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Appendices

D.1 CONTAINER STORAGE

D.1.1 Container and Waste Description

End users of Cleansorb columns typically produce one of six different types of spent granulate wastes, which are directly related to the manufacturing process in which the Cleansorb column is utilized for. These processes and the resulting waste streams that CS Clean Solutions, Inc. (CS Clean) intends to manage are discussed in detail below. Prior to acceptance, a waste stream determination is performed and provided to CS Clean as part of a waste profile by the end user for each hazardous waste stream received from offsite processes in accordance with procedures and controls described in the Waste Characteristics section (**Section C**) of this application package. **Table C.1** (**Section C**) provides a list of Resource Conservation and Recovery Act (RCRA) hazardous waste codes for each granulate waste type, as well as hazardous properties associated with each waste code. Specific types of hazardous waste from spent columns are described below.

D.1.1.1 Ion Implantation Granulate

The ion implantation manufacturing process uses a low flow of hydride gas, which accelerates ions of a material in an electrical field to impact them into solid semiconductor devices.

Spent granulate waste derived from columns used to abate ion implantation process exhaust typically consists of copper salts of hydride gases, such as arsine, phosphine, silane, and germane. This waste granulate usually contains reduced copper and very small concentrations of arsenic. It is estimated that ion implantation process waste granulate will account for approximately 4,800 pounds of spent granulate per year to be processed by CS Clean.

D.1.1.2 Chemical Vapor Deposition Granulate

Chemical Vapor Deposition (CVD) manufacturing processes use metal precursors along with a high flow of hydride gas to deposit thin layers of atoms onto semiconductor wafers. CVD wastes primarily consist of three sub-types (Metal Organic CVD, Plasma-Enhanced CVD, and Tin-Germanium CVD) all of which produce similar waste granulate types.

Spent granulate waste derived from columns used to abate CVD process exhaust typically consists of copper salts of hydride gases. Additionally, columns used with CVD processes may also contain magnesium, aluminum salts of metal organic compounds, reduced copper, elemental white phosphorous, and/or arsenic in minor concentrations. It is estimated that CVD process waste granulate will account for approximately 3,000 pounds of spent granulate per year to be processed by CS Clean.

D.1.1.3 Chemical Etching Granulate

Chemical etching manufacturing processes use a varied flow of acid and halogen gases to chemically remove layers from the surface of wafers to create complex semiconductors. Gases used in the etching process that are abated by CS Clean's column granulate commonly include fluorine (F^2), hydrogen fluorine (HF), chlorine (Cl^2), hydrogen chloride (HCl), and boron trifluoride (BF^3). The

granulate is also used to abate the fluorinated plasma breakdown byproducts of perfluorocarbon (PFC) gases, such as nitrogen fluoride (NF^3), and sulfur hexafluoride (SF^6).

Spent granulate waste derived from columns used to abate chemical etching process exhaust typically consists of magnesium and aluminum salts of the above-mentioned etching gases. It is estimated that chemical etching process waste granulate will account for approximately 3,000 pounds of spent granulate per year to be processed by CS Clean.

D.1.1.4 Nitride Granulate

Nitride-based manufacturing processes use a high flow of ammonia gas as an active agent in manufacturing various semiconductors and devices.

Due to the chemical reaction of this ammonia with the column granulate, spent granulate waste derived from columns used to abate nitride process exhaust typically consists of copper and zinc salts of ammonia and hydrides. It is estimated that nitride process waste granulate will account for approximately 1,800 pounds of spent granulate per year to be processed by CS Clean.

D.1.1.5 Silicon Epi (Epitaxy)

Spent granulate waste used to abate chlorosilane gases and a small amount of hydride gas. Spent Silicon Epi (Epitaxy) granulate contains chloride salts of aluminum and magnesium and copper salts of arsenic and phosphorus.

It is estimated that epitaxy process waste granulate will account for approximately 24,000 pounds of spent granulate per year to be processed by CS Clean.

D.1.1.6 Cobalt

Spent granulate waste used to abate ammonia and cobalt precursors. Spent cobalt granulate contains aluminum and magnesium salts, cobalt, copper oxides, and ammonia complexes with copper compounds.

It is estimated that cobalt process waste granulate will account for approximately 24,000 pounds of spent granulate per year to be processed by CS Clean.

D.1.2 Containers with or without Free Liquids

Spent Cleansorb columns received from offsite are considered a semi-solid or sludge and do not typically contain free liquids. Spent granulates will receive testing via a paint filters test for the presence of free liquids. Information on the six types of spent granulate waste streams and characteristics are provided under **Section C**.

Wastewater and spent liquid waste from the copper sulfate treatment are generated as part of the treatment, cleaning, and cleaning waste steps highlighted under **Section A.5**. All rinse water from rinsing sinks, wastewater, and waste liquids from copper sulfate treatment are plumbed directly to intermediate bulk containers (IBCs) in the waste storage area. Spent granulate waste treated with

copper sulfate treatment (i.e., CVD, ion implantation, cobalt, or epitaxy) will contain free liquids. Treated spent granulate waste that did not receive copper sulfate treatment (i.e., nitride and chemical etching) does not contain free liquids.

Treated spent granulate waste is transferred to a Department of Transportation (DOT)-approved drum where it is stored in the waste storage area on dedicated spill pallets within a bermed area until shipped offsite for disposal to a licensed treatment, storage, and disposal facility.

A drawing of the process area is provided in **Appendix D.1.1** and a process flow diagram is described in **Appendix D.1.5**. Container storages of spent granulate waste, once received, are stored in the waste storage area on spill pallets, temporarily staged in the preparation area during transfer, and are opened for spent granulate treatment in the waste material transfer room for treatment using purging and copper sulfate. Drawings of these areas are provided in **Appendix D.1.6**. Standard Operating Procedures (SOPs) for the purging and treatment processes are provided in **Appendix D.1.2**. These areas are bermed and feature a sealed, impervious flooring membrane, which is detailed further in **Section D.1.4**. No floor drains exist in these areas and the sink is plumbed via dedicated piping to the IBC in the waste storage area.

D.1.3 Description of Containers

D.1.3.1 Spent Granulate Received from Offsite

Spent Cleansorb columns received from offsite come in a variety of sizes (ranging in size from 25 to 200 liters (L) in size). All Cleansorb columns are SAE 316 grade stainless steel in composition, DOT-approved, hermetically sealed gas scrubbers containing spent granulate. Columns received offsite are of ambient atmospheric pressure.

Only one column will be transferred at a time in the waste material transfer room and no more than twelve columns and/or waste drums will be stored together in the waste storage area at any given time. All stored columns will remain accessible and be provided with at least 30 inches of aisle space to allow for sufficient access. Columns will not be stacked.

Number of columns to be processed annually are highlighted below in **Table D.1.1**.

Table D.1.1
Spent Granulate Quantities Processed Annually

End User Waste Type	Number of Columns	Estimated Total Weight (lbs.)	Container Size (liters)
Ion Implant	8	4,800	25 – 200
Silicon Epi (Epitaxy)	41	24,000	
Cobalt	41	24,000	
CVD	5	3,000	
Chemical Etching	5	3,000	
Nitride	3	1,800	

Cleansorb column handling and treatment SOPs are provided in **Appendix D.1.2**. Cleansorb columns once emptied and cleaned are considered RCRA empty containers and are transferred out of the waste material transfer room to the preparation area and outside into non-RCRA areas of the facility for column refill and regeneration of new granulate materials.

D.1.3.2 Waste Generated from Onsite Treatment

Waste that is generated resulting from the treatment and transfer of spent granulate waste from Cleansorb columns is containerized in 55-gallon DOT approved containers or in the IBCs.

Treated spent granulate waste is placed in a 55-gallon DOT approved container in the waste material transfer room, sealed, and then placed on spill containment pallets in the waste storage area. No more than twelve waste 55-gallon drums and spent columns will be stored in the waste storage area on spill containment pallets. All drums will be stored accessible with at least 30 inches of aisle space to access every drum.

A process flow diagram is provided for the process in **Appendix D.1.5**.

Copper sulfate and rinse wastewater will be plumbed and discharged directly to one of two IBCs (one for the copper sulfate mixture and one for the rinse wastewater). The IBC totes will be stored closed in the waste storage area, will remain accessible, and be provided with at least 30 inches of aisle space to allow for access to each tote. Containers will not be stacked.

All containers will be DOT-approved UN containers for the specifications for the 55-gallon drums, spent columns, and IBCs are provided below.

- 55-gallon drums will be steel 1A1 or 1A2, X rated for PG I, II, or III materials and capable of holding 330 kilograms of solids
- Spent columns will be steel 1A2, X rated for PG I, II, or III materials and be capable of holding 334 kilograms of solids
- 275-gallon composite plastic totes with steel outer packaging will be 31HA1, Y rated for PG II or III materials, be capable of 3,800-kilogram stacks, 1,700-kilogram gross mass, 1041 Liters of capacity, and have a pressure rating of 70 kilopascals.

D.1.4 Containment Design

Descriptions of process areas as provided in **Appendix D.1.1** are provided below.

1. **Shipping and Receiving** – Spent column waste is received here through an overhead roll-up garage door and treated spent column waste generated as part of the treatment process is shipped from this location. The exterior entries of this room are bermed with a one and a half-inch berm, exterior walls are improved with a four-inch urethane and epoxy curb, and the concrete base floor is improved with an impervious and seamless urethane and epoxy coating system, the specifications for which are provided in **Appendix D.1.4**. Waste is only temporarily stored here while it is verified for receipt or shipment.
2. **Waste Storage Area** – This area is used to stage waste containers of spent granulate that have been removed from spent columns and are waiting to be shipped offsite for

disposal, as well as spent columns that are staged prior to processing that are received from shipping and receiving. This area also holds up to two IBC stored in the waste storage area to collect rinse water and spent copper sulfate and water solution generated from onsite treatment operations. The exterior entries of this room are bermed with a one and a half-inch berm, exterior walls are improved with a four-inch urethane and epoxy curb, and the concrete base floor is improved with an impervious and seamless urethane and epoxy coating system, the specifications for which are provided in **Appendix D.1.4**. The waste storage area also features two spill pallets for spent columns and treated waste for disposal the waste storage room.

3. **Preparation Area** - This area is utilized to help control access to the waste material transfer storage area. The preparation area is utilized to house key supporting equipment such as the controls for electrochemical gas detection, personal protective equipment (PPE), and copper sulfate process piping. Spent columns and treated spent granulate waste is transported through this area. Waste containers are only temporarily stored in this location during transfer operations. The exterior entries of this room are bermed with a one and a half-inch berm, exterior walls are improved with a four-inch urethane and epoxy curb, and the concrete base floor is improved with an impervious and seamless urethane and epoxy coating system, the specifications for which are provided in **Appendix D.1.4**.
4. **Waste Material Transfer Room** – This area is used for decontamination of the used Cleansorb columns after they have been emptied in the waste material transfer room. This room is used for secondary purging of spent columns, copper sulfate treatment of spent columns, and transfer of spent granulate from spent columns into DOT-approved waste containers for storage and shipment for offsite disposal. This includes disassembly and thorough cleaning of each column and associated parts in dedicated wash basins. The copper sulfate storage mixing tank, purge gas canisters, pumps and associated transfer piping, two decontamination sinks, a wash basin, a waste transfer pump and associated transfer piping are in this location. Waste containers are only temporarily stored in this location during treatment operations. No exterior entries exist for this room as it accessed through the Donning and Doffing Passthrough or the Preparation Area. The exterior walls are improved with a four-inch urethane and epoxy curb, and the concrete base floor is improved with an impervious and seamless urethane and epoxy coating system, the specifications for which are provided in **Appendix D.1.4**.
5. **Donning and Doffing Passthrough** – This area is utilized for employees to don and doff PPE from the preparation area to waste material transfer room. Waste containers will not be stored in this room. No exterior entries exist for this room as it accessed through the waste material transfer room or the preparation area. The exterior walls are improved with a four-inch urethane and epoxy curb, and the concrete base floor is improved with an impervious and seamless urethane and epoxy coating system, the specifications for which are provided in **Appendix D.1.4**.

A Construction drawing of the floor plan in addition to flooring specifications are provided in **Appendix D.1.4**.

D.1.4.1 Containment Drainage

Any incidental spillage of waste outside of its intended container would be captured on the impervious flooring and berm or the spill containment pallets. A spill in the process area would result in implementation of the contingency plan under **Section G** of this application. Additionally, CS Clean will routinely inspect for spills per **Section F.2** of this application. Should a spill occur the contingency plan will be activated and the spill, depending on size and specific hazards, may be cleaned up by CS Clean personnel or a third-party spill response contractor. CS Clean will utilize a vacuum pump to pump any spilled waste into DOT-approved containers.

In the event a spill is encountered, non-critical operations will cease, the contingency plan will be implemented immediately, and facility operations will not resume until the spill event is concluded, cleaned, and all equipment is returned to working order per **Section G** of this permit application.

Similarly, if a safety emergency is encountered, such as an emergency release,, imminent danger, or security threat, non-critical operations will cease, the contingency plan (**Section G**) will be implemented immediately, and facility operations will not resume until the spill event is concluded.

Critical operations include emergency systems such as the generator, ventilation, supplied air and exhaust, alarms, Uninterruptible Power Supply (UPS), Cleanprotect, and spill containment functions.

No floor drains or sink drains in the waste process area are connected to the municipal sewer or wastewater systems.

D.1.4.2 Containment Capacity

The exterior walls and doors of the process area are improved with a one and a half-inch tall berm. The floor plans and impervious flooring system and berming is provided for in **Appendix D.1.4** providing adequate containment for all process areas.

As such these areas will act as a containment system. The calculated containment for each area is highlighted below in **Table D.1.2** with the largest container and maximum container volumes noted for each area.

Table D.1.2
Containment Capacity Calculations

Room / Process Area	Area (sq feet)	Largest Container (Gallons)	Maximum Storage Volume (Gallons)	Containment Required (10% of Max or 110 % Largest, whichever greater)	Containment Present (Gallons) with 1.5 inch Berm and seamless flooring[1]
Waste Storage Room and Shipping and Receiving Area	579.75	55	660	66.0	542.06

Table D.1.2 Containment Capacity Calculations					
Room / Process Area	**Area (sq feet)**	**Largest Container (Gallons)**	**Maximum Storage Volume (Gallons)**	**Containment Required (10% of Max or 110 % Largest, whichever greater)**	**Containment Present (Gallons) with 1.5 inch Berm and seamless flooring[1]**
Preparation Area and Waste Storage Area Room	645.60	275	605	302.5	603.63
Waste Material Transfer Room	557.29	55	55	60.5	521.06
Donning and Doffing Pass Through	47.36	N/A	N/A	N/A	44.28
Assumes one cubic foot = 7.48 gallons of capacity					

D.1.4.3 Control of Run-On

All treatment and storage of spent granulate columns and waste containers are conducted inside the facility's structure with a roof. Facility process drawings and a floor plan are provided in **Appendices D.1.1** and **D.1.4**.

D.1.5 Container Inspection Schedule

This section has been prepared to:

- Identify which areas, storage vessels, containers, and other related items will be inspected at the facility and the frequency with which they will be inspected,
- Identify what types of problems to be reviewed during each inspection,
- Develop and follow a written inspection schedule,
- Ensure the inspection of all storage vessels and containers
- Describe documented inspection log(s) that are used and retained to memorialize each inspection.

In addition to the line items listed above, CS Clean fulfills the following inspection principles:

- Inspect the containers for deterioration, errors, and discharges which could result in the release of hazardous waste or pose a threat to human health.
- Conduct routine inspections often enough to identify problems in time to correct them before risking harm to human health or the environment.
- Develop and follow a written inspection schedule which must be retained at the facility. This inspection schedule will identify specific types of problems which must be looked for.

- Remedy any deterioration or errors that the inspection reveals and take remedial action any time an incident is identified.
- Record all inspections, including the date and time of inspection, name of the inspector, notation of observations made, and the date and nature of any repairs made and keep these records for a five-year period.

D.1.5.1 Inspection Schedule for Process Areas

This section delineates the container areas and equipment at CS Clean which require routine inspections. A summary of the inspection areas and inspection frequency are provided on **Table D.1.3**.

Provided in **Sections D.1.5.1** through **D.1.5.4** are descriptions of the inspections which are performed at CS Clean for the areas of the facility with hazardous waste container traffic (waste storage area, waste material transfer room, preparation area).

Table D.1.3
Container Inspection Schedule

Area/ Equipment	Specific Item	Types of Problems	Freq. of Inspection
Waste Storage Area	Spills/releases	Accumulated liquid, wet spots	Daily
	Drum and storage containers placement and stacking	Drum aisle spacing: 6-'9" (minimum) Storage bulk container aisle spacing: 2'-0" (minimum) Height of stacks: 2 high maximum for all containers	Daily
	Closing of containers and storage	Open lids or bungs	Daily
	Labeling of containers and storage bulk containers	Improper identification, date missing	Daily
	Floor of storage room/Berm	Cracks, spalling, uneven settlement, erosion, wet spots	Daily
	Debris and refuse	Obstruction, aesthetics, possible reaction with leaks	Daily
	Storage capacity	>10 55-gallon containers >10 spent columns >2 275-gallon totes	Daily
Preparation Area	Spills/releases	Accumulated liquid, wet spots	Weekly
	Floor of area/Berm	Cracks, spalling, uneven settlement, erosion, wet spots	Weekly
	Debris and refuse	Obstruction, aesthetics, possible reaction with leaks	Weekly
	Spent column containers	Being stored outside waste storage area	Weekly

Table D.1.3 Container Inspection Schedule			
Area/ Equipment	**Specific Item**	**Types of Problems**	**Freq. of Inspection**
Waste Material Transfer Room	Spills/releases	Accumulated liquid, wet spots	Weekly
	Spent column containers	Being stored outside waste storage area	Weekly
	Labeling of storage	Improper identification	Weekly
	Floor of area/Berm	Cracks, spalling, uneven settlement, erosion, wet spots	Weekly
	Debris and refuse	Obstruction, aesthetics, possible reaction with leaks	Weekly

D.1.5.2 Container inspections

Spent columns are stored in the waste storage area once moved from the shipping/receiving area; all waste granulate storage containers are stored within the waste storage room. The waste storage room is used to store 55-gallon containers and various sizes of spent columns (ranging from 25 to 200 liters in size, containing up to approximately 125 pounds of spent granulate). These storage containers are visually inspected for condition (dents, signs of corrosion, deterioration, and leaks), whether they are open or closed, whether they are properly labeled, and placement (proper aisle clearance and space).

Since wastes are managed and stored in these areas, the waste storage area, waste material storage area, shipping and receiving, preparation area, donning and doffing passthrough themselves are inspected for the presence of leaks/spills; if cracks, settlement, or erosion are present in the concrete floor (base); if warning signs are damaged or missing; if debris/refuse is present, and if total storage capacity is exceeded. These inspections are performed daily by the facility personnel for the containers stored in the waste storage area.

The results of these inspections are recorded on the waste storage area daily inspection logs (**Appendix D.7**).

D.1.5.3 Site Capacity Inspection

To ensure the storage capacities of the waste storage area are not exceeded, facility personnel verify that the capacities listed below are not exceeded on a daily basis.

Table D.1.4 Container Capacity		
Type of Container	**Maximum Number of Containers**	**Maximum Storage Volume**
WASTE STORAGE AREA (Room)		
55-gallon containers or Spent Columns	12	660 gallons
	TOTAL	660 gallons

Table D.1.4 Container Capacity		
Type of Container	**Maximum Number of Containers**	**Maximum Storage Volume**
WASTE STORAGE AREA (IBCs by Preparation Area)		
275-gallon bulk containers	2	550 gallons
	TOTAL	550 gallons

The results of this inspection are recorded on the waste storage area daily Inspection Logs (**Appendix D.1.7**).

D.1.5.4 Inspection Schedule for Non-Permitted Hazardous Waste Storage Areas

This section identifies the equipment and structures at the non-permitted hazardous waste storage areas which are inspected. The only non-permitted hazardous waste storage area currently planned for use by CS Clean at its Phoenix facility is the less than or equal to (≤) 90-day container accumulation area. The inspection items and inspection frequencies for this area are provided on **Table D.1.5** below.

Table D.1.5 Inspection Schedule For Non-Permitted Hazardous Waste Storage Areas			
Area/ Equipment	**Specific Item**	**Types of Problems**	**Frequency of Inspection**
≤ 90 Day Hazardous Waste Accumulation Area (Waste Storage Area)			
55-gallon containers and 275- gallon totes	Condition	Dents, corrosion, leaking	Daily
	Tops/Bungs	Open when not in use; spillage	Daily
	Empties	Not stored on side with bungs closed, etc.	Daily
	Waste Stored	Incompatible with container, not segregated	Daily
	Labels	Missing or illegible; not labeled "Hazardous Waste," waste not identified; accumulation date missing or older than thirty days; old labels present	Daily
Secondary Containment Area	Containment	Missing, damaged	Daily
	Containers	Stored outside of containment	Daily
	Floor	Spill or spill residue	Daily
	Aisle Space	Inadequate to reach all containers	Daily

The results of this inspection are recorded on the waste storage area daily Inspection Logs (**Appendix D.1.7**).

D.1.6 Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste

CS Clean has taken precautions for the management of hazardous waste to prevent the ignition of waste, reaction of waste, and incompatible waste from mixing.

All waste will undergo reactivity, ignitability, and other testing per the waste determination and profiling process described under the waste characteristics section prior to acceptance as outlined in **Section C**.

CS Clean utilizes the purge and copper sulfate treatment processes, as described in **Appendix D.1.2** to minimize any potential reaction or ignition during treatment. The purging process removes any residual gases and inert the column prior to the CS Clean technician opening. The copper sulfate treatment process quenches the spent CVD, ion implant, cobalt, or epitaxy waste granulate upon emptying out of the column to a 55-gallon waste drum, this prevents a reaction from occurring for the reactive waste streams. Then emptied Cleansorb columns are cleaned in the sinks and wash basin, dried, and then are considered RCRA-empty before being returned to service for refill and regeneration with granulate.

Spent columns and 55-gallon drums are stored on spill pallets in the waste storage area. A review utilizing the U.S. Environmental Protection Agency's (EPA) "A Method for Determining The Compatibility of Hazardous Waste" was conducted against the profiles based on the waste stream characteristics and information specified from spent columns manufacturing processes received by the facility per waste profiles provided in **Appendix C.2** (**Section C**). The review, provided in **Appendix F.10** (**Section F**), was developed for the composition associated with the six spent column waste streams. Please note that the waste streams are in mixtures (at various percentages). Upon review several waste streams contain chemicals, that per the "A Method for Determining The Compatibility of Hazardous Waste" contain water reactive chemicals in mixtures. Upon further review and consultation, with CS Clean's chemical engineering team it was determined that these wastes are not water reactive as the chemicals contained within are not in pure form and are in salt mixture. The chemical compatibility review is based on the spent granulates mixtures in salt mixture forms and was matched to Reactive Group Names based on the form and compound reported in the waste profiles.

Based on the chemical compatibility review and information on salt mixtures provided the "Method for Determining the Compatibility of Hazardous Waste" did not identify waste storage or chemical compatibility restrictions.

Only one spent column will be processed at a time to minimize the hazard of incompatible wastes mixing. All wastes will be shipped offsite for final disposal to an approved treatment, storage, and disposal approved for that waste stream to minimize incompatible wastes being disposed of together. Shipments of waste will be adequately segregated per the DOT Segregation Table for Hazardous Materials.

The waste storage area and waste material transfer room, located in the west-central area of the building, where ignitable and reactive waste is stored and treated onsite, is greater than 50 feet from the property line. A figure showing 50 feet from the property line is provided in **Appendix F.11** (**Section F**).

CS Clean does not allow smoking in the facility and has "No Smoking" signs posted on exterior door entrances.

The facility is equipped with a fire sprinkler system as described in **Appendix F.4** should a fire occur and portable fire extinguishers are available.

D.1.7 Waste Tracking System for Containers

Any spent column shipped to CS Clean from an end user is accepted only if it arrives with all proper waste profiling, transportation, and CS Clean-required documentation. Spent column shipments that arrive without all the required documentation (i.e., waste manifest, CS Clean waste approval, and waste profile) will be refused. An example waste profile, blank waste profile, end user declaration, and hazardous waste manifest, highlighting the required paperwork, are provided in **Appendix D.1.8**.

Every container of spent granulate that is generated offsite from end users' used columns will be assigned a unique waste container identification number. The identification number is assigned by CS Clean as the serial number provided on each returned canister.

The information listed below will be recorded on the Hazardous Waste Tracking Log, of which a blank copy is provided as **Appendix D.1.9**.

- End user
- Material description, estimated quantity
- Waste container Identification Number
- Waste Manifest Number
- Date received
- Receiver's initials
- Date sampled
- Waste code(s)
- Copy of Waste Profile
- Date stored
- Date shipped offsite

In addition to the information above, tracking logs for containers of process water generated onsite will also include:

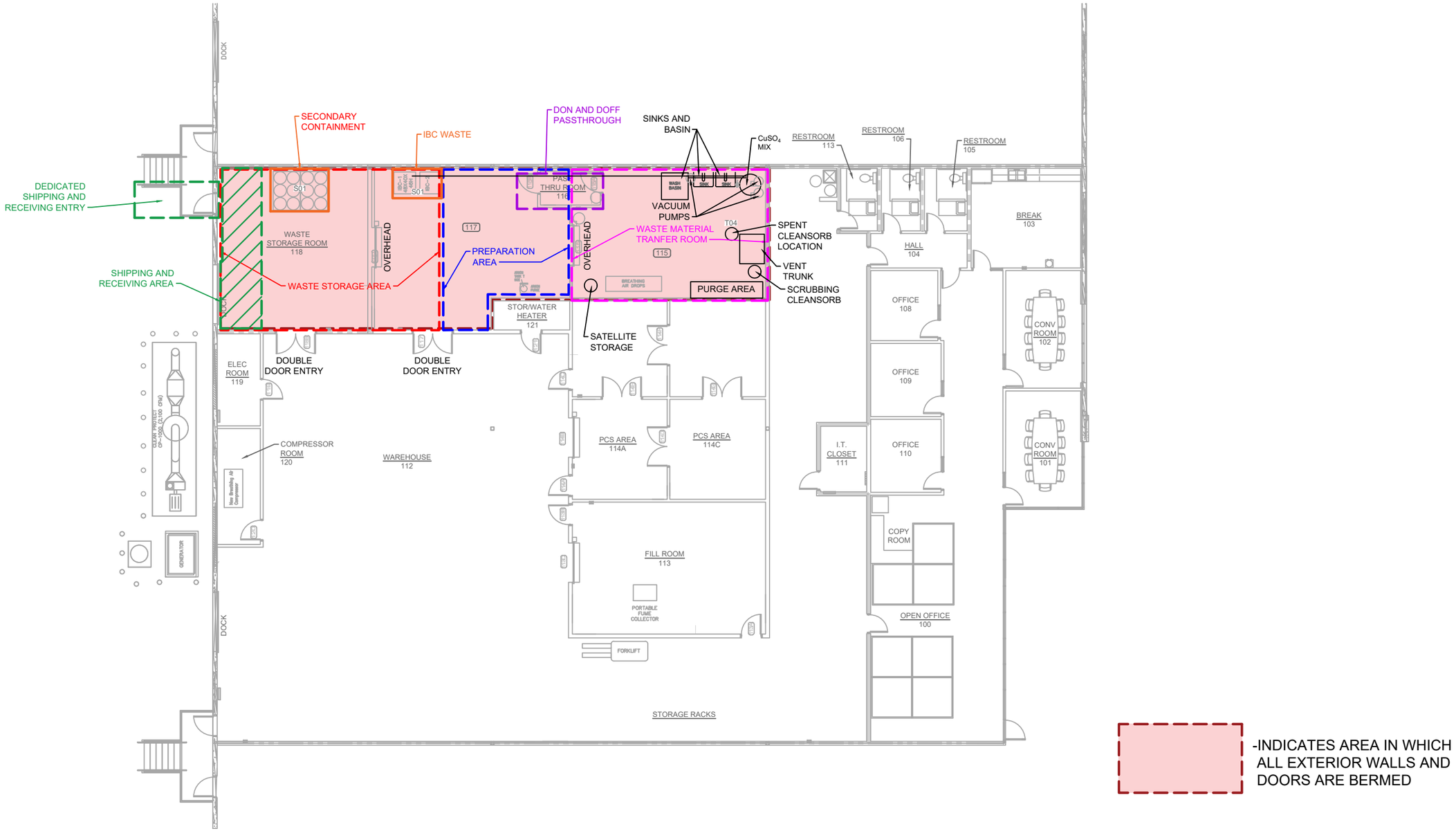
- Generation date
- Sample method(s) for waste analysis

Once complete, the hazardous waste tracking logs are kept in a shared drive.

A similar procedure would be used to ship generated hazardous waste or treated waste for final disposal at an approved treatment, storage, and disposal location.

After treatment, a tracking procedure is also used to ship generated hazardous waste or treated waste for final disposal at an approved treatment, storage, and disposal location. The waste would be first verified for acceptance via a waste profile and have a waste manifest for the waste shipped. The final waste manifests returned by the disposal facility are attached the waste tracking logs and associated paperwork and kept on file at the CS Clean facility.

APPENDIX D.1.1
Process Drawing



-INDICATES AREA IN WHICH ALL EXTERIOR WALLS AND DOORS ARE BERMED

HRP
MOVE YOUR ENVIRONMENT FORWARD
197 SCOTT SWAMP ROAD
FARMINGTON, CT 06032
(860) 674-9570
HRPASSOCIATES.COM

NORTH

0 8' 16'

SCALE 1/16" = 1'-0"

REVISIONS	
NO.	DATE

DESIGNED BY:	REVIEWED BY:	ISSUE DATE:
DSW	DSW	06/23/2025
DRAWN BY:	PROJECT NUMBER:	SHEET SIZE:
BOB	CSC0016.RC	11"x17"

BUILDING PLAN

CS CLEAN SOLUTIONS
26 COMMERCE DRIVE
DANBURY, CONNECTICUT

FIGURE

2

APPENDIX D.1.2
SOPs

CS CLEAN SOLUTIONS	Title:	**Appendix D.1.2.1**– Secondary Purging Procedure
	Review / Revision Date:	June 13, 2025
	Reviewed by:	A.Furphy & D.Webster

I.3.1 SPENT CLEANSORB COLUMN SECONDAR AIR, NITROGEN OR ARGON PURGING PROCEDURE (REQUIRED FOR ALL COLUMNS)

1. Prior to handling, verify the spent column is intact and the contents are adequately contained. In preparation for decontamination, verify the column's contents by reviewing its documentation and completed End User Declaration. This will ensure knowledge of contents and use of appropriate handling and decontamination procedures.

2. Don base level personal protective equipment (PPE), including safety shoes, chemical resistant gloves, and safety glasses, at a minimum. Additional PPE should be utilized as necessary based on identified hazards.

3. Using a hand truck, move the spent column from the waste storage area to the waste material transfer room.

4. Once in place in the waste material transfer room, attach the grounding strap to the column.

5. Turn on the dedicated waste material transfer room exhaust system to ensure an air exchange rate of ten (10) air changes per hour within the room. Visually verify that the ventilation is working properly via the exhaust duct pressure gauge in the room.

6. Ensure that the electrochemical gas and oxygen monitoring system is functioning and that no alarm notifications are active on the control panel of the sensor monitoring system.

7. Don additional PPE, to include: chemical resistant suit and boot covers and supplied air full face or hood respiratory protection.

8. Connect the inlet port of the spent column to the air, nitrogen or argon purging supply line connection. Connect the outlet port of the spent column to the clean column connection for the Cleansorb column that has been designated to receive the pass-through purge gas. Ensure that both the inlet and outlet coupling connectors are properly seated and securely fastened to the spent column's ports, and that the inlet coupling connection is properly seated on the clean column.

9. Operate both the inlet and outlet port manual valves of the clean column to the open position. Then, operate both port manual valves of the spent column to the open position.

10. Initiate the flow of nitrogen or argon by turning the compressed air, nitrogen or argon tank valve to the open position, and adjust the nitrogen or argon regulator to a rate of 40 liters/minute. Purge the spent column with nitrogen or argon for at least 30 minutes for all spent columns. After at least 30 minutes, stop the flow of nitrogen or argon by turning the compressed nitrogen or argon tank valve to the closed position.

11. Close the inlet and outlet port valves on both the spent column and pass-through column, and disconnect the couplings from the inlet and outlet ports of the spent column. Verify that both port valves on the spent column are securely closed prior to moving the column for continued processing in the waste material transfer room.

12. Change Control Log

What	Who	When
Replaced : “used canister” with “spent column”	A.Furphy	11/30/2023
Replaced “nitrogen” with “nitrogen or argon” In all areas	A.Furphy	11/30/2023
Replaced “canister” with “column” in all areas	A.Furphy	11/30/2023
Updated Review / Revision Date From May 23, 2017 to November 30, 2023		
Update processes to reflect nomenclature changes for site conditions of “Shipping and Receiving Area”, “waste material storage room”, “preparation area”, and “waste storage area”.	D Webster	5/14/2025
Included Air into the Purging procedure & Updated title to purging procedure (Removed Nitrogen)	A.Furphy	06/13/2025

CS CLEAN SOLUTIONS	Title:	**Appendix D.1.2.2** – Copper Sulfate Treatment Procedure
	Review / Revision Date:	July 28, 2025
	Reviewed by:	D.Webster

I.3.2 COPPER SULFATE TREATMENT PROCEDURE (CVD, ION IMPLANTATION, COBALT, AND SILICON EPI COLUMNS ONLY)

1. Don required PPE, ie: chemical resistant gloves, 3M mask with P100 cartridges and safety goggles. Prepare a 10% by volume copper sulfate solution in 100 gallons of water in the open-top copper sulfate mixing tank and mix until adequately blended using supplied air to agitate.

2. Move the spent column into the waste material transfer room.

3. Ensure that all of the procedures described in the **Secondary Air, Nitrogen or argon Purging Procedure (Appendix D.1.2.1)** have been completed prior to initiating this procedure. The spent column MUST have been properly purged with nitrogen or argon before completing this procedure.

4. Turn on the dedicated waste material transfer room exhaust system to ensure an air exchange rate of ten (10) air changes per hour within the room. Visually verify that the ventilation is working properly via the exhaust duct pressure gauge in the room.

5. Ensure that the electrochemical gas and oxygen monitoring system is functioning and that no alarm notifications are active on the control panel of the sensor monitoring system.

6. Prep one 55-gallon steel drum with plastic bag and then add one 55 gallon can drum liner on top of the 1st inserted bag and move into place for acceptance of funnel and copper sulfate mixture.

7. Add a special CS funnel to the freshly prepped drum for dumping of material from spent column by using a buddy and lifting the funnel into place and clamping it down with supplied steel clamp.

8. Don nitrile gloves and connect drip free connects to the funnel and proceed to add Copper Sulfate mixture using the quick drip free connects and turning on the Fluimac supply pump and begin pumping the mixture of copper sulfate to approximately 2/3rds full of accepting drum then stop the pump and disconnect.

9. Set incoming spent column into Morse drum lifter.

10. Attach CS made CC column dumping funnel to top of full spent column coming in for reclamation processing.

11. Don appropriate PPE, to include safety shoes, chemical resistant suit, gloves, and boot covers, and supplied air full face or hood respiratory protection. Lift and begin dumping of spent column using drum lifter, transferring the material from the spent 200L column to prepared 55-gallon drum.

12. Once the spent granulate is transferred from the 200L column to the 55-gallon steel drum, you can move the full 55-gallon drum with spent material to the off-gassing station where it will sit for 24 hours and checked periodically for heat buildup.

13. After 24 hours, the column and drum can be hooked back up to the quick connectors for proper pump down of copper sulfate material back to the holding tank.

14. Once the pump down is completed, the material in the 55-gallon steel drum should be sealed using tape and drum lid can be placed on top and sealed using supplied lid and ring.

15. To empty spent copper sulfate waste water, open the manual valve on the inlet side of the waste transfer pump, and then the manual valve on the inlet side of the designated waste IBC. Ensure that the manual valve on the inlet side of the decontamination process water IBC is in the closed position to prevent cross-contamination.

16. Turn on the waste transfer pump and allow all spent copper sulfate solution to be evacuated from the mixing tank.

17. Turn off the waste transfer pump and securely close the waste transfer pump and waste IBC inlet manual valves.

Change Control Log		
What	Who	When
Replaced : “used canister” with “spent column”	A.Furphy	11/30/2023
Replaced “nitrogen” with “nitrogen or argon” In all areas	A.Furphy	11/30/2023
Replaced “canister” with “column” in all areas	A.Furphy	11/30/2023
Updated Review / Revision Date From May 23, 2017 to November 30, 2023		
Update processes to reflect nomenclature changes for site conditions of “Shipping and Receiveing Area”, “waste material storage room”, “preparation area”, and “waste storage area”. Added Air tp Purge reference	D Webster	5/14/2025

I.3.3 SPENT COLUMN EMPTYING PROCEDURES

1. Ensure that the **Secondary Nitrogen or argon Purging Procedure (Appendix D.1.2.1)** and, if applicable, **Copper Sulfate Treatment Procedure (Appendix D.1.2.2)** have been completed prior to initiating this procedure.

2. Turn on the dedicated waste material transfer room exhaust system to ensure an air exchange rate of ten (10) air changes per hour within the room. Visually verify that the ventilation is working properly via the exhaust duct pressure gauge in the room.

3. Ensure that the electrochemical gas and O_2 monitoring system is functioning and that no alarm notifications are active on the control panel of the sensor monitoring system.

4. Don appropriate level of PPE to include safety shoes, chemical resistant suit, gloves, and boot covers, and supplied air full face or hood respiratory protection at a minimum. Under no circumstances are any emptying procedures permitted with less than this specified PPE.

5. Move a clean 55-gallon waste collection container into place within the waste material transfer room and attach the grounding strap. Line the container with a plastic bag.

6. Power on the dust collection vacuum that will be used to reduce airborne particulate during the material transfer procedure, and retrieve the vacuum hose arm. This hose should be placed immediately adjacent to and facing the material transfer operation for the duration of the activity. The vacuum should remain powered on and in the area until the 55-gallon waste container has been tightly sealed.

7. On the spent column, detach the inlet valve and associated coupling adapter.

8. Leave the column outlet valve open and detach the outlet coupling adapter.

9. Open the clamping ring on the spent column. Then, remove the clamping ring from the unit.

10. Lift and remove the adapter module from the column to expose the perforated plate.

11. Lift and remove perforated plate from the column.

12. Remove the top layer (approximately 2-3 in.) of spent granulate from the top of the column with a plastic scooping device. Carefully place the granulate in the empty 55-gallon waste container.

13. Remove the guide ring from around the top of the column.

14. Place the column funnel on the top of the column and secure the funnel with the clamping ring removed in Step 8.

15. To prepare the column for tipping, securely mount the column to the mechanical assisting lift device. Verify that the column is secured to the lift device prior to proceeding to the next step.

16. Carefully lift the column. Slowly tip the column and completely empty the remaining spent granulate into the 55-gallon waste container.

17. Once the spent granulate is transferred into the waste container, return the column to an upright position, lower the column to the ground, and unsecure the column from the lift device.

18. Open the clamping ring on the spent column and remove the funnel.

19. If the spent column is equipped with a lower perforated plate, remove the perforated plate from within the column and carefully remove any remaining granulate material from the drum.

20. Cover the spent granulate in the 55-gallon waste container with a thin layer of virgin granulate of the same type as the spent material.

21. Tie the plastic bag liner closed tightly and securely seal the 55-gallon waste container.

CS CLEAN SOLUTIONS	Title:	**Appendix D.1.2.3** –Emptying Procedure
	Review / Revision Date:	May 14, 2025
	Reviewed by:	

Change Control Log		
What	Who	When
Replaced : “used canister” with “spent column”	A.Furphy	11/30/2023
Replaced “nitrogen” with “nitrogen or argon” In all areas	A.Furphy	11/30/2023
Replaced “canister” with “column” in all areas	A.Furphy	11/30/2023
Updated Review / Revision Date From May 23, 2017 to November 30, 2023		
Update processes to reflect nomenclature changes for site conditions of “Shipping and Receiving Area”, “waste material storage room”, “preparation area”, and “waste storage area”.	D Webster	5/14/2025

I.3.2 SPENT ION IMPLANT COLUMN OXIDATION PROCEDURE

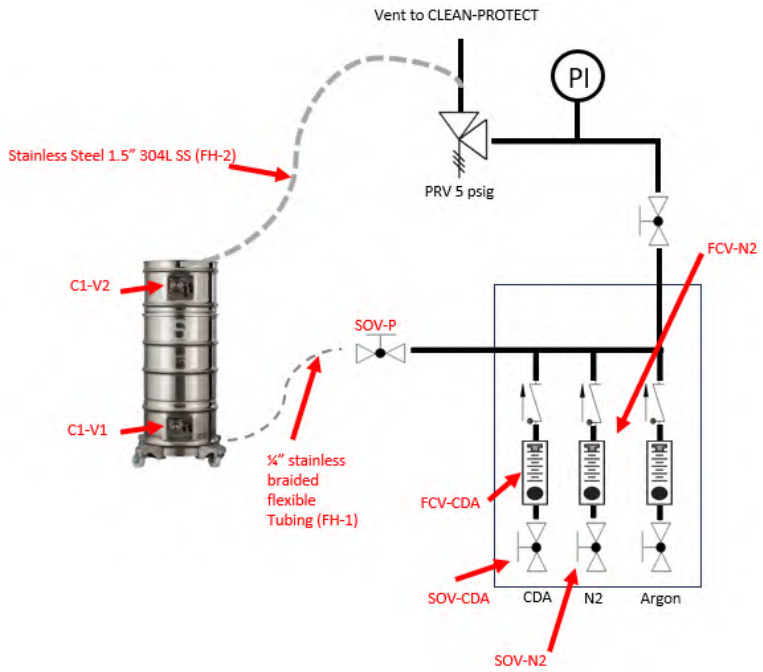
1. Move the spent column into the waste material transfer room.

2. Ensure that all of the procedures described in the **Secondary Nitrogen or argon Purging Procedure (Appendix D.1.2.1)** have been completed prior to initiating this procedure. The spent column MUST have been properly purged with nitrogen or argon before completing this procedure.

3. Turn on the dedicated waste material transfer room exhaust system to ensure an air exchange rate of ten (10) air changes per hour within the room. Visually verify that the ventilation is working properly via the exhaust duct pressure gauge in the room.

4. Ensure that the electrochemical gas and oxygen monitoring system is functioning and that no alarm notifications are active on the control panel of the sensor monitoring system.

5. Don PPE as required for Ion Implant columns (Tyvek, safety shoes, supplied air mask)



6. Using an anemometer, measure the air flow rate of the outlet purge 1.5" stainless steel KF 40 hose (FH-2) to facility exhaust. Ensure a flowrate of at least 5 m/s.

7. Connect 1.5” stainless steel KF40 facility exhaust hose (FH-2) to the outlet of the spent column.

8. Connect ¼” flexible stainless steel braided hose (FH-1) to the inlet of the spent column.

9. Open the outlet valve (C1-V2) on the spent column.

10. Open the inlet valve (C1-V1) of the spent column.

11. Open purge shut off valve (SOV-P)

12. Open N2 supply valve (SOV-N2) on gas purge panel and set flow to 25 slm using flow control valve (FCV-N2).

13. Open CDA supply valve (SOV-CDA) on gas purge panel and set flow to 5 slm using flow control valve (FCV-CDA)

14. Leave it at 25 slm N2 and 5 slm CDA for 30 mins.

15. After 30 mins, using CDA flow control valve (FCV-CDA), increase CDA flow to 25 slm while leaving N2 flow at 25 slm.

16. Leave flow at 25 slm CDA and 25 slm N2 for 30 mins.

17. After 30 mins, stop flow of both N2 and CDA by closing SOV-CDA and SOV-N2.

18. Close purge shut off valve (SOV-P)

19. While leaving both valves on the spent column open, disconnect the ¼” stainless steel braided hose (FH-1) from the column inlet and allow room air into the column.

20. Using an anemometer, measure the room air flow going into the column. Flow should be at least 5 m/s.

21. Over the next few hours, monitor the temperature of the column using a touch-free IR thermocouple.

22. The temperature of the column will rise. Allow reaction to continue until the skin temperature of the column has dropped to 30C or below.

23. Reconnect 1.5” flexible SS braided hose (FH-1) to the spent column inlet.

24. Open purge shut off valve (SOV-P).

25. Open SOV-N2 and adjust FCV-N2 to Flow N2 at 25 slm until the column outer temperature is the same as the room temperature.

26. Stop flow of N2 by closing SOV-N2.

27. Close purge shut off valve SOV-P.

28. Close valve at the column inlet (C1-V1).

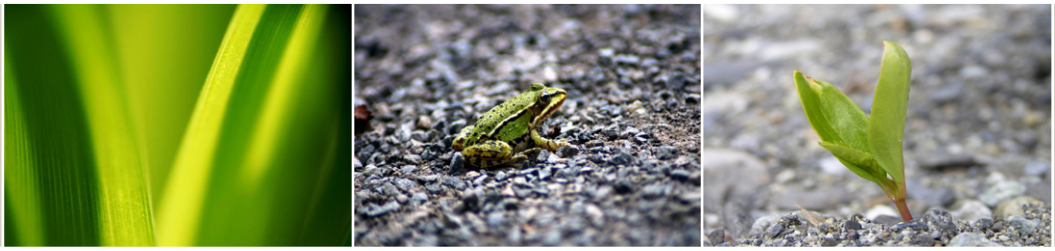
29. Close valve at the column outlet (C1-V2).

30. disconnect the hoses at the inlet (FH-1) and outlet (FH-2) of the spent column.

31. Maintain the column in the waste material storage area for decontamination process.

Update processes to reflect nomenclature changes for site conditions of “Shipping and Receiveing Area”, “waste material storage room”, “preparation area”, and “waste storage area”.	D Webster	5/14/2025

APPENDIX D.1.3
Cleanprotect Specifications

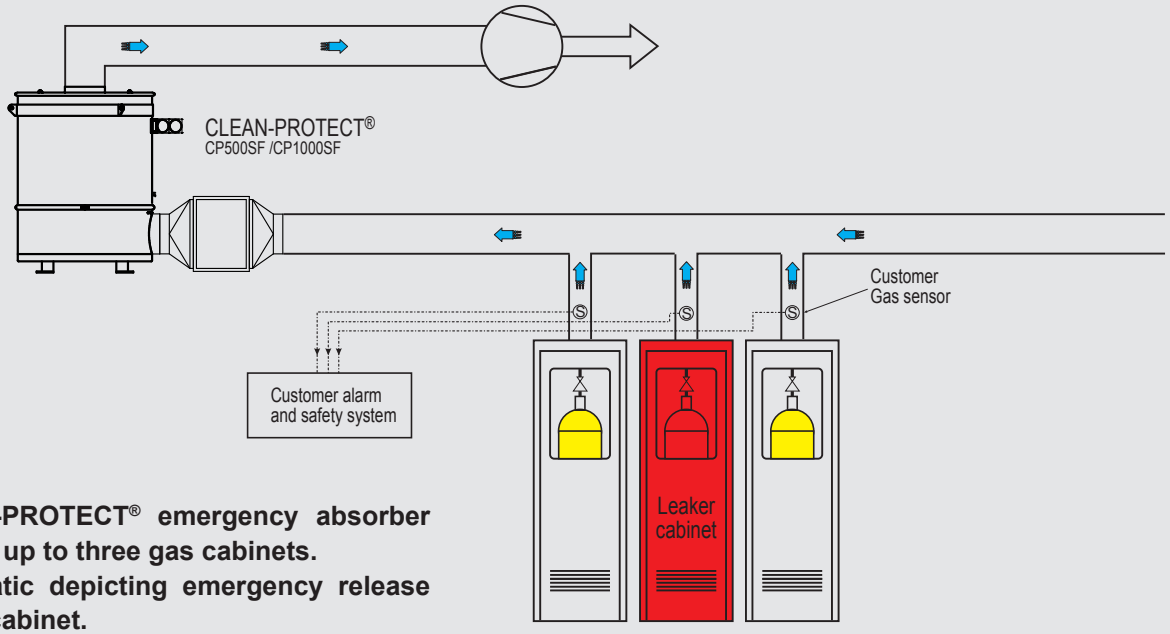


CS CLEAN SYSTEMS®

Product Information and Specifications

CLEAN-PROTECT® Emergency Gas Release Absorber
Models: CP500SF, CS1000SF

Rev. 201530518



CLEAN-PROTECT® emergency absorber hooked up to three gas cabinets. Schematic depicting emergency release in one cabinet.

Safeguard against accidental release of hazardous gases

Hazardous process gases are commonly used in the chemical, pharmaceutical, and semiconductor industries, among others. Most usually, the gases are supplied to the process from cylinders which are housed in an air-extracted cabinet. Larger supply vessels are often stored in concrete bunkers connected to a forced ventilation duct.

Hazardous release from gas cylinders poses a very serious threat to the workforce and factory neighborhood.

The CLEAN-PROTECT® product line was specially developed to absorb toxic, corrosive, or pyrophoric gases during an emergency gas release incident.

At the heart of the CLEAN-PROTECT® system is the dry chemisorbent material, CLEANSORB®. Installed in-line, the system is constantly on stand-by. Escaping gases undergo an irreversible chemical reaction (oxidation or neutralization) within the CLEAN-PROTECT® system, where they are safely converted into non-volatile, solid by-products. Provided the system has not absorbed gas, the chemisorbent bed has a stable lifetime of up to five years between change-outs.

CP systems can also be used for selected non-emergency applications involving high airflows.

CLEAN-PROTECT® Emergency Gas Release Absorber

- High air extract flowrates, protection of multiple gas cabinets
- Scrubbing capacity for full gas cylinder
- Low pressure drop
- Permanently online, practically no maintenance
- Fully passive – no electrical connections
- Typical 5 years service life between absorber refills
- Applicable to a wide range of hazardous gases, including:
- **AsH_3, BF_3, Br_2, Cl_2, ClF_3, $COCl_2$, F_2, HCl, HF, HBr, H_2S, H_2Se, HCN, NH_3, N_2H_4, PH_3, SO_2**

Worldwide Service and Support

- CS CLEAN SYSTEMS customers can avail of a worldwide sales and service network.
- Given the important safety function assigned to the CLEAN-PROTECT® system, commissioning, maintenance and refilling is only permitted by authorized CS CLEAN SYSTEMS service partners.

Important!

The configuration of a CLEAN-PROTECT® emergency absorber system requires careful consideration by the manufacturer of the exhaust gases to be treated and the associated installation.

Before requesting a system recommendation or quotation, please ask your authorized CS CLEAN SYSTEMS sales and service partner to provide you with a Process Definition form so that we can recommend a model and configuration which is optimized for your process.

Available Models	Column Size
CLEAN-PROTECT® CP500SF	Approx. 500 liter
CLEAN-PROTECT® CP1000SF	Approx. 1,000 liter

Basic System Components and Configuration

System Description	Cylindrical absorber column, constructed from 316L stainless steel. Filled with CLEANSORB® granulate to safely remove hazardous gases by irreversible chemical reaction at ambient temperature. The scrubber medium is free of combustible materials such as activated carbon or organic binders. To be installed in the air extract ducting downstream of one or several gas cabinets, allowing permanent airflow through the absorber bed. Specially designed to handle high airflows with minimal pressure drop. Housing containing dust filter at inlet of CP system, fitted with lid for quick change-out of filter bag. 2 individual differential pressure gauges mounted on cylindrical body to monitor pressure drop across inlet dust filter and main absorber bed. Anchoring sockets on support legs for seismic protection.
Documentation	Operating manual in English language with customer-specific specifications and system check-out protocol.

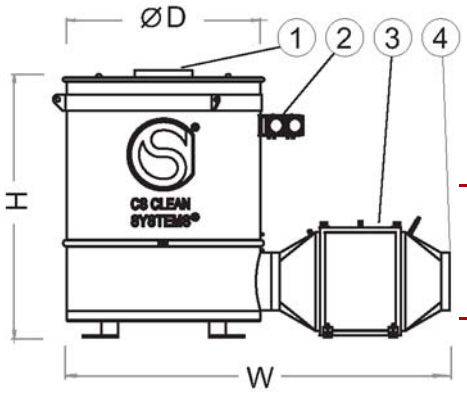
Optional Accessories

Dust filter horizontal, galvanized:	Galvanized filter housing incl. filter element, diameter 355 mm, butt end connector for horizontal installation, foldaway clamp to connect filter outlet to CP inlet.
Dust filter horizontal, stainless steel:	Stainless steel filter housing incl. filter element, diameter 355 mm, butt end connector for horizontal installation, foldaway clamp to connect filter outlet to CP inlet.
Dust filter vertical, stainless steel:	Stainless steel filter housing incl. filter element, Ø 355, butt end connector for vertical installation, incl. frame for filter housing, 90°elbow Ø 355, 2 fold-away clamp to connect filter element.

Photo showing CLEAN-PROTECT® with inlet dust filter for vertical connection. Though specifications for this and other non-standard configurations are not provided in this document, we will be pleased to advise you regarding your individual installation requirements.

System Specifications

Series	CLEAN-PROTECT
Models	CP500SF, CP1000SF



1 Connection for gas outlet

ϕ 355 mm (14 in), butt end;
flow for CP500SF: < 1800 m^3/h (1060 $foot^3$/minute)
flow for CP1000SF: < 3600 m^3/h (2120 $foot^3$/minute)

2 Differential pressure displays

0...500 Pa (display for pressure drop over pre-filter)
0...2 kPa (display for pressure drop over pre-filter + absorber)

3 Pre-filter (particle filter)

material of housing: stainless steel (different material on request);
dimensions: 1100mm x 670mm x 670mm (43.3in x 26.4in x 26.4in)
filter type: bag filter, GU-4-5 EU4)

4 Connection for gas inlet

ϕ 355 mm (14 in), butt end;
flow for CP500SF: < 1800 m^3/h (1060 $foot^3$/minute)
flow for CP1000SF: < 3600 m^3/h (2120 $foot^3$/minute)

Model	H	W	D
CP500SF	1660 mm (65.35 in)	2370 mm (93.30 in)	1200 mm (47.24 in)
CP1000SF	2450 mm (96.45 in)	2370 mm (93.30 in)	1200 mm (47.24 in)

Weight with heaviest filling	1000 kg (2205 lb) for CP500SF 1600 kg (3527 lb) for CP1000SF
Pressure build up at max. flow	6...11 mbar (0.09...0.16 psi) for CP500SF 7...12 mbar (0.10...0.17 psi) for CP1000SF
Lifetime of absorber filling	5 years, if no contact with toxic gas after contact with toxic gas, the filling is to be exchanged to get ready for use again

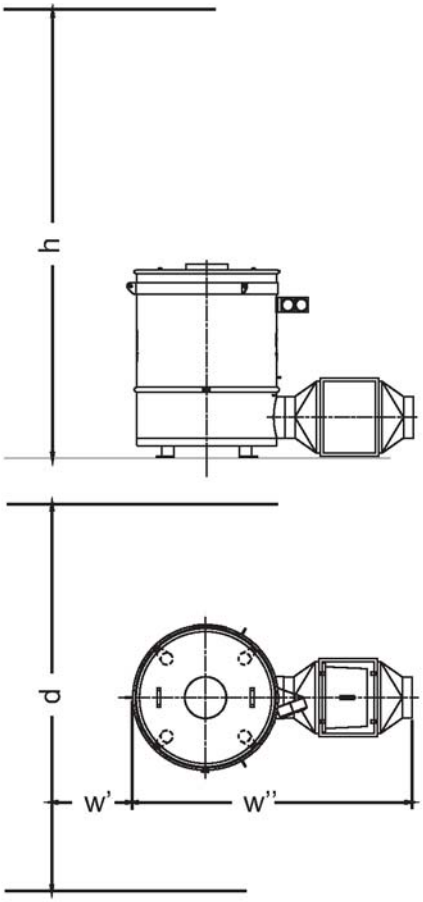
On-site Conditions for System Operation

Temperature range	5...35°C (41...95°F); for special setups and applications a range of up to -28...+60°C (-18...+140°F) is possible
Humidity	80 % relative humidity (non-condensing!)
Installation site	indoors, illumination > 270 lux, mechanical ventilation or outdoors (protected from unauthorized access)
Altitude	max. 2000 m (6600 ft) above sea level
Floor space	absolutely level; according to DIN 18202

📖 Contact the manufacturer CS CLEAN SYSTEMS AG for further details on outdoor installation.

Space requirement for installation and refill

The CLEAN-PROTECT safety absorber is to be refilled on site. Space is needed for a pallet jack or forklift truck as well as a platform ladder.



Model	h	w‘	w‘‘	d
CP500SF	3550 mm (140 in)	600 mm (24 in)	2400 mm (95 in)	3300 mm (130 in)
CP1000SF	4250 mm (168 in)	600 mm (24 in)	2400 mm (95 in)	3300 mm (130 in)

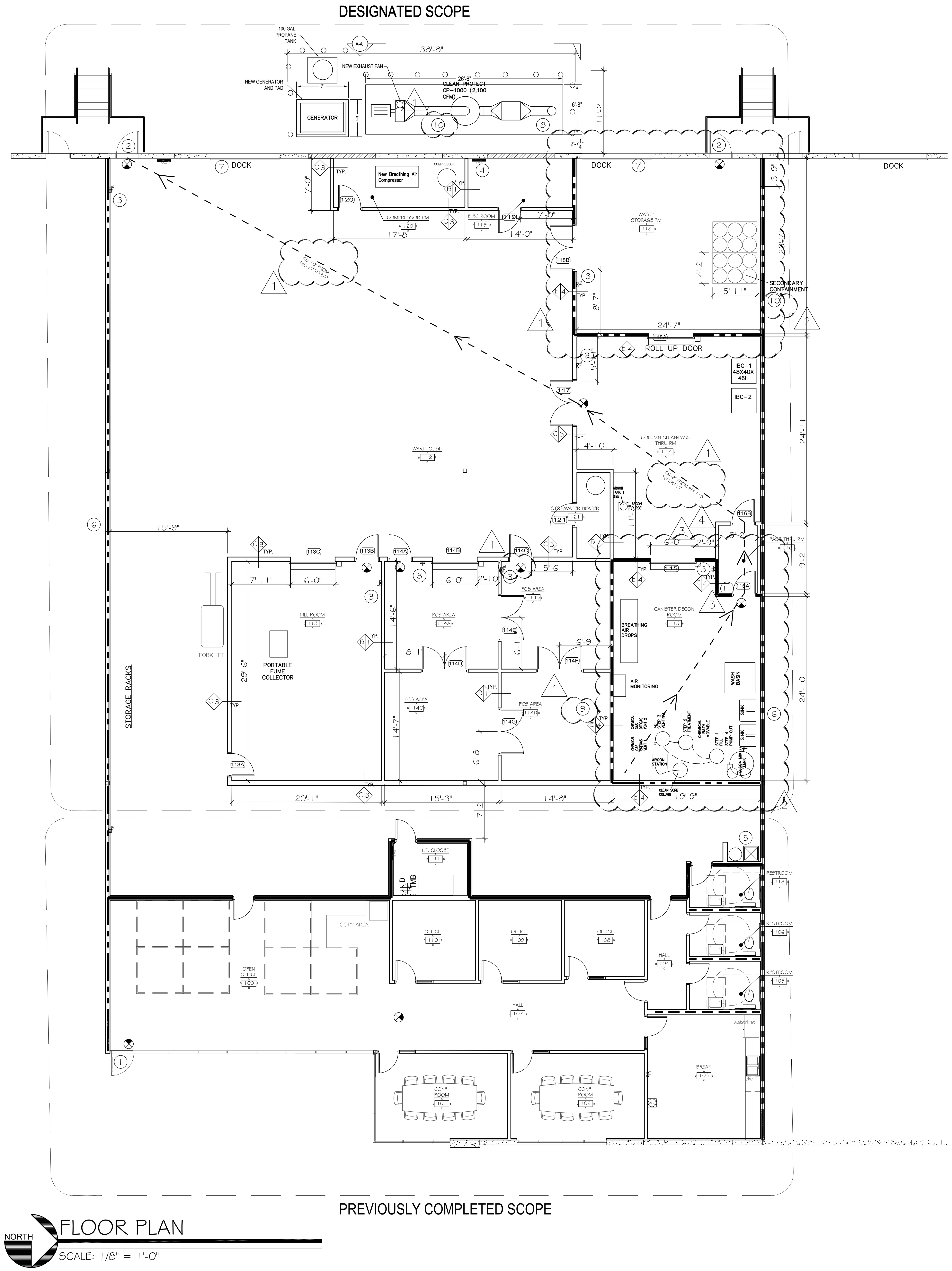
CS CLEAN SYSTEMS®

CS CLEAN SYSTEMS AG
Fraunhoferstrasse 4
85737 Ismaning, Germany
Phone: +49 (89) 96 24 00-0
Fax: +49 (89) 96 24 00-122
E-mail:
General: welcome@csclean.com
Distribution: sales@csclean.com
URL: www.cscleansystems.com

APPENDIX D.1.4

Floor Plan and Flooring Specifications

Date: 02/12/25 REV Plan #: 2302856-01-RVSN



STANDARD KEY NOTES

1. EXISTING BUILDING STANDARD TENANT ENTRY.
2. EXISTING BUILDING STANDARD SECONDARY TENANT ENTRY.
3. SEMI-RECESSED FIRE EXTINGUISHER CABINET W/ TEMPERED GLASS DOOR AND (1) 10 LB. PORTABLE FIRE EXTINGUISHER. (7 NEW) FINAL TOTAL APPROVED BY FIRE.
4. NEW RECESSED/SURFACE ELECTRICAL PANELS. (REFER TO E-SHEETS)
5. EXISTING MOP SINK AND WATER HEATER. PROVIDE FRP SURROUND AS REQUIRED BY CODE.
6. EXISTING DEMISING WALL. GC TO VERIFY FIRE RATING. PROVIDE IF DOES NOT EXIST.
7. EXISTING WAREHOUSE ROLLER DOOR.
8. NEW EXTERIOR EQUIPMENT. REFER TO ENGINEERING SHEETS. OUTDOOR AREA HAS BEEN SUBMITTED FOR MINOR SITE PLAN AMENDMENT.
9. GC TO PROVIDE WATER RESISTANT GYP. BD. WITH 8' AFF FRP.
10. REFER TO MECH SHEETS FOR DETAILS.
11. NOTE REMOVED

GENERAL NOTES

A. SCOPE OF THIS PROJECT IS A NEW TENANT IMPROVEMENT IN AN EXISTING BUILDING TENANT SPACE. WORK INCLUDES NEW NON-BEARING PARTITIONS, NEW CEILING, NEW CASE WORK, NEW FINISHES, NEW MECHANICAL, PLUMBING AND ELECTRICAL. TYPICAL WALL TO GO 6" ABOVE CEILING GRID.
B. NEW CEILING GRID, TEE'S, MAINS, AND TILES TO BE ARMSTRONG, DUNE, 2X4 TEGULAR AT 12'-0" A.F.F. UNLESS NOTED OTHERWISE. HOLD AS HIGH AS POSSIBLE.
C. PROVIDE NEW LIGHT FIXTURES AS INDICATED ON PLAN. PROVIDE ONE LIGHT FIXTURE FOR 75 SQUARE FEET OF TENANT FLOOR AREA UNLESS NOTED OTHERWISE.
D. NEW AND EXISTING HVAC SYSTEM, NEW AND EXISTING SPRINKLERS AND LIFE SAFETY DEVICES PER LAYOUT AND APPLICABLE CODES. CONTRACTOR TO PRICE NEW LIFE SAFETY DEVICES IF NONE EXIST. SPRINKLER HEADS IN THE CONTROL ZONE AREA SHOULD BE FLUSH OR SEMI RECESSED. THE COVER PLATES ARE TO BE WHITE FINISHED OR PAINTED TO MATCH THE CEILING COLOR.
E. VERIFY INSULATION AT ALL EXISTING INTERIOR AND EXTERIOR WALLS PROVIDE NEW IF NONE EXISTS.
F. ALIGNING WALLS WITH EXISTING COLUMN PLACEMENT PER PLAN TAKES PRECEDENCE OVER DIMENSIONS.
G. PROVIDE FURRING AS REQUIRED TO ACCOMMODATE POWER ON NON FURRED SHELL WALLS AND COLUMNS.
H. DEMO EXISTING WINDOW COVERINGS DURING CONSTRUCTION.
I. PARTITIONS SHOWN AS "ALIGNING" WITH COLUMNS ARE INTENDED TO HAVE FINISHED GYP. BD. FACE ALIGN WITH THE FINISHED GYP. BD. FACE.
J. PREPARE WALL AND FLOOR SURFACES TO RECEIVE NEW FINISHES AS SPECIFIED IN THE FINISH SCHEDULE.
K. PROVIDE BLOCKING IN WALL FOR ALL WALL MOUNTED MILLWORK SUPPLIED AND INSTALLED BY CONTRACTOR. WOOD BLOCKING IS TO BE FIRE-RETARDANT TREATED PER IBC.
L. ALL PLASTIC LAMINATED MILLWORK MUST CONFORM TO AWI STANDARDS FOR CUSTOM GRADE.
M. ALL FURNITURE/EQUIPMENT IN PLAN IS SHOWN FOR EXITING PURPOSES ONLY AND IS NOT IN CONTRACT UNLESS OTHERWISE NOTED.
N. CONTRACTOR TO PROVIDE THE CORRECT NUMBER OF FIRE LIFE SAFETY DEVICES (FIRE EXTINGUISHERS & HORNS/STROBES) AS REQUIRED BY CODE. EXACT LOCATION AND QUANTITY TO BE DETERMINED.
O. ALL DOORS TO HAVE LEVER STYLE HARDWARE SCHLAGE KEY C KEYWAY. UNLESS OTHERWISE NOTED.
P. CONTRACTOR TO PROVIDE INSULATION TO BE WIRED IN AT ALL EXTERIOR WALLS. R-19 AT EXTERIOR WALLS AND R-30 AT ROOF CAVITIES. PROVIDE TYPE X GYP. BD. AT ALL EXTERIOR WALLS.
Q. PROVIDE SOUND BATT INSULATION IN WALLS AND CEILING AS INDICATED PER PLAN.
R. CONTRACTOR TO VERIFY REVEALS AT EACH WINDOW AND FURR AS NEEDED PER FIELD CONDITIONS.
S. VERIFY WITH EQUIPMENT VENDORS SPECIAL EQUIPMENT NEEDS PRIOR TO CONSTRUCTION.
T. SMOKE AND FLAME SPREAD FOR INTERIOR WALLS AND CEILINGS PER ASTM E-84 AND PER THE IBC 803. CLASS C FINISHES REQUIRED FOR "B" OCCUPANCIES PER IBC SECTION 803 TABLE 803.5
U. THERMAL AND ACOUSTIC INSULATION SHALL COMPLY WITH IBC AND ASTM E-84.

WALL LEGEND

- PARTITION TYPE: SEE PAGE IA-3. (B1)
- PARTITION TYPE: SEE PAGE IA-3 (D1)
- PARTITION TYPE: SEE PAGE IA-3 (C1)
- PARTITION TYPE: SEE PAGE IA-3 (C3)
- PARTITION TYPE: SEE PAGE IA-3 (E4)

A Design In Vision — INTERIOR ARCHITECTURE & DESIGN

14583 W. Windsor Ave.
Goodyear, AZ 85395

Phone 623-535-5526
Fax 623-535-5546

Project Manager: K.AMEN
Drawn by: E. BAILEY
Checked by: D.CURTIS
Project Number: 22350

REGISTERED ARCHITECT — CURTIS — Date Signed 2-04-25 — ARIZONA, U.S.A. — Expires 6.30.26

CS CLEAN

2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

1	CITY COMMENTS 10/2/23
2	TENANT COORDINATION 10/2/
3	CITY COMMENTS 2/12/24
4	TENANT COORDINATION 1/31/

DATE:	ISSUED FOR:
4/12/23	PERMIT

SHEET:

IA-2

REV Plan #: 2302856-01-RVSN Date: 02/12/25

Stevens-Leinweber
Construction, Inc

5045 N 12th Street, Suite 200
Phoenix, AZ 85014
Phone: (602) 485-1950 | Fax: (602) 953-7333

TRANSMITTAL LETTER

DATE: October 10, 2024

TO: **A Design InVision LLC**
14583 W. Windsor Ave.
Goodyear, AZ 85395
Attn: **Kathi Amen**

SLC PROJECT #:	09846	PROJECT NAME:	CS Clean Solutions
SUBMITTAL NUMBER:	03-350-01	SUBMITTAL NAME:	Epoxy Floor Submittal
TRANSMITTAL METHOD:	Email	TRANSMITTAL METHOD #2 (OPT):	

FILE DATE	DRAWING #	TRADE	Rev.	DESCRIPTION
10/10/2024	09846-03-350-01	Special Concrete Finishing	1	Technical Specifications

These are transmitted as checked below:
☒

Remarks: For review and approval

Sincerely,
Jaclyn Swope

Contractor's Stamp	Engineer's Stamp	Architect's Stamp

Technical Data Sheet

PIP 2000 UR

Low-Odor, High Solids, High-Gloss Pigmented Urethane System

PROTECTIVE INDUSTRIAL POLYMERS
7875 Bliss Parkway North Ridgeville, OH 44039
440-327-0015 440-353-0549 - FAX

DESCRIPTION:
PIP 2000 UR is a high-solids, high-gloss, three-part, aliphatic pigmented polyurethane coating. It can be applied over an epoxy primer or used to recoat an existing epoxy or urethane floor.

USES:
Suited for productions areas, show room floors, aircraft hangers, warehouses and other places where physical and chemical resistance combined with light stability are important.

ADVANTAGES:
- High-gloss provides UV stability when applied pigmented and light reflectivity
- Excellent resistance to tire staining (hot or cold)
- Resists Skydrol®, jet fuels and other chemicals
- Four times floor life compared to most epoxies
- Complies with VOC regulations for Industrial Maintenance Coatings in the OTC & CA* (*excluding SCAQMD)
- Excellent wet edge color stability

STORAGE: Materials should be stored in un-opened containers between 65°F (18°C) and 90°F (32°C) and at or below 50% RH.

SHELF LIFE: 1 year from date of manufacture (un-opened).

PACKAGING KITS/ PART NUMBERS:
Volume Mix Ratio: .5A : 2B : .125C

1.31 gallons PIP 2000 UR Pigmented (350 **SF @ 6 mils smooth)**
2000-A/Q
2000-B/1
CPU-xxxx/HP

2.62 gallons PIP 2000 UR Pigmented (**701 SF @ 6 mils smooth)**
2000-A/HG
2000-B/2
CPU-xxxx/P

2.62 gallons PIP 2000 UR Pigmented GlossGrip #10 Texture (1200 SF @ 3.5 mils)
2000-A/HG
2000-B/2
CPU-xxxx/P
GlossGrip #10/P

2.88 gallons PIP 2000 UR Pigmented DiamondWear Texture (1320 SF @ 3.5 mils)
2000-A/HG
2000-B/2
CPU-xxxx/P
DiamondWear/HG

Some pastel or vivid colors may require 2 pints (1 quart) of color for enhanced opacity when applying a single coat over dis-similar substrates. Consult Protective Industrial Polymers for specific recommendation.

OPTIONS: *Low temperature and Low Humidity*
For applications where the temperatures are between 55°F-65°F combined with relative humidity levels (RH) between 20-35%, the use of **PIP 2000-2100-Series Spike** accelerator is recommended. Use of this accelerator will hasten the cure to be similar of the standard material in normal conditions (70-80F with 35-80% RH). The use of this accelerator in normal conditions will result in a shorter working time, higher viscosity build, reduced leveling and increases stickiness and roller drag. When relative humidity (RH) is below 20%, please consult Protective Industrial Polymers for specific recommendations and limitations.

See PIP 2000-2100-Series Spike Technical Data Sheet for more detailed information regarding the use of this accelerator.

DO NOT apply coatings unless the surface temperature is more than five degree over the dew point. During the application and cure of the coating, the substrate temperature, material temperature and room conditions should be ideally maintained between 65°F (18°C) and 90°F (32°C) with relative humidity (RH) between 30-80%. DO NOT apply coatings unless the surface temperature is more than five degree over the dew point.

Color Pack: 0 VOC Color packs designated as CPU-xxxx are used with **PIP 2000 UR**. Many standard and custom colors are available; please refer to the price list for available colors. It is important to have a color consistent floor in a similar color before application of **PIP 2000 UR** or multiple coats may be required.

Texture: **PIP GlossGrip #10 Additive** can be incorporated into **PIP 2000 UR** to create a wear texture while maintaining an easily cleaned glossy surface.

LIMITATIONS:
Contamination and surface defects: If contaminates including oil, silicone, mold release agents and/or other materials are present, **PIP 2000 UR** may fisheye or crawl away from the surface. All surface contaminates should be removed with a suitable detergent prior to application. Solvent cleaning of silicone based contaminates is NOT RECOMMENDED; please contact Technical Service for additional recommendations.

DO NOT APPLY PIP 2000 DIRECT TO PIP 1300 MVR. ALWAYS APPLY ANOTHER PIP EPOXY PRODUCT SUCH AS PIP 1000 SERIES COATINGS ON TOP OF THE PIP 1300 MVR BEFORE APPLYING THE PIP 2000 URETHANE.

UV Protection: **If applied as a clear coating (without the color pack), PIP 2000 UR will not protect underlying epoxy coatings from UV radiation and subsequent yellowing of the epoxy. Please use PIP 2100 UR-Gloss or PIP 2100 UR-Satin for clear applications requiring UV protection.**

PIP 2000 VIVID

Vivid Colors: Bold vivid colors especially in the blue and green family require a special Part A and Part B; 2000-A VIVID and 2000-B VIVID if a high gloss finish is desired. Failure to utilize the 2000 Vivid will result in a dull irregular sheen. Applicable colors currently as of this update are:

Technical Data Sheet

PIP 2000 UR

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1. CPU-26 Hyper Blue
2. CPU-31- Cat Green
3. CPU-61- Deep Blue
4. CPU-75- Regal Blue
5. CPU-142 Blue Gray
6. CPU-305-NSK Green
7. CPU-350 Safety Red
8. CPU-357 Magnum Green
9. CPU-374 Dirty Blue
10. CPU-450- Safety Blue
11. CPU-514- Paradise Green
12. CPU-526- Aisle Green
13. CPU-589- Grass Green
14. CPU-945 Pantone
15. CPU -2935 Lazer Blue (RAL)
16. CPU-2945 Signal Blue (RAL
17. CPU-6018 Green

Consult Protective Industrial Polymers for updates to this list of colors if uncertain as to the use of the 2000 VIVID product.

MATERIAL PROPERTIES*:

Properties	Test Method	Results
Flash Point	ASTM D3278	187 °F (86°C)
Volume Solids (mixed)	ASTM D2369	85-90%
Mixed Viscosity	ASTM D2196	400 cPs
Dry Time	ASTM D5895	Tack Free 6 hr Dry 12-16 hr Full Cure 7-14 days
VOC-Volatile Organic Compound	ASTM D3960	< 175 g/l Clear & Pigmented

CURED PROPERTIES*:

Properties	Test Method	Results
Abrasion Resistance Taber CS-17, mg loss/1000 cycles/1000g mass	ASTM D4060	25 mg
Coefficient if Friction-COF James Test	ASTM D2047	0.55 0.65(w/GlossGrip #10
Tensile Strength	ASTM D2370	2300 psi
Elongation	ASTM D2370	5%
Impact	ASTM D2794	140 in.lbs Direct & Reverse
Hardness (Pencil)	ASTM D3363	3H
Dry Film Thickness	at 4 mils WFT	3.5 mils
Flammability	ASTM E648	Class 1
Flame Spread	ASTM E84	Class A

*Properties and results are based on laboratory testing at 72°F (22°C) %50 RH, theoretical calculations and estimates. Typical properties, as stated, are to be considered as representative of current production and should not be treated as specifications.

CHEMICAL RESISTANCE*:

PIP 2000 UR	1 Day	7 Days
ACIDS, INORGANIC		
10% Hydrochloric	G	G
30% Hydrochloric	G	F
10% Nitric	G	F
50% Phosphoric	G	F
37% Sulfuric	F	P
ACIDS, ORGANIC		
1110% Acetic	G	F
10 % Citric	G	G
Oleic	E	E
ALKALIES		
10% Ammonium Hydroxide	E	E
50% Sodium Hydroxide	E	E
SOLVENTS		
Ethylene Glycol	G	G
Isopropanol	G	G
Methanol	P	P
d-Limonene	E	E
Jet Fuel	E	E
Gasoline	E	E
Mineral Spirits	E	E
Xylene	E	E
Methylene Chloride	P	P
MEK	G	G
PMA	G	G
MISCELLANEOUS		
20% Ammonium Nitrate	E	E
Brake Fluid	E	E
Bleach	E	E
Motor Oil	E	E
Skydrol®500B	E	E
Skydrol®LD4	E	E

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20% Sodium Chloride	E	E
10% TSP	E	E

*Based on spot testing of the clear coating after 14 days of cure. Pigmented versions may see reduced chemical resistance and staining.

Legend: **E- Excellent (Not Effected)**
G-Good (Limited Negative Effect)
F-Fair (Moderate Negative Effect)
P-Poor (Unsatisfactory)

INSPECTION AND APPLICATION:
Caution! Follow all precautions and instructions prior to installation**.**

PIP 2000 UR must be applied to an epoxy or other approved primer or base coat. Sections below detailing substrate, moisture and vapor/contamination apply to the required conditions of the concrete substrate prior to application of an epoxy primer.

SUBSTRATE: The concrete substrate must be free of curing membranes, silicate surface hardener, paint, or sealer and be structurally sound. Do not coat if concrete contains Type III Portland Cement. If you suspect concrete has been treated or sealed, proceed with complete removal process. Consult your PIP representative for further instruction if Sodium or Potassium metasilicate hardeners or densifiers are suspected or have been utilized. Concrete must have a minimum internal tensile strength of 200 psi when tested in accordance of ASTM C1583. Concrete must have a maximum relative humidity of less than 75% when tested as per ASTM F2170.

MOISTURE VAPOR/CONTAMINATION: Testing for MVT does not guarantee against future problems. If there is no known vapor barrier or the vapor barrier is inadequate, there is an elevated risk of bond failure. Moisture and moisture vapor transmission rates are dynamic in nature and may change over time. Initial testing does not guarantee future results. If the relative humidity of the concrete substrate is over 75% (using ASTM F2170), Protective Industrial Polymers must be consulted for further specific recommendations.
Other factors including the migration of oils, chemicals, excessive salts or Alkali Silica Reaction (ASR) from the concrete from may also elevate the risk of adhesion difficulties. Testing for these prior to application is always recommended. Consult your PIP representative for approved mitigation treatments.

TEMPERATURE AND HUMIDITY: During the application and cure of the coating, the substrate temperature, material temperature and room conditions must be maintained between 65°F (18°C) and 90°F (32°C). Relative Humidity (RH) should be limited to 30-80%. DO NOT apply coatings unless the surface temperature is more than five degree over the dew point. If there is no known vapor barrier or the vapor barrier is inadequate, there is an elevated risk of bond failure.
Other factors including the migration of oils, chemicals, excessive salts or Alkali Silica Reaction (ASR) from the concrete from may also elevate the risk of adhesion difficulties. Consult your PIP representative for approved mitigation treatments.

APPLICATION EQUIPMENT:

- **Protective equipment and clothing as called for in the SDS (Safety Data Sheet)**
- **Jiffy® Mixer Blade**
- **Clean container for mixing material**
- **Low speed high torque drill motor**
- **High quality short nap roller covers- ¼ inch nap**
- **Application Squeegee**
-

PREPARATION:
Surface dirt, grease, oil and contaminates must be removed by detergent scrubbing and rinsing with clean (clear) water.
Mechanical Preparation: Shot Blasting or grinding the surface is the preferred method of preparation. The success of industrial diamond grinding as a concrete preparation method will vary depending on technique and the hardness of the concrete.

JOINTS: All non moving joints (control joints) can be filled with a rigid or semi-rigid joint compound. Construction joints may be filled with semi-rigid joint filler and might need to be re-built and re-cut depending on conditions. Isolation or expansion joints must be filled with a flexible material designed for expansion and should not be coated over.

MIXING: Use a Jiffy®ES mix blade attached to a slow speed drill.
The color pack should be added slowly with the mixer running first to the **2000-B** (Part B) and mixed thoroughly until color is uniform throughout the container prior to adding the **2000-A** Part A. Add **2000-A** (Part A) and mix all components together for 2-3 minutes.
Product may be thinned with Xylene or S-1 solvent with a maximum addition of 8 ounces per mixed gallon of the **PIP 2000 UR**. Never use an alcohol solvent to thin a Protective Industrial Polymers urethane coating. Please consult Protective Industrial Polymers for additional thinning recommendations.

Optional **GlossGrip** or **DiamondWear** should be added after the Part A, Part B and color is mixed.

APPLICATION

DO NOT SPRAY!!

Prior to coating, the floor must be completely free of fine dust and minute debris. It is best to mechanically wash, rinse and finally damp wipe the floor with clean towels and water. It is also recommended to rid roller of initial loose nap by wetting and painting a small scrap piece of plastic sheeting or cardboard prior to using on the floor.
Atmospheric Relative Humidity above 50%, regardless of temperature, has a dramatic effect on reducing the workable wet edge tie-in time relating to consistent color development of PIP 2000 or PIP 2100 series urethanes. Temperatures above 75F have the same impact. When encountering either of these situations or a combination of both, it is imperative to mix, apply, and finish roll the coating within 10 minutes. Exceeding this time may present roller marks or dark edge lines. Plan your application pattern ahead of time so that these wet tie-in times can be met as practically possible.

SMOOTH GLOSS APPLICATION

Technical Data Sheet

PIP 2000 UR

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Pour entire mix as quickly as possible to the floor. Quickly spread material uniformly using a notched squeegee over the floor. Then level by back-rolling with a 3/8"-3/16 inch nap non-shedding roller. Care should be taken to overlap and cross lap, but not over roll the coating introducing air into the surface. Applying the material too thin (less than 6 mils) may result in poor leveling, may exhibit a slight orange peel finish and not sufficiently hide small dust, dirt and roller lint commonly encountered and exacerbated on high gloss floors. The best practice is to measure and grid the floor to be sure of the proper application rate.

TEXTURED APPLICATION Apply **PIP 2000 UR** containing **GlossGrip #10** to the floor surface utilizing a roller pan and roller. Do not squeegee as it will be very difficult to remove the squeegee lines. It is best to place a screen at the bottom of the pan to prevent the roller from picking up settled aggregate at the bottom of the pan. Roll often so as to expose aggregate uniformly. Material applied excessively heavy (greater than 3.5 mils) will exhibit irregular texture, may blister or gas and can be soft during curing. Applying the material too thin will result in a non-uniform gloss. The best practice is to measure and grid the floor to be sure of the proper application rate.

CURING (DRYING): The cure time of PIP 2000 UR is greatly dependent on both temperature and relative humidity. At 70-75 degrees F and 35% RH, PIP 2000 UR should be tack free and light foot traffic or recoat ready after 6-8 hours of cure. Allow the coating to cure (dry) for a minimum 24 hours before vehicular traffic. Final physical and chemical resistance properties are achieved at 7-10 days. Allow for longer cure times at lower temperatures and low humidity.

PIP 2000-2100-Series Spike can be added to decrease the curing time of PIP 2000 UR. Below are approximate guidelines to use for additions of PIP 2000-2100-Series Spike. Jobsite conditions other than which are listed may also affect curing profile. Use only as a general guideline.

Cure Profile (72F and 35% RH) PIP 2000

Standard product (Tack free, light foot traffic ready)	6-8 hrs.
2 fl. oz. 2000-2100-Series Spike/2.5 gal. mixed	4.5-5.5 hrs.
4 fl. oz. 2000-2100-Series Spike/2.5 gal. mixed	3.5-4.5 hrs.

Cure Profile (60F and 35% RH) PIP 2000

Standard product (Tack free, light foot traffic ready)	10-12 hrs
4 fl. oz. 2000-2100-Series Spike/2.5 gal. mixed	8 hrs
6 fl. oz. 2000-2100-Series Spike/2.5 gal. mixed	6 hrs

Cure Profile (90F and 60% RH) PIP 2000

Standard product (Tack free, light foot traffic ready)	3-4 hrs
2 fl. oz. 2000-2100-Series Spike/2.5 gal. mixed	1.5-2 hrs.
4 fl. oz. 2000-2100-Series Spike/2.5 gal. mixed	Not recommended
6 fl. oz. 2000-2100-Series Spike/2.5 gal. mixed	Not recommended

TECHNICAL SUPPORT: For application questions, please contact your salesman or PIP technical service at 440-327-0015.

READ SDS (SAFETY DATA SHEET) FOR SAFETY AND PRECAUTIONS. USE PRODUCT AS DIRECTED FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.

MAINTENANCE GUIDELINES:
Allow floor coating to cure at least one week before cleaning by mechanical means (IE: sweeper, scrubber, disc buffer).
CARE: Increased life of the floor will be seen with proper maintenance and will help maintain a fresh appearance of your new Protective Industrial Polymers floor. Regularly sweep to avoid ground in dirt and grit which can quickly dull the finish, decreasing the life of the coating. Spills should be removed quickly as certain chemicals may stain and can permanently damage the finish.
Only soft nylon brushes or white pads should be used on your new floor coating. Premature loss of gloss can be caused by hard abrasive bristle Polypropylene (Tynex®) brushes.

CAUTION: Heavy objects dragged across the surface will scratch all floor coatings. Avoid gouging or scratching the surface.
Pointed items or heavy items dropped on the floor may cause chipping or concrete pop out damage. Plasticizer migration from rubber tires can permanently stain the floor coating. If a rubber tire is planned to set on the floor for a long period of time, place a piece of acrylic sheet between the tire and the floor to prevent tire staining. Rubber burns from quick stops and starts from lift trucks can heat the coating to its softening point causing permanent damage and marking.

REPAIR: Repair gouges, chip outs, and scratches as soon as possible to prevent moisture and chemical under cutting and permanent damage to the floor coating.

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WARRANTY AND CONDITIONS OF USAGE

WARRANTY AND LIMITATION OF LIABILITY: Protective Industrial Polymers Inc. ("PIP") warrants that its products shall conform to the manufacturer's written specifications and shall be free from defects for one (1) year from the date of purchase. PIP MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES AND DISCLAIMS THE SAME, INCLUDING, WITHOUT LIMITATION, FAILURE OF THE PRODUCT DUE TO ACTS OF GOD, FLOODING, EXTREME OR ABNORMAL TEMPERATURES, HUMIDITY AND MOSITURE, STRUCTURAL CONDITIONS, SITE PREPARATION AND CONDITIONS, ACCIDENTS, DAMAGE CAUSED BY INSTALLATION OF MACHINERY, EQUIPMENT OR FIXTURES WITHOUT ADEQUATE FLOOR PROTECTION OR WITHOUT ADEQUATE TIME FOR CURING, FAILURE TO COMPLY WITH CONDITIONS OF USAGE (SPECIFIED BELOW), VANDALISM, NEGLIGENT OR INTENTIONAL ACTS OF THIRD PARTIES OR OTHER CASUALTIES. If any PIP product fails to conform to this warranty, PIP shall either replace the product at no cost to Buyer or refund the cost of the product, in PIP's sole discretion. Replacement of any product or a refund of the cost of any product shall be the sole and exclusive remedy available to buyer, and buyer shall have no claim for incidental, special or consequential damages, including, without limitation, business interruption damages. Any warranty claim must be made within one (1) year from the date of delivery of products. PIP does not authorize anyone on its behalf to make any written or oral statements which in any way alter PIP's warranty or installation and storage information or instructions in its product literature or on its packaging labels. Any installation of PIP products which fails to conform to such installation information or instructions or the "Conditions of Usage" (specified below) shall void this warranty. Product demonstrations, if any, are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. Buyer shall be solely responsible for determining the suitability of PIP's products for the Buyer's intended purposes.

CONDITIONS OF USAGE: Installation of all products purchased must be by professional installers periodically published by PIP or otherwise approved by PIP in writing. Modification to any of PIP's products voids the warranty. The installer shall maintain a written contemporaneous record of field conditions (including, without limitation, surface and atmospheric conditions, usage rates, and lot numbers of products installed). PIP reserves the right of inspection of any installed product, installation and maintenance records and records of field conditions and may conduct additional testing as is reasonably required to investigate any warranty claims. Warranty shall only apply for products or materials that have been paid for in full. Moisture Vapor Transmission (MVT) and ASR (Alkali Silica Reaction) Disclaimer and Exclusion: Although rare, some floors at or below grade level are sometimes subjected to saturation by moisture from beneath the concrete floor slab. This moisture can travel through the concrete and collect between floor toppings creating the potential for delaminating from hydrostatic pressure and or ASR. Conditions contributing to this include heavy rainfall, broken pipes, excess hydration within fresh concrete, and other factors or defective and old concrete. These factors are difficult, if not impossible to predict. PIP recommends testing for MVT and/or the presence of ASR in the concrete substrate prior to applying any polymer floor topping. The recommended test method for MVT is ASTM F 2170-11. ASR can be predicted by a higher than normal pH within the concrete. If high pH should be detected, it is recommended a lab test for ASR. If and when delamination of the floor occurs because of a moisture condition that exists beneath or in the concrete slab beyond the capacity of the individual product installed or failure of the concrete due to ASR, this Limited Warranty does not extend to such delaminating or topping failure. This writing constitutes the sole and only agreement of warranty relating to PIP products.

Technical Data Sheet

PIP 1000 CR/HB/FS/ST

Universal Epoxy Coating and Primer System

PROTECTIVE INDUSTRIAL POLYMERS
7875 Bliss Parkway North Ridgeville, OH 44039
440-327-0015 440-353-0549 - FAX

DESCRIPTION:

PIP 1000 series coatings are a two-component or three component (with color packs), universal, 100% solids, epoxy resin coating systems that can be applied either clear or pigmented. **PIP 1000** has a universal, clear unfilled "A" component (1000-A) and is supplied with a choice of curing agents to achieve specific cure rates, chemical resistance requirements and final aesthetics. This product produces a gloss finish.

USES:

Use as a primer, build coat, broadcast, anchor and top coat simply by selecting and mixing with the correct curing agent.

ADVANTAGES:

- Match the curing agent to the needs of the project.
- Extremely low odor
- High build application
- Excellent impact and abrasion resistance
- Seals substrate reducing water vapor intrusion
- Resists staining from cleaning and industrial chemicals
- Complies with VOC regulations for industrial maintenance coatings in the OTC and CA*. (*including SCAQMD when thinned to maximum)

STORAGE: Materials should be stored in un-opened containers between 65°F (18°C) and 90°F (32°C) and at or below 50% RH.

SHELF LIFE: 1 year from date of manufacture (un-opened).

PACKAGING KITS/ PART NUMBERS:

3 Gallon Clear Kit:
1000-A/2
1000xx-B/1 (xxx denotes either HB, CR, FS or ST)
15 Gallon Clear Kit:
1000-A/5 (2 ea.)
1000xx-B/5
159 Gallon Clear Kit:
1000-A/55 (2 ea.)
1000xx-B/55

3.125 Gallon Pigmented Kit:
1000-A/2
1000xx-B/1
CPU-###/P
15.63 Gallon Pigmented Kit:
1000-A/5 (2 ea.)
1000xx-B/5 (1 ea.)
CPU-###/P (5)
165.6 Gallon Pigmented Kit:
1000-A/55 (2 ea.)
1000xx-B/55
CPU-###/P (53)

* xx denotes suffix for specialized hardener

OPTIONS:

Color-Many standard and custom colors are available. Please refer to the price list for available colors. Brilliant or pastel colors may require multiple coats or double color packs to obtain full hide on a substrate of dis-similar color.
Various aggregates of different size shapes and composition can be incorporated into **PIP 1000** to improve traction in slip hazard areas.

LIMITATIONS:

Contamination and surface defects: If contaminates including oil, silicone, mold release agents and/or other materials are present, resin systems may fisheye or crawl away from the surface. All surface contaminates should be removed with a suitable detergent prior to application. Solvent cleaning of silicone based contaminates is NOT RECOMMENDED. Please contact Technical Service for additional recommendations. **PIP 1000 will** amber over time from UV exposure. Top coating with a pigmented aliphatic urethane will provide UV stability.

MATERIAL PROPERTIES*:

Properties	Test Method	Results
Flash Point	ASTM D3278	≥215 °F (102°C)
Volume Solids (mixed)	ASTM D2369	100 %
Mixed Viscosity	ASTM D2196	400-700 cPs
Dry Time	ASTM D5895	Tack Free 4-6 hr Dry 6-10 hr Full Cure 7 days
VOC-Volatile Organic Compound	ASTM D3960	0 g/l clear & pigmented ≤250 g/l with max thinning

CURED PROPERTIES*:

Properties	Test Method	Results
Abrasion Resistance Tabor CS-17, mg loss/1000 cycles/1000g mass	ASTM D4060	75 mg
Coefficient if Friction-COF James Test	ASTM D2047	0.55 0.65(w/NS-36)
Tensile Strength	ASTM D2370	12,000 psi
Adhesion to Concrete	ASTM D4541	350 psi concrete failure
Impact	ASTM D2794	40 in.lbs Direct & Reverse
Hardness (Shore D) Hardness (Pencil)	ASTM 2240 ASTM D3363	85-90 2H

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Dry Film Thickness	at 15 mils WFT	15 mils
Water Absorption	ASTM C413	<0.5%
Flame Spread	ASTM E84	Class A
Flammability Rating	ASTM E648	Class 1
Flammability	ASTM D635	Self Extinguishing

*Properties and results are based on laboratory testing at 72°F (22°C) %50 RH, theoretical calculations and estimates. Typical properties, as stated, are to be considered as representative of current production and should not be treated as specifications.

CHEMICAL RESISTANCE*: Consult Protective Industrial Polymers for specific requirements.

RECOMMENDED APPLICATION RATE:
7-10 mils as a primer (optional additional of xylene solvent);
up to 30 mils as a coating.

Primer Applications:
Up to 1 gallon of xylene solvent can be added per 3.00 gallons of resin (total 4.00 gallons) for a maximum concrete penetration. VOC rating at this dilution is < 250 g/l. 1000CR-B is the recommended hardener for this application.

CURING AGENT OPTIONS:

1000CR-B curing agent offers the best chemical resistance and is recommended for use as a direct to concrete primer. This coating is not intended for final finish applications which require stringent UV stability as it will amber the most in comparison to the other curing agents. However, it is the most chemical resistant version of the PIP 1000-series coatings. 1000CR is not intended for direct-to-concrete applications where there are known or suspected high levels of water vapor transmission.

1000HB-B is a general-purpose curing agent with the best overall aesthetics and gloss properties. It has the least resistance to amine blush. PIP 1000HB is not intended for direct-to-concrete applications where there are known or suspected high levels of water vapor transmission.

1000FS-B curing agent provides up to a 50% faster curing time than 1000HB-B, 1000CR-B and 1000ST-B. 1000FS-B exhibits good aesthetics with low blush propensity considering its fast curing properties. 1000FS-B will amber (more than 1000HB but less than 1000CR) and is not recommended for final finish applications which require stringent UV stability. 1000FS-B has a reduced working time and recoat window and must be sanded within 8 hours in temperatures above 75F and 12 hours in temperatures between 60 and 70F. Contact Protective Industrial Polymers with specific requirements, recommendations and limitations.
1000 FS is not intended for direct-to-concrete applications where there are known or suspected high levels of water vapor transmission.

1000ST-B is a general purpose curing agent with increased rheology which provides for an orange peel or slightly stippled finish when applied at 5-6 mils. 1000ST exhibits good UV and chemical resistance properties, excellent gloss and aesthetics with extremely low blush propensity. 1000ST is not intended for direct-to-concrete applications where there are known or suspected high levels of water vapor transmission.

INSPECTION AND APPLICATION:
Caution! Follow all precautions and instructions prior to installation.

SUBSTRATE: The concrete substrate must be free of curing membranes, silicate surface hardener, paint, or sealer and be structurally sound. Do not coat if concrete contains Type III Portland Cement. If you suspect concrete has been treated or sealed, proceed with complete removal process. Consult your PIP representative for further instruction if Sodium or Potassium metasilicate hardeners or densifiers are suspected or have been utilized. Concrete must have a minimum internal tensile strength of 200 psi when tested in accordance of ASTM C1583. Concrete must have a maximum relative humidity of less than 75% when tested as per ASTM F2170.

MOISTURE VAPOR/CONTAMINATION: Testing for MVT does not guarantee against future problems. If there is no known vapor barrier or the vapor barrier is inadequate, there is an elevated risk of bond failure. Moisture and moisture vapor transmission rates are dynamic in nature and may change over time. Initial testing does not guarantee future results. If the relative humidity of the concrete substrate is over 75% (using ASTM F2170), Protective Industrial Polymers must be consulted for further specific recommendations.
Other factors including the migration of oils, chemicals, excessive salts or Alkali Silica Reaction (ASR) from the concrete from may also elevate the risk of adhesion difficulties. Testing for these prior to application is always recommended. Consult your PIP representative for approved mitigation treatments.

TEMPERATURE AND HUMIDITY: During the application and cure of the coating, the substrate temperature, material temperature and room conditions must be maintained between 65°F (18°C) and 90°F (32°C). Relative Humidity (RH) should be limited to 30-80%. DO NOT apply coatings unless the surface temperature is more than five degree over the dew point.

APPLICATION EQUIPMENT:

- **Protective equipment and clothing as called for in the SDS (Safety Data Sheet)**
- **Jiffy® Mixer Blade model ES**
- **Clean container for mixing material**
- **Low speed high torque drill motor**
- **High quality short nap roller covers- ¼-3/8 inch nap**
- **Application Squeegee**

PREPARATION:
Surface dirt, grease, oil and contaminates must be removed by detergent scrubbing and rinsing with clean (clear) water.

Technical Data Sheet

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Mechanical Preparation: Shot Blasting or aggressive diamond grinding the surface is the preferred method of preparation. The success of industrial diamond grinding as a concrete preparation method will vary depending on technique and the hardness of the concrete.

JOINTS: All non moving joints (control joints) can be filled with a rigid or semi-rigid joint compound. Construction joints may be filled with semi-rigid joint filler and might need to be re-built and re-cut depending on conditions. Isolation or expansion joints must be filled with a flexible material designed for expansion and should not be coated over.

MIXING: ***In bulk packaging containers such as full 5-gallon containers and drums, pre-mix the Part A prior to in field metering.***
Mix ratio for curing agents 1000HB, 1000CR 1000FS and 1000ST is 2 Parts A to 1 part B by volume. A pint of CPU color is recommended per 3 gallon mix. The color pack should be added and mixed in homogenously prior to adding the Part B hardener. Mix all components together for 2-3 minutes with a Jiffy® ES mix blade attached to a slow speed drill. Mix only enough material at one time that can be applied without exceeding the pot life. ***Note:*** Once this material is mixed, it can't be resealed for later use.

APPLICATION:

APPLY PIP 1000 to the floor surface using a notched or flat squeegee depending on desired thickness. Leaving the material sit in the pail longer than 5 minutes will result in an increase of viscosity and reduce leveling properties. Back roll and evenly spread the wet coating using a ¼-3/16" inch nap non-shed roller. Care should be taken to overlap and cross lap, but not over roll the coating introducing air to the surface.

SPREADING RATE: When **PIP 1000** is applied as a primer, surface irregularities and porosity in the concrete may affect coverage rate. Be sure to plan accordingly as there may be a need for extra material to provide proper coverage. Material applied too heavy may blister or develop stress cracks or may remain soft for an extended time if applied very heavy in puddles at temperatures below 60F. Too little material may produce dry spots and a non-uniform look. The best practice is to measure and grid the floor to be sure of proper application rate.

CURING (DRYING): Allow the coating to cure (dry) for a minimum of 12 hours for 1000HB, 1000CR or 1000ST after application at 75°F (24°C) and 50% RH before opening the floor to light traffic, allow more time for low temperatures and higher humidity or for heavier traffic.
For 1000FS, allow the coating to cure (dry) for a minimum of 6 hours after application at 75°F (24°C) and 50% RH before opening the floor to light traffic, allow more time for low temperatures and higher humidity or for heavier traffic.
As a general rule, a temperature change of every +/-10-degree F will either double the cure time or cut in half. Full coating properties may take up to 7 days to develop.

RECOAT: **PIP 1000** can be top coated with other PIP urethanes or epoxies within 24 hours (see exception under 1000FS-B curing agent) at 70-75F 30% RH without sanding or may be used as a topcoat over existing (sound) PIP epoxy coatings. If the re-coat window has expired, the prior cured coating surface must be sanded with 100 grit sand paper or sanding screen installed on a swing-type floor buffer. Sand to a uniform dulled surface. Remove all sanding debris with a vacuum and damp mop. Scrub with detergent and rinse with clean water. Surface must be dry before coating.

TECHNICAL SUPPORT: For application questions, please contact your salesman or PIP technical service at 440-327-0015.

DISPOSAL: Dispose in accordance with federal, state, and local regulations.

READ SDS (SAFETY DATA SHEET) FOR SAFETY AND PRECAUTIONS. USE PRODUCT AS DIRECTED FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.

MAINTENANCE GUIDELINES:
Allow floor coating to cure at least one week before cleaning by mechanical means (IE: sweeper, scrubber, disc buffer).

CARE: Increased life of the floor will be seen with proper maintenance and will help maintain a fresh appearance of your new Protective Industrial Polymers floor. Regularly sweep to avoid ground in dirt and grit which can quickly dull the finish, decreasing the life of the coating. Spills should be removed quickly as certain chemicals may stain and can permanently damage the finish.
Only soft nylon brushes or white pads should be used on your new floor coating. Premature loss of gloss can be caused by hard abrasive bristle Polypropylene (Tynex®) brushes.

CAUTION: Heavy objects dragged across the surface will scratch all floor coatings. Avoid gouging or scratching the surface.
Pointed items or heavy items dropped on the floor may cause chipping or concrete pop out damage. Plasticizer migration from rubber tires can permanently stain the floor coating. If a rubber tire is planned to set on the floor for a long period of time, place a piece of acrylic sheet between the tire and the floor to prevent tire staining. Rubber burns from quick stops and starts from lift trucks can heat the coating to its softening point causing permanent damage and marking.

REPAIR: Repair gouges, chip outs, and scratches as soon as possible to prevent moisture and chemical under cutting and permanent damage to the floor coating.

Technical Data Sheet

PIP 1000 CR/HB/FS/ST

Universal Epoxy Coating and Primer System

PROTECTIVE INDUSTRIAL POLYMERS

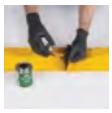
7875 Bliss Parkway North Ridgeville, OH 44039
440-327-0015 440-353-0549 - FAX

WARRANTY AND CONDITIONS OF USAGE

WARRANTY AND LIMITATION OF LIABILITY: Protective Industrial Polymers Inc. ("PIP") warrants that its products shall conform to the manufacturer's written specifications and shall be free from defects for one (1) year from the date of purchase. PIP MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES AND DISCLAIMS THE SAME, INCLUDING, WITHOUT LIMITATION, FAILURE OF THE PRODUCT DUE TO ACTS OF GOD, FLOODING, EXTREME OR ABNORMAL TEMPERATURES, HUMIDITY AND MOSITURE, STRUCTURAL CONDITIONS, SITE PREPARATION AND CONDITIONS, ACCIDENTS, DAMAGE CAUSED BY INSTALLATION OF MACHINERY, EQUIPMENT OR FIXTURES WITHOUT ADEQUATE FLOOR PROTECTION OR WITHOUT ADEQUATE TIME FOR CURING, FAILURE TO COMPLY WITH CONDITIONS OF USAGE (SPECIFIED BELOW), VANDALISM, NEGLIGENT OR INTENTIONAL ACTS OF THIRD PARTIES OR OTHER CASUALTIES. If any PIP product fails to conform to this warranty, PIP shall either replace the product at no cost to Buyer or refund the cost of the product, in PIP's sole discretion. Replacement of any product or a refund of the cost of any product shall be the sole and exclusive remedy available to buyer, and buyer shall have no claim for incidental, special or consequential damages, including, without limitation, business interruption damages. Any warranty claim must be made within one (1) year from the date of delivery of products. PIP does not authorize anyone on its behalf to make any written or oral statements which in any way alter PIP's warranty or installation and storage information or instructions in its product literature or on its packaging labels. Any installation of PIP products which fails to conform to such installation information or instructions or the "Conditions of Usage" (specified below) shall void this warranty. Product demonstrations, if any, are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. Buyer shall be solely responsible for determining the suitability of PIP's products for the Buyer's intended purposes.

CONDITIONS OF USAGE: Installation of all products purchased must be by professional installers periodically published by PIP or otherwise approved by PIP in writing. Modification to any of PIP's products voids the warranty. The installer shall maintain a written contemporaneous record of field conditions (including, without limitation, surface and atmospheric conditions, usage rates, and lot numbers of products installed). PIP reserves the right of inspection of any installed product, installation and maintenance records and records of field conditions and may conduct additional testing as is reasonably required to investigate any warranty claims. Warranty shall only apply for products or materials that have been paid for in full. Moisture Vapor Transmission (MVT) and ASR (Alkali Silica Reaction) Disclaimer and Exclusion: Although rare, some floors at or below grade level are sometimes subjected to saturation by moisture from beneath the concrete floor slab. This moisture can travel through the concrete and collect between floor toppings creating the potential for delaminating from hydrostatic pressure and or ASR. Conditions contributing to this include heavy rainfall, broken pipes, excess hydration within fresh concrete, and other factors or defective and old concrete. These factors are difficult, if not impossible to predict. PIP recommends testing for MVT and/or the presence of ASR in the concrete substrate prior to applying any polymer floor topping. The recommended test method for MVT is ASTM F 2170-11. ASR can be predicted by a higher than normal pH within the concrete. If high pH should be detected, it is recommended a lab test for ASR. If and when delamination of the floor occurs because of a moisture condition that exists beneath or in the concrete slab beyond the capacity of the individual product installed or failure of the concrete due to ASR, this Limited Warranty does not extend to such delaminating or topping failure. This writing constitutes the sole and only agreement of warranty relating to PIP products.




PIG® Build-A-Berm® Barrier Kit

PLR511 Ideal For Long-Term Custom Containment,4.5" W x 50' L x 1.5" H,1 each

Build a semi-permanent barrier around your machinery or storage areas with our crush-resistant spill berm kit.

- Barriers can be constructed into a semi-permanent, high-visibility barrier that's exactly the size and shape you need - indoors or out
- Pliable open-cell foam barrier springs back into shape after you walk or roll over it with light, wheeled equipment
- Durable, 18-oz. all-vinyl covering resists oils, coolants and most chemicals
- Cut to length with utility knife; for best sealing results, secure to a smooth, sealed surface with Sili-Thane sealant (included); join seams with Industrial-Strength Vinyl Cement (sold separately)
- Contain leaks and spills around your machinery without building expensive concrete curbs or cutting and installing angle iron
- High-visibility yellow color draws attention to barrier for increased safety
- Easy removal requires only a flat-bladed shovel
- Great for use around battery charging stations, machinery or any other leak-prone areas
- Kit includes straight sections, corners and Sili-Thane sealant; create any length, shape or configuration to suit your application or environment

Specifications

Max Liquid Temp Exposure	Max Exposure Limit 225°F for up to 30 Minutes
Style	Kit
Dimensions	4.5" W x 50' L x 1.5" H
Barrier Height	1.5" H
Brand	PIG
Ideal For	Long-Term Custom Containment
Color	Yellow
Install/Deploy Type	Glued In Place Barrier
Storage Temp Range	Store Between 0°F and 120°F
Temperature Limit	Works from -22°F to 160°F
Traffic	Cart Traffic

Sold as	1 each
Weight	26 lbs.
New Pig Patent	5,820,297
# per Pallet	5
Composition	Cover: 18 oz. Vinyl-Coated Fabric Core: Polyurethane Foam Sealant: Sili-Thane™ 803 Sealant
Includes	2 - 4.5" W x 25' L x 1.5" H PIG® BUILD-A-BERM® Barriers 6 - 10.3 fl. oz Sili-Thane™ 803 Sealant Tubes 4 - 4.5" W x 6.75" L x 1.5" H PIG® Build-A-Berm® Barrier 90° Corner (PLR279)
Shelf Life	1 year
UNSPSC	24101907
Pigalog® Page Number	Page 159

Metric Equivalent

Weight	11.8 kg
Dimensions	11cm W x 15.2m L x 3.8cm H

Technical Information

Shipping Restrictions

This product is subject to export restrictions and cannot be shipped to: Canada, European Union, Great Britain.

Technical Documents

PIG Build-A-Berm® Barrier

Sili-Thane™ 803 Sealant

Instructions for Using PIG® Build-A-Berm® Barrier

SPCC: 8 Things You Need to Know

Sili-Thane 803 Sealant (White)

Silithane 803 Black Sealant

40 CFR 112.7

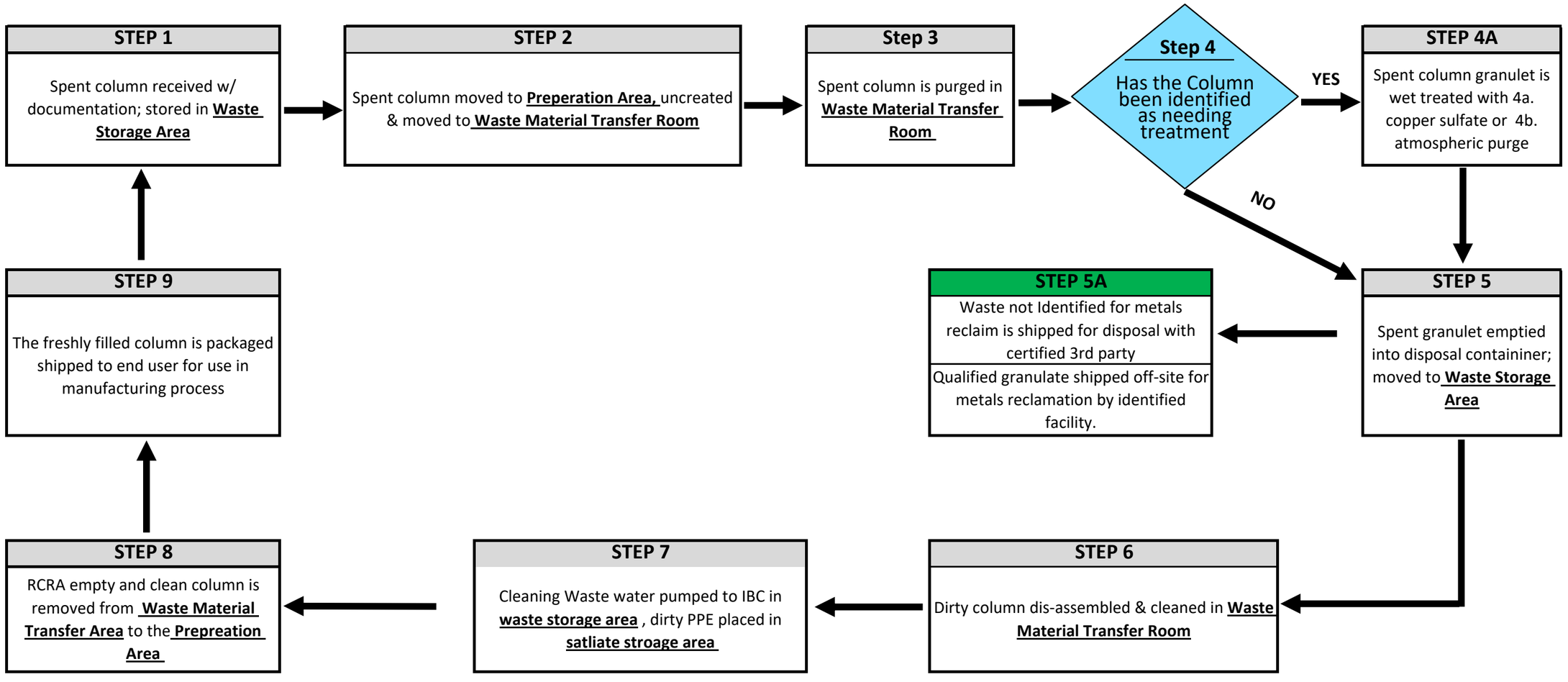
40 CFR 122.26

40 CFR 264.175

New Pig
World's best stuff for leaks, drips and spills.

One Pork Avenue • Tipton, PA 16684-0304
1-855-493-4647 • Fax: 1-800-621-7447• newpig.com • hothogs@newpig.com

APPENDIX D.1.5
Process Flow Diagram


STEP 1
Spent column received w/ documentation; stored in Waste Storage Area
STEP 2
Spent column moved to Preperation Area, uncreated & moved to Waste Material Transfer Room
Step 3
Spent column is purged in Waste Material Transfer Room
Step 4
Has the Column been identified as needing treatment
YES
NO
STEP 4A
Spent column granulet is wet treated with 4a. copper sulfate or 4b. atmospheric purge
STEP 5
Spent granulet emptied into disposal containiner; moved to Waste Storage Area
STEP 5A
Waste not Identified for metals reclaim is shipped for disposal with certified 3rd party
Qualified granulate shipped off-site for metals reclamation by identified facility.
STEP 6
Dirty column dis-assembled & cleaned in Waste Material Transfer Room
STEP 7
Cleaning Waste water pumped to IBC in waste storage area , dirty PPE placed in satliate stroage area
STEP 8
RCRA empty and clean column is removed from Waste Material Transfer Area to the Prepreation Area
STEP 9
The freshly filled column is packaged shipped to end user for use in manufacturing process

APPENDIX D.1.6
Drawings

HVAC DUCTWORK ABBREVIATIONS AND SYMBOLS

OA	OUTSIDE AIR	FD	FIRE DAMPER
SA	SUPPLY AIR	FSD	FIRE/SMOKE DAMPER
RA	RETURN AIR	BDD	BACKDRAFT DAMPER
EA	EXHAUST AIR	AD	ACCESS DOOR
TA	TRANSFER AIR	WMS	WIRE MESH SCREEN
CFM	CUBIC FEET/MINUTE	FC	FLEXIBLE CONNECTION
(100)	AIR FLOW-CFM	AL	ACOUSTICAL LINING
Ø	ROUND DIAMETER	OBD	OPPOSED BLADE DAMPER
CD	CEILING DIFFUSER	RG	RETURN GRILLE
LD	LINEAR DIFFUSER	OAI	OUTSIDE AIR INTAKE

SINGLE LINE SYMBOL	DOUBLE LINE SYMBOL	
10x8	10x8	NEW DUCT - FIRST DIMENSION IS TOP SIZE (CLEAR INSIDE DIMENSION, INCHES)
		INTERNALLY LINED DUCT (ALSO REFER TO SPECIFICATIONS)
8ø	8ø	FLEXIBLE DUCT (8 INCH DIAMETER)
		DUCT UP (RETURN SHOWN)
		DUCT DOWN (RETURN SHOWN)
		MITERED ELBOW (W/ TURNING VANES)
		RADIUS ELBOW
		BRANCH TAKE-OFF (45 DEGREES)
		RADIUS TAKE-OFF

SUPPLY/INTAKE SYMBOLS		RETURN/EXHAUST SYMBOLS	
	DUCT		DUCT
	AIRFLOW DIRECTION		AIRFLOW DIRECTION
	CEILING DIFFUSER		CEILING GRILLE
	LINEAR DIFFUSER		LINEAR RETURN

OTHER SYMBOLS

	DIFFUSER THROW (NO AIRFLOW IN SHADED DIRECTION)		
	MANUAL BALANCE DAMPER		FIRE & SMOKE FIRE=FD FIRE/SMOKE=FSD SMOKE=SMD
S	SPLITTER DAMPER		
BDD	BACK DRAFT DAMPER	M	CONTROL DAMPER
V	VAV BOX	SD	DUCT SMOKE DETECTOR
	DUCT COIL	T	THERMOSTAT/SENSOR
	FLEXIBLE CONNECTION	CO2	CARBON DIOXIDE SENSOR
	RECTANGULAR TO ROUND TRANSITION	R 12	DUCT RISE (R) OR DROP (D) IN DIRECTION OF ARROW. NUMBER INDICATES INCHES OF RISE/DROP (WHEN SHOWN).
TS	TEMPERATURE SENSOR	D 12	

HVAC PIPING ABBREVIATIONS AND SYMBOLS

CHWS(R)	CHILLED WATER SUPPLY (RETURN)	HWS(R)	HEATING WATER SUPPLY (RETURN)
CWS(R)	CONDENSER WATER SUPPLY (RETURN)	CW	CITY WATER
DR	DRAIN	PD	PUMP DISCHARGE
BFP	BACKFLOW PREVENTOR		
GPM	GALLONS/MINUTE		

	BALL VALVE	M	ELECTRIC ACTUATOR
	BUTTERFLY VALVE	S	SOLENOID ACTUATOR
	PLUG VALVE		PNEUMATIC ACTUATOR
	GATE VALVE		CONCENTRIC REDUCER
	GLOBE VALVE		ECCENTRIC REDUCER
	BALANCING VALVE		FLOW LIMITING VALVE
	PRESSURE REDUCING VALVE		PUMP
	SAFETY RELIEF VALVE		PRESSURE GAUGE
	CHECK VALVE		THERMOMETER
	STRAINER W/ BLOWDOWN VALVE	A	MANUAL AIR VENT (A=AUTO VENT)
TDV	TRIPLE-DUTY VALVE	TW	THERMOWELL
	3-WAY VALVE		PIPE ANCHOR
	UNION		PIPE GUIDE
FC	FLEXIBLE CONNECTION	EJ	EXPANSION JOINT
	ELBOW DOWN		ELBOW UP
	BOTTOM CONNECTION		TOP CONNECTION
CV	CONTROL VALVE & TRIM	P 1/4	PIPE PITCHED DOWN 1 IN DIRECTION OF ARROW. NUMBER INDICATES INCHES OF PITCH PER FOOT (WHEN SHOWN).

GENERAL DRAWING ABBREVIATIONS AND SYMBOLS

W/	WITH	W/O	WITHOUT
TYP	TYIPICAL	NIC	NOT IN CONTRACT
EX	EXISTING	KW	KILOWATT
AD	ACCESS DOOR	HP	HORSEPOWER
AFF	ABOVE FINISH FLOOR	BHP	BRAKE HORSE POWER
DWG	DRAWING	VSD	VARIABLE SPEED DRIVE
DN	DOWN	ODP	OPEN DRIP PROOF
		TEFC	TOTALLY ENCLOSED FAN-COOLED

	NEW WORK
	EXISTING TO REMAIN
	TO BE DEMOLISHED
	POINT OF NEW CONNECTION TO EXISTING
	POINT OF DISCONNECTION
1	DRAWING NOTE
	REVISION SYMBOL
A	SECTION DRAWING SYMBOL
	CONTINUATION SYMBOL
OR S.F.	SQUARE FOOT

MECHANICAL DRAWING LIST

MECHANICAL SPECIFICATIONS

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL CODES, LAWS, RULES, AND REGULATIONS OF ALL NATIONAL, COUNTY, STATE, AND LOCAL AUTHORITIES HAVING JURISDICTION OVER THE PREMISES. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, THE 2018 INTERNATIONAL MECHANICAL CODE, THE 2018 INTERNATIONAL PLUMBING CODE, THE 2018 INTERNATIONAL BUILDING CODE, THE 2018 INTERNATIONAL ENERGY CONSERVATION CODE, AND THE 2017 NATIONAL ELECTRICAL CODE, ALL WITH LOCAL AMENDMENTS.
2. BEFORE BEGINNING WORK AND PRIOR TO PLACING ORDERS, SUBMIT ELECTRONIC COPIES OF SHOP DRAWINGS AND/OR LITERATURE IN PDF FORMAT ON ALL EQUIPMENT, AIR DEVICES, DUCTWORK, DUCT ACCESSORIES, PIPING, PIPING SPECIALTIES, AND INSULATION TO BE FURNISHED. BOOKMARK THE PDF FOR EACH SECTION.
3. GUARANTEE WORK TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE AS DETERMINED BY THE ARCHITECT. IF IT IS LONGER, THE GUARANTEE PERIOD SPECIFIED BY THE ARCHITECT SHALL TAKE PRECEDENCE. ANY MATERIAL, EQUIPMENT, OR WORKMANSHIP WHICH PROVES DEFECTIVE WITHIN THE GUARANTEE PERIOD SHALL BE PROMPTLY REPAIRED OR REPLACED AT NO COST TO THE OWNER. PROVIDE NOTARIZED COPIES OF THE GUARANTEE WITH THE O&M MANUALS.
4. FURNISH FIVE HARD COPIES OF OPERATING AND MAINTENANCE MANUALS. MANUALS SHALL BE LOOSE-LEAF 8-1/2" x 11" FORMAT, BOUND IN THREE-RING BINDERS WITH IDENTIFYING TABS SEPARATING SECTIONS. O&M MANUALS SHALL ALSO BE SUBMITTED IN PDF FORMAT WITH BOOKMARKED SECTIONS AND SAVED ON A USB DRIVE. THE USB DRIVE SHALL BE SUBMITTED TO THE OWNER WITH THE HARD COPIES. EACH O&M MANUAL SHALL CONTAIN MANUFACTURER'S SPARE PARTS LIST, CARE, OPERATION, AND INSTALLATION INSTRUCTIONS. PROVIDE A SEQUENCE OF OPERATION AND A PREVENTATIVE MAINTENANCE SCHEDULE IDENTIFYING DAILY, WEEKLY, MONTHLY AND SEASONAL MAINTENANCE PROCEDURES AS REQUIRED. CONTRACTOR SHALL PROVIDE THIS SEQUENCE OF OPERATION AND SCHEDULE IF NOT GIVEN BY THE MANUFACTURER. PROVIDE A LIST OF SUGGESTED SUPPLIERS WITH NAMES, ADDRESSES, AND PHONE NUMBERS FOR EACH PRODUCT OR PRODUCT GROUP. O&M MANUALS SHALL BE SUBMITTED IN PDF FORMAT TO THE ARCHITECT FOR ENGINEER'S REVIEW BEFORE THE HARD COPIES AND USB DRIVE ARE SUBMITTED TO THE OWNER.
5. MAINTAIN A CLEAN, UNDAMAGED SET OF BLUELINE OR BLACKLINE CONTRACT DRAWINGS ON SITE. RECORD ALL CHANGES FROM CONTRACT DRAWINGS INCLUDING "FOUND" CONDITIONS, ADDENDA, OR OTHER INSTRUCTIONS ISSUED BY THE ARCHITECT AND SUBMIT TO ARCHITECT AS "RECORD DRAWINGS" AT CLOSE OF PROJECT.
6. CONDENSATE PIPING SHALL BE TYPE "M" COPPER WITH PLUGGED TEES FOR CLEANOUTS. MALE THREADS ON PLUGS SHALL BE WRAPPED WITH TEFLON TAPE PRIOR TO THREADING INTO TEES. JOINTS IN ABOVE GRADE CONDENSATE PIPING SHALL BE SOLDERED WITH LEAD FREE 95-5 SOLDER. JOINTS IN BELOW GRADE CONDENSATE PIPING SHALL BE BRAZED USING A BRAZING COMPOUND WITH A MINIMUM OF 15% SILVER. ABOVE GRADE CONDENSATE PIPING SHALL BE INSULATED WITH 3/4" ARMAFLEX.
7. ALL METAL DUCTWORK SHALL BE CONSTRUCTED OF NEW GALVANIZED STEEL ASTM A 527, G90 OF LOCK-FORMING QUALITY. ALL DUCT JOINTS SHALL BE SEALED WITH HARDCAST VG-181 DUCT SEALANT. MATERIAL USED FOR JOINING DUCTS SHALL BE UL 181 LISTED.
8. ALL CONSTANT VOLUME SUPPLY AND RETURN DUCTWORK SHALL BE CONSIDERED LOW PRESSURE DUCTWORK. LOW PRESSURE DUCTWORK SHALL BE CONSTRUCTED PER SMACNA "HVAC DUCT CONSTRUCTION STANDARDS" FOR THE 1" PRESSURE CLASS.
9. ALL EXHAUST DUCTWORK SHALL BE STAINLESS STEEL CONSTRUCTED PER SMACNA "HVAC DUCT CONSTRUCTION STANDARDS" FOR THE NEGATIVE AND/OR POSITIVE 6" PRESSURE CLASS.
10. DUCTWORK CONVEYING WATER VAPOR OR IN HUMID AREAS SHALL BE 3003-H14 ALUMINUM ALLOY OR 316 STAINLESS STEEL.
11. CAULK WATERTIGHT ALL DUCTWORK EXPOSED TO THE WEATHER WITH DAP "CMC" EXTERIOR DUCT SEALANT, HARDCAST VERSA GRIP "VG-102", OR DESIGN POLYMERICS DP 1010.
12. LOW PRESSURE SUPPLY AND RETURN DUCTWORK INSIDE THE BUILDING ENVELOPE SHALL BE LINED WITH 1-1/2" ACOUSTICAL DUCT LINER INSULATION. DUCT LINER INSULATION INSIDE THE BUILDING ENVELOPE SHALL HAVE A MINIMUM INSTALLED R-VALUE OF 6.0.
13. THE SIZES SHOWN ON PLANS FOR INTERNALLY LINED DUCTS ARE ACTUAL OUTSIDE SHEET METAL DIMENSIONS.
14. PROVIDE FLEX CONNECTIONS AT UNIT INLET AND OUTLET.
15. FLEXIBLE DUCT SHALL BE THERMAFLEX M-KC CLASS 1 DUCT WITH BI-DIRECTIONAL REINFORCED METALIZED VAPOR BARRIER WITH TRIPLE PLY STAND-UP SEAM AND R-6.0 INSULATION.
16. ALL DUCT WORK SHALL BE HUNG WITH SHEET METAL STRAP HANGERS PER LATEST SMACNA "HVAC DUCT CONSTRUCTION STANDARDS" FASTENED TO STRUCTURE ABOVE.
17. SYSTEMS SHALL BE BALANCED TO APPROXIMATE CFM'S SHOWN AND TO THE SATISFACTION OF THE OWNER. BALANCE SHALL BE PERFORMED BY AN INDEPENDENT BALANCING CONTRACTOR WHO IS A MEMBER OF AABC. ALL TAB WORK SHALL BE GUARANTEED FOR A PERIOD OF SIXTY DAYS. TAB CONTRACTOR SHALL MAKE ADJUSTMENTS DURING THIS PERIOD FOR COMFORT LEVEL ADJUSTMENT, AT DIRECTION OF OWNER. FINAL REPORT SHALL BE SUBMITTED TO THE ENGINEER AND CITY INSPECTOR.
18. PROVIDE COILED PLASTIC PIPE MARKERS FOR PIPE IDENTIFICATION OF ALL EXPOSED PIPING OR PIPING ABOVE ACCESSIBLE CEILINGS. MARKERS USED ON OUTDOOR PIPING SHALL BE APPROVED FOR OUTDOOR USE.
19. PROVIDE 2" X 3" OR LARGER LAMINATED BLACK PLASTIC NAMEPLATES WITH ONE-HALF INCH ENGRAVED WHITE NUMBERS AND LETTERS FOR EACH PIECE OF EQUIPMENT. NAMEPLATE MATERIALS MOUNTED OUTSIDE SHALL BE RESISTANT TO UV DEGRADATION.
20. PROVIDE FIRE DAMPER WITH DUCT ACCESS DOOR WHERE DUCTS PENETRATE FIRE-RESISTANCE-RATED ASSEMBLIES. PROVIDE SPECIAL INSPECTIONS FOR ALL FIRE AND SMOKE DAMPERS AS REQUIRED BY CITY OF PHOENIX. GRILLES MOUNTED ON FIRE-RESISTANCE-RATED WALLS SHALL BE PROVIDED WITH 'OUT OF PARTITION' FIRE DAMPERS EQUAL TO POTTORFF VFD-10-OP. (6)

EXISTING CONDITIONS NOTE

EVERY EFFORT HAS BEEN MADE TO PROVIDE ACCURATE INFORMATION REGARDING EXISTING CONDITIONS. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS ABOVE THE CEILING PRIOR TO BIDDING THE PROJECT. ANY CONFLICTS DISCOVERED BY MECHANICAL CONTRACTOR DURING THE PRE-BID PROCESS WHICH MAY EFFECT THE SCOPE OR COST SHALL BE REPORTED TO THE ARCHITECT AND ENGINEER PRIOR TO SUBMITTING A BID. THE SUBMISSION OF A BID SHALL INDICATE MECHANICAL CONTRACTOR COMPLETELY UNDERSTANDS THESE CONTRACT DOCUMENTS AND THE EXISTING CONDITIONS.

(5) ENTIRE SHEET

1 MECHANICAL SPECIFICATIONS, LEGEND, AND NOTES
SCALE N.T.S.

CM Associates Engineers
Mechanical ■ Electrical Fire Protection
706 E. BELL RD. SUITE 215
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PROJECT No. 24102

14583 W. Windsor Ave.
Goodyear, AZ 85395
Phone 623-535-5526
Fax 623-535-5546

Project Manager: MW
Drawn by: MW
Checked by: CM
Project Number: 22350

Registered Professional Engineer (Mechanical) CERTIFICATE NO. 42007 CLEMENT M. MIKULICH STATE OF ARIZONA U.S.A. Expires 3/31/2026

CS CLEAN

2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

(5)	TENANT COORDINATIONS 10/9/24
(6)	COORDINATION CHANGES 11/18/24

DATE: 1/31/23
ISSUED FOR: PERMIT

SHEET: M-01

Air System Sizing Summary for FC-1 / CU-1
(In Alternative: CS CLEAN)

Project: 24102 CS Clean — 10/04/2024
Prepared by: CM Associates Engineers, PLLC — 1:29 PM

Air System Information

Air System Name	FC-1 / CU-1	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	111.5 sqft
Air System Type	SZCAV	Location	Phoenix Sky Harbor Intl, AZ, USA

Sizing Calculation Information

Calculation Months	Jan to Dec	Zone CFM Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space CFM Sizing	Individual peak space loads

Central Cooling Coil Sizing Data

Total coil load	0.6	Tons	Peak coil load occurs at	July 6:00	
Total coil load	6.8	MBH	OA DB / WB	94.6 / 67.1	F
Sensible coil load	6.7	MBH	Entering DB / WB	74.5 / 59.2	F
Coil CFM at peak load	322	CFM	Leaving DB / WB	54.8 / 51.4	F
Sum of peak zone CFM	322	CFM	Resulting RH	41	%
Sensible heat ratio	0.995		Design supply temp.	57.0	F
CFM/Ton	572.5		Zone T-stat Check	1 of 1	OK
sqft/Ton	198.0		Max zone temperature deviation	0.0	F
BTU/(hr sqft)	60.6				
Water flow @ 10.0 F rise	N/A				

Supply Fan Sizing Data

Design CFM	322	CFM	Fan motor BHP	0.22	BHP
Design CFM/sqft	2.89	CFM/sqft	Fan motor kW	0.18	kW
			Fan total static	2.50	in wg

Outdoor Ventilation Air Data

Design airflow CFM	0	CFM	CFM/person	0.00	CFM/person
CFM/sqft	0.00	CFM/sqft			

Hourly Analysis Program 6.2 — Page 1 of 1

Air System Sizing Summary for AC-10
(In Alternative: CS CLEAN)

Project: 24102 CS Clean — 10/04/2024
Prepared by: CM Associates Engineers, PLLC — 12:11 PM

Air System Information

Air System Name	AC-10	Number of zones	1
Equipment Class	PKG ROOF	Floor Area	1405.4 sqft
Air System Type	SZCAV	Location	Phoenix Sky Harbor Intl, AZ, USA

Sizing Calculation Information

Calculation Months	Jan to Dec	Zone CFM Sizing	Sum of space airflow rates
Sizing Data	User-Modified	Space CFM Sizing	Individual peak space loads

Central Cooling Coil Sizing Data

Total coil load	4.4	Tons	Peak coil load occurs at	July 6:00	
Total coil load	52.6	MBH	OA DB / WB	94.6 / 67.1	F
Sensible coil load	50.8	MBH	Entering DB / WB	77.5 / 62.2	F
Coil CFM at peak load	2000	CFM	Leaving DB / WB	53.4 / 52.9	F
Sum of peak zone CFM	2000	CFM	Resulting RH	47	%
Sensible heat ratio	0.967		Design supply temp.	57.0	F
CFM/Ton	456.4		Zone T-stat Check	1 of 1	OK
sqft/Ton	320.7		Max zone temperature deviation	0.0	F
BTU/(hr sqft)	37.4				
Water flow @ 10.0 F rise	N/A				

Central Heating Coil Sizing Data

Max coil load	10.9	MBH	Load occurs at	Design Heating	
Coil CFM at Design Heating	2000	CFM	BTU/(hr sqft)	7.7	
Max coil CFM	2000	CFM	Ent. DB / Lvg DB	67.9 / 73.1	F
Water flow @ 20.0 F drop	N/A				

Supply Fan Sizing Data

Design CFM	2000	CFM	Fan motor BHP	1.37	BHP
Design CFM/sqft	1.42	CFM/sqft	Fan motor kW	1.09	kW
			Fan total static	2.50	in wg

Outdoor Ventilation Air Data

Design airflow CFM	250	CFM	CFM/person	62.50	CFM/person
CFM/sqft	0.18	CFM/sqft			

Hourly Analysis Program 6.2 — Page 1 of 2

Air System Sizing Summary for AC-11
(In Alternative: CS CLEAN)

Project: 24102 CS Clean — 10/04/2024
Prepared by: CM Associates Engineers, PLLC — 12:11 PM

Air System Information

Air System Name	AC-11	Number of zones	1
Equipment Class	PKG ROOF	Floor Area	2005.0 sqft
Air System Type	SZCAV	Location	Phoenix Sky Harbor Intl, AZ, USA

Sizing Calculation Information

Calculation Months	Jan to Dec	Zone CFM Sizing	Sum of space airflow rates
Sizing Data	User-Modified	Space CFM Sizing	Individual peak space loads

Central Cooling Coil Sizing Data

Total coil load	5.0	Tons	Peak coil load occurs at	July 14:00	
Total coil load	60.1	MBH	OA DB / WB	115.0 / 73.0	F
Sensible coil load	60.1	MBH	Entering DB / WB	90.4 / 66.2	F
Coil CFM at peak load	2000	CFM	Leaving DB / WB	61.9 / 56.3	F
Sum of peak zone CFM	2000	CFM	Resulting RH	48	%
Sensible heat ratio	1.000		Design supply temp.	57.0	F
CFM/Ton	399.1		Zone T-stat Check	1 of 1	OK
sqft/Ton	400.1		Max zone temperature deviation	0.0	F
BTU/(hr sqft)	30.0				
Water flow @ 10.0 F rise	N/A				

Central Heating Coil Sizing Data

Max coil load	25.9	MBH	Load occurs at	Design Heating	
Coil CFM at Design Heating	2000	CFM	BTU/(hr sqft)	12.9	
Max coil CFM	2000	CFM	Ent. DB / Lvg DB	58.9 / 71.3	F
Water flow @ 20.0 F drop	N/A				

Supply Fan Sizing Data

Design CFM	2000	CFM	Fan motor BHP	1.37	BHP
Design CFM/sqft	1.00	CFM/sqft	Fan motor kW	1.09	kW
			Fan total static	2.50	in wg

Outdoor Ventilation Air Data

Design airflow CFM	800	CFM	CFM/person	133.33	CFM/person
CFM/sqft	0.40	CFM/sqft			

Hourly Analysis Program 6.2 — Page 2 of 2

COMcheck Software Version COMcheckWeb
Mechanical Compliance Certificate

Project Information

Energy Code:	2018 IECC
Project Title:	
Location:	Phoenix, Arizona
Climate Zone:	2b
Project Type:	Alteration

Construction Site:	Owner/Agent:	Designer/Contractor:
2453 W Parkside Ln Phoenix, Arizona 85203	Jason Dugay CS Clean Solutions Inc. jason.dugay@csclean-usa.com	Mik Mikulich CM Associates Engineers, PLLC info@cmmep.com

Mechanical Systems List

Quantity	System Type & Description
1	AC-10, 11 (Single Zone): Single Package Heat Pump Heating Mode: Capacity = 59 kBtu/h, Proposed Efficiency = 8.00 HSPF, Required Efficiency = 8.00 HSPF Cooling Mode: Capacity = 59 kBtu/h, Proposed Efficiency = 16.00 SEER, Required Efficiency = 15.40 SEER Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2018 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Mik Mikulich, Principal Engineer — Name - Title
Mik Mikulich — Signature
10/10/2024 — Date

Project Title:
Data filename:
Report date: 10/14/24
Page 1 of 9

Building:	CS CLEAN					
System Tag/Name:	AC-10					
Operating Condition Description:	HEATING					
Units (select from pull-down list)	IP					
Inputs for System	**Name**	**Units**	**w/o diversity System**	**Diversity**	**w/ diversity System**	**Check Figures**
Floor area served by system	As	sf	1,274		Default entry has been overridden.	
Population of area served by system	*Ps*	P	2	*D* 100%	2	Default entry has been overridden. 1.9 P/1000 sf
Design primary supply fan airflow rate	Vpsd	cfm	2,000	100%	2,000	Default entry has been overridden. 1.57 cfm/sf
OA req'd per unit area for system (Weighted average)	Ras	cfm/sf	0.12			Default entry has been overridden. 0.12 ave cfm/sf
OA req'd per person for system area (Weighted average)	Rps	cfm/p	7.6			Default entry has been overridden. 7.63 ave cfm/p
Percent increase in Vbz over minimum required			0%			
Does system have Outdoor Air Economizer		Select from pull-down list			No	
Outdoor air intake provided for system	OA	cfm	250			

Inputs for Potentially Critical zones			Potentially Critical Zones			
Zone Name			PASS THRU RM	COLUMN CLEAN/PASS THRU RM	*WASTE STORAGE RM*	Totals/averages
Zone Tag		*Zone title turns purple italic for critical zone(s)*	116	117	118	
Occupancy Category			Corridors	Shipping/receiving	Occupiable storage rooms for liquids or gels	
		Select from pull-down list:				
Floor Area of zone	*Az*	sf	47	646	581	1,274 total sf
Design population of zone	*Pz*	P (default value listed; may be overridden)	0	1.292	1.162	2.454 total P
Design total supply to zone (primary plus local recirculated)	Vdzd	cfm	50	1,150	800	2,000 total cfm
Induction Terminal Unit, Dual Fan Dual Duct or Transfer Fan?		Select from pull-down list or leave blank if N/A:				
Frac. of local recirc. air that is representative of system RA	*Er*					1.00 average
Inputs for Operating Condition Analyzed						
Percent of total design airflow rate at conditioned analyzed	Ds	% May need to manually edit Ds	100%	100%	100%	100% 100% average
Air distribution type at conditioned analyzed		Select from pull-down list:		CSCRH	CSCRH	CSCRH
Zone air distribution effectiveness at conditioned analyzed	*Ez*			0.80	0.80	0.80 0.80 average
Primary air fraction of supply air at conditioned analyzed	*Ep*					1.00 average
Results						
System Ventilation Efficiency	*Ev*		1.00			
Outdoor air intake required for system	*Vot*	cfm	169			
Outdoor air per unit floor area	*Vot*/As	cfm/sf	0.13			
Outdoor air per person served by system (including diversity)	*Vot*/Ps	cfm/p	68.8			
Outdoor air as a % of design primary supply air	Ypd	%	8%			

Building:	CS CLEAN					
System Tag/Name:	AC-11					
Operating Condition Description:	HEATING					
Units (select from pull-down list)	IP					
Inputs for System	**Name**	**Units**	**w/o diversity System**	**Diversity**	**w/ diversity System**	**Check Figures**
Floor area served by system	As	sf	1,923		Default entry has been overridden.	
Population of area served by system	*Ps*	P	3	*D* 100%	3	Default entry has been overridden. 1.4 P/1000 sf
Design primary supply fan airflow rate	Vpsd	cfm	2,000	100%	2,000	Default entry has been overridden. 1.04 cfm/sf
OA req'd per unit area for system (Weighted average)	Ras	cfm/sf	0.10			Default entry has been overridden. 0.10 ave cfm/sf
OA req'd per person for system area (Weighted average)	Rps	cfm/p	8.0			Default entry has been overridden. 8.00 ave cfm/p
Percent increase in Vbz over minimum required			0%			
Does system have Outdoor Air Economizer		Select from pull-down list			No	
Outdoor air intake provided for system	OA	cfm	800			

Inputs for Potentially Critical zones			Potentially Critical Zones			
Zone Name			FILL RM	*PCS AREA*	CANISTER DECON RM	Totals/averages
Zone Tag		*Zone title turns purple italic for critical zone(s)*	113	114	115	
Occupancy Category			Corridors	Shipping/receiving	Occupiable storage rooms for liquids or gels	
		Select from pull-down list:				
Floor Area of zone	*Az*	sf	534	834	555	1,923 total sf
Design population of zone	*Pz*	P (default value listed; may be overridden)	0	1.668	1.11	2.778 total P
Design total supply to zone (primary plus local recirculated)	Vdzd	cfm	400	800	800	2,000 total cfm
Induction Terminal Unit, Dual Fan Dual Duct or Transfer Fan?		Select from pull-down list or leave blank if N/A:				
Frac. of local recirc. air that is representative of system RA	*Er*					1.00 average
Inputs for Operating Condition Analyzed						
Percent of total design airflow rate at conditioned analyzed	Ds	% May need to manually edit Ds	100%	100%	100%	100% 100% average
Air distribution type at conditioned analyzed		Select from pull-down list:		CSCRH	CSCRH	CSCRH
Zone air distribution effectiveness at conditioned analyzed	*Ez*			0.80	0.80	0.80 0.80 average
Primary air fraction of supply air at conditioned analyzed	*Ep*					1.00 average
Results						
System Ventilation Efficiency	*Ev*		0.93			
Outdoor air intake required for system	*Vot*	cfm	238			
Outdoor air per unit floor area	*Vot*/As	cfm/sf	0.12			
Outdoor air per person served by system (including diversity)	*Vot*/Ps	cfm/p	85.7			
Outdoor air as a % of design primary supply air	Ypd	%	12%			

1 MECHANICAL DETAILS AND CALCULATIONS
SCALE N.T.S.

ENTIRE SHEET

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Goodyear, AZ 85395
Phone 623-535-5526
Fax 623-535-5546

Project Manager: MW
Drawn by: MW
Checked by: CM
Project Number: 22350

Registered Professional Engineer (Mechanical) CERTIFICATE NO. 42007 CLEMENT M. MIKULICH ARIZONA U.S.A. Expires 3/31/2026

CS CLEAN
2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

5	TENANT COORDINATIONS 10/9/24

DATE: 1/31/23
ISSUED FOR: PERMIT

SHEET: M-02

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PROJECT No. 24102

HVAC - PACKAGED - HEAT PUMP

RTU #	Area Served	Manuf.	Model	Cooling Output	Unit Type	Max Outside Air (CFM)	Volts Phase	MCA	MOCP	WT (Lbs.)
AC-10, AC-11	Process Area	Daikin	DRH060	5 Ton	Heat Pump	AC-10: 200 AC-11: 800	208/3/60	30.7	45	650

NOTE: ALL HVAC UNITS TO HAVE SMOKE DETECTORS THAT WILL AUTOMATICALLY SHUT DOWN UNITS.

HVAC - DUCTLESS SPLIT-SYSTEM COOLING ONLY

FC/CU #	Area Served	Manuf.	Model (indoor / outdoor)	Cooling Output	Unit Type	CFM	Volts Phase	MCA	MOCP	WT (Indoor / Outdoor)
FC-1 / CU-1	ELEC RM	Trane / Mitsubishi	TPKA0A0121LA10A / TRUYA0121KA70NA	1 Ton	Cooling Only	385	208/1/60	11	28	30 / 100

NOTE: UNIT COMPLETE WITH LOW AMBIENT CONTROL, MICROPROCESSOR CONTROLLER, WIRED REMOTE CONTROLLER, AND 115V LITTLE GIANT CONDENSATE PUMP.

HVAC - EXHAUST FAN

EF #	Area Served	Manuf.	Model	Unit Type	CFM	ESP	Volts Phase	Motor	FLA	WT
EF-1	CANISTER RM'S	NY BLOWER	2610	PRESSURE BLOWER BELT-DRIVE	2300	6"	208/3/60	5 HP	-	125
EF-2	COMPRESSOR RM	COOK	GC-642	CEILING -MOUNTED DIRECT-DRIVE	400	0.5"	115/1/60	135 W	1.9	40

NOTE:
1. EF-1 COMPLETE WITH INVERTER-DUTY, PREMIUM EFFICIENCY, TEFC MOTOR, SPRING VIBRATION ISOLATORS. ENTIRE EXHAUST FAN SHALL BE WEATHERPROOF.
2. EF-2 COMPLETE WITH FAN SPEED CONTROLLER, GRAVITY BACK-DRAFT DAMPER, HANGING VIBRATION ISOLATORS, AND NEMA 1 DISCONNECT.

EXISTING PACKAGED HEAT PUMP SCHEDULE

RTU #	Area Served	Cooling Output	Unit Type	Max Outside Air (CFM)
AC-1 TO AC-4, AC-7, AC-8	Industrial Area Interior	5 Ton	Heat Pump	200
AC-5 TO AC-6	Industrial Area Interior	3 Ton	Heat Pump	150
AC-9	Industrial Area Interior	4 Ton	Heat Pump	75

AIR DEVICE SCHEDULE

TAG	MANUFACTURER	MODEL	REMARKS
CD	PRICE	SMD	36 T-BAR FRAME AND ROUND NECK
RG	PRICE	80	
EG	PRICE	80	PROVIDE FILTER FRAME WHERE INDICATED
EGA	PRICE	530	
TG	PRICE	STG	

ENTIRE SHEET

1 MECHANICAL SPECIFICATIONS
SCALE N.T.S.

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Project Manager: MW
Drawn by: MW
Checked by: CM
Project Number: 22350

Registered Professional Engineer (Mechanical) CERTIFICATE NO. 42007 CLEMENT M. MIKULICH DATE SIGNED 1/31/2023 ARIZONA U.S.A. Expires 3/31/2026

CS CLEAN

2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

5	TENANT COORDINATIONS 10/9/24
6	COORDINATION CHANGES 11/18/24

DATE: 1/31/23
ISSUED FOR: PERMIT

SHEET: M-03

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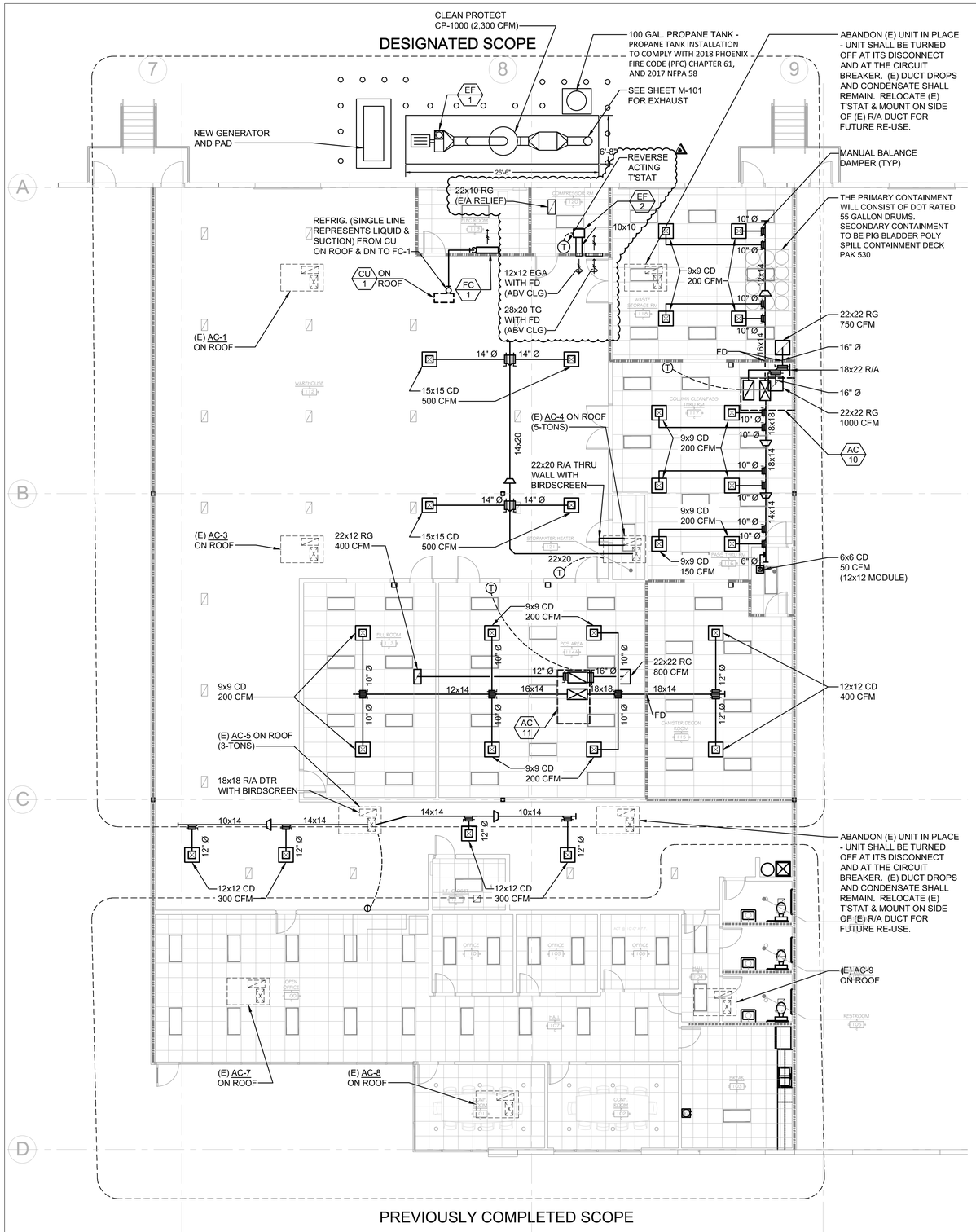
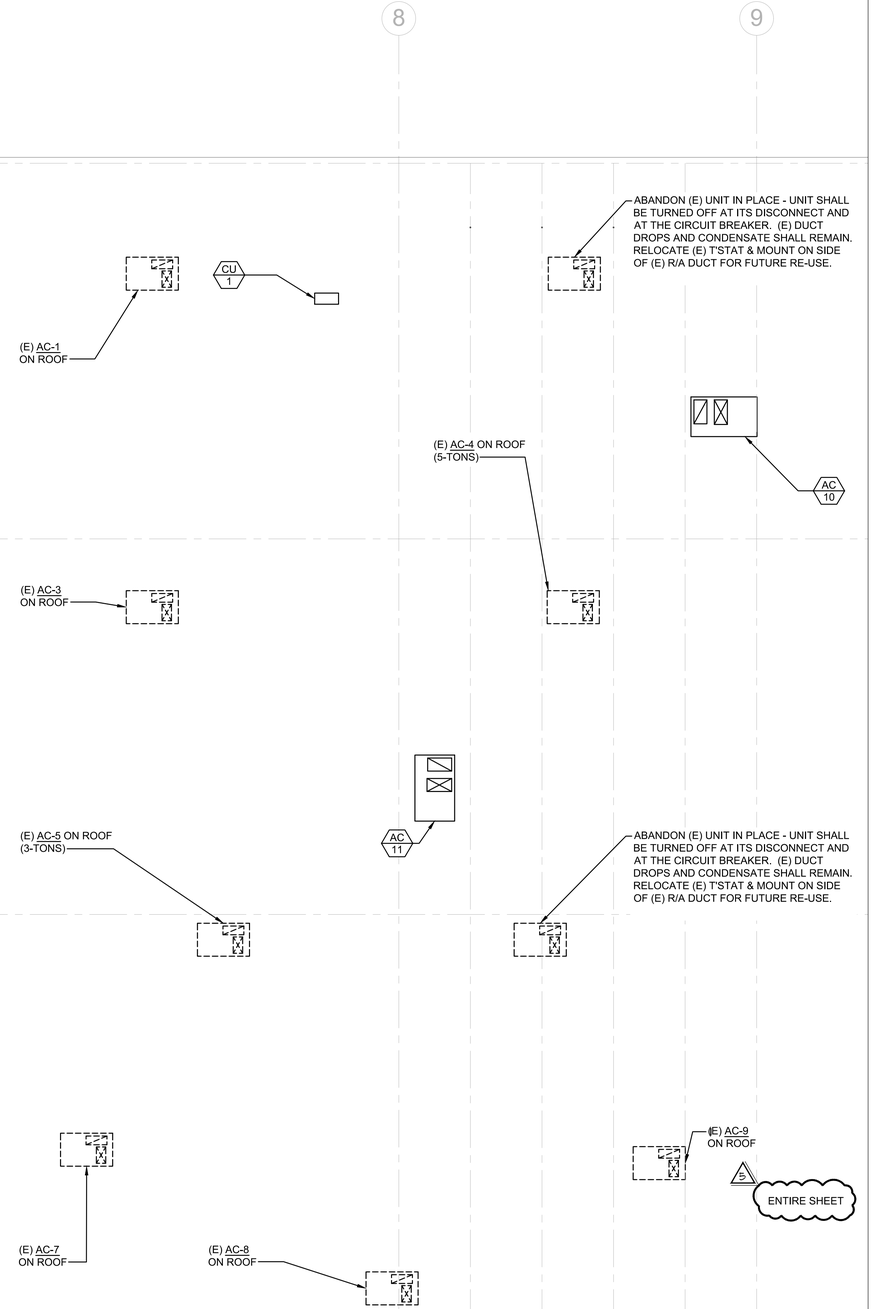


1 MECHANICAL PLAN - FIRST FLOOR
SCALE 1/8"=1'-0"



2 MECHANICAL PLAN - ROOF
SCALE 1/8"=1'-0"

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Phone 623-535-5526
Fax 623-535-5546

Project Manager: MW
Drawn by: MW
Checked by: CM
Project Number: 22350

Registered Professional Engineer (Mechanical) CERTIFICATE NO. 42007 CLEMENT M. MIKULICH ARIZONA U.S.A. Expires 3/31/2026

CS CLEAN

2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

4	NOTE PROPANE TANK
5	CONTAINMENT NOTE
5	TENANT COORDINATIONS 10/9/24
6	COORDINATION CHANGES 11/18/24

DATE: 1/31/23
ISSUED FOR: PERMIT

SHEET: M-100

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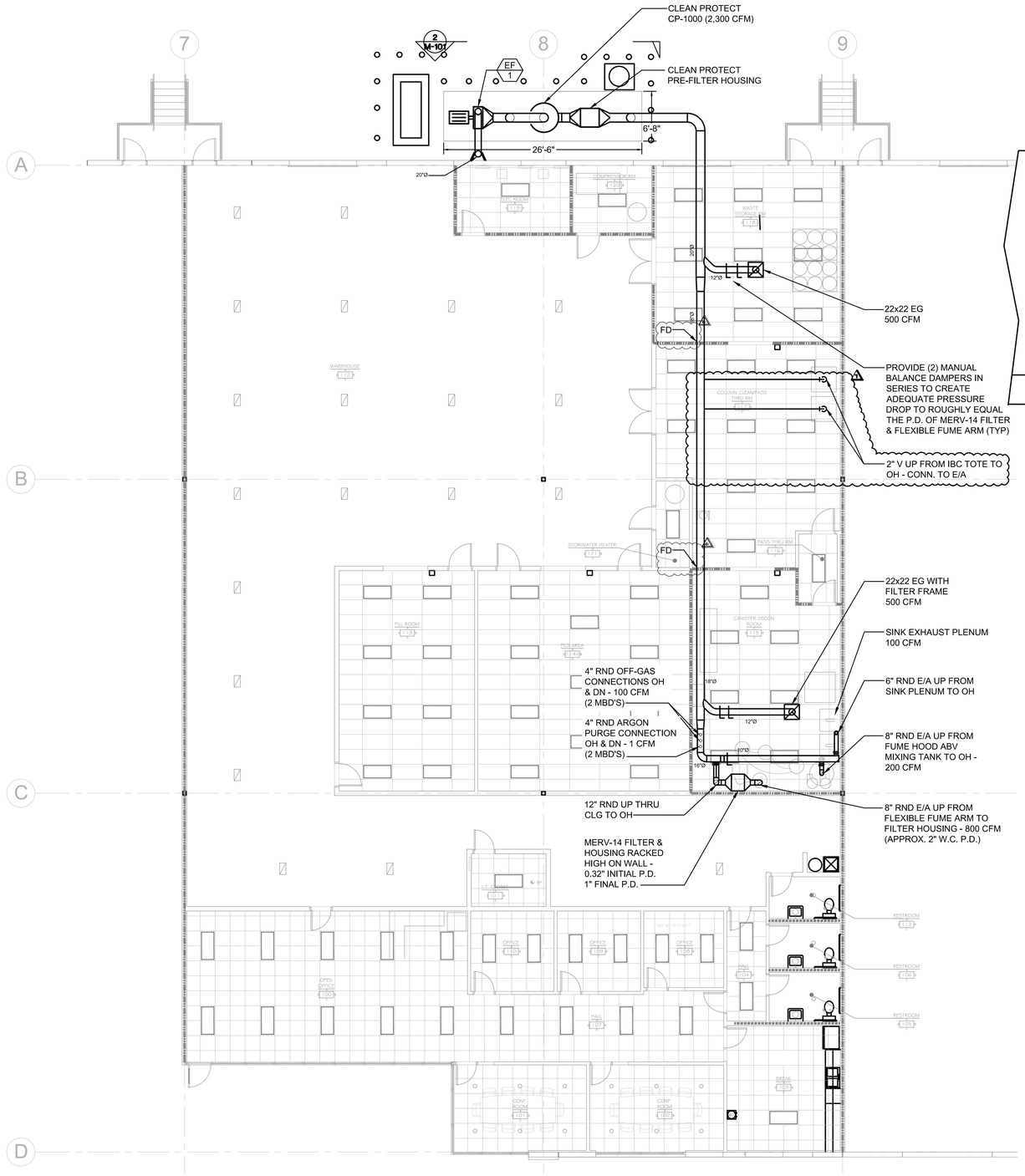
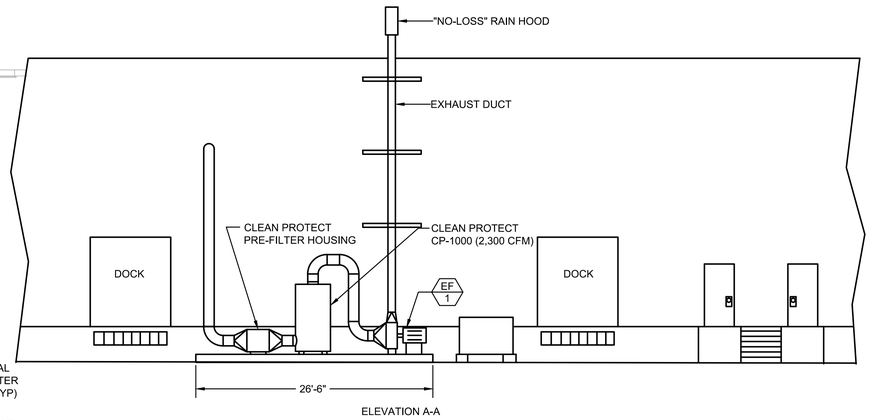


1 LOCAL EXHAUST - FIRST FLOOR

SCALE 1/8"=1'-0"



ELEVATION A-A

2 SECTION A-A

SCALE 1/8"=1'-0"

ENTIRE SHEET

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ARIZONA U.S.A.
Expires 3/31/2026

CS CLEAN

2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

5	TENANT COORDINATIONS 10/9/24
4	COORDINATION CHANGES 11/18/24
3	OWNER CHANGES 12/11/24

DATE: 1/31/23
ISSUED FOR: PERMIT

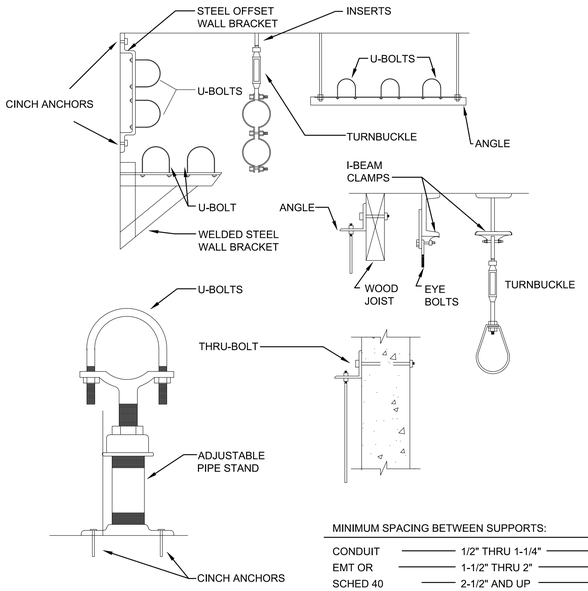
SHEET: M-101

SYMBOL LIST

PLAN SYMBOL	DESCRIPTION
SAN	SANITARY SEWER PIPING
W	WATER MAIN
	VENT PIPING
G	GAS PIPING
	(SOV) 1/4 TURN BALL VALVE
	OS&Y GATE VALVE
	CHECK VALVE
	DOUBLE CHECK VALVE
	GAS COCK
	BALANCING VALVE
	PRESSURE REDUCING VALVE
	UNION
	BACKFLOW PREVENTER
	CLEANOUT DECK PLATE
	CLEANOUT WALL PLATE
	WATER HAMMER ARRESTER
	TRAP PRIMER
BIB	FROST PROOF WALL HYDRANT/HOSE BIBB
	PIPE SLEEVE
	IN-LINE PUMP
	QUICK DISCONNECT AIR COUPLING
	FLOOR DRAIN
	SOLENOID VALVE
#	KEY NOTE DESIGNATION
	CONNECT NEW W/EXISTING

NOTE:
SYMBOL LIST SHOWN ABOVE IS FOR GENERAL REFERENCE ONLY. THE PRESENCE OF A SYMBOL DOES NOT IMPLY ITS USE ON THIS PROJECT. REFER TO DRAWINGS FOR SPECIFIC SYMBOLS USED.

PIPING	LINE TYPE
COLD WATER	
HOT WATER	
SANITARY	
GAS	
EXISTING COLD WATER	
EXISTING HOT WATER	
EXISTING SANITARY	
EXISTING GAS	

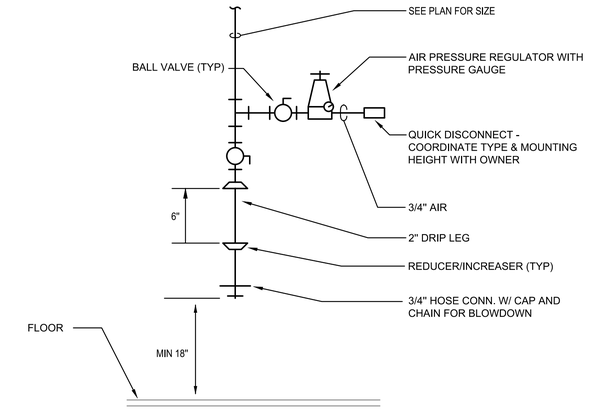


MINIMUM SPACING BETWEEN SUPPORTS:

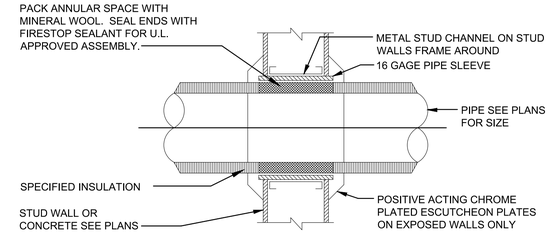
CONDUIT	1/2" THRU 1-1/4"	3'
EMT OR	1-1/2" THRU 2"	8'
SCHED 40	2-1/2" AND UP	10'

+ 2' FROM EACH TURN

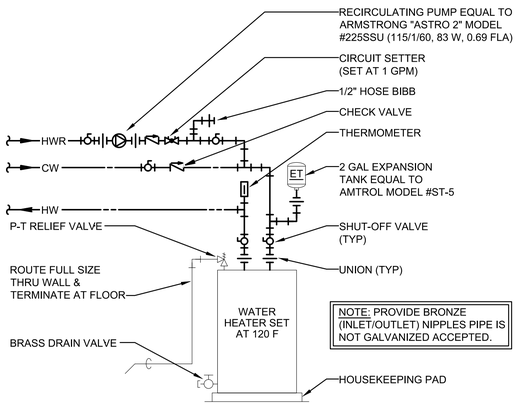
TYPICAL PIPE SUPPORT DETAIL
SCALE: N.T.S.



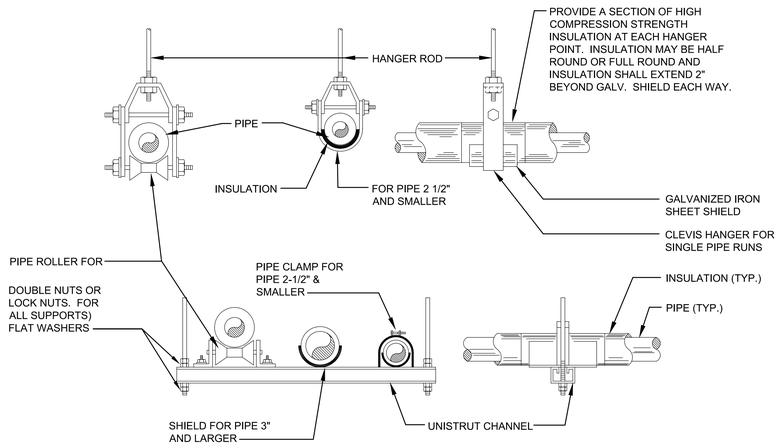
COMPRESSED AIR DROP DETAIL
SCALE: N.T.S.



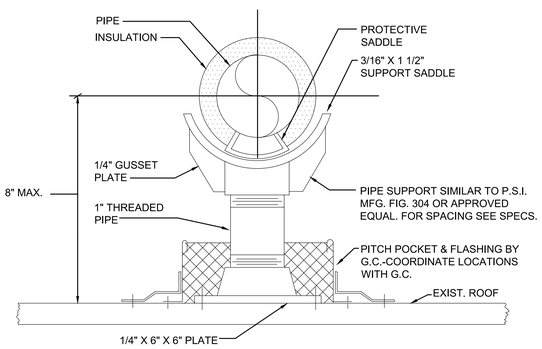
PIPE VENT THROUGH WALL DETAIL
SCALE: N.T.S.



ELECTRIC WATER HEATER PIPING DETAIL
SCALE: N.T.S.



GAS/WATER PIPING HANGER AND SUPPORT DETAIL
SCALE: N.T.S.



ROOF MOUNTED PIPE SUPPORT DETAIL
SCALE: N.T.S.

ENTIRE SHEET

1 PLUMBING - DETAILS
SCALE N.T.S.

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Drawn by: MW
Checked by: CM
Project Number: 22350

Registered Professional Engineer (Mechanical)
CERTIFICATE NO.
42007
CLEMENT
M. MIKULICH
STATE OF ARIZONA U.S.A.
Expires 3/31/2026

CS CLEANERS
2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

4	REVIEW COMMENTS 8/30/23
5	TENANT COORDINATIONS 10/9/24

DATE: 1/31/23
ISSUED FOR: PERMIT

SHEET: P-01

EXISTING CONDITIONS NOTE

- EVERY EFFORT HAS BEEN MADE TO PROVIDE ACCURATE INFORMATION REGARDING EXISTING CONDITIONS. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS ABOVE THE CEILING PRIOR TO BIDDING THE PROJECT. ANY CONFLICTS DISCOVERED BY PLUMBING CONTRACTOR DURING THE PRE-BID PROCESS WHICH MAY EFFECT THE SCOPE OR COST SHALL BE REPORTED TO THE ARCHITECT AND ENGINEER PRIOR TO SUBMITTING A BID. THE SUBMISSION OF A BID SHALL INDICATE PLUMBING CONTRACTOR COMPLETELY UNDERSTANDS THESE CONTRACT DOCUMENTS AND THE EXISTING CONDITIONS.
- THE NEW SYSTEMS INDICATED ON THE DRAWINGS SHALL BE FULLY FURNISHED AND INSTALLED. ANY ITEMS INCIDENTAL TO THE COMPLETION OF THESE CONTRACT DOCUMENTS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
- PLUMBING CONTRACTOR SHALL COORDINATE ALL PATCHING AND REPAIRING WORK WITH THE GENERAL CONTRACTOR AND ARCHITECT.
- BEFORE BEGINNING WORK, PLUMBING CONTRACTOR SHALL VERIFY THAT THE WASTE PIPING BEING INSTALLED UNDER THIS SCOPE CAN CONNECT TO THE EXISTING WASTE PIPE INVERT. CONTRACTOR SHALL CONTACT THE ARCHITECT AND ENGINEER IMMEDIATELY IF THE EXISTING WASTE PIPE INVERT CANNOT BE MET.
- EXISTING "AS-BUILT" DOCUMENTS ARE NOT AVAILABLE AND SOME UNDERGROUND WASTE LINE LOCATIONS SHOWN ARE BASED ON ASSUMPTIONS ONLY. AS A SUGGESTION, OWNER SHOULD ARRANGE FOR THE CONTRACTOR TO IDENTIFY ALL EXISTING UNDER GROUND WASTE LINES TO VERIFY EXACT INVERTS, LOCATIONS AND ROUTINGS PRIOR TO BEGINNING INSTALLATION.

PLUMBING GENERAL NOTES

- COORDINATE ALL OVERHEAD PIPING WITH HVAC DUCTWORK AND WORK OF OTHER TRADES.
- OFFSET ALL NEW AND/OR EXISTING V.T.R.'S TO TERMINATE A MIN. OF 3'-0" FROM ALL VERTICAL SURFACES AND A MIN. OF 10'-0" FROM, OR AT LEAST 3'-0" ABOVE ALL OUTSIDE AIR INTAKES.
- PLUMBER TO VERIFY EXACT SIZE AND LOCATION OF ALL EXIST. PIPING AND TO VERIFY INVERTS TO ASSURE PROPER SLOPE MAY BE OBTAINED BEFORE BEGINNING WORK.
- RUN ALL WASTE LINES AT 2% SLOPE UNLESS NOTED OTHERWISE.
- ALL SLAB PENETRATIONS SHALL BE SEALED USING 3M FIRE BARRIER WATER TIGHT SEALANT 1003SL SELF-LEVELING FIRE STOP FOR FLOOR APPLICATIONS OR EQUIV. INSTALLED BY TRAINED AND CERTIFIED PERSONNEL.
- SAWCUT EXISTING CONCRETE SLAB AS REQUIRED FOR INSTALLATION AND CONNECTION OF U.G. PIPING TO EXISTING U.G. PIPING. BACKFILL AND PATCH CONCRETE SLAB TO MATCH EXISTING.
- CONTRACTOR TO FIELD VERIFY EXISTING ROUGH-IN DIMENSIONS, WHERE EXISTING FIXTURES ARE TO BE REPLACED, PROVIDE NEW ROUGH-INS AS REQUIRED.
- COORDINATE WITH AND REFER TO ARCHITECTURAL DOCUMENTS FOR ALL DEMOLITION WORK TO BE DONE. REMOVE ALL DOMESTIC WATER LINES NOT BEING RE-USED AND CAP AT ACTIVE MAIN. NO DEAD ENDS ARE ALLOWED.

PLUMBING SPECIFICATIONS

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL CODES, LAWS, RULES, AND REGULATIONS OF ALL NATIONAL, COUNTY, STATE, AND LOCAL AUTHORITIES HAVING JURISDICTION OVER THE PREMISES. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, THE 2018 INTERNATIONAL PLUMBING CODE, THE 2018 INTERNATIONAL BUILDING CODE, THE 2018 INTERNATIONAL ENERGY CONSERVATION CODE, AND THE 2017 NATIONAL ELECTRICAL CODE, ALL WITH LOCAL AMENDMENTS
2. BEFORE BEGINNING WORK AND PRIOR TO PLACING ORDERS, SUBMIT ELECTRONIC COPIES OF SHOP DRAWINGS AND/OR LITERATURE IN PDF FORMAT ON ALL EQUIPMENT, FIXTURES, PIPING, PIPING SPECIALTIES, AND INSULATION TO BE FURNISHED. BOOKMARK THE PDF FOR EACH SECTION.
3. GUARANTEE WORK TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE AS DETERMINED BY THE ARCHITECT. IF IT IS LONGER, THE GUARANTEE PERIOD SPECIFIED BY THE ARCHITECT SHALL TAKE PRECEDENCE. ANY MATERIAL, EQUIPMENT, OR WORKMANSHIP WHICH PROVES DEFECTIVE WITHIN THE GUARANTEE PERIOD SHALL BE PROMPTLY REPAIRED OR REPLACED AT NO COST TO THE OWNER. PROVIDE NOTARIZED COPIES OF THE GUARANTEE WITH THE O&M MANUALS.
4. FURNISH FIVE HARD COPIES OF OPERATING AND MAINTENANCE MANUALS. MANUALS SHALL BE LOOSE-LEAF 8-1/2" x 11" FORMAT, BOUND IN THREE-RING BINDERS WITH IDENTIFYING TABS SEPARATING SECTIONS. O&M MANUALS SHALL ALSO BE SUBMITTED IN PDF FORMAT WITH BOOKMARKED SECTIONS AND SAVED ON A USB DRIVE. THE USB DRIVE SHALL BE SUBMITTED TO THE OWNER WITH THE HARD COPIES. EACH O&M MANUAL SHALL CONTAIN MANUFACTURER'S SPARE PARTS LIST, CARE, OPERATION, AND INSTALLATION INSTRUCTIONS. PROVIDE A PREVENTATIVE MAINTENANCE SCHEDULE IDENTIFYING DAILY, WEEKLY, MONTHLY AND SEASONAL MAINTENANCE PROCEDURES AS REQUIRED. CONTRACTOR SHALL PROVIDE THIS SCHEDULE IF NOT GIVEN BY THE MANUFACTURER. PROVIDE A LIST OF SUGGESTED SUPPLIERS WITH NAMES, ADDRESSES, AND PHONE NUMBERS FOR EACH PRODUCT OR PRODUCT GROUP. O&M MANUALS SHALL BE SUBMITTED IN PDF FORMAT TO THE ARCHITECT FOR ENGINEER'S REVIEW BEFORE THE HARD COPIES AND USB DRIVE ARE SUBMITTED TO THE OWNER.
5. MAINTAIN A CLEAN, UNDAMAGED SET OF BLUELINE OR BLACKLINE CONTRACT DRAWINGS ON SITE. RECORD ALL CHANGES FROM CONTRACT DRAWINGS INCLUDING "FOUND" CONDITIONS, ADDENDA, OR OTHER INSTRUCTIONS ISSUED BY THE ARCHITECT AND SUBMIT TO ARCHITECT AS "RECORD DRAWINGS" AT CLOSE OF PROJECT.
6. THE BUILDING'S VENT AND SANITARY WASTE PIPING TO A POINT FIVE FEET OUTSIDE THE BUILDING SHALL BE SOLID CORE SCHEDULE 40 PVC DWV OR SOLID CORE ABS DWV PLASTIC PIPE. JOINTS IN PLASTIC PIPE SHALL BE MADE WITH SOLVENT AND CEMENT PER MANUFACTURER'S RECOMMENDATIONS.
7. ABOVE GROUND DOMESTIC WATER PIPING SHALL BE TYPE L SEAMLESS HARD DRAWN COPPER TUBING WITH CAST BRASS OR WROUGHT COPPER FITTINGS. UNDERGROUND DOMESTIC WATER PIPING SHALL BE TYPE K COPPER, SOFT ANNEALED, WITHOUT JOINTS WHEN POSSIBLE. JOINTS IN COPPER WATER PIPING 2" AND SMALLER ABOVE GRADE SHALL BE SOLDERED WITH ENGELHARD "SILVABRITE 100", 100% LEAD FREE OR OTHER NON-LEAD SOLDER, MINIMUM 4,000 PSI TENSILE STRENGTH USING NOKORODE SOLDER PASTE APPLIED WITH A BRUSH TO BOTH THE PIPE AND THE INSIDE OF THE FITTING SOCKET. NO ACID CORE SOLDER NOR FLUX CONTAINING ACID SHALL BE USED. PIPE SHALL BE CUT SQUARE AND REAMED. THE PARTS OF THE PIPE AND FITTINGS TO BE SOLDERED SHALL BE THOROUGHLY CLEANED WITH SAND CLOTH BEFORE APPLYING FLUX. JOINTS IN COPPER PIPING 2-1/2" AND LARGER AND ALL SIZES BELOW GRADE SHALL BE BRAZED USING A BRAZING COMPOUND WITH A MINIMUM OF 15% SILVER.
8. ALL BREATHING AIR PIPING SHALL BE ASTM B-819 TYPE L HARD DRAWN SEAMLESS MEDICAL GAS COPPER TUBING, IDENTIFIED BY THE MARKINGS "BREATHING AIR" IN BLUE. FITTINGS SHALL BE WROUGHT COPPER, BRASS OR BRONZE DESIGNED EXPRESSLY FOR BRAZED CONNECTION, COMPLIANT WITH ANSI B16.22. PIPE (TUBE), FITTINGS, VALVES, AND OTHER COMPONENTS SHALL BE SPECIALLY CLEANED FOR OXYGEN SERVICE IN A FACILITY EQUIPPED TO CLEAN, RINSE, AND PURGE THE MATERIAL IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 99 SECTION 5.1.10.1.1 AND RECEIVED ON JOB SITE CLEANED AND CAPPED. ON SITE CLEANING OF THE INTERIOR SURFACES OF TUBES, VALVES, FITTINGS, AND OTHER COMPONENTS IS NOT ALLOWED. BRAZING ALLOY SHALL BE BCUP-5 BRAZING ALLOY OR EQUIVALENT ALLOY WITH AT LEAST 1000 DEGREE F MELTING POINT.
7. COMPRESSED AIR PIPING SHALL BE TYPE L SEAMLESS HARD DRAWN COPPER TUBING WITH CAST BRASS OR WROUGHT COPPER FITTINGS. JOINTS IN COMPRESSED AIR PIPING 2" AND SMALLER ABOVE GRADE SHALL BE SOLDERED WITH ENGELHARD "SILVABRITE 100", 100% LEAD FREE OR OTHER NON-LEAD SOLDER, MINIMUM 4,000 PSI TENSILE STRENGTH USING NOKORODE SOLDER PASTE APPLIED WITH A BRUSH TO BOTH THE PIPE AND THE INSIDE OF THE FITTING SOCKET. NO ACID CORE SOLDER NOR FLUX CONTAINING ACID SHALL BE USED. PIPE SHALL BE CUT SQUARE AND REAMED. THE PARTS OF THE PIPE AND FITTINGS TO BE SOLDERED SHALL BE THOROUGHLY CLEANED WITH SAND CLOTH BEFORE APPLYING FLUX.
8. ISOLATION VALVES (SOV'S) SHALL BE 1/4 TURN BALL VALVES.
9. ABOVE GROUND DOMESTIC HOT WATER PIPING UP TO 1-1/4" SHALL BE INSULATED WITH 1" FIBERGLASS INSULATION. ABOVE GROUND DOMESTIC HOT WATER PIPING 1-1/2" AND GREATER SHALL BE INSULATED WITH 1-1/2" FIBER GLASS INSULATION.
10. FIBERGLASS PIPE INSULATION SHALL HAVE A MAXIMUM 0.24 BTU-IN/(HR-SQFT-^F) THERMAL CONDUCTIVITY 'K' VALUE AT 100^F MEAN RATING TEMPERATURE.
11. PROVIDE COILED PLASTIC PIPE MARKERS FOR PIPE IDENTIFICATION OF ALL EXPOSED PIPING OR PIPING ABOVE ACCESSIBLE CEILINGS. MARKERS USED ON OUTDOOR PIPING SHALL BE APPROVED FOR OUTDOOR USE.
12. ALL WASTE, VENT, AND WATER PIPING SHALL BE TESTED PER INTERNATIONAL PLUMBING CODE (IPC) BEFORE BEING CONCEALED IN ANY WAY. ALL JOINTS SHALL BE MADE DRIPTIGHT BEFORE BEING CONCEALED. DOMESTIC WATER PIPING SHALL BE TESTED AT 1-1/2 TIMES WORKING PRESSURE OR 100 PSIG, WHICHEVER IS GREATER, FOR AT LEAST 15 MINUTES. TEST ON BUILDING DRAIN AND VENT PIPING SHALL BE MADE WITH HYDROSTATIC PRESSURE TO MINIMUM 10'-0" HEAD FOR AT LEAST 15 MINUTES. FINAL TEST OF THE COMPLETE DRAIN AND VENT SYSTEM PER SECTION 312.4 OF THE IPC SHALL BE PERFORMED AT FINAL ACCEPTANCE.
13. WHERE PIPES PASS THROUGH FLOORS (EXCEPT SLAB ON GRADE) OR INTERIOR MASONRY OR CONCRETE WALLS, PIPE SLEEVES SHALL BE INSTALLED. PIPE SLEEVES SHALL BE SCHEDULE 40 STEEL PIPE FOR ALL PIPES PASSING THROUGH FIRE RATED FLOORS OR WALLS. SLEEVES FOR NON-RATED WALLS SHALL BE PVC SCHEDULE 40 PIPE OR 18 GAUGE SHEET METAL. SLEEVES FOR UNCOVERED PIPE SHALL BE TWO PIPE SIZES LARGER THAN THE MAIN. SLEEVES FOR INSULATED MAINS SHALL BE OF SUFFICIENT SIZE TO PASS THE COVERING WITH A MINIMUM 1/4" CLEARANCE. SLEEVES THROUGH CONCRETE WALLS OR FLOORS SHALL BE INSTALLED WITH MINIMUM 1" CLEARANCE TO BE PACKED & SEALED. SLEEVES THROUGH FLOORS SHALL EXTEND A MINIMUM OF TWO INCHES ABOVE THE FINISHED FLOOR. SLEEVES THROUGH WALLS SHALL BE ONE CONTINUOUS PIECE AND SHALL EXTEND FROM FINISHED SURFACE TO FINISHED SURFACE. THE OUTER SURFACE OF THE SLEEVE SHALL BE FIXED TO THE PARTITION IT PENETRATES WITH POUR ROCK, MORTAR, OR ETC. SLEEVE SHALL NOT BE USED TO SUPPORT PIPES AS IT WILL TRANSMIT VIBRATION AND SOUND TO STRUCTURE. COPPER PIPE PASSING THROUGH A STEEL SLEEVE SHALL BE PROTECTED WITH POLYETHYLENE TAPE OR OTHER APPROVED DIELECTRIC MATERIALS.
14. FOR PIPE PENETRATING FIRE-RESISTANCE-RATED ASSEMBLIES, THE INTERNAL SURFACE OF THE SLEEVE SHALL BE SEALED WITH A UL 2079 APPROVED FIRESTOPPING MATERIAL. SEALANT SHALL BE TESTED PER ASTM E 1399. EQUIVALENT TO BIO FIRESHIELD BIOSTOP 500 PLUS.
15. PERFORM STERILIZATION OF THE DOMESTIC WATER SYSTEMS WITH 50 PPM CHLORINE AT EACH VALVED OUTLET HELD FOR TWENTY-FOUR HOURS WITH TESTS EVERY EIGHT HOURS OR 200 PPM AND ALLOWED TO STAND FOR 3 HOURS. THEN FLUSH ALL OUTLETS TO 0.2 PPM. FURNISH ALL EQUIPMENT AND CHEMICALS REQUIRED. PROVIDE APPROPRIATE TAGS ON ALL OUTLETS DURING TESTING TO PREVENT ACCIDENTAL CONSUMPTION OR DRAINING OF THE SYSTEM. CERTIFY IN WRITING, BY THE TESTING COMPANY, THAT THE WATER LINES HAVE BEEN STERILIZED AND THAT APPROVAL OF THE INSTALLATION WAS OBTAINED FROM THE AUTHORITIES HAVING JURISDICTION OVER THE WORK. GIVE ORIGINAL TO OWNER AND INCLUDE ONE COPY WITH EACH O&M MANUAL.

5 ENTIRE SHEET

1 PLUMBING - SPECIFICATIONS
SCALE N.T.S.

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Drawn by: MW
Checked by: CM
Project Number: 22350

Registered Professional Engineer (Mechanical) CERTIFICATE NO. 42007 CLEMENT M. MIKULICH STATE OF ARIZONA U.S.A.
Expires 3/31/2026

CS CLEANERS

2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

5	TENANT COORDINATIONS 10/9/24

DATE: 1/31/23
ISSUED FOR: PERMIT

SHEET: P-02

MECHANICAL EQUIPMENT					(in)										
Purchase by CS or GC	Equipment	Location	Function	Notes	L	W	H	Placement	Power	phase	volts	amps	mocp	Gas	Spare?
COLUMN CLEAN AREA															
CS	Column Rinse Basin	Cleaning Room	Rinse Column after Emptying	TBD custom build	42.0	42.0	24.0	ground level							
CS purchased and onsite	Sink	Cleaning Room	Secondary Rinse	drain 1.5" IPS. Hot/cold required	86.0	42.0	36.0	above ground level							
CS	IBC (MOCVD)	Cleaning Room	MOCVD Waste Water	haul away.				ground level							
CS	IBC (All Other)	Cleaning Room	Waste Water	haul away				ground level							
CS	LV9		HOV (Hand operated valve)						1.5 hp	1	115				yes
CS	LV8		HOV						1.5 hp	1	115				yes
CS	LV10		HOV												
GC	CV5		CV (check valve)												
CS	P1		Diaphram pump	Transfer Waste water from chemical mixing tank and Rinse containment to IBC, Air operated	19.0	26.0		ground level	20-120 psi						
GC	PV1		Hand operated supply valve												
GC	R2		Regulator for air supply P1												
GC	LV1		HOV for sink												
GC	LV2		HOV for sink												
GC	CV1		Check valve wash basin												
GC	CV2		Check valve sink												
GC	CV4		Check valve copper sulfate tank												
GC	LV4		Hand operated copper sulfate drain valve												
GC	PV4		Hand operated copper sulfate mixer valve												
GC	LV7		Water supply copper sulfate tank												
GC	R1		Regulator air supply for P2 and P3												
GC	PV2		HOV pneumatic supply P2												
GC	PV3		HOV pneumatic supply P3												
GC	P2		Air operated diaphram pump	Copper sulfate transfer pump to funnel											
GC	P3		Air operated diaphram pump	Copper sulfate transfer pump from funnel											
GC	LV5		HOV												
GC	LV6		HOV												
CS	Camfil filter housing		Inline Partical filter with CP1000 exhaust	See Danbury for model info											
Built and onsite	**PURGE PANEL to be built by CS employees.**														
CS	N2 Isolation Valve	material xf	On/Off N2 supply	hand operated ball valve				wall mount							
CS	AR Isolation Valve	material xf	On/Off Air Supply	hand operated ball valve				wall mount							
CS	N2 Pressure Regulator	material xf	Regulate N2 pressure to safe value	regulator				wall mount							
CS	AR Presure Regulator	material xf	Regulate Air pressure to safe value	regulator				wall mount							
CS	N2 Rotameter	material xf	Control N2 flow	hand adjustable flowmeter				wall mount							
CS	AR Rotameter	material xf	Control Air Flow	hand adjustable flowmeter				wall mount							
	To be installed by Mechanical technician with process piping TBD.														
CS	pressure relief valve	material xf	relieve overpressure for Ar/N2 purge pane	pressure relief											
			CS to buy GC to install	CS to buy GC to install											
CS	chemical mixing tank	Cleaning Room	mix CuSO4 solution	Polycorbonate Tank Identical to Danbury				ground level						Air for mixing & ventilation	

LIFE SAFETY					(in)										
ITEM	Equipment	Location	Function	Notes	L	W	H	Placement	Power						
CS built and onsite	Hazardous and Oxygen detector Panels	Column clean/Waste storage/PCS area	detect hazerdous gas	4 sampling points: acids/hydrides/Halogen and O2 : Locate maximum 30 ft from sampling point	6.5	13.0	7.2	wall mount	24 VDC Each						
CS	O2 Sensor	Column clean/Waste storage/PCS area	monitor 02 levels	SEE Above integrated into Gas detection box for sampling. sampling unitsPureair TX-1100DRA	5.5	10.5	3.3	wall mount	24 VDC						
GC	Eye Wash + shower	Cleaning clean passthrough and one in PCS area Room B	flush hazerdous substance	Needs H20				ground level	no		h20 supply				
GC	Generator	Outside area	power life safety and CuSO4 pump in the event of a power outage	KOHLER 48-50KW Propane Generator					propane						
CS	UPS power supply	IT closet	Utilized for air compressor for supplied Breathing Air	Other Item may be added if needed											

UTILITIES					(in)										
ITEM	Equipment	Location	Function	Notes	L	W	H	Placement	Value						
			CS to buy GC to install	CS to buy GC to install											
CS	Breathing Air	material xf and cleaning	SCBA Air supply	Hoses on Ceiling Track Separate drop					90 psi						
CS	Nitrogen cylinder	clean area next to pumps	Column Purging	Location Column Clean passthrough room: Procedure to verify enough N2 before commencing purging					90 psi						spare
CS	Argon Cylinder	clean area next to pumps	Column Purging	Location Column Clean passthrough room: Procedure to verify enough N2 before commencing purging					90 psi						spare
CS	120 VAC	Cleaning room, Columns pass through, Storage room	General Utility					wall mount	120 VAC						

ANCILLARY EQUIPMENT					(in)										
ITEM	Equipment	Location	Function	Notes	L	W	H	Placement	Value						
CS purchased and onsite	Drum Lifter	cleaning room	mobile					ground level							
CS	Dust evacuation arm	material XF	Direct ventilation to gas/dust source	ventilate dust from canister granulate pouring driect connet to CP1000 exhaust				CS to buy GC to install							
CS in CT will ship	Stainless steel containment pallet	cleaning room	catch drip leaks at column disconnect of wet purge	Built by Barzetti in Danbury											
CS	Fire Extinguishers	material XF	Fire Response												
CS	Breathing airline reels	cleaning room	Breathning air supply lines	Qty x 3 totals $ see from Grainger											

PCS Area															
ITEM	Equipment	Location	Function	Notes	L	W	H	Placement	Power	phase	volts	amps	mocp	Gas	Spare?
Inactive			CS to buy GC to install	CS to buy GC to install											
CS	Scissor lift tables x	oom C and B							120Vac						
CS	Water blast booth	Room C	Parts wash with NOX off gassir	Needs H2O											
CS	CP 200 x 2	Room C	Parts wash exhaust	Exhaust of NOX off gassing											
CS	Wash basin	Room D	Part wash	Nitric Acid Dip solution TBD											
CS	Parts washing tabl	Room D	Part wash	H2O needed Hot and Cold											
CS	Oven	Room D	Parts drying						230 Vac						

1 EQUIPMENT LIST

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Drawn by: MW
Checked by: CM
Project Number: 22350

Registered Professional Engineer (Mechanical) CERTIFICATE NO. 42007 CLEMENT M. MIKULICH ARIZONA U.S.A. Expires 3/31/2026

CS CLEAN

2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

5	TENANT COORDINATIONS 10/9/24

DATE: 1/31/23 ISSUED FOR: PERMIT

SHEET: P-03

ENTIRE SHEET

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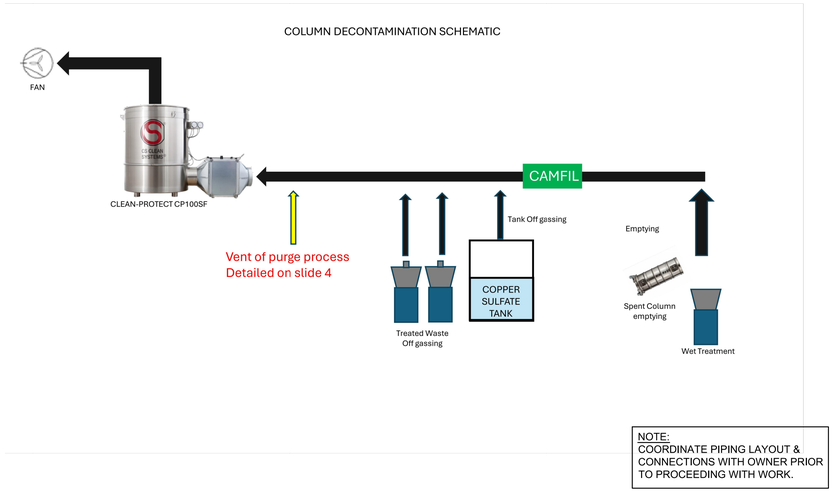
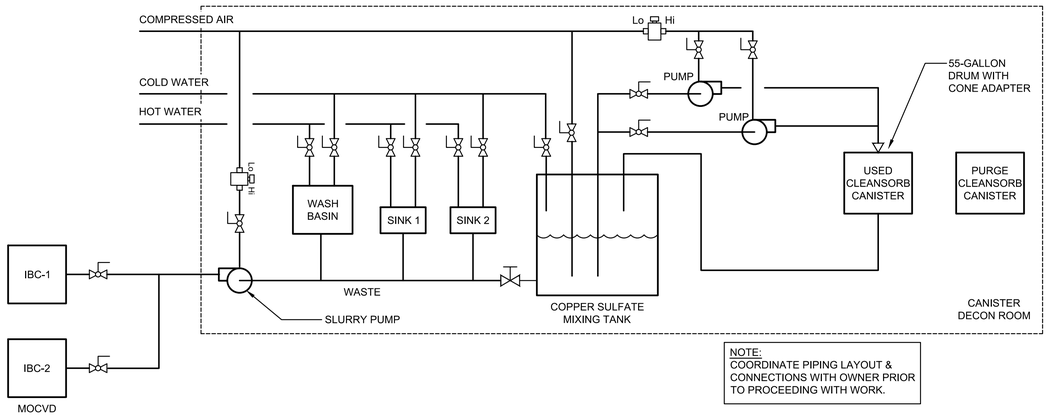


USED CLEANSORB CANISTER DECONTAMINATION PROCESS SCHEMATIC

SCALE: N.T.S.



WET TREATMENT PROCESS SCHEMATIC

SCALE: N.T.S.

1 PROCESS SCHEMATIC

SCALE N.T.S.

LEGEND

- MANUAL VALVE
- CHECK VALVE
- RELIEF VALVE
- ADJUSTABLE PRESSURE REGULATOR
- FLOW METER
- 1/4 TURN BALL VALVE

CS CLEAN SOLUTIONS PROCESS NARRATIVE

THE FOLLOWING IS A NARRATIVE DESCRIBING THE CS CLEAN SOLUTIONS PROCESS.

THE CS CLEAN FACILITY IN PHOENIX AZ IS A HAZARDOUS WASTE 10-DAY TRANSFER FACILITY THAT SERVES AS AN INTERMEDIATE POINT IN THE MANAGEMENT OF HAZARDOUS WASTE. CS IS ALSO IN POSSESSION OF AN AIR PERMIT TO ENABLE PURGING OF CUSTOMER PRODUCTS BEFORE OR AS PART OF WASTE MANAGEMENT.

THE TERM "10-DAY" REFERS TO THE MAXIMUM AMOUNT OF TIME HAZARDOUS WASTE CAN BE STORED AT SUCH A FACILITY BEFORE IT MUST BE TRANSFERRED TO ANOTHER DESIGNATED FACILITY OR TREATMENT/DISPOSAL SITE. HERE'S A BREAKDOWN OF THE KEY COMPONENTS OF THIS DEFINITION:

HAZARDOUS WASTE: HAZARDOUS WASTE IS WASTE MATERIAL THAT POSES A SUBSTANTIAL THREAT TO HUMAN HEALTH AND THE ENVIRONMENT DUE TO ITS TOXIC, FLAMMABLE, CORROSIVE, OR REACTIVE PROPERTIES. THIS CATEGORY OF WASTE IS REGULATED BY ENVIRONMENTAL AGENCIES TO ENSURE SAFE HANDLING, TRANSPORTATION, TREATMENT, AND DISPOSAL.

TRANSFER FACILITY: A TRANSFER FACILITY IS A LOCATION WHERE HAZARDOUS WASTE IS TEMPORARILY STORED AND CONSOLIDATED BEFORE BEING TRANSPORTED TO ITS FINAL TREATMENT, RECYCLING, OR DISPOSAL DESTINATION. THESE FACILITIES HELP STREAMLINE THE WASTE MANAGEMENT PROCESS, REDUCE THE NUMBER OF INDIVIDUAL WASTE SHIPMENTS, AND IMPROVE EFFICIENCY.

10-DAY LIMIT: THE "10-DAY" REFERENCE SIGNIFIES THAT HAZARDOUS WASTE CAN ONLY BE STORED AT THIS TYPE OF FACILITY FOR A MAXIMUM OF 10 DAYS BEFORE IT MUST BE TRANSFERRED TO ANOTHER FACILITY OR SITE THAT IS AUTHORIZED TO MANAGE HAZARDOUS WASTE. THIS TIME LIMIT IS CRUCIAL TO PREVENT LONG-TERM STORAGE AT TRANSFER FACILITIES AND ENSURE THAT THE WASTE CONTINUES ITS JOURNEY TOWARD PROPER TREATMENT AND DISPOSAL.

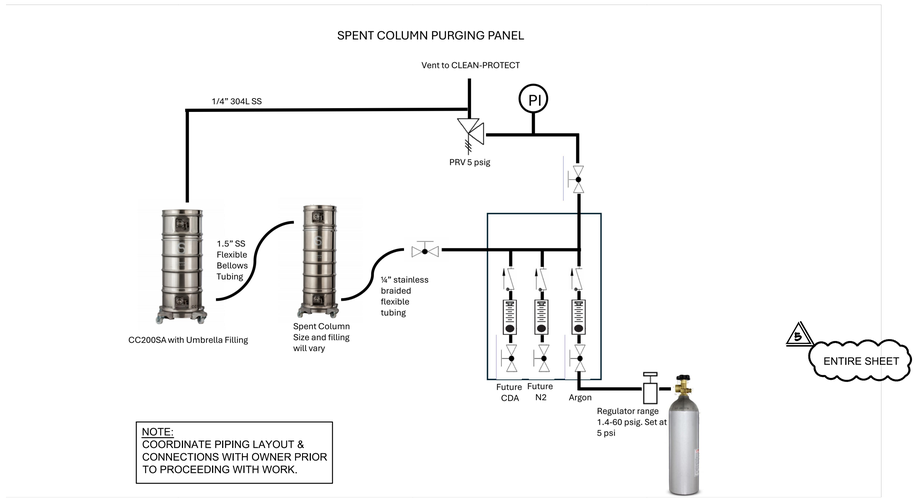
IN ESSENCE, A HAZARDOUS WASTE 10-DAY TRANSFER FACILITY ACTS AS A TEMPORARY HUB IN THE HAZARDOUS WASTE MANAGEMENT SYSTEM, ALLOWING FOR EFFICIENT AND SAFE CONSOLIDATION AND TRANSFER OF HAZARDOUS WASTE MATERIALS WHILE ADHERING TO STRICT TIME CONSTRAINTS TO PREVENT PROLONGED STORAGE AND MINIMIZE ENVIRONMENTAL RISKS. IT PLAYS A VITAL ROLE IN THE BROADER FRAMEWORK OF HAZARDOUS WASTE MANAGEMENT AND REGULATORY COMPLIANCE.

THE PRIMARY PURPOSE OF AN AIR PERMIT IS TO ENSURE THAT AIR EMISSIONS FROM THE PERMITTED SOURCE DO NOT EXCEED ESTABLISHED AIR QUALITY STANDARDS, AND THEY COMPLY WITH ENVIRONMENTAL REGULATIONS TO PROTECT PUBLIC HEALTH AND THE ENVIRONMENT. KEY ELEMENTS OF AN AIR PERMIT INCLUDE: EMISSION LIMITS: AN AIR PERMIT SPECIFIES THE MAXIMUM ALLOWABLE QUANTITIES AND TYPES OF POLLUTANTS THAT CAN BE RELEASED INTO THE ATMOSPHERE FROM THE PERMITTED SOURCE. THESE LIMITS ARE SET TO PROTECT AIR QUALITY AND PUBLIC HEALTH. OPERATING CONDITIONS: AIR PERMITS OFTEN INCLUDE SPECIFIC OPERATING CONDITIONS, SUCH AS EMISSION CONTROL TECHNOLOGIES AND MONITORING REQUIREMENTS, THAT THE PERMIT HOLDER MUST ADHERE TO IN ORDER TO REMAIN IN COMPLIANCE WITH THE PERMIT.

COMPLIANCE MONITORING: PERMITS TYPICALLY REQUIRE REGULAR MONITORING AND REPORTING OF EMISSIONS DATA TO ENSURE THAT THE FACILITY IS OPERATING WITHIN THE ESTABLISHED LIMITS. REGULATORY AGENCIES MAY CONDUCT INSPECTIONS TO VERIFY COMPLIANCE.
RECORDKEEPING: THE PERMIT HOLDER IS USUALLY REQUIRED TO MAINTAIN DETAILED RECORDS OF EMISSIONS, MAINTENANCE ACTIVITIES, AND OTHER RELEVANT DATA TO DEMONSTRATE COMPLIANCE.

PERMIT DURATION: AIR PERMITS CAN BE ISSUED FOR DIFFERENT DURATIONS, RANGING FROM A FEW YEARS TO DECADES, DEPENDING ON THE NATURE OF THE FACILITY OR OPERATION AND REGULATORY REQUIREMENTS. RENEWAL OR MODIFICATION OF PERMITS MAY BE NECESSARY AS CIRCUMSTANCES CHANGE.
REGULATORY AUTHORITY: AIR PERMITS ARE ISSUED AND ENFORCED BY REGULATORY AGENCIES RESPONSIBLE FOR AIR QUALITY, SUCH AS STATE ENVIRONMENTAL AGENCIES OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) IN THE UNITED STATES.

AIR PERMITS ARE ESSENTIAL TOOLS FOR ENVIRONMENTAL PROTECTION AND ARE USED TO CONTROL AND MINIMIZE THE IMPACT OF INDUSTRIAL AND COMMERCIAL ACTIVITIES ON AIR QUALITY. THESE PERMITS HELP ENSURE THAT EMISSIONS OF POLLUTANTS, INCLUDING GREENHOUSE GASES, PARTICULATE MATTER, VOLATILE ORGANIC COMPOUNDS, AND HAZARDOUS AIR POLLUTANTS, DO NOT EXCEED ESTABLISHED LIMITS AND DO NOT HARM HUMAN HEALTH OR THE ENVIRONMENT. VIOLATING THE CONDITIONS OF AN AIR PERMIT CAN LEAD TO REGULATORY ENFORCEMENT ACTIONS, FINES, OR OTHER PENALTIES.



N2, ARGON, AND COMPRESSED AIR PURGE SCHEMATIC

SCALE: N.T.S.

5 ENTIRE SHEET

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CS CLEAN

2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

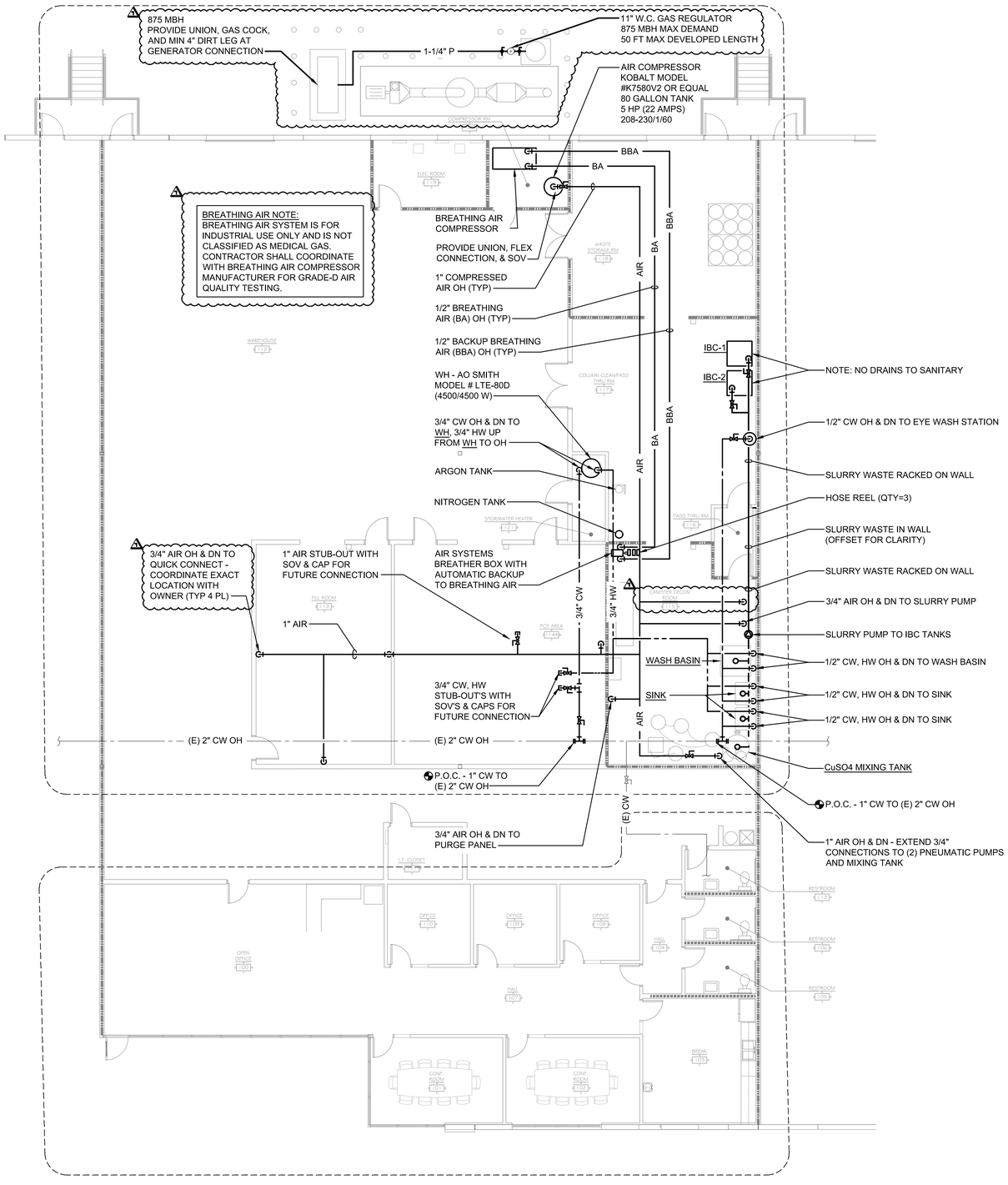
REVISIONS:

3	REMOVED CU SULFATE PROCESS
4	ADDED NARRATIVE
5	TENANT COORDINATIONS 10/9/24

DATE: 1/31/23
ISSUED FOR: PERMIT

SHEET: P-100

DESIGNATED SCOPE



PREVIOUSLY COMPLETED SCOPE

1 PLUMBING PLAN - FIRST FLOOR

SCALE 1/8"=1'-0"

ENTIRE SHEET

CM Associates Engineers
MECHANICAL ■ ELECTRICAL
FIRE PROTECTION
706 E. BELL RD. SUITE 215
PHOENIX, ARIZONA, 85022
INFO@CMMEP.COM
(602) 899-2512
WWW.CMMEP.COM
PROJECT No. 24102

14583 W. Windsor Ave.
Goodyear, AZ 85395

Phone 623-535-5526
Fax 623-535-5546

Project Manager: MW
Drawn by: MW
Checked by: CM
Project Number: 22350

Registered Professional Engineer (Mechanical) CERTIFICATE NO. 42007 CLEMENT M. MIKULICH DATE REGISTERED 12/31/2004 ARIZONA U.S.A.
Expires 3/31/2026

CS CLEANERS CLEAN

2453 W PARKSIDE LN PHOENIX, AZ 85203

SUITE 150 ±11,318 USF

REVISIONS:

6	REMOVED 4" SANITARY LINE
5	ADDED PVC LINE
4	MOVED EYEWASH STATION
3	CHANGES PER CITY COMMENT
2	TENANT COORDINATIONS 10/9/24
1	TENANT COORDINATIONS 10/9/24

DATE: 1/31/23
ISSUED FOR: PERMIT

SHEET: P-101

APPENDIX D.1.7
Inspection Logs

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

DAILY INSPECTION LOG **WASTE STORAGE AREA** **CS CLEAN SOLUTIONS, INC.** **2453 WEST PARKSIDE LANE, SUITE 150** **PHOENIX, AZ**			
Inspection Item	**Types of Problems**	**Problem? Yes/No**	**Date and Type of Repair Performed (if applicable)**
Building Observations			
No evidence of spills/leaks	Accumulated liquid on floor or secondary containment, wet spots		
Floor, berms, and other surfaces are in acceptable condition	Cracks, erosion, uneven settlement		
Warning signs posted and in acceptable condition	Blocked, damaged, missing, deteriorated		
Housekeeping practices acceptable	Obstruction, aesthetics, unauthorized materials storage		
Material Storage Observations			
Containers and bulk containers in acceptable condition	Cracks, dents, corrosion, signs of leaks or spills		
Placement and storage acceptable	Drum aisle spacing: 30" (minimum), height of stack: 1 high maximum		
Containers, bulk containers, and columns closed and secured	Open lids or bungs		
Labeling of containers and storage bulk containers	Improper identification, missing labels, accumulation date missing		
Storage capacity is not exceeded	$\geq$10 55-gallon containers, $\geq$10 spent columns, >2 275-gallon totes		
Wastewater bulk container is provided with start accumulation date	Missing label, date		

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

DAILY INSPECTION LOG **WASTE STORAGE AREA** **CS CLEAN SOLUTIONS, INC.** **2453 WEST PARKSIDE LANE, SUITE 150** **PHOENIX, AZ**			
Inspection Item	**Types of Problems**	**Problem? Yes/No**	**Date and Type of Repair Performed (if applicable)**
Waste material holding time within maximum limit	1-year maximum handling time for spent granulate material from delivery to disposal (applies only to off-site, non-reclaimed waste storage). 90-days for onsite generated wastes.		
Secondary Containment	Secondary containment present and capable of supporting 110% of largest container		
Compatible Waste	Incompatible waste is stored so that spill will not comingle		
Wastewater generation log is available and in-use	Missing generation log, not in use		
Wastewater storage duration has not exceeded permit limitations	Limitations based on hazardous waste generator status (<90 days)		

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

WEEKLY INSPECTION LOG **PREPARATION AREA** **CS CLEAN SOLUTIONS, INC.** **2453 WEST PARKSIDE LANE, SUITE 150** **PHOENIX, AZ**			
Inspection Item	**Types of Problems**	**Problem? Yes/No**	**Date and Type of Repair Performed (if applicable)**
Building Observations			
No evidence of spills/leaks	Accumulated liquid on floor or in trench, wet spots		
Floor, berms, and other surfaces are in acceptable condition	Cracks, erosion, uneven settlement		
Warning signs posted and in acceptable condition	Blocked, damaged, missing, deteriorated		
Aisle Space	30 inches of aisle space maintained		
Housekeeping practices acceptable	Obstruction, aesthetics, unauthorized materials storage		
Material/Equipment Observations			
Fill and drain valves secured and in good condition	Leaks, deterioration		
Wastewater transfer piping and pumps in good condition	Leaks, dents, corrosion, deterioration		
Containers, bulk containers, and columns closed and secured (in-use)	Open lids or bungs		
Storage capacity is not exceeded	No storage of spent columns or waste		

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

WEEKLY INSPECTION LOG **WASTE MATERIAL TRANSFER AREA** **CS CLEAN SOLUTIONS, INC.** **2453 WEST PARKSIDE LANE, SUITE 150** **PHOENIX, AZ**			
Inspection Item	**Types of Problems**	**Problem? Yes/No**	**Date and Type of Repair Performed (if applicable)**
Building Observations			
No evidence of spills/leaks	Accumulated liquid on floor or in trench, wet spots		
Floor, berms, and other surfaces are in acceptable condition	Cracks, erosion, uneven settlement		
Warning signs posted and in acceptable condition	Blocked, damaged, missing, deteriorated		
Aisle space	30 inches of aisle space maintained		
Housekeeping practices acceptable	Obstruction, aesthetics, unauthorized materials storage		
Material/Equipment Observations			
Tanks and bulk containers in good condition	Leaks, dents, corrosion, deterioration		
Fill and drain valves secured and in good condition	Leaks, deterioration		
Wastewater transfer piping in good condition	Leaks, dents, corrosion, deterioration		
Containers, bulk containers, and columns closed and secured (in-use)	Open lids or bungs		
Storage capacity is not exceeded	No storage of spent columns, only satellite storage area		

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

WEEKLY INSPECTION LOG **SHIPPING AND RECEIVING AREA** **CS CLEAN SOLUTIONS, INC.** **2453 WEST PARKSIDE LANE, SUITE 150** **PHOENIX, AZ**			
Inspection Item	**Types of Problems**	**Problem? Yes/No**	**Date and Type of Repair Performed (if applicable)**
Building Observations			
No evidence of spills/leaks	Accumulated liquid on floor or in trench, wet spots		
Floor, berms, and other surfaces are in acceptable condition	Cracks, erosion, uneven settlement		
Warning signs posted and in acceptable condition	Blocked, damaged, missing, deteriorated		
Aisle space	30 inches of aisle space maintained		
Housekeeping practices acceptable	Obstruction, aesthetics, unauthorized materials storage		
Material Storage Observations			
Shipping containers in acceptable condition	Cracks, dents, corrosion, signs of leaks or spills		
Storage capacity is not exceeded	No storage of spent columns or wastes		

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

WEEKLY INSPECTION LOG

DONNING AND DOFFING PASSTHROUGH AREA

CS CLEAN SOLUTIONS, INC.
2453 WEST PARKSIDE LANE, SUITE 150
PHOENIX, AZ

Inspection Item	Types of Problems	Problem? Yes/No	Date and Type of Repair Performed (if applicable)
Building Observations			
No evidence of spills/leaks	Accumulated liquid on floor or in trench, wet spots		
Floor, berms, and other surfaces are in acceptable condition	Cracks, erosion, uneven settlement		
Warning signs posted and in acceptable condition	Blocked, damaged, missing, deteriorated		
Aisle space	30 inches of aisle space maintained		
Housekeeping practices acceptable	Obstruction, aesthetics, unauthorized materials storage		
Material Storage Observations			
Storage capacity is not exceeded	No storage of spent columns or wastes		

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

MONTHLY INSPECTION LOG – EMERGENCY AND SAFETY SYSTEMS

WASTE MATERIAL TRANSFER ROOM,WASTE STORAGE AREA, PREPARATION AREA, AND SHIPPING AND RECEIVING AREA

CS CLEAN SOLUTIONS, INC.
2453 WEST PARKSIDE LANE, SUITE 150
PHOENIX, AZ

Inspection Item	Types of Problems	Problem? Yes/No	Date and Type of Repair Performed (location if applicable)
All fire extinguishers visible and accessible	Not properly identified, missing, not mounted securely		
All fire extinguishers fully charged	Not adequately charged		
Fire alarm system functioning properly and has been tested in the past year	Pull boxes not functioning properly, loss of water pressure or alarm signal for sprinklers		
At least 18-inch clearance provided for all sprinkler heads	Material or equipment storage issues		
Smoke alarms functioning correctly	Loss of power, blocked, damaged		
All exits marked with exit signs and illuminated	Missing signage, loss of power, damaged		
Evacuation plans posted near doors and/or common areas	Missing signage, not accurate, not sufficient size		
All doorways and hallways leading to an exit free and clear and provided illumination	Material or equipment storage issues, loss, or power, damaged		
Emergency notification equipment including telephone and/or paging system operational	Loss of power, blocked, damaged		
Emergency phone numbers posted	Missing signage, not accurate		
Emergency lights functioning correctly	Loss of power, blocked, damaged		
First aid kits visible and accessible	Not properly identified, missing, not accessible		
First aid kits stocked as required and expiration dates current	Depleted or missing inventory, expired components		

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

MONTHLY INSPECTION LOG – EMERGENCY AND SAFETY SYSTEMS

WASTE MATERIAL TRANSFER ROOM,WASTE STORAGE AREA, PREPARATION AREA, AND SHIPPING AND RECEIVING AREA

CS CLEAN SOLUTIONS, INC.
2453 WEST PARKSIDE LANE, SUITE 150
PHOENIX, AZ

Inspection Item	Types of Problems	Problem? Yes/No	Date and Type of Repair Performed (location if applicable)
Eye wash stations and safety showers inspected and functioning properly	Low water pressure, leaking, draining		
PPE readily available and in good condition	Broken, dirty, missing equipment (includes air supply system, respirators, chemical resistant clothing, eye protection, gloves)		
Spill kits readily available and include adequate materials	Missing, damaged, not accessible		
Duct flow pressure gauge operating correctly	Damaged, loss of power, faulted		
Ventilation	HEPA present and functioning, Cleanprotect operating		
Liquid level switch operating correctly	Damaged, loss of power, faulted		
Gas/O_2 Detection System calibrated and operating correctly	Expired calibration, damaged, loss of power, faulted		
Emergency Generator	Checked for operation in loss of power, maintained		
Uninterruptible Power Supply (UPS)	Checked for operation in loss of power, maintained		

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

WEEKLY INSPECTION LOG – EMERGENCY AND SAFETY SYSTEMS

WASTE MATERIAL TRANSFER ROOM,WASTE STORAGE AREA, PREPARATION AREA, AND SHIPPING AND RECEIVING AREA

CS CLEAN SOLUTIONS, INC.
2453 WEST PARKSIDE LANE, SUITE 150
PHOENIX, AZ

Inspection Item	Types of Problems	Problem? Yes/No	Date and Type of Repair Performed (location if applicable)
Eye wash stations and safety showers inspected and functioning properly	Low water pressure, leaking, draining		
PPE readily available	Includes air supply system, respirators, chemical resistant clothing, eye protection, gloves in stock		
Respirators in good condition	Respirator components (mouthpiece, supplied air systems, connections), broken or damaged, dirty.		
Chemical resistant clothing	Good condition, no holes, damage, or dirty/used equipment.		
Gloves	Good condition, no holes, damage, or dirty/used equipment.		
Eye protection	Good condition, no holes, damage, or dirty/used equipment.		

Name of Inspector: _____ **Date of Inspection:** _____

Time of Inspection: _____

MONTHLY INSPECTION LOG – SECURITY

WASTE MATERIAL TRANSFER ROOM. WASTE STORAGE AREA, PREPARATION AREA, AND SHIPPING AND RECEIVING AREA

CS CLEAN SOLUTIONS, INC.
2453 WEST PARKSIDE LANE, SUITE 150
PHOENIX, AZ

Inspection Item	Types of Problems	Yes/No	Date and Type of Repair Performed (Location if applicable)
Facility perimeter fence in acceptable condition	Damaged, deteriorated, missing		
Warning signs posted and in acceptable condition	Missing, damaged		
Building security system operating correctly	Damaged, loss of power, notifications not provided		
All doors and key card system operational	Damaged, cannot close or lock		
Lighting on interior and exterior adequate	Damaged bulbs, loss of power		

APPENDIX D.1.8

Waste Acceptance Paperwork

CS CLEAN SOLUTIONS

26 Commerce Dr
Danbury, CT 06810
(203) 797-8155

SPENT CHEMISORBENT WASTE PROFILE DATA

End User:	Application:	Date:
Revision #: 0	Author:	Contact:

The purpose of this document is to provide to the end-user a characterization of the spent Chemisorbent from a CS Exhaust Purification System. This information is be required by a Hazardous Waste Management Service provider for the proper handling and disposal of the spent or expired Chemisorbent material. The waste characterization is dependent on the process gas Treated. Therefore, this waste profile is valid only for the process data submit by the end-user on the CS Process Definition Sheet.

END USER CONTACT INFORMATION			
End User Address:		End User Contact:	
End User Contact Email:		End User Phone	

ABATEMENT SYSTEM INFORMATION			
System Model Number		System Serial Number	
Absorber Column Model		Chemisorbent Volume	
Process/Process gases		Column/Canister Serial #	

GENERATED WASTE INFORMATION			
Waste Name		Process Generating Waste	
Estimated Quantity		Type/Size	

PHYSICAL PROPERTIES			
State at 70F		Layers	
% Liquid		% Solid	
Pumpable ?		% Halogens	
BTU Content		Flash Point (F)	
Highest/Lowest PH of layer		Color	

CHEMICAL COMPOSITION			
	%		%
	%		%
	%		%
	%		%
	%		%
	%		%

METAL CONTENT					
Antimony	%	Chromium (III) Cr (D007)	%	Nickel	%
Arsenic (D004)	%	Cobalt	%	Selenium (D010)	%
Barium (D005)	%	Copper	%	Silver (D011)	%
Beryllium	%	Lead (D008)	%	Thallium	%
Cadmium	%	Mercury (D009)	%	Vanadium	%
Chromium (III) Cr (D007)	%	Molybdenum	%	Zinc	%

OTHER PROPERTIES (check X)		
<20% VOC	OSHA Carcinogen	Flammable Solid
Lab Pack -Assorted	Acutely Hazardous (P Code)	Dangerous when wet
DOT Corrosive only	CA Extremely Hazardous	Spontaneously Combustible
Oxidizer	Pesticide Containing	Pyrophoric / Air Reactive
Organic Peroxide	Reactive Cyanide	Explosive / Shock Sensitive
Polymeric Resin	Reactive Sulfide	Benzene NESHAP
Ozone Depleting	Ammonia Containing	Highly Odorous
Compressed gas	Radioactive	Dioxin Containing
Medical (infectious)	Friable Asbestos	PCB Containing
Dioxin Containing	Ozone Depleting	Non-Friable Asbestos

CS CLEAN SOLUTIONS

26 Commerce Dr
Danbury, CT 06810
(203) 797-8155

Shipping Information (TO BE DETERMINED BY GENERATOR)

Shipping Name _____

Technical n.o.s. or NON-RCRA Name _____

Hazard Class _____ UN / NA _____ PG ☐I ☐II ☐III

EPA Waste Class Code(s) _____ ☐None

CA Code _____Other State Code (s) _____ Lowest RQ Constituent _____/Pounds _____

☐ "Poison" ☐ "Poison Inhalation Hazard, Zone ☐ "Dangerous When Wet" ☐Ozone Depleting Label ☐DOT-E

Primary Label _____ Subsidiary Label _____ Emergency Response Guidebook# _____

Special Handling Instructions _____

End of Document

CS CLEAN SOLUTIONS

Customer Declaration upon Return of used CLEANSORB Modules/Columns for Regeneration and Refill

Please contact your local CS representative or see www.csclean.com.

Company/ End User:		
Contact:		
Address:		
Phone:	Fax:	E-mail:

Cleansorb System Model:	**S/N System:**
Module/Canister 1 Type:	S/N Module/Canister:
Module/Canister 2 Type:	S/N Module/Canister:
In operation from:	to:
Endpoint sensor in system? Yes ❒ No ❒	Manufacturer: Type:
Endpoint sensor most recent calibration date:	

Details of processes and gases absorbed	
Type of Process:	
No pump ❒	**For Chemical Vapor Deposition Processes ONLY**
Rotary vane (oil) pump ❒	Has the absorber bed been oxidized? Yes ❒ No ❒
Dry pump ❒	Has the canister been filled with argon? Yes ❒ No ❒

What was the reason for changing the canister?		
System endpoint alarm ❒	Colour change ❒	Expiry date reached ❒
External gas detector ❒	Estimated bed capacity ❒	Abnormal conditions ❒
Is the absorber bed possibly over-saturated?	Yes ❒ No ❒	

Was the absorber canister purged prior to removal from the scrubber? Yes ❒ No ❒				
1	Purge gas:	Flowrate: [L/min]	Duration:	[min]
	Has the absorber bed been exposed to air? Yes ❒ No ❒			
2	Purge gas:	Flowrate: [L/min]	Duration:	[min]

Comments/ information/ special safety precautions necessary:

Signature: _____ Date: _____

Please fill in the form completely.

CS CLEAN SOLUTIONS

26 Commerce Dr
Danbury, CT 06810
(203) 797-8155

SPENT CHEMISORBENT WASTE PROFILE DATA

End User:		Application:	Ex. Semiconductor Exhaust Gas	Date:	May 15, 2017
Revision #: 0		Author:	John Doe	Contact:	john.doe@example.com

The purpose of this document is to provide to the end-user a characterization of the spent Chemisorbent from a CS Exhaust Purification System. This information is be required by a Hazardous Waste Management Service provider for the proper handling and disposal of the spent or expired Chemisorbent material. The waste characterization is dependent on the process gas Treated. Therefore, this waste profile is valid only for the process data submit by the end-user on the CS Process Definition Sheet.

END USER CONTACT INFORMATION

End User Address:	End User Contact:
End User Contact Email:	End User Phone

ABATEMENT SYSTEM INFORMATION

System Model Number	CS200PS Primeline	System Serial Number	
Absorber Column Model	CC200SA	Chemisorbent Volume	200L
Process/Process gases	AsH3, PH3, TMAl, TMIn, DET, TMGa, DMZn, CBr4	Column/Canister Serial #	

GENERATED WASTE INFORMATION

Waste Name	Exhaust Scrubber Granulate Waste	Process Generating Waste	Metal Organic Chemical Vapor Deposition
Estimated Quantity	200L	Type/Size	Scrubber Column/Canister

PHYSICAL PROPERTIES

State at 70F	Solid	Layers	4
% Liquid	0%	% Solid	100%
Pumpable ?	No	% Halogens	0.1-1 %
BTU Content	< 5,000 BTU	Flash Point (F)	> 200 F
Highest/Lowest PH of laye	7.1 - 12.4	Color	light blue, white, and black

CHEMICAL COMPOSITION

Copper Oxide	10-50	%	Indium Oxide	0-5	%
Silicon Oxide	5-20	%	Phosphorous (elemental)	0.1 - 5	%
Copper Arsenide	10-30	%	Gallium oxide, Aluminum Oxide	0-1	%
Copper Phosphate	0-5	%	Zinc oxide, magenisum bromide	0 - trace	%
Copper (elemental)	0-2	%	Magnesium oxide	5-15%	%
Copper Phosphide	10-30	%	Magnesium Chloride, Aluminum Chloride	0- trace	%

METAL CONTENT

Antimony	0%	Chromium (III) Cr (D007)	0%	Nickel	0%
Arsenic (D004)	0-1%	Cobalt	0%	Selenium (D010)	0%
Barium (D005)	0%	Copper	40-50%	Silver (D011)	0%
Beryllium	0%	Lead (D008)	0%	Thallium	0%
Cadmium	0%	Mercury (D009)	0%	Vanadium	0%
Chromium (III) Cr (D007)	0%	Molybdenum	0%	Zinc	0%

OTHER PROPERTIES (check X)

<20% VOC	X	OSHA Carcinogen		Flammable Solid	
Lab Pack -Assorted		Acutely Hazardous (P Code)		Dangerous when wet	
DOT Corrosive only		CA Extremely Hazardous		Spontaneously Combustible	
Oxidizer		Pesticide Containing		Pyrophoric / Air Reactive	X
Organic Peroxide		Reactive Cyanide		Explosive / Shock Sensitive	
Polymeric Resin		Reactive Sulfide		Benzene NESHAP	
Ozone Depleting		Ammonia Containing		Highly Odorous	
Compressed gas		Radioactive		Dioxin Containing	
Medical (infectious)		Friable Asbestos		PCB Containing	
Dioxin Containing		Ozone Depleting		Non-Friable Asbestos	

CS CLEAN SOLUTIONS

26 Commerce Dr
Danbury, CT 06810
(203) 797-8155

Shipping Information (TO BE DETERMINED BY GENERATOR)

Shipping Name _____

Technical n.o.s. or NON-RCRA Name _____

Hazard Class _____ UN / NA _____ PG ☐I ☐II ☐III

EPA Waste Class Code(s) _____ ☐None

CA Code _____ Other State Code (s) _____ Lowest RQ Constituent _____/Pounds _____

☐ "Poison" ☐ "Poison Inhalation Hazard, Zone ☐ "Dangerous When Wet" ☐Ozone Depleting Label ☐DOT-E

Primary Label _____ Subsidiary Label _____ Emergency Response Guidebook# _____

Special Handling Instructions _____

End of Document

Please print or type.

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number

GENERATOR

5. Generator's Name and Mailing Address

Generator's Site Address (if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number

Facility's Phone:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1.					
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name — Signature — Month — Day — Year

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit: _____

Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month — Day — Year

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month — Day — Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name — Signature — Month — Day — Year

APPENDIX D.1.9
Waste Tracking Log

CS CLEAN SOLUTIONS	Title:	**Appendix** D.1.9
		Hazardous Waste Tracking Log
	Reviewed by:	

Customer Name: _____

Waste Container Identification Number: _____

Date Received/Stored: _____ Date Shipped Off-site: _____

Receiver's Initials: _____

For Spent Granulate Waste and Wastewater Generated On-Site	
Waste Name	
Material Description	
Estimated Quantity (kg, liters)	
Waste Manifest Number	
Date Sampled (if applicable)	
Hazardous Waste Code(s)	
Other Properties	
Complete Additional Line Items for Wastewater Generated On-Site	
Generation Date	
Sample Method(s) for Waste Analysis	

Please retain a copy of the completed waste profile along with the tracking log.