

OPERATING PROCEDURE

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This guide contains the procedures for performing miscellaneous testing and maintenance that are performed by the Company.

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Quality: Whenever any wiping is to be done on booth/equipment, clean lint-free material and clean water (no soap!) is to be used.

AIR FLOW TEST PROCEDURE

To be performed: As per required by BSMS.

Equipment required: Alnor Velometer on ALo@ range.

Quality: Do not blow into velometer or use compressed air near the holes. Powder will damage the internal parts of the velometer. Perform tests only when the booth is clean.

Procedure

1. Turn the booth on.
2. Perform tests in required locations as per BSMS
 - a) Ensure velometer is on ALo@ range (as air flow in booth is very little).
 - b) Position velometer so that the air current being measured will enter the

- meter through the ALo@ range hole.
- c) Observe the reading in CFM. If the needle fluctuates a lot move the meter around a bit to attempt to get a more stable reading; wait until reading stabilizes to get an accurate reading.
 - d) Record the reading on BSMS sheet.
3. Once all the required readings have been done, adjust the booth damper as follows:
- a) 100 - 150 CFM: Do not adjust damper.
 - b) < 100 CFM: Open damper more and retest.
 - c) > 150 CFM: Close damper more and retest.

Note: CFM may be adjusted lower as long as powder is contained in the booth.

4. Turn booth off (if parts are not ready to be painted).

PHOTO SENSOR ALIGNMENT

To be performed: As per required by BSMS.
When auto guns are not performing properly.

Equipment Required: Allen wrench
Phillips screwdriver

Safety: Ensure that photo sensors and mirrors are always clean - free of dust, powder etc. Clean only with UV Detector Cleaner and a clean lint-free kimwipe.

Procedure

This process must be done for all photo sensors.

1. Ensure that the sensor is set for dark (DK) readings and not light (LT) readings.
- The switch is behind the plastic cover on the back of the sensor.
2. Align the sensor on both the horizontal and vertical axis.
 - a) Place your hand in front of the light beam.
 - i) Red light in the back of sensor should shut off.
 - b) Remove your hand quickly and observe how quick the red light comes on
 - i) Instantaneous: Sensor is fine - do not adjust anything.
 - ii) Momentary delay: Sensor needs adjusting - call maintenance.

UV DETECTOR CLEANING AND TESTING PROCEDURE

To be performed: As per required by BSMS.

Equipment required: Proper size wrench
Kimwipes
UV Detector cleaning solution
Lighter

Cleaning Procedure

Safety: Do not perform cleaning while parts are being painted in the booth as it would disengage a very important safety device. Quartz Lens are very sensitive. Do not use window cleaner or water when cleaning quartz lens. Use a kimwipe and UV Detector Cleaning Solution ONLY.

1. Turn UV Detector out away from the booth
- loosen mounting bolts enough so that it turns easily.
2. Remove black cover on the detector
 - a) Release the spring clasps
 - b) Pull cover off
3. Remove Silver Spring clip from around the detector lens and wipe clean with a kimwipe.

Note: Alarm sounds - booth functions cease.

4. Clean quartz lens
 - a) Saturate a lint-free kimwipe with UV Detector cleaning solution **ONLY**.
 - b) Wipe lens clean with the kimwipe.
 - c) Quickly dry the lens with a clean dry lint-free kimwipe. Be sure to leave no spotting or residue on the lens.
5. Put the Silver Spring clip and black cover back in place and secure with the spring clasps.
6. Re-aim the detector towards the inside of the booth and tighten down the mounting bolts. Test to ensure the detector is solidly in place.
7. Proceed to testing prior to starting production.

TESTING UV DETECTOR SYSTEM

Safety: Powder dust can be explosive/flammable in the booth environment. Do not perform test when 1) Parts are being painted in the booth or 2) The booth interior has not been blown clean.

1. Turn booth fan on
2. Using a spark or a flame from lighter, slowly bring spark/flame toward the UV detector=s line of vision

- test should be performed near the detector

3. The UV detector upon detecting spark/flame should
 - a) Set off booth alarm
 - b) Simultaneously shut the booth off

If the alarm does not sound and/or the booth does not shut off then:

- a) Shut the booth off
- b) Contact Maintenance and Electrical Maintenance immediately

Safety: Do not paint any parts in the booth if the UV detector system is not working properly.

HIGH VOLTAGE CABLES AND CONNECTORS LUBRICATING PROCEDURE (Automatic Guns)

To be performed only by Maintenance (**assisted by painters when necessary**).

Do's

- Establish a protected path for the cable to follow between the gun and the power unit.
- When spraying fluids, cover the cable and spray gun with non-conductive plastic wherever possible to protect them from contact with solvent and/or coating material. Change the plastic regularly.
- Anchor the electrostatic cable so that no strain will be placed on the cable. The cable can be anchored to the powder feed hoses leading to the gun so that any strain put on the cable will be born by the hose.
- Tie the cable to spray gun mounting bar (automatic guns) so that it is not damaged by abrading or striking other objects.
- If the electrostatic gun is mounted to a reciprocator or a similar movable machine, use elastic straps or springs to anchor the cable. Make sure any cable loops required to accommodate machine movement are prevented from flexing severely or striking hard surfaces. (Automatic guns)
- Clean and protect the ends of the cable so that no contaminants, oils, particles, solvents, etc. are carried into the gun or power unit where arcing, carbon tracking or burn through will occur.
- Make sure sufficient dielectric grease is present in the gun cable bore or insulating

tube to displace all air when the cable is inserted. Also, assure all air is displaced from the power unit well by the proper application of dielectric grease or oil as directed by the power unit manual.

Don'ts

- Don't allow the cable to become cut or abraded around sharp corners such as booth edges.
- Don't walk on the cable or run over it with heavy objects.
- Don't bend the cable around a radius of less than 6 inches at stationary points and 8 inches at flexing points.
- Don't stretch the cable or allow the reciprocator, product, or conveyor to pull on it. (Automatic guns)
- Don't allow loops or loose segments of the cable between anchor points to flex severely or strike against other objects.
- Don't anchor the cable to moving machinery unless allowances have been made for cable movement.
- Don't bundle cables together in such a way that they can strain or abrade each other.
- Don't put dirty (even slightly dirty) cable ends into the well of the power unit or electrostatic gun.
- Don't use ketones, lacquer thinner, or other active solvents to clean the outside of the cable as this will damage the outer cover and cause electrical breakdown.
- Don't use sharp instruments that may cut or dent the cable when you are installing it.
- Don't reinstall the cable without regreasing (where appropriate) after maintenance.

Equipment required: Dielectric grease/Vaseline
Proper sized wrench
Clean lint-free rag

**Safety: Be sure to follow all lock-out procedures
Be sure all power to the booth and guns are off.**

**Quality: Be very careful with all plastic threads. DO NOT CROSS THREAD THEM.
They damage very easily.**

Lubricating Cables

1. Unscrew cable from the back of the control module and pull cable out.
2. Wipe the old lubricant off of the cable and metal tip.
3. Inspect for:
 - a) Wear or oxidization
 - b) Burn marks from sparks
 - c) Cracks or any other damage
4. Generously lubricate cable and tip.

5. Slide cable back into control module.

Quality: Avoid scraping lubricant off the cable when inserting it. Do not cross thread the plastic mount. Ensure that there are no kinks, bends or twists in the cable. This will cause damage to the cable.

Lubricating Connectors

1. Remove from the back of the gun
 - a) Powder Feed hose
 - b) Black/White air lines
2. Using a proper sized wrench remove the retaining nut and pull the gun from the gun bar.
3. Using the wrench remove the mounting bolt and send any damaged bolts to Maintenance for replacement.
4. Wipe clean the black tip and brass ring on mounting bolt.
5. Inspect black tip to ensure that it will still plunge downward.
6. Inspect brass ring for damage to soldered joint and gently scrub the ring with a scotchbrite pad or steel wool. (If broken give to Maintenance to fix.)
7. Sparingly lubricate black tip and tighten back onto gun body.
8. Sparingly lubricate brass ring.
9. Put gun body back onto gun bar and tighten retaining nut onto mounting bolt (ensure gun is pointing in the proper direction prior to tightening down).

WARNING: Do not cross thread the bolts - they are plastic and damage easily.

10. Wipe gun body down with a clean rag to remove any excess lubricant.
11. Replace powder feed hose and black/white air lines.

KV TESTING PROCEDURE

To be performed: Daily as part of BSMS
In the event of a charging problem with a spray gun
During Preventative Maintenance

Equipment required: Electrostatic System Analyser

1. Colour bar scale indicates the general condition of a component or system.
 - a) Yellow/Green zone - indicates acceptable efficiency
 - b) Red zones - indicates a faulty component. Further investigation is required to identify the problem (i.e.: control module, gun cable, power unit).

2. Number scale indicates a value of the KV output of the gun being tested.

This is the number recorded as KV=s on the BSMS and must be recorded every time the guns are tested (not just on weekly maintenance) so that any changes in the readings can be monitored. Comparing the current readings with previous testings will show any changes and allow for preventative maintenance to be performed before the component breaks down.

Procedure for manual and automatic guns

1. When doing the regular daily check, complete BSMS first before performing test.
2. Turn off flow and atomization regulators to all guns by unhooking the four main air lines to the Venturi pumps.
3. Set PLC to >set guns= program.
4. Turn on the master control module.
5. Set all guns to 90 K.V.=s.
6. Turn power off on each individual gun control module.

Safety: Personnel must not enter the booth prior to step #7.

7. Move gun arrays into the booth at least 12 inches to keep the ion field away from the grounded booth walls.
8. Attach the analyser ground wire to a good, secure ground.

Warning: Failure to provide a good ground may result in a serious electrical shock!

9. Ensure that electrode tips are clean and free of any impact fusion.
10. Place the collector ball at the end of the analyser against the electrode of the spray gun, keeping your body as far away from the gun as possible to ensure the most accurate reading.
11. Turn on the power for that gun on the control module. Then:
 - a) Allow reading to stabilize.
 - b) Note the reading in the colour scale and record the reading in the number scale.
 - i) Manual spray guns - are tested by squeezing and holding the trigger.
 - ii) Automatic spray guns - are tested by turning the power on manually to each gun one at a time.

12. When testing is complete:

Disengage power to each spray gun tested by turning off the power button on its control module.

Safety: Ensure that the analyser needle on the number scale reads zero before removing the collector ball from the electrode tip so that any residual electrostatic charge can dissipate through the ground wire. Failure to do so may result in a serious electrical shock!

13. Record readings onto appropriate weekly and daily log sheets. Compare current readings to previous readings and report any variances or non-conformances to Maintenance or your Supervisor immediately.

14. Reset KV=s to 60.

15. Shut down booth, or prepare for parts to be painted.

16. Change PLC program to new program required.

17. Reattach the four main air lines for flow and atomization to Venturi pumps.

CARTRIDGE FILTER REPLACEMENT PROCEDURE

To be performed: When collector pressure reaches 5.5" of W.C.
(Max. 6.5" of W.C.) Or
Colour contamination occurs

Equipment required: 30 clean filters
Vacuum cleaner
Tack cloths
Screwdriver
Wrench (correct sizes)
Ratchet & socket

Safety: Be sure to follow all lock-out procedures

Procedure (broken down into 5 basic steps)

STEP A Removing the filters

1. Remove baffle plates and begin cleaning them.
2. Blow down the walls of the collector to get down as much powder as possible into the hopper

WARNING: Be careful not to damage any of the filters with the air wand. Do not blow directly on filters.

3. Shut booth down and lock it out.

4. Unhook from the collector
 - a) Powder hoses
 - b) Venturi air lines
 - c) Low level powder alarm to the hopper
 - d) Blue air lines attached to the side of the collector
5. Unlatch and unhook both tie-down straps from the booth.
6. Roll collector away from the booth.
7. Open doors to gain access to the filter end plates. Use a wrench or flat head screwdriver.
8. Remove filter end plates (15 of them - 1 for every 2 filters) using a ratchet and socket.
 - a) Clean end plates
 - b) Store nuts/washers in a safe place
9. Slide out cartridge filters and place them in either a clean box or plastic bag. Do not damage them as they can be cleaned and reused.

IF ONLY CHANGING THE FILTERS AND NOT CLEANING OUT THE COLLECTOR AND HOPPER PROCEED TO STEP AD@

STEP B Remove Hopper/Clean Collector

1. Remove triangular braces by unbolting them and wipe them clean.
2. Vacuum out the inside of collector and then wash clean.
3. Remove hopper
 - a) Unhook 4 yellow air lines at the bottom of the hopper (2 on each side)
 - b) Unhook 2 air lines at the rear of the hopper.
 - c) Rotate handle on the side of the collector clockwise to drop the hopper from the collector.
 - d) Pull hopper out of collector.
4. Re-install triangular braces

Note: Ensure nuts are tightened securely.

STEP C Clean Out Hopper

1. Vacuum screener before removing.
2. Remove and clean vibrating screener thoroughly
 - a) Lift screener out of hopper
 - b) Detach two air lines from the motor at the bottom
 - c) Clean screener

3. Remove and clean venturi pump connectors from the hopper feed tubes.
4. Clean out hopper
 - a) Scoop out all the powder into clean plastic bags. Be careful not to contaminate the powder.
 - b) Vacuum remaining powder out of the hopper.
 - c) Gently tack out any residual powder.

Quality: Do not use tack rag or wet rag on fluidization plate as it will plug up and then need to be prematurely replaced.

5. Reattach feed tubes and venturi pump connectors
6. Reassemble screener
 - a) Attach the air lines to the motor
 - b) Place screener in position on top of hopper
7. Slide the hopper back into the collector. Secure it in place by pulling the handle on the side of the collector counter-clockwise.
8. Reattach the two air lines at the rear of the hopper. (Screener Lines)
9. Reattach the four yellow air lines at the bottom side of the hopper.

STEP D Replace Cartridge Filters

1. Slide the new filters into place with the rubber seal ends first.
2. Put on end plate and snug into place. Do not tighten too much yet in order to make final adjustments to filters.
3. Align the two filters by peering down them. They should not overlap one another, the filters should appear as though they are one unit.
4. Centre the end plate on the filter and tighten down securely. Ensure end plate washers have good seals on them.

Quality: Do not bend the end plates.

5. Double check . . .
 - a) Alignment of filters
 - b) Compression of seals
 - c) Bolts are tightened
6. Close doors and retighten ensuring that the seal is good.
7. Collector is ready for reattachment to booth.

STEP E Season Cartridge Filters

Quality: Failure to properly season filters will result in powder fines getting through the filter media and into the final filters resulting in premature replacement.

1. Perform BSMS to ensure the booth is working properly.
2. Start-up booth
3. Move auto guns toward the centre of the booth in order to keep the powder from being attracted to the booth walls.
4. Fill hopper with powder

Productivity: Double check to ensure that the proper colour is being added!

5. Make the following adjustments:
 - a) Turn the pulse pressure to 25 PSI.
 - b) Turn the collector pressure to 2.0" of W.C. Increase pressure only if and when the booth will not contain the spraying powder any longer. Pressure should then be increased in small increments only.
6. Turn all the auto guns on and . . .
 - a) Turn all KV=s to 0
 - b) Increase flow rate to 20 PSI.
7. Add four boxes of powder to the hopper (see #4 warning!)
8. Spray powder until the hopper is completely empty.
9. Reset the following:
 - a) Pulse pressure back to 80 PSI.
 - b) KV=s to normal settings
 - c) Regulator pressures to normal settings.
10. Continue back pulsing cartridge filters for approximately 1 hour before shutting off the booth.
11. Begin production.

GROUNDING CONNECTIONS TESTING PROCEDURE

To be performed: Once per shift

Note: If grounding test results are questionable check several racks throughout shift. If any tests fail (exceed 1 megohm) then contact maintenance.

Safety: To minimize the possibility of ignition (of air borne powder in powder booth) by static electrical sparks; powder transportation, application, recovery equipment, work pieces and all other conductive objects shall be grounded with a resistance to ground not exceeding one megohm. Ungrounded objects store electrostatic charge when subjected to an electrostatic field - i.e.: powder coating. When charge becomes too great, it is released to ground causing an arc or spark. At this point the UV detectors on the booth will alarm and shut the booth down (within 1/2 second of detection). In addition, when racks, hooks, and elements of the line lose their ground, powder will fail to properly adhere to the part surface to be painted. Most of the powder will be reclaimed into the booth recovery system instead of coating your parts. As a result, parts will be light. Therefore, it is extremely important in terms of both safety and quality that you ensure parts have an adequate ground prior to painting.

Equipment required: Fluke 70 Series II Multimeter
- cable attached to copper ground bar (to attach meter to).

Procedure

1. Visually inspect the 2 grounding straps from the collector to the booth.
2. Visually inspect copper ground bar to ensure it is touching the flat bars of the line as they go through powder booth.

Note: If there is a problem, contact your supervisor.

3.
 - a. Turn on your Fluke 70 Series II Multimeter with your black and red probes plugged into their respective input jacks.
 - b. Turn the rotary switch to the Measuring Resistance mode (this is the fourth setting from off clockwise; it resembles a horseshoe).
 - c. Push the yellow push button until an >M= appears on the right hand side of display screen. You are in megohm mode.
 - d. Press yellow button again to put the meter in fixed range so that it will not revert to Auto range. This symbol will be displayed - ? on the left side of the screen.
 - e. Test your meter by touching the ends of both probes together. Your reading should be 0. If it is not, contact maintenance.
 - f. Now you are ready to take a reading. With your alligator clamp (black) attached to the permanent cable leading to ground bar, touch the red probe to either a rack or a part passing by you going into the booth. Reading should be from 0 (ideal) to 0.9. A reading of 1 megohm or greater indicates no ground. (For more information on the Multimeter, refer to MAN007.)

Note: If this test fails, contact your (Company).

Safety: When taking a reading, stay out of the fall zone beneath the rack or parts.

IONIZATION AIR TEST PROCEDURE

1. Turn booth main power switch on.
2. Move gun arrays all the way to the farthest back position (all the way out of the booth).
3. Switch gun arrays to manual position to keep them from being moved accidentally.
4. Turn on the automatic guns Emergency Stop button.
5. Turn conveyor interlocks to A Bypass@.
6. Pull black air line out of back of auto gun #1.
7. Hold the end of the black air line near your hand. Pressure should be fairly light (low PSI).
8. Adjust pressure with small black regulator above gun control module number indicator.
9. Repeat for all 18 automatic guns.
10. Replace the black air lines after testing each gun, ensuring they are securely clipped into place.
11. Turn conveyor interlocks back on.
12. Shut off the automatic guns by depressing the stop button.
13. Switch auto guns back to auto position.
14. Reset booth PLC.

PULSE VALVE ALIGNMENT PROCEDURE

Equipment Required: Tape measure
Pipe wrench
Ladder

Two people are required to move the collector.

1. Lockout main power switches on booth.
2. Shut off main air valve to booth.

Safety: Ensure all air is bled from booth system.

3. Disconnect 2 main air lines to collector.
4. Unlatch collector and pull away from booth.
5. Measure the pulse valves using the measuring guide starting from the bottom and work your way upward.
6. Measure the pulse valves from outside to outside
7. Check for any indication of air leaks.
8. Repeat until all 15 pulse valves are aligned.

Warning: Make sure to remove all tools!

9. Relatch collector and attach air lines.
10. Turn on main air valve to booth.
11. Unlock booth main power switch.

AUTO GUNS ALIGNMENT PROCEDURE

Setting:	Automatic gun #1 - 98" (from floor)	#10- 97"
	#2 - 86"	#11 - 86"
	#3 - 76"	#12 - 76"
	#4 - 66"	#13 - 66"
	#5 - 56"	#14 - 56"
	#6 - 46"	#15 - 46"
	#7 - 36"	#16 - 36"
	#8 - 26"	#17 - 26"
	#9 - 19"	#18 - 19"

Procedure:

1. Switch to manual position until the automatic guns are at the point where they are moved into the booth approximately two feet.
2. Adjust to the centre of the spray tip and secure in place with a >T= handle Allen wrench.

BAFFLE PLATE ALIGNMENT

The collector opening is 80" high. Each baffle plate is 8" high. Using a large tip, flat screwdriver, adjust the plates so that there is 4.5" of space in between each baffle plate.

GUN ARRAY POSITIONS

South Gun Array

	Position	From Centre of Booth
No sensors broke	- #1 -	12"
1st sensor broke	- #2 -	19.5"
2nd sensor broke	- #3 -	25.5"
3rd sensor broke	- #4 -	31.5"
4th sensor broke	- #5 -	37.25"

North Gun Array

	Position	From Centre of Booth
No sensors broke	- #1 -	12"
1st sensor broke	- #2 -	19.25"
2nd sensor broke	- #3 -	25"
3rd sensor broke	- #4 -	31"
4th sensor broke	- #5 -	37"

PULSE VALVE ALIGNMENT & MEASURING GUIDE

