

Standard Operating Procedure Start-Up Procedure & Verification for Pumps	SOP No. 8.033
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Page No.: 1 of 7

1 Purpose

- 1.1 Provide a standard procedure for start-up and commissioning of HVAC equipment.
- 1.2 Provide a standard procedure for coordinating selection, receiving, check out, and acceptance of new equipment.

2 Scope

- 2.1 This procedure applies to (but is not limited to) the following types of equipment: Chilled, Hot, Process, Cooling, Condenser, Transfer, and Chemical.

3 Responsibility

- 3.1 Project Managers have overall responsibility for new equipment from procurement to start-up. To assure optimum selection of equipment and smooth commissioning, the Project Manager is responsible for coordinating the following activities:
 - 3.1.1 Review of customer and specific job specifications.
 - 3.1.2 Review of equipment selected with Service prior to ordering.
 - 3.1.3 Assure equipment is on approved list.
 - 3.1.4 Review drawings, assure drawing schedules and equipment details are correct.
 - 3.1.5 Coordinate delivery and commissions schedule with all team members including (but not limited to): Site Foremen, Balance and Service (start-up), Customer, General Contractor, and Safety (as needed).
 - 3.1.5.1 In most cases, Start-up should be scheduled a month in advance.

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Revision No.	SOP No.	Page
New	8.033	2 of 7

3.1.5.2 If exact date is known, Service should be notified with estimated time frame.

3.1.5.3 Communicate specific requirements to all team players in writing and verbally.

3.1.5.4 Provide appropriate job number(s) to team members.

3.2 Therma Service/Start-up has responsibility for the following activities:

3.2.1 Therma will provide a qualified Service Mechanic to perform equipment start-up

3.2.2 The Start-up Technician will perform the start-up tasks as specified in the commissioning Standard Operating Procedure for that equipment.

3.2.3 Service will provide estimated time required to Project Manager (PM) prior to start-up. Service will meet agreed upon schedules to assure customer satisfaction.

3.2.4 The start-up technician will fully complete a start-up sheet for each piece of equipment. A copy of this sheet will be provided to the Project Manager with the turnover documents: A second copy will be filed in Service by Customer Name and Address.

3.2.5 All time will be charged to the appropriate job number as specified by the Project Manager. If requested, Time and Material sheets shall be completed.

3.3 The Start-up/Commissioning Coordinator has responsibility for the following activities:

3.3.1 Provide a communication path between the Project Manager and the Field Foremen.

3.3.2 Schedule qualified personnel for start-up, balance, test, and room certification as required.

3.3.3 Coordinate punchlist completion with Project Managers.

3.3.4 Coordinate start-up, service, balance, and testing report documentation.

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Revision No.	SOP No.	Page
New	8.033	3 of 7

4 Procedures

- 4.1 General: Service Technician is responsible for filling out start-up sheet FN 8.033.1 for Pumps. A start-up sheet will be completed for each piece of equipment. Each sheet requires the following information:
 - 4.1.1 Job identification: The job name, job number, and job address are to be completed by the start-up/commissioning coordination. These will be provided to the Service Technician.
 - 4.1.2 Section 5 - Equipment Description.
 - 4.1.3 Section 6 - Equipment Pre-Installation Inspection.
 - 4.1.4 Section 7 - Equipment Installation Inspection.
 - 4.1.5 Section 8 - Operational Inspection.
 - 4.1.6 Signature - As each section and page is completed, the service technician must print and sign his/her name and record the date. This document should also be signed off by an owner representative.

5 Equipment Description

- 5.1 This section should be completed by the Service Technician or Service Coordinator. Any design documentation specifying equipment should be recorded in this section. This includes: Specification number, Submittal number, Process and Instrumentation Diagram number, Drawing number, Also, record which area this equipment will be serving.
- 5.2 Fill in the "design" column, record the following information as specified on the design documents. Unit Tag number (per drawings) Manufacturer (per equipment schedule and/or approved submittals) Model number (per equipment schedule and approved submittals).

6 Equipment Pre-Installation

- 6.1 For each of the following items: Check Yes, No or N/A for not applicable. If No is checked, describe the difference in the comment section and notify the Project Manager immediately. Initial and date each item as it is checked.

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Revision No.	SOP No.	Page
New	8.033	4 of 7

- 6.2 Nameplate data matches vendor specifications. When the equipment is delivered, verify it matches specifications. Complete Section 5. In the "actual on site" column, record the actual data as shown on the equipment and verify that it matches the design criteria.
 - 6.3 Insure all parts are received and verify the packing slip(s).
 - 6.4 Inspect for visible signs of damage, leak, or defective parts. Note any discrepancies and notify the Project Manager.
 - 6.5 Verify electrical service for correct voltage, current and thermal overload protection.
 - 6.6 Operation and Maintenance (O&M) manual is available in the field.
 - 6.7 Start up technicians reviewed factory start up procedures in the Operation and Maintenance manual.
 - 6.8 If Therma provided Variable Frequency Drives (VFDs) that are controlling the fans, complete FN 8.029.1 VFD start-up form(s).
- 7 Installation Inspection
- 7.1 For each of the following items: Check Yes, No or N/A for not applicable. If No is checked, describe the difference in the comment section and notify the Project Manager immediately. Lock Out/Tag Out procedures should be observed before most of the following steps.
 - 7.2 Unit is properly installed in place. Make sure unit is installed per Operation and Maintenance literature. Examples horizontally mounted indoor operation only etc.
 - 7.3 Tag number is attached to the unit. Tag should be attached to service disconnect or near unit identification plate, if mounted in a ceiling system tagging should reflect location above or below.
 - 7.4 Unit base is filled with concrete. This insures that once pump is aligned it will not go out of alignment due to base torque or stopping and starting.
 - 7.5 Service clearance is adequate for maintenance. Service clearance includes access to the equipment through the ceiling systems, over duct work etc. strainer access for removal and replacement are essential.

Revision No.	SOP No.	Page
New	8.033	5 of 7

- 7.6 Spring isolators are installed and adjusted. Check Operation and Maintenance literature: (internal and external isolation skids) and springs need to be set properly. Isolators equipped with rubber damper washers on the seismic restraints these must be “just free” not compressed or removed. Isolation springs must not be used as leveling devices: leveling should be accomplished otherwise.
 - 7.7 Pressure taps are installed on inlet and outlet piping. Typical gauge installation includes at least: 1 – common Pete’s plug, 1- common gauge, 1- isolation valve on pump inlet, 1 – isolation valve on pump outlet and instrument piping between all previous devices: check mechanical drawing details.
 - 7.8 Inlet and outlet valves are installed properly.
 - 7.9 Inlet strainers are installed and cleaned.
 - 7.10 Suction diffuser is supported properly.
 - 7.11 Pump is lubricated. Check Operation and Maintenance literature prior to start-up.
 - 7.12 Motor and bearing bracket are free of insulation. Operation, repairs, lubrication and observations all require that these items not be insulated.
 - 7.13 Clamps, bolts, and setscrews are tight. Including pump couplings.
 - 7.14 Connection between the unit and piping are installed per good piping practices. Check Operation and Maintenance literature and mechanical drawing details.
 - 7.15 Electrical connections are secure. Check all terminals, with a reliable meter, from line to line and to ground before checking all electrical connections in all panels, motors, and devices. Check wire, wire nuts, spade connectors, and crimps as well.
- 8 Operational Inspection
- 8.1 Use Operation and Maintenance literature and follow start up procedures the form FN 8.033.1 is a general out line and is to provide a quality assured start up when used in conjunction with the Operation and Maintenance literature. If there are any discrepancies notify the Project Manager immediately.

Revision No.	SOP No.	Page
New	8.033	6 of 7

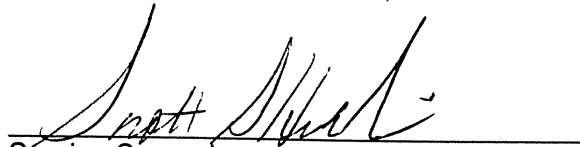
- 8.2 Unit vibration is acceptable. Check Operation and Maintenance literature for tolerances. Check for vibration at different fan speeds and volumes. Check unit, check around unit and below roof under unit.
- 8.3 Pump rotation is correct. Check Operation and Maintenance literature: some pumps may be damaged even by brief reverse rotation.
- 8.4 Coupling assemblies need alignment (If yes, proceed with step ID.5 , otherwise go to step ID.6).
- 8.5 Record final data. Check Operation and Maintenance literature: tolerances of alignment should be completed after pump base is secure.
- 8.6 Suction strainers are removed after 72 hours of operation. Check Operation and Maintenance literature: some strainers recommend replacement of the strainer basket with a fine mesh in stages.
- 8.7 Pump seal is not leaking after 72 hours of operation.
- 8.8 Record start-up operating parameters.

Revision No.	SOP No.	Page
New	8.033	7 of 7

Document Approval


 Service Manager

5-18-99
 Date


 Service Supervisor

5/19/99
 Date


 Quality Assurance Manager

5-28-99
 Date

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