

SECTION 3 – CLEANROOM SPECIFICATIONS

NASA Langley Research Center requires a cleanroom, approximately 1000 square feet (usable floor space). Typical usage is 3 to 5 people at a time. The cleanroom shall be stand alone modular and will be housed in Building 1247B, Rm 109.

The contractor shall provide a complete cleanroom including flooring, lights, ceiling, wall panels, doors, windows, electrical, gas lines and interface to water filtration sciff. No permits are required on behalf of the Contractor.

1.0 Cleanroom size and lighting requirements:

Desired Goal of 50% class 100 and 50% Class 1000. Ultimately, over time, NASA wishes to upgrade the entire space to 100% class 100. As an option (see section 10 below), the contractor shall provide the incremental costs to upgrade as well as a summary of the work needed to upgrade the class 1000 to class 100 over time. The contractor is requested to identify areas that may be difficult to upgrade in the future and suggest solutions for minimizing these difficulties upfront.

- 1.1 At a minimum, 40% of the area shall be class 100, amber lighted for photolithography.
- 1.2 The class 1000 side (no more than 60% of the area) (which may later be upgraded to class 100) shall be 50% regular white lighting (fluorescent). And 20% amber. Thus the entire class 100 side and 20% of the class 1000 side will be amber lighted for a total of 60% of the entire room amber lighted.
- 1.3 An amber curtain shall separate the two regions of the cleanroom. The curtain shall be flexible in that it can be moved to separate the room into two regions (amber light/white light).
- 1.4 A second amber curtain shall be used to separate the class 100 from the class 1000 and can be removed ones the entire room is upgraded to class 100.
- 1.5 The vendor shall specify the expected lighting level of the room both amber and white light regions. Unit of measure shall be specified. (i.e. foot candles, watts/cm²).

2.0 Cleanroom Doors and Windows

- 2.1 One set of double doors or 72" wide to allow for passage of large equipment.
- 2.2 One single 36" door for normal passage.
- 2.3 Doors shall have appropriate sweeps, gaskets and thresholds.
- 2.4 All doors shall have amber windows (size not specified).
- 2.5 Two large (vendors shall specify available sizes) amber windows are desired in the room for observation and safety viewing.
- 2.6 Windows shall be dual pane.

3.0 Gowning area

The cleanroom shall have a separate gowning class 10000 area.

4.0 Flooring

- 4.1 The flooring shall be for a class 100 cleanroom that uses some acids and bases.
- 4.2 The desired flooring is epoxy on cement.
- 4.3 The contractor shall provide options and a description of the epoxy thickness and provide 2mm thick 2-part non-flammable high gloss epoxy flooring throughout project.
- 4.4 The existing flooring in building 1247B Room 109 is concrete.

5.0 Electrical

- 5.1 30 amp outlets shall be provided throughout the lab and be located at a minimum, in each corner and middle of the walls/room.
- 5.2 Two phone jacks and two computer internet drops are to be provided.
- 5.3 All electrical work shall be in accordance with the latest version of the National Electrical Code (NEC).
- 5.4 All components shall be UL listed components.
- 5.5 Wiring shall be installed in EMT conduit utilizing compression fittings. Screw type fittings are not permitted.
- 5.6 600 volt wiring shall be copper, THWN, 90°C insulation. Conductors AWG #10 and smaller shall be solid round copper wire. Conductors AWG #8 and larger shall be stranded copper wire. Conductors shall not be less than AWG #12.
- 5.7 All feeder and branch circuits shall contain an equipment grounding conductor routed in the same conduit as the circuit conductors.
- 5.8 Wiring shall be derated based on conduit fill in accordance with the NEC. For circuits rated 100 amps or less, conductor ampacity shall be based on a 60°C temperature rise. For circuits rated greater than 100 amps, conductor ampacity shall be based on a 75°C temperature rise.
- 5.9 Dedicated electrical panelboards for lighting and convenience circuits in the cleanroom shall be door-in-door type, with tin or silver plated copper busbars, and bolt-on main and branch circuit breakers. Plug in circuit breakers are not permitted. All current carrying conductors in the panelboard shall be copper. Panelboards shall be provided with a full-capacity isolated neutral bus and a separate grounding bus bonded to the panelboard enclosure.
- 5.10 240 volts circuit breakers shall have an interrupting rating of 22 KAIC. 480 volt circuit breakers shall have an interrupting rating of 25 KAIC. All circuit breakers shall be bolt-on type. No plug-in or snap-in breakers are permitted.
- 5.11 All convenience outlets and switches shall be labeled to indicate circuit number.
- 5.12 Receptacles shall be commercial grade, 20A, 125 VAC, 3-wire duplex conforming to NEMA 5-20R and 30A, 125 VAC, 3-wire duplex conforming to NEMA L5-30R as required.

6.0 Fire Protection

Fire suppression for cleanroom area shall be supplied by contractor – see attached document FPE Review FP-08-50.

7.0 Gas lines

- 7.1 Argon, nitrogen and compressed air lines shall be available throughout the cleanroom. Piping shall be ¼" stainless steel, type 347 or equivalent, with wall thickness of at least 0.035".
- 7.2 At a minimum, there shall be at least 2 vertical drops per wall for four gas lines (one left free for other gas(es) or vacuum). Compressed air shall be widely available throughout the cleanroom as drops or piping.
- 7.3 The contractor shall provide the gas and air lines up to the shut off valves. NASA will provide the regulators as well as the gas and compressed air.

8.0 HVAC

The contractor is responsible for proposing, providing, and installing the appropriate HVAC system required to maintain the desired class levels and should be easily upgradable. HVAC units shall be located outside of the main building on a concrete pad. (An existing concrete pad is available.)

- 8.1 The temperature shall normally be held at 62 - 68 degrees Fahrenheit.
- 8.2 Humidity shall be held at a range of 40%-60%, normally at 50% or drier.
- 8.3 The contractor shall work with LaRC to interface the HVAC.
- 8.4 Manometers and appropriate devices to measure and control temperature and humidity shall be included.
- 8.5 The HVAC System shall be stand-alone and not connected to the existing building's system.
- 8.6 Make-up air shall be pulled from outside the main building.
- 8.7 The existing building in which the cleanroom is to be installed, has no known moisture problems from either humidity or roof leaks.
- 8.8 Vendor shall state the air change rates assumed for defining class 100 and class 1000.

9.0 Water Filtration interface

- 9.1 NASA Langley utilizes a US Filter sciff. NASA will move the sciff from the existing location to the location for the new cleanroom. This includes move/rig/set/and electrical hookup.
- 9.2 The Contractor shall be responsible for the plumbing connections to the sciff. Currently, 2" PVC passes from the chemical benches (located in the cleanroom) through the cleanroom wall, 11 inches from the ground. A water tank is placed approximately 18" away from the wall. Then 1" PVC connects the water tank pump to the US Filter sciff.
- 9.3 The contractor shall interface the water sciff to three chemical benches. No drains are required. The three ductless hoods will be located side by side in the new cleanroom. The water is collected and recycled back to the Schiff.
- 9.4 The Contractor shall specify where outside the cleanroom the US Filter Schiff must be located.

10.0 Panels

- 10.1 The materials and structure of the walls shall be constructed for easy cleaning with isopropyl alcohol.
- 10.2 Fire Retardency and quality of structure shall be described in detail.
- 10.3 Wall system shall be constructed of sufficient thickness, non-combustible Class A.
- 10.4 The entire wall system shall be approved by UL (Underwriters Laboratory). Detailed description shall be provided.

11.0 Drawings

The Contractor shall provide complete drawings and wiring schematics in CAD.

12.0 Training

Upon completion of the cleanroom installation, the Contractor shall provide maintenance and operation training on-site at NASA Langley Research Center.

13.0 Certification

The Contractor shall perform a certification of the fully installed cleanroom in an at rest state. Successful certification of the cleanroom, witnessed by Government officials, shall constitute acceptance of the cleanroom by the Government.