Procedures Manual

Precidium™ Bus Transit Flooring System

Quantum Chemical
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1. Surface Preparation

1.1. Removal (refurbishment only)

A. All metal trim, covers and edging are to be removed and sand blasted to eliminate all residues, rust, and unwanted material. Immediately following sand blasting, all pieces must be primed with an approved anti-corrosive steel primer to maintain a rust-free surface for the floor installation.
B. All wood surfaces are to be sanded down to remove all previous flooring, all adhesive, and all dirt and residue.
C. All steel panels in the sub floor are to be sand blasted and/or hand ground to ensure surfaces are free of all **RUST**, carpet, adhesive, rubber flooring and any remaining dirt and residue. They must be immediately primed with an anti-corrosive steel primer to maintain a rust-free surface for the floor installation.
D. All vertical surfaces that will be coated must be cleaned of any paint, silicone caulking, rust, carpet, adhesive and any remaining dirt and residue. All metal substrates must be primed with anti-corrosive steel primer.

1.2. Transitions

A. All trim and paneling that have a transition to the *Precidium™ Transit Floor* must not have a height on the top edge higher than 0.1875 inches. Any parts that have a transition from the subfloor to the top of the part greater than this must be lowered to fit within this tolerance.
B. The process to lower the transition is going to be specific for each part and will be decided with the Design/Project Engineer and the Project Managers on the job site.

1.3. Leveling

A. All cracks, depressions, voids, seams and overhangs creating shadows **MUST** be filled with an approved, high quality body filler and sanded flush.
B. All screw holes are to be filled with filler prior to reinstallation of the metal trim, covers, and edging.
C. The subfloor should be leveled to remove any low/high areas. This should be smooth to within 1.8 millimeters over 1 meter in any horizontal direction.
D. Once the above is complete the entire subfloor is vacuumed to remove all dust, dirt and debris. *Once the car is vacuumed, further* a*ccess to the car will be limited to 2 doors, and all personnel must wear unworn tyvek boot covers when entering the car to prevent the re-entry of dirt and dust.*

1.4.Quality Inspection Report: 1. Surface Preparation

Date Started: _____ Car Number: _____

Date Completed: _____ QA Officer: _____

1. All metal trim, covers and edging were removed, cleaned, sand blasted, and primed with anti-corrosive primer? Yes ❑ No ❑
2. All wood surfaces were sanded down and all carpet/rubber flooring, adhesive, and dirt/residue were removed from subfloor? Yes ❑ No ❑
3. All steel panels in the sub floor were shot blasted/hand ground to a surface free of all **RUST**, carpet, adhesive, rubber flooring and any dirt/residue and primed with anti-corrosive primer? Yes ❑ No ❑
4. All required vertical surfaces were cleaned of any paint, silicone caulking, rust, carpet, adhesive, dirt/residue, and all steel vertical surfaces were primed with an anti-corrosive steel wash primer? Yes ❑ No ❑
5. All trim and paneling that has a transition to the *Precidium™ Transit Floor* does not have a height on the top edge higher than 0.1875 inches in respect to the subfloor? Yes ❑ No ❑
6. All cracks, depressions, voids, seams have been properly filled, cured, and sanded flush? Yes ❑ No ❑
7. All screw holes have been filled prior to reinstallation of the metal trim, covers, and edging? Yes ❑ No ❑
8. The entire subfloor has been vacuumed and all dust, dirt and debris has been removed? Yes ❑ No ❑
9. The entire surface to be coated is ready to be taped, masked, paper/plastic, wire trimmed and no further cleaning or prep work is required? Yes ❑ No ❑

If any questions were answered 'No', provide a detailed explanation.

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If any questions were answered 'No', approval from Quantum's Project Manager is needed to continue

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QA Officer *Project Manager*

2. Pre-Spray Preparation

2.1. Wire Trim

A. The wire trim is to be placed everywhere the *Precidium™ Transit Floor* terminates; this is defined with the wire side of the wire tape. This is predetermined by Quantum's Project Manager.
B. All areas where wire tape is to be placed must be degreased with Acetone to ensure the tape will stay in place prior to spraying.
C. Immediately following the wire tape being put down, the plastic top layer is removed exposing the adhesive and is taped in place with 3M Masking tape.
D. One end of each continuous piece of wire tape is to have a min. 4 inch piece of wire exposed for removal after spraying.

2.2.Plastic/Paper Wrapping

A. The entire inside of the car that is not to be sprayed should be covered with plastic and paper wrap. This is done to ensure that no parts of the car get unnecessarily coated by overspray.
B. All doors, windows and any other opening to the outside of the car should be sealed with paper and plastic to ensure minimum overspray to the outside of the car.
C. The entire outside of the car should be wrapped in 12 foot wide plastic wrap to ensure that the car is protected from overspray.
D. All paper and plastic wrap must be completely sealed to prevent overspray getting under the plastic wrap.

2.3. Masking

A. All wire trim should be masked to the substrate to ensure that it does not move.
B. Any trim pieces that have exposed substrate have to be masked to prevent overspray.
C. The car is to be thoroughly walked through and inspected to ensure there are no exposed areas. If any such areas are found they should be sealed with masking tape.

2.4.Quality Inspection Report: 2. Pre-Spray Preparation

Date Started: _____ Car Number: _____

Date Completed: _____ QA Officer: _____

1. All areas where wire tape was placed were degreased first with Acetone? Yes ❑ No ❑
2. Wire tape is positioned according to Quantum's specifications? Yes ❑ No ❑
3. Anywhere the Precidium™ Floor terminates is taped with wire tape? Yes ❑ No ❑
4. All wire tape is taped down with masking tape? Yes ❑ No ❑
5. Every continuous piece of wire tape has one (min. 4 inches) exposed wire? Yes ❑ No ❑
6. **ALL** surfaces that are not to be coated are completely protected with plastic wrap, paper, or masking tape? Yes ❑ No ❑
7. The outside of the car is protected from overspray? Yes ❑ No ❑

If any questions were answered 'No', provide a detailed explanation.

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If any questions were answered 'No', approval from Quantum's Project Manager is needed to continue

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QA Officer *Project Manager*

3. Floor Installation

3.1. Precidium™ MTI Bus Floor

A. The **Precidium™ MTI Bus Floor** is applied with a Graco HXP3 Plural Component Proportioner (or equivalent). The application gun should be a Graco AP Fusion unit with a AW 39/39 mix module. No screen is used in either the Y-Filter or gun on the resin side. The applicator needs proper training and must be certified by Quantum to install the Precidium™ MTI Bus Floor.
B. The Resin (Blue) must be thoroughly mixed with the drum mixer, Use a 3 HP air motor, 2" bung mount, ¾" x 28" shaft with dual 8" diameter impellers.
C. Turn hose heaters on 30 minutes prior to spraying.
D. Set the **ISO** (Red) side heaters to 150° F and **RESIN** (Blue) side heaters to 150° F.
E. Set the pressure to 2500 psi.
F. The **Precidium™ MTI Bus Floor** is mixed 1:1 by volume.
G. The **Precidium™ MTI Bus Floor** has a 7 second pot life.
H. The **Precidium™ Precidium™ MTI Bus Floor** has a 16 second tack free time.
I. The **Precidium™ MTI Bus Floor** can only be sprayed on itself without preparation within a 24 hour window of curing. After this the **Precidium™ MTI Bus Floor** will not adhere to itself.
J. The first coat should be a thin tack coat 7 to 10 mils in thickness. And should be allowed to cure 5 minutes. A second coat at 25 to 35 mils should be applied and again allowed to cure for 5 minutes. A third coat of 25 to 35 mils should be applied for a total base resin thickness of around 60 to 70 mils.
K. The final texturing coat is applied by positioning the gun 5 or 6 feet above floor surface, and while working backwards across the floor move the spray pattern rapidly from side to side.

3.2.YellowLines and Markings

A. After leaving texture coat of **Precidium™ MTI Bus Floor** to cure for 15 minutes cover floor with cardboard leaving area for yellow markings exposed.
B. Mask off lines and markings at least 3 feet on either side.
C. Apply lines and markings with an E10 HP (230 volt).
D. Apply lines and markings at 30 mil thickness.

*3.3.*Floor Preperation

A. Inspect the floor, looking for any blisters, bubbles, or imperfections. If any are found refer to section 5 for repair techniques.
B. Any high spots or ridges must be ground level with a rasp to give an even floor.
C. Any low spots, voids, or valleys can be leveled with additional **Precidium™ MTI Bus Floor.**

3.4.Quality Inspection Report: 3. Floor Installation

Date Started: _____ Car Number: _____

Date Completed: _____ QA Officer: _____

1. The sub-floor was completely clean of all dirt, residue and was solvent wiped with acetone 24 hours before coating? Yes ❑ No ❑
2. Hose heat is turned on? Yes ❑ No ❑
3. Precidium™ MTI Bus Floor is sprayed using approximately ___ strokes? Yes ❑ No ❑
4. All transitions are finished flush? Yes ❑ No ❑
5. Entire floor is inspected for blisters, bubbles, and imperfections? Yes ❑ No ❑
6. All imperfections are repaired? Yes ❑ No ❑
7. Entire floor is aesthetically approved according to the transit authority sample? Yes ❑ No ❑

If any questions were answered 'No', provide a detailed explanation.

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If any questions were answered 'No', approval from Quantum's Project Manager is needed to continue

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QA Officer *Project Manager*

3.5. Quality Control Report: Floor Installation

Date Started: _____ Car Number: _____

Date Completed: _____ QA Officer: _____

Precidium™ MTI Bus Floor

Time and Date of Application:

1. _____

Amount of mixed material:

1. _____

Stroke Counter:

Side 1: _____ Side 2: _____

Precidium™ MTI Bus Floor Applicator(s):

1. _____
2. _____
3. _____

Batch Number(s):

Resin: _____

ISO: _____

Copy sent to Quantum Group Yes ❑ No ❑

Car approved by Project Manager Yes ❑ No ❑

_____ _____

QA Officer *Project Manager*

4. Post Spray Clean-Up

4.1. Preparation of Floor

A. Generally the floor should have 1 hour of cure before clean up is started.
B. Prior to foot traffic, protect center aisle with a roll of paper.
C. Everyone should be in socks or wearing Tyvek boot covers.
D. When the material is "green" it can be chemically stained, so it is important that **NO FOOD or BEVERAGES** are taken into the car during this curing time *(up to 1 week).*

4.2. Removal of Wire Trim

A. First remove all wire trim, the angle the wire trim is pulled is important because this cuts the coating at the same angle.
B. The wire trim is pulled with a pair of pliers; it is possible to break the wire. If the wire breaks it is important to find the broken end and keep pulling that end. If the other end is pulled instead it is possible to pull the wire out instead of cutting the coating.
C. The floor should be inspected to ensure the Precidium™ Transit Floor terminates at the desired area. If the wire trim moved from the desired termination point during application it should be repaired before going to the next step. ***Check Section 5.3***

4.3. Removal of Paper/Plastic, Others

A. Once all the wire trim is pulled and the floor is inspected, remove all masking tape, paper, foil and plastic wrap.
B. Any residue that is left from the masking tape should be scraped and wiped off.
C. Any termination points that are not determined with wire tape should be inspected. If these areas will have a joint that needs to sit flush to the substrate, trimming is required. This can be done with a sharp utility knife. It is important that this is done when the material is "green". After 72 hours the material becomes hard and it is difficult to cut.
D. If any overspray did get underneath the plastic wrap, it must be removed.
E. Any loose debris left on the floor should be swept or vacuumed.

4.4.Quality Inspection Report: 4. Post Spray Clean-up

Date Started: _____ Car Number: _____

Date Completed: _____ QA Officer: _____

1. Paper is rolled down the center aisle of the car? Yes ❑ No ❑
2. All personnel are wearing Tyvek boot covers or bare feet with socks? Yes ❑ No ❑
3. After wire trim is pulled the floor terminates at desired locations? Yes ❑ No ❑
4. If question 3 was answered 'no' the termination point was repaired? Yes ❑ No ❑
5. All masking tape, paper and plastic wrap were removed? Yes ❑ No ❑
6. Any overspray that was under any masking tape, paper, plastic wrap has been properly removed? Yes ❑ No ❑
7. The floor is finished and all requirements were met? Yes ❑ No ❑

If any questions were answered 'No', provide a detailed explanation

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If any questions were answered 'No', approval from Quantum's Project Manager is needed to continue

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QA Officer *Project Manager*

5. Repairs

5.1. Blister Repair

A. While installing the Precidium™ Transit Floor, blisters can occur. It is important that one understands the type of blister and what the cause is. After these two variables have been determined one must learn the proper repair technique. It is important to remember that there are different types of blisters and each type has different causes. For evaluation of each blister it must be cut open and examined carefully.

5.1.1. Contaminated Substrate

A. A contaminated substrate is the *most common cause of blisters*. Within this type of blister there are several causes. **Note: These blisters almost always have a smooth finish on the bottom of the blister.**

5.1.1.1. Porous Substrate: If the substrate to be coated is porous (usually Concrete or Wood) pinholing will happen. This is cause by entrapped air trying to escape the substrate as the coating cures. The **Precidium™ MTI Bus Floor** cures at a rapid rate leaving a pinhole where the air escaped.

Solution: The solution to this problem is to fill the pinholes with a material recommended by Quantum and recoat with **Precidium™ MTI Bus Floor**.

5.1.1.2. Moisture/Solvent Blistering: This is when moisture is on the surface of the substrate or in the substrate that is to be coated. The exothermic reaction of the **Precidium™ MTI Bus Floor c**uring, heats the moisture/solvent. This rise in temperature causes expansion and off-gassing of moisture/solvent. This causes ballooning and pinholing of the coating as seen in Figure 1.

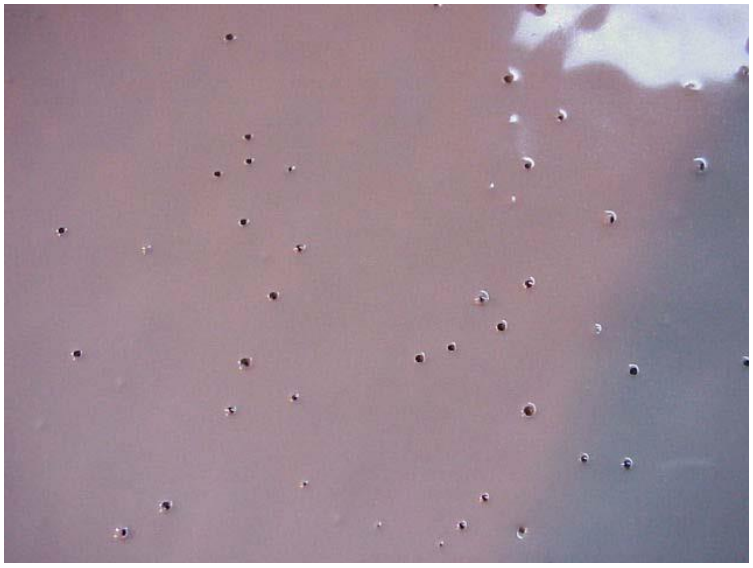

Figure 1 Ballooning and Pinholing

Solution: The repair for this issue is to sand down all balloon ridges and fill the void with a material approved by Quantum, Then reapply **Precidium™ MTI Bus Floor.** Be sure to work material in the voids with a hand trowel with multiple passes from multiple directions.

Prevention: Ensure substrate is allowed to dry for a minimum of 16 hours after it has been solvent wiped. Also ensure the applicator is not perspiring on the subfloor during application.

5.1.1.3. Rust, Dirt, Corrosion, etc.: This type of blistering is better described as delamination, but at first glance it can look like a blister. The basic mechanism seen is the elastomeric floor coating is applied to a separate substrate that is not the subfloor. This other substrate (rust, dirt, etc.) has very little or no adhesion to the surface. When the surface is heated by the exotherm of the coating being applied, the **Precidium™ MTI Bus Floor** which could not adhere to the subfloor will delaminate. This can be caused by any substrate contamination. This type of blistering is the most preventable, by using good surface preparation techniques.

Figure 2: Delamination caused by Rust

Solution: Cut open the blister at the outer diameter. This cut should make a beveled edge. Clean out the containments, scuff and solvent wipe. Reapply **Precidium™ MTI Bus Floor**

Prevention: This is easily prevented by always ensuring the surface is clean of all rust, dirt, residue and any other contamination.

5.1.2. ISO/Rich Blister

A. These blisters are caused during application. Generally there will be a spike or drop in pressure on one component during application. A proficient applicator will feel this while spraying and can identify the area where this happened. When this pressure change occurs the material is mixed **off ratio.** When this happens a blister is formed.

B. *Resin Rich blisters* will be gummy and wet underneath the blister. This material will always remain in a liquid/gel state.

Figure 4 Resin Rich Blister, Wet and Gummy to touch

Solution: Cut out blister and dispose. Clean substrate by scuffing and solvent wiping. Then level off the blister with **Precidium™ MTI Bus Floor**.

C. *ISO Rich Blisters* will be rough and scaly. This material will eventually cure from moisture in the atmosphere and substrate.

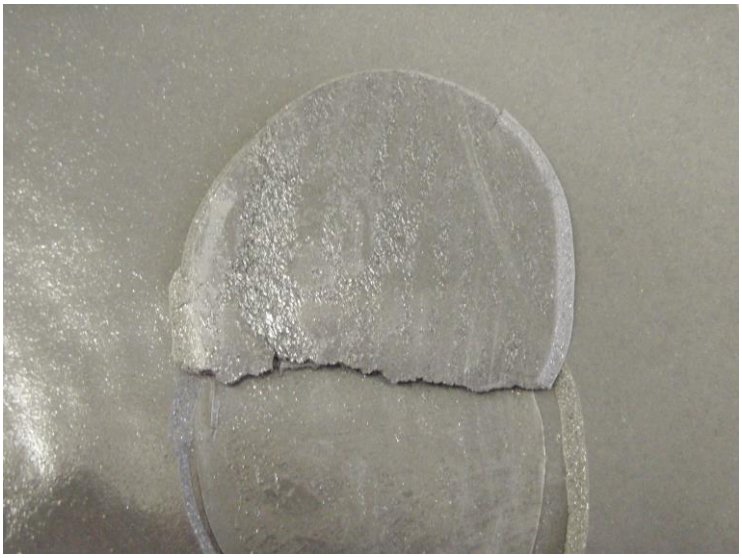

Figure 5 ISO Rich Blister, Rough and Scaly appearance

Solution: Cut out blister and dispose. Clean substrate by scuffing and solvent wiping, then level off the blister with **Precidium™ MTI Bus Floor**. If it was only slightly off ratio it is possible the ISO has already cured. If this is the case the blister can be cleaned, scuffed and solvent wiped, after which **Precidium™ MTI Bus Floor** is reapplied.

Prevention: Always ensure that the screens in the gun and G-250H are cleaned. Ensure the mix module is drilled out regularly during application.

5.2. Unwanted Termination Point

A. If the wire trim tape shifted before the **Precidium™ MTI Bus Floor** is sprayed, the termination will vary from the desired point. This normally will be 0-1 inch inside the desired termination point. This is repaired with filling the spot with polyurethane caulking. After the caulk cures overnight the **Precidium™ MTI Bus Floor** is reapplied. This is done without masking any defined lines; it is to be feathered in so no transition can be seen.

5.3. Post Installation Damage

A. Due to the work that still has to be done in the car, post installation damage can happen, and can be easily repaired. Fixing the damage is done using the above techniques followed by reapplying the **Precidium™ MTI Bus Floor**.

5.3.1. Chemical Damage

A. During the first week of curing, the **Precidium™ MTI Bus Floor** is more susceptible to staining. If a chemical stain is found, the top can be scrubbed with a Scotch-Brite pad.

B. Physical Damage

A. Each instance of physical damage will have a specific repair. Large areas of damage will have to be removed, filled with **Precidium™ MTI Bus Floor**, and sanded flush.

5.4.Quality Inspection Report: Repairs

Date Started: _____ Car Number: _____

Date Completed: _____ QA Officer: _____

1.	Finished floor has desired termination points?	Yes ❑ No ❑
2.	Floor is inspected after installation for damage?	Yes ❑ No ❑
3.	All repair work is finished after installation?	Yes ❑ No ❑
4.	Floor is inspected prior to shipping for post-installation damage?	Yes ❑ No ❑
5.	Any post-installation damage is repaired?	Yes ❑ No ❑

If any questions were answered 'No', please provide a detailed explanation.

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If any questions were answered 'No', approval from Quantum's Project Manager is needed to continue

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QA Officer *Project Manager*

6. Safety

6.1. Personal Protective Equipment

A. **Pre-Spray Preparation;** Standard Protective Equipment

B. **Floor Installation**;

a. Implementation of Engineering Controls (i.e. Spray Booths and Local Exhaust Ventilation)

b. Training on MSDS's

c. Respirators

i. Required: Full Face Organic vapor cartridge with HEPA particulate pre-filter. Cartridge filters must be changed out every 8 hours and records kept.

ii. Recommended: Air supply system, must have CO monitor system.

d. *Eyes*: Full face respirators

e. *Body*: Tyvek Suit, Boot Covers, Blue Nitrile Gloves

f. *Others*: Fire extinguisher, eye wash station, drinking water, empty pails, spill mix, industrial paper towels.