

Standard Operating Procedure <b>Start-Up Procedure &amp; Verification for Boilers</b>	SOP No. 8.036
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- 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: Hot Water Steam and Steam for Humidification Boilers.
- 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. Assure equipment is on approved list.
    - 3.1.3 Review drawings, assure drawing schedules, and equipment details are correct.
    - 3.1.4 Coordinate delivery and commission schedule with all team members including (but not limited to): Site Foremen, Balance and Service (start-up), Customer, General Contractor, and Safety (as needed).
      - 3.1.4.1 In most cases, Start-up should be scheduled a month in advance.
      - 3.1.4.2 If exact date is known, Service should be notified with estimated time frame.
      - 3.1.4.3 Communicate specific requirements to all team players in writing and verbally.

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3.1.4.4 Provide appropriate job number 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 punch-list completion with Project Managers.
- 3.3.4 Coordinate start-up, service, balance, and test report documentation.

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#### 4 Procedures

- 4.1 General: Service Technician is responsible for filling out start-up sheet FN 8.036.1 for Boiler. 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 when required.

#### 5 Equipment Description

- 5.1 This section should be completed by the Service Technician. Any design documentation specifying equipment should be recorded in this section. This includes: Specification number, Submittal number, Process and Instrumentation Diagram number, and 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 Inspection

- 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.
- 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 design criteria.

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- 6.3 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.
- 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 procedure should be observed before most of the following steps.
  - 7.2 Unit is installed level in approved room and properly protected from weather and drafts. Approved room generally includes fire rated walls and ceilings, concrete floor, etc. If equipment is installed outdoors it should be rated as such.
  - 7.3 No negative pressure in the approved room. Approved room generally includes gravity ventilation ducts to eliminate chance of negative pressure. Negative pressure causes boiler to malfunction and flue gas to be pulled into room.
  - 7.4 Proper air openings are provided. Gravity vents, ducts and or door louvers are required to have proper air openings.
  - 7.5 Unit is installed level on a concrete floor or non-combustible base. Check Operation and Maintenance literature: some equipment needs to be level to 1/8" or better to allow proper drainage and or operation.
  - 7.6 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.
  - 7.7 Service clearance is adequate for maintenance. Service clearance includes access to the equipment through the ceiling systems, over duct work etc. Filter access for removal and replacement are essential.
  - 7.8 Proper earth ground is connected to green ground screw in panel. Check Operation and Maintenance literature.

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- 7.9 Relief valve type, setting, and capacity are correct. Check Operation and Maintenance literature.
- 7.10 Gas lines are bled of air.
- 7.11 Draft hood or barometric damper is installed. Check Operation and Maintenance literature.
- 7.12 Vent stack is proper height and size. Check Operation and Maintenance literature and mechanical drawing details.
- 7.13 Unrestricted vent cap on top to protect from weather and down drafts. Check Operation and Maintenance literature.
- 7.14 Gas inlet piping is properly installed. Check Operation and Maintenance literature and mechanical drawing details.
- 7.15 Main and pilot gas valves are installed. Check Operation and Maintenance literature and mechanical drawing design.
- 7.16 Hot water supply outlet is proper size. Check Operation and Maintenance literature and mechanical drawing design.
- 7.17 Hot water return inlet is proper size. Check Operation and Maintenance literature and mechanical drawing design.
- 7.18 Make up water supply has proper shut-off and back flow device. Boilers or any other equipment with make-up water generally is fed by (an individual or a industrial water loop) a back flow prevention device to eliminate treated water getting back into potable water.
- 7.19 Drain valve is installed. In boiler and related piping for maintenance.
- 7.20 Temperature and pressure gauges are installed. Check Operation and Maintenance literature and mechanical drawing design.
- 7.21 High limit and operating controls are installed. Check Operation and Maintenance literature and mechanical drawing design.
- 7.22 Tube surfaces are inspected. Check Operation and Maintenance literature and mechanical drawing design.
- 7.23 Make-up water pressure regulator are installed. Check Operation and Maintenance literature and mechanical drawing design.
- 7.24 Expansion tank is installed. Check Operation and Maintenance literature and mechanical drawing design.

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- 7.25 Pressure and temperature test ports are provided. Check Operation and Maintenance literature and mechanical drawing design.
- 7.26 Air separation device is properly installed. Check Operation and Maintenance literature and mechanical drawing design.
- 7.27 Pump(s) are installed. Check Operation and Maintenance literature and mechanical drawing design. (Use start-up sheet FN 8.033.1 if by Therma) Air separator generally should be upstream of pumps and downstream of boiler.
- 7.28 Pot feeder is installed. Check Operation and Maintenance literature and mechanical drawing design.
- 7.29 System has been cleaned and treated. Check Operation and Maintenance literature and mechanical drawing design.
- 7.30 Isolation valves are installed. Check Operation and Maintenance literature and mechanical drawing design.
- 7.31 Water treatment is installed. Check Operation and Maintenance literature and mechanical drawing design. (Use start-up sheet FN8.046.1 if by Therma).
- 7.32 Steam check valves are installed. Check Operation and Maintenance literature and mechanical drawing design.
- 7.33 Steam traps are installed. Check Operation and Maintenance literature and mechanical drawing design.
- 7.34 Steam condensate is returned to steam make-up tank or sent to a tempering device before drain. Check Operation and Maintenance literature and mechanical drawing design.

## 8 Operational Inspection


- 8.1 Use Operation and Maintenance literature and follow start up procedures the form FN 8.036.1 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.
- 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.

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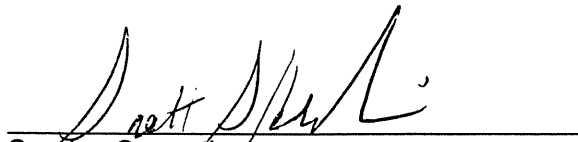
- 8.3 Heating components perform per manufacturer's specification. Check Operation and Maintenance literature: verify all safety controls, operating controls, ignition controls, pilot flames, and vent fans (blowers).
- 8.4 Natural gas supply pressure is at manufacturer's specification. Check Operation and Maintenance literature: use mag gauge or natural gas pressure gauge to verify. Typically these units require 7"-14" w.c. inlet pressure.
- 8.5 Manifold pressure is at manufacturer's specification. Check Operation and Maintenance literature: use mag gauge or natural gas gauge to verify. Typically these units run from ½" w.c. on low fire to 5" w.c. on high fire.
- 8.6 Make sure thermostat is set. Operate (or have operated) temperature controls to ensure all functions and set points.
- 8.7 Record start up operating parameters in the Supplementary form(s), FN 8.028.2 and FN 8.028.3. Use as many of the Supplementary forms as necessary to complete Boiler start-up form FN 8.036.1.

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## 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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