Taber® Rotary Platform Abrasion Tester

Model 1700 / 1750

Operating Instructions

TABER® INDUSTRIES

ICONS

This instruction manual contains several notes and warnings that should be observed carefully by the user. The following icons denote these notes and warnings:

Indicates a ***NOTE*** that warrants careful attention. These notes may detail a step in the procedure or point out a unique feature of the instrument.

Indicates a ***WARNING*** that warrants careful attention. These warnings inform the user of any dangers that may cause injury to the operator and/or dam the instrument. It is imperative that you read and follow all warnings carefully.

The Waste Electrical and Electronic Equipment Directive (***WEEE Directive***) is the European Community Directive on waste electrical and electronic equipment which sets collection, recycling and recovery targets for all types of electrical goods.

Safety label – ***Shock hazard***

Safety label – ***Caution***

CE ***CE marking*** is a certification mark that indicates conformity with health, safety, and environmental protection standards for products sold within the European Economic Area (EEA).

SAFETY PRECAUTIONS

READ ALL SAFETY PRECAUTIONS BEFORE ATTEMPTING TO OPERATE.

Because of the design requirements, there are potential hazards that an operator should be aware of:

WARNING: *The rotating motion of the specimen holder creates an entanglement hazard. Do not place body parts or objects in the area surrounding the specimen holder and wheels as this may cause injury and / or damage the equipment.*

WARNING: *To minimize airborne particulate generated during testing, the Taber Abraser Vacuum must be used unless performing wet tests.*

WARNING: *Lithium metal batteries may get hot, explode or ignite and cause serious injury if exposed to abusive conditions.*

Below are general precautions that one should take when operating the equipment:

- Do not wear loose clothing or jewelry as they can become entangled in the moving parts.
- Do not attempt to handle or adjust the test specimen while the instrument is being operated.
- While mounting / removing test specimens, the instrument should be stopped and the abrading arms and vacuum nozzle should be in the rest position.
- Fine particulate may become airborne during this test. To prevent inhalation, a paper mask should be worn.
- Prolonged exposure to loud noise generated by the vacuum can cause impairment or loss of hearing. Wear a suitable protection device such as earplugs to protect against damaging loud noises.
- Lithium metal battery safety precautions:
    - Do not place the battery in fire or heat the battery.
    - Do not install the battery backwards so the polarity is reversed.
    - Do not connect the positive terminal and negative terminal of the battery to each other with any metal object (such as wire).
    - Do not expose battery to water or salt water, or allow the battery to get wet.
    - Do not disassemble or modify the battery.

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Taber Industries, ("Taber") warrants that its products are free from defects in material and workmanship. This Limited Warranty shall be applicable for a period of one year from the date of initial shipment of any product. The terms of this Limited Warranty do not in any way extend to parts of the product thereof which have a life, under normal usage, inherently shorter than the one year previously stated. Taber will, at its option, repair or replace the defective product if Taber determines it is defective within the warranty period and if it is returned, freight prepaid, to Taber. Replacement parts will be shipped F.O.B. Taber's plant. Taber is not obligated to furnish service under this Limited Warranty: a) to repair damage resulting from attempts by personnel other than Taber representatives to install, repair, or service the product; b) to repair damage resulting from improper use or from connecting the product to incompatible equipment; or c) if personnel other than Taber representatives, without Taber's prior permission, modify the product.

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TABER IS NOT RESPONSIBLE FOR THE LOSS OF ANY DATA UNDER ANY CIRCUMSTANCES AND ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES THAT MAY RESULT THEREOF.

CLAIMS FOR SHORTAGES

We use extreme care during packaging to eliminate the possibility of error. If a shipping error is discovered:

1. Carefully examine the packing materials and ensure nothing was inadvertently overlooked when the shipment was unpacked.

2. Notify the company you purchased the product from and immediately report the shortage.

3. File any claim within 30 days from shipment.

CLAIMS FOR DAMAGES

Claims for loss or damage in transit should be made promptly and directly to the transportation company.

CONTENTS

Contents of the shipping container include the following:

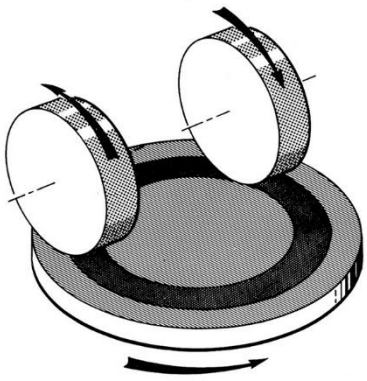
	Model 1700	Model 1750
▪ *Rotary Platform Abraser*		
▪ *Vacuum System (box 2)*	*1*	*1*
▪ *Vacuum Y-Adaptor & Hose Kit*	*N/A*	*1*
▪ *Auxiliary Weights (500 g load)*	*2*	*4*
▪ *Auxiliary Weights (1000 g load)*	*2*	*4*
▪ *Specimen Holder (SH-125)**	*1*	*2*
▪ *Hold Down Ring (SH-101)**	*1*	*2*
▪ *Hand Brush (S-12)*	*1*	*1*
▪ *Torx T25 Screwdriver*	*1*	*1*
▪ *Power Cord Kit 115/230 VAC*	*1*	*1*
▪ *Operating Instructions*	*1*	*1*

**Mounted on the Abraser*

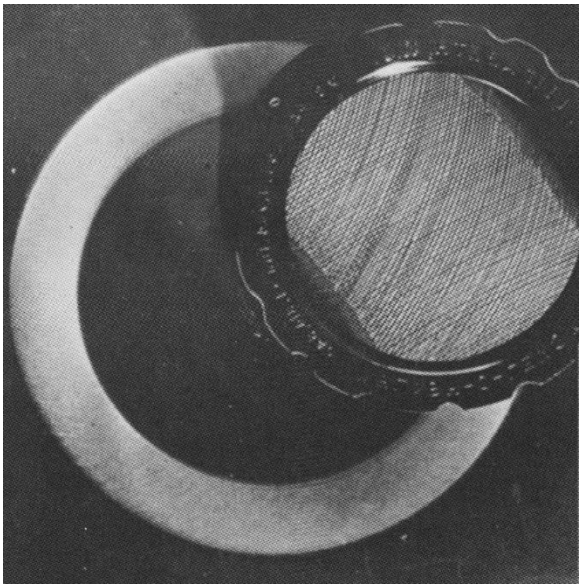
INTRODUCTION

The ***Model 1700*** and ***1750 Taber Rotary Platform Abrasers*** are durable, precision built test instruments designed to evaluate the resistance of surfaces to rubbing abrasion. The field of application is varied and includes tests of solid materials, coated surfaces (paint, lacquer, electroplate, powder coat), plastics, textiles (ranging from sheer silks to heavy upholstery), metals, leather, rubber, linoleum, plus many others.

Commonly referred to as the "Taber test", the Taber Abraser is a simple, effective means to determine a material's resistance to abrasion. The characteristic rub-wear action is produced by the contact of a test sample turning on a vertical axis, against the sliding rotation of two abrading wheels. The wheels are driven by the sample in opposite directions about a horizontal axis displaced tangentially from the axis of the sample. One abrading wheel rubs the specimen outward toward the periphery and the other, inward toward the center. The resulting abrasion marks form a pattern of crossed arcs over an area of approximately 30 cm^2.



An important feature of the Taber Abraser is that the wheels traverse a complete circle on the specimen surface, revealing abrasion resistance at all angles relative to the weave or grain of the material.



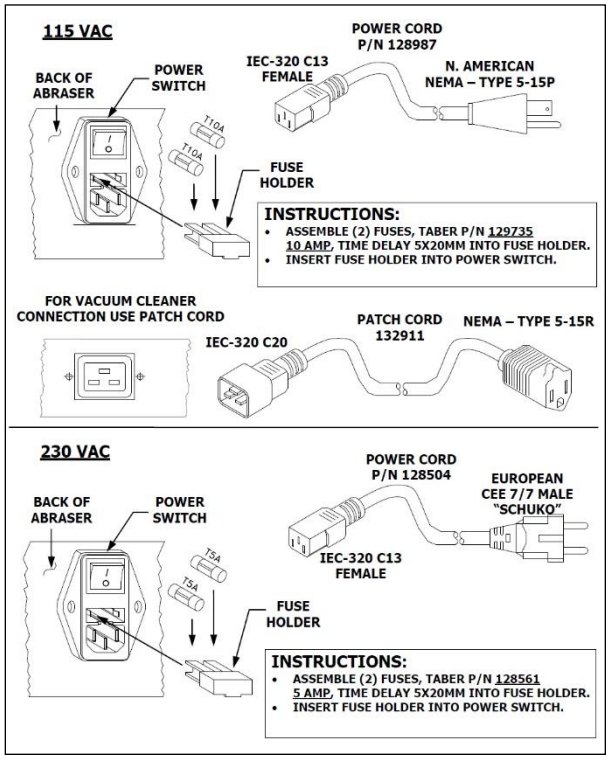
It is important to recognize there may be several factors that contribute to wear performance of materials in actual use. Before predictions can be drawn from laboratory tests, actual end-use trials should be conducted. This helps establish the relationship between the laboratory abrasion test and actual wear in the intended end-use. The consideration of additional factors is often necessary in the calculation of predicted durability from specific abrasion data. While "abrasion resistance" (often stated in terms of the number of cycles to produce a specified degree or amount of abrasion) and "durability" (defined as the ability to withstand deterioration or wearing out in use, including the effects of abrasion) are frequently related, the relationship typically varies with different end uses.

Accelerated abrasion tests compress the life span of a product into a much shorter duration in a controlled and monitored environment. While the test may not represent the actual conditions materials are exposed to, lab tests can duplicate many real world conditions, making it much easier to reproduce the test. In addition, there is greater flexibility with the methodology, costs are significantly less, and you are able to test more samples.

INSTRUMENT SET-UP

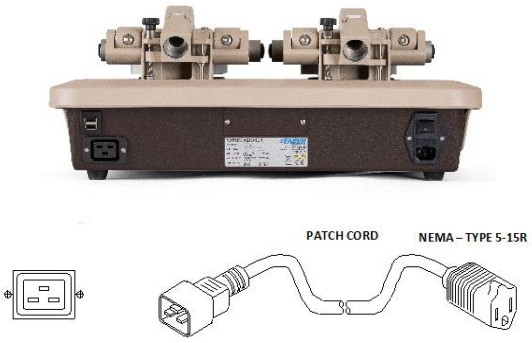
1. Place the Abraser unit on a flat, level surface.
2. Install the correct fuses into the fuse holder.

   115V – two (2) T10A, 5 x 20mm fuses (#129735)
   230V – two (2) T5A, 5 x 20mm fuses (#128561)



3. Place the vacuum unit in a ventilated area near the Abraser. Remove the motor housing and install the vacuum cartridge filter and filter bag. Reinstall the motor housing.
4. Connect the flexible suction hose to the vacuum unit and Abraser. A "Y-Adaptor" is used to split the vacuum hose for the Model 1750 Dual Abraser.

5. Plug the male connector of the vacuum power cord into the appropriate receptacle at the rear of the Abraser. When operating at 115V, a patch cord is used to connect the vacuum unit to the Abraser.



6. Plug the female connector of the Abraser power cord into the power inlet located on the rear of the instrument. Connect the instrument to a 115V/60 Hz or 230V/50 Hz circuit.

7. Using the ON / OFF power switch located on the back of the instrument immediately above the cord, turn the instrument on. The instrument is now ready to operate.

△ **WARNING:** *Do not place the vacuum in a closed cabinet without adequate ventilation. Failure to provide sufficient airflow may cause the motor to overheat, resulting in damage to the vacuum.*

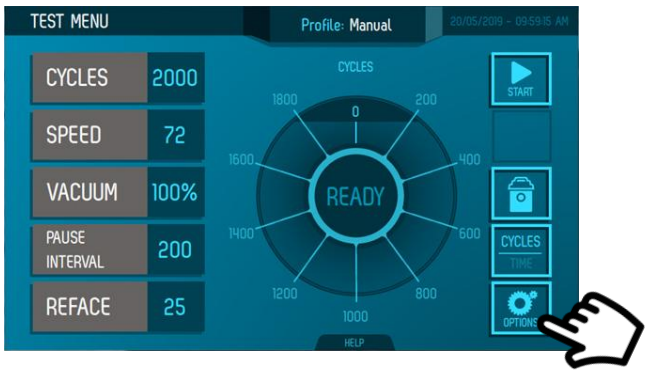
△ **WARNING:** *Failure to connect the Rotary Platform Abrasion Tester to a surge protector or surge suppressor may result in damage to the instrument's electronic components.*

NOTE: To remove the fuse holder, slide it out of the power switch. A small screwdriver may be used to assist in the removal.

NOTE: Two power cords (NEMA Type 5-15P and "Schuko") are provided for your convenience. Discard the power cord not used.

SETTING PREFERENCES

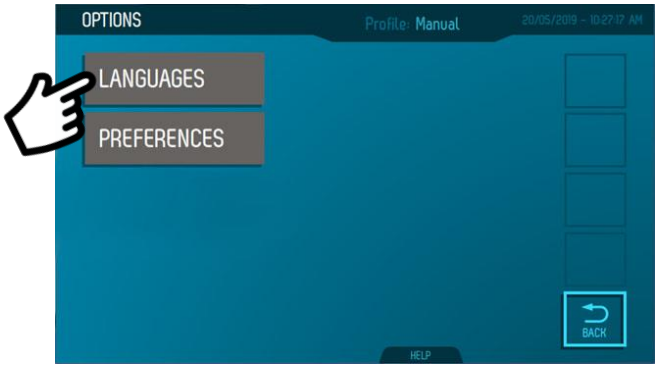
The Model 1700 / 1750 Abraser allows you to set preferences on how information is displayed. Press the OPTIONS button, and then select the desired option. After making your selection, press OK.

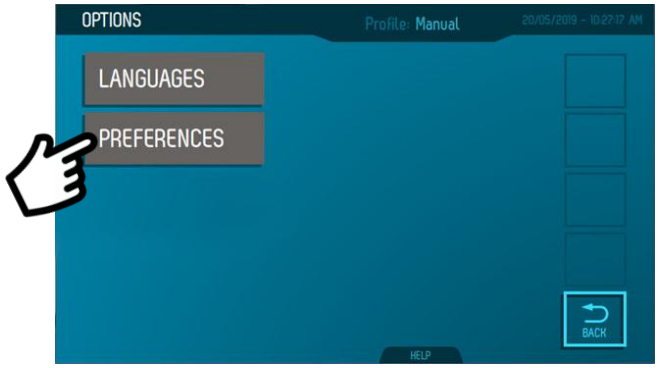


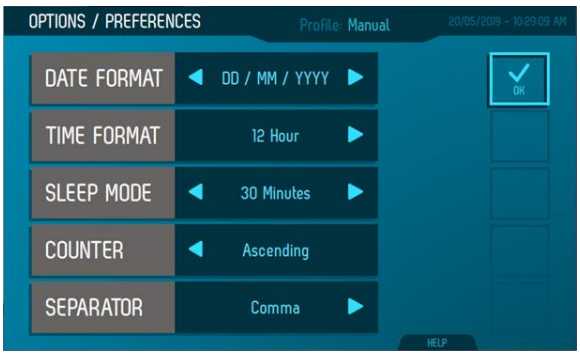
NOTE: Options shown below in bold text are factory default settings.

Language:	**English**, Mandarin, Japanese, Spanish, French, German, or Dutch
Date Format:	**DD/MM/YYYY** or MM/DD/YYYY
Time Format:	12 Hour or **24 Hour**
Sleep Mode:	Programmable time (e.g. **1 Hour**) or Off
Counter:	**Ascending** or Descending
Separator:	Comma or **Period**

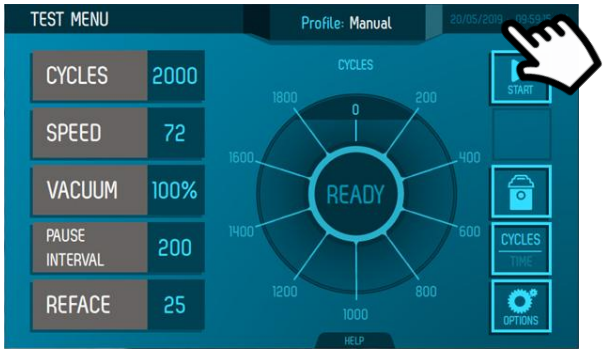
Language and Preferences

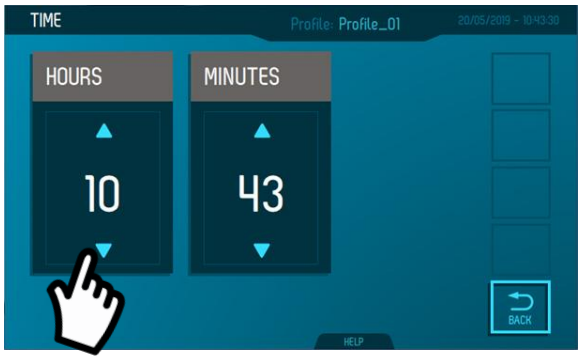






Time and Date



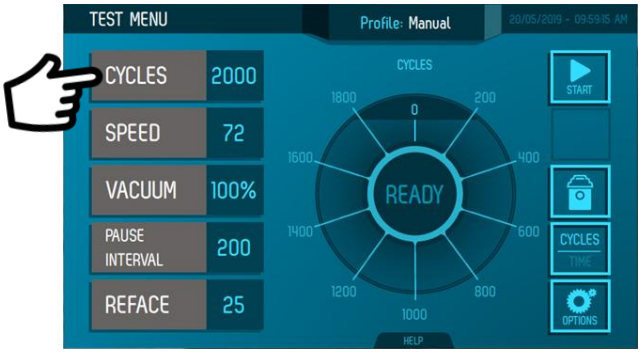


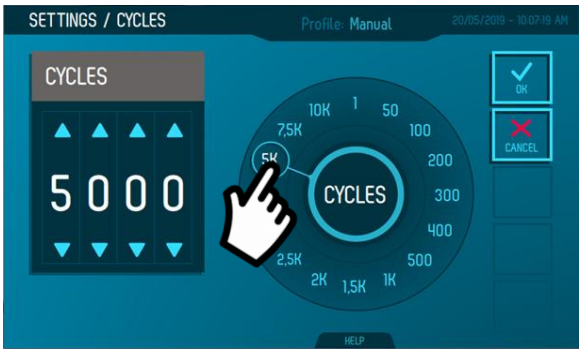
SETTING TEST PARAMETERS

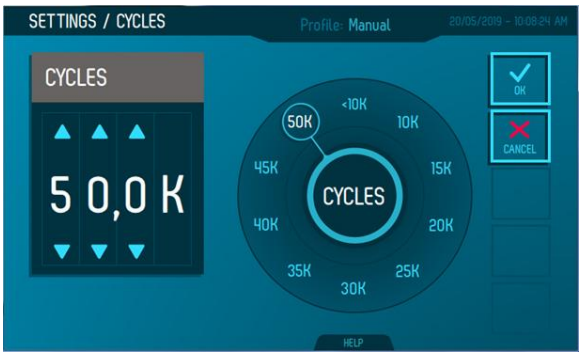
The Model 1700 / 1750 Abraser allows you easily change test parameters. When the instrument is not operating, press the appropriate button and use the dial or odometer to set the value. After making your selection, press OK.

Test Cycles

The Abraser can be preset to any number of test cycles below the maximum value of 50,000. The total cycle count shown on the display screen defaults to the test duration value that was last entered.







To increase (or decrease) test duration after the original cycles have been entered, the number of specimen holder revolutions must be a value greater than the completed cycles. Enter the new value then press OK.

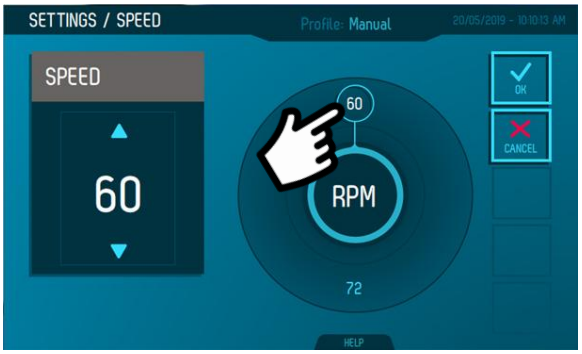
The Abraser specimen holder will stop automatically at the selected number of test cycles.

For the Model 1750, both specimen holders can be preset to different values depending on the nature of the test. Prior to entering a new value for the test cycles, ensure the touchscreen is shown for the correct specimen holder. To change between the left or right, press the arrow button on the side of the display screen or press the toggle switch at the top status bar. LEFT or RIGHT will be shown indicating which specimen holder is being displayed. The ongoing cycle count for each will be presented in the corresponding readout.

NOTE: An abrasion cycle, or test cycle, is defined as one complete revolution of the specimen in contact with the abrading wheels.

Speed

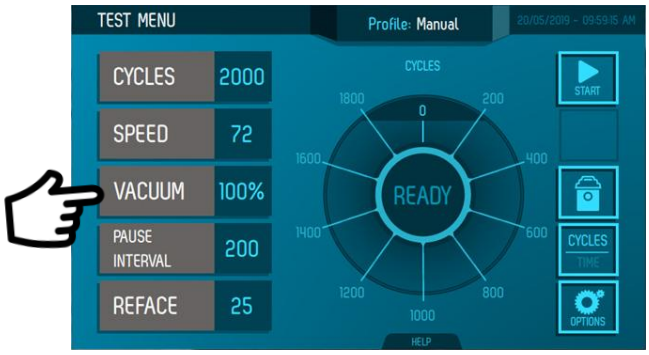
The speed of the Rotary Platform Abrasion Tester can be selected as 60 rpm or 72 rpm. The tester will store the speed that was last selected in memory and use this as a default until it is changed.

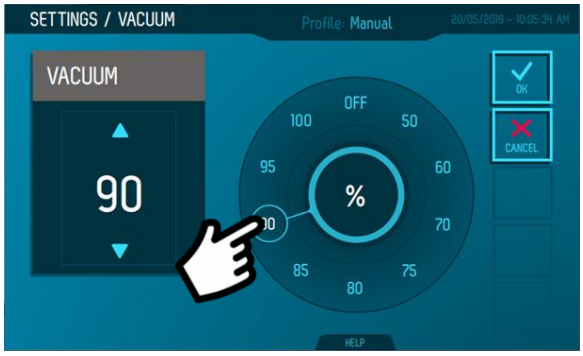


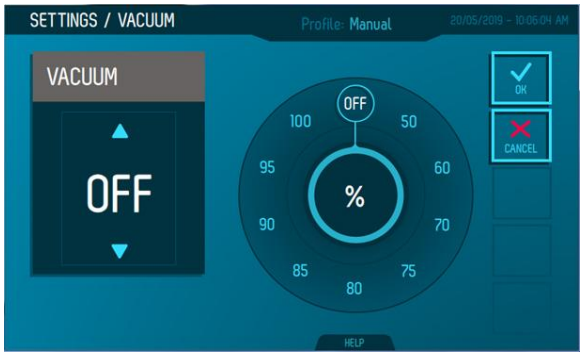
NOTE: The specimen holders for the Model 1750 Dual Abraser can be set to rotate at different speeds.

Vacuum Level

Model 1700 and 1750 Rotary Platform Abraser offer variable vacuum control, calibrated to values of 50 – 100%. Changing the vacuum level adjusts the speed of the vacuum unit motor and the corresponding vacuum suction for accurate standardization and control of test procedures.





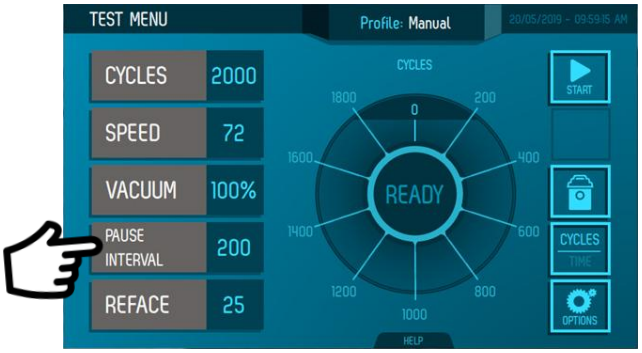


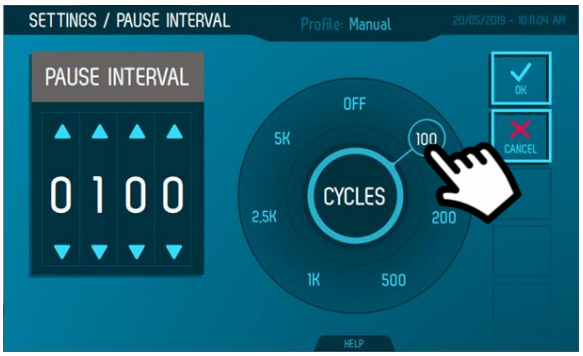
WARNING: *Do not use the vacuum for wet tests. To minimize risk of shock, disconnect the electrical cord to the vacuum unit.*

NOTE: When testing flexible materials, the vacuum level should be set high enough to remove the abraded wear debris, but not lift the specimen.

Pause Interval

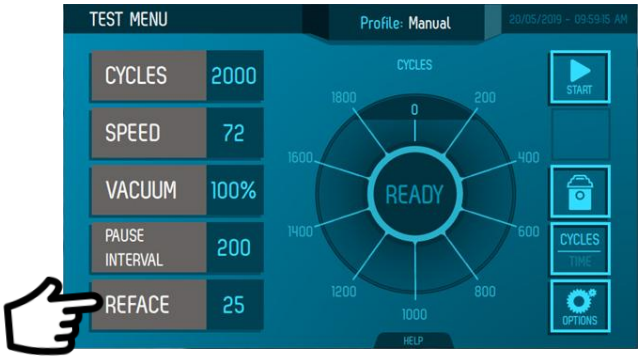
The Pause Interval will automatically stop the test at a set interval. This feature is useful to refresh the abradant and / or inspect the test specimen.

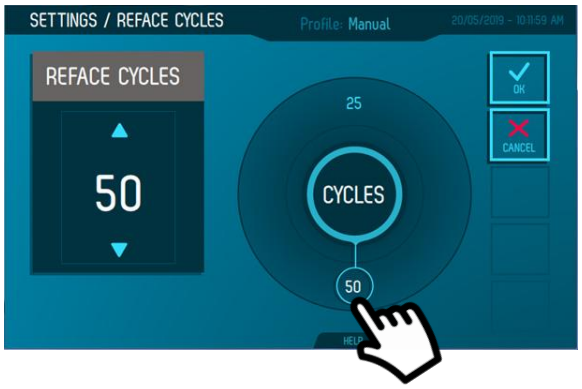




Reface Cycle

The Reface Mode allows you to reface the wheels without adding test cycles to the completed (remaining) test cycle count. This convenient feature is ideal for any test that requires the abradant to be refreshed at intervals during the test.

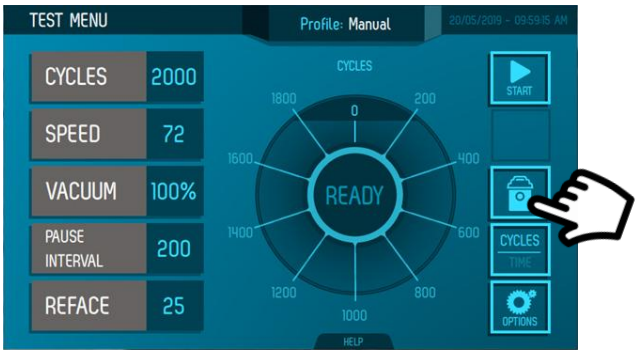


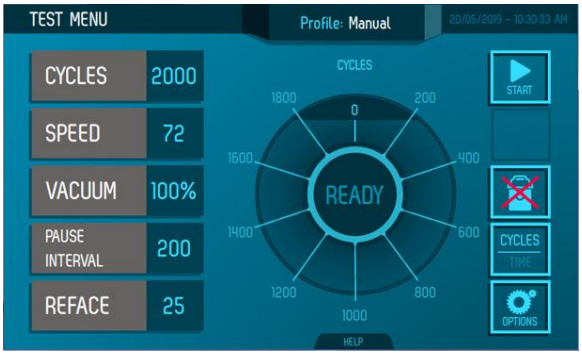


NOTE: Do not exceed 50 resurfacing cycles on an S-11 refacing disc. If more than 50 cycles are required to refresh the wheels, use additional refacing discs.

Vacuum Only

The VACUUM ONLY key allows you to operate the vacuum unit without the Abraser. This is useful when cleaning the surrounding work area or when operating the Wheel Refacer.

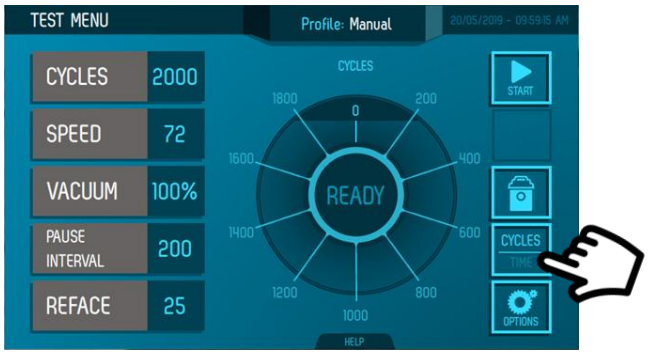


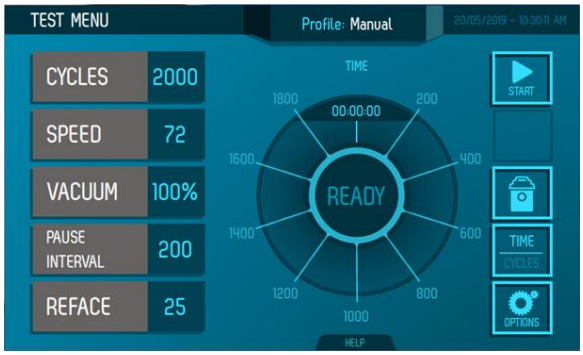


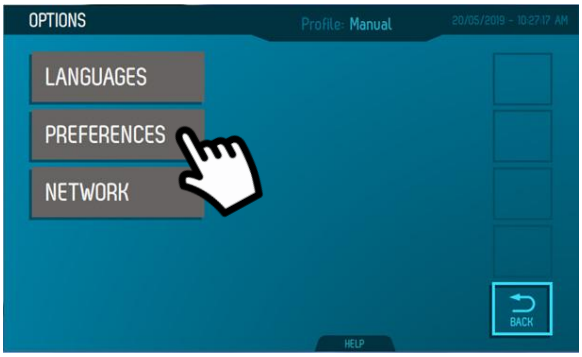
NOTE: When the vacuum is operating, a red “X” appears over the vacuum icon. Pressing this button will stop the vacuum.

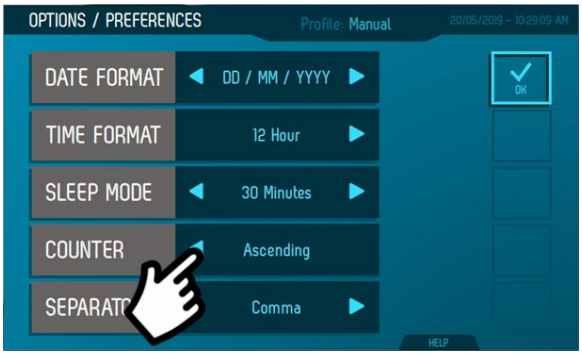
Display Option

The Rotary Platform Abrasion tester can be programmed to show “Cycles” or “Time”.

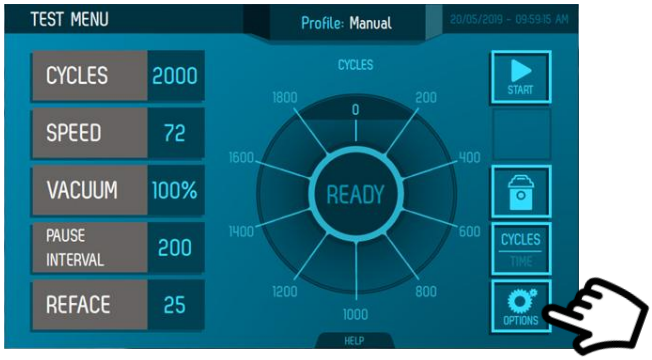








Both “Cycles” and “Time” can be displayed as ascending (completed Cycles/Time) or descending (remaining Cycles/Time).



INSTRUMENT PREPARATION

Taber Abrading Wheels

Selecting Wheels – Genuine Taber abrasive wheels are available in a variety of standardized formulations. The choice of which abrasive wheel to use is dependent on the material that is being evaluated. Many test methods specify which Genuine Taber abrasive wheel should be used. If you are not following an established test method, trial and error is suggested to help determine the appropriate abrasive wheel.

It is often the case that materials degrade faster with the more demanding conditions of accelerated testing. As a basic rule of thumb, a minimum number of test cycles should be completed before the end point occurs (i.e. 300 cycles). Otherwise, the abrasive wheel may be too aggressive or the load is too great.

For additional information, contact Taber or an authorized distributor.

Mounting Wheels – Model 1700 / 1750 features the Quick Release Mounting Hub. An expanding collet hub design with push-button operation permits quick wheel mounting. A spring loaded, beveled retaining nut provides a positive locking force on the hub retaining lip making certain the wheels remain securely fastened until disengaged.

To mount a wheel, press the push button located at the end of the auxiliary weight mount. This will release the beveled retaining nut enabling the collet to contract. With the label facing toward the center of the specimen holder, carefully slide the wheel all the way onto the mounting hub. Release the push button. The hub retaining lip will secure the wheel until it is disengaged.

Genuine Taber abrading wheels are supplied in pairs. A close inspection of the wheel labels will show that one is marked “Left Hand”, while the other is “Right Hand”. The wheel labels should be mounted facing inward (toward each other).

Left / Right Indications

NOTE: H-18 and H-22 Calibrade wheels have a tendency to wear the Quick Release Collets Wheel collets. Collets should be routinely replaced when they no longer secure the wheels or excessive play is noted. Order Quick Release Wheel / Hub Collet Replacement Kit (#133338).

NOTE: Taber Industries offers a Wheel / Hub Kit with a Locking Nut that can be used in place of the Quick Release Wheel / Hub Kit. This kit is suggested for companies that perform a significant number of tests with the H-18 or H-22 Calibrade wheels. Order Wheel / Hub Kit with Locking Nut (#135934).

NOTE: Before preparing the wheels for testing, check their condition and expiration date (if applicable). Shelf life is dependent on proper storage conditions (temperature 23° C ± 2° C, relative humidity 50% ± 5%). When not in use, store abrading wheels in their original container.

NOTE: Periodic cleaning of the mounting hub and flange with the S-12 brush is recommended to prevent the accumulation of particles and other debris.

Wheel Loading (Auxiliary Weights)

Auxiliary weights can be attached to the pivoted arms to increase the force the wheel is pressed against the specimen, exclusive of the mass of the wheel itself. In addition to the mass of the abrading arm, auxiliary weights are included to provide standard wheel loads of 500 or 1000 grams.

- To operate with a load of 250 gram, no additional weights are used.

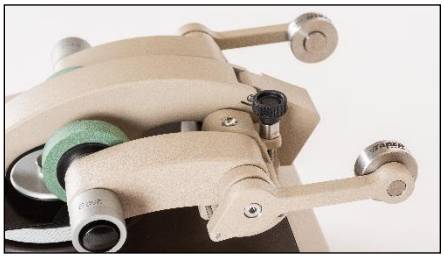
- To operate with a load of 500 gram, slide the auxiliary weights marked 500 g onto the left and right auxiliary weight mounts.

- To operate with a load of 1000 gram, slide the auxiliary weights marked 1000 g onto the left and right auxiliary weight mounts.

NOTE: For simplicity sake, each auxiliary weight is marked with the total load that will be exerted on the wheel and is the combined total of the weight and the abrading arm. The weights marked 500 g are actually 250 grams. Likewise, the weights marked 1000 g are 750 grams.

NOTE: Wheel load references are per arm (not combined). The load that is specified in most test methods does not include the mass of the wheel.

NOTE: An optional counterweight kit is available when less than 250 g load is required.



Vacuum System

Models 1700 / 1750 include a Taber vacuum unit that includes a heavy-duty motor and life-lubricated sealed bearings. When the vacuum power connection is plugged into the rear of the abraser housing, the vacuum will automatically turn on when a test commences and shut off at the end of the programmed test cycles. A flexible rubber suction hose connects it to the Abraser.

Vacuum Nozzle Height Adjustment – To adjust the gap between the vacuum nozzle and test specimen, rotate the precision adjustment knob. Each full rotation of the knob represents a 1 mm height adjustment. All adjustments should be made after the specimen has been mounted.

WARNING: *When testing flexible materials, ensure the suction from the vacuum nozzle does not lift the specimen. Any contact between the specimen and vacuum nozzle during the test, will cause additional wear that may influence the test results.*

NOTE: A gap of 3 mm has been found to be effective on most materials.

NOTE: To facilitate setting the nozzle gap, a shim may be inserted between the vacuum nozzle and specimen. Take care not to damage the specimen surface.

Vacuum Level – The vacuum suction level should be set high enough to remove debris from the specimen surface, but not lift flexible samples. A visual inspection of the wear path can usually indicate if debris is adhering to the specimen surface and the vacuum level (or vacuum nozzle height) needs to be adjusted. For test control and standardization of vacuum suction, the vacuum level is calibrated to values of 50 – 100%.

NOTE: The amount of vacuum suction is influenced by the type of material being tested and height of the nozzle above the specimen surface.

Vacuum Nozzle Inserts – The Model 1700 / 1750 includes replaceable vacuum nozzle inserts (front nozzle is short, rear nozzle is long). The nominal 8 mm are standard for most tests. The optional 11 mm nozzle inserts are typically required for materials that are evaluated using a change in haze (e.g. ASTM D1044).

REFACING WHEELS

Taber abrasive wheels possess properties that cause the working faces to disintegrate slowly as they are used, continually exposing fresh abrasive grains to the specimen being tested. However, depending on the material being evaluated, debris from the test specimen may clog or adhere to the wheel surface. If this occurs, the wheels must be cleaned (refaced) at regularly defined intervals. Do not confuse coloring of the wheels with "clogging" as this may simply be due to the wheel faces becoming coated with fine abrading dust, a condition that must be expected.

It is good practice to standardize the abradant prior to each test. Failure to reface the wheel surfaces, may introduce variation into the test results.

NOTE: Wear life of Taber abrasive wheels varies depending on test load, and the surface texture / frictional characteristics of the material being tested. Under ordinary conditions, a wheel set should last from 10,000 to 50,000 wear cycles. Abnormally short wheel life may indicate the use of the wrong wheel, load, or procedure for the material tested, or too frequent refacing.

NOTE: Wheels can be used until they are worn down to their minimum diameter of 44.4 mm as indicated by the wheel label.

Refacing Resilient Wheels (Calibrase)

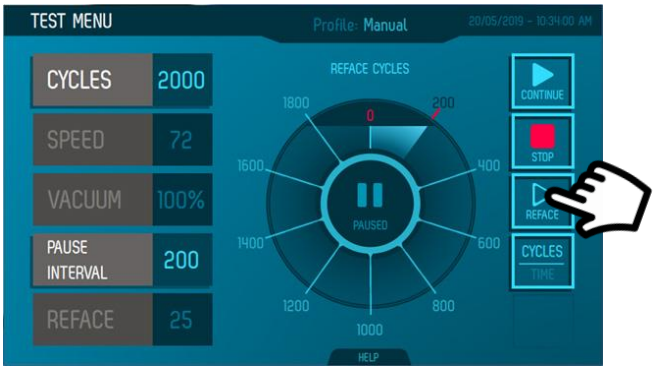
The S-11 Refacing Disc are used to resurface all Calibrase wheels with the exception of CS-10F when they are used for evaluating change in haze for transparent materials. In this case, CS-10F wheels are refaced using the ST-11 Refacing Stone.

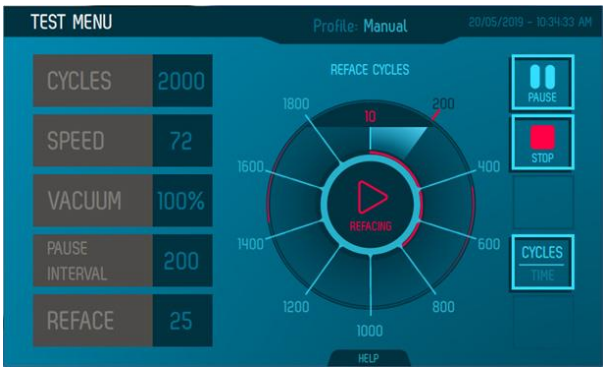
1. Mount the wheels to the abraser.
2. Mount an S-11 Refacing Disc (or ST-11 Refacing Stone) on the SH-125 specimen holder. Use the clamp plate and nut, and hold-down ring to secure the S-11. The clamp plate and clamp ring are not required for the ST-11 refacing stone.
3. Mount the auxiliary weights for the load that will be used for testing.
4. Lower the abrading wheels onto the refacing medium.
5. Adjust the vacuum pick-up nozzle height to within 3 – 6 mm of the refacing disc. See note on page 14 for CS-10F wheels.
6. Program the appropriate number of cycles according to Table 1 (or as specified) and subject the wheels to refacing.

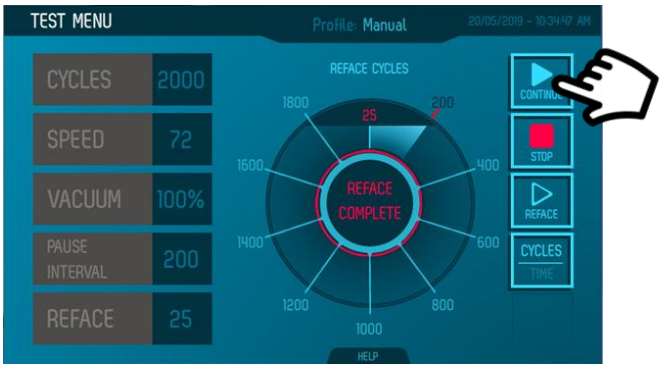
TABLE 1

Wheel Status	Refacing Cycles
New	2 refacings of 50 cycles
Used *(previous test <1,000 cycles)*	25 cycles
Used *(previous test >1,000 cycles)*	50 cycles
* During Test	25 cycles

The below screen shot shows a test with a PAUSE INTERVAL set for 200 cycles. To resurface the wheels, remove the specimen and mount the appropriate refacing medium (adjust vacuum nozzle if necessary). Press the Reface button to commence refacing. Once the reface is complete, remove the refacing medium and mount the test specimen. Select CONTINUE to continue testing or REFACE to perform a second refacing.







NOTE: The S-11 refacing disc is used only once for a maximum of 50 cycles. Never reface wheels with a used S-11 refacing disc. Otherwise, the wear coefficient of the wheel faces may change and inject an error in the test results.

NOTE: Wheels that have not been used for a long period of time may require two break-in refacings like a new set of wheels.

NOTE: When refacing CS-10F wheels, adjust the vacuum pick-up nozzle to 0.80 mm – 1.60 mm above the ST-11 refacing stone.

NOTE: The useful life of the ST-11 refacing disc is 7,500 cycles per side (approximately 300 refacings per side).

NOTE: Refacing cycles are not added to the cumulative number of test cycles.

Refacing Vitrified Wheels (Calibrade)

All Calibrade wheels are diamond trued at the factory and may be used continuously without further refacing until the abrading surfaces show indications of becoming:

Worn out of round – Occasionally, wheels become out of round due to an uneven surface of the test specimen or other reasons. The normal abrading surface of the wheels should be concentric with the hub.

Crowned – The working surfaces of wheels that are "crowned" appear slightly rounded. To check for this condition, place a straight edge on the two wheels. The straight edge should be in contact with the full width of the wheels.

Clogged – "Clogged" wheels can be identified as adhesive buildup of wear debris on the working faces of the wheels and should not be confused with the discoloration caused by abrading dust.

Refacing is also advised when starting a series of comparative tests or changing to an entirely different material. In some instances, where there is a tendency for the working surfaces of the wheels to pick up excess material, it may be desirable to reface the wheels before testing each specimen.

To properly reface Calibrade wheels, a Taber Wheel Refacer must be used. This instrument utilizes a diamond tool that is traversed across the working surface to precision dress the abrading wheels.

NOTE: Refacing Calibrade wheels may leave a sharp edge that may sever threads when testing textile fabrics. It is acceptable to remove this sharp edge prior to testing. To do so, cut a small strip from an S-11 refacing disc and hold it lightly against the outer edge of each wheel. Manually turn the nut to rotate the motor shaft. Reverse the wheels on the arbor and round the opposite corners. Only the extreme sharpness of the edges should be removed. A radius of 0.4 mm is sufficient.

SPECIMEN PREPARATION

As you start testing, use of these guidelines should assist in developing a test procedure that will yield reproducible test results, accurate within the variations of quality inherent in the material itself.

- The suggested number of test specimens from each laboratory sampling unit is a minimum of three (3).
- All specimens should be labeled to maintain specimen identity.

Specimen Size

Rigid Materials – Rigid specimens are often cut from a larger sheet utilizing an appropriate cutting method. Specimens should be approximately 100 mm square with surfaces plane and parallel. A 6.5mm diameter hole must be drilled in the center of the specimen to secure it to the standard specimen holder (SH-125). The material thickness that can be evaluated with the Taber Abraser without additional accessories, is 6.5 mm or less.

NOTE: The width of the wear path is 12.7 mm, and located 31.75 mm from the center of the specimen.

NOTE: Optional "Drive Pin" specimen holder (SH-19) is available for testing rigid materials that are difficult to drill a center hole in.

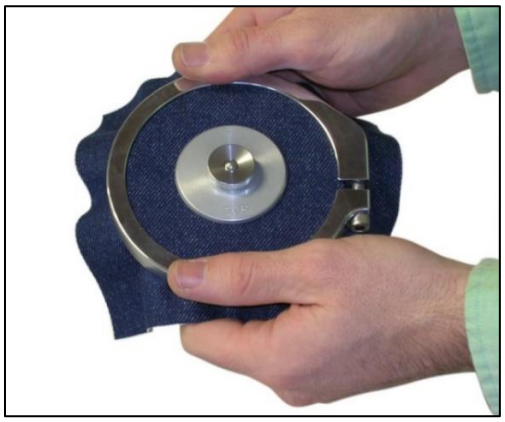
NOTE: Optional accessories are available to test specimen thickness greater than 6.5 mm. Materials greater than 6.5 mm but less than 12.7 mm can be evaluated using the S-21 Extension Nut. The Arm Height Extension modification will permit testing up to 40 mm in thickness.

Flexible Materials – Flexible specimens are typically circular and require the use of the hold-down ring. A 130 mm - 135 mm diameter specimen is required so the hold-down ring will grip the overlapped material. If a mounting card is used, the specimen should be approximately 108 mm in diameter.

Most flexible materials can be cut to size using the ***Model 5000 – Taber Sample Cutter***. Manually operated, this bench top cutter uses an industrial cutting blade to prepare a 107 mm diameter specimen. A punch lever evenly transfers force through a spring-loaded clutch to punch a 6.5 mm center hole.

When it is desired to use abrasion test samples for tests of other destructive agents such as laundering, dry cleaning, and light fastness, it is recommended the specimens be cut square rather than round. The larger area of the square provides for shrinkage in subsequent tests and permits handling without touching the area to be abraded. For textile materials, fold the sample twice and use scissors to cut a small portion of the resulting corner for the center hole.

NOTE: To mount textiles or other flexible specimens, place the test specimen on the holder with the side to be abraded facing up. Lightly secure the clamp plate and nut in place. Adjust the hold-down ring so it is a snug fit, and place it half way on the specimen holder. Draw the specimen taut over the specimen holder by pulling on corners and edges. Tighten the clamp ring further, and push the ring all the way down over the edge of the holder, thus putting tension on the specimen as it is secured on holder. Finish tightening the clamp plate and nut, and finally tighten the hold-down ring. Avoid tightening to excess so as not to wrinkle the specimen. Trim off any excess material around the edges.



WARNING: *To prevent damage to the instrument, avoid excess specimen material that extends beyond the specimen hold-down ring and will rub on the abraser housing. Trim excess material or use tape to secure to the specimen holder. Taber offers Model SH-12 "Tall" Specimen Holder (#135920) to accommodate 135 mm diameter specimens.*

NOTE: To prevent the vacuum from lifting the specimen, it is advised to use the hold-down ring.

NOTE: The SH-101 hold-down ring will accommodate flexible materials up to 0.8 mm thick. The optional SH-102 hold-down ring will accommodate flexible materials up to 1.6 mm thick.

NOTE: Optional Textile Specimen Holder (SH-15) has a raised wear track to give the fabric extra tension when the hold-down ring is drawn down over the edge of the holder and the clamp plate is secured

NOTE: To prevent stretching or wrinkling of the specimen during testing, flexible materials can be mounted to the S-36 or S-36-1 Mounting Card.

Specimen Cleaning

The specimen surface must be free from fingerprints or other contaminants. If necessary, use an appropriate cleaning method for the material being tested.

Specimen Conditioning

Prior to testing, it is recommended that specimens be conditioned for at least 24 hours in a standard laboratory atmosphere of 23 °C ± 2 °C (73.4 °F ± 3.6 °F) with 50 ± 5% relative humidity. For materials that are susceptible to environmental influences, tests should be conducted in the same test atmosphere.

TEST PROCEDURE

As you start your testing, use of these guidelines should assist you in developing a test procedure that will yield reproducible test results, accurate within the variations of quality inherent in the material itself.

Establishing a Test Procedure

The purpose of this section is to outline all the elements of a typical test procedure from analysis of the testing problem to final evaluation of results. Knowledge of the mere mechanics of testing, the preparation and mounting of specimens, and the setup and operation of the Abraser is presumed.

To aid in the establishment of a test procedure, the following recommendations are offered. It is important to recognize that these recommendations may not apply to all variations of materials and that modifications may be required in performing a practical abrasion test. They should not be construed as fixed test specifications.

Analyze Test Problem – The value of the Taber Abraser in research and quality control programs depends to a considerable extent on the operator's knowledge of the test problem; the service requirements and the desired wear characteristics of the material examined. Analyzing this problem before embarking on a test series may save time and material. As nearly as possible, the test should reproduce the wear experience of the specimen in actual use.

Control Test Environment – Both heat and moisture may affect the abrasion resistance of most materials, particularly organic materials. Therefore, an environmentally controlled test room is strongly recommended where reproducible precision results are required. Abrasion research projects are normally carried out in an atmosphere maintained at 23 °C ± 2 °C (73.4 °F ± 3.6 °F) with 50 ± 5% relative humidity. For materials that are susceptible to humidity, samples should be conditioned in the test atmosphere for at least 24 hours – organic materials preferably for 48 hours or more. When research is conducted to determine wear life under changing atmospheric conditions, as in automobile and aircraft materials, the atmosphere of the laboratory may be controlled accordingly.

NOTE: If an environmentally controlled test laboratory is not available, test specimens should be conditioned and tested with a minimum lapse of time.

NOTE: When it is necessary to interrupt a test of organic material for several hours, or overnight, the sample should be discarded and a new test begun. In the course of a few hours the weight of a sample may change by moisture absorption or for other unexplained reasons.

Determine Test Procedure – Standard test procedures for a number of materials have been established and, in the interest of uniformity and the ready exchange of information, are very generally accepted. To ensure that test results will be comparable, the procedure described should be followed exactly.

In the absence of a standard specification, the technician must work out his or her own test procedure. Choice of abrading wheels, load weights, method of mounting the sample, duration of test, and other details may best be decided by preliminary testing of the specimen material.

Begin by estimating the nature and degree of wear that the specimen would receive in actual service. Select an abrasive wheel that will most nearly reproduce this wear. Under ordinary conditions a load and wheel combination should run on a specimen a minimum of 300 cycles before the end point occurs, otherwise the test may be too harsh. In certain instances there may be exceptions to this rule since there are many varieties of material that can be tested with the Abraser.

When setting up a test procedure, always keep in mind to avoid wearing the material too fast as this will result in ripping and tearing action.

Record Test Procedure – It is essential that careful record of every phase of the test procedure be kept for purposes of comparison. This will also enable others to duplicate the test at a later date.

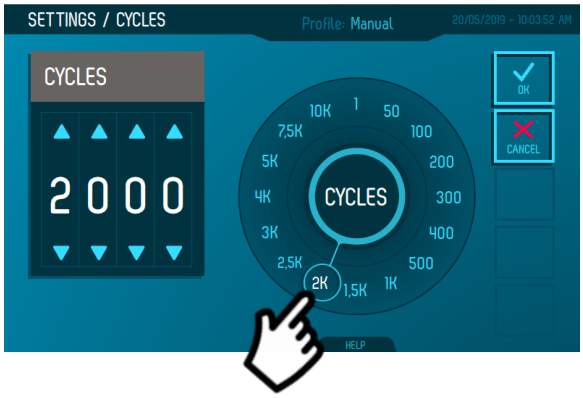
Select Evaluation Method – Test results are commonly expressed as a wear factor or numerical abrasion index of the test specimen. The most common methods for calculating this index are by measuring a visual or physical change. For additional information see page 19.

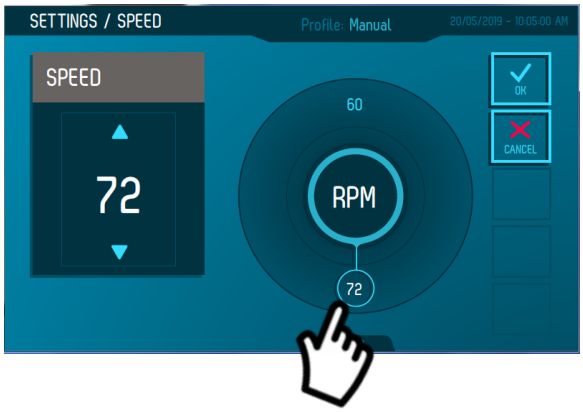
The following steps are intended to assist in establishing a test procedure for conducting wear tests of rigid or flexible materials.

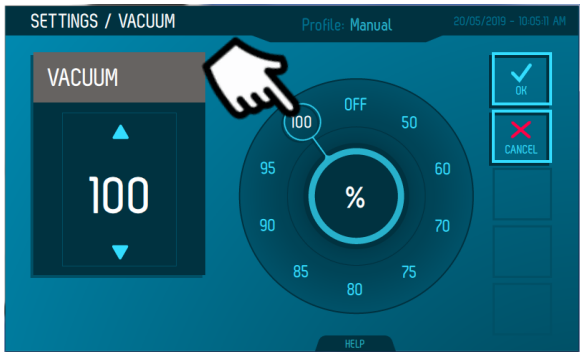
1. Mount the selected wheels on their respective flanged holders.

   IMPORTANT: Prior to testing, ensure the wheels have been resurfaced, if necessary.

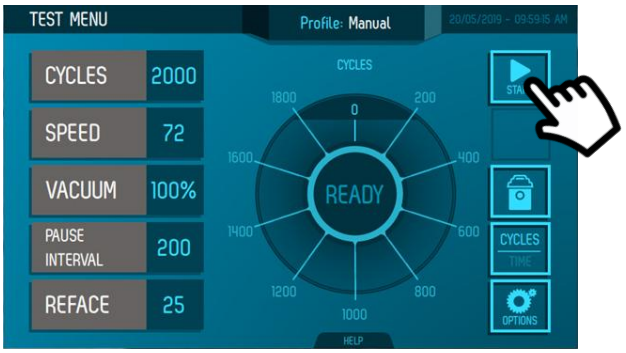
2. Measure and record specific parameters of the unabraded test specimen, if necessary.
3. Secure specimen to Abraser specimen holder.
4. Select and mount the auxiliary weights, if necessary.
5. Adjust the vacuum nozzle gap.
6. Using the Abraser touchscreen, enter the appropriate test parameters then press the "OK" button.



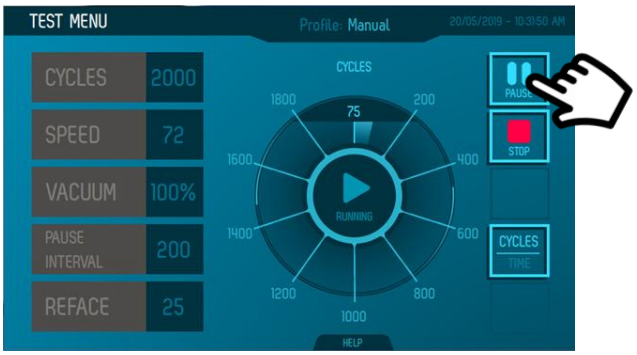




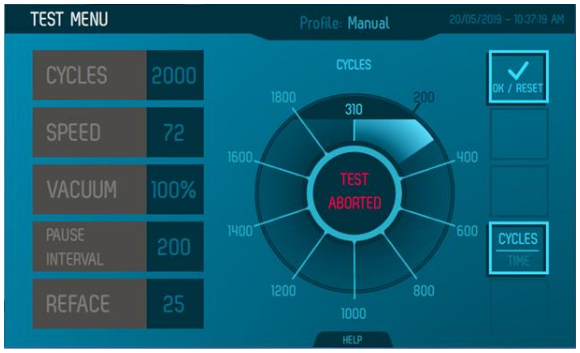
7. Lower the abrading heads onto the surface of the test specimen.
8. Press START button on Abraser keypad to commence testing.



9. To interrupt a test, press the PAUSE button. To stop or cancel a test, press the STOP button.



NOTE: If the STOP button is pressed before the programmed number of cycles is reached, a screen prompt will ask if you are sure. If you wish to continue testing, select NO. Selecting YES will abort the test.



10. After completion of test cycles, remove and clean test specimen.
11. Evaluate and record intermediate or final values based on method selected for reporting test result. For weight loss, weigh specimen to nearest 0.1 mg. For visual comparisons, examine test surface and note characteristics.

⚠ **WARNING:** *When testing flexible materials, trim any excess material overhanging the specimen holder or hold-down ring. Otherwise, the material may rub on the abraser housing and cause damage.*

NOTE: During usage, the abrasive wheels will break down causing the diameter to change. Wheels must be replaced when the diameter wears down to the wheel label (44.4 mm).

NOTE: The PAUSE INTERVAL will stop the test at predetermined number of cycles and is useful for tests that require the abradant to be refreshed or to evaluate the specimen during the test (e.g. visual inspection of wear-through to the substrate or periodic weight measurements).

CALCULATION OF RESULTS

The following are commonly used methods for reporting abrasion test results. For comparable and reproducible tests, it is recommended that all testing be performed under conditions covered by an established test procedure.

Weight Loss

The weight loss test method is a quantifiable method that records the weight loss of the test specimen due to abrasion. This method is recommended when the results are to be compared with those of similar materials having nearly the same specific gravity.

Weigh the test specimen before and after testing to obtain the initial and final weight values. The difference between these two values, F_{Total}, will be the weight loss.

$$F_{total} = A - B$$

Where, A = weight of test specimen before abrasion, mg
B = weight of test specimen after abrasion, mg

Use the following formula to calculate average mass loss, F_m, in milligrams (mg) per 100 cycles:

$$F_m = \frac{F_{total}}{n} x100$$

Where, n = total number of cycles

When performing the weight loss method, loose particulate may adhere to specimens during testing. It is critical that test specimens are cleaned prior to weighing. If a sample has been wet tested or if an indicator has been used, ensure the specimen is thoroughly dried. If static electricity affects the specimen, a static eliminator may be sprayed on both sides prior to taking the final measurement.

Taber Wear Index may also be used to present weight loss data. This measurement represents the loss in weight in milligrams per thousand cycles of abrasion for a test performed under a specific set of conditions. The lower the wear index, the better the abrasion resistance quality of the material.

$$TaberWear\ Index = \frac{F_{total}\ x\ 1000\ cycles}{n}$$

For example: if a specimen is abraded 5000 cycles and has a weight loss of 500 mg, the wear index will be 100. Likewise, a material that withstood 500 cycles of abrasion and had a weight loss of 100

milligrams of material would have a wear index of 200.

EXAMPLE:

$$\frac{\text{500 mg. x 1000 cycles}}{\text{5000 cycle test}} = \text{100 Taber Wear Index (Weight Loss Method)}$$

$$\frac{\text{100 mg. x 1000 cycles}}{\text{500 cycle test}} = \text{200 Taber Wear Index (Weight Loss Method)}$$

NOTE: When using a mounting card, ensure the cards have been conditioned with the test specimen. Take the weight measurement of the specimen BEFORE and AFTER it is affixed to the mounting card, then calculate the difference to obtain the mass of the mounting card. Subtract this from the final weight measurement.

Volume Loss

When comparing the wear resistance of materials having different specific gravities, a correction for the specific gravity of each material should be applied to the weight loss to give a true measure of the comparative wear resistance. The use of this correction factor gives a wear index related to the loss in volume of the material to which it is applied. Determine the specific gravity of the material to be tested in accordance with standard practice.

$$VL\ (cm^3) = \frac{W_1 - W_2}{S}$$

Where, VL = volume loss

W_1 = weight of test specimen before abrasion, g

W_2 = weight of test specimen after abrasion, g

S = density of the material being abraded, g/cm³

$$VL\ (mm^3)/100\ cycles = \frac{VL, cm^3 x 1000}{n} x 100$$

Where, n = total number of cycles

For illustration, consider a hypothetical case where it is desired to compare the wear resistance of an aluminum die casting material with the wear resistance of a similar zinc material. In this case, three specimens, 100 mm square by 6.35 mm thick, of each type of material are prepared so that an average result can be obtained. Each test specimen is run 5000 cycles, using a CS-17 wheel with a 1000 g load. For purposes of illustration, assume that both the aluminum and zinc samples showed a weight loss of 860 mg. It would appear that the materials have equal resistance to abrasion since their weight loss was equal, however since aluminum and zinc materials have different specific gravities, a correction factor must be applied to give a true indication of the wear resistance. In doing this, the aluminum material evidences a much greater volume loss, as seen by comparison of the wear factor:

EXAMPLES:

Aluminum

$$\frac{\text{860 mg. x 1000 cycles}}{\text{2.7 sp. Gravity x 5000 cycle test}} = \text{63.7 Taber Wear Index (Volume Loss Method)}$$

Zinc

$$\frac{\text{860 mg. x 1000 cycles}}{\text{7.1 sp. Gravity x 5000 cycle test}} = \text{24.2 Taber Wear Index (Volume Loss Method)}$$

When a clear organic coating is compared with a heavily pigmented color coat, the latter will have a higher specific gravity as a result of the added color pigment. It is recommended that a correction factor be used based on the amount of solids per gallon of the liquid material.

Visual Change

Certain materials are best adapted for testing to a clearly marked change in appearance or physical breakdown of the specimen. This is especially true of materials with a plated, glazed, polished, or printed surface where the end point is sharply indicated; of materials that withstand less than 300 abrasion cycles before reaching the end point of test; and of textile materials.

The visual method is a subjective test that requires examination of the test specimen, and should be conducted under controlled lighting. The test specimen is normally evaluated prior to subjecting it to abrasion. After a specified number of cycles or until wear through to the substrate occurs, the specimen is inspected and any changes of appearance are noted.

The test results are most often a description of the wear, and must be as thorough as possible to ensure all the details of the wear mechanism are captured. For example if the test specimen is a coating, one suggestion is to monitor when the surface coating has worn down enough so that the substrate material is visible (this is defined as 'breakthrough'). For printed specimens, break-through is when a portion of the printing has fully worn away. Breakthrough testing should be quantified by recording the number of cycles it took for breakthrough to occur.

Other examples of Visual End Points:

1. Loss of Luster
2. Changes of Surface Appearance
3. Color Changes
4. Appearance of a Hole
5. No longer Legible (e.g. text)

Another option is to compare the abraded specimens with a measured abraded standard. A rating scale of 1 – 5 is commonly used to assist with this type of evaluation, and often includes a photograph depicting each ranking.

Depth of Wear (Change in Thickness)

Certain test requirements may call for measuring the depth of wear. Using a thickness gage or micrometer, measure the specimen thickness on four points of an unabraded sample, 90° apart and oriented 38 mm from the center hole (this will be within the wear path). After abrading the sample, repeat the measurements and record the difference. To compensate for depth differences around the specimen wear path, an average should be computed from the four readings. To assist with measuring at the same location, the back of the sample can be marked accordingly.

The depth of wear can also be measured using an Optical Micrometer or similar instrument. Place the measuring device so that it spans both the abraded and unabraded portion of the specimen. Calculate the amount of wear by measuring the difference between the abraded and unabraded areas in four equal-distant points around the specimen, and averaging the results.

EXAMPLE:

0.003” Average Depth of Wear in 5000 Cycles

$$\frac{0.003\text{”} \times 1000 \text{ cycles}}{5000 \text{ cycle test}} = 0.0006 \text{ Wear Factor (Depth Method)}$$

Other Physical Change Methods

Performance specifications may be incorporated when a material is used for a particular application. For example, a tensile test might be utilized before and after abrading a textile webbing material that is used in the manufacture of seat belts. A burst test could be incorporated in evaluating the abrasion resistance of a rubber seal. Or, an air permeability test might be included for medical packaging materials that require the product be kept in a sterilized environment.

INFLUENCES ON RESULTS

The measurement of abrasion resistance is a complex phenomenon and may be influenced by a number of factors. If there are significant differences between reported test results for two laboratories (or more), it is often attributed to procedural errors or an instrument that is out of calibration or one of the factors mentioned below.

Physical properties of the material, such as hardness or resiliency, can influence resistance to abrasion. In addition, material characteristics such as type or amount of added substances are known to be potential sources of variation. When testing organic materials or coatings, ensure materials are fully cured according to the manufacturers’ instructions. Many coatings show low abrasion resistance the first few days but progressively improve during the following 30 days as the coating cures. Other items to consider include surface roughness (e.g. type, depth and amount of embossing); specimen flatness; and parallelism of the opposing sides. Textile materials may be affected by the inherent mechanical properties of the fibers; the dimensions of the fibers; the structure of the yarns; the construction of the fabrics; and the type, kind, and amount of finishing material added to the fibers, yarns or fabrics.

The type of abradant used plays an important role. All abrasion tests are subject to variation due to changes in the abradant during specific tests. To minimize this variation, the abradant must be cleaned at frequent intervals and checked periodically.

Other factors to consider include the conditions of the tests (temperature and humidity, conditioning of specimens, etc.), and test methodology (vacuum nozzle height, pressure between the specimen and abradant, etc.). For comparable and reproducible tests, it is recommended that all testing be performed under conditions covered by an established test procedure.

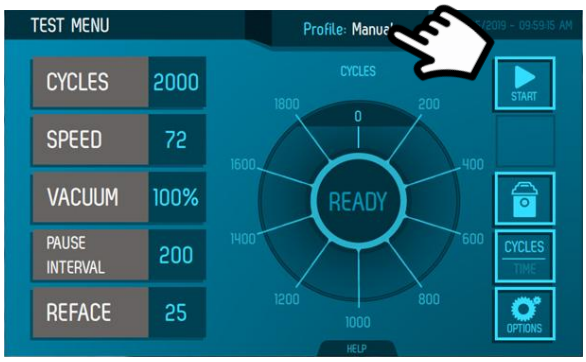
The measurement of the relative amount of abrasion may also be affected by the method of evaluation. This is especially true with visual assessments, as the results may be influenced by the judgment of the operator.

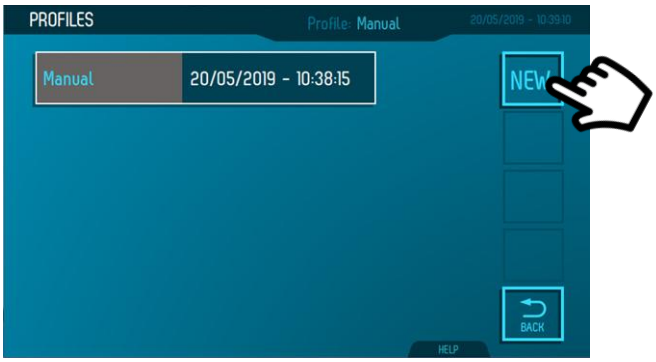
If a thorough investigation does not uncover the cause for the difference, comparative tests should be performed to determine if there is a statistical bias between the laboratories. The test samples used must be as homogeneous as possible, drawn from the material from which the disparate test results were obtained, and randomly assigned in equal numbers to each laboratory for testing. The test results from the laboratories should be

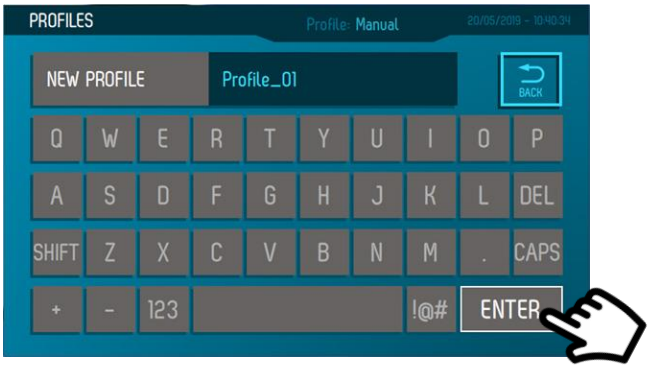
compared using a statistical test for unpaired data, at a probability level chosen prior to the testing series. If bias is found, either its cause must be found and corrected, or future test results must be adjusted in consideration of the known bias.

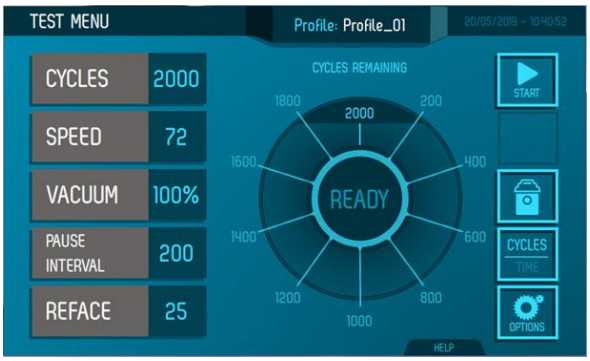
PROGRAMMING TEST PARAMETERS

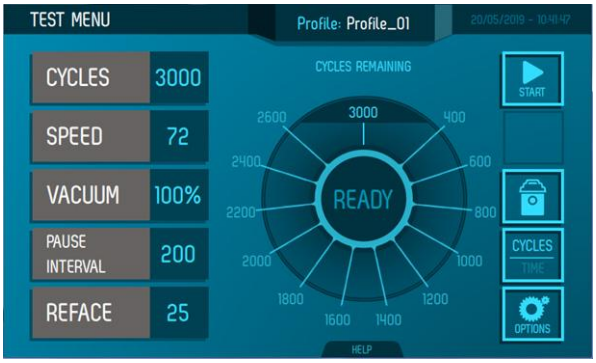
The Model 1700 / 1750 includes the option to save commonly used test profiles.









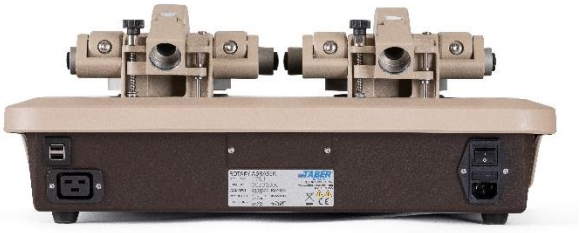


HELP

At the bottom of the display screen is the HELP button. Pressing this will provide details on the instrument.

USB Port

Incorporated into the Model 1700 / 1750 Abraser is a USB port. This is used for software updates or to communicate with the Model 355 Grit Feeder Attachment.



MAINTENANCE

The Taber Rotary Platform Abraser 1700 / 1750 is a precision instrument and if used and maintained properly, should give you many years of trouble-free service.

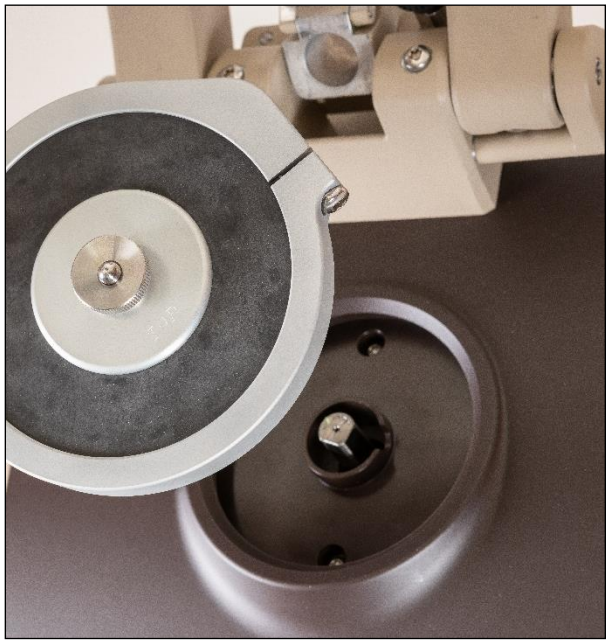
General Care

- Brush or vacuum all particulate material and debris off the instrument and surrounding work area.
- The bearings and other moving parts DO NOT require lubrication.
- Do not spill any liquids onto the instrument. Wipe off all spills immediately.
- The motor drive shaft cavity is designed to minimize the collection of debris. Avoid wiping or brushing debris into this area. If necessary, remove the specimen holder and vacuum between the housing and motor disc.

Installing / Removing the Specimen Holder

The specimen holder can be removed from the instrument. This will allow for optional holders to be used.

To remove the holder, grab the outside edge of the holder and lift straight upward. To install the specimen holder, align the set-screws with the flats on the motor shaft.



Cleaning Vacuum Pick-Up Nozzle

Abraded material and debris may collect in the vacuum pick-up nozzle orifices. Keep the orifices clean of particulate by using a small brush.

Replacing Quick Release Wheel Collet

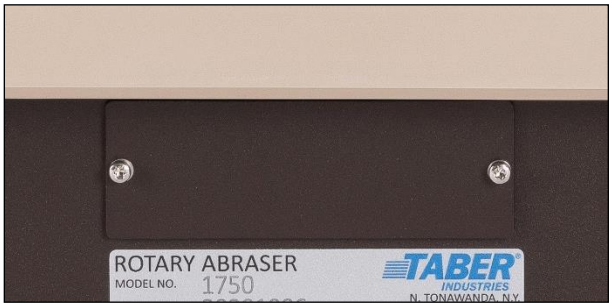
The expandable collet for the Quick Release Wheel Hub is manufactured out of a wear resistant plastic, however it should be replaced when the retaining lip shows signs of wear. An indication of this wear is a rounding of the lip, or the wheels are no longer held securely in place. To facilitate this repair, a replacement collet kit is available from Taber Industries.

Vacuum Unit

The vacuum unit included with model 1700 and 1750 is designed with a heavy-duty motor that includes life-lubricated sealed bearings. Vacuum cartridge filter and collection bags should be replaced on a regular basis.

Battery Replacement

To replace the batteries, open the battery compartment cover found on the rear of the instrument. Install two new AAA lithium metal batteries in the battery compartment.



CALIBRATION / FACTORY SERVICE

Should your Model 1700 / 1750 Rotary Platform Abraser require repair or adjustment, carefully pack the instrument in the original packaging or in a rugged container with adequate cushioning material. After obtaining a return authorization number from the factory, the unit should be shipped, transportation charges prepaid, to Taber Industries.

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Fax: *716.694.1450*
E-mail: *sales@taberindustries.com*
WebSite: **www.TaberIndustries.com**
www.OrderTaber.com

Part#	Description
133338	Quick Release Wheel / Hub Collet Kit, replacement
125769	Auxiliary Weight – 500 gram load (ea.)
125770	Auxiliary Weight – 1000 gram load (ea.)
121016	S-19 Specimen Holder Rubber Pad (ea.)
120979	Specimen Holder Nut (replacement)
121150	Clamp Plate (replacement)
135929	8mm Vacuum Nozzle Inserts (set of 2)
135930	11mm Vacuum Nozzle Inserts (set of 2)
131680	Cartridge Type Filter (for Taber Vacuum)
131800	Replacement Motor Brush Kit for 110 Vacuum (2 per set)
134643	Replacement Motor Brushes for 230V Vacuum (2 ea.)
121103	S-12 Hand Brush
135500	Screwdriver, Torx T25 (for hold-down ring)