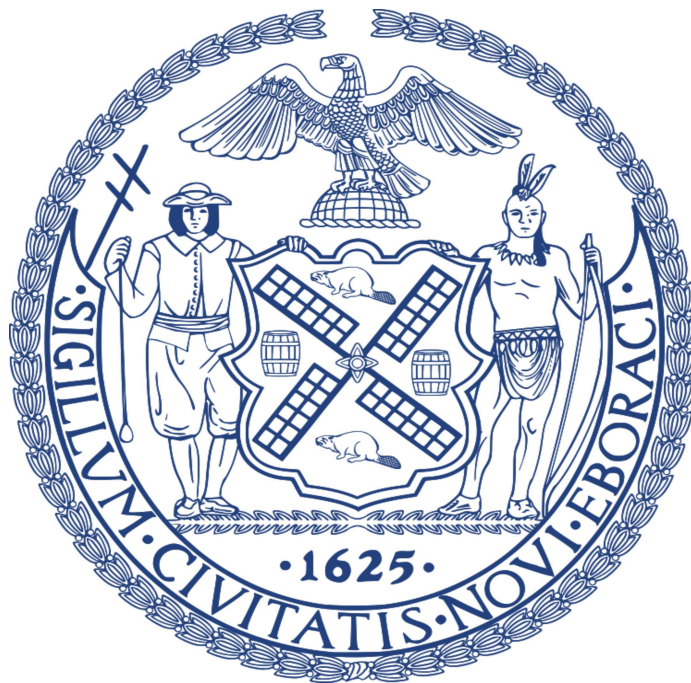




Housing Preservation & Development



*Office of Enforcement and Neighborhood Services
Division of Code Enforcement*

Steam Radiator Inspection Training Manual for Superintendents

This training manual has been developed to provide guidance to building superintendents and other designated personnel acting as inspectors in conducting steam radiator inspections pursuant to §27-2056.22

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INTRODUCTION

This manual was developed to help ensure competency of building superintendents acting as inspectors tasked with conducting steam radiator inspections in accordance with New York City Administrative Code §27-2056.22 and all related rules and requirements.

The purpose of this manual is to ensure that inspections are performed consistently, accurately, and in compliance with applicable laws and safety standards. Proper inspection of steam radiators is critical to maintaining safe living conditions, preventing hazardous conditions, and ensuring the reliable operation of building heating systems.

Superintendents acting as inspectors must review and fully understand the requirements contained within the manual including the section dedicated to “Definitions and Terms”. The terminology contained in the section establishes a baseline for identifying system components consistently, evaluating conditions, and properly completing inspections including the communication of system defects observed during the process.

DEFINITIONS AND TERMS

Inspectors: Building superintendents, and other qualified personnel, as defined in New York City Administrative Code §27-2056.21, acting as inspectors conducting steam radiator inspections in accordance with New York City Administrative Code §27-2056.22 and all related rules and requirements.

Steam Boiler: Steam boilers are generally fabricated of either steel or cast iron and should be installed in accordance with the manufacturer’s specifications.

Low-pressure steam boilers: A boiler which generates steam and operates at a steam pressure not exceeding 15 PSIG (103.4 kPa gauge).

Low-pressure boilers are generally designated with an H-stamp by the American Society of Mechanical Engineers (ASME).

High-pressure steam boilers: An appliance for supplying steam for a steam boiler that operates at a pressure of more than 15 PSIG (103.4 kPa gauge).

High-pressure boilers are generally designated with an S-stamp by the American Society of Mechanical Engineers (ASME).

For both low-pressure and high-pressure steam boilers, the manufacturer's specifications may be found on the boiler's jacket (boiler's outer shell), or nameplate. Additionally,

information regarding the boiler may also be found within the Department of Building's (DOB) compliance filing. More information about DOB compliance filings may be found under Required Inspection Steps, section 1, of this manual, below.

Figure 3 (page 6 of this manual) illustrates a steam boiler fitted with the necessary trim.

- A **sight glass** is provided for visual observation of the boiler water level.
- A **relief valve** protects the boiler from damage should it exceed the maximum allowable pressure.
- A **burner** is the boiler component responsible for heating water to create steam.
- A **low water cut-off** shall automatically stop the combustion operation of the appliance when the water level drops below the lowest safe water level as established by the manufacturer.

Header: Boilers, depending upon their size, have one or more risers. The vertical steam piping from the tapped outlet joins a horizontal pipe called a “Header”. The steam supply mains are connected to this header.

Steam Supply Main: The steam supply main carries steam from the header to the radiators connected along its length. In the case of one-pipe systems, it also carries the condensate (the water resulting after the temperature drops) from these units back to the drip connection. When the condensate flow in the supply main is in the same direction as the steam flow, the system is called a **parallel flow system**.

Risers: The vertical pipe carrying steam to the radiator from the supply main is called a riser. In the case of the one-pipe system, the riser also drains condensate from the radiator back to the supply main. In one-pipe systems, the horizontal runouts connecting the main to the riser must be pitched down toward the supply main to make this drainage possible.

Heating Units: As shown in Figure 4 (page 6 of this manual), steam systems use convectors, cast iron radiators, wall fin tube, and similar heat output units.

Bellies: Low spots or sags in piping where the pipe dips below its intended pitch, allowing water (condensate) to collect.

Drip Connections: Where piping carries both steam and condensate, it is often desirable to drain off the condensate at various points to expedite steam flow. This condensate is drained off to a return line by a connection called a “drip”. For example, in Figure 2 (page 6 of this manual), the steam supply main is dripped into the dry return, which in turn is dripped into the wet return.



Radiator Valves: The steam supply to the system radiators is controlled by radiator valves. Each radiator must be equipped with an angle pattern radiator supply valve as shown.



**Calibrated Non-Contact Digital
Infrared Thermometers or Thermal Imaging Devices:**

Devices that measure the surface temperature of an object from a distance. They work by detecting infrared energy emitted by an object, converting it into an electrical signal, and displaying the temperature.



Pressure Gauge: A device that measures pressure within a system, often in units of Pounds per Square Inch (PSI).



Air Vents: (also called steam radiator air valves) Small valves on **one-pipe steam radiators** that allow trapped air to escape so steam can enter and heat the radiator properly. These valves also allow air back into system to aid condensate flow to return line.

Basics of Steam Heating

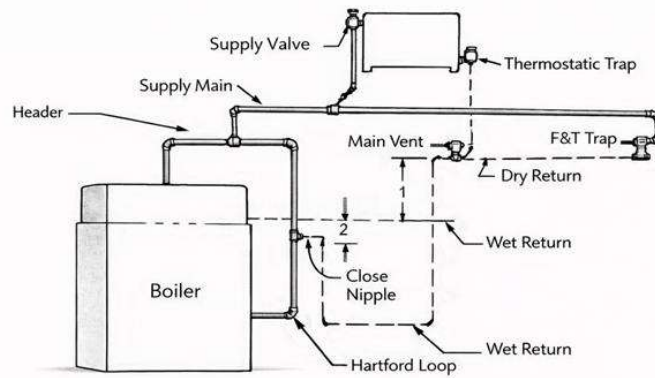


Figure 2
Two-Pipe Parallel Return System

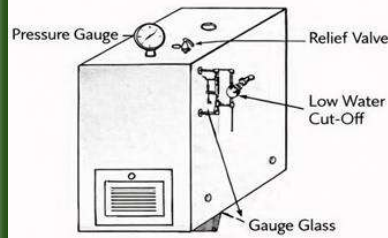


Figure 3
Steam Boiler Controls

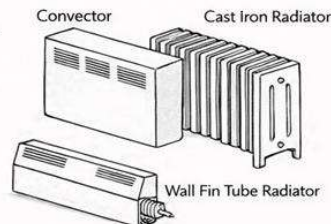


Figure 4
Steam Radiation

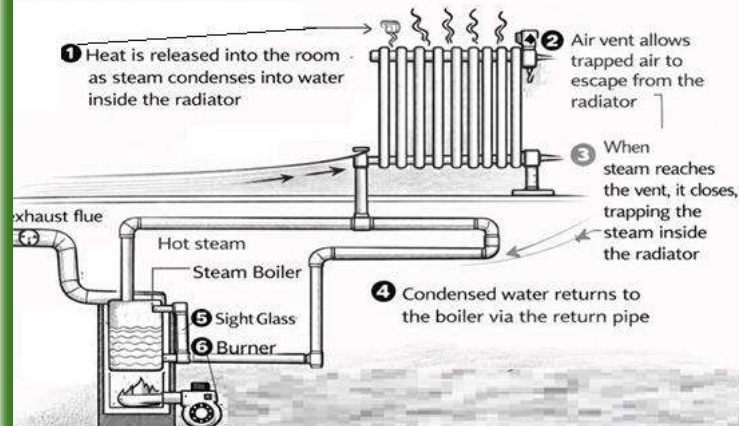


Radiator Vents



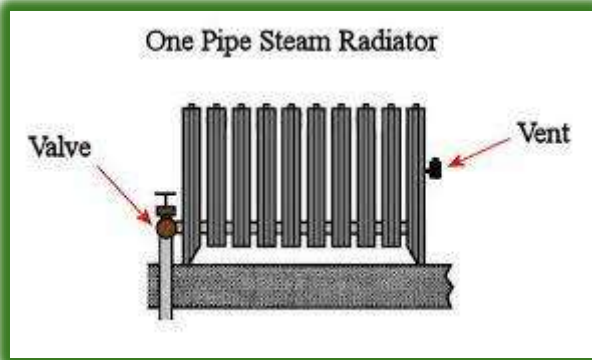
Typical Steam Supply Valve

How Steam Radiator Air Vents Work



SYSTEMS

1-pipe systems



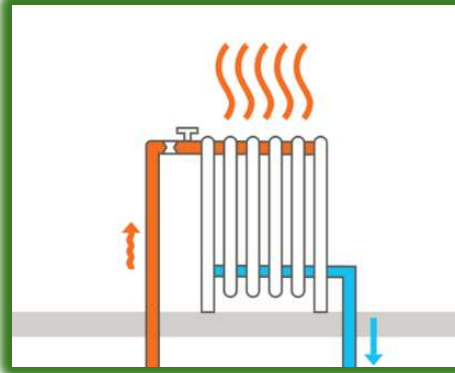
In a 1-pipe system, visually inspect the air vent for proper operation and ensure it is free from obstruction. On one-pipe steam heat systems the radiator valve is normally fully open (for the radiator to operate properly) or fully shut (no heat); you may find that some 1-pipe steam heating system radiators will not work properly if the valve is left "in between" these positions. Steam rises and enters each heating radiator through a single pipe, pushing air out of the radiator through its vent. Condensate returns to the boiler through the same pipe, passing out through a special passage in the radiator control valve.



Steam Vent on a 1-pipe heating system

Steam rises and enters each heating radiator through a single pipe, pushing air out of the radiator through a **steam vent**. Condensate returns to the boiler through the same pipe, passing out through a special passage in the radiator control valve.

2-pipe system



In a 2-pipe system, visually inspect the steam traps for proper operation and restrictions. Using a calibrated non-contact digital infrared thermometer or thermal imaging device, check the trap body/outlet as it should be noticeably cooler than the inlet.

The diagram to the left shows a 2-pipe steam heat radiator; one pipe feeds steam at the top left of the radiator, controlled by a thermostatically operated inlet valve, while at the right side of the radiator at its bottom condensate returns to the boiler through a steam trap. *Do not use air vents on two pipe steam heat systems, Instead use float and thermostatic (F&T) traps at the end of the system main. These are fast-acting traps that allow both air and condensate out of the system main.*



The thermostatic control valve controls the steam input into the radiator.



Steam traps regulate flow instead of air vents: In a two-pipe system, devices similar to the one pictured will allow air to vent from the radiator making room for steam. Once steam enters, the device will close trapping steam in the radiator. After the heat-cycle concludes and steam condensates, the device will reopen allowing condensate to return to the boiler.

REQUIRED INSPECTION STEPS

Inspectors will perform the following:

1. Boiler Inspection Verification (Initial inspection requirement)

Inspector must verify that a satisfactory annual boiler inspection for the prior year was submitted and accepted by the [NYC Department of Buildings](#) in accordance with NYC Administrative Code §28-303.7. Note: multiple dwellings with 6 or more units, mixed use buildings (containing both commercial plus 1-5 residential units), and any residential building classified as Single Room Occupancy (SRO) are required to file an annual boiler inspection. If the required inspection and filing have not been completed, steam radiator inspections **shall not proceed**.

- a. Visit [DOB NOW Public Portal](#) and enter the House Number, Street Name and select the appropriate Borough.

Search the Public Portal

FAQS | USER MANUAL


Address


Borough, Block, Lot


BIN


Job Number

Address

House Number

Enter House Number

Street Name

Enter Street Name

Borough

Select Borough

Search

b. Select Boiler under the Safety: Compliance Filings.

Jobs/Occupancy/Compliance Filings

BIS Schedule of Occupancy

BUILD: Job Filings

Certificate of Occupancy

SAFETY: Compliance Filings

Compliance Type: Select

Select

Boilers

Elevators

Facades

Building Emission

Parking Structures

Violations

Deficiency

Back

SAFETY: Compliance Filings

Compliance Type: Boilers

View	Boiler ID	Multi Dwelling	Boiler Status	Boiler Make	Boiler Model
✎	20000044272Y0001	YES	ACTIVE	FEDERAL	FLR4857

Boiler Information
Select Device

Boiler ID 2000004427	BTU/h 16800000	Boiler Make FEDERAL	Boiler Model FLR4857
Pressure Type Low Pressure	Fuel N/A	Filed At 	Located In CELLAR
Floor N/A	Year Built 2014		

Filings

View	Tracking #	Applicant	NYS/NYC Certificate No	Inspection Type	Results	Compliance Report
✎	---	---	---	EXTERNAL	DEFECTS FOUND	ACCEPTED

- i. Verify inspection was completed and the result was free from defect for prior year.

2. Activation of Boiler

- a. Prior to activation, confirm there is sufficient water in the boiler by checking the sight glass.



- b. Turn on the boiler system.
- c. Using the pressure gauge on the boiler, check pressure levels to ensure it is operating within the range indicated in the manufacturer's specifications.

Upon boiler activation, if the inspector observes the boiler operating above the maximum allowable range as set forth below, they must deactivate the unit and follow instructions included in section 4(b) below.

- i. Low pressure steam boilers generally operate within a range of 5-12 PSI with a maximum of 15 PSI.
 - ii. High pressure boilers typically operate a range of 150 to 1,000 PSI.
- d. Once the system is operational, confirm that boiler is producing steam pressure.

3. Visual Radiator & Surrounding Area Inspection

Visually inspect the steam radiator, steam supply valve, exposed steam piping, joints, connections, and the floor and walls adjacent to the radiator for signs of active steam or water leaks, cracks, corrosion, and/or warping.

- a. Visually inspect the annular spaces at steam piping penetrations. Spaces shall be sufficient to allow for the expansion and contraction of pipes and prevent damage to pipe or surrounding material. Spaces must be sealed in accordance with section 1206.4 of the Mechanical Code of the city of New York or successor provisions.
- b. Utilize a calibrated non contact digital infrared thermometer or thermal imaging device to confirm the transfer of heat into the steam radiator; and inspect:

i. Radiator body for cracks.



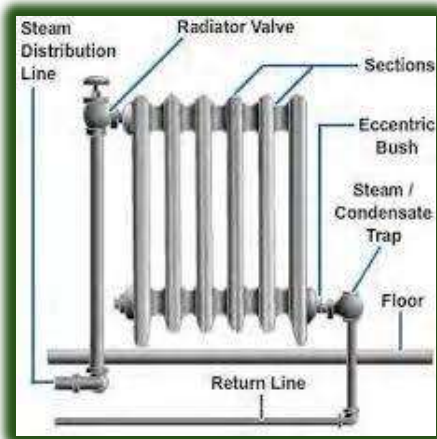
For steam and/or water leaks.



ii. Corrosion and/or warping.



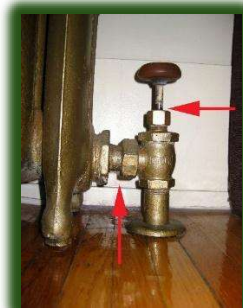
- iii. Pipe joints and connections are securely connected, not loose, and not subjected to stress/strain.



- iv. Adjacent walls and floors for recent damage.



- v. Listen for audible hissing or banging (air hammer) at each radiator suggesting a steam leak or other defect.
- vi. Visually inspect and operate the steam supply valve to confirm proper functioning and to identify any leaks.



- vii. Confirm the proper pitch of the steam piping, condensate return, and the steam radiator, (Steam piping shall be installed to drain to the boiler or the steam trap) as per section 1206.8 of the Mechanical Code of the city of New York or successor provisions.

What does this mean:

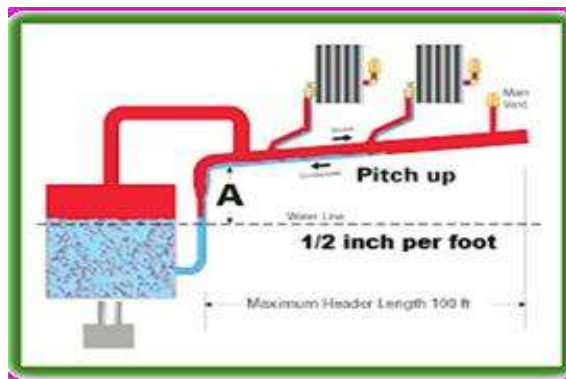
- For a 1-pipe system, radiators should slope slightly towards condensate return/steam supply lines.
- For a 2-pipe system, radiators should slope slightly towards the steam-trap at the top of the condensate return line.
- In either system (1-pipe and 2-pipe) the slope of the radiator shall not be less than 1/2 inch per foot, or 2-degrees, as recommended by American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) standards.

Why:

- The pitch allows condensate to return to a boiler to maintain system water levels.

What to look for:

- Using a level (plumbers' level recommended) ensure the radiator is properly pitched.
 - Look for dips or “bellies” in the line.
 - Pipes should NOT be level or sagging.



4. Recording Inspection Results

a. General Inspection Reporting Requirements

Inspectors shall:

- i. Using the Record of Steam Radiator Inspection form, document all observed conditions in a clear and accurate manner, including defects, damage, or irregular system performance such as:
 - Active steam or water leaks
 - Cracked or damaged radiators
 - Improperly functioning valves, vents, or steam traps
 - Signs of overheating, pressure issues, or system malfunction
 - Combustible materials located near radiators or piping
 - Audible hissing or banging
- ii. Whenever an inspection reveals a defect or damage of a steam radiator, or related component, using the Record of Steam Radiator Inspection form, the inspector must notify:
 - the owner, managing agent, or other responsible party;
 - the tenant who resides within the apartment where hazardous conditions were observed about the findings; and
 - HPD by email at RadiatorInfo@hpd.nyc.gov, subject line 'Steam Radiator Inspection and building address'. Include information about referrals made to DOB because of immediately hazardous conditions observed during inspections (311 Service Request numbers, etc.)

Notifications must be completed within 48 hours following completion of an inspection.

Notwithstanding requirements set forth in §27-2056.22 of the Administrative Code, certain conditions, such as uncontrolled steam leaks, likely to be hazardous to life or safety require immediate notification to DOB using 311 or boilertechnical@buildings.nyc.gov.

Owners are required to correct reported defects within 14 days of the inspection that determined the existence of a defect(s).

Photographs of all relevant conditions, where applicable, to support findings and provide visual documentation are recommended.

b. Observation of Hazardous Conditions

As per section §66-03, Hazardous Conditions, if, during an inspection of a steam radiator performed pursuant to §27-2056.22 of the Administrative Code of the City of New York, the inspector observes a condition likely to be hazardous to life or safety the radiator must be taken out of service within 24 hours.

Possible hazardous conditions include:

- i. An active steam leak:
 - Controlled steam leak: isolate the leak by closing the radiator valve and confirm that the valve holds in the closed position. Using a calibrated non contact digital infrared thermometer or thermal imager verify that the steam is not being distributed to the radiator. The system is not to be reactivated until the condition has been properly evaluated and corrected.
 - Uncontrolled steam leak, where a leak cannot be stopped by closing the steam radiator supply valve: lockout/tagout the boiler*.

The system is not to be reactivated until DOB has conducted an inspection and the cease use tag is removed. To arrange for a reinspection contractors may contact DOB at 212-602-0580, or boilertechnical@buildings.nyc.gov.

- ii. Severe corrosion of a steam radiator or a related system component.
- iii. Any other condition(s) observed that may inhibit the safe operation of the steam system.

*Lockout/tagout: make inoperable and affix a warning note indicating imminent danger if used prior to correction.

Notification requirements specified in 4(a)(ii) above must be followed.

The owner, or other party responsible, must repair or replace the steam radiator within seven (7) days of the inspection.

Systems must not be reactivated until hazardous conditions have been properly evaluated and corrected. Systems must not be reactivated until hazardous conditions have been properly evaluated and corrected.

If there are questions concerning the steam radiator inspection process or associated requirements, please email: RadiatorInfo@hpd.nyc.gov.

Radiator Inspection Checklist

This CHECKLIST should be referenced when completing the Record of Steam Radiator Inspection for each apartment inspected. The [record-of-steam-radiator-inspection.pdf](#) can be found at [inspection-of-steam-radiators](#) on HPD's website (www.nyc.gov/hpd). Follow the instructions on that form carefully to complete this process. Complete the last page of this document, the **CERTIFICATION OF BUILDING OWNER AND BUILDING SUPERINTENDENT REGARDING INSPECTION(S) OF STEAM RADIATOR(S)**, properly before doing any inspections.

Boiler issues

- ☐ Boiler inspection not accepted by DOB
- ☐ Boiler not operational

Potential defects to check for at each radiator.

- ☐ Cracks
- ☐ Steam and/or water leaks observed
- ☐ Corrosion and/or warping
- ☐ Pipe and joint connections not properly secured
- ☐ Evidence of recent damage to adjacent walls and floors
- ☐ Hissing and/or banging sounds observed at radiator
- ☐ Valves not operational
- ☐ Improper pitch
- ☐ Air vents (1-pipe) not functioning
- ☐ Steam traps (2-pipe) not functioning
- ☐ Pipe penetrations not properly sealed
- ☐ Combustibles nearby
- ☐ Radiator not heating evenly

**CERTIFICATION OF BUILDING OWNER AND BUILDING SUPERINTENDENT REGARDING
INSPECTION(S) OF STEAM RADIATOR(S)**

I _____ (print name) owner/managing agent for the building located at _____ (address) (“Premises”) certify that _____ (print name of superintendent), who I authorized to conduct the inspection of steam radiators as required under NYC Administrative Code §27-2056.22, reviewed the informational materials provided by the Department of Housing Preservation and Development (HPD) prior to conducting such inspections.

(Print Owner/Managing Agent Name)

(Owner/Managing Agent Signature)

State of New York, County of _____

Sworn to before me this _____ day of _____, 20_____

Stamp

(Notary Signature)

I _____ (print name)
Building Superintendent for the building located at _____ (address) (“Premises”) certify that I reviewed and acknowledge comprehension of the informational materials provided by HPD regarding the inspection of steam radiators pursuant to NYC Administrative Code §27-2056.22, prior to conducting such inspections.

Print Superintendent Name

Superintendent Signature

State of New York, County of _____

Sworn to before me this _____ day of _____, 20_____

Stamp

(Notary Signature)