



How-to Guide: *Supporting Documentation*

In Compliance with 2020 New York City Energy Conservation Code

- GENERAL
- BUILDING ENVELOPE
- **MECHANICAL SYSTEMS**
- LIGHTING & ELECTRICAL POWER
- OTHER REQUIREMENTS

NOTE: In this *How-To Guide: Supporting Documentation*, selected Energy Code provisions have been generalized, summarized, rephrased, and/or highlighted. This guide is intended: 1) To provide general guidance for the job applications seeking compliance with the 2020 NYCECC; 2) Not to replace or represent the entire 2020 NYCECC and related regulations of the City of New York and the Department of Buildings; and 3) Not to provide complete compliance solutions for any particular type of job or work. Comprehensive mandates, applicability, exemptions, exceptions and options will be found in the 2020 NYCECC and related regulations of the City of New York and the Department of Buildings.

OPTIMAL EQUIPMENT SIZE

Residential Buildings

- **Equipment Sizing per ACCA Manual S:** Heating and Cooling equipment of a Residential job application must be sized in accordance with ACCA Manual S based on building loads calculated per ACCA Manual J, or other approved calculation methodologies. R403.7
- **Sizing Statement:** The drawings must include a statement indicating the total Heating and Cooling design loads have been determined as such.
- **Duct Sizing per ACCA Manual D:** Ducts in a Residential job application must be sized in accordance with ACCA Manual D.
- **Minimum Efficiency:** New or replacement heating and cooling equipment must meet or exceed the minimum efficiency rating required by [Federal law](#). R403.3.8

Commercial Buildings

- **ANSI/ASHRAE/ACCA Standard 183:** Design loads associated with Heating, Ventilating and Air Conditioning (HVAC) of a Commercial job application must be determined in accordance with ANSI/ASHRAE/ACCA Standard 183, or by an approved equivalent computational method. C403.1.1
C403.3.1
6.4.2.1
- **Sizing Statement:** The drawings, preferably in an EN- labeled sheet, must include a statement indicating the total HVAC design loads have been determined as such.
- **Design loads and System Commissioning:** Total HVAC design loads combined with Service Water Heating loads of a job application largely dictate whether System Commissioning (per Section C408 and Section 6.7.2.3) on the job is required or not. Refer to [OR-8] for the detailed requirements for System Commissioning.

Item	Complies?	Comments/Assumptions
	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input checked="" type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input checked="" type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Mechanical Systems list for values.
	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input checked="" type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Mechanical Systems list for values.
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	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input checked="" type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Mechanical Systems list for values.

CALCULATION OF HEATING AND COOLING LOADS

DESIGN LOADS HAS BEEN DETERMINED IN ACCORDANCE WITH THE PROCEDURES DESCRIBED IN ANSI/ASHRAE/ACCA STANDARD 183.

MECHANICAL CONTRACTOR SHALL PROVIDE OPERATING AND MAINTENANCE MANUALS TO THE BUILDING OWNER.

ALL SUPPLY AND RETURN AIR DUCTS AND PLENUMS SHALL BE INSULATED A MINIMUM OF R-5 INSULATION WHEN LOCATED IN THE UNCONDITIONED SPACES AND WITH A MINIMUM OF R-8 INSULATION WHEN LOCATED OUTSIDE THE BUILDING. WHEN LOCATED WITHIN A BUILDING ENVELOPE ASSEMBLY, THE DUCT OR PLENUM SHALL BE SEPARATED FROM THE BUILDING EXTERIOR OR UNCONDITIONED OR EXEMPT SPACES BY MINIMUM OF R-8 INSULATION.

THERE IS NO REFRIGERANT PIPING UTILIZED FOR THIS PROJECT.

• For definitions of “Residential Building” and “Commercial Building,” refer to R202 & C202.

Figure MS-1. Sample Sizing Statement

MINIMUM EQUIPMENT EFFICIENCY/PERFORMANCE

Complete Equipment Specifications

For all proposed HVAC and Service Water Heating (SWH) equipment, the equipment schedule on construction drawings must clearly list the *equipment efficiency* or performance rating along with the type, size, capacity, and fuel type of all equipment, and any additional specifications pertaining to the energy use of the equipment. For all Energy-Code-regulated equipment, their rated efficiency/performance ratings identified in the equipment schedule must meet or exceed the corresponding Code-prescribed value.

R403.7
C403.3.2
C404.2
6.4.1

Values on Construction Drawings First, and then on Energy Analysis

Values and descriptions for HVAC and SWH equipment reported on Energy Analysis (on EN- labeled sheets) must be quoted from those in the equipment schedules and specifications on the relevant construction drawings—e.g., M- , or P- labeled drawings.

1 RCNY §5000-01
(f),(g)

SPLIT SYSTEM AIR CONDITIONING SCHEDULE "A"											
MARK	AREA SERVED	TON	OUTDOOR MODEL#	INDOOR MODEL#	COOLING CAPACITY		HEATING CAPACITY		POWER SUPPLY	INDOOR UNIT	
					RATED CAPACITY BTUH	RATED CAPACITY(BTUH)		MCA (A)		MO	
						@ 47 F	@ 17 F				
CU-C-1 AHU-C-1	UNIT # 1	4 T.	XXXX-XXXXXX	XXXX-XXXXX	47,500	52,500	38,000	2C			



COMcheck Software Version 4.1.3.0

Mechanical Compliance Certificate

OUTDOOR UNIT			EER	SEER	HSPF	COP @
IND PRESSURE TEL	WEIGHT (LBS)	EXTERNAL DIMENSIONS (H x W x D)				
58 dB	283	52-15/16x35-7/16x12-5/8	--	14.40	8.8	2.6

Energy Code: 2020 New York City Energy Conservation Code
 Project Title: New Multifamily Building
 Location: New York, New York
 Climate Zone: 4a
 Project Type: New Construction

Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Mechanical Systems List

Quantity System Type & Description

- 1 HVAC System_CU-C-1 (Single Zone):
 Split System Heat Pump
 Heating Mode: Capacity = 53 kBtu/h,
 Proposed Efficiency = 8.80 HSPF, Required Efficiency = 8.20 HSPF
 Cooling Mode: Capacity = 48 kBtu/h,
 Proposed Efficiency = 14.40 SEER, Required Efficiency: 14.00 SEER
 Fan System: AHU-C-1 | 1ST FLOOR -- Compliance (Motor nameplate HP method) : Passes

Fans:

AHUC1 Supply, Single-Zone VAV, 1307 CFM, 0.5 motor nameplate hp, 0.7 fan efficiency grade

Figure MS-2.

Sample Mechanical Equipment Schedules & Matching Mechanical COMcheck Report
 - SPLIT SYSTEM HEAT PUMP

• Efficiency value of individual equipment should be listed in the same measurement unit prescribed in the corresponding efficiency requirements table in the Code.

AIR COOLED CONDENSING UNIT SCHEDULE															
UNIT NO.	SERVICE	LOCATION	NOMINAL COOLING CAPACITY,TON	NOMINAL HEATING CAPACITY,BTU	ELECTRICAL DATA				MANUFACTURER AND MODEL No.	IEER/EER	CODE REQUIRED EFFICIENCY EER	COP	CODE REQUIRED EFFICIENCY COP	WEIGHT LBS	REMARKS
					MCA	MFS	VOLTS	PH							
ACCU-L-1	LOBBY	ROOF-BLDG. B	10	135,000	46	1 @ 60	208	3	XXXX- XXXXXX	24.4/12.7	11.0	3.84	3.3	765	HEAT PUMP

AIR HANDLING UNIT SCHEDULE																
UNIT NO.	SERVICE	LOCATION	CFM	O.A. CFM	EXT.S.P. IN.W.C.	NOMINAL COOLING CAPACITY TON	NOMINAL HEATING CAPACITY BTU/HR	POWER CONSUM. COOL/HEAT WATTS	ELECTRICAL DATA				WEIGHT (LBS)	MANUFACTURER AND MODEL	REMARKS	AIR COOLED CONDENSING UNIT SERVED
									MCA AMPS	MFA AMPS	VOLTS	PH				
AC-L-1	LOBBY	1ST FLOOR	1200	-	0.8	4	54,000	259	5.3	15	208	1	106	XXXX- XXXXXX	CEILING TYPE DUCTED	ACCU-L-1
AC-L-2	LOBBY	1ST FLOOR	800	-	-	2.5	34,000	57	0.9	15	208	1	57	XXXX- XXXXXX	4 WAY CASSETTE	



COMcheck Software Version 4.1.3.0
Mechanical Compliance Certificate

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Mechanical Systems List

Quantity System Type & Description

- 1 ACCU-L-1 (Single Zone):
 VRF Condensing Unit, Air Cooled Heat Pump
 Heating Mode: Capacity = 135 kBtu/h,
 Proposed Efficiency = 3.84 COP, Required Efficiency = 3.30 COP
 Cooling Mode: Capacity = 120 kBtu/h,
 Proposed Efficiency = 12.70 EER, Required Efficiency: 11.00 EER + 14.6 IEER
 Fan System: None
- 1 AC-L-1 (Single Zone):
 Cooling: 1 each - VRF Zone Fan Unit, Capacity = 48 kBtu/h, No Economizer, Economizer exception: Low Capacity Residential
 No minimum efficiency requirement applies
 Fan System: Unspecified
- 2 AC-L-2 (Single Zone):
 Cooling: 1 each - VRF Zone Fan Unit, Capacity = 30 kBtu/h, No Economizer, Economizer exception: Low Capacity Residential
 No minimum efficiency requirement applies
 Fan System: Unspecified

Figure MS-3.
Sample Mechanical Equipment Schedules & Matching Mechanical COMcheck Report
 - VRF HEAT PUMP :
 AIR-COOLED CONDENSER & ZONED FAN UNITS

RESIDENTIAL-BUILDING-SPECIFIC REQUIREMENTS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

▪ Systems for Multiple Dwelling Units

- **Systems serving** multiple dwelling units must comply with Sections C403 and C404 (Commercial Buildings section) of ECC in lieu of Section R403.

R403.8
R408

▪ Controls

- **Programmable Thermostat:** At least one thermostat for each separate heating and cooling system must be provided with controls, setback capabilities and temperature set points prescribed by this section of the Code.
- **Heat Pump Supplementary Heat:** Heat pumps having supplementary electric-resistance heat must have controls that prevent unnecessary supplemental heat operation.
- **Outdoor Temperature Setback for Hot Water Boilers:** Hot water boilers that supply heat to the building through one- or two-pipe heating systems must have an outdoor setback control.

R403.1.1
R403.1.2
R403.2

▪ Duct & Piping Insulation

- Duct system in new buildings and additions must be specified to be located in conditioned space.
- Duct system in alterations must satisfy minimum R-values listed in R403.3.1 depending on the location of ducts.
- For heating/cooling system pipes carrying fluids > 105 °F, or < 60 °F, drawings must specify the pipe insulation thickness in accordance with Table R403.4. The thickness and conductivity of the piping insulation must result in R-3 or greater.

R403.3.1
R403.3.7

▪ Duct Leakage Testing

- Duct system where the Leakage Testing is required, drawings must include a statement specifying that duct leakage testing shall be performed at either Rough-in, or Post-construction, and the leakage shall be ≤ 4 cfm/100 sf of conditioned floor area.

R403.3.3
R403.3.4

RESIDENTIAL-BUILDING-SPECIFIC REQUIREMENTS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

■ Service Water Heating

- **Heat Trace Temperature Control:** Any electric heat trace systems must be provided with controls that automatically adjust the energy input to the heat tracing to maintain the desired water temperature in response to the occupant's hot water use.
- **Demand Recirculation Systems:** Any *circulation pump* must be equipped *with controls* that automatically start/turn off the pump in response to the hot water demand and water temperature in the system.
- **Insulation:** Hot water pipes must be insulated with a minimum thermal resistance value of R-3.
- **Supply of Heated Water:** Service hot water supply piping must be designed in accordance of with one of the following:
 - (a) Maximum allowable pipe length method
 - (b) Maximum allowable pipe volume method
 - (c) Drain water heat recovery units
 - (d) Recirculation systems

R403.5.1
R403.5.2
R403.5.3
R403.5.5

■ Ventilation

- **Dampers:** Outdoor air intakes and exhausts must have *automatic or gravity* dampers that close when the ventilation system is not operating.
- **Fan Efficacy:** Fans used to provide whole-house mechanical ventilation must meet or exceed the minimum system efficacies of Table R403.6.1.
- **Ventilation System Design:**

In new Residential buildings, 'exhaust-only' ventilation is No Longer accepted for energy code compliance.

Instead, ventilation system of every dwelling unit must be designed with:

 - (a) Supply and exhaust ventilation with heat recovery ventilator (**HRV**) or energy recovery ventilator (**ERV**), Or
 - (b) Balanced ventilation system satisfying air flow rates of Table R403.6.2(1), and fan capacities adjusted per Table R403.6.2(2).

R403.6

R403.6.1

R403.6.2

HVAC SYSTEM CONTROLS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Thermostatic Controls

- All mandatory thermostatic controls applicable to the proposed system must be specified on drawings.
- The required controls include:
 - 1) Heat pump supplementary heat controls
 - 2) Minimum 5°F Deadband
 - 3) Setpoint overlap restriction.Note that many programmable thermostats meet this requirement.

C403.4.1
6.4.3.1
6.4.3.2

Off-Hour Controls

Thermostatic setback controls that are controlled by either an automatic time clock or programmable control system must be provided in each zone.

C403.4.2
6.4.3.3

Narratives on Operations and Controls

A narrative must be provided for each mandatory control system describing its function and operation and specifying proper setpoints of equipment and controls.

1 RCNY §5000-01 (g)(2)

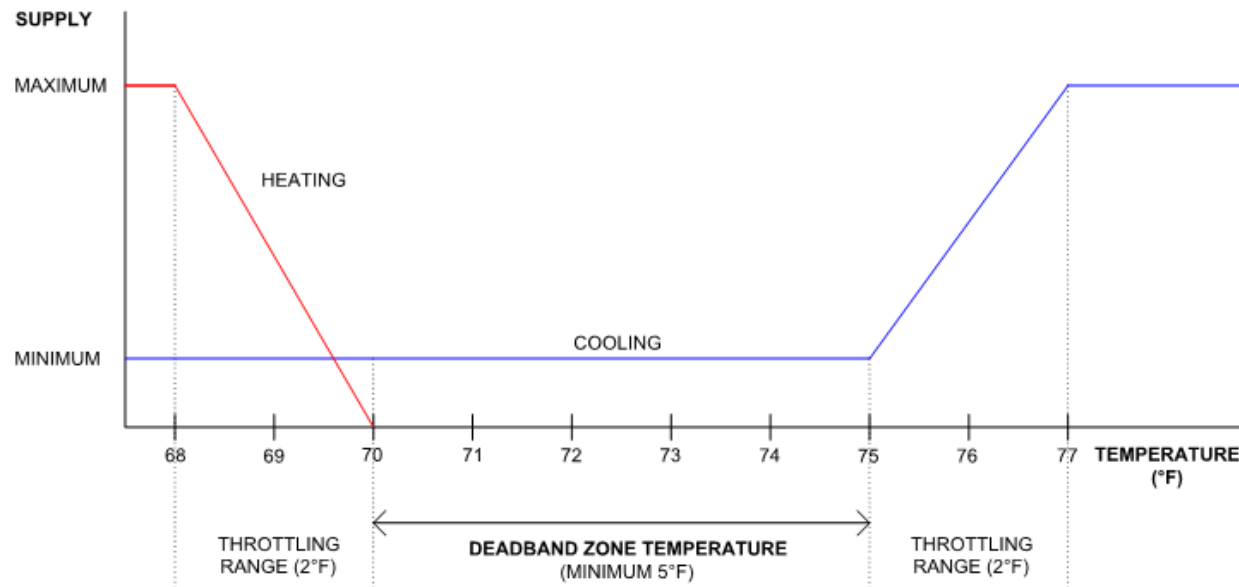


Figure MS-7.
Sample Deadband Control Setup

ECONOMIZERS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Requirement for Each Cooling System

- Most commercial buildings have spaces that need cooling all year long. If it is colder outside than inside, economizers provide “free cooling” by bringing in the outdoor air to cool the space in lieu of activating mechanical cooling equipment. C403.5
6.5.1
- Air or water economizer must be provided on individual fan-cooling units ≥ 270 kBtu/h for **Group R** occupancies, and ≥ 54 kBtu/h for **all other** occupancies
- For **ECC-following jobs**:
 - Even if each fan cooling unit serving **Group R** occupancies is < 270 kBtu/h, the total supply capacity of all fan cooling units not provided with economizers must be ≤ 20 % of the total supply capacity, or **1,500 kBtu/h**, whichever is greater.
 - Even if each fan cooling unit serving **all other** occupancies is < 54 kBtu/h, the total supply capacity of all fan cooling units not provided with economizers must be ≤ 20 % of the total supply capacity, or **300 kBtu/h**, whichever is greater.

(• NOTE: For split systems or VRF systems, the indoor cooling unit capacity must be used to calculate the total supply capacity.)

High-Efficiency Exemption

- **ECC-following jobs**: Individual cooling systems with minimum **20%** efficiency improvement (IPLV or EER) are exempt from providing economizers. Table C403.5(2)
Table 6.5.1-2
- **ASHRAE-following jobs**: Individual cooling systems with minimum **42%** efficiency improvement (IPLV, IEER, SEER, or alternatively EER) are exempt from providing economizers.

Cooling Stage Requirements

Cooling systems with economizers are required to have two-, three- or four-stage cooling, depending on the size of the cooling system. The economizers are required to provide partial cooling even if the outdoor air is not cool enough to satisfy the entire cooling load. C403.5.1

High-Limit Shutoff

Economizers in lieu of mechanical cooling can save energy significantly when the outdoor air is cool and has low humidity. The Code sets the temperature and enthalpy limits when economizers are to shut off; these high-limit shutoffs must be noted in the construction documents. C403.5.3.3
6.5.1.1.3

Economizer Fault Detection and Diagnostics (FDD)

Systems equipped with an economizer must include a *fault detection and diagnostics* (FDD) system equipped with specific sensors that detect and reports faults. C403.5.5
6.4.3.12

VENTILATION

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document – through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. – how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

▪ Demand Controlled Ventilation (DCV)

For spaces larger than 500 sf and with an average occupant load of at least 25 people/1,000 sf of floor area, *demand control ventilation* (DCV) must be specified. For the average occupant load, Table 403.3 of NYC Mechanical Code must be referenced. See Figure below for example.

C403.7.1
6.4.3.8

▪ Energy Recovery Ventilation Systems (ERV)

- Each fan system operating < 8,000 hours/yr, where the supply airflow rate exceeds the values in Table C403.7.4(1) [for ECC-following jobs], or values in Table 6.5.6.1-1 [for ASHRAE-following jobs], exhaust air energy recovery ventilation (ERV) system is required.
- Each fan system operating \geq 8,000 hours/yr, where the supply airflow rate exceeds the values in Table C403.7.4(2) [for ECC-following jobs], or values in Table 6.5.6.1-2 [for ASHRAE-following jobs], exhaust air energy recovery ventilation (ERV) system is required.
- The ERV operation must demonstrate a minimum total (sensible and latent) recovery effectiveness ratio of 50%, and be provided with controls that communicate with air economizer operation. This must be identified in the equipment schedule and controls notes.
- Where the sum of the airflow rates exhausted within 30 feet of each other is \geq 75 % of the design ventilation outdoor air flow rate, an ERV is required.

C403.7.4
6.5.6.1

**TABLE 403.3
MINIMUM VENTILATION RATES**

OCCUPANCY CLASSIFICATION	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE R_p CFM/FT ^{2a}	DEFAULT OCCUPANT DENSITY #/1000 FT ^{2a}	EXHAUST AIRFLOW RATE CFM/FT ^{2a}
Education				
Auditoriums	5	0.06	150	—
Corridors (see public spaces)	—	—	—	—
Media center	10	0.12	25	—
Lecture hall (fixed seats)	7.5	0.06	150	—
Art classroom	10	0.18	20	0.7
Science laboratories ^{b, k}	10	0.18	25	1.0
Offices				
Conference rooms	5	0.06	50	—
Office spaces	5	0.06	5	—
Reception areas	5	0.06	30	—
Telephone/data entry	5	0.06	60	—

Figure MS-9.
Excerpt from Table 403.3 of
2014 NYC Mechanical Code Chapter 4

FAN CONTROLS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

▪ VAV System Controls for Multiple Zones

Supply air systems serving multiple zones must be *variable air volume* (VAV) systems that, during periods of occupancy, are capable of being controlled to reduce primary air supply before reheating, re-cooling or mixing.

C403.6
6.5.3.3

▪ Fan Airflow Control

- Direct expansion (DX) cooling systems ≥ 65 kBtu/h must have a minimum of two stages of fan speed control. For example, variable speed drive (VSD) or variable frequency drive (VFD) must be specified in the equipment schedule for these systems.
- Chilled-water and evaporative cooling systems with fan motor power $\geq 1/4$ hp must also have a minimum of two stages of fan speed control.

C403.8.5.1
6.5.3.2.1

▪ Fan Motor Power Limitation

- Drawings must indicate (ideally in the Fan Schedule) that each individual fan system power in the HVAC system does not exceed the allowable fan system *motor nameplate horsepower* (Option 1), or fan system *brake horsepower* (Option 2).
- The fan brake horsepower for each fan listed on the schedule must be \leq the first available motor size greater than the hp value calculated per Section C403.8.2.

C403.8.1
C403.8.2
6.5.3.1.1
6.5.3.1.2

▪ Fan Efficiency

- Fans with a motor nameplate horsepower > 5 hp must be designed to have a *fan efficiency grade* (FEG) ≥ 67 .
- The total efficiency of the fan at the design point of operation must be within 15 percentage points of the maximum total efficiency of the fan.

C403.8.3
6.5.3.1.3

BOILER CONTROLS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

▪ Outdoor Temperature Setback Control

For one- or two-pipe systems, drawings must specify setback controls that automatically lower the boiler water temperature based on the outdoor air temperature.

C403.4.1.5

▪ Hot-Water Temperature Reset Controls

Hot water systems with design output capacity ≥ 300 kBtu/h must be provided with automatic controls to reset supply water temperatures by representative building loads or outdoor air temperature.

C403.4.4
6.5.4.4

▪ Modulating Burner

Hot water systems of a single boiler with input design capacity > 500 kBtu/h must be equipped with either a multi-staged or modulating burner.

C403.4.3

▪ Boiler Turndown

- A single boiler or boiler systems $\geq 1,000$ kBtu/h must have a turndown ratio of 3 to 1, 4 to 1, or 5 to 1, as defined by the Code.
- The turndown ratio may be met by a single boiler, modulating boilers or a combination of the two.

C403.3.4
6.5.4.1

▪ Condensing Boilers

For space heating gas-fired condensing boilers with rated thermal efficiency (E_t) of $\geq 90\%$, the distribution system must be designed so that the hot water return temperature (entering water temperature) is $\leq 120^\circ\text{F}$, when the boiler is firing.

C403.3.5
6.4.1.6

HEAT REJECTION CONTROLS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

▪ Heat Rejection Fan Power

Heat rejection fans with motors ≥ 7.5 hp must be equipped with controls to reduce the fan power to operate the fan at two-thirds of full speed or less.

C403.9.1
6.5.5.2

▪ Multiple-Cell Cooling Towers

Heat rejection systems with multiple cells and equipped with VFD (variable frequency drive) controls must be operated in sequence as described in Section C403.9.2.

C403.9.2

▪ Cooling Tower Flow Turndown

Heat rejection systems operating with water-cooled chillers and configured with VFD condenser water pumps must be designed so that all open-circuit cooling tower cells are capable of running in parallel with sequencing as provided by the Code.

C403.9.4
6.5.5.4

Chiller Controls

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

■ Chilled-Water Temperature Reset Controls

Chilled water systems with a design output capacity ≥ 300 kBtu/h must be provided with automatic controls to reset supply water temperatures by representative building loads or outdoor air temperature.

C403.4.4
6.5.4.4

■ Supply Temperature Reset and Deadband

Hydronic systems of heating fluids that have been previously mechanically cooled, and hydronic systems of cooling fluids that have been previously mechanically heated, must be provided with supply temperature reset controls and/or a supply temperature deadband between changeovers based on the system type.

C403.4.3.3.1
6.5.2.2

■ Chiller Isolation

- A chilled-water plant including more than one chiller must be configured so that all fluid flow through the chiller is automatically reduced or shut off when the chiller is shut down.
- A boiler plant including more than one boiler must be configured so that the flow through the boiler is automatically reduced or shut off when the boiler is shut down.

C403.4.5
6.5.4.3

ADDITIONAL HVAC CONTROLS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

▪ Shutoff Dampers

- Class-I *motorized* shutoff dampers with a maximum air leakage rate of 4 cfm/ft² at 1.0 inch water gauge must be provided in outdoor air intakes, exhaust openings, and stairway/shaft vents. Alternatively, where permitted by the Code, *gravity* (non-motorized) dampers may be provided in lieu of motorized dampers.
- Alternatively, *gravity* (non-motorized) dampers may be provided in lieu of motorized dampers in buildings less than 3-stories above grade plane, or where the design exhaust capacity is ≤ 300 cfm. – *Only* when following NYCECC.
- See Section 6.4.3.4.2 for exceptions where non-motorized dampers are permitted when following ASHRAE.

C403.7.7
6.4.3.4.2

▪ Enclosed Parking Garage Ventilation

Enclosed parking garage ventilation systems must have capacity to monitor contaminant (CO) levels and automatically throttle the fan power in response to the contaminant levels.

C403.7.2
6.4.3.4.5

▪ Pump Controls: Hydronic Variable Flow Systems

- HVAC pumping systems with 3 or more modulating control valves must be designed for variable fluid flow, and be capable of reducing pump flow rates to no more than the larger of 25% of the design flow rate or the minimum flow required by the heating/cooling equipment manufacturer for the proper operation of equipment.
- Individual chilled-water pumps serving variable-flow systems having motors ≥ 5 hp must have controls or devices (such as variable-speed controls) that will result in pump motor demand of a maximum 30% of design wattage at 50% of design water flow.

6.5.4.2

▪ Hot Gas Bypass Limitation

- Cooling systems must not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation.
- The capacity of the hot gas bypass, when permitted by Code, must be limited to:
 - For ECC-followings jobs, maximum 50% of the total capacity for the rated capacity ≤ 240 kBtu/h; and maximum 25% for the rated capacity > 240 kBtu/h.
 - For ASHRAE-following jobs, maximum 15% of the total capacity for the rated capacity ≤ 240 kBtu/h; and maximum 10% for the rated capacity > 240 kBtu/h.

C403.3.3
6.5.9

▪ Vestibule Heating/ Cooling

- The heating system must be provided with controls to shut off the source when the outdoor temperature is $> 45^\circ\text{F}$.
- The heating and cooling systems must have a thermostat in the vestibule to limit heating to $\leq 60^\circ\text{F}$ and cooling to $\geq 85^\circ\text{F}$.

C403.4.1.4
6.4.3.9

SERVICE WATER HEATING SYSTEMS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

Heat Traps

For water-heating equipment not supplied with integral heat traps and serving non-circulating systems, heat traps must be specified on both supply and discharge piping associated with the heating equipment.

C404.3
7.4.6

Circulation Pumps and Heat Trace Systems

- Heated-water circulation systems must be provided with circulation pumps that are automatically turned on and off by the hot water demand in the system.
- Electric heat trace systems must have controls to automatically adjust the energy input to maintain the desired water temperature in the piping, and to be automatically turned off when there is no hot water demand.

C404.6
7.4.4.2

Heat Recovery for Service Water Heating

Condenser heat recovery system must be installed for facilities as follows:

C403.9.5
6.5.6.2.1

- 1) operating 24 hours/day,
- 2) the total installed heat capacity of water-cooled systems > 6,000 kBtu/h of heat rejection, *and*
- 3) the total design service water heating load > 1,000 kBtu/h.

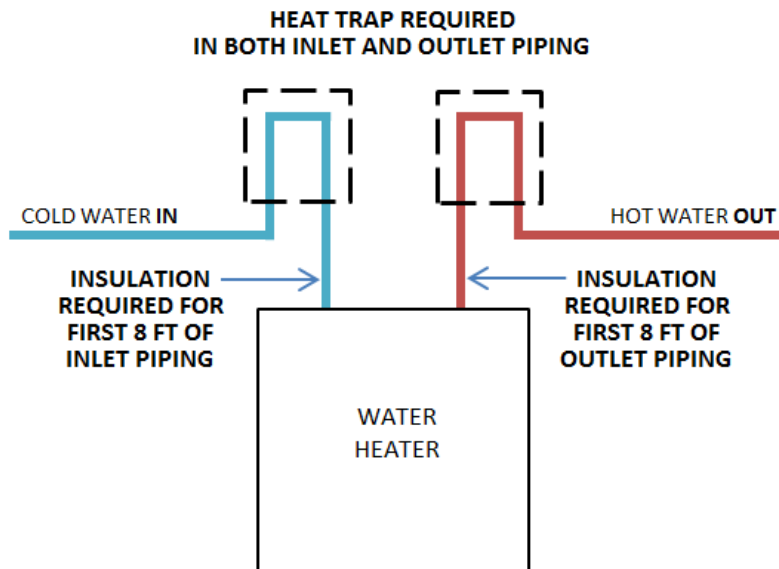


Figure MS-15.
Heat Traps and Insulation Requirements for Non-Circulating Systems

DUCTS AND PIPING

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

■ Duct and Plenum Insulation

Supply and return air ducts and plenums must be designed as follows:

C403.11.1
6.4.4.1.2

<u>Location</u>	<u>Requirement</u>
- In Unconditioned space	Insulated with min. R-6 insulation
- Outside the building	Insulated with min. R-8 insulation
- Within a building envelope assembly	Separated from the building exterior or unconditioned space by min. R-8 insulation

■ Duct System Sealing

- Joints, seams and connections of ducts, air handlers, and filter boxes must be sealed.
- Drawings must clearly indicate pressure classifications of the proposed duct systems in accordance with NYC Mechanical Code.
- For high-pressure duct systems that operate at a *static pressure* > 3 inches water gauge, drawings must specify the *duct leakage test* requirements in accordance with the SMACNA HVAC Air Duct Leakage Test Manual.

C403.11.2
6.4.4.2.1

■ Piping Insulation

- Piping to service heating, cooling and service water heating systems must be thermally insulated.
- Minimum pipe insulation thicknesses depending on the fluid temperature range must be specified on drawings.

C403.11.3
C404.4
6.4.4.1.3

■ Maximum Pipe Length/Volume

Heater water supply piping systems must be designed in accordance with:

C404.5

- Maximum allowable pipe length method:** The piping length from the nearest source of heated water to the terminal fixture is within the maximum allowable pipe length per Table C404.5.1, *or*
- Maximum allowable pipe volume method:** The water volume from the nearest source of heated water (i.e., hot water riser) to the terminal fixture is within the maximum allowable pipe volume calculated per C404.5.2.1.

REQUIREMENTS FOR SPECIFIC USE AND FUNCTION

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

▪ Radiant Heating for Outside

- Systems to provide heat outside the building thermal envelope must be radiant systems, e.g., electrical unit heaters in parking garage
- The heating systems must be controlled by an occupancy sensing device or timer switch.

C403.12.1
6.5.8.1

▪ Hotel Guest Rooms

In each guestroom in hotels and motels (all Group R-1 buildings) with greater than 50 guestrooms, temperature setpoint controls and ventilation controls during unoccupied hours, and/or a captive key card system must be provided.

C403.7.6
6.4.3.3.5

▪ Refrigeration & Commercial Kitchen Equipment and System

Refrigeration equipment and systems must be installed and provided in accordance with applicable Code provisions:

- Maximum allowable daily energy use in kWh per equipment type – Section C403.10
- Design of factory-built walk-in coolers/freezers and refrigerated warehouse coolers/freezers – Section C403.10.1
- Design of site-built walk-in coolers/freezers – Section C403.10.2
- Design of site-built refrigerated display cases – Section C403.10.3
- Design of refrigeration systems with remote compressors/condensers not located in a condensing unit – Section C403.10.4
- Commercial kitchen equipment – Section C405.10

C403.10
C405.10
6.5.11
6.8.1
10.4.6

▪ Pools and Spas

Energy use of pools and permanent spas must be controlled by 1) Heaters with readily accessible on-off switch and centrally set thermostat, 2) Time switches that automatically turn on and off heaters and pump motors, and 3) Vapor-retardant cover for outdoor heated pools.

C404.9
C404.10
C408.2
7.4.5

▪ Snow- and Ice-Melt System Controls

Snow- and ice-melting systems must be provided with automatic and/or manual controls capable of shutting off the system in response to the pavement temperature and outdoor weather conditions.

R403.9
C403.12.2
6.4.3.7

▪ Freeze Protection System Controls

Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, must have controls to automatically shut off the system in response to the outdoor temperature ($> 40^{\circ}\text{F}$) and the protected fluid conditions.

C403.12.3
6.4.3.7

ASHRAE-SPECIFIC REQUIREMENTS

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

▪ Direct Digital Control (DDC)

DDC controls and display are required for new buildings with chilled-water and hot-water plants ≥ 300 kBtu/h, or fan systems ≥ 10 hp. See Table 6.4.3.10.1 for extensive DDC requirements applicable per building types and system types.

6.4.3.10

▪ Door Switches

For doors separating conditioned space from the outdoors, controls must be provided to disable or reset mechanical heating and cooling operations within 5 minutes of the door opening.

6.5.10

▪ Chilled-Water Plant Monitoring

- For electric-motor-driven chilled-water plants in new buildings, or for new plants in existing buildings, devices to measure and monitor the electric energy use and efficiency (in kW/ton) of the chilled-water plant must be installed for:

6.4.3.11

- a) water-cooled chilled-water plants of $> 1,000$ tons peak cooling capacity
- b) air-cooled chilled-water plants of > 570 tons peak cooling capacity

- The chiller plant electrical energy use efficiency must be graphically displayed with data trending every 15 minutes.

POST-INSTALLATION DOCUMENTATION

The relevant construction drawings (e.g., M-, P- labeled drawings) must clearly document — through equipment schedules, notes, narratives, drawings, and/or diagrams, etc. — how the proposed system will comply with the applicable Code requirements, and where the proposed means and measures will be located.

■ Operating and Maintenance Manual

- Drawings must specify that an *operating and maintenance manual* is to be provided to the building owner within 90 days of the issuance of the certificate of occupancy (C/O) or letter of completion.
- The *operating and maintenance manual* must document all HVAC/Service Water Heating equipment and controls, and also Lighting equipment and controls.

R303.3
C408.1.1
C408.2.5.2
4.2.2.3

■ System Balancing Report

- Drawings must specify that HVAC/SWH systems are required to be tested, adjusted and balanced in accordance with ASHRAE 111 or other approved standards.
- Subsequently, within 90 days of the issuance of the certificate of occupancy or letter of completion, the System Balancing Report describing the completed activities and measurements must be provided to the building owner.

C408.2.2
C408.2.5.3
6.7.2.3.2

■ Final Commissioning Report

- When System Commissioning is required in accordance with Section C408.2, drawings must specify that a Final Commissioning Report is to be provided to the building owner, and
- The Commissioning Report Certification must be submitted to the Department:
 - **Within 30 months** of the issuance of the C/O or letter of completion for *new buildings* $\geq 500,000$ *sf* in conditioned space area, excluding R-2 occupancies; and
 - **Within 18 months** of the issuance of the C/O or letter of completion for *all other buildings*.
- Refer to 'Other Requirements' section of this How-To Guide, page [OR-8] for further information on the mechanical systems commissioning.

C408.2.5.4
6.7.2.3

■ Permanent Certificate for Residential Building Equipment

- This requirement applies to all residential buildings and commercial buildings with R-3 occupancy
- Refer to this How-to Guide, page [OR-6]

R401.3
C401.2.1