SECTION 11 08 00

**COMMISSIONING OF EQUIPMENT**

**BASED ON DFD MASTER SPECIFICATION DATED 02/27/2015**

***This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.***

**P A R T 1 ‑ G E N E R A L**

**SCOPE**

This section includes commissioning forms for construction verification and functional performance testing. Included are the following topics:

PART 1 - GENERAL

Scope

Related Work

Reference

Submittals

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

***DO NOT INCLUDE ANY COMMISSIONING FORMS for PRELIMINARY review. Just edit the list below and only submit pages 11 08 00-1 through 11 08 00-2 with strikethroughs.***

Commissioning Forms

CV-11 53 13

FPT-11 53 13

**RELATED WORK**

Section 01 91 01 or 01 91 02 – Commissioning Process

**REFERENCE**

Applicable provisions of Division 1 shall govern work under this section.

**SUBMITTALS**

Reference the General Conditions of the Contract for submittal requirements.

Reference Section 01 91 01 or 01 91 02 Commissioning Process for Construction Verification Checklist and Functional Performance Test submittal requirements.

**P A R T 2 – P RO D U C T S**

(Not Used)

**P A R T 3 – E X E C U T I O N**

**COMMISSIONING FORMS**

Commissioning forms are to be filled in as work progresses by the individuals responsible for installation and shall be completed for each installation phase.

Provide a description of the work completed since the last entry, the percentage of the total work completed for the system for that area and the step of installation or finalization.

Circle Yes or No for each commissioning form item. If the information requested for an item does not apply to the given stage of installation for the system, list it as “N/A”. Explain all discrepancies, negative responses or N/A responses in the negative responses section.

Once the work is 100% complete and the responses to each item are complete and resolved for a given commissioning forms group, mark as complete, initial and date in the spaces provided.

Provide copies of the commissioning forms to the commissioning agent 2 days prior to construction progress meetings.

***Edit the individual construction verification checklists and provide additional checklists as needed to reflect the verification requirements of assemblies, components, equipment and systems to be commissioned on this project.***

***DO NOT INCLUDE ANY of the following***

***COMMISSIONING FORMS for PRELIMINARY review. Just edit the list in Part I above and only submit pages***

***11 08 00-1 through 11 08 00-2 with strikethroughs.***

**CV-11 53 13 – High Performance Laboratory Fume Hoods**

**Identification/Tag: \_\_\_\_\_\_**

**Location:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Group/Item** | **Group/Task Description** | | | **Submitted** | **Delivered** |
| *A* | *MODEL VERIFICATION* | | | | |
| 1 | Manufacturer | | |  |  |
| 2 | Model | | |  |  |
| 3 | Serial Number | | |  |  |
| 4 | Width / Length / Height (in / in / in) | | | **/ /** | **/ /** |
| 5 | Water Services (if applicable) | | |  |  |
| 6 | Gas Services (if applicable) | | |  |  |
| 7 | Steam Service (if applicable) | | |  |  |
| 8 | Voltage / Phase / Frequency (V / - / Hz) | | | **/ /** | **/ /** |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |

| **Group/Item** | **Group/Task Description** | | | **Response** | |
| --- | --- | --- | --- | --- | --- |
| *B* | *PHYSICAL CHECKS* | | | | |
| 1 | Unit is free from physical damage. | | | YES | NO |
| 2 | Openings are sealed with plastic. | | | YES | NO |
| 3 | All water service piping has factory applied insulation per specification requirements. | | | YES | NO |
| 4 | All components and accessories present. | | | YES | NO |
| 5 | Installation and startup manual provided. | | | YES | NO |
| 6 | Unit tags affixed. | | | YES | NO |
| 7 | Manufacturer’s ratings readable/accurate | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *C* | *INSTALLATION* | | | | |
| 1 | Unit secured as required by manufacturer and specifications. | | | YES | NO |
| 2 | Unit is located per contract documents and with sufficient clearance from draft producing devices per manufacturer recommendations. | | | YES | NO |
| 3 | The unit and work surface is level. | | | YES | NO |
| 4 | Adequate clearance around unit for service. | | | YES | NO |
| 5 | All components accessible for maintenance. | | | YES | NO |
| 6 | Steel safety bar provided and positioned prior to bottom air foil per specification requirements. | | | YES | NO |
| 7 | Unit labeled and is easy to see. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *D* | *DUCTWORK* | | | | |
| 1 | Ductwork is supported independently of unit. | | | YES | NO |
| 2 | Ductwork is sealed per specification requirements. | | | YES | NO |
| 3 | Ductwork is clean and free of debris. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *E* | *WATER PIPING (if applicable)* | | | | |
| 1 | All piping components have been installed (in the correct order) as required by contract document or manufacturer. | | | YES | NO |
| 2 | Piping arranged for ease of unit removal. | | | YES | NO |
| 3 | Piping supported independent of unit and as required by specifications. | | | YES | NO |
| 4 | Piping is clean. | | | YES | NO |
| 5 | Dielectric fittings installed to isolate dis-similar pipe materials. | | | YES | NO |
| 6 | Piping and valves properly checked and free of leaks. | | | YES | NO |
| 7 | Vacuum breaker provided per specification requirements. | | | YES | NO |
| 8 | All valves and test ports are easily accessible. | | | YES | NO |
| 9 | Valve tags attached. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *F* | *GAS PIPING (if applicable)* | | | | |
| 1 | Gas supply is the same type and pressure as listed on the unit data plate. | | | YES | NO |
| 2 | Service fixture rated for gas type. | | | YES | NO |
| 3 | Gas cock / valve and union provided on gas supply. | | | YES | NO |
| 4 | Drip / dirt leg and cap provided on gas supply. | | | YES | NO |
| 5 | Piping and valves properly checked and free of leaks. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *G* | *STEAM PIPING (if applicable)* | | | | |
| 1 | All piping components have been installed (in the correct order) as required by contract document or manufacturer. | | | YES | NO |
| 2 | Strainer and isolation valve installed. | | | YES | NO |
| 3 | Proper condensate trap installed. | | | YES | NO |
| 4 | Piping pitched for proper condensate flow. | | | YES | NO |
| 5 | Piping arranged for ease of unit removal. | | | YES | NO |
| 6 | Piping supported as required by specifications. | | | YES | NO |
| 7 | Piping is clean. | | | YES | NO |
| 8 | Individual trap and sufficient vertical condensate head provided for unit. | | | YES | NO |
| 9 | Piping and valves properly checked and free of leaks. | | | YES | NO |
| 10 | Piping insulation is complete and installed as per specifications. | | | YES | NO |
| 11 | All valves and test ports are easily accessible. | | | YES | NO |
| 12 | Valve tags attached. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *H* | *ELECTRICAL* | | | | |
| 1 | Local disconnect installed in accessible and visible location. | | | YES | NO |
| 2 | All electrical connections are tight. | | | YES | NO |
| 3 | All electrical components are grounded. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *I* | *CONTROLS INSTALLATION* | | | | |
| 1 | Remote status wiring installed and communication verified. | | | YES | NO |
| 2 | Remote alarm wiring installed and communication verified. | | | YES | NO |
| 3 | Sash position switch wiring installed and communication verified. | | | YES | NO |
| 4 | Local alarm wiring installed and communication verified. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *J* | *MECHANICAL STARTUP* | | | | |
| 1 | Unit is clean. | | | YES | NO |
| 2 | Sash pulleys lubricated and sash operation checked and acceptable. | | | YES | NO |
| 3 | All lamps installed and operational. | | | YES | NO |
| 4 | Manufacturer's startup checklist completed and attached. | | | YES | NO |
| 5 | Instructional signage provided on unit per specification requirements. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *K* | *CONTROLS STARTUP* | | | | |
| 1 | Sash position alarms set at 1” and 18” above fully closed positions (combination sashes ONLY). | | | YES | NO |
| 2 | Sash position local alarms verified and acceptable (combination sashes ONLY). | | | YES | NO |
| 3 | Face velocity high and low alarms verified and acceptable. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *L* | *TAB* | | | | |
| 1 | Final TAB values for unit complies with design values specified given the tolerances specified under 23 05 93. | | | YES | NO |
| 2 | All final settings and positions of TAB have been permanently labeled on unit. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |
| *M* | *CALIBRATION/TESTING* | | | | |
| 1 | Face velocity monitor calibrated and high/low alarms set per specification requirements. | | | YES | NO |
| 2 | Unit certified per specifications requirements and/or ASHRAE 110-1995. | | | YES | NO |
| **❑ CHECKLIST GROUP COMPLETE** | | **INITIALS:** |  | **DATE:** |  |

**Negative Responses**

| **Group/**  **Item** | **Date**  **Found** | **Found**  **By** | **Reason for Negative Response** | **Resolved** | **Date**  **Resolved** | **Resolution** |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **YES / NO** |  |  |
|  |  |  |  | **YES / NO** |  |  |
|  |  |  |  | **YES / NO** |  |  |
|  |  |  |  | **YES / NO** |  |  |
|  |  |  |  | **YES / NO** |  |  |

***Edit the individual functional performance test forms and provide additional test forms as needed to reflect the functional performance test requirements of assemblies, components, equipment and systems to be commissioned on this project. Include test forms with final review documents; no submission is required at preliminary review.***

***Edit to provide test forms unique to the specific test requirements of the project and remove the “SAMPLE” watermark. Edited or unedited test forms may be used in the bidding documents. Unedited test forms must be edited by the A/E at the time of shop drawing submittal and accompany the submittals when returned to the contractor prior to functional performance testing. Incorporate changes to the contract documents into the test forms prior to testing. This option is preferred for medium and large projects where there are many functional performance tests to be done.***

**FPT-11 53 13 – High Performance Laboratory Fume Hood**

**Equipment Identification/Tag: \_\_\_\_\_\_\_**

**Location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Test Duration**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Date: |  | Start Time: |  | End Time |  |
|  |  |  |  |  |  |
| Estimated Duration: | |  |  |  |  |
| Cx Provider(s): | |  | |  |  |
|  | |  | |  |  |
|  | |  | |  |  |
|  | |  | |  |  |
| Applicable Equipment: | |  | | | |
|  | |  | | | |

**Objectives**

This test is performed to investigate the alarm functions associated with the laboratory fume hood.

**Instrumentation**

|  |  |  |
| --- | --- | --- |
| **Instrument** | **Accuracy** | **Measurement** |
| N/A | N/A | N/A |

**Stated Sequence**

*To be defined by A/E and commissioning provider at completion of construction documents.*

**Sampling Set**

All units and all sequences.

**Procedure**

1. Sash Position Alarms (combination sashes ONLY)
   1. Verify sash is at full closed position. If not close sash fully.
   2. Verify unit and associated exhaust system are energized. If not override unit and/or exhaust system to be energized.
   3. Slowly raise sash position until visual alarm is noted on unit.
   4. Record height above work surface alarm is generated.
   5. Slowly raise sash position until audible alarm is generated at unit.
   6. Record height above work surface alarm is generated.
   7. Close sash fully and return systems to normal operation.
2. Face Velocity Alarms
   1. Verify sash is at full closed position. If not close sash fully.
   2. Verify unit and associated exhaust system are energized. If not override unit and/or exhaust system to be energized.
   3. Record tag of associated air valve.
   4. Record low velocity alarm setpoint.
   5. Record high velocity alarm setpoint.
   6. Override air valve to fully open damper position.
   7. Verify alarm is generated at unit and at BAS head end for high velocity.
   8. Record air velocity when alarm is generated.
   9. Return system to normal operation.
   10. Override air valve to minimum damper position and lock damper at this position.
   11. Open sash fully.
   12. Verify alarm is generated at unit and at BAS head end for low velocity.
   13. Record air velocity when alarm is generated.
   14. Close sash fully and return system to normal operation.

**Results**

**Sash Position Alarms (combination sashes ONLY):**

|  |  |
| --- | --- |
| First Alarm Position (in.): |  |
| Second Alarm Position (in.): |  |
| First alarm position is equal to 1” above work surface? | **Y / N** |
| Visual alarm is generated at unit when first alarm position is exceeded? | **Y / N** |
| Second alarm position is 18” above work surface? | **Y / N** |
| Audible alarm is generated at unit when second alarm position is exceeded? | **Y / N** |

**Face Velocity Alarms:**

|  |  |
| --- | --- |
| Associated Air Valve: |  |
| High Velocity Setpoint: |  |
| Low Velocity Setpoint: |  |
| Air Velocity for High Velocity Test: |  |
| Alarm is generated at unit and at BAS head end when high velocity setpoint is exceeded? | **Y / N** |
| Air Velocity for Low velocity Test:? |  |
| Alarm is generated at unit and at BAS head end when air velocity falls below the low velocity setpoint? | **Y / N** |

**Conclusion**

Acceptable Criteria: All setpoints comply with contract documents. All alarm and safeties operate per specified sequence and initiate appropriate alarm conditions at unit and/or BAS head end.

Comments:

Observations:

Final Status: ❑ Accepted ❑ Not Accepted

**Relevant Trend Data**

CFM, air velocity, sash position

**Witnesses**

| **Name** |  | **Signature** |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
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