Rev C	Working Draft
Rev D	Released Feb 2023
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Artisan Finishing Systems

Pretreatment Operations & Maintenance Procedure

December 2022

Preface & Rationale for Pretreatment Process.

Commercially aluminum profiles and sheets having on its surface natural oxide layer. This oxide layer spontaneously and instantly forms on any fresh surface of products as a result of the reaction of aluminum as a reactive metal with oxygen and moisture. In a production environment, this occurs in the presence of contaminants., moisture, grease, fats, as well as various technological materials.

Why prepare an aluminum surface for painting?
This "production" oxide layer is not homogeneous and contains impurities and inclusions. Therefore, it does not have the ability to prevent corrosion in corrosive environments or to serve as an adhesive base for subsequent surface finishing of aluminum.

To ensure corrosion prevention and optimum adhesion between the aluminum base and the finish, for example, powder coated, this contaminated oxide layer must be removed to a pure metal (aluminum alloy) by a suitable controlled pretreatment process – aluminum chemical reactions with various chemicals.

On a chemically clean aluminum surface, a controlled and homogeneous conversion / adhesive coating is formed., for example, yellow chromation or special anode coating.

The use of chemicals and additives of high purity prevents new contamination of this prepared layer, which is then maximally preserved until the application of the specified finish coating.

Surface finish for painting
Surface preparation is an important step in the process of applying a uniform surface layer of a protective or decorative coating. The process of preliminary surface preparation includes three main stages [1, 2]:

- grease removal, fats and dirt;
- removal of the outer inhomogeneous and contaminated oxide layer;
- formation of a special adhesive coating.

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General Facility inspection schedule and logs

Artisan Finishing Systems has implemented an inspection process for each work pod and storage area. Each area of inspection has defined PPE, inspection criteria and will retain for 5 years. Please see Excel spreadsheet included in document upload.

Additionally, the company performs a monthly facility inspection to ensure compliance, safe and smooth operations, provide on-going monitoring of weekly inspection procedures; seek out preventive maintenance opportunities and on-going tasks are being properly implemented to generally seek non-conformities and ways to improve operations.

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Surface preparation for painting

In aluminum building structures - windows, doors, facades - powder coating is usually used to protect against corrosion and ensure an attractive appearance of products. Powder and liquid staining are largely similar processes., although they require various technological equipment. Therefore, all, what will be further described in relation to the preparation of the surface for painting, equally applies to powder, and liquid coloring of aluminum.

See. also here

Conversion chromating: yellow and green

Chromation is the most commonly used conversion process for coating aluminum products., in particular, aluminum profiles. Because these coatings are called conversion, that they do not just “stick” to the surface, and form a single whole with it.

There are two types of chromating processes:

- yellow hormation and
- green chromated.

Artisan Finishing uses only Green Chromate

Green chromate

Green chromate is also called phosphochromate.. The main components of phosphochromate baths are usually phosphoric acid., hydrofluoric and chromic acid or another source of hexavalent chromium.

The difference between yellow and green chromate

The difference between the two conversion coatings - yellow and green - chromate and phosphochromate - is not too big. Both types of chromation have similar properties.. It is believed, that yellow chromation gives better corrosion protection, than green chromating, and green chromation, in turn, provides better paint adhesion, powder and liquid.

Chromate Free Process

Due to the environmental hazards of chromate compounds, various chromate-free surface preparation technologies have been developed., mainly based on titanium and zirconium compounds.

In this preparation system, dissolved titanium and zirconium compounds together with complex fluoride compounds and additives interact in an acidic solution with the surface of aluminum. Complex oxides form on the surface, containing aluminum, titanium and zirconium, fluorine and other components. The resulting conversion / adhesive layer is colorless and therefore requires careful adjustment of process parameters and strict control to ensure complete surface treatment.

Artisan Finishing is investigating if this chromate-free process could be implemented in our facility and processes.

Other related material preparation processes

Provided for background purposes.

Anodizing as surface preparation - Artisan does not perform anodizing in any form.

Under the influence of electric current during the processing of aluminum in an acidic aqueous solution, a very strong oxide layer is formed on its surface - an anodic oxide or anodic coating.

As an aluminum surface preparation for painting, anodizing in an aqueous solution of sulfuric acid is used to obtain an anode layer with a thickness of 3 to 8 micrometers. Unlike a conventional protective and decorative anode coating, this anode layer is not subjected to compaction - pore filling. Such a porous structure provides surfaces with high adhesive properties for powder and liquid staining.. According to Qualicoat, the prepared surface must be painted no later than, than for 16 hours [2].

Currently, only anodic preparation of the aluminum surface provides protection against such damage to the painted surface as filiform corrosion.. Qualicoat concurrently with the license for anodic surface preparation approves powder coating applications for aluminum structures, which are used in coastal areas of the seas and oceans.

1. **Aluminum substrate & the pretreatment process**

Recycled, stripped, or low quality aluminum can lead to reduced corrosion resistance when in service. In particular, high level of iron, copper or carbon contamination can risk increase the risk of filiform corrosion in marine or industrial atmospheres.

The pretreatment system should comply with the requirements of the relevant ATM a specification. A multi stage cleaning and conversion process is mandatory, using amorphous Chrome phosphate, amorphous Chrome mate or a non Chrome treatment. A minimum of seven stages is recommended. The actual detail procedure to be employed should be reviewed and agreed upon with the pretreatment supplier.

Cleaning and etching aluminum surface; Correct cleaning and etching of the aluminum prior to chemical conversion is vital stage in the preparation of the substrate prior to painting. It has been identified, following extensive research by aluminum producers, that two particular factors can affect the corrosion resistance of coated aluminum.

There can be increased trends toward filiform corrosion when bulk concentrations of silicone copper and lead are above certain concentrations or if the aluminum is outside the recommended levels for the specific alloy concerned.

During the thermos mechanical transformation of aluminum in production it has been found that a reactive uppermost surface region of unpredictable composition can be formed. If this reactive layer is not removed it can increase the propensity to corrosion and specifically filiform corrosion.
The purity of cleaning solutions and rinsing water should be checked at least once per shift and because the conversion chemicals are consumed during processing, these must be controlled and replenished. The pretreatment supplier will advise on the method of monitoring and adjusting the pretreatment solutions. See pretreatment titration guides.

Material being prepared for painting should be thoroughly dried and drained, employing the maximum temperature of 180 degrees F for green Chrome phosphate. Surfaces must not be contaminated at this stage and paint or powder application must take place within 72 hours.
Handling of pretreated material must be kept to a minimum and lint fully free gloves must be worn at all times

the correct surface preparation for the metal substrate is critical to the performance of the finished system for principal aims of pretreatment are:

- to completely clean the surface
- to condition the metal, creating an optimum surface for receipt of thick coating
- to promote high levels of film slash substrate adhesion
- to achieve uniform cosmetic appearance and performance on all surfaces

The application process
The applicator must have the application facilities necessary experience to apply the powder coating evenly to controlled film thickness. The thickness of the coating on significant surfaces of the actual work should be frequently monitored by Eddy current method new line measurements shall be evenly dispersed over the significant exposed area, excluding inside corners and channels. On these surfaces the average trip film thickness should be at least 1.8 mills excluding projects in the marine environment.

It is essential that aluminum components are fully drained and dried prior to coating application. Section should be ideally coded immediately after pretreatment, but may be stored for up to 72 hours in industrial environment if necessary.

Coating products can be applied by manual or automatic electrostatic spray equipment. The choice of application will depend on the shape and complexity to the piece to be coded. The powder coating

product should be applied in the average dry film thickness of at least 2.4 mills on significant surfaces excluding marine environments. Paint should be applied to at least 1.6 mills on significant surfaces excluding marine environments.

Powder overspray can be effectively recycled using suitable reclamation equipment. Efficiency of recovery will depend on the method employed but reclaim powder should be saved to remove foreign particles and planted with virgin powder prior to reuse.

2. **Names and Contacts:**

See Appendix 2 - Emergency Contact List

3. **The pretreatment workflow – Artisan Finishing Systems**
   Artisan Finishing Systems' process
   The process for pretreating material is as follows: material is sorted by order and lot. All materials are then wiped In with a solvent and a clean rag. This process removes oils shavings and other detritus from the material prior to immersion in the pretreatment tanks.

At each treatment stage, the material is fully immersed ion the solution of the specific tank, or rotated so that it be fully immersed.

In between stages, the material should hang over the specific tank long enough to allow nearly all coating material or rinse water to drain back into the specific tank. Keeping the tanks at target temperature further causes the solutions to "sheet off" the material and allow it to dry off faster creating less fluid transfer between solution tanks.

After manual cleaning, the material is then placed in racks for transfer into the tanks.

- Beginning with tanks one or two depending on the objective (pretreatment or stripping) for approximately 3 minutes.
- This material is then rinsed in tank 3 for one minute.
- The material is then neutralized in tank 4 for two minutes.
- The materials then rinsed in tank 5 for one minute The materials then immersed in tank seven for three to five minutes.
- The material is then rinsed in tank 8 for one minute.
- The materials then rinsed in tanked 9 for one minute.

When the pretreatment cycle is complete and the material is dry it can be placed in racks for transport to the paint or powder lines.

Care should be taken, including at a minimum the use of gloves, to minimize contact with potential contaminants. PPE should always be used to prevent technician contact with solvents, treatment solutions, particularly hexavalent chromium, and contaminated rinse waters in each waste stream.

4. **Principal design criteria**

The artisan finishing systems pretreatment process is designed to ensure the following criteria are met.
Treatment tanks and transfer processes are designed to isolate and control solutions in their individual tanks and minimize cross-contamination of solutions.
All tanks are monitored on a daily basis to ensure effective titration and to identify any changes in tank solution concentrations.
Solutions approved for exit to public waste systems after pH neutralization are monitored in at three stages to ensure compliant discharge and alert the operator to pH deviations prior to them reaching the effluent exit point.

These stages are: manually in each tank, daily; in the pH adjustment tank, continuously; and in the multi-stage sedimentation tank, continuously.

All tank effluents are monitored and measured in their waste streams
All effluents are isolated so as to prevent the release of unmonitored or unmeasured solutions to outside pathways.

The chromium phosphate waste stream is isolated from earlier phases of the treatment process. if a solution or liquid Has come into contact with chromium phosphate it never goes back into the wastewater effluent waste stream. All chromium phosphate liquids be they treatment compound or rinse water, are processed throw the chromium medication process waste stream. In this way equivalent chromium solutions, rinses or wastes, can never reach the public wastewater system as effluent prior to undergoing the physically separated and monitored chromium neutralization process.

The chromium phosphate process, whereby the Hexavalent Chromium solution is chemically reduced to a trivalent chromium solutions, and further pH neutralized, resulting in fluids appropriate for discharge to the public waste water system. A by product is a chromate contaminated “sand” which is disposed as a manifested hazardous material through an authorized HazMat management service. (Currently ACT Enviro).

5. **Operational Objectives**

Hazardous Materials volumes and aging.
Artisan as a mid-level waste generator is authorized to keep dangerous and hazardous waste onsite for up to 180 days. Once a collection unit has been started the company must cycle it to our HazMat management service in 180 days or less.

The company generates and processes waste approximately on the following schedule:

Liquid solvents: 55 gallon drums 1 per 90 days
Chromate sand waste: 55 gallon drum 1 per 90 days
Dry waste from powder coating, rags and material used in material cleaning, used filters and other dry waste: One cubic yard box every 120 days

Sludge collection from various tanks 200 gallons/year

The values are estimates. The company has recently begun closely monitoring and tracking of waste streams, volumes and accumulation rates. This list will be refined after a few complete data collection cycles are complete.

6. Maintenance & Safety

The company expects complete and uninterrupted adherence to all safety processes and procedures within the pretreatment department. Deviation from plans and processes will have severe consequences: Among the area at risk if procedures are deviated from are: Personal safety; environmental safety and potential discharge; damage to the local community and the greater Puget Sound environment; improper pre-treatment of material of material and subsequent field failures of the coatings.

Processes and procedures must be followed continuously, conscientiously and without fail. There is no other way to safely and legally operate the company.

7. Pretreatment Equipment and Process Maintenance

To ensure proper maintenance of the equipment and processes in pretreatment area, the company has established a variety of tools and processes – summarized here in the overall SOP

Weekly checklists – these ensure the operators review specific equipment for proper and safe operation; the certain equipment and area are clean and maintained, and the provides a formal and repeating schedule to report anomalies. These checklists are maintained in the checklist logs for each functional area.

Monthly work-day – during the first week of every month, the company defines a work/maintenance portion of the day. During this time, systems are reviewed, maintained, checked and monitored for proper operation. The task list is unique to each area, but consistent for each area. Unique elements that arise (eg on the weekly checklist) or since last full maintenance day, are addressed.

Periodic maintenance – several processes require annual or semi annual maintenance – unless anomalous data or weekly or monthly observation initiates earlier intervention.

These areas include: Filter changes (other than paint booth filters which are changed monthly), sedimentation tank clean-out (we project this will occur twice per year), accumulated sludge from strip tanks (approximately once per year),

Ad hoc – maintenance or clean up the must occur as a result of some anomalous activity.

Examples: fluid splashes and minor accumulations within the containment barrier. Detritus skimmers (absorbent pads) used to collect floating material in rinse tanks are changed as needed;

8. Lab Testing and chemical maintenance

Daily off-line tank monitoring & testing

A related process to the overall pretreatment process is daily tank testing against standard values. This process is designed to ensure the following:

1. The solutions are being maintained at safe levels for the operations team
2. The solutions are being maintained at appropriate levels for our discharge parameters.
3. The tanks are at the appropriate level for a variety of parameter for optimum performance
    a. Different tanks have different criteria and parameters
4. The tanks are maintaining consistent conditions day-to-day, deviations would indicate abnormal operating conditions

See pretreatment tank daily procedure, PPE, safety instructions and data log for details

Tank and Effluent automated monitoring processes

Each pretreatment tank is monitored in numerous ways. (See WASTE WATER MANAGEMENT - TANKS 3 & 5 Rev B Feb 2023.docx).

1. The daily "concentration" testing
2. The automated monitoring system for effluent – pH adjustment tank and sedimentation tank
3. Visual inspection by the operators – part of the daily operating mechanism with a formal checklists review weekly.
4. The water log is maintained by the pretreatment team. Deviations from the normal input levels would trigger an operations review to determine the cause of the deviation.
5. Record keeping
   The following monitored, generated and tested results are permanently maintained
    a. daily test results
    b. Continuous monitoring output
    c. Water input log
    d. Periodic solid waste removal
    e. Semiannual sampling & testing

9. Operations
Pretreatment Start-up and Shut down processes

For the pretreatment area to function safely, consistently and efficiently the unit must initatiate operations each day and conclude operations each day following standard procedures.

The operators bring the systems on-line through various functions – tank heaters, fans, re-circulating systems, crane power, monitoring concentrations, etc. These are part of their daily checklists

Following a standard process ensures all systems are on-line, all functions are checked and monitored and the team can begin the day's operations.

Conversely, at the end of a shift, the operators shut-down (or in some cases adjust) the pretreatment systems' various functions – tank heaters are reduced, fans are shut down, re-circulating systems are

turn off, crane power is cut, water inflow is stopped, effluents lines are checked and stopped. These are part of their daily operating procedures.

Following a standard process ensures all systems are off-line, all functions are reduced or checked and the team can safely cease operations.

Ad hoc activity occurs when tanks are being cleaned, chromate is being reprocessed, or some other maintenance is occurring that would interrupt the normal operating environment.

10. **Pretreatment Dept Safety procedures**

PPE – Each activity within the pretreatment area has a work instruction. Generally all technicians are instructed to wear PPE when in contact with or generating or moving: any chemicals, dust, particulates, paints, and solvents. PPE is provided by the company appropriate for each work task and materials used. General PPE includes respirators, gloves, eye protection, chemical bibs, hoods and caps, ear protection, and boots.

a. Chemical training:

The company holds new employee chemical training explain the chemicals used, safety requirements and "stations" such as first aid, eyewash and shower locations, and processes. Documentation of chemicals used and their hazards and cautions are also part of new hire training.
Once per year the company provides an all employee refresher course on chemicals, hazards, cautions, dangers, risks and locations of safety stations.

Exhaust & Fumes – The company is equipped with exhaust fumes where needed. In the pretreatment department these include general exhaust fans mounted in the walls, and specifically a laminar flow exhaust system for the Chromate tank. These exhaust systems are checked daily as part of the daily operating checks and weekly as part of the work area checklist. The filters on the laminar flow system are changed annually, but monitored daily for airflow resistance.

b. Equipment:

Each specific task and operation in the pretreatment area has a work instruction. These define what equipment is needed to perform the task. It is also details the location of this equipment, specifically that any equipment used within the pretreatment chemical barrier remains within the barrier – permanently.

c. Training

11. **Treatment tanks sludge.** Reference company tank sludge removal and maintenance procedure

12. **Emergency plans.** Reference Company incident report process and Company Emergency plan

13. Appendices:

Tank Titration tables

Annual Hazards Communication training Agenda

Chemical & Solvent Inventory Order Form

Source list for purchased chemicals

Emergency Contact List

Pretreament Tank – Daily Testing Log

Copy of completed log

Artisan Evacuation Plan/Map

Sludge Discharge Control Plan

Pretreatment Dept – How to add chemicals. Tanks 1-7 and press system

Manual pH testing and corrective action

Toxic Organic Management Plan

Facility Map – defining pretreatment components

Titrations Procedures

Tank 1 - Cleaner 98

Tank 2 – Caustic Soda Beads

Tank 4 – De-oxidation DEX 300

Tank 7 - Aluma Kote 1 & 2 (Chromium Phosphate)

Pretreatment daily/weekly inspection log

Clean-up Procedure – Spills within the containment berm

Pretreatment tank liner replacement procedure

Sludge & Solid Waste removal procedure (Tanks 1 & 2)

Pretreatment Tanks (Tanks 1 & 2, 4, 7)– Titration testing equipment

Wastewater Management process (Tanks 3 & 5).

Water use table – Syncs to tank 3 & 5 rinse tanks pH adjustment process

Examples table(October-November 2022)

Wastewater Management process (Tanks 8 & 9)

Recommended Preventive Maintenance Schedule – Chrome immersion Process

Change log

Version	Creator	Description
D	T Brown	Add version table, added daily Ph monitoring, added sampling plan

WASTEWATER MANAGEMENT PROCESS
Tanks 3 & 5
October 2022

Goal of this procedure:
Define the steps necessary, cautions, communications, frequency, safety equipment and containers, disposal and safety of Pretreatment rinse tanks 3 & 5 as waste.

Rinsing Caustic Treatment solutions from the pre-painted metals creates small amounts of caustic waste in the rinse tanks 3 & 5. This must be managed to maintain proper material cleanliness in preparation for painting, minimize cross contamination of following tanks in the treatment process and to properly manage the water as effluent per permitted process.

This procedure will include all the waste for the company from these two process tanks.

List of Waste:

- Solid Waste
- Recycle
- **Caustic (Tanks 1, 2)**
- Acid (Tanks 4 & 5)
- Chrome (liquid) (Tanks 7, 8, 9)
- Filters
- Septic & Water Drainage
- Others (oil, bulbs, batteries)

Caustic Waste: Tanks 1, 2 and rinse using Tank 3. (No chromium exposure)

- Description: Spent Chemical residue removed from tanks 1 and 2.
- Managed and moderated (Ph) effluent released through the Ph adjustment tank and the sedimentation tanks systems.
- Frequency: Daily
- Caution: Review Confined Space Plan \\SEAGATE\Public\Compliance\Plans and programs\Confined Space Plan.docx

- Containers: None.
- Safety: Caustic has the potential for harm follow caustic protocols
    - Eye Protection
    - Chemical Gloves

    - Water hose
    - Hazardous Material Labels
    - Airhorn
    - On-station monitor – to request help from other in case of accident
    -
- Note: There is no Chromium Phosphate in the waste stream at this stage of pretreatment

- Compliance: Label as D002

Process:
Continuous: Ph adjustment system continually monitors water in Ph Adjustment tank using automatic. Ph Adjustment system adds acid to Ph Adjustment tank automatically to continually balance effluent water Ph.
Manually monitor acid tank source for fill level. Refill as needed.
Manual observation of Ph readings: Daily.
Tool: Ph meter (Calibration per instructions)

Check Ph of water daily, in tanks 3 and 5, or by merged flow in Ph Adjustment tank, using pH meter.
(Calibration per instructions)
Add free flow water via water add pipe system to dilute alkaline levels caused by residual caustic fluid remaining on material after treatment and drip period (a few minutes).

Maintain Ph level in tanks 3 & 5 between 7 and 9 steady level.

If Ph exceeds limits stop production, alert management, stop all effluent flows, increase water input to balance ph levels until within allowed range.
Create incident report defining levels, timing, estimated amount of discharge and corrective actions.

Daily sampling:
Parameter: pH. The pH of water will be sampled daily, in tanks 3 and 5, or by merged flow in Ph Adjustment tank, using calibrated pH meter. Results will be entered in the daily pretreatment data log, then entered into the computer log files

Semi-annual sampling: The effluent will be sampled (~300ml) and submitted to a licensed water quality lab every 6 months +/- 30 days.

- Test for Total Toxic Organics (TTO), metals, Chromate compounds, and other monitored compounds will be performed.

- Results will be filed with compliance records and

Active Roles:

- Supervisor – Monitors treatment tanks daily reports
- Pretreatment team - Responsible for monitoring daily/weekly ph levels, water effluent, adding chemicals as needed.

Store all equipment in appropriate location. All equipment used inside berm is considered chrome contaminated and must remain within the berm barrier.
All disposable PPE goes into CYB
All reusable PPE should be rinse with clean hose water over tank 3 or 5 and dried for re-use
Rags and plastic sheeting are HazMat and go in the CYB.
Complete procedure documentation

Place documentation into appropriate files and logs.

Change log

Version	Creator	Description
B	T Brown	Added “Tanks 3 and 5, **or by merged flow** in Ph Adjustment tank, using pH meter.
		Added sampling and 3rd party testing plan

WASTEWATER MANAGEMENT PROCESS
Tanks 8 & 9
October 2022

Goal of this procedure:
Define the steps necessary, cautions, communications, frequency, safety equipment and containers, disposal and safety of Pretreatment rinse tanks 8 & 9 as hazardous waste.

Chromium Caustic Treatment solutions from the pre-painted metals creates small amounts of waste in the rinse tanks 8 & 9. This must be managed to prevent any discharge of any chrome waste outside the chrome waste stream, to maintain proper treatment processing of the pre-painted material, cleanliness in preparation for painting, and to properly manage the water as effluent per permitted process.

This procedure will include all the waste for the company from these two process tanks.

List of Waste:

- Solid Waste
- Recycle
- Caustic (Tanks 1, 2)
- Acid (Tanks 4 & 5)
- **Chrome (liquid) (Tanks 8 & 9)**
- Filters
- Septic & Water Drainage
- Others (oil, bulbs, batteries)

Chrome Rinse Waste Water: Tanks 8 & 9 are used to rinse residual chromium from material being pre-processed for painting. Parts being processed for painting are cycled from the cleaning tanks (1-5) and into the chromate tank (#7) for etching. After the chomate dip, the parts are rinsed in tanks 8 & 9. Used in succession, tanks 8 & 9 gradually increase in the concentration of chromate as parts are cycled through them. Gradually, these rinse tanks are less effective and must be exchanged and discharged.

Tank 8 is moved into the re-processing process. Tank 9 liquid is moved into tank 8 – it may receive additional tap water to bring levels up to operating voume. Tank 9 is recharged with fresh, clean tap water.

When tank 8 is migrated to tank 6 (waste/holding) it becomes part of the chrome re-processing procedure.

At no time do these tanks discharge water into the out-bound city sewer effluent stream. These tanks (8 & 9) are monitored daily visually and for conductivity to check progression of effectiveness.

The frequency of conversion to post processing is determined by visual inspection, consistently high conductivity, and cleanliness of parts exiting the tanks.

- Monitoring Frequency: Daily
- Re-processing Frequency: determined by multiple factors affecting cleanliness, volume of parts being processed and others.
-
- Containers: None.
- Safety: Chromate has the potential for harm. Follow safe use protocols
    - Eye Protection
    - Chemical Gloves
    - Water hose
    - Hazardous Material Labels
    - Airhorn
    - On-station monitor – to request help from other in case of accident
    -

- Compliance: Label as D002

Active Roles:

- Supervisor – Monitors treatment tanks daily reports
- Pretreatment team - Responsible for monitoring daily/weekly levels, water effluent, adding chemicals as needed.

Store all equipment in appropriate location. All equipment used inside berm is considered chrome contaminated and must remain within the berm barrier.
All disposable PPE goes into CYB
All reusable PPE should be rinse with clean hose water over tank 3 or 5 and dried for re-use
Rags and plastic sheeting are HazMat and go in the CYB.
Complete procedure documentation

Place documentation into appropriate files and logs.

Definitions: CYB – Cubic Yard Box – waste management tool for loose materials to be manifested for proper disposal

Pre-Treat Press Procedures

Feb 2023

Preparations:

- pH meter – Tank Test Lab Cabinet
- Glass jar –Tank Test Lab Cabinet
- Flashlight
- PPE
    - Protective chemical suit
    - Hood
    - Boots
    - Eye protection
    - Full Face mask for individual handling caustic or acid solution or compounds
    - Gloves
    - Respirator with Carbon Filters.
- Review SDS
    - Caustic Beads
    - Sulfuric Acid
    - Metabisulphate

Process Steps:

- Fill Collection to about 18" below top of tank (stain line) – See Tank Pumping Instructions.
    - Empty/Refill Scrubber reserve
        - Pump water out until Intake is reached.
        - Turn off pump
        - Refill with tap water
            - **THIS IS A MONITORED FILL PROCESS. DO NOT LEAVE THE AREA WHILE TANK IS BEING FILLED**
        - Repeat 1 or 2 times until water is clear.
    - Empty Spare tank #6
        - Goal is for tank#6 to be empty for emergency reserve purposes.
    - Fill with tank #8
        - Turn off both Chrome heaters
        - Add safety block to tanks #8 and #9 to prevent tank deformation.
            - **DO NOT ENTER TANKS WITHOUT FOLLOWING PRESCRIBED ENCLISED SPACE PROCEDURE WITH PPE AND OBSERVING SAFETY PERSONNEL**.
        - Pump liquid from tank #8 to Collection Tank
            - When tank #8 is empty, inspect visually for wear or damage. If any problems are noted, inform management, and note on dept safety checklist.

- Replace water in tank #8 with water from tank #9
    - When tank #9 is empty, inspect visually for wear or damage. If any problems are noted, inform management, and note on dept safety checklist.
    -
- When tank #9 is empty, refill with tap water
    - Valve is below grating (Master valve on south wall)
    - **THIS IS A MONITORED FILL PROCESS. DO NOT LEAVE THE AREA WHILE TANK IS BEING FILLED**
- Remove safely Blocks
- Turn on tank heaters

- Turn on air valve (near control panel) to start aerating and mixing the tank.
- Check pH with pH meter.
    - If >2.5 add Sulfuric acid until it reaches 2.5 (If solution is less than 2.5 no Sulfuric Acid is needed)
    - If more Sulfuric acid is needed:
        - Fill drum half-way with water
        - **THIS IS A MONITORED FILL PROCESS. DO NOT LEAVE THE AREA WHILE TANK IS BEING FILLED**
        - Pump 10 Gallons Sulfuric Acid into drum
        - Finish filling drum with water (approx 30-35 gal)
            - **THIS IS A MONITORED FILL PROCESS. DO NOT LEAVE THE AREA WHILE TANK IS BEING FILLED**
            -
- Add 1 bag of Metabisulphate.
    - Let mix about 15 minutes

- Add Sodium Hydroxide bead (caustic bead) to bring PH up to about 10.0 (~ 2-4 bags)
    - Let mix about 15 minutes
    - Test pH

- Take a sample in a glass jar
    - Test pH of jar
- Turn off mixing air.
- Allow tank to settle at least 24 hours.
- Check sample from tank in glass jar to assure Chromium precipitated out
    - Approx top half of liquid should be clear to translucent.
    - Bottom half of jar should be full of precipitate
    - (sometimes a lower pH may be required see subsequent steps)
    - Check pH of sample jar

- Re-processing tank
    - Check pH of tank
    - Visually inspect tank to assure similar results to test jar.

    - Top portion of tank should be clear liquid.
    - Bottom portion filled with precipitate.
- Bring to a more neutral pH (while mixing with air add acid)
    - If first sample precipitated lower to pH < 9
    - If first sample did not precipitated lower pH <5
- Take another sample to assure precipitated after pH change
- If liquid separation process is observed and complete, go to Press process (below)
- If not precipitated - start over at top of instructions.

Press process:

- Close press chamber – Air valve on top of press pump. – Takes 5 minutes
- Open fluid valves – 3 smaller white valve in series north side of press
- Turn on pump [This starts pumping liquid from tank to press]
    - Orange valve open
    - Larger white valve open
    - All press liquid valves open
    - Air valve to turn on pump. (slowly to keep it from jumping)
- Let pump operate until complete – pump noises cease and system is no longer moving liquid into press. This is an indication the screens in the press are full, and the pump pressure is not enough to push more liquid through the screen press.
    - This may take several hours
    - Monitor all systems in the pretreatment area during reprocessing.
    - If any tanks in re-processing material flow near the top, stop the pump process and allow levels to stabilize.
    - Resume when sufficient capacity in tanks is re-established.
        - Turn pump on very low.
- When water is no longer going through the press (check at pre-treat)
- Turn off Pump
    - Air valve to turn off pump.
    - Orange valve off
    - Larger white valve (#26) off
- Set press fluid valves (the 3 smaller white valves in series north side of press)
    - Close press fluid valves – #16 & #18
    - Leave valve #17 open.
- Pressurize with air for 45 min – Air valve above fluid valves.
- Turn off air
- Open the 3 fluid valves
- Uncover the material capture bin below the press
- Open the press chamber – Air valve on top of press pump. – Takes 5 minutes
- Wearing proper PPE, separate the screen panels and manually scrape (using collected material off screens and allow to fall into collection bin

- If collection bin is full, wearing proper PPE, transfer material to sealable, transport certified metal drum.
- Cover collection bin
- Ensure all valves, press screens, pressure settings and other flow controlling devices are set to closed unless specifically set to another condition in the re-processing procedure to facilitate non-reprocessing pretreatment operations
- Dispose of used PPE in appropriate vessels
- Store contaminate equipment within “chrome berm” area.
- Clean re-useable PPE such as goggles and boots and store for next use.

PRETREATMENT TANK LINER REPLACEMENT PROCEDURE

Created July 3 2022

Purpose: The purpose of this procedure is to define the steps to inspect, maintain, replace and disposal of pretreatment tank liners.

Definitions
PPE – personal protective equipment
Tools – equipment or appliances used when performing this procedure
Treatment tanks - A metal tanks, lined with a chemically resistant liner used to treat metal to improve adhesion and anticorrosion for paint preparation
Workspace: The pretreatment zone as defined by the retention berm at Artisan Finishng
Crane: the overhead lift system
The DANGEROUS WASTE consolidation drums are stored in the secured, vented storage room.
Yard Box – a 1 Cubic yard container pre-designated as for Dangerous waste.

PPE
PPE – Rubber chemically resistant suits, boots, googles, face shields, gloves, respirators with appropriate filters, duct tape,
Safety harness

Tools & Equipment
Buckets
Replacement Liner
Crane
Lift Cable
Plastic sheeting
Wooden chocks
Hose & Nozzle
Shovel
55 gallon residual HAZAMT container
Dangerous waste Cubic Yard Box – The designated storage location for non-liquid hazardous waste.
Disposable rags
Chain or metal bands to secure the rolled liner
Do Not Enter signs for work space area.
Rope to screen work area from Stair to Desk.
Bin or barrel to store all equipment used within barrier zone
Container to store all hardware used to secure liner in place (nuts, bolts, clips, etc)
Markers or labels to ID location of each piece of liner securing system

Procedure:
Collect necessary equipment and tools

Don required PPE for this procedure
Label all signs with date & Time on Work In Progress DO NOT ENTER signs
Cordon off work-space

Tank 7 replacement process
TANK 7 CONTENTS ARE HIGHLY CONTAMINATED. EXTRA CAUTION AND SPECIAL HANDLING ARE REQUIRED TO ENSURE TECHNICIAN, FACILIITY, SYSTEMS AND UBLIC SAFETY.
ALL MATERIALS USED IN THIS PROCESS AND WITHIN THE RETENTION BERM MUST BE PROPERLY DISPOSED OF (IN DRUMS OR YARD BOX) OR PERMANTALY RETAINED WITHIN THE RETENTION BERM FOR NEXT USE.

Transfer tank 7 contents into an empty tank 6
Cover tank 6 to minimize evaporation

Add wooden chocks to top of tank 7 to minimize deformation of tanks while empty

Disconnect power to tank heaters – mark with lock out/tag out label
Disconnect power to laminar flow system – mark with lock out/tag out label

The tank is now considered empty of liquids and secure

Disconnect laminar flow system where attached to tank 7
Using crane if needed, move laminar flow system over tank 8 or tank 6 depending on access required

Determine amount of sludge accumulation in bottom of tank 7
- Measure height of tank from inside and outside to determine sludge level.
- If determined to be too thick, advance to sludge removal section below

Carefully remove remaining liner securing system of bands and plates. Number and mark each band and plate's location for accurate placement during re-installation.
Place all bands and plates in boxes or containers out of the immediate work space but within work zone for access during reinstallation
Place all hardware in appropriate container

When most sludge is removed and all mounting and securing hardware is removed, using the crane, lift the liner out of the metal tank. Carefully move to plastic tarp in cordoned off work space.
When liner is secure on tarp, place several chains or bands of approximately 10 feet in length under one end. Roll the liner toward the end with the chains/bands. When rolled as tight as possible, bring bands together and secure them.
Using the crane, lift the liner and place in a Haz Waste Yard box.
Label the Yard box with the date and contents
Secure the lid and place within the Yellow Zone near the priming area.

Collect all tools used during process and place in designated storage location within retention berm.
Collect all trash, temporary containers, disposable articles and PPE – place in yard box for removal.

Removal of DANGEROUS WASTE from Site
When full, but no longer than 180 days from first use, the DANGEROUS WASTE containers (both liquids and solids), will be manifested and removed from the site by a licensed hazardous management company

Artisan Finishing Systems will pursue DANGEROUS WASTE recycling programs where and when available.

Sludge removal process
Once tank is empty of liquids and secure, using technician should be fully PPE garbed, INCLLUDING HARNESSED TO THE OVERHEAD CRANE, they may enter the tank.

No individual technician should spend more than 15 minutes in any tank in one loading cycle.
Loading Technicians should exchange position with the observing tech and start a new loading cycle.

Using shovels and 5 gal buckets, the loading Tech removes the sludge from the tank and loads into buckets.
Each full bucket is placed in the material processing basket attached to the crane.
Multiple buckets may be filled and removed per cycle.
When multiple buckets are loaded in the crane basket, the observing tech lifts the backet using the crane and offloads the buckets on the plastic sheeting spread on the floor within the designated work area.
The sludge buckets are then emptied into 55 gal HAZMAT Drums.
As each drum is filled to no more than 6 inches of the top, it is sealed, labeled and dated with appropriate warning labels.

Loading Tech continues loading sludge until very little can be accumulated on the shovel. Using the buckets in a sliding motion on the tank bottom, the tech should removal as much residual sludge as possible.

Sludge & Solid Waste Removal Procedure
Tanks 1 & 2
July 2022

Goal of this procedure:
Define the steps necessary, cautions, communications, frequency, safety equipment and containers, disposal and safety of Pretreatment tank sludge and other contaminated or hazardous waste.
Cleaning material in the Caustic Tanks metals creates small amounts of detritus to fall from the material. This can accumulate into a sludge at the bottom of the tank, eventually reducing the tank treatment volume and interfering with efficient material processing.

This procedure will include all the waste for the company from straight forward items such as garbage to more complicated items like the pre-treatment chemicals.

List of Waste:

- Solid Waste
- Recycle
- **Caustic (Tanks 1, 2)**
- Acid (Tanks 4 & 5)
- Chrome (liquid) (Tanks 7, 8, 9)
- Filters
- Septic & Water Drainage
- Others (oil, bulbs, batteries)

Caustic Waste: Tanks 1, 2 and rinse using Tank 3. (No chromium exposure)

- Description: Spent Chemical residue removed from tanks 1 and 2.
- Handling Agency: Ingenium customerservice@pureingenium.com 206-268-0406
- Frequency: Typically, Tanks are cleaned once per year during the winter slow period Dec-February.
  Review Confined Space Plan \\SEAGATE\Public\Compliance\Plans and programs\Confined Space Plan.docx

- Containers: Chemically appropriate drums (Either Sealable poly or metal)
- Safety: Caustic has the potential for harm follow caustic protocols
  - Eye Protection
  - Chemical Gloves
  - Duct tape – to seal gloves

- Tank width support blocks
- Do Not Enter signs for catwalk stairs during procedures
- Evacuation hose able to reach from pump to bottom of tank
- Evacuation hose able to reach from pump to tank 6 and also to reprocessing tank (as contingency)
- Water hose
- 3-5 plastic 5 gal pails
- Flat blade shovel
- Flashlight
- 55 gallon drums
- Hazardous Material Labels
- Permanent marker
- Rope to lower and raise equipment and tools
- Airhorn
- Plastic impervious tarp placed on floor on the East side of the tank structures
- When in tank – Confined Space Alt Entry procedures
- When in tank – Full mask respirator
- When in tank – Tyvek suit with hood, rubber boots, gloves, eye protection, and all other applicable PPE.
- When in tank – Safety harness attached to both operator and overhead crane
- Second Operator -(trained in tank waste removal process and crane operation)
- On-station monitor – to request help from other in case of accident awhile Operator 2 assists operator 1
- Operators (1 and 2) should be fully trained on both roles as they will switch functions every 15 minutes to prevent fatigue.
-

- Compliance: Label as D002

Process:

Secure work area with Do Not Enter Signs during procedure

Secure tank with block to prevent deformation from pressure of neighboring tank when work tank is empty.

Pump liquid contents of work tank into Tank 6 – Overflow tank. Remove maximum about of liquid so as to expose sludge in bottom of tank.

Entry Procedures for Pre-Treatment tanks

Eliminate all hazards

If the tank previously held chemicals remove all chemicals and rinse.

Establish forced air system

Fill in Confined Space documentation and receive pre-procedure approval.

Assure air flow in place and that tank is adequately cleared of chemicals
Place ladder in tank for ingress and egress
Have second trained operator on-station for assistance
Have trained safety monitor on station for observation and if needed emergency actions.
Manually remove sludge using spade and buckets.
Exit tank
Remove ladder
When sludge is exposed, stop liquid removal and secure pumping equipment & hoses

After donning PPE and connecting to crane for egress assistance if needed, Operator 1 may enter tank using a ladder. Operator 2 distributes and retrieves equipment as requested by operator 1.

Organize equipment near work site.

When Operator 1 is stable at bottom of tank and operator 2 has lowered requested equipment, Op 1 can loosen manually sludge with flat shovel and load the 5 gal pails. AS each pail is loaded, Operator 2 will raise it and place it on in the crane tray.
When the tray is full, but after no more than 15 minutes, Op 1 exits the tank via ladder and disconnects the harness from the crane. Op 2 attaches the crane tray to the crane and lifts the full buckets out of the tanks.

The tray is lowered to the plastic tarp area on the floor.

Both operators then empty the buckets of sludge into the 55 gal haz mat drums
Any drum with sludge in it, must be closed when not actively being loaded.
This process is repeated until enough sludge is removed from the tank so large parts can be fully submerged allowing pretreatment to proceed smoothly.

Active Roles:

- Supervisor – Authorizes Entry and is Responsible for assuring that procedures are followed
- Person(s) Entering – Responsible for recording entry permit and following procedures
- Monitor – Responsible for assuring continuous airflow and observing person(s) entering remain safe without incident, contacting emergency services when required.

Before a confined space entry, persons involved with review their active roles.

Post-sludge removal and clean-up.
Close and seal all drums
Move drums to temporary storage location pending removal by HazMat contractor.
Rinse all equipment used in process and which came into contact with sludge over tanks leaving residue to collect in tanks
Store all equipment in appropriate location. All equipment used inside berm is considered chrome contaminated and must remain within the berm barrier.
All disposable PPE goes into CYB
All reusable PPE should be rinse with clean hose water over tank 3 or 5 and dried for re-use
Rags and plastic sheeting are HazMat and go in the CYB.
Weigh each barrel of sludge or estimate weight and add to process logs.

Complete procedure documentation adding initiation dates on all sludge storage units
Complete procedure documentation

Report to site manager the process is complete and close confined space activity.
Place documentation into appropriate files and logs.

2022 WATER USAGE

October

Booth Limits	Recorded	**Report when**	Pretreat Scrubber	Pump Range 2.5 – 3.5
1.3 Prime&Clear	# 1 / # 2	**approaching**	Limits	Gauges Max Limit
1.8 color	Initials	**limits**	Record and Initials	2.5/1.75/1.0/1.5

S	M	T	W	T	F	S
						1
2	3 4257400 2100	4 4259000 1600	5 4261100 2100 4261100	6 4261760 700 4261800	7 4263900 2100	8
9	10 4266800 4269200 2400 5300	11 4271800 4272000 2800	12 4274400 4275900 3400	13 4278100 4279500 1400	14 4279800 700	15
16	17 4282000 4300 4284100	18 4286600 4286600 2500	19 4289400 4300 4290900	20 4293400 2500 4293400	21 4295200 1800	22
23	24 4297900 4300200 5000	25 4303000 6700 4306900	26 1100 4308000	27 4310100 1100	28 4310100	29
30	31					

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2022 WATER USAGE

November

Booth Limits	Recorded	**Report when**	Pretreat Scrubber	Pump Range 2.5 – 3.5
1.3	# 1 / # 2	**approaching**	Limits	Gauges Max Limit
Prime&Clear	Initials	**limits**	Record and Initials	2.5/1.75/1.0/1.5
1.8 color				

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

MIDNIGHT 1 A.M. 2 A.M.

2023 Water Usage

January

Booth Limits 1.3 Prime&Clear 1.8 color	Recorded # 1 / # 2 Initials	**Report when approaching limits**	Pretreat Scrubber Limits Record and Initials	Pump Range 2.5 – 3.5 Gauges Max Limit 2.5/1.75/1.0/1.5

S	M	T	W	T	F	S
1	2 off Holiday	3 4426900 4426900 2500	4 4428900 4431100 4200	5 4433500 4433700 2600	6 4433700 0	7
8	9 4436000 4436000 2300	10 4438100 4438100 2100	11 4439800 4439800 1700	12 4441000 4443500 3700	13 4443600 4443600 100	14
15	16 4445400 4446400 2800	17 4446200 4446500 3100	18 4452200 4452900 3400	19 4455000 4455000 2100	20 4455000 4455000 0	21
22	23 4457300 4457400 2400	24 4458100 4458100 700	25 4458800 4459800 1700 1000	26 4462200 4462200 2400	27 4462200 4462205 0	28
29	30 4464200 4464200 2000	31 4467500 4467500 3300 0				