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1.1 Rating

Machine:	Prep/Master® Grinder
Machine-Type :	4430
Manufacturer:	Substrate Technology 1384 Bungalow Rd. Morris IL 60450 USA 815.941.4800

1.2 Unit – specifications

Dimensions:

	Machine	
	4430	
Length	84”	213 cm
Width	44”	112 cm
Height	50”	127 cm
Weight	1,262 lbs.	572 Kg

Connected loads of the electrical system:

	Grinder	
Power	30 HP	
Electrical connection	230V/60Hz 3 Phase 400V/50-60Hz 3 Phase Depending on ordered unit.	

1.3 Operative range and correct usage

The Prep/Master® 4430 is designed to be used on clean, dry or wet horizontal surfaces without obstacles. The machine can not be used for other purposes. The manufacturer will not be liable for damages resulting from such incorrect usage. In case of wrong usage the user is responsible for all risks.



1.4 Stand –by power supply (generator)

If the Prep/Master® 4430 is operated using a generator, the generator must be operated in accordance with the current local electrical directives (This applies in special to the protective ground conductor) in order to ensure that all safety devices are functioning and to be able to eliminate possible damage to electrical components.



1.5 Advice for operators of the Grinder

During the operation of the 4430 it may be possible to exceed the acceptable noise level of 85 dB(A). This is dependent on the different locations and the local circumstances. When the noise level is 85 dB(A) or more, the machine operator and the persons working near the machine must wear sound – insulating devices.



1.6 Machine type designation

Machine type:	Prep/Master® 4430
Unit / designation:	STI Grinder
Working width:	44” – 112cm
Drive:	Manual
Grinding capacity:	Variable
Dust hose connection:	2” – 5cm

2.0 Explanation of warnings and symbols

2.1 Organizational measures

2.2 Personnel selection and qualification

2.3 Safety precautions applicable to different operating conditions

2.4 Repair work , maintenance activities, and default repair on the job side

2.5 Definition of the Safety off position

2.6 Dangerous aspects of the machine

2.7 Electrical engineering regulations

2.8 For special attention

2.0 Warnings and symbols

The following denominations and symbols are used in the Operating Instructions to highlight areas of particular importance:



Symbol of operational safety.
This symbol will be shown in these Operating Instructions next to all safety precautions that are to be taken in order to ensure prevention of injury. Follow these instructions and take special care in these circumstances. In addition to these instructions, the general safety precautions and the local accident prevention guidelines are also to be followed. Please check, whether there are special regulations for the particular job site.



Information, instructions and restrictions with regards to possible risks to persons or extensive material damages.



Particular details regarding the economical use of the equipment

Warning against dangerous voltages.



Indications relating to protective devices of electrical equipment.



Indications where consultation with the manufacturer is necessary



Instructions relating to periodical checks



Reference to important instructions contained in the Operating Instructions





2.1 Organizational measures

The Operating Instructions are to be kept near the location where the machine is located and must be reachable all the time!

In addition to the Operating Instructions general and legal regulations regarding accident prevention and environmental protection must be with and indicated every time!

Such duties may for example relate to the handling of hazardous substances or to the provision and wearing of personal protection equipment as well as compliance with local traffic regulations.

The Operating Instructions must be supplemented by instructions including the duty to supervise and report relating to particular local working practices, for example work organisation, work procedures and personnel allocation.

Personnel entrusted with working with the machine must have read the **Operating Instructions** before starting the work; in particular the chapter about **Safety Instructions**. These have to be read before starting any work with the machine. This particularly applies to incidental activities such as setting up the machine, carrying out maintenance work or training staff to work with the machine.

From time to time the working practices of the staff are to be checked regarding awareness of **safety and hazards**.

Personnel must tie back long hair and not wear loose clothing or jewellery and rings. There is a risk of injury through getting stuck or being drawn into moving machinery.



Use **personal protection equipment** if necessary or required by regulations! Take notice of **all** safety and hazard notices on the machine.

All **safety and hazard notices on** the machine must be kept complete and **readable**

If **safety-critical changes** occur to the machine or its performance, the machine must be **shut down immediately!** The cause of the fault has to be established immediately and has to be repaired before starting the work again.

Changes, add-ons or conversions of the machine which might have an influence to the safety of the machine must not be undertaken without the **permission of the manufacturer**.



This applies in particular to the fitting and adjustment of safety devices and to welding on major and load bearing parts.

Spare parts must always comply with the technical requirements and the specifications of the manufacturer. This is always guaranteed with original spare parts of the manufacturer.

Inspection intervals and intervals for recurring checks specified in these Operating Instructions must be complied with. At the same time it is necessary to meet the legal requirements.

To perform maintenance work correctly it is important to be equipped with proper tools for the task in question.

The **location** and the operation of **fire extinguishers** must be made known on each building site!



Take note of the facilities for fire reporting and fighting fires!



2.2 Personnel selection and qualification

Fundamental duties:

Only reliable personnel are allowed to work on the machine

Only trained personnel can be used to operate the machine. **Note the statutory minimum age!** Specify clearly the responsibilities of personnel for operation, setting up, servicing and maintenance work. !

Make sure that only **authorized** personnel operate or work on the machine.

Select clearly the **machine operator**. Define his/her responsibilities also with regard to **traffic safety regulations** and empower him/her to decline instructions from third parties which are not complying with the safety requirements.

Personnel being trained or made acquainted with the equipment may only be deployed **under constant supervision of an experienced person**.



Work on the electrical parts of the equipment may only be undertaken by a **skilled electrician** or by a **trained person** under the **guidance** and **supervision** of a **skilled electrician** as well as in accordance with **the electrical engineering regulations**.

2.3 Safety precautions applicable to different operating conditions

Avoid any method of working that **impairs safety!**

All precautions have to be taken, that the machine will only be used in a safe and functional status.



Only operate the machine when all **safety devices** and related **safety equipment**, e.g. detachable **safety devices**, emergency stops and suction devices are present and **operational!**

The machine has to be checked visually at least once a day for any **damage** and **defects**.

In the event of **operational malfunctions** the machine must be **shut down immediately** and secured. The fault must be rectified before starting the machine again!



Secure the **work area** around the machine in **public areas** providing a **safety distance** of at least 10 feet around the machine.

Fault must be rectified immediately!

Start up and switch off operations and control devices have to be handled in accordance with the Operating Instructions.

All persons in the proximity of the machine must wear safety glasses with lateral protection as well as safety shoes. Ear protection may be required. The operator is obliged to wear close fitting protective clothing.



Use only extension cables for extending the main cable that are sized and marked in accordance with the overall power consumption of the machine and the valid local guidelines..



Before starting the machine make sure that nobody can be endangered when the machines starts running.

Do not switch off or remove the exhaust and ventilation devices when the machine is running!

2.4 Special work within the scope of use of the machine and maintenance activities as well as repairs during operation.

Mechanical servicing work:

Before starting any servicing work on the machine, put the machine in the **Safety off position** as described in chapter 2.5 in order to prevent the machine from being switched on accidentally.

Please follow any special safety instructions in the various chapters on servicing the machine. **See chapter 7**

Adjustments, servicing and inspection work and inspection intervals specified in these Operating Instructions as well as any information on the replacement on parts and systems of the machine must be **undertaken and / or complied with**.

These activities can only be undertaken by **qualified personnel**.

Before starting any maintenance or repair work the **operator** of the machine has to be informed about it.

During all work related to the use, the re-erection or the adjustment of the machine and of the safety devices as well as inspection, maintenance and repair, the start up and shut off procedures have to be done in accordance with the Operating Instructions.



For the machine to be shut off completely for **repair or maintenance work** the plug has to be **disconnected** in order to prevent the machine from being switched on **accidentally**.

The dust bin of a connected dust collector has to be emptied before transportation. Please handle in accordance with the regulation how to dispose the dust and make sure that you meet the local regulations.

Do not use any **aggressive cleaning materials!**

Use lint-free cleaning cloths.

Always tighten any screw connection that is undone during servicing and maintenance work.

If **safety devices** need to be **dismantled** during setting up, servicing and repair work, these **safety devices** must be **reinstalled** and inspected immediately after completion of the servicing and repair work.

Make sure that process materials and replacement parts are disposed of safely and in an environmentally-friendly manner!



. Work on the electrical parts of the equipment may only be undertaken by a **skilled electrician** or by a **trained person** under the **guidance** and **supervision** of a **skilled electrician** as well as in accordance with **the electrical engineering regulations**.

Make sure that electrical components used for replacement purpose comply with the original parts and are correctly adjusted if necessary.

2.7 Electrical engineering regulations

Work on the electrical parts of the equipment may only be undertaken by a **skilled electrician** or by a **trained** person under the **guidance** and **supervision** of a **skilled electrician** as well as in accordance with **the electrical engineering regulations**.

2.5 Definition of the safety off position

Definition:

The safety off position is the position of the machine when it cannot generate any hazard.

Putting the machine in the safety off position means:

- Switch off the grinder.**
- Switch off the dust collector.**
- Wait for standstill of all drives.**
- Pull out main plugs.**
- Secure the machine against unintended start up.**

2.6 Particular dangerous aspects of the machine

Every machine, if it is **not used according to the regulations**, may be **hazardous** for operating, setting-up and service personnel. The **operating authority** is responsible for **compliance with the safety regulations** during operation and maintenance of **safety devices** supplied with the machine as well as the provision of appropriate additional safety devices.



Never start machine in the tilted position. The machine must only be started when all guards and dust collection parts are attached and machine is standing flat on work surface.

Use only extension cables for extending the main cable that are sized and marked in accordance with the overall power consumption of the machine and the valid VDE guidelines. In case there is any question ask the manufacturer or a skilled electrician.

The electrical parts of the machine must be **inspected regularly**. Please note in particular the **specified recurring inspections according to local regulations**. Defects such as **loose** connections or **scorched** cables must be rectified immediately. **Call a skilled electrician or the STI customer service.**

If work on **electrified** parts is necessary, a **second person** must be deployed who can pull out the plug in an emergency. The working area must be sealed with a red and white **safety chain** and a danger sign. Use tools that are **insulated against voltages**.

Only start work, once you are familiar with the **electrical engineering regulations** that apply to your area.

Only use voltage testers that comply with the regulations when troubleshooting. From time to time check voltage tester to ensure that they are operationally efficient.

2.8 For special attention

Use only proper and default free tools for your work. Damaged tools have to be repaired immediately or to be replaced.

Use during your work for your own safety the required safety **equipment** and **safety cloths** (e.g. safety glasses, safety shoes, safety gloves)

Please instruct your operators and the repair personnel about the following points:

- ✚ Cleaning-, and repair work is only allowed if the machine is shut off. (**safety off position**)
- ✚ Make sure, that during the work on the machine, the machine cannot be started.
- ✚ It is not allowed to open or remove **safety devices** while the machine is **running**
- ✚ Do not forget to bring all safety covers and safety devices in **place again** after cleaning, repair and maintenance work.
- ✚ Do not touch **moving parts** and do not walk into the working path of the machine.
- ✚ Please check after repair- cleaning- and maintenance work and before you start the machine again, that no person is in the working area and could be endangered by the machine.

3.1 OPERATIVE RANGE

3.2 SCOPE OF SUPPLY

3.3 DESCRIPTION OF THE MACHINE

3.4 OPERATING ELEMENTS MACHINE

3.5 THE 20HP MOTOR

3.6 THE CUTTING AREA

3.7 THE COUPLERS & TOOL HOLDERS

3.8 VARIABLE SPEED DRIVE

3.9 TOOL CHANGE

3.10 TOOLS

3.11 CARE AND MAINTENANCE

3.1 OPERATIVE RANGE

The **STI Prep/Master® 4430** is a grinding machine with counter rotating tool holders it is used for pre-treatment of horizontal surfaces. The dragging of the diamond abrasive products across the surface to be treated thoroughly removes surface contaminants, coats of paint, sealants and thin coatings.

A suitable filter unit must be connected to the machine in order to thoroughly collect the dust being produced by the grinding process. The proper dust collection system ensures dust-free operation of the machine and clean air at the workspace. STI recommends the 2720 Power House dust collector.

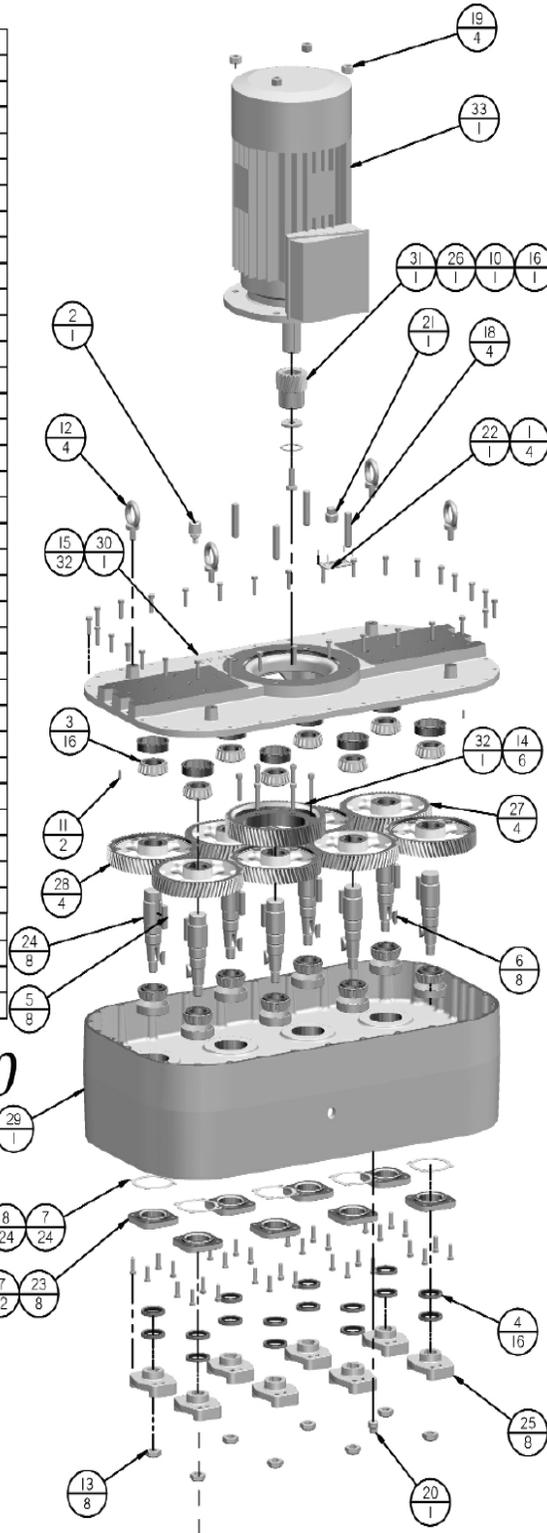
3.2 SCOPE OF SUPPLY

Provided with machine:

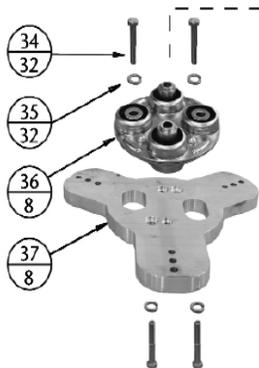
- **Prep/Master 4430**
- **Dust Hose (2 X 2"/5cm)**
- **Manual (1 x 2)**

3.3 DESCRIPTION OF THE MACHINE

ITEM #	QTY	PART #	DESCRIPTION
1	4	3808789	DRIVE SCREW #4 X 1/4
2	1	4067682	BREATHER
3	16	FF2300	BRG ASSY 32209
4	16	FG3103	SEAL CIR 16120
5	8	FH0736	KEY 1/2 SQ. X 2
6	8	FH112	WOODRUFF KEY 3/8 X 1 1/4
7	24	FI0330	SHIM .005
8	24	FI0331	SHIM .007
9	8	FI0332	SHIM .020
10	1	FI1232	INT RET RING N5000-218
11	2	FI1510	DOWEL PIN 1/4 X 3/4
12	4	FI1699	EYEBOLT M16
13	8	FJ9326	LOCKNUT M24
14	6	FJ9816	SDC HD M10 X 50 GRADE 12.9
15	32	FJ9818	HKCS M10 X 35
16	1	FJ9819	HK HD M16 X 40
17	32	FJ9820	HK HD M10 X 30
18	4	FJ9832	STUD M18 X 2.5 X 3" LG
19	4	FJ9833	HEX NUT M18 X 2.5
20	1	FK0110	SQ. HD. PLUG 3/4-14 NPT
21	1	FK0112	SQ HD PLUG 1" NPT
22	1	FN0353	NAMEPLATE, SUBSTRATE
23	8	HR0247	HR0247 COVER
24	8	HR0250	HR0250 SHAFT
25	8	HR0252	HR0252 COUPLING FLANGE
26	1	HR0253	HR0253 PINION RETAINER
27	4	HR0332	HR0332 HELICAL GEAR 69T
28	4	HR0334	HR0334 HELICAL GEAR 69T
29	1	HR0362	HR0362 HOUSING
30	1	HR0364	HR0364 COVER
31	1	HR0370	HR0370 PINION 22T
32	1	HR0371	HR0371 HELICAL GEAR
33	1	LS4374547	MOTOR 30HP 3 PH
34	32	CS1/2	1/2"-20 3" CAPSCREW
35	32	LW1/2	1/2" Lockwasher
36	8	SM88-602	602 Morflex Coupler
37	8	FL2420C	Aluminum Tool Plate



Prep/Master 4430



3.4 OPERATING ELEMENTS

The Variable Speed Drive is carrying all controls and instruments used for supervision and control of the machine.

Key Button Controls Start/ Stop

Pushing the Key Button „Start" will switch the controls on and start the motor. Pushing the Key Button “Stop” will stop the motor running.

Arrow up and Arrow Down

While powered but without the motor running, the red Arrow Up and red Arrow Down buttons can be used to set the motor speed faster or slower than the base RPM of the motor (1,725RPM)

Rotation

While powered but without the motor running, the “Rotation” button is used to change the rotation of the motor. Press the “Rotation” button and press “Enter” within 2 seconds to change the motor rotation. To change back to previous rotation repeat the process

Auto/Man and Prog/Run

These buttons are used for drive diagnostics and programming and are not used.

Dead Man Switch

Dead Man Switch is intended to be used for the safety of the operator and protection of the machine from excess damage in the event of an emergency. Lanyard must be worn by operator for this safety device to work properly.

Manual On/Off Switch – If Equipped

The On/Off switch is used to turn off all power supplied to the grinder.

3.5 THE ELECTRIC MOTOR

The power plant of the Prep/Master® grinder is the electric motor. The motor is responsible for turning the gears which turn the abrasive tools on the floor. The motor is controlled exclusively by the Variable Speed Drive which inputs specific power to generate a given RPM.

3.6 THE CUTTING AREA

The area inside the stainless steel shroud and directly beneath the gear deck is the cutting area. This is the area in which the tools turn to produce the grinding action. It is also the area that keeps the dust from grinding contained and subsequently evacuated through the dust collection ports.

3.7 THE COUPLERS & TOOL PLATE/STONE HOLDER

The grinder is outfitted with couplers and tool plates OR stone holders. The couplers attach to the tool plates and provide flex for smooth operation of the diamond tools. The tool plate/stone holder holds the tools in place for the grinding application.

3.8 THE VARIABLE SPEED DRIVE

The variable speed drive is responsible for monitoring incoming power as well as changing the electronic frequency to allow the motor to run at different speeds. This unit is a closed panel that is intended to be operated only with the keypad.

3.9 TOOL CHANGE

In order to change the tools, the operator must first ensure that the grinder is switched off and disconnected from the electrical source. The operator should then place all the saddle weights provided in the weight holders on either side of the variable speed drive*. Then push machine down by the handle in a controlled manner until the grinder is resting on the top casters. The operator then loosens the attachment hardware holding the abrasive tools in place and re-installs with preferred abrasive tool.

*Machine must only be tilted back on firm, level surface. *There is danger of machine falling if all weights are not used and surface is not level.*

3.10 TOOLS – See Last Section

3.11 CARE AND MAINTENANCE

Special attendance and regular maintenance of the machine and its parts are imperative for functioning and safety.

In order to prevent unnecessary downtimes it is recommended to keep original spare and wear parts on stock.

The following maintenance should take place before and after every operation of machine:

1. Clean all surfaces with a dry, lint free cloth
2. Inspect all electrical cables for cuts and replace damaged chords
3. Check all electrical connections are secure and snug
4. Inspect gear box for any signs of oil leakage and repair as required
5. Verify functionality of Dead Man Switch



All persons in the proximity of the machine in operation must wear safety glasses with lateral protection and safety shoes. The machine operator must wear close-fitting protective clothing.

4.1 General Notes

4.2 Transport

4.3 Operation Conditions

4.4 Transport of the machine by vehicle

4.5 Machine Specifications

4.1 General Notes

Before the machine used for the first time, **STI** authorized dealers offer a course to familiarise maintenance and operating personnel with all elements of the machine. We are not liable for damage caused by incorrect use of the machine by personnel not trained by **STI**.

4.2 Transport

In order to transport the machine from a vehicle to the working area you need to tilt the machine down. In order to do so place the pocket weights in the weight baskets and tilt the machine back so it rest on the back casters.

When transporting the machine with hoisting equipment like a crane or a lift, check the total weight permitted. (See Chapter 1.dimensions)

Please use only appropriate, allowed and qualified hoisting equipment as well as ropes and chains. You will find the weight of the equipment in chapter 1 or on the serial plate on the machine.

Do not fix any rope or chain to the handle. The machine must be placed on a pallet or platform designed to hold the weight of the machine and the platform or pallet can then be lifted or hoisted from the appropriate points.

4.3 Transport of the machine with vehicles

When transporting the machine with vehicle, proceed in such a manner that damage due to the effects of use of force or incorrect loading and unloading is avoided. Use straps to tighten the machine to the cabin of the vehicle.

Use at least two straps, or tighten the machine with one strap to the cabin wall of the vehicle. Make sure, that all parts of the machine are fixed.

4.4 Operation Conditions

Check the surface to be treated for loose parts (stones, screws, etc.). The surface must be swept if necessary. Make sure that the machine can travel over all inequalities on the surface. Small inequalities like floor joints less than ¼” are no barriers for the machine.

The machine must be operated in accordance with instructions given in Chapter 5”Initial operation“.

5.1 Preparing for initial operation

5.2 Initial operation

5.1 Preparing for initial operation

Before start up ensure all existing protective housings are fitted and the filter unit is connected correctly.



All persons in the proximity of the machine must wear safety glasses with lateral protection as well as safety shoes. The operator is obliged to wear close-fitting protective clothing.

Carefully handle all plugs, cables, hoses and operating devices. Avoid any contact with live wires.

Work on the electrical system have to be done only by qualified specialists.

Check the surface to be treated; it should be free of for loose parts (stones, screws, etc.). The surface needs sweeping if necessary. Ensure that the machine can run over all inequalities on the surface. Small inequalities like floor joints aren't a barrier for the machine.



In order to avoid downtimes a regular inspection is essential. Carry out the following checks before any start-up:

-  Check whether all machine parts are assembled safely and correctly.
-  Check all screws and other fasteners for tight seat.
-  Check the tool holders to ensure that the proper tools are in place and secure.
-  Check the tightness of the hose connections and the condition of the hose to the filter.
-  Make sure the dust container of the filter unit is empty. Please comply with the local waste treatment regulations considering the removed material.
-  Check the electrical connections for dirt and foreign body deposits.
-  Check the electrical motors for dirt and other contaminants.

Before start-up operators and other personnel must be familiar with the safety regulations given in this manual.



-  Place the grinder in the area where work is to begin.
-  Place weights on grinding head beside motor.
-  Check the main power cable and the dust hose for damage. Replace or repair all damaged parts before starting the machine.
-  Connect the grinder and the filter unit with the dust hose. Use hose clamps at the connections.
-  Connect the supply cable of the blast-machine with the site supply. Make sure that the correct electric supply is available.

5.2 Initial operation

All persons near the machine must wear safety glasses with lateral protection, ear protection as well as safety shoes. The operator is obliged to wear close fitted protective clothing.



The start of the grinder and the filter unit is affected in the following sequence:

- 1) Switching on the filter unit

Initial operation of the grinding machine

- 1) Check that the main switch is turned to on and the dead man switch is in place and lanyard is around operator's wrist.
- 2) Press the 'Start' Button
- 3) Immediately begin moving the machine from side to side to prevent the tools from digging into the concrete surface and creating an uneven profile.
- 4) For the operation of the running machine it is necessary to move the machine from side-to-side to create an even profile that is consistent in flatness and profile.
- 5) When work in work area is complete push the 'Stop' button to stop the grinding motor.



**The dustbin of the filter unit needs regular dumping.
Do not overfill the bin to avoid dust exposure when opening the bin
Comply with the local waste treatment regulations considering the removed material.**

Before start-up the operating personnel must be familiar with the safety regulations given in this manual.



Attention! Before you plug the equipment to a power supply make sure the power supply is equivalent to the data shown on the machine label.



-  Assure the plug is connected correctly to the power source.
-  Assure the dust hose is connected correctly to filter and machine.

6.1	Daily Operation
6.2	Failure Occurs
6.3	Safety Shutdown
6.4	Restart

6.1 Daily Operation

Normal start-up and operation of the Grinder is not different as has been described in Chapter 5 "Initial operation".

Carry out grinding operation in parallel tracks in a way that the dust hose and electric cable do not become twisted.

Make sure that no vehicles, such as forklift trucks and other equipment run over the electric cable and the dust hose.

The speed of moving the grinding machine over the work surface will influence the final finish and production.

In the case that the surface shows different characteristics, means different hardness or different coating thicknesses, a uniform grinding result will be achieved by varying the speed of movement over the surface.

6.2 Failure Occurs

Irrespective of the following information, the local safety regulations are valid in any case for the operation of the machine.

Assure all turning machine parts have come to standstill before inspection or maintenance work starts. Always arrange the Safety Off as described in Chapter 2



6.3 Safety Switch Off

The machine must be set into its "Safety Off Position" before starting any kind of maintenance or repair work.

See Chapter 2 "Safety instructions".

6.4 Restart



See chapter. 5 “Initial Operation”.

All persons in the proximity of the machine must wear safety glasses with lateral protection as well as safety shoes. Ear protection may be required. The operator is obliged to wear close fitting protective clothing.



7.1	Recommendations
7.2	Maintenance and Inspection
7.3	Maintenance
7.4	Wear Parts

7.1 Recommendations

Prior to any repair work on the machine and its drives, secure the machine against unintentional switch-on. Put the machine to its Safety Off Position as described in chapter 2



Failures due to inadequate or incorrect maintenance may generate very high repair costs and long stoppage periods of the machine. Regular maintenance is essential.

Safety and service life of the machine depend, among other things, on proper maintenance.

The following table will show recommendations about time, inspection and maintenance for the normal use of the machine.

The time indications are based on uninterrupted operation. When the indicated number of working hours is not achieved during the corresponding period, the period can be extended.

Due to different working conditions it cannot be foreseen how frequently inspections for wear checks, inspection, maintenance and repair works ought to be carried out. Prepare a suitable inspection schedule considering your own working conditions.

Our specialists will be pleased to assist you with more advice.

7.2 Maintenance and Inspection

Operating hours/ time period	Inspection points, maintenance instructions
Daily prior operation	<p>Check all electrical cables for cuts or damage</p> <p>Check the hose connections for tightness and fixed seat.</p> <p>Check the hose to the filter for damages.</p> <p>Make sure that the dustbin of the filter has been dumped.</p> <p>Check Morflex Coupler, tool plate and diamond tooling for wear and damage.</p> <p>Check that shroud and rubber seal are in good working condition.</p> <p>Check the electric connections for sediments of dirt or foreign bodies.</p> <p>Check the electric motor for dirt and other contaminants.</p> <p>Check gearbox assembly for any leaks of oil from motor and top and bottom of gear box.</p>
Daily after operation	<p>Check for debris, if any, in the dust ports under gear box as well as at handle</p> <p>Check for dirt build up on variable speed drive and electric motor.</p>

7.3 Maintenance

Only those repair works are described which occur within the context of maintenance or which are required to replace wear parts.

If you replace parts yourself for specific reasons, the following instructions and work sequence have to be observed.

You should also stock all spare or wear parts that cannot be supplied quickly. As a rule, production standstill periods are more expensive than the cost for the corresponding spare part.

Screws that have been removed must be replaced with those of the same quality (strength, material) and design.

Prior to any repair works on the machine and its drives, secure the machine against unintentional switching-on. Pull out the mains plug in order to do this. Store the plug near the machine to avoid accidents.



7.4 Wear Parts

Regular wear parts consist of the Morflex coupler.

To replace a worn or damaged Morflex coupler perform the following:

Remove ½"-20 bolts from drive plate using a ½" impact wrench and ¾" socket. Use pry tool to remove assembly from drive plate. Remove ½"-20 bolts from tool plate using a ½" impact wrench and ¾" socket. Use pry tool to remove coupler from tool plate. Replace with new coupler. Replace bolts through new coupler and into tool plate* tighten with impact wrench. Place tool plate assembly onto drive plate with bolts* tighten with impact wrench.

* When replacing bolts, be sure to hand start bolts BEFORE using impact wrench to tighten down. This minimizes the risk of stripping the threads by tightening an unseated bolt.

8.1 Hints for the Electrics



Shut off completely the machine for **repair or maintenance work**. All plugs have to be **disconnected** keep all cables and plugs near the machine in order to prevent the machine from being switched on **accidentally**.



Electric spares need to be ordered with reference to the electrics circuit diagram within this chapter. If there is any doubt about it, you need to call your local STI service technician.



The electrical parts of the machine must be **inspected regularly**. Please note in particular the **specified recurring inspections according to local regulations**. Defects such as **loose** connections or **scorched** cables must be rectified immediately. **Call a skilled electrician or the STI customer service**.



Work on the electrical parts of the equipment have to be undertaken by a **skilled electrician** or by a **trained** person under the **guidance** and **supervision** of a **skilled electrician** as well as in accordance with **the electrical engineering regulations**.

9.1 Diagnosis of failures

9.2 Diagnosis of electrical failures

9.1 Diagnosis of errors



Prior to any repair works on the machine or its drives, the machine must be secured against unintentional switch-on. Put the machine to its Safety off position.

Failure	Possible Reasons for Failure	Failure Corrective Actions
Unusual Vibrations	Uneven or loose surface being ground	Verify suitability of substrate being ground
	Loose or damaged tooling	Inspect tooling to make sure that all connecting hardware is tight and tool is firmly seated to holder
Unusual Noise	Uneven or looses surface being ground	Verify suitability of substrate being ground
	Loose or damaged tooling	Inspect tooling to make sure that all connecting hardware is tight and tool is firmly seated to holder
	Shroud is dragging on the floor	Adjust shroud and tighten to no more than ¼" above floor
Reduced performance or no performance.	Diamond tooling is worn or damaged	Inspect diamond tooling for remaining abrasive, if depleted, replace with new
Dust being produced	Shroud is out of adjustment	Adjust shroud and tighten to no more than 2mm above floor
	Dust hose is clogged	Inspect dust hose and ports for debris that may be clogging hose
	Dust collector malfunction	Verify dust collector is operating properly

9.2 Diagnosis of electric errors



Prior to any repair works on the machine or its drives the machine must be secured against unintentional switching-on. Put the machine to its Safety off position.



Work on **electrical** equipment or operating materials may only be undertaken by a **skilled electrician** or by **trained** persons under the **guidance** and **supervision** of a **skilled electrician** as well as in accordance with the **electrical engineering regulations**.

Failure	Possible Reasons for Failure	Failure Corrective Actions
Motor does not start up	Missing Phase	Check power supply
	Faulty Switch or relays	Diagnosis and replacement by electrician
	Emergency Stop	Unlock Emergency Stop Bottom
Motor stops during operation	current too high power supply circuit breaker disengaged	Disconnect plug Reset Circuit breaker or replace fuse.
	Motor is damaged	Check Motor

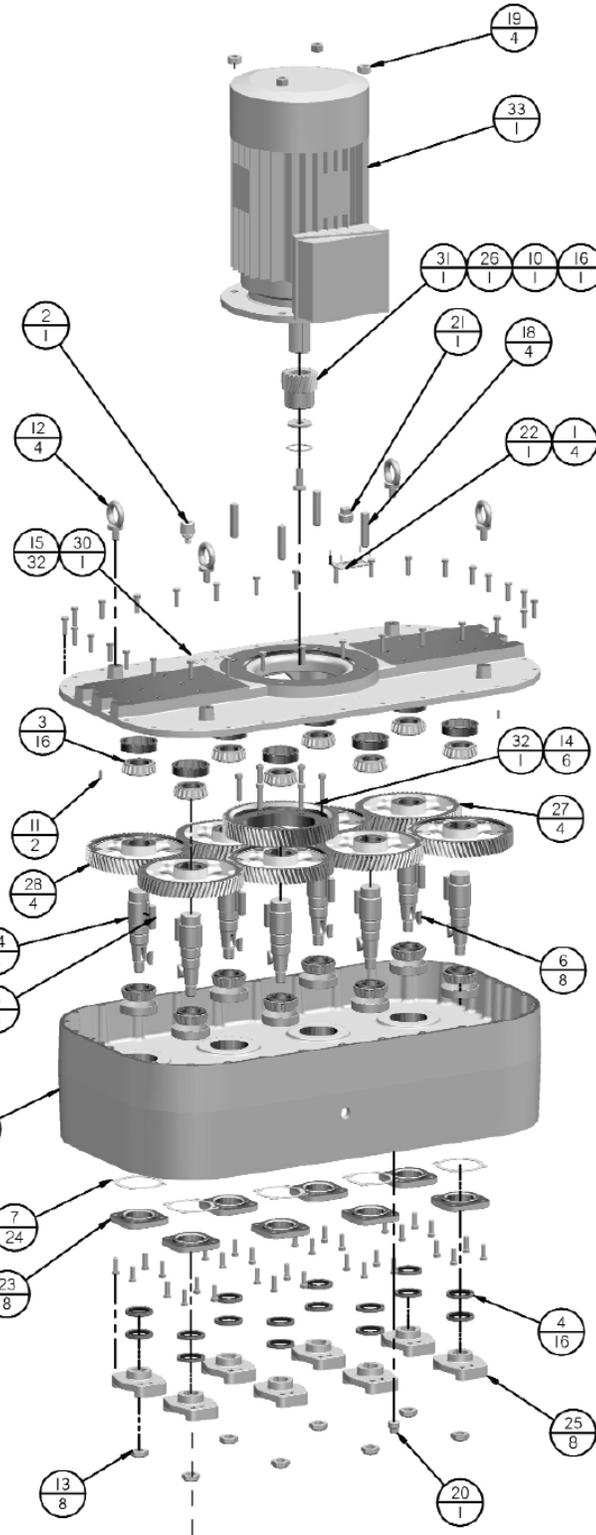
Call your local dealer if you can't solve the problem.



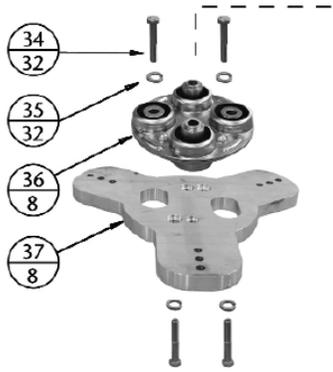
Exploded Diagram of machine

Exploded Diagram of gear box

ITEM #	QTY	PART #	DESCRIPTION
1	4	3808789	DRIVE SCREW #4 X 1/4
2	1	4067682	BREATHER
3	16	FF2300	BRG ASSY 32209
4	16	FG3103	SEAL C/R 16120
5	8	FH0736	KEY 1/2 SQ. X 2
6	8	FH1112	WOODRUFF KEY 3/8 X 1 1/4
7	24	FI0330	SHIM .005
8	24	FI0331	SHIM .007
9	8	FI0332	SHIM .020
10	1	FI1232	INT RET RING N5000-218
11	2	FI1510	DOWEL PIN 1/4 X 3/4
12	4	FI1699	EYEBOLT M16
13	8	FJ9326	LOCKNUT M24
14	6	FJ9816	SOC HD M10 X 50 GRADE 12.9
15	32	FJ9818	HHCS M10 X 35
16	1	FJ9819	HX HD M16 X 40
17	32	FJ9820	HX HD M10 X 30
18	4	FJ9832	STUD M18 X 2.5 X 3" LG
19	4	FJ9833	HEX NUT M18 X 2.5
20	1	FK0110	SQ. HD. PLUG 3/4-14 NPT
21	1	FK0112	SQ. HD PLUG 1" NPT
22	1	FN0353	NAMEPLATE, SUBSTRATE
23	8	HR0247	HR0247 COVER
24	8	HR0250	HR0250 SHAFT
25	8	HR0252	HR0252 COUPLING FLANGE
26	1	HR0253	HR0253 PINION RETAINER
27	4	HR0332	HR0332 HELICAL GEAR 69T
28	4	HR0334	HR0334 HELICAL GEAR 69T
29	1	HR0362	HR0362 HOUSING
30	1	HR0364	HR0364 COVER
31	1	HR0370	HR0370 PINION 22T
32	1	HR0371	HR0371 HELICAL GEAR
33	1	LS4374547	MOTOR 30HP 3 PH
34	32	CS1/2	1/2"-20 3" CAPSCREW
35	32	LW1/2	1/2" Lockwasher
36	8	SM88-602	602 Morflex Coupler
37	8	FL2420C	Aluminum Tool Plate



Prep/Master 4430



Now that you own the most versatile and reliable surface preparation and polishing machine on the market, you need to understand the way it gets the job done. Diamond tooling provided by Substrate Technology has been designed and tested for use with the Prep/Master® line of machinery exclusively. We have assembled a system that takes the guess work out of the industry that is Concrete Surface Preparation and Polishing. These products are proprietary, original creations that are made to work consistently so that you have success on your first and every concrete grinding or polishing project thereafter.

Why a Diamond Cuts – *A diamond's ability to cut is directly influenced by weight, speed and diamond size. As any one of those factor's are reduced or increased the remaining two need to be modified to accommodate that change without affecting performance.* Diamond tooling cuts by using the aggressive characteristics of synthetic or natural diamonds. As the diamond chip is moved across the work surface, its inherent strength causes a scratch in the material equal to the amount which the diamond chip is protruding from the matrix. The matrix that holds the diamond is very important to the diamond chip's ability to cut as well as be retained so that the diamond can be held in place for as long as possible to keep lifespan at an acceptable level. During the grinding process, the matrix holds the diamond by eroding away only at the leading edge of the diamond as a function of abrasion, but the matrix attached to the trailing edge of the diamond stays intact and provides support to the diamond as it is pushed through the work-piece. As the diamond chip wears down from abrasion so does the matrix that is supporting it until the matrix support is reduced so much that the remaining diamond chip falls out of the matrix. After a diamond chip falls out, the wearing of matrix repeats to expose a new diamond chip and the process continues until no matrix or diamond remains.

Why a Diamond Doesn't Cut – The easiest way to explain why a diamond doesn't cut is to say that a given material is harder than what the diamond was created to grind. The reason why the design is flawed for a specific material hardness is not so easy to explain.

Possible Causes:

1. Diamond make-up, that is the individual diamond chip's mechanical makeup, may be the culprit in a material being too hard to cut. The diamond chip design may not allow the diamond to fracture fast enough to maintain an aggressive edge when working on a hard material.
2. The concentration of diamond chips in a given tool may be too great or too little; the more diamond chips touching the floor the less the pressure on each chip and vice-versa.
3. The matrix strength may be too strong to release the diamonds at a consistent rate to always allow a fresh diamond chip to become exposed to the work-piece.
4. The speed at which the diamond tool is being moved across the surface may be too fast or too slow for its design thereby causing excess heat.
5. The weight may be more or less than what the diamond tool was designed to handle and without the proper amount of pressure the diamond tool is being run outside of its designed operating limits.
6. The diamond chip size may be too small or large for the given work-piece and its inherent hardness characteristics.

Whatever the reason the diamond tool is failing, correcting the problem is usually as easy as adding water to the equation; because heat, in most cases, inhibits the cutting ability of the diamond tool.

Heat and Diamonds – Heat plays a crucial role in the life and cutting characteristics of any diamond tool because just like a metal cutting tool there is an optimal temperature at which it is designed to operate. When a diamond is moved across a surface, heat is being produced by the friction caused by the tool movement and therefore it is impossible to prevent some heat being created. With regard to acceptable heat levels, diamond tools are designed to dissipate heat by *transferring* heat at a given rate so the cutting ability or lifespan is not compromised. The diamond tool transfers heat into the metal that holds the diamonds and matrix and eventually into the tool holder. The diamond tool also transfers heat as a function of cutting the concrete or stone into small chips that

then carry the resultant heat with them away from the diamond tool (i.e. Chip Clearance). When one or both of these temperature regulators are not performing in the way they were designed, the diamond tool stops cutting or keeps cutting but lifespan is reduced drastically. The best indicator that a diamond tool is operating outside its required temperature range is when the diamond tool cannot be held in a bare hand.

Super-Abrasive Applications – When a diamond tool is used on a surface that is softer than that which it was created to cut, the productivity will be high but so will the diamond cost per square foot.

Examples of super-abrasive applications – thin-set mortar, cementitious or gypsum based underlayment, epoxy coatings containing silica, soft concrete (carbonized or rain slab) and soft natural stone such as limestone

Acceptable Cost per Square Foot – Diamond tooling should be costing the equipment owner between \$.03 & \$.05 per square foot for each type of diamond tool being used. So if there is a project that requires 4 polishing steps, the diamond cost should be \$.12 - \$.20 per square foot (\$.03 - \$.05 per square foot/per diamond type X 4 total types) overall. *This is a general guideline, but it is important to always strive for tool choices that yield close to this amount to keep cost at an acceptable level.*

Plug Stone Holders vs. Tool Plates – The two ways to hold diamond tooling on the Prep/Master® is to either use a 2” plug stone holder or an aluminum tool plate; both have their advantages and disadvantages.

The 2” plug stone holder offers convenience in diamond tool change because removing tools only requires a hammer and replacing the tool only requires hand pressure to twist the tool in. Another advantage, due to the creation of the E-Z plug, the 2” stone plug holder can accommodate a variety of tools for prep and polishing. One disadvantage is that stone holders can wear out where the 2” plug and the 8.5° taper interface. When the taper in the stone holder wears, the diamond stones sit at a different height based on that wear which will cause the diamonds stones to make an uneven cut across an otherwise flat surface; this condition can lead to premature wear of diamond tooling as well as a floor not being cut flat. Another disadvantage of the 2” stone holder, it’s easy to mix matched sets of diamonds. When used diamonds are mixed, the tool life is reduced and the likelihood of different tool heights being used is increased since it is difficult to match used diamonds exactly; this also causes an uneven cut.

The aluminum tool plate offers a flat cut when new or used because the tooling is mounted using hardware on a flat tool plate holder.

The tools are mounted using hardware that does not allow any discrepancy in height when mounted properly. Another advantage, when multiple tool plates are purchased, the operator can keep the tool plates assembled with each diamond type when not in use so that the diamond tools will be kept in matched sets until they are depleted; this accomplishes both a flat cut as well as maximum diamond lifespan. The disadvantage of the tool plate is that an impact wrench and sockets are required to change tooling; the time it takes to change tools on a tool plate versus a 2" stone plug holder is approximately 5 times as long.

To sum up the difference between the two holder types: Convenient tool change at the expense of a flat cut if stone holders are not replaced after 100,000 square feet (10,000M²).

Segment Attachment – When attaching the diamond segment to the tool plate ensure that the hardware is tight to keep tool from loosening. Also make sure that the tool plate, as well as the diamond segment, is clean where they meet to ensure the flattest possible cut. If the surfaces have build up, the diamond tool will cut at an angle that will essentially be gouging the surface of the concrete rather than grinding across it.

Recommended Weight Configurations – The Prep/Master® machines come with the necessary amount of weights needed to perform all the processes it has been designed for. It is important to realize, however, that the full set of weights will not be used for all applications. So when polishing concrete, for instance, the machine may only need half the available weights on the head to provide the polish that is desired on that particular slab; weight will also affect the life of the polishing tools being used. It is important to note this because when performing any process with the Prep/Master® the operator must establish what amount of weight is needed to yield the best possible product; in the shortest amount of time and with the least expense in diamond tooling cost.

Recommended Speed Settings – Any given tool has a safe operating range with regard to speed. As a rule, no tool is to be run at less than 30Hz or more than 90 Hz. To determine the best speed, it is best to start slow (+/-45Hz) and monitor the tools performance. For all tools listed in this guide, appropriate speeds follow each product description.

Importance of Concrete Densifiers – Whether an unsealed concrete surface is polished or unpolished, that surface will deteriorate if a densifier is not used. Concrete densifiers offer protection to a concrete floor by a chemical process in which the densifier reacts with the Calcium

Hydroxide (Free Lime) present in all cured concrete.

During hydration, the process by which cement dries, the compound Calcium Hydroxide is formed. This compound is a weak by-product of hydration and contributes nothing to the abrasion resistance or overall strength of the concrete. This weak material can be very easily abraded from the surface of the concrete which leads to small voids as the particles are pulled out. Over time, these voids collapse which make them larger and lead to dulling of the concrete surface or in extreme cases de-lamination. The chemical densifier fills the voids with crystal growth created by its reaction with the Calcium Hydroxide and essentially 'glues' the cement particles together. The result is a surface that exhibits increased abrasion resistance which prevents dusting, de-lamination or loss of shine if polished. We think it's important to mention densifiers here, because if a densifier is omitted from a polishing process, that surface will **NOT** be permanent.

Choosing the Right Diamond Tool for the Application – Using the correct diamond tooling for a specific application is the most important part of ensuring productivity and an acceptable cost per square foot (lifespan) for the specific tool. With that said, predicting which tool to use is probably the most difficult thing to do because concrete surfaces are so variable from one pour to the next and depending on the surface strength or the strength and composition of topical materials (thin-set, patch, adhesive, etc.) the variation from one material to the next can cause the diamond tooling to be affected in any number of ways.

Thin-Set covered concrete – 10S Diamond – 16 Grit

Patch covered concrete – 10S Diamond – 16 or 30 Grit depending on hardness

Adhesive covered concrete – 3SEG – 16/20 or 30/40 Grit

Epoxy Coatings (un-sanded) – 3SEG – 16/20 or 30/40

Sanded Epoxy Coatings – 10S Diamond – 16 or 30 Grit depending on finish desired

Hard Concrete – 10S Diamond – 30 Grit with the use of water

Note-There are many different conditions that will be encountered when preparing a concrete slab, the above is a general list of those conditions.

There is no substitute for experience and observation when it comes to determining exactly which diamond design will work in a given application.

Diamond Tooling Offered by STI – Substrate Technology offers diamond tooling for any phase of the grinding or polishing process. Below is a list of those tools and their applications.

Concrete Applications

Metal Bonded Tooling

3SEG Diamond – The 3SEG diamond is a 3”, metal bonded diamond used for the aggressive removal of fresh or thick adhesives, epoxy and any other flexible material that requires an aggressive edge to thoroughly remove the coating.

Grits – 16/20, 30/40, 50/60 & 80/100

Life – 30,000SF/3,000M²

Speed – 50Hz

10S Diamond – The 10S diamond is a 3”, metal bonded diamond used for the aggressive removal of dry or thin adhesive, sanded epoxy coatings, thin-set, floor patch, concrete surface correction (spalling) and scratch removal prior to polishing.

Grits – 16, 30, 70, 120, 220 & 400

Life – 30,000SF/3,000M²

Speed – 45Hz

Resin Bonded Tooling

3TERZ Pad – The Terrazzo polishing pads were made to cut, well, terrazzo. However, after some experimenting, we found that the Terrazzo pads also work well for cutting concrete; whether new or old. The great thing about the Terrazzo pads is that they cut like crazy, but leave a super-fine scratch pattern.

New, Unsealed Concrete – Terrazzo pads are a first cut tool for new, hard-troweled concrete. They are to be run wet to ensure even scratch pattern and consistent removal of the cream layer of concrete. When used properly, the result should be consistent exposure of the fine sand particles that reside beneath the paper thin layer of the hard troweled surface.

Grits – 50 & 100

Life – 8,000SF/800M²

Speed – 50Hz

Existing Concrete – Terrazzo pads cannot be used to remove coatings or imperfections; they are a tool for scratch removal or as a first cut tool on smooth surfaces. An existing concrete slab that is coated or damaged must first be cleaned with the appropriate tooling to a minimum 70 grit scratch in the surface of the concrete before the Terrazzo pad can be utilized.

Grits – 50 & 100

Life – 6,000SF/600M2

Speed – 50Hz

FL-07 Pad – For use after Terrazzo Pad 100 grit after surface has been cleaned and allowed to dry. The grit designation is 3*, 4*, 5, 6, 7, 8 & LUX. These pads are used in the order of numbers from lowest (#3) to highest (#8) and the LUX pad is a final buffing step.

**#3 and #4 are pads that can be omitted from the process if the 100 Terrazzo pad is used prior to beginning the FL-07 process. If 100 Terrazzo pad does not precede FL-07 process, then the floor must be ground to a minimum 120 grit metal finish.*

Life of FL-07 Pads – 8,000SF/800M2

Speed – 50Hz

REZ/MET Pad – For use after minimum 70 grit grinding application

Grits – 35, 50 & 100

Life – 5,000SF/500M2

Speed – 45Hz

Premium Plus Pad – For use after 100 Terrazzo pad 100 grit after surface has been cleaned and allowed to dry.

Grits – 35, 50, 100, 200, 400, 800, 1500 & 3000

Life – 4,000SF/400M2

Speed – 60Hz

Special Application Tooling

Carbide Scrapers – This tool is used when excessively thick or fresh adhesive needs to be removed. The process is done wet to allow the slicing of the material from the surface.

Speed – 40Hz

PCD Wolverine – This tool is used for the aggressive removal of thick (<2MM) materials. The profile left by the PCD is very rough and usually needs to be followed with a metal bond diamond to smooth the surface to an acceptable profile.

Speed – 40Hz

Common Applications and Recommended Procedure

Thin-set**, sanded epoxy or patch** removal:

10S Diamond 16 Grit*

Adhesive, flexible coatings and non sanded epoxy:

3SEG Diamond 16/20 Grit*

**Because of the aggressive scratch left by the 16 or 16/20 grits, a follow up with 30 grit may be necessary before topical sealers or VCT can be applied. This prevents telegraphing of the scratches through the finished product(s).*

*** When performing patch removal it is important to remember that regardless of the patching material or underlayment being removed there is some percentage of sand present in the material. This is important to remember because sand, whether coarse or fine, is very abrasive to the diamond tooling being used. See [‘Choosing the Right Diamond Tool for the Application’](#) It’s also worth noting that in most cases underlayment is a relatively soft material that places more drag on the motor than a grinding or polishing process. So varying the placement of the weights on the head or handle may be necessary depending on material softness and desired productivity. Another indicator of an overload is the display of an overload or lo-volt fault displayed on the variable speed drive display. See [‘Recommended Weight Configurations’](#)*

Concrete Polishing with preparation/removal:

10S Diamond 30 Grit

10S Diamond 70 Grit

3TERZ Pad 100 Grit (wet)

FL-07 Pad #5

Densifier Application

FL-07 Pad #6

FL-07 Pad #7

FL-07 Pad #8

Densifier Application

FL-07 Pad #LUX

Concrete Polishing of new, unsealed, hard-troweled concrete:

3TERZ Pad 100 Grit (wet)

Premium Plus Pad 200

Densifier Application

Premium Plus Pad 400

Premium Plus Pad 800

Densifier Application

Premium Plus Pad 1500