

COMMITTENTE:



PROGETTAZIONE:



INFRASTRUTTURE FERROVIARIE STRATEGICHE DEFINITE DALLA LEGGE OBIETTIVO N. 443/01

U.O. GEOLOGIA, GESTIONE TERRE E BONIFICHE

PROGETTO DEFINITIVO

**LINEA PESCARA - BARI
RADDOPPIO DELLA TRATTA FERROVIARIA TERMOLI - LESINA
LOTTI 2 e 3 - RADDOPPIO TERMOLI - RIPALTA**

Indagini geognostiche e prove in situ

**SONDAGGI
Prove in foro**

**PROVE PRESSIOMETRICHE "MPT"
PROVE DILATOMETRICHE "DRT"**

SCALA:

-

COMMESSA LOTTO FASE ENTE TIPO DOC. OPERA/DISCIPLINA PROGR. REV.

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Rev.	Descrizione	Redatto	Data	Verificato	Data	Approvato	Data	Autorizzato Data
A	Emissione definitiva	C. Trevisi	Settembre 2018	A. Pellegrino M. Sciarra	Settembre 2018	B.M. Bianchi	Settembre 2018	F. Marchese Settembre 2018

PROVE PRESSIOMETRICHE SU TERRA PT E PROVE DILATOMETRICHE SU ROCCIA DRT

METODOLOGIA OPERATIVA

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1.0 PREMESSA

Le prove di deformabilità in sito (prove pressiometriche su terre o dilatometriche su roccia), consistono nel rilievo della pressione e della conseguente dilatazione o ricomprensione delle pareti di un foro di sondaggio e sono eseguite per determinare i moduli di deformabilità (primo carico della curva sperimentale) e di elasticità (in ciclo di scarico – ricarico) dell'ammasso terroso o roccioso in esame.

Nel caso in cui, durante il corso della prova si riesce a raggiungere la plasticizzazione completa ovvero l'inizio delle deformazioni plastiche, è possibile definire una pressione di creep e una pressione limite corrispondente alla resistenza del materiale investigato.

2.0 PROVE DILATOMETRICHE DRT SU ROCCIA E PRESSIOMETRICHE MPT SU TERRA

Le prove pressiometriche su terra PT (Pressuremeter Test) o le prove dilatometriche su roccia DRT (Dilatometric Rock Test) si eseguono in fori di sondaggio calibrato, rispettivamente le prime (PT) in fori di diametro 66 mm mentre le seconde in fori di diametro variabile da 76 mm a 101 mm, e sono finalizzate principalmente alla determinazione della deformabilità dell'ammasso terroso o roccioso nelle condizioni di sito.

Il pressiometro è costituito da una sonda tricellulare in cui la cella centrale rappresenta la cella di misura e le celle superiori ed inferiori costituiscono delle camere di contropressione pneumatica che consentono nell'ambito di deformabilità dei terreni misurare l'espansione di una cavità cilindrica a basi piane, tuttavia tale strumento presenta dilatazioni parassite (cavi, sonda, instabilità delle contropressioni etc.) che costituiscono un errore strumentale solo parzialmente determinabile.

Il dilatometro da Roccia o Dilarock è invece caratterizzato da una monocamera cilindrica espandibile con misura della dilatazione di tipo elettronico posta direttamente sulla testa della sonda, pertanto, in questo strumento, la dilatazione parassita si limita alla variazione di spessore della guaina dilatometrica e determina un errore strumentale ampiamente inferiore a quello del pressiometro nonchè ad eccezione di rari casi (rocce durissime) di uno o più ordini inferiore alla grandezza da misurare.

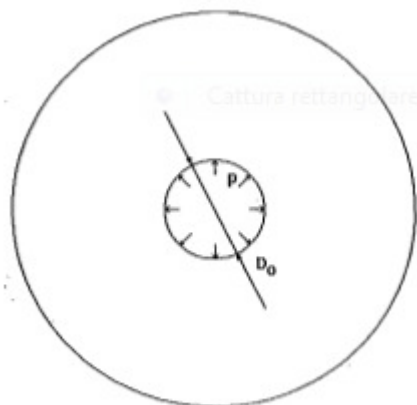
Il pressiometro tricellulare, ideato per le terre, presenta delle forti limitazioni nell'uso in rocce tenere sia per quanto riguarda la precisione che l'accuratezza dei dati rilevati poiché :

- la dilatazione dei cavi è generalmente superiore di 10-100 volte rispetto alle deformazioni della roccia da misurare, piccole imprecisioni nella taratura alterano i risultati in modo sostanziale;
- la guaina più resistente di cui è dotata la sonda pressiométrica (guaina telata metallica) presenta una inerzia max di circa 4 bar e quando il peso della colonnina d'acqua supera tale resistenza, riempie la cella di misura, rendendo difficoltoso l'inserimento nella tasca di prova;
- la pressione differenziale applicata, dovrebbe consentire alle celle di guardia (gas) di mantenere piane le basi della cella di misura (acqua); va notato che il peso della colonnina di gas (considerato nullo) aumenta con l'incremento delle pressione e non risulta più trascurabile oltre approssimativamente i 30 bars (i primi pressimetri di Louis Menard lavoravano a 25 bars);

Alla luce di queste considerazioni , la prova pressiométrica, non adrebbe mai prevista oltre i 50 metri di profondità ovvero oltre le medie pressioni superiori ai 25 – 30 bar e sostituita con la prova dilatometrica da roccia tenera (dilatometro volumetrico) : tale indicazione viene spesso ignorata da Progettisti e Direttori Lavori che pretendono l'esecuzione di prove pressiométriche oltre i limiti strumentali anzidetti.

Secondo l'esperienza acquisita dallo scrivente durante il corso di oltre 12.000 prove di deformabilità, si consiglia :

- 1) per terreni molli o sciolti ovvero sotto falda utilizzare il pressimetro auto perforante
- 2) per terreni da consistenti a molto consistenti o sino a molto addensati utilizzare il pressimetro di Menard
- 1) per materiali complessi , terre dure, rocce tenere e rocce dure fratturate utilizzare il dilarock volumetrico tipo CSM
- 2) per rocce dure compatte e calcestruzzi si usa preferibilmente il dilarock a sensori radiali.



schema di piastra indefinita con foro circolare pressurizzato, schema interpretativo tradizionale delle prove dilatometriche



Corpo sonda dilatometro da roccia diam 95 mm

PROVE PRESSIOMETRICHE PT (pressuremeter test) o DILATOMETRICHE SU ROCCIA DRT (dilatometric rock test)

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

Lavoro: **STRUMENTAZIONE** LAVORI DI STRUMENTAZIONE E PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

Commessa: LIA3.ID02.A01

Ordine: N° 100031758 - Attivazione: N° 56

La campagna di prove in sito è stata eseguita mediante l'impiego della seguente strumentazione (quella effettivamente utilizzata in neretto):

Dilatometro cilindrico volumetrico profondità sino 150 m : GEODV series tipo CSM (Colorado school of Mine) volumetrico da 200 bar dotato di lettura delle pressioni e deformazioni volumetriche in alta sensibilità (0,1 cmc /0,002 mm) in modo analogico/digitale, trasmissione delle pressione mediante cavi ad alta pressione, produzione 2005 e succ.

Dilatometro cilindrico volumetrico profondità sino 1000 m : VM01 tipo CSM (Colorado school of Mine) volumetrico da 200 bar dotato di lettura delle pressioni e deformazioni volumetriche in alta sensibilità (0,03 cmc /0,001 mm) in modo digitale a controllo remoto, trasmissione delle pressione mediante cavi ad alta pressione, produzione 2013.

Dilatometro cilindrico con sensori radiali : Roctest Telemac DMP-02/95 matricola 21F07 produzione 2007 con misura degli spostamenti radiali a mezzo n. 3 LVD disposti a 120 ° (sensibilità 1 μ , errore strumentale \pm 5 μ) uno dall'altro e su piani diversi montati a guaina flessibile lunga 1 m, centralina ad acquisizione digitale dei dati dilaroc n. 28D03 e cavi ad alta pressione.

Centralina di misura pressiometro Apageo Segelm matricola 573 da 100 bar di lettura delle deformazioni in sensibilità elevata (1/50 cmc)

Sonda dilatometrica: monocellulare diam 95 mm, 90 mm , 70 mm e 63 mm

Sonda pressiometrica: tricellulare o monocellulare diametro 44mm, 60 mm, 74 mm, auto perforante 63 mm

Carotiere: tipo_semplice o doppio corona a prismi di widia ad alta resistenza

Energizzatore: bombola di aria compressa/azoto compresso a 300 bar o pompa idraulica da 140 bar

2.2 PROCEDURE DI RIFERIMENTO Per la esecuzione delle prove dilatometriche/pressiometriche si è fatto riferimento ai seguenti standard operativi:

AFNOR NFP 94 – 110 - prove pressiometriche su terra

ASTM (D4719 - 87) – prove pressiometriche su terra

ISRM 1987 – (suggested method for determining deformability with flexible dilatometer with volume change measurements)

ISRM 1987 – (suggested method for determining deformability with flexible dilatometer with

radial displacement change measurements)

2.3 MODALITÀ' OPERATIVE

La prova pressiométrica PT (o dilatometrica DRT) consiste nella immissione in foro di sondaggio di una sonda cilindrica tricellulare (PT) / monocellulare (DRT) dilatabile collegata ad un controllore pressione - volume posto in superficie e collegato al sistema di energizzazione rappresentato da una bombola di azoto a 200 bar.

La deformazione del tratto di terreno sottoposto a prova viene ottenuta immettendo un liquido in pressione all'interno della cella di misura posta nella zona mediana della sonda pressiométrica, ovvero di azoto nella camera dilatometrica; essa, durante la prova, si comporta come una cavità cilindrica in espansione la cui geometria è correttamente mantenuta dalle opportune pressioni applicate alle celle di guardia, poste superiormente ed inferiormente alla stessa cella di misura.

In tal modo si ottiene un tensore degli sforzi piano con sforzo principale orientato orizzontalmente, il cui valore, viene misurato in superficie mediante manometri di precisione a scale differenziate nonché corretto in funzione delle inerzie proprie del sistema di espansione e della profondità dell'eventuale acqua presente nel foro all'atto della prova.

La rilevazione della deformazione del terreno viene eseguita direttamente in superficie mediante sistema volumetrico dotato di sensibilità normale (PT) od in alta precisione (DRT) ovvero da n. 3 sensori radiali di tipo *LVDT* (DRT) posti nel settore centrale della sonda; tale meccanismo si rende necessario in funzione delle diverse tipologie di prova (*prova su terreno* o *prova su roccia*), ed il valore ricavato viene successivamente depurato della dilatabilità propria dei tubi di immissione.

Applicando una serie di gradini di pressione, mantenuti costanti per determinati intervalli di tempo (*stress controlled*), e, rilevandone conseguentemente la deformazione, si ottiene una curva sforzo - deformazione in sito.

Durante il corso delle prove pressiométriche/dilatometriche effettuate si è proceduto ad eseguire uno (PT) o tre (DRT) cicli di scarico-ricarico a partire approssimativamente dal limite superiore del campo pseudoelastico (PT) ovvero nel tratto pseudoelastico (DRT), al fine di determinare il modulo di elasticità di Young dalla pendenza media del ciclo stesso ovvero dal tratto di ricarica (PT) o scarico (DRT).

Di particolare importanza per l'esecuzione di una corretta modalità di prova è l'esecuzione del foro che è avvenuta secondo tecnologie diversificate in funzione della litologia e sotto la diretta supervisione del tecnico strumentista: in tal modo è possibile effettuare prove pressiometriche/dilatometriche con estrema versatilità, dai terreni poco consistenti sino alle rocce compatte .

2.4 INTERPRETAZIONE TEORICO - SPERIMENTALE DEI RISULTATI

I principi teorici interpretativi sui quali si fonda l'analisi delle risultanze della prova dilatometrica sono riconducibili alla espansione di una cavità cilindrica secondo le seguenti assunzioni:

- mezzo omogeneo - ortotropo di dimensioni illimitate;
- espansione della cavità secondo simmetria assiale coincidente con l'asse del foro e deformazione piana;
- espansione di tipo quasi statico con incrementi e decrementi di pressione sufficientemente lenti da rendere trascurabili gli effetti delle forze di inerzia;
- comportamento del mezzo secondo una legge elasto - plastico lineare.

Gli elementi che influenzano una prova dilatometrica sono i seguenti:

volume di roccia interessato (effetto scala)

pressioni massime elevate (caso di rocce compatte)

intervallo di deformazione

possibilità di studio della anisotropia del litotipo (orientazione della fatturazione)

determinazione della deformabilità reale in sito mediante l'applicazione di opportune procedure operative (vedi cap. prec.)

I parametri ottenibili dall'analisi della curva dilatometrica sono i seguenti:

Po) PRESSIONE INIZIALE Po

La Pressione iniziale Po viene determinata in corrispondenza del limite inferiore del campo pseudoelastico (tratto subrettilineo di prima compressione della curva dilatometrica), può o meno corrispondere alla tensione totale tangenziale in sito , poiché a seguito del preforo il litotipo si trova in condizioni di trazione a comportamento più o meno elastico in funzione della intensità del disturbo arrecato dalla perforazione.

Em o Ep) MODULO PRESSIOMETRICO DI MENARD

Tale modulo è il modulo secante calcolato lungo tutto il campo pseudo elastico della curva pressiométrica compreso tra P_o e P_f , e rappresenta il modulo di deformabilità di primo carico sino alla massima deformazione del terreno prima della insorgenza delle deformazioni di tipo plastico (punto P_f).

Tale modulo risulta sempre inferiore od uguale al modulo di elasticità di Young calcolato come segue:

E) MODULO DI ELASTICITA' E_y

Il modulo reversibile di elasticità o di Young è dato dalla relazione di Lamè applicata ad una cavità cilindrica in espansione:

$$E = (1+\nu) \Phi P/d$$

con:

- ν : coefficiente di Poisson del materiale (sovente uguale a 0,25 – 0,30);
- Φ : diametro del foro (mm);
- P : pressione (Mpa);
- D : deformazione diametrale (mm).

Il modulo è calcolato per ciascun ciclo nel tratto di scarico significativo nel seguente modo,

$$E = (1+\nu) \Phi (P_{imax} - P_{imin}) / (d_{imax} - d_{imin})$$

con:

$P_{imax} - P_{imin}$: pressione massima e minima del tratto considerato;

$d_{imax} - d_{imin}$: deformazione massima e minima del tratto considerato;

Tali valori sono calcolati per interpolazione dai dati sperimentali mediante procedure statistiche matematiche nel ciclo di scarico-ricarico.

T) MODULO DI DEFORMABILITA' INTERMEDIO T_i

Analogamente ad E viene calcolato sulla curva di prima ricompressione tra la pressione massima di un ciclo P_i (deformazione = x_i) e la pressione massima raggiunta nel ciclo precedente P_{i-1} (deformazione = x_{i-1}) secondo la seguente relazione:

$$T_i = (1+\nu) \Phi (P_i - P_{i-1}) / (x_i - x_{i-1})$$

EG) MODULO DI DEFORMABILITA' GLOBALE

Tale modulo corrisponde alla pendenza media dello sviluppo della curva sperimentale di prima ricompressione da P_o , D_o sino a P_f , D_f (limiti del campo pseudoelastico investigato)

PL) PRESSIONE LIMITE PI

corrisponde allo stato di equilibrio limite indifferente con deformazioni infinite, per convenzione al valore della pressione relativo ad una dilatazione della sonda pressiométrica uguale al raddoppio della cavità dopo l'inizio della fase pseudoelastica.

Da cui:

1 metodo - Pressione limite (Cassan 1978)

$$PI = 1,7*(Pf-\sigma_{ho})+\sigma_{ho} \quad \text{COESIVI}$$

$$PI = 1,5*(Pf-\sigma_{ho})+\sigma_{ho} \quad \text{Mpa granulari} \quad P'l/P'f = 1,70$$

2 metodo - Pressione limite (metodo per 1/V , Van Wambecke e D'Henricourt)

$$PI (VI) = \quad \text{Kpa} \quad \text{Inverso del VL} \quad 1,14 \quad \text{CALCOLATA PER VIA GRAFICA}$$

Con

Pf = pressione di fluage calcolata su curva sperimentale

σ_{ho} = stima della tensione orizzontale in sito

P'l (Pressione limite netta) = PI - Po (pressione iniziale campo pseudoelastico)

Con:

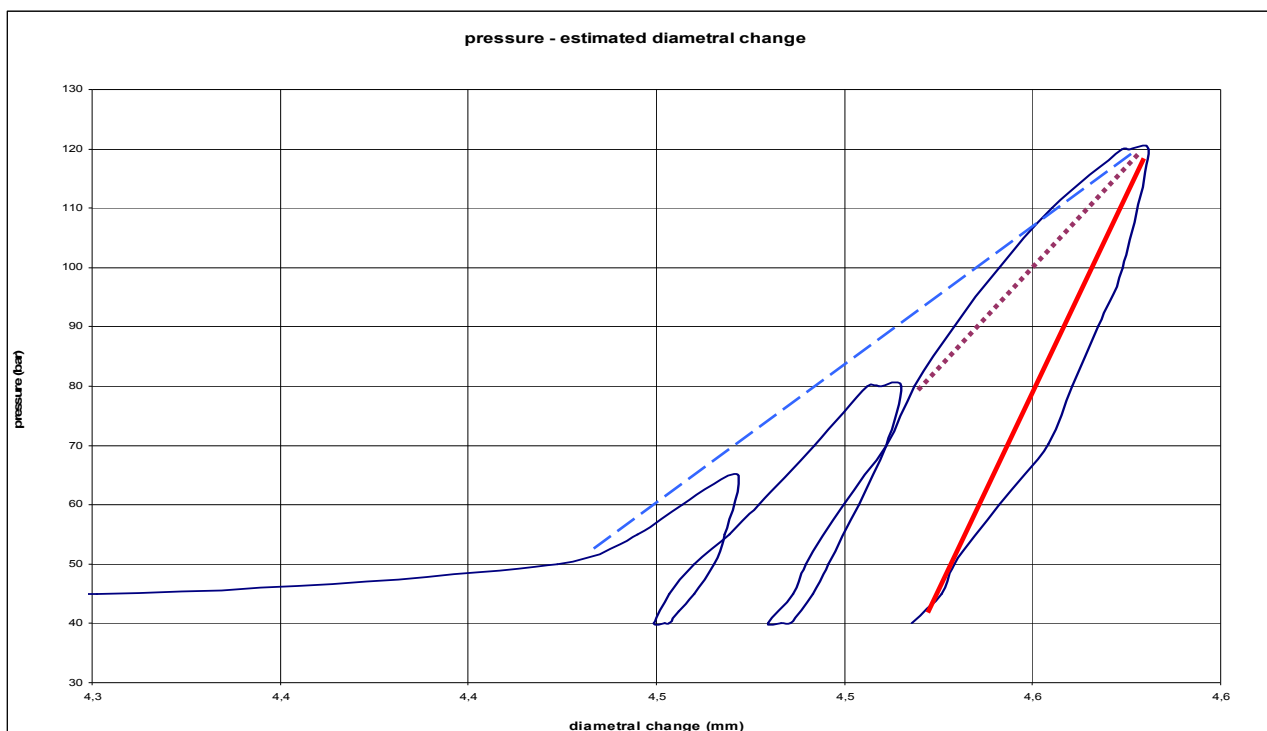
$$V_{lim.} = v_o + (v_o + V_o)$$

v_o = volume di ricompressione iniziale

V_o = volume proprio della sonda a riposo




La determinazione della pressione limite è stata qui eseguita in funzione del grado di deformazione raggiunto in base alle seguenti metodiche:

- metodo dell'extrapolazione diretta dalla curva pressiométrica;
- metodo dell'extrapolazione dall'inverso del volume iniettato (*Van Wambecke e d'Henricourt, 1971*)



Esempio di prova dilatometrica profonda effettuata con dilatometro GeoAnalisi VM01

Rappresentazione dei moduli caratteristici

<i>simbolo</i>	<i>Modulo derivato da curva corretta</i>
	<i>EG modulo di deformabilità globale</i>
	<i>T3 modulo di deformabilità intermedio</i>
	<i>E3=EY modulo di elasticità</i>

Coesione non drenata c_u :

stima della resistenza al taglio non drenata di materiali coesivi od assimilati a comportamento geomeccanico coesivo, direttamente dalla curva pressiometrica o mediante correlazioni sperimentali, ampiamente diffuse, in funzione della pressione limite netta dei terreni compresi nell'ambito di grado di consistenza da basso ad elevato (*Amar & Jezequel, 1972; Cassan, 1978, Johnson 1986*);

Angolo di attrito efficace ϕ' + effetto coesione:

stima della resistenza al taglio drenata di materiali prettamente granulari od assimilati, derivante da correlazioni empiriche meno diffuse delle precedenti e sovente corrette in funzione

di comparazioni locali con prove geotecniche in sito od in laboratorio eventualmente disponibili, secondo la seguente:

$$\phi_i' = (4 * (\text{Log}_2(P_l(\text{Mpa})/0,25) + 6))$$

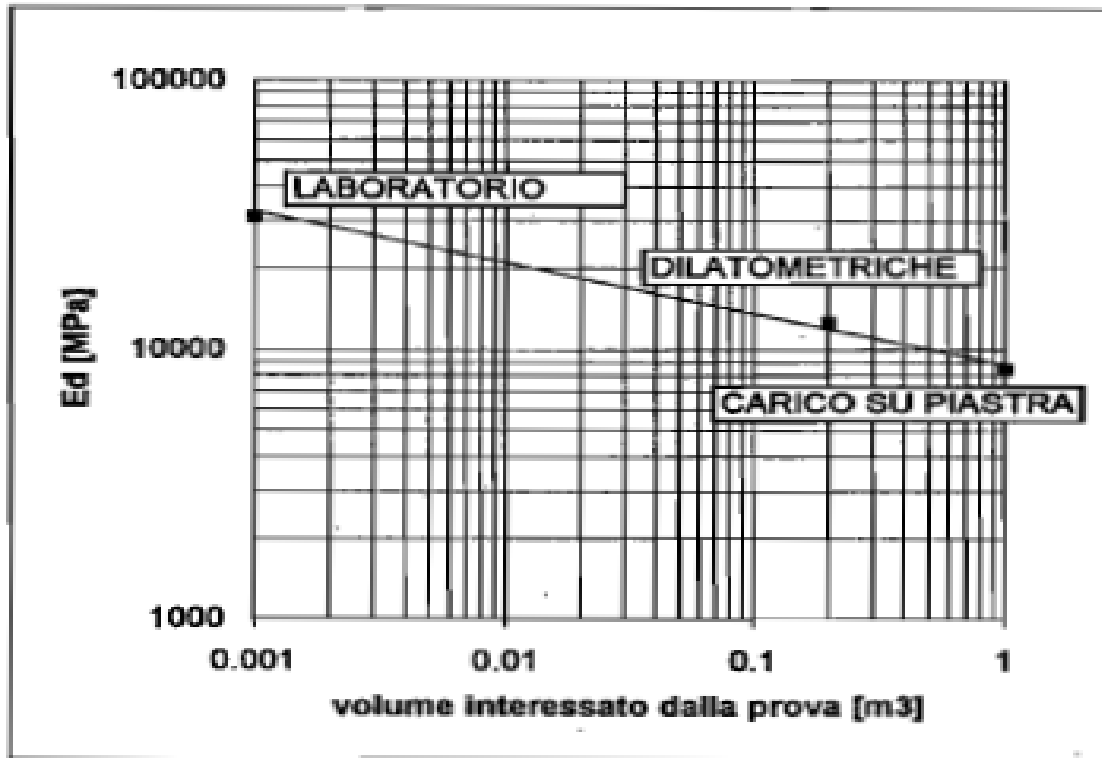
(da *Centre D'etudes L. Menard* , 1963 e da *Hughes et Alij*, 1977).

i valori così ottenuti, comprensivi dell'effetto della coesione c' laddove presente, vanno utilizzati come indicativi .

Un altro approccio per valutare la resistenza dei materiali investigati è invece quello di derivarli in termini di pressioni nette, direttamente dalla pressione di creep o fluage (pressione di incipiente rottura) desunti dalla curva pressiometrica/dilatometrica corretta, in tal caso si dovrà considerare l'effetto scala e la rispondenza del bulbo delle tensioni prodotto dallo strumento con quello teorico delle opere da progettare.

3.0 PIANIFICAZIONE DELLE INDAGINI PRESSIOMETRICHE/DILATOMETRICHE

Le prove pressiometriche PT e le prove dilatometriche DRT su roccia costituiscono prove puntuali (seppur interessano volumi di gran lunga più significativi delle prove di laboratorio) rispetto ai bulbi di tensione indotti dalla grandissima maggioranza delle opere civili. pertanto per essere significative delle condizioni di ammasso terroso/roccioso devono essere pianificate in appositi fori di sondaggio a cadenza di una prova / 1.2 ml di perforazione sino ad un massimo di 1 prova / 5 ml di perforazione per bulbi di tensione particolarmente estesi (gallerie, dighe e grandi opere) .



Effetto scala tra prove geomeccaniche per un litotipo fissile

Esecuzioni singole o in numero statisticamente poco significativo rispetto alle dimensioni volumetriche dell'ammasso da investigare possono essere fuorvianti delle caratteristiche geomeccaniche dello stesso, come raccomandato dalle norme americane (ISRM) e francesi (AFNOR)

(b) Within each drillhole, the tests may be spaced either at equal intervals or at specified locations in pre-selected geological formations or beds. Generally, a continuous log of deformability should be taken along the length of test hole pertinent to design. For example, a 1, 2 or 5 m test interval may be specified depending on test hole lengths and required resolution.

ISRM 1987 Working group on flexible dilatometers

ASTM (D4719 - 87) – prove pressiometriche su terra

ISRM 1987 – (suggested method for determining deformability with flexible dilatometer with volume change measurements)


ISRM 1987 – (suggested method for determining deformability with flexible dilatometer with radial displacement change measurements)

AGI 1993 Determinazione della deformabilità di ammassi rocciosi mediante prove dilatometriche (R.Crivelli, P.Devin, S. Guido)


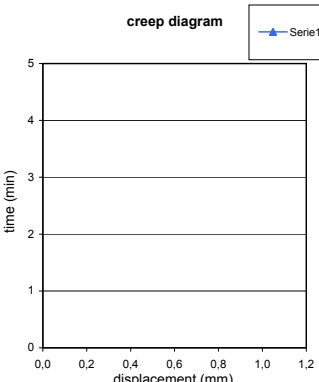
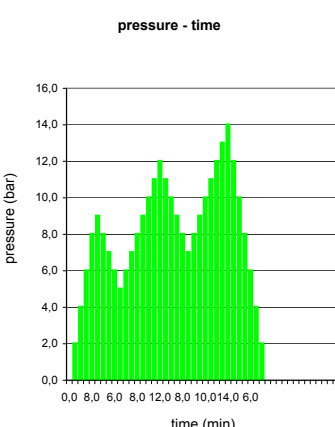
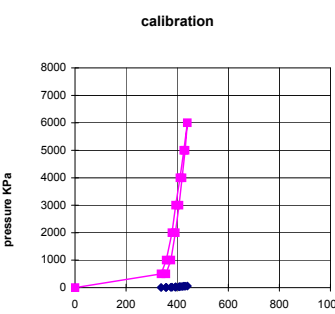
Sede: Via Monsignor Bologna, 18 - CAMPOBASSO
Stabilimento: C.da S.Maria delle Macchie - Vinchiaturo (CB)
Tel. 0874/340003-16 **Fax:** 0874/340014
P.IVA e Cod. Fiscale: 00717630701
web: www.imosgeo.it



S1 GALL BIS

	DILATOMETRIC ROCK TEST DRT			mod DVT rev. 2			
	borehole	S1GALL bis	probe depth m	5,5	code	1	
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT
	Project	RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)		report	1714SIT	15	DRT
site	CAMPOMARINO	coordinates	EAST NORTH	date	06.12.17	pag	1/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

Borehole S1GALL bis			LITHOTYPE	time	P	Pcorr	Vol	ε c	1/v	diameter	Dil. Diam	Modulo																																																																																																									
					min	bar	Kpa	cmc	%	1000/cm	(mm)	(mm)	MPa																																																																																																								
test	1	depth m	5,50	0	0,0	0	0,0	-7,578	0,000	96,273	0,000	0,0																																																																																																									
slope (degree)	90	core barrel		1	2,0	187	590,2	0,000	1,694	104,168	7,894	3,1																																																																																																									
Device:	CSM Type GEODV03 95 mm			2	4,0	384	620,4	0,372	1,612	104,556	8,282	68,7																																																																																																									
Orientation capteur	Standard method: ISRM 1987			3	6,0	579	668,6	0,964	1,496	105,172	8,898	43,0																																																																																																									
Probe diam 95 MM	Borehole diam	101 MM		4	8,0	772	724,8	1,649	1,380	105,886	9,612	37,2																																																																																																									
Meteo	Temperatur e			5	9,0	867	771,9	2,220	1,296	106,480	10,207	22,0																																																																																																									
lithotype	SABBIE LIMOSE DEBOLM. CEMENTATE ROSSASTRE			6	8,0	767	772,8	2,231	1,294	106,492	10,218	-1221,9																																																																																																									
water table	POCKET PENETRO METER			7	7,0	667	768,7	2,181	1,301	106,440	10,166	266,9																																																																																																									
Creep test P (Bars) =				8	6,0	567	765,6	2,144	1,306	106,401	10,127	353,1																																																																																																									
Temps min	PBAR	MM		9	5,0	468	757,5	2,046	1,320	106,299	10,025	134,2																																																																																																									
1				10	6,0	568	763,6	2,120	1,310	106,376	10,102	178,5																																																																																																									
2				11	7,0	667	768,7	2,181	1,301	106,440	10,166	214,1																																																																																																									
3				12	8,0	766	778,8	2,303	1,284	106,567	10,294	107,7																																																																																																									
4				13	9,0	863	799,9	2,558	1,250	106,832	10,559	51,1																																																																																																									
5				14	10,0	960	827,0	2,884	1,209	107,172	10,898	39,7																																																																																																									
				15	11,0	1057	860,1	3,280	1,163	107,585	11,311	32,5																																																																																																									
				16	12,0	1153	887,2	3,604	1,127	107,922	11,648	40,3																																																																																																									
				17	11,0	1054	885,1	3,579	1,130	107,896	11,648	536,7																																																																																																									
				18	10,0	954	884,0	3,566	1,131	107,882	11,609	1025,8																																																																																																									
				19	9,0	854	883,9	3,565	1,131	107,881	11,608	11388,1																																																																																																									
				20	8,0	754	881,8	3,540	1,134	107,855	11,581	536,3																																																																																																									
				21	7,0	655	869,7	3,395	1,150	107,704	11,431	91,8																																																																																																									
				22	8,0	755	874,8	3,456	1,143	107,768	11,494	219,5																																																																																																									
				23	9,0	854	882,9	3,553	1,133	107,869	11,595	137,9																																																																																																									
				24	10,0	952	897,0	3,721	1,115	108,044	11,770	78,9																																																																																																									
				25	11,0	1052	904,1	3,805	1,106	108,132	11,858	158,3																																																																																																									
				26	12,0	1149	926,2	4,068	1,080	108,405	12,132	50,1																																																																																																									
				27	13,0	1246	953,3	4,389	1,049	108,740	12,466	40,9																																																																																																									
				28	14,0	1342	987,4	4,792	1,013	109,159	12,886	32,4																																																																																																									
				29	12,0	1143	977,2	4,672	1,023	109,034	12,761	225,0																																																																																																									
				30	10,0	945	959,0	4,457	1,043	108,810	12,537	125,1																																																																																																									
				31	8,0	747	943,8	4,277	1,060	108,623	12,349	149,5																																																																																																									
				32	6,0	548	931,6	4,132	1,073	108,472	12,199	186,0																																																																																																									
				33	4,0	350	914,4	3,928	1,094	108,259	11,986	131,1																																																																																																									
				34	2,0	152	898,2	3,735	1,113	108,059	11,785	138,8																																																																																																									
PROBE SCHEME	 <p>rod adaptor electronic device double action piston expandable cylinder</p>			 <p>creep diagram</p>	 <p>pressure - time</p>	 <p>calibration</p>	<table border="1"> <tr> <td colspan="10">valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione</td> </tr> <tr> <td colspan="10">FIELD LIMITS</td> </tr> <tr> <td></td> <td>P</td> <td>P corr</td> <td>V corr</td> <td>creep</td> <td>1000/V</td> <td>diameter</td> <td>Dil. Diam</td> <td>loop</td> <td></td> </tr> <tr> <td>min</td> <td>2,0</td> <td>187,5</td> <td>590,2</td> <td>0,0</td> <td>1,7</td> <td>104,2</td> <td>7,9</td> <td>primo</td> <td></td> </tr> <tr> <td>max</td> <td>14,0</td> <td>1342,0</td> <td>987,4</td> <td>4,8</td> <td>1,0</td> <td>109,2</td> <td>12,886</td> <td>carico</td> <td></td> </tr> <tr> <td>max</td> <td>9,0</td> <td>866,7</td> <td>771,9</td> <td>2,2</td> <td>1,3</td> <td>106,5</td> <td>10,207</td> <td>I</td> <td></td> </tr> <tr> <td>min</td> <td>5,0</td> <td>468,3</td> <td>757,5</td> <td>2,0</td> <td>1,3</td> <td>106,3</td> <td>10,025</td> <td></td> <td></td> </tr> <tr> <td>max</td> <td>12,0</td> <td>1153,5</td> <td>887,2</td> <td>3,6</td> <td>1,1</td> <td>107,9</td> <td>11,648</td> <td>II</td> <td></td> </tr> <tr> <td>min</td> <td>7,0</td> <td>655,5</td> <td>869,7</td> <td>3,4</td> <td>1,1</td> <td>107,7</td> <td>11,431</td> <td></td> <td></td> </tr> <tr> <td>max</td> <td>14,0</td> <td>1342,0</td> <td>987,4</td> <td>4,8</td> <td>1,0</td> <td>109,2</td> <td>12,886</td> <td>III</td> <td></td> </tr> <tr> <td>min</td> <td>2,0</td> <td>152,2</td> <td>898,2</td> <td>3,7</td> <td>1,1</td> <td>108,1</td> <td>11,785</td> <td></td> <td></td> </tr> </table>	valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione										FIELD LIMITS											P	P corr	V corr	creep	1000/V	diameter	Dil. Diam	loop		min	2,0	187,5	590,2	0,0	1,7	104,2	7,9	primo		max	14,0	1342,0	987,4	4,8	1,0	109,2	12,886	carico		max	9,0	866,7	771,9	2,2	1,3	106,5	10,207	I		min	5,0	468,3	757,5	2,0	1,3	106,3	10,025			max	12,0	1153,5	887,2	3,6	1,1	107,9	11,648	II		min	7,0	655,5	869,7	3,4	1,1	107,7	11,431			max	14,0	1342,0	987,4	4,8	1,0	109,2	12,886	III		min	2,0	152,2	898,2	3,7	1,1	108,1	11,785		
valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione																																																																																																																					
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PROBE CALIBRATION	probe GEODV03 CSM TYPE membrane CAUCCIU' ARMATO measure cell height (cm) V0 cell volume at rest (cmc) 3457 lenght cable (mt) 100 Volume initial Vi (cmc) 349 diam calibration tube (cm) 10,1 tube calibration volume cmc 3806			Calibration in air coeff m 0,0011 bar /cmc Confined calibration first load 1,45 cmc/bar unload 1,11 cmc/bar																																																																																																																	



DILATOMETRIC ROCK TEST DRT

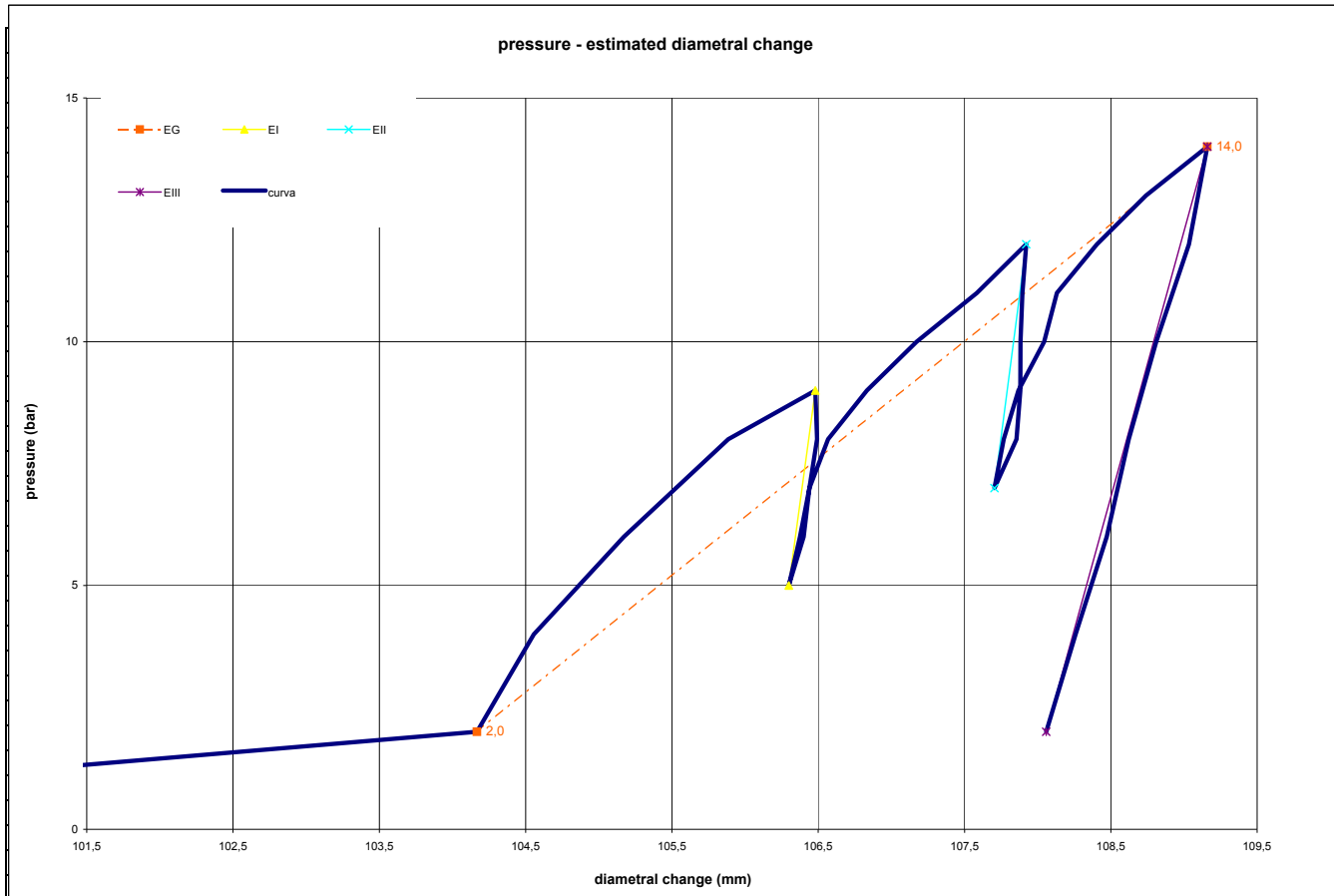
borehole **S1GALL bis** probe depth m **5,5** code **1** mod DVT rev. 1

Client: **ITALFERR S.P.A.** job **1714** v. accept. **1714SIT**

Project: **RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)** report **1714SIT 15 DRT**

site: **CAMPOMARINO** coordinates **EAST NORTH** data **06.12.17** pag **2/3**

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



DATA PROCESSING					SENSOR 1	SENSOR 2	SENSOR 3	SENSOR AVE		
Legend: H = test depth W = water table depth v = Poisson ratio vo = cell initial volume do = cell initial diameter Φ = borehole wall diameter Po = start pressure Pmax = max loop pressure (MPa) Pmin = min loop pressure (MPa) d max displacement at P max d min displacement at P min σv vertical total stress estimated ε c = dR / Ro		DATA		ELASTICITY MODULUS EI						
		symbol	datum	loop	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	Eav (Mpa)
		γsoil	2,2	2	12,00	7,00				297
		W (ml)	5,5	3	14,00	2,00				146
		v	0,3	4						
		vo (cmc)	3457	5						
		do (mm)	96,27	DEFORMATION MODULUS TI						
		σv (kPa)	121	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)
				1	9,00	2,00				40
				2	12,00	9,00				27
		3	14,00	12,00				21		
		4								
		5								
ELASTICITY MODULUS Ei		ELASTICITY MODULUS Ey estimated			GLOBAL DEFORMATION MODULUS EG					
Ei = (1+ v) Φ Pax - Pmin		Ey = (EII+EIII)/2			Pmax	Pmin	EG1 (Mpa)	EG2 (Mpa)	EG3 (Mpa)	EGm (Mpa)
dmax - dmin		Ey = EIII			14,00	2,00				31
					DIAMETER		F	F	F	F
					beginning diameter (mm)					104,168
					final diameter (mm)					109,159
					range mm					4,992
DEFORMATION MODULUS Ti		DM loop minimum displacement			DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS					
Ti = (1+ v) Φ Pi - Pi-1		Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	187	EG (MPa)	31
Xi - Xi-1		bar	0	120	240	0	Pf creep pressure (KPa)	1342	E3 (MPa)	146
GLOBAL DEFORMATION MODULUS EG		9,0	10,997	10,997	10,997	10,207	PL limit pres. (KPa) Cassan >	2222	E/PL	14,65
EG = (1+ v) Φ Pmax - Po							PL' net limit pres (KPa) >	2137	EG/Ey	0,21
dmax - do							Ko lateral coeff at rest (KPa)	0,70	cu coesion (KPa) johnson	
note: RAGGIUNTI I LIMITI DI DEFORMAZIONE DELLO STRUMENTO							Pho lateral pressure (KPa)	85	φ friction angle (°) >	

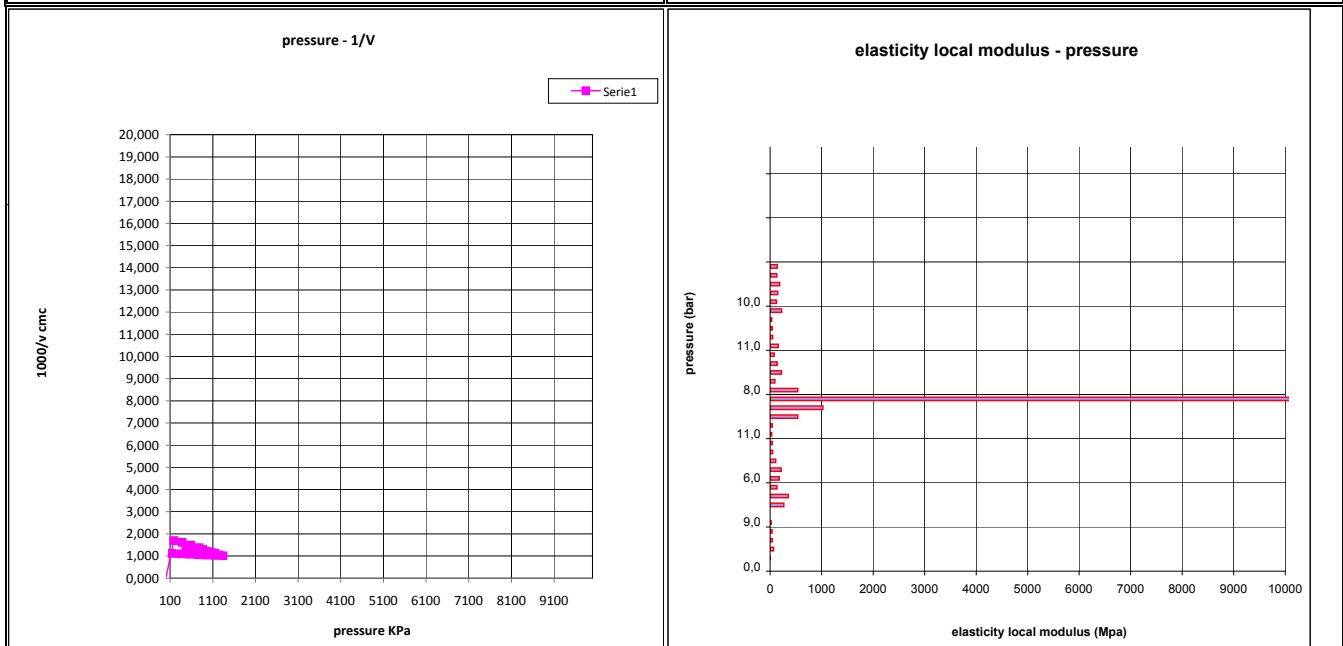


DILATOMETRIC ROCK TEST DRT			
borehole	S1GALL bis	probe depth m	5,5
		mod DVT	rev. 1
		code	1
Client:	ITALFERR S.P.A.	job	1714 v. accept. 1714SIT
Project	RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)	report	1714SIT 15 DRT
site	CAMPOMARINO	coordinates	EAST NORTH
		date	06.12.17 pag 3/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



da inserire





DILATOMETRIC ROCK TEST DRT

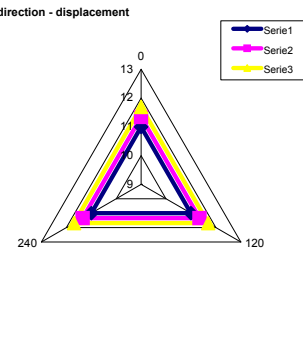

borehole **S1GALL bis** probe depth m **11,0** mod DVT rev. 2
 code **2**

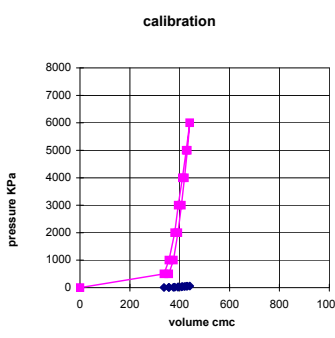
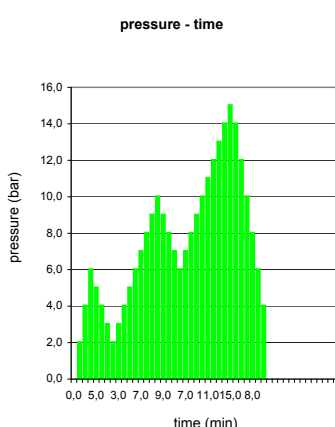
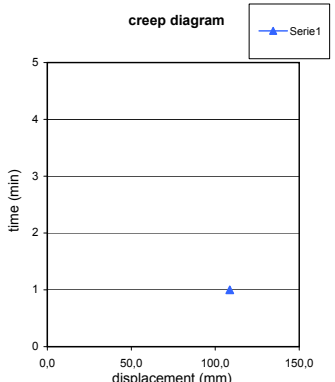
Client: **ITALFERR S.P.A.** job 1714 v. accept. 1714SIT

Project **RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)** report **1714SIT 16 DRT**

site **CAMPOMARINO** coordinates EAST NORTH date **06.12.17** pag **1/3**

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

Borehole S1GALL bis				LITHOTYPE direction - displacement 	time	P	Pcorr	Vol	ϵ_c	1/V	diameter	Dil. Diam	Modulo	
						min	bar	Kpa	cmc	%	1000/cm	(mm)	(mm)	MPa
						0	0,0	0	0,0	-8,512	0,000	96,273	0,000	0,0
test	2	depth m	11,00	1	2,0	233	673,2	0,000	1,485	105,230	8,957	3,4		
slope (degree)	90	core barrell		2	4,0	431	690,4	0,208	1,448	105,449	9,176	123,9		
Device: CSM Type GEODV03 95 mm				3	6,0	627	724,6	0,620	1,380	105,883	9,610	62,1		
Orientation capteur C1=	Standard method: ISRM 1987			4	5,0	527	724,5	0,619	1,380	105,882	9,608	10969,9		
Probe diam 95 MM	Borehole diam	101 MM		5	4,0	428	720,4	0,570	1,388	105,830	9,556	263,9		
Meteo	Temperatur	e		6	3,0	328	716,3	0,520	1,396	105,778	9,505	263,6		
lithotype	SABBIE DEBOLM. LIMOSE ROSSASTRE MOLTO ADDENSATE			7	2,0	228	714,2	0,495	1,400	105,751	9,478	515,6		
water table	POCKET PENETRO METER			8	3,0	328	717,3	0,532	1,394	105,791	9,517	348,8		
Creep test P (Bars) =				9	4,0	428	720,4	0,570	1,388	105,830	9,556	349,1		
Temps min	PBAR	MM		10	5,0	527	728,5	0,667	1,373	105,932	9,659	133,0		
1				11	6,0	625	739,6	0,801	1,352	106,073	9,799	96,9		
2				12	7,0	722	765,7	1,114	1,306	106,402	10,129	40,7		
3				13	8,0	820	786,8	1,366	1,271	106,668	10,394	50,9		
4				14	9,0	919	797,9	1,498	1,253	106,807	10,534	98,3		
5				15	10,0	1015	827,0	1,845	1,209	107,172	10,898	36,9		
PROBE SCHEME 				16	9,0	916	825,9	1,832	1,211	107,158	10,884	1012,0		
rod adaptor	electronic device			17	8,0	816	821,8	1,783	1,217	107,107	18	270,3		
double action piston				18	7,0	717	815,7	1,710	1,226	107,030	10,757	181,0		
expandable cylinder				19	6,0	617	808,6	1,626	1,237	106,941	10,668	155,1		
PROBE CALIBRATION				20	7,0	717	814,7	1,698	1,227	107,018	10,744	180,7		
probe	GEODV03 CSM TYPE			21	8,0	816	821,8	1,783	1,217	107,107	10,833	155,3		
membrane	CAUCCIU' ARMATO			22	9,0	915	826,9	1,844	1,209	107,170	10,897	217,0		
measure cell height (cm)				23	10,0	1014	837,0	1,964	1,195	107,297	11,023	109,1		
V0 cell volume at rest (cmc)	3457			24	11,0	1112	858,1	2,214	1,165	107,560	11,286	51,8		
length cable (mt)	50			25	12,0	1209	884,2	2,522	1,131	107,885	11,611	41,8		
Volume initial Vi (cmc)	349			26	13,0	1305	914,3	2,877	1,094	108,258	11,985	36,3		
diam calibration tube (cm)	10,1			27	14,0	1403	939,4	3,172	1,065	108,568	12,295	44,1		
tube calibration volume cmc	3806			28	15,0	1499	971,5	3,548	1,029	108,964	12,690	34,4		
Calibration in air				29	14,0	1399	971,4	3,547	1,029	108,963	12,689	11617,6		
coeff m	0,0011	bar / cmc		30	12,0	1200	965,2	3,474	1,036	108,886	12,613	370,0		
Confined calibration				31	10,0	1001	955,0	3,355	1,047	108,761	12,487	223,9		
first load	1,45	cmc/bar		32	8,0	802	944,8	3,235	1,058	108,635	12,362	223,4		
unload	1,11	cmc/bar		33	6,0	604	924,6	2,998	1,082	108,386	12,112	111,8		
				34	4,0	407	898,4	2,690	1,113	108,061	11,788	85,4		



valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione

FIELD LIMITS									
	P	P corr	V corr	creep	1000/V	diameter	Dil. Diam	loop	
min	2,0	233,0	673,2	0,0	1,5	105,2	9,0	primo	
max	15,0	1498,8	971,5	3,5	1,0	109,0	12,7	carico	
max	6,0	627,1	724,6	0,6	1,4	105,9	9,6	I	
	4,0	427,6	720,4	0,6	1,4	105,8	9,6		
min	9,0	915,5	825,9	1,8	1,2	107,2	10,9	II	
	6,0	617,5	808,6	1,6	1,2	106,9	10,7		
max	15,0	1498,8	971,5	3,5	1,0	109,0	12,7	III	
	4,0	407,2	898,4	2,7	1,1	108,1	11,8		



DILATOMETRIC ROCK TEST DRT

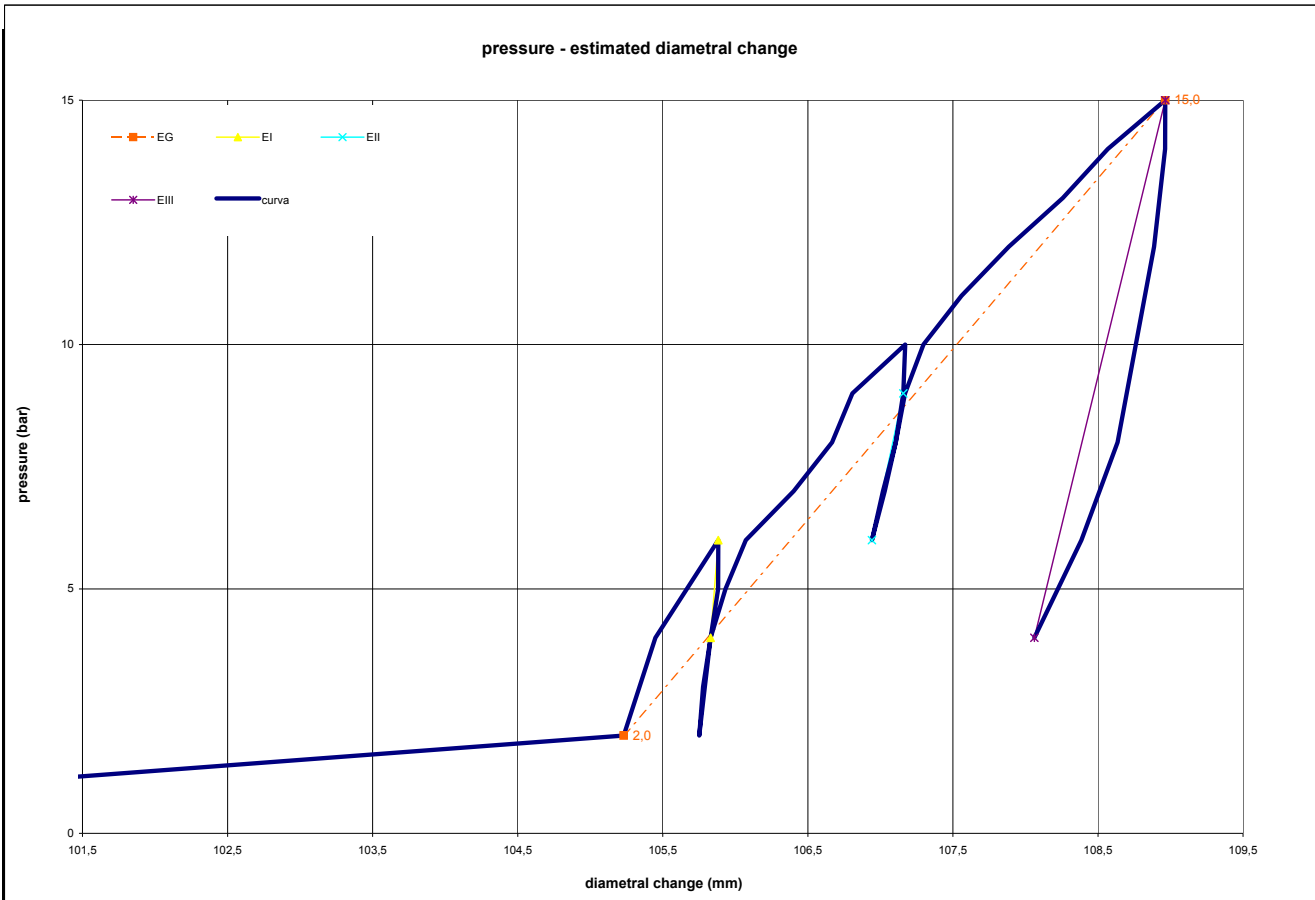
borehole **S1GALL bis** probe depth m **11,0** code **2** mod DVT rev. 1

Client: **ITALFERR S.P.A.** job **1714** v. accept. **1714SIT**

Project: **RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)** report **1714SIT 16 DRT**

site: **CAMPOMARINO** coordinates **EAST NORTH** date **06.12.17** pag **2/3**

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



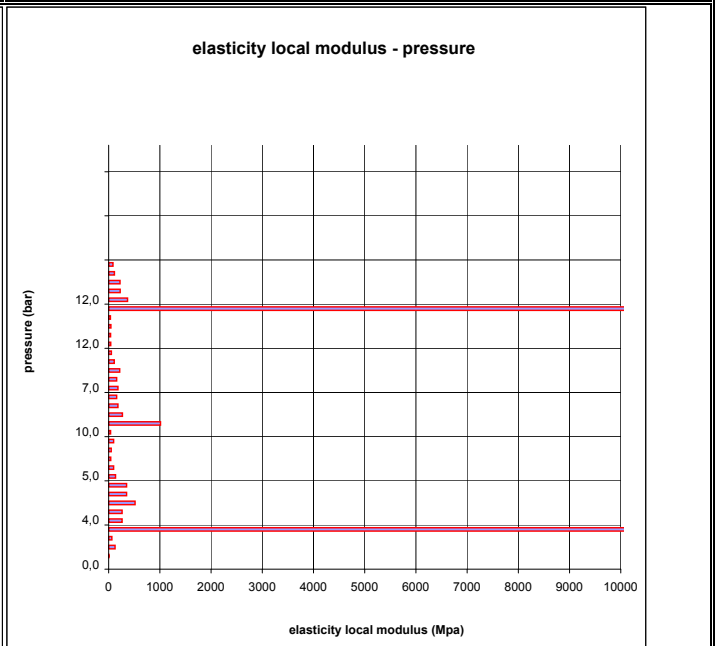
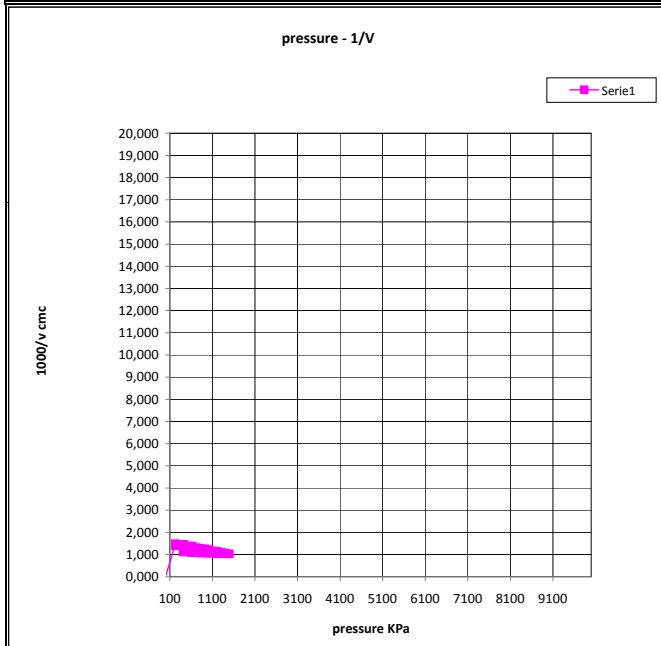
DATA PROCESSING		SENSOR 1		SENSOR 2		SENSOR 3		SENSOR AVE	
Legend: H = test depth W = water table depth v = Poisson ratio vo = cell initial volume do = cell initial diameter Φ = borehole wall diameter Po = start pressure Pmax = max loop pressure (MPa) Pmin = min loop pressure (MPa) d max displacement at P max d min displacement at P min σv vertical total stress estimated ε c = dR / Ro		ELASTICITY MODULUS Ei							
		DATA	loop	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	Eav (Mpa)
symbol	datum	1	6,00	4,00				513	
γnsoil	2,2	2	9,00	6,00				188	
W (ml)	11,0	3	15,00	4,00				165	
v	0,3	4							
vo (cmc)	3457	5							
do (mm)	96,27	DEFORMATION MODULUS Ti							
σv (kPa)	242	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)	
		1	6,00	2,00				83	
		2	9,00	6,00				31	
		3	15,00	9,00				44	
		4							
		5							
ELASTICITY MODULUS Ei		ELASTICITY MODULUS Ey estimated							
Ei = (1+ v) Φ Pax - Pmin		Pmax	Pmin	EG1 (Mpa)	EG2 (Mpa)	EG3 (Mpa)	EGm (Mpa)		
dmax - dmin	Ey = (EII+EIII)/2	15,00	2,00				46		
	Ey = EIII	DIAMETER		F	F	F	F		
DEFORMATION MODULUS Ti		beginning diameter (mm)						105,230	
Ti = (1+ v) Φ Pi - Pi-1		final diameter (mm)						108,964	
Xi - Xi-1		range mm						3,734	
GLOBAL DEFORMATION MODULUS EG		DM loop minimum displacement		DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS					
EG = (1+ v) Φ Pmax - Po	Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	233	EG (MPa)	46
dmax - do	bar	0	120	240	0	Pf creep pressure (KPa)	1499	E3 (MPa)	165
	6,0	10,997	10,997	10,997	9,610	PL limit pres. (KPa) Cassan >	2429	E/PL	20,52
						PL' net limit pres (KPa) >	2260	EG/Ey	0,28
note: RAGGIUNTI I LIMITI DI DEFORMAZIONE DELLO STRUMENTO						Ko lateral coeff at rest (KPa)	0,70	cu coesion (KPa) johnson	
						Pho lateral pressure (KPa)	169	φ friction angle (°) >	



DILATOMETRIC ROCK TEST DRT		mod DVT	rev. 1
borehole	S1GALL bis	probe depth m	11,0
		code	2
Client:	ITALFERR S.P.A.	job	1714 v. accept. 1714SIT
Project	RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)	report	1714SIT 16 DRT
site	CAMPOMARINO	coordinates	EAST NORTH
		date	06.12.17
		pag	3/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

PLACE	SECTION
da inserire	
	



Sede: Via Monsignor Bologna, 18 - CAMPOBASSO
Stabilimento: C.da S.Maria delle Macchie - Vinchiaturo (CB)
Tel. 0874/340003-16 **Fax:** 0874/340014
P.IVA e Cod. Fiscale: 00717630701
web: www.imosgeo.it



S1 GALL

	DILATOMETRIC ROCK TEST DRT					mod DVT rev. 1
	borehole	S1GALL	probe depth m	30,0	code	1
	Client:	ITALFERR S.P.A.		job	1714	v. accept. 1714SIT
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT 01 DRT	
	site	CAMPOMARINO	coordinates	EAST NORTH		date 15.06.17 pag 1/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

Borehole	LITHOTYPE		time									
			P		Pcorr	Vol	ε c	1/V	diameter	Dil. Diam	Modulo	
			min	bar	Kpa	cmc	%	1000/cmc	(mm)	(mm)	MPa	
S1GALL	direction - displacement		0	0,0	0	0,0	-7,636	0,000	96,273	0,000	0,0	
test 1	depth m 30,00		1	2,0	471	413,6	-2,267	2,418	101,870	5,597	10,4	
slope (degree) 90	core barrel		2	4,0	662	502,3	-1,154	1,991	103,030	6,757	21,1	
Device: CSM Type GEODV03 95 mm			3	6,0	855	551,9	-0,536	1,812	103,674	7,400	38,7	
Orientation capteur C1=	Standard method: ISRM 1987		4	8,0	1049	595,3	0,000	1,680	104,233	7,959	45,0	
Probe diam 95 MM	Borehole diam	101 MM	5	10,0	1243	625,2	0,369	1,599	104,617	8,344	66,0	
Meteo	Temperatur e		6	9,0	1145	628,0	0,403	1,592	104,653	8,379	-360,6	
lithotype SABBIA LIMOSA BEIGE DA ADDENSATA A DEB. CEMENTATA			7	8,0	1047	621,3	0,320	1,610	104,567	8,293	148,2	
water table			8	7,0	950	611,7	0,203	1,635	104,445	8,171	104,3	
Creep test P (Bars) = 48,0			9	6,0	853	591,9	-0,041	1,689	104,190	7,916	49,6	
Temps min	PBAR	MM	10	7,0	950	602,7	0,092	1,659	104,329	8,055	91,2	
1	48,0	110,727	11	8,0	1047	612,6	0,213	1,632	104,455	8,182	100,8	
2	48,0	110,744	12	9,0	1145	619,3	0,296	1,615	104,541	8,268	147,9	
3	48,0	110,750	13	10,0	1243	628,2	0,406	1,592	104,656	8,382	111,5	
4	48,0	110,756	14	12,0	1437	661,8	0,818	1,511	105,086	8,812	59,2	
5	48,0	110,762	15	14,0	1631	685,5	1,107	1,459	105,387	9,113	85,0	
rod adaptor			16	16,0	1826	703,5	1,327	1,421	105,616	9,342	112,2	
electronic device			17	18,0	2021	721,7	1,548	1,386	105,846	9,518	112,0	
double action piston			18	20,0	2217	732,4	1,678	1,365	105,982	9,708	190,3	
expandable cylinder			19	18,0	2021	731,2	1,663	1,368	105,966	9,693	1655,2	
			20	16,0	1825	724,1	1,577	1,381	105,877	9,604	290,7	
			21	14,0	1630	707,5	1,375	1,413	105,666	9,393	122,3	
			22	12,0	1435	688,8	1,148	1,452	105,429	9,156	108,6	
			23	14,0	1630	705,1	1,346	1,418	105,636	9,362	124,8	
			24	16,0	1825	718,5	1,509	1,392	105,806	9,533	151,4	
			25	18,0	2021	733,6	1,692	1,363	105,997	9,723	135,7	
			26	20,0	2216	738,4	1,751	1,354	106,058	9,784	424,0	
			27	22,0	2411	757,9	1,987	1,319	106,304	10,031	104,9	
			28	28,0	2997	801,6	2,514	1,248	106,853	10,580	142,2	
			29	30,0	3192	812,2	2,642	1,231	106,986	10,713	195,8	
rod adaptor			30	32,0	3388	822,8	2,770	1,215	107,120	10,846	196,3	
electronic device			31	34,0	3582	846,5	3,053	1,181	107,415	11,142	88,3	
double action piston			32	36,0	3777	874,0	3,382	1,144	107,758	11,485	76,2	
expandable cylinder			33	38,0	3970	917,2	3,896	1,090	108,294	12,020	48,8	
			34	40,0	4164	948,6	4,269	1,054	108,682	12,409	67,8	
			35	42,0	4358	981,3	4,655	1,019	109,085	12,812	65,5	
			36	44,0	4552	1015,4	5,056	0,985	109,503	13,229	63,5	
			37	46,0	4745	1065,7	5,645	0,938	110,117	13,844	43,1	
			38	48,0	4938	1116,0	6,231	0,896	110,727	14,454	43,7	
			39	48,0	4938	1117,4	6,247	0,895	110,744	14,471	-0,7	
			40	48,0	4938	1117,9	6,253	0,895	110,750	14,477	-0,7	
			41	48,0	4938	1118,4	6,258	0,894	110,756	14,483	-0,7	
			42	48,0	4938	1118,9	6,264	0,894	110,762	14,489	-0,7	
			43	40,0	4156	1094,0	5,975	0,914	110,461	14,187	359,2	
			44	30,0	3177	1062,3	5,605	0,941	110,076	13,802	349,9	
			45	20,0	2201	985,6	4,705	1,015	109,137	12,864	142,5	
			46	10,0	1227	886,2	3,528	1,128	107,910	11,636	107,7	
			47	6,0	838	839,9	2,974	1,191	107,333	11,060	90,9	
			PROBE CALIBRATION			valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione						
probe GEODV03 CSM TYPE			FIELD LIMITS									
membrane CAUCCIU' ARMATO			P		P corr	V corr	creep	1000/V	diameter	Dil. Diam	loop	
measure cell height (cm)			min	8,0	1048,5	595,3	0,0	1,7	104,2	8,0	primo	
V0 cell volume at rest (cmc) 3457			max	34,0	3582,2	846,5	3,1	1,2	107,4	11,1	carico	
length cable (mt) 50			max		10,0	1242,8	625,2	0,4	1,6	104,6	8,3	I
Volume initial Vi (cmc) 349			min		6,0	852,7	591,9	0,0	1,7	104,2	7,9	
diam calibration tube (cm) 10,1			max		20,0	2216,6	732,4	1,7	1,4	106,0	9,7	II
tube calibration volume cmc 3806			min		12,0	1435,0	688,8	1,1	1,5	105,4	9,2	
Calibration in air			max		48,0	4938,3	1118,9	6,3	0,9	110,8	14,5	III
coeff m 0,06 cmc/Kpa			min		6,0	837,8	839,9	3,0	1,2	107,3	11,1	
Confined calibration												
first load 66 Kpa/cmc												
unload 85 Kpa/cmc												

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015
Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"
Commissa: LIA3.1D02.A01
Ordine: N° 100031758 - Attivazione: N° 56



DILATOMETRIC ROCK TEST DRT

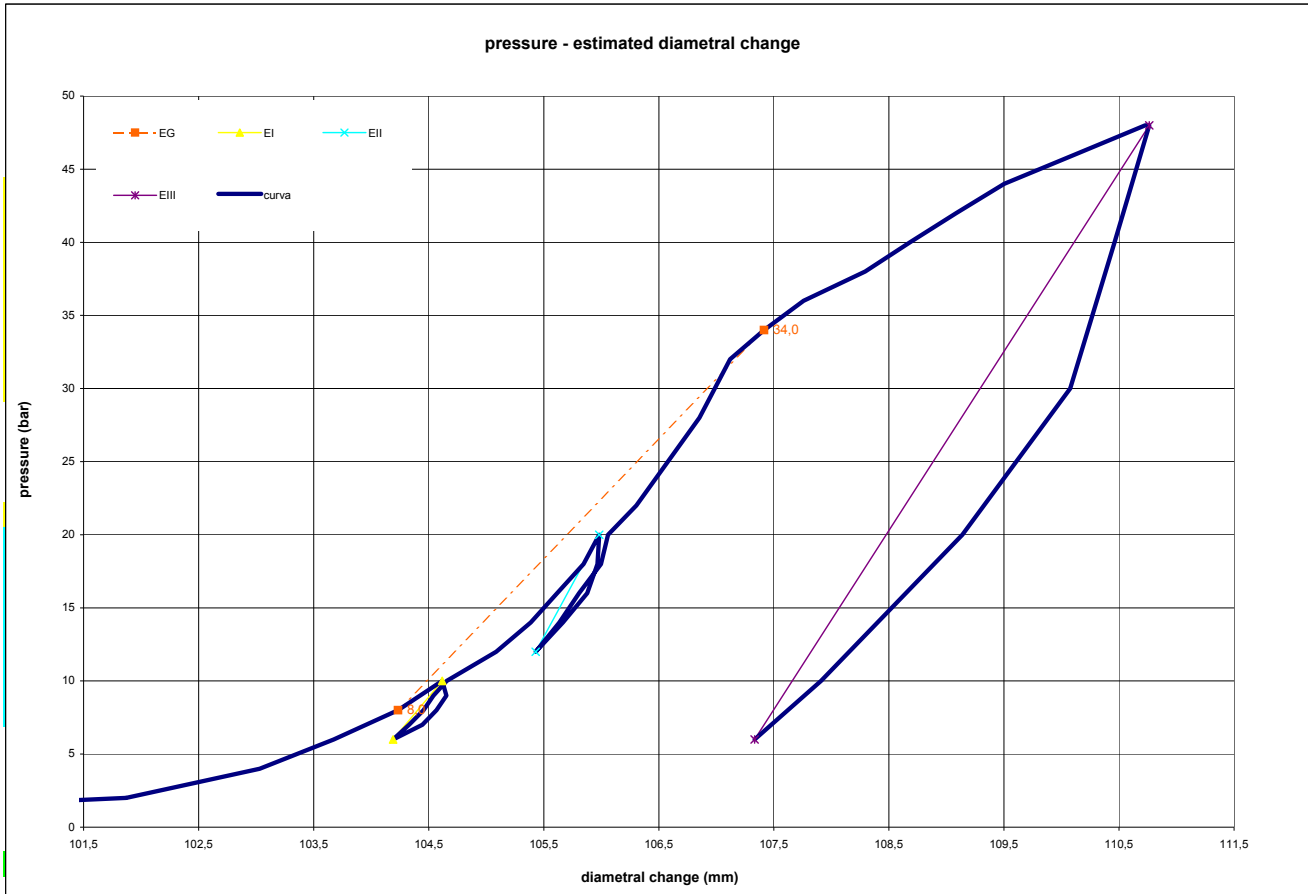
borehole **S1GALL** probe depth m **30,0** mod DVT rev. 1
code **1**

Client: **ITALFERR S.P.A.** job 1714 v. accept. **1714SIT**

Project: **COLLEGAMENTO CAMPOMARINO-RIPALTA** report **1714SIT 01 DRT**

site **CAMPOMARINO** coordinates EAST NORTH date **15.06.17** pag **2/3**

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



DATA PROCESSING		SENSOR 1		SENSOR 2		SENSOR 3		SENSOR AVE		
Legend: H = test depth W = water table depth v = Poisson ratio vo = cell initial volume do = cell initial diameter Φ = borehole wall diameter Po = start pressure Pmax = max loop pressure (MPa) Pmin = min loop pressure (MPa) d max displacement at P max d min displacement at P min σv vertical total stress estimated εc = dR / Ro		ELASTICITY MODULUS Ei								
		DATA	loop	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	Eav (Mpa)	
		symbol	datum	1	10,00	6,00			119	
		γnsoil	2,5	2	20,00	12,00			184	
		W (ml)	30,0	3	48,00	6,00			156	
		DEFORMATION MODULUS Ti								
vo (cmc)	3457	5								
do (mm)	96,27	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)		
σv (kPa)	750	1	10,00	8,00				66		
		2	20,00	10,00				93		
		3	48,00	20,00				74		
		4								
		5								
		GLOBAL DEFORMATION MODULUS EG								
ELASTICITY MODULUS Ei		Pmax		Pmin	EG1 (Mpa)	EG2 (Mpa)	EG3 (Mpa)	EGm (Mpa)		
Ei = (1+ v) Φ Pax - Pmin		34,00		8,00				104		
Ei = (EII+EIII)/2										
Ei = EIII										
		DIAMETER								
		beginning diameter (mm)								
		final diameter (mm)								
		range mm								
		DM loop minimum displacement				DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS				
		Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	1049	EG (MPa)	104
		bar	0	120	240	0	Pf creep pressure (KPa)	3582	E3 (MPa)	156
		10,0	10,997	10,997	10,997	8,344	PL limit pres. (KPa) Cassan >	5722	E/P/L	19,96
							PL' net limit pres (KPa) >	5197	EG/Ey	0,67
note: MATERIALE ASSIMILATO A TERRENO COESIVO							Ko lateral coeff at rest (KPa)	0,70	cu coesion (KPa) johnson	597
							Pho lateral pressure (KPa)	525	φ friction angle (°) >	

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

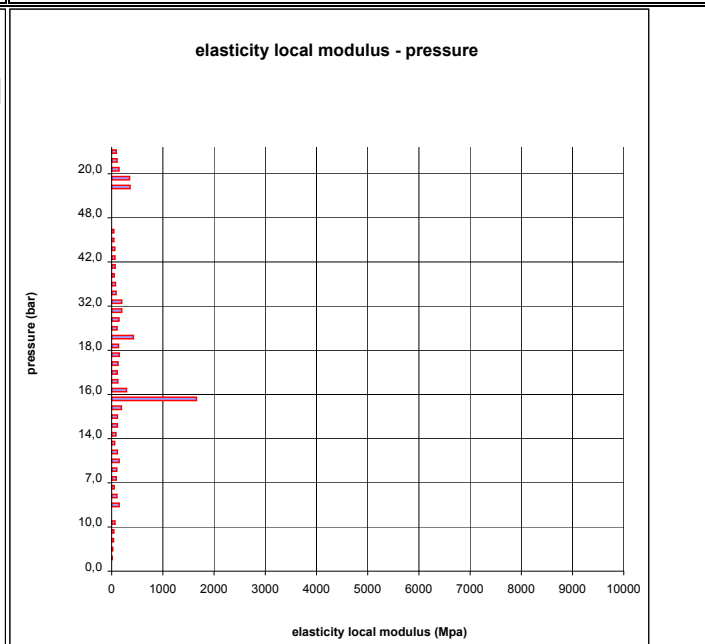
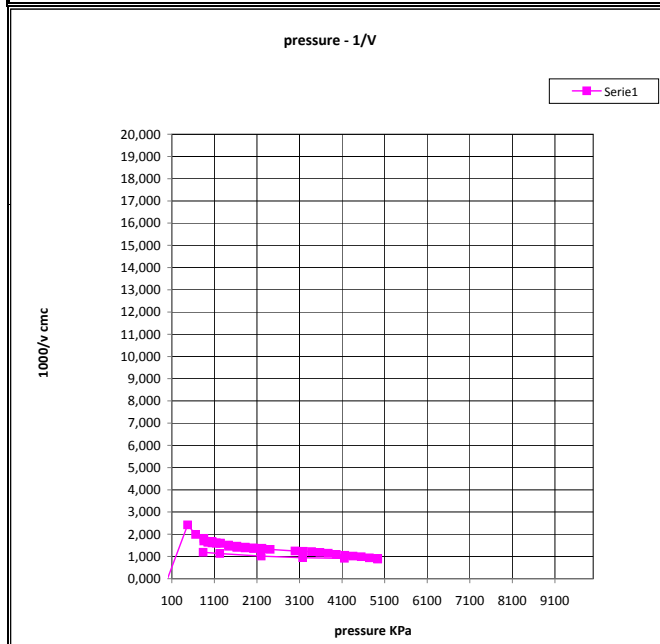
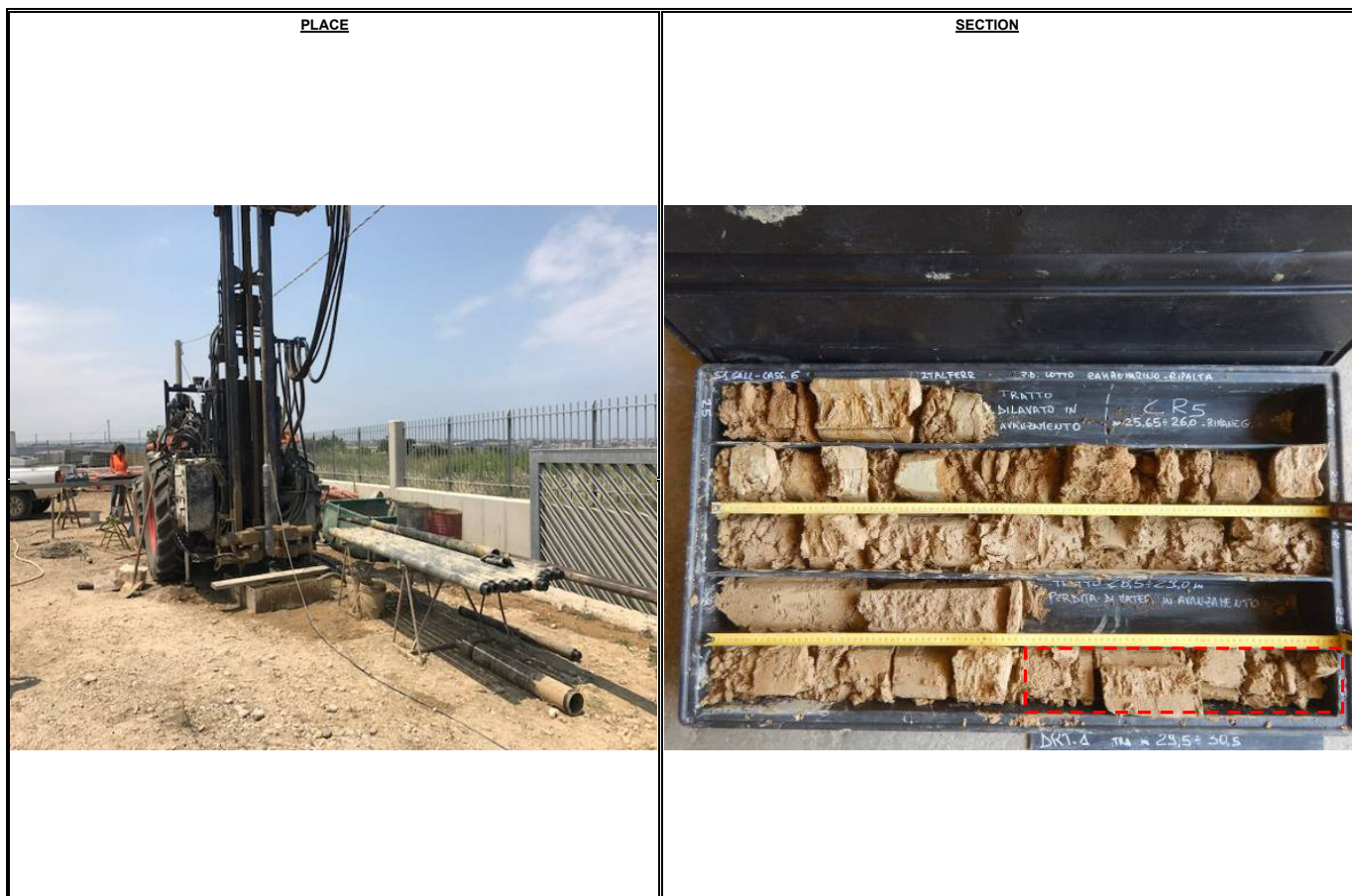
Comessa: LIA3.1D02.A01


Ordine: N° 100031758 - Attivazione: N° 56



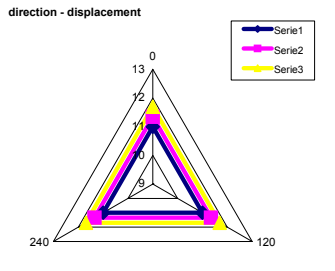
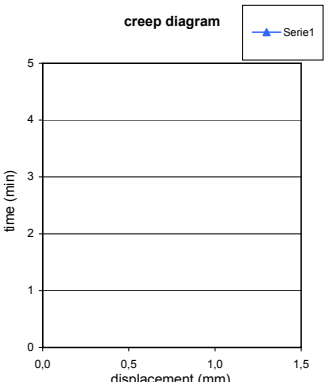

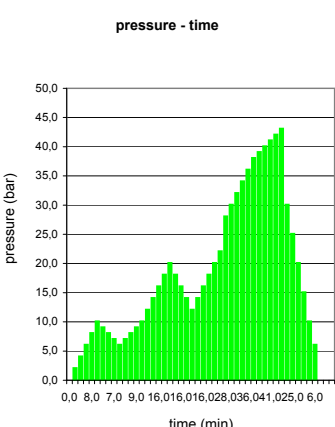
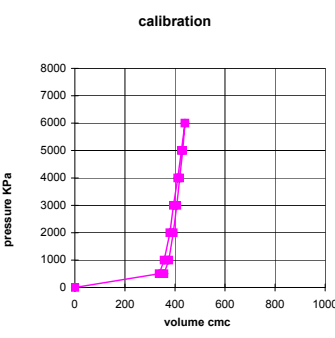
DILATOMETRIC ROCK TEST DRT			
borehole	S1GALL	probe depth m	30,0
		mod DVT	rev. 1
		code	1
Client:	ITALFERR S.P.A.	job	1714 v. accept. 1714SIT
Project	COLLEGAMENTO CAMPOMARINO-RIPALTA	report	1714SIT 01 DRT
site	CAMPOMARINO	coordinates	EAST NORTH date 15.06.17 pag 3/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



	DILATOMETRIC ROCK TEST DRT				mod DVT rev. 1	
	borehole	S1GALL	probe depth m	40,1	code	2
	Client:	ITALFERR S.P.A.		job	1714	v. accept. 1714SIT
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT 02 DRT	
site	CAMPOMARINO	coordinates	EAST NORTH		date	15.06.17 pag 1/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

Borehole			LITHOTYPE			time		P	Pcorr	Vol	ε c	1/V	diameter	Dil. Diam	Modulo
						min	bar								
S1GALL			direction - displacement			0	0,0	0	0,0	-4,710	0,000	96,273	0,000	0,0	
test	2	depth m				1	2,0	579	296,6	-0,706	3,371	100,319	4,045	17,6	
slope (degree)	90	core barrel				2	4,0	772	350,2	0,000	2,856	101,032	4,758	34,0	
Device:	CSM Type GEODV03 95 mm					3	6,0	967	364,9	0,193	2,740	101,227	4,954	126,3	
Orientation capteur	Standard method: ISRM 1987					4	8,0	1162	381,2	0,406	2,624	101,442	5,169	115,0	
Probe diam 95 MM	Borehole diam	101 MM				5	10,0	1357	404,2	0,707	2,474	101,746	5,473	81,3	
Meteo	Temperatur e					6	9,0	1259	397,4	0,618	2,516	101,656	5,383	138,1	
lithotype	Alternanza di strati sabbiosi e arenacei teneri giallo / beige					7	8,0	1161	388,5	0,501	2,574	101,538	5,265	105,2	
water table	POCKET PENETRO METER					8	7,0	1064	386,5	0,476	2,587	101,513	5,240	490,2	
Creep test P (Bars) =						9	6,0	966	381,9	0,416	2,618	101,452	5,179	203,2	
Temps min	PBAR	MM				10	7,0	1063	389,6	0,517	2,566	101,554	5,281	121,4	
1						11	8,0	1161	395,3	0,590	2,530	101,628	5,355	167,3	
2						12	9,0	1259	399,4	0,644	2,504	101,682	5,409	228,7	
3						13	10,0	1356	408,2	0,759	2,450	101,799	5,525	106,7	
4						14	12,0	1552	415,8	0,859	2,405	101,899	5,626	247,6	
5						15	14,0	1748	419,5	0,906	2,384	101,947	5,674	521,2	
						16	16,0	1943	426,1	0,992	2,347	102,034	5,761	285,8	
						17	18,0	2139	438,8	1,157	2,279	102,200	18	150,2	
						18	20,0	2334	446,4	1,256	2,240	102,300	6,027	249,6	
						19	18,0	2138	446,8	1,260	2,238	102,305	6,032	-5315,5	
						20	16,0	1943	441,1	1,187	2,267	102,231	5,958	338,4	
						21	14,0	1747	433,5	1,088	2,307	102,131	5,858	249,3	
						22	12,0	1551	426,8	1,002	2,343	102,044	5,770	286,4	
						23	14,0	1746	441,5	1,192	2,265	102,236	5,962	129,7	
						24	16,0	1942	443,1	1,213	2,257	102,257	5,984	1164,8	
						25	18,0	2138	448,8	1,286	2,228	102,331	6,058	338,6	
						26	20,0	2334	448,4	1,282	2,230	102,327	6,053	-5318,3	
						27	22,0	2530	458,9	1,418	2,179	102,465	6,191	181,3	
						28	28,0	3116	487,0	1,780	2,054	102,831	6,557	205,7	
						29	30,0	3311	504,1	2,001	1,984	103,054	6,780	112,4	
						30	32,0	3506	522,2	2,235	1,915	103,289	7,016	106,7	
						31	34,0	3701	538,4	2,442	1,857	103,499	7,225	120,5	
						32	36,0	3896	559,5	2,712	1,787	103,772	7,499	92,3	
						33	38,0	4091	581,2	2,989	1,721	104,051	7,778	90,6	
						34	39,0	4188	598,0	3,203	1,672	104,268	7,994	58,4	
						35	40,0	4285	615,8	3,429	1,624	104,497	8,223	55,3	
						36	41,0	4381	637,6	3,706	1,568	104,776	8,503	45,3	
						37	42,0	4478	659,4	3,982	1,516	105,055	8,781	45,5	
						38	43,0	4574	696,3	4,446	1,436	105,524	9,250	26,9	
						39	30,0	3302	655,6	3,934	1,525	105,006	8,732	323,2	
						40	25,0	2813	641,5	3,755	1,559	104,826	8,552	356,2	
						41	20,0	2324	625,4	3,551	1,599	104,620	8,346	310,7	
						42	15,0	1835	601,3	3,245	1,663	104,310	8,037	206,4	
						43	10,0	1346	576,2	2,925	1,736	103,987	7,714	196,9	
						44	6,0	955	554,9	2,654	1,802	103,713	7,439	184,7	
PROBE SCHEME															
rod adaptor			electronic device												
double action piston															
expandable cylinder															
pressure - time															
calibration															
PROBE CALIBRATION															
probe	GEODV03 CSM TYPE														
membrane	CAUCCIU' ARMATO														
measure cell height (cm)															
V0 cell volume at rest (cmc)	3457														
length cable (mt)	50														
Volume initial Vi (cmc)	349														
diam calibration tube (cm)	10,1														
tube calibration volume cmc	3806														
Calibration in air															
coeff m	0,06 cmc/Kpa														
Confined calibration															
first load	66 Kpa/cmc														
unload	85 Kpa/cmc														
valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione															
FIELD LIMITS															
		P	P corr	V corr	creep	1000/V	diameter	Dil. Diam	loop						
min		4,0	771,6	350,2	0,0	2,9	101,0	4,8	primo						
max		34,0	3701,2	538,4	2,4	1,9	103,5	7,2	carico						
max		10,0	1356,5	404,2	0,7	2,5	101,7	5,5	I						
min		6,0	965,8	381,9	0,4	2,6	101,5	5,2							
max		20,0	2334,3	446,4	1,3	2,2	102,3	6,0	II						
min		12,0	1551,2	426,8	1,0	2,3	102,0	5,8							
max		43,0	4574,0	696,3	4,4	1,4	105,5	9,3	III						
min		6,0	955,4	554,9	2,7	1,8	103,7	7,4							

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

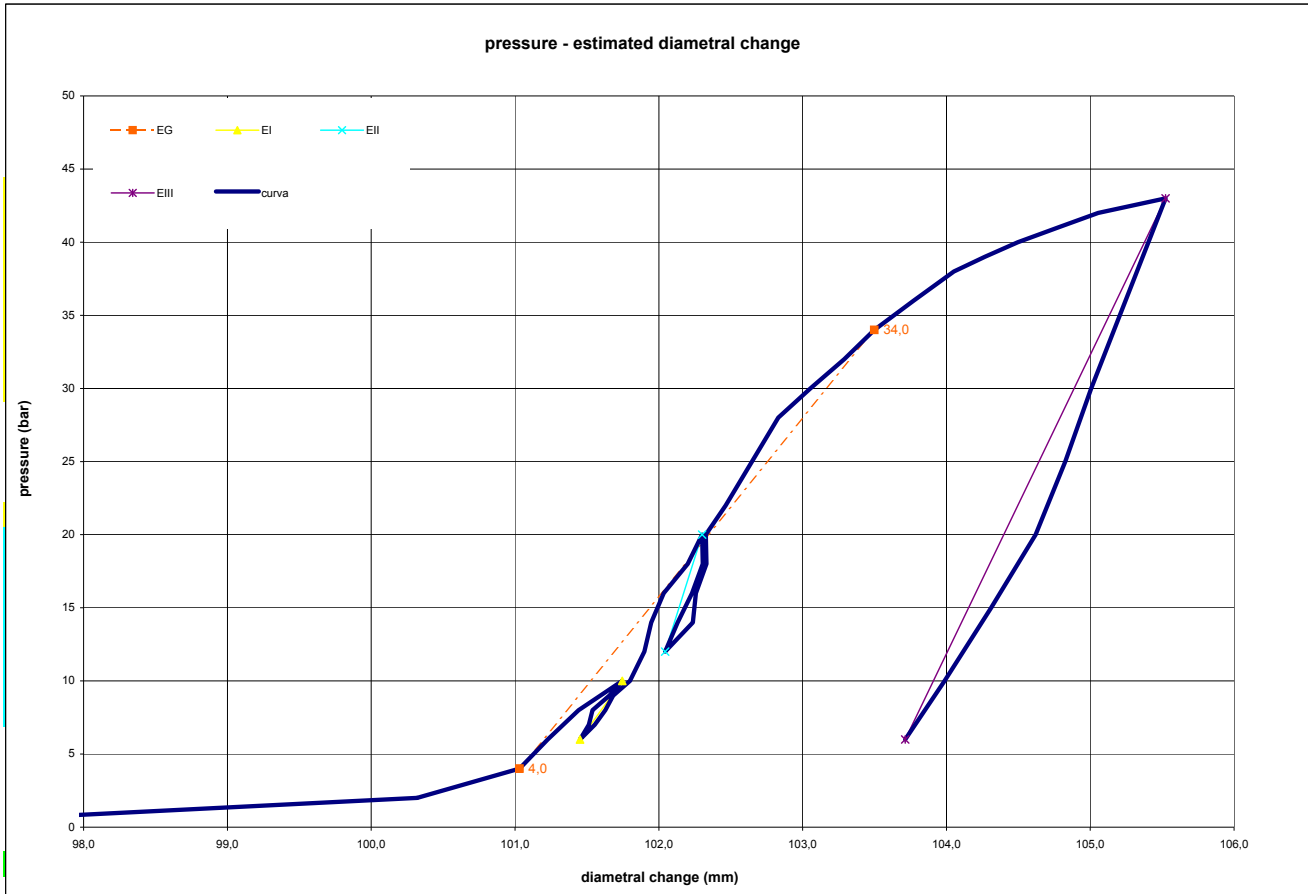
Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56




DILATOMETRIC ROCK TEST DRT				mod DVT	rev. 1
borehole	S1GALL	probe depth m	40,1	code	2
Client:	ITALFERR S.P.A.	job	1714	v. accept.	1714SIT
Project	COLLEGAMENTO CAMPOMARINO-RIPALTA	report	1714SIT 02 DRT		
site	CAMPOMARINO	coordinates	EAST	date	15.06.17
			NORTH	pag	2/3

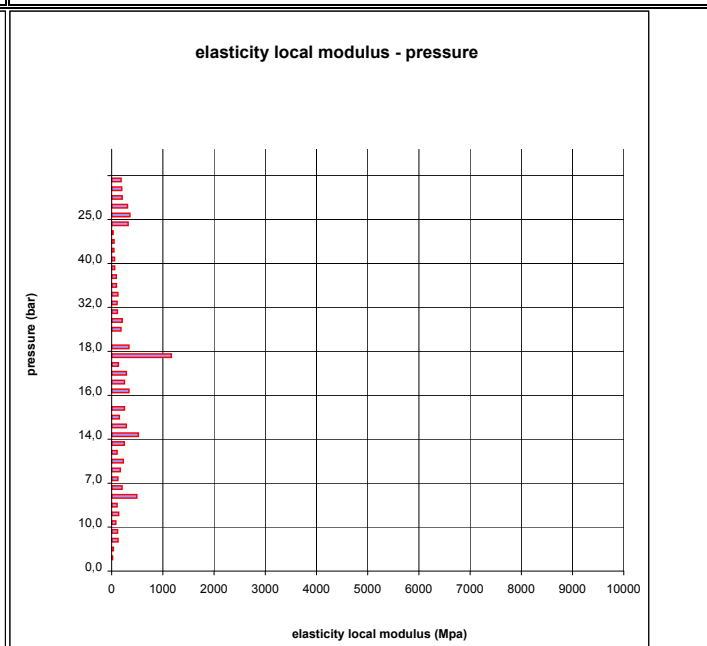
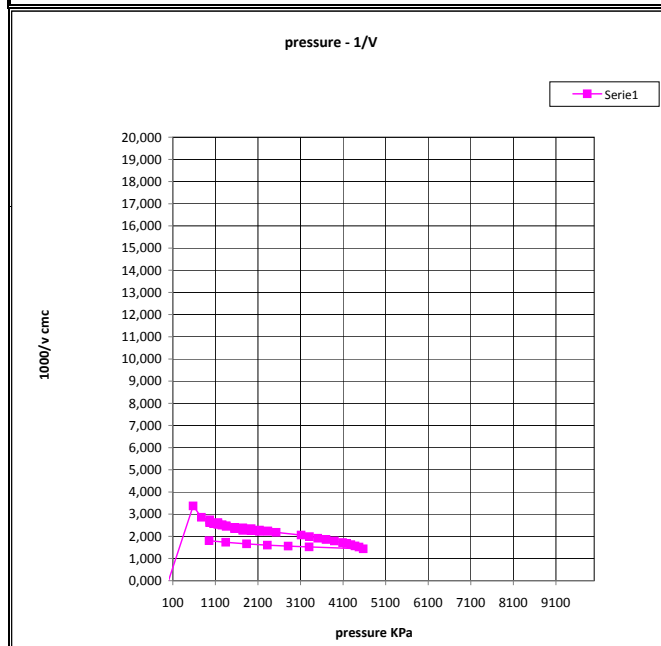
DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987




DATA PROCESSING		SENSOR 1		SENSOR 2		SENSOR 3		SENSOR AVE		
Legend:		ELASTICITY MODULUS Ei		E1 (Mpa)		E2 (Mpa)		E3 (Mpa)		
H = test depth	DATA	loop	Pmax	Pmin				Eav (Mpa)		
W = water table depth	symbol	datum	1	10,00	6,00			168		
v = Poisson ratio	γsoil	2,5	2	20,00	12,00			385		
vo = cell initial volume	W (ml)	40,1	3	43,00	6,00			252		
do = cell initial diameter	v	0,25	4							
Φ = borehole wall diameter	vo (cmc)	3457	5							
Po = start pressure	do (mm)	96,27	DEFORMATION MODULUS Ti		T1 (Mpa)		T2 (Mpa)		T3 (Mpa)	
Pmax = max loop pressure (MPa)	σv (kPa)	1001	loop	Pmax	Pmin			Tm (Mpa)		
Pmin = min loop pressure (MPa)			1	10,00	4,00			103		
d max displacement at P max			2	20,00	10,00			223		
d min displacement at P min			3	43,00	20,00			88		
σv vertical total stress estimated			4							
εc = dR / Ro			5							
ELASTICITY MODULUS Ei	ELASTICITY MODULUS Ey estimated	GLOBAL DEFORMATION MODULUS EG		EG1 (Mpa)		EG2 (Mpa)		EG3 (Mpa)		
Ei = (1+ v) Φ Pax - Pmin	Ey = (EII+EIII)/2		Pmax	Pmin				EGm (Mpa)		
dmax - dmin	Ey = EIII		34,00	4,00				150		
		DIAMETER		F		F		F		
DEFORMATION MODULUS Ti		beginning diameter (mm)						101,032		
Ti = (1+ v) Φ Pi - Pi-1		final diameter (mm)						105,524		
Xi - Xi-1		range mm						4,492		
GLOBAL DEFORMATION MODULUS EG		DM loop minimum displacement		DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS		Po initial pressure (KPa)		772		
EG = (1+ v) Φ Pmax - Po		Pbar	C1	C2	C3	Cm	Pf creep pressure (KPa)	3701		
dmax - do		10,0	10,997	10,997	10,997	5,473	PL limit pres. (KPa) Cassan >	5801		
note: MATERIALE ASSIMILATO A TERRENO COESIVO							PL' net limit pres (KPa) >	5101		
							EG/Ey	0,59		
							Ko lateral coeff at rest (KPa)	0,70		
							cu coesion (KPa) johnson	605		
							φ friction angle (°) >			
							Pho lateral pressure (KPa)	701		

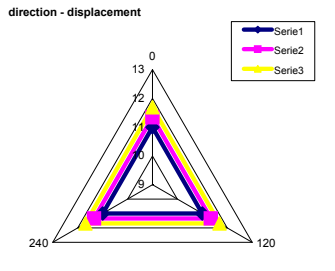
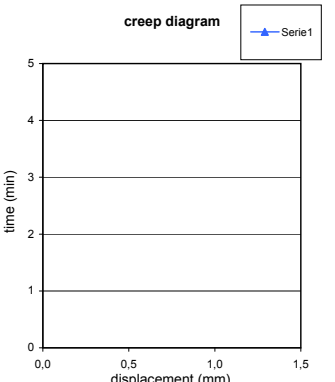
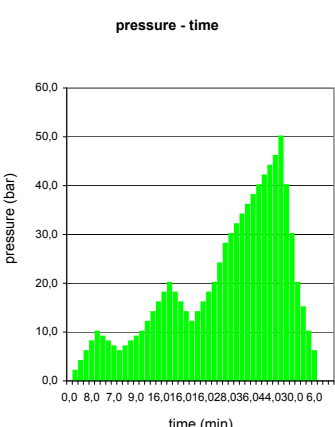
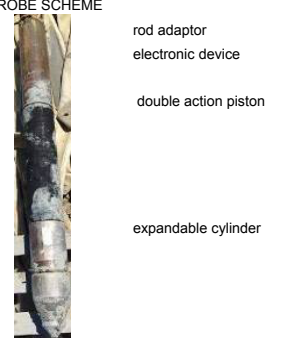
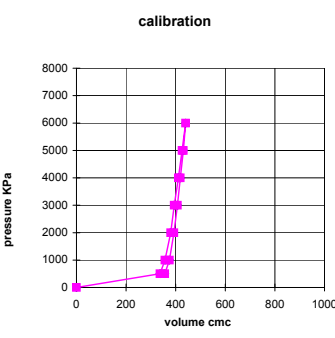
	DILATOMETRIC ROCK TEST DRT			mod DVT	rev. 1		
	borehole	S1GALL	probe depth m	40,1	code	2	
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT 02	DRT	
site	CAMPOMARINO	coordinates	EAST	date	15.06.17	pag	3/3
			NORTH				

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



	DILATOMETRIC ROCK TEST DRT			mod DVT rev. 1				
	borehole	S1GALL	probe depth m	50,0	code	3		
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT	
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT 03	DRT		
site	CAMPOMARINO	coordinates	EAST	NORTH	date	15.06.17	pag	1/3

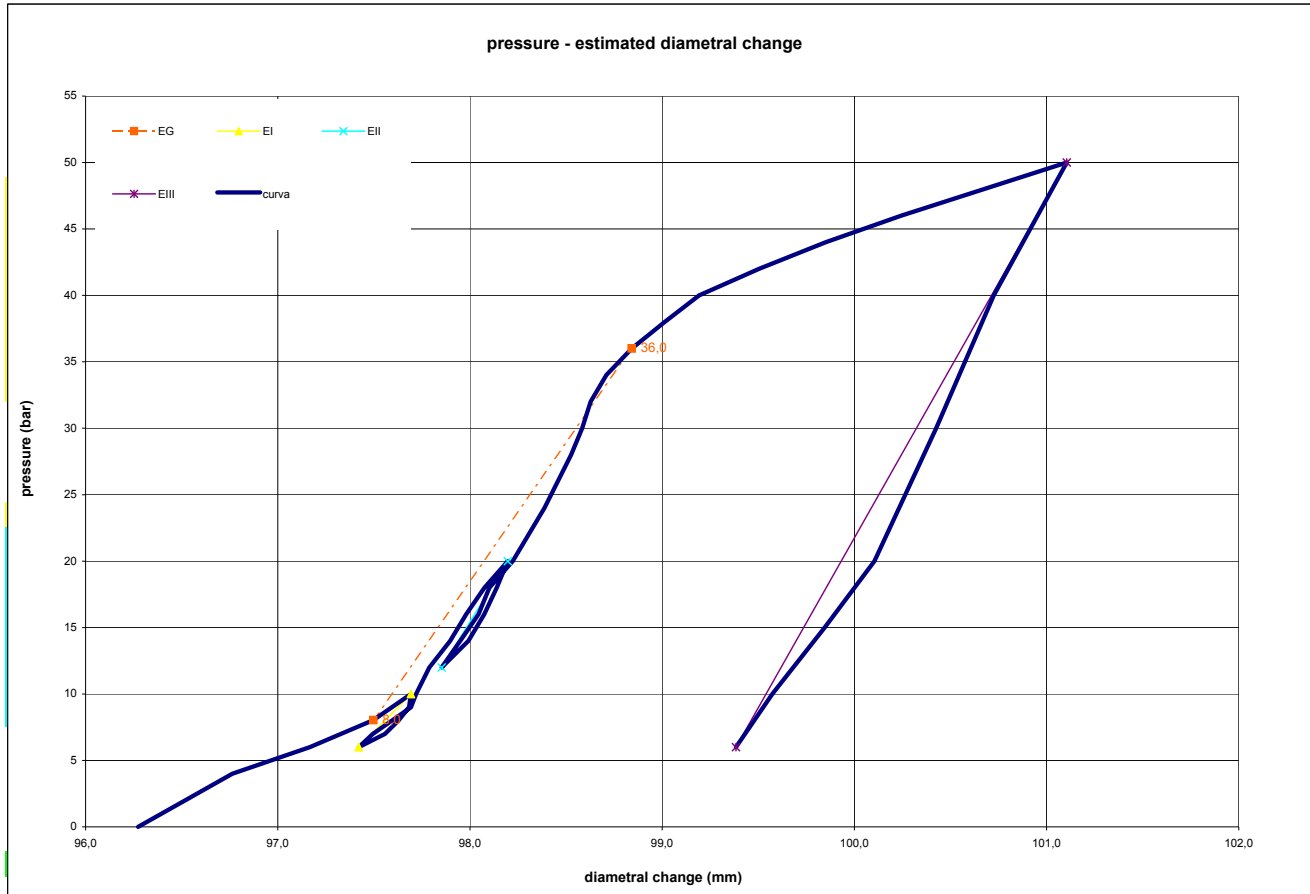
DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

Borehole		LITHOTYPE		time		P	Pcorr	Vol	ε c	1/V	diameter	Dil. Diam	Modulo																																																																																											
				min	bar									Kpa	cmc	%	1000/cmc	(mm)	(mm)	MPa																																																																																				
test	3	depth m	50,00			0	0,0	0	0,0	-1,255	0,000	96,273	0,000	0,0																																																																																										
slope (degree)	90	core barrel				1	2,0	695	17,6	-1,003	56,689	96,519	0,245	341,4																																																																																										
Device:	CSM Type GEODV03 95 mm					2	4,0	890	35,3	-0,752	28,345	96,763	0,490	96,3																																																																																										
Orientation capteur	Standard method: ISRM 1987					3	6,0	1084	64,4	-0,339	15,523	97,166	0,893	58,5																																																																																										
Probe diam 95 MM	Borehole diam	101 MM				4	8,0	1283	88,4	0,000	11,311	97,497	1,223	73,1																																																																																										
Meteo	Temperatur e			<p>valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione</p>		5	10,0	1474	102,7	0,201	9,737	97,693	1,420	118,9																																																																																										
lithotype	sabbie fini limose argillose da addensate a deb cementate			<table border="1"> <thead> <tr> <th colspan="4">Creep test P (Bars) =</th> </tr> <tr> <th>Temps min</th> <th>PBAR</th> <th>MM</th> <th></th> </tr> </thead> <tbody> <tr><td>1</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td></tr> </tbody> </table>		Creep test P (Bars) =				Temps min	PBAR	MM		1				2				3				4				5				6	9,0	1376	102,0	0,191	9,806	97,683	1,410	1211,0																																																														
Creep test P (Bars) =																																																																																																								
Temps min	PBAR	MM																																																																																																						
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5																																																																																																								
water table	POCKET PENETRO METER			<table border="1"> <thead> <tr> <th colspan="9">FIELD LIMITS</th> </tr> <tr> <th></th> <th>P</th> <th>P corr</th> <th>V corr</th> <th>creep</th> <th>1000/V</th> <th>diameter</th> <th>Dil. Diam</th> <th>loop</th> </tr> </thead> <tbody> <tr> <td>min</td> <td>8,0</td> <td>1282,9</td> <td>88,4</td> <td>0,0</td> <td>11,3</td> <td>97,5</td> <td>1,2</td> <td>primo</td> </tr> <tr> <td>max</td> <td>36,0</td> <td>4017,8</td> <td>186,9</td> <td>1,4</td> <td>5,3</td> <td>98,8</td> <td>2,6</td> <td>carico</td> </tr> <tr> <td>max</td> <td>10,0</td> <td>1474,1</td> <td>102,7</td> <td>0,2</td> <td>9,7</td> <td>97,7</td> <td>1,4</td> <td>I</td> </tr> <tr> <td>min</td> <td>6,0</td> <td>1083,2</td> <td>82,9</td> <td>-0,1</td> <td>12,1</td> <td>97,4</td> <td>1,1</td> <td></td> </tr> <tr> <td>max</td> <td>20,0</td> <td>2452,2</td> <td>139,5</td> <td>0,7</td> <td>7,2</td> <td>98,2</td> <td>1,9</td> <td>II</td> </tr> <tr> <td>min</td> <td>12,0</td> <td>1669,5</td> <td>114,3</td> <td>0,4</td> <td>8,7</td> <td>97,9</td> <td>1,6</td> <td></td> </tr> <tr> <td>max</td> <td>50,0</td> <td>5380,1</td> <td>355,7</td> <td>3,7</td> <td>2,8</td> <td>101,1</td> <td>4,8</td> <td>III</td> </tr> <tr> <td>min</td> <td>6,0</td> <td>1074,6</td> <td>227,0</td> <td>1,9</td> <td>4,4</td> <td>99,4</td> <td>3,1</td> <td></td> </tr> </tbody> </table>		FIELD LIMITS										P	P corr	V corr	creep	1000/V	diameter	Dil. Diam	loop	min	8,0	1282,9	88,4	0,0	11,3	97,5	1,2	primo	max	36,0	4017,8	186,9	1,4	5,3	98,8	2,6	carico	max	10,0	1474,1	102,7	0,2	9,7	97,7	1,4	I	min	6,0	1083,2	82,9	-0,1	12,1	97,4	1,1		max	20,0	2452,2	139,5	0,7	7,2	98,2	1,9	II	min	12,0	1669,5	114,3	0,4	8,7	97,9	1,6		max	50,0	5380,1	355,7	3,7	2,8	101,1	4,8	III	min	6,0	1074,6	227,0	1,9	4,4	99,4	3,1		7	8,0	1278	98,0	0,135	10,208	97,628	1,354	216,3
FIELD LIMITS																																																																																																								
	P	P corr	V corr	creep	1000/V	diameter	Dil. Diam	loop																																																																																																
min	8,0	1282,9	88,4	0,0	11,3	97,5	1,2	primo																																																																																																
max	36,0	4017,8	186,9	1,4	5,3	98,8	2,6	carico																																																																																																
max	10,0	1474,1	102,7	0,2	9,7	97,7	1,4	I																																																																																																
min	6,0	1083,2	82,9	-0,1	12,1	97,4	1,1																																																																																																	
max	20,0	2452,2	139,5	0,7	7,2	98,2	1,9	II																																																																																																
min	12,0	1669,5	114,3	0,4	8,7	97,9	1,6																																																																																																	
max	50,0	5380,1	355,7	3,7	2,8	101,1	4,8	III																																																																																																
min	6,0	1074,6	227,0	1,9	4,4	99,4	3,1																																																																																																	
Creep test P (Bars) =						8	7,0	1181	92,8	0,062	10,771	97,558	1,284	169,5																																																																																										
Temps min	PBAR	MM				9	6,0	1083	82,9	-0,077	12,060	97,421	1,148	87,0																																																																																										
1						10	7,0	1181	88,2	-0,002	11,333	97,494	1,221	162,7																																																																																										
2						11	8,0	1279	95,5	0,099	10,476	97,594	1,320	119,9																																																																																										
3						12	9,0	1376	102,7	0,201	9,739	97,693	1,419	120,2																																																																																										
4						13	10,0	1474	104,6	0,228	9,560	97,719	1,446	454,0																																																																																										
5						14	12,0	1670	109,6	0,299	9,121	97,788	1,515	346,1																																																																																										
						15	14,0	1865	117,6	0,410	8,505	97,897	1,623	219,9																																																																																										
						16	16,0	2061	123,6	0,495	8,089	97,980	1,706	289,8																																																																																										
						17	18,0	2257	130,6	0,593	7,659	98,075	1,8	252,6																																																																																										
						18	20,0	2452	139,5	0,718	7,168	98,197	1,923	196,4																																																																																										
						19	18,0	2256	135,3	0,658	7,393	98,139	1,865	415,0																																																																																										
						20	16,0	2061	130,5	0,592	7,662	98,074	1,801	370,7																																																																																										
						21	14,0	1865	124,5	0,507	8,033	97,991	1,718	290,4																																																																																										
						22	12,0	1669	114,3	0,365	8,746	97,853	1,579	172,3																																																																																										
						23	14,0	1865	121,4	0,464	8,239	97,949	1,676	248,4																																																																																										
						24	16,0	2061	128,3	0,561	7,793	98,044	1,770	252,4																																																																																										
						25	18,0	2257	132,5	0,619	7,549	98,101	1,827	424,2																																																																																										
						26	20,0	2452	141,4	0,744	7,072	98,223	1,949	196,5																																																																																										
						27	24,0	2843	153,5	0,913	6,516	98,387	2,114	292,0																																																																																										
						28	28,0	3235	163,7	1,056	6,110	98,526	2,252	347,6																																																																																										
						29	30,0	3431	167,9	1,115	5,956	98,584	2,310	418,3																																																																																										
						30	32,0	3627	171,1	1,160	5,843	98,628	2,354	548,1																																																																																										
						31	34,0	3822	177,2	1,244	5,644	98,710	2,436	294,1																																																																																										
						32	36,0	4018	186,9	1,380	5,350	98,842	2,568	182,6																																																																																										
						33	38,0	4213	199,6	1,555	5,011	99,013	2,740	141,0																																																																																										
						34	40,0	4408	212,8	1,739	4,699	99,192	2,919	135,1																																																																																										
						35	42,0	4603	235,9	2,059	4,238	99,504	3,231	77,4																																																																																										
						36	44,0	4798	261,7	2,414	3,821	99,851	3,577	70,0																																																																																										
						37	46,0	4992	291,0	2,818	3,436	100,244	3,970	61,8																																																																																										
						38	50,0	5380	355,7	3,701	2,811	101,105	4,832	56,7																																																																																										
						39	40,0	4402	327,1	3,311	3,057	100,725	4,452	324,9																																																																																										
						40	30,0	3423	304,6	3,004	3,283	100,425	4,152	410,4																																																																																										
						41	20,0	2444	280,6	2,675	3,564	100,104	3,831	382,3																																																																																										
						42	15,0	1955	261,3	2,409	3,827	99,846	3,572	236,1																																																																																										
						43	10,0	1466	241,0	2,129	4,149	99,573	3,299	223,3																																																																																										
						44	6,0	1075	227,0	1,936	4,405	99,384	3,111	258,3																																																																																										



DILATOMETRIC ROCK TEST DRT				mod DVT	rev. 1
borehole	S1GALL	probe depth m	50,0	code	3
Client:	ITALFERR S.P.A.	job	1714	v. accept.	1714SIT
Project	COLLEGAMENTO CAMPOMARINO-RIPALTA	report	1714SIT 03 DRT		
site	CAMPOMARINO	coordinates	EAST NORTH	date	15.06.17
				pag	2/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987




DATA PROCESSING		SENSOR 1			SENSOR 2		SENSOR 3		SENSOR AVE			
Legend: H = test depth W = water table depth v = Poisson ratio vo = cell initial volume do = cell initial diameter Φ = borehole wall diameter Po = start pressure Pmax = max loop pressure (MPa) Pmin = min loop pressure (MPa) d max displacement at P max d min displacement at P min σv vertical total stress estimated ε c = dR / Ro		ELASTICITY MODULUS Ei										
		DATA	loop	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	Eav (Mpa)			
symbol	datum	1	10,00	6,00				175				
γnsoil	2,5	2	20,00	12,00				277				
W (ml)	50,0	3	50,00	6,00				305				
v	0,25	4										
vo (cmc)	3457	5										
do (mm)	96,27	DEFORMATION MODULUS Ti										
σv (kPa)	1250	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)				
		1	10,00	8,04				119				
		2	20,00	10,00				237				
		3	50,00	20,00				123				
		4										
		5										
ELASTICITY MODULUS Ei Ei = (1+ v) Φ Pax - Pmin dmax - dmin ELASTICITY MODULUS Ey estimated Ey = (EII+EIII)/2 Ey = EIII		GLOBAL DEFORMATION MODULUS EG										
			Pmax	Pmin	EG1 (Mpa)	EG2 (Mpa)	EG3 (Mpa)	EGm (Mpa)				
			36,00	8,04				248				
DEFORMATION MODULUS Ti Ti = (1+ v) Φ Pi - Pi-1 Xi - Xi-1		DIAMETER										
		beginning diameter (mm)										
		final diameter (mm)										
GLOBAL DEFORMATION MODULUS EG EG = (1+ v) Φ Pmax - Po dmax - do		range mm										
note: MATERIALE ASSIMILATO A TERRENO COESIVO		DM loop minimum displacement					DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS					
		Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	1283	EG (MPa)	248		
note: MATERIALE ASSIMILATO A TERRENO COESIVO		bar	0	120	240	0	Pf creep pressure (KPa)	4018	E3 (MPa)	305		
		10,0	10,997	10,997	10,997	1,420	PL limit pres. (KPa) Cassan >	6218	E/P/L	46,38		
note: MATERIALE ASSIMILATO A TERRENO COESIVO							PL' net limit pres (KPa) >	5343	EG/Ey	0,81		
							Ko lateral coeff at rest (KPa)	0,70	cu coesion (KPa) johnson	647		
note: MATERIALE ASSIMILATO A TERRENO COESIVO							Pho lateral pressure (KPa)	875	φ friction angle (°) >			

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

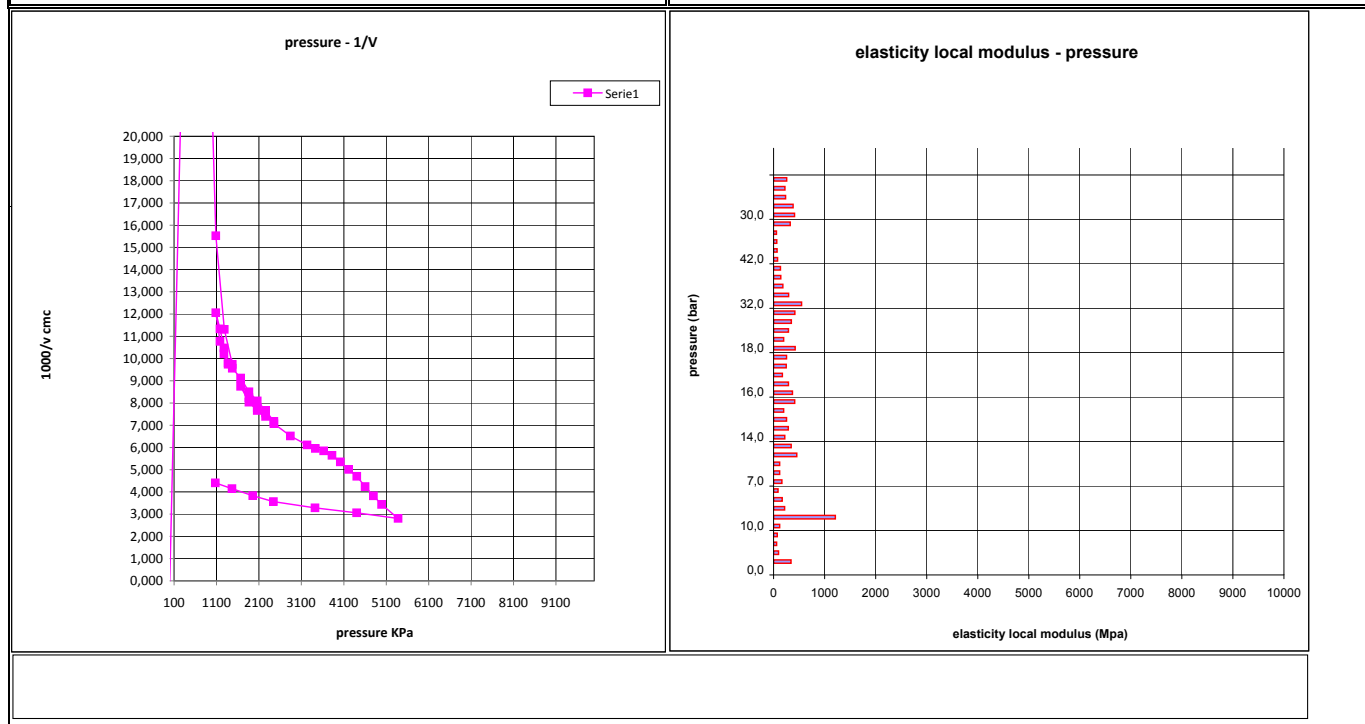
Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - **Attivazione:** N° 56

	DILATOMETRIC ROCK TEST DRT			mod DVT	rev. 1		
	borehole	S1GALL	probe depth m	50,0	code	3	
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT	03	DRT
site	CAMPOMARINO	coordinates	EAST	date	15.06.17	pag	3/3
			NORTH				


DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



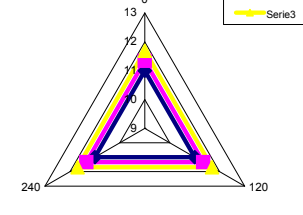

Sede: Via Monsignor Bologna, 18 - CAMPOBASSO
Stabilimento: C.da S.Maria delle Macchie - Vinchiaturo (CB)
Tel. 0874/340003-16 **Fax:** 0874/340014
P.IVA e Cod. Fiscale: 00717630701
web: www.imosgeo.it



S2 GALL

	DILATOMETRIC ROCK TEST DRT			mod DVT	rev. 1		
	borehole	S2GALL	probe depth m	31,1	code	1	
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT	04	DRT
	site	CAMPOMARINO	coordinates	EAST NORTH	date	07.06.17	pag

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

Borehole		LITHOTYPE		time		P	Pcorr	Vol	ε c	1/V	diameter	Dil. Diam	Modulo	
S2GALL		direction - displacement		min	bar	Kpa	cmc	%	1000/cmc	(mm)	(mm)	MPa		
test	1	depth m	31,10	0	0,0	0	0,0	-5,748	0,000	96,273	0,000	0,0		
slope (degree)	90	core barrel		1	2,0	488	323,6	-1,435	3,090	100,679	4,406	13,6		
Device: CSM Type GEODV03 95 mm				2	4,0	681	376,3	-0,752	2,658	101,377	5,104	34,9		
Orientation capteur C1=		Standard method: ISRM 1987		3	6,0	875	406,9	-0,356	2,457	101,782	5,508	61,0		
Probe diam 95 MM	Borehole diam 101 MM			4	8,0	1069	434,6	0,000	2,301	102,145	5,872	68,2		
Meteo	Temperatur e			5	10,0	1264	446,6	0,155	2,239	102,303	6,030	158,1		
lithotype sabbie medio fini con livelli conglomeratici				6	9,0	1167	443,4	0,113	2,255	102,261	5,987	296,4		
water table				POCKET PENETRO METER		7	8,0	1069	441,6	0,090	2,265	102,237	5,964	524,5
Creep test P (Bars) = 35,0				Temps min PBAR MM		8	7,0	971	441,7	0,092	2,264	102,239	5,966	-5308,8
1	35,0	103,968		9	6,0	873	438,9	0,056	2,278	102,202	5,929	338,1		
2	35,0	104,030		10	7,0	971	441,7	0,092	2,264	102,239	5,966	338,1		
3	35,0	104,084		11	8,0	1069	445,5	0,140	2,245	102,288	6,015	256,4		
4	35,0	104,097		12	9,0	1166	449,4	0,190	2,225	102,340	6,066	243,5		
5	35,0	104,110		13	10,0	1264	452,2	0,226	2,211	102,376	6,103	339,0		
PROBE SCHEME				14	12,0	1460	456,8	0,286	2,189	102,437	6,164	412,6		
		rod adaptor electronic device		15	14,0	1655	468,5	0,435	2,135	102,589	6,316	164,5		
		double action piston		16	16,0	1851	477,1	0,545	2,096	102,702	6,429	222,4		
		expandable cylinder		17	18,0	2047	483,8	0,630	2,067	102,789	6,481	290,1		
				18	20,0	2242	493,4	0,753	2,027	102,915	6,541	369,6		
				19	18,0	2046	494,5	0,767	2,022	102,928	6,555	-1827,6		
PROBE CALIBRATION				20	16,0	1850	492,1	0,737	2,032	102,898	6,624	826,9		
probe		GEODV03 CSM TYPE		21	14,0	1654	486,3	0,662	2,056	102,822	6,548	330,6		
membrane		CAUCCIU' ARMATO		22	12,0	1459	478,1	0,558	2,091	102,716	6,442	236,6		
measure cell height (cm)				23	14,0	1655	480,5	0,588	2,081	102,746	6,473	824,0		
V0 cell volume at rest (cmc)		3457		24	16,0	1850	486,8	0,669	2,054	102,829	6,555	304,1		
length cable (mt)		50		25	18,0	2046	493,3	0,751	2,027	102,913	6,639	299,8		
Volume initial Vi (cmc)		349		26	20,0	2242	500,2	0,840	1,999	103,003	6,730	278,7		
diam calibration tube (cm)		10,1		27	22,0	2437	512,4	0,996	1,951	103,162	6,889	158,1		
tube calibration volume cmc		3806		28	24,0	2632	522,7	1,126	1,913	103,295	7,022	189,7		
Calibration in air		coeff m		29	26,0	2828	535,8	1,293	1,866	103,466	7,192	148,1		
		0,06 cmc/Kpa		30	28,0	3023	547,5	1,440	1,827	103,616	7,343	167,8		
Confined calibration		first load		31	30,0	3218	556,8	1,558	1,796	103,737	7,464	209,8		
		66 Kpa/cmc		32	35,0	3708	574,7	1,785	1,740	103,968	7,695	274,8		
		unload		33	35,0	3707	579,5	1,845	1,726	104,030	7,756	-0,6		
		85 Kpa/cmc		34	35,0	3707	583,7	1,898	1,713	104,084	7,811	-0,6		
				35	35,0	3707	584,7	1,911	1,710	104,097	7,823	-0,6		
				36	35,0	3707	585,7	1,923	1,707	104,110	7,836	-0,6		
				37	30,0	3217	581,6	1,872	1,719	104,057	7,784	1207,1		
				38	20,0	2237	574,4	1,781	1,741	103,964	7,691	1372,9		
				39	10,0	1258	554,1	1,524	1,805	103,702	7,429	484,9		
				40	8,0	1063	545,4	1,414	1,834	103,589	7,316	224,1		
				41	6,0	867	534,8	1,280	1,870	103,453	7,179	185,3		
				42	4,0	672	522,6	1,125	1,914	103,294	7,020	159,0		
				43	2,0	477	507,6	0,935	1,970	103,100	6,826	129,7		
valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione														
FIELD LIMITS														
		P	P corr	V corr	creep	1000/V	diameter	Dil. Diam	loop					
min		8,0	1069,2	434,6	0,0	2,3	102,1	5,9	primo					
max		35,0	3707,5	574,7	1,8	1,7	104,0	7,7	carico					
max		10,0	1264,5	446,6	0,2	2,2	102,3	6,0	I					
min		6,0	872,8	438,9	0,1	2,3	102,2	5,9						
max		20,0	2242,0	493,4	0,8	2,0	102,9	6,6	II					
min		12,0	1458,7	478,1	0,6	2,1	102,7	6,4						
max		35,0	3706,9	585,7	1,9	1,7	104,1	7,8	III					
min		6,0	867,1	534,8	1,3	1,9	103,5	7,2						



DILATOMETRIC ROCK TEST DRT

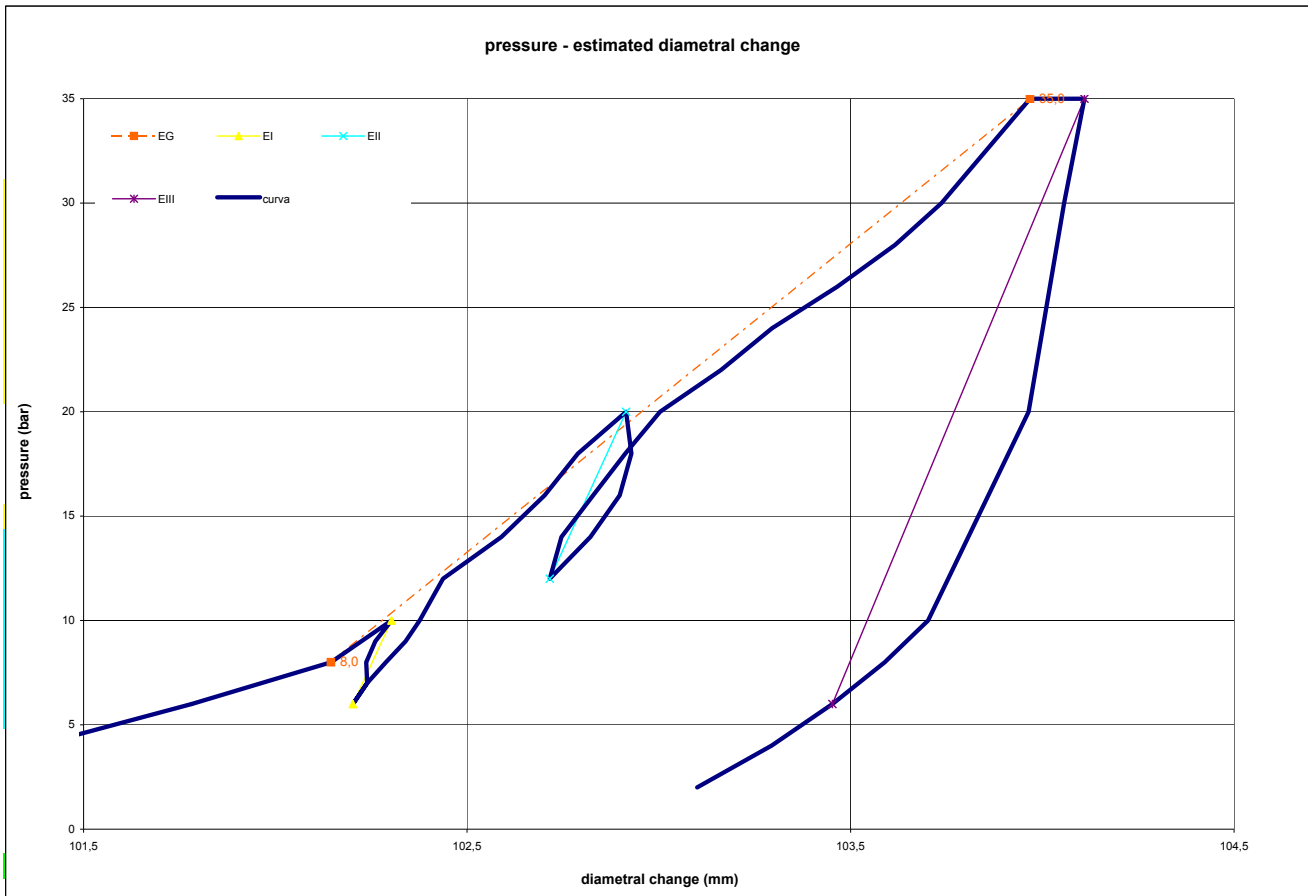
borehole **S2GALL** probe depth m **31,1** mod DVT **1** rev. 1

Client: **ITALFERR S.P.A.** job **1714** v. accept. **1714SIT**

Project: **COLLEGAMENTO CAMPOMARINO-RIPALTA** report **1714SIT 04 DRT**

site: **CAMPOMARINO** coordinates **EAST NORTH** date **07.06.17** pag **2/3**

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



DATA PROCESSING		SENSOR 1		SENSOR 2		SENSOR 3		SENSOR AVE				
Legend: H = test depth W = water table depth v = Poisson ratio vo = cell initial volume do = cell initial diameter Φ = borehole wall diameter Po = start pressure Pmax = max loop pressure (MPa) Pmin = min loop pressure (MPa) d max displacement at P max d min displacement at P min σv vertical total stress estimated εc = dR / Ro		ELASTICITY MODULUS Ei										
		DATA	loop	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	Eav (Mpa)			
symbol	datum	1	10,00	6,00				497				
γnsoil	2,5	2	20,00	12,00				503				
W (ml)	31,1	3	35,00	6,00				552				
v	0,25	4										
vo (cmc)	3457	5										
do (mm)	96,27	DEFORMATION MODULUS Ti										
σv (kPa)	778	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)				
		1	10,00	8,00				158				
		2	20,00	10,00				204				
		3	35,00	20,00				156				
		4										
		5										
ELASTICITY MODULUS Ei		ELASTICITY MODULUS Ey estimated		GLOBAL DEFORMATION MODULUS EG								
Ei = (1+ v) Φ Pax - Pmin	Ey = (EII+EIII)/2		Pmax	Pmin	EG1 (Mpa)	EG2 (Mpa)	EG3 (Mpa)	EGm (Mpa)				
dmax - dmin	Ey = EIII		35,00	8,00				185				
DEFORMATION MODULUS Ti		DIAMETER										
Ti = (1+ v) Φ Pi - Pi-1	Xi - Xi-1	beginning diameter (mm)						102,145				
		final diameter (mm)						104,110				
		range mm						1,965				
GLOBAL DEFORMATION MODULUS EG		DM loop minimum displacement		DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS								
EG = (1+ v) Φ Pmax - Po	dmax - do	Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	1069	EG (MPa)	185		
		10,0	10,997	10,997	10,997	6,030	Pf creep pressure (KPa)	3708	E3 (MPa)	552		
note: MATERIALE ASSIMILATO A TERRENO COESIVO								PL limit pres. (KPa) Cassan >		5922	E/P/L	34,37
								PL' net limit pres (KPa) >		5378	EG/Ey	0,33
								Ku lateral coeff at rest (KPa)		0,70	cu coesion (KPa) johnson	
								Pho lateral pressure (KPa)		544	φ friction angle (°) >	

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

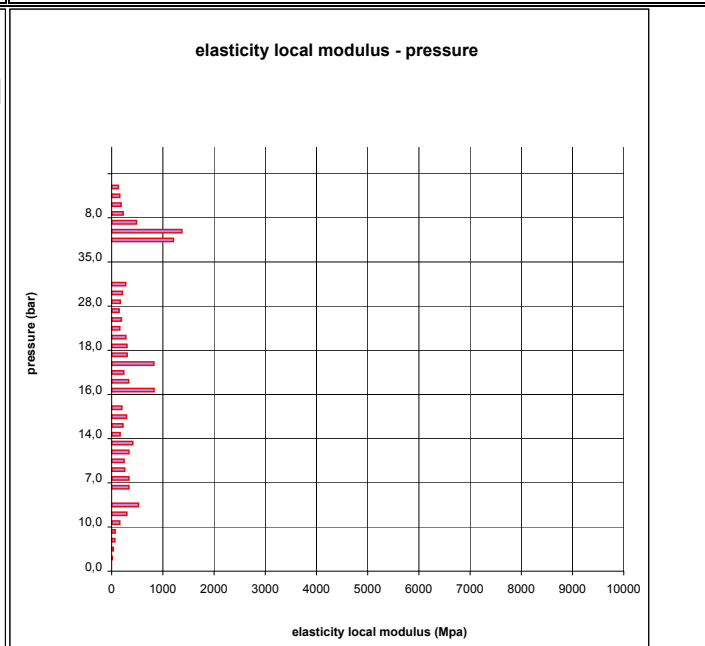
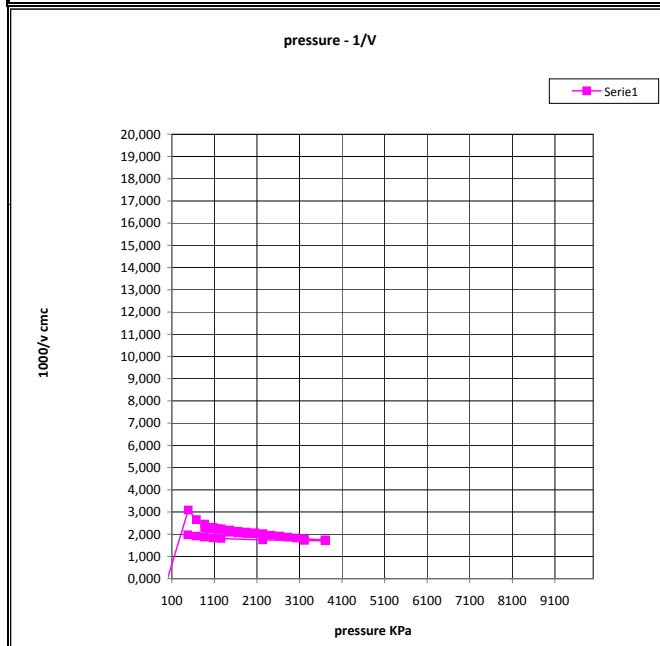
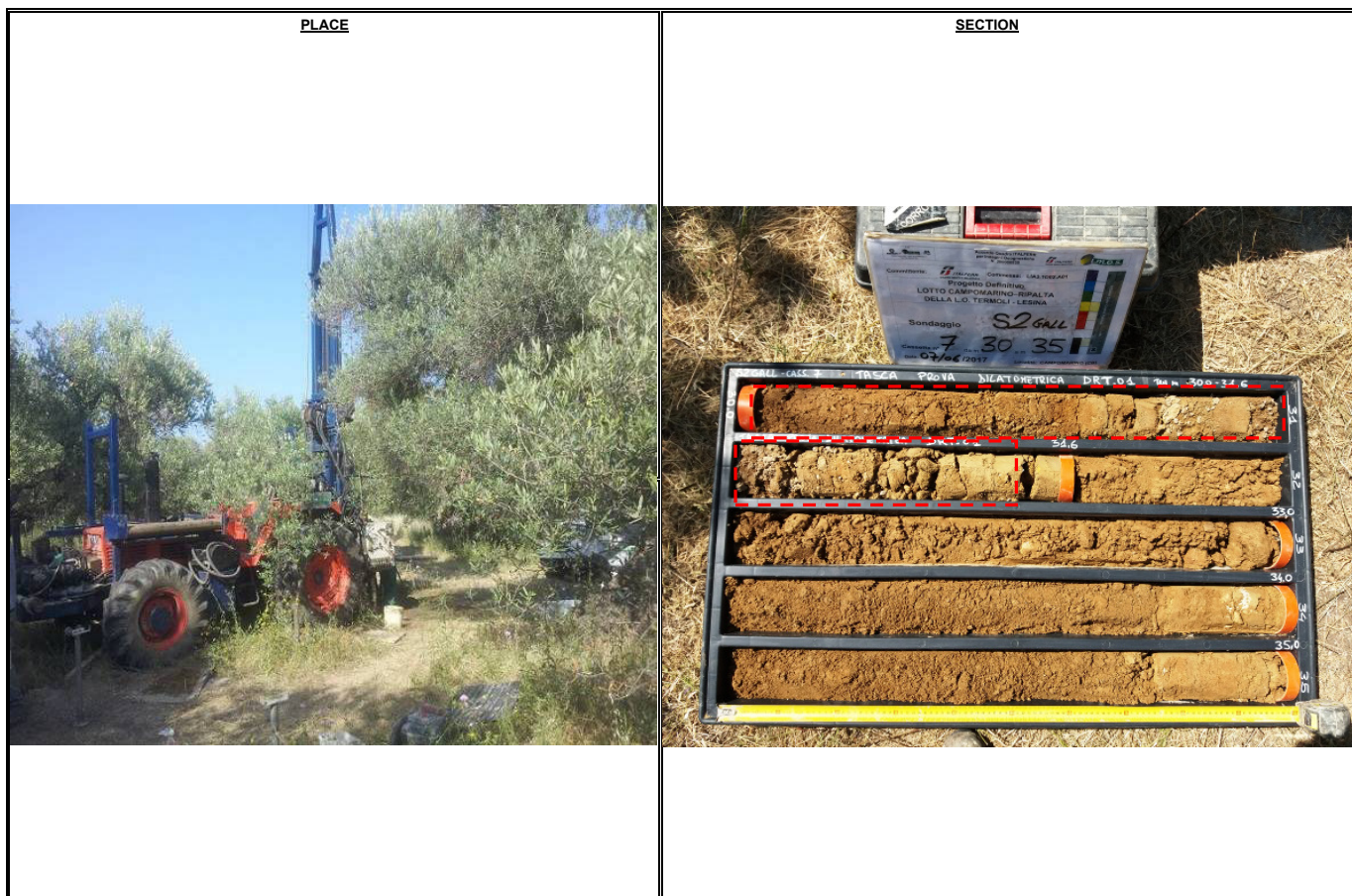
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Ordine: N° 100031758 - **Attivazione:** N° 56



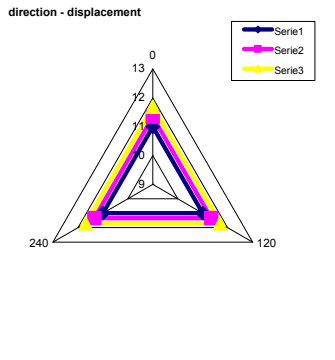
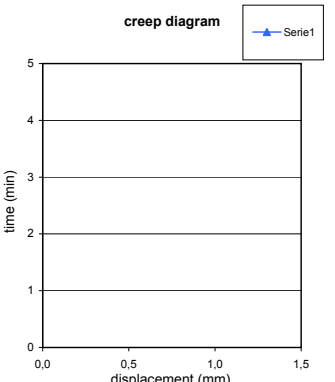
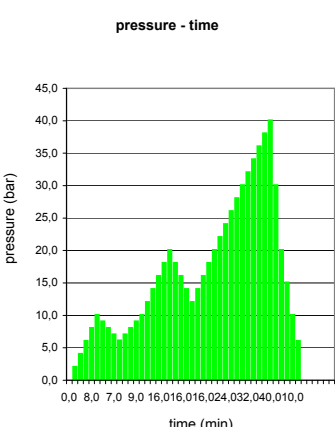
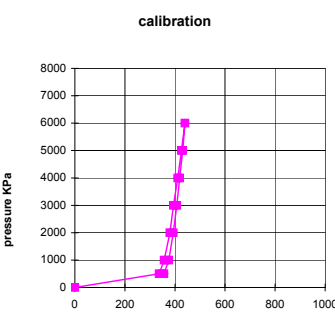

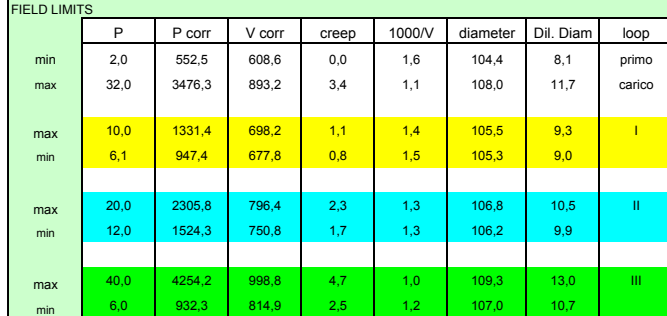

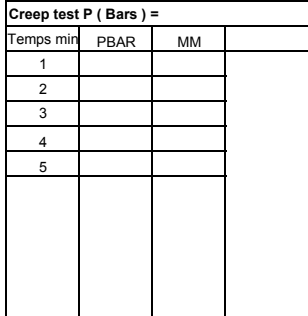
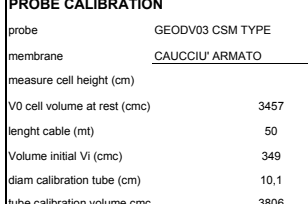
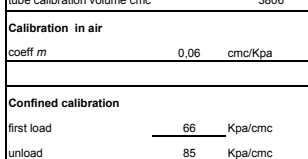
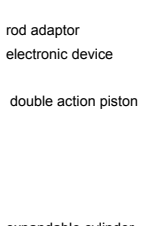
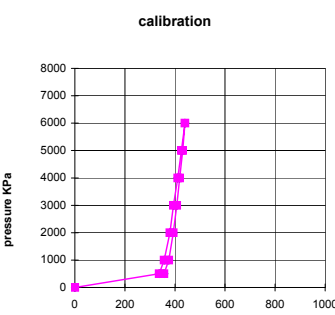
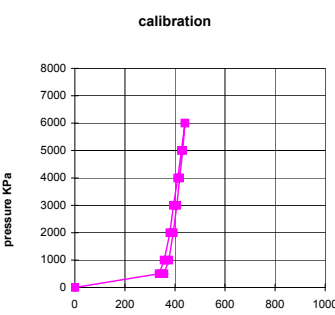
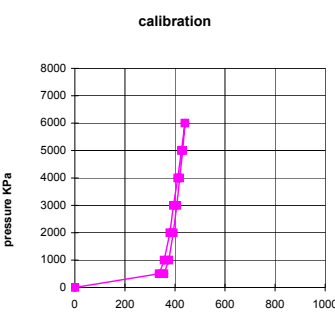
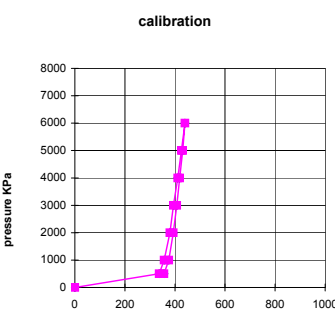
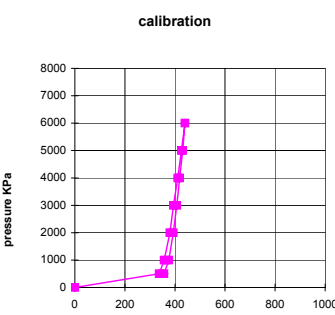
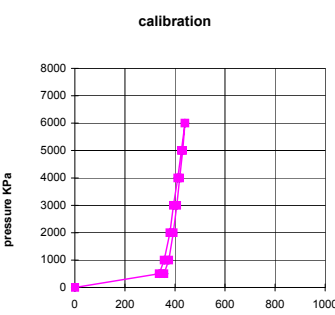
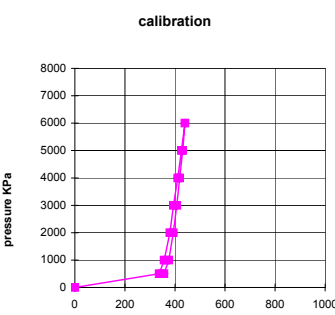
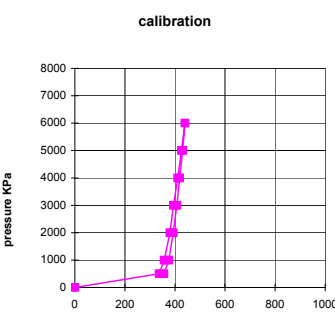
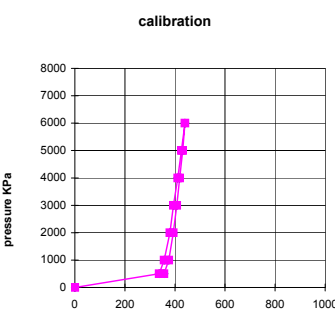
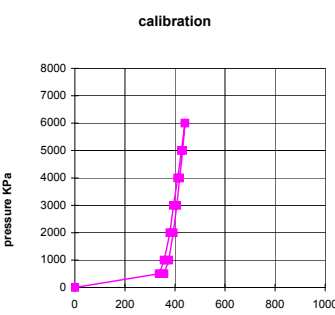
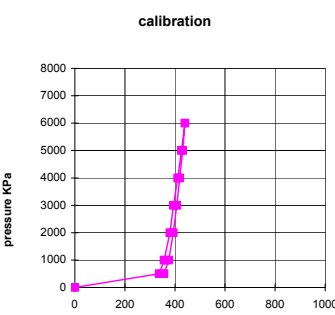
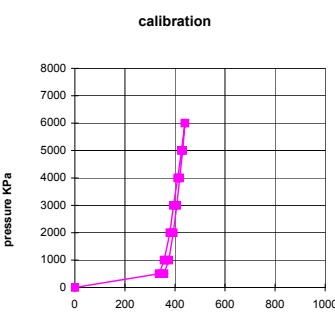
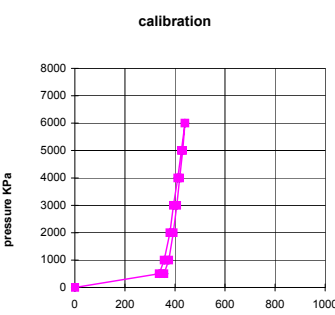
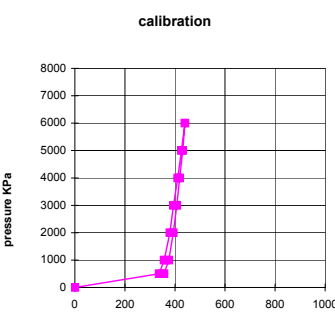
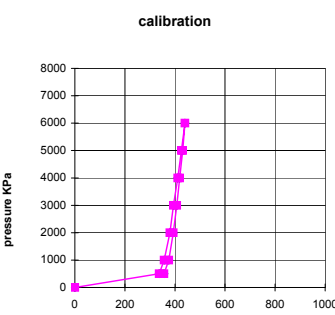
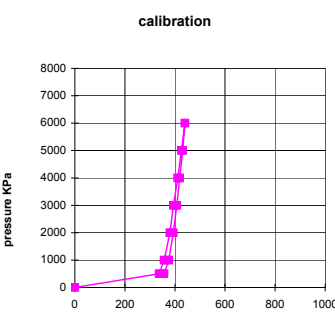
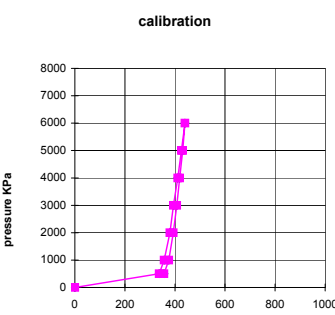
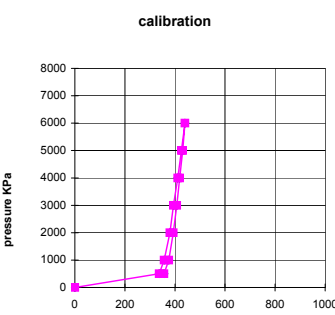
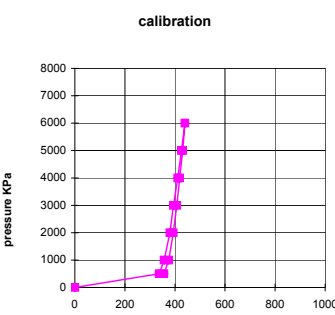
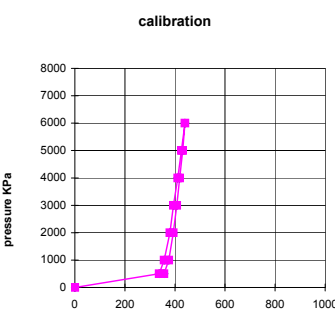
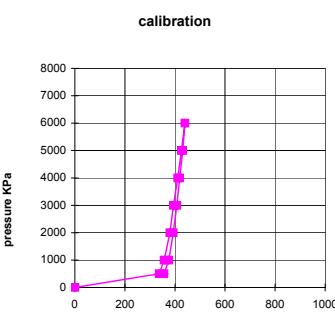
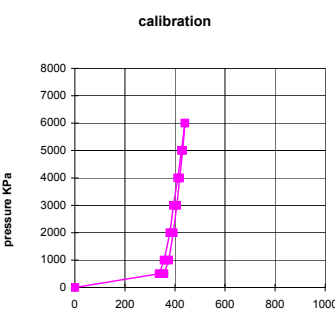
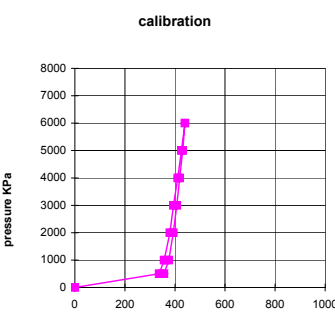
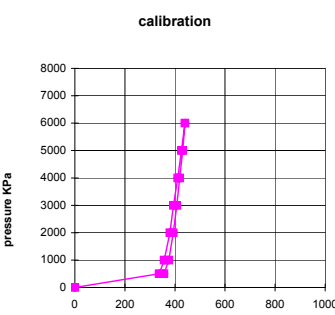
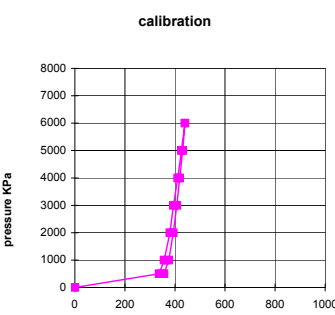
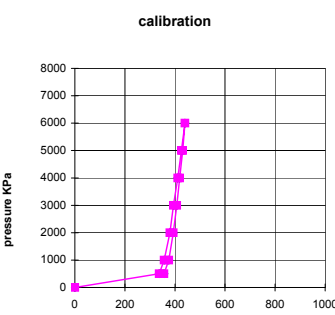
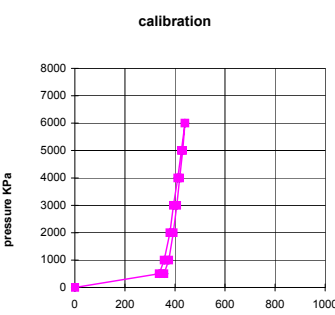
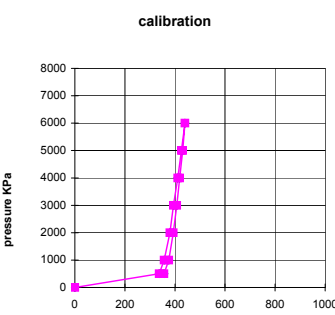
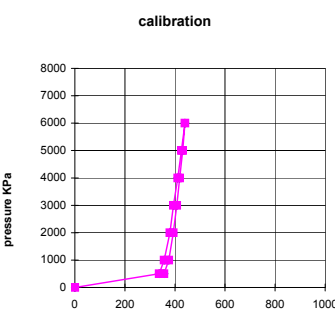
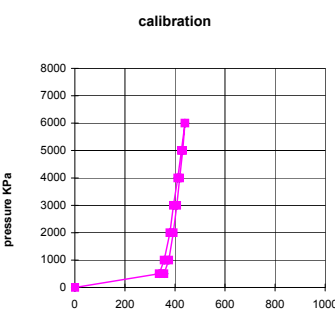
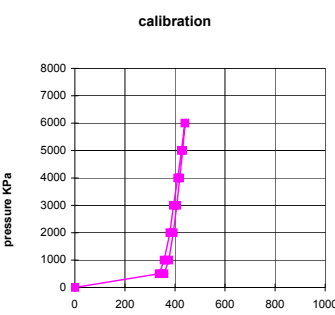
DILATOMETRIC ROCK TEST DRT			
borehole	S2GALL	probe depth m	31,1
		mod DVT	rev. 1
		code	1
Client:	ITALFERR S.P.A.	job	1714 v. accept. 1714SIT
Project	COLLEGAMENTO CAMPOMARINO-RIPALTA	report	1714SIT 04 DRT
site	CAMPOMARINO	coordinates	EAST NORTH date 07.06.17 pag 3/3


DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



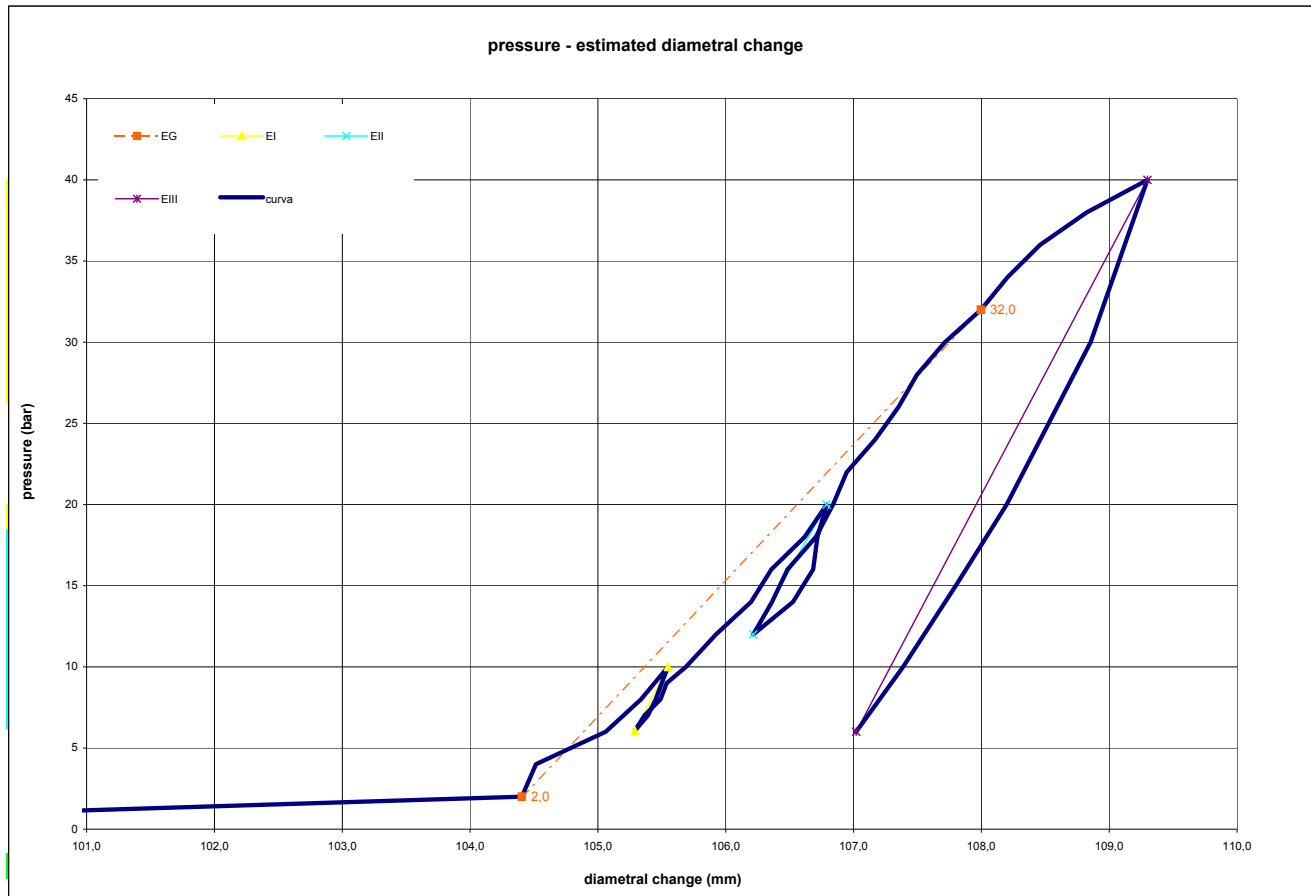
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	borehole	S2GALL	probe depth m	39,3	code	2		
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT	
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT	05	DRT	
site	CAMPOMARINO	coordinates	EAST	NORTH	date	08.06.17	pag	1/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987


Borehole		LITHOTYPE		time		P	Pcorr	Vol	ε c	1/V	diameter	Dil. Diam	Modulo	
				min	bar									Kpa
test	2	depth m	39,30			0	0,0	0	0,0	-7,788	0,000	96,273	0,000	0,0
slope (degree)	90	core barrel				1	2,0	553	608,6	0,000	1,643	104,405	8,131	8,5
Device:	CSM Type GEODV03 95 mm					2	4,0	748	617,3	0,106	1,620	104,516	8,242	230,3
Orientation capteur	Standard method: ISRM 1987					3	6,0	942	659,9	0,629	1,515	105,061	8,788	46,5
Probe diam 95 MM	Borehole diam	101 MM				4	8,0	1136	681,6	0,893	1,467	105,337	9,063	92,9
Meteo	Temperatur e					5	10,0	1331	698,2	1,095	1,432	105,548	9,275	121,5
lithotype	sabbie limose da moltoaddensate a deb. Cementate					6	9,0	1234	694,4	1,049	1,440	105,500	9,226	265,8
water table	POCKET PENETRO METER					7	8,0	1136	690,6	1,002	1,448	105,451	9,178	265,6
Creep test P (Bars) =						8	7,0	1038	685,7	0,944	1,458	105,390	9,117	210,1
Temps min	PBAR	MM				9	6,1	947	677,8	0,847	1,475	105,289	9,016	118,7
1						10	7,0	1038	683,7	0,919	1,463	105,365	9,091	159,2
2						11	8,0	1136	693,6	1,039	1,442	105,489	9,216	102,8
3						12	9,0	1233	697,4	1,085	1,434	105,538	9,265	265,8
4						13	10,0	1331	709,2	1,229	1,410	105,688	9,415	85,6
5						14	12,0	1526	727,8	1,455	1,374	105,924	9,651	109,2
						15	14,0	1720	749,5	1,717	1,334	106,198	9,924	94,4
						16	16,0	1916	762,1	1,870	1,312	106,357	10,084	162,7
						17	18,0	2111	782,8	2,119	1,278	106,617	10,18	99,8
						18	20,0	2306	796,4	2,283	1,256	106,788	10,515	152,0
						19	18,0	2110	790,8	2,215	1,265	106,717	10,444	368,8
						20	16,0	1914	788,1	2,183	1,269	106,684	10,411	787,8
						21	14,0	1719	775,5	2,031	1,290	106,525	10,252	163,7
						22	12,0	1524	750,8	1,734	1,332	106,215	9,941	83,3
						23	14,0	1720	762,5	1,874	1,312	106,362	10,088	176,8
						24	16,0	1915	772,1	1,991	1,295	106,483	10,210	214,2
						25	18,0	2110	789,8	2,203	1,266	106,705	10,431	117,1
						26	20,0	2306	800,4	2,331	1,249	106,838	10,565	195,2
						27	22,0	2501	809,0	2,435	1,236	106,947	10,673	241,1
						28	24,0	2696	826,7	2,646	1,210	107,168	10,894	118,1
						29	26,0	2891	841,3	2,822	1,189	107,351	11,077	143,0
						30	28,0	3087	853,0	2,961	1,172	107,496	11,222	180,6
						31	30,0	3282	870,6	3,171	1,149	107,716	11,442	119,4
						32	32,0	3476	893,2	3,441	1,120	107,997	11,724	93,3
						33	34,0	3671	909,9	3,638	1,099	108,203	11,930	127,7
						34	36,0	3866	930,5	3,883	1,075	108,459	12,185	103,3
						35	38,0	4061	960,2	4,233	1,041	108,825	12,551	72,1
						36	40,0	4254	998,8	4,688	1,001	109,299	13,026	55,6
						37	30,0	3276	962,6	4,262	1,039	108,855	12,581	299,8
						38	20,0	2299	909,4	3,633	1,100	108,197	11,924	201,7
						39	15,0	1811	877,3	3,251	1,140	107,799	11,526	165,4
						40	10,0	1323	844,2	2,856	1,185	107,387	11,113	159,2
						41	6,0	932	814,9	2,505	1,227	107,021	10,747	142,9

	DILATOMETRIC ROCK TEST DRT			mod DVT	rev. 1		
	borehole	S2GALL	probe depth m	39,3	code	2	
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT	05	DRT
site	CAMPOMARINO	coordinates	EAST	date	08.06.17	pag	2/3
			NORTH				

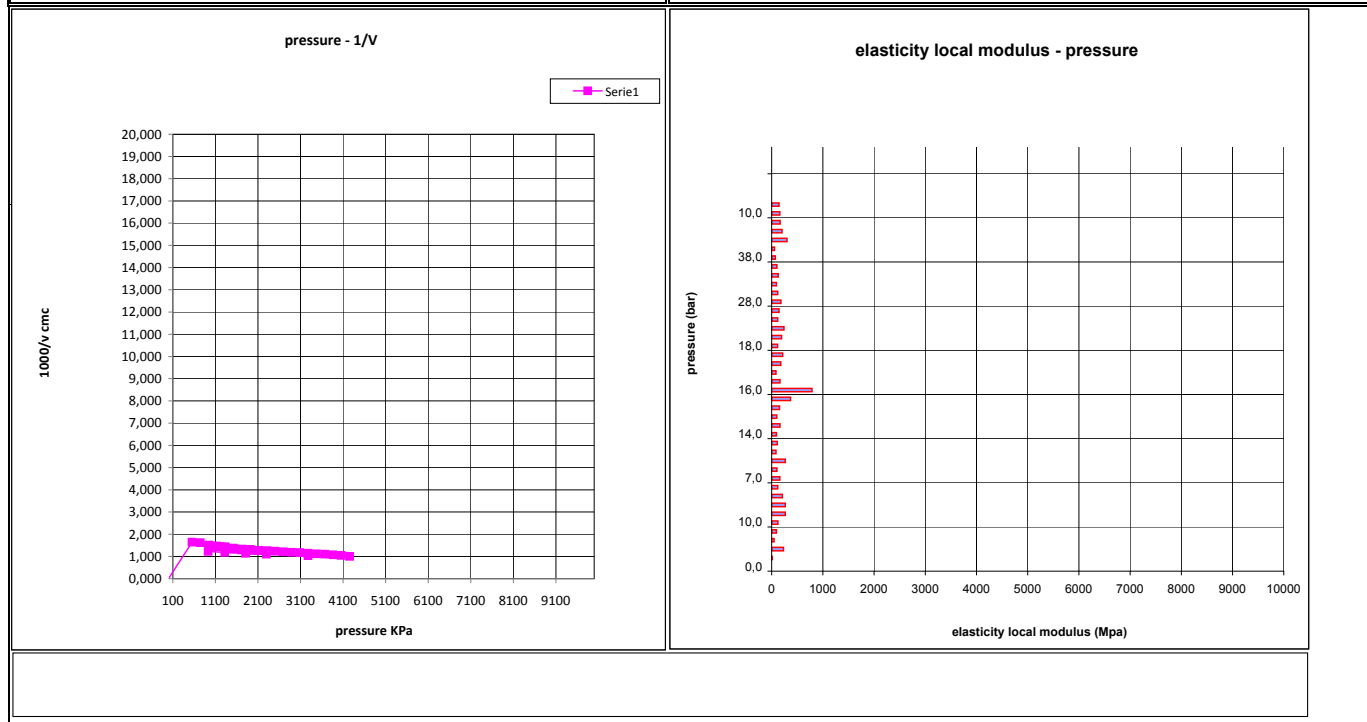
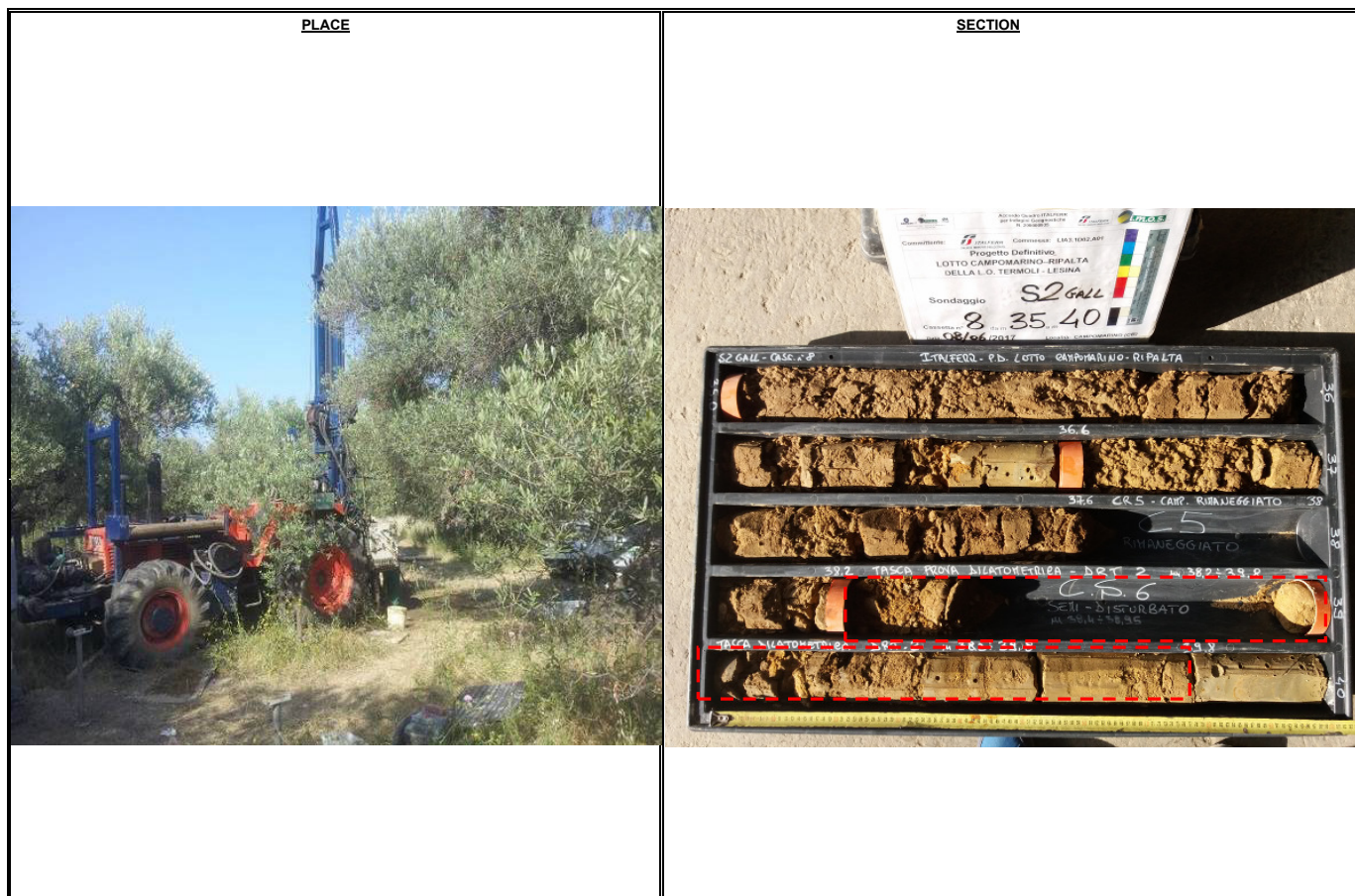
DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987




DATA PROCESSING		SENSOR 1			SENSOR 2		SENSOR 3		SENSOR AVE		
Legend: H = test depth W = water table depth v = Poisson ratio vo = cell initial volume do = cell initial diameter Φ = borehole wall diameter Po = start pressure Pmax = max loop pressure (MPa) Pmin = min loop pressure (MPa) d max displacement at P max d min displacement at P min σv vertical total stress estimated εc = dR / Ro		ELASTICITY MODULUS Ei									
		DATA	loop	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	Eav (Mpa)		
		symbol	datum	1	10,00	6,07			194		
		γnsoil	2,5	2	20,00	12,00			178		
		W (ml)	39,3	3	40,00	6,00			190		
v	0,25	4									
vo (cmc)	3457	5									
do (mm)	96,27	DEFORMATION MODULUS Ti									
σv (kPa)	983	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)			
		1	10,00	2,00				89			
		2	20,00	10,00				103			
		3	40,00	20,00				101			
		4									
		5									
ELASTICITY MODULUS Ei Ei = (1+ v) Φ Pax - Pmin dmax - dmin		ELASTICITY MODULUS Ey estimated Ey= (EII+EIII)/2 Ey= EIII		Pmax		Pmin	EG1 (Mpa)	EG2 (Mpa)	EG3 (Mpa)	EGm (Mpa)	
				32,00	2,00				106		
DEFORMATION MODULUS Ti Ti = (1+ v) Φ Pi - Pi-1 Xi - Xi-1		DIAMETER		F		F		F		F	
		beginning diameter (mm)								104,405	
		final diameter (mm)								109,299	
		range mm								4,895	
GLOBAL DEFORMATION MODULUS EG EG = (1+ v) Φ Pmax - Po dmax - do		DM loop minimum displacement			DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS						
		Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	553	EG (MPa)	106	
		bar	0	120	240	0	Pf creep pressure (KPa)	3476	E3 (MPa)	190	
		10,0	10,997	10,997	10,997	9,275	PL limit pres. (KPa) Cassan >	5428	E/P/L	22,41	
							PL' net limit pres (KPa) >	4741	EG/Ey	0,56	
note: MATERIALE ASSIMILATO A TERRENO COESIVO							Ko lateral coeff at rest (KPa)	0,70	cu coesion (KPa) johnson	568	
							Pho lateral pressure (KPa)	688	φ friction angle (°) >		

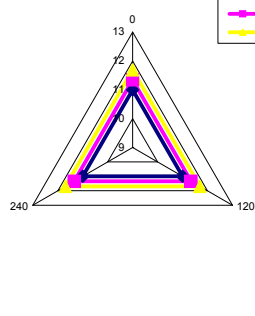
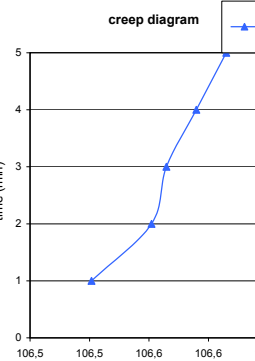
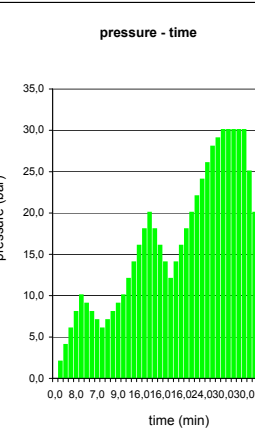
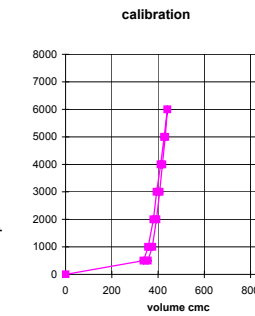
	DILATOMETRIC ROCK TEST DRT			mod DVT	rev. 1		
	borehole	S2GALL	probe depth m	39,3	code	2	
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT 05	DRT	
site	CAMPOMARINO	coordinates	EAST	date	08.06.17	pag	3/3
			NORTH				

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



	DILATOMETRIC ROCK TEST DRT			mod DVT	rev. 1					
	borehole	S2GALL	probe depth m	50,5	code	3				
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT			
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT 06 DRT					
site	CAMPOMARINO	coordinates		EAST		NORTH	date	08.06.17	pag	1/3

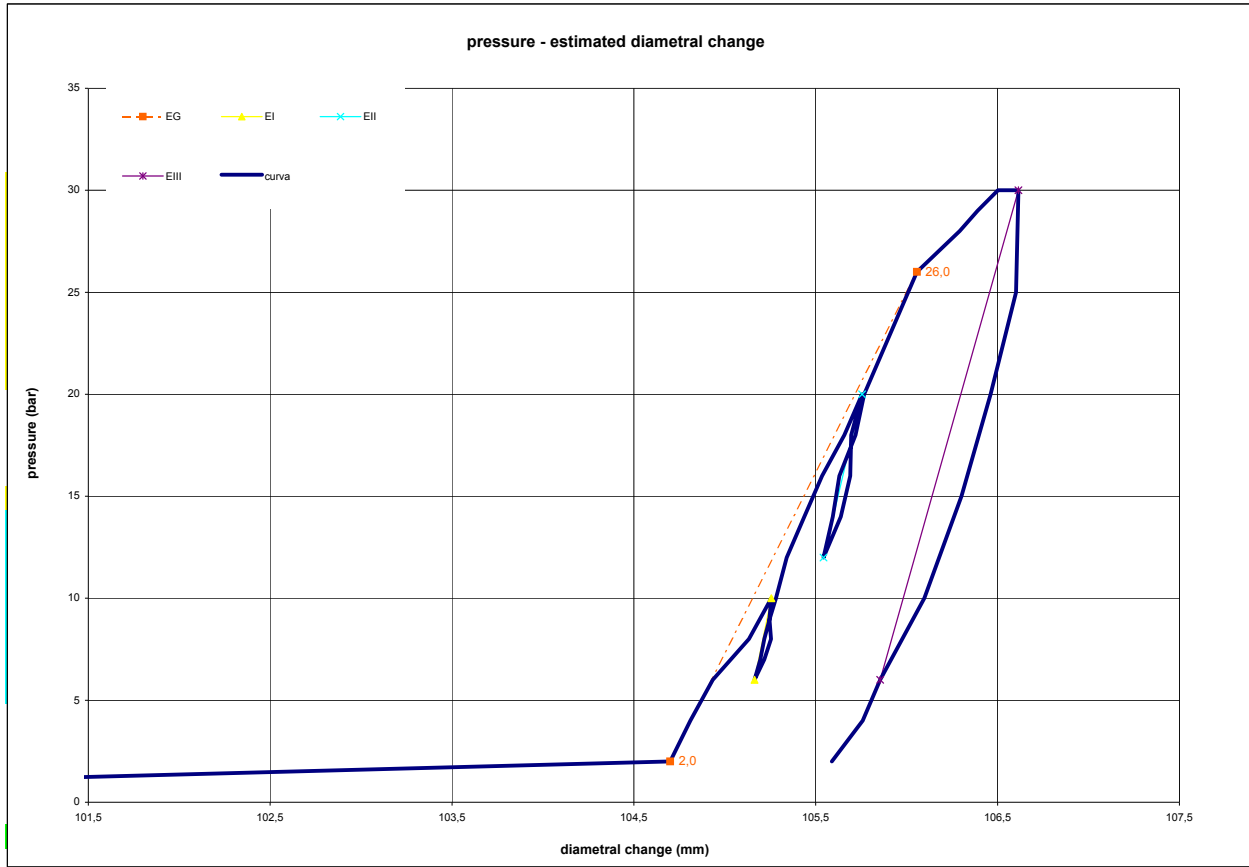
DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

Borehole S2GALL				LITHOTYPE		time		P	Pcorr	Vol	ϵ_c	ν/V	diameter	Dil. Diam	Modulo
						min	bar	Kpa	cmc	%	1000/cmc	(mm)	(mm)	MPa	
test	3	depth m	50,50			0	0,0	0	0,0	-8,048	0,000	96,273	0,000	0,0	
slope (degree)	90	core barrel				1	2,0	663	631,6	0,000	1,583	104,700	8,426	9,9	
Device:	CSM Type GEODV03 95 mm					2	4,0	859	640,3	0,106	1,562	104,810	8,537	231,6	
Orientation capteur	Standard method: ISRM 1987					3	6,0	1054	649,9	0,223	1,539	104,933	8,660	208,0	
Probe diam	95 MM	Borehole diam	101 MM			4	8,0	1249	665,6	0,414	1,502	105,133	8,860	128,3	
Meteo	Temperatur e					5	10,0	1445	675,2	0,531	1,481	105,256	8,982	209,2	
lithotype	sabbie e limi sabbiosi da addensate a deb.cementate					6	9,0	1347	674,4	0,521	1,483	105,245	8,972	1234,3	
water table	POCKET PENETRO METER					7	8,0	1249	675,1	0,530	1,481	105,254	8,981	-1489,7	
Creep test P (Bars) =	30,0					8	7,0	1151	672,1	0,494	1,488	105,217	8,943	346,1	
Temps min	PBAR	MM				9	6,0	1053	667,9	0,443	1,497	105,163	8,890	239,1	
1	30,0	106,502				10	7,0	1151	670,4	0,473	1,492	105,195	8,922	400,7	
2	30,0	106,552				11	8,0	1249	672,2	0,494	1,488	105,217	8,944	587,6	
3	30,0	106,565				12	9,0	1347	674,5	0,523	1,483	105,247	8,973	435,7	
4	30,0	106,590		13	10,0	1445	677,2	0,556	1,477	105,281	9,008	371,8			
5	30,0	106,615		14	12,0	1640	681,8	0,612	1,467	105,340	9,067	436,4			
				15	14,0	1836	689,5	0,705	1,450	105,438	9,164	265,2			
				16	16,0	2032	697,1	0,798	1,434	105,535	9,261	265,6			
				17	18,0	2227	706,8	0,914	1,415	105,657	18	210,8			
				18	20,0	2423	714,5	1,008	1,400	105,755	9,482	263,3			
				19	18,0	2227	709,8	0,951	1,409	105,695	9,422	430,5			
				20	16,0	2031	709,3	0,945	1,410	105,690	9,416	4640,9			
				21	14,0	1835	705,3	0,896	1,418	105,638	9,365	504,6			
				22	12,0	1639	697,7	0,805	1,433	105,543	9,269	269,7			
				23	14,0	1835	701,8	0,854	1,425	105,594	9,320	503,7			
				24	16,0	2031	704,6	0,888	1,419	105,630	9,356	717,4			
25	18,0	2227	711,7	0,974	1,405	105,719	9,446	289,4							
26	20,0	2423	715,4	1,019	1,398	105,767	9,493	546,0							
27	22,0	2618	723,0	1,112	1,383	105,863	9,590	267,3							
28	24,0	2814	730,7	1,204	1,369	105,960	9,687	267,8							
29	26,0	3009	738,3	1,296	1,354	106,057	9,783	268,3							
30	28,0	3204	757,0	1,521	1,321	106,292	10,019	109,9							
31	29,0	3302	764,8	1,615	1,308	106,391	10,117	131,6							
32	30,0	3399	773,6	1,721	1,293	106,502	10,228	116,8							
33	30,0	3399	777,6	1,769	1,286	106,552	10,279	-0,6							
34	30,0	3399	778,6	1,781	1,284	106,565	10,291	-0,6							
35	30,0	3399	780,6	1,805	1,281	106,590	10,316	-0,6							
36	30,0	3399	782,6	1,829	1,278	106,615	10,341	-0,6							
37	25,0	2909	781,5	1,816	1,280	106,601	10,328	4721,7							
38	20,0	2419	770,4	1,683	1,298	106,461	10,188	466,7							
39	15,0	1930	757,7	1,530	1,320	106,301	10,028	406,6							
40	10,0	1441	741,5	1,335	1,349	106,097	9,823	317,6							
41	6,0	1050	722,3	1,103	1,384	105,854	9,581	213,5							
42	4,0	854	714,8	1,012	1,399	105,759	9,485	270,8							
43	2,0	659	701,3	0,849	1,426	105,588	9,315	151,3							
				valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione											
				FIELD LIMITS											
				min	P	P corr	V corr	creep	1000/V	diameter	Dil. Diam	loop			
				max	2,0	663,2	631,6	0,0	1,6	104,7	8,4	primo			
				min	26,0	3009,5	738,3	1,3	1,4	106,1	9,8	carico			
				max	10,0	1444,8	675,2	0,5	1,5	105,3	9,0	I			
				min	6,0	1053,1	667,9	0,4	1,5	105,2	8,9				
				max	20,0	2422,7	714,5	1,0	1,4	105,8	9,5	II			
				min	12,0	1639,5	697,7	0,8	1,4	105,5	9,3				
				max	30,0	3398,9	782,6	1,8	1,3	106,6	10,3	III			
min	6,0	1049,8	722,3	1,1	1,4	105,9	9,6								
				Calibration in air coeff m: 0,06 cmc/Kpa											
				Confined calibration first load: 66 Kpa/cmc unload: 85 Kpa/cmc											
				PROBE SCHEME rod adaptor electronic device double action piston expandable cylinder											
PROBE CALIBRATION probe: GEODV03 CSM TYPE membrane: CAUCCIU' ARMATO measure cell height (cm): V0 cell volume at rest (cmc): 3457 lenght cable (mt): 50 Volume initial Vi (cmc): 349 diam calibration tube (cm): 10,1 tube calibration volume cmc: 3806															



DILATOMETRIC ROCK TEST DRT				mod DVT	rev. 1
borehole	S2GALL	probe depth m	50,5	code	3
Client:	ITALFERR S.P.A.	job	1714	v. accept:	1714SIT
Project	COLLEGAMENTO CAMPOMARINO-RIPALTA	report	1714SIT 06	DRT	
site	CAMPOMARINO	coordinates	EAST	date	08.06.17
			NORTH	pag	2/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



DATA PROCESSING		SENSOR 1		SENSOR 2		SENSOR 3		SENSOR AVE						
Legend:		ELASTICITY MODULUS Ei		E1 (Mpa)		E2 (Mpa)		E3 (Mpa)						
H = test depth		loop	Pmax	Pmin					Eav (Mpa)					
W = water table depth		symbol	datum	1	10,00	6,00			553					
v = Poisson ratio		ynsoil	2,5	2	20,00	12,00			482					
vo = cell initial volume		W (ml)	50,5	3	30,00	6,00			404					
do = cell initial diameter		v	0,25	4										
Φ = borehole wall diameter		vo (cmc)	3457	5										
Po = start pressure		do (mm)	96,27	DEFORMATION MODULUS Ti										
Pmax = max loop pressure (MPa)		σv (kPa)	1263	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)				
Pmin = min loop pressure (MPa)				1	10,00	2,00			184					
d max displacement at P max				2	20,00	10,00			256					
d min displacement at P min				3	30,00	20,00			149					
σv vertical total stress estimated				4										
ε c = dR / Ro				5										
ELASTICITY MODULUS Ei		ELASTICITY MODULUS Ey estimated		GLOBAL DEFORMATION MODULUS EG										
Ei = (1+ν) Φ Pmax - Pmin		Ey = (EII+EIII)/2				EG1 (Mpa)		EG2 (Mpa)		EG3 (Mpa)		EGm (Mpa)		
dmax - dmin		Ey = EIII				26,00		2,00				226		
DEFORMATION MODULUS Ti				DIAMETER		F		F		F		F		
Ti = (1+ν) Φ Pi - Pi-1				beginning diameter (mm)								104,700		
Xi - Xi-1				final diameter (mm)								106,615		
				range mm								1,915		
				DM loop minimum displacement		DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS								
		Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	663	EG (MPa)	226				
		bar	0	120	240	0	Pf creep pressure (KPa)	3009	E3 (MPa)	404				
		10,0	10,997	10,997	10,997	8,982	PL limit pres. (KPa) Cassan >	4497	E/PL	62,62				
								PL' net limit pres (KPa) >	3614	EG/Ey	0,56			
								Ko lateral coeff at rest (KPa)	0,70	cu cohesion (KPa) johnson	475			
								Pho lateral pressure (KPa)	884	φ friction angle (°) >				
note: MATERIALE ASSIMILATO A TERRENO COESIVO														

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

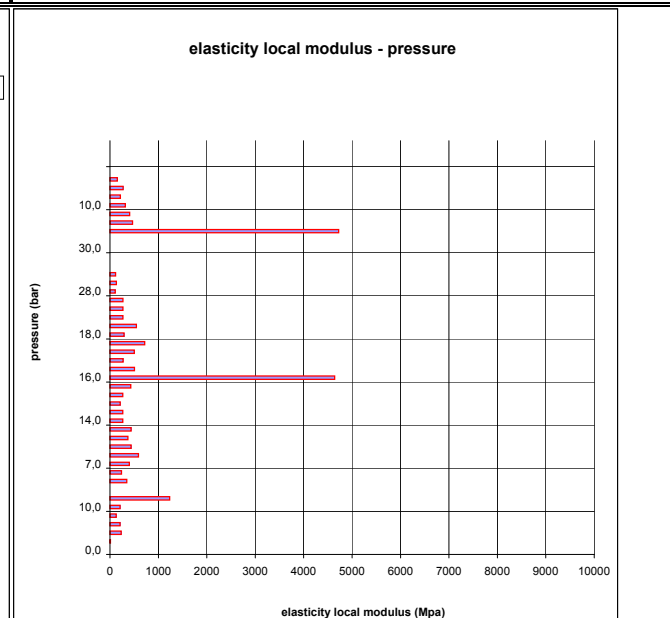
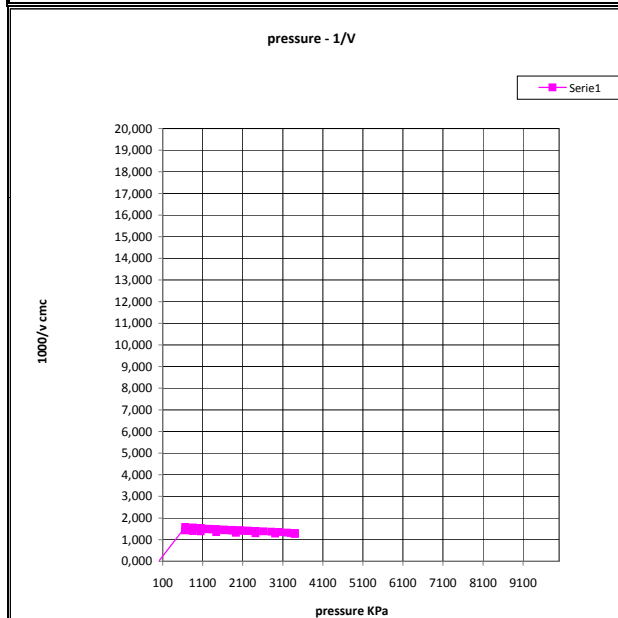
Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56



DILATOMETRIC ROCK TEST DRT				mod DVT	rev. 1
borehole	S2GALL	probe depth m	50,5	code	3
Client:	ITALFERR S.P.A.	job	1714	v. accept.	1714SIT
Project	COLLEGAMENTO CAMPOMARINO-RIPALTA	report	1714SIT 06 DRT		
site	CAMPOMARINO	coordinates	EAST NORTH	date	08.06.17
				pag	3/3

DILATOMETRIC ROCK TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



Sede: Via Monsignor Bologna, 18 - CAMPOBASSO
Stabilimento: C.da S.Maria delle Macchie - Vinchiaturo (CB)
Tel. 0874/340003-16 **Fax:** 0874/340014
P.IVA e Cod. Fiscale: 00717630701
web: www.imosgeo.it



S2 GALL BIS



PRESSUREMETER TEST					mod MPT	rev 2.0
BOREHOLE	S2GALL bis	DEPTH m	13,3	TEST CODE MPT	1	
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT
PROJECT	RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)		REPORT	1714SIT 13		
OBJECT						
COORDINATES						
SITE	Campomarino	DATE	05.12.17	PAGE	1/3	

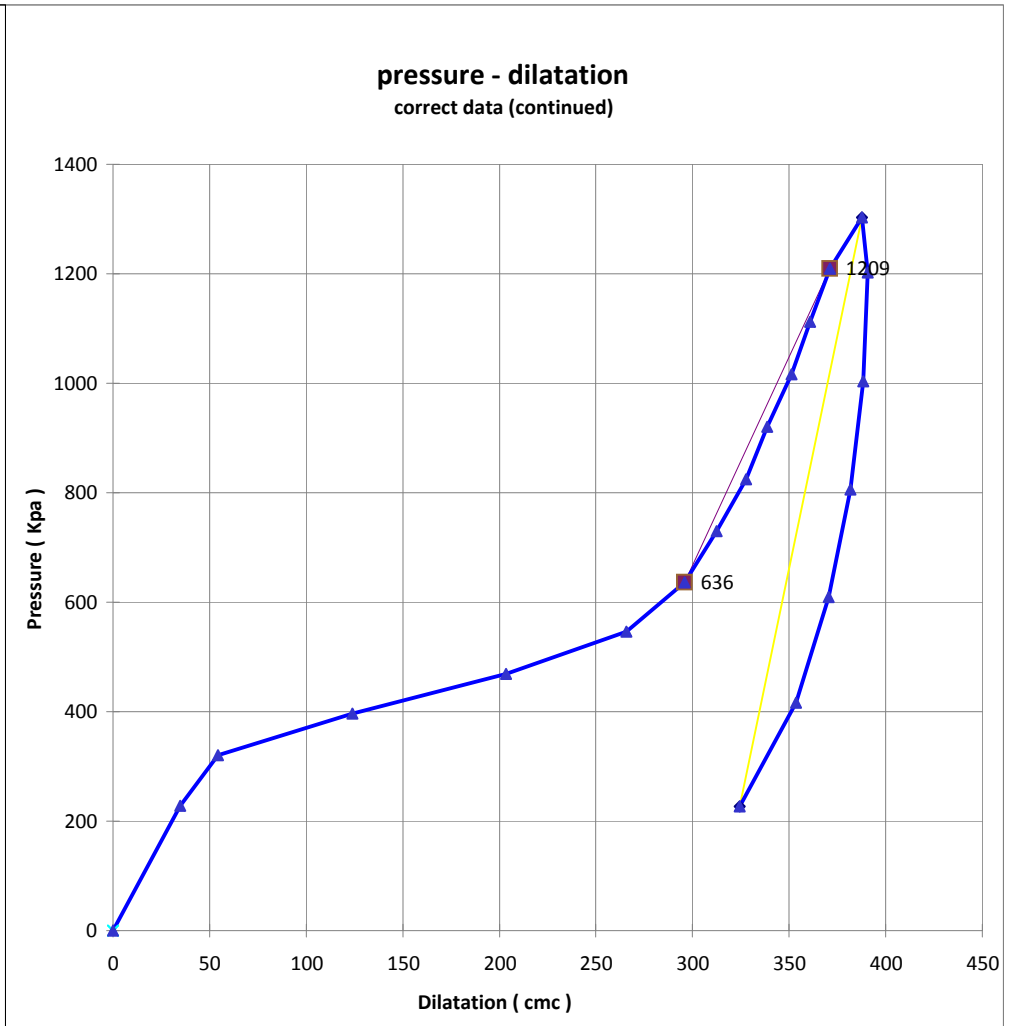
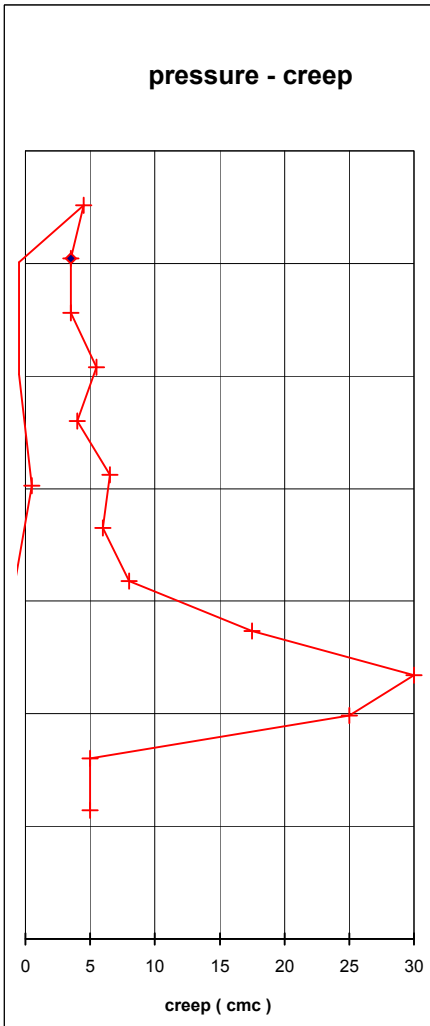
weather _____ test depth 13,30 m


hydrostatic level (m) > _____ us _____ KPa display by surface (m) 1,00 SPT (m) _____ n/15cm

γ_n nat.grav assumed 2,20 t/mc Pressuremeter: APAGEO SEGELM

σ_v assumed 293 kPa test pocket carotaggio 66 mm probe: TE60

soil brief description ARGILLA AVANA CON LIVELLI SABBIOSI pressuremeter modulus **Em** 17,3 MPa
 assumed elasticity modulus **Ey** 25,9 MPa
 geological unit _____ E_m/P^*L 10,15
 assumed cu 196 kPa
 test in according with AFNOR NFP 94 - 110 Assumed friction angle by Menard _____ °



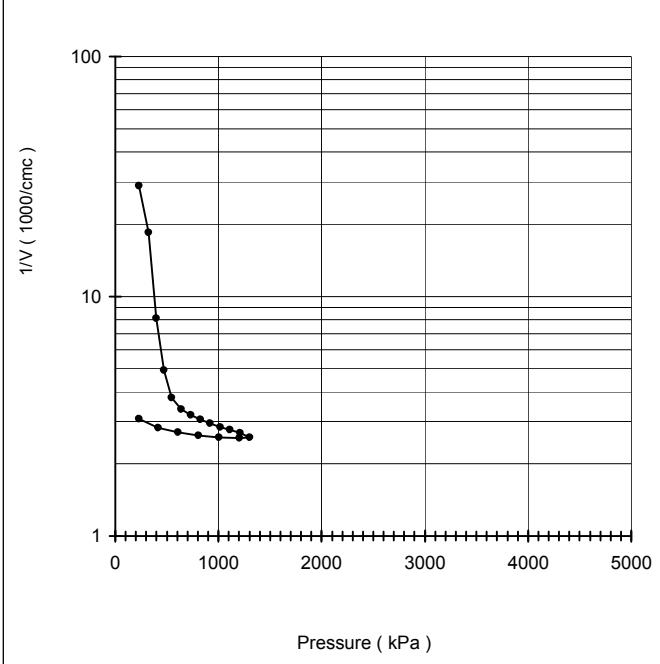
	PRESSUREMETER TEST						mod MPT	rev 1.0
	BOREHOLE	S2GALL bis	DEPTH m	13,3	TEST CODE MPT	1		
	CLIENT	ITALFERR S.P.A.			JOB N.	1714	TYPE	SIT
	PROJECT	RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)			REPORT	1714	13	MPT
	OBJECT							
	COORDINATES							
SITE	Campomarino	DATE	05.12.17	PAGE	2/3			

DATA PROCESSING

PRESSUREMETER CURVE LIMITS				PHYSIC PROPERTIES			SYSTEM CORRECTION	
	FIRST LOAD	LOOP 1	LOOP 2	VP probe volume at rest	523	cmc	inertia cover	
initial pressure P1 (kPa)	636	1303		VL probe limit volume	1115	cmc	kPa/cmc	0,35
initial volume pressure V1 (kPa)	296	388		V0 initial volume	296	cmc	sys. Dilatation	
initial creep vol C1 (cmc)	8			1/VL	0,90	10 ⁻³ cmc	cmc/Mpa	3,62
final pressure P2 (kPa)	1209	227		v poisson index	0,33			
final volume V2 (kPa)	371	324		α sp reologic experimental coeff.	0,44			
fin creep (cmc)/ unload Eu (Mpa)	4	39,6		α reologic theoretic coefficient	0,67			
							MPa	

PRESSUREMETER PARAMETERS				DATA									
Ko lateral coeff at rest assumed	0,70				Pressure	Vr 30"	Vr 60"	P corr.	V corr.	creep	Modulus		
Pho estim. Horiz pres at rest	205	kPa		n°	bars	cmc	cmc	kPa	cmc	cmc	MPa		
P0 measured initial pressure	636	kPa		1	0,0	0	0	0	0	0			
Em pressuremeter modulus	17,3	MPa		2	1,0	30	35	228	35	5	9,5		
Ey min elasticity mod. measured in unload	39,6	MPa		3	2,0	50	55	321	54	5	7,1		
Ey elasticity mod. assumed by C. reologic	25,9	MPa		4	3,0	100	125	397	124	25	1,8		
Pc creep pressure	1209	kPa		5	4,0	175	205	469	204	30	1,7		
P*c net creep pressure	1004	kPa		6	5,0	250	268	547	266	18	2,5		
PL limit pressure by Cassan	1912	kPa		7	6,0	290	298	636	296	8	6,3		
PL limit pressure by Van Vambecke	2671	kPa		8	7,0	309	315	730	312	6	12,4		
PL assumed limit pressure	1912	kPa		9	8,0	324	331	825	328	7	14,0		
P*L assumed net limit pressure	1707	kPa		10	9,0	338	342	921	339	4	19,6		
Em/P*L	10,15		Ey/P*L	23,22	11	10,0	350	355	1016	351	6	17,4	
					12	11,0	362	365	1113	361	4	23,4	
					13	12,0	372	376	1209	371	4	22,5	

GEOTECHNICAL PARAMETERS				14	13,0	388	393	1303	388	5	13,6
Assumed CU by Amar et Jezequel	196	kPa		15	12,0	396	395	1202	391	-1	-85,5
Assumed friction angle by Menard		°		16	10,0	393	392	1003	388	-1	212,2
				17	8,0	384	385	806	382	1	70,4
				18	6,0	374	373	610	370	-1	41,5
				19	4,0	356	355	416	354	-1	27,2
				20	2,0	329	325	227	324	-4	14,8
				21							
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				35							



FORO LARGO



PRESSUREMETER TEST						mod MPT	rev 1.0
BOREHOLE	S2GALL bis	DEPTH m	13,3	TEST CODE MPT	1		
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT	
PROJECT	RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)		REPORT	1714	13	MPT	
OBJECT							
COORDINATES							
SITE	Campomarino	DATE	05.12.17	PAGE	3/3		

PLACE

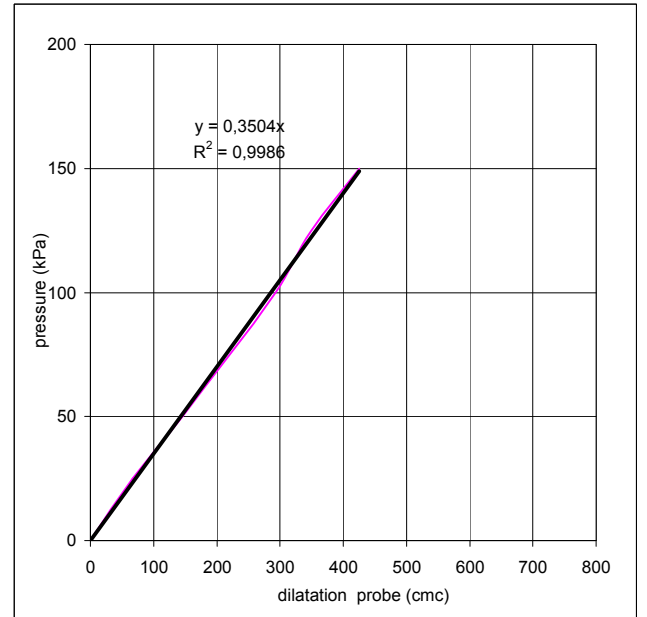


SOIL TYPE



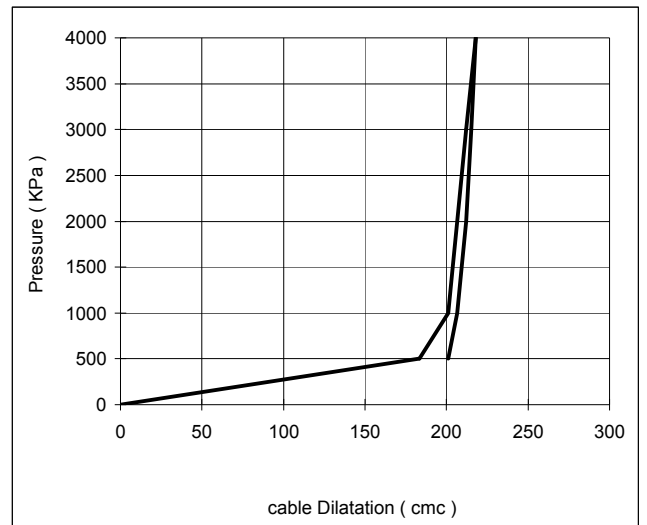
CALIBRATION IN AIR

membrane SI cover TELATA MORBIDA kPa/cmc 0,35
 Height measure cell (cm) 21,00 VP in. probe vol (cmc) 523



CONFINED CALIBRATION

Length cable 50 ϕ confined diameter (cm) 6,6
 Vi (cmc) 195 Coeff. 5,62 cmc/Mpa first load
 tube volume cmc 718 Coeff. 3,62 cmc/Mpa unload





PRESSUREMETER TEST					mod MPT	rev 2.0
BOREHOLE	S2GALL bis	DEPTH m	23,0	TEST CODE MPT	2	
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT
PROJECT	RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)		REPORT	1714SIT 14		MPT
OBJECT						
COORDINATES						
SITE	Campomarino	DATE	05.12.17	PAGE	1/3	

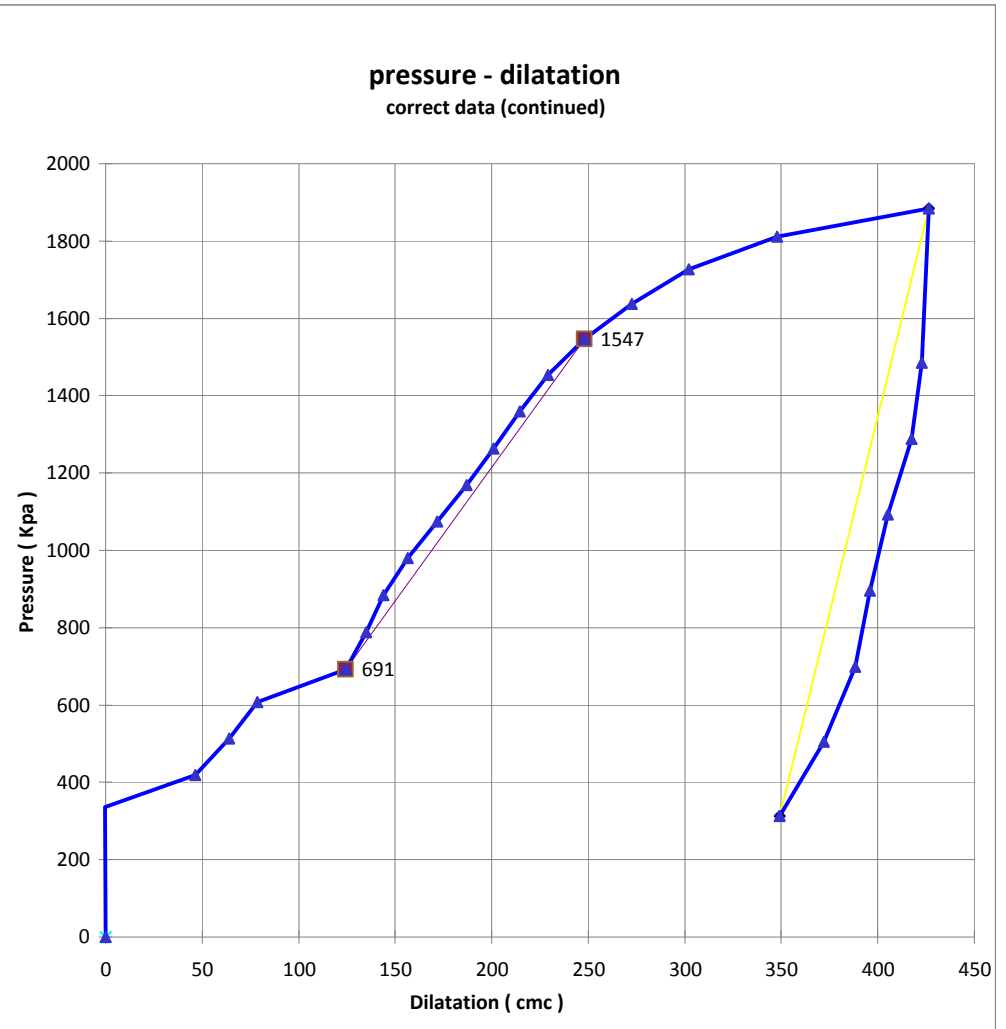
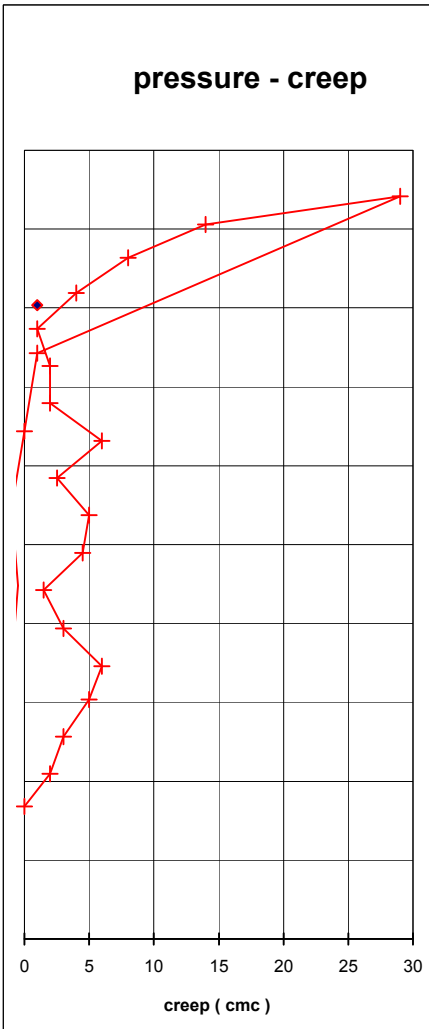
weather _____ test depth 23,00 m


hydrostatic level (m) > _____ us _____ KPa display by surface (m) 1,00 SPT (m) _____ n/15cm

γ_n nat.grav assumed 2,20 t/mc Pressuremeter: APAGEO SEGELM

σ_V assumed 506 kPa test pocket carotaggio 66 mm probe: TE60

soil brief description ARGILLA LIMOSA GRIGIA CON RARI LIVELLETTI SABBIOSI pressuremeter modulus **Em** 13,0 MPa
 assumed elasticity modulus **Ey** 19,5 MPa
 geological unit _____ E_m/P^*L 7,66
 assumed c_u 195 kPa
 test in according with AFNOR NFP 94 - 110 Assumed friction angle by Menard _____ °

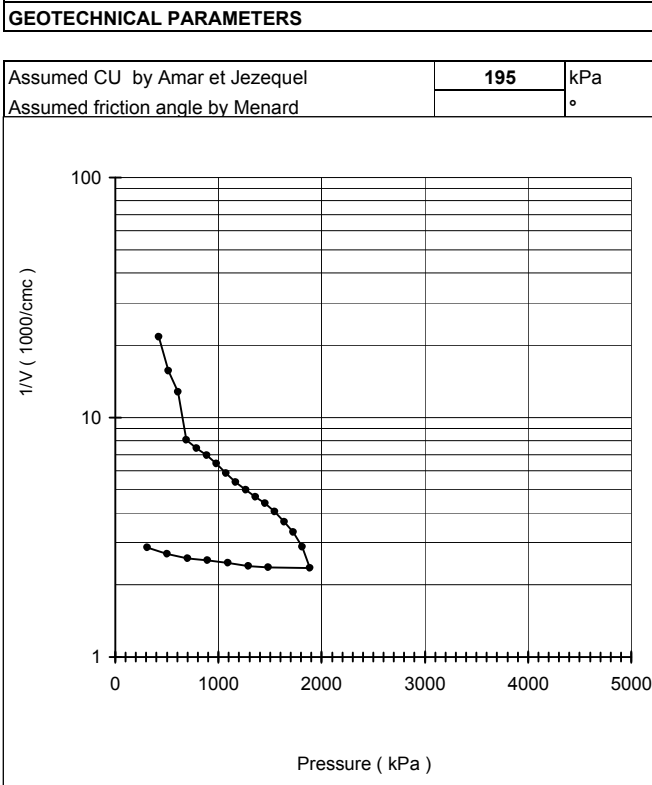


		PRESSUREMETER TEST				mod MPT rev 1.0	
		BOREHOLE	S2GALL bis	DEPTH m	23,0	TEST CODE MPT	2
CLIENT	ITALFERR S.P.A.			JOB N.	1714	TYPE	SIT
PROJECT	RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)			REPORT	1714	14	MPT
OBJECT							
COORDINATES							
SITE	Campomarino		DATE	05.12.17		PAGE	2/3

DATA PROCESSING

PRESSUREMETER CURVE LIMITS				PHYSIC PROPERTIES			SYSTEM CORRECTION	
	FIRST LOAD	LOOP 1	LOOP 2					
initial pressure P1 (kPa)	691	1884		VP probe volume at rest	523	cmc	inertia cover	
initial volume pressure V1 (kPa)	124	426		VL probe limit volume	772	cmc	kPa/cmc	0,35
initial creep vol C1 (cmc)	6			V0 initial volume	124	cmc	sys. Dilatation	
final pressure P2 (kPa)	1547	313		1/VL	1,30	10 ⁻³ cmc	cmc/Mpa	3,62
final volume V2 (kPa)	248	349		v poisson index	0,33			
fin creep (cmc)/ unload Eu (Mpa)	1	49,3		α sp reologic experimental coeff.	0,26			
				α reologic theoretic coefficient	0,67			

PRESSUREMETER PARAMETERS				DATA									
Ko lateral coeff at rest assumed	0,70				Pressure	Vr 30"	Vr 60"	P corr.	V corr.	creep	Modulus		
Pho estim. Horiz pres at rest	354	kPa		n°	bars	cmc	cmc	kPa	cmc	cmc	MPa		
P0 measured initial pressure	691	kPa		1	0,0	0	0	0	0	0			
Em pressuremeter modulus	13,0	MPa		2	1,0	0	0	335	0	0	-1288,7		
Ey min elasticity mod. measured in unload	49,3	MPa		3	2,0	45	47	419	46	2	2,6		
Ey elasticity mod. assumed by C. reologic	19,5	MPa		4	3,0	62	65	513	64	3	8,2		
Pc creep pressure	1607	kPa		5	4,0	75	80	607	79	5	10,2		
P*c net creep pressure	1253	kPa		6	5,0	120	126	691	124	6	3,1		
PL limit pressure by Cassan	2484	kPa		7	6,0	134	137	787	135	3	15,7		
PL limit pressure by Van Vambecke	2057	kPa		8	7,0	145	147	884	144	2	18,6		
PL assumed limit pressure	2057	kPa		9	8,0	155	160	980	157	5	13,5		
P*L assumed net limit pressure	1703	kPa		10	9,0	170	175	1074	172	5	11,4		
Em/P*L	7,66	Ey/P*L		11	10,0	188	191	1169	187	3	11,7		
		28,96		12	11,0	199	205	1264	201	6	12,8		
				13	12,0	217	219	1359	215	2	13,6		
				14	13,0	232	234	1454	229	2	12,8		
				15	14,0	252	253	1547	248	1	10,1		
				16	15,0	274	278	1638	273	4	7,7		
				17	16,0	300	308	1728	302	8	6,5		
				18	17,0	340	354	1812	348	14	4,1		
				19	18,0	404	433	1884	426	29	2,2		
				20	14,0	427	428	1486	423	1	282,7		
				21	12,0	422	422	1288	418	0	94,1		
				22	10,0	410	409	1092	405	-1	39,6		
				23	8,0	400	399	896	396	-1	52,1		
				24	6,0	392	391	699	388	-1	61,7		
				25	4,0	375	374	505	372	-2	28,6		
				26	2,0	353	350	313	349	-3	19,8		
				27									
				28									
				29									
				30									
				31									
				32									
				33									
				34									
				35									



tratto iniziale della curva pressiometrica disturbato da perforazione



PRESSUREMETER TEST						mod MPT	rev 1.0
BOREHOLE	S2GALL bis	DEPTH m	23,0	TEST CODE MPT	2		
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT	
PROJEC	RADDOPPIO TERMOLI-RIPALTA (Lotti 2 e 3)		REPORT	1714	14	MPT	
OBJECT							
COORDINATES							
SITE	Campomarino	DATE	05.12.17	PAGE	3/3		

PLACE

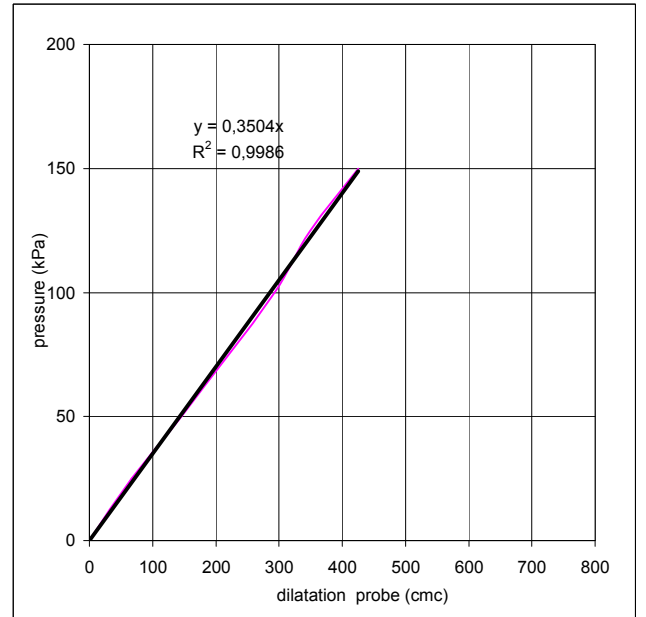


SOIL TYPE



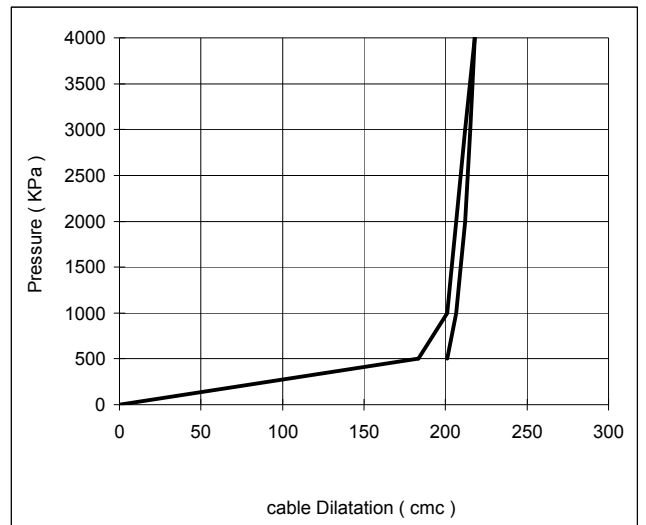
CALIBRATION IN AIR

membrane SI cover TELATA MORBIDA kPa/cmc 0,35
 Height measure cell (cm) 21,00 VP in. probe vol (cmc) 523



CONFINED CALIBRATION

Lenght cable 50 ϕ confined diameter (cm) 6,6
 Vi (cmc) 195 Coeff. 5,62 cmc/Mpa first load
 tube volume cmc 718 Coeff. 3,62 cmc/Mpa unload



Sede: Via Monsignor Bologna, 18 - CAMPOBASSO
Stabilimento: C.da S.Maria delle Macchie - Vinchiaturo (CB)
Tel. 0874/340003-16 **Fax:** 0874/340014
P.IVA e Cod. Fiscale: 00717630701
web: www.imosgeo.it



S3 GALL



PRESSUREMETER TEST					mod MPT	rev 2.0
BOREHOLE	S3GALL	DEPTH m	20,0	TEST CODE MPT	1	
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT
PROJECT	LOTTO CAMPOMARINO-RIPALTA		REPORT	1714SIT	7	MPT
OBJECT						
COORDINATES						
SITE	Campomarino	DATE	17.05.17	PAGE	1/3	

weather _____ test depth 20,00 m

hydrostatic level (m) > _____ us _____ KPa display by surface (m) 1,00 SPT (m) _____ n/15cm

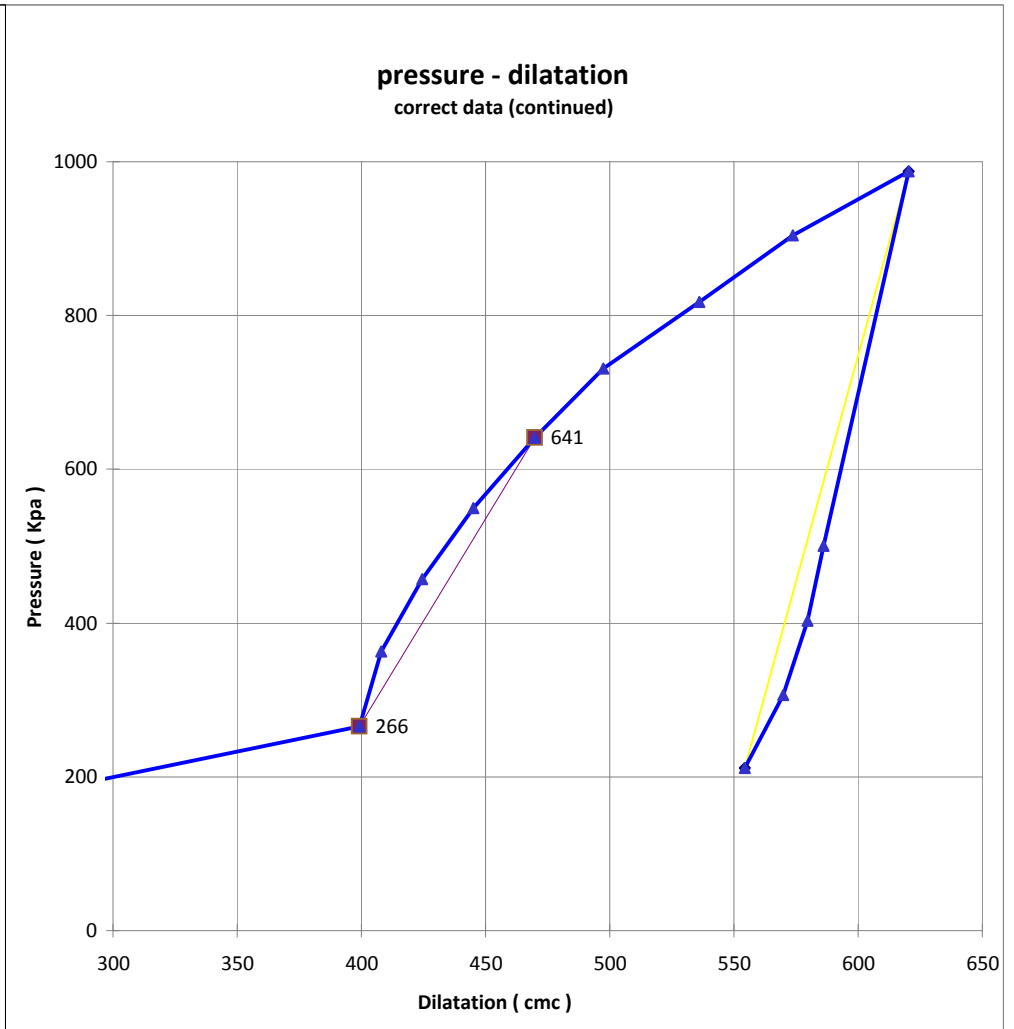
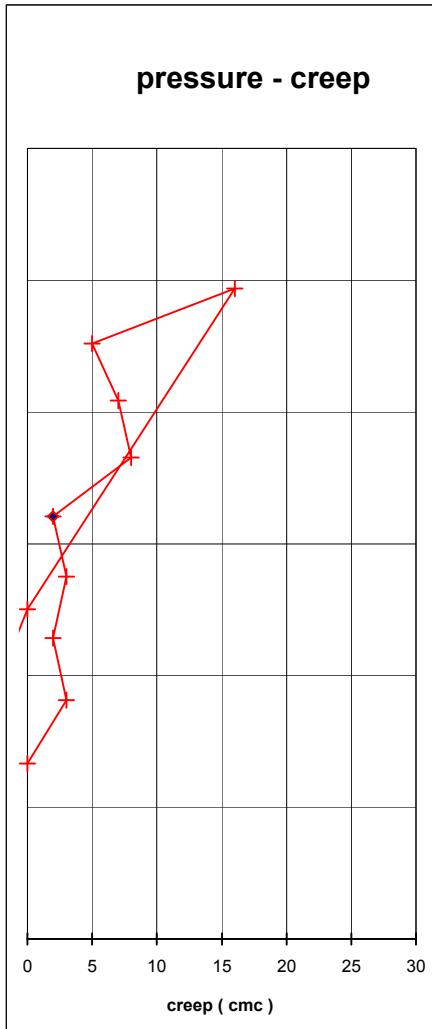
γ_n nat. grav assumed 2,20 t/mc Pressuremeter: APAGEO SEGELM

σ_v assumed 440 kPa test pocket carotaggio 66 mm probe: TE60

soil brief description argilla limosa grigia molto consistente pressuremeter modulus **Em** 13,5 MPa
 assumed elasticity modulus **Ey** 20,2 MPa
 E_m/P^*L 23,92

geological unit _____ Assumed CU (johnson, 1986) 112 kPa
 Assumed friction angle by Menard _____ °

test in according with AFNOR NFP 94 - 110





PRESSUREMETER TEST						mod MPT	rev 1.0
BOREHOLE	S3GALL	DEPTH m	20,0	TEST CODE MPT	1		
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT	
PROJECT	LOTTO CAMPOMARINO-RIPALTA		REPORT	1714	7	MPT	
OBJECT							
COORDINATES							
SITE	Campomarino	DATE	17.05.17	PAGE	2/3		

DATA PROCESSING

PRESSUREMETER CURVE LIMITS

	FIRST LOAD	LOOP 1	LOOP 2
initial pressure P1 (kPa)	266	988	
initial volume pressure V1 (kPa)	399	620	
initial creep vol C1 (cmc)	0		
final pressure P2 (kPa)	641	212	
final volume V2 (kPa)	470	554	
fin creep (cmc)/ unload Eu (Mpa)	2	34,7	

PHYSIC PROPERTIES

VP probe volume at rest	523	cmc	inertia cover	
VL probe limit volume	1322	cmc	kPa/cmc	0,35
V0 initial volume	399	cmc	sys. Dilatation	
1/VL	0,76	10 ⁻³ cmc	cmc/Mpa	3,62
v poisson index	0,33			
α sp reologic experimental coeff.	0,39			
α reologic theoretic coefficient	0,67			

MPa

PRESSUREMETER PARAMETERS

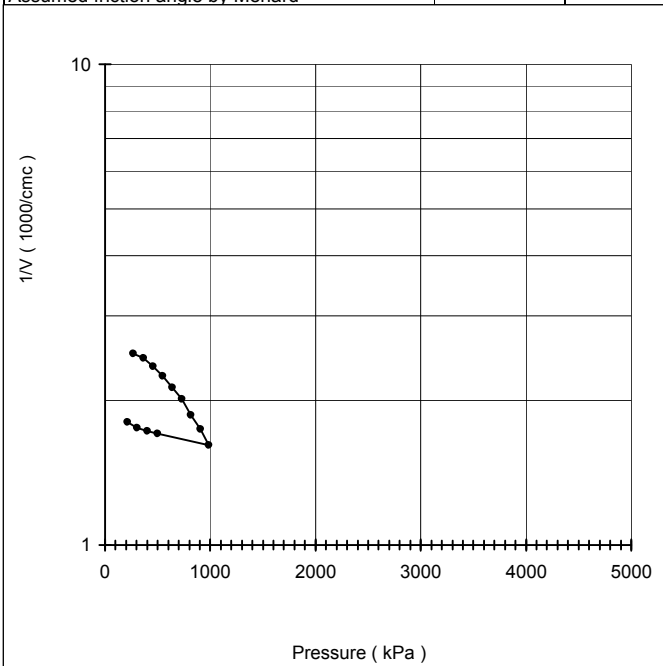
Ko lateral coeff at rest assumed	0,70	
Pho estim. Horiz pres at rest	308	kPa
P0 measured initial pressure	266	kPa
Em pressuremeter modulus	13,5	MPa
Ey min elasticity mod. measured in unload	34,7	MPa
Ey elasticity mod. assumed by C. reologic	20,2	MPa
Pc creep pressure	641	kPa
P*c net creep pressure	333	kPa
PL limit pressure by Cassan	874	kPa
PL limit pressure by Van Vambecke	1578	kPa
PL assumed limit pressure	874	kPa
P*L assumed net limit pressure	566	kPa
Em/P*L	23,92	
Ey/P*L	61,28	

DATA

	Pressure	Vr 30"	Vr 60"	P corr.	V corr.	creep	Modulus
n°	bars	cmc	cmc	kPa	cmc	cmc	MPa
1	0,0	0	0	0	0	0	
2	2,0	400	400	266	399	0	1,3
3	3,0	406	409	363	408	3	27,6
4	4,0	424	426	457	425	2	14,1
5	5,0	444	447	550	445	3	11,4
6	6,0	470	472	641	470	2	9,7
7	7,0	492	500	731	497	8	8,7
8	8,0	532	539	817	536	7	6,2
9	9,0	572	577	904	574	5	6,6
10	10,0	608	624	988	620	16	5,3
11	5,0	588	588	500	586	0	42,7
12	4,0	583	581	403	580	-2	43,2
13	3,0	572	571	306	570	-1	29,2
14	2,0	556	555	212	554	-1	17,4
15							
16							
17							
18							
19							
20							
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31							
32							
33							
34							
35							

GEOTECHNICAL PARAMETERS

Assumed CU (johnson, 1986)	112	kPa
Assumed friction angle by Menard		°



MATERIALE ASSIMILATO A TERRENO COESIVO

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56



PRESSUREMETER TEST						mod MPT	rev 1.0
BOREHOLE	S3GALL	DEPTH m	20,0	TEST CODE MPT	1		
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT	
PROJECT	LOTTO CAMPOMARINO-RIPALTA		REPORT	1714	7	MPT	
OBJECT							
COORDINATES							
SITE	Campomarino	DATE	17.05.17	PAGE	3/3		

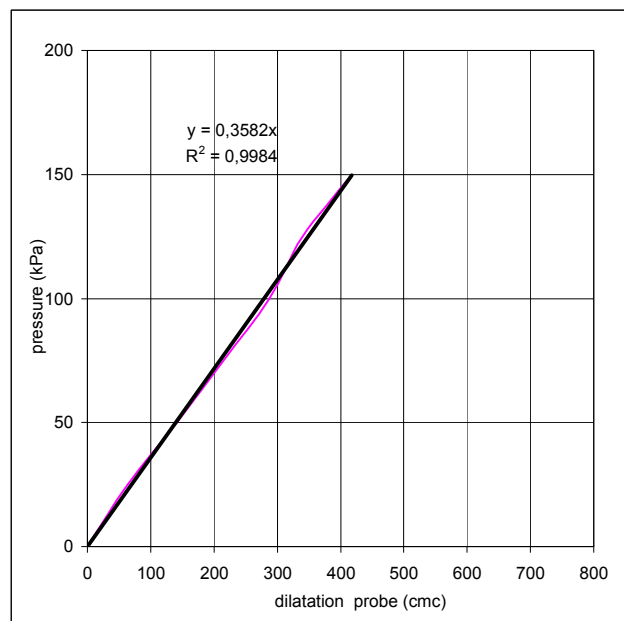
PLACE



CALIBRATION IN AIR

membrane SI cover TELATA MORBIDA kPa/cmc 0,35

Height measure cell (cm) 21,00 VP in. probe vol (cmc) 523



SOIL TYPE

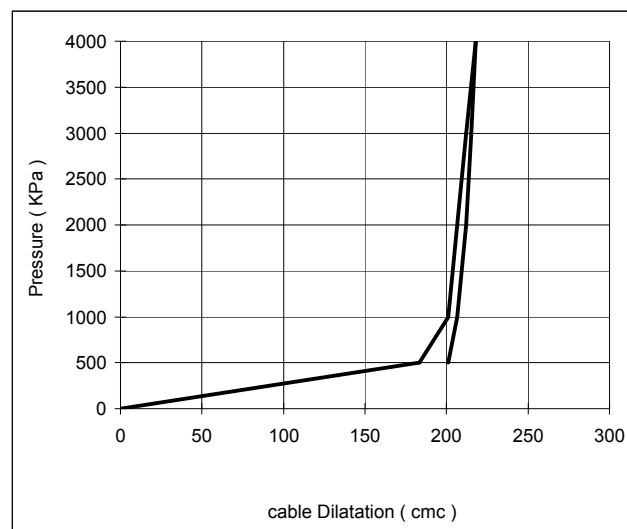


CONFINED CALIBRATION

Lenght cable 50 ϕ confined diameter (cm) 6,6

Vi (cmc) 195 Coeff. 5,62 cmc/Mpa first load

tube volume cmc 718 Coeff. 3,62 cmc/Mpa unload





PRESSUREMETER TEST					mod MPT	rev 2.0
BOREHOLE	S3GALL	DEPTH m	25,2	TEST CODE MPT	1	
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT
PROJECT	LOTTO CAMPOMARINO-RIPALTA		REPORT	1714SIT	8	MPT
OBJECT						
COORDINATES						
SITE	Campomarino	DATE	17.05.17	PAGE	1/3	

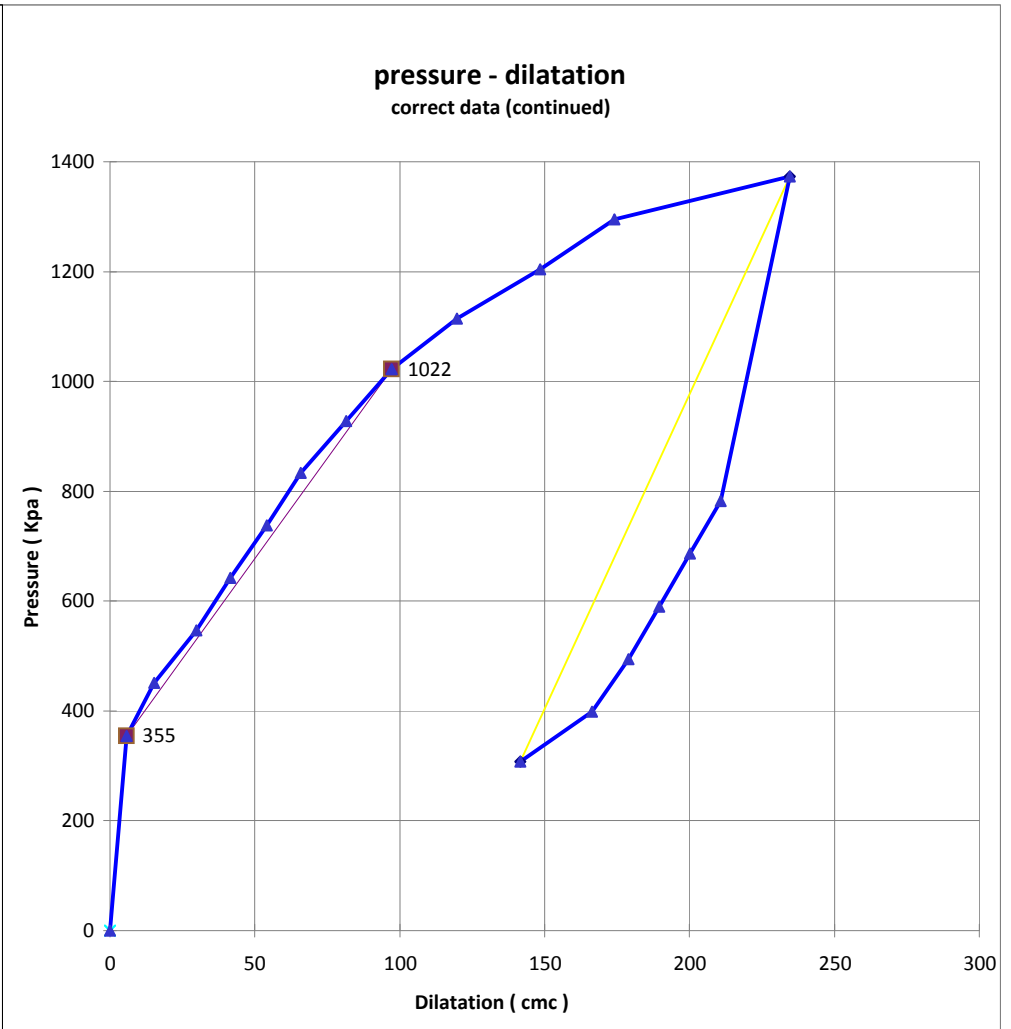
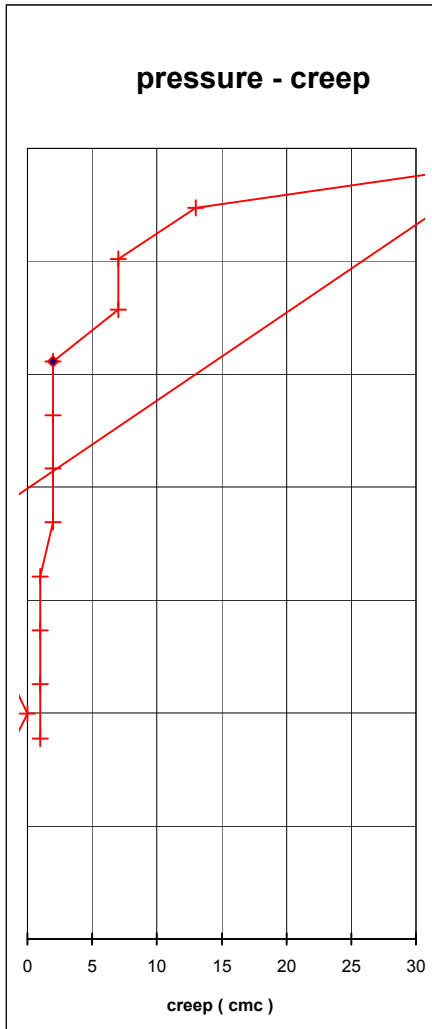
weather _____ test depth 25,20 m

hydrostatic level (m) > _____ us _____ KPa display by surface (m) 1,00 SPT (m) _____ n/15cm

γ_n nat.grav assumed 2,20 t/mc Pressuremeter: APAGEO SEGELM

σ_v assumed 554 kPa test pocket carotaggio 66 mm probe: TE60

soil brief description argilla limosa molto consistente pressuremeter modulus **Em** 11,1 MPa
 assumed elasticity modulus **Ey** 16,6 MPa
 geological unit _____ Em/P*L 10,34
 assumed cu 133 kPa
 test in according with AFNOR NFP 94 - 110 Assumed friction angle by Menard _____ °





PRESSUREMETER TEST						mod MPT	rev 1.0
BOREHOLE	S3GALL	DEPTH m	25,2	TEST CODE MPT	1		
CLIENT	ITALFERR S.P.A.			JOB N.	1714	TYPE	SIT
PROJECT	LOTTO CAMPOMARINO-RIPALTA			REPORT	1714	8	MPT
OBJECT							
COORDINATES							
SITE	Campomarino	DATE	17.05.17	PAGE	2/3		

DATA PROCESSING

PRESSUREMETER CURVE LIMITS

	FIRST LOAD	LOOP 1	LOOP 2
initial pressure P1 (kPa)	355	1373	
initial volume pressure V1 (kPa)	6	235	
initial creep vol C1 (cmc)	1		
final pressure P2 (kPa)	1022	307	
final volume V2 (kPa)	97	142	
fin creep (cmc)/ unload Eu (Mpa)	2	21,7	

PHYSIC PROPERTIES

VP probe volume at rest	523	cmc	inertia cover	
VL probe limit volume	534	cmc	kPa/cmc	0,35
V0 initial volume	6	cmc	sys. Dilatation	
1/VL	1,87	10 ⁻³ cmc	cmc/Mpa	3,62
v poisson index	0,33			
α sp reologic experimental coeff.	0,51			
α reologic theoretic coefficient	0,67			

MPa

PRESSUREMETER PARAMETERS

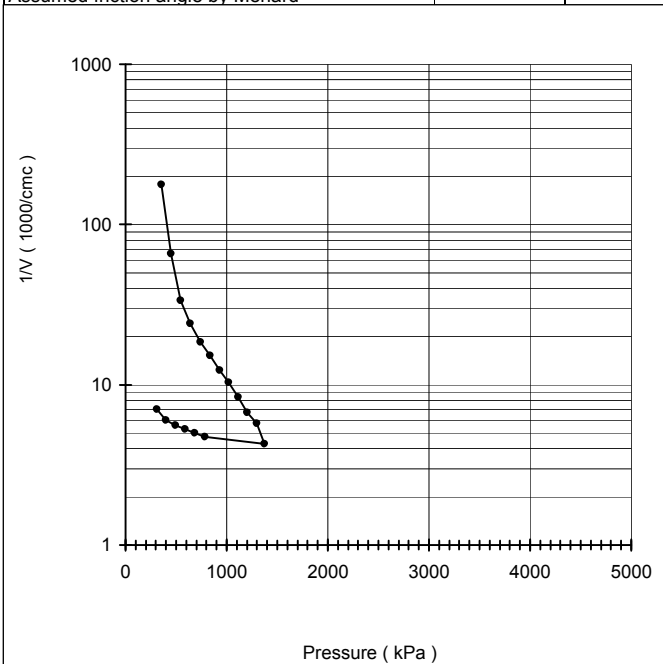
Ko lateral coeff at rest assumed	0,70	
Pho estim. Horiz pres at rest	388	kPa
P0 measured initial pressure	355	kPa
Em pressuremeter modulus	11,1	MPa
Ey min elasticity mod. measured in unload	21,7	MPa
Ey elasticity mod. assumed by C. reologic	16,6	MPa
Pc creep pressure	1022	kPa
P*c net creep pressure	634	kPa
PL limit pressure by Cassan	1466	kPa
PL limit pressure by Van Vambecke	1512	kPa
PL assumed limit pressure	1466	kPa
P*L assumed net limit pressure	1078	kPa
Em/P*L	10,34	
Ey/P*L	20,12	

DATA

	Pressure	Vr 30"	Vr 60"	P corr.	V corr.	creep	Modulus
n°	bars	cmc	cmc	kPa	cmc	cmc	MPa
1	0,0	0	0	0	0	0	
2	1,0	5	6	355	6	1	88,1
3	2,0	15	16	451	15	1	14,2
4	3,0	30	31	546	30	1	9,4
5	4,0	42	43	642	42	1	12,2
6	5,0	54	56	737	54	2	11,5
7	6,0	66	68	833	66	2	12,8
8	7,0	82	84	928	81	2	9,6
9	8,0	98	100	1022	97	2	9,8
10	9,0	116	123	1114	120	7	6,8
11	10,0	145	152	1204	148	7	5,5
12	11,0	165	178	1295	174	13	6,5
13	12,0	202	239	1373	235	37	2,5
14	6,0	214	213	782	211	-1	49,2
15	5,0	203	202	686	200	-1	17,5
16	4,0	192	191	590	190	-1	17,3
17	3,0	182	180	494	179	-2	17,0
18	2,0	167	167	399	166	0	14,0
19	1,0	144	142	307	142	-2	6,7
20							
21							
22							
23							
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26							
27							
28							
29							
30							
31							
32							
33							
34							
35							

GEOTECHNICAL PARAMETERS

Assumed CU by Amar et Jezequel	133	kPa
Assumed friction angle by Menard		°



MATERIALE ASSIMILATO A TERRENO COESIVO

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56



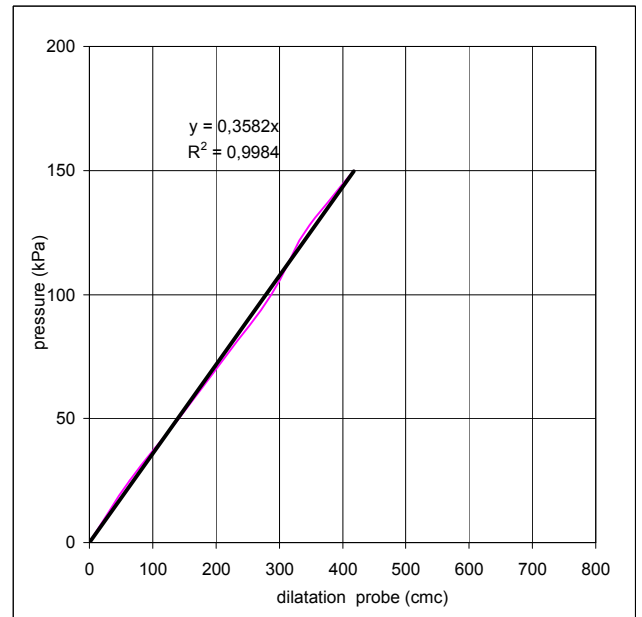
PRESSUREMETER TEST						mod MPT	rev 1.0
BOREHOLE	S3GALL	DEPTH m	25,2	TEST CODE MPT	1		
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT	
PROJECT	LOTTO CAMPOMARINO-RIPALTA		REPORT	1714	8	MPT	
OBJECT							
COORDINATES							
SITE	Campomarino	DATE	17.05.17	PAGE	3/3		

PLACE



CALIBRATION IN AIR

membrane SI cover TELATA MORBIDA kPa/cmc 0,35
 Height measure cell (cm) 21,00 VP in. probe vol (cmc) 523

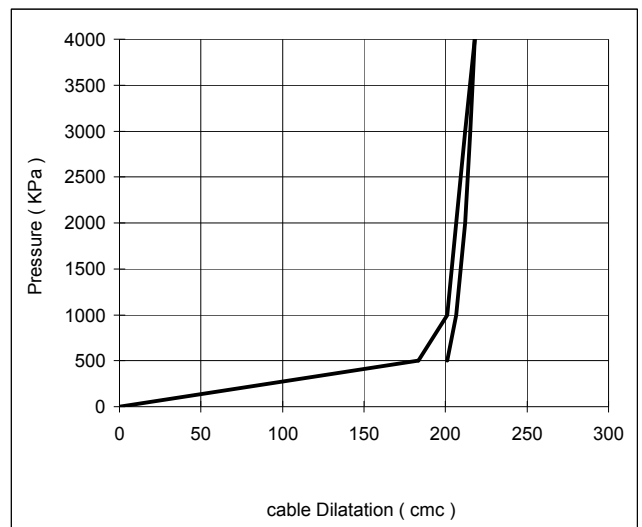



SOIL TYPE



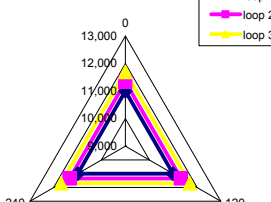
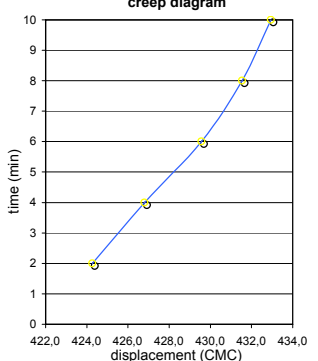
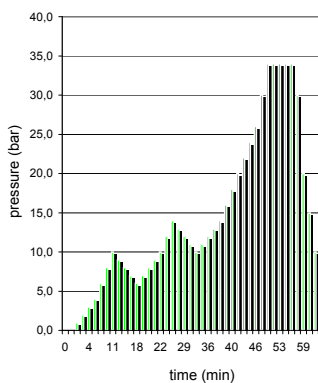

CONFINED CALIBRATION

Length cable 50 ϕ confined diameter (cm) 6,6
 Vi (cmc) 195 Coeff. 5,62 cmc/Mpa first load
 tube volume cmc 718 Coeff. 3,62 cmc/Mpa unload



	DILATOMETRIC ROCK TEST DRT			mod DVT rev. 1			
	borehole	S3GALL	probe depth m	33,6	code	3	
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT	09	DRT
site	CAMPOMARINO	coordinates	EAST	date	18.05.17	pag	1/3
			NORTH				

DILATOMETER TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987


				LITHOTYPE		time	test data								
				direction - displacement			P	P corr	Volume	ε c	1/V	diameter	Dil. Diam	Modulo	
						min	bar	Kpa	cmc	%	1000/cm	(mm)	(mm)	MPa	
Borehole	S3GALL					0	0,0	0	0,00	-2,840	#DIV/0!	99,104	0,000		
test	3	depth m 33,60				1	0,0	0	0,00	-2,840	#DIV/0!	99,104	0,000		
slope (degree)	core barrel					2	1,0	90	77,79	-1,865	12,856	100,098	0,995	11	
Device:	CSM Type VM01 95 mm					3	2,0	186	99,41	-1,595	10,059	100,373	1,269	44	
Orientation capteur	Standard method: ISRM 1987					4	3,0	283	117,92	-1,366	8,481	100,607	1,504	52	
C1=						5	4,0	377	153,18	-0,929	6,528	101,053	1,949	27	
Probe diam 90 MM	Borehole diam 101 MM					9	6,0	566	228,71	0,000	4,372	102,000	2,897	25	
Meteo	Temperatu re					10	8,0	759	262,19	0,409	3,814	102,417	3,314	59	
lithotype	SABBIA LIMOSA DA MOLTO ADDENSATA A DEB. CEMENTATA					11	10,0	953	280,06	0,626	3,571	102,639	3,536	112	
water table	RQD					12	9,0	855	277,47	0,595	3,604	102,607	3,504	391	
Creep test P (Bars) = 34,0						13	8,0	757	274,89	0,564	3,638	102,575	3,471	391	
Temps min	PBAR	CMC				17	7,0	659	274,40	0,558	3,644	102,569	3,465	2085	
2	34,0	424,3				18	6,0	561	271,11	0,518	3,688	102,528	3,425	307	
4	34,0	426,8				19	7,0	660	271,90	0,527	3,678	102,538	3,434	1287	
6	34,0	429,6				20	8,0	757	275,89	0,576	3,625	102,587	3,484	253	
8	34,0	431,5				21	9,0	855	278,07	0,602	3,596	102,615	3,511	463	
10	34,0	432,9		22	10,0	953	282,46	0,656	3,540	102,669	3,565	230			
PROBE SCHEME						23	12,0	1147	299,63	0,864	3,337	102,882	3,778	117	
	rod adaptor					27	14,0	1341	322,50	1,141	3,101	103,164	4,061	88	
	electronic device					28	13,0	1243	320,51	1,117	3,120	103,140	4,036	515	
	double action piston					29	12,0	1145	319,03	1,099	3,135	103,122	4,018	688	
	expandable cylinder					30	11,0	1048	315,64	1,058	3,168	103,080	3,976	301	
PROBE CALIBRATION						31	10,0	950	311,96	1,014	3,206	103,034	3,931	276	
probe	telata 85 mm					32	11,0	1048	313,14	1,028	3,193	103,049	3,945	861	
membrane	no					36	12,0	1146	316,26	1,066	3,162	103,087	3,984	327	
V0 cell volume at rest (cmc)	3856					37	13,0	1238	320,23	1,114	3,123	103,136	4,033	244	
length cable (mt)	100					38	14,0	1341	324,85	1,170	3,078	103,193	4,090	232	
Volume initial Vi (cmc)	150			39	16,0	1536	336,17	1,307	2,975	103,333	4,230	180			
diam calibration tube (cm)	10,10			40	18,0	1731	343,74	1,398	2,909	103,426	4,323	271			
tube calibration volume cmc	4006			41	20,0	1927	353,77	1,519	2,827	103,550	4,446	205			
Calibration in air				42	22,0	2122	362,29	1,622	2,760	103,655	4,551	241			
coeff m	0,10 cmc/Kpa			44	24,0	2317	374,37	1,767	2,671	103,803	4,699	170			
Confined calibration				46	26,0	2512	384,02	1,883	2,604	103,921	4,818	214			
first load	3,00 cmc/Mpa			47	30,0	2903	403,85	2,121	2,476	104,164	5,060	209			
unload	2,14 cmc/Mpa			49	34,0	3293	424,27	2,366	2,357	104,413	5,310	204			
				51	34,0	3293	426,80	2,396	2,343	104,444	5,340	-1			
				53	34,0	3292	429,58	2,429	2,328	104,478	5,374	-1			
				55	34,0	3292	431,54	2,453	2,317	104,502	5,398	-1			
				57	34,0	3292	432,95	2,469	2,310	104,519	5,415	-1			
				58	30,0	2900	432,24	2,461	2,314	104,510	5,407	5985			
				59	20,0	1920	415,95	2,266	2,404	104,312	5,208	643			
				60	15,0	1431	403,76	2,120	2,477	104,163	5,059	428			
				61	10,0	942	385,99	1,907	2,591	103,945	4,842	292			
				62	8,0	748	370,94	1,726	2,696	103,761	4,657	137			
				63	6,0	553	359,01	1,582	2,785	103,614	4,511	173			
				i valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione											
				FIELD LIMITS											
					P	P corr	V corr	creep	1000/V	diameter	Dil. Diam	loop			
				min	6,0	565,7	228,7	0,0	4,4	102,0	2,9	first load			
				max	34,0	3293,0	424,3	2,4	2,4	104,4	5,3	first load			
				max	10,0	953,0	280,1	0,6	3,6	102,6	3,5	I			
				min	6,0	561,5	271,1	0,5	3,7	102,5	3,4	I			
				max	14,0	1341,2	322,5	1,1	3,1	103,2	4,1	II			
				min	10,0	949,8	312,0	1,0	3,2	103,0	3,9	II			
				max	34,0	3292,1	432,9	2,5	2,3	104,5	5,4	III			
				min	6,0	552,7	359,0	1,6	2,8	103,6	4,5	III			

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

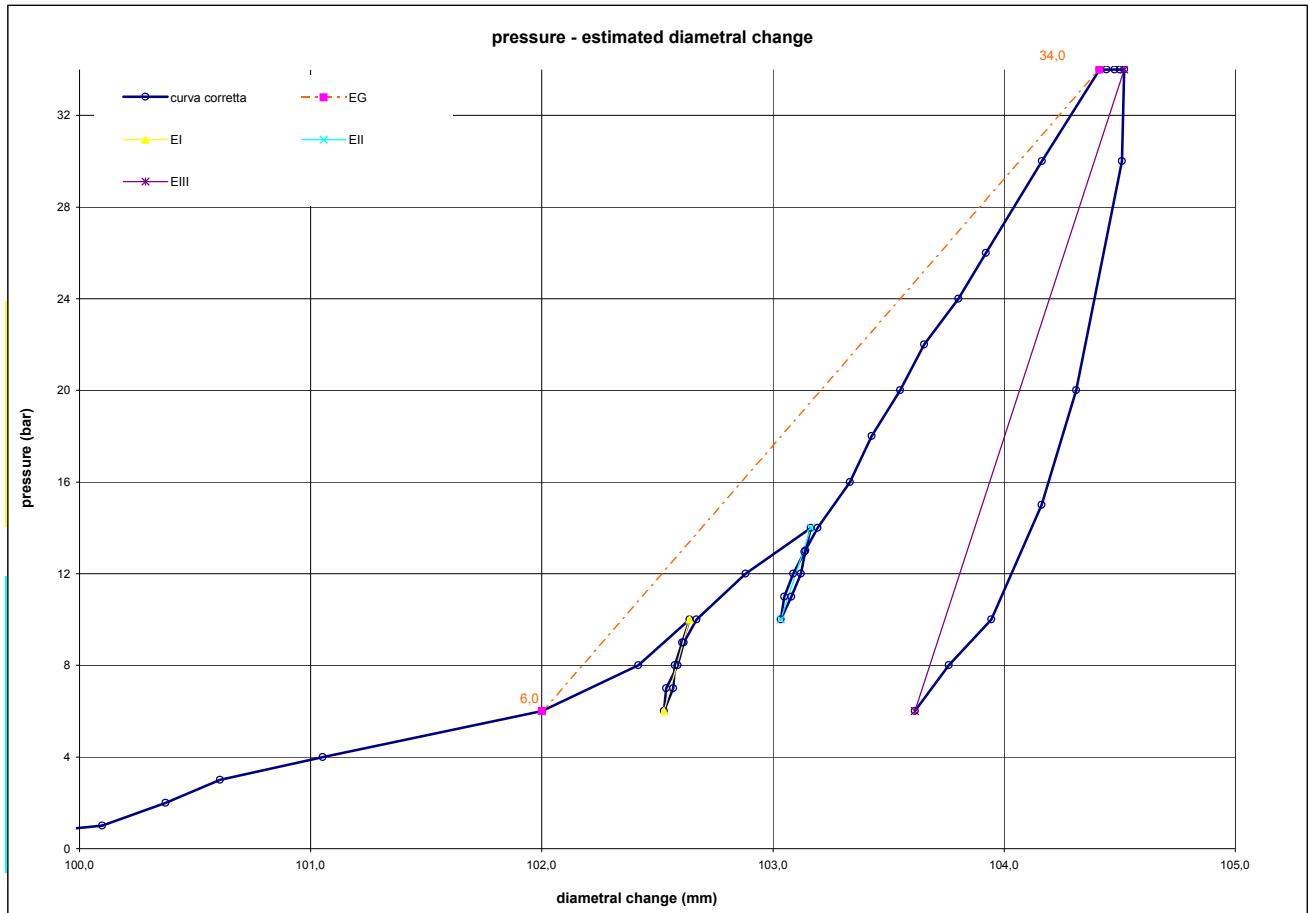
Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56

	DILATOMETRIC ROCK TEST DRT			mod DVT rev. 1			
	borehole	S3GALL	probe depth m	33,6	code	3	
	Client:	ITALFERR S.P.A.	job	1714	v. accept.	1714SIT	
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA			report	1714SIT 09 DRT	
	site	CAMPOMARINO	coordinates	EAST	date	18.05.17	pag

DILATOMETER TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987




DATA PROCESSING		SENSOR 1		SENSOR 2		SENSOR 3		SENSOR AVE		
Legend: H = test depth W = water table depth v = Poisson ratio vo = cell initial volume do = cell initial diameter Φ = borehole wall diameter Po = start pressure Pmax = max loop pressure (MPa) Pmin = min loop pressure (MPa) d max = displacement at P max d min = displacement at P min σv vertical total stress estimated $\epsilon_c = dR / R_o$		ELASTICITY MODULUS Ei								
		DATA		loop	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	Eav (Mpa)
		symbol	datum	1	10,00	6,00				450
		γnsoil	2,5	2	14,00	10,00				383
		W (ml)	0,0	3	34,00	6,00				386
v	0,25	4								
vo (cmc)	3856	5								
do (mm)	99,10	DEFORMATION MODULUS Ti								
σv (kPa)	840	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)		
		1	10,00	6,00				77		
		2	14,00	10,00				94		
		3	34,00	14,00				184		
		4								
		5								
ELASTICITY MODULUS Ei $Ei = (1 + v) \Phi P_{ax} - P_{min}$ $d_{max} - d_{min}$		ELASTICITY MODULUS Ey estimated		Pmax	Pmin	EG1 (Mpa)	EG2 (Mpa)	EG3 (Mpa)	EGm (Mpa)	
		$Ey = (E_{II} + E_{III}) / 2$ $Ey = E_{III}$		34,00	6,00				144	
DEFORMATION MODULUS Ti $Ti = (1 + v) \Phi Pi - Pi-1$ $Xi - Xi-1$		DIAMETER		F	F	F	F			
		beginning diameter (mm)						102,000		
		final diameter (mm)						104,519		
		range mm					2,519			
GLOBAL DEFORMATION MODULUS EG $EG = (1 + v) \Phi P_{max} - P_o$ $d_{max} - d_o$ note: MATERIALE ASSIMILATO A TERRENO COESIVO		DM loop minimum displacement				DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS				
		Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	566	EG (MPa)	144
		bar	0	120	240	0	Pf creep pressure (KPa)	3293	E3 (MPa)	386
		10,0	10,997	10,997	10,997	3,536	PL limit pressure (KPa) Cassan	5186	E/PL	31,34
		14,0	11,342	11,342	11,342	4,061	PL' net limit pres (KPa) >	4598	EG/Ey	0,37
	34,0	11,692	11,692	11,692	5,415	Ko lateral coeff at rest (KPa)	0,70	cu cohesion (KPa) johnson	544	
						Pho lateral pressure (KPa)	588	φ friction angle (°) >		

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

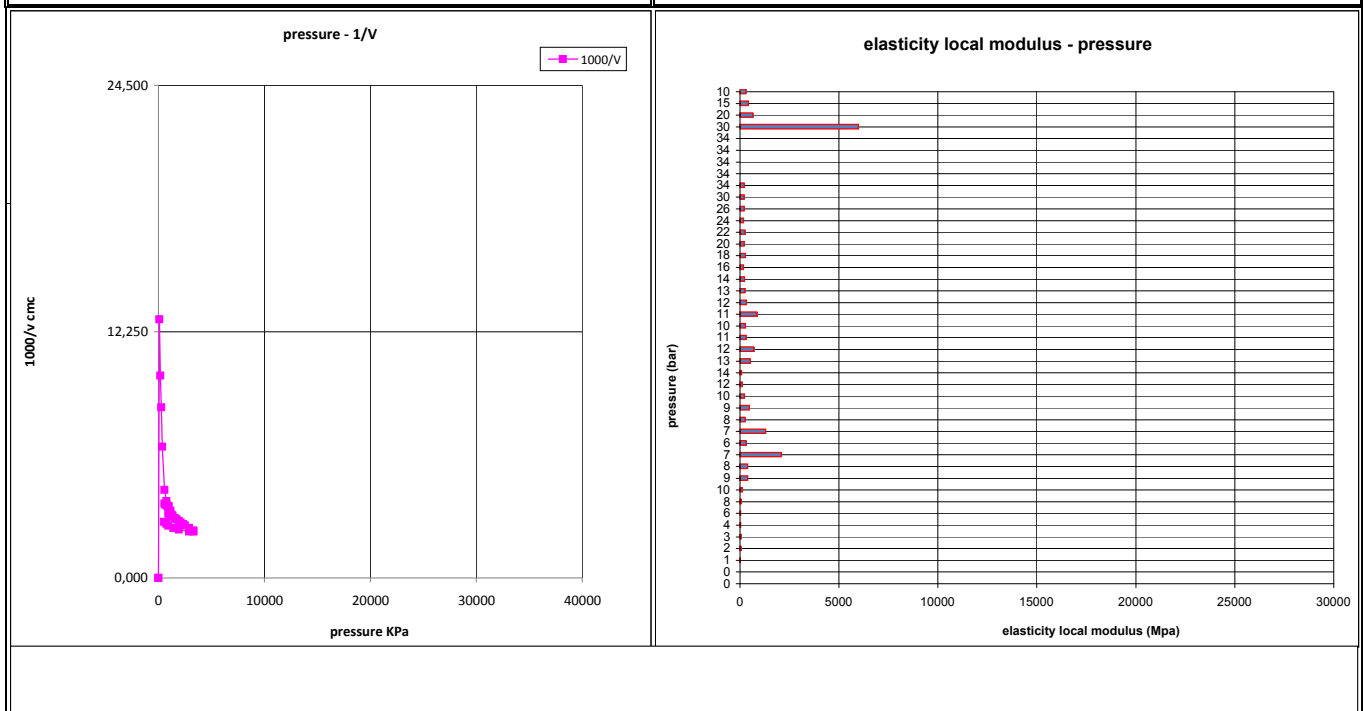
Lavoro: INDAGINI GEONOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - **Attivazione:** N° 56

	DILATOMETRIC ROCK TEST DRT		mod DVT	rev. 1
	borehole	S3GALL	probe depth m	33,6
	Client:	ITALFERR S.P.A.	job	1714 v. accept. 1714SIT
	Project:	COLLEGAMENTO CAMPOMARINO-RIPALTA	report	1714SIT 09 DRT
site	CAMPOMARINO	coordinates	EAST NORTH	date 18.05.17 pag 3/3

DILATOMETER TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



Sede: Via Monsignor Bologna, 18 - CAMPOBASSO
Stabilimento: C.da S.Maria delle Macchie - Vinchiaturo (CB)
Tel. 0874/340003-16 **Fax:** 0874/340014
P.IVA e Cod. Fiscale: 00717630701
web: www.imosgeo.it



S4 GALL



PRESSUREMETER TEST					mod MPT	rev 2.0
BOREHOLE	S4GALL	DEPTH m	20,5	TEST CODE MPT	1	
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT
PROJECT	LOTTO CAMPOMARINO-RIPALTA		REPORT	1714SIT	10	MPT
OBJECT						
COORDINATES						
SITE	Campomarino	DATE	15.05.17	PAGE	1/3	

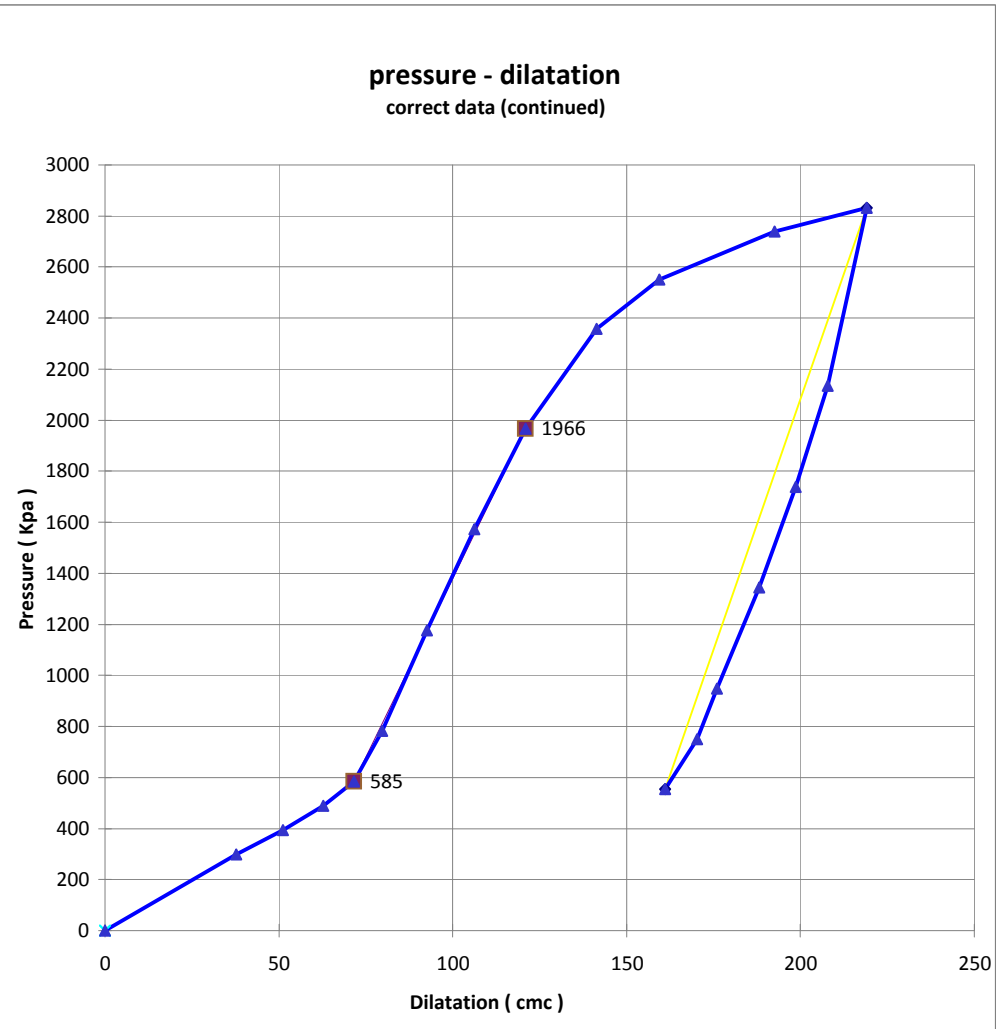
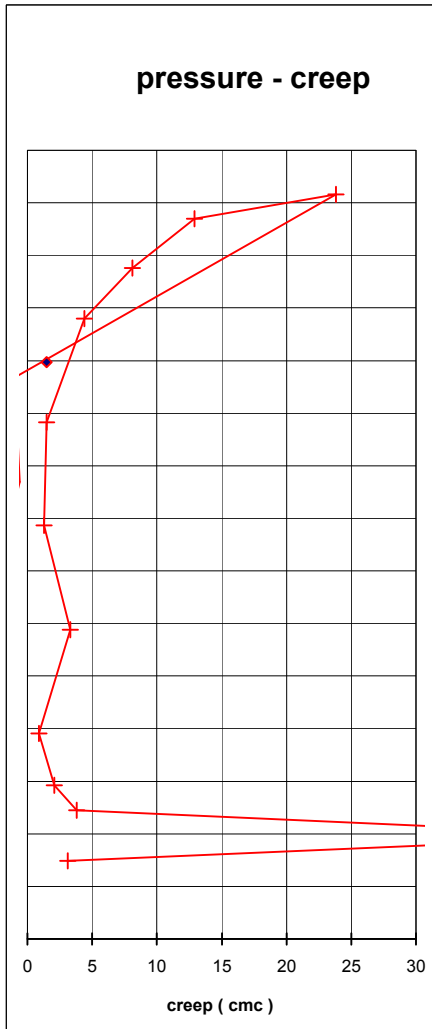
weather _____ test depth 20,50 m

hydrostatic level (m) > _____ us _____ KPa display by surface (m) 1,00 SPT (m) _____ n/15cm

γ_n nat.grav assumed 2,20 t/mc Pressuremeter: APAGEO SEGELM

σ_v assumed 451 kPa test pocket carotaggio 66 mm probe: TE60

soil brief description sabbia deb.limose o limose pressuremeter modulus **Em** 46,1 MPa
 assumed elasticity modulus **Ey** 68,8 MPa
 geological unit _____ E_m/P^*L 14,86
 assumed cu 335 kPa
 test in according with AFNOR NFP 94 - 110 Assumed friction angle by Menard _____ °





PRESSUREMETER TEST						mod MPT	rev 1.0
BOREHOLE	S4GALL	DEPTH m	20,5	TEST CODE MPT	1		
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT	
PROJECT	LOTTO CAMPOMARINO-RIPALTA		REPORT	1714	10	MPT	
OBJECT							
COORDINATES							
SITE	Campomarino	DATE	15.05.17	PAGE	2/3		

DATA PROCESSING

PRESSUREMETER CURVE LIMITS

	FIRST LOAD	LOOP 1	LOOP 2
initial pressure P1 (kPa)	585	2831	
initial volume pressure V1 (kPa)	72	219	
initial creep vol C1 (cmc)	2		
final pressure P2 (kPa)	1966	554	
final volume V2 (kPa)	121	161	
fin creep (cmc)/ unload Eu (Mpa)	2	74,5	

PHYSIC PROPERTIES

VP probe volume at rest	523	cmc	inertia cover	
VL probe limit volume	666	cmc	kPa/cmc	0,35
V0 initial volume	72	cmc	sys. Dilatation	
1/VL	1,50	10 ⁻³ cmc	cmc/Mpa	3,62
v poisson index	0,33			
α sp reologic experimental coeff.	0,62			
α reologic theoretic coefficient	0,67			

MPa

PRESSUREMETER PARAMETERS

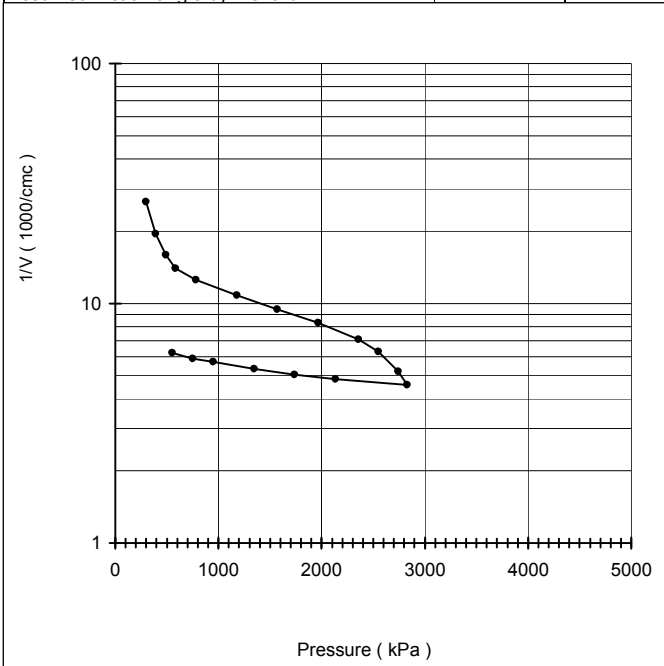
Ko lateral coeff at rest assumed	0,70	
Pho estim. Horiz pres at rest	316	kPa
P0 measured initial pressure	585	kPa
Em pressuremeter modulus	46,1	MPa
Ey min elasticity mod. measured in unload	74,5	MPa
Ey elasticity mod. assumed by C. reologic	68,8	MPa
Pc creep pressure	2193	kPa
P*c net creep pressure	1877	kPa
PL limit pressure by Cassan	3507	kPa
PL limit pressure by Van Vambecke	3421	kPa
PL assumed limit pressure	3421	kPa
P*L assumed net limit pressure	3105	kPa
Em/P*L	14,86	
Ey/P*L	23,99	

DATA

	Pressure	Vr 30"	Vr 60"	P corr.	V corr.	creep	Modulus
n°	bars	cmc	cmc	kPa	cmc	cmc	MPa
1	0,0	0	0	0	0	0	
2	1,0	35	38	298	38	3	11,4
3	2,0	4	52	393	51	48	10,7
4	3,0	60	64	489	63	4	12,8
5	4,0	71	73	585	72	2	17,0
6	6,0	81	82	782	80	1	38,8
7	10,0	93	96	1177	93	3	49,4
8	14,0	110	111	1572	106	1	48,2
9	18,0	126	128	1966	121	2	45,3
10	22,0	145	149	2359	141	4	33,4
11	24,0	160	168	2552	159	8	19,3
12	26,0	189	202	2740	192	13	10,6
13	27,0	205	229	2831	219	24	6,6
14	20,0	216	215	2136	208	-1	120,9
15	16,0	205	204	1739	199	-1	83,7
16	12,0	195	193	1344	188	-3	72,2
17	8,0	180	179	948	176	-1	60,5
18	6,0	175	173	751	170	-3	65,7
19	4,0	166	163	554	161	-4	38,8
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							

GEOTECHNICAL PARAMETERS

Assumed CU by Amar et Jezequel	335	kPa
Assumed friction angle by Menard		°



MATERIALE ASSIMILATO A TERRENO COESIVO

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

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Commissa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56



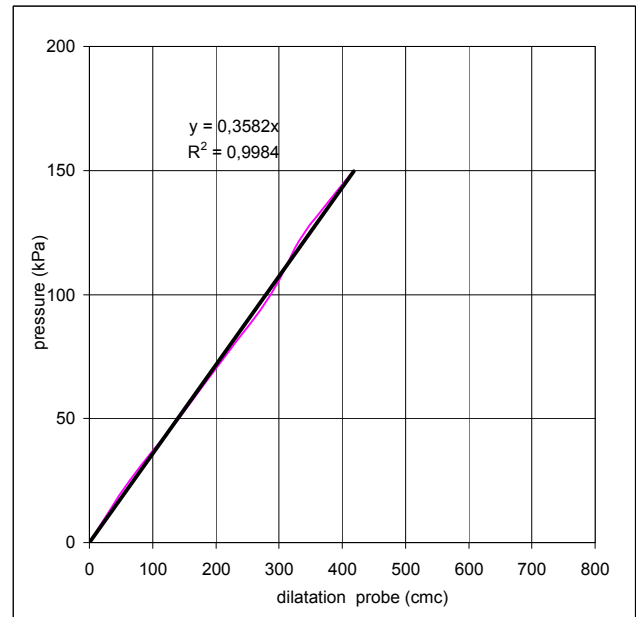
PRESSUREMETER TEST						mod MPT	rev 1.0
BOREHOLE	S4GALL	DEPTH m	20,5	TEST CODE MPT	1		
CLIENT	ITALFERR S.P.A.		JOB N.	1714	TYPE	SIT	
PROJECT	LOTTO CAMPOMARINO-RIPALTA		REPORT	1714	10	MPT	
OBJECT							
COORDINATES							
SITE	Campomarino	DATE	15.05.17	PAGE	3/3		

PLACE



CALIBRATION IN AIR

membrane SI cover TELATA MORBIDA kPa/cmc 0,35
 Height measure cell (cm) 21,00 VP in. probe vol (cmc) 523

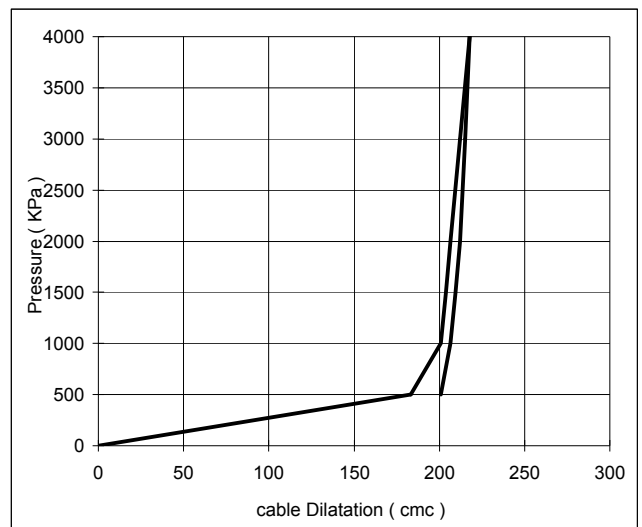



SOIL TYPE







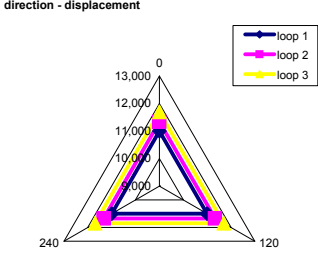
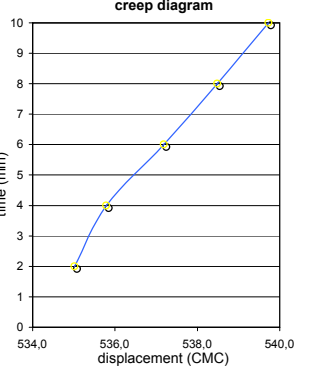
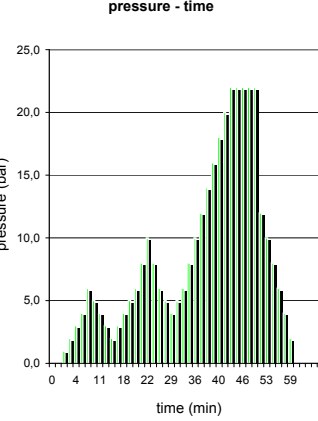
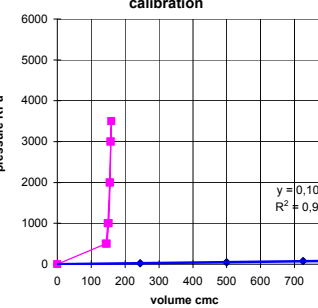
CONFINED CALIBRATION

Lenght cable 50 ϕ confined diameter (cm) 6,6
 Vi (cmc) 195 Coeff. 5,62 cmc/Mpa first load
 tube volume cmc 718 Coeff. 3,62 cmc/Mpa unload



	DILATOMETRIC ROCK TEST DRT			mod DVT rev. 1				
	borehole	S4GALL	probe depth m	25,6	code	2		
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT	
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT	11	DRT	
site	CAMPOMARINO	coordinates	EAST		date	16.05.17	pag	1/3
			NORTH					

DILATOMETER TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

Borehole	S4GALL		LITHOTYPE	time	test data																																																																																																																																																																																																																																										
					P	P corr	Volume	ε c	1/V	diameter	Dil. Diam	Modulo																																																																																																																																																																																																																																			
					min	bar	Kpa	cmc	%	1000/cmc	(mm)	(mm)	MPa																																																																																																																																																																																																																																		
test	2	depth m	25,60	0	0,0	0	0,00	-2,754	#DIV/0!	99,104	0,000																																																																																																																																																																																																																																				
slope (degree)	90	core barrell		1	0,0	0	0,00	-2,754	#DIV/0!	99,104	0,000																																																																																																																																																																																																																																				
Device:	CSM Type VM01 95 mm			2	1,0	86	124,59	-1,196	8,027	100,692	1,588	7																																																																																																																																																																																																																																			
Orientation capteur	Standard method: ISRM 1987			3	2,0	181	155,57	-0,812	6,428	101,083	1,979	31																																																																																																																																																																																																																																			
Probe diam	90 MM	Borehole diam	101 MM	4	3,0	274	207,16	-0,177	4,827	101,731	2,627	18																																																																																																																																																																																																																																			
Meteo	Temperatu re			5	4,0	370	221,54	0,000	4,514	101,911	2,807	68																																																																																																																																																																																																																																			
lithotype	ALTERNANZE DI SABBIA LIMOSA E LIVELLI ARGILLOSI, DA ADDENSATA A DEB.CEMENTATA			9	6,0	563	257,21	0,436	3,888	102,355	3,252	55																																																																																																																																																																																																																																			
water table	RQD			10	5,0	466	246,93	0,311	4,050	102,227	3,124	97																																																																																																																																																																																																																																			
Creep test P (Bars) =				11	4,0	368	240,74	0,235	4,154	102,150	3,047	162																																																																																																																																																																																																																																			
Temps min	PBAR	CMC		12	3,0	271	231,89	0,127	4,312	102,400	2,936	112																																																																																																																																																																																																																																			
2	22,0	535,0		13	2,0	175	212,07	-0,116	4,715	101,792	2,689	49																																																																																																																																																																																																																																			
4	22,0	535,8		17	3,0	272	224,66	0,038	4,451	101,950	2,846	78																																																																																																																																																																																																																																			
6	22,0	537,2		18	4,0	369	231,33	0,120	4,323	102,033	2,929	149																																																																																																																																																																																																																																			
8	22,0	538,5		19	5,0	466	248,93	0,335	4,017	102,252	3,149	56																																																																																																																																																																																																																																			
10	22,0	539,7		20	6,0	562	263,61	0,515	3,793	102,435	3,331	68																																																																																																																																																																																																																																			
PROBE SCHEME	 rod adaptor  electronic device  double action piston  expandable cylinder			 direction - displacement  creep diagram  pressure - time  calibration	<table border="1"> <tr> <td>21</td> <td>8,0</td> <td>756</td> <td>291,09</td> <td>0,849</td> <td>3,435</td> <td>102,776</td> <td>3,672</td> <td>73</td> </tr> <tr> <td>22</td> <td>10,0</td> <td>947</td> <td>336,06</td> <td>1,394</td> <td>2,976</td> <td>103,332</td> <td>4,228</td> <td>44</td> </tr> <tr> <td>23</td> <td>8,0</td> <td>753</td> <td>316,09</td> <td>1,153</td> <td>3,164</td> <td>103,085</td> <td>3,982</td> <td>102</td> </tr> <tr> <td>27</td> <td>6,0</td> <td>559</td> <td>298,11</td> <td>0,934</td> <td>3,354</td> <td>102,863</td> <td>3,759</td> <td>113</td> </tr> <tr> <td>28</td> <td>5,0</td> <td>462</td> <td>288,09</td> <td>0,813</td> <td>3,471</td> <td>102,739</td> <td>3,635</td> <td>101</td> </tr> <tr> <td>29</td> <td>4,0</td> <td>365</td> <td>272,14</td> <td>0,619</td> <td>3,675</td> <td>102,541</td> <td>3,437</td> <td>63</td> </tr> <tr> <td>30</td> <td>5,0</td> <td>462</td> <td>283,03</td> <td>0,751</td> <td>3,533</td> <td>102,676</td> <td>3,573</td> <td>92</td> </tr> <tr> <td>31</td> <td>6,0</td> <td>559</td> <td>295,01</td> <td>0,897</td> <td>3,390</td> <td>102,825</td> <td>3,721</td> <td>84</td> </tr> <tr> <td>32</td> <td>8,0</td> <td>753</td> <td>320,49</td> <td>1,206</td> <td>3,120</td> <td>103,140</td> <td>4,036</td> <td>79</td> </tr> <tr> <td>36</td> <td>10,0</td> <td>947</td> <td>341,26</td> <td>1,457</td> <td>2,930</td> <td>103,396</td> <td>4,292</td> <td>98</td> </tr> <tr> <td>37</td> <td>12,0</td> <td>1141</td> <td>362,33</td> <td>1,712</td> <td>2,760</td> <td>103,655</td> <td>4,551</td> <td>97</td> </tr> <tr> <td>38</td> <td>14,0</td> <td>1335</td> <td>383,40</td> <td>1,965</td> <td>2,608</td> <td>103,914</td> <td>4,810</td> <td>97</td> </tr> <tr> <td>39</td> <td>16,0</td> <td>1528</td> <td>411,81</td> <td>2,306</td> <td>2,428</td> <td>104,261</td> <td>5,158</td> <td>72</td> </tr> <tr> <td>40</td> <td>18,0</td> <td>1723</td> <td>432,97</td> <td>2,560</td> <td>2,310</td> <td>104,519</td> <td>5,416</td> <td>98</td> </tr> <tr> <td>41</td> <td>20,0</td> <td>1914</td> <td>477,97</td> <td>3,096</td> <td>2,092</td> <td>105,066</td> <td>5,963</td> <td>46</td> </tr> <tr> <td>42</td> <td>22,0</td> <td>2105</td> <td>535,01</td> <td>3,773</td> <td>1,869</td> <td>105,755</td> <td>6,652</td> <td>36</td> </tr> <tr> <td>44</td> <td>22,0</td> <td>2105</td> <td>535,79</td> <td>3,782</td> <td>1,866</td> <td>105,765</td> <td>6,661</td> <td>-1</td> </tr> <tr> <td>46</td> <td>22,0</td> <td>2104</td> <td>537,19</td> <td>3,798</td> <td>1,862</td> <td>105,781</td> <td>6,678</td> <td>-1</td> </tr> <tr> <td>47</td> <td>22,0</td> <td>2104</td> <td>538,49</td> <td>3,814</td> <td>1,857</td> <td>105,797</td> <td>6,693</td> <td>-1</td> </tr> <tr> <td>49</td> <td>22,0</td> <td>2104</td> <td>539,73</td> <td>3,828</td> <td>1,853</td> <td>105,812</td> <td>6,708</td> <td>-1</td> </tr> <tr> <td>51</td> <td>12,0</td> <td>1126</td> <td>509,01</td> <td>3,465</td> <td>1,965</td> <td>105,442</td> <td>6,338</td> <td>349</td> </tr> <tr> <td>53</td> <td>10,0</td> <td>932</td> <td>491,53</td> <td>3,258</td> <td>2,034</td> <td>105,230</td> <td>6,127</td> <td>121</td> </tr> <tr> <td>55</td> <td>8,0</td> <td>738</td> <td>467,44</td> <td>2,971</td> <td>2,139</td> <td>104,938</td> <td>5,835</td> <td>87</td> </tr> <tr> <td>57</td> <td>6,0</td> <td>544</td> <td>450,30</td> <td>2,767</td> <td>2,221</td> <td>104,730</td> <td>5,627</td> <td>122</td> </tr> <tr> <td>58</td> <td>4,0</td> <td>350</td> <td>427,67</td> <td>2,496</td> <td>2,338</td> <td>104,455</td> <td>5,351</td> <td>92</td> </tr> <tr> <td>59</td> <td>2,0</td> <td>159</td> <td>369,17</td> <td>1,794</td> <td>2,709</td> <td>103,739</td> <td>4,635</td> <td>35</td> </tr> </table>	21	8,0	756	291,09	0,849	3,435	102,776	3,672	73	22	10,0	947	336,06	1,394	2,976	103,332	4,228	44	23	8,0	753	316,09	1,153	3,164	103,085	3,982	102	27	6,0	559	298,11	0,934	3,354	102,863	3,759	113	28	5,0	462	288,09	0,813	3,471	102,739	3,635	101	29	4,0	365	272,14	0,619	3,675	102,541	3,437	63	30	5,0	462	283,03	0,751	3,533	102,676	3,573	92	31	6,0	559	295,01	0,897	3,390	102,825	3,721	84	32	8,0	753	320,49	1,206	3,120	103,140	4,036	79	36	10,0	947	341,26	1,457	2,930	103,396	4,292	98	37	12,0	1141	362,33	1,712	2,760	103,655	4,551	97	38	14,0	1335	383,40	1,965	2,608	103,914	4,810	97	39	16,0	1528	411,81	2,306	2,428	104,261	5,158	72	40	18,0	1723	432,97	2,560	2,310	104,519	5,416	98	41	20,0	1914	477,97	3,096	2,092	105,066	5,963	46	42	22,0	2105	535,01	3,773	1,869	105,755	6,652	36	44	22,0	2105	535,79	3,782	1,866	105,765	6,661	-1	46	22,0	2104	537,19	3,798	1,862	105,781	6,678	-1	47	22,0	2104	538,49	3,814	1,857	105,797	6,693	-1	49	22,0	2104	539,73	3,828	1,853	105,812	6,708	-1	51	12,0	1126	509,01	3,465	1,965	105,442	6,338	349	53	10,0	932	491,53	3,258	2,034	105,230	6,127	121	55	8,0	738	467,44	2,971	2,139	104,938	5,835	87	57	6,0	544	450,30	2,767	2,221	104,730	5,627	122	58	4,0	350	427,67	2,496	2,338	104,455	5,351	92	59	2,0	159	369,17	1,794	2,709	103,739	4,635	35
21	8,0	756	291,09	0,849	3,435	102,776	3,672	73																																																																																																																																																																																																																																							
22	10,0	947	336,06	1,394	2,976	103,332	4,228	44																																																																																																																																																																																																																																							
23	8,0	753	316,09	1,153	3,164	103,085	3,982	102																																																																																																																																																																																																																																							
27	6,0	559	298,11	0,934	3,354	102,863	3,759	113																																																																																																																																																																																																																																							
28	5,0	462	288,09	0,813	3,471	102,739	3,635	101																																																																																																																																																																																																																																							
29	4,0	365	272,14	0,619	3,675	102,541	3,437	63																																																																																																																																																																																																																																							
30	5,0	462	283,03	0,751	3,533	102,676	3,573	92																																																																																																																																																																																																																																							
31	6,0	559	295,01	0,897	3,390	102,825	3,721	84																																																																																																																																																																																																																																							
32	8,0	753	320,49	1,206	3,120	103,140	4,036	79																																																																																																																																																																																																																																							
36	10,0	947	341,26	1,457	2,930	103,396	4,292	98																																																																																																																																																																																																																																							
37	12,0	1141	362,33	1,712	2,760	103,655	4,551	97																																																																																																																																																																																																																																							
38	14,0	1335	383,40	1,965	2,608	103,914	4,810	97																																																																																																																																																																																																																																							
39	16,0	1528	411,81	2,306	2,428	104,261	5,158	72																																																																																																																																																																																																																																							
40	18,0	1723	432,97	2,560	2,310	104,519	5,416	98																																																																																																																																																																																																																																							
41	20,0	1914	477,97	3,096	2,092	105,066	5,963	46																																																																																																																																																																																																																																							
42	22,0	2105	535,01	3,773	1,869	105,755	6,652	36																																																																																																																																																																																																																																							
44	22,0	2105	535,79	3,782	1,866	105,765	6,661	-1																																																																																																																																																																																																																																							
46	22,0	2104	537,19	3,798	1,862	105,781	6,678	-1																																																																																																																																																																																																																																							
47	22,0	2104	538,49	3,814	1,857	105,797	6,693	-1																																																																																																																																																																																																																																							
49	22,0	2104	539,73	3,828	1,853	105,812	6,708	-1																																																																																																																																																																																																																																							
51	12,0	1126	509,01	3,465	1,965	105,442	6,338	349																																																																																																																																																																																																																																							
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57	6,0	544	450,30	2,767	2,221	104,730	5,627	122																																																																																																																																																																																																																																							
58	4,0	350	427,67	2,496	2,338	104,455	5,351	92																																																																																																																																																																																																																																							
59	2,0	159	369,17	1,794	2,709	103,739	4,635	35																																																																																																																																																																																																																																							

| PROBE CALIBRATION | probe telata 85 mm membrane no V0 cell volume at rest (cmc) 3856 lenght cable (mt) 100 Volume initial Vi (cmc) 150 diam calibration tube (cm) 10,10 tube calibration volume cmc 4006 Calibration in air coeff m 0,10 cmc/Kpa Confined calibration first load 3,00 cmc/Mpa unload 2,14 cmc/Mpa | | | i valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione FIELD LIMITS | | | | | | | | | | |-----|------|--------|--------|-------|--------|----------|-----------|------------| | | P | P corr | V corr | creep | 1000/V | diameter | Dil. Diam | loop | | min | 4,0 | 370,2 | 221,5 | 0,0 | 4,5 | 101,9 | 2,8 | first load | | max | 18,0 | 1722,5 | 433,0 | 2,6 | 2,3 | 104,5 | 5,4 | first load | | max | 6,0 | 562,9 | 257,2 | 0,4 | 3,9 | 102,4 | 3,3 | I | | min | 2,0 | 175,0 | 212,1 | -0,1 | 4,7 | 101,8 | 2,7 | I | | max | 10,0 | 947,4 | 336,1 | 1,4 | 3,0 | 103,3 | 4,2 | II | | min | 4,0 | 365,2 | 272,1 | 0,6 | 3,7 | 102,5 | 3,4 | II | | max | 22,0 | 2104,2 | 539,7 | 3,8 | 1,9 | 105,8 | 6,7 | III | | min | 4,0 | 349,6 | 427,7 | 2,5 | 2,3 | 104,5 | 5,4 | III | |

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56



DILATOMETRIC ROCK TEST DRT

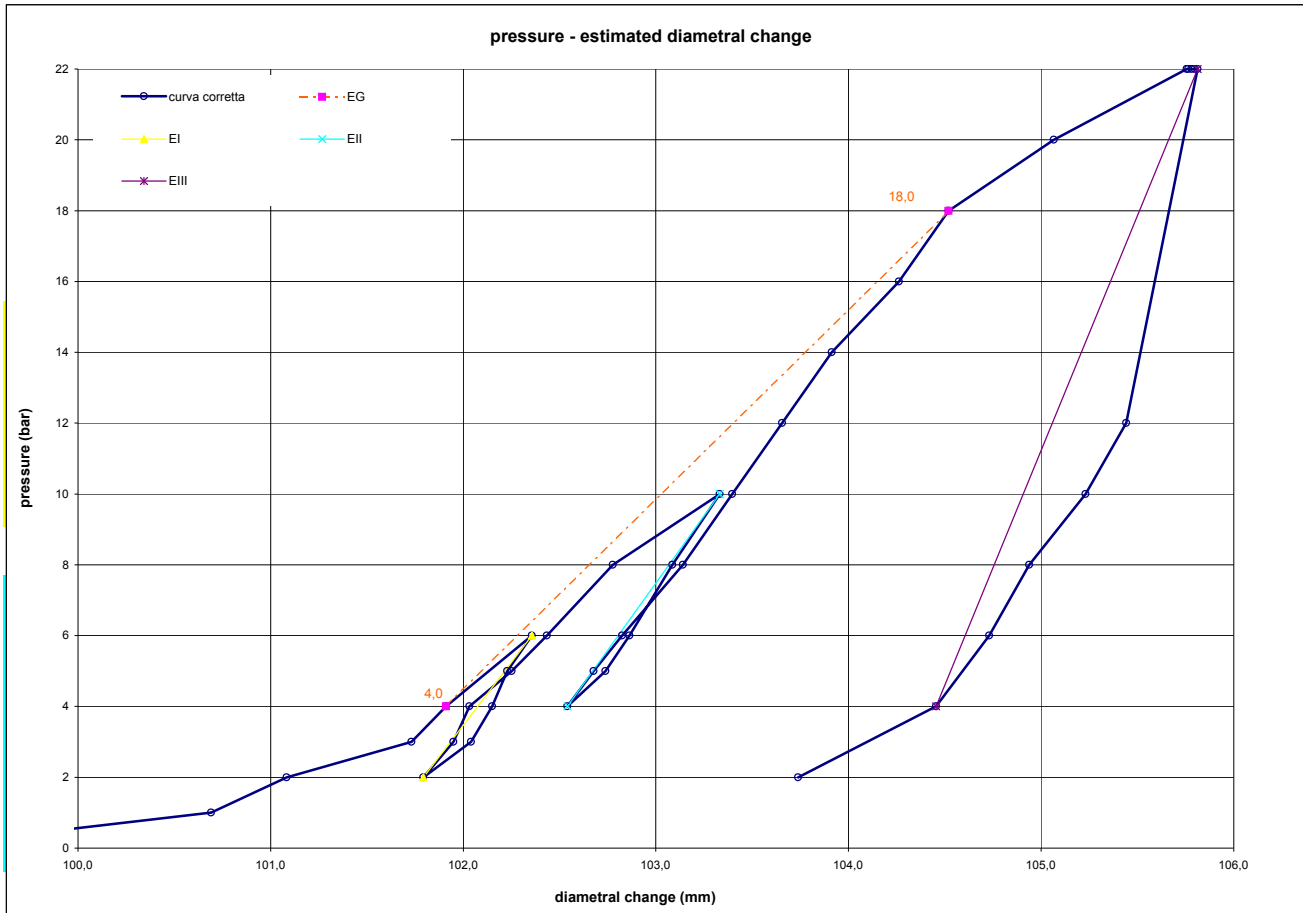
borehole **S4GALL** probe depth m **25,6** code **2** mod DVT rev. 1

Client: **ITALFERR S.P.A.** job **1714** v. accept. **1714SIT**

Project **COLLEGAMENTO CAMPOMARINO-RIPALTA** report **1714SIT 11 DRT**

site **CAMPOMARINO** coordinates EAST NORTH date **16.05.17** pag **2/3**

DILATOMETER TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987




DATA PROCESSING		SENSOR 1			SENSOR 2		SENSOR 3		SENSOR AVE	
Legend: H = test depth W = water table depth v = Poisson ratio vo = cell initial volume do = cell initial diameter ϕ = borehole wall diameter Po = start pressure Pmax = max loop pressure (MPa) Pmin = min loop pressure (MPa) d max displacement at P max d min displacement at P min σv vertical total stress estimated εc = dR / Ro		DATA		ELASTICITY MODULUS Ei		ELASTICITY MODULUS EG				
		symbol	datum	loop	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	Eav (Mpa)
		γnsoil	2,5	2	10,00	4,00				88
		W (ml)	0,0	3	22,00	4,00				94
		v	0,25	4						165
		vo (cmc)	3856	5						
		do (mm)	99,10							
		σv (kPa)	640	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)
				1	6,00	4,00				55
				2	10,00	6,00				50
		3	22,00	10,00				59		
		4								
		5								
ELASTICITY MODULUS Ei		ELASTICITY MODULUS Ey estimated		DIAMETER		GLOBAL DEFORMATION MODULUS EG				
Ei = (1+ v) ϕ Pax - Pmin	Ey = (EII+EIII)/2	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	EGm (Mpa)			
dmax - dmin	Ey = EIII	18,00	4,00	F	F	F	66			
DEFORMATION MODULUS Ti		DM loop minimum displacement		DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS						
Ti = (1+ v) ϕ Pi - Pi-1	Xi - Xi-1	Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	370	EG(MPa)	
		bar	0	120	240	0	Pf creep pressure (KPa)	1723	E3 (MPa)	
GLOBAL DEFORMATION MODULUS EG		6,0	10,997	10,997	10,997	3,252	PL limit pressure (KPa) Cassan	2615	E/P/L	
EG = (1+ v) ϕ Pmax - Po	dmax - do	10,0	11,342	11,342	11,342	4,228	PL' net limit pres (KPa) >	2167	EG/Ey	
		22,0	11,692	11,692	11,692	6,708	Ko lateral coeff at rest (KPa)	0,70	cu coesion (KPa) johnson	
note: MATERIALE ASSIMILATO A TERRENO COESIVO							Pho lateral pressure (KPa)	448	ϕ friction angle (°) >	
									66	
									165	
									30,48	
									0,40	
									286	

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015



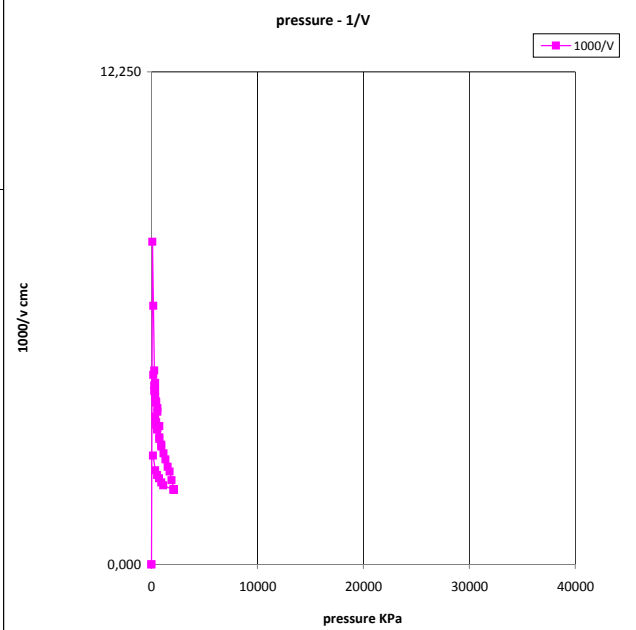
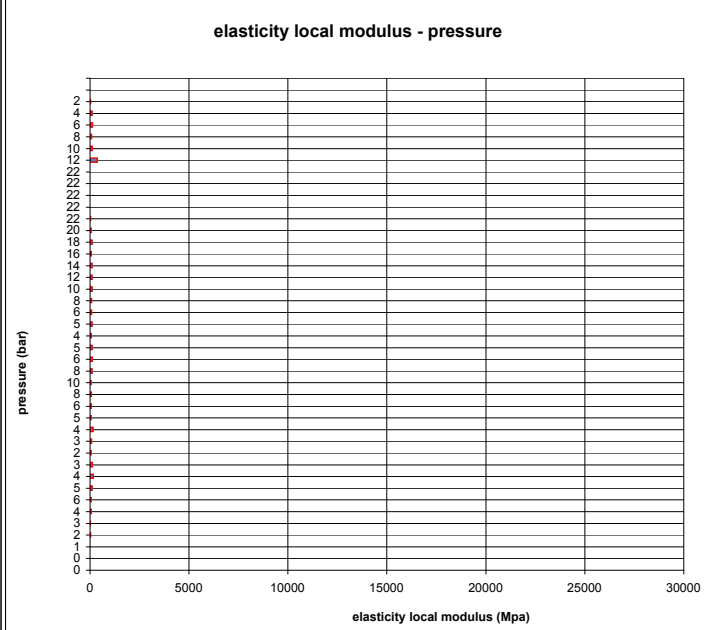
Lavoro: INDAGINI GEONOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"


Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56

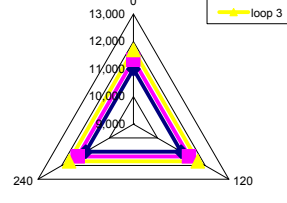
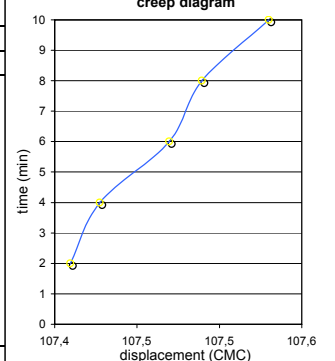
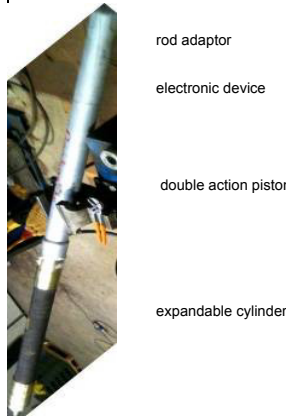
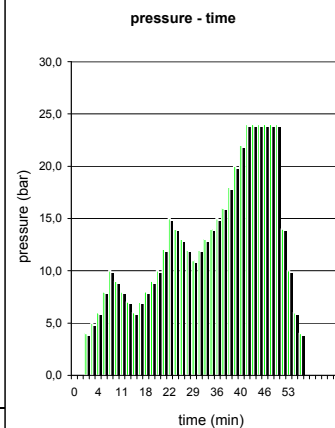
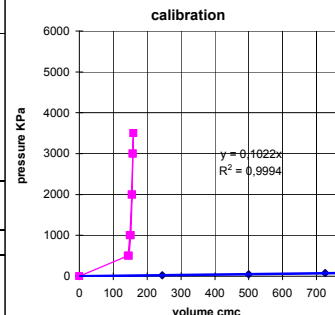
	DILATOMETRIC ROCK TEST DRT			mod DVT	rev. 1		
	borehole	S4GALL	probe depth m	25,6	code	2	
	Client:	ITALFERR S.P.A.	job	1714	v. accept.	1714SIT	
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT	11 DRT	
site	CAMPOMARINO	coordinates	EAST	date	16.05.17	pag	3/3
			NORTH				

DILATOMETER TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

<p>PLACE</p> 	<p>BOX</p> 
<p>pressure - 1/V</p> 	<p>elasticity local modulus - pressure</p> 

	DILATOMETRIC ROCK TEST DRT			mod DVT rev. 1			
	borehole	S4GALL	probe depth m	35,2	code	3	
	Client:	ITALFERR S.P.A.		job	1714	v. accept.	1714SIT
	Project	COLLEGAMENTO CAMPOMARINO-RIPALTA		report	1714SIT	12	DRT
site	CAMPOMARINO	coordinates	EAST	date	16.05.17	pag	1/3
			NORTH				

DILATOMETER TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987

				LITHOTYPE		time	test data								
				direction - displacement		min	P	P corr	Volume	ϵ_c	1/V	diameter	Dil. Diam	Modulo	
							bar	Kpa	cmc	%	1000/cmc	(mm)	(mm)	MPa	
Borehole	S4GALL					0	0,0	0	0,00	-5,077	#DIV/0!	99,104	0,000		
test	3	depth m 35,20				1	0,0	0	0,00	-5,077	#DIV/0!	99,104	0,000		
slope (degree)	90	core barrell				2	4,0	364	284,94	-1,632	3,509	102,700	3,596	13	
Device:	CSM Type VM01 95 mm					3	5,0	455	358,03	-0,768	2,793	103,602	4,499	13	
Orientation capteur	Standard method: ISRM 1987					4	6,0	546	423,51	0,000	2,361	104,404	5,300	15	
Probe diam 90 MM	Borehole diam	101 MM				5	8,0	739	455,69	0,375	2,194	104,796	5,692	64	
Meteo	Temperatu re					9	10,0	933	479,62	0,653	2,085	105,086	5,982	88	
lithotype	SABBIA FINE LIMOSA DA MOLTO ADDENSATA A DEB. CEMENTATA					10	9,0	835	475,27	0,603	2,104	105,033	5,930	244	
water table	RQD					11	8,0	738	469,09	0,531	2,132	104,958	5,855	171	
Creep test P (Bars) =	24,0					12	7,0	640	464,60	0,479	2,152	104,904	5,800	235	
Temps min	PBAR	CMC		13	6,0	543	453,81	0,353	2,204	104,773	5,669	97			
2	24,0	107,4		17	7,0	641	460,60	0,432	2,171	104,855	5,752	155			
4	24,0	107,4		18	8,0	738	466,19	0,497	2,145	104,923	5,820	189			
6	24,0	107,5		19	9,0	835	475,27	0,603	2,104	105,033	5,930	116			
8	24,0	107,5		20	10,0	932	486,66	0,735	2,055	105,171	6,068	92			
10	24,0	107,5		21	12,1	1131	512,42	1,033	1,952	105,483	6,379	84			
PROBE SCHEME						22	15,0	1416	550,19	1,469	1,818	105,938	6,834	83	
						23	14,0	1319	548,10	1,445	1,824	105,913	6,809	517	
						27	13,0	1221	542,51	1,381	1,843	105,846	6,742	192	
				<p>i valori diametrali sono calcolati come valore medio della sonda cilindrica in espansione</p>		28	12,0	1124	531,63	1,255	1,881	105,714	6,611	98	
				FIELD LIMITS		29	11,0	1027	521,49	1,138	1,918	105,592	6,489	105	
				min		30	12,0	1125	525,83	1,188	1,902	105,645	6,541	247	
				max		31	13,0	1222	533,71	1,279	1,874	105,740	6,636	135	
				min		32	14,0	1319	545,20	1,412	1,834	105,878	6,774	93	
				max		36	15,0	1416	558,29	1,562	1,791	106,035	6,932	82	
				min		37	16,0	1512	574,37	1,747	1,741	106,228	7,125	66	
				max		38	18,0	1706	601,11	2,054	1,664	106,548	7,445	80	
min		39	20,0	1899	629,20	2,375	1,589	106,883	7,780	77					
max		40	22,0	2093	655,01	2,669	1,527	107,190	8,087	84					
min		41	24,0	2287	673,46	2,879	1,485	107,409	8,306	119					
max		42	24,0	2287	673,46	2,879	1,485	107,409	8,306	#DIV/0!					
min		44	24,0	2287	674,97	2,896	1,482	107,427	8,324	-1					
max		46	24,0	2287	678,53	2,936	1,474	107,470	8,366	-1					
min		47	24,0	2286	680,20	2,955	1,470	107,489	8,386	-1					
max		49	24,0	2286	683,63	2,994	1,463	107,530	8,426	-1					
min		51	14,0	1307	664,06	2,772	1,506	107,298	8,194	566					
max		53	10,0	917	640,83	2,507	1,560	107,022	7,918	189					
min		55	6,0	527	612,32	2,182	1,633	106,682	7,579	153					
max		57	4,0	335	578,09	1,790	1,730	106,273	7,169	63					
PROBE CALIBRATION						min	6,0	546,2	423,5	0,0	2,4	104,4	5,3	first load	
probe	telata 85 mm					max	24,0	2287,1	673,5	2,9	1,5	107,4	8,3	first load	
membrane	no					min	10,0	933,0	479,6	0,7	2,1	105,1	6,0	I	
V0 cell volume at rest (cmc)	3856					max	6,0	543,2	453,8	0,4	2,2	104,8	5,7	I	
length cable (mt)	100					min	15,0	1416,5	550,2	1,5	1,8	105,9	6,8	II	
Volume initial Vi (cmc)	150					max	11,0	1027,0	521,5	1,1	1,9	105,6	6,5	II	
diam calibration tube (cm)	10,10					min	24,0	2286,0	683,6	3,0	1,5	107,5	8,4	III	
tube calibration volume cmc	4006					max	6,0	527,4	612,3	2,2	1,6	106,7	7,6	III	
Calibration in air															
coeff m	0,10 cmc/Kpa														
Confined calibration															
first load	3,00 cmc/Mpa														
unload	2,14 cmc/Mpa														

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

Lavoro: INDAGINI GEONOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

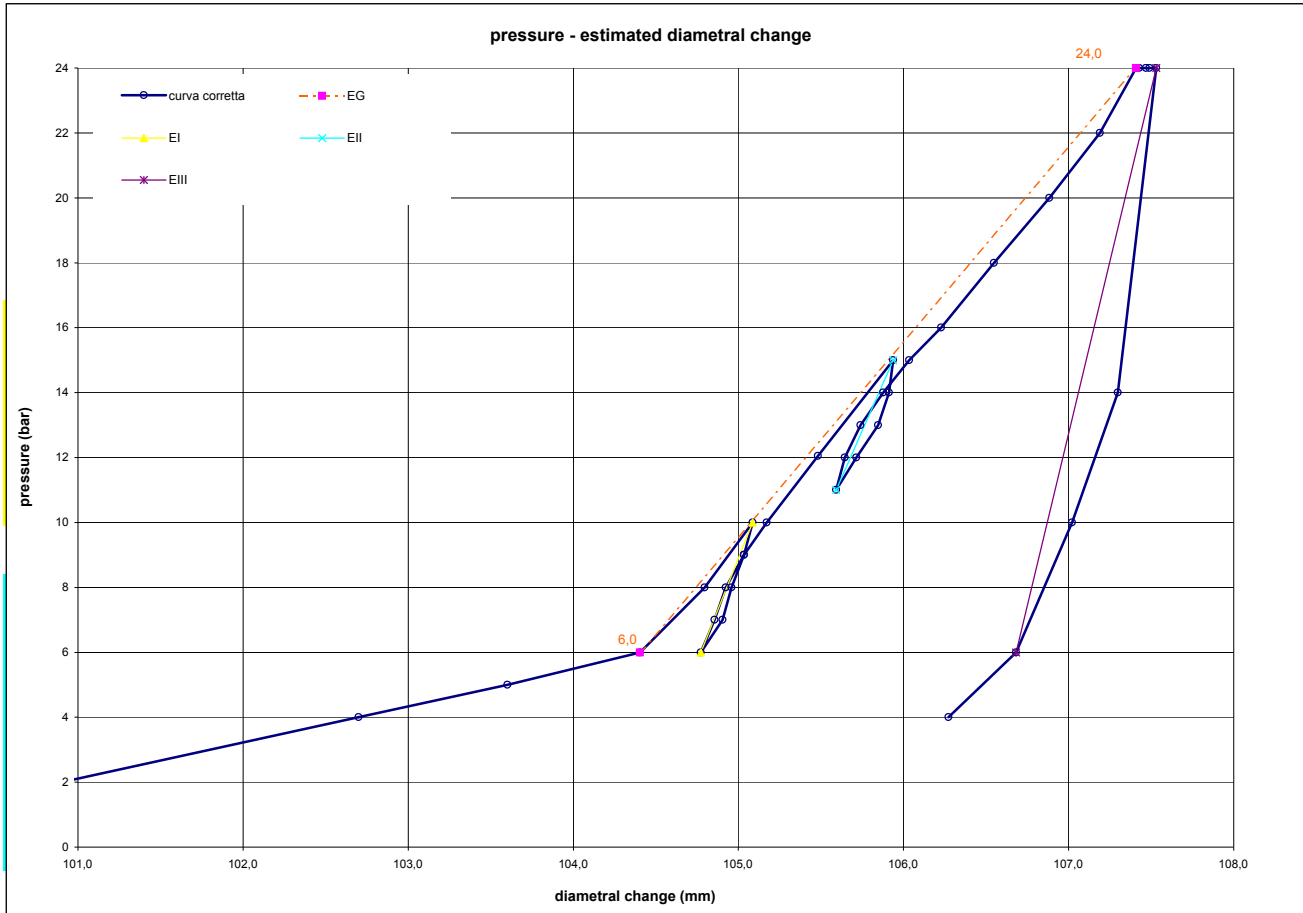
Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56



DILATOMETRIC ROCK TEST DRT				mod DVT rev. 1	
borehole	S4GALL	probe depth m	35,2	code	3
Client:	ITALFERR S.P.A.	job	1714	v. accept	1714SIT
Project	COLLEGAMENTO CAMPOMARINO-RIPALTA			report	1714SIT 12 DRT
site	CAMPOMARINO	coordinates	EAST	date	16.05.17
			NORTH	pag	2/3

DILATOMETER TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987




DATA PROCESSING		SENSOR 1			SENSOR 2		SENSOR 3		SENSOR AVE	
Legend: H = test depth W = water table depth ν = Poisson ratio vo = cell initial volume do = cell initial diameter Φ = borehole wall diameter Po = start pressure Pmax = max loop pressure (MPa) Pmin = min loop pressure (MPa) d max = displacement at P max d min = displacement at P min σv = vertical total stress estimated εc = dR / Ro		ELASTICITY MODULUS Ei			SENSOR 1		SENSOR 2		SENSOR 3	
DATA		loop	Pmax	Pmin	E1 (Mpa)	E2 (Mpa)	E3 (Mpa)	Eav (Mpa)		
symbol	datum	1	10,00	6,00				162		
γnsoil	2,5	2	15,00	11,00				147		
W (ml)	0,0	3	24,00	6,00				271		
ν	0,25	4								
vo (cmc)	3856	5								
do (mm)	99,10	DEFORMATION MODULUS Ti			SENSOR 1		SENSOR 2		SENSOR 3	
σv (kPa)	880	loop	Pmax	Pmin	T1 (Mpa)	T2 (Mpa)	T3 (Mpa)	Tm (Mpa)		
		1	10,00	6,00				74		
		2	15,00	10,00				74		
		3	24,00	15,00				71		
		4								
		5								
ELASTICITY MODULUS Ei		GLOBAL DEFORMATION MODULUS EG			SENSOR 1		SENSOR 2		SENSOR 3	
Ei = (1+ ν) Φ Pax - Pmin			Pmax	Pmin	EG1 (Mpa)	EG2 (Mpa)	EG3 (Mpa)	EGm (Mpa)		
Ei = (EII+EIII)/2			24,00	6,00				76		
Ei = EIII		DIAMETER			SENSOR 1		SENSOR 2		SENSOR 3	
Ei = EIII		beginning diameter (mm)			F		F		F	
		final diameter (mm)							104,404	
		range mm							107,530	
		DM loop minimum displacement							3,126	
DEFORMATION MODULUS Ti		DILATOMETRIC AND GEOTECHNICAL ESTIMATED PARAMETERS			SENSOR 1		SENSOR 2		SENSOR 3	
Ti = (1+ ν) Φ Pi - Pi-1		Pbar	C1	C2	C3	Cm	Po initial pressure (KPa)	546	EG (MPa)	
Xi - Xi-1		bar	0	120	240	0	PL creep pressure (KPa)	2287	E3 (MPa)	
		10,0	10,997	10,997	10,997	5,982	PL limit pressure (KPa) Cassan	3457	E/PL	
		15,0	11,342	11,342	11,342	6,834	PL' net limit pres (KPa) >	2841	EG/Ey	
		24,0	11,692	11,692	11,692	8,426	Ko lateral coeff at rest (KPa)	0,70	cu cohesion (KPa) johnson	
							Pho lateral pressure (KPa)	616	φ friction angle (°) >	
									76	
									271	
									26,61	
									0,28	
									371	
note: MATERIALE ASSIMILATO A TERRENO COESIVO										

Committente: ITALFERR spa - A.Q. n° 20000935 del 29.01.2015

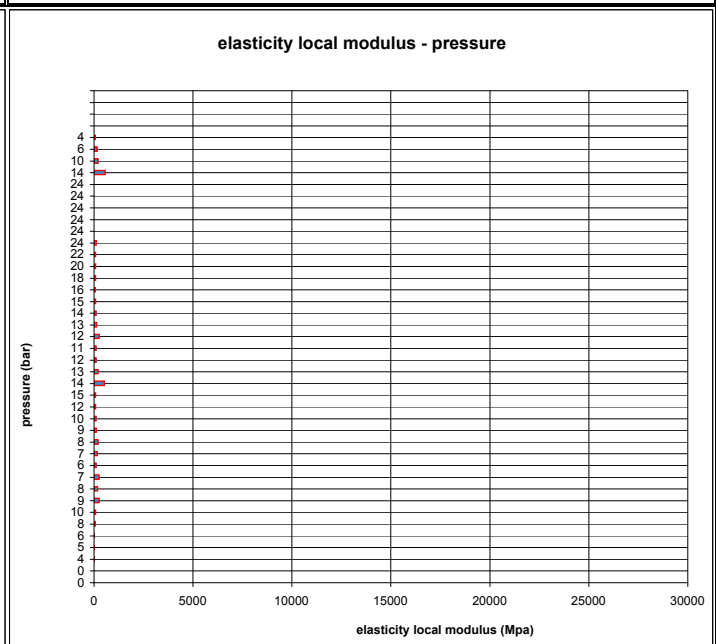
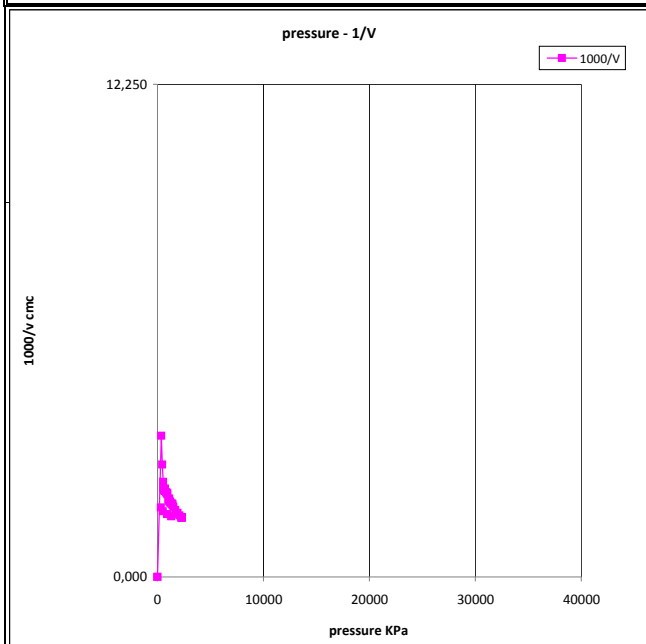
Lavoro: INDAGINI GEOGNOSTICHE PROGETTO DEFINITIVO "LOTTO 3 CAMPOMARINO-RIPALTA DELLA L.O. TERMOLI-LESINA"

Comessa: LIA3.1D02.A01

Ordine: N° 100031758 - Attivazione: N° 56

	DILATOMETRIC ROCK TEST DRT		mod DVT	rev. 1
	borehole	S4GALL	probe depth m	35,2
	Client:	ITALFERR S.P.A.	job	1714
	Project:	COLLEGAMENTO CAMPOMARINO-RIPALTA	v. accept.	1714SIT
site:	CAMPOMARINO	report	1714SIT	12 DRT
	coordinates	EAST	date	16.05.17
		NORTH	pag	3/3

DILATOMETER TEST WITH VOLUME CHANGE MEASUREMENTS - ISRM 1987



INTERRUZIONE PROVA PER DEFORMAZIONE ANOMALA