ARTICLE 3. SOLAR ENERGY INCOME TAX CREDIT

NOTE: IC 4-4-3 was repealed by P.L.4-2005, SECTION 148, effective February 9, 2005.
NOTE: 16 IAC 3 was transferred from 55 IAC 4. Wherever in any promulgated text there appears a reference to 55 IAC 4, substitute 16 IAC 3.

Rule 1. Active Solar Thermal Programs

16 IAC 3-1-1 Definitions

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.1. For the purposes of IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]* and 55 IAC 4-1 these words and terms are defined as follows:

"Absorber" means that part of the solar collector that receives solar radiation and transforms it into thermal energy. It usually is a solar surface through which energy is transmitted to the transfer fluid; however, the transfer fluid itself could be the absorber in certain configurations.

"Active energy system" means any energy-producing system designed for the purpose of thermal conditioning of space and/or water, which utilizes solar devices thermally isolated from the living space to provide for collection, storage, and distribution and control of solar energy.

"Ambient air" means the outdoor air in the vicinity of the solar collector being tested.

"ASHRAE" means the American Society of Heating, Refrigeration Air Conditioning Engineers, Inc.

"Auxiliary or conventional energy equipment" means an energy system that depends upon any depletable fuel resource such as coal, wood, petroleum products, propane, natural gas, nuclear fuel, or any fuel type not specified by IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*.

"Collector enclosure" means the structural frame which supports the components of the collector and protects internal components from the environment.

"Concentrating collector" means a solar collector which uses reflectors, lenses, or optical elements to concentrate the radiant energy passing through the aperture onto an absorber which has a surface area smaller than the aperture. Some collectors using concentrating elements also fit the definition of a flat-plate collector; thus, this document treats non-concentrating flat-plate collectors, concentrating flat-plate collectors, and concentrating tracking collectors.

"Concentrator" means that part of the concentrating collector which directs the incident solar radiation onto the absorber.

"Control subsystem" means that assembly of devices and their electrical, pneumatic or hydraulic auxiliaries that have the sole purpose of regulating the processes of collecting, transporting, storing and utilizing solar energy and providing for the safety of the occupants. It does not include those controls normally used for heating and cooling with conventional energy.

"Corrosion" means the deterioration of a substance or its properties caused by an electrochemical reaction with its environment.

"Cover plate" means the material or materials covering the aperture and most directly exposed to solar radiation. These materials generally are used to reduce the heat loss from the absorber to the surroundings and to protect the absorber.

"Crazing" means the development of minute surface cracks.

"Cross connection" means any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other either water of unknown or questionable safety or steam, gas, chemicals or other substances whereby there may be a flow from one system to the other, the direction of flow depending on the pressure differential between the two systems.

"Delamination" means separation into constituent layers.

"Design life" means the period of time during which a system is expected to perform its intended function without requiring major maintenance or replacement.

"Double-wall heat exchanger" means a heat exchanger having two walls or interfaces which are physically separated from each other to prevent possible contamination of potable water resulting from any leak in either or both walls.

"Drain-back or drain-down" means a system in which the fluid in the solar collectors is drained from the system under prescribed conditions.

"Eligible cost" means those costs incurred in the installation of a qualified energy system for devices which are solely used for the collection, absorption, storage, distribution, and control of the qualified energy source.

"Evaporative cooling (with collectors)" means a space-conditioning system which accomplishes space cooling by evaporating water as it circulates through the collectors. The thermal energy is stored and later transferred to the interior of the building during

the cooling period.

"Flat-plate collector" means a solar collector (either liquid- or air-circulating) in which the surface absorbing the incident radiation is essentially flat and employs no concentration. However, in 55 IAC 4 the term refers to all collectors designed to perform satisfactorily with all parts of the collector in fixed positions.

"Fpm" is an abbreviation for feet per minute.

"Freeze protection" means preventing damage from freezing of solar components by the most energy-efficient and/or cost-efficient method possible. Examples include, but are not limited to, using anti-freeze solutions and providing for manual or automatic draining of fluids to an inside reservoir, storage tank, or drain. Even with anti-freeze thermosiphoning can freeze indoor coils, etc.

"Gross collector area" means the maximum projected area of the complete collector module, including integral mounting means.

"Innovative equipment" means solar equipment which, due to its design, cannot be evaluated fairly and adequately by the test methods described in 55 IAC 4.

"Instantaneous efficiency" means the amount of energy removed by the transfer fluid over a given measuring period divided by the total incident solar radiation onto the gross collector area during the measuring period.

"Integrity of construction" means those physical and mechanical properties of the solar collector which collectively are responsible for the overall thermal performance and physical structure of the solar collector.

"Irradiance" means the rate of solar radiation received by a unit surface area in unit time in W/m^2 ($Btu/hr.ft^2$).

"Iwc" means an abbreviation of inches of water column and is normally used in measuring pressure drop of air flowing through ducts, coils, rock beds, etc. It is equivalent in pressure to the weight of the water column.

"KPa" means kilopascal, a metric measurement.

"Liquid storage" means that solar thermal storage which is liquid when a storage medium, but also refers to phase-change and thermochemical systems.

"Low pressure service hot water (SHW) and swimming pool solar collectors" means collectors which, by virtue of their installation, will not have a direct fluid interchange with an auxiliary heater or street-pressure supply. Heat transfer from such collectors to the service water system would be accomplished by use of an appropriate heat exchanger.

"MPQ" means manufacturer's pre-qualification certification.

"Manufacturer" means any individual, partnership, corporation, association, or other legal entity which manufacturers, assembles or produces energy system components, or any person designated by the manufacturer as a distributor, sales or service representative.

"Manufactured solar collector" means any solar collector designed and reproduced for sale.

"Maximum allowable temperature" means the maximum temperature permitted in a system, and the basis for the temperature setting of the temperature-relieving devices protecting the system.

"Model" means a unit of solar equipment that is identifiable by a specified size, set of materials, and performance. A change in any of these basic characteristics constitutes a new model.

"NEC" means the National Electric Code.

"No-flow condition" means the condition that results when the heat transfer fluid does not flow through the collector array due to shut-down or malfunction, and the collector is exposed to the amount of solar radiation that it would receive under normal operating conditions.

"Non-combustible" means incapable of supporting combustion.

"Non-pressurized" means tanks that operate at atmospheric pressure at the liquid surface. They may be sealed with a simple liquid trap.

"Operation indicators" means lights or alarms that indicate when the system is on or off.

"Other solar collector" means solar collectors other than manufactured solar collectors. This definition includes, but is not limited to, user-built, custom-built, and site-built collectors not designed for reproduction and sale.

"Outgassing" means the generation of vapors by materials, usually during exposure to elevated temperature and/or reduced pressure.

"Pitting" means the process by which localized material loss is caused in materials or components by erosion, corrosion, or chemical decomposition.

"Plenum" means an air compartment to improve distribution of air through rock beds, air coils, distribution ducts, etc.

"Potable water" means water meeting the requirements of the public health service drinking water standards or the regulations of the public health authority having jurisdiction.

"Pre-qualified collector" means any solar collector which has successfully completed all quality and performance tests of the Solar Rating and Certification Corporation's (SRCC) Standard 100-81 or the SRCC equivalent; and has met all requirements for manufacturer's pre-qualification with the department of commerce.

"Pre-qualified system" means any active energy system which (1) utilizes pre-qualified collector(s); and (2) utilizes components for which compliance with minimum standards set forth in 55 IAC 4-1-6, 55 IAC 4-1-7, and 55 IAC 4-1-8 has been demonstrated.

"Pressure drop" means static pressure loss in fluid pressure, as in one end of a conduit to the other due to friction.

"Psig" means pounds per square inch gauge.

"Pyranometer" means a radiometer used to measure the total solar radiation (direct, diffuse, and reflected) incident on a surface per unit time per unit area.

"Qualified energy device or system" means an individual device or a configuration of devices designed for the purpose of thermal conditioning for space and/or water, and which utilize an energy resource specified by IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*.

"Radiant sky cooling (using collectors)" means a space-conditioning system that circulates fluid through the collectors during those hours which have the appropriate conditions for cooling (usually night or early morning). The thermal energy is stored and later transferred to the building exterior during the cooling period.

"Rated performance" means the solar equipment thermal output characteristics determined by tests specified in 55 IAC 4.

"Recommended" means provisions that are good practice but not required for qualification.

"Reflector or reflective surface" means a surface intended primarily for the function of reflecting radiant energy.

"Relief device" means a pressure-activated valve or rupture member designed to automatically relieve excessive pressure.

"Rock or pebble bed storage" means a common storage method for thermal energy in air systems.

"SBCCI" means Southern Building Code Conference International.

"Sensors" means devices used to sense individual parameters. Examples are, but are not limited to, pressure transducers, thermocouples, and flow meters.

"Similar model" means a collector model which varies from a laboratory-tested model only by variation in size. All other materials and design features must be identical in order to qualify as a similar model. A similar model may be certified based on test results and specifications for the laboratory-tested model.

"Site-dependent collector" means a collector intended to be assembled only at the site of its application. This may be because parts of the building (e.g., rafters insulation) are part of the collector or because the size of the collector makes pre-assembly impractical.

"Solar collector" means a device designed to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a fluid coming in contact with it.

"Solar energy" means the energy originating from the sun's radiation primarily encountered in the wavelength region from 0.3 to 2.7 micrometers.

"Solar Rating and Certification Corporation (SRCC)" means a non-profit organization whose primary purpose is the development and implementation of certification programs and national rating standards for solar energy equipment.

"Standard" means a document which specifies the performance, durability or safety, requirements for a product.

"Storage media" means the storage material such as water, rock, anti-freeze, heat pipes, etc.

"Street-pressure solar collectors" means collectors which, by virtue of their installation in a municipal water system, will be directly subjected to variations in street water pressure and hot water tank pressure.

"Superficial flow rate" means, in rock and pebble storage bins, the flow rate divided by the cross-sectional area of the bin.

"Thermal shock" means a rapid change in temperature e.g., the resumption of circulation in a collector after the fluid present within it had reached stagnation temperature.

"Thermal storage" means the storage of energy (either positive or negative, i.e., hot or cold) by means such as rock, water, anti-freeze, phase-change products, etc.

"Thermosiphon action" means circulation of fluid by action of the change in density when the fluid is heated or cooled.

"Time constant" means the time required for the fluid leaving a solar collector to attain 63.2 percent of its steady state value following a step change in insolation or inlet fluid temperature.

"Toxic fluids" means gases or liquids which are poisonous, irritating, and/or suffocating.

"Transfer fluid" means a medium such as air, water, or other fluid which passes through or in contact with the solar collector and carries the thermal energy away from the collector.

"Transparent frontal area" means the projected area of that part of the collector designed to transmit incident solar energy to the interior of the collector.

"U.L. listing" means having undergone testing by Underwriters Laboratory, which is an agency established to test and approve electrical appliances, wire, and other electrical equipment.

"Warranty" means a minimum warranty which most manufacturers provide for one year against defect in material and workmanship. *(Office of the Lieutenant Governor; 16 IAC 3-1-1; filed Jan 15, 1982, 12:35 pm: 5 IR 336; filed Mar 16, 1984, 3:40 pm: 7 IR 1211; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-1) to the Office of the Lieutenant Governor (16 IAC 3-1-1) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-1-2 Tests required for manufactured solar collectors

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.2. All manufactured solar collectors must undergo the following quality and performance tests in order to receive a pre-qualificiation *[sic.]* certificate. This requirement pertains to glazed and unglazed flat-plate liquid collectors; air collectors; dual-axis parabolic collectors, linear tracking concentrating collectors; and vacuum-tube collectors. Special exceptions are denoted by "*". The collector must be tested according to the following sequence, which is identical to the Solar Rating & Certification Corporation's (SRCC) Standard 100-81, to qualify according to IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*:

(1) receiving inspection;
(2) static pressure test;
(3) thirty day exposure ("no-flow" or "stagnation") test;
(4) thermal shock/water spray test;
(5) thermal shock/cold fill test;*
(6) static pressure test;
(7) collector time constant determination test;
(8) thermal performance test;
(9) incident angle modifier test;**
(10) disassembly and final inspection.

*Not required for air collectors.

**Two incident angle modifier tests are required for dual-axis parabolic and vacuum-tube collectors: both for north/south and east/west orientation, based on total irradiation. *(Office of the Lieutenant Governor; 16 IAC 3-1-2; filed Jan 15, 1982, 12:35 pm: 5 IR 339; filed Mar 16, 1984, 3:40 pm: 7 IR 1216; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-2) to the Office of the Lieutenant Governor (16 IAC 3-1-2) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-1-3 Performance tests for manufactured solar collectors

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.3. Each of the tests listed in 55 IAC 4-1-2 for manufactured solar collectors shall be performed in accordance with the following standards: (a) Manufactured solar collectors. Manufactured solar collectors shall have testing performed in the following sequence:

(1) Receiving inspection: Upon receiving a collector for tests, the test laboratory shall inspect and document the condition of the collector.

(2) Static pressure test: A static pressure test shall be conducted prior to exposure testing as follows on street pressure collectors, low-pressure service hot water (SHW) and swimming pool solar collectors, hybrid and alternate fluid solar collectors.

(A) The basis of test pressure shall be:

(i) 1100 kPa gauge (160 psig) for street pressure collectors. This standard is based on two (2) items:

(AA) Two (2) times the allowable street gauge pressure 550 kPa gauge (80 psig) in a dwelling (SBCCI, Plumbing Code, Sec. 1213.9); and

(BB) The test pressure exceeding the required P-T valve relief setting on approved hot water tanks, which is 1030 kPa gauge (150 psig).

(ii) Collectors specified for positive operating pressure less than street pressure 550 kPa gauge (80 psig) will be pressure-tested at one and one-half (1 1/2) times the manufacturer's rated operating gauge pressure, but a minimum of 170 kPa gauge (25 psig).

(iii) Collectors specified for operating pressures greater than 550 kPa gauge (80 psig) will be pressure tested at one and one-half (1 1/2) times the manufacturer's rated operating gauge pressure or 1100 kPa gauge (160 psig), whichever is greater.

(iv) Collectors specified for operating at atmosphere pressure or below will be pressure tested at the discretion of the test director, but at no greater than 170 kPa gauge (25 psig).

(B) Method of pressure testing shall be either hydrostatic or pneumatic pressure sources may be used on liquid filled collectors. (Pneumatic pressure sources will be used for air collectors.)

(i) Liquid collector pressure test procedures is as follows:

(AA) A pressure gauge will be attached to read pressure at the exit port of the collector, the collector completely filled with unheated fluid, and the exit port closed off.

(BB) Hydraulic pressure will be applied via the inlet port until the gauge indicates the test pressure.

(CC) After stable test pressure has been achieved, the exit port shall be closed and the pressure shall be monitored for fifteen minutes.

(ii) Air collectors pressure test procedure is as follows:

(AA) A pressure tap, pipe, or tubing will be sealed into the exit port of the test specimen and connected to a manometer which can be read directly to 2.5 Pa (0.01 inches water column) or to a pressure gauge of equivalent accuracy. An air volume meter, accurate to within 142 cm^3 (±0.5 cubic feet) shall be placed in the air supply system between the supply source and the collector.

(BB) Apply pressure via the inlet port of 125 Pa (0.5 inch water column) and monitor pressure for one hour. The volume of air added or removed in order to maintain the required pressure shall be documented.

(3) Exposure test. The purpose of this test is to verify integrity of construction after at least thirty (30) days of exposure to adverse conditions. (Note: There presently exist no correlations between real-time and accelerated aging; such correlations need to be established to properly quantify the results obtained from this short-term test.) The exposure method of testing shall be as follows:

(A) Liquid collectors shall be filled completely with clean liquid, following which the liquid shall be allowed to gravity-drain for fifteen (15) minutes with the collector mounted at a 45° tilt angle. The collector inlet and outlet shall be loosely sealed.

(B) Exposure conditions shall consist of thirty (30) days of cumulative exposure to a minimum daily incident solar radiation flux of 17,000 (kJ/m^2.day) or 1,500 (BUT/ft^2.day *[sic., BTU/ft^2.day]*) as measured in the plane of the collector aperture. The exposure conditions shall include at least one consecutive four-hour period with a minimum instantaneous flux of 950 W/m^2 pr (300 BTU/ft^2.hour).

(C) The average baseline ambient temperature shall be 27.0°C (80°F) or higher during the four-hour period.

(D) Data recorded and reported during exposure testing shall include integrated daily solar radiation data. A regularly scheduled weekly visual inspection shall also be made, and record of changes in the physical appearance of the collector shall be kept.

(4) Thermal shock/water spray test. The thermal shock/water spray test shall be performed during a five (5) minute period on three (3) different days of the exposure tests. The collector shall be subjected to heavy spray from above or in front of the collector. Spray testing shall be conducted after at least one (1) hour of direct sun (minimum 850 W/m^2) (270 BTU/ft^2) and within two (2) hours of solar noon. These three (3) spray tests shall be conducted during the last ten (10) days of the exposure test. Water delivery shall be at a rate not less than 20 mL per minute per square meter of collector (1.8 gallons/ft^2.hour) (2.9 inches of rainfall per hour), with the spray pattern designed to wet the surface that would be wet during a normal rain shower. Temperature of the water shall be 24 ±5.0°C (75 ±10°F) during the spray test. The procedure of NBSIR 1305A, test 7.3, shall be used.

(5) Thermal shock/cold fill test. The thermal shock/cold fill test shall be performed to the following specifications:

(A) At one (1) time during the test sequence the unfilled collector will be exposed to full sun, not less than 950 W/m^2 (300 BTU/ft^2), for one (1) hour. While the collector is still so exposed, liquid will be circulated through the collector

for five (5) minutes at a flow rate of approximately 15 mL per minute per square meter of collector (1.5 gallons/hour.ft^2). The temperature of the entering liquid shall be 24°C ±5.0°C (75 ±10°F) during this test. The procedure of NBSIR 1305A, test 7.4, shall be used.

(B) Solar collectors may be certified without the thermal shock/cold fill if their designs are such that cold refill of a hot collector is not allowed. This statement must be made by the manufacturer and shall be included in the certification document.

(6) Second static pressure test. A second static pressure test following the provision of the previous section on static pressure test shall be conducted after exposure and prior to thermal performance testing.

(7) Collector time constant. A time constant test will be conducted to determine the time required for the outlet fluid temperature to attain 63.2 percent of its steady state value following in a step change in the input. The test method used will conform to the method described in the ASHRAE Standard 93-77, "Method of Testing to Determine the Thermal Performance of Solar Collectors".

(8) Thermal performance test. A thermal performance test will be conducted on those collectors that have passed the requirements of the preceding sections and for which the collector time constant has been determined. The thermal performance test determines "instantaneous" efficiency of the solar collector over a wide range of operating temperatures. Efficiency is defined as the ratio of collected energy to the available energy falling upon the entire collector area. Collected energy is determined by the produce of fluid mass flow, specific heat and integrated temperature gain across the collector. Available energy is determined by the integrated solar irradiance. Typically, four (4) data points of at least five (5) minute duration are taken at each of four (4) different inlet fluid temperatures. For unglazed collectors, the inlet fluid temperatures include test temperatures below and above ambient air temperature. Glazed collectors are normally tested over a range of inlet fluid temperatures from near ambient to approximately 70°C (126°F) above ambient temperature. The test method used for glazed collectors shall conform to the ASHRAE Standard 93-77. The test method for unglazed collectors shall conform to the ASHRAE Standard 96-80, "Methods of Testing the Thermal Performance of Unglazed Flat Plate Liquid Type Solar Collector". Any deviation from this standard will be delineated in the test report.

(9) Collector incident angle modifier. The performance curve for a collector is determined when the insulation incident on the collector is within 30 degrees of normal to the aperature *[sic.]* of the collector. To predict collector performance of a wide range of conditions, tests will be conducted to determine the collector incident angle modifier. This is used to modify the efficiency curve (determined within 30 degrees of normal incidence) to account for changes in performance as a function of the sun's incident angle. The test method used will conform to the ASHRAE Standard 93-77 or ASHRAE 96-80. Biaxial incident angle modifiers are required on collectors which are nonsymmetrical in their response to irradiance as solar altitude and azimuth change.

(10) Disassembly and final inspection. After exposure and performance testing, the collector shall be dissembled *[sic.]*. Conditions that may lead to abnormally short collector life will be justification for denying qualification of a manufactured solar collector.

(b) Innovative and site-dependent collectors.

(1) Innovative equipment. solar collectors which cannot be tested by the standard test sequence of ASHRAE 93-77 or ASHRAE 96-80 will be evaluated using case-specific procedures developed or adopted by the SRCC and intended to provide comparable results to ASHRAE testing.

(2) The basis for certifying site-dependent collectors shall be testing and evaluating a sample collector not less than two (2) square meters (22 ft^2) in area. The sample collector shall be typical of an installed collector in absorber plate materials and finish, supporting materials enclosing the absorber, manifolding or absorber plate and treatment and cover plate material attachments.

(Office of the Lieutenant Governor; 16 IAC 3-1-3; filed Jan 15, 1982, 12:35 pm: 5 IR 340; filed Mar 16, 1984, 3:40 pm: 7 IR 1216; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-3) to the Office of the Lieutenant Governor (16 IAC 3-1-3) by P.L.4-2005, SECTION 150, effective February 9, 2005.

16 IAC 3-1-4 Design and construction standards for manufactured solar collectors

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.4. The following criteria represent the requirements for durability in collector design and construction. (a) Cover Plate:

All glass cover plates must be of a nonshattering or tempered type.

(b) Condensation: The collector shall be designed to prevent condensate build-up. The use of desiccants to control condensation will be permitted. The test report shall note any unusual condensate build-up.

(c) Pressure test results

(1) After testing, a liquid-circulating collector shall be considered passable if:

(A) a loss of pressure does not occur,

(B) there is no evidence of fluid leakage, and

(C) there is no evidence of fluid path deterioration (swelling, stretching, etc.).

(2) After testing, an air-circulating collector shall be considered passable if there is no evidence of fluid path deterioration (swelling, stretching, etc.).

(d) After the thermal shock/water spray: The collector structure and performance shall not be degraded by moisture penetration. There shall be no cracking, crazing, warping, or buckling, of the cover plate.

(e) Exposure test results: The test shall be terminated if it is apparent without collector disassembly that the unit no longer meets the quality requirements of the following section.

(f) After exposure and performance testing, the collectors shall be disassembled. Conditions that may lead to abnormally short collector life will be justification for denying pre-qualification. The conditions are as follows:

(1) Severe deformation* of the absorber.

(2) Severe deformation* of the fluid flow passages.

(3) Loss of bonding between fluid flow passages and absorber plate.

(4) Leakage from fluid flow passages or connections.

(5) Loss of mounting integrity.

(6) Severe corrosion* or other deterioration caused by chemical action.

(7) Crazing, cracking, blistering or flaking of the absorber coating or delamination of reflective surfaces.

(8) Retention of water in the insulation.

(9) Swelling, severe outgassing or other detrimental changes in collector insulation which adversely affect collector performance.

(10) Cracking, loss of elasticity, or loss of adhesion of gaskets and sealants.

(11) Leaking or damage to hoses inside the collector enclosure or leakage from mechanical connections.

(12) Cracking, crazing, permanent warping or buckling of the cover plate.

(13) Cracking or warping of the collector enclosure materials.

*Deformation or corrosion shall be considered severe if it impairs the function of the collector or there is evidence that it will progress. *(Office of the Lieutenant Governor; 16 IAC 3-1-4; filed Jan 15, 1982, 12:35 pm: 5 IR 342; filed Mar 16, 1984, 3:40 pm: 7 IR 1218; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-4) to the Office of the Lieutenant Governor (16 IAC 3-1-4) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-1-5 User-built and custom-built solar collector standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.5. (a) The following standards apply to solar collectors which are user-built or custom built, or are otherwise not appropriately categorized as a *[sic.]* "manufactured" solar collectors.

Demonstration of compliance with this section shall be provided by the builder of the system. A thirty (30) day no-flow test followed by a disassembly and final inspection must be conducted in order to meet performance and durability requirements of this section. Additionally, specifications for materials used in the collector must be provided, as well as verification that the collector has been installed in accordance with local building codes and safety standards.

(b) Safety/construction standards.* (1) Cover plates.

Cover plates shall comply with standard building codes for wind, weight, snow and line loads.

Cover plates shall be in compliance with standard building codes for safety standards. Glass materials must be of a tempered type; plastic materials must be of non-shattering type.

(2) Enclosures.

The collector enclosure materials must be of materials which comply with local building codes as well as state and federal fire

and safety standards.

The collector enclosure shall be constructed of noncombustible materials (e.g., metal) or of combustible materials provided the combustible material is completely insulated from the high temperatures inside the collector.

Note: Long-term exposure (years) of wood to temperatures above 212°F can result in auto-ignition of wood.

(3) All components.

All collector components exposed to high temperature areas of the collector (i.e., in contact with the absorber or receiving direct solar radiation within the collector) shall be noncombustible or have a flame-spread rating not exceeding twenty-five (25) and a smoke-development rating not exceeding fifty (50), when tested in accordance with ASTM E 84-80, unless it can be shown that temperatures in the collector will not exceed 200°F.

Transmission losses due to outgassing. Outgassing of volatiles that will reduce collector performance below specified design values shall not occur when the collector is exposed to the temperature and pressure that will occur in actual service.

All gaskets, caulking, and sealants must be capable of withstanding the theoretical design temperature of the collector.

(c) Performance/durability standards. The collector must be constructed of materials capable of withstanding temperatures experienced during a minimum of thirty (30) days under a no-flow condition (minimum insolation: 1500 BTU/ft^2/day).

Following the thirty (30) day exposure and subsequent disassembly, the following conditions shall be noted:

(1) Cover plates. (A) Cover plates must resist clouding, cracking, warping, discoloration and buckling when exposed to direct clear-sky radiation in a "no-flow" condition for a minimum of thirty (30) days.

(B) Cover plates shall not expand and contract excessively causing structural deformation during the day or leakage during the night.

(C) Reflective surfaces must not develop cracking or delamination due to high temperature.

(D) Condensation formed on the underside of the cover plate(s) shall not reduce its transmittance during its design life to a degree that would affect the performance as declared in disclosure statement form.

(E) The cover plate(s) under normal weather conditions shall not, with normal maintenance, collect or retain dirt to an extent that would reduce its ability to transmit sunlight to a degree that would substantially affect the performance of the collector.

(2) Absorber plates. (A) Paint or coating material shall be capable of withstanding the above-mentioned condition without developing flaking or change in color.

RECOMMENDATION: Glazed collectors can reach, (depending on the design temperatures) up to 400°F. All coatings should be capable of withstanding the design temperature of the collector.

(B) Separation between the fluid-flow passage and the absorber plate should not become greater due to temperature stress.

(C) The absorber plate should not develop any evidence of thermal-bonding material leakage when exposed to the above-mentioned temperature conditions.

(3) Enclosure. The collector enclosure must not warp or deviate to the extent that gaps can exist between the enclosure and any gasketing or glazing material when being exposed to the above temperature conditions.

(4) Insulation. (A) Insulation shall not show evidence of swelling, oozing, charring, or expanding to the extent that it will affect the performance of the collector.

(B) Insulation shall not outgas into the collector, causing clouding of the cover plate or emittance of toxic odors.

Note: Insulation should be capable of withstanding the theoretical design temperature of the collector. *(Office of the Lieutenant Governor; 16 IAC 3-1-5; filed Mar 16, 1984, 3:40 pm: 7 IR 1219; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-5.1) to the Office of the Lieutenant Governor (16 IAC 3-1-5) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-1-6 Qualification for income tax credit

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.6. To be eligible for Indiana income tax credit, active solar heating and cooling systems including solar water heating systems shall meet the following requirements: (a) All components (including heat exchangers, pumps, piping, fans and ducts) shall be sized to carry the heat transfer fluid at design flow rates without significant operational impairment or corrosion. Consideration should be given to minimizing pressure drops and fluctuations.

(b) Over-temperature and over-pressure protection shall be provided to maintain the system within the temperature and pressure operating limits as required by the design.

(c) A means shall be provided to isolate the solar system for servicing or emergencies. Such isolation shall not interrupt service from conventional heating and cooling systems; no section shall be allowed to be isolated from a pressure-relief device where hazardous or damaging pressures may occur.

(d) The system components and assemblies shall include adequate provisions for the thermal expansion of heat transfer fluids, thermal storage fluids, and system components.

(e) Means shall be provided to prevent undesired escape of the thermal energy from storage through thermosiphoning action. A damper in a primary solar duct system shall have felted blade edges or be otherwise treated to ensure a tight cut-off of the air stream.

(f) Incompatible materials shall be isolated or treated to prevent degradation.

(g) System components containing liquids shall be protected from freeze damage. Systems which use potable water as the heat-transfer fluid, or any fluid mixture not formulated to resist freezing at a temperature of -25°F., or integrated collector/storage systems ("batch" or "breadbox" water-heaters) shall include:

(1) Manual isolation and drain-down features for the solar loop. Vacuum relief must be assured and drainage plumbing standards observed.

RECOMMENDED automatic freeze-protection measures include: A thermostatically-controlled electrical element in the collector/storage tank, and thermostatically-controlled heat tapes on all plumbing exposed to unheated space may be used; power capacity and thermostat setting of these controls must be sufficient to prevent freeze damage from occurring.

Alternatively, passively-actuated automatic drain-down protection may be used (i.e., a "normally-open, spring-actuated" valve and controller system).

(2) Adequate system features must be included, and system user operation assured to preclude the possibility of damage to the system or the building through the freezing of a filled solar loop or the stagnation of a drained solar loop. Details of these features, and owner's instructions, must accompany the application for tax credit.

(h) Heat exchangers used for transfer of heat between the potable water system and heat transfer or thermal storage fluids shall meet local building and/or plumbing codes for protection of potable water from contamination.

RECOMMENDATION – According to normal practice when using toxic fluids in heat transfer with potable water, the potable water system should be protected with a "double-wall heat exchanger".

(i) The system shall be designed so as to eliminate any hazard to the building or occupants during normal or abnormal system operating conditions.

(j) Overload and overcurrent protection of electrically-operated components shall be consistent with the maximum current rating of the device and with provisions of the National Electrical Code, and National Fire Protection Administration (NFPA) Code 70 and all Indiana building codes.

(k) Collectors, tanks, pumps, valves, regulating orifices, pressure regulators, heat exchangers, piping, hoses and other components shall be capable of operation within design pressures and design temperature ranges without significant deterioration.

(l) The system shall be able to withstand prolonged periods of stagnation (high solar flux, low demand) without significant system deterioration and with no maintenance. This includes conditions encountered during loss of electric power to the system.

(m) Components or materials shall not be affected by exposure to sunlight to an extent that will significantly impair their function during their design life.

Note: Components often utilized with a solar energy system which do not qualify for tax credit include air-source heat pumps and wood-burning devices. When utilized in an active-solar thermal system, a liquid- or water-source heat pump, or a heat pump circulating its refrigerant charge directly through collectors, may qualify for tax credit under this section. *(Office of the Lieutenant Governor; 16 IAC 3-1-6; filed Jan 15, 1982, 12:35 pm: 5 IR 343; filed Mar 16, 1984, 3:40 pm: 7 IR 1220; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-6) to the Office of the Lieutenant Governor (16 IAC 3-1-6) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-1-7 Storage sub-system standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.7. For the purposes of IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]* thermal storage sub-systems shall meet the standards listed below. (a) Thermal storage in air-circulating systems:

(1) Heat-storage media and thermal storage container materials, including any interior protective coatings, shall not impart

toxic elements to air distributed to areas of human occupancy (e.g., rocks containing asbestos must not be used due to the potential carcinogenic hazard).

(2) Rocks and pebbles shall be washed free of particulate matter and organic material prior to placement in the storage enclosure.

(3) Materials exposed to the air passage shall be noncombustible or have a flame spread rating not exceeding twenty-five (25) and a smoke development rating not exceeding fifty (50), when tested in accordance with ASTM E 84-80, unless it can be shown that temperatures in the thermal-storage sub-system will not exceed 200°F.

EXCEPTION: In one- and two- family dwellings, materials not meeting the criteria of (3) above may be used when smoke detectors approved for duct installation are installed which, when actuated, stop all air flow through the storage device and sound an alarm. Minimum sensitivity of approved smoke devices shall be set to operate when smoke reduces the intensity of a one (1) foot long beam of white light by four (4) percent or the equivalent.

(4) Where storage units are located outside or underground, they shall be protected against the intrusion of water.

(5) Rock bins shall have a plenum at both their inlet and outlet.

(6) Insulation of a storage container shall have a minimum thermal resistance of R = 12 when within the insulated shell of the building or R = 30 when outside the insulated shell of the building.

(b) Thermal storage in liquid-circulating systems:

(1) Pressurized tanks shall be leak-tested after installation, except when the tank contains markings to indicate prior testing has been accomplished. If testing is required, the test pressure shall be 1.5 times the maximum allowable pressure. Non-pressurized tanks shall be tested visually for leaks by filling.

(2) Potable water systems shall be protected from make-up water cross-connection to the solar energy storage system in accordance with the requirements of local plumbing codes.

(3) All openings into tanks, except vents, shall be tightly covered and secured in place. Vents shall be screened with corrosion-resistant material having not less than twenty (20) openings per linear inch, or shall be otherwise protected.

(4) Non-pressurized tanks connected to a make-up water system shall have overflows directed to an approved point of disposal. Make-up water piping from the potable water systems shall be connected as required in local plumbing codes.

(5) The liquid solar energy storage system shall be capable of being emptied.

(6) Shutoff valves shall be provided between the supply system and cold- and hot-water storage tanks.

(7) Insulation of a storage container shall have a minimum thermal resistance of R = 12 when within the insulated shell of the building or R = 30 when outside the insulated shell of the building.

(8) Insulation of an integrated collector/storage unit shall have a minimum thermal resistance of R = 16, except for the collector aperture, which shall be triple-glazed at minimum.

RECOMMENDATION: Manual or automatic collector covers should be used, to minimize heat-loss during periods of inadequate insolation, for freeze protection, and as protection against collector stagnation when drained, under certain conditions.

(c) Recommended practices for thermal storage sub-systems;

(1) One to two gallons of water or 1/2 to 1 cubic foot of pebbles per square foot or *[sic.]* collector area should normally be allowed for solar hot water and space heating applications.

(2) The superficial flow rate through the rock bin should be between twenty (20) and thirty (30) fpm at a minimum pressure drop of 0.10 iwc and a maximum drop of 0.38 iwc depending on available fan power.

(3) Insulation should be installed per manufacturers recommendations for the application.

(4) Means should be provided to prevent any undesired loss of thermal energy from storage through thermosiphon action during shut down.

(5) Closed storage tanks should be designed to withstand vacuum-induced pressures or should provide controls to prevent it.

(6) Solar components that are to be buried in soils should be protected against degradation.

(Office of the Lieutenant Governor; 16 IAC 3-1-7; filed Jan 15, 1982, 12:35 pm: 5 IR 344; filed Mar 16, 1984, 3:40 pm: 7 IR 1222; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-7) to the Office of the Lieutenant Governor (16 IAC 3-1-7) by P.L.4-2005, SECTION 150, effective February 9, 2005.

16 IAC 3-1-8 Control sub-system standards

Authority: IC 4-4-3-21

Affected: IC 6-3.1-8

Sec.8. (a) The following conditions shall be prevented either by inherent design features or by equipping the system with the necessary controls.

(1) Standards pertaining to manufacturer.

(A) Damage resulting from thermal shock shall be prevented.

(B) Manufactured electrical devices shall be U.L. listed; for innovative and custom-fabricated equipment not so listed, a complete schematic diagram and description shall be included in the application, for individual evaluation.

(2) Standards pertaining to installation.

(A) Wiring of the control circuit shall be in conformity with all local code requirements and in accordance with the National Electrical Code.

(B) Control circuit wiring and terminals shall be identified and marked or color coded so the wires can be readily traced.

(C) The wiring, pneumatic lines and/or other means for transmitting sensor outputs to control devices shall be protected from damage or from introducing false signals as a result of environmental or system operating conditions.

(b) Recommended practices for solar control sub-systems may pertain to either manufacture or installation.

(1) System controls should include provisions for by-pass, adjustment, or override of manual or automatic controls as is required to facilitate installation, startup, operation, shutdown, and maintenance.

(2) Operation indicators should allow an observer to determine readily that the system is operating.

(3) Control sensors should be protected from environmental influence such as wind, moisture, temperature, etc. that might alter their intended function.

(4) Closed storage tanks should be protected against damage from vacuum-induced pressure or should be designed to withstand it.

(5) Systems using liquid heat-transfer fluids should provide suitable means for air or gas removal from points in the piping system where air is most likely to accumulate.

(6) All switches and controls should be clearly identified as to function.

(7) Aluminum wiring should not be used.

(8) Controls should be placed in the correct environment as specified by the manufacturer.

(Office of the Lieutenant Governor; 16 IAC 3-1-8; filed Jan 15, 1982, 12:35 pm: 5 IR 345; filed Mar 16, 1984, 3:40 pm: 7 IR 1223; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-8) to the Office of the Lieutenant Governor (16 IAC 3-1-8) by P.L.4-2005, SECTION 150, effective February 9, 2005.

16 IAC 3-1-9 Qualified energy system certificate; application

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.9. In order to receive a tax credit under IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]* this procedure shall be followed in submitting and processing an application for such credit. (a) The applicant must file an application for a qualified energy system certificate with the department of commerce. This application shall include the following items:

(1) The completed application form provided by the department of commerce;

(2) Proof of costs for the purchase and installation of the qualified energy system including:

(A) proof that the system was complete, in operation, and paid for as of December 31st of the applicable tax year prior to application for benefits;

(B) proof that the system is installed on in-state property owned by the applicant; and

(3) A list of the persons or corporations who supplied labor or materials for the installation of the system;

(4) The completed installers statement of compliance signed by the person responsible for the installation of the system, attesting to the installation's compliance with all standards set forth in 55 IAC 4; and

(5) Evidence of manufacturer's compliance as demonstrated by:

(A) The manufacturer's pre-qualification MPQ number for the system; or

(B) The MPQ number for the collector PLUS a list of all components including manufacturer and model number; a schematic diagram of the system, labeling all parts; and product literature on each component (usually available from the manufacturer); or

(C) Evidence that the solar collector meets the standards of 55 IAC 4-1-5 *[sic., 55 IAC 4-1-5.1]* (results of no-flow test, schematic drawing, etc.) for other solar collectors, including, but not limited to user-built collectors and systems. Other

system components must meet the standards of 55 IAC 4-1-6, 55 IAC 4-1-7, and 55 IAC 4-1-8.

(b) Upon receiving the application, the department of commerce shall evaluate it, to determine whether the energy system qualifies for tax credit under IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*.

If the department of commerce determines that the energy system qualifies for tax credit, the department of commerce shall issue a certificate of approval to the applicant; it shall also interpret and make recommendations to the department of revenue concerning the costs within the system that are eligible for credit.

(c) The department of commerce shall forward approved applications to the department of revenue for determination of the amount of credit that the applicant is entitled to under IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*. The department of commerce shall also notify the taxpayer in writing whether the application is approved or rejected. *(Office of the Lieutenant Governor; 16 IAC 3-1-9; filed Jan 15, 1982, 12:35 pm: 5 IR 346; filed Mar 16, 1984, 3:40 pm: 7 IR 1224; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-10) to the Office of the Lieutenant Governor (16 IAC 3-1-9) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-1-10 Manufacturer pre-qualification number; application

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.10. In order to receive a manufacturer's pre-qualification (MPQ) number, this procedure shall be followed in submitting and processing an application for such number: (a) The manufacturer must file an application for pre-qualification of a collector or system with the department of commerce.

(b) Upon receiving the application, the department of commerce shall determine whether the energy system or collector meets all of the pre-qualification requirements of 55 IAC 4-1.

Note: Collector pre-qualification is a pre-requisite for system pre-qualification.

(c) Prior to application the applicant shall have a representative collector tested at an independent testing facility. These tests shall have been conducted in accordance with procedures set forth in 55 IAC 4-1-3, "Procedures for Performance of Tests for Manufactured Solar Collectors" (i.e., in accordance with SRCC Standard 100-81). The completed test results will be attached to the application and submitted to the department of commerce for review.

(d) The manufacturer must also provide a description and schematic diagram of each system for which pre-qualification is sought. All components must be labeled by brand name, manufacturer, and model number. The manufacturer must verify in writing that all components comply with the requirements of 55 IAC 4-1-6. Similar verification must be provided for storage sub-systems (55 IAC 4-1-7), and solar control sub-systems (55 IAC 4-1-8).

(e) If the department of commerce determines that the manufactured solar collector or system does meet all of the requirements of this chapter, a pre-qualification number will be assigned to the system and the manufacturer notified of this number.

(f) After a pre-qualification number has been assigned to a manufactured solar energy system, that system, unaltered, will qualify for tax credit, provided that the installation of the system complies with all applicable standards.

(g) In the event that a manufacturer has not subjected the collector to the tests required by 55 IAC 4-1-2, the department of commerce shall accept, on an interim basis only, demonstration of compliance with 55 IAC 4-1-5, "Minimum Standards for Other Solar Collectors" *[sic., 55 IAC 4-1-5.1]*. Manufacturers are expected to make arrangements for collector testing during this interim period, the length of which is to be determined by the department of commerce. Collectors for which compliance with such minimum standards has been demonstrated will be qualified for the energy credit; however, no pre-qualification number will be issued for the collectors or systems using such collectors. *(Office of the Lieutenant Governor; 16 IAC 3-1-10; filed Jan 15, 1982, 12:35 pm: 5 IR 347; filed Mar 16, 1984, 3:40 pm: 7 IR 1224; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-11) to the Office of the Lieutenant Governor (16 IAC 3-1-10) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-1-11 Appeals

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.11. These rules establish the procedures for the filing of an administrative appeal of a tax credit decision issued by the director of the department of commerce, division of energy policy or his designee. In all cases, efforts shall be made by the director

and any aggrieved parties to informally confer and resolve issues prior to scheduling an appeal.

(a) Appeals taken from the decision of the director shall be presented, heard and decided by a three (3) member appeal board. The division of energy policy director shall select a board member from the Indiana department of commerce, division of energy policy, not involved in the tax credit program and a representative from the industry with technical expertise to serve on the set-aside appeal board.

(b) The applicant aggrieved by an order issued by the director may file an appeal with the board in accordance with these guidelines. The appeal shall be filed within fifteen (15) days of service after order from which the appeal is taken.

(c) All notices of appeal shall be in writing and signed by the appellant; shall designate clearly on its face that it is an appeal; shall be accompanied by any documents or briefs, if any, which pertain to the appeal.

(d) If the board determines that the appeal raises material issue(s) of fact, the board shall grant a request for an evidentiary hearing by the appellant or any other party. Upon the granting of a request for an evidentiary hearing, the director shall schedule such hearing as soon as possible taking into account the convenience of the parties and the circumstances surrounding the appeal.

(e) The notice shall include:

(1) a statement of the time, place and nature of the hearing;

(2) a statement that the hearing is held pursuant to these rules and any other relevant legal authority;

(3) a reference to the particular sections of any statutes and standards involved;

(4) a short and plain statement of the matters to be considered at the hearing.

(Office of the Lieutenant Governor; 16 IAC 3-1-11; filed Jan 15, 1982, 12:35 pm: 5 IR 347; filed Mar 16, 1984, 3:40 pm: 7 IR 1225; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-1-12) to the Office of the Lieutenant Governor (16 IAC 3-1-11) by P.L.4-2005, SECTION 150, effective February 9, 2005.

Rule 2. Passive Solar Thermal Systems

16 IAC 3-2-1 Definitions

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.1. For the purposes of IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]* and 55 IAC 4-2, certain words and terms are defined as follows:

"Adjustable shading" means a device designed to shade glazing from undesired radiation but which may be adjusted to permit glazing to receive desired radiation. This term may include awnings or overhangs installed on the building's exterior, or devices enclosed between panes of glazing. Only when conditions do not permit practical installation as above can installations on the building's interior qualify as adjustable shading. Loose-fitting interior shades, blinds, curtains or drapes do not qualify as asjustable *[sic.]* shading; moveable insulation does.

"Attached sunspace" means habitable space, adjacent to but with the capacity for thermal separation from, the building's occupied space on at least one (1) side, that qualifies as a type of indirect-gain passive-solar thermal system. It may be constructed in either the "greenhouse" or the "solarium" style.

"Atrium sunspace" means habitable space, adjacent to but with the capacity for thermal separation from, the building's occupied space on at least three (3) sides, that qualifies as a type of indirect-gain passive-solar thermal system. It may be constructed in either the "greenhouse" or the "solarium" style.

"Absorption" means the conversion of radiant energy into thermal (heat) energy. When absorber material is claimed for credit, it must involve a fully or partially insolated surface; it is typically used in conjunction with or as the exposed surface of thermal-storage mass.

"Aperture" means an opening within a building's construction, typically permitting the penetration of light or air (e.g., "collection aperture", "ventilation aperture").

"Attributable" means obtained to serve an exclusive purpose (cf. "dedicated").

"Clerestory" means a window within a vertical exterior wall, usually above a roof surface, primarily for introducing ventilation, illumination, or solar radiation into occupied or habitable space.

"Collection" means glazed aperture(s) permitting direct radiation and providing useable insolation.

"Comfort range" means that range of environmental conditions ideal for human occupancy.

"Controls" means devices that have the sole purpose of operating the solar-energy system.

"Conduction" means the transmission of heat energy through material by way of the excitation of its molecules.

"Convection" means the circulatory motion that occurs in a fluid of a nonuniform temperature owing to the variation of its density and the action of gravity; also, the transfer of heat by this automatic circulation of a fluid.

"Conventional energy system" means an energy system that depends upon any depletable fuel resource such as coal, wood, petroleum products, propane, natural gas, nuclear fuel, or any fuel type not specifically qualified *[sic.]* IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*.

"Dedicated" means solely or primarily intended for the purpose of utilizing an energy resource specifically qualified by IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*; dedicated devices may only incidentally serve other purposes. Cost for devices which are primarily components of a qualifying system, but which substantially serve other purposes, may be eligible at the rate of fifty percent (50%).

"Direct-gain" means the method of passive-solar heating in which solar radiation is collected and utilized directly within a structure's occupied space.

"Direct solar radiation" means unimpaired or unshaded sunlight striking the glazed surface of a passive solar system for at least four (4) hours between 9 a.m. and 4 p.m. on a clear December 21st.

"Distribution" means forcing or facilitating the circulation of thermally-conditioned fluid throughout a system or a space.

"Double-envelope construction" or "double-shell-construction" means a building that has, throughout half or more of the combined area of foor *[sic.]* (or attic) and north wall, two (2) envelopes or shells with a continuous airspace at least six inches (6") thick between them; has a large sunspace integral with the south side; has a large below-grade airspace, such as a crawl-space, basement, or sub-basement space; and has full continuity from one (1) airspace to the next, so that air is free to circulate around a complete circuit, or convective loop, that includes the sunspace, the roof or attic, the north wall system, and the crawl-space or equivalent.

"Equivalent net thermal performance" means achieving equal (±5%) heat-retention results throughout twenty-four (24) hour days over the course of the heating season.

"Glazing" means rigid transparent or translucent glass or plastic material of reasonable permanence, installed in the wall(s) or roof(s) of a building; it may include head, jambs, sills, and/or sealants, but not members that are structural requirements of the building as a whole.

"Greenhouse" means a style of attached-sunspace or atrium-sunspace typically using a prefabricated construction system, and consisting of at least eighty percent (80%) glazing over all exposed or exterior surfaces.

"Habitable space" means space in a structure for living, sleeping, eating, or cooking. Bathrooms, toilet compartments, closets, halls, storage or utility space, and similar areas are not considered habitable space. (From Section 409, Indiana Construction Rules, 1980 edition.) A space need not be continuously thermally conditioned to levels within the human comfort range to be defined as habitable space (cf. "occupied space").

"Indirect-gain" means the method of passive-solar heating in which solar radiation is collected within a space that can be thermally separated from a building's occupied space. Indirect-gain systems include, but are not limited to, attached-sunspaces, atrium-sunspaces, and trombe walls.

"Insolation" means direct solar radiation that has been received.

"Isolated-gain" means the method of solar heating in which solar radiation is collected at a location that is physically remote from its point of use. If collection, storage, and distribution of solar energy is thermally isolated from the living space, such systems must qualify for credit under IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]* through compliance with standards for active-solar thermal systems; if these functions occur within and utilize the structural elements of the building, they must qualify for credit under IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]* through compliance with standards for passive-solar thermal systems. If in question, this distinction will be made by the department of commerce.

"Movable insulation" means an assembly of glazing and insulation with a minimum thermal resistance (R-value) of 5 as an entire unit in place, including glazing material and dead air space, which serves the function of preventing heat loss through apertures in a solar energy system. Movable insulation includes, but is not limited to, insulated shutters, panels, curtains, and blinds forming an airtight seal between the aperture and the occupied or habitable space.

Movable insulation does not include non-airtight devices, even if backed with insulating material.

"Occupied space" means the area of the building within its insulated shell that is continuously thermally conditioned to levels within the human comfort range. Basements, attics, crawl spaces, garages, and storage rooms are not normally included in the occupied space.

"Oriented toward" means facing, or falling on an axis perpendicular to a line drawn from, a specified point on the compass.

"Radiation" means the process of emission, transmission, and absorption of heat energy by way of the motion of electromagnetic waves.

"Retrofit" means demolition and subsequent replacement and/or addition.

"Semipassive" or "hybrid" means a thermal system which utilizes the structure of a building and is augmented by mechanical components to provide for collection, storage and distribution of solar energy for heating or cooling.

"Skylight" means a glazed ceiling/roof penetration.

"Solarium" means a style of attached-sunspace or atrium-sunspace typically using a conventional, site-fabricated construction system.

"Structural" means elements of a building required to support the weight of its roof and/or the integrity of its walls or foundation.

"Substantial" means existing in a quantity sufficient to maximize a design's potential benefit, in accordance with accepted construction practice.

"Sunspace" means an enclosure or room designed both as habitable space and as a passive collector/absorber for solar radiation. A sunspace must have the capacity for thermal separation from the building's occupied space; it may or may not be "occupied space".

"Thermal mass" means that medium used to store solar energy as heat for re-distribution into the occupied space during periods of inadequate solar gain.

"Thermal separation" means an air tight separation between spaces with a minimum thermal resistance of R = 1.5; this thermal resistance is typical of double-glazing.

"Thermal storage" means any thermal mass utilized to store energy accumulated by a heat transfer medium or by direct solar gain. Examples of thermal storage include, but are not limited to, stone or masonry walls or floors, containers of water, rock beds, and phase change materials.

"Thermocirculating" means functioning by means of natural convection.

"Thermosiphon energy system" means any system which utilizes either air or liquid as a heat transfer medium that moves through a collection device by natural convection forces. To qualify as a passive solar thermal system, all components must exist within the insulated shell of the building. No pumps or fans are utilized in a thermosiphon energy system.

"Trombe wall" means a masonry wall or portion of a wall utilized in connection with south-facing glazing to store and re-radiate direct solar radiation. A trombe wall may re-radiate heat directly into occupied space or into a distribution medium for utilization elsewhere in the building. *(Office of the Lieutenant Governor; 16 IAC 3-2-1; filed Mar 16, 1984, 3:40 pm: 7 IR 1226; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-5) to the Office of the Lieutenant Governor (16 IAC 3-2-1) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-2 Compliance with standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.2. A passive solar energy system that does not comply with the standards in 55 IAC 4-2 does not qualify for tax credits under IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*. However, this section does not apply to a standard that is declared to be only optional or recommended. *(Office of the Lieutenant Governor; 16 IAC 3-2-2; filed Mar 16, 1984, 3:40 pm: 7 IR 1228; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-6) to the Office of the Lieutenant Governor (16 IAC 3-2-2) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-3 Direct-gain systems; collection

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.3. (a) This section applies to direct-gain systems.

(b) (Orientation) Claimed collector glazing must be oriented toward a compass-point within 30° of magnetic south; claimed collector roof-glazing or skylights must be elevated to a pitch or angle-above-horizontal of 30° or more.

(c) (Exposure) Claimed collector glazing must be exposed to direct solar radiation.

(d) (Materials) Single, double, or triple glazing is acceptable, as is light-diffusing glazing such as fiberglass. Reflective or tinted

glazing does not qualify when used in a collection aperture. Its use in roof-glazing or skylights elevated to a pitch or angle-above-horizontal of less than 30° does not disqualify the system; however, such glazing must be operable to be eligible for credit, as a control device for ventilation.

(e) (Eligibility) In direct-gain systems in new construction only, the quantity of qualifying collector glazing that is eligible for credit must be computed by subtracting the average glazed area that might be expected for conventional purposes (view, daylighting, emergency access, aesthetic design) from the actual collection aperture area, to yield the excess glazing area dedicated to the purpose of solar heating. The expected-average glazing area will be established by views of the portion of the building's exterior shell enclosing occupied space, excluding the portion containing the collection aperture itself. A worksheet for this computation is provided in the application.

Where existing glazing has been demolished, qualifying retrofitted collector glazing is fully eligible for credit. *(Office of the Lieutenant Governor; 16 IAC 3-2-3; filed Mar 16, 1984, 3:40 pm: 7 IR 1228; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-7) to the Office of the Lieutenant Governor (16 IAC 3-2-3) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-4 Direct-gain systems; absorption

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.4. (a) This section applies to direct-gain systems.

(b) (Exposure) Where claimed, absorber surfaces must be located immediately within the insolated space, and must not be obscured by materials of low conductivity such as carpeting or funishings *[sic.]*.

(c) (Materials) This subsection is an optional standard. Where enclosing solid or phase-change thermal-storage mass, these surfaces should be of a hard, dense material or dark color and low sheen, that achieves a minimum absorptivity of sixty-five percent (65%) (e.g., common red brick). The surface of liquid containers may be as above, or may be transparent or translucent. When insolation occurs on surfaces not enclosing thermal-storage mass, these surfaces should be more highly reflective. Absorber surfaces should be capable of withstanding constant surface temperatures of 180°F., and constant ultraviolet radiation without degradation or the release of potentially harmful byproducts.

(d) (Eligibility) Where claimed, absorber surfaces must be in direct contact or used in conjunction with substantial thermal-storage mass. *(Office of the Lieutenant Governor; 16 IAC 3-2-4; filed Mar 16, 1984, 3:40 pm: 7 IR 1228; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-8) to the Office of the Lieutenant Governor (16 IAC 3-2-4) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-5 Direct-gain systems; storage

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.5. (a) This section applies to direct-gain systems.

(b) (Placement) Where claimed, thermal-storage mass must be positioned so as to receive substantial direct, reflective or conductive heat gain.

(c) (Heat-retention) Where claimed, thermal-storage mass must either be insulated to minimize re-radiation of heat to unheated areas of the building, or must be completely enclosed within the insulated shell of the building so that re-radiation is contributed directly to the occupied space.

(d) (Eligibility) For thermal-storage mass materials used with a pressurized heat-transfer sub-system, no limit to the material eligible for credit is imposed; for solid materials not used with such a sub-system, not more than eight inches (8") of storage-material thickness or depth, in addition to any structural requirement of the building, is eligible for credit.

Only the cost for foundation or wall construction that is dedicated or attributable to the use of thermal-storage mass (that is, otherwise not required or in excess of that typically required by the building, using its remainder to establish the norm) is fully eligible for credit. Thermal-storage mass also used for structural purposes may be eligible for credit based on fifty percent (50%) of its actual cost. *(Office of the Lieutenant Governor; 16 IAC 3-2-5; filed Mar 16, 1984, 3:40 pm: 7 IR 1229; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-9) to the Office of the Lieutenant Governor (16 IAC 3-2-5) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-6 Direct-gain systems; distribution

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.6. (a) This section applies to direct-gain systems.

(b) (Provision) Heat-gain must be distributed into occupied space. Where convection of heated air is relied upon, a thermocirculating loop must be established.

(c) (Eligibility) Where plenums, apertures, and hatches, fans and ductwork, or pumps and piping are dedicated to the distribution of heat-gain, they are eligible for credit. *(Office of the Lieutenant Governor; 16 IAC 3-2-6; filed Mar 16, 1984, 3:40 pm: 7 IR 1229; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-10) to the Office of the Lieutenant Governor (16 IAC 3-2-6) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-7 Direct-gain systems; controls

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.7. (a) This section applies to direct-gain systems.

(b) (Provision and eligibility) Heat-loss must be controlled. The collection aperture must be equipped with moveable insulation, or window treatments of demonstrably equivalent net thermal performance, for use during periods of inadequate insolation. Such devices are eligible for credit.

(c) (Provision and eligibility) Heat-gain must be controlled. The collection aperture must be equipped with moveable insulation, adjustable shading, properly-designed overhangs, or a pressurized heat-ventilation system. Such devices are eligible for credit; only the dedicated cost for an overhang (that which is in excess of the cost of overhangs typical of the remainder of the building) is eligible for credit.

(d) (Eligibility) Where qualifying distribution devices have been equipped with manual or automatic physical or electrical switches, they are eligible for credit, as is dedicated electrical service. Such control devices or sub-systems must be dedicated to controlling the passive-solar energy system; control devices connected to the conventional heating system, such as room thermostats, furnace controls, and upper-limit cut-offs, are not eligible for credit.

Where insulation has been applied in direct contact with eligible components such as thermal-storage mass or distribution devices, and is dedicated or attributable to the retention of the system's heat-gain, it is eligible for credit. Conventional insulation measures that are typical of the building (using its remainder to establish the norm) are ineligible for credit. *(Office of the Lieutenant Governor; 16 IAC 3-2-7; filed Mar 16, 1984, 3:40 pm: 7 IR 1229; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-11) to the Office of the Lieutenant Governor (16 IAC 3-2-7) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-8 Indirect-gain sunspace systems; collection in greenhouse-style attached or atrium sunspaces

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.8. (a) This section applies to greenhouse-style attached or atrium sunspaces.

(b) (Orientation) The claimed collector/enclosure must, as an average of all glazed areas, be oriented toward a compass-point within 30° of magnetic south; a minimum pitch or angle-above-horizontal for a greenhouse-style roof is not imposed.

(c) Standards in 55 IAC 4-2-7(c) and (d) concerning exposure and materials apply.

(d) (Eligibility) In greenhouse-style construction only, the eligible cost of the qualifying collector/enclosure itself is fifty percent (50%) of its actual cost; unless specifically excepted by the department of commerce, such a sunspace is considered to serve as an enclosure of habitable space.

(e) (Eligibility) Any structural or solid portion of the exterior walls and/or roof (that is, neither a collection nor a ventilation aperture) is ineligible for credit. (See also 55 IAC 4-2-15(b)). *(Office of the Lieutenant Governor; 16 IAC 3-2-8; filed Mar 16, 1984, 3:40 pm: 7 IR 1230; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-12) to the Office of the Lieutenant Governor (16 IAC 3-2-8) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-9 Indirect-gain sunspace systems; collection in solarium-style attached or atrium sunspaces

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.9. (a) This section applies to solarium-style attached or atrium sunspaces.

(b) Standards in 55 IAC 4-2-7(b), (c), and (d) concerning orientation, exposure, and materials apply.

(c) (Eligibility) In solarium-style construction only, the eligible cost of its qualifying glazing is its actual cost; unless specifically excepted by the department of commerce, such a sunspace is considered to serve as an enclosure of habitable space.

Standards in 55 IAC 4-2-12(e) concerning eligibility applies *[sic.]*. *(Office of the Lieutenant Governor; 16 IAC 3-2-9; 13; filed Mar 16, 1984, 3:40 pm: 7 IR 1230; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-13) to the Office of the Lieutenant Governor (16 IAC 3-2-9) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-10 Indirect-gain sunspace systems; absorption; storage; distribution

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.10. (a) This section applies both to greenhouse-style and to solarium-style attached or atrium sunspaces.

(b) Absorption standards in 55 IAC 4-2-8(b), (c), and (d) concerning exposure, materials, and eligibility apply. The standards in this subsection are optional only if they are optional under 55 IAC 4-2-8(c).

(c) Storage standards in 55 IAC 4-2-9(b), (c), and (d) concerning placement, heat-retention, and eligibility apply.

(Eligibility) Further, a cost for masonry construction serving both as a foundation for the sunspace and as thermal-storage mass may be eligible for credit at the rate of fifty percent (50%) of its actual cost.

(d) Distribution standards in 55 IAC 4-2-10(b) and (c) concerning provision and eligibility apply. *(Office of the Lieutenant Governor; 16 IAC 3-2-10; filed Mar 16, 1984, 3:40 pm: 7 IR 1230; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-14) to the Office of the Lieutenant Governor (16 IAC 3-2-10) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-11 Indirect-gain sunspace systems; controls

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.11. (a) This section applies both to greenhouse-style and to solarium-style attached or atrium sunspaces.

(b) (Provision and Design) Heat-loss from conditioned space must be controlled. If thermal-storage mass is used in the sunspace, complete moveable insulation or window treatments of demonstrably equivalent net performance must be used in conjunction with either mechanically-forced distribution or operable thermal separation(s) that may be opened to permit natural convection, enabling occupied space to gain stored heat even during periods of inadequate insolation.

If thermal-storage mass is not used in the sunspace, either mechanically-forced distribution or operable thermal separation(s) that may be opened to permit natural convection must be used, enabling occupied space to gain heat during periods of insolation. During periods of inadequate insolation, distribution must be stopped and/or operable thermal separation(s) must be closed. Complete moveable insulation or equivalent window treatments may be used instead of thermal separation.

Any structural member or solid portion of the exterior walls and/or roof (that is, neither a collection nor a ventilation aperture) must be insulated to a minimum thermal resistance of R = 12. Such insulation is ineligible for credit.

Foundations or slabs enclosing or being claimed as thermal-storage mass must be insulated to a nominal minimum thermal resistance of R = 4. Such insulation is eligible for credit.

(c) (Eligibility) If moveable insulation is used in any aperture in the sunspace, it is eligible for credit.

If window treatments are used, only the dedicated insulation cost (that for heat-retention in excess of typical double-glazing, or R = 1.5) is eligible for credit when such treatments are used in apertures not qualified as collection.

If thermal separation is established, only the cost for separating devices that are dedicated or attributable to controlling the distribution of heat-gain, such as operable windows or hatches, or moveable insulation, is eligible for credit.

(d) (Provision) Heat-gain into conditioned space must be controlled. All apertures in the exterior walls may be equipped with

moveable insulation or with operable shading devices, or convective or fan-forced ventilation may be utilized. Both techniques may be used in conjunction.

(e) (Eligibility) If moveable insulation is used in any aperture in the sunspace, it is eligible for credit.

If operable shading devices are used, only those which are mounted on the exterior of the sunspace (such as awnings or "dedicated" overhangs), are enclosed between layers of glazing, or are suspended beneath roof-glazing that is otherwise impractical to shade will be eligible for credit. Other kinds of loose-fitting interior shades, blinds, curtains, or drapes are not qualifying shading devices, and are ineligible for credit.

If convective or fan-forced ventilation of heat-gain is relied upon, all plenums, apertures, hatches, dampers, fans, ductwork, wiring, and swiches *[sic.]* dedicated to such ventilation are eligible for credit. *(Office of the Lieutenant Governor; 16 IAC 3-2-11; 15; filed Mar 16, 1984, 3:40 pm: 7 IR 1230; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-15) to the Office of the Lieutenant Governor (16 IAC 3-2-11) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-12 Indirect-gain trombe wall systems

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.12. (a) This section applies to indirect-gain trombe wall systems.

(b) Collection standards in 55 IAC 4-2-7(b), (c), and (d) concerning orientation, exposure, and materials apply.

(Eligibility) When used in a trombe-wall system, all collector glazing is eligible for credit.

(c) Absorption standards in 55 IAC 4-2-8(b), (c), and (d) concerning exposure, materials, and eligibility apply.

(d) Storage standards in 55 IAC 4-2-9(b), (c), and (d), and 55 IAC 4-2-14(d) concerning placement, heat-retention, and eligibility apply.

(Sizing) A trombe-wall assembly must be a minimum of eight inches (8") thick, including its thermal-mass wall, air chamber, and collector glazing.

(e) Distribution standards in 55 IAC 4-2-10(b) and (c) concerning provision and eligibility apply.

(f) Controls. (Provision and eligibility) Heat-loss from conditioned space must be controlled. Counter-flow dampers to prevent the establishment of a reverse-thermocirculating loop may be used, or the collection aperture may be equipped with moveable insulation on its interior or exterior side. Such devices are eligible for credit.

Standards in 55 IAC 4-2-15(d) and (e) concerning the provision and eligibility of heat-gain controls apply. *(Office of the Lieutenant Governor; 16 IAC 3-2-12; filed Mar 16, 1984, 3:40 pm: 7 IR 1231; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-16) to the Office of the Lieutenant Governor (16 IAC 3-2-12) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-13 Double-envelope construction systems

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.13. (a) This section applies to double-envelope construction systems.

(b) (Design) Solar heat-gain must be introduced into the airspace-loop within the double-envelope by way of an indirect-gain system constructed in compliance with the applicable foregoing standards.

(c) (Eligibility) Cost for devices that uniquely distinguish this construction technique from standard construction are eligible for credit. These include costs for framing the internal envelope, and fire-protection and/or vapor-barrier devices installed within the airspace-loop. *(Office of the Lieutenant Governor; 16 IAC 3-2-13; filed Mar 16, 1984, 3:40 pm: 7 IR 1231; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-17) to the Office of the Lieutenant Governor (16 IAC 3-2-13) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-14 Isolated-gain thermosiphon systems; categorization

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.14. (a) For an isolated-gain thermosiphon systems energy system to be catagorized *[sic.]* as a passive-solar thermal system, all components must be installed within the insulated shell of the building.

(b) No fans, pumps, or mechanical devices may be used to circulate the heat-transfer medium within the system. *(Office of the Lieutenant Governor; 16 IAC 3-2-14; filed Mar 16, 1984, 3:40 pm: 7 IR 1232; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-18) to the Office of the Lieutenant Governor (16 IAC 3-2-14) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-15 Isolated-gain thermosiphon systems; collection

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.15. (a) This section applies to isolated-gain thermosiphon systems.

(b) (Orientation) Claimed collector glazing must be oriented toward a compass-point within 30° of magnetic south. Collector glazing for air-circulating systems must be elevated to a pitch or angle-above-horizontal of 55° or more; for liquid-circulating systems this angle must be 45° or more.

(c) Standards in 55 IAC 4-2-7(c) and (d) concerning exposure and materials apply.

(d) (Eligibility) When used in an isolated-gain thermosiphon system, all collector glazing is eligible for credit. *(Office of the Lieutenant Governor; 16 IAC 3-2-15; filed Mar 16, 1984, 3:40 pm: 7 IR 1232; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-19) to the Office of the Lieutenant Governor (16 IAC 3-2-15) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-16 Isolated-gain thermosiphon systems; absorption

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.16. (a) This section applies to isolated-gain thermosiphon systems.

(b) Standards in 55 IAC 4-2-19(a) concerning collector orientation also apply to absorber orientation.

(c) Standards in 55 IAC 4-2-8(b) concerning exposure applies *[sic.]*.

(d) (Design) Liquid thermosiphon systems may be non-glazed; they must be freezeproof without manual assistance.

(e) (Materials) All elements within the collector/absorber enclosure (or the absorber if installed separately) exposed to high temperatures shall be non-combustible or have a flame-spread rating not exceeding twenty-five (25) and a smoke-development rating not exceeding fifty (50), when tested in accordance with ASTM E 84-80, unless it can be shown that the associated temperatures will not exceed 200°F.

Further, the collector/absorber enclosure (or the absorber enclosure if installed separately) shall be constructed of non-combustible materials (e.g., metal), or of combustible materials provided the combustible materials are insulated from the associated high temperatures.

Note: Long-term exposure (years) of wood to temperatures above 212°F. can result in autoignition of the wood.

Insulation of the collector/absorber enclosure (or the absorber enclosure if installed separately) shall be capable of withstanding the temperatures developed during a minimum of thirty (30) days of "no-flow" condition. *(Office of the Lieutenant Governor; 16 IAC 3-2-16; filed Mar 16, 1984, 3:40 pm: 7 IR 1232; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-20) to the Office of the Lieutenant Governor (16 IAC 3-2-16) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-17 Isolated-gain thermosiphon systems; storage

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.17. (a) This section applies to isolated-gain thermosiphon systems and is an optional standard.

(b) Standards in 55 IAC 4-2-9(b), (c), and (d) concerning placement, heat-retention and eligibility apply.

(c) (Design) Storage tanks used in liquid thermosiphon systems must be located at a higher elevation than the collector and/or absorber.

(d) (Heat-retention) Further, insulation of a storage container shall have a minimum thermal resistance of R = 12 when installed within the insulated shell of the building, or R = 30 when forming part of the insulated shell of the building. *(Office of the Lieutenant Governor; 16 IAC 3-2-17; filed Mar 16, 1984, 3:40 pm: 7 IR 1232; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-21) to the Office of the Lieutenant Governor (16 IAC 3-2-17) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-18 Isolated-gain thermosiphon systems; distribution

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.18. (a) This section applies to isolated-gain thermosiphon systems.

(b) (Provision) Heat-gain must be distributed to storage and/or its point of use.

(c) (Design) Distribution must be achieved by way of natural convection (i.e., thermocirculation).

Further, potable water must be protected from contamination by the use of a double-wall heat exchanger if a toxic heat-transfer fluid is used in the system.

(d) (Eligibility) Where plenums, apertures, hatches, ductwork, grilles, or piping are dedicated to the distribution of heat-gain, they are eligible for credit. *(Office of the Lieutenant Governor; 16 IAC 3-2-18; filed Mar 16, 1984, 3:40 pm: 7 IR 1233; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-22) to the Office of the Lieutenant Governor (16 IAC 3-2-18) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-19 Isolated-gain thermosiphon systems; controls

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.19. (a) This section applies to isolated-gain thermosiphon systems.

(b) (Provision and eligibility) Heat-loss must be controlled. Check-valves or counter-flow dampers to prevent the establishment of a reverse-thermocirculating loop may be used, the collection aperture may be equipped with moveable insulation on its interior or exterior side, or the collector's/absorber's inlet and outlet ports may both be installed above the absorber so cold fluid contained within it stops natural convection.

(c) (Provision and eligibility) If the thermal conditioning of space is the purpose of the system, heat-gain must be controlled. Standards in 55 IAC 4-2-15(d) concerning the provision and eligibility of heat-gain controls apply. *(Office of the Lieutenant Governor; 16 IAC 3-2-19; filed Mar 16, 1984, 3:40 pm: 7 IR 1233; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-23) to the Office of the Lieutenant Governor (16 IAC 3-2-19) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-20 Semipassive or hybrid systems; mechanically pressurized thermal storage and control sub-systems

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.20. Mechanically-pressurized thermal storage and control sub-systems of a semipassive or hybrid system shall comply with all the applicable standards of 55 IAC 4-1-7 and 55 IAC 4-1-8. *(Office of the Lieutenant Governor; 16 IAC 3-2-20; filed Mar 16, 1984, 3:40 pm: 7 IR 1233; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-24) to the Office of the Lieutenant Governor (16 IAC 3-2-20) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-21 Qualified energy system certificate; compliance with application procedures

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.21. An applicant seeking tax credit under 55 IAC 4-2 shall comply with the application procedures in 55 IAC 4-1-10. However, the provisions in 55 IAC 4-1-10(a)(5) concerning the need to show evidence of manufacturer's compliance does not apply

to such an application. *(Office of the Lieutenant Governor; 16 IAC 3-2-21; filed Mar 16, 1984, 3:40 pm: 7 IR 1233; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-25) to the Office of the Lieutenant Governor (16 IAC 3-2-21) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-2-22 Appeals

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.22. The appeal procedure in 55 IAC 4-1-12 applies to an appeal under 55 IAC 4-2. *(Office of the Lieutenant Governor; 16 IAC 3-2-22; filed Mar 16, 1984, 3:40 pm: 7 IR 1233; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-2-26) to the Office of the Lieutenant Governor (16 IAC 3-2-22) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

Rule 3. Active Geothermal Systems

16 IAC 3-3-1 Definitions

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.1. For purposes of IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]* and 55 IAC 4-4, certain words and terms are defined as follows:

"Aquifer" means water-bearing subsurface stratum of permeable rock, sand, or gravel.

"ARI" means American Refrigeration Institute.

"BTU" means the amount of heat necessary to raise one (1) pound of water 1°F.

"COP (coefficient of performance)" means the measurement of efficiency, figured by dividing the quantity of energy supplied to operate a device into the quantity of heat energy delivered as an end product. (COP = Btu/hr ÷ (Watts × 3.413))

"Closed-loop geothermal heat pump system" means a water-to-air or water-to-water heat pump that utilizes underground tubing to circulate the water through the heat pump without introduction of new water or disposal of waste water, from the system. All systems that require pre-heating of water by natural gas, oil or electricity or the use of an evaporative cooling tower are excluded.

"Direct cooling coils" means large finned coils through which cold well water is pumped; warm air passes across coil, transferring its heat to the colder water.

"EER" means ratio of net capacity output in Btu/hr to energy input in watts. (EER = Btu/hr ÷ Watts)

"Geothermal heat pump" means a water-to-air or water-to-water heat pump that utilizes water whose temperature is moderated by the thermal mass of the earth.

"Groundwater" means water from beneath the ground surface, including percolating, flowing and interstatial water.

"Open-loop geothermal heat pump system" means a water-to-air or water-to-water heat pump that utilizes the water from a well or water from the bottom of a lake, and pumps that water through a water-to-air or water-to-water heat pump, then disposes of that water either into a storm sewer, into a stream or pond, or into an injection well.

"Scaling" means mineral encrustation or build-up on heat pump system piping. *(Office of the Lieutenant Governor; 16 IAC 3-3-1; filed Mar 9, 1982, 4:11 pm: 5 IR 703; filed Mar 16, 1984, 3:40 pm: 7 IR 1233; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-4-1) to the Office of the Lieutenant Governor (16 IAC 3-3-1) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-3-2 Minimum standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.2. In order for each active geothermal energy systems to become eligible for a tax credit pursuant to IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*, such systems must meet the standards in 55 IAC 4-4-7 and 55 IAC 4-4-8. *(Office of the Lieutenant Governor; 16 IAC 3-3-2; filed Mar 16, 1984, 3:40 pm: 7 IR 1234; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-4-6) to the Office of the Lieutenant Governor (16 IAC 3-3-2) by*

P.L.4-2005, SECTION 150, effective February 9, 2005.

16 IAC 3-3-3 Open-loop systems

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.3. (a) This section applies to open-loop systems.

(b) Open-loop systems shall have a coefficient of performance (COP) of 3.0 for the heating cycle, utilizing test procedures prescribed in ARI Standard 325-82 for groundwater-source heat pumps in a low-temperature heating climate (50°F entering water temperature); or utilizing ARI Standard 320-81 for water-source heat pumps (70°F entering water temperature).

(c) Open-loop systems shall have an energy efficiency rating (EER) in the cooling mode of at least 9.5 utilizing ARI Standard 325-82 for groundwater-source heat pumps in a high-temperature cooling climate (70°F entering water temperature); or utilizing ARI Standard 320-81 for water-source heat pumps (85°F entering water temperature).

(d) Open-loop systems shall utilize no more than 2.5 gallons of water per minute per ton capacity for either heating or cooling (except for direct cooling coils), based on 55°F entering water temperature. (Not applicable to lake and pond applications or closed-loop systems).

(e) Direct cooling coil systems shall utilize no more than four (4) gallons of water per minute per ton capacity; based on 55°F entering water temperature.

(f) Open-loop systems shall utilize a minimum entering water temperature of 45°F in open-loop system installations.

(g) Open-loop systems shall utilize a minimum entering water temperature of 36°F for lake and pond installations.

(h) Open-loop systems shall not dispose of waste water into a sanitary sewer.

(i) Open-loop systems may dispose of waste water into a combination storm and sanitary sewer where approved by local code.

(j) Open-loop systems shall not be an air-to-air, or air-to-water heat pump system.

(k) Any installation using ten (10) gallons of water per minute or more shall be required to submit a four (4) hour minimum pump test to show that there is adequate water in the supply well. If the well does not stabilize after four (4) hours, the test should continue for an additional twenty (20) hours. If the well does not stabilize after twenty-four (24) hours it is recommended that the owner contact the department of natural resources for information on a hydrogeological analysis. *(Office of the Lieutenant Governor; 16 IAC 3-3-3; filed Mar 16, 1984, 3:40 pm: 7 IR 1234; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-4-7) to the Office of the Lieutenant Governor (16 IAC 3-3-3) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-3-4 Closed-loop systems

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.4. (a) This section applies to closed-loop systems.

(b) Closed-loop systems shall operate at a minimum average circulating temperature of 30°F in a closed-loop installation.

(c) Closed-loop systems shall utilize non-toxic antifreeze solution to lower the freezing point to at least 20°F and operate at a maximum of 100°F.

(d) A closed loop installed in a lake must be submerged to a minimum depth of six (6) feet.

(e) Horizontal closed-loop piping systems must have at least 300 feet of two (2) inch diameter pipe per ton of capacity or its equivalent heat-exchange area.

(f) Horizontal closed-loop pipes may be installed at a minimum of four (4) feet in the same trench with a pipe installed at a depth of at least five and one-half (5 1/2) feet.

(g) Two (2) horizontal closed-loop pipes may be installed at the same depth on each side of a trench at least two (2) feet wide.

(h) Horizontal closed-loop systems must space trenches at least four (4) feet apart, measured between center-lines.

(i) Shall not be an air-to-air or air-to-water heat pump system. *(Office of the Lieutenant Governor; 16 IAC 3-3-4; filed Mar 16, 1984, 3:40 pm: 7 IR 1235; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-4-8) to the Office of the Lieutenant Governor (16 IAC 3-3-4) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-3-5 Qualified energy system certificate; application

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.5. (a) In order to receive a tax credit under IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*, the procedure in this section must be followed in submitting and processing an application for such credit.

(b) The applicant must file an application for a qualified energy system certificate with the department of commerce. This application shall include the following items:

(1) The completed application form provided by the department of commerce.

(2) Proof of costs for the purchase and installation of the qualified energy system including:

(A) Proof that the system was complete, in operation, and paid for as of December 31st of the applicable tax year prior to application for benefits.

(B) Proof that the system is installed on in-state property owned by the applicant.

(C) A breakdown of costs must be provided on each receipt. Separate costs should appear for the heat pump, cooling coils, duct work, etc. Also, labor costs must be itemized.

(D) Identification of supplier(s).

(3) The completed installer's statement of compliance, signed by the person responsible for installation of said system attesting to compliance with all standards set forth in 55 IAC 4-4.

(4) Results of a pump test showing the level of drawdown is required on open-loop systems using ten (10) gallons or more of well water per minute. System should be tested every fifteen (15) minutes for four (4) hours at a rate twenty percent (20%) higher than the maximum usage of the heat pump system.

(5) Either a manufacturer's pre-qualification (MPQ) number, or evidence that the active geothermal system meets the performance standards set forth in 55 IAC 4-4-6.

(c) Upon receiving the application, the department of commerce shall evaluate it to determine whether the energy system qualifies for the tax credit under IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*.

(d) If the department of commerce determines that the energy system qualifies for the tax credit, the department of commerce shall issue a qualified energy system certificate to the applicant; it shall also interpret and make recommendations to the department of revenue concerning the costs within the system that are eligible for credit.

(e) The department of commerce shall forward approved applications to the department of revenue for determination of the amount of credit that the applicant is entitled to under IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]*. *(Office of the Lieutenant Governor; 16 IAC 3-3-5; filed Mar 16, 1984, 3:40 pm: 7 IR 1235; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-4-9) to the Office of the Lieutenant Governor (16 IAC 3-3-5) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-3-6 Manufacturer pre-qualification number; application

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.6. (a) In order to receive a manufacturer pre-qualification number, the procedure in this section must be followed in submitting and processing an application for such number.

(b) The manufacturer must file an application for a pre-qualified geothermal heat pump number with the department of commerce.

(c) Upon receiving said application, the department of commerce shall determine whether the geothermal heat pump meets all of the pre-qualification requirements of this chapter.

(d) Prior to application the applicant shall have a representative geothermal heat pump tested at a test laboratory. This test shall have been conducted in accordance with either the requirements of ARI Standard 320-81 (tested for COP at 70° entering water temperature (EWT) and for EER at 85° EWT); or Standard 325-82 (tested for COP at 50° EWT and for EER at 70° EWT). The heat pump must have a minimum COP of 3.0; and minimum EER of 9.5.

(e) If the department of commerce determines that the maufactured *[sic.]* geothermal system does meet all of the requirements of this chapter, a pre-qualification number will be assigned to the geothermal heat pump and the manufacturer notified of said number.

(f) After a pre-qualification number has been assigned to a geothermal heat pump, that device, unaltered, will qualify for a tax credit, provided that the installation of the geothermal heat pump meets all of the requirements in these regulations. *(Office of the Lieutenant Governor; 16 IAC 3-3-6; filed Mar 16, 1984, 3:40 pm: 7 IR 1236; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-4-10) to the Office of the Lieutenant Governor (16 IAC 3-3-6) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-3-7 Appeals

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.7. The appeal procedure in 55 IAC 4-1-12 applies to an appeal concerning 55 IAC 4-4. *(Office of the Lieutenant Governor; 16 IAC 3-3-7; filed Mar 16, 1984, 3:40 pm: 7 IR 1236; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-4-11) to the Office of the Lieutenant Governor (16 IAC 3-3-7) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

Rule 6. Passive Geothermal Systems (Earth-sheltered Construction)

16 IAC 3-4-1 Minimum standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.1. In order for each passive geothermal system to become eligible for tax credit pursuant to IC 6-3-3.3 *[IC 6-3-3.3 was repealed by P.L.51-1984, SEC. 3.]* such systems must meet the standards in 55 IAC 4-4-10 and 55 IAC 4-4-11. *(Office of the Lieutenant Governor; 16 IAC 3-4-1; filed Mar 16, 1984, 3:40 pm: 7 IR 1236; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-6-1) to the Office of the Lieutenant Governor (16 IAC 3-4-1) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-4-2 Building standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.2. (a) An earth-sheltered building must utilize one (1) other qualifying space-heating system in its design. Examples of such a system include active and passive solar thermal systems and active geothermal systems.

(b) Exterior rigid-board insulation to the local frostline, plus a complete vapor barrier, must be incorporated into the earth-sheltered building shell.

(c) The cost for earth-sheltering is eligible at the rate of fifty percent (50%) of its actual cost. This includes costs for unit masonry, poured or precast concrete, and reinforcing and stabilizing elements; vapor barriers; insulation; drainage measures; excavation and backfill; structural members only of interior walls that support earth-sheltered roofs; and air-to-air heat-exchangers and dehumidifiers to assure suitable air quality.

Interior finishing of walls (sheetrock, panelling, etc.) and landscaping are ineligible for credit.

Eligible costs must be limited to the portions of the building that are actually earth-sheltered, and to components that are attributable solely to the earth-sheltering technique. *(Office of the Lieutenant Governor; 16 IAC 3-4-2; filed Mar 16, 1984, 3:40 pm: 7 IR 1236; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-6-2) to the Office of the Lieutenant Governor (16 IAC 3-4-2) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-4-3 Air-change tube standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.3. (a) Earth-sheltered air-change tubes must form part of an air-to-air thermal-conditioning system; they must be protected from the intrusion of water into the tubes; they must be protected from the intrusion of foreign objects, by way of screens or grilles

over all openings; and they must be buried, except for inlet and outlet ports, at minimum depth of six feet (6′) beneath the surface.

(b) The cost for such tubes and all required accessories, plus excavation, backfill, and associated drainage measures, and any fans, wiring, and controls dedicated to augmenting the airflow through the tubes are eligible for credit based on its actual cost. *(Office of the Lieutenant Governor; 16 IAC 3-4-3; filed Mar 16, 1984, 3:40 pm: 7 IR 1237; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-6-3) to the Office of the Lieutenant Governor (16 IAC 3-4-3) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-4-4 Qualified energy system certificate; compliance with application procedures

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.4. An applicant seeking tax credit under 55 IAC 4-6 shall comply with the application procedures in 55 IAC 4-1-10. However, the provisions in 55 IAC 4-1-10 (1)(5) concerning the need to show evidence of manufacturer's compliance does not apply to such an application. *(Office of the Lieutenant Governor; 16 IAC 3-4-4; filed Mar 16, 1984, 3:40 pm: 7 IR 1237; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-6-4) to the Office of the Lieutenant Governor (16 IAC 3-4-4) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

16 IAC 3-4-5 Appeals

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.5. The appeal procedure in 55 IAC 4-1-12 applies to an appeal under 55 IAC 4-6. *(Office of the Lieutenant Governor; 16 IAC 3-4-5; filed Mar 16, 1984, 3:40 pm: 7 IR 1237; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-6-5) to the Office of the Lieutenant Governor (16 IAC 3-4-5) by P.L.4-2005, SECTION 150, effective February 9, 2005.*

Rule 5. Alternative Energy Generating Systems; Photovoltaic, Wind, and Hydro Conversion Energy

16 IAC 3-5-1 Definitions

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.1. In 55 IAC 4-7:

"Conduit" means a natural or artificial channel through which water is conveyed.

"Generator" means a machine by which mechanical energy is changed into electrical energy.

"Governor" means a device that regulates turbine speed through water flow on synchronous generators.

"Head" means the vertical height in feet from the headwater or the point where the water enters the intake pipe, to where the water leaves the turbine housing.

"Horizontal axis wind turbine (HAWT)" means a WECS whose rotor axis is substantially parallel (± 5°) to the wind velocity.

"Innovative" means a device or practice introduced into an energy system on an experimental or prototypical basis; not yet manufactured or reproduced on a large scale.

"Inverter" means a solid state, integrated circuit or rotary mechanical device for converting direct current (DC) to alternating current (AC).

"Manufacturer" means any individual, partnership, corporation, association, or other legal entity which manufactures, assembles, or produces energy system components, or any person designated by the manufacturer as a distributor, sales, or service representative.

"Overspeed" means the speed above the designed maximum revolutions per minute (RPM) of the windmill.

"Photovoltaic system" means a system that generates electricity directly from the radiant energy of the sun.

"Turbine" means a rotary device actuated by the reaction or impulse or bolts of a current of fluid subject to pressure and usually made with a series of curved vanes on a central rotating spindle.

"Turbulence" means fluctuation in wind velocity or direction of the wind caused by obstruction in the path of the wind.

"U.L." means Underwriters Laboratory.

"Vertical axis wind turbine (VAWT)" means a WECS whose rotor axis is vertical.

"Water wheel" means a wheel made to rotate by direct action of water.

"Wind barrier" means an obstacle which impedes wind flow.

"WECS" means wind energy conversion system, a horizontal or vertical axis device for converting the kinetic energy of the wind into mechanical, thermal, or electrical energy. *(Office of the Lieutenant Governor; 16 IAC 3-5-1; filed Mar 16, 1984, 3:40 pm: 7 IR 1237; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-7-1) to the Office of the Lieutenant Governor (16 IAC 3-5-1) by P.L.4-2005, SECTION 1150, effective February 9, 2005.*

16 IAC 3-5-2 Solar photovoltaic system standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.2. (a) In order for a solar photovoltaic system to qualify for tax credit, such a system must meet the requirements of this section.

(b) Appropriate federal and state permits necessary for the installation of a photovoltaic system must be obtained; these may include a Federal Energy Regulatory Commission license or exemption, and evidence that the system meets the Indiana public service commission's interconnection standards for selling power to a utility.

(c) Applicable local building and zoning codes must be observed. Copies of any applicable permits must be submitted with the application for tax credit.

(d) Any photovoltaic system which produces greater than thirty-seven (37) watts of electricity in peak sun conditions (clear, summer sun) is eligible for a tax credit.

(e) Only those portions of the project, i.e., collection and inversion equipment related to the production of energy, are eligible for the tax credit. The cost of any bracing or storage sub-system used with a photovoltaic system is also eligible for tax credit. *(Office of the Lieutenant Governor; 16 IAC 3-5-2; filed Mar 16, 1984, 3:40 pm: 7 IR 1238; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-7-2) to the Office of the Lieutenant Governor (16 IAC 3-5-2) by P.L.4-2005, SECTION 1150, effective February 9, 2005.*

16 IAC 3-5-3 Wind energy conversion system standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.3. (a) In order for a wind energy conversion system to qualify for tax credit, such a system must meet the requirements of this section.

(b) Appropriate federal and state permits necessary for the installation of a WECS must be obtained; these may include a Federal Energy Regulatory Commission license or exemption, and evidence that the system meets the Indiana public service commission's interconnection standards for selling power to a utility.

(c) Applicable local building and zoning codes must be observed. Copies of any applicable permits must be submitted with the application for tax credit.

(d) Equipment must comply with this subsection.

(1) WECS used to generate power must yield a minimum output of thirty-seven (37) watts of electricity or equivalent mechanical energy in a twenty-five (25) MPH wind.

(2) WECS equipment shall be designed for a life expectancy of five (5) years; equipment removed prematurely shall be subject to a tax recapture.

(3) The interconnected WECS electrical system shall not sustain self-excitation or in any manner energize the electric utility service after a utility outage has occurred. The WECS electrical system shall de-energize or disconnect itself after a utility outage within a reasonable time period and not damage other connected loads or compromise the safety of the utility system.

(4) The WECS electrical system shall be designed to be capable of surviving typical utility transients, i.e., voltage spikes, low and high voltage, and over- and under-frequency.

(e) Standards for site evaluation and installation.

(f) This subsection applies to all WECS:

(1) Whenever possible, units installed in hilly terrain should be situated on top of a rise or slope exposed to prevailing wind currents.

(2) Tower structure and installation, and installation of any WECS shall be in conformance with Federal Aviation Administration (FAA) height restrictions.

(3) WECS must contain both automatic and manually-activated systems to disconnect utility interfacing in the event of a utility power failure.

(4) WECS must contain both automatic and manually-activated overspeed control to protect the system from overspeed failure.

(5) Innovative systems will be evaluated on a case-by-case basis, provided that they meet all requirements of this chapter.

(6) All wiring shall be in conformity with all local code requirements and the National Electric Code.

(g) This subsection applies to horizontal-axis WECS:

(1) Horizontal-axis WECS should be at a height principally above turbulent airflow to maximize power output and to maintain the lifespan of the unit.

(2) Horizontal-axis WECS constructed within 500 feet of wind barrier (i.e., buildings, trees, etc.) should be fixed at a height so as to allow a complete rotor to be a minimum of thirty (30) feet above such barrier(s).

(3) The rotor of a horizontal-axis WECS shall clear the ground by a minimum of fifteen (15) feet.

(h) Only those portions of the project, i.e., turbine, generator, and inversion equipment related to the production of energy are eligible for the tax credit. The cost of any bracing or storage sub-system used with a WECS is also eligible for tax credit. *(Office of the Lieutenant Governor; 16 IAC 3-5-3; filed Mar 16, 1984, 3:40 pm: 7 IR 1238; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-7-3) to the Office of the Lieutenant Governor (16 IAC 3-5-3) by P.L.4-2005, SECTION 1150, effective February 9, 2005.*

16 IAC 3-5-4 Hydroelectric system standards

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.4. (a) In order for a hydropower system to qualify for tax credit, such a system must meet the requirements of this section.

(b) Appropriate federal and state permits necessary for the installation of a hydroelectric system must be obtained; these may include a Federal Energy Regulatory Commission license or exemption, and evidence that the system meets the Indiana public service commission's interconnection standards for selling power to a utility.

(c) Applicable local building and zoning codes must be observed, and the Indiana department of natural resources rules must be observed. Copies of any applicable permits must be submitted with the application for tax credit.

(d) Only those portions of the project, i.e., the power-source and power-train related to the production of energy, are eligible for tax credit. The cost of a dam is not eligible for tax credit. *(Office of the Lieutenant Governor; 16 IAC 3-5-4; filed Mar 16, 1984, 3:40 pm: 7 IR 1239; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-7-4) to the Office of the Lieutenant Governor (16 IAC 3-5-4) by P.L.4-2005, SECTION 1150, effective February 9, 2005.*

16 IAC 3-5-5 Qualified energy system certificate; compliance with application procedures

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.5. An applicant seeking tax credit under 55 IAC 4-7 shall comply with the application procedures in 55 IAC 4-1-10. However, the provisions in 55 IAC 4-1-10(a)(5) concerning the need to show evidence of manufacturer's compliance does not apply to such an application. *(Office of the Lieutenant Governor; 16 IAC 3-5-5; filed Mar 16, 1984, 3:40 pm: 7 IR 1239; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-7-5) to the Office of the Lieutenant Governor (16 IAC 3-5-5) by P.L.4-2005, SECTION 1150, effective February 9, 2005.*

16 IAC 3-5-6 Appeals

Authority: IC 4-4-3-21
Affected: IC 6-3.1-8

Sec.6. The appeal procedure in 55 IAC 4-1-12 applies to an appeal concerning 55 IAC 4-7. *(Office of the Lieutenant*

Governor; 16 IAC 3-5-6; filed Mar 16, 1984, 3:40 pm: 7 IR 1239; readopted filed Dec 2, 2001, 12:30 p.m.: 25 IR 1267) NOTE: Transferred from the Department of Commerce (55 IAC 4-7-6) to the Office of the Lieutenant Governor (16 IAC 3-5-6) by P.L.4-2005, SECTION 1150, effective February 9, 2005.

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