



# New York State Energy Conservation Construction Code

## BASIC REQUIREMENTS

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### Basic Requirements

The code specifies basic requirements that are mandatory for all buildings. Some of these requirements apply to the heating and cooling system (including ducts), hot water system, and electrical system. Other requirements apply to material and equipment identification and to sealing the building envelope. This guide discusses the code basic requirements, except for the insulation and window requirements (which are covered in other guides). Each requirement in this guide lists the corresponding code section number as a reference.

Figure 1 graphically illustrates several basic requirements.

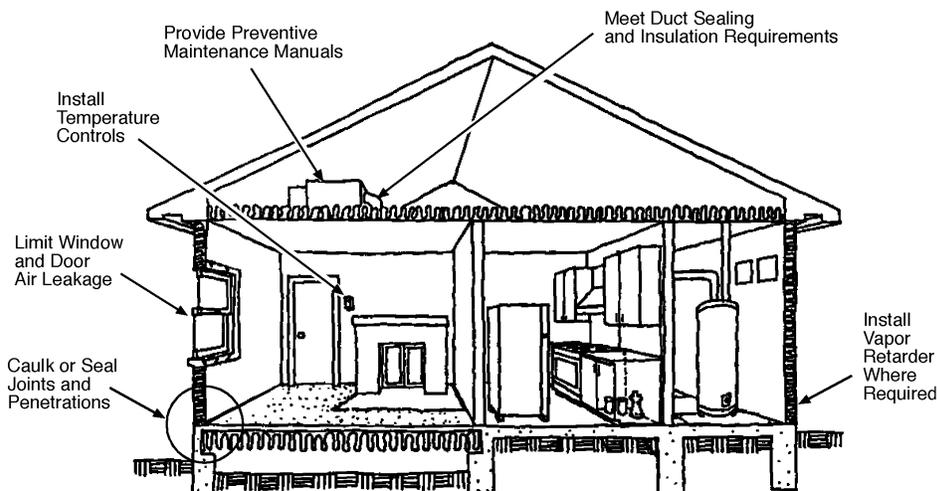


Figure 1. Some of the Basic Requirements

## Construction Documents

(Section 104.2) When plans or specifications bear the seal and signature of a licensed professional, a written statement shall be included that the documents are in compliance with the code.

A design professional shall provide to the code enforcement official a written certification that the required HVAC tests, system balancing, etc., have been performed and the system is operating as designed. EXCEPTION: One- and two-family dwelling units.

Plans shall clearly note the Chapter(s) and method used for compliance.

## Air Leakage

(Section 502.1.4) All joints and penetrations in the building envelope that are sources of air leakage must be caulked, gasketed, weatherstripped, or otherwise sealed in an approved manner. The following areas should be sealed using appropriate materials :



- exterior joints around window and door frames



- between wall sole plates, floors, and exterior wall panels



- openings for plumbing, electricity, refrigerant, and gas lines in exterior walls, floors, and roofs



- openings in the attic floor (such as where ceiling panels meet interior and exterior walls and masonry fireplaces)



- service and access doors or hatches
- openings for plumbing and gas lines in the subfloor and interior plates of kitchens and bathrooms

- all other similar openings in the building envelope
- recessed lighting fixtures.

Sealants used between dissimilar materials (such as between the sole plate and a slab floor) must allow for the expansion and contraction of the materials.

Recessed lighting fixtures must be 1) IC rated with no penetrations, or 2) IC rated in accordance with ASTM 283, or 3) installed inside an air-tight assembly with a 0.5 inch (12.76 mm) clearance from any combustible material and a 3 inch (76 mm) clearance from insulation material.

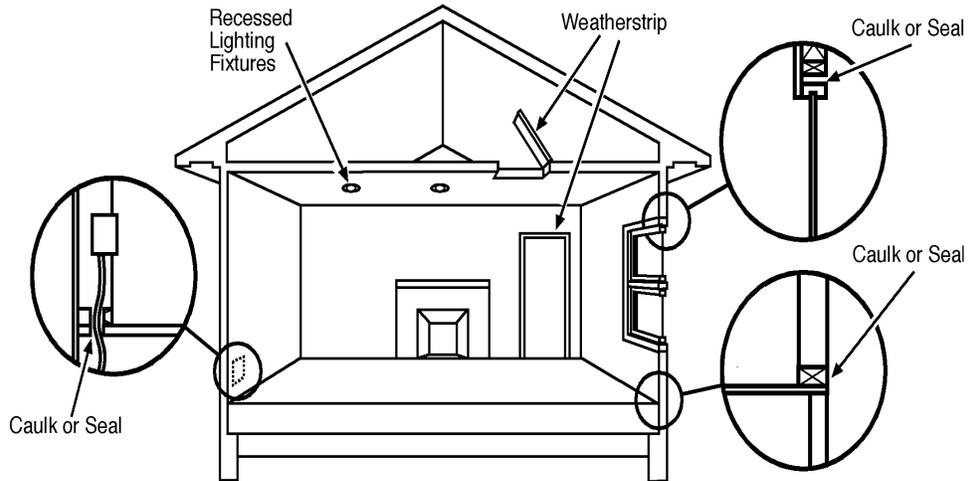


Figure 2. Typical Openings that Should be Sealed

(Section 102.7) Fireplaces (solid fuel type) shall be installed with tight fitting non-combustible fireplace doors to control infiltration losses. Fireplaces shall be provided with a source of combustion air, as required by the Fireplace construction provisions of the *Building Code*.

## Vapor Retarders

(Section 502.1.1) Vapor retarders must be installed in all non-vented framed ceilings, walls, and floors. Non-vented areas are framed cavities without vents or other openings allowing the free movement of air. The vapor retarder must have a perm rating of 1.0 or less and must be installed on the "warm-in-winter side" of the insulation (between the insulation and the conditioned space).

Exemptions: Vapor retarders are not required:

- Where moisture or its freezing will not damage the materials.
- If other approved means to avoid condensation and leakage of moisture are provided.

## Exposed Foundation Insulation

(Section 102.4.1) Exterior foundation wall and slab perimeter insulation must have a rigid, opaque, and weather-resistant covering that prevents the degradation of the insulation's performance. The protective covering must cover the exposed (above-grade) area of the insulation and extend to a minimum of 6 in. (153 mm) below grade.

# Materials and Equipment Information

(Section 102.2) All insulation, caulking and weatherstripping, windows and skylights, and mechanical and water heating equipment must be installed in accordance with the manufacturer's installation instructions.

(Section 104.2) Insulation R-values and glazing and door U-factors must be clearly marked on the building plans or specifications. If two or more different insulation levels exist for the same component, record each level separately on the plans or specifications. For example, if the walls adjacent to the garage have less insulation than the other walls, both insulation levels must be noted. If credit is taken for high-efficiency heating or cooling equipment, the equipment efficiency, make and model number must also be marked on the plans or specifications.

(Section 102.1) Materials and equipment must be identified in a manner that will allow compliance with the code to be determined. There are several ways to label materials and equipment to satisfy this requirement.

- Provide labels on all pertinent materials and equipment. For example, the R-value of the insulation is often pre-printed directly on the insulation or can be determined from a striping code. Window U-factors are often included on the manufacturer label posted directly on the window.
- Provide contractor statements certifying the products they have installed. For example, the insulation contractor should certify the R-value of the installed insulation.

(Section 102.5.1) For blown or sprayed insulation, the initial installed thickness, the settled thickness, the coverage area, and the number of bags must be clearly posted at the job site. In attics, thickness markers must be placed at least once every 300 square feet.

(Section 102.2) Manufacturer manuals for all installed heating and cooling equipment and service water heating equipment must be provided to the homeowner.

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## Heating and Cooling

### Heating and Cooling Equipment Efficiencies

The code defines heating and cooling equipment efficiency requirements. However, federal regulations have restricted manufactured equipment efficiency minimums to levels at or above these code requirements. Because new equipment efficiencies below the code requirements can no longer be manufactured, these requirements have been omitted from this material.

### Duct Insulation

(Section 503.3.3.3) Supply- and return-air ducts and plenums for heating and cooling systems located in unconditioned spaces (spaces neither heated nor cooled) must be insulated to the minimum R-value specified in Table 2. Unconditioned spaces include ventilated crawl spaces, ventilated attics, and framed cavities in those floor, wall, and ceiling assemblies which

- a) separate conditioned space from unconditioned space or outside air and
- b) are uninsulated on the side facing away from conditioned space.

Exceptions: Insulation is not required on factory-installed plenums, casings, or ductwork furnished as part of the HVAC equipment.

Select the Heating Degree Days for your building location and find the R-value requirement from Table 2 based on where the ducts are located. For the prescriptive package and trade-off worksheet approaches, your zone number can be found in table included with the prescriptive/trade-off packages. If you are using the software, the duct insulation requirement is printed in the *Inspection Checklist*.

When ducts are located in exterior building cavities, either

- The full insulation R-value requirement for that building component must be installed between the duct and the building exterior, in which case the ducts do not require insulation, or
- The ducts must be insulated to the duct R-value requirement given in Table 2 and the duct area must be treated as a separate component. For example, if ducts insulated to R-6 are located in an exterior wall insulated to R-19, the area of the wall minus the duct area is a wall component with R-19 insulation, and the area of the ducts is a wall component with R-6 insulation.

Table 2. Duct Insulation R-Value Requirements

Annual Heating Degree Days	Ducts in Unconditioned Spaces (i.e. Attics, Crawl Spaces, Unheated Basements and Garages, and Exterior Cavities)		Ducts Outside the Building	
	Supply	Return	Supply	Return
3,501 - 7500	R-8	R-2	R-8	R-4
Above 7500	R-11	R-2	R-11	R-6

## Duct Construction

(Section 503.3.3.4.2) All joints, seams, and connections must be securely fastened with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric, or tapes. Duct tape not listed for the intended application is not permitted.

Exception: Continuously welded and locking-type longitudinal joints and seams on ducts operating at less than 2 in. w.g. (500 Pa).

Ducts shall be supported every 10 feet or in accordance with the manufacturer's instructions. Cooling ducts with exterior insulation must be covered with a vapor retarder. Air filters are required in the return air system.



Duct with mastic



(Section 503.3.3.7) The HVAC system must provide a means for balancing air and water systems. For air systems, this requirement can be met by installing manual dampers at each branch of the ductwork or by installing adjustable registers that can constrict the airflow into a room. For water systems, balancing valves can be installed to control the water flow to rooms or zones.

## Temperature Controls

(Section 503.3.2.1) Each dwelling unit is considered a zone and must have at least one thermostat provided for each separate system (heating and cooling).

(Section 503.3.2.2) Each heating and cooling system must have a thermostat capable of being set:

- down to 55°F or lower when used to control heating
- up to 85°F or higher when used to control cooling
- with a temperature range or deadband of at least 5°F when used to control both heating and cooling.



*Thermostat*

## Heat Pump Thermostats

(Section 503.3.2.3) Heat pump installations must include a thermostat that can prevent the back-up heat from turning on when the heating requirements can be met by the heat pump alone. A two-stage thermostat that controls the back-up heat on its second stage meets this requirement.

## HVAC Piping Insulation

(Section 503.3.3) All HVAC piping (such as in hydronic heating systems) installed in unconditioned spaces and conveying fluids at temperatures greater than 105°F or chilled fluids at less than 55°F must be insulated to the thicknesses specified in Table 3. Pipe insulation is not required for piping installed within HVAC equipment.

Table 3. Minimum HVAC Piping Insulation Thickness <sup>(a)</sup>

Piping System Types	Fluid Temp Range (°F)	Insulation Thickness in Inches by Pipe Sizes <sup>(b)</sup>			
		Runouts 2in. <sup>(c)</sup>	1 in. and less	1.25 in. to 2 in.	2.5 in. to 4 in.
<b>Heating Systems</b>					
Low Pressure/Temperature	201-250	1.0	1.5	1.5	2.0
Low Temperature	120-200	0.5	1.0	1.0	1.5
Steam Condensate (for feed water)	Any	1.0	1.0	1.5	2.0
<b>Cooling Systems</b>					
Chilled Water, Refrigerant, and Brine	40-55	0.5	0.5	0.75	1.0
	Below 40	1.0	1.0	1.5	1.5
<p>(a) The pipe insulation thicknesses specified in this table are based on insulation R-values ranging from R-4 to R-4.6 per inch of thickness. For materials with an R-value greater than R-4.6, the insulation thickness specified in this table may be reduced as follows:</p> <p style="text-align: center;">New Minimum Thickness = 4.6 x Table 3 Thickness/Actual R-Value</p> <p>For materials with an R-value less than R-4, the minimum insulation thickness must be increased as follows:</p> <p style="text-align: center;">New Minimum Thickness = 4.0 x Table 3 Thickness/Actual R-Value</p> <p>(b) For piping exposed to outdoor air, increase thickness by 0.5 in.</p> <p>(c) Applies to runouts not exceeding 12 ft in length to individual terminal units.</p>					

# Service (Potable) Water Heating

## Heat Traps

(Section 504.7) Water heaters with vertical pipe risers must have a heat trap on both the inlet and outlet unless the water heater has an integral heat trap or is part of a circulating system.

## Swimming Pools

(Section 504.3) All heated swimming pools must be equipped with an on/off pool heater switch mounted for easy access. Heated pools require a pool cover unless over 20% of the heating energy is from non-depletable sources (such as solar heat).

(Section 504.3.3) All swimming pool pumps must be equipped with a time clock.

## Circulating Service Hot Water Systems

(Section 504.4) Circulating hot water systems must have automatic or manual controls that allow the pumps to be conveniently turned off when the hot water system is not in operation.

(Section 504.5) Piping in circulating hot water systems must be insulated to the levels specified in Table 4 unless an engineering calculation is provided that demonstrates that insulation will not reduce the annual energy requirements of the building.

Table 4. Minimum Insulation Thickness for Recirculation Piping

Heated Water Temperature (°F)	Insulation Thickness in Inches by Pipe Sizes (a)			
	Non-Circulating Runouts	Circulating Mains and Runouts		
	Up to 1 in.	Up to 1.25 in.	1.5-2.0 in.	Over 2 in.
170-180	0.5	1.0	1.5	2.0
140-160	0.5	0.5	1.0	1.5
100-130	0.5	0.5	0.5	1.0
(a) Nominal pipe size and insulation thickness.				

## Electrical

(Section 102.1) All dwelling units in must be equipped with separate electric meters.