Anholt

Konsolideringsforsøg (Datarapport 1)

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Publication date:
2006

Document Version
Også kaldet Forlagets PDF

Citation for published version (APA):
Thorsen, G., & Ibsen, L. B. (2006). *Anholt: Konsolideringsforsøg (Datarapport 1)*. Department of Civil Engineering, Aalborg University. AAU Geotechnical Engineering Papers Nr. R0604

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Anholt
Konsolideringsforsøg
Datarapport

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Godkendt

Anholt
Konsolideringsforsøg
Marint ler, Eem og Jura

AAU Geotechnical Engineering Papers
Laboratory testing paper no. R0603
ISSN 1398-6465

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1. Indledning

Denne datarapport indeholder resultater af konsolideringsforsøg med tre prøver af interglacialt ler fra Eem mellemistid, en lerprøve fra Mellem Jura og en lerprøve fra Nedre Jura. Prøverne er udtaget fra kerner fra en geologisk undersøgelsesboring. Boringen er udført i foråret 1990 som led i et forskningsprojekt, GEOKAT-projektet. Geokatprojektet var et forskningsrådsstøttet projekt ved Geologisk Institut, Aarhus Universitet. Den gennemborede lagserie er beskrevet i Dansk Geologisk Forening, Årsskrift for 1990-91 (Nielsen, 1992).

2. Formål

Det væsentligste formål med forsøgene har været at undersøge om det var muligt at bestemme forkonsolideringsspændingen for aflejringerne til vurdering af den geologiske historie.

3. Forsøgsmateriale

Prøverne til konsolideringsforsøgene er udtaget fra kerneprøver, hvilket betyder, at de kan have haft mulighed for at svelle i forbindelse med prøveoptagningen. Efter optagning har prøverne været opbevaret i plastikrør, men de har ikke været opbevaret lufttæt, og der er derfor foregået nogen udtørring af prøverne.
Ved klassifikationsforsøg er bestemt følgende før forsøg:

Prøve P1	Eem	w = 19,8%	γ = 19.8 kN/m^3	e = 0.61	$S_w \sim$ 88%
Prøve P2	Eem	w = 22.5%	γ = 19.5 kN/m^3	e = 0.68	$S_w \sim$ 91%
Prøve k12	Eem	w = 17.8%	γ = 21.3 kN/m^3	e = 0.48	$S_w \sim$ 96%
Prøve k26	mellem Jura	w = 12,3%	γ = 19.0 kN/m^3	e = 0.47	$S_w \sim$ 75%
Prøve k98	nedre Jura	w = 16,8%	γ = 21.2 kN/m^3	e = 0.46	$S_w \sim$ 99%

Prøverne er antaget fuldt vandmættet ved afslutning af konsolideringsforsøget.
For Eem prøverne er skønnet en relativ korndensitet på d_s = 2.72, for prøve k26 og k98 er den relative korndensitet skønnet til henholdsvis d_s = 2.69 og d_s = 2.7

For prøve k12 er bestemt vandindholdet ved flydegrænsen w_L = 32.1% og vandindholdet ved plasticitetsgrænsen w_P = 15.4%, hvilket giver et plasticitetsindeks I_P = 16.7%

4. Forsøgsprogram

Forsøgene er udført i det danske konsolideringsapparat med prøvestørrelse H x D = 35 x 70 mm for prøve P1 og H x D = 30 x 60 mm for de øvrige prøver. Apparaterne havde en lille filtersten i det nederste trykhoved og som drænvej er anvendt $H_d = 0{,}7 \times D$.

Forsøgene er udført ved trinvis belastning. Ved forsøgene med prøve P1 og P2 er de enkelte belastningstrin afbrudt, når det kunne konstateres, at konsolideringsprocessen var afsluttet og maksimalbelastning er aftaget på én gang. Ved de øvrige forsøg er varigheden af de enkelte belastningstrin søgt afpasset, så krybningsdekadehældningen kunne bestemmes på de enkelte belastningstrin og så svelling var minimal på aflastningstrinene.

5. Tolkning af forsøg

Ved tolkning af tidskurverne er anvendt en adskillelse af konsolideringstøjning og krybningstøjning som angivet af Moust Jacobsen (Jacobsen, 1992). Krybekurverne er beregnet ud fra følgende udtryk $\varepsilon_{kryb} = Q_s \times \log((t_A+t)/t_A)$, hvor Q_s er den maksimale værdi for ε_s.

For tidskurver ved spændinger op til den maksimale værdi af krybningstøjningsindekset, Q_s, er nået er denne værdi anvendt. For tidskurver ved højere spændinger er den aktuelle værdi for krybningstøjningsindekset, ε_s, anvendt i stedet for Q_s.

Tiden, t_A, er fundet som den tid, der giver en krybekurve, der falder sammen med den sidste del af tidskurven, hvorved konsolideringstøjningen, ε_c, bliver konstant med tiden. Samtlige tidskurver med angivet adskillelse af konsolideringskurve og krybekurve fremgår af bilagene.

Tiden, t_A, er kraftigt faldende op til forkonsolideringsspændingen er nået, hvorefter den er næsten konstant eller meget svagt faldende. Da der er tale om bortdræning af vand både under konsolideringsprocessen og ved krybning, vil størrelsen af t_A, når materialet er i normalkonsolideret tilstand, sandsynligvis ligesom konsolideringstiden være afhængig af den aktuelle drænvej.

Ved tolkning af konsolideringsforsøgene er foretaget bestemmelse af forkonsolideringsspænding, σ'_{pc}, tøjningsindeks, Q, krybningstøjningsindeks, ε_s, det maksimale krybningstøjningsindeks, Q_s, svarende til normalkonsolideret tilstand, samt konsolideringskoefficient ved 10^0C, $c_{k10} = k_{10} \times K/\gamma_w$. Konsolideringskoefficienten er beregnet ud fra følgende udtryk, $c_{k10} = (\pi/4) \times (H_d)^2/t_c$, hvor t_c er den tid, hvor tidskurvens rette linie i vt – afbildning skærer værdien for konsolideringstøjningen, ε_c. Som drænvej er anvendt $H_d = 0{,}7 \times D$.

Resultaterne fremgår af bilag 2.1 – 6.1. På grund af de ret korte tidskurver ved forsøgene med prøve 1 og 2 er der noget usikkerhed i bestemmelse af krybningstøjningsindeks..

For hvert belastningstrin er bestemt konsolideringsmodulen, $K = \Delta\sigma'/\Delta\varepsilon_c$, som stort set svarer til tangentmodulen ved belastningstrinnets middelspænding. Resultaterne fremgår af bilag 2.2 – 6.2.

Forkonsolideringsspændingen, σ'_{pc}, er bestemt ud fra:

- variationen af tiden t_A på de enkelte belastningstrin (bilag 2.1 – 6.1)

samt følgende kriterier (dgf-Bulletin 15, 2001):

- knæk i ε_s - σ' kurven, hvor ε_s når den maksimale værdi, Q_s
- knæk eller spring i K - σ'_{middel} kurven
- afbøjning fra en ret linie i σ'- ε_c kurve

Der er fundet rimelig god overensstemmelse mellem de forskellige kriterier.

For prøverne k26 og k98 er de i afsnit 6 anførte værdier for Q og σ'_{pc} minimumsværdier, idet forkonsolideringsspændingen sandsynligvis ikke er nået i forsøget.

Ved at antage fuld vandmætning ved forsøgets slutning er udregnet et begyndelsesvandindhold ved hvert enkelt belastningstrin, værdierne fremgår af bilag 2.2 - 6.2.

6. Forsøgsresultater

Arbejdskurverne for de enkelte konsolideringsforsøg fremgår af bilag 2-6
Beregnede og målte værdier samt tolkede parametre er angivet i nedenstående skema:

Prøve	Alder	w	σ'_{pc}	σ'_0	K	Q	Qs	α	OCR	I_p
no.		%	MPa	MPa	MPa	%	%	Qs/Q	σ'_{pc}/σ'_0	%
P1	Eem	22,6	>3	~0,78	~50	9,5?	~0,5	~0,05	~4	
P2	Eem	24,9	>4	~0,78	~60	13?	~0,5	~0,04	~5	
k12	Eem	18,5	>2	~0,8	?	~8	~0,23	~0,03	~2,5	16,7
k26	M-jura	17,5	(~8)	~1,6	~100	(~6)	0,11	~0,02	>5	
k98	N-jura	16,8	(>3)	~3	~150	(~5?)	~0,07	~0,01	>1	

σ'_0 er den beregnede effektive spænding in situ, OCR = forkonsolideringsgrad = σ'_{pc}/σ'_0. De angivne vandindhold er de beregnede vandindhold for $S_w \sim 100\%$.

7. Kommentarer til forsøgsresultater

7.1 Sammenligning med Terzaghi-kurve og Casagrande-konstruktion

På en Terzaghi-kurve, $\varepsilon = Q \times \log((\sigma'_\kappa + \sigma')/\sigma'_\kappa)$, findes kurvens maksimale krumning ved

$\sigma' = 0.62 \times \sigma'_\kappa$,

Anvendelse af Casagrande konstruktion:

Tangenten til kurven i det punkt med størst krumning får hældningen 0.38 ×Q. Ved en vinkel på 30^0 mellem tangent og vandret linie gennem tangentpunktet får vinkelhalveringslinien hældningen 0.18×Q. Skæringspunktet mellem vinkelhalveringslinien og kurvens asymptote, $\varepsilon = Q\times\log(\sigma'/\sigma'_\kappa)$, findes ved $\sigma' = 2 \times \sigma'_\kappa$.

På bilag 7 er vist arbejdskurverne for de udførte konsolideringsforsøg med tilpassede Terzaghi-kurver: $\varepsilon = \Delta\varepsilon_0 + Q \times \log((\sigma'_\kappa + \sigma')/\sigma'_\kappa)$. Terzaghi-kurverne er tilpasset efter følgende princip: Tøjningsindekset Q = den ved forsøget bestemte værdi for Q, σ'_κ så lille som muligt og $\Delta\varepsilon_0$ er den værdi på arbejdskurvens ε – skala, der svarer til $\varepsilon = 0$ på Terzaghi-kurven. I nedenstående skema er de herved fundne værdier for σ'_{pc} og Q sammenholdt med de værdier, der er fundet ud fra forsøgene. For prøve k26 og k98 er forkonsolideringsspændingen sandsynlivis ikke nået i forsøget.

I skemaet er angivet værdier for $\Delta\varepsilon_0$, hvor positive værdier svarer til, at prøverne har udvidet sig inden forsøgsstart, mens negative værdier tyder på et poreundertryk ved forsøgsstart.

Prøve	Alder	σ'_0 (kPa)	σ'_{pc} (kPa)	Q (%)	σ'_{pc} (kPa)	Q (%)	$\Delta\varepsilon_0$ (%)	$\Delta\varepsilon_0$ (%)
no.			Forsøg	Forsøg	Terzaghi	Terzaghi		
1	Eem	~780	>2500	9,5?	4000	15	+0,5	
2	Eem	~780	>4000	13?	4000	15		-0,5
k12	Eem	~800	~5000	~8	4000	11	+4,6	
k26	M-jura	~1620	(~8000)	(~6)	(6000)	(9)		-0,45
k98	N-jura	~3040	(>3000)	(~5)	(6000)	(8)		-0,7

7.2 Sammenligning med skønsformel for tøjningsindeks Q baseret på vandindhold

I DS415:84 er anført følgende skønsformel for normalkonsoliderede, gytjeholdige (dyndede) aflejringer: Q = 60×(w-25)/(w+40) %, når w indsættes i %. For post- og senglaciale aflejringer fra Skagen 3 boringen (Thorsen, 2006a) er udtrykket Q = 60×w/(w+90) %, fundet som en mulig tilnærmelse.

Fig. 1 viser de ud fra arbejdskurverne fundne værdier for tøjningsindeks, Q, sammenholdt med kurven Q = 60×w/(w+90) %. Som vandindhold er anvendt de begyndelsesværdier, der er beregnet ud fra antagelse om fuld vandmætning ved forsøgets slutning.

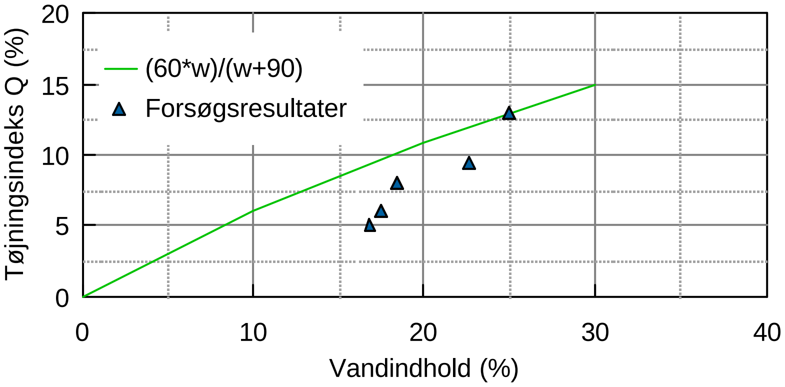

Fig. 1 Tøjningsindeks fra forsøg som funktion af vandindhold

Fig. 2 viser de fundne værdier for tøjningsindeks, Q, der er fundet ved tilpassede Terzaghi-kurver.

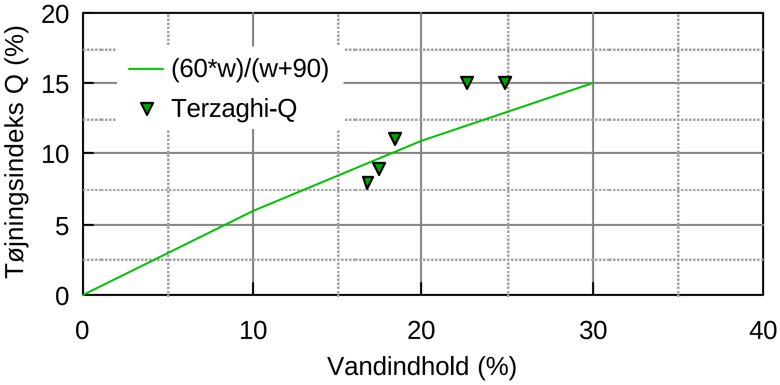

Fig. 2 Tøjningsindeks fra Terzaghi-kurve som funktion af vandindhold

7.3 Sammenligning med andre forsøg med Eem-ler

På fig. 3 er arbejdskurverne for prøve P1, P2 og k12 vist sammen med to arbejdskurver fra forsøg udført på naturfugtige prøver af Eem-ler, Skagen 3, prøve K98 (Thorsen, 2006a) og Nørre Lyngby, prøve A1-P7 (Thorsen, 2006b).

Fig. 4 viser de samme arbejdskurver, men kurverne er forskudt, så ε – skalaen svarer til de tilpassede Terzaghi-kurver. Desuden er indtegnet de dertil svarende asymptoter. I signaturforklaringen for arbejdskurverne er angivet værdien for korrektionen, $-\Delta\varepsilon_0$, og ved asymptoterne er angivet de anvendte værdier for tøjningsindeks, Q, og forbelastningsspænding, σ'_{pc}.

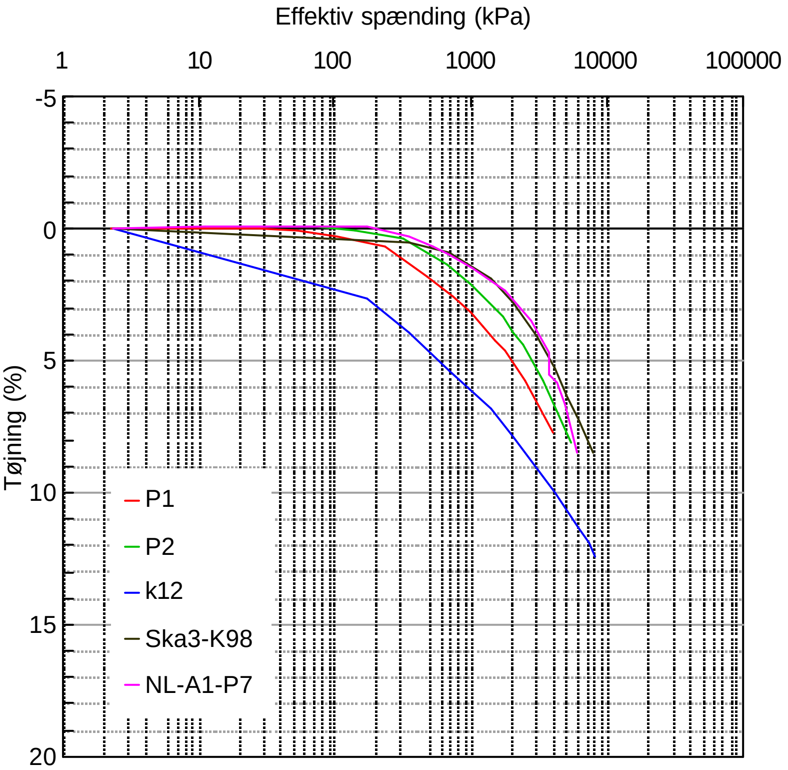

Fig. 3 Arbejdskurver fra P1, P2 og k12 sammenholdt med arbejdskurver fra forsøg med Eemler fra Skagen og Nørre Lyngby.

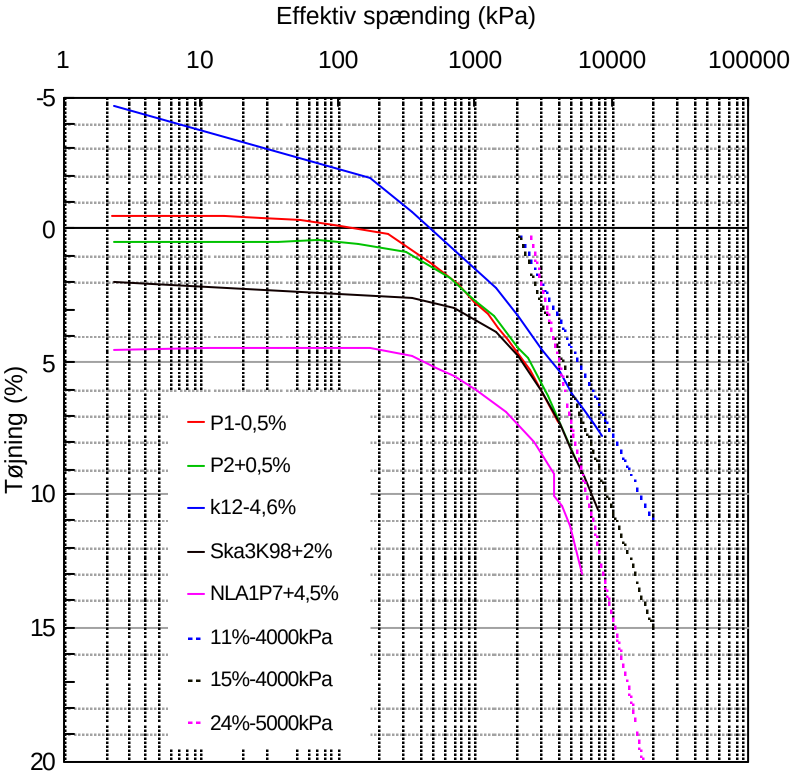

Fig. 4 Arbejdskurver med korrektioner svarende til Terzaghi-kurver samt de dertil svarende assymptoter.

For prøverne P1, P2 og Ska3K98 (beregnede begyndelsesvandindhold på henholdsvis ~23, ~25 og ~27 %) er ved tilpassede Terzaghi-kurver fundet ens værdier for tøjningsindeks, Q = 15 %, og forkonsolideringsspænding, σ'_{pc} = 4000 kPa.

For prøve k12 (beregnet begyndelsesvandindhold på w = ~18 %) er fundet tøjningsindeks Q = 11 % og forkonsolideringsspænding σ'_{pc} = 4000 kPa.

For prøve NLA1P7 (beregnet begyndelsesvandindhold på w = ~29 %) er fundet tøjningsindeks Q = 24 % og forkonsolideringsspænding σ'_{pc} = 5000 kPa.

De aktuelle forsøgsresultater viser ikke markante forskelle, der kan henføres til prøvernes kvalitet.

8. Konklusion

Der er udført 5 konsolideringsforsøg med 5 kerneprøver, 3 prøver af interglacialt ler Eem, 1 af ler fra mellem Jura og 1 af ler fra nedre Jura.

Det væsentligste formål med forsøgene var at forsøge at bestemme aflejringernes forkonsoliderings-spænding.

Ved tolkning af forsøgenes tidskurver er anvendt en adskillelse af konsolideringstøjning og krybningstøjning som angivet af Moust Jacobsen (jfr. afsnit 5).

Resultaterne af forsøgene fremgår af afsnit 6.

De aktuelle arbejdskurver er sammenlignet med Terzaghi-kurver med indlagt Casagrandekonstruktion. Resuktaterne fremgår af bilag 7 samt afsnit 7.1.

Prøvematerialet er udtaget af kerneprøver, der efter optagningen har været opbevaret i plastikrør, en ikke lufttæt opbevaring. Forsøgsresultaterne kunne derfor være påvirket af en eventuel ændring af prøvematerialet efter optagning. Der er derfor foretaget en sammenligning med resultater fra andre forsøg (jfr. afsnit 7.2 og 7.3).

Den foreliggende sammenligning mellem resultaterne af konsolideringsforsøg med kerneprøverne af Eem-ler fra Anholt med en naturfugtig kerneprøve af Eem-ler fra Skagen og en intakt rørprøve af Eem-ler fra Nørre Lyngby viser ikke markante forskelle, der kan henføres til prøvernes kvalitet.

Forkonsolideringsspændingen for Eem-leret er fundet til σ'_{pc} ~ 4000 kPa, og for mellem og nedre juraler¨til σ'_{pc} ~ 6000 kPa.

I forsøgene med prøverne fra Jura er normalkonsolideret tilstand næppe nået. Forkonsoliderings-spændingen er sandsynligvis højere end den maksimale spænding under forsøget.

9. Referencer

DS415:84: *Dansk Ingeniørforenings norm for fundering.* 1984. ISBN 87-571-0765-3.

Dgf-Bulletin 15: *Laboratoriehåndbogen, afsnit 5, konsolideringsforsøg.* Dgf's laboratoriekommité, December 2001. ISBN NO 87-89833-12-0.

Jacobsen, H. Moust, 1992: *Bestemmelse af forbelastningstryk i laboratoriet.* Proceedings Nordisk Geoteknikermøde NGM-92, Aalborg. Danish Geotechnical Society, Bulletin 9, Vol.2, pp 455-460 ISBN 87-983058-7-5.

Nielsen, O.B., 1992: *Lithologi, lithostratigrafi og aflejringsmiljø i Anholtboringen.* Dansk Geologisk Forening, Årsskrift for 1990-91, pp 67-72, København 1992.

Thorsen, G. 1996: *Oedometer tests – an aid in determination of the geological load history?* Bulletin of the Geological Society of Denmark. Vol. 43 pp. 41-50. Copenhagen 1996

Thorsen, G. 2006a: *Skagen 3. Konsolideringsforsøg. Postglacialt marint silt og ler. Senglacialt marint ler. Glacialt ler fra Weichsel og Eem.* Datarapport. AAU Geotechnical Engineering Papers. Laboratory testing paper no. R0601, ISSN 1398-6465

Thorsen, G. 2006b: *Nørre Lyngby. Konsolideringsforsøg. Senglacialt marint ler. Glacialt ler og marint ler fra Eem.* Datarapport no.2. AAU Geotechnical Engineering Papers. Laboratory testing paper no. R0602, ISSN 1398-6465

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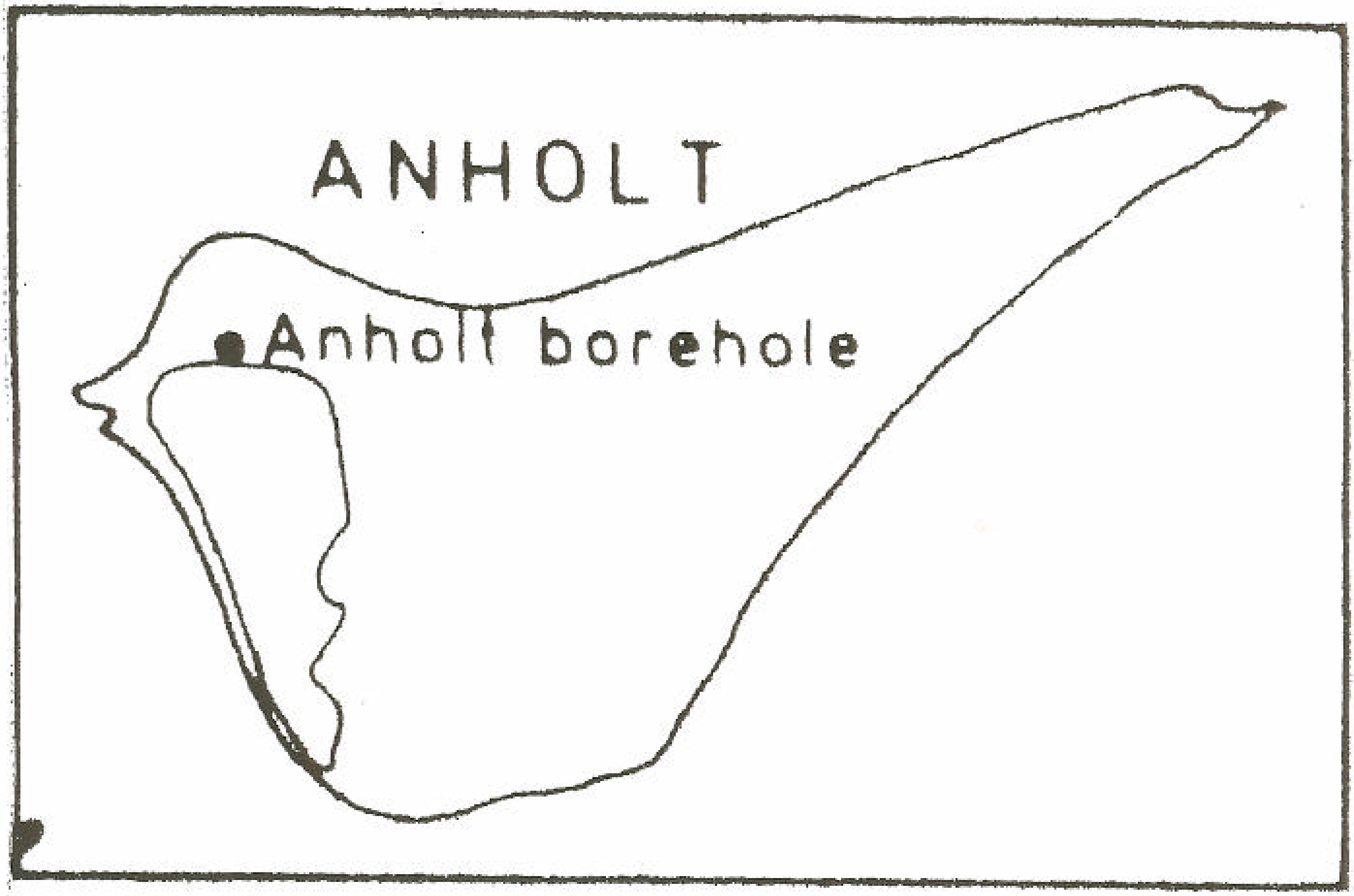
Aalborg University



Efter: Nielsen: Lithologi, Anholtboringen, fig.1, Geologisk Forening, Årsskrift for 1990-91. (1992)

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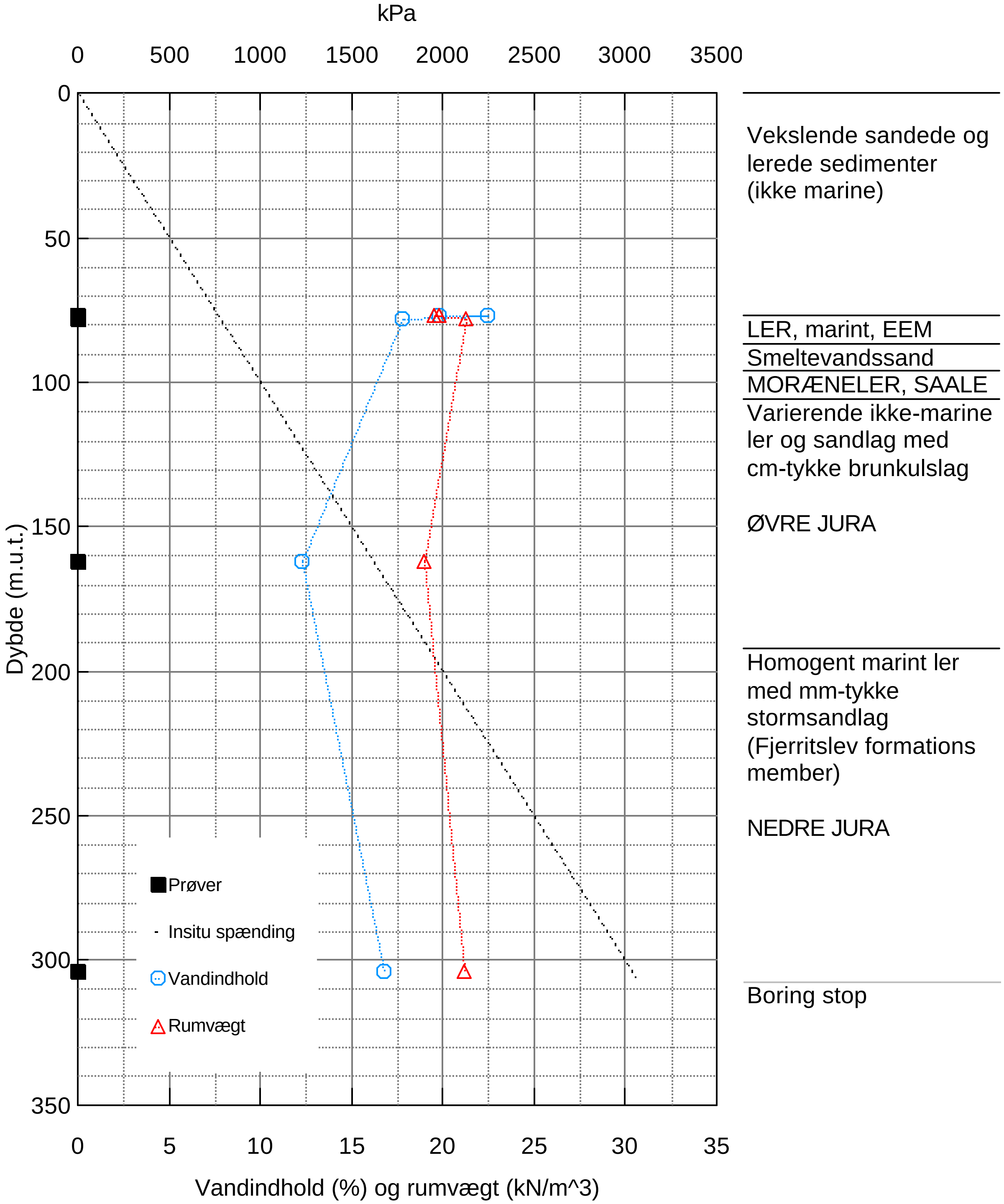
Anholtboringen
Udtagne prøver til konsolideringsforsøg
samt vandindhold og rumvægt for de udtagne prøver



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Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh. pr.1**
Department of Civil Engineering		**Page no**	**1**
Aalborg University		**Date: 12.12.91-10.01.92**	

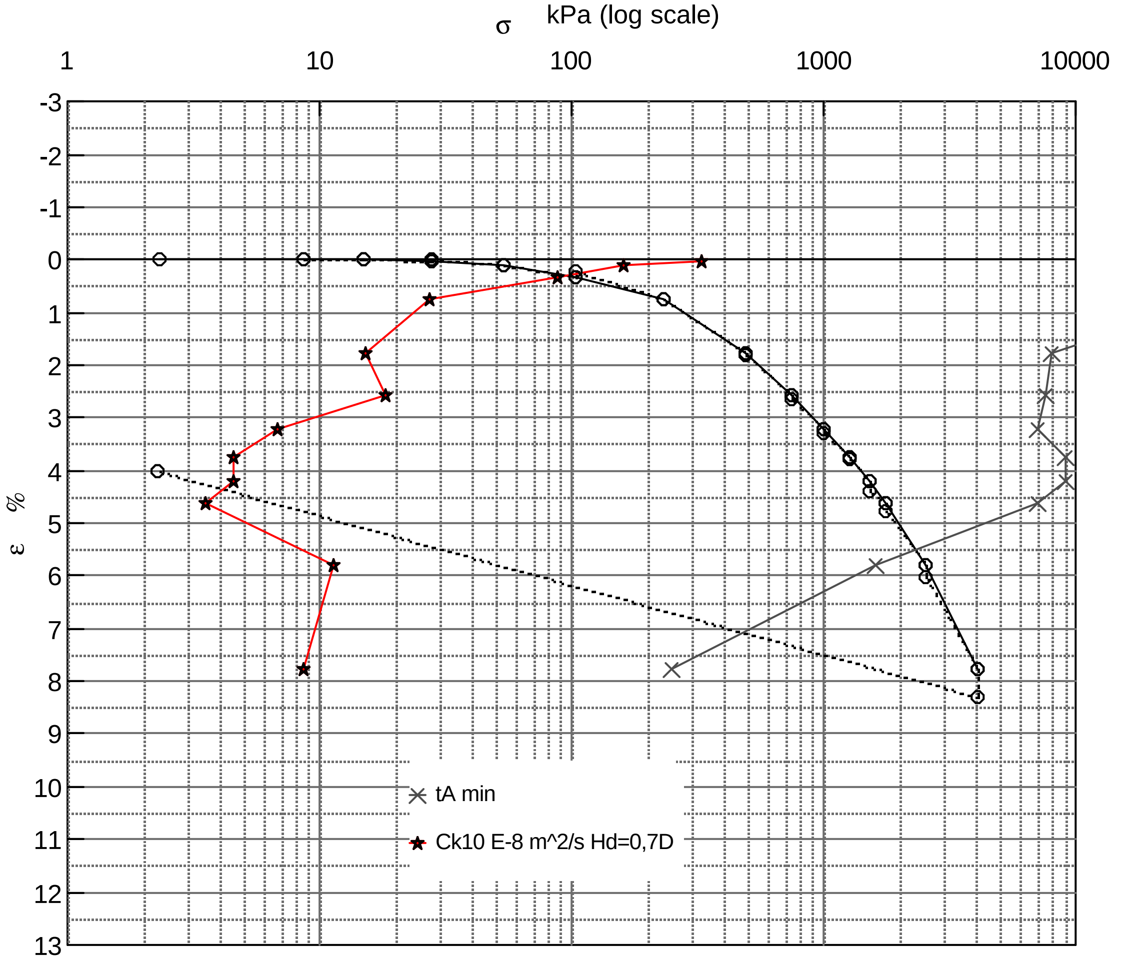
20.09.05/gt

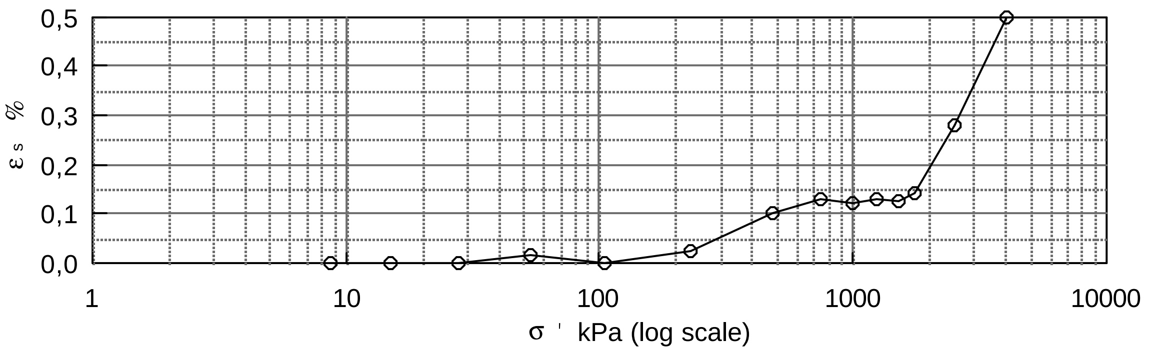
Description of soil:

Clay Eemian Glacial

Bor no :	Overburden pressure σ' o	~780 kPa		Water content %	~19.8	~20.2
Lab. no: Pr 1	Vane strength c v	kPa		Bulk density Mg / m^3	2,02	~2.11
Level : 76.7 m.b.s	CPT - value q c	MPa		Grain density Mg / m^3	~2.72	
				Void ratio	~0.61	~0.55
				Degr. of Saturation %	~88	~100
				Dimension H x D mm	35x70	33.6x70

	Before	After





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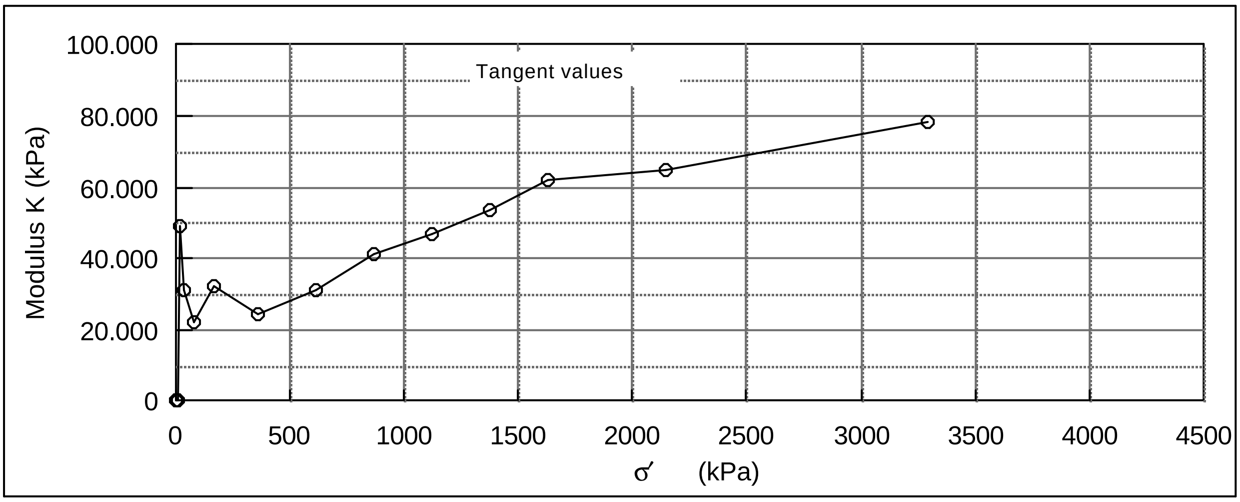

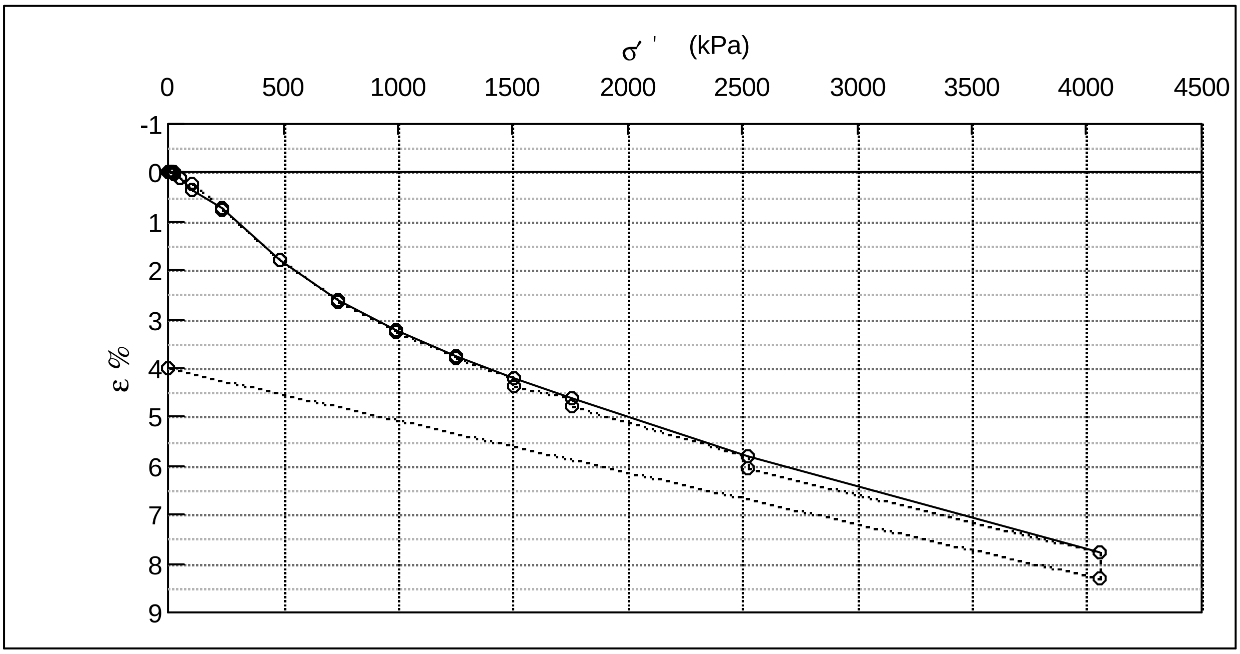

Test results

Q 9,5 % ?

Qs ~0.5 %

σ'_{pc} >2500 kPa

σ'	ε_c	ε_s	Ck10	σ'_m	K	w
kPa	%	% / lct	m^2/s	kPa	kPa	%
2,3	0,00	-	-	-	-	22,6
8,7	0,00	0,00	0	5,5		22,6
15,0	0,00	0,00	0	11,9		22,6
27,8	0,03	0,00	3,3E-06	21,4	49020,7	22,6
53,3	0,11	0,02	1,6E-06	40,5	31086,3	22,5
104,3	0,34	0,00	8,8E-07	78,8	21974,8	22,4
231,7	0,74	0,03	2,7E-07	168,0	32266,8	22,2
486,6	1,77	0,10	1,5E-07	359,2	24557,6	21,5
741,5	2,59	0,13	1,8E-07	614,1	31200,5	21,1
996,4	3,20	0,12	6,8E-08	869,0	41515,9	20,7
1.251,3	3,75	0,13	4,5E-08	1.123,9	46944,3	20,4
1.506,2	4,22	0,13	4,5E-08	1.378,8	53891,7	20,1
1.761,2	4,63	0,14	3,5E-08	1.633,7	62172,6	19,9
2.525,9	5,81	0,28	1,1E-07	2.143,5	64862,0	19,2
4.055,3	7,76	0,50	8,6E-08	3.290,6	78473,4	18,0
2,3	4,00	0,00	0	2.028,8	107850,8	20,2

Remark:
"Genbelastningsgren"
Normalkonsolideret tilstand næppe nået

Job: Anholt		**AAU**
		Encl. No 2.2
Executed:	AMS/mj/gt	Check:
Approved:		

Geotechnical Engineering Group
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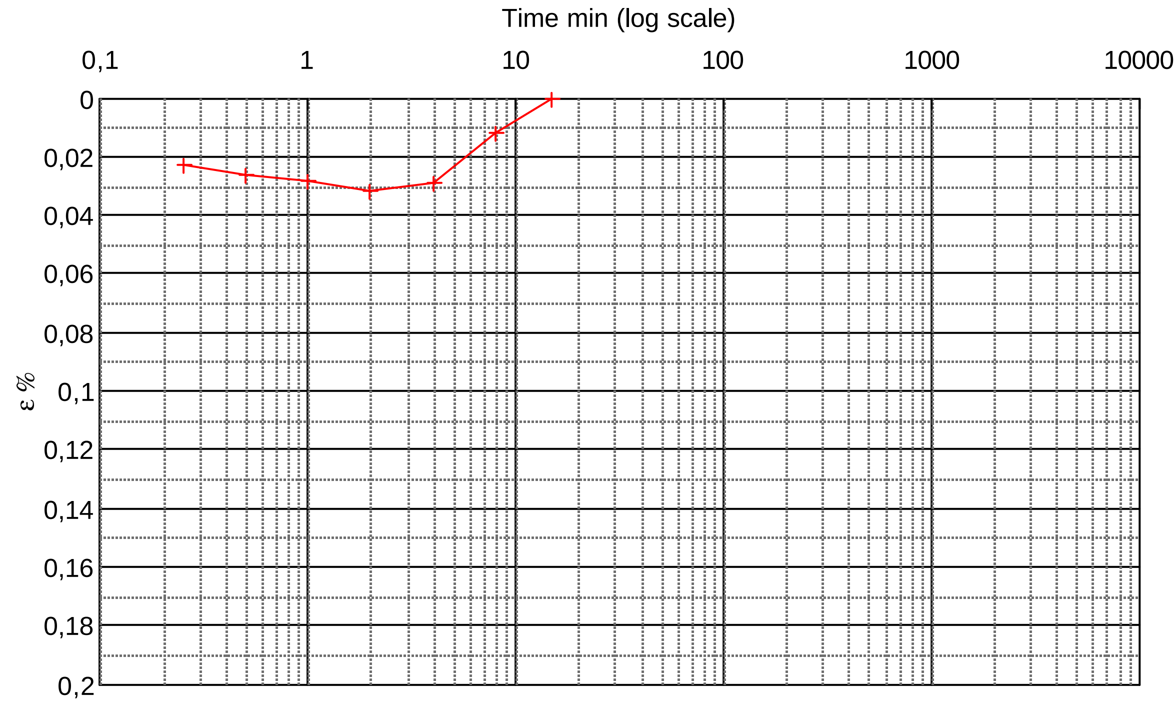
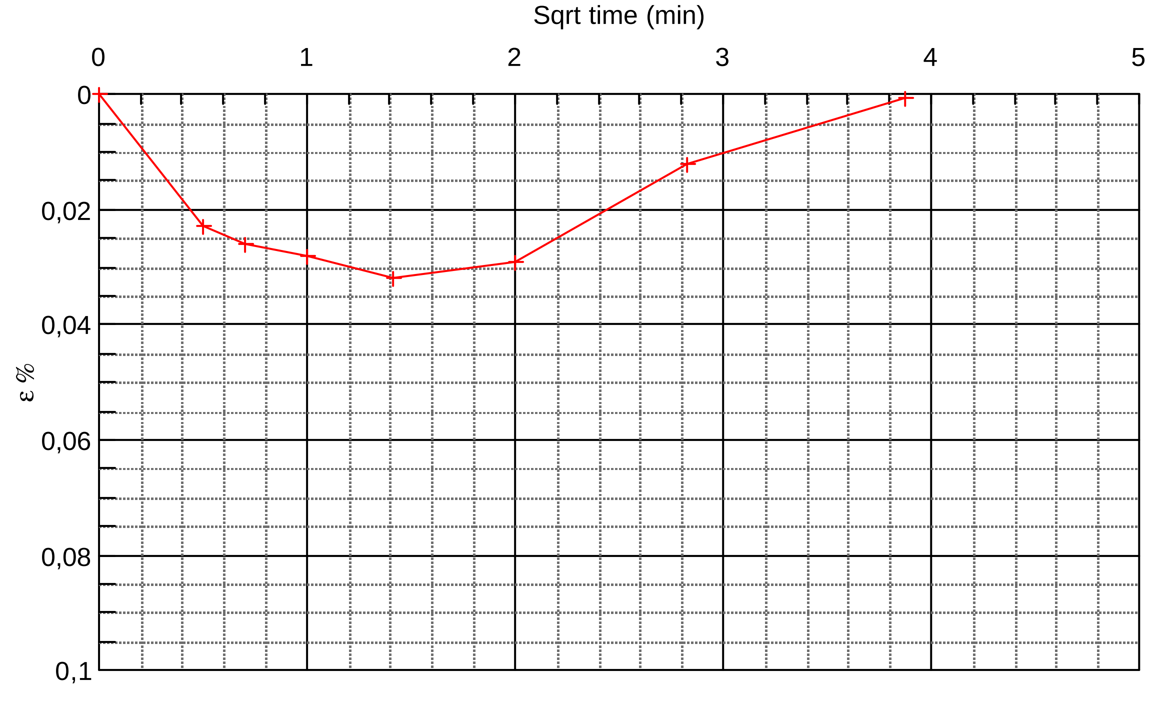
OEDOMETER TEST

Test no	**Anh. pr.1**
Page no	**2**
Date	**12.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i	tc in sec	
1	Before	2,29	ε0	0,00	ε c %	K i kPa	
	After	8,67	ε~#	0,001	ε s	k10 m/sec	
					ε kryb	ck10 m^2 /sec	





Material: Clay Eemian Glacial	
Bor no :	Depth: 76.7 m.b.s
Lab. no: Pr 1	Insitu stress. ~780 kPa

Job:	Anholt	**AAU**
		Encl. No 2.3
Executed:	AMS/mj/gt	Check:
Approved:		

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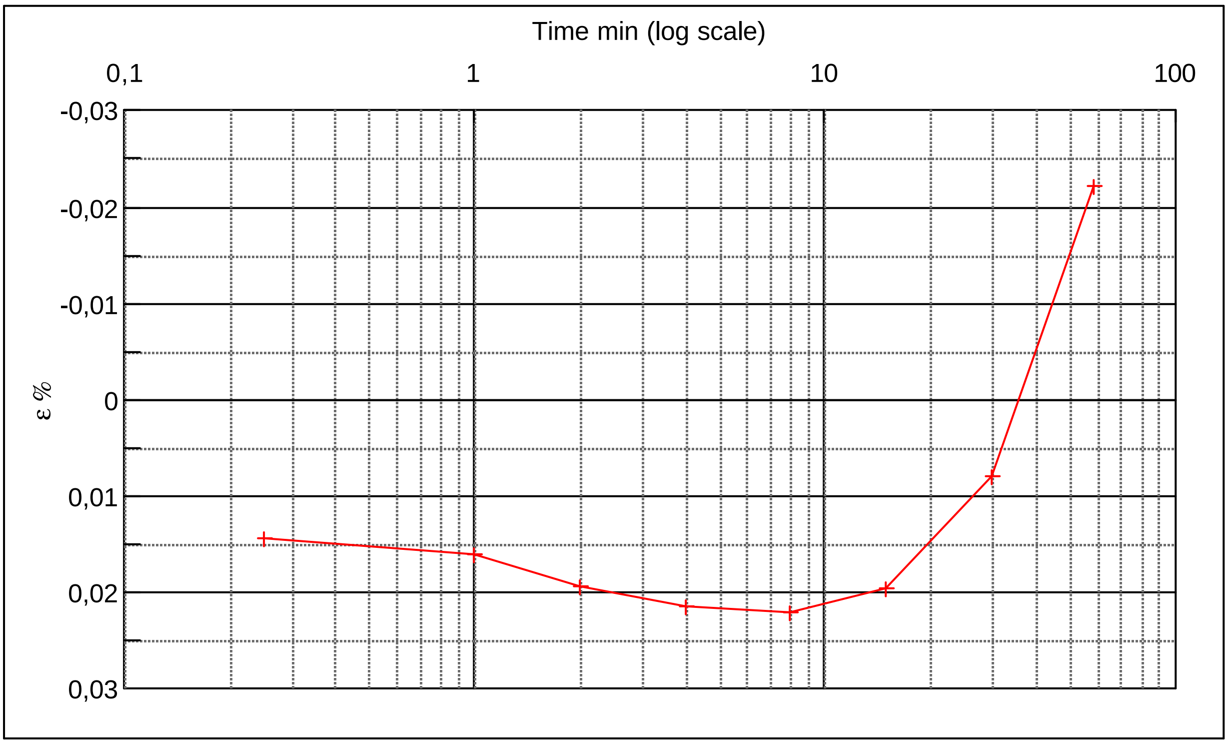
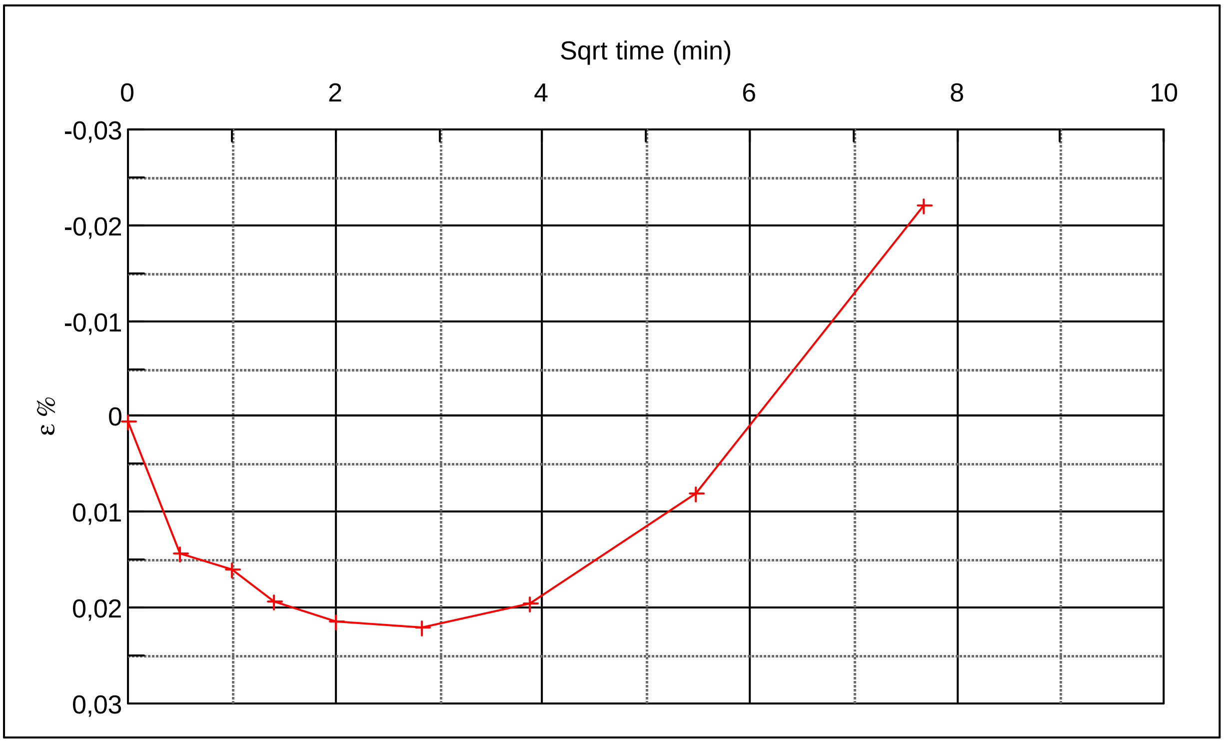
OEDOMETER TEST

Test no	**Anh. pr.1**
Page no	**3**
Date	**12.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε_i	tc in sec	
2	Before	8,7	ε0	0,001	ε_c %	K i kPa	
	After	15,0	ε~#	(0,022)	ε_s	k10 m/sec	
					ε_{kryb}	ck10 m^2 /sec	





Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 2.4
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: Pr 1	Insitu stress. ~780 kPa	Approved:	

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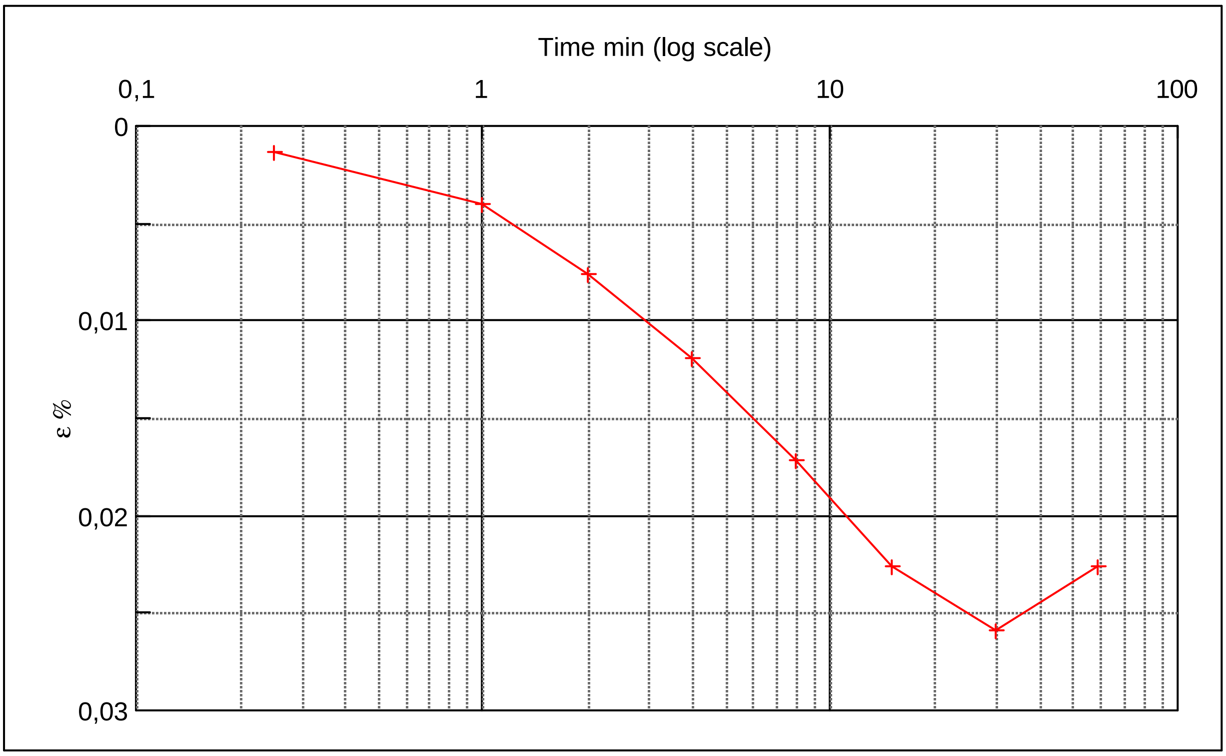
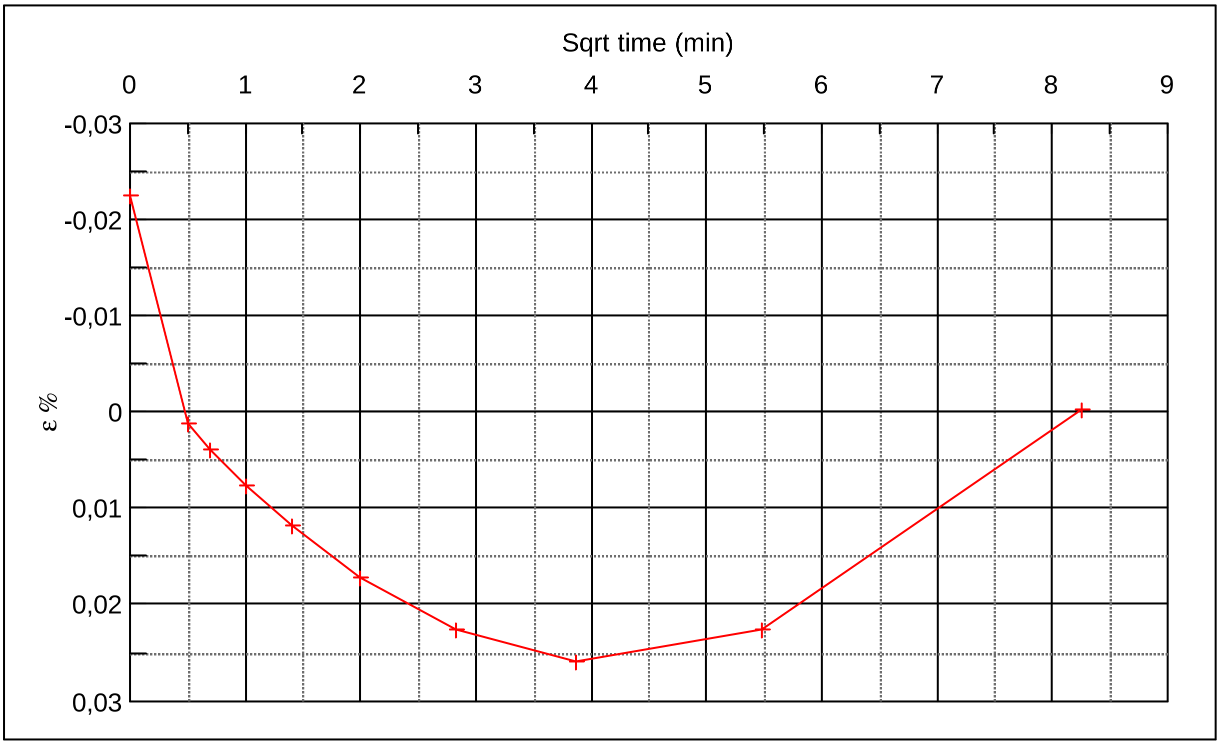
OEDOMETER TEST

Test no	**Anh. pr.1**
Page no	**4**
Date	**12.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	405,6
3	Before	15,0	ε0	(0,022)	ε c %	0,026	K i kPa	26.318
	After	27,8	ε~#	0,000	ε s		k10 m/sec	1,2E-09
					ε kryb		ck10 m^2 /sec	3,25E-06

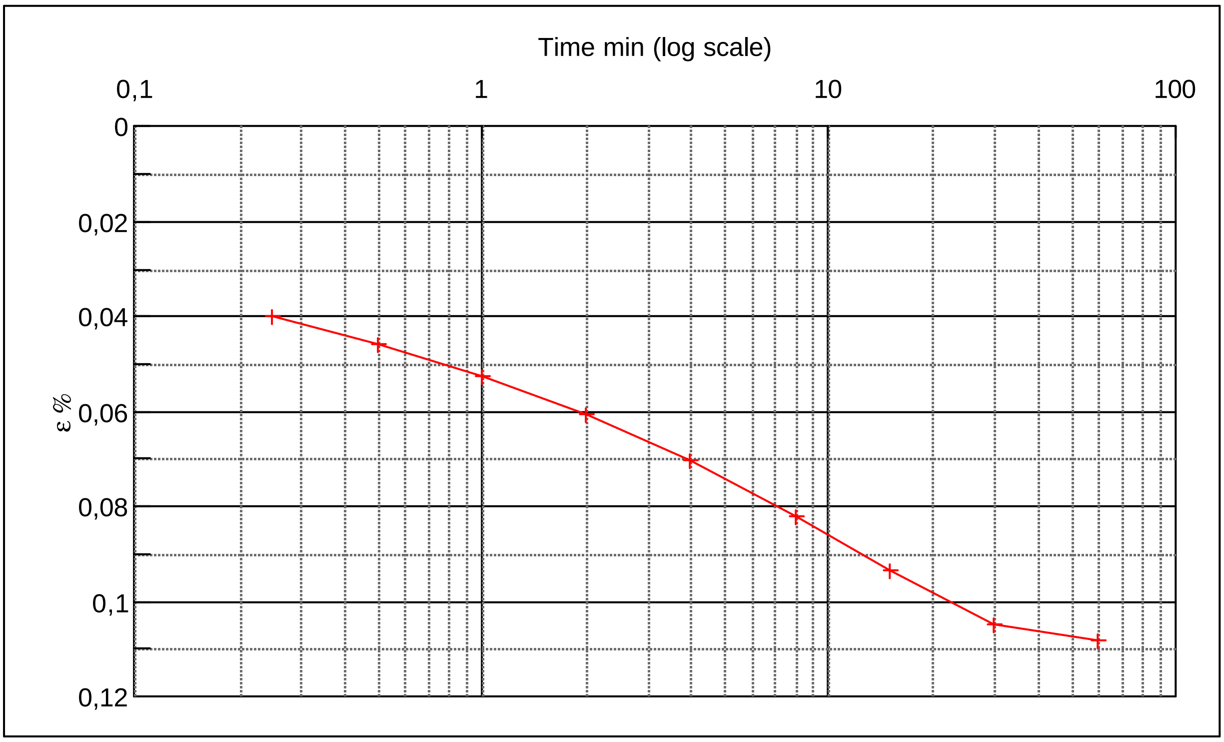


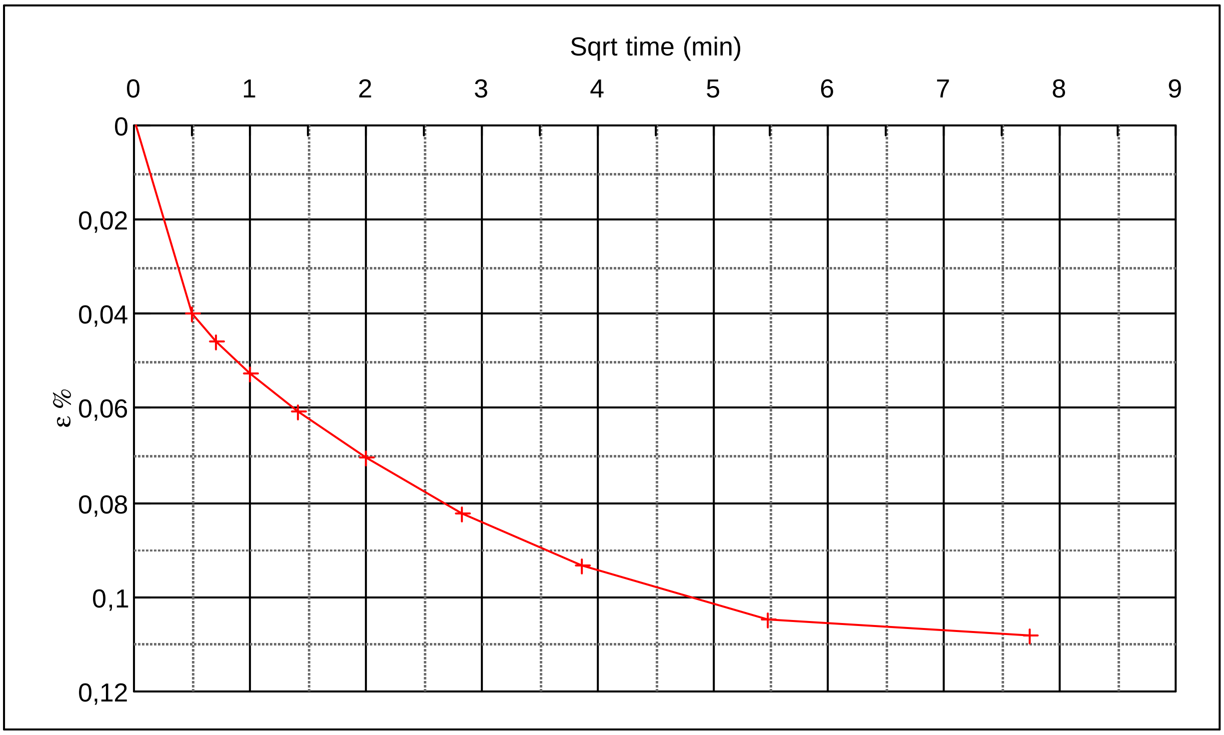


Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 2.5
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: Pr 1	Insitu stress. ~780 kPa	Approved:	

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh. pr.1**
Department of Civil Engineering		**Page no**	**5**
Aalborg University		**Date**	**12.12.91**
			20.09.05./gt

Step no	σ	kPa	ε	%	ε i		tc in sec	821,4	
4	Before	27,8	ε0	(0,00)	ε c %	0,11	K i kPa	23.540	
	After	53,3	ε~#	0,11	ε s	0,02	k10 m/sec	6,7E-10	
					ε kryb	0,00	ck10 m^2 /sec	1,61E-06	





Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 2.6
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: Pr 1	Insitu stress. ~780 kPa	Approved:	

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Department of Civil Engineering
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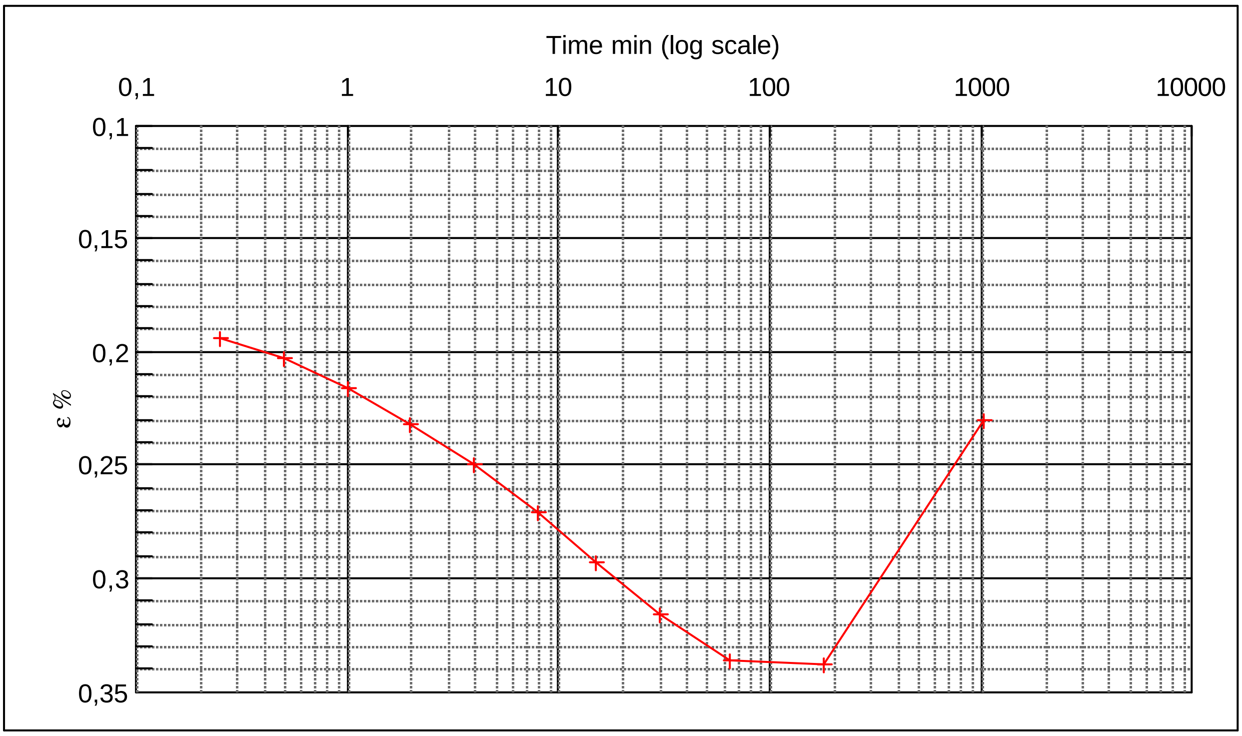
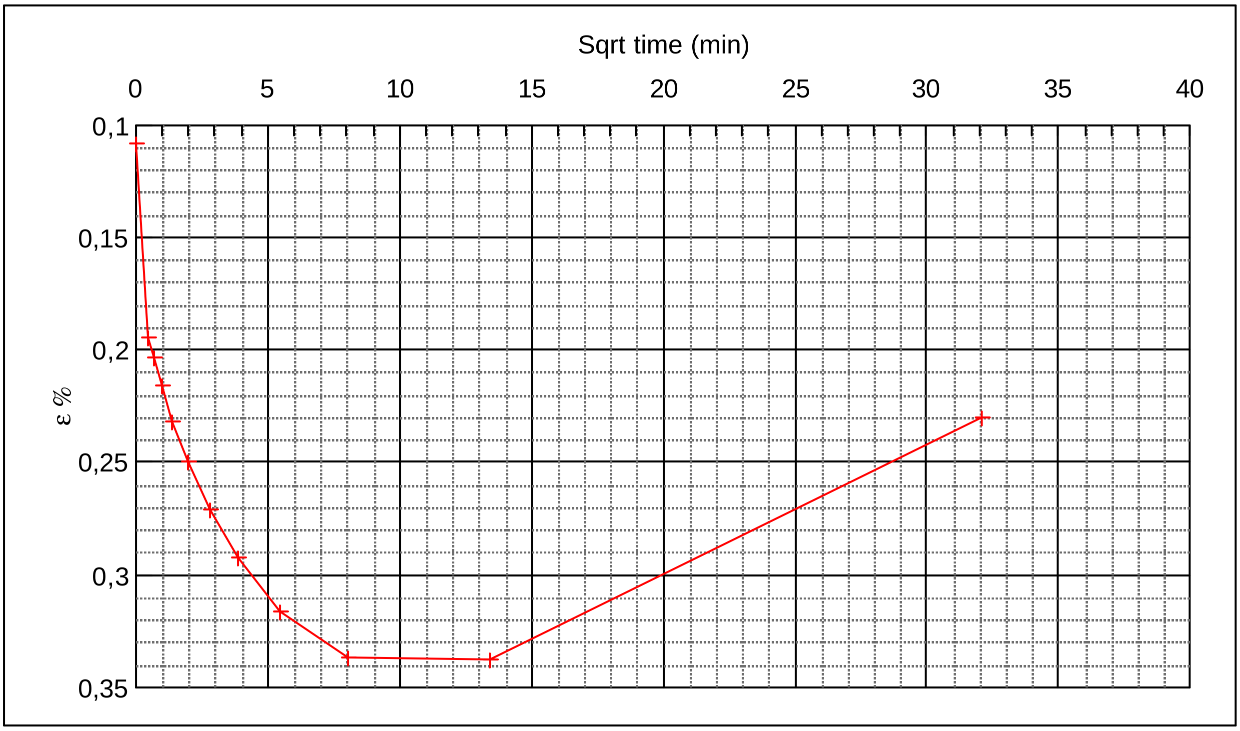
OEDOMETER TEST

Test no	**Anh. pr.1**
Page no	**6**
Date	**12.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	1500
5	Before	53,3	ε0	0,11	ε c %	0,34	K i kPa	22.002
	After	104,3	ε~#	0,23	ε s		k10 m/sec	3,9E-10
					ε kryb	-0,11	ck10 m^2 /sec	8,80E-07





Material: Clay Eemian Glacial	
Bor no :	Depth: 76.7 m.b.s
Lab. no: Pr 1	Insitu stress.~780 kPa

Job:	Anholt	**AAU**
		Encl. No 2.7
Executed:	AMS/mj/gt	Check:
Approved:		

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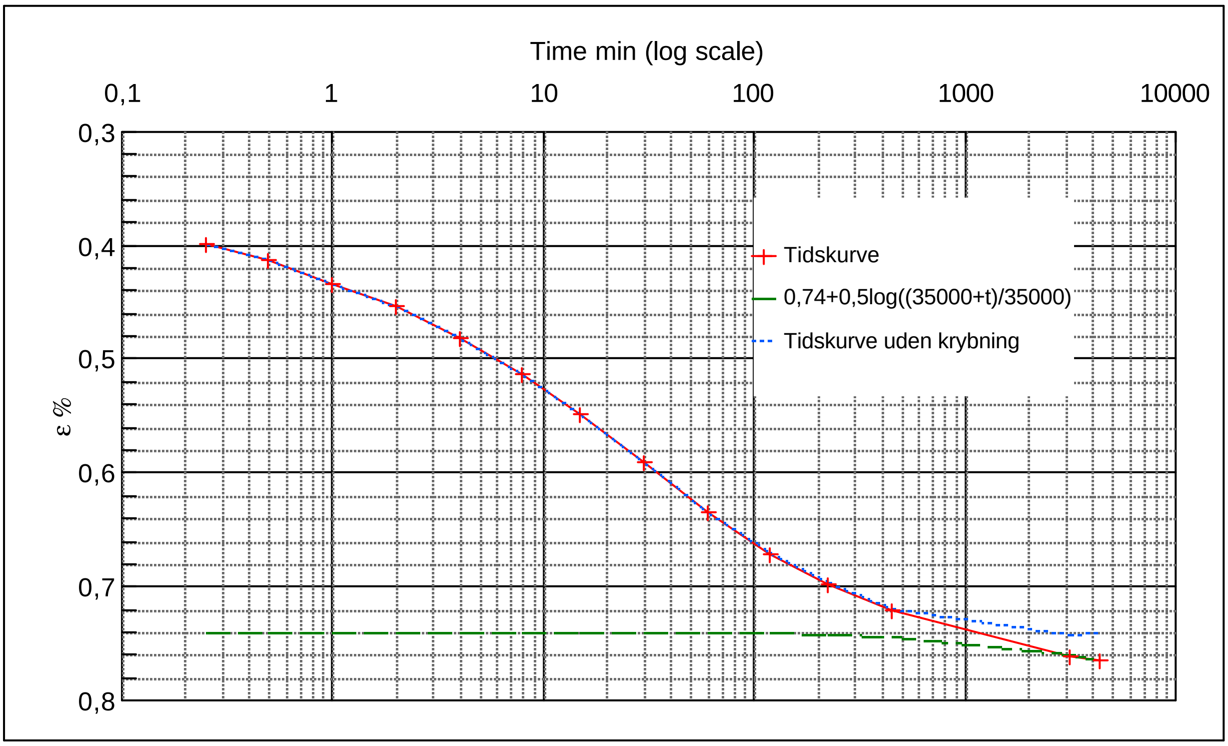
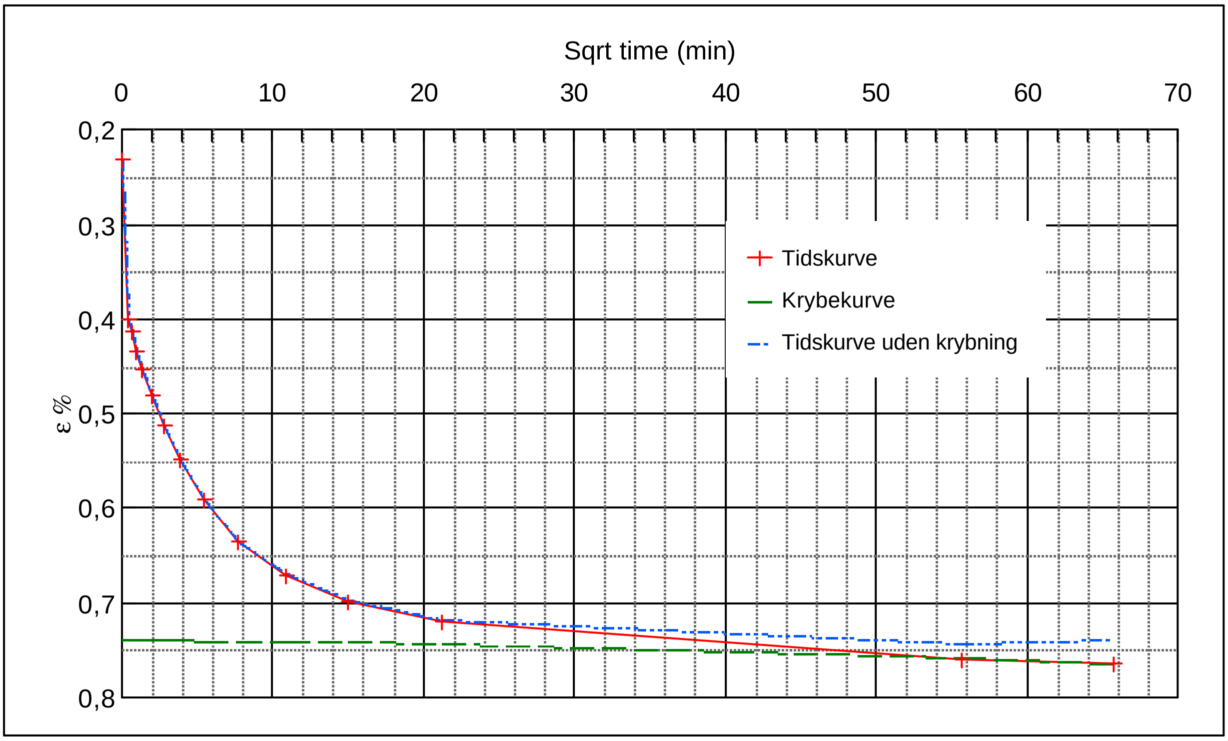
OEDOMETER TEST

Test no **Anh. pr.1**
Page no **7**
Date **13.12.91**
20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	4860
6	Before	104,3	ε_0	0,23	ε_c %	0,74	K i kPa	25.238
	After	231,7	ε~#	0,77	ε_s	0,03	k10 m/sec	1,1E-10
					ε_{kryb}	0,03	ck10 m^2 /sec	2,72E-07





Material:
Clay Eemian Glacial

Bor no :
Lab. no: Pr 1

Depth: 76.7 m.b.s
Insitu stress. ~780 kPa

Job: Anholt

AAU
Encl. No
2.8

Executed: AMS/mj/gt
Check:
Approved:

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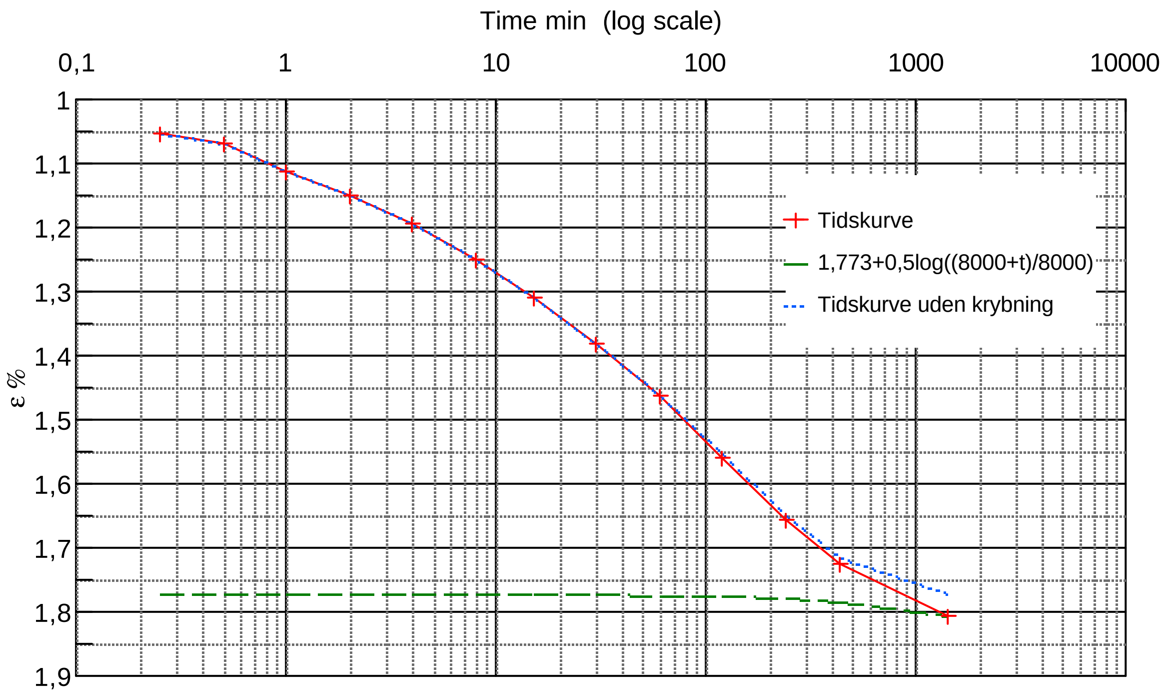
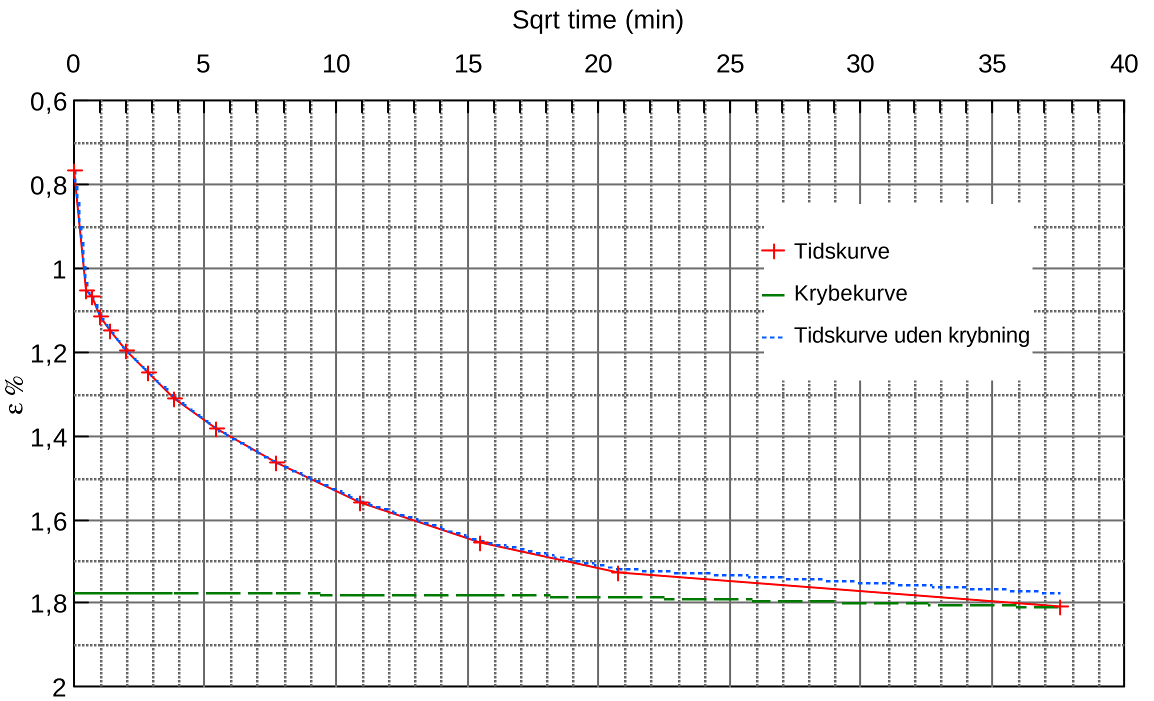
OEDOMETER TEST

Test no	**Anh. pr.1**
Page no	**8**
Date	**16.12.91**

20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	8640
7	Before	231,7	ε0	0,77	ε_c %	1,77	K i kPa	25.288
	After	486,6	ε~#	1,81	ε_s	0,1	k10 m/sec	5,9E-11
					ε_{kryb}	0,03	ck10 m^2 /sec	1,53E-07





Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 2.9
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: Pr 1	Insitu stress. ~780 kPa	Approved:	

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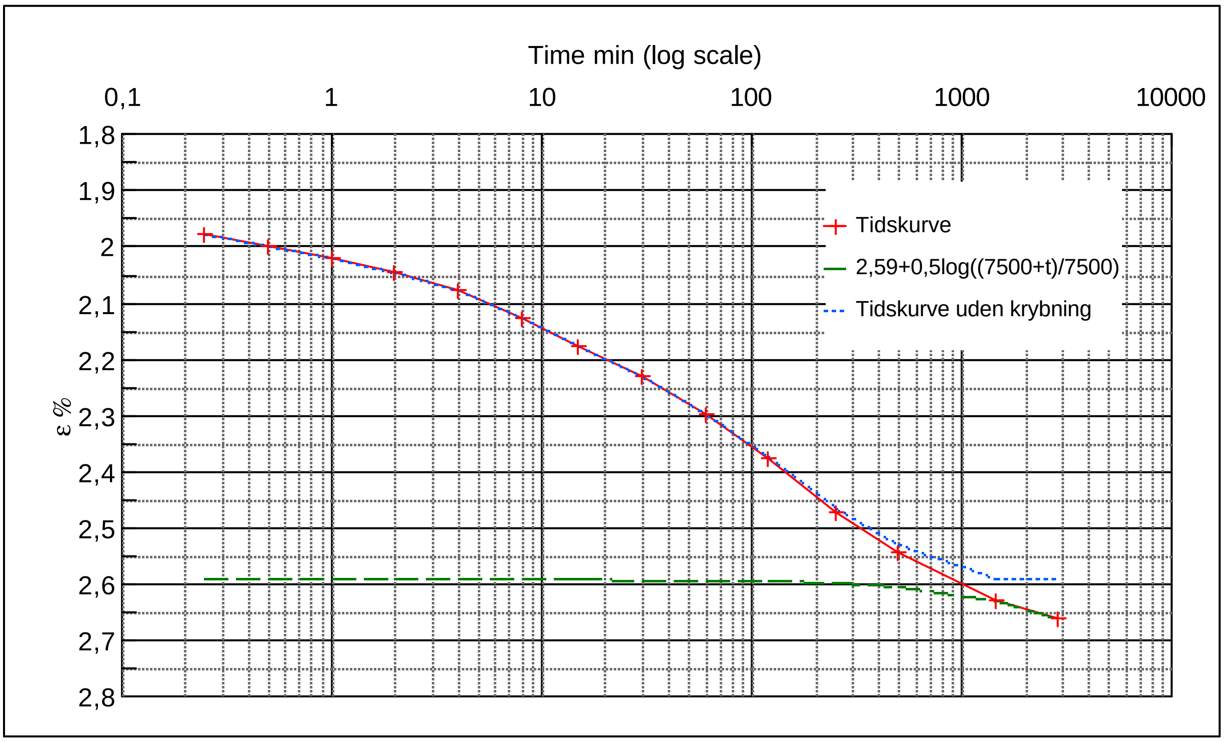
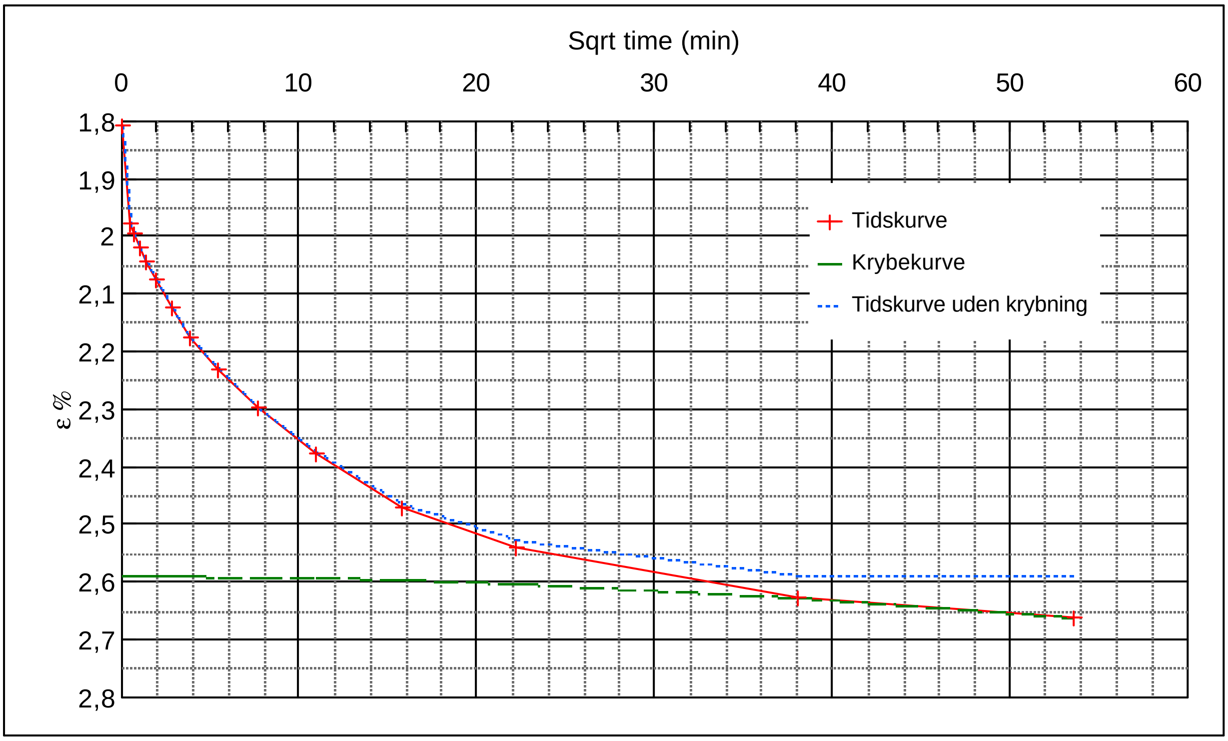
OEDOMETER TEST

Test no	**Anh. pr.1**
Page no	**9**
Date	**17.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	7260
8	Before	486,6	ε0	1,81	ε_c %	2,59	K i kPa	32.585
	After	741,5	ε~#	2,66	ε_s	0,13	k10 m/sec	5,5E-11
					ε_{kryb}	0,07	ck10 m^2 /sec	1,82E-07





Material: Clay Eemian Glacial	
Bor no :	Depth: 76.7 m.b.s
Lab. no: Pr 1	Insitu stress. ~780 kPa

Job:	Anholt	**AAU**
		Encl. No 2.10
Executed:	AMS/mj/gt	Check:
Approved:		

Geotechnical Engineering Group
Department of Civil Engineering
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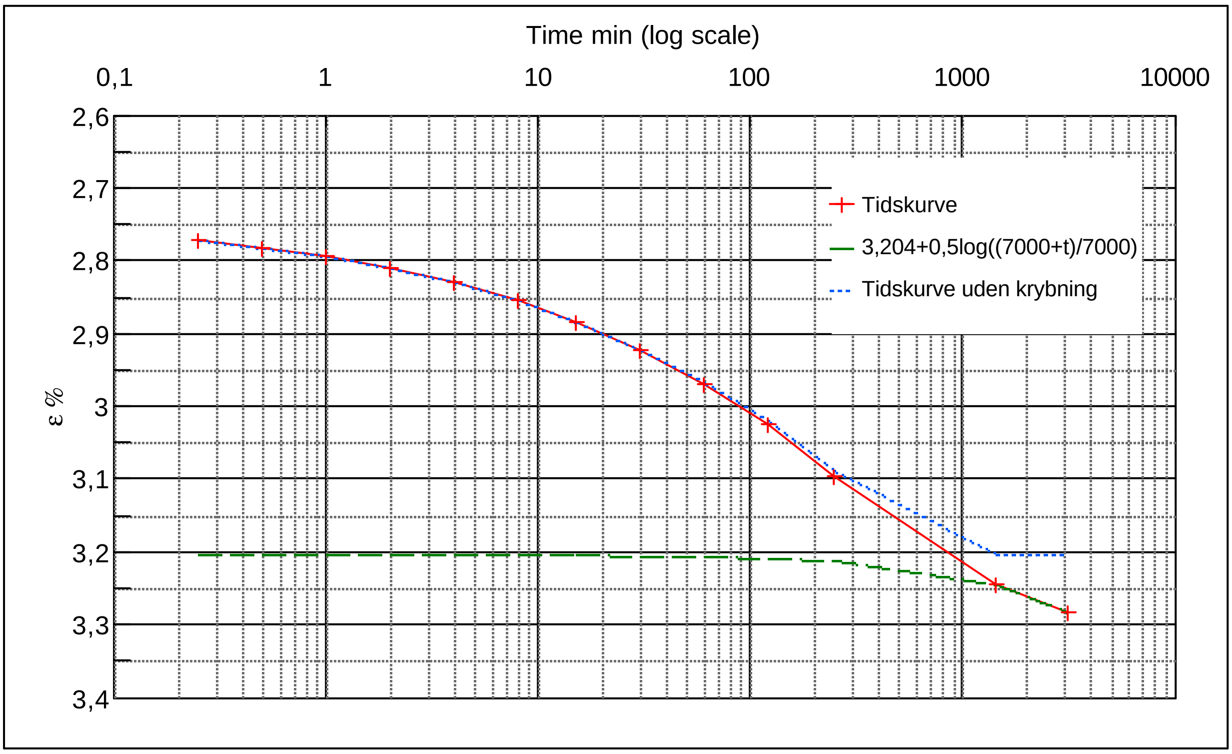
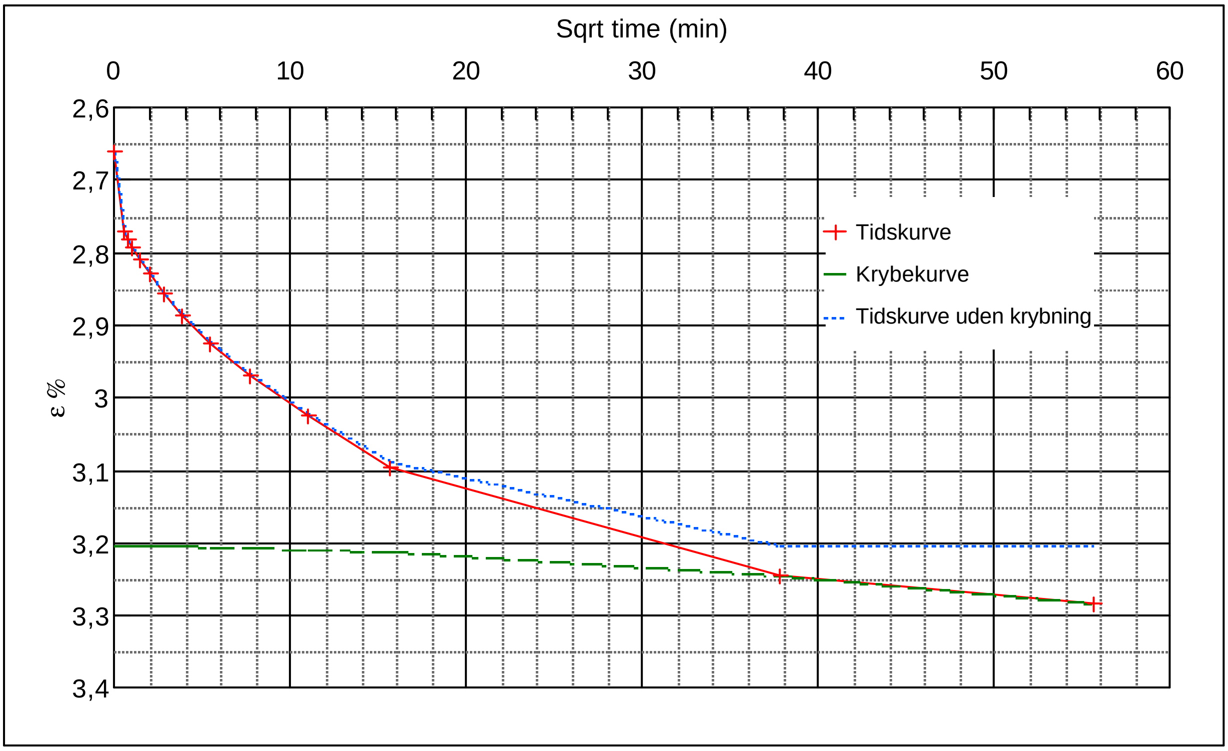
OEDOMETER TEST

Test no	**Anh. pr.1**
Page no	**10**
Date	**19.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	19440
9	Before	741,5	ε0	2,66	ε c %	3,20	K i kPa	46.932
	After	996,4	ε~#	3,28	ε s	0,12	k10 m/sec	1,4E-11
					ε kryb	0,08	ck10 m^2 /sec	6,79E-08



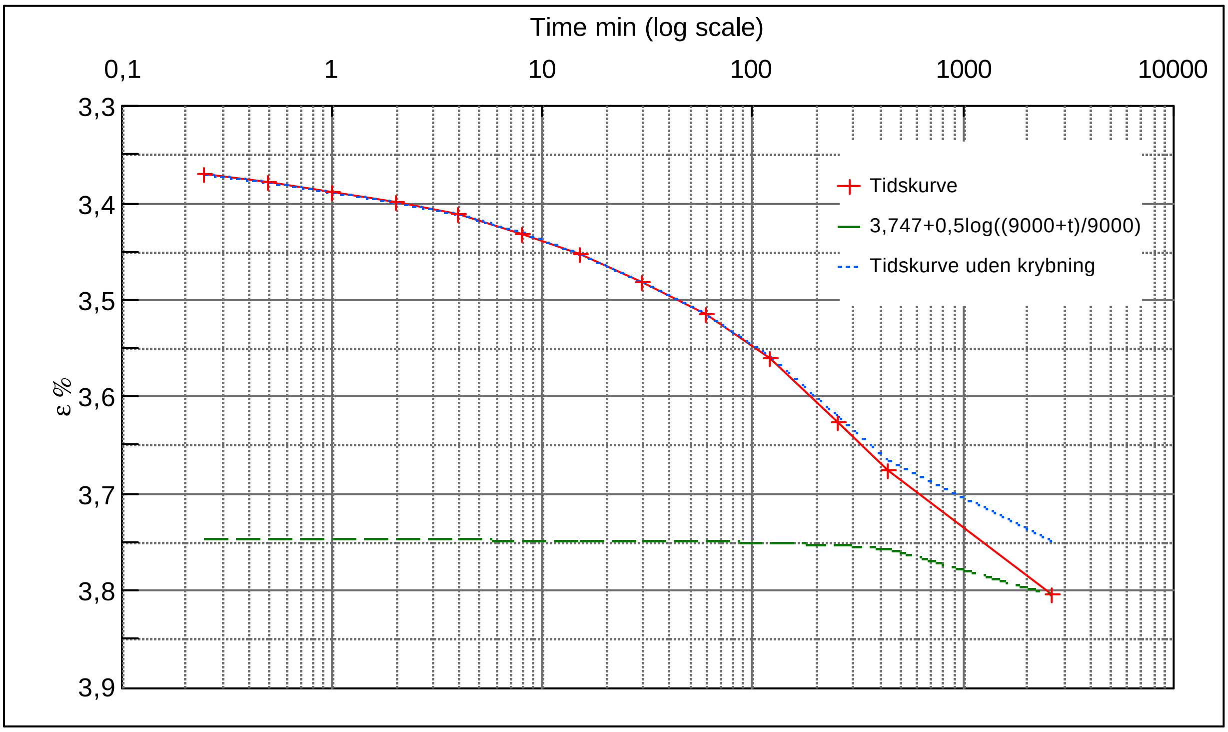


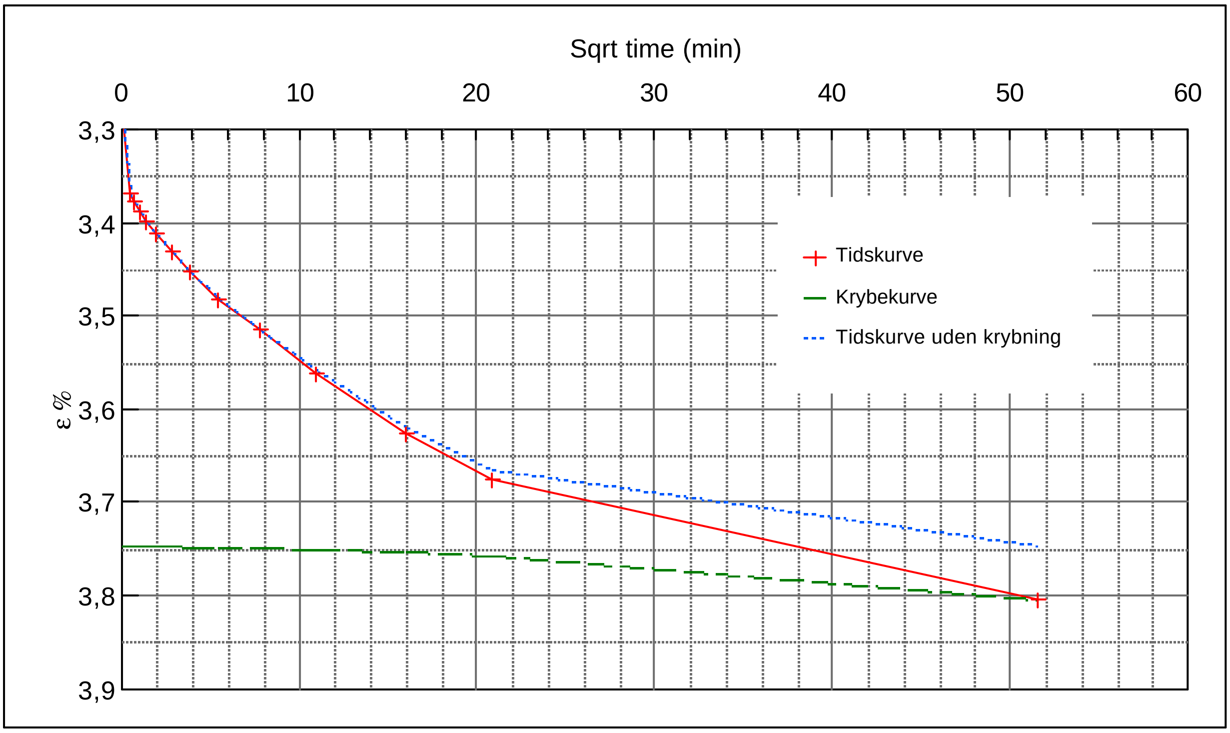
Material: Clay Eemian Glacial	
Bor no : Lab. no: Pr 1	Depth: 76.7 m.b.s Insitu stress. ~780 kPa

Job:	Anholt	**AAU**
		Encl. No 2.11
Executed:	AMS/mj/gt	Check:
Approved:		

Geotechnical Engineering Group **Department of Civil Engineering** **Aalborg University**	**OEDOMETER TEST**	**Test no** **Page no** **Date**	**Anh. pr.1** **11** **21.12.91** 20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	29040	
10	Before	996,4	ε0	3,28	ε c %	3,75	K i kPa	55.056	
	After	1.251,3	ε~#	3,80	ε s	0,13	k10 m/sec	8,10E-12	
					ε kryb	0,06	ck10 m^2 /sec	4,55E-08	





Material: Clay Eemian Glacial	
Bor no : Lab. no: Pr 1	Depth: 76.7 m.b.s Insitu stress.~780 kPa

Job:	Anholt	**AAU**
		Encl. No 2.12
Executed:	AMS/mj/gt	Check:
Approved:		

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Department of Civil Engineering
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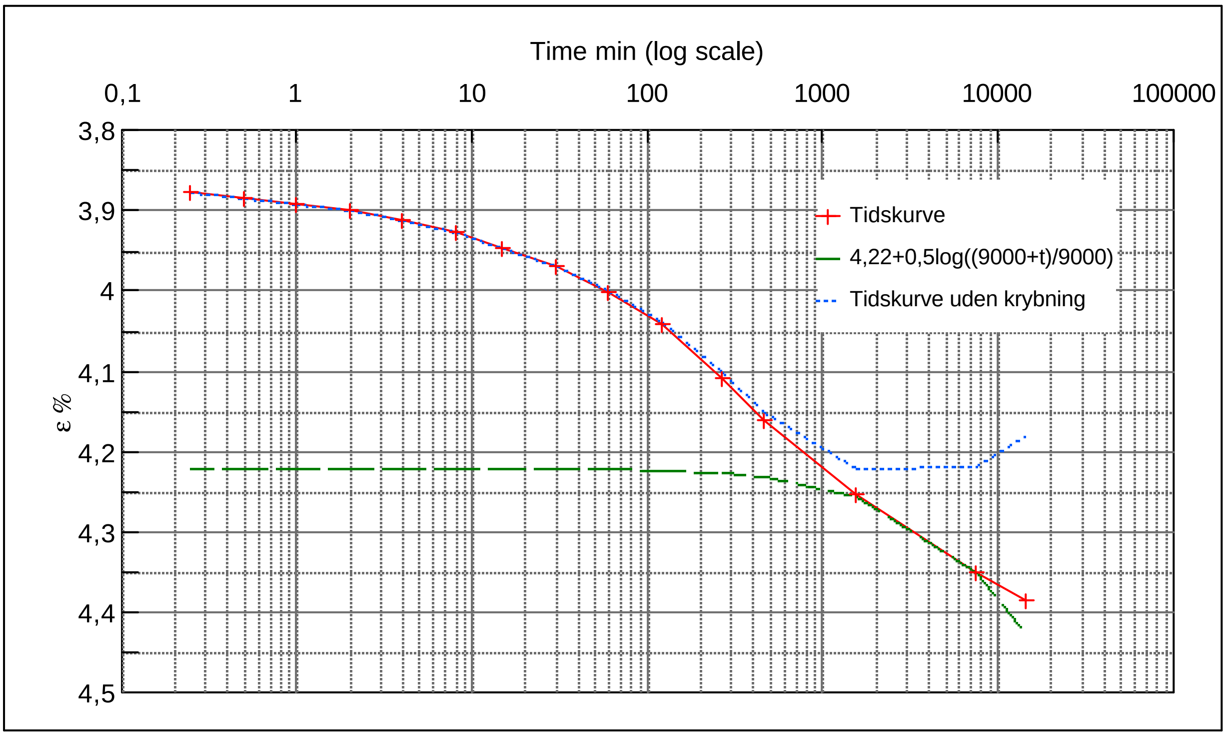
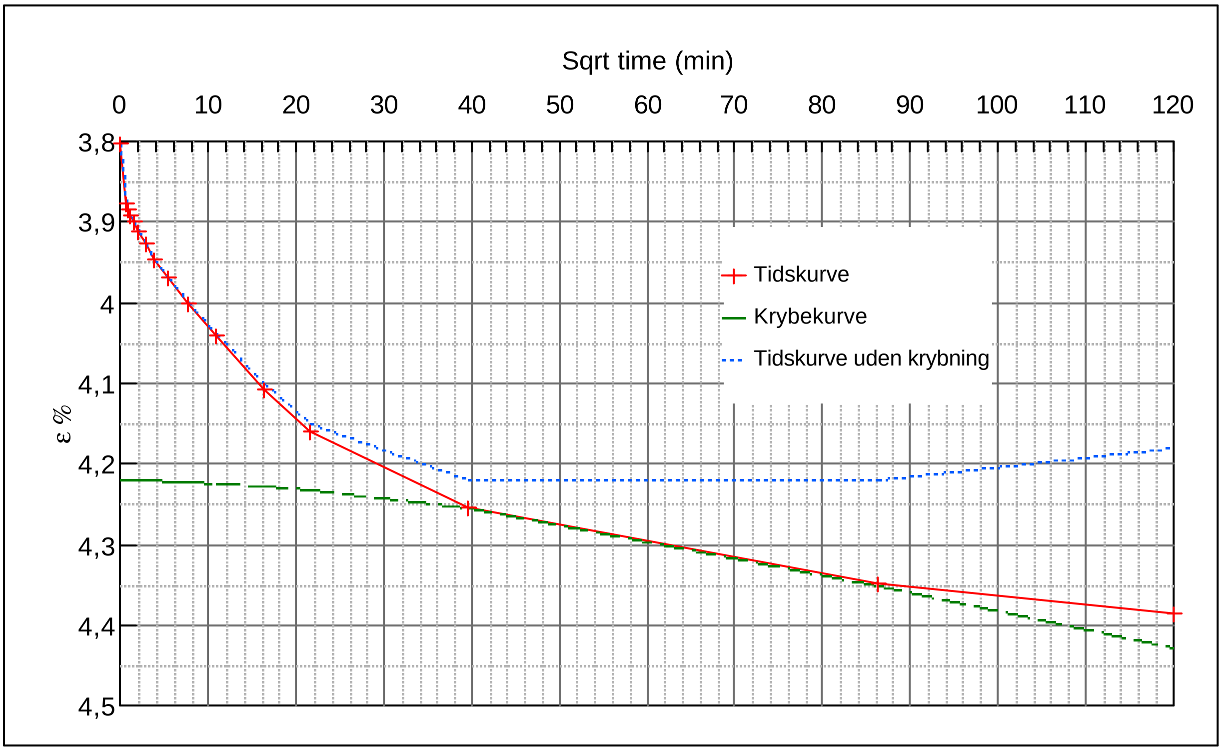
OEDOMETER TEST

Test no	**Anh. pr.1**
Page no	**12**
Date	**23.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	29040
11	Before	1.251,3	ε0	3,80	ε_c %	4,22	K i kPa	61.192
	After	1.506,2	ε~#	4,39	ε_s	0,13	k10 m/sec	7,3E-12
					ε_{kryb}	0,17	ck10 m^2 /sec	4,55E-08



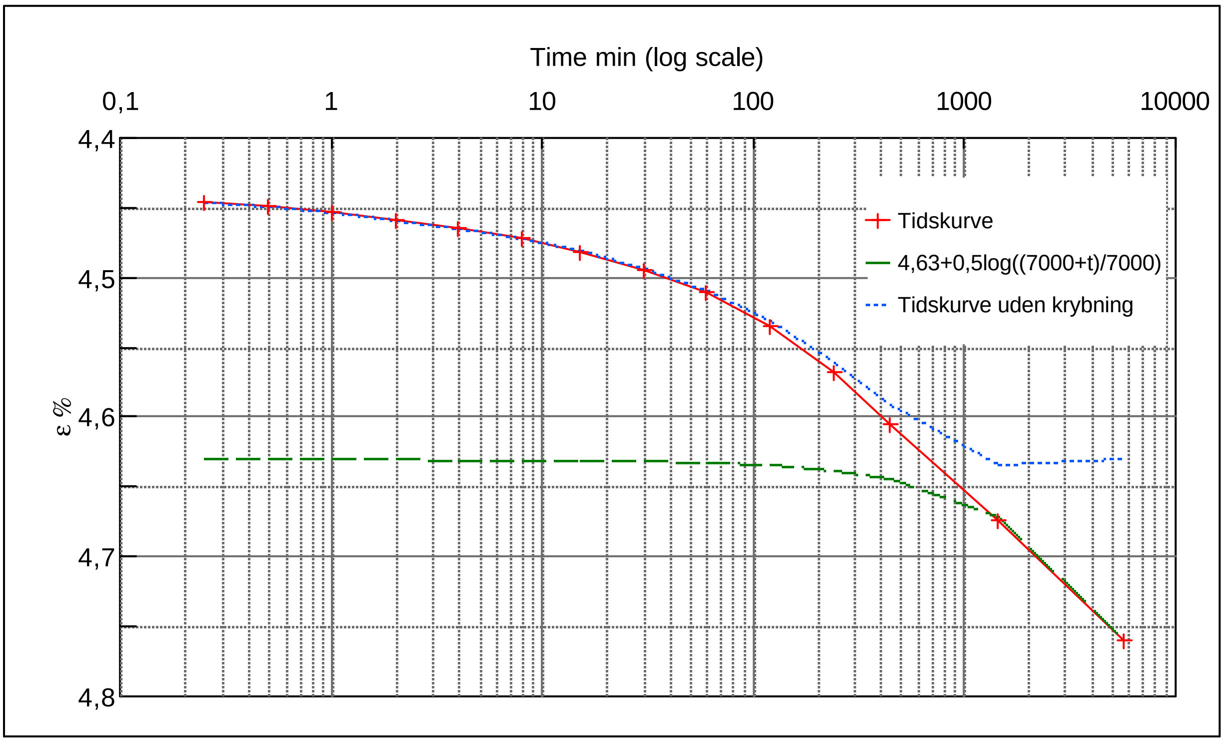


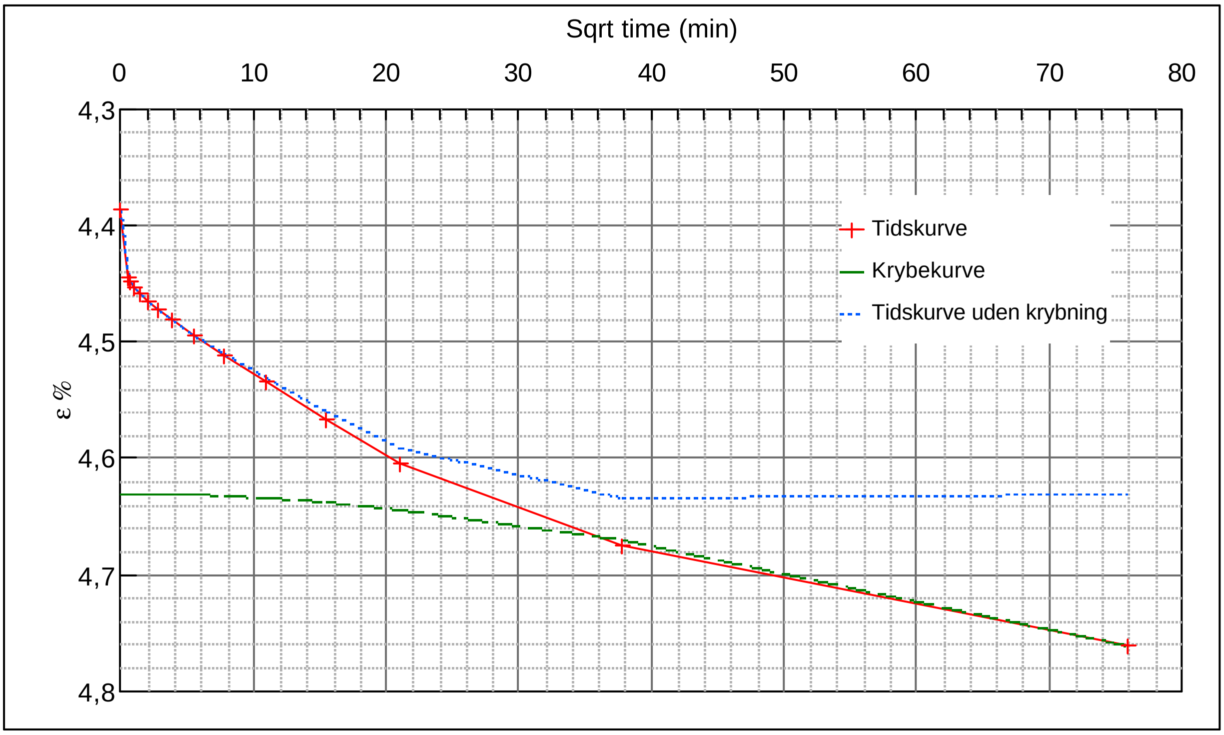
Material: Clay Eemian Glacial	
Bor no :	Depth: 76.7 m.b.s
Lab. no: Pr 1	Insitu stress. ~780 kPa

Job: Anholt	**AAU**
	Encl. No 2.13
Executed: AMS/mj/gt	Check:
Approved:	

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh. pr.1**
Department of Civil Engineering		**Page no**	**13**
Aalborg University		**Date**	**02.01.92**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	37500
12	Before	1.506,2	ε_0	4,39	ε_c %	4,63	K i kPa	104.348
	After	1.761,2	ε~#	4,76	ε_s	0,14	k10 m/sec	3,3E-12
					ε_{kryb}	0,13	ck10 m^2 /sec	3,52E-08





Material: Clay Eemian Glacial		**Job:**	Anholt	**AAU**
				Encl. No 2.14
Bor no :	Depth: 76.7 m.b.s	Executed:	AMS/mj/gt	Check:
Lab. no: Pr 1	Insitu stress. ~780 kPa	Approved:		

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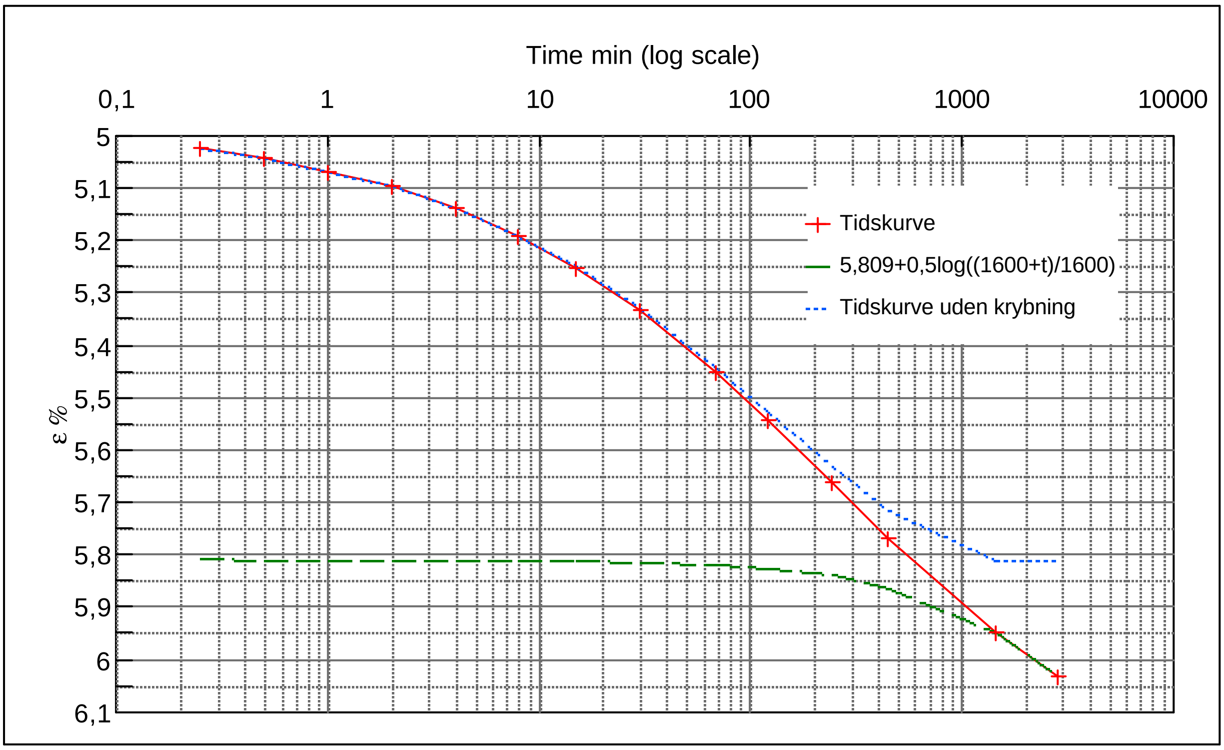
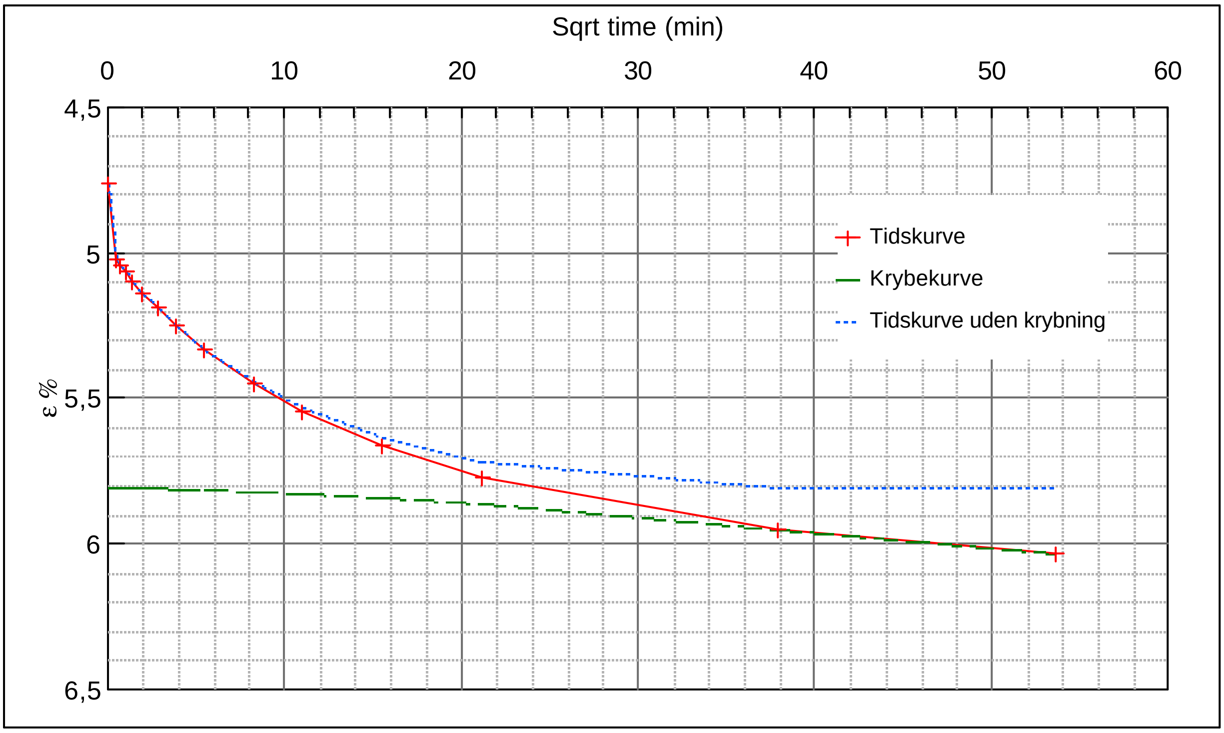
OEDOMETER TEST

Test no	**Anh. pr.1**
Page no	**14**
Date	**06.01.92**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	11760
13	Before	1.761,2	ε0	4,76	$\varepsilon_{c\ \%}$	5,81	K i kPa	72.910
	After	2.525,9	ε~#	6,03	ε_s	0,28	k10 m/sec	1,5E-11
					ε_{kryb}	0,22	ck10 m^2 /sec	1,12E-07

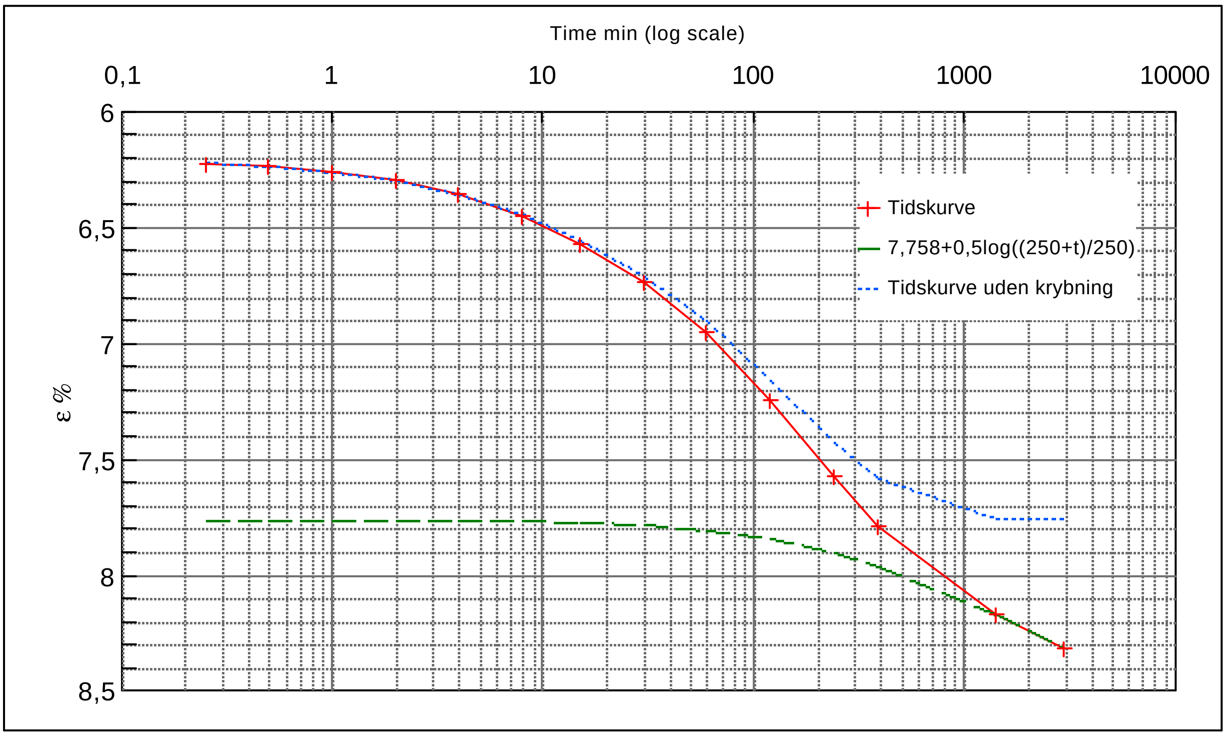


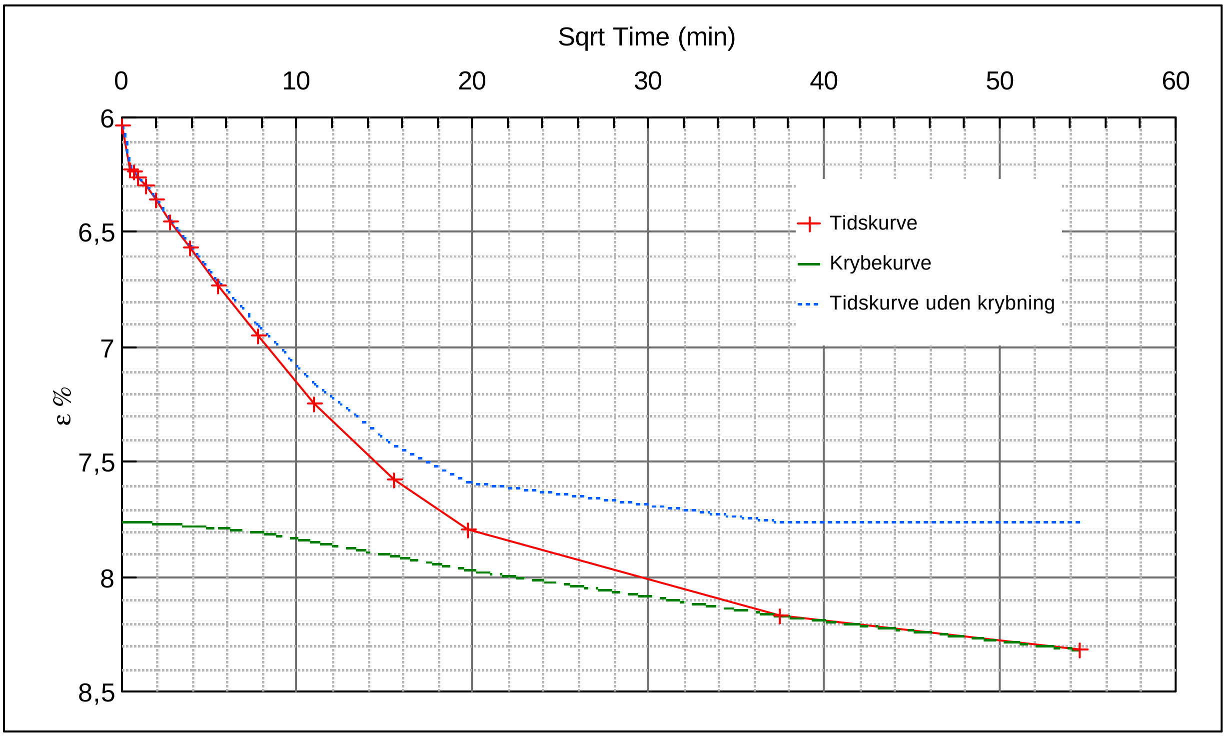


Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 2.15
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: Pr 1	Insitu stress. ~780 kPa	Approved:	

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh. pr.1**
Department of Civil Engineering		**Page no**	**15**
Aalborg University		**Date**	**08.01.92**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	15360	
14	Before	2.525,9	ε0	6,03	ε_c %	7,76	K i kPa	88.649	
	After	4.055,3	ε~#	8,31	ε_s	0,5	k10 m/sec	9,5E-12	
					ε_{kryb}	0,55	ck10 m^2 /sec	8,59E-08	





Material: Clay Eemian Glacial	
Bor no :	Depth: 76.7 m.b.s
Lab. no: Pr 1	Insitu stress.~780 kPa

Job:	Anholt	**AAU**
		Encl. No 2.16
Executed:	AMS/mj/gt	Check:
Approved:		

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Department of Civil Engineering
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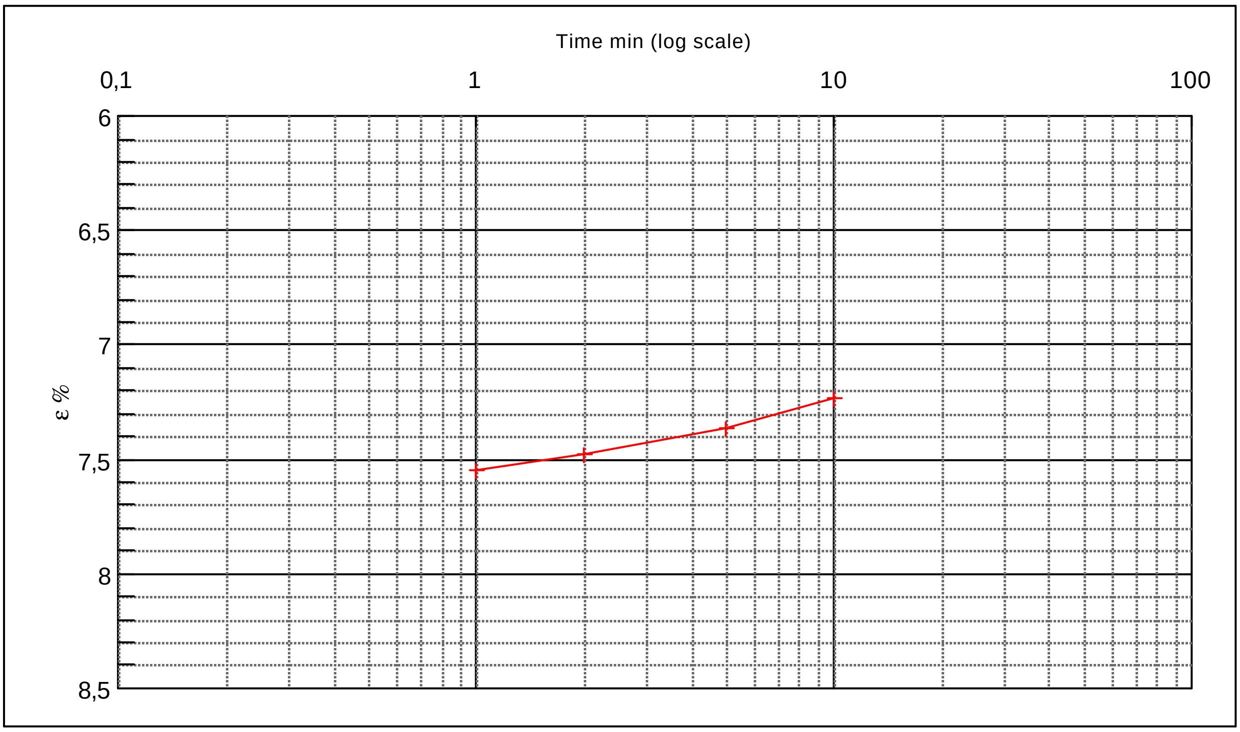
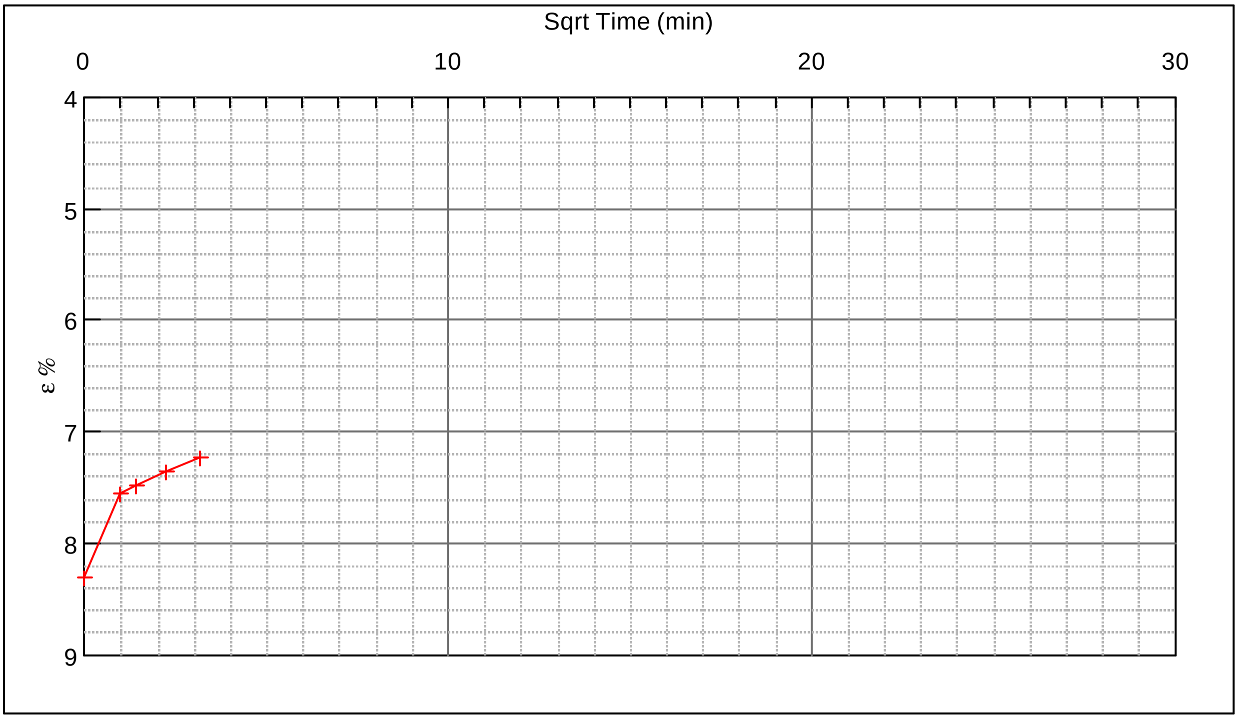
OEDOMETER TEST

Test no **Anh. pr.1**
Page no **16**
Date **10.01.92**
20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	
15	Before	4.055,3	ε0	7,55	ε c %	4	K i kPa	114.198
	After	2,29	ε~#	4	ε s		k10 m/sec	
					ε kryb		ck10 m^2 /sec	





Material:
Clay Eemian Glacial

Bor no :
Lab. no: Pr 1

Depth: 76.7 m.b.s
Insitu stress. ~780 kPa

Job: Anholt

AAU
Encl. No
2.17

Executed: AMS/mj/gt
Check:
Approved:

Geotechnical Engineering Group
Department of Civil Engineering
Aalborg University

OEDOMETER TEST

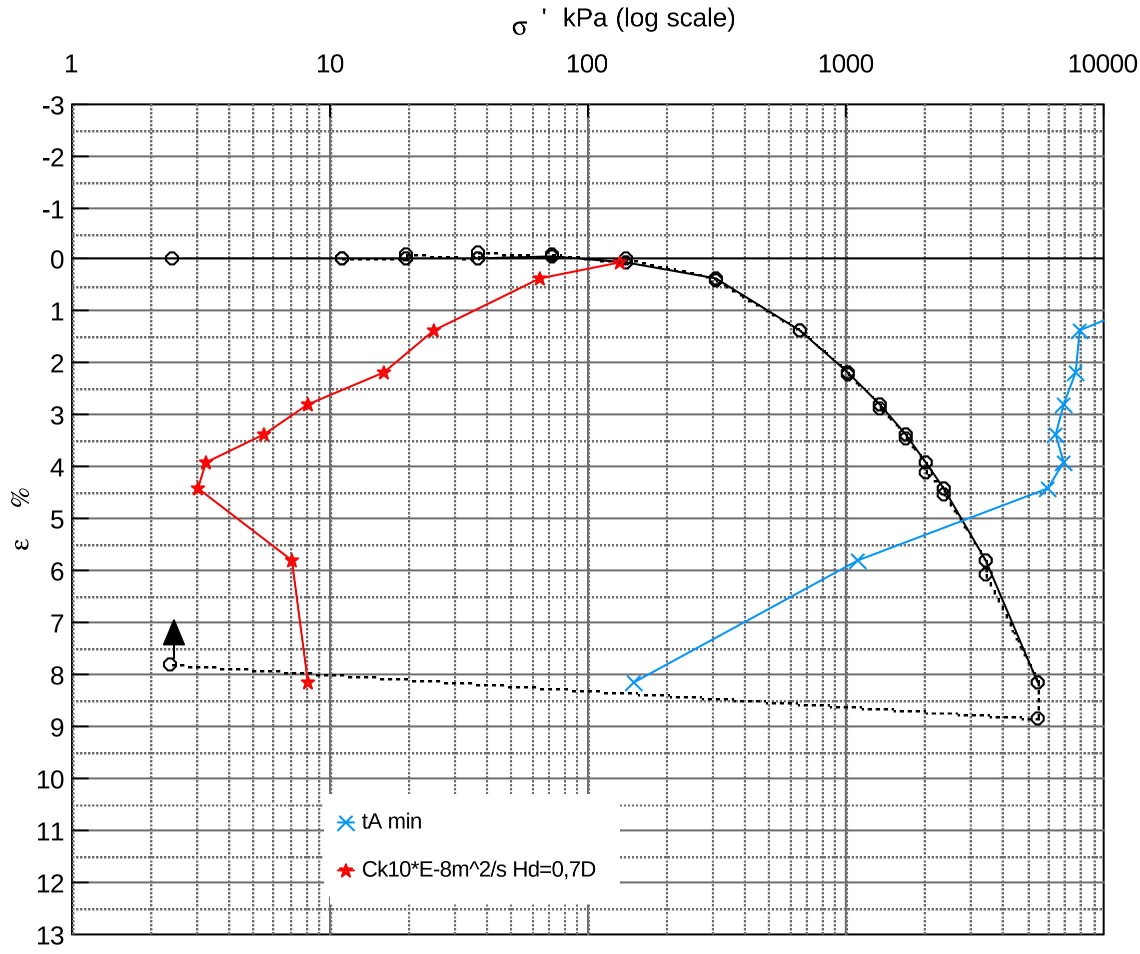
Test no **Anh.pr.2**
Page no **1**
Date: 12.12.91-10.01.92
20.09.05/gt

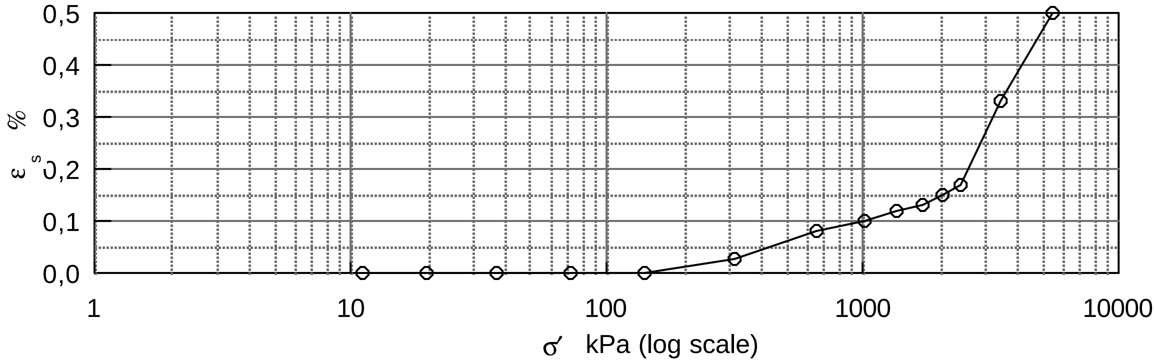
Description of soil:
Clay Eemian Glacial

Bor no :
Lab. no: Pr.2
Level : 76.7 m.b.s

Overburden pressure σ'_o ~780 kPa
Vane strength c_v kPa
CPT - value q_c MPa

	Before	After
Water content %	22,5	20,1
Bulk density Mg/m^3	1,99	2,11
Grain density Mg/m^3	~2.72	
Void ratio	0,68	0,54
Degr. of Saturation %	91	100
Dimension H x D mm	30x60	27.7x60

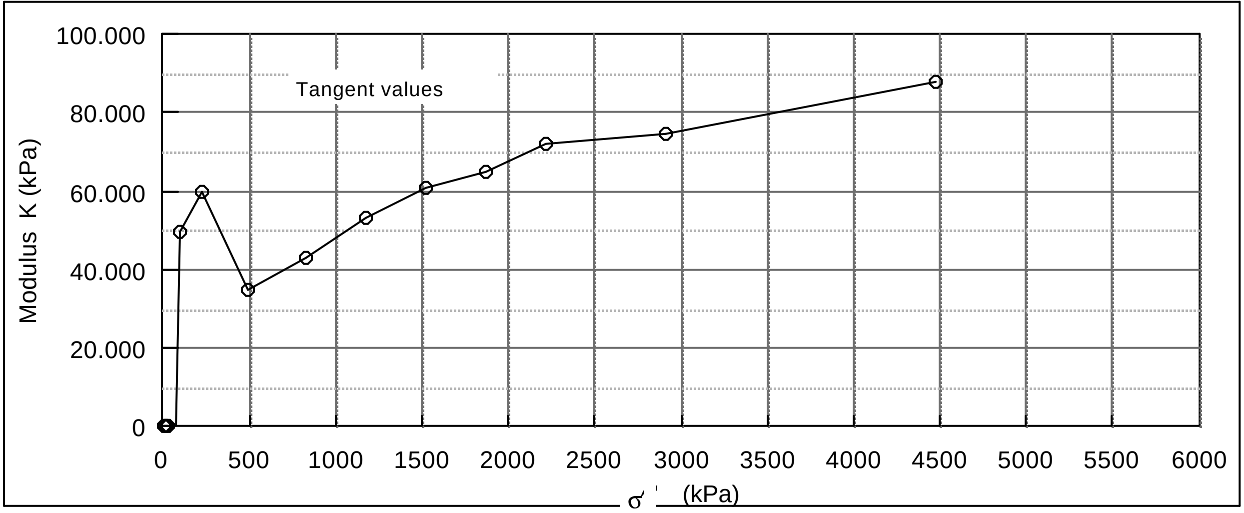


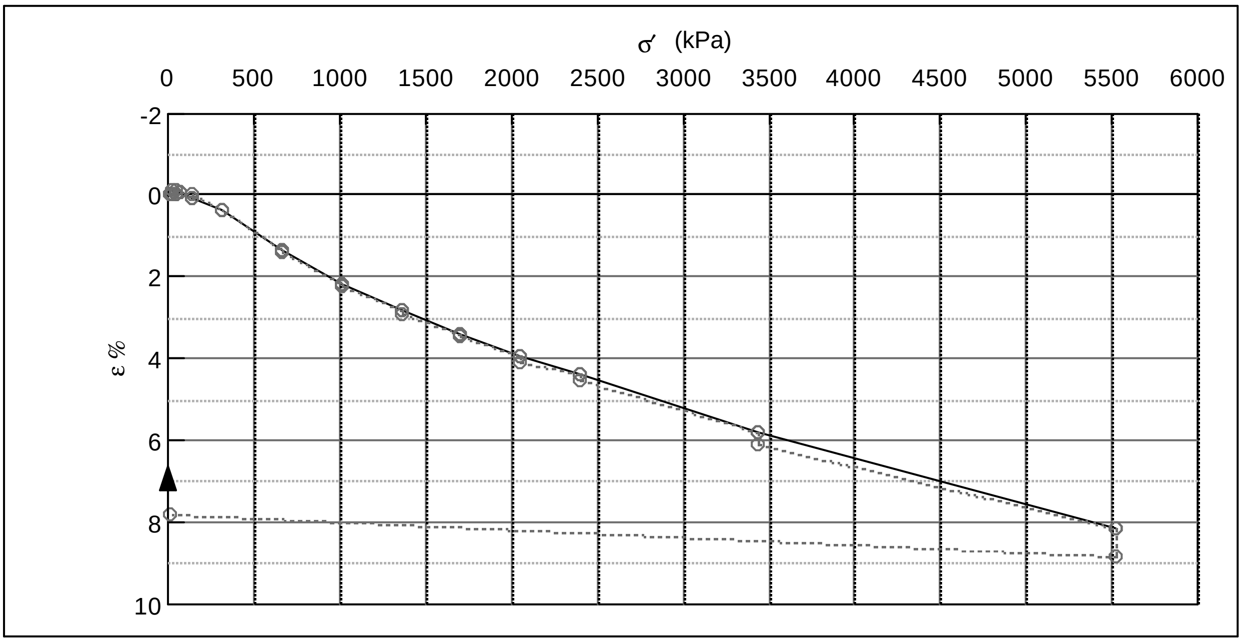


Job: Anholt
AAU
Encl. No
3.1
Executed: AMS/mj/gt
Check:
Approved:

OEDOMETER TEST **Test no** **Anh.pr.2** **Page no** **1a**

20.09.05/gt





Test results

Q	13 % ?
Qs	~0.5 %
σ'_{pc}	>4000 kPa

σ'	ε_c	ε_s	Ck10	σ'_m	K	w
kPa	%	% / lct	m^2/s	kPa	kPa	%
2,4				-	-	24,9
11,1				6,8		24,9
19,8				15,4		24,9
37,1				28,5		24,9
71,8	(0,07)			54,5	-49565,4	24,9
141,2	0,07	0,00	1,3E-06	106,5	49565,4	24,8
314,7	0,36	0,03	6,5E-07	228,0	59820,3	24,6
661,6	1,35	0,08	2,5E-07	488,2	35046,2	24,0
1.008,6	2,16	0,10	1,6E-07	835,1	42834,3	23,5
1.355,6	2,81	0,12	8,2E-08	1.182,1	53378,1	23,1
1.702,5	3,38	0,13	5,6E-08	1.529,0	60869,8	22,8
2.049,5	3,92	0,15	3,3E-08	1.876,0	64851,9	22,4
2.396,4	4,40	0,17	3,1E-08	2.223,0	71982,9	22,2
3.437,3	5,80	0,33	7,2E-08	2.916,9	74454,5	21,3
5.519,1	8,17	0,50	8,2E-08	4.478,2	87726,4	19,8
2,4	7,80			2.760,7	1499083,9	20,1

Remark:
"Genbelastningsgren"
Normalkonsolideret tilstand næppe nået

Job:	Anholt	**AAU** Encl. No 3.2
Executed:	AMS/mj/gt	Check:
Approved:		

Geotechnical Engineering Group
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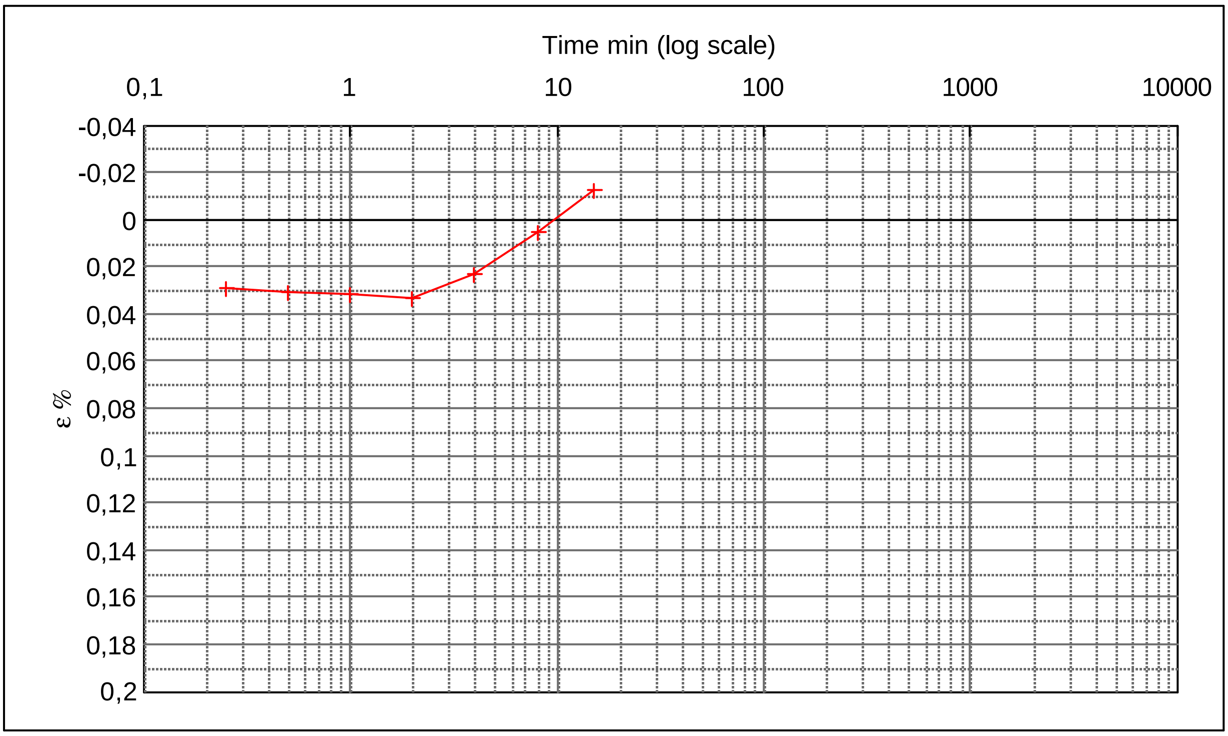
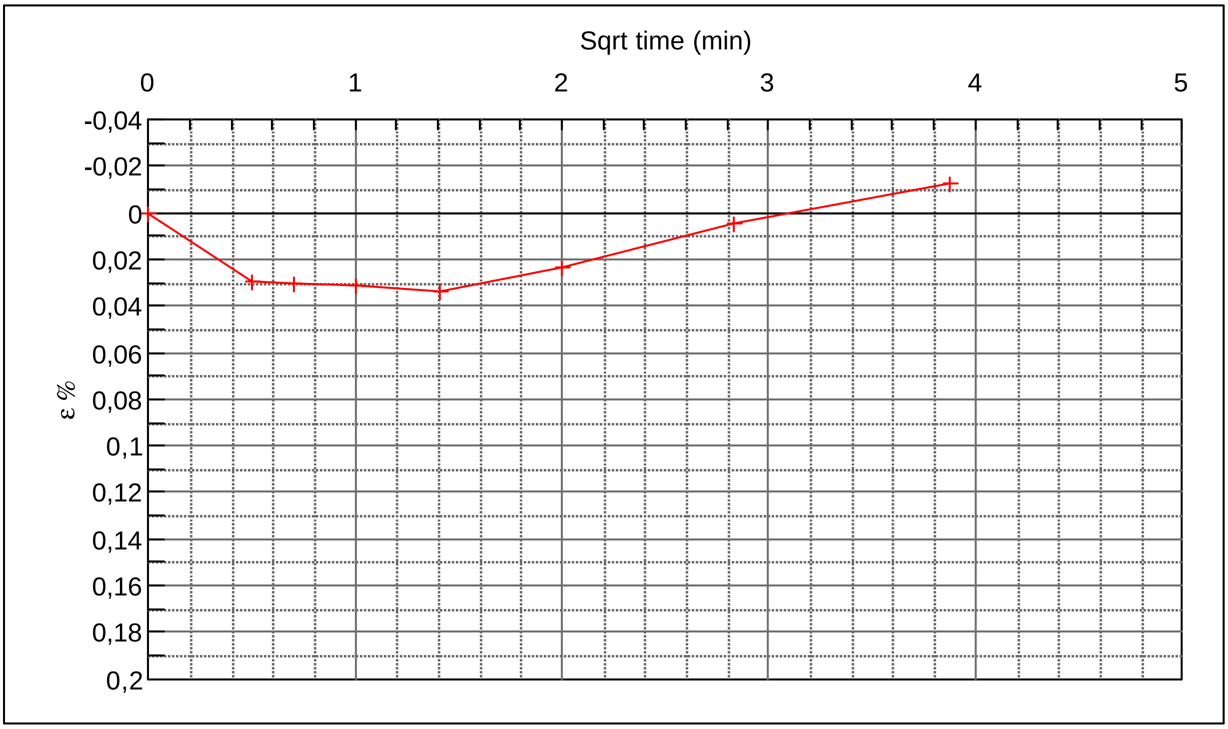
OEDOMETER TEST

Test no	**Anh.pr.2**
Page no	**2**
Date	**12.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε_i	tc in sec	
1	Before	2,43	ε0	0,000	ε_c %	K i kPa	
	After	11,1	ε~#	(0,013)	ε_s	k10 m/sec	
					ε_{kryb}	ck10 m^2 /sec	





Material: Clay Eemian Glacial		**Job:** Anholt	**AAU** Encl. No 3.3
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: P2	Insitu stress.~780 kPa	Approved:	

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Department of Civil Engineering
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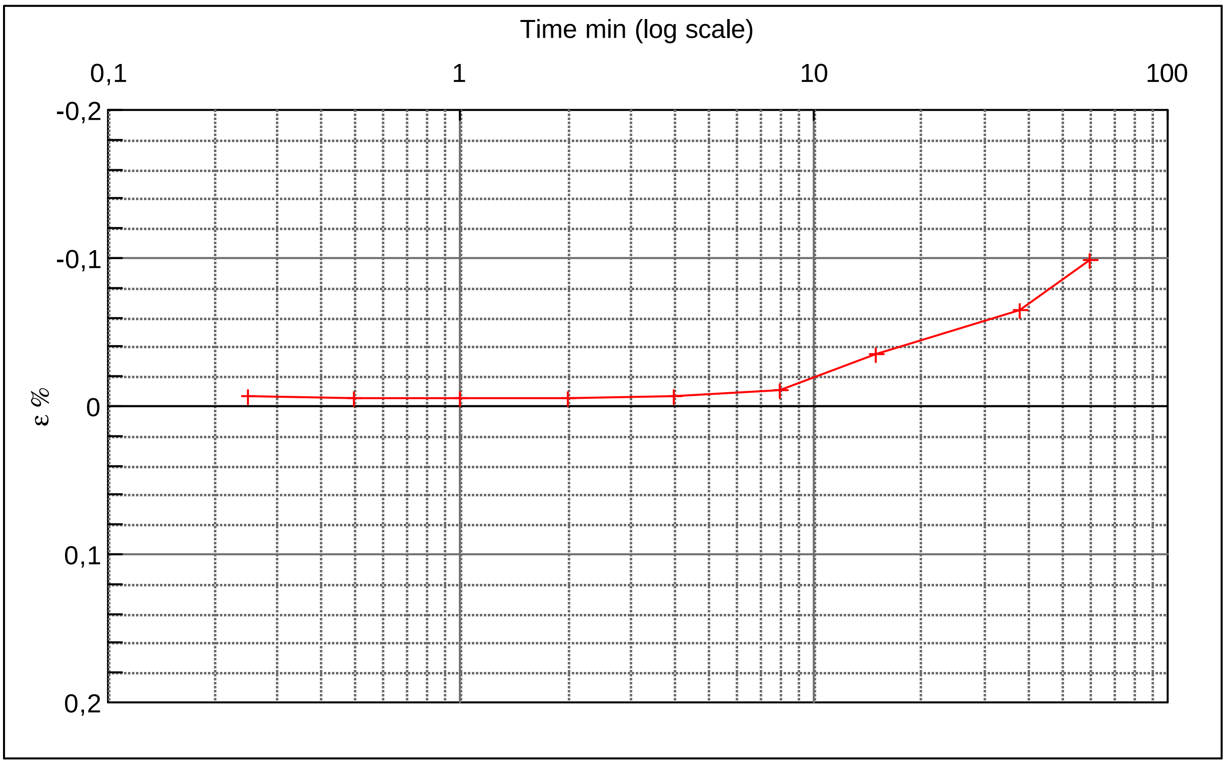
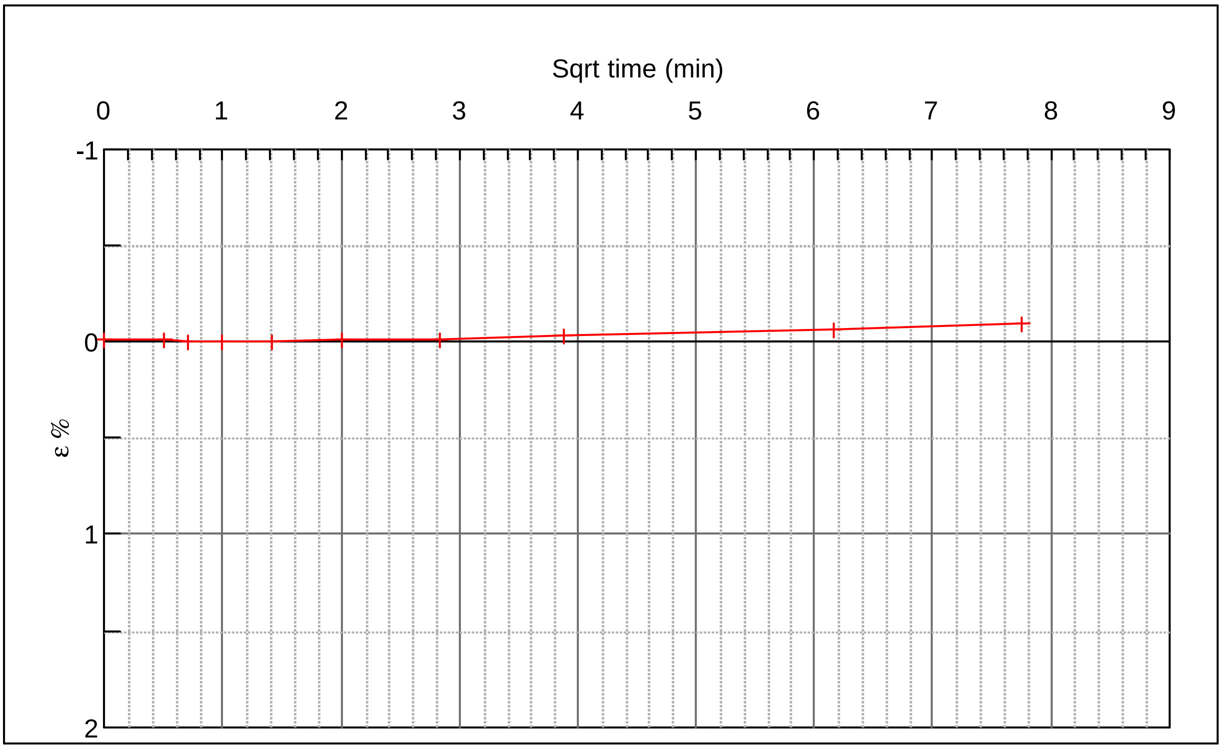
OEDOMETER TEST

Test no	**Anh.pr.2**
Page no	**3**
Date	**12.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i	tc in sec		
2	Before	11,1	ε0	(0,012)	ε c %	K i kPa		
	After	19,8	ε~#	(0,099)	ε s	k10 m/sec		
					ε kryb	ck10 m^2 /sec		





Material: Clay Eemian Glacial			
Bor no :		Depth:	76.7 m.b.s
Lab. no:	P2	Insitu stress.	~780 kPa

Job:	Anholt	**AAU**
		Encl. No 3.4
Executed:	AMS/mj/gt	Check:
Approved:		

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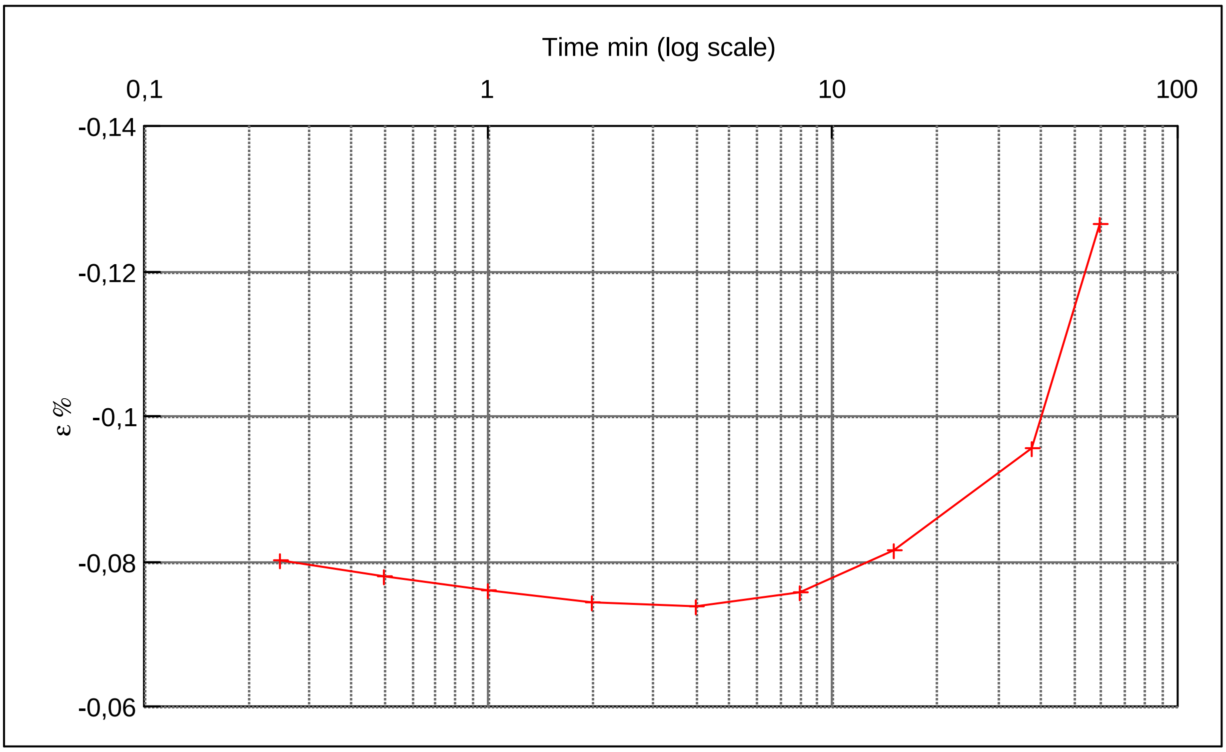
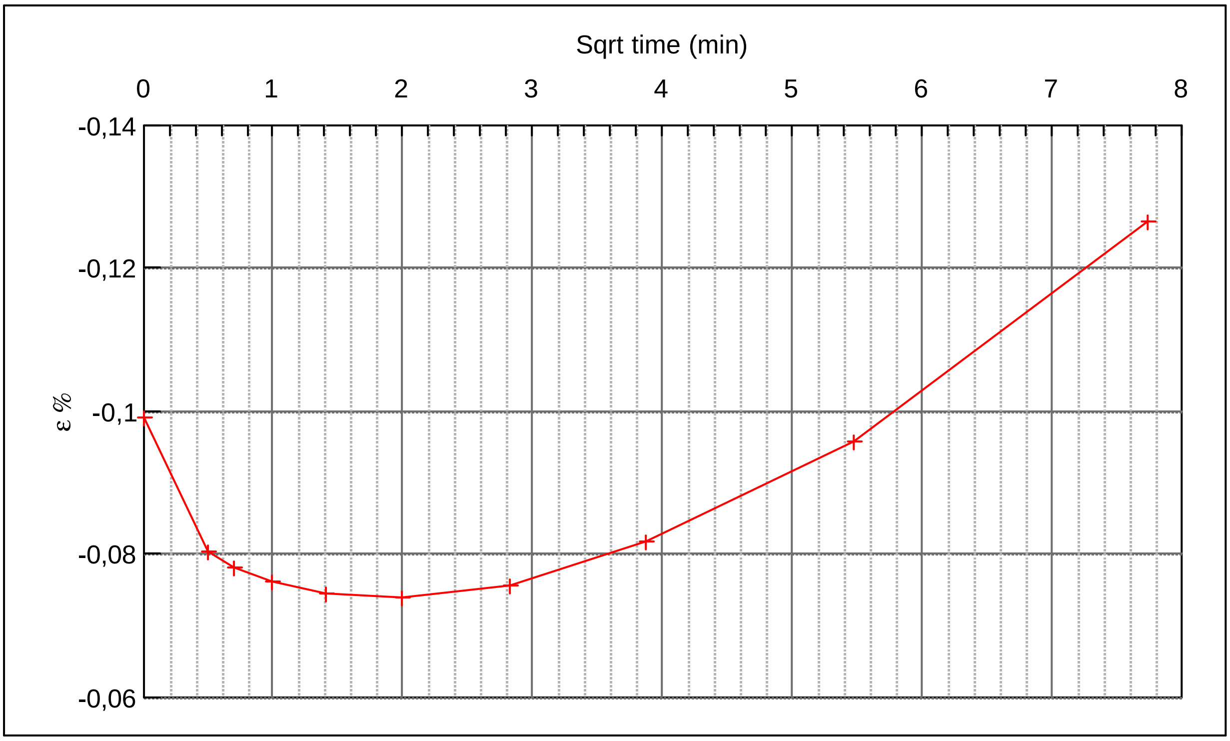
OEDOMETER TEST

Test no	**Anh.pr.2**
Page no	**4**
Date	**12.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%			
3	Before	19,8	ε0	(0,099)	ε i	tc in sec	
	After	37,1	ε~#	(0,127)	ε c %	K i kPa	
					ε s	k10 m/sec	
					ε kryb	ck10 m^2 /sec	

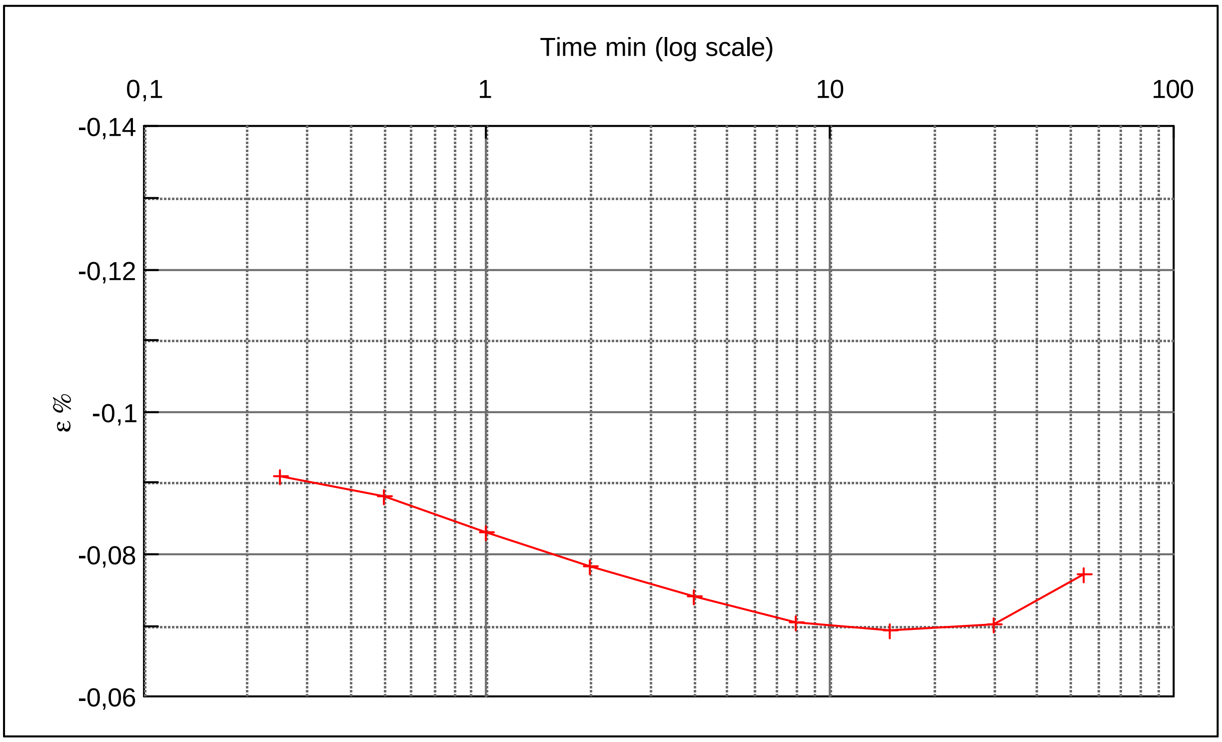


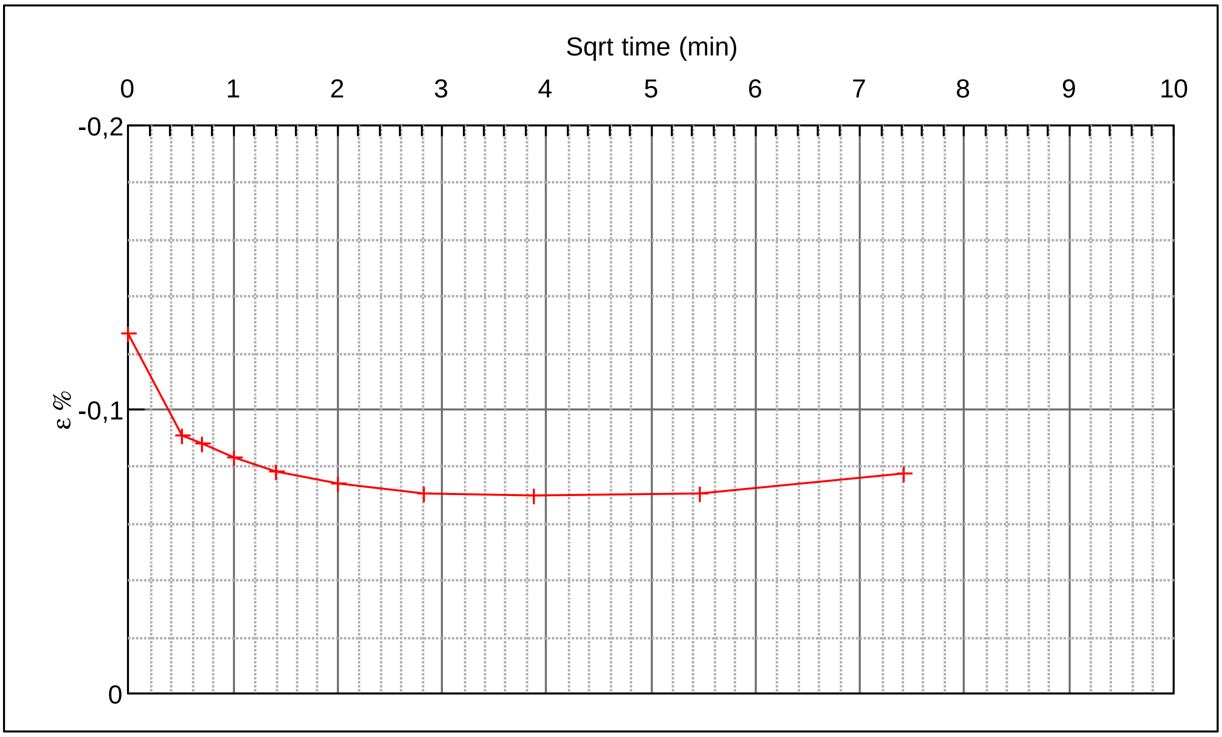


Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 3.5
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: P2	Insitu stress. ~780 kPa	Approved:	

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh.pr.2**
Department of Civil Engineering		**Page no**	**5**
Aalborg University		**Date**	**12.12.91**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec
4	Before	37,1	ε0	(0,127)	ε c %	-0,07	K i kPa
	After	71,8	ε~#	(0,077)	ε s		k10 m/sec
					ε kryb		ck10 m^2 /sec

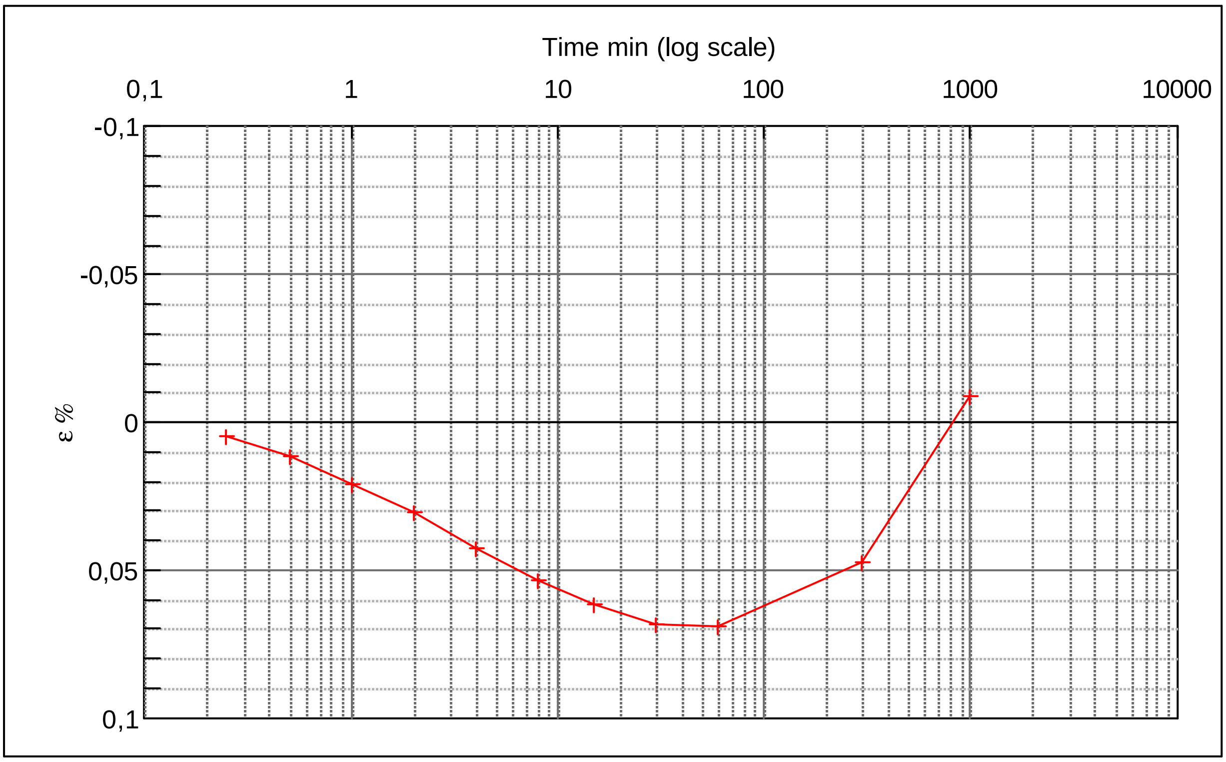


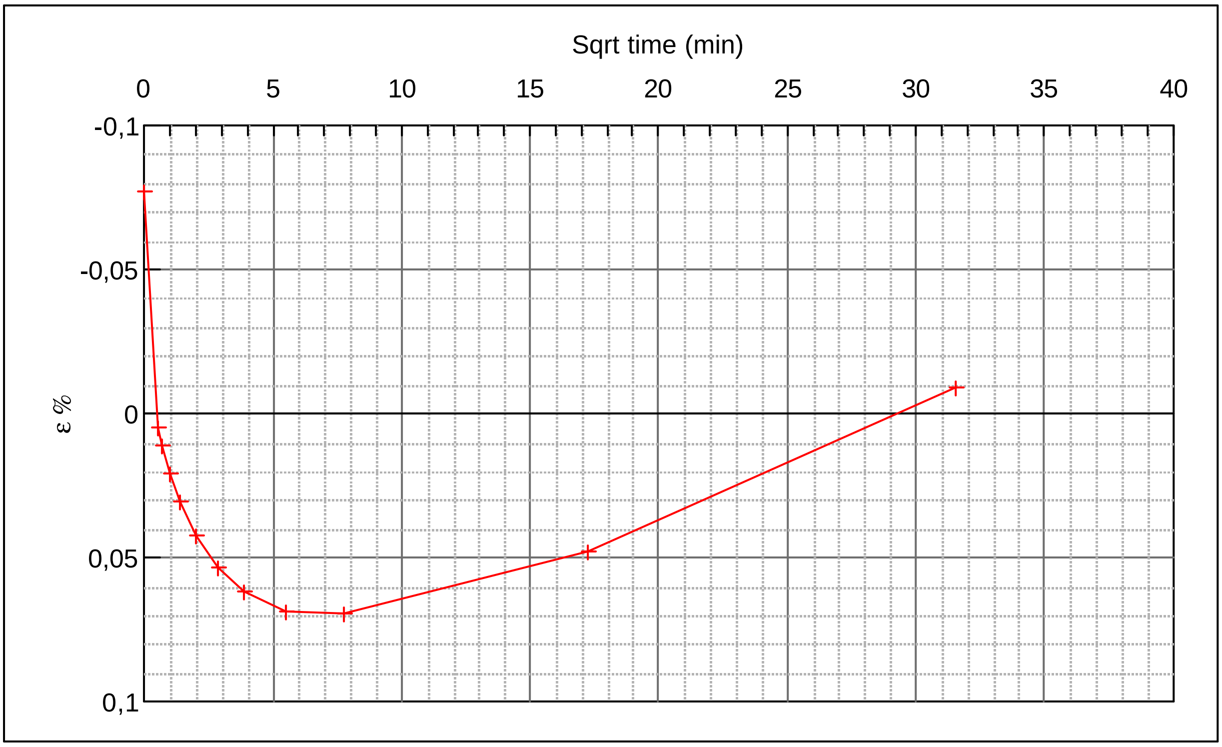


Material: Clay Eemian Glacial		**Job:** Anholt	**AAU** Encl. No 3.6
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: P2	Insitu stress. ~780 kPa	Approved:	

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh.pr.2**
Department of Civil Engineering		**Page no**	**6**
Aalborg University		**Date**	**12.12.91**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	735
5	Before	71,8	ε0	(0,08)	ε c %	0,07	K i kPa	47.205
	After	141,2	ε~#	(0,01)	ε s		k10 m/sec	2,7E-10
					ε kryb		ck10 m^2 /sec	1,32E-06





Material: Clay Eemian Glacial		**Job:**	Anholt	**AAU** Encl. No 3.7
Bor no :	Depth: 76.7 m.b.s	Executed:	AMS/mj/gt	Check:
Lab. no: P2	Insitu stress. ~780 kPa	Approved:		

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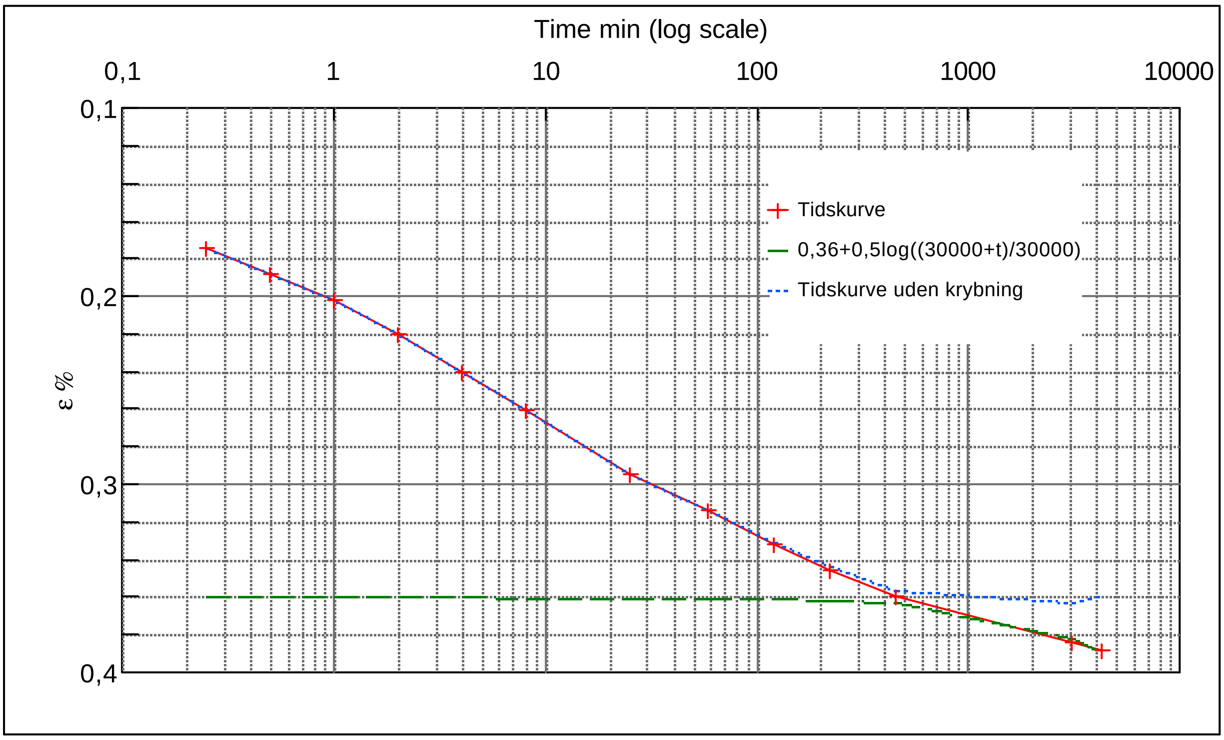
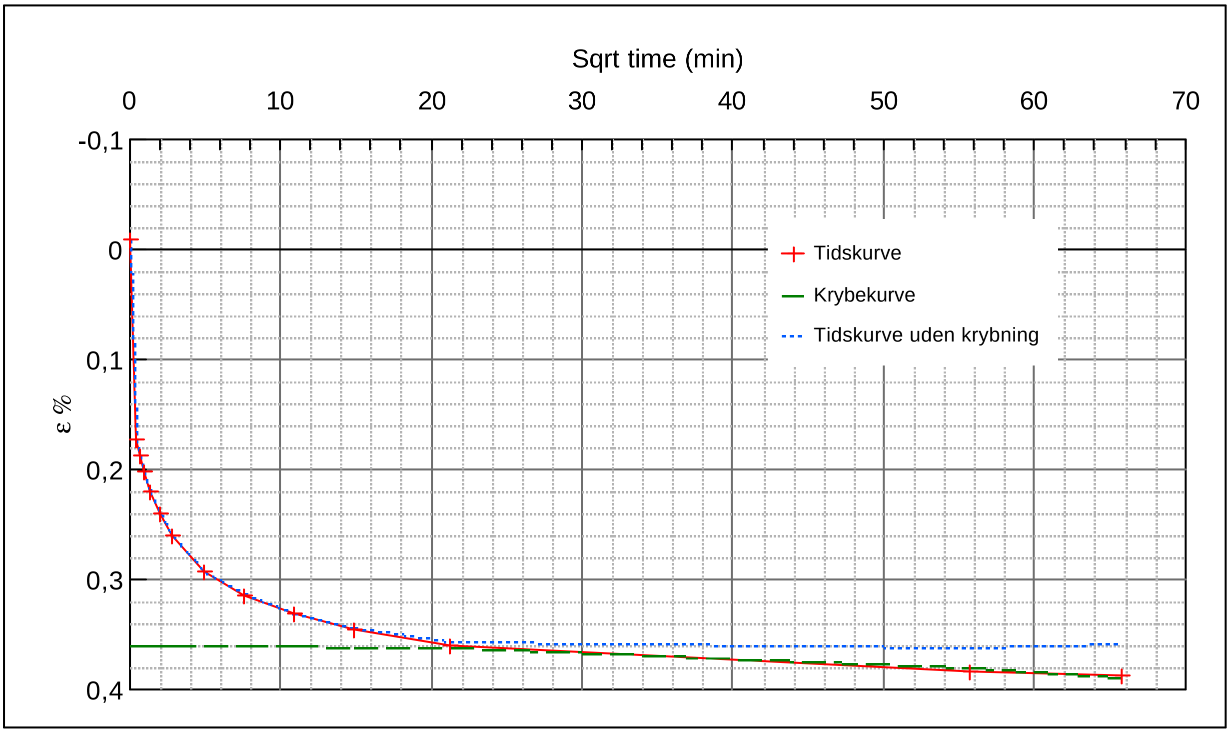
OEDOMETER TEST

Test no **Anh.pr.2**
Page no **7**
Date **13.12.91**
20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	1500
6	Before	141,2	ε0	(0,01)	ε c %	0,36	K i kPa	47.013
	After	314,7	ε~#	0,39	ε s	0,028	k10 m/sec	1,3E-10
					ε kryb	0,028	ck10 m^2 /sec	6,47E-07





Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 3.8
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: P2	Insitu stress.~780 kPa	Approved:	

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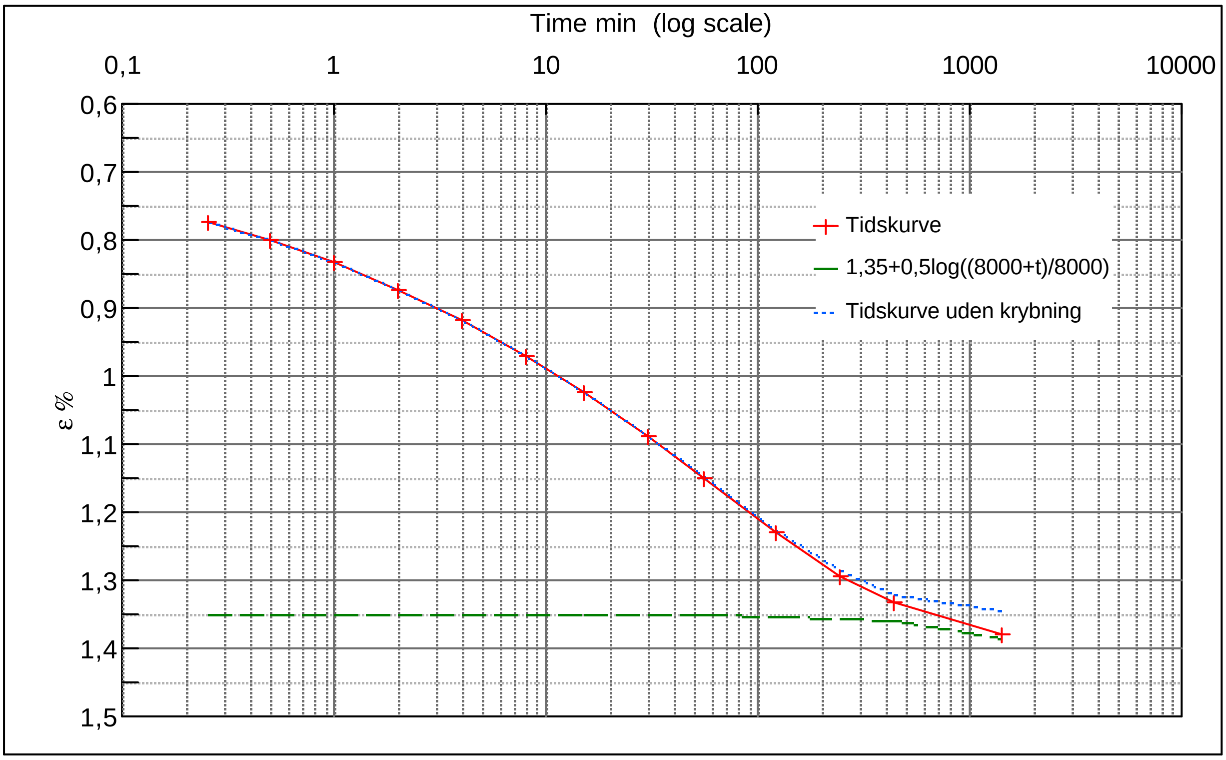
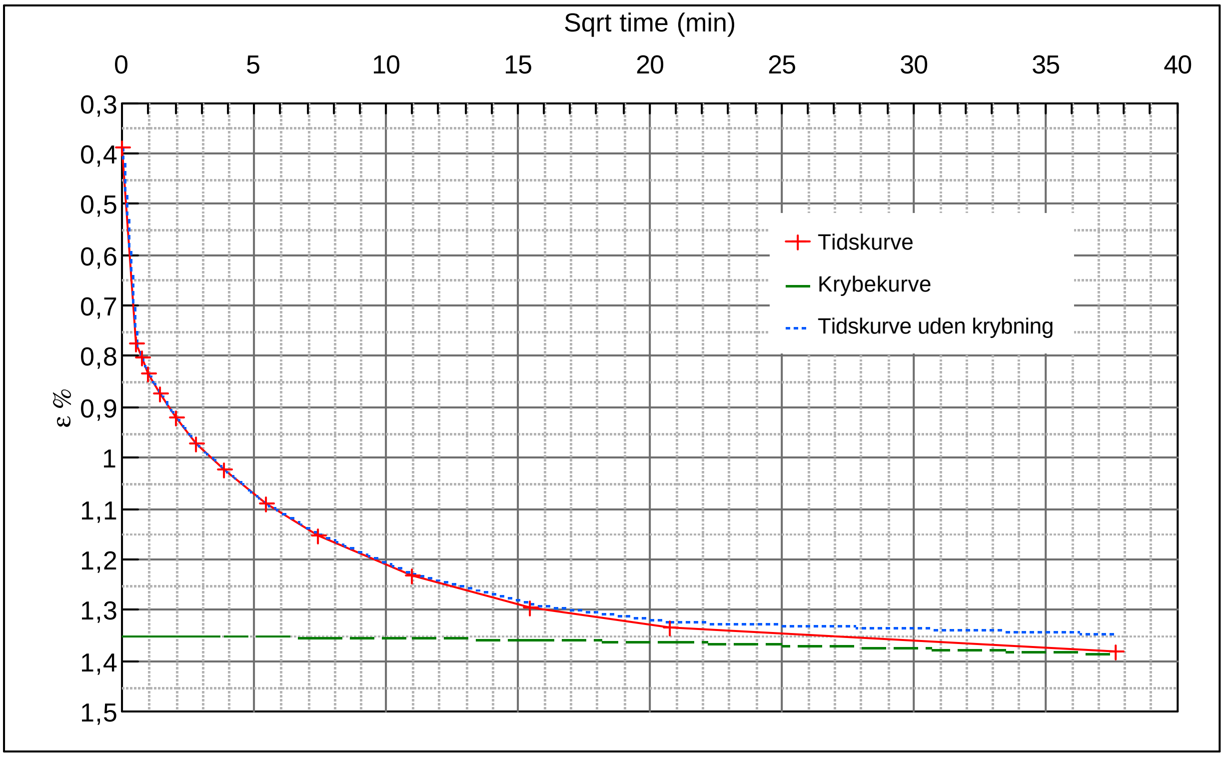
OEDOMETER TEST

Test no	**Anh.pr.2**
Page no	**8**
Date	**16.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	3840
7	Before	314,7	ε0	0,39	ε c %	1,35	K i kPa	36.060
	After	661,6	ε~#	1,38	ε s	0,08	k10 m/sec	6,9E-11
					ε kryb	0,032	ck10 m^2 /sec	2,52E-07





Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 3.9
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: P2	Insitu stress. ~780 kPa	Approved:	

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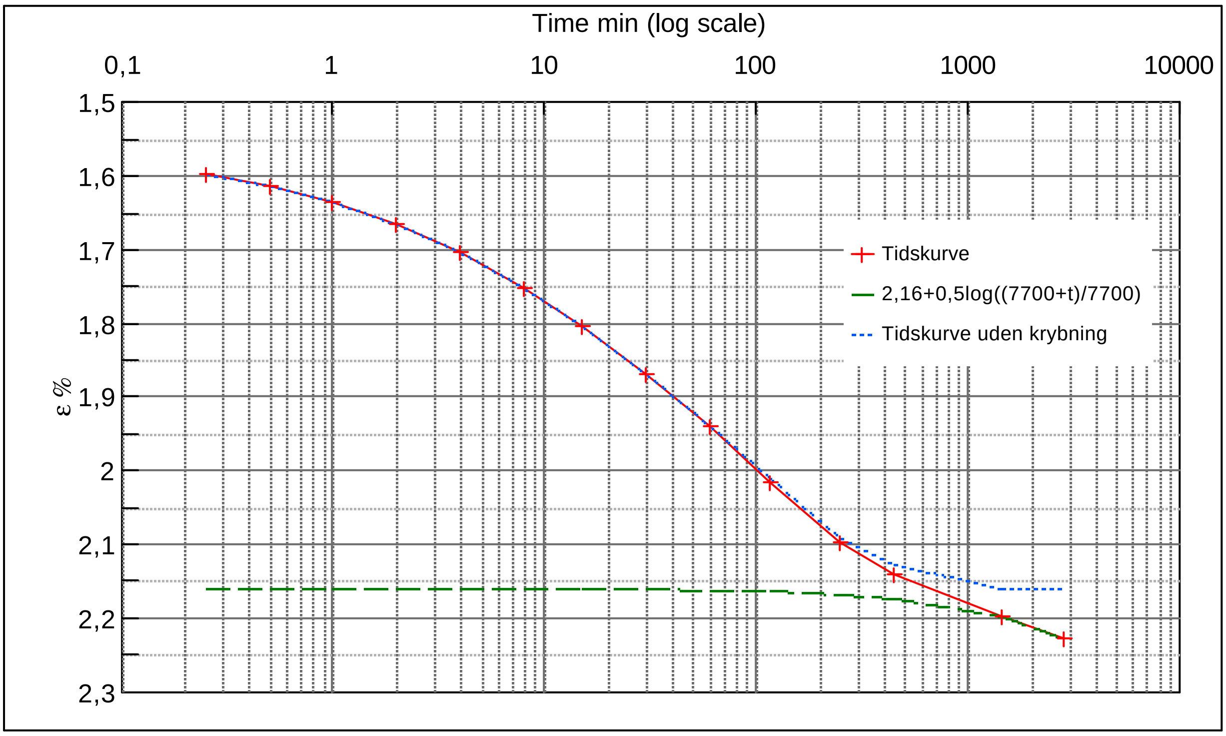
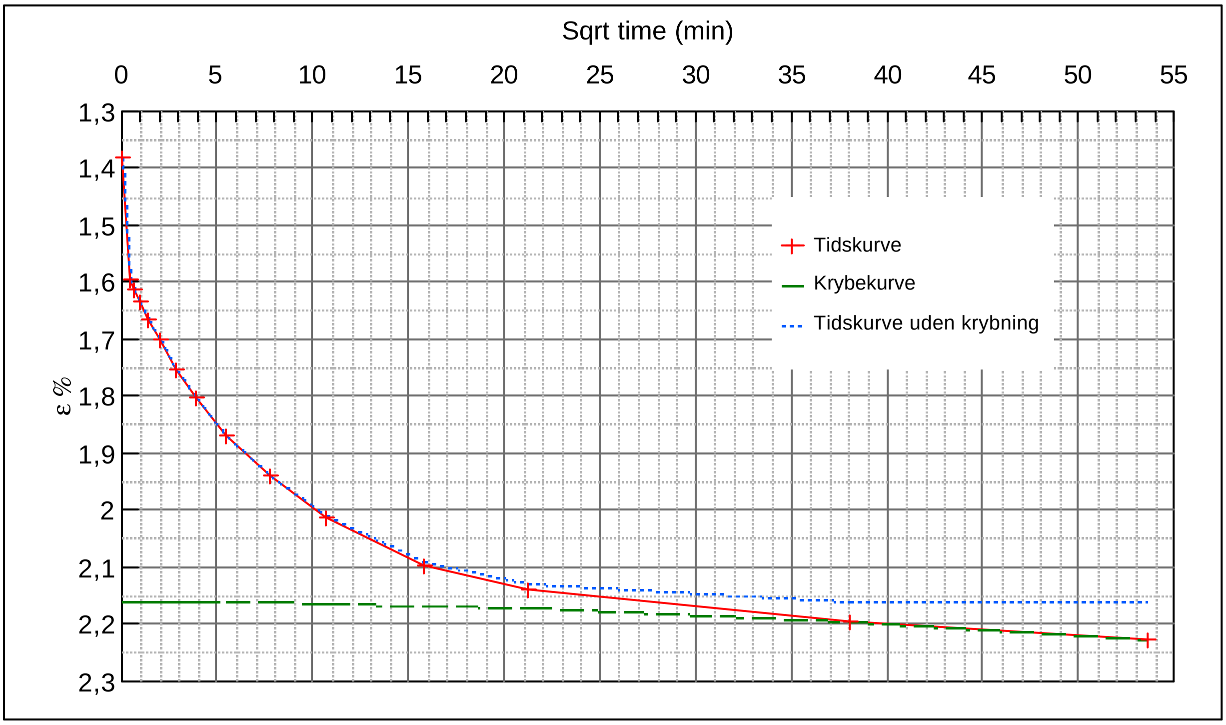
OEDOMETER TEST

Test no **Anh.pr.2**
Page no **9**
Date **17.12.91**
20.09.05/gt

Step no	σ	kPa	ε	%	ε_{i}		tc in sec	6000
8	Before	661,6	ε0	1,38	ε_{c} %	2,16	K i kPa	44.577
	After	1.008,6	ε~#	2,23	ε_{s}	0,1	k10 m/sec	3,6E-11
					ε_{kryb}	0,069	ck10 m^2 /sec	1,62E-07

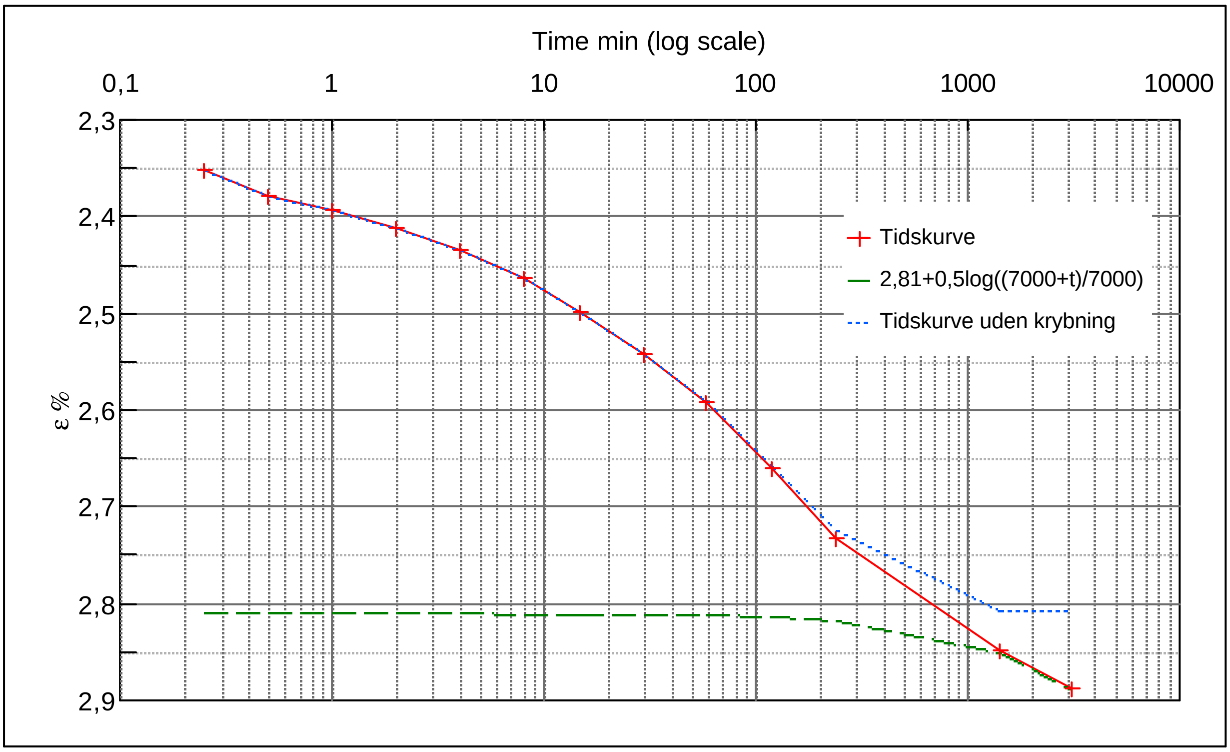


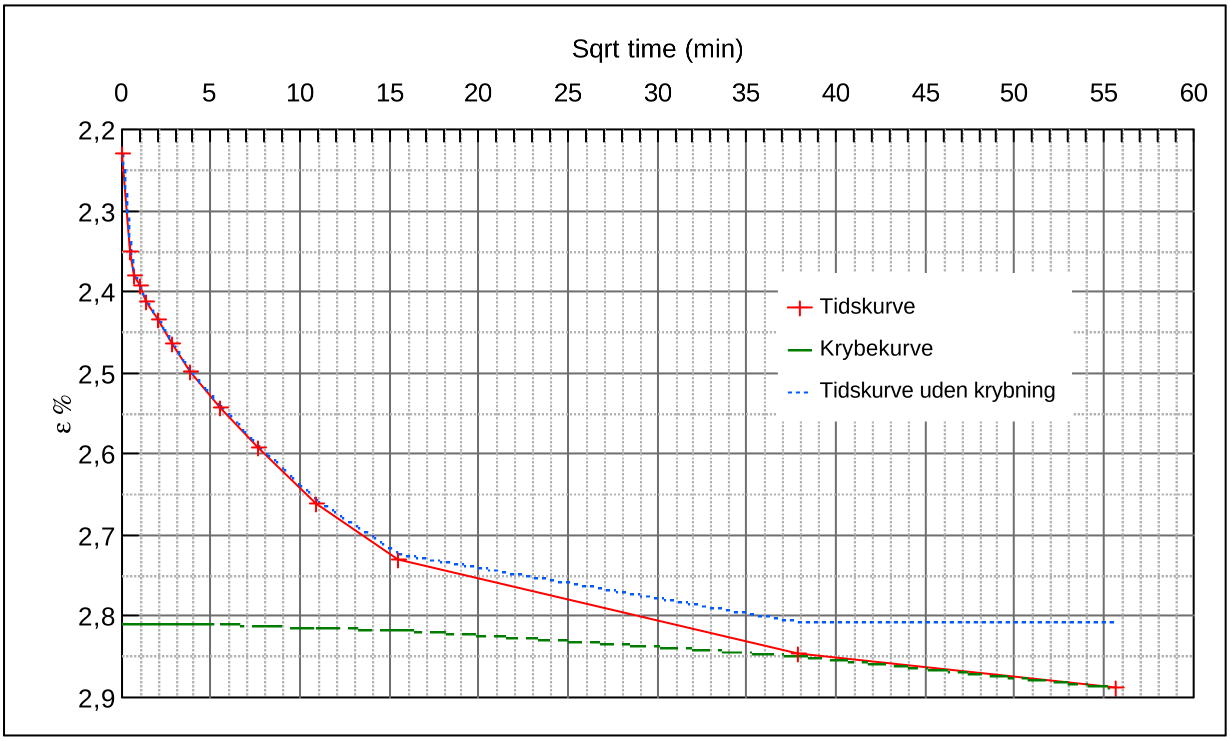


Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 3.10
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: P2	Insitu stress.~780 kPa	Approved:	

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh.pr.2**
Department of Civil Engineering		**Page no**	**10**
Aalborg University		**Date**	**19.12.91**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε_{i}		tc in sec	11760
9	Before	1.008,6	ε0	2,23	ε_{c} %	2,81	K i kPa	59.666
	After	1.355,6	ε~#	2,89	ε_{s}	0,12	k10 m/sec	1,4E-11
					ε_{kryb}	0,078	ck10 m^2 /sec	8,25E-08





Material: Clay Eemian Glacial		**Job:**	Anholt	**AAU** Encl. No 3.11
Bor no :	Depth: 76.7 m.b.s	Executed:	AMS/mj/gt	Check:
Lab. no: P2	Insitu stress. ~780 kPa	Approved:		

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Department of Civil Engineering
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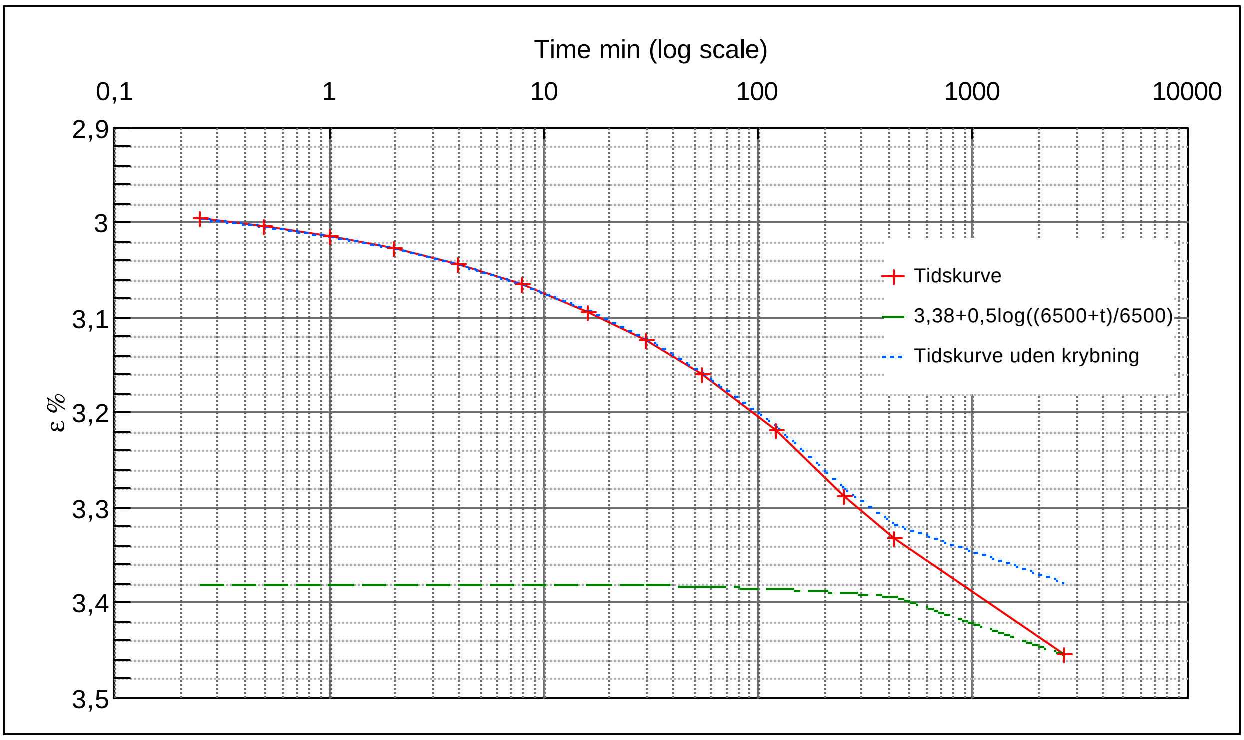
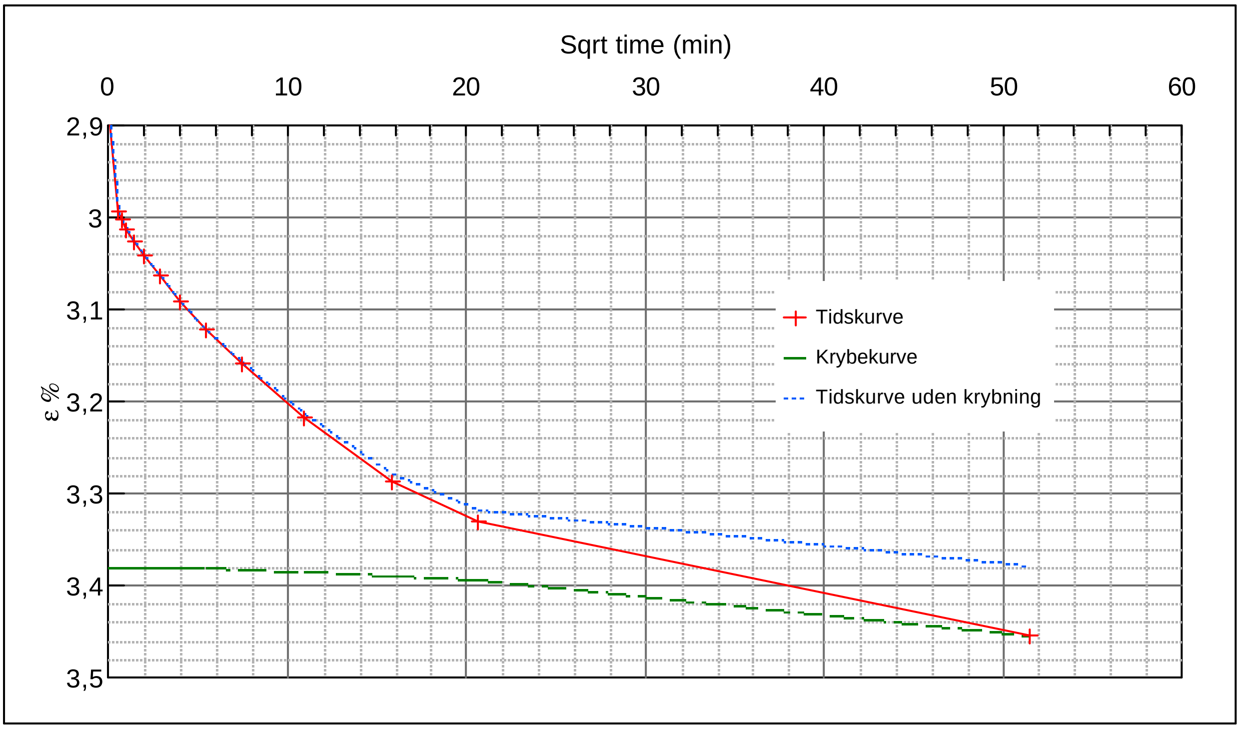
OEDOMETER TEST

Test no	**Anh.pr.2**
Page no	**11**
Date	**21.12.91**

20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	17340
10	Before	1.355,6	ε_0	2,89	ε_c %	3,38	K i kPa	70.448
	After	1.702,5	ε~#	3,45	ε_s	0,13	k10 m/sec	7,8E-12
					ε_{kryb}	0,073	ck10 m^2 /sec	5,59E-08





Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 3.12
Bor no :	Depth: 76.7 m.b.s	Executed: AMS/mj/gt	Check:
Lab. no: P2	Insitu stress.~780 kPa	Approved:	

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Department of Civil Engineering
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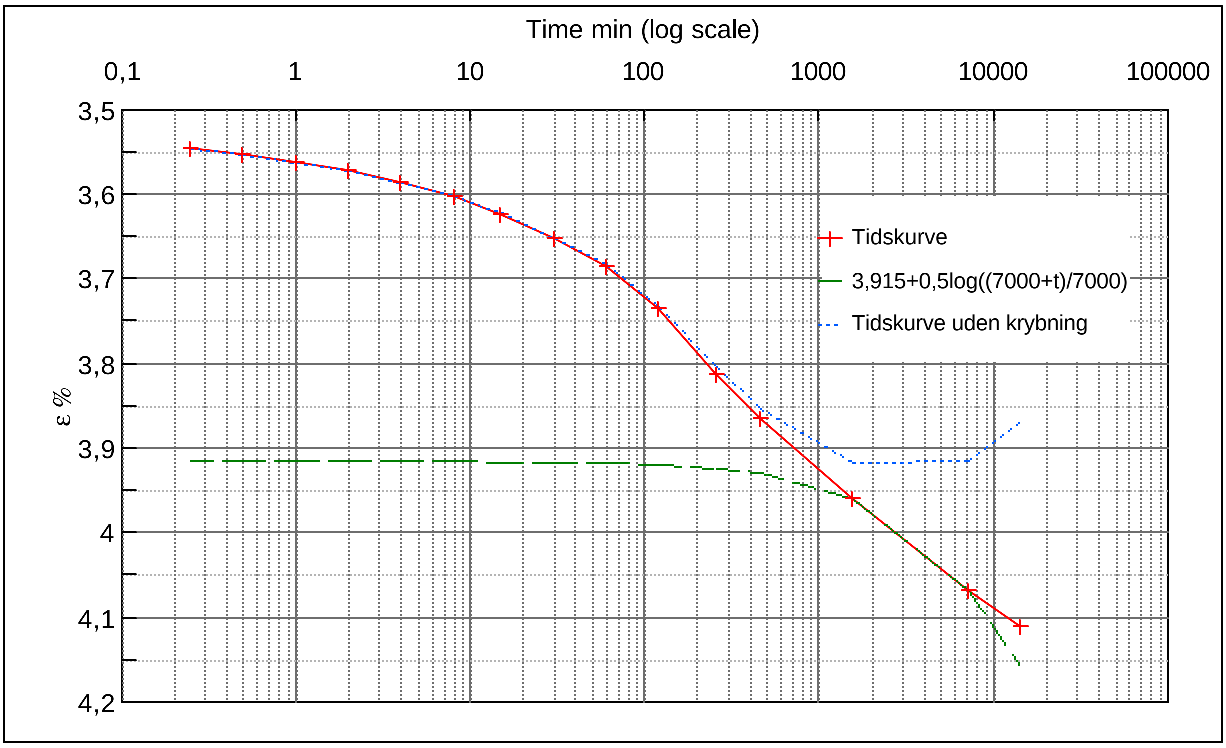
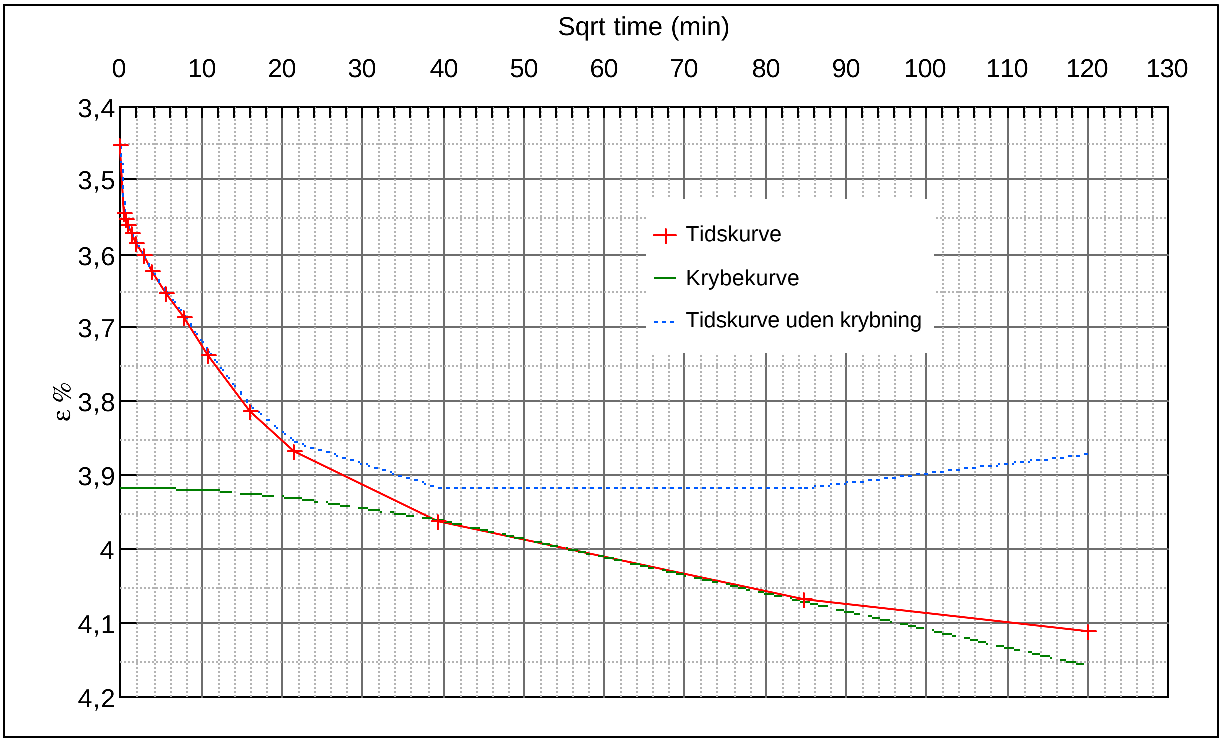
OEDOMETER TEST

Test no	**Anh.pr.2**
Page no	**12**
Date	**23.12.91**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	29040
11	Before	1.702,5	ε0	3,45	ε_c %	3,92	K i kPa	75.126
	After	2.049,5	ε~#	4,11	ε_s	0,15	k10 m/sec	4,4E-12
					ε_{kryb}	0,20	ck10 m^2 /sec	3,34E-08



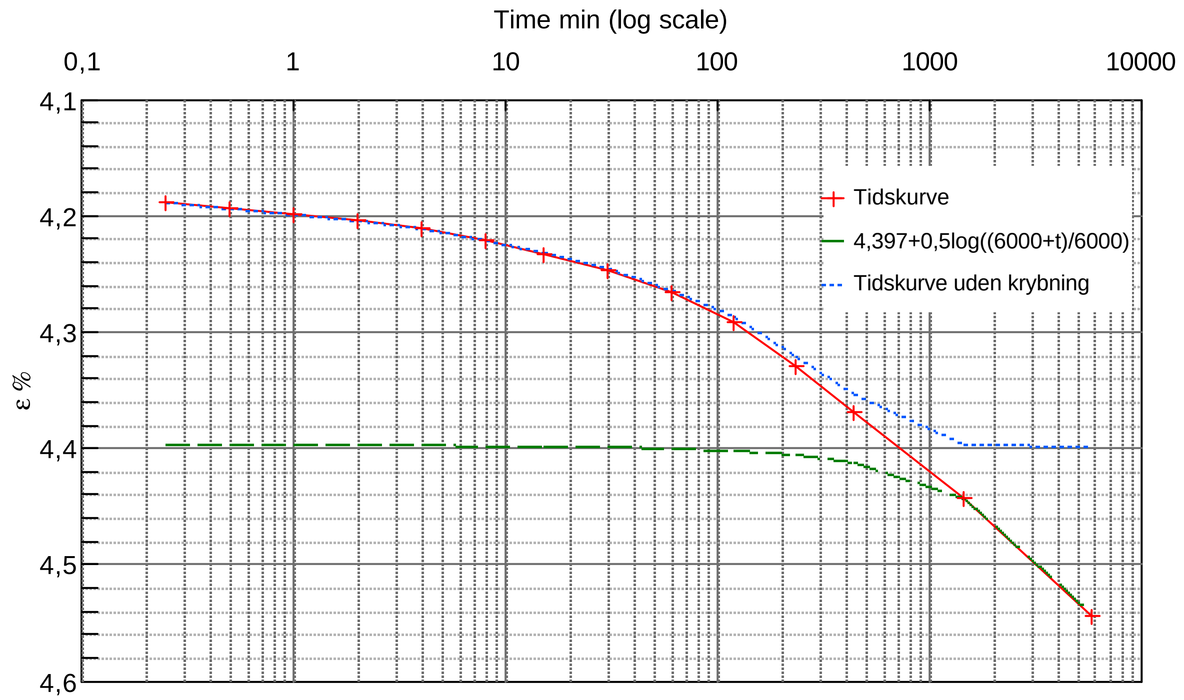


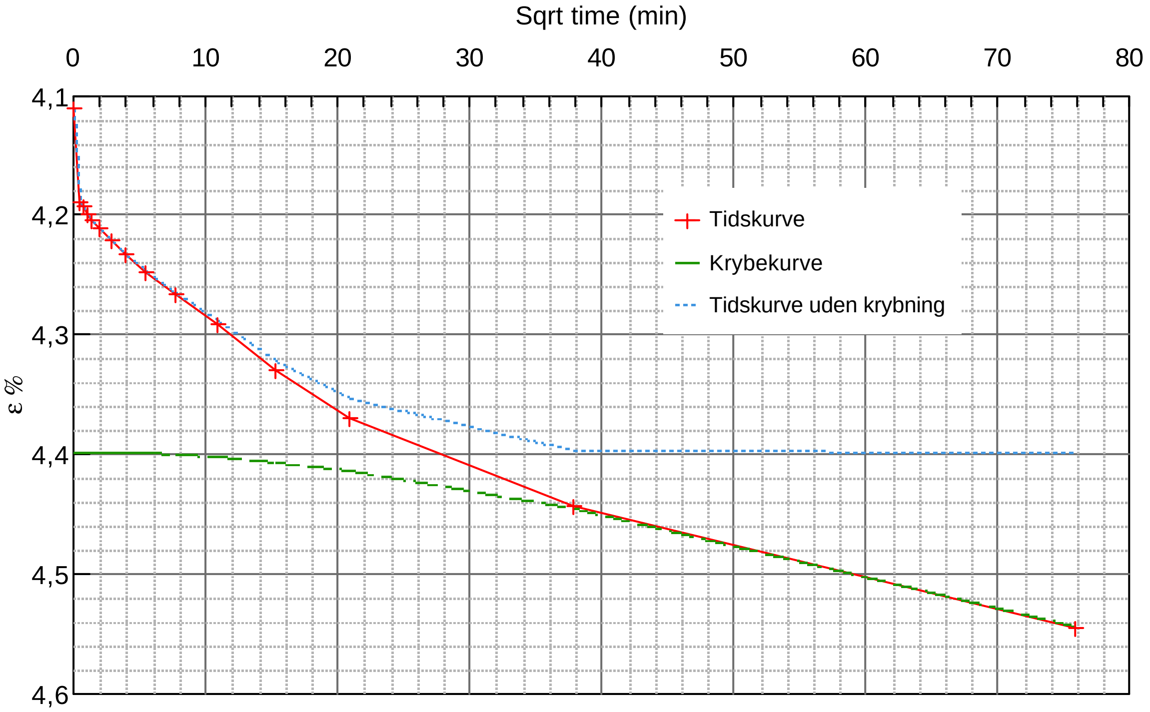
Material: Clay Eemian Glacial	
Bor no :	Depth: 76.7 m.b.s
Lab. no: P2	Insitu stress. ~780 kPa

Job:	Anholt	**AAU**
		Encl. No 3.13
Executed:	AMS/mj/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh.pr.2**
Department of Civil Engineering		**Page no**	**13**
Aalborg University		**Date**	**02.01.92**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	31740
12	Before	2.049,5	ε_0	4,11	ε_c %	4,40	K i kPa	121.102
	After	2.396,4	ε~#	4,54	ε_s	0,17	k10 m/sec	2,5E-12
					ε_{kryb}	0,147	ck10 m^2 /sec	3,06E-08

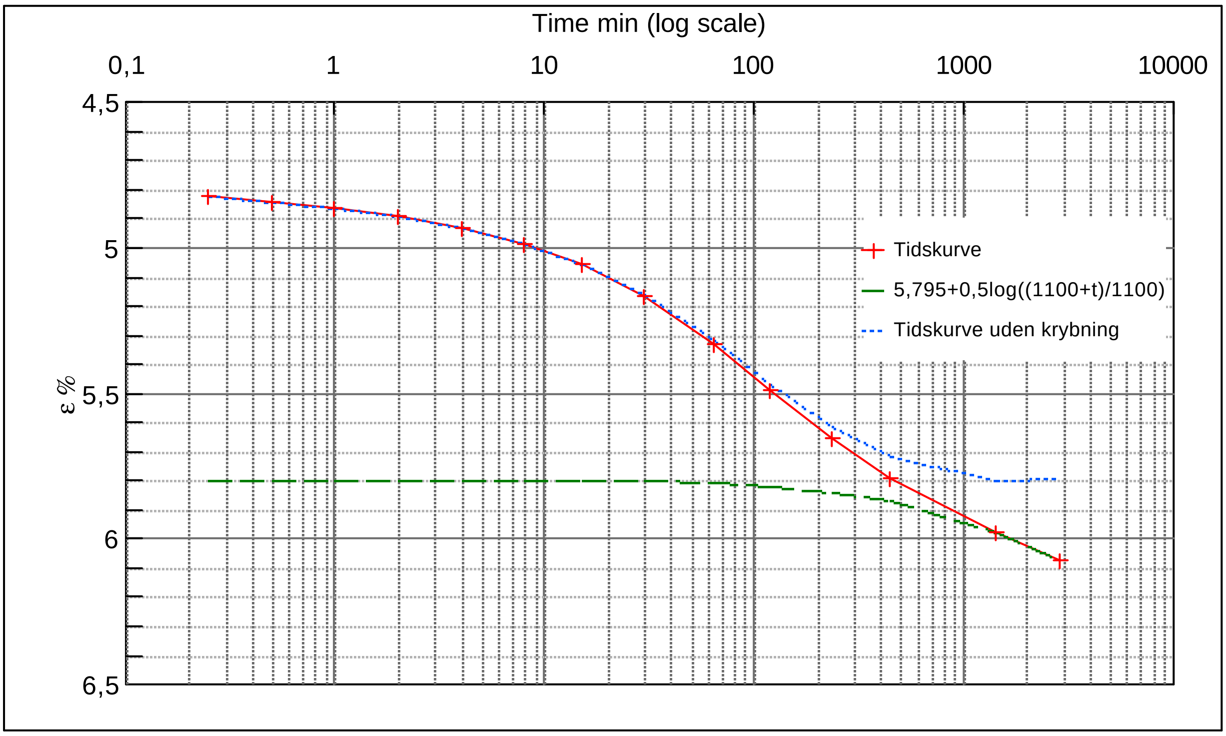


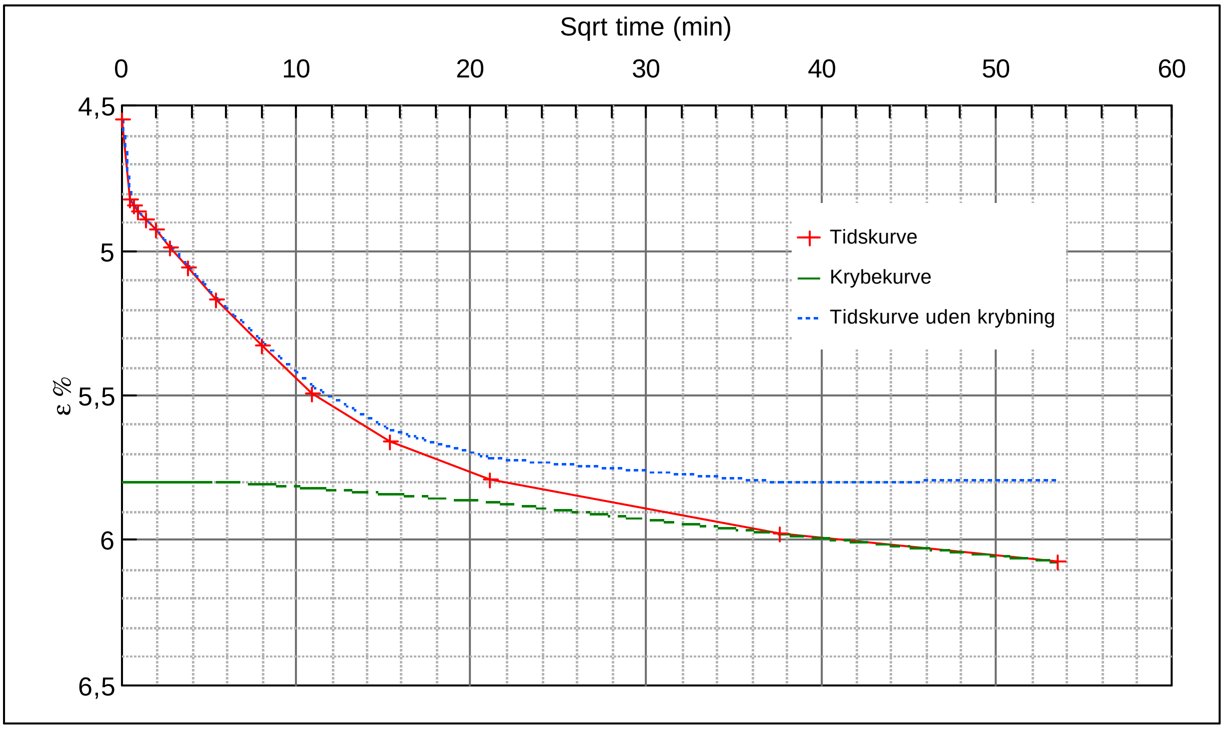


Material: Clay Eemian Glacial		**Job:**	Anholt	**AAU**
				Encl. No 3.14
Bor no :	Depth: 76.7 m.b.s	Executed:	AMS/mj/gt	Check:
Lab. no: P2	Insitu stress. ~780 kPa	Approved:		

Geotechnical Engineering Group **Department of Civil Engineering** **Aalborg University**	**OEDOMETER TEST**	**Test no** **Page no** **Date**	**Anh.pr.2** **14** **06.01.92** 20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	13500		
13	Before	2.396,4	ε0	4,54	ε c %	5,80	K i kPa	83.203		
	After	3.437,3	ε~#	6,07	ε s	0,33	k10 m/sec	8,5E-12		
					ε kryb	0,28	ck10 m^2 /sec	7,18E-08		





Material: Clay Eemian Glacial		Job:	Anholt	**AAU**
				Encl. No 3.15
Bor no :	Depth: 76.7 m.b.s	Executed:	AMS/mj/gt	Check:
Lab. no: P2	Insitu stress.~780 kPa	Approved:		

Geotechnical Engineering Group
Department of Civil Engineering
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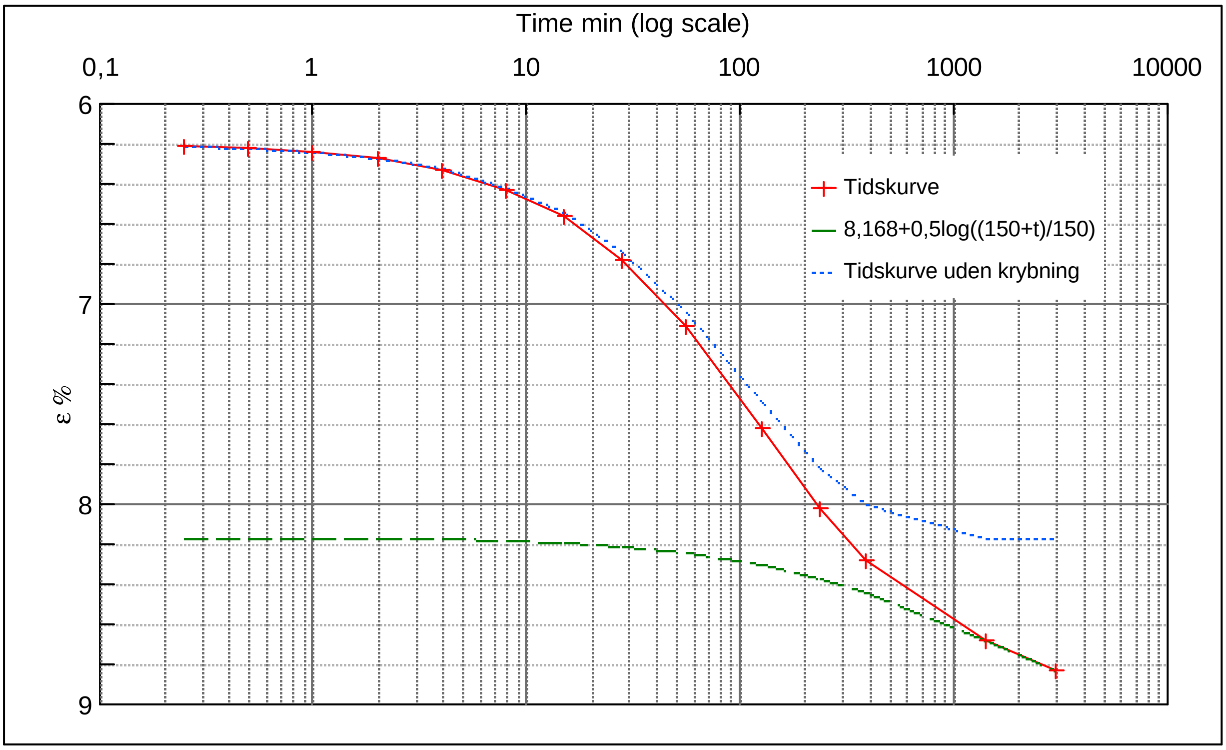
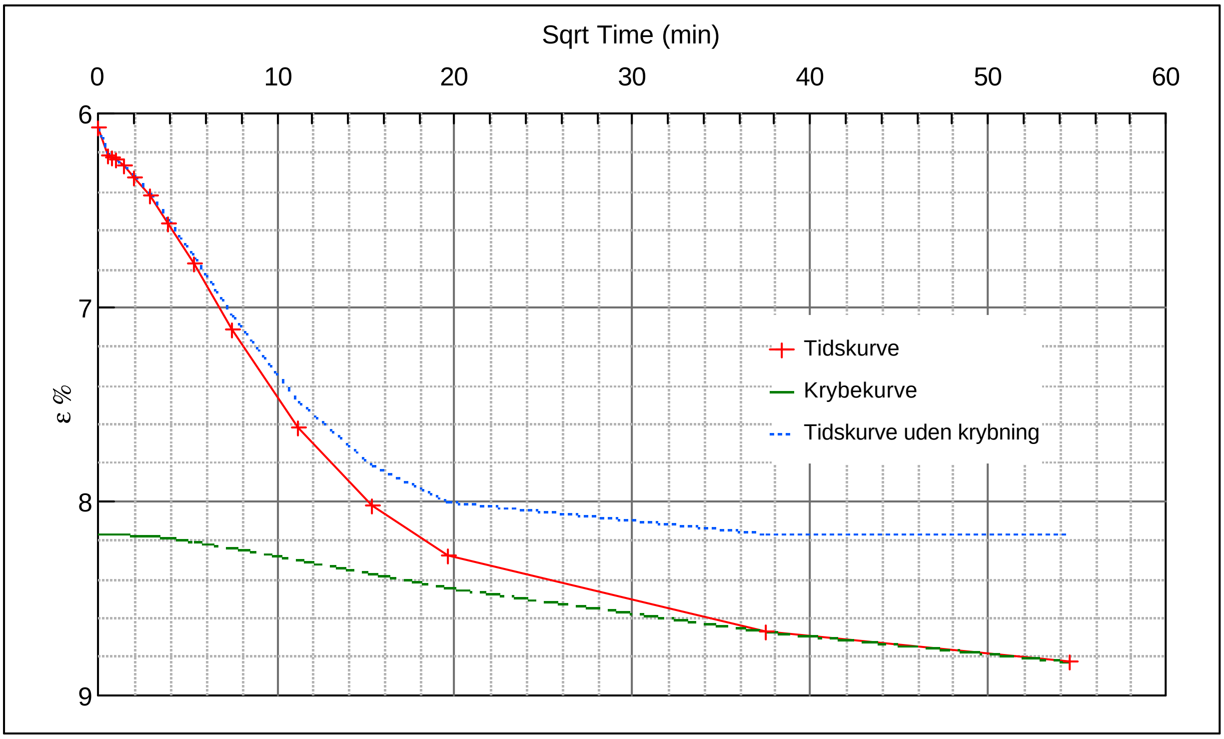
OEDOMETER TEST

Test no	**Anh.pr.2**
Page no	**15**
Date	**08.01.92**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	11760
14	Before	3.437,3	ε0	6,07	ε_{c} %	8,17	K i kPa	99.320
	After	5.519,1	ε~#	8,83	ε_s	0,5	k10 m/sec	8,2E-12
					ε_{kryb}	0,659	ck10 m^2 /sec	8,25E-08





Material: Clay Eemian Glacial	
Bor no :	Depth: 76.7 m.b.s
Lab. no: P2	Insitu stress. ~780 kPa

Job:	Anholt	**AAU**
		Encl. No 3.16
Executed:	AMS/mj/gt	Check:
Approved:		

Geotechnical Engineering Group
Department of Civil Engineering
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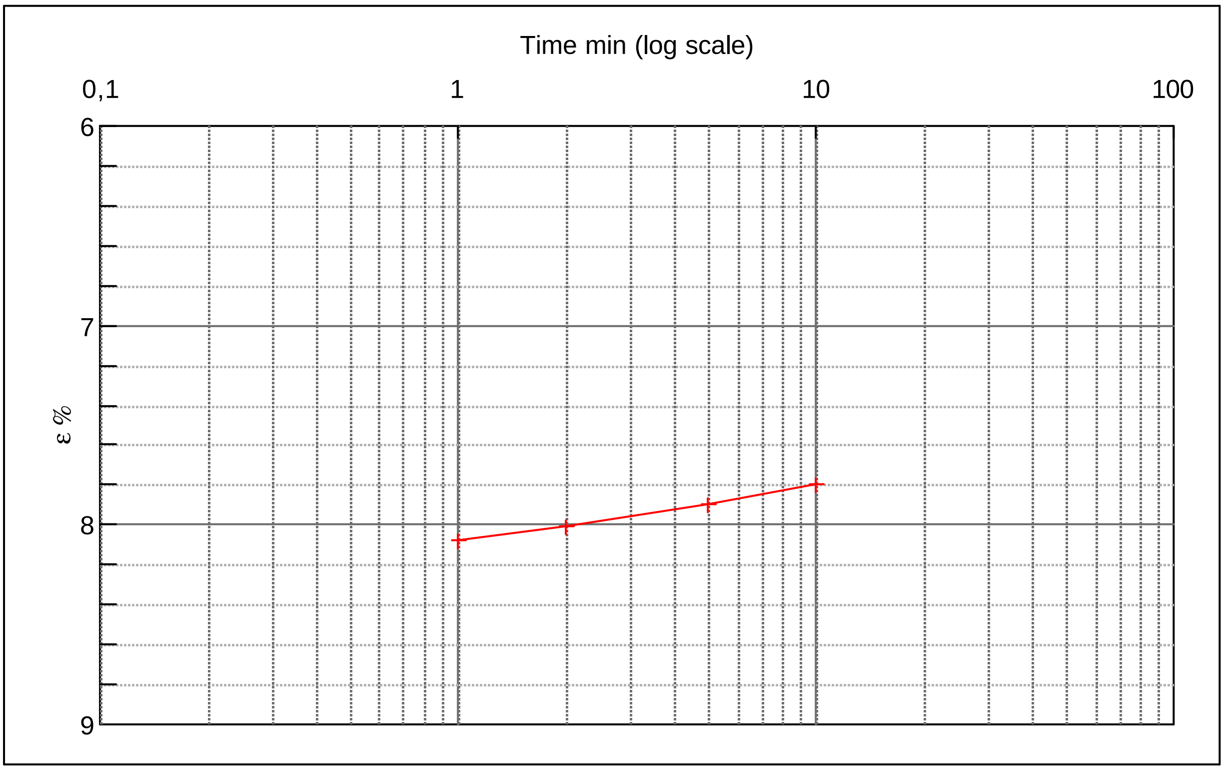
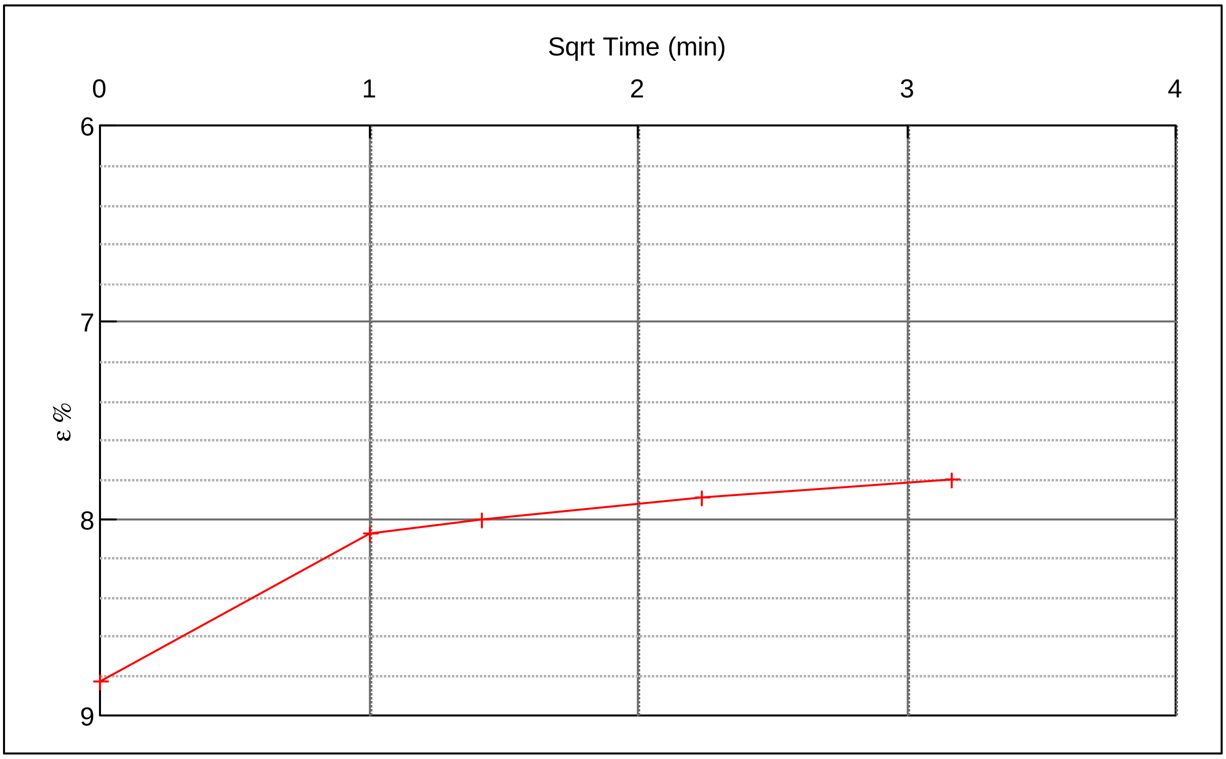
OEDOMETER TEST

Test no **Anh.pr.2**
Page no **16**
Date **10.01.92**
20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	
15	Before	5.519	ε0	8,83	ε c %	7,8	K i kPa	536.985
	After	2,43	ε~#	7,80	ε s		k10 m/sec	
					ε kryb		ck10 m^2 /sec	





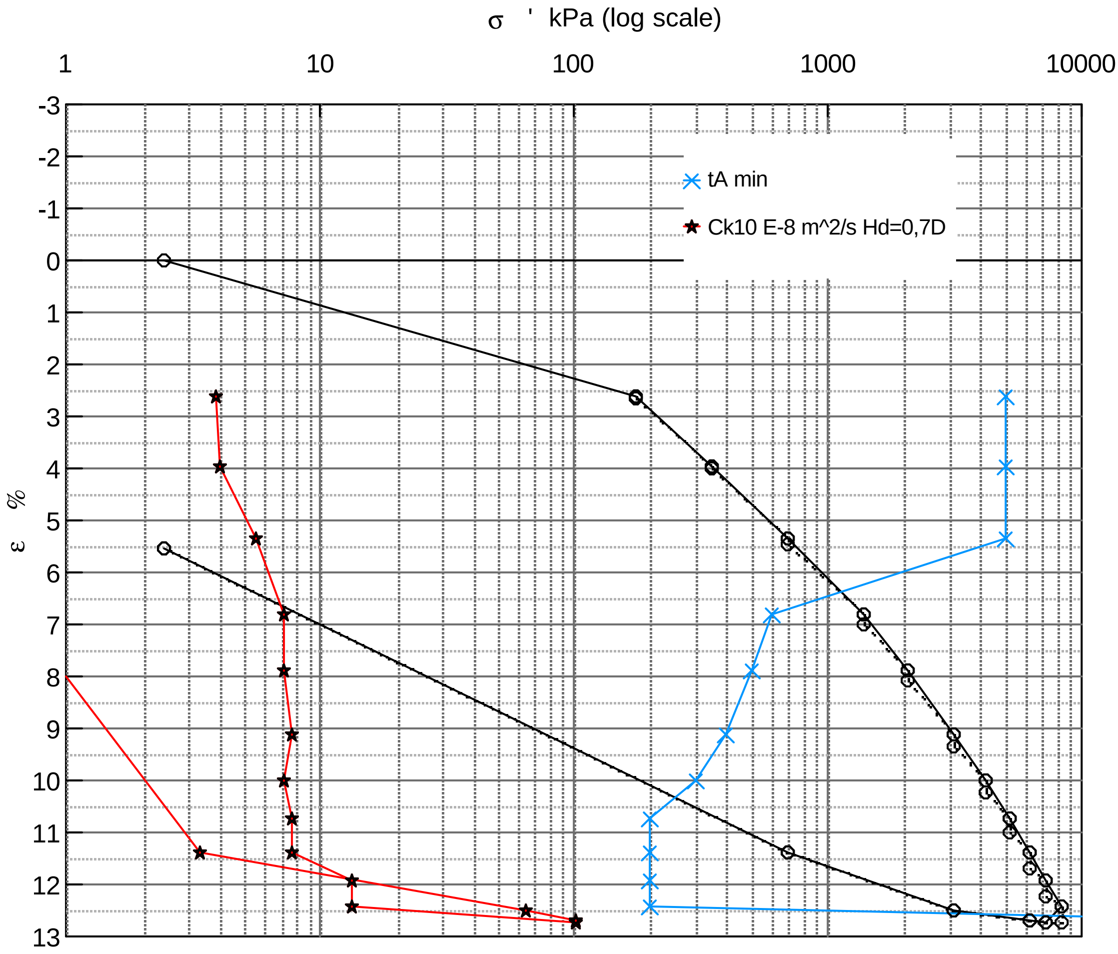
Material: Clay Eemian Glacial

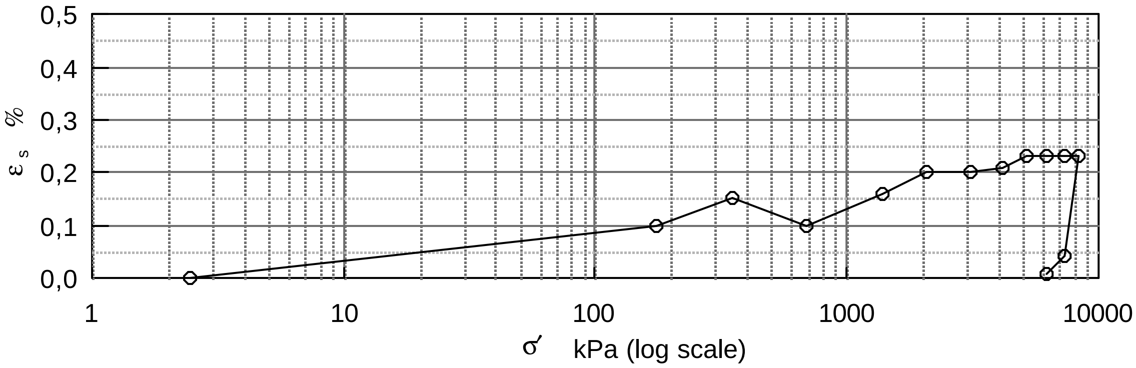
Bor no :
Lab. no: P2
Depth: 76.7 m.b.s
Insitu stress. ~780 kPa

Job: Anholt
AAU
Encl. No 3.17
Executed: AMS/mj/gt
Check:
Approved:

Geotechnical Engineering Group		**OEDOMETER TEST**	**Test no**	**Anh k12**
Department of Civil Engineering			**Page no**	**1**
Aalborg University			**Date**	**05.10-20.11.92**
				20.09.05/gt

Description of soil:			Before	After
Clay Eemian Glacial		Water content %	17,8	15,5
		Bulk density Mg/m^3	2,17	2,21
		Grain density Mg/m^3	~2.72	
Bor no :	Overburden pressure σ'_o ~800 kPa	Void ratio	0,48	0,42
Lab. no: k12	Vane strength c_v kPa	Degr. of Saturation %	~96	~100
Level : 78 m.b.s.	CPT - value q_c MPa	Dimension H x D mm	30x60	28.8x60

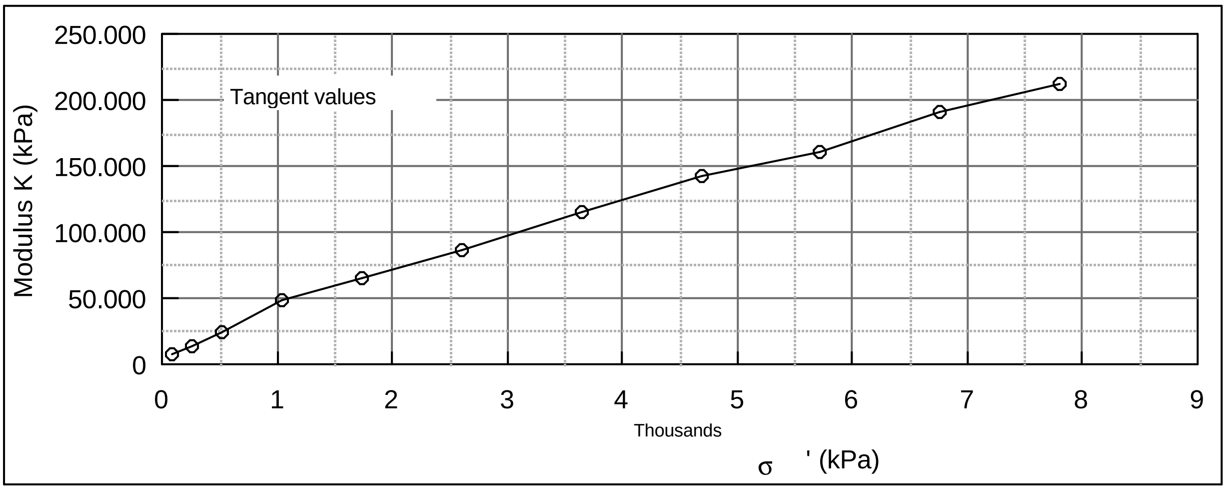


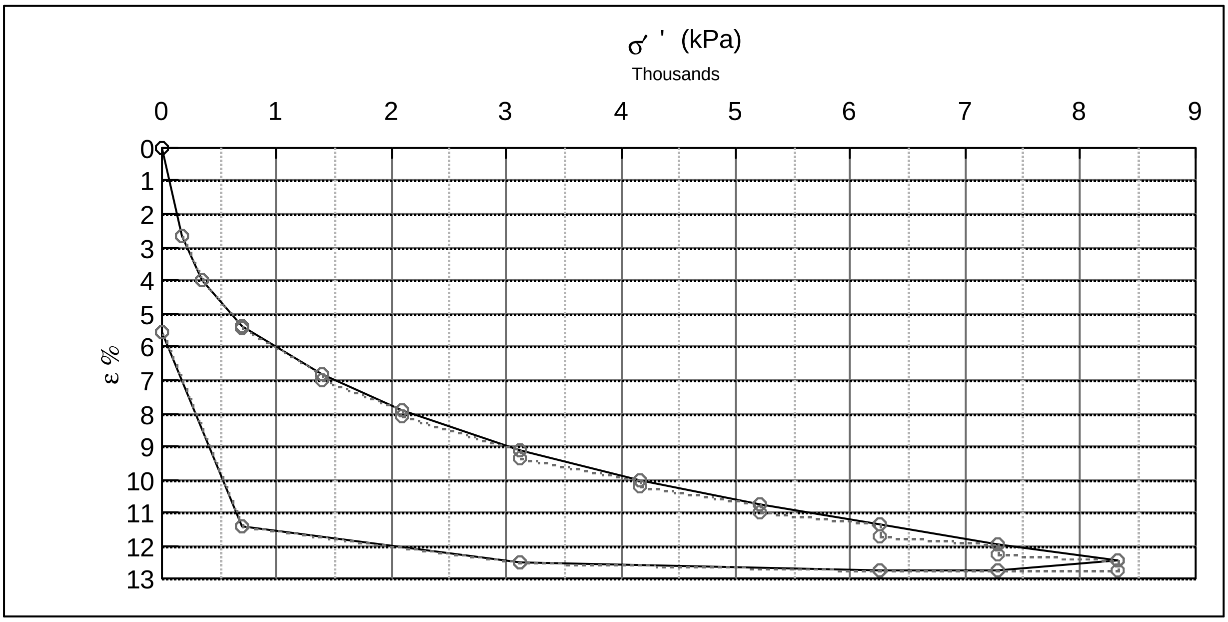


Job: Anholt		**AAU**
		Encl. No 4.1
Executed:	AMS/gt	Check:
Approved:		

OEDOMETER TEST **Test no** **Anh k12** **Page no** **1a**

20.09.05/gt





Test results

Q ~8 %

Qs ~0.23 %

σ'_{pc} ~5000 kPa

σ'	ε_c	ε_s	C k10	σ'_m	K	w
kPa	%	% / lct	m^2/s	kPa	kPa	%
2,4	0,00	0,00	-	-	-	18,5
175,9	2,64	0,10	3,8E-08	89,2	6571,2	17,1
349,4	3,96	0,15	4,0E-08	262,6	13142,3	16,4
696,3	5,37	0,10	5,6E-08	522,9	24606,9	15,6
1.390,3	6,82	0,16	7,2E-08	1.043,3	47856,2	14,8
2.084,2	7,90	0,20	7,2E-08	1.737,2	64251,4	14,2
3.125,0	9,10	0,20	7,7E-08	2.604,6	86739,4	13,6
4.165,9	10,00	0,21	7,2E-08	3.645,5	115652,6	13,1
5.206,8	10,73	0,23	7,7E-08	4.686,4	142585,4	12,7
6.247,7	11,38	0,23	7,7E-08	5.727,2	161375,7	12,3
7.288,5	11,92	0,23	1,3E-07	6.768,1	190985,9	12,0
8.329,4	12,41	0,23	1,3E-07	7.809,0	212423,1	11,8
7.288,5	12,73	0,04	1,0E-06	7.809,0	-328869,9	11,6
6.247,7	12,71	0,01	1,0E-06	6.768,1	7178436,7	11,6
3.125,0	12,51		6,5E-07	4.686,4	1530696,1	11,7
696,3	11,40		3,3E-08	1.910,7	219593,5	12,3
2,4	5,54		4,2E-09	349,4	11827,4	15,5

Remark:

Job:	Anholt	**AAU** Encl. No 4.2
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group
Department of Civil Engineering
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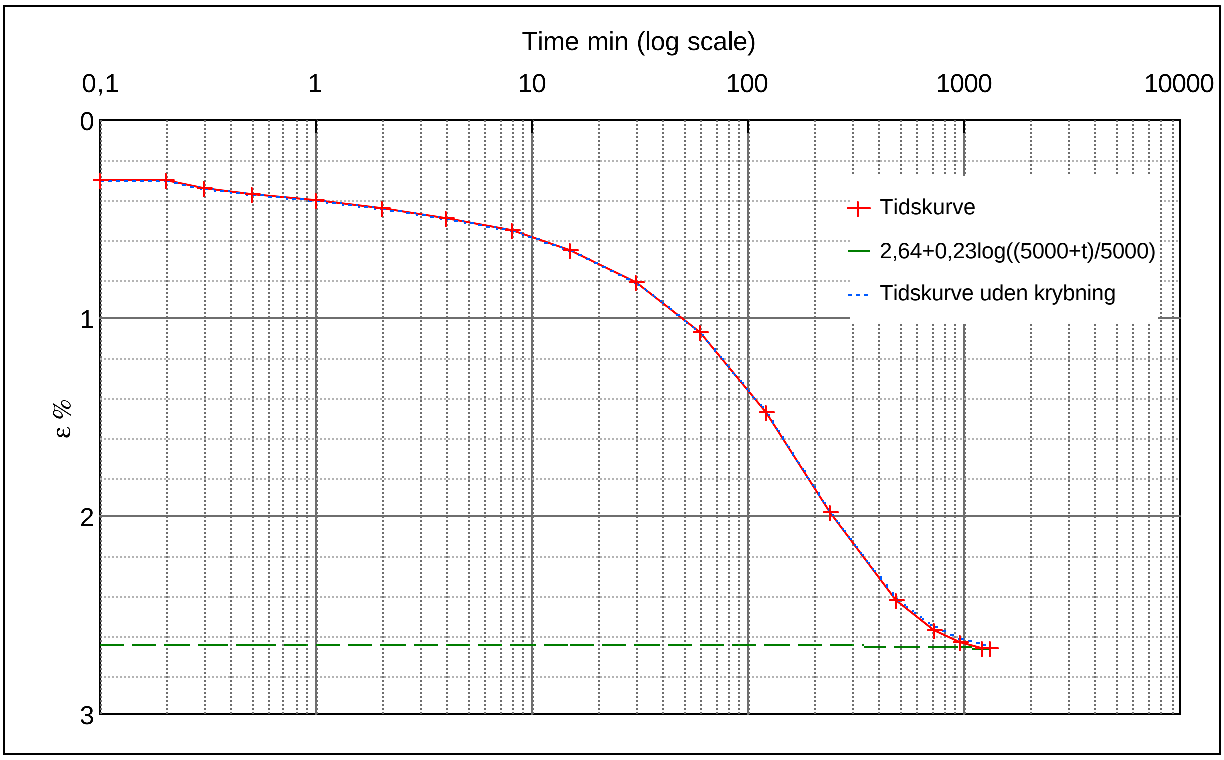
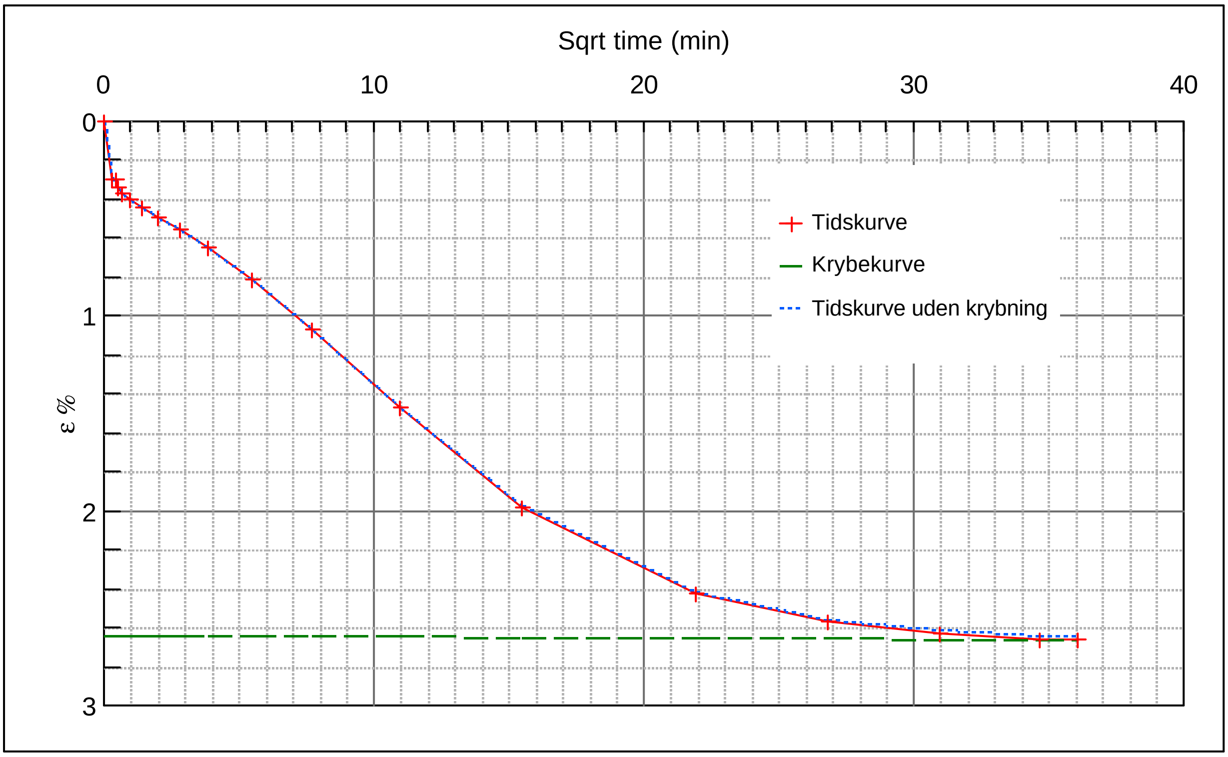
OEDOMETER TEST

Test no	**Anh k12**
Page no	**2**
Date	**05.10.92**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	25215
1	Before	2,43	ε0	0,00	ε c %	2,64	K i kPa	6.571
	After	175,9	ε~#	2,66	ε s	0,1	k10 m/sec	5,7E-11
					ε kryb	0,02	ck10 m^2 /sec	3,85E-08





Material: Clay Eemian Glacial	
Bor no :	Depth: 78 m.b.s.
Lab. no: k12	Insitu stress:~800 kPa

Job: Anholt	**AAU**
	Encl. No 4.3
Executed: AMS/gt	Check:
Approved:	

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Department of Civil Engineering
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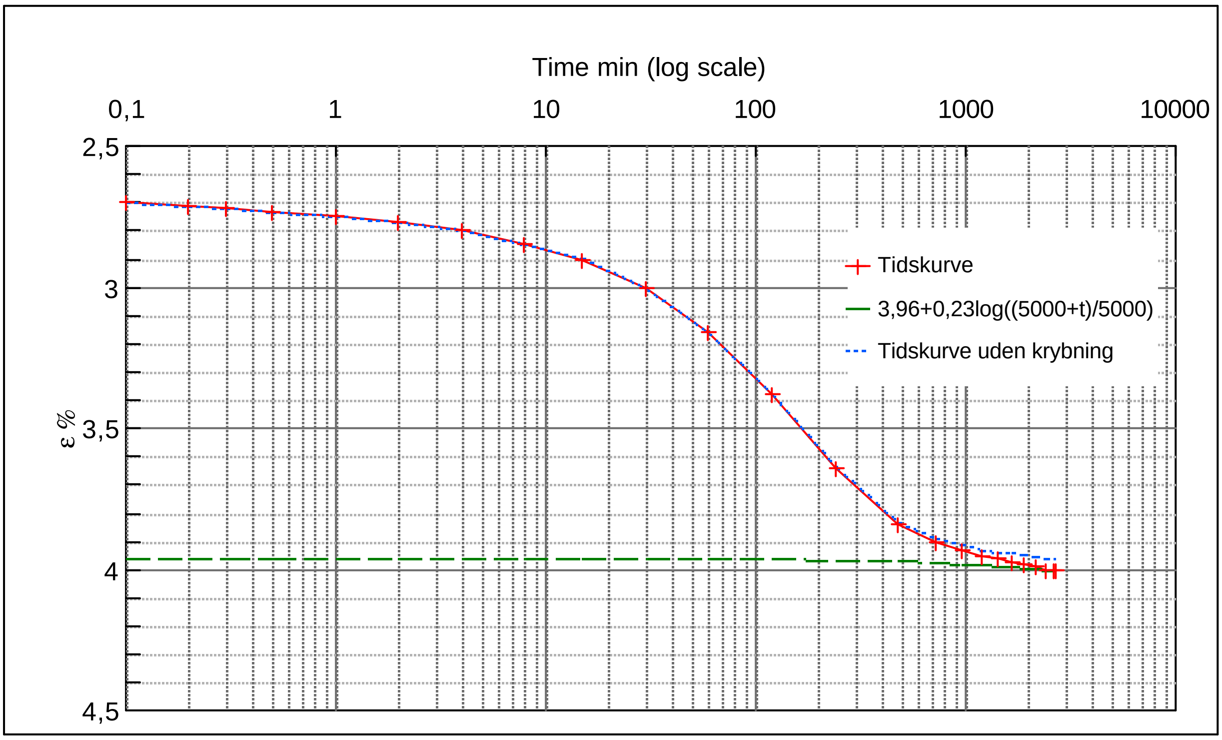
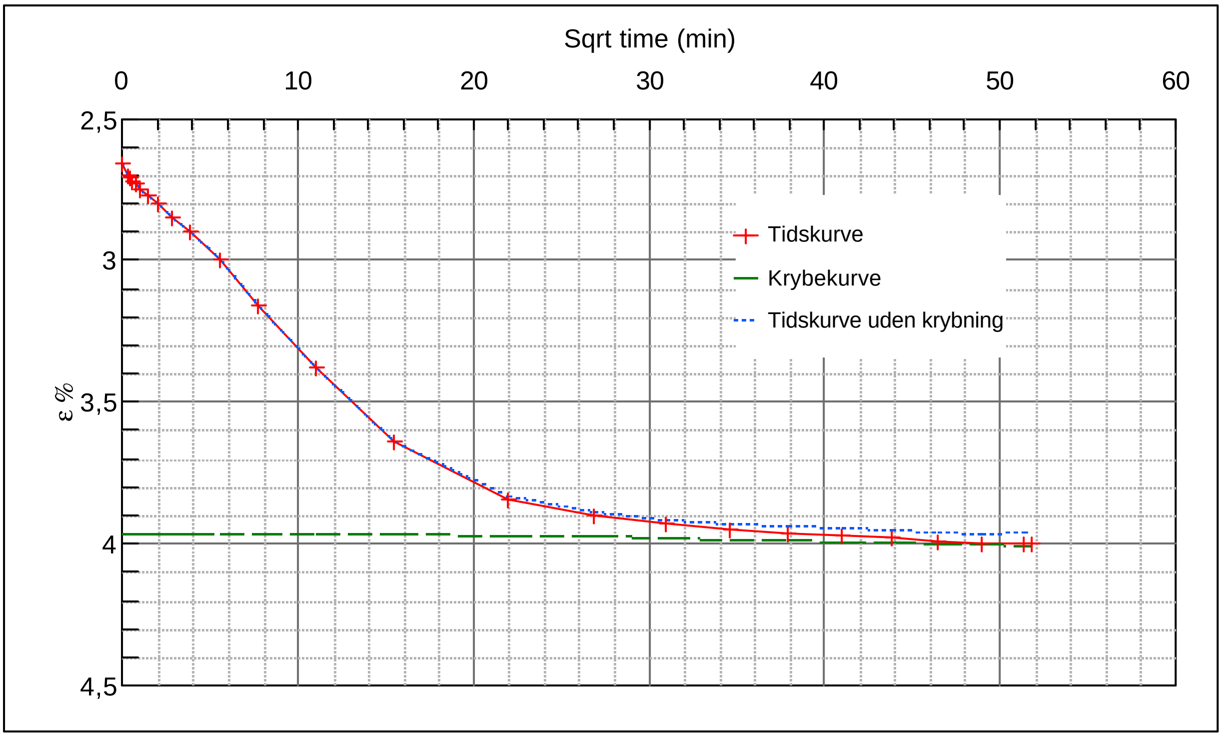
OEDOMETER TEST

Test no	**Anh k12**
Page no	**3**
Date	**06.10.92**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	24000
2	Before	175,9	ε0	2,66	ε c %	3,96	K i kPa	13.345
	After	349,4	ε~#	4,00	ε s	0,15	k10 m/sec	3,0E-11
					ε kryb	0,04	ck10 m^2 /sec	4,04E-08



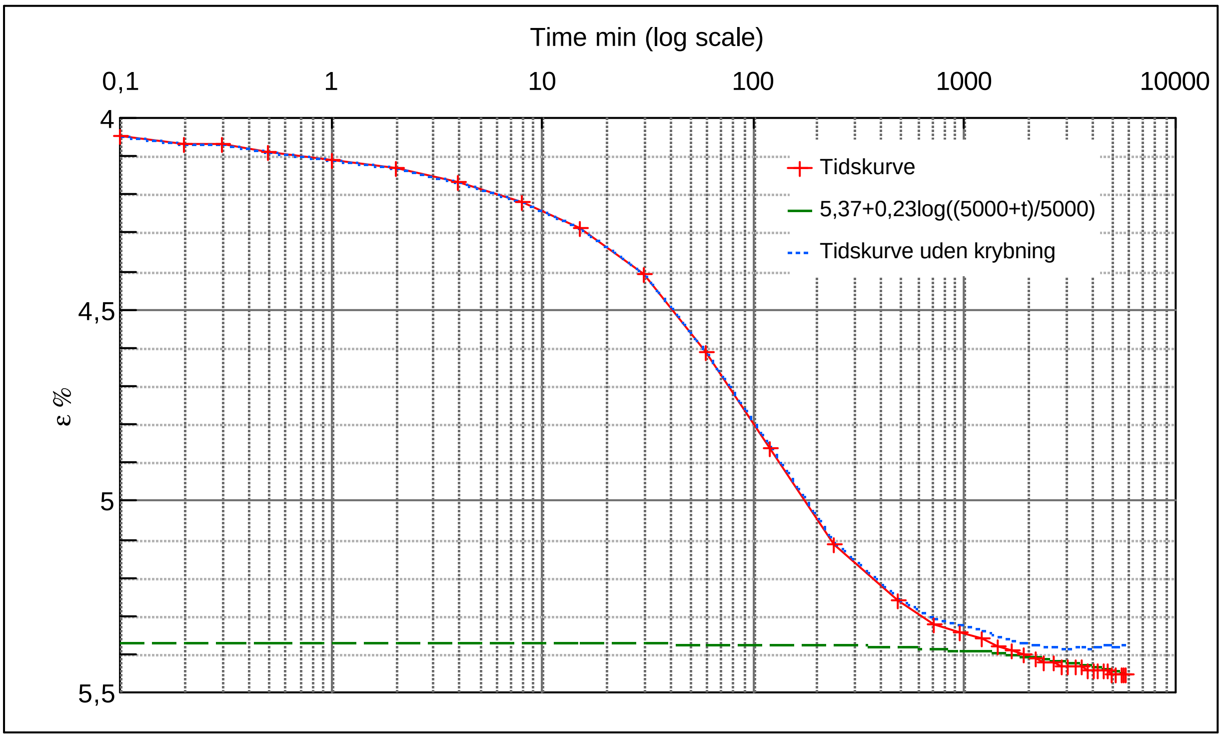


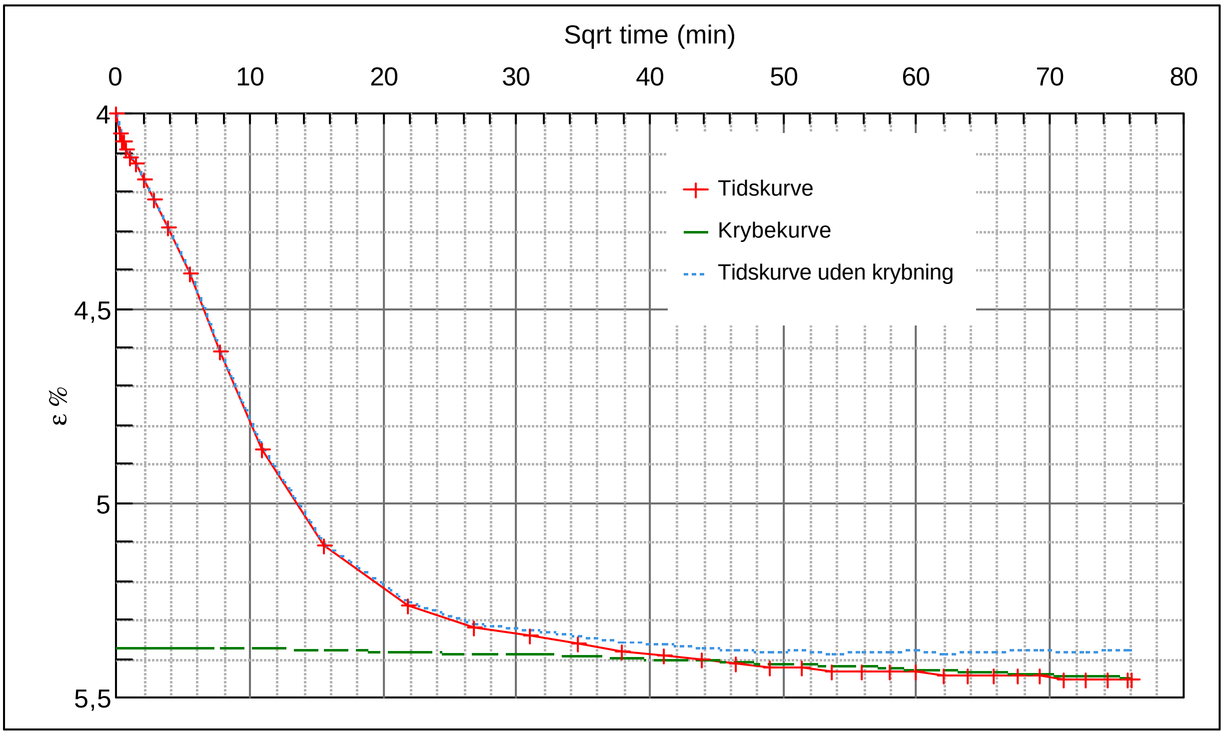
Material: Clay Eemian Glacial	
Bor no :	Depth: 78 m.b.s.
Lab. no: k12	Insitu stress:~800 kPa

Job:	Anholt	**AAU**
		Encl. No 4.4
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k12**
Department of Civil Engineering		**Page no**	**4**
Aalborg University		**Date**	**08.10.92**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	17340
3	Before	349,4	ε0	4,00	ε_c %	5,37	K i kPa	25.325
	After	696,3	ε~#	5,45	ε_s	0,1	k10 m/sec	2,2E-11
					ε_{kryb}	0,08	ck10 m^2 /sec	5,59E-08

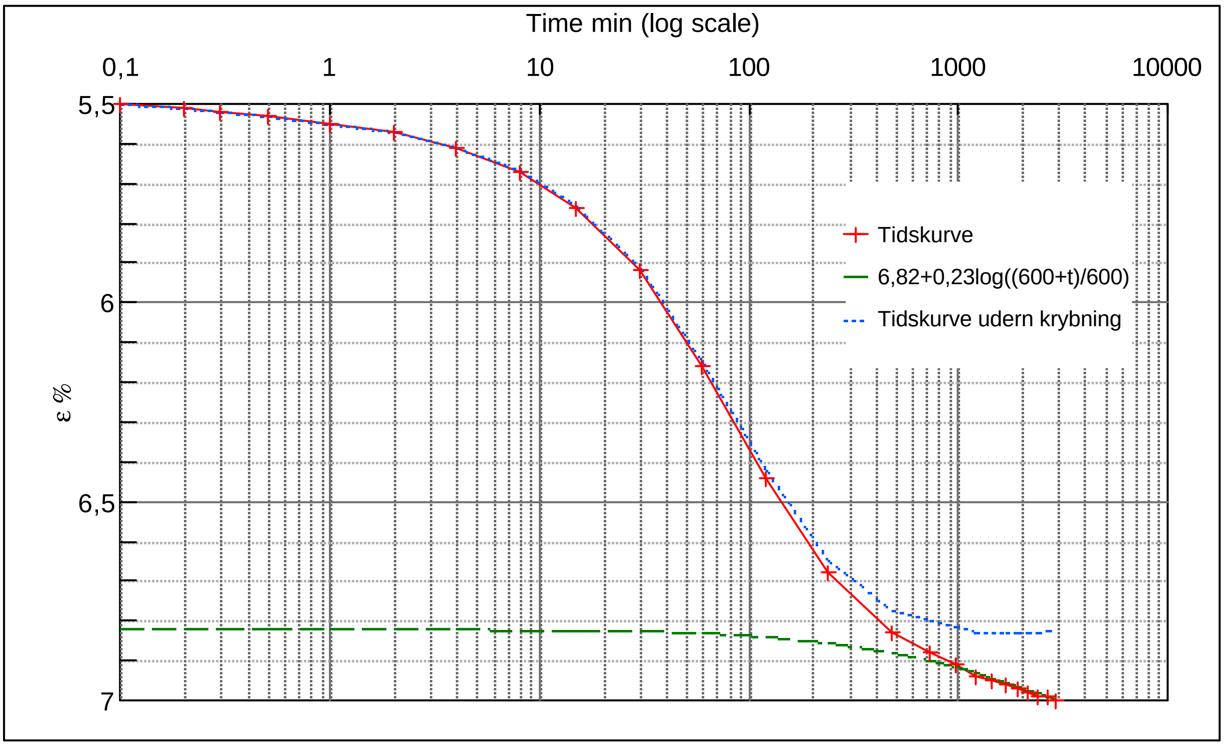


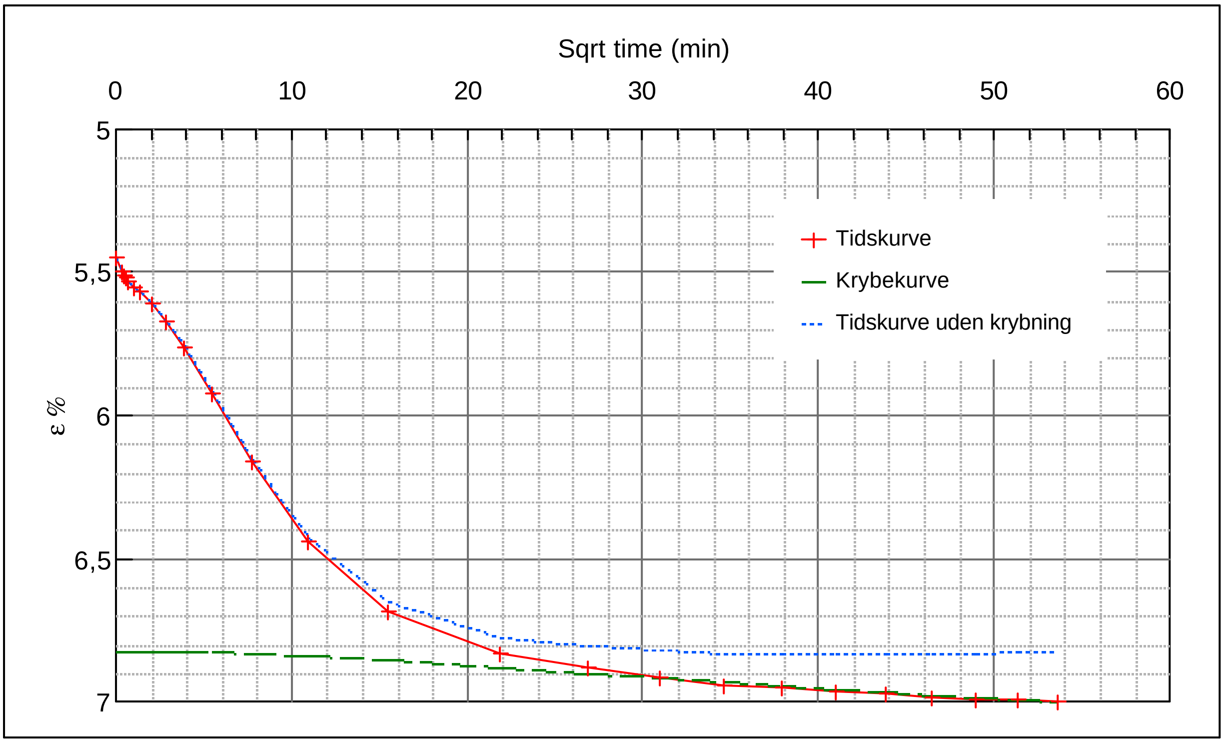


Material:		**Job:**	Anholt	**AAU**
Clay Eemian Glacial				Encl. No 4.5
Bor no :	Depth: 78 m.b.s.	Executed:	AMS/gt	Check:
Lab. no: k12	Insitu stress:~800 kPa	Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k12**
Department of Civil Engineering		**Page no**	**5**
Aalborg University		**Date**	**12.10.92**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε		tc in sec	13500
4	Before	696,3	ε0	5,450	$\varepsilon_{c\ \%}$	6,82	K i kPa	50.651
	After	1.390,3	ε~#	7,00	ε_s	0,16	k10 m/sec	1,4E-11
					ε_{kryb}	0,18	ck10 m^2 /sec	7,18E-08

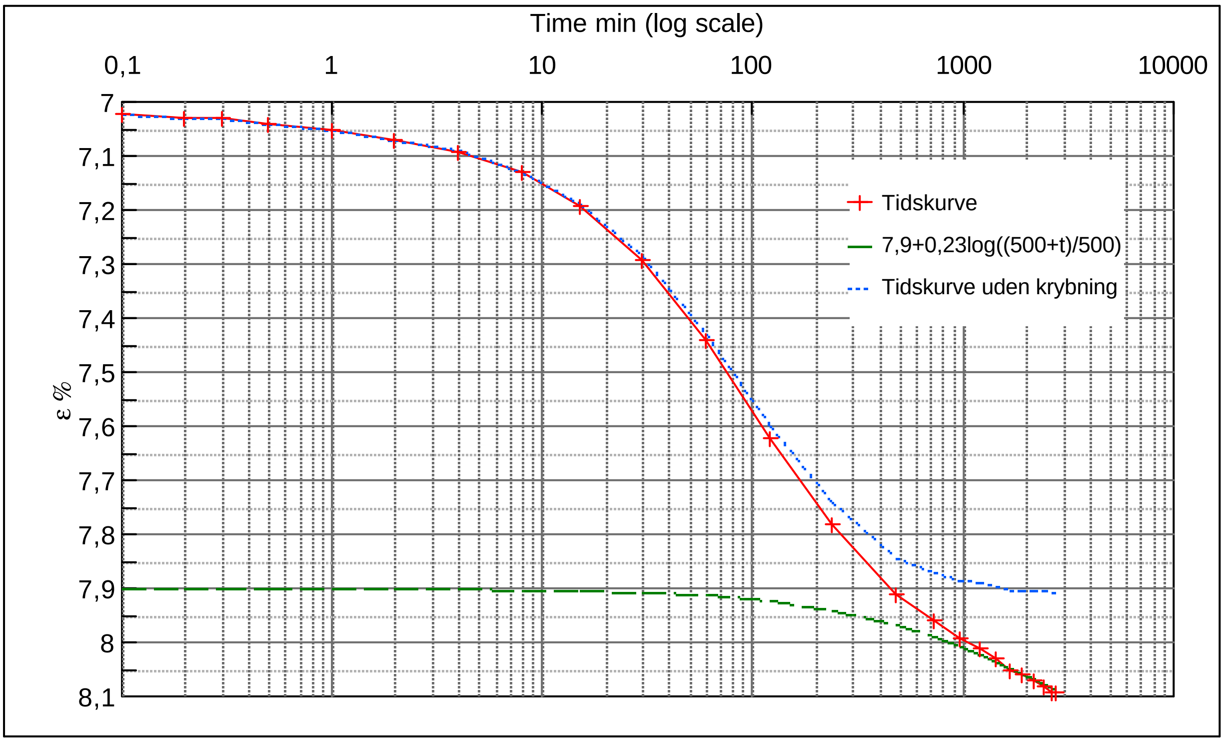


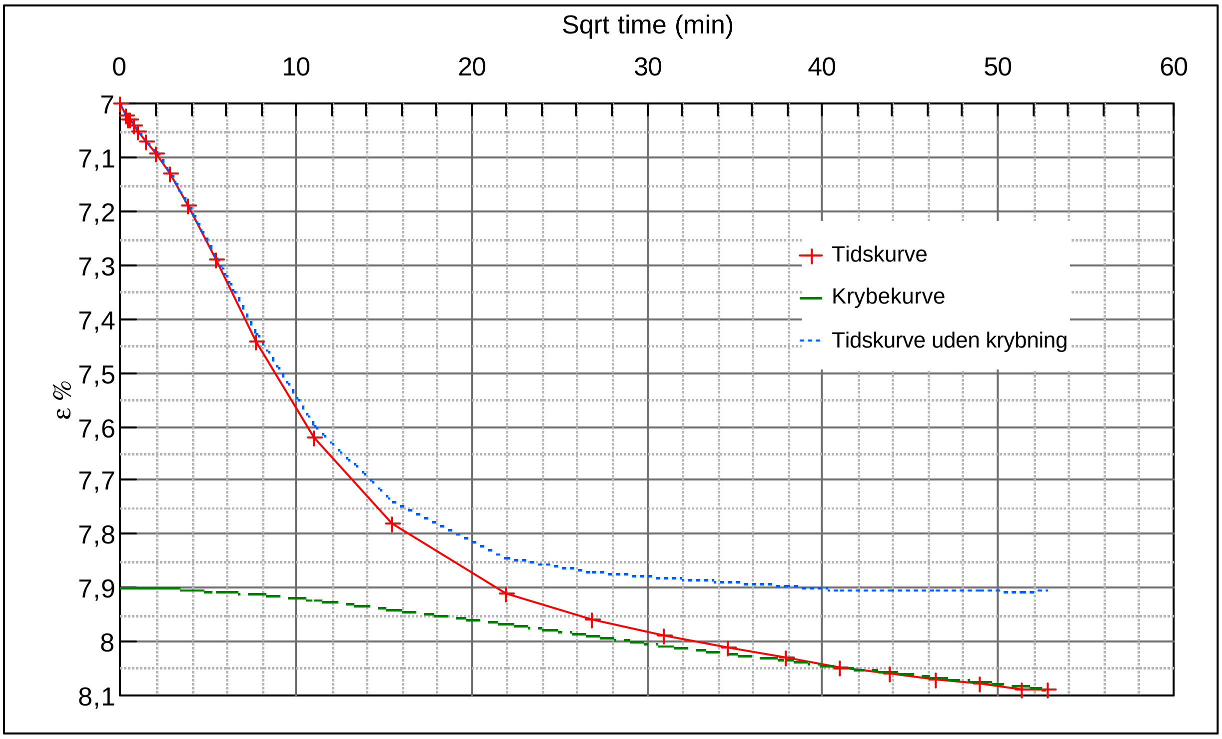


Material: Clay Eemian Glacial		**Job:**	Anholt	**AAU**
				Encl. No 4.6
Bor no :	Depth: 78 m.b.s.	Executed:	AMS/gt	Check:
Lab. no: k12	Insitu stress:~800 kPa	Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k12**
Department of Civil Engineering		**Page no**	**6**
Aalborg University		**Date**	**14.10.92**
			20.09.05/gt

Step no	σ	kPa	ε	%				
5	Before	1.390,3	ε0	7,00	ε_i		tc in sec	13500
	After	2.084,2	ε~#	8,09	ε_{c} %	7,9	K i kPa	77.102
					ε_s	0,2	k10 m/sec	9,1E-12
					ε_{kryb}	0,19	ck10 m^2 /sec	7,18E-08

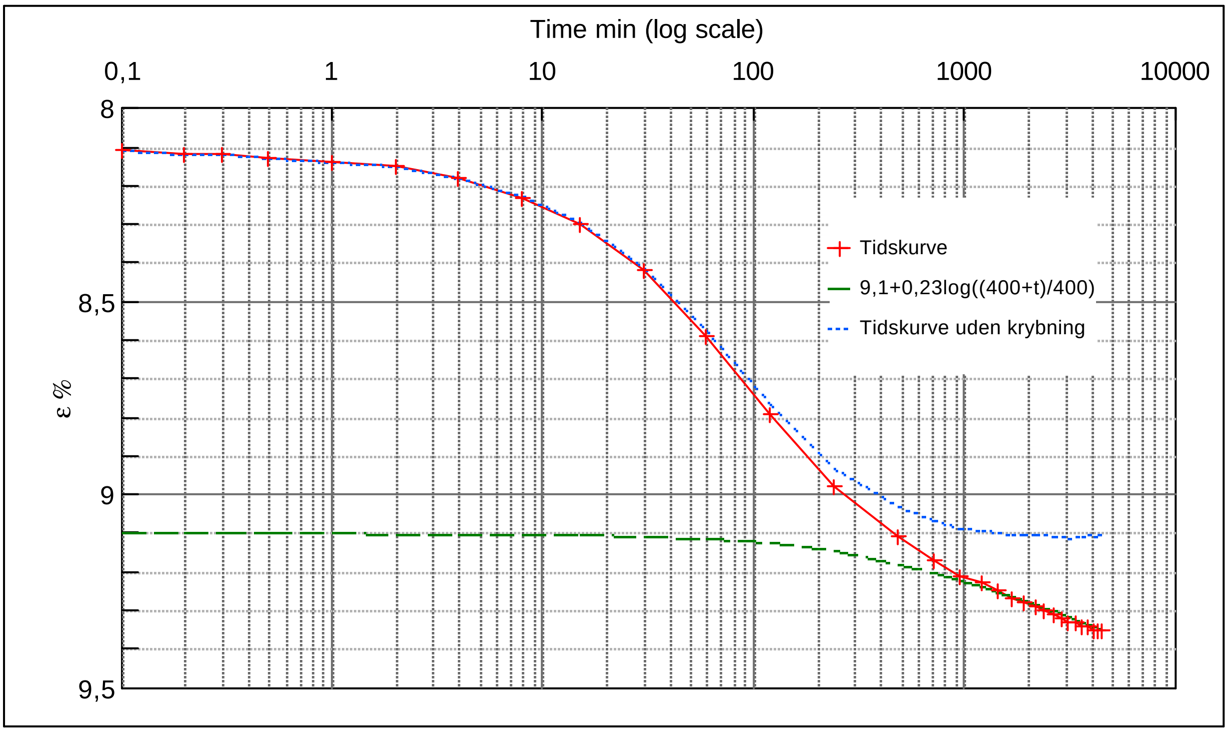


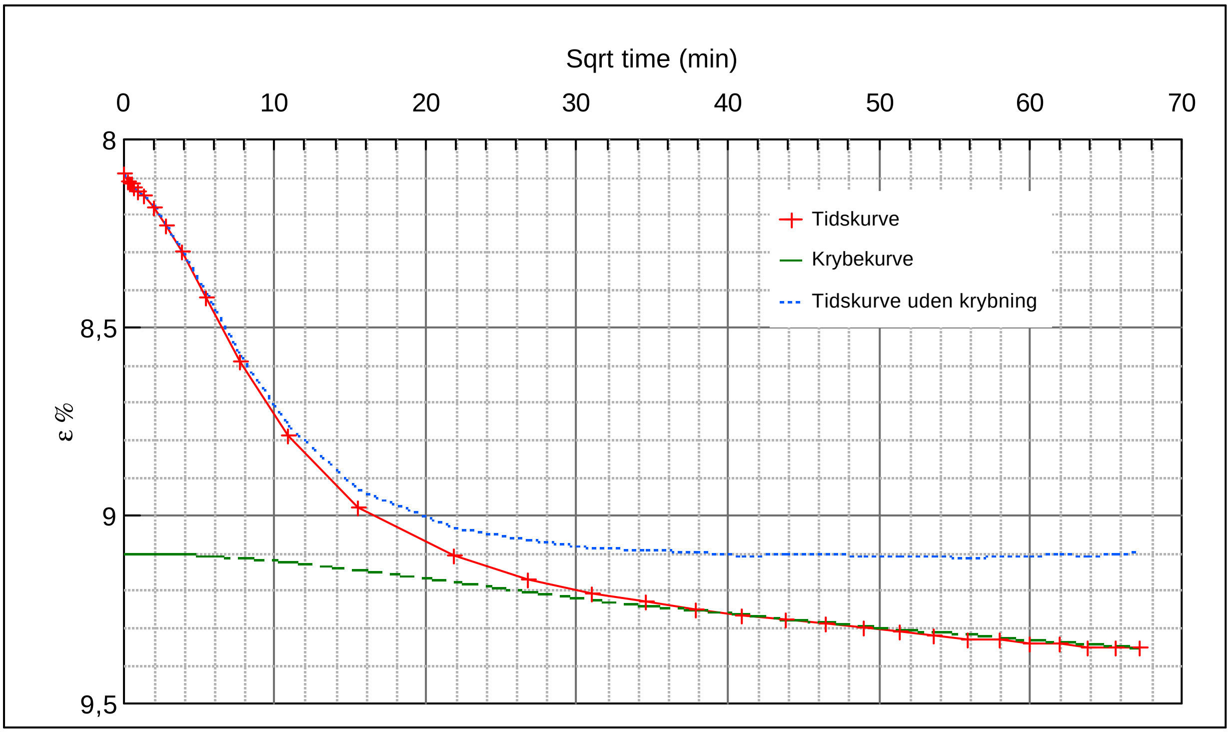


Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 4.7
Bor no :	Depth: 78 m.b.s.	Executed: AMS/gt	Check:
Lab. no: k12	Insitu stress:~800 kPa	Approved:	

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k12**
Department of Civil Engineering		**Page no**	**7**
Aalborg University		**Date**	**16.10.92**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	12615
6	Before	2.084,2	ε0	8,09	ε_c %	9,1	K i kPa	103.057
	After	3.125,0	ε~#	9,35	ε_s	0,2	k10 m/sec	7,3E-12
					ε_{kryb}	0,25	ck10 m^2 /sec	7,69E-08





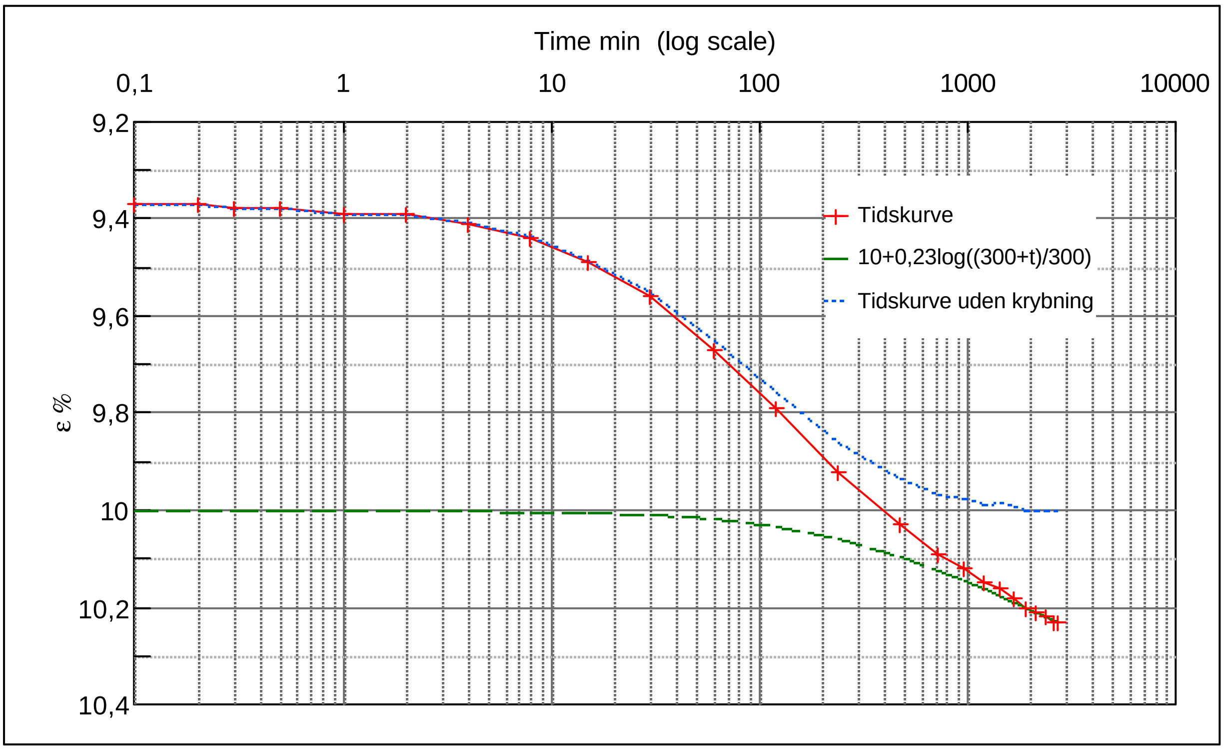
Material: Clay Eemian Glacial			**Job:** Anholt		**AAU** Encl. No 4.8
Bor no :	Depth:	78 m.b.s.	Executed:	AMS/gt	Check:
Lab. no: k12	Insitu stress	~800 kPa	Approved:		

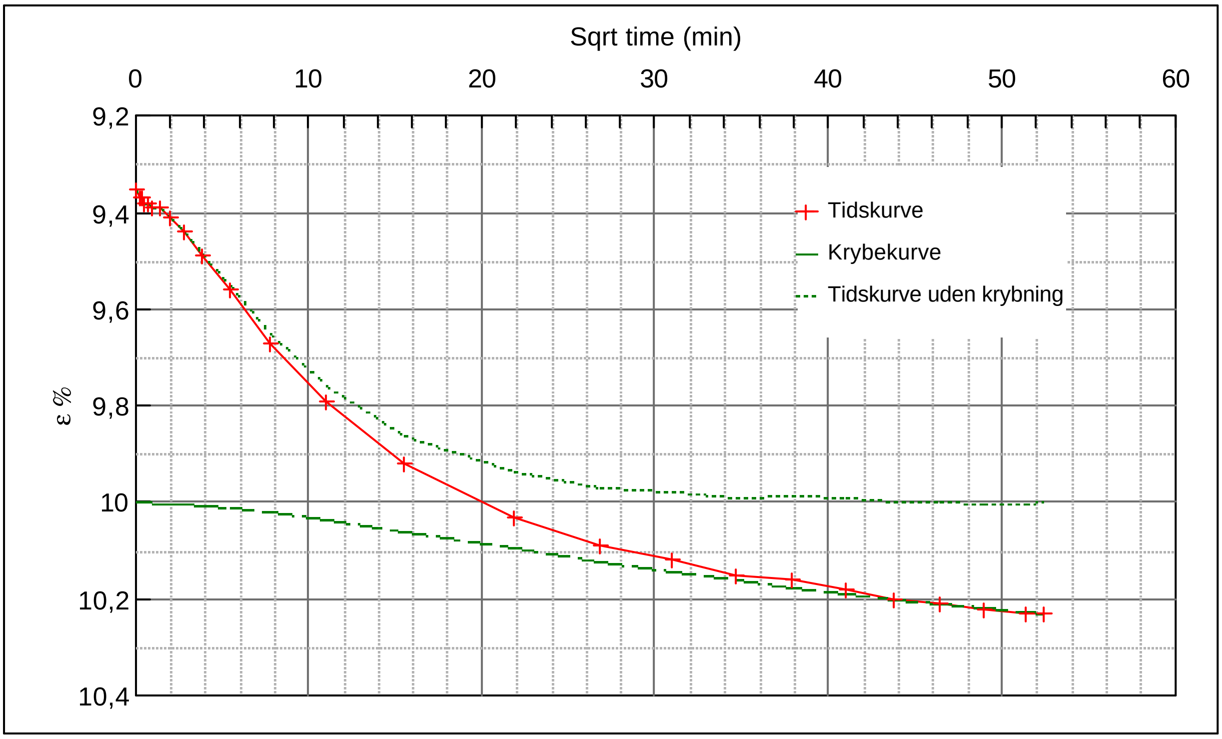
Geotechnical Engineering Group
Department of Civil Engineering
Aalborg University

OEDOMETER TEST

Test no	**Anh k12**
Page no	**8**
Date	**19.10.92**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	13500
7	Before	3.125,0	ε0	9,35	$\varepsilon_{c\ \%}$	10	K i kPa	160.134
	After	4.165,9	ε~#	10,23	ε_s	0,21	k10 m/sec	4,4E-12
					ε_{kryb}	0,23	ck10 m^2 /sec	7,18E-08





Material:	Clay Eemian Glacial		
Bor no :		Depth:	78 m.b.s.
Lab. no:	k12	Insitu stress:	~800 kPa

Job:	Anholt	**AAU**
		Encl. No 4.9
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group
Department of Civil Engineering
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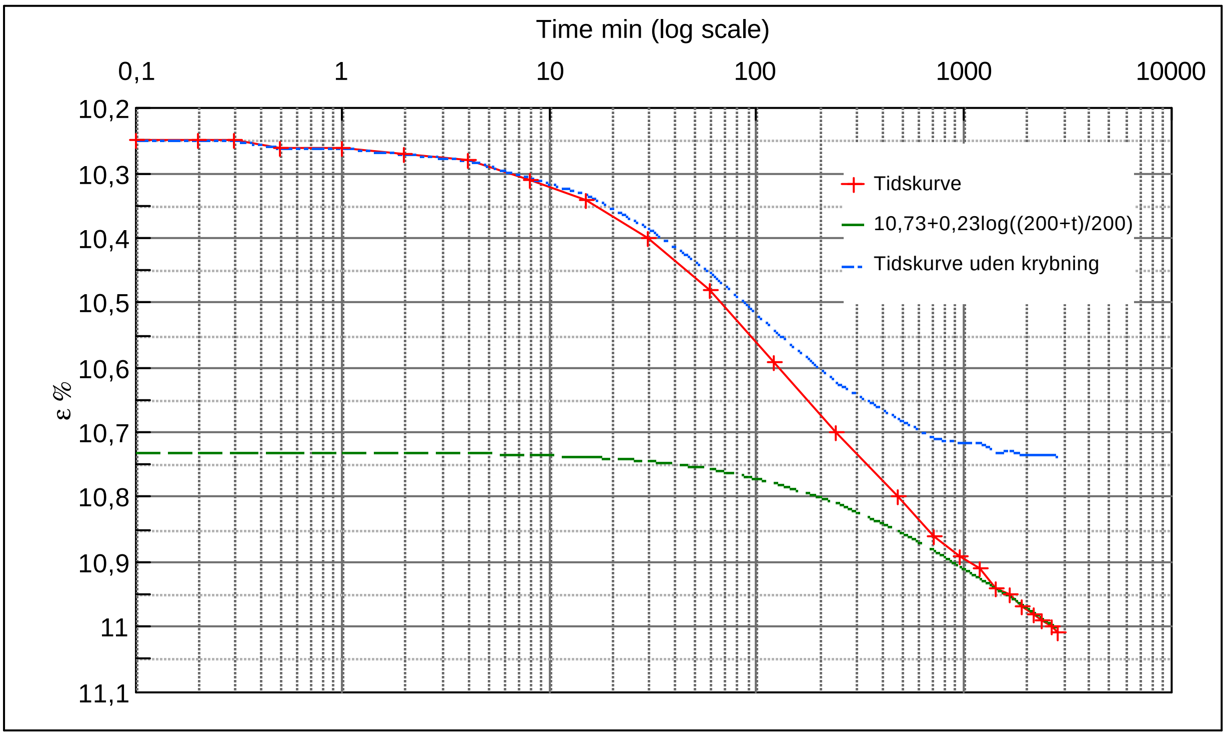
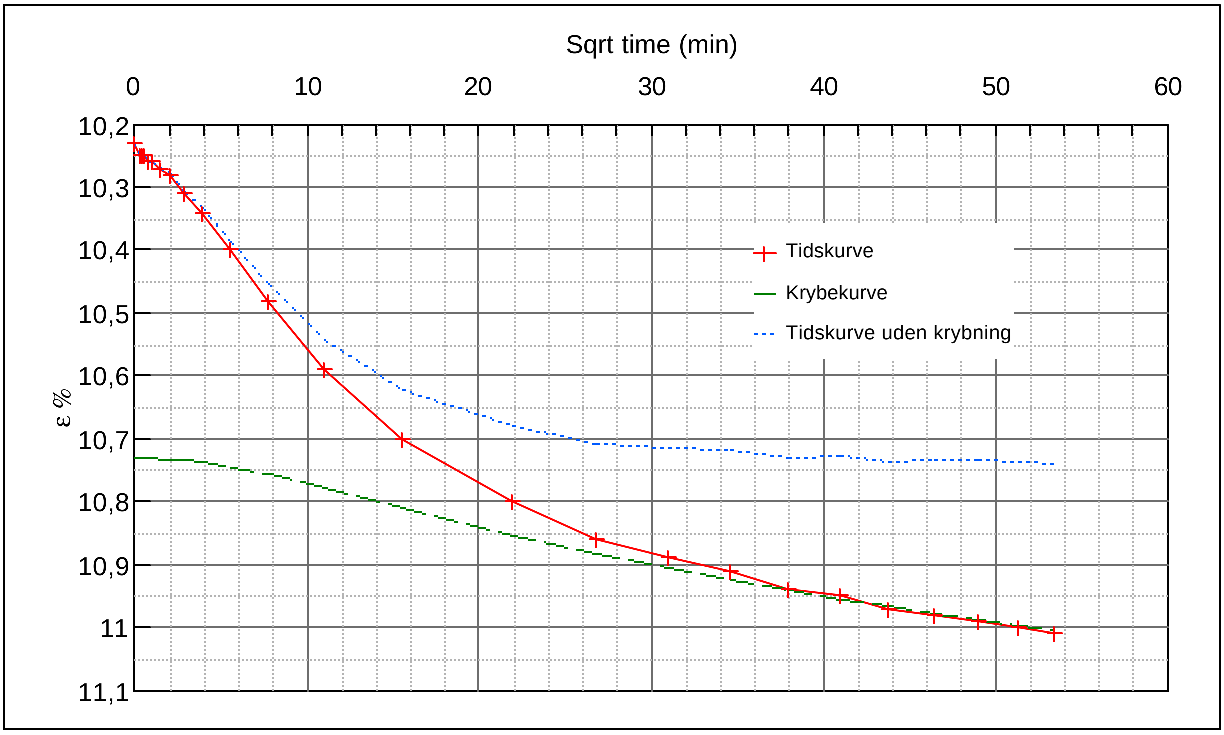
OEDOMETER TEST

Test no	**Anh k12**
Page no	**9**
Date	**21.10.92**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	12615
8	Before	4.165,92	ε0	10,23	ε c %	10,73	K i kPa	208.175
	After	5.206,80	ε~#	11,01	ε s	0,23	k10 m/sec	3,6E-12
					ε kryb	0,28	ck10 m^2 /sec	7,69E-08





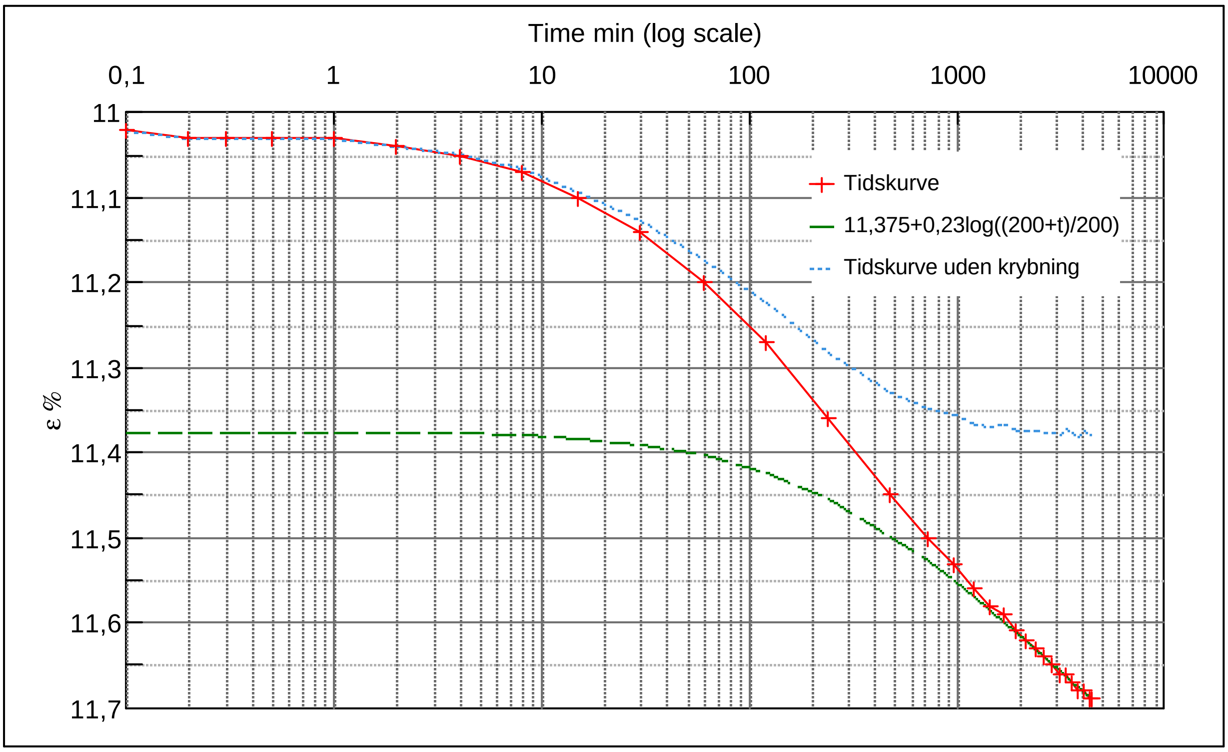
Material: Clay Eemian Glacial	
Bor no :	Depth: 78 m.b.s.
Lab. no: k12	Insitu stress ~800 kPa

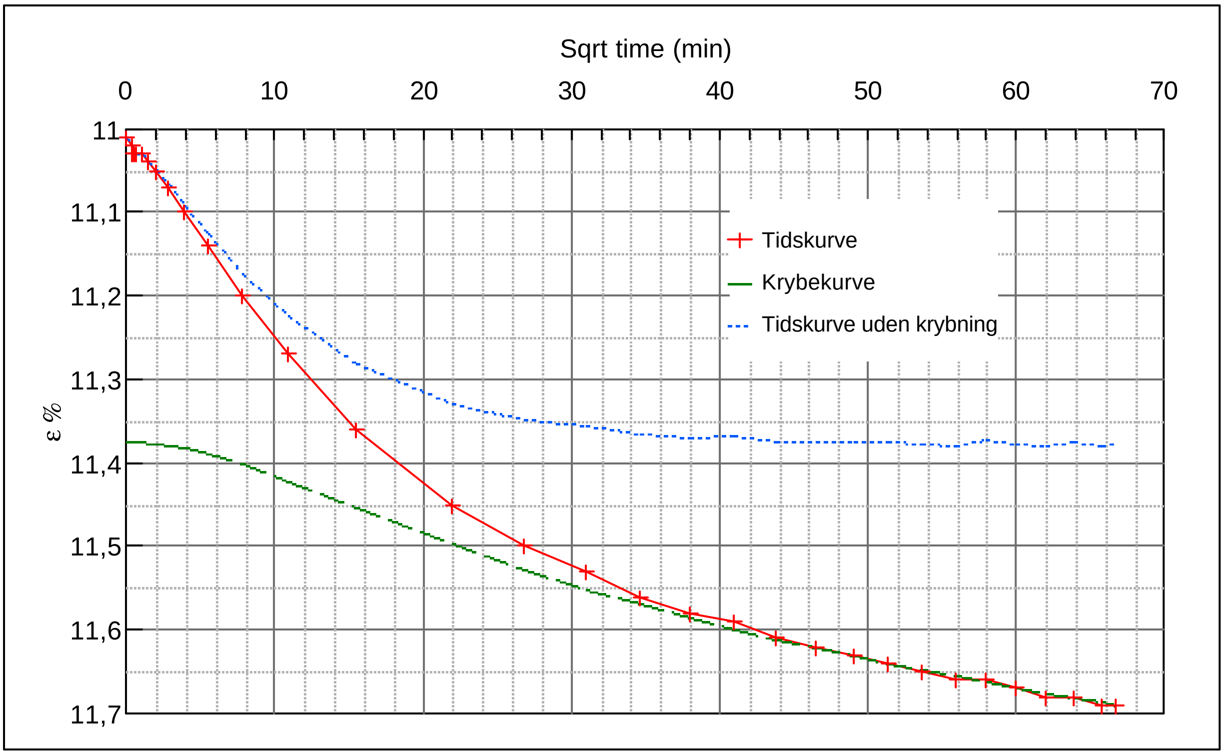
Job: Anholt	**AAU**
	Encl. No 4.10
Executed: AMS/gt	Check:
Approved:	

Geotechnical Engineering Group **OEDOMETER TEST** **Test no** **Anh k12**
Department of Civil Engineering **Page no** **10**
Aalborg University **Date** **23.10.92**

20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	12615
9	Before	5.206,8	ε0	11,01	ε_c %	11,38	K i kPa	285.171
	After	6.247,7	ε~#	11,69	ε_s	0,23	k10 m/sec	2,6E-12
					ε_{kryb}	0,315	ck10 m^2 /sec	7,69E-08





Material:
Clay Eemian Glacial

Bor no :
Lab. no: k12

Depth: 78 m.b.s.
Insitu stress:~800 kPa

Job: Anholt

AAU
Encl. No
4.11

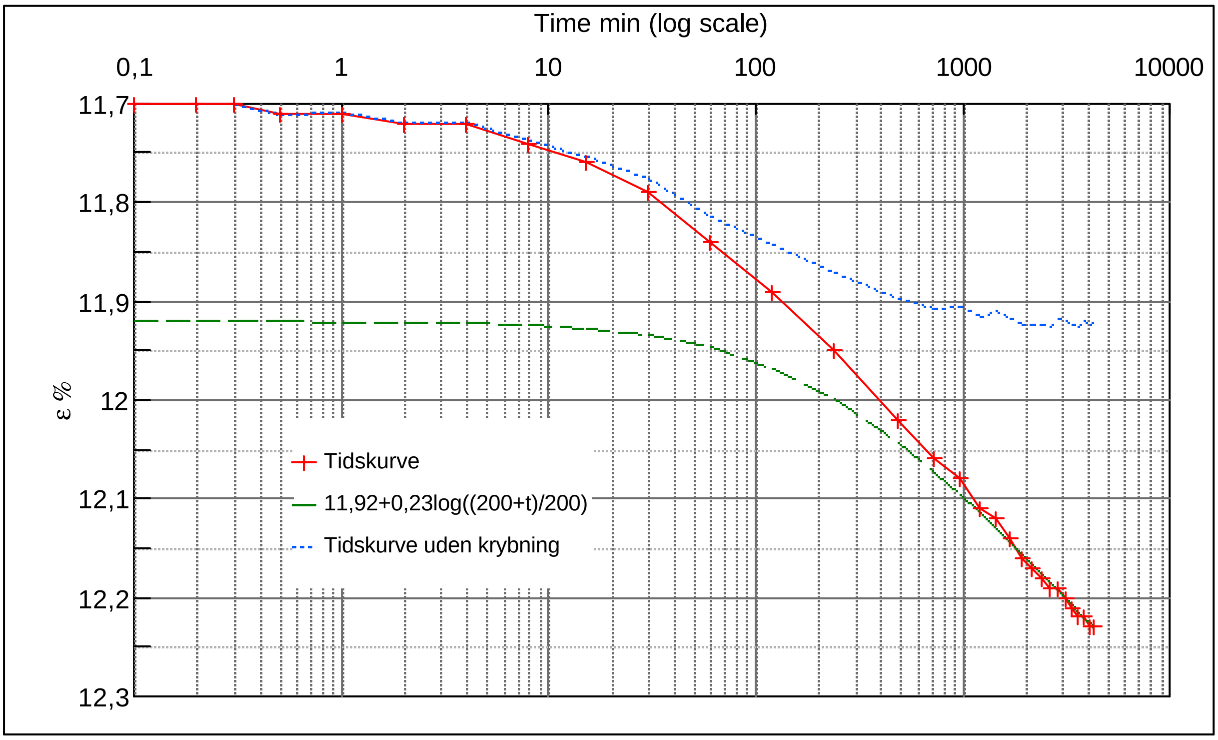
Executed: AMS/gt
Check:
Approved:

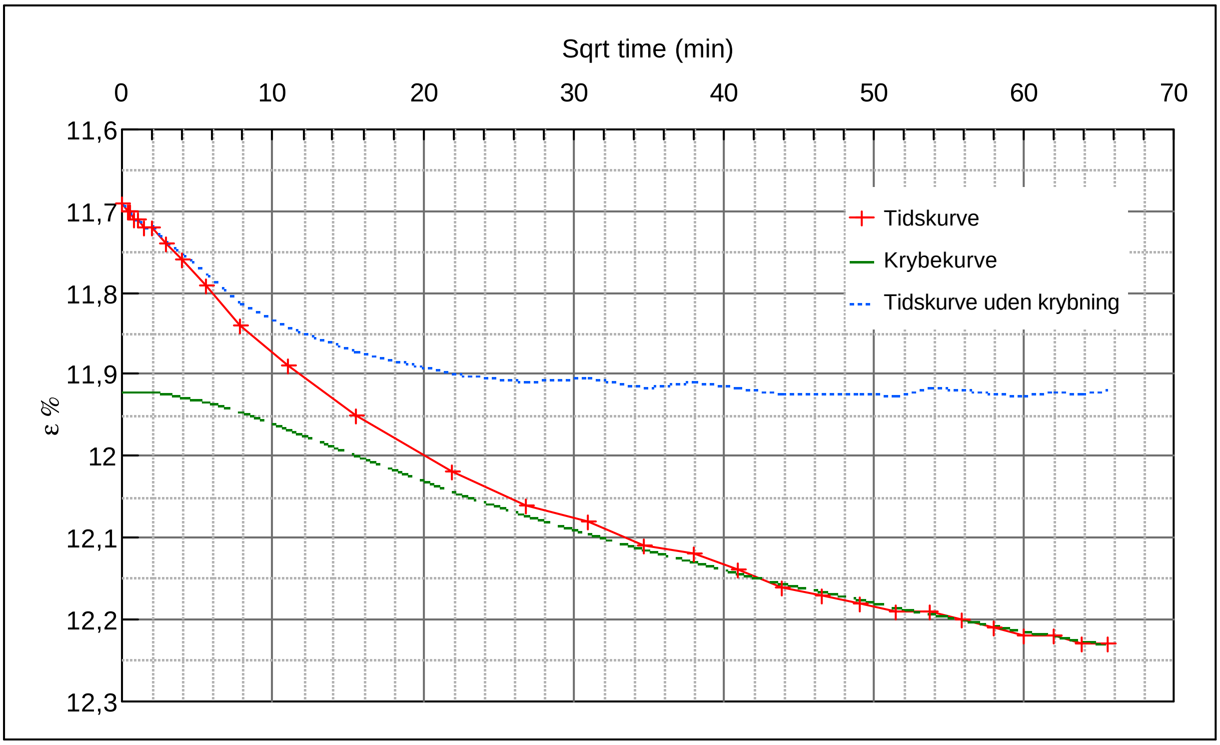
Geotechnical Engineering Group
Department of Civil Engineering
Aalborg University

OEDOMETER TEST

Test no	**Anh k12**
Page no	**11**
Date	**26.10.92**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	7260
10	Before	6.247,7	ε0	11,69	ε c %	11,92	K i kPa	452.554
	After	7.288,5	ε~#	12,23	ε s	0,23	k10 m/sec	2,9E-12
					ε kryb	0,31	ck10 m^2 /sec	1,34E-07





Material: Clay Eemian Glacial	
Bor no :	Depth: 78 m.b.s.
Lab. no: k12	Insitu stress:~800 kPa

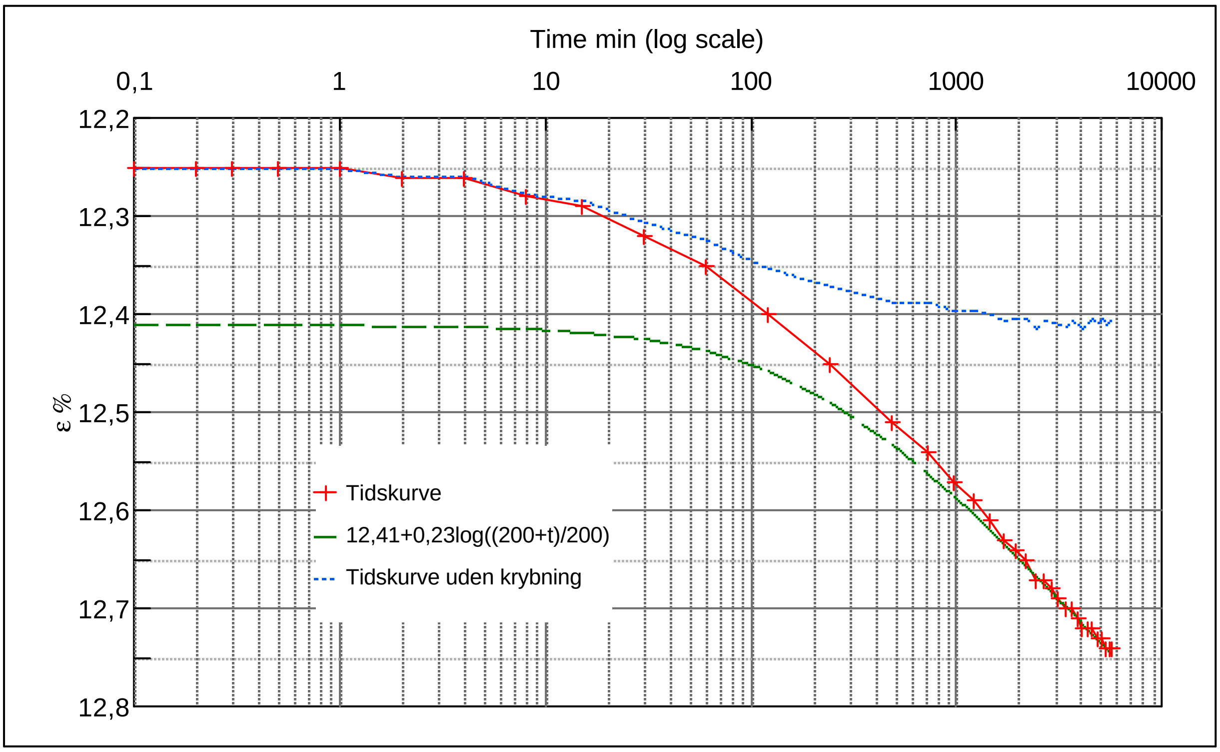
Job: Anholt	**AAU**
	Encl. No 4.12
Executed: AMS/gt	Check:
Approved:	

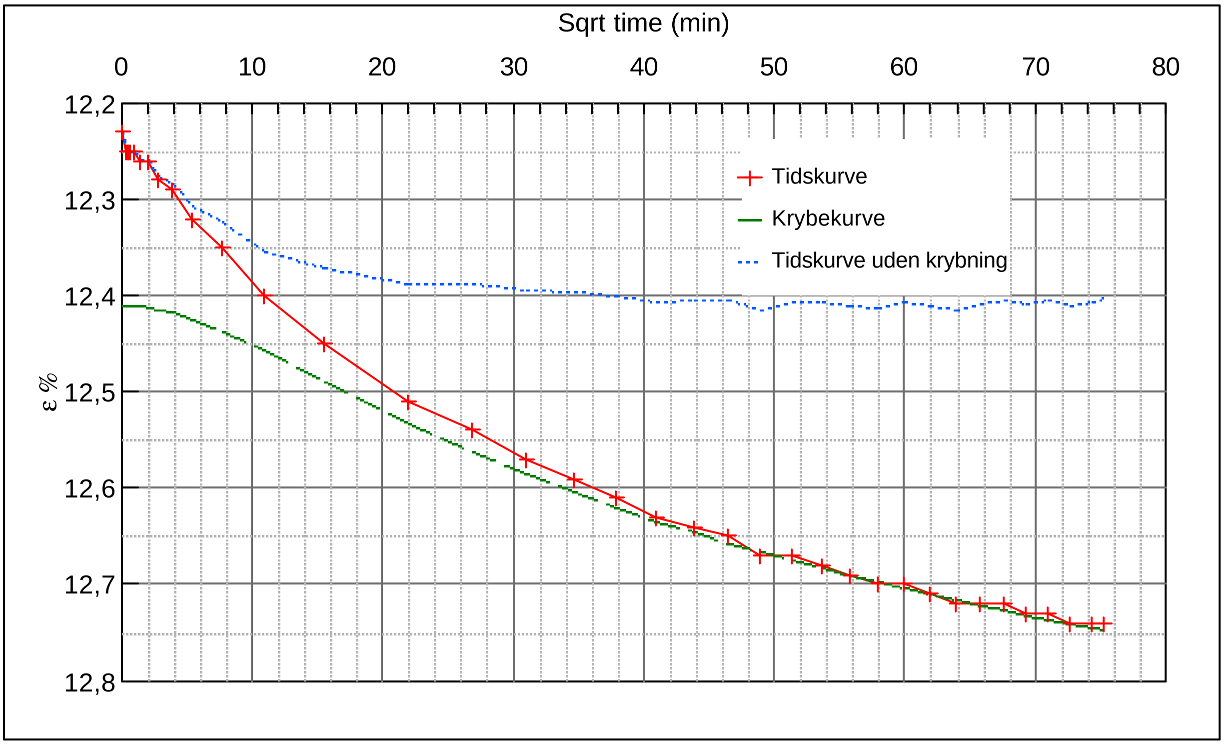
Geotechnical Engineering Group
Department of Civil Engineering
Aalborg University

OEDOMETER TEST

Test no **Anh k12**
Page no **12**
Date **29.10.92**
20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	7260
11	Before	7.288,5	ε0	12,23	ε c %	12,41	K i kPa	578.263
	After	8.329,4	ε~#	12,74	ε s	0,23	k10 m/sec	2,3E-12
					ε kryb	0,33	ck10 m^2 /sec	1,34E-07





Material:			
Clay Eemian Glacial			
Bor no :		Depth:	78 m.b.s.
Lab. no:	k12	Insitu stress:~800 kPa	

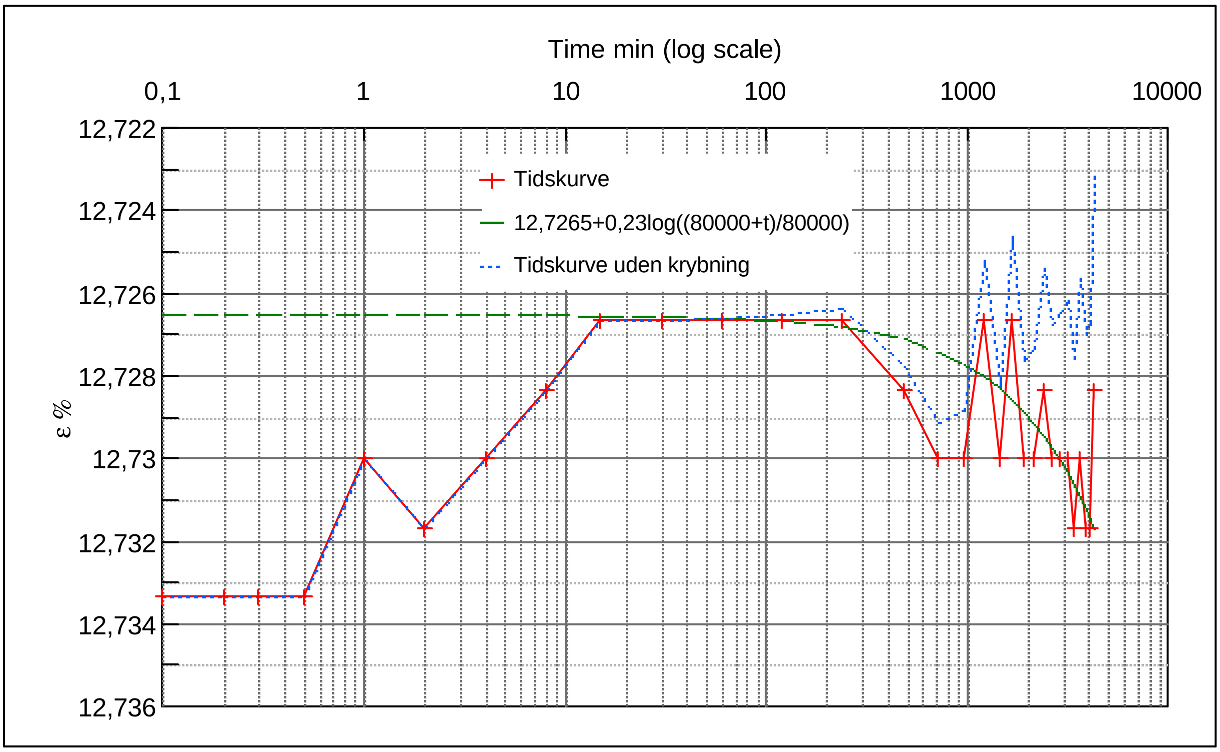
Job:	Anholt	**AAU**
		Encl. No 4.13
Executed:	AMS/gt	Check:
Approved:		

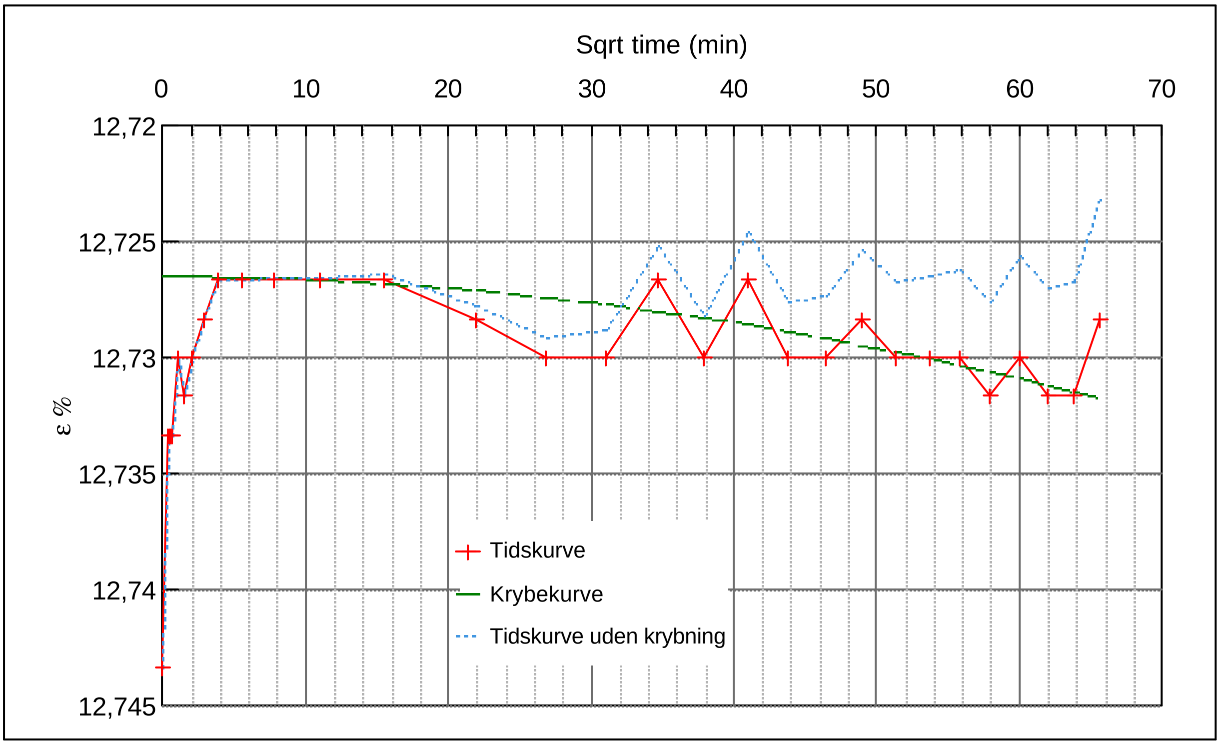
Geotechnical Engineering Group
Department of Civil Engineering
Aalborg University

OEDOMETER TEST

Test no	**Anh k12**
Page no	**13**
Date	**02.11.92**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε		tc in sec	960
12	Before	8.329,4	ε0	12,74	ε_i		K i kPa	6.183.406
	After	7.288,5	ε~#	12,73	ε_{c} %	12,73	k10 m/sec	1,6E-12
					ε_{s}	0,04		
					ε_{kryb}	0,0015	ck10 m^2 /sec	1,01E-06



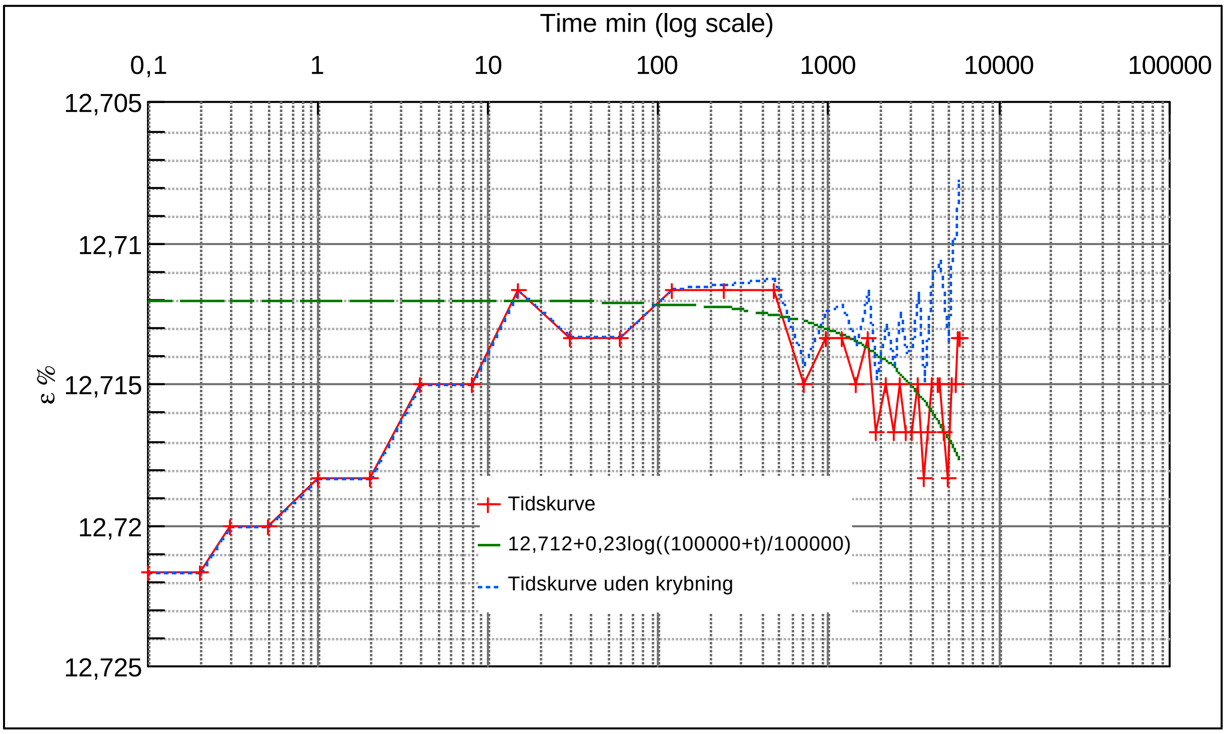


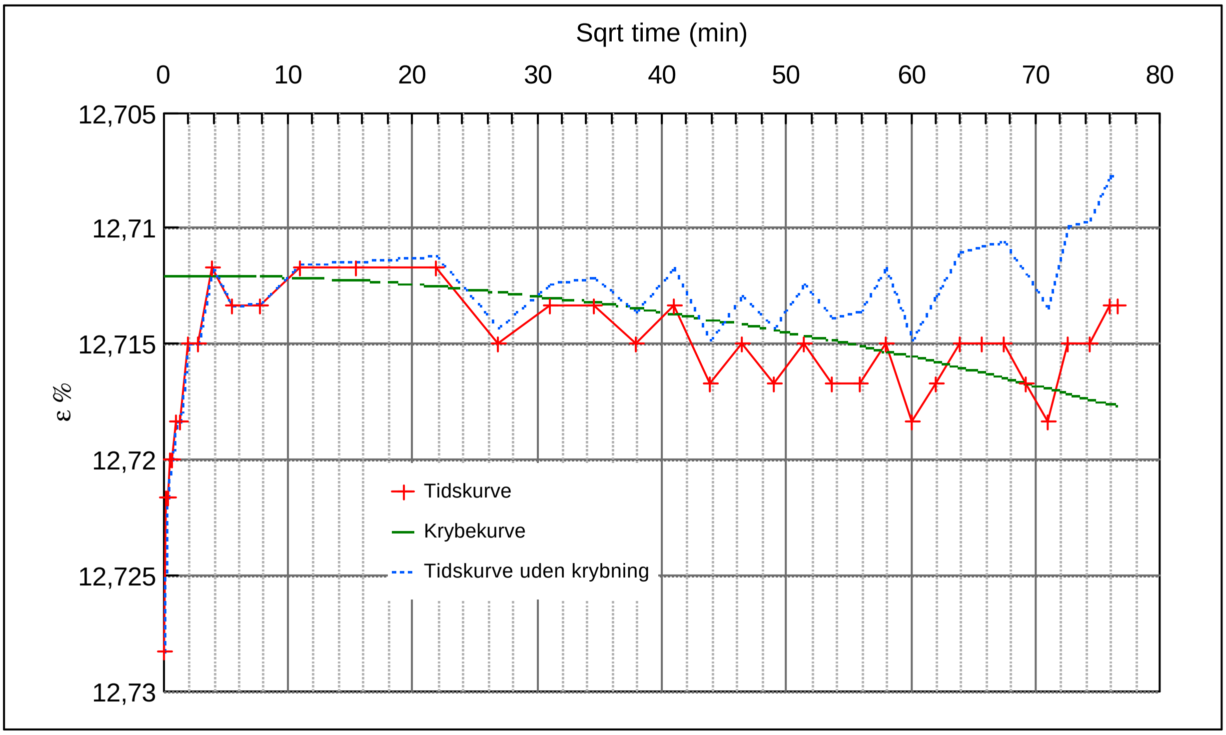
Material: Clay Eemian Glacial			
Bor no :		Depth:	78 m.b.s.
Lab. no:	k12	Insitu stress:~800 kPa	

Job:	Anholt	**AAU**
		Encl. No 4.14
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k12**
Department of Civil Engineering		**Page no**	**14**
Aalborg University		**Date**	**05.11.92**
			20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	960
13	Before	7.288,5	ε0	12,73	ε c %	12,71	K i kPa	6.372.694
	After	6.247,7	ε~#	12,71	ε s	0,006	k10 m/sec	1,6E-12
					ε kryb	0,001	ck10 m^2 /sec	1,01E-06





Material: Clay Eemian Glacial		**Job:** Anholt	**AAU**
			Encl. No 4.15
Bor no :	Depth: 78 m.b.s.	Executed: AMS/gt	Check:
Lab. no: k12	Insitu stress ~800 kPa	Approved:	

Geotechnical Engineering Group
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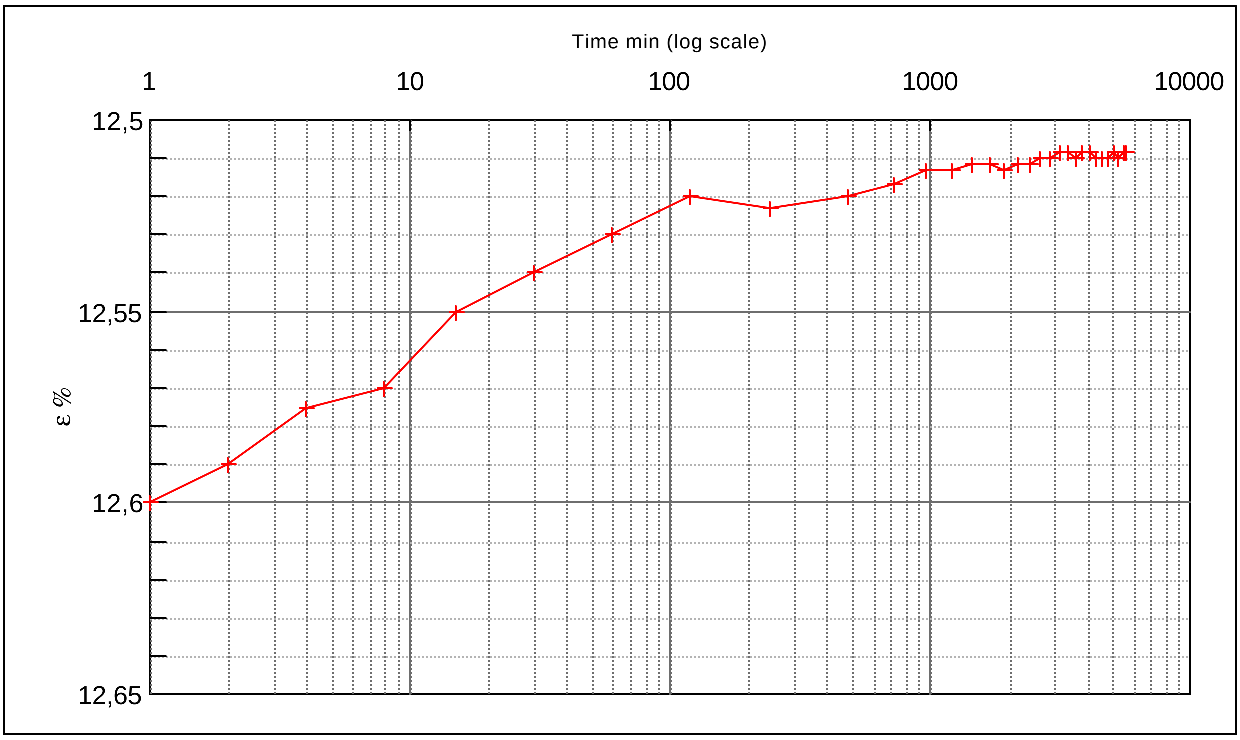
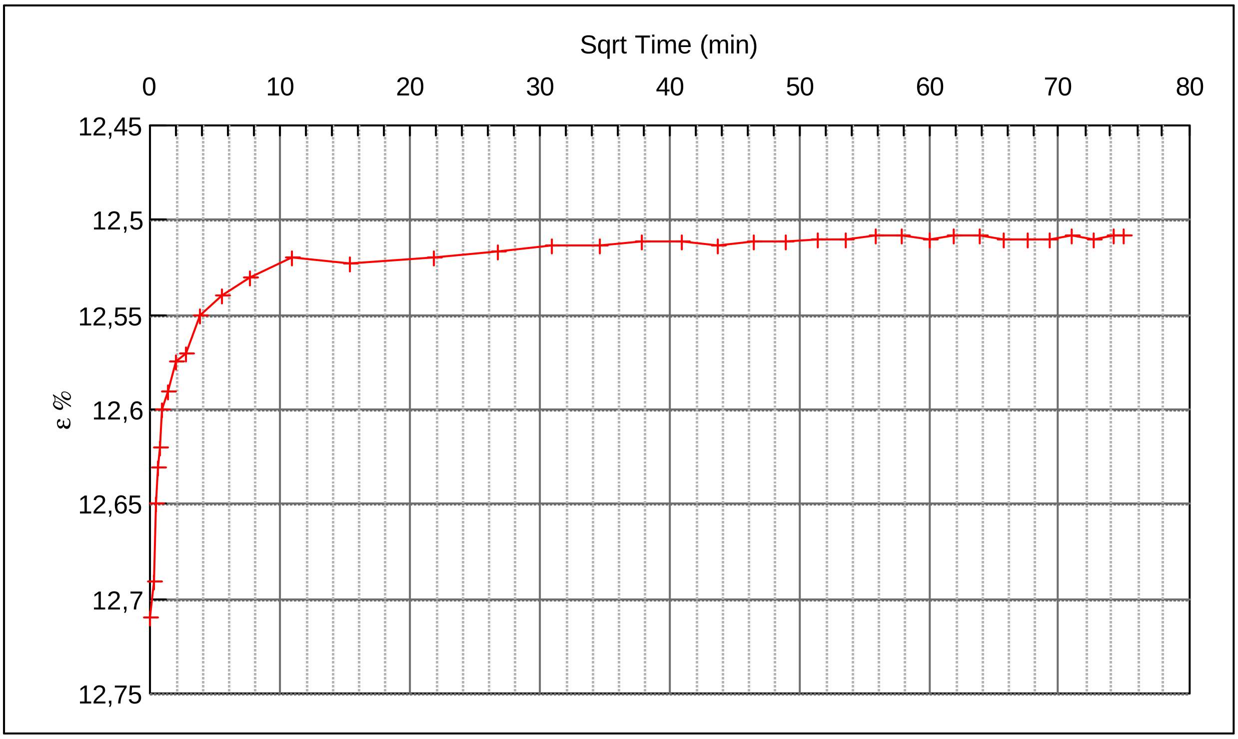
OEDOMETER TEST

Test no	**Anh k12**
Page no	**15**
Date	**09.11.92**
	20.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	1500
14	Before	6.247,7	ε0	12,71	ε c %	12,5	K i kPa	1.545.851
	After	3.125,0	ε~#	12,51	ε s		k10 m/sec	4,1E-12
					ε kryb		ck10 m^2 /sec	6,47E-07





Material: Clay Eemian Glacial	
Bor no :	Depth: 78 m.b.s.
Lab. no: k12	Insitu stress ~800 kPa

Job:	Anholt	**AAU**
		Encl. No 4.16
Executed:	AMS/gt	Check:
Approved:		

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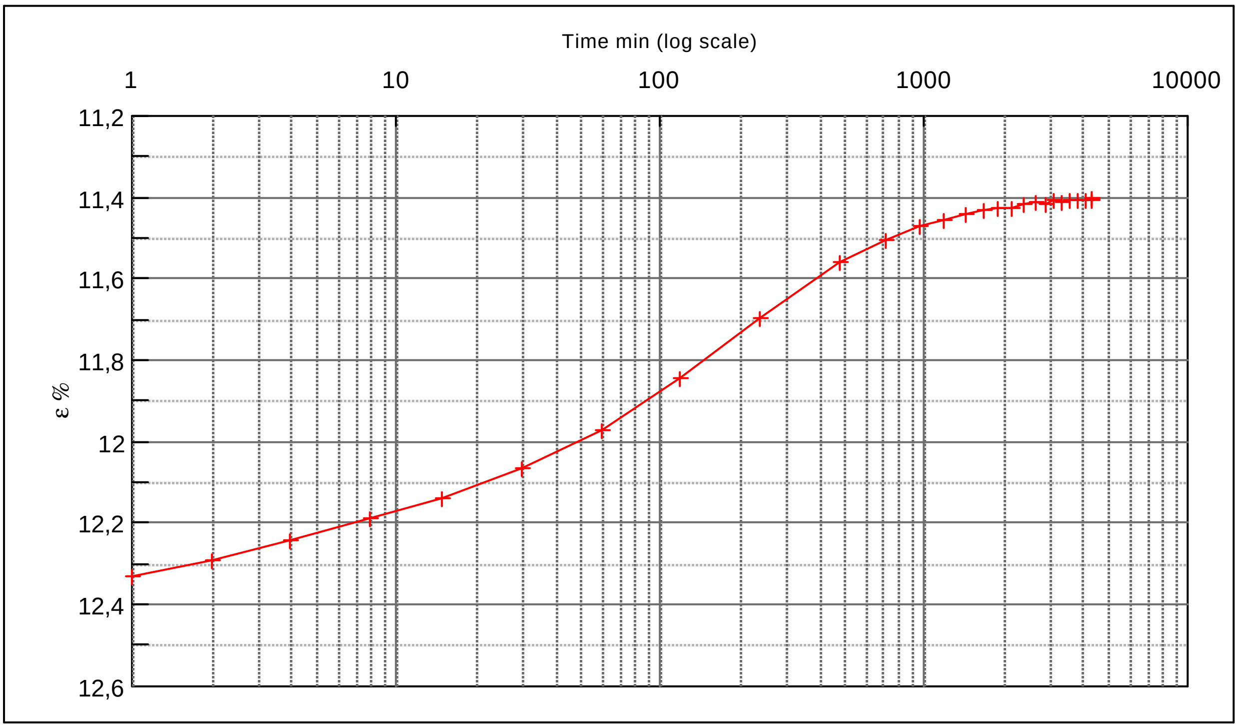
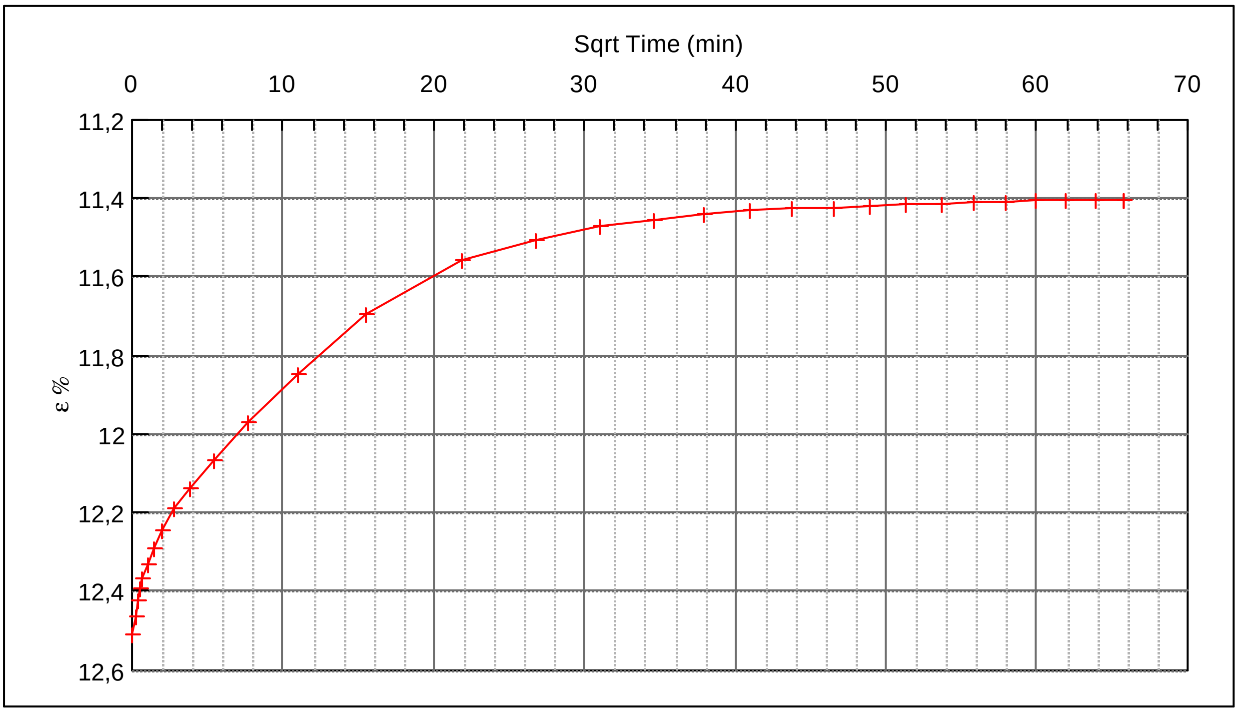
OEDOMETER TEST

Test no **Anh k12**
Page no **16**
Date **13.11.92**
20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	29040
15	Before	3.125,0	ε_0	12,51	ε_c %	11,4	K i kPa	219.527
	After	696,3	ε~#	11,40	ε_s		k10 m/sec	1,5E-12
					ε_{kryb}		ck10 m^2 /sec	3,34E-08





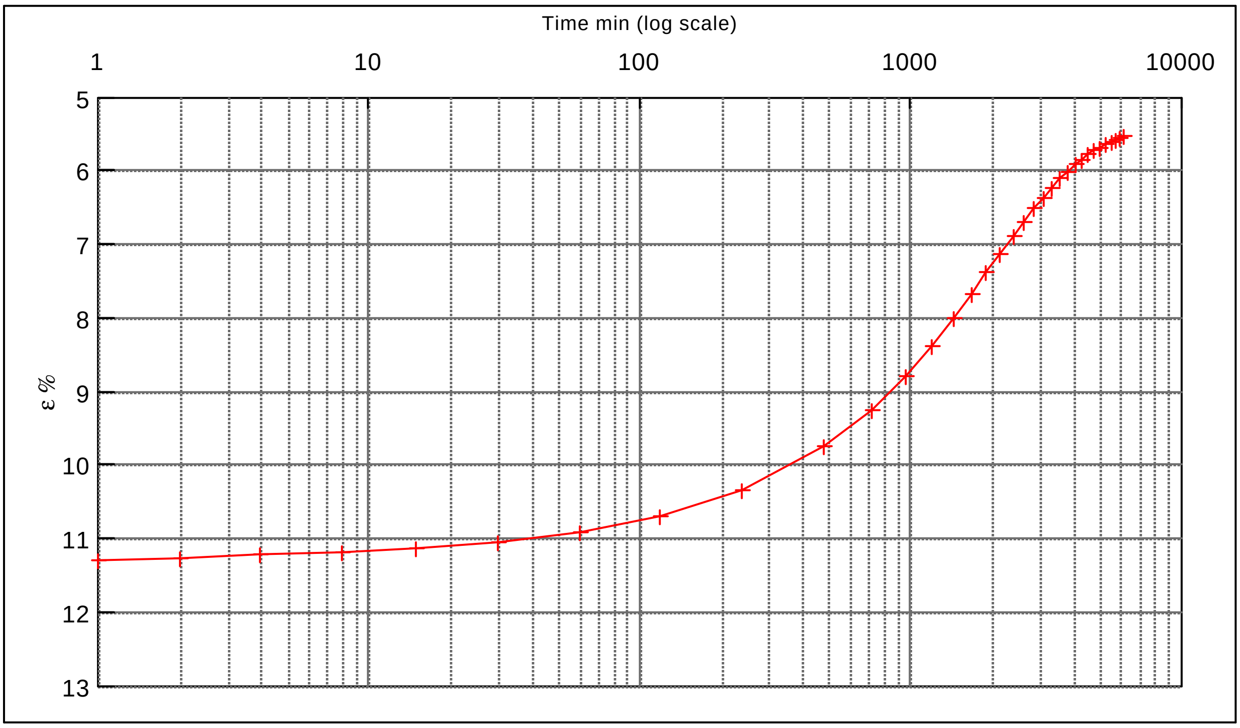
Material:		
	Clay Eemian Glacial	
Bor no :	Depth:	78 m.b.s.
Lab. no: k12	Insitu stress:	~800 kPa

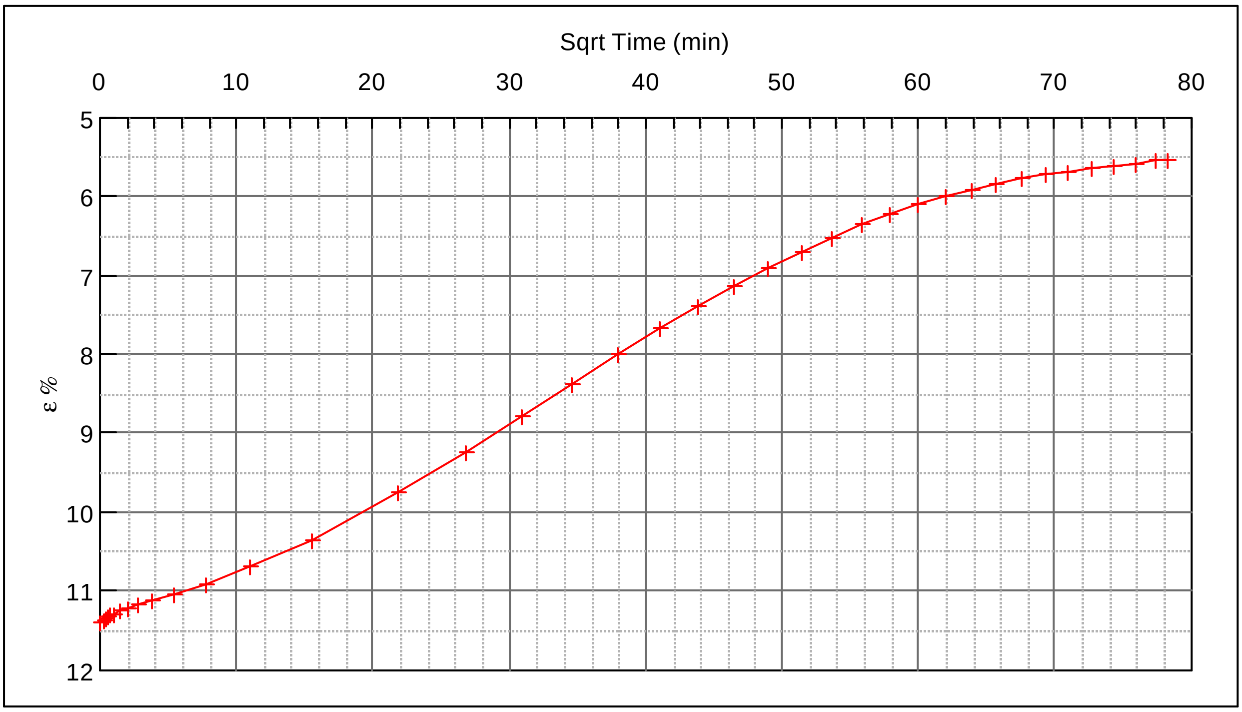
Job:	Anholt	**AAU**
		Encl. No 4.17
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group **Department of Civil Engineering** **Aalborg University**	**OEDOMETER TEST**	**Test no** **Page no** **Date**	**Anh k12** **17** **16.11.92**

20.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	230640
16	Before	696,3	ε_0	11,40	ε_c %	5,54	K i kPa	11.831
	After	2,43	ε~#	5,54	ε_s		k10 m/sec	3,5E-12
					ε_{kryb}		ck10 m^2 /sec	4,20E-09





Material: Clay Eemian Glacial		**Job:** Anholt	**AAU** Encl. No 4.18
Bor no :	Depth: 78 m.b.s.	Executed: AMS/gt	Check:
Lab. no: k12	Insitu stress: ~800 kPa	Approved:	

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k26**
Department of Civil Engineering		**Page no**	**1**
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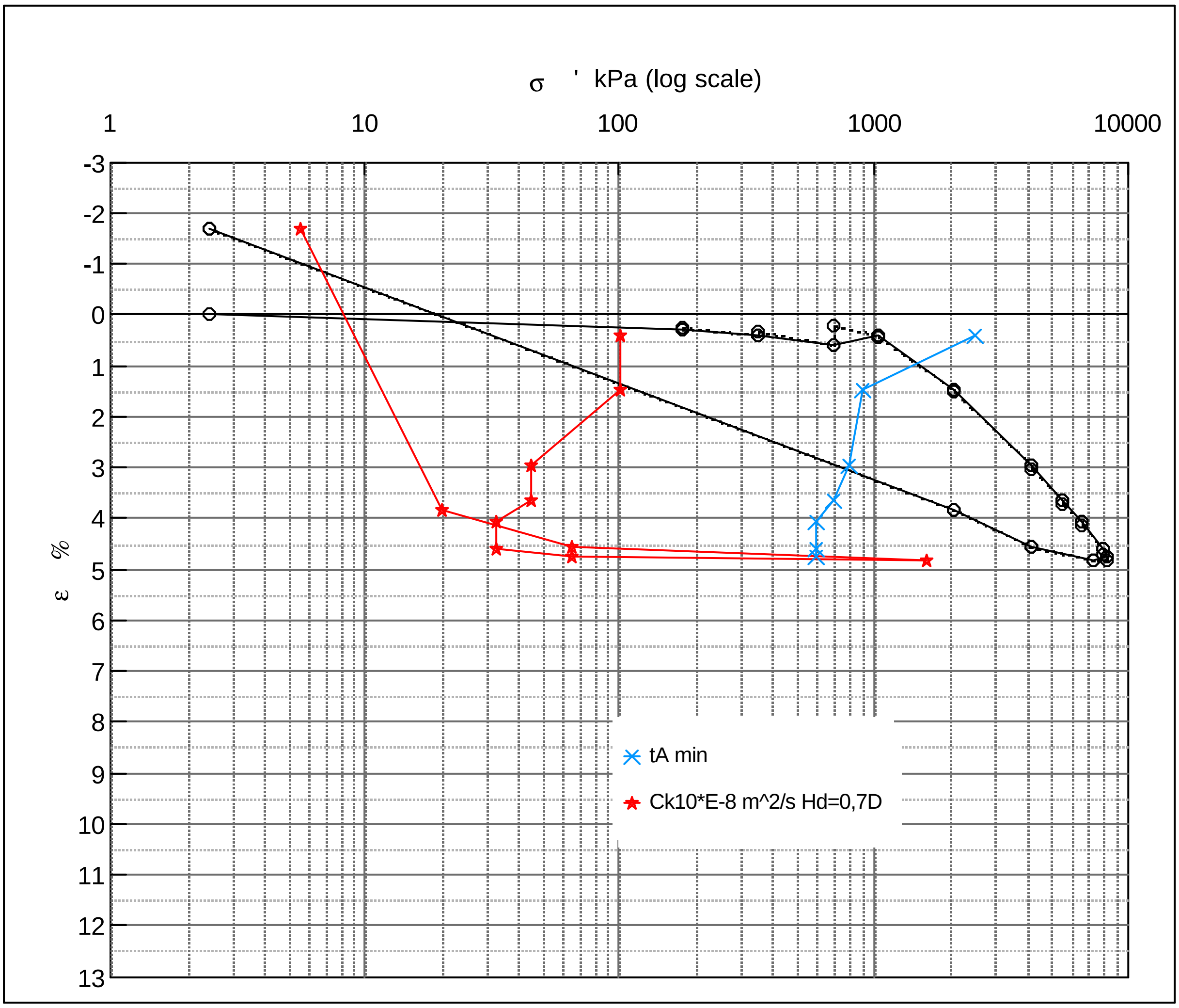
			19.09.05/gt

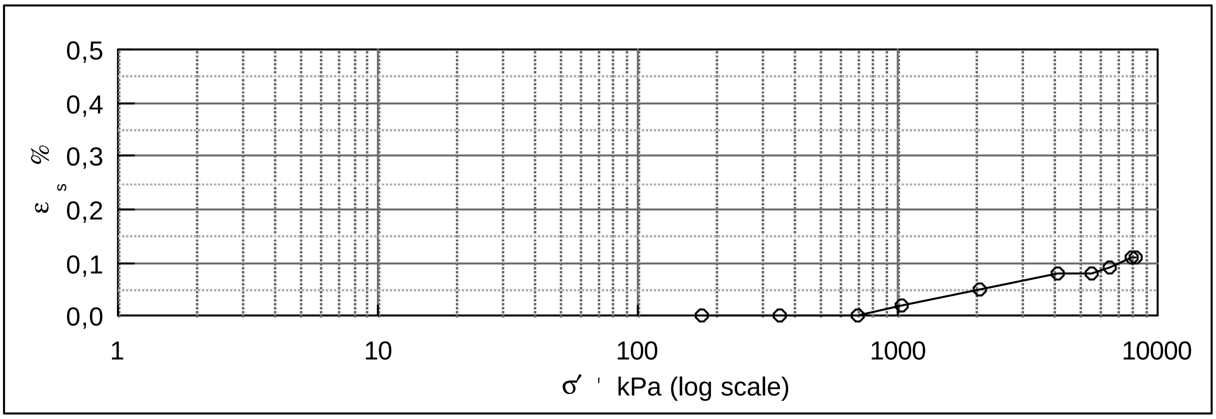
Description of soil:

Clay middle jura

Bor no :	A III	Overburden pressure	σ'_o	~1620 kPa
Lab. no:	k 26	Vane strength	c_v	kPa
Level :	162 m.b.s	CPT - value	q_c	MPa

	Before	After
Water content %	12,3	18,4
Bulk density Mg/m^3	2,07	2,15
Grain density Mg/m^3	~2.69	
Void ratio	0,47	0,49
Degr. of Saturation %	75	100
Dimension H x D mm	30x60	30.5x60

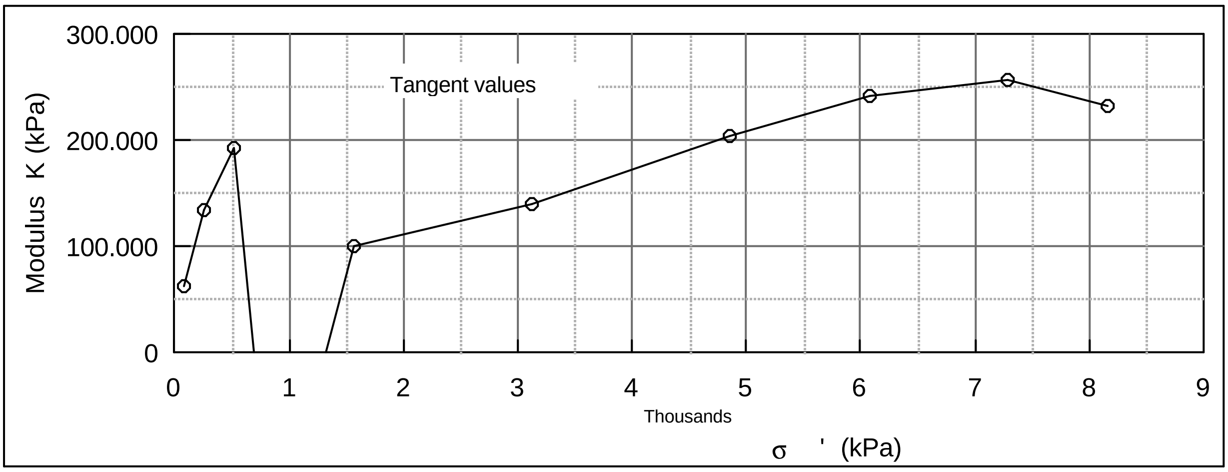


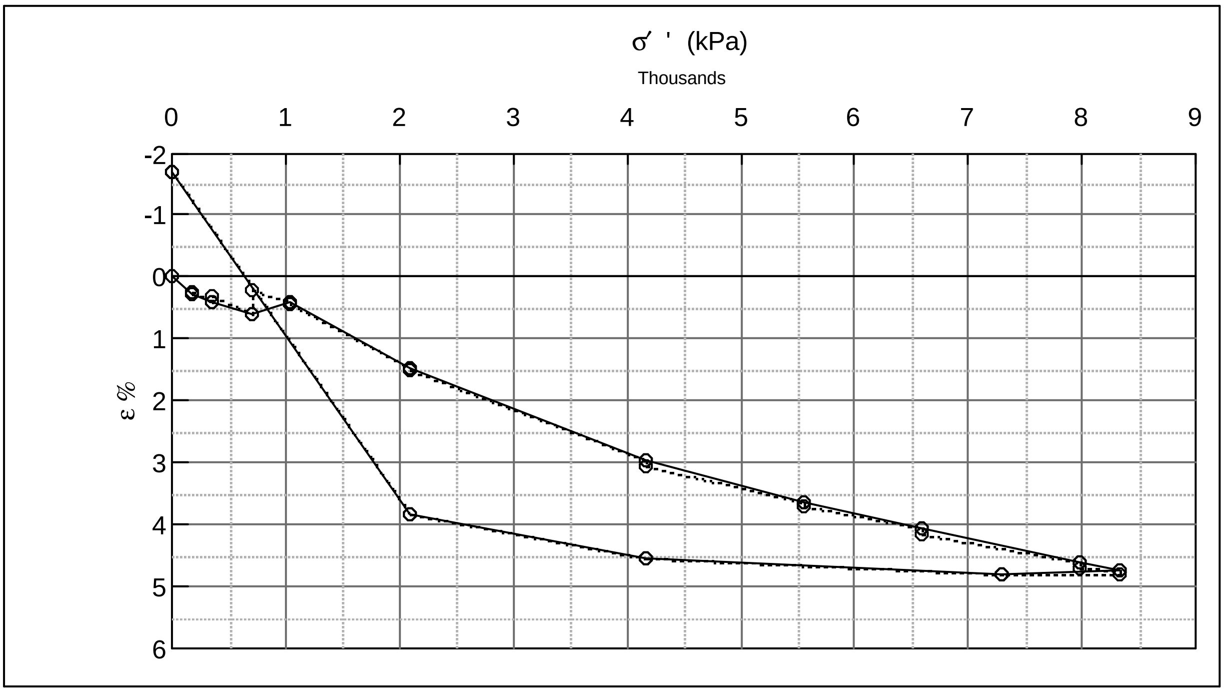


Job: Anholt		**AAU**
		Encl. No 5.1
Executed:	AMS/gt	Check:

OEDOMETER TEST **Test no** **Anh k26** **Page no** **1a**

19.09.05/gt





Test results

Q ~ 6 % ?
Qs 0.11 %
σ'_{pc} ~8000 kPa

σ'	ε_c	ε_s	C k10	σ'_m	K	w
kPa	%	% / lct	m^2/s	kPa	kPa	%
2,4	0,00					17,5
175,9	0,28			89,2	61956,7	17,3
349,4	0,41			262,6	133445,3	17,3
696,3	0,59			522,9	192754,3	17,2
1.043,3	0,41	0,02	1,0E-06	869,8	-187544,7	17,3
2.084,2	1,46	0,05	1,0E-06	1.563,7	98661,0	16,7
4.165,9	2,95	0,08	4,5E-07	3.125,0	139714,5	15,9
5.553,8	3,63	0,08	4,5E-07	4.859,8	204092,8	15,5
6.594,6	4,06	0,09	3,3E-07	6.074,2	242063,6	15,3
7.982,5	4,60	0,11	3,3E-07	7.288,5	257005,8	15,0
8.329,4	4,75	0,11	6,5E-07	8.155,9	231305,2	14,9
7.288,5	4,81		1,6E-05	7.809,0	-1892497,0	14,9
4.165,9	4,55		6,5E-07	5.727,2	1210317,8	15,0
2.084,2	3,85		2,0E-07	3.125,0	296545,1	15,4
2,4	(1,69)		5,6E-08	1.043,3	37590,2	18,4

Remark:
" Genbelastningsgren"
Normalkonsolideret tilstand næppe nået

Job: Anholt
AAU
Encl. No
5.2
Executed: AMS/gt
Check:
Approved:

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k26**
Department of Civil Engineering		**Page no**	**2**
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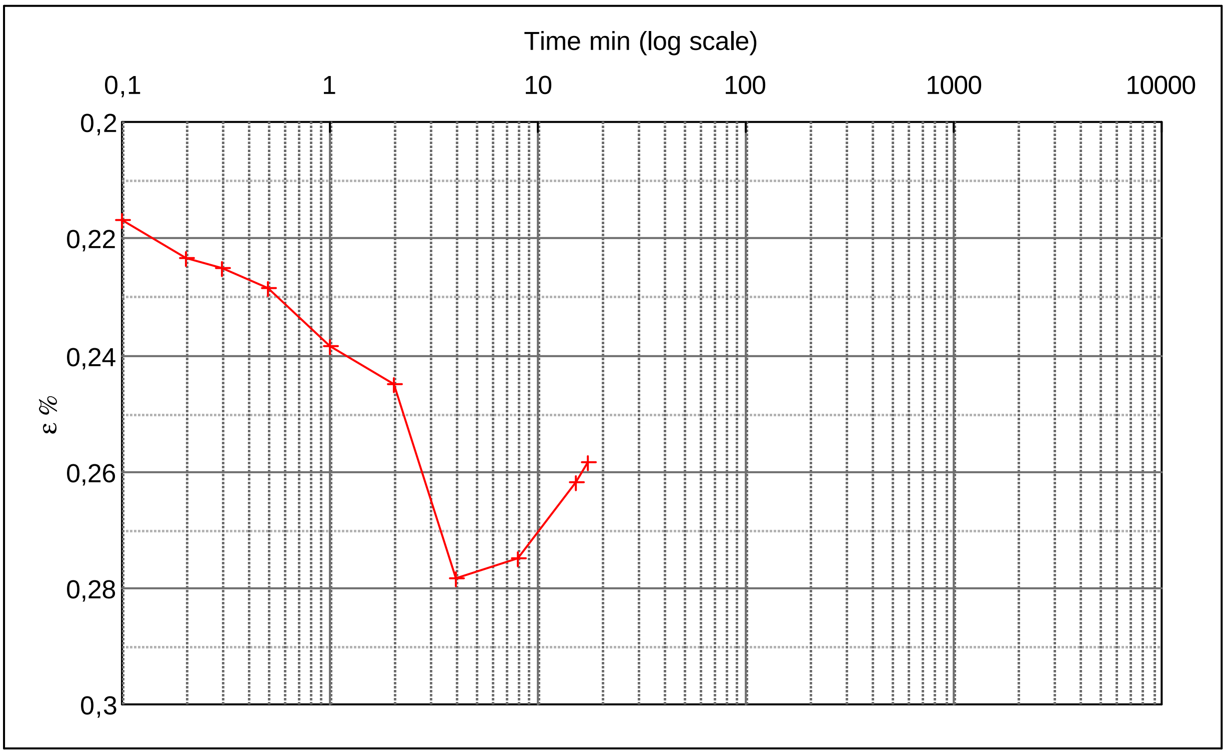
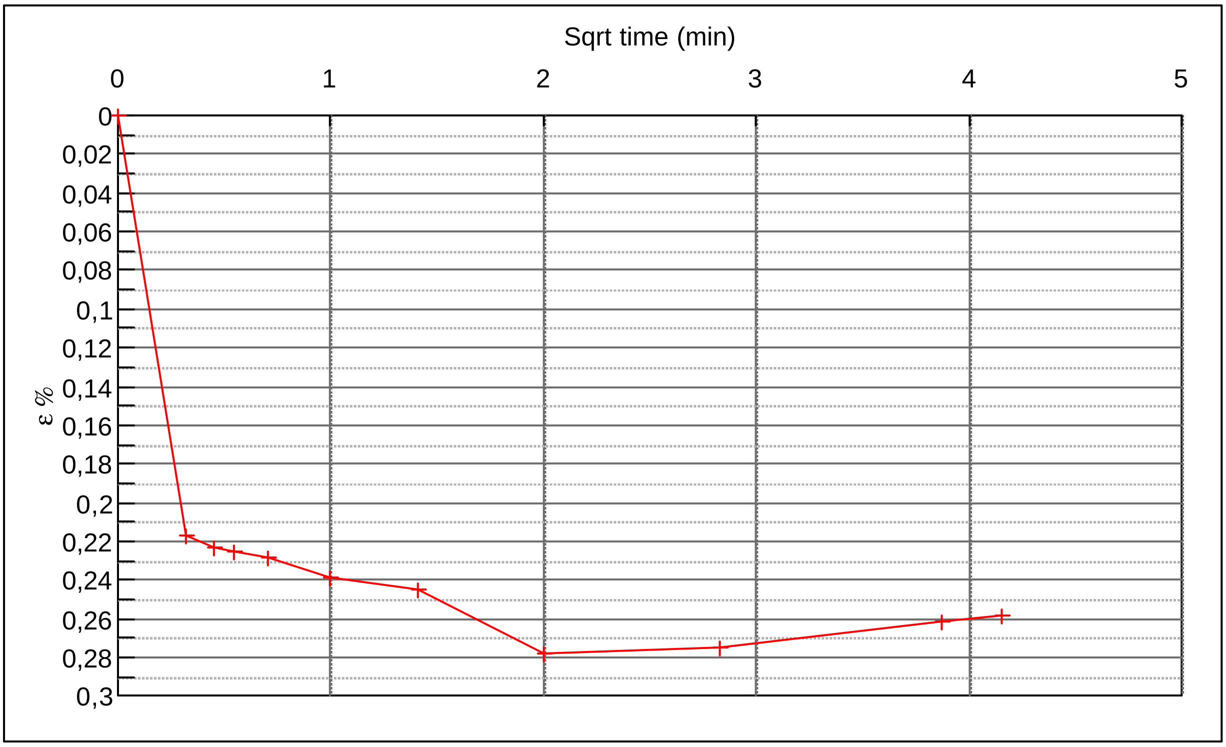
Step no	σ	kPa	ε	%	ε i		tc in sec	
1	Before	2,43	ε0	0,00	ε c %	0,28	K i kPa	
	After	175,9	ε~#	0,26	ε s		k10 m/sec	
					ε kryb		ck10 m^2 /sec	





Material: Clay middle jura		**Job:** Anholt	**AAU**
			Encl. No 5.3
Bor no : A III	Depth: 162 m.b.s	Executed: AMS/gt	Check:
Lab. no: k 26	Insitu stress:~1620 kPa	Approved:	

Geotechnical Engineering Group
Department of Civil Engineering
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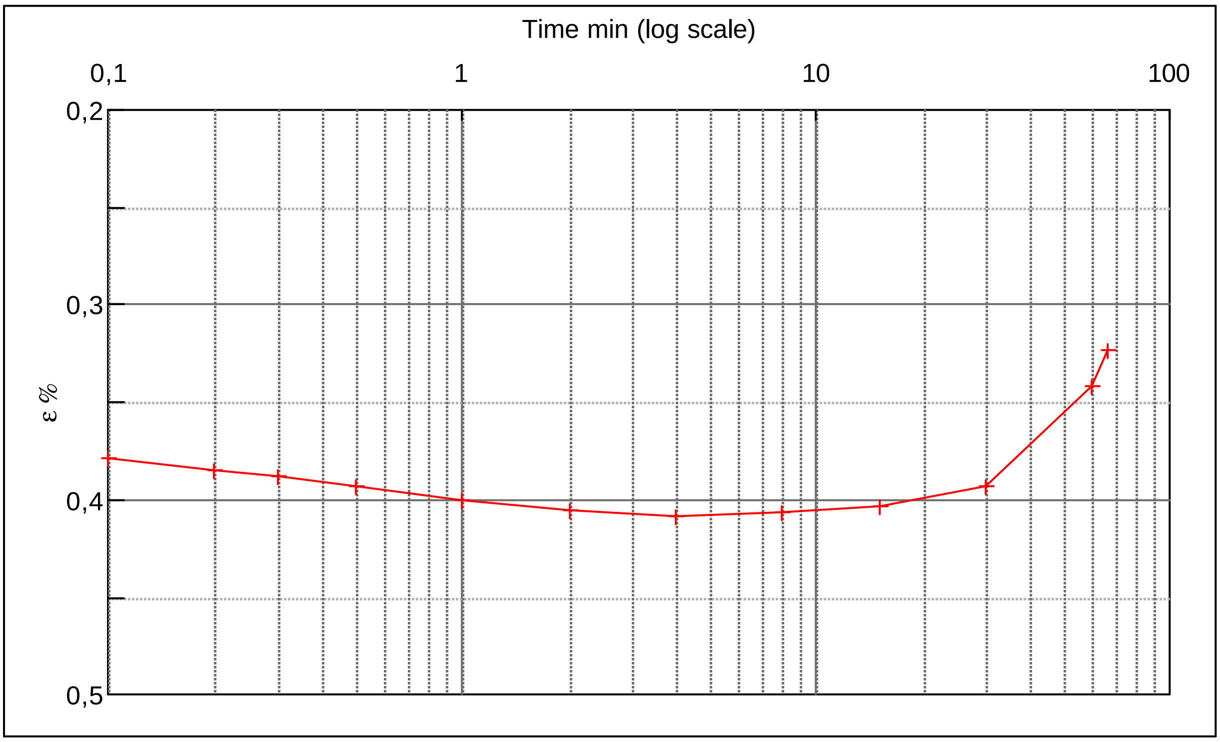
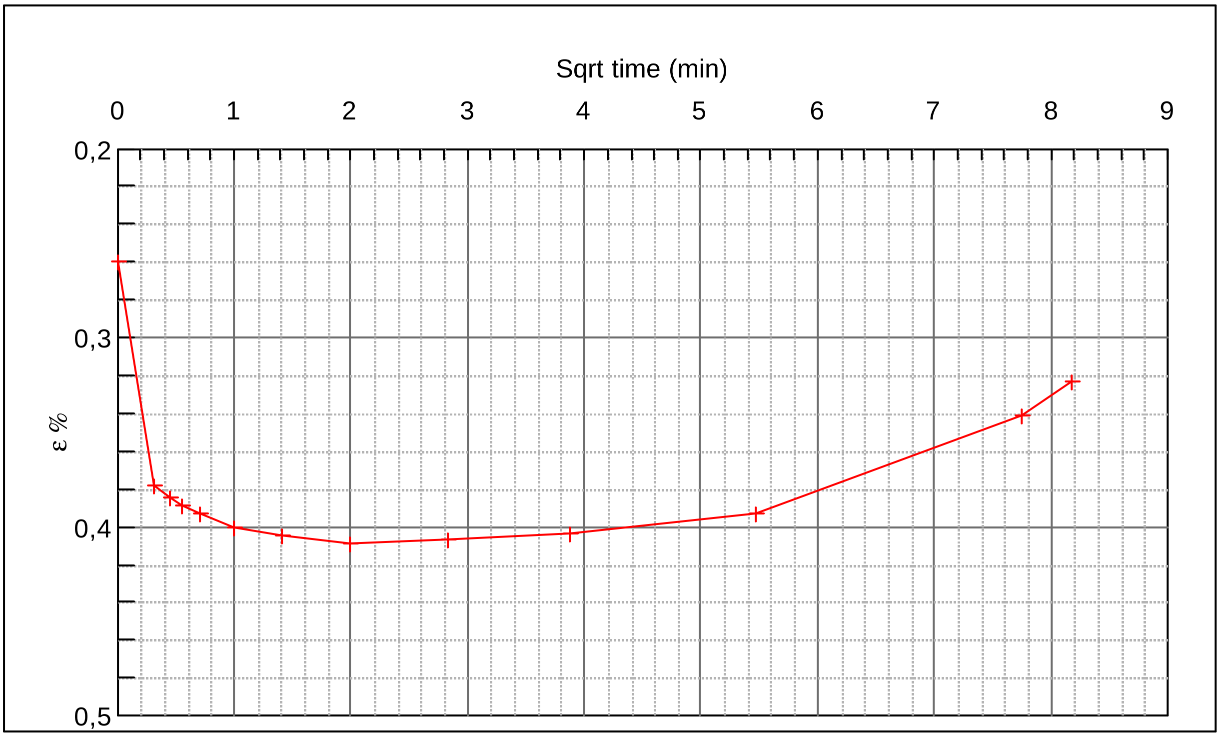
OEDOMETER TEST

Test no	**Anh k26**
Page no	**3**
Date	**15.03.94**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	
2	Before	175,9	ε0	0,26	ε c %	0,41	K i kPa	
	After	349,4	ε~#	0,32	ε s		k10 m/sec	
					ε kryb		ck10 m^2 /sec	





Material:	Clay middle jura		
Bor no :	A III	Depth:	162 m.b.s
Lab. no:	k 26	Insitu stress:	~1620 kPa

Job:	Anholt	**AAU**
		Encl. No 5.4
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k26**
Department of Civil Engineering		**Page no**	**4**
Aalborg University		**Date**	**15.03.94**
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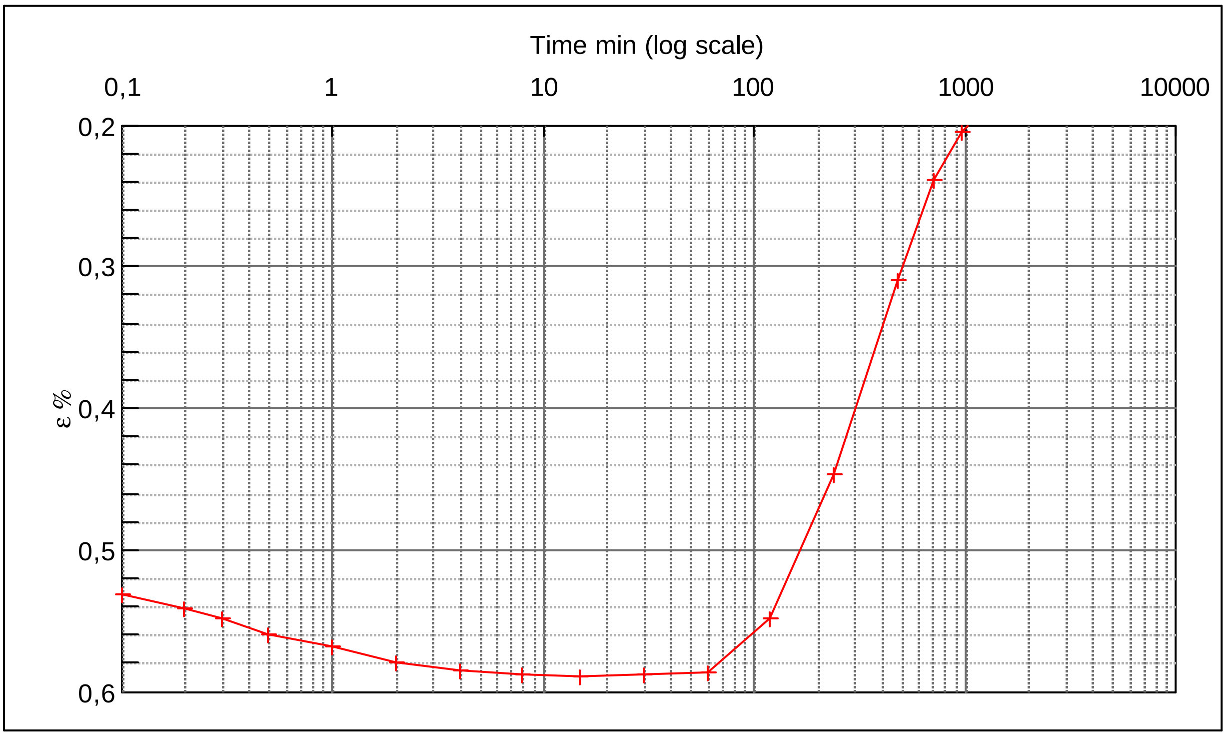
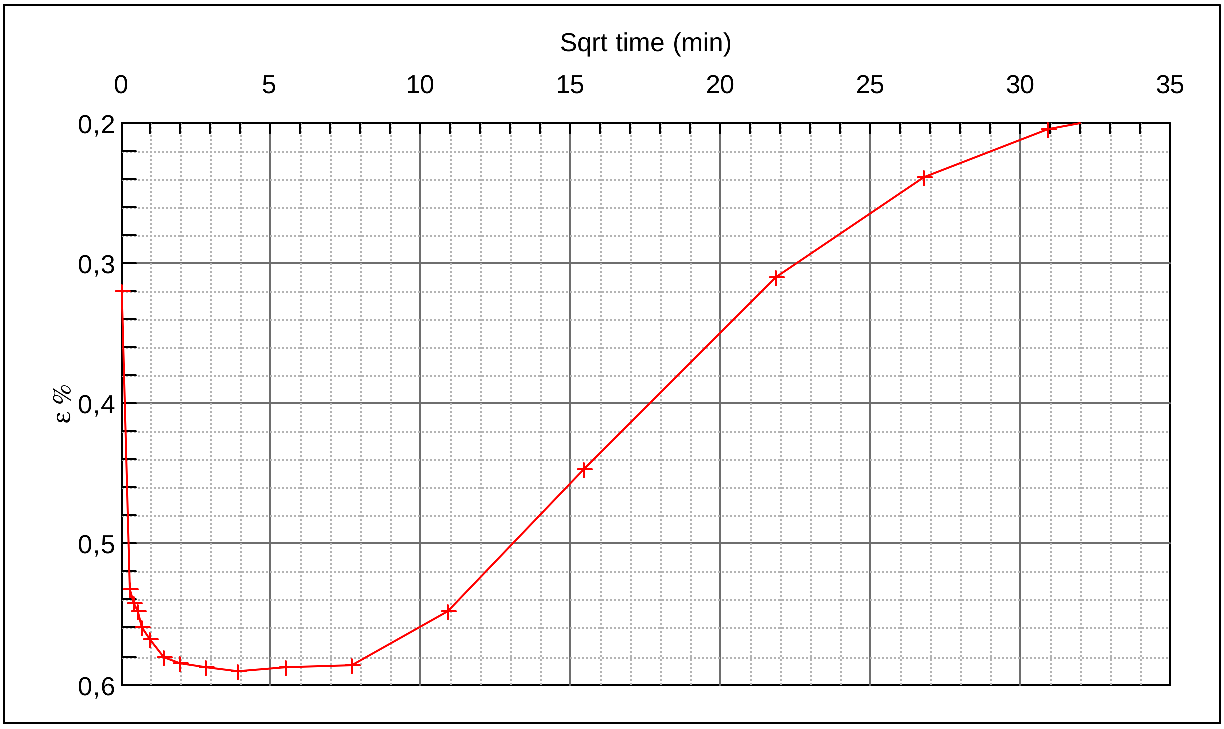
Step no	σ	kPa	ε	%	ε i		tc in sec	
3	Before	349,4	ε0	0,32	ε c %	0,59	K i kPa	
	After	696,3	ε~#	0,20	ε s		k10 m/sec	
					ε kryb		ck10 m^2 /sec	



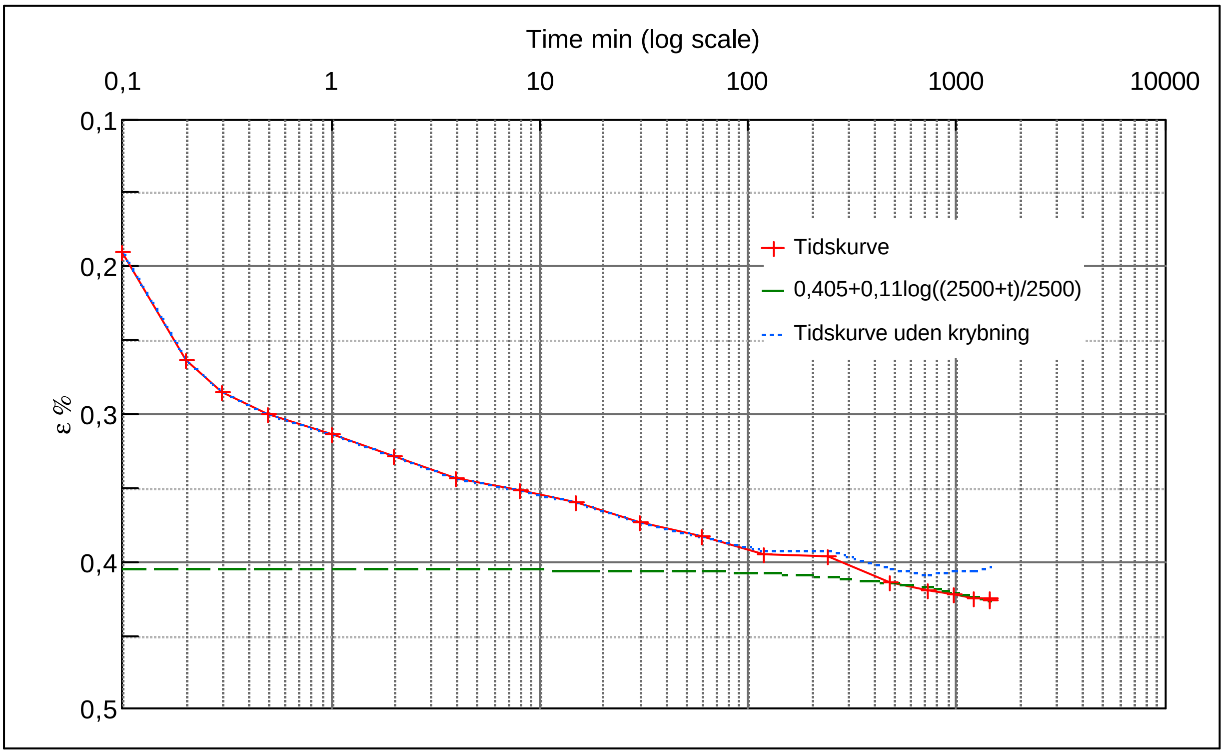


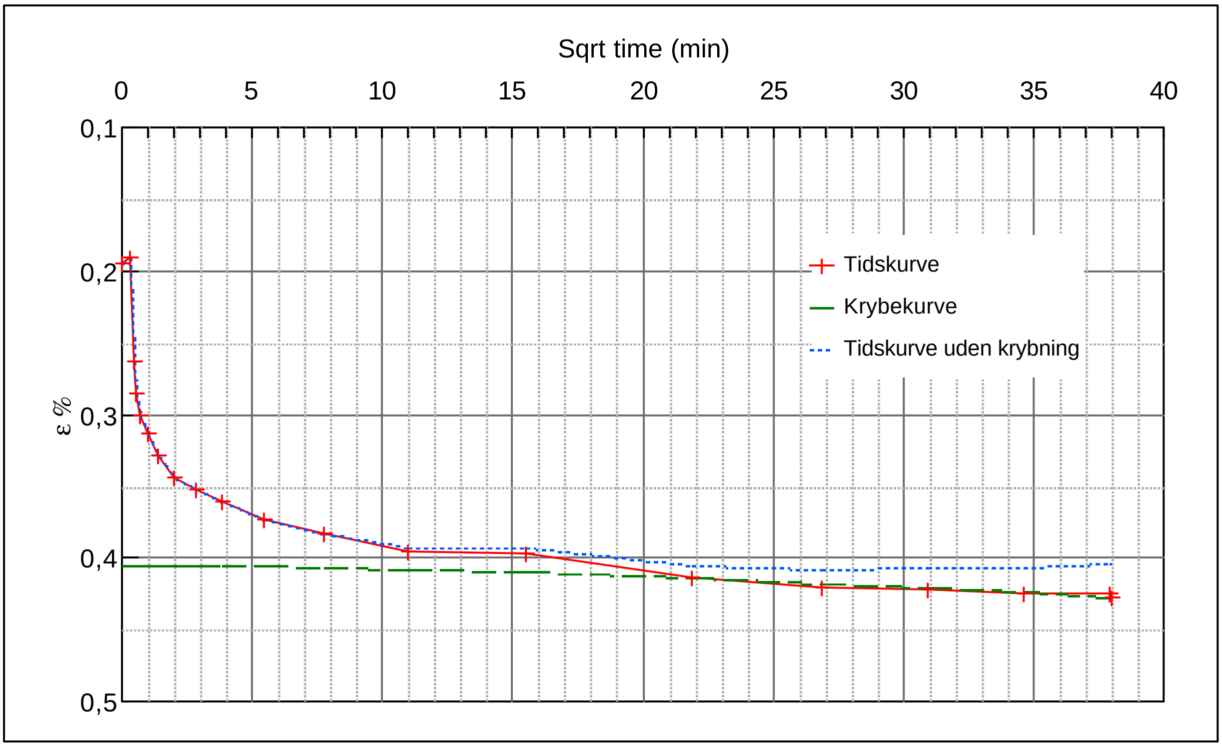
Material:			
	Clay middle jura		
Bor no :	A III	Depth:	162 m.b.s
Lab. no:	k 26	Insitu stress	~1620 kPa

Job:	Anholt	**AAU**
		Encl. No 5.5
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k26**
Department of Civil Engineering		**Page no**	**5**
Aalborg University		**Date**	**16.03.94**
			19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	960
4	Before	696,3	ε0	0,195	ε_c %	0,405	K i kPa	165.218
	After	1.043,3	ε~#	0,427	ε_s	0,02	k10 m/sec	6,0E-11
					ε_{kryb}	0,02	ck10 m^2 /sec	1,01E-06





Material: Clay middle jura		**Job:** Anholt	**AAU** Encl. No 5.6
Bor no : A III	Depth: 162 m.b.s	Executed: AMS/gt	Check:
Lab. no: k 26	Insitu stress:~1620 kPa	Approved:	

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k26**
Department of Civil Engineering		**Page no**	**6**
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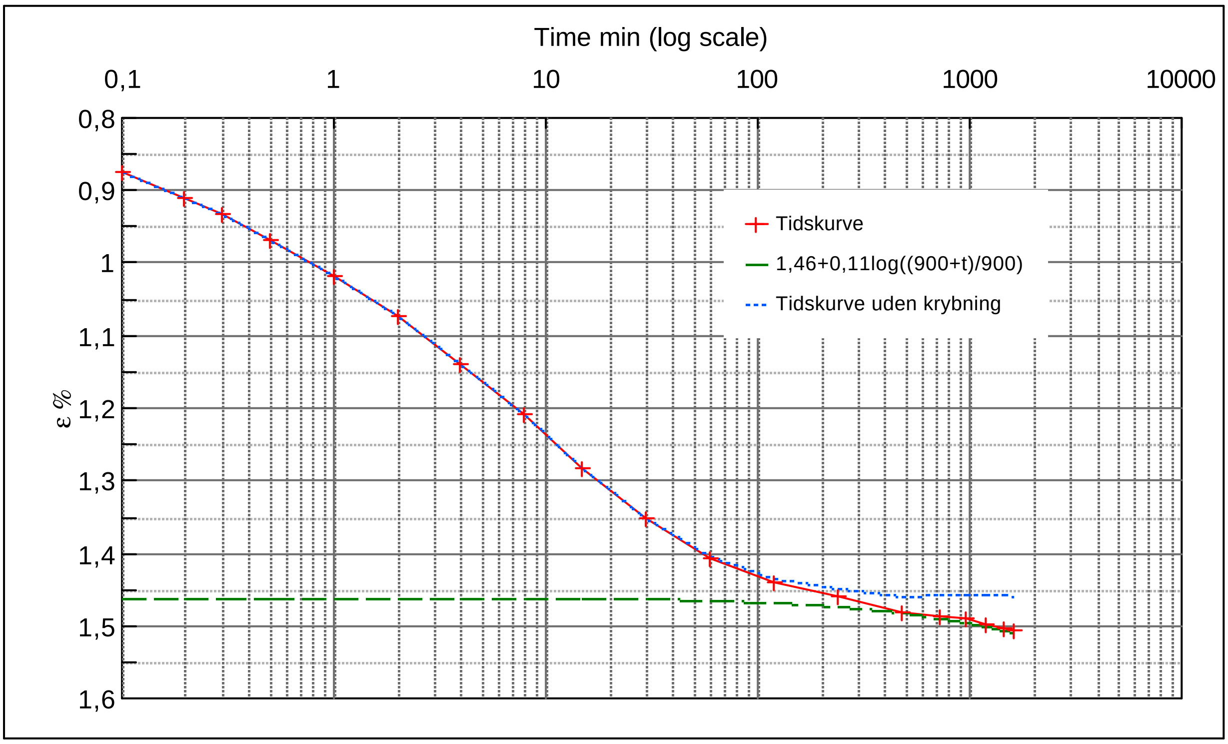
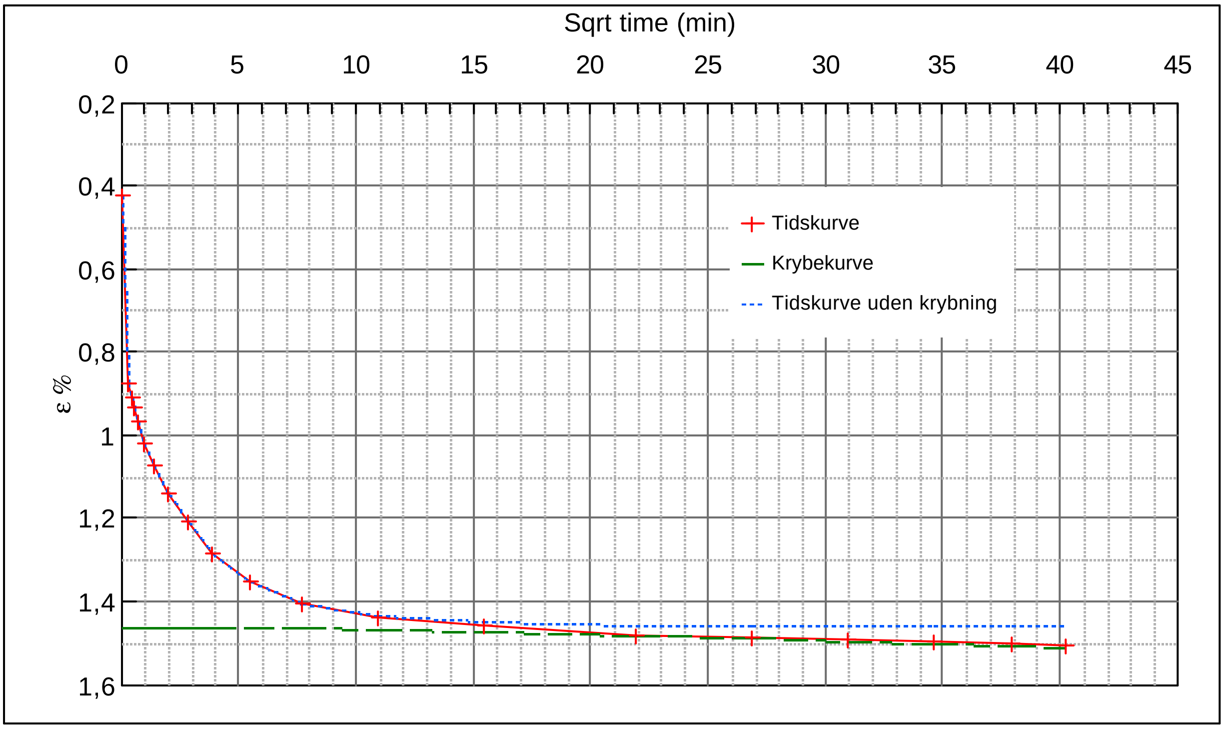
			19.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	960
5	Before	1.043,3	ε0	0,42	ε c %	1,46	K i kPa	100.406
	After	2.084,2	ε~#	1,51	ε s	0,05	k10 m/sec	9,9E-11
					ε kryb	0,05	ck10 m^2 /sec	1,01E-06





Material: Clay middle jura		**Job:** Anholt	**AAU**
			Encl. No 5.7
Bor no : A III	Depth: 162 m.b.s	Executed: AMS/gt	Check:
Lab. no: k 26	Insitu stress ~1620 kPa	Approved:	

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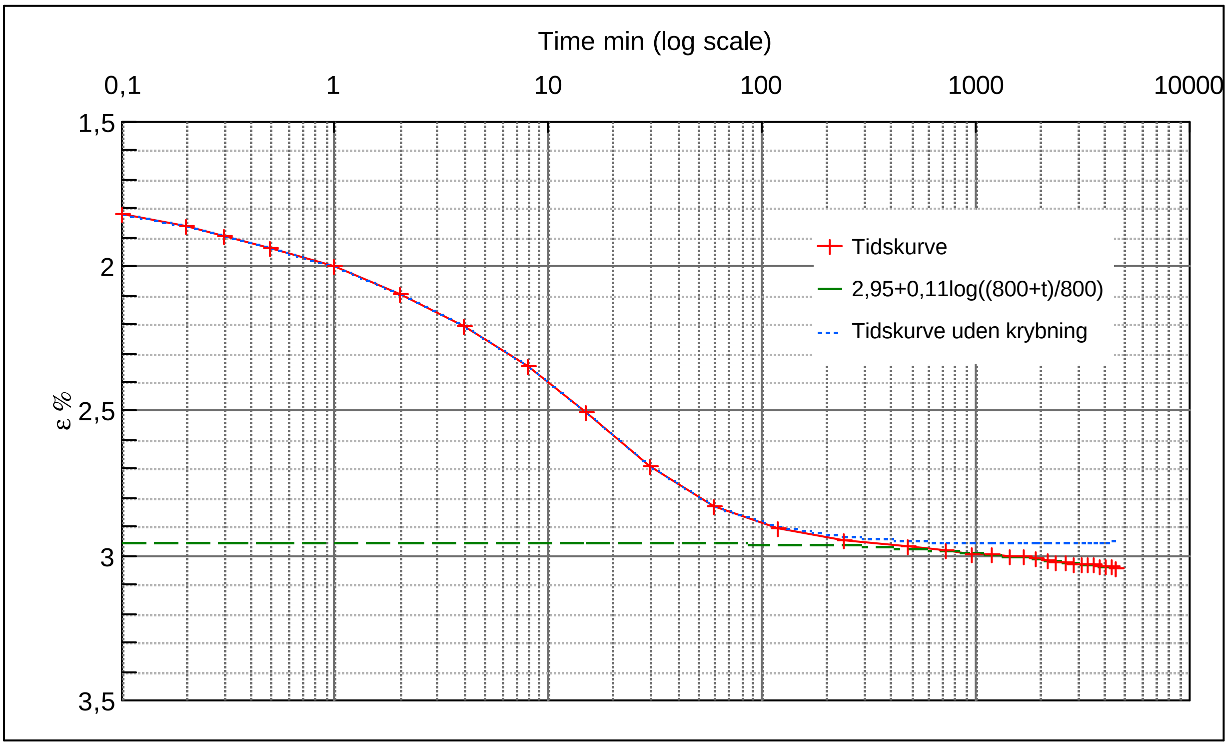
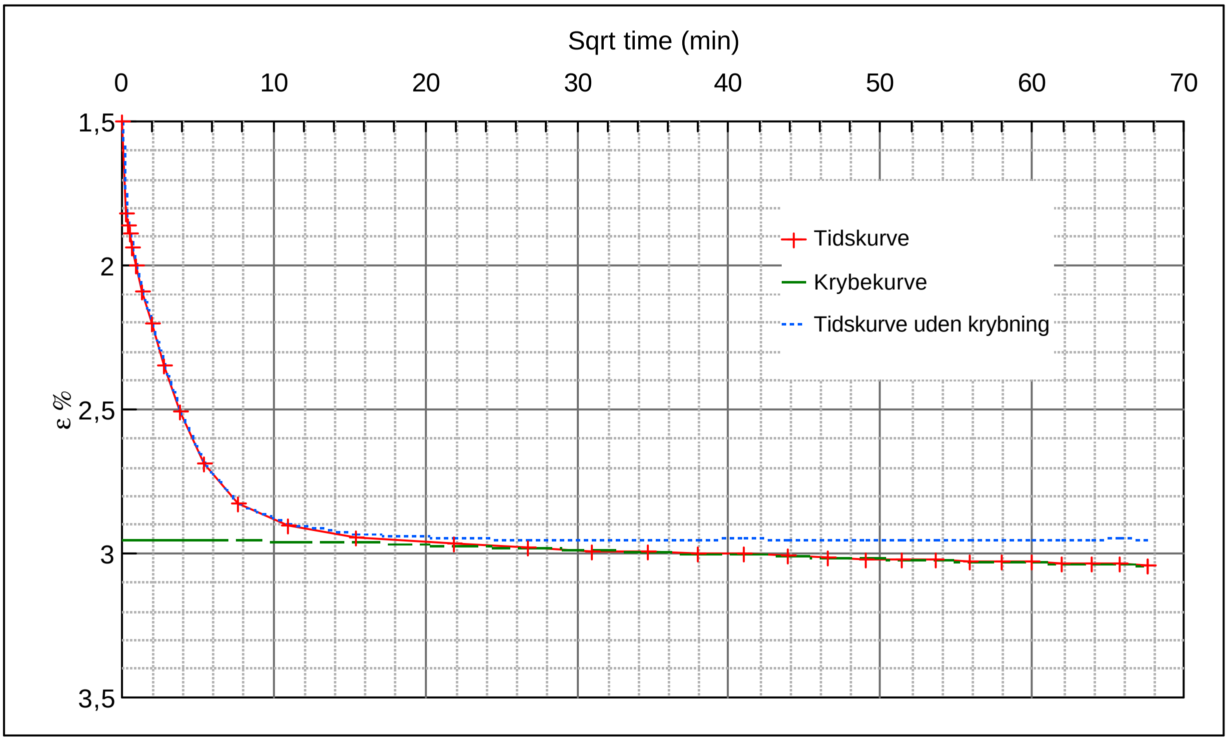
OEDOMETER TEST

Test no	**Anh k26**
Page no	**7**
Date	**18.03.94**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	2160
6	Before	2.084,2	ε0	1,50	$\varepsilon_{c\ \%}$	2,95	K i kPa	143.900
	After	4.165,9	ε~#	3,04	ε_s	0,08	k10 m/sec	3,1E-11
					ε_{kryb}	0,09	ck10 m^2 /sec	4,49E-07





Material: Clay middle jura			
Bor no :	A III	Depth:	162 m.b.s
Lab. no:	k 26	Insitu stress:~1620 kPa	

Job:	Anholt	**AAU**
		Encl. No 5.8
Executed:	AMS/gt	Check:
Approved:		

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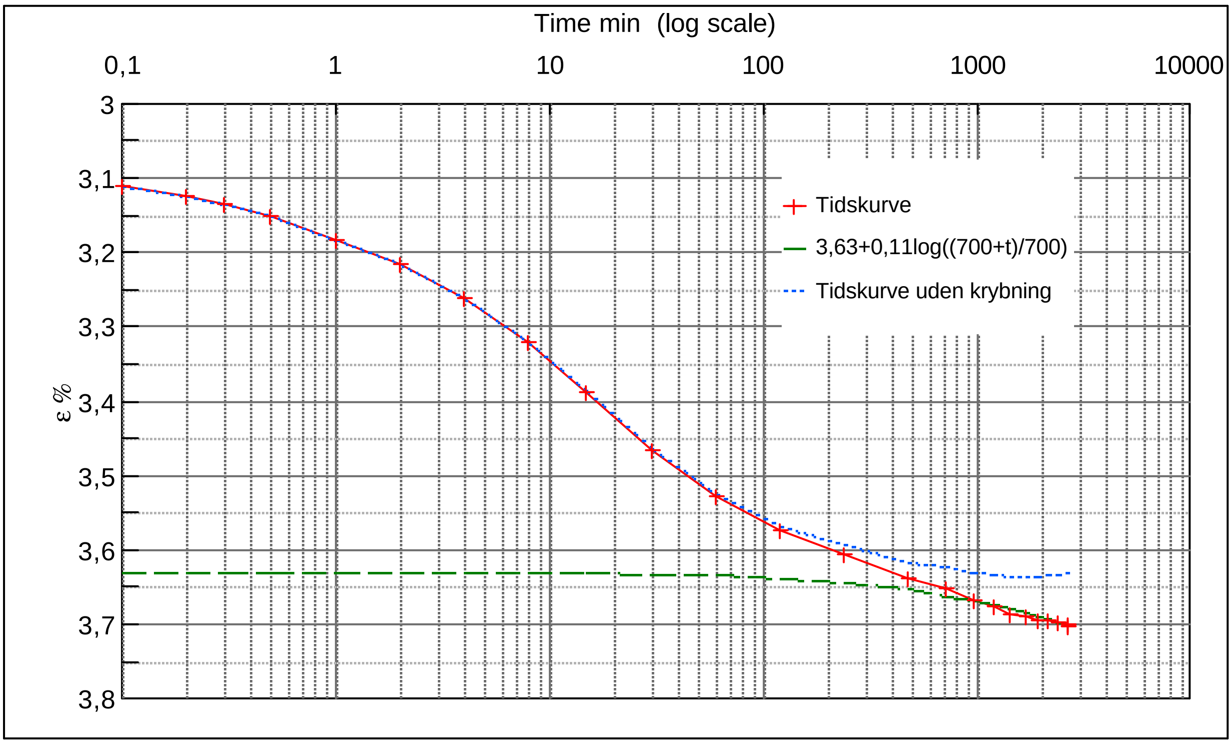
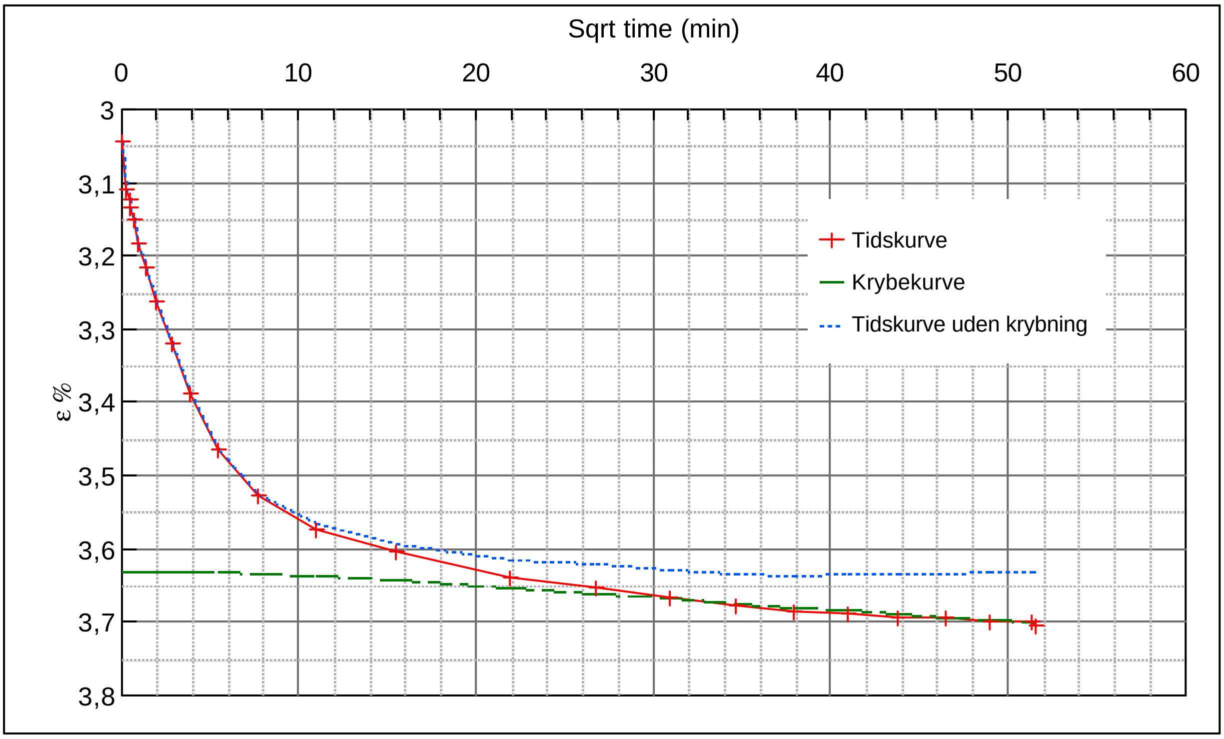
Test no	**Anh k26**
Page no	**8**
Date	**21.03.94**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε_{i}		tc in sec	2160
7	Before	4.165,9	ε0	3,04	ε_{c} %	3,63	K i kPa	236.562
	After	5.553,8	ε~#	3,70	ε_{s}	0,08	k10 m/sec	1,9E-11
					ε_{kryb}	0,07	ck10 m^2 /sec	4,49E-07





Material: Clay middle jura		**Job:** Anholt	**AAU**
			Encl. No 5.9
Bor no : A III	Depth: 162 m.b.s	Executed: AMS/gt	Check:
Lab. no: k 26	Insitu stress:~1620 kPa	Approved:	

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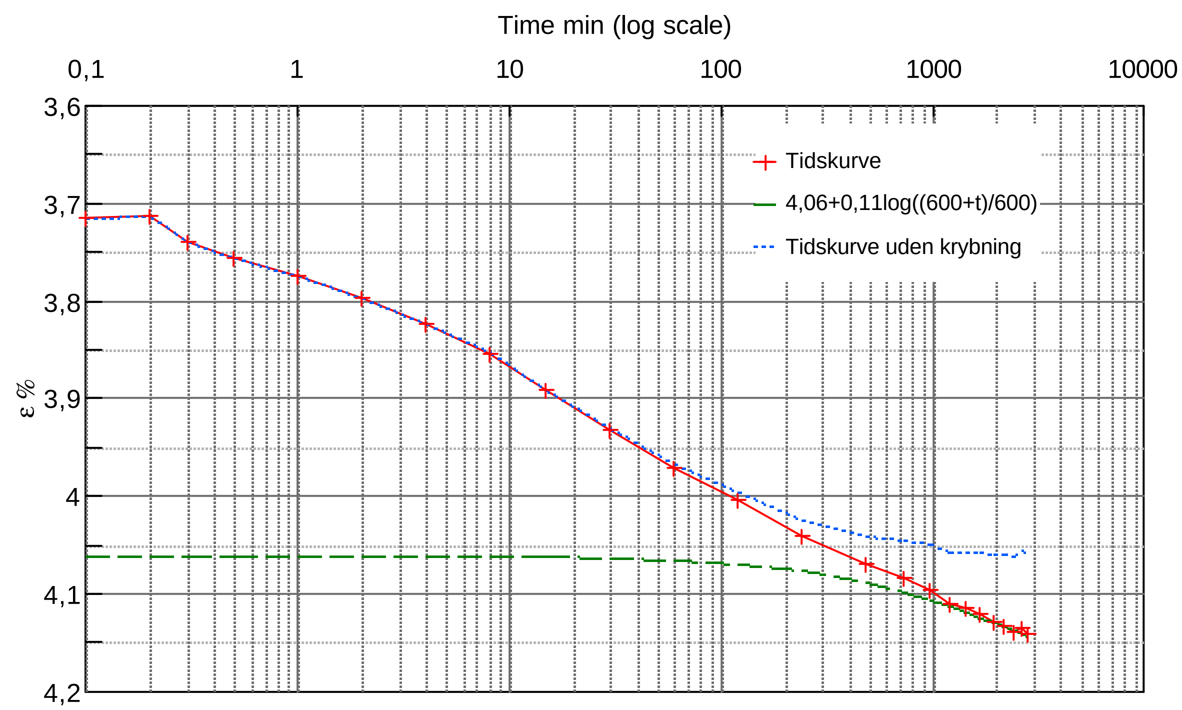
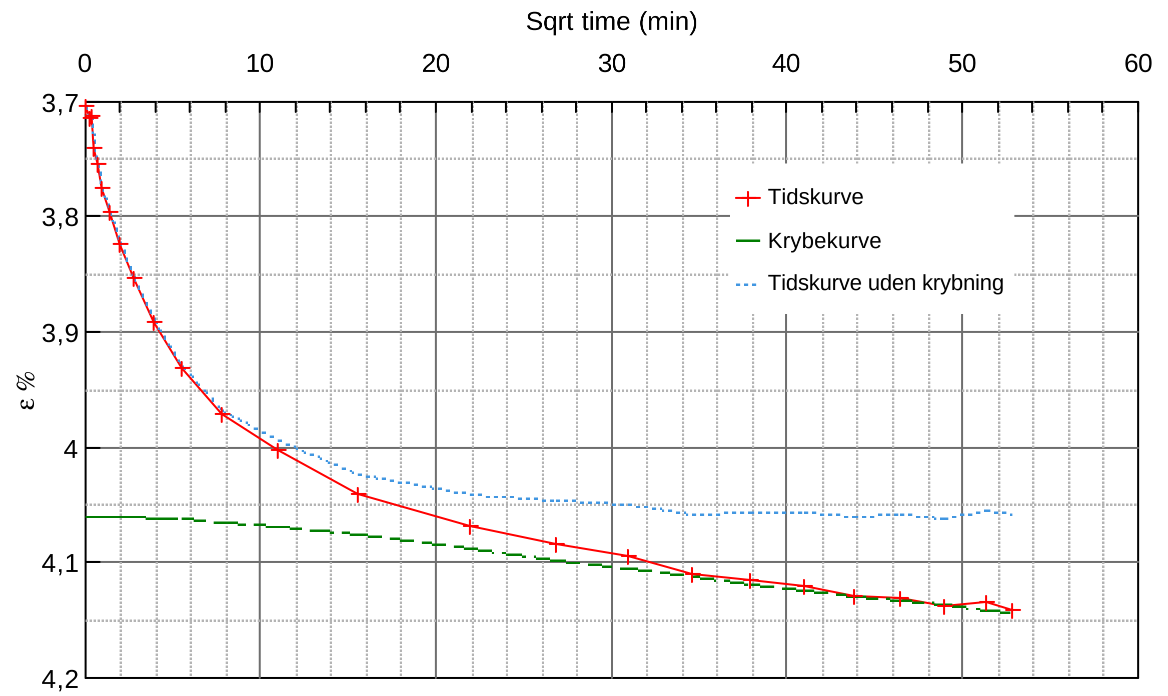
Test no	**Anh k26**
Page no	**9**
Date	**23.03.94**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	2940
8	Before	5.553,8	ε0	3,70	ε_c %	4,06	K i kPa	291.834
	After	6.594,6	ε~#	4,14	ε_s	0,09	k10 m/sec	1,1E-11
					ε_{kryb}	0,08	ck10 m^2 /sec	3,30E-07





Material: Clay middle jura			
Bor no :	A III	Depth:	162 m.b.s
Lab. no:	k 26	Insitu stress:	~1620 kPa

Job:	Anholt	**AAU**
		Encl. No 5.10
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k26**
Department of Civil Engineering		**Page no**	**10**
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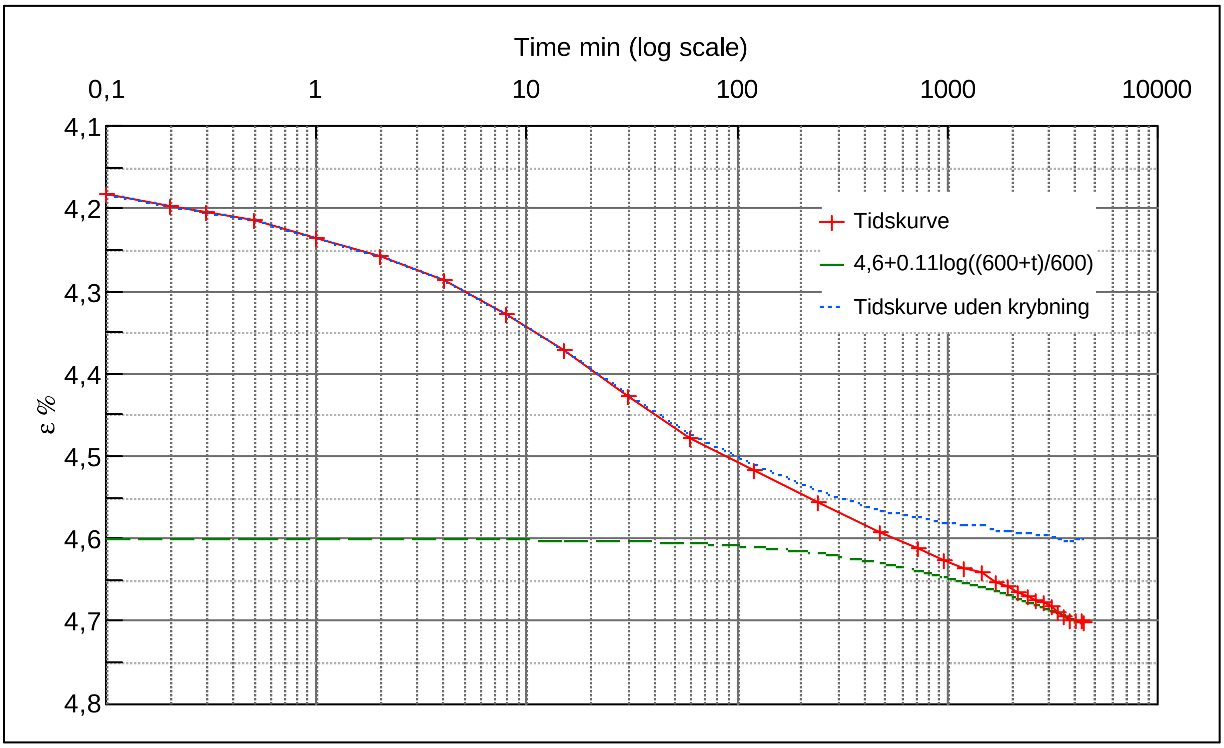
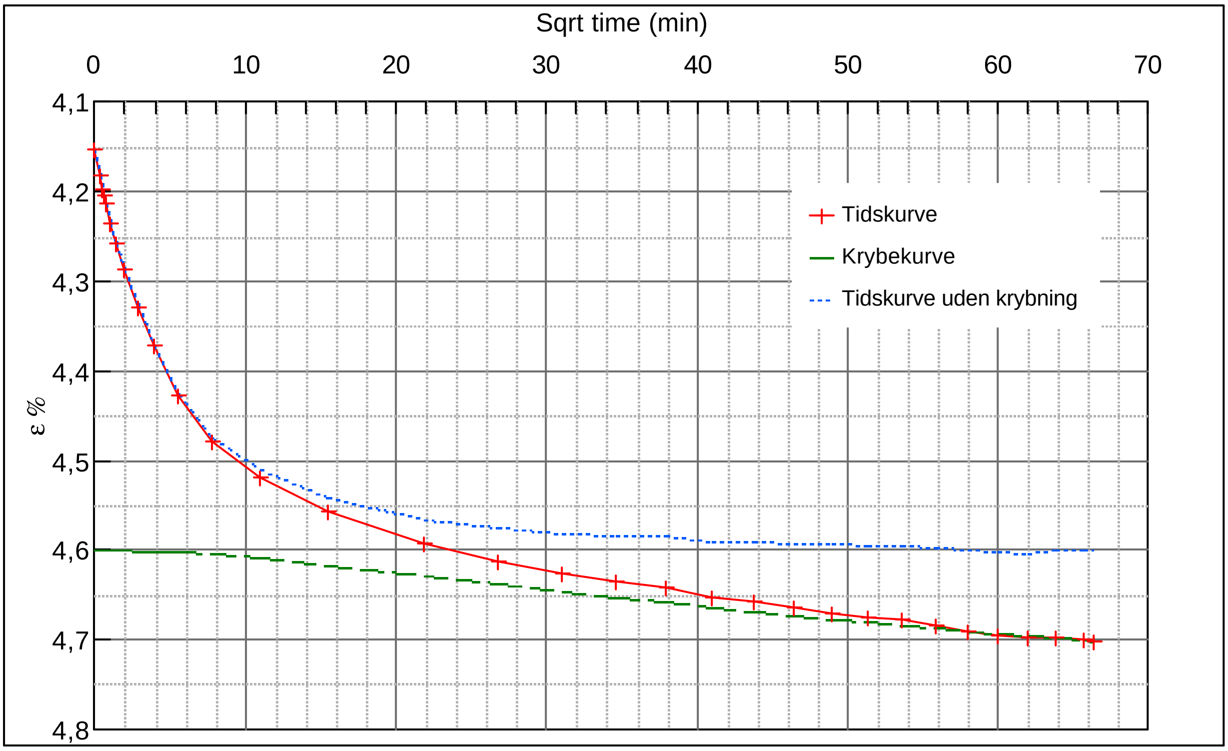
			19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	2940
9	Before	6.594,6	ε0	4,15	ε_c %	4,6	K i kPa	310.708
	After	7.982,5	ε~#	4,70	ε_s	0,11	k10 m/sec	1,0E-11
					ε_{kryb}	0,10	ck10 m^2 /sec	3,30E-07





Material: Clay middle jura	
Bor no : A III	Depth: 162 m.b.s
Lab. no: k 26	Insitu stress:~1620 kPa

Job: Anholt	**AAU**
	Encl. No 5.11
Executed: AMS/gt	Check:
Approved:	

Geotechnical Engineering Group
Department of Civil Engineering
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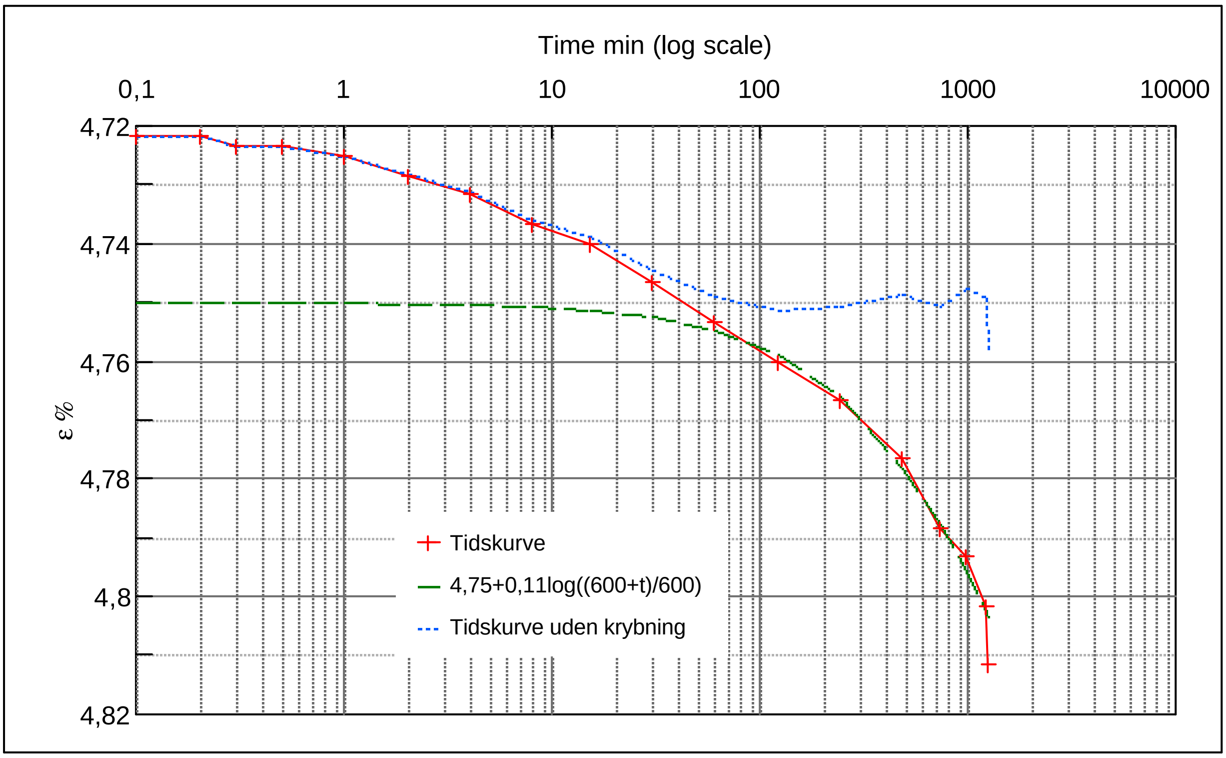
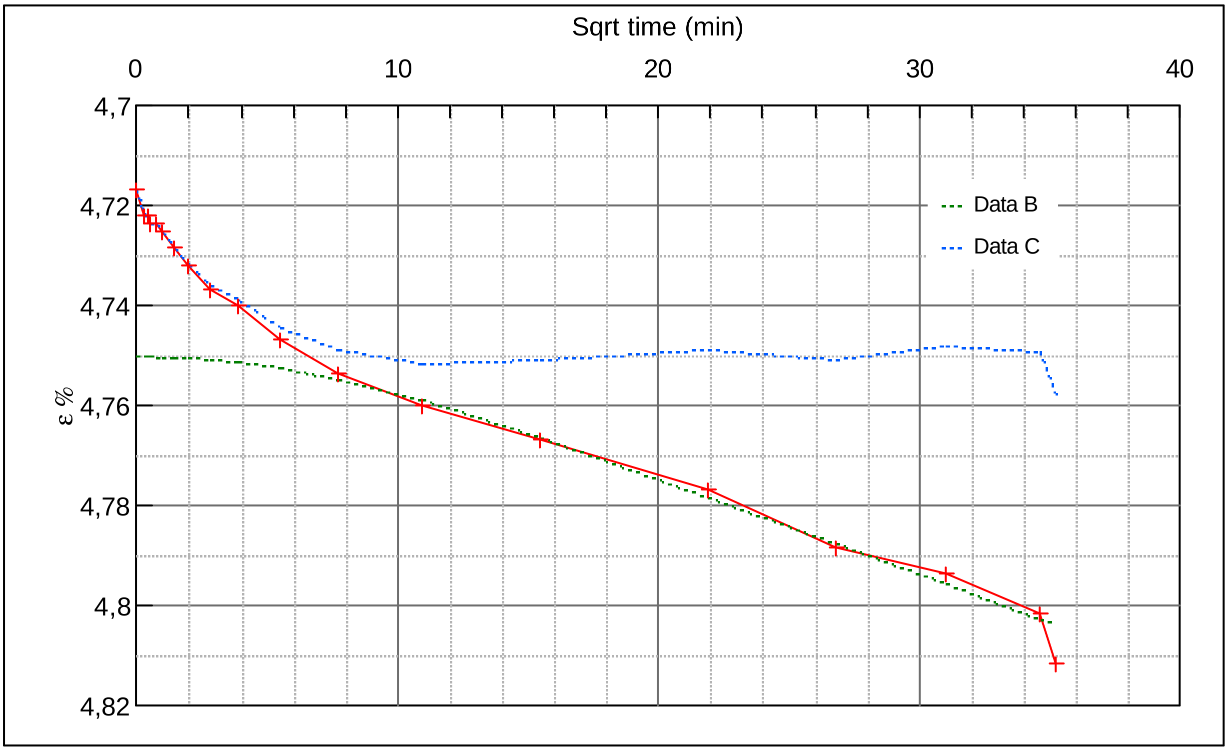
OEDOMETER TEST	**Test no**	**Anh k26**
	Page no	**11**
	Date	**28.03.94**
		19.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	1500
10	Before	7.982,5	ε0	4,72	ε c %	4,75	K i kPa	1.040.873
	After	8.329,4	ε~#	4,81	ε s	0,11	k10 m/sec	6,1E-12
					ε kryb	0,06	ck10 m^2 /sec	6,47E-07





Material: Clay middle jura		**Job:** Anholt	**AAU**
			Encl. No 5.12
Bor no : A III	Depth: 162 m.b.s	Executed: AMS/gt	Check:
Lab. no: k 26	Insitu stress:~1620 kPa	Approved:	

Geotechnical Engineering Group
Department of Civil Engineering
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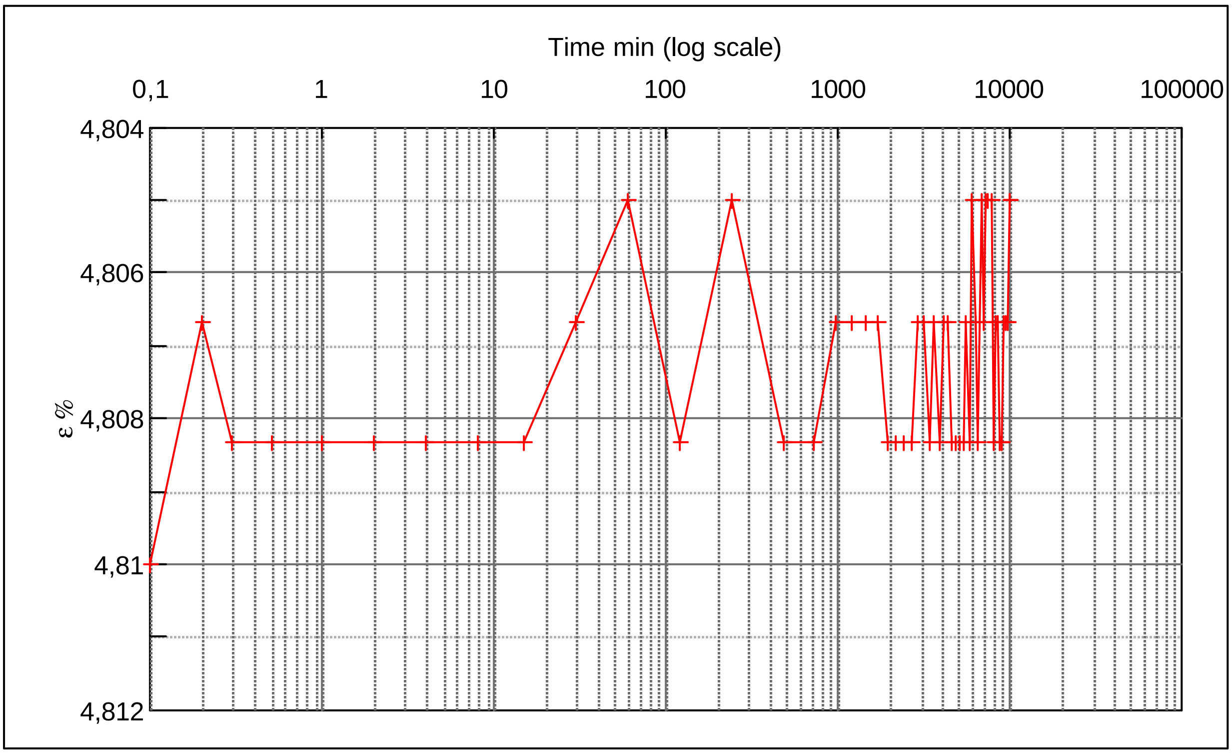
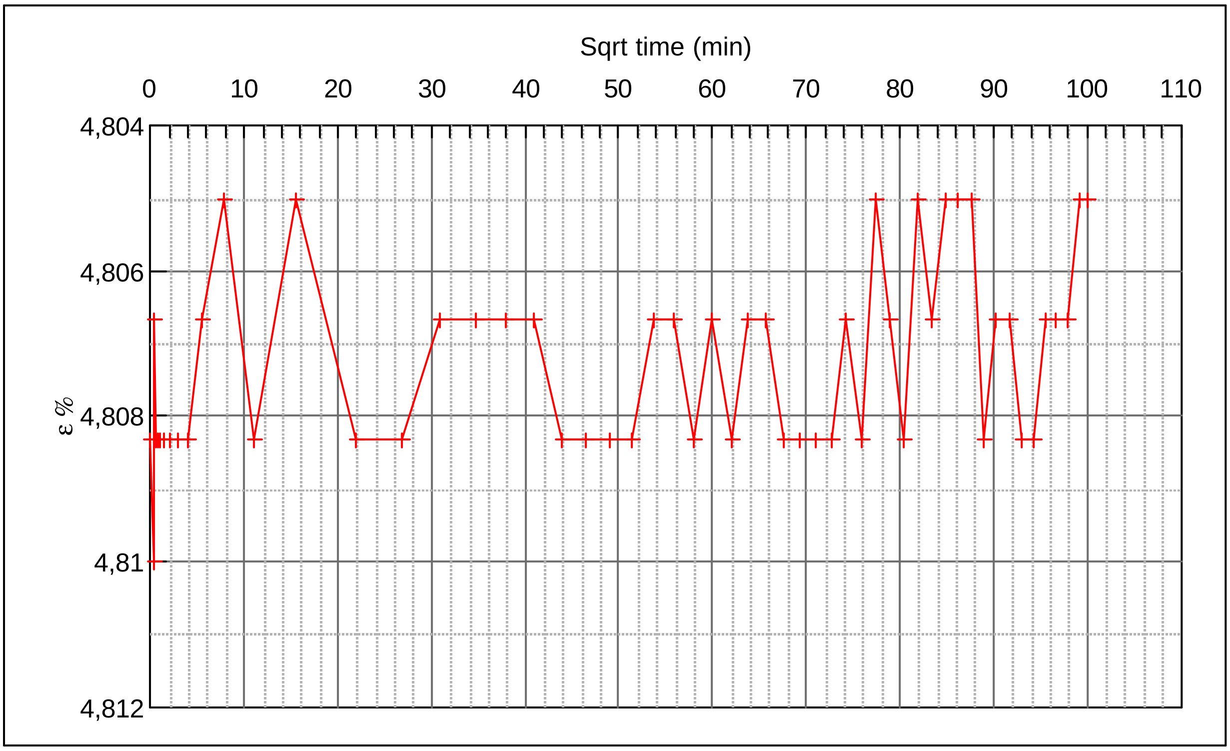
OEDOMETER TEST	**Test no**	**Anh k26**	
	Page no	**12**	
	Date	**29.03.94**	
		19.09.05/gt	

Step no	σ	kPa	ε	%	ε i		tc in sec	60
11	Before	8.329,4	ε0	4,81	ε c %	4,81	K i kPa	31.226.200
	After	7.288,5	ε~#	4,81	ε s		k10 m/sec	5,1E-12
					ε kryb		ck10 m^2 /sec	1,62E-05





Material:			
	Clay middle jura		
Bor no :	A III	Depth:	162 m.b.s
Lab. no:	k 26	Insitu stress:	~1620 kPa

Job:	Anholt	**AAU**
		Encl. No 5.13
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k26**
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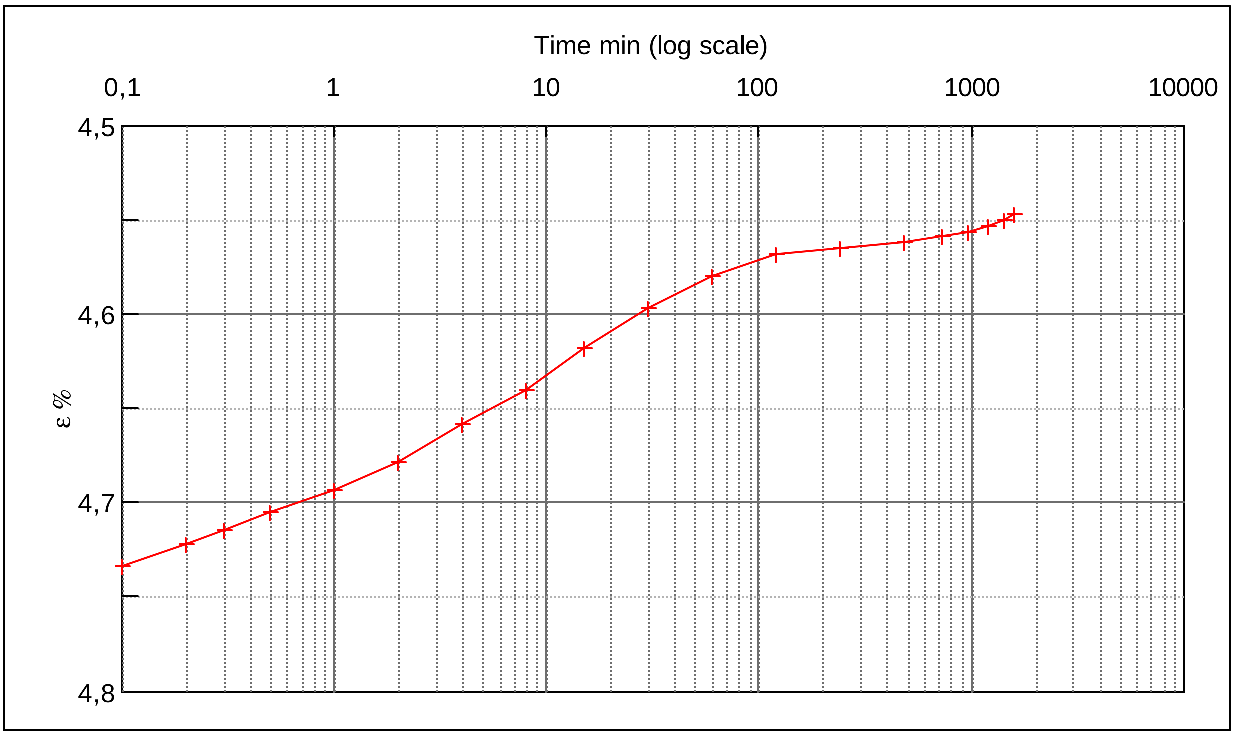
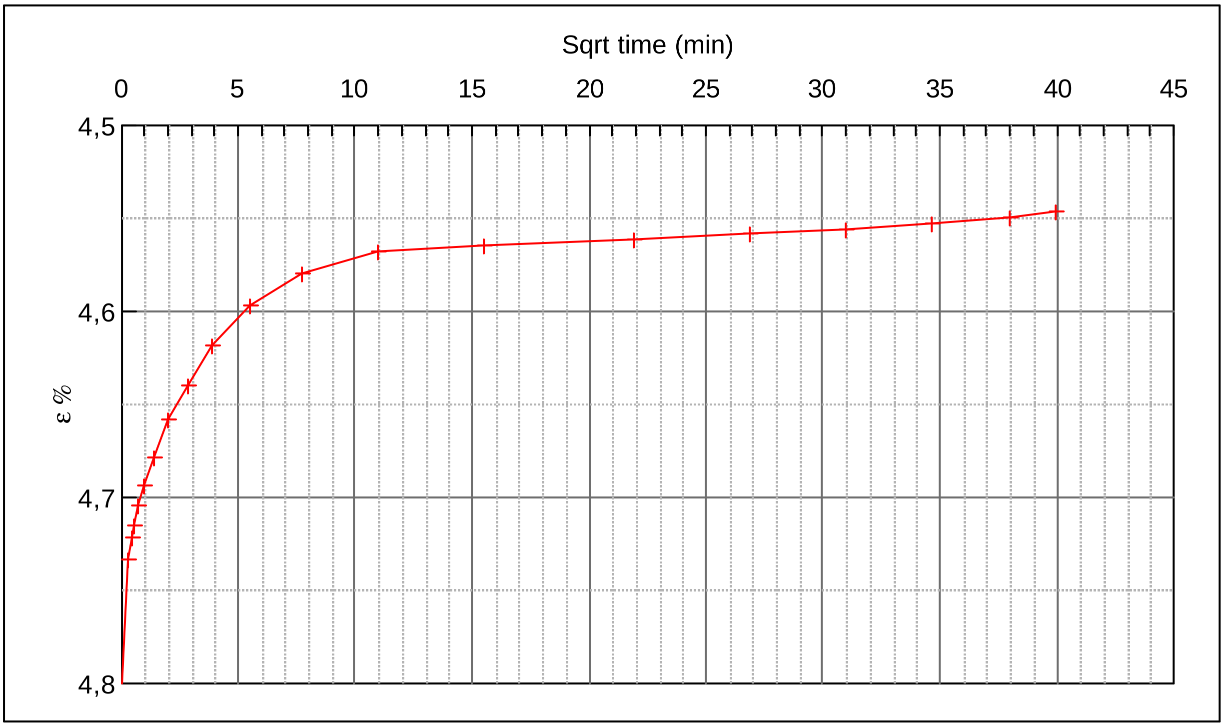
			19.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	1500
12	Before	7.288,5	ε0	4,80	ε c %	4,55	K i kPa	1.218.187
	After	4.165,9	ε~#	4,55	ε s		k10 m/sec	5,2E-12
					ε kryb		ck10 m^2 /sec	6,47E-07





Material:			**Job:** Anholt	**AAU**
Clay middle jura				Encl. No 5.14
Bor no : A III	Depth: 162 m.b.s		Executed: AMS/gt	Check:
Lab. no: k 26	Insitu stress ~1620 kPa		Approved:	

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OEDOMETER TEST

Test no	**Anh k26**
Page no	**14**
Date	**06.04.94**
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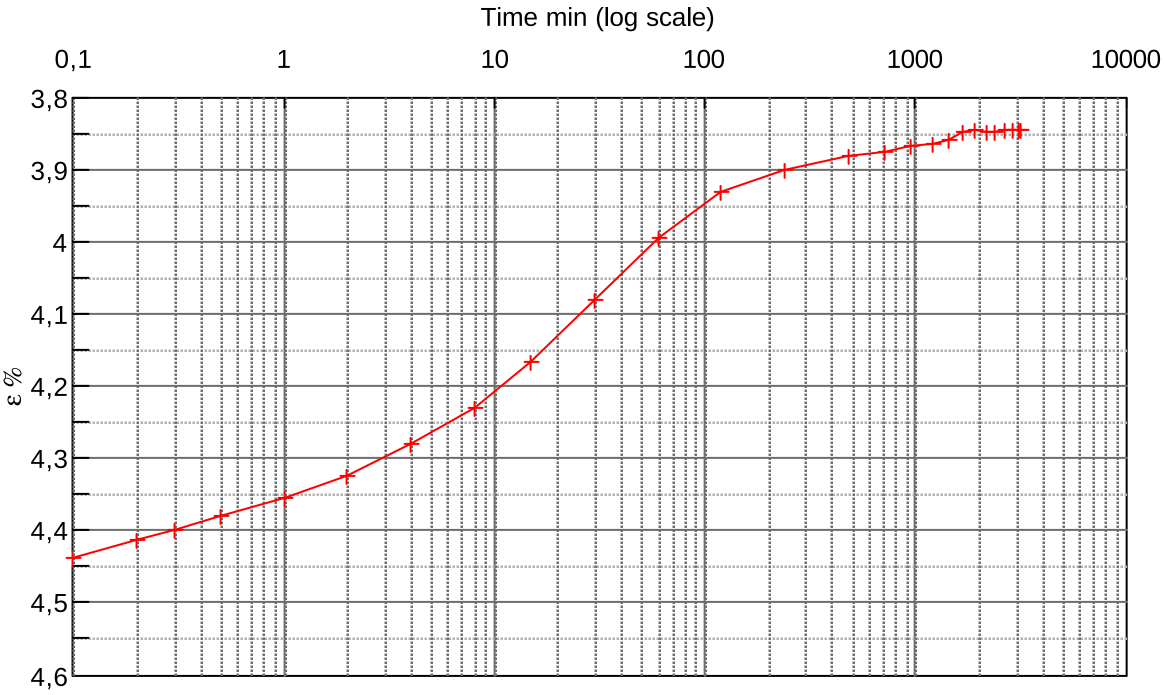
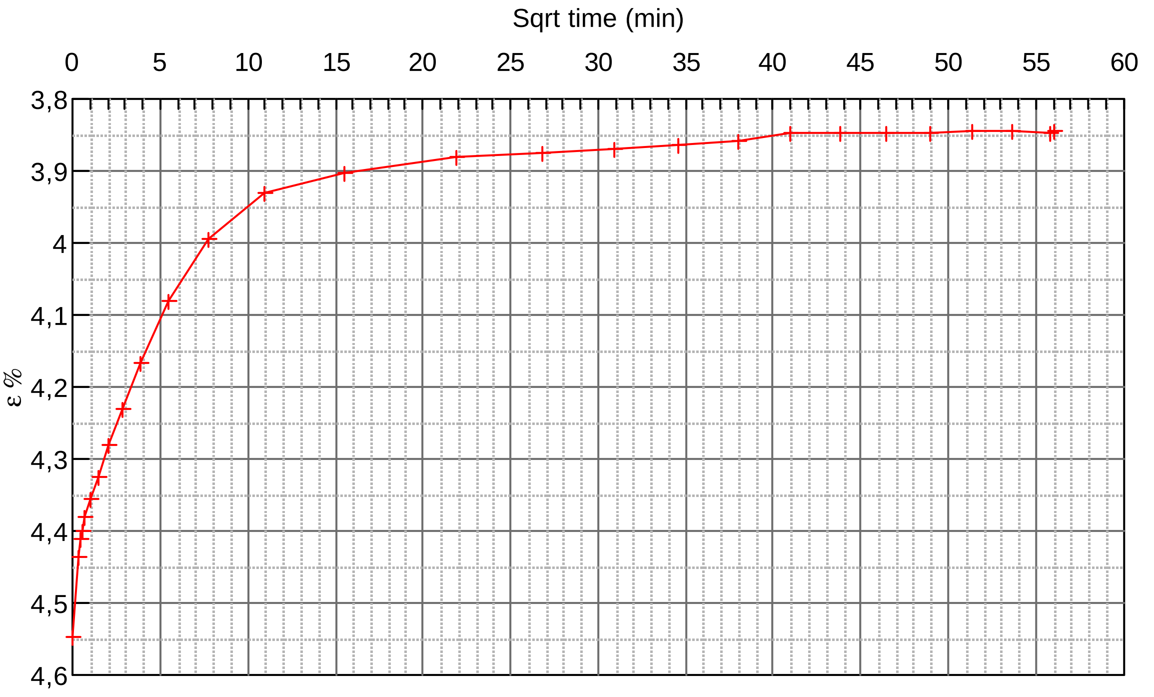
Step no	σ	kPa	ε	%	ε_i		tc in sec	4860
13	Before	4.165,9	ε0	4,55	ε_{c} %	3,85	K i kPa	297.392
	After	2.084,2	ε~#	3,85	ε_s		k10 m/sec	6,6E-12
					ε_{kryb}		ck10 m^2 /sec	2,00E-07





Material: Clay middle jura		**Job:** Anholt	**AAU** Encl. No 5.15
Bor no : A III	Depth: 162 m.b.s	Executed: AMS/gt	Check:
Lab. no: k 26	Insitu stress:~1620 kPa	Approved:	

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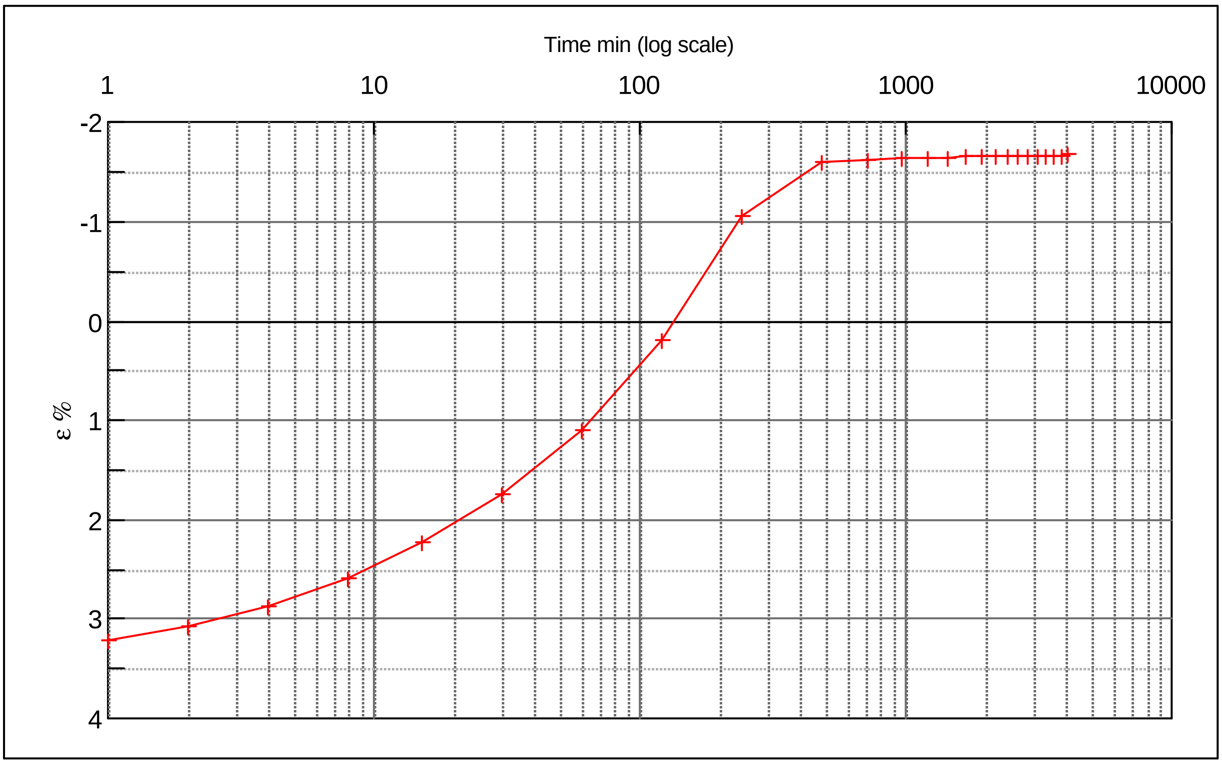
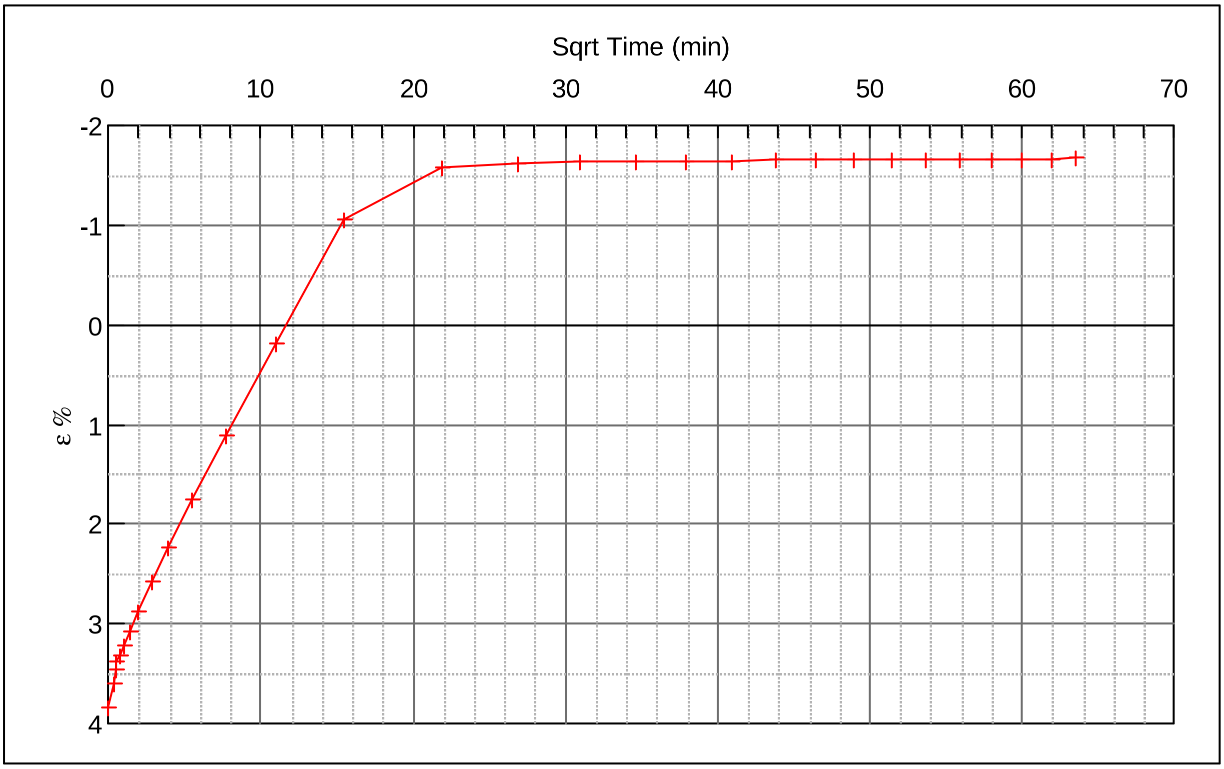
OEDOMETER TEST

Test no **Anh k26**
Page no **15**
Date **08.04.94**
19.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	17340
14	Before	2.084,2	ε0	3,85	ε c %	(1,69)	K i kPa	37.590
	After	2,43	ε~#	(1,69)	ε s		k10 m/sec	1,5E-11
					ε kryb		ck10 m^2 /sec	5,59E-08





Material: Clay middle jura		**Job:** Anholt	**AAU** Encl. No 5.16
Bor no : A III	Depth: 162 m.b.s	Executed: AMS/gt	Check:
Lab. no: k 26	Insitu stress: ~1620 kPa	Approved:	

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OEDOMETER TEST

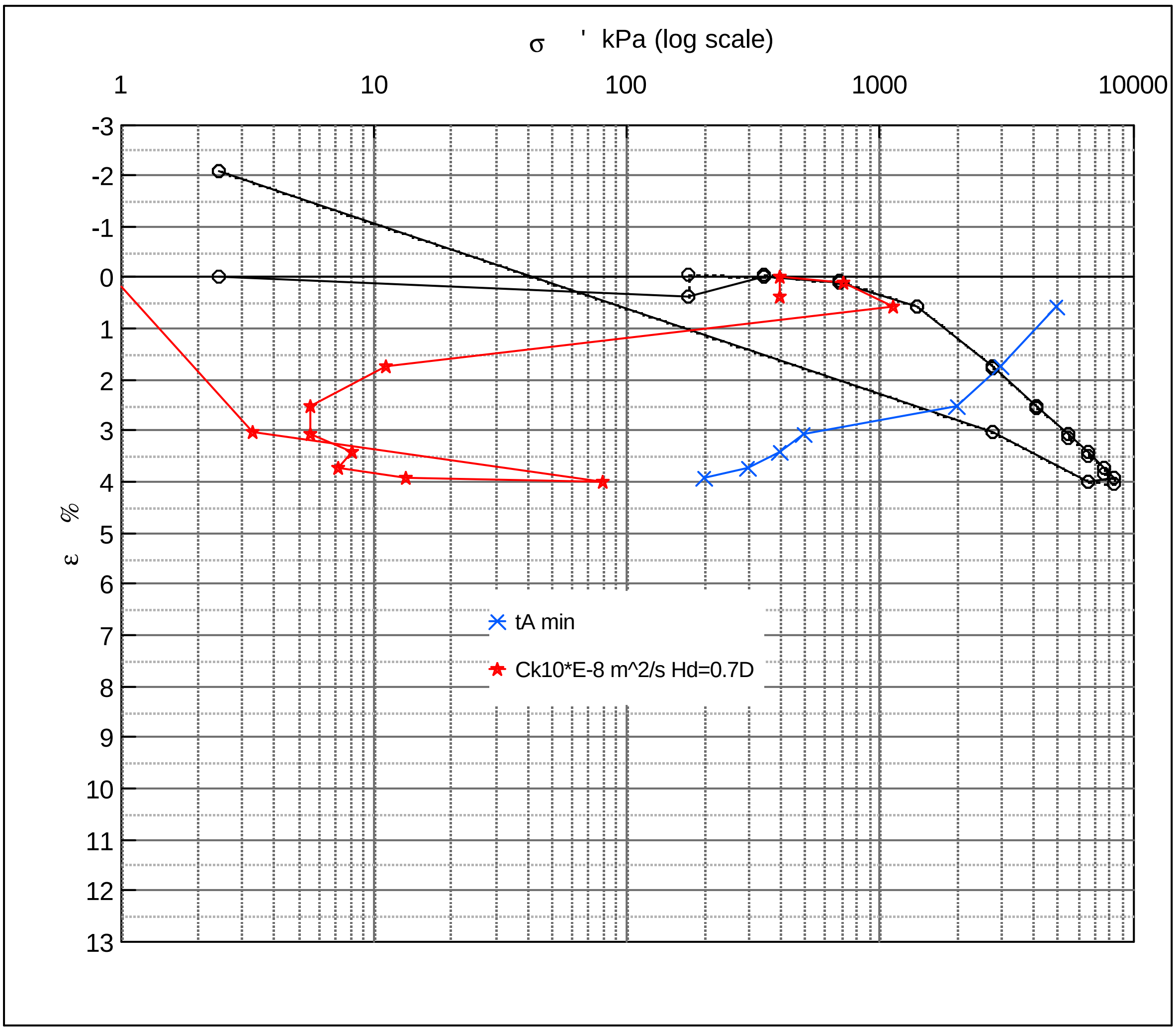
Test no	**Anh k98**
Page no	**1**
Date	**08.02.-16.03.93**
	19.09.05/gt

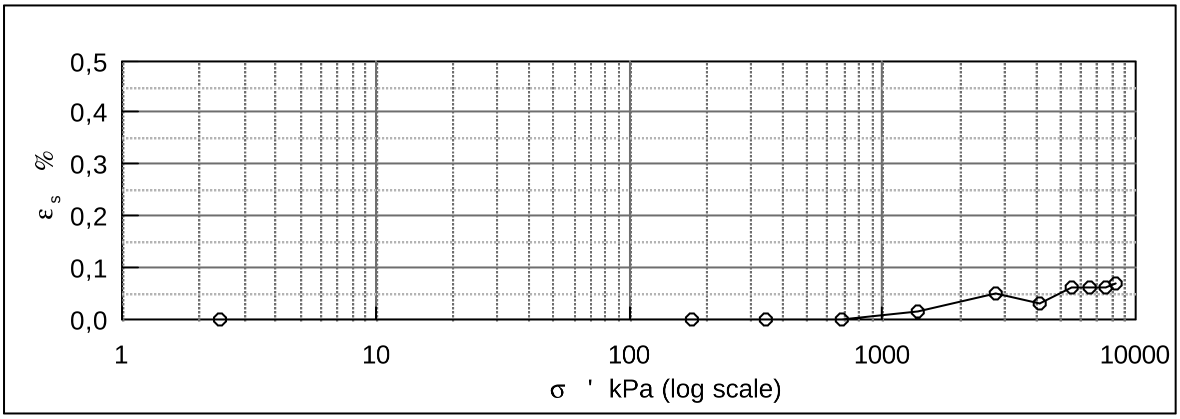
Description of soil:

Clay, Lower Jura

Bor no :	A IV	Overburden pressure σ'_o	~3040 kPa
Lab. no:	k98	Vane strength c_v	kPa
Level :	304 m.b.s	CPT - value q_c	MPa

	Before	After
Water content %	16,8	20,3
Bulk density Mg / m^3	2,16	2,1
Grain density Mg / m^3	~2.7	
Void ratio	0,46	0,55
Degr. of Saturation %	99	100
Dimension H x D mm	30x60	30.1x60

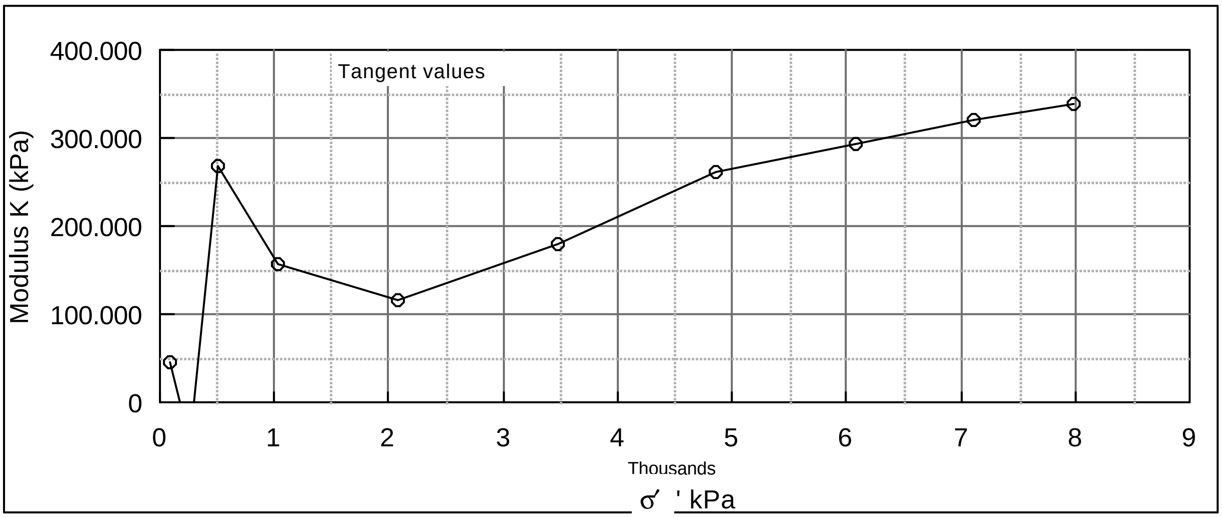


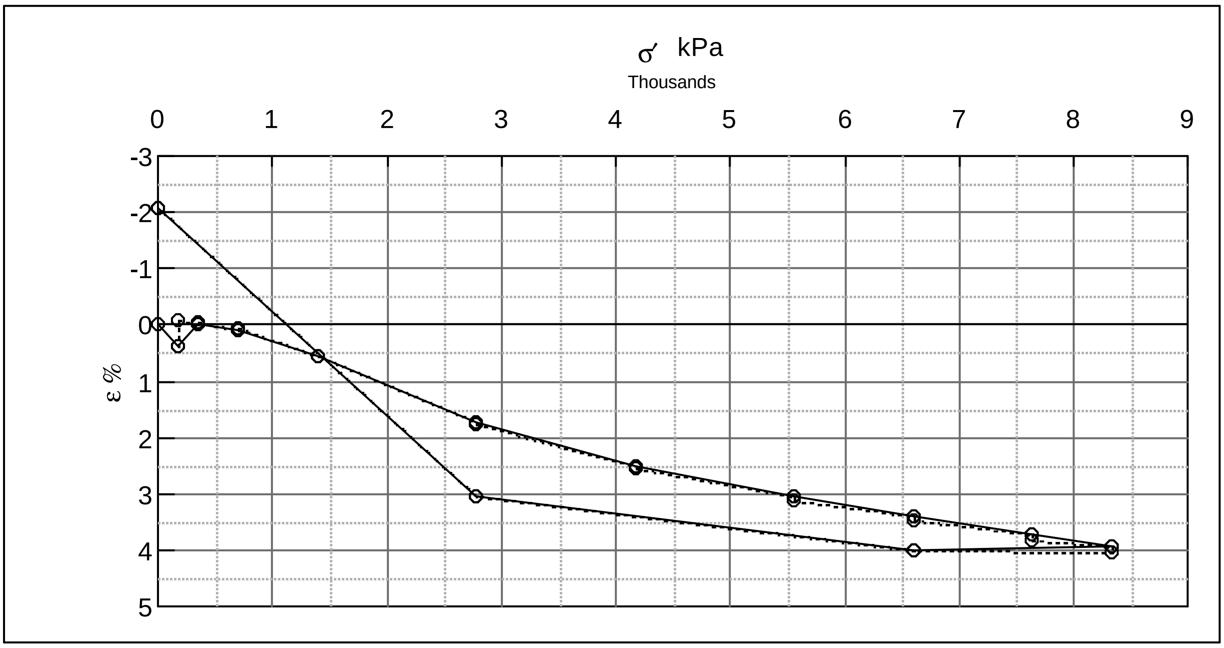


Job: Anholt	**AAU**
	Encl. No 6.1
Executed: AMS/gt	Check:
Approved:	

OEDOMETER TEST **Test no** **Anh k98** **Page no** **1a**

08.02.-16.03.93
19.09.05/gt





Test results

Q	~5	%
Qs	~0.07 %	
σ'_{pc}	>3000 kPa	

σ'	ε_c	ε_s	Ck10	σ'_m	K	w
kPa	%	% / lct	m^2/s	kPa	kPa	%
2,4	0,00	0,00				16,8
175,9	0,38	0,00	4,0E-06	89,2	45652,3	16,5
349,4	(0,03)	0,00	4,0E-06	262,6	-42311,9	16,8
696,3	0,10	0,00	7,2E-06	522,9	266890,6	16,7
1.390,3	0,55	0,02	1,1E-05	1.043,3	155936,1	16,3
2.778,1	1,74	0,05	1,1E-07	2.084,2	116136,5	15,3
4.165,9	2,52	0,03	5,6E-08	3.472,0	177927,1	14,7
5.553,8	3,05	0,06	5,6E-08	4.859,8	261854,9	14,2
6.594,6	3,41	0,06	8,2E-08	6.074,2	293203,8	13,9
7.635,5	3,73	0,06	7,2E-08	7.115,1	320268,7	13,6
8.329,4	3,94	0,07	1,3E-07	7.982,5	336852,2	13,5
6.594,6	3,99		8,0E-07	7.462,0	-3401546,8	13,4
2.778,1	3,03		3,3E-08	4.686,4	399637,2	14,2
2,4	(2,08)		3,8E-09	1.390,3	54265,1	18,6

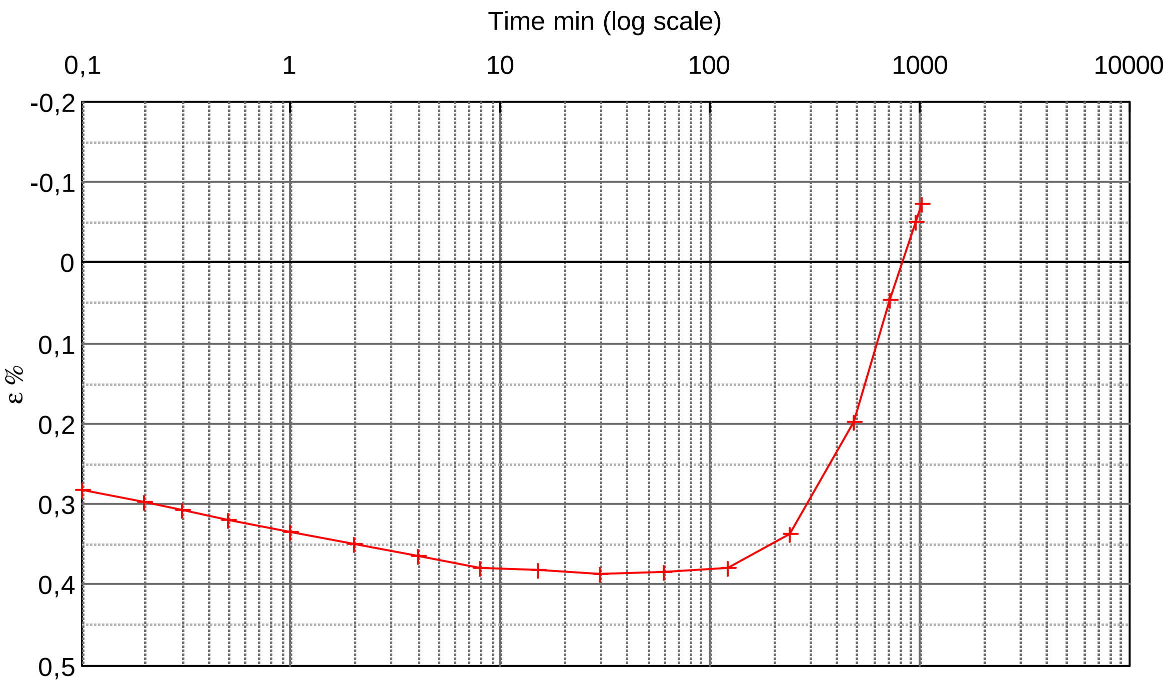
Remark:

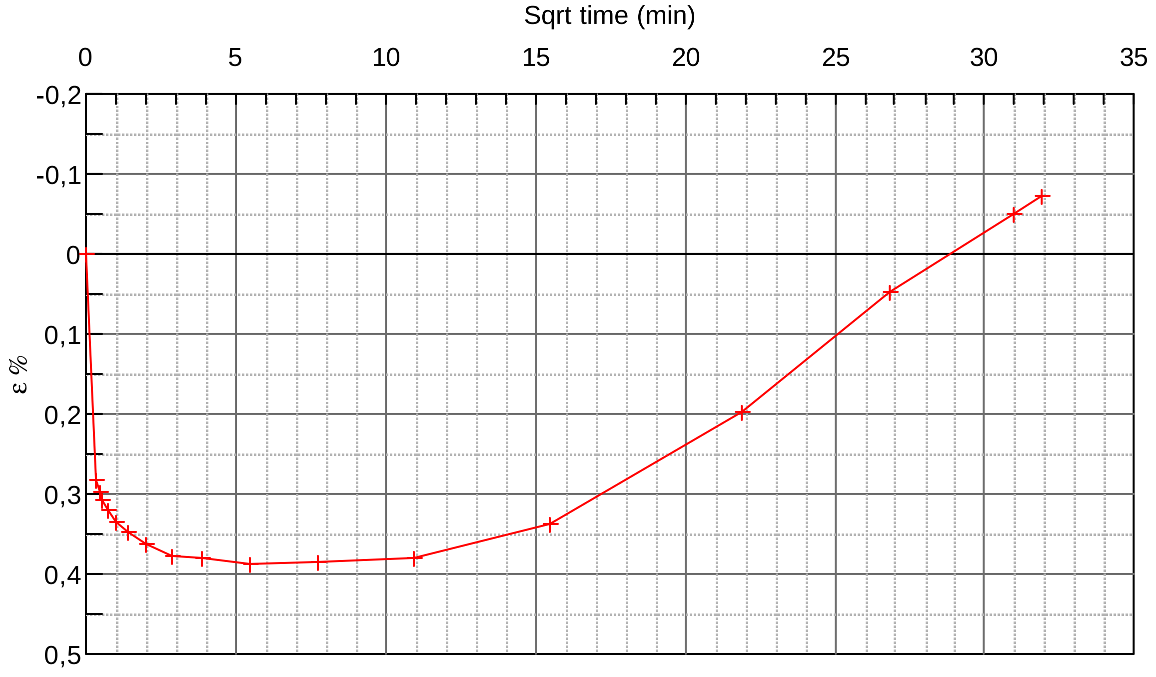
Sandsynligvis en genbelastningsgren
Den normalkonsoliderede tilstand er ikke nået

Job: Anholt		**AAU**
		Encl. No 6.2
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k98**
Department of Civil Engineering		**Page no**	**2**
Aalborg University		**Date**	**08.02.93**
			19.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	240
1	Before	2,43	ε0	0,00	ε c %	0,38	K i kPa	45.652
	After	175,9	ε~#	(0,07)	ε s		k10 m/sec	8,7E-10
					ε kryb		ck10 m^2 /sec	4,04E-06





Material: Clay, Lower Jura		**Job:** Anholt	**AAU**
			Encl. No 6.3
Bor no : A IV	Depth: 304 m.b.s	Executed: AMS/gt	Check:
Lab. no: k98	Insitu stress: ~3040 kPa	Approved:	

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OEDOMETER TEST

Test no	**Anh k98**
Page no	**3**
Date	**09.02.93**
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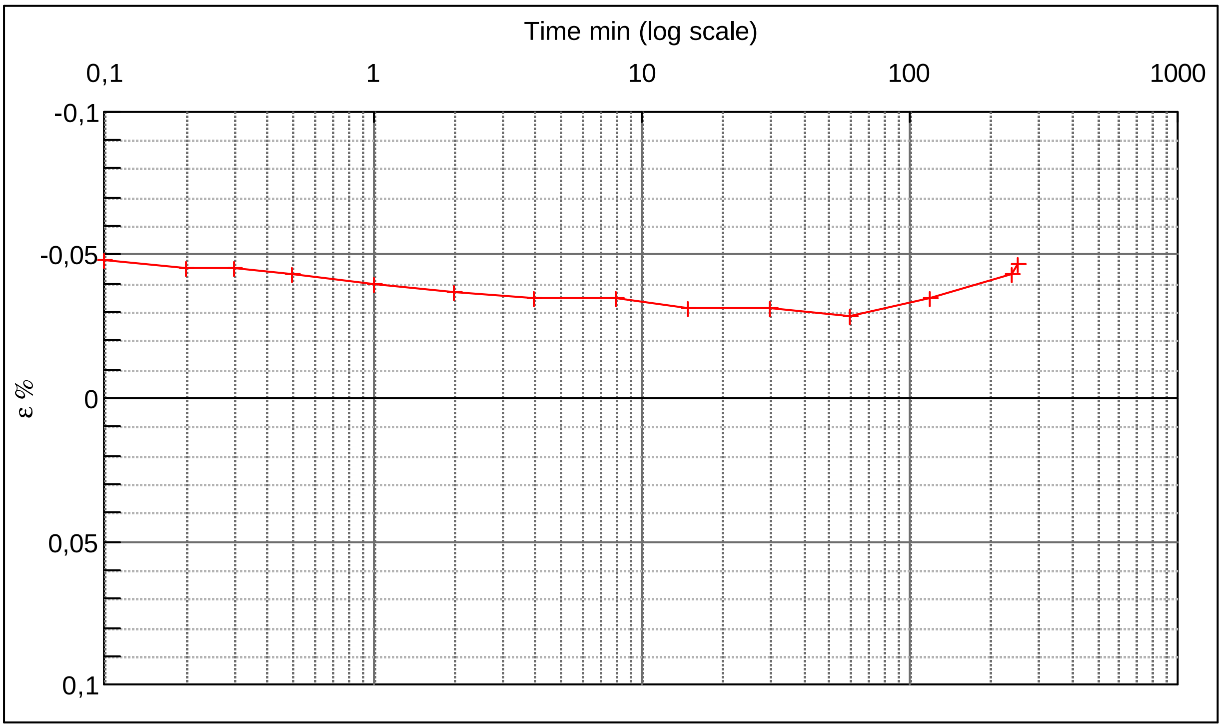
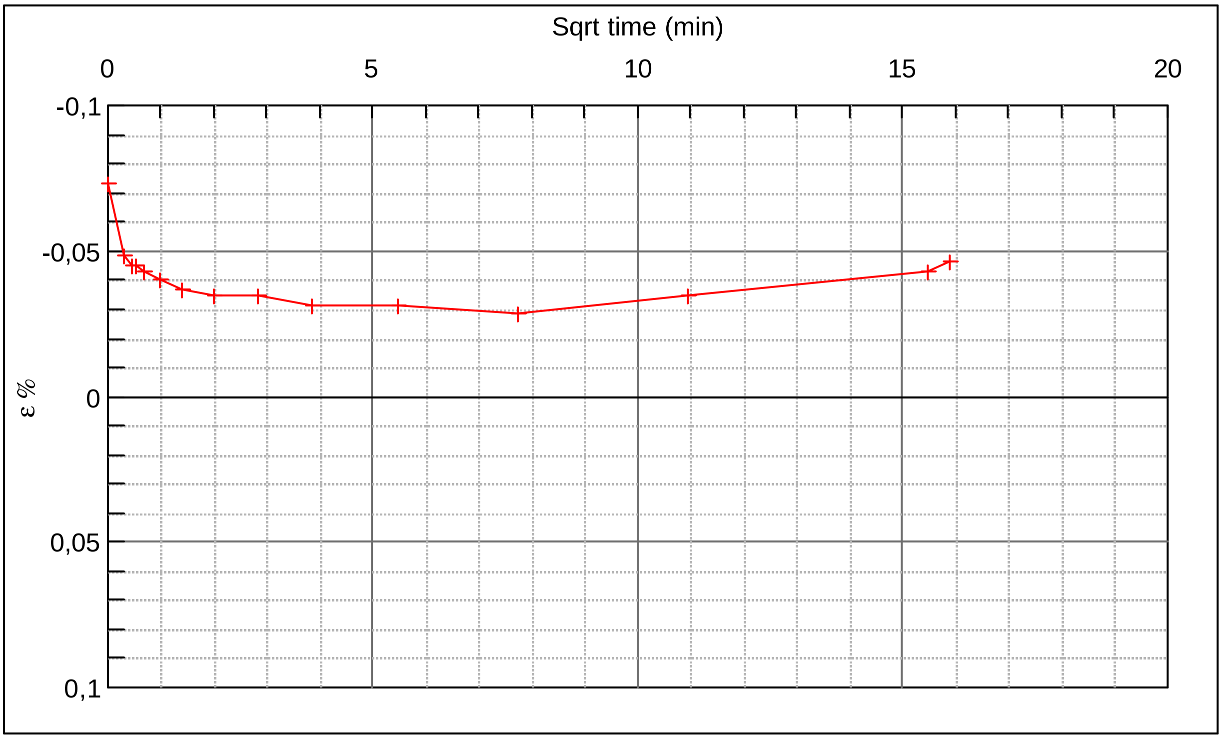
Step no	σ	kPa	ε	%	ε_i		tc in sec	240
2	Before	175,9	ε_0	(0,07)	ε_c %	(0,03)	K i kPa	400.336
	After	349,4	ε~#	(0,05)	ε_s		k10 m/sec	9,9E-11
					ε_{kryb}		ck10 m^2 /sec	4,04E-06





Material:			
Clay, Lower Jura			
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress	~3040 kPa

Job:	Anholt	**AAU**
		Encl. No 6.4
Executed:	AMS/gt	Check:
Approved:		

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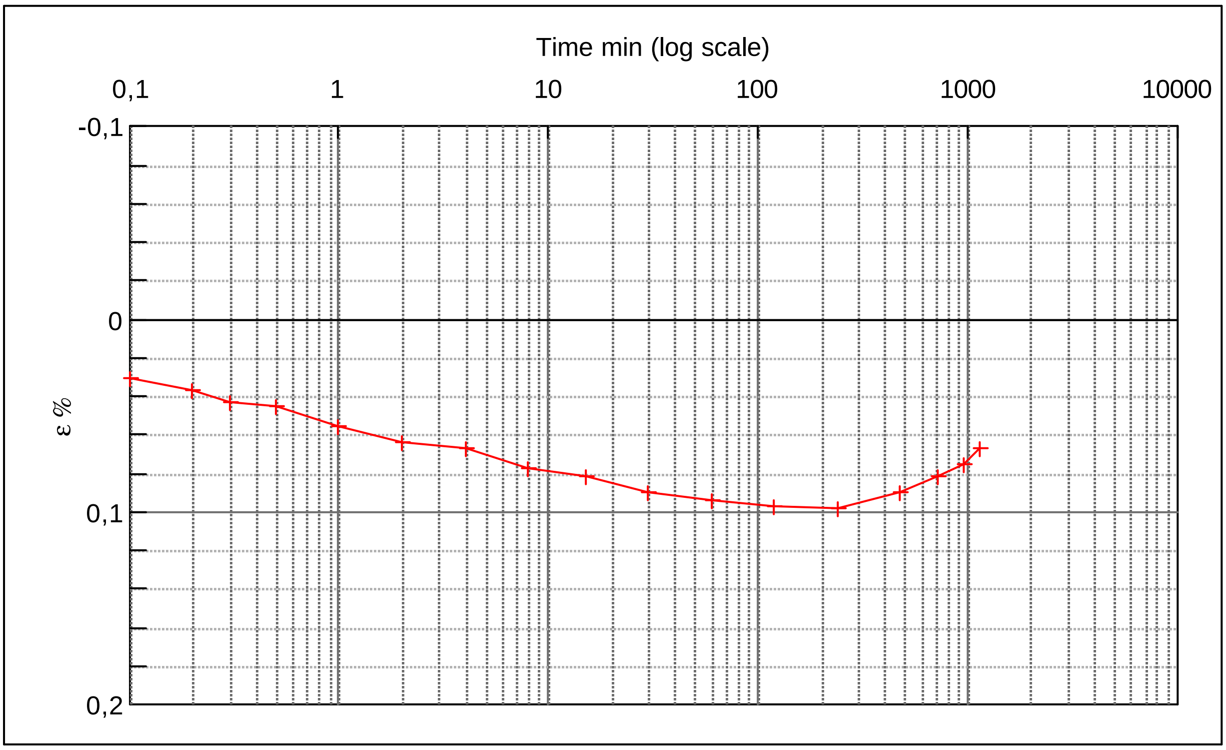
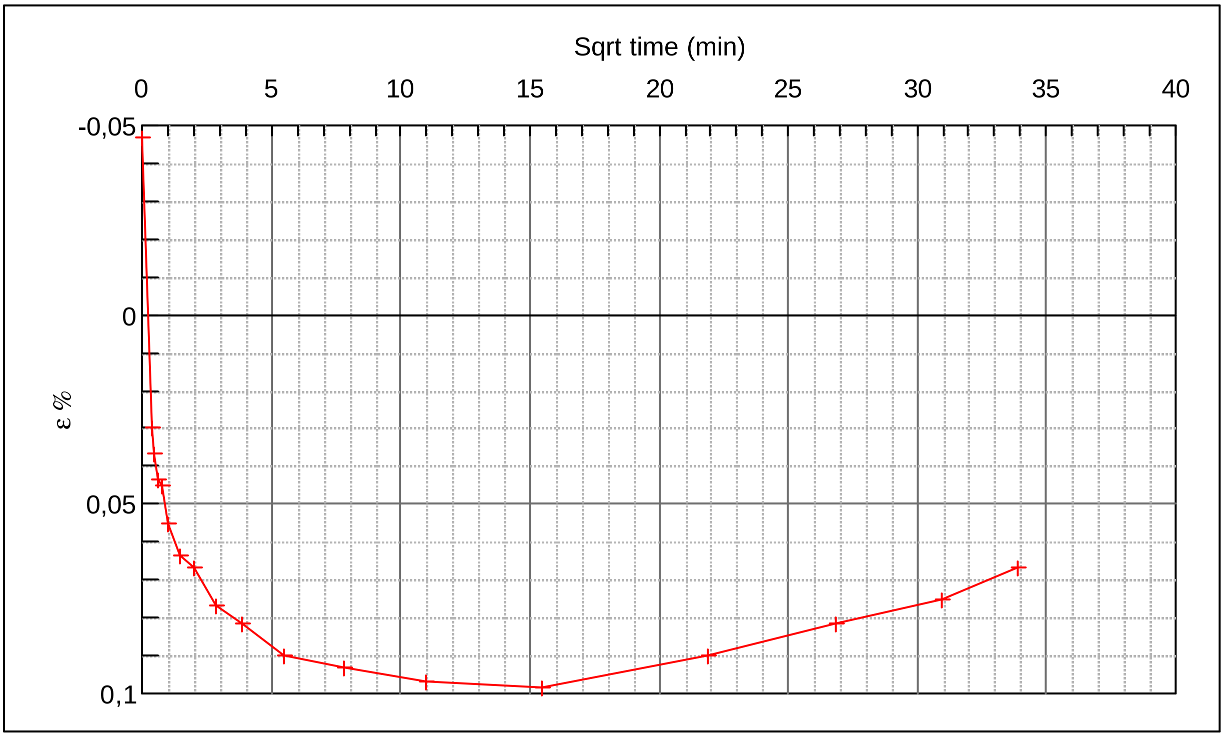
OEDOMETER TEST

Test no	**Anh k98**
Page no	**4**
Date	**09.02.93**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	135
3	Before	349,4	ε_0	(0,05)	ε_c %	0,10	K i kPa	236.562
	After	696,3	ε~#	0,07	ε_s		k10 m/sec	3,0E-10
					ε_{kryb}		ck10 m^2 /sec	7,18E-06



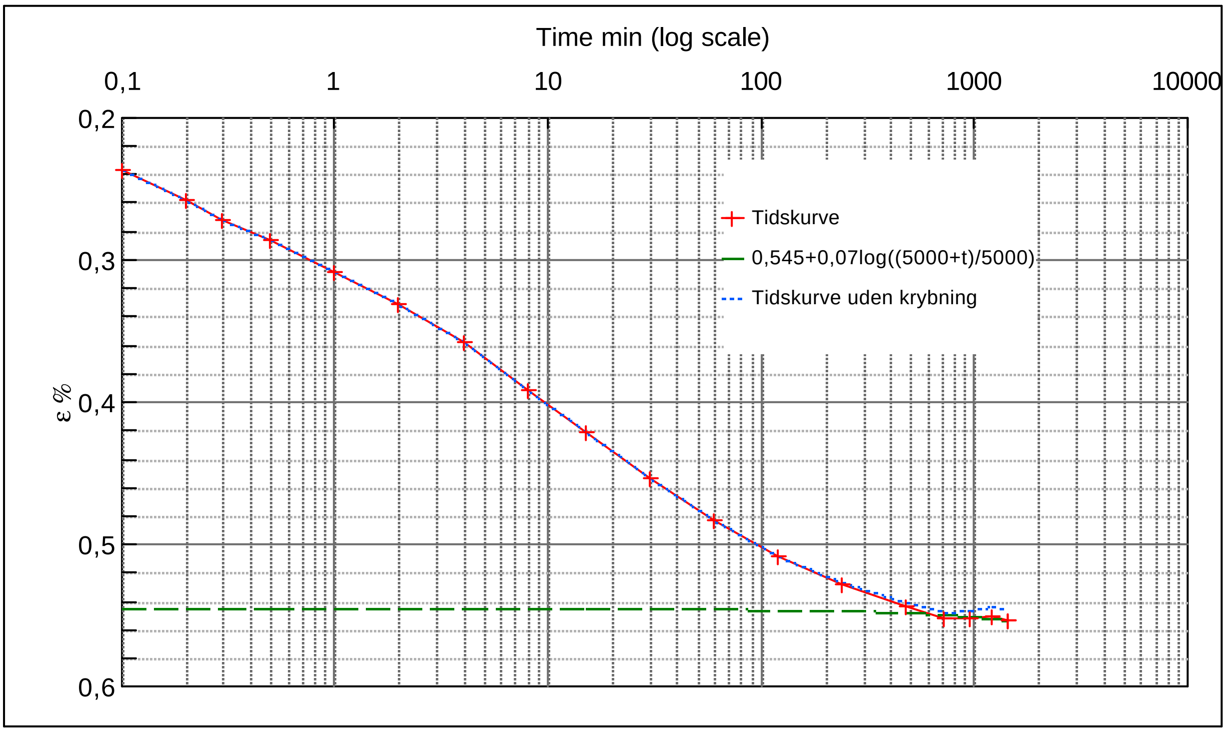


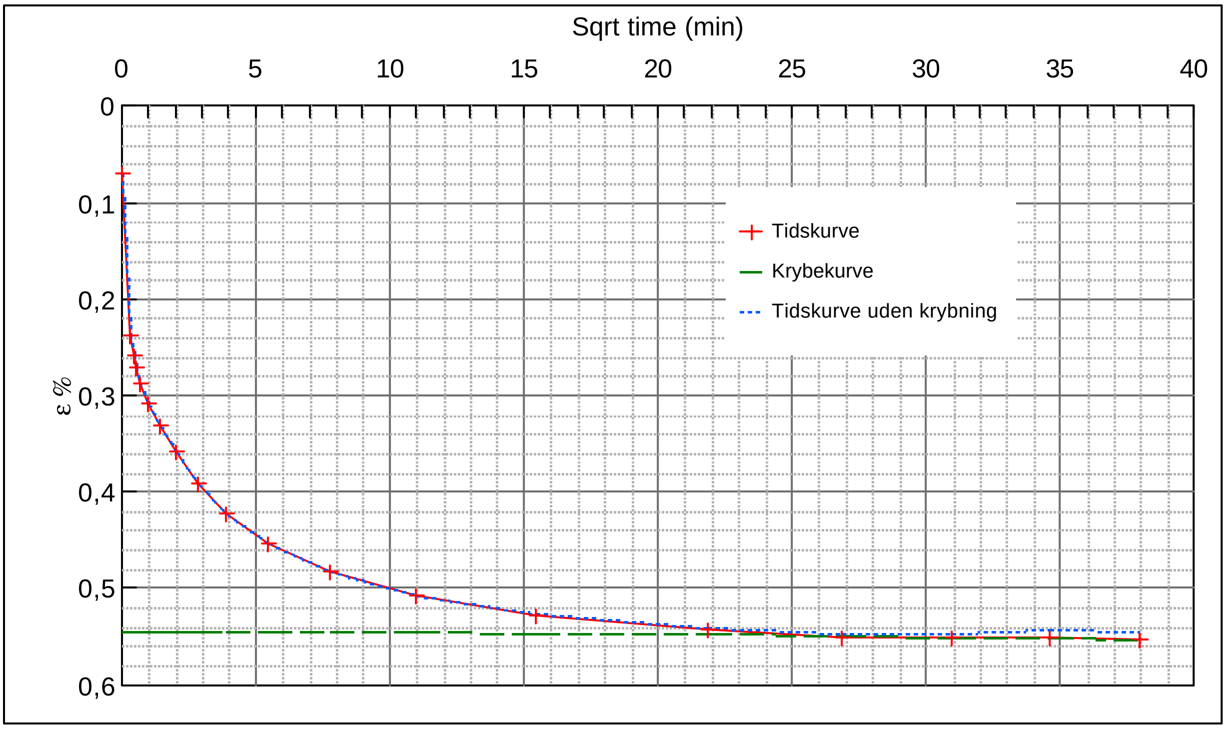
Material: Clay, Lower Jura			
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress:~3040 kPa	

Job:	Anholt	**AAU**
		Encl. No 6.5
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k98**
Department of Civil Engineering		**Page no**	**5**
Aalborg University		**Date**	**10.02.93**
			19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	86,4
4	Before	696,3	ε0	0,07	ε_c %	0,545	K i kPa	146.087
	After	1.390,3	ε~#	0,55	ε_s	0,015	k10 m/sec	7,5E-10
					ε_{kryb}	0,01	ck10 m^2 /sec	1,12E-05





Material: Clay, Lower Jura			
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress	~3040 kPa

Job:	Anholt	**AAU**
		Encl. No 6.6
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group
Department of Civil Engineering
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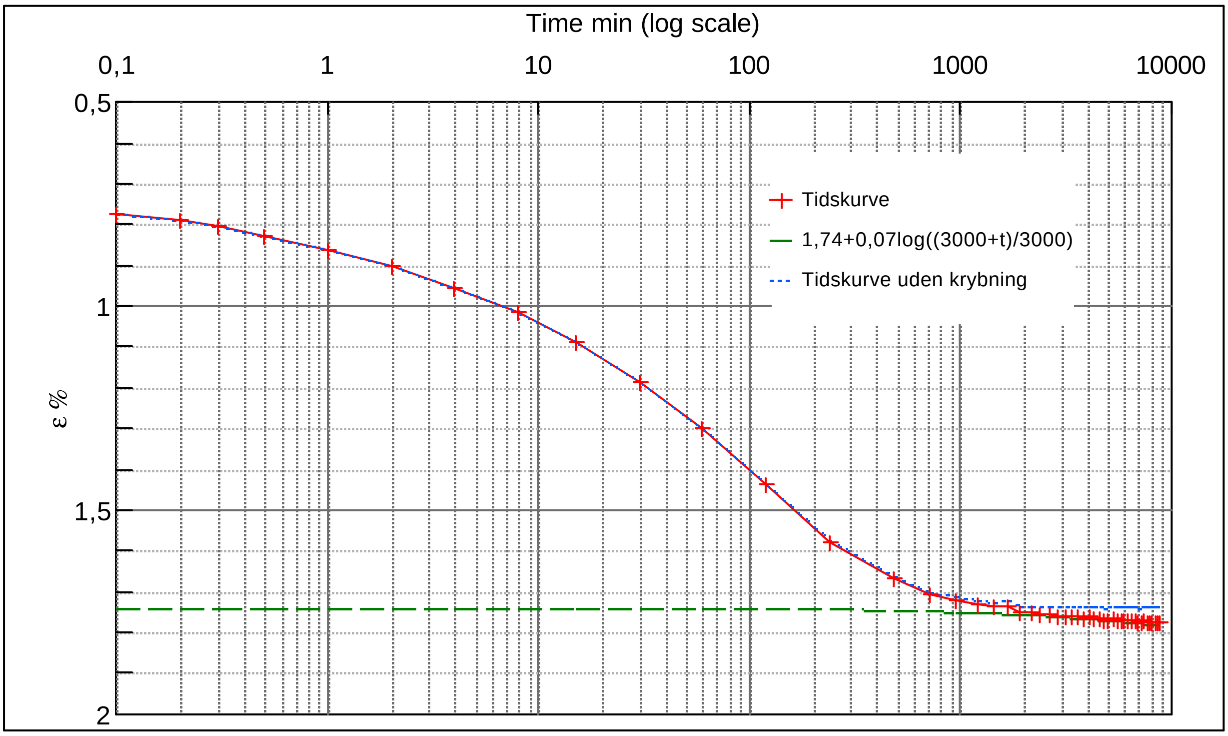
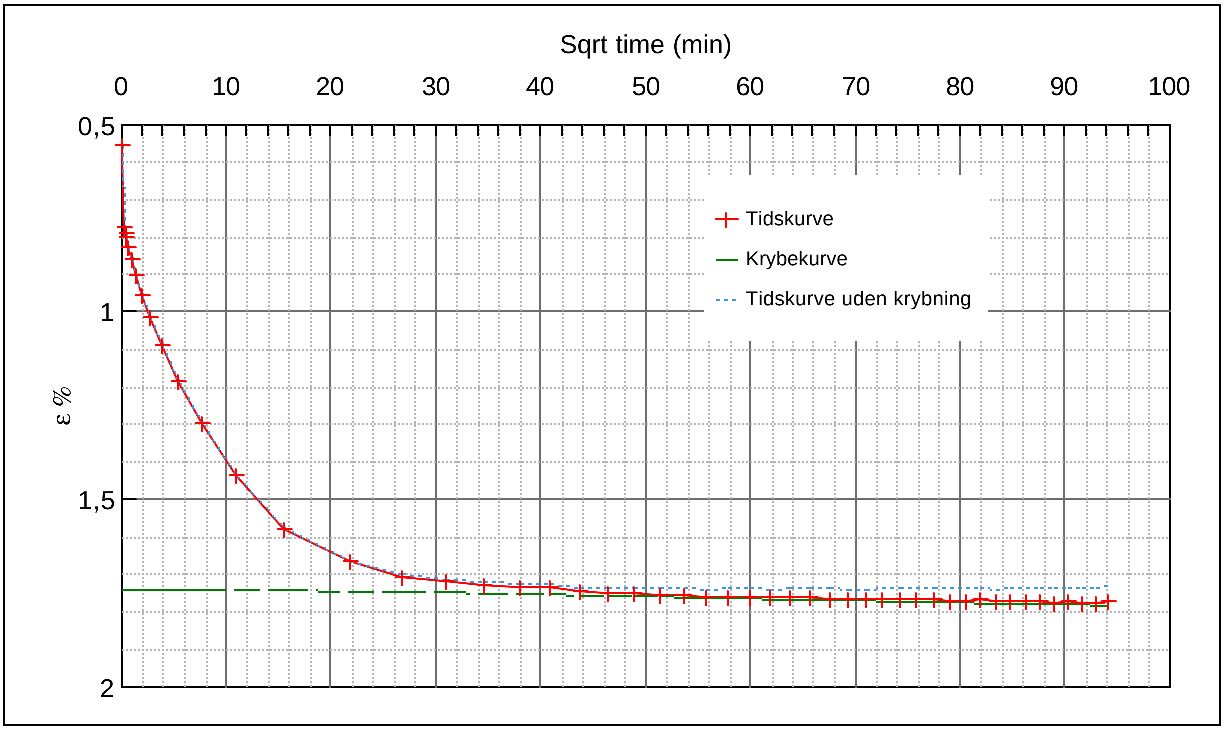
OEDOMETER TEST

Test no	**Anh k98**
Page no	**6**
Date	**11.02.93**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε i		tc in sec	8640
5	Before	1.390,3	ε0	0,56	ε c %	1,74	K i kPa	117.117
	After	2.778,1	ε~#	1,77	ε s	0,05	k10 m/sec	9,4E-12
					ε kryb	0,03	ck10 m^2 /sec	1,12E-07



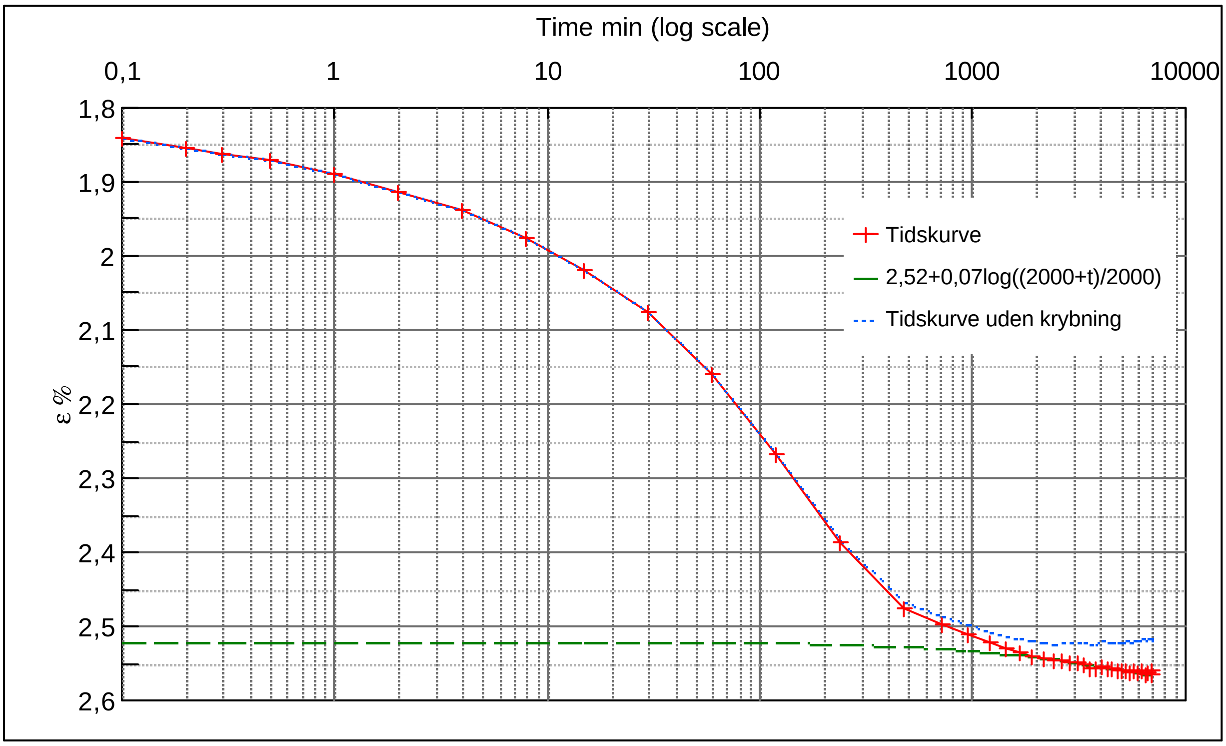


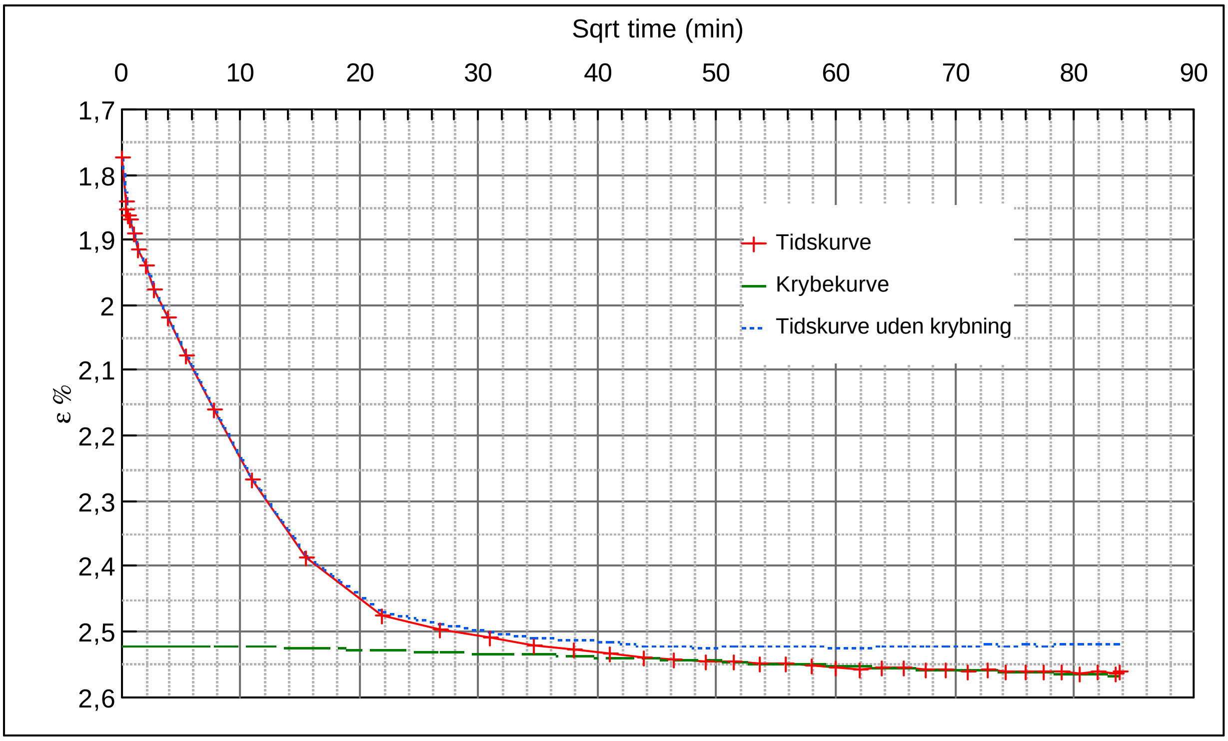
Material:			
	Clay, Lower Jura		
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress	~3040 kPa

Job:	Anholt	**AAU**
		Encl. No 6.7
Executed:	AMS/gt	Check:
Approved:		

Geotechnical Engineering Group	**OEDOMETER TEST**	**Test no**	**Anh k98**
Department of Civil Engineering		**Page no**	**7**
Aalborg University		**Date**	**17.02.93**
			19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	17340		
6	Before	2.778,1	ε0	1,78	ε_{c} %	2,52	K i kPa	186.286		
	After	4.165,9	ε~#	2,56	ε_s	0,03	k10 m/sec	2,9E-12		
					ε_{kryb}	0,04	ck10 m^2 /sec	5,59E-08		





Material: Clay, Lower Jura			
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress:~3040 kPa	

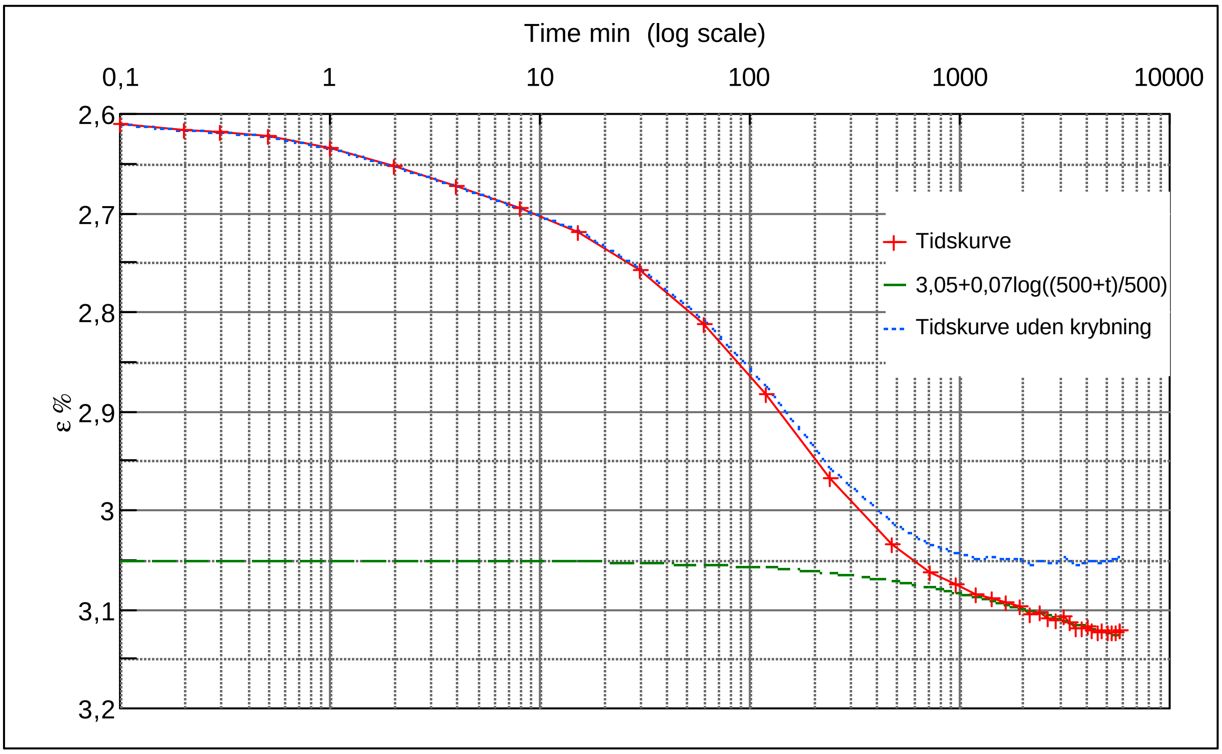
Job:	Anholt	**AAU**
		Encl. No 6.8
Executed:	AMS/gt	Check:
Approved:		

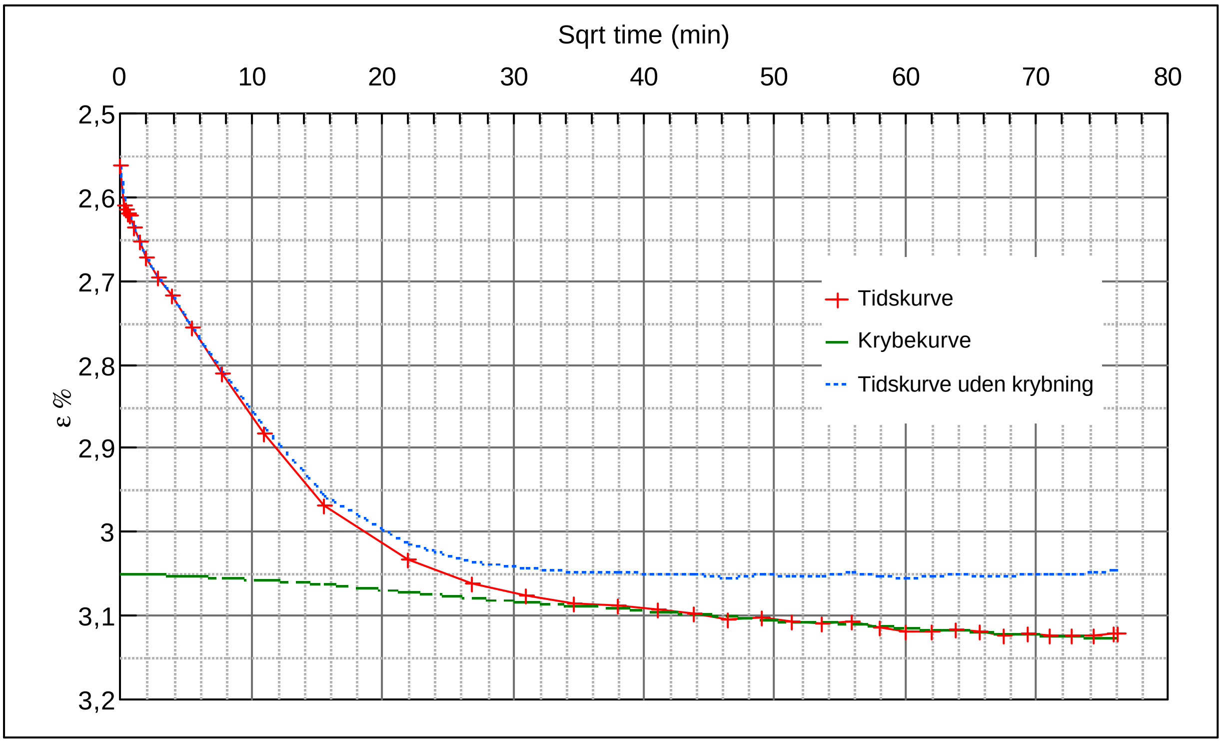
Geotechnical Engineering Group
Department of Civil Engineering
Aalborg University

OEDOMETER TEST

Test no	**Anh k98**
Page no	**8**
Date	**22.02.93**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	17340
7	Before	4.165,9	ε0	2,56	ε_c %	3,05	K i kPa	284.197
	After	5.553,8	ε~#	3,12	ε_s	0,06	k10 m/sec	1,9E-12
					ε_{kryb}	0,07	ck10 m^2 /sec	5,59E-08





Material: Clay, Lower Jura			
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress:~3040 kPa	

Job:	Anholt	**AAU**
		Encl. No 6.9
Executed:	AMS/gt	Check:
Approved:		

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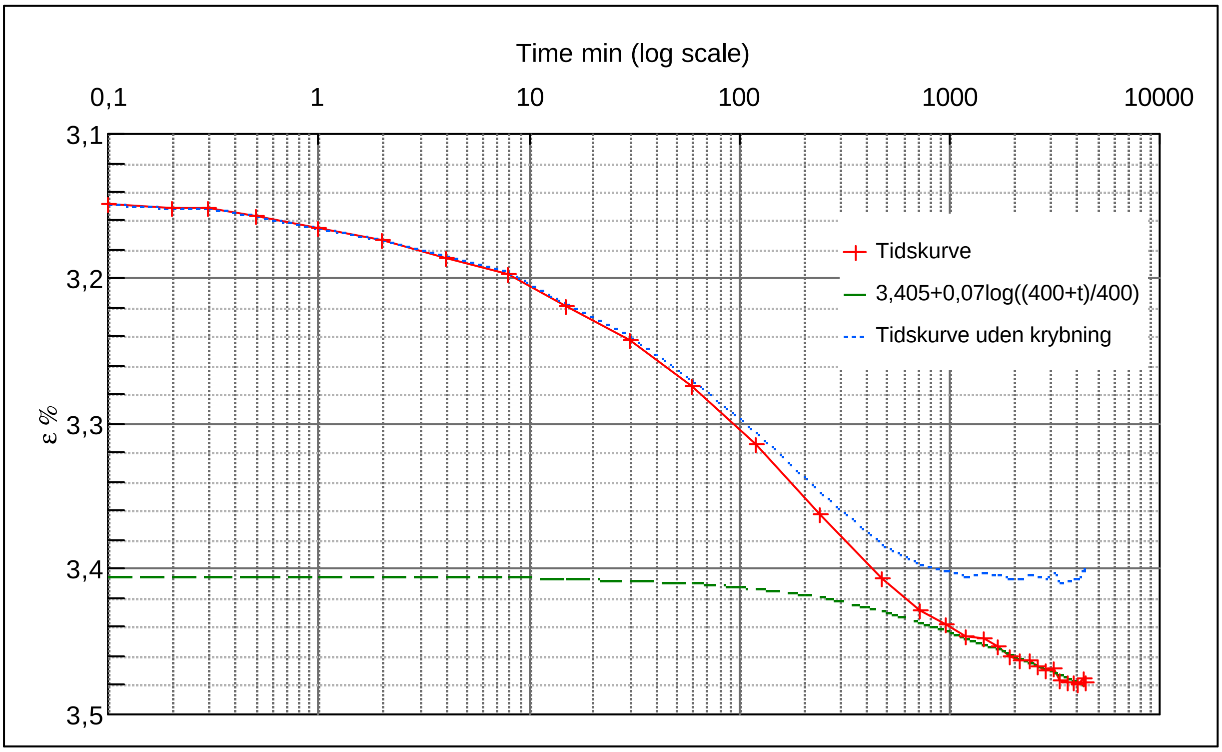
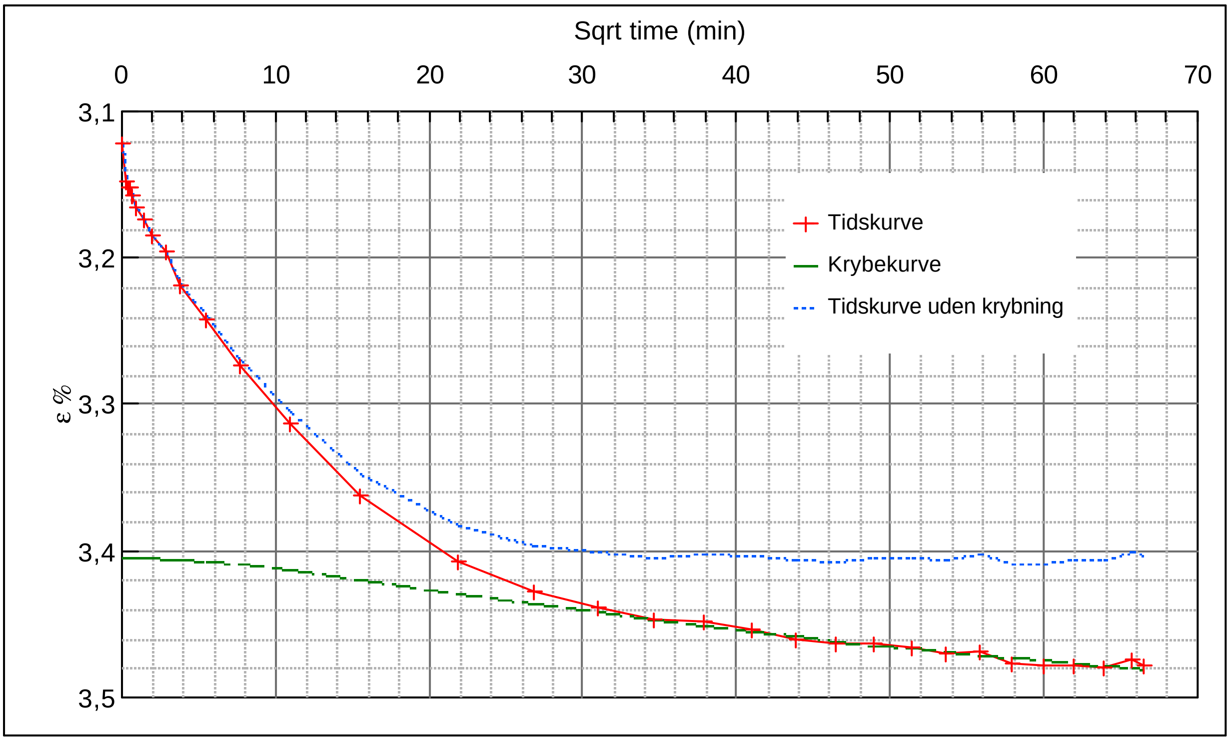
OEDOMETER TEST

Test no	**Anh k98**
Page no	**9**
Date	**26.02.93**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	11760
8	Before	5.553,8	ε_0	3,12	ε_c %	3,405	K i kPa	367.367
	After	6.594,6	ε~#	3,48	ε_s	0,06	k10 m/sec	2,2E-12
					ε_{kryb}	0,07	ck10 m^2 /sec	8,25E-08





Material: Clay, Lower Jura			
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress:~3040 kPa	

Job:	Anholt	**AAU**
		Encl. No 6.10
Executed:	AMS/gt	Check:
Approved:		

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Department of Civil Engineering
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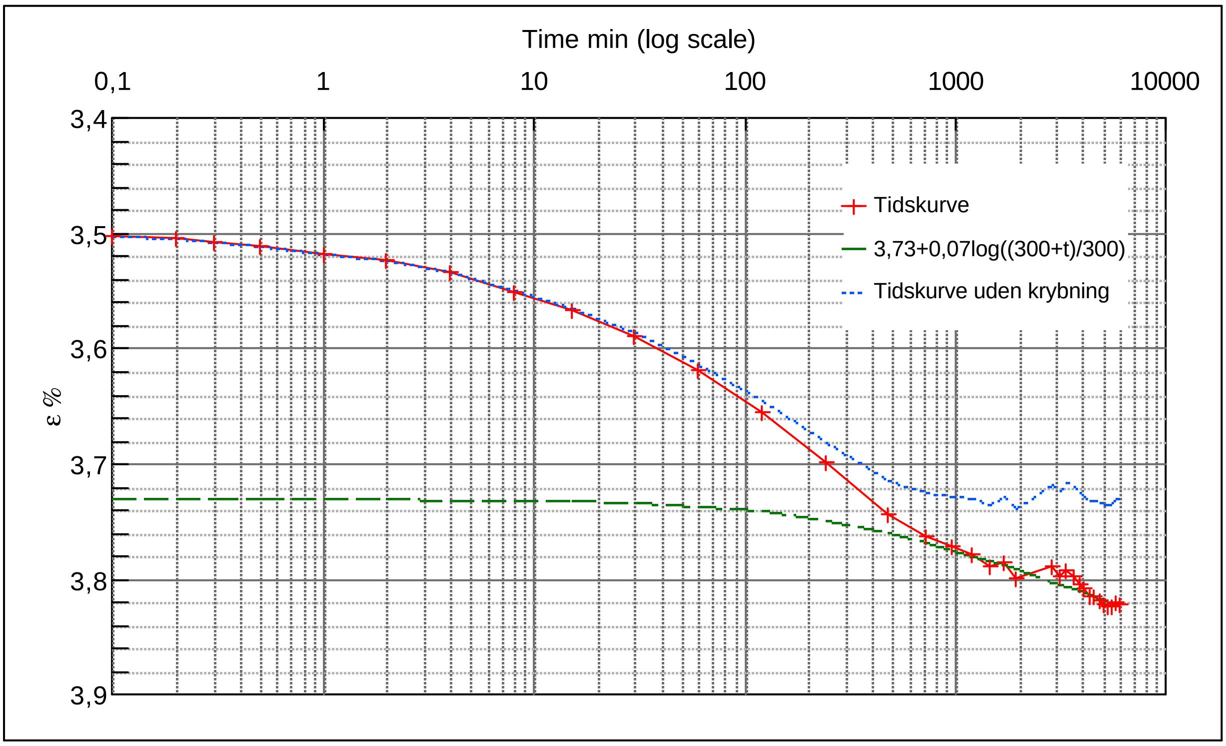
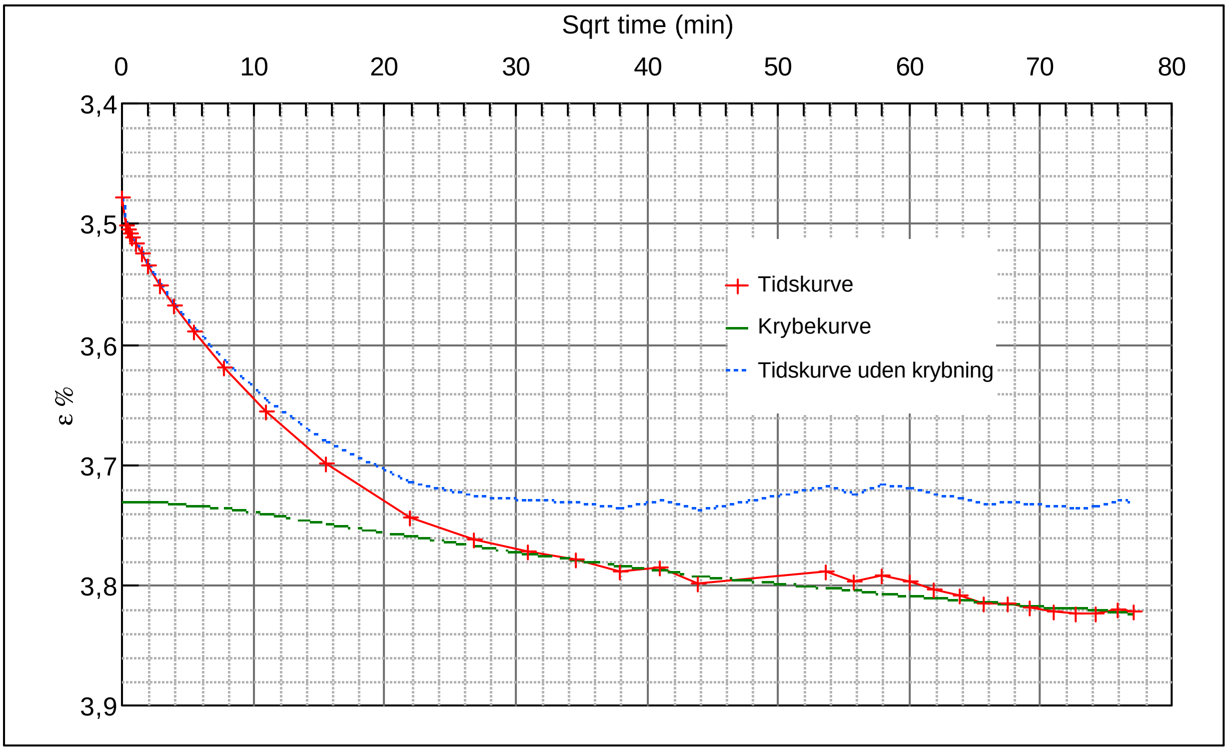
OEDOMETER TEST

Test no	**Anh k98**
Page no	**10**
Date	**01.03.93**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε_{i}		tc in sec	13500
9	Before	6.594,6	ε0	3,48	ε_{c} %	3,73	K i kPa	413.592
	After	7.635,5	ε~#	3,82	ε_{s}	0,06	k10 m/sec	1,7E-12
					ε_{kryb}	0,09	ck10 m^2 /sec	7,18E-08





Material: Clay, Lower Jura			**Job:**	Anholt	**AAU**
					Encl. No 6.11
Bor no :	A IV	Depth: 304 m.b.s	Executed:	AMS/gt	Check:
Lab. no:	k98	Insitu stress:~3040 kPa	Approved:		

Geotechnical Engineering Group
Department of Civil Engineering
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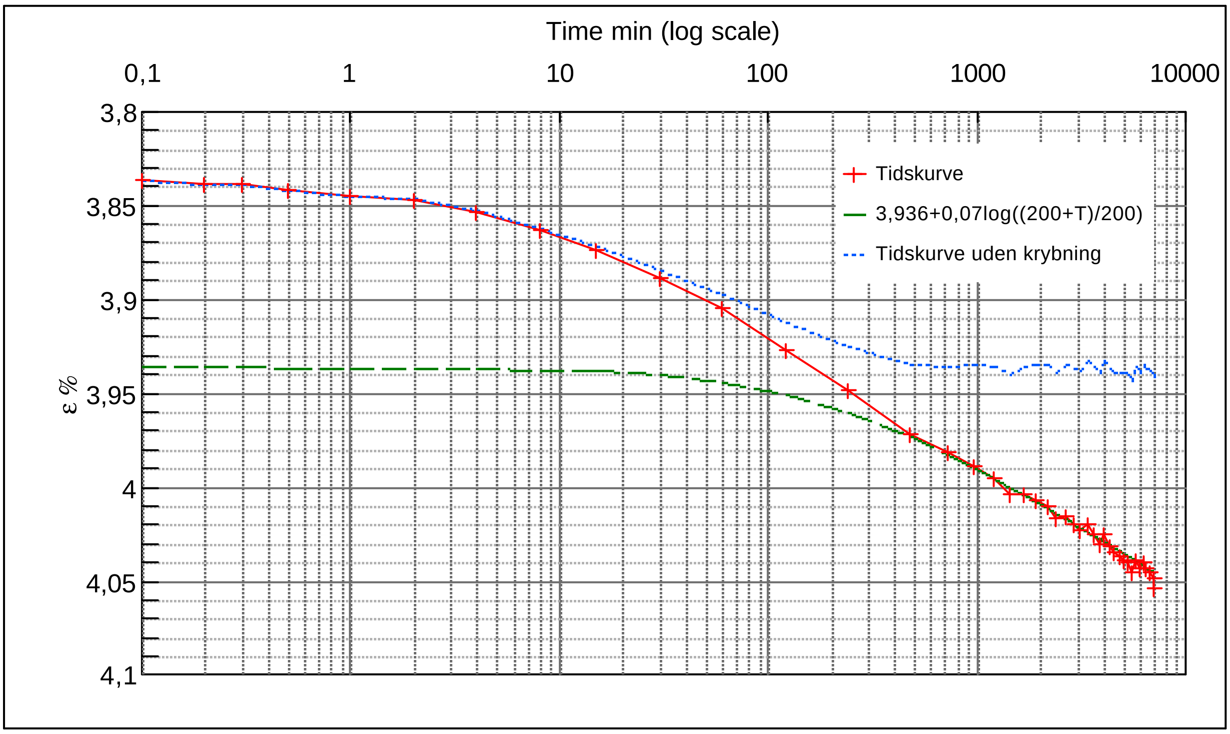
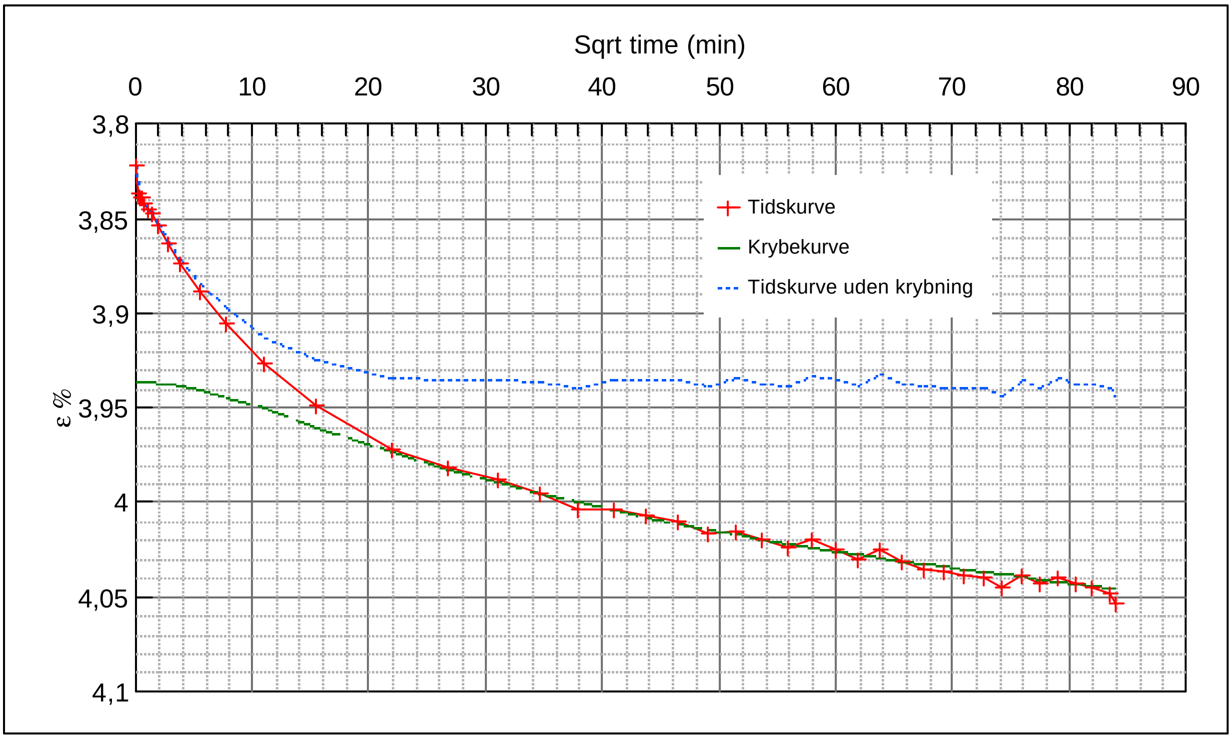
OEDOMETER TEST

Test no	**Anh k98**
Page no	**11**
Date	**05.03.93**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	7260
10	Before	7.635,5	ε0	3,82	ε_{c} %	3,94	K i kPa	606.923
	After	8.329,4	ε~#	4,05	ε_s	0,07	k10 m/sec	2,2E-12
					ε_{kryb}	0,12	ck10 m^2 /sec	1,34E-07





Material:	Clay, Lower Jura		
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress	~3040 kPa

Job:	Anholt	**AAU**
		Encl. No 6.12
Executed:	AMS/gt	Check:
Approved:		

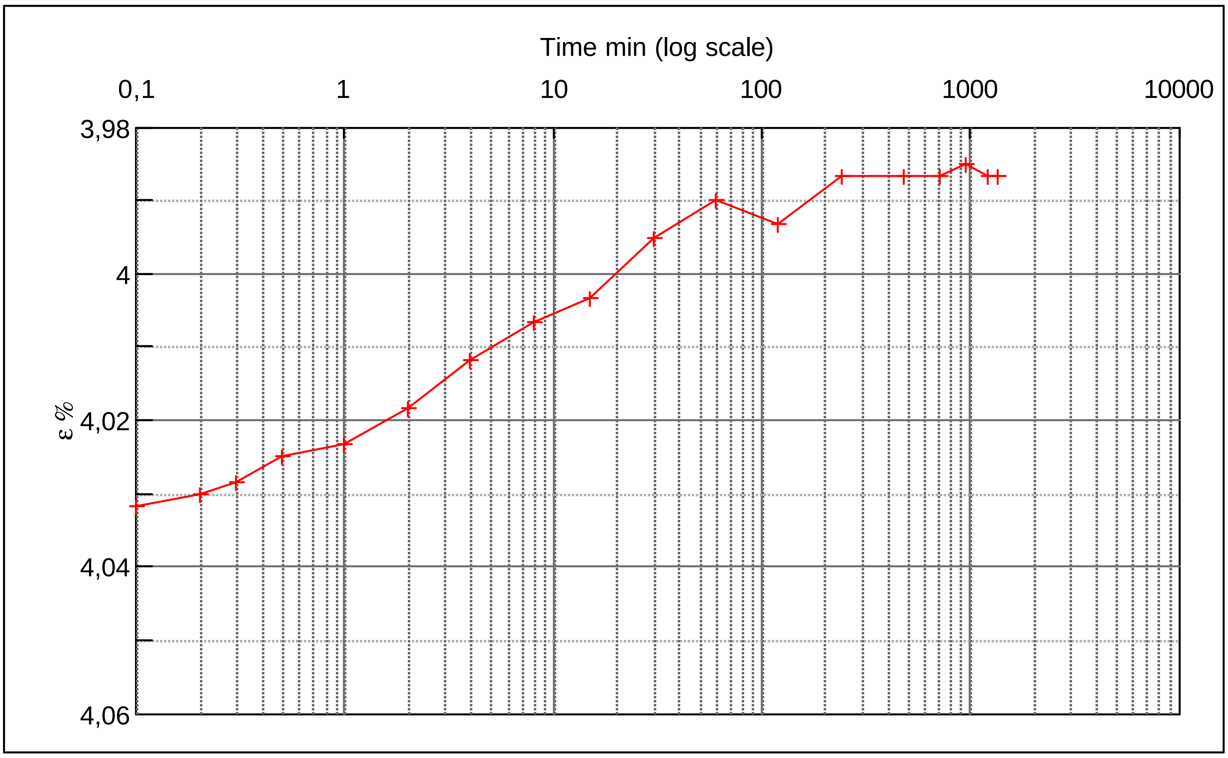
Geotechnical Engineering Group
Department of Civil Engineering
Aalborg University

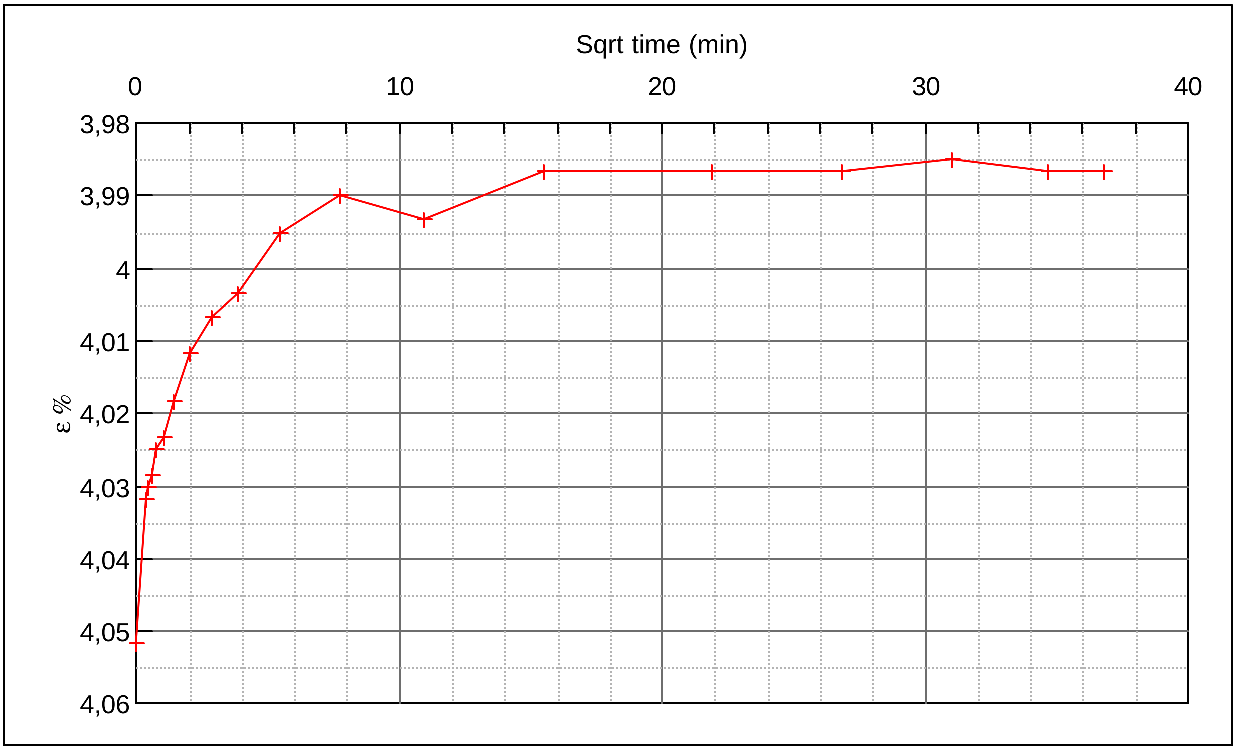
OEDOMETER TEST

Test no	**Anh k98**
Page no	**12**
Date	**10.03.93**

19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	1215
11	Before	8.329,4	ε0	4,05	ε_c %	3,99	K i kPa	2.682.663
	After	6.594,6	ε~#	3,99	ε_s		k10 m/sec	2,9E-12
					ε_{kryb}		ck10 m^2 /sec	7,98E-07





Material: Clay, Lower Jura			
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress:	~3040 kPa

Job:	Anholt	**AAU** Encl. No 6.13
Executed:	AMS/gt	Check:
Approved:		

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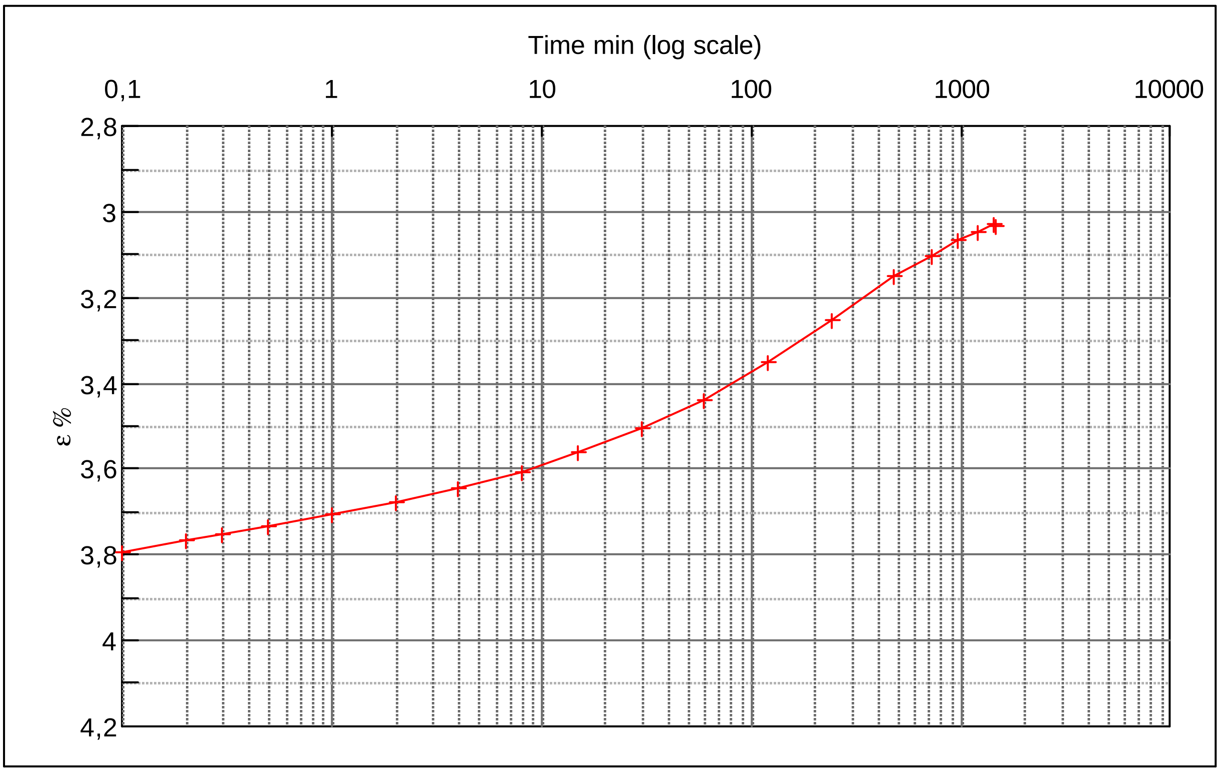
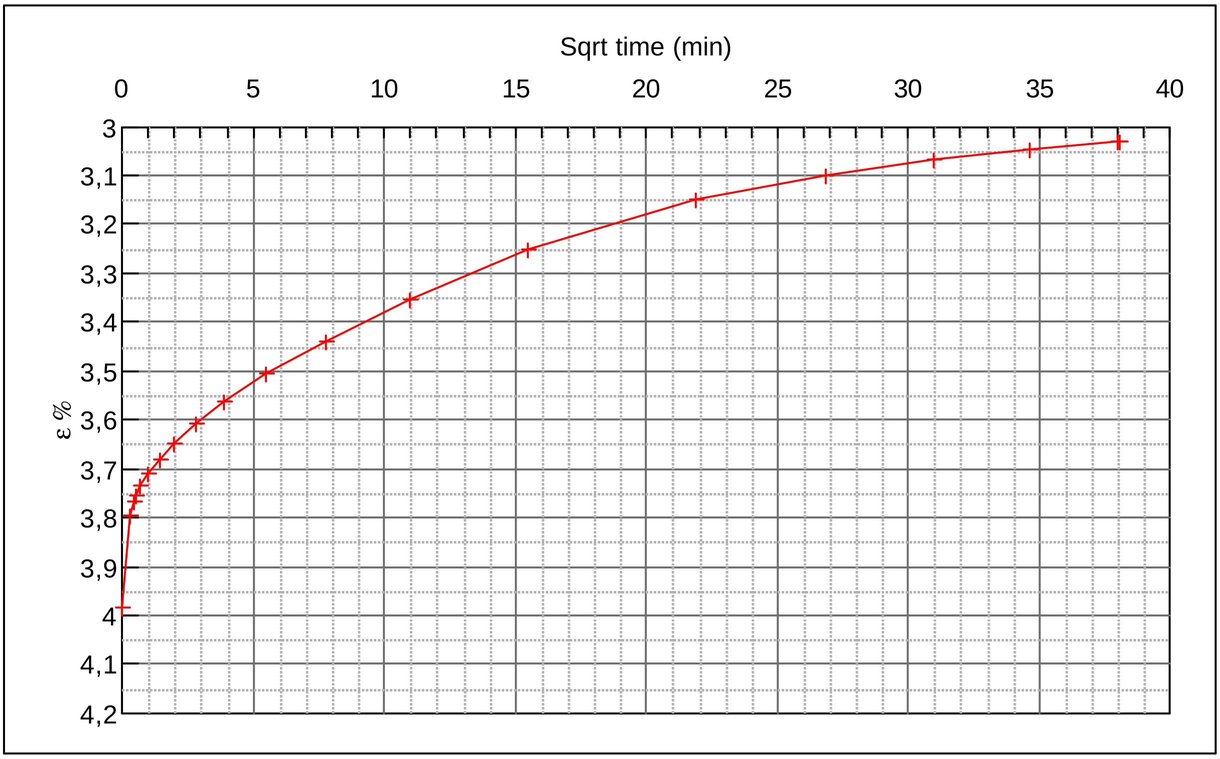
Department of Civil Engineering
Aalborg University

OEDOMETER TEST

Test no **Anh k98**
Page no **13**
Date **11.03.93**
19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	29040
12	Before	6.594,6	ε0	3,98	ε_c %	3,03	K i kPa	401.178
	After	2.778,1	ε~#	3,03	ε_s		k10 m/sec	8,2E-13
					ε_{kryb}		ck10 m^2 /sec	3,34E-08





Material: Clay, Lower Jura		**Job:** Anholt	**AAU** Encl. No 6.14
Bor no : A IV	Depth: 304 m.b.s	Executed: AMS/gt	Check:
Lab. no: k98	Insitu stress: ~3040 kPa	Approved:	

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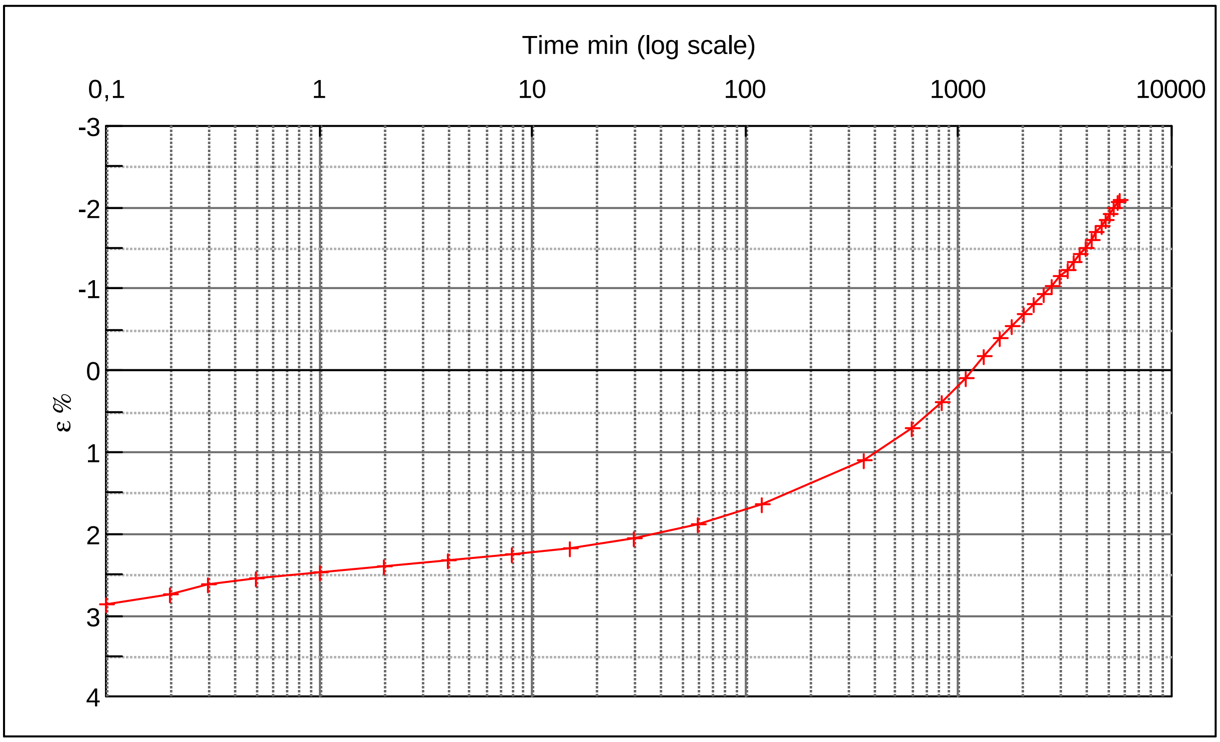
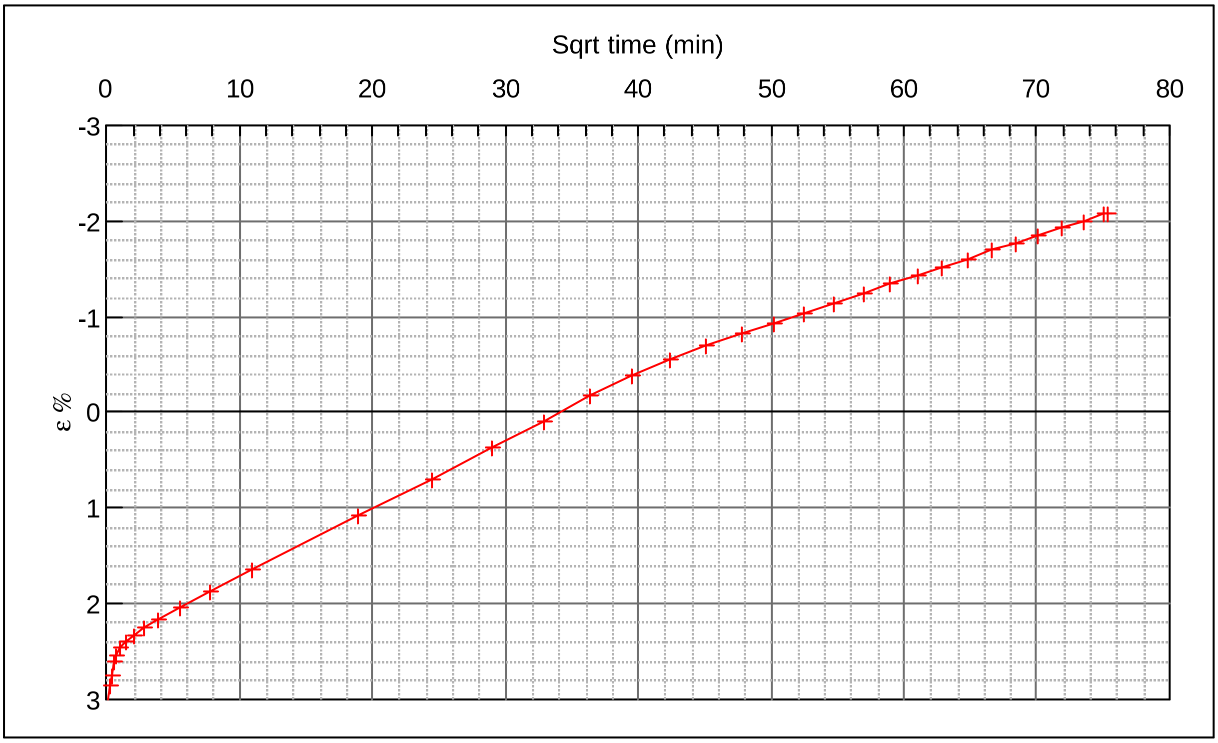
OEDOMETER TEST

Test no	**Anh k98**
Page no	**14**
Date	**12.03.93**
	19.09.05/gt

Step no	σ	kPa	ε	%	ε_i		tc in sec	253500
13	Before	2.778,1	ε0	3,03	ε_c %	(2,08)	K i kPa	54.269
	After	2,43	ε~#	(2,08)	ε_s		k10 m/sec	6,9E-13
					ε_{kryb}		ck10 m^2 /sec	3,83E-09





Material: Clay, Lower Jura			
Bor no :	A IV	Depth:	304 m.b.s
Lab. no:	k98	Insitu stress:~3040 kPa	

Job:	Anholt	**AAU**
		Encl. No 6.15
Executed:	AMS/gt	Check:
Approved:		

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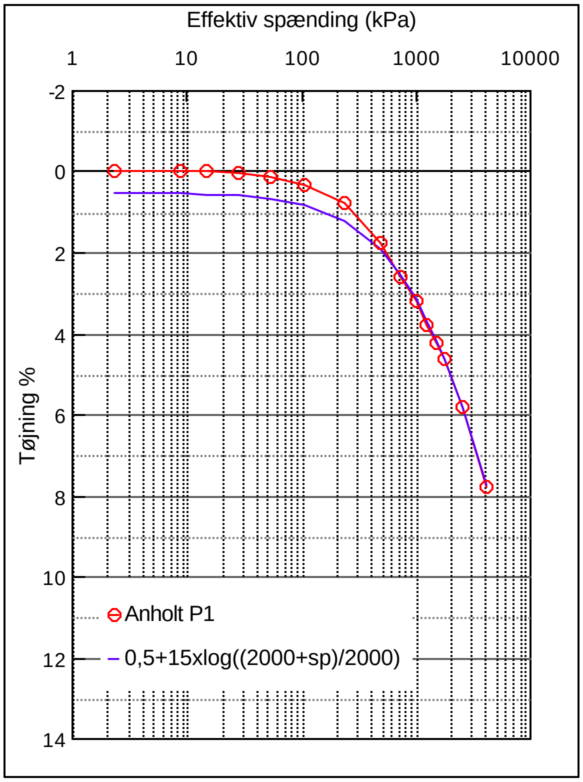
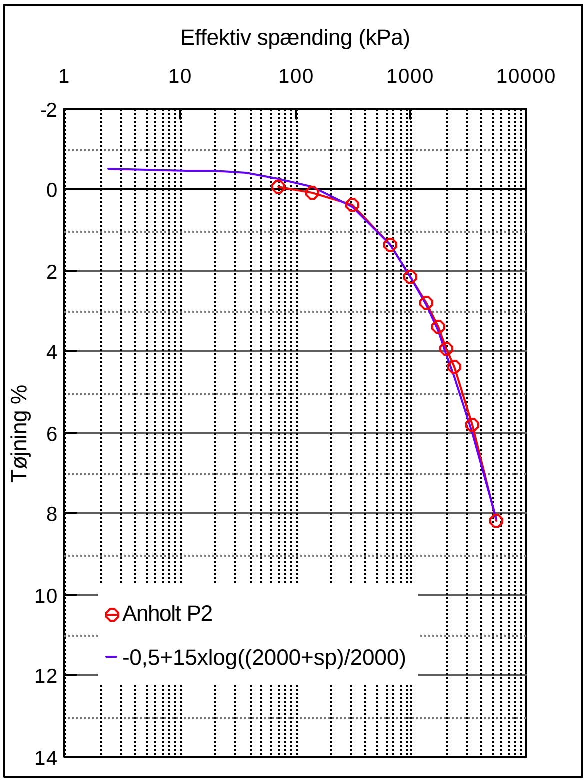
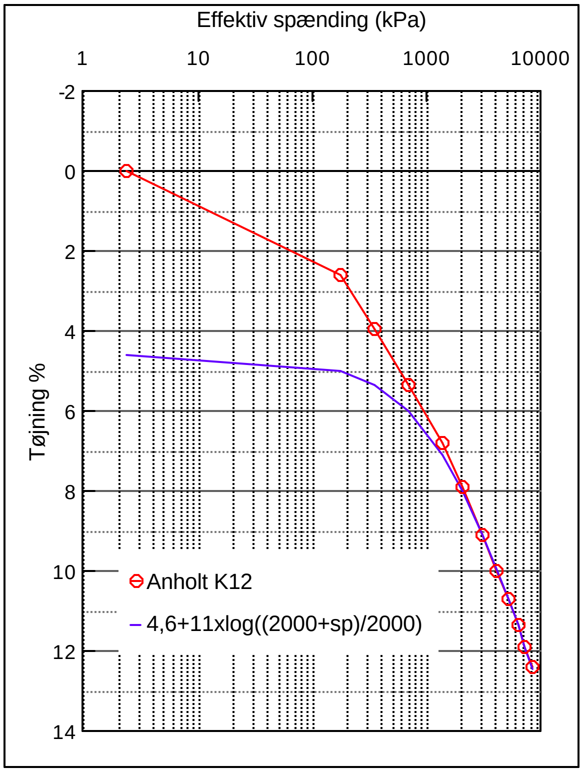
Eem. Arbejdskurver fra konsolideringsforsøg med tilpassede Terzaghi-kurver







Job: ANHOLT	AAU Encl. No 7.1
Executed: gt	Check:
Approved:	

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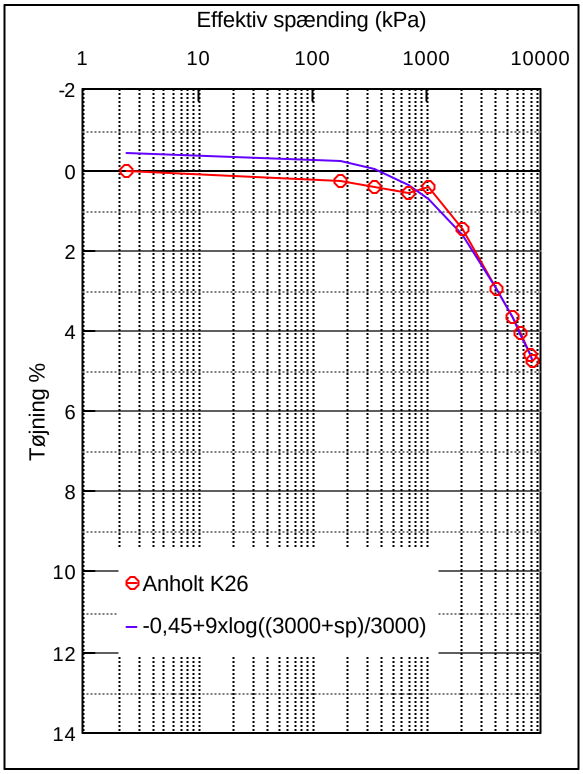
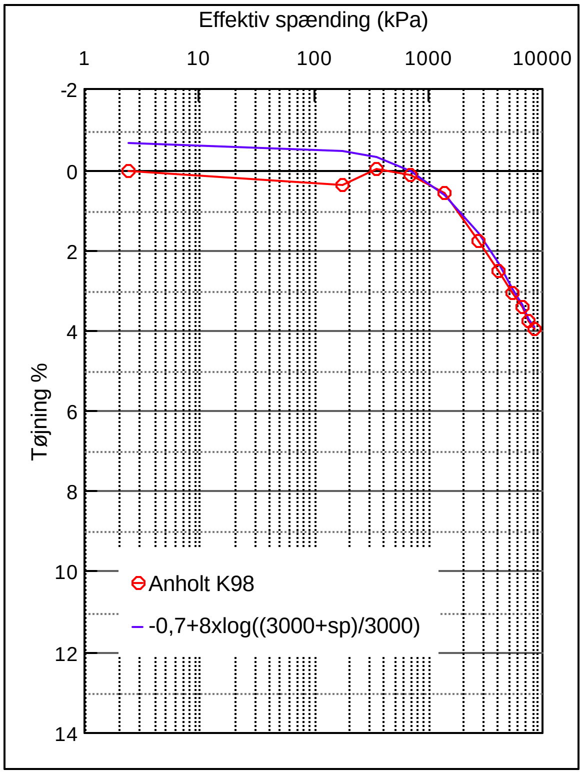
Jura. Arbejdskurver fra konsolideringsforsøg med tilpassede Terzaghi-kurver





Job: ANHOLT	AAU
	Encl. No 7.2
Executed: gt	Check:
Approved:	