


<div><div><b>SOGEO</b><sup>®</sup> <small>S.R.L.</small> INDAGINI GEOGNOSTICHE ED AMBIENTALI Via S. Potito n. 43 - 48022 S. Potito di LUGO (RA) Tel. 054522042 - Fax 054534443 - E-mail: <a href="mailto:sogeo@sogeo-srl.com">sogeo@sogeo-srl.com</a> Concessione Ministero Infrastrutture e Trasporti - Settore C Decr. n. 005754 del 05/07/2010</div></div>		COMMITTENTE: Venturi Ambiente		SOND.N°: S.1		PROF.(m): 30.00			
		CANTIERE: Anzola dell'Emilia (BO)		QUOTA (m): p.d.c.					
		PERFORATRICE: Ellettari EK200/STR		LATITUDINE (°):					
		METODO PERFORAZ.: Distruzione di nucleo		LONGITUDINE (°):					
		RIVESTIMENTO: Ø 127 mm		ATTREZZO PERFORAZ.: Trilama		DATA INIZ-FINE: 25/05/2023-25/05/2023			
PIEZOMETRO: Installato piezometro Norton Ø 3" a -30.00 m dal p.d.c. (fessurato da -3.0 a -30.0 m)				SCALA: 1:100					
RIF.PREV.N°: 129-22		CERTIFICATO N°: C23-045-1		RAPPORTO N°: -----		DATA DI EMISSIONE: 26/05/2023		PAGINA N°: 1 di 1	

Scala 1:100	P.P. I [daN/cm²]	Vane Test [daN/cm²]	Profondita'	Stratigrafia	Descrizione	Campioni	Campioni Rim.	S.P.T. [n. colpi] P.A.	Falda	Pz.Norton
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15					Perforazione a distruzione di nucleo					
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30			30.00							

Lo Sperimentatore

Il Direttore del Laboratorio

**SOGEO**<sup>S.R.L.</sup>

INDAGINI GEOGNOSTICHE ED AMBIENTALI  
Via S. Potito n. 43 - 48022 S. Potito di LUGO (RA)  
Tel. 054522042 - Fax 054534443 - E-mail: [sogeo@sogeo-srl.com](mailto:sogeo@sogeo-srl.com)  
Concessione Ministero Infrastrutture e Trasporti - Settore C  
Decr. n. 005754 del 05/07/2010

# SCHEMA INSTALLAZIONE STRUMENTI

**Piezometro "Norton" (Norm. rif. A.G.I. 1977)**

COMMITTENTE: Venturi Ambiente

SONDAGGIO N°: S.1

CANTIERE: Anzola dell' Emilia (BO)

RIF. PREV. N: 129-22

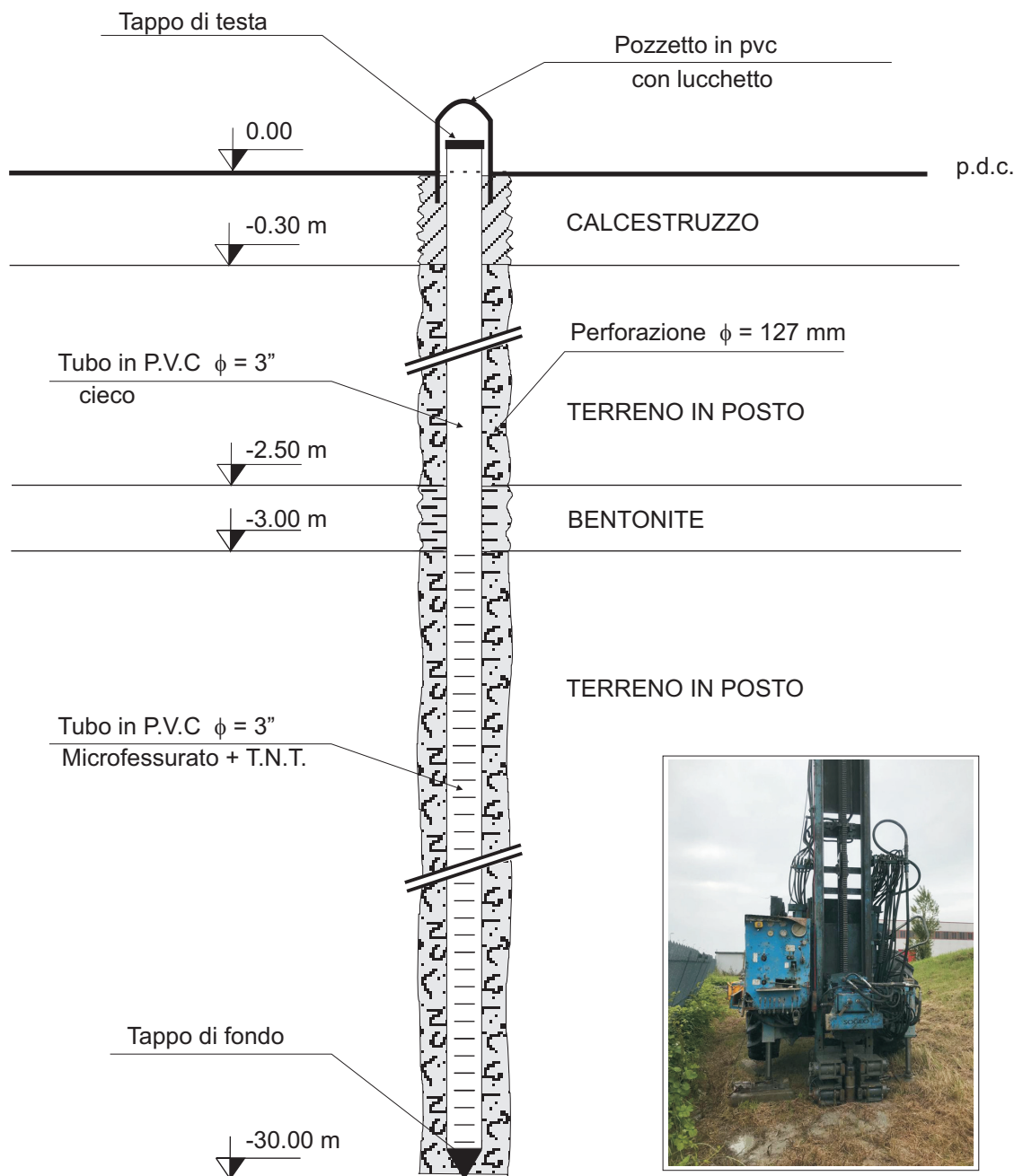
LOCALITA': Anzola dell' Emilia (BO)

DATA DI ESECUZIONE: 25/05/2023

N° CERTIFICATO: C23-045-1


N° RAPPORTO: -----

DATA DI EMISSIONE: 26/05/2023



N.B: SCHEMA NON IN SCALA

Lo Sperimentatore	Note ed osservazioni: Eseguito lo spurgo del piezometro a fine installazione. Livello acqua rilevato a -2.50 m dal p.d.c. (In risalita).	Il Direttore del Laboratorio

 <div><b>SOGEO</b><sup>®</sup> S.R.L. <small>INDAGINI GEOGNOSTICHE ED AMBIENTALI Via S. Potito n. 43 - 48022 S. Potito di LUGO (RA) Tel. 054522042 - Fax 054534443 - E-mail: sogeo@sogeo-srl.com Concessione Ministero Infrastrutture e Trasporti - Settore C Decr. n. 005754 del 05/07/2010</small></div>	COMMITTENTE: Venturi Ambiente			SOND.N°: S.2	PROF.(m): 30.00
	CANTIERE: Anzola dell'Emilia (BO)			QUOTA (m): p.d.c.	
	PERFORATRICE: Ellettari EK200/STR			LATITUDINE (°):	
	METODO PERFORAZ.: Distruzione di nucleo			LONGITUDINE (°):	
	RIVESTIMENTO: Ø 127 mm			ATTREZZO PERFORAZ.: Trilama	
PIEZOMETRO: Installato piezometro Norton Ø 3" a -30.00 m dal p.d.c. (fessurato da -3.0 a -30.0 m)				SCALA: 1:100	
RIF.PREV.N°: 129-22		CERTIFICATO N°: C23-045-2	RAPPORTO N°: -----	DATA DI EMISSIONE: 26/05/2023	PAGINA N°: 1 di 1

Scala 1:100	P.P. I [daN/cm²]	Vane Test [daN/cm²]	Profondita'	Stratigrafia	Descrizione	Campioni	Campioni Rim.	S.P.T. [n. colpi] P.A.	Falda	Pz.Norton
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15					Perforazione a distruzione di nucleo					
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30			30.00							

Lo Sperimentatore

Il Direttore del Laboratorio

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Decr. n. 005754 del 05/07/2010

# SCHEMA INSTALLAZIONE STRUMENTI

**Piezometro "Norton" (Norm. rif. A.G.I. 1977)**

COMMITTENTE: Venturi Ambiente

SONDAGGIO N°: S.2

CANTIERE: Anzola dell' Emilia (BO)

RIF. PREV. N: 129-22

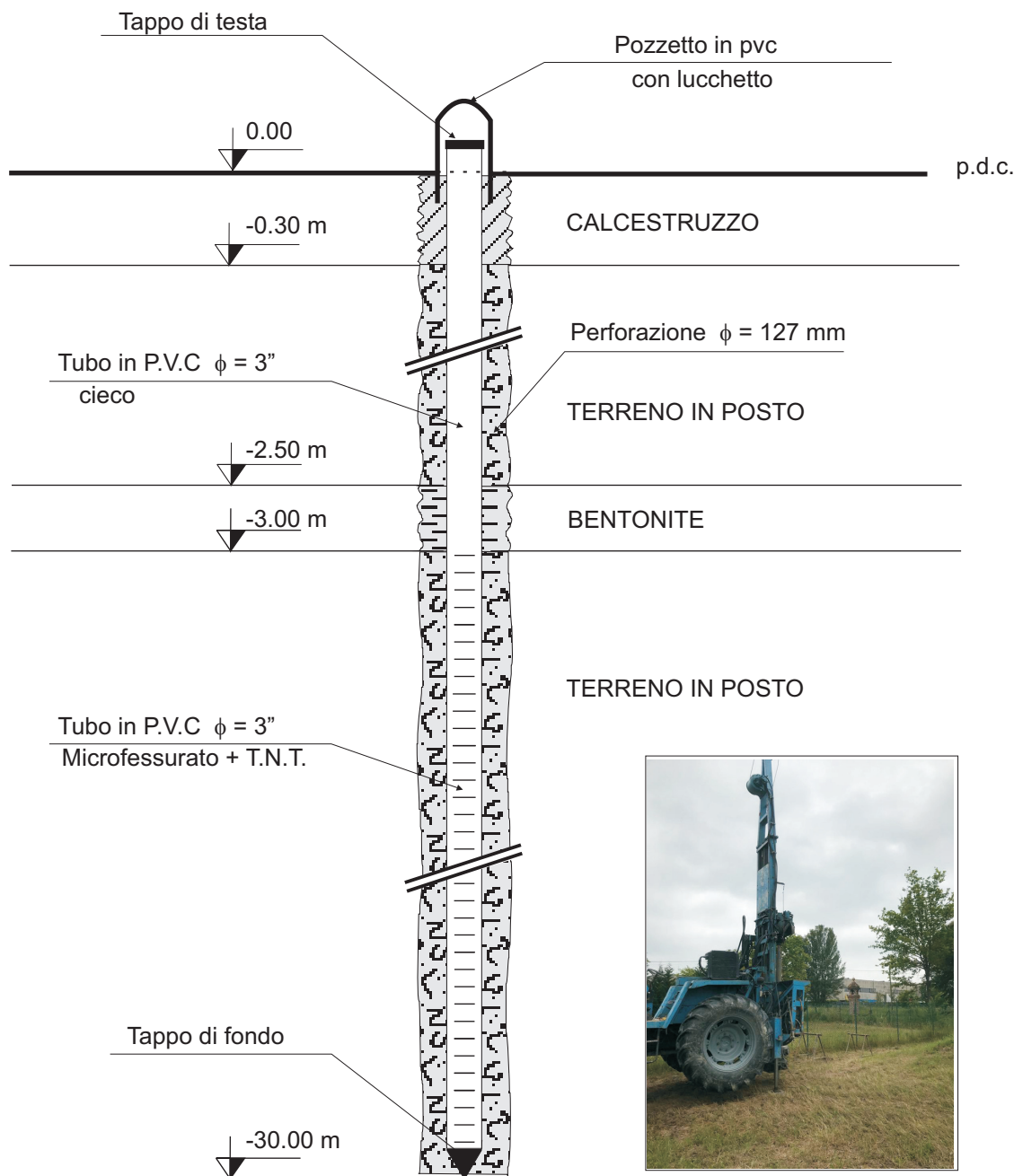
LOCALITA': Anzola dell' Emilia (BO)

DATA DI ESECUZIONE: 25/05/2023

N° CERTIFICATO: C23-045-2


N° RAPPORTO: -----

DATA DI EMISSIONE: 26/05/2023



N.B: SCHEMA NON IN SCALA

Lo Sperimentatore	Note ed osservazioni: Eseguito lo spurgo del piezometro a fine installazione. Livello acqua rilevato a -2.50 m dal p.d.c. (In risalita).	Il Direttore del Laboratorio

<div><div><div>SOGEO</div><div>S.R.L.</div><div>INDAGINI GEOGNOSTICHE ED AMBIENTALI</div><div>Via S. Potito n. 43 - 48022 S. Potito di LUGO (RA)</div><div>Tel. 054522042 - Fax 054534443 - E-mail: sogeo@sogeo-srl.com</div><div>Concessione Ministero Infrastrutture e Trasporti - Settore C</div><div>Decr. n. 005754 del 05/07/2010</div></div></div>	COMMITTENTE: Venturi Ambiente			SOND.N°: S.3	PROF.(m): 30.00
	CANTIERE: Anzola dell'Emilia (BO)			QUOTA (m): p.d.c.	
	PERFORATRICE: Ellettari EK200/STR			LATITUDINE (°):	
	METODO PERFORAZ.: Carotaggio continuo			LONGITUDINE (°):	
RIVESTIMENTO: Ø 127 mm		ATTREZZO PERFORAZ.: Carotiere semplice Ø 101 mm			DATA INIZ-FINE: 24/05/2023-24/05/2023
PIEZOMETRO: Installato piezometro Norton Ø 3" a -30.00 m dal p.d.c. (fessurato da -3.0 a -30.0 m)					SCALA: 1:100
RIF.PREV.N°: 129-22	CERTIFICATO N°: C23-045-3	RAPPORTO N°: -----	DATA DI EMISSIONE: 26/05/2023		PAGINA N°: 1 di 1

Scala 1:100	P.P. I [daN/cm²]	Vane Test [daN/cm²]	Profondita'	Straigrafia	Descrizione	Campioni	Campioni Rim.	S.P.T. [n. colpi] P.A.	Falda	Pz.Norton
1			0.20		Asfalto					
2			1.40		Materiale di riporto sabbioso ghiaioso di colore grigio-marrone					
3	0.7	0.30			Limo sabbioso, debolmente argilloso, di colore marrone-grigio					
4	0.6	0.30								
5	0.9	0.50								
6	1.3	0.60	4.10		Limo argilloso, debolmente sabbioso, di colore grigio-verde con zonature marroni e con tracce scure di sostanza organica	4.20				
7	2.4	1.20	4.20		Campione indisturbato	C.I.1				
8	1.4	0.90	4.70		Limo argilloso, debolmente sabbioso, di colore grigio-verde con zonature marroni e con tracce scure di sostanza organica	4.70				
9	1.0	0.40			Argilla limosa passante ad argilla con limo, di colore grigio-verde, con zonature marroni e saltuari calcinelli					
10	1.4	0.80	6.20							
11	1.4	0.70								
12	1.9	1.10								
13	1.5	0.70			Alternanza di livelli decimetrici di argilla limosa e di livelli di sabbia limosa, di colore grigio-marro-ne					
14	2.3	1.10								
15	1.5	0.70								
16	1.2	0.60			Campione indisturbato					
17	1.6	0.80								
18	1.1	0.60	11.70		Alternanza di livelli decimetrici di argilla limosa e di livelli di sabbia limosa, di colore grigio-marro-ne	12.00				
19			12.00		Campione indisturbato	C.I.2				
20			12.50		Alternanza di livelli decimetrici di argilla limosa e di livelli di sabbia limosa, di colore grigio-marro-ne	12.50				
21	1.6	0.80			Argilla limosa passante a limo e argilla, debolmente sabbioso, di colore grigio					
22	0.5	0.20	14.90							
23	1.1	0.80								
24	1.0	0.60			Argilla limosa passante ad argilla debolmente limosa, di colore grigio, con scarsi e saltuari calci-nelli					
25	1.0	0.70								
26	1.3	0.80	18.00							
27	1.7	0.80								
28	2.6	1.40			Argilla limosa passante ad argilla con limo, con intercalati livelli centimetrici sabbiosi-limosi. Co-lore grigio con zonature marroni					
29	1.7	0.80								
30	1.7	0.80								
31	2.4	1.20			Argilla limosa passante ad argilla con limo, con intercalati livelli centimetrici sabbiosi-limosi. Co-lore grigio con zonature marroni					
32	2.4	1.20								
33	2.2	1.00								
34	2.0	0.90			Argilla limosa passante ad argilla con limo, con intercalati livelli centimetrici sabbiosi-limosi. Co-lore grigio con zonature marroni					
35	2.1	0.90								
36	2.4	1.40	29.40							
37			30.00							

Lo Sperimentatore

Il Direttore del Laboratorio

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Decr. n. 005754 del 05/07/2010

# SCHEMA INSTALLAZIONE STRUMENTI

**Piezometro "Norton" (Norm. rif. A.G.I. 1977)**

COMMITTENTE: Venturi Ambiente

SONDAGGIO N°: S.3

CANTIERE: Anzola dell' Emilia (BO)

RIF. PREV. N: 129-22

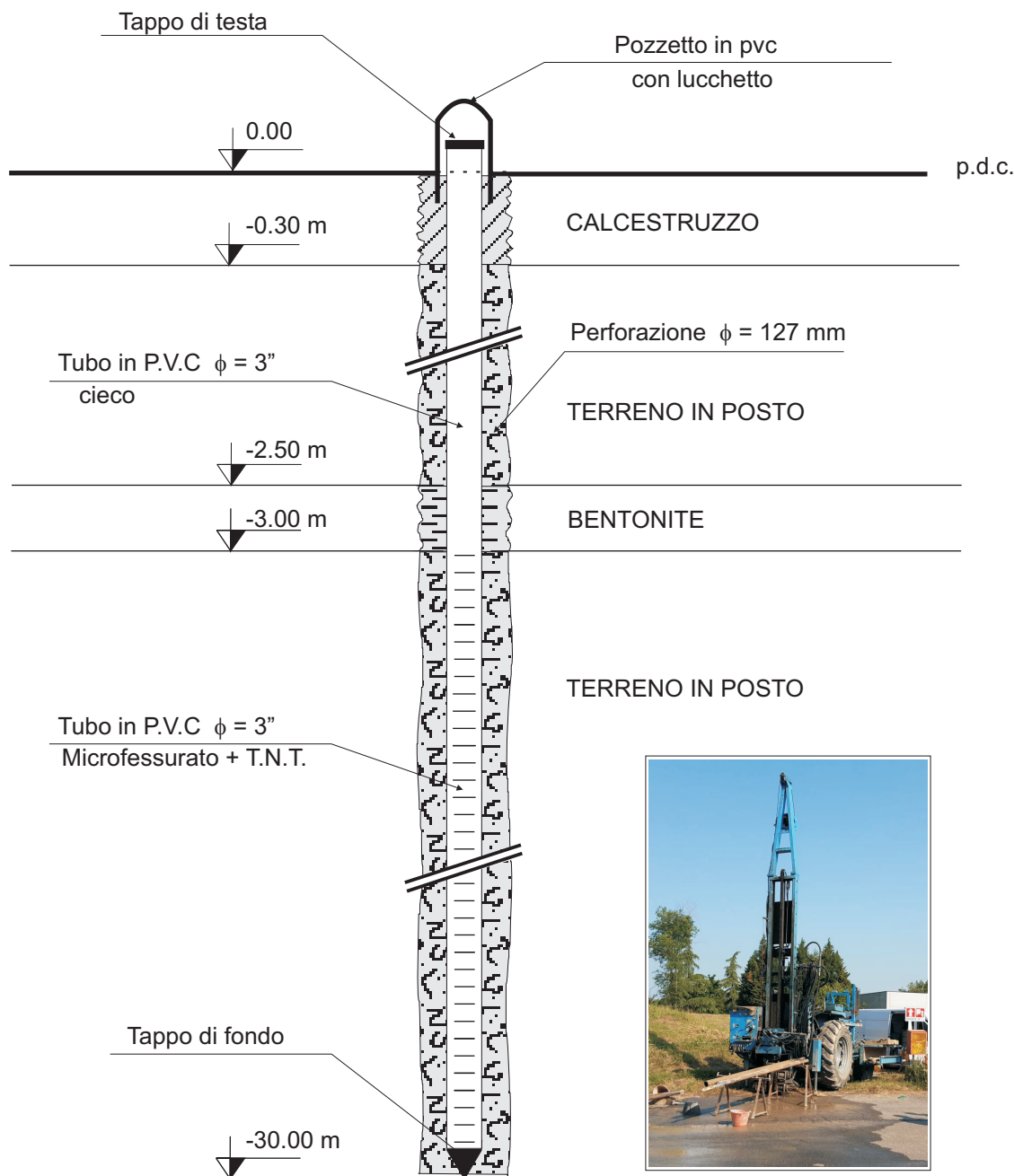
LOCALITA': Anzola dell' Emilia (BO)

DATA DI ESECUZIONE: 24/05/2023

N° CERTIFICATO: C23-045-3

N° RAPPORTO: -----

DATA DI EMISSIONE: 26/05/2023



N.B: SCHEMA NON IN SCALA

Lo Sperimentatore	Note ed osservazioni: Eseguito lo spurgo del piezometro a fine installazione. Livello acqua rilevato a -2.50 m dal p.d.c. (In risalita).	Il Direttore del Laboratorio





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**COMMITTENTE:** Venturi Ambiente  
**RIF. N° :** 129-22

**LOCALITA':** Anzola dell'Emilia (BO)  
**ALLEGATO A:** C23-045-3

**SONDAGGIO N:S.3**  
**DATA:** 24/05/2023



Cassa 2 da -5.0 a -10.0 m



Cassa 4 da -15.0 a -20.0 m



Cassa 1 da 0.0 a -5.0 m



Cassa 3 da -10.0 a -15.0 m





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INDAGNI GEOLOGICHE ED AMBIENTALI  
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**COMMITTENTE:** Venturi Ambiente  
**RIF. N° :** 129-22

**LOCALITA':** Anzola dell'Emilia (BO)  
**ALLEGATO A:** C23-045-3

**SONDAGGIO N: S.3**  
**DATA:** 24/05/2023



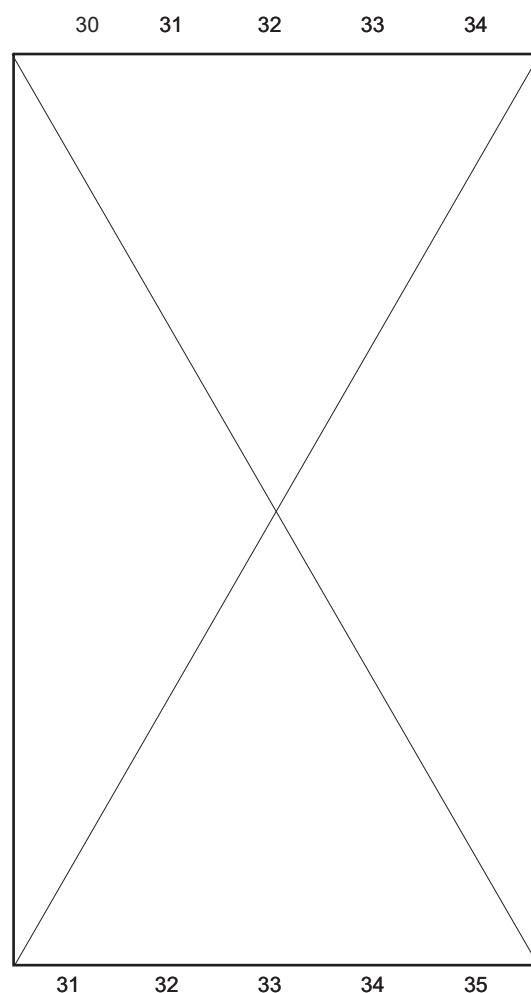
Cassa 6 da -25.0 a -30.0 m



Posizionamento



Cassa 5 da -20.0 a -25.0 m



Cassa 7 da -30.0 a -35.0 m



## VENTURI ANZOLA, HV1

Instrument: TEB-0624/01-21

Data format: 32 bit

Full scale [mV]: 89

Start recording: 24/05/2023 08:47:18 End recording: 24/05/2023 09:07:18

Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN

GPS data not available

Trace length: 0h20'00". Analyzed 88% trace (manual window selection)

Sampling rate: 128 Hz

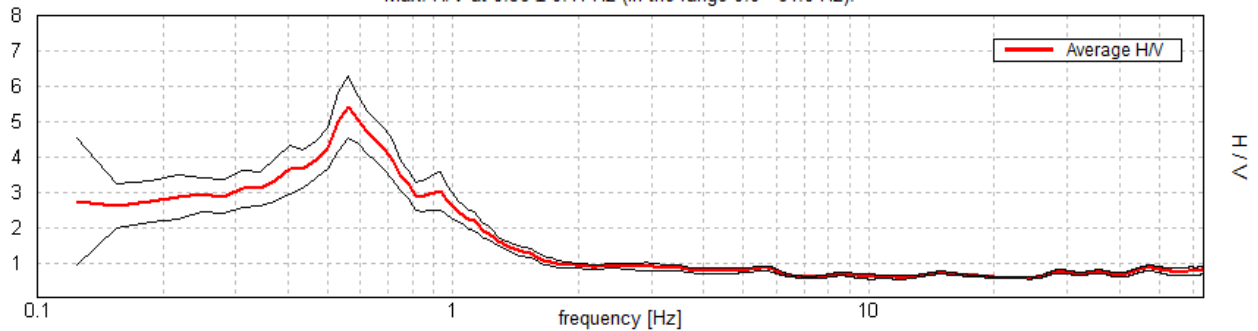
Window size: 20 s

Smoothing type: Triangular window

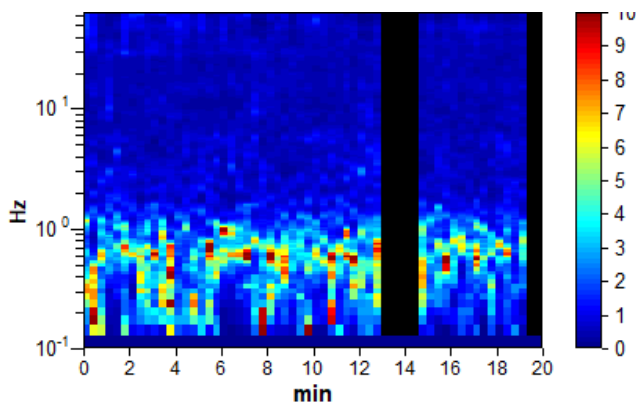
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

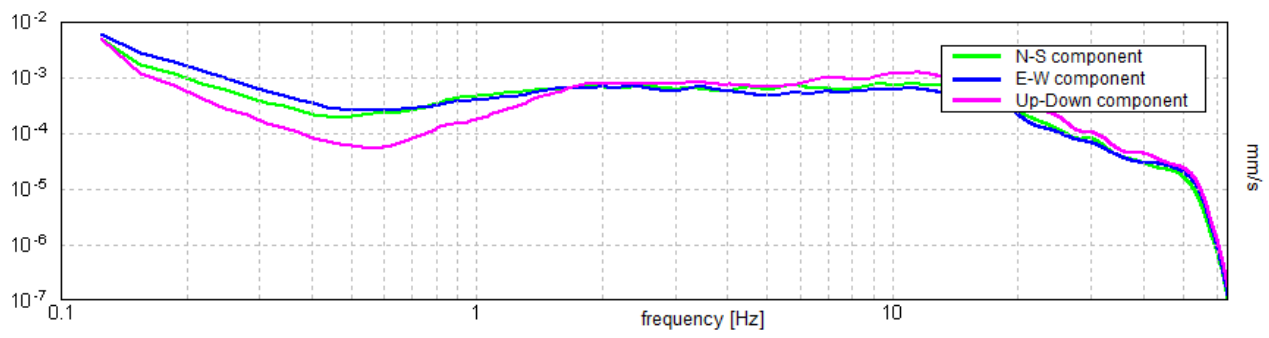
Max. H/V at  $0.56 \pm 0.11$  Hz (in the range 0.0 - 64.0 Hz).



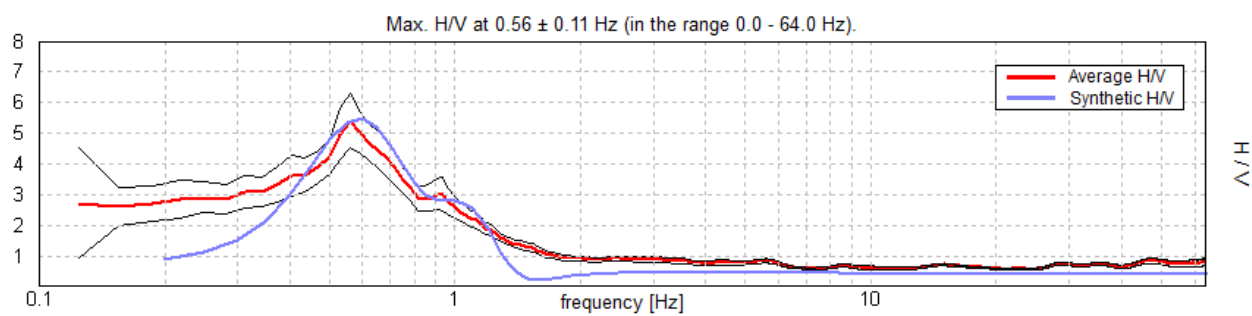
### H/V TIME HISTORY



# SINGLE COMPONENT SPECTRA

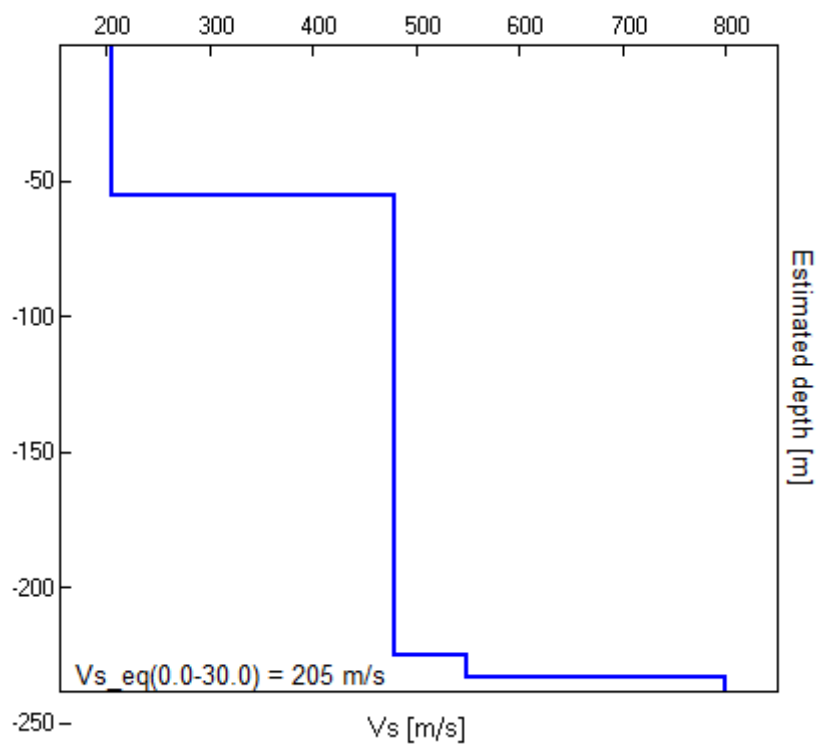


# EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
55.00	55.00	205	0.42
225.00	170.00	480	0.42
233.00	8.00	550	0.42
inf.	inf.	800	0.42

$Vs_{eq}(0.0-30.0) = 205$  m/s





[According to the SESAME, 2005 guidelines. **Please read carefully the *Grill* manual before interpreting the following tables.**]

**Max. H/V at  $0.56 \pm 0.11$  Hz (in the range 0.0 - 64.0 Hz).**

### Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$0.56 > 0.50$	OK	
$n_c(f_0) > 200$	$596.3 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 28 times	OK	

### Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$	0.156 Hz	OK	
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	1.0 Hz	OK	
$A_0 > 2$	$5.40 > 2$	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.20176  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.11349 < 0.08438$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.8875 < 2.0$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

### Threshold values for $\sigma_f$ and $\sigma_A(f_0)$

Freq. range [Hz]	$< 0.2$	$0.2 - 0.5$	$0.5 - 1.0$	$1.0 - 2.0$	$> 2.0$
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

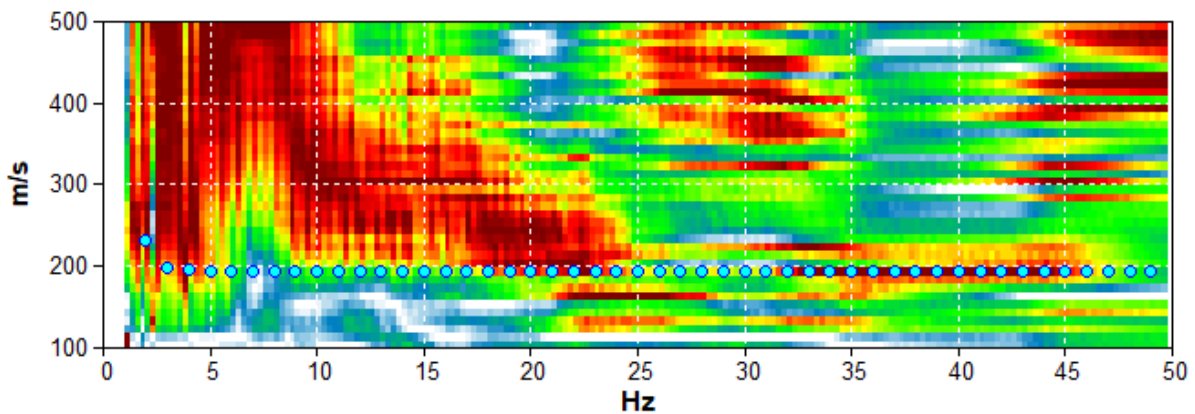
## VENTURI ANZOLA, RE. MI. 1

Start recording: 24/05/2023 08:47:18 End recording: 24/05/2023 09:07:18  
Trace length: 0h20'00". Analyzed 88% trace (manual window selection)  
Sampling rate: 128 Hz

Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN

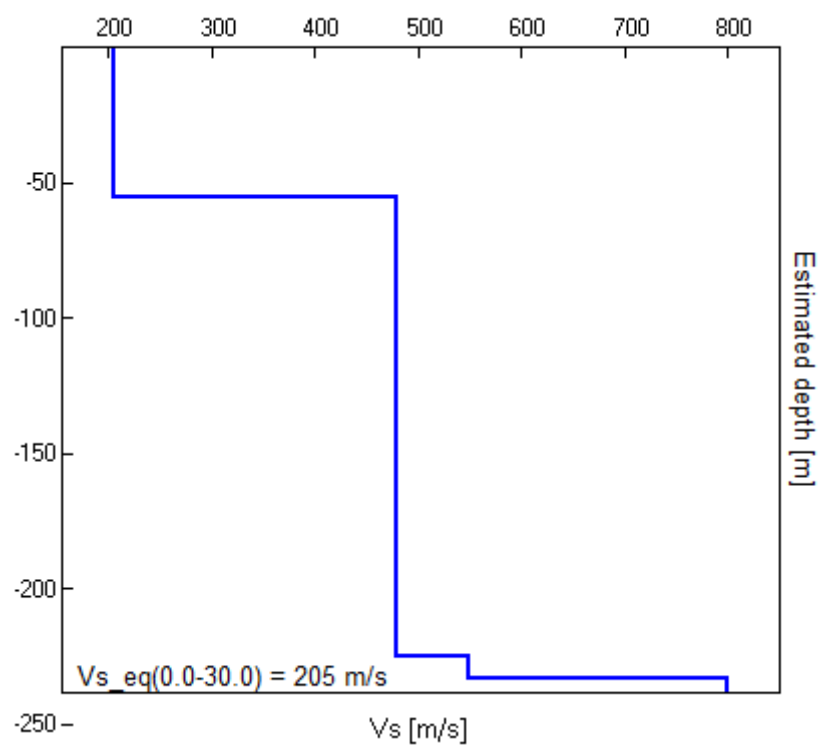
Array geometry (x): 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 m.

### MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE







Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
55.00	55.00	205	0.42
225.00	170.00	480	0.42
233.00	8.00	550	0.42
inf.	inf.	800	0.42





$$V_{s\_eq}(0.0-30.0) = 205 \text{ m/s}$$





<div><div><div>GEOTEAS.r.l.</div><div>AZIENDA CON SISTEMA DI GESTIONE QUALITA' UNI EN ISO 9001:2015 CERTIFICATO DA CERTIQUALITY</div></div></div>	CERTIFICATO DI PROVA TEST REPORT		2639	23.984	000
	pagine del documento - document pages				
	9				
Verbale - Acceptance report Committente - Commissioner Località - Locality Cantiere - Investigation site		2639 SOGEO SRL ANZOLA DELL'EMILIA (BO) VENTURI			
DATI IDENTIFICATIVI DEI CAMPIONI E PROVE ESEGUITE Samples identification and performed tests					
Sondaggio Borehole	Campione Sample	Profondità Depth	Prove eseguite - Performed tests		
S3	C1	4.20- 4.70m	Peso di volume ed umidità naturale, peso specifico dei grani, taglio diretto, CD, in scatola di Casagrande.		
S3	C2	12.00- 12.50m	Peso di volume ed umidità naturale, peso specifico dei grani, taglio diretto, CD, in scatola di Casagrande.		
Note - Remarks:					
<p>Il nostro laboratorio esegue le prove commissionate secondo le norme di riferimento riportate su ogni certificato; il laboratorio segue inoltre le raccomandazioni contenute nella norma UNI EN 17025 "Requisiti generali per la competenza dei laboratori di prova e taratura". Questi risultati sono per uso esclusivo del cliente per il quale sono stati ottenuti. Essi sono applicabili solamente ai campioni testati e non sono indicativi di campioni apparentemente simili. These results are for the exclusive use of the client for whom they were obtained. They apply only to the tested samples and are not</p>					
Via della Tecnica 57/A4 - 40068 San Lazzaro di Savena (BO) Tel. +39 051 6255377; fax +39 051 4998378 e-mail laboratorio.geotea@database.it Autorizzazione del Consiglio Superiore dei Lavori Pubblici Ministero Infrastrutture e Trasporti - Settore Terre					

<div><div><div>GEOTEAs.r.l.</div><div><div>AZIENDA CON SISTEMA DI GESTIONE QUALITA' UNI EN ISO 9001:2015 CERTIFICATO DA CERTIQUALITY</div></div></div></div>	<div>PESO DI VOLUME CON FUSTELLA TARATA</div> <div>Determination of bulk and dry density of fine-grained soil with sampling tube</div> <div>Normativa di riferimento: UNI CEN ISO/TS 17892-2</div> <div>Technical specification</div>	
	<div>Certificato - Test report</div> <div>Verbale - Acceptance report</div> <div>Committente - Commissioner</div> <div>Località - Locality</div> <div>Cantiere - Site</div> <div>Sondaggio - Borehole</div> <div>Campione - Sample</div> <div>Profondità - Depth</div> <div>Data ricevimento - Receiving date</div> <div>Data inizio prove - Test starting date</div> <div>Data fine prove - Test ending date</div> <div>Data certificazione - Report date</div> <div>Data apertura campione - Sample opening date</div> <div>Classe campione - Sample quality</div>	<div>2639- 23.984- 001</div> <div>2639</div> <div>SOGEO SRL</div> <div>ANZOLA DELL'EMILIA (BO)</div> <div>VENTURI</div> <div>S3</div> <div>C1</div> <div>4.20- 4.70m</div> <div>01/06/2023</div> <div>01/06/2023</div> <div>09/06/2023</div> <div>12/06/2023</div> <div>01/06/2023</div> <div>Q4</div>
	<div>Massa tara (g) - Tara weight</div> <div>Massa campione umido + tara (g)</div> <div>Moist specimen + tara</div> <div>Massa campione secco + tara (g)</div> <div>Dried specimen + tara</div> <div>Volume fustella tarata (cm³)</div> <div>Sampling tube volume</div>	<div>71.67</div> <div>100.10</div> <div></div> <div>93.74</div> <div></div> <div>14.88</div>
	<div>Umidità naturale (%) - Water content</div> <div>Massa volumica umida (kg/m³) - Bulk density</div> <div>Massa volumica secca (kg/m³) - Dry density</div>	<div>28.82</div> <div>1910.10</div> <div>1482.80</div>
<div>Note - Remarks</div>		
<div>Direttore</div> <div>Manager</div>	<div>Sperimentatore</div> <div>Technician</div>	
<div>Via della Tecnica 17/A4 - 40068 San Lazzaro di Savena (BO)</div> <div>Tel. +39 051 6255377; fax +39 051 4998378</div> <div>e-mail laboratorio.geotea@database.it</div> <div>Autorizzazione del Consiglio Superiore dei Lavori Pubblici</div> <div>Ministero Infrastrutture e Trasporti - Settore Terre</div>		
<div>IOP DE 3.5 - MOD PROD 11 B6 REV2</div>		

<div><div><div>GEOTEA s.r.l.</div><div><div>AZIENDA CON SISTEMA DI GESTIONE QUALITA' UNI EN ISO 9001:2015 CERTIFICATO DA CERTIQUALITY</div></div></div></div>	<div>PESO SPECIFICO DEI GRANI</div> <div>PARTICLE DENSITY - PYCNOMETER METHOD</div> <div>Normativa di riferimento: UNI CEN ISO/TS 17892-3</div> <div>Technical specification</div>	
	<div>Certificato - Test report</div> <div>Verbale - Acceptance report</div> <div>Committente - Commissioner</div> <div>Località - Locality</div> <div>Cantiere - Site</div> <div>Sondaggio - Borehole</div> <div>Campione - Sample</div> <div>Profondità - Depth</div> <div>Data ricevimento - Receiving date</div> <div>Data inizio prove - Test starting date</div> <div>Data fine prove - Test ending date</div> <div>Data certificazione - Report date</div> <div>Data apertura campione - Sample opening date</div> <div>Classe campione - Sample quality</div>	<div>2639- 23.984- 002</div> <div>2639</div> <div>SOGEO SRL</div> <div>ANZOLA DELL'EMILIA (BO)</div> <div>VENTURI</div> <div>S3</div> <div>C1</div> <div>4.20- 4.70m</div> <div>01/06/2023</div> <div>01/06/2023</div> <div>09/06/2023</div> <div>12/06/2023</div> <div>01/06/2023</div> <div>Q4</div>
	<div>Massa tara (g) - Tara weight</div> <div>Massa campione umido + tara (g)</div> <div>Moist specimen + tara</div> <div>Massa campione secco + tara (g)</div> <div>Dried specimen + tara</div> <div>Massa picnometro + campione (g) Pycnometer weight + dried specimen</div> <div>Massa picnometro + tappo + acqua (g)</div> <div>Pycnometer weight + plug + water</div> <div>Massa picn. + tappo + acqua + camp. (g)</div> <div>Pycnometer weight + plug + water + spec.</div> <div>Contentuto in acqua (%) - Water content</div> <div>Massa volumica umida kg/m³ - Bulk density</div> <div>Massa volumica secca (kg/m³)</div> <div>Dried bulk density</div> <div>Massa specifica dei grani (kg/m³)</div> <div>Particle density</div> <div>Indice dei vuoti - Void index</div> <div>Porosità (%) - Porosity</div> <div>Umidità di saturazione (%)</div> <div>Water saturation content</div> <div>Grado di saturazione (%) - Saturation degree</div>	<div>71.67</div> <div>100.10</div> <div>93.74</div> <div>123.45</div> <div>194.99</div> <div>232.54</div> <div>28.82</div> <div>1910.10</div> <div>1482.80</div> <div>2667.98</div> <div>0.80</div> <div>44.42</div> <div>29.96</div> <div>96.19</div>
	<div>Note - Remarks</div>	
<div>Direttore / Manager</div> <div></div>	<div>Sperimentatore / Technician</div> <div></div>	
<div>Via della Tecnica 5/A - 40068 San Lazzaro di Savena (BO)</div> <div>Tel. +39 051 6255377; fax +39 051 4998378</div> <div>e-mail laboratorio.geotea@database.it</div> <div>Autorizzazione del Consiglio Superiore dei Lavori Pubblici</div> <div>Ministero Infrastrutture e Trasporti - Settore Terre</div>		
<div>IOP DE 3.5 - MOD PROD 11 B25 REV2</div>		





# GEOTE s.r.l.

AZIENDA CON SISTEMA DI GESTIONE QUALITA' UNI EN ISO 9001:2015 CERTIFICATO DA CERTIQUALITY

## TAGLIO DIRETTO

### DIRECT SHEAR TEST

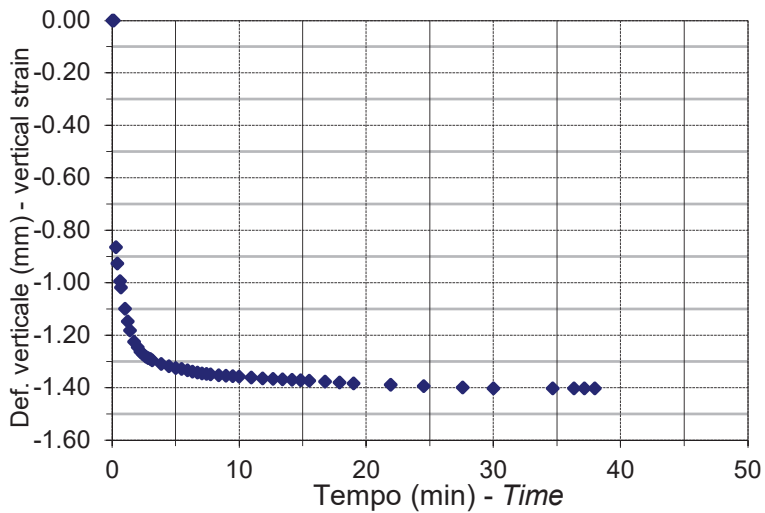
Normativa di riferimento: UNI CEN ISO/TS 17892-10

### Technical specification

Certificato - <i>Test report</i>	2639- 23.984- 003
Verbale - <i>Acceptance report</i>	2639
Committente - <i>Commissioner</i>	SOGEO SRL
Località - <i>Locality</i>	ANZOLA DELL'EMILIA (BO)
Cantiere - <i>Site</i>	VENTURI
Sondaggio - <i>Borehole</i>	<b>S3</b>
Campione - <i>Sample</i>	<b>C1</b>
Profondità - <i>Depth</i>	<b>4.20- 4.70m</b>
Data ricevimento - <i>Receiving date</i>	01/06/2023
Data inizio prove - <i>Test starting date</i>	01/06/2023
Data fine prove - <i>Test ending date</i>	09/06/2023
Data certificazione - <i>Report date</i>	12/06/2023
Data apertura campione - <i>Sample opening date</i>	01/06/2023
Classe del campione - <i>Sample quality</i>	Q4

Umidità iniziale - <i>Initial water content</i>	%	28.82		
Densità naturale iniziale - <i>Initial wet density</i>	kg/m <sup>3</sup>	1910.10		
Densità secca iniziale - <i>Initial dry density</i>	kg/m <sup>3</sup>	1482.80		
Provino - <i>Specimen id</i>	n°	1	2	3
Lato - <i>Specimen side</i>	mm	60.0	60.0	60.0
Altezza iniziale - <i>Initial specimen height</i>	mm	20.0	20.0	20.0
Velocità di taglio utilizzata - <i>Strain rate</i>	mm/min	0.006	0.006	0.006
Press. di consolidazione <i>Consolidation pressure</i>	kPa	98.1	196.1	294.2
Umidità finale - <i>Final water content</i>	%	29.15	29.00	29.00

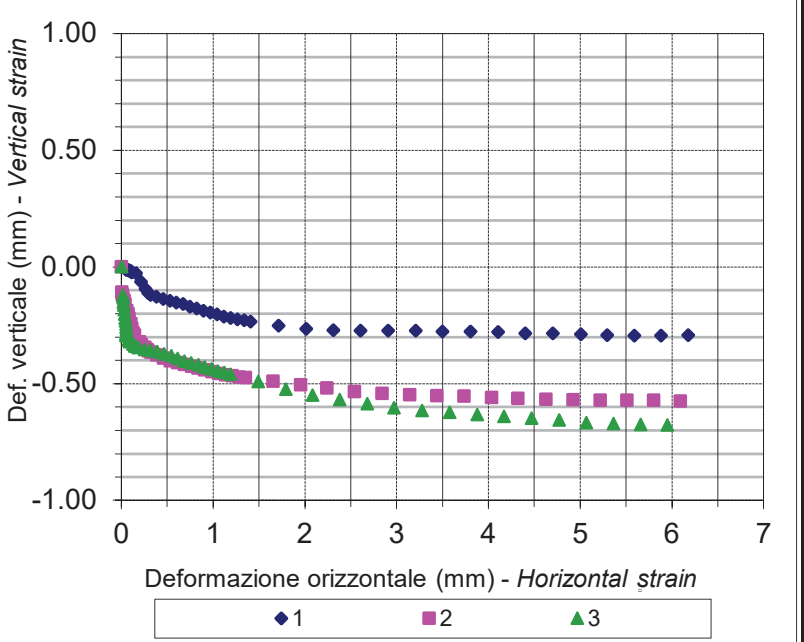
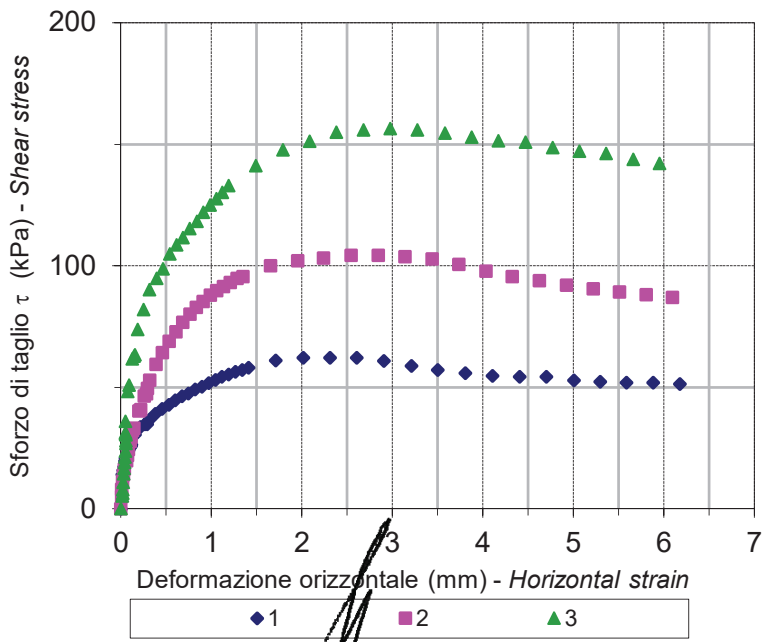
#### Fase di consolidazione - *Consolidation test*



#### Note - *Remarks*

Limo argilloso sabbioso. Colore marrone oliva. Consistente.

Pocket Penetrometer 1.3- 1.5- 1.8 kg/cm<sup>2</sup>  
Tor Vane 0.6- 0.8- 0.8 kg/cm<sup>2</sup>









Direttore *Manager*





Sperimentatore *Technician*

Grado di incertezza delle misure degli strumenti di forza: ± 0,15%

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Autorizzazione del Consiglio Superiore dei Lavori

<div><div><div>GEOTEA s.r.l.</div><div>AZIENDA CON SISTEMA DI GESTIONE QUALITA' UNI EN ISO 9001:2015 CERTIFICATO DA CERTIQUALITY</div></div></div>	TAGLIO DIRETTO																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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<div>Consolidation test (0-100 kPa)</div> <table><thead><tr><th>time (s)</th><th>def. ↓ (mm)</th></tr></thead><tbody><tr><td>1</td><td>0.00</td></tr><tr><td>6</td><td>-0.86</td></tr><tr><td>10</td><td>-0.93</td></tr><tr><td>24</td><td>-0.99</td></tr><tr><td>30</td><td>-1.02</td></tr><tr><td>60</td><td>-1.10</td></tr><tr><td>90</td><td>-1.15</td></tr><tr><td>120</td><td>-1.18</td></tr><tr><td>180</td><td>-1.23</td></tr><tr><td>240</td><td>-1.25</td></tr><tr><td>300</td><td>-1.26</td></tr><tr><td>360</td><td>-1.27</td></tr><tr><td>420</td><td>-1.28</td></tr><tr><td>480</td><td>-1.29</td></tr><tr><td>540</td><td>-1.29</td></tr><tr><td>600</td><td>-1.30</td></tr><tr><td>900</td><td>-1.31</td></tr><tr><td>1200</td><td>-1.32</td></tr><tr><td>1500</td><td>-1.33</td></tr><tr><td>1800</td><td>-1.33</td></tr><tr><td>2100</td><td>-1.33</td></tr><tr><td>2400</td><td>-1.34</td></tr><tr><td>2700</td><td>-1.34</td></tr><tr><td>3000</td><td>-1.35</td></tr><tr><td>3300</td><td>-1.35</td></tr><tr><td>3600</td><td>-1.35</td></tr><tr><td>4200</td><td>-1.35</td></tr><tr><td>4800</td><td>-1.36</td></tr><tr><td>5400</td><td>-1.36</td></tr><tr><td>6000</td><td>-1.36</td></tr><tr><td>7200</td><td>-1.36</td></tr><tr><td>8400</td><td>-1.36</td></tr><tr><td>9600</td><td>-1.37</td></tr><tr><td>10800</td><td>-1.37</td></tr><tr><td>12000</td><td>-1.37</td></tr><tr><td>13200</td><td>-1.37</td></tr><tr><td>14400</td><td>-1.37</td></tr><tr><td>16800</td><td>-1.38</td></tr><tr><td>19200</td><td>-1.38</td></tr><tr><td>21600</td><td>-1.38</td></tr><tr><td>28800</td><td>-1.39</td></tr><tr><td>36000</td><td>-1.39</td></tr><tr><td>45600</td><td>-1.40</td></tr><tr><td>54000</td><td>-1.40</td></tr><tr><td>72000</td><td>-1.40</td></tr><tr><td>79200</td><td>-1.40</td></tr><tr><td>82800</td><td>-1.40</td></tr><tr><td>86400</td><td>-1.40</td></tr></tbody></table>	time (s)	def. ↓ (mm)	1	0.00	6	-0.86	10	-0.93	24	-0.99	30	-1.02	60	-1.10	90	-1.15	120	-1.18	180	-1.23	240	-1.25	300	-1.26	360	-1.27	420	-1.28	480	-1.29	540	-1.29	600	-1.30	900	-1.31	1200	-1.32	1500	-1.33	1800	-1.33	2100	-1.33	2400	-1.34	2700	-1.34	3000	-1.35	3300	-1.35	3600	-1.35	4200	-1.35	4800	-1.36	5400	-1.36	6000	-1.36	7200	-1.36	8400	-1.36	9600	-1.37	10800	-1.37	12000	-1.37	13200	-1.37	14400	-1.37	16800	-1.38	19200	-1.38	21600	-1.38	28800	-1.39	36000	-1.39	45600	-1.40	54000	-1.40	72000	-1.40	79200	-1.40	82800	-1.40	86400	-1.40	<div>Provino 1 - Specimen 1</div> <table><thead><tr><th>def. → (mm)</th><th>def. ↓ (mm)</th><th>shear stress (kPa)</th></tr></thead><tbody><tr><td>0.02</td><td>0.00</td><td>14.17</td></tr><tr><td>0.03</td><td>0.00</td><td>15.83</td></tr><tr><td>0.04</td><td>0.00</td><td>17.22</td></tr><tr><td>0.04</td><td>0.00</td><td>18.61</td></tr><tr><td>0.05</td><td>0.01</td><td>19.72</td></tr><tr><td>0.05</td><td>0.01</td><td>20.83</td></tr><tr><td>0.06</td><td>0.01</td><td>21.67</td></tr><tr><td>0.07</td><td>0.01</td><td>22.78</td></tr><tr><td>0.08</td><td>0.02</td><td>23.61</td></tr><tr><td>0.09</td><td>0.02</td><td>24.17</td></tr><tr><td>0.09</td><td>0.02</td><td>25.00</td></tr><tr><td>0.10</td><td>0.02</td><td>25.28</td></tr><tr><td>0.10</td><td>0.02</td><td>25.56</td></tr><tr><td>0.11</td><td>0.02</td><td>25.83</td></tr><tr><td>0.11</td><td>0.02</td><td>26.11</td></tr><tr><td>0.12</td><td>0.02</td><td>26.39</td></tr><tr><td>0.16</td><td>0.03</td><td>30.56</td></tr><tr><td>0.21</td><td>0.06</td><td>33.61</td></tr><tr><td>0.27</td><td>0.09</td><td>34.72</td></tr><tr><td>0.29</td><td>0.11</td><td>34.72</td></tr><tr><td>0.32</td><td>0.12</td><td>36.67</td></tr><tr><td>0.38</td><td>0.13</td><td>39.17</td></tr><tr><td>0.45</td><td>0.14</td><td>41.11</td></tr><tr><td>0.53</td><td>0.15</td><td>42.78</td></tr><tr><td>0.60</td><td>0.15</td><td>44.72</td></tr><tr><td>0.67</td><td>0.16</td><td>46.39</td></tr><tr><td>0.75</td><td>0.17</td><td>47.50</td></tr><tr><td>0.82</td><td>0.18</td><td>49.17</td></tr><tr><td>0.90</td><td>0.19</td><td>50.28</td></tr><tr><td>0.97</td><td>0.20</td><td>51.67</td></tr><tr><td>1.04</td><td>0.20</td><td>53.06</td></tr><tr><td>1.12</td><td>0.21</td><td>54.44</td></tr><tr><td>1.19</td><td>0.22</td><td>55.28</td></tr><tr><td>1.27</td><td>0.22</td><td>56.39</td></tr><tr><td>1.34</td><td>0.23</td><td>57.22</td></tr><tr><td>1.41</td><td>0.23</td><td>58.06</td></tr><tr><td>1.71</td><td>0.25</td><td>61.11</td></tr><tr><td>2.02</td><td>0.27</td><td>62.22</td></tr><tr><td>2.31</td><td>0.27</td><td>62.22</td></tr><tr><td>2.61</td><td>0.27</td><td>62.22</td></tr><tr><td>2.91</td><td>0.27</td><td>60.83</td></tr><tr><td>3.21</td><td>0.27</td><td>58.89</td></tr><tr><td>3.50</td><td>0.28</td><td>57.22</td></tr><tr><td>3.81</td><td>0.28</td><td>55.83</td></tr><tr><td>4.10</td><td>0.28</td><td>54.72</td></tr><tr><td>4.40</td><td>0.28</td><td>54.44</td></tr><tr><td>4.70</td><td>0.28</td><td>54.44</td></tr><tr><td>5.01</td><td>0.29</td><td>52.78</td></tr><tr><td>5.30</td><td>0.29</td><td>52.22</td></tr><tr><td>5.59</td><td>0.29</td><td>51.94</td></tr><tr><td>5.88</td><td>0.30</td><td>51.94</td></tr><tr><td>6.18</td><td>0.29</td><td>51.39</td></tr></tbody></table>	def. → (mm)	def. ↓ (mm)	shear stress (kPa)	0.02	0.00	14.17	0.03	0.00	15.83	0.04	0.00	17.22	0.04	0.00	18.61	0.05	0.01	19.72	0.05	0.01	20.83	0.06	0.01	21.67	0.07	0.01	22.78	0.08	0.02	23.61	0.09	0.02	24.17	0.09	0.02	25.00	0.10	0.02	25.28	0.10	0.02	25.56	0.11	0.02	25.83	0.11	0.02	26.11	0.12	0.02	26.39	0.16	0.03	30.56	0.21	0.06	33.61	0.27	0.09	34.72	0.29	0.11	34.72	0.32	0.12	36.67	0.38	0.13	39.17	0.45	0.14	41.11	0.53	0.15	42.78	0.60	0.15	44.72	0.67	0.16	46.39	0.75	0.17	47.50	0.82	0.18	49.17	0.90	0.19	50.28	0.97	0.20	51.67	1.04	0.20	53.06	1.12	0.21	54.44	1.19	0.22	55.28	1.27	0.22	56.39	1.34	0.23	57.22	1.41	0.23	58.06	1.71	0.25	61.11	2.02	0.27	62.22	2.31	0.27	62.22	2.61	0.27	62.22	2.91	0.27	60.83	3.21	0.27	58.89	3.50	0.28	57.22	3.81	0.28	55.83	4.10	0.28	54.72	4.40	0.28	54.44	4.70	0.28	54.44	5.01	0.29	52.78	5.30	0.29	52.22	5.59	0.29	51.94	5.88	0.30	51.94	6.18	0.29	51.39	<div>Provino 2 - Specimen 2</div> <table><thead><tr><th>def. → (mm)</th><th>def. ↓ (mm)</th><th>shear stress (kPa)</th></tr></thead><tbody><tr><td>0.01</td><td>0.11</td><td>5.00</td></tr><tr><td>0.01</td><td>0.12</td><td>8.06</td></tr><tr><td>0.02</td><td>0.13</td><td>11.39</td></tr><tr><td>0.03</td><td>0.14</td><td>13.89</td></tr><tr><td>0.04</td><td>0.16</td><td>16.39</td></tr><tr><td>0.06</td><td>0.19</td><td>19.72</td></tr><tr><td>0.08</td><td>0.20</td><td>21.94</td></tr><tr><td>0.09</td><td>0.22</td><td>24.44</td></tr><tr><td>0.10</td><td>0.24</td><td>27.78</td></tr><tr><td>0.12</td><td>0.26</td><td>29.44</td></tr><tr><td>0.13</td><td>0.28</td><td>32.22</td></tr><tr><td>0.14</td><td>0.29</td><td>33.06</td></tr><tr><td>0.20</td><td>0.32</td><td>40.28</td></tr><tr><td>0.22</td><td>0.33</td><td>40.83</td></tr><tr><td>0.26</td><td>0.35</td><td>46.39</td></tr><tr><td>0.28</td><td>0.36</td><td>47.22</td></tr><tr><td>0.29</td><td>0.36</td><td>49.44</td></tr><tr><td>0.32</td><td>0.37</td><td>52.78</td></tr><tr><td>0.39</td><td>0.38</td><td>59.44</td></tr><tr><td>0.46</td><td>0.39</td><td>64.17</td></tr><tr><td>0.53</td><td>0.40</td><td>68.89</td></tr><tr><td>0.61</td><td>0.41</td><td>72.78</td></tr><tr><td>0.69</td><td>0.42</td><td>76.67</td></tr><tr><td>0.77</td><td>0.43</td><td>80.00</td></tr><tr><td>0.84</td><td>0.43</td><td>82.78</td></tr><tr><td>0.91</td><td>0.44</td><td>85.28</td></tr><tr><td>0.99</td><td>0.45</td><td>87.78</td></tr><tr><td>1.06</td><td>0.46</td><td>89.72</td></tr><tr><td>1.14</td><td>0.46</td><td>91.39</td></tr><tr><td>1.21</td><td>0.47</td><td>93.06</td></tr><tr><td>1.29</td><td>0.47</td><td>94.72</td></tr><tr><td>1.35</td><td>0.48</td><td>95.56</td></tr><tr><td>1.65</td><td>0.49</td><td>100.00</td></tr><tr><td>1.95</td><td>0.51</td><td>101.94</td></tr><tr><td>2.24</td><td>0.52</td><td>103.06</td></tr><tr><td>2.54</td><td>0.54</td><td>104.17</td></tr><tr><td>2.84</td><td>0.54</td><td>104.17</td></tr><tr><td>3.14</td><td>0.55</td><td>103.61</td></tr><tr><td>3.44</td><td>0.55</td><td>102.78</td></tr><tr><td>3.74</td><td>0.56</td><td>100.56</td></tr><tr><td>4.04</td><td>0.56</td><td>97.78</td></tr><tr><td>4.32</td><td>0.56</td><td>95.56</td></tr><tr><td>4.63</td><td>0.57</td><td>93.89</td></tr><tr><td>4.93</td><td>0.57</td><td>91.94</td></tr><tr><td>5.22</td><td>0.57</td><td>90.56</td></tr><tr><td>5.51</td><td>0.57</td><td>89.17</td></tr><tr><td>5.80</td><td>0.57</td><td>88.06</td></tr><tr><td>6.10</td><td>0.58</td><td>86.94</td></tr></tbody></table>	def. → (mm)	def. ↓ (mm)	shear stress (kPa)	0.01	0.11	5.00	0.01	0.12	8.06	0.02	0.13	11.39	0.03	0.14	13.89	0.04	0.16	16.39	0.06	0.19	19.72	0.08	0.20	21.94	0.09	0.22	24.44	0.10	0.24	27.78	0.12	0.26	29.44	0.13	0.28	32.22	0.14	0.29	33.06	0.20	0.32	40.28	0.22	0.33	40.83	0.26	0.35	46.39	0.28	0.36	47.22	0.29	0.36	49.44	0.32	0.37	52.78	0.39	0.38	59.44	0.46	0.39	64.17	0.53	0.40	68.89	0.61	0.41	72.78	0.69	0.42	76.67	0.77	0.43	80.00	0.84	0.43	82.78	0.91	0.44	85.28	0.99	0.45	87.78	1.06	0.46	89.72	1.14	0.46	91.39	1.21	0.47	93.06	1.29	0.47	94.72	1.35	0.48	95.56	1.65	0.49	100.00	1.95	0.51	101.94	2.24	0.52	103.06	2.54	0.54	104.17	2.84	0.54	104.17	3.14	0.55	103.61	3.44	0.55	102.78	3.74	0.56	100.56	4.04	0.56	97.78	4.32	0.56	95.56	4.63	0.57	93.89	4.93	0.57	91.94	5.22	0.57	90.56	5.51	0.57	89.17	5.80	0.57	88.06	6.10	0.58	86.94	<div>Provino 3 - Specimen 3</div> <table><thead><tr><th>def. → (mm)</th><th>def. ↓ (mm)</th><th>shear stress (kPa)</th></tr></thead><tbody><tr><td>0.02</td><td>0.12</td><td>5.25</td></tr><tr><td>0.02</td><td>0.13</td><td>6.42</td></tr><tr><td>0.02</td><td>0.15</td><td>7.88</td></tr><tr><td>0.03</td><td>0.17</td><td>10.79</td></tr><tr><td>0.03</td><td>0.18</td><td>14.29</td></tr><tr><td>0.03</td><td>0.20</td><td>16.63</td></tr><tr><td>0.04</td><td>0.22</td><td>18.96</td></tr><tr><td>0.05</td><td>0.23</td><td>21.29</td></tr><tr><td>0.05</td><td>0.25</td><td>23.63</td></tr><tr><td>0.05</td><td>0.26</td><td>26.83</td></tr><tr><td>0.05</td><td>0.27</td><td>28.00</td></tr><tr><td>0.06</td><td>0.28</td><td>30.33</td></tr><tr><td>0.05</td><td>0.29</td><td>30.63</td></tr><tr><td>0.05</td><td>0.29</td><td>31.21</td></tr><tr><td>0.05</td><td>0.30</td><td>35.88</td></tr><tr><td>0.07</td><td>0.31</td><td>48.13</td></tr><tr><td>0.09</td><td>0.32</td><td>50.75</td></tr><tr><td>0.13</td><td>0.33</td><td>61.54</td></tr><tr><td>0.15</td><td>0.34</td><td>62.71</td></tr><tr><td>0.15</td><td>0.34</td><td>63.29</td></tr><tr><td>0.19</td><td>0.35</td><td>73.79</td></tr><tr><td>0.25</td><td>0.35</td><td>81.96</td></tr><tr><td>0.32</td><td>0.36</td><td>90.13</td></tr><tr><td>0.39</td><td>0.36</td><td>94.79</td></tr><tr><td>0.47</td><td>0.37</td><td>98.58</td></tr><tr><td>0.54</td><td>0.38</td><td>104.71</td></tr><tr><td>0.61</td><td>0.39</td><td>108.50</td></tr><tr><td>0.69</td><td>0.40</td><td>111.42</td></tr><tr><td>0.76</td><td>0.41</td><td>115.21</td></tr><tr><td>0.84</td><td>0.42</td><td>118.13</td></tr><tr><td>0.91</td><td>0.43</td><td>121.92</td></tr><tr><td>0.98</td><td>0.44</td><td>124.83</td></tr><tr><td>1.05</td><td>0.45</td><td>127.46</td></tr><tr><td>1.12</td><td>0.45</td><td>130.08</td></tr><tr><td>1.19</td><td>0.46</td><td>133.00</td></tr><tr><td>1.49</td><td>0.49</td><td>141.17</td></tr><tr><td>1.79</td><td>0.53</td><td>147.58</td></tr><tr><td>2.09</td><td>0.55</td><td>151.08</td></tr><tr><td>2.38</td><td>0.57</td><td>154.88</td></tr><tr><td>2.68</td><td>0.59</td><td>155.75</td></tr><tr><td>2.97</td><td>0.61</td><td>156.33</td></tr><tr><td>3.28</td><td>0.62</td><td>155.75</td></tr><tr><td>3.58</td><td>0.62</td><td>154.58</td></tr><tr><td>3.88</td><td>0.63</td><td>152.83</td></tr><tr><td>4.17</td><td>0.64</td><td>151.38</td></tr><tr><td>4.47</td><td>0.65</td><td>150.79</td></tr><tr><td>4.77</td><td>0.66</td><td>148.46</td></tr><tr><td>5.07</td><td>0.67</td><td>147.00</td></tr><tr><td>5.36</td><td>0.67</td><td>146.13</td></tr><tr><td>5.66</td><td>0.68</td><td>143.79</td></tr><tr><td>5.95</td><td>0.68</td><td>142.04</td></tr></tbody></table>	def. → (mm)	def. ↓ (mm)	shear stress (kPa)	0.02	0.12	5.25	0.02	0.13	6.42	0.02	0.15	7.88	0.03	0.17	10.79	0.03	0.18	14.29	0.03	0.20	16.63	0.04	0.22	18.96	0.05	0.23	21.29	0.05	0.25	23.63	0.05	0.26	26.83	0.05	0.27	28.00	0.06	0.28	30.33	0.05	0.29	30.63	0.05	0.29	31.21	0.05	0.30	35.88	0.07	0.31	48.13	0.09	0.32	50.75	0.13	0.33	61.54	0.15	0.34	62.71	0.15	0.34	63.29	0.19	0.35	73.79	0.25	0.35	81.96	0.32	0.36	90.13	0.39	0.36	94.79	0.47	0.37	98.58	0.54	0.38	104.71	0.61	0.39	108.50	0.69	0.40	111.42	0.76	0.41	115.21	0.84	0.42	118.13	0.91	0.43	121.92	0.98	0.44	124.83	1.05	0.45	127.46	1.12	0.45	130.08	1.19	0.46	133.00	1.49	0.49	141.17	1.79	0.53	147.58	2.09	0.55	151.08	2.38	0.57	154.88	2.68	0.59	155.75	2.97	0.61	156.33	3.28	0.62	155.75	3.58	0.62	154.58	3.88	0.63	152.83	4.17	0.64	151.38	4.47	0.65	150.79	4.77	0.66	148.46	5.07	0.67	147.00	5.36	0.67	146.13	5.66	0.68	143.79	5.95	0.68	142.04
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<div><div><div>GEOTEAS.r.l.</div><div>AZIENDA CON SISTEMA DI GESTIONE QUALITA' UNI EN ISO 9001:2015 CERTIFICATO DA CERTIQUALITY</div></div></div>	<div>PESO DI VOLUME CON FUSTELLA TARATA</div> <div>Determination of bulk and dry density of fine-grained soil with sampling tube</div> <div>Normativa di riferimento: UNI CEN ISO/TS 17892-2</div> <div>Technical specification</div>		
	<div>Certificato - Test report</div> <div>Verbale - Acceptance report</div> <div>Committente - Commissioner</div> <div>Località - Locality</div> <div>Cantiere - Site</div> <div>Sondaggio - Borehole</div> <div>Campione - Sample</div> <div>Profondità - Depth</div> <div>Data ricevimento - Receiving date</div> <div>Data inizio prove - Test starting date</div> <div>Data fine prove - Test ending date</div> <div>Data certificazione - Report date</div> <div>Data apertura campione - Sample opening date</div> <div>Classe campione - Sample quality</div>	<div>2639- 23.984- 004</div> <div>2639</div> <div>SOGEO SRL</div> <div>ANZOLA DELL'EMILIA (BO)</div> <div>VENTURI</div> <div>S3</div> <div>C2</div> <div>12.00- 12.50m</div> <div>01/06/2023</div> <div>01/06/2023</div> <div>09/06/2023</div> <div>12/06/2023</div> <div>01/06/2023</div> <div>Q4</div>	
	<div>Massa tara (g) - Tara weight</div> <div>Massa campione umido + tara (g) Moist specimen + tara</div> <div>Massa campione secco + tara (g) Dried specimen + tara</div> <div>Volume fustella tarata (cm³) Sampling tube volume</div> <div>Umidità naturale (%) - Water content</div> <div>Massa volumica umida (kg/m³) - Bulk density</div> <div>Massa volumica secca (kg/m³) - Dry density</div>	<div>70.66</div> <div>99.74</div> <div>94.05</div> <div>14.88</div> <div>24.33</div> <div>1953.78</div> <div>1571.49</div>	
	<div>Note - Remarks</div>		
<div>Direttore Manager</div> <div></div>		<div>Sperimentatore Technician</div> <div></div>	
<div>Via della Tecnica 17/A4 - 40068 San Lazzaro di Savena (BO)</div> <div>Tel. +39 051 6255377; fax +39 051 4998378</div> <div>e-mail laboratorio.geotea@database.it</div> <div>Autorizzazione del Consiglio Superiore dei Lavori Pubblici</div> <div>Ministero Infrastrutture e Trasporti - Settore Terre</div>			
<div>IOP DE 3.5 - MOD PROD 11 B6 REV2</div>			

<div><div><div>GEOTEAS.r.l.</div><div><div>AZIENDA CON SISTEMA DI GESTIONE QUALITA' UNI EN ISO 9001:2015 CERTIFICATO DA CERTIQUALITY</div></div></div></div>	<div>PESO SPECIFICO DEI GRANI</div> <div>PARTICLE DENSITY - PYCNOMETER METHOD</div> <div>Normativa di riferimento: UNI CEN ISO/TS 17892-3</div> <div>Technical specification</div>	
	<div>Certificato - Test report</div> <div>Verbale - Acceptance report</div> <div>Committente - Commissioner</div> <div>Località - Locality</div> <div>Cantiere - Site</div> <div>Sondaggio - Borehole</div> <div>Campione - Sample</div> <div>Profondità - Depth</div> <div>Data ricevimento - Receiving date</div> <div>Data inizio prove - Test starting date</div> <div>Data fine prove - Test ending date</div> <div>Data certificazione - Report date</div> <div>Data apertura campione - Sample opening date</div> <div>Classe campione - Sample quality</div>	<div>2639- 23.984- 005</div> <div>2639</div> <div>SOGEO SRL</div> <div>ANZOLA DELL'EMILIA (BO)</div> <div>VENTURI</div> <div>S3</div> <div>C2</div> <div>12.00- 12.50m</div> <div>01/06/2023</div> <div>01/06/2023</div> <div>09/06/2023</div> <div>12/06/2023</div> <div>01/06/2023</div> <div>Q4</div>
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	<div>Note - Remarks</div>	
<div>Direttore / Manager</div> <div></div>	<div>Sperimentatore / Technician</div> <div></div>	
<div>Via della Tecnica 5/A - 40068 San Lazzaro di Savena (BO)</div> <div>Tel. +39 051 6255377; fax +39 051 4998378</div> <div>e-mail laboratorio.geotea@database.it</div> <div>Autorizzazione del Consiglio Superiore dei Lavori Pubblici</div> <div>Ministero Infrastrutture e Trasporti - Settore Terre</div>		
<div>IOP DE 3.5 - MOD PROD 11 B25 REV2</div>		





# GEOTE s.r.l.

AZIENDA CON SISTEMA DI GESTIONE QUALITÀ UNI EN ISO 9001:2015 CERTIFICATO DA CERTIQUALITY

## TAGLIO DIRETTO

### DIRECT SHEAR TEST

Normativa di riferimento: UNI CEN ISO/TS 17892-10

### Technical specification

Certificato - *Test report*

Verbale - *Acceptance report*

Committente - *Commissioner*

Località - *Locality*

Cantiere - *Site*

Sondaggio - *Borehole*

Campione - *Sample*

Profondità - *Depth*

Data ricevimento - *Receiving date*

Data inizio prove - *Test starting date*

Data fine prove - *Test ending date*

Data certificazione - *Report date*

Data apertura campione - *Sample opening date*

Classe del campione - *Sample quality*

2639- 23.984- 006

2639

SOGEO SRL

ANZOLA DELL'EMILIA (BO)

VENTURI

**S3**

**C2**

**12.00- 12.50m**

01/06/2023

01/06/2023

09/06/2023

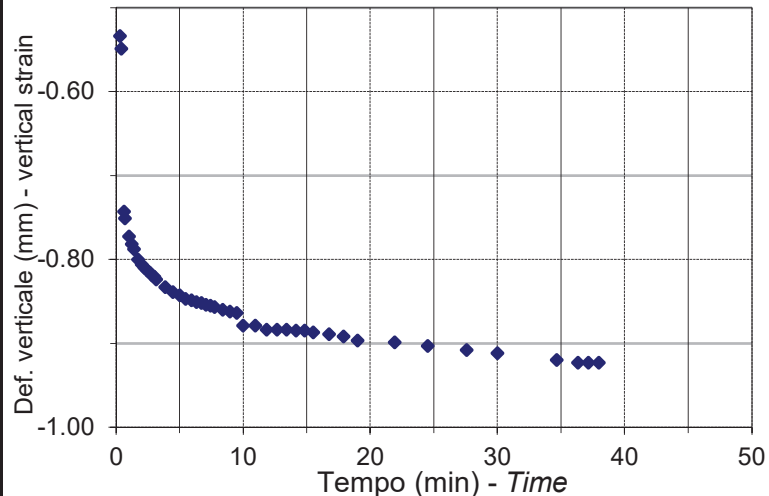
12/06/2023

01/06/2023

Q4

Umidità iniziale - <i>Initial water content</i>	%	24.33		
Densità naturale iniziale - <i>Initial wet density</i>	kg/m <sup>3</sup>	1953.78		
Densità secca iniziale - <i>Initial dry density</i>	kg/m <sup>3</sup>	1571.49		
Provino - <i>Specimen id</i>	n°	1	2	3
Lato - <i>Specimen side</i>	mm	60.0	60.0	60.0
Altezza iniziale - <i>Initial specimen height</i>	mm	20.0	20.0	20.0
Velocità di taglio utilizzata - <i>Strain rate</i>	mm/min	0.006	0.006	0.006
Press. di consolidazione <i>Consolidation pressure</i>	kPa	196.1	294.2	392.3
Umidità finale - <i>Final water content</i>	%	23.00	22.56	22.42

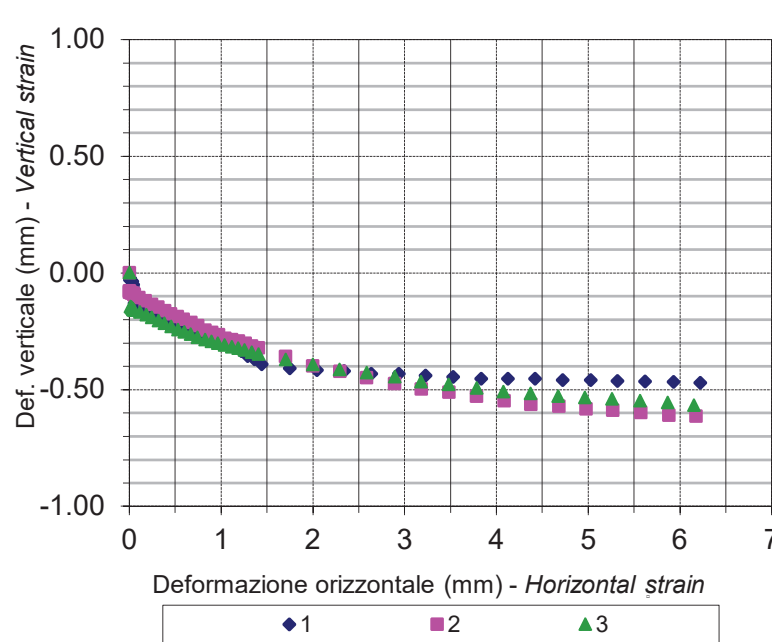
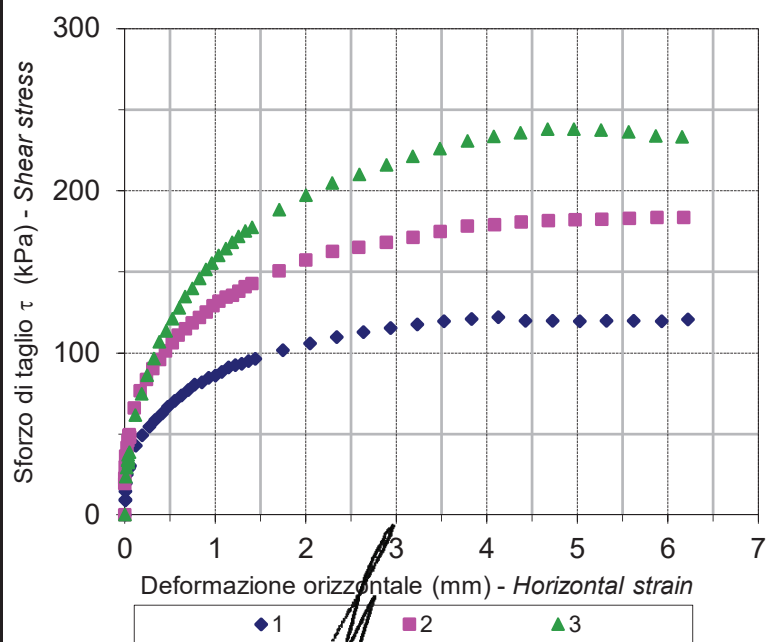
### Fase di consolidazione - *Consolidation test*



### Note - *Remarks*

Limo sabbioso argilloso. Colore grigio.

Pocket Penetrometer	0.7- 0.7	kg/cm <sup>2</sup>
Tor Vane	0.4- 0.4	kg/cm <sup>2</sup>





Direttore *Manager*

Grado di incertezza delle misure degli strumenti di forza:  $\pm 0,15\%$

Sperimentatore *Technician*

Via della Tecnica 57/A4 - 40068 San Lazzaro di Savena (BO)  
Tel. +39 051 6255377; fax +39 051 4998378  
e-mail laboratorio.geotea@database.it  
Autorizzazione del Consiglio Superiore dei Lavori Pubblici



<div><div><div>GEOTEAs.r.l.</div><div>AZIENDA CON SISTEMA DI GESTIONE QUALITA' UNI EN ISO 9001:2015 CERTIFICATO DA CERTIQUALITY</div></div></div>	TAGLIO DIRETTO																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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<div>Consolidation test (0-100 kPa)</div> <table><thead><tr><th>time (s)</th><th>def. ↓ (mm)</th></tr></thead><tbody><tr><td>1</td><td>0.00</td></tr><tr><td>6</td><td>-0.53</td></tr><tr><td>10</td><td>-0.55</td></tr><tr><td>24</td><td>-0.74</td></tr><tr><td>30</td><td>-0.75</td></tr><tr><td>60</td><td>-0.77</td></tr><tr><td>90</td><td>-0.78</td></tr><tr><td>120</td><td>-0.79</td></tr><tr><td>180</td><td>-0.80</td></tr><tr><td>240</td><td>-0.81</td></tr><tr><td>300</td><td>-0.81</td></tr><tr><td>360</td><td>-0.81</td></tr><tr><td>420</td><td>-0.82</td></tr><tr><td>480</td><td>-0.82</td></tr><tr><td>540</td><td>-0.82</td></tr><tr><td>600</td><td>-0.82</td></tr><tr><td>900</td><td>-0.83</td></tr><tr><td>1200</td><td>-0.84</td></tr><tr><td>1500</td><td>-0.84</td></tr><tr><td>1800</td><td>-0.85</td></tr><tr><td>2100</td><td>-0.85</td></tr><tr><td>2400</td><td>-0.85</td></tr><tr><td>2700</td><td>-0.85</td></tr><tr><td>3000</td><td>-0.85</td></tr><tr><td>3300</td><td>-0.86</td></tr><tr><td>3600</td><td>-0.86</td></tr><tr><td>4200</td><td>-0.86</td></tr><tr><td>4800</td><td>-0.86</td></tr><tr><td>5400</td><td>-0.86</td></tr><tr><td>6000</td><td>-0.88</td></tr><tr><td>7200</td><td>-0.88</td></tr><tr><td>8400</td><td>-0.88</td></tr><tr><td>9600</td><td>-0.88</td></tr><tr><td>10800</td><td>-0.88</td></tr><tr><td>12000</td><td>-0.89</td></tr><tr><td>13200</td><td>-0.89</td></tr><tr><td>14400</td><td>-0.89</td></tr><tr><td>16800</td><td>-0.89</td></tr><tr><td>19200</td><td>-0.89</td></tr><tr><td>21600</td><td>-0.90</td></tr><tr><td>28800</td><td>-0.90</td></tr><tr><td>36000</td><td>-0.90</td></tr><tr><td>45600</td><td>-0.91</td></tr><tr><td>54000</td><td>-0.91</td></tr><tr><td>72000</td><td>-0.92</td></tr><tr><td>79200</td><td>-0.92</td></tr><tr><td>82800</td><td>-0.92</td></tr><tr><td>86400</td><td>-0.92</td></tr></tbody></table>	time (s)	def. ↓ (mm)	1	0.00	6	-0.53	10	-0.55	24	-0.74	30	-0.75	60	-0.77	90	-0.78	120	-0.79	180	-0.80	240	-0.81	300	-0.81	360	-0.81	420	-0.82	480	-0.82	540	-0.82	600	-0.82	900	-0.83	1200	-0.84	1500	-0.84	1800	-0.85	2100	-0.85	2400	-0.85	2700	-0.85	3000	-0.85	3300	-0.86	3600	-0.86	4200	-0.86	4800	-0.86	5400	-0.86	6000	-0.88	7200	-0.88	8400	-0.88	9600	-0.88	10800	-0.88	12000	-0.89	13200	-0.89	14400	-0.89	16800	-0.89	19200	-0.89	21600	-0.90	28800	-0.90	36000	-0.90	45600	-0.91	54000	-0.91	72000	-0.92	79200	-0.92	82800	-0.92	86400	-0.92	<div>Provino 1 - Specimen 1</div> <table><thead><tr><th>def. → (mm)</th><th>def. ↓ (mm)</th><th>shear stress (kPa)</th></tr></thead><tbody><tr><td>0.00</td><td>0.02</td><td>8.99</td></tr><tr><td>0.00</td><td>0.02</td><td>9.52</td></tr><tr><td>0.01</td><td>0.03</td><td>14.55</td></tr><tr><td>0.01</td><td>0.03</td><td>19.58</td></tr><tr><td>0.02</td><td>0.03</td><td>24.87</td></tr><tr><td>0.03</td><td>0.04</td><td>28.31</td></tr><tr><td>0.04</td><td>0.05</td><td>30.95</td></tr><tr><td>0.04</td><td>0.06</td><td>28.84</td></tr><tr><td>0.05</td><td>0.08</td><td>30.42</td></tr><tr><td>0.05</td><td>0.10</td><td>29.63</td></tr><tr><td>0.06</td><td>0.13</td><td>30.42</td></tr><tr><td>0.12</td><td>0.15</td><td>42.59</td></tr><tr><td>0.19</td><td>0.16</td><td>49.21</td></tr><tr><td>0.27</td><td>0.18</td><td>54.50</td></tr><tr><td>0.33</td><td>0.20</td><td>58.73</td></tr><tr><td>0.41</td><td>0.22</td><td>62.43</td></tr><tr><td>0.47</td><td>0.23</td><td>66.67</td></tr><tr><td>0.55</td><td>0.24</td><td>70.37</td></tr><tr><td>0.62</td><td>0.25</td><td>73.81</td></tr><tr><td>0.70</td><td>0.26</td><td>76.98</td></tr><tr><td>0.77</td><td>0.27</td><td>80.42</td></tr><tr><td>0.85</td><td>0.28</td><td>81.75</td></tr><tr><td>0.93</td><td>0.29</td><td>84.66</td></tr><tr><td>1.00</td><td>0.29</td><td>85.98</td></tr><tr><td>1.07</td><td>0.30</td><td>88.36</td></tr><tr><td>1.15</td><td>0.31</td><td>91.01</td></tr><tr><td>1.22</td><td>0.34</td><td>92.33</td></tr><tr><td>1.29</td><td>0.36</td><td>93.39</td></tr><tr><td>1.36</td><td>0.37</td><td>94.97</td></tr><tr><td>1.44</td><td>0.39</td><td>96.30</td></tr><tr><td>1.75</td><td>0.41</td><td>101.59</td></tr><tr><td>2.05</td><td>0.42</td><td>105.82</td></tr><tr><td>2.34</td><td>0.42</td><td>109.79</td></tr><tr><td>2.64</td><td>0.43</td><td>112.70</td></tr><tr><td>2.93</td><td>0.43</td><td>115.34</td></tr><tr><td>3.23</td><td>0.44</td><td>117.46</td></tr><tr><td>3.53</td><td>0.45</td><td>119.58</td></tr><tr><td>3.83</td><td>0.45</td><td>120.90</td></tr><tr><td>4.13</td><td>0.45</td><td>121.96</td></tr><tr><td>4.42</td><td>0.45</td><td>119.84</td></tr><tr><td>4.72</td><td>0.46</td><td>119.84</td></tr><tr><td>5.03</td><td>0.46</td><td>119.58</td></tr><tr><td>5.32</td><td>0.46</td><td>119.84</td></tr><tr><td>5.62</td><td>0.46</td><td>119.84</td></tr><tr><td>5.93</td><td>0.47</td><td>119.58</td></tr><tr><td>6.22</td><td>0.47</td><td>120.63</td></tr></tbody></table>	def. → (mm)	def. ↓ (mm)	shear stress (kPa)	0.00	0.02	8.99	0.00	0.02	9.52	0.01	0.03	14.55	0.01	0.03	19.58	0.02	0.03	24.87	0.03	0.04	28.31	0.04	0.05	30.95	0.04	0.06	28.84	0.05	0.08	30.42	0.05	0.10	29.63	0.06	0.13	30.42	0.12	0.15	42.59	0.19	0.16	49.21	0.27	0.18	54.50	0.33	0.20	58.73	0.41	0.22	62.43	0.47	0.23	66.67	0.55	0.24	70.37	0.62	0.25	73.81	0.70	0.26	76.98	0.77	0.27	80.42	0.85	0.28	81.75	0.93	0.29	84.66	1.00	0.29	85.98	1.07	0.30	88.36	1.15	0.31	91.01	1.22	0.34	92.33	1.29	0.36	93.39	1.36	0.37	94.97	1.44	0.39	96.30	1.75	0.41	101.59	2.05	0.42	105.82	2.34	0.42	109.79	2.64	0.43	112.70	2.93	0.43	115.34	3.23	0.44	117.46	3.53	0.45	119.58	3.83	0.45	120.90	4.13	0.45	121.96	4.42	0.45	119.84	4.72	0.46	119.84	5.03	0.46	119.58	5.32	0.46	119.84	5.62	0.46	119.84	5.93	0.47	119.58	6.22	0.47	120.63	<div>Provino 2 - Specimen 2</div> <table><thead><tr><th>def. → (mm)</th><th>def. ↓ (mm)</th><th>shear stress (kPa)</th></tr></thead><tbody><tr><td>0.00</td><td>0.08</td><td>19.17</td></tr><tr><td>0.00</td><td>0.08</td><td>22.50</td></tr><tr><td>0.01</td><td>0.08</td><td>29.72</td></tr><tr><td>0.01</td><td>0.08</td><td>36.39</td></tr><tr><td>0.02</td><td>0.09</td><td>41.67</td></tr><tr><td>0.04</td><td>0.09</td><td>45.83</td></tr><tr><td>0.05</td><td>0.09</td><td>48.89</td></tr><tr><td>0.05</td><td>0.09</td><td>49.44</td></tr><tr><td>0.05</td><td>0.09</td><td>47.78</td></tr><tr><td>0.06</td><td>0.10</td><td>48.06</td></tr><tr><td>0.10</td><td>0.11</td><td>65.83</td></tr><tr><td>0.17</td><td>0.12</td><td>76.39</td></tr><tr><td>0.24</td><td>0.14</td><td>83.61</td></tr><tr><td>0.31</td><td>0.15</td><td>90.28</td></tr><tr><td>0.38</td><td>0.16</td><td>95.83</td></tr><tr><td>0.45</td><td>0.18</td><td>101.11</td></tr><tr><td>0.52</td><td>0.19</td><td>106.11</td></tr><tr><td>0.59</td><td>0.20</td><td>110.83</td></tr><tr><td>0.67</td><td>0.21</td><td>114.72</td></tr><tr><td>0.75</td><td>0.23</td><td>118.33</td></tr><tr><td>0.82</td><td>0.25</td><td>121.67</td></tr><tr><td>0.90</td><td>0.26</td><td>125.00</td></tr><tr><td>0.97</td><td>0.27</td><td>128.89</td></tr><tr><td>1.04</td><td>0.28</td><td>131.67</td></tr><tr><td>1.12</td><td>0.29</td><td>134.17</td></tr><tr><td>1.19</td><td>0.29</td><td>135.56</td></tr><tr><td>1.26</td><td>0.30</td><td>138.06</td></tr><tr><td>1.33</td><td>0.31</td><td>140.83</td></tr><tr><td>1.41</td><td>0.32</td><td>142.78</td></tr><tr><td>1.70</td><td>0.36</td><td>150.56</td></tr><tr><td>2.00</td><td>0.40</td><td>157.22</td></tr><tr><td>2.29</td><td>0.42</td><td>162.50</td></tr><tr><td>2.59</td><td>0.45</td><td>165.00</td></tr><tr><td>2.89</td><td>0.47</td><td>168.06</td></tr><tr><td>3.18</td><td>0.50</td><td>171.11</td></tr><tr><td>3.49</td><td>0.51</td><td>174.72</td></tr><tr><td>3.79</td><td>0.53</td><td>178.06</td></tr><tr><td>4.09</td><td>0.55</td><td>178.89</td></tr><tr><td>4.38</td><td>0.56</td><td>180.56</td></tr><tr><td>4.68</td><td>0.57</td><td>181.39</td></tr><tr><td>4.98</td><td>0.58</td><td>181.94</td></tr><tr><td>5.27</td><td>0.59</td><td>182.22</td></tr><tr><td>5.58</td><td>0.60</td><td>182.78</td></tr><tr><td>5.88</td><td>0.61</td><td>183.33</td></tr><tr><td>6.18</td><td>0.62</td><td>183.33</td></tr></tbody></table>	def. → (mm)	def. ↓ (mm)	shear stress (kPa)	0.00	0.08	19.17	0.00	0.08	22.50	0.01	0.08	29.72	0.01	0.08	36.39	0.02	0.09	41.67	0.04	0.09	45.83	0.05	0.09	48.89	0.05	0.09	49.44	0.05	0.09	47.78	0.06	0.10	48.06	0.10	0.11	65.83	0.17	0.12	76.39	0.24	0.14	83.61	0.31	0.15	90.28	0.38	0.16	95.83	0.45	0.18	101.11	0.52	0.19	106.11	0.59	0.20	110.83	0.67	0.21	114.72	0.75	0.23	118.33	0.82	0.25	121.67	0.90	0.26	125.00	0.97	0.27	128.89	1.04	0.28	131.67	1.12	0.29	134.17	1.19	0.29	135.56	1.26	0.30	138.06	1.33	0.31	140.83	1.41	0.32	142.78	1.70	0.36	150.56	2.00	0.40	157.22	2.29	0.42	162.50	2.59	0.45	165.00	2.89	0.47	168.06	3.18	0.50	171.11	3.49	0.51	174.72	3.79	0.53	178.06	4.09	0.55	178.89	4.38	0.56	180.56	4.68	0.57	181.39	4.98	0.58	181.94	5.27	0.59	182.22	5.58	0.60	182.78	5.88	0.61	183.33	6.18	0.62	183.33	<div>Provino 3 - Specimen 3</div> <table><thead><tr><th>def. → (mm)</th><th>def. ↓ (mm)</th><th>shear stress (kPa)</th></tr></thead><tbody><tr><td>0.01</td><td>0.15</td><td>23.33</td></tr><tr><td>0.02</td><td>0.15</td><td>29.17</td></tr><tr><td>0.03</td><td>0.15</td><td>33.61</td></tr><tr><td>0.03</td><td>0.15</td><td>36.94</td></tr><tr><td>0.04</td><td>0.16</td><td>34.17</td></tr><tr><td>0.04</td><td>0.16</td><td>34.72</td></tr><tr><td>0.04</td><td>0.16</td><td>32.22</td></tr><tr><td>0.05</td><td>0.16</td><td>38.61</td></tr><tr><td>0.11</td><td>0.17</td><td>61.39</td></tr><tr><td>0.18</td><td>0.18</td><td>74.44</td></tr><tr><td>0.24</td><td>0.19</td><td>86.11</td></tr><tr><td>0.32</td><td>0.21</td><td>96.39</td></tr><tr><td>0.38</td><td>0.22</td><td>106.67</td></tr><tr><td>0.46</td><td>0.23</td><td>113.33</td></tr><tr><td>0.53</td><td>0.24</td><td>120.83</td></tr><tr><td>0.60</td><td>0.25</td><td>127.50</td></tr><tr><td>0.67</td><td>0.26</td><td>134.44</td></tr><tr><td>0.74</td><td>0.28</td><td>139.72</td></tr><tr><td>0.82</td><td>0.29</td><td>145.83</td></tr><tr><td>0.89</td><td>0.29</td><td>151.39</td></tr><tr><td>0.96</td><td>0.30</td><td>155.28</td></tr><tr><td>1.04</td><td>0.31</td><td>160.00</td></tr><tr><td>1.12</td><td>0.32</td><td>164.17</td></tr><tr><td>1.19</td><td>0.32</td><td>168.06</td></tr><tr><td>1.26</td><td>0.33</td><td>171.67</td></tr><tr><td>1.33</td><td>0.34</td><td>175.00</td></tr><tr><td>1.41</td><td>0.35</td><td>177.22</td></tr><tr><td>1.70</td><td>0.37</td><td>188.06</td></tr><tr><td>2.00</td><td>0.39</td><td>197.22</td></tr><tr><td>2.29</td><td>0.41</td><td>204.72</td></tr><tr><td>2.59</td><td>0.43</td><td>210.00</td></tr><tr><td>2.89</td><td>0.45</td><td>215.83</td></tr><tr><td>3.18</td><td>0.47</td><td>221.11</td></tr><tr><td>3.48</td><td>0.48</td><td>225.83</td></tr><tr><td>3.79</td><td>0.50</td><td>230.56</td></tr><tr><td>4.08</td><td>0.51</td><td>233.33</td></tr><tr><td>4.37</td><td>0.52</td><td>235.56</td></tr><tr><td>4.67</td><td>0.53</td><td>237.78</td></tr><tr><td>4.96</td><td>0.53</td><td>237.78</td></tr><tr><td>5.26</td><td>0.54</td><td>237.22</td></tr><tr><td>5.56</td><td>0.55</td><td>236.11</td></tr><tr><td>5.87</td><td>0.56</td><td>233.61</td></tr><tr><td>6.15</td><td>0.57</td><td>233.06</td></tr></tbody></table>	def. → (mm)	def. ↓ (mm)	shear stress (kPa)	0.01	0.15	23.33	0.02	0.15	29.17	0.03	0.15	33.61	0.03	0.15	36.94	0.04	0.16	34.17	0.04	0.16	34.72	0.04	0.16	32.22	0.05	0.16	38.61	0.11	0.17	61.39	0.18	0.18	74.44	0.24	0.19	86.11	0.32	0.21	96.39	0.38	0.22	106.67	0.46	0.23	113.33	0.53	0.24	120.83	0.60	0.25	127.50	0.67	0.26	134.44	0.74	0.28	139.72	0.82	0.29	145.83	0.89	0.29	151.39	0.96	0.30	155.28	1.04	0.31	160.00	1.12	0.32	164.17	1.19	0.32	168.06	1.26	0.33	171.67	1.33	0.34	175.00	1.41	0.35	177.22	1.70	0.37	188.06	2.00	0.39	197.22	2.29	0.41	204.72	2.59	0.43	210.00	2.89	0.45	215.83	3.18	0.47	221.11	3.48	0.48	225.83	3.79	0.50	230.56	4.08	0.51	233.33	4.37	0.52	235.56	4.67	0.53	237.78	4.96	0.53	237.78	5.26	0.54	237.22	5.56	0.55	236.11	5.87	0.56	233.61	6.15	0.57	233.06
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1.19	0.29	135.56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.26	0.30	138.06																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.33	0.31	140.83																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.41	0.32	142.78																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.70	0.36	150.56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.00	0.40	157.22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.29	0.42	162.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.59	0.45	165.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.89	0.47	168.06																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.18	0.50	171.11																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.49	0.51	174.72																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.79	0.53	178.06																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.09	0.55	178.89																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.38	0.56	180.56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.68	0.57	181.39																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.98	0.58	181.94																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
5.27	0.59	182.22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
5.58	0.60	182.78																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
5.88	0.61	183.33																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
6.18	0.62	183.33																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
def. → (mm)	def. ↓ (mm)	shear stress (kPa)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.01	0.15	23.33																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.02	0.15	29.17																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.03	0.15	33.61																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.03	0.15	36.94																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.04	0.16	34.17																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.04	0.16	34.72																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.04	0.16	32.22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.05	0.16	38.61																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.11	0.17	61.39																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.18	0.18	74.44																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.24	0.19	86.11																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.32	0.21	96.39																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.38	0.22	106.67																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.46	0.23	113.33																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.53	0.24	120.83																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.60	0.25	127.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.67	0.26	134.44																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.74	0.28	139.72																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.82	0.29	145.83																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.89	0.29	151.39																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.96	0.30	155.28																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.04	0.31	160.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.12	0.32	164.17																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.19	0.32	168.06																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.26	0.33	171.67																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.33	0.34	175.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.41	0.35	177.22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.70	0.37	188.06																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.00	0.39	197.22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.29	0.41	204.72																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.59	0.43	210.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.89	0.45	215.83																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.18	0.47	221.11																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.48	0.48	225.83																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.79	0.50	230.56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.08	0.51	233.33																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.37	0.52	235.56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.67	0.53	237.78																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.96	0.53	237.78																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
5.26	0.54	237.22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
5.56	0.55	236.11																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
5.87	0.56	233.61																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
6.15	0.57	233.06																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Via della Tecnica 57/A4 - 40068 San Lazzaro di Savena (BO) Tel. +39 051 6255377; fax +39 051 4998378 e-mail laboratorio.geotea@database.it Autorizzazione del Consiglio Superiore dei Lavori Pubblici Ministero Infrastrutture e Trasporti - Settore Terre																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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TAGLIO DIRETTO

Committente: SOGEO SRL  
Località: ANZOLA DELL'EMILIA (BO)  
Cantiere: VENTURI

Sondaggio: S3  
Campione: C1  
Profondità: 4.20- 4.70m

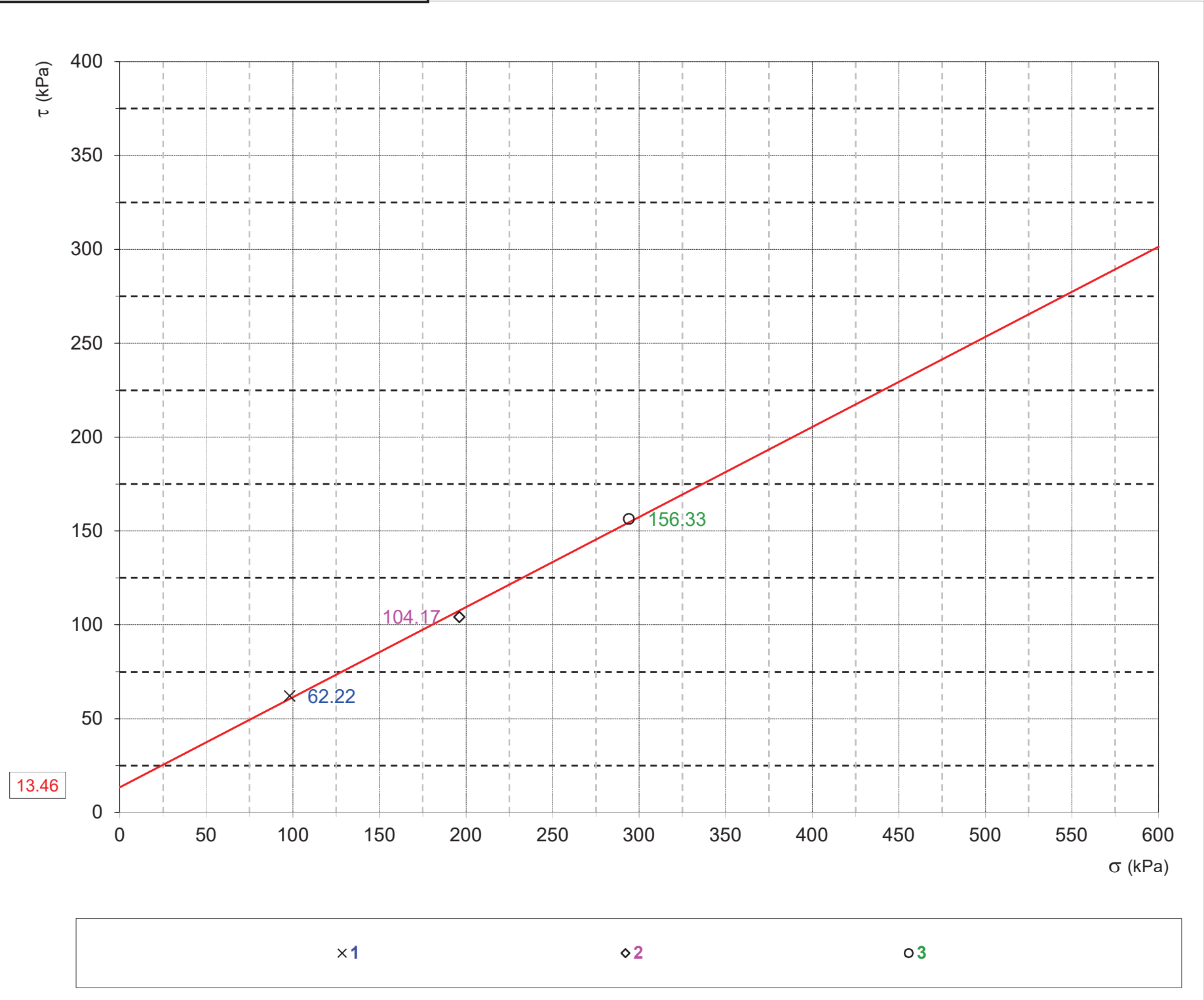
REGRESSIONE LINEARE DEI TRE VALORI DI SFORZO MASSIMO

Lato provino	60.00	mm
Altezza iniziale	20.00	mm

Limo argilloso sabbioso. Colore marrone oliva.  
Consistente.

Valori dei provini a rottura				
Provino	n°	1	2	3
Sforzo a rottura	kPa	62.22	104.17	156.33
Intercetta C'	KPa	13.46		
$\phi'$	° sess	25.63		

Velocità di prova
0.006
mm/min



La coesione efficace e l'angolo di resistenza al taglio si riferiscono alla elaborazione della prova di taglio diretto eseguita mediante una semplice regressione lineare sui tre punti di sforzo massimo e per il campo tensionale nel quale i vari provini sono stati sottoposti a taglio.

TAGLIO DIRETTO

Committente: SOGEO SRL  
Località: ANZOLA DELL'EMILIA (BO)  
Cantiere: VENTURI

Sondaggio: S3  
Campione: C2  
Profondità: 12.00- 12.50m

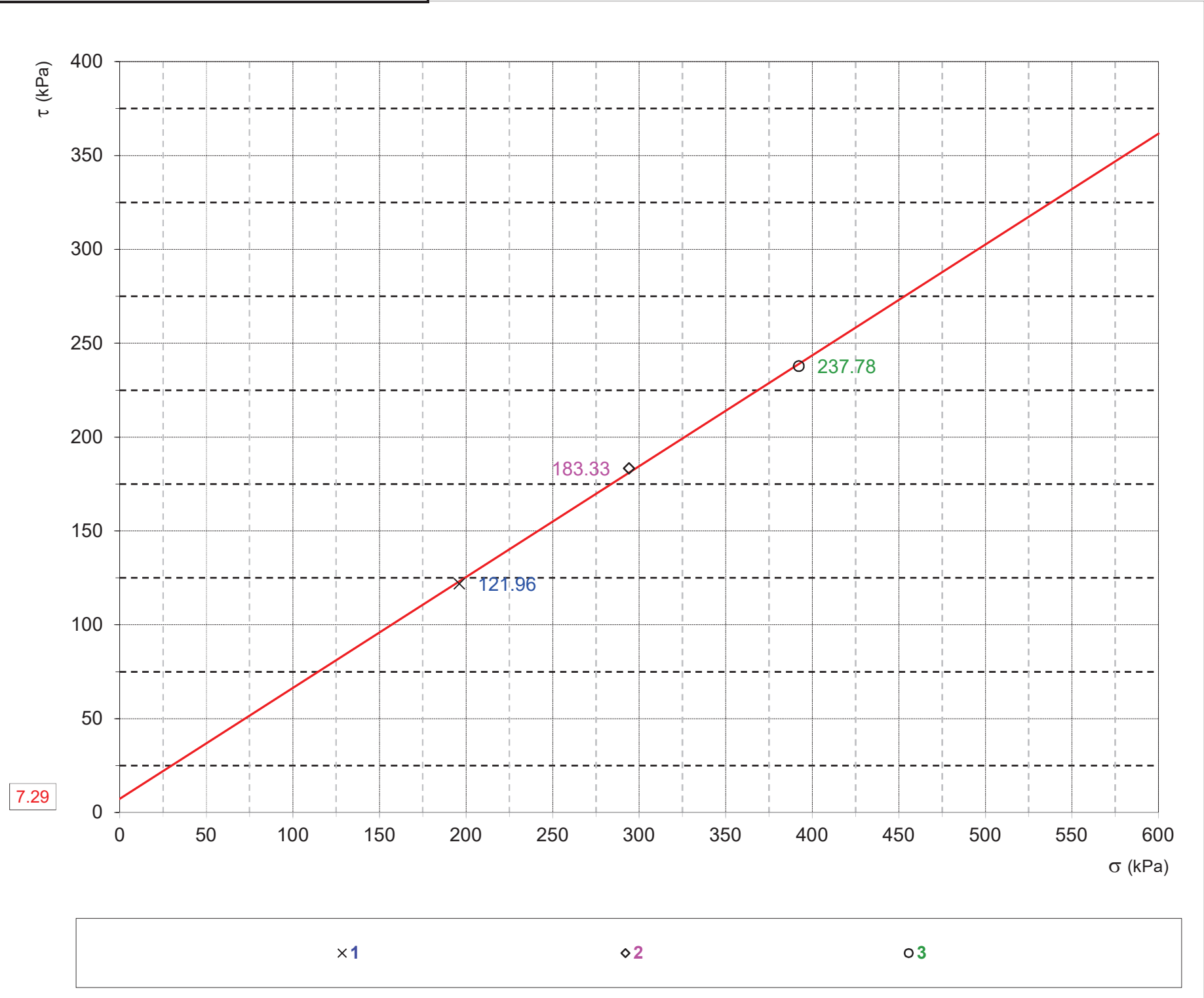
REGRESSIONE LINEARE DEI TRE VALORI DI SFORZO MASSIMO

Lato provino	60.00	mm
Altezza iniziale	20.00	mm

Limo sabbioso argilloso. Colore grigio.

Valori dei provini a rottura				
Provino	n°	1	2	3
Sforzo a rottura	kPa	121.96	183.33	237.78
Intercetta C'	KPa	7.29		
$\phi'$	° sess	30.56		

Velocità di prova
0.006
mm/min



La coesione efficace e l'angolo di resistenza al taglio si riferiscono alla elaborazione della prova di taglio diretto eseguita mediante una semplice regressione lineare sui tre punti di sforzo massimo e per il campo tensionale nel quale i vari provini sono stati sottoposti a taglio.