Testing Equipment for Construction Materials

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H-3062.3F

Operating Manual

PC-Controlled Blaine Apparatus
with measuring cell acc. EN-Standard for determining the fineness

(PC optional)

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Warning: It is expected that Users and Operators read and understand this entire Operating Manual before putting the system into operation. Reading and understanding this entire Operating Manual is absolutely necessary before operating the system.

Contents **Page no.:**

Attachments:
EU Declaration of Conformity
Test records
Safety Data Sheet

1. General information

1.1 Manufacturer's designation

Manufacturer's designation:	please see the cover page of this Operating Manual
Designation of the model itself:	Please see the nameplate (rating plate) on the unit. It provides all the characteristics and the electrical rating data.

1.2 Purpose for which this system has been designed

This Operating Manual contains the information required for operation of the products described here, for the purpose for which they have been designed. This Operating Manual is intended to be used only by technically qualified staff.
"Technically qualified staff" is defined as those persons who – as a result of their training; their experience; the instructions which they have received; as well as their knowledge of the relevant standards, regulations, accident-prevention regulations, and conditions of product operation in the company – have been authorized by the person responsible for the safety of the company facilities to carry out the activities and actions required for operation of the products described below, and who can recognize and prevent any possible dangers arising from such operation (this definition of technically qualified staff has been provided in IEC 364).

The User must by all means observe the requirements and limit values, as well as all safety instructions, given in this Operating Manual. Any use of this device not in conformity with these stipulations shall be considered to be in violation of the use for which this system was intended. If this device must be operated under special conditions, or with special modes of operation, then this shall be authorized only after consultation with the Manufacturer, and after obtaining his prior and express approval.

The fineness of grind can be determined according to the Blaine technique and is indicated as the specific surface (Blaine value). The apparatus serves exclusively for determination of the specific surface of powders, and for fast analysis of characteristic operational values. The Blaine value is not a measure of granulometric distribution. The Blaine value can therefore be used only to a limited degree to evaluate the suitability of a type of test material for a certain use.

Caution 	The instructions given in this Operating Manual apply only for the correct application of the apparatus. In order to correctly conduct tests, the User and Operator must observe the specific standards that apply for the testing being conducted.

Please take the time to read this Operating Manual carefully. It describes how you safely operate the apparatus.
Please keep this Operating Manual to hand at all times, during the entire life cycle of this apparatus. Please refer to it whenever you have a question on the operation of this apparatus.

The Manufacturer cannot accept any responsibility for any damages that occur owing to false use of this apparatus.

This operating manual contains safety instructions that are to be observed in order to exclude any risk of fatalities, injuries, damage to the equipment or improper operation. Safety markings are as follows:

Caution 	This warning refers to dangers that could cause material damage.
Danger 	This warning refers to dangers that could cause severe injuries or even fatalities.
Note 	Provides practical advice on operation

1.3 Conditions under which this system may NOT be used

It may therefore NOT be used under such conditions or in connection with the following actions:

- Do not disassemble this system. Do not try to repair it or to modify it.
- Operate this product only with a mains electrical system which satisfies the ratings for voltage and current as given in this Operating Manual.
- The apparatus may not be operated in locations which are subject to the following conditions or substances: Ice formation, Heat radiation, Formation of condensation water, Dust, Corrosive gases, Vibrations, Severe physical impact (jolts), High relative humidity, Excessive temperature fluctuations
- Do not tamper with the liquid in the manometer. This liquid can cause serious health.

1.4 Guarantee

Our **General Terms of Sales and Delivery** apply in all cases.

The Manufacturer guarantees that this Operating Manual has been prepared in conformity with the technical and functional parameters of the Blaine Apparatus as delivered. The Manufacturer reserves the right to add supplementary information to this Operating Manual as required.

The guarantee provided by the Manufacturer is the legal guarantee. This guarantee does not cover wear-and-tear parts.

The Manufacturer guarantees trouble-free operation only if the User observes the instructions in this Operating Manual, and only if the User employs the Blaine Apparatus for the purpose for which it is intended.

The Manufacturer cannot be held liable for damages that may occur if the Blaine Apparatus is used for purposes for which it is not intended, or if the User does not observe the instructions and rules for operation as set forth in this Operating Manual.

No claims for damages may be lodged against the Manufacturer if the Blaine Apparatus is modified in its structural or constructional characteristics without the prior written consent of the Manufacturer, or if its functional characteristics are modified without such consent.

Any person acting in violation of the above stipulations may be prosecuted before a court of law.

1.5 Safety instructions

Only those persons may be permitted to operate the Blaine Apparatus alone (i.e., without supervision) who have met all of the following criteria:

- Persons who are at least eighteen (18) years of age, and
- Persons who have been instructed in the operation of the Blaine Apparatus, and

In the operation of the Blaine Apparatus, the person operating the instrument must take every precaution to ensure that he/she does not injure himself / herself or any other persons. Only those persons may be permitted to operate the Blaine Apparatus who have been instructed in its proper use.
If any malfunction, damage, or other trouble is determined on the Blaine Apparatus, and if its faulty condition endangers its operational safety, then the apparatus must be immediately taken out of operation. It may be put back into operation only after all sources of danger have been eliminated.

Check to make sure that the ratings given on the nameplate (rating plate) on the unit match those of the actual voltage supplied by the mains power.
The Blaine Apparatus may be used only for the purposes described here. Any use of the apparatus in a manner not intended or described here will result in loss of guarantee protection.

This Blaine Apparatus has been designed and built in accordance with the state of the engineering art and with the accepted rules of good engineering practice. The use of this Blaine Apparatus, however, can result in danger to life and limb of the Users and third parties, and can cause damage to mechanical-engineering parts and other items of property.

If there are any malfunctions or other trouble that could cause dangerous situations to arise in work with the Blaine Apparatus, these difficulties must be immediately corrected before working with the apparatus.

Danger 	The mixing of cement with water causes the release of alkaline substances. In working with concrete, it is essential to take all necessary precautions to prevent dry cement from entering the eyes, mouth, or nose. Use protective clothing to prevent skin contact with wet cement or concrete. If cement or concrete enters the eyes, immediately and carefully wash out the eyes with clean water. Seek medical help without delay. If moist concrete comes into contact with the skin, wash it off immediately.
	The liquid in the manometer is, as recommended in the relevant standard. This liquid can cause serious health. Please read the attachments for further information.

The manufacturer strongly recommends to carefully observe the following: all instructions and procedure descriptions given in this Operating Manual; all applicable safety directives, guidelines, and regulations; and all general rules for workplace environments.

The Operator must ensure that the personnel wear the respectively required protective clothing, such as:

Safety boots
Suitable clothing
Protective gloves
Working clothing must be appropriate and not hinder the operatives in their work.
If need respiratory protection

1.6 Acceptance of the product and transport

1.6.1 Acceptance of the product

When accepting delivery of the product, first inspect it for its outer, visible condition. If this inspection is satisfactory, the machine may be accepted from the freight forwarder (package service, courier, or other forwarding business).
If there are no shortcomings, and if there are no transport damages, then use the bill of delivery to make sure that the consignment is complete, and that all parts have been delivered.
If you assume or suspect transport damage, or if transport damage becomes apparent only after you have accepted the delivery, immediately make an exact report of the conditions and any damage as they exist. Send us this report immediately by fax or e-mail.
Important: Absolutely do not make any changes to the delivered goods.

After we have studied your report, we can make a decision whether we can correct the difficulties by one of the following options:

- Deliver spare parts to you, or

- Send a specialized fitter/installer to your plant, or
- Ask that you return the system to us for repair.

1.6.2 Transport

This system will be delivered in the appropriate cardboard boxes. In order to prevent transport damage, the remaining hollow spaces in the interior of the boxes will be filled with bulk material.

This system can be moved by hand to the point at which it is to be operated. Its weight is approx. 4 kg.

After you have unpacked the apparatus, make a visual inspection to determine whether it was damaged during transport. In cases of doubt, in which you believe the apparatus may have been damaged, do not connect it, and get in touch with your dealer or sales person.

1.7 Scope of delivery

1 ea.	Air Permeability Tester, including power cable, measuring cell with piston, and sieve plates
1 ea.	PC cable (zero modem cable RS232)
1 ea.	Brush
1 ea.	Funnel
50 ml	Filling oil for manometer
1 ea.	Cone grease
1 ea.	Injection unit with hose for filling
1 unit	Round filter, ø 12,8 mm
1 ea.	Cone rubber stopper
1 CD	PC software
	Calibration (only model 1.0297E)

Optional:

	PC for control of the Blaine Apparatus
1 bottle	Calibration sand, coarse
1 bottle	Calibration sand, fine
	Calibration

Note	
	When the Blaine Apparatus model 1.0297 is delivered, it is NOT calibrated. If the customer requires, we can deliver the instrument with official calibration: as an option, for an additional price. Do not place the Blaine Apparatus into operation before it has been properly calibrated. Use only the supplied liquid, otherwise the functionality of the device can not be guaranteed.

1.8 Instructions for electrical connection

Danger 	The electrical connections must be made by properly qualified electricians. Before making the power connections, make sure that your power supply is in accordance with the required power and frequency ratings given in these instructions and on the equipment rating plate. The power plug must have a safety device (an overcurrent trip) that protects the system against overcurrent. This device must match the machine voltage, and must be in accordance with the valid regulations. The technical characteristics of this safety device must satisfy the regulations of the standards that apply in the country in which the machine is being installed.
Caution 	The Manufacturer cannot be held liable for any damage that takes place because the above instructions are not followed.

Electrical tolerances:
Actual voltage: ± 10% of the rated voltage
Frequency: ± 1% of the rated frequency, on a continual basis; ± 2% of the rated frequency, on a short-term basis
The power supply may not be interrupted for longer than 3 ms, and may not be set to zero. Not more than 1 s may lapse between two power outages (cuts).
The power outages (cuts) may not exceed 20% of the voltage peak for more than one cycle. Not more than 1 s may elapse between two power cuts.

The manufacturer cannot be held liable for damages to persons or property that arise because the above instructions have not been observed.

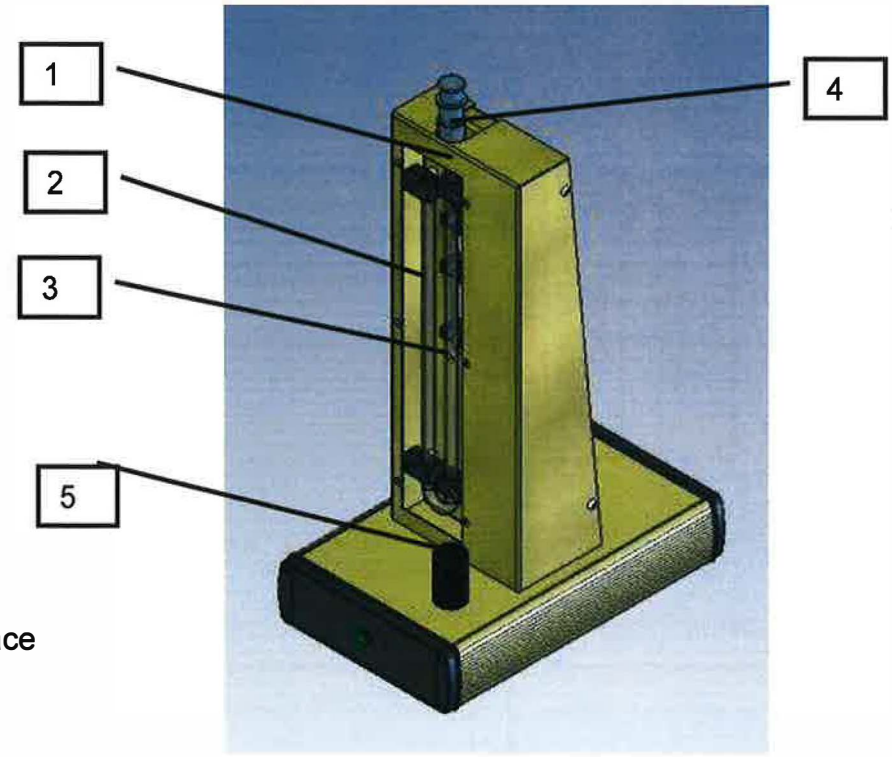
2. Characteristics of the apparatus

2.1 Basic structural design

The measuring apparatus is mounted on a stable metal plate. A sturdy metal enclosure contains the U-shaped manometer tube. The User can observe the level of the manometer fluid through a window. The measuring section on the U tube can't be individually set or changed. On top the measuring cell can be plugged in. The measuring procedure takes place on a PC. After the User enters the test data pertaining to the test, the test procedure is automatically carried out and analyzed.

The Manufacturer tests the function and liquid tightness of the apparatus before delivery.

1- Opening to fill the manometer liquid
2- U- shaped tube
3- Measuring section with photoelectric barrier
4- Measuring cell with piston and sieve plates
5- socket



Rear side:

Power switch
Connection as serial interface

2.2 Technical data

Power rating:	110-230 V / 50-60 Hz
Measuring cell:	ø 12.7 mm
Volume of the measuring cell:	approx. 1.9 cm³
Dimensions of the Apparatus:	175 mm wide x 300 mm deep x 450 mm high
Weight:	4 kg
Precision of the time measurement:	0.2 s
Minimum computer requirements:	PC with Windows XP, Vista, 7 operating system, and with one available serial interface

3. Placing into operation

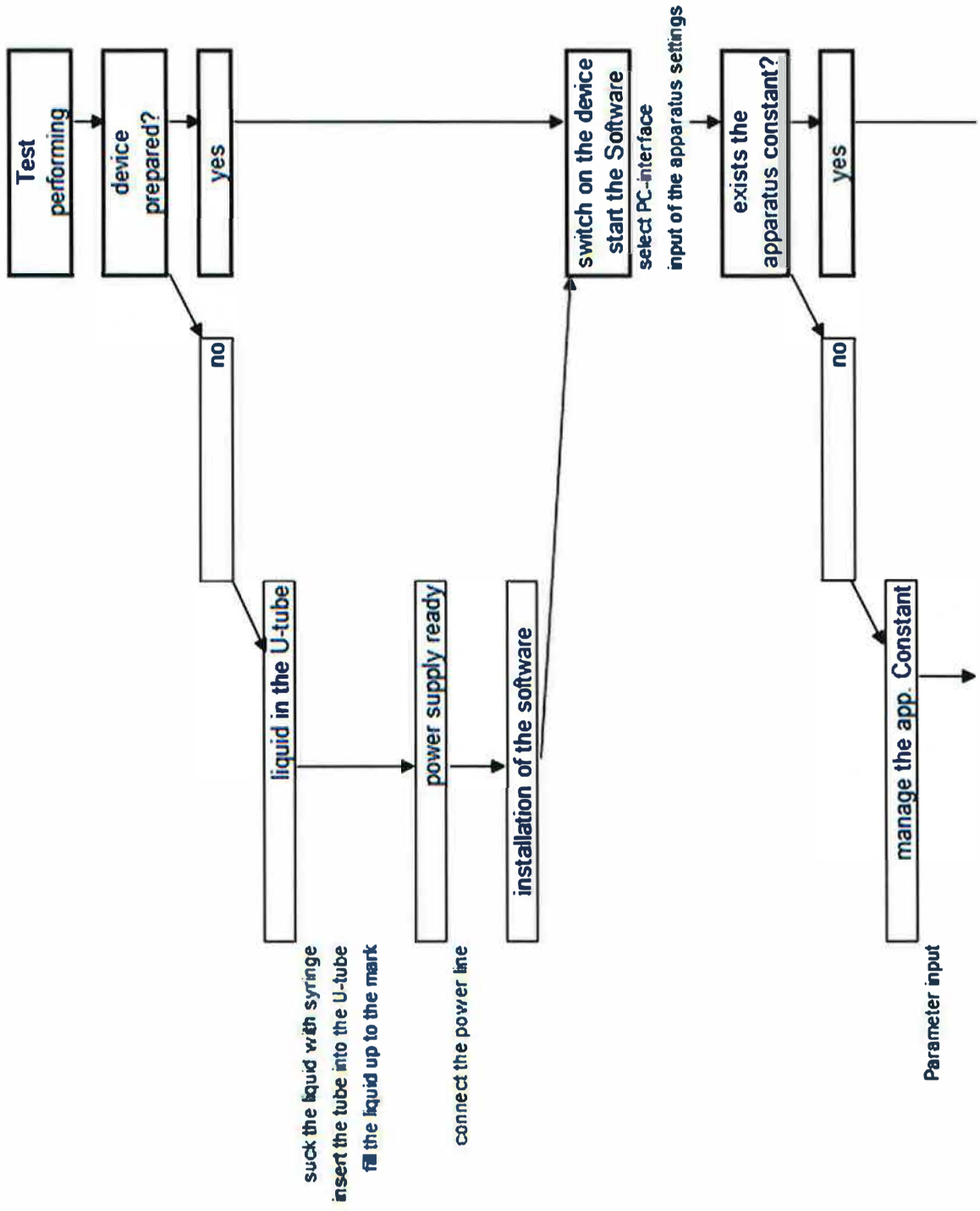
3.1 Setting up the apparatus

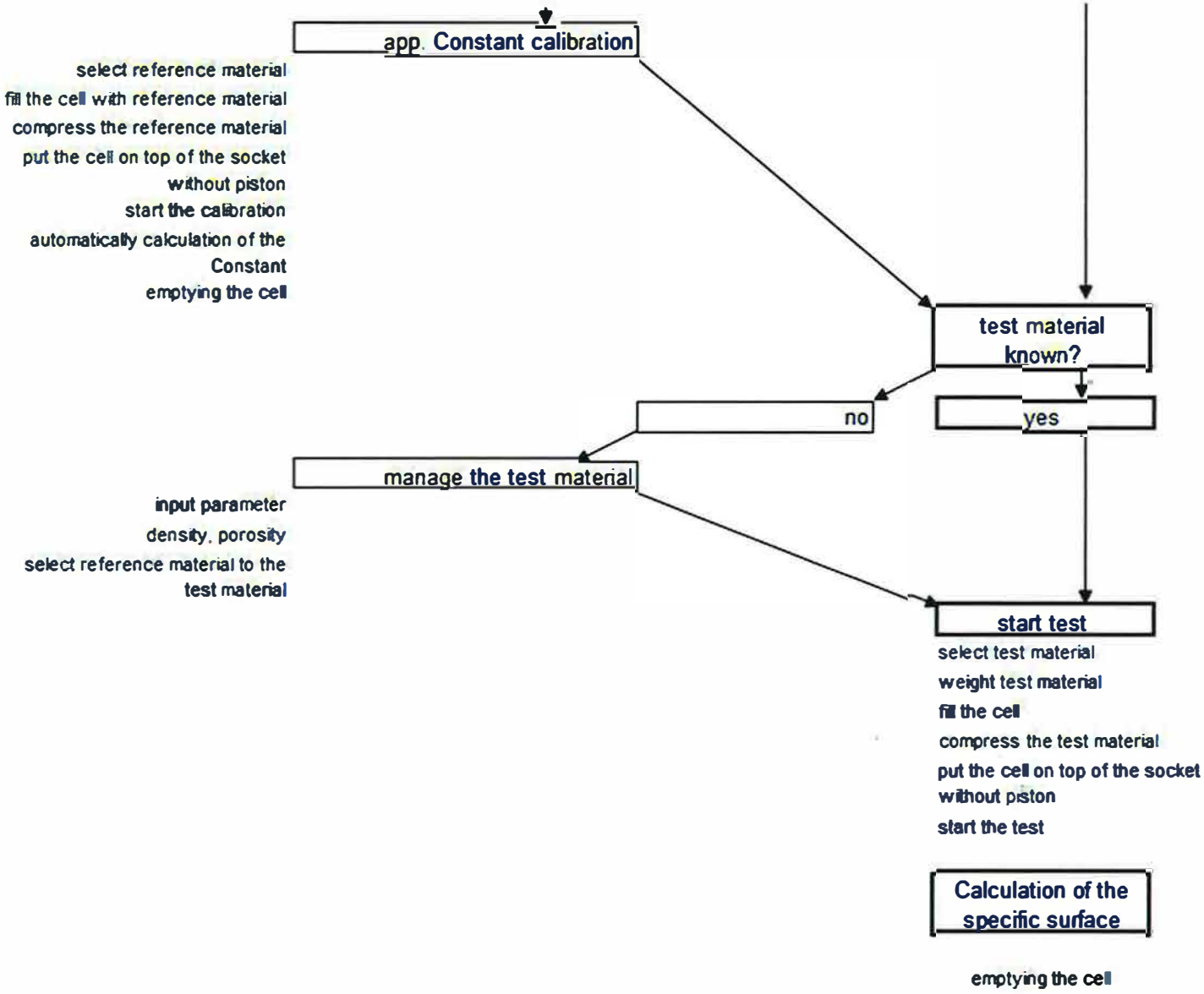
Set up the Blaine Apparatus on a surface that is level, that is not subject to vibrations, and that can sufficiently support the weight of the apparatus.

Permissible temperature conditions:	In accordance with standard EN 196
Permissible relative humidity:	In accordance with standard EN 196

Set up the PC near the Blaine Apparatus. The PC is optional and is not included in the scope of delivery. To connect the Blaine Apparatus to the control PC, follow the instructions in the section “Installation of software.”

The following illustration shows briefly the setup procedure.



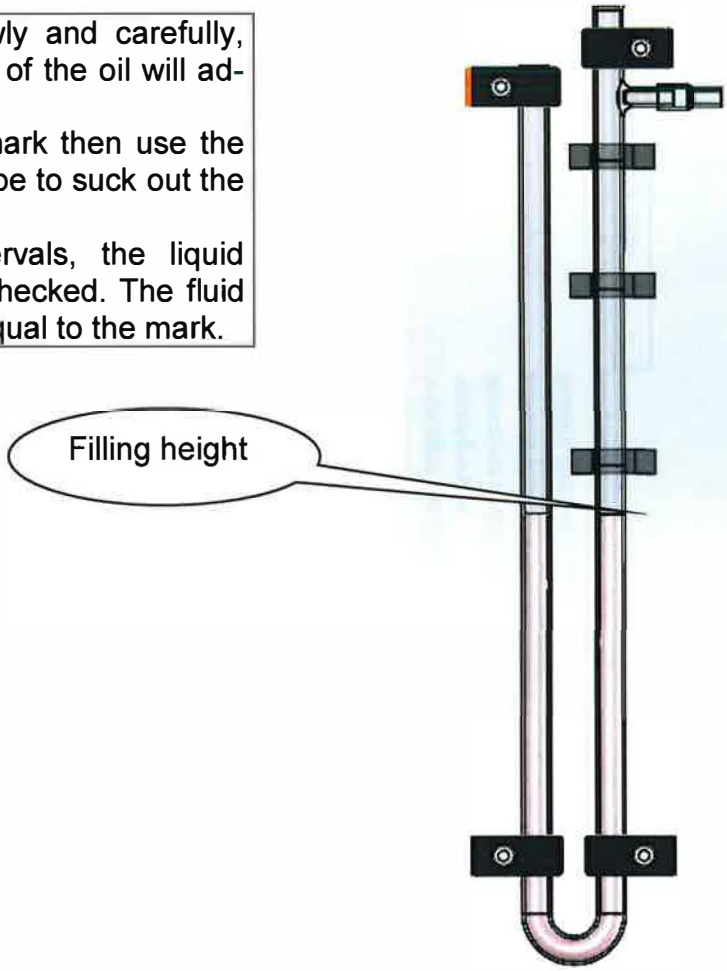

app. Constant calibration
select reference material
fill the cell with reference material
compress the reference material
put the cell on top of the socket without piston
start the calibration
automatically calculation of the Constant
emptying the cell
test material known?
no
yes
manage the test material
input parameter
density, porosity
select reference material to the test material
start test
select test material
weight test material
fill the cell
compress the test material
put the cell on top of the socket without piston
start the test
Calculation of the specific surface
emptying the cell

3.2 Filling the U-shaped tube

Use the injection with hose, supplied by the Manufacturer, to pour the filling oil into the U-shaped tube. Before filling the tube, make sure that it is clean and dry.
Use the injection unit to remove liquid from the bottle in which it is delivered. Insert the end of the injector hose into the U-shaped tube. Make sure that you can see the hose in the U-shaped tube, and also make sure that the manometer liquid actually flows into the tube. Fill the liquid up to the lowest mark.
If the liquid is filled above the proper filling height, use the injector unit to remove the surplus oil.
Grease the cone slightly with the delivered grease.

Caution 	The manometer liquid is a mineral hydraulic oil. This liquid can cause serious health.
	Do not pour out the oil throuht the cone. It could go to a valve and could cause damage.

Note 	Fill the oil slowly and carefully, since the levels of the oil will adjust very slowly. If exceed the mark then use the injection with tube to suck out the surplus oil. At regular intervals, the liquid level must be checked. The fluid level must be equal to the mark.

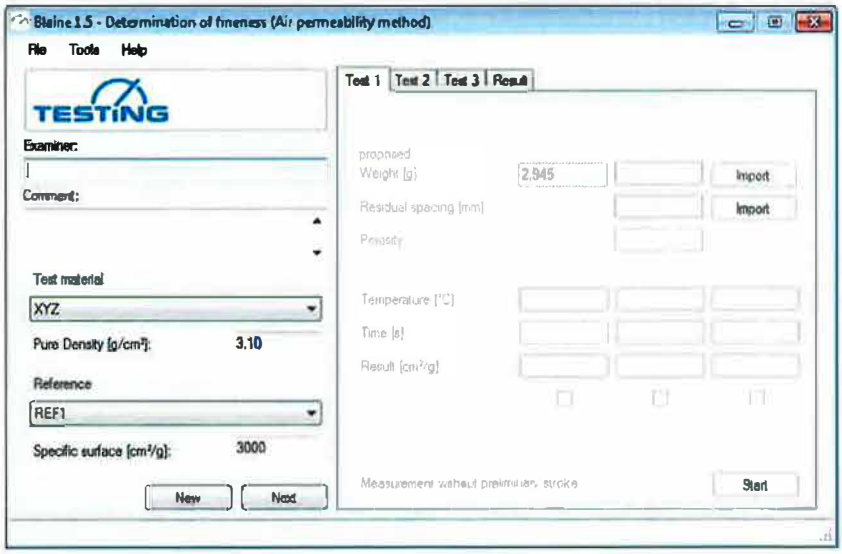


3.3 Installation of the software

Note	A PC with Windows XP, Vista, 7 is required to operate Blaine Apparatus. The PC is not part of the scope of delivery.

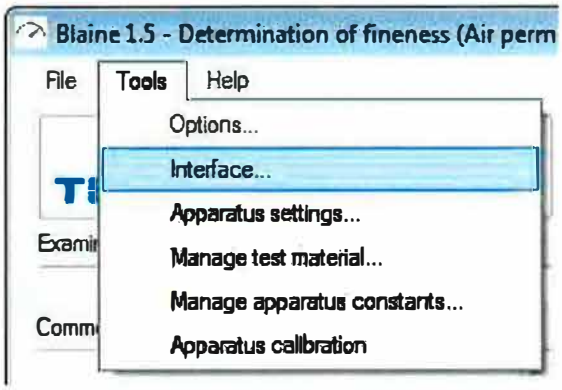
Insert the provided CD into the proper drive of the PC. Use Windows Explore to read the directory of the CD. Select all the files on this CD drive, and copy them to your desktop – or to a folder that you have prepared for "Programs."

Double click on the file Blain.exe to start the program to conduct the test. The following window will open:



Use the serial interface cable to connect the PC to the Blaine Apparatus.

The advance settings and the communication between the apparatus and the PC are made in the menu "Tools", which is described in the sections below.



4. Advance settings for conducting the test

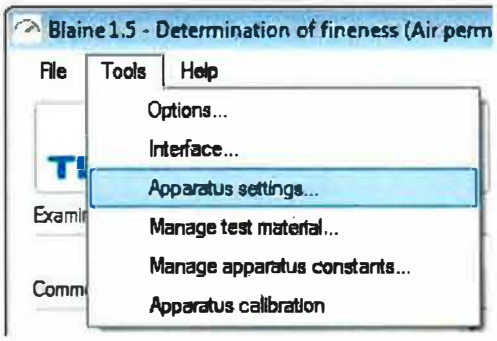
4.1 Selection of the interface

Use the menu "Tools" to make the required settings for your serial interface (e.g. COM). Then click on the button "OK".

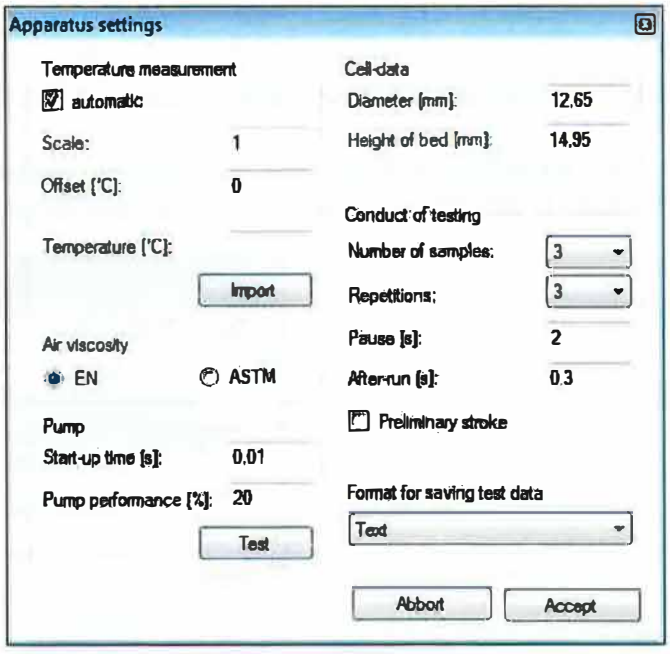
4.2 Setting the parameters for your specific apparatus

To exactly perform the testing, it is necessary to select or to determine the required test parameters. These parameters include the following:

The data on the measuring cells
The temperature measurement
The viscosity determination
The conduct of testing
The data-output format.
The pump performance



Open the menu "Tools" - Apparatus settings. The window shown to the right will then open.



4.2.1 Determination of the measuring-cell data

Diameter **[e.g. 12.65 mm]**	Use a vernier calliper (slide gauge) to measure the diameter of the measuring cell. Record this value.
Bed height **[e.g. 14.95 mm]**	Place the sieve plate and two filter papers into the measuring cell and press them into place with the hand tamper. Use a vernier calliper to measure the distance from the upper edge of the measuring cell to the filter papers (this is the vertical height H in mm). The piston measures the length that protrudes into the measuring cell (this is the height h in mm). Calculate the height of the bed by the formula B = H – h, and record this result.

4.2.2 Temperature measurement

There is a temperature sensor inside the Blaine Apparatus that measures the air temperature during the testing procedure.
Press the button "Import" to display the present apparatus-temperature value. If this reading is not the same as the temperature from your reference thermometer, you can make the required adjustment in the fields located above.

Scaling:	Recorded values change the slope of the straight lines.
Offset:	Recorded values change the offset of the straight lines.

For temperature values outside the standard, the calculated values are extrapolated.

4.2.3 Determination of viscosity

In this field you have the selection of "EN" or "ASTM." This takes into account the slight differences in the conversion table.

4.2.4 Conduct of testing

Test samples:	In this field, indicate the number of powder beds for which the measured value should be determined.
Repetitions:	This takes the advance setting into account that determines how many individual measurements should be performed per powder bed.
Pause:	This indicates the interval time between the individual measurements. It also takes into account the decrease of the fluid in the U-tube.

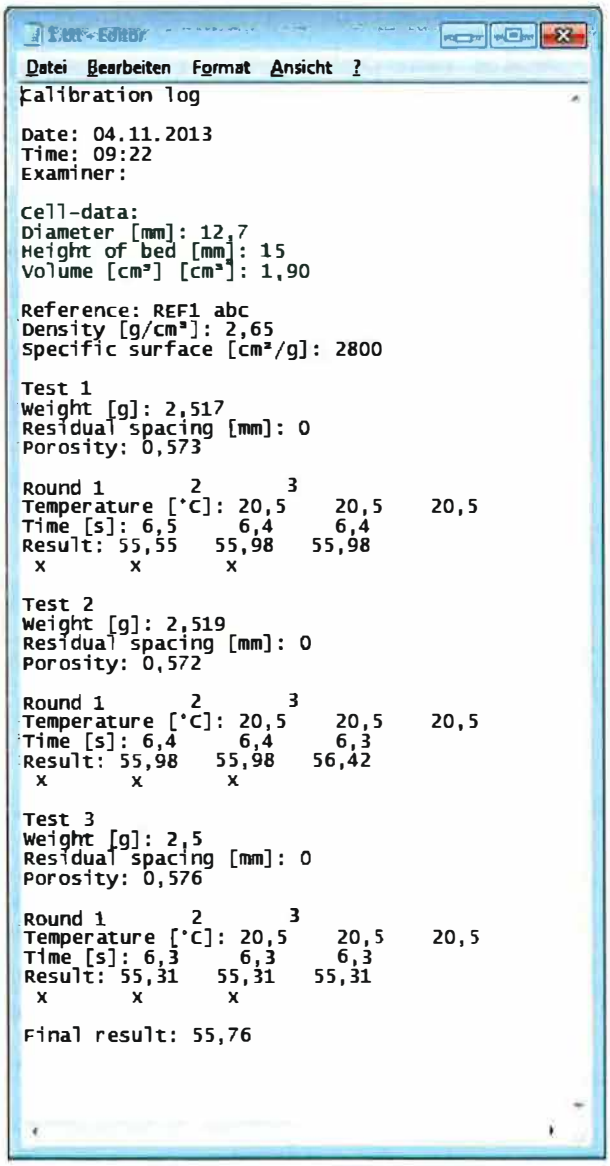
After runs:	deactivated
Pre-stroke:	The user can determine here whether the system will pull in air through the powder bed before the individual measurement begins. The pre-stroke will not result in calculation of the cycle time.

4.2.5 Output format

At the end of testing, the User can save the test-result data in two different formats:

*.txt	Here, the data will be saved in Text Editor format. The font is Courier Standard, 10 pitch.
*.csv	Here, the data are saved in formatted form for export and import of tables.

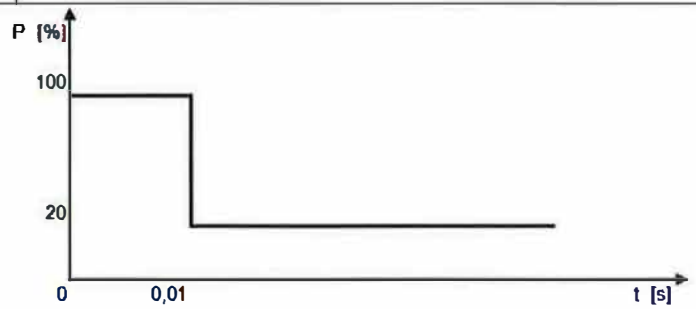
The following screenshot shows an example for the Text Editor file:



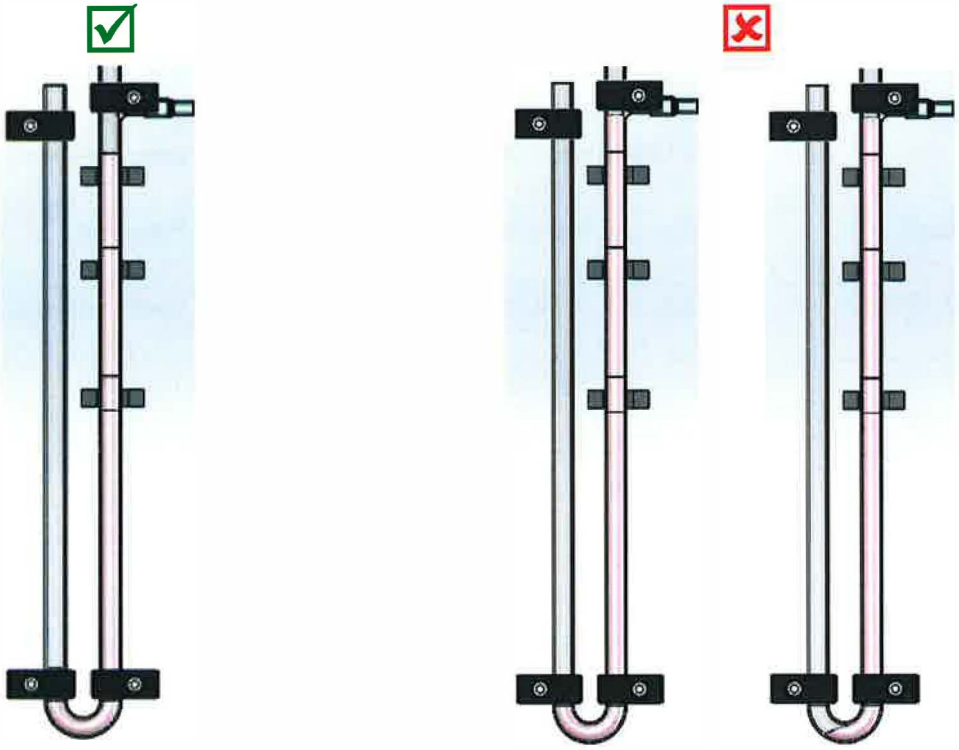
4.2.6 The pump perfomance

The aspiration of the manometer fluid can be determined or changed by the pump capacity.

Starting time **[0.01]**	Specifies the startup behavior of the pump
Pumping power **[20]**	Can be set from 0% -100% (full power)



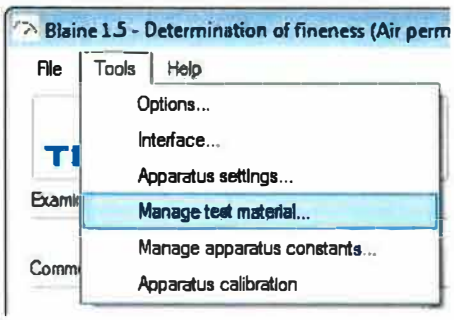
During the step of suction of the manometer liquid, do not allow the liquid to be pulled through the U-bend.

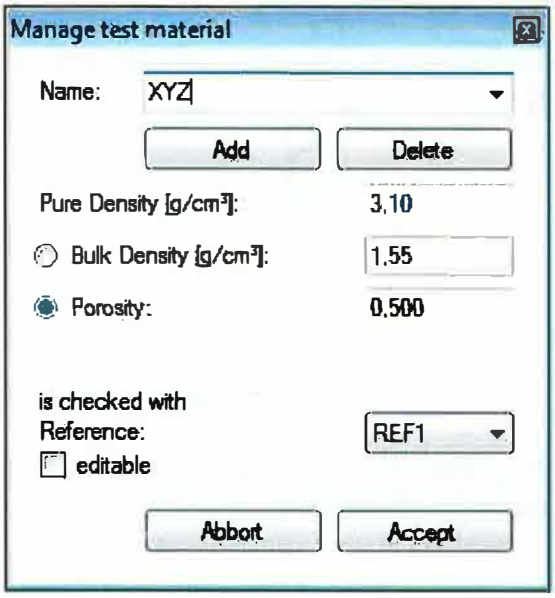


This can have several causes:
- the pump performance is set too heavy
- too less liquid in the U-tube

4.3 Management of the test material

The User can enter several and various test material for purposes of comparative measurements.
To do this, open the menu "Tools - Manage of test material".





Name:	In this field, enter the name of the test material. You can manage the test material by adding or deleting these names.
Density:	Enter the individual density of the test material.
Bulk density:	Enter the individual bulk density of the test material.
Porosity: **[0 - 1]**	Enter the individual porosity of the test material.
Reference:	A calibration substance (calibration sand) is required for each test material. The calibration substance should match the individual calibration substance with respect to specific surface and density. You can select the calibration sand here. If you tick the box "Editable" you can change the relationship to the calibration substance before the test is started. If you leave the box "Editable" unticked, it is not possible to change the setting for the calibration substance before the test. The already set relationship between test material and calibration substance will then remain unchanged.

4.4 Calibration of the apparatus

4.4.1 General instructions

Note	The Blaine Apparatus Model 1.0297 is not calibrated before being delivered to the User.

To determine the constant of the Blaine Apparatus, it is necessary to run 3 testing cycles with at least 3 different sample weights. The mean (average) value is then calculated. The determination of the apparatus constants takes place as described in EN 196-6.

We recommend using this procedure with the aid of a welknown calibration substance, to determine the apparatus constant. Once before starting the determination of the apparatus constant the name of the reference material has to be insert, see next chapter.

For these calculations, it is necessary to know the density of the calibration substance (in g/cm³), as well as the specific surface (in cm²/g). Preparation and placing of the powder bed takes in a manner derived from EN 196-6.

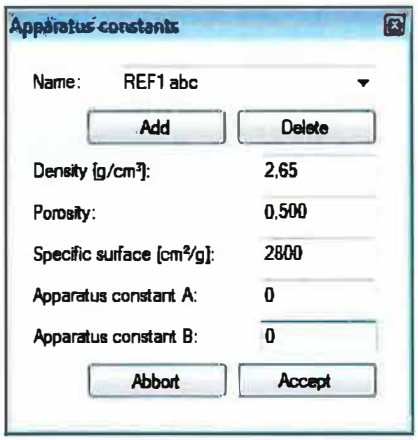
Re-calibration is necessary because of the following factors:

- Wear and tear on the Blaine Apparatus
- Frequent use of this apparatus
- Changes in any of the following:
  - The manometer liquid
  - The quality of the filter paper
  - The U-shaped tube
- Systematic deviations
- After 1000 tests.

4.4.2 Management of the apparatus constants

The User can enter several and various calibration substances for the comparative measurements.

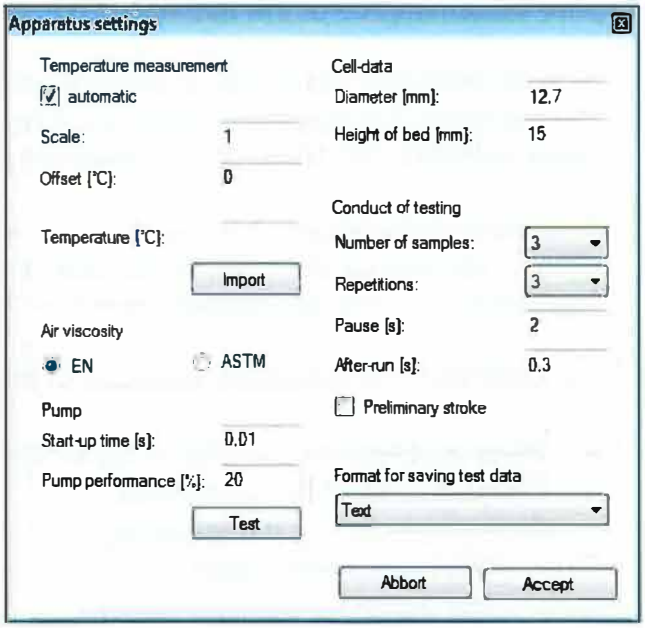
Open the menu “Tools / Manage apparatus constants”. The window at the right will appear:



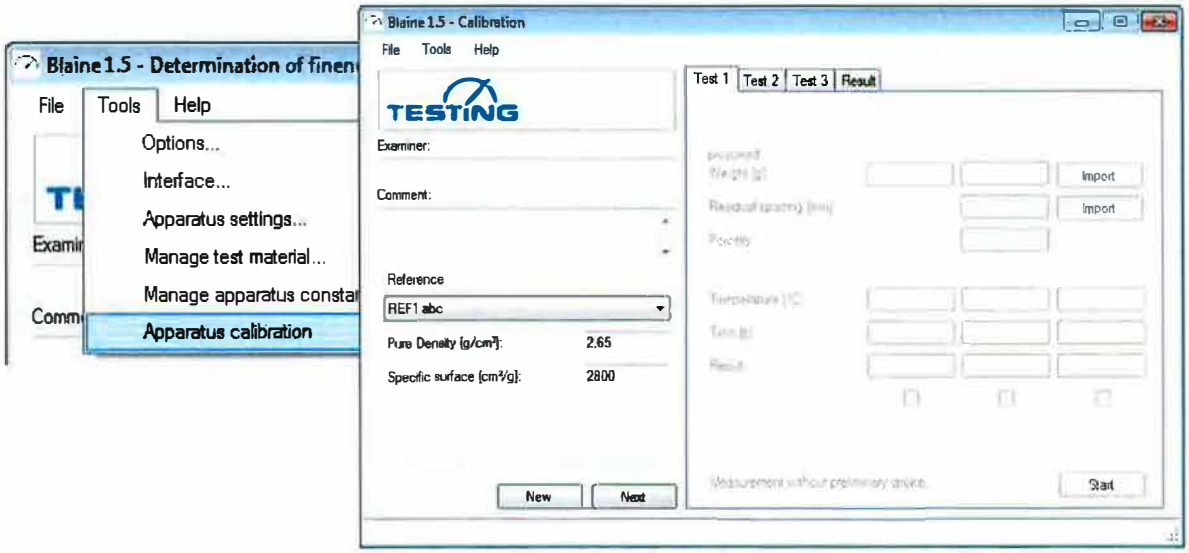
Name:	Enter the reference name in this field. You can manage the calibration substances by entering or removing these names.
Density:	Enter the density of the calibration substance.
Specific surface:	Enter the specific surface of the calibration substance.
Apparatus constant:	The present constant for the calibration substance will be displayed. If this constant is changed, the old displayed value is overwritten.

4.4.3 Determination of the apparatus constants

Open the window "Apparatus settings" in the menu "Tools". Determine the correct measuring-cell data, and make settings for 3 samples with 3 repetitions for determination of the apparatus constants. Confirm the settings with "OK"



Then open the window "Calibrate apparatus constants" in the menu "Tools".



On the left side, the User can enter the name of the Tester, and can make a few notes. Then select the reference type: in other words, the calibration substance. Use the button "Next" to move to the right side of the test.

Caution 	The following tasks are first performed separately: i.e., not on the apparatus itself.

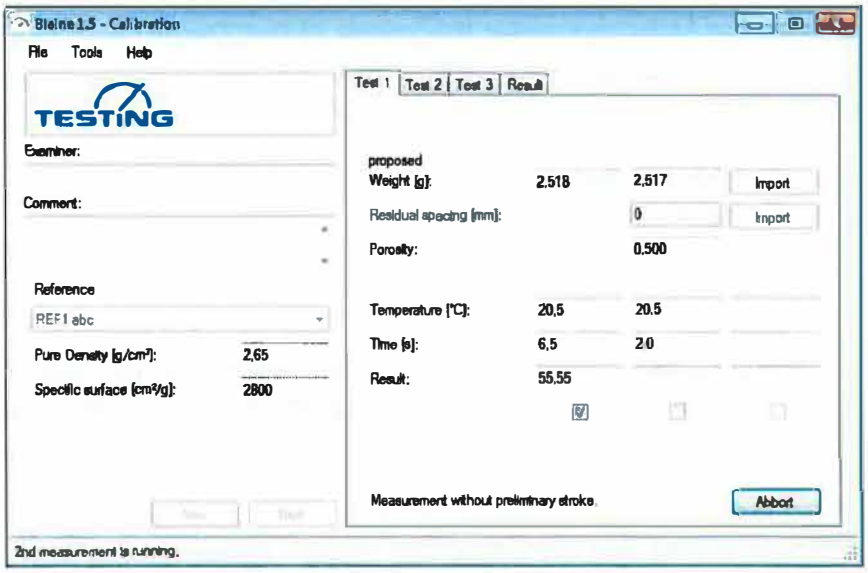
Clean the measuring cell. Then place the sieve plate into the cell. Make sure that the sieve plate rests flat on all sides on the edge of the cell base. Next use the hand tamper to place a filter plate onto the sieve plate.

Enter the weighed calibration substance in the field for "NetWeight", and then fill it into the prepared measuring cell by using the funnel. Level off the surface by shaking the measuring cell slightly, or by tapping it on the side. Take off the funnel and use the hand tamper to place a second filter plate onto the surface of the calibration substance.

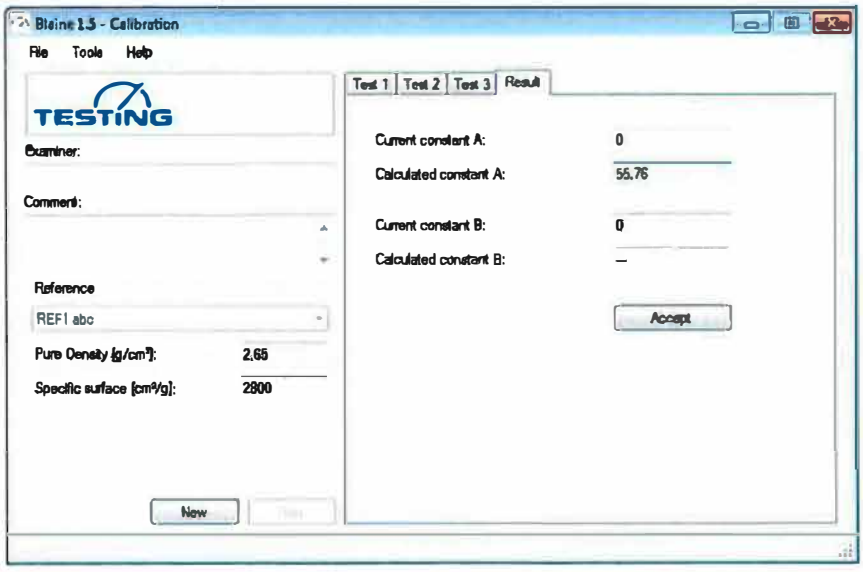
Now compress the calibration substance by slowly pressing the piston down, until the collar of the piston comes to rest on the top edge. Then lift the piston slowly a short distance, turn it 90°, and compress the calibration substance once again. The system will then calculate the porosity and display it.

Finally, slowly retract the piston, without loosening the calibration substance. Then place the measuring cell onto its cone support, and turn it slidly.

Next press the START button, which will begin the measuring procure. The test temperature will be automatically entered. A pump raises the manometer liquid over the upper photoelectric barrier. Then the pump shuts itself off, and a valve closes automatically. The flow through the test material begins, and the liquid level in the U-shaped tube falls, or reaches equilibrium again. The throughput time between the two photoelectric barriers is then measured, and the measured time is displayed after passage of the lowest photoelectric barrier.



After the measurement is finished, take the measuring cell from its support. Use a hand tamper to press the calibration substance out from the bottom. Then repeat the measurements a second and a third time, in the same manner as described above. Finally, the average value is calculated. Now save the new constant by selecting “OK”.
It takes into account only the measuring point A.



You will then be asked to save the data. You can also print out the results. Also see the settings for “Output format”.

4.5 Data security

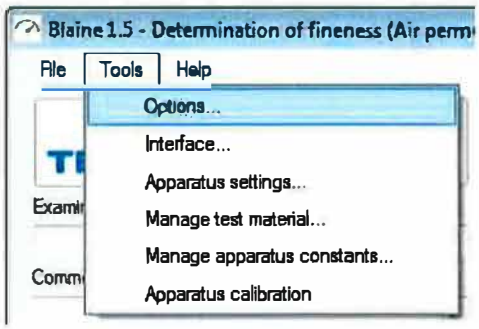
Note	To prevent complete loss of data by improper User actions or by failure of the PC, we recommend saving the apparatus settings that you have made in a backup file.

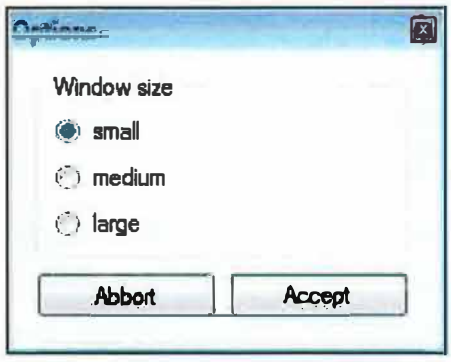
Open the folder in which the installation files are located. Open the file Blaine.ini and save it under another name: for example, Blaine backup.ini. You may also print out the file for backup. In case of data loss, you can then change the name of the file Blaine backup.ini to its original name, and your old settings will be restored.

4.6 Resizing the main window

The User can adjust the window size of the main window.

Open the window in the menu “Tools - Options”. The folling windows will open.





5. Conducting the tests

The following example is given to describe the test procedure.
During the production process, it is required to test sample type "XYZ" **[A]**. This sample type has already been stored in the database, and the following values are already known:

Test material	XYZ
Density [g/cm³]	3,10
Expected specific surface [cm²/g]	2800

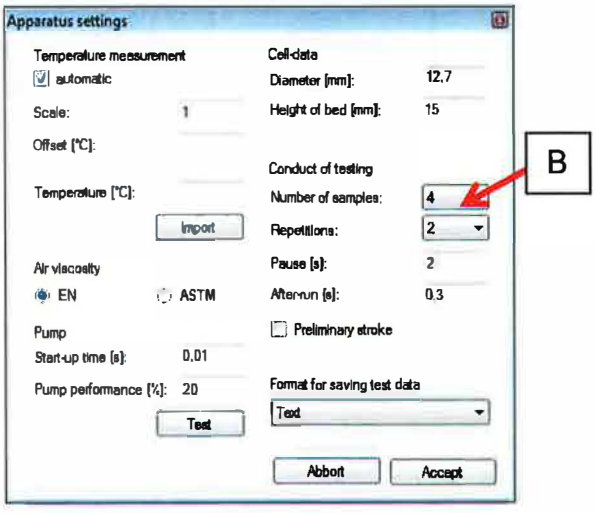
[B] To obtain a representative result, the following are conducted:

[B1] Sample tests	4
[B2] Repetitions for each sample	2

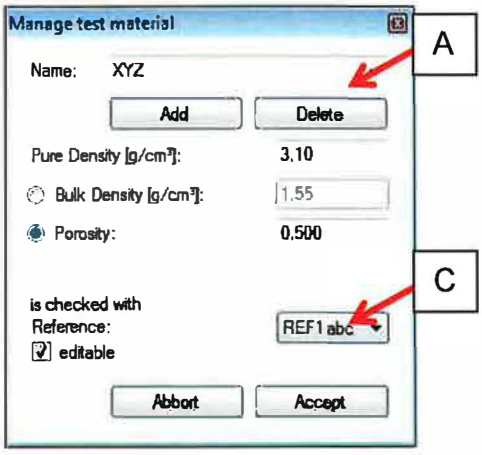
The apparatus constants with various calibration substances have already been determined and the test results have been saved. The calibration substance that most nearly matches the test materail is Reference 1 or 2 **[C].** This calibration substance was assigned to the test material, and this assignment cannot be changed (because the tick had been removed from the box in the "editable" field.
Existing apparatus constants that can be selected:

Reference 1 abc	2800 cm²/g; 2.65 g/cm³
Reference 2	3200 cm²/g; 3.00 g/cm³
Reference 3	4200 cm²/g; 3.00 g/cm³
Reference 4	6500 cm²/g; 2.65 g/cm³

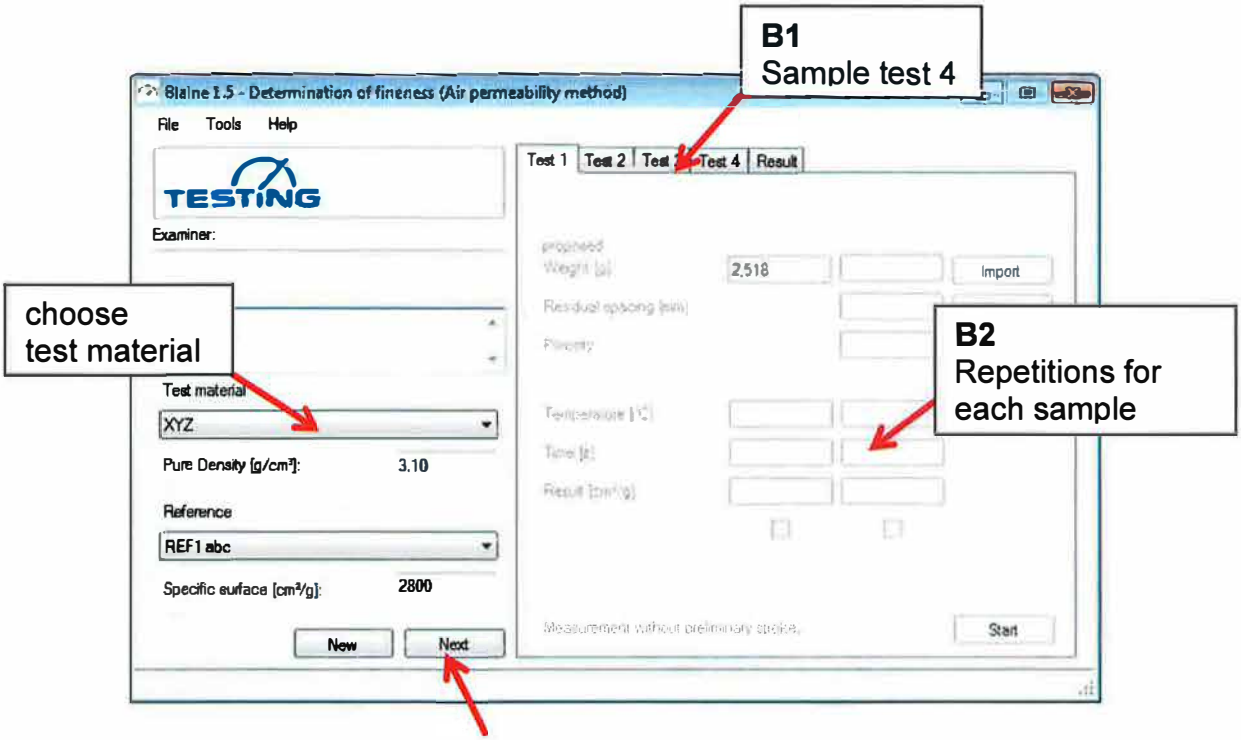
The advance settings for the conduct of testing are as follows:



Under "Apparatus setting"



"Manage the test material"



The start window should appear as shown here.

Use the button “Next” to start the test.

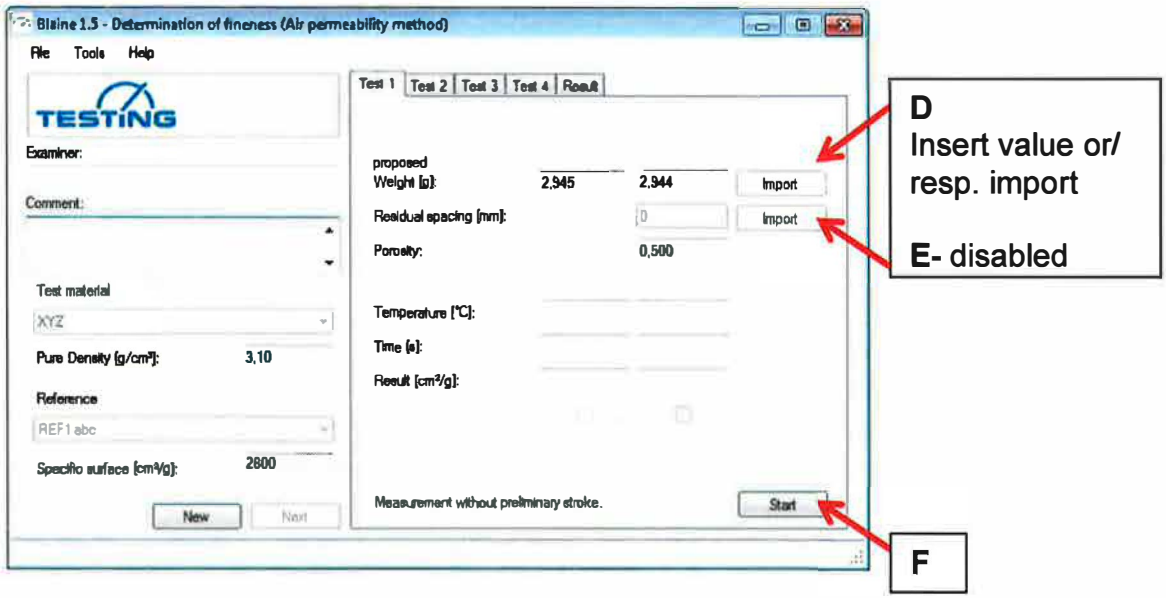
Caution	The following tasks are first performed separately: i.e., not on the apparatus itself.

Clean the measuring cell. Then place the sieve plate into the cell. Make sure that the sieve plate rests flat on all sides on the edge of the cell base. Next use the hand tamper to place a filter plate onto the sieve plate.

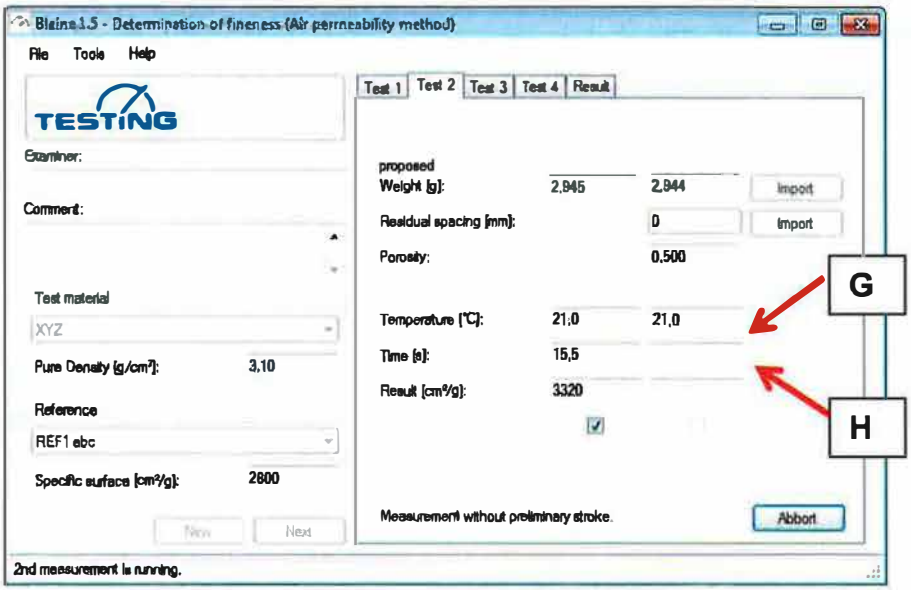
Enter the weighed test material in the field for “NetWeight” **[D]**, and then fill it into the prepared measuring cell by using the funnel. Level off the surface by shaking the measuring cell slightly, or by tapping it on the side. Take off the funnel and use the hand tamper to place a second filter plate onto the surface of the test material.

Now compress the test material by slowly pressing the piston down, until the collar of the piston comes to rest on the top edge. Then lift the piston slowly a short distance, turn it 90°, and compress the calibration substance once again.

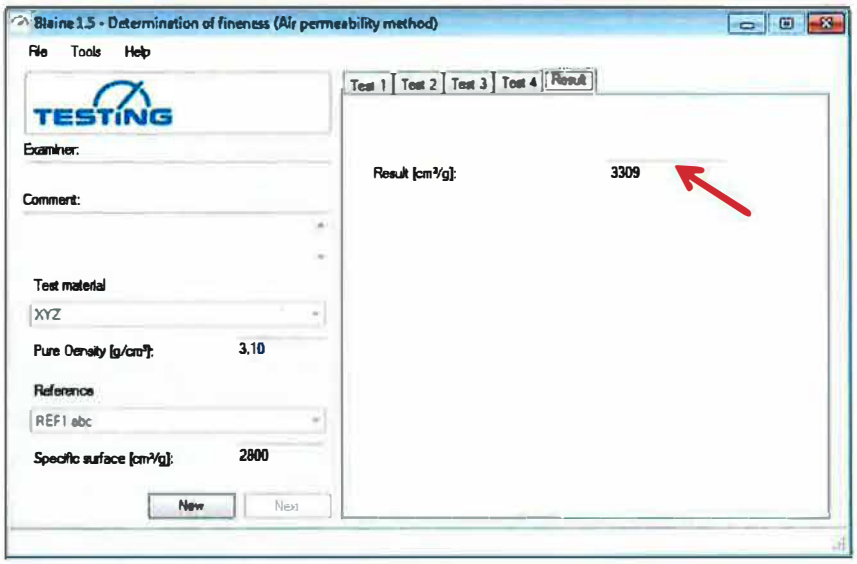
Finally, slowly retract the piston, without loosening the test material. Then place the measuring cell onto its support, and turn it to its proper position.



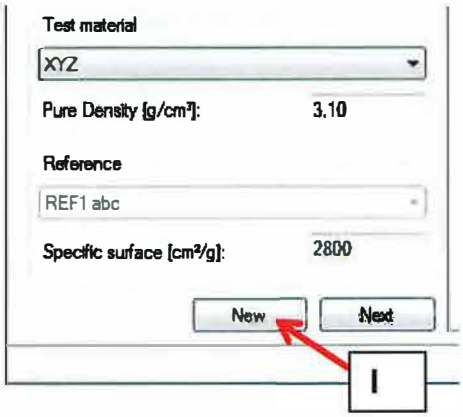
Next press the START button **[F]**, which will begin the measuring procure. The test temperature will be automatically entered **[G]**. A pump raises the manometer liquid over the upper photoelectric barrier. Then the pump shuts itself off, and a valve closes automatically. The flow through the test material begins, and the liquid level in the U-shaped tube falls, or reaches equilibrium again. The throughput time between the two photoelectric barriers is then measured, and the measured time is displayed **[H]** after passage of the lowest photoelectric barrier.



After the measurement is finished, take the measuring cell from its support. Use the hand tamper to press the test material out from the bottom. Then repeat the measurements a second and a third time, in the same manner as described above. Finally, the average (mean) of the results is calculated as final result.



You can save these final results: under the menu “File / Save”, or when the button “New” is pressed for a new test **[I]**.



To change the file format, go to the menu “Tools / Apparatus settings / Output format”.

6. Maintenance and cleaning

In case of special maintenance work (e.g., repairs, exchange of parts, and all other work that is not described in this Operating Manual), please get directly in touch with the manufacturer.
The Blaine Apparatus requires practically no maintenance. After long service, we recommend a thorough cleaning and refilling of the U-shaped tube with the required liquid.

If the apparatus has been used for a long time, or if the ambient conditions make an external cleaning of the apparatus necessary, please proceed as follows:

- Switch off the main power switch on the reverse of the apparatus.
- Disconnect the apparatus from the power supply.
- Use a brush or vacuum cleaner to remove loose dust on the apparatus. If necessary, the apparatus can then be cleaned with a moist cloth. Use a normal household cleaning agent for this purpose.

Caution 	Do **NOT** try to clean the apparatus with pressurized water, water or other liquid spray, spray water that results in puddles, dripping sponges, or any other unsuitable cleaning methods. If any of these methods are used, the water or other liquid that results can enter the control system and lead to permanent damages to the mechanical, electrical, and/or electronic components of the apparatus.

All maintenance work involving components of the apparatus and/or the electrical system must be conducted by qualified specialists.

At regular intervals, the liquid level must be checked. The fluid level must be equal to the mark.
The glass cone should be lightly greased.

7. Troubleshooting

This section describes a number of simple problems tht can be easily solved during work.

Caution 	All maintenance, inspection, testing, and repair work on apparatus components or on the electrical system may be performed ONLY by sufficiently qualified personnel.

PROBLEM	CAUSE	SOLUTION
The system will not start.	There is no power to the system. The pump or the electrical system is defective. The U-shaped tube is covered with condensation or dirt. The signal of the photoelec. barrier is disturbed	Operate the main power switch correctly. Check the power cable. Check the fuse on the main switch and exchange it if necessary. Check PC-port and suitable drivers. Clean the U-shaped tube. Remove the back plate and check the connections Get in touch with the Supplier.
The apparatus does not respond.	The system is switched off, or the serial interface is not correct. electrical system is defective.	Switch on the apparatus. Correct the serial interface and/or possible drivers Get in touch with the Supplier.
The manometer fluid is not pulled in correctly.	The pump doesn't work or is defective. A valve is defective. The pneumatic lines are loose or have leaks. The U-shaped tube is covered with condensation or dirt. The signal of the photoelec. barrier is disturbed Measuring cell is not used properly and twisted, leak between the	Replace the pumpe Modify the pump parameter Replace the valve and round filter in the intake fitting. Check the system for leaks Clean the U-shaped tube. Remove the back plate and check the connections Grease the cone

	glass cone and cell	Get in touch with the Supplier
The measured values are not correct.	The constant for the apparatus is not correct.	Correctly determine the constant for the system.
	The calibration substance does not properly match the test material.	Choose the proper calibration substance to correctly match the test material.
	The remaining intervals are not correct.	Properly set the measurement gauge.
	The temperature value is not correct.	The temperature sensor is defective. Set the proper temperature value.
	The volume data are not correct.	Properly determine the volume.
	The time metering is not correct. The photoelectric barrier does not function.	Regulate the photoelectric barriers on the potentiometer. Check the PC time metering. Clean the U-shaped tube.
	The measuring cell has not been properly attached, or it has not been turned correctly.	Check the cone seal itself, and its position in the measuring cell.

8. Shutting down the system for lengthy periods

If the Blaine Apparatus is scheduled to remain out of operation for a lengthy period of time, please follow these steps:

- Disconnect the apparatus from the power supply.
- Perform all required maintenance work.
- Remove the liquid from the U-shaped tube.
- Oil parts which are not painted.
- Then cover the apparatus to protect it from dust

9. Scrapping

If the apparatus will not be used again, we recommend the following steps for scrapping:

- Disconnect the power cable from the power supply.
- Cover all sharp, protruding, or otherwise dangerous parts.
- Disassemble the apparatus and scrap it in accordance with currently valid regulations.

10. After-sales service

A great deal of care has been taken to ensure that this Operating Manual is correct. We cannot, however, guarantee that it is without mistakes or errors, or that all information contained herein will continue to remain valid in the event of technical changes.

10.1 Date of issue of this Operating Manual

Issue no. 7
Oct 2013

10.2 Copyright

The copyright to this Operating Manual remains with the company

TESTING Bluhm & Feuerherdt GmbH.

This Operating Manual is intended only for the Operator, User, and the User's staff. The information in this Operating Manual may not be:

- Reproduced, or
- Distributed, or
- Provided to any other persons.

Any person acting in violation of the above stipulations may be prosecuted before a court of law.

10.3 Contact for spare parts and technical help

If you have any technical questions, or if you require spare parts, please get directly in touch with the following address:

TESTING Bluhm & Feuerherdt GmbH
Motzener Str. 26b
DE – 12277 Berlin
Germany

Tel.:++49 30 710 96 45 0
Fax: ++49 30 710 96 45 98
www.testing.de

EC Declaration of Conformity in accordance with the Machinery Directive 2006/42/EC Appendix II 1.A

The authorised representative established in the community,

Mr. Feuerherdt

hereby declares that the following product

Manufacturer:	TESTING Bluhm & Feuerherdt GmbH Motzener Str. 26b 12277 Berlin
Product designation:	1.0297/1.0297E
Serial number:	continuous
Serial/Type designation:	PC-Controlled Blaine-Apparatus

complies with all of the relevant provisions of the above named guidelines as well as the additional applied guidelines (following) - including any of the amendments thereto which are in force at the time of the declaration.

The following additional EU Directives have been applied:

Low Voltage Directive 2006/95/EC

The following harmonised standards have been applied:

EN 60204-1:2006	The Safety of Machines - Electrical Equipment of Machines - Part 1: General Requirements (IEC 60204-1:2005 (modified))
EN ISO 12100-1:2003	The Safety of Machines - Basic Concepts, General Principles for Design - Part 1: Basic Terminology, Methodology (ISO 12100-1:2003)
EN ISO 12100-1:2003	The Safety of Machines - Basic Concepts, General Principles for Design - Part 2: Technical Principles (ISO 12100-2:2003)

The name and address of the person who has been authorised to compile the technical documentation:Mr. Metge

Location: Berlin
Date: 28/01/2010

(Signature)
Managing Director

(Signature)
Technician

Record of Measurement and Testing

DIN VDE 57 100 – DGUV Vorschrift 3

☒	Acceptance testing	☐	Testing after a repair

Model / Type	Article number	Production number
PC-controlled Blaine App.	1.0297/1.0297E	60-2016

Ratings					
Voltage	Frequency	Amperage	W	rpm	Class of protection
110 - 240V	50 Hz	----	10	----	I (VDE 0100)

No.	Test or measurement		Required	Actual
1	Visual check for protective earth conductor in enclosure			☒ OK
2	Supply voltage during the measurement			220 V
3	Contact resistance test		< 300 mΩ	100 mΩ
4	Insulation resistance		≧ 1.0 MΩ	> 2 MΩ
5	Equivalent device leakage current		≦ 3.5 mA	0,222 mA
6	Power consumption			5 W
7	Data measuring cell			
8	Diameter	D=		12,70 mm
9	Height of bed	B=		14,69 mm
10	Volume	V=		1,86 cm³
11	Functional test			☒ OK

Measuring equipment used:	Digital multimeter (Voltcraft)	Equipment tester as per 0701

Results of repair / spare parts required / remarks:

Instructions:

A We recommend the use of a residual-current circuit-breaker (RCCB) with fault-current tripping rating of 30 mA.

B For movable electrical equipment, the German Accident-Prevention Regulations DGUV requires that measurements according to VDE 0701, Sections 1 – 4, be repeated at intervals of approx. every six (6) months.

As manufacturer of such equipment, we are required to inform you of this regulation.

Measurements and tests conducted on:	Date: 27.01.2016	Signature: J. Steff

Material Safety Data Sheet

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Material Name :	**Shell Tellus S2 V 15**
Uses :	Hydraulic oil
Product Code :	001D7747
Manufacturer/Supplier :	**PT Shell Indonesia** Talavera Office Park 22nd-27th Floor 22-26 Jl. Letjen TB Simatupang Kav. Jakarta Selatan 12430 Indonesia
Telephone :	(+62) 2175924700
Fax :	(+62) 2175924679
Emergency Telephone Number :	(+62) 811 984 290

2. COMPOSITION/INFORMATION ON INGREDIENTS

Preparation Description :	Highly refined mineral oils and additives.
Additional Information :	The highly refined mineral oil contains <3% (w/w) DMSOextract,according to IP346.

3. HAZARDS IDENTIFICATION

EC Classification :	Not classified as dangerous under EC criteria.
Health Hazards :	Not expected to be a health hazard when used under normal conditions. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis. Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal. High-pressure injection under the skin may cause serious damage including local necrosis. Used oil may contain harmful impurities.
Signs and Symptoms :	If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure. Local necrosis is evidenced by delayed onset of pain and tissue damage a few hours following injection. Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.
Safety Hazards :	Not classified as flammable but will burn.
Environmental Hazards :	Not classified as dangerous for the environment.

4. FIRST AID MEASURES

Inhalation :	No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
Skin Contact :	Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop. Obtain medical attention even in the absence of apparent wounds.
Eye Contact :	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
Ingestion :	If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (37° C), shortness of breath, chest congestion or continued coughing or wheezing.
Advice to Physician :	Treat symptomatically. Potential for chemical pneumonitis. Consider: gastric lavage with protected airway, administration of activated charcoal. High pressure injection injuries require prompt surgical intervention and possibly steroid therapy, to minimise tissue damage and loss of function. Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. Prompt surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetics, and wide exploration is essential. Call a doctor or poison control center for guidance.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Specific Hazards :	Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.
Suitable Extinguishing Media:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable Extinguishing Media:	Do not use water in a jet.
Protective Equipment for Firefighters	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe the relevant local and international regulations.

Protective measures :	Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.
Clean Up Methods :	Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.
Additional Advice :	Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

General Precautions :	Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data

	sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Handling :	Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
Storage :	Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: 0 - 50 °C / 32 - 122 °F
Recommended Materials :	For containers or container linings, use mild steel or high density polyethylene.
Unsuitable Materials :	PVC.
Additional Information :	Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA [Mist.]		5 mg/m3	
	ACGIH	STEL [Mist.]		10 mg/m3	
	ID OEL	NAB [Mist.]		5 mg/m3	

Biological Exposure Index (BEI) - See reference for full details
Data not available

Exposure Controls :	The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
Personal Protective Equipment:	Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
Respiratory Protection :	No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point>65°C(149 °F)].
Hand Protection :	Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Eye Protection :	Wear safety glasses or full face shield if splashes are likely to occur.
Protective Clothing :	Skin protection is not required under normal conditions of use. It is good practice to wear chemical resistant gloves.
Monitoring Methods :	Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Environmental Exposure Controls:	Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance :	Amber. Liquid at room temperature.
Odour :	Slight hydrocarbon.
pH :	Not applicable.
Initial Boiling Point and Boiling Range :	> 280 °C / 536 °F estimated value(s)
Pour point :	Typical -42 °C / -44 °F
Flash point :	Typical 170 °C / 338 °F (COC)
Upper / lower Flammability or Explosion limits:	Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature :	> 320 °C / 608 °F
Vapour pressure :	< 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Specific gravity :	Typical 0.872 at 15 °C / 59 °F
Density :	Typical 872 kg/m3 at 15 °C / 59 °F
Water solubility :	Negligible.
Solubility in other solvents :	Data not available
n-octanol/water partition coefficient (log Pow)	> 6 (based on information on similar products)
Dynamic viscosity :	Data not available
Kinematic viscosity :	Typical 15 mm2/s at 40 °C / 104 °F
Vapour density (air=1) :	> 1 (estimated value(s))
Evaporation rate (nBuAc=1) :	Data not available
Decomposition Temperature:	Data not available

10. STABILITY AND REACTIVITY

Stability :	Stable.
Conditions to Avoid :	Extremes of temperature and direct sunlight.
Materials to Avoid :	Strong oxidising agents.
Hazardous Decomposition Products	Hazardous decomposition products are not expected to form during normal storage.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment :	Information given is based on data on the components and the toxicology of similar products.
Acute Oral Toxicity :	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat Aspiration into the lungs may cause chemical pneumonitis which can be fatal.
Acute Dermal Toxicity :	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
Acute Inhalation Toxicity :	Not considered to be an inhalation hazard under normal conditions of use.
Skin Irritation :	Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Irritation :	Expected to be slightly irritating.
Respiratory Irritation :	Inhalation of vapours or mists may cause irritation.
Sensitisation :	Not expected to be a skin sensitiser.
Repeated Dose Toxicity :	Not expected to be a hazard.
Mutagenicity :	Not considered a mutagenic hazard.
Carcinogenicity :	Product contains mineral oils of types shown to be oncarcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC). Other components are not known to be associated with carcinogenic effects.
Reproductive and Developmental Toxicity	Not expected to be a hazard.
Additional Information :	Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. High pressure injection of product into the skin may lead to local necrosis if the product is not surgically removed.

12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity :	Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract). Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.
Microorganisms :	Data not available
Mobility :	Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
Persistence/degradability :	Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
Bioaccumulation :	Contains components with the potential to bioaccumulate.
Other Adverse Effects :	Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

13. DISPOSAL CONSIDERATIONS

Material Disposal :	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
Container Disposal :	Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Local Legislation :	Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

Land (as per ADR classification): Not regulated

	This material is not classified as dangerous under ADR regulations.
IMDG	This material is not classified as dangerous under IMDG regulations.
IATA (Country variations may apply)	This material is not classified as dangerous under IATA regulations.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

EC Classification :	Not classified as dangerous under EC criteria.
EC Symbols :	No Hazard Symbol required
EC Risk Phrases :	Not classified.
EC Safety Phrases :	Not classified.
Chemical Inventory Status	
EINECS :	All components listed or polymer exempt.
TSCA :	All components listed.

16. OTHER INFORMATION

R-phrase(s)
Not classified.

MSDS Version Number :	1.0
MSDS Effective Date :	15.10.2010
MSDS Revisions :	A vertical bar (|) in the left margin indicates an amendment from the previous version.
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