

Mission Support Business Model

Aviation Corrosion Control Facilities (CCF) (Rev A)

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Subj: AVIATION CORROSION CONTROL FACILITIES (CCF) CSTO (REV A)

- Ref:
- a) Civil Engineering Manual, COMDTINST M11000.11 (series)
 - b) Shore Infrastructure – Mission Support Business Model Requirements Directive Technical Order, SILC-RDTO-36-11 29 11 00-01 (latest)
 - c) U.S. Coast Guard Safety & Environmental Health Manual, COMDTINST 5100.47 (series)
 - d) Safe Work Practice – AIRSTA Coating Applications and Removal Operations | HSWL Guidance

1. **PURPOSE.** This Configuration Standard Technical Order (CSTO) establishes standards for Corrosion Control Facilities for aviation maintenance facilities. The information in this CSTO applies to all new construction projects, additions, alterations, and renovation projects that have been identified within Category Code 211-03 Corrosion Control Facility - Aircraft, Category Code 211-08 Aircraft Component Maintenance Shop, Category Code 211-12 Aircraft Paint and Finishing Hangar, Category Code 211-05 Aircraft Hangar, or other Category Codes in support of aviation corrosion applications and removal. This guidance is not a substitute for applicable code requirements. This provides design configuration guidance for space development or renovations.
2. **ACTION.** Execution managers overseeing the delivery of shore infrastructure products and services shall ensure conformance with the provisions of this technical order.
3. **AUTHORIZATION.** This technical order has been reviewed and is authorized by the SILC Commander.
4. **DIRECTIVES / TECHNICAL ORDERS AFFECTED.** This Technical Order supports the U.S. Coast Guard Safety & Environmental Health Manual. This CSTO supersedes Aviation Coatings Application and Removal Facilities CSTO SILC-CSTO-36-71 91 11 13-07.
5. **ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS.**
 - a. The development of this technical order and the guidance contained within it have been thoroughly reviewed by the originating office in conjunction with SILC EMD. This guidance is categorically excluded under current Department of Homeland Security (DHS) categorical exclusion A3 from further environmental analysis in accordance with the U.S. Coast Guard Environmental Planning Policy, COMDTINST 5090.1 (series).
 - b. This guidance will not result in any substantial change to existing environmental conditions or violations of any applicable Federal, state, local laws relating to the

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protection of the environment. All future specific actions resulting from the general guidance in this technical order must be individually evaluated for compliance with the National Environmental Policy Act (NEPA) and other applicable environmental mandates, consistent with Coast Guard Environmental Planning Policy.

6. DISTRIBUTION. The SILC Configuration Manger posts an electronic version of this technical order in CG-TIMS and adds the document in the Approved Technical Order Library on SILC's Configuration Management site on the CG Portal. No paper distribution will be made of this document.
7. SCOPE. This Technical Order provides a description of the USCG Aviation Corrosion Control Facility standard that is critical to the sustainment and support of aviation maintenance. The process described in this technical order shall be performed within the following constraints:
 - a. TECHNICAL AUTHORITY. The technical authority for this technical order is the SILC Commander. Additional roles and responsibilities associated with this Technical Order are identified in Section 1.3 of this technical order.
 - b. ASSETS / SERVICES. This Technical Order applies to all new real property assets and repair or replacement projects that impact the design, repair, renovation, or reconfiguration of an Aviation Corrosion Control Facility.
8. TOOLS AND EQUIPMENT. None.
9. TRAINING. Implementation of this technical order does not require training beyond standard Coast Guard requirements for architectural and engineering personnel.
10. DEVELOPMENT TEAM. The following authorities and subject matter experts were significantly involved in producing this technical order.

Name	Position	Organization
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11. FORMS / REPORTS. None.
12. REQUEST FOR CHANGES. Submit recommendations for technical order improvements, waivers, or corrections in accordance with the Engineering Change Proposal (ECP) PGTO.

JOHN F. BARRESI
Captain, U.S. Coast Guard

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1 OVERVIEW

1.1 Configuration Standard Summary

This Configuration Standard Technical Order (CSTO) establishes standards for Organizational and Depot Level Aviation Corrosion Control Facilities. This CSTO is the direct result of collaboration between the Tactical Operations Product Line (TOPL), Aviation Logistic Center (ALC), and the Health, Safety, and Work-Life Service Center (HSWL SC) following their Coatings Applications and Removal Operations Assessment at Coast Guard Air Stations (AIRSTAs) throughout the country. HSWL SC assessments documented exposure to compounds containing hexavalent chromium (CrVI) during coatings application and removal and other operations including: exposure to volatile organic compounds (VOCs), crystalline silica and isocyanate-containing coatings, fire and life safety hazards, slip, trip and fall hazards. Aeronautical Engineering Maintenance Management Process Guide CGTO PG-85-00-110-A promulgates adherence to safe work practices and proper maintenance of engineering controls to provide protection for personnel against these hazards.

To ensure aviation facilities meet their operational capabilities and comply with the required standards, Corrosion Control Facilities shall be configured based on layout, space sizes, systems, and equipment.

1.2 Applicability

This Technical Order applies to all new and existing facilities to include the design of all new construction projects, alterations, and renovation projects that have been identified within: Category Code 211-03 Corrosion Control Facility - Aircraft, Category Code 211-08 Aircraft Component Maintenance Shop, Category Code 211-12 Aircraft Paint and Finishing Hangar, Category Code 211-05 Aircraft Hangar, or other Category Codes in support of aviation corrosion applications and removal. This Technical Order is not intended as a substitution for thorough review during design by individual Program Managers and Operations Staff in the appropriate departments.

Upon approval of this Technical Order, Operational Commanders should only initiate modifications on existing Corrosion Control Facilities defined in the criteria of this Technical Order. The feasibility of an independent Corrosion Control Facility, located in a separate building intended to centralize all unit corrosion control operations, should be evaluated and considered to both isolate and minimize the exposure of hazards generated by these activities.

Deviation from Technical Order: Designers are required to comply with all mandatory requirements unless the appropriate authority waives these requirements. Deviations to this Technical Order may be authorized by submitting a waiver request through the Engineering Change Proposal (ECP) process outlined in Shore Infrastructure Logistics Center (SILC) Engineering Change Proposal Process Guide. The United States Coast Guard (USCG) waiver authority for CSTOs is the SILC Commander.

Corrosion Control procedures are outlined in the Aeronautical Engineering Maintenance Manual CIM 13020 (series). Safe Work Practice (SWP) guidance procedures are outlined in Aeronautical Engineering Safe Work Practices Process Guide ALC CGTO PG-85-00-2210-A

and the Aeronautical Engineering Maintenance Management Process Guide. This Technical Order configures the facilities and spaces related to aviation corrosion control operations.

1.3 Roles and Responsibilities

The technical authority for this configuration standard is the Aviation Asset Line Manager. Table 1-1 enumerates the roles and responsibilities for establishing the standards defined in this technical order. The following codes are used: RASCI.

- R = Responsible:** Those who do the work (typically only one Responsible per task).
- A = Approver:** The one ultimately accountable for the deliverable or task (must have only one Approver per task).
- S = Supports:** Those who provide resources, information, expertise or other assistance in completing of the task. A Supports role indicates more intensive and consistent involvement than just being identified in a Consulted role.
- C = Consulted:** Those whose opinions are sought (two-way communications).
- I = Informed:** Those who are kept up-to-date on progress (one-way communication).

Table 1-1: Roles and Responsibilities RASCI Matrix

Task, Deliverable, or Responsibility	DCO/CG-7	CG-43	SILC	SILC EMD / CEU Environmental	PLM, TACOPS PL	Branch Chief, TOPL	Aviation ALM	AC&I Planner, TACOPS PL	FD&CC	Regional CEUs	Base FE	FAM	HSWL
Establish Standards	I	C	R	S	C	S	S	I	C	C	I	I	S
Prioritize Projects	I	C	C	I	A	C	R	S	C	C	I	C	C
Manage AC&I Projects	I	C	C	I	C	C	C	C	R	I	C	I	I
Manage Depot Level Projects	I	C	C	I	C	C	C	I	I	R	I	C	I
Assess Physical Baselines	I	I	I	I	I	A	S	I	I	I	I	I	S
Ensure Compliance with CSTO	I	C	A	S	C	S	S	I	R	R	I	I	S
Provide Technical Authority	I	C	C	S	A	S	R	I	I	I	I	I	C
Complete Fit, Form, and Function Checklist	I	I	I	I	I	I	A	I	R	R	I	I	S
Waiver Review & Approval	C	C	R	A	S	S	S	I	I	I	I	I	C

2 TECHNICAL REQUIREMENTS

2.1 Organization

The working area (allotted square foot of space) for each corrosion control facility is based on the functions performed and maximum number of personnel required to perform tasks during standard operating periods in accordance with the Shore Facilities Standards Manual (SFSM) and Appendix A. Unit Commanding Officers and their respective maintenance staff will ensure each Corrosion Control Facility meets the requirements outlined within this Technical Order.

2.2 Design Requirements

Coast Guard Aviation Corrosion Control Facilities shall be tailored to meet the parameters contained in UFC 3-410-04 Industrial Ventilation and UFC 4-211-02 Aircraft Corrosion Control & Paint Facilities. These Unified Facilities Criteria (UFC) capture the necessary regulatory and industry standards to design a compliant facility. Appendix B, Design Requirements Check List, provides a summary of the critical design requirements that shall be included in each Aviation Corrosion Control Facility.

Aviation corrosion control operational functions are performed in spaces categorized as Regulated Areas or Temporary Regulated Areas.

Regulated Areas:

In accordance with the Occupational Safety and Health Administration (OSHA), Regulated Area refers to a space, including temporary work areas, where maintenance or non-routine tasks are performed, where an employee's airborne exposure exceeds, or can reasonably be expected to exceed, either the time-weighted average (TWA) permissible exposure limit (PEL) or short term exposure limit (STEL). Additionally, Regulated Areas include work spaces where entry and exit is restricted and controlled. Regulated Areas shall be specifically designed to meet the requirements of Regulated Areas as defined by OSHA for each potential hazardous contaminant identified within OSHA 29CFR1910. Work areas where OSHA designated Toxic and Hazardous Substances are involved in USCG corrosion control operations are considered Regulated Areas.

Based on HSWL SC and OSHA health risk assessment data, all dedicated Sanding or Dirty Booths or Rooms, Doffing Booths, Paint Booths, Paint Mixing Rooms, Composite Booths or Rooms and other spaces where CrVI or OSHA designated Toxic and Hazardous Substances may be applied, or removed, are considered Regulated Areas. Access to these areas must be controlled and limited to properly trained, protected, and command authorized personnel. In addition, each command must ensure that the boundaries of each Regulated Area are clearly distinguished from the rest of the workplace in a manner that adequately alerts employees to the exposure risks. This may include the use of warning signs, barricades, etc. Regardless, the methods employed must effectively warn personnel to not enter the area unless authorized and wearing proper Personal Protective Equipment (PPE). Each Regulated Area must have separate dedicated ventilation systems that are independent and isolated from Non-Regulated Areas and other Regulated Areas. Space for hazardous waste storage containers shall be available in all Regulated Areas.

Regulated Area Increased Safety Control Design Requirements.

All Regulated Areas shall be equipped with safety system control features in accordance with UFC 4-211-02, sections 4-2.4, 4-5.2, and 3-5.2, and shall be designed to prevent the use of grinding and painting equipment without proper ventilation controls. A dedicated power source shall be provided for the use of any grinding and painting equipment and shall be interlocked with the regulated area ventilation and exhaust system.

All Regulated Areas are required to be maintained in a slight negative pressure of no less than 0.10 (typ.) in Water Gauge (WG) Static Pressure with respect to the surrounding areas for Sanding Booths and Rooms and 0.05 (typ.) in WG Static Pressure for all Composite Booths and Rooms, Paint Booths and Rooms, and Doffing Booths. Regulated Areas shall also include static and differential pressure sensors in accordance with UFC 3-410-04, section 6-3.13. Regulated Areas shall be installed at appropriate locations to enhance monitoring and maintenance of desired sanding, grinding, and painting room pressures.

NOTE: *In accordance with OSHA, all surfaces must be maintained as free as practicable of accumulations of CrVI. Refer to Appendix C, CrVI Surface Contamination Guidance, Table 1 HSWL SC (se) Recommended Chromium (VI) Surface Contamination Criteria. Contact the HSWL SC District Safety and Environmental Health Officer (SEHO) representative for additional information covering CrVI surface wipe requirements.*

Temporary Regulated Areas:

Temporary Regulated Areas are work areas in which work is being conducted outside of normal engineering controls. All areas where CrVI-containing coatings are applied or removed outside of Paint Booths and dedicated Sanding Booths and Rooms are to be considered Temporary Regulated Areas. Follow the respective AIRSTA Corrosion Control Facility (CCF) Operations Technical Information Maintenance Instruction (TIMI) for Temporary Regulated Area requirements.

NOTE: *In accordance with OSHA, all surfaces must be maintained as free as practicable of accumulations of CrVI. Refer to Appendix C, CrVI Surface Contamination Guidance, Table 1 HSWL SC (se) Recommended Chromium (VI) Surface Contamination Criteria. Contact the HSWL SC District SEHO representative for additional information covering CrVI surface wipe requirements.*

Non-Regulated Areas:

Per OSHA, Non-Regulated area refers to any space where entry and exit is neither restricted nor controlled for the purposes of protection against hazardous contaminants associated with corrosion control operations.

NOTE: *In accordance with OSHA, all surfaces must be maintained as free as practicable of accumulations of CrVI. Refer to Appendix C, CrVI Surface Contamination Guidance, Table 1 HSWL SC (se) Recommended Chromium (VI) Surface Contamination Criteria. Contact the HSWL-SC District SEHO for additional information covering CrVI surface wipe requirements.*

2.2.1 Sanding “Dirty” Booth or Room: (Regulated Area)

A booth structure installed per National Fire Protection Association (NFPA) 33 shall be the first option considered when designing a sanding room. If a booth structure cannot be utilized due to space constrictions, then a properly sealed four walled room with an impermeable ceiling can be used as the designated sanding room. The Sanding Booth or Room shall be approximately 175 square feet in size and shall have separate exhaust systems that discharge outside the building for the booth or room and the downdraft table. A sample Sanding Booth layout is shown in Appendix D.

Follow UFC 3-410-04 Industrial Ventilation (Ch.2 Section 2-3) for system design guidance. For Sanding Booth specific design, refer to American National Standards Institute (ANSI) Z9.6 (Exhaust Systems for Grinding, Polishing, and Buffing) and NFPA 91 (Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate solids). The American Conference of Governmental Industrial Hygienists (ACGIH) IV Manual, Industrial Ventilation; A Manual of Recommended Practice, Chapter 5, “Exhaust System Design Procedure”, presents accurate and authoritative information to assist designers with duct system design.

All Sanding “Dirty” Booth or Room projects, to include additions, alterations, and renovations shall consult the workflow practices in the following documents:

- UFC 4-211-02- Aircraft Corrosion Control & Paint Facilities:
- UFC 3-410-04 Industrial Ventilation
- ANSI Z9.6 (Exhaust Systems for Grinding, Polishing, and Buffing)
- NFPA 91 (Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate solids)
- The American Conference of Governmental Industrial Hygienists (ACGIH) IV Manual, Industrial Ventilation

All Regulated Areas require increased safety control measures and increased monitoring requirements as outlined in Regulated Areas Section 2.2 above.

The dimensions of the Sanding Booth or Room shall be adequate to accommodate the largest removable component, with at least 3 feet of working space around the component. Because facility life often exceeds aircraft service life, designers shall size area and door openings to the size of the largest component plus 10% to accommodate asset changes. Appendix A provides minimum dimensions for each airframe component.

Sanding Booths and Rooms shall always be under slightly negative pressure of no less than 0.10 (typ.) in WG Static Pressure with respect to the surrounding areas. The Aeronautical Engineering Maintenance Management Process Guide indicates, "Ventilation systems must be designed so dust collected can be disposed of as hazardous waste". Negative pressure prevents dust migration from Regulated Areas to Non-Regulated Areas through doors or other infiltration points. The surrounding areas can be either outside the building envelope or an adjacent room or hallway. If tempered replacement air is needed, heated makeup air must be provided if temperature is less than 55°F for an appreciable period of time during booth operation. Make-up air shall be heated to at least 65°F and no more than 80°F (OSHA 1910.94).

Refer to Appendix E – Regulated Area – Typical Ventilation Controls Diagram for detailed information regarding static pressure fan control requirements for supply and exhaust systems.

A Regulated Area immediately outside of the Sanding Booth or Room must be established for personnel to remove or “Doff” their disposable PPE. Refer to Section 2.2.6 Changing Area or Locker Room (Non-Regulated Area) & Doffing Booth (Regulated Area) for details describing the Doffing Booth.

All Sanding “Dirty” Booths and Rooms must have dedicated ventilation systems which are independent and isolated from Non-Regulated Areas and other Regulated Areas.

Reduce potential for cross drafts or turbulence near a given exhaust hood by properly locating and designing the hood with baffles, and also by designing the replacement air system to complement the exhaust system.

Determine the exhaust volumetric flow in cubic feet per minute (cfm), required to maintain the capture velocity. Sanding Tables (downdraft) shall be designed to efficiently capture sanded dust, to include heavy metals. An average face velocity range of 150- 250 fpm is required to efficiently carry hazardous dust away from the operator (ACGIH Industrial Ventilation Manual 29th Edition, Figure VS-80-18). High Efficiency Particulate Air (HEPA) Filtration approved for hexavalent chromium shall be utilized both for the downdraft table and exhaust ventilation system. Exhaust ventilation from the downdraft table and the Sanding Booth or Room must be properly ducted outside of the building.

Configure the downdraft table so all portions of the table are easily cleaned. Ensure the table has a clear space (not less than 3 feet on all sides) that is kept free from storage or combustible construction.

The Aviation Logistic Center (ALC) developed specifications for a HEPA Rated Downdraft Table including Design Specifications, Dimensional, and Performance requirements for use during O-level sanding of CrVI primed aircraft components in the CCF. Specifications for the ALC approved downdraft table are provided in Appendix F - ALC Downdraft Table Equipment.

2.2.2 Paint Booth or Room (Regulated Area)

All Paint Booth or Room projects, to include additions, alterations, and renovations shall consult the recommended workflow practices in the following documents:

- UFC 4-211-02- Aircraft Corrosion Control & Paint Facilities
- UFC 3-410-04 Industrial Ventilation
- NFPA 91 (Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate solids)
- NFPA 33 (Standard for Spray Application Using Flammable or Combustible Materials)
- The American Conference of Governmental Industrial Hygienists (ACGIH) Manual, Industrial Ventilation

All Regulated Areas require increased safety control measures and increased monitoring requirements as outlined in Regulated Areas Section 2.2 above.

The dimensions of the Paint Booth or Room shall be adequate to accommodate the largest removable component, with at least 3 feet of working space around the component. Because facility life often exceeds aircraft service life, designers shall size area and door openings to the size of the largest component plus 10% to accommodate asset changes. Appendix A provides minimum dimensions for each airframe component.

Paint Booths and Rooms shall be under slightly negative pressure of no less than 0.05 (typ.) in WG Static Pressure with respect to the surrounding areas. The surrounding areas can be either outside the building envelope or an adjacent room or hallway. If tempered replacement air is needed, heated makeup air must be provided if temperature is less than 55° F for an appreciable period of time during booth operation. Make-up air shall be heated to at least 65° F, no more than 80° F (OSHA 1910.94). Refer to Appendix E – Regulated Area – Typical Ventilation Controls Diagram for detailed information regarding static pressure fan control requirements for supply and exhaust systems.

All Paint Booths and Rooms must have dedicated Heating, Ventilation, and Air Conditioning (HVAC) systems which are independent and isolated from Non-Regulated Areas and other Regulated areas.

Air velocities in Paint Booths and Rooms must meet the requirements of UFC 3-410-04, NFPA 33 and OSHA 1910.94. Refer to Table 2-1 Air Velocities in Paint Booths.

Table 2-1: Air Velocities in Paint Booths

Operating Conditions for Objects inside Booth	Cross drafts in feet per minute (fpm)	Airflow Velocities, fpm	
		Design fpm	Range fpm
Electrostatic and Automatic Airless operation contained in booth without operator	Negligible	50, large booth	50-75
Air-operated guns, manual or automatic	Up to 50	100, small booth 100, large booth	75-125
Air-operated guns, manual or automatic	Up to 100	150, small booth 150, large booth	125-175

Downdraft paint spray booth configuration provides a cleaner paint job than the cross draft booth configuration and controls exposure to workers better than cross draft booth configuration (UFC 3-410-04).

Cross draft paint spray booth configuration usually require less total volumetric airflow rate than the downdraft spray paint booth because the vertical cross-section area of the booth is often smaller than the booth footprint area (UFC 3-410-04).

The ACGIH Industrial Ventilation Manual provides detailed guidance for the control of airborne pollutants through the use of small and large Paint Booths. The size of the booth is governed principally by the size of the airframe component being coated. Sufficient space must be provided to permit air flow on all sides of the object, to provide room to work, and to enable the air to enter the booth in a smooth, controlled manner without excessive wrap-around.

The key requirement for the filtration of a Paint Booth exhaust ventilation system is the ability to reduce the amount of Hazardous Air Pollutants (HAP) that are released into the atmosphere. The National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories require that filters be installed in the ventilation system to control the inorganic HAP emissions before they are exhausted to the atmosphere. A NESHAP compliant filtration system shall be utilized (40CFR 63.5, NFPA 33, MIL-HDBK-1028/1C).

Intake filters shall have an efficiency of 30 percent (measured on the basis of American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) 52.1) or commercially-rated filters with at least a 90 percent efficiency (at 10 microns) rating (MIL-HDBK-1028/C).

Breathing air (Grade D) compressed air piping shall be provided in the Paint Booth or Room for respirators in accordance with UFC 3-410-04.

2.2.3 Paint Mixing Room (Regulated Area)

All dispensing or transfer of flammable liquids from containers, mixing of flammable liquids, and filling of containers (including paint guns and pressure pots) must be done only in an approved spray booth or mixing room. A separate paint mixing room will significantly reduce the amount of clutter in the Paint Booth. One of the most common causes for exposure hazards has been mixing paint in an unventilated space. A properly designed and located paint mixing room must accommodate all equipment, cabinets, and tables associated with paint mixing and daily-use storage of paints and thinners which otherwise would be housed within the confines of the Paint Booth. Installing a prefabricated mixing booth is a simple method to incorporate a separate mixing area into a new or existing facility. The design requirements in Chapter 2 of UFC 4-211-02 Aircraft Corrosion Control and Paint Facilities are generally applicable to Paint Mixing Rooms. Baseline requirements are listed below:

- Paint Mixing Rooms must follow design requirements as specified in NFPA 33.
- Must follow paint storage and handling requirements as specified in NFPA 30.
- Mixing rooms should be provided with a floor drain and collection sump system to contain spills. The floor drain and sump system shall be independent and separate from the buildings drainage system. The sump must be manually evacuated and hazardous waste shall be properly disposed in accordance with applicable local, state or federal regulations as outlined in Section 2.7 Environmental Considerations.
- Agitators must be driven by compressed air, water, low-pressure steam, or electricity. If powered by an electric motor agitator, it must meet all electrical codes and standards.
- An Eye Wash Station must be accessible and require no more than 10 seconds to reach (ANSI Z358.1).

All Regulated Areas require increased safety control measures and increased monitoring requirements as outlined in Regulated Areas Section 2.2 above.

2.2.4 Composite Booth or Room “Clean Room” (Regulated Area)

Composite Booths and Rooms are intended to provide operators an area to conduct fiberglass layup and repair. These spaces typically contain workbenches and may require ventilation hoods and curing ovens for repair of composite parts. ALC CGTO PG-85-00-110-A Aeronautical Engineering Maintenance Management Process Guide establishes guidelines for a standardized composite facility.

A booth structure shall be the first option considered when designing a composite room. If a booth structure cannot be utilized due to space constrictions, then a properly sealed four walled room with an impermeable ceiling can be used as the designated composite room. The Composite Booth or Room shall be approximately 200 square feet in size and shall be adequate to accommodate the largest removable composite component that is unit level repairable, with at least 3 feet of working space around the component. A sample Composite Booth or Room layout is shown in Appendix D.

Facility life often exceeds aircraft service life. Therefore designers shall size booth and door openings to the size of the largest component plus 10% to accommodate asset changes. Appendix A provides minimum dimensions for each airframe component.

Composite Booths and Rooms must have dedicated HVAC systems which are independent and isolated from Non-Regulated Areas and other Regulated areas. Special temperature and humidity controls may be required based on the types of composite used.

All Regulated Areas require increased safety control measures and increased monitoring requirements as outlined in Regulated Areas Section 2.2 above.

2.2.5 Coatings Removal and Painting on the Hangar Deck (Temporary Regulated Area)

Coating Removal and Painting on the Hangar Deck shall follow OSHA and recommended workflow practices provided in the following documents:

- NFPA 33 (Spray Application Using Flammable or Combustible Material) Chapter 18 Spray Application Operations in Membrane Enclosures
- NFPA 410 (Standards on Aircraft Maintenance) Chapter 7 Aircraft External Cleaning, Painting, and Paint Removal
- OSHA Requirements (All applicable)

Units are required to establish standard practices in a Technical Information Maintenance Instruction (TIMI). Example TIMI's may be obtained from the Corrosion Control Branch at ALC. Units are also advised to consult with their local SEHO to ensure these TIMI's incorporate best practices associated with mitigating the exposure hazard. Additional guidance on this matter may also be found in Reference d), Safe Work Practice – AIRSTA Coating Applications and Removal Operations | HSWL Guidance.

2.2.6 Changing Area or Locker Room (Non-Regulated Area) and Doffing Booth (Regulated Area)

The Changing Area or Locker Room Area is intended to provide a non-regulated clean space for employees to change out of and store their street clothes and personal belongings.

Changing Areas and Locker Rooms shall not be used for the storage, donning, or doffing of CrVI related personal protective equipment (PPE). CrVI PPE activities shall be limited to the Doffing Booth which is intended to provide a regulated space for personnel to properly conduct the necessary cleaning procedures including the removal and disposal of PPE prior to entering non-regulated spaces following corrosion control operations.

Changing Area or Locker Room Area (Non-Regulated Area)

A Changing Area or Locker Room Area must be provided. The change rooms or locker rooms must be equipped with separate storage facilities (e.g., lockers) for street clothes, equipment, and personal belongings. These storage facilities must prevent contamination of street clothes. Preventing contamination of street clothing limits outside exposures that would otherwise occur after the work shift ends.

Clean Locker Rooms are defined as male and female locker, shower, and toilet facilities used for storage of operators' equipment, personal items, and street clothes. CrVI related equipment and PPE shall not be stored in the clean locker room. Requirements for locker rooms include the following:

- Heating ventilation and cooling required, positive pressurized in relation to sanding and painting area.
- Flush valve toilets, flush valve urinals, countertop or wall mounted lavatories, showers, and floor drains.
- Cleaning or storage of PPE equipment containing CrVI or crystalline silica and isocyanate-containing materials shall not be conducted in Non-Regulated Areas to include Changing Areas and Locker Rooms.

Doffing Booth (Dirty) (Regulated Area)

A Doffing Booth is used for donning, doffing, and disposition of contaminated disposable PPE clothing worn by operators during the performance of their corrosion control duties. The Doffing Booth shall be approximately 49 square feet and shall be configured in a manner to ensure proper space allowance for disposal containers (disposable PPE including, but not limited to, gloves, boots, tape, disposable suits, dirty cleaning supplies and all other items requiring proper disposal) as well as an area to conduct proper cleaning of non-disposable PPE (to include, but not limited to, masks). Requirements for Doffing Booths include the following:

- Heating ventilation and cooling required, negatively pressurized of no less than 0.05 (typ.) in WG Static Pressure with respect to surrounding Non-Regulated Areas. Ventilation shall contain a dedicated HVAC system, which is independent and isolated from Non-Regulated Areas and other Regulated areas. Refer to Appendix E – Regulated Area – Typical Ventilation Controls Diagram for detailed information regarding static pressure fan control requirements for supply and exhaust systems.
- Handwashing facilities and floor drains are not permitted in the Doffing Booth and the Sanding Booth or Room. Disposal of any contaminated wastewater shall be in accordance with applicable local, state or federal regulations as outlined in Section 2.7 Environmental Considerations.

For the purposes of this Technical Order and to mitigate personnel exposure, units shall eliminate skin exposure while working with compounds containing occupational health hazard materials, especially CrVI and isocyanates. According to the OSHA Small Entity Compliance Guide for the Hexavalent Chromium Standards (3320-10N), “Employers must provide appropriate protective clothing and equipment wherever skin or eye contact with CrVI is likely to present a hazard to employees”. Specific guidance on this matter is provided in reference (d), Safe Work Practice – AIRSTA Coating Applications and Removal Operations | HSWL Guidance. Compliance with this requirement allows facilities to designate a safe area outside of Sanding Booths and Rooms where personnel may remove and dispose their PPE into an appropriate, properly marked and labeled hazardous materials waste container. This Doffing Booth shall meet the facility layout requirements listed in Section 2.4.1 to ensure compliance with OSHA regulations. In addition to proper layout of regulated, temporary regulated and non-regulated areas, units are responsible for regular cleaning to prevent the migration of dust and other contaminants to adjacent spaces. Review ALC Process Guide and MPC safety precautions for further guidance.

All Regulated Areas require increased safety control measures and increased monitoring requirements as outlined in Regulated Areas Section 2.2 above.

2.2.7 Metal Shop (Non regulated Area)

The metal shop layout shall provide sufficient space for the operator to handle materials, and perform required job operations without interference between machines and equipment. Lathes, milling machines, and similar types of equipment that produce cuttings or flying particles should be set at 15-degree angles to each other, and secured to floors, bases, or stands. Lighting in the immediate areas must be adequate to eliminate glare or shadows. Reference CGTO PG-85-00-110-A for a complete list of metal shop equipment requirements.

Location of the CCF which includes the Sanding Booth or Room, Doffing Booth, Composite Booth or Room, Paint Booth, and Paint Mixing Room should be adjacent to the metal shop to permit safe and effective transport of aircraft components.

Ventilation in the metal shop shall be under neutral pressure with respect to surrounding Regulating Areas and shall not be cross-connected or “shared” with Regulated Areas.

2.2.8 HVAC Ventilation

Regulated Area HVAC ventilation systems, to include ducting, shall be isolated and independent from all ventilation systems serving non-regulated areas and other Regulated Areas. Exhaust ventilation must be used in all Regulated Areas to maintain a constant negative pressure environment.

2.2.9 Plumbing

Plumbing requirements include the following:

- Compressed air shall be provided for painting and sanding tools. Compressed air power sources for Regulated Areas shall be interlocked with safety system control features and shall be designed to prevent the use of grinding and painting equipment without proper ventilation controls. See Regulated Area Section 2.2.

- Breathing air (Grade D) shall be provided for respirators in accordance with UFC 3-410-04.
- OSHA requires separate, non-interchangeable connections for breathing air (Grade D) and pneumatic tool compressed air systems.
- Shut-off valve shall be installed on hose or flexible connections from containers or piping (OSHA 1910.107).
- Pumping system, if used for delivery, shall be sufficient to accommodate system pressures (OSHA 1910.107).
- Air Piping shall be steel or heat and damage resistant (OSHA 1910.107).
- Piping systems shall be bonded or grounded (OSHA 1910.107, NFPA 33).
- Spray nozzles from positive displacement pumps shall have relief valve in the pump discharge line or a device to stop it if safe operating pressure is exceeded (OSHA 1910.107).
- Pneumatic sanding and grinding equipment with integrated vacuum dust collection components require large volumes of service air. Consult equipment manufacturer's requirements and plan compressor and compressed air line size accordingly; size pneumatic water separator or oil coalescing filter accordingly. Place pneumatic water separator or oil coalescing filter away from the clean room bonding area as oil that is atomized when drained will interfere with adhesive bonding.
- Hand washing sinks, floor drains, washing machines and dryer equipment shall not be located or installed in Regulated Areas. Waste water from this equipment contains high levels of chromium and is considered hazardous waste.
- Dispose of all sanitary and contaminated wastewater in accordance with applicable local, state or federal regulations as outlined in Section 2.7 Environmental Considerations.

2.2.10 Electrical

CCF designs shall adhere to the electrical requirements listed in NFPA 70 and must include the following:

- Explosion-proof lighting and wiring, or lighting and wiring shall be specified for use in spray area (OSHA 1910.107, NFPA 33).
- Light fixture panels shall be specified safety glass (heat treated) and listed for use in spray area (NFPA 33).
- Lighting shall comply with UFC 3-530-01 Interior and Exterior Lighting Systems and Control.
- No open flame or spark producing equipment shall be allowed within 20 feet of spray area (OSHA 1910.107). No electrical equipment in spraying area unless approved for that location (OSHA 1910.107).
- Electrically conductive parts, ducts, or equipment shall be electrically bonded and grounded to prevent sparks and static electricity (NFPA 33).
- Supply and exhaust systems shall be electrically interlocked (NFPA 33).

- Electrical power (120 volt) shall be provided for painting and sanding tools. Electrical power sources for Regulated Areas shall be interlocked with safety system control features and shall be designed to prevent the use of grinding and painting equipment without the proper ventilation controls. See Regulated Area Section 2.2.
- Drying apparatus shall be interlocked with spraying apparatus so spraying cannot occur when drying is in process (NFPA 33). Drying system shall be interlocked to shut off in the event of ventilation system failure (NFPA 33).
- Rooms used for moisture removal or curing of advanced composites shall have 120-volt (20-amp) power supplies. Place no more than two outlets on each circuit breakers as heating devices draw extensive amounts of electricity.

2.2.11 Fire Protection

Provide fire protection in accordance with SILC-CSTO-36-11 55 13 25-02 / 20161222 Aircraft Hangar Fire Protection Requirements and the following documents:

- UFC 3-600-01 Fire Protection Engineering for Facilities
- NFPA 13 Standard for the Installation of Sprinkler Systems
- UFC 4-211-01 Aircraft Maintenance Hangars
- UFC 4-211-02 Aircraft Corrosion Control and Paint Facilities
- NFPA 30 Flammable and Combustible Liquids Code
- NFPA 33 Standard for Spray Application Using Flammable or Combustible Materials

It is essential that the local Civil Engineering and Fire Protection stakeholders be consulted to ensure all fire protection requirements applicable to specific aircraft painting operations and facilities needs are met. All CCF areas shall have fire protection systems as required by NFPA 33. These systems must include but are not limited to the following:

- Exhaust ductwork and plenum shall be provided with fire protection.
- Particulate filters shall be provided with fire protection (if applicable).
- Recirculation air supply units shall be installed (if applicable).
- Mixing room shall be provided with fire protection (if applicable).
- Fire extinguishers shall be provided and located for instant use in emergency (NFPA 10, NFPA 33, 29 CFR 1910.107).
- Fire alarm shall be provided (NFPA 72, NFPA 101).
- Sprinklers shall be protected against overspray residue (NFPA 33).
- Ducts shall not penetrate fire barriers (NFPA 33). Penetrations through combustible walls shall be protected with an appropriate fire resistant assembly (29 CFR 1910.94).
- Quantities of flammable liquid in excess of 25 gallons shall be stored in an acceptable or approved cabinet (29 CFR 1926.152(b) (2)).

2.2.12 Ductwork, Fans, Exhaust Stacks, Controls, Air Pollution Control Equipment

Ductwork, Fans, Exhaust Stacks, Controls, and Air Pollution Control Equipment have the following requirements:

- UFC 3-410-04 Ductwork, fans, exhaust stack, controls, and air pollution control requirements include the following: Use UFC 3-410-04 Industrial Ventilation and NFPA 33 Spray Application Using Flammable or Combustible Materials for the design of all industrial ventilation ductwork, fans, exhaust stacks, controls, and air pollution control equipment. Ventilation systems for Regulated Areas must be independent and isolated from Non-Regulated Areas and other Regulated Areas to eliminate any cross contamination.
- Routing of exhaust ducts shall be designed, in accordance with NFPA 33 Section 7.4, to immediately discharge contaminated air to the outside of the building and minimize exhaust ductwork from passing through work spaces to the greatest extent possible. Any ductwork passing through adjacent work spaces must be sealed and properly tested.
- All HVAC systems shall not draw air from the hangar bay where temporary regulated areas may be established to minimize possibility of drawing contaminated air into adjacent work spaces.
- Ductwork shall be exposed for inspection and not concealed behind interior walls or ceilings.
- All ventilation exhaust discharge points for Regulated Areas shall be properly designed in accordance with NFPA 33, NFPA 45, NFPA 91 and the ACGIH Industrial Ventilation Manual and shall properly filter hazardous solids as well as discharge above the roof at a location, height, and velocity sufficient to prevent re-entry of contaminants and to prevent exposures to personnel.
- COMDTINST M5100.47(latest) Safety and Environmental Health Manual establishes policy and guidelines regarding health risk reduction for military members, civilian employees, as well as all visitors, contractors and their personnel, and personnel of other agencies that operate within or visit USCG facilities.

Follow the maintenance procedures and recommendations provided by the equipment manufacturer for components including ventilation filters, annunciator panels, fans, and monitor pressure indicators. All exhaust filters shall be physically marked with proper replacement procedures as well as a change-out schedule/log. Filtration requirements are listed in section 2.2.1 and section 2.2.2.

2.2.13 Hangar Bay Design and Operational Requirements (Temporary Regulated Area)

2.2.13.1 Hangar Bay Design Requirements

In accordance with UFC 4-211-01, Section 3-5.3.1.5 Hangars Exhaust is intended to keep the hangar bay ventilation in negative pressure during maintenance activities. Ventilate the hangar bay at a general rate of 0.5 cubic feet per minute (cfm)/ square foot (2.54 liters/sec/m²) when aircraft maintenance activities are being conducted for the purposes of odor and fume mitigation. Include ventilation exhaust fans with the exhaust ductwork extended down to the

height of 8 ft. (2.5 m) above the hangar floor or lower along back wall opposite the hangar doors. Install intake louvers with motorized dampers above the hangar doors or in adjacent walls to interlock with the exhaust fans. Proper exhaust ventilation in the hangar bay provides the ability to maintain a slightly negative pressure with respect to surrounding areas. Negative pressure prevents contaminated dust migration to Non-Regulated Areas through doors or other infiltration points during maintenance activities.

In accordance with UFC 4-211-02: 4-2.4, 4-5.2, and 3-5.2, a safety system control shall be implemented to prevent the use of grinding and painting equipment without proper ventilation controls. A dedicated power source should be provided for the use of any grinding and painting equipment and shall be interlocked with the hangar bay ventilation and exhaust system.

2.2.13.2 Hangar Bay Operational Requirements

All grinding, painting or contaminated dust generating activities conducted on the hangar bay require the implementation of a Temporary Regulated Area in accordance to the Aeronautical Engineering Safe Work Practices Process Guide CGTO for Aircraft Corrosion Control work. The use of Temporary Regulated Areas within the Hangar bay should be minimized to the greatest extent possible. Unless otherwise stated by the CGTO, during the use of Temporary Regulated Areas, the following operational requirements shall be adhered to:

1. All doors between the hangar bay and interior administrative and shop areas must remain closed during sanding and painting operations. Main aircraft hangar doors shall remain closed to maintain negative pressure.
2. Only corrosion control personnel should be on the hangar deck during sanding and painting operations to minimize potential exposure.
3. If ventilation air intakes exist on the hangar deck, sanding and painting shall be confined and conducted at the farthest possible point in the hangar.
4. All exhaust filters shall be properly cleaned and disposed of in accordance with Section 2.7.
5. If facility modifications are conducted in spaces where Temporary Regulated Areas are erected, Unit personnel shall review and coordinate any needed TIMI updates to ensure proper containment of hazards.

2.3 Design Review, Construction Inspection & Acceptance Testing

2.3.1 Design Review.

A detailed 35% design review should be conducted involving the District SEHO, HSWL SC, TOPL Asset Line Manager, and regional Civil Engineering Unit (CEU) Environmental Branch. The review should incorporate required changes to operational procedures, identify areas of potential contamination concerns, and address National Environmental Policy Act (NEPA) responsibilities, potential environmental permitting or other environmental planning requirements, or any other considerations including personal protective gear to ensure adequate protection is provided to the user.

A detailed 95% design review should be conducted involving the District SEHO, HSWL SC, TOPL Asset Line Manager, and regional CEU Environmental Branch. The review should include evaluating the detailed construction inspection and acceptance testing measures which will be required to be conducted in the presence of USCG Contracting Officer's Representative. The detailed testing procedures must be included in this review and approved by the USCG Project Manager. The 95% review shall ensure NEPA and other environmental planning responsibilities and environmental compliance requirements have been fully evaluated, addressed and completed.

2.3.2 Construction Inspection and Acceptance.

The designer shall develop a construction inspection and acceptance testing checklist which outlines procedures to adequately certify the construction has been completed in compliance with the project specifications. The acceptance testing shall ensure proper functioning of the overall system, safety control measures (including interlocks), monitoring gauges, and in person review of unit TIMI to ensure facility controls and procedures are complimentary. The acceptance testing must be conducted in the presence of USCG Contracting Officer's Representative or delegate verifying compliance with the specifications and standards identified.

The acceptance checklist shall include Testing, Adjusting, and Balancing (TAB) for HVAC systems as provided in the Unified Facilities Guide Specifications (UFGS) 23 05 93. Smoke tests are required and shall be performed in all regulated areas. The designer shall develop and outline detailed testing procedures and test scenarios necessary to ensure the specifications of this CSTO are met. One phase of the smoke test shall be conducted with the ventilation system turned off, to validate the space envelope's ability to prohibit any smoke from migrating to non-regulated areas.

2.4 Safety and Health Considerations

2.4.1 Hygiene Facilities

Provide hygiene facilities to assure employee compliance with basic hygiene practices that minimize exposure to CrVI and all hazardous materials or wastes determined to be human health hazards by USCG policy. According to OSHA 1910.1026, the baseline requirement for washing areas is: "The employer shall provide readily accessible washing facilities capable of removing chromium (VI) from the skin, and shall ensure that affected employees use these facilities when necessary." The specific facility layout shall be determined by the design engineer as each site varies in complexity and need. These facilities shall not be located within the Sanding Booth or Room or the Doffing Booth. Additional details may also be found in ALC Process Guide and Maintenance Procedure Card (MPC) safety precautions. Consult with the HSWL SC and the Aviation Asset Line Manager if further guidance is needed to determine the extent of and location for these facilities.

2.4.2 Breathing Air

Breathing air for supplied air respirators must meet grade D standards as required by 29 CFR 1910.134(d) and defined in Compressed Gas Association Specification for Air G-7.1. Breathing air fittings must not be compatible with outlets for non-respirator worksite air or other gas

systems. Provide multiple connection ports for airline respirator hoses to allow worker mobility if required. Breathing air Grade D is required in the Paint Booth.

2.4.3 Respiratory Protection

Respiratory Protection shall meet the requirements specified in the COMDTINST M5100.47 (latest) Safety and Environmental Health Manual. Additionally, the unit health safety officer or manager, district SEHO Representative, and Respiratory Protection Manager shall be consulted to determine the appropriate type of respiratory protection required for each process. 29 CFR 1910.134(d), *Respiratory Protection* specifies requirements for respiratory protection.

2.5 Equipment & Other Systems

Equipment which is not considered building infrastructure (such as downdraft tables, vacuum assisted tools, personal protective equipment, and hazardous materials disposal equipment) are all essential for mitigating exposures to harmful materials that are released into the air during corrosion control maintenance activities. The operational performance of this equipment and building infrastructure equipment must be properly maintained by the aviation facility staff. The office of Aeronautical Engineering, CG-41, provides equipment requirements for corrosion control operations. These requirements are identified in the Aeronautical Engineering Safe Work Practices Process Guide and the Aeronautical Engineering Maintenance Management Process Guide.

2.6 Facility Layout

All construction projects, to include additions, alterations, and renovation projects that affect the coatings application and removal facility shall consult the recommended workflow practices recommended by UFC 4-211-02- Aircraft Corrosion Control and Paint Facilities.

Some of the key elements of those workflow practices include:

- Specify a Regulated Area immediately outside of the Sanding Booth or Room for personnel to remove and dispose their PPE.
- Provide hazardous waste storage bin within all Regulated Areas.

Refer to Appendix D for example facility layouts.

The dimensions of the facility shall be adequate to accommodate the largest removable component that is unit level repairable, with at least 3 feet of working space around the component. Because facility life often exceeds aircraft service life, designers shall size booth and door openings to the size of the largest component plus 10% to accommodate asset changes.

2.7 Environmental Considerations

Aviation Corrosion Control Facilities have the potential for significant NEPA, Environmental planning, and environmental compliance implications, particularly from an air emission, waste water discharge, and waste management perspective. The design and construction of all new aviation coatings applications and removal facilities, as well as additions, alterations, and renovation projects to existing facilities shall ensure that strict environmental regulatory

compliance is achieved and maintained. Constructing or altering an emissions source such as these facilities without appropriate environmental planning analysis, prior notification to and proper coordination with regulatory authorities has the potential to violate NEPA and the Clean Air Act (CAA), Clean Water Act (CWA), Resource Conservation and Recovery Act (RCRA), and other environmental regulations. Design personnel, engineers, and unit personnel shall coordinate with appropriate unit-level environmental professionals, CEU Environmental Management Branch personnel, and SILC Environmental Management Division personnel prior to constructing, altering, or renovating an aviation corrosion control facility.

Design, construction, alterations, and renovations of aviation corrosion control facilities must consider the potential for air emissions, waste generation, and waste water discharges. A new or amended air or waste water permit may be needed to comply with applicable federal, state, or local environmental laws and regulations. A change to a unit hazardous waste generator status from increased hazardous waste generation from a new or renovated facility may require compliance with additional regulatory requirements.

As authorized by the CWA, the National Pollutant Discharge Elimination System (NPDES) Permit Program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Contact the appropriate CEU Environmental Management Branch, SILC Environmental Management, and the local Publicly Owned Treatment Works (POTW) Treatment Plant to verify the regulatory requirements for the discharge of CrVI in waste water.

Management and disposal of CrVI waste shall follow the requirements outlined in the Safety Data Sheet (SDS) for chromate primer (MIL-PRF-23377 Type I, Class C1 or C2), COMDTINST M16478.1 (series) Hazardous Waste Management Manual and applicable federal, state, and local environmental laws and regulations. Waste, scrap, or other debris that are contaminated with CrVI and other hazardous waste generated from aviation coatings application and removal activities that are destined for disposal shall be collected and disposed of in sealed, impermeable bags or other closed, impermeable containers that are labeled in accordance with the Standards Applicable to Generators of Hazardous Waste, 40 CFR 262 and the OSHA Hazard Communication Standard, 1910.1200.

3 REFERENCES

The documents listed in the following tables are referenced or were used to develop standards in this technical order. In order to identify process relationships and potential revisions, applicable documents are identified in the Purpose column as *Parent*, *Sibling*, or *Child*, as described in Figure 3-1.

Figure 3-1: Process Relationship Descriptions

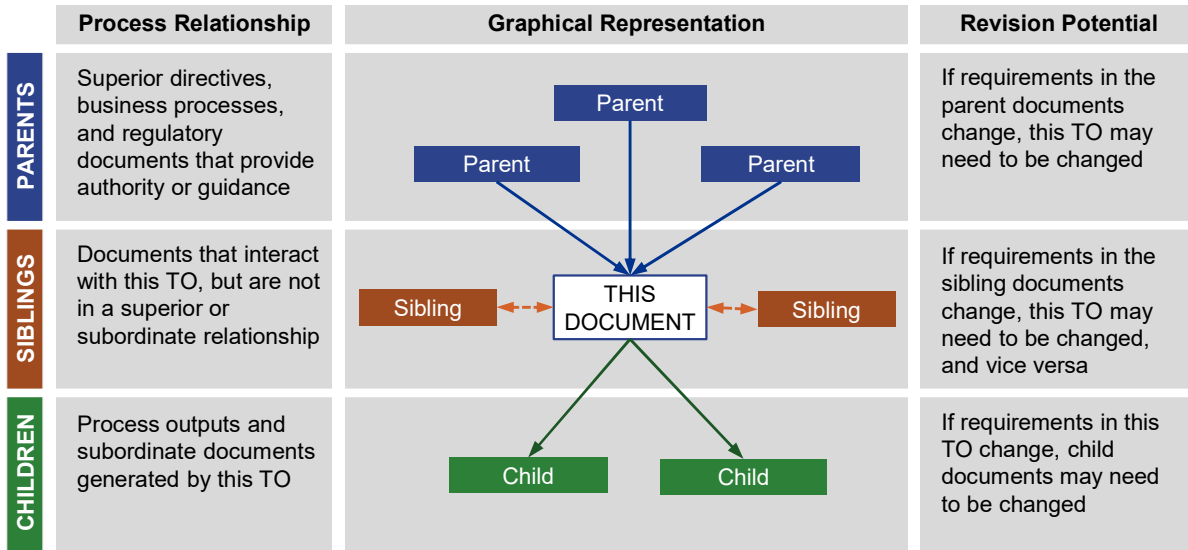


Table 3-1: Coast Guard Publications

Document Name	Document No.	Rev / Date	Purpose
Aeronautical Engineering Corrosion Control Program Process Guide	CGTO PG-85-00-60-A	Latest	(Parent) This process guide establishing specific guidelines for Aeronautical Engineering Corrosion Control Program.
Aeronautical Engineering Maintenance Management Manual	COMDTINST M13020 1G	(series)	(Parent) This Manual establishes policies, procedures, and standards for the Aeronautical Engineering Community.
Aeronautical Engineering Maintenance Management Process Guide	ALC CGTO PG-85-00-110-A	Latest	(Parent) This process guide establishing procedural consistency for aeronautical engineering maintenance management.
Aeronautical Engineering Safe Work Practices Process Guide	ALC CGTO PG-85-00-2210-A	Latest	(Parent) This process guide provides guidance and expectations for the safety of USCG corrosion control crews conducting aircraft corrosion control activities.

SILC-CSTO-36-71 91 11 13-07
Aviation Corrosion Control Facilities (CCF) (Rev A)

Document Name	Document No.	Rev / Date	Purpose
Aircraft Hangar Fire Protection Requirements	SILC-CSTO-36-11 55 13 25-02	Latest	(Parent) This CSTO provides design criteria as well as functional and operational performance parameters in order to ensure necessary fire protection for USCG Hangars.
Civil Engineering Manual	COMDTINST M11000.11	Latest	(Parent) Establishes framework for the CE program.
Coast Guard Health Promotion Manual	COMDTINST M6200.1	Latest	(Parent) Establishes policy and guidelines regarding health risk reduction at CG facilities.
Coast Guard Shore Facilities Standards Manual	COMDTINST M11012.9	Latest	(Parent) Establishes Shore Operations Space Requirements.
Hazardous Waste Management Manual	COMDTINST M16478.1	Latest	(Parent) This Manual establishes policies, procedures, and standards for the disposal of hazardous waste.
Safe Work Practice – AIRSTA Coating Applications and Removal Operations HSWL Guidance		Latest	(Sibling) Interim measure to manage exposure risks associated with aircraft painting and paint removal operations.
Safety & Environmental Health Manual	COMDTINST M5100.47	Latest	(Parent) This Manual sets forth the key elements of the Coast Guard's Safety and Environmental Health Program, assigning responsibilities for the implementation of those program elements and specifying the Safety and Environmental Health (SEH) standards that are to be applied within the Coast Guard.
Shore Infrastructure – Mission Support Business Model RDTO	SILC-RDTO-36-11 29 11 00-01	Latest	(Parent) Authority for creating SILC technical orders to further define the MSBM.

Table 3-2: Other Government Publications

Document Name	Document No.	Rev / Date	Purpose
Aircraft Corrosion Control & Paint Facilities	UFC 4-211-02	(series)	This UFC provides requirements for evaluating, planning, programming, and designing Aircraft Corrosion Control and Paint Facilities (ACCPFs).
Aircraft Maintenance Facilities	MIL-HDBK-1028/1C		Provides requirements for Aircraft Maintenance Facilities.

SILC-CSTO-36-71 91 11 13-07
Aviation Corrosion Control Facilities (CCF) (Rev A)

Document Name	Document No.	Rev / Date	Purpose
Aircraft Maintenance Hangars	UFC 4-211-01	(series)	This UFC provides guidelines for evaluating, planning, programming, and designing Aircraft Maintenance Hangars.
Chromium (VI)	29 CFR 1926.1126	(series)	Regulations for Construction.
Chromium (VI)	29 CFR 1910.1026	(series)	Regulations for control of chromium exposure.
Clean Air Act	42 CFR Chapter 85		Provides requirements for Air Pollution Prevention and Control.
Fire Protection Engineering for Facilities	UFC 3-600-01	(series)	This UFC establishes fire protection engineering policy and criteria.
Flammable and Combustible Liquids Code	NFPA 30	2018	Provides requirements for storage and ventilation of flammable and combustible liquids.
Flammable Liquids	29 CFR 1910.106	(series)	Regulations for the storage of flammable liquids.
Hazardous Waste Management System	40 CFR Part 260		Provides requirements for Hazardous Waste Management.
Industrial Ventilation	UFC 3-410-04	(series)	Criteria are developed to define requirements during the design of industrial ventilation systems.
Interior and Exterior Lighting Systems and Control.	UFC 3-530-01	(series)	Provides requirements for interior and exterior lighting equipment. Provides design requirements for many typical lighting applications.
National Electric Code	NFPA 70		Provides requirements for Electrical Installation.
National Emission Standards for Hazardous Air Pollutants	40 CFR 63.5		Provides requirements for National Emission Standards for Hazardous Air Pollutants.
National Fire Alarm and Signaling Code	NFPA 72		Provides requirement for Fire Alarm and Signaling.
Sanitation	29 CFR 1910.141	(series)	Regulations for general environmental sanitation controls.
Spray Application Using Flammable or Combustible Materials	NFPA 33	(series)	This standard shall apply to the spray application of flammable or combustible materials.
Spray Finishing Using Flammable and Combustible Materials	29 CFR 1910.107	(series)	Regulations for the design of spray booths.

Document Name	Document No.	Rev / Date	Purpose
Standard for Exhaust Systems for air Conveying of Vapors, Gases, Mists and Particulate solids	NFPA 91	(series)	This standard provides minimum requirements for the design, construction, installation, operation, testing, and maintenance of exhaust systems for air conveying of vapors, gases, mists, and particulate solids as they relate to fire and/or explosion prevention.
Standard for Portable Fire Extinguishers	NFPA 10		Provides requirements for Portable Fire Extinguishers.
Standard for the Installation of Sprinkler Systems	NFPA 13		Provides requirements for installation of Sprinkler Systems.
Standard on Aircraft Maintenance	NFPA 410	(series)	This standard covers the minimum requirements for fire safety to be followed During aircraft maintenance.
Standards for Spray Application Using Flammable or Combustible Materials	NFPA 33	Latest	Provides requirements for fire safety for spray application of flammable or combustible materials.
Testing, Adjusting and Balancing of HVAC	UFGS 23 05 93	Aug 2009	Provides requirements for testing, adjusting and balancing of HVAC systems.
Ventilation	29 CFR 1910.94	(series)	Regulations for the design of spray booth ventilation systems.
Ventilation	29 CFR 1926.57	(series)	Regulations for the design of ventilation systems for the control of dusts, fumes, mist, and gases in concentrations causing harmful exposure.

Table 3-3: Technical Publications

Document Name	Document No.	Rev / Date	Purpose
ASHRAE STANDARD	ASHRAE 52.1		This standard establishes procedures for measuring the ability of air cleaners to remove the coarser fraction of airborne dust.
Exhaust Systems for Grinding, Polishing, and Buffing	ANSI Z9.6-2008	(series)	This standard provides guidance to protect the health of personnel engaged in and working in the vicinity of grinding, polishing and buffing operations.

Document Name	Document No.	Rev / Date	Purpose
Eyewash and Shower Equipment	ANSI Z358.1	(series)	This standard establishes a universal minimum performance and use requirements for all Eyewash and Drench Shower equipment used for the treatment of the eyes, face, and body of a person who has been exposed to hazardous materials and chemicals.
Industrial Ventilation Manual: A Manual of Recommended Practice	American Conference of Governmental Industrial Hygienists (ACGIH)	(series)	The manual is not intended to be used as a requirement, but rather as a guide. The manual attempts to present a logical method of designing and testing industrial ventilation systems.
Spray Finishing Operations: Safety Code for Design, Construction, and Ventilation	ANSI Z9.3-2007	(series)	This standard provides guidance to manufacturers and users to protect the health of personnel from contact with potentially toxic materials associated with spray finishing operations.

4 DEFINITIONS

See the Shore Infrastructure Lexicon for common glossary terms.

Table 4-1: Acronyms and Abbreviations

Term	Definition
ACGIH	American Conference of Governmental Industrial Hygienists
AIRSTA	Air station
ALC	Aviation Logistics Center
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers
CAA	Clean Air Act
CCF	Corrosion Control Facility
CEU	Civil Engineering Unit
cfm	Cubic feet per minute
CFR	Code of Federal Regulations
CrVI	Hexavalent Chromium
CSTO	Configuration Standard Technical Order
CWA	Clean Water Act
ECP	Engineering Change Proposal
fpm	Feet per Minute
HAP	Hazardous Air Pollutants
HEPA	High Efficiency Particulate Air
HSWL SC	Health, Safety, and Work-Life Service Center
HVAC	Heating, Ventilation, and Air Conditioning
MPC	Maintenance Procedure Card
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act

Term	Definition
SEHO	Safety and Environmental Health Officer
SFSM	Shore Facilities Standards Manual
SILC	Shore Infrastructure Logistics Center
STEL	Short Term Exposure Limit
<u>SWP</u>	Safe Work Practice
TAB	Testing, Adjusting, Balancing
TIMI	Technical Information Maintenance Instruction
TOPL	Tactical Operations Product Line
TWA	Time-Weighted Average
UFC	Unified Facilities Criteria
UFGS	Unified Facilities Guide Specifications
USCG	United States Coast Guard
VOC	Volatile Organic Compound
WG	Water Gauge

Appendix A – Size Requirements by Airframe

Airframe Component Size

Design Requirements

MH-60						
MH-60	Width (ft)	Height (ft)	Total Area (ft²)	MH-60	Area (ft²)	Minimum Width Dimension (ft)
Turtle Shell	6.6	5.5	36.3	Sanding "Dirty" Booth/Room	175	14.6
Cowling	2.7	5.6	15.1	Doffing Room	49	7.0
Floor Panel	6.2	3.8	23.6	Composite "Clean" Booth/Room	200	14.6
				Paint Booth	300	14.6

MH-65						
MH-65	Width (ft)	Height (ft)	Total Area (ft²)	MH-65	Area (ft²)	Minimum Width Dimension (ft)
Turtle Shell	3.8	3.0	11.4	Sanding "Dirty" Booth/Room	175	12.8
Cowling	4.0	3.2	12.8	Doffing Room	49	7.0
Floor Panel	4.8	4.3	20.6	Composite "Clean" Booth/Room	200	12.8
				Paint Booth	300	12.8

HC-144						
HC-144	Width (ft)	Height (ft)	Total Area (ft²)	HC-144	Area (ft²)	Minimum Width Dimension (ft)
Turtle Shell	8.3	5.8	48.14	Sanding "Dirty" Booth/Room	175	16.3
Rear Wing Cowling	4.0	1.8	7.2	Doffing Room	49	7.0
				Composite "Clean" Booth/Room	200	16.3
				Paint Booth	300	16.3

HC-130						
HC-130	Width (ft)	Height (ft)	Total Area (ft²)	HC-130	Area (ft²)	Minimum Width Dimension (ft)
Nose Cowling	5.7	5.5	31.4	Sanding "Dirty" Booth/Room	175	13.7
				Doffing Room	49	7.0
				Composite "Clean" Booth/Room	200	13.7
				Paint Booth	300	13.7

Appendix B – Design Requirements Check List

2.2.1 Sanding “Dirty” Room/Booth: (CrVI exposure - Regulated Area)

- Exhaust ventilation to maintain min -.10 (typ.) WG negative pressure (relative to the atmosphere) during sanding operation
- Independent make up air system. Heated to 65-80 °F (during sanding operation)
- Independent Heating system. Heated to 65-80 °F. (during non-sanding operation)
- Exhaust ventilation to maintain min -.05 (typ.) WG negative pressure (during non-sanding operation)
- Sanding downdraft tables average face velocity range of 150- 250 fpm
- Configure the downdraft table so all portions of the table are easily cleaned
- Minimum room Size per Appendix A
- Review Layout example per Appendix D
- Review Typical Control Diagram per Appendix E
- Ensure clear space around downdraft table (not less than 3 feet on all sides)
- Provide double doors at entrance to accommodate largest component.
- Dedicated power source provided for the use with grinding equipment interlocked with exhaust ventilation system.
- Install visual gauges, audible alarms, and/or pressure activated devices on filters to ensure that the minimum air velocity or volume are maintained
- Interlock the sanding tool power supply with the ventilation system's on-off switch.
- Provide an observation window and an access door

2.2.2 Paint Room/Booth (crystalline silica/isocyanate exposure - Regulated Area)

- Exhaust ventilation to maintain min -.05 (typ.) WG negative pressure (relative to the atmosphere) during painting operation
- Air velocities in paint booths must meet the requirements of UFC 3-410-04, NFPA 33 and OSHA1910.94.
- Independent make up air system. Heated to 65-80 °F during painting operation
- Exhaust ventilation to maintain min -.05 (typ.) WG negative pressure during non-painting operation
- Independent Heating system. Heated to 65-80 °F. during non-painting operations
- Paint Room/Booth shall be adequate to accommodate the largest removable component, with at least 4 feet of working space around the component plus 10%. Min size per Shore Facilities Standards Manual (SFSM) 300SF for single aircraft type, 375 for multiple aircraft types min.
- Provide double doors at entrance to accommodate largest component.
- Safety system control features, designed to prevent the use of painting equipment without proper ventilation controls in operation
- Breathing air (Grade D) provided for respirators
- Review layout example per Appendix D
- Typical Control Diagram per Appendix E
- Reference Table 7-14, UFC 4-211-02
- Reference CGTO PG_85-00-110-A Chapter 2.11

2.2.3 Paint Mixing Room (crystalline silica/isocyanate exposure - Regulated Area)

- Must have continuous mechanical ventilation as specified in NFPA 30
- Accommodate all equipment, cabinets, and tables associated with paint mixing and daily-use storage of paints and thinners
- Design requirements, UFC 4-211-02 Chapter 2 & 3 Table 7-3
- Eye Wash Station must be accessible and require no more than 10 seconds to reach
- Floor drain and collection sump system
- Compressed air for agitator (paint mixer)

2.2.4 Composite Room/Booth "Clean Room" (Volatile Organic Compounds exposure - Regulated Area)

- Space to accommodate the largest removable composite component that is unit level repairable, with at least 4 feet of working space around the component plus 10%.
- Minimum room Size per Appendix A
- Layout example per Appendix D
- Exhaust ventilation to maintain min -.05 (typ.) WG negative pressure (relative to the atmosphere)
- Independent HVAC system. Temperature range 65-84 °F with Humidity control (per CGTO)
- Provide double doors at entrance to accommodate largest component. Doors must be large enough to allow the secondary and tertiary components to pass into the space. Full-length, double doors are recommended. (per CGTO)
- 120-volt (20-amp) power supplies with no more than two outlets on each circuit breaker. (per CGTO)
- Reference CGTO PG-85-00-110-A Encl. (3) C. Bonding And Layup Area ISO Class 9 Clean Room

2.2.6 Doffing Booth (Dirty) (CrVI exposure - Regulated Area)

- Independent HVAC system
- Exhaust ventilation to maintain min -.05 (typ.) WG negative pressure
- Configured to ensure proper space allowance for disposal containers
- Layout example per Appendix D
- Typical Control Diagram per Appendix E
- Handwashing facilities and floor drains "not permitted" due to Environmental requirements

2.2.6 Changing Area / Locker Room (Non-Regulated Area)

- Design requirements are not included with this CSTO

2.2.7 Ventilation

- Regulated Area ventilation shall be isolated from all ventilation systems serving non-regulated areas and other regulated areas.

2.2.8 Plumbing

- Compressed air power sources for Regulated Areas interlocked with safety system control features and designed to prevent the use of grinding and painting equipment without proper ventilation controls
- Breathing air (Grade D) for respirators
- Eye wash station with tempered water

2.2.9 Electrical

- Supply and exhaust systems shall be electrically interlocked
- Explosion-proof lighting/wiring or lighting/wiring shall be in spray area
- Lighting shall comply with UFC 3-530-01

2.2.10 Fire Protection Consult with CEU and Fire Protection stakeholders

- Fire suppression system per NFPA, & UFC 3-600-01
- Fire alarm detection system per NFPA
- Fire extinguishers per NFPA

2.2.11 Ductwork, Fans, Exhaust Stacks, Controls, etc.

- HVAC systems shall not draw air from the hangar bay. (Fresh air must be drawn from outside the building)
- UFC 3-410-04, & NFPA 33 for the design of all industrial ventilation ductwork, fans, exhaust stacks, controls, etc.
- Exhaust discharge points from Regulated areas must be located above the roof and sufficient to prevent re-entry of contaminants and exposure to personnel

2.3.2 Construction Inspection & Acceptance

- Testing, Adjusting, and Balancing (TAB) procedures outlined to conform to CSTO
- Regulated areas require a complete air barrier of the perimeter envelope to prevent contaminants from migrating to non-regulated areas. Ensure all openings and gaps in the walls and structure are sealed.

Future design considerations

Reference CGTO PG-85-00-110-A

Metal shop under slight negative pressure
Welding shop exhaust ventilation

General requirements per UFC 3-410-04

- Chapter 2 Design Procedure: Steps 1-9
- Chapter 2 Design Criteria:
 - Ductwork, per ACGIH IV, NFPA 91, SMACNA RIDCS-RTIDCS, cleanouts
 - Fans, Selection, Location
 - Exhaust Stack, design, location
 - Air Pollution Control Equipment
 - Replacement Air, Space pressure modulation, plenum design
 - Controls, Gauges & Sensors, Differential Pressure sensors, interlocks etc.
 - Operational Considerations, Testing, energy conservation, recirculation, maintenance
 - Safety and Health Consideration, postings, noise, breathing air, air compressors, eye wash station, hygiene facilities
 - Commissioning
- Chapter 5 Composite Fabrication & Repair Facilities: (includes Clean room and dirty room)
 - Function
 - Operational Considerations
 - Floor plan
 - Design Criteria, Exhaust air system, Hood design, etc.
 - Replacement Air
 - System Controls
 - Safety and Health Considerations
- Chapter 9 Paint Spray Booths
 - Function
 - Operational Considerations
 - Painting Equipment Types
 - Design Criteria, Paint Booths, filtration system, mixing room,
 - Fans and motors
 - Replacement air, air distribution, HVAC
 - Control system
 - Safety and Health Considerations

Appendix C – CrVI Surface Contamination Guidance



Commanding Officer
United States Coast Guard
Health, Safety and Work-life Service
Center

300 East Main Street, Suite 1000
Norfolk, VA 23510
Staff Symbol: (se)
Phone: 757-628-4412
Fax: 757-628-4418
Email: Edward.L.Bock@uscg.mil

11131
03 Jan 2022

MEMORANDUM

BOCK.EDWARD.L. Digitally signed by
BOCK.EDWARD.L.1018745476
Date: 2022.01.03 09:34:49 -0500
1018745476

From: Edward L. Bock
CG HSWL SC (se)

Reply to: CDR Beth Osterink
Attn of: (757) 628-4403

To: CEU TOPL

Subj: HEXAVALENT CHROMIUM SURFACE CONTAMINATION THRESHOLD
GUIDANCE

Ref: (a) Your memo 11131/21-202 dated 29 SEP 21
(b) OSHA 29 CFR 1910.26 – Chromium (VI)
(c) OSHA Technical Manual, TED 01-00-015
(d) ACGIH, 2021 TLVs and BEIs

1. On 12 October 2021 I received reference (a) requesting clarification on surface contamination limits for hexavalent chromium [chromium (VI)]. Per reference (b), we must maintain all surfaces as free as practicable of chromium (VI) accumulations. Accessible contaminated surfaces require cleaning and must follow methods prescribed in reference (b). Inaccessible areas with known chromium (VI) contamination must be recorded and clearly marked to ensure it is not disturbed during maintenance or renovation and personnel are properly protected.

2. After cleaning, units can use the exposure risk-based criteria in Table 1 based on references (b) to (d) for as free as practicable to evaluate the effectiveness of controls and hygiene practices.

Table 1. HSWL SC (se) Recommended Chromium (VI) Surface Contamination Criteria

Criteria ($\mu\text{g}/100\text{cm}^2$)	Location
< 0.05	Designated eating and drinking areas
≤ 2.0	Non-regulated Areas: Floors and accessible areas (includes ventilation systems and components)
As free as practicable	OSHA Regulated Areas: Floors and accessible areas

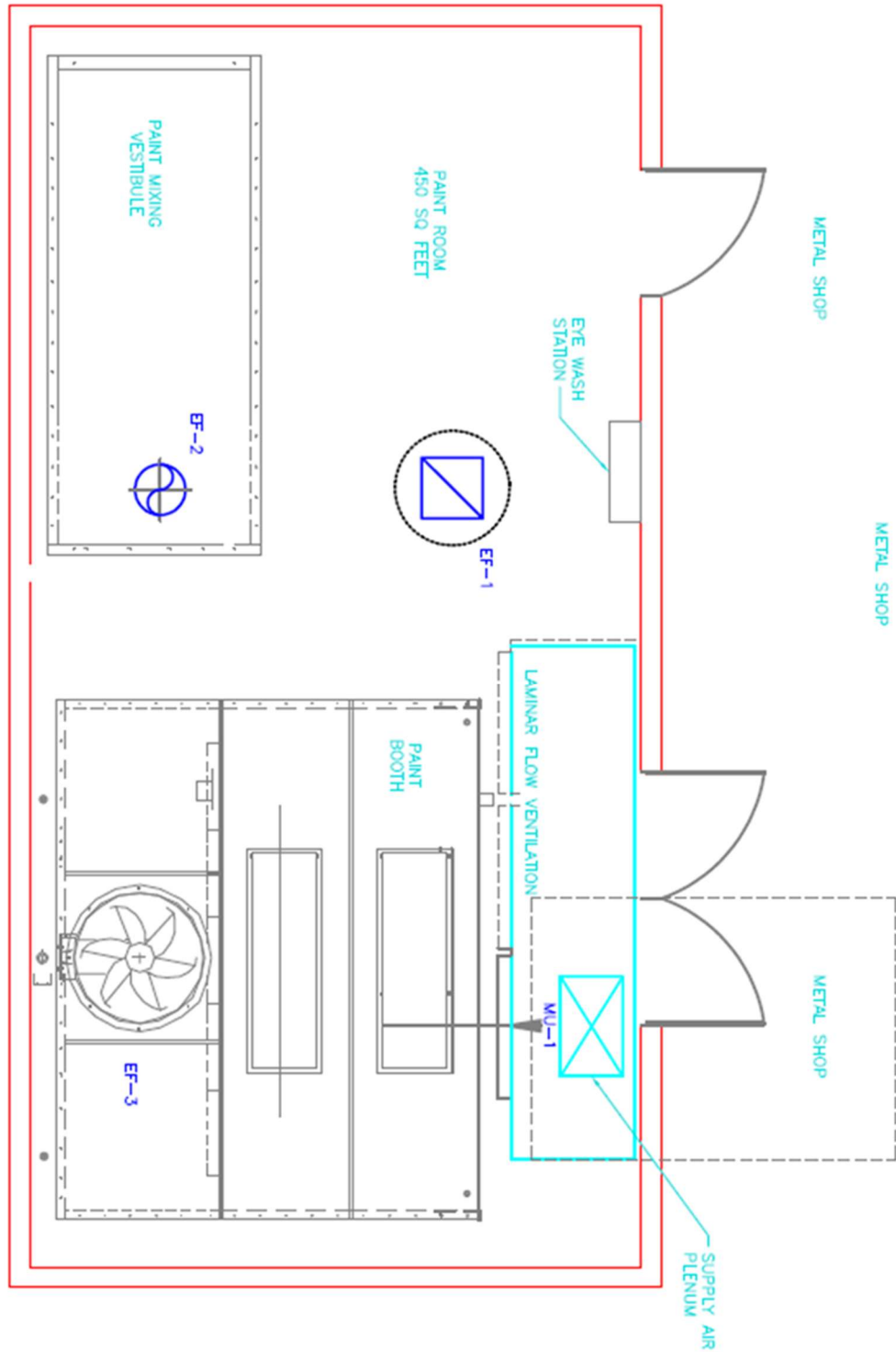
3. The HSWL SC (se) primary contact for this matter is CDR Beth Osterink, HSWL SC (se-eh), Environmental Health Branch Chief at 757-628-4403 or Beth.A.Osterink@uscg.mil.

#

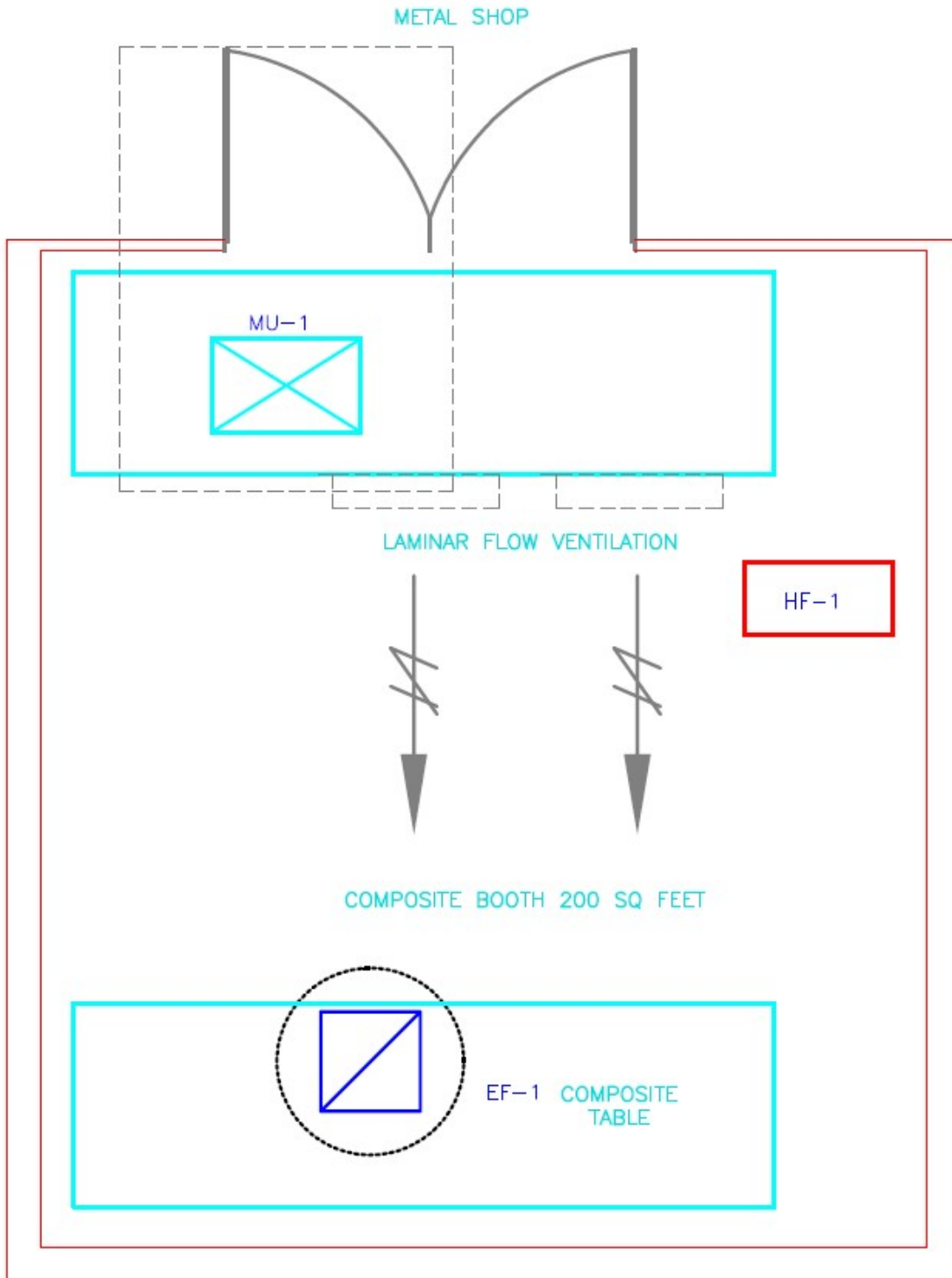
Encl: CG CEU TOPL memo dated 29 Sep 2021

Copy: CG-113
CG Aviation Logistics Center

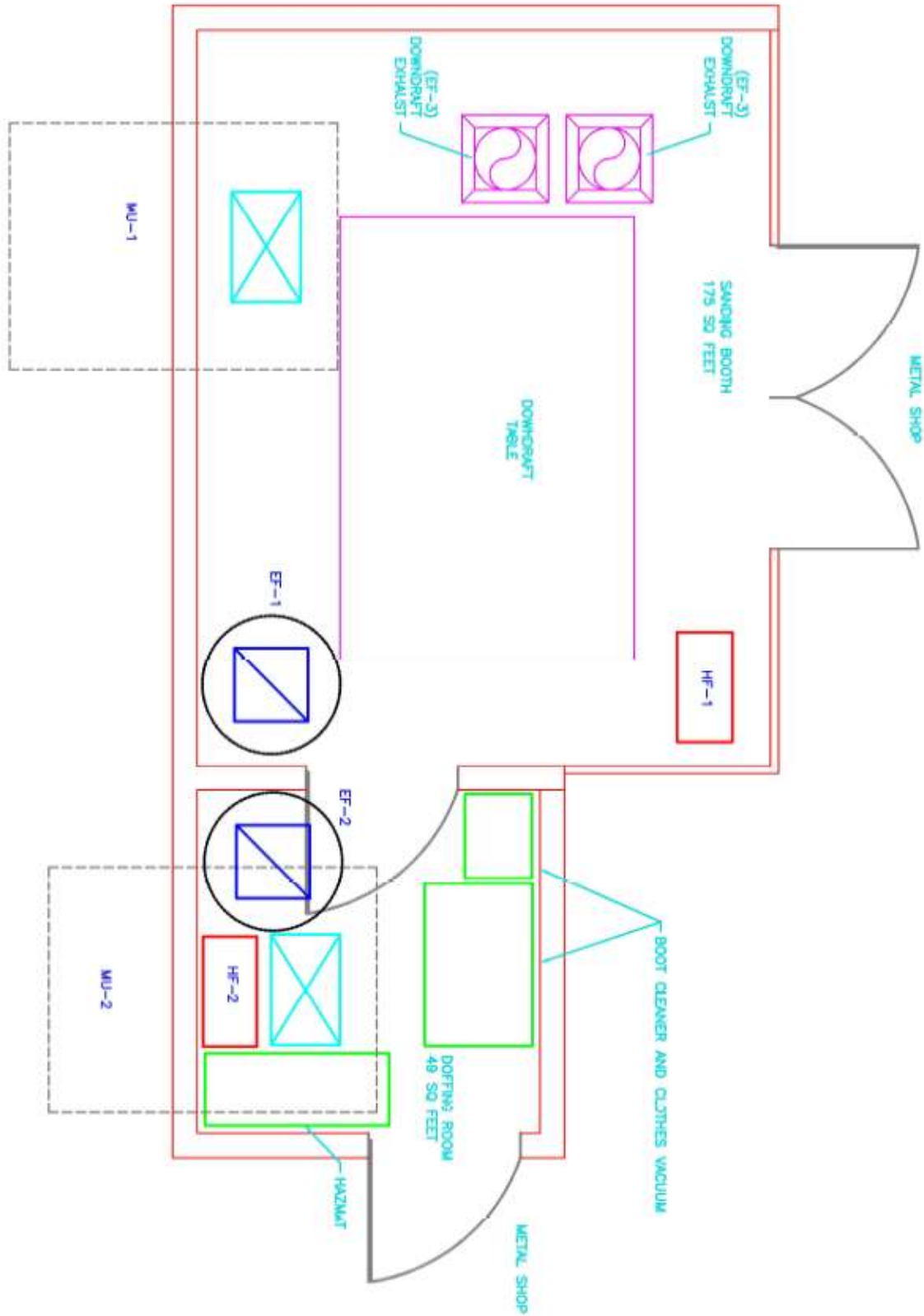
Appendix D – Example Facility Layout Drawings



Sample Layout of Paint Booth/Room



Sample Layout of Composite "Clean" Booth/Room



Sample Layout of Sanding "Dirty" Booth/Room with Attached Doffing Booth

Appendix F – ALC Downdraft Table Equipment

DIVERSITECH Downdraft Table Specifications

Work surface dimensions: 48" deep x 72" wide x 36" high 14ga. Mild steel construction

Includes;

10.0HP TEFC Motor [230-460/3/60] DD-3X6 EO

Approx. 6300 CFM | 375 FPM | NEMA12 control panel | Includes dual 10" exhaust silencers

Automated reverse-pulse filter self-cleaning system to help reduce maintenance requirements. Solenoid operated air valves discharge large blasts of air through the filter cartridges thus dislodging particles embedded in the filter media. The particles fall into a dust drawer located below the cartridge. The angled v-shaped baffles above the drawer prevent the dust from re-entering the cabinet when the machine is turned on.

Neglecting to pulse the filter regularly will reduce filter life

16" Nanotech XV Cartridge Filter, 140 sqft, MERV 15, DD-3X6 (2 per table)

Extended Overhang 1" galvanized steel bar grating only

Set of three metal mesh pre-filters, 16" x 25" x 1" w/flange,

DD-3X6

Sound dampening in blower motor compartment

Clean air workstation: EO side and back panels 48" high with top cover/ backdraft hood/light kit

Dual HEPA after filters w/frames, MERV 17, DD-3X6

Minihelic gauge, DD-3X6

Resettable Electric-Motor-Actuated Hour Meter

Blue Cushion Grid Matting for DD-3X6

DIVERSITECH Downdraft Table Illustration

