Chapter SPS 371

SOLAR ENERGY SYSTEMS

Note: Chapter ILHR 71 was renumbered chapter Comm 71 under s. 13.93 (2m) (b) 1., Stats., and corrections made under s. 13.93 (2m) (b) 6. and 7., Stats., Register, July, 1998, No. 511. Chapter Comm 71 was renumbered chapter SPS 371 under s. 13.92 (4) (b) 1., Stats., Register December 2011 No. 672.

Subchapter I — Administration

SPS 371.01 Purpose. In accordance with the requirements of s. 101.175, Stats., the purpose of this chapter is to:

(1) Establish statewide standards for solar energy systems which do not impede the development of innovative systems but which do:

(a) Promote accurate consumer evaluation of solar energy systems;

(b) Conform, where feasible, with national performance standards promulgated or recognized by the federal government for solar energy systems; and

(c) Promote the production, marketing and installation of solar energy systems.

(2) Establish provisions to issue a seal of quality at the request of any manufacturer or retailer, for each solar energy system or component which meets or exceeds the quality standards, and to charge a fee to cover the cost of the seal and the cost of examining the solar energy system or component.

Note: See ch. SPS 302 for fees relating to material approvals and inspections.

(3) Establish quality standards for, but not limited to:

(a) The minimum requirements of a warranty;

(b) The minimum requirements of an operation and maintenance manual; and

(c) Minimum specifications for materials, workmanship, durability and efficiency.

(4) Provide for the inspection of any solar energy system at the request of any buyer.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

SPS 371.02 Scope. (1) PROMOTION OF CONSUMER EVALUATION. The provisions of subch. II−Consumer Evaluation are intended to promote accurate consumer evaluation of solar energy systems by:

(a) Requiring sellers to disclose information about the quality of the solar energy systems prior to sale;

(b) Identifying systems with a seal of quality that meet the quality standards specified in this chapter; and

(c) Providing inspections of solar energy systems upon request by a buyer.

(2) PROMOTION OF PRODUCTION, MARKETING AND INSTALLATION. The quality standards contained in subch. III−Definitions, subch. IV−Materials and Workmanship, subch. V−Warranty, and subch. VI−Operation and Maintenance Manual are intended to promote the production, marketing and installation of solar energy systems by:

(a) Not impeding the development of innovative systems;

(b) Conforming with national standards;

(c) Developing minimum requirements for a warranty;

(d) Developing minimum requirements for an operation and maintenance manual; and

(e) Not prohibiting the sale of solar energy systems which do not meet the quality standards specified in this chapter.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

SPS 371.03 Application. (1) PROMOTION OF CONSUMER EVALUATION. The provisions of subch. II−Consumer Evaluation are mandatory requirements and shall apply as follows:

(a) The pre−sale disclosure rules shall apply to each sale of a solar energy system with a value of more than $300.

(b) The seal of quality rules shall apply only to those systems that the manufacturer or retailer elects to have approved by the department.

(c) The voluntary inspection rules shall apply only to those systems identified as meeting the quality standards specified in this chapter.

(2) PROMOTION OF PRODUCTION, MARKETING AND INSTALLATION. The quality standards specified in subch. III−Definitions, subch. IV−Materials and Workmanship, subch. V−Warranty, and subch. VI−Operations and Maintenance Manual are recommended standards and shall apply to those systems the seller identifies on the pre−sale information form as meeting those quality standards.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

Subchapter II — Consumer Evaluation

SPS 371.05 Pre−sale information. (1) PRE−SALE FORM. Prior to the sale of any solar energy system with a value of more than $300, the seller shall furnish to the prospective buyer a completed copy of the "Solar Energy System Pre−Sale Information" form provided by the department.

Note: The "Solar Energy System Pre−Sale Information" form (SBD−7611) is available at the Department's Web site at www.dsps.wi.gov through links to Division of Industry Services forms.

(2) SELLER'S RESPONSIBILITY. The seller shall:

(a) Complete each item on the pre−sale information form;

(b) Sign and date the pre−sale information form and provide one completed copy to the prospective buyer; and

(c) Present, written and orally, the information required on the pre−sale information form with the prospective buyer present.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

SPS 371.06 Solar inspections. Pursuant to s. 101.175 (7), Stats., the department may, at the request of any buyer, inspect a solar energy system that has been sold and declared to meet the quality standards specified in this chapter. The department shall charge an applicable fee, as specified in ch. SPS 302, for the inspection.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; correction made under s. 13.93 (2m) (b) 7., Stats., Register, August, 1995, No. 476; correction made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 371.07 Seal of quality. Pursuant to s. 101.175 (2), Stats., the purpose of this section is to establish the requirements for the issuance of the seal of quality. Any manufacturer or retailer prior to the sale in this state of any solar energy system or component may request the department to issue a seal of quality for each solar energy system or component which meets or exceeds the quality standards established in this chapter.

(1) APPLICATION FOR APPROVAL. An application for the seal of quality for a solar energy system or component shall be submitted to the department. Upon receipt of a fee and a written request, the department may issue an approval number for the solar energy system or component. The department shall review and make a determination on an application for approval within 30 business days of receipt of all forms, fees, plans and documents required to complete the review.

Note: See ch. SPS 302 for fees relating to material approval.

(2) ISSUANCE OF APPROVAL. An approval number shall be issued if the department determines that the solar energy system or component meets or exceeds the requirements of this chapter.

(3) REQUIRED DATA. Sufficient data, tests and other evidence to prove that the solar energy system or component meets or exceeds the standards established in this chapter shall be submitted.

(4) REVOCATION OF APPROVAL. The department may revoke any approval issued under this section for any false statements or misrepresentation of facts on which the approval was based.

(5) MISREPRESENTATION, MISUSE OR DUPLICATION. Pursuant to s. 101.175 (6), Stats., misrepresentation, misuse or duplication of the department seal of quality issued under this section shall be deemed deceptive advertising under s. 100.18 (9m), Stats.

(6) FALSE ENDORSEMENT. A person may not advertise that the seal of quality issued by the department is an endorsement of the product by the department or the state of Wisconsin.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

Subchapter III — Definitions

SPS 371.10 Definitions. In this chapter, the following definitions shall apply.

(1) "Absorber" means that part of a solar collector whose primary function is to absorb radiant energy and transfer it to a fluid. In photovoltaic solar energy systems, the function is to generate electrical energy.

(2) "Active solar energy system" means any mechanical system which collects solar radiation in the form of thermal energy and uses a heat transfer fluid to transport the thermal energy to meet load requirements or to thermal storage.

(3) "Air system" means an active solar energy system that uses air as the heat transfer fluid.

(4) "Approved" means acceptable to the department.

(5) "Auxiliary energy system" means equipment using non−solar energy sources to supplement or backup the output provided by a solar energy system.

(6) "Building" means a structure for support, shelter or enclosure of persons or property, other than a one− or 2−family dwelling.

(7) "Closed loop system" means an active solar energy system in which a closed piping system, containing a fixed charge of heat transfer fluid, transfers heat from collectors to storage or use.

(8) "Collector" means a device designed to absorb incident solar radiation and to transfer the energy to a fluid passing through it.

(9) "Collector cover" means the material covering the aperture to provide thermal and environmental protection.

(10) "Component" means a distinct device or assembly that forms a functional part of a solar energy system including, but not limited to, collectors, thermal storage, heat exchangers, controls, pumps, fans, dampers and valves. Unless otherwise specified, such as a building component, a component shall have the above definition.

(11) "Department" means the department of safety and professional services.

(12) "Design pressure" means the maximum allowable continuous or intermittent pressure for which a specific part of a solar energy system is designed to operate safely and reliably.

(13) "Design temperature" means the maximum allowable continuous or intermittent temperature for which a specific part of a solar energy system is designed to operate safely and reliably.

(14) "Drainback system" means a closed loop system which allows gravity draining of the heat transfer fluid into lower portions of the solar loop under prescribed circumstances.

(15) "Draindown system" means an active solar energy system in which the fluid in the solar collector is drained from the solar energy system under prescribed circumstances.

(16) "Dwelling" means any building which contains one or 2 dwelling units.

(17) "Flammable liquid" means a liquid having a flash point below 100ºF and having a vapor pressure not exceeding 40 psia at 100ºF.

(18) "Fluid" means a liquid or gas.

(19) "Heat exchanger" means a device designed to transfer heat between two physically separated fluids.

(20) "Heat transfer fluid" means the medium used to transfer energy from the solar collectors to the thermal storage or load.

(21) "Heated space" means any space maintained at a temperature of at least 50ºF.

(22) "Hot water" means water heated for domestic or industrial use.

(23) "Liquid system" means an active solar energy system that uses liquid as the heat transfer fluid.

(24) "Maximum operating pressure" means the maximum pressure experienced in a system, under any normal operating conditions including no−flow.

(25) "Maximum operating temperature" means the maximum temperature experienced in a system, under any normal operating conditions including no−flow.

(26) "No−flow condition" means the condition that results when the heat transfer fluid does not flow through the collector array due to normal shut−down or malfunction.

(27) "Open loop system" means an active solar energy system in which water for domestic or industrial use is directly heated in collectors.

(28) "Outgassing" means the emission of gases by component materials usually during exposure to elevated temperatures or reduced pressures.

(29) "Owner" means any person having a legal or equitable interest in the solar energy system.

(30) "Photovoltaic" means a solar energy system that converts radiant solar energy directly into electrical energy.

(31) "Potable water" means water which is:

(a) Safe for drinking, personal or culinary use; and

(b) Free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming in its bacteriological and chemical quality to the requirements specified in ch. NR 809.

(32) "Primary solar duct system" means the duct system between the collectors and thermal storage and the ducts making connection to the space distribution system.

(33) "Seal of quality" means a written approval by the department documenting certification and compliance with specific quality standards.

(34) "Solar energy system" means equipment which directly converts and then transfers or stores solar energy into usable forms of thermal or electrical energy.

(35) "System designer" means a person who offers for sale a solar energy system as a complete package, the components of which may be produced by different manufacturers.

(36) "Thermal resistance (R)" means a measure of the ability to retard the flow of heat.

Note: The R−value is the reciprocal of the heat transfer coefficient, expressed by U (R = 1/U). The higher the R−value of a material, the more difficult is it for heat to flow through the material.

(37) "Thermal storage" means a container and its contents used for storing thermal energy.

(38) "Tilt angle" means the angle above horizontal of a plane surface.

(39) "Toxic fluids" means fluids which are poisonous or irritating in nature or composition.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; correction in (31) (b) made under s. 13.93 (2m) (b) 7., Stats., Register, August, 1995, No. 476; correction in (11) made under s. 13.92 (4) (b) 6., Stats., Register December 2011 No. 672.

Subchapter IV — Materials and Workmanship

SPS 371.20 Purpose. Pursuant to s. 101.175 (4) (c), Stats., this subchapter establishes quality standards for materials and workmanship for solar energy systems and components. Sections SPS 371.21 to 371.26 shall apply to active solar energy systems and components. Section SPS 371.30 shall apply to photovoltaic solar energy systems and components.

Note: The requirements of this subchapter are recommended standards. See s. SPS 371.03.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; correction made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 371.21 General installation requirements.

(1) ACCESS, LOCATION AND CLEARANCES. (a) *Access.* Components shall be accessible for required routine maintenance without trespassing on adjoining property or disassembling any major portion of the solar energy system, building or dwelling.

(b) *Location.* 1. Components within 10 feet horizontally of a chimney or vent shall be at least 2 feet below the top of the chimney or vent.

2. The location of components may not interfere with the operation of required doors, windows or other building components.

Note: Components may be subject to local zoning requirements.

(c) *Clearances.* 1. Combustible materials may not be exposed to components having maximum operating temperatures that can cause ignition. Clearances to combustible materials specified in the component listing or by the component manufacturer shall be maintained.

2. Clearance between combustible materials and unlisted components shall be maintained in accordance with Table 371.21−A.

Table 371.21−A
Clearance Between Combustible Materials and Unlisted Components

Maximum Sustained Surface Temperature	[1]Required Clearance (inches)
200ºF or less	0
201ºF to 250ºF	1
251ºF to 500ºF	6
Over 500ºF	Approval required

[1]If approved insulation protects the component, the required clearance may be reduced by 50%.

(2) MATERIAL TESTS AND STANDARDS. The installation of, as well as all materials used in the construction of, solar energy systems shall meet the applicable requirements specified in chs. SPS 320 to 325, 361 to 366, and 381 to 387 and this chapter. Where different chapters specify different requirements, the most restrictive material test and installation standard shall apply.

(3) INSULATION. (a) *General.* Insulation of piping, ducts and thermal storage containers shall be of a type satisfactory for its intended purpose and installed in accordance with recognized standards and practices.

1. 'Flame spread rating.' The flame spread rating for all insulation materials may not exceed the following values:
Plastic foam: 75
Other insulation materials: 150

2. 'Compressive loads.' Insulation shall be protected against compressive loads from pipe and duct supports and storage tanks.

3. 'Exterior insulation.' Exterior insulation shall be capable of withstanding moisture, ultraviolet radiation, and environmental exposure.

(b) *Piping.* Pipes of nominal size of one and one−half inch or larger shall be insulated to a thermal resistance value of R−4 or greater. All other piping in the solar energy system shall be insulated to a thermal resistance value of R−3 or greater. A vapor barrier, if installed, shall be located on the warm side of the insulation.

(c) *Ducts.* Ductwork located in unheated spaces shall be insulated to a thermal resistance value of R−11 or greater, where space permits. Ductwork in heated spaces shall be insulated to a thermal resistance value of R−3 or greater. A vapor barrier, if installed, shall be located on the warm side of the insulation.

(d) *Thermal storage.* 1. 'Thermal storage – liquid systems.' Thermal storage for liquid systems located in unheated spaces shall be insulated to an overall thermal resistance value of R−16 or greater. Thermal storage for liquid systems installed in heated spaces shall be insulated to an overall thermal resistance value of R−11 or greater.

2. 'Thermal storage – air systems.' Thermal storage for air systems located in unheated spaces shall be insulated to an overall thermal resistance value of R−38 or greater. Thermal storage for air systems installed in heated spaces shall be insulated to an overall thermal resistance value of R−11 or greater.

(4) PROTECTION. (a) *Protection against vermin.* All penetrations of the building or dwelling by components shall be properly sealed with noncombustible material to prevent the entrance of vermin.

(b) *Protection against vehicular or pedestrian traffic.* Components exposed to vehicular or pedestrian traffic shall be protected against impact damage.

(c) *Protection against water penetration.* All penetrations by components into a building or dwelling from the outside shall be properly sealed and waterproofed with approved materials to prevent leaks, insects and drafts from entering the building or

dwelling. All penetrations shall be made using weatherproof devices which will allow for expansions and contractions.

(d) *Protection against decay and termites.* Wood used in the construction of the collector or mounting, and exposed to outdoor conditions shall be pressure−treated with preservative or shall be a naturally durable, decay resistant species of lumber and shall be protected against termites.

(e) *Protection from heated components.* Components which are maintained at temperatures above 170° F shall be protected from human contact. The protections may be in the form of insulation, metal or plastic guards.

(5) SMOKE DETECTORS. All dwellings that contain air systems with wood−frame collectors shall be provided with smoke detectors as specified in s. SPS 321.09.

(6) FIRE PROTECTION. The design and installation of the solar energy system and components shall provide a level of fire safety consistent with chs. SPS 320 to 325 for one− and 2−family dwellings, or chs. SPS 361 to 366 for commercial buildings.

(a) *Vents, pipes and ducts.* 1. 'Existing buildings.' An existing building's vents, pipes, and ducts, installed for the operation of the solar energy system, shall comply with chs. SPS 361 to 366.

2. 'Existing dwellings.' Existing dwellings shall be provided with draftstopping at openings around vents, pipes and ducts installed for the operation of the solar energy system. Draftstopping materials may not be less than $^1/_2$ −inch gypsumboard, $^3/_8$ −inch plywood, mineral−based insulation or other approved materials.

(b) *Collectors.* A collector intended for installation integral with or forming a part of the building or dwelling roof structure and its associated roof covering material, may not reduce or impair the fire resistance of the designated roof covering material.

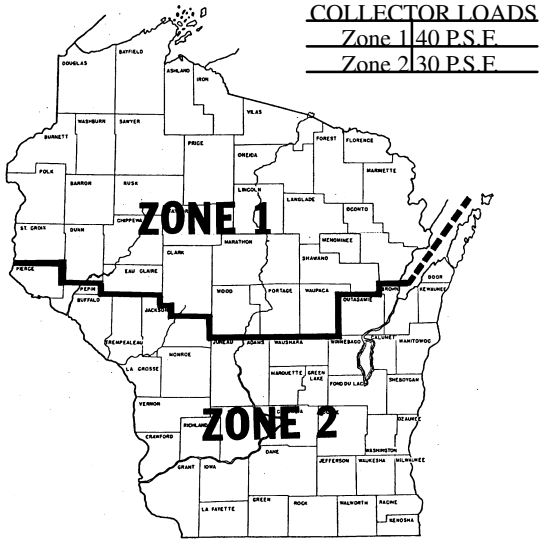
(7) LOADS. The structural design of the solar energy system, including connections and supporting structural elements, shall be based on loads anticipated during the design life of the solar energy system. Roof loading due to the following loading effects shall be included in the design of all structural elements influenced by these loads:

(a) *Dead loads.* 1. 'Collector.' The collector and supporting structure, including building components, shall be designed and constructed to support the weight of the collector, other components and heat transfer fluids.

2. 'Thermal storage.' The thermal storage and supporting structure shall be designed and constructed to support the weight of the storage container, components, heat transfer fluids and storage medium.

(b) *Live loads.* 1. 'Use.' Surfaces that must support maintenance personnel shall resist a load of 250 pounds distributed over a 4−inch square area.

2. 'Wind, snow and seismic.' The collector, including any mounting hardware and building components, shall be designed and constructed to resist the wind and snow loads specified in chs. SPS 320 to 325 for one− and 2−family dwellings, or the wind, snow and seismic loads specified in chs. SPS 361 to 366 for commercial buildings.



History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; CR 01−139: am. (2), (5), (6) (intro.), r. and recr. (7) (b) 2., r. (7) (b) 3. Register June 2002 No. 558, eff. 7−1−02; correction in (6) (a) 1. made under s. 13.93 (2m) (b) 7., Stats., Register June 2002 No. 558; correction in (1) (c) 2., (2), (5), (6) (intro.), (a) 1., (7) (b) 2. made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 371.22 General mechanical requirements.

(1) INTERCONNECTIONS. When a solar energy system and an auxiliary energy system are interconnected, the design temperature or design pressure of either system may not be exceeded. The interconnection may not compromise or bypass any required safety devices on either system. Auxiliary equipment shall be compatible with the solar energy system output, including but not limited to, temperatures, pressures and heat transfer fluid type.

(2) IDENTIFICATION OF MATERIALS. Components and materials used in solar energy systems shall be permanently marked or labeled by the manufacturer as to the component's limitations. All listed components shall have the seal of the listing agency permanently affixed to the component.

(3) RELIEF VALVES. (a) *Pressure relief.* 1. All components of the solar energy system having valves capable of isolating heat generating or heat transfer components shall be provided with an approved, adequately sized pressure relief valve. The installation of the relief valve discharge shall be in accordance with s. SPS 382.40 (5).

2. The pressure relief valve shall be set at a pressure not to exceed the design pressure of the solar energy system or component or 150 psig, whichever is lesser. The relief valve settings may not exceed the recommendations of the valve manufacturer.

(b) *Vacuum relief.* Vacuum relief valves shall be installed as required in s. SPS 382.40 (5).

(c) *Temperature relief.* 1. Temperature relief valves shall be of adequate relief rating expressed in Btu/hr for the components served.

2. Temperature relief valves shall be installed in thermal storage so that the temperature sensing element is immersed within the top 6 inches of a storage tank that contains liquid. The temperature relief valve shall be set to open at 210° F or less.

(d) *Combination pressure−temperature relief valves.* Combination pressure−temperature relief valves shall comply with all the requirements of the separate pressure and temperature relief valves.

(e) *Entrapped air.* Except for drainback systems, the solar energy system shall provide means for removing air at the highest point of the system when liquid heat transfer fluids are used.

(4) HEAT EXCHANGERS. (a) Except as provided in par. (b), wherever potable water is interfaced with toxic heat transfer fluids, a double wall heat exchanger, with positive leak detection vented to the atmosphere, shall be provided. The vent shall be located at the lowest part of the heat exchanger or as approved by the department.

(b) Where air is the heat transfer fluid, a single wall heat exchanger may be used. Where potable water is the heat transfer fluid, direct connection to the potable water system is allowed or a single wall heat exchanger may be used.

(5) HEAT TRANSFER FLUIDS. (a) Solar energy systems using liquid heat transfer fluids shall have a label attached to the thermal storage indicating the heat transfer fluid's name, freezing point and pH, and the system designer's recommendations for checking and maintaining the heat transfer fluid.

(b) The heat transfer fluid contained in a non−draindown or non−drainback system shall be able to withstand temperatures of at least −35ºF before freezing.

(c) Only heat transfer fluids recommended by the system designer for use in the solar energy system shall be used. Ethylene glycol may not be used for solar energy systems in one− and 2−family dwellings, but may be used in buildings.

(d) Flammable liquids may not be used as heat transfer fluids.

(e) The heat transfer fluid shall be capable of withstanding design temperatures without rapid thermal degradation.

(f) The flash point of the heat transfer fluid shall exceed, by 50ºF, the maximum operating temperature of the solar energy system.

(g) Drains and other designated heat transfer fluid discharge or fill points in solar energy systems at which toxic, combustible or high temperature heat transfer fluids may be discharged shall be labeled with a warning describing the identification and hazardous properties of the fluid, instructions concerning the safe handling of the fluid, and emergency first aid procedures.

(6) CONTROLS. (a) Controls, dampers and valves shall be marked to identify their function. Any control that serves as an emergency shutdown device shall be so identified by a conspicuous and permanent label.

(b) Automatic control of the heat transfer fluid circulation between the collector and thermal storage or load shall be used to limit operations to conditions when useful energy can be collected.

(c) Fail−safe controls shall be designed so that in the event of a power failure, or a failure of any component in the solar energy system, the temperature or pressure or both developed in the solar energy system, will not damage the component or the building or present a danger to the occupants.

(d) Controls shall be selected and installed so that the solar energy system and auxiliary energy system will operate together and independently.

(e) Space heating and control thermostats shall be installed in accordance with the manufacturer's or system designer's instructions. Space heating thermostats shall be located away from drafts, heat sources and exterior walls. Mercury bulb thermostats shall be leveled to assure satisfactory operation. Thermostats mounted outdoors shall be suitable for outdoor environmental exposure.

(f) Controls shall be installed to prevent component damage from thermal shock.

(g) Controls shall include provisions for manual bypass, adjustment or override of automatic controls as is required to facilitate installation, startup, shutdown and maintenance.

(7) CORROSION. (a) All materials used in the solar energy system shall be compatible. All components in contact with the heat transfer fluid used in the solar energy system shall be compatible with the heat transfer fluid.

(b) All metal parts, including screws, bolts, and washers, which are not inherently corrosion resistant and are exposed to atmospheric conditions, shall be protected from corrosion by painting, plating, or similar means.

(c) Metallic parts which provide protection to either electrical components or internal building structures shall be galvanically compatible and protected from corrosion.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; corrections in (3) (a) and (b) made under s. 13.93 (2m) (b) 7., Stats., Register June 2002 No. 558; correction in (3) (a) 1., (b) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 371.23 Collectors. (1) COLLECTOR CERTIFICATION REQUIREMENTS. After January 1, 1987, all collectors shall be certified by the Solar Rating and Certification Corporation (SRCC), the Air Conditioning and Refrigeration Institute (ARI) or equivalent. This provision does not apply to home−built systems, custom−built systems and small manufacturers. As used in this subsection:

(a) "Home−built system" means an owner−installed solar energy system incorporating a collector assembled by the system owner from components, but does not include manufactured collectors supplied as an integral unit and installed by the owner.

(b) "Custom−built system" means a one−of−a−kind solar energy system incorporating a collector fabricated at the installation site from components, but does not include modular systems in which the modular components are assembled at the installation site.

(c) "Small manufacturer" means a business that builds or assembles less than 2500 square feet of collector per year and elects not to list with SRCC or ARI.

Note: Certification of collectors by the SRCC and the ARI is based on the American Society of Heating, Refrigerating and Air−Conditioning Engineers (ASHRAE) standards 93−77 and 95−1981. Further information can be obtained from the Solar Rating and Certification Corporation, 1001 Connecticut Avenue, N.W., Suite 800, Washington, D.C. 20036, or the Air−Conditioning and Refrigeration Institute, 1501 Wilson Boulevard, 6th Floor, Arlington, VA 22209.

(2) COLLECTOR TILT AND ORIENTATION. Collectors shall be installed as close to the optimum tilt angle as conditions allow and within 45º of due south.

(3) COLLECTOR DESIGN AND CONSTRUCTION. (a) *Transmission losses due to outgassing.* Outgassing of volatiles from components may not reduce the collector performance below the declared collector performance when the collector is exposed to the temperatures and pressures that will occur in actual service.

(b) *Dirt retention.* The cover plate under normal weather conditions may not, with normal maintenance, collect or retain excessive dirt.

(c) *Glass.* Glass used in collector construction shall be tempered.

(d) *Glazings.* Glazings subject to human impact and within 7 feet of ground level shall be safety glazing material constructed, treated or combined with other materials so as to minimize the likelihood of cutting and piercing injuries resulting from human impact with the glazing material.

(e) *Plastic.* Plastic used in collector construction shall be capable of withstanding the maximum operating pressure and temperature, and shall be used in accordance with manufacturer's recommendations.

(f) *No−flow.* The collector shall be capable of withstanding no−flow conditions.

(g) *Leakage.* The construction of the collector shall provide protection against:

1. External leakage of the heat transfer fluid from the collector;

2. Internal leakage into the collector from environmental conditions; and

3. Internal leakage of the heat transfer fluid from the collector from cleaning operations as performed during routine maintenance as specified in the operation and maintenance manual.

(h) *Corrosion.* 1. All materials used in the absorber or heat transfer fluid conduits may not be pitted, corroded, or otherwise degraded by the heat transfer fluid to an extent that will result in failure during its design life.

2. In closed loop systems, aluminum may not be connected with copper or iron. Separation of different pipe materials by isolating bushings is not acceptable.

(i) *Ultraviolet stability.* All materials used in the collector may not degrade when exposed to ultraviolet radiation to an extent that will reduce the collector performance below the declared collector performance.

(j) *Insulation.* Collector insulation shall be capable of withstanding moisture, ultraviolet radiation, and environmental exposure.

(4) COLLECTOR MOUNTING AND INSTALLATION. (a) *Mounting.* 1. 'Mounting on roofs.' Load design requirements shall be in accordance with s. SPS 371.21 (7).

2. 'Mounting on the ground.' When collectors are located on concrete slabs, the slab shall be a minimum of 4 inches thick. Collectors shall be located a minimum of 6 inches above the ground surface. Collectors installed on the ground shall be adequately supported and anchored.

3. 'Collector stresses.' Structural supports may not impose undue stresses on the collector.

4. 'Wood.' All wood components used in collector mounting which are exposed to the environment shall be resistant to decay in accordance with s. SPS 371.21 (4) (d). Wood used in collector frames or housings shall be protected against structural degradation due to high temperature exposure.

5. 'Metal.' All metal parts shall be protected from environmental conditions in accordance with s. SPS 371.22 (7) (b) and (c).

6. 'Tilt and orientation.' Structural supports shall be constructed to maintain collector tilt and orientation within design conditions throughout the life of the solar energy system.

(b) *Installation.* 1. 'Instructions.' Collectors shall be installed in accordance with the instructions provided by the system designer.

2. 'Fire protection.' Collectors made of combustible materials may not be located on or adjacent to construction required to be of noncombustible materials. Collector installation shall also comply with s. SPS 371.21 (6).

3. 'Safety.' Safe access to components subject to deterioration or failure, such as rubber hoses, joint sealants, and cover plates, shall be provided to allow for maintenance or repair. For roof−mounted collectors, the work space adjacent to collectors and provisions for safe placement of ladders shall be considered.

4. 'Moisture protection.' Collector installation may not contribute to moisture buildup, rotting, or other accelerated deterioration of roofing materials. Collectors and structural supports shall be installed in a manner such that water flowing off the collector surface and structural supports will not accelerate formation of ice dams or cause water damage to the building or dwelling. Provisions shall be taken to minimize buildup of snow upon collectors, which may reduce their effectiveness.

5. 'Caulking and sealing.' Joints between structural supports and buildings or dwellings shall be caulked and flashed to prevent water leakage. Bolts or other means of fastening the collector or structural supports to the roof shall be sealed from water penetration.

6. 'Filling and draining.' Interconnecting piping or ducting shall be installed to minimize flow restrictions and to provide balanced flow. Piping shall be installed to allow for filling and draining.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; correction in (4) (a) 1., 4., 5., (b) 2. made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 371.24 Air systems. This section shall apply to active solar energy systems and components that use air as a heat transfer fluid.

(1) AIR DISTRIBUTION. (a) *Size.* Air distribution components shall be adequately sized to insure a uniform distribution of air.

(b) *Dust and dirt prevention.* 1. 'Flow efficiency and health hazard.' Duct and fan systems shall be protected against accumulation of deposits of dust or dirt that could reduce flow and efficiency or create a potential health hazard when admitted into occupied spaces.

2. 'Air filters'. Air filters shall be installed on the outlet side of the thermal storage in solar energy systems. Air filters shall be removable to allow cleaning. Solar energy systems used for space heating shall incorporate the use of a high efficiency air filter installed in the cold air riser duct to the collectors unless the air does not pass over the absorber.

(c) *Insulation.* The primary solar duct system shall be insulated as specified in s. SPS 371.21 (3).

(d) *Ductwork.* 1. 'Interior ducts'. Interior ducts shall comply with chs. SPS 320 to 325 for one− and 2−family dwellings or chs. SPS 361 to 366 for commercial buildings.

2. 'Exterior ducts'. Ducts located outside the dwelling or building shall be constructed of galvanized steel or corrosion−resistant metal.

(e) *Temperature, pressure and exposure.* Ducts, insulation, gaskets, sealants and adhesives shall be capable of withstanding maximum operating temperatures, pressures and environmental exposure.

(f) *Bypass.* Solar energy systems providing both space heating and domestic water heating shall be equipped with a bypass of the thermal storage during the nonheating season.

(2) SEALING OF AIR SYSTEMS. (a) *Duct system.* The primary solar duct system shall be sealed in accordance with the following requirements:

1. All joints in metal ducts shall be made with good fit−up and closure.

2. Joints and seams shall be sealed with adhesives, mastics or compatible combinations of tape binders and adhesives in ducts conveying air to and from storage units and solar collectors and in ducts conveying air from such circuits to points of connections with ducts circulating air to and from the occupied space.

3. Tapes shall be used in accordance with manufacturer's recommendations.

4. Oil−base caulking and glazing compounds may not be used.

5. Stapled closures of duct connections and stapled fitting assemblies shall be sealed.

Note: The purpose of these requirements is to reduce the duct loss to 10% or less. It is not the intent to require testing of the installed system to determine duct leakage, but to assure construction standards which will essentially provide the required degree of airtightness in the primary solar duct system. Construction which will provide equivalent airtightness will be allowed in lieu of the sealing requirements.

(b) *Thermal storage.* Thermal storage shall be constructed and sealed or otherwise fabricated to limit air leakage. Sealing shall include joints in thermal storage, duct and access openings.

Note: This is not intended to apply to thermal storage which is thermally coupled to heated spaces. Concrete should be considered potentially porous and may require lining and sealing to limit air leakage. Problems associated with shrinking, warping and cracking should be considered for thermal storage constructed of wood.

(c) *Collectors and components.* Collectors and other components, such as air handling units, heat exchangers and filters, shall be assembled and sealed in accordance with manufacturer's and system designer's instructions. Sealing shall include all joints

between components and ducts. Equivalent airtightness shall be provided for site−built collectors.

(3) FREEZE PROTECTION. (a) *Cold airflow prevention.* The solar energy system shall be designed and installed to prevent cold airflow across the water heater coil. If mechanical dampers are used to meet this requirement, they shall not allow leakage of more than 5% of the solar energy system design airflow rate at one−inch water column.

(b) *Secondary freeze protection.* Solar energy systems using electrical or mechanical devices for freeze protection, shall incorporate a secondary freeze protection system in case of mechanical failure. An electrical freeze sensor which activates the pump to circulate fluid through the water heater coil may be used to meet this requirement.

(c) *Nonautomatic freeze protection.* Any nonautomatic freeze protection shall be noted as such in the operation and maintenance manual.

(4) THERMAL STORAGE. (a) *Air quality.* Heat transfer fluid, heat storage media and thermal storage materials, including any interior protective coating, may not impart toxic elements or offensive odors to air distributed to areas of human occupancy.

(b) *Insulation.* Thermal storage shall be insulated in accordance with s. SPS 371.21 (3).

(c) *Loads and environmental conditions.* Loads shall meet the requirements of s. SPS 371.21 (7). Thermal storage located outside or underground shall be waterproof.

(d) *Rock storage.* When rock is utilized for thermal storage, the rock shall be cleaned and dried before it is placed into the storage area. The thermal storage shall be provided with an inlet and an outlet plenum.

(e) *Phase change.* If phase change storage materials are used, they shall be placed in sealed containers.

(5) DAMPERS. (a) Volume control dampers shall be installed in each branch or zone duct. Single leaf dampers which are a part of a manufactured air grille may not be used.

(b) Opposed blade dampers which are a part of a manufactured air grille shall be acceptable if sufficient space is provided behind the grille face for proper operation of the damper. Where space prohibits the use of an opposed blade damper behind the grille face, an opposed blade damper may be installed in the register stack at a location where it is accessible from the grille opening.

(c) Volume control dampers shall be of a type and size that will satisfy the design conditions of the duct system.

(d) Backdraft dampers or motorized dampers shall be installed so as to prevent air passage through the collectors when solar energy is not being collected.

(e) Dampers installed in the primary solar duct system shall have felted blade edges or otherwise be treated to insure tight cutoff of the airstream.

(f) Volume control dampers shall be furnished with a locking control device to hold the damper in its fixed control position unless the damper is motor controlled.

(6) BLOWERS. (a) Blowers shall be of a type and size that will satisfy the design conditions of the solar energy system.

(b) All blowers shall be rated by the manufacturers in cfm capacity against a specific external static pressure.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; CR 01−139: am. (1) (d) 1. Register June 2002 No. 558, eff. 7−1−02; correction in (1) (c), (d) 1., (4) (b), (c) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 371.25 Liquid systems. This section shall apply to active solar energy systems and components that use liquid as a heat transfer fluid.

Note: The connection of a solar energy system to the potable water supply system may require the obtaining of a local plumbing permit.

(1) LIQUID DISTRIBUTION. (a) *Design.* Components shall be designed for flow rates, temperatures, pressures, mechanical stresses, material properties and heat transfer fluid characteristics to provide proper and efficient performance.

(b) *Pipe.* 1. 'Size.' Pipe sizing shall be in accordance with accepted design practice or recognized methods.

Note: The sizes of pipe to be used for mains and risers may be selected from the ASHRAE Guide and Data Book, published by the American Society of Heating, Refrigerating and Air−Conditioning Engineers; or from the manuals published by The Hydronics Institute, 35 Russo Place, Berkely Heights, New Jersey 07922 or the Mechanical Contractors Association of America, 5410 Grosvenor Lane, Suite 120, Bethesda, Maryland 20814.

2. 'Pipe materials.' Piping materials for open loop systems shall comply with s. SPS 384.30. Piping materials for closed loop systems shall be schedule 40 black pipe, type K, L or M copper, or other pipe approved by the department. Unglazed, nonconcentrating collectors, limited to unpressurized systems for swimming pool and spa heating applications, with a maximum operating temperature of 200ºF, may utilize rubber or plastic plates and piping.

3. 'Draining and filling.' Where the design requires piping to be drained to protect the solar energy system from freezing or where the heat transfer fluid must be replaced as part of regular maintenance, the piping shall be pitched toward a designated point in the solar energy system to permit drainage. Appropriate valving to drain and fill the solar energy system shall also be supplied.

4. 'Hangers and supports'. Pipe hangers and supports shall be in accordance with s. SPS 382.60.

5. 'Identification of potable and nonpotable water.' The identification of potable and nonpotable water piping systems shall be in accordance with s. SPS 382.40 (3) (b).

6. 'Insulation.' Piping shall be insulated in accordance with s. SPS 371.21 (3).

(c) *Valves.* 1. Relief valves shall be designed and installed in accordance with s. SPS 371.22 (3).

2. All required shutoff or control valves shall be readily accessible.

3. Valves used to charge or drain closed loop systems shall be the loose−key type, have valve outlets capped or have handles removed when the solar energy system is operational.

4. The cold water branch to each thermal storage tank or water heater shall be provided with a valve located in the same room near the equipment and serving only this equipment in accordance with s. SPS 382.40 (4).

(d) *Sealants and gaskets.* Gaskets, sealants, hoses and other plastic, rubber and synthetic parts may not be adversely affected by contact with heat transfer fluids, high temperatures, high pressures or sunlight to an extent that their ability to function is impaired.

(2) PUMPS. Pumps shall be sized to provide an adequate flow. Pumps shall be properly matched with the heat transfer fluid so that potable water quality is maintained and pump and loop parts are not degraded under normal operating conditions.

Note: It is recommended to use centrifugal−type pumps.

(3) PROVISIONS FOR LIQUID EXPANSION. (a) *Liquid expansion required.* Any portion of the solar energy system utilizing a closed loop shall be provided with a means for liquid expansion. The expansion tank, or other approved method, shall have the capacity to withstand the heat transfer fluid expansion from minimum to maximum design temperatures and be compatible with the heat transfer fluid.

(b) *Open expansion tanks.* Solar energy systems, equipped with an open expansion tank to satisfy heat transfer fluid expansion, shall be provided with an indoor overflow, from the upper portion of the expansion tank, in addition to an open vent. The indoor overflow shall be carried within the building or dwelling to an approved drain.

(c) *Closed loop systems.* 1. Closed loop systems shall have an airtight tank or other suitable air cushion that shall be:

a. Consistent with the volume and capacity of the closed loop system; and

b. Suitably designed for a hydrostatic test pressure of 2.5 times the design pressure of the closed loop system.

2. Expansion tanks for closed loop systems designed to operate at or above 50 psig shall be constructed in accordance with ch. SPS 341.

(4) THERMAL STORAGE. Thermal storage for domestic or industrial use shall meet the requirements of s. SPS 382.40 (5) and the following:

(a) Thermal storage shall be located in heated areas whenever possible.

(b) Thermal storage shall be insulated in accordance with s. SPS 371.21 (3).

(c) Thermal storage shall be located to provide for servicing.

(d) Thermal storage shall be designed and installed to withstand all anticipated loads and environmental conditions.

(e) Thermal storage shall be designed for maximum operating temperatures and pressures.

(f) Pressurized thermal storage shall be provided with relief valves in accordance with s. SPS 371.22 (3).

(g) Only pressurized thermal storage shall be used for potable water.

(h) Concrete thermal storage tanks may not be pressurized.

(i) Thermal storage buried outdoors shall be located at least 3 feet away from the building for every foot excavated below the footing.

(j) Nonpressurized thermal storage shall be provided with a vent to the outside atmosphere. The thermal storage opening for the vent shall be sealed at the penetration of the thermal storage, and the vent shall be provided with a $^1/_{16}$−inch mesh screen to prevent the entrance of vermin.

(k) Nonpressurized thermal storage shall be provided with an overflow piped to an approved drain.

(5) JOINTS AND CONNECTIONS. (a) Except as provided in pars. (b) and (c), joints and connections for solar energy systems shall meet the requirements of s. SPS 384.40.

(b) Joints and connections for closed loop systems with nonconcentrating collectors and type K, L or M copper tubing may be soldered with 50/50 solder to within 5 feet of the collectors. Within 5 feet of the collectors, soldering shall be in compliance with par. (a).

(c) Joints and connections within 5 feet of concentrating collectors shall be silver brazed or attached with proper flare, compression or threaded joint.

(6) FREEZE PROTECTION. (a) All solar energy systems, except draindown and drainback systems, utilized during periods when outdoor temperatures are below 40ºF, shall be provided with freeze protection.

(b) Components containing liquid heat transfer fluids shall be provided a means of protection from freeze damage. Automatic freeze protection shall be provided in a power failure mode.

(c) Any nonautomatic freeze protection shall be noted as such in the operation and maintenance manual.

(d) Collectors and piping which must drain for freeze protection shall be installed with a slope of at least 1/8 inch per foot.

(7) POTABLE WATER PROTECTION. (a) *Prohibited connections to fixtures and equipment.* Protection against backflow or back siphonage shall be provided for connections to potable water supply systems in accordance with s. SPS 382.41.

(b) *Recirculating water.* Water used for space heating may not be returned to the potable water system.

(c) *Toxic elements.* Heat transfer fluids, heat storage media and thermal storage materials, including any interior protective coatings, may not impart toxic elements to potable water.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; corrections in (1) (c) 4., (3) (c) 2., (4) (intro.) and (7) (a) made under s. 13.93 (2m) (b) 7., Stats., Register June 2002 No. 558; correction in (1) (b) 2., 4., 5., 6., (c) 1., 4., (3) (c) 2., (4) (intro.) (b), (f), (5) (a), (7) (a) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 371.26 Electrical requirements. All electrical work shall conform to the Wisconsin Electrical Code, ch. SPS 316.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; CR 01−139: am. Register June 2002 No. 558, eff. 7−1−02; correction made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 371.30 Photovoltaic solar energy systems. **(1)** GENERAL INSTALLATION REQUIREMENTS. Photovoltaic solar energy systems shall comply with s. SPS 371.21 (1), (2), (4), (6) and (7).

(2) ELECTRICAL REQUIREMENTS. All electrical wiring, installation, equipment and materials used in the construction and installation of photovoltaic solar energy systems shall comply with the Wisconsin Electrical Code, ch. SPS 316.

Note: For design requirements and definitions for photovoltaic solar energy systems, see Article 690, of the National Electrical Code (NEC), as adopted by reference in the Wisconsin Electrical Code, Volume 2, ch. SPS 316.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86; CR 01−139: am. (2) Register June 2002 No. 558, eff. 7−1−02; correction in (1), (2) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

Subchapter V — Warranty

SPS 371.40 Purpose. Pursuant to s. 101.175 (4) (a), Stats., this subchapter establishes the requirement of a warranty and minimum warranty requirements for solar energy systems and components.

Note: The requirements of this subchapter are recommended standards. See s. SPS 371.03.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

SPS 371.41 System designer's warranty. All new solar energy systems shall be covered by a system designer's warranty. The system designer's warranty shall meet or exceed the following requirements:

(1) TYPE AND DURATION OF WARRANTY. The system designer shall issue to every buyer a written warranty that meets the following minimum requirements:

(a) A one year warranty on the entire solar energy system and the installation of the solar energy system.

(b) A 5 year warranty on the collectors and the installation of the collectors.

(c) The warranty shall specify those items covered and those items not covered.

(d) The warranty shall begin the day the solar energy system is put into operation.

(2) VOIDING OF A WARRANTY. (a) The warranty may specify reasonable installation and maintenance procedures, including specifications of incompatible components, and may state reasonable use conditions for the system designer's warranty to be effective.

(b) The warranty may not be voided or in any way reduced by conditions that may occur in the normal operation of the solar energy system.

(c) The warranty shall list any actions that will void the warranty.

(3) NOTIFICATION. The warranty shall contain the name, address, and telephone number of the customer service representative.

Note: By federal law, all warranties must be in accordance with the standards, terms and conditions specified in the Magnuson−Moss Warranty − Federal Trade

Commission Improvement Act, 15 United States Code, Sections 2301−2312 (1976), and the regulations promulgated thereunder as found in 16 Code of Federal Regulations, Subchapter G (1981). The requirements of this section are in addition to the federal warranty requirements.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

Subchapter VI — Operation and Maintenance Manual

SPS 371.50 Purpose. Pursuant to s. 101.175 (4) (b), Stats., this subchapter establishes the minimum requirements of an operation and maintenance manual for solar energy systems.

Note: The requirements of this subchapter are recommended standards. See s. SPS 371.03.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

SPS 371.51 General requirements. (1) The operation and maintenance manual shall be supplied by the system designer.

(2) Additional instructions for operation and maintenance may be added by the installer but may not:

(a) Contradict the manufacturer's instructions;

(b) Contradict the system designer's instructions;

(c) Void the manufacturer's warranty;

(d) Void the system designer's warranty; or

(e) Void the installer's warranty.

(3) Any pre−installation instructions shall be supplied by the installer.

(4) All operation and maintenance manuals, installation instructions and other instructions shall be supplied to the buyer on or before the day the solar energy system is operational.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

SPS 371.52 Operation and maintenance manual for active solar energy systems. The operation and maintenance manual for active solar energy systems shall include, but is not limited to, the following requirements:

(1) OPERATING INSTRUCTIONS. Operating instructions shall contain the following:

(a) Operating instructions for normal solar energy system operations;

(b) Operating instructions for leaving the solar energy system inactive for extended periods of time, such as vacations;

(c) Operating instructions for disengaging the solar energy system and operating and maintaining the auxiliary energy system, if present, independently of the solar energy system;

(d) A valving diagram clearly showing the position that each valve should be in, for operation of the solar energy system;

(e) A detailed explanation of the freeze protection and no−flow protection features of the solar energy system including what the owner needs to do, if anything, in the event a power failure occurs simultaneously with freezing or no−flow conditions. If the solar energy system does not provide freeze or no−flow protection or both, the operation and maintenance manual shall state so in a clear and concise manner;

(f) The conditions at which the solar energy system may be damaged by freezing or no−flow conditions or both;

(g) Operating instructions for start−up procedures; and

(h) Operating instructions for diagnostic procedures. Operating instructions for diagnostic procedures shall state on every page warnings if the diagnostic procedure performed by the owner voids any warranty.

(2) MAINTENANCE INSTRUCTIONS. Routine maintenance, performed by the owner, may not void the system designer's or installer's warranty unless certain routine maintenance, performed by the owner, is prohibited by the system designer or installer. If routine maintenance, performed by the owner, is prohibited, it shall be stated accordingly in a contrasting color next to the prohibited routine maintenance. Routine maintenance instructions shall include the following:

(a) The time intervals for routine maintenance. The operation and maintenance manual shall provide a space for logging maintenance done on the solar energy system by the owner, installer or system designer;

(b) Instructions for changing the heat transfer fluid, if a heat transfer fluid is present. A detailed description of the heat transfer fluid used in the system shall be provided. The description shall include the following:

1. The exact name of the heat transfer fluid;

2. Whether the heat transfer fluid is toxic or non−toxic;

3. If the heat transfer fluid is toxic, a cautionary statement regarding the poisonous characteristics of the heat transfer fluid;

4. First aid instructions in case the heat transfer fluid is ingested, splashed on skin or splashed in eyes;

5. The system designer's or installer's recommended heat transfer fluid change interval;

6. A caution that the heat transfer fluid may be hot;

7. A warning against the use of toxic heat transfer fluids in systems not designed and installed for the use of toxic heat transfer fluids; and

8. A proper disposal method for the heat transfer fluid.

(c) Cleaning instructions, if any, for the following components that are present:

1. Collector plate and cover;

2. Heat exchanger; and

3. Collector absorber.

(d) Instructions for any other required routine maintenance.

(3) COMPONENT SPECIFICATIONS AND DETAILED DRAWINGS. Component specifications and detailed drawings for solar energy systems shall contain the following:

(a) A detailed drawing of the entire solar energy system and each major component;

(b) A list of the solar energy system's specifications including all of the following that are applicable:

1. The collector manufacturer and model number;

2. Gross collector area;

3. Collector performance test results or system performance rating or both;

4. The name of the organization doing the performance rating;

5. Fluid capacity of the collectors and thermal storage;

6. Full weights of the collectors and thermal storage;

7. Temperature and pressure ratings of the thermal storage, collectors and pump;

8. The size of all piping and ducts; and

9. The type of thermal storage.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.

SPS 371.53 Operation and maintenance manual for photovoltaic solar energy systems. The operation and maintenance manual for photovoltaic solar energy systems shall include, but is not limited to, the following requirements:

(1) OPERATING INSTRUCTIONS. Operating instructions shall contain the following:

(a) Operating instructions for normal solar energy system operations;

(b) Operating instructions for leaving the solar energy system inactive for extended periods of time, such as vacations;

(c) Operating instructions for disengaging the solar energy system and operating and maintaining the auxiliary energy system, if present, independently of the photovoltaic solar energy system;

(d) Operating instructions for start−up procedures; and

(e) Operating instructions for diagnostic procedures. Operating instructions for diagnostic procedures shall state on every

page warnings if the diagnostic procedure performed by the owner voids any warranty.

(2) MAINTENANCE INSTRUCTIONS. Routine maintenance, performed by the owner, shall not void the system designer's or installer's warranty unless certain routine maintenance, performed by the owner, is prohibited by the system designer or installer. If routine maintenance, performed by the owner, is prohibited, it shall be stated accordingly in a contrasting color next to the prohibited routine maintenance. Routine maintenance instructions shall include the following:

(a) The time intervals for such maintenance. The operation and maintenance manual shall provide a space for logging maintenance done on the solar energy system by the owner, installer or system designer.

(b) Cleaning instructions, if any, for the following components that are present:

1. Collector plate;
2. Collector cover; and
3. Batteries.

(c) Routine maintenance instructions, if any, for the following:

1. Checking and restoring battery fluid level;
2. Checking for and removing corrosion; and
3. Cleaning of battery top.

(d) Instructions for any other required routine maintenance.

(3) COMPONENT SPECIFICATIONS AND DETAILED DRAWINGS. Component specifications and detailed drawings for solar energy systems shall contain the following:

(a) A detailed drawing of the entire solar energy system and each major component;

(b) A list of the solar energy system's specifications including all of the following that are applicable:

1. The collector manufacturer and model number;
2. Gross collector area;
3. Collector performance test results or system performance rating or both;
4. The name of the organization doing the performance rating;
5. Temperature and pressure ratings of the electrical storage and collectors;
6. Weights of collector and electrical storage;
7. Voltage, current and kilowatt rating of collectors;
8. Amp−hour capacity of batteries; and
9. Temperature and ventilation requirements for the battery storage area.

History: Cr. Register, June, 1986, No. 366, eff. 7−1−86.