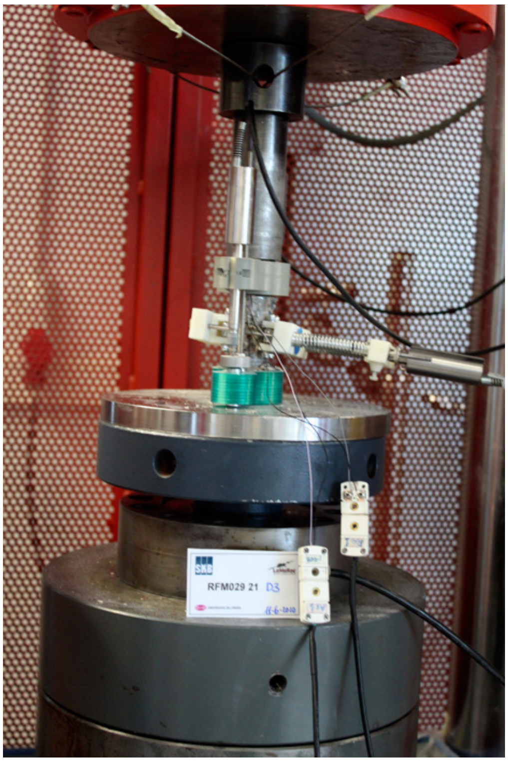

Figure 2. Sample after the test

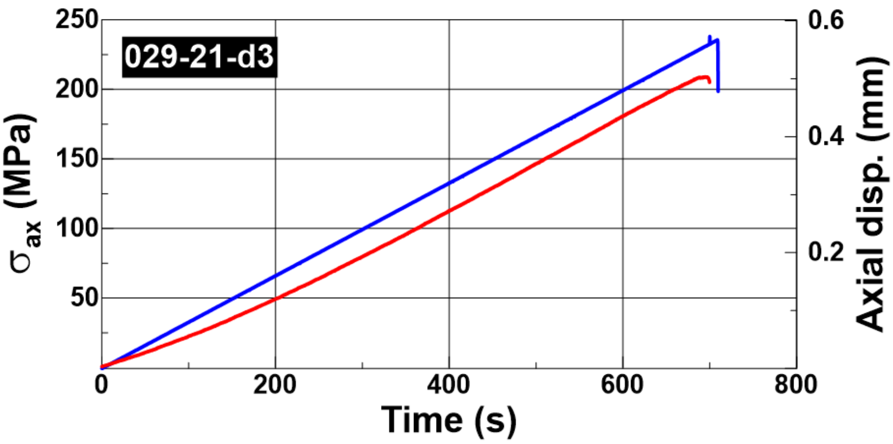

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	Specimen		Ref. LaMeRoc	21_029d_4
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	50.04	49.62	49.31	49.46	49.87	Mean length, L (mm)	49.66	Dry mass, M_d (g)	51.68
Diameter (mm)	22.44	22.48	22.35	22.40	-	Mean diameter, D (mm)	22.42	Dry density, ρ_d (kg/m^3)	2637

L/D ratio	2.22	Permeability, k (mD)	-	Bulk mass, M (g)	51.72
Water content (%)	0.08	Porosity, n (%)	0.20	Bulk density, ρ (kg/m^3)	2639
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	Time to failure (s)	854	Temperature (ºC)	22.0		
F_{max} (kN)	23.9	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	60.6	$UCS_{1:2}$ (MPa)	61.8	UCS_{50} (MPa)	53.5	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	50.0	$\nu_{50\%}$	0.17	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.786	V_{S1} (km/s)	3.006	V_{S2} (km/s)	3.377	V_S (km/s)	3.192
Dynamic moduli		E_{dyn} (GPa)	68.9	ν_{dyn}	0.28	V_P/V_S	1.81
		G_{dyn} (GPa)	26.9	K_{dyn} (GPa)	52.5		
Notes (6)							

PICTURES AND PLOTS

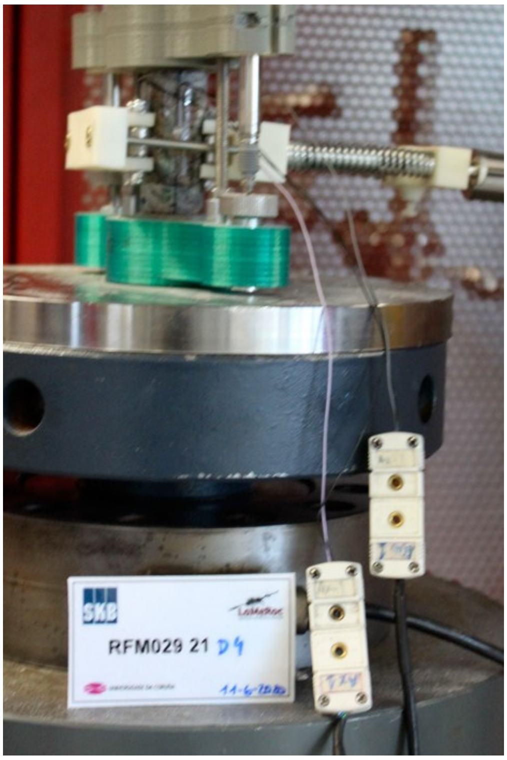

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

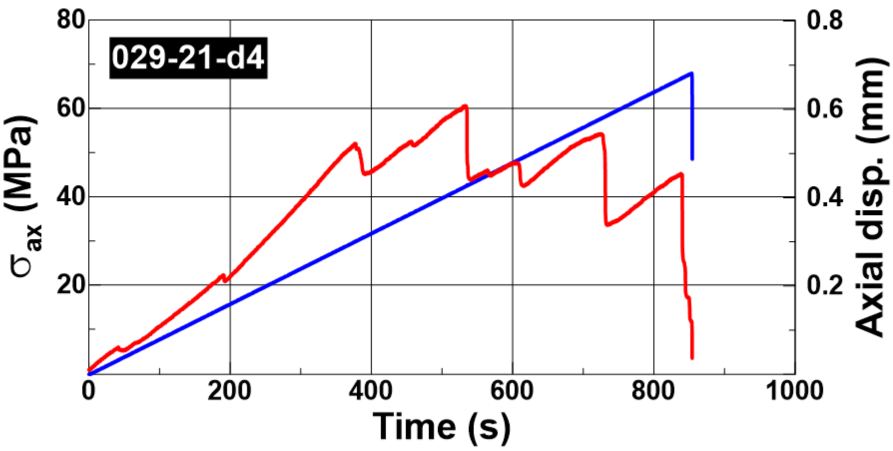

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	21_029d_5
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	46.24	46.33	46.42	46.40	46.34	**Mean length, L (mm)**	46.35	**Dry mass, M_d (g)**	48.28
Diameter (mm)	22.38	22.37	22.40	22.41	-	**Mean diameter, D (mm)**	22.39	**Dry density, ρ_d (kg/m^3)**	2646

L/D ratio	2.07	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	48.32
Water content (%)	0.08	**Porosity, n (%)**	0.22	**Bulk density, ρ (kg/m^3)**	2648
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	646	**Temperature (ºC)**	22.0		
F_{max} (kN)	70.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	180.0	**$UCS_{1:2}$ (MPa)**	182.4	**UCS_{50} (MPa)**	157.8	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	77.0	**$\nu_{50\%}$**	0.31	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.870	**V_{S1} (km/s)**	3.105	**V_{S2} (km/s)**	3.437	**V_S (km/s)**	3.271
	Dynamic moduli	**E_{dyn} (GPa)**	72.2	**ν_{dyn}**	0.27	**V_P/V_S**	1.79
		G_{dyn} (GPa)	28.3	**K_{dyn} (GPa)**	53.5		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. Sample before the test

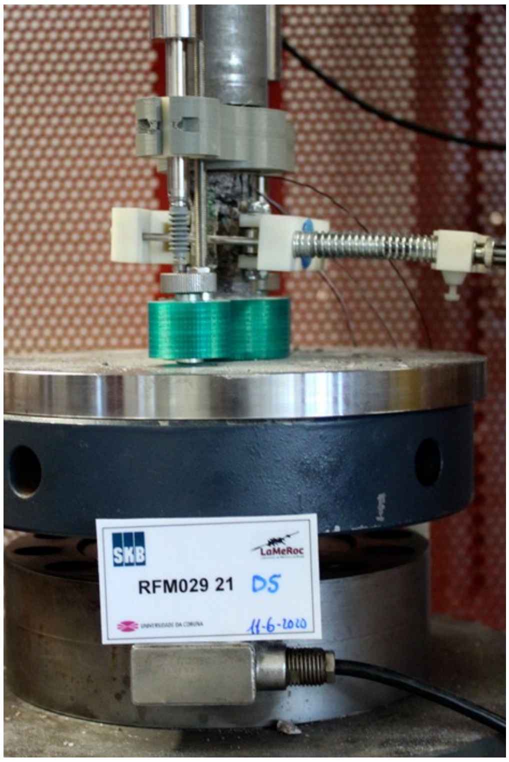

Figure 2. Sample after the test

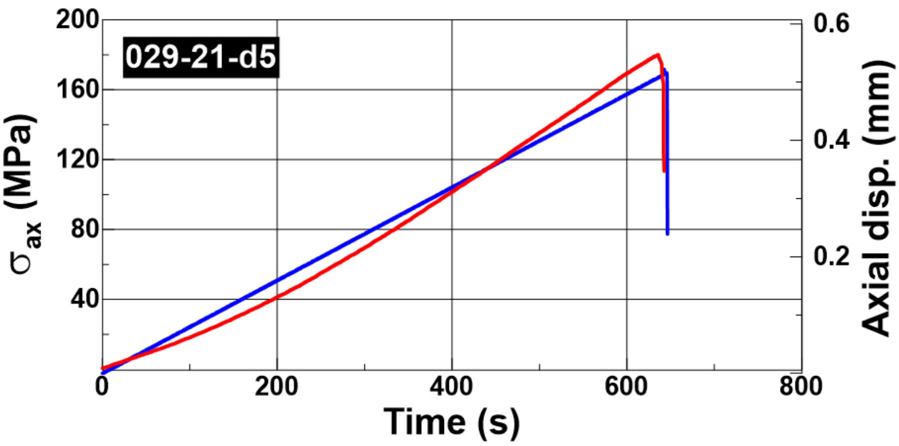

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

LaMeRoc

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	30_029b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	86.40	86.38	86.41	86.45	86.46	**Mean length, L (mm)**	86.42	**Dry mass, M_d (g)**	166.48
Diameter (mm)	30.37	30.36	30.44	30.44	30.44	**Mean diameter, D (mm)**	30.41	**Dry density, ρ_d (kg/m^3)**	2652

L/D ratio	2.84	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	166.64
Water content (%)	0.10	**Porosity, n (%)**	0.25	**Bulk density, ρ (kg/m^3)**	2655
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	**Time to failure (s)**	777	**Temperature (ºC)**	22.0		
F_{max} (kN)	141.4	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	194.6	**$UCS_{1:2}$ (MPa)**	203.1	**UCS_{50} (MPa)**	185.8	**σ_{CI} (MPa)**	122.1
	Static moduli	**$E_{50\%}$ (GPa)**	75.0	**$\nu_{50\%}$**	0.31	**σ_{CD} (MPa)**	187.3
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.897	**V_{S1} (km/s)**	3.423	**V_{S2} (km/s)**	3.347	**V_S (km/s)**	3.385
	Dynamic moduli	**E_{dyn} (GPa)**	76.3	**ν_{dyn}**	0.25	**V_P/V_S**	1.74
		G_{dyn} (GPa)	30.4	**K_{dyn} (GPa)**	51.7		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

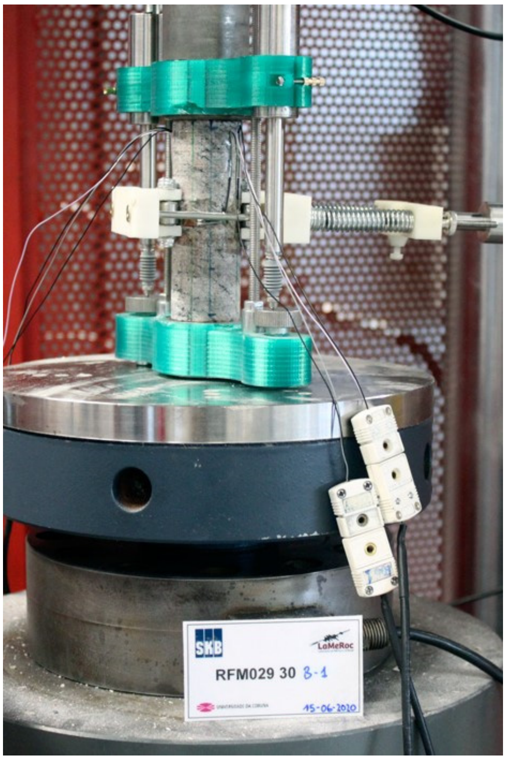

Figure 1. *Sample before the test*

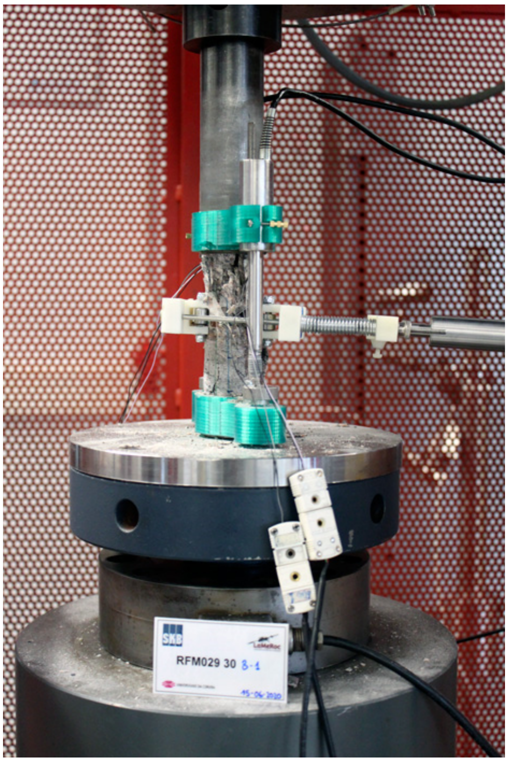

Figure 2. *Sample after the test*

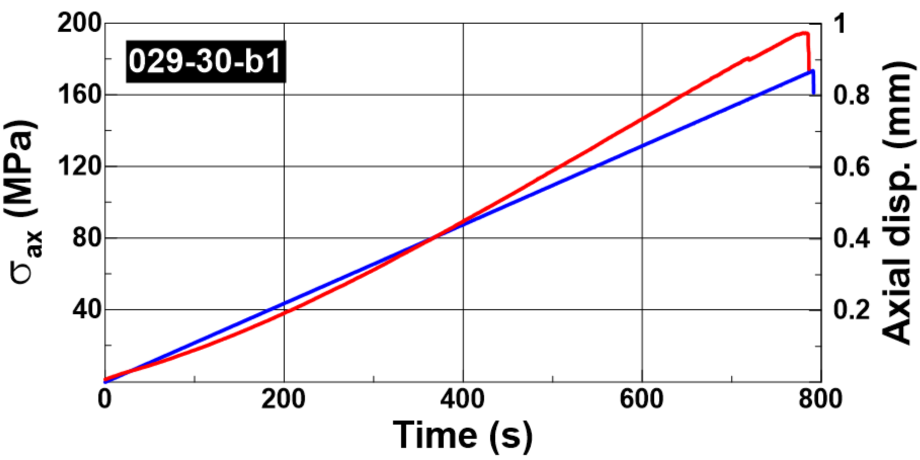

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	30_029b_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	89.86	89.94	90.07	90.06	89.97	**Mean length, L (mm)**	89.98	**Dry mass, M_d (g)**	172.81
Diameter (mm)	30.48	30.47	30.47	30.42	30.46	**Mean diameter, D (mm)**	30.46	**Dry density, ρ_d (kg/m^3)**	2636

L/D ratio	2.95	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	173
Water content (%)	0.11	**Porosity, n (%)**	0.29	**Bulk density, ρ (kg/m^3)**	2638
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	**Time to failure (s)**	643	**Temperature (ºC)**	22.0		
F_{max} (kN)	140.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	192.9	**$UCS_{1:2}$ (MPa)**	201.9	**UCS_{50} (MPa)**	184.7	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	216.9	**$\nu_{50\%}$**	0.23	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.945	**V_{S1} (km/s)**	3.646	**V_{S2} (km/s)**	3.252	**V_S (km/s)**	3.449
	Dynamic moduli	**E_{dyn} (GPa)**	78.2	**ν_{dyn}**	0.25	**V_P/V_S**	1.72
		G_{dyn} (GPa)	31.4	**K_{dyn} (GPa)**	51.4		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

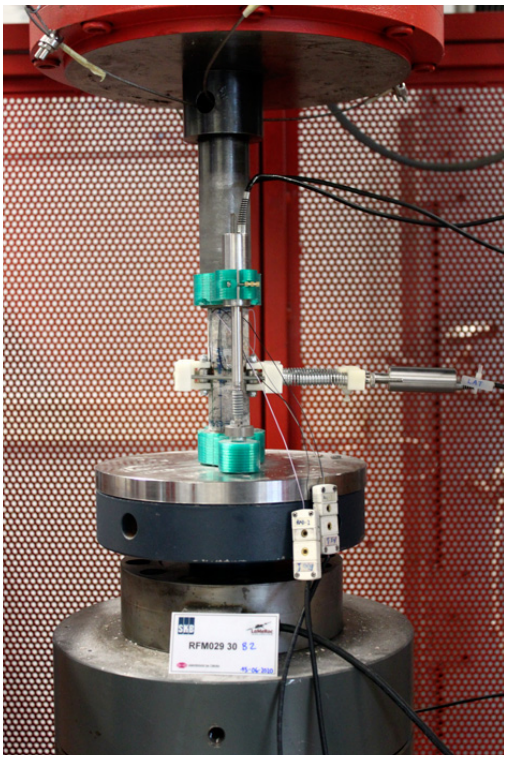

Figure 1. *Sample before the test*

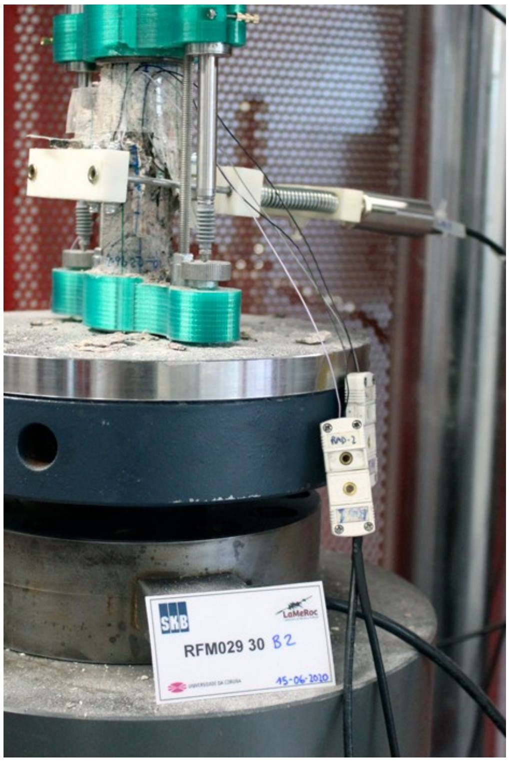

Figure 2. *Sample after the test*

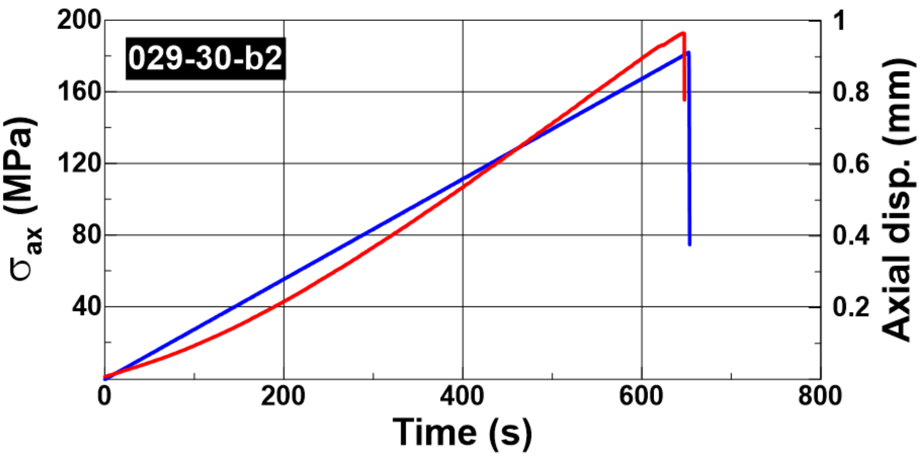

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	30_029b_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	85.98	86.08	86.09	85.95	85.88	**Mean length, L (mm)**	86.00	**Dry mass, M_d (g)**	165.84
Diameter (mm)	30.48	30.48	30.47	30.48	30.47	**Mean diameter, D (mm)**	30.48	**Dry density, ρ_d (kg/m^3)**	2644

L/D ratio	2.82	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	165.92
Water content (%)	0.05	**Porosity, n (%)**	0.13	**Bulk density, ρ (kg/m^3)**	2645
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	**Time to failure (s)**	494	**Temperature (ºC)**	22.0		
F_{max} (kN)	99.4	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	136.3	**$UCS_{1:2}$ (MPa)**	142.1	**UCS_{50} (MPa)**	130.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	79.0	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.912	**V_{S1} (km/s)**	3.567	**V_{S2} (km/s)**	3.389	**V_S (km/s)**	3.478
	Dynamic moduli	**E_{dyn} (GPa)**	79.0	**ν_{dyn}**	0.24	**V_P/V_S**	1.70
		G_{dyn} (GPa)	32.0	**K_{dyn} (GPa)**	49.8		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

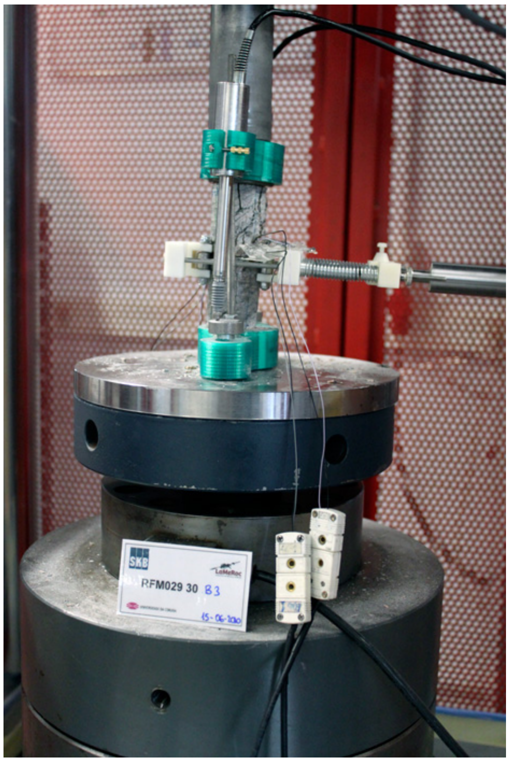

Figure 2. *Sample after the test*

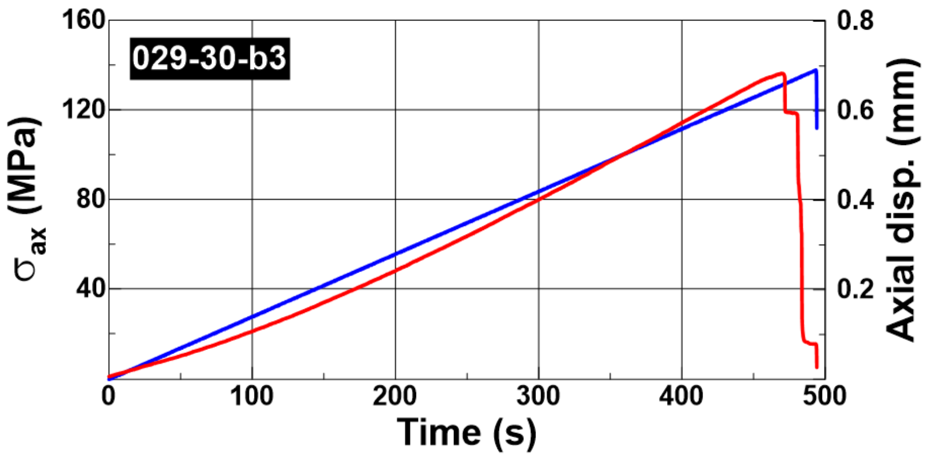

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	30_029c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	86.76	86.84	86.91	86.78	86.77	**Mean length, L (mm)**	86.81	**Dry mass, M_d (g)**	167.04
Diameter (mm)	30.61	30.62	30.60	30.62	30.65	**Mean diameter, D (mm)**	30.62	**Dry density, ρ_d (kg/m³)**	2613

L/D ratio	2.84	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	167.28
Water content (%)	0.14	**Porosity, n (%)**	0.38	**Bulk density, ρ (kg/m³)**	2617
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	**Time to failure (s)**	618	**Temperature (ºC)**	22.0		
F_{max} (kN)	131.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	178.7	**$UCS_{1:2}$ (MPa)**	186.5	**UCS_{50} (MPa)**	170.8	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	79.3	**$\nu_{50\%}$**	0.33	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.977	**V_{S1} (km/s)**	3.746	**V_{S2} (km/s)**	3.153	**V_S (km/s)**	3.450
	Dynamic moduli	**E_{dyn} (GPa)**	77.9	**ν_{dyn}**	0.25	**V_P/V_S**	1.73
		G_{dyn} (GPa)	31.1	**K_{dyn} (GPa)**	52.0		
Notes (6)							

PICTURES AND PLOTS

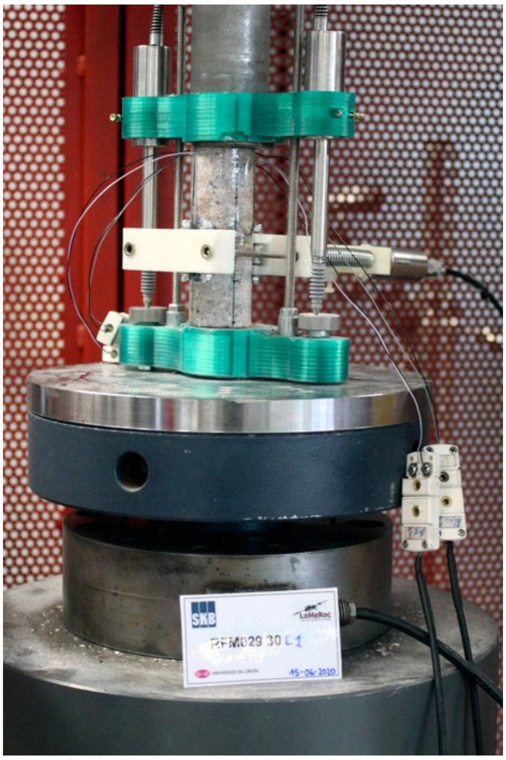

Figure 1. *Sample before the test*

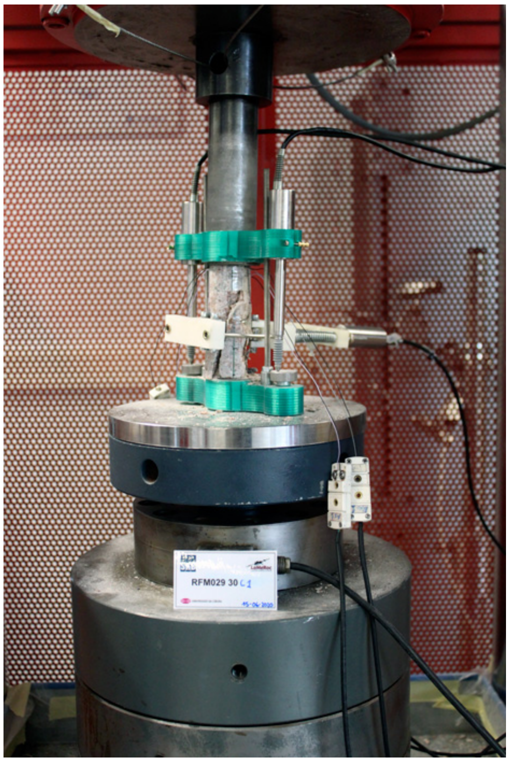

Figure 2. *Sample after the test*

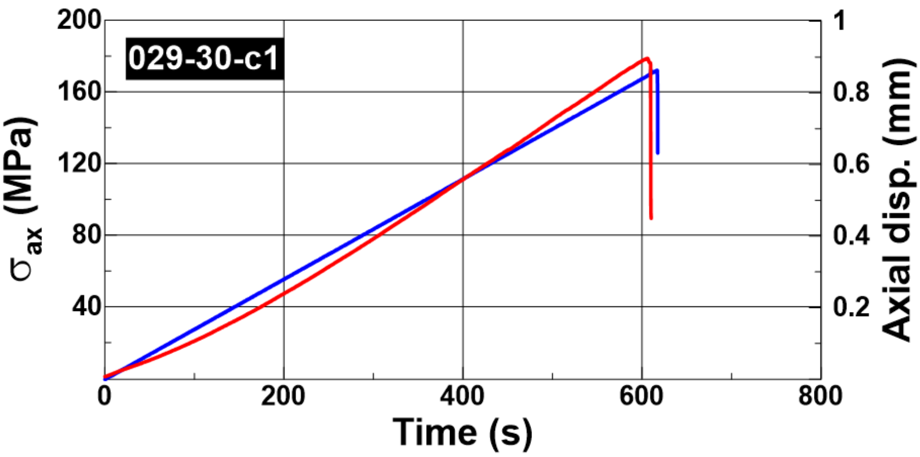

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	30_029c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	86.78	86.80	86.74	86.76	86.79	**Mean length, L (mm)**	86.77	**Dry mass, M_d (g)**	167.12
Diameter (mm)	30.62	30.63	30.60	30.62	30.62	**Mean diameter, D (mm)**	30.62	**Dry density, ρ_d (kg/m^3)**	2616

L/D ratio	2.83	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	167.34
Water content (%)	0.13	**Porosity, n (%)**	0.34	**Bulk density, ρ (kg/m^3)**	2619
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	**Time to failure (s)**	600	**Temperature (ºC)**	22.0		
F_{max} (kN)	129.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	176.3	**$UCS_{1:2}$ (MPa)**	184.0	**UCS_{50} (MPa)**	168.4	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	224.7	**$\nu_{50\%}$**	0.39	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.995	**V_{S1} (km/s)**	3.290	**V_{S2} (km/s)**	3.151	**V_S (km/s)**	3.221
	Dynamic moduli	**E_{dyn} (GPa)**	70.5	**ν_{dyn}**	0.30	**V_P/V_S**	1.86
		G_{dyn} (GPa)	27.2	**K_{dyn} (GPa)**	57.9		
Notes (6)							

PICTURES AND PLOTS

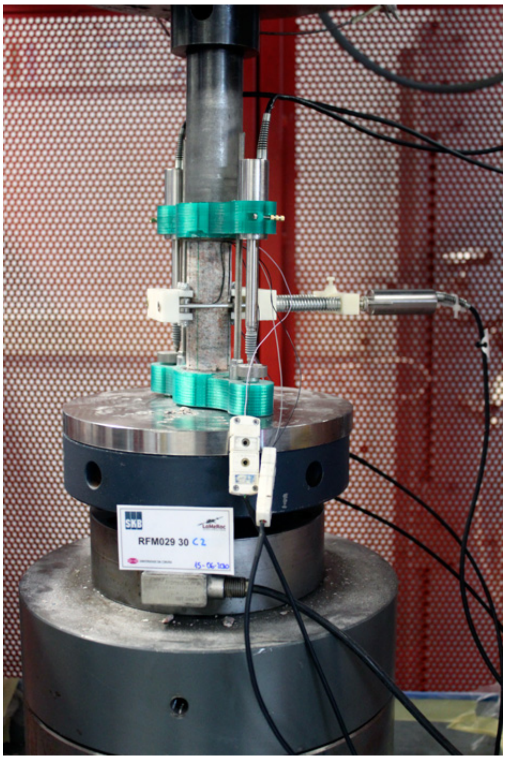

Figure 1. *Sample before the test*

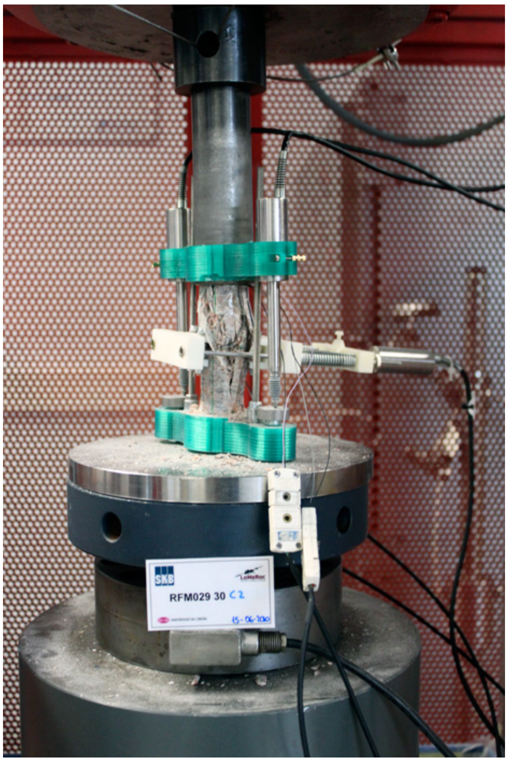

Figure 2. *Sample after the test*

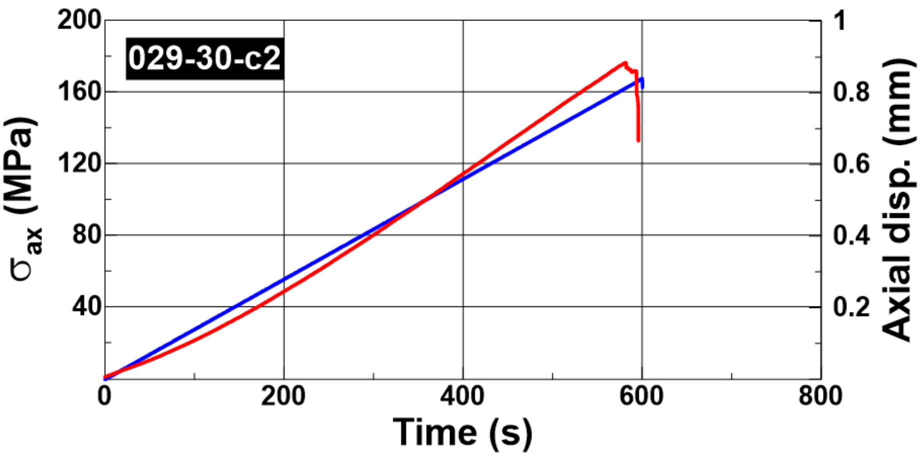

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		Report date	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	Specimen		Ref. LaMeRoc	30_029c_3
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	85.71	85.69	85.65	85.61	85.63	Mean length, L (mm)	85.66	Dry mass, M_d (g)	165.45
Diameter (mm)	30.60	30.60	30.60	30.60	30.60	Mean diameter, D (mm)	30.60	Dry density, ρ_d (kg/m^3)	2626

L/D ratio	2.80	Permeability, k (mD)	-	Bulk mass, M (g)	165.71
Water content (%)	0.16	Porosity, n (%)	0.41	Bulk density, ρ (kg/m^3)	2631
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	Time to failure (s)	634	Temperature (ºC)	22.0		
F_{max} (kN)	150.6	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	204.8	$UCS_{1:2}$ (MPa)	213.5	UCS_{50} (MPa)	195.5	σ_{CI} (MPa)	93.4
Static moduli		$E_{50\%}$ (GPa)	79.1	$\nu_{50\%}$	0.31	σ_{CD} (MPa)	160.7
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	6.025	V_{S1} (km/s)	3.235	V_{S2} (km/s)	3.231	V_S (km/s)	3.233
Dynamic moduli		E_{dyn} (GPa)	71.4	ν_{dyn}	0.30	V_P/V_S	1.86
		G_{dyn} (GPa)	27.5	K_{dyn} (GPa)	58.8		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

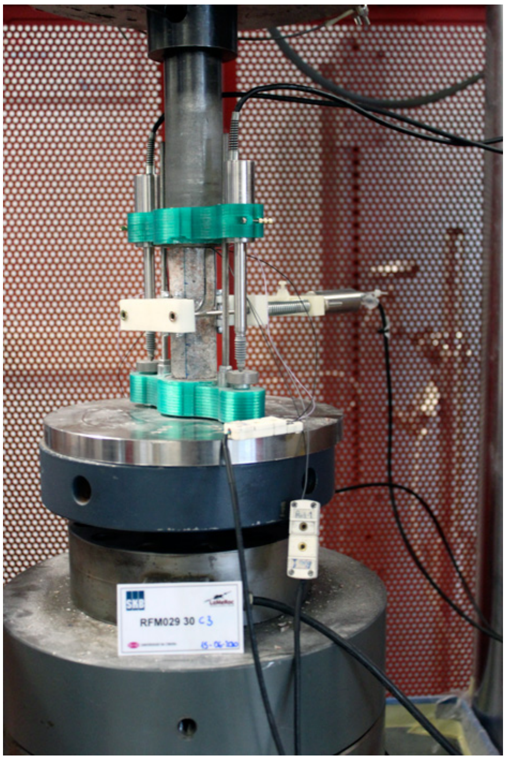

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

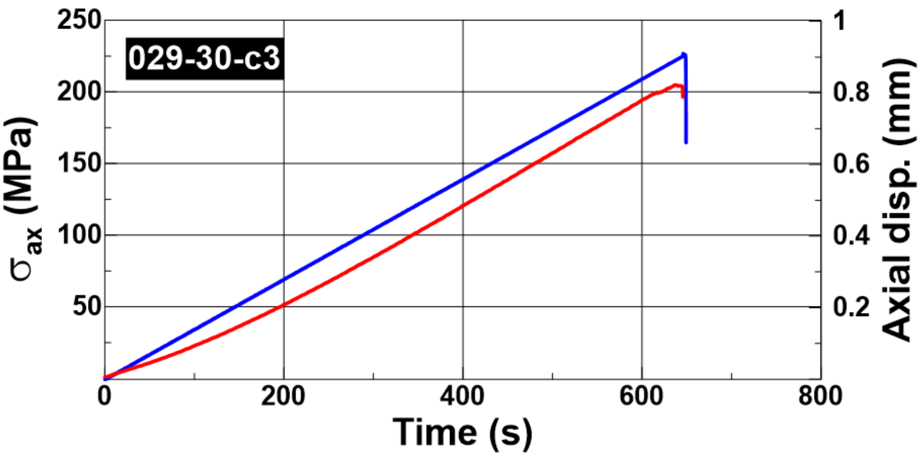

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

LaMeRoc

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	30_029d_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	85.78	85.82	85.82	85.76	85.74	**Mean length, L (mm)**	85.78	**Dry mass, M_d (g)**	166.58
Diameter (mm)	30.58	30.58	30.58	30.60	30.61	**Mean diameter, D (mm)**	30.59	**Dry density, ρ_d (kg/m³)**	2642

L/D ratio	2.80	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	166.77
Water content (%)	0.11	**Porosity, n (%)**	0.30	**Bulk density, ρ (kg/m³)**	2645
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s⁻¹)**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	**Time to failure (s)**	574	**Temperature (ºC)**	22.0		
F_{max} (kN)	124.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	168.9	**$UCS_{1:2}$ (MPa)**	176.1	**UCS_{50} (MPa)**	161.2	**σ_{CI} (MPa)**	101.0
	Static moduli	**$E_{50\%}$ (GPa)**	72.8	**$\nu_{50\%}$**	0.27	**σ_{CD} (MPa)**	163.9
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.883	**V_{S1} (km/s)**	2.933	**V_{S2} (km/s)**	3.188	**V_S (km/s)**	3.061
	Dynamic moduli	**E_{dyn} (GPa)**	65.1	**ν_{dyn}**	0.31	**V_P/V_S**	1.92
		G_{dyn} (GPa)	24.8	**K_{dyn} (GPa)**	58.5		
Notes (6)							

PICTURES AND PLOTS

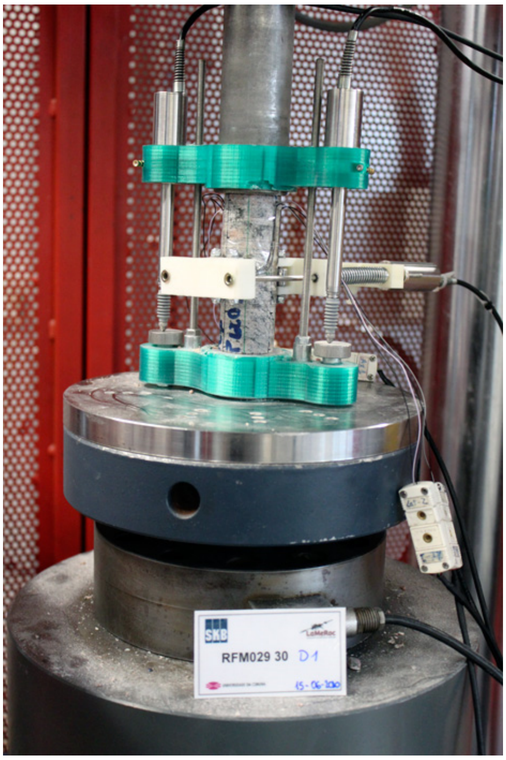

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

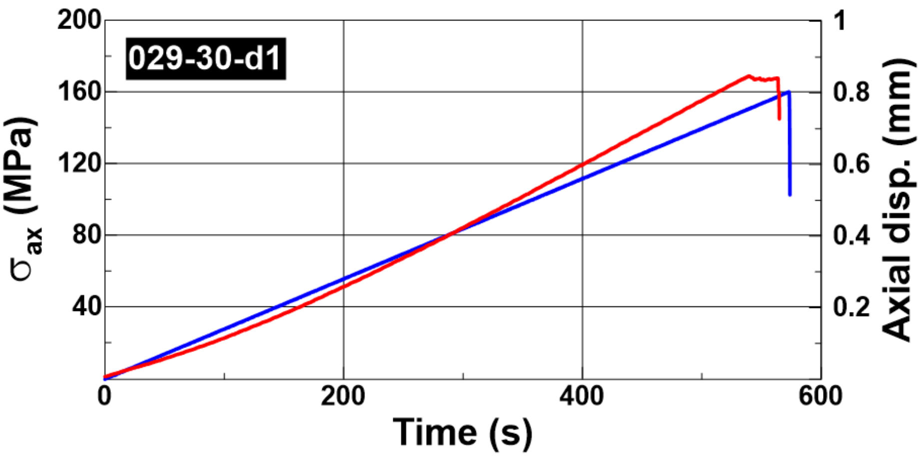

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	30_029d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	85.24	85.32	85.31	85.33	85.28	**Mean length, L (mm)**	85.30	**Dry mass, M_d (g)**	165.23
Diameter (mm)	30.64	30.58	30.63	30.50	30.51	**Mean diameter, D (mm)**	30.57	**Dry density, ρ_d (kg/m^3)**	2639

L/D ratio	2.79	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	165.42
Water content (%)	0.11	**Porosity, n (%)**	0.30	**Bulk density, ρ (kg/m^3)**	2642
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	**Time to failure (s)**	536	**Temperature (ºC)**	22.0		
F_{max} (kN)	112.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	153.5	**$UCS_{1:2}$ (MPa)**	159.9	**UCS_{50} (MPa)**	146.4	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	75.6	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.902	**V_{S1} (km/s)**	3.407	**V_{S2} (km/s)**	3.126	**V_S (km/s)**	3.267
	Dynamic moduli	**E_{dyn} (GPa)**	72.1	**ν_{dyn}**	0.28	**V_P/V_S**	1.81
		G_{dyn} (GPa)	28.2	**K_{dyn} (GPa)**	54.4		
Notes (6)							

PICTURES AND PLOTS

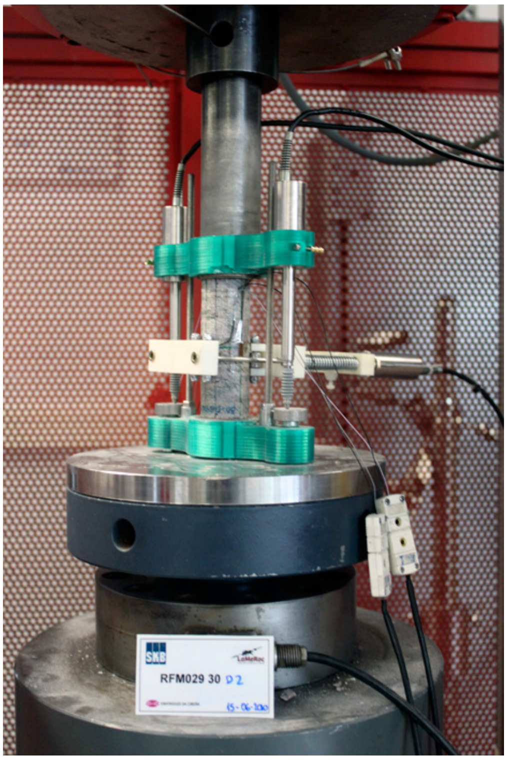

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

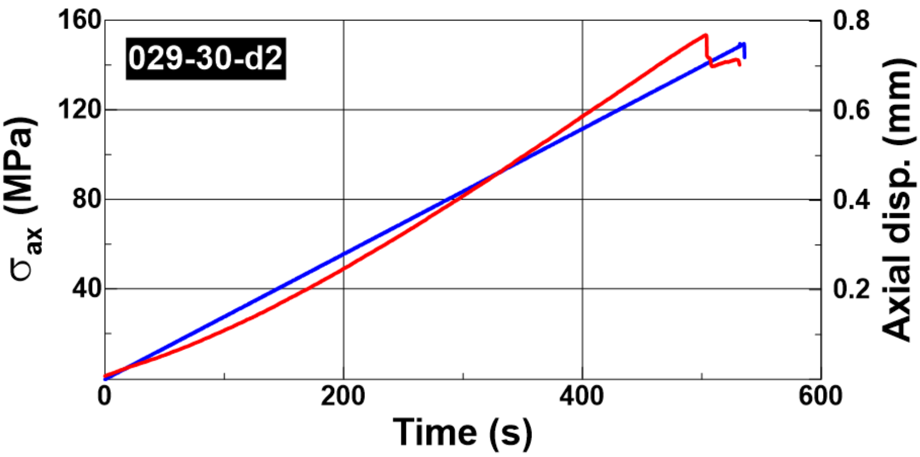

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	**Report date**
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	30_029d_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	86.69	86.64	86.65	86.68	86.70	**Mean length, L (mm)**	86.67	**Dry mass, M_d (g)**	168.44
Diameter (mm)	30.59	30.58	30.62	30.59	30.59	**Mean diameter, D (mm)**	30.59	**Dry density, ρ_d (kg/m^3)**	2644
L/D ratio	2.83	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	168.62
Water content (%)	0.11	**Porosity, n (%)**	0.28					**Bulk density, ρ (kg/m^3)**	2646
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	**Time to failure (s)**	625	**Temperature (ºC)**	22.0		
F_{max} (kN)	140.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	191.2	**$UCS_{1:2}$ (MPa)**	199.5	**UCS_{50} (MPa)**	182.6	**σ_{CI} (MPa)**	78.5
	Static moduli	**$E_{50\%}$ (GPa)**	73.4	**$\nu_{50\%}$**	0.34	**σ_{CD} (MPa)**	126.9
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.895	**V_{S1} (km/s)**	3.442	**V_{S2} (km/s)**	3.259	**V_S (km/s)**	3.350
	Dynamic moduli	**E_{dyn} (GPa)**	74.9	**ν_{dyn}**	0.26	**V_P/V_S**	1.76
		G_{dyn} (GPa)	29.7	**K_{dyn} (GPa)**	52.3		
Notes (6)							

PICTURES AND PLOTS

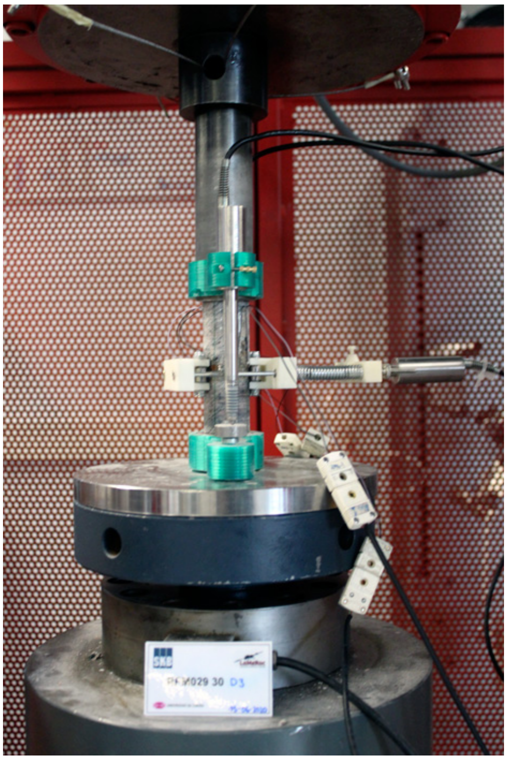

Figure 1. *Sample before the test*

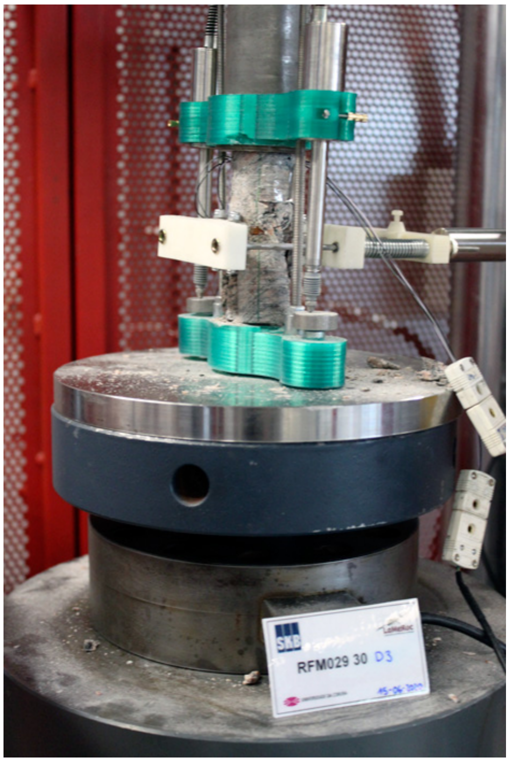

Figure 2. *Sample after the test*

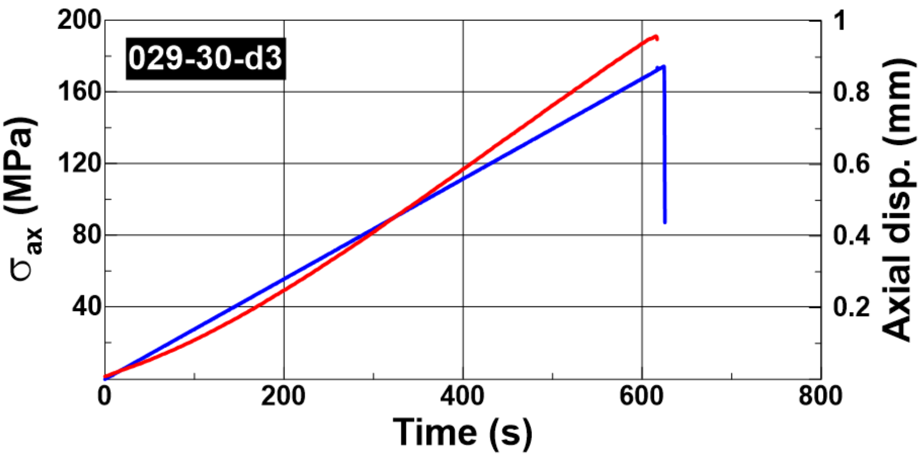

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	30_029d_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	86.90	86.69	86.88	87.01	87.04	**Mean length, L (mm)**	86.90	**Dry mass, M_d (g)**	167.51
Diameter (mm)	30.51	30.50	30.57	30.56	30.50	**Mean diameter, D (mm)**	30.53	**Dry density, ρ_d (kg/m^3)**	2633

L/D ratio	2.85	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	167.71
Water content (%)	0.12	**Porosity, n (%)**	0.31	**Bulk density, ρ (kg/m^3)**	2637
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	15/06/2020	**Time to failure (s)**	552	**Temperature (ºC)**	22.0		
F_{max} (kN)	60.0	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	82.0	**$UCS_{1:2}$ (MPa)**	85.6	**UCS_{50} (MPa)**	78.3	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	27.2	**$\nu_{50\%}$**	0.09	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.863	**V_{S1} (km/s)**	3.192	**V_{S2} (km/s)**	3.174	**V_S (km/s)**	3.183
	Dynamic moduli	**E_{dyn} (GPa)**	69.0	**ν_{dyn}**	0.29	**V_P/V_S**	1.84
		G_{dyn} (GPa)	26.7	**K_{dyn} (GPa)**	55.0		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

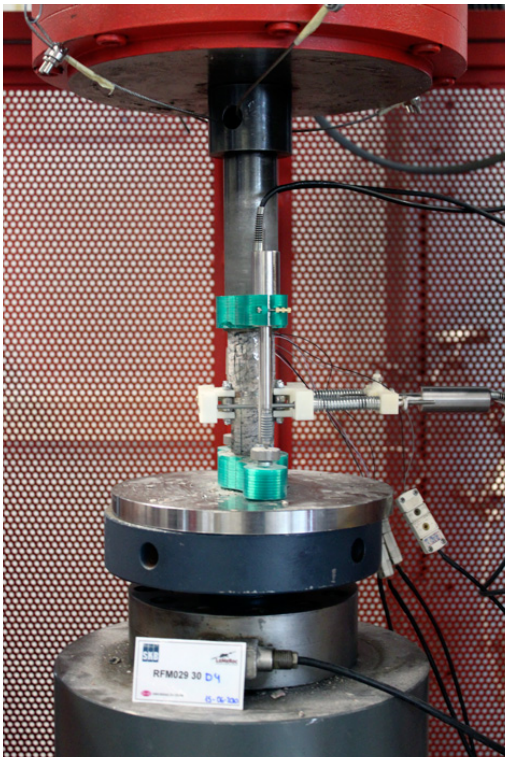

Figure 2. *Sample after the test*

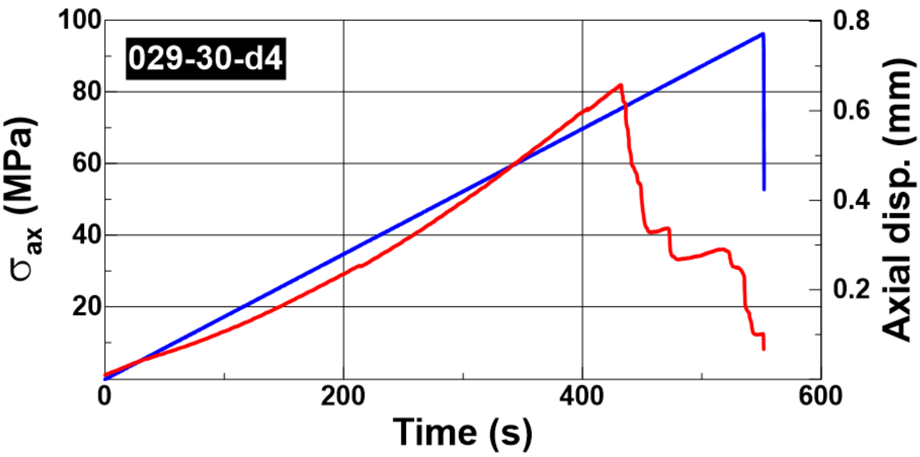

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		Report date	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	Specimen		Ref. LaMeRoc	42_029b_1
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	101.33	101.35	101.36	101.47	101.42	Mean length, L (mm)	101.39	Dry mass, M_d (g)	361.53
Diameter (mm)	41.03	41.20	41.30	41.35	41.40	Mean diameter, D (mm)	41.26	Dry density, ρ_d (kg/m³)	2667
L/D ratio	2.46	Permeability, k (mD)	-			Bulk mass, M (g)	361.9		
Water content (%)	0.10	Porosity, n (%)	0.27			Bulk density, ρ (kg/m³)	2670		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-10AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	Time to failure (s)	641			Temperature (ºC)	22.0
F_{max} (kN)	233.9	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	174.9	$UCS_{1:2}$ (MPa)	180.3	UCS_{50} (MPa)	174.2	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	90.2	$\nu_{50\%}$	0.30	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.844	V_{S1} (km/s)	2.984	V_{S2} (km/s)	2.991	V_S (km/s)	2.987
Dynamic moduli		E_{dyn} (GPa)	63.1	ν_{dyn}	0.32	V_P/V_S	1.96
		G_{dyn} (GPa)	23.8	K_{dyn} (GPa)	59.4		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

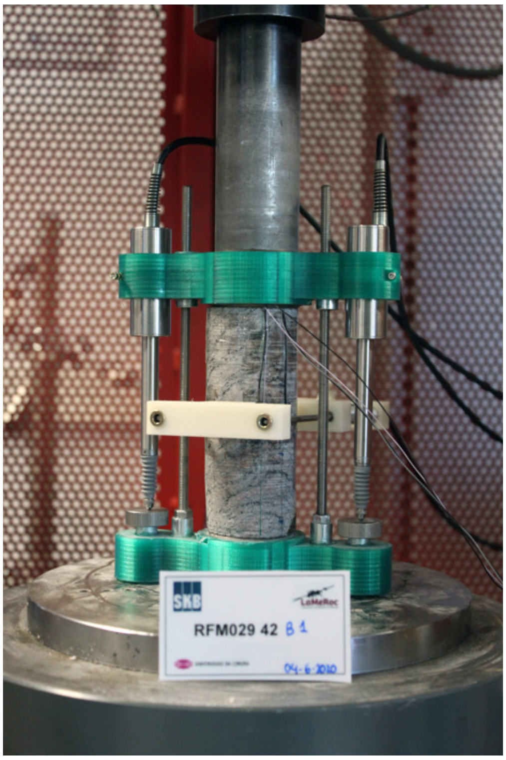

Figure 1. *Sample before the test*

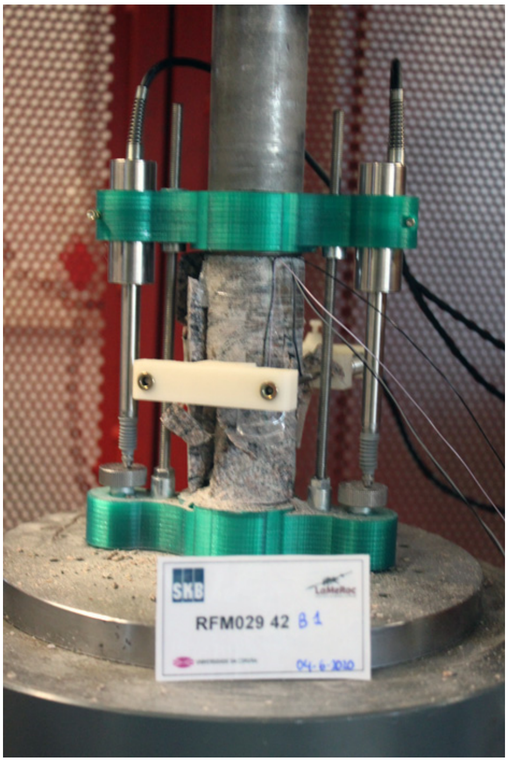

Figure 2. *Sample after the test*

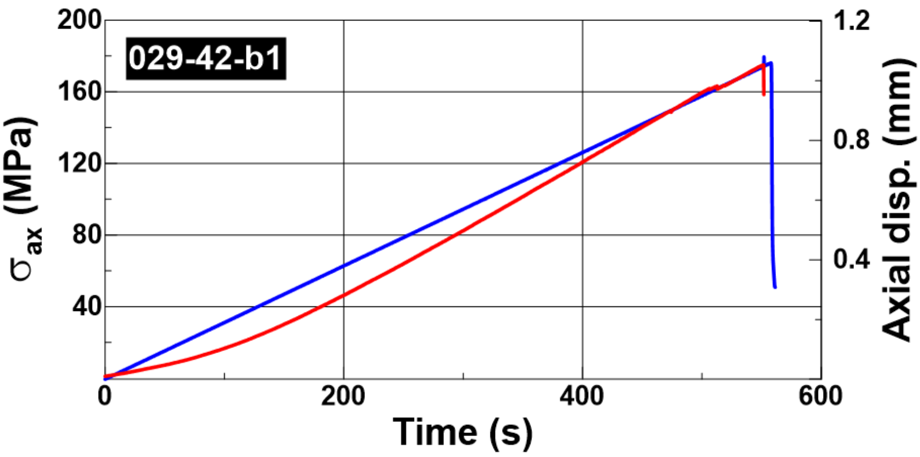

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		Report date	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	Specimen		Ref. LaMeRoc	42_029b_2
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	105.66	105.75	105.65	105.63	105.62	Mean length, L (mm)	105.66	Dry mass, M_d (g)	383.38
Diameter (mm)	41.68	41.68	41.65	41.78	41.74	Mean diameter, D (mm)	41.71	Dry density, ρ_d (kg/m^3)	2656
L/D ratio	2.53	Permeability, k (mD)	-					Bulk mass, M (g)	383.86
Water content (%)	0.13	Porosity, n (%)	0.33					Bulk density, ρ (kg/m^3)	2659
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-10AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	Time to failure (s)	671			Temperature (ºC)	22.0
F_{max} (kN)	224.5	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	164.4	$UCS_{1:2}$ (MPa)	169.8	UCS_{50} (MPa)	164.4	σ_{CI} (MPa)	-
	Static moduli	$E_{50\%}$ (GPa)	89.9	$\nu_{50\%}$	0.32	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.869	V_{S1} (km/s)	2.975	V_{S2} (km/s)	3.368	V_S (km/s)	3.171
	Dynamic moduli	E_{dyn} (GPa)	69.2	ν_{dyn}	0.29	V_P/V_S	1.85
		G_{dyn} (GPa)	26.7	K_{dyn} (GPa)	55.9		
Notes (6)							

PICTURES AND PLOTS

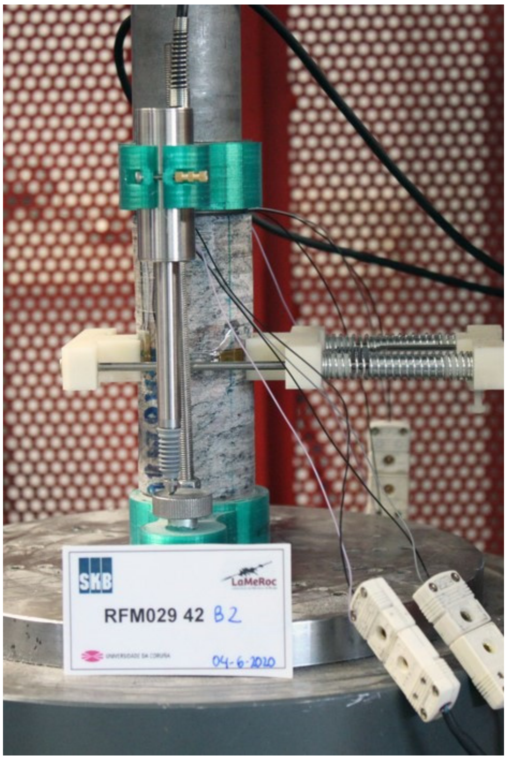

Figure 1. Sample before the test

Figure 2. Sample after the test

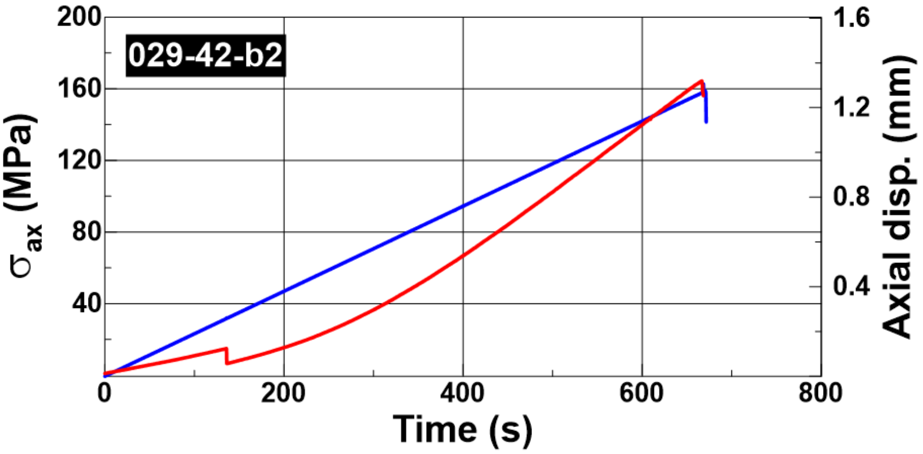

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

LaMeRoc Laboratorio de Mecánica de Rocas

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	42_029b_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	97.38	96.91	97.00	97.45	97.50	**Mean length, L (mm)**	97.25	**Dry mass, M_d (g)**	344.71
Diameter (mm)	41.19	41.00	40.85	41.01	41.38	**Mean diameter, D (mm)**	41.09	**Dry density, ρ_d (kg/m³)**	2674
L/D ratio	2.37	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	345.07		
Water content (%)	0.10	**Porosity, n (%)**	0.28			**Bulk density, ρ (kg/m³)**	2676		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s⁻¹)**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	599	**Temperature (ºC)**	22.0		
F_{max} (kN)	230.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	173.9	**$UCS_{1:2}$ (MPa)**	178.6	**UCS_{50} (MPa)**	172.4	**σ_{CI} (MPa)**	97.0
	Static moduli	**$E_{50\%}$ (GPa)**	88.7	**$\nu_{50\%}$**	0.28	**σ_{CD} (MPa)**	160.4
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.817	**V_{S1} (km/s)**	2.954	**V_{S2} (km/s)**	3.016	**V_S (km/s)**	2.985
	Dynamic moduli	**E_{dyn} (GPa)**	63.0	**ν_{dyn}**	0.32	**V_P/V_S**	1.95
		G_{dyn} (GPa)	23.8	**K_{dyn} (GPa)**	58.8		
Notes (6)							

PICTURES AND PLOTS

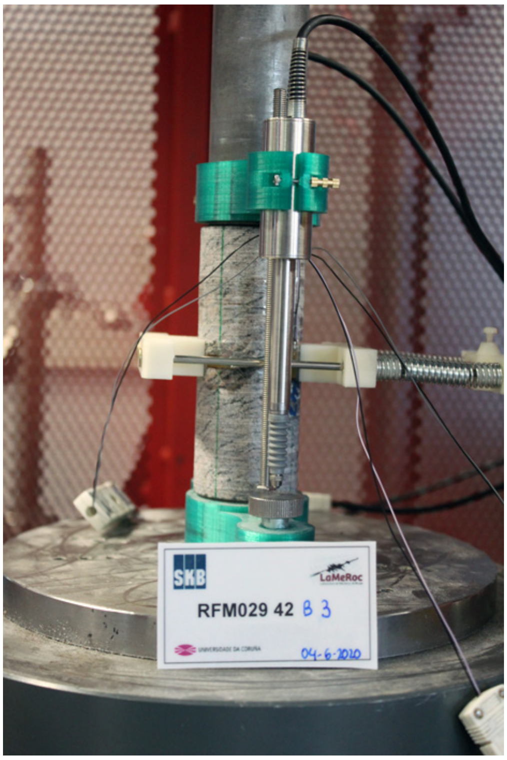

Figure 1. *Sample before the test*

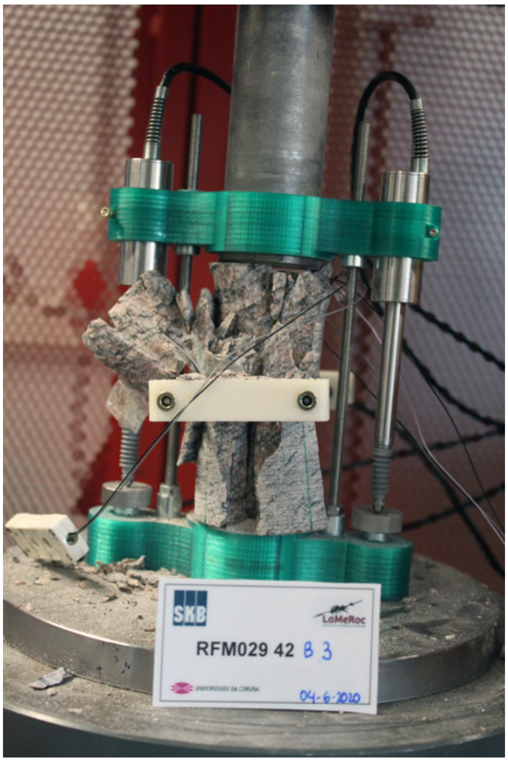

Figure 2. *Sample after the test*

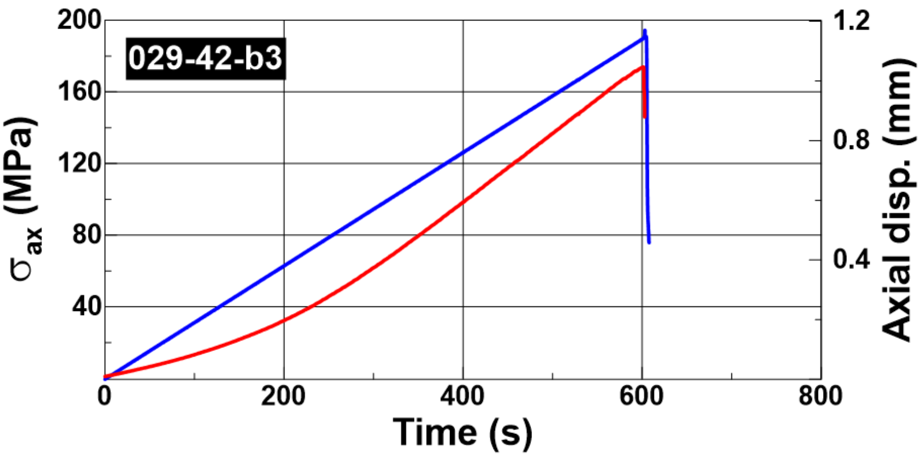

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	42_029c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	101.28	101.43	101.57	101.39	101.27	**Mean length, L (mm)**	101.39	**Dry mass, M_d (g)**	362.15
Diameter (mm)	41.81	41.54	41.61	41.64	41.76	**Mean diameter, D (mm)**	41.67	**Dry density, ρ_d (kg/m^3)**	2619
L/D ratio	2.43	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	362.7		
Water content (%)	0.15	**Porosity, n (%)**	0.40			**Bulk density, ρ (kg/m^3)**	2623		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	600	**Temperature (ºC)**	22.0		
F_{max} (kN)	260.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	190.7	**$UCS_{1:2}$ (MPa)**	196.3	**UCS_{50} (MPa)**	190.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	160.8	**$\nu_{50\%}$**	0.52	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.967	**V_{S1} (km/s)**	2.974	**V_{S2} (km/s)**	3.008	**V_S (km/s)**	2.991
	Dynamic moduli	**E_{dyn} (GPa)**	62.5	**ν_{dyn}**	0.33	**V_P/V_S**	2.00
		G_{dyn} (GPa)	23.5	**K_{dyn} (GPa)**	62.1		
Notes (6)							

PICTURES AND PLOTS

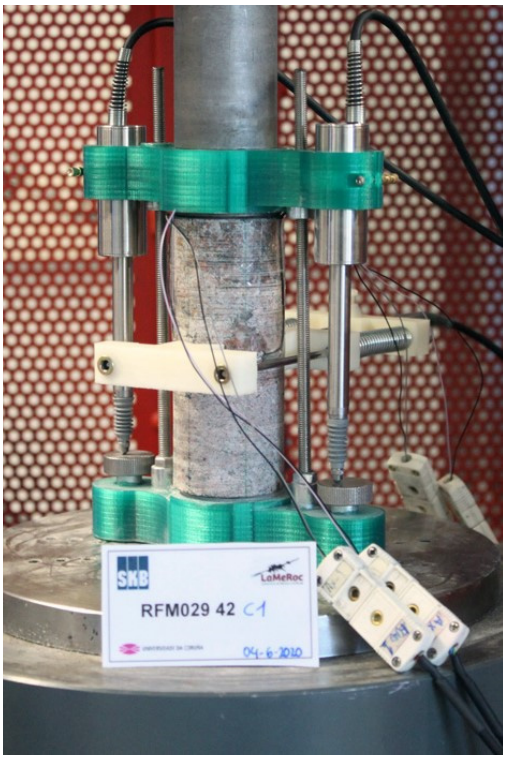

Figure 1. *Sample before the test*

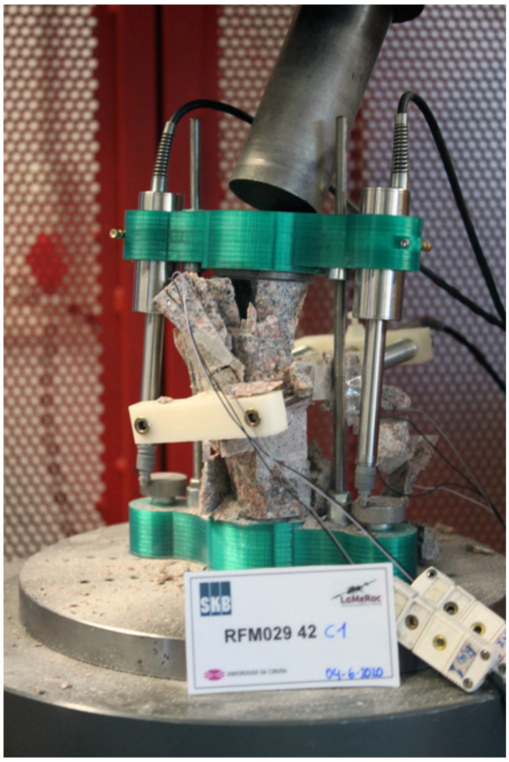

Figure 2. *Sample after the test*

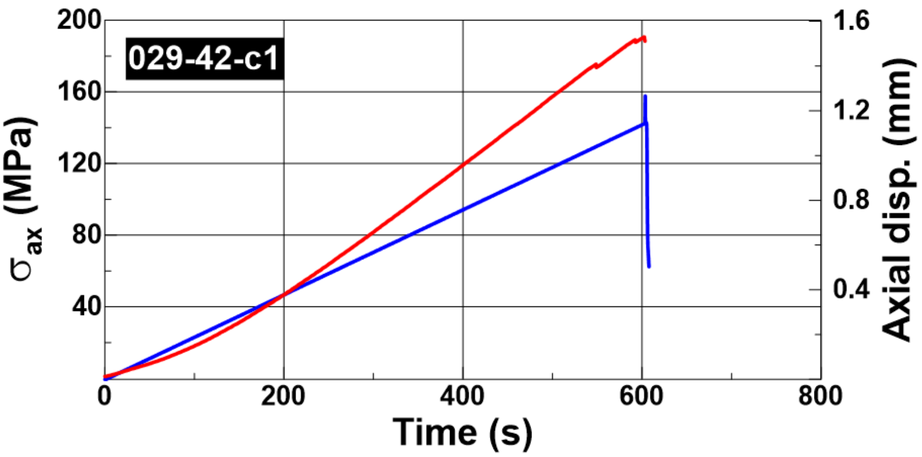

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	42_029c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	106.72	106.85	106.76	16.68	106.64	**Mean length, L (mm)**	106.74	**Dry mass, M_d (g)**	384.57
Diameter (mm)	41.73	41.72	41.72	41.79	41.80	**Mean diameter, D (mm)**	41.75	**Dry density, ρ_d (kg/m^3)**	2631

L/D ratio	2.56	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	386.27
Water content (%)	0.44	**Porosity, n (%)**	1.16	**Bulk density, ρ (kg/m^3)**	2643
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	508	**Temperature (ºC)**	22.0		
F_{max} (kN)	205.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	150.1	**$UCS_{1:2}$ (MPa)**	155.2	**UCS_{50} (MPa)**	150.3	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	86.7	**$\nu_{50\%}$**	0.31	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.966	**V_{S1} (km/s)**	3.305	**V_{S2} (km/s)**	3.326	**V_S (km/s)**	3.315
Dynamic moduli		**E_{dyn} (GPa)**	74.2	**ν_{dyn}**	0.28	**V_P/V_S**	1.80
		G_{dyn} (GPa)	29.1	**K_{dyn} (GPa)**	55.3		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

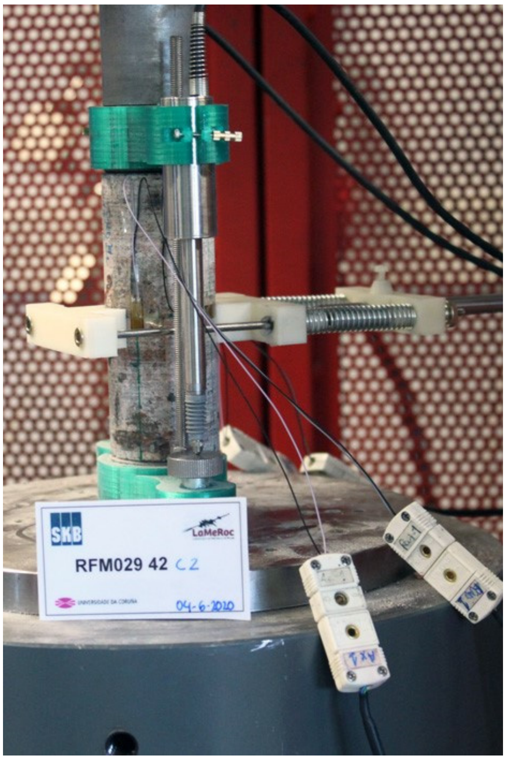

Figure 1. Sample before the test

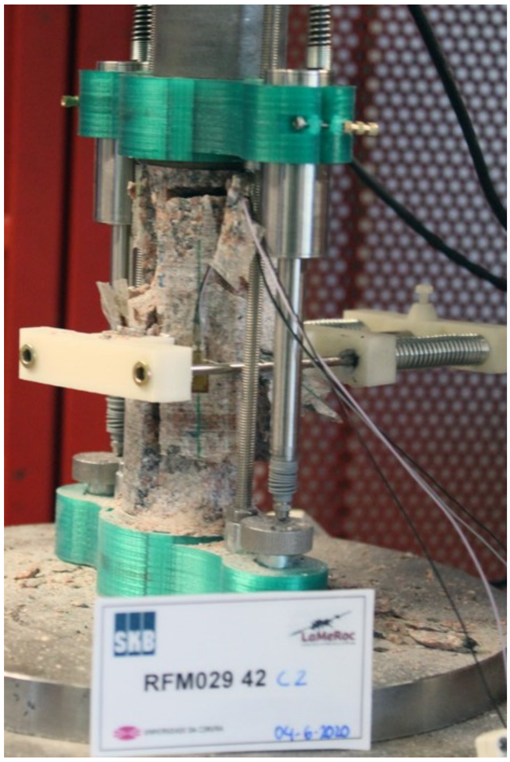

Figure 2. Sample after the test

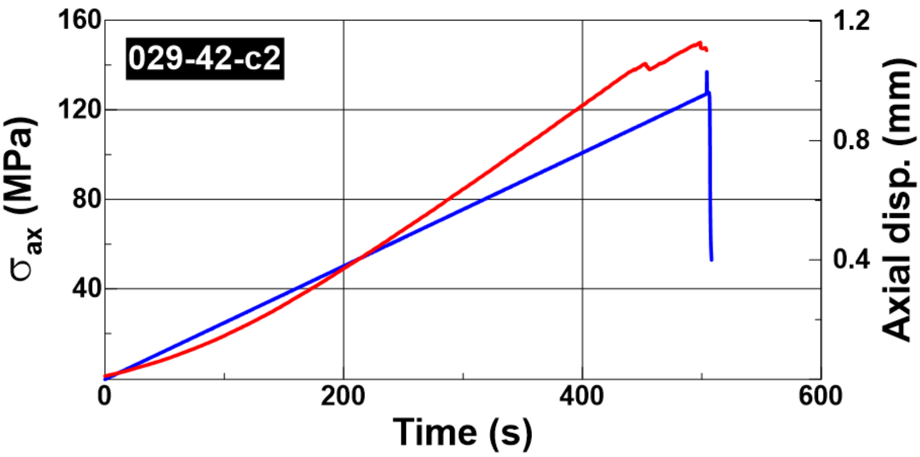

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	Report date
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	Specimen		Ref. LaMeRoc	42_029c_3
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	102.07	102.19	102.04	102.00	101.96	Mean length, L (mm)	102.05	Dry mass, M_d (g)	368.31
Diameter (mm)	41.55	41.80	41.85	41.81	41.82	Mean diameter, D (mm)	41.77	Dry density, ρ_d (kg/m^3)	2634
L/D ratio	2.44	Permeability, k (mD)	-	Bulk mass, M (g)	368.74				
Water content (%)	0.12	Porosity, n (%)	0.31	Bulk density, ρ (kg/m^3)	2637				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-10AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	Time to failure (s)	422	Temperature (°C)	22.0		
F_{max} (kN)	173.9	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	127.0	$UCS_{1:2}$ (MPa)	130.8	UCS_{50} (MPa)	126.6	σ_{CI} (MPa)	44.7
Static moduli		$E_{50\%}$ (GPa)	99.1	$\nu_{50\%}$	0.41	σ_{CD} (MPa)	93.1
ϕ_{dry} (°)	-	c'_{dry} (kPa)	-	ϕ_{wet} (°)	-	c'_{wet} (kPa)	-
V_P (km/s)	6.077	V_{S1} (km/s)	3.184	V_{S2} (km/s)	3.391	V_S (km/s)	3.288
Dynamic moduli		E_{dyn} (GPa)	73.7	ν_{dyn}	0.29	V_P/V_S	1.85
		G_{dyn} (GPa)	28.5	K_{dyn} (GPa)	59.4		
Notes (6)							

PICTURES AND PLOTS

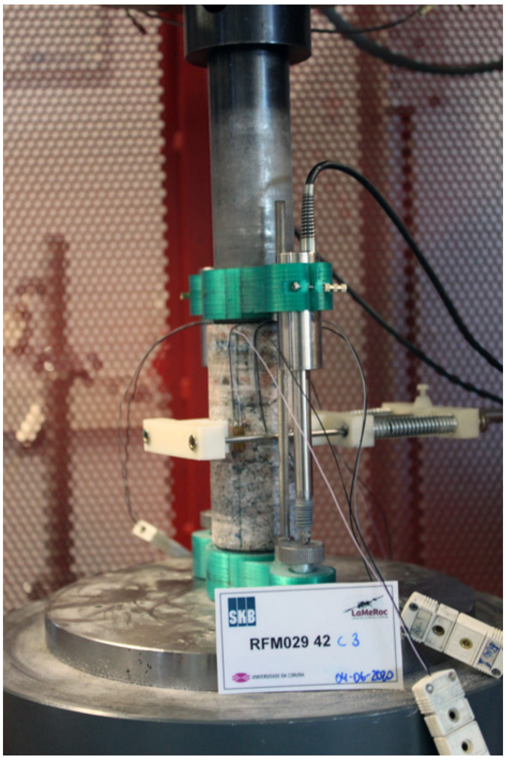

Figure 1. *Sample before the test*

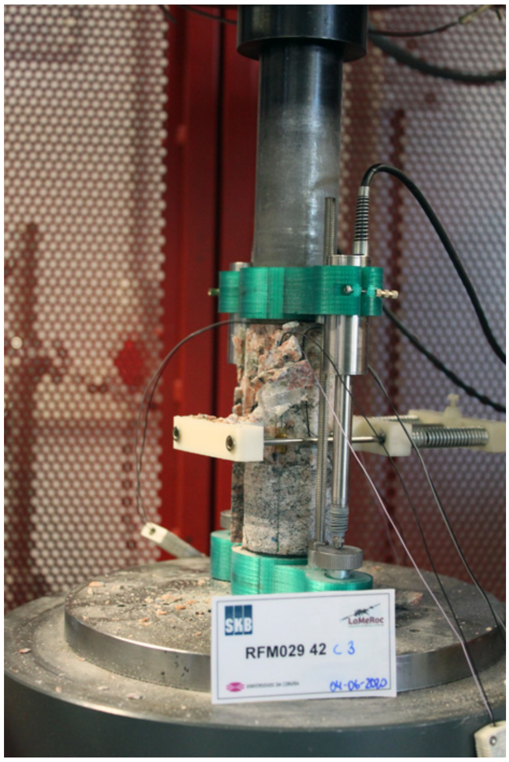

Figure 2. *Sample after the test*

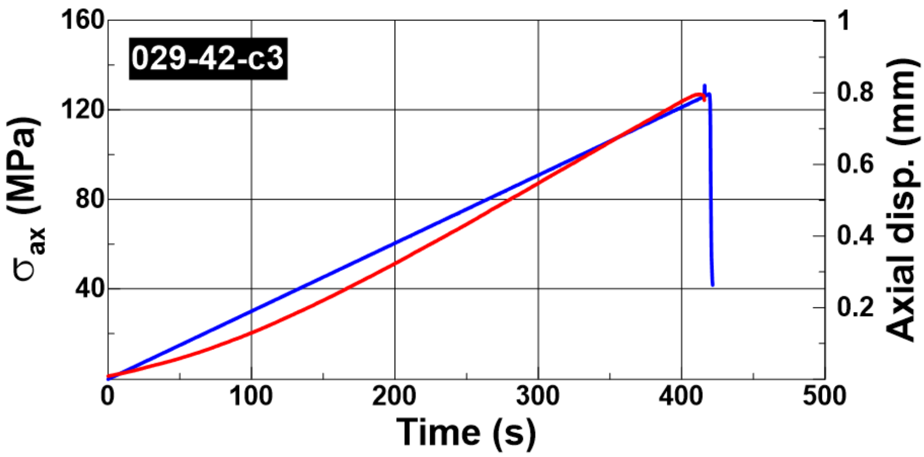

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	42_029d_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	107.19	107.18	107.26	107.46	107.28	**Mean length, L (mm)**	107.27	**Dry mass, M_d (g)**	387.37
Diameter (mm)	41.69	41.70	41.66	41.72	41.68	**Mean diameter, D (mm)**	41.69	**Dry density, ρ_d (kg/m^3)**	2645

L/D ratio	2.57	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	387.75
Water content (%)	0.10	**Porosity, n (%)**	0.26	**Bulk density, ρ (kg/m^3)**	2648
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	681	**Temperature (ºC)**	22.0		
F_{max} (kN)	223.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	163.4	**$UCS_{1:2}$ (MPa)**	169.1	**UCS_{50} (MPa)**	163.7	**σ_{CI} (MPa)**	62.0
	Static moduli	**$E_{50\%}$ (GPa)**	79.1	**$\nu_{50\%}$**	0.40	**σ_{CD} (MPa)**	106.0
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.902	**V_{S1} (km/s)**	3.472	**V_{S2} (km/s)**	3.490	**V_S (km/s)**	3.481
	Dynamic moduli	**E_{dyn} (GPa)**	79.1	**ν_{dyn}**	0.23	**V_P/V_S**	1.70
		G_{dyn} (GPa)	32.1	**K_{dyn} (GPa)**	49.5		
Notes (6)							

PICTURES AND PLOTS

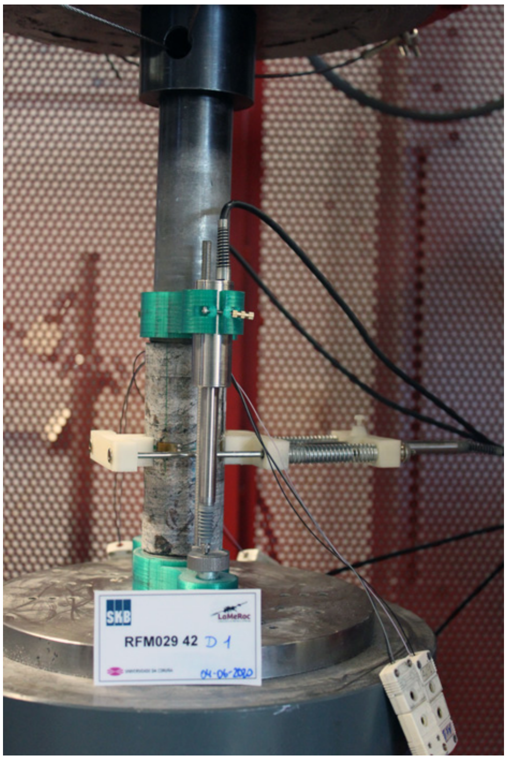

Figure 1. *Sample before the test*

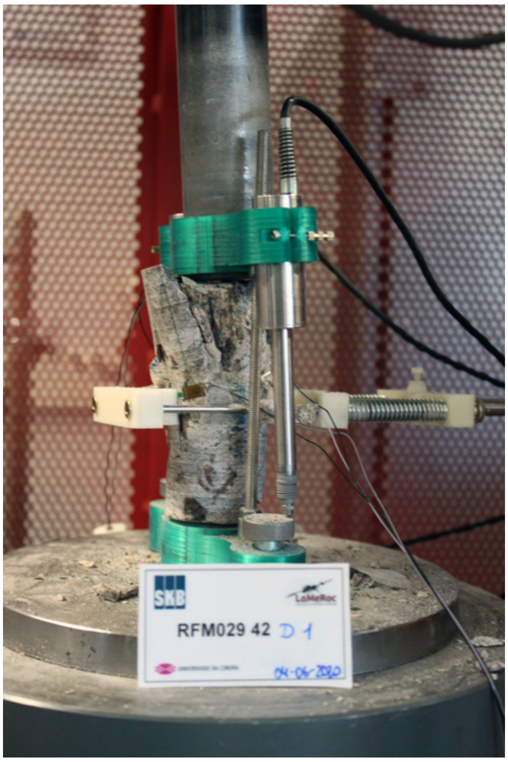

Figure 2. *Sample after the test*

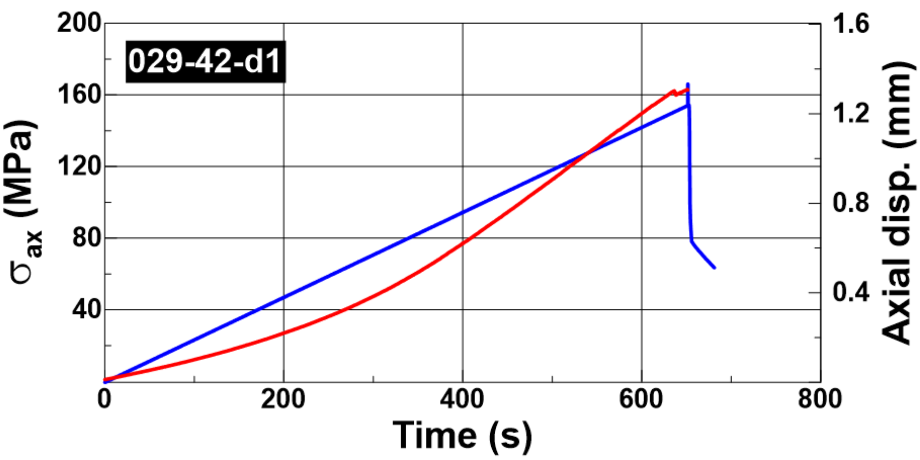

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	42_029d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	108.65	108.48	108.52	108.57	108.70	**Mean length, L (mm)**	108.58	**Dry mass, M_d (g)**	391.4
Diameter (mm)	41.67	41.67	41.66	41.66	41.68	**Mean diameter, D (mm)**	41.67	**Dry density, ρ_d (kg/m^3)**	2643
L/D ratio	2.61	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	391.86				
Water content (%)	0.12	**Porosity, n (%)**	0.31	**Bulk density, ρ (kg/m^3)**	2646				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	833	**Temperature (ºC)**	22.0		
F_{max} (kN)	235.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	172.5	**$UCS_{1:2}$ (MPa)**	178.7	**UCS_{50} (MPa)**	173.0	**σ_{CI} (MPa)**	85.3
Static moduli		**$E_{50\%}$ (GPa)**	84.9	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	122.3
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.837	**V_{S1} (km/s)**	3.458	**V_{S2} (km/s)**	3.448	**V_S (km/s)**	3.453
Dynamic moduli		**E_{dyn} (GPa)**	77.7	**ν_{dyn}**	0.23	**V_P/V_S**	1.69
		G_{dyn} (GPa)	31.5	**K_{dyn} (GPa)**	48.1		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

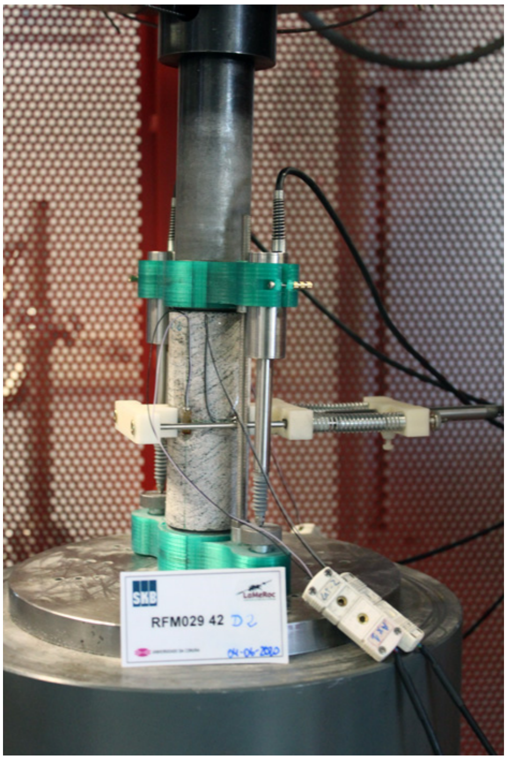

Figure 1. *Sample before the test*

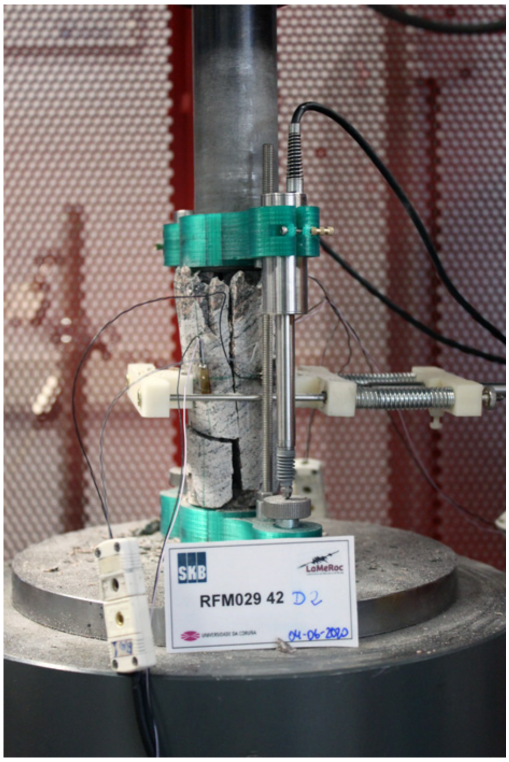

Figure 2. *Sample after the test*

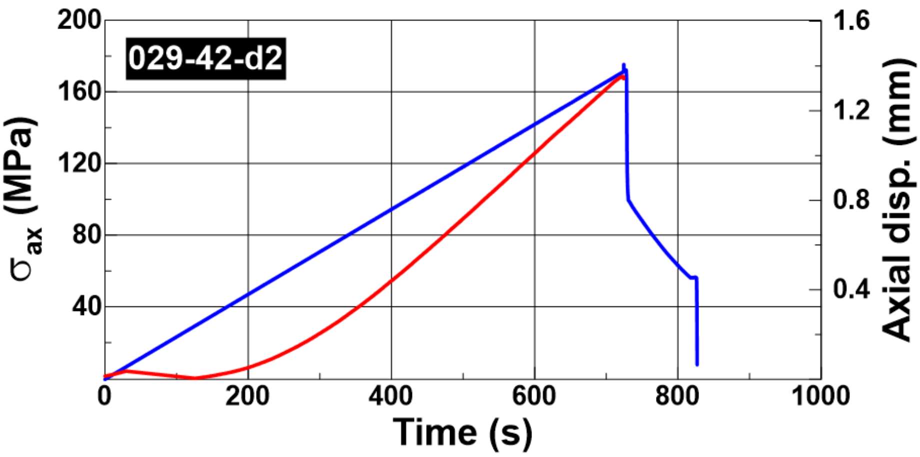

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	42_029d_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	105.18	105.20	105.40	105.36	105.23	**Mean length, L (mm)**	105.27	**Dry mass, M_d (g)**	379.71
Diameter (mm)	41.56	41.62	41.63	41.61	41.65	**Mean diameter, D (mm)**	41.61	**Dry density, ρ_d (kg/m³)**	2652

L/D ratio	2.53	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	380.08
Water content (%)	0.10	**Porosity, n (%)**	0.26	**Bulk density, ρ (kg/m³)**	2655
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s⁻¹)**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	528	**Temperature (ºC)**	22.0		
F_{max} (kN)	205.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	151.3	**$UCS_{1:2}$ (MPa)**	156.4	**UCS_{50} (MPa)**	151.3	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	87.7	**$\nu_{50\%}$**	0.26	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.857	**V_{S1} (km/s)**	3.422	**V_{S2} (km/s)**	3.003	**V_S (km/s)**	3.213
	Dynamic moduli	**E_{dyn} (GPa)**	70.4	**ν_{dyn}**	0.28	**V_P/V_S**	1.82
		G_{dyn} (GPa)	27.4	**K_{dyn} (GPa)**	54.5		
Notes (6)							

PICTURES AND PLOTS

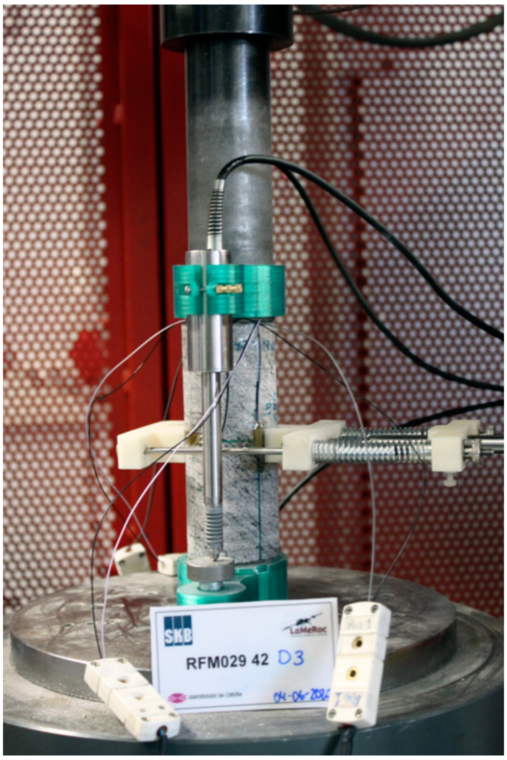

Figure 1. *Sample before the test*

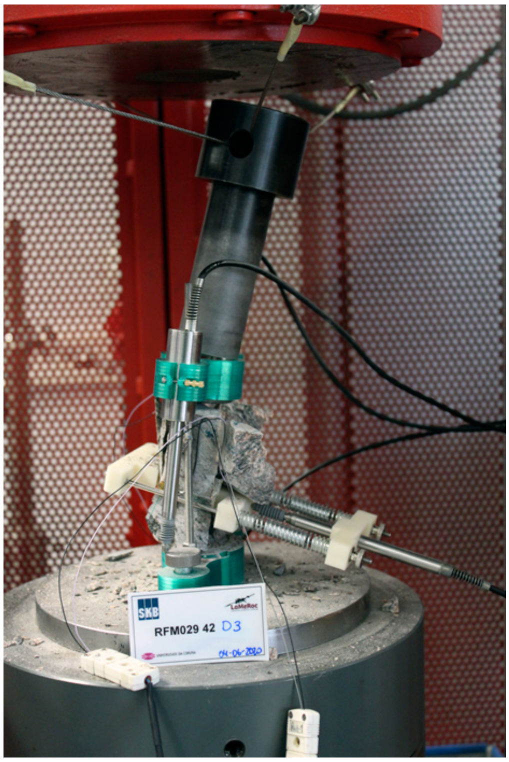

Figure 2. *Sample after the test*

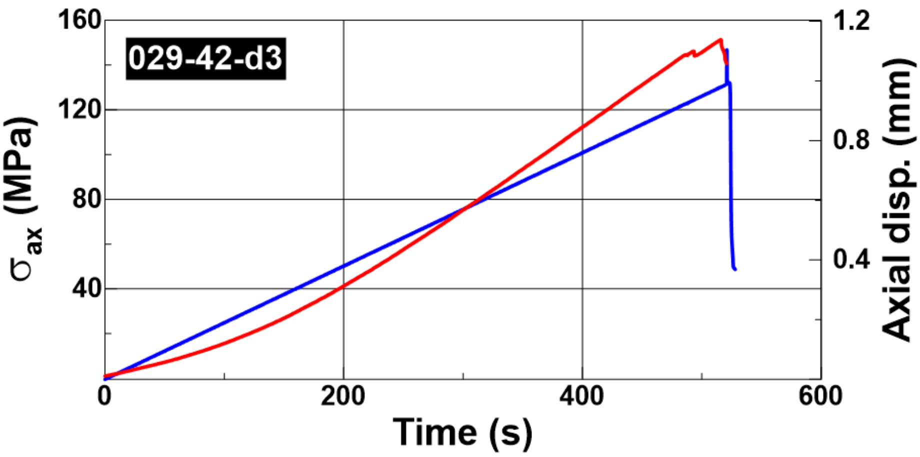

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	42_029d_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	105.63	105.29	105.42	105.71	105.78	**Mean length, L (mm)**	105.57	**Dry mass, M_d (g)**	379.17
Diameter (mm)	41.65	41.63	41.54	41.67	41.69	**Mean diameter, D (mm)**	41.64	**Dry density, ρ_d (kg/m^3)**	2638

L/D ratio	2.54	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	379.57
Water content (%)	0.11	**Porosity, n (%)**	0.28	**Bulk density, ρ (kg/m^3)**	2641
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	558	**Temperature (ºC)**	22.0		
F_{max} (kN)	240.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	176.4	**$UCS_{1:2}$ (MPa)**	182.3	**UCS_{50} (MPa)**	176.4	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	90.4	**$\nu_{50\%}$**	0.36	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.885	**V_{S1} (km/s)**	3.361	**V_{S2} (km/s)**	3.356	**V_S (km/s)**	3.358
Dynamic moduli		**E_{dyn} (GPa)**	75.0	**ν_{dyn}**	0.26	**V_P/V_S**	1.75
		G_{dyn} (GPa)	29.8	**K_{dyn} (GPa)**	51.7		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

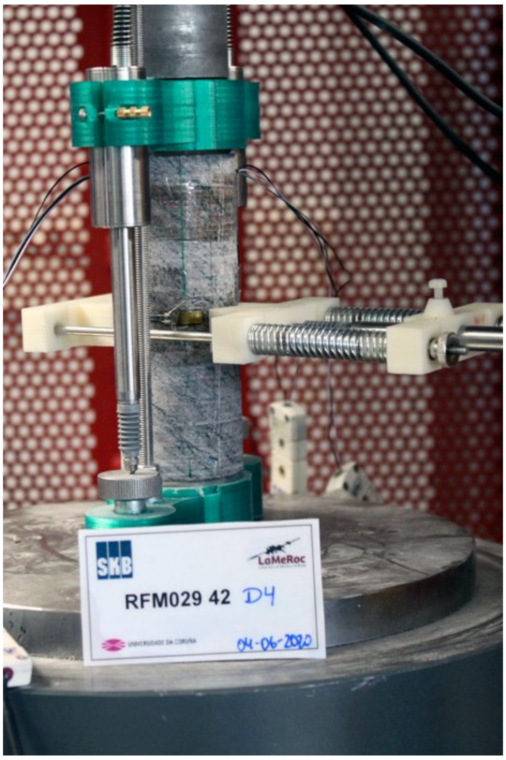

Figure 1. *Sample before the test*

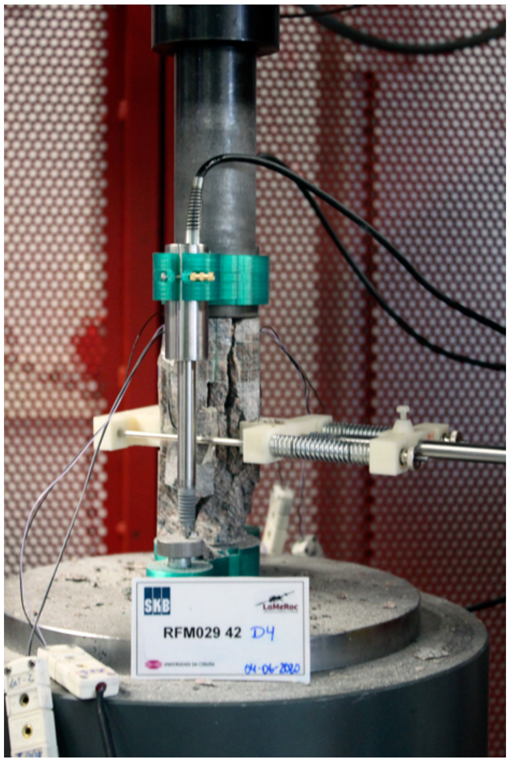

Figure 2. *Sample after the test*

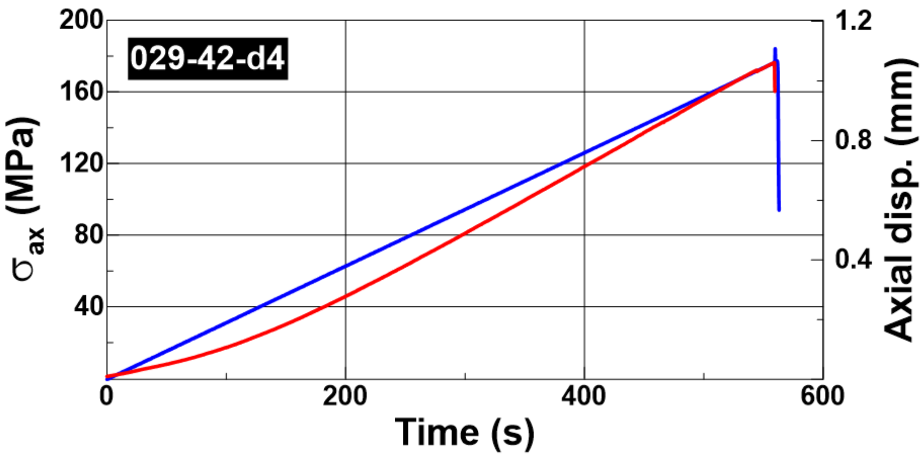

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	54_029b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	147.38	147.31	147.25	147.29	147.31	**Mean length, L (mm)**	147.31	**Dry mass, M_d (g)**	881.07
Diameter (mm)	53.74	53.74	53.74	53.73	53.75	**Mean diameter, D (mm)**	53.74	**Dry density, ρ_d (kg/m^3)**	2637
L/D ratio	2.74	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	882.47				
Water content (%)	0.16	**Porosity, n (%)**	0.42	**Bulk density, ρ (kg/m^3)**	2641				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	25/06/2020	**Time to failure (s)**	549	**Temperature (ºC)**	22.0		
F_{max} (kN)	418.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	184.6	**$UCS_{1:2}$ (MPa)**	192.1	**UCS_{50} (MPa)**	194.6	**σ_{CI} (MPa)**	99.9
Static moduli		**$E_{50\%}$ (GPa)**	75.4	**$\nu_{50\%}$**	0.27	**σ_{CD} (MPa)**	146.0
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.137	**V_{S1} (km/s)**	3.136	**V_{S2} (km/s)**	2.991	**V_S (km/s)**	3.064
Dynamic moduli		**E_{dyn} (GPa)**	60.7	**ν_{dyn}**	0.22	**V_P/V_S**	1.68
		G_{dyn} (GPa)	24.8	**K_{dyn} (GPa)**	36.6		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

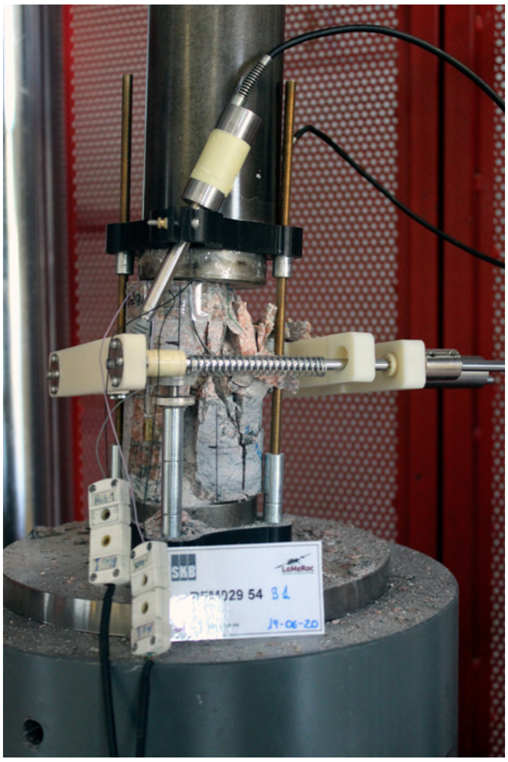

Figure 2. *Sample after the test*

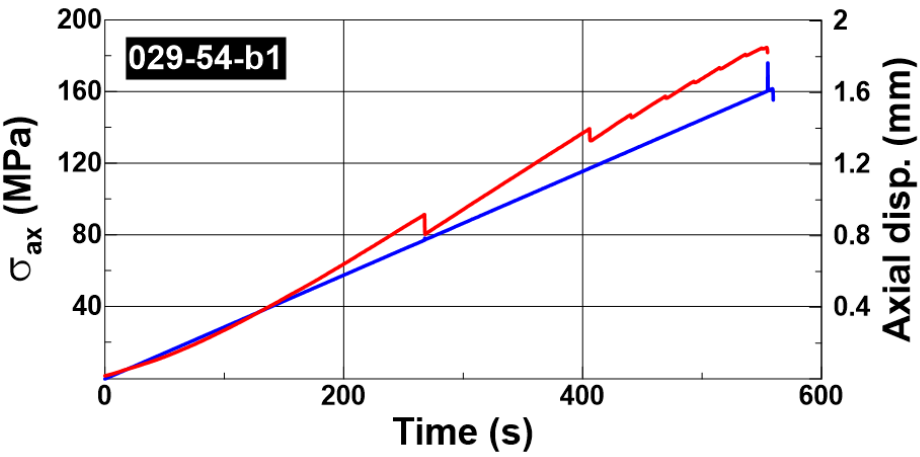

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	54_029b_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	146.25	146.44	146.39	146.30	146.23	**Mean length, L (mm)**	146.32	**Dry mass, M_d (g)**	875.99
Diameter (mm)	53.70	53.75	53.72	53.66	53.82	**Mean diameter, D (mm)**	53.73	**Dry density, ρ_d (kg/m^3)**	2640
L/D ratio	2.72	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	877.19				
Water content (%)	0.14	**Porosity, n (%)**	0.36	**Bulk density, ρ (kg/m^3)**	2644				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	25/06/2020	**Time to failure (s)**	494	**Temperature (ºC)**	22.0		
F_{max} (kN)	411.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	181.6	**$UCS_{1:2}$ (MPa)**	188.8	**UCS_{50} (MPa)**	191.3	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	78.6	**$\nu_{50\%}$**	0.24	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.162	**V_{S1} (km/s)**	3.200	**V_{S2} (km/s)**	2.997	**V_S (km/s)**	3.098
Dynamic moduli		**E_{dyn} (GPa)**	61.8	**ν_{dyn}**	0.22	**V_P/V_S**	1.67
		G_{dyn} (GPa)	25.4	**K_{dyn} (GPa)**	36.6		
Notes (6)							

PICTURES AND PLOTS

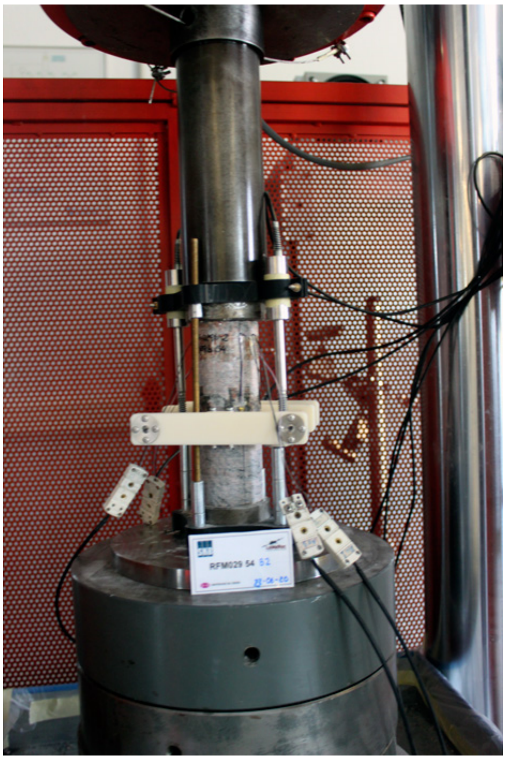

Figure 1. Sample before the test

Figure 2. Sample after the test

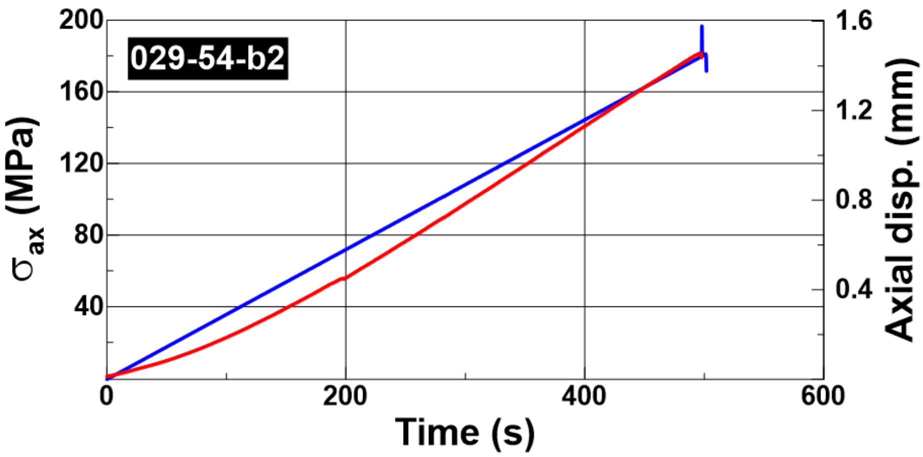

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

LaMeRoc

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		Report date	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	Specimen		Ref. LaMeRoc	54_029b_3
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	140.67	140.68	140.76	140.81	140.79	Mean length, L (mm)	140.74	Dry mass, M_d (g)	845.74
Diameter (mm)	53.67	53.69	53.67	53.70	53.72	Mean diameter, D (mm)	53.69	Dry density, ρ_d (kg/m^3)	2654
L/D ratio	2.62	Permeability, k (mD)	-			Bulk mass, M (g)	846.92		
Water content (%)	0.14	Porosity, n (%)	0.37			Bulk density, ρ (kg/m^3)	2658		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-10AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	25/06/2020	Time to failure (s)	561	Temperature (ºC)	22.0		
F_{max} (kN)	449.6	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	198.6	$UCS_{1:2}$ (MPa)	205.8	UCS_{50} (MPa)	208.5	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	80.9	$\nu_{50\%}$	0.27	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.051	V_{S1} (km/s)	3.157	V_{S2} (km/s)	2.961	V_S (km/s)	3.059
Dynamic moduli		E_{dyn} (GPa)	60.2	ν_{dyn}	0.21	V_P/V_S	1.65
		G_{dyn} (GPa)	24.9	K_{dyn} (GPa)	34.7		
Notes (6)							

PICTURES AND PLOTS

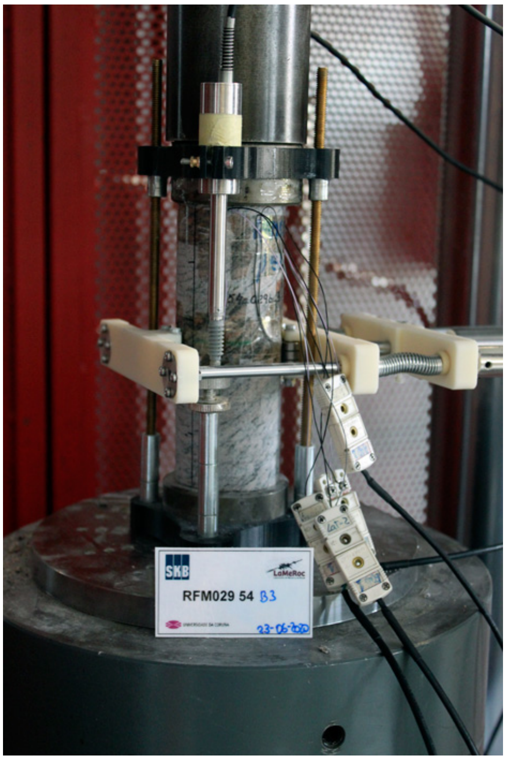

Figure 1. *Sample before the test*

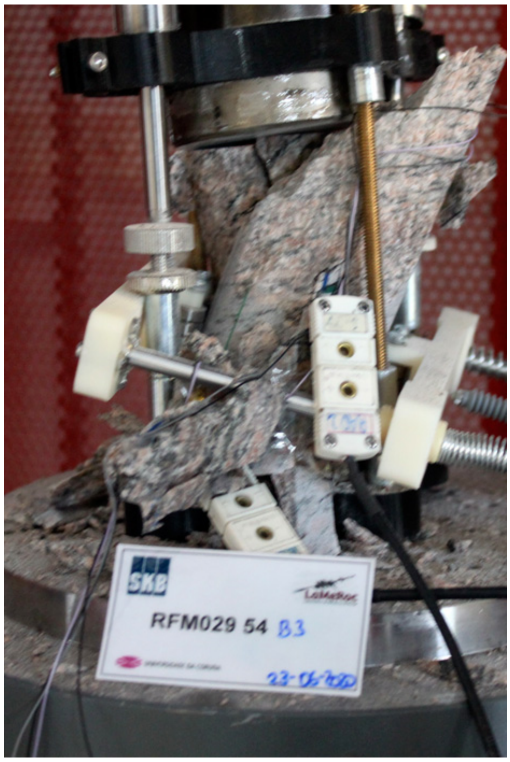

Figure 2. *Sample after the test*

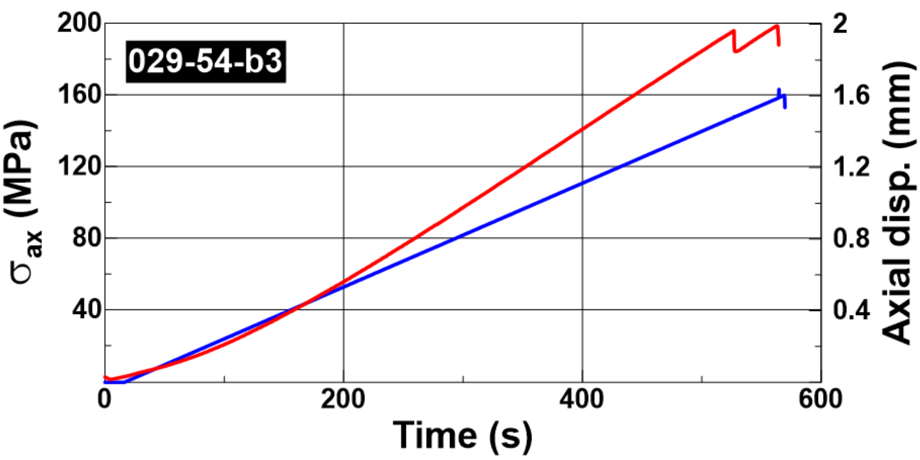

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	54_029b_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	145.04	145.07	145.01	144.93	144.88	**Mean length, L (mm)**	144.99	**Dry mass, M_d (g)**	871.13
Diameter (mm)	53.70	53.76	53.66	53.75	53.70	**Mean diameter, D (mm)**	53.71	**Dry density, ρ_d (kg/m^3)**	2652
L/D ratio	2.70	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	872.09				
Water content (%)	0.11	**Porosity, n (%)**	0.29	**Bulk density, ρ (kg/m^3)**	2654				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	25/06/2020	**Time to failure (s)**	566	**Temperature (ºC)**	22.0		
F_{max} (kN)	495.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	218.8	**$UCS_{1:2}$ (MPa)**	227.4	**UCS_{50} (MPa)**	230.3	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	87.6	**$\nu_{50\%}$**	0.26	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.090	**V_{S1} (km/s)**	3.136	**V_{S2} (km/s)**	3.199	**V_S (km/s)**	3.168
	Dynamic moduli	**E_{dyn} (GPa)**	63.1	**ν_{dyn}**	0.18	**V_P/V_S**	1.61
		G_{dyn} (GPa)	26.6	**K_{dyn} (GPa)**	33.3		
Notes (6)							

PICTURES AND PLOTS

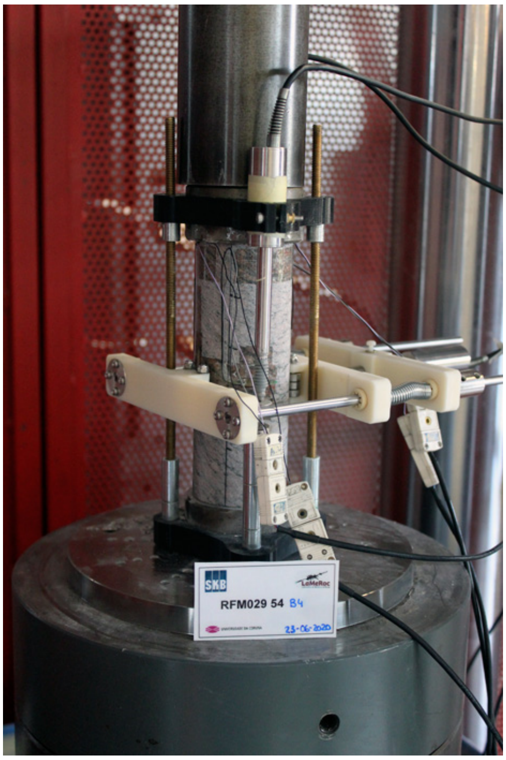

Figure 1. *Sample before the test*

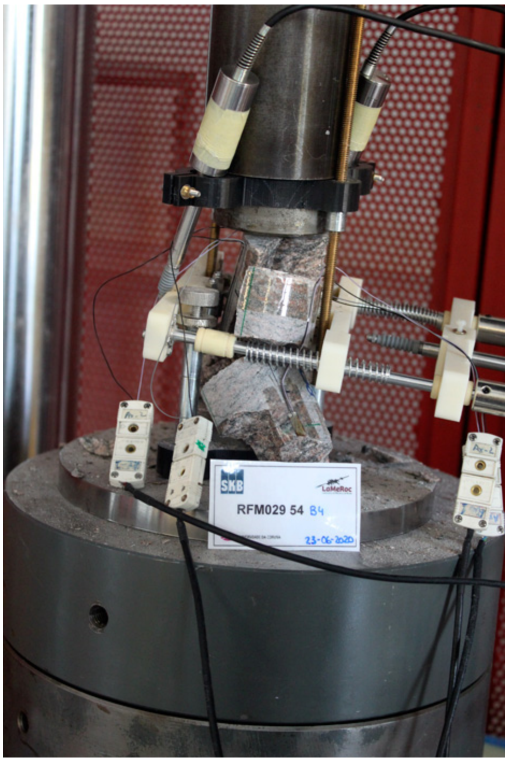

Figure 2. *Sample after the test*

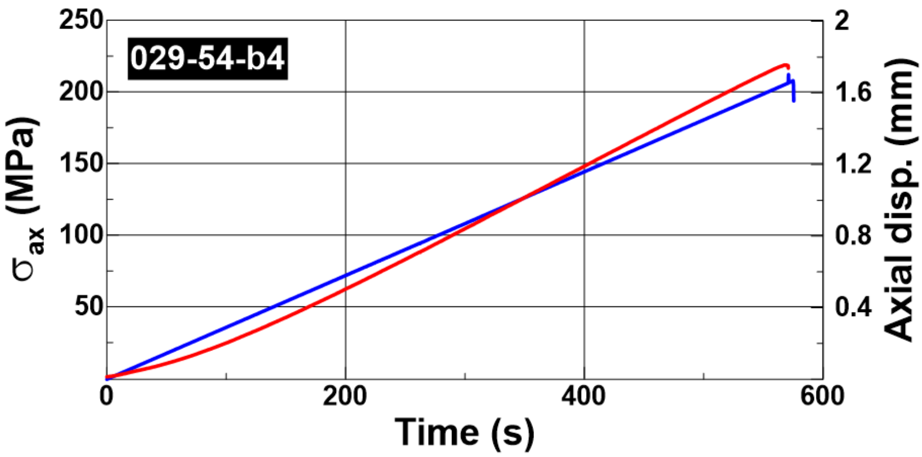

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		Report date	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	Specimen		Ref. LaMeRoc	54_029c_1
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	143.20	143.10	143.05	143.10	143.22	Mean length, L (mm)	143.13	Dry mass, M_d (g)	854.71
Diameter (mm)	53.75	53.75	53.73	53.74	53.75	Mean diameter, D (mm)	53.74	Dry density, ρ_d (kg/m^3)	2632

L/D ratio	2.66	Permeability, k (mD)	-	Bulk mass, M (g)	855.91
Water content (%)	0.14	Porosity, n (%)	0.37	Bulk density, ρ (kg/m^3)	2636
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-10AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	25/06/2020	Time to failure (s)	496	Temperature (ºC)	22.0		
F_{max} (kN)	421.5	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	185.8	$UCS_{1:2}$ (MPa)	192.9	UCS_{50} (MPa)	195.4	σ_{CI} (MPa)	101.3
Static moduli		$E_{50\%}$ (GPa)	78.4	$\nu_{50\%}$	0.32	σ_{CD} (MPa)	158.7
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.084	V_{S1} (km/s)	3.123	V_{S2} (km/s)	2.780	V_S (km/s)	2.951
Dynamic moduli		E_{dyn} (GPa)	57.2	ν_{dyn}	0.25	V_P/V_S	1.72
		G_{dyn} (GPa)	23.0	K_{dyn} (GPa)	37.5		
Notes (6)							

PICTURES AND PLOTS

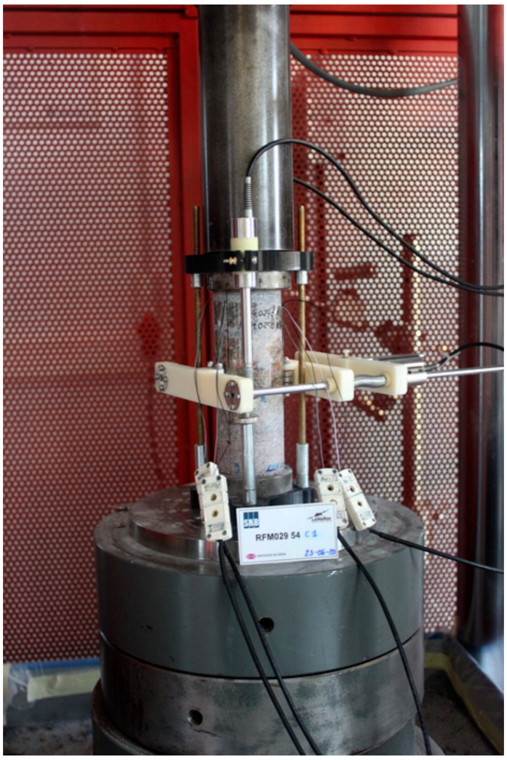

Figure 1. *Sample before the test*

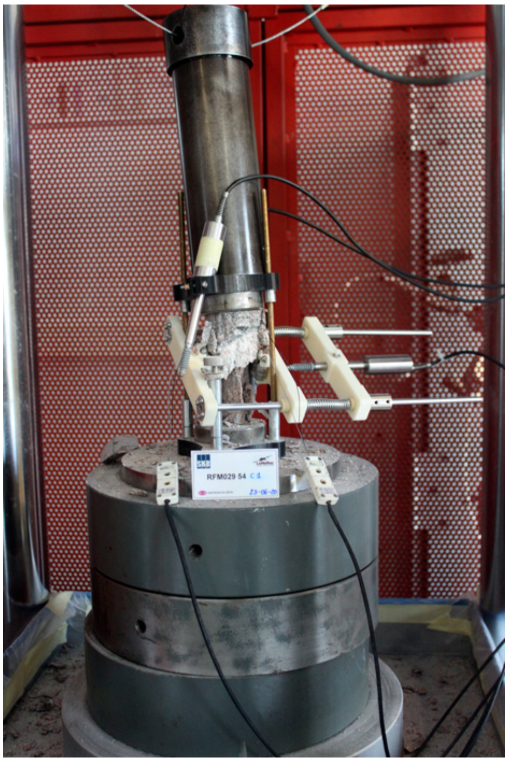

Figure 2. *Sample after the test*

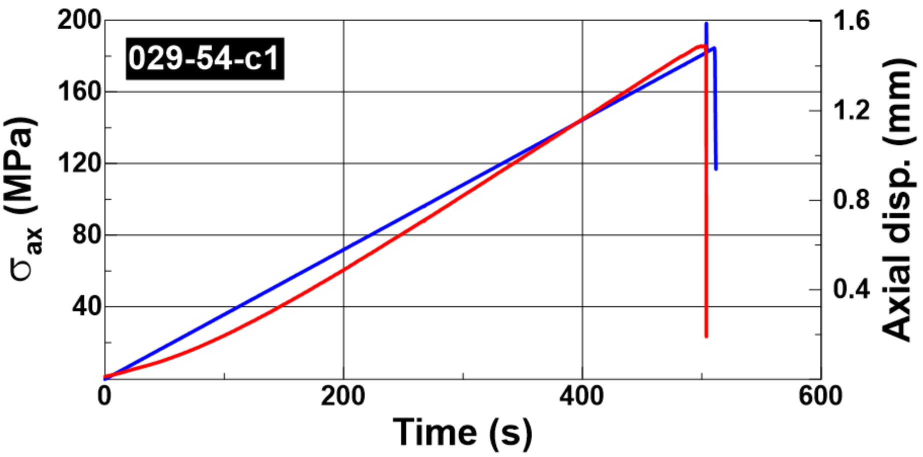

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	*Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements*
Project	*Scale Effect of Intact Granite Rocks*
Company	*Svensk Kärnbränslehantering AB*
Test type	*UCS*
Report reference	**Report date**
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	*29c*	**Specimen**		**Ref. LaMeRoc**	*54_029c_2*
Depth (m)	*surface block*	**Formation**		**Facies**	
Sampling date		**Location**	*Forsmark (Sweden)*	**Lithology**	*RFM029*
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	*Y*	**Date**		**Dimensional verification (Y/N)**	*Y*	**Date**	
Cutting (Y/N)	*Y*	**Date**		**Trimming (Y/N)**	*Y*	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	*145.26*	*145.24*	*144.98*	*144.92*	*145.03*	**Mean length, L (mm)**	*145.09*	**Dry mass, M_d (g)**	*865.72*
Diameter (mm)	*53.81*	*53.78*	*53.78*	*53.77*	*53.77*	**Mean diameter, D (mm)**	*53.78*	**Dry density, ρ_d (kg/m³)**	*2627*
L/D ratio	*2.70*	**Permeability, k (mD)**	*-*					**Bulk mass, M (g)**	*867*
Water content (%)	*0.15*	**Porosity, n (%)**	*0.39*					**Bulk density, ρ (kg/m³)**	*2630*
Notes (4)									

EQUIPMENT

Device	*Servosis 150 ton*	**Force class (UNE-EN-7500)**	*1*	**Displacement class (ASTM E2309)**	*A*
Calibration date	*09/09/2020*	**Control mode (Force/Strain)**	*Strain*		
LDT model	*Solartron AX/5/s*	**Loading rate (N/s)**	*-*		
Strain gauge type	*BX120-10AA*	**Strain rate (s⁻¹)**	*4.17E-06*		
Load cell	*Built-in 1500 kN*	**Shear rate (mm/s)**	*-*		
Notes (5)					

TEST RESULTS

Test date	*25/06/2020*	**Time to failure (s)**	*657*			**Temperature (ºC)**	*22.0*
F_{max} (kN)	*574.8*	**T_0 (MPa)**	*-*	**$T_{0,50}$ (MPa)**	*-*		
UCS (MPa)	*253.0*	**$UCS_{1:2}$ (MPa)**	*263.0*	**UCS_{50} (MPa)**	*266.4*	**σ_{CI} (MPa)**	*141.4*
	Static moduli	**$E_{50\%}$ (GPa)**	*77.8*	**$\nu_{50\%}$**	*0.30*	**σ_{CD} (MPa)**	*228.2*
ϕ_{dry} (º)	*-*	**c'_{dry} (kPa)**	*-*	**ϕ_{wet} (º)**	*-*	**c'_{wet} (kPa)**	*-*
V_P (km/s)	*5.113*	**V_{S1} (km/s)**	*3.253*	**V_{S2} (km/s)**	*3.225*	**V_S (km/s)**	*3.239*
	Dynamic moduli	**E_{dyn} (GPa)**	*64.3*	**ν_{dyn}**	*0.16*	**V_P/V_S**	*1.58*
		G_{dyn} (GPa)	*27.6*	**K_{dyn} (GPa)**	*32.0*		
Notes (6)							

PICTURES AND PLOTS

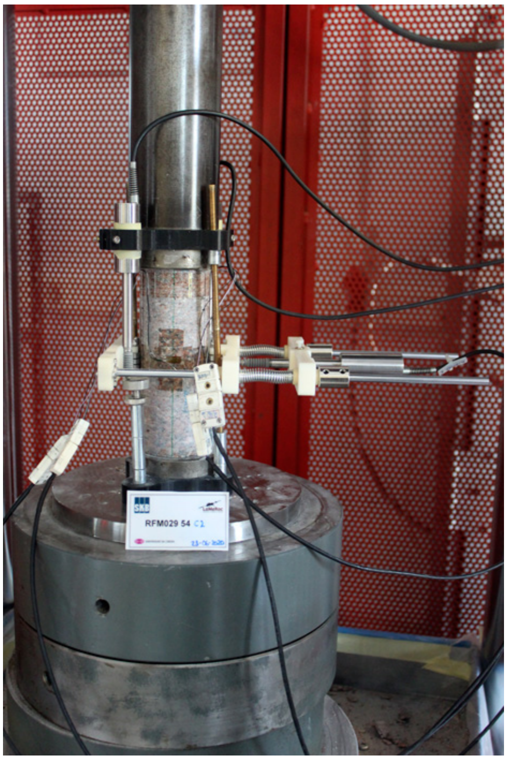

Figure 1. *Sample before the test*

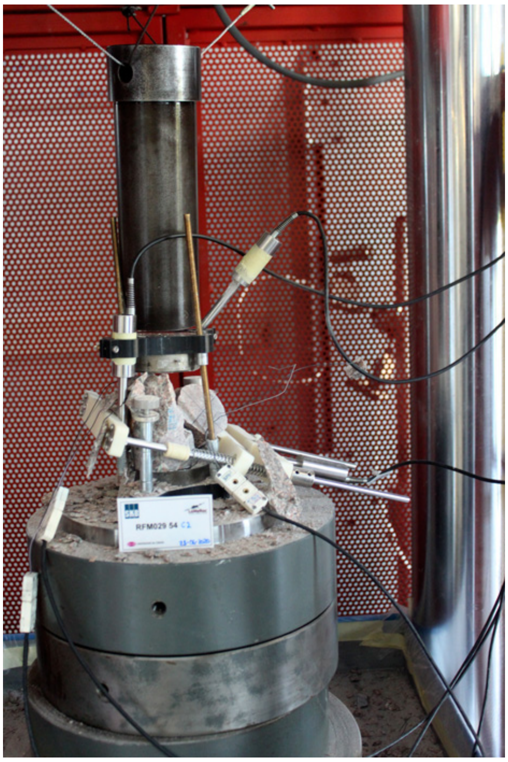

Figure 2. *Sample after the test*

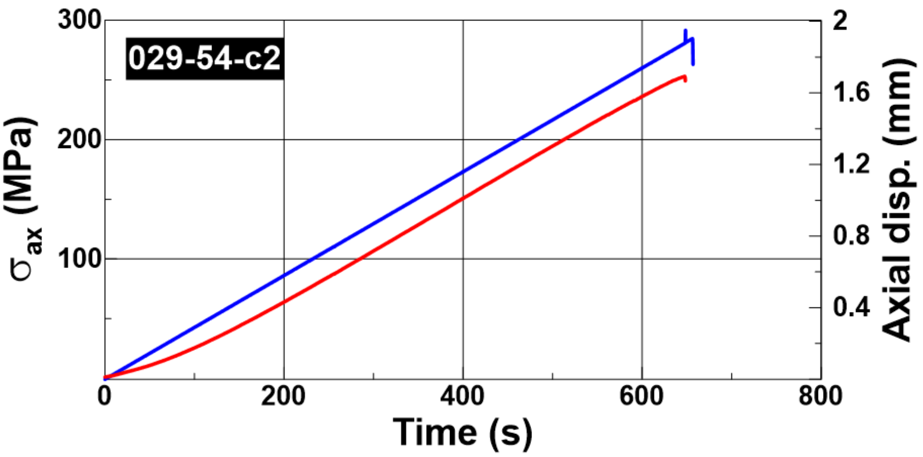

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

LaMeRoc

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		Report date	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	Specimen		Ref. LaMeRoc	54_029c_3
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	146.15	146.17	146.45	146.49	146.41	Mean length, L (mm)	146.33	Dry mass, M_d (g)	871.79
Diameter (mm)	53.75	53.75	53.80	53.74	53.74	Mean diameter, D (mm)	53.76	Dry density, ρ_d (kg/m^3)	2625

L/D ratio	2.72	Permeability, k (mD)	-	Bulk mass, M (g)	873.33
Water content (%)	0.18	Porosity, n (%)	0.46	Bulk density, ρ (kg/m^3)	2630
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-10AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	25/06/2020	Time to failure (s)	523	Temperature (ºC)	22.0		
F_{max} (kN)	385.9	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	170.0	$UCS_{1:2}$ (MPa)	176.8	UCS_{50} (MPa)	179.2	σ_{CI} (MPa)	-
	Static moduli	$E_{50\%}$ (GPa)	76.2	$\nu_{50\%}$	0.29	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	4.887	V_{S1} (km/s)	3.010	V_{S2} (km/s)	3.056	V_S (km/s)	3.033
	Dynamic moduli	E_{dyn} (GPa)	57.4	ν_{dyn}	0.19	V_P/V_S	1.61
		G_{dyn} (GPa)	24.2	K_{dyn} (GPa)	30.6		
Notes (6)							

PICTURES AND PLOTS

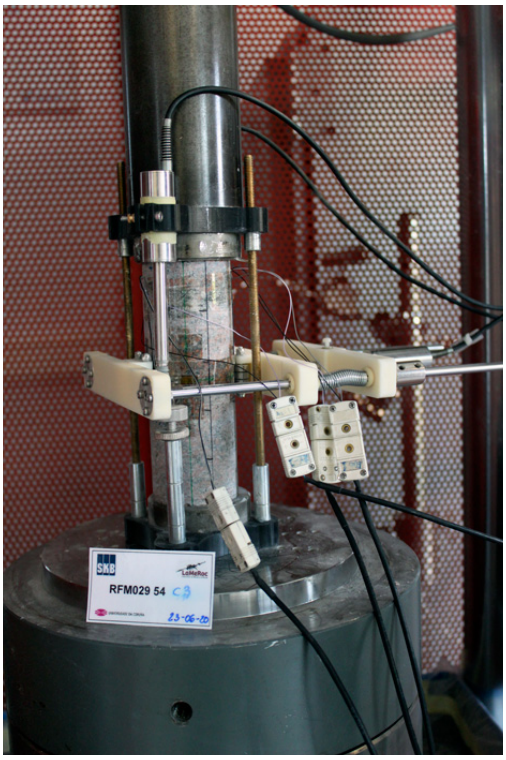

Figure 1. *Sample before the test*

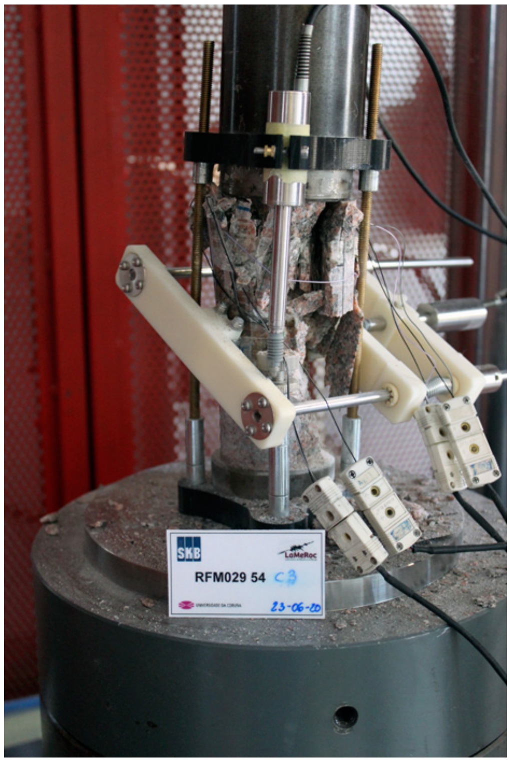

Figure 2. *Sample after the test*

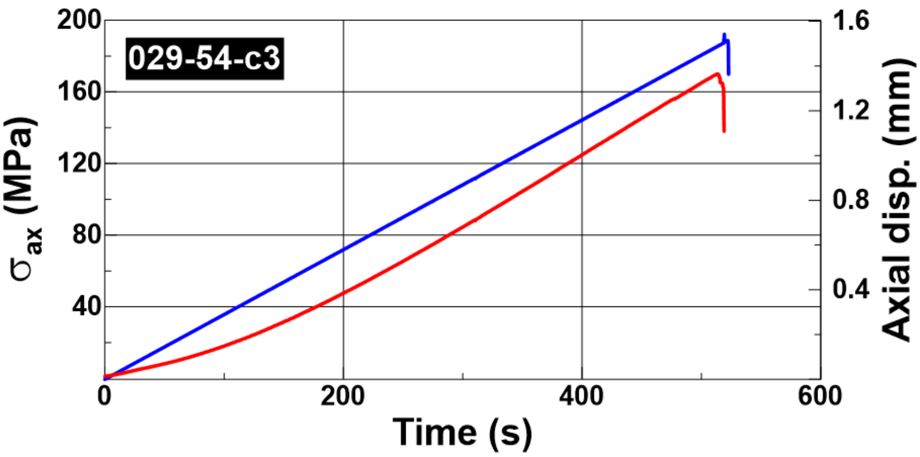

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	54_029d_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	151.41	151.29	151.46	151.67	151.62	**Mean length, L (mm)**	151.49	**Dry mass, M_d (g)**	906.11
Diameter (mm)	53.67	53.62	53.62	53.65	53.64	**Mean diameter, D (mm)**	53.64	**Dry density, ρ_d (kg/m^3)**	2647

L/D ratio	2.82	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	907.3
Water content (%)	0.13	**Porosity, n (%)**	0.35	**Bulk density, ρ (kg/m^3)**	2650
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	25/06/2020	**Time to failure (s)**	486	**Temperature (ºC)**	22.0		
F_{max} (kN)	349.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	154.8	**$UCS_{1:2}$ (MPa)**	161.5	**UCS_{50} (MPa)**	163.6	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	82.7	**$\nu_{50\%}$**	0.28	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.195	**V_{S1} (km/s)**	3.232	**V_{S2} (km/s)**	3.169	**V_S (km/s)**	3.201
Dynamic moduli		**E_{dyn} (GPa)**	64.8	**ν_{dyn}**	0.19	**V_P/V_S**	1.62
		G_{dyn} (GPa)	27.1	**K_{dyn} (GPa)**	35.3		
Notes (6)							

PICTURES AND PLOTS

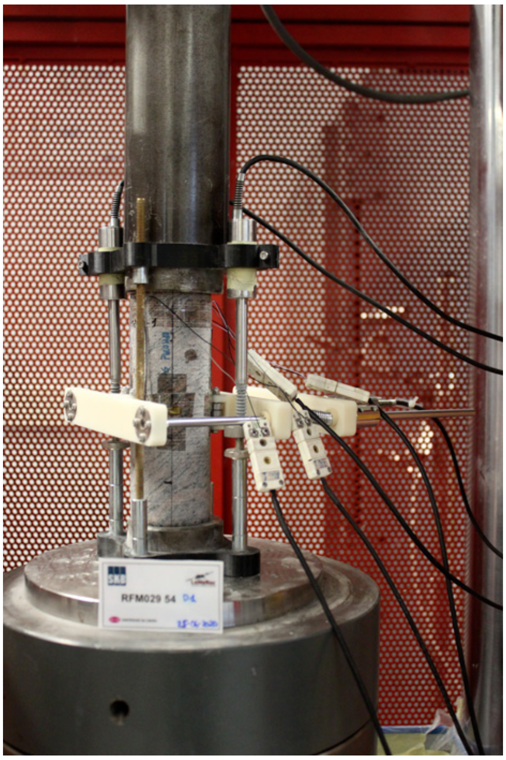

Figure 1. *Sample before the test*

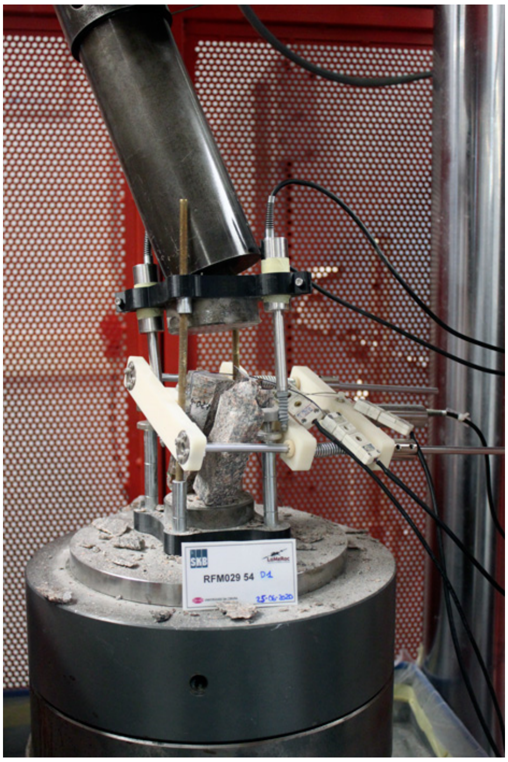

Figure 2. *Sample after the test*

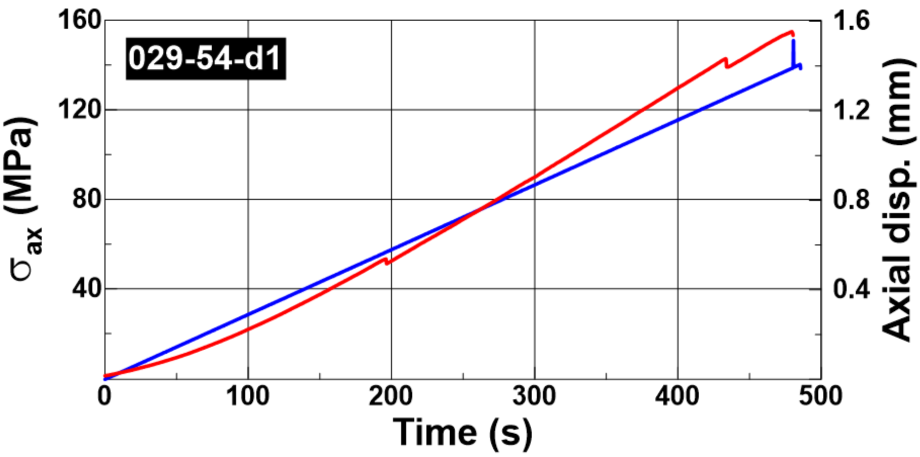

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	54_029d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	149.02	149.02	149.09	149.04	149.00	**Mean length, L (mm)**	149.03	**Dry mass, M_d (g)**	887.12
Diameter (mm)	53.40	53.51	53.54	53.55	53.54	**Mean diameter, D (mm)**	53.51	**Dry density, ρ_d (kg/m^3)**	2647

L/D ratio	2.79	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	888.13
Water content (%)	0.11	**Porosity, n (%)**	0.30	**Bulk density, ρ (kg/m^3)**	2650
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	25/06/2020	**Time to failure (s)**	462	**Temperature (ºC)**	22.0		
F_{max} (kN)	362.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	161.4	**$UCS_{1:2}$ (MPa)**	168.2	**UCS_{50} (MPa)**	170.2	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	75.8	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.238	**V_{S1} (km/s)**	3.290	**V_{S2} (km/s)**	3.178	**V_S (km/s)**	3.234
Dynamic moduli		**E_{dyn} (GPa)**	66.1	**ν_{dyn}**	0.19	**V_P/V_S**	1.62
		G_{dyn} (GPa)	27.7	**K_{dyn} (GPa)**	35.7		
Notes (6)							

PICTURES AND PLOTS

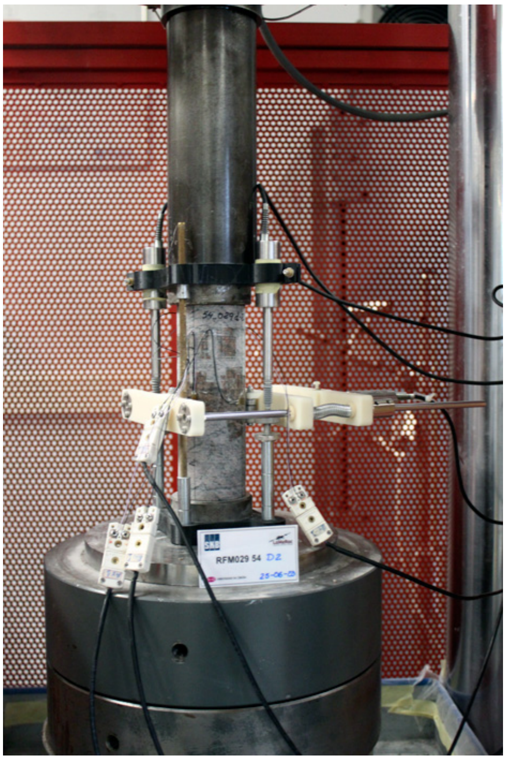

Figure 1. *Sample before the test*

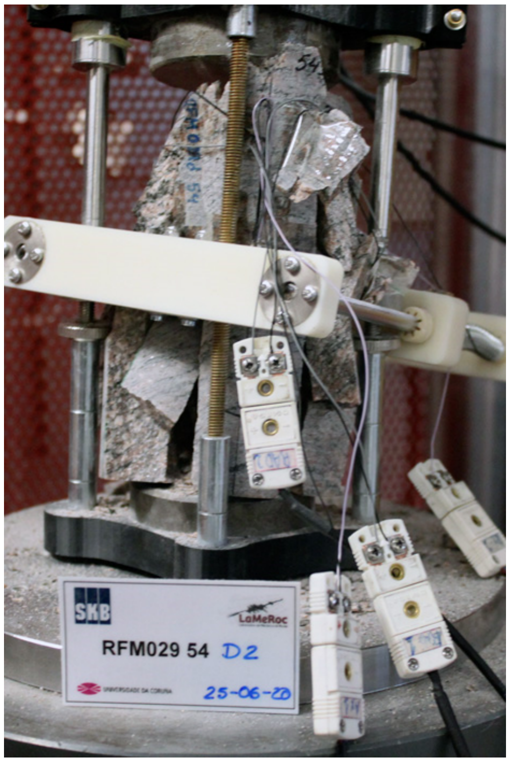

Figure 2. *Sample after the test*

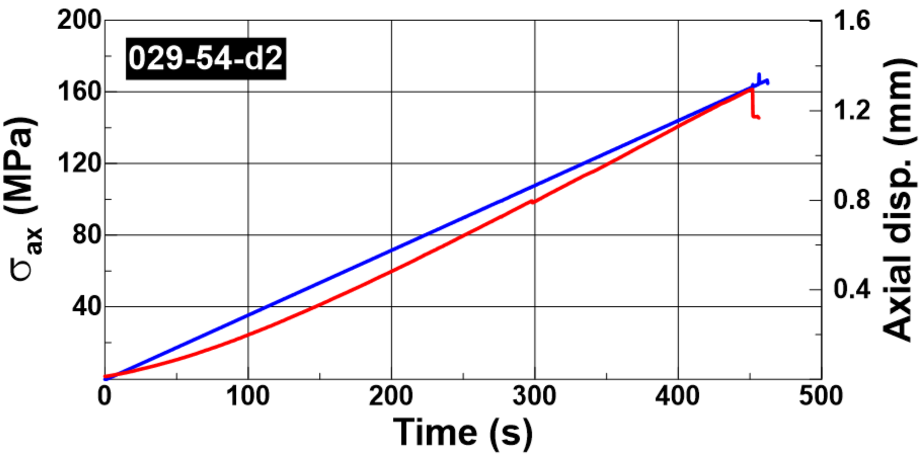

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	54_029d_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	142.38	142.45	142.33	142.19	142.23	**Mean length, L (mm)**	142.32	**Dry mass, M_d (g)**	850.69
Diameter (mm)	53.73	53.73	53.66	53.64	53.57	**Mean diameter, D (mm)**	53.67	**Dry density, ρ_d (kg/m^3)**	2643
L/D ratio	2.65	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	852.13		
Water content (%)	0.17	**Porosity, n (%)**	0.45			**Bulk density, ρ (kg/m^3)**	2647		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	25/06/2020	**Time to failure (s)**	440	**Temperature (ºC)**	22.0		
F_{max} (kN)	355.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	157.3	**$UCS_{1:2}$ (MPa)**	163.2	**UCS_{50} (MPa)**	165.3	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	76.6	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.194	**V_{S1} (km/s)**	3.206	**V_{S2} (km/s)**	3.207	**V_S (km/s)**	3.206
	Dynamic moduli	**E_{dyn} (GPa)**	64.9	**ν_{dyn}**	0.19	**V_P/V_S**	1.62
		G_{dyn} (GPa)	27.2	**K_{dyn} (GPa)**	35.1		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

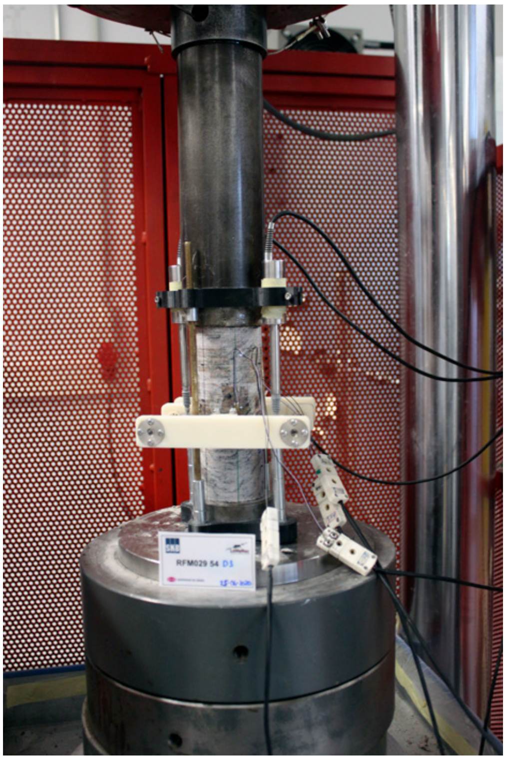

Figure 1. *Sample before the test*

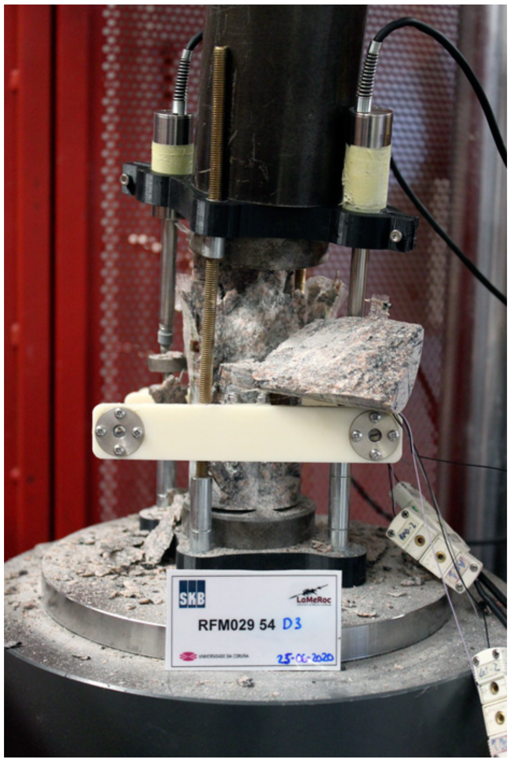

Figure 2. *Sample after the test*

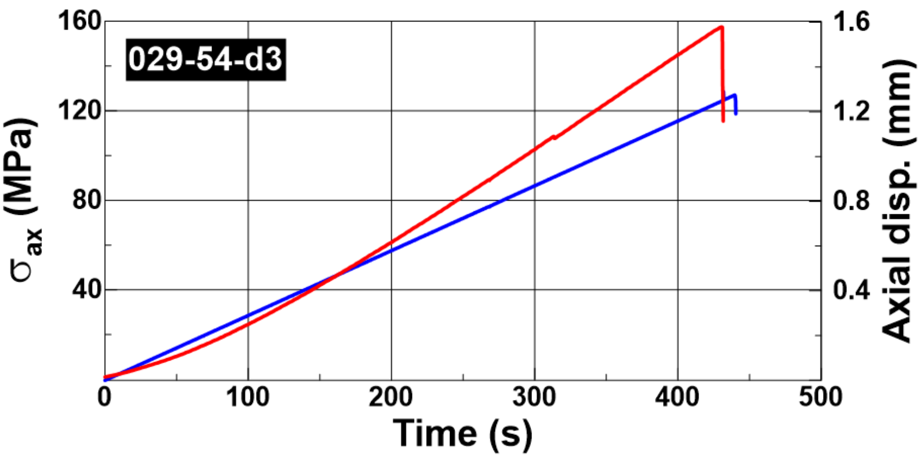

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	63_029b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	123.19	123.04	122.92	122.73	122.79	**Mean length, L (mm)**	177.36	**Dry mass, M_d (g)**	1512.9
Diameter (mm)	64.06	64.12	64.08	63.93	64.09	**Mean diameter, D (mm)**	64.06	**Dry density, ρ_d (kg/m^3)**	2647

L/D ratio	2.77	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	1515.21
Water content (%)	0.15	**Porosity, n (%)**	0.40	**Bulk density, ρ (kg/m^3)**	2651
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	600	**Temperature (ºC)**	22.0		
F_{max} (kN)	633.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	196.6	**$UCS_{1:2}$ (MPa)**	204.7	**UCS_{50} (MPa)**	214.1	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	128.8	**$\nu_{50\%}$**	0.41	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.138	**V_{S1} (km/s)**	3.281	**V_{S2} (km/s)**	3.167	**V_S (km/s)**	3.224
Dynamic moduli		**E_{dyn} (GPa)**	64.8	**ν_{dyn}**	0.18	**V_P/V_S**	1.59
		G_{dyn} (GPa)	27.6	**K_{dyn} (GPa)**	33.3		
Notes (6)							

PICTURES AND PLOTS

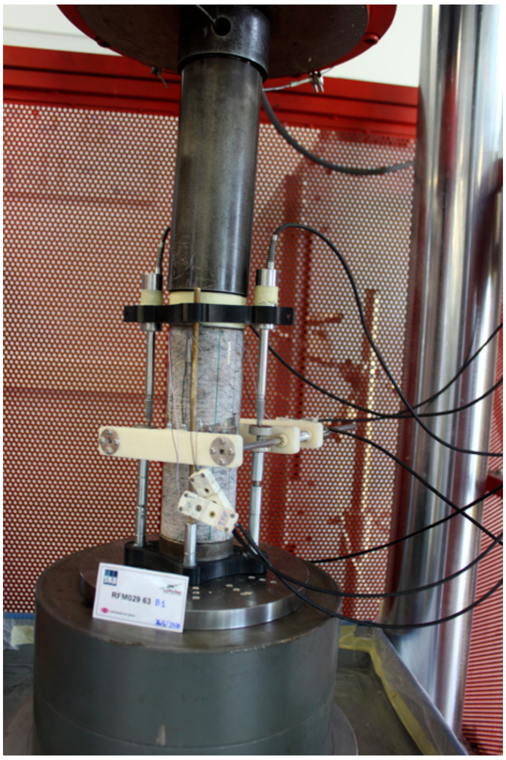

Figure 1. *Sample before the test*

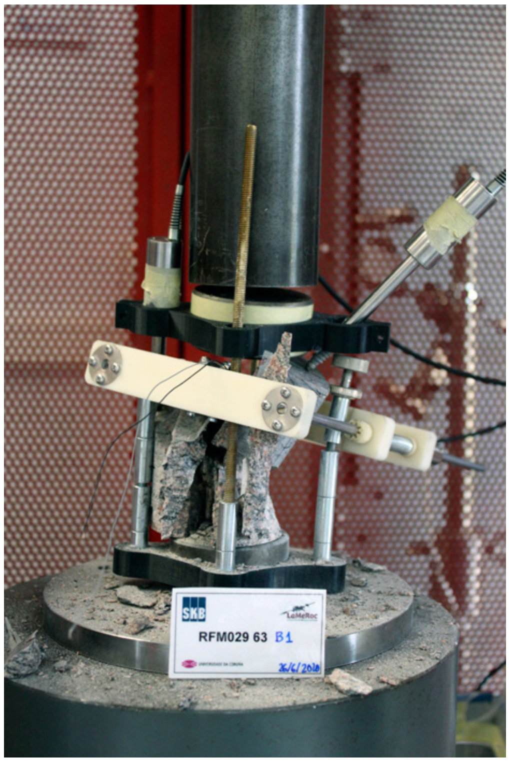

Figure 2. *Sample after the test*

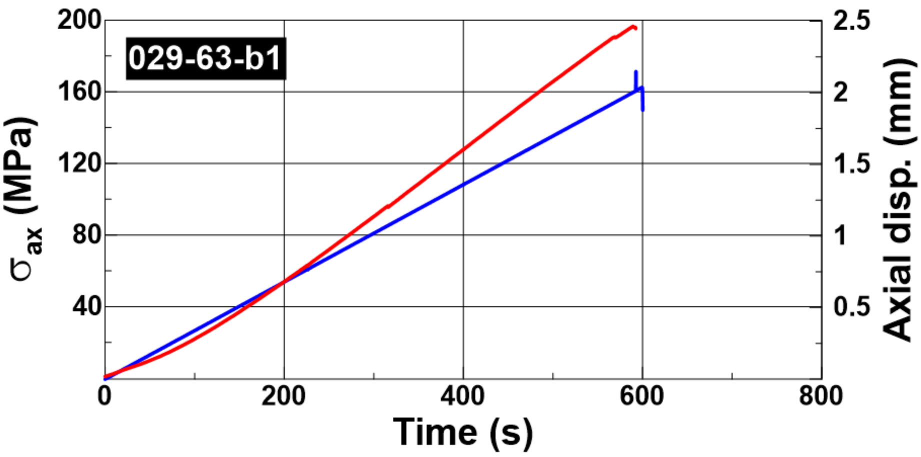

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	63_029b_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	124,03	124,10	124.01	123.89	123.92	**Mean length, L (mm)**	178.37	**Dry mass, M_d (g)**	1529.51
Diameter (mm)	64.08	63.95	64.11	64.05	64.16	**Mean diameter, D (mm)**	64.07	**Dry density, ρ_d (kg/m^3)**	2660
L/D ratio	2.78			**Permeability, k (mD)**	-			**Bulk mass, M (g)**	1531.57
Water content (%)	0.13			**Porosity, n (%)**	0.36			**Bulk density, ρ (kg/m^3)**	2663
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	483			**Temperature (ºC)**	22.0
F_{max} (kN)	479.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	148.8	**$UCS_{1:2}$ (MPa)**	155.1	**UCS_{50} (MPa)**	162.1	**σ_{CI} (MPa)**	70.2
	Static moduli	**$E_{50\%}$ (GPa)**	49.1	**$\nu_{50\%}$**	0.28	**σ_{CD} (MPa)**	135.1
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.114	**V_{S1} (km/s)**	3.271	**V_{S2} (km/s)**	3.168	**V_S (km/s)**	3.219
	Dynamic moduli	**E_{dyn} (GPa)**	64.7	**ν_{dyn}**	0.17	**V_P/V_S**	1.59
		G_{dyn} (GPa)	27.6	**K_{dyn} (GPa)**	32.9		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

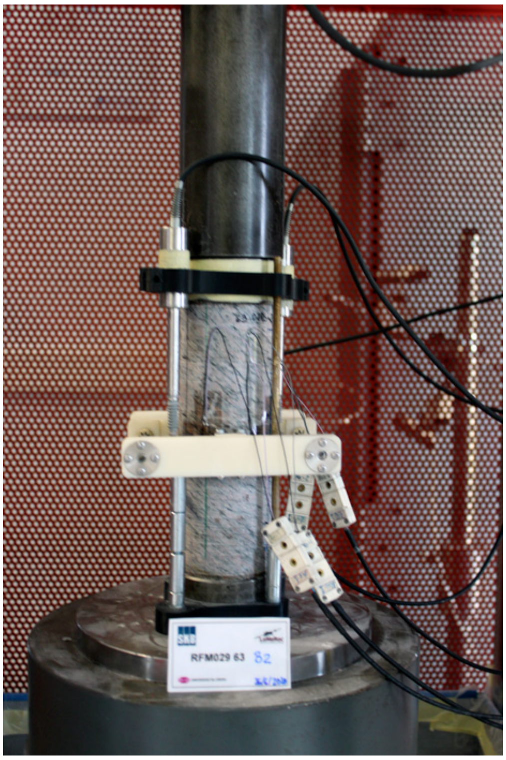

Figure 1. *Sample before the test*

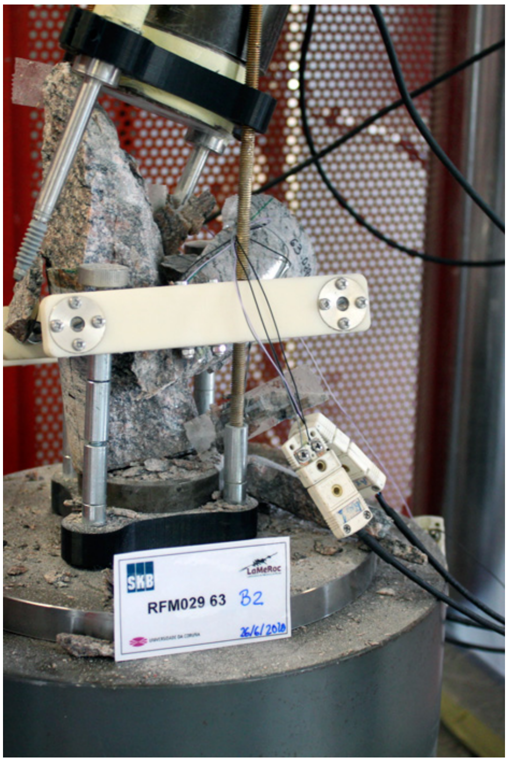

Figure 2. *Sample after the test*

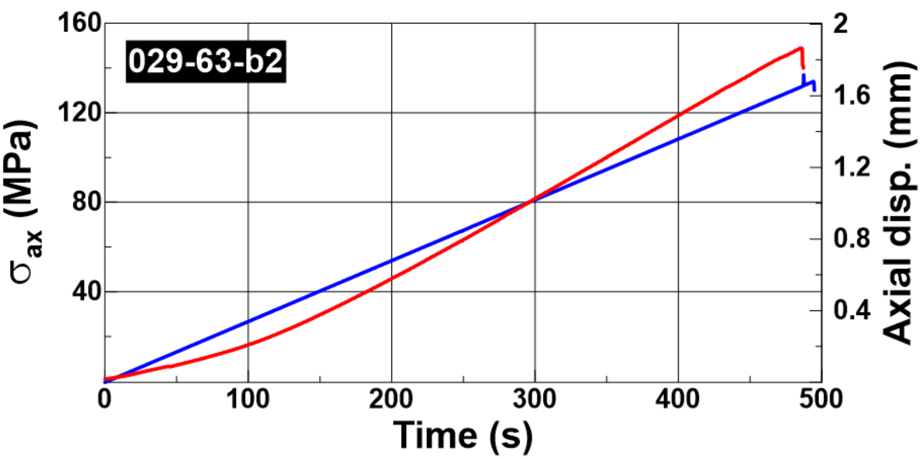

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	63_029b_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	157.92	157.60	157.74	158.18	158.08	**Mean length, L (mm)**	157.90	**Dry mass, M_d (g)**	1343.41
Diameter (mm)	64.07	64.11	64.13	64.11	64.06	**Mean diameter, D (mm)**	64.10	**Dry density, ρ_d (kg/m^3)**	2637
L/D ratio	2.46	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	1345.5		
Water content (%)	0.16	**Porosity, n (%)**	0.41			**Bulk density, ρ (kg/m^3)**	2641		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	395			**Temperature (ºC)**	22.0
F_{max} (kN)	335.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	103.9	**$UCS_{1:2}$ (MPa)**	107.1	**UCS_{50} (MPa)**	112.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	75.1	**$\nu_{50\%}$**	0.22	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.200	**V_{S1} (km/s)**	3.259	**V_{S2} (km/s)**	3.157	**V_S (km/s)**	3.208
	Dynamic moduli	**E_{dyn} (GPa)**	64.8	**ν_{dyn}**	0.19	**V_P/V_S**	1.62
		G_{dyn} (GPa)	27.2	**K_{dyn} (GPa)**	35.2		
Notes (6)							

PICTURES AND PLOTS

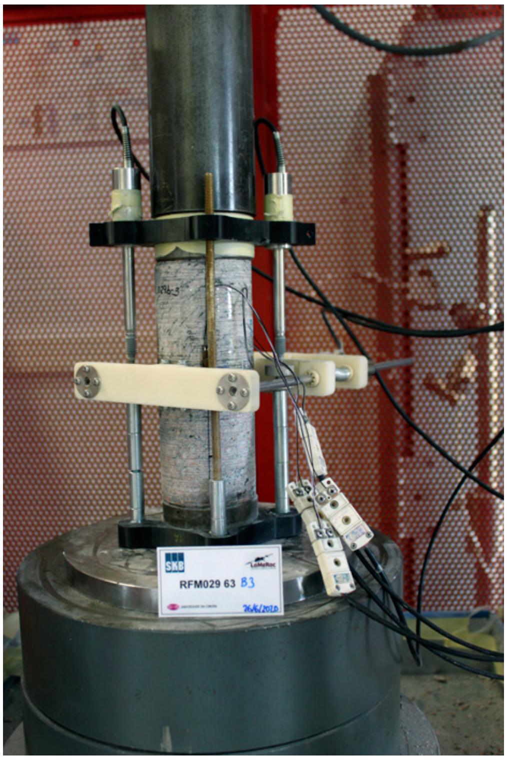

Figure 1. *Sample before the test*

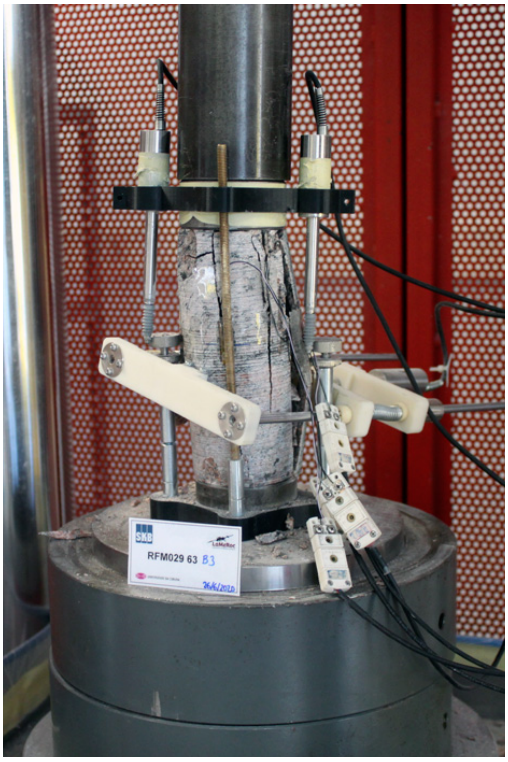

Figure 2. *Sample after the test*

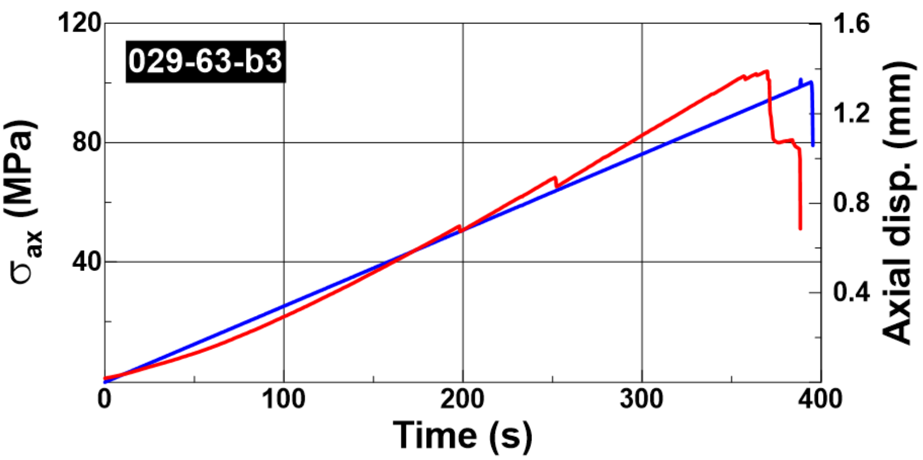

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	Report date
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	Specimen		Ref. LaMeRoc	63_029c_1
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	121.40	121.33	121.20	121.08	121.04	Mean length, L (mm)	175.64	Dry mass, M_d (g)	1501.05
Diameter (mm)	64.10	64.13	64.15	64.15	64.12	Mean diameter, D (mm)	64.13	Dry density, ρ_d (kg/m^3)	2646
L/D ratio	2.74			Permeability, k (mD)	-			Bulk mass, M (g)	1503.39
Water content (%)	0.16			Porosity, n (%)	0.41			Bulk density, ρ (kg/m^3)	2650
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-20AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	Time to failure (s)	554			Temperature (ºC)	22.0
F_{max} (kN)	594.5	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	184.1	$UCS_{1:2}$ (MPa)	191.5	UCS_{50} (MPa)	200.3	σ_{CI} (MPa)	103.1
	Static moduli	$E_{50\%}$ (GPa)	75.9	$\nu_{50\%}$	0.27	σ_{CD} (MPa)	173.4
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.057	V_{S1} (km/s)	3.145	V_{S2} (km/s)	3.158	V_S (km/s)	3.151
	Dynamic moduli	E_{dyn} (GPa)	62.2	ν_{dyn}	0.18	V_P/V_S	1.60
		G_{dyn} (GPa)	26.3	K_{dyn} (GPa)	32.7		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

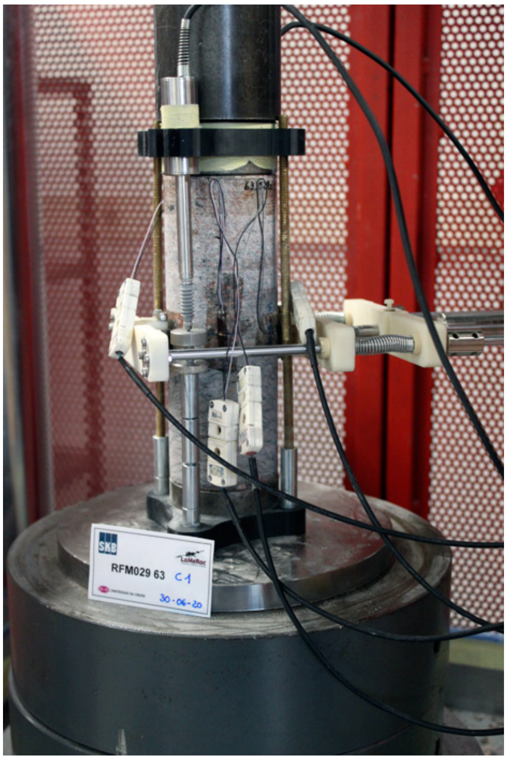

Figure 1. *Sample before the test*

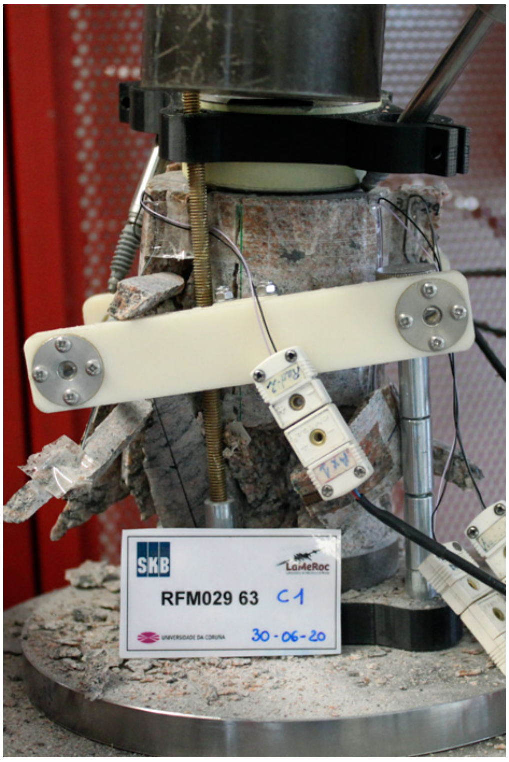

Figure 2. *Sample after the test*

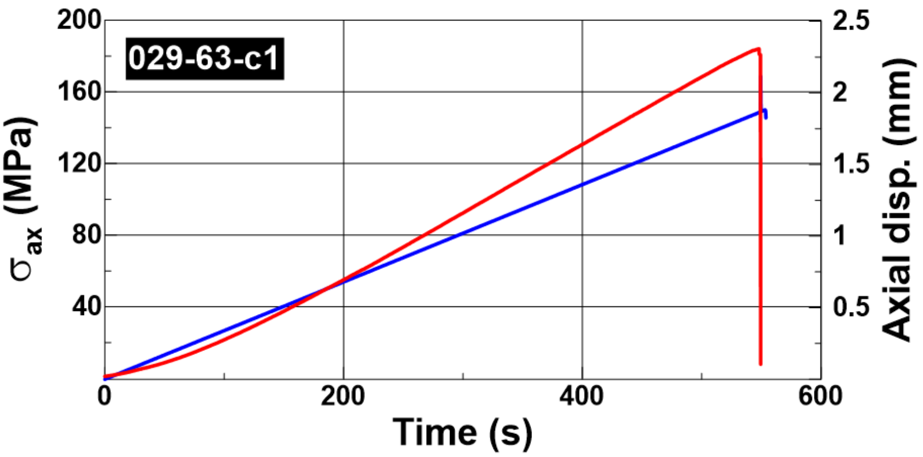

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	63_029c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	123.37	123.39	123.37	123.48	123.46	**Mean length, L (mm)**	177.84	**Dry mass, M_d (g)**	1517.17
Diameter (mm)	64.13	64.15	64.18	64.12	64.12	**Mean diameter, D (mm)**	64.14	**Dry density, ρ_d (kg/m^3)**	2640
L/D ratio	2.77	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	1519.6
Water content (%)	0.16	**Porosity, n (%)**	0.42					**Bulk density, ρ (kg/m^3)**	2644
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	514	**Temperature (ºC)**	22.0		
F_{max} (kN)	481.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	149.1	**$UCS_{1:2}$ (MPa)**	155.3	**UCS_{50} (MPa)**	162.4	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	78.3	**$\nu_{50\%}$**	0.28	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.097	**V_{S1} (km/s)**	3.106	**V_{S2} (km/s)**	3.178	**V_S (km/s)**	3.142
Dynamic moduli		**E_{dyn} (GPa)**	62.3	**ν_{dyn}**	0.19	**V_P/V_S**	1.62
		G_{dyn} (GPa)	26.1	**K_{dyn} (GPa)**	33.9		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

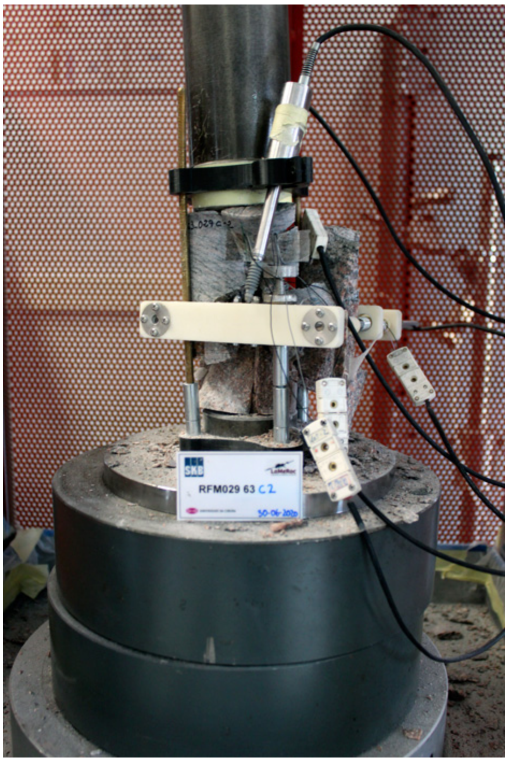

Figure 2. *Sample after the test*

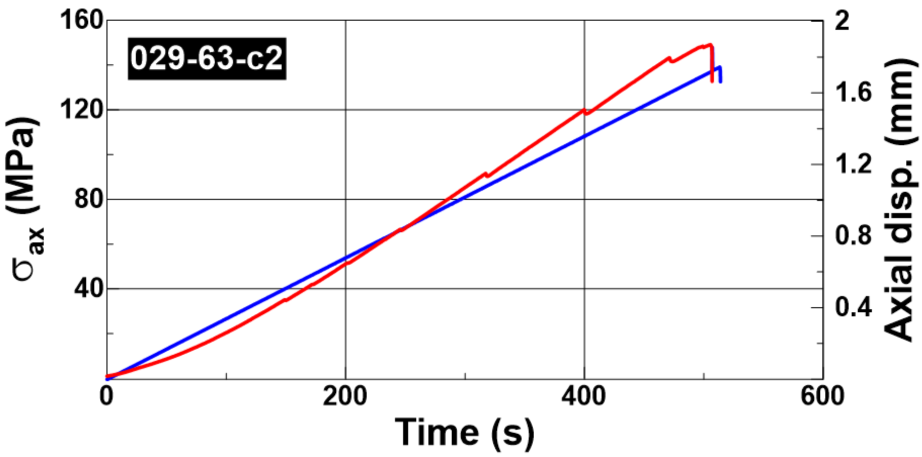

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	63_029c_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	123.57	123.24	122.73	122.87	123.32	**Mean length, L (mm)**	177.58	**Dry mass, M_d (g)**	1511.89
Diameter (mm)	64.14	64.13	64.15	64.13	64.14	**Mean diameter, D (mm)**	64.14	**Dry density, ρ_d (kg/m^3)**	2635
L/D ratio	2.77				**Permeability, k (mD)**	-		**Bulk mass, M (g)**	1514.44
Water content (%)	0.17				**Porosity, n (%)**	0.44		**Bulk density, ρ (kg/m^3)**	2640
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	560	**Temperature (ºC)**	22.0		
F_{max} (kN)	583.3	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	180.6	**$UCS_{1:2}$ (MPa)**	188.0	**UCS_{50} (MPa)**	196.7	**σ_{CI} (MPa)**	97.1
	Static moduli	**$E_{50\%}$ (GPa)**	79.8	**$\nu_{50\%}$**	0.35	**σ_{CD} (MPa)**	156.3
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	4.974	**V_{S1} (km/s)**	3.078	**V_{S2} (km/s)**	3.085	**V_S (km/s)**	3.082
	Dynamic moduli	**E_{dyn} (GPa)**	59.6	**ν_{dyn}**	0.19	**V_P/V_S**	1.61
		G_{dyn} (GPa)	25.1	**K_{dyn} (GPa)**	31.9		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

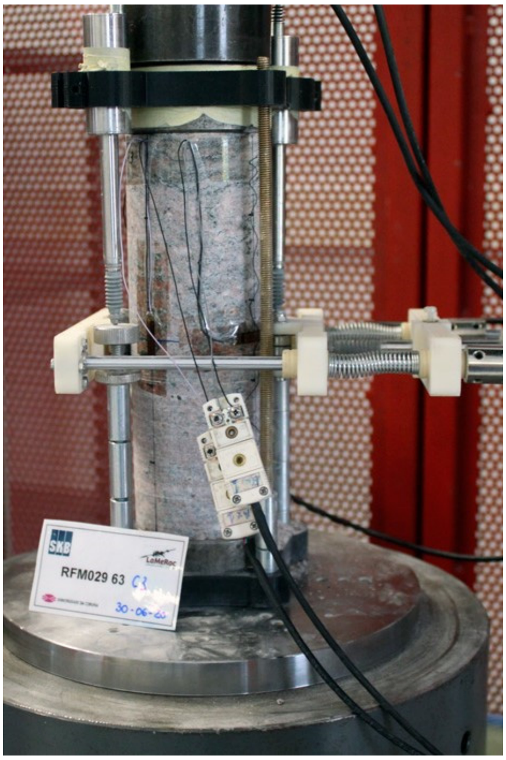

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

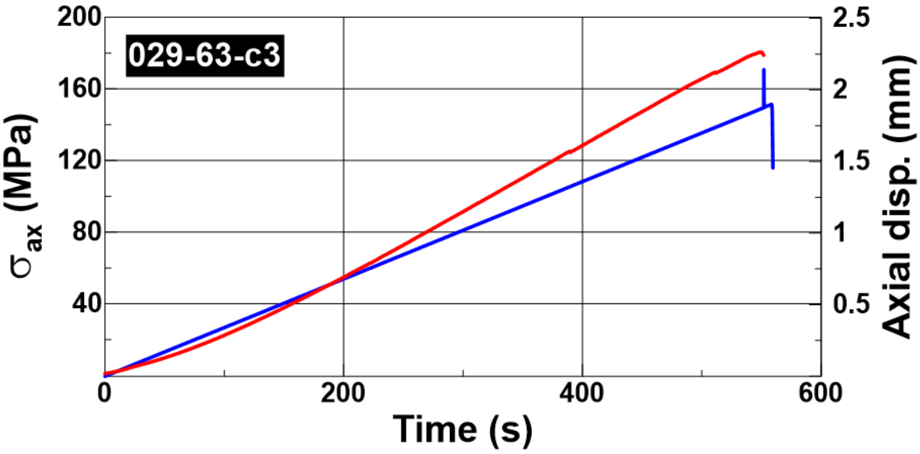

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	63_029d_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	125.07	124.96	124.87	124.85	124.88	**Mean length, L (mm)**	179.36	**Dry mass, M_d (g)**	1532.34
Diameter (mm)	63.95	64.08	64.06	64.07	64.06	**Mean diameter, D (mm)**	64.04	**Dry density, ρ_d (kg/m^3)**	2652
L/D ratio	2.80				**Permeability, k (mD)**	-		**Bulk mass, M (g)**	1534.76
Water content (%)	0.16			**Porosity, n (%)**	0.42			**Bulk density, ρ (kg/m^3)**	2656
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020			**Control mode (Force/Strain)**	Strain
LDT model	Solartron AX/5/s			**Loading rate (N/s)**	-
Strain gauge type	BX120-20AA			**Strain rate (s^{-1})**	4.17E-06
Load cell	Built-in 1500 kN			**Shear rate (mm/s)**	-
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	679			**Temperature (ºC)**	22.0
F_{max} (kN)	703.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	218.3	**$UCS_{1:2}$ (MPa)**	227.6	**UCS_{50} (MPa)**	237.9	**σ_{CI} (MPa)**	131.9
	Static moduli	**$E_{50\%}$ (GPa)**	82.4	**$\nu_{50\%}$**	0.29	**σ_{CD} (MPa)**	202.0
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.066	**V_{S1} (km/s)**	3.080	**V_{S2} (km/s)**	3.155	**V_S (km/s)**	3.118
	Dynamic moduli	**E_{dyn} (GPa)**	61.7	**ν_{dyn}**	0.20	**V_P/V_S**	1.62
		G_{dyn} (GPa)	25.8	**K_{dyn} (GPa)**	33.7		
Notes (6)							

PICTURES AND PLOTS

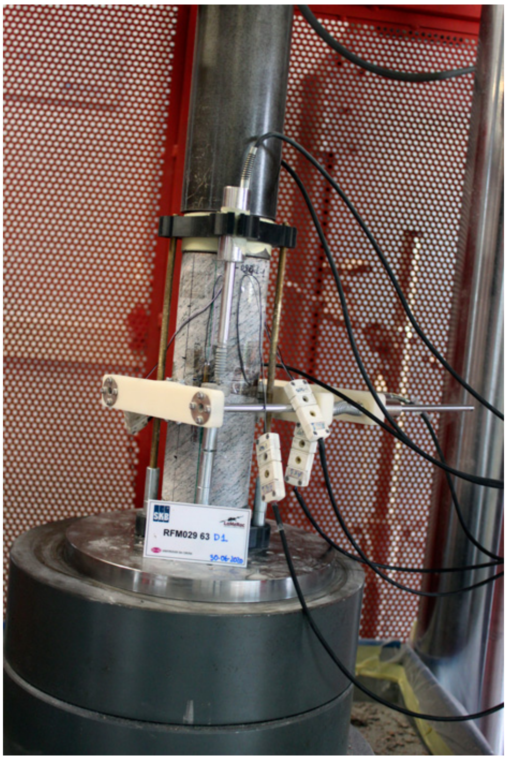

Figure 1. *Sample before the test*

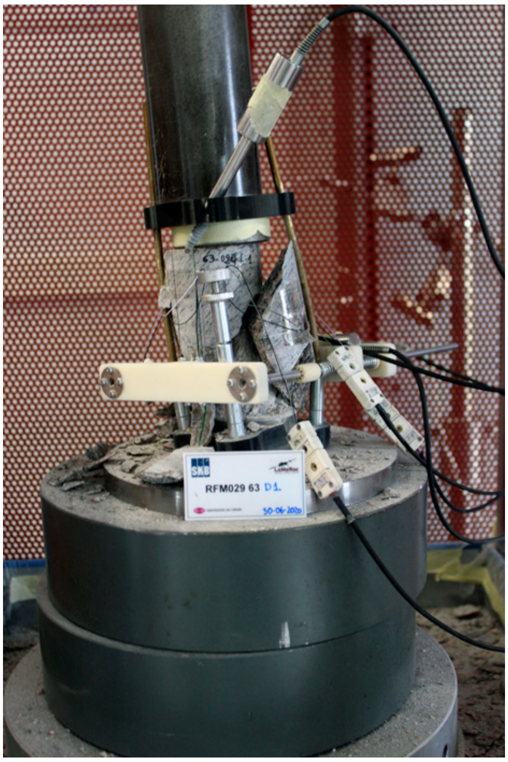

Figure 2. *Sample after the test*

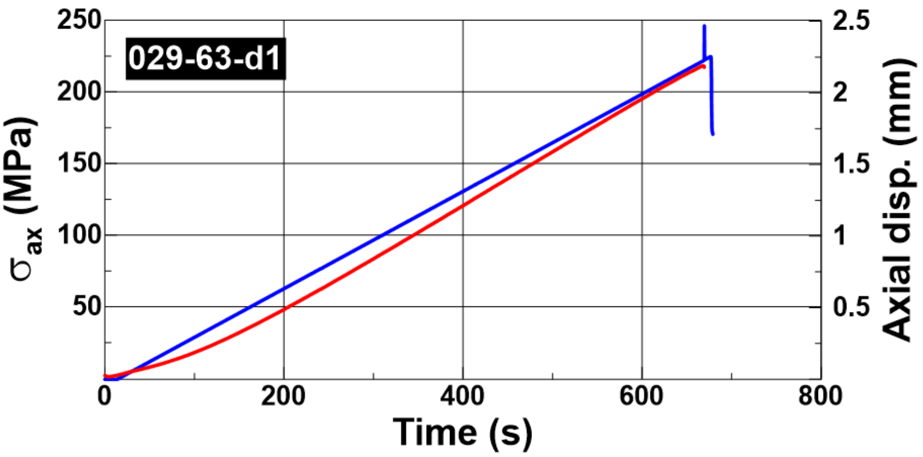

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	63_029d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	126.63	126.50	126.47	126.32	126.38	**Mean length, L (mm)**	180.89	**Dry mass, M_d (g)**	1543.28
Diameter (mm)	64.01	63.97	63.98	64.03	64.01	**Mean diameter, D (mm)**	64.00	**Dry density, ρ_d (kg/m^3)**	2652
L/D ratio	2.83				**Permeability, k (mD)**	-		**Bulk mass, M (g)**	1545.12
Water content (%)	0.12			**Porosity, n (%)**	0.32			**Bulk density, ρ (kg/m^3)**	2655
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	500			**Temperature (ºC)**	22.0
F_{max} (kN)	410.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	127.7	**$UCS_{1:2}$ (MPa)**	133.2	**UCS_{50} (MPa)**	139.2	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	77.5	**$\nu_{50\%}$**	0.26	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.230	**V_{S1} (km/s)**	3.295	**V_{S2} (km/s)**	3.152	**V_S (km/s)**	3.224
	Dynamic moduli	**E_{dyn} (GPa)**	65.9	**ν_{dyn}**	0.19	**V_P/V_S**	1.62
		G_{dyn} (GPa)	27.6	**K_{dyn} (GPa)**	35.8		
Notes (6)							

PICTURES AND PLOTS

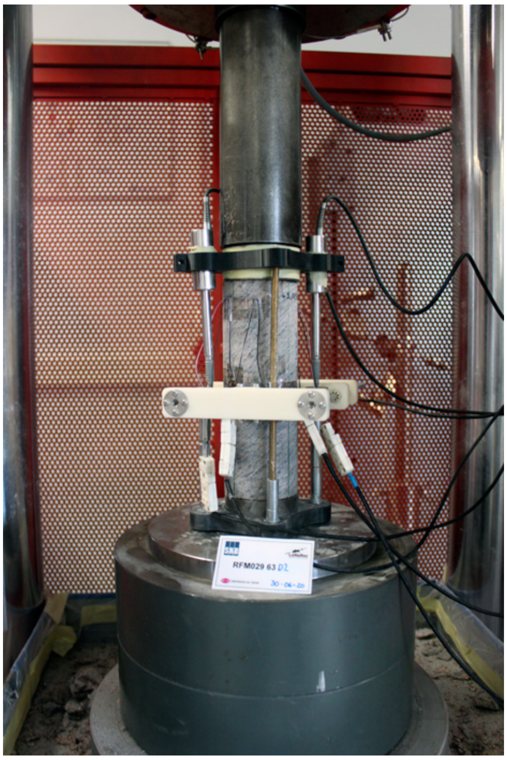

Figure 1. Sample before the test

Figure 2. Sample after the test

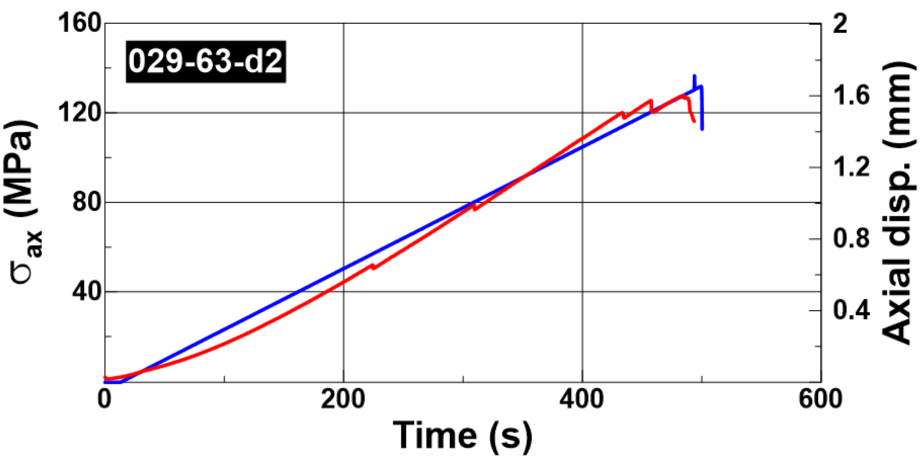

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	63_029d_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	125.25	124.98	124.92	125.08	125.15	**Mean length, L (mm)**	179.51	**Dry mass, M_d (g)**	1535.34
Diameter (mm)	64.09	64.10	64.09	64.10	64.11	**Mean diameter, D (mm)**	64.10	**Dry density, ρ_d (kg/m^3)**	2651
L/D ratio	2.80			**Permeability, k (mD)**		-		**Bulk mass, M (g)**	1537.54
Water content (%)		0.14		**Porosity, n (%)**		0.38		**Bulk density, ρ (kg/m^3)**	2654
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	613	**Temperature (ºC)**	22.0		
F_{max} (kN)	616.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	191.1	**$UCS_{1:2}$ (MPa)**	199.2	**UCS_{50} (MPa)**	208.3	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	81.1	**$\nu_{50\%}$**	0.12	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.252	**V_{S1} (km/s)**	3.329	**V_{S2} (km/s)**	3.240	**V_S (km/s)**	3.284
Dynamic moduli		**E_{dyn} (GPa)**	67.5	**ν_{dyn}**	0.18	**V_P/V_S**	1.60
		G_{dyn} (GPa)	28.6	**K_{dyn} (GPa)**	35.0		
Notes (6)							

PICTURES AND PLOTS

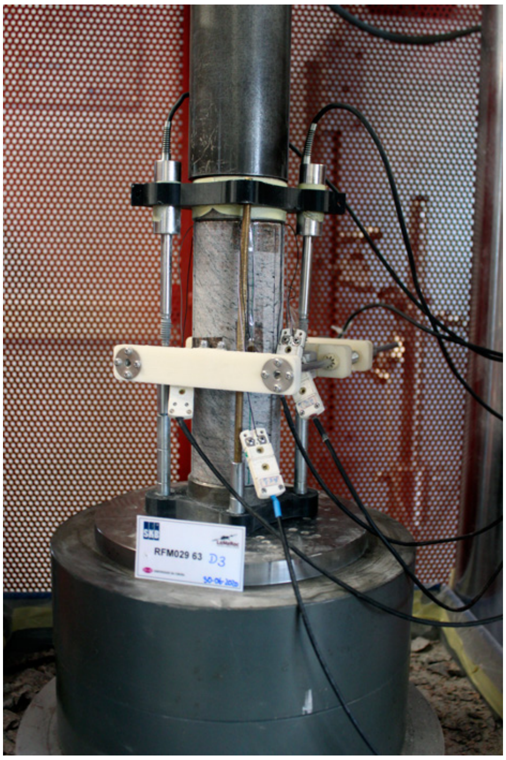

Figure 1. *Sample before the test*

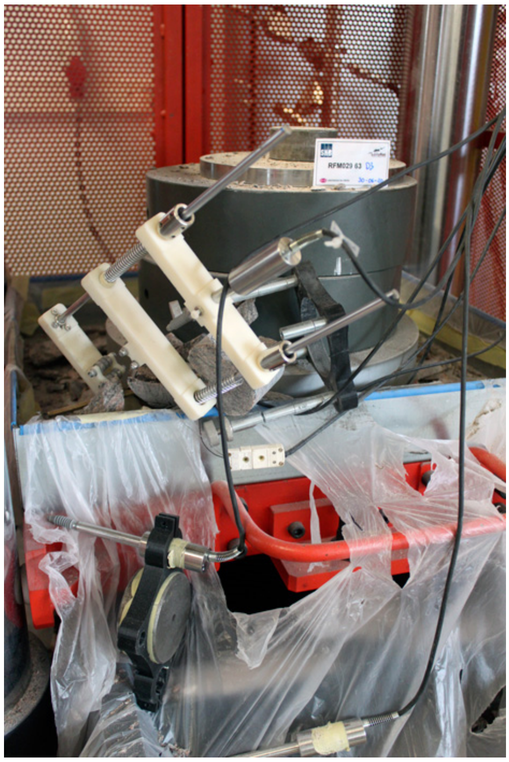

Figure 2. *Sample after the test*

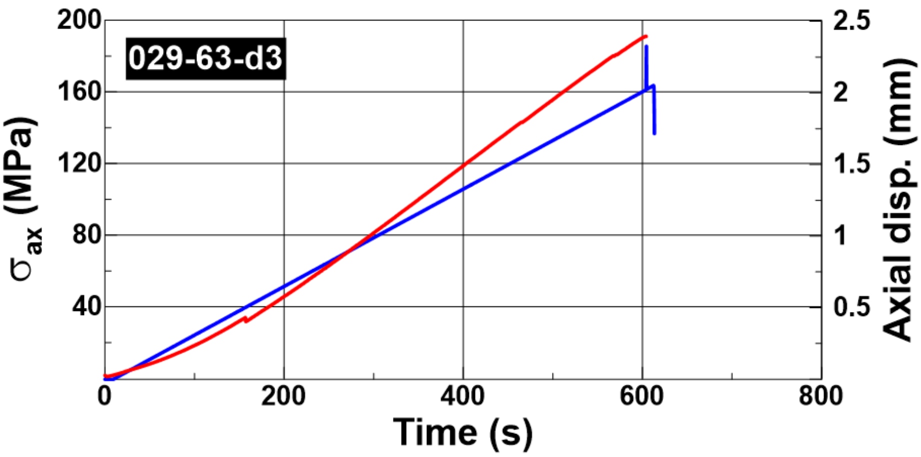

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	*Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements*
Project	*Scale Effect of Intact Granite Rocks*
Company	*Svensk Kärnbränslehantering AB*
Test type	*UCS*
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	*29b*	**Specimen**		**Ref. LaMeRoc**	*100_029b_1*
Depth (m)	*surface block*	**Formation**		**Facies**	
Sampling date		**Location**	*Forsmark (Sweden)*	**Lithology**	*RFM029*
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	*Y*	**Date**		**Dimensional verification (Y/N)**	*Y*	**Date**
Cutting (Y/N)	*Y*	**Date**		**Trimming (Y/N)**	*Y*	**Date**
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	*146.11*	*146.24*	*146.43*	*146.51*	*146.33*	**Mean length, L (mm)**	*270.62*	**Dry mass, M_d (g)**	*5521*
Diameter (mm)	*99.03*	*99.26*	*99.46*	*99.41*	*98.29*	**Mean diameter, D (mm)**	*99.09*	**Dry density, ρ_d (kg/m^3)**	*2645*
L/D ratio	*2.73*	**Permeability, k (mD)**	*-*			**Bulk mass, M (g)**	*5525.1*		
Water content (%)	*0.07*	**Porosity, n (%)**	*0.20*			**Bulk density, ρ (kg/m^3)**	*2647*		
Notes (4)									

EQUIPMENT

Device	*Servosis 150 ton*	**Force class (UNE-EN-7500)**	*1*	**Displacement class (ASTM E2309)**	*A*
Calibration date	*09/09/2020*	**Control mode (Force/Strain)**	*Strain*		
LDT model	*Solartron AX/5/s*	**Loading rate (N/s)**	*-*		
Strain gauge type	*BX120-50AA*	**Strain rate (s^{-1})**	*4.17E-06*		
Load cell	*Built-in 1500 kN*	**Shear rate (mm/s)**	*-*		
Notes (5)					

TEST RESULTS

Test date	*31/07/2020*	**Time to failure (s)**	*881*			**Temperature (ºC)**	*22.0*
F_{max} (kN)	*1509.6*	**T_0 (MPa)**	*-*	**$T_{0,50}$ (MPa)**	*-*		
UCS (MPa)	*195.8*	**$UCS_{1:2}$ (MPa)**	*203.6*	**UCS_{50} (MPa)**	*230.3*	**σ_{CI} (MPa)**	*77.7*
	Static moduli	**$E_{50\%}$ (GPa)**	*71.8*	**$\nu_{50\%}$**	*0.28*	**σ_{CD} (MPa)**	*182.4*
ϕ_{dry} (º)	*-*	**c'_{dry} (kPa)**	*-*	**ϕ_{wet} (º)**	*-*	**c'_{wet} (kPa)**	*-*
V_P (km/s)	*5.115*	**V_{S1} (km/s)**	*3.245*	**V_{S2} (km/s)**	*3.154*	**V_S (km/s)**	*3.199*
	Dynamic moduli	**E_{dyn} (GPa)**	*63.9*	**ν_{dyn}**	*0.18*	**V_P/V_S**	*1.60*
		G_{dyn} (GPa)	*27.1*	**K_{dyn} (GPa)**	*33.1*		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

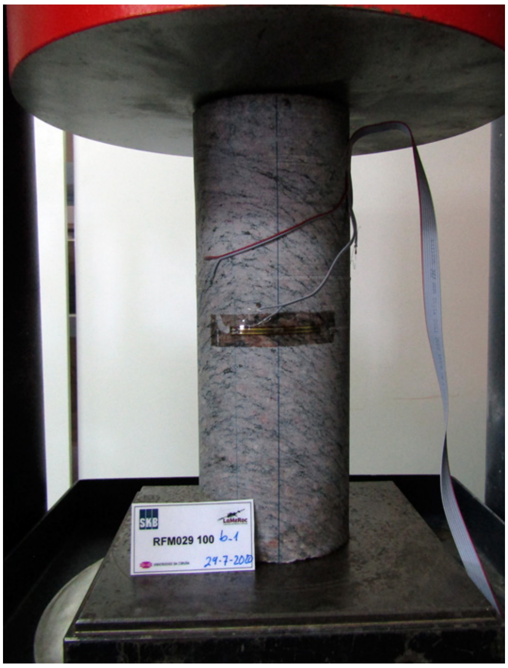

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

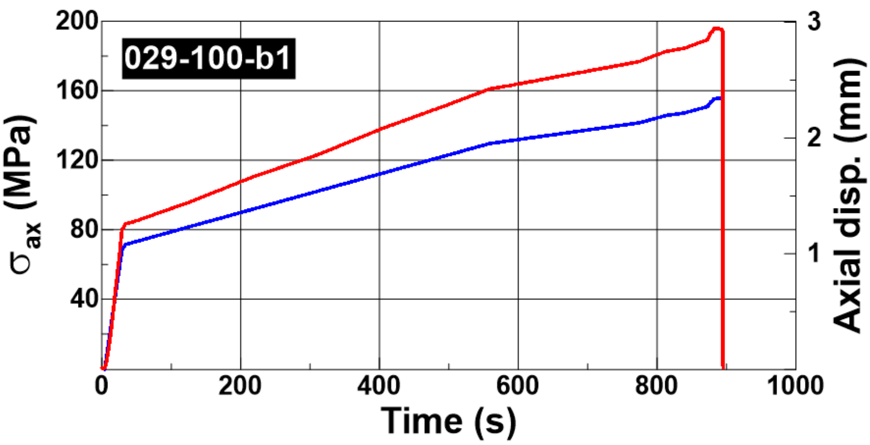

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	Specimen		Ref. LaMeRoc	100_029d_1
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	146.16	146.30	145.72	145.73	145.94	Mean length, L (mm)	270.27	Dry mass, M_d (g)	5618.2
Diameter (mm)	99.91	100.04	99.91	99.93	99.86	Mean diameter, D (mm)	99.93	Dry density, ρ_d (kg/m^3)	2650

L/D ratio	2.70	Permeability, k (mD)		-	Bulk mass, M (g)	5622.2	
Water content (%)	0.07	Porosity, n (%)		0.19	Bulk density, ρ (kg/m^3)	2652	
Notes (4)							

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-50AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	31/07/2020	Time to failure (s)	619			Temperature (ºC)	22.0
F_{max} (kN)	1265.6	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	161.4	$UCS_{1:2}$ (MPa)	167.7	UCS_{50} (MPa)	190.0	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	-	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.175	V_{S1} (km/s)	3.278	V_{S2} (km/s)	3.301	V_S (km/s)	3.290
Dynamic moduli		E_{dyn} (GPa)	66.6	ν_{dyn}	0.16	V_P/V_S	1.57
		G_{dyn} (GPa)	28.7	K_{dyn} (GPa)	32.8		
Notes (6)							

PICTURES AND PLOTS

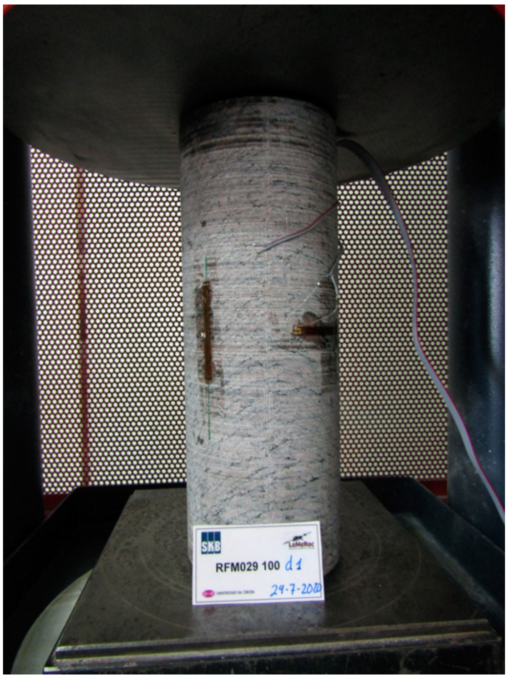

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

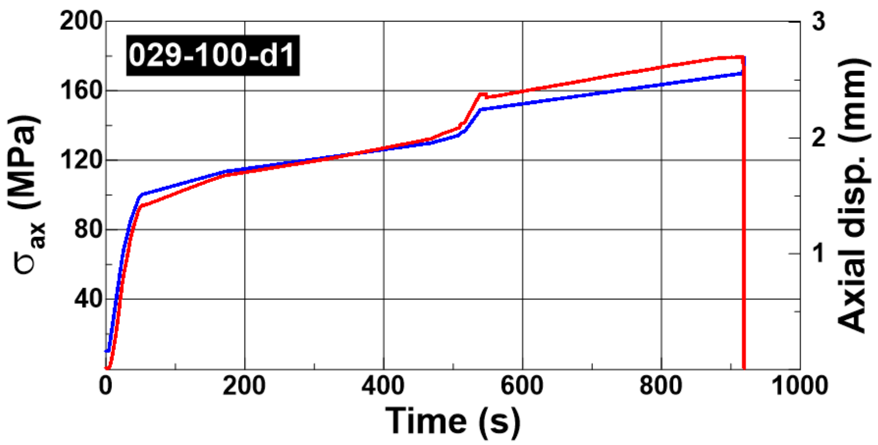

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	100_029d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y		**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y		**Date**	
Notes (3)								

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	144.15	144.15	144.28	144.31	144.25	**Mean length, L (mm)**	268.53	**Dry mass, M_d (g)**	5579.2
Diameter (mm)	99.87	99.80	99.53	99.84	99.93	**Mean diameter, D (mm)**	99.79	**Dry density, ρ_d (kg/m^3)**	2656
L/D ratio	2.69	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	5583.9		
Water content (%)	0.08	**Porosity, n (%)**	0.22			**Bulk density, ρ (kg/m^3)**	2659		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-50AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	31/07/2020	**Time to failure (s)**	164			**Temperature (ºC)**	22.0
F_{max} (kN)	1056.4	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	135.1	**$UCS_{1:2}$ (MPa)**	140.3	**UCS_{50} (MPa)**	158.9	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	72.6	**$\nu_{50\%}$**	0.11	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.203	**V_{S1} (km/s)**	3.352	**V_{S2} (km/s)**	3.183	**V_S (km/s)**	3.268
Dynamic moduli		**E_{dyn} (GPa)**	66.7	**ν_{dyn}**	0.17	**V_P/V_S**	1.59
		G_{dyn} (GPa)	28.4	**K_{dyn} (GPa)**	34.1		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

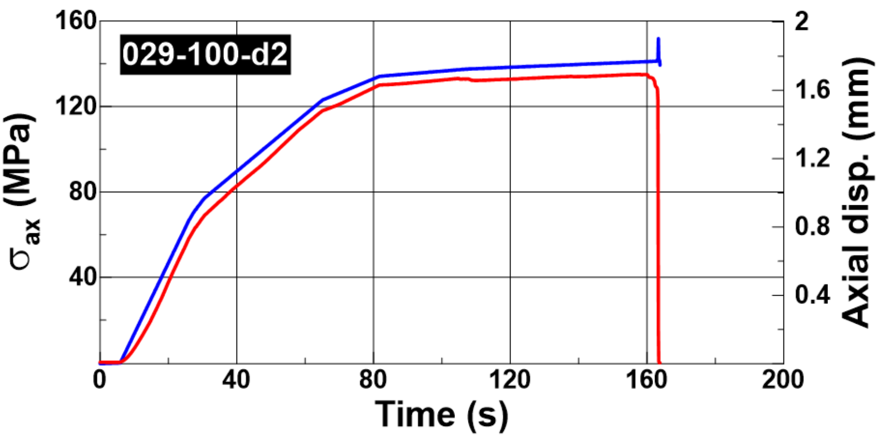

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	15_045a_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	43.28	43.15	43.16	43.23	43.13	**Mean length, L (mm)**	43.19	**Dry mass, M_d (g)**	22.79
Diameter (mm)	16.12	16.10	16.03	16.01	-	**Mean diameter, D (mm)**	16.07	**Dry density, ρ_d (kg/m^3)**	2603

L/D ratio	2.69	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	22.80
Water content (%)	0.04	**Porosity, n (%)**	0.11	**Bulk density, ρ (kg/m^3)**	2604
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	810	**Temperature (ºC)**	22.0		
F_{max} (kN)	23.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	114.1	**$UCS_{1:2}$ (MPa)**	118.5	**UCS_{50} (MPa)**	96.6	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	185.6	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.105	**V_{S1} (km/s)**	3.486	**V_{S2} (km/s)**	3.660	**V_S (km/s)**	3.573
	Dynamic moduli	**E_{dyn} (GPa)**	82.4	**ν_{dyn}**	0.24	**V_P/V_S**	1.71
		G_{dyn} (GPa)	33.2	**K_{dyn} (GPa)**	52.7		
Notes (6)							

PICTURES AND PLOTS

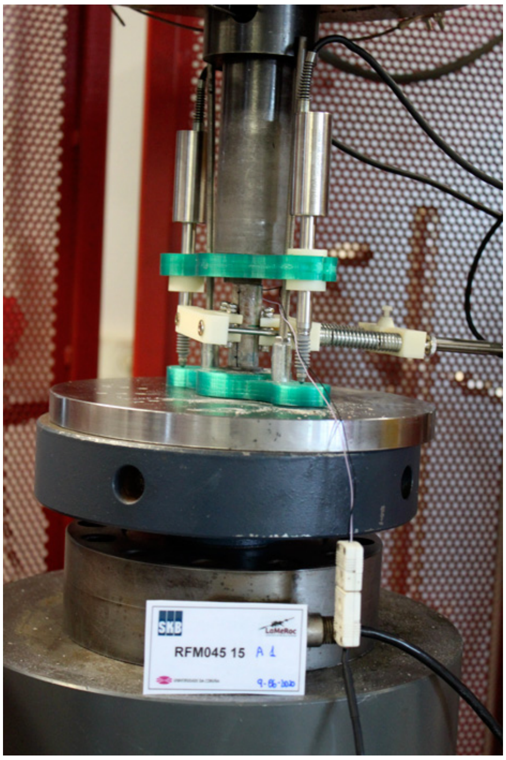

Figure 1. *Sample before the test*

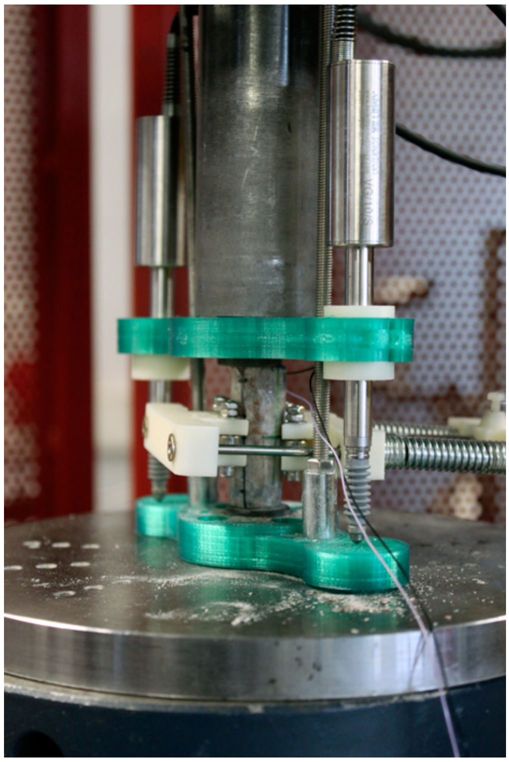

Figure 2. *Sample after the test*

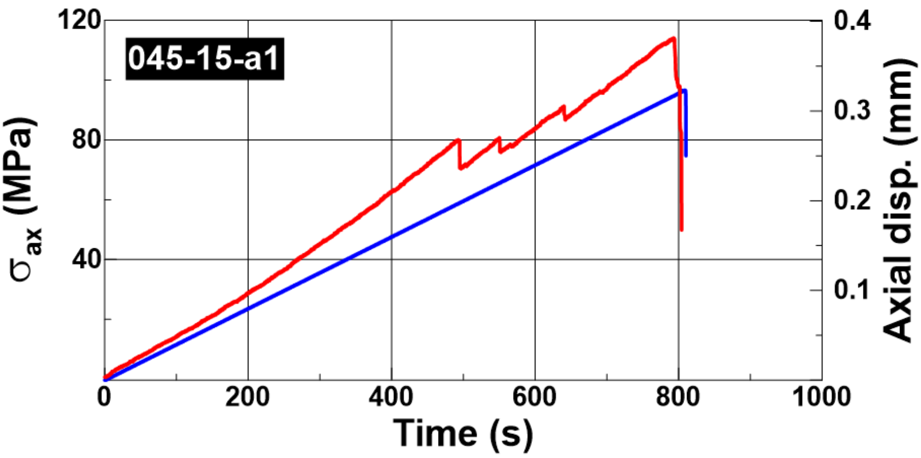

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	15_045a_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	42.35	42.35	42.35	42.39	42.36	**Mean length, L (mm)**	42.36	**Dry mass, M_d (g)**	22.5
Diameter (mm)	16.12	16.07	16.07	16.06	-	**Mean diameter, D (mm)**	16.08	**Dry density, ρ_d (kg/m^3)**	2616

L/D ratio	2.63	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	22.51
Water content (%)	0.04	**Porosity, n (%)**	0.12	**Bulk density, ρ (kg/m^3)**	2617
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	685	**Temperature (ºC)**	22.0		
F_{max} (kN)	12.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	59.4	**$UCS_{1:2}$ (MPa)**	61.6	**UCS_{50} (MPa)**	50.2	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	80.7	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.105	**V_{S1} (km/s)**	3.429	**V_{S2} (km/s)**	3.376	**V_S (km/s)**	3.403
	Dynamic moduli	**E_{dyn} (GPa)**	77.2	**ν_{dyn}**	0.27	**V_P/V_S**	1.79
		G_{dyn} (GPa)	30.3	**K_{dyn} (GPa)**	57.1		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

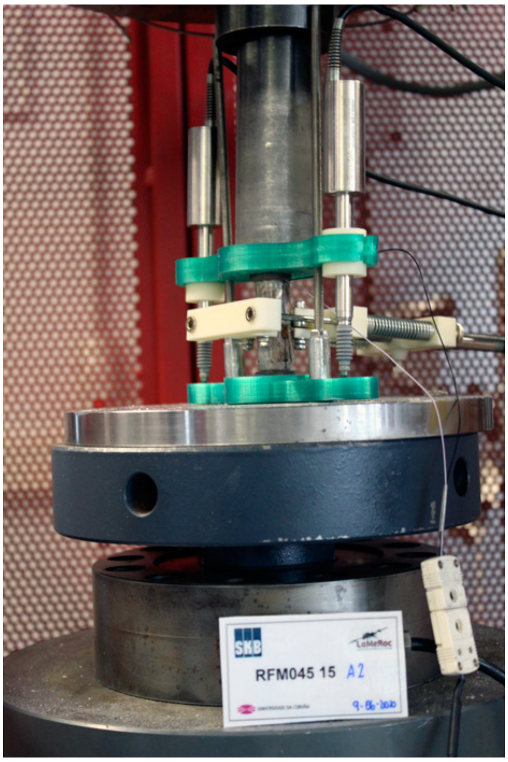

Figure 2. *Sample after the test*

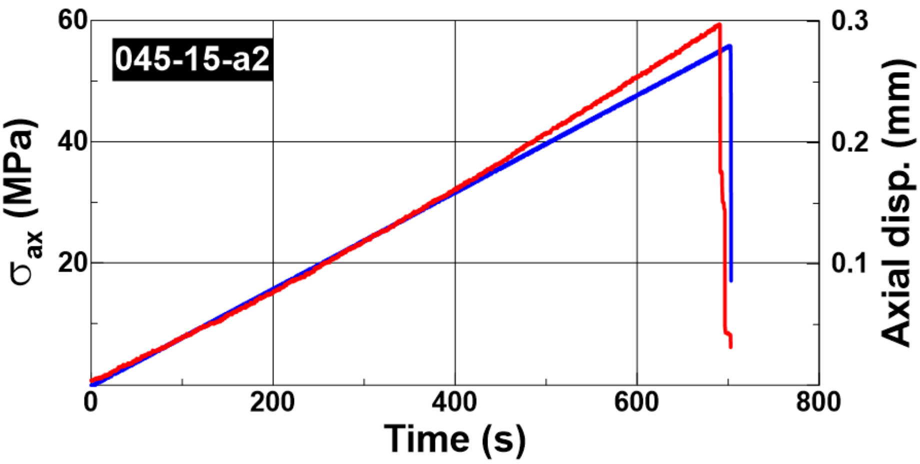

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	15_045a_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	35.77	35.88	36.09	36.15	35.97	**Mean length, L (mm)**	35.97	**Dry mass, M_d (g)**	18.93
Diameter (mm)	16.10	16.09	16.09	16.06	-	**Mean diameter, D (mm)**	16.09	**Dry density, ρ_d (kg/m³)**	2590

L/D ratio	2.24	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	18.95
Water content (%)	0.11	**Porosity, n (%)**	0.27	**Bulk density, ρ (kg/m³)**	2592
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	1138	**Temperature (ºC)**	22.0		
F_{max} (kN)	9.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	45.5	**$UCS_{1:2}$ (MPa)**	46.5	**UCS_{50} (MPa)**	37.9	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	58.8	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.929	**V_{S1} (km/s)**	3.463	**V_{S2} (km/s)**	3.074	**V_S (km/s)**	3.269
Dynamic moduli		**E_{dyn} (GPa)**	71.0	**ν_{dyn}**	0.28	**V_P/V_S**	1.81
		G_{dyn} (GPa)	27.7	**K_{dyn} (GPa)**	54.2		
Notes (6)							

PICTURES AND PLOTS

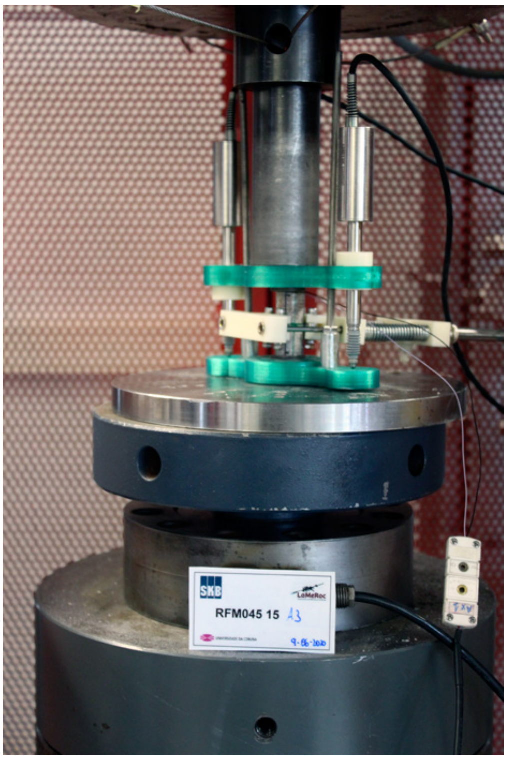

Figure 1. *Sample before the test*

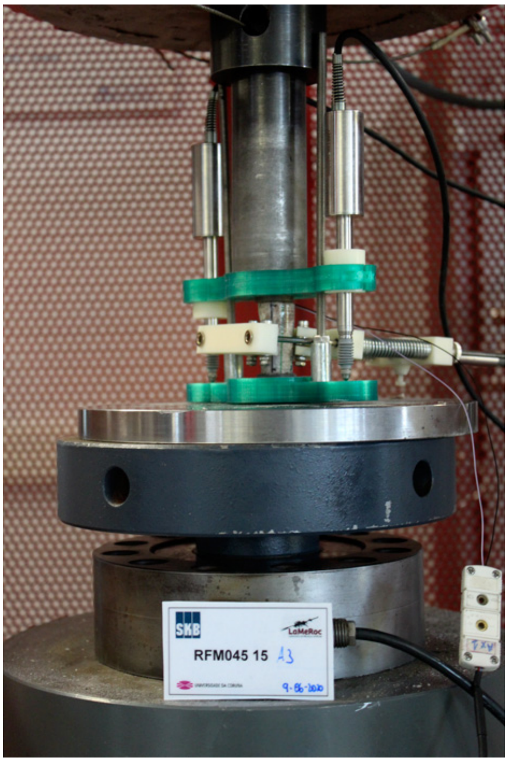

Figure 2. *Sample after the test*

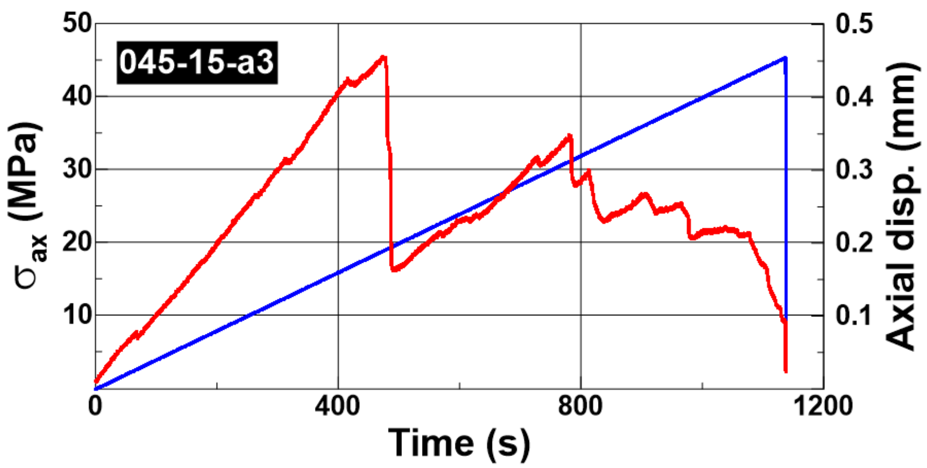

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	15_045a_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	41.87	42.03	42.07	42.00	42.08	**Mean length, L (mm)**	42.01	**Dry mass, M_d (g)**	22.17
Diameter (mm)	16.07	16.02	16.06	16.04	-	**Mean diameter, D (mm)**	16.05	**Dry density, ρ_d (kg/m^3)**	2609

L/D ratio	2.62	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	22.21
Water content (%)	0.18	**Porosity, n (%)**	0.47	**Bulk density, ρ (kg/m^3)**	2614
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	774	**Temperature (ºC)**	22.0		
F_{max} (kN)	13.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	64.6	**$UCS_{1:2}$ (MPa)**	67.0	**UCS_{50} (MPa)**	54.6	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	63.7	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.079	**V_{S1} (km/s)**	3.523	**V_{S2} (km/s)**	3.643	**V_S (km/s)**	3.583
	Dynamic moduli	**E_{dyn} (GPa)**	82.8	**ν_{dyn}**	0.23	**V_P/V_S**	1.70
		G_{dyn} (GPa)	33.6	**K_{dyn} (GPa)**	51.9		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

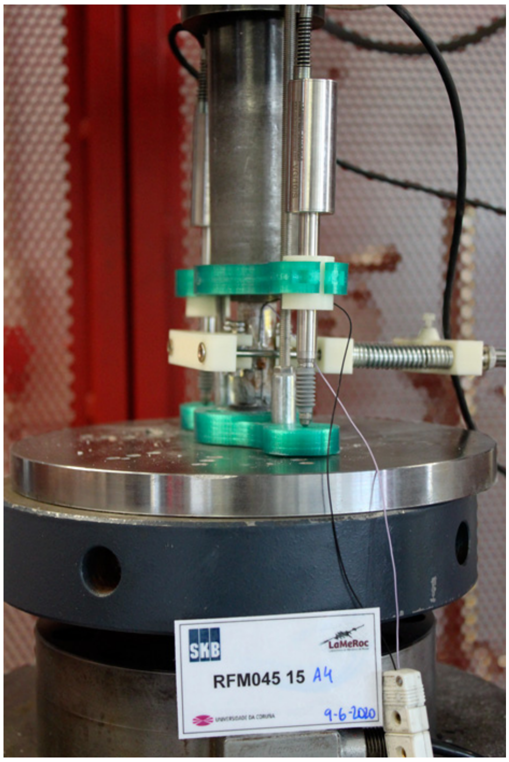

Figure 2. *Sample after the test*

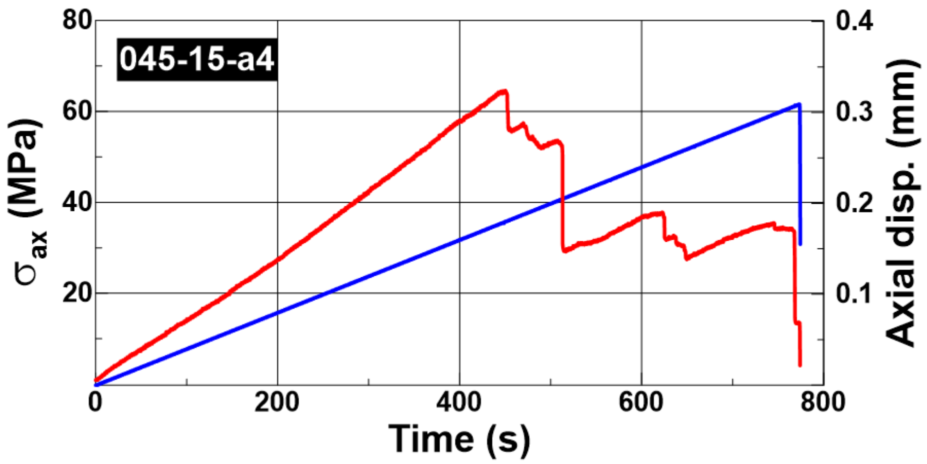

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	15_045b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	41.90	41.72	41.66	41.85	41.91	**Mean length, L (mm)**	41.81	**Dry mass, M_d (g)**	21.11
Diameter (mm)	15.87	15.72	15.66	15.77	-	**Mean diameter, D (mm)**	15.76	**Dry density, ρ_d (kg/m^3)**	2590
L/D ratio	2.65		**Permeability, k (mD)**	-				**Bulk mass, M (g)**	21.16
Water content (%)	0.24		**Porosity, n (%)**	0.61				**Bulk density, ρ (kg/m^3)**	2596
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020			**Control mode (Force/Strain)**	Strain
LDT model	Solartron AX/5/s			**Loading rate (N/s)**	-
Strain gauge type	BX120-6AA			**Strain rate (s^{-1})**	4.17E-06
Load cell	Built-in 1500 kN			**Shear rate (mm/s)**	-
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	999			**Temperature (ºC)**	22.0
F_{max} (kN)	9.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	48.5	**$UCS_{1:2}$ (MPa)**	50.3	**UCS_{50} (MPa)**	40.9	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.139	**V_{S1} (km/s)**	3.399	**V_{S2} (km/s)**	3.288	**V_S (km/s)**	3.343
	Dynamic moduli	**E_{dyn} (GPa)**	74.8	**ν_{dyn}**	0.29	**V_P/V_S**	1.84
		G_{dyn} (GPa)	29.0	**K_{dyn} (GPa)**	59.1		
Notes (6)							

PICTURES AND PLOTS

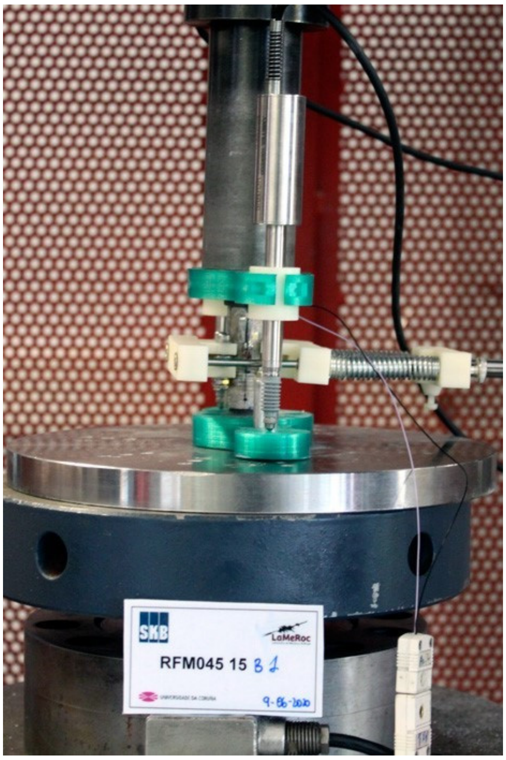

Figure 1. *Sample before the test*

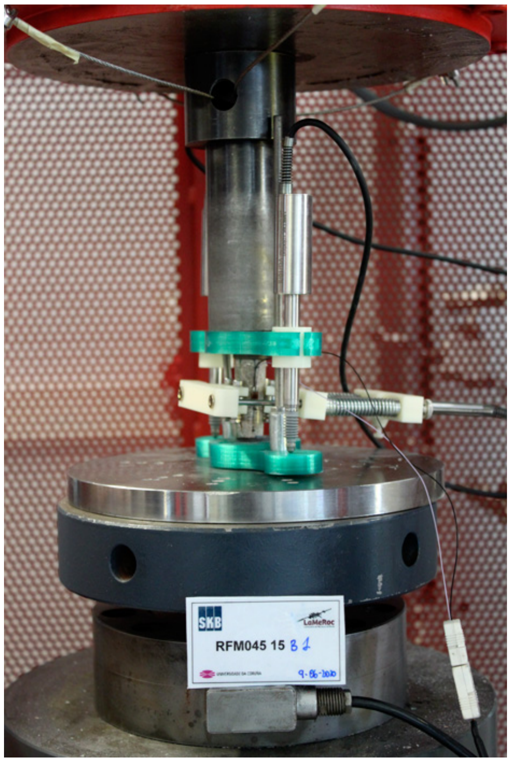

Figure 2. *Sample after the test*

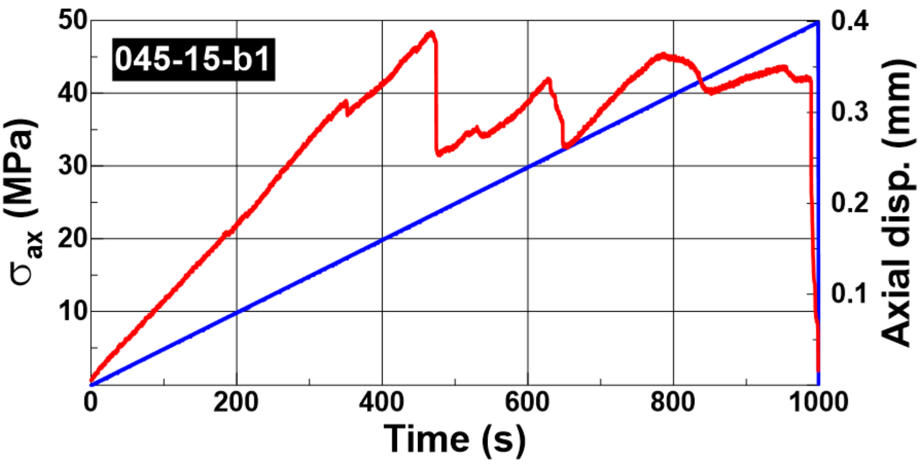

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	15_045b_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	40.78	40.62	40.69	40.74	40.79	**Mean length, L (mm)**	40.72	**Dry mass, M_d (g)**	21.19
Diameter (mm)	16.05	16.08	16.03	16.10	-	**Mean diameter, D (mm)**	16.07	**Dry density, ρ_d (kg/m^3)**	2567
L/D ratio	2.53	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.32				
Water content (%)	0.61	**Porosity, n (%)**	1.57	**Bulk density, ρ (kg/m^3)**	2583				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	646	**Temperature (ºC)**	22.0		
F_{max} (kN)	6.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	34.1	**$UCS_{1:2}$ (MPa)**	35.3	**UCS_{50} (MPa)**	28.7	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.138	**V_{S1} (km/s)**	3.508	**V_{S2} (km/s)**	3.495	**V_S (km/s)**	3.502
	Dynamic moduli	**E_{dyn} (GPa)**	79.7	**ν_{dyn}**	0.26	**V_P/V_S**	1.75
		G_{dyn} (GPa)	31.7	**K_{dyn} (GPa)**	55.1		
Notes (6)							

PICTURES AND PLOTS

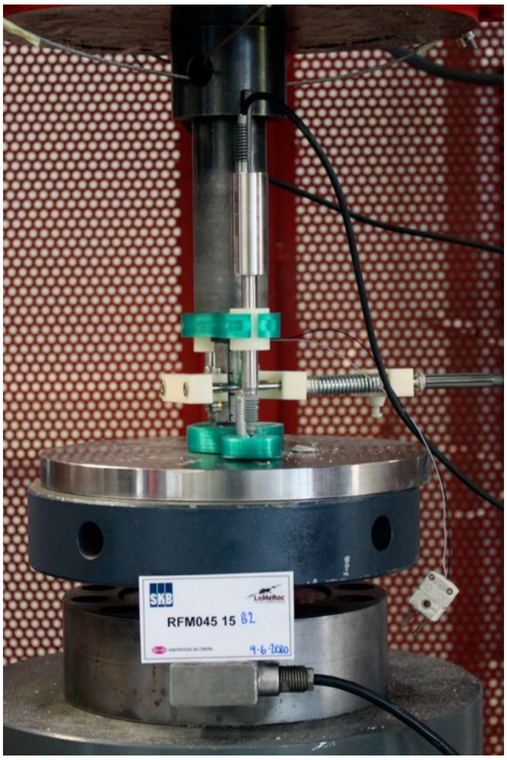

Figure 1. *Sample before the test*

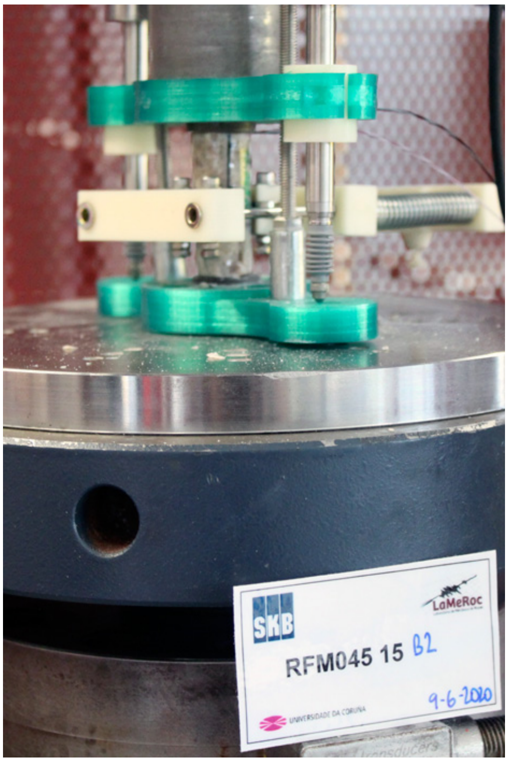

Figure 2. *Sample after the test*

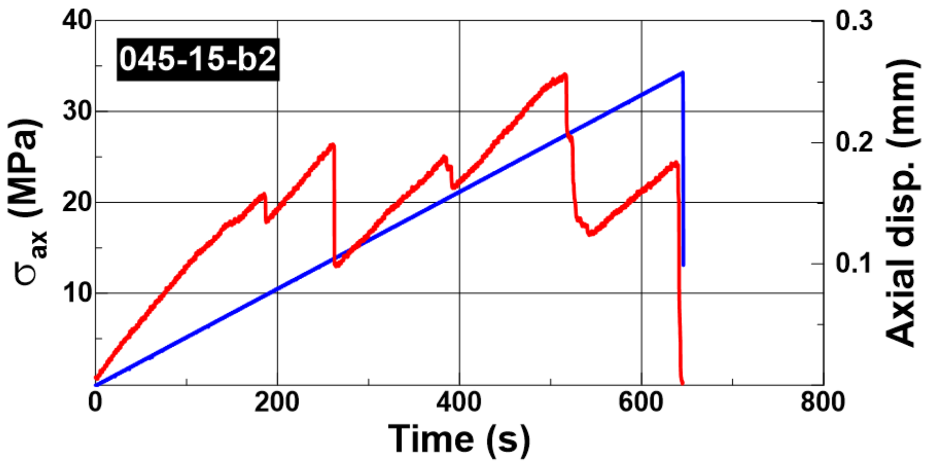

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	Specimen		Ref. LaMeRoc	15_045b_3
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	41.89	41.92	41.97	41.87	41.82	Mean length, L (mm)	41.89	Dry mass, M_d (g)	21.51
Diameter (mm)	16.15	15.93	15.96	15.89	-	Mean diameter, D (mm)	15.98	Dry density, ρ_d (kg/m^3)	2559

L/D ratio	2.62	Permeability, k (mD)	-	Bulk mass, M (g)	21.53
Water content (%)	0.09	Porosity, n (%)	0.24	Bulk density, ρ (kg/m^3)	2562
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	Time to failure (s)	800	Temperature (ºC)	22.0		
F_{max} (kN)	10.0	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	49.9	$UCS_{1:2}$ (MPa)	51.8	UCS_{50} (MPa)	42.2	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	78.5	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	6.232	V_{S1} (km/s)	3.479	V_{S2} (km/s)	3.498	V_S (km/s)	3.489
Dynamic moduli		E_{dyn} (GPa)	79.3	ν_{dyn}	0.27	V_P/V_S	1.79
		G_{dyn} (GPa)	31.2	K_{dyn} (GPa)	57.9		
Notes (6)							

PICTURES AND PLOTS

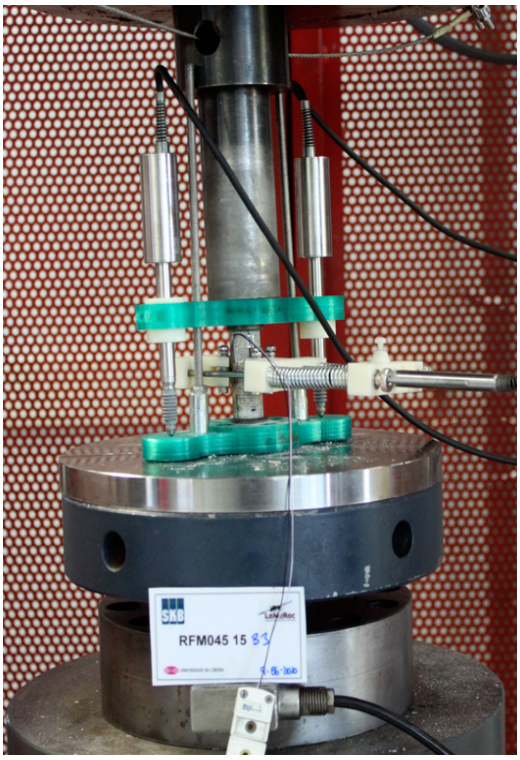

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

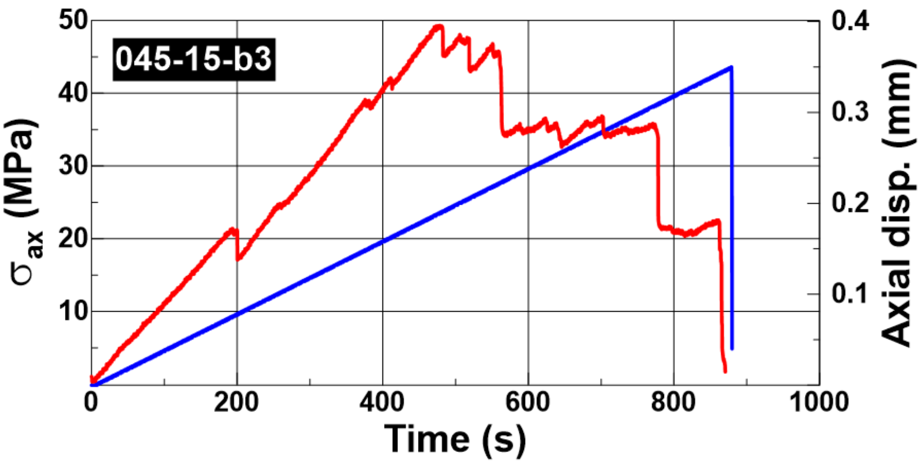

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	15_045b_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	38.54	38.57	38.63	38.56	38.53	**Mean length, L (mm)**	38.57	**Dry mass, M_d (g)**	19.91
Diameter (mm)	16.08	15.93	16.01	15.92	-	**Mean diameter, D (mm)**	15.99	**Dry density, ρ_d (kg/m^3)**	2572

L/D ratio	2.41	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	19.93
Water content (%)	0.10	**Porosity, n (%)**	0.26	**Bulk density, ρ (kg/m^3)**	2575
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	682	**Temperature (ºC)**	22.0		
F_{max} (kN)	12.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	63.5	**$UCS_{1:2}$ (MPa)**	65.3	**UCS_{50} (MPa)**	53.2	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	128.5	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.200	**V_{S1} (km/s)**	3.159	**V_{S2} (km/s)**	3.368	**V_S (km/s)**	3.264
	Dynamic moduli	**E_{dyn} (GPa)**	71.8	**ν_{dyn}**	0.31	**V_P/V_S**	1.90
		G_{dyn} (GPa)	27.4	**K_{dyn} (GPa)**	62.4		
Notes (6)							

PICTURES AND PLOTS

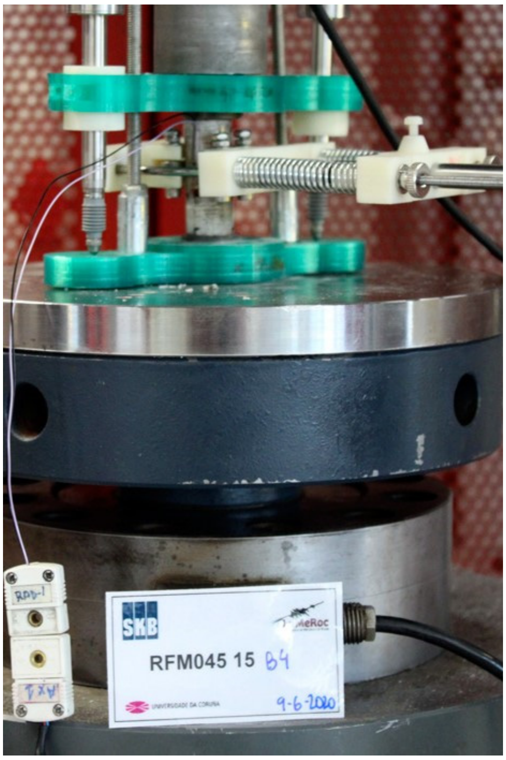

Figure 1. *Sample before the test*

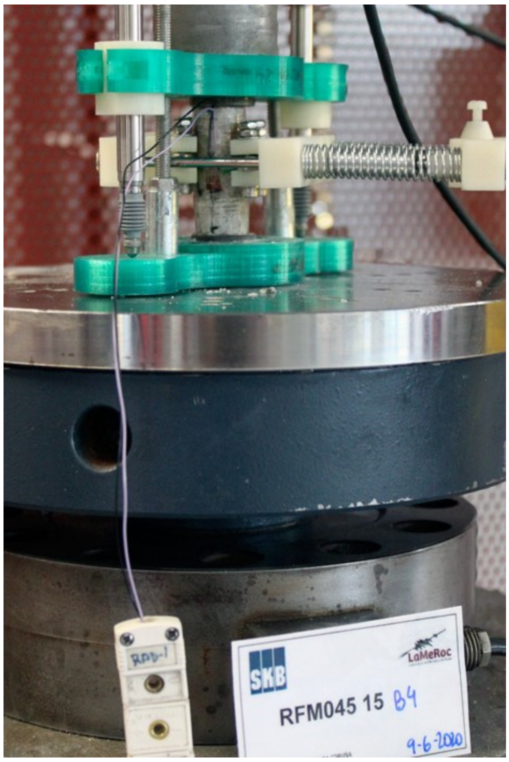

Figure 2. *Sample after the test*

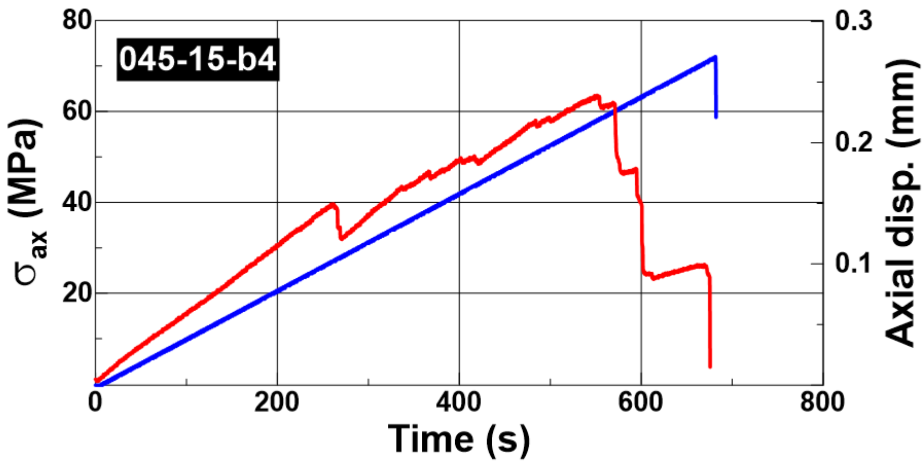

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	15_045c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	41.74	41.68	41.75	41.79	41.73	**Mean length, L (mm)**	41.74	**Dry mass, M_d (g)**	21.46
Diameter (mm)	16.09	16.03	15.91	15.99	-	**Mean diameter, D (mm)**	16.01	**Dry density, ρ_d (kg/m^3)**	2556
L/D ratio	2.61	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.47				
Water content (%)	0.05	**Porosity, n (%)**	0.12	**Bulk density, ρ (kg/m^3)**	2557				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	845	**Temperature (ºC)**	22.0		
F_{max} (kN)	10.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	52.4	**$UCS_{1:2}$ (MPa)**	54.3	**UCS_{50} (MPa)**	44.2	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	68.4	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.116	**V_{S1} (km/s)**	3.183	**V_{S2} (km/s)**	3.522	**V_S (km/s)**	3.353
Dynamic moduli		**E_{dyn} (GPa)**	73.9	**ν_{dyn}**	0.29	**V_P/V_S**	1.82
		G_{dyn} (GPa)	28.7	**K_{dyn} (GPa)**	57.3		
Notes (6)							

PICTURES AND PLOTS

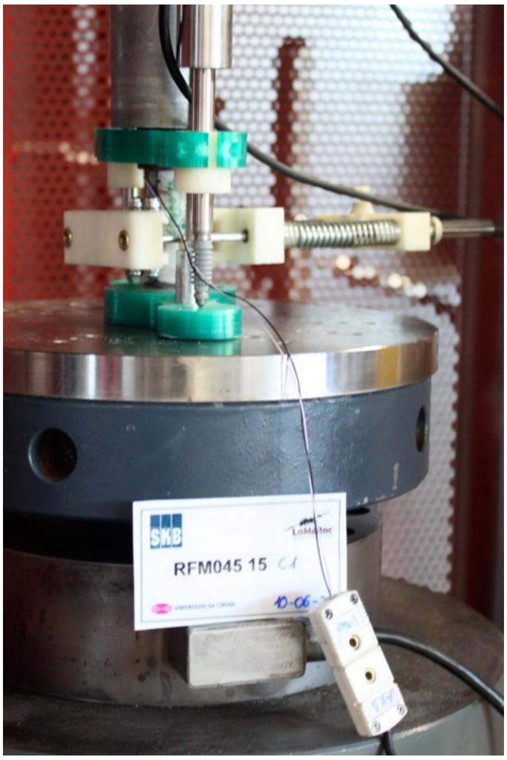

Figure 1. *Sample before the test*

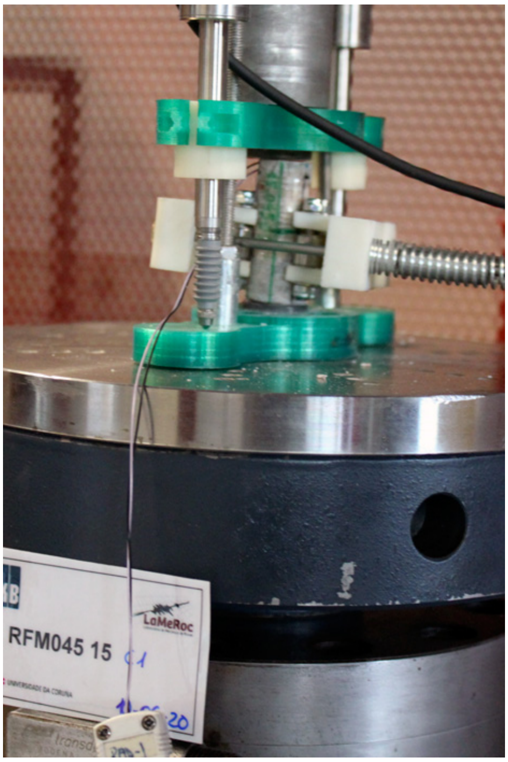

Figure 2. *Sample after the test*

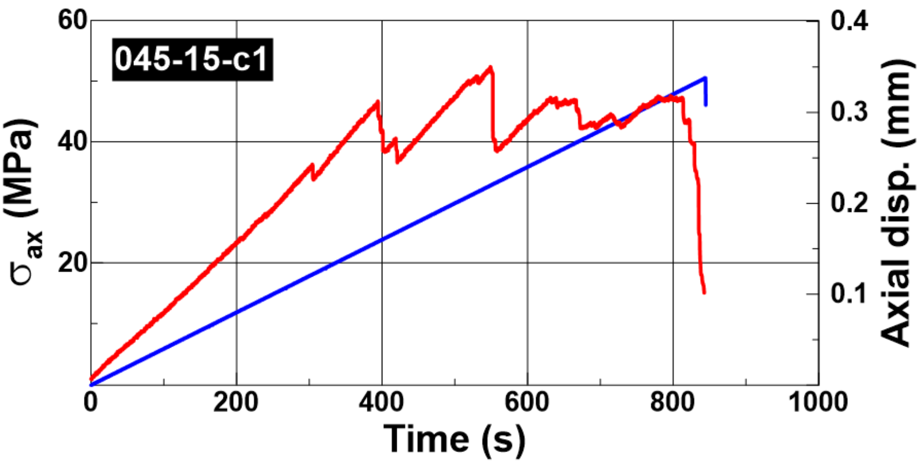

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	15_045c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	41.02	41.12	41.16	41.04	41.02	**Mean length, L (mm)**	41.07	**Dry mass, M_d (g)**	21.49
Diameter (mm)	16.01	16.04	16.01	15.87	-	**Mean diameter, D (mm)**	15.98	**Dry density, ρ_d (kg/m^3)**	2608

L/D ratio	2.57	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.51
Water content (%)	0.09	**Porosity, n (%)**	0.24	**Bulk density, ρ (kg/m^3)**	2610
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	988	**Temperature (ºC)**	22.0		
F_{max} (kN)	13.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	67.4	**$UCS_{1:2}$ (MPa)**	69.8	**UCS_{50} (MPa)**	56.8	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.080	**V_{S1} (km/s)**	3.624	**V_{S2} (km/s)**	3.273	**V_S (km/s)**	3.449
	Dynamic moduli	**E_{dyn} (GPa)**	78.4	**ν_{dyn}**	0.26	**V_P/V_S**	1.76
		G_{dyn} (GPa)	31.0	**K_{dyn} (GPa)**	55.1		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

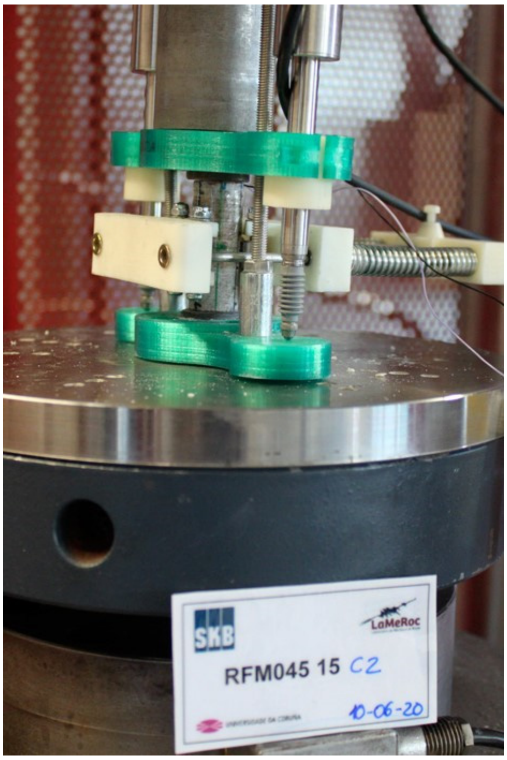

Figure 1. Sample before the test

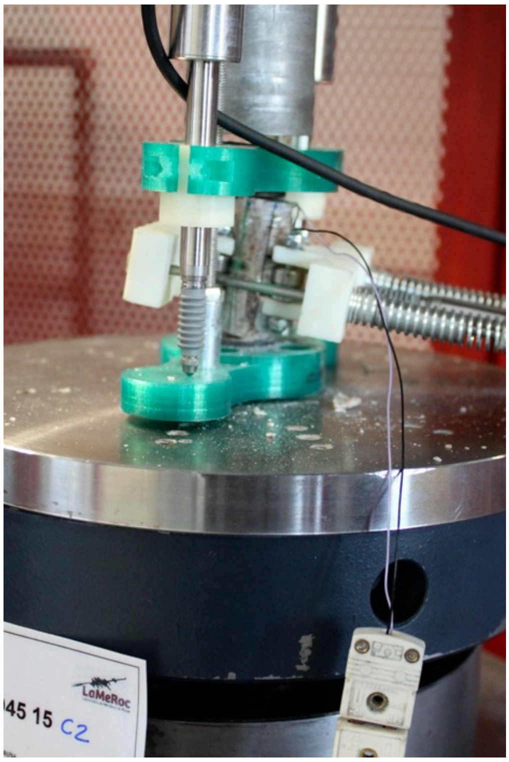

Figure 2. Sample after the test

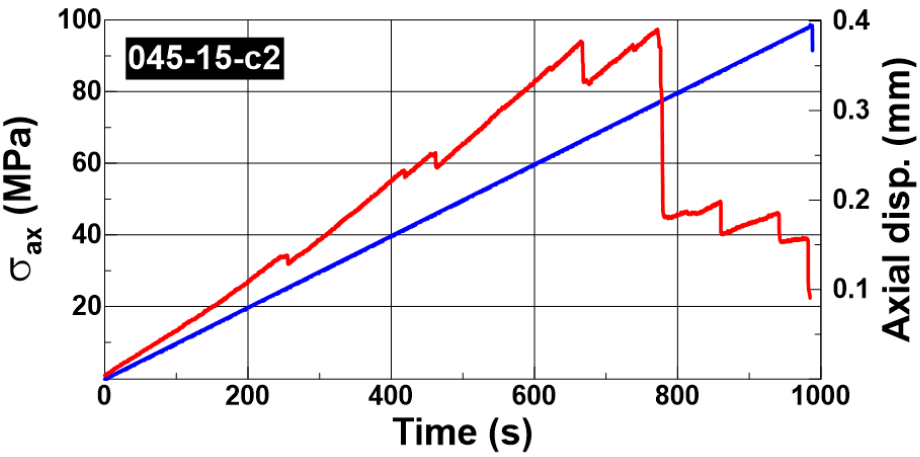

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	Specimen		Ref. LaMeRoc	15_045c_3
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	38.15	38.79	39.10	39.05	38.50	Mean length, L (mm)	38.72	Dry mass, M_d (g)	19.94
Diameter (mm)	15.73	15.93	16.05	16.02	-	Mean diameter, D (mm)	15.93	Dry density, ρ_d (kg/m^3)	2583

L/D ratio	2.43	Permeability, k (mD)	-	Bulk mass, M (g)	19.96
Water content (%)	0.10	Porosity, n (%)	0.26	Bulk density, ρ (kg/m^3)	2586
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	Time to failure (s)	995	Temperature (ºC)	22.0		
F_{max} (kN)	10.5	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	52.6	$UCS_{1:2}$ (MPa)	54.1	UCS_{50} (MPa)	44.1	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	-	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.937	V_{S1} (km/s)	2.860	V_{S2} (km/s)	3.223	V_S (km/s)	3.042
Dynamic moduli		E_{dyn} (GPa)	63.3	ν_{dyn}	0.32	V_P/V_S	1.95
		G_{dyn} (GPa)	23.9	K_{dyn} (GPa)	59.2		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

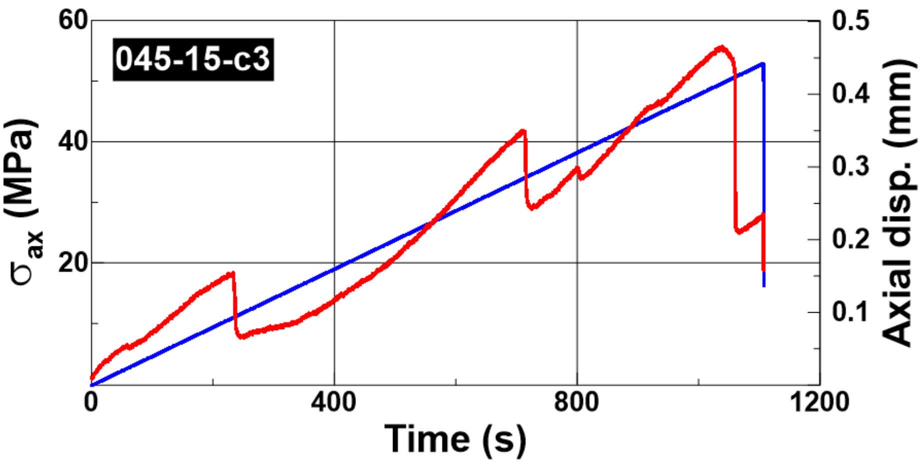

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Notes (1)	

Report reference		**Report date**	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	15_045c_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	38.52	38.75	38.84	38.67	38.46	**Mean length, L (mm)**	38.65	**Dry mass, M_d (g)**	20.07
Diameter (mm)	15.80	16.02	16.12	15.92	-	**Mean diameter, D (mm)**	15.97	**Dry density, ρ_d (kg/m^3)**	2594

L/D ratio	2.42	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	20.09
Water content (%)	0.10	**Porosity, n (%)**	0.26	**Bulk density, ρ (kg/m^3)**	2597
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	509	**Temperature (ºC)**	22.0		
F_{max} (kN)	2.3	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	11.4	**$UCS_{1:2}$ (MPa)**	11.7	**UCS_{50} (MPa)**	9.5	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.259	**V_{S1} (km/s)**	3.185	**V_{S2} (km/s)**	3.198	**V_S (km/s)**	3.192
	Dynamic moduli	**E_{dyn} (GPa)**	70.1	**ν_{dyn}**	0.32	**V_P/V_S**	1.96
		G_{dyn} (GPa)	26.5	**K_{dyn} (GPa)**	66.5		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

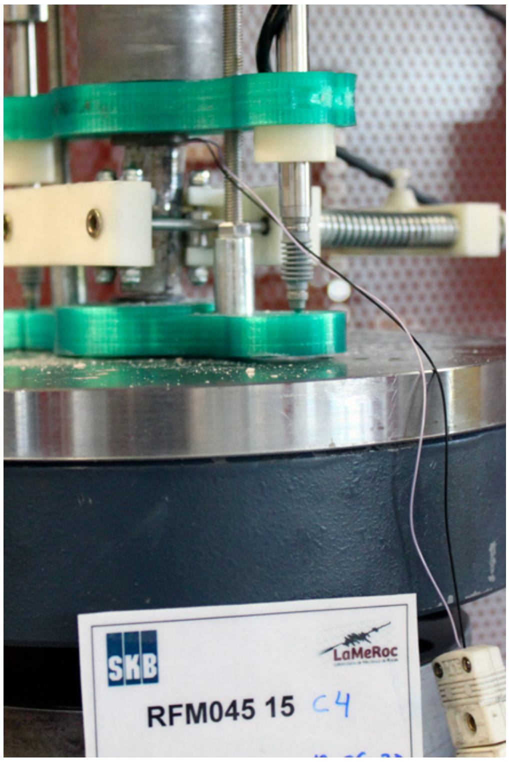

Figure 2. *Sample after the test*

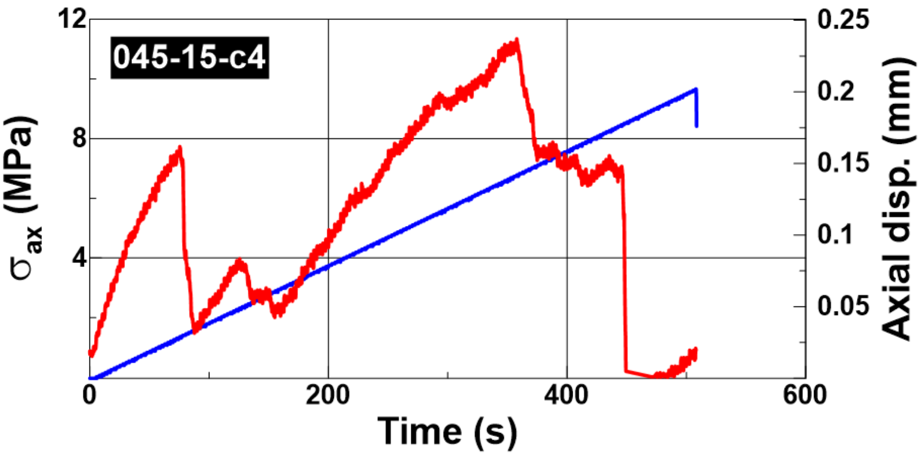

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45d	Specimen		Ref. LaMeRoc	15_045d_1
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	38.06	38.11	38.01	37.32	37.50	Mean length, L (mm)	37.80	Dry mass, M_d (g)	19.15
Diameter (mm)	16.01	15.90	15.96	15.20	-	Mean diameter, D (mm)	15.77	Dry density, ρ_d (kg/m^3)	2595

L/D ratio	2.40	Permeability, k (mD)	-	Bulk mass, M (g)	19.18
Water content (%)	0.16	Porosity, n (%)	0.41	Bulk density, ρ (kg/m^3)	2599
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	Time to failure (s)	200	Temperature (ºC)	22.0		
F_{max} (kN)	2.3	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	12.0	$UCS_{1:2}$ (MPa)	12.3	UCS_{50} (MPa)	10.0	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	52.2	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.990	V_{S1} (km/s)	3.346	V_{S2} (km/s)	3.592	V_S (km/s)	3.469
Dynamic moduli		E_{dyn} (GPa)	78.0	ν_{dyn}	0.25	V_P/V_S	1.73
		G_{dyn} (GPa)	31.3	K_{dyn} (GPa)	51.5		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

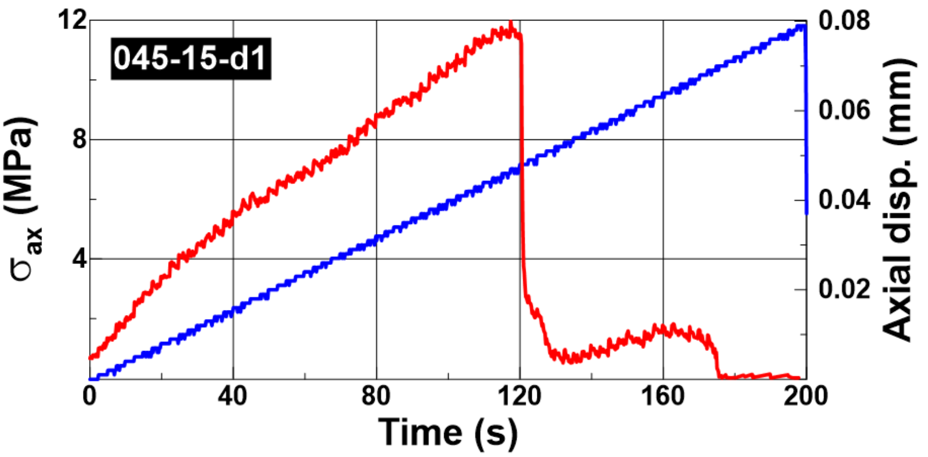

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	15_045d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	40.78	40.36	40.55	40.76	40.60	**Mean length, L (mm)**	40.61	**Dry mass, M_d (g)**	21.16
Diameter (mm)	16.07	15.98	15.95	15.97	-	**Mean diameter, D (mm)**	15.99	**Dry density, ρ_d (kg/m^3)**	2594

L/D ratio	2.54	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	21.19
Water content (%)	0.14	**Porosity, n (%)**	0.37	**Bulk density, ρ (kg/m^3)**	2598
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	706	**Temperature (ºC)**	22.0		
F_{max} (kN)	10.0	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	49.6	**$UCS_{1:2}$ (MPa)**	51.2	**UCS_{50} (MPa)**	41.7	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.949	**V_{S1} (km/s)**	3.228	**V_{S2} (km/s)**	3.462	**V_S (km/s)**	3.345
	Dynamic moduli	**E_{dyn} (GPa)**	73.7	**ν_{dyn}**	0.27	**V_P/V_S**	1.78
		G_{dyn} (GPa)	29.1	**K_{dyn} (GPa)**	53.2		
Notes (6)							

PICTURES AND PLOTS

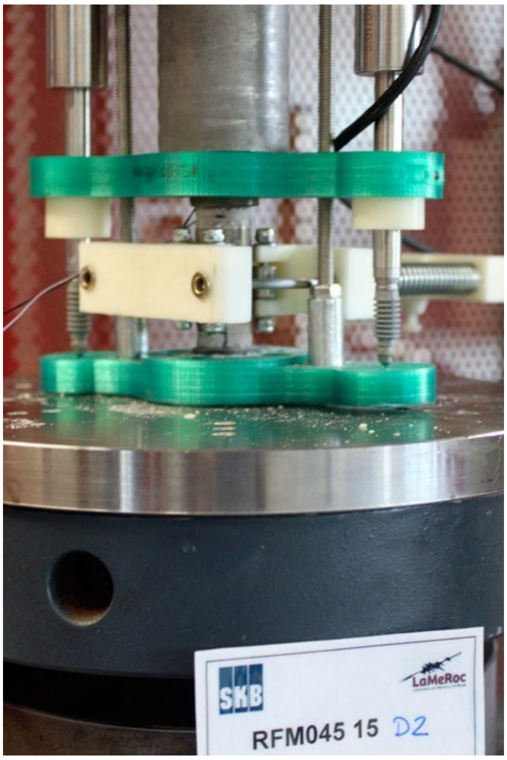

Figure 1. *Sample before the test*

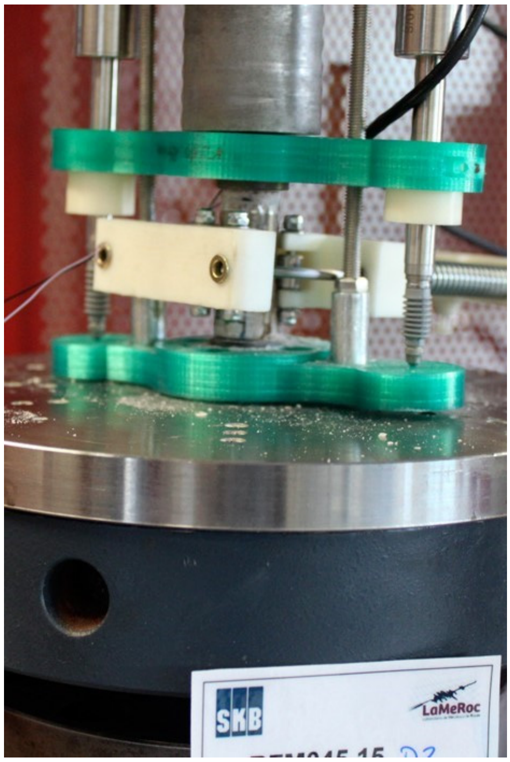

Figure 2. *Sample after the test*

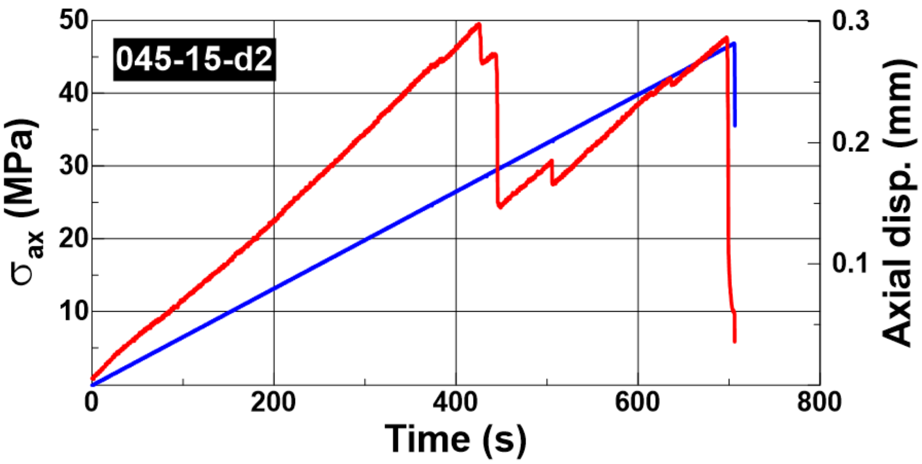

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	15_045d_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	39.42	39.19	39.56	39.54	39.51	**Mean length, L (mm)**	39.44	**Dry mass, M_d (g)**	20.03
Diameter (mm)	15.87	15.79	15.84	15.90	-	**Mean diameter, D (mm)**	15.85	**Dry density, ρ_d (kg/m^3)**	2574

L/D ratio	2.49	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	20.06
Water content (%)	0.15	**Porosity, n (%)**	0.39	**Bulk density, ρ (kg/m^3)**	2578
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	11/06/2020	**Time to failure (s)**	582	**Temperature (ºC)**	22.0		
F_{max} (kN)	10.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	53.7	**$UCS_{1:2}$ (MPa)**	55.4	**UCS_{50} (MPa)**	45.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	63.5	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.974	**V_{S1} (km/s)**	3.492	**V_{S2} (km/s)**	3.239	**V_S (km/s)**	3.365
	Dynamic moduli	**E_{dyn} (GPa)**	74.0	**ν_{dyn}**	0.27	**V_P/V_S**	1.78
		G_{dyn} (GPa)	29.2	**K_{dyn} (GPa)**	53.1		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

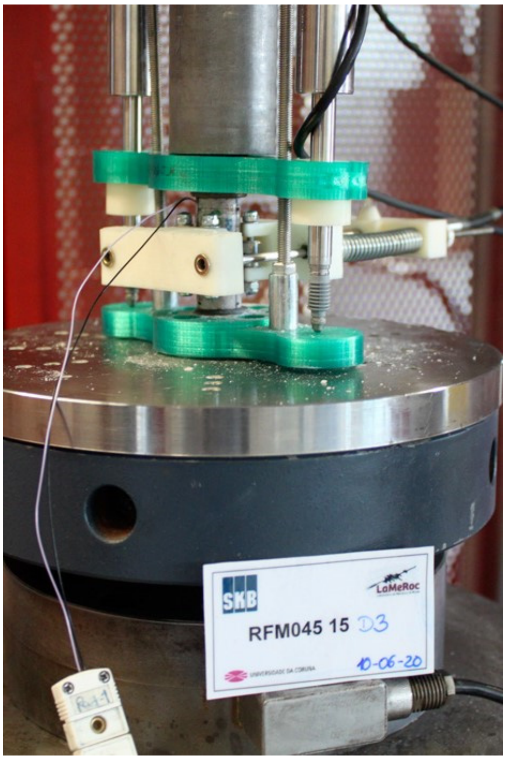

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

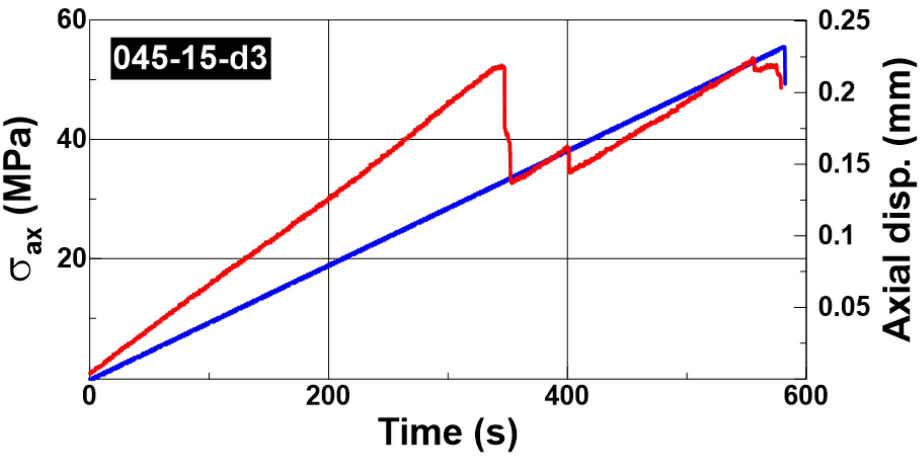

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	21_045a_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	59.72	59.70	59.72	59.74	59.71	**Mean length, L (mm)**	59.72	**Dry mass, M_d (g)**	60.29
Diameter (mm)	22.29	22.36	22.35	22.23	22.22	**Mean diameter, D (mm)**	22.29	**Dry density, ρ_d (kg/m^3)**	2587

L/D ratio	2.68	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	60.34
Water content (%)	0.08	**Porosity, n (%)**	0.21	**Bulk density, ρ (kg/m^3)**	2589
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	900	**Temperature (ºC)**	22.0		
F_{max} (kN)	86.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	222.5	**$UCS_{1:2}$ (MPa)**	231.1	**UCS_{50} (MPa)**	199.8	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	75.0	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.024	**V_{S1} (km/s)**	3.353	**V_{S2} (km/s)**	3.226	**V_S (km/s)**	3.290
	Dynamic moduli	**E_{dyn} (GPa)**	72.2	**ν_{dyn}**	0.29	**V_P/V_S**	1.83
		G_{dyn} (GPa)	28.0	**K_{dyn} (GPa)**	56.6		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

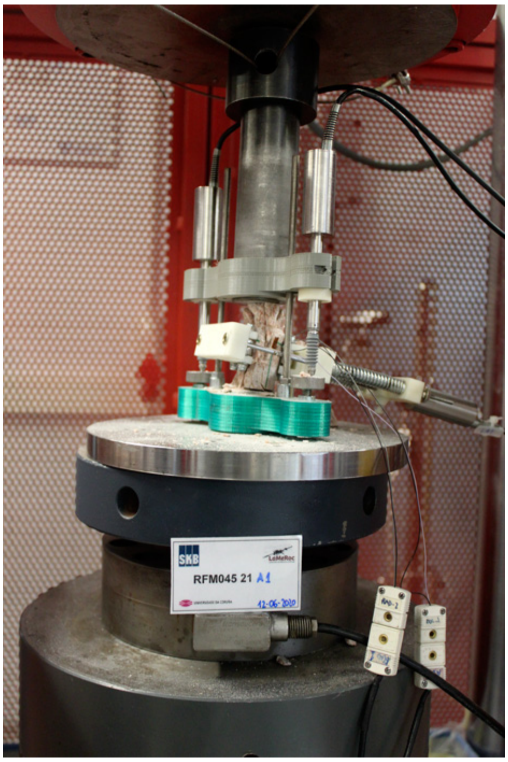

Figure 2. *Sample after the test*

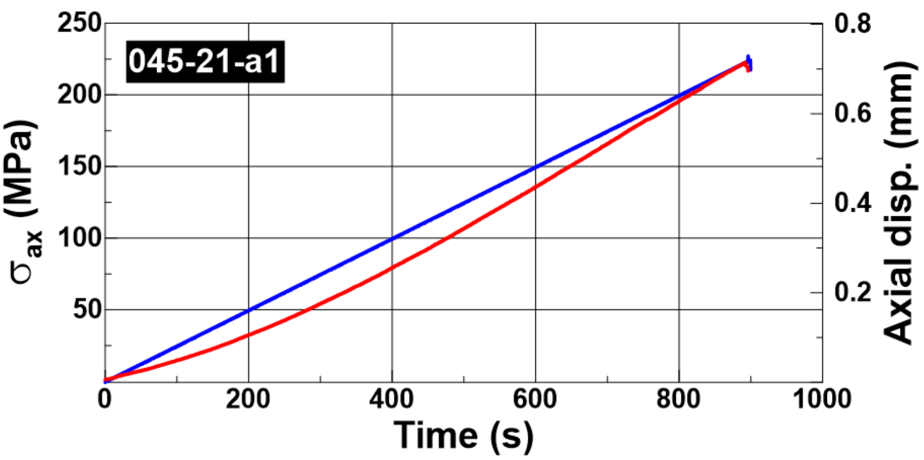

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

PICTURES AND PLOTS

Figure 1. *Sample before the test*

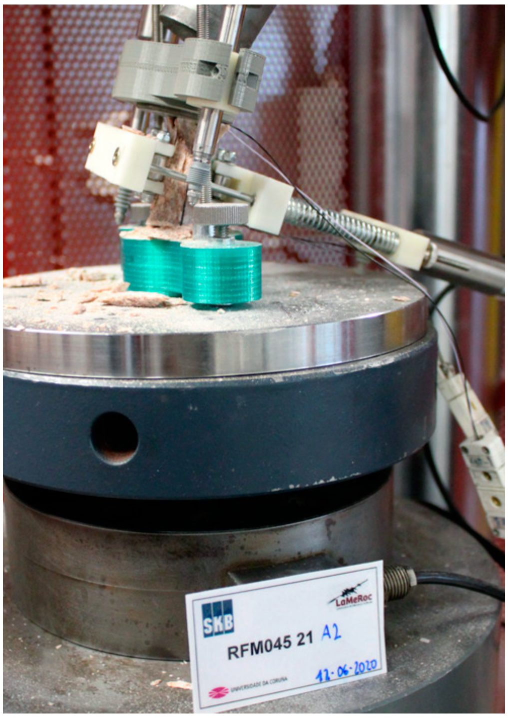

Figure 2. *Sample after the test*

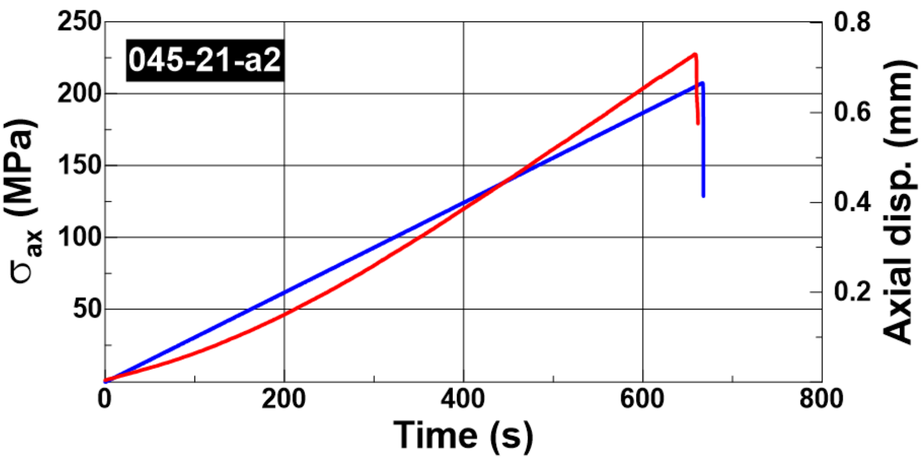

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	21_045a_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	57.90	57.93	57.95	57.91	57.90	**Mean length, L (mm)**	57.92	**Dry mass, M_d (g)**	58.78
Diameter (mm)	22.26	22.32	22.36	22.23	22.23	**Mean diameter, D (mm)**	22.28	**Dry density, ρ_d (kg/m^3)**	2603

L/D ratio	2.60	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	58.85
Water content (%)	0.12	**Porosity, n (%)**	0.31	**Bulk density, ρ (kg/m^3)**	2606
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	655			**Temperature (ºC)**	22.0
F_{max} (kN)	86.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	220.7	**$UCS_{1:2}$ (MPa)**	228.6	**UCS_{50} (MPa)**	197.7	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	82.1	**$\nu_{50\%}$**	0.28	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.034	**V_{S1} (km/s)**	3.415	**V_{S2} (km/s)**	3.459	**V_S (km/s)**	3.437
Dynamic moduli		**E_{dyn} (GPa)**	77.6	**ν_{dyn}**	0.26	**V_P/V_S**	1.76
		G_{dyn} (GPa)	30.8	**K_{dyn} (GPa)**	53.9		
Notes (6)							

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	21_045a_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	57.15	57.29	57.25	57.28	57.23	**Mean length, L (mm)**	57.24	**Dry mass, M_d (g)**	57.68
Diameter (mm)	22.38	22.24	22.25	22.22	22.19	**Mean diameter, D (mm)**	22.26	**Dry density, ρ_d (kg/m^3)**	2590

L/D ratio	2.57	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	57.75
Water content (%)	0.12	**Porosity, n (%)**	0.31	**Bulk density, ρ (kg/m^3)**	2593
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	668	**Temperature (°C)**	22.0		
F_{max} (kN)	88.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	227.5	**$UCS_{1:2}$ (MPa)**	235.5	**UCS_{50} (MPa)**	203.5	**σ_{CI} (MPa)**	166.0
	Static moduli	**$E_{50\%}$ (GPa)**	76.4	**$\nu_{50\%}$**	0.26	**σ_{CD} (MPa)**	208.9
ϕ_{dry} (°)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (°)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.091	**V_{S1} (km/s)**	3.349	**V_{S2} (km/s)**	3.391	**V_S (km/s)**	3.370
	Dynamic moduli	**E_{dyn} (GPa)**	75.4	**ν_{dyn}**	0.28	**V_P/V_S**	1.81
		G_{dyn} (GPa)	29.5	**K_{dyn} (GPa)**	57.0		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

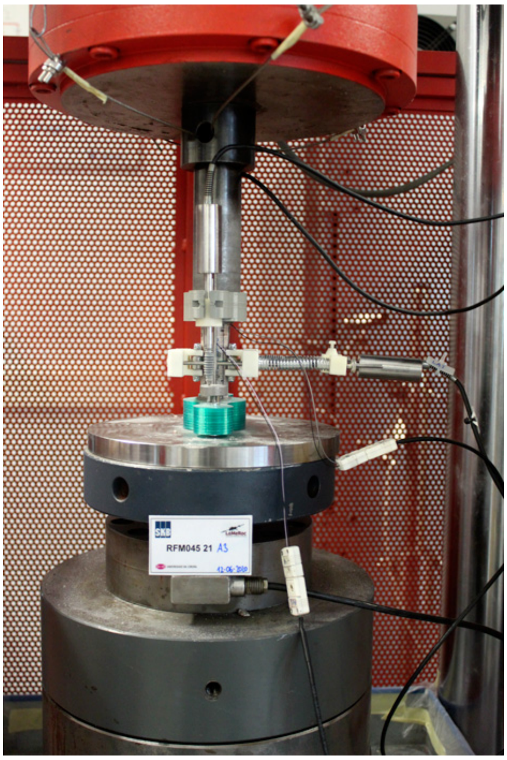

Figure 1. Sample before the test

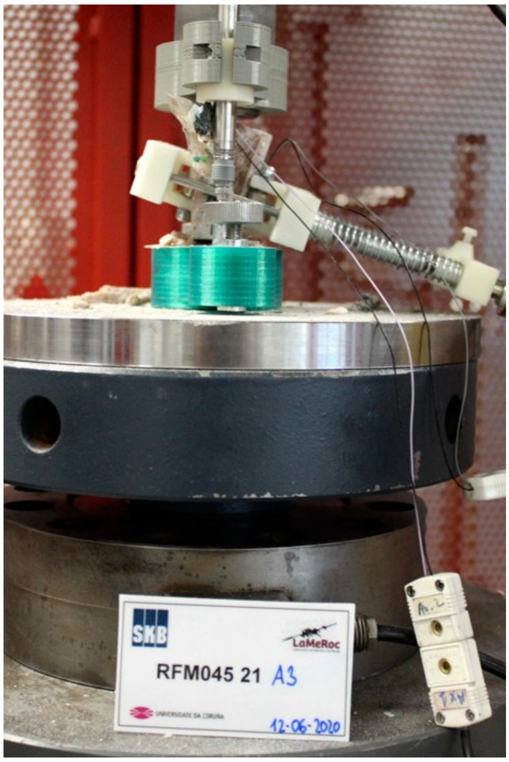

Figure 2. Sample after the test

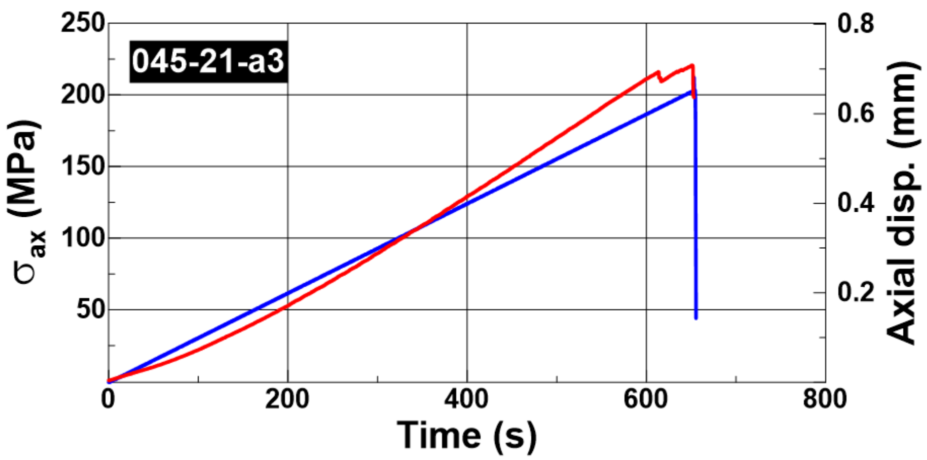

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	21_045a_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	58.31	58.42	58.33	58.43	58.26	**Mean length, L (mm)**	58.35	**Dry mass, M_d (g)**	59.17
Diameter (mm)	22.23	22.34	22.31	22.22	-	**Mean diameter, D (mm)**	22.28	**Dry density, ρ_d (kg/m^3)**	2602
L/D ratio	2.62	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	59.23
Water content (%)	0.10	**Porosity, n (%)**	0.26					**Bulk density, ρ (kg/m^3)**	2605
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	599	**Temperature (ºC)**	22.0		
F_{max} (kN)	69.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	178.4	**$UCS_{1:2}$ (MPa)**	184.9	**UCS_{50} (MPa)**	159.9	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.041	**V_{S1} (km/s)**	3.544	**V_{S2} (km/s)**	3.546	**V_S (km/s)**	3.545
	Dynamic moduli	**E_{dyn} (GPa)**	81.0	**ν_{dyn}**	0.24	**V_P/V_S**	1.70
		G_{dyn} (GPa)	32.7	**K_{dyn} (GPa)**	51.4		
Notes (6)							

PICTURES AND PLOTS

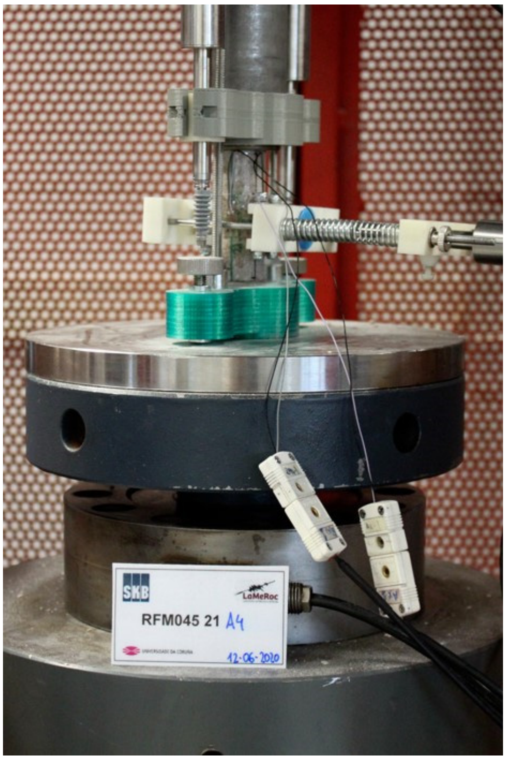

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

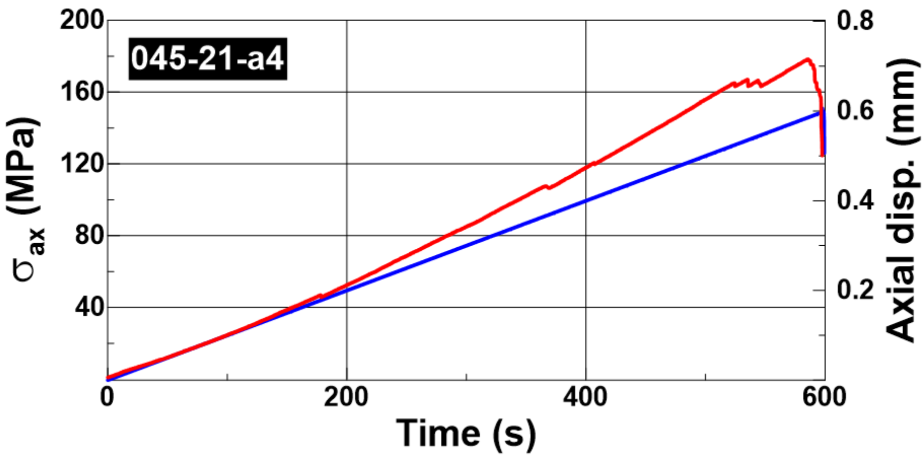

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	Specimen		Ref. LaMeRoc	21_045b_1
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	56.62	56.67	56.60	56.60	56.57	Mean length, L (mm)	56.61	Dry mass, M_d (g)	57.83
Diameter (mm)	22.25	22.27	22.29	22.24	22.20	Mean diameter, D (mm)	22.25	Dry density, ρ_d (kg/m^3)	2627

L/D ratio	2.54	Permeability, k (mD)	-	Bulk mass, M (g)	57.89
Water content (%)	0.10	Porosity, n (%)	0.27	Bulk density, ρ (kg/m^3)	2630
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	Time to failure (s)	485	Temperature (ºC)	22.0		
F_{max} (kN)	63.0	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	162.1	$UCS_{1:2}$ (MPa)	167.5	UCS_{50} (MPa)	144.8	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	108.0	$\nu_{50\%}$	0.62	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	6.160	V_{S1} (km/s)	3.400	V_{S2} (km/s)	3.464	V_S (km/s)	3.432
Dynamic moduli		E_{dyn} (GPa)	79.0	ν_{dyn}	0.27	V_P/V_S	1.79
		G_{dyn} (GPa)	31.0	K_{dyn} (GPa)	58.5		
Notes (6)							

PICTURES AND PLOTS

Figure 1. Sample before the test

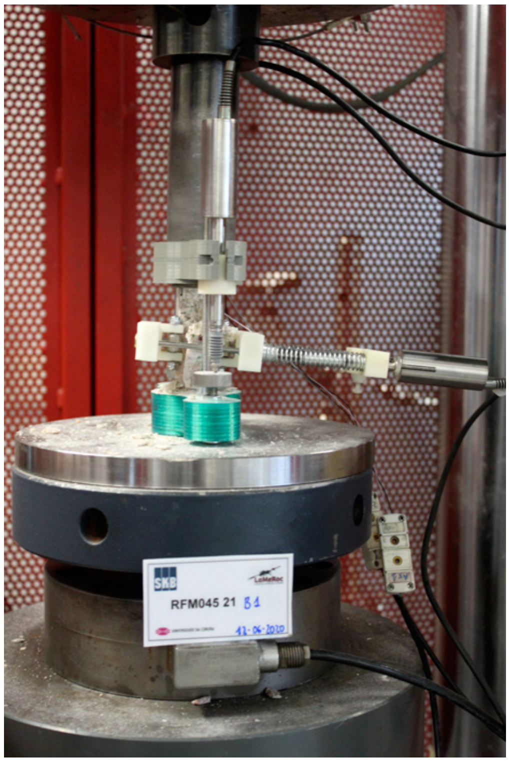

Figure 2. Sample after the test

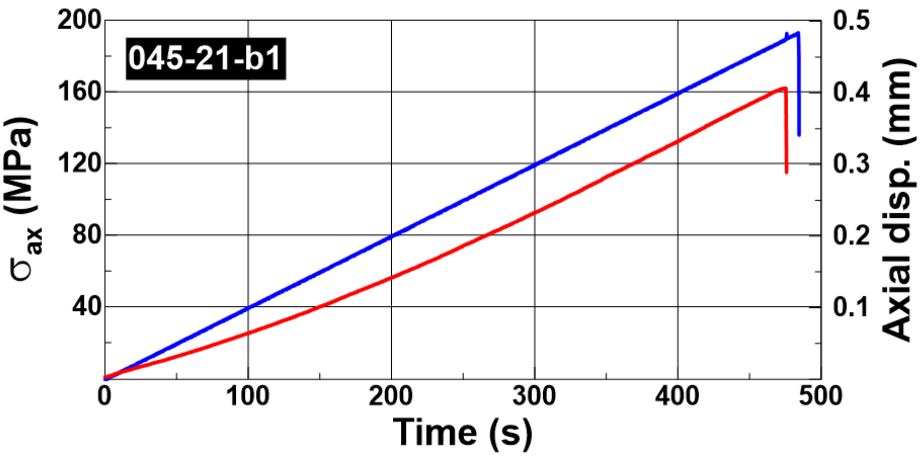

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	21_045b_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	59.45	59.48	59.50	59.48	59.54	**Mean length, L (mm)**	59.49	**Dry mass, M_d (g)**	60.86
Diameter (mm)	22.27	22.26	22.25	22.26	22.23	**Mean diameter, D (mm)**	22.25	**Dry density, ρ_d (kg/m^3)**	2630

L/D ratio	2.67	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	60.94
Water content (%)	0.13	**Porosity, n (%)**	0.35	**Bulk density, ρ (kg/m^3)**	2634
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	648	**Temperature (ºC)**	22.0		
F_{max} (kN)	90.0	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	231.3	**$UCS_{1:2}$ (MPa)**	240.2	**UCS_{50} (MPa)**	207.6	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	75.1	**$\nu_{50\%}$**	0.22	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.121	**V_{S1} (km/s)**	3.506	**V_{S2} (km/s)**	3.535	**V_S (km/s)**	3.520
	Dynamic moduli	**E_{dyn} (GPa)**	81.8	**ν_{dyn}**	0.25	**V_P/V_S**	1.74
		G_{dyn} (GPa)	32.6	**K_{dyn} (GPa)**	55.2		
Notes (6)							

PICTURES AND PLOTS

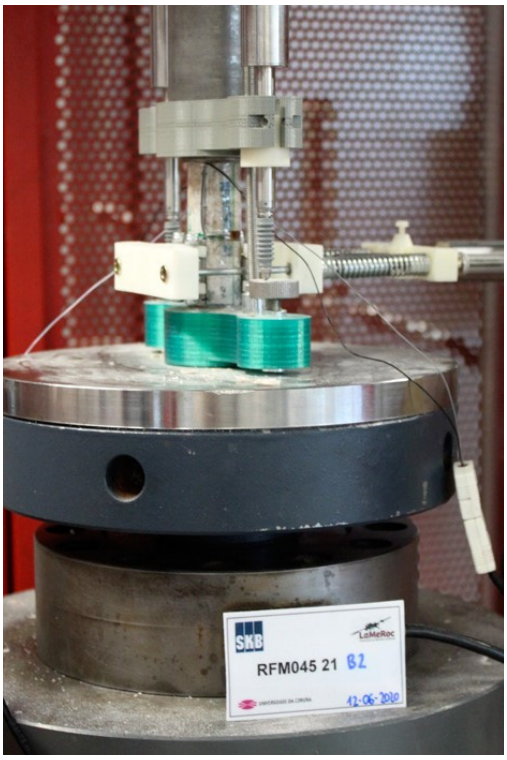

Figure 1. Sample before the test

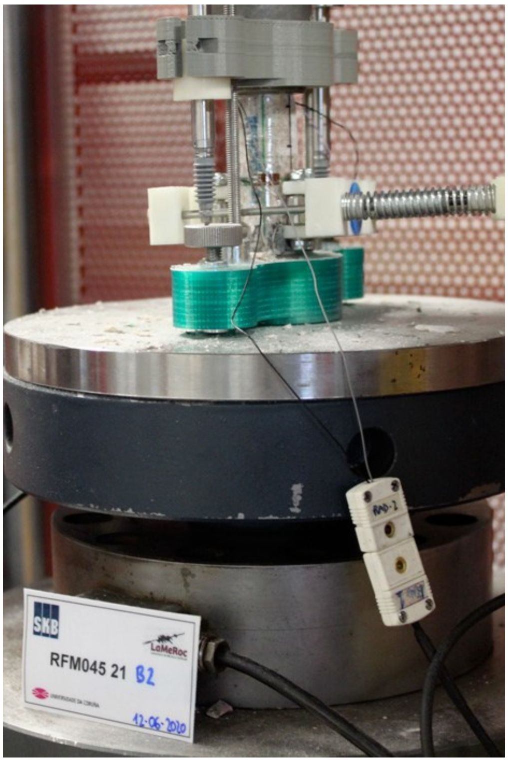

Figure 2. Sample after the test

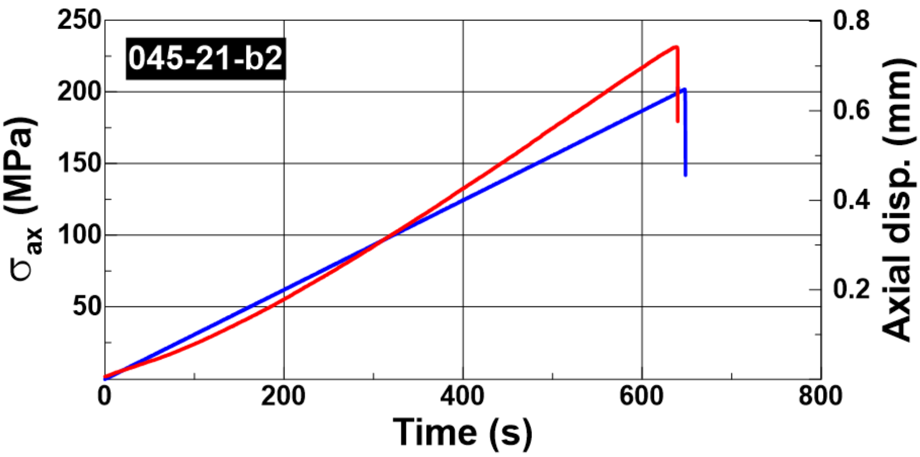

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	21_045b_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	57.77	57.88	57.90	57.80	57.92	**Mean length, L (mm)**	57.85	**Dry mass, M_d (g)**	58.76
Diameter (mm)	22.26	22.25	22.22	22.24	22.27	**Mean diameter, D (mm)**	22.25	**Dry density, ρ_d (kg/m^3)**	2613

L/D ratio	2.60	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	58.81
Water content (%)	0.09	**Porosity, n (%)**	0.22	**Bulk density, ρ (kg/m^3)**	2615
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	471	**Temperature (ºC)**	22.0		
F_{max} (kN)	58.4	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	150.3	**$UCS_{1:2}$ (MPa)**	155.6	**UCS_{50} (MPa)**	134.5	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	178.4	**$\nu_{50\%}$**	1.00	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.278	**V_{S1} (km/s)**	3.352	**V_{S2} (km/s)**	3.352	**V_S (km/s)**	3.352
Dynamic moduli		**E_{dyn} (GPa)**	76.4	**ν_{dyn}**	0.30	**V_P/V_S**	1.87
		G_{dyn} (GPa)	29.4	**K_{dyn} (GPa)**	63.9		
Notes (6)							

PICTURES AND PLOTS

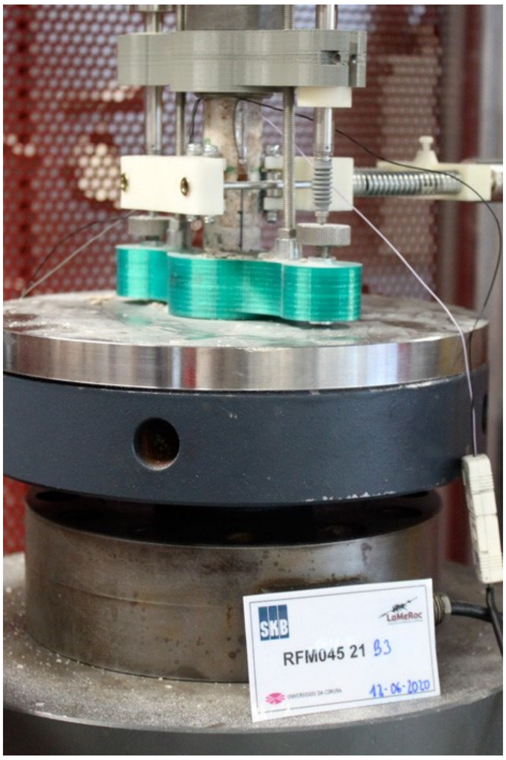

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

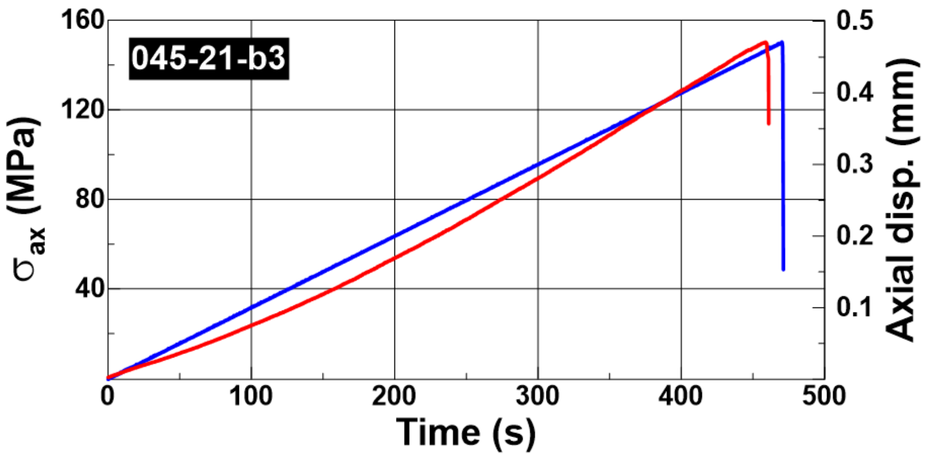

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	*Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements*		
Project	*Scale Effect of Intact Granite Rocks*		
Company	*Svensk Kärnbränslehantering AB*		
Test type	*UCS*		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	*45b*	**Specimen**		**Ref. LaMeRoc**	*21_045b_4*
Depth (m)	*surface block*	**Formation**		**Facies**	
Sampling date		**Location**	*Forsmark (Sweden)*	**Lithology**	*RFM045*
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	*Y*	**Date**		**Dimensional verification (Y/N)**	*Y*	**Date**	
Cutting (Y/N)	*Y*	**Date**		**Trimming (Y/N)**	*Y*	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	*57.73*	*57.68*	*57.79*	*57.77*	*57.72*	**Mean length, L (mm)**	*57.74*	**Dry mass, M_d (g)**	*58.95*
Diameter (mm)	*22.36*	*22.29*	*22.31*	*22.26*	*22.23*	**Mean diameter, D (mm)**	*22.29*	**Dry density, ρ_d (kg/m^3)**	*2616*

L/D ratio	*2.59*	**Permeability, k (mD)**	*-*	**Bulk mass, M (g)**	*59.02*
Water content (%)	*0.12*	**Porosity, n (%)**	*0.31*	**Bulk density, ρ (kg/m^3)**	*2620*
Notes (4)					

EQUIPMENT

Device	*Servosis 150 ton*	**Force class (UNE-EN-7500)**	*1*	**Displacement class (ASTM E2309)**	*A*
Calibration date	*09/09/2020*	**Control mode (Force/Strain)**	*Strain*		
LDT model	*Solartron AX/5/s*	**Loading rate (N/s)**	*-*		
Strain gauge type	*BX120-6AA*	**Strain rate (s^{-1})**	*4.17E-06*		
Load cell	*Built-in 1500 kN*	**Shear rate (mm/s)**	*-*		
Notes (5)					

TEST RESULTS

Test date	*12/06/2020*	**Time to failure (s)**	*644*	**Temperature (ºC)**	*22.0*		
F_{max} (kN)	*93.4*	**T_0 (MPa)**	*-*	**$T_{0,50}$ (MPa)**	*-*		
UCS (MPa)	*239.3*	**$UCS_{1:2}$ (MPa)**	*247.8*	**UCS_{50} (MPa)**	*214.2*	**σ_{CI} (MPa)**	*93.8*
	Static moduli	**$E_{50\%}$ (GPa)**	*143.7*	**$\nu_{50\%}$**	*0.48*	**σ_{CD} (MPa)**	*151.6*
ϕ_{dry} (º)	*-*	**c'_{dry} (kPa)**	*-*	**ϕ_{wet} (º)**	*-*	**c'_{wet} (kPa)**	*-*
V_P (km/s)	*6.168*	**V_{S1} (km/s)**	*3.449*	**V_{S2} (km/s)**	*3.522*	**V_S (km/s)**	*3.485*
	Dynamic moduli	**E_{dyn} (GPa)**	*80.5*	**ν_{dyn}**	*0.27*	**V_P/V_S**	*1.77*
		G_{dyn} (GPa)	*31.8*	**K_{dyn} (GPa)**	*57.2*		
Notes (6)							

PICTURES AND PLOTS

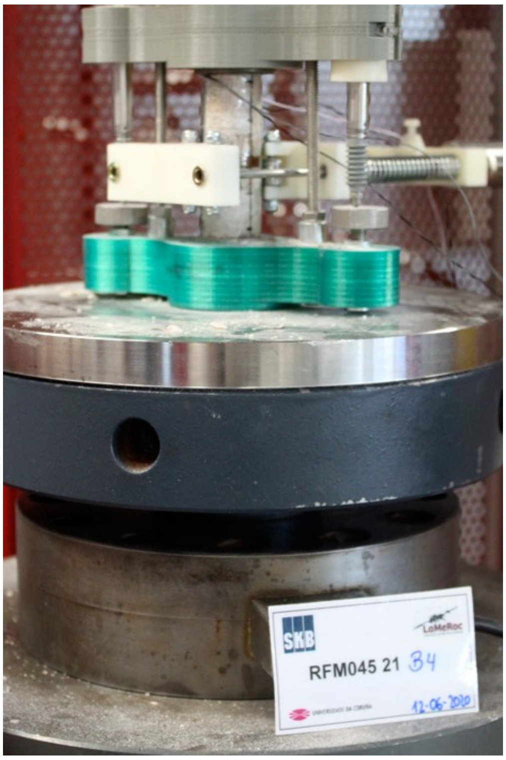

Figure 1. *Sample before the test*

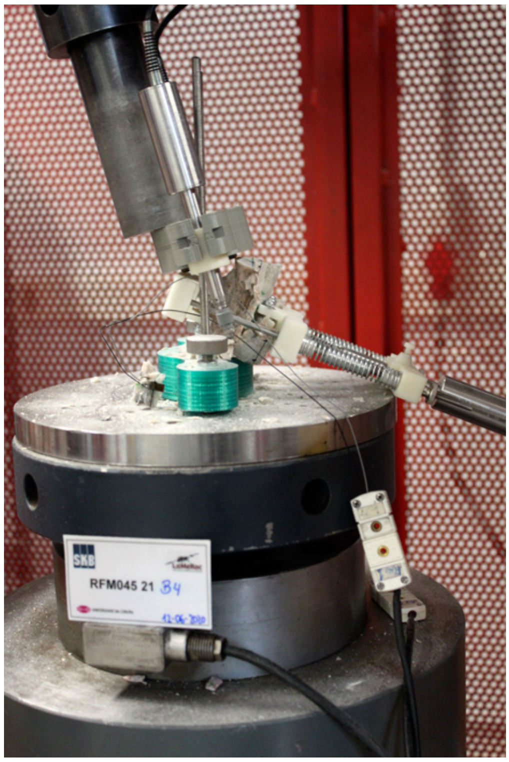

Figure 2. *Sample after the test*

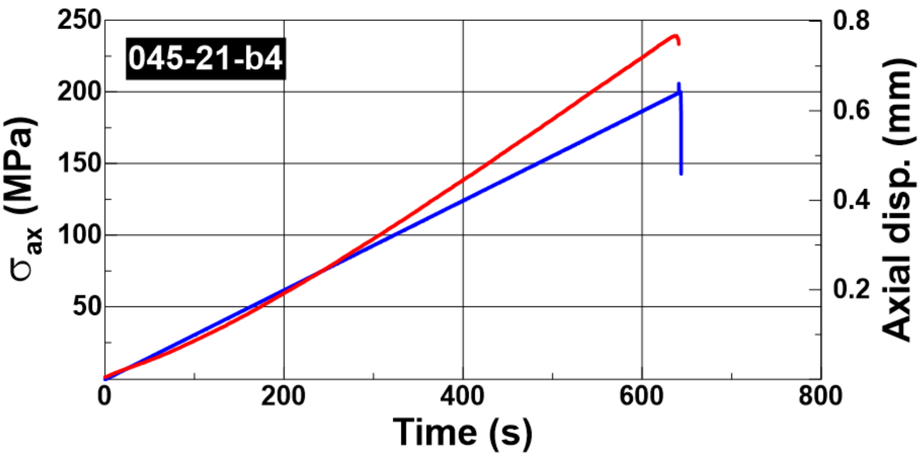

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	Specimen		Ref. LaMeRoc	21_045c_1
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	56.76	56.71	56.60	56.74	56.76	Mean length, L (mm)	56.71	Dry mass, M_d (g)	57.5
Diameter (mm)	22.25	22.27	22.23	22.28	22.22	Mean diameter, D (mm)	22.25	Dry density, ρ_d (kg/m^3)	2608
L/D ratio	2.55	Permeability, k (mD)	-			Bulk mass, M (g)	57.55		
Water content (%)	0.09	Porosity, n (%)	0.23			Bulk density, ρ (kg/m^3)	2610		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	Time to failure (s)	719	Temperature (ºC)	22.0		
F_{max} (kN)	98.8	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	254.2	$UCS_{1:2}$ (MPa)	262.8	UCS_{50} (MPa)	227.2	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	75.3	$\nu_{50\%}$	0.22	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	6.047	V_{S1} (km/s)	3.390	V_{S2} (km/s)	3.493	V_S (km/s)	3.442
Dynamic moduli		E_{dyn} (GPa)	77.9	ν_{dyn}	0.26	V_P/V_S	1.76
		G_{dyn} (GPa)	30.9	K_{dyn} (GPa)	54.2		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

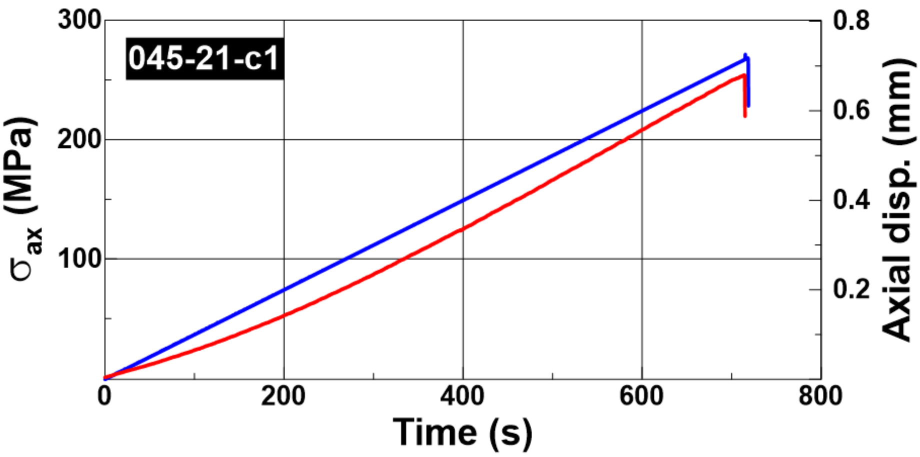

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	21_045c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	55.86	55.86	55.85	55.90	55.88	**Mean length, L (mm)**	55.87	**Dry mass, M_d (g)**	56.76
Diameter (mm)	22.26	22.25	22.28	22.24	22.25	**Mean diameter, D (mm)**	22.26	**Dry density, ρ_d (kg/m³)**	2611
L/D ratio	2.51	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	56.79				
Water content (%)	0.05	**Porosity, n (%)**	0.14	**Bulk density, ρ (kg/m³)**	2613				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	615	**Temperature (ºC)**	22.0		
F_{max} (kN)	77.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	198.5	**$UCS_{1:2}$ (MPa)**	205.0	**UCS_{50} (MPa)**	177.2	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	61.1	**$\nu_{50\%}$**	0.24	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.057	**V_{S1} (km/s)**	3.250	**V_{S2} (km/s)**	3.284	**V_S (km/s)**	3.267
Dynamic moduli		**E_{dyn} (GPa)**	72.2	**ν_{dyn}**	0.29	**V_P/V_S**	1.85
		G_{dyn} (GPa)	27.9	**K_{dyn} (GPa)**	58.7		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

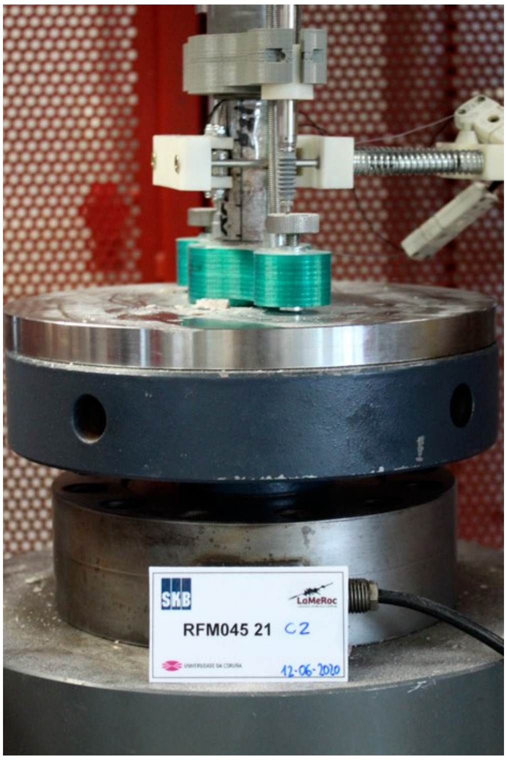

Figure 1. Sample before the test

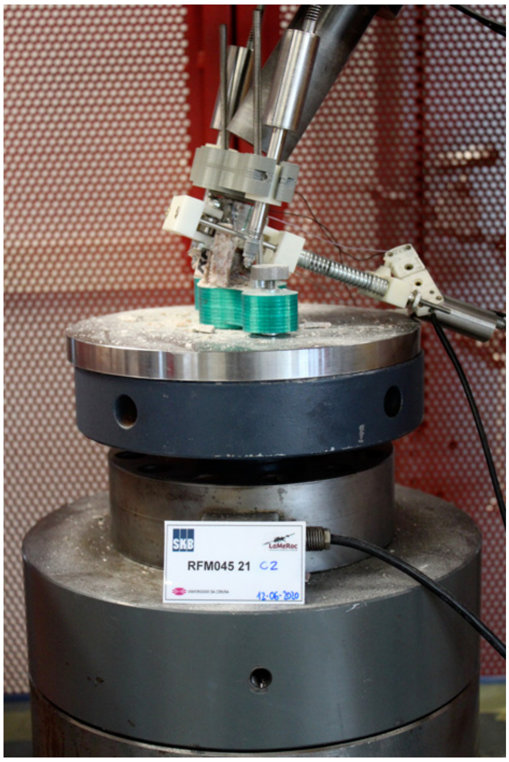

Figure 2. Sample after the test

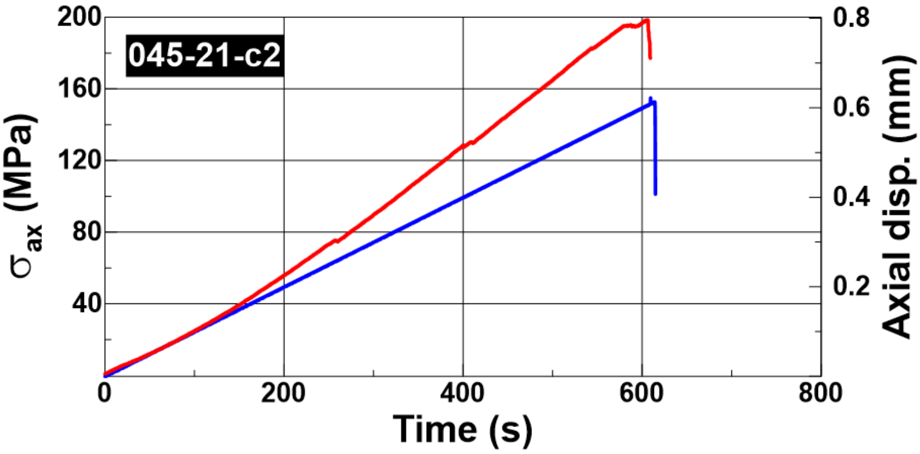

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	21_045c_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	56.76	56.65	56.80	56.85	56.72	**Mean length, L (mm)**	56.76	**Dry mass, M_d (g)**	57.31
Diameter (mm)	22.30	22.34	22.23	22.28	22.23	**Mean diameter, D (mm)**	22.28	**Dry density, ρ_d (kg/m³)**	2591

L/D ratio	2.55	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	57.35
Water content (%)	0.07	**Porosity, n (%)**	0.18	**Bulk density, ρ (kg/m³)**	2593
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	642	**Temperature (ºC)**	22.0		
F_{max} (kN)	87.3	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	224.0	**$UCS_{1:2}$ (MPa)**	231.6	**UCS_{50} (MPa)**	200.2	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	164.2	**$\nu_{50\%}$**	0.64	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.180	**V_{S1} (km/s)**	3.239	**V_{S2} (km/s)**	3.462	**V_S (km/s)**	3.351
	Dynamic moduli	**E_{dyn} (GPa)**	75.2	**ν_{dyn}**	0.29	**V_P/V_S**	1.84
		G_{dyn} (GPa)	29.1	**K_{dyn} (GPa)**	60.2		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

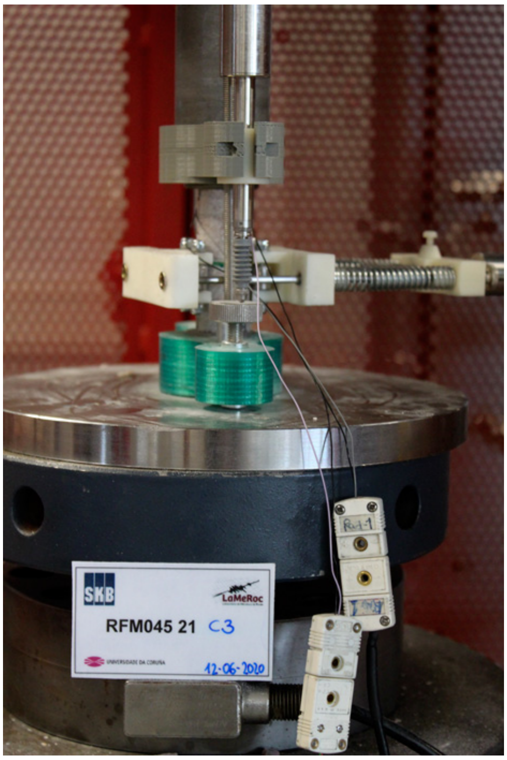

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

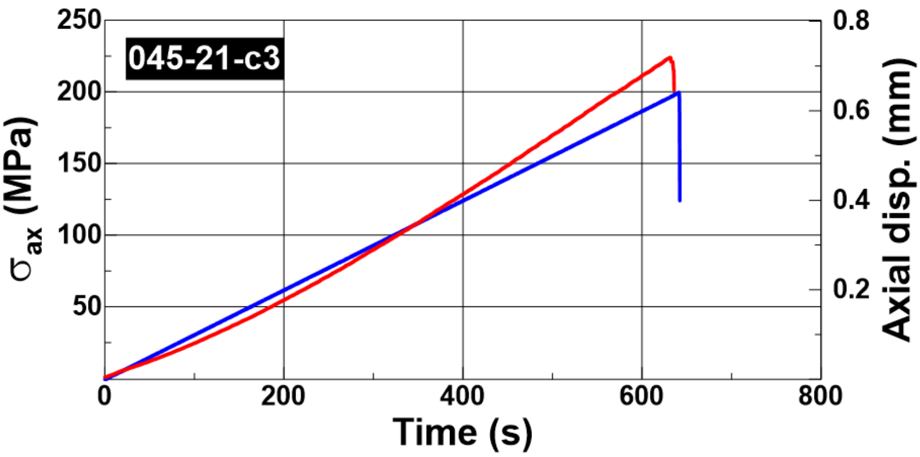

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	21_045c_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	58.14	58.16	58.14	58.13	58.16	**Mean length, L (mm)**	58.15	**Dry mass, M_d (g)**	59.05
Diameter (mm)	22.23	22.25	22.23	22.22	22.26	**Mean diameter, D (mm)**	22.24	**Dry density, ρ_d (kg/m^3)**	2615

L/D ratio	2.61	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	59.11
Water content (%)	0.10	**Porosity, n (%)**	0.27	**Bulk density, ρ (kg/m^3)**	2617
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	655	**Temperature (ºC)**	22.0		
F_{max} (kN)	92.0	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	236.9	**$UCS_{1:2}$ (MPa)**	245.5	**UCS_{50} (MPa)**	212.2	**σ_{CI} (MPa)**	131.4
Static moduli		**$E_{50\%}$ (GPa)**	100.5	**$\nu_{50\%}$**	0.42	**σ_{CD} (MPa)**	183.5
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.055	**V_{S1} (km/s)**	3.508	**V_{S2} (km/s)**	3.551	**V_S (km/s)**	3.529
Dynamic moduli		**E_{dyn} (GPa)**	81.0	**ν_{dyn}**	0.24	**V_P/V_S**	1.72
		G_{dyn} (GPa)	32.6	**K_{dyn} (GPa)**	52.5		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

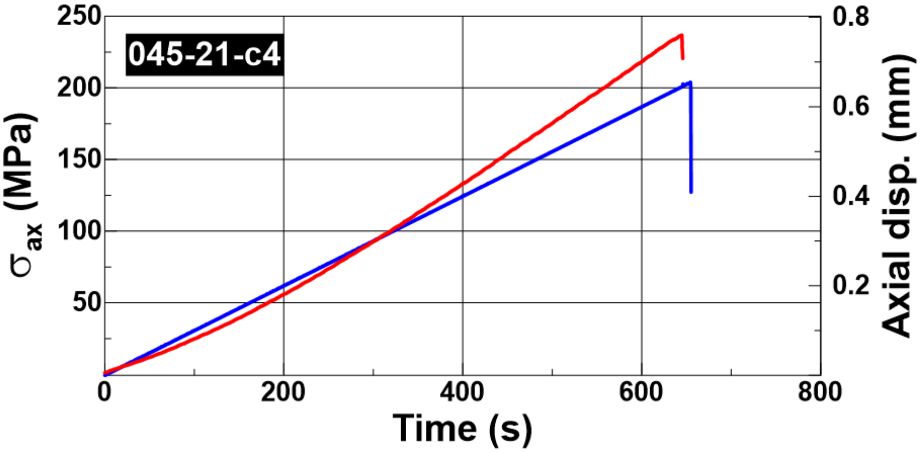

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	*Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements*
Project	*Scale Effect of Intact Granite Rocks*
Company	*Svensk Kärnbränslehantering AB*
Test type	*UCS*
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	*45d*	**Specimen**		**Ref. LaMeRoc**	*21_045d_1*
Depth (m)	*surface block*	**Formation**		**Facies**	
Sampling date		**Location**	*Forsmark (Sweden)*	**Lithology**	*RFM045*
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	*Y*	**Date**		**Dimensional verification (Y/N)**	*Y*	**Date**	
Cutting (Y/N)	*Y*	**Date**		**Trimming (Y/N)**	*Y*	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	*58.59*	*58.60*	*58.58*	*58.56*	*58.58*	**Mean length, L (mm)**	*58.58*	**Dry mass, M_d (g)**	*59.2*
Diameter (mm)	*22.22*	*22.23*	*22.21*	*22.22*	*22.22*	**Mean diameter, D (mm)**	*22.22*	**Dry density, ρ_d (kg/m^3)**	*2606*

L/D ratio	*2.64*	**Permeability, k (mD)**	*-*	**Bulk mass, M (g)**	*59.27*
Water content (%)	*0.12*	**Porosity, n (%)**	*0.31*	**Bulk density, ρ (kg/m^3)**	*2609*
Notes (4)					

EQUIPMENT

Device	*Servosis 150 ton*	**Force class (UNE-EN-7500)**	*1*	**Displacement class (ASTM E2309)**	*A*
Calibration date	*09/09/2020*	**Control mode (Force/Strain)**	*Strain*		
LDT model	*Solartron AX/5/s*	**Loading rate (N/s)**	*-*		
Strain gauge type	*BX120-6AA*	**Strain rate (s^{-1})**	*4.17E-06*		
Load cell	*Built-in 1500 kN*	**Shear rate (mm/s)**	*-*		
Notes (5)					

TEST RESULTS

Test date	*12/06/2020*	**Time to failure (s)**	*662*	**Temperature (ºC)**	*22.0*		
F_{max} (kN)	*91.5*	**T_0 (MPa)**	*-*	**$T_{0,50}$ (MPa)**	*-*		
UCS (MPa)	*235.9*	**$UCS_{1:2}$ (MPa)**	*244.7*	**UCS_{50} (MPa)**	*211.4*	**σ_{CI} (MPa)**	*-*
Static moduli		**$E_{50\%}$ (GPa)**	*74.2*	**$\nu_{50\%}$**	*0.27*	**σ_{CD} (MPa)**	*-*
ϕ_{dry} (º)	*-*	**c'_{dry} (kPa)**	*-*	**ϕ_{wet} (º)**	*-*	**c'_{wet} (kPa)**	*-*
V_P (km/s)	*6.033*	**V_{S1} (km/s)**	*3.451*	**V_{S2} (km/s)**	*3.461*	**V_S (km/s)**	*3.456*
Dynamic moduli		**E_{dyn} (GPa)**	*78.3*	**ν_{dyn}**	*0.26*	**V_P/V_S**	*1.75*
		G_{dyn} (GPa)	*31.2*	**K_{dyn} (GPa)**	*53.4*		
Notes (6)							

PICTURES AND PLOTS

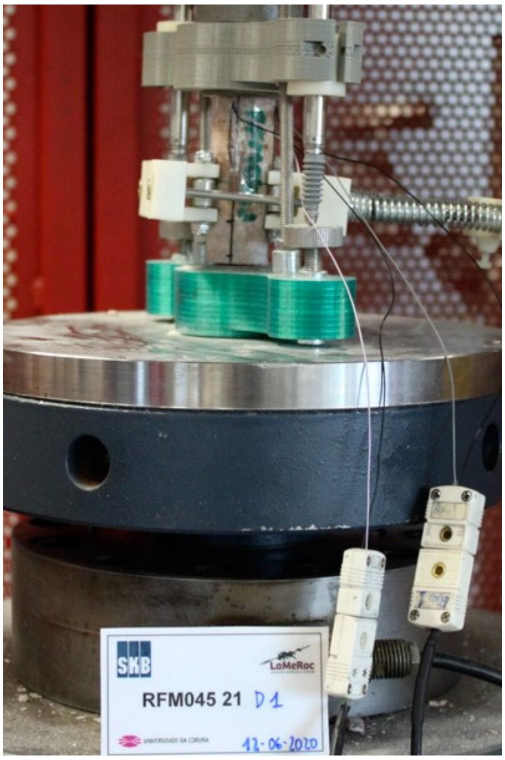

Figure 1. *Sample before the test*

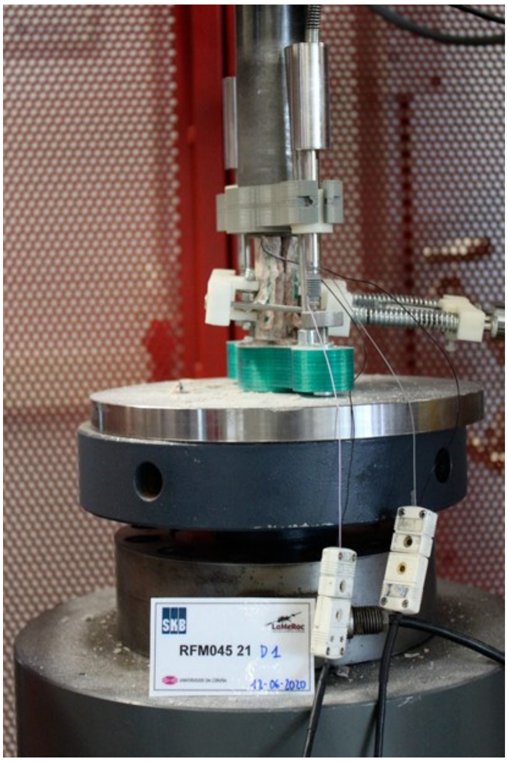

Figure 2. *Sample after the test*

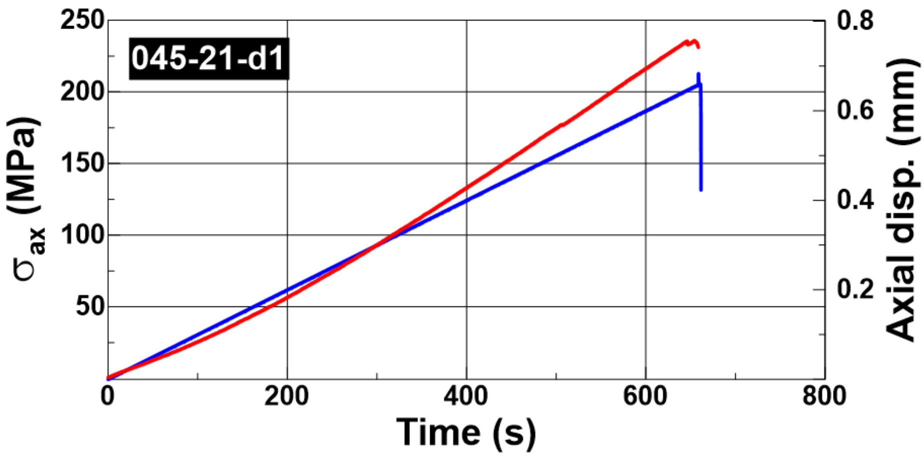

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	21_045d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	58.08	58.10	58.06	58.13	58.12	**Mean length, L (mm)**	58.10	**Dry mass, M_d (g)**	58.97
Diameter (mm)	22.23	22.24	22.25	22.26	22.26	**Mean diameter, D (mm)**	22.25	**Dry density, ρ_d (kg/m^3)**	2611
L/D ratio	2.61	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	59.02				
Water content (%)	0.08	**Porosity, n (%)**	0.22	**Bulk density, ρ (kg/m^3)**	2613				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	656	**Temperature (ºC)**	22.0		
F_{max} (kN)	86.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	223.0	**$UCS_{1:2}$ (MPa)**	231.1	**UCS_{50} (MPa)**	199.8	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	65.6	**$\nu_{50\%}$**	0.30	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.047	**V_{S1} (km/s)**	3.309	**V_{S2} (km/s)**	3.377	**V_S (km/s)**	3.343
	Dynamic moduli	**E_{dyn} (GPa)**	74.8	**ν_{dyn}**	0.28	**V_P/V_S**	1.81
		G_{dyn} (GPa)	29.2	**K_{dyn} (GPa)**	56.6		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

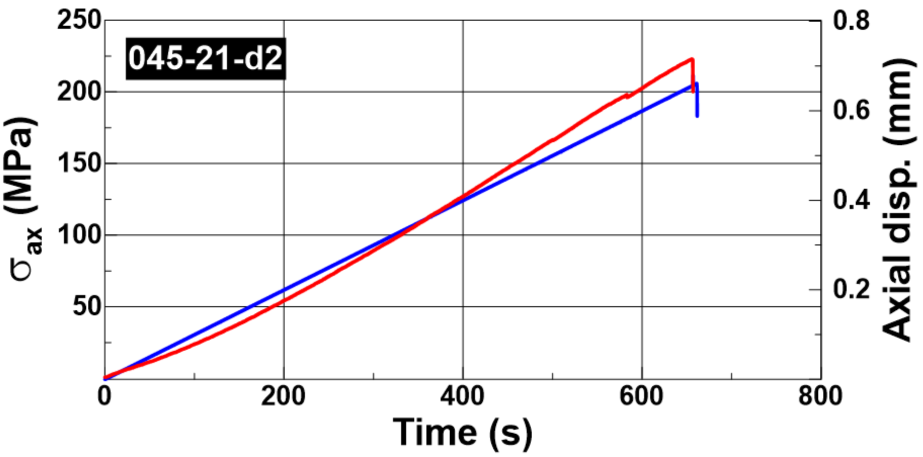

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	21_045d_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	60.65	60.66	60.75	60.75	60.73	**Mean length, L (mm)**	60.71	**Dry mass, M_d (g)**	61.14
Diameter (mm)	22.15	22.18	22.21	22.21	22.23	**Mean diameter, D (mm)**	22.20	**Dry density, ρ_d (kg/m^3)**	2603

L/D ratio	2.74	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	61.21
Water content (%)	0.11	**Porosity, n (%)**	0.30	**Bulk density, ρ (kg/m^3)**	2606
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	12/06/2020	**Time to failure (s)**	803	**Temperature (ºC)**	22.0		
F_{max} (kN)	112.4	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	290.4	**$UCS_{1:2}$ (MPa)**	302.2	**UCS_{50} (MPa)**	261.1	**σ_{CI} (MPa)**	118.6
	Static moduli	**$E_{50\%}$ (GPa)**	77.3	**$\nu_{50\%}$**	0.23	**σ_{CD} (MPa)**	238.5
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.057	**V_{S1} (km/s)**	3.414	**V_{S2} (km/s)**	3.459	**V_S (km/s)**	3.437
	Dynamic moduli	**E_{dyn} (GPa)**	77.7	**ν_{dyn}**	0.26	**V_P/V_S**	1.76
		G_{dyn} (GPa)	30.8	**K_{dyn} (GPa)**	54.6		
Notes (6)							

PICTURES AND PLOTS

Figure 1. Sample before the test

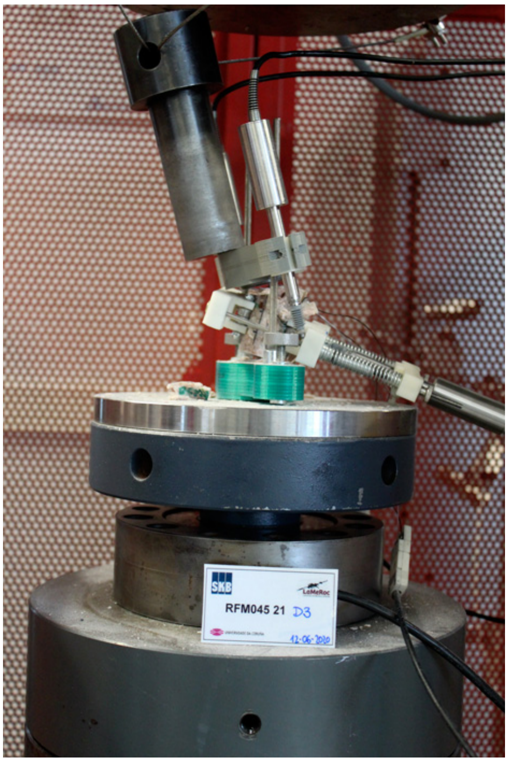

Figure 2. Sample after the test

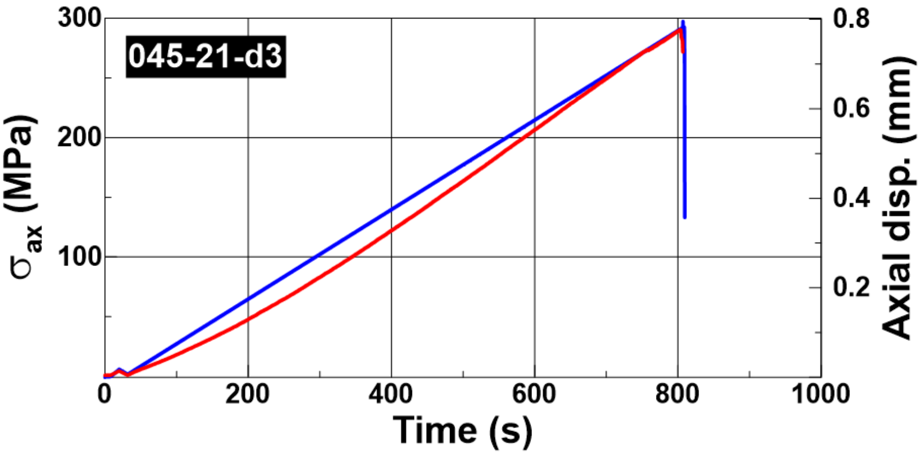

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	30_045a_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	73.32	73.43	73.39	73.25	73.18	**Mean length, L (mm)**	73.31	**Dry mass, M_d (g)**	142.14
Diameter (mm)	30.80	30.68	30.68	30.61	30.60	**Mean diameter, D (mm)**	30.67	**Dry density, ρ_d (kg/m^3)**	2624

L/D ratio	2.39	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	142.31
Water content (%)	0.12	**Porosity, n (%)**	0.31	**Bulk density, ρ (kg/m^3)**	2627
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	651	**Temperature (ºC)**	22.0		
F_{max} (kN)	113.0	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	152.9	**$UCS_{1:2}$ (MPa)**	157.2	**UCS_{50} (MPa)**	143.9	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	65.3	**$\nu_{50\%}$**	0.12	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.064	**V_{S1} (km/s)**	3.496	**V_{S2} (km/s)**	3.356	**V_S (km/s)**	3.426
Dynamic moduli		**E_{dyn} (GPa)**	78.1	**ν_{dyn}**	0.27	**V_P/V_S**	1.77
		G_{dyn} (GPa)	30.8	**K_{dyn} (GPa)**	55.5		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

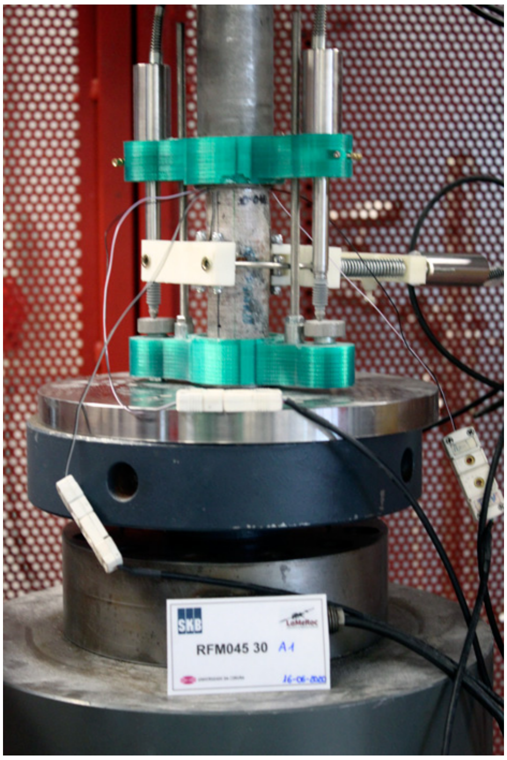

Figure 1. *Sample before the test*

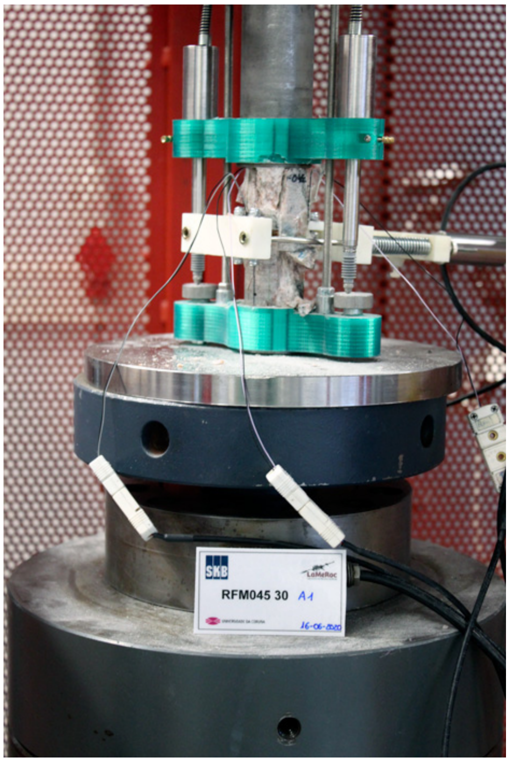

Figure 2. *Sample after the test*

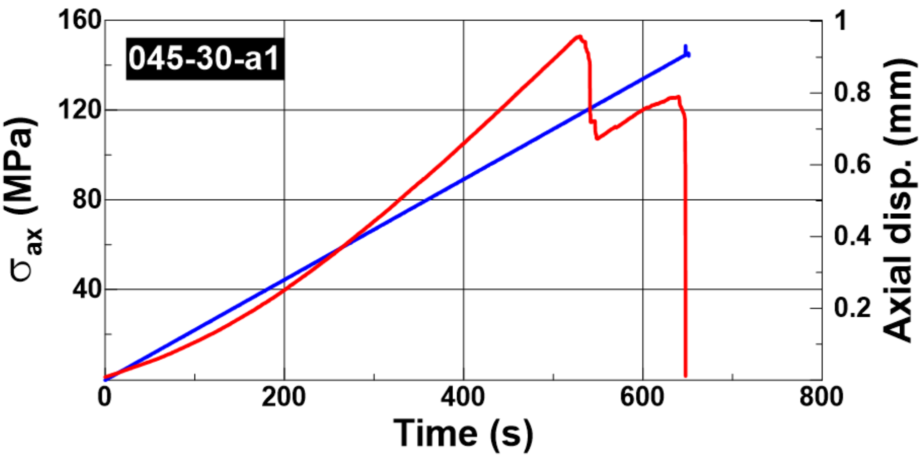

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	Report date
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	Specimen		Ref. LaMeRoc	30_045a_2
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	66.59	66.72	66.95	66.86	66.68	Mean length, L (mm)	66.76	Dry mass, M_d (g)	128.32
Diameter (mm)	30.50	30.54	30.67	30.62	30.69	Mean diameter, D (mm)	30.60	Dry density, ρ_d (kg/m^3)	2613

L/D ratio	2.18	Permeability, k (mD)	-	Bulk mass, M (g)	128.43
Water content (%)	0.09	Porosity, n (%)	0.22	Bulk density, ρ (kg/m^3)	2615
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-6AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	Time to failure (s)	599	Temperature (ºC)	22.0		
F_{max} (kN)	85.6	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	116.4	$UCS_{1:2}$ (MPa)	118.5	UCS_{50} (MPa)	108.5	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	24.3	$\nu_{50\%}$	0.01	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	6.013	V_{S1} (km/s)	3.363	V_{S2} (km/s)	3.393	V_S (km/s)	3.378
Dynamic moduli		E_{dyn} (GPa)	75.8	ν_{dyn}	0.27	V_P/V_S	1.78
		G_{dyn} (GPa)	29.8	K_{dyn} (GPa)	54.8		
Notes (6)							

PICTURES AND PLOTS

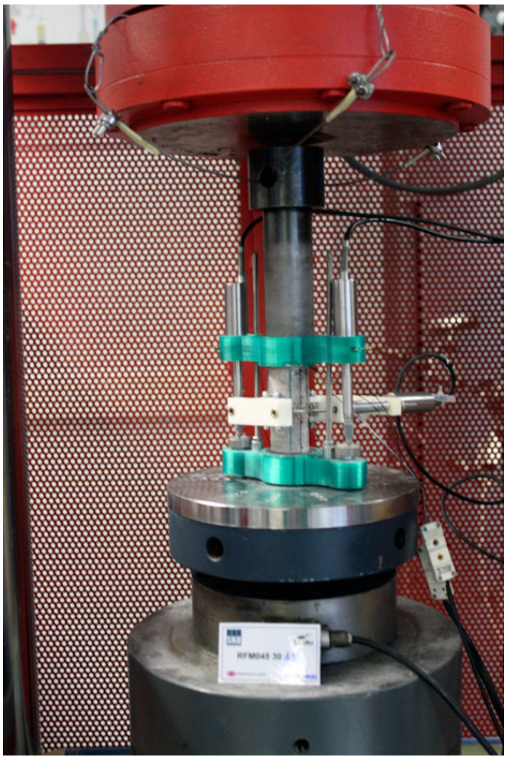

Figure 1. *Sample before the test*

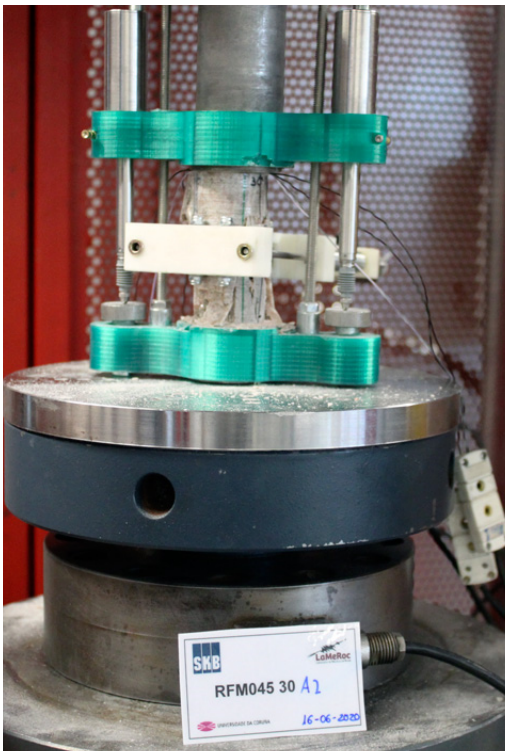

Figure 2. *Sample after the test*

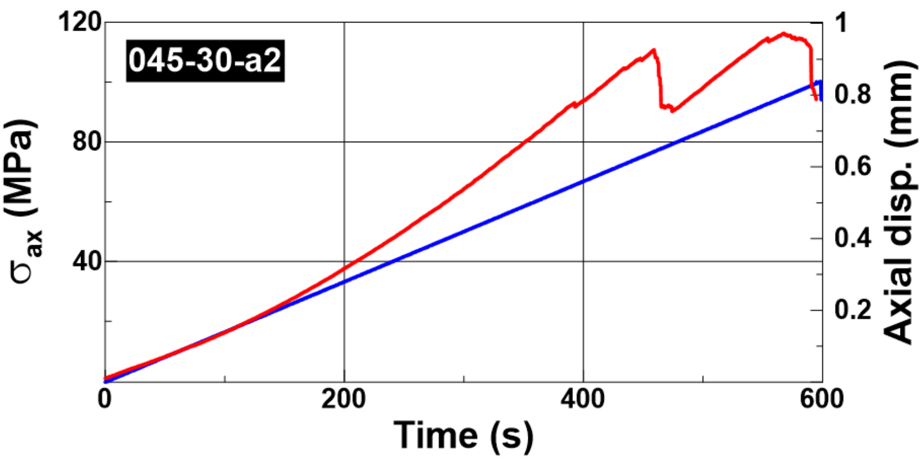

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	30_045a_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	71.05	70.90	71.01	71.16	71.25	**Mean length, L (mm)**	71.07	**Dry mass, M_d (g)**	136.37
Diameter (mm)	30.51	30.59	30.62	30.51	30.44	**Mean diameter, D (mm)**	30.53	**Dry density, ρ_d (kg/m^3)**	2620

L/D ratio	2.33	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	136.52
Water content (%)	0.11	**Porosity, n (%)**	0.29	**Bulk density, ρ (kg/m^3)**	2623
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	519	**Temperature (ºC)**	22.0		
F_{max} (kN)	93.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	127.9	**$UCS_{1:2}$ (MPa)**	131.1	**UCS_{50} (MPa)**	120.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	66.8	**$\nu_{50\%}$**	0.31	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.094	**V_{S1} (km/s)**	3.317	**V_{S2} (km/s)**	3.466	**V_S (km/s)**	3.391
	Dynamic moduli	**E_{dyn} (GPa)**	77.0	**ν_{dyn}**	0.28	**V_P/V_S**	1.80
		G_{dyn} (GPa)	30.2	**K_{dyn} (GPa)**	57.2		
Notes (6)							

PICTURES AND PLOTS

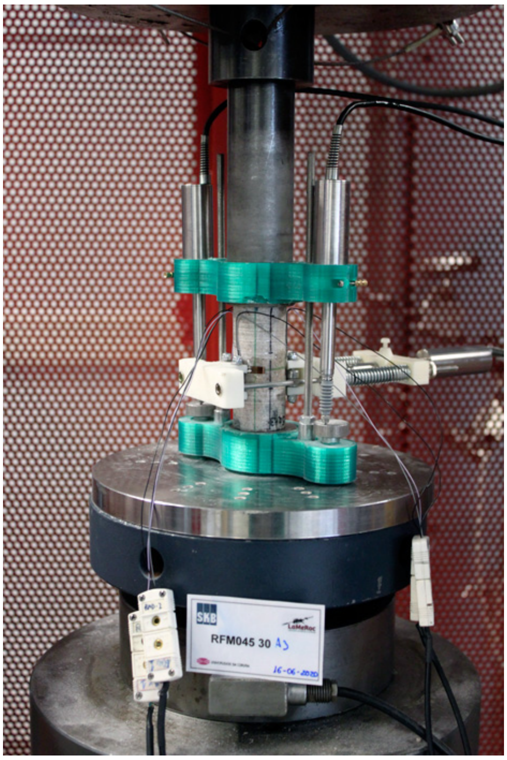

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

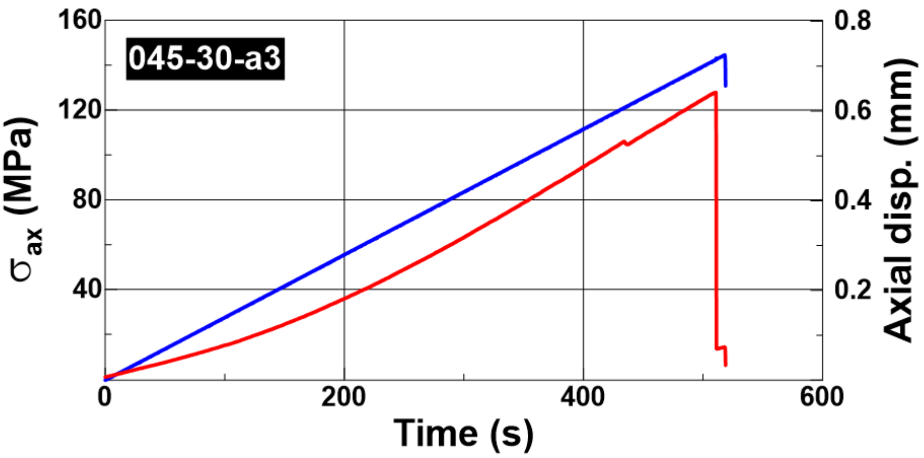

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	30_045b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	84.22	84.80	84.61	84.23	84.13	**Mean length, L (mm)**	84.40	**Dry mass, M_d (g)**	168
Diameter (mm)	31.36	31.16	31.06	31.02	31.15	**Mean diameter, D (mm)**	31.15	**Dry density, ρ_d (kg/m^3)**	2612

L/D ratio	2.71	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	168.16
Water content (%)	0.10	**Porosity, n (%)**	0.25	**Bulk density, ρ (kg/m^3)**	2614
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	812	**Temperature (ºC)**	22.0		
F_{max} (kN)	55.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	72.8	**$UCS_{1:2}$ (MPa)**	75.7	**UCS_{50} (MPa)**	69.5	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	75.9	**$\nu_{50\%}$**	0.22	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.980	**V_{S1} (km/s)**	3.738	**V_{S2} (km/s)**	3.177	**V_S (km/s)**	3.457
	Dynamic moduli	**E_{dyn} (GPa)**	78.1	**ν_{dyn}**	0.25	**V_P/V_S**	1.73
		G_{dyn} (GPa)	31.3	**K_{dyn} (GPa)**	51.8		
Notes (6)							

PICTURES AND PLOTS

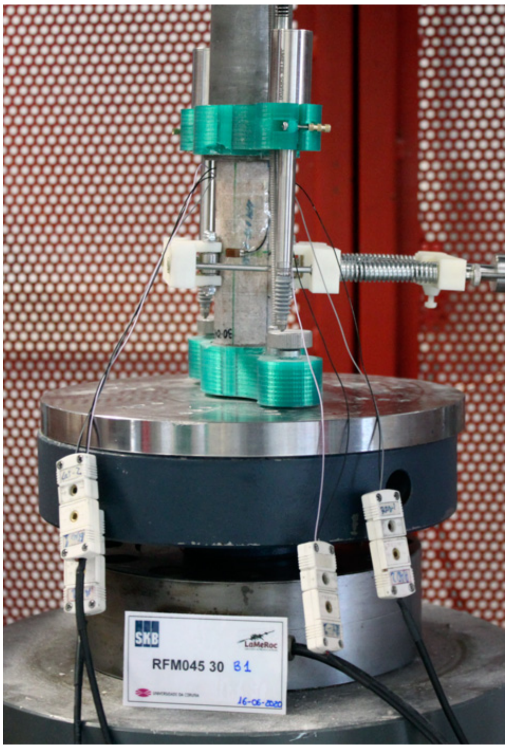

Figure 1. *Sample before the test*

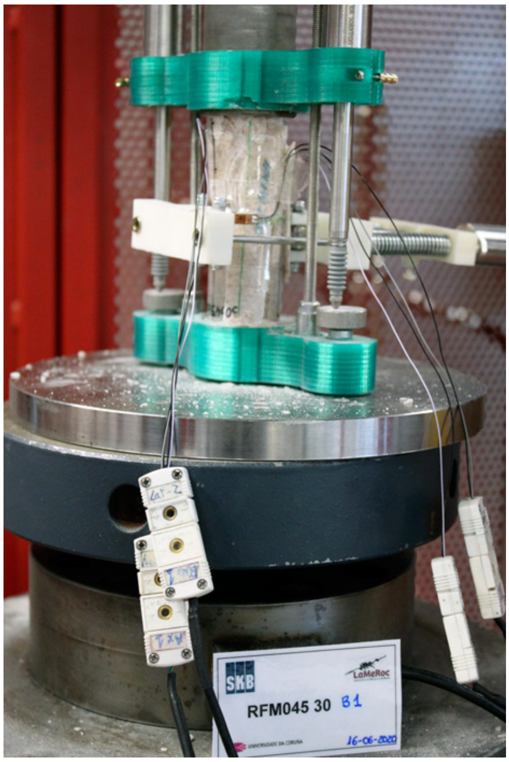

Figure 2. *Sample after the test*

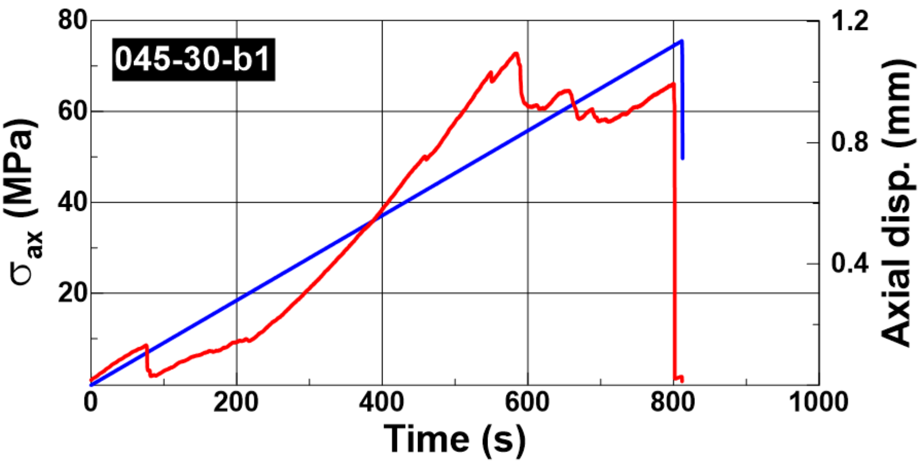

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

LaMeRoc

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	30_045b_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	84.43	84.42	84.64	84.69	84.66	**Mean length, L (mm)**	84.57	**Dry mass, M_d (g)**	168.63
Diameter (mm)	31.23	31.18	31.24	31.10	31.06	**Mean diameter, D (mm)**	31.16	**Dry density, ρ_d (kg/m^3)**	2614

L/D ratio	2.71	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	168.77
Water content (%)	0.08	**Porosity, n (%)**	0.22	**Bulk density, ρ (kg/m^3)**	2617
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	594	**Temperature (ºC)**	22.0		
F_{max} (kN)	101.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	133.1	**$UCS_{1:2}$ (MPa)**	138.4	**UCS_{50} (MPa)**	127.1	**σ_{CI} (MPa)**	65.6
	Static moduli	**$E_{50\%}$ (GPa)**	100.1	**$\nu_{50\%}$**	0.10	**σ_{CD} (MPa)**	114.6
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.131	**V_{S1} (km/s)**	3.564	**V_{S2} (km/s)**	3.313	**V_S (km/s)**	3.438
	Dynamic moduli	**E_{dyn} (GPa)**	78.6	**ν_{dyn}**	0.27	**V_P/V_S**	1.78
		G_{dyn} (GPa)	30.9	**K_{dyn} (GPa)**	57.1		
Notes (6)							

PICTURES AND PLOTS

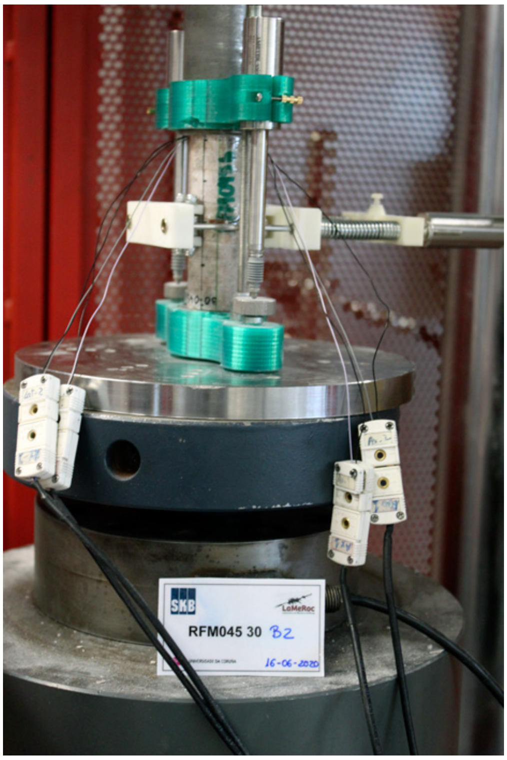

Figure 1. *Sample before the test*

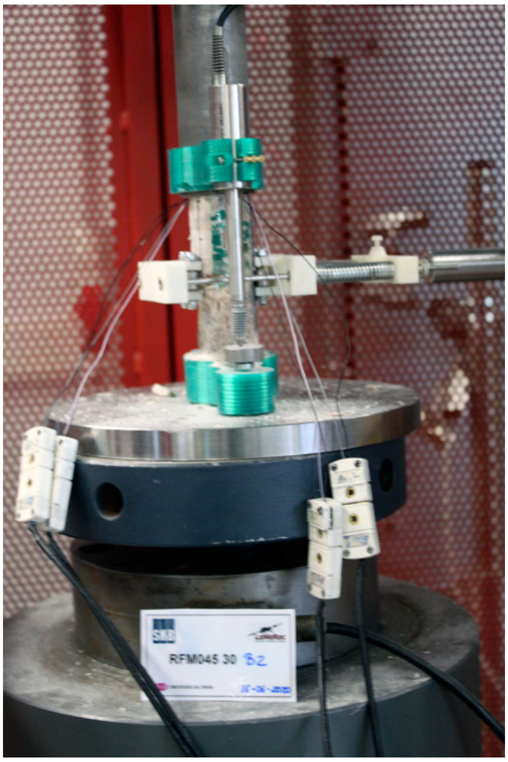

Figure 2. *Sample after the test*

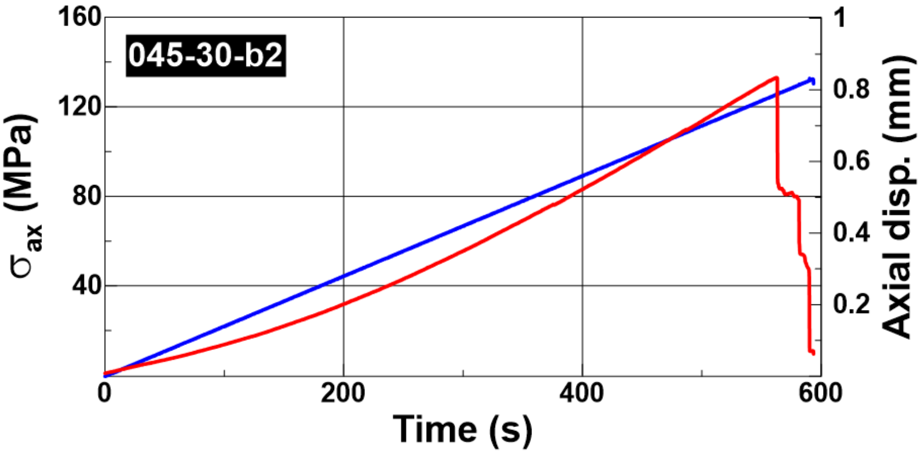

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	30_045c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	86.42	86.35	86.08	86.02	86.16	**Mean length, L (mm)**	86.21	**Dry mass, M_d (g)**	166.81
Diameter (mm)	31.15	30.77	30.77	30.80	30.73	**Mean diameter, D (mm)**	30.84	**Dry density, ρ_d (kg/m^3)**	2590

L/D ratio	2.79	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	166.96
Water content (%)	0.09	**Porosity, n (%)**	0.23	**Bulk density, ρ (kg/m^3)**	2592
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	571	**Temperature (°C)**	22.0		
F_{max} (kN)	91.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	122.1	**$UCS_{1:2}$ (MPa)**	127.2	**UCS_{50} (MPa)**	116.6	**σ_{CI} (MPa)**	52.4
	Static moduli	**$E_{50\%}$ (GPa)**	50.0	**$\nu_{50\%}$**	0.17	**σ_{CD} (MPa)**	117.3
ϕ_{dry} (°)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (°)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.111	**V_{S1} (km/s)**	3.569	**V_{S2} (km/s)**	3.505	**V_S (km/s)**	3.537
	Dynamic moduli	**E_{dyn} (GPa)**	81.0	**ν_{dyn}**	0.25	**V_P/V_S**	1.73
		G_{dyn} (GPa)	32.4	**K_{dyn} (GPa)**	53.6		
Notes (6)							

PICTURES AND PLOTS

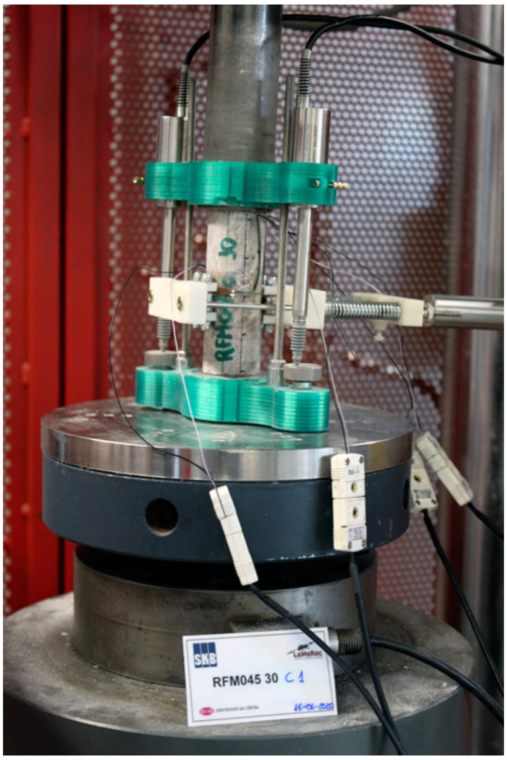

Figure 1. *Sample before the test*

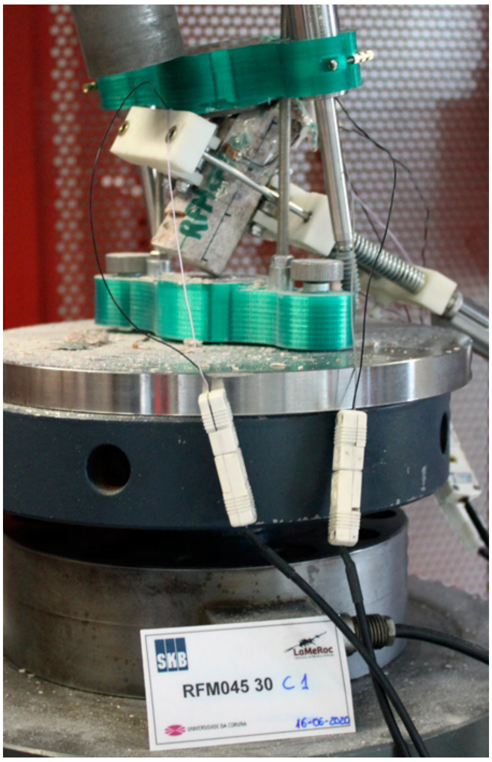

Figure 2. *Sample after the test*

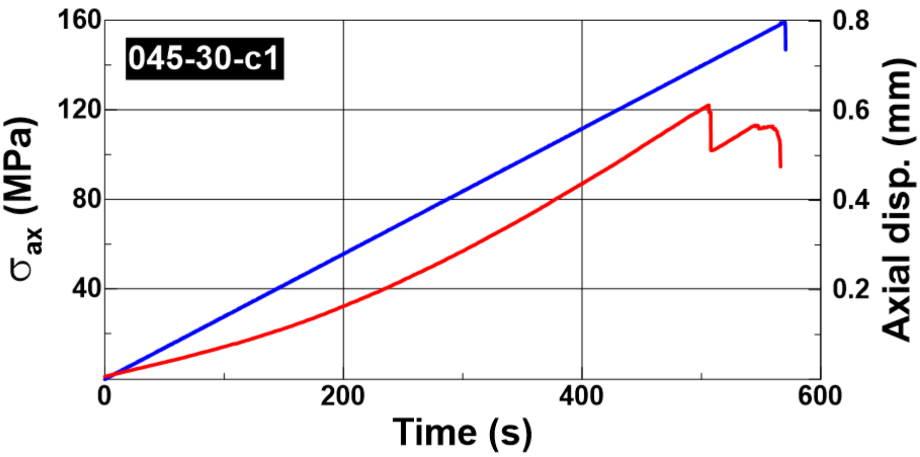

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	30_045c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	83.83	83.81	83.76	83.75	83.77	**Mean length, L (mm)**	83.78	**Dry mass, M_d (g)**	162.3
Diameter (mm)	30.81	30.76	30.93	30.77	30.94	**Mean diameter, D (mm)**	30.84	**Dry density, ρ_d (kg/m^3)**	2593

L/D ratio	2.72	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	162.46
Water content (%)	0.10	**Porosity, n (%)**	0.26	**Bulk density, ρ (kg/m^3)**	2595
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	830	**Temperature (ºC)**	22.0		
F_{max} (kN)	211.5	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	283.1	**$UCS_{1:2}$ (MPa)**	294.4	**UCS_{50} (MPa)**	269.9	**σ_{CI} (MPa)**	129.8
	Static moduli	**$E_{50\%}$ (GPa)**	81.5	**$\nu_{50\%}$**	0.27	**σ_{CD} (MPa)**	216.9
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.004	**V_{S1} (km/s)**	3.401	**V_{S2} (km/s)**	3.383	**V_S (km/s)**	3.392
	Dynamic moduli	**E_{dyn} (GPa)**	75.6	**ν_{dyn}**	0.27	**V_P/V_S**	1.77
		G_{dyn} (GPa)	29.9	**K_{dyn} (GPa)**	53.7		
Notes (6)							

PICTURES AND PLOTS

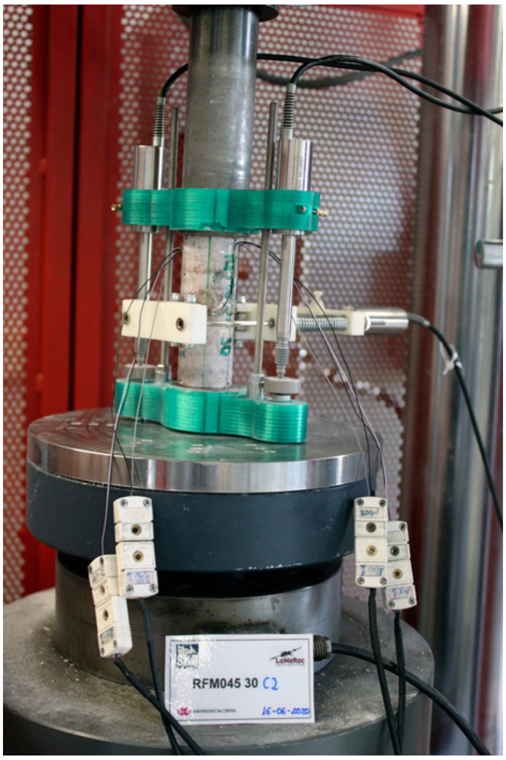

Figure 1. *Sample before the test*

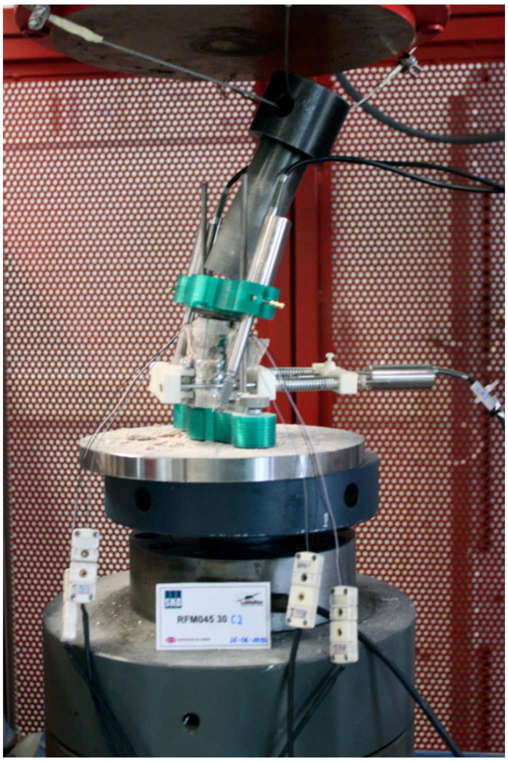

Figure 2. *Sample after the test*

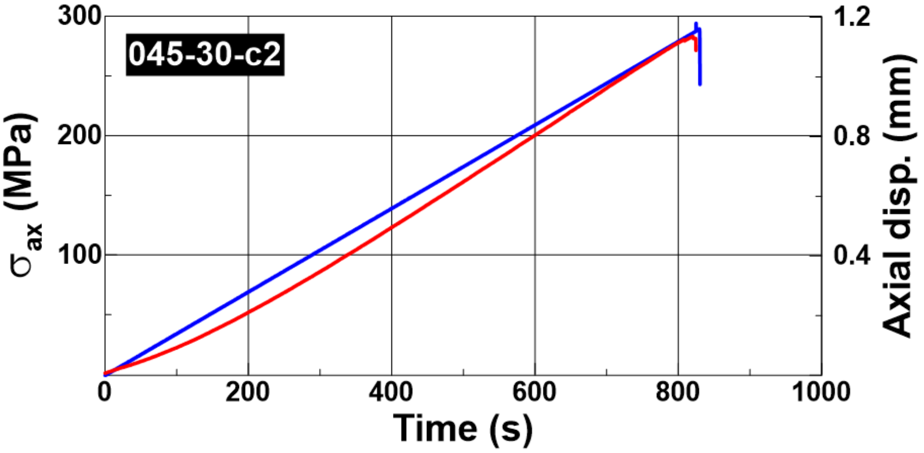

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	30_045c_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	84.41	84.39	84.50	84.49	84.46	**Mean length, L (mm)**	84.45	**Dry mass, M_d (g)**	163.86
Diameter (mm)	30.97	30.65	30.65	30.65	30.74	**Mean diameter, D (mm)**	30.73	**Dry density, ρ_d (kg/m^3)**	2616

L/D ratio	2.75	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	164.03
Water content (%)	0.10	**Porosity, n (%)**	0.27	**Bulk density, ρ (kg/m^3)**	2618
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	864	**Temperature (ºC)**	22.0		
F_{max} (kN)	209.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	283.0	**$UCS_{1:2}$ (MPa)**	294.6	**UCS_{50} (MPa)**	269.9	**σ_{CI} (MPa)**	175.3
	Static moduli	**$E_{50\%}$ (GPa)**	98.8	**$\nu_{50\%}$**	0.30	**σ_{CD} (MPa)**	257.4
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.992	**V_{S1} (km/s)**	3.428	**V_{S2} (km/s)**	3.370	**V_S (km/s)**	3.399
	Dynamic moduli	**E_{dyn} (GPa)**	76.4	**ν_{dyn}**	0.26	**V_P/V_S**	1.76
		G_{dyn} (GPa)	30.3	**K_{dyn} (GPa)**	53.7		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

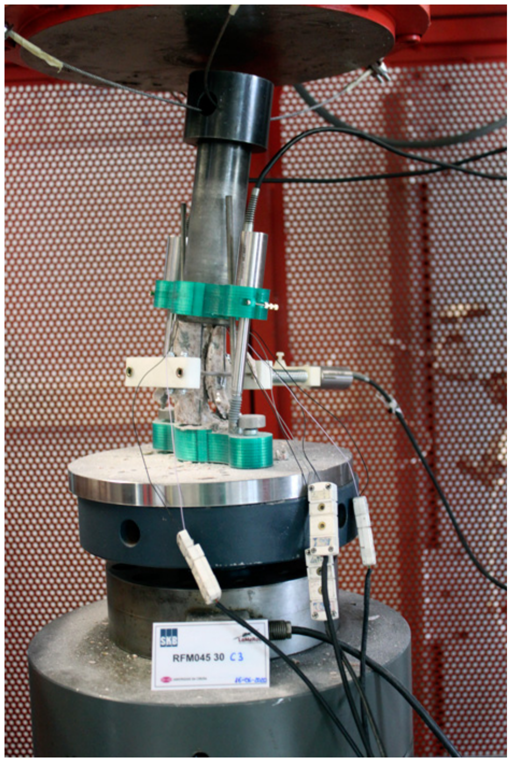

Figure 2. *Sample after the test*

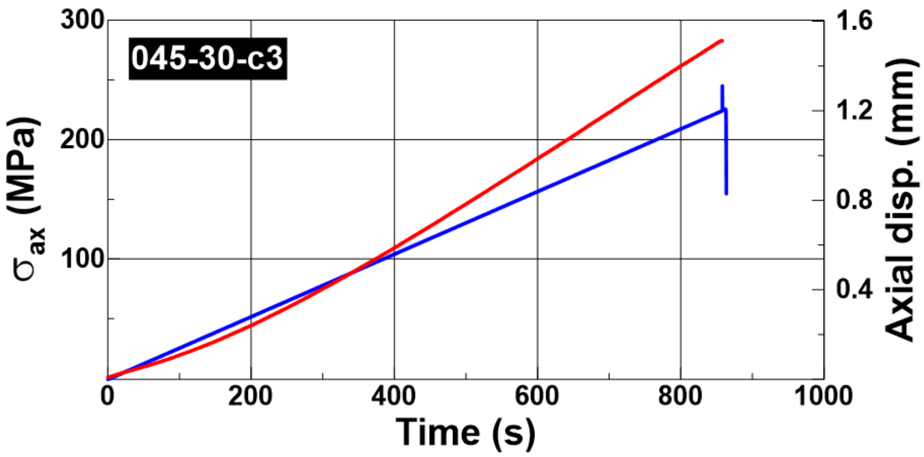

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	30_045d_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	83.98	84.07	84.19	84.05	83.95	**Mean length, L (mm)**	84.05	**Dry mass, M_d (g)**	168.74
Diameter (mm)	31.44	31.25	31.24	31.32	31.61	**Mean diameter, D (mm)**	31.37	**Dry density, ρ_d (kg/m^3)**	2597

L/D ratio	2.68	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	168.90
Water content (%)	0.09	**Porosity, n (%)**	0.25	**Bulk density, ρ (kg/m^3)**	2600
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	627	**Temperature (ºC)**	22.0		
F_{max} (kN)	122.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	158.8	**$UCS_{1:2}$ (MPa)**	164.9	**UCS_{50} (MPa)**	151.7	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	67.8	**$\nu_{50\%}$**	0.27	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.062	**V_{S1} (km/s)**	3.485	**V_{S2} (km/s)**	3.353	**V_S (km/s)**	3.419
	Dynamic moduli	**E_{dyn} (GPa)**	77.0	**ν_{dyn}**	0.27	**V_P/V_S**	1.77
		G_{dyn} (GPa)	30.4	**K_{dyn} (GPa)**	55.0		
Notes (6)							

PICTURES AND PLOTS

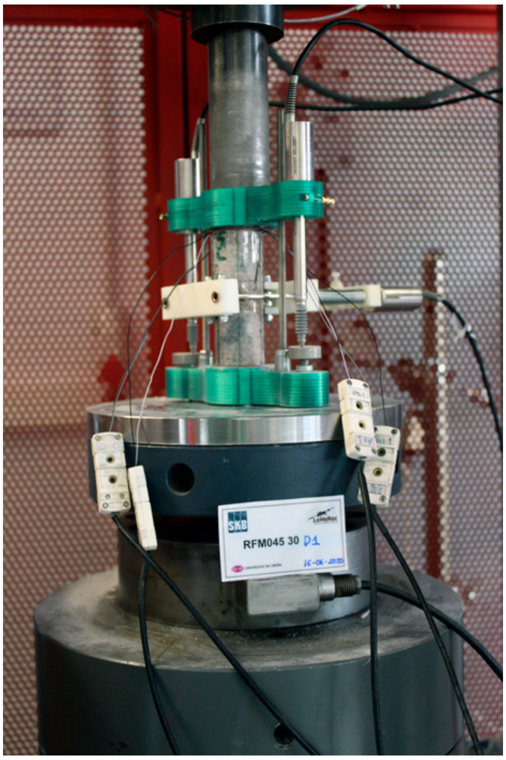

Figure 1. *Sample before the test*

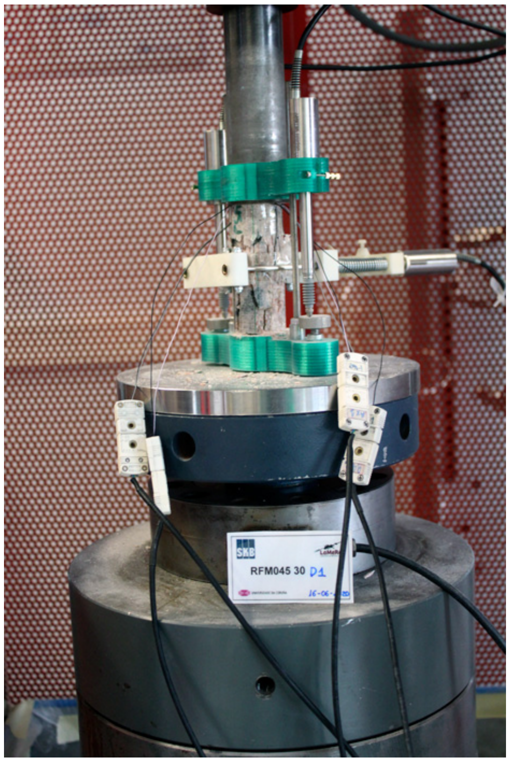

Figure 2. *Sample after the test*

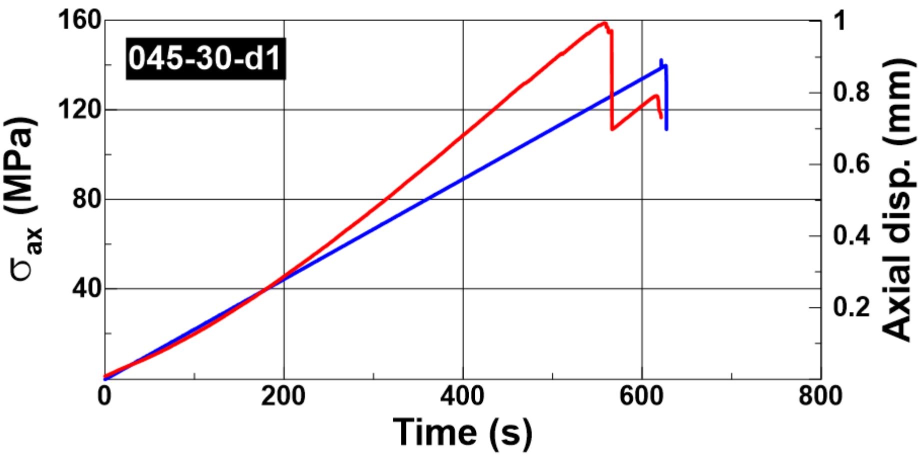

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	30_045d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	82.87	82.77	82.76	82.80	82.84	**Mean length, L (mm)**	82.81	**Dry mass, M_d (g)**	165.92
Diameter (mm)	31.25	31.33	31.26	31.28	31.33	**Mean diameter, D (mm)**	31.29	**Dry density, ρ_d (kg/m^3)**	2606

L/D ratio	2.65	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	166.11
Water content (%)	0.11	**Porosity, n (%)**	0.30	**Bulk density, ρ (kg/m^3)**	2609
Notes (4)					

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-6AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	623	**Temperature (ºC)**	22.0		
F_{max} (kN)	125.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	163.6	**$UCS_{1:2}$ (MPa)**	169.7	**UCS_{50} (MPa)**	156.0	**σ_{CI} (MPa)**	95.7
Static moduli		**$E_{50\%}$ (GPa)**	90.2	**$\nu_{50\%}$**	0.34	**σ_{CD} (MPa)**	138.1
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.067	**V_{S1} (km/s)**	3.130	**V_{S2} (km/s)**	3.561	**V_S (km/s)**	3.346
Dynamic moduli		**E_{dyn} (GPa)**	74.8	**ν_{dyn}**	0.28	**V_P/V_S**	1.81
		G_{dyn} (GPa)	29.2	**K_{dyn} (GPa)**	57.1		
Notes (6)							

PICTURES AND PLOTS

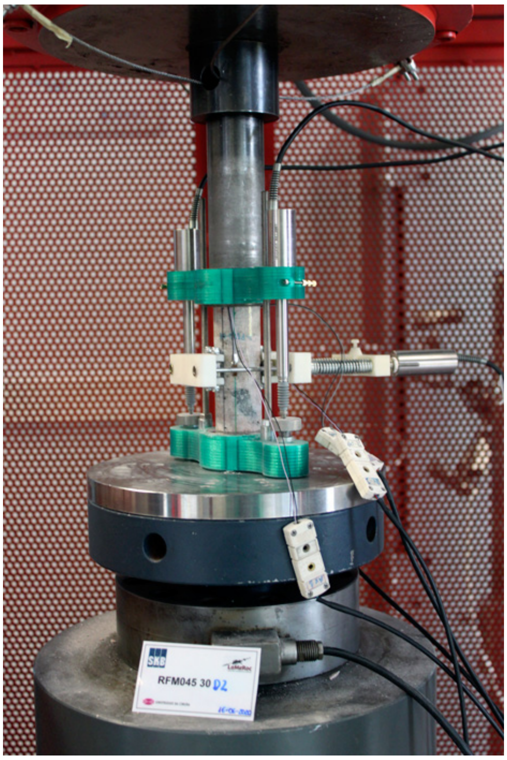

Figure 1. *Sample before the test*

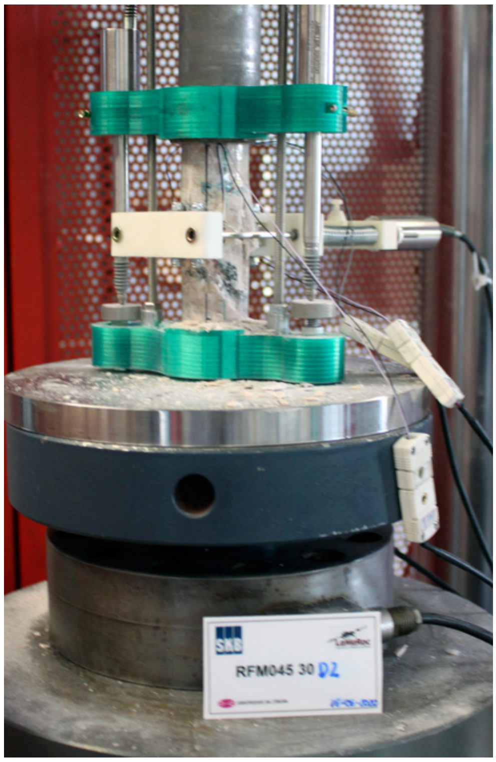

Figure 2. *Sample after the test*

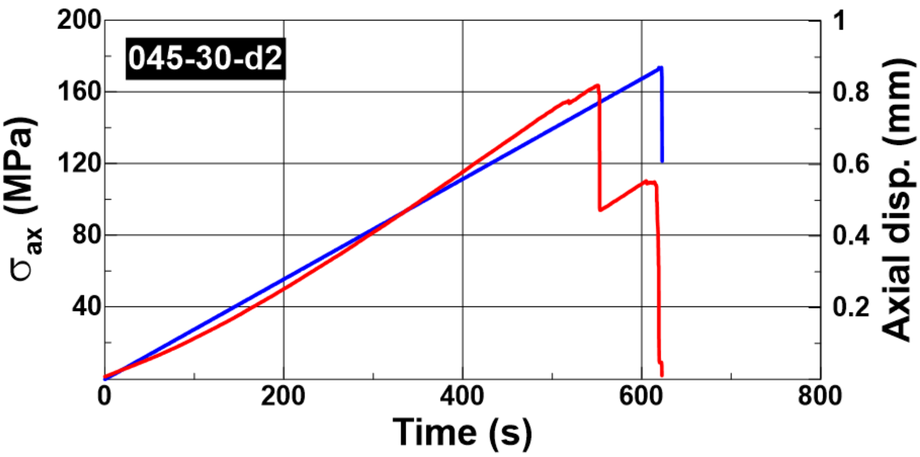

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	42_045a_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	110.36	110.40	110.45	110.47	110.39	**Mean length, L (mm)**	110.41	**Dry mass, M_d (g)**	393.94
Diameter (mm)	41.64	41.65	41.65	41.66	-	**Mean diameter, D (mm)**	41.65	**Dry density, ρ_d (kg/m^3)**	2619
L/D ratio	2.65	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	394.32		
Water content (%)	0.10	**Porosity, n (%)**	0.25			**Bulk density, ρ (kg/m^3)**	2621		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	16/06/2020	**Time to failure (s)**	886	**Temperature (ºC)**	22.0		
F_{max} (kN)	306.3	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	224.8	**$UCS_{1:2}$ (MPa)**	233.3	**UCS_{50} (MPa)**	225.7	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	205.9	**$\nu_{50\%}$**	0.54	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.999	**V_{S1} (km/s)**	3.367	**V_{S2} (km/s)**	3.696	**V_S (km/s)**	3.531
	Dynamic moduli	**E_{dyn} (GPa)**	80.7	**ν_{dyn}**	0.23	**V_P/V_S**	1.70
		G_{dyn} (GPa)	32.7	**K_{dyn} (GPa)**	50.8		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

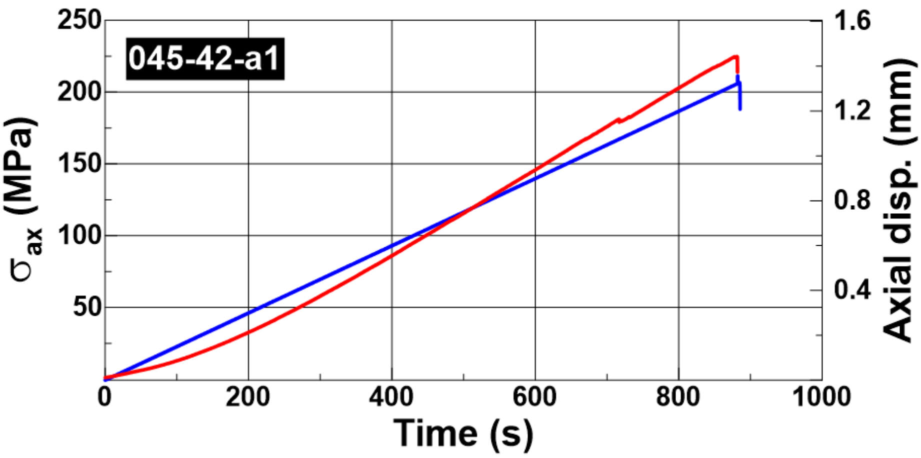

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	42_045a_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	111.35	111.36	111.29	111.27	111.29	**Mean length, L (mm)**	111.31	**Dry mass, M_d (g)**	399.45
Diameter (mm)	41.72	41.79	41.81	41.68	-	**Mean diameter, D (mm)**	41.75	**Dry density, ρ_d (kg/m^3)**	2621
L/D ratio	2.67	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	399.79		
Water content (%)	0.09	**Porosity, n (%)**	0.22			**Bulk density, ρ (kg/m^3)**	2624		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	635	**Temperature (ºC)**	22.0		
F_{max} (kN)	258.3	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	188.7	**$UCS_{1:2}$ (MPa)**	195.9	**UCS_{50} (MPa)**	189.6	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	218.6	**$\nu_{50\%}$**	0.24	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.011	**V_{S1} (km/s)**	3.404	**V_{S2} (km/s)**	3.585	**V_S (km/s)**	3.495
Dynamic moduli		**E_{dyn} (GPa)**	79.8	**ν_{dyn}**	0.24	**V_P/V_S**	1.72
		G_{dyn} (GPa)	32.0	**K_{dyn} (GPa)**	52.1		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

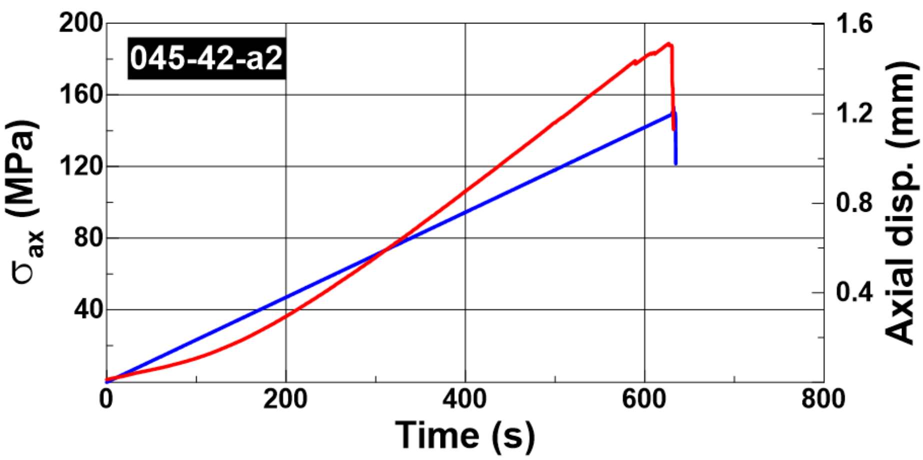

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	42_045a_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	107.41	107.40	107.44	107.50	107.46	**Mean length, L (mm)**	107.44	**Dry mass, M_d (g)**	385.19
Diameter (mm)	41.68	41.70	41.70	41.68	-	**Mean diameter, D (mm)**	41.69	**Dry density, ρ_d (kg/m^3)**	2626
L/D ratio	2.58	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	385.59
Water content (%)	0.10	**Porosity, n (%)**	0.27					**Bulk density, ρ (kg/m^3)**	2629
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	655	**Temperature (ºC)**	22.0		
F_{max} (kN)	249.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	182.9	**$UCS_{1:2}$ (MPa)**	189.3	**UCS_{50} (MPa)**	183.2	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.942	**V_{S1} (km/s)**	3.564	**V_{S2} (km/s)**	3.402	**V_S (km/s)**	3.483
Dynamic moduli		**E_{dyn} (GPa)**	79.0	**ν_{dyn}**	0.24	**V_P/V_S**	1.71
		G_{dyn} (GPa)	31.9	**K_{dyn} (GPa)**	50.3		
Notes (6)							

PICTURES AND PLOTS

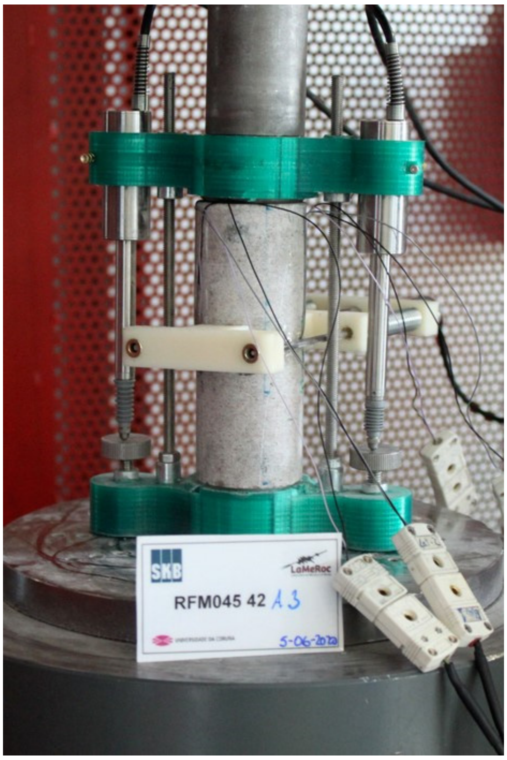

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

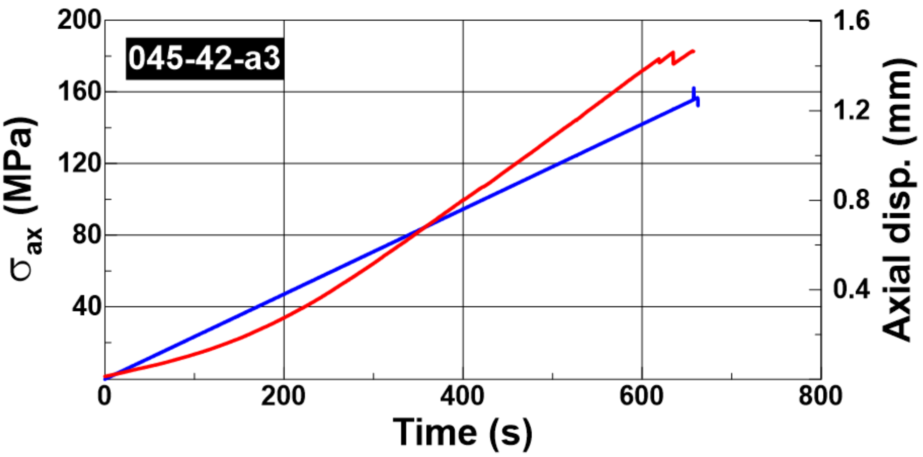

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	**Report date**
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	42_045b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	107.01	107.18	106.96	106.69	106.72	**Mean length, L (mm)**	106.91	**Dry mass, M_d (g)**	396.75
Diameter (mm)	42.42	42.45	42.48	42.48	-	**Mean diameter, D (mm)**	42.46	**Dry density, ρ_d (kg/m^3)**	2621
L/D ratio	2.52	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	397.12		
Water content (%)	0.09	**Porosity, n (%)**	0.24			**Bulk density, ρ (kg/m^3)**	2624		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	661	**Temperature (ºC)**	22.0		
F_{max} (kN)	269.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	190.5	**$UCS_{1:2}$ (MPa)**	196.7	**UCS_{50} (MPa)**	191.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	107.1	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.033	**V_{S1} (km/s)**	3.311	**V_{S2} (km/s)**	3.661	**V_S (km/s)**	3.486
	Dynamic moduli	**E_{dyn} (GPa)**	79.7	**ν_{dyn}**	0.25	**V_P/V_S**	1.73
		G_{dyn} (GPa)	31.9	**K_{dyn} (GPa)**	53.0		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

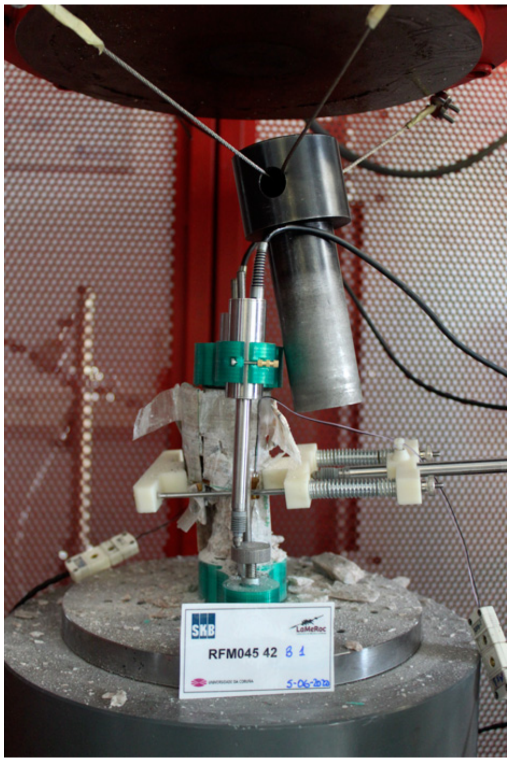

Figure 2. *Sample after the test*

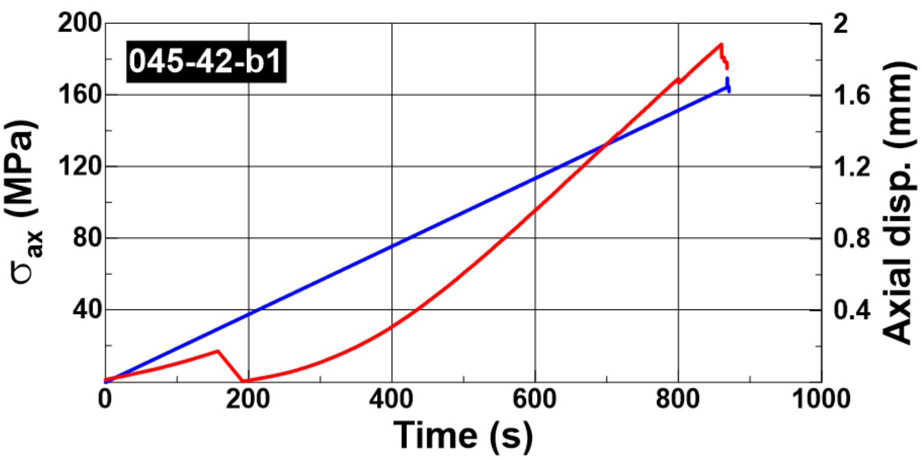

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	Specimen		Ref. LaMeRoc	42_045b_2
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	106.84	106.78	106.74	106.77	106.82	Mean length, L (mm)	106.79	Dry mass, M_d (g)	394.06
Diameter (mm)	42.39	42.41	42.40	42.43	-	Mean diameter, D (mm)	42.41	Dry density, ρ_d (kg/m^3)	2613
L/D ratio	2.52	Permeability, k (mD)	-					Bulk mass, M (g)	394.50
Water content (%)	0.11	Porosity, n (%)	0.29					Bulk density, ρ (kg/m^3)	2615
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-10AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	Time to failure (s)	563	Temperature (ºC)	22.0		
F_{max} (kN)	232.9	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	164.9	$UCS_{1:2}$ (MPa)	170.3	UCS_{50} (MPa)	165.4	σ_{CI} (MPa)	-
	Static moduli	$E_{50\%}$ (GPa)	83.0	$\nu_{50\%}$	0.27	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	6.346	V_{S1} (km/s)	3.254	V_{S2} (km/s)	3.326	V_S (km/s)	3.290
	Dynamic moduli	E_{dyn} (GPa)	74.5	ν_{dyn}	0.32	V_P/V_S	1.93
		G_{dyn} (GPa)	28.3	K_{dyn} (GPa)	67.6		
Notes (6)							

PICTURES AND PLOTS

Figure 1. Sample before the test

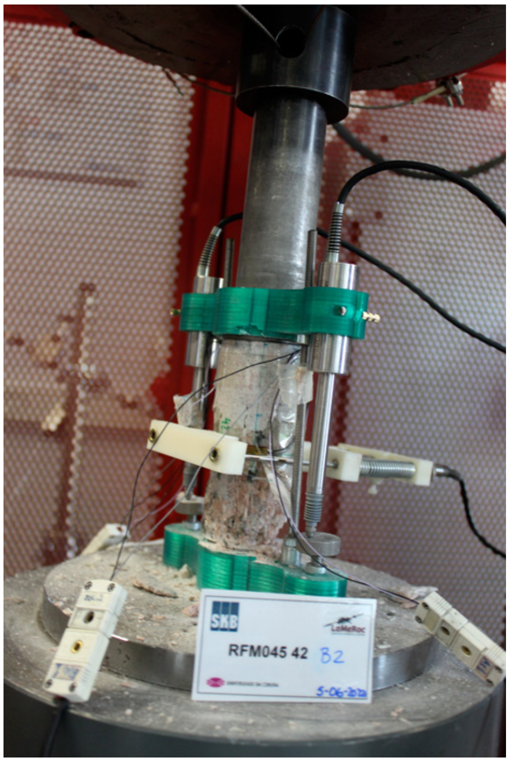

Figure 2. Sample after the test

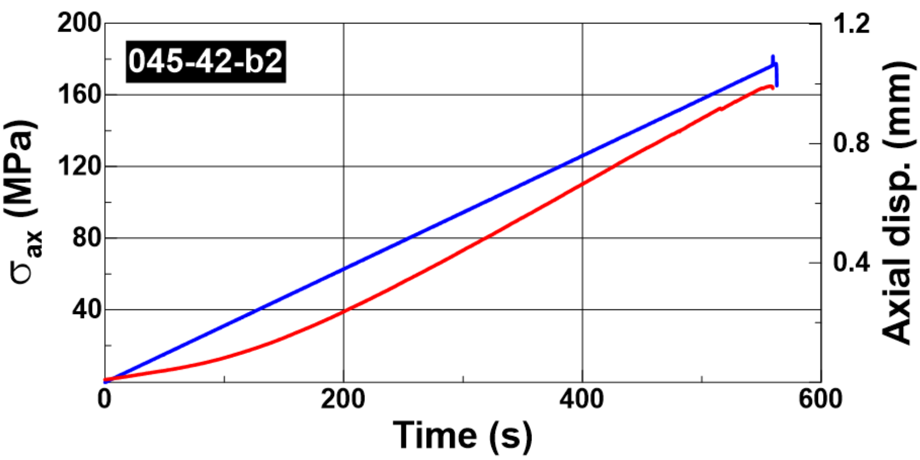

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	42_045c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	107.56	107.58	107.65	107.59	107.62	**Mean length, L (mm)**	107.60	**Dry mass, M_d (g)**	382.88
Diameter (mm)	41.60	41.59	41.66	41.62	-	**Mean diameter, D (mm)**	41.62	**Dry density, ρ_d (kg/m^3)**	2616
L/D ratio	2.59	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	383.22
Water content (%)	0.09	**Porosity, n (%)**	0.23					**Bulk density, ρ (kg/m^3)**	2618
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	589	**Temperature (ºC)**	22.0		
F_{max} (kN)	186.4	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	137.0	**$UCS_{1:2}$ (MPa)**	141.9	**UCS_{50} (MPa)**	137.3	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	133.1	**$\nu_{50\%}$**	0.27	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	6.008	**V_{S1} (km/s)**	3.489	**V_{S2} (km/s)**	3.140	**V_S (km/s)**	3.315
	Dynamic moduli	**E_{dyn} (GPa)**	73.7	**ν_{dyn}**	0.28	**V_P/V_S**	1.81
		G_{dyn} (GPa)	28.8	**K_{dyn} (GPa)**	56.1		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

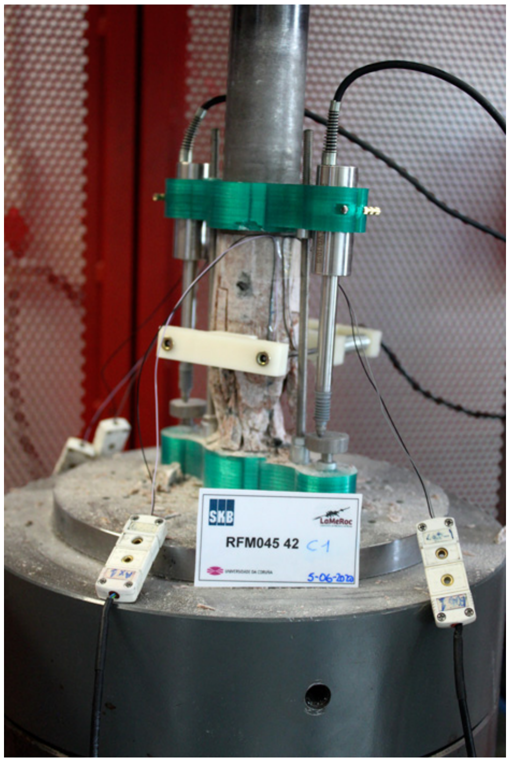

Figure 2. *Sample after the test*

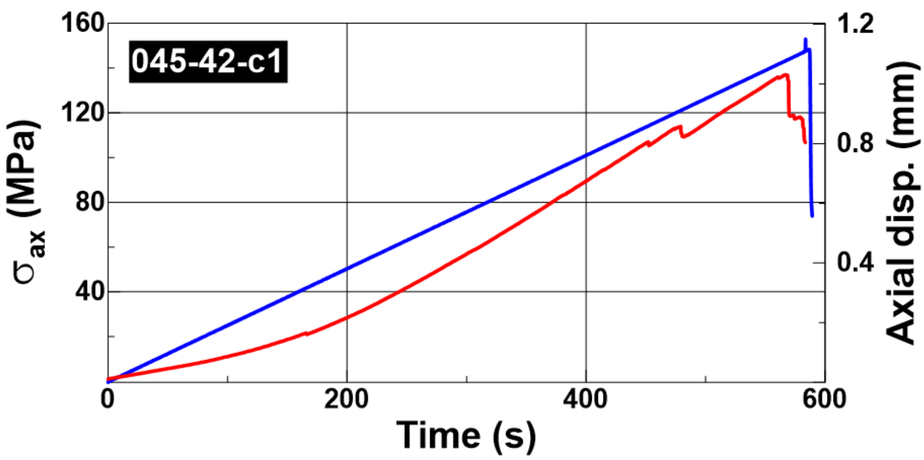

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	42_045c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	106.93	107.02	107.06	107.00	106.97	**Mean length, L (mm)**	107.00	**Dry mass, M_d (g)**	379.36
Diameter (mm)	41.62	41.56	41.60	41.56	-	**Mean diameter, D (mm)**	41.59	**Dry density, ρ_d (kg/m^3)**	2610
L/D ratio	2.57	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	379.65
Water content (%)	0.08	**Porosity, n (%)**	0.20					**Bulk density, ρ (kg/m^3)**	2612
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	779	**Temperature (ºC)**	22.0		
F_{max} (kN)	350.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	257.8	**$UCS_{1:2}$ (MPa)**	266.8	**UCS_{50} (MPa)**	258.1	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	91.7	**$\nu_{50\%}$**	0.27	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.846	**V_{S1} (km/s)**	3.421	**V_{S2} (km/s)**	3.423	**V_S (km/s)**	3.422
	Dynamic moduli	**E_{dyn} (GPa)**	75.8	**ν_{dyn}**	0.24	**V_P/V_S**	1.71
		G_{dyn} (GPa)	30.6	**K_{dyn} (GPa)**	48.5		
Notes (6)							

PICTURES AND PLOTS

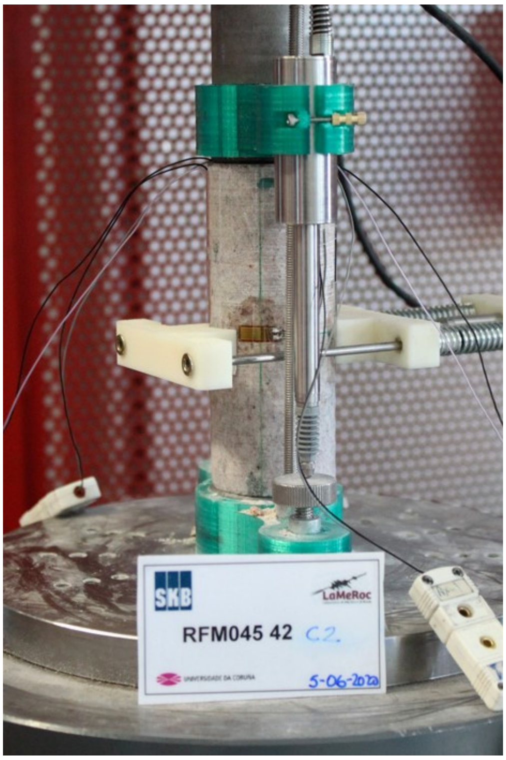

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

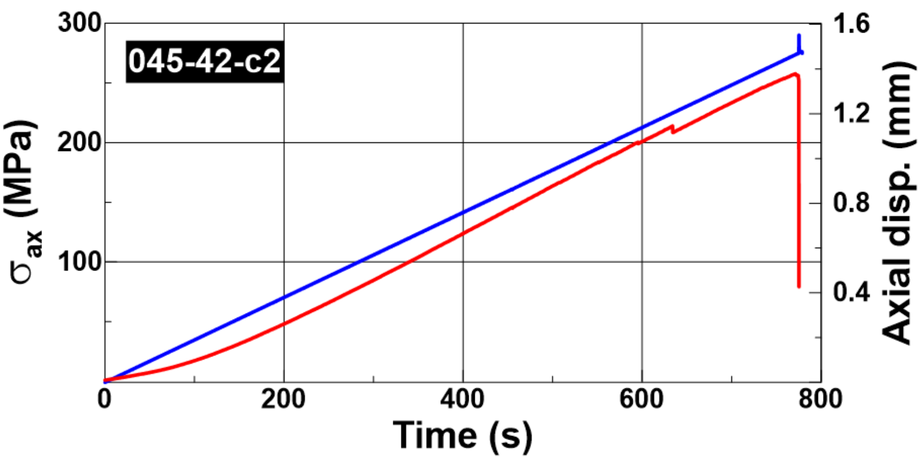

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	42_045c_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	112.03	112.03	111.95	111.97	111.96	**Mean length, L (mm)**	111.99	**Dry mass, M_d (g)**	397.05
Diameter (mm)	41.57	41.52	41.53	41.55	-	**Mean diameter, D (mm)**	41.54	**Dry density, ρ_d (kg/m^3)**	2616
L/D ratio	2.70	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	397.28
Water content (%)	0.06	**Porosity, n (%)**	0.15					**Bulk density, ρ (kg/m^3)**	2617
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	737	**Temperature (ºC)**	22.0		
F_{max} (kN)	327.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	242.0	**$UCS_{1:2}$ (MPa)**	251.4	**UCS_{50} (MPa)**	243.2	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	97.2	**$\nu_{50\%}$**	0.21	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.912	**V_{S1} (km/s)**	3.344	**V_{S2} (km/s)**	3.325	**V_S (km/s)**	3.334
	Dynamic moduli	**E_{dyn} (GPa)**	73.7	**ν_{dyn}**	0.27	**V_P/V_S**	1.77
		G_{dyn} (GPa)	29.1	**K_{dyn} (GPa)**	52.7		
Notes (6)							

PICTURES AND PLOTS

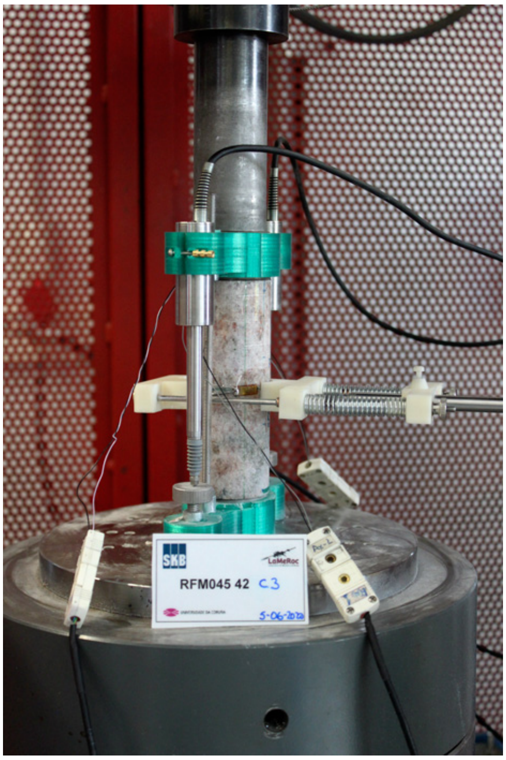

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

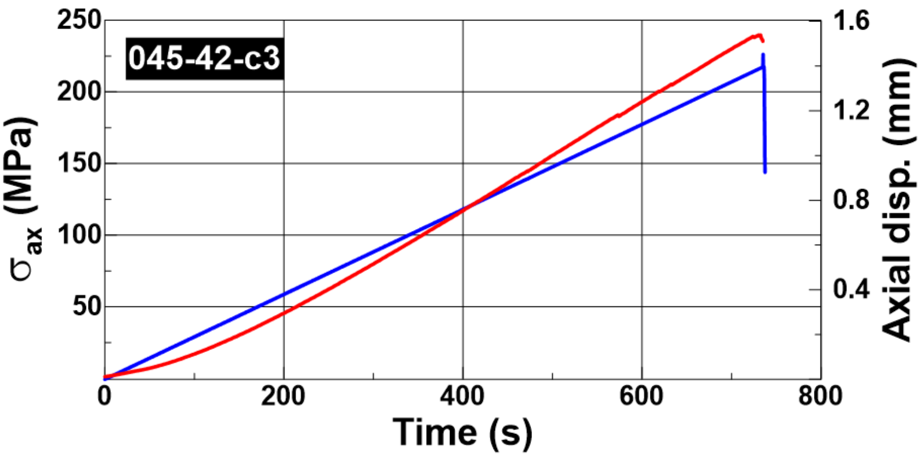

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	42_045d_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	105.23	105.18	105.19	105.23	105.23	**Mean length, L (mm)**	105.21	**Dry mass, M_d (g)**	387.93
Diameter (mm)	42.36	42.41	42.49	42.38	-	**Mean diameter, D (mm)**	42.41	**Dry density, ρ_d (kg/m^3)**	2610
L/D ratio	2.48	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	388.26		
Water content (%)	0.09	**Porosity, n (%)**	0.22			**Bulk density, ρ (kg/m^3)**	2612		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	729			**Temperature (ºC)**	22.0
F_{max} (kN)	275.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	195.1	**$UCS_{1:2}$ (MPa)**	201.3	**UCS_{50} (MPa)**	195.4	**σ_{CI} (MPa)**	106.1
	Static moduli	**$E_{50\%}$ (GPa)**	89.5	**$\nu_{50\%}$**	0.27	**σ_{CD} (MPa)**	174.3
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.971	**V_{S1} (km/s)**	3.315	**V_{S2} (km/s)**	3.412	**V_S (km/s)**	3.364
	Dynamic moduli	**E_{dyn} (GPa)**	74.9	**ν_{dyn}**	0.27	**V_P/V_S**	1.78
		G_{dyn} (GPa)	29.6	**K_{dyn} (GPa)**	53.7		
Notes (6)							

PICTURES AND PLOTS

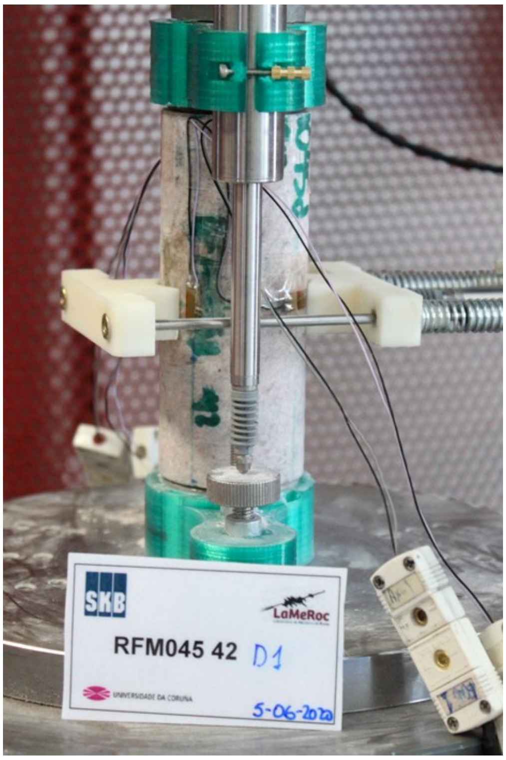

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

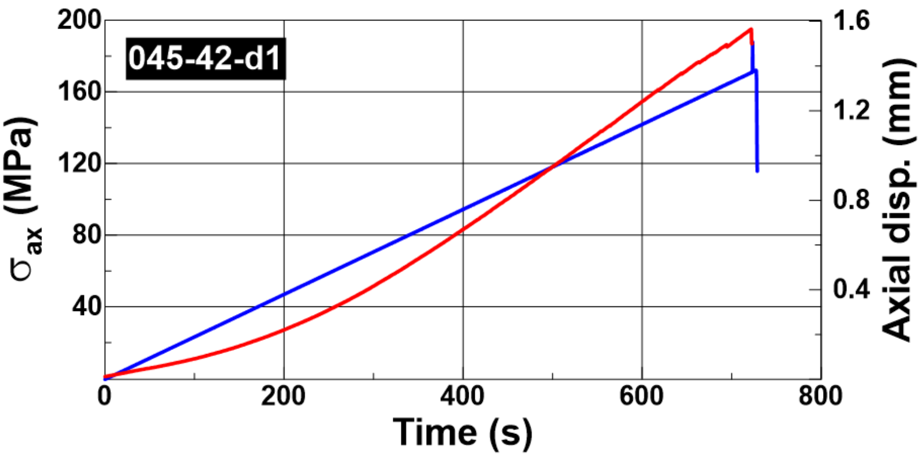

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	42_045d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	107.41	107.26	107.13	107.29	107.38	**Mean length, L (mm)**	107.29	**Dry mass, M_d (g)**	390.92
Diameter (mm)	41.70	41.95	42.09	42.12	-	**Mean diameter, D (mm)**	41.97	**Dry density, ρ_d (kg/m^3)**	2634
L/D ratio	2.56	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	391.26
Water content (%)	0.09	**Porosity, n (%)**	0.23					**Bulk density, ρ (kg/m^3)**	2636
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	05/06/2020	**Time to failure (s)**	647	**Temperature (ºC)**	22.0		
F_{max} (kN)	169.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	122.3	**$UCS_{1:2}$ (MPa)**	126.4	**UCS_{50} (MPa)**	122.5	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	77.6	**$\nu_{50\%}$**	0.14	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.996	**V_{S1} (km/s)**	3.465	**V_{S2} (km/s)**	3.513	**V_S (km/s)**	3.489
	Dynamic moduli	**E_{dyn} (GPa)**	79.9	**ν_{dyn}**	0.24	**V_P/V_S**	1.72
		G_{dyn} (GPa)	32.1	**K_{dyn} (GPa)**	52.0		
Notes (6)							

PICTURES AND PLOTS

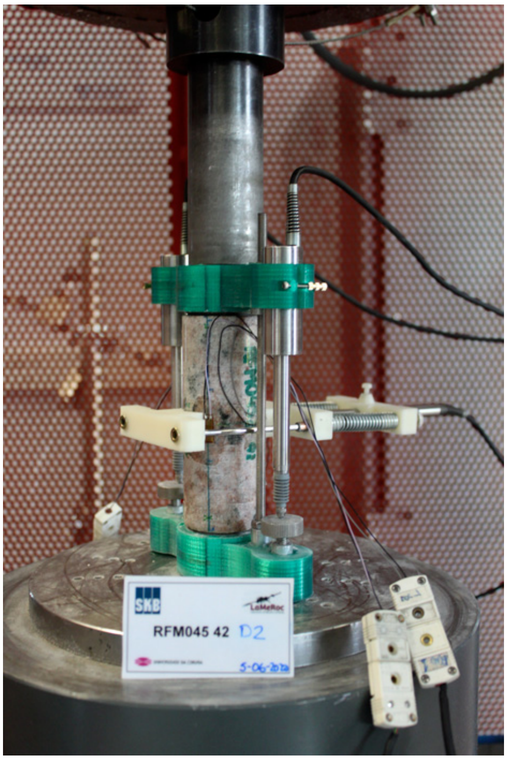

Figure 1. *Sample before the test*

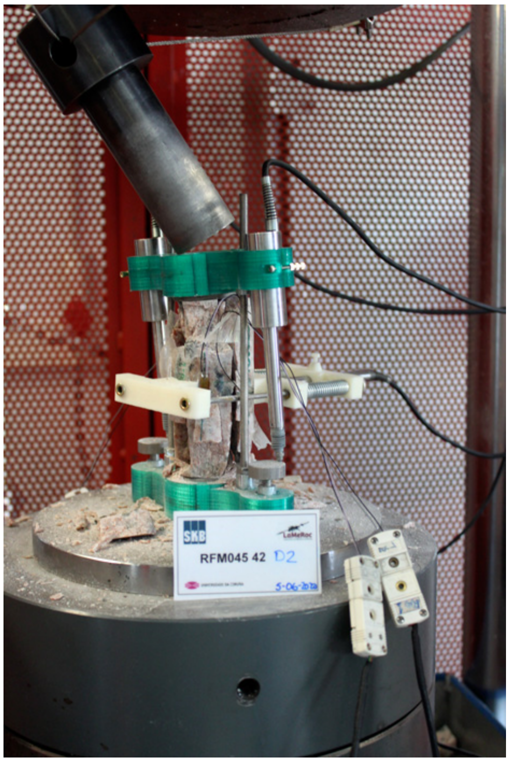

Figure 2. *Sample after the test*

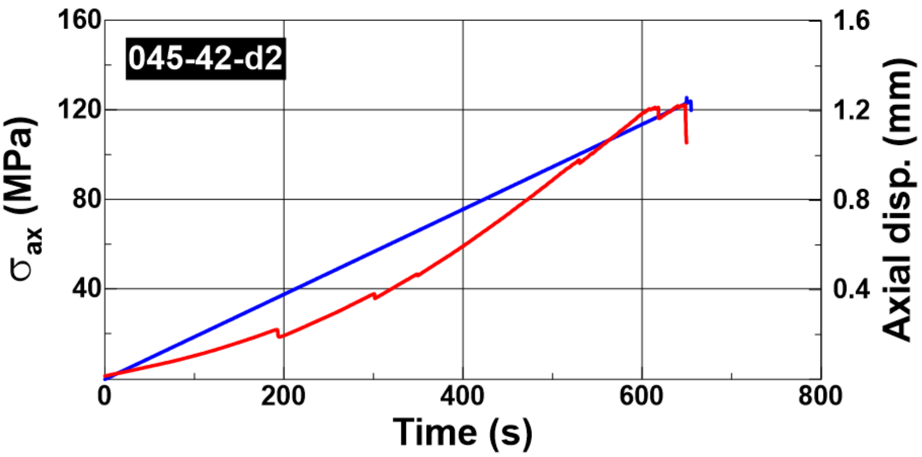

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	50_045a_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	146.43	146.58	146.71	146.64	146.44	**Mean length, L (mm)**	146.56	**Dry mass, M_d (g)**	740.76
Diameter (mm)	49.74	49.62	49.80	49.66	49.72	**Mean diameter, D (mm)**	49.71	**Dry density, ρ_d (kg/m^3)**	2604
L/D ratio	2.95	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	741.68
Water content (%)	0.12	**Porosity, n (%)**	0.32					**Bulk density, ρ (kg/m^3)**	2608
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	**Time to failure (s)**	785	**Temperature (ºC)**	22.0		
F_{max} (kN)	545.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	281.0	**$UCS_{1:2}$ (MPa)**	294.1	**UCS_{50} (MPa)**	293.8	**σ_{CI} (MPa)**	178.6
	Static moduli	**$E_{50\%}$ (GPa)**	81.1	**$\nu_{50\%}$**	0.26	**σ_{CD} (MPa)**	261.3
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.167	**V_{S1} (km/s)**	3.281	**V_{S2} (km/s)**	2.959	**V_S (km/s)**	3.120
	Dynamic moduli	**E_{dyn} (GPa)**	61.6	**ν_{dyn}**	0.21	**V_P/V_S**	1.66
		G_{dyn} (GPa)	25.4	**K_{dyn} (GPa)**	35.8		
Notes (6)							

PICTURES AND PLOTS

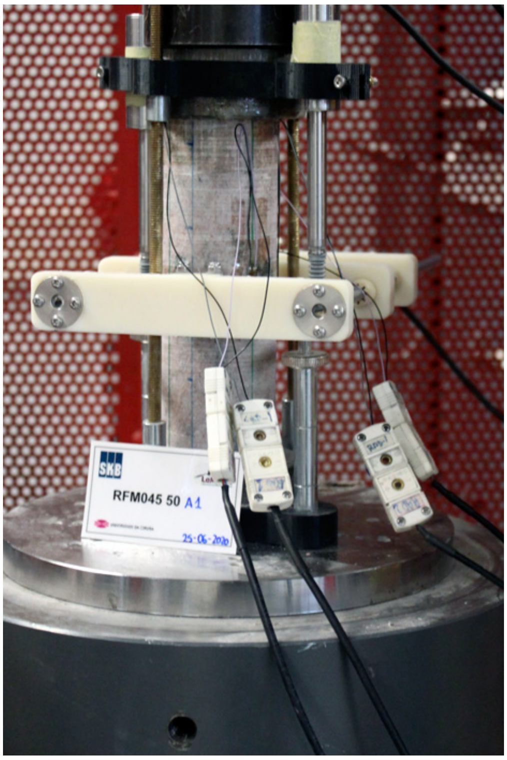

Figure 1. Sample before the test

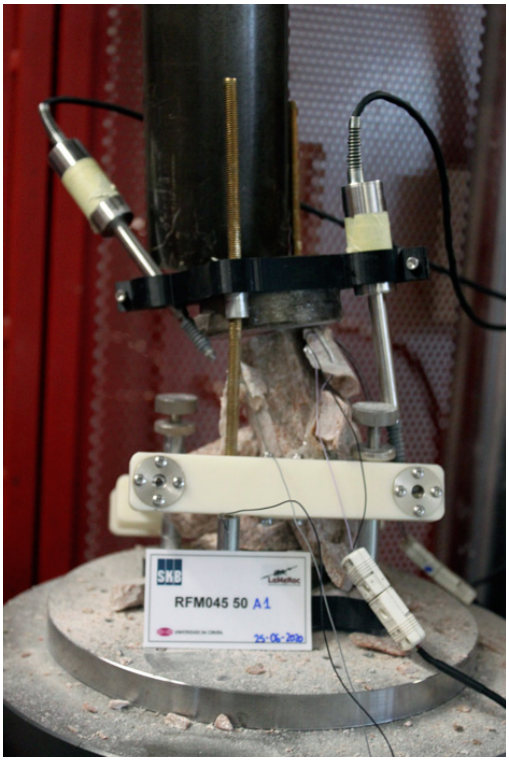

Figure 2. Sample after the test

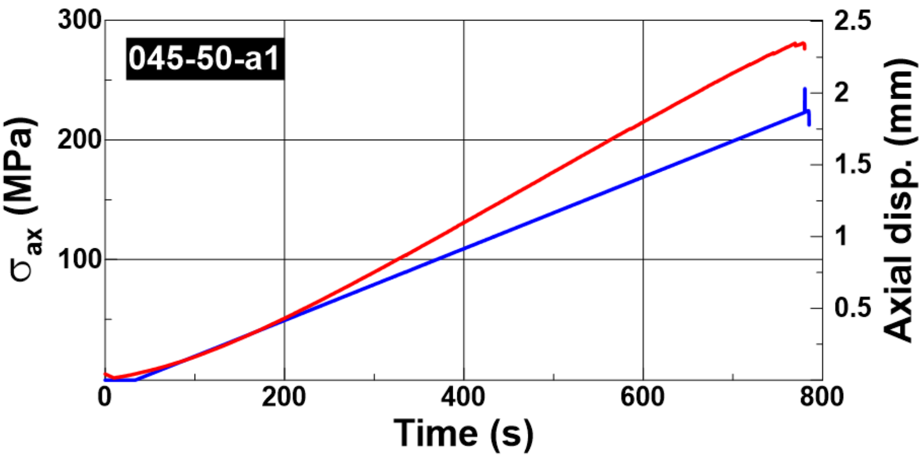

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

LaMeRoc Laboratorio de Mecánica de Rocas

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	50_045a_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	145.81	145.72	145.67	145.68	145.78	**Mean length, L (mm)**	145.73	**Dry mass, M_d (g)**	739.09
Diameter (mm)	49.59	49.69	49.66	49.68	49.64	**Mean diameter, D (mm)**	49.65	**Dry density, ρ_d (kg/m^3)**	2619
L/D ratio	2.94	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	740.27		
Water content (%)	0.16	**Porosity, n (%)**	0.42			**Bulk density, ρ (kg/m^3)**	2623		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	**Time to failure (s)**	539	**Temperature (ºC)**	22.0		
F_{max} (kN)	415.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	214.7	**$UCS_{1:2}$ (MPa)**	224.7	**UCS_{50} (MPa)**	224.4	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	83.9	**$\nu_{50\%}$**	0.24	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.265	**V_{S1} (km/s)**	3.076	**V_{S2} (km/s)**	3.151	**V_S (km/s)**	3.114
Dynamic moduli		**E_{dyn} (GPa)**	62.6	**ν_{dyn}**	0.23	**V_P/V_S**	1.69
		G_{dyn} (GPa)	25.4	**K_{dyn} (GPa)**	38.8		
Notes (6)							

PICTURES AND PLOTS

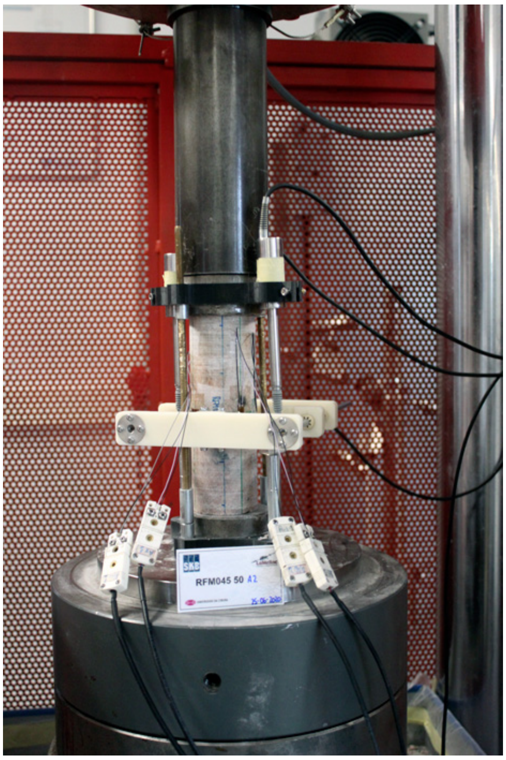

Figure 1. *Sample before the test*

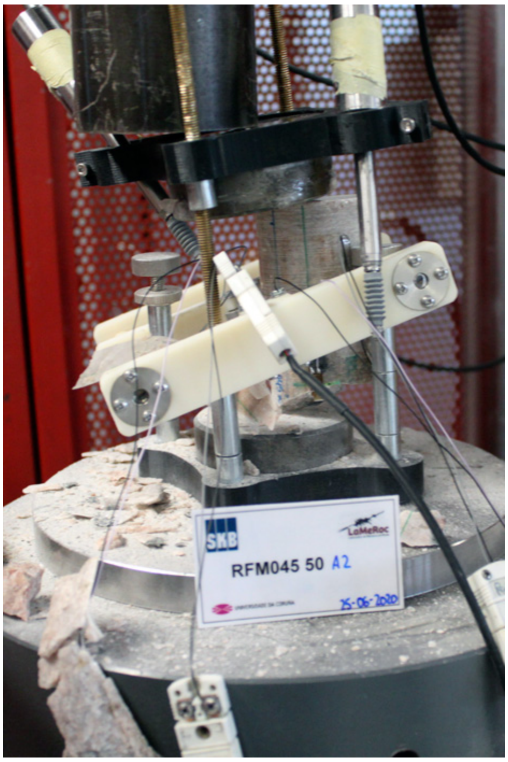

Figure 2. *Sample after the test*

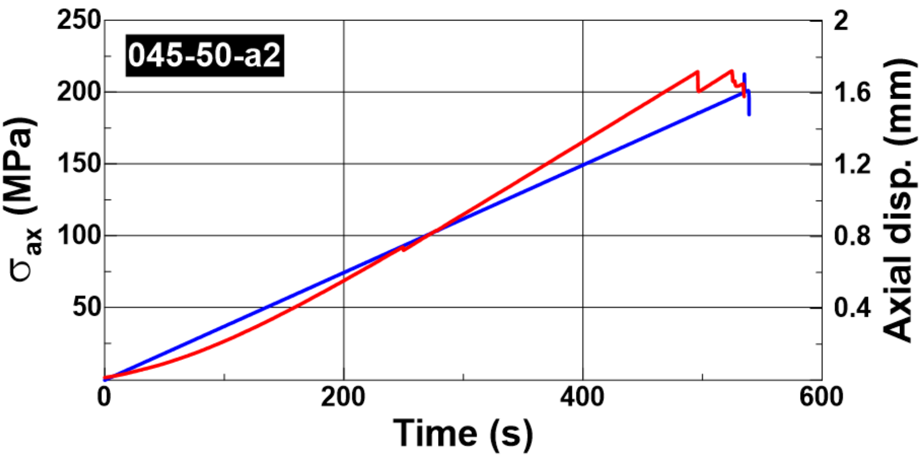

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	50_045a_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	149.00	148.98	148.78	148.97	148.87	**Mean length, L (mm)**	148.92	**Dry mass, M_d (g)**	760.5
Diameter (mm)	49.79	49.72	49.72	49.62	49.54	**Mean diameter, D (mm)**	49.68	**Dry density, ρ_d (kg/m^3)**	2635
L/D ratio	3.00	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	761.68		
Water content (%)	0.16	**Porosity, n (%)**	0.41			**Bulk density, ρ (kg/m^3)**	2639		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	**Time to failure (s)**	491	**Temperature (ºC)**	22.0		
F_{max} (kN)	264.6	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	136.5	**$UCS_{1:2}$ (MPa)**	143.1	**UCS_{50} (MPa)**	142.9	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	79.9	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.300	**V_{S1} (km/s)**	3.226	**V_{S2} (km/s)**	3.145	**V_S (km/s)**	3.185
	Dynamic moduli	**E_{dyn} (GPa)**	65.2	**ν_{dyn}**	0.22	**V_P/V_S**	1.66
		G_{dyn} (GPa)	26.8	**K_{dyn} (GPa)**	38.4		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. Sample before the test

Figure 2. Sample after the test

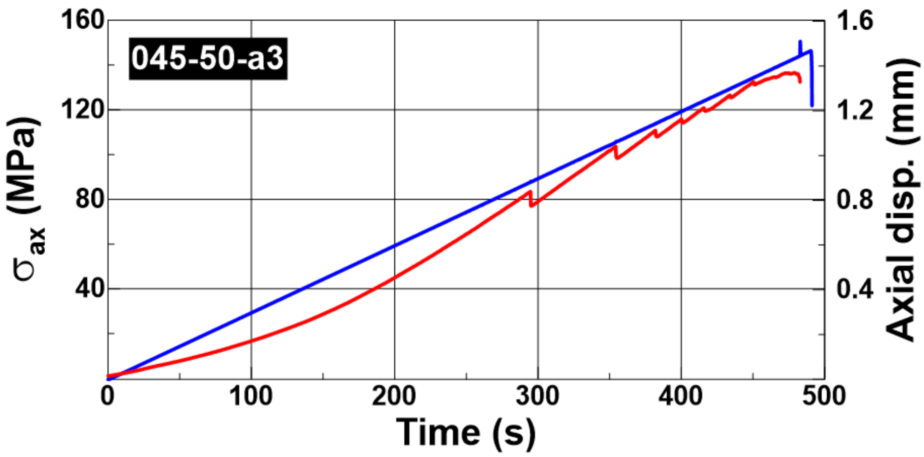

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	50_045b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	139.22	139.01	139.03	138.96	139.13	**Mean length, L (mm)**	139.07	**Dry mass, M_d (g)**	703.83
Diameter (mm)	49.59	49.67	49.58	49.66	49.51	**Mean diameter, D (mm)**	49.60	**Dry density, ρ_d (kg/m^3)**	2619
L/D ratio	2.80	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	704.75		
Water content (%)	0.13	**Porosity, n (%)**	0.34			**Bulk density, ρ (kg/m^3)**	2622		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	**Time to failure (s)**	397	**Temperature (ºC)**	22.0		
F_{max} (kN)	234.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	121.6	**$UCS_{1:2}$ (MPa)**	126.8	**UCS_{50} (MPa)**	126.6	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	77.7	**$\nu_{50\%}$**	0.29	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.194	**V_{S1} (km/s)**	2.726	**V_{S2} (km/s)**	3.085	**V_S (km/s)**	2.906
Dynamic moduli		**E_{dyn} (GPa)**	56.3	**ν_{dyn}**	0.27	**V_P/V_S**	1.79
		G_{dyn} (GPa)	22.1	**K_{dyn} (GPa)**	41.2		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

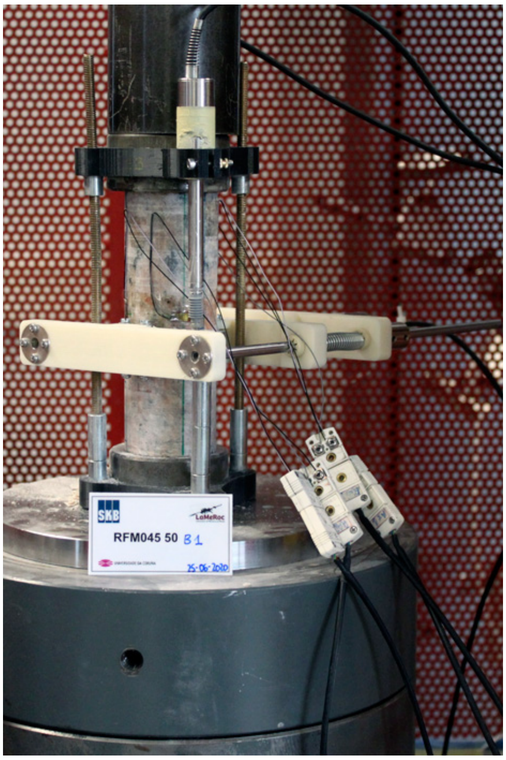

Figure 1. *Sample before the test*

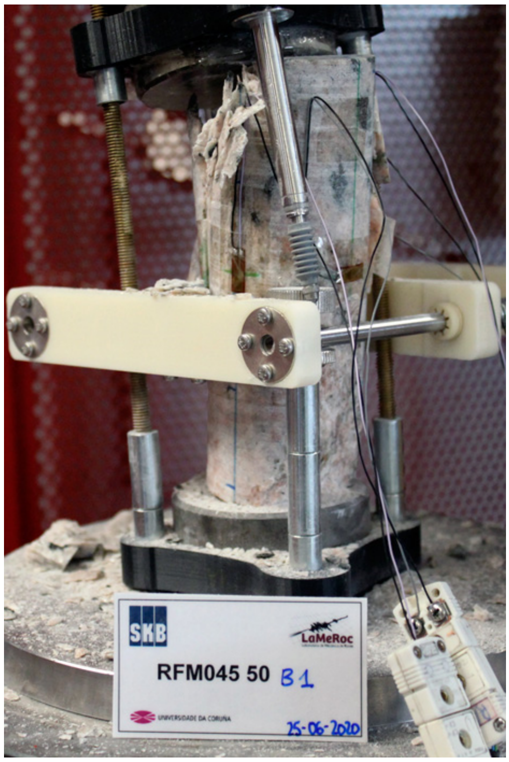

Figure 2. *Sample after the test*

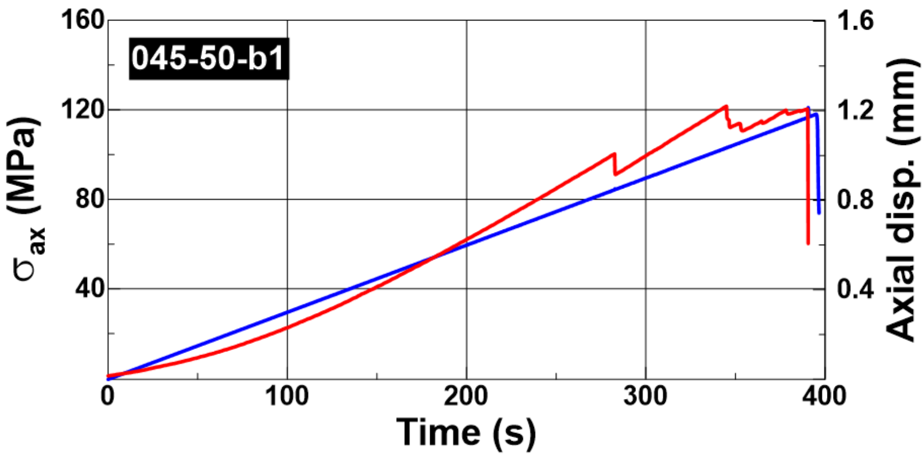

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	Report date
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	Specimen		Ref. LaMeRoc	50_045b_2
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	139.00	139.05	139.12	139.07	139.07	Mean length, L (mm)	139.06	Dry mass, M_d (g)	705.84
Diameter (mm)	49.51	49.61	49.61	49.57	49.53	Mean diameter, D (mm)	49.57	Dry density, ρ_d (kg/m^3)	2631
L/D ratio	2.81	Permeability, k (mD)	-					Bulk mass, M (g)	707.05
Water content (%)	0.17	Porosity, n (%)	0.45					Bulk density, ρ (kg/m^3)	2635
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	Force class (UNE-EN-7500)	1	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Strain		
LDT model	Solartron AX/5/s	Loading rate (N/s)	-		
Strain gauge type	BX120-10AA	Strain rate (s^{-1})	4.17E-06		
Load cell	Built-in 1500 kN	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	Time to failure (s)	411			Temperature (ºC)	22.0
F_{max} (kN)	245.2	T_0 (MPa)	-	$T_{0,50}$ (MPa)	-		
UCS (MPa)	127.1	$UCS_{1:2}$ (MPa)	132.5	UCS_{50} (MPa)	132.3	σ_{CI} (MPa)	-
	Static moduli	$E_{50\%}$ (GPa)	80.3	$\nu_{50\%}$	0.23	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	5.308	V_{S1} (km/s)	3.407	V_{S2} (km/s)	3.119	V_S (km/s)	3.263
	Dynamic moduli	E_{dyn} (GPa)	67.1	ν_{dyn}	0.20	V_P/V_S	1.63
		G_{dyn} (GPa)	28.1	K_{dyn} (GPa)	36.8		
Notes (6)							

PICTURES AND PLOTS

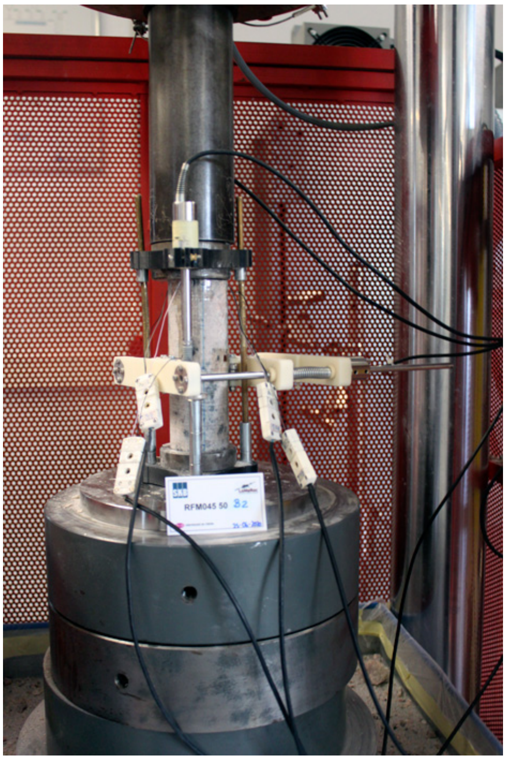

Figure 1. *Sample before the test*

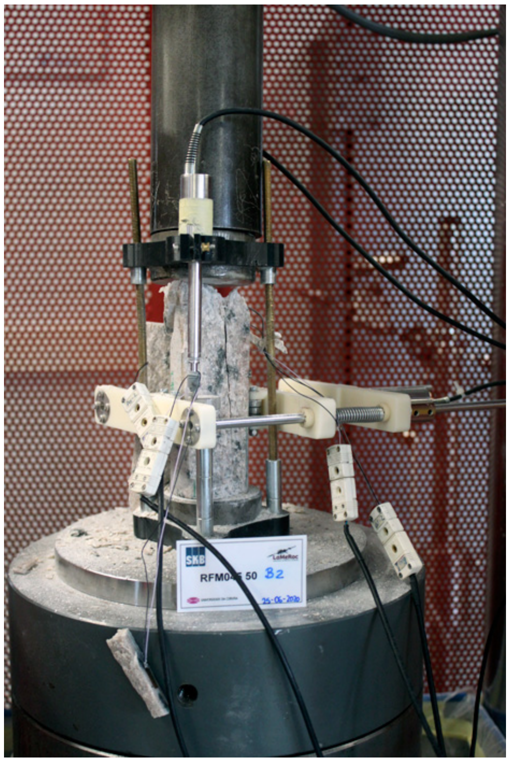

Figure 2. *Sample after the test*

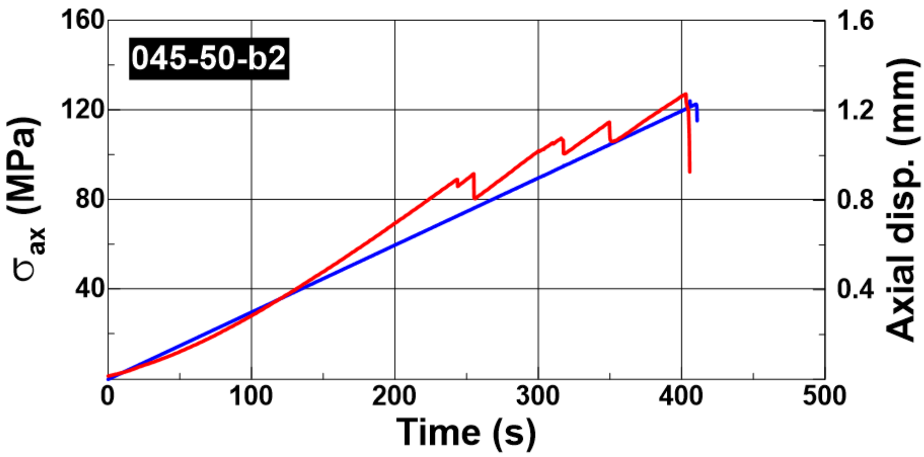

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	50_045c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	145.40	145.40	145.32	145.36	145.40	**Mean length, L (mm)**	145.38	**Dry mass, M_d (g)**	736.7
Diameter (mm)	49.55	49.71	49.61	49.66	49.58	**Mean diameter, D (mm)**	49.62	**Dry density, ρ_d (kg/m^3)**	2620
L/D ratio	2.93	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	737.95		
Water content (%)	0.17	**Porosity, n (%)**	0.44			**Bulk density, ρ (kg/m^3)**	2625		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	**Time to failure (s)**	530	**Temperature (ºC)**	22.0		
F_{max} (kN)	454.1	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	234.8	**$UCS_{1:2}$ (MPa)**	245.7	**UCS_{50} (MPa)**	245.4	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	77.4	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.287	**V_{S1} (km/s)**	3.131	**V_{S2} (km/s)**	3.135	**V_S (km/s)**	3.133
	Dynamic moduli	**E_{dyn} (GPa)**	63.3	**ν_{dyn}**	0.23	**V_P/V_S**	1.69
		G_{dyn} (GPa)	25.8	**K_{dyn} (GPa)**	39.0		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

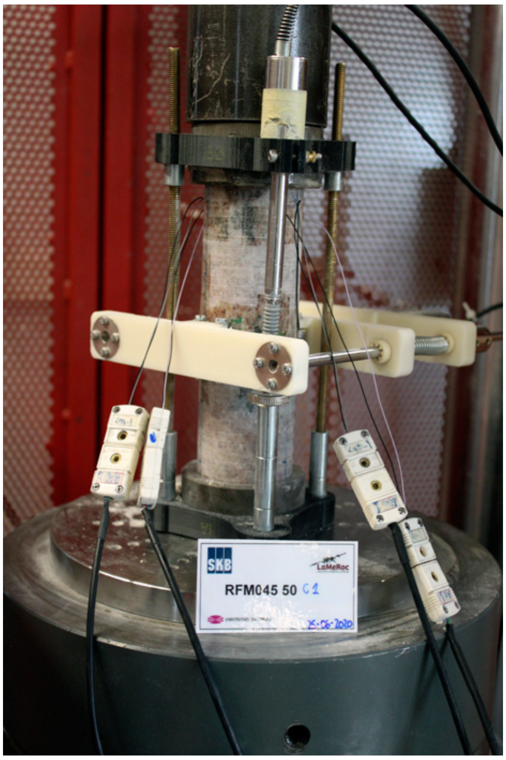

Figure 1. *Sample before the test*

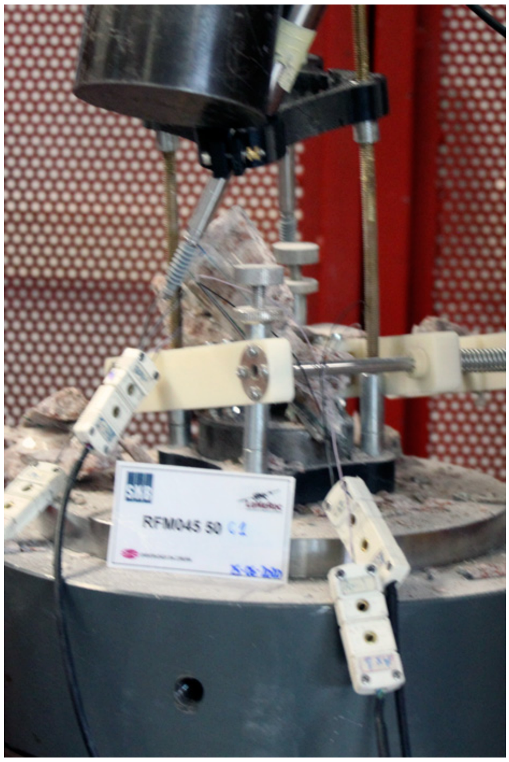

Figure 2. *Sample after the test*

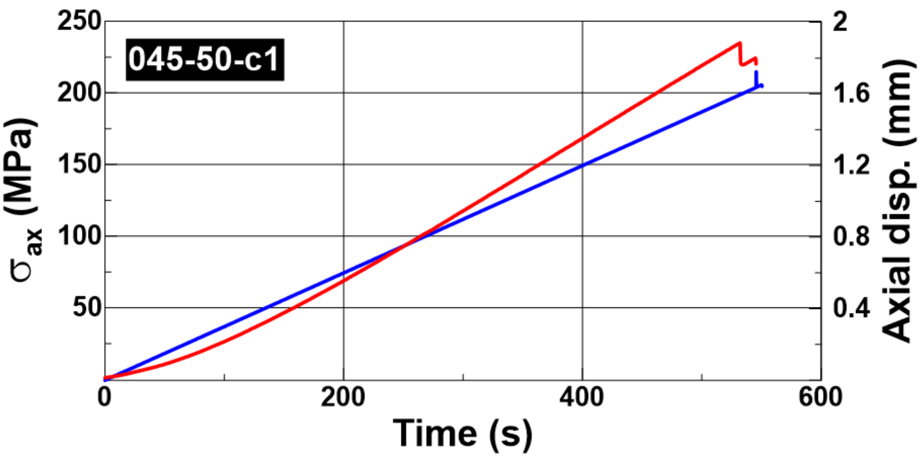

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

LaMeRoc

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	**Report date**
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	50_045c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	146.27	146.37	146.28	146.22	146.26	**Mean length, L (mm)**	146.28	**Dry mass, M_d (g)**	741.07
Diameter (mm)	49.48	49.58	49.72	49.77	49.64	**Mean diameter, D (mm)**	49.64	**Dry density, ρ_d (kg/m³)**	2618
L/D ratio	2.95	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	741.95		
Water content (%)	0.12	**Porosity, n (%)**	0.31			**Bulk density, ρ (kg/m³)**	2621		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	**Time to failure (s)**	599	**Temperature (ºC)**	22.0		
F_{max} (kN)	498.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	257.8	**$UCS_{1:2}$ (MPa)**	269.8	**UCS_{50} (MPa)**	269.5	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	84.8	**$\nu_{50\%}$**	0.27	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.248	**V_{S1} (km/s)**	3.197	**V_{S2} (km/s)**	3.145	**V_S (km/s)**	3.171
Dynamic moduli		**E_{dyn} (GPa)**	63.9	**ν_{dyn}**	0.21	**V_P/V_S**	1.65
		G_{dyn} (GPa)	26.4	**K_{dyn} (GPa)**	37.1		
Notes (6)							

PICTURES AND PLOTS

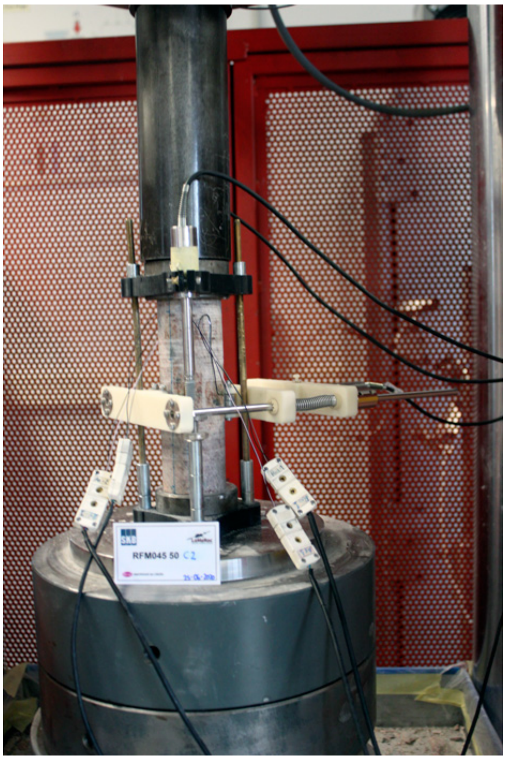

Figure 1. *Sample before the test*

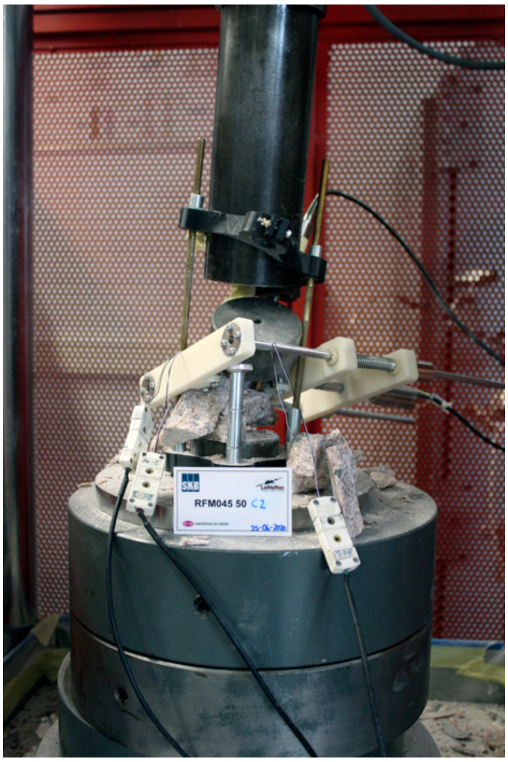

Figure 2. *Sample after the test*

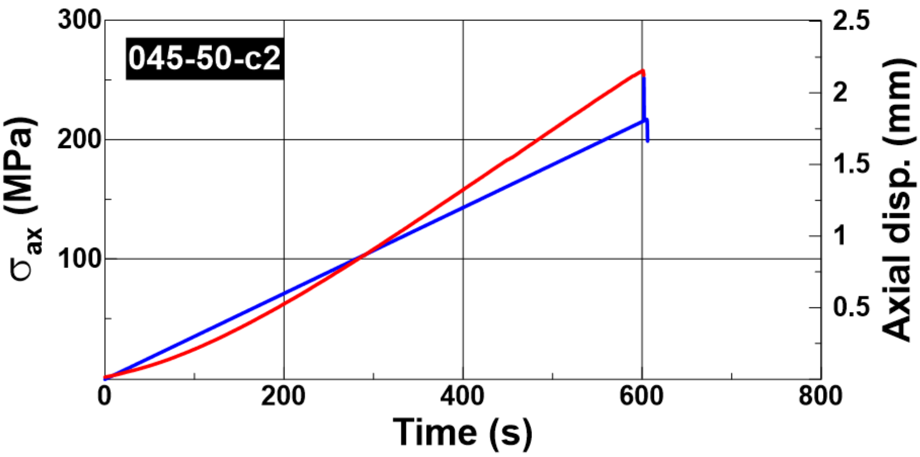

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	50_045c_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	136.75	138.76	138.80	138.69	138.66	**Mean length, L (mm)**	138.33	**Dry mass, M_d (g)**	702.01
Diameter (mm)	49.58	49.80	49.83	49.68	49.58	**Mean diameter, D (mm)**	49.69	**Dry density, ρ_d (kg/m^3)**	2617
L/D ratio	2.78	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	702.93		
Water content (%)	0.13	**Porosity, n (%)**	0.34			**Bulk density, ρ (kg/m^3)**	2620		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	**Time to failure (s)**	437	**Temperature (ºC)**	22.0		
F_{max} (kN)	242.0	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	124.8	**$UCS_{1:2}$ (MPa)**	130.0	**UCS_{50} (MPa)**	129.8	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	79.2	**$\nu_{50\%}$**	0.26	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.264	**V_{S1} (km/s)**	3.161	**V_{S2} (km/s)**	3.159	**V_S (km/s)**	3.160
Dynamic moduli		**E_{dyn} (GPa)**	63.7	**ν_{dyn}**	0.22	**V_P/V_S**	1.67
		G_{dyn} (GPa)	26.2	**K_{dyn} (GPa)**	37.7		
Notes (6)							

PICTURES AND PLOTS

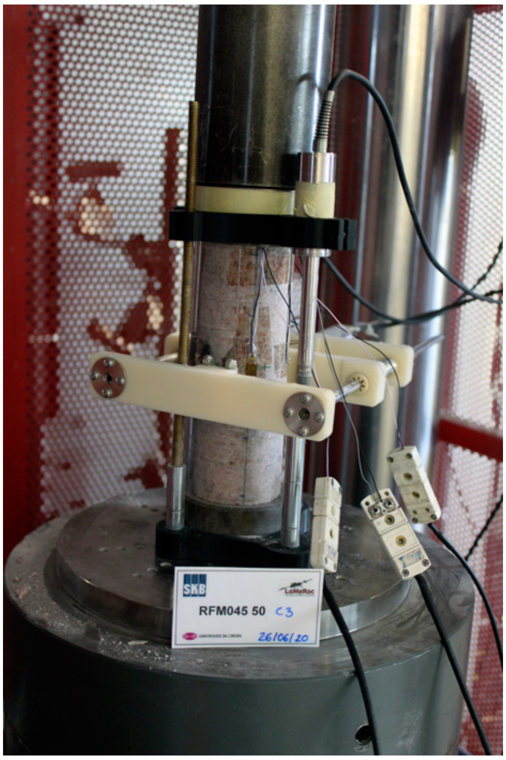

Figure 1. *Sample before the test*

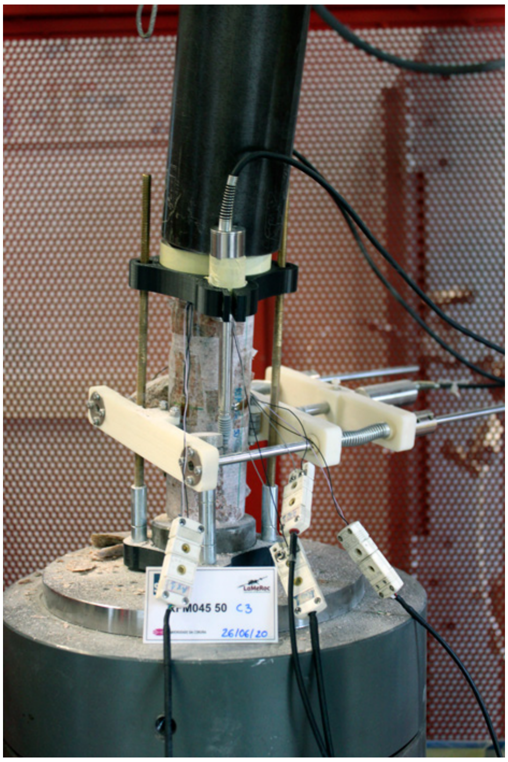

Figure 2. *Sample after the test*

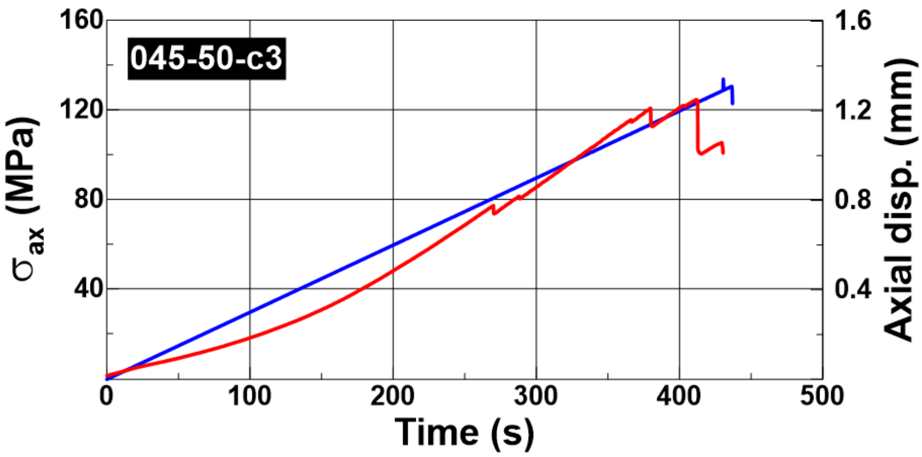

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	54_045d_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	141.40	141.48	141.44	141.48	141.39	**Mean length, L (mm)**	141.44	**Dry mass, M_d (g)**	864.7
Diameter (mm)	53.87	54.58	54.44	54.56	54.53	**Mean diameter, D (mm)**	54.40	**Dry density, ρ_d (kg/m^3)**	2631
L/D ratio	2.60	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	865.76		
Water content (%)	0.12	**Porosity, n (%)**	0.32			**Bulk density, ρ (kg/m^3)**	2634		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	**Time to failure (s)**	523	**Temperature (ºC)**	22.0		
F_{max} (kN)	420.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	181.0	**$UCS_{1:2}$ (MPa)**	187.5	**UCS_{50} (MPa)**	190.4	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	73.5	**$\nu_{50\%}$**	0.23	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.286	**V_{S1} (km/s)**	3.136	**V_{S2} (km/s)**	3.203	**V_S (km/s)**	3.170
Dynamic moduli		**E_{dyn} (GPa)**	64.5	**ν_{dyn}**	0.22	**V_P/V_S**	1.67
		G_{dyn} (GPa)	26.5	**K_{dyn} (GPa)**	38.3		
Notes (6)							

PICTURES AND PLOTS

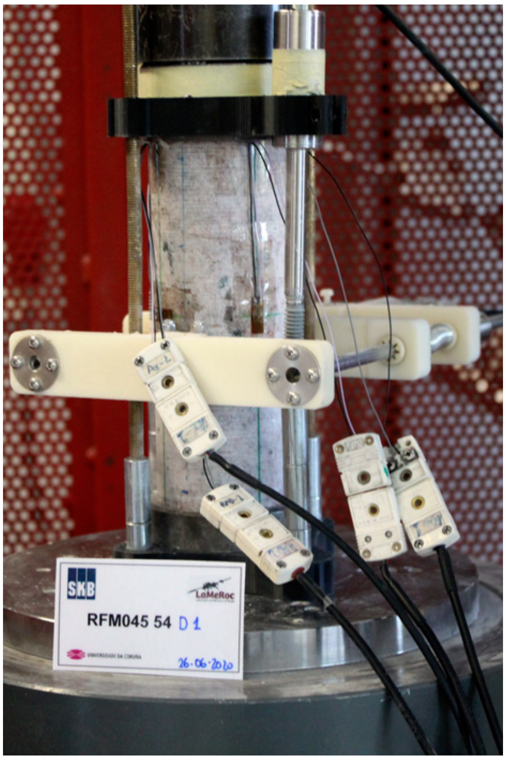

Figure 1. *Sample before the test*

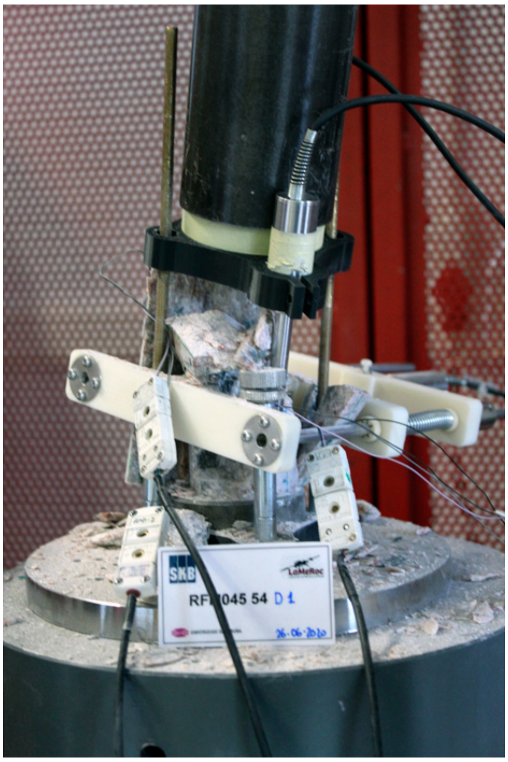

Figure 2. *Sample after the test*

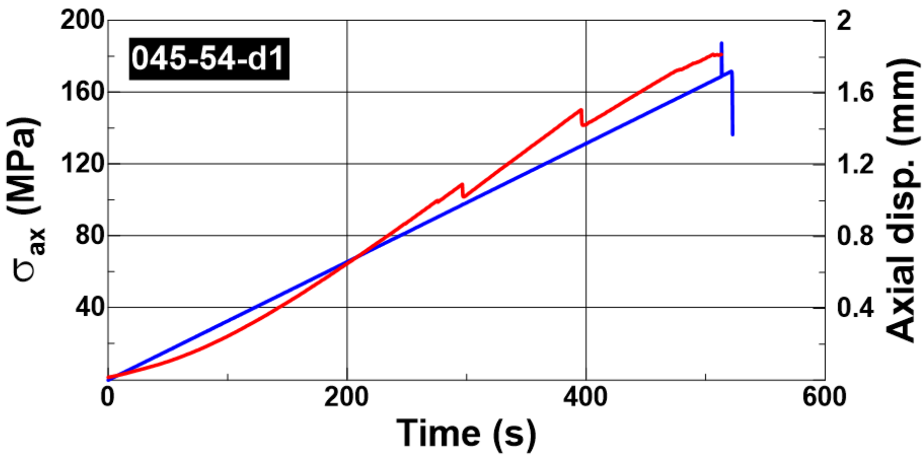

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	**Report date**
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	54_045d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	145.84	145.75	145.76	145.86	145.89	**Mean length, L (mm)**	145.82	**Dry mass, M_d (g)**	881.55
Diameter (mm)	54.15	54.62	54.52	54.56	54.39	**Mean diameter, D (mm)**	54.45	**Dry density, ρ_d (kg/m^3)**	2596
L/D ratio	2.68	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	882.99		
Water content (%)	0.16	**Porosity, n (%)**	0.42			**Bulk density, ρ (kg/m^3)**	2601		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-10AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	26/06/2020	**Time to failure (s)**	621	**Temperature (ºC)**	22.0		
F_{max} (kN)	592.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	254.6	**$UCS_{1:2}$ (MPa)**	264.4	**UCS_{50} (MPa)**	268.5	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	78.8	**$\nu_{50\%}$**	0.23	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.214	**V_{S1} (km/s)**	3.100	**V_{S2} (km/s)**	3.091	**V_S (km/s)**	3.095
Dynamic moduli		**E_{dyn} (GPa)**	61.2	**ν_{dyn}**	0.23	**V_P/V_S**	1.68
		G_{dyn} (GPa)	24.9	**K_{dyn} (GPa)**	37.5		
Notes (6)							

PICTURES AND PLOTS

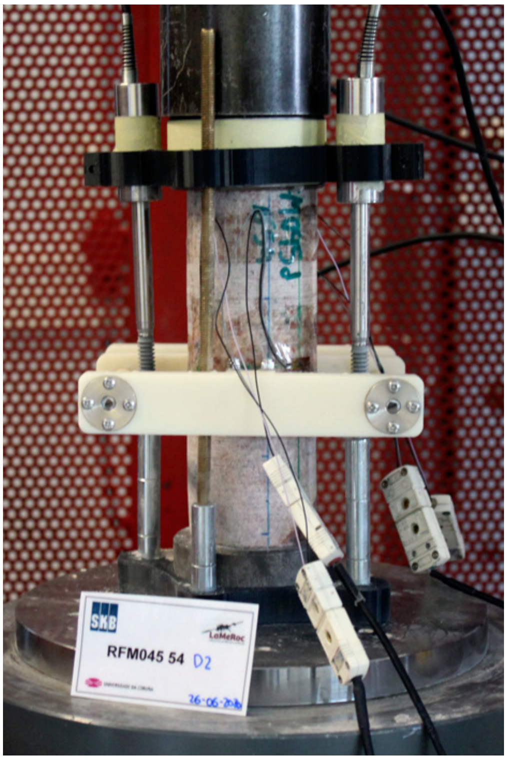

Figure 1. *Sample before the test*

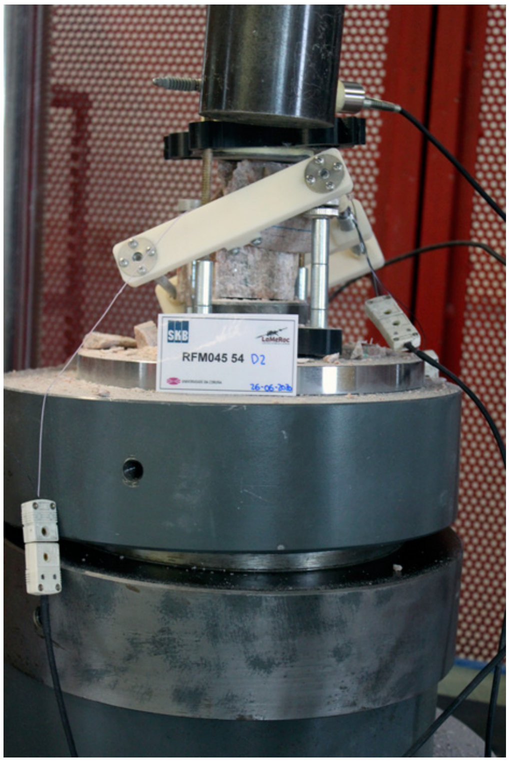

Figure 2. *Sample after the test*

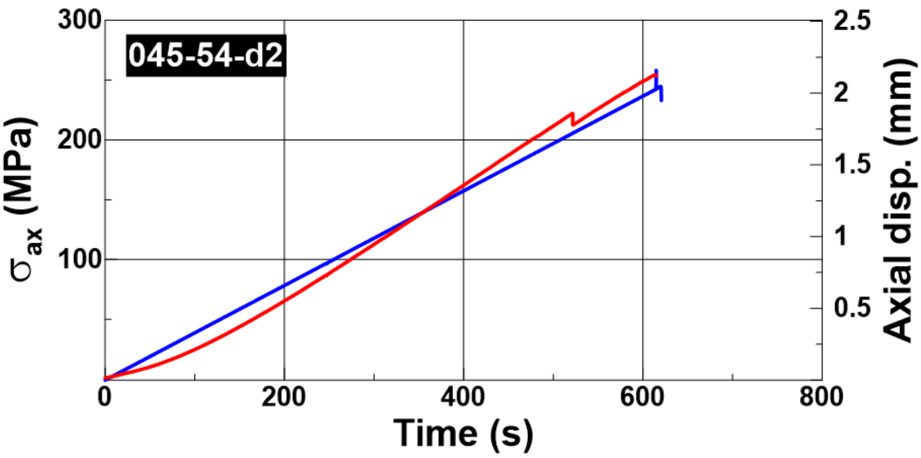

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	60_045a_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	150.47	150.62	150.51	150.45	150.21	**Mean length, L (mm)**	150.45	**Dry mass, M_d (g)**	1090.91
Diameter (mm)	59.18	59.20	59.23	59.20	59.22	**Mean diameter, D (mm)**	59.21	**Dry density, ρ_d (kg/m^3)**	2634
L/D ratio	2.54	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	1092.60		
Water content (%)	0.15	**Porosity, n (%)**	0.41			**Bulk density, ρ (kg/m^3)**	2638		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	526	**Temperature (ºC)**	22.0		
F_{max} (kN)	532.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	193.3	**$UCS_{1:2}$ (MPa)**	199.8	**UCS_{50} (MPa)**	206.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	94.1	**$\nu_{50\%}$**	0.35	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.082	**V_{S1} (km/s)**	3.078	**V_{S2} (km/s)**	3.029	**V_S (km/s)**	3.054
	Dynamic moduli	**E_{dyn} (GPa)**	59.9	**ν_{dyn}**	0.22	**V_P/V_S**	1.66
		G_{dyn} (GPa)	24.6	**K_{dyn} (GPa)**	35.3		
Notes (6)							

PICTURES AND PLOTS

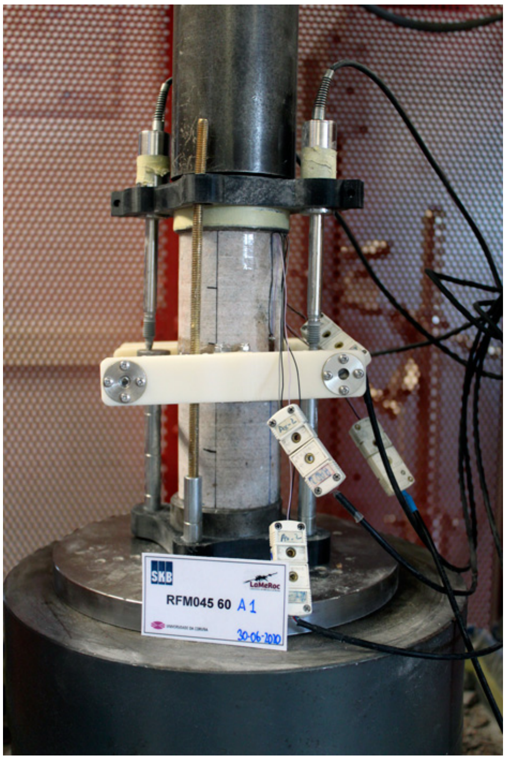

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

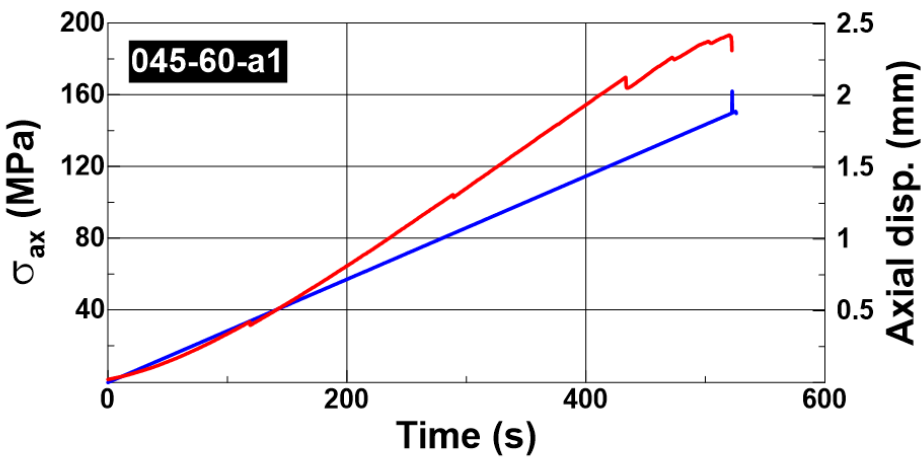

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

LaMeRoc Laboratorio de Mecánica de Rocas

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	**Report date**
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	60_045a_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	148.92	148.95	148.94	148.96	148.88	**Mean length, L (mm)**	148.93	**Dry mass, M_d (g)**	1076.08
Diameter (mm)	59.15	59.28	59.21	59.16	59.14	**Mean diameter, D (mm)**	59.19	**Dry density, ρ_d (kg/m^3)**	2626
L/D ratio	2.52	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	1077.31		
Water content (%)	0.11	**Porosity, n (%)**	0.30			**Bulk density, ρ (kg/m^3)**	2629		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	485	**Temperature (ºC)**	22.0		
F_{max} (kN)	416.3	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	151.3	**$UCS_{1:2}$ (MPa)**	156.3	**UCS_{50} (MPa)**	161.1	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	77.9	**$\nu_{50\%}$**	0.17	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.217	**V_{S1} (km/s)**	3.242	**V_{S2} (km/s)**	3.190	**V_S (km/s)**	3.216
Dynamic moduli		**E_{dyn} (GPa)**	64.9	**ν_{dyn}**	0.19	**V_P/V_S**	1.62
		G_{dyn} (GPa)	27.2	**K_{dyn} (GPa)**	35.3		
Notes (6)							

PICTURES AND PLOTS

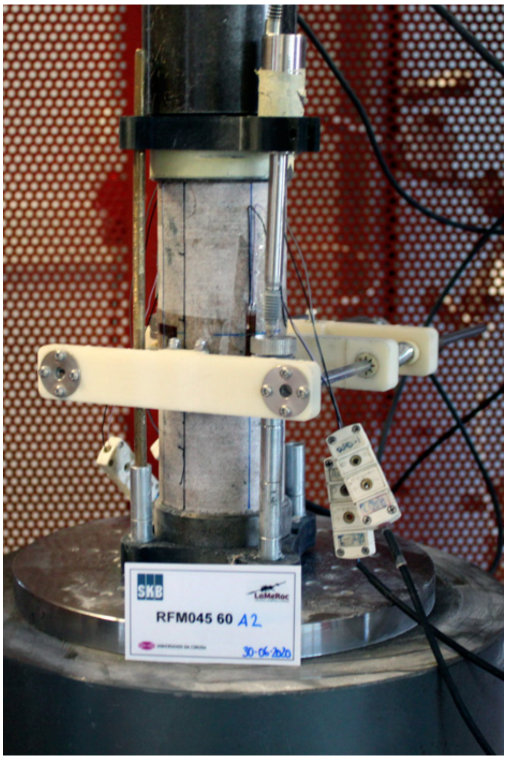

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

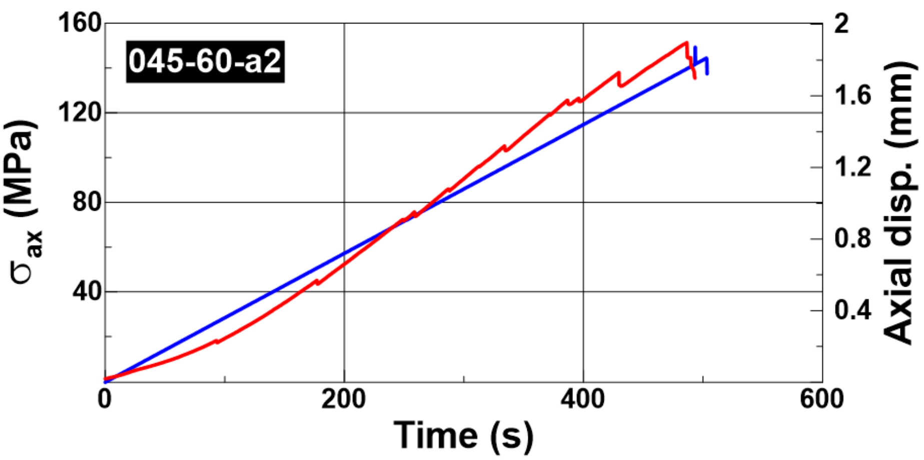

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45a	**Specimen**		**Ref. LaMeRoc**	60_045a_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	139.82	140.16	139.58	139.45	139.50	**Mean length, L (mm)**	139.70	**Dry mass, M_d (g)**	1009.33
Diameter (mm)	59.30	59.33	59.33	59.36	59.32	**Mean diameter, D (mm)**	59.33	**Dry density, ρ_d (kg/m^3)**	2613
L/D ratio	2.35				**Permeability, k (mD)**	-		**Bulk mass, M (g)**	1010.51
Water content (%)	0.12				**Porosity, n (%)**	0.31		**Bulk density, ρ (kg/m^3)**	2617
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020			**Control mode (Force/Strain)**	Strain
LDT model	Solartron AX/5/s			**Loading rate (N/s)**	-
Strain gauge type	BX120-20AA			**Strain rate (s^{-1})**	4.17E-06
Load cell	Built-in 1500 kN			**Shear rate (mm/s)**	-
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	523			**Temperature (ºC)**	22.0
F_{max} (kN)	512.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	185.3	**$UCS_{1:2}$ (MPa)**	190.2	**UCS_{50} (MPa)**	196.1	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	77.8	**$\nu_{50\%}$**	0.22	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.090	**V_{S1} (km/s)**	3.069	**V_{S2} (km/s)**	3.107	**V_S (km/s)**	3.088
	Dynamic moduli	**E_{dyn} (GPa)**	60.3	**ν_{dyn}**	0.21	**V_P/V_S**	1.65
		G_{dyn} (GPa)	24.9	**K_{dyn} (GPa)**	34.5		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

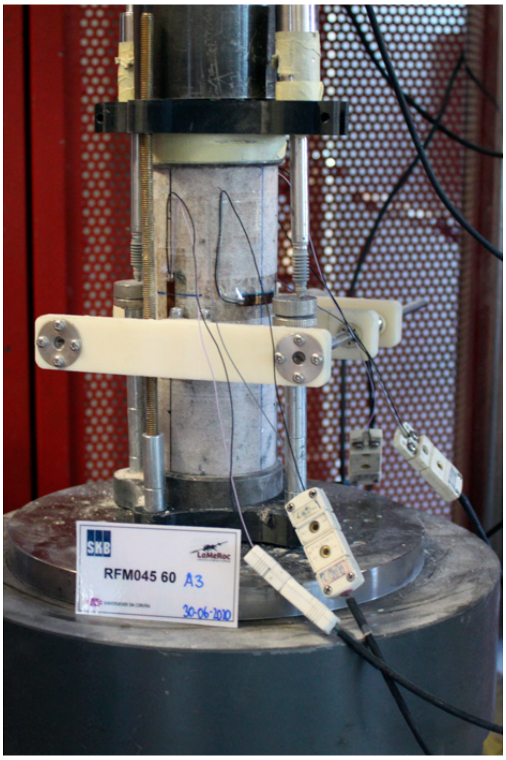

Figure 1. *Sample before the test*

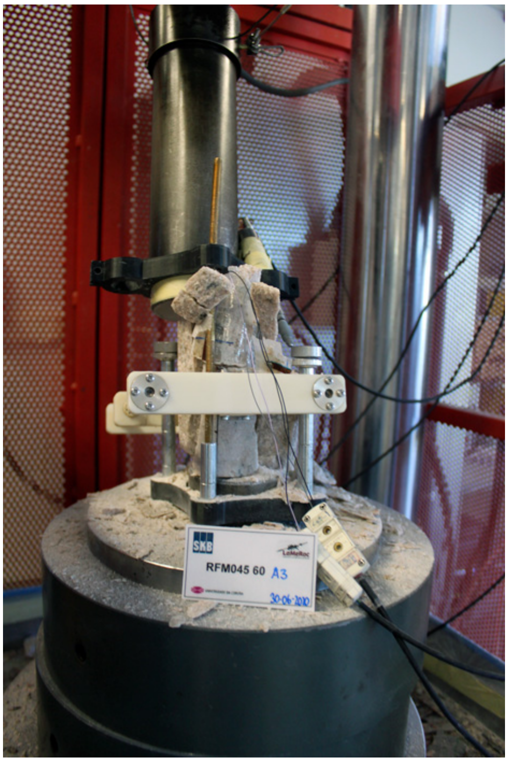

Figure 2. *Sample after the test*

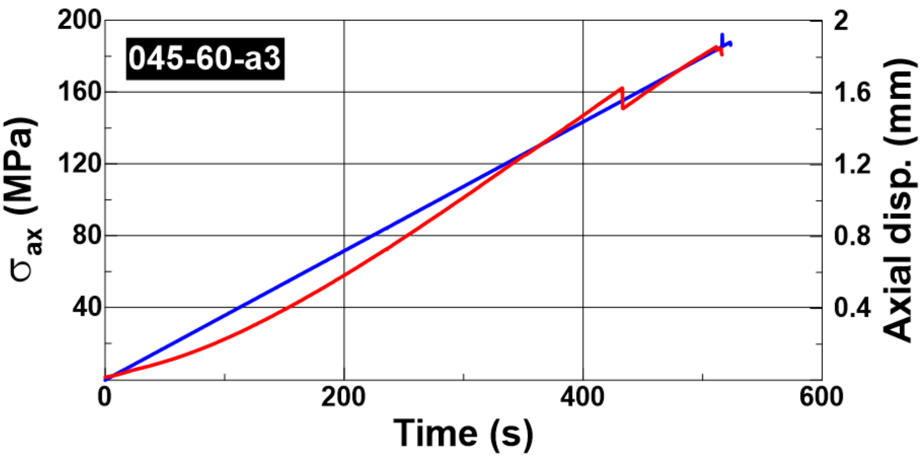

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	60_045b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	149.93	149.87	149.91	149.97	149.92	**Mean length, L (mm)**	149.92	**Dry mass, M_d (g)**	1088.1
Diameter (mm)	59.34	59.40	59.34	59.34	59.34	**Mean diameter, D (mm)**	59.35	**Dry density, ρ_d (kg/m^3)**	2623
L/D ratio	2.53	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	1089.61		
Water content (%)	0.14	**Porosity, n (%)**	0.36			**Bulk density, ρ (kg/m^3)**	2627		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	551	**Temperature (ºC)**	22.0		
F_{max} (kN)	567.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	205.0	**$UCS_{1:2}$ (MPa)**	211.8	**UCS_{50} (MPa)**	218.5	**σ_{CI} (MPa)**	116.0
	Static moduli	**$E_{50\%}$ (GPa)**	78.3	**$\nu_{50\%}$**	0.24	**σ_{CD} (MPa)**	151.3
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.129	**V_{S1} (km/s)**	3.076	**V_{S2} (km/s)**	3.209	**V_S (km/s)**	3.143
	Dynamic moduli	**E_{dyn} (GPa)**	62.2	**ν_{dyn}**	0.20	**V_P/V_S**	1.63
		G_{dyn} (GPa)	25.9	**K_{dyn} (GPa)**	34.5		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

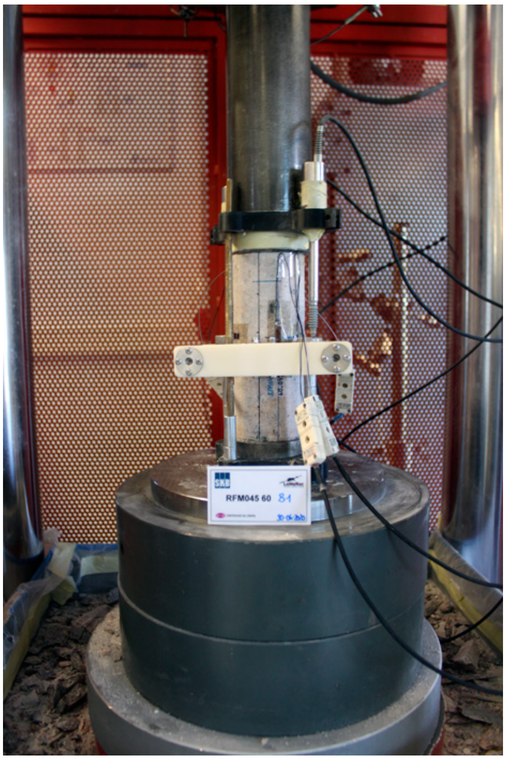

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

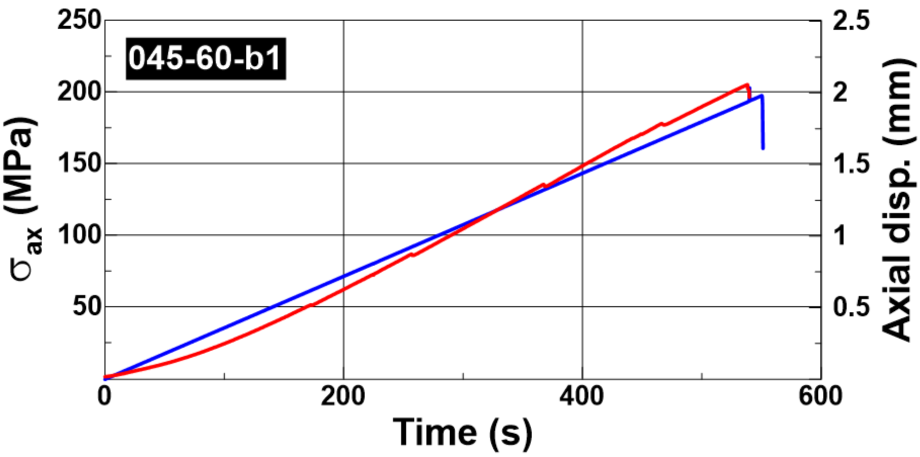

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

LaMeRoc

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	60_045b_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	148.37	148.11	148.37	148.65	148.67	**Mean length, L (mm)**	148.43	**Dry mass, M_d (g)**	1067.07
Diameter (mm)	59.20	59.19	59.05	59.27	59.21	**Mean diameter, D (mm)**	59.18	**Dry density, ρ_d (kg/m^3)**	2613
L/D ratio	2.51	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	1068.57
Water content (%)	0.14	**Porosity, n (%)**	0.37					**Bulk density, ρ (kg/m^3)**	2617
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	432	**Temperature (ºC)**	22.0		
F_{max} (kN)	351.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	127.9	**$UCS_{1:2}$ (MPa)**	132.0	**UCS_{50} (MPa)**	136.1	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	88.4	**$\nu_{50\%}$**	0.27	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.033	**V_{S1} (km/s)**	2.954	**V_{S2} (km/s)**	3.211	**V_S (km/s)**	3.083
Dynamic moduli		**E_{dyn} (GPa)**	59.7	**ν_{dyn}**	0.20	**V_P/V_S**	1.63
		G_{dyn} (GPa)	24.9	**K_{dyn} (GPa)**	33.1		
Notes (6)							

PICTURES AND PLOTS

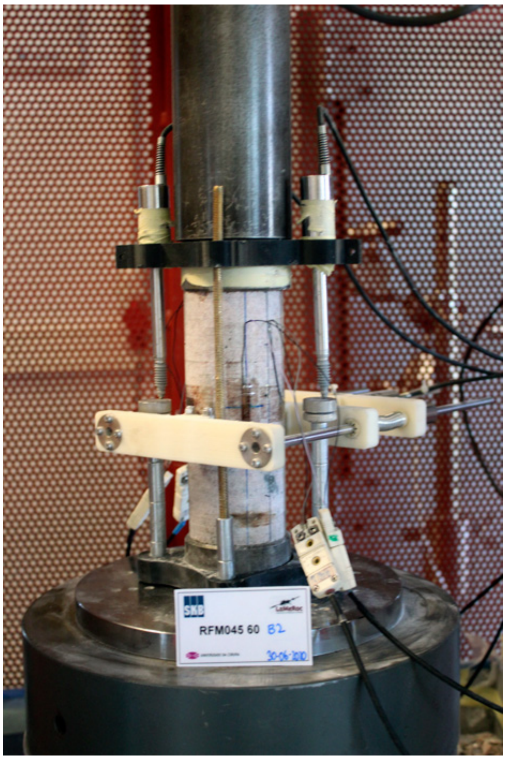

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

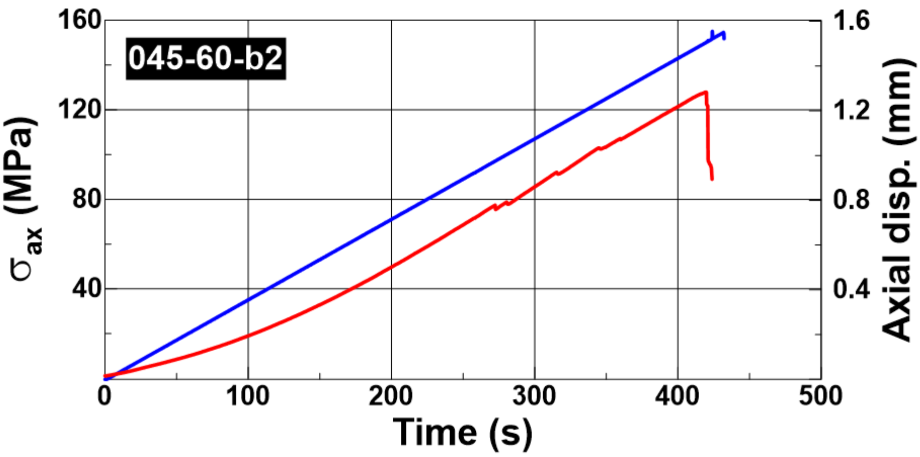

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	60_045c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	143.59	143.28	143.39	143.48	143.60	**Mean length, L (mm)**	143.47	**Dry mass, M_d (g)**	1049.87
Diameter (mm)	59.50	59.57	59.61	59.63	59.56	**Mean diameter, D (mm)**	59.57	**Dry density, ρ_d (kg/m^3)**	2625
L/D ratio	2.41	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	1051.04
Water content (%)	0.11	**Porosity, n (%)**	0.29					**Bulk density, ρ (kg/m^3)**	2628
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	628	**Temperature (ºC)**	22.0		
F_{max} (kN)	696.9	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	250.0	**$UCS_{1:2}$ (MPa)**	257.2	**UCS_{50} (MPa)**	265.4	**σ_{CI} (MPa)**	143.8
Static moduli		**$E_{50\%}$ (GPa)**	79.0	**$\nu_{50\%}$**	0.28	**σ_{CD} (MPa)**	231.6
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.053	**V_{S1} (km/s)**	3.099	**V_{S2} (km/s)**	3.124	**V_S (km/s)**	3.112
Dynamic moduli		**E_{dyn} (GPa)**	60.8	**ν_{dyn}**	0.19	**V_P/V_S**	1.62
		G_{dyn} (GPa)	25.5	**K_{dyn} (GPa)**	33.2		
Notes (6)							

PICTURES AND PLOTS

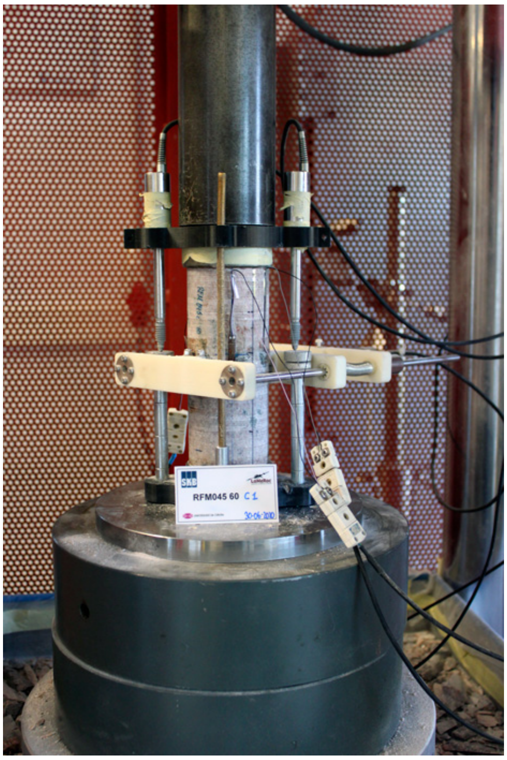

Figure 1. Sample before the test

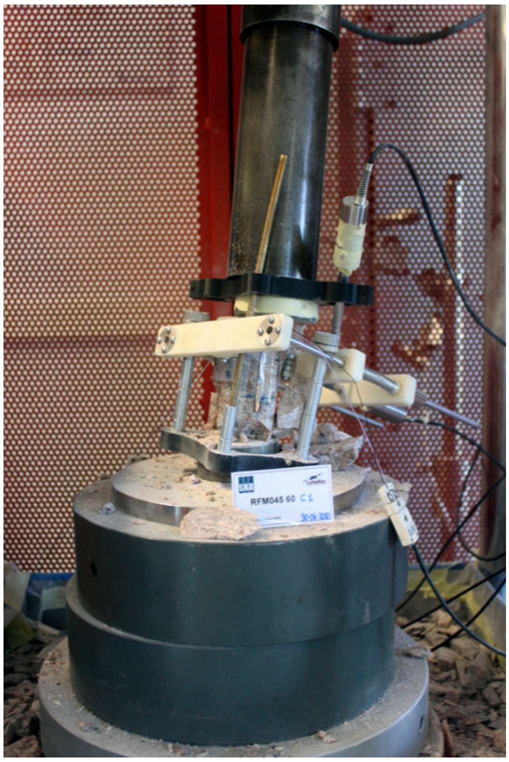

Figure 2. Sample after the test

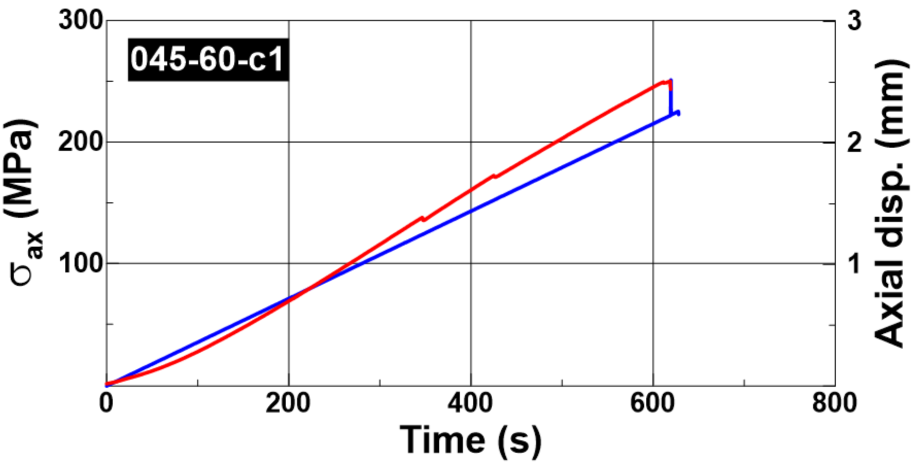

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	60_045c_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	143.90	143.74	143.72	143.79	143.95	**Mean length, L (mm)**	143.82	**Dry mass, M_d (g)**	1053.66
Diameter (mm)	59.61	59.61	59.62	59.65	59.63	**Mean diameter, D (mm)**	59.62	**Dry density, ρ_d (kg/m^3)**	2624
L/D ratio	2.41	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	1054.96		
Water content (%)	0.12	**Porosity, n (%)**	0.32			**Bulk density, ρ (kg/m^3)**	2627		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	574	**Temperature (ºC)**	22.0		
F_{max} (kN)	583.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	209.1	**$UCS_{1:2}$ (MPa)**	215.1	**UCS_{50} (MPa)**	222.0	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	74.5	**$\nu_{50\%}$**	0.26	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.011	**V_{S1} (km/s)**	3.042	**V_{S2} (km/s)**	3.065	**V_S (km/s)**	3.053
	Dynamic moduli	**E_{dyn} (GPa)**	59.0	**ν_{dyn}**	0.20	**V_P/V_S**	1.64
		G_{dyn} (GPa)	24.5	**K_{dyn} (GPa)**	33.3		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

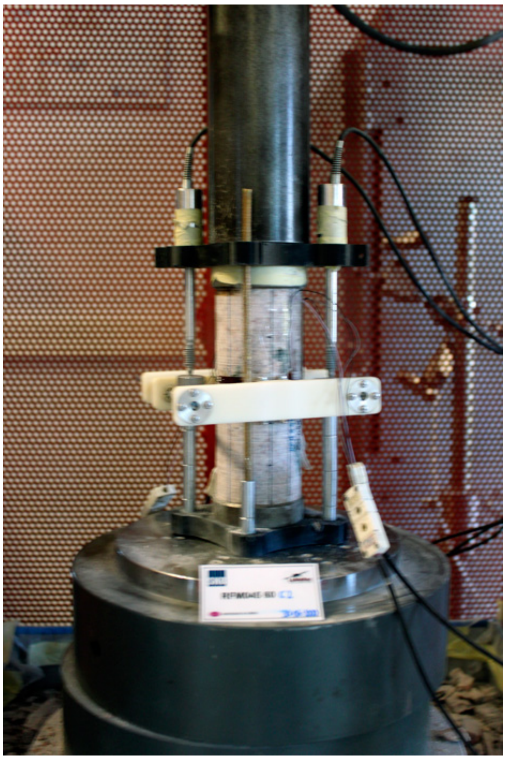

Figure 2. *Sample after the test*

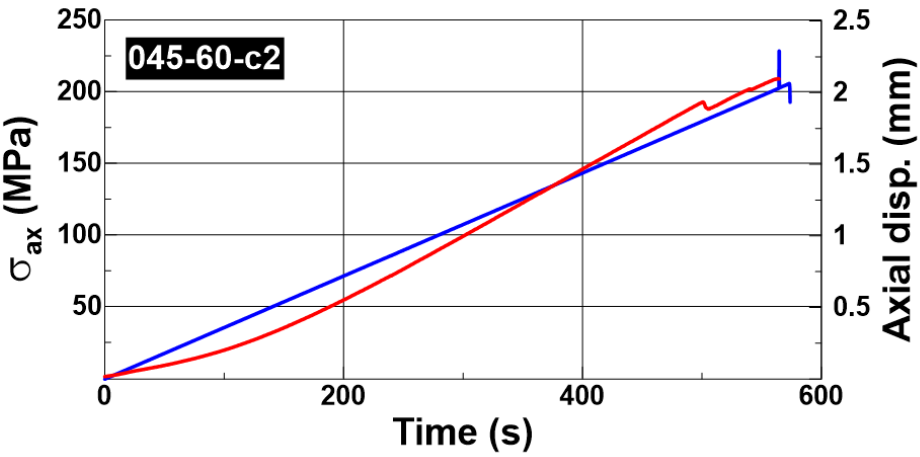

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	60_045c_3
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	142.18	141.99	142.10	142.41	142.34	**Mean length, L (mm)**	142.20	**Dry mass, M_d (g)**	1041.74
Diameter (mm)	59.60	59.65	59.62	59.62	59.69	**Mean diameter, D (mm)**	59.64	**Dry density, ρ_d (kg/m^3)**	2623
L/D ratio	2.38	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	1042.95
Water content (%)	0.12	**Porosity, n (%)**	0.30					**Bulk density, ρ (kg/m^3)**	2626
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	548			**Temperature (ºC)**	22.0
F_{max} (kN)	496.2	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	177.6	**$UCS_{1:2}$ (MPa)**	182.6	**UCS_{50} (MPa)**	188.4	**σ_{CI} (MPa)**	106.3
	Static moduli	**$E_{50\%}$ (GPa)**	77.6	**$\nu_{50\%}$**	0.25	**σ_{CD} (MPa)**	155.0
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	4.992	**V_{S1} (km/s)**	2.899	**V_{S2} (km/s)**	3.012	**V_S (km/s)**	2.955
	Dynamic moduli	**E_{dyn} (GPa)**	56.4	**ν_{dyn}**	0.23	**V_P/V_S**	1.69
		G_{dyn} (GPa)	22.9	**K_{dyn} (GPa)**	34.9		
Notes (6)							

PICTURES AND PLOTS

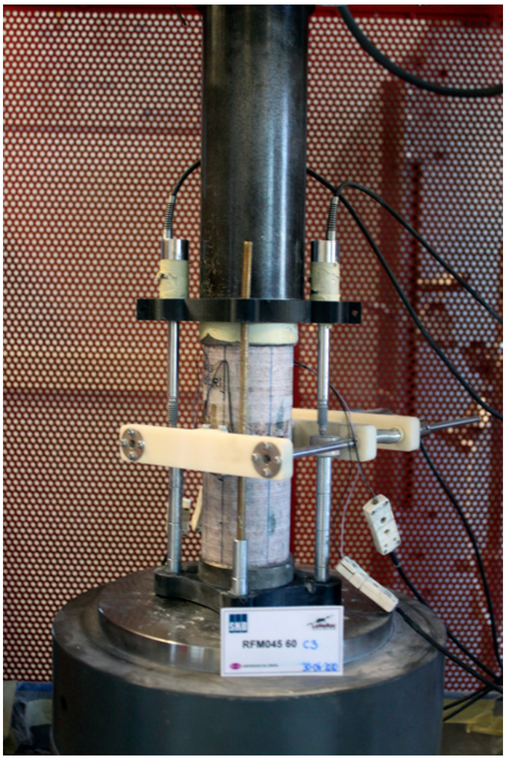

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

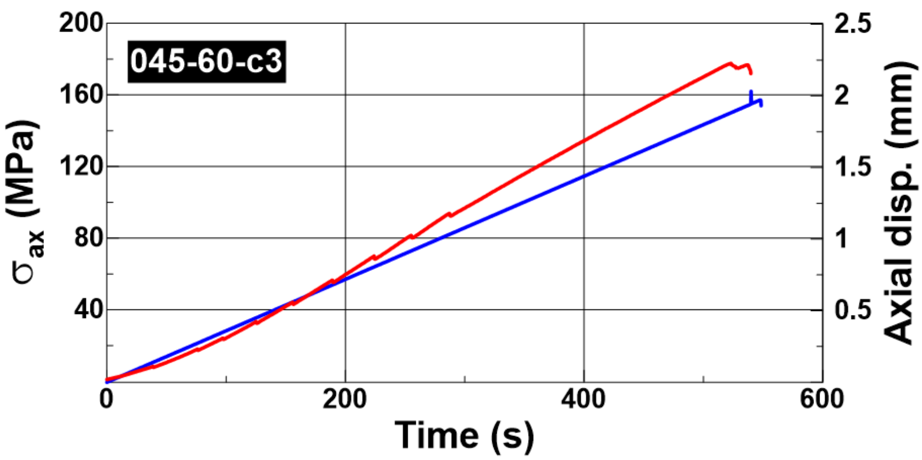

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	60_045d_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	147.45	147.72	147.70	147.49	147.33	**Mean length, L (mm)**	147.54	**Dry mass, M_d (g)**	1073.52
Diameter (mm)	59.53	59.60	59.62	59.63	59.60	**Mean diameter, D (mm)**	59.60	**Dry density, ρ_d (kg/m^3)**	2608
L/D ratio	2.48	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	1075.14
Water content (%)	0.15	**Porosity, n (%)**	0.39					**Bulk density, ρ (kg/m^3)**	2612
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	531	**Temperature (ºC)**	22.0		
F_{max} (kN)	374.0	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	134.1	**$UCS_{1:2}$ (MPa)**	138.3	**UCS_{50} (MPa)**	142.7	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	68.6	**$\nu_{50\%}$**	0.20	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.058	**V_{S1} (km/s)**	3.026	**V_{S2} (km/s)**	3.003	**V_S (km/s)**	3.015
Dynamic moduli		**E_{dyn} (GPa)**	58.1	**ν_{dyn}**	0.22	**V_P/V_S**	1.68
		G_{dyn} (GPa)	23.7	**K_{dyn} (GPa)**	35.2		
Notes (6)							

PICTURES AND PLOTS

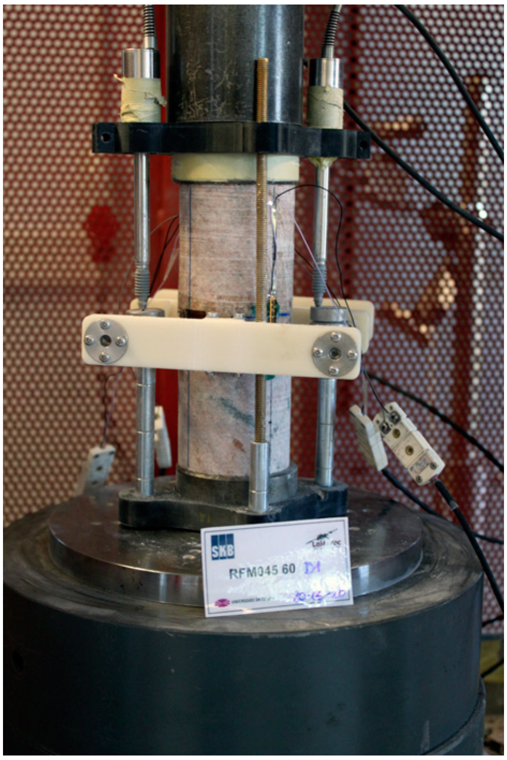

Figure 1. Sample before the test

Figure 2. Sample after the test

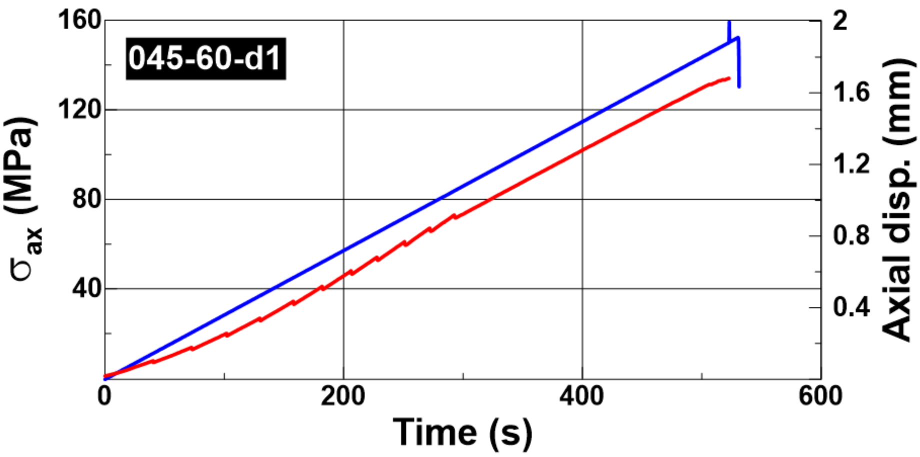

Figure 3. Stress-time (red) and displacement-time (blue) diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45d	**Specimen**		**Ref. LaMeRoc**	63_045d_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	160.89	161.17	161.18	160.81	160.61	**Mean length, L (mm)**	160.93	**Dry mass, M_d (g)**	1346.6
Diameter (mm)	63.61	64.00	63.15	62.95	63.48	**Mean diameter, D (mm)**	63.44	**Dry density, ρ_d (kg/m^3)**	2647
L/D ratio	2.54	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	1348.49		
Water content (%)	0.14	**Porosity, n (%)**	0.37			**Bulk density, ρ (kg/m^3)**	2651		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-20AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	01/07/2020	**Time to failure (s)**	569	**Temperature (ºC)**	22.0		
F_{max} (kN)	389.3	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	123.2	**$UCS_{1:2}$ (MPa)**	127.3	**UCS_{50} (MPa)**	132.9	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	78.4	**$\nu_{50\%}$**	0.26	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.049	**V_{S1} (km/s)**	3.039	**V_{S2} (km/s)**	3.113	**V_S (km/s)**	3.076
Dynamic moduli		**E_{dyn} (GPa)**	60.4	**ν_{dyn}**	0.20	**V_P/V_S**	1.64
		G_{dyn} (GPa)	25.1	**K_{dyn} (GPa)**	34.1		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

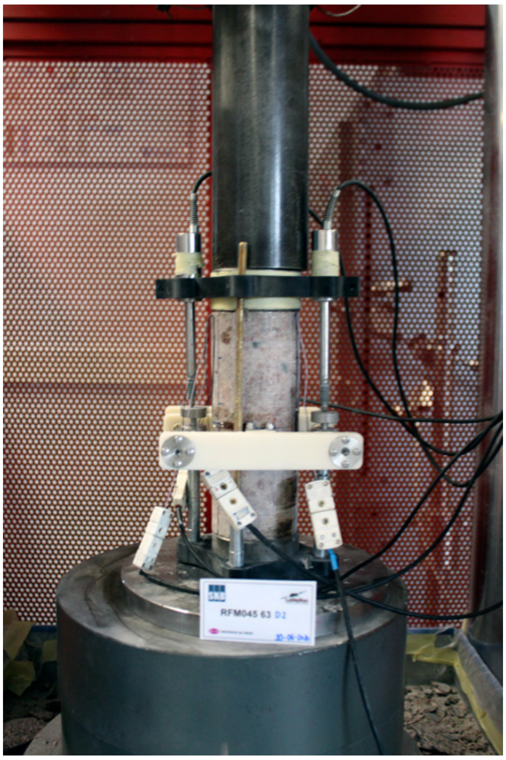

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

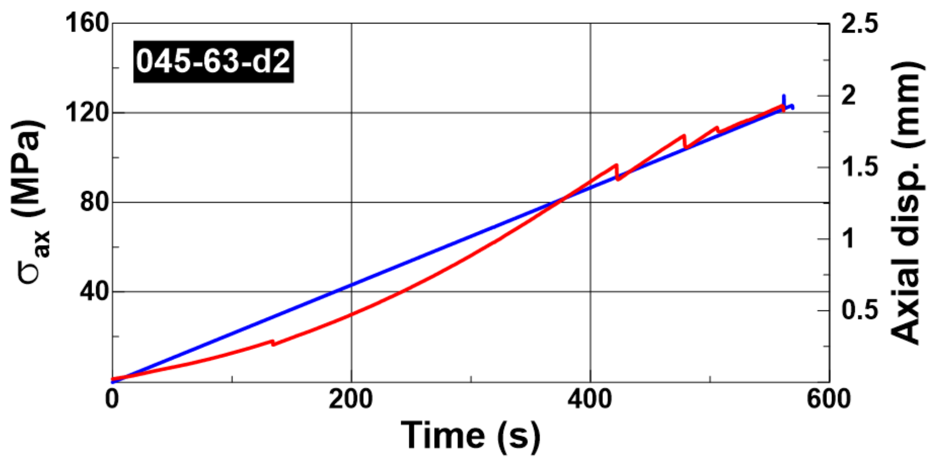

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	UCS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	45b	**Specimen**		**Ref. LaMeRoc**	100_045b_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	145.96	145.80	145.55	145.99	146.09	**Mean length, L (mm)**	270.18	**Dry mass, M_d (g)**	5553.2
Diameter (mm)	99.60	99.82	99.68	99.88	100.05	**Mean diameter, D (mm)**	99.81	**Dry density, ρ_d (kg/m^3)**	2627
L/D ratio	2.71	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	5557.30		
Water content (%)	0.07	**Porosity, n (%)**	0.19			**Bulk density, ρ (kg/m^3)**	2629		
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-50AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	31/07/2020	**Time to failure (s)**	273	**Temperature (ºC)**	22.0		
F_{max} (kN)	944.7	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	120.8	**$UCS_{1:2}$ (MPa)**	125.5	**UCS_{50} (MPa)**	142.1	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	87.8	**$\nu_{50\%}$**	0.24	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.279	**V_{S1} (km/s)**	3.168	**V_{S2} (km/s)**	3.158	**V_S (km/s)**	3.163
Dynamic moduli		**E_{dyn} (GPa)**	64.2	**ν_{dyn}**	0.22	**V_P/V_S**	1.67
		G_{dyn} (GPa)	26.3	**K_{dyn} (GPa)**	38.2		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

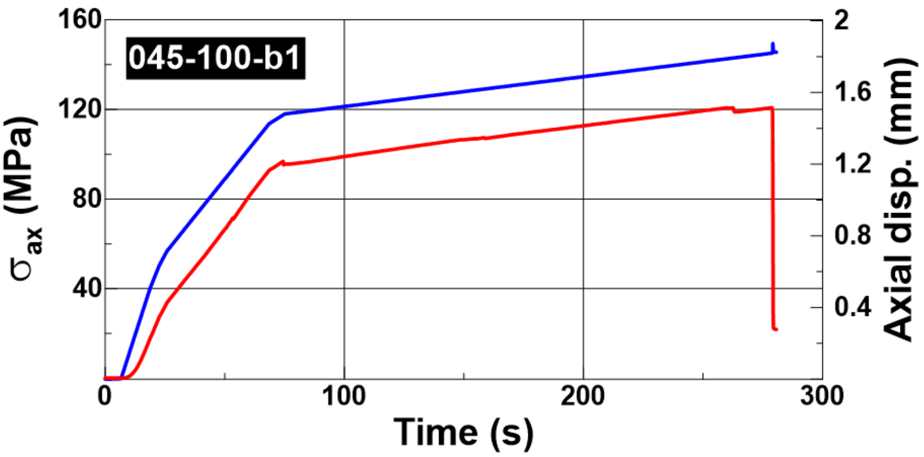

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	UCS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	45c	**Specimen**		**Ref. LaMeRoc**	100_045c_1
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM045
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	128.63	128.59	128.69	128.73	128.67	**Mean length, L (mm)**	252.96	**Dry mass, M_d (g)**	5084.9
Diameter (mm)	99.11	98.84	98.90	98.98	99.14	**Mean diameter, D (mm)**	98.99	**Dry density, ρ_d (kg/m^3)**	2612
L/D ratio	2.56	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	5090.10				
Water content (%)	0.10	**Porosity, n (%)**	0.27	**Bulk density, ρ (kg/m^3)**	2614				
Notes (4)									

EQUIPMENT

Device	Servosis 150 ton	**Force class (UNE-EN-7500)**	1	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Strain		
LDT model	Solartron AX/5/s	**Loading rate (N/s)**	-		
Strain gauge type	BX120-50AA	**Strain rate (s^{-1})**	4.17E-06		
Load cell	Built-in 1500 kN	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	31/07/2020	**Time to failure (s)**	572	**Temperature (ºC)**	22.0		
F_{max} (kN)	1421.8	**T_0 (MPa)**	-	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	184.7	**$UCS_{1:2}$ (MPa)**	191.1	**UCS_{50} (MPa)**	216.1	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	73.0	**$\nu_{50\%}$**	0.28	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	5.124	**V_{S1} (km/s)**	3.013	**V_{S2} (km/s)**	3.026	**V_S (km/s)**	3.020
	Dynamic moduli	**E_{dyn} (GPa)**	58.8	**ν_{dyn}**	0.23	**V_P/V_S**	1.70
		G_{dyn} (GPa)	23.8	**K_{dyn} (GPa)**	36.9		
Notes (6)							

PICTURES AND PLOTS

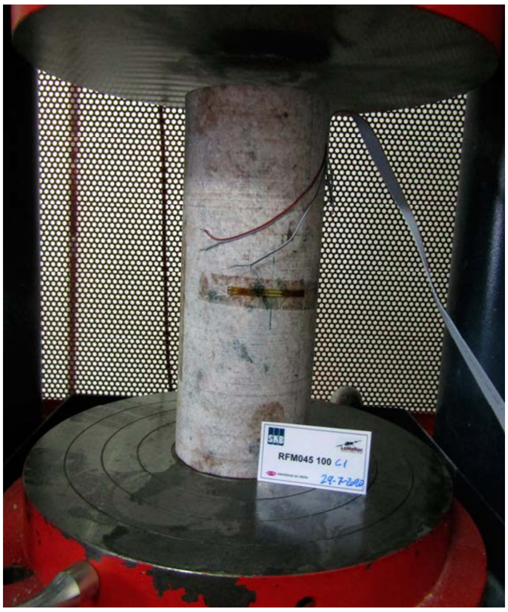

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

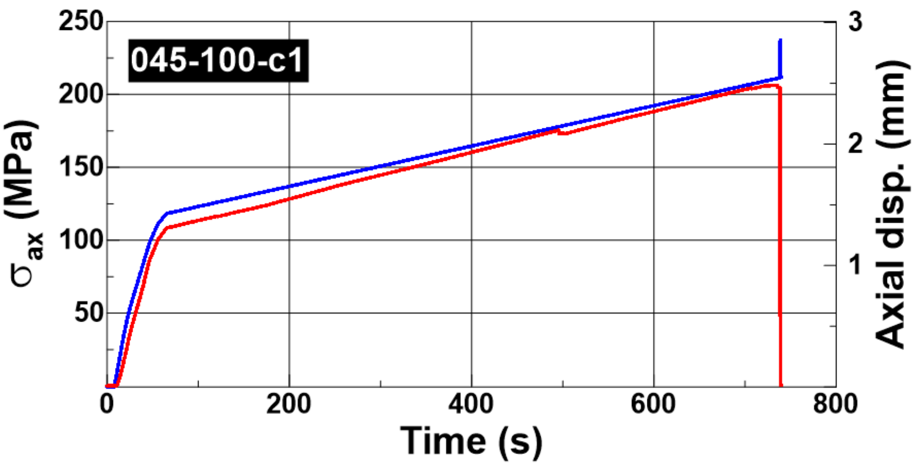

Figure 3. *Stress-time (red) and displacement-time (blue) diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	42_14
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	20.07	19.86	19.48	20.16	20.17	**Mean length, L (mm)**	19.95	**Dry mass, M_d (g)**	69.62
Diameter (mm)	41.66	41.64	41.83	41.47	41.64	**Mean diameter, D (mm)**	41.65	**Dry density, ρ_d (kg/m³)**	2562

L/D ratio	0.48	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	69.74
Water content (%)	0.17	**Porosity, n (%)**	0.44	**Bulk density, ρ (kg/m³)**	2566
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	275		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	64	**Temperature (ºC)**	22.0		
F_{max} (kN)	18.3	**T_0 (MPa)**	14.6	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

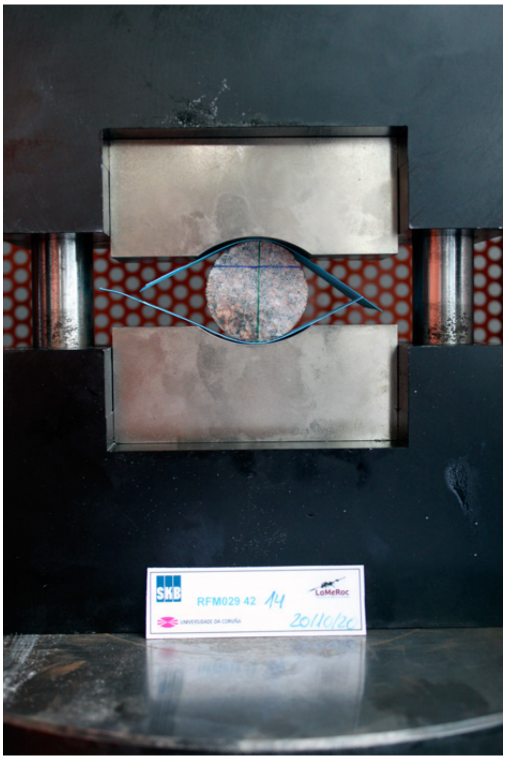

Figure 1. *Sample before the test*

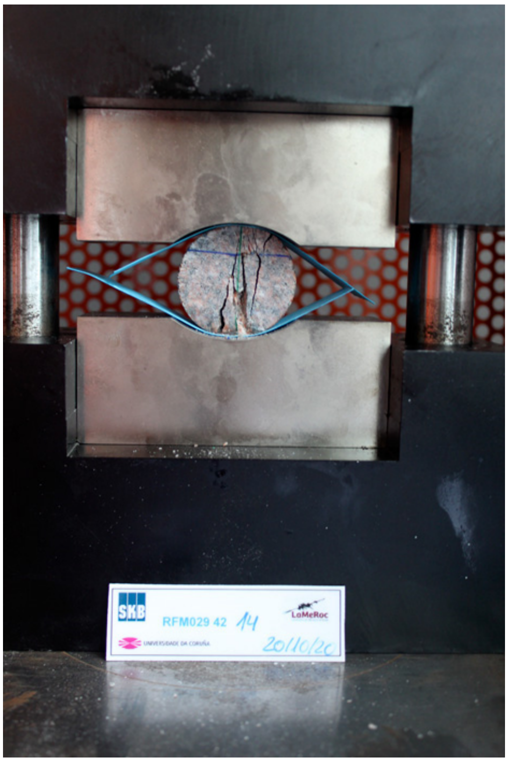

Figure 2. *Sample after the test*

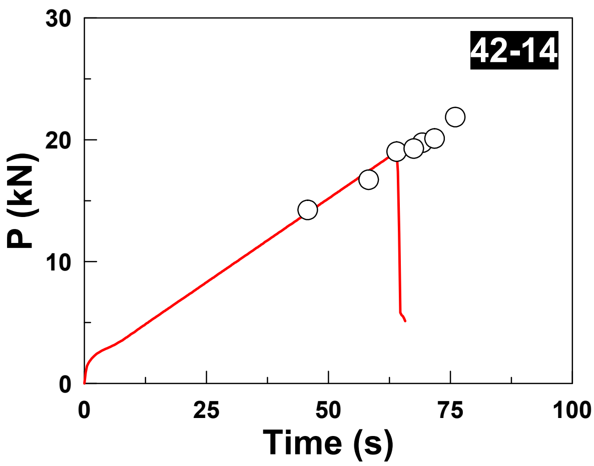

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	42_21
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	19.42	19.65	19.09	19.13	19.35	**Mean length, L (mm)**	19.33	**Dry mass, M_d (g)**	69.22
Diameter (mm)	41.48	41.99	41.94	41.89	41.99	**Mean diameter, D (mm)**	41.86	**Dry density, ρ_d (kg/m^3)**	2603

L/D ratio	0.46	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	69.34
Water content (%)	0.17	**Porosity, n (%)**	0.45	**Bulk density, ρ (kg/m^3)**	2607
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	275		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	58.25	**Temperature (ºC)**	22.0		
F_{max} (kN)	16.2	**T_0 (MPa)**	13.2	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

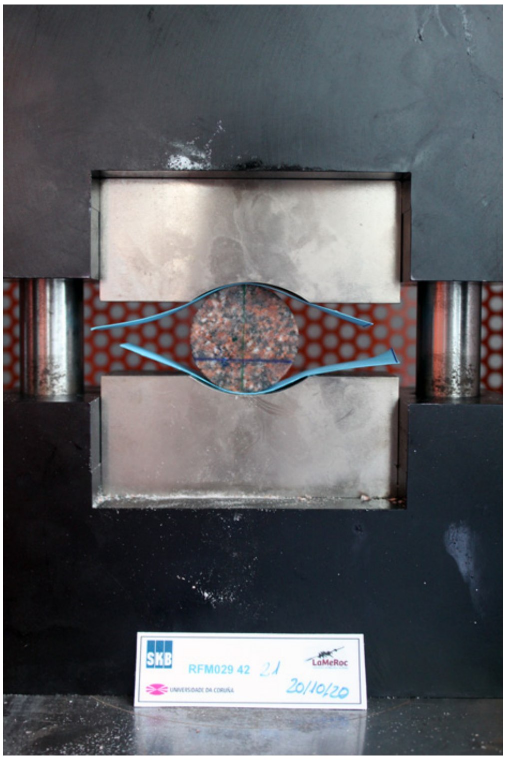

Figure 1. *Sample before the test*

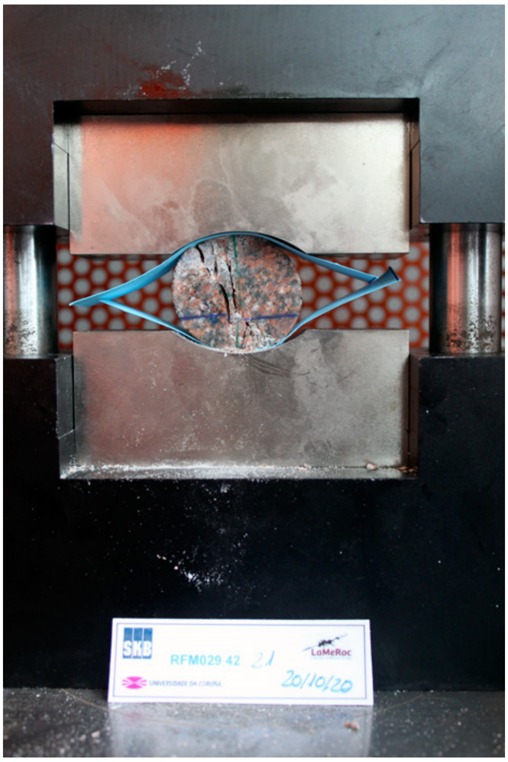

Figure 2. *Sample after the test*

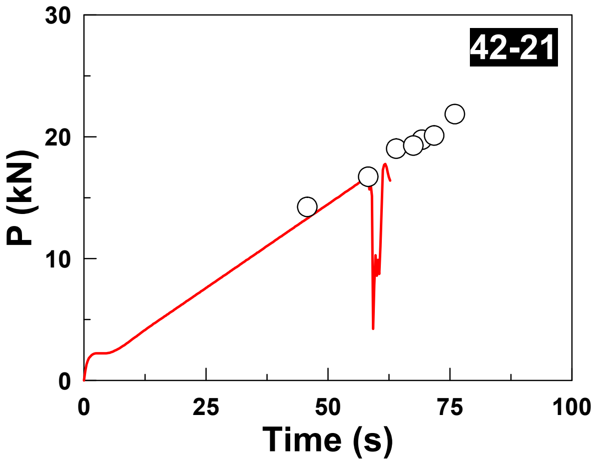

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	42_22
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	20.72	21.03	20.68	20.70	20.66	**Mean length, L (mm)**	20.76	**Dry mass, M_d (g)**	74.33
Diameter (mm)	41.76	41.75	41.75	41.89	41.75	**Mean diameter, D (mm)**	41.78	**Dry density, ρ_d (kg/m^3)**	2612

L/D ratio	0.50	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	74.42
Water content (%)	0.12	**Porosity, n (%)**	0.32	**Bulk density, ρ (kg/m^3)**	2615
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	275		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	76	**Temperature (ºC)**	22.0		
F_{max} (kN)	21.2	**T_0 (MPa)**	16.0	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

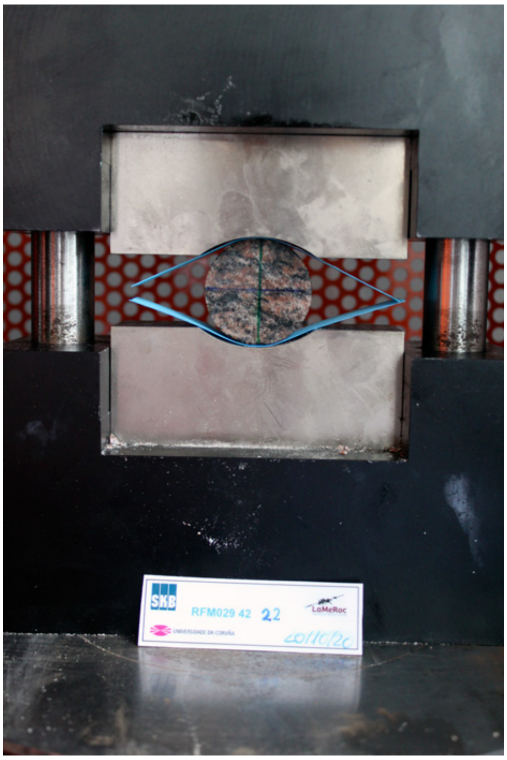

Figure 1. *Sample before the test*

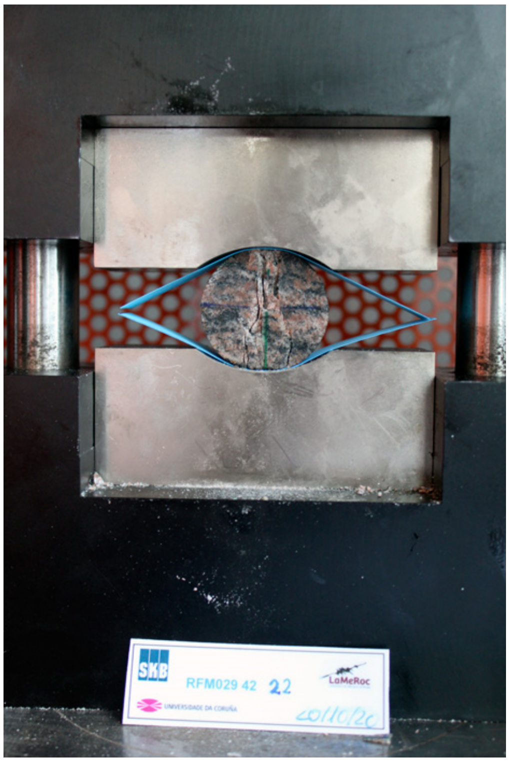

Figure 2. *Sample after the test*

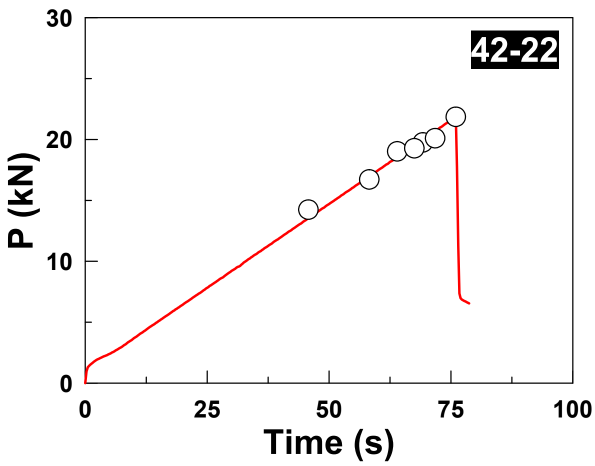

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	42_23
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	19.99	20.11	20.02	19.92	19.94	**Mean length, L (mm)**	20.00	**Dry mass, M_d (g)**	72.04
Diameter (mm)	41.90	41.79	41.80	41.71	41.68	**Mean diameter, D (mm)**	41.78	**Dry density, ρ_d (kg/m^3)**	2628

L/D ratio	0.48	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	72.14
Water content (%)	0.14	**Porosity, n (%)**	0.36	**Bulk density, ρ (kg/m^3)**	2632
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	275		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	47.75	**Temperature (ºC)**	22.0		
F_{max} (kN)	13.4	**T_0 (MPa)**	10.9	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

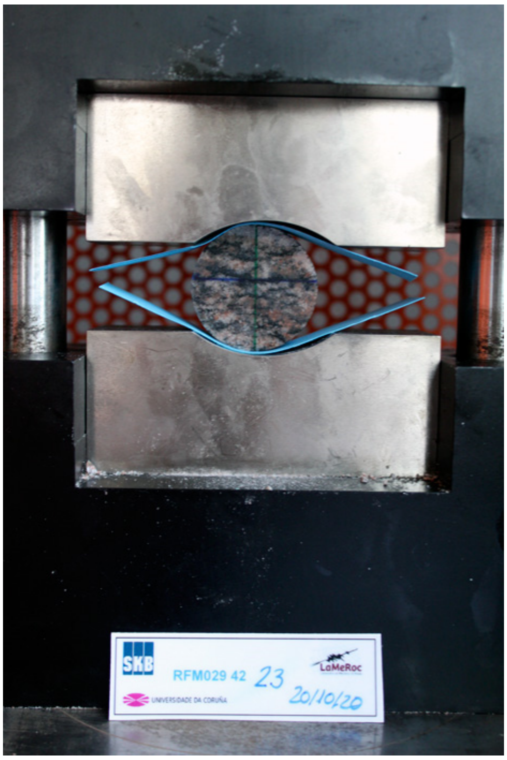

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

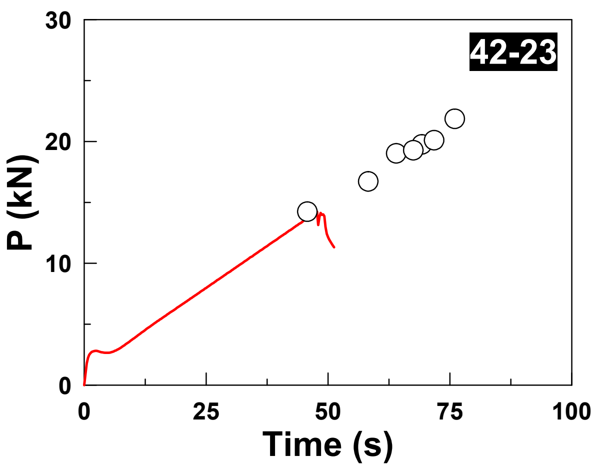

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference	Report date
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	Specimen		Ref. LaMeRoc	42_24
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	18.24	18.22	18.30	18.40	18.32	Mean length, L (mm)	18.30	Dry mass, M_d (g)	65.57
Diameter (mm)	41.57	41.52	41.55	41.85	41.73	Mean diameter, D (mm)	41.64	Dry density, ρ_d (kg/m^3)	2631

L/D ratio	0.44	Permeability, k (mD)	-	Bulk mass, M (g)	65.68
Water content (%)	0.17	Porosity, n (%)	0.44	Bulk density, ρ (kg/m^3)	2636
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	Force class (UNE-EN-7500)	0.5	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Force		
LDT model	-	Loading rate (N/s)	275		
Strain gauge type	-	Strain rate (s^{-1})	-		
Load cell	AEP TC4 50 ton	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	Time to failure (s)	69.25	Temperature (ºC)	22.0		
F_{max} (kN)	19.6	T_0 (MPa)	16.5	$T_{0,50}$ (MPa)	-		
UCS (MPa)	-	$UCS_{1:2}$ (MPa)	-	UCS_{50} (MPa)	-	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	-	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	-	V_{S1} (km/s)	-	V_{S2} (km/s)	-	V_S (km/s)	-
Dynamic moduli		E_{dyn} (GPa)	-	ν_{dyn}	-	V_P/V_S	-
		G_{dyn} (GPa)	-	K_{dyn} (GPa)	-		
Notes (6)							

PICTURES AND PLOTS

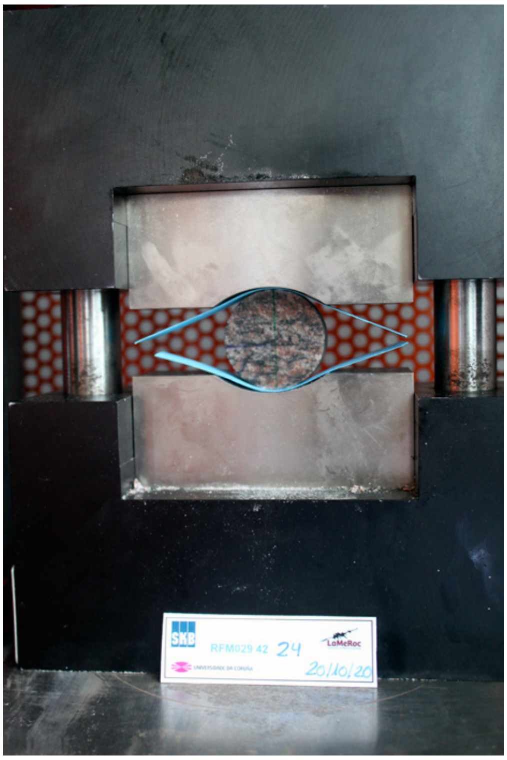

Figure 1. *Sample before the test*

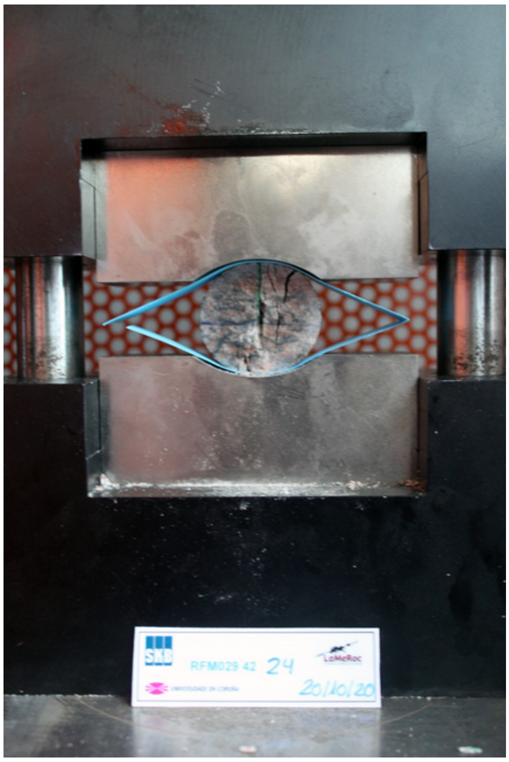

Figure 2. *Sample after the test*

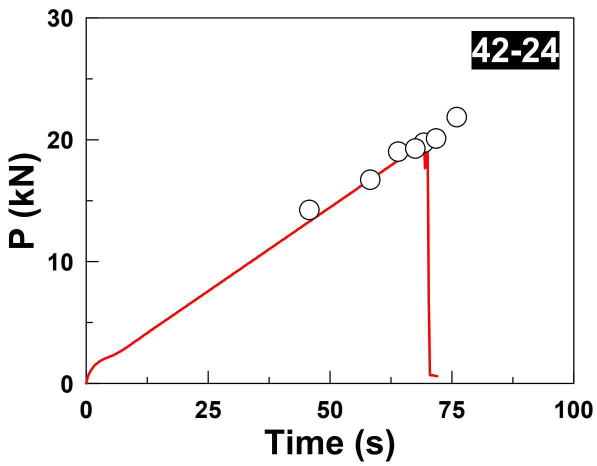

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	42_25
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	22.56	22.64	22.74	22.55	22.51	**Mean length, L (mm)**	22.60	**Dry mass, M_d (g)**	80.97
Diameter (mm)	41.68	41.76	41.77	41.90	41.66	**Mean diameter, D (mm)**	41.75	**Dry density, ρ_d (kg/m^3)**	2617

L/D ratio	0.54	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	81.09
Water content (%)	0.15	**Porosity, n (%)**	0.39	**Bulk density, ρ (kg/m^3)**	2620
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	275		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	71.75	**Temperature (ºC)**	22.0		
F_{max} (kN)	19.9	**T_0 (MPa)**	13.6	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

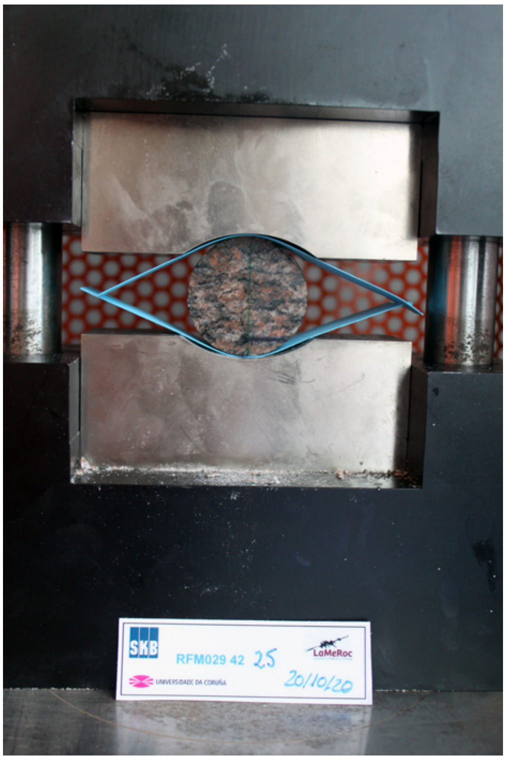

Figure 1. *Sample before the test*

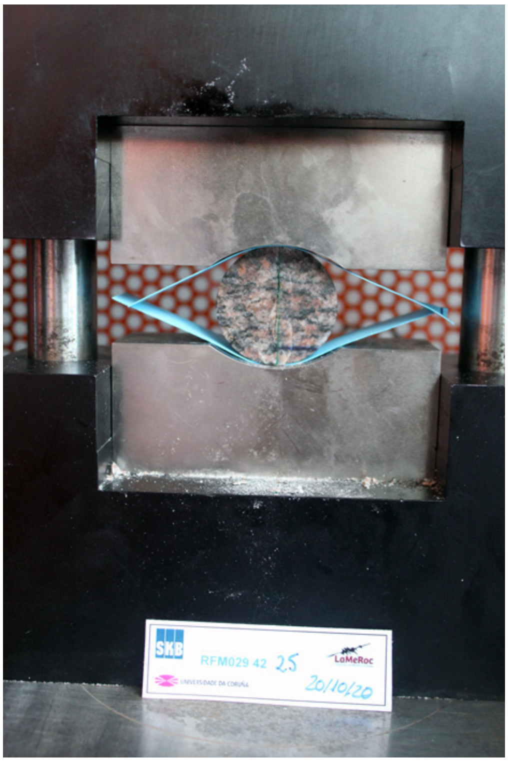

Figure 2. *Sample after the test*

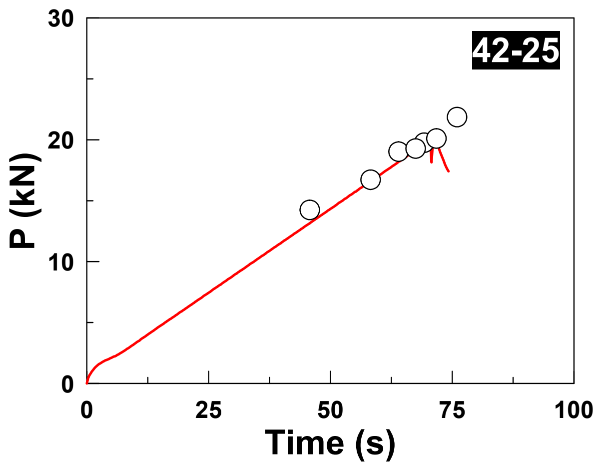

Figure 3. *Load-time diagram of the test*

LaMeRoc

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	42_26
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	18.06	17.93	17.95	17.93	17.91	**Mean length, L (mm)**	17.96	**Dry mass, M_d (g)**	63.97
Diameter (mm)	41.72	41.75	41.70	41.75	41.76	**Mean diameter, D (mm)**	41.74	**Dry density, ρ_d (kg/m^3)**	2604

L/D ratio	0.43	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	64.09
Water content (%)	0.19	**Porosity, n (%)**	0.49	**Bulk density, ρ (kg/m^3)**	2609
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	275		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	67.5	**Temperature (°C)**	22.0		
F_{max} (kN)	18.9	**T_0 (MPa)**	16.4	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (°)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (°)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

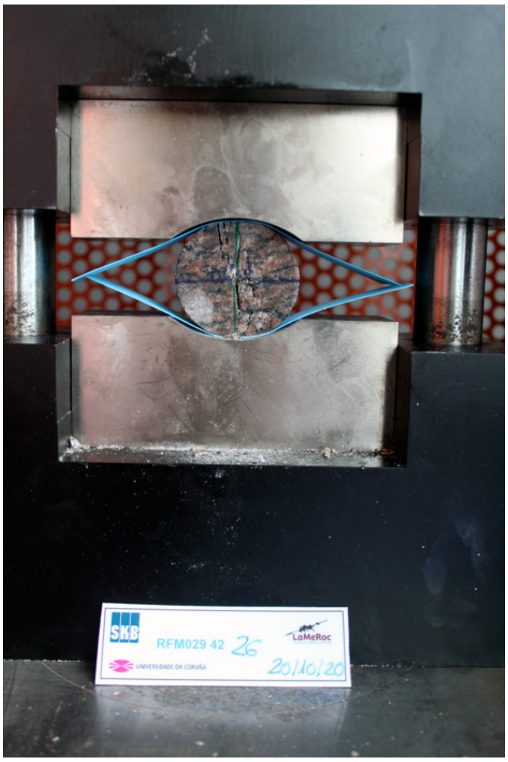

Figure 2. *Sample after the test*

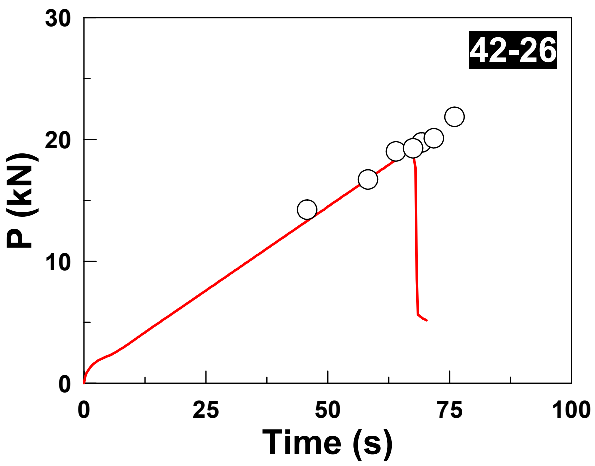

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	54_8
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	26.41	26.26	26.30	26.69	26.71	**Mean length, L (mm)**	26.47	**Dry mass, M_d (g)**	156.69
Diameter (mm)	53.62	53.87	54.00	54.66	53.71	**Mean diameter, D (mm)**	53.97	**Dry density, ρ_d (kg/m^3)**	2587

L/D ratio	0.49	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	156.9
Water content (%)	0.13	**Porosity, n (%)**	0.35	**Bulk density, ρ (kg/m^3)**	2590
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	455		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	57.75	**Temperature (ºC)**	22.0		
F_{max} (kN)	27.9	**T_0 (MPa)**	12.5	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

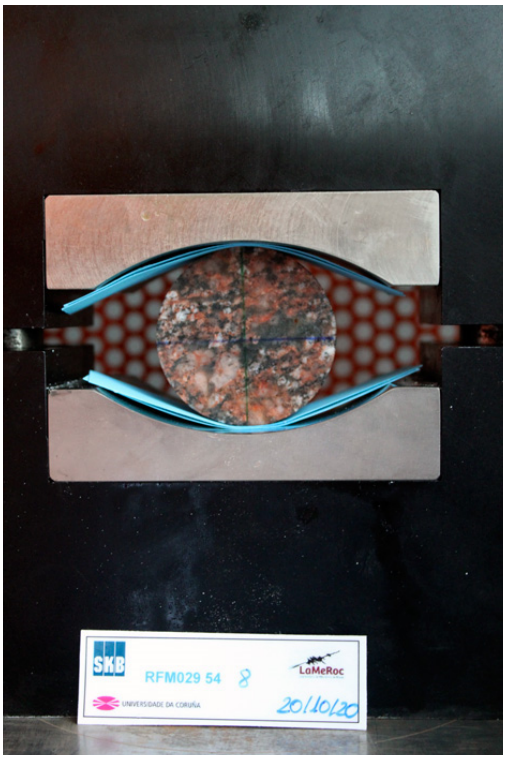

Figure 1. *Sample before the test*

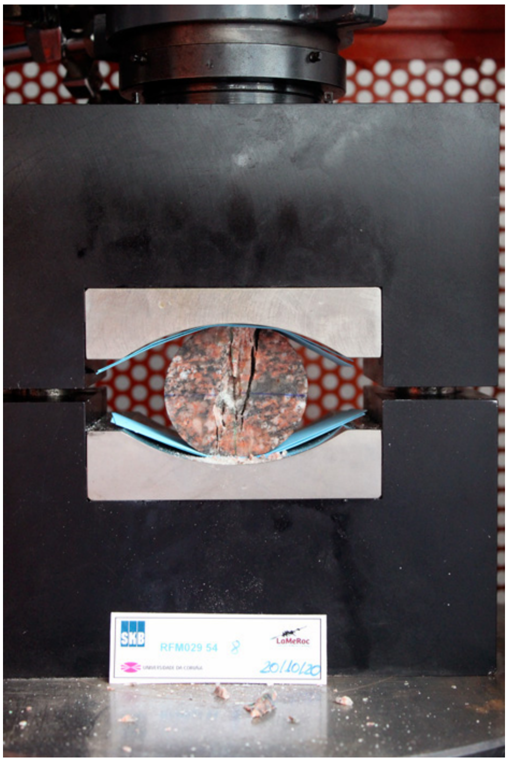

Figure 2. *Sample after the test*

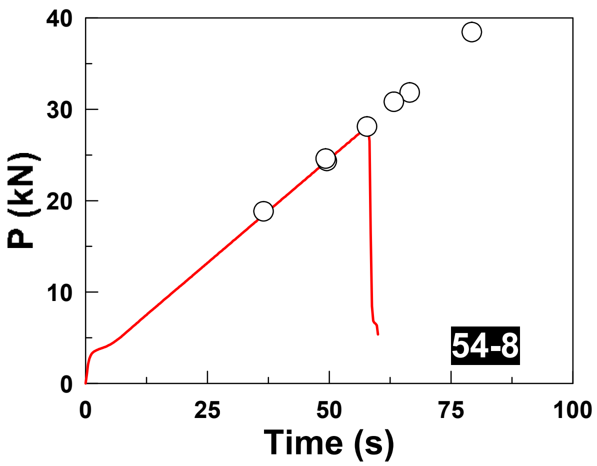

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	54_9
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	28.37	27.97	27.93	28.08	28.04	**Mean length, L (mm)**	28.08	**Dry mass, M_d (g)**	166.85
Diameter (mm)	53.77	53.75	53.75	53.81	53.79	**Mean diameter, D (mm)**	53.77	**Dry density, ρ_d (kg/m³)**	2617

L/D ratio	0.52	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	167.17
Water content (%)	0.19	**Porosity, n (%)**	0.50	**Bulk density, ρ (kg/m³)**	2622
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	455		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	66.5	**Temperature (ºC)**	22.0		
F_{max} (kN)	31.5	**T_0 (MPa)**	13.4	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

Figure 1. *Sample before the test*

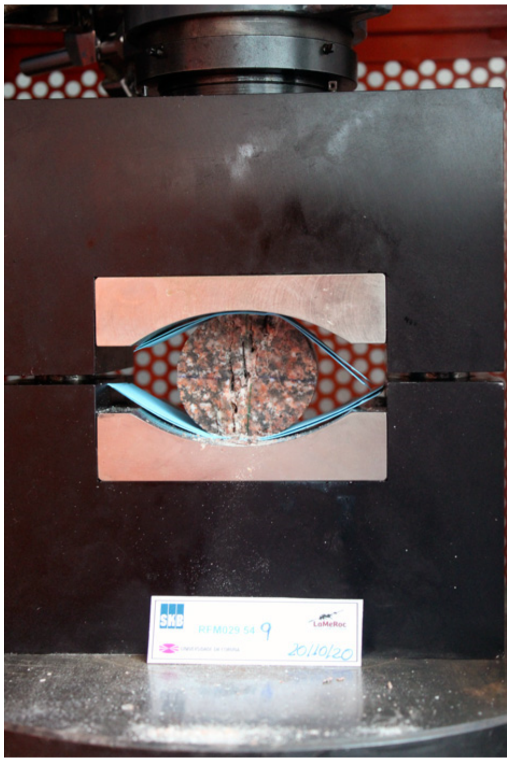

Figure 2. *Sample after the test*

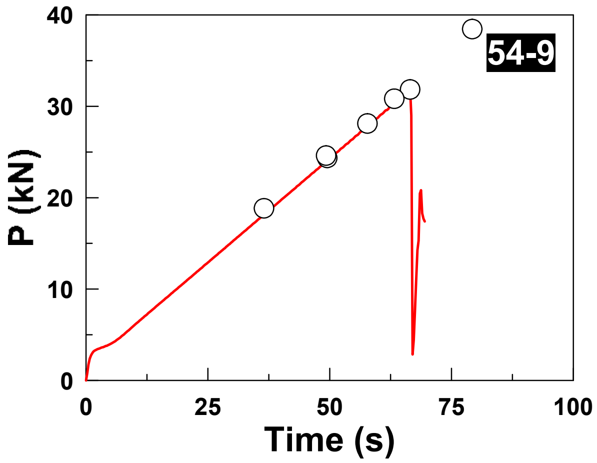

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference	Report date
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	Specimen		Ref. LaMeRoc	54_10
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	27.15	26.85	27.51	26.95	27.10	Mean length, L (mm)	27.11	Dry mass, M_d (g)	160.69
Diameter (mm)	53.81	53.76	53.56	53.78	53.77	Mean diameter, D (mm)	53.74	Dry density, ρ_d (kg/m^3)	2613

L/D ratio	0.50	Permeability, k (mD)	-	Bulk mass, M (g)	160.98
Water content (%)	0.18	Porosity, n (%)	0.47	Bulk density, ρ (kg/m^3)	2618
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	Force class (UNE-EN-7500)	0.5	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Force		
LDT model	-	Loading rate (N/s)	455		
Strain gauge type	-	Strain rate (s^{-1})	-		
Load cell	AEP TC4 50 ton	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	Time to failure (s)	63.25	Temperature (ºC)	22.0		
F_{max} (kN)	30.1	T_0 (MPa)	13.5	$T_{0,50}$ (MPa)	-		
UCS (MPa)	-	$UCS_{1:2}$ (MPa)	-	UCS_{50} (MPa)	-	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	-	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	-	V_{S1} (km/s)	-	V_{S2} (km/s)	-	V_S (km/s)	-
Dynamic moduli		E_{dyn} (GPa)	-	ν_{dyn}	-	V_P/V_S	-
		G_{dyn} (GPa)	-	K_{dyn} (GPa)	-		
Notes (6)							

PICTURES AND PLOTS

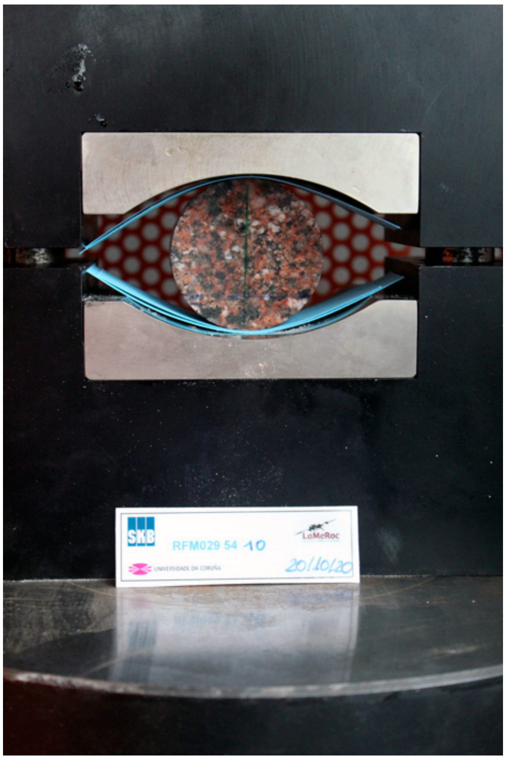

Figure 1. *Sample before the test*

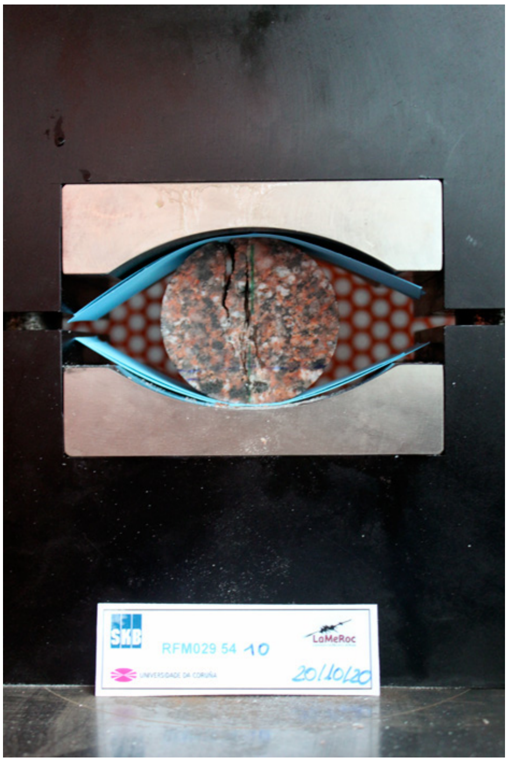

Figure 2. *Sample after the test*

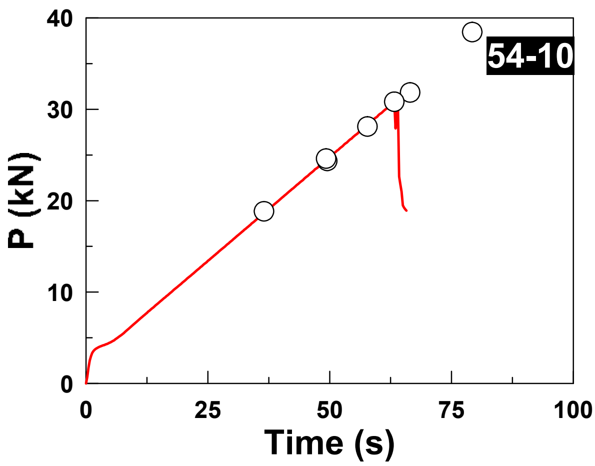

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference		Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	Specimen		Ref. LaMeRoc	54_11
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	27.68	27.40	27.13	27.57	28.10	Mean length, L (mm)	27.58	Dry mass, M_d (g)	163.36
Diameter (mm)	53.72	53.75	53.81	53.72	53.66	Mean diameter, D (mm)	53.73	Dry density, ρ_d (kg/m^3)	2613

L/D ratio	0.51	Permeability, k (mD)	-	Bulk mass, M (g)	163.82
Water content (%)	0.28	Porosity, n (%)	0.74	Bulk density, ρ (kg/m^3)	2620
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	Force class (UNE-EN-7500)	0.5	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Force		
LDT model	-	Loading rate (N/s)	455		
Strain gauge type	-	Strain rate (s^{-1})	-		
Load cell	AEP TC4 50 ton	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	Time to failure (s)	49.5	Temperature (ºC)	22.0		
F_{max} (kN)	24.1	T_0 (MPa)	10.5	$T_{0,50}$ (MPa)	-		
UCS (MPa)	-	$UCS_{1:2}$ (MPa)	-	UCS_{50} (MPa)	-	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	-	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	-	V_{S1} (km/s)	-	V_{S2} (km/s)	-	V_S (km/s)	-
Dynamic moduli		E_{dyn} (GPa)	-	ν_{dyn}	-	V_P/V_S	-
		G_{dyn} (GPa)	-	K_{dyn} (GPa)	-		
Notes (6)							

PICTURES AND PLOTS

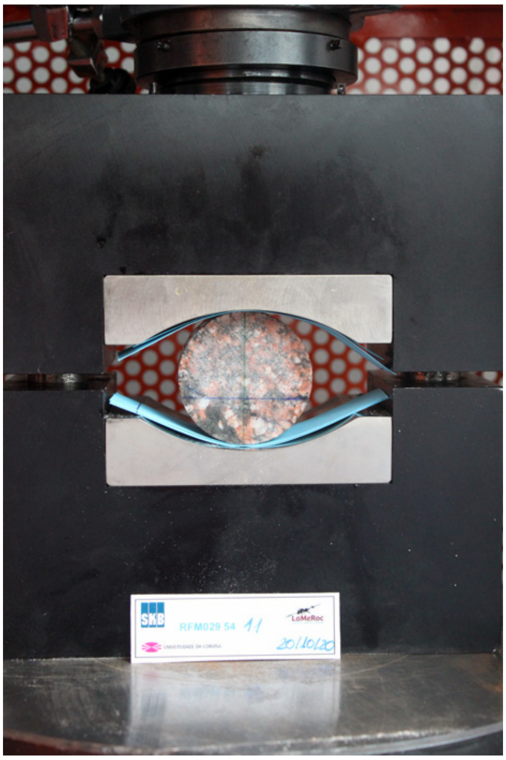

Figure 1. *Sample before the test*

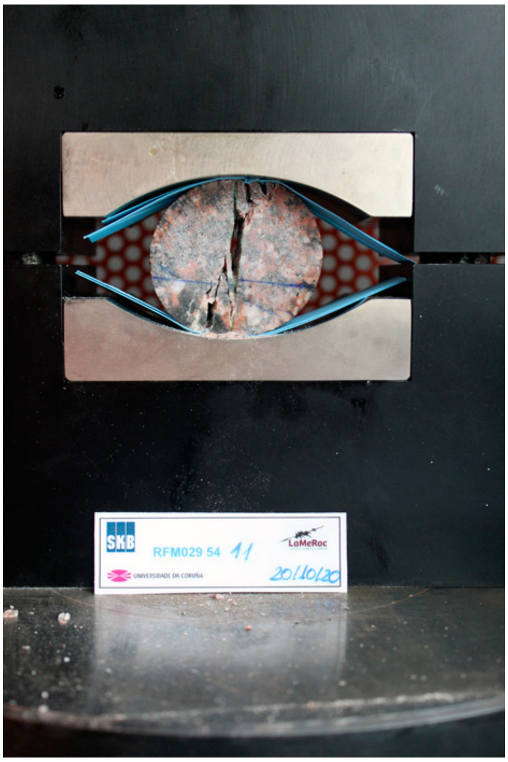

Figure 2. *Sample after the test*

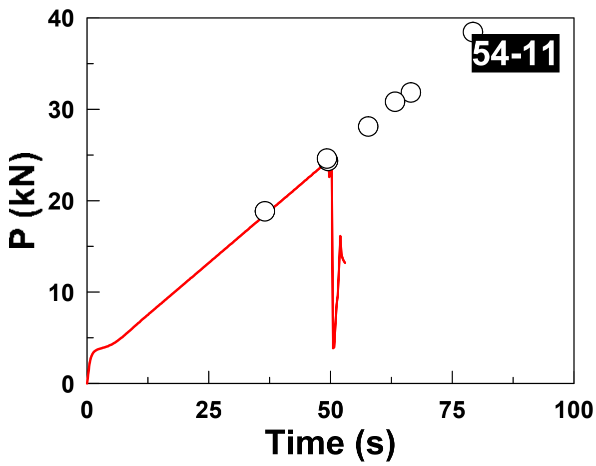

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference	Report date
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	Specimen		Ref. LaMeRoc	54_12
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	22.90	22.46	22.42	23.02	23.26	Mean length, L (mm)	22.81	Dry mass, M_d (g)	134.06
Diameter (mm)	53.71	53.79	53.74	53.88	53.74	Mean diameter, D (mm)	53.77	Dry density, ρ_d (kg/m^3)	2588

L/D ratio	0.42	Permeability, k (mD)	-	Bulk mass, M (g)	134.3
Water content (%)	0.18	Porosity, n (%)	0.46	Bulk density, ρ (kg/m^3)	2592
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	Force class (UNE-EN-7500)	0.5	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Force		
LDT model	-	Loading rate (N/s)	455		
Strain gauge type	-	Strain rate (s^{-1})	-		
Load cell	AEP TC4 50 ton	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	Time to failure (s)	36.25	Temperature (ºC)	22.0		
F_{max} (kN)	18.2	T_0 (MPa)	9.8	$T_{0,50}$ (MPa)	-		
UCS (MPa)	-	$UCS_{1:2}$ (MPa)	-	UCS_{50} (MPa)	-	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	-	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	-	V_{S1} (km/s)	-	V_{S2} (km/s)	-	V_S (km/s)	-
Dynamic moduli		E_{dyn} (GPa)	-	ν_{dyn}	-	V_P/V_S	-
		G_{dyn} (GPa)	-	K_{dyn} (GPa)	-		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

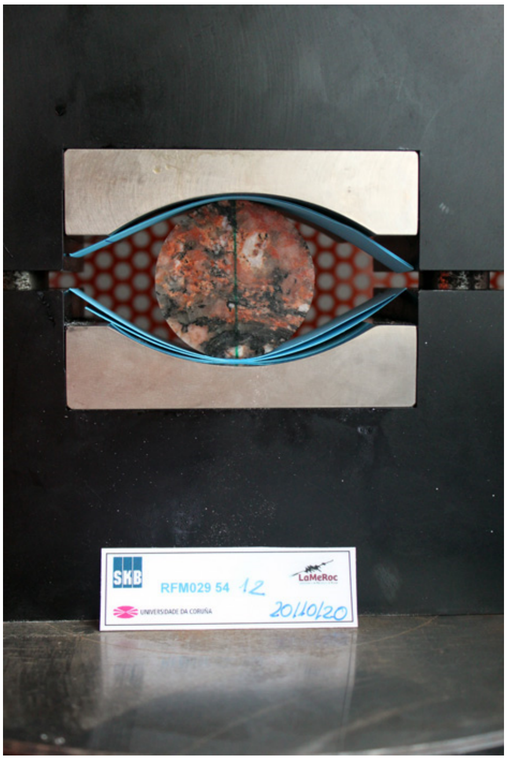

Figure 1. *Sample before the test*

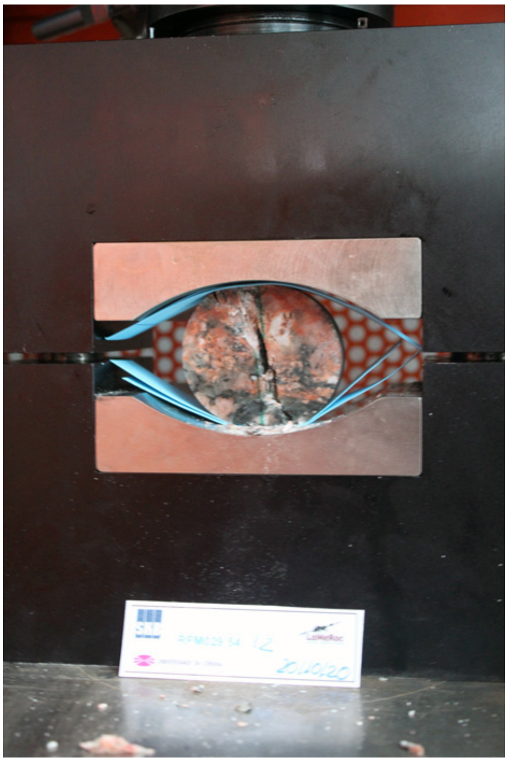

Figure 2. *Sample after the test*

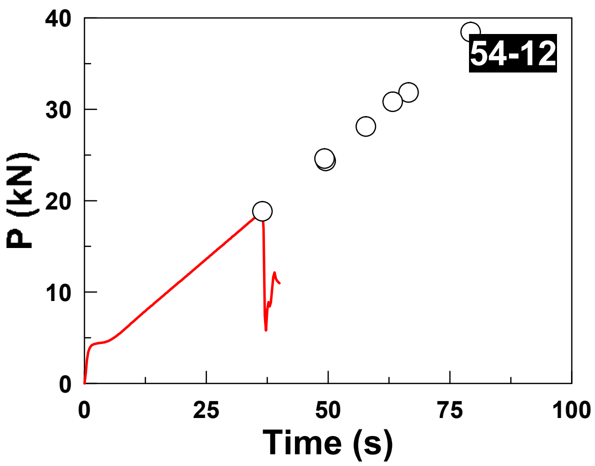

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	54_13
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	28.28	28.16	28.67	28.61	28.56	**Mean length, L (mm)**	28.46	**Dry mass, M_d (g)**	169.19
Diameter (mm)	53.64	53.60	53.76	53.72	53.60	**Mean diameter, D (mm)**	53.66	**Dry density, ρ_d (kg/m³)**	2629

L/D ratio	0.53	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	169.43
Water content (%)	0.14	**Porosity, n (%)**	0.37	**Bulk density, ρ (kg/m³)**	2632
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	455		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	79.25	**Temperature (ºC)**	22.0		
F_{max} (kN)	37.9	**T_0 (MPa)**	16.2	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

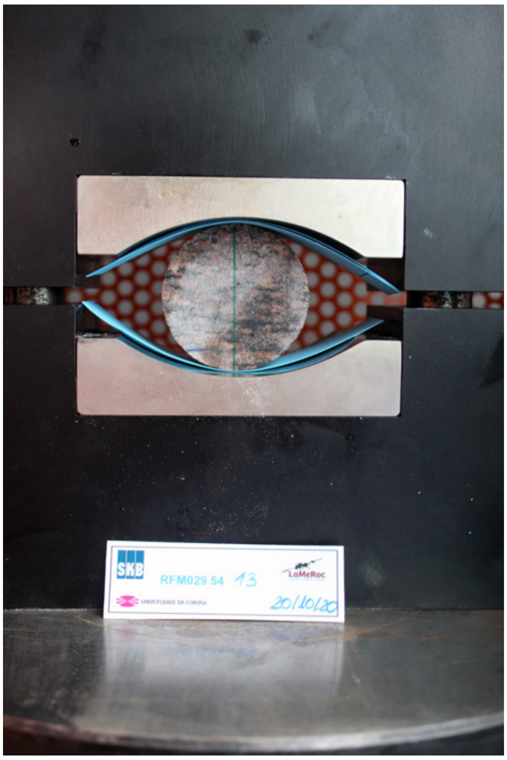

Figure 1. *Sample before the test*

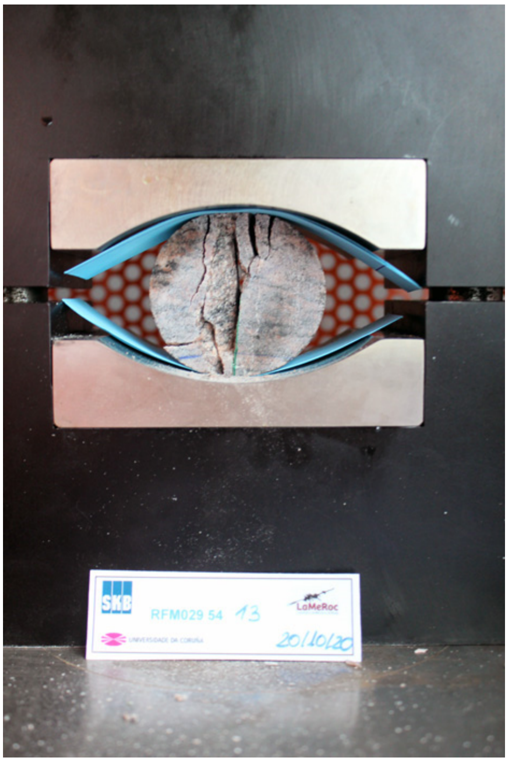

Figure 2. *Sample after the test*

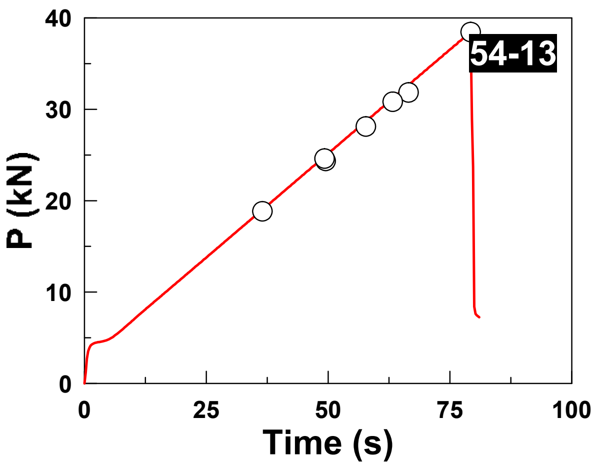

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	54_14
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	28.36	27.80	27.57	27.93	28.20	**Mean length, L (mm)**	27.97	**Dry mass, M_d (g)**	166.01
Diameter (mm)	53.59	53.68	53.59	53.65	53.90	**Mean diameter, D (mm)**	53.68	**Dry density, ρ_d (kg/m^3)**	2622

L/D ratio	0.52	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	166.33
Water content (%)	0.19	**Porosity, n (%)**	0.51	**Bulk density, ρ (kg/m^3)**	2627
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	455		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	49.25	**Temperature (ºC)**	22.0		
F_{max} (kN)	24.0	**T_0 (MPa)**	10.4	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

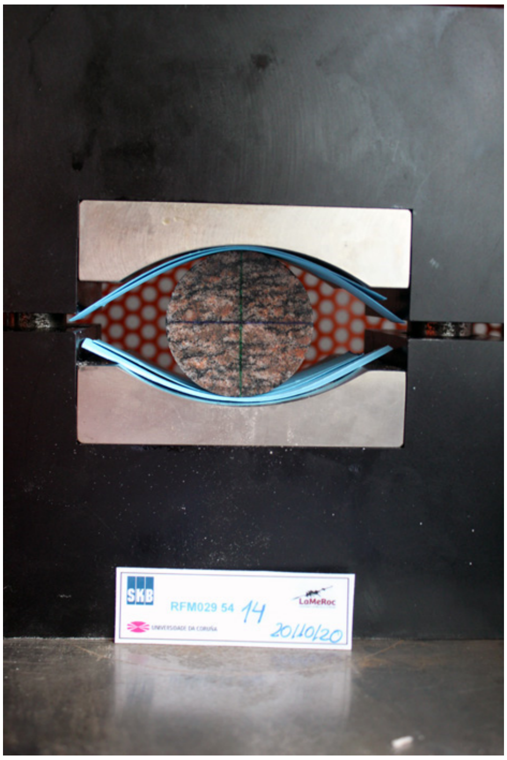

Figure 1. *Sample before the test*

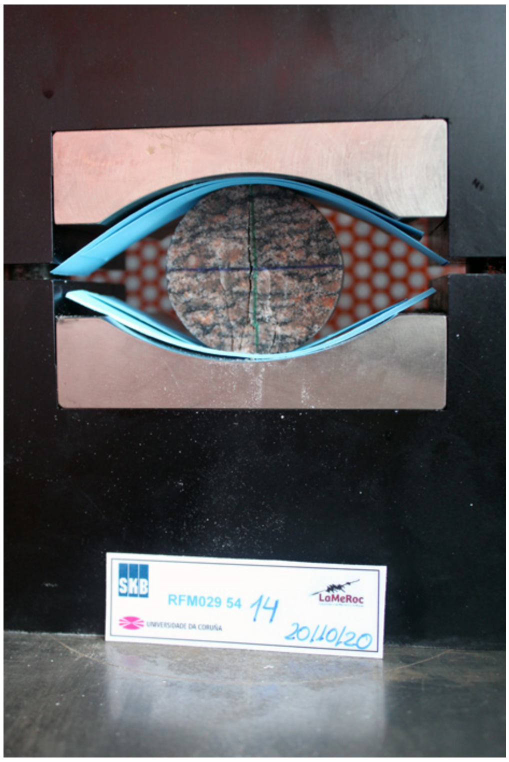

Figure 2. *Sample after the test*

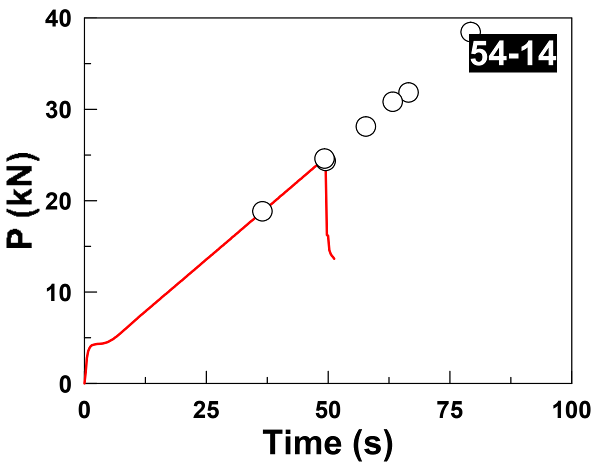

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	63_5
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	31.95	31.86	31.58	31.77	32.04	**Mean length, L (mm)**	31.84	**Dry mass, M_d (g)**	268.84
Diameter (mm)	64.14	64.16	64.32	64.13	64.18	**Mean diameter, D (mm)**	64.19	**Dry density, ρ_d (kg/m³)**	2609

L/D ratio	0.50	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	269.14
Water content (%)	0.11	**Porosity, n (%)**	0.29	**Bulk density, ρ (kg/m³)**	2612
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	625		
Strain gauge type	-	**Strain rate (s⁻¹)**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	64.5	**Temperature (ºC)**	22.0		
F_{max} (kN)	41.4	**T_0 (MPa)**	12.9	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

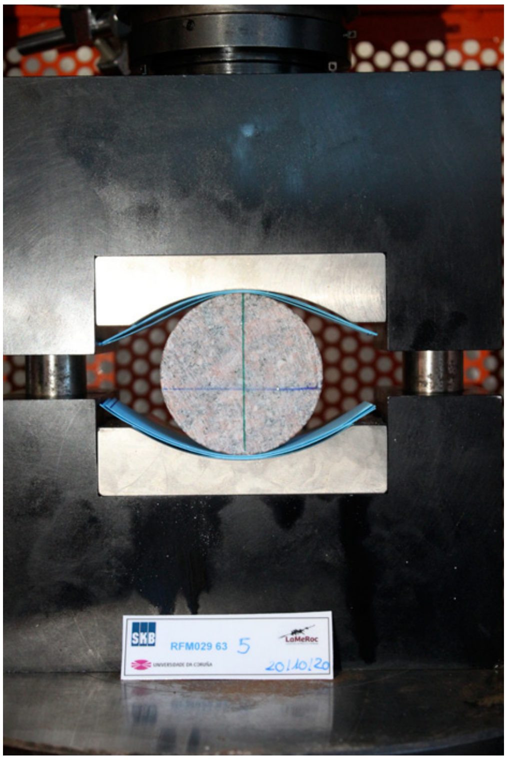

Figure 1. *Sample before the test*

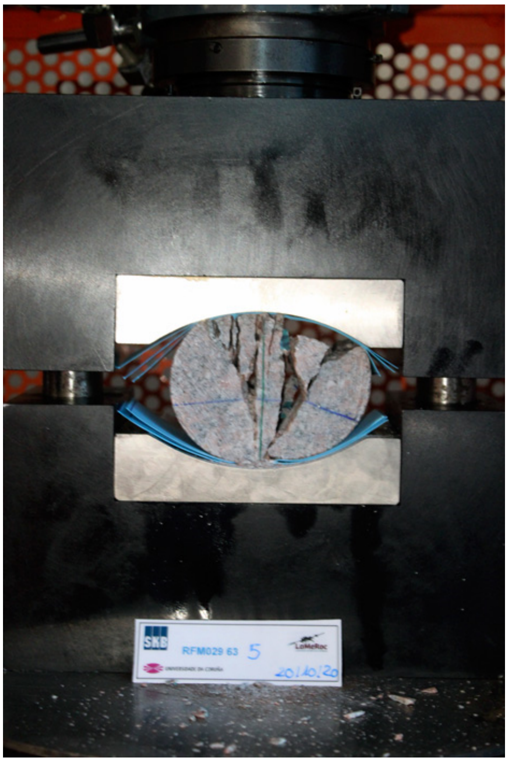

Figure 2. *Sample after the test*

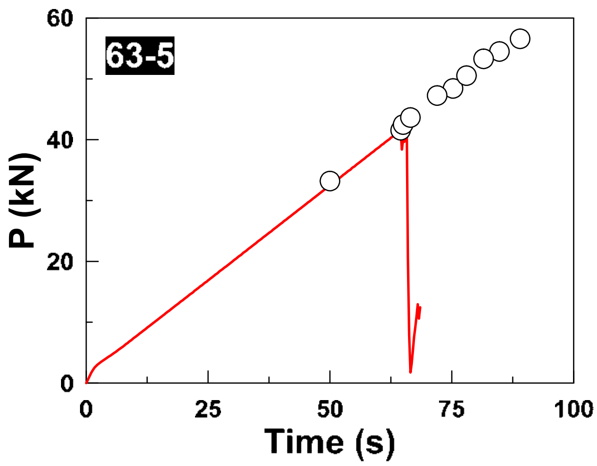

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	63_7
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	30.91	30.79	31.76	31.72	30.84	**Mean length, L (mm)**	31.20	**Dry mass, M_d (g)**	261.25
Diameter (mm)	64.06	64.06	64.10	64.04	63.92	**Mean diameter, D (mm)**	64.04	**Dry density, ρ_d (kg/m^3)**	2600

L/D ratio	0.49	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	261.56
Water content (%)	0.12	**Porosity, n (%)**	0.31	**Bulk density, ρ (kg/m^3)**	2603
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	625		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	89	**Temperature (°C)**	22.0		
F_{max} (kN)	56.4	**T_0 (MPa)**	18.0	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (°)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (°)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

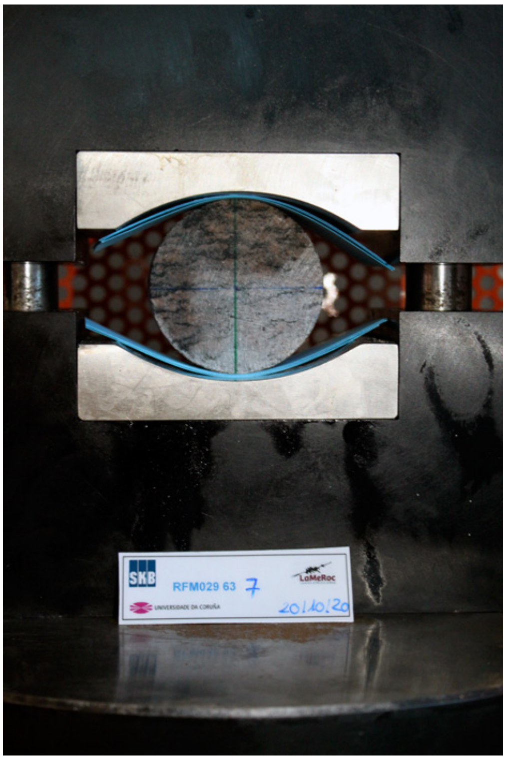

Figure 1. *Sample before the test*

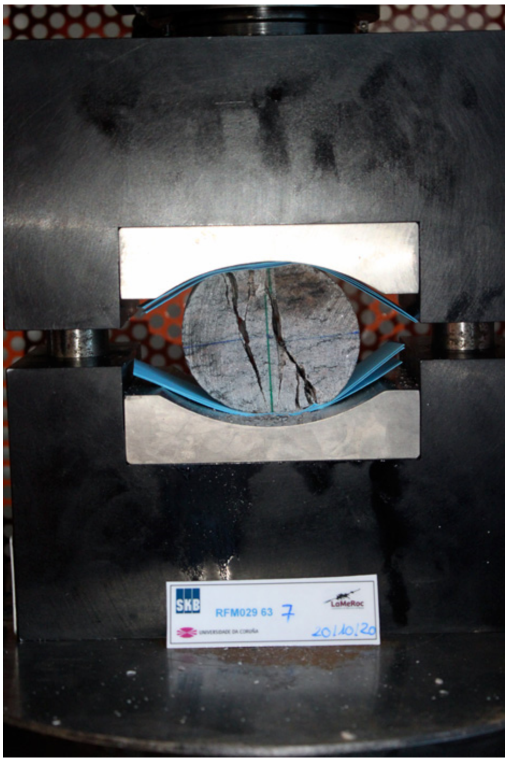

Figure 2. *Sample after the test*

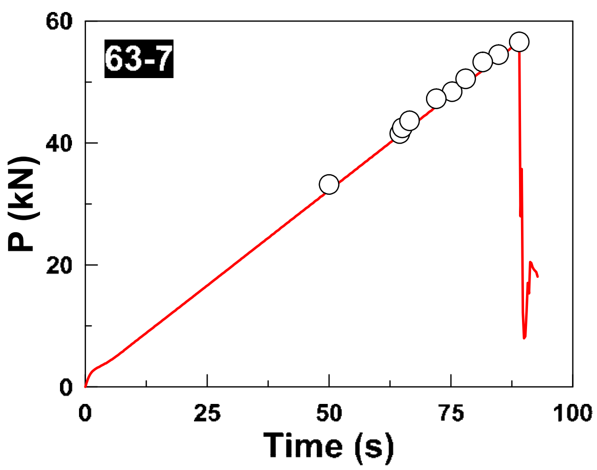

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	63_8
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	32.61	33.21	33.04	32.40	32.44	**Mean length, L (mm)**	32.74	**Dry mass, M_d (g)**	276.58
Diameter (mm)	64.09	64.06	64.14	64.10	64.13	**Mean diameter, D (mm)**	64.10	**Dry density, ρ_d (kg/m^3)**	2617

L/D ratio	0.51	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	276.88
Water content (%)	0.11	**Porosity, n (%)**	0.28	**Bulk density, ρ (kg/m^3)**	2620
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	625		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	75.25	**Temperature (ºC)**	22.0		
F_{max} (kN)	42.2	**T_0 (MPa)**	14.7	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

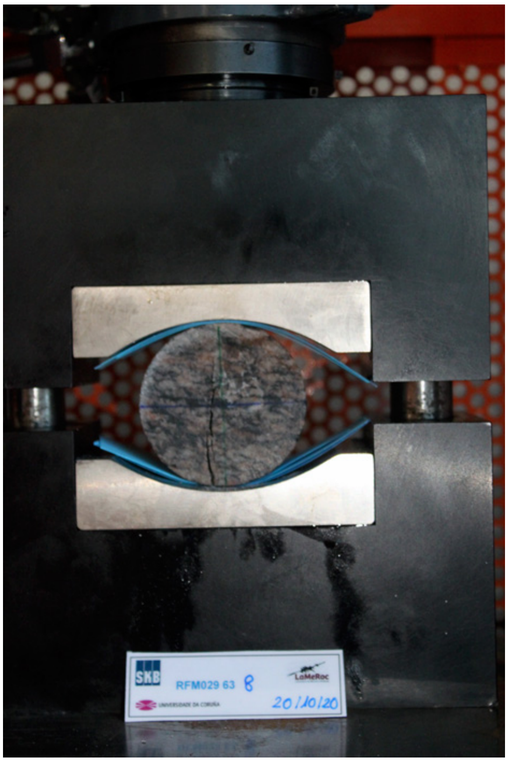

Figure 2. *Sample after the test*

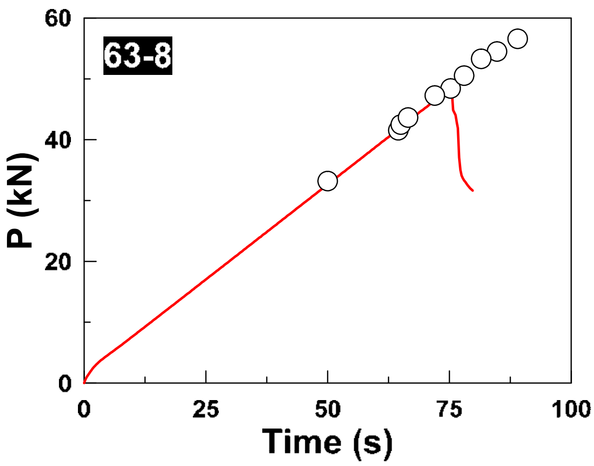

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29d	**Specimen**		**Ref. LaMeRoc**	63_9
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	33.07	32.67	32.61	32.71	32.70	**Mean length, L (mm)**	32.75	**Dry mass, M_d (g)**	276.01
Diameter (mm)	64.06	64.14	64.13	64.14	64.09	**Mean diameter, D (mm)**	64.11	**Dry density, ρ_d (kg/m^3)**	2610

L/D ratio	0.51	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	276.25
Water content (%)	0.09	**Porosity, n (%)**	0.23	**Bulk density, ρ (kg/m^3)**	2613
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	625		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	78	**Temperature (ºC)**	22.0		
F_{max} (kN)	50.1	**T_0 (MPa)**	15.3	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

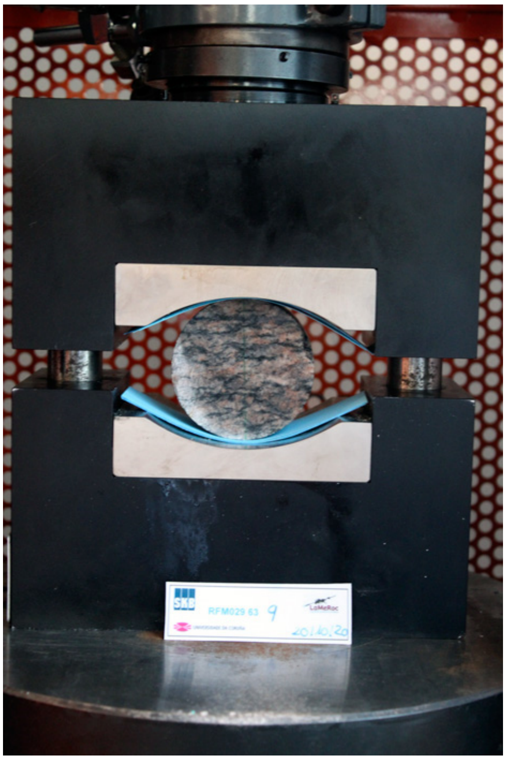

Figure 1. Sample before the test

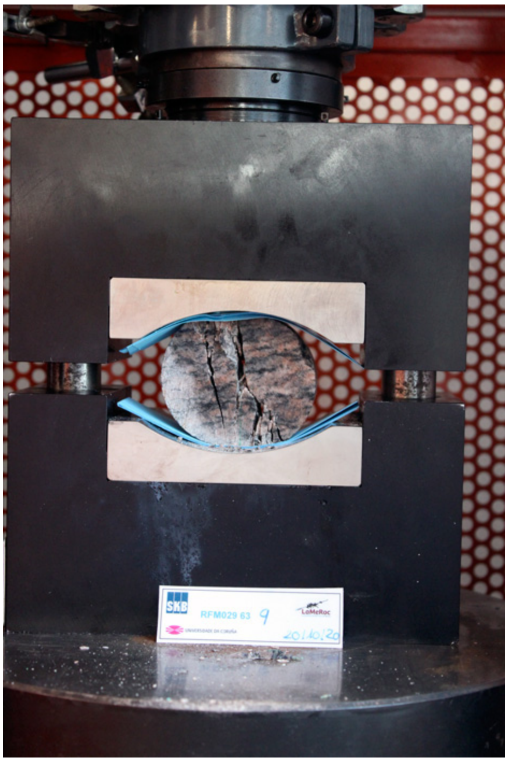

Figure 2. Sample after the test

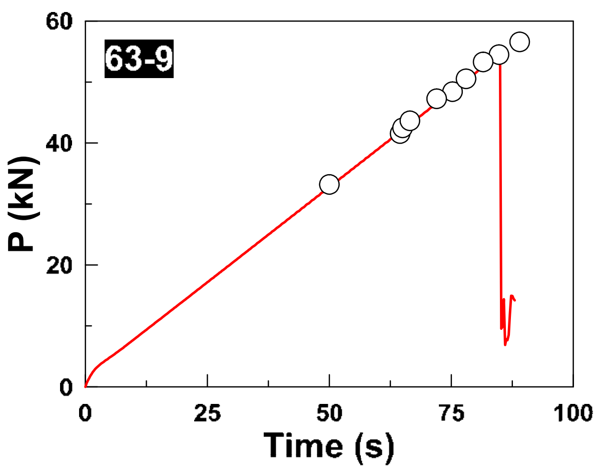

Figure 3. Load-time diagram of the test

Test Report Data Sheet

LaMeRoc

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference		**Report date**	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	63_10
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	30.11	30.92	31.03	30.59	30.13	**Mean length, L (mm)**	30.56	**Dry mass, M_d (g)**	259.22
Diameter (mm)	64.09	64.08	64.00	64.06	64.10	**Mean diameter, D (mm)**	64.07	**Dry density, ρ_d (kg/m^3)**	2632
L/D ratio	0.48	**Permeability, k (mD)**	-					**Bulk mass, M (g)**	259.61
Water content (%)	0.15	**Porosity, n (%)**	0.40					**Bulk density, ρ (kg/m^3)**	2636
Notes (4)									

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	625		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	84.75	**Temperature (ºC)**	22.0		
F_{max} (kN)	54.4	**T_0 (MPa)**	17.7	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

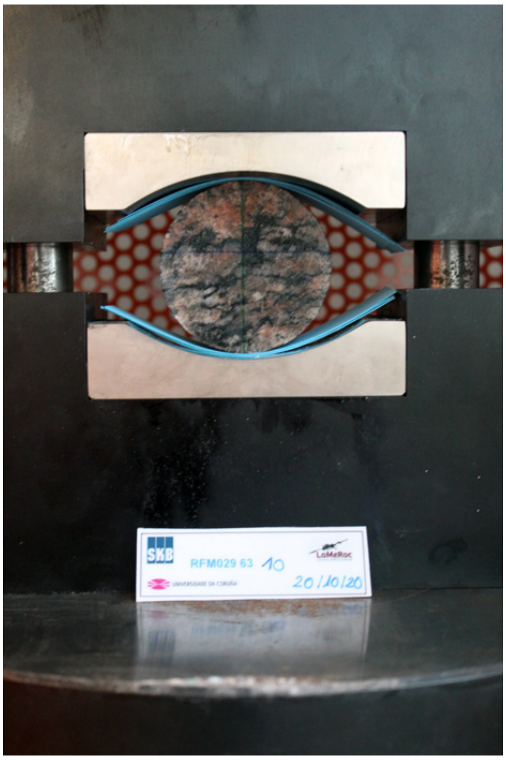

Figure 1. Sample before the test

Figure 2. Sample after the test

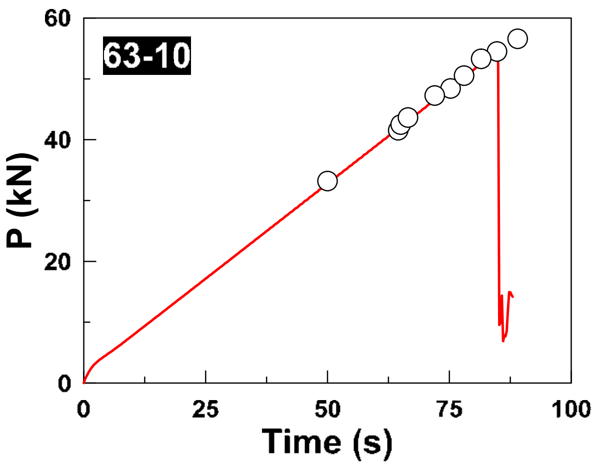

Figure 3. Load-time diagram of the test

Test Report Data Sheet

PROJECT

Title	*Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements*		
Project	*Scale Effect of Intact Granite Rocks*		
Company	*Svensk Kärnbränslehantering AB*		
Test type	*BTS*		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	*29b*	**Specimen**		**Ref. LaMeRoc**	*63_13*
Depth (m)	*surface block*	**Formation**		**Facies**	
Sampling date		**Location**	*Forsmark (Sweden)*	**Lithology**	*RFM029*
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	*Y*	**Date**		**Dimensional verification (Y/N)**	*Y*	**Date**	
Cutting (Y/N)	*Y*	**Date**		**Trimming (Y/N)**	*Y*	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	*30.53*	*30.60*	*30.71*	*30.68*	*30.53*	**Mean length, L (mm)**	*30.61*	**Dry mass, M_d (g)**	*257.98*
Diameter (mm)	*64.04*	*63.74*	*63.67*	*64.17*	*64.12*	**Mean diameter, D (mm)**	*63.95*	**Dry density, ρ_d (kg/m^3)**	*2624*

L/D ratio	*0.48*	**Permeability, k (mD)**	*-*	**Bulk mass, M (g)**	*258.34*
Water content (%)	*0.14*	**Porosity, n (%)**	*0.37*	**Bulk density, ρ (kg/m^3)**	*2628*
Notes (4)					

EQUIPMENT

Device	*Servosis 50 ton*	**Force class (UNE-EN-7500)**	*0.5*	**Displacement class (ASTM E2309)**	*A*
Calibration date	*09/09/2020*	**Control mode (Force/Strain)**	*Force*		
LDT model	*-*	**Loading rate (N/s)**	*625*		
Strain gauge type	*-*	**Strain rate (s^{-1})**	*-*		
Load cell	*AEP TC4 50 ton*	**Shear rate (mm/s)**	*-*		
Notes (5)					

TEST RESULTS

Test date	*20/10/2020*	**Time to failure (s)**	*50*	**Temperature (ºC)**	*22.0*		
F_{max} (kN)	*32.0*	**T_0 (MPa)**	*10.8*	**$T_{0,50}$ (MPa)**	*-*		
UCS (MPa)	*-*	**$UCS_{1:2}$ (MPa)**	*-*	**UCS_{50} (MPa)**	*-*	**σ_{CI} (MPa)**	*-*
	Static moduli	**$E_{50\%}$ (GPa)**	*-*	**$\nu_{50\%}$**	*-*	**σ_{CD} (MPa)**	*-*
ϕ_{dry} (º)	*-*	**c'_{dry} (kPa)**	*-*	**ϕ_{wet} (º)**	*-*	**c'_{wet} (kPa)**	*-*
V_P (km/s)	*-*	**V_{S1} (km/s)**	*-*	**V_{S2} (km/s)**	*-*	**V_S (km/s)**	*-*
	Dynamic moduli	**E_{dyn} (GPa)**	*-*	**ν_{dyn}**	*-*	**V_P/V_S**	*-*
		G_{dyn} (GPa)	*-*	**K_{dyn} (GPa)**	*-*		
Notes (6)							

PICTURES AND PLOTS

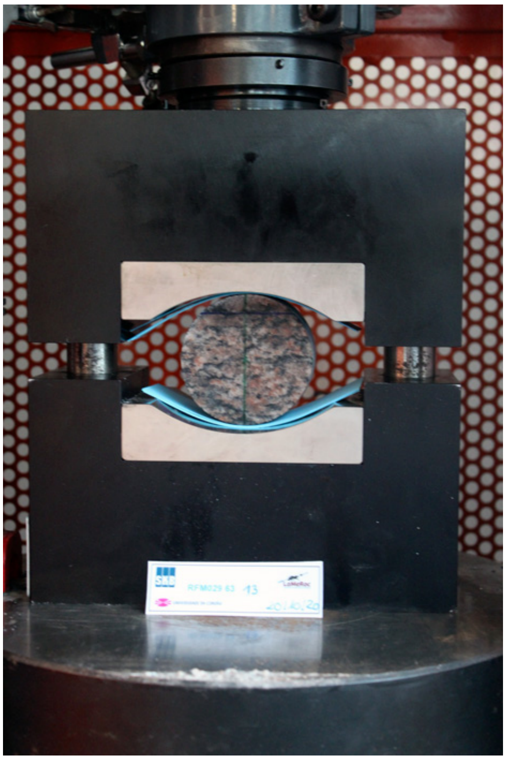

Figure 1. *Sample before the test*

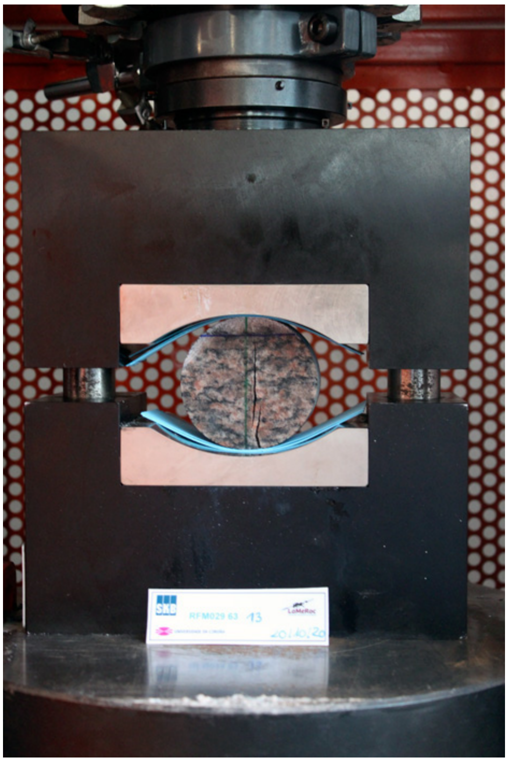

Figure 2. *Sample after the test*

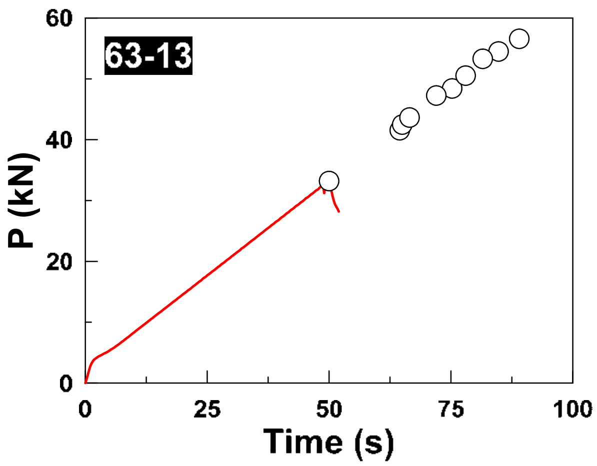

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	63_14
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	32.56	32.34	32.24	32.50	32.30	**Mean length, L (mm)**	32.39	**Dry mass, M_d (g)**	273.95
Diameter (mm)	64.07	63.90	63.79	64.08	63.86	**Mean diameter, D (mm)**	63.94	**Dry density, ρ_d (kg/m³)**	2634

L/D ratio	0.51	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	274.31
Water content (%)	0.13	**Porosity, n (%)**	0.35	**Bulk density, ρ (kg/m³)**	2638
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	625		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	65	**Temperature (ºC)**	22.0		
F_{max} (kN)	42.4	**T_0 (MPa)**	13.1	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

Test Report Data Sheet

PICTURES AND PLOTS

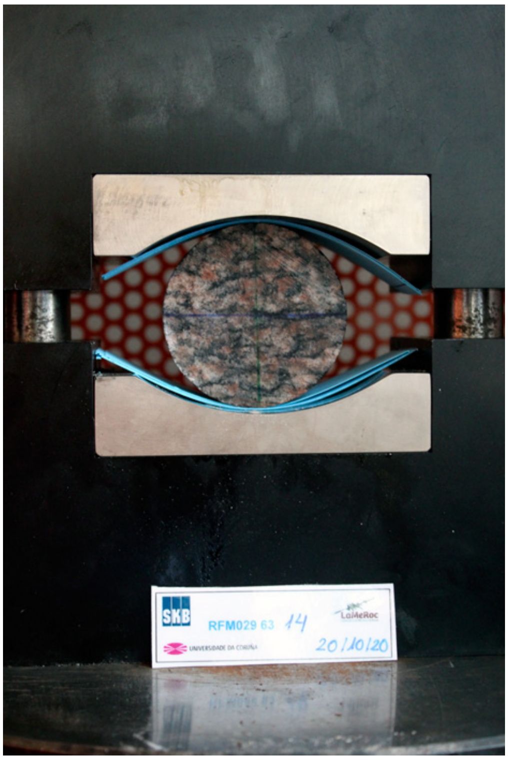

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

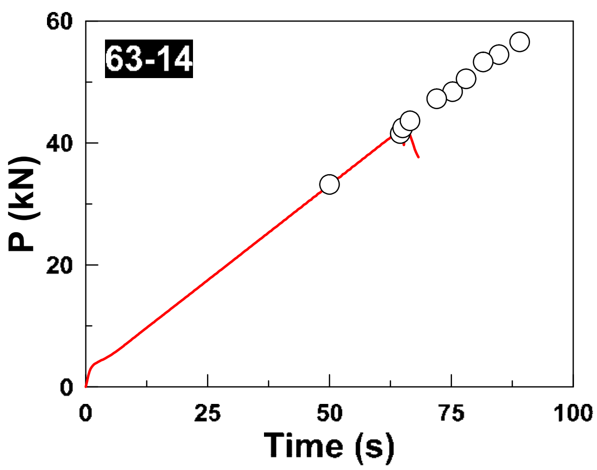

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	63_15
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	32.66	32.71	32.47	32.26	32.45	**Mean length, L (mm)**	32.51	**Dry mass, M_d (g)**	276.68
Diameter (mm)	64.13	64.06	64.16	64.15	64.13	**Mean diameter, D (mm)**	64.13	**Dry density, ρ_d (kg/m^3)**	2635

L/D ratio	0.51	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	276.95
Water content (%)	0.10	**Porosity, n (%)**	0.26	**Bulk density, ρ (kg/m^3)**	2638
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	625		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	72	**Temperature (ºC)**	22.0		
F_{max} (kN)	46.7	**T_0 (MPa)**	14.4	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

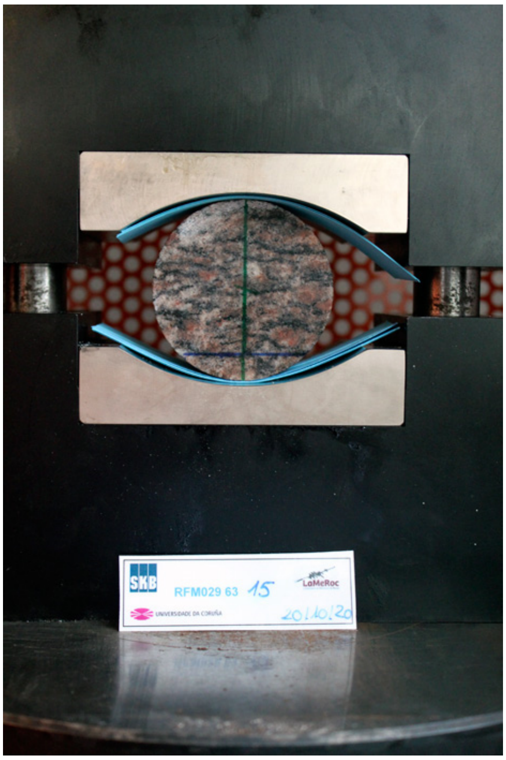

Figure 1. *Sample before the test*

Figure 2. *Sample after the test*

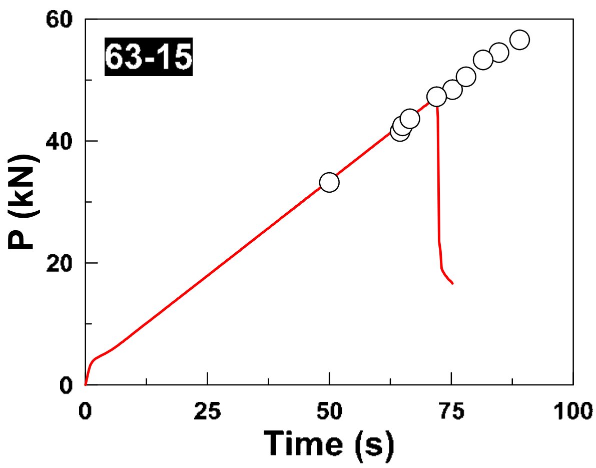

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	63_16
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	26.71	26.84	26.62	26.26	26.31	**Mean length, L (mm)**	26.55	**Dry mass, M_d (g)**	226.30
Diameter (mm)	64.37	64.25	64.03	64.09	64.11	**Mean diameter, D (mm)**	64.17	**Dry density, ρ_d (kg/m^3)**	2636

L/D ratio	0.41	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	226.6
Water content (%)	0.13	**Porosity, n (%)**	0.35	**Bulk density, ρ (kg/m^3)**	2639
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	625		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	66.5	**Temperature (ºC)**	22.0		
F_{max} (kN)	43.5	**T_0 (MPa)**	16.3	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

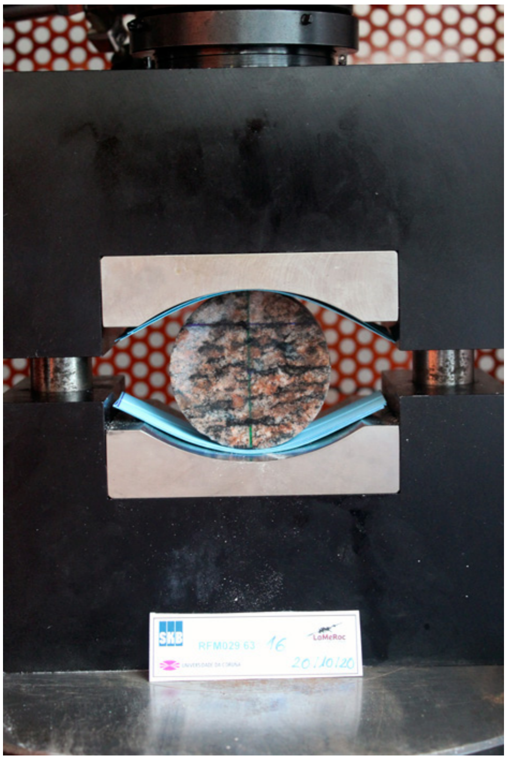

Figure 1. Sample before the test

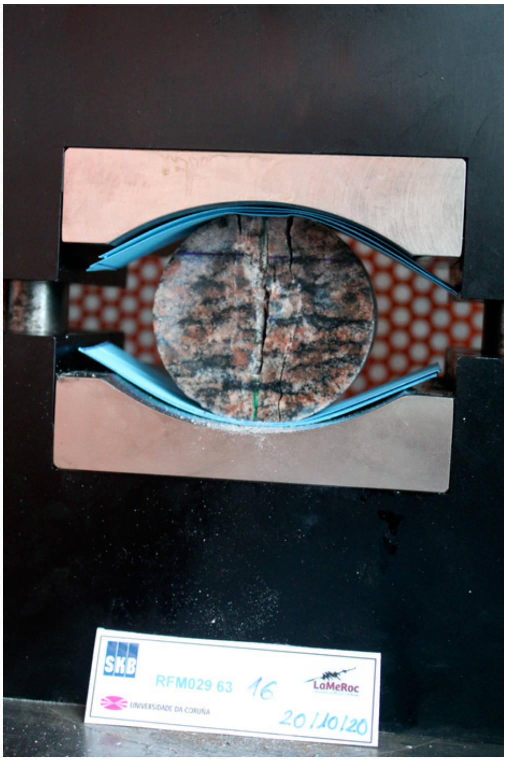

Figure 2. Sample after the test

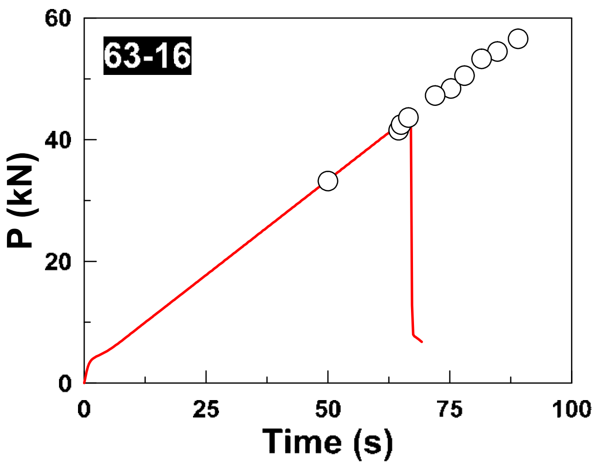

Figure 3. Load-time diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29b	**Specimen**		**Ref. LaMeRoc**	63_17
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	32.50	32.50	32.49	32.70	33.46	**Mean length, L (mm)**	32.73	**Dry mass, M_d (g)**	277.63
Diameter (mm)	64.18	64.21	64.22	64.19	64.32	**Mean diameter, D (mm)**	64.22	**Dry density, ρ_d (kg/m^3)**	2618

L/D ratio	0.51	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	277.9
Water content (%)	0.10	**Porosity, n (%)**	0.25	**Bulk density, ρ (kg/m^3)**	2621
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	625		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	20/10/2020	**Time to failure (s)**	81.5	**Temperature (ºC)**	22.0		
F_{max} (kN)	52.7	**T_0 (MPa)**	16.1	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

Figure 1. *Sample before the test*

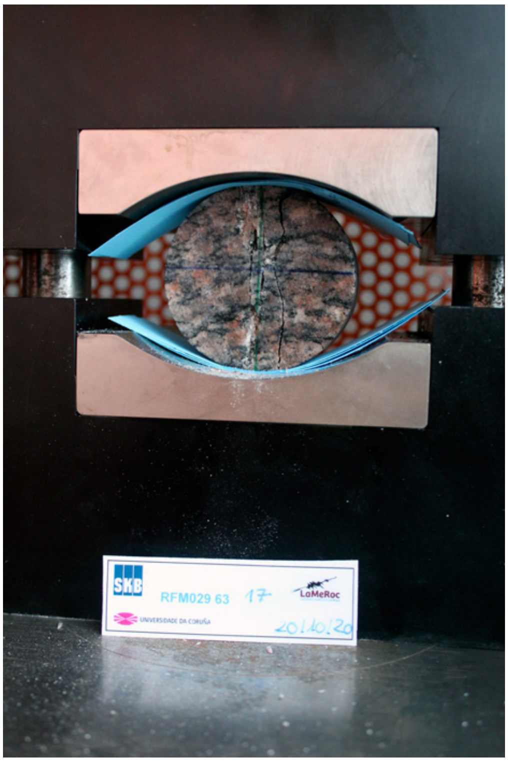

Figure 2. *Sample after the test*

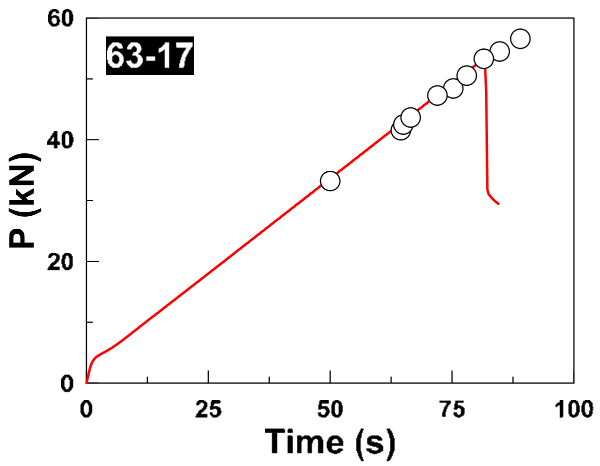

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	100_2
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	44.73	44.77	44.65	44.54	44.70	**Mean length, L (mm)**	44.68	**Dry mass, M_d (g)**	899.64
Diameter (mm)	98.98	99.00	99.12	99.02	99.02	**Mean diameter, D (mm)**	99.03	**Dry density, ρ_d (kg/m³)**	2614

L/D ratio	0.45	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	900.69
Water content (%)	0.12	**Porosity, n (%)**	0.31	**Bulk density, ρ (kg/m³)**	2617
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	1570		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	19/10/2020	**Time to failure (s)**	62.5	**Temperature (ºC)**	22.0		
F_{max} (kN)	88.1	**T_0 (MPa)**	14.6	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

![LaMeRoc logo] **Test Report Data Sheet**

PICTURES AND PLOTS

Figure 1. *Sample before the test*

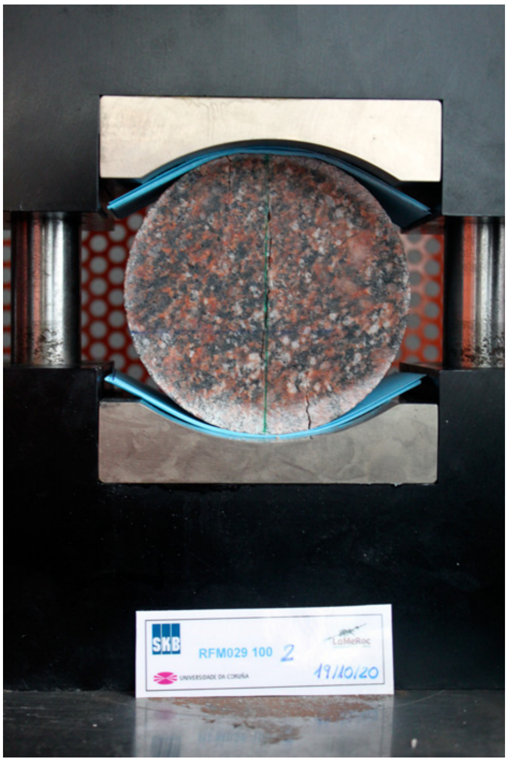

Figure 2. *Sample after the test*

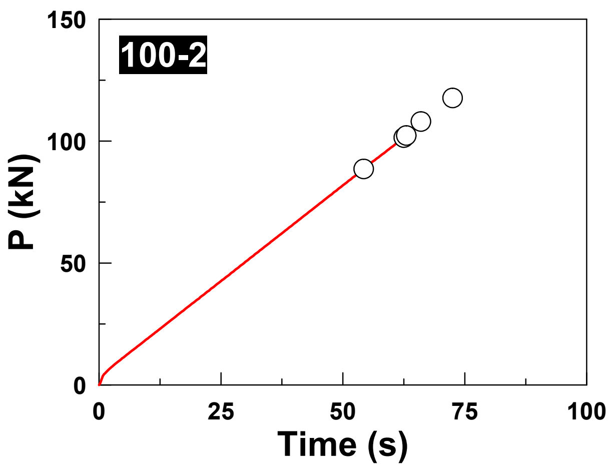

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference	
Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	29c	**Specimen**		**Ref. LaMeRoc**	100_4
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**
Notes (3)						

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	49.90	49.01	48.58	48.16	48.55	**Mean length, L (mm)**	48.84	**Dry mass, M_d (g)**	1061.30
Diameter (mm)	102.64	102.69	102.83	103.02	102.96	**Mean diameter, D (mm)**	102.83	**Dry density, ρ_d (kg/m^3)**	2617
L/D ratio	0.47	**Permeability, k (mD)**	-			**Bulk mass, M (g)**	1062.6		
Water content (%)	0.12	**Porosity, n (%)**	0.32			**Bulk density, ρ (kg/m^3)**	2620		
Notes (4)									

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	1570		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	19/10/2020	**Time to failure (s)**	66			**Temperature (ºC)**	22.0
F_{max} (kN)	100.4	**T_0 (MPa)**	13.7	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

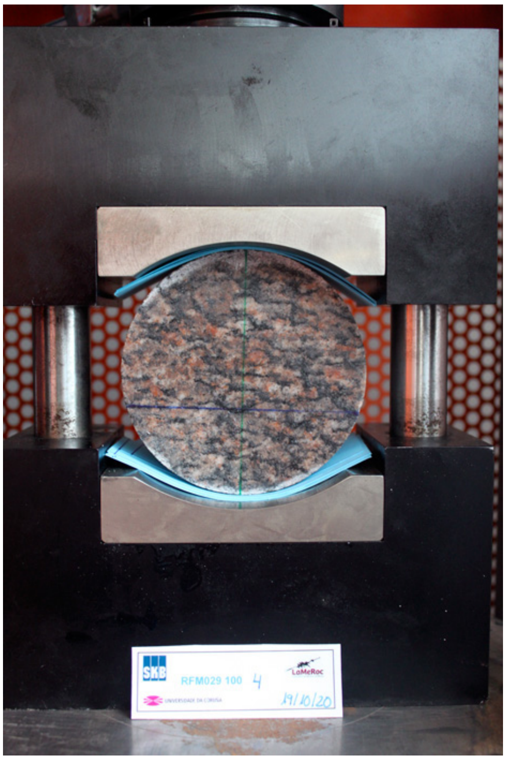

Figure 1. Sample before the test

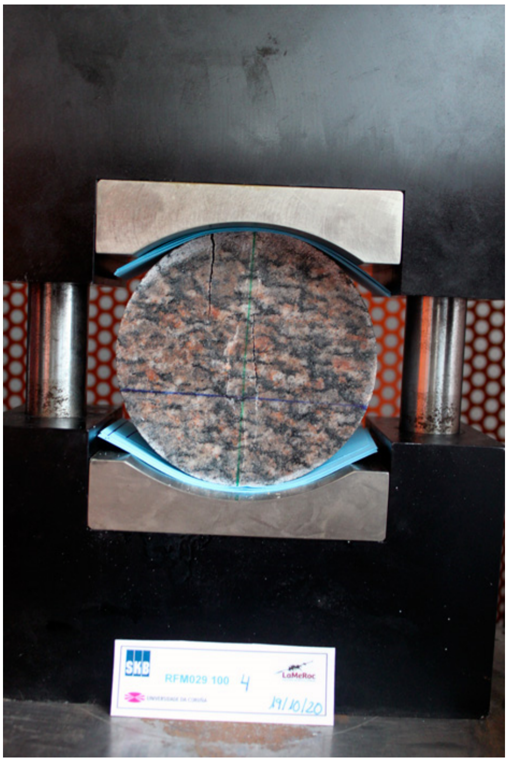

Figure 2. Sample after the test

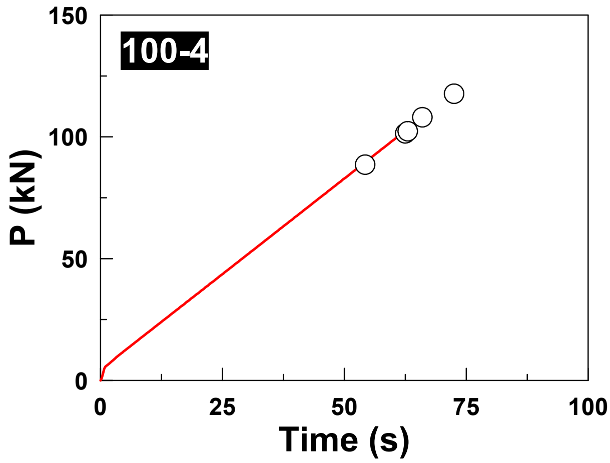

Figure 3. Load-time diagram of the test

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	-	**Specimen**		**Ref. LaMeRoc**	100_5
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	49.17	47.91	47.95	49.23	49.58	**Mean length, L (mm)**	48.77	**Dry mass, M_d (g)**	969.88
Diameter (mm)	98.38	98.77	98.42	98.48	98.73	**Mean diameter, D (mm)**	98.56	**Dry density, ρ_d (kg/m³)**	2607

L/D ratio	0.49	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	970.64
Water content (%)	0.08	**Porosity, n (%)**	0.20	**Bulk density, ρ (kg/m³)**	2609
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	1570		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	19/10/2020	**Time to failure (s)**	72.5	**Temperature (ºC)**	22.0		
F_{max} (kN)	109.7	**T_0 (MPa)**	15.6	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
	Static moduli	**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
	Dynamic moduli	**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

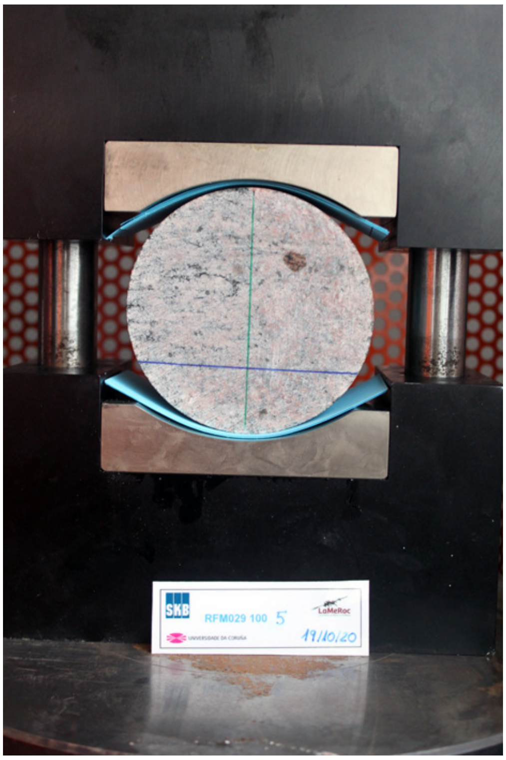

Figure 1. *Sample before the test*

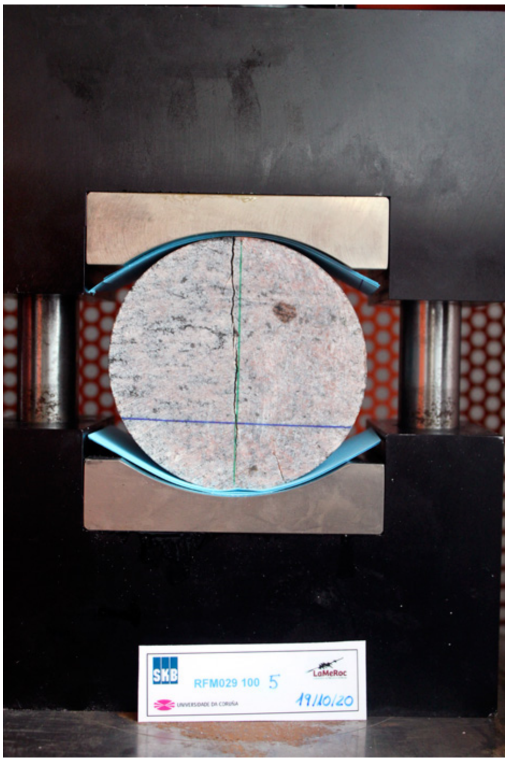

Figure 2. *Sample after the test*

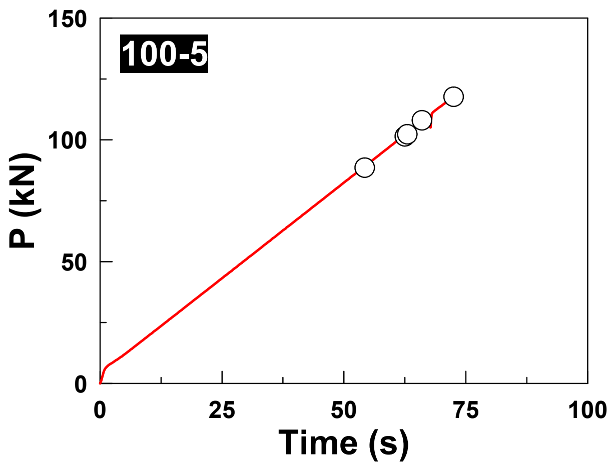

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements		
Project	Scale Effect of Intact Granite Rocks		
Company	Svensk Kärnbränslehantering AB		
Test type	BTS		
Report reference		**Report date**	
Notes (1)			

SAMPLE IDENTIFICATION

Core / Block ID	-	**Specimen**		**Ref. LaMeRoc**	100_6
Depth (m)	surface block	**Formation**		**Facies**	
Sampling date		**Location**	Forsmark (Sweden)	**Lithology**	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	**Date**		**Dimensional verification (Y/N)**	Y	**Date**	
Cutting (Y/N)	Y	**Date**		**Trimming (Y/N)**	Y	**Date**	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	44.37	44.09	44.33	44.59	44.82	**Mean length, L (mm)**	44.44	**Dry mass, M_d (g)**	893.29
Diameter (mm)	98.80	98.90	98.49	98.89	98.83	**Mean diameter, D (mm)**	98.78	**Dry density, ρ_d (kg/m^3)**	2623

L/D ratio	0.45	**Permeability, k (mD)**	-	**Bulk mass, M (g)**	894.25
Water content (%)	0.11	**Porosity, n (%)**	0.28	**Bulk density, ρ (kg/m^3)**	2626
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	**Force class (UNE-EN-7500)**	0.5	**Displacement class (ASTM E2309)**	A
Calibration date	09/09/2020	**Control mode (Force/Strain)**	Force		
LDT model	-	**Loading rate (N/s)**	1570		
Strain gauge type	-	**Strain rate (s^{-1})**	-		
Load cell	AEP TC4 50 ton	**Shear rate (mm/s)**	-		
Notes (5)					

TEST RESULTS

Test date	19/10/2020	**Time to failure (s)**	54.25	**Temperature (ºC)**	22.0		
F_{max} (kN)	81.4	**T_0 (MPa)**	12.8	**$T_{0,50}$ (MPa)**	-		
UCS (MPa)	-	**$UCS_{1:2}$ (MPa)**	-	**UCS_{50} (MPa)**	-	**σ_{CI} (MPa)**	-
Static moduli		**$E_{50\%}$ (GPa)**	-	**$\nu_{50\%}$**	-	**σ_{CD} (MPa)**	-
ϕ_{dry} (º)	-	**c'_{dry} (kPa)**	-	**ϕ_{wet} (º)**	-	**c'_{wet} (kPa)**	-
V_P (km/s)	-	**V_{S1} (km/s)**	-	**V_{S2} (km/s)**	-	**V_S (km/s)**	-
Dynamic moduli		**E_{dyn} (GPa)**	-	**ν_{dyn}**	-	**V_P/V_S**	-
		G_{dyn} (GPa)	-	**K_{dyn} (GPa)**	-		
Notes (6)							

PICTURES AND PLOTS

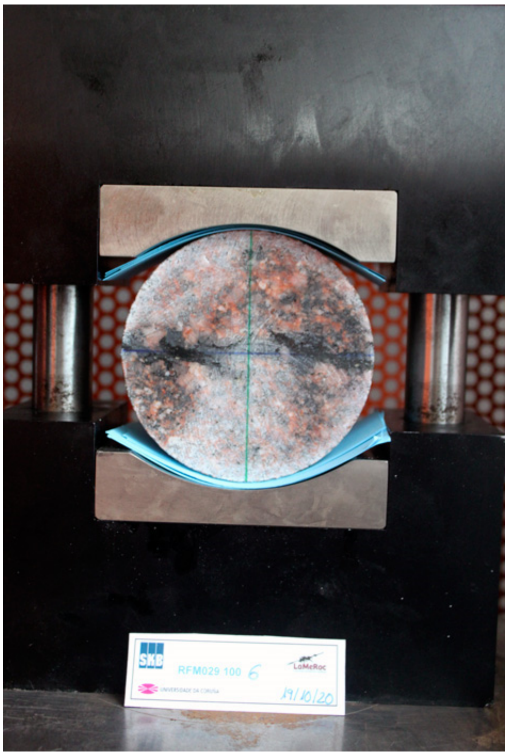

Figure 1. *Sample before the test*

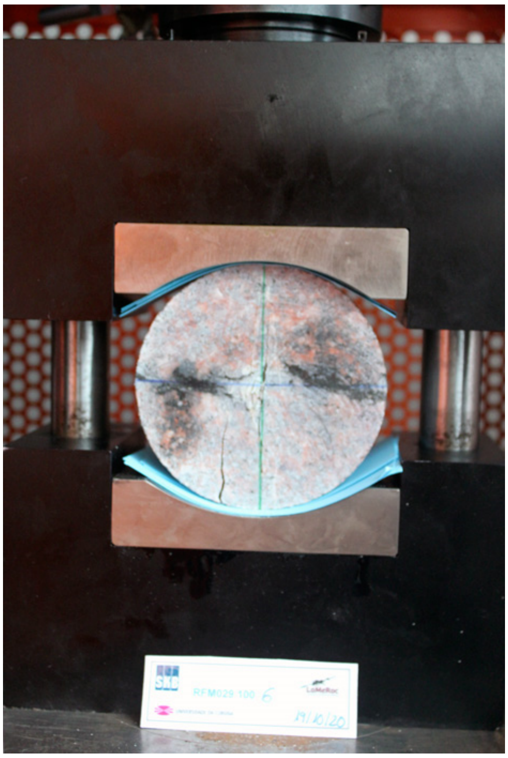

Figure 2. *Sample after the test*

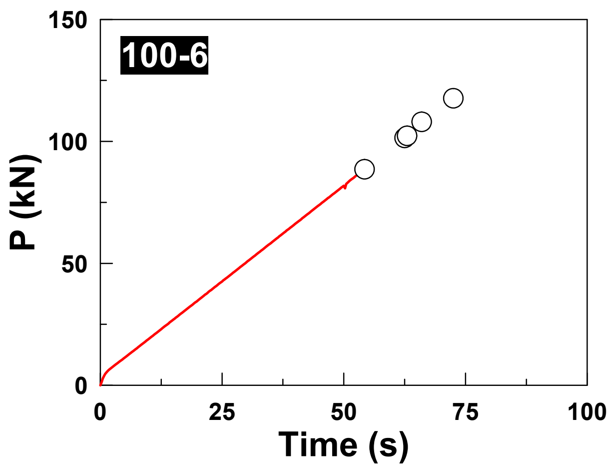

Figure 3. *Load-time diagram of the test*

Test Report Data Sheet

PROJECT

Title	Scale Effect of Intact Granite Rocks through UCS Testing and Geophysical Measurements
Project	Scale Effect of Intact Granite Rocks
Company	Svensk Kärnbränslehantering AB
Test type	BTS
Report reference		Report date	
Notes (1)	

SAMPLE IDENTIFICATION

Core / Block ID	-	Specimen		Ref. LaMeRoc	100_7
Depth (m)	surface block	Formation		Facies	
Sampling date		Location	Forsmark (Sweden)	Lithology	RFM029
Notes (2)					

SAMPLE PREPARATION

Overcoring (Y/N)	Y	Date		Dimensional verification (Y/N)	Y	Date	
Cutting (Y/N)	Y	Date		Trimming (Y/N)	Y	Date	
Notes (3)							

SAMPLE PROPERTIES

	1	2	3	4	5				
Length (mm)	45.58	45.62	45.22	45.48	45.66	Mean length, L (mm)	45.51	Dry mass, M_d (g)	910.59
Diameter (mm)	98.60	98.80	98.81	98.78	98.49	Mean diameter, D (mm)	98.70	Dry density, ρ_d (kg/m^3)	2615

L/D ratio	0.46	Permeability, k (mD)	-	Bulk mass, M (g)	912.01
Water content (%)	0.16	Porosity, n (%)	0.41	Bulk density, ρ (kg/m^3)	2619
Notes (4)					

EQUIPMENT

Device	Servosis 50 ton	Force class (UNE-EN-7500)	0.5	Displacement class (ASTM E2309)	A
Calibration date	09/09/2020	Control mode (Force/Strain)	Force		
LDT model	-	Loading rate (N/s)	1570		
Strain gauge type	-	Strain rate (s^{-1})	-		
Load cell	AEP TC4 50 ton	Shear rate (mm/s)	-		
Notes (5)					

TEST RESULTS

Test date	19/10/2020	Time to failure (s)	63.25	Temperature (ºC)	22.0		
F_{max} (kN)	95.0	T_0 (MPa)	14.5	$T_{0,50}$ (MPa)	-		
UCS (MPa)	-	$UCS_{1:2}$ (MPa)	-	UCS_{50} (MPa)	-	σ_{CI} (MPa)	-
Static moduli		$E_{50\%}$ (GPa)	-	$\nu_{50\%}$	-	σ_{CD} (MPa)	-
ϕ_{dry} (º)	-	c'_{dry} (kPa)	-	ϕ_{wet} (º)	-	c'_{wet} (kPa)	-
V_P (km/s)	-	V_{S1} (km/s)	-	V_{S2} (km/s)	-	V_S (km/s)	-
Dynamic moduli		E_{dyn} (GPa)	-	ν_{dyn}	-	V_P/V_S	-
		G_{dyn} (GPa)	-	K_{dyn} (GPa)	-		
Notes (6)							

PICTURES AND PLOTS

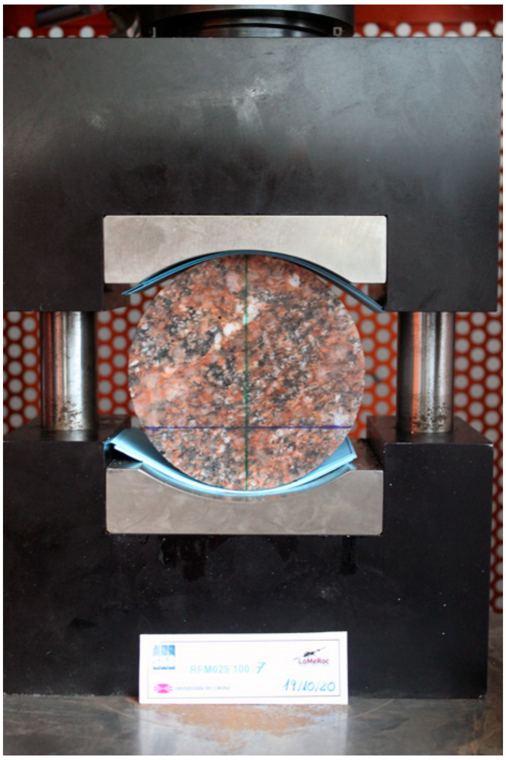

Figure 1. *Sample before the test*

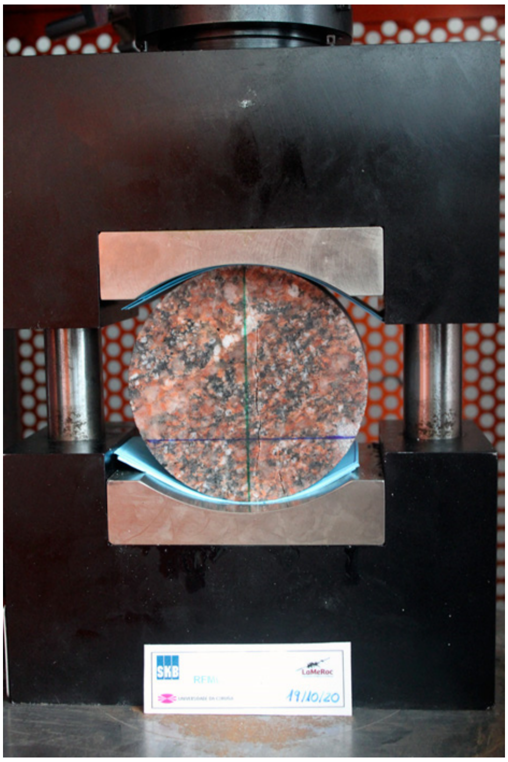

Figure 2. *Sample after the test*

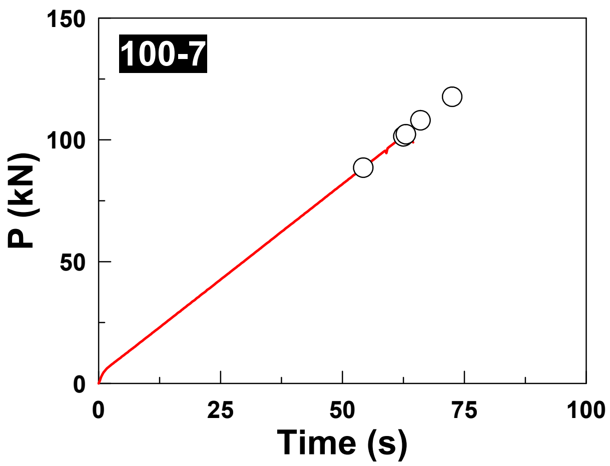

Figure 3. *Load-time diagram of the test*

Arkitektkopia AB, Bromma, 2021

SKB is responsible for managing spent nuclear fuel and radioactive waste produced by the Swedish nuclear power plants such that man and the environment are protected in the near and distant future.

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