**Bobby Jindal**
GOVERNOR

**Bruce Greenstein**
SECRETARY

# State of Louisiana

## Department of Health and Hospitals
Office of the Secretary

November 3, 2011

Glenn T. Cambre, Director
Center for Environmental Health Services
Office of Public Health
Department of Health and Hospitals
628 N. 4th Street
P.O. Box 4489
Baton Rouge, Louisiana 70821-4489

Re: **Revised Letter of Intent – Solar Water Heating System Design Requirements**

Dear Mr. Cambre:

**This letter officially rescinds and replaces the previous letter issued on August 4th, 2010.**

It has recently come to my attention that Chapter 5 (Water Heaters) of the Louisiana State Plumbing Code, 2000 edition does not include requirements specific to the design and installation of solar water heating systems. Solar water heating systems differ greatly from traditional water heaters and therefore require a unique set of requirements to ensure a safe and reliable system. For that reason it is my intent to allow solar water heating systems only when the following requirements are strictly met:

1. **Definitions**

**Active Solar System** – a solar water heating system that utilizes an electric pump and controllers to circulate heat-transfer fluid through the solar collectors.

**Auxiliary Heating Equipment** – equipment utilizing energy other than solar, to supplement the output provided by the solar energy system.

**Closed Loop System** – a system where the collector loop heat transfer fluid is enclosed in a piping loop separate from the potable water supply.

**Collector Loop** – the piping of a collector system in which a heat transfer fluid circulates between the solar collector(s) and a heat exchanger.

**Direct-Circulation System** – a system where the potable water is heated as a result of being circulated directly through the collectors (these systems are prohibited).

**Double Wall Heat Exchanger** – a heat exchanger design in which a single failure of any fluid barrier will not cause a cross connection or permit back siphonage of heat transfer fluid into the potable

water system. Any barrier which fails shall allow the discharge of exchanger fluid and/or potable water to the atmosphere at a location visible to the operator or owner.

**Drainback System** – liquid system that only fills the collector when the temperature differential is appropriate. The water that is circulated through the collectors is stored in a reservoir.

**Engineered Solar System** – a system designed for a specific building project with drawings and specifications indicating materials to be installed, all as prepared by a person registered or licensed to perform solar design work.

**Heat Transfer Fluid** – the operating or thermal storage liquid in a mechanical system, including water or other liquid base, and additives at the concentration present under operating conditions used to move heat from one location to another. Refrigerants are not included as heat transfer liquids.

**IAF** – International Accreditation Forum, the world association of Conformity Assessment Accreditation Bodies and other bodies interested in conformity assessment in the fields of management systems, products, services, personnel and other similar programs of conformity assessment. Its primary function is to develop a single worldwide program of conformity assessment which reduces risk for business and its customers by assuring them that accredited certificates may be relied upon. Accreditation assures users of the competence and impartiality of the body accredited.

**IAF MLA Signatory** – The objective of the IAF MLA is to ensure that the personnel certifications granted by signatories of the IAF MLA can be recognized by other signatories, increasing the worldwide employability of the certified professionals. Mutual recognition is based on peer evaluations between signatories to ensure each other's personnel certifications are equivalent and that each certified professional can perform the required tasks. Once an accreditation body is a signatory of the IAF MLA it is required to recognize the certificates issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope. Accreditations granted by IAF MLA signatories are recognized worldwide based on their equivalent accreditation programs, therefore reducing costs and adding value to business and consumers. Accreditation body members of IAF are admitted to the MLA only after stringent evaluation of their operations by a peer evaluation team. For a complete list of IAF members and signatories visit: http://www.iaf.nu/articles/IAF_MEM_USA__all/112.

**IEC** – International Electrotechnical Commission

**Indirect-Circulation System** – a closed loop solar water heating system which prohibits contact between the heat transfer fluid and the potable water by the use of a heat exchanger to transfer the collected heat from the heat transfer fluid to the potable water.

**ISO**—International Organization for Standardization.

**ISO/IEC Guide 65** – a document that specifies requirements for bodies that operate third-party certifications of products to ensure that those bodies conduct their certification processes in an impartial, reliable, and consistent manner. Conformity to these standards provides assurance that a certification program is of high quality, integrity, and competency, and that it is free of any conflicts of interest, such as financial, commercial, or social influences.

**Listed** – equipment or materials included in a list published by an approved nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that

maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner. The means for identifying listed equipment may vary for each testing laboratory, inspection agency, or other organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The plumbing official should utilize the system employed by the listing organization to identify a listed product.

**MLA** – Multilateral Recognition Arrangement, to ensure mutual recognition of accredited certification between signatories to the MLA, and subsequently acceptance of accredited certification in many markets based on one accreditation.

**Readily Accessible** – having direct access without the need of removing any panel, door or similar covering of the item described and without requiring the use of portable ladders, chairs, etc.

**Solar Collector** – a device designed to absorb radiation from the sun and transfer this energy to a fluid which passes through the collector.

**Solar Water Heating System** – any unit or package of components designed to collect, convey, store, and convert the sun's energy for the purpose of heating potable water.

**Toxic** – a substance that causes injury, illness, or death, especially by chemical means.

## 2. General

### 2.1. Certification

2.1.1. Solar water heating systems shall be certified to the Solar Rating & Certification Corporation's (SRCC) OG-300 document, 2010 edition (Operating Guidelines and Minimum Standards for Certifying Solar Water Heating Systems) by the SRCC themselves or by listing agencies [such as the International Association of Plumbing and Mechanical Officials (IAPMO)] which are currently accredited as meeting the ISO/IEC Guide 65 by the American National Standards Institute (ANSI) or other IAF MLA signatory accreditation bodies.

### 2.2. Installation

2.2.1. Solar water heating systems and appurtenances shall comply with the requirements of this document, the Louisiana State Plumbing Code (LSPC), 2000 Edition (as applicable), and any other applicable requirements of the Louisiana State Uniform Construction Code (LSUCC).

2.2.2. Solar water heating systems shall be installed in a manner conforming to this document, the LSPC, applicable standards, and the manufacturers' installation instructions. In instances where this document, the LSPC, applicable standards, or the manufacturers' instructions conflict, the more stringent provisions shall prevail.

### 2.3. Maintenance

2.3.1. Solar water heating systems shall be maintained in proper safe and sanitary operating condition, and the owner shall be responsible for maintenance.

2.3.2. Access for maintenance and repair shall be provided to solar water heating system equipment, components, valves, etc. Solar water heating equipment and appurtenances shall not

obstruct or interfere with the operation of any doors, windows, or other building components requiring operation or access.

### 2.4. Safety

2.4.1. Any solar water heating system capable of providing hot water in excess of $140^0$ F ($60^0$C) shall be equipped with a listed tempering valve or temperature-limiting device to limit the temperature of water delivered to the domestic hot water system to a maximum of $140^0$ F ($60^0$C).

2.4.2. Solar water heating equipment that could generate a glow, spark, or flame capable of igniting flammable vapors may be installed in a residential garage provided the pilots and burners, heating elements, motors, controllers, or switches are at least 18 inches (457 mm) above the floor level.

## 3. Solar Water Heating System Design Criteria

### 3.1. Overall System Design

3.1.1. All solar water heating systems shall be of the closed loop type, utilizing an indirect circulation system.

3.1.2. Direct circulation systems are prohibited.

3.1.3. Solar water heating systems shall have flow directions indicated on system components and piping or shall have flow directions indicated on a diagrammatic representation of the system as installed, permanently affixed to the system hardware in a readily accessible and visible location.

3.1.4. The solar water heating system shall be valved to provide for shut-off from the service water supply without interrupting normal cold water service to the residence (see Section 506.1 of the LSPC and apply).

### 3.2. Freeze Protection

3.2.1. Solar water heating system components shall be protected from damage resulting by freezing of heat transfer liquids at the lowest ambient temperatures that will be encountered during the operation of the system.

3.2.2. Solar water heating systems, where the design requires piping to be drained to protect the system from freezing, or where the heat transfer fluid must be replaced as part of regular maintenance, shall have all piping pitched toward a designated point in the system to accomplish the intended purpose.

### 3.3. Temperature & Pressure

3.3.1. Solar water heating system components (*i.e.*, solar collector, storage tank, heat exchanger, piping) containing pressurized fluids shall be protected against pressures and temperatures exceeding design limitations with a properly installed temperature and pressure (T&P) relief valve. Each section of the system in which excessive temperatures and pressures are capable of developing shall have a T&P relief valve located so that a section cannot be valved off or otherwise isolated from protection by a properly installed a T&P relief valve.

3.3.2. Relief valves and its discharge piping and appurtenances shall meet the requirements listed in the LSPC, Sections 507.5 through 507.8.5.

3.3.3. Vacuum relief valves shall be installed at the high point of the solar system for drain back systems unless specifically not required by the system design.

### 3.4. Thermal Contraction & Expansion

3.4.1. The solar water heating system design, components and subassemblies shall include adequate provisions for the thermal contraction and expansion of heat transfer fluids and system components that will occur over the design temperature range.

3.4.2. Provisions for thermal contraction and expansion within the potable water system shall be installed in accordance with the requirements of the LSPC, Section: 613.2, as it relates to the water being heated for consumer use.

### 3.5. Solar Collectors

3.5.1. Collectors that are manufactured as a complete component shall be listed by a recognized third party listing agency.

3.5.2. Collectors shall be listed and labeled to show the manufacturer's name, model number, serial number, collector weight, collector maximum allowable temperatures and pressures, and the type of heat transfer fluids that are compatible with the collector. The label shall clarify that these specifications apply only to the collector.

3.5.3. Valves shall be installed to allow the solar collectors to be isolated from the remainder of the solar water heating system. Each isolation valve shall be labeled with the open and closed position.

3.5.4. Collectors shall be anchored to roof structures or other surfaces in a manner to resist wind, snow, or seismic loadings in compliance with the LSUCC. Anchors secured to and through a roofing material shall be made in a manner to maintain the water integrity of the roof covering. Roof drainage shall not be impaired by the installation of collectors. Collector panels that are not an integral part of the roofing system shall be installed in a manner so as to preserve the integrity of the roof surface.

### 3.6. Heat Exchangers

3.6.1. Heat exchangers used for potable water heating shall protect the potable water system from being contaminated by the heat-transfer fluid. Heat exchangers that are of double-wall construction shall be utilized that separate the potable water from the heat-transfer fluid by providing a space between the two walls that is vented to the atmosphere.

3.6.2. The heat exchanger design shall be such that any failure of a barrier material shall allow the discharge of exchanger fluid and/or potable water to the atmosphere. The discharge location shall be visible to the operator or owner of the system and be located so that no hazards are created by such discharge.

3.6.3. Single-walled heat exchangers are prohibited.

### 3.7. Heat Transfer Fluid

3.7.1. Heat transfer fluid shall be compatible with all materials in the system.

3.7.2. The flash point of the actual heat transfer fluid utilized in a solar water heating system shall be not less than 50°F (10°C) above the design maximum stagnation (no-flow) temperature of the fluid attained in the collector.

3.7.3. Only non-toxic fluids shall be utilized as the heat transfer fluid, including additives, such as anti-freeze agents, conditioners, or corrosion inhibitors.

### 3.8. Storage or Heat Exchanger Tank Construction

3.8.1. All tanks shall be tested and listed by an approved agency.

3.8.2. Pressurized thermal storage units shall be listed and labeled to show the manufacturer's name, model number, serial number, storage unit maximum and minimum allowable operating temperatures and pressures, and the type of heat transfer fluids that are compatible with the storage unit. The label shall clarify that these specifications apply only to the thermal storage unit. (FRC)

3.8.3. Tank covers shall be structurally designed to withstand all anticipated loads and pressures.

3.8.4. All devices attached to or within the tank shall be accessible for repair and replacement.

### 3.9. Auxiliary Heating System

3.9.1. Auxiliary water heating equipment shall be provided such that the combined system (*i.e.*, solar water heating system & auxiliary water heating equipment) will provide the same degree of reliability and performance as a conventional water heating system.

3.9.2. Auxiliary (non-solar) water heating equipment shall be compatible with the solar system heat output, temperatures, flow rates and fluid types. Auxiliary water heating equipment shall be listed and labeled by a recognized third party listing agency.

3.9.3. The piping system shall be provided with valves which can be closed for the purpose of isolating the solar hot water heating system from the auxiliary water heater, thereby permitting operation of the auxiliary water heating system when the solar water heating system is inoperative or being serviced.

3.9.4. Auxiliary water heaters shall meet all applicable requirements set forth in Chapter 5 (Water Heaters) of the LSPC.

## 4. Potable Water Supply

### 4.1. Color Code Identification

4.1.1. Piping and outlets conveying nonpotable water (*i.e.*, heat transfer fluid) shall be adequately and durably identified by a distinctive yellow-colored paint with black lettering, with the words "Caution: Nonpotable water, do not drink." Such wording shall not be concealed by pipe insulation and when insulated, the insulation shall be painted the same color as required for the pipe.

4.1.2. Each system shall be identified with a colored band to designate the liquid being conveyed, and the direction of normal flow shall be clearly shown. The minimum size of the letters and length of the color field shall conform to the following table:

| Minimum Length of Color Field and Size of Letters | | |
|---|---|---|
| **Outside Diameter of Pipe or Covering (Inches)** | **Minimum Length of Color Field (Inches)** | **Minimum Size of Letters (Inches)** |
| 1/2 to 1-1/4 | 8 | 1/2 |
| 1-1/2 to 2 | 8 | 3/4 |
| 2-1/2 to 6 | 12 | 1-1/4 |
| 8 to 10 | 24 | 2-1/2 |
| Over 10 | 32 | 3-1/2 |

4.1.3. A colored identification band shall be indicated every 20 feet (6096 mm) but at least once per room, and shall be visible from the floor level.

4.1.4. Each valve, branch fitting, branch terminal, and outlet on the nonpotable waterline shall be posted as follows: "Caution: Nonpotable water, do not drink."

## 5. Materials

### 5.1. General

5.1.1. All materials used in the solar water heating system including the solar water heating loop shall be of materials specified in Section 611of the LSPC and comply with the standards listed in Table 603 of the LSPC.

5.1.2. All hard-drawn copper tubing, in addition to the required incised marking, shall be marked in accordance with sections 19.3.1 and 19.3.2 of ASTM B88-99 *Standard Specification for Seamless Copper Water Tube*. The colors shall be: Type K, green; Type L, blue. (Please note that Type M is not approved for plumbing uses in Louisiana).

5.1.3. Cast-iron fittings up to and including two inches in size, when used in connection with piping, shall be galvanized.

5.1.4. All malleable iron fittings shall be galvanized.

5.1.5. Flexible corrugated water heater connectors of copper or stainless steel shall be limited to 24 inches in length.

5.1.6. PEX tubing shall not be installed within the first 18 inches of piping connected to a water heater.

5.1.7. All metals used in the storage system which come into contact with the heat transfer fluid shall be in accordance with Tables S-515-2.3.2 or S-515-2.3.3 of HUD Minimum Property Standard 4930.2. Documentation shall be provided to demonstrate that material usages not covered in these tables meet the intent of S-515-1.4 and S-515-7.4 (SRCC).

5.1.8. In no case shall plastic pipe, including CPVC, be used in a solar water heating loop.

5.1.9. All solar water heater system piping shall be insulated to a minimum of R 2.6. 'R-2.6 minimum'.

## 6. Testing

### 6.1. Closed Loop System

6.1.1. Closed loop or other type pressure systems shall be tested at one and one-half (1-1/2) times maximum designed operating pressure. All systems shall withstand the test without leaking for a period of not less than 15 minutes.

### 6.2. Storage Tanks

6.2.1. Pressure type storage tanks shall be tested as prescribed in 6.1.1 above.

6.2.2. Non-pressure type storage tanks shall be tested by filling it with water for a period of 24 hours prior to inspection and shall withstand the test without leaking. No tank or portion thereof shall be covered or concealed prior to approval.

7. **Abandonment**

7.1. Every abandoned solar water heating system or part thereof shall be disconnected from any remaining systems, drained, plugged, and capped in an approved manner.

Please ensure that copies of this letter are circulated to your staff and others as appropriate. Should questions arise, they should be directed to Mr. Jake Causey, P.E., Engineering Services Section, Center for Environmental Health Services, Office of Public Health. Mr. Causey may be reached at (225) 342-7499.

Very truly yours,

Jimmy Guidry, M.D.
State Health Officer

JG/JKC/JKH/jkh

cc: Jake Causey, Chief Engineer, Engineering Services Section, CEHS, OPH
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State Plumbing Board of Louisiana c/o John Barker, Executive Director
State Licensing Board for Contractors c/o Michael McDuff, Executive Director
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Louisiana Professional Engineering and Land Surveying Board c/o Donna D. Sentell, Executive Secretary
Louisiana Engineering Society c/o Brenda Gajan, Executive Director
Louisiana Board of Architectural Examiners c/o Mary "Teeny" Simmons, Executive Director
AIA Louisiana c/o Lynn B. Robertson, Executive Director
American Society of Plumbing Engineers, New Orleans Chapter, c/o Richard Molina
Local Plumbing Inspectors (from S. Becnel's Excel list)
Gulf States Renewable Energy Industries Association (GSREIA) c/o Jeff Cantin, Secretary/Treasurer