

# TQC SCRUB, ABRASION AND WASHABILITY TEST

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**AB5000**



## **IMPORTANT!**

Before taking this instrument in use we strongly advise you to read this manual carefully.

## **User Guide**

**V3.1 1216**  
**firmware 2.0.0\***

*\*This manual describes the functionality on systems with firmware version 2.0.0.  
The firmware version is indicated in the startup screen immediately after the system is switched on.*

TQC will grant a warranty for a period of 12 months for Scrub, Abrasion and Washability Test and 12 months for all related equipment from the date of delivery in respect of any evidence of faulty workmanship and materials.

Should a delivered consignment prove to be contrary to contract upon inspection, the customer shall grant TQC the opportunity hereunder of removing the fault, or else the customer may demand replacement. Because of size and weight of the instrument TQC will strive to give remote support.

Should the supply or delivery of any improvement or replacement not prove possible, the customer may choose between having the purchase price reduced or in demanding the contract of sale to be rescinded (conversion). Damage resulting from natural wear and tear, mechanical or chemical damage, an act of God or non compliance with the operating instructions shall be excluded from the warranty as well as mechanical interference by the customer or by third parties with Scrub, Abrasion and Washability Test and related equipment without TQC's written permission. No liability will be accepted for defects, damage or injury caused due to use not carried out in accordance with the manufacturer's user instructions. To claim warranty, the rejected product has to be sent to TQC together with the original invoice, any exchange before the product has been returned to TQC is not possible. TQC reserve the right to repair, exchange or supply an equivalent substitute. TQC is not liable for handling or transport costs. Warranty on the purchase price is limited, all liability for consequential damages or changes in technology is expelled.

This product complies to

- Machinery Directive 2006/42 / EC
- Low Voltage Directive 2006/95 / EC
- EMC Directive 2004/108 / EC



This product is RoHS 2 compliant (2011/65/EU)



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## 1 GENERAL

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### 1.1 Importance of operating manual

This manual is written in order to become familiar with all the functions and possible applications of the instrument. It contains important instructions about how to use the instrument safely and economically; according to the purpose designated. Following these instructions is not only essential to avoid risks. It also reduces repair costs and down-time and increases the products reliability and service-life.

Anyone who works with the instrument should follow the instructions in this manual, particularly the safety related instructions. Additionally local rules and regulations relating to environmental safety and accident prevention should be observed.

### 1.2 User-responsibility

The user should;

- only allow persons to work with the instrument who are familiar with the general instructions on how to work safely and to prevent accidents. The use of the instrument should have been instructed duly. The safety chapter and the warnings in this manual should have been read and understood; acknowledged as evidenced by their signature.
- regularly check the safety-awareness of personnel at work.

### 1.3 Responsibility of personnel

Before commencing work anyone appointed to work with the instrument should pay attention to the general regulations relating to working safety and accident prevention. The safety chapter and the warnings in this manual should have been read and understood; acknowledged as evidenced by their signature.

#### 1.3.1 Dangers

This instrument has been designed and constructed in accordance with state-of-the-art technology and the acknowledged safety regulations. Nevertheless, working with the instrument may cause danger to the life and health of the operator or to others, or damage to the instrument or other property. Therefore the instrument should only be used for its designated purpose, and in a perfect technical condition. Any defect that could have a negative effect on safety should be repaired immediately.

### 1.4 Designated purpose

The Scrub, Abrasion and Washability Test is exclusively designed to perform washability tests of painted and coated test panels as described within the specifications. Other applications constitute improper use. TQC will not be held liable for damage resulting from improper use. Designated purpose also includes properly observing all instructions in the operation manual, and adherence to inspection and maintenance schedules.

## 1.5 Copyright

The copyright of this operating manual remains with TQC.

This operating manual is intended solely for the user and his personnel. Its instructions and guidelines may not be duplicated, circulated or otherwise passed on to others, neither fully, nor partly. Infringement of these restrictions may lead to legal action may be taken if this restrictions are infringed upon.

## 1.6 Manufacturer's/Supplier's address

TQC  
Molenbaan 19  
2908 LL Capelle aan den IJssel




The Netherlands,  
T +31(0)10-7900100,  
F +31 (0)10-7900129

## 2 SAFETY INSTRUCTIONS

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### 2.1 Meaning of Symbols

The following symbols for dangers are used in this instruction manual.

Symbol	Explanation	Warning
 <i>Danger</i>	Possible immediate danger to the life or health of personnel.	If this guideline is not noted it can lead to severe danger to health, up to fatal injury.
 <i>Warning</i>	A dangerous situation could be caused.	Non observance of this guideline can lead to injury or to damage to equipment.
	Special tips and particular information.	Guidelines to make optimal use of the instrument.

### 2.2 Availability of Safety Information

The instruction manual should be kept at the place where the instrument operates. In addition to the information contained in the instruction manual, general and local regulations for accident prevention and environmental protection shall be kept available and observed. Always ensure all guidelines in respect of safety and dangers on the instrument are in readable condition. In case of danger the instrument has to be switched off by means of the emergency- button on the front of the instrument. Then eliminate danger.



### 2.3 Training of Personnel

- Anyone who operates the instrument should be trained properly.
- It has to be clear who has which responsibility regarding commissioning, set-up of maintenance and repairs, installation, and operation.
- Anyone who hasn't finished training should be supervised by an experienced person while working with the instrument.

### 2.4 Dangers from Electrical Energy

- Work on the electrical supply may only be done by a qualified electrician.
- The electrical equipment of the instrument must be checked regularly. Loose connections and cable damaged by heat must be corrected immediately.
- Always make sure the instrument's power is turned off while adjusting any electric component.

### 2.5 Points of Special Danger

There are two special point of danger in the moving zone of the tool carriers:



**Danger**

***Always have the tool carrier locked into place prior to testing.***

***Keep your hands away from the working area after the instrument has started!***

### 2.6 Care, Maintenance, Repairs

- Always make sure the instrument is connected to an earthed socket.
- Maintenance and inspection should be carried out at the correct intervals
- Operating personnel should be informed before starting with maintenance or repair work
- Always make sure the instruments power is turned off and the instrument is not connected to a socket while adjusting any electrical component whenever maintenance, inspection or repair work is done.
- Do not open the instrument. In case of malfunction always consult the manufacturer.

### 2.7 Modifications to the Equipment

- Any modifications or additions or alterations to the instrument may solely be made with permission from the manufacturer.
- All measures involving modifications require written confirmation of approval from TQC
- Instruments which are not in fault-free condition must immediately be switched off
- Only use replacement parts from the original supplier. Parts used from other sources aren't guaranteed to take the loading and meet the safety requirements.

## 2.8 Cleaning of the instrument and disposal of materials

- When in use it is not always possible to avoid some spill of paint on the work surface.
- Try to keep the instrument as clean as possible to prevent distortions of functions.
- To clean the instrument properly use a suitable solvent to dispose remains of paint or ink.
- Wear gloves during cleaning; Don't spill an overdose of solvent during cleaning.
- Cleaning materials must always be used and disposed of correctly.

## 3 TRANSPORT AND STORAGE

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### 3.1 Packing

Please take note of pictorial symbols on the packing.

### 3.2 User: Check on Receipt

Check packing for damage  
After unpacking check complete supply.

### 3.3 Reporting Transport Damage and Documentation

Any damage to the package or instrument should be documented as accurately as possible (possibly photographed) and reported to the relevant insurers or, in the case of sales "delivered to customers works", to the supplier. Always have damages to the package reported on the receipt note and registered to the deliverer.

### 3.4 Storage and Protective Measures when not in use

- The instrument must be stored in a dry place at a temperature between 10 - 40°C.
- The storage period should not be longer than 3 months.
- Store instrument in the original packing if possible.

## 4 INSTRUMENT DATA

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### 4.1 Name / Article

TQC Scrub, Abrasion and Washability Test – Microprocessor controlled scrub, abrasion and washability test.

## 4.2 Scope of Supply

- TQC Scrub, Abrasion and Washability Test
- Power cord
- Flexible LED light
- Tubing (only AB5000, AB5005)
- Fluid containers (only AB5000, AB5005)
- Optional accessories

## 4.3 Technical Data

Stroke speed	:	1 – 60 cycles per minute
Stroke length	:	20 - 300 mm
Max panel width	:	max 70 mm
Max panel length	:	max 350 mm
Max panel height	:	max. 35 mm
Pump speed	:	0,0 - 3,0 ml (only AB5000, AB5005)

## 4.4 Dimensions and Weight

Depth	:	650 mm *
Width	:	350 mm *
Height	:	350 mm *
Net weight	:	approx. 35 kg

\* without fluid containers

## 4.5 Basic Unit

Power supply	:	115 – 230 V, 50 - 60 Hz
Power consumption	:	max. 80 Watt
Display	:	Blue illuminated, graphic 100 x 35 mm, 193x64 pixels
Safety	:	Emergency button, integrated acoustic alarm
Function	:	Jog shuttle knob by rotation / pushing

## 4.6 Accuracy

Tool carrier speed accuracy	:	+/- 1% of set speed
Stroke length accuracy	:	+/- 0.01 mm (with empty carrier)

## 4.7 Noise Level

The continuous noise level from the instrument does not exceed 70 dB.

## 5 INSTALLATION AND ASSEMBLY

### 5.1 Installation and Operation

The instrument has to be installed in a suitable place, preferably on a sturdy table or work area, with normal ambient temperature. Special fixings are not required. Carefully unpack the apparatus and the accessories and check complete supply. Place, if necessary, a spirit level on the work surface and adjust the height of the feet.

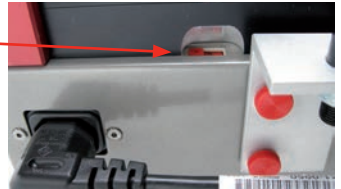
### 5.2 Preparation of Energy Connections

The instrument is equipped with a safety tested mains supply cable and may only be connected to plug sockets with earth connection complying with the safety regulations.



Warning

***Before connecting the instrument, check whether the supply voltage specified in the indication window corresponds to the local supply voltage. If it does not, the instrument shall not be connected under any circumstances. This switch is located at the rear of the instrument.***



### 5.3 Mains Connection

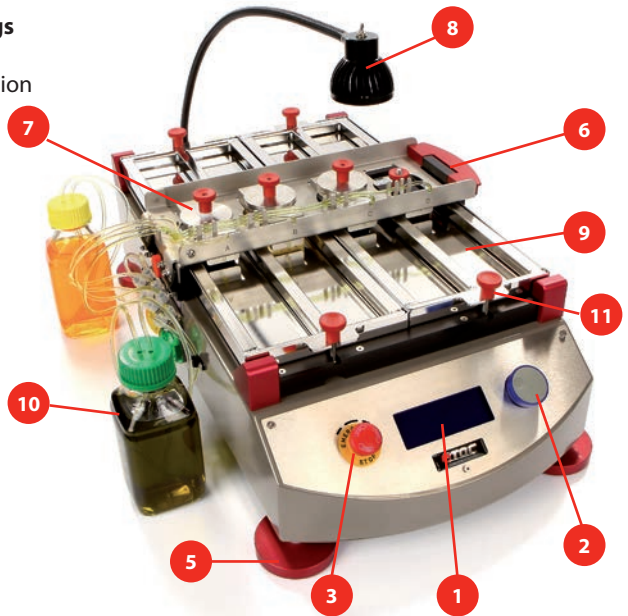
The mains connection is located at the rear of the instrument. Plug in the female plug in the socket on the rear of the housing. The ON/OFF Switch is located at the right hand site near the end of the instrument.



## 6 INSTRUMENT CONTROLS AND FUNCTIONS

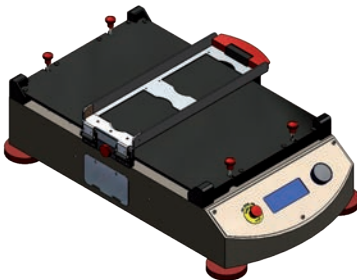
### 6.1 General instruments settings

1. Display with process information
2. Jog Shuttle
3. Emergency button
4. Acoustic alarm / Buzzer
5. Levelling supports
6. Traverse / tool carrier
7. Drippers
8. Lamp
9. Panel Clamp on test bed
10. Fluid bottles
11. Fixture screws

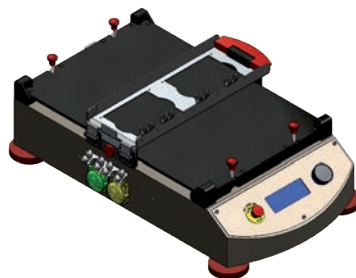


### 6.2 Models

#### 6.2.1 Basic model (AB5210 & AB5215)



#### 6.2.2 Standard model (AB5000 & AB5005)

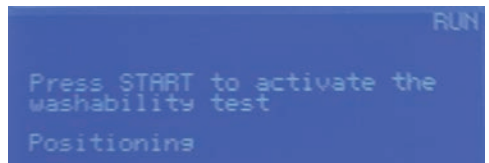


## 7 MENU BASIC MODEL

### 7.1 TQC Start screens after switched on

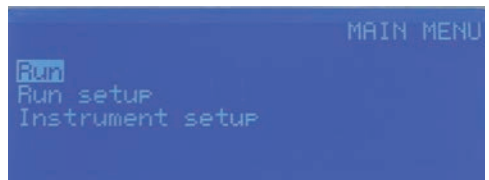
Switch on instrument by mains switch at the right side on the housing. This is the first screen shown after switching on the instrument.

Every time the TQC Basic Washability Test is turned on. The indenter needs to find its reference positions. Press the jog shuttle to activate the reference procedure.



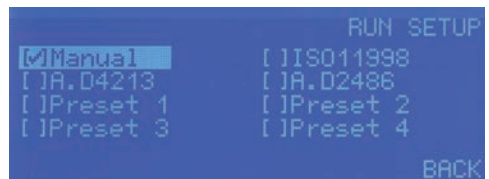
### 7.2 MAIN MENU

The TQC Basic Washability Test has an advanced menu structure. The Main Menu allows the user to access all the features, available. To select a function turn the Jog shuttle till the white selector is on the item and push the Jog shuttle.



### 7.3 RUN SETUP

The TQC Basic Washability Test is able to operate in eight programs. The programs are defined in three groups.\*



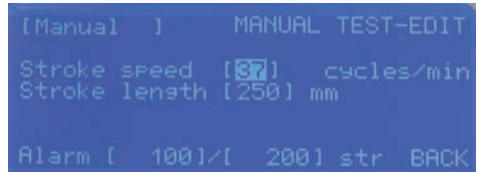
1. **Manual program:** This program allows for free editing of all the parameters except name.
2. **Standard defined programs:** TQC pre-programmed 3 standards into the Basic washability test. ISO 11998, ASTM D4213 and ASTM D2486 are the selected standards, when selected all the normative parameters can not be edited.
3. **User defined presets:** These 4 presets can be programmed by the user. All parameters and name can be edited and stored.

\*Preset test: maximum count is 99999 cycles  
It is not possible to set any value larger than 99999.

Manual / user defined test: stops counting on the display at 999999. It will show up to 999999 on the display but will not stop and count until the machine is broken, overflow at 4294967296 cycles.

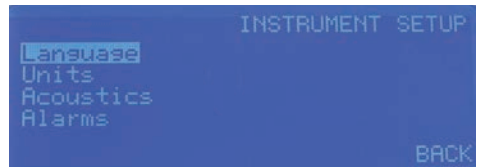
## 7.4 RUN SETUP – Test Edit

After selecting a test by and pressing the jog shuttle for a second time the Test-Edit menu appears. The fields in this menu that can be edited depending on the selected program type. Within this menu speeds and stroke length can be edited. The alarm settings are divided in 2 categories. The first number is for an intermediate alarm. In this example every 100 cycles the TQC Basic Washability tester gives an alarm. This alarm will not stop the test but just mark regular intervals as reminders for analysts to check if any wear occurred. The number 200 in this example marks the end of the test and will sound a long alarm. After the values have been set, choosing the back button will automatically store the settings.



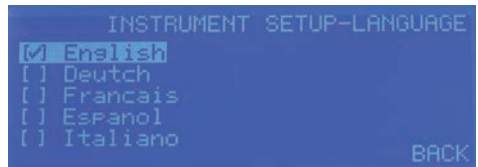
## 7.5 INSTRUMENT SETUP

The instrument setup menu gives the user access to more advanced settings allowing him or her to fine tune the instrument to their specifications.



### 7.5.1 INSTRUMENT SETUP – LANGUAGE

The TQC Basic Washability Test is equipped with a multi.language menu. In this part of the menu you can select the desired language. by setting the tick mark in front it.



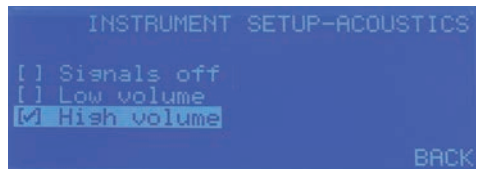
### 7.5.2 INSTRUMENT SETUP – UNITS

The units used in the display can be set to one of the three available units. The selected unit will be displayed in all other menus.



### 7.5.3 INSTRUMENT SETUP – ACOUSTICS

The audible alarm levels can be set in this menu. The three available options are no sound, low volume or high volume. When Signals off is selected the audible alarm for depth indication will also not be heard.



## 7.5.4 INSTRUMENT SETUP – ALARMS

During a run with set alarm intervals as in RUN SETUP -Test Edit. The alarm is sounded during the test to remind the operator to check the status.



This alarm can either be a single alarm or be repeated every minute. When the repeated alarm option is selected the alarm can be acknowledged during the run. The alarm will then remain silent till the next time the set interval is reached. Otherwise it will sound every minute. When “pause at ALARM EACH” is selected the TQC Wash, scrub and abrasion tester pauses at each alarm, and continues after conformation on the alarm.

**NOTE:** The pause at alarm each function is only available on firmware versions 2 or higher.

## 7.6 RUN

- Connect the instrument to the mains at the rear side of the housing.
- Insert the correct tools in the tool carrier and make sure they are set to the correct weight.
- Set the stroke length to the correct length.

For performing a Basic Washability test a suitable panel is required. Please see the specifications and required standards for further specifications.

### 7.6.1 RUN (1)

After selecting RUN in the main menu the TQC Basic Washability Tester will show the main setting of the selected program. In this case the cycles per minute and stroke length. A warning is shown to check if the tool carrier and sample holders are locked into place. When the check has been done select confirm to continue.

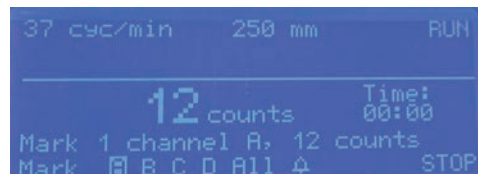


### 7.6.2 RUN (2)

After confirmation the last safety warning appears. If all safety precautions have been taken please select confirm to start the test. The half stroke made prior to the beginning of the test is an addition to the firmware as of version 2.0. In earlier version the 2 screens displayed, are combined in one.

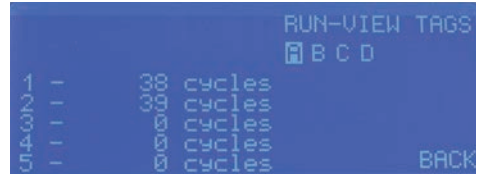
### 7.6.3 RUN (3)

During the test the following screen appears. The screen again shows the setting that are in use above the line. In the middle it shows the number of counts that have been made and the time. When running manual mode the elapsed time is shown. In the other presets the remaining time will be shown.





The view tags option brings you to the 4 screens where per track the selected markers are displayed. Selecting the letter of the track will show the 5 markers per track. Selecting back will bring you again back to the former screen.



After the RUN has been ended and the traverse has come to a halt. The screen shows three options. View tags to view the set markers during the run and resume to continue the test. The back option gets you back to the main menu. When resume is selected the timer will not countdown any more but will mark the elapsed time after the test has been continued.



The view tags option brings you to the 4 screens where per track the selected markers are displayed. Selecting the letter of the track will show the 5 markers per track. Selecting back will bring you back to the former screen.



## 8 MENU STANDARD MODEL

### 8.1 TQC Start screens after switched on

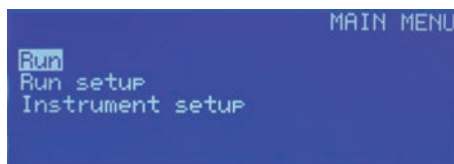
Switch on instrument by mains switch at the right side on the housing. This is the first screen shown after switching on the instrument.



Every time the TQC Washability Test is turned on, it needs to find its reference positions. Press the jog shuttle to activate the reference procedure.

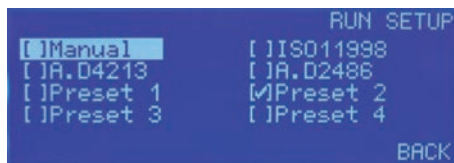
### 8.2 MAIN MENU

The TQC Washability Test has an advanced menu structure. The Main Menu allows the user to access all the features available. To select a function turn the Jog shuttle until the white selector is on the item. Push the Jog shuttle to confirm.



### 8.3 RUN SETUP

The TQC Washability Test is able to operate in eight programs. The programs are defined in three groups.\*



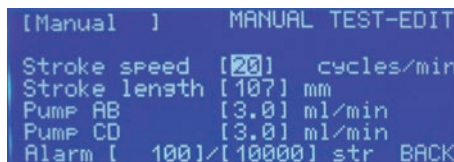
1. *Manual program:* This program allows for free editing of all the parameters except name.
2. *Standard defined programs:* TQC preprogrammed 3 standards into the Washability test : ISO 11998, ASTM D4213 and ASTM D2486. When a standard is selected all the normative parameters can not be edited.
3. *User defined presets:* These 4 presets can be programmed by the user. All parameters and name can be edited and stored.

\*Preset test: maximum count is 99999 cycles  
It is not possible to set any value larger than 99999.

Manual / user defined test: stops counting on the display at 999999. It will show up to 999999 on the display but will not stop and count until the machine is broken, overflow at 4294967296 cycles.

### 8.4 RUN SETUP – Test Edit

After selecting a test, pressing the jog shuttle for a second time activates the Test-Edit menu. The editable fields in this menu depend on the selected program type. Within this menu speeds, stroke length and pump speeds can be edited.



The alarm setting is divided in 2 categories.

The first number corresponds to the intermediate alarm. In this example every 100 cycles the TQC Washability tester gives an alarm. This alarm will not stop the test but just mark regular intervals as reminders for analysts to check if any wear occurred. The number 10000 in this example marks the end of the test and a long alarm will sound. After the values have been set, using the back button will automatically store the settings.

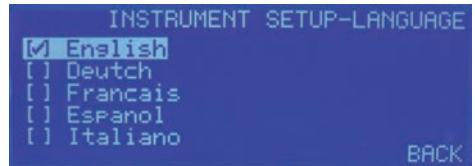
## 8.5 INSTRUMENT SETUP

The instrument setup menu gives the user access to more advanced settings allowing him or her to fine-tune the instrument to their specifications.



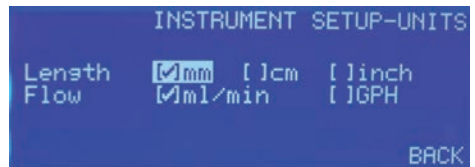
### 8.5.1 INSTRUMENT SETUP – LANGUAGE

The TQC Washability Test is equipped with a multi-language menu. In this part of the menu you can select the desired language. Set the tick mark in front of the desired language.



### 8.5.2 INSTRUMENT SETUP – UNITS

The units used in the display can be set to one of the three available units. The selected unit will be displayed in all other menus. The unit GPH stands for Gallons per Hour.



### 8.5.3 INSTRUMENT SETUP – ACOUSTICS

The audible alarm levels can be set in this menu. The three available options are no sound, low volume or high volume. When Signals off is selected the audible alarm for depth indication will also not be heard.



### 8.5.4 INSTRUMENT SETUP – ALARMS

During a run with set alarm intervals as in RUN SETUP -Test Edit. The alarm is sounded during the test to remind the operator to check the status.

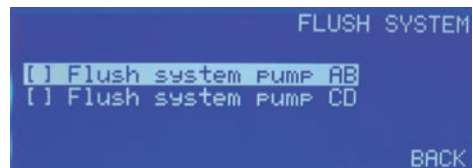


This alarm can either be a single alarm or be repeated every minute. When the repeated alarm option is selected the alarm can be acknowledged during the run. The alarm will then remain silent till the next time the set interval is reached. Otherwise it will sound every minute. When "pause at "ALARM EACH" is selected the TQC Wash, scrub and abrasion tester pauses at each alarm, and continues after conformation on the alarm.

**NOTE:** The pause at alarm each function is only available on firmware versions 2 or higher.

### 8.5.5 INSTRUMENT SETUP – FLUSH SYSTEM

The TQC Washability Test has two pumps that can be flushed in order to clean them or to prepare for a test. When pressing the jog shuttle shortly the pump will remain on until pressed again. When holding the button down, the pump will stop when the button is released.



## 8.6 RUN

### 8.6.1 RUN (1)

After selecting RUN in the main menu the TQC Washability Tester will show the main setting of the selected program. In this case the cycles per minute, stroke length, and both pump speeds. A warning is shown to check if the tool carrier and sample holders are locked into place. When the check has been done select confirm to continue.



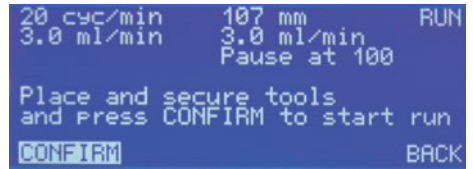
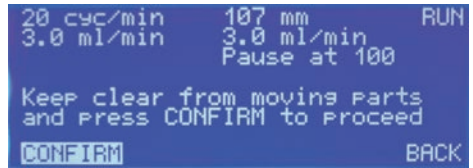
### 8.6.2 RUN (2)

After the first screen has been confirmed, a check should be performed that the test fluid is at the tips of the tubing. If the fluid is present this can be confirmed. Selecting flush will bring the user to the screen as described in 8.5.5. Selecting back after flushing will take the user back to the Run (2) screen.



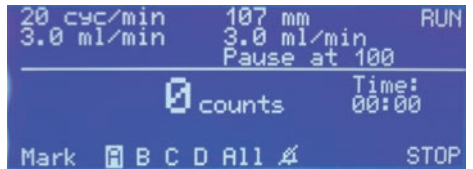
### 8.6.3 RUN (3)

After the presence of fluid is confirmed the last safety warning appears. If all safety precautions have been taken, please select confirm to start the test. The half stroke made prior to the beginning of the test is an addition to the firmware as of version 2.0. In earlier version the 2 screens displayed, are combined in one.

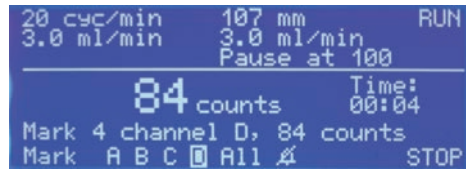


### 8.6.4 RUN (4)

During the test the following screen appears. The screen again shows the setting that are in use above the line. In the middle it shows the number of counts that have been made and the time. When running manual mode the elapsed time is shown. In the other presets the remaining time will be shown.



The bottom of the screen shows the marker option to mark events per track or all tracks. When an input is selected the TQC Washability tester shows the marker number, channel and quantity of strokes.

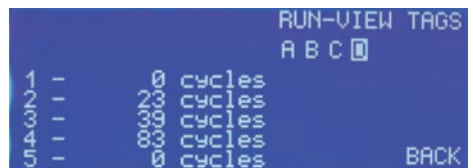


The last icon showing the bell enables users to acknowledge the repeat alarm function for that run. When the alarm is acknowledged the symbol is stroked. The alarm will not sound until the next set interval is reached. To stop the test select stop. The test will end after completion of a full cycle.

After the RUN has been ended and the traverse has come to a halt, the screen shows three options. View tags to view the set markers during the run; resume to continue the test; back to return to the main menu. When resume is selected the timer will not countdown any more but will mark the elapsed time after the test has been continued.



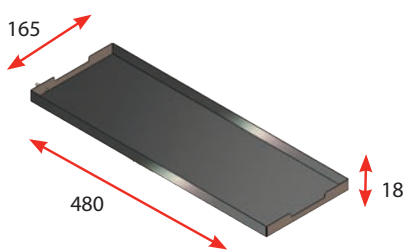
The view tags option brings you to the 4 screens where per track the selected markers are displayed. Selecting the letter of the track will show the 5 markers per track. Selecting back will bring you again back to the former screen.



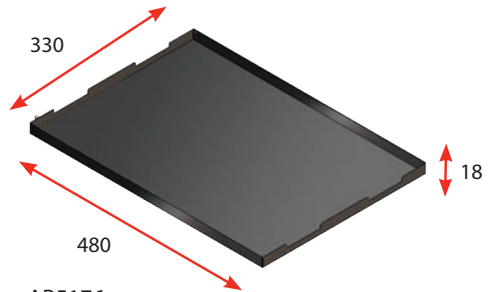
## 9 MECHANICAL

### 9.1 Test beds

The TQC Scrub, Abrasion and Washability Tester can be supplied with 2 types of test beds. Either one AB5176 covering the full width of the machine or one or two AB5196, covering either half the width or the full width.



AB5196  
dimensions in mm



AB5176  
dimensions in mm

### Placement

Dependent on the model either two narrow or one wide test bed is placed flat on the top plate of the Washability tester. Place beds as illustrated.

AB5210 and 5215 can be used without the test beds when used for dry abrasion testing. Following rules have to be applied:

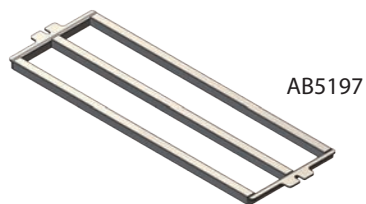
- The sample shall not protrude from the test bed.
- The sample shall be positioned such that it will not move.
- The sample shall not block any of the movement of the TQC scrub, abrasion and Washability tester.

### 9.2 Sample clamp frames

In order to hold samples down the TQC scrub, abrasion and washability tester shall be equipped with one of the following sample clamp frames. These can be used on both test bed models AB5196 and AB5176. The total machine can contain two frames at a time.



AB5045



AB5197

**Placement**

The sample frames are with the indentation on each side up such that they can be fixed using the fixture screws (6.1 detail 11) of the TQC Scrub, abrasion and washability tester.

The Rubber seals beneath the clamping frames are made out of Viton rubber. The chemical resistance of this rubber is expressed in annex C.

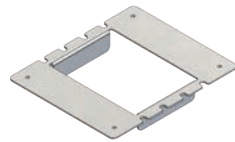
**9.3 Tool holders**

The TQC Scrub, Abrasion and Washability Test is equipped with a universal traverse as of 01-04-2016. Earlier models have a standard configured traverse containing tool holders equal in function to AB5041. Models after 01-04-2016 have a configurable traverse allowing for a flexible arrangement of the tools. The tool holders are linked to the tools in use and the frames that are used. Please use Annex B (Ordering matrix) to select the proper tool holder in correlation to the clamping frame and tool in use.

The following models are available and all have the same installation:



AB5042



AB5043



AB5041



AB5044

**Placement**

Place the tool holder in the designated part of the traverse and secure it with the 4 screws supplied with each tool holder. Always make sure the tool holder is properly secured with the guides for the tools facing downward.

## 9.4 Tools

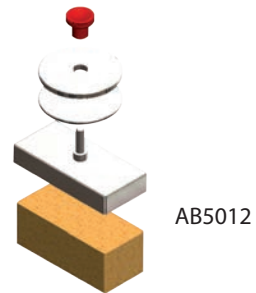
The TQC Scrub, Abrasion and Washability Tester can be supplied with a wide range of tools. These tools are all selected and produced with the greatest care. Please see standards configuration table in Annex A to select the correct tool for the appropriate standard.

### 9.4.1 Small Sponge (AB5012)

The small sponge holder is supplied ready for use. The sponge is a gentle tool to test the washability of the coating. Often used for cleanability tests of for example wall paints.

#### Scope of supply:

- Sponge
- Sponge holder
- Weight
- Fixation screw



#### Specifications

Sponge tool complete (508g/17.92oz) ASTM D4213-92, ASTM D4828, includes;

- Stainless steel holder
  - Inner dimensions holder 92x41mm
  - Outer dimensions holder 94x43mm
- Sponge pad
- Weight 60g/0.13oz
- Weight 100g/0.22oz

#### Placement

The AB5012 sponge tool is placed in the AB5042 or AB5041 holder and needs to fit comfortably in the holder. The tool must be able to move freely without friction in the holder. Always position the tool facing the same way, to create the best homogeneity in results. For replacement intervals check the appropriate standard.



### 9.4.2 Wild Boar Brush (AB5010)

The wild boar brush holder is supplied ready for use. The brush is used to test scrub resistance of coatings. The brushes are not worn in. This needs to be done on the machine of the user.

#### Scope of supply

- Wild boar brush
- Brush holder
- Weight

#### Specifications

Wild Boar Brush tool complete (250g/8.82oz) DIN 53778, includes:

- Stainless steel holder
  - Inner dimensions holder 92x41mm
  - Outer dimensions holder 94x43mm
- Wild boar hair brush, made out of real wild boar hair
- Weight 60g/0.13oz

#### Placement

The AB5010 Wild boar hair tool is placed in the AB5042 or AB5041 holder and needs to fit comfortably in the holder. The tool must be able to move freely without friction in the holder. Always position the tool facing the same way, to create the best homogeneity in results. For replacement intervals check the appropriate standard.

### 9.4.3 Nylon brush (AB5011)

The nylon brush brush holder is supplied ready for use. The brush is used to test scrub resistance of coatings. The brushes are not worn in. This needs to be done on the machine of the user.

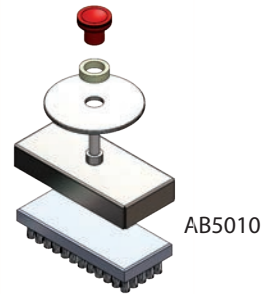
#### Scope of supply

- Nylon brush
- Brush holder
- Weight
- Fixation screw

#### Specifications

Nylon Brush tool complete (454g/16.01 oz) ASTM D2486, includes:

- Stainless steel brush holder
  - Inner dimensions holder 92x41mm
  - Outer dimensions holder 94x43mm
- Nylon brush
- 1 x weight 60g/0.13oz
- 1 x weight 100g/0.22oz



**Placement**

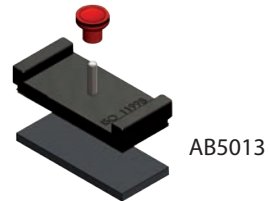
The AB5011 nylon brush tool is placed in the AB5042 or AB5041 holder and needs to fit comfortably in the holder. The tool must be able to move freely without friction in the holder. Always position the tool facing the same way, to create the best homogeneity in results. For replacement intervals check the appropriate standard.

**9.4.4 Abrasive pad tool (AB5013)**

The Abrasive pad holder is supplied ready for use. The pad is used to test scrub resistance of coatings. The pads cause an aggressive wear of the coating.

**Scope of supply**

- Abrasive pad
- Pad holder
- Fixation screw

**Specifications**

Abrasive tool complete (135g/4.76oz) includes:

- Aluminium pad holder
  - Inner dimensions holder 92x41mm
  - Outer dimensions holder 94x43mm
- Abrasive pad

**Placement**

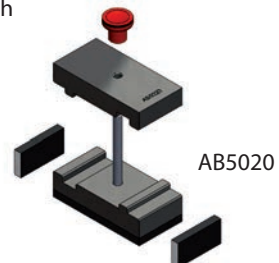
The AB5013 abrasive pad tool is placed in the AB5042 or AB5041 holder and needs to fit comfortably in the holder. The tool must be able to move freely without friction in the holder. Always position the tool facing the same way, to create the best homogeneity in results. For replacement intervals and maximum life please check the appropriate standard.

**9.4.5 Universal material clamp (AB5020)**

The Universal clamp holder is designed to hold abrasive media as sandpaper, cloth, towel material, etc. The rubber lining on the bottom create a uniform pressure on the bottom. The rubber pads on each side allow for the size adjustment to any thickness of cloth.

**Scope of supply**

- Clamp tool upper part with fixation screw
- Clamp tool lower part with rubber lining on the bottom and a separate rubber lining for both short sides



## Specifications

Universal Material Clamp Tool. Assembly of two black anodised aluminum blocks with rubber lining into which user-selected abrasive material can be clamped.

Dimensions\*: 75x40x80 mm

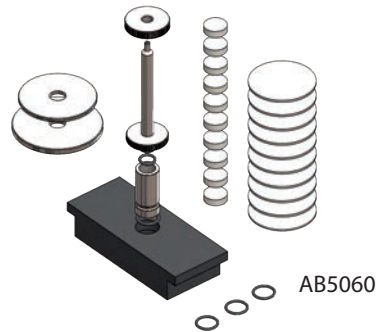
\*without rubber lining on the short sides

## Placement

The AB5020 abrasive pad tool is placed in the AB5042 or AB5041 holder and needs to fit comfortably in the holder. The tool must be able to move freely without friction in the holder. Always position the tool facing the same way, to create the best homogeneity in results. For replacement intervals and maximum life please check the appropriate standard.

### 9.4.6 MEK / Crockmeter tool.(AB5060)

The AB5060 MEK / Crockmeter is designed to perform several types of MEK / Crockmeter tests, depending on the configuration used. A full set weighs 200g. The hollow fixation screw allows for easy filling of the liquid reservoir in the stamp.



## Scope of supply

- TQC MEK / Crockmeter tool
- Weight
- Set of felts and Viton O-rings

## Placement

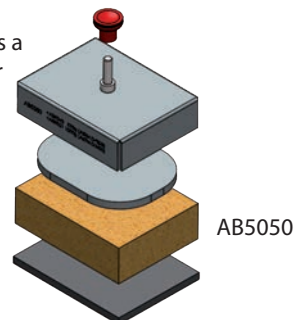
The AB5060 MEK / Crockmeter tool is placed in the AB5042 or AB5041 holder and needs to fit comfortably in the holder. The tool must be able to move freely without friction in the holder. Always position the tool facing the same way, to create the best homogeneity in results. For replacement intervals and maximum life please check the appropriate standard.

### 9.4.7 Large Sponge tool (AB5050)






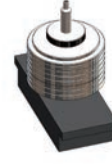
The large sponge holder is supplied ready for use. The sponge is a gentle tool to test the washability of the coating. Often used for cleanability tests on for example wall paints.

## Scope of supply

- Sponge
- Sponge holder
- Weight
- Fixation screw



Specifications

Desired Mass	Assembly	Configuration
<p>200g (standard delivery)</p>		
<p>454g Not included: 1x AB5065 (54 g) 2x AB5015 (100g)</p>		
<p>900g Not included: 1x AB5015 (100g) 2x AB5066 (200g)</p>		

**Specifications**

- Sponge tool AB5050 includes;
  - Stainless steel holder
    - Inner dimensions holder 90x75 mm
    - Outer dimensions holder 102x78mm
- Sponge pad
- Weight 500g

**Placement**

The AB5050 sponge tool is placed in the AB5043 holder and needs to fit comfortably in the holder. The tool must be able to move freely without friction in the holder. Always position the tool facing the same way, to create the best homogeneity in results. For replacement intervals check the appropriate standard.

**9.4.8 TQC Cloth holder (AB5055)**

The TQC Cloth holder is supplied ready for use. The tool is suitable for clamping flexible test media around the test body. Allowing for a smooth testing.

**Scope of supply**

- Cloth holder body
- Cloth holder frame

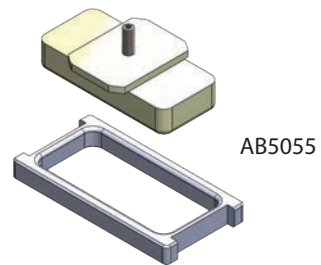
**Specifications**

Cloth holder body:

Material: POM  
Dimensions: 90x54\*x30 mm  
\* Width of the block is 40mm

Cloth holder frame:

Material: anodised aluminium  
Inner dimensions: 91x41x12 mm  
Outer dimensions: 110x51x12 mm

**Placement**

The AB5055 Cloth holder can only be placed in the AB5044 tool holder and needs to fit comfortably in the holder. The tool must be able to move freely without friction in the holder.

#### 9.4.9 Metal Shim (AB5025)

The metal shim is usually placed in the middle and underneath of the test sample. The small elevation will increase abrasion at that point hence test results are obtained more quickly.

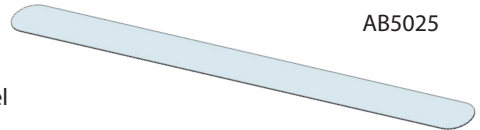
##### Scope of Supply

4 metal shims with rounded corners

##### Specifications

Material: Shim made of stainless spring steel

Dimensions: 0,25x12x158 mm



Please verify proper use of the shims by appropriate standard and or specification.

#### 9.4.10 Glass bed (AB5180)

Some standards require all tests to be performed on a glass test bed. This to ensure the flattest and smoothest substrate for the test. Often the glass bed is used together with the metal shims for many ASTM standards.

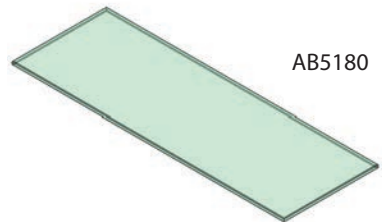
##### Scope of Supply

2 glass plates with chamfered edges

##### Specifications

Material : Glass

Dimensions : 470x163x6mm



#### 9.4.11 Heavy Weight Support Tool (AB5032)

When using top heavy tools the risk exists for a tool to tip over due to the load, or the used speed. Instable tools cause irregular wear and will lead to non-reproducible results. A tipped over tool can significantly scratch the sample and damage it beyond use. The heavy weight support tools are used to stabilize the tools by creating a fixture point on the vertical axis of the tool. Per tool 1 heavy weight support tool is required.

##### Scope of supply

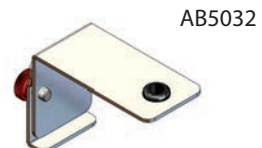
1 heavy weight support tool

1 fixture screw

##### Specifications

Material : Stainless steel and plastic

Dimensions : 94x40x80mm



#### 9.4.12 Tubing (AB5115 and AB5113)

The TQC Scrub, Abrasion and Washability Tester AB5000 and AB5005 are equipped with pumps for the application of test liquids to the samples. These tubes do require maintenance and timely replacement depending on the liquids that are pumped. The chemical resistance of the tubes is covered in the chemical resistance table. The wear of the tubes depends both on the abrasiveness and aggressiveness of the media used. It is not possible to predict the life expectancy of a tube.

##### Scope of Supply

- AB5115** General tubing set  
1 set of tubes suitable for installation between container and pump and from the pump to the test area's
- AB5113** Pump tubing kit  
4 tubes for installation in the pumps.

##### Specifications

- Pump tubing : BPT Pharmamed tube  
Tubing to pump and from pump : Tygon (at delivery PVC tube to the pump)

##### Additional information

- Waste / drainage tube : Silicon tube

## 10 INSTRUMENT PREPARATIONS

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Connect all the tubing according to the details stated on the side of the Washability Test.

### 10.1 Test bed

The test beds are made out of stainless steel 316. To prevent flash rust they need to be cleaned with CIF, Commandant 4 or any other light abrasive fluid before use.

### 10.2 Test Panels

We supply a range of test panels in many different substrates.  
Please visit: <http://www.tqc.eu/en/products/article/test-panels>

### 10.3 Test Fluid

Prepare the test fluid as stated in the used standard. Always use a suitable container to hold the sample solution. Place the container such that moment of the carrier won't knock the container over or the container influences the movement of the carrier.

## 10.4 Waste fluid container

Take care that the waste water container is empty before each test is performed. Also ensure that selected waste water container is large enough to contain the at the test needed volume of waste fluid. The top of the container may never be higher than the drains of the washability test.

## 10.5 Tool carrier

The tool carrier can be opened from the right hand side. The tool carrier can be adjusted in four heights. Always make sure the carrier is securely locked into place.

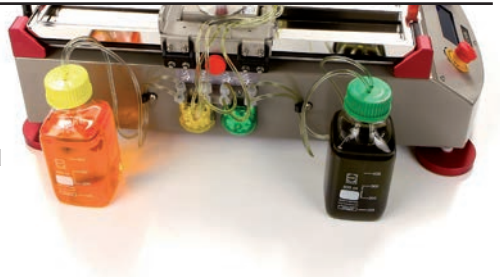
## 10.6 Tools

TQC provides a wide range of possible tools. Always use the tools as instructed by both manual and standard. (See also Annex A, B, C)

# 11 OPERATION

## 11.1 Preparatory Work

- Connect the instrument to the mains at the rear side of the housing.
- Insert the correct tools in the tool carrier and make sure they are set to the correct weight.
- Set the stroke length to the correct length.



The pump contains each 2 pump tubes. Please make sure that the moving tubing of the traverse is not able to get interlinked with the tubing supplying the pump of fluid.



In height adjustable tool carrier.

## 11.2 Performing a Washability test

For performing a Washability test a suitable panel and test fluid is required. Please see the specifications and required standards for further specifications.



### 11.3 Start the instrument

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Start the instrument following the steps listed in the menu chapters.

## 12 CARE AND MAINTENANCE

### 12.1 Inspection and Maintenance

- Though robust in design, this instrument is precision-machined. Never drop it or knock it over.
- Always clean the instrument after use.
- Clean the instrument using a soft dry cloth. Never clean the instrument by any mechanical means such as a wire brush or abrasive paper. This may cause, just like the use of aggressive cleaning agents, permanent damage.
- Do not use compressed air to clean the instrument.
- Never bend or exert extreme forces on the tool carrier
- Generally the TQC Washability Test does not require any maintenance.

***Make sure that no paint or other liquids are spilled on the electronics or left in the tubing.***

### 12.2 Disposal of Materials

Disposal of materials used in the operation of the instrument or for auxiliary functions and exchanged items should be dealt with safety and in a manner that will not harm the environment. Follow the local regulations.

### 12.3 Customer Service

Customer service is provided on request by  
TQC, Molenbaan 19, 2908LL Capelle aan den IJssel - The Netherlands,  
T +31 (0)10-7900100, F +31 (0)10-7900100 or by your local representative.

## 13 DISCLAIMER

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The right of technical modifications is reserved.

The information given in this manual is not intended to be exhaustive and any person using the product for any purpose other than that specifically recommended in this manual without first obtaining written confirmation from us as to the suitability of the product for the intended purpose does so at his own risk. Whilst we endeavour to ensure that all advice we give about the product (whether in this manual or otherwise) is correct we have no control over either the quality or condition of the product or the many factors affecting the use and application of the product. Therefore, unless we specifically agree in writing to do so, we do not accept any liability whatsoever or howsoever arising for the performance of the product or for any loss or damage (other than death or personal injury resulting from our negligence) arising out of the use of the product. The information contained in this manual is liable to modification from time to time in the light of experience and our policy of continuous product development.

## ANNEX A | STANDARDS CONFIGURATION TABLE

Art. No.	Description	DIN 53778	ASTM D2486	ASTM D421 3-92	ASTM D4828	ISO 11998	ASTM D3450	ASTM D421 3 (from 1996)	MEK test / DIN 55654
<b>Scrub Test Basic Device:</b>									
AB5000	TQC Scrub, Abrasion and Washability Test 230 V	x	x	x	x	x	x	x	x
AB5005	TQC Scrub, Abrasion and Washability Test 100 V	x	x	x	x	x	x	x	x
AB5210	TQC Scrub, Abrasion and Washability Test Basic 230 V		x	x	x		x	x	x
AB5215	TQC Scrub, Abrasion and Washability Test Basic 100 V		x	x	x		x	x	x
<b>Test beds:</b>									
AB5196	Reservoir low, half	x	x	x	x	x	x	x	x
AB5176	Reservoir low, full	o	o	o	o	o	o	o	o
<b>Clamping frames:</b>									
AB5045	Wide channel single frame for low reservoir	x	x			x			x
AB5197	Double narrow channel frame for low reservoir	o	o	x	x	o	x	x	o
<b>Tool adapter (WARNING: The adapter must be compatible with the clamping frame)</b>									
AB5041	Tool adapter "Double" for tools AB5012/5010/5011/5013/5020	x	x			x			x
AB5042	Tool adapter "Single" for tools AB5012/5010/5011/5013/5020	o	o			o			o
AB5043	Tool adapter "Single" for tool AB5050			x	x		x	x	
AB5044	Tool adapter "Double" for tool AB5055								
<b>Tools:</b>									
AB5010	Wild Boar Brush (250g/8.82oz) DIN 53778	x							
AB5011	Nylon Brush (454g/16.01oz) ASTM D2486		x						
AB5012	Sponge (232g/8.12oz)								
AB5013	Abrasive pad (232g/8.12oz) ISO 11998					x			
AB5020	Universal holder								
AB5050	Sponge tool, large, conform ASTM D4828 / D3450 (500g)(excl weights)			x	x		x	x	
AB5055	Cloth holder tool for detergents test (norms)								
AB5060	MEK Test / Crock meter								x
<b>Accessories:</b>									
AB5014	Weight for Washability test 60g								
AB5015	Weight for Washability test 100g								
AB5030	Weight for Washability test 1000g						o		
AB5040	Weight for Washability test 500gr						o		

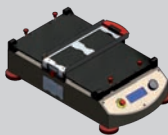



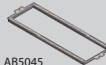







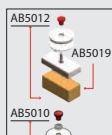
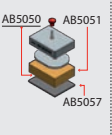
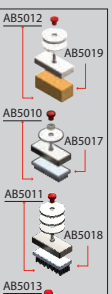

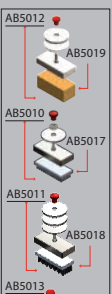
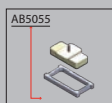
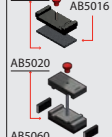
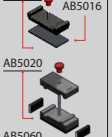
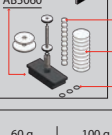
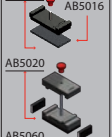
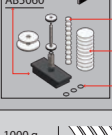
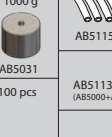
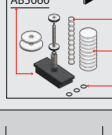
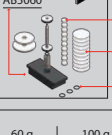
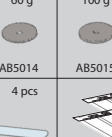
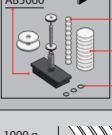
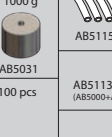
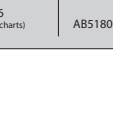









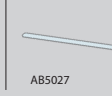
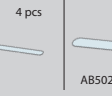
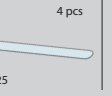
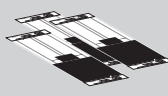
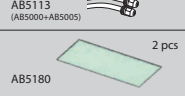

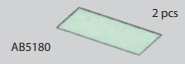
## ANNEX A | STANDARDS CONFIGURATION TABLE

Art. No.	Description	DIN 53778	ASTM D2486	ASTM D421 3-92	ASTM D4828	ISO 11998	ASTM D3450	ASTM D421 3 (from 1996)	MEK test / DIN 55654
<b>AB5032</b>	Tool stabilization kit for heavy weights	o	x	o	o	o	x	o	
<b>AB5025</b>	Metal shims for ASTM D2486, for reservoir half (set of 4)		x						
<b>AB5027</b>	Metal shims for ASTM D2486, for reservoir full (set of 4)		o						
<b>AB5180</b>	Glass base conform ASTM D2486 (set of 2)	x	x	x	x		x	x	
	<b>Consumables:</b>								
<b>AB5016</b>	Abrasive pads for tool AB5013, set 5 pcs (Weight each appr. 3 g.) Abrasive pads for tool AB5050, set 5 pcs			x		x		x	
<b>AB5017</b>	Wild boar brush for tool AB5010	x							
<b>AB5018</b>	Nylon brush for tool AB5011 Sponge pads for tool AB5050, set 5 pcs		x		x		x	x	
<b>AB5019</b>	Sponge pads for tool AB5012, set 5 pcs								
<b>VF2316</b>	TQC opacity scrub charts, black and white, 100 pieces TQC opacity scrub charts black, 100 pieces.	o			o	o		o	
	<b>Spare parts:</b>								
<b>AB5140</b>	Glass container 500ml								
<b>AB5142</b>	Glass container cap yellow								
<b>AB5141</b>	Glass container cap green								
<b>AB5113</b>	Pump tubes set of 4 Full tubing kit								

X = mandatory

O = Optional

## ANNEX B | ORDERING MATRIX

1 TQC AUTOMATIC WASHABILITY TEST																	
 <p>AB5210 (230V) AB5215 (110V)</p>					 <p>AB5000 (230V) AB5005 (110V)</p>												
<p>2 possible</p>  <p>AB5196</p>					<p>1 possible</p>  <p>AB5176</p>												
<p>3</p>  <p>AB5045</p>					<p>2 possible</p>  <p>AB5197</p>												
<p>4</p>  <p>AB5042</p>		 <p>AB5043</p>		 <p>AB5041</p>		 <p>AB5044</p>		<p>2 possible</p>  <p>AB5041</p>		 <p>AB5044</p>							
<p>5</p> <p>2 possible</p> 		<p>2 possible</p> 		<p>4 possible</p> 		<p>4 possible</p> 		<p>4 possible</p> 		<p>4 possible</p> 							
																	
																	
<p>6</p>  <p>AB5032</p>		<p>45 g</p>  <p>AB5065</p>		<p>54 g</p>  <p>AB5074</p>		<p>60 g</p>  <p>AB5014</p>		<p>100 g</p>  <p>AB5015</p>		<p>300 g</p>  <p>AB5066</p>		<p>500 g</p>  <p>AB5040</p>		<p>1000 g</p>  <p>AB5031</p>		 <p>8x 600 mm AB5115 (AB5000+AB5005)</p>	
 <p>AB5027</p>		<p>4 pcs</p>  <p>AB5025</p>		<p>4 pcs</p> 		 <p>VF2316 (Optical scrub charts)</p>		<p>100 pcs</p>  <p>AB5180</p>		<p>4 pcs</p>  <p>AB5113 (AB5000+AB5005)</p>		<p>2 pcs</p> 					

## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	BPT Pharmed tube	Compatibility		
			Tygon	Silicone	Viton
Acetaldehyde	D	D	D	A	D
Acetamide	D	N/A	D	B	B
Acetate Solvent	D	N/A	D	C	D
Acetic Acid	D	N/A	D	C	B
Acetic Acid 20%	D	A	D	B	B
Acetic Acid 80%	C	N/A	D	B	B
Acetic Acid, Glacial	D	N/A	D	B	D
Acetic Anhydride	D	A	D	C	D
Acetone	D	D	D	D	D
Acetone, 50% water	D	N/A	N/A	A2	D
Acetyl Bromide	D	C	D	N/A	N/A
Acetyl Chloride (dry)	C	C	D	C	A
Acetylene	A1	N/A	A1	B	A
Acrylonitrile	B1	N/A	D	D	D
Adipic Acid	A2	N/A	D	N/A	A2
Alcohols: Amyl	A2	N/A	D	D	A
Alcohols: Benzyl	D	N/A	D	N/A	A
Alcohols: Butyl	A2	N/A	A2	B	A
Alcohols: Diacetone	B1	N/A	B1	D	D
Alcohols: Ethyl	C	N/A	C	B	A
Alcohols: Hexyl	A2	N/A	A2	B	C
Alcohols: Isobutyl	A1	N/A	A1	A	A
Alcohols: Isopropyl	A1	N/A	D	A	A
Alcohols: Methyl	A1	N/A	A1	A	C
Alcohols: Propyl	A1	N/A	A1	A	A
Allyl Chloride	D	N/A	N/A	N/A	A3
Aluminum Acetate (saturated)	A	A	N/A	D	A
Aluminum Chloride	A2	A	A2	B	A
Aluminum Chloride 20%	A1	A	A1	B	A
Aluminum Fluoride	A2	N/A	A2	B	A
Aluminum Hydroxide	A2	A	A2	N/A	A
Aluminum Nitrate	B2	A	B2	B1	A2
Aluminum Potassium Sulfate 10%	A2	A	A2	A	A
Aluminum Potassium Sulfate 100%	A2	A	A2	A	A
Aluminum Sulfate	A2	A	A2	A	A
Amines	D	N/A	D	B	D
Ammonia 10%	B1	a	B1	N/A	D
Ammonia Nitrate	B	a	B	N/A	D
Ammonia, anhydrous	A2	a	B	C	D
Ammonia, liquid	A1	a	A2	N/A	D

**ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS**

Chemical	PVC	BPT Pharmed tube	Compatibility		
			Tygon	Silicone	Viton
Ammonium Acetate	A	a	A	N/A	A
Ammonium Bifluoride	A	N/A	A2	N/A	A
Ammonium Carbonate	A2	a	A2	C	A
Ammonium Chloride	A2	a	A2	C	A
Ammonium Fluoride 25%	A	N/A	N/A	N/A	A
Ammonium Hydroxide	A	a	A	A	B
Ammonium Nitrate	A2	a	A2	C	A
Ammonium Oxalate	A	N/A	A	N/A	N/A
Ammonium Persulfate	A2	N/A	A2	D	A
Ammonium Phosphate, Dibasic	A2	a	A2	A	A
Ammonium Phosphate, Monobasic	A	a	A	A	A
Ammonium Phosphate, Tribasic	A	a	A	A	A
Ammonium Sulfate	A2	a	A2	A	A
Ammonium Sulfite	A2	N/A	A2	N/A	D
Amyl Acetate	D	B	D	D	D
Amyl Alcohol	A2	D	D	D	A
Amyl Chloride	D	c	D	D	B1
Aniline	C1-Fair	c	D	B	A
Aniline Hydrochloride	B2	c	D	D	A
Antifreeze (glycol-based)	B	N/A	B	B	A
Antimony Trichloride	A2	N/A	N/A	N/A	A2
Aqua Regia (80% HCl, 20% HNO3)	C1-Fair	d	D	D	B
Aromatic Hydrocarbons	D	d	N/A	D	A
Arsenic Acid	A1	N/A	B	A	A2
Arsenic Salts	A	a	A	N/A	A
Asphalt	A2	N/A	N/A	D	A
Barium Carbonate	A2	a	N/A	N/A	A
Barium Chloride	A1	a	B	A	A
Barium Cyanide	D	a	N/A	N/A	A
Barium Hydroxide	A2	a	N/A	A	A
Barium Nitrate	A	a	N/A	B	A
Barium Sulfate	B1	a	N/A	A	A
Barium Sulfide	A2	a	N/A	A	A
Beer	A2	N/A	A	A	A
Beet Sugar Liquids	A2	N/A	N/A	A	A
Benzaldehyde	D	d	D	D	D
Benzene	C1-Fair	N/A	D	D	A
Benzene Sulfonic Acid	A	d	D	D	A
Benzoic Acid	A	N/A	D	B	A
Bleach	A	N/A	B	N/A	A

## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	Compatibility			
		BPT Pharmed tube	Tygon	Silicone	Viton
Bleaching Liquors	A1	a	N/A	B	A
Borax (Sodium Borate)	A1	N/A	N/A	B	A
Boric Acid	A2	a	A	A	A
Bromine	C1-Fair	d	D	D	A
Butadiene	C1-Fair	N/A	A	D	B
Butane	C1-Fair	a	A	D	A
Butanol (Butyl Alcohol)	C1-Fair	d	D	B	A
Buttermilk	A1	N/A	B	A	A
Butyl Amine	D	N/A	D	B1	D
Butyl Ether	A2	N/A	A2	D	D
Butylacetate	D	b	D	D	D
Butylene	A1	N/A	N/A	D	A
Butyric Acid	B1	b	D	D	B1
Calcium Bisulfide	A2	a	N/A	C	A
Calcium Bisulfite	B	a	N/A	A	A
Calcium Carbonate	A2	a	N/A	A	A
Calcium Chlorate	B2	a	N/A	N/A	A
Calcium Chloride (30% in water)	C	a	A	A	A
Calcium Chloride (saturated)	A	a	N/A	A	A
Calcium Hydroxide	B	a	B2	A	A
Calcium Hydroxide (saturated)	A	a	N/A	A	A
Calcium Hypochlorite	B1	a	A	B	A
Calcium Hypochlorite (saturated)	A	a	N/A	N/A	A
Calcium Hypochlorite 30%	A	a	N/A	N/A	A
Calcium Nitrate	A2	a	A2	B1	A2
Calcium Oxide	B	a	C	A	B
Calcium Sulfate	B2	a	N/A	N/A	A
Calcium Sulfide	A	a	N/A	N/A	A
Cane Juice	A1	N/A	A	A	A
Carbolic Acid (Phenol)	D	N/A	B	D	A
Carbon Bisulfide	D	d	D	N/A	A
Carbon Dioxide (dry)	A2	a	A	B	B
Carbon Dioxide (wet)	A1	a	A	B	B
Carbon Disulfide	D	N/A	D	N/A	A1
Carbon Monoxide	A2	N/A	A	A2	A
Carbon Tetrachloride	D	d	D	D	A
Carbonated Water	A	N/A	N/A	N/A	A
Carbonic Acid	A2	N/A	A	A	A
Catsup	A	N/A	N/A	N/A	A
Cellulose Acetate	D	N/A	N/A	N/A	D

**ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS**

Chemical	PVC	Compatibility			
		BPT Pharmed tube	Tygon	Silicone	Viton
Chloral Hydrate	A	N/A	N/A	N/A	D
Chloric Acid	A2	N/A	N/A	N/A	N/A
Chlorine (dry)	D	c	A	D	A
Chlorine Water	A2	d	N/A	D	A
Chlorine, Anhydrous Liquid	D	d	B	D	A
Chloroacetic Acid	B1	b	A	D	D
Chlorobenzene (Mono)	D	d	D	D	A
Chlorobromomethane	D	b	N/A	D	A
Chloroform	D	c	D	D	A
Chlorosulfonic Acid	D	d	D	D	D
Chromic Acid 10%	A2	a	C	C	B
Chromic Acid 30%	A1	a	B	C	A
Chromic Acid 5%	A2	a	B	C	A
Chromic Acid 50%	D	a	B	C	A
Chromium Salts	A	a	A	N/A	N/A
Cider	A	N/A	N/A	B1	A
Citric Acid	B2	N/A	N/A	A	A
Copper Chloride	A1	a	A	A1	A
Copper Cyanide	A2	a	N/A	A	A
Copper Fluoborate	A	a	A	N/A	A
Copper Nitrate	A2	a	B	N/A	A
Copper Sulfate >5%	A2	a	N/A	A	A
Copper Sulfate 5%	A2	a	A	A	A
Creosote	A	N/A	N/A	D	A
Cresols	D	d	D	D	A
Cresylic Acid	D	N/A	N/A	D	A
Cupric Acid	A2	N/A	A2	A1	A2
Cyclohexane	D	d	D	D	A
Cyclohexanone	D	d	D	D	D
Detergents	A	N/A	A	A	A
Dextrin	A	N/A	N/A	N/A	D
Dextrose	A	N/A	N/A	A	A
Diacetone Alcohol	D	a	N/A	D	D
Dichlorobenzene	D	N/A	N/A	D	C
Dichloroethane	D	N/A	D	N/A	C
Diesel Fuel	A1	N/A	D	D	A
Diethyl Ether	D	N/A	N/A	D	D
Diethylamine	D	N/A	A	B	A
Diethylene Glycol	C1-Fair	N/A	C1-Fair	B1	A2
Dimethyl Aniline	D	N/A	D	D	D



## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	BPT Pharmed tube	Compatibility		
			Tygon	Silicone	Viton
Dimethyl Formamide	D	N/A	D	C	C
Diphenyl Oxide	D	N/A	D	C	A
Disodium Phosphate	A	N/A	N/A	N/A	A
Dyes	B	N/A	C	N/A	A
Epsom Salts (Magnesium Sulfate)	A1	N/A	B	A	A
Ethane	A1	N/A	A	D	A
Ethanol	C	c	C	B	A
Ethanolamine	D	N/A	N/A	B	D
Ether	D	c	D	D	C
Ethyl Acetate	D	b	D	B	D
Ethyl Benzoate	D	N/A	D	D	A1
Ethyl Chloride	D	c	D	D	A
Ethyl Ether	D	N/A	D	D	D
Ethylene Bromide	D	N/A	D	D	A
Ethylene Chloride	D	N/A	N/A	D	B
Ethylene Chlorohydrin	D	a	D	C	A
Ethylene Diamine	D	N/A	N/A	A	B
Ethylene Dichloride	D	c	D	D	A
Ethylene Glycol	A	a	A	A	A
Ethylene Oxide	D	a	A	D	D
Fatty Acids	A	c	D	C	A
Ferric Chloride	A	a	N/A	B	A
Ferric Nitrate	A	a	N/A	C	A
Ferric Sulfate	A	a	N/A	B	A
Ferrous Chloride	A	a	N/A	N/A	A
Ferrous Sulfate	A	a	N/A	N/A	B
Fluoboric Acid	A	d	N/A	N/A	B
Fluorine	D	N/A	D	D	C
Fluosilicic Acid	D	c	A	N/A	B1
Formaldehyde 100%	A	d	D	B	D
Formaldehyde 40%	A	d	D	N/A	A
Formic Acid	A1	a	A	B	C
Freon® 11	A2	d	A	D	B
Freon® 113	B	d	N/A	D	B
Freon® 12	A2	d	A	D	B
Freon® 22	A	d	A	D	D
Freon® TF	B	d	N/A	D	B
Fruit Juice	A	N/A	A	N/A	A
Fuel Oils	A2	N/A	D	D	A
Furan Resin	A	N/A	A	D	D

## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	BPT Pharmed tube	Compatibility		
			Tygon	Silicone	Viton
Furfural	D	N/A	D	D	D
Gallic Acid	B	N/A	D	D	A
Gasoline (high-aromatic)	A	d	N/A	D	A
Gasoline, leaded, ref.	B	d	D	D	A1
Gasoline, unleaded	C2-Fair	d	D	D	A1
Gelatin	B	N/A	A	A	A
Glucose	A2	a	A	A	A
Glue, P.V.A.	C	a	C	A	B
Glycerin	A	a	A	A	A
Glycolic Acid	B	N/A	A	A	A
Grape Juice	A	N/A	B	A	A
Grease	A	N/A	A	D	A
Heptane	C1-Fair	N/A	D	D	A
Hexane	B1	N/A	D	D	A
Honey	A	N/A	A	A	A
Hydraulic Oil (Petro)	A	N/A	A	B	A
Hydraulic Oil (Synthetic)	A	N/A	A	B	A
Hydrobromic Acid 100%	A1	d	A	D	A
Hydrobromic Acid 20%	B2	d	A	D	A
Hydrochloric Acid 100%	D	a	A1	D	A
Hydrochloric Acid 20%	A2	a	A1	D	A
Hydrochloric Acid 37%	B	b	A1	B	A
Hydrochloric Acid, Dry Gas	A2	a	N/A	N/A	N/A
Hydrocyanic Acid	B	N/A	A	C	A
Hydrocyanic Acid (Gas 10%)	A	N/A	A	D	A
Hydrofluoric Acid 100%	C	N/A	D	D	B
Hydrofluoric Acid 20%	B	N/A	A	D	A
Hydrofluoric Acid 50%	B1	d	C	D	B
Hydrofluoric Acid 75%	C	N/A	C	D	B
Hydrofluosilicic Acid 100%	B1	N/A	D	D	A
Hydrofluosilicic Acid 20%	A2	N/A	A	D	A
Hydrogen Gas	A2	N/A	A	C	A
Hydrogen Peroxide 10%	A1	a	B	A	A
Hydrogen Peroxide 100%	A	b	B	B	A
Hydrogen Peroxide 30%	A1	a	B	B	A
Hydrogen Peroxide 50%	A1	a	B	B	A
Hydrogen Sulfide (aqua)	B1	N/A	A	C	D
Hydrogen Sulfide (dry)	A2	N/A	A	C	D
Hydroquinone	B	N/A	N/A	N/A	B
Hydroxyacetic Acid 70%	D	N/A	N/A	N/A	A

## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	Compatibility			
		BPT Pharmed tube	Tygon	Silicone	Viton
Ink	C	N/A	C	N/A	A
Iodine	A	a	A	N/A	A
Iodine (in alcohol)	A	a	N/A	N/A	N/A
Iodoform	A	N/A	C	N/A	N/A
Isooctane	A1	N/A	D	D	A1
Isopropyl Acetate	D	N/A	D	D	D
Isopropyl Ether	B	N/A	D	D	D
Isotane	A	N/A	N/A	N/A	A
Jet Fuel (JP3, JP4, JP5, JP8)	C	N/A	D	D	A
Kerosene	A2	d	D	D	A
Ketones	D	d	D	N/A	D
Lacquer Thinners	D	b	D	D	D
Lacquers	D	N/A	A	D	D
Lactic Acid	B1	a	A	A	A
Lard	A1	N/A	D	B	A
Lead Acetate	B	a	B	A	D
Lead Nitrate	A2	N/A	A2	B1	A2
Lead Sulfamate	B	N/A	N/A	B	A
Lime	B	N/A	A	N/A	A
Linoleic Acid	A2	N/A	A2	B1	B1
Lithium Chloride	D	N/A	A2	A1	A1
Lubricants	B2	N/A	B	D	A
Lye: Ca(OH) <sub>2</sub> Calcium Hydroxide	B2	N/A	B2	A	B1
Lye: KOH Potassium Hydroxide	B	N/A	B	C	B
Lye: NaOH Sodium Hydroxide	A	N/A	B	A1	B1
Magnesium Bisulfate	A2	N/A	A2	N/A	N/A
Magnesium Carbonate	B	N/A	N/A	N/A	A
Magnesium Chloride	B	a	N/A	A	A2
Magnesium Hydroxide	A2	N/A	A	A	A
Magnesium Nitrate	A2	N/A	A	N/A	A
Magnesium Sulfate (Epsom Salts)	A1	a	A	A	A
Maleic Acid	A2	N/A	D	N/A	A
Malic Acid	A2	a	A	B	A
Manganese Sulfate	C	a	A1	A1	A2
Mayonnaise	D	N/A	D	N/A	A
Melamine	D	N/A	D	C	A
Mercuric Chloride (dilute)	A	a	D	N/A	A
Mercuric Cyanide	A	a	N/A	A	A1
Mercurous Nitrate	A	a	A2	N/A	A1
Mercury	A	a	A	N/A	A

**ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS**

Chemical	PVC	Compatibility			
		BPT Pharmed tube	Tygon	Silicone	Viton
Methane	B	a	A	D	A
Methanol (Methyl Alcohol)	A1	a	D	A	C
Methyl Acetate	D	N/A	D	D	D
Methyl Acetone	D	N/A	A	N/A	D
Methyl Alcohol 10%	A1	N/A	A1	A	C
Methyl Bromide	D	N/A	D	N/A	A
Methyl Butyl Ketone	A	N/A	N/A	D	D
Methyl Cellosolve	D	N/A	C	D	D
Methyl Chloride	D	c	D	D	A1
Methyl Dichloride	A	N/A	N/A	N/A	A1
Methyl Ethyl Ketone	D	d	D	D	D
Methyl Isobutyl Ketone	D	N/A	D	D	D
Methyl Isopropyl Ketone	D	N/A	N/A	C	D
Methyl Methacrylate	A	N/A	N/A	C	D
Methylamine	D	N/A	D	N/A	D
Methylene Chloride	D	N/A	D	N/A	B
Milk	A2	N/A	A	A	A
Mineral Spirits	A	N/A	D	D	A
Molasses	A	N/A	A	N/A	A
Monoethanolamine	D	N/A	D	B	D
Motor Oil	B	N/A	D	N/A	N/A
Mustard	B	N/A	B	N/A	D
Naphtha	A1	d	D	D	A
Naphthalene	D	N/A	D	D	A
Natural Gas	A	N/A	A	A	A
Nickel Chloride	A	a	B	A	A
Nickel Nitrate	A	a	A2	N/A	A2
Nickel Sulfate	A	a	A	A	A
Nitrating Acid (<1% Acid)	D	N/A	D	N/A	N/A
Nitrating Acid (<15% H2SO4)	D	N/A	D	N/A	N/A
Nitrating Acid (<15% HNO3)	D	N/A	D	N/A	N/A
Nitrating Acid (>15% H2SO4)	D	N/A	D	N/A	N/A
Nitric Acid (20%)	A1	a	D	D	A
Nitric Acid (5 to 10%)	A1	a	D	C	A
Nitric Acid (50%)	B1	a	D	D	A
Nitric Acid (Concentrated)	B1	d	D	D	A
Nitrobenzene	D	d	D	D	B
Nitromethane	B2	N/A	D	D	D
Nitrous Acid	A	a	A	N/A	B
Nitrous Oxide	A	N/A	A	N/A	B

## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	BPT Pharmed tube	Tygon	Silicone	Viton
	Compatibility				
Oils: Aniline	D	c	D	D	C
Oils: Castor	A	N/A	A	A	A
Oils: Cinnamon	D	N/A	N/A	N/A	A
Oils: Citric	B	N/A	D	N/A	A
Oils: Coconut	A1	N/A	A	A	A
Oils: Cod Liver	A1	N/A	N/A	B	A
Oils: Corn	B	N/A	B	A	B
Oils: Cottonseed	B2	N/A	B	A	A
Oils: Creosote	C	N/A	N/A	D	A
Oils: Crude Oil	A	N/A	N/A	N/A	A
Oils: Diesel Fuel (20, 30, 40, 50)	B	N/A	A	D	A
Oils: Fuel (1, 2, 3, 5A, 5B, 6)	A2	N/A	A	C	B
Oils: Hydraulic Oil (Petro)	A	N/A	A	B	A
Oils: Hydraulic Oil (Synthetic)	A	N/A	A	B	A
Oils: Linseed	A2	c	A	A	A
Oils: Mineral	B	d	B	C	A
Oils: Olive	C	c	B	D	A
Oils: Orange	C1-Fair	c	N/A	D	A
Oils: Palm	A	c	N/A	N/A	A
Oils: Peanut	A1	c	A	A	A
Oils: Pine	D	c	D	D	A
Oils: Rosin	C1-Fair	c	N/A	N/A	A
Oils: Sesame Seed	A	c	A	N/A	A
Oils: Silicone	A	c	A	C	A
Oils: Soybean	A1	N/A	B	A	A
Oils: Transformer	B	N/A	N/A	B	A
Oils: Turbine	A1	N/A	A	D	A
Oleic Acid	C2-Fair	c	D	D	B
Oleum 100%	D	N/A	C	D	A
Oleum 25%	D	N/A	A	D	A
Oxalic Acid (cold)	B	b	B	B	A
Ozone	B	b	A	A	A
Palmitic Acid	B1	c	D	D	A1
Paraffin	B	N/A	D	N/A	B
Pentane	A	N/A	A	D	A
Perchloric Acid	C	a	N/A	D	A
Perchloroethylene	C1-Fair	c	D	D	A
Petrolatum	B	N/A	B	D	A
Phenol (10%)	C1-Fair	a	B	D	A
Phenol (Carbolic Acid)	D	a	B	D	A

## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	BPT Pharmed tube	Tygon	Silicone	Viton
Compatibility					
Phosphoric Acid (<40%)	B	a	A	C	A
Phosphoric Acid (>40%)	B	a	A	D	A
Phosphoric Acid (crude)	B2	N/A	D	D	A
Phosphoric Acid (molten)	D	N/A	D	N/A	N/A
Phosphorus	A1	N/A	B1	N/A	N/A
Phosphorus Trichloride	D	N/A	A	N/A	A1
Photographic Developer	A	N/A	A	B	A
Photographic Solutions	A	N/A	A2	A	B1
Phthalic Anhydride	D	N/A	D	N/A	A
Picric Acid	D	a	A	D	A
Chemical	PVC	BPT Pharmed tube	Tygon	Silicone	Viton
Compatibility					
Plating Solutions: Antimony Plating 130°F	A	a	N/A	N/A	A
Plating Solutions: Arsenic Plating 110°F	A	a	N/A	N/A	A
Plating Solutions: Brass: High-Speed Brass Bath 110°F	A	a	N/A	N/A	A
Plating Solutions: Brass: Regular Brass Bath 100°F	A	a	N/A	N/A	A
Plating Solutions: Bronze: Cu-Cd Bronze Bath R.T.	A	a	N/A	N/A	A
Plating Solutions: Bronze: Cu-Sn Bronze Bath 160°F	D	a	N/A	N/A	A
Plating Solutions: Bronze: Cu-Zn Bronze Bath 100°F	A	a	N/A	N/A	A
Plating Solutions: Cadmium: Cyanide Bath 90°F	A	a	N/A	N/A	A
Plating Solutions: Cadmium: Fluoborate Bath 100°F	A	a	N/A	N/A	A
Plating Solutions: Chromium: Barrel Chrome Bath 95°F	A	a	N/A	N/A	C
Plating Solutions: Chromium: Black Chrome Bath 115°F	A	a	N/A	N/A	C
Plating Solutions: Chromium: Chromic-Sulfuric Bath 130°F	A	a	N/A	N/A	C
Plating Solutions: Chromium: Fluoride Bath 130°F	A	a	N/A	N/A	C
Plating Solutions: Chromium: Fluosilicate Bath 95°F	A	a	N/A	N/A	C
Plating Solutions: Copper (Acid): Copper Fluoborate Bath 120°F	A	a	N/A	N/A	A
Plating Solutions: Copper (Acid): Copper Sulfate Bath R.T.	A	a	N/A	N/A	A
Plating Solutions: Copper (Cyanide): Copper Strike Bath 120°F	A	a	N/A	N/A	A
Plating Solutions: Copper (Cyanide): High-Speed Bath 180°F	D	a	N/A	N/A	A
Plating Solutions: Copper (Cyanide): Rochelle Salt Bath 150°F	D	a	N/A	N/A	A
Plating Solutions: Copper (Misc): Copper (Electroless)	A	a	D	N/A	A
Plating Solutions: Copper (Misc): Copper Pyrophosphate	A	a	N/A	N/A	A
Plating Solutions: Gold: Acid 75°F	A	a	N/A	N/A	A
Plating Solutions: Gold: Cyanide 150°F	D	a	N/A	N/A	A
Plating Solutions: Gold: Indium Sulfamate Plating R.T.	A	a	N/A	N/A	A
Plating Solutions: Gold: Neutral 75°F	A	a	N/A	N/A	A
Plating Solutions: Iron: Ferrous Am Sulfate Bath 150°F	D	a	N/A	N/A	A
Plating Solutions: Iron: Ferrous Chloride Bath 190°F	D	a	N/A	N/A	A

## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	BPT Pharmed tube	Tygon	Silicone	Viton
Plating Solutions: Iron: Ferrous Sulfate Bath 150°F	D	a	N/A	N/A	A
Plating Solutions: Iron: Fluoborate Bath 145°F	D	a	N/A	N/A	A
Plating Solutions: Iron: Sulfamate 140°F	A	a	N/A	N/A	A
Plating Solutions: Iron: Sulfate-Chloride Bath 160°F	D	a	N/A	N/A	A
Plating Solutions: Lead Fluoborate Plating	A	a	N/A	N/A	A
Plating Solutions: Nickel: Electroless 200°F	D	a	N/A	N/A	A
Plating Solutions: Nickel: Fluoborate 100-170°F	A	a	N/A	N/A	A
Plating Solutions: Nickel: High-Chloride 130-160°F	D	a	N/A	N/A	A
Plating Solutions: Nickel: Sulfamate 100-140°F	A	a	N/A	N/A	A
Plating Solutions: Nickel: Watts Type 115-160°F	D	a	N/A	N/A	A
Plating Solutions: Rhodium Plating 120°F	A	a	N/A	N/A	A
Plating Solutions: Silver Plating 80-120°F	A	a	N/A	N/A	A
Plating Solutions: Tin-Fluoborate Plating 100°F	A	a	N/A	N/A	A
Plating Solutions: Tin-Lead Plating 100°F	A	a	N/A	N/A	A
Plating Solutions: Zinc: Acid Chloride 140°F	A	a	N/A	N/A	A
Plating Solutions: Zinc: Acid Fluoborate Bath R.T.	A	a	N/A	N/A	A
Plating Solutions: Zinc: Acid Sulfate Bath 150°F	D	a	N/A	N/A	A
Plating Solutions: Zinc: Alkaline Cyanide Bath R.T.	A	a	N/A	N/A	A

Chemical	PVC	BPT Pharmed tube	Tygon	Silicone	Viton
Potash (Potassium Carbonate)	A	a	A	N/A	A
Potassium Bicarbonate	A	a	A	A1	A
Potassium Bromide	A	N/A	B	A1	A
Potassium Chlorate	A	N/A	B	B	A
Potassium Chloride	A	N/A	A	A	A
Potassium Chromate	A	N/A	B	N/A	A
Potassium Cyanide Solutions	A	N/A	A	A	A
Potassium Dichromate	A	N/A	N/A	A	A
Potassium Ferricyanide	A	N/A	B	N/A	A
Potassium Ferrocyanide	A	N/A	B	N/A	A
Potassium Hydroxide (Caustic Potash)	A1	a	B	C	B
Potassium Hypochlorite	B1	N/A	B1	N/A	N/A
Potassium Iodide	A2	a	B	N/A	A
Potassium Nitrate	A	N/A	A	A	A
Potassium Permanganate	A1	N/A	B	N/A	A
Potassium Sulfate	A2	N/A	A	A	A2
Potassium Sulfide	A2	N/A	N/A	A	A
Propane (liquefied)	A1	N/A	N/A	D	A
Propylene	B1	N/A	A	D	A1

## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	BPT Pharmed tube	Compatibility		
			Tygon	Silicone	Viton
Propylene Glycol	C1-Fair	N/A	A	A	A
Pyridine	D	c	D	D	D
Pyrogalllic Acid	A	N/A	N/A	N/A	A
Resorcinol	C	N/A	C	N/A	A1
Rosins	C1-Fair	N/A	N/A	A	A
Rum	A	N/A	N/A	A	A
Salicylic Acid	B1	N/A	B1	N/A	A1
Salt Brine (NaCl saturated)	A	N/A	N/A	A1	A2
Sea Water	A2	N/A	N/A	A1	A
Silicone	A	a	N/A	C	A
Silver Nitrate	A1	a	B	A	A
Soap Solutions	A	b	A	A	A
Soda Ash (see Sodium Carbonate)	A	a	N/A	A	A
Sodium Acetate	B1	N/A	A	D	D
Sodium Benzoate	B1	n/a	B1	N/A	A1
Sodium Bicarbonate	A2	n/a	B	A	A
Sodium Bisulfate	A2	a	B	A	A
Sodium Bisulfite	A2	a	B	A	A
Sodium Borate (Borax)	A2	n/a	N/A	A	A
Sodium Bromide	B2	n/a	B2	N/A	A1
Sodium Carbonate	A2	a	B	A	A
Sodium Chlorate	A1	b	B	C	A
Sodium Chloride	A2	n/a	B	A	A
Sodium Cyanide	A2	n/a	A	A	A2
Sodium Ferrocyanide	A	a	A	N/A	A
Sodium Fluoride	A2	n/a	D	N/A	A
Sodium Hydrosulfite	C	b	A	C	A
Sodium Hydroxide (20%)	A	a	A1	A2	C
Sodium Hydroxide (50%)	A	N/A	C	A1	D
Sodium Hydroxide (80%)	A	n/a	C	A1	D
Sodium Hypochlorite (<20%)	A	n/a	C	B	A1
Sodium Hypochlorite (100%)	B	N/A	N/A	B	A1
Sodium Iodide	A	N/A	N/A	N/A	C
Sodium Metaphosphate	A	N/A	N/A	A	A
Sodium Metasilicate	A	N/A	N/A	N/A	A
Sodium Nitrate	A2	a	B	D	A
Sodium Perborate	A2	N/A	N/A	B	A
Sodium Peroxide	B2	N/A	N/A	D	A
Sodium Polyphosphate	A1	N/A	N/A	D	A
Sodium Silicate	A2	a	B	A	A



## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	Compatibility			
		BPT Pharmed tube	Tygon	Silicone	Viton
Sodium Sulfate	A2	a	A	A	A
Sodium Sulfide	A2	a	B	A	A2
Sodium Sulfit	A2	a	A	A	A2
Sodium Tetraborate	A2	N/A	N/A	A	A
Sodium Thiosulfate (hypo)	A2	N/A	N/A	A	A
Stannic Chloride	A2	N/A	N/A	B	A
Stannous Chloride	A1	N/A	A	B	A
Starch	A	N/A	N/A	N/A	A
Stearic Acid	B2	c	D	B	A1
Stoddard Solvent	C1-Fair	N/A	C	D	A
Styrene	D	d	N/A	D	B
Sulfate (Liquors)	B	N/A	N/A	B	A1
Sulfur Chloride	C1-Fair	N/A	D	C	A
Sulfur Dioxide	A1	N/A	A	B	A
Sulfur Dioxide (dry)	A2	N/A	A	B	A
Sulfur Hexafluoride	B	N/A	N/A	B	N/A
Sulfur Trioxide	A	N/A	A	B	A
Sulfur Trioxide (dry)	A1	N/A	B	B	A
Sulfuric Acid (<10%)	A1	a	A	C	A
Sulfuric Acid (10-75%)	A1	a	C	D	A2
Sulfuric Acid (75-100%)	D	d	D	D	A1
Sulfuric Acid (cold concentrated)	D	d	D	D	B
Sulfuric Acid (hot concentrated)	D	d	D	D	A2
Sulfurous Acid	A2	a	B	D	A
Tannic Acid	A1	b	B	B	A
Tanning Liquors	A1	a	B	B	A
Tartaric Acid	A1	a	B	A	A
Tetrachloroethane	C	n/a	N/A	D	A
Tetrachloroethylene	D	n/a	N/A	D	A
Tetrahydrofuran	D	n/a	N/A	D	D
Tin Salts	A	a	A	B	A
Toluene (Toluol)	D	d	D	D	A
Tomato Juice	A	n/a	N/A	N/A	A
Trichloroacetic Acid	B	b	A	D	C
Trichloroethane	C	n/a	D	D	A
Trichloroethylene	D	d	D	D	A
Tricresylphosphate	D	N/A	D	C	A2
Triethylamine	B	N/A	A	N/A	D
Trisodium Phosphate	A	N/A	A	A	A
Turpentine	D	d	D	D	A

## ANNEX C | CHEMICAL RESISTANCE OF WASHABILITY TEST COMPONENTS

Chemical	PVC	BPT Pharmed tube	Tygon	Silicone	Viton
	Compatibility				
Urea	D	a	B	B	A
Uric Acid	A	a	A	N/A	N/A
Urine	A	N/A	N/A	N/A	A1
Varnish	D	N/A	D	D	A
Vinegar	B	N/A	A1	A	A
Vinyl Acetate	D	N/A	D	D	A1
Vinyl Chloride	D	N/A	D	N/A	A1
Water, Acid, Mine	B	N/A	N/A	B	A
Water, Deionized	A2	a	A2	N/A	A1
Water, Distilled	A2	a	B	C	A
Water, Fresh	B	a	B	B	A
Water, Salt	B	a	B	B	A
Whiskey and Wines	A2	N/A	C	A	A
White Liquor (Pulp Mill)	A2	N/A	N/A	A	A
White Water (Paper Mill)	A	N/A	N/A	N/A	A
Xylene	D	d	D	D	B
Zinc Chloride	B	a	A	B	A
Zinc Sulfate	A2	N/A	A	A	A

### Explanation of Footnotes

1. Satisfactory to 72°F (22°C)
2. Satisfactory to 120°F (48°C)

### Ratings -- Chemical Effect

- A = Excellent.
- B = Good -- Minor Effect, slight corrosion or discoloration.
- C = Fair -- Moderate Effect, not recommended for continuous use. Softening, loss of strength, swelling may occur.
- D = Severe Effect, not recommended for ANY use.
- N/A = Information not available.



**DECLARATION OF CONFORMITY**

TQC BV, hereby declares that the product(s) mentioned on this declaration have been produced according, and comply with our internal standards and if applicable with the relevant international standards.

The product(s) have been tested according the appropriate quality instruction, which is part of TQC's quality system, which is annually audited by DNV GL – Business Assurance as the independent national accredited body, and has been found conform to the Management System Standard NEN-EN-ISO 9001:2008, traceable through Certificate Number: 181638-2015-AQ-NLD-RvA

Product : TQC Basic Scrub & Washability Test  
Catalogue reference(s) : AB5210 / AB5215  
Standards : DIN53778, ASTM D2486, ASTM D4213, ASTM D4828,  
ASTM D3450, ISO 11998, ASTM F1319, ISO 105X12  
Renault D431010, GME 60269, ECCA T11, EN 13523-11  
EN 60730-1 and EN 13300.

George N. Moonen



TQC BV  
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2908 LL Capelle aan den IJssel  
The Netherlands

Capelle aan den IJssel, 12 December 2016

## DECLARATION OF CONFORMITY

TQC BV, hereby declares that the product(s) mentioned on this declaration have been produced according, and comply with our internal standards and if applicable with the relevant international standards.

The product(s) have been tested according the appropriate quality instruction, which is part of TQC's quality system, which is annually audited by DNV GL – Business Assurance as the independent national accredited body, and has been found conform to the Management System Standard NEN-EN-ISO 9001:2008, traceable through Certificate Number: 181638-2015-AQ-NLD-RvA

Product	: TQC Scrub & Washability Test
Catalogue reference(s)	: AB5000 / AB5005
Standards	: DIN53778, ASTM D2486, ASTM D4213, ASTM D4828, ASTM D3450, ISO 11998, ASTM F1319, ISO 105X12 Renault D431010, GME 60269, ECCA T11, EN 13523-11 EN 60730-1 and EN 13300.

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