TO: Joint Committee on Recreational Water Facilities

FROM: Tom Vyles, Chair of the Joint Committee

DATE: June 27, 2023

SUBJECT: Proposed revision to NSF/ANSI/CAN 50: *Equipment and Chemicals for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities* (50i189r5.1)

Revision 5.1 of NSF/ANSI/CAN 50, issue 189 is being forwarded to the Joint Committee for consideration. Please review the proposal and **submit your ballot by June 19, 2023** via the NSF Online Workspace <www.standards.nsf.org>.

Please review all ballot materials. When adding comments, please include the section number applicable to your comment and add all comments under one comment number whenever possible. If you need additional space, please use the attached blank comment template in the reference documents and upload online via the browse function.

Please note that your last recorded vote from any previous ballot draft revision(s) will not be carried forward. Please respond affirmative, negative, or abstain to the content of this revision. Comments on any prior revision(s) will not be carried forward.

Purpose

This ballot will harmonize Section 23 – *Heat Exchangers, Heaters, Coolers, And Solar Water Heating Systems* in NSF/ANSI/CAN 50 with other existing standards.

Background

Beginning with the 2015 edition, the NSF 50 standard included provisions for solar pool heating equipment. Subsequent editions of NSF 50 have retained the solar pool heater requirements. Currently, the provisions are contained in Section 23 of the NSF 50 standard. Unfortunately, these provisions do not coordinate or align with requirements for these products specified in current consensus codes and standards for the products. Solar thermal products, especially solar collectors, have unique design and testing considerations, and we believe that they would be better addressed by a dedicated set of provisions, rather than the generic ones currently found in NSF 50.

Currently, most solar thermal collectors are tested and certified to the ANSI-approved, ICC 901/SRCC 100 standard, as prescribed in model codes published by the International Code Council (ICC), the International Association of Plumbing & Mechanical Officials (IAPMO) and many state and local codes. This standard is also recognized by Federal agencies including the Internal Revenue Service and Environmental Protection Agency (ENERGY STAR program). The Solar Rating & Certification Corporation has published standards for solar thermal collectors and published certifications and ratings for them since the early 1980's. Presently, SRCC certifies most solar thermal collectors sold in North America through its ISO 17065 accredited programs. SRCC, together with several manufacturers of solar pool heating equipment have reviewed the requirements for solar pool heaters contained in NSF 50 and propose the following revisions with the objective of coordinating them with existing consensus codes and standards. We believe that these revisions will serve to bring clarity and consistency to the requirements, reduce redundant testing and reduce costs all while enhancing performance, safety, and compliance.

This issue paper was presented at the 2021 Recreational Water Facilities Joint Committee meeting, and a motion to send the language to the Task Group on Heaters & Heat Exchangers was approved there. The Task Group met twice to review and develop language, and an r2 straw ballot was sent to the group. That ballot drew comments, and the TG chair and issue proponent drafted revisions based on those comments. The r3 draft was straw balloted with the Task Group, and again received comments. The Task Group met again on 1/24/23 to review those comments, and an r4 version was sent to ballot, which included modifications to annex N-2 to apply pressure testing from that section to the heater and cooler products. Feedback received on that ballot was reviewed during a 4/25/23 teleconference, with a focus point of the discussion recommending instead creating a separate annex for pressure testing of these products. A revised draft based on that discussion was balloted, and received no negative votes, but did receive comments suggesting some minor language changes for clarity. The issue proponent agreed, and the revised document is presented here for consideration.

If you have any questions about the technical content of the ballot, you may contact me in care of:

Tom Vyles
Chair, Joint Committee on Recreational Water Facilities
c/o Jason Snider
Joint Committee Secretariat
Tel: (734) 418-6660
Email: jsnider@nsf.org

[Note – the recommended changes to the standard which include the current text of the relevant section(s) indicate deletions by use of ~~strikeout~~ and additions by grey highlighting. Rationale Statements are in *italics* and only used to add clarity; these statements will NOT be in the finished publication.]

NSF/ANSI/CAN Standard

Equipment and Chemicals for Swimming Pools, Spas, Hot Tubs, and other Recreational Water Facilities

Evaluation criteria for materials, components, products, equipment, and systems for use at recreational water facilities

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3 Definitions

3.## Heat exchanger: A device that transfers heat from one medium to another.
Rationale: per ICC 902/PHTA 902/SRCC 400 and to differentiate solar thermal collectors from heat exchangers

3.## Solar thermal collector: Component(s) in a solar water heater that collect and convert solar radiation to thermal energy.
Rationale: per ICC 902/PHTA 902/SRCC 400 and to differentiate solar thermal collectors from heat exchangers. Also establishes the role of the solar collector in a solar water heating system.

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23 Heat exchangers, heaters, and coolers~~, and solar water heating systems~~, and associated components

23.1 General

The requirements in this section apply to devices utilized to increase or decrease the temperature of the water in pools, spas, and other recreational waters. ~~Some examples of products~~ Products addressed by this section include ~~metal and or plastic heat exchangers~~, heaters~~,~~ and coolers~~,~~ and ~~solar radiant panel collectors~~ and ~~their~~ associated components such as metal or plastic heat exchangers, fittings, couplings, ~~and~~ valves, and solar thermal collectors.

23.1 General

The requirements in this section apply to devices utilized to increase or decrease the temperature of pools, spas, and other recreational waters. Some examples of products addressed by this section include metal and or plastic heat exchangers, heaters, coolers, and solar radiant panel collectors and associated components such as fittings, couplings, and valves.

23.1.1 Sections of the heater that may require inspection or service shall be accessible.

23.1.2 Heaters shall be marked or labeled for proper assembly/installation and operation.

23.1.3 Replacement parts for the heater shall fit the heater without a need for undue alteration of the heater or replacement part.

23.1.4 Heaters shall comply with the material formulation requirements in Section 4.2.

23.1.5 Heaters shall comply with the corrosion resistance requirements in Section 4.3.

23.2 Heat Exchangers and Solar Thermal Collectors

Heat exchangers and solar thermal collectors used with heaters and coolers shall comply with the requirements in Section 23.1 and performance requirements in Section 23.3.

23.2.1 Heat exchangers and solar thermal collectors used as part of pool heating and cooling systems shall comply with the applicable standard listed in Table 23.1.

Table 23.1 -- Standards for heat exchangers and solar thermal collectors used with pool heaters and coolers

Device	Standard
Heat Exchangers	AHRI 400
Solar Thermal Collectors	ICC 901/SRCC 100

Rationale: These standards can be referenced using the links below:
ICC 901/SRCC 100: https://codes.iccsafe.org/content/ICC9012020P1
AHRI 400: https://www.ahrinet.org/search-standards/ahri-400-i-p-and-401-si-performance-rating-liquid-liquid-heat-exchangers

23.2.2 Heat exchangers and solar thermal collectors used as part of pool heating and cooling systems shall be marked and provided with operating and installation manuals in accordance with the requirements of the applicable standard in Table 23.1.

23.2.3 Head loss curves for heat exchangers and solar thermal collectors shall be determined using the pressure drop test method specified in accordance with the requirements of the applicable standard in Table 23.1, The head loss curve shall be provided over the entire design flow range of the device as required in Section 23.3.3.

23.~~2~~3 Performance

Heater and associated components shall meet the applicable performance requirements of this section based upon their design and construction including related components such as fittings, couplings, valves, controllers, etc.

23.~~2~~3.1 Dimensional conformity test

Heaters and associated components under pressure shall be evaluated for dimensional conformance with the piping and fitting dimensions recommended by the manufacturer.

23.23.2 ~~Hydrostatic~~ pressure testing

Heaters, heat exchangers, coolers and associated components under pressure shall ~~be capable of withstanding a hydrostatic pressure test at 150% of the rated working pressure test per Annex N-2.~~ undergo the hydrostatic and cyclical pressure test series specified in Annex N-14 without rupture, leak, burst, or other deformation.

~~**23.2.3 Cyclic pressure test**~~

~~Heaters and associated components under pressure shall be capable of withstanding 20,000 cycle low / high / low cyclical pressure test per Annex N-2.~~

~~**23.2.4 Design burst hydrostatic pressure test**~~

~~Heaters and associated components under pressure shall be capable of withstanding a hydrostatic pressure test at 200% of the rated working pressure test per Annex N-2.~~

~~**23.2.5 Elevated temperature hydrostatic pressure test**~~

~~Heaters and associated components under pressure shall be capable of withstanding a hydrostatic pressure test at 200% of the rated working pressure when tested at 140 °F (60 °C).~~

23.23.~~6~~3 Head loss curve

Manufacturers shall make available a head loss curve for the equipment and associated components. Equipment and associated components shall not exceed the head loss indicated by the manufacturer's head loss curve when tested in accordance with manufacturer's installation orientation and plumbing design.

23.3~~4~~ Operation and installation instructions

The manufacturer shall provide written operation and installation instructions with each unit. The instructions shall include drawings, charts, and parts list necessary for the proper installation, operation, repair and maintenance of the heater and its associated components.

The operation and installation instruction shall contain the following information:

—a heater's maximum flow rating (LPM, GPM) shall be specified to mitigate erosion damage, as directed by the manufacturer;

—a heater's minimum flow rating (LPM, GPM) shall be specified to prevent overheating or scale formation as directed by the manufacturer;

—a warning that the heater equipment shall be installed in full compliance with the manufacturer's recommendations as well as the local regulatory and building code requirements for gas supply, plumbing, electrical connections, air exchange and ventilation. Corrosive chemicals shall be stored away from the heater to minimize potential damage to the exterior of the heater;

—a warning that the heater equipment shall not be installed immediately after the injection point for low pH or acidic chemicals to minimize potential corrosive damage to the inside of the heater;

—reference to recommended use chemicals, maximum and minimum concentrations (i.e., salt level, total alkalinity, calcium hardness, etc.);

—applicable caution and warning statements shall be prominently displayed:

—Example: If system flow is allowed to stagnate in a solar collector there is a potential risk of high water temperatures. Consider draining the system otherwise water in solar collectors can reach high temperatures and create hot liquid / gas. If hot liquids or gas are not purged from the system it could adversely affect plumbing, or the safety of swimmers near water return fittings.

—instructions or guidance for proper size selection and installation; and

—applicable diagrams and a parts list to facilitate the identification and ordering of replacement parts or other supply and installation needs.

23.45 Marking and product identification

The heater shall be clearly and permanently marked or labeled with the following:

- manufacturer name and address or website;
- model number;
- serial number, date code, or other means to identify date of production;
- whether the unit was evaluated for pools or spas, if not evaluated for both applications;
- working pressure;
- size or capacity;
- flow direction (if applicable);
- maximum head loss; and
- maximum design flow rate.

Normative Annex 14

Test methods for the evaluation of heaters, coolers and associated components

NOTE − The test conditions specified in this Annex are not intended to represent recommended field use conditions.

N-14.1 Pressure test series

N-14.1.1 Purpose

The purpose of this test is to verify the pressure integrity of heaters, coolers and associated components used in swimming pools, hot tubs and spas through a series of hydrostatic and cyclical pressure tests.

N-14.1.2 Apparatus

—a pressure testing rig capable of delivering and regulating hydrostatic pressure in the tested device;

—temperature-indicating device(s) (required accuracy: ± 2°F [± 1 °C]);

—timer(s) (required accuracy: ± 0.5 s); and

—pressure gauges or sensors sized to yield the measurement within 25% to 75% of full scale with a required accuracy of ± 2% of reading or ± 1 psi [7 kPA], whichever is greater).

Electronic transducers may be used for recording test data. Transducers shall meet the accuracy requirements for gauges, but the measurement does not need to be within 25% to 75% of the range of the transducer. Automatic timers shall be used to ensure that the proper pressures are applied and maintained for the required intervals.

N-14.1.3 Test setup

Install the heater or cooler and associated components according to the manufacturer's instructions. Connect the device to the pressure-testing apparatus. Fill the device with the water heated to 140 ± 5°F (60 °C) and bleed off all air. Maintain the water at 140 ± 5°F (60 °C) for the duration of the test series.

N-14.1.4 Test method

a) **First Hydrostatic Pressure Test**: Steadily pressurize the device with water to a pressure equal to 1.5 times the maximum working pressure of the device specified by the manufacturer. Maintain the maximum pressure for 300 ± 30 s. Slowly reduce the pressure to 0 psi (0 kPa). At the conclusion of the first hydrostatic pressure test examine the device and its integral and associated components for evidence of a rupture, leak, burst, or other deformation.

b) **Cyclical Pressure Test:** Steadily pressurize the device with water to a pressure of 30 ± 1 psi (207 ± 7 kPa) at a rate not exceeding 30 psi/s and maintain it at that level for 2 ± 0.5 s. Then slowly reduce the pressure to 0 psi (0 kPa) and maintain it for 2 ± 0.5 s. Repeat the pressurization and depressurization cycle 20,000 times. At the conclusion of cyclical testing, examine the device and its integral and associated components for evidence of a rupture, leak, burst, or other deformation.

c) **Second Hydrostatic Pressure Test:** Steadily pressurize the device with water to a pressure equal to 2 times the maximum working pressure of the device specified by the manufacturer within 65 ± 5 s. Then, slowly reduce the pressure to 0 psi (0 kPa). At the conclusion of the Second Hydrostatic Pressure Test, examine the device and its integral and associated components for evidence of a rupture, leak, burst, or other deformation.

N-14.1.5 Acceptance criteria

There shall be no rupture, leakage, burst, or permanent deformation of the device or its integral or associated components during the three phases of the test, except that leakage from integral components such as valves and fittings during the Second Hydrostatic Pressure test (as described in Section N-14.1.4.c) shall not constitute a failure.