TO: Joint Committee on Recreational Water Facilities

FROM: Mr. Tom Vyles, Chairperson

DATE: October 31, 2022

SUBJECT: Proposed revision to NSF/ANSI/CAN 50 *Equipment and Chemicals for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities (50i168r5)*

Draft 5 of NSF/ANSI/CAN 50 issue 168 is being forwarded to the Joint Committee for balloting. Please review the changes proposed to this Standard and **submit your ballot by November 21, 2022** via the NSF Online Workspace (http://standards.nsf.org).

Please review all ballot materials. When adding comments, please include the section number applicable your comment and add all comments under one comment number whenever possible. If additional space is needed, you may upload a word or .PDF version of your comments online via the browser function.

Purpose

This ballot will add language regarding polymeric fiber media for filters in NSF/ANSI/CAN 50.

Background

Several manufacturers have approached NSF International requesting to have their polymer fiber filtration media tested and certified. These media, which resemble soft fuzzy spheres 1-4 inches in diameter, are intended to function as a sand replacement media. NSF Laboratories have developed a testing procedure to validate the claims of performance equivalency with sand media, as well as establish product longevity in a chlorinated environment.

These products exist in the marketplace and are marketed to both residential and commercial pool operators and owners. It benefits pool owners and users to have methodology to distinguish between effective filtration media products and ineffective products.

An r1 version of this language was straw balloted with the RWF TG on filters, and drew many comments, which the ad hoc group reviewed, and revised language in response. R3 language was then sent to ballot, which drew further comments. The draft was revised based on those comments, and an r4 draft was again sent to the Task group. That ballot received multiple comments, and language was further revised and was approved in a straw ballot of the Task Group.

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

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[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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2 Normative references

The following documents contain provisions that, through reference in this text, constitute provisions of this Standard. At the time of publication, the indicated editions were valid. All standards are subject to revision and parties are encouraged to investigate the possibility of applying the recent editions of the standards indicated below. The most recent published edition of the document shall be used for undated references.

SAE Fuel Filter Test Methods J905 2009

ISO 16232:2018 *Road vehicles — Cleanliness of components and systems*

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3 Definitions

3.XX free available chlorine (FAC): all chlorine present in the water.

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13 Filtration media

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13.3 Polymeric fiber filtration media

Polymeric fiber filter media shall conform to the requirements of Section 4 of NSF/ANSI/CAN 50. Polymeric fiber filter media shall be evaluated for use in sand filter housings. Polymeric fiber filtration media designed

for one filter/backwash cycle or single use shall be designated and clearly marked and labeled as such on the product and the NSF/ANSI/CAN 50 listing.

NOTE -- This applies to both in-situ and prepared media.

13.3.1 Chemical resistance

Polymeric fiber filtration media designed for more than one filter/backwash cycle are exempt from testing in 13.3.1 if the media materials of construction are identified as acceptable in either:

- Section 4.2 Corrosion resistance; or
- Section 14.9.2 Components and piping; or
- Section 14.9.3 Gaskets and seals.

Materials of construction not covered under Sections 4.2, 14.9.2, or 14.9.3 shall demonstrate resistance to deterioration or degradation in the presence of chlorine levels up to 20 mg/L, and pH levels between 6.5 and 8.5. The media shall be challenged with the following exposure conditions prior to conducting testing under 13.3.2 through 13.3.7.

The sample of media shall be exposed to the sequence of exposure conditions. The sequence of steps 1 through 4 shall be repeated 5 times on the sample of media. For each exposure condition, the “FAC”, pH and temperature shall be monitored and controlled throughout the entire exposure period within the ranges given below:

- 24 ± 1 hours of exposure to water having 20±2 mg/L FAC, pH 6.5±0.5, temperature 104±2°F;
- 48 ± 2 hours of exposure to water having 5 ±1mg/L FAC, pH 7.5±0.5, temperature 104±2°F;
- 24 ± 1 hours of exposure to water having 20±2 mg/L FAC, pH 8.5±0.5, temperature 104±2°F; and
- 48 ± 2 hours of exposure to water having 5 ±1mg/L FAC, pH 7.5±0.5, temperature 104±2°F.

13.3.2 Fiber media migration

The purpose of this test is to determine if the filter media introduces contaminant into the water system downstream of the filter. This contaminant is referred to as media migration, although its source is not necessarily the filter media. Any of the filter components or the manufacturing techniques used in building the filter can also be a source of contamination. For this purpose, clean, sterile, and measurable lab equipment is used and not a filter vessel. Media migration per SAE J905 (2009) modified - Water as test fluid, microscope analysis for fibers only, and media test per analysis disk.

13.3.2.1 Test materials

Filter media equivalency to Qty (1) 50-pound bag of #20 filter sand per test cycle.

13.3.2.2 Test fluid – challenge water

DI or RO water sufficient quantity to conduct full test.

13.3.2.3 Test filters

Two (2) test filters should consist of a representative sample from each test materials submission in 13.3.2.1. Each test filter shall contain 5% by weight and volume of the total sample as described in 13.3.2.1. For example, if 0.5 lb. (226g) of polymeric media is equivalent to 50 lb of #20 filter sand, then each test filter should contain 0.025 lb (11.34g) of polymeric media.

13.3.2.4 Test apparatus

— filter holder;

— 47mm (1.85”) ID housing; capable of holding 47 mm diameter wire cloth screen and the quantity of material specified in 13.3.2.3. For polymeric media where 1 ft3 is equivalent to 100 lb of #20 sand, the height of the filter holder will need to be about 1 ft.;

— The 47 mm ID housing is suitable for polymeric media where the individual units have at least one dimension that is ≤ 47 mm. If the polymeric media is larger, a larger diameter housing with an inner diameter ≥ the smallest dimension of the media.

— petri dishes 60mm (2.4”) ID;
— forceps flat bladed;
— washing bottles and storage bottles; and
— Olympus BX-40 Episcopic Microscope, 10X ocular, 10X objective, 100X total, or equivalent.

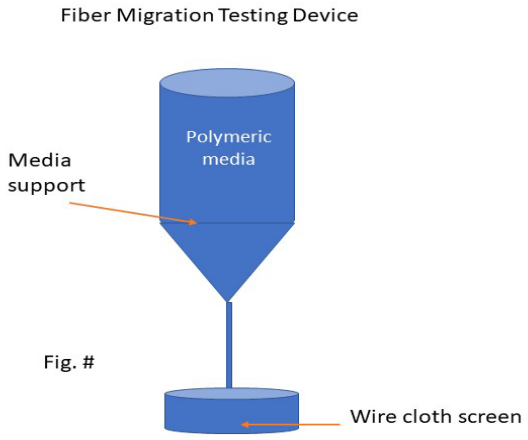

Figure 1
Subsequent figures will be renumbered accordingly

13.3.2.5 Media migration filter screen

— membrane filters, white, plain, 47 mm diameter, 0.8µm pore size; and

— identify each membrane with a sample number by marking the rim (sealing edge) with a ballpoint pen.

13.3.2.7 Wire cloth screen (analysis disk)

— 47mm diameter, 40µm nominal or 10” washable wire element as flow rate dictates

13.3.2.8 Test preparation

Apparatus must be clean before testing can be started. Do this by flushing filtered water through the test system. Obtain a background analysis disk free of fibers.

a) Install wire cloth screen in holder in series with and downstream of the test filter location. Fill sump with test fluid. Install a cleanup filter in place of the test filter.

b) Circulate test fluid through the system at the correlated flow (flux rate used in 13.3.8) flow and 40 °C (104 °F) and determine the system cleanliness by method described in 13.3.2.9.d. Repeat as often as necessary to achieve a cleanliness level of 2mg maximum, for all four filter holders.

Example: 47mm ID test housing; correlated flux rate of 20gpm;
- 47mm = 2.69in^2, 20gpm/ft^2 = 0.138 in^2,
- 2.69 x 0.138 = 0.37gpm through the 47mm test housing.

13.3.2.9 Test procedure

a) After satisfying 13.3.2.8.b, install a test filter and analysis disk.

b) Install clean wire cloth screen in holder.

c) Assemble two (2) test filters by placing the designated amount of polymeric filter media in the two (2) filter holders. This should be a loose fill that is not tamped or pressed into the filter holder. If the media is not in the form of a sphere (e.g. it is a cylinder), and the largest dimension is greater than the diameter of the holder, the media should be placed in the holder lengthwise so that it does not need to be compacted to fit into the holder.

d) Flow test fluid through test housing, loaded with test media and through a new analysis disk at correlated flow and temperature for 30 min. Repeat this cycle of 30 min circulation on a total of two (2) test filters without a change or addition to the test sump. Discard any spillage that occurs in changing test filters. Do not replenish the sump with any make-up fluid.

e) Carefully remove the wire cloth analysis disk screen from the holder and wash collected migration from the screen into a clean beaker with pre-filtered challenge water. No less than 300 mL of water should be used for thorough washing. Be sure to change flow directions and angles to ensure all fibers are dislodged from wire screen. Filter the washing through a 0.8µm, 47 mm diameter analytical membrane filter disc by placing membrane centrally on funnel base, centering funnel position, and clamping assembly securely. Place a large watch glass on top of funnel to protect the membrane until used..

f) Analyze the contaminant to determine its nature. Fibers should be counted as accurately as possible. Fibers are classified as >10 x 1 dimensionally L x W. Clumping can be common in large migrations of media. In this case, a best estimate would be appropriate.

13.3.2.10 Presentation of data

To obtain media migration per filter batch, determine fiber count and size distribution per ISO 16232-7. Report the nature of the contaminant from the test filters.

13.3.2.12 Evaluation of results

Report results as shown:
- the number of fibers counted on each of the two (2) test filters; and
- total (sum) of all fibers (by adding the counts from all two (2) into one sum).

13.3.3 Initial head loss

When tested in a representative sand-type filter, the head loss through the filter operating at the designed flow rate shall not exceed the filter manufacturer's maximum designed head loss when determined in accordance with Annex N-2, section N-2.3.

13.3.3.1 Acceptance criteria

The measured head loss shall not exceed the design head loss specified by the filter manufacturer.

13.3.4 Initial cleaning of filter media test

The purpose of this test is to verify the effectiveness of the manufacturer's recommended procedures for the cleaning of filter media, and to verify that the cleanability of a polymeric filter media is at least equivalent to that of sand and alternate sand-type medias. Testing shall be conducted in accordance with Annex N-2, section N-2.4.

13.3.4.1 Testing shall be conducted within the sand filter vessel, any departure from this method (such as removal and external cleaning equipment or methods) shall be clearly marked and labeled on the packaging and noted on the NSF/ANSI/CAN 50 listing.

13.3.4.3 Challenge slurries
Challenge slurries shall be as prescribed in Annex N-2.4.3

13.3.4.4 Method

a) Install and condition the filter in accordance with the manufacturer's instructions.

b) Operate the filter at the design flow rate for commercial filters (i.e.public pool), (per 6.3.9.1 Table 6.3).
c) Record the initial pressure differential reading at start-up.

d) Challenge the unit with the appropriate challenge slurry. Continue to operate at the design flow rate for commercial filters until the pressure differential across the filter is equal to the manufacturer's recommended pressure differential for cleaning.

e) Upon reaching the desired pressure differential, slowly reduce the flow to zero, shut down the system, and slowly drain the filter. Sudden reductions in flow can invalidate this test, as the water surge (including reversal of flow) can re-settle the media bed. Examine the surface of the filter media bed for conformance to Section 6.3.

f) Clean the unit per the manufacturer's instructions. Examine the filter media, for soil, organics, and filter aid.

g) Write down the differential pressure reading after cleaning cycle.

13.3.4.9 Acceptance criteria

The head loss through the filter after cleaning the media shall not exceed 150% of the initial head loss through the filter after cleaning shall not exceed the housing manufacturer's maximum design head loss, less 20%.

13.3.5 Initial turbidity reduction test

When tested in a representative sand-type filter, the media shall reduce water turbidity by 70% or more when tested in accordance with Annex N-2, section N-2.5.

13.3.5.1 Challenge slurries

Challenge slurries shall be as prescribed in Annex N-2.4.3 or Annex N-2.5.3

13.3.5.9 Acceptance criteria

After the fifth tank volume, the *TR* ratio shall be ≤ 0.30. This is equivalent to a 70% or greater reduction in turbidity.

Filters that reach the manufacturer's recommended condition for cleaning prior to completing five turnovers, shall have TR ratio ≤ 0.30 at the time the filter reaches the manufacturer's recommended condition for cleaning.

13.3.6 Longevity test

Polymeric fiber filtration media designed for more than one filter/backwash cycle are exempt from testing in 13.3.1 and 13.3.6 if the media materials of construction are identified as acceptable in either:

- Section 4.3 Corrosion resistance; or
- Section 14.9.2 Components and piping; or
- Section 14.9.3 Gaskets and seals.

Materials of construction not covered under Sections 4.3, 14.9.2, or 14.9.3 shall be tested for continued conformance to the head loss, turbidity reduction and cleanability requirements of the test standard after performing six complete soiling and cleaning cycles as defined in 13.3.4.

13.3.7 Filter media behavior

If the cleaning method of the media includes backwashing, then the filter media shall meet the requirements of 6.3.5 and the cleanability testing shall be conducted in accordance with 13.3.4

13.3.7.1 Testing shall be conducted within the sand filter vessel, any departure from this method (such as removal and external cleaning equipment or methods) shall be clearly marked on the packaging and noted on the NSF/ANSI/CAN 50 listing.

13.3.8 Filtration and backwash rates

The design filtration rate of polymeric media filters shall conform to the limits specified in Section 6.3.9.

13.3.9 Installation and operating instructions

The manufacturer of polymeric fiber filtration media shall provide written instructions for:

- the installation of the media in a filter;
- requirements for a different support media, if any;
- the volumetric or weight equivalent media amount to sand;
- preparation of the media for operation;
- cleaning of the media; and
- operation of filter with the media.

For purposes of equivalencies, one hundred (100) pounds of #20 filter sand is the volumetric equivalent to one (1) cubic foot.

13.3.10 Labeling requirements

Polymeric fiber filtration media shall contain the following information on the product packaging or documentation shipped with the product:

- manufacturer's name and contact information (address, phone number, website, or prime supplier);
- product identification (product type, and trade name);
- net weight or net volume;
- when applicable, mesh or sieve size;
- lot number or other production identifier such as a date code;
- when appropriate, special handling, storage and use instructions;
- the specific certification mark of the certifying organization for certified products; and
- special media operation specifications, if any, as required in Section 13.3