

FULLY AUTOMATIC TRIAXIAL TESTER (T-5001/A) ASTM D2850 • D4767 • D7181

- Used to perform large range of Triaxial tests on soil samples to determine the strength parameters and the mechanical properties.
- Capable of performing:
 - Standard Triaxial Tests:
 - UU Test (Unconsolidated Undrained Test)
 - CU Test (Isotropically Consolidated Undrained Test)
 - CD Test (Isotropically Consolidated Drained Test)
 - Wide range of advanced Triaxial tests (ie, K_o consolidation, custom stress paths, extension tests ... etc)
- Capacity:
 - Frame
 - Load Cell
 - Cell

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- Pressure Transducer
- Water Tank
 - Ram travel
- Sample Dimensions
 - Triaxial Tests
 - Flexible Wall Permeability : 35 90 mm

 The load cell is installed inside the cell to eliminate the piston friction calculations from the test and provide very precise measurements, which is directly applied on the sample. The water-proof load cell is made completely of stainless steel.





: 2000 kPa

: 25 bar

: > 30 lt

: 50 mm

: 35 - 70 mm





- The load is applied by servo-motor, which allows sensitive control on loading speed ranging from 0.00001 9.99999 mm/ min.
- The cell is made of high-strength plexiglass specially designed for this particular device with thickness of 10 mm.
- Equipped with 2 PVAs (Pressure-Volume Actuator) which controls and measures both pressure change volume change in the cell and the sample. The PVA is completely controlled from computer with the supplied software.
- The pressure is measured using very precise pressure transducer that sends the data to the equipped acquisition system.
- The acquisition system gathers the data from all the sensors (load cell, pressure transducers, electronic position indicators
 ... etc), analyses it and sends it to the computer via USB.
- The water tank is fitted with a magnetic stirrer to de-air the water before pumping it into the system. Adding this feature significantly reduces the time required to saturate the sample and provide air-free water during the test to the whole system.
- The LCD indicator at the front of the system shows the readings from all the sensors and the position of the PVA pistons with the amount of water left in each one simultaneously.
- The tests are all performed from computer with the help of ALFA's state-of-the-art Triaxial Control software (refer to appendix A for more details).
- The device is supplied with all the required accessories to perform Triaxial Tests, Uniaxial UCS Tests, Permeability Tests, and all the tools for proper sample preparation.

SUPPLIED WITH





• TRIAXIAL SOFTWARE

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Proceed to			CONNECT	STOP ALL		
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	Square hoor basis inci	emen 👻 every 20 💠 secon	ds	MOTORS		
e Initialization Saturation Consolidat	ion Flow / Permeability Sh	ear Results & Graphs Manual C	Control Ending Test Calculations Moh	r Circle		
		Testing Laboratory Information				
ALFA Testing Equipment		Laboratory / Comapny Name:	ALFA Testing Equipment			
		Sample Received By: Testing Date: Tested By: Quality Controt: Receiverer's Notes:				
Monday , 8 June , 2015						
0.000						
0.000						
		Vertical Filter Strips Properties				
06			 I am using vertical filter strips 			
23.000	m	Total Width of Filter:	0.000	mm		
CL (clay of low plasticity, lean clay)	~	Value of K fp:	0.000			
5E-10	m/s	Membrane Properties				
0.000	m/s	Correction Method:	Modified ASTM Method			
4.000	m	Thickness.	0.000	μm		
50.000	mm	Perimeter:	0.000	cm		
100.000	mm	Modulus of Elasticity (E).	0.000	kgl/cm²		
Parabolic	Custom Correction	Stiffness Value:	0.000	kgf		
	ALFA Testing Equipment Monday , 0 June , 2015 0.000 0.000 0.000 CL [clay of low plasticity, lean clay] 5E-10 0.000 4.000 50.000 100.000	ALFA Testing Equipment Monday , 0 June , 2015 0 000 0 0000 0 0000 0 000 0 000 0	ALFA Testing Equipment Laboratory Information ALFA Testing Equipment Laboratory Information Monday , 0 June , 2015 w 0.000 m 0.000 m/s Total Wright of Filter. Value of K fp: 0.000 m/s 0.000 m/s 0.000 m/s 0.000 m/s 0.000 m/s 0.000 m 100.000 m	ALFA Testing Equipment Laboratory / Conspry Name: ALFA Testing Equipment Monday , 0 June , 2015 Image: Conspry Name: ALFA Testing Equipment 0.000 Image: Conspry Name: ALFA Testing Equipment 0.000 Image: Conspry Name: ALFA Testing Equipment 0.000 Image: Conspry Name: Monday , 0 June , 2015 0.000 Image: Conspry Name: Monday , 0 June , 2015 0.000 Image: Conspry Name: Monday , 0 June , 2015 0.000 Image: Conspry Name: Monday , 0 June , 2015 0.000 Image: Conspry Name: Image: Conspry Name: 0.000 Image: Conspry N		

- The software provides full control on ALFA's Triaxial Tester (T-5001/A). It consists of different tabs with selfexplanatory notes and guides taken from the international standards and based on the findings of reliable researchers and universities in the world.
- Each tab guides the user to what should be done in very simple step-by-step progress. The top part of the software
 is constant that provides quick access to some important control functions on the software and the machine like
 proceeding to next stage, changing the data recording method for the report, emergency stop for the machine ...
 etc.



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• TRIAXIAL SOFTWARE

File Menu

i ne menu		
Start New Test	Used to start new test from beginning	4
Continue Old Test	Used to continue an old test and merge the data of sets together for comparison	File Tools Help Start New Test Continue Old Test res Constant Save To Constant
• Save	Saves the current test	Save As Initialization Saturation Cons
Save As	Saves the current test to different file	Reporting Data Export ALFA Testing Equipment
Reporting	Adjust the report settings and what to include in it	Sampling Date: Monday , 8 June , 2015
Data Export	Export the data to third-party applications like Excel	Borehole Label / Number: 0.0 Sample Label / Number: 0.0
• Exit	Closes the software	Deliverer's Notes:
Tools Menu		
Preferences	Adjust test preferences like units, connections etc	
Calibration	Perform / check the sensors' calibration	File Tools Help Test Preferences
LCD Monitor	Turn ON and OFF the LCD monitor	Thi LCD Monitor + ss Constant Next St
		Prefining Information Text Type Inhibitation Saturation Cons Sample Owner Information Client Name: ALFA Testing Equipment Project Name: Sampling Date: Monday , 8 June , 2015 Borehole Label / Number 0.00 Sample Label / Number 0.00 Deliverer's Notes:
Help Menu		
Check for Updates	Check if there is any update available for the software (requires internet connection)	File Tools Help Test Cardrol P. Check for Updates
User Manual	Views the user manual	Start This Stage About Proceed
• About	Gives information about the software and its version	Prefiminary Information Test Type Initialization Saturation Cont Sample Durver Information Direct Name: ALFA Testing Egupment Project Name: Sampling Date: Monday, 6 June ,2015 Borehole Label / Number: 0.00 Sample Label / Number: 0.00



• TRIAXIAL SOFTWARE : Preliminary Information Tab

est Control Pane	d			Data Recording Intervals		Control Panel			
Start	Hold Stre	sses Constant	Proceed to	Stage: Consolidation 🗸		CONNECT	STOP ALL		
This Stage	Hold Str	ains Constant	Next Stage	Square Root Basis Incre	men 🗸 every 20 💠 secor	ds	MOTORS		
eliminary Information	ion Test Type	Initialization Satur	ation Consolidation	Flow / Permeability She	ear Results & Graphs Manual (Control Ending Test Calculations N	fohr Circle		
Sample Owner In	formation				Testing Laboratory Information				
Client Name:		ALFA Testing Equipment			Laboratory / Comapny Name: ALFA Testing Equipment				
Project Name:		[]			Sample Received By:				
Se	ampling Date:	Monday , 8 Ju	ine ,2015		Testing Date:	Monday , 8 June , 2015			
Borehole Lab	bel / Number:	0.000			Tested By:				
Sample Lab	bel / Number:	0.000			Quality Control:	Mostafa Alyousif			
Deliv	verer's Notes:				Receiverer's Notes:				
Specimen Proper					Vertical Filter Strips Properties	-			
Specimen Lab		0	ŝ			I am using vertical filter strips	_		
Spe	cimen Depth:	23.0	00	m	Total Width of Filter:	0.000	mm		
Soil Type	(Ref. USCS)	CL (clay of low plastic	city, lean clay] 🔍 🗸		Value of K fp:	0.000			
Coefficient of	of Cons. (Cv):	5E-	10	m/s	Membrane Properties				
Hydraulic Cor	nductivity (k):	0.0	10	m/s	Correction Method:	Modified ASTM Method	~		
Water	Table Depth.	4.0	10	m	Thickness:	0.000	μm		
Specim	nen Diameter:	50.0	00	mm	Perimeter	0.000	cm		
	cimen Height.	100.	000	mm	Modulus of Elasticity (E):	0.000	kgl/cm²		
Anna Mariana	ction Method:	Parabolic	v	Custom Correction	Stiffness Value:	0.000	kgf		

Sample Owner Information:

- To be filled with the sample owner's information. These information are used in the final report.

Testing Laboratory Information:

• To be filled with the testing laboratory or institute's information. These information are used in the final report.

Specimen Properties:

Specimen number, depth, coefficient of consolidation, water table, soil type, diameter, height, area correction
method ... etc are all selected and specified from this section. These information are crucial and to be used in
further calculations and to decide the behavior of the equipment based on the sample properties.

Vertical Strips:

• Specifying whether the vertical strips are used or not, with its properties.

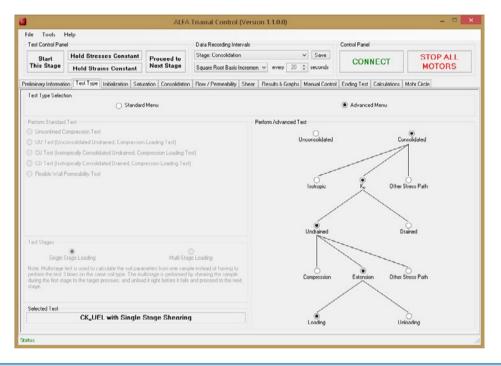
Membrane Properties:

- Specify the correction method for the membrane and specify is properties.



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TRIAXIAL SOFTWARE : Test Type Tab



Test Type Selection:

- Select whether to have simplified menu (for standard tests) or advanced menu (for custom tests).

Perform Standard Test:

Choose the test type from simplified selections.

Perform Advanced Test:

 Choose the test from stage-by-stage selection. This option gives the ability to perform any custom test on the sample from very wide range of functions based on international standards and findings of reliable researchers and institutes.

Test Stages:

 Select between single-stage or multi-stage tests. This option gives the ability to obtain 3 mohr circles and determine the strength parameters from a single Triaxial soil sample.

Selected Test:

Displays the chosen test type.



• TRIAXIAL SOFTWARE : Initialization Tab

		ALFA	Triaxial Control (V	ersion 1.1.0.0)				
	elp							
Test Control Panel			Data Recording Interv			ol Panel		
Start	Hold Stresses Constant	Proceed to	Stage. Consolidation 🗸 Save			CONNECT STOP		
This Stage Hold Strains Constant Next Stage			Square Root Basis Incremen 👻 every 20 🔅 seconds			MO		
reliminary Information	n Test Type Initialization Satu	ration Consolidation	h Flow / Permeability S	hear Results & Graphs Manua	Control Endi	ng Test Calculations M	fohr Circle	
Proper Flushing Ins	structions			Initial Readings / Positions				
				Pore Pressure	Piston	Cell Pr	essure Piston	
				0			0	
				Recommended. 4	0% - 90%	Recomme	nded: 40% - 90%	
				Target: 0.0	÷ %	Target:	0.0 🔹 %	
				Approach the ab	ove target	Approach	the above target	
						Motor Position		
						Axial Motor Position		
					ST	TOP ALL		
Vacuum Applicatio	n			Stage Automation Control				
	🗌 Vacuum will be	applied to the system	1	Saturation	Consolidati	ion 🔲 Shear		
Ve	acuum Value:	0	mmHg	- Checked stages will be st				
Absol	lute Pressure: 1	n.33	kPa	Unckecked stages will as				

Proper Flushing Instructions:

• Some instructions to perform proper flushing for the setup to avoid having air bubbles left over.

Initial Readings / Positions:

 Shows and controls the initial positions of each piston/motor to avoid over-travelling or running out of water during the test.

Vacuum Application:

Gives the ability to include the vacuum calculations to the software if applied (used for sand samples).

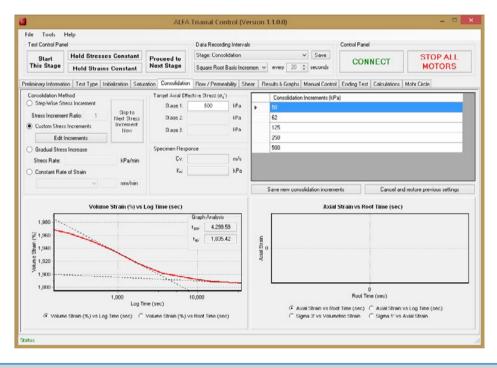
Stage Automation Control:

Gives the option to select which stage to start automatically.



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TRIAXIAL SOFTWARE : Consolidation Tab



Consolidation Method:

• Gives the ability to select which method to follow in order to consolidate the sample.

Target Pressures:

 Gives the option to target 3 consolidation pressures in multi-stage mode to obtain the strength parameters from single sample.

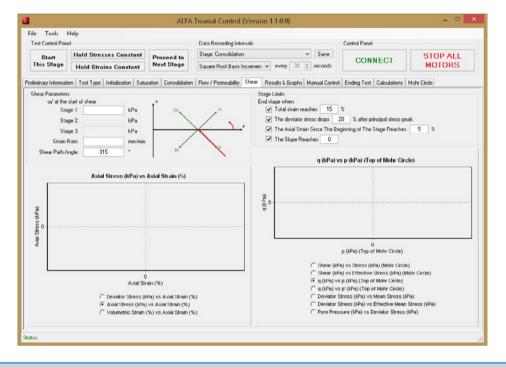
Specimen Response:

Shows the consolidation value and the KO value.

- Axial Strain vs σ1
- σ3 vs σ1
- Volumetric strain vs time (for t50 and t100 calculations)



• TRIAXIAL SOFTWARE : Shear Tab



Shear Parameters:

 Displays the target pressure for each stage and gives the ability to draw any custom path for the sample. The strain rate is also specified in this section.

Stage Limits:

· Gives the option to end the test with any desired limitations..

- Mohr Circle graphs and calculations
- q vs p
- q vs p'
- Deviator stress vs mean stress
- Pore pressure vs deviator stress



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• TRIAXIAL SOFTWARE : Flow/Permeability Tab

	ools Hel	р									
est Cont	trol Panel				Data Recording Inte	ervalo			Control Panel		
Start Proceed to			Stage: Consolidatio	Stage: Consolidation V Save			CONNECT STOP ALL				
This St	tage	Hold Strains Constant		Next Stage	Square Root Basis Incremen 🗸 every 20 3		seconds	CON	NECT	MOTORS	
ninary Ir	nformation	Test Ty	pe Initialization Satu	ration Consolidation	Flow / Permeability	Shear 1	Results & Graphs	Manual Control	Ending Test	Calculations 1	Mohr Circle
ow Para empera		10						Fluc	cvs Hydrauli	c Gradient	
	Flow Direct	tion	Target Hydraulic Grad	ient Hydraulic C	onductivity (m/s)						
	Downwards	-									
- F	Downwards	-				- And	0				
	Upward:	~ ~									
					_						
									0	i i i i i i i i i i i i i i i i i i i	
									0 Hydraulic		
_				_	-						
					Flow	vs Time (i	min)				
			_	_	Flow	vs Time (I	min)				
				_	How	vs Time (i	min)				
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low 0					Flow	vs Time (min)				
Flow					Flow	vs Time (i	min)				
Flow					How	vs Time (i	min)				
6 Flow					Flow	vs Time (i	min)				
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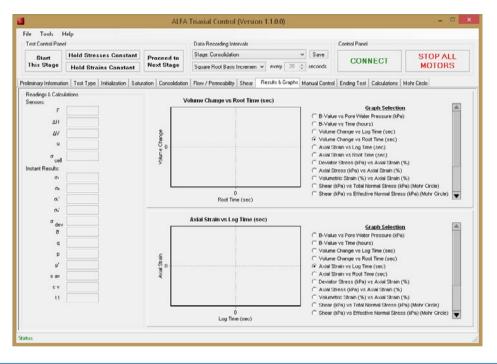
Flow Parameters:

 Displays the target pressure for each stage and gives the ability to draw any custom path for the sample. The strain rate is also specified in this section.

- Flow vs time
- Flux vs hydraulic gradient



• TRIAXIAL SOFTWARE : Results & Graphs Tab



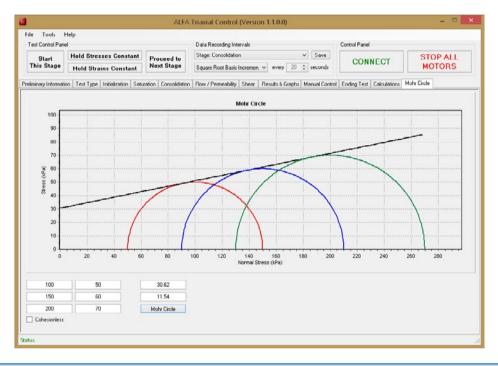
Readings and Calculations:

Shows the readings from all the sensors and the calculated values for each parameter simultaneously.

- B-Value vs Pore Water Pressure (kPa)
- a-Value vs Time (hours)
- Volume Change vs Log Time (sec)
- Volume Change vs Root Time (sec)
- Axial Strain vs Log Time (sec)
- Axial Strain vs Root Time (sec)
- Deviator Stress (kPa) vs Axial Strain
- Axial Stress (kPa) vs Axial Strain
- Volumetric Strain vs Axial Strain
- Shear (kPa) vs Total Normal Stress (kPa) (Mohr Circle)
- Shear (kPa) vs Effective Normal Stress (kPa) (Mohr Circle)
- q (kPa) vs p (kPa) (Top of Mohr Circle)
- q (kPa) vs p' (kPa) (Top of Mohr Circle)
- Deviator Stress (kPa) vs Mean Stress (kPa)
- Deviator Stress (kPa) vs Effective Mean Stress (kPa)
- Pore Pressure (kPa) vs Deviator Stress (kPa)



TRIAXIAL SOFTWARE : Mohr Circle Tab



Mohr Circle

• The software allows the user to combine and compare tests from different samples together in one single report, draw the corresponding mohr circles and calculate the related soil characteristics.



• TRIAXIAL SOFTWARE : Manual Control Tab

2		ALFA	Triaxial Control (Versi	on 1.1.0.0)			- = ×	
	Help							
Test Control Pane			Data Recording Intervals			Control Panel		
Start This Stage		d Stresses Constant Proceed to Next Stage		Stage: Consolidation V Save Square Root Basis Incremen every 20 © seconds			STOP ALL MOTORS	
	Hold Strains Constant							
Preliminary Informati Assial Loading Mo	on Test Type Initialization Satu		Flow / Permeability Shear	Results & Graphs M		Ending Test Calcul	stions Mohr Circle	
	0.0 ÷ * 0 ÷			and.				
Status							d.	

Provides manual control on each motor/PVA.

Ending Test Tab:

• Gives instructions on how to end the test properly and empty the cell from water ... etc.