SECTION 41 34 23.33 – SPRAY PAINTING BOOTH AND SANDING ROOM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes Spray Painting Booth and Sanding Room System with the following features:

1. Full Downdraft type spray painting booth including exhaust filters, exhaust fan, recirculation fan, makeup air unit, compressor/condenser unit, ductwork, and controls.
2. Cross flow sanding room system including exhaust filtration/dust separation system, exhaust fan, recirculation fan, makeup air unit, ductwork, and controls.
3. Paint mixing room with exhaust.
4. Air shower.
5. Vestibule, shower room, and decontamination room.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: System shall be designed by a Professional Engineer(s) experience in the design of paint booths, sanding rooms, paint mixing rooms, ventilation, and controls.

1.3 DEFINITIONS

A. Three stage NESHAP filters: Multi stage filter system that complies with National Emissions Standard for Hazardous Air Pollutants (NESHAP) requirements for new spray booths that complies with the functional requirements of three stage filtration for spray painting and sanding in the aerospace industry that operate with chromates.

1.4 SUBMITTALS

A. Product Data:

1. Spray booth complying with NFPA 33.
2. Spray booth NESHAP exhaust filter system.
3. Sanding room
4. Sanding room NESHAP exhaust filter system.
5. Tube-axial fans.
6. Makeup air units.
7. Gravity ventilators.
8. Air shower.
9. Water shower
10. Wall panels
11. Compressor-condenser for cooling.
12. Other ventilation equipment and accessories
13. Plumbing fixtures: faucets, showerhead, floor drain
14. Light fixtures: vestibule, shower room, decontamination room

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Dimensioned outline plan and elevation drawings of Spray Painting Booth System, Sanding Room System, and other components specified including ductwork and stacks.
2. Drawings showing size, locations, and details of paint booth floor trenches and underfloor tunnels for paint booth exhaust.
3. Drawings showing ladders and platforms for maintenance access.
5. Electrical one line diagram.

C. Control information including screen diagrams and ladder diagrams or other control logic documentation.

D. Delegated Design Submittal
1. Design Calculations: Signed and sealed by a qualified professional engineer for booth air flows, heating, cooling, and humidification requirements, structural design, and electrical design.
2. Coordination drawings for all building interfaces including:
   a. Paint booth trench and inserts
   b. Roof penetrations
   c. Guys, if any, for stacks.
   d. Electrical points of connection and loads
   e. Compressed air connections
   f. Breathing air connections
   g. Hot and cold water connections
   h. Drain connections
   i. Weights of items located on or hung from the roof structure

E. Qualification Data: For manufacturer, installer and testing agency.

F. Field quality-control test reports.

G. Operation and Maintenance Data: For all equipment, components, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

1. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

H. Warranty: Special warranty specified in this Section.

I. All test results shall be a required submittal to the Government.
J. Contractor shall submit qualifications of any required Independent Testing and Inspection Agent in advance for Government approval.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer or distributor with experience providing similar systems. Maintain, within 200 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

B. Comply with NFPA 33 – Spray Application Using Flammable or Combustible Materials.

C. Comply with NFPA 70.

D. Comply with ANSI/AIHA Z9.3 Spray Finishing Operations

E. Comply with ASSE standards regarding sanding and recirculation of air.

1.6 PROJECT CONDITIONS

A. Electrical power will be provided as 480 volts, 3 phase, 60 Hz with one connection to the paint booth panel, one connection to the sanding room panel, and one connection to the mixing room panel. All lighting and equipment power shall be distributed from these panels by the contractor.

B. The interior area where this system is to be installed is classified as electrically hazardous Class I, Division 2 up to 18” above to floor. Electrical devices and wiring should be above this level if possible. They must conform to NFPA 70 requirements if below this elevation.

C. Mechanical design shall be based on 0.4% Charlotte, NC ambient data.
   1. Summer: 94 deg F DB/74 deg F WB
   2. Winter: 18 deg F DB

1.7 COORDINATION

A. Contractor is responsible for coordination and proper relation of all work to the building structure and to the work of all trades. The Contractor shall verify all dimensions of the building that relate to fabrication of all equipment and notify the Contracting Officer of any discrepancy before the order for the equipment is finalized.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of all equipment in this specification for a period of one year from date of substantial completion.
PART 2 - PRODUCTS

2.1 SPRAY PAINTING BOOTH AND SANDING ROOM SYSTEM

A. The items covered by this Section are to be provided by a single supplier that will be responsible for delegated design, all items listed in specification, and overall performance of system and subsystems.

B. Suppliers: Subject to compliance with requirements available suppliers offering these systems include, but are not limited to, the following:
   1. Global Finishing Solutions. Osseo, WI. Contact: Alan B. McLaughlin, 715-797-9757, amclaughlin@globalfinishing.com
   2. Metal Prep, Inc., High Poiint, NC. Contact: Robert Smith, 336-841-8047, Robert.mith@metalprep.net

2.2 PAINT SPRAY BOOTH SYSTEM

A. Full down draft design spray booth. Air shall flow from ceiling plenum to exhaust chambers in the floor. Floor trenches and underfloor tunnels will be by other contractors. Paint Booth contractor shall supply drawings showing size, locations, and required details. Paint booth manufacturer shall supply floor grating - **125 psf min. load rating**, underfloor filters, and filter supports.

B. Average velocity of air shall be 50 fpm evenly distributed throughout the booth working area.

C. Booth size, interior:
   1. 35 ft. long.
   2. 17 ft. wide.
   3. 14 ft. high.

D. Doors:
   1. Main door shall be double bifolding doors with windows for observing booth operation and personnel inside the booth.
   2. Three personnel single doors as indicated on system drawing. These shall be manually operated with weather stripping, sweep seals, and FM approved panic hardware.
   3. All doors shall have open door sensing connected to the system control panel.

E. Booth shall be constructed of galvanized steel not less than 18 ga. Metal surfaces inside the booth shall be covered with white strippable coating. Glass surfaces shall be covered with clear strippable coating. Booth shall be self-supporting.

F. Booth shall be assembled with screws and nuts. Tek screw or other fasteners with exposed sharp points are prohibited.

G. Provide permanent ladders for access to any equipment mounted above the paint booth or sanding room.
H. Provide strippable coating for interior of paint booth, clear coating for windows and white for other surfaces.

I. Booth shall provide three modes of operation.
1. Paint Mode: 30,000 CFM airflow with temperature held within range of 70 to 90 deg F and humidity between 50 and 70% RH. Recirculation will be allowed for up to 70% of the airflow.
2. Cure Mode: 15,000 CFM airflow with temperature held to 120 +/- deg F.
3. Preparation Mode: 30,000 CFM airflow

J. Coordinate sprinkler head locations with sprinkler contactor. Provide openings in ceiling as required for “Extra Hazard Occupancy.

K. Compressed air piping and fittings and breathing air piping and fittings will be provided by other subcontractor to the GC. Refer to Plumbing drawings.

L. Provide compressed air shutoff solenoid for installation in piping and connect to control system.

M. Provide LED lighting to provide 70 fc illuminations. Two fixtures shall have battery backup ability to provide emergency lighting in case of power failure.

N. Provide tube-axial exhaust fan that meets NFPA 33 requirements. Exhaust fan may be installed above the roof and should be weather proof design.

O. Provide exhaust stack with gravity ventilator and ductwork to assure exhaust is 6 ft. above building parapet. If guy wires are required, coordinate anchorage with building Structural Engineer of record and the building Architect of Record.

P. Provide low vibration and low noise recirculation fan.

Q. Exhaust filters shall comply with NESHAP 3-stage performance standards that meet to exceed EPA Method 319 emissions stands.

R. Provide direct-fired, natural gas heated make-up air unit with DX cooling coil and filter section. Unit shall be suitable for roof mounting.

S. Provide condenser/compressor package unit for roof top mounting.

T. Provide evaporative humidifier to provide minimum humidification requirement.

U. Provide PLC controls with touch screen operator interface. Control panel shall control all parts of the system. All fans shall have VFD drives.

V. Provide ladders and platforms to access overhead components that require maintenance.

2.3 SANDING ROOM SYSTEM

A. Cross draft design sanding booth.
B. Average velocity of air shall be 100 fpm evenly distributed throughout the booth working area.

C. Booth size, interior:
   1. 35 ft. long.
   2. 17 ft. wide.
   3. 14 ft. high.

D. Doors:
   1. Main door shall be trifold door with windows for observing booth operation and personnel inside the booth.
   2. Two personnel single doors as indicated on system drawing. These shall be manually operated with weather stripping, sweep seals, and FM approved panic hardware.
   3. All doors shall have open door sensing connected to the system control panel.

E. Booth shall be constructed of galvanized steel not less than 18 ga.

F. Booth shall be assembled with screws and nuts. Tek screw or other fasteners with exposed sharp points are prohibited.

G. Airflow shall be 24,000 CFM with recirculation up to 80%. Temperature shall be maintained above 55 deg F.

H. Coordinate sprinkler head locations with sprinkler contractor. Provide openings in ceiling as required for “Extra Hazard Occupancy.

I. Compressed air piping and fittings and breathing air piping and fittings will be provided by other subcontractor to the GC. Refer to Plumbing drawings.

J. Provide LED lighting to provide 70 fc illumination. Two fixtures shall have battery backup ability to provide emergency lighting in case of power failure.

K. Provide tube-axial exhaust fan that meets NFPA 33 requirements. Exhaust fan may be installed above the roof and should be weather proof design.

L. Provide exhaust stack with gravity ventilator and ductwork to assure exhaust is 6 ft. above building parapet. If guy wires are required, coordinate anchorage with building Structural Engineer of record and the building Architect of Record.

M. Provide low vibration and low noise recirculation fan.

N. Exhaust filters shall comply with NESHAP 3-stage performance standards that meet to exceed EPA Method 319 emissions stands.

O. Provide direct-fired, natural gas heated make-up air unit with filter section. Unit shall be suitable for roof mounting.

P. Provide PLC controls with touch screen operator interface. Control panel shall control all parts of the system. All fans shall have VFD drives.
Q. Provide ladders and platforms to access overhead components that require maintenance.

2.4 PAINT MIXING ROOM

A. Comply with NFPA 33.

B. Size:
   1. 12 ft. long
   2. 8 ft. wide
   3. 8 ft. high

C. Room shall be constructed of galvanized steel not less than 18 ga.

D. Room shall have 4” deep containment base built in.

E. Exhaust system shall provide 900 CFM exhaust

2.5 AIR SHOWER

A. Air shower shall be used to remove surface particles from personnel when leaving controlled environment booths were they may have been exposed to particles containing chromates and other hazardous materials before they pass into a decontamination room where they will remove outer protective clothing.

B. The air shower shall be a pass through unit for one person at a time. Doors shall be interlocked so that shower operates with both doors closed and persons passing through must be subjected to the shower for a period of time adjustable in the control panel initially set to 15 seconds.

C. Size shall be as shown on the drawings.

D. Shower walls shall be constructed of hard, durable, non-particulating surface.

E. Exhaust air shall be filtered through a HEPA filters.

F. Airflow should be high velocity, low pressure flow with velocity that has proven effective removing particles form clothing and skin.

G. Equipment should be located above the air shower compartment. Provide removable ceiling panels in adjacent area for maintenance access.

2.6 VESTIBULES, SHOWER ROOM, AND DECONTAMINATION ROOM

A. Shower room shall be provided with FRP walls and ceiling. Provide complete plumbing system including pipes and fixtures from point of connection to building hot water and cold water supply. Connect shower drain to building drain.
B. Vestibules and decontamination rooms shall be hard surface, easily cleanable walls, floors, and ceiling. Ventilation will be by others. Provide built in LED lighting at 50 fc illumination.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, floor trenches and underfloor tunnels, and other conditions, with Installer present, for compliance with requirements for installation and other conditions affecting performance.

B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturers' written installation instructions and drawings.

B. The Contractor is responsible for interconnecting all control components and devices required for a complete working system. He shall provide all wiring and conduit to and from all devices even if not shown on the electrical drawings. Electrical equipment shall be installed per the requirements of Division 26.

C. It is essential that the paint booth environment be kept clean. The Contractor is responsible for maintaining a clean project. On a regular basis, the Contractor shall clean up construction dust and debris, and properly dispose of it. Also, at various stages of completion the Contractor shall perform a general clean-up. For instance, at the completion of the erection of the shell and before filters are installed. Cover all important surfaces to protect them from construction dirt, especially glass and filters. Any cleaning or replacement required due to inadequate cleaning or protection of materials shall be at the expense of the Contractor. Near the completion of the project, the Contractor shall perform a final clean-up. It shall entail cleaning all surfaces to the satisfaction of the Contracting Officer's Representative. Repair or repaint any surface that has been damaged during construction.

3.3 CONNECTIONS

A. Drawings indicate general arrangement of piping and specialties.

B. Connect fuel, water, and drain piping to allow service and maintenance.

C. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
D. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.4 IDENTIFICATION

A. Identify system components according to Section 26 05 53 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations. Report results in writing.

B. Test and adjust all systems to ensure proper operation. Correct any excessive vibration or noise. Lubricate all equipment as recommended by the manufacturer.

C. Test and adjust doors to open wide without binding or dragging.

D. Balance airflows to required quantities.

E. After testing and balancing systems and before final acceptance, the Contractor shall replace all filters with new clean filters.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Government maintenance personnel to adjust, operate, and maintain the Paint Booth and Sanding Room System. Refer to Section 01 79 00 "Demonstration and Training."

B. Provide on-site training for Operations and Maintenance Personnel. Course should include at least 16 hours of classroom and hands-on. The session outline shall cover the following items:

2. Review of As-built Drawings.
3. Overview of system components.
4. System operation under normal conditions.
5. System operation under abnormal conditions.
7. Troubleshooting procedures.
8. Maintenance and Repair procedures.

C. Provide handouts in bound format and in sufficient quantity to provide each attendee with a copy.

END OF SECTION 41 34 23.33