

6 NYCRR Part 638
GREEN BUILDING TAX CREDIT

Statutory Authority: Tax Law Section 19

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638.1 Intent and Purpose

(a) Intent - Green buildings minimize environmental impact and maximize the preservation of open space. Section 19 of the Tax Law is intended to encourage building owners and developers to design, construct and operate buildings that are energy efficient, utilize recycled materials, provide clean air, and incorporate renewable and energy efficient power generation.

(b) Purpose - The purpose of this part is to set forth:

(1) certain standards and other requirements that must be met for a "base building" to be a "green base building" and for "tenant space" to be designated as "green tenant space," as those terms are defined in Section 19 of the Tax Law, and

(2) the methods by which taxpayers must demonstrate compliance with those standards and requirements to be eligible for the green building tax credit.

638.2 Applicability

This Part applies to all "base buildings" and all "tenant spaces" for which a "green building credit" is being sought by the taxpayer(s), whether the "green building credit" being sought includes (or consists of) a "green base building credit component," "green tenant space credit component" or "green whole-building credit component," as those terms are defined in Section 19 of the Tax Law.

This Part takes effect immediately except that with respect to allowable costs paid or incurred by the taxpayer the effective date is June 1, 1999.

638.3 Definitions

Unless the context otherwise requires, the definitions contained in Section 19 of the Tax Law are applicable to this Part. The following additional definitions and clarifications are applicable to this Part.

(a) Air Conditioner. A combination of components, including a compressor, a condenser, and an evaporator or cooling coil, designed for the purpose of conditioning air for one or more rooms of a building by providing one or more of the following functions: cooling, heating, air circulation, dehumidifying or air cleaning.

(b) Air Pollutant. One or more contaminants in quantities, of characteristics and of a duration which are or may be injurious to human, plant or animal life or to property or which unreasonably interfere with the comfortable enjoyment of life and property.

(c) Allowable Costs. Amounts properly chargeable to capital account (other than for land), which are paid or incurred on or after June 1, 1999, for: construction or rehabilitation; commissioning costs; interest paid or incurred during the construction or rehabilitation period; legal, architectural, engineering and other professional fees allocable to construction or rehabilitation; closing costs for construction, rehabilitation or mortgage loans; recording taxes and filing fees incurred with respect to construction or rehabilitation; site cost (such as temporary electric wiring, scaffolding, demolition costs, and fencing and security; and costs of furniture, carpeting, partitions, walls and wall coverings, ceilings, drapes, blinds, lighting, plumbing, electrical wiring and ventilation; provided that such costs must not include the cost of telephone systems and computers (other than electrical wiring costs) and must not include the cost of fuel cells or photovoltaic (PV) modules (including installation) or the cost of new air conditioning equipment using an EPA-approved non-ozone depleting refrigerant or other EPA-approved refrigerant as provided in Section 7.13.

(d) Alternate Supply Water. Gray water, rainwater, or drainage water, singly or mixed together, used in place of private or public potable water supply only for uses other than as potable water.

(e) Ambient Air. That portion of the atmosphere, external to buildings, to which the general public has access.

(f) Annual Eligibility Certificate (AEC). A package consisting of a written statement by the taxpayer in accordance with Sections 638.5(b) and (c) and a certification or a number of certifications that must be made by an appropriate architect(s) and/or professional engineer(s) licensed to practice in this state under the seal of such architect or engineer, that the building, base building or tenant space with respect to which the credit is claimed is a green building, green base building or green tenant space, respectively, in accordance with the standards and guidelines in effect at the time the property which is the basis for the credit was placed in service, that the fuel cell or photovoltaic modules constitute qualifying alternate energy sources and that the air conditioning equipment uses an EPA-approved non-ozone depleting refrigerant or other EPA-approved refrigerant approved by the Commissioner and remains in

service. Each certification must set forth the specific findings upon which the certification was based. An AEC is submitted, for each taxable year for which a taxpayer claims a credit under this section, to the New York State Department of Taxation and Finance and to the DEC, in accordance with Section 19 of the Tax Law and this Part.

(g) Appliances. Clothes washers, refrigerators, dishwashers, and room air conditioners.

(h) Architectural Coating. Any coating applied to stationary structures and to their appurtenances, to mobile homes, to pavements, or to curbs.

(i) Architect. A person licensed or otherwise authorized under the Article 147 of Title 8 of the New York State Education Law to use the title of "architect."

(j) ASTM. American Society of Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2459, www.astm.org.

(k) Base Building. All areas of a building not intended for occupancy by a tenant or owner, including but not limited to the structural components of the building, exterior walls, floors, windows, roofs, foundations, chimneys and stacks, parking areas, mechanical rooms and mechanical systems, and owner-controlled and/or operated service spaces, sidewalks, main lobby, shafts and vertical transportation mechanisms, stairways and corridors.

(l) Basis of Design. Documentation of the primary concepts and assumptions that have influenced design decisions that were made to comply with the design intent. The "basis of design" specifically describes the systems, components, conditions and methods chosen to meet the design intent.

(m) Biological Contaminants. Contaminant agents derived from or that are living organisms (e.g., viruses, bacteria, fungi, and mammal and bird antigens).

(n) Black Water. Water from toilet, urinal and bidet flushing, as well as other water containing human or animal excreta, such as wastewater from diaper laundering or wastewater from cleaning of animal stalls or cages.

(o) Bond Breaker. A coating the sole purpose of which, when applied between layers of concrete, is to prevent the freshly poured top layer of concrete from bonding to the substrate on which it is poured.

(p) Building Automation System. The monitoring and control of components, subsystems, and systems of a space or building with the purpose of automating their operation.

(q) Building Envelope. The components of a building that enclose that building from the environment, including but not limited to, exterior walls, underground walls, windows, roofs, floors with one surface exposed to outdoor air, floors on ground; also, exterior light shelves and exterior shading devices.

(r) Carpet Adhesive. Product used to adhere carpet to a substrate.

(s) Carpet Cushion. A product installed beneath carpet, typically composed of fiber, sponge rubber or polyurethane foam.

(t) Certificate of Readiness. A document stating that all equipment, systems, and controls have been correctly installed; operated as specified; have been tested, adjusted, and balanced; and are verified as ready for functional performance testing and other acceptance procedures.

(u) Certification. Statement under the seal of an architect or engineer, made in accordance with the standards and guidelines in effect at the time the property, which is the basis for the credit, was placed in service

(v) Certified Energy Manager. A person with current certification from the Association of Energy Engineers located at 4025 Pleasantdale Rd., Suite 420, Atlanta, GA 30340

(w) Certified Indoor Air Quality Professional. A person with current certification from the Association of Energy Engineers located at 4025 Pleasantdale Rd., Suite 420, Atlanta, GA 30340

(x) Certified Industrial Hygienist (CIH). A person with current certification from the American Board of Industrial Hygiene located at 6015 West St. Joseph, Suite 102, Lansing, MI 48917.

(y) Certified Wood. Wood-based materials originally sourced from forestlands participating in an acceptable system or program which certifies sustainable forest management, as determined by the Commissioner of the Department of Environmental Conservation, or his/her designee. Acceptable systems or programs must include all of the following: (1) adherence to management practices which conserve biological diversity, maintain productive capacity of forest ecosystems, maintain forest ecosystem health and vitality, conserve and maintain soil and

water resources, and maintain forest contribution to global carbon cycles; (2) independent third party auditing that monitors, measures and reports compliance with system or program principles and guidelines; and (3) documentation verifying that the wood-based products used have been obtained from lands enrolled under or participating in an acceptable certification system or program.

(z) Combustion Source. For indoor air quality purposes, an oil or gas fuel burning device, including but not limited to the following: hot air furnace, hot water boiler, hot water heater; gas-fired - clothes drier, kitchen range, oven; gas logs, coal, cord wood and wood-pellet fueled - fireplaces and wood stoves; kerosene - radiant or convective space heaters; gasoline or diesel engines.

(aa) Commissioner. Although Section 19 of the Tax Law, upon which this regulation is based, refers to the commissioner and intends to mean the Commissioner of the Department of Taxation and Finance, for the purposes of this regulation "Commissioner" means the Commissioner of the New York State Department of Environmental Conservation (DEC or Department).

(ab) Commissioning. A quality control process that is intended to ensure that specified components and systems have been installed and properly started-up and then functionally tested to verify and document proper operation through all specified modes of operation and conditions. In addition, training of operations and maintenance personnel, identified by the owner, is verified and final project operations and maintenance documents are reviewed for completeness.

(ac) Commissioning Agent. The entity responsible for carrying out the detailed planning and implementation of the commissioning process. The commissioning agent can be an individual, an organization, or a team with individuals from more than one organization.

(ad) Commissioning Authority (CA). The owner's representative that ensures that the commissioning process is properly carried out. The commissioning authority leads the commissioning process and makes final recommendations to the owner regarding the performance of the commissioned building systems. The commissioning authority can be an individual, an organization, or a team with individuals from more than one organization.

(ae) Concrete Curing Compound. A coating the sole purpose of which is to retard the evaporation of water from the surface of freshly cast concrete, thereby strengthening it.

(af) Construction Documents. The documents that contain the requirements for the construction and performance of a building and its components, equipment, systems and subsystems. This includes but is not limited to construction drawings and specifications.

(ag) Construction Indoor Air Quality (IAQ) Management Plan. The document that specifies the procedures which have been used to meet the requirements of Section 638.8.

(ah) Construction IAQ Management Report. The document that records the results of construction indoor air quality management as required by Section 638.8.

(ai) Contaminant Source Control. The reduction of contaminant load by either elimination, such as exhaust or reduction of emissions from components and processes, or by isolation.

(aj) Core of the Building. For the purpose of energy simulations, the portion of a building composed of thermal zones that have no exterior walls and no exterior windows.

(ak) Credit Allowance Year. The later of (A) the taxable year during which the property, construction, completion or rehabilitation referred to in the: 1. green whole building credit component, 2. green base building credit component, 3. green tenant space credit component, 4. fuel cell credit component, 5. photovoltaic credit component, and 6. green refrigerant component, has been placed in service or has received a final certificate of occupancy; or (B) the first taxable year with respect to which the credit may be claimed pursuant to the credit component certificate.

(al) Credit Component Certificate (CCC). A document issued by DEC upon proper application by a taxpayer for Green Building Credit under Section 19 of the Tax Law. This document must state the first taxable year for which a credit may be claimed by the taxpayer/applicant and an expiration date. It must state, also, the maximum amount of credit component allowable for each of the five taxable years for which the credit component is allowed. This document is identified as an "initial" credit component certificate in Article 19 of the Tax Law.

(am) Design Base Building. The base building as designed with the intention to qualify for the green building credit.

(an) Design Base Building Model. An energy use computer model of the whole building, in which the design base building is modeled with components that have the energy efficiency as

designed.

(ao) Design Intent. Documentation of the ideas, concepts and criteria considered by the owner to be important to the project, based on information gathered during the early stages of design (programming, conceptual, pre-schematic). The design intent must include at a minimum a narrative description of the systems, what the objectives of the systems are and how the systems will meet those objectives.

(ap) Design Tenant Space. The tenant space as designed with the intention to qualify for the green building credit.

(aq) Design Tenant Space Model. An energy use computer model of the whole building, in which the all components of the design tenant space have the energy efficiency as designed.

(ar) Design Whole Building. The whole building is designed with the intention to qualify for the green building credit.

(as) Design Whole Building Model. An energy use computer model of the whole building where all components have the energy efficiency as designed.

(at) Domestic Hot Water (DHW). Water heated to serve the needs of occupants of a building, exclusive of process.

(au) Drainage Water. Water collected from basement sump pumps or drainage tiles around buildings as a byproduct of protecting the building(s) against moisture.

(av) Economic Development Area. An area which is designated (A) an economic development zone pursuant to Article Eighteen-B of the General Municipal Law or (B) an empowerment zone or enterprise community pursuant to Section 1391 of the Internal Revenue Code.

(aw) Eligible Building. A building located in this state which is:

(1) Classified B2, B3, B4, C1, C2, C5, or C6 for purposes of the New York State Uniform Fire Prevention and Building Code or similarly classified under any subsequent code; provided that any such building contains at least twenty thousand square feet of interior space, or

(2) A residential multi-family building with at least twelve dwelling units that contain at least twenty thousand square feet of interior space, or

(3) One or more residential multi-family buildings with at least two dwelling units that are part of a single or phased construction project that contains, in the aggregate, at least twenty thousand square feet of interior space; provided that in any single phase of such project at least ten thousand square feet of interior space is under construction of rehabilitation, or

(4) Any combination of buildings described in (1), (2) and (3) and

(5) Is not a building located on freshwater wetlands the construction of which requires a permit under Section 24-0701 or 25-0403, respectively, of the Environmental Conservation Law, or on wetlands such that the construction thereof requires a permit pursuant to Section 404 of the Federal Clean Water Act (33 U.S.C. S 1344)(see Section 638.10).

(ax) Energy Code. The New York State Energy Conservation Construction Code (March 1, 1991).

(ay) Energy Code Base Building. A base building that is identical with the design base building, except that (1) the type of heating ventilating and air conditioning (HVAC) system in the base building is determined as required in Section 638.7(c)(3)(ii); and (2) the energy efficiency of all base building components is in compliance with the prescriptive requirements of the energy code.

(az) Energy Code Base Building Model. An energy use computer model of the whole building, in which the base building is modeled according to the definition of the energy code base building.

(ba) Energy Code Tenant Space. A tenant space that is identical with the design tenant space, except that (1) the type of HVAC system in the energy code tenant space is determined by Section 638.7(c)(3)(iii); and (2) the energy efficiency of all energy code tenant space components is in compliance with the prescriptive requirements of the energy code.

(bb) Energy Code Whole Building. A whole building composed of an energy code base building and where all tenant spaces are energy code tenant spaces.

(bc) Energy Code Tenant Space Model. An energy use computer model of the whole building, in which the tenant space intended to qualify for the green building credit is modeled according to the definition of the energy code tenant space.

(bd) Energy Code Whole Building Model. An energy use computer model of the whole building, where the energy efficiency of all components of the whole building comply with the prescriptive requirements of the energy code.

(be) Energy Star. A labeling and marketing system for products meeting specified energy efficiency targets ®. A list of Energy Star® qualified products is available on EPA's web site www.epa.gov/energystar.

(bf) Form Release Agent. Chemical treatment applied to the liner or the face of a form that reacts with the concrete cement to prevent it from sticking to the form, including but not limited to petroleum-based agents such as light-bodied, low-viscosity plain oil and used engine oil.

(bg) Fossil Fuel. Natural gas, petroleum, coal, and any form of solid, liquid or gaseous fuel derived from such material for the purpose of creating useful heat.

(bh) Fuel Cell. A device that produces electricity directly from hydrogen or hydrocarbon fuel through a non-combustive electro-chemical process.

(bi) Functional Performance Testing. The process of determining the ability of the HVAC system to deliver heating, ventilating, and air-conditioning services in accordance with the final design intent and construction documents.

(bj) Gray Water. Waste water generated by water using fixtures other than toilets; including but not limited to baths, sinks and laundry facilities.

(bk) Green Building. A building wherein the base building is a green base building and all tenant space is green tenant space.

(bl) Green Building Credit. The tax credit provided for by Section 19 of the Tax Law.

(bm) Green Roof. Vegetative cover on top of a building above, at or below grade, of one of two types: extensive or intensive.

(bn) Heating, Cooling and Water Heating Equipment. Mechanical devices located within or associated with a building, used for comfort conditioning or for domestic or sanitary water heating, including, but not limited to, furnaces, boilers, air conditioning, heat pumps, chillers, and water heaters. This equipment does not include any equipment used for process.

(bo) Housekeeping. Construction-related practices to suppress dust, ensure that surfaces are kept clean, remove spills or excess application of wet materials, keep work areas dry, and remove debris from work areas.

(bp) HVAC Protection. Practices to safeguard the HVAC system from airborne contaminants.

(bq) HVAC Distribution System. (1) The assembly of ducts, fans, terminal devices and associated controls that conduct and deliver air to cool, heat and/or ventilate a space; or (2) the assembly of pumps, pipes, terminal devices and associated controls that conduct and deliver hot water, chilled water or steam to cool or heat a space; or (3) the assembly of pipes that transport refrigerant to spaces remote from the chiller or heat pump to terminal devices to cool or heat a space. In this last uncommon case, the pipes, terminal devices and associated controls form the HVAC distribution system.

(br) IAQ Profile. A description of the features of the building structure, function and occupancy that impact indoor air quality.

(bs) IAQ Testing Protocol. The document prepared by a qualified professional, describing the IAQ test strategy, sampling locations, sampling and analytical methods, sampling frequency and duration, and quality assurance/quality control measures.

(bt) IAQ Testing Report. The report prepared by a qualified professional, providing the results of the IAQ testing for the taxable year, and indicating whether those results meet the IAQ standards required in Section 638.7(d).

(bu) Incremental Cost of Building-Integrated Photovoltaic Modules. Includes:

(1) The cost of building-integrated photovoltaic modules and any associated inverter, additional wiring or other electrical equipment or additional mounting or structural materials, less the cost of spandrel glass or other building material that would have been used in the event that building-integrated photovoltaic modules were installed,

(2) Incremental labor costs properly allocable to on-site preparation, assembly and original installation of photovoltaic modules, and

(3) Incremental architectural and engineering services

and designs and plans directly related to the construction or installation of photovoltaic modules.

(bv) Indoor Air Quality Testing. Measurement of air concentrations of carbon dioxide, carbon monoxide, particulate matter, radon, formaldehyde and total volatile organic compounds.

(bw) Indoor Air. Air within the building envelope.

(bx) Interlocks. The connections between systems or components that ensure the actions of one system or component result in the automatic reaction of another system or component.

(by) Known Values. Values for which (1) written and/or graphic documentation exists that can be reasonably obtained, or (2) the taxpayer or the taxpayer's agent or employee has direct knowledge via observation or measurement.

(bz) Makeup Water. Potable water added to the alternate supply water to make up a shortfall in quantity.

(ca) Mechanical Plant. All HVAC systems, HVAC equipment and HVAC components that belong to the base building and that affect energy consumption; indoor air quality systems, equipment and components that effect mechanical ventilation in the base building or tenant spaces; and domestic hot water systems or components that belong to the base building. "Mechanical plant" does not include electricity-generating equipment (e.g., fuel cells, PV), unless waste heat from such equipment is used to meet building needs for heating or hot water.

(cb) Millwork. Lumber intended for finish work in buildings, including sash, doors, cornices, panelwork and other items of interior or exterior trim and cabinetry but not including flooring, ceiling or siding.

(cc) Minimum Sample for Commissioning. For the purposes of these regulations, the minimum sample must be no less than 10 percent and no less than ten units, but no greater than the maximum number of units that the sample is intended to represent. In this context, a "unit" is one item of a larger group of the same type of items.

(cd) Moisture/Pollutant Pathway. The route that moisture and/or airborne pollutants may follow through the building, e.g., through the building envelope, through the HVAC system, through utility chases, abandoned pipes and other openings within the building, through outdoor air intakes, or through differential pressure gradients.

(ce) Multifamily residences. These include residential units, area(s) for the common use of the residents, and all areas related to the management of these units. All other uses are excluded.

(cf) Non-vehicular Transportation. This includes elevators, lifts, dumbwaiters, conveyors, escalators, moving sidewalks (also called passenger conveyors or power walks).

(cg) Occupancy. Use of a space in accordance with its intended purpose.

(ch) Occupiable Space. Any enclosed space intended for human activities. Storage rooms and conference rooms are not excluded where the space use of the tenant space is storage or conference.

(ci) Occupied Space. An occupiable space that is in use for its intended purpose.

(cj) Office. A space in which the primary or intended occupancy or use is the transaction of business, civic or professional service.

(ck) Office Building. A base building that has offices in at least 90 percent of its occupiable space exclusive of corridors, lobbies, restrooms, mechanical rooms, janitorial rooms, storage rooms, and conference rooms.

(cl) Office Tenant Space. A tenant space that has offices in at least 90 percent of its occupiable space exclusive of corridors, lobbies, restrooms, mechanical rooms, janitorial rooms, storage rooms, and conference rooms.

(cm) Operations and Maintenance. The process of sustaining the performance of a building in accordance with design requirements and intent. "Operations" refers to functional activities related to building systems. The scheduling of equipment operation and temperature control are functions of operating a building. "Maintenance" involves servicing equipment so that it will run in accordance with the manufacturer's intent for at least the duration of its expected service life.

(cn) Operations and Maintenance (O&M) Manual. The document that records the information pertinent to the operations and maintenance of the components, equipment, subsystems, and systems for the building, including all the information required by Section 638.8(k)(1).

(co) Owner. A person or other legal entity holding title to

property.

(cp) Parameters Affecting Energy Use. Parameters affecting energy use include, but are not limited to, the following:

- (1) material properties (e.g., specific heat, density, thermal absorption, thickness, thermal conductivity),
- (2) U-Factor,
- (3) R-value,
- (4) shading coefficient,
- (5) power densities for lighting and plug equipment and process equipment,
- (6) fossil fuel use rate for process equipment,
- (7) number of occupants,
- (8) design and operating temperatures for HVAC equipment,
- (9) static pressures for fans and pumps,
- (10) equipment efficiencies,
- (11) design and operating airflow rates for supply, exhaust, and outside air, and
- (12) schedules.

(cq) Particulate Matter. Solid or liquid particles in the air, typically, in the size range 0.01 to 100 microns in diameter.

(cr) Permanent Expanded Polystyrene (EPS) Form. A form, also known as "insulating concrete form" (ICF), made from rigid expanded polystyrene insulation that is left in place after the concrete is cured. Typically used for vertical walls.

(cs) Permeable Asphalt. Asphalt used as top course of a pavement that allows water to seep through. Also known as "asphalt-treated permeable base" or as "popcorn mix."

(ct) Pesticide. Any substance or a mixture of substances as defined in 6 NYCRR Part 325.1(aw).

(cu) Plug Equipment. Any equipment that plugs into an electrical outlet, excluding any equipment that is used for heating, cooling, ventilation, or any type of lighting or process.

(cv) PM₁₀. Particulate matter less than or equal to 10 microns in aerodynamic diameter.

(cw) Portland Cement Pervious Pavement. A discontinuous mixture of coarse aggregate, hydraulic cement and other cementitious materials, admixtures and water which allow for the passage of water and air. This type of concrete has a variety of

names including porous, gap-graded, no-fines, permeable, and low density.

(cx) Post-consumer Material. Those products, packages or materials generated by a business or consumer which have served their intended end use as consumer items and which have been separated or diverted from the waste stream for the purposes of collection and recycling as a secondary material feedstock. "Post-consumer material" does not include waste material generated during or after the completion of a manufacturing or converting process.

(cy) Pre-consumer Material. Material and by-products which have not reached a business or consumer for an intended end use and have been recovered or diverted from the waste stream, including, but not limited to, industrial scrap material, overstock or obsolete inventories from distributors, wholesalers and other companies. "Pre-consumer material" does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process and does not include on-site converting waste. On-site converting waste can be claimed as recycled material if the manufacturer or advertiser can substantiate that the material would otherwise have entered the solid waste stream.

(cz) Preformed Blocks for Concrete Forming. Permanent form constructed of blocks made from materials such as waste wood, portland cement, EPS and flyash. These blocks are stacked vertically, then filled with concrete.

(da) Primary Cooling Equipment. Equipment that produces chilled water or cool air to satisfy the comfort needs of an occupied space. For the purpose of these regulations, primary cooling equipment is restricted to the following: air conditioners, heat pumps, chillers, indirect or direct evaporative cooling equipment, ice storage, and cooling towers.

(db) Primary Heating Equipment. Equipment that produces hot water, steam or hot air to satisfy the comfort needs of an occupied space. For the purpose of these regulations, primary heating equipment is restricted to the following: furnaces, boilers, heat pumps, and electric resistance.

(dc) Process. For energy use calculations, an activity or treatment that is not related to the space conditioning, lighting, domestic hot water heating, or ventilating of a building as it relates to human occupancy. "Processes" include, but are not limited to, special lighting required for theatrical productions or broadcasting; use of medical equipment; use of

natural gas for cooking; and use of vehicles powered by batteries within a building.

(dd) Process Equipment. Any equipment used in a process, excluding plug equipment.

(de) Professional Engineer. A person licensed or otherwise authorized under the Article 145 of Title 8 of the New York State Education Law to use the title of "professional engineer."

(df) Qualifying Alternate Energy Sources. Building-integrated and non-building integrated photovoltaic modules and fuel cells installed to serve the base building or tenant space which have the capability to monitor their AC output, and which are validated upon installation, and annually thereafter, to ensure that such systems meet their design specifications.

(dg) Qualified IAQ Manager. Person who meets the following criteria:

(1) Is an employee of the building owner, tenant, or the building manager.

(2) Is responsible for the IAQ in the base building or tenant space, as applicable, and has authority to make decisions and to implement improvements with regard to IAQ. The primary responsibility for IAQ in the base building or tenant space, must rest with the IAQ manager, even if outside contractors or consultants are retained to perform duties related to IAQ.

(3) Has three years experience performing and/or managing operations and maintenance, plus at least one of the following three types of qualifications:

(i) professional engineer, or certified industrial hygienist, or licenced architect, or certified energy manager, or certified indoor air quality professional;

(ii) bachelor's degree in engineering, or bachelor's degree in architecture; or

(iii) an additional 2 years experience in performing and/or managing operations and maintenance.

The IAQ manager must attend at least one IAQ course or seminar annually.

(dh) Qualified Professional. A certified industrial hygienist or professional engineer.

(di) Rapidly Renewable Materials. Materials that substantially replenish themselves faster than traditional extraction demand (i.e., planted and harvested in less than a 10 year cycle) and do not result in significant biodiversity loss, increased erosion, or air quality impacts. "Rapidly renewable materials" include, but are not limited to, bamboo, linoleum, cork, fast-growing poplar, monterey pine and products based on grain-based feedstock (such as wheat straw cabinetry).

(dj) R-value. Under steady state conditions, the mean temperature difference between two defined surfaces of material or construction that induces a unit heat flow through a unit area.

(dk) Reclaimed Wood. Wood derived from dismantling old buildings, bridges, barns, ships, warehouses, wine tanks and other structures; from logs raised from river and lake bottoms; from urban forest and orchard maintenance.

(dl) Recycled Content. A specified minimum percentage by weight of pre-consumer and post-consumer material.

(dm) Licensed Architect. A person who is licensed by the New York State Education Department as a licensed architect to engage in the practice of architecture in New York State.

(dn) Room Air Conditioner. An encased air conditioner designed for mounting in a window or through the wall for the purpose of providing conditioned air to an enclosed space without the use of ducts.

(do) Sequence of Operations. Defines how the systems and components will react to changing conditions to achieve the proper operation of the system. The sequence must include the intended modes of operation, the steps needed to enact each mode, and the data that determines what, when and how a step is performed.

(dp) Shading Coefficient. The ratio of the solar heat gain through glazing to the solar gain through an unshaded 1/8 inch thick clear double strength glass under the following conditions:

- (1) An ambient temperature of 89 degrees Fahrenheit,
- (2) An indoor temperature of 75 degrees Fahrenheit,

- (3) A wind velocity of 7.5 miles per hour,
- (4) A solar intensity of 248 Btu per hour per square foot,
and
- (5) Normal incidence.

(dq) Slipform. A form that is moved slowly as concrete is placed during construction.

(dr) Space Conditioning. The process through which a space is heated, ventilated or cooled.

(ds) Space Use. Predominant use of a space.

(dt) Specific Heat. The ratio of the heat absorbed (or released) by unit mass of a system to the corresponding temperature change.

(du) Special-Purpose Interior Glazings. Glazings added to the exterior windows in order to protect critical-function spaces, such as broadcasting studios or visual laboratories, from noise and/or glare.

(dv) Static Pressure. The increase in pressure produced across a fan or pump at its design flow rate.

(dw) Substrate. Any material to which a coating is applied.

(dx) Synthetic Carpet. Carpet manufactured with manmade materials, including, but not limited to, nylon 6, nylon 6,6; polyester; polypropylene; and polyvinyl.

(dy) Systems and Energy Management Manual. A composite document that expands the scope of the operation and maintenance manual by including the additional information gathered by the commissioning process as required by Section 638.8(k)(2).

(dz) Tenant. Person or other legal entity entering into occupation of property with the permission of the owner.

(ea) Tenant Improvements. Improvements which are necessary or appropriate to support or conduct the business of a tenant or occupying owner.

(eb) Tenant Space. The portion of a building intended for occupancy by a tenant or occupying owner.

(ec) Testing, Adjusting, and Balancing (TAB). The process of

checking and adjusting all the heating, cooling and ventilating systems to meet the requirements of the construction documents and design intent. This process includes: (1) balancing air and water distribution systems; (2) adjusting the total system to provide design quantities; (3) electrical measurement; (4) establishing quantitative performance of equipment; (5) verifying automatic controls; and, as applicable, (6) sound and vibration measurement.

(ed) Thermal Absorptance. A measure of the ability of a material to absorb solar radiation, expressed as a percentage of the solar radiation absorbed.

(ee) Thermal Conductivity. The time rate of heat flow through a unit area of homogeneous material in a direction perpendicular to isothermal planes, induced by a unit temperature gradient between the two surfaces.

(ef) Thermal Zone. A building area that is either (a) unconditioned (e.g., a garage), or that is (b) conditioned and controlled by at least one controlling device, such as a thermostat.

(eg) Throttling Range. The number of degrees that a space temperature must change so that the heating (or cooling) system goes from full heating (or cooling) to no heating (or no cooling).

(eh) Total Volatile Organic Compounds. The sum of volatile organic compounds that can be analyzed and measured by EPA Method TO-1, calibrated referenced to toluene.

(ei) Type 1 Finishes. Materials and finishes which have the potential for short-term off-gassing, (a) because of the way they are manufactured or (b) because they contain solvents which evaporate during drying or curing. Type 1 finishes include:

- (1) Architectural coatings;
- (2) Adhesives, caulks and sealants;
- (3) Wood preservatives and finishes;
- (4) Control and/or expansion joint fillers;
- (5) All hard finishes requiring adhesive installation;

(6) Composite wood products, including millwork, wood paneling, doors or furniture made from particle board or

medium density fiberboard containing urea formaldehyde resin;
and

(7) Materials and finishes that can be categorized as both a Type 1 finish and a Type 2 finish.

(ej) Type 2 Finishes. Materials that are woven, fibrous or porous in nature and finishes which tend to adsorb contaminants associated with Type 1 finishes. They also collect dust and can retain moisture, promoting mold growth. Type 2 finishes include:

(1) Carpet and carpet cushion;

(2) Fabric-covered partitions and acoustic wall panels;

(3) Fabric wall coverings;

(4) Acoustical ceiling tiles; and

(5) Upholstered furniture.

(ek) U-Factor. The heat flow rate per unit area under steady state conditions from the fluid on the warm side of a building component to the fluid on the cold side, per unit temperature difference between the two fluids. For most applications the fluid is air.

(el) UL Listing. Underwriters Laboratory (UL) certification that a manufacturer's product has been tested by UL to nationally recognized safety standards and found to be free from reasonably foreseeable risk of fire, electric shock and related hazards according to those standards.

(em) Unit Pavers. Units with regular shape used for outdoor paving systems. In these systems voids between the unit pavers allow water to drain. Unit paver materials include concrete, brick, stone, plastic (discrete units or grid).

(en) Ventilation Zone. Subdivided area of the building served by one air handling unit.

(eo) Volatile Organic Compound (VOC). (1) A chemical with sufficiently high vapor pressure to exist as a gas or vapor at ambient temperatures, i.e., with lower boiling point limit between 50 and 100 degrees Centigrade and an upper limit between 240 and 260 degrees Centigrade and formaldehyde or (2) any organic compound that participates in atmospheric photochemical reactions.

(ep) Waste Management Plan. Document outlining resource efficient measures used during construction to minimize waste generation, reuse and renovate existing structures, salvage existing materials and items for reuse or sale, reuse materials on-site, and recycle waste generated during the demolition and construction process.

(eq) Wastewater. Water that has been used at least once in a building.

(er) Water Cascading. Unidirectional use of untreated wastewater for a purpose with appropriately matched lower quality requirements.

(es) Water Recycling. Reuse of treated wastewater for purposes including the original use, involving repeated cycling of water through a system. Water recycling flow is not limited by input to the system, but it may be limited by increasing concentration of wastewater constituents that are not removed by treatment.

(et) Water Reuse. Unidirectional use of treated wastewater for another purpose, limited in quantity to the amount of water used for the original purpose.

(eu) Whole Building. An entire building, including the base building and all tenant spaces.

638.4 Differentiating Between Base Building and Tenant Space.

This subpart enumerates and explains the criteria by which systems, equipment and components are classified as belonging to the base building or the tenant spaces.

(a) Tenant improvements to be classified as part of tenant space

(1) All components and any other item which is a tenant improvement belongs to and is part of tenant space and must be treated as such for the purpose of determining compliance with the requirements of Part 638 and Section 19 of the Tax Law.

(2) All tenant improvements must comply with the requirements applicable to tenant space, and tenant space must be evaluated inclusive of tenant improvements.

(b) Distinction between base building and tenant improvements

(1) Non-residential tenant spaces.

(i) The following components located within a non-residential tenant space are tenant improvements belonging to tenant space:

('a') partitions separating tenant space from base building or other tenant spaces;

('b') partitions within the tenant space;

('c') doors and windows between the tenant space and base building, and within the tenant space;

('d') ceilings;

('e') flooring and carpet systems;

('f') wall finishes;

('g') interior movable louvers and shades;

('h') millwork;

('i') lighting system.

(ii) The following components located in a non-residential space are tenant improvements belonging to tenant space if they meet the criteria of Section 638.4(b)(3):

('a') pipes, and hydronic or steam terminal devices;

('b') ducts, and air delivery terminal devices;

('c') fans, pumps, primary heating equipment, primary cooling equipment, and other mechanical equipment;

('d') controls for mechanical equipment used for space conditioning;

('e') mechanical rooms and mechanical spaces;

('f') lobbies that serve only the tenant space;

('g') corridors located within the tenant space;

('h') interior stairways, if these stairways only connect areas within a tenant space;

('i') special-purpose interior glazing;

('j') interior light shelves.

(2) Residential tenant spaces.

(i) The following components located within a residential tenant space are part of the tenant space and must comply with the requirements for tenant space:

('a') movable furniture, and fixed furniture installed by the tenant;

('b') movable lighting fixtures, including the associated lamps;

('c') rugs;

('d') movable wall coverings.

(ii) Any or all of the following components located within a residential tenant space, if installed and paid for by the base building owner are part of the base building for purposes of the requirements of this part and Section 19 of the Tax Law:

('a') ceiling finishes;

('b') flooring and carpet system;

('c') wall finishes, except movable wall coverings;

('d') bathroom and kitchen cabinetry, and built-in furniture;

('e') molding, wainscoting;

('f') fixed lighting fixtures;

('g') clothes washers, dishwashers, refrigerators, freezers, refrigerator/freezer combinations;

(3) The components listed in Section 638.4(b)(1)(ii) are tenant improvements belonging to and part of the tenant space if all four of the following conditions are met:

(i) The components exclusively serve the tenant space;

(ii) The components were specifically designed for the

tenant space;

(iii) The energy-using components, if any, are metered to allow their energy consumption to be billed to the tenant space;

(iv) The tenant or tenants of the tenant space paid for the components. A tenant paid for a component if:

('a') The component was purchased directly by the tenant, either as a unit already in place, or for the cost of the materials and of the labor to have it installed; or

('b') The cost of the component was paid for by the owner of the base building, but such cost is to be recovered from the tenant through increased payments under the lease between owner and tenant, provided that the lease agreement explicitly states the amount of the lease payments which are attributable to the cost of the component; or

('c') The cost of the modification of an existing component was paid for by the tenant to make it fit for its own use and to bring it into compliance with requirements of this part and Section 19 of the Tax Law.

('1') The cost of the component that a tenant claims as an allowable cost must only be the cost of the modification for which it paid.

('2') In addition, the entire system that is located in the tenant space (not only the portion for which the tenant paid) must be considered part the tenant space and as such becomes subject to all the requirements of this part applicable to tenant spaces.

638.5 Required Submissions For Green Building Tax Credit Certification

(a) Requirements for Credit Component Certificate

The following must be submitted with an application form obtained from the New York State Department of Environmental Conservation in order to obtain a Credit Component Certificate:

(1) a letter of secured funding;

(2) a demonstration and amount of the allowable costs as defined in Section 638.3(c). The amount will be used as the basis for determining the amount of tax credit that a taxpayer can claim.

(3) a written statement by the architect or engineer of record verifying that:

(i) the plans and specifications for the building can meet the green buildings standards as indicated in Section 7;

(ii) the plans and specifications for the building have been certified; and,

(iii) that the certified plans and specifications are consistent with those approved by the municipal government;

(4) a written statement by the building owner stating that all required permits from any local, state or federal government agency have been obtained. The first page and signature page of each permit must accompany the statement.

(5) If an owner/operator of a green building, green base building or green tenant space is applying for the green refrigerant component provide for under paragraph 7 of subdivision (a) of Section 19 of the Tax Law, provide a written statement signed by the architect or engineer of record confirming that all new air conditioning equipment meets the requirement of Section 638.7(m).

(b) Annual Eligibility Certificate Submission Requirements

The submission must include a written statement by the owner or tenant, as applicable, stating that the green building credit is claimed and the amount of credit claimed. The submission must also include the following written statements confirming that the applicable standards and methods in Section 638.7 have been met or executed prior to the submission.

(1) Written statement from base building owner certifying:

(i) Compliance with the Appliance Standards, as defined in Section 638.7(a).

(ii) Compliance with the Refrigerants Standards, as defined in Section 638.7(m).

(2) Written statement from a qualified professional certifying that the base building operation is in compliance with the solid waste management plan as required in Section 638.7(o).

(3) Written statement from the owner or tenant, as applicable, certifying:

(i) The base building complies with all applicable zoning requirements, land use and erosion control requirements and storm water management ordinances.

(ii) The base building or tenant space complies with all applicable building code requirements and environmental regulations. In the case of the rehabilitation of an existing building, all existing environmental hazards must be identified and managed in accordance with applicable laws, regulations and industry guidelines.

(iii) IAQ management plan for operations and maintenance has been implemented for the base building or tenant space, respectively, as prescribed in Section 638.7(d).

(4) Written statement from the architect, engineer of record or the Commissioning Authority certifying:

(i) Compliance with heating, cooling and service water heating equipment installed meets the requirements in Section 638.7(b);

(ii) Compliance with ventilation systems for smoking areas requirements in Section 638.7(f);

(iii) Compliance with the air purging standards in Section 638.7(g);

(iv) Compliance with fresh air intakes requirements in Section 638.7(h).

(5) Written statement from the architect or engineer of record certifying:

(i) Compliance with the ventilation and exchange of indoor/outdoor air requirements of Section 638.7(e);

(ii) For the first year, there is compliance with the energy use standards and methods in Section 638.7(c). This statement must specifically affirm that all modeling and calculations reflect the as-built conditions. For the

second and subsequent years, a statement that describes the changes made to the base building, tenant space or whole building and which confirms that any changes made do not decrease its energy efficiency.

(iii) Compliance with IAQ Requirements in Section 638.7(d).

(iv) Compliance with materials, finishes and new furniture standards in Section 638.7(j). Compliance with this Section may be satisfied by one of the two alternative compliance paths.

 ('a') Performance-Based or
 ('b') Listed Materials

(v) Compliance with plumbing fixtures standards in Section 638.7(k); and

(vi) Buildings in areas that do not have sewers or that have designated storm sewers meet the requirements in Section 638.7(l).

(c) Other Required Submissions for the Annual Eligibility Certificate Submission

(1) Indoor Air Quality with respect to levels for Carbon Dioxide, Carbon Monoxide, Formaldehyde, Particulate Matter, Radon and Total Volatile Organic Compounds

(i) Statement of Certification of IAQ Requirements - A written statement by the owner which confirms that IAQ testing has been successfully executed for the tax year according to Section 638.7(d).

(2) Indoor Air Quality Management Plan During Construction or Rehabilitation

(i) Statement of Construction IAQ Management Certification - A written statement by the owner that confirms that the IAQ Management Plan for Construction has been implemented.

(3) Indoor Air Quality Management Plan Requirement for Operations and Maintenance and Demonstration of Compliance

(i) Statement of Certification for IAQ Management Plan for Operations and Maintenance - A written statement by the owner that confirms that the IAQ Management Plan for

Operations and Maintenance has been implemented for the tax year.

(4) Buildings where water use is not metered

(i) If the requirements of Section 638.7(i) are met by using Alternate Supply Water for a portion of the water needs of the base building the following must be submitted each year:

('a') A certification of the water use calculations by the professional engineer who performed them;

('b') A certification by the professional engineer who conducted the field inspection that the inspection found the alternative supply water system to be installed as called for in the construction documents.

(ii) If the requirements of Section 638.7(i) are met by using Water Cascading, the following must be submitted for the first year:

('a') A certification by the professional engineer who conducted the field inspection that the inspection found the alternative supply water system to be installed as called for in the construction documents.

(5) Alternative Energy Sources

The owner/operator of a green building, green base building or green tenant space must provide certification of initial and annual (by month) results to provide validation of performance of photovoltaic modules and/or fuel cells, and be provided under the seal of a professional engineer.

(6) Commissioning

(i) Required Reports and Plans

('a') Commissioning Plan. Must include components as listed in Section 638.8(f).

('b') Commissioning Report. Must include components as listed in Section 638.8(l).

(ii) Required Written Statements

('a') Initial Statement of Commissioning Certification - a written statement signed by the

commissioning authority and owner must to be included with the first eligibility certificate submission and may be executed prior to performing the seasonally deferred testing. The statement must certify that:

('1') the commissioning plan has been executed according with the requirements of Section 638.8(f);

('2') the design intent of the building has been achieved to the owner's satisfaction;

('3') whether all the requirements of Section 638.8 have or have not been met.

('b') Subsequent Statement of Commissioning Certification - A written statement signed by the commissioning authority and owner to be included in the second eligibility certification submission. The statement must confirm that:

('1') the conditions in Section 638.8 have been met with respect to the seasonally deferred testing.

('2') the conditions in Section 638.8 have been met with respect to the site visit to be held within six months to one year after commissioning.

('c') Statement of Re-Commissioning Certification. If a commissioned system, equipment or component (1) is replaced, or (2) is modified in a way that, in the judgement of the commissioning authority, will materially affect the energy use of the base building, then that system, equipment or component, or that modification to the system, equipment or component, must be re-commissioned.

Then, a written statement signed by the commissioning authority and owner must be included with the eligibility certificate submission for the next tax year. This statement must certify that the conditions in Section 638.5(c)(6)(ii)('a') have been met with respect to the replacement or modification. If appropriate, prior to the signing of the eligibility certificate for the next tax year, a written statement must be signed by the commissioning authority and owner certifying that the conditions of paragraphs (1) and (2) of subdivision (d) of this section have been met with respect to the replacement or modification.

638.6 Application Procedures

(a) Application Acceptance

Eligible taxpayers may apply to the Department of Environmental Conservation for a credit component certificate pursuant to Section 19(c) of the Tax Law. The application must be submitted according to the following procedure:

The Department will begin to accept applications 30 calendar days after the effective date of this part.

(b) Application Form

The application must conform to the format provided by the New York State Department of Environmental Conservation, and must be accompanied by the items referenced in Section 638.5(a).

Two copies of the original application package for the tax credit, three original cover letters and electronic copy provided on disk must be submitted to:

Director
Pollution Prevention Unit
New York State Department
of Environmental Conservation
625 Broadway
Albany, NY 12233-8010

Attn: Green Buildings Tax Credit Eligibility
Application

(c) Separate Application(s) for Building Spaces

(1) If the applications for the green building credit are submitted together for a base building and for all tenant spaces in the building, or for a whole building, then the energy use must be calculated by analyzing the whole building simultaneously, as required by Section 638.7(c)(3)(v).

(2) The tenant spaces must demonstrate compliance with all other requirements of this part and Section 19 of the Tax Law together as a group.

(3) If the applications for the green building credit are not submitted together for a base building and for all tenant spaces in the building, then the base building and/or any tenant space that applies for the Tax Credit must demonstrate compliance with this part and Section 19 of the Tax Law

separately from each other.

(d) Review Procedure

(1) The Department of Environmental Conservation will use the procedures in this section to determine the order in which it will review and approve applications for the Green Buildings Tax Credit pursuant to Section 19 of the Tax Law.

(2) Review of applications for approval will be based upon the date received. Applications received on a Saturday, Sunday, a holiday when State offices are closed, or after 4:30 p.m. on any business day will be considered received on the next business day. One original cover letter will be date and time stamped by the department and returned to the applicant as proof of their initial receipt of application.

(3) The department will perform a review of all applications for conformance to Section 638.5.

(4) Applications that are incomplete or otherwise do not conform to Section 638.5 above will be determined not to meet the requirements of this regulation by the department and will be denied without prejudice to make a subsequent new application. There will be no allowances for amendment of applications. Notification of this determination will be mailed by the department to the applicant within 90 calendar days of receipt of the application.

(e) Issuance of a Credit Component Certificate

If the department determines that an application is in conformance with Section 638.5(a), then a credit component certificate for an approved application, signed by the Commissioner of the Department of Environmental Conservation or his/her designee, will be issued by first class mail within 90 calendar days of receipt of an applicant's submission by the department.

(f) Insufficient Tax Credit Allocation

If available tax credit allocations are insufficient, the department will retain applications deemed complete for future certificate issuance, if other allocations become available, based upon initial date of receipt. Written notice of insufficient funds will be provided to the applicant within 90 calendar days.

(g) Unused Credits

If credits issued are not completely utilized by an applicant awarded a certificate, any remaining credits will be reallocated to the next eligible applicant. If there are no eligible applicants during the calendar year, the dollar amount of the credit allocation will be added to the amount of allowable credit allocations for the next calendar year.

(h) Annual Eligibility Certificate

(1) To verify that a taxpayer is eligible for the tax credit, as allowed by the credit component certificate, an annual eligibility certificate submission must be received by both the Department of Taxation and Finance and DEC annually on or before the anniversary of the issuance date of the credit component certificate. The annual eligibility certificate submission should be made according to Section 638.6 and must be submitted each year until there is no remaining tax credit for the taxpayer to claim.

(2) The copy of the annual eligibility certificate submitted to the Department of Taxation and Finance must also be accompanied by the credit component certificate initially issued by DEC for the green building, in order to receive tax credits.

(3) Failure on the part of the applicant to file a copy of the annual eligibility certificate submission with DEC as referenced in Section 638.5(b) and (c) will cause credit allocations previously reserved in the credit component certificate for that year to become subject for reallocation. The department will reallocate these unused credits pursuant to the Unused Credits Provision of Section 638.6(g). The department will not provide reminder notices to applicants in any form.

638.7 Standards and Methods for Determining Compliance

This section provides the standards for each feature and category of consideration for green buildings. Also, where necessary, this section further specifies methods for demonstrating compliance beyond the basic written certifications of compliance by the owner, applicant and appropriate licensed professionals described in Section 638.5(b) and (c).

(a) Appliances

(1) Standards

(i) The appliances installed in a base building or tenant space must be models with an Energy Star® label.

(ii) If the owner of a base building, or the owner's agent:

 ('a') installs in residential units or

 ('b') offers for installation in residential units or

 ('c') offers for purchase to tenants in residential units of that building appliances, then all such appliances must be models with an Energy Star® label.

(b) Heating, Cooling and Service Water Heating Equipment

(1) Standards

The performance prescribed in the energy code, in the Official Compilation of Codes, Rules, and Regulations of the State of New York (NYCRR), Volume 9, Part 7813 or 7814 as applicable to the building type, must be met for all heating, cooling and service water heating equipment that belongs to the base building or tenant space. Lower performance is not permitted for the purposes of this subpart even if an alternate compliance method is used to demonstrate compliance with the energy code under Part 7812.

(c) Energy Use

(1) Standards

(i) Base Building.

For new construction, energy use of a design base building must be less than or equal to 65 percent of the respective energy code base building and must be less than or equal to 75 percent for rehabilitation of a base building.

(ii) Tenant Space.

 ('a') For tenant space except office tenant space:

For new construction, energy use of a design tenant space must be less than or equal to 65 percent of the respective energy code tenant space and must be less than or equal to 75 percent for rehabilitation of tenant space.

(iii) For office tenant space:

For new construction, energy use of design tenant space must be less than or equal to 55 percent of the respective energy code tenant space and must be less than or equal to 65 percent for rehabilitation of such tenant space.

(iv) Whole Building

('a') For new construction where the floor area of office tenant space accounts for less than 90 percent of the floor area of all tenant spaces, energy use of a design whole building must be less than or equal to 65 percent of the respective energy code whole building and must be less than or equal to 75 percent for rehabilitation of a whole building.

('b') For new construction where the floor area of office tenant space accounts for greater than or equal to 90 percent of the floor area of all tenant spaces, energy use of a design whole building must be less than or equal to 60 percent of the respective energy code whole building and less than or equal to 70 percent for rehabilitation of a whole building.

(2) Computer Modeling Methods

This subpart describes the hourly computer modeling methodology required to demonstrate that a base building, tenant space or whole building complies with the requirements of the energy use standards set forth in Section 638.7(c) and as required by Section 19 of the Tax Law.

If calculations cannot show that changes made to the base building, tenant space or whole building do not decrease its energy efficiency, then the requirements of Section 638.7(c) must be met again.

(3) Acceptable Computer Programs

(i) Compliance with the energy use standards must be demonstrated using the DOE-2.1E computer program, specifically, any version from V86 through V110 inclusively, or an equivalent computer program. A computer program is considered equivalent if either of conditions ('a') or ('b') below are met:

('a') The DOE-2.1E computer program, any version from V86 through V110 inclusively, has been modified without

altering its computational algorithms. The following are acceptable modifications:

('1') Input and/or output interface.

('2') When compared to DOE-2.1E, specifically, any version between V86 and V110 inclusively, the capability of the computer program is increased to model larger size buildings and/or greater detail.

('b') The computer program meets the DOE-2.1e equivalency requirements of "Nonresidential Alternative Calculation Method Approval Manual for the 1998 Energy Efficiency Standards for Nonresidential Buildings" dated April 1998 and issued by the California Energy Commission under serial number P400-98-011.

(ii) Method for comparing the design base building and energy code base building for the purpose of verifying compliance with the energy use standards for the base building.

To demonstrate compliance with the energy use standards for the base building, the energy code base building must be compared to the design base building using energy simulations as follows:

('a') The energy code base building model and the design base building model must be created, and then energy simulations with these computer models must be performed.

('b') Assign the type of cooling and heating systems to the energy code base building using Table 7.1, with exceptions as noted in this section. Table 7.1 must be applied using the following definition for the Size of Cooling Equipment Installed (column 2).

('1') Included in the definition: (a) all cooling equipment, including back-ups, except as noted in subparagraphs b) and c) of this paragraph; (b) ice storage systems; and (c) evaporative cooling systems (direct or indirect).

('2') Excluded from the definition: (a) air-to-air heat recovery system, (b) glycol loop heat recovery system, and (c) desiccant dehumidification system.

('3') In buildings that include multifamily

residences as well as other uses, the size of the installed cooling equipment must be accounted separately where it does not serve either (1) residential units or, (2) areas associated with the management of these residential units.

Table 7.1: Type of cooling and heating system to be modeled in the majority of the areas of the energy code base building			
Space Use	Size of Cooling Equipment Installed	Heating / Reheat Fuel Used in the Space ¹	Type of Cooling and Heating system designated for the Space Use of column 1, to be modeled in the Energy Code Base Building
Multi-family residences	any	fossil fuel	Through-the-wall unitary direct expansion (DX) with hot water or steam coils ² for residential units. Packaged rooftop DX for common areas with fossil fuel heating ³ . or Air-cooled, single-effect absorption chiller/heater ⁴ with four pipe fan-coils.
		electric	Through-the-wall unitary air-to-air heat pumps for residential units. Split-system air-to-air heat pumps for common areas.
Hotels, motels	≤ 150 tons	fossil fuel	Through-the-wall unitary DX with hot water or steam coils ² for residential units. Packaged rooftop DX for common areas with fossil fuel heating ³ . or Air-cooled, single-effect absorption chiller/heater ⁴ with four pipe fan-coils.
		electric	Through-the-wall unitary air-to-air heat pumps for guest rooms and apartments. Split-system air-to-air heat pumps for common areas.
Hotels, motels	> 150 tons and ≤ 300 tons	fossil fuel	Four pipe fan-coils with air-cooled chiller ^{4,7} .
		electric	Split-system air-to-air heat pumps.
Hotels, motels	> 300 tons	fossil fuel	Four pipe fan-coils with water-cooled chiller ^{4,7} .
		electric	Split-system air-to-air heat pumps.
Office buildings	≤ 150 tons	fossil fuel	Packaged rooftop DX with fossil fuel heating ⁵ . The air system is Variable Air Volume (VAV) ⁶ . or Air-cooled, single-effect absorption chiller/heater ⁴ . The air system is VAV ⁶ .
		electric	Packaged rooftop air-to-air heat pumps.
Office buildings	> 150 tons and ≤ 300 tons	fossil fuel	VAV system ⁶ with air-cooled chiller ^{4,7}
		electric	Split-system air-to-air heat pumps.
Office buildings	> 300 tons	fossil fuel	VAV system ⁶ with water-cooled chiller ^{4,7} .
		electric	Split-system air-to-air heat pumps.

Table 7.1: Type of cooling and heating system to be modeled in the majority of the areas of the energy code base building			
Space Use	Size of Cooling Equipment Installed	Heating / Reheat Fuel Used in the Space ¹	Type of Cooling and Heating system designated for the Space Use of column 1, to be modeled in the Energy Code Base Building
Store, mall	≤ 150 tons	fossil fuel	Packaged rooftop DX with fossil fuel heating ³ . or Air-cooled, single-effect absorption chiller/heater ⁴ .
		electric	Packaged rooftop air-to-air heat pumps.
Store, mall	> 150 tons and ≤ 300 tons	fossil fuel	Water loop heat pumps with boiler ⁵ and cooling tower. or Air-cooled, single-effect absorption chiller/heater ⁴ .
		electric	Split-system air-to-air heat pumps.
Store, mall	>300 tons	fossil fuel	Water loop heat pumps with boiler ⁵ and cooling tower. or Air-cooled, single-effect absorption chiller/heater ⁴ .
		electric	Split-system air-to-air heat pumps.
Warehouse, auto service/dealer	≤ 300 tons	fossil fuel	Split-system DX with fossil fuel heating ³ . or Air-cooled, single-effect absorption chiller/heater ⁴ .
		electric	Packaged rooftop air-to-air heat pumps
Warehouse, auto service/dealer	>300 tons	fossil fuel	Water loop heat pumps with boiler ⁵ and cooling tower. or Air-cooled, single-effect absorption chiller/heater ⁴ .
		electric	Split-system air-to-air heat pumps
Other (restaurant, education, health/hospital, library, recreation, assembly)	≤ 150 tons	fossil fuel	Packaged rooftop DX with fossil fuel heating ³ . or Air-cooled, single-effect absorption chiller/heater ⁴ .
		electric	Packaged rooftop air-to-air heat pumps.

Table 7.1: Type of cooling and heating system to be modeled in the majority of the areas of the energy code base building

Space Use	Size of Cooling Equipment Installed	Heating / Reheat Fuel Used in the Space ¹	Type of Cooling and Heating system designated for the Space Use of column 1, to be modeled in the Energy Code Base Building
Other (restaurant, education, health/hospital, library, recreation, assembly)	>150 tons and ≤ 300 tons	fossil fuel	Air system with air-cooled chiller ^{4,7} , where the air system in the energy code model is constant air volume or VAV according to the air system in the design model.
		electric	Split-system air-to-air heat pumps.
Other (restaurant, education, health/hospital, library, recreation, assembly)	>300 tons	fossil fuel	Air system with water-cooled chiller ^{4,7} , where the air system in the energy code model is constant air volume or VAV according to the air system in the design building model.
		electric	Split-system air-to-air heat pumps.

¹Heating and reheat fuel used in the space (Column 3) is the heating fuel used for most of the combined heating and reheating needs of a particular space, as defined by the "Space Use" column of Table 7.1. Where the design base building uses electric resistance heating or reheating, the "heating and reheat fuel used in the space" must be selected as fossil fuel.

²The energy code base building model must use hot water if the design base building uses hot water, and the energy code base building model must use steam if the design base building (and thus the design base building model) uses steam.

³If the design base building uses a furnace, then the energy code base building model must also use a furnace. If the design base building uses a boiler, then the energy code base building model must also use a boiler. The energy code base building model must use the same type of fossil fuel as that used in the design base building.

⁴The chiller assigned to the energy code base building model must use the same energy source as the chiller assigned to the design base building. If the chiller in the design base building (and thus the design base building model) uses a particular type of fossil fuel, the chiller in the energy code base building model must be a single-effect absorption machine using the same type of fossil fuel.

⁵The furnace or boiler in the energy code base building model must use the same fuel as the furnace or boiler in the design base building (and thus the design base building model).

⁶Office spaces must use VAV system for the energy code base building model. In other spaces within the building, the energy code base building model must use the same type of air system as that used in the design base building.

⁷If Table 7.1 requires the modeling in the energy code base building model of electric chillers with a total installed capacity greater than 150 tons (column 2), the type and number of these chillers must be assigned as follows:

- (i) "Size of cooling equipment installed" is >150 tons and < 300 tons:

Specify in the energy code base building model two equally-sized, reciprocating, air-cooled chillers. Exception: if the design base building uses only one chiller, also specify in the energy code base building model only one chiller.

- (ii) "Size of cooling equipment installed" is >300 tons: The energy code base building must use centrifugal water-cooled chillers, unless the design base building uses screw water-cooled chillers in conjunction with an ice storage system, in which case the energy code base building model must also have screw chillers, and a low-temperature air distribution system (but need not be modeled with an ice storage system).
- (a) The number of centrifugal chillers for the energy code base building model must be established as follows: (1) up to and including 600 tons: one chiller; (2) 601 tons through 1600 tons: two chillers sized equally; (3) over 1600 tons: two chillers minimum, with chillers added so that no chiller is larger than 800 tons, all sized equally. (4) notwithstanding the requirements of (1), (2) and (3) directly above, the number of chillers in the energy code base building model must not be higher than the number of chillers in the design base building model.
- (b) The number of screw chillers for the energy code base building model must be the same as that for the design base building model.

('4') Unless otherwise specified in Table 7.1, the HVAC distribution system in the energy code base building model must be the same type as the HVAC distribution system in the design base building.

('5') If the design base building purchases hot water, steam or chilled water (instead of producing them in the building), the energy code base building model must make the same assumption.

('6') Buildings with multiple types of cooling and/or heating systems.

('i') If a space in the design base building uses a different type of cooling/heating system than the predominant use in the rest of the base building, and if this cooling/heating system is different because of the use of that space, then the energy code base building model must have the same type of cooling/heating system for that particular space.

('ii') The "size of cooling equipment installed" (Table 7.1, column 2) is determined by the whole building, even if there are several cooling systems in the building, except for multifamily residences as per Section 638.7(c)(3)(iii)('b')('3').

('c') Energy simulation techniques for the energy

code base building model and the design base building model.

In modeling the base building, the following energy simulation techniques must be used:

('1') Energy Code Base Building Model. For the components that belong to the base building, assign values to the simulation parameters affecting energy use.

The energy code base building model must be created by using the HVAC system type of Table 7.1 and the modeling requirements of Section 638.7(c)(3)(vi).

('i') The energy efficiency of all base building components must comply with the prescriptive requirements of the energy code. For multifamily residences, the energy code base building model must use the following values for fixed lighting installed in apartments, if fixed lighting is claimed as part of the base building: kitchen - 325 watts; each bathroom - 200 watts; dining room - 120 watts; hallway - 60 watts; entry space 60 - watts.

('ii') The energy code base building model must be coded to report in the output the following energy use that does not belong to the base building and that must be removed from the compliance calculations: (a) the electricity used in the whole building by plug equipment and non-vehicular transportation equipment, and (b) the electricity or fossil fuels used in the whole building by process equipment.

('iii') The effect of the aforementioned equipment on heating and cooling must not be removed from the compliance calculations.

('iv') The energy code base building model must have separate electrical meters for the lighting in the base building and the tenant spaces. Where domestic hot water is used by both the base building and tenant spaces, it must be metered separately for each. Similarly, if there are other end-uses common to both base building and tenant space(s), separate meters must be assigned to those end-uses. The energy use associated with components that belong to the tenant spaces must be excluded from the

compliance calculation.

('2') Design Base Building Model. For the components that belong to the base building, assign values to the simulation parameters affecting energy use.

The components of the design base building must be modeled as built. The same procedure as for the energy code base building, per Section 638.7(c)(3)(iii)('c')('1') above, must be followed, with the following exception:

Values for energy end-uses calculated in Section 638.7(c)(3)(iii)('c')('1') may be used instead if repeating the analyses with the design base building model would yield the same results.

('3') Assign values to the simulation parameters affecting energy use for the components that do not belong to the base building and are energy-using systems that are not part of the base building, i.e., are part of tenant spaces. The requirements of this paragraph must be followed when creating computer models for both the energy code base building and design base building. The following assumptions must be made:

('i') Tenant-supplied lighting (not fixed lighting supplied by the base building owner) for residential apartments have the following values: each bedroom-120 watts; living room-300 watts; dining room-120 watts.

('ii') If the values for the parameters affecting energy use in one or more tenant spaces are known values, these values must be used for both the energy code base building model and the design base building model, except that no value can be less energy-efficient than that required by the energy code.

('iii') If the values of the parameters affecting energy use in one or more tenant spaces are unknown values, then both the energy code base building model and the design base building model must use the prescriptive energy efficiency values of the energy code for these spaces, except that lighting density (general lighting and task lighting) in

tenant spaces that are not residential apartments must be as listed for each space type of Table 7.2. For residential apartments, the following values must be used for the combination of fixed lighting and occupant-provided lighting: each bedroom - 120 watts; living room - 300 watts; dining room - 120 watts; each bathroom - 200 watts; kitchen - 325 watts; hallway - 60 watts; and entrance space - 60 watts.

Table 7.2: Lighting Density by Space Type

SPACE TYPE*	LIGHTING DENSITY (watts per square foot)
Auditorium	1.6
Bank/financial institution	2.0
Classroom/lecture hall	1.6
Convention, conference or meeting center	1.5
Corridor, restroom, support area	0.8
Dining	1.4
Exercise center	1.1
Exhibition hall	3.3
Grocery Store	2.1
Gymnasium playing surface	1.9
Hotel function	2.4
Industrial work, <20ft ceiling height	2.1
Industrial work, 20ft ceiling height	3.0
Kitchen	2.2
Library	1.8
Lobby-hotel	1.9
Lobby-other	1.0
Mall, arcade, atrium	1.4
Medical and clinical care	1.6
Museum	1.6
Office	1.5
Religious worship	3.2
Restaurant	1.7
Retail sales, wholesale showroom	2.1
Storage, industrial and commercial	1.0
Theaters-motion picture	1.0
Theaters-performance	1.5
Other	1.0
* For the purpose of selecting space types, a "space" is all	

Table 7.2: Lighting Density by Space Type

SPACE TYPE*	LIGHTING DENSITY (watts per square foot)
contiguous areas which accommodate or are associated with a single space type listed.	

('4') Assign peak electrical demand for plug equipment.

The peak electrical demand of plug equipment must be assigned as follows in both the energy code base building model and in the design base building model:

('i') Computer-intensive office areas: 2.0 watts per square foot. These areas assume 83 square feet per workstation with computer and monitor at each workstation, plus one printer and facsimile. This figure includes circulations of open floors, but does not include circulations enclosed by floor-to-ceiling walls.

('ii') General office areas, not included in computer-intensive office areas above: 1.5 watts per square foot. These areas assume 100 square feet per workstation with computer and monitor at each workstation, plus one printer and facsimile. These areas comprise typical open-office layouts, including circulations unenclosed by floor-to-ceiling walls, and small storage spaces and conference rooms less than 500 square feet.

('iii') Large conference rooms, not included in general office areas above: 1.0 watts per square foot.

('iv') Corridors (enclosed by floor-to-ceiling walls) and storage areas not included in general office areas above, elevator lobbies, restrooms, janitorial areas: 0 watts per square foot.

('v') Mainframe computer rooms: 50 watts per square foot, or according to design. A lower or higher figure may be used if verified through measurement. Adding nameplate ratings is not acceptable.

('vi') Residential apartments: peak combined

electrical demand must be no higher than 4 watts per square foot in each kitchen, 0.5 watts per square foot in each living room, 1.5 watts per square foot in each bedroom and is based on the following assumptions: audio-video equipment, electric clocks, electric appliances for personal hygiene in bathrooms, refrigerator/freezer, microwave, dishwasher. Electric range may add no more than 1 watt per square foot in each kitchen.

('vii') Other space uses: maximum electrical use must account for the fact that not all equipment is used simultaneously.

To perform the compliance analyses, the electrical use of plug equipment must be separately reported in the output of the computer models.

('5') Perform energy simulations of the energy code base building model and the design base building model.

('i') Energy use not assigned to the base building is metered in the computer model and reported in the simulation output. The electricity used by plug equipment and non-vehicular transportation equipment in the whole building, and the electrical and fossil fuels used by process equipment in the whole building is also metered.

('ii') The simulations must be performed for all hours in an entire year, using representative hourly meteorological data.

('6') Calculate the energy use that does not belong to the base building.

The energy use computed by the energy code base building model must be compared with the energy use computed by the design base building model after excluding the following:

('i') Using the results from the simulations of the energy code base building model, add the kilowatt-hours (kwh) of all non-base building uses, such as lighting in tenant spaces, plug equipment, non-vehicular transportation, and process equipment. Add the therms (or gallons, or hundreds of cubic feet (ccf)) for all non-base building uses, such as

domestic hot water (DHW) for tenant spaces and process equipment that uses fossil fuels.

('ii') Perform the same calculations using results from the design base building model. In addition, as noted in Section 638.7(c)(3)(ii)('c')('2'), some results obtained with analyses of the energy code base building model may be used directly for design base building calculations.

('7') Compare the energy use for the energy code base building to the energy use for the design base building in order to verify compliance with the energy use standards.

('i') From the energy use predicted by both the energy code base building model and the design base building model, subtract the kilowatt-hours, and also the therms, gallons or ccf calculated in Section 638.7(c)(3)(ii)('c')('6').

('ii') Convert the results to source Btu. Use the actual Btu content of the energy source if known; otherwise use the conversion factors below:

Btu = kwh x 10,000
= therms x 100,000
= cf natural gas x 1,027
= gallons of propane x 86,047
= gallons of #2 oil x 138,700
= gallons of #6 oil x 149,690

('iii') In order to meet the energy use requirements of this part, energy use for the design base building must meet the requirements set forth in Section 638.7(c)(1), "Energy Use Standards."

(iii) Method for comparing the design building tenant space and the energy code tenant space for the purpose of verifying compliance with the energy use standards for tenant space.

To demonstrate compliance with the energy use standards for tenant space, including the tenant improvements assigned to the tenant space in accordance with Section 638.4, the energy code tenant space must be compared to the design tenant space by creating an energy code tenant space model and performing energy simulations with these models.

('a') Assign type of cooling/heating system to the energy code tenant space.

If the tenant space applying for the green building credit has its own primary cooling equipment, the type of cooling/heating system in the tenant space must be assigned according to paragraph ('1') below. Otherwise, the type of the HVAC distribution system must be assigned according to paragraph ('2') below. Primary cooling equipment assignment to the tenant space must be determined in accordance with Section 638.4.

('1') If the design tenant space has its own primary cooling equipment, the type of cooling/heating system in the tenant space must be coded in the energy code tenant space model by using Table 7.1. In using Table 7.1, substitute the words "tenant space" for the words "base building."

('i') For a given "Space Type" (as defined in Table 7.1), select a row in Table 7.1 to determine the type of cooling system in the tenant space. The size of cooling equipment in Table 7.1, column 2 must be the installed cooling equipment in the whole building, not just in the tenant space, except for, buildings with residential units as described in Section 638.7(c)(3)(ii)('b')('3').

('ii') If the applicable energy code cooling system is an air-cooled chiller, then the energy code tenant space model must use an air-cooled chiller plant for the tenant space. If the applicable energy code cooling system is water-cooled, then the energy code tenant space model must use a water-cooled chiller plant for the tenant space. The type and number of chillers (if applicable) in the plant that serves the tenant space in the energy code tenant space model must be selected as follows:

('A') If the installed size of the cooling equipment in the design tenant space is < 150 tons, one chiller must be modeled. Electric chillers must be modeled as the reciprocating type.

('B') If the installed size of the cooling equipment in the design tenant space is >150 tons and < 300 tons, two equally sized chillers must

be modeled, unless the design tenant space uses only one chiller, in which case, the energy code tenant space model must code only one chiller. Electric chillers must be modeled as the reciprocating type.

('C') If the installed size of the cooling equipment in the design tenant space is >300 tons, water-cooled chillers must be modeled. The number of chillers assigned to the energy code tenant space model must be established as follows:

up to and including 600 tons: one chiller;

601 tons through 1600 tons: two chillers of equal size;

over 1600 tons: a minimum of two chillers with additional chillers added such that no chiller is larger than 800 tons, and all chillers are of equal size.

Notwithstanding the requirements immediately above, the number of chillers assigned to the energy code tenant space model must not be higher than the number of chillers assigned to the design tenant space model.

Electric chillers must be modeled as the centrifugal type.

('iii') Use the "Heating and Reheat Fuel Used in the Space" (Table 7.1) appropriate for the whole building, unless the tenant space has its own primary heating equipment (per Section 638.4 "Differentiating Between Base Building and Tenant Spaces"). If the design tenant space has its own primary heating equipment, the dominant fuel for the design tenant space must be coded in the energy code tenant space model, in accordance with footnote 1 of Table 7.1.

('2') The design tenant space does not have its own primary cooling equipment.

('i') The type of HVAC distribution system in the energy code tenant space must be the same type as the design tenant space model type.

('iii') For design tenant space with its own primary heating equipment (with the exception of electric resistance heating and geothermal heat pumps) the same system must be modeled in both the design tenant space model and the energy code tenant space model. For electric resistance heating and/or reheat systems, the energy code tenant space model must assume fossil fuel as the primary fuel. For geothermal heat pump systems, the energy code tenant space model must assume a water loop heat pump system with a fossil fuel-fired boiler and cooling tower as the primary fuel.

('3') The energy-efficiency of all HVAC and DHW equipment in the energy code tenant space must be modeled in accordance with the energy code energy-efficiency requirements.

('b') Energy simulation techniques for the energy code tenant space model and the design tenant space model.

('1') The effect of the following components must be included in those instances where they are a tenant improvement:

('i') lighting;

('ii') scheduled lighting controls that turn lights off at a specified hour;

('iii') fans and pumps, including controls; and

('iv') other systems, e.g., water-cooled DX and associated controls.

('2') The effect of the following components must be eliminated :

('i') the building envelope;

('ii') fans and pumps, unless considered part of the tenant space as determined in accordance with Section 638.4; and

('iii') cooling and heating equipment, unless considered part of the tenant space as determined in accordance with Section 638.4.

('3') Energy code tenant space model. Assign values for the parameters affecting energy use to components of the tenant space.

('i') The energy efficiency of energy-using components that belong to the tenant space must comply with the prescriptive requirements of the energy code.

('ii') Assign values for the parameters affecting energy use to tenant space components.

('iii') The energy-using components of tenant spaces for which an application is made must be modeled as built.

('iv') For energy-using systems that do not belong to the tenant improvements in the tenant space applying for green building credit, assign energy use values as follows:

('A') If a tax credit application is made for a specific tenant space, and the values of the parameters affecting energy use for other areas that do not apply for the tax credit are known values, these values must be used for both the energy code tenant space model and design tenant space model, except that no value can be less energy efficient than what is required by the energy code.

('B') If the values of the parameters affecting energy use for the base building and/or other tenant spaces are unknown values, the energy code tenant space model and the design tenant space model must both use the prescriptive values of the energy code for the systems belonging to the base building and/or other tenant spaces, except that lighting density (general lighting plus task lighting) in tenant spaces that are not residential apartments, must be listed for each space type within Table 7.2 and residential apartments, must use the values listed under the heading "Exceptions," in Section 638.7(c)(3)(ii)(c)(e)(3)(iii).

('4') The peak electric demand of plug equipment must be assigned to both the energy code tenant space model and the design tenant space model using the same

figures as Section 638.7(c)(3)(ii)(`c`)(`4`).

(`5`) Energy simulations must be performed for both the energy code tenant space model and the design tenant space model and the model run for all hours in one calendar year, using an hourly weather file considered appropriate for the region where the building which is the subject of the tax credit application is located.

(`6`) A separate computer model must be created if a tenant space has primary heating or cooling equipment.

(`i`) If the tenant space has its own primary cooling equipment and/or primary heating equipment in accordance with Section 638.4, the following operations must be performed to ascertain the energy efficiency of such equipment:

(`A`) In both the energy code tenant space model and the design tenant space model, assign the efficiency of the primary cooling equipment that belongs to the tenant space as follows:

Energy efficiency ratio (EER) = 3412 or higher

Coefficient of performance (COP) 1000 or higher

Kilowatt per ton (kw/ton) = 0.00352 or lower

(`B`) For both the energy code tenant space model and the design tenant space model, assign the efficiency of the primary heating equipment that belongs to the tenant space as follows:

Combustion efficiency = 100,000 percent

COP = 1000 or higher

(`C`) Perform simulations for both the energy code tenant space and the design tenant space for all hours in one calendar year, using an hourly weather file considered appropriate for the region where the building which is the subject of the tax credit application is located.

(`D`) Record a decrease in energy use (electricity or fuel) as a positive number (+

sign).

('E') To demonstrate compliance with the energy use standards for the tenant space for the remaining calculations, use the computer models featuring primary cooling equipment with the efficiency assigned in clause ('A') above of Section 638.7(c)(3)(iii)('a')('6')('i'), and/or primary heating equipment with the efficiency assigned in clause ('B') above of Section 638.7(c)(3)(iii)('a')('6')('i'). The requirement applies to both the energy code and design tenant space model.

('ii') A tenant space that does not have its own primary cooling equipment and/or primary heating equipment (Section 638.4) must use as a starting point and as a reference the computer models created in accordance with Section 638.7(c)(3) with the exception of Section 638.7(c)(3)(iii)('a')('6')('i').

('7') Lighting simulations. The effect on energy use of the lighting in the tenant space must be calculated in accordance with the following:

('i') Assign the lighting power density to 75 percent of its value by multiplying the watts per square foot or the watts in the tenant space by 0.75, then perform the energy simulations for both the energy code tenant space model and the design tenant space model.

('ii') Multiply both the change in total kilowatt-hours and the change in fuel use by 4.

('iii') Record a decrease in energy use (electricity or fuel) as a positive number (+ sign). Record an increase in energy use (fuel use only) as a negative number (- sign).

('8') Simulations for special-purpose interior glazings. The effect on energy use of the special-purpose interior glazing assigned to to the tenant space must be calculated in accordance with the following:

Special-purpose interior glazing that is part of the tenant space under consideration (Section 638.4),

requires the following simulations using the design tenant space model be performed:

('i') Remove the interior glazing layers from the model by coding the U-factor and shading coefficient of the exterior glass into the computer model and discounting any effect caused by the interior glass. Perform an energy simulation with the appropriate design tenant space model.

('ii') Record a decrease in energy use (electricity or fuel) as a positive number (+ sign). Record an increase in energy use (electricity or fuel) as a negative number (- sign).

('9') Simulations for domestic hot water. The effect on energy use of the domestic hot water system assigned to the tenant space must be calculated as follows using both the energy code and design tenant space models:

('i') Assign the DHW use in the tenant space to 75 percent of its value and perform the simulation.

('ii') Multiply both the change in total kilowatt-hours and the change in fuel use by 4.

('iii') Record a decrease in energy use (electricity or fuel) as a positive number (+ sign). Record an increase in energy use (electricity or fuel) as a negative number (- sign).

('10') Simulations for HVAC fans and pumps. The effect on energy use of the HVAC fans and pumps assigned to the tenant space must be calculated as follows:

Perform the simulations described below with both the energy code tenant space model and the design tenant space model for HVAC fans and pumps which are part of the tenant space.

('i') Assign electrical use of the HVAC fans and pumps that are part of the tenant improvements to zero by setting the supply static pressure to zero and the efficiency to 100 percent. If the software used for simulations does not allow the use of zero or 100 percent, use a value no higher than 0.01

instead of zero, and no lower than 99.99 percent and perform the energy simulation.

('ii') Record a decrease in energy use (electricity or fuel) as a positive number (+ sign). Record an increase in energy use (in this case only fuel use can increase) as a negative number (- sign).

('11') The energy use of the energy code tenant space and design tenant space must be calculated as follows:

('i') Algebraically sum all changes in electricity use as calculated pursuant to Section 638.7(c)(3)(iii)(b)(6) through (10) above for the following, as applicable, for both the energy code tenant space and the design tenant space:

('A') Primary cooling equipment and/or primary heating equipment;

('B') Lighting;

('C') Interior glazings;

('D') DHW;

('E') HVAC fans and pumps.

Perform the same operation for all changes in fossil fuel use.

('12') Compare the energy use for the energy code tenant space to the energy use for the design tenant space in order to verify compliance with the energy use standards, as follows:

('i') Convert the results obtained in Section 638.7(c)(3)(iii)(b)(11) to source Btu. Use the actual Btu content of the energy source if known; otherwise, use the conversion factors below:

BTU = kilowatt-hours x 10,000
= therms x 100,000
= cf natural gas x 1027
= gallons of propane x 86,047
= gallons of #2 oil x 138,700
= gallons of #6 oil x 149,690

('ii') In order to meet the energy use requirements of this part, energy use calculated for

the design tenant space must meet the requirements set forth in Section 638.7(c), "Energy Use Standards."

(iv) Method for comparing the design whole building and the energy code whole building for the purpose of verifying compliance with energy use standards

To demonstrate compliance with the energy use standards for a whole building, the energy code whole building must be compared to the design whole building by creating an energy code and design whole building model, and performing energy simulations with these computer models.

('a') Assign HVAC systems to the energy code whole building and perform an energy simulation thereof by substituting the words "whole building" for the words "base building" in Section 638.7(c)(3)(ii)('b') and Table 7.1.

('b') Energy simulation techniques for the energy code whole building model and the design whole building model.

Apply energy simulation techniques to calculate the energy use for the energy code and design whole building model and compare the two results in order to determine compliance with the energy use standards set forth in Section 638.7(c), and as required in Section 19 of the Tax Law. The following energy simulation techniques must be used:

('1') Create an energy code whole building model by assigning an HVAC system in accordance with subdivision ('a') of this section. All components, including the HVAC systems, must be modeled with the energy efficiency prescribed by the energy code. For residential apartments, the values listed under the heading "Exceptions," within Section 638.7(c)(3)(ii)('c')('3')('iii') must be used for the combination of fixed lighting and occupant-provided lighting.

('2') Model the components of the design whole building as built, including all fixed lighting in residential apartments. For the purposes of the model, assume that tenant-supplied lighting for residential apartments meets the requirements of Section 638.7(c)(3)(ii)('c')('3')('i').

('3') Code both the energy code and design whole building computer models so that the energy used by all

the following components is reported separately in the output and the effect of these components on cooling and heating is not be removed from the calculations: The electrical use of all plug equipment, non-vehicular transportation equipment, process equipment, and occupant-provided lighting in residential apartments. The fossil fuel use of process equipment must also be excluded from the calculations.

('4') Assign the plug equipment peak electrical demand of Section 638.7(c)(3)(ii)('c')('4') for both the energy code base building model and the design base building model.

('5') Perform the energy simulations for both the energy code base building model and the design base building model using an hourly weather file considered appropriate for the region where the building which is the subject of the tax credit application is located.

('6') In order to verify compliance with the energy efficiency standards calculate the energy use that does not belong to the energy code and design whole building by comparing the energy use generated by the design whole building model after excluding the following:

('i') The summation of the electrical kilowatt-hours of plug equipment; non-vehicular transportation equipment; electrical use of process equipment, if any; and the therms (or gallons, or ccf) for all process equipment based on the results of the computer simulations of the energy code whole building model per paragraph ('5') of Section 638.7(c)(3)(iv)('b').

('ii') Perform the same calculations using results from the design whole building model.

('7') Verify compliance with the energy use standards by comparing energy use for the energy code whole building with the energy use for the design whole building.

('i') Using the energy use predicted by the energy code whole building model and the design whole building model as specified in Section 638.7(c)(3)(iv)('b')('5'), subtract the kilowatt-hours and the therms or gallons or ccf calculated in Section 638.7(c)(3)(iv)('b')('6').

('ii') Convert the results calculated in ('i') to source Btu using the actual Btu content of the

energy source if known; otherwise, use the conversion factors below:

BTU = kilowatt-hours x 10,000
= therms x 100,000
= cf natural gas x 1,027
= gallons of propane x 86,047
= gallons of #2 oil x 138,700
= gallons of #6 oil x 149,690

('iii') In order to meet the energy use requirements of this part, energy use for the design whole building must meet the requirements set forth in Section 638.7(c)(1), "Energy Use Standards."

(v) Energy Use Modeling Requirements

All modeling of energy use must comply with the following requirements:

('a') Thermal Zones

('1') A building area must be modeled as more than a single thermal zone if both of the following conditions exist:

('i') temperatures are controlled by more than one thermostat, and

('ii') the heating or cooling loads are likely to be different in the spaces controlled by the respective thermostats.

('2') Separate thermal zones must be created for the following:

('i') each facade (orientation) of the building;

('ii') corner rooms with windows on more than one exposure;

('iii') open-office corner areas with windows on more than one exposure and which are controlled by a separate thermostat;

('iv') core of the building;

('v') top floor versus middle floors versus ground floor;

('vi') functions with significantly different internal heat gains, or with significantly different

operation schedules (e.g., general purpose offices versus computer-intensive areas); and

('vii') return air plenums.

('3') A separate thermal zone must not be created for restrooms if building air is exhausted through the restrooms, but should be treated as part of the thermal zone for the adjacent spaces.

('b') HVAC systems

('1') HVAC systems must not be combined where:

('i') they are served by different central plant equipment having different part-load characteristics, or

('ii') they serve areas with different magnitude or profiles for loads.

('2') HVAC systems may be combined if they are similar and serve similar areas, e.g., DX systems installed on each floor of identical floors of an office building.

('3') Outside air flow in both the energy code model and design model must be no less than required by the applicable building code. If the design model uses a higher outside air flow rate for purposes of better indoor air quality, then the energy code model must use the same (higher) outside air flow rate. However, the design model may receive credit for modulating down the outside air rate from any level that is code compliant or higher in order to account for changes in occupancy.

('4') In VAV systems, the same minimum position for the VAV boxes must be assigned to both the energy and design code model and model except where VAV boxes in the design base building or design tenant space are capable of closing during non-occupied hours, this feature does not need to be coded in the energy code model.

('c') Placement of Glazed Areas

Glazed areas must be positioned in a geometrically-correct manner on a facade if:

('1') Significant self-shading from the building itself is present, or there is a major obstruction of

solar access e.g., other buildings, trees, relief.

('2') Glass must not be aggregated within a thermal zone if it is non-uniformly shaded.

('d') Thermal conductivity values for concrete masonry units and fibrous insulation:

('1') Concrete masonry units.

The R-value data from ASHRAE Handbook of Fundamentals 1997, chapter 24, Table 4, "Masonry Materials," must be used for concrete masonry units when performing any energy simulation model. Where ASHRAE does not provide the R-value for a masonry type used in the project, the R-value of such concrete masonry units must be obtained either by performing a three-dimensional heat-flow simulation, a two-dimensional heat-flow simulation, or an isothermal planes calculation, as described in the ASHRAE Handbook of Fundamentals, 1997, chapter 24, pages 24.8 through 24.9, "Masonry Walls."

('2') Fibrous insulation.

The R-value for compressed fibrous insulation must be calculated by one of the following methods:

('i') multiply the thickness of the insulation after having been compressed by the R-value/inch of the uncompressed insulation;

('ii') use manufacturers' data for compressed insulation; or

('iii') use published data for the R-value of compressed insulation based on tests.

('e') U-Factors for building envelope assemblies

('1') The following procedure must not be used for determining the U-Factor (or overall R-value) of a building envelope assembly: Parallel path calculations for walls, roofs, and floors built with steel members and with cavity insulation (e.g., 6 inch steel studs at 16 inches on center with R-19 insulation in between).

('2') The following methods for deriving the U-Factor (or overall R-value) of a building envelope assembly may be used (see Section 638.10):

('i') ASHRAE/IESNA Standard 90.1-1999, Table A-10 (Section A3.3) "Assembly U-Factors for Steel Frame Walls";

('ii') ASHRAE/IESNA Standard 90.1-1999, Table 11 (Section A3-4) "Assembly U-Factors for Wood Frame Walls";

('iii') ASHRAE/IESNA Standard 90.1-1999, Table A-12 "Assembly C-Factors for Below-Grade Walls";

('iv') ASHRAE/IESNA Standard 90.1-1999, Table A-13 (Section A5.2) "Assembly U-Factor for Mass Floors";

('v') ASHRAE/IESNA Standard 90.1-1999, Table A-14 (Section A5.3) "Assembly U-Factors";

('vi') ASHRAE/IESNA Standard 90.1-1999, Table A-15 (Section A5.4) "Assembly U-Factors for Wood Joist Floors";

('vii') ASHRAE/IESNA Standard 90A-1999, Table A-16 (Section A6) "Assembly F-Factors for Slab-on-Grade Floors";

('viii') ASHRAE Handbook of Fundamentals, 1997, chapter 24, pages 24.9 through 24.12 ("Constructions Containing Metal," "Zone Method of Calculation," and "Modified Zone Method for Metal Stud Walls with Insulated Cavities");

('ix') Three-dimensional heat-flow simulations;
or

('x') Two-dimensional heat-flow simulations.

('3') To obtain the U-Factor in the spandrel panels of curtain walls, use data published by the manufacturer, perform a two or three-dimensional computer simulation, or use the "Zone Method of Calculation" (page 24.10 of ASHRAE Handbook of Fundamentals, 1997).

('4') Center-of-glass U-Factor must not be used for modeling the U-Factor of entire windows (glass and frame). Any of the following three methods must be used instead:

('i') The computer input must define the glass with the center-of-glass conductance separately from the frame conductance, but only if the simulation software being used to perform the energy models has the capability to separately define the thermal conductance of glass and frame.

('ii') Unit U-factors of the ASHRAE Handbook of Fundamentals, 1997, chapter 29, Table 5 or the U-Factors of ASHRAE/IES Standard 90.1-1999, table A-17 (Section A8.1) "Assembly U-factors for Unlabeled Glazed Wall systems (Site-Built Windows) and Unlabeled Skylight."

('iii') A rating by the National Fenestration Rating Council (NFRC) for the entire window . (NFRC, 1300 Spring Street, Suite 500, Silver Spring, MD 20910 nfrcusa@aol.com).

('f') Modeling of Lighting

The following requirements must be followed when modeling lighting energy use:

('1') Lighting densities (watts per square foot) coded in the computer program must account for both general lighting and task lighting. Assign 0.2 watts per square foot for task lighting in office spaces, in addition to general lighting requirements.

('2') Use a daylight dimming model in order to account for energy saved during hours without daylight.

('3') Analyze the effect of light shelves on thermal zones that are not adjacent to windows as follows:

('i') The footcandle levels in the thermal zone that does not include the windows must be found by performing a simulation with a light analysis computer program such as Radiance or Adeline, both by Lawrence Berkeley Laboratory, 1 Cyclotron Road, Berkeley, CA 94720, or by using a scale model. This light level must be determined for at least one typical day in summer, winter, spring or fall, and for at least 3 hours (one morning, one noon and one afternoon) for each of those days.

('ii') The energy analysis model must be coded to reflect the energy savings due to natural light. A schedule that reduces the electric lighting during the day is an acceptable means to approximate the effect of daylight on thermal zones that do not include windows.

('g') Schedules

('1') Occupancy schedules must not assume that all spaces are fully occupied simultaneously.

('2') Heating temperature

('i') The modeled temperature in spaces for occupancy periods during the heating season must be no higher than 72 degrees Fahrenheit, except for residential rentals and daycare centers, where it must be no higher than 74 degrees Fahrenheit, and special uses such as swimming pool areas or saunas.

('ii') Heating temperature schedules must assume that heating recovery from setback (if applicable) starts no more than 2 hours and no less than 1 hour before opening the building for occupancy. The heating temperature in the building must be ramped from the setback temperature to the temperature for the occupied space in approximately equal steps.

('iii') Cooling temperature schedules must assume that recovery from setup (if applicable) starts no more than 1 hour before occupancy.

('iv') The schedules for occupancy, lighting, plug equipment, process equipment heating, cooling, fan, pump, and outside air must be coordinated.

('h') Central Plant

('1') Chillers. Where default curves in the computer program are inadequate, then equipment-specific part-load curves for chillers must be used.

('2') Cooling towers. The cooling tower size and number of cells must be assigned to the model. Where there is a water-side economizer, the set point temperature must also be assigned.

('3') Pumps. If the hot water pumps operate continuously throughout the heating season, and/or if chilled water pumps operate continuously throughout the cooling season, the computer models must account for this operation.

('i') Verification

The design base building model, design tenant space model and design whole building models must produce an output where the number of hours undercooled, underheated, and the outside throttling range are no more than 10 percent higher when compared with the number of hours undercooled, underheated and outside the throttling range in the energy code base building,

energy code tenant space, and energy code whole building, respectively.

(d) Indoor Air Quality

For indoor air quality with respect to levels for carbon dioxide, carbon monoxide, formaldehyde, particulate matter, radon and total volatile organic compounds

(1) Indoor Air Quality Testing

(i) This applies to base building and tenant space as follows:

('a') Base Building.

Indoor air quality testing must be performed with respect to the whole building no later than 30 days after occupancy and annually each taxable year until the taxpayer no longer has any tax credit to claim. The taxpayer must show that, with respect to a base building, during a taxable year during which any part of the building is occupied, the indoor air quality met the standards established in this subpart for carbon dioxide, carbon monoxide, formaldehyde, particulate matter, radon and total volatile organic compounds.

('b') Tenant Space

Indoor air quality testing must be performed with respect to the tenant space no later than 30 days after occupancy and annually each taxable year until the taxpayer no longer has any tax credit to claim. The taxpayer must show that, with respect to the tenant space, during a taxable year during which any part of the tenant space is occupied, the indoor air quality met the standards established in this subpart for carbon dioxide, carbon monoxide, formaldehyde, particulate matter, radon and total volatile organic compounds.

(ii) Standards

The IAQ testing protocol must cite the indoor air quality standards for the green building credit presented in Table 7.3 below.

Table 7.3
Indoor Air Quality Standards for the Green Building Credit*

	Test Duration (minutes)	Criteria	Basis	Source of Standard
Carbon Dioxide	up to 48 hours continuous, 10 minutes for mobile	700 parts per million above background (outside air)	surrogate for odors.	ASHRAE 62-1999
Carbon Monoxide	up to 24 hours for continuous, 10 minutes for mobile	Indoor levels not to exceed background (outside air). Background (outside air) and outside air at air intakes not to exceed 9 ppm, 8-hour average 35 ppm, 1-hour average	primary standard set to protect public health, including the health of sensitive populations such as asthmatics, children and the elderly.	Environmental Protection Agency (EPA) - National Ambient Air Quality Standards/ NYS - Air Quality Standards/ ASHRAE 62-1999
formaldehyde	8 hours continuous	50 parts per billion	normative data for typical Buildings.	EPA's Building Assessment Survey and Evaluation (BASE) study. California Air Resources Board Indoor Air Quality Guideline, No.1, "Formaldehyde in the Home" residential Action Level
Particulates	8 hours continuous	150 micrograms per cubic meter, 24-hour average (PM ₁₀)	protection against coarse particles associated with aggravation of respiratory conditions such as asthma.	EPA - National Ambient Air Quality Standards (ASHRAE 62-1999)
Radon	48 hours minimum	4 picocuries per liter	protection against increased incidence of lung cancer.	EPA - Radon Reduction Techniques for Detached Houses, Technical Guidance (ASHRAE 62-1999)
Total volatile organic compounds	8 hours continuous	200 micrograms per cubic meter above background (outside air)	"comfort range" based mucous membrane irritation studies.	EPA Research Triangle Park research and administrative facility baseline testing, 2001. Molhave, 1990, referenced in European Collaborative Action Report No. 11, Guidelines for Ventilation Requirements in Buildings

Table 7.3 Indoor Air Quality Standards for the Green Building Credit*				
	Test Duration (minutes)	Criteria	Basis	Source of Standard
Alternative Approach to TVOCs: volatile organic compounds (VOC) scan, 10 - 15 compounds	8 hours continuous	Each VOC is less than or equal to the median (50 th percentile) of concentrations measured in EPA BASE study of Office Buildings throughout the U.S.	normative data for typical Office Buildings.	EPA's Building Assessment Survey and Evaluation (BASE) study.

*see Section 638.10

(iii) Prerequisites

The required IAQ testing must be performed by a qualified professional retained by the taxpayer. The ventilation system must be operated at the design condition of minimum outside air as specified for normal occupancy for 24 hours before and during IAQ testing. The qualified professional may elect to account for seasonal variations in meeting the prerequisite requirements by sampling on a quarterly basis where appropriate.

('a') Prior to performing the required annual IAQ testing, the following four prerequisite conditions must be met.

('1') The commissioning of the ventilation systems must be complete (with the exception of seasonally deferred testing), as documented in the commissioning report; any deficiencies related to the ventilation system must be completely corrected; and those corrections must be documented in the commissioning report.

('2') Except for residential buildings, a one week purge with air handlers operating at 100 percent outside air must be complete, on every floor prior to occupancy, according to Section 638.7(g)(1).

('3') The HVAC system must operate in the design condition of minimum outside air as specified in the design documents for normal occupancy.

('4') Construction or rehabilitation of at least 50 percent of the rentable square footage or occupiable space of the building which is projected to be occupied in the taxable year for which the tax credit is being claimed must be completed and the space used in accordance with its intended purpose. The architect or engineer of record must confirm completion of the space in compliance with design documents, including furniture, fixtures and equipment, and must confirm that use of the space is consistent with the intended occupancy of the space, prior to IAQ testing.

The testing must be conducted within 30 days of the time when this percentage of building occupancy has been achieved.

('b') Prior to performing the required annual IAQ testing in multifamily residential buildings, the following two additional prerequisite conditions must be met:

('1') Ranges, ovens and unvented gas fireplaces must be coupled with fan-powered exterior exhaust.

('2') In residential buildings with combustion sources, UL-listed carbon monoxide detectors which meet Underwriters Laboratories (UL) UL Standard 2034, Single and Multiple Station Carbon Monoxide (CO) Detectors, effective October 1, 1998, must be installed (see Section 638.10).

('i') These detectors must also meet the reliability requirements of ASTM D22.05.

('ii') The number, type, selection and placement of all CO detectors or alarms must meet National Fire Protection Association (NFPA) 720, Recommended Practice for the Installation of Household Carbon Monoxide (CO) Warning Equipment, 1998 edition (see Section 638.10). Locations must include mechanical equipment rooms, attached parking garages, and adjacent occupied units.

(iv) IAQ Testing Protocol

('a') Test Strategy

The qualified professional must prepare an IAQ testing protocol based on a strategy which includes establishing an appropriate schedule for testing and identifying representative sampling locations in the building. The protocol must be based on: (1) a review

of relevant background information on the whole building or tenant space, as applicable, and its HVAC system, including central air handling and distribution system, perimeter zone units, unitary systems, evaporative cooling systems, outdoor air intake control, and/or natural ventilation system, and (2) a site walk-through.

Preparation of the IAQ testing protocol must include:

('1') following the procedures in paragraph ('2') of this subdivision, review the following document:

('i') updated as-built floor plans and HVAC drawings to identify the HVAC equipment serving each floor and/or major area;

('ii') the operations and maintenance records for the ventilation system; and

('iii') commissioning report, operations and maintenance manual, systems and energy management manual, and other relevant studies where available.

('2') The review required by paragraph ('1') must be conducted, at a minimum, with respect to:

('i') the design intent for the mechanical plant,

('ii') location of air intakes and exhausts and pressure differentials between rooms that may account for influx of contaminants;

('iii') design for supplied outdoor air, flow and distribution of air;

('iv') position of dampers;

('v') local exhaust ventilation;

('vi') air-cleaning equipment;

('vii') HVAC operating times;

('viii') regular operational checks;

('ix') equipment cleaning and disinfecting schedules; and

('x') observed and corrected deficiencies.

('3') Interview owner, and where applicable tenant representatives for each occupied space, to ascertain whether there are indoor air quality complaints. Where such complaints exist, identify their nature and the building areas associated with them.

('4') Examine the records of indoor air quality complaints as required by Section 638.9(c)(5). Determine any patterns, their magnitude, distribution and duration.

('5') Review ventilation system operation with building engineer or designated IAQ manager. Perform a site walk-through inspection covering all relevant areas, including at a minimum:

- ('i') inside and outside contamination sources;
- ('ii') HVAC systems; and
- ('iii') occupied floors.

('6') Inspect for signs of water damage or microbial contamination and test for improper air pressure relationships. The qualified professional must immediately notify building management of deficiencies observed during the site walk-through.

('7') Inspect and review design and operational parameters of the HVAC system, including at a minimum the following:

- ('i') source and amount of outside air delivered per occupant;
- ('ii') adjustable or local HVAC controls;
- ('iii') type of humidifier/dehumidifier and how controlled;
- ('iv') outdoor air damper settings; and
- ('v') operational control sequences.

('8') Evaluate recent of rehabilitation or maintenance that can be a source of contaminants. The following must be evaluated where applicable:

- ('i') painting;
- ('ii') carpet installation;

- ('iii') air conditioning repairs;
- ('iv') carpet cleaning;
- ('v') disinfecting of HVAC system;
- ('vi') pesticide application; and
- ('vii') use of acid drain cleaners.

('9') Identify indoor contaminant sources. The following sources must be included in this inventory where applicable:

- ('i') office equipment;
- ('ii') cleaning compounds and disinfectants;
- ('iii') tobacco smoke;
- ('iv') adhesives, paints, and glues;
- ('v') off-gassing of construction material and building fabric;
- ('vi') contaminants generated by construction or rehabilitation,
- ('vii') appliances; and
- ('viii') air fresheners.

('10') Identify outdoor contaminant sources. The following must be included in this inventory where applicable:

- ('i') vehicle exhaust;
- ('ii') roofing materials;
- ('iii') cooling towers;
- ('iv') dust or other contaminants from construction activity;
- ('v') industrial plant exhaust or building exhaust;
- ('vi') gasoline vapors;
- ('vii') pollen;

('viii') biological contaminants; and

('ix') atmospheric pollutants.

('11') Identify areas with different occupancies or different potentials for IAQ problems. The following must be included in this inventory where applicable:

('i') high occupancy density areas, such as assembly rooms, cafeterias, physical fitness rooms;

('ii') special use areas such as elevators, restrooms, conference rooms, storage areas, janitor closets, copier rooms, hallways, graphic arts facilities, kitchens, loading docks, parking garages;

('iii') private offices, partitioned office spaces, open office spaces;

('iv') areas with different types of interior finishes on walls, partitions, ceilings and floors; and

('v') areas with different types of furnishings.

('b') Sampling Locations

The qualified professional must identify representative sampling locations.

('1') If the testing is being conducted for a base building (whether a "green base building credit component" or a "green whole-building credit component," as those terms are defined in Section 19 of the Tax Law, is being sought), the sampling locations must represent conditions not only in the common areas of the building, but also must represent conditions in the whole building. The building owner must notify the tenants, in advance and in writing, of the IAQ testing.

('2') If the testing is being conducted for tenant space, the testing program need only cover the tenant space.

('3') Each sampling location must cover:

('i') 20,000 sq. ft. or less in size, or

('ii') areas in one ventilation zone.
The qualified professional is to determine whether

('1') or ('2') is applicable and must use the more stringent requirement.

('4') Ambient air must be tested, in addition to supply and return air.

('5') When IAQ testing is performed for radon, measurements must be made only in occupied spaces, not in supply or return or outdoor air when IAQ testing is performed. Radon must be measured in the occupiable space on the lowest floor, particularly in those areas used regularly by building maintenance staff, such as workrooms, storage areas or mechanical rooms.

('6') Carbon monoxide testing must be conducted in the following locations:

('i') Areas containing combustion sources.

Where applicable, testing must be conducted in attached parking garages; mechanical rooms with fossil fuel used to actuate boilers, furnaces, DHW heaters, chillers, desiccant dehumidifiers, heat pumps or other equipment; occupied spaces with fossil fuel- or wood-fired stoves, fireplaces, vented or unvented heaters and appliances.

('ii') Occupied spaces that share a wall, floor or ceiling slab with areas referenced in subparagraph ('i') directly above, including custodial rooms.

Carbon monoxide testing must be coordinated with equipment tuneup and maintenance schedules required by the IAQ management plan for operations and maintenance by Section 638.7(c)(3).

('c') Sampling and analytical methods

The following methods and types of instrumentation, or those which provide equivalent data quality as determined by the qualified professional, must be used (see Section 638.10):

('1') Carbon Dioxide: Real time non-dispersive infrared (NDIR) analyzers with output logged over time, or equivalent, with averaging times as specified in the EPA's A Standardized EPA Protocol for Characterizing Indoor Air Quality in Large Office Buildings (1994). The measurement protocol in Method IP-3A, of EPA's Compendium of Methods for the Determination of Air

Pollutants in Indoor Air, Report EPA-600/4-90/010; NTIS-PB90-200288, Atmospheric Research and Exposure Assessment Laboratory, Research Triangle Park, NC (April 1990) must be used.

('2') Carbon Monoxide: Real time, portable analyzers with electrochemical sensors, battery-operated, with output logged over time, or equivalent, with averaging times as specified in EPA's A Standardized EPA Protocol for Characterizing Indoor Air Quality in Large Office Buildings (1994). CO testing equipment must provide accurate readings below 10 ppm (with a range to 200 ppm). The measurement protocol in Method IP-3A of EPA's Compendium of Methods for the Determination of Air Pollutants in Indoor Air, Report EPA-600/4-90/010; NTIS-PB90-200288, Atmospheric Research and Exposure Assessment Laboratory, Research Triangle Park, NC (April 1990) must be used.

('3') Particulate Matter: At minimum, particle-size selective sampler with impactor and nozzle allowing for collection of PM₁₀ particulate matter. The measurement protocol in Method IP-10A of EPA's Compendium of Methods for the Determination of Air Pollutants in Indoor Air, Report EPA-600/4-90/010; NTIS-PB90-200288, Atmospheric Research and Exposure Assessment Laboratory, Research Triangle Park, NC (April 1990) must be used.

('4') Radon: At minimum, meet New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) Certification Manual Item 194.5 (4/15/94) using one of the following methods: Electret, alpha-track detector, charcoal canister, continuous radon monitors, or continuous working level monitors. The laboratory analyzing radon samples must have current NYSDOH ELAP certification for radon analysis. The sampling and analytical methods as specified in Indoor Radon and Radon Decay Product Measurement Device Protocols, USEPA, Office of Radiation Programs, EPA 402-R-92-004, July 1992 must be used. www.epa.gov/iaq/radon/pubs/devprot1.html

('5') Total Volatile Organic Compounds: Collection on solid sorbent with analysis by thermal desorption and gas chromatography/mass spectrometry (GC/MS), using EPA Methods TO-14A and TO-17, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air - Second edition, EPA Center for Environmental Research Information, EPA/625/R-96/010b (January 1999). www.epa.gov/ttn/amtic/airtox.html

('6') Formaldehyde: Collection must be on 2,4-dinitrophenylhydrazine (DNPH)-coated silica gel cartridges. The DNPH-aldehyde derivatives on the cartridges must be eluted with acetonitrile, then analyzed by high performance liquid chromatography (HPLC) with ultraviolet (UV) detection, using EPA Method TO-11A, Determination of formaldehyde in Ambient Air Using Adsorbent Cartridge Followed by High Performance Liquid Chromatography (Active Sampling Methodology), Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air - Second edition, EPA Center for Environmental Research Information, EPA/625/R-96/010b (January 1999).
www.epa.gov/ttn/amtic/airtox.html

('d') Sampling Frequency and Duration

('1') At minimum, testing must be conducted no later than 30 days after occupancy and on an annual basis for each of the years for which the tax credit is being claimed.

('2') Radon measurements need not be repeated after the initial test if readings of less than 4 picocuries/liter are recorded. See Table 7.3.

('3') The sampling duration and timing for contaminants other than radon must be consistent with the methods specified in this subpart. Carbon dioxide readings must include periods when concentrations are expected to peak. In settings with stable occupancies, carbon dioxide readings may be repeated in late morning and late afternoon when carbon dioxide levels in the building are closest to equilibrium, to give the best indication of effective air exchange rates.

('e') Quality Assurance/Quality Control

('1') The IAQ testing protocol must meet the measurement methods, monitoring regime, sample and data management requirements of (see Section 638.10):

('i') EPA's A Standardized EPA Protocol for Characterizing Indoor Air Quality in Large Office Buildings (1994), June 1994; and

('ii') EPA's Quality Assurance Overview Document for the U.S. Environmental Protection Agency's Office of Research and Development and Office of Air and Radiation Large Building Studies (1994), prepared by EPA Atmospheric Research and Exposure Assessment Laboratory, Research Triangle Park, NC

and EPA Office of Radiation and Indoor Air, November 1994.

(v) IAQ Testing Report

('a') Report Contents

Following IAQ testing the qualified professional must provide to the owner or tenant, as applicable, a report which includes:

('1') The address and location of the building or tenant space;

('2') Operator and firm identification;

('3') Signed approval sheet by qualified professional;

('4') General description of the building, HVAC system, and conditions recorded during the initial data-gathering phase, consisting of the document review, interviews and site walk-through;

('5') Confirmation that building systems were operating in the manner specified in the IAQ testing protocol when IAQ testing was performed;

('6') Description of sampling and analytical methods;

('7') Field observations of how the building systems were operating; air exchange rates; inside and outside temperature and relative humidity records; wind speed and direction; weather conditions; occupant density; and occupant activities; particularly those which may affect the results;

('8') Sufficient documentation of sampling procedures and locations so that test conditions could be replicated and results objectively evaluated;

('9') Instrument model numbers, serial numbers, equipment calibration records, in accordance with manufacturers' instructions and method requirements;

('10') Date, start times and stop times of testing;

('11') For data logged results, hourly averages for each location at each time period, based on 3-minute readings;

('12') Chain-of-custody records;

('13') Data interpretation; which addresses the method of sampling and analytical errors;

('14') Laboratory reports with results, minimum detection limits for each analyte and a reference to the specific analytical method used.

('b') Acceptability of Results:

('1') Test results must be representative of building conditions in the base building and/or tenant space for the year for which the green building credit is being sought and must comply with the standards presented in Table 7.3 of Section 638.7(d)(1). If the testing is conducted only once, the test data from that period must be used in the determination. If multiple tests are conducted, the entire database must be included in the comparison and determination.

('2') Compliance with the standards set forth in this subpart must be determined as follows:

('i') Data from each ventilation zone must comply with the standards presented in Table 7.3. If more than one location has been tested in one ventilation zone, the results obtained from that ventilation zone are averaged prior to the comparison. The qualified professional must certify that test results from each ventilation zone in the space for which the green building credit is being sought comply with the standards set forth in Section 638.7(d)(1).

('ii') For test results obtained for carbon dioxide and carbon monoxide, the data must be in the form of data logged results, with data points representing averages within the time periods specified in the IAQ testing protocol. Data will be considered to be in compliance with the standards presented in Table 7.3 if the measured indoor values are less than or equal to those values, with an allowance that any accumulated period of no more than five minutes may exceed those values.

('iii') For test results obtained for particulates, radon, total volatile organic compounds, volatile organic compound scan and formaldehyde, the data must be in the form of integrated results, averaged over the time period specified in the IAQ testing protocols contained in

Section 638.7(d)(2)(iii). Data will be considered to be in compliance with the standards presented in Table 7.3 if the values are less than or equal to those values.

('iv') For each taxable year during which any part of the space is occupied space at any time, and for which a taxpayer claims a green building credit, if testing is conducted and there are exceedances in any part of the space for which the green building credit is being claimed, that entire space will not qualify for the green building credit unless:

('A') additional testing is performed and results demonstrate that during the taxable year for which the credit is being claimed the air quality meets the IAQ standards set forth in Table 7.3. Data from the additional testing must be presented in the IAQ Testing Report which explains the reasons, if identified, any exceedances and documents how the situation was remedied.

(2) Management Plan during Construction or Rehabilitation

This subpart applies to base buildings and tenant spaces.

(i) Standards

An indoor air quality management plan during construction and rehabilitation must be implemented in accordance with the following requirements of this subpart for the construction or rehabilitation of any base building or tenant space:

(ii) Construction Details

When constructing or rehabilitating a base building and/or tenant space, compliance with the following construction detailing provisions is required:

('a') Wherever two or more elements of the building envelope form a joint, the construction drawings must detail the continuity of the moisture protection strategy.

('b') When the joints occur in three dimensions such that three planes intersect or end dams are required, the details must be three dimensional.

('c') The level of construction detail must be as provided by Sheet Metal and Air Conditioning Contractors' National Association, Inc., Architectural Sheet Metal

Manual, 5th edition, 1993 (see Section 638.10);

(iii) Indoor Air Quality (IAQ) Management Process During Construction

An IAQ management process during construction which encompasses the following elements must be implemented for any base building or tenant space:

('a') Coordination

('1') During the pre-construction phase of the project, a mechanism must be established by the owner or tenant for communication and notification between the owner or owner's representative, or tenant or tenant's representative, the architect/engineer of record, the general contractor or construction manager, plus other parties as determined by the above-listed parties, to prevent and effectively resolve problems related to construction-related air pollutant control.

('2') Specific authority must be designated by the owner or tenant for the development, supervision, direction and enforcement of the IAQ Management Process During Construction. This authority must include job-site inspections, with the ability to implement stop work orders or termination of services for non-conformance with the procedures for the IAQ Management Process During Construction.

('b') Indoor Air Quality (IAQ) Management Plan During Construction

('1') Division 1 (General Conditions) of the project specifications must require a written construction IAQ management plan which includes procedures meeting or exceeding the minimum requirements of the "IAQ Guidelines for Occupied Buildings Under Construction" published by the Sheet Metal and Air Conditioning Contractors' National Association, Inc. (see Section 638.10).

('2') The IAQ Management Plan During Construction must include measures to protect the ventilation system components and air pathways against contamination during construction. The Plan must include cleaning procedures to be employed prior to the building being occupied, in the event that ventilation system components and air pathways are not adequately protected. The Plan must include control measures, as

defined in the *IAQ GUIDELINES FOR OCCUPIED BUILDINGS UNDER CONSTRUCTION* published by Sheet Metal and Air Conditioning Contractors' National Association, Inc. 2000. (see Section 638.10):

- ('i') HVAC protection;
- ('ii') contaminant source control;
- ('iii') interruption of moisture/pollutant pathway;
- ('iv') housekeeping; and
- ('v') scheduling of events to protect indoor air quality by:
 - ('A') permitting adequate airing-out of new materials,
 - ('B') sequencing the installation of finish materials,
 - ('C') proper curing of concrete before covering,
 - ('D') installation during unoccupied periods, and
 - ('E') avoidance of building occupancy while construction-related pollutants are still present.

These five requirements must be highlighted in the IAQ Management Plan During Construction for each phase of construction. The Plan must specify the location, type, amount, sequence and timing of the various control measures, including emergency procedures, and the labor, materials and time required to implement them.

('3') The project construction documents must address the following:

- ('i') an overview of tasks to be executed;
- ('ii') a list of reference documents, including specification references, drawing list, and submittal drawings;
- ('iii') a list of primary participants in the process and their responsibilities;

('iv') a plan for management, communication and documentation;

('v') an outline of the scope of the IAQ Management Process During Construction, including submittal review, inspection, and enforcement;

('vi') the expected written work products, including checklists and worksheets; and

('vii') an activity schedule.

('4') The project construction documents must require the contractor responsible for constructing and/or rehabilitating the base building and/or tenant space, to:

('i') Designate a representative with daily responsibility for IAQ issues;

('ii') Include procedures related to the IAQ Management Plan During Construction on the agenda during every pre-construction meeting and during every regularly scheduled meeting;

('iii') Store building materials in a weather-tight, clean area protected from dust, debris and moisture damage;

('iv') Keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the work. Identify the storage, disposal and Housekeeping practices to be applied to building supplies and waste materials to protect building systems from contamination;

('v') Submit a special construction schedule to prevent Type 2 Finishes from acting as sinks for storage and subsequent release of contaminants emitted from Type 1 Finishes. Specifications must identify per location whether every finish is Type 1 Finish or Type 2 Finish. In the schedule, the contractor must include appropriate allowances for drying or curing times of Type 1 Finishes before installation of Type 2 Finishes, based on technical specifications provided by the manufacturers;

('vi') Provide 100 percent outside air continuously during installation of materials and finishes, beginning after the building is substantially enclosed, according to Section 638.7(g). Where a supply air system is already

installed, it must have filters in place before work begins;

('vii') The permanent HVAC system may be used to move both supply and return air provided the following conditions are met:

('A') Replace all construction-related filtration media used on permanent HVAC equipment at substantial completion of the work.

('B') Confirm that all air filters, casing, coils, fans and ducts are clean, before TAB, and air quality testing.

('C') Permanent return air ducts must be inspected and/or cleaned to comply with minimum requirements of *GENERAL SPECIFICATIONS FOR THE CLEANING OF HVAC SYSTEMS* published by the National Air Duct Cleaning Association (see Section 638.10) www.nadca.com.

('viii') Coordinate duct testing and cleaning procedures with the commissioning requirements set forth in Section 638.8 to ensure that they may be witnessed and documented by the commissioning authority; and

('ix') Provide the owner or tenant a building or tenant space, as applicable clean, dry and free of debris.

('c') Construction IAQ Management Report

('1') To demonstrate compliance with the standards established by this section, the taxpayer must prepare a construction IAQ management report documenting effective implementation of the construction IAQ management plan;

('2') The owner must retain the following documentation as part of the construction IAQ management report.

('i') All meeting minutes, checklists, worksheets, notifications and deficiency or resolution logs related to construction or rehabilitation IAQ issues;

('ii') A listing of all temporary usages of building mechanical plant, cut sheets of filtration media used during construction and installed

immediately prior to occupancy, and schedule of filter replacement and changeouts;

('iii') Progress photographs of job site sufficient to document implementation of construction or rehabilitation IAQ management measures during each phase of construction; and

('iv') Documentation of duct testing and cleaning.

(3) Operations and Maintenance Management Plan

This subpart applies to base buildings and tenant spaces.

(i) Standards

An indoor air quality management plan for operations and maintenance must be implemented for a base building or tenant space, in accordance with the following requirements:

('a') Basis Documents

The documents listed below in subdivisions (1) through (3) of this section must be reviewed by the IAQ manager before undertaking the action items.

('1') EPA's Building Air Quality: A Guide for Building Owners and Facility Managers (BAQ), 1991(see Section 638.10).

('2') Building Air Quality Action Plan(a joint publication of the EPA, the National Institute for Occupational Safety and Health, and the International Facility Managers Association, 1998 (see Section 638.10).

('3') The Checklist contained in the BAQ Action Plan and available at www.epa.gov/iaq/base/apchkl3.pdf (see Section 638.10).

(ii) Components

The IAQ management plan for operations and maintenance must be informed by the documents listed in Section 638.7(d)(3)(i)(a) and must include the following eight action items:

('a') Designate a qualified IAQ manager.

The taxpayer must designate a qualified IAQ manager for

the base building or tenant space.

('b') Develop an IAQ profile of the base building or tenant space.

The IAQ manager must identify, review and retain existing records and must conduct a walkthrough of the base building or tenant space to develop an IAQ profile.

('1') Existing Records

Existing records to be identified, reviewed, and filed include the following:

('i') All commissioning documents required under Section 638.8;

('ii') Updated manufacturers' operating instructions and maintenance records for HVAC system components;

('iii') Updated schedules and procedures for facility operations and maintenance;

('iv') HVAC "as built" blueprints updated to indicate current HVAC configuration;

('v') Updated drawings of tenant build-out and interior building renovations;

('vi') Updated information on major space use changes and on significant increases or decreases in occupant density;

('vii') HVAC system planned and actual cubic feet per minute (cfm) of outside air per occupant;

('viii') Occupant thermal comfort complaints and indoor temperature and relative humidity readings;

('ix') Pressure differential measurements between areas and/or zones;

('x') The most recent TAB report;

('xi') Material Safety Data Sheets (MSDS) requested from suppliers for all products containing hazardous chemicals;

('xii') Documentation of HVAC control system set points and ranges.

('2') Walkthrough

The IAQ manager must conduct a walkthrough inspection of occupied areas and mechanical rooms located in the base building or tenant space. During the walkthrough, an inventory of IAQ problem indicators must be identified and noted on a floor plan or comparable drawing.

The inventory of IAQ problem indicators must include the following, where applicable:

- ('i') Odors;
- ('ii') Dirty or unsanitary conditions;
- ('iii') Visible fungal growth or moldy odors;
- ('iv') Evidence of moisture in inappropriate locations;
- ('v') Staining or discoloration of building material(s);
- ('vi') Smoke damage;
- ('vii') Presence of hazardous substances;
- ('viii') Potential for soil gas entry;
- ('ix') Unusual noises from light fixtures or equipment;
- ('x') Poorly maintained filters;
- ('xi') Uneven temperatures;
- ('xii') Overcrowding;
- ('xiii') Personal air cleaners or fans;
- ('xiv') Inadequate ventilation;
- ('xv') Inadequate exhaust air flow;
- ('xvi') Blocked vents; and
- ('xvii') Inadequately draining condensate drain pans.

The IAQ manager must identify the HVAC components that need to be repaired, adjusted, cleaned, or

replaced. The IAQ manager must prepare work orders and maintenance schedules for the completion of this work.

The IAQ manager must record the control settings and operating schedules for each air handling unit and must check them against the design intent.

('c') Address Existing and Potential IAQ Problems.

The IAQ manager must list, according to his/her judgement and available information, potential sources for existing IAQ problems and must consider whether there are potential sources for future IAQ problems. The presence of moisture condensation on walls and ceilings, and the presence of standing water in the base building and/or tenant space, as applicable, even if occasional and not causing known IAQ problems, must always be considered as potential sources for IAQ problems.

Next, the IAQ manager must develop a strategy for controlling the adverse effects of these sources, using the techniques listed below, individually or in combination, as appropriate:

('1') Remove the source of contamination;

('2') Remove or clean the materials affected by the contamination;

('3') Modify the use of the spaces affected by the identified sources;

('4') Increase ventilation to dilute and/or exhaust pollutants;

('5') Improve air filtration to clean air from outside and inside the building;

('6') Control occupant exposure to pollutants by scheduling contaminant-producing activities during unoccupied periods.

('d') Educate Building Personnel About IAQ Management.

The IAQ manager must identify in-house and contractor personnel whose activities could affect indoor air quality. These personnel must always include the housekeeping staff and the maintenance contractors. The IAQ manager must ensure that all such personnel receive at least annual training on IAQ, as appropriate with

their activities.

('e') Develop and implement a plan for facility operations and maintenance. The IAQ manager must develop procedures for HVAC operations, housekeeping, preventive maintenance, and unscheduled maintenance, as specified herein.

('1') HVAC Operation. Where heat recovery from exhaust air exists, the IAQ manager must provide for a system purge during morning start-up or during maintenance and cleaning. The IAQ manager must establish in writing the frequency of the maintenance and recalibration of economizer controls, and of adjustments to the on/off set points.

('2') Housekeeping. The IAQ manager must evaluate the following, with the purpose of maintaining good IAQ:

- ('i') Cleaning agents used in the building;
- ('ii') Use of cleaning materials;
- ('iii') Methods of cleaning;
- ('iv') Cleaning schedules;
- ('v') Purchasing of cleaning materials;
- ('vi') Storage of cleaning materials; and
- ('vii') Proper disposal of cleaning materials.

('3') HVAC Preventive Maintenance. The IAQ manager must develop and institute a preventive IAQ maintenance plan for the HVAC system. This plan must be updated when equipment is added, removed, or replaced. The plan includes at a minimum the following:

- ('i') Inspecting outside air intakes for nearby sources of contamination;
- ('ii') Clearing obstructions from air dampers to ensure that they are operating properly;
- ('iii') Replacing or cleaning air filters;
- ('iv') Inspecting and cleaning drain pans;
- ('v') Inspecting and cleaning heating and cooling coils;

('vi') Inspecting and cleaning the interior of air handling units;

('vii') Inspecting fan motors and belts;

('viii') Inspecting and cleaning air humidification equipment and controls;

('ix') Inspecting, cleaning, and treating cooling towers; and

('x') Inspecting and cleaning air distribution pathways and air distribution boxes (constant volume or variable air volume).

('4') **Unscheduled Maintenance.** The IAQ manager must institute written procedures for handling equipment failure and other unscheduled maintenance events that affect the IAQ in the base building and/or tenant space, as applicable. Procedures for unscheduled maintenance must include:

('i') Immediate notification of the IAQ manager by building maintenance personnel;

('ii') Preventive measures to protect the building's IAQ;

('iii') Notification of occupants and tenants.

('f') **Contaminant Source Control.** The IAQ manager must develop procedures to control sources of potentially significant pollutants generated during remodeling and renovation; painting; pest control; and shipping and receiving.

('1') **Remodeling and renovation.** The IAQ manager must review the designs and construction activities for all proposed activities of remodeling or renovation prior to their initiation. The IAQ manager must develop an IAQ plan, and must ensure its implementation. The plan must always include items (i), (vi) and (viii) below. In addition, the IAQ manager must consider the other measures listed below:

('i') Do not perform remodeling or renovation activities in occupied spaces.

('ii') Schedule work during periods of no occupancy or low occupancy.

('iii') Isolate work areas by blocking return vents in work areas and/or installing temporary barriers.

('iv') Pressurize spaces that adjoin the work space to prevent transportation of pollutants (if the air system has a configuration that permits it).

('v') Use specialized cleaning procedures. Use of High Efficiency Particulate Air (HEPA) vacuums constitutes an acceptable cleaning procedure.

('vi') Change the air filters at the end of construction activities.

('vii') Among work processes available, choose one that results in lower emissions of pollutants. For example, wet-sanding of drywalls is an acceptable lower-emitting alternative to dry-sanding.

('viii') Protect ventilation and distribution equipment from contamination.

('ix') Among those products available for the work, purchase those that have lower emissions of VOC, formaldehyde and toxic compounds.

('2') Painting. In addition to any measures taken for paragraph a) of this subdivision, the IAQ manager must ensure that the following measures are taken to reduce building occupant exposure to paint:

('i') Where the air handling system that serves the zones being painted also serves other occupied zones, work must be scheduled during periods of no occupancy. The period of 2 hours before regular occupancy must not be used for painting.

('ii') Where the air handling system that serves the zones being painted does not serve other occupied zones and there are other air handling systems serving occupied zones located on the same floor, work must be scheduled during periods of no occupancy or low occupancy (i.e., during non-working weekends, and before and after regularly scheduled hours).

('iii') Where the air handling system that serves the zones being painted does not serve other occupied zones and the entire floor on which painting is performed remains unoccupied during the painting period, the period of 2 hours before occupancy must not be used for painting.

('iv') Pressurize spaces that adjoin the work space on the same floor to prevent transportation of pollutants (if the air system has a configuration that permits it) and/or isolate work areas by blocking return vents in work areas and/or installing temporary barriers.

('3') Pest Control. The IAQ manager must implement an integrated pest management plan program as defined in 6 NYCRR Part 325.1. The program will incorporate the following:

('i') Systematic approach to managing pests which focuses on long-term prevention or suppression with minimal impact on human health, the environment and nontarget organisms; and

('ii') Incorporate all reasonable measures to prevent pest problems by properly identifying pests, monitoring population dynamics, and utilizing cultural, physical, biological or chemical pest population control methods to reduce pests to acceptable levels.

('4') Shipping or receiving. The IAQ manager must evaluate air pressure differentials and must prevent exhaust and other noxious emissions from entering the building by installing barriers or using pressurization.

('5') Environmental tobacco smoke. The IAQ manager must institute a smoking policy that prohibits smoking or restricts smoking to areas that are separately ventilated, maintained under negative pressure, and directly exhausted to the outside. This requirement does not apply to residential apartments.

('g') Communicate with tenants and occupants about their role in maintaining good IAQ.

The building owner must provide each tenant, and a tenant must provide each sub-tenant, with written guidelines to improve IAQ in their space, prior to initial occupancy and upon request. The IAQ manager must develop communication procedures to inform tenants and occupants about building conditions and policies that may have a significant adverse impact on IAQ, including informing them when major renovation, remodeling, maintenance, or pest control activities are planned.

('h') Establish procedures for responding to IAQ

complaints.

('1') The IAQ manager must develop a procedure for responding to IAQ complaints which must include:

('i') Logging entries into existing work-order systems;

('ii') Collecting information from the complainant;

('iii') Ensuring the confidentiality of information and records obtained from complainants;

('iv') Determining the response capability of in-house staff;

('v') Identifying appropriate outside sources of assistance;

('vi') Applying remedial action;

('vii') Providing feedback to the complainant;

('viii') Following-up to ensure that remedial action has been effective.

('2') The IAQ manager must inform staff, occupants and tenants of the procedures described in paragraph (a) directly above, including how to locate responsible staff and where to obtain complaint forms.

(e) Ventilation and Exchange of Indoor and Outdoor Air

(1) Standards

This subpart applies to:

(i) Base Buildings and

(ii) Tenant Spaces, if according to Section 638.4 the entire air system belongs to the tenant space applying for the green building credit.

This subpart does not apply to residential buildings.

In addition to complying with applicable codes, the base building or tenant space must meet the requirements of ASHRAE Standard 62-1999 Addendum (a) (1990), Addendum (c) (1999), Addendum (d) (1999), Addendum (e) (1999), Addendum (f) (1999) and Addendum (p) (2000). The highest applicable per person outside air requirement(s) of the codes or the

ASHRAE Standard and addenda must be met (see Section 638.10).

(f) Ventilation Requirements for Smoking Areas

(1) Standards

This subpart applies to:

(i) Base Buildings and

(ii) Tenant Spaces, if according to Section 638.4 the entire air system belongs to the tenant space applying for the green building credit.

It does not apply to residential buildings.

(iii) If smoking is permitted in specific areas of the base building or tenant space, separate air ventilation and circulation must be provided for smoking and non-smoking areas.

(iv) The smoking areas must be designed to function at a negative air pressure when compared with adjacent non-smoking areas.

(v) The smoking areas must be separated from the non-smoking areas by construction that is continuous and free of moisture/pollutant pathways. This requirement is met as follows:

('a') Seal all joints between walls, floor and ceiling surfaces;

('b') Seal all penetrations of ducts, pipes and other conduits;

('c') Test integrity of joints and penetrations using a nontoxic smoke stick or nontoxic colored agents while there is a pressure difference between the smoking and non-smoking spaces; and

('d') Comply with the specific requirements related to smoking areas in Section 638.8(h)(2)(iv)(d).

(vi) For buildings in which smoking is permitted, the taxpayer must ensure that, if smoking is permitted in tenant space, it is permitted only in areas in which the air ventilation and circulation is separated from that of non-smoking areas, according to subdivisions (iii), (iv) and (v) of this section.

(g) Air Purging

(1) Standard

This subpart applies to base buildings that are not residential buildings.

(i) Purging must be conducted on every floor immediately prior to initial occupancy and on any floor that has undergone renovation, immediately prior to re-occupancy, for a period of at least one week, as follows:

('a') When outside air temperatures are between 55 and 85 degrees Fahrenheit, and the relative humidity between 30 and 60 percent, 100 percent outside air is provided at a minimum of 50 percent of the full airflow rate of the fan during typical operating conditions.

('b') When the outside air temperature and relative humidity are outside the ranges specified in subparagraph 'a' directly above, 100 percent outside air is provided at a minimum of 25 percent of the full airflow rate of the fan during typical operating conditions.

(ii) The ventilation system must be capable of replacing 100 percent of the air on any floor, on a minimum of two floors at a time.

(h) Fresh Air Intakes

(1) Standard

This subpart applies to base buildings.

For the purpose of this Section 638.7(h), Fresh Air intakes are (1) areas through which outside air is introduced to the mechanical ventilation system for ventilation purposes and (2) operable windows.

The fresh air intakes must be located at a horizontal separation distance from potential point-of-contamination sources that is equal to, or larger than the greater of the following:

(i) the separation distance specified in Table 7.4 below;

(ii) the separation distance specified by other applicable codes and regulations.

Note: These separation distances are minimums, and do not constitute an assurance that adequate indoor air quality

will be achieved. Separation distances are only one of several factors that determine the effectiveness of the location of Fresh Air intakes.

Table 7.4
Separation Distance for Potential Pollution Sources

Potential Point-of-Contamination Sources	Minimum Separation Distance (in feet)	Notes
1. Building Exhaust, except as noted in (5) below	25	
2. Garage entry, tunnel for cars, automobile loading area, truck loading area or dock, bus parking or idling area or drive-in waiting line	25	Distance measured to closest place that vehicle exhaust is likely to be located.
3. Garbage storage / pick-up area, dumpsters	25	
4. Cooling tower intake or basin, or cooling tower exhaust	25	
5. Exhaust from locations with noxious or toxic fumes or gases, or with dangerous bio-aerosols, including paint spray booths, chemical storage rooms, refrigerating machinery rooms, fossil fuel burning Appliance vents, fume exhaust from laboratory hoods, hospital exhaust, soiled laundry storage.	50	This is not a comprehensive list of dangerous exhaust types.
6. Other point sources of contamination	25	

(i) Buildings Located in Areas Where Water Use is Not Metered

(1) Standard

This subpart applies to the base building only, regardless of whether the green building credit is sought for the base building only, or for the base building and one or more tenant spaces. A base building located in an area where water use is not metered must meet the requirements as follows as determined by a professional engineer:

(i) If a base building has a cooling tower system, such system must be designed with delimiters to reduce drift and evaporation.

(ii) If a base buildings has exterior plants, all such plants must be tolerant of climate, soils and natural water availability and must not receive watering from municipal potable water after a period of establishment is complete.

(iii) The base building must be served by alternate supply water in accordance with the following requirements:

('a') Except as provided for in this subpart, the applicable plumbing code and all other applicable regulations in effect must be met.

('b') The requirements of one of the following must be met:

('1') Alternate supply water used for a portion of the water needs of the base building.

('i') A new base building must meet the requirements of Criterion 1 set forth in clause ('iv'), of this subparagraph ('1'). If the projected toilet/urinal water use of the base building is less than 20 percent of total projected water use of the base building, the requirements of Criterion 2, set forth in clause ('v') of this subparagraph ('1'), must also be met.

('ii') A base building that is remodeled and that has a projected toilet/urinal water use of greater than 20 percent of the total water use of the base building must meet the requirements of either Criterion 1 set forth in clause ('iv') of this subparagraph ('1') or Criterion 2 set forth in clause ('v') of this subparagraph ('1'). If the projected toilet/urinal water use is less than 20 percent of the total water use of the base building, the base building must meet the requirements of

Criterion 2 set forth in clause ('v') of this subparagraph ('1').

('iii') To meet the requirements of the criteria set forth in clauses ('iv') and ('v') below, any type of alternate supply water may be used singly or in combination. The various water types of alternate supply water may be combined at a point in the stream that is appropriate for the level of treatment each requires. The alternate supply water must be dyed using a permanent nontoxic dyeing system, to allow clear differentiation between the potable and non-potable water streams at all times.

('iv') Criterion 1: Alternate Supply water used for flushing urinals and toilets.

('A') All toilets and urinals belonging to the base building must be flushed with alternate supply water.

('B') Water flow calculations must be performed by the professional engineer and must show that, in average over a year, the makeup water for toilet flush and urinal flush is no more than 10 percent of total water used for flushing.

('v') Criterion 2: alternate supply water is used for 20 percent or more of the water needs of the base building.

('A') Alternate supply uses include toilet and urinal flushing, laundry, car wash, fire sprinklers, fire fighting, landscape water features, or irrigation, and any other appropriate use of alternate supply water as determined by the professional engineer.

('B') Water flow calculations must be performed by the professional engineer and must show that, in average over a year, the alternate supply water is used for more than 20 percent of total water used for the base building.

('vi') Inefficient use of alternate supply water may not be used to inflate the alternate supply water percentage. The alternate supply water must be used with the same water conservation measures that would be normally taken for potable water.

('2') Water Cascading. Only residential, motel and hotel buildings may comply with the requirements of

this subpart. Both Criterion 1 and Criterion 2, set forth in clauses ('i') and ('ii') of this subparagraph ('2'), must be met.

('i') Criterion 1: all private toilets cascade handwash water to the toilet bowl.

('A') A qualifying fixture or arrangement must have a handwash basin with a faucet (i.e., a sink), located above a toilet. The handwash basin must have the drain directly connected to the toilet bowl. Upon flushing the toilet, water must automatically run through the faucet, providing users with the opportunity to wash their hands in potable water which is then directly and immediately introduced to the toilet bowl for the purpose of flushing.

('B') Water used for hand washing must not be introduced into the toilet tank for storage but used directly for flushing.

('C') If the sink is used without need to flush the toilet, the water from the basin must still drain through the toilet.

('D') Installations which first use a portion of the toilet flush flow for hand washing may be supplied with potable water, or with alternate supply water appropriately treated for hand washing, or with a combination of the two.

('ii') Criterion 2: All institutional laundry machines must reuse post-wash rinse water as laundry wash water. All institutional laundry machines (if any) on the premises must have and must utilize the capability of reusing post-wash rinse water as laundry wash water.

('3') Checklists and field inspection

('i') Checklists. The construction documents must include a brief description of the checklists and tests to be performed upon completion of the alternate supply water system.

('ii') Field Inspection

The field inspection is intended to document whether the alternate supply water system meets the requirements necessary to qualify for the green building credit. The field inspection provides no

assurance of system safety. Safety inspection, if required, is a separate issue. The field inspection must include the following:

('A') Inspection, by a professional engineer of the alternative supply water system after completion and must examine the alternate supply water collection, treatment, storage, and delivery systems to ensure they are present and in working order.

('B') Confirmation, by means of dye or equivalent, that the fixtures specified as connected to the alternate supply water on the approved plans are indeed supplied with alternate supply water and not potable water.

('C') If water cascading is used, verification that the hardware directing the handwash to the toilet is present as called for on in the construction documents. In addition, the inspection must verify that water cascading systems are present on all institutional laundry machines on the premises.

('D') As a result of the field inspection a brief report must be prepared, containing the following information:

(a) The address and location of the building or tenant space;

(b) Operator and firm identification;

(c) Signed approval sheet by certified industrial hygienist or licensed engineer;

(d) Description of inspection procedure and methods;

(e) Field observations including how the various alternate supply water systems and subsystems are operating;

(f) Copies of any required testing performed to comply with health regulations, confirmation of disinfection; and

(g) Data interpretation for compliance with requirements of this subpart.

(j) Materials, Finishes and New Furniture

This establishes requirements for building materials, finishes and newly purchased furnishings for base buildings and tenant spaces.

This subpart applies to base buildings and tenant spaces.

(1) Standard

The taxpayer must incorporate eligible materials, finishes and furnishings into the construction and interior build-out of the base building or tenant space.

This subpart may be satisfied by either a performance-based path or a listed materials path.

(i) Performance-Based Compliance Path

('a') All of the requirements of this Alternative compliance path must be met as set forth as follows:

('1') Recycled content

('i') For all tenant space and/or steel-framed base buildings, use a minimum of 50 percent of building materials that contain in aggregate a minimum weighted average of 20 percent post-consumer material, or, a minimum weighted average of 40 percent pre-consumer material.

('ii') For non-steel framed base buildings, a minimum threshold of 25 percent (not 50 percent) must apply.

('iii') Percentage of building materials must be calculated as the installed cost of materials; with recycled content divided by the total installed cost of all building materials (exclusive of mechanical and electrical material and labor costs, project overhead and fees), multiplied by 100. Material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in this subpart.

('2') Rapidly Renewable Materials

('i') For base building and/or tenant space, use rapidly renewable materials for 1 percent of total building materials.

('ii') Percentage of building materials must be calculated as the installed cost of rapidly

renewable materials divided by the total installed cost of all building materials (exclusive of mechanical and electrical material and labor costs, project overhead and fees), multiplied by 100. Material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in this subpart.

('3') Maximum Toxicity/VOC Content

For base building and/or tenant space, meet requirements for all adhesives, sealants, paints, composite wood products and carpet systems as follows:

('i') Adhesives must meet or exceed the VOC limits of California's South Coast Air Quality Management District Rule #1168, Adhesive and Sealant Applications (adopted April 7, 1989 with amendments through September 15, 2000), available at www.aqmd.gov/rules/html/r1168.html; (see Section 638.10) and all sealants used as a filler must meet or exceed California's Bay Area Air Resources Board Reg. 8, Rule 51, Organic Compounds: Adhesive and Sealant Products (Adopted November 18, 1992, with amendments through January 7, 1998), available at www.baaqmd.gov/regs/rg0851.pdf; (see Section 638.10)

('ii') Interior and exterior paints used as topcoats must meet the product-specific performance and environmental requirements of Green Seal's Standard for Architectural Coatings (GS-11) (First edition, May 20, 1993) and Green Seal's Choose Green Report on Architectural Paints (December, 1999). Green Seal, 1001 Connecticut Avenue, NW, Suite 827, Washington, DC 20036, www.greenseal.org; (see Section 638.10)

('iii') Carpet systems must meet the carpet and Rug Institute Green Label Indoor Air Quality Testing Program, Carpet Indoor Air Quality Specification, CRI0596, May 1996. Listings of carpets meeting the labeling requirements of the CRI can be found at www.carpet-rug.org; (see Section 638.10)

('iv') Composite wood or agrifiber products must contain no added urea-formaldehyde resins.

('v') Cut sheets and material safety data sheets for products must be retained to document compliance with VOC content limits and exclusions for chemical components and urea-formaldehyde.

('4') Construction Waste Management

For base building, recycle and/or salvage at least 50 percent (by weight) of construction, demolition and land clearing waste. Exception: if demolition and land clearing has been completed prior to the effective date of this regulation, recycle and/or salvage at least 50 percent (by weight) of construction waste and implement one of the substitution options from Section 638.7(j)(1)(i)('b'). For tenant space, recycle and/or salvage at least 50 percent (by weight) of construction and demolition waste.

Maintain a copy of the construction waste management plan for the project highlighting recycling and salvage requirements. End-of-project recycling and salvage rate data must be retained. Percentage of materials must be calculated as the weight (in tons) of the recycled and salvaged material, divided by the total weight (in tons) of all (i.e., recycled, salvaged and disposed) construction, demolition and land clearing waste multiplied by 100, using standard volume to weight conversion methods. Percentage of materials for construction waste only must be calculated as the weight (in tons) of the recycled and salvaged material, divided by the total weight (in tons) of all (i.e., recycled, salvaged and disposed) construction waste multiplied by 100, using standard volume to weight conversion methods.

('b') Substitution Options

The taxpayer may select one of five substitution options:

('1') Substitution Option 1: Building Reuse

The following can be substituted to meet either the recycled content requirement at Section 638.7(j)(1)(i)('a')('1') or the construction waste management requirement at in that same Section 638.7(j)(1)(i)('a')('4').

('i') For base building, maintain at least 75 percent of the existing building structure (foundations, columns, beams, floors) and shell (exterior skin, excluding window assemblies but not excluding glass curtain walls). For tenant space, maintain at least 75 percent of interior walls, ceilings and flooring. Retain pre-construction and post-construction plan and elevation drawings highlighting reused structure and shell elements. Percentage of building materials must be calculated

as the amount (volume or weight) of building material element reused divided by the total amount (volume or weight) of that building material in the existing building, multiplied by 100. For shell and walls, ceilings and floor coverings, the calculation is based on area (in square feet). For structural foundation and frame, the calculation is based on volume (in cubic feet).

('2') Substitution Option 2: Reducing Occupant Exposure to VOCs

For base building and/or tenant space, the following can be substituted to meet the maximum toxicity/VOC content requirement at Section 638.7(j)(1)(i)('a')('3') (see Section 638.10).

('i') Select all construction materials and furnishings, including paints, adhesives, sealants, caulks, carpet, floor and wall coverings, composite wood products, drywall products, concrete deck leveling compounds, furniture and insulation products, according to the California Department of Health Services document, Reducing Occupant Exposure to volatile organic compounds (VOCs) from Office Building Construction Materials: Non-Binding Guidelines, July 1996. Available at www.cal-iaq.org/VOC/. (see Section 638.10)

('ii') Material safety data sheets, chemical content listings, emissions test data and calculations, ventilation and installation protocols, product specifications and occupancy schedules must be retained to document compliance.

('3') Substitution Option 3: Salvaged and/or refurbished materials and products

For base building and/or tenant space, the following can be substituted to meet either the recycled content requirement at Section 638.7(j)(1)(i)('a')('1') or the rapidly renewable materials requirement at in that same section.

('i') Specify salvaged or refurbished materials for 10 percent of all building materials. Steel or wood beams, brick, stone, paving materials, wood flooring, doors, hardware, carpet tiles, and lighting fixtures would comply with this requirement if salvaged or refurbished.

('ii') Percentage of building materials must be

calculated as the installed cost of materials which are salvaged or refurbished divided by the total installed cost of all building materials (exclusive of mechanical and electrical material and labor costs, project overhead and fees). The quotient is then multiplied by 100. Material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in Section 638.7(j)(1)(i)(`a`). If the cost of the salvaged or refurbished material is below market value, use replacement cost to estimate the material value, otherwise use actual cost to the project.

(`4`) Substitution Option 4: Local/Regional Materials.

For base building and/or tenant space, the following can be substituted to meet the recycled content requirement in Section 638.7(j)(1)(i)(`a`)(`1`).

Use a minimum of 20 percent of building materials that are manufactured regionally within a radius of 500 miles of the building. Of these regionally manufactured materials, use a minimum of 50 percent that are extracted, harvested, or recovered within 500 miles of the building. Percentage of building materials must be calculated as the installed cost of local/regional materials divided by the total installed cost of all building materials exclusive of mechanical and electrical material and labor costs, project overhead and fees. The quotient is then multiplied by 100. Material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in Section 638.7(j)(1)(i)(`a`).

(`5`) Substitution Option 5: Green Roof

For base building, the following can be substituted to meet the rapidly renewable materials requirement of Section 638.8(j)(1)(i)(`a`)(`2`). This substitution option can only be used for buildings in which the roof area is at least 10 percent of the total floor area of the building, excluding parking areas within the building.

Use a Green Roof for at least 50 percent of the roof area, using layering technology and either one of two types of Green Roof: extensive or intensive. Percentage of roof area must be calculated as the area (in square feet) of the green roof divided by the total area of roof surface (in square feet) multiplied by 100.

(ii) Alternative 2: Listed Materials

('a') For base building and/or tenant space, all of the requirements in this section must be met, whenever these materials are used.

('1') Fibrous Insulation

Unfaced batts or blankets are prohibited above suspended ceilings. Loose, blown-in insulation is prohibited from locations where air handling units are located.

('2') Supply and Return Air Plenums

The following insulation types are prohibited from supply and return air plenums: batts, blankets, blown and sprayed-in.

('3') Duct Liners

Where duct liners are used, compliance with all of the following provisions ('i') through ('iv') is required. The duct liner must be installed:

('i') only where needed for sound attenuation (e.g., in fan discharge and inlet plenums, in limited sections of duct risers and mains, and in variable air volume boxes), not solely for thermal insulation or condensation control;

('ii') only in clean and dry areas, not in wet sections of air handlers (e.g., not in coil sections or humidifier sections);

('iii') with protective liner facings to resist damage and wear; and

('iv') having perforated double wall construction, with mylar or other facing inside the liner, for air handlers >30,000 cfm.

('4') Synthetic Carpet and Carpet Cushion

('i') All synthetic carpeting (including face fiber, primary backing, and secondary backing) must:

('A') have carpet component identification code labels as established by the Carpet and Rug Institute (CRI) of Dalton, Georgia (see Section 638.10). The labels must be permanently printed or attached to the carpet backing. The codes must

identify the carpet's face fiber, and may identify its primary backing, secondary backing, adhesive, adhesive filler, and dyes; and

('B') meet the Carpet and Rug Institute's voluntary indoor air quality labeling requirements and have received the CRI Green IAQ label in accordance with the Carpet Indoor Air Quality Specification, CRI0596, May 1996 (see Section 638.10). Listings of carpet meeting the labeling requirements of the CRI can be found at www.carpet-rug.com. (see Section 638.10)

('ii') All synthetic carpet cushion must:

('A') meet the Carpet and Rug Institute's voluntary indoor air quality labeling requirements and have received the CRI Green IAQ label. Listings of cushions meeting the labeling requirements of the CRI can be found at www.carpet-rug.com (see Section 638.10) and

('B') meet or exceed the recycled contents content requirements and product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Procurement of Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000) (codified at 40 CFR 247.1). (see Section 638.10) ("EPA CPG"). Lists available at www.epa.gov/cpg.

('5') Carpet Adhesive

Carpet Adhesive must meet the carpet and rug industry's voluntary indoor air quality labeling requirements and must have been awarded the CRI Green IAQ label. Listings of adhesives meeting the labeling requirements of the CRI can be found at www.carpet-rug.com. (see Section 638.10)

('6') Endangered Wood

Any wood product made from a species listed under the Convention on International Trade of Wild Fauna and Flora (CITES) Appendix I, II or III, must have been obtained in compliance with the applicable CITES regulations which can be obtained from CITES Secretariat, 15 chemin des Anemones, 1219 Chatelaine-Geneva, Switzerland. (see Section 638.10) Available at www.cites.org/CITES/eng/index.shtml.

('b') The requirements of at least one option under each material category specifically listed in paragraphs ('1') through ('9') must be met. If a specific material type is not used, the requirement for that material does not apply.

('1') Concrete (cast in place or pre-cast), concrete masonry units or autoclaved aerated cellular concrete (precast panels or blocks).

The requirements of one of the following subparagraphs ('i') through ('iii') must be met:

('i') Flyash and/or other recycled content

75 percent of the concrete, concrete masonry units or autoclaved aerated cellular concrete must contain flyash and/or other recycled content. Percentage must be calculated as the volume (in cubic yards or feet) of concrete with flyash and/or recycled content divided by the total volume (in cubic yards or feet) of concrete, multiplied by 100.

('A') Flyash:

The use of flyash in concrete must meet product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Procurement of Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000 (codified at 40 CFR 247.1). ("EPA CPG") (see Section 638.10). Specifications available at www.epa.gov/cpg. Flyash must replace a minimum of 10 percent by weight of the portland cement in the concrete mixture. Flyash cannot be obtained from facilities where hazardous waste materials are included in the fuel mix used to create the ash; or

('B') Other recycled content additives:

Use a minimum of 10 percent by weight recycled materials content in aggregate (such as recycled glass or recycled expanded polystyrene beads) or as fiber reinforcement (such as recycled carpet fibers) in concrete. Document the quantity of recycled content used.

('iii') Non-hazardous bond breakers, curing compounds, form release agents

100 percent of all bond breakers, curing compounds and form release agents must be composed of non-petroleum based, non-hazardous (i.e., without chlorinated solvents or heavy metals) ingredients.

('iii') Steel forms, slip forms, preformed blocks

75 percent of the steel forms, slip forms and preformed blocks must meet these requirements. Use one or more of the following: modular steel forms; slipforms; or preformed blocks for concrete forming; permanent formwork made from expanded polystyrene manufactured without the use of chlorofluorocarbons (CFCs) or hydrochlorofluorocarbons (HCFCs). Percentage must be calculated as the surface area (in square feet) of compliant formwork, divided by the total surface area (in square feet) of all formwork, multiplied by 100.

('2') Wood and wood products and millwork

The requirements of one of the following subparagraphs ('i') or ('ii') must be met. Substitution Options A and B, described at ('iii') and ('iv'), may be used to meet a portion of the requirement for ('i') or ('ii').

('i') Certified sustainably harvested wood

For all new wood (i.e., not salvaged or refurbished wood) excluding furniture in buildings that do not have a wood structure, use a minimum of 50 percent of certified wood. For buildings with a wood structure, the minimum is 75 percent instead of 50 percent.

Percentage must be calculated as the installed cost of certified wood divided by the total installed cost of new wood-based material, multiplied by 100. Material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in Section 638.7(j)(1)(i)(b').

('ii') Millwork substrates

75 percent of the millwork substrates used must meet one or more of the six categories ('A') through ('F').

Percentage must be calculated as the installed cost of compliant millwork divided by the total installed cost of all millwork, multiplied by 100. Material

cost may be used in lieu of installed cost if this substitution is made for all cost calculations in Section 638.7(j)(1)(i)('b').

('A') Medium density fiberboard (MDF) or composite wood must not contain urea-formaldehyde or phenol-formaldehyde resins.

('B') Wood-fiber based medium density fiberboard or composite wood must not contain urea-formaldehyde or phenol-formaldehyde resins.

('C') Fiberboard (strawboard) or agrifiber panels from agricultural waste - The fiberboard or agrifiber product must contain a minimum of 75 percent agricultural waste fiber (by weight). The product must not contain urea-formaldehyde or phenol-formaldehyde resins.

('D') Engineered honeycombed panels incorporating recycled paper - The panels must be engineered molded-fiber stress-skin panels incorporating a minimum of 75 percent post industrial/post consumer cellulose content (by weight). Agricultural waste fibers may also be counted toward the recycled content. The panels must not contain urea-formaldehyde or phenol-formaldehyde resins.

('E') Medium density fiberboard (MDF) with recycled content from demolition wood, pallets or waste wood. The MDF must contain a minimum of 50 percent post industrial/post consumer wood content (by weight).

('F') Millwork fabricated with reclaimed wood or salvaged wood. The millwork must contain a minimum of 50 percent reclaimed or salvaged wood content (by weight).

('iii') Substitution Option A: Pressure treated wood

For the purpose of compliance with these regulations, pressure treated wood use is permitted only where required by applicable building code. Chemicals classified by the International Agency for Research on Cancer (IARC) as Group I (carcinogenic to humans), Group 2A (probably carcinogenic to humans), or Group 2B (possibly carcinogenic to humans) must not be used in manufacture of pressure treated wood. Non-compliant products include, but

are not limited to, chromated copper arsenate (CCA) treatments, ammoniacal copper zinc arsenate (ACZA) treatments, and those using pentachlorophenol or creosote. IARC Program on the Evaluation of Carcinogenic Risks to Humans, List of IARC Evaluations, revised December 5, 1998; (see Section 638.10) available at <http://193.51.164.11/monoeval/grlist.html>.

Compliant pressure treated wood may substitute for all or a portion of the certified wood or millwork selected to meet 1) or 2) of this paragraph. For the certified wood calculation, the percentage must be calculated as the installed cost of certified wood and compliant pressure-treated wood divided by the total installed cost of all new wood-based material. The quotient is then multiplied by 100. For the millwork calculation, the percentage must be calculated as the installed cost of compliant millwork and compliant pressure-treated wood divided by the installed cost of all millwork and compliant pressure-treated wood. The quotient is then multiplied by 100. In either calculation, material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in Section 638.7(j)(1)(i)('b').

('iv') Substitution Option B: Plastic lumber or composite lumber used for exterior patio, terrace or decks. 100 percent recycled plastic lumber, a minimum of 90 percent from post-consumer material, or composite lumber, manufactured from a minimum of 75 percent recycled content plastic and wood or bio-based material, must be used.

Compliant plastic and composite wood may substitute for all or a portion of the certified wood or millwork selected to meet ('i') or ('ii') of this paragraph. For the certified wood calculation, the percentage must be calculated as the installed cost of certified wood and compliant plastic and composite wood divided by the total installed cost of all new wood-based material. The quotient is then multiplied by 100. For the millwork calculation, the percentage must be calculated as the installed cost of compliant millwork and/or compliant plastic and/or composite wood divided by the installed cost of all millwork and compliant plastic and composite wood. The quotient is then multiplied by 100. In either calculation, material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in

Section 638.7(j)(1)(i)('b').

('3') Insulation

75 percent of the insulation material used must be from one or more of the options listed in the clauses set forth in any of the following subparagraphs ('i') through ('iv').

Percentage must be calculated as the installed cost of compliant insulation divided by the total installed cost of all insulation. The quotient is then multiplied by 100. Material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in Section 638.7(j)(1)(i)('b').

('i') Batts and Blankets

('A') Fiberglass - Fiberglass insulation must meet or exceed the recycled contents content from glass cullet and post-consumer bottle glass requirements and product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Procurement of Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000) (codified at 40 CFR 247.1) (see Section 638.10). ("EPA CPG"). Lists available at www.epa.gov/cpg. In plenums and shafts, where insulation may come in contact with the airstream, insulation must be encapsulated and formaldehyde-free.

('B') Mineral wool - Mineral wool insulation must meet or exceed the recycled contents content from blast furnace slag requirements and product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Procurement of Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000) (codified at 40 CFR 247.1)(see Section 638.10). ("EPA CPG"). Lists available at www.epa.gov/cpg.

('C') Natural fiber or recycled fiber - natural fiber (cotton, wool) or recycled synthetic fiber (e.g., from carpet) insulation must contain a minimum 95 percent pre-consumer recycled fiber by weight in the insulating core only.

('ii') Foamed in Place

('A') Foamed magnesium silicate - magnesium sulfate cementitious foam insulation must exhibit a minimum R-value of 3.8 per inch of thickness using ASTM test methods. Foaming agent must have zero ozone-depleting potential.

('B') Spray polyurethane - spray polyurethane insulation must be installed with a foaming agent having zero ozone-depleting potential (e.g., using water/carbon dioxide or HFC-134a). Use must be limited to enclosed spaces (e.g., roofs, walls and attics).

('iii') Blown-in

('A') Cellulose - cellulose insulation must meet or exceed the recycled contents content requirements and product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Procurement of Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000) (codified at 40 CFR 247.1)(see Section 638.10). ("EPA CPG"). Lists available at www.epa.gov/cpg.

('B') Mineral wool - Mineral wool insulation must meet or exceed the recycled contents content requirements and product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Procurement of Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000) (codified at 40 CFR 247.1)(see Section 638.10). ("EPA CPG"). Lists available at www.epa.gov/cpg. Insulation must be free of resin binders and mineral oil.

('C') Fiberglass - Fiberglass insulation must meet or exceed the recycled contents content from glass cullet and post-consumer bottle glass requirements and product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Procurement of Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000) (codified at 40 CFR 247.1) (see Section 638.10). ("EPA CPG"). Lists available at www.epa.gov/cpg. The insulation must contain no formaldehyde binders.

('iv') Rigid/semi-rigid board

('A') Expanded Polystyrene (EPS) - EPS insulation must be manufactured with a blowing agent exhibiting zero ozone depleting potential. It must be limited to building envelope applications. With the same limitations and restrictions, extruded polystyrene (XPS) insulation may be used as an alternate.

('B') Perlite composition board - Perlite insulation must meet or exceed the recycled contents content requirements and product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Procurement of Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000) (see Section 638.10). Lists available at www.epa.gov/cpg.

('C') Fiberglass - Semi-rigid fiberglass must meet or exceed the recycled contents content from glass cullet and post-consumer bottle glass requirements and product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Procurement of Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000)(see Section 638.10) (codified at 40 CFR 247.1). ("EPA CPG"). Lists available at www.epa.gov/cpg. Semi-rigid fiberglass board must be used on building exterior; if used to insulate heating ducts, boards must be wrapped or enclosed.

('D') Polyisocyanurate - Rigid polyisocyanurate board must be manufactured with a blowing agent exhibiting zero ozone depleting potential (e.g., pentane). It must be limited to building envelope applications.

('4') Flooring and ceramic, ceramic/glass, or cementitious tiles

Fifty percent of the total uncarpeted floor area used must be from one or more of the options listed in the clauses set forth in any of the following subparagraphs ('i') through ('iii'). Percentage must be calculated as the surface area (in square feet) of compliant flooring and floor tile, divided by the total surface area (in square feet) of all uncarpeted floor area. The quotient is then multiplied by 100.

Exception: If less than 5 percent or 10,000 square feet

of the floor area, whichever area is smaller, is uncarpeted, then the requirements of this paragraph ('4') do not apply.

('i') Resilient flooring

('A') Natural linoleum - The natural linoleum flooring must consist of linseed oil, pine resin, cork dust or sawdust, inert fillers, pigments, and a jute or fiberglass scrim backing. Variations to these components are allowed, however the product must not contain synthetic latex, vinyl, or other thermoplastics or thermosetting plastics as backings or pre-finished coatings. The product must not contain materials which hinder the linoleum's ability to biodegrade at the end of its service life.

('B') Cork - Cork flooring must be made without urea-formaldehyde binder. The product must not contain synthetic latex, vinyl, or other thermoplastic or thermosetting plastics as backings or pre-finished surface coating. The product must not contain materials which hinder its biodegradability at the end of its service life.

('ii') Solid Flooring

('A') Certified and reclaimed wood flooring 90 percent of the solid wood flooring products must be certified wood or reclaimed wood.

('B') Bamboo flooring - bamboo flooring may be used.

('C') Fluid and/or composite flooring - terrazzo-type flooring to contain at least 40 percent recycled aggregate consisting of glass, stone, flyash, fiber or plastic.

('D') Stained concrete flooring - Finished concrete flooring with or without integral color added to topping layer must be sealed with low toxicity water-based or water-dispersed acrylic sealer.

('iii') Tile

('A') Ceramic, Ceramic/Glass, and Cementitious Tile - A minimum of 50 percent - pre-consumer material content, or a minimum of 25 percent

post-consumer content, or a minimum combination of pre-consumer/post-consumer material content of 30 percent (the percentage is based on the weight of the component materials). Tiles must not contain glazings using lead.

('5') Ceiling tiles and/or panels

Seventy Five percent of the total area of acoustical ceiling tiles and panels used must be from one or more of the following subparagraphs ('i') through ('v'). Percentage must be calculated as the surface area (in square feet) of compliant ceiling tiles and panels, divided by the total surface area (in square feet) of all acoustical ceiling tiles and panels. The result is then multiplied by 100.

Exception: If less than 5 percent or 10,000 square feet of the ceiling area, whichever area is smaller, has no ceiling tiles or ceiling panels, then the requirements of this paragraph do not apply.

('i') Mineral fiber - recycled content

Mineral-fiber acoustical ceiling panels must contain 75 percent combined pre-consumer material and post-consumer material (by weight).

('ii') Wood-fiber based - with no formaldehyde binders

Acoustical ceiling panels must contain at least 40 percent wood fibers and be manufactured with formaldehyde-free binder.

('iii') Perlite-based - with no formaldehyde binders or friable mineral fibers

Acoustical ceiling panels must contain no manmade mineral fibers and be manufactured with formaldehyde-free binder.

('iv') Straw-based, or incorporating other agricultural waste fibers

Acoustical ceiling panels must contain at least 90 percent straw or other agricultural waste fibers.

('v') Recycled Metal

Metal ceilings must contain at least 50 percent combined pre-consumer material and post-consumer

material (by weight).

('6') Carpet and carpet tile

The requirements of one of the following subparagraphs ('i') through ('iii') must be met for 75 percent of the total carpeted floor area. Percentage must be calculated as the surface area (in square feet) of compliant carpet and carpet tile flooring, divided by the total surface area (in square feet) of all carpeted floor area. The result is then multiplied by 100.

Exception: If less than 5 percent or 10,000 square feet of the floor area, whichever area is smaller, is uncarpeted, then the requirements of this paragraph ('6') do not apply.

('i') Nylon (or recycled fiber) carpet and carpet tile - carpet fiber and/or carpet backing must contain a minimum of 25 percent pre-consumer and post-consumer material. The percentage of recycled content is based on the weight of the component materials. Agricultural- or non-petroleum-based polymers can be included in lieu of recycled content. Alternatively, the carpet must meet the recycled contents content requirements and product specifications, as available, listed in the U.S. Environmental Protection Agency's Comprehensive Procurement Guideline for Products Containing Recovered Materials. 65 Fed. Reg. 3,070 (final, January 19, 2000) (codified at 40 CFR 247.1) (see Section 638.10). ("EPA CPG"). Lists available at www.epa.gov/cpg.

('ii') Natural fiber carpets - wool, sisal, coir, hemp, cotton, linen. Carpet fiber must contain at least 50 percent wool, sisal, coir, cotton or linen fibers, with natural or vegetable dyes for color, with a primary and secondary backing of jute/cotton.

('iii') Carpet and carpet tile leasing, recycling, remanufacturing - carpet and carpet tile must meet one of these three requirements:

('A') Leasing: At least 90 percent of the carpet used must be leased from a carpet manufacturer, service or distributor ("leasing agent") which will recycle the carpet at the end of its useful life or when a replacement is requested. The leasing agent must be licensed in the State of New York and have been engaged in

carpet manufacturing, distribution or servicing for a minimum of five years.

('B') Remanufactured/renewed carpet tile: At least 90 percent of the carpet tile must be previously used carpet tile that has been cleaned, retextured and reprinted.

('C') Recycled polyester carpet: At least 90 percent of the carpet must be manufactured with fiber containing a minimum of 90 percent post-consumer material plastic (polyethylene terephthalate) (PET), and the primary and secondary backing must consist of woven polypropylene.

('7') Architectural coatings

The requirements of both of the following subparagraphs ('i) and ('ii') must be met for 75 percent of the materials installed. Percentage must be calculated as the installed cost of compliant architectural coatings (including paint) divided by the total installed cost of all architectural coatings (including paint). The quotient is then multiplied by 100. Material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in Section 638.7(j)(1)(i)('b').

('i') Paints

Interior and exterior paints - Chemical exclusions and low volatile organic compound (VOC) content: interior and exterior paints used as topcoats must meet the product-specific performance and environmental requirements of Green Seal's Standard for Architectural Coatings (GS-11) (First edition, May 20, 1993) and Green Seal's Choose Green Report on Architectural Paints (December, 1999) (see Section 638.10). Green Seal, 1001 Connecticut Avenue, NW, Suite 827, Washington, DC 20036. www.greenseal.org.

('ii') Architectural coatings

Low volatile organic compound (VOC) content: architectural coatings, other than interior and exterior topcoat paint, must meet the VOC content limits of the California's South Coast Air Quality Management District Rule 1113, Architectural Coatings (adopted September 2, 1977, with amendments through May 14, 1999) (see Section 638.10),

available at www.aqmd.gov/rules/html/r1113.html wherever these VOC content limits are more stringent than required by law.

('8') Adhesives and Sealants

Seventy-five percent of the adhesives and sealants used must be from one or both of the following subparagraphs ('i') and ('ii'). Percentage must be calculated as the installed cost of compliant adhesives and/or sealants divided by the total installed cost of all adhesives and sealants. The quotient is then multiplied by 100. Material cost may be used in lieu of installed cost if this substitution is made for all cost calculations in Section 638.7(j)(1)(i)('b').

('i') Low volatile organic compound (VOC) content: Adhesives must meet or exceed the VOC limits of California's South Coast Air Quality Management District Rule #1168, Adhesive and Sealant Applications (adopted April 7, 1989 with amendments through September 15, 2000) (see Section 638.10), available at www.aqmd.gov/rules/html/r1168.html; and all sealants used as a filler must meet or exceed California's Bay Area Air Resources Board Reg. 8, Rule 51, Organic Compounds: Adhesive and Sealant Products (Adopted November 18, 1992, with amendments through January 7, 1998) (see Section 638.10), available at www.baaqmd.gov/regs/rg0851.pdf.

('ii') Commercial adhesives - chemical exclusions and low volatile organic compound (VOC) content: adhesives must meet the product-specific performance, health and environmental requirements of Green Seal's Standard for Commercial Adhesives (GS-36) (October 19, 2000). Green Seal, 1001 Connecticut Avenue, NW, Suite 827, Washington, DC 20036, www.greenseal.org; and all sealants used as filler must meet or exceed Bay Area Air Resources Board Reg. 8, Rule 51 (January 7, 1998) (see Section 638.10), available at www.baaqmd.gov/regs/rg0851.pdf.

('9') New furniture

The requirements of one of the following subparagraphs ('i') through ('v') must be met. Percentage must be calculated as the number of new furniture items installed, that comply under a specific subparagraph, divided by the total number of new furniture items installed, that are addressed by that specific subparagraph. The result is then multiplied by 100:

('i') Environmental specifications: 50 percent of the new furniture, except for furniture used for process, must meet the indoor air quality, recycled content, CFC and HCFC, and waste audit requirements outlined in the State of California Department of General Services, Procurement Division, Final Environmental Specifications for Office Furniture Systems, revised December 15, 2000 (see Section 638.10).

('ii') Emissions Testing: 50 percent of the new office workstations must meet the emissions limits outlined in EPA's Headquarters Office Furniture Specifications. Furniture is to be tested using the Large Chamber Protocol for Measuring Emissions of VOCs and Aldehydes from office workstations, produced by Research Triangle Institute for the EPA National Risk Management Laboratory Office of Research and Development, Research Triangle Park, NC, 1999 (see Section 638.10). Available at <http://etv.rti.org/iap/document.cfm> or www.epa.gov/etv/test_plan.htm#prevention

('iii') Upholstered furniture: 50 percent of new upholstered furniture must be upholstered with fabric with one or more of the following properties: recycled fiber, recyclable components, reusable or biodegradable material.

('iv') Certified wood furniture: 50 percent of solid wood furniture must originate from certified wood.

('v') Reconditioned, remanufactured or reused furniture: 50 percent of new furniture must be reconditioned, remanufactured or reused. Remanufacturing restores durable products to serve their original function by replacing worn or damaged parts. Reconditioned or remanufactured furniture includes those remanufactured in a closed loop system, in which the owner supplies products for remanufacture and then buys them back and those remanufactured in an open system, in which the consumer purchases remanufactured furniture the consumer did not originally own.

('c') Substitution options

Each of the following can be substituted for any one category enumerated in paragraphs ('1') through ('9') of Section 638.7(j)(1)(ii)('b'):

('1') Substitution Option 1: Low Mercury Content Fluorescent Lamps

Use only fluorescent lamps containing less than 10 milligrams of mercury, and which can be disposed as a non-hazardous waste as defined by EPA, at least until there is no remaining tax credit for the taxpayer to claim.

('2') Substitution Option 2: Building Reuse

For base building, maintain at least 75 percent of the existing building structure (foundations, columns, beams, floors) and shell (exterior skin, excluding window assemblies but not excluding glass curtain walls). For tenant space, maintain at least 75 percent of interior walls, ceiling and flooring. Retain pre-construction and post-construction plan and elevation drawings highlighting reused structure and shell elements. Percentage of building materials must be calculated as the amount (volume or weight) of building material element reused divided by the total amount (volume or weight) of that building material in the existing building, multiplied by 100. For shell and walls, ceilings and floor coverings, the calculation is based on area (in square feet). For structural foundation and frame, the calculation is based on volume (in cubic feet).

('3') Substitution Option 3: Green Roof

('i') This substitution option can only be used for base buildings in which the roof area is at least 10 percent of the total floor area, excluding parking areas within the building.

('ii') Use a Green Roof for at least 50 percent of the roof area, using layering technology and either one of two types of green roof: extensive or intensive. Percentage of roof area must be calculated as the area (in square feet) of the green roof divided by the total area of roof surface (in square feet) multiplied by 100.

(k) Plumbing Fixtures

This subpart applies to base buildings and tenant spaces.

(1) Standard

All plumbing fixtures in the public areas of a base building, or in all areas of a tenant space, must meet the

requirements of the New York State Energy Policy Act of 1992, New York State Energy Law Article 6; 9 NYCRR 1250.3 and 9 NYCRR 7810-7816 inclusive (see Section 638.10) or successor provision in effect at the time the building or rehabilitation for which the green building credit is claimed is placed in service.

(1) Buildings Located in Areas That Do Not Have Sewers or That Have Designated Storm Sewers

This subpart applies to base buildings.

(1) Standard

The buildings located in areas that do not have sewers, or that have designated storm sewers, must include one of the following features:

(i) An oil grit separator or water quality pond for pretreatment of runoff from any surface parking areas, or

(ii) At least 50 percent of non-landscaped areas (including roadways, surface parking, plazas, and pathways), if any, must be comprised of pervious paving materials.

('a') One of the following pervious paving materials and systems must be used to comply with the requirements of Section 638.7(1):

('1') Permeable Asphalt.

Permeable Asphalt must have at least 15 percent void content, per ASTM D3203-94(2000) "Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures," (see Section 638.10).

('2') Portland Cement Pervious Pavement

Portland Cement Pervious Pavement must have at least 15 percent void content and have a unit weight of no more than 125 lbs/ft³ as per ASTM C29/C29M-97 "Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate," and per ASTM C138-01(2000) "Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete," and per ASTM C172-99 "Standard Practice for Sampling Freshly Mixed Concrete," (see Section 638.10).

('3') Unit Pavers.

The pavement system must have at least 25 percent void

content as a percentage of the volume that is void in comparison to the solid material.

('b') Accessories for pervious pavements.

Base material and filter material must be graded 3/4" minimum to 1-1/2" maximum, be free draining, and be at least 16" in depth. Paths must be provided to drain the subbase of the pavement to a receiver. Acceptable receivers are the following: aquifer, creek, lake, storm sewer, swale.

('c') Maintenance.

Paved areas that use pervious pavements must be clearly marked to limit use of de-icing chemicals and sand, and to prevent resurfacing with non-pervious material.

(m) Refrigerants

(1) All new air conditioning equipment (including chillers and absorption chillers, water or air cooled unitary equipment, water cooled heat pumps, packaged terminal heat pumps, air conditioners, and other similar air conditioning equipment) exclusively utilizes one of the following:

(i) an EPA-approved non-ozone depleting refrigerant.

(ii) within two years of the effective date of this Part, a refrigerant composed of 1,1-dichloro-2,2,2-trifluoroethane, commonly referred to as "HCFC 123." Any owner/operator of a green building utilizing a refrigerant authorized by this subparagraph HCFC-123 who submits the written statement required by Section 638.5 (a) of this part within two years of the effective date of this part will be entitled to the green refrigerant component for the entire time period specified in the Initial Credit Component Certificate issued by the Department.

(iii) the two year time limit set forth in subparagraph (ii) shall not apply in the event that the Commissioner determines that the environmental attributes of HCFC-123, in aggregate, are equal to or more beneficial than the environmental attributes of EPA-approved non-ozone depleting refrigerants. Such determination shall be made following notice and a minimum 30-day opportunity for public comment and shall consider the environmental attributes of the refrigerant, including global warming potential as defined by the United States Environmental Protection Agency, and any other attributes deemed necessary by the Commissioner.

(n) Alternate Energy Sources

(1) Standards

(i) The fuel cell and/or photovoltaic modules must constitute building-integrated and non-building integrated photovoltaic modules and fuel cells. They must be installed to serve the base building or tenant space. To qualify they must have the capability to monitor their AC output and be validated upon installation, and annually thereafter, to ensure that such systems meet their design specifications.

(ii) The fuel cell and/or photovoltaic module must remain in service for the period of the eligibility certificate.

(o) Waste Disposal

This section sets forth the manner of demonstration for a base building to meet the recycling requirements to qualify as a green base building.

(1) Standard

The individuals or the firms that design the recycling system must prepare a solid waste management plan that includes the design intent, basis of design and full sequences of operation for all equipment and recycling systems. At a minimum, the solid waste management plan must include the provision for:

(i) Separate Waste Disposal Chutes, or

(ii) A Carousel Compactor System, or

(iii) Provision of readily accessible designated collection area(s), and provide sufficient space to store recyclable materials separately between collection dates, and

(iv) Compliance with all state and local recycling laws and/or ordinances.

(v) For base buildings leased or rented by State agencies and or public authorities, compliance with the reuse and recycling provisions of Executive Order #142.(see Section 638.10)

638.8 Commissioning

(a) Applicability

This subpart sets forth the requirements for commissioning of the mechanical plant of a base building. This includes: (1) those systems, equipment and components of the mechanical plant that affect energy consumption, and (2) indoor air quality systems, equipment and components that affect mechanical ventilation. These commissioning requirements do not apply to the mechanical plant, if any, of tenant space. These requirements do not apply to components that do not affect the energy use of the building, such as safety controls.

(b) Commissioning Process

The owner must implement the commissioning process summarized below.

(1) Commissioning Steps

(i) Designate a qualified commissioning authority (CA).

(ii) Ensure that the (i) individuals or firms performing the design of the base building or tenant space(s) (ii) the commissioning agent and (iii) the commissioning authority fulfill their roles and responsibilities in accordance with Section 638.8(c) and (d).

(2) Systems to be Commissioned

(i) All base building Heating, Ventilating, and Air-Conditioning (HVAC) systems, equipment and components that affect energy use must be commissioned.

(ii) All indoor air quality systems that affect the operation of the HVAC ventilation system of the base building must be commissioned.

(iii) The following list of systems, equipment and components must be commissioned:

('a') chillers, unitary and split-air conditioners, boilers, furnaces, and domestic hot water and service hot water heaters;

('b') cooling towers, fans, pumps, heat exchangers;

('c') controls for central plant and for HVAC, including, if present, the energy management system or the portion of the building automation system (BAS) that affects energy use;

- ('d') ducts and associated dampers;
- ('e') piping and associated valves;
- ('f') duct insulation and pipe insulation;
- ('g') duct system protection during construction, as related to indoor air quality;
- ('h') air quality monitoring systems as they relate to ventilation systems;
- ('i') renewable and alternative energy technologies, as appropriate per mechanical plant definition;
- ('j') waste heat recovery; and
- ('k') thermal storage.

(iv) In addition to the systems, equipment and components listed in paragraph (iii), other systems, equipment and components that are used for heating, cooling, or ventilation and that affect energy use or indoor air quality must also be commissioned.

(c) Responsibilities of Primary Participants in Commissioning

(1) Designers. The individuals or the firms that design each system to be commissioned must prepare in writing the following: (1) design intent, (2) basis of design and (3) full sequences of operation for all equipment and systems, all of which must meet the requirements of this subpart and industry standards.

(2) Commissioning Agent. The commissioning agent must perform the functional testing of equipment, documented by the commissioning authority, using forms approved by the commissioning authority, all of which must meet the requirements of this subpart and industry standards.

(3) Commissioning Authority

(i) The commissioning authority must:

- ('a') develop a commissioning plan, and
- ('b') document performance (i.e., determine and document whether systems, equipment

and components are functioning in accordance with the documented design intent and in accordance with the construction documents).

('c') For the purposes of this subpart, the commissioning authority (CA) cannot be responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management.

('d') Review and approve the design intent, basis of design, and sequence of operation. Commissioning authority approval is solely for the purpose of ensuring that sufficient information is contained therein to perform commissioning and must not constitute approval for any other purpose.

('e') Develop, or assist with developing and approve, or review and approve, the following written work products:

('1') Commissioning specifications;

('2') Commissioning plan;

('3') Start-up and check-out checklists and procedures;

('4') Functional performance testing procedures and checklists;

('5') Testing, adjusting, and balancing (TAB) plan;

('6') Operations and maintenance manual;

('7') Systems and energy management manual; and

('8') Commissioning Report.

Commissioning authority approval is solely for the purpose of ensuring that the above are in accordance with the commissioning requirements and must not constitute approval for any other purpose.

(4) Verify and document installation of systems, equipment and components. This activity must ensure the

following:

(i) that systems, equipment and components are installed according to construction documents and manufacturer's instructions,

(ii) that other building systems or components are not compromising the efficacy of the systems or features being commissioned, and

(iii) that any required differences between the final installation and the original construction documents are documented.

(5) Verify, document, and approve that the start-up and checkout were completed and performed as required by Section 638.8(h).

(6) Witness all or part of the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures were followed. Document this testing and verify that this documentation is included in operations and maintenance manuals. Notify owner of any deficiencies in results or procedures.

(7) Witness all or part of any duct testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Document this testing and verify that this documentation is included in operations and maintenance manuals. Notify owner of any deficiencies in results or procedures.

(8) Witness sufficient functional testing of the control system and approve it to be used for TAB, before TAB is executed.

(9) Verify, document, and approve that functional performance tests were performed as required by this subpart. See Section 638.8(i) for details.

(10) Maintain a master log for deficiencies and resolutions, and maintain a separate testing record. Provide to the owner written progress reports regarding issues related to the commissioning (e.g., progress being made, issues to resolve, milestones met, test results, recommended actions).

(11) Review the operations and maintenance manual for the completeness of all features components, equipment, subsystems, and systems that are commissioned in accordance with this part.

(12) Oversee and approve the training of the owner's operations and maintenance personnel. See Section 638.8(j) for details.

(13) Verify, document and approve required seasonally-deferred testing and corrections of any deficiencies. Document final testing and verify that this documentation is included in the commissioning report and in operations and maintenance manuals.

(14) Return to the site between six months and one year of building occupancy and review with facility staff the then current building operation and all outstanding issues related to the original commissioning and any seasonally deferred testing. Also interview facility staff and identify problems or concerns they have with operating the building as originally intended. Make suggestions for improvements and for recording these changes in the operations and maintenance manual and in the systems and energy management manual. Compliance with this subparagraph is required before the submission of the eligibility certificate for the second taxable year for which the green building credit is claimed.

(d) Qualifications of the Commissioning Authority and Commissioning Agent

(1) The commissioning authority's primary representative that will be fulfilling the responsibilities of the commissioning authority must have a professional engineer's license earned for mechanical engineering and must have a minimum of 5 years of experience in HVAC engineering.

(2) The commissioning authority must approve the qualifications of the commissioning agent.

(3) The commissioning agent and commissioning authority may be the same organization or person.

(4) A qualified member of the architecture or engineering firm or company that performs the design may act as the commissioning authority; however, such an individual must not be responsible for any aspect of the project design, or construction management or supervision for the subject building. In addition, reporting of all conditions and findings must be immediate and direct from the commissioning authority to the owner.

(e) Design Intent and Basis of Design

A design intent narrative and a basis of design

narrative must be developed.

(1) An overall design intent narrative is required for the following:

- (i) space temperature and humidity criteria;
- (ii) thermal zoning criteria;
- (iii) level of occupant control over HVAC systems (e.g., direct local control at the space level, control only at a central energy management system level)
- (iv) ventilation requirements and related indoor air quality criteria;
- (v) performance criteria related to energy efficiency;
- (vi) environmental responsiveness of the facility; and
- (vii) commissioning criteria.

(2) The basis of design must include at a minimum the following:

- (i) occupancy;
- (ii) space and process requirements;
- (iii) applicable codes, policies, and standards;
- (iv) design assumptions (e.g., heating/cooling load, and climatic);
- (v) performance standards, benchmarks or metrics;
- (vi) interaction between systems affecting intended performance; and
- (vii) control system appropriate for the skill of the operations and maintenance staff.

The design intent and basis of design must become part of the operations and maintenance manual and of the systems and energy management manual.

(f) Commissioning Plan

(1) A commissioning plan covering a given system, equipment or component is required before such system, element or component is commissioned.

(2) The commissioning plan must address the following:

(i) an overview of the tasks to be executed during commissioning;

(ii) a list of all features to be commissioned;

(iii) a list of reference documents related to commissioning, including specification references, drawing list, and submittal drawings;

(iv) a list of primary participants in the commissioning process and their responsibilities;

(v) a plan for management, communication and documentation;

(vi) an outline of the scope of the commissioning process, including submittal review, inspection, start-up, testing, training, operations and maintenance manual, systems and energy management manual;

(vii) a brief description of the checklists and tests to be performed, with reference to specific pre-start and start-up checklists;

(viii) a list of the functional performance tests to be performed to verify proper operation of all commissioned systems, including prerequisite activities and reference to specific checklists or worksheets which are necessary;

(ix) where the commissioning authority is not the commissioning agent, a description of the process to be performed by the commissioning authority to verify that the systems are operating as indicated in the documentation provided by the commissioning agent;

(x) a brief description of the content of the training to be provided to the operations and maintenance personnel;

(xi) the expected written work products, including checklist, worksheets, and testing procedures; and

(xii) an activity schedule.

(g) Commissioning Specifications

- (1) Commissioning specifications must be included in the construction documents.
- (2) The commissioning specifications must include the following:
 - (i) scope and details of the commissioning process;
 - (ii) qualifications and skills required by the commissioning agent;
 - (iii) a detailed description of the responsibilities of all parties included in the commissioning process;
 - (iv) systems, equipment and components to be commissioned;
 - (v) requirements for prefunctional checklist and start-up;
 - (vi) the functional performance testing process;
 - (vii) specific functional performance test requirements, including testing conditions and acceptance criteria for each piece of equipment being commissioned;
 - (viii) provisions for resolving deficiencies;
 - (ix) requirements for reporting and documentation for commissioning;
 - (x) requirements for training;
 - (xi) requirements for operations and maintenance manual, and for systems and energy management manual; and
 - (xii) schedule.

(h) Start-up and Checkout

Start-up and checkout must comprise the checks and tests to determine that all components, equipment, subsystems, systems, and interfaces between systems operate in accordance with construction documents. In this context, "operate" includes all modes and sequences of control operation, interlocks and conditional control responses, and specified responses to abnormal or emergency conditions.

(1) The results of the start-up and check-out must be documented and must be performed according to:

(i) the manufacturer's written instructions for the systems and equipment being commissioned, and

(ii) the construction documents.

(2) A certificate of readiness must be prepared by the contractor and delivered to the commissioning authority stating that start-up and checkout have been successfully completed and that all equipment, systems, and controls are complete and ready for functional performance testing.

(i) The commissioning authority must verify that initial start-up and check-out were successfully completed.

(ii) The commissioning authority must verify that every point of the control system was checked and that every control point is commanding, reporting and controlling as specified in the construction documents. Verification must include a minimum sample of each type of control point. In addition, the controls that are verified must be within a minimum sample of each type of component, equipment, subsystem and system where the sensor type is installed.

If any control point in the minimum sample is not commanding, reporting and controlling as specified in the construction documents, then an additional minimum sample of each type of control found not to be performing must be checked, until all control points in a minimum sample are found to be performing as specified.

(iii) The commissioning authority must verify that all sensors have been calibrated so that the value reported in the control system represents the actual local value. Verification must include re-calibrating a minimum sample of each type of sensor. In addition, the sensors that are re-calibrated must be within a minimum sample of each type of component, equipment, subsystem and system where the sensor type is installed.

If any sensor in the minimum sample is out of calibration, then an additional minimum sample of each type of sensor found to be out of calibration must be re-calibrated, until all sensors in a minimum sample are found to be in calibration.

(iv) The commissioning authority must verify that all actuators have been adjusted to fully close and open dampers and valves, and also must verify by visual observation that the reported values in the control system are correct.

Verification must include checking the operation of a minimum sample of each type of actuator, valve, and damper. In addition, the actuator, valve, and damper must be within a minimum sample of each type of component, equipment, subsystem and system where the type of actuator, valve, and damper is installed.

If any actuator, valve, or damper in the minimum sample does not operate as required in the construction documents, then an additional minimum sample of each type of actuator, valve, or damper found not to be operating as required must be verified until all actuators, valves, or dampers in a minimum sample are found to be to be operating as required.

(v) The commissioning authority must verify the TAB by re-measuring a minimum sample of values reported for each type of component, equipment, subsystem, or system in the TAB reports. In addition, the values that are re-measured must be within a minimum sample of each type of subsystem and each type of system.

If any re-measured value in the minimum sample deviates from the values in the TAB report or from the requirements in the construction documents by more than 10 percent, then an additional minimum sample must be re-measured for each type of component, equipment, subsystem or system for which there is a deviation, until all re-measured values in a minimum sample are within 10 percent of the values in the TAB report or of the requirements in the construction documents.

(vi) The commissioning authority must:

('a') check that chimneys, chimney connectors and stacks are free of cracks, blockages and leaks;

('b') ensure that proper combustion air is provided to the HVAC equipment;

('c') ensure that all appliances are installed in accordance with applicable fire safety and local building codes; and

('d') witness the testing of air-

tightness of smoking areas (if any), and document that all air leaks, if any, were sealed.

(i) Functional Performance Testing

(1) Written, repeatable test procedures must be prepared specifically for the project and must be used to functionally test equipment, components, subsystems, systems, and sequences and modes of operation. Test procedures must be documented to describe the individual test procedure, the expected system response, and acceptance criteria for each procedure.

(2) Testing documentation must identify the actual system response and must provide any pertinent observations or discussion.

(3) After initial check-out has been verified and approved by the commissioning authority, then the following must be tested:

(i) Each sequence in the sequence of operations must be tested. Additionally, other significant modes, sequences and control strategies not mentioned in the written sequences must be tested. The testing must include the following:

('a') start-up;

('b') shutdown;

('c') unoccupied and manual modes;

('d') modulation up and down the unit's range of capacity, if applicable;

('e') staging, if applicable;

('f') power failure/power down;

('g') alarms;

('h') backup upon failure; and

('i') interlocks with other equipment.

(ii) The functional performance of each type of component, equipment, subsystem, and system must be tested using a minimum sample for each type of component, equipment, subsystem and system. If any component, equipment, subsystem or system in the minimum sample is found not to operate as required in

the construction documents, then an additional minimum sample of each type found not to be operating as required must be tested until all units in a minimum sample are found to be operating as required.

(iii) Equipment must be tested to demonstrate performance under near-design conditions. To this end, tests on respective HVAC equipment and systems must be executed during both the heating and cooling season. However, overriding of control values to simulate cooling conditions during the heating season, and heating conditions during the cooling season is allowed where it would not affect the demonstrated performance required in the construction documents for the component, equipment, subsystem, system, or mode or sequence of operation being tested. Where the conditions listed above in this paragraph are not met, seasonally deferred testing must be undertaken.

(iv) The central plant (heating and cooling) must have its efficiency recorded for later reference by operations staff.

(v) Functional performance testing must be done using manual methods, or control system trend logs and read-outs, or stand-alone data loggers, as deemed appropriate by the commissioning authority.

(j) Training

(1) The commissioning authority must assemble written verification that training of operations and maintenance personnel was conducted for all commissioned features and systems.

(2) The training program for operations and maintenance personnel must include instructional and demonstration portions.

(3) The owner must identify for the purpose of training the specific in-house personnel or contracted organization that will be responsible for the operations and maintenance for the building. Training must be performed within six months of the date that either the initial or subsequent statement of commissioning certification, as appropriate as determined by the commissioning authority, has been executed. Qualified personnel must perform training for a sufficient duration of time to ensure that facility staff for the building has all the information they need to properly operate, maintain and replace each feature or system that is commissioned.

(4) In addition, if operations and maintenance personnel change during the period that the tax credit provided for in this part is taken, the replacement personnel must receive the training required by these regulations. Written verification that this training was conducted must be maintained.

(5) The operations and maintenance manual, and the systems and energy management manual must be available for and used for the training.

(6) The instructional portion of the training program must cover at least the following:

(i) general purpose of each building system (i.e., design intent) including theory of operation, capabilities and limitations, and modes of control and sequences of operation in the subject building;

(ii) use of the operations and maintenance manual and of the systems and energy management manual;

(iii) review of control drawings and schematics;

(iv) procedures for start-up, shutdown, seasonal changeover, normal operation, unoccupied operation, and manual operation;

(v) controls set-up and programming;

(vi) troubleshooting;

(vii) alarms;

(viii) interactions with other systems;

(ix) operational monitoring and record keeping, including what should be monitored, what useful information can come from monitored data, and why that information is important to analyzing system operation;

(x) adjustments and optimizing methods for energy conservation;

(xi) relevant health and safety issues;

(xii) inspection, service, and maintenance requirements for each system, including any requirements for special skills and knowledge that may best be met by specialized service contractors;

(xiii) sources for replacement parts/equipment;

(xiv) tenant interaction issues; and

(xv) why certain features are environmentally responsive (i.e., save energy, improve indoor air quality (IAQ), reduce toxic materials, reduce waste).

(7) The demonstration portion of the training program must include at least the following:

(i) Operation of each system, or typical examples if there are several similar systems in the building;

(ii) Start-up and shutdown procedures, operation under all specified modes of control and sequences of operation, and the correct procedures under emergency or abnormal conditions; and

(iii) Procedures necessary for effective operational monitoring, as appropriate, but particularly for projects with direct digital control systems incorporating trending and graphing features.

(k) Manuals

(1) Operations and maintenance (O&M) manual

(i) The operations and maintenance data must be complete and must be accessible by the operations and maintenance personnel and the owner.

(ii) The operations and maintenance manual must include for each piece of equipment and each system:

('a') the name, address and telephone number of the manufacturer or vendor and installing contractor;

('b') submittal data; and

('c') operations and maintenance instructions with the models and features for the subject site clearly marked.

(iii) The operations and maintenance manual must be edited to include only data for equipment that is actually installed. The data must include the following:

('a') instructions for installation, maintenance, replacement, start-up;

- ('b') special maintenance requirements and sources for replacement parts/equipment;
- ('c') parts list;
- ('d') list of special tools required;
- ('e') performance data; and
- ('f') warranty information.

(iv) The manual must also include an as-built documentation package for controls that includes information related to the following:

- ('a') normal operation;
 - ('b') shutdown;
 - ('c') unoccupied operation;
 - ('d') seasonal changeover;
 - ('e') manual operation;
 - ('f') controls set-up and programming;
 - ('g') troubleshooting;
 - ('h') alarms;
 - ('i') control drawings and schematics;
- and
- ('j') final sequences of operation.

(2) Systems and Energy Management Manual

(i) In addition to the operations and maintenance manual and the commissioning report, a systems and energy management manual must be developed and delivered to the owner.

(ii) The following components must be included in the systems and energy management manual even though some parts may also be found in the operations and maintenance manual:

- ('a') Narratives for the final design intent and basis of design, including brief descriptions of each system;

('b') Final sequences of operations for all equipment;

('c') Procedures for seasonal start-up and shutdown, manual and restart operation;

('d') As-built control drawings;

('e') For all energy-saving features and strategies, rationale description, operating instructions, and caveats about their function and maintenance relative to energy use;

('f') Recommendations and brief method for appropriate accounting of energy use of the whole building.

('g') Recommendations for re-calibration frequency of sensors and actuators by type and use;

('h') Plans for continuous commissioning or recommended frequency for re-commissioning by equipment type, with reference to tests conducted during initial commissioning;

('i') Recommendations regarding seasonal operational issues affecting energy use;

('j') List of all user-adjustable set points and reset schedules, with a discussion of the purpose of each and the range of reasonable adjustments with energy implications;

('k') Schedule of how frequently to review the various setpoints and reset schedules to ensure they still are at current, relevant, and efficient values;

('l') List of time-of-day schedules and a frequency to review them for relevance and efficiency;

('m') Guidelines for establishing and tracking benchmarks for building energy use and primary plant equipment efficiencies;

('n') Guidelines for ensuring that future renovations and equipment upgrades will not result in decreased energy efficiency and will maintain the design intent;

('o') List of diagnostic tools, with a description of their use, that will assist facility staff for the building in operating equipment more efficiently; and

('p') A copy of the commissioning report; and

('q') Index of all commissioning documents with notation as to their location.

(1) Commissioning Report

(1) After all commissioning tasks except seasonally deferred testing have been completed, a commissioning report must be delivered to the owner.

(2) The report must include:

(i) an executive summary;

(ii) list of participants and their respective roles;

(iii) a brief building description;

(iv) an overview of the scope of commissioning and testing;

(v) a general description of testing and verification methods; and

(vi) a list of each feature or system commissioned.

(3) For each piece of commissioned equipment, the report must contain the determination of the commissioning authority regarding the adequacy of the equipment, documentation and training.

(4) The commissioning report must address the following areas:

(i) Adequacy of equipment with respect to construction documents and design intent;

(ii) Equipment installation;

(iii) Functional performance and efficiency;

(iv) Equipment documentation;

(v) Operations and maintenance review and recommendations; and

(vi) Operator training.

(5) The functional performance and efficiency section for each piece of equipment must identify the verification method used (manual testing, trend logs of the building automation system, data loggers) and must include observations and conclusions from the testing.

(6) The report must also include a list of outstanding commissioning issues and any testing that is scheduled for a later date due to weather conditions (i.e., seasonally deferred testing).

(i) All outstanding deficiencies identified during or as a result of commissioning activities as required by this subpart must have been corrected or must be separately listed and highlighted in the commissioning report.

(ii) Each non-compliance issue must be referenced to where the deficiency is documented (e.g., the specific functional test, inspection, trend log).

(7) Appendixes must contain acquired sequence documentation, logs, meeting minutes, progress reports, deficiency lists, site visit reports, findings, unresolved issues, communications, and other relevant information. Documentation must be provided in a separate labeled binder for the following:

(i) Start-up and checkout in accordance to Section 638.8(h)

(ii) Functional performance testing (along with blank forms for the operators), and

(iii) As available, data obtained from monitoring, and analysis of those data.

(8) If components, equipment, subsystems, systems, controls, or sequences of operations as-built are different than required in the original construction documents, then the commissioning report must list these differences.

In addition, the commissioning report must state that the computer models used to calculate energy use to demonstrate compliance with this Part must be revised to reflect the difference listed between the as-built conditions and

original modeling assumptions and inputs and the listed deficiencies which have not been corrected. The commissioning report must also state that the revised energy models must be re-run to demonstrate that the energy performance is in compliance with the energy use provisions specified in Section 638.7(c).

(9) Once the seasonally deferred testing has been completed, the Commissioning Authority must issue an addendum to the commissioning report, or must re-issue the commissioning report, using the same criteria and methods as in the initial commissioning report.

638.9 Record Keeping and Reporting

The following information must be retained, for inspection by the Department of Environmental Conservation upon request, at least until there is no remaining tax credit for the taxpayer to claim.

(a) General

Any pertinent information supporting that:

(1) the building meets applicable laws, ordinances, codes, regulations, industry guidelines, and other applicable requirements;

(2) invoices demonstrating that the appliances installed in a base building or tenant space are models with an Energy Star® label;

(3) the heating, cooling and service water heating equipment meets all requirements in Section 638.7(b)

(4) the ventilation and exchange of indoor/outdoor air meets requirements in Section 638.7(e);

(5) the ventilation for smoking areas meets requirements in Section 638.7(f);

(6) the air purging system meets requirements in Section 638.7(g);

(7) the fresh air intakes meet requirements in Section 638.7(h);

(8) the materials, finishes and furniture meet requirements in Section 638.7(j);

(9) plumbing fixtures meet requirements in Section 638.7(k); and

(10) buildings located in areas that do not have sewers or that have designated sewers meet requirements in Section 638.7(1).

(b) Energy Use

(1) Retain the input and output for all computer simulations performed to satisfy the requirements of Section 638.7(c); and the calculations performed to satisfy the requirements Section 638.7(c). If the inputs and outputs do not meet the energy use standards of Section 638.7(c), then the requirements of Section 638.7(c) must be met again.

(c) Indoor Air Quality

(1) Information showing compliance with indoor air quality standards in Section 638.7(d).

(2) IAQ Test Protocol as required in Section 638.7(d)(1)(iv).

(3) IAQ Test Report as required in Section 638.7(d)(1)(v).

(4) Information showing compliance with the IAQ Management Plan During Construction or Rehabilitation in Section 638.7(d)(2)(iii). Information must include:

(i) Construction Details.

(ii) Construction IAQ Management Plan

(iii) Construction IAQ Management Report

(5) Information showing compliance with the Operations and Maintenance IAQ Management Plan in Section 638.7.

(d) Buildings Where Water is not Metered

Compliance Report must be given to the owner and architect or engineer of record. The report must include:

(1) Calculations (if applicable);

(2) Certifications.

(e) Commissioning

Information supporting the compliance with Commissioning Certificates and Re-Commissioning Certificates submissions.

638.10 Referenced Material

The following referenced documents have been filed with the Department of State. The documents are available from the addresses listed or, in the case of federal publications, from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, and for inspection and copying at the Department of Environmental Conservation, 50 Wolf Road, Albany, NY 12233-0001. For each reference, additional sources for hard copy materials and web sites, where appropriate, are provided:

Table 10.1		
Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
7(c)(3)(v) ('e')('2')	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., <i>FUNDAMENTALS</i> ch.24 (I-P ed.1997)	available from ASHRAE, 1791 Tullie Circle, N.E. Atlanta, GA 30329 (404) 636-8400 or on the internet (at http://www.ashrae.org)
7(c)(3)(v) ('e')('4')	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., <i>FUNDAMENTALS</i> ch.29, Table 5 (I-P ed.1997),	available from ASHRAE, 1791 Tullie Circle, N.E. Atlanta, GA 30329 (404) 636-8400 or on the internet (at http://www.ashrae.org)
7(c)(3)(v) ('e')('2')	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Standard 90.1-1999, <i>ENERGY STANDARD FOR BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS</i> 1999	available from ASHRAE, 1791 Tullie Circle, N.E. Atlanta, GA 30329 (404) 636-8400 or on the internet (at http://www.ashrae.org)
Table 7.3	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Standard 62-1999, <i>VENTILATION FOR ACCEPTABLE INDOOR AIR QUALITY</i> . 1999	available from ASHRAE, 1791 Tullie Circle, N.E. Atlanta, GA 30329 (404) 636-8400 or on the internet (at http://www.ashrae.org)

Table 10.1

Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
7(1)(1)(ii) ('a')('2')	ASTM, C29/29M-97 <i>STANDARD TEST METHOD FOR BULK DENSITY ('UNIT WEIGHT') AND VOIDS IN AGGREGATE</i> 1997	available from ASTM, 100 Barr Harbor Dr. West Conshohocken, Pa. 19428 (404) 636-8400 and internet (at http://astm.org)
7(1)(1)(ii) ('a')('2')	ASTM, C 138-01 <i>STANDARD TEST METHOD FOR UNIT WEIGHT, YIELD, AND AIR CONTENT (GRAVIMETRIC) OF CONCRETE</i> 2001	available from ASTM, 100 Barr Harbor Dr. West Conshohocken, Pa. 19428 (404) 636-8400 and internet (at http://astm.org)
7(1)(1)(ii) ('a')('2')	ASTM, C 172-99 <i>STANDARD PRACTICE FOR SAMPLING FRESHLY MIXED CONCRETE</i> 1999	available from ASTM, 100 Barr Harbor Dr. West Conshohocken, Pa. 19428 (404) 636-8400 and internet (at http://astm.org)
7(1)(1)(ii) ('a')('1')	ASTM, D3203-94(<i>STANDARD TEST METHOD FOR PERCENT AIR VOIDS IN COMPACTED DENSE AND OPEN BITUMINOUS PAVING MIXTURES.</i> 1994	available from ASTM, 100 Barr Harbor Dr. West Conshohocken, Pa. 19428 (404) 636-8400 and internet (at http://astm.org)
7(d)(1)(iii) ('b')('2')	ASTM, D6332-99, <i>STANDARD GUIDE FOR TESTING SYSTEMS FOR MEASURING DYNAMIC RESPONSES OF CARBON MONOXIDE DETECTORS TO GASES AND VAPORS.</i> 1999	available from ASTM, 100 Barr Harbor Dr. West Conshohocken, Pa. 19428 (404) 636-8400 and internet (at http://astm.org)

Table 10.1		
Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
Table 7.3	California Department of Health Services: Indoor Air Quality Program, <i>REDUCING OCCUPANT EXPOSURE TO VOLATILE ORGANIC COMPOUNDS VOCs FROM OFFICE BUILDING CONSTRUCTION MATERIALS: NON-BINDING GUIDELINES</i> 1996	available from: IAQ Assistance Line: 510-540-2476 Mail: DHS - IAQ Program 2151 Berkeley Way (EHLB) Berkeley, CA 94704
Table 7.3	California Air Resources Board, <i>INDOOR AIR QUALITY GUIDELINE, No.1, "Formaldehyde in the Home"</i> September 1991	available from the California Air Resources Board, Research Division, Indoor Exposure Assessment Section, P.O. Box 2815, Sacramento, California 95812 (916) 322-8282 and
7(j)(1)(i) ('a')('3')	California Bay Area Air Resources Board, <i>REGULATION 8, RULE 51: ADHESIVE AND SEALANT PRODUCTS</i> , November 19, 1992, with amendments through January 1998.	available from the Bay Area Air Quality Management District Offices 939 Ellis Street San Francisco, Ca 94109 (415) 771-6000 and
7(j)(1)(ii) ('b')('9')	California <i>FINAL ENVIRONMENTAL SPECIFICATIONS FOR OFFICE FURNITURE SYSTEMS</i> , December 18, 2000	California Department of General Services, Sacramento, Ca http://www.ca.gov
7(j)(1)(ii) ('b')('7')	California South Coast Air Quality Management District, <i>RULE 1113: ARCHITECTURAL COATINGS</i> , September 2, 1977, with amendments through May14, 1999.	available from AQMD, 21865 E. Copley Drive, Diamond Bar, Ca 91765 1-800-363-7664

Table 10.1

Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
7(j)(1)(i) ('a')('3')	California South Coast Air Quality Management District, <i>RULE 1168: ADHESIVE AND SEALANT APPLICATIONS</i> , April 7, 1989, with amendments through September 2000.	available from AQMD, 21865 E. Copley Drive, Diamond Bar, Ca 91765 1-800-363-7664
7(j)(1)(i) ('a')('3')	Carpet and Rug Institute, <i>STANDARD FOR INSTALLATION OF COMMERCIAL CARPET</i> (CRI 104-1996); and <i>STANDARD FOR INSTALLATION OF RESIDENTIAL CARPET</i> (ISBN 0-89275-030-8-1995) 1996 and 1995 respectively	available from The Carpet and Rug Institute, P.O. Box 2048, Dalton, GA 30722 1-800-882-8846
7(j)(1)(ii) ('a')('4')	Carpet and Rug Institute, <i>INDOOR AIR QUALITY TESTING PROGRAM: RECOMMENDED INDOOR AIR QUALITY SPECIFICATIONS</i> 2001	available from The Carpet and Rug Institute, P.O. Box 2048, Dalton, GA 30722 1-800-882-8846
7(j)(1)(i) ('a')('3')	Green Seal, <i>GREEN REPORT ON ARCHITECTURAL PAINTS</i> , December 1999.	available from Green Seal, Inc., 1001 Connecticut Avenue, NW, Suite 827, Washington, D.C. 20036 (202) 872-6400
7(j)(1)(i) ('a')('3')	Green Seal, <i>STANDARD GS-11</i> May 20, 1993.	available from Green Seal, Inc., 1001 Connecticut Avenue, NW, Suite 827, Washington, D.C. 20036 (202) 872-6400

Table 10.1

Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
7(j)(1)(ii) ('b')('8')	Green Seal, <i>STANDARD FOR COMMERCIAL ADHESIVES</i> (GS-36) October 19, 2000.	available from Green Seal, Inc., 1001 Connecticut Avenue, NW, Suite 827, Washington, D.C. 20036 (202) 872-6400
7(j)(1)(ii) ('b')('2')	International Agency for Research on Cancer (IARC), <i>OVERALL EVALUATIONS OF CARCINOGENICITY TO HUMANS</i> , August 2000	available from IARC 150 Cours A. Thomas 69008 Lyon, France tel: 33+472738485 fax: 33+472738361 e-mail: www.iarc.fr Document available at http://193.51.164.11/monoeval/qlist.html
7(d)(2)(iii) ('b')('4')	National Air Duct Cleaners Association (NADCA), <i>GENERAL SPECIFICATIONS FOR THE CLEANING OF HVAC SYSTEMS</i> 1997	available from NADCA, 1518 K Street, NW, Suite 503, Washington D.C. 20005, phone 202-737-2926, fax 202-347-8847.
7(d)(1)(iii) ('b')('2')	National Fire Protection Association. <i>RECOMMENDED PRACTICE FOR THE INSTALLATION OF HOUSEHOLD CARBON MONOXIDE WARNING EQUIPMENT</i> (ed. 1998)	available from NFPA 1 Batterymarch Park P.O. Box 9101, Quincy, MA 02269-9191 (617)770-3000 and on internet at http://www.nfpa.org

Table 10.1

Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
7(d)(1)(iv) (c)('4')	NYS Department of Health, <i>ENVIRONMENTAL LABORATORY APPROVAL PROGRAM CERTIFICATION MANUAL</i> May 15, 2000	available from NYS DOH, Wadsworth Center, ELAP, P.O. Box 509, Albany, N.Y. 12201-0509, 518/485-5570 and on internet at http://www.wadsworth.org/1abcert
7(d)(2)(ii) (c)('1')	Sheet Metal and Air Conditioning Contractors' National Association, Inc., <i>ARCHITECTURAL SHEET METAL MANUAL</i> , 5 th edition 1993, with addendum 1997	available from SMACNA, 4201 Lafayette Center Drive, Chantilly, Va. 20151-1209 and www.smacna.org
7(d)(2)(iii) (b)('1')	Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA), <i>IAQ GUIDELINES FOR OCCUPIED BUILDINGS UNDER CONSTRUCTION</i> , 2nd edition 2000,	available from SMACNA, 4201 Lafayette Center Drive, Chantilly, Va. 20151-1209 and www.smacna.org
7(d)(1)(iii) (b)('2')	Underwriters Laboratories Inc. No. UL 2034 Standard for safety, <i>SINGLE AND MULTIPLE STATION CARBON MONOXIDE ALARMS</i> . 1999	available from Underwriters Laboratories Inc. (UL) 333 Pfingsten Road Northbrook, IL 60062-2096 (847) 272-8800,

Table 10.1		
Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
7(j)(1)(ii) ('a')('6')	UNEP/CITES, Secretariat. <i>CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA.</i> March 23, 1973, with amendments through September 13, 2000.	available from UNEP/CITES, Secretariat International Endowment House 15, chemin des Anemones CH-1219 Chatelaine, Geneva, Switzerland tel: (+4122) 917-8139/40
Table 7.3	U.S. Code of Federal Regulations, Title 40, Parts 50 and 51 1999	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250
7(j)(1)(ii) ('a')('4')	US Environmental Protection Agency Office of Solid Waste "COMPREHENSIVE PROCUREMENT GUIDELINES FOR PROCUREMENT OF PRODUCTS CONTAINING RECOVERED MATERIALS" July 2001	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250

Table 10.1		
Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
7(d)(3)(i) ('a')('2')	United States Environmental Protection Agency, <i>BUILDING AIR QUALITY: ACTION PLAN</i> . June 1998. Document Number: EPA 402-K-98-001, aka National Institute of Occupational Safety and Health Document Number: 98-123.	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250,
7(d)(3)(i) ('a')('1')	United States Environmental Protection Agency, <i>BUILDING AIR QUALITY: GUIDE FOR BUILDING OWNERS AND FACILITY MANAGERS</i> , 1991. Document Number: ISBN 0-16-035919-8	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250
7(d)(1)(iv) ('c')('1')	United States Environmental Protection Agency, <i>COMPENDIUM OF METHODS FOR THE DETERMINATION OF AIR POLLUTANTS IN INDOOR AIR</i> . EPA Order Number EPA600S490010, April 1990	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250
7(d)(1)(iv) ('c')('5')	United States Environmental Protection Agency, <i>COMPENDIUM OF METHODS FOR THE DETERMINATION OF TOXIC ORGANIC COMPOUNDS IN AMBIENT AIR</i> . January 1999, EPA Order Number EPA625R-96/010b	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250

Table 10.1		
Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
7(j)(1)(ii) ('b')('9')	United States Environmental Protection Agency, <i>ENVIRONMENTAL TECHNOLOGY VERIFICATION: LARGE CHAMBER TEST PROTOCOL FOR MEASURING EMISSIONS OF VOCS AND ALDEHYDES</i> , EPA Cooperative Agreement No. CR 822870-01, 1999.	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250
Table 7.3	United States Environmental Protection Agency : <i>INDIVIDUAL VOLATILE ORGANIC COMPOUND PREVALENCE AND CONCENTRATIONS IN 56 BUILDINGS OF THE BUILDING ASSESSMENT SURVEY AND EVALUATION STUDY</i> . Undated	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800
7(d)(1)(iv) ('c')('4')	United States Environmental Protection Agency, <i>INDOOR RADON AND RADON DECAY PRODUCT MEASUREMENT DEVICE PROTOCOLS</i> , Document Number: EPA 402-R-92-004, July 1992.	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800
7(d)(iv) ('e')('1')	United States Environmental Protection Agency, <i>QUALITY ASSURANCE OVERVIEW DOCUMENT FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S OFFICE OF RESEARCH AND DEVELOPMENT AND OFFICE OF AIR AND RADIATION LARGE BUILDING STUDIES</i> (1994).	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250

Table 10.1		
Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
Table 7.3	United States Environmental Protection Agency: <i>RADON REDUCTION TECHNIQUES FOR EXISTING DETACHED HOUSES</i> , No. EPA 625/R-93/011 (October 1993), "Technical Guidance (Third Edition) for Active Soil Depressurization Systems.	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250
7(d)(1)(iv) ('c')('1')	United States Environmental Protection Agency, <i>STANDARDIZED EPA PROTOCOL FOR CHARACTERIZING INDOOR AIR QUALITY IN LARGE OFFICE BUILDINGS</i> (1994),	This reference is contained within the above-listed reference entitled <i>COMPENDIUM OF METHODS FOR THE DETERMINATION OF AIR POLLUTANTS IN INDOOR AIR</i> as Method IP-3A, and is available from the Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250
Table 7.3	United States Environmental Protection Agency: Research Triangle Park N.C., <i>TESTING FOR INDOOR AIR QUALITY, BASELINE IAQ AND MATERIALS SECTION 01445</i> , February 28, 1997. Document Number: EPA68-C2-0115 01445-1	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800

Table 10.1

Section of Regulation in which Reference is first Cited	Name of Reference	Where to Obtain a Copy of Reference
3(av)	26 USCA 1391 U.S. Internal Revenue Code December 2000	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250
3(aw)(5)	33 U.S.C.A. 1344 U.S Clean Water Act February 1987	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250 or
3(be)	42 USCA 8251 National Energy Conservation Policy Act 1995	available from Superintendent of Documents, U.S. Government Printing Office (GPO), P.O. Box 371954, Pittsburgh, PA 15250-7954, or call (202) 512-1800, fax (202) 512-2250

638.11 Severability

If any provisions of this Subchapter are held invalid, such invalidity does not affect other provisions which can be given effect without the invalid provisions.

638.12 Enforcement

(a) It is unlawful for any person to make a false statement in connection with applications, plans, specifications and/or reports submitted pursuant to this Part.

(b) Failure to comply with the provisions of this Part may result in penalties as permitted under Article 71 of the Environmental Conservation Law.

(c) Alternatively, or in addition to the action or proceeding to recover the civil penalty provided by subdivision (b) of this section, the Attorney General of the State of New York, upon the request of the Commissioner, may institute an action or proceeding to enjoin any violation of, or to enforce any provision of these regulations or of any order issued pursuant thereto.

(d) Any action of proceeding commenced to recover a penalty may be settled or discontinued by the Attorney General with the consent of the Commissioner.

(e) In addition to any action or proceeding provided by subdivisions (a) and (b) of this section, if the commissioner finds that a person may have filed a false written statement with the State Green Buildings Tax Credit program, the Commissioner may refer the matter to the Attorney General for such action, including criminal prosecution, as may be appropriate.

638.13 Effective Date

This Part takes effect immediately except that with respect to allowable costs paid or incurred by the taxpayer the effective date is June 1, 1999.

This Part must be filed in the Department of Audit and Control and a duplicate original copy hereof must be filed in the Office of the Department of State.

638.14 Confidentiality

Any information pertaining to manufacture, production or secret processes submitted in connection with applications, reports, plans and specifications or testing and designated by the person submitting such information as secret or proprietary

must be kept confidential as provided by Part 616 of this Title dealing with trade secret confidentiality. All requests for confidential treatment of information submitted to the department will be handled in accordance with the procedures set forth in Part 616 of this Title.