TO: Joint Committee on Food Equipment

FROM: Michael Perez, Chair of the Joint Committee

DATE: April 19, 2024

SUBJECT: Proposed revision to NSF/ANSI 3 – *Warewashing Equipment* (3i23r1)

Revision 1 of NSF/ANSI 3, issue 23 is presented to the Joint Committee on Food Equipment (JCFE) for consideration. Please review the proposed new and revised language and **submit your ballot by May 10, 2024** via the NSF Online Workspace <www.standards.nsf.org>. Log in at https:///standards.nsf.org/kps.

When adding comments, please include the section number for your comment and add all comments under one comment number whenever possible. If additional space is needed you may upload a MS Word or .PDF version of your comments directly to the NSF Online Workspace.

Purpose

The purpose of this ballot is to approve new and revised language correcting the use of NOTES, use of the term "Shall", and adding a new normative reference in Section 2.

Background

Issue paper **FE-2024-03** highlighted the value of cleaning up several misplaced terms and phrases in Standard 3, along with the missing normative reference to Standard 51.

This Revision 1 approval ballot reflects the language presented by the issue proponent and is presented here for your consideration.

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

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Chair, Joint Committee on Food Equipment
c/o Allan Rose
Joint Committee Secretariat
NSF International
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Email: arose@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 *red italics* and only used to add clarity; these statements will NOT be in the finished publication.]

NSF/ANSI Standard
for Food Equipment –

Commercial Warewashing Equipment

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2 Normative references

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

40 CFR § 180.940, *Tolerance exemptions for active and inert ingredients for use in antimicrobial formulations (Food-Contact Surface Sanitizing Solutions)*[3]

ASSE 1001-2017, *Performance Requirements for Atmospheric Type Vacuum Breakers*[4]

ASSE 1004-2017, *Backflow Prevention Requirements for Commercial Dishwashing Machines*[4]

IAPMO, *Uniform Plumbing Code* 2018[5]

ICC, *International Plumbing Code* 2018[6]

IEEE/ASTM SI 10-2016, *American National Standard for Metric Practice*[7]

NSF/ANSI 29, *Detergent and Chemical Feeders for Commercial Spray-Type Dishwashing Machines*

NSF/ANSI 51, Food Equipment Materials

NSF/ANSI 170, *Glossary of Food Equipment Terminology*

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[3] National Archives and Records Administration, Office of the Federal Register. 7 G Street NW, Suite A-734, Washington, DC 20401. <www.ecfr.gov>

[4] ASSE International. 18927 Hickory Creek Drive, Suite 220, Mokena, IL 60448. <www.asse-plumbing.org>

[5] International Association of Plumbing and Mechanical Officials. 4755 E Philadelphia St., Ontario, CA 91761. <www.iapmo.org>

[6] International Code Council. 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001. <www.iccsafe.org>

[7] ASTM International. 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. <www.astm.org>

5.19.4 If a sanitizing feeder is not provided by the manufacturer of a chemical sanitizing dish machine, the manufacturer shall specify the type and concentration of chemical sanitizer, appropriate sanitizer feed rate (mL/min), feed time(s), and necessary electrical requirements. This information ~~must~~ shall be displayed in a visible location on the machine on a permanently attached data plate. Electrical requirements may be on the inside of an enclosure or in the instruction manual.

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6 Performance

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NOTE 1 — Figures 1 through 5 in this section show specific patterns in which dishes and glasses are ~~shall be~~ arranged when evaluating machine performance. These patterns are applicable to most machine designs. However, the test patterns may be modified when necessary to accommodate an alternate machine design, size, or configuration. In such cases, the test pattern should ~~shall~~ be representative of the patterns shown in Figures 1 through 5, to the extent possible.

***Rationale**: NOTES are informative not normative and as such should not contain the term "Shall". Unlike the other NOTEs in this ballot however which are proposed to move into normative language, this NOTE is in fact informative. It cross references figures, also informative, and offers language to create alternative patterns for performance testing.*

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6.2 Sanitization efficacy

~~NOTE — Warewashing machines that include an auxiliary rinse system shall meet the applicable performance tests of this section with the auxiliary rinse system operating as intended. Warewashing machines that include a post-sanitizing rinse shall meet the applicable performance tests of this section with the post-sanitizing rinse operating as intended and deactivated.~~

Warewashing machines that include an auxiliary rinse system shall meet the applicable performance tests of this section with the auxiliary rinse system operating as intended. Warewashing machines that include a post-sanitizing rinse shall meet the applicable performance tests of this section with the post-sanitizing rinse operating as intended and deactivated.

***Rationale**: NOTES are informative not normative and as such should not contain the term "Shall"*

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6.2.6.2 Test method

a) Prior to the test, the sanitization portion of the machine shall be operated for at least one cycle to verify that the machine is operating in accordance with the manufacturer's minimum specifications.

b) A suspension of *Escherichia coli* (ATCC #11229)[8] in sterile phosphate buffer deionized water (SBDW) shall be prepared by washing four 24 h French bottle slants into 0.5 L of SBDW. This technique ensures that the suspension contains more than 1.0×10^6 colony forming units per mL (CFU/mL).

[8] American Type Culture Collection (ATCC). 10801 University Boulevard, Manassas, VA 20110. <www.atcc.org>

An aliquot of the suspension shall be aseptically removed. Density shall be determined via optical density. The dispersion and morphological characteristics of the challenge culture suspension shall be microscopically examined using Brightfield microscopy and differential staining (i.e., gram stain). A Brightfield microscope and a calibrated ocular micrometer shall be used to verify the size, shape and arrangement of the organisms. The bacteria present in the challenge suspension shall be confirmed to be singlet in arrangement and dispersed in a homogeneous manner.

c) 35 Libbey #618 milk glasses (8 oz) or the equivalent shall be inoculated with the *E. coli* / SBDW suspension. Each glass shall be inoculated in succession, by filling the glass with the suspension and then pouring the contents into the next glass. The lip of each emptied glass shall be dipped 1 in (2.54 cm) into a container of the suspension.

d) The inoculated glasses shall be air-dried for 10 ± 2 min before the test run. The glasses shall be placed upside down in a standard 20 in × 20 in (50.8 cm × 50.8 cm) dish rack. The rack shall be delineated into sections as shown in Figure 5.

e) For rackless conveyor machine designs, the glasses shall be arranged directly on the conveyor in the same configuration shown in Figure 5.

~~NOTE — For rackless conveyor machine designs, the glasses shall be arranged directly on the conveyor in the same configuration shown in Figure 5.~~

***Rationale**: NOTES are informative not normative and as such should not contain the term "Shall"*

~~e~~ f) The glasses shall be run through the sanitizing rinse portion of the machine cycle under one of the conditions in the manufacturer's specifications.

~~f~~ g) Immediately upon removal from the machine, each section of glasses shall be sampled by swabbing all interior surfaces of the five glasses with a single sterile cotton swab. The cotton swab shall be placed into a vial (containing 5 mL of sterile neutralizing buffer) corresponding to the section in which the glasses were placed. Samples shall be handled aseptically. Analysis shall be initiated within 15 min of sampling. If analysis cannot be performed within 15 min, the swabs shall be refrigerated at 4 ± 2 °C (39 ± 2 °F) for a maximum of 24 h.

~~g~~ h) These procedures shall be repeated for two additional trials to make a total of 105 glasses in 21 sections. The swab samples shall be enumerated using the violet red bile (VRB) agar pour plate method.

~~h~~ i) Positive control

Five of the inoculated glasses shall be randomly selected as positive controls. All interior surfaces of the five control glasses shall be swabbed with a single cotton swab after inoculation and the required drying period. The cotton swab shall be placed in a vial with 5 mL sterile neutralizing buffer and enumerated (CFU/mL) by the VRB agar pour plate method.

~~i~~ j) Negative control

Individual negative control samples shall be collected from a glass that has not been inoculated, the VRB agar, the swab, the SBDW, and the pipette used. Enumeration shall be by the VRB agar pour plate method.

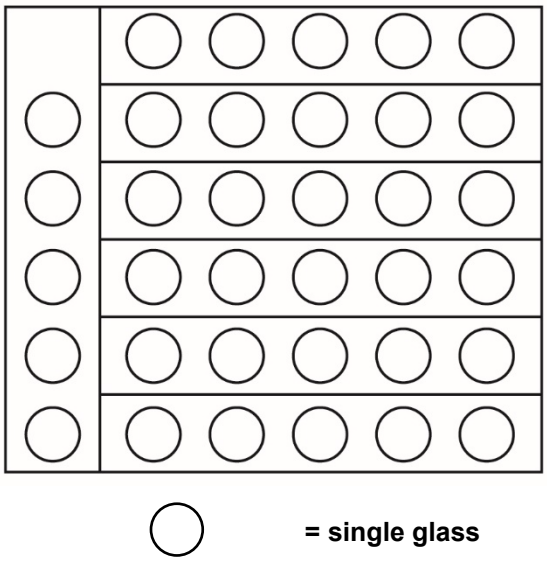

Figure 5
Test pattern for the bacteriological swab test for chemical sanitizing dishwashing and glass washing machines

k) This pattern is for a standard (20 × 20 in [50.8 × 50.8 cm]) rack. Similar patterns shall be used for different sizes and configurations.

6.2.6.3 Acceptance criteria

For each of the 21 zones, R shall be ≥ 5.0:

$$R = \log_{10} (N_i/N_f)$$

where:

N_i = initial inoculum density (CFU/mL)
N_f = number of CFU/mL recovered in each section of each rack

If $N_f < 1$, the samples shall be considered acceptable.

~~NOTE — This pattern is for a standard (20 × 20 in [50.8 × 50.8 cm]) rack. Similar patterns shall be used for different sizes and configurations.~~

***Rationale**: NOTES are informative not normative and as such should not contain the term "Shall". Additionally, this, is being relocated immediately following the figure illustrating the pattern.*

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6.2.8.2 Test method

a) Prior to the test, the sanitization portion of the machine shall be operated for at least one cycle to verify that the machine is operating in accordance with the manufacturer's minimum specifications.

b) A suspension of *E. coli* (ATCC #11229)[8] in SBDW shall be prepared by washing four 24 h French bottle slants into 0.5 L of SBDW. This technique ensures that the suspension contains more than 1.0×10^6 CFU/mL.

An aliquot of the suspension shall be aseptically removed. The density shall be determined via optical density. The dispersion and morphological characteristics of the challenge culture suspension shall be microscopically examined using Brightfield microscopy and differential staining (i.e., gram stain). A Brightfield microscope and a calibrated ocular micrometer shall be used to verify the size, shape and arrangement of the organisms. The bacteria present in the challenge suspension shall be confirmed to be singlet in arrangement and dispersed in a homogeneous manner.

c) Four $^1/_6$ size hotel pans (6 in depth) and one stainless steel stock pot shall be inoculated with the *E. coli* / SBDW suspension. The dimensions of the stock pot shall be such that it encompasses as much of the rack area as possible without overlapping the pans (see Figure 3). Each pan shall be inoculated in turn, by filling the container with the suspension and then pouring the contents into the next container. The pot shall be inoculated in a similar manner by pouring the suspension into the pot and then maneuvering the pot at an angle so that all interior surfaces contact the suspension. The lip of each emptied pan or pot shall be dipped 1 in (2.54 cm) into a container of the suspension.

d) The inoculated pans and pot shall be air-dried for 10 ± 2 min before the test run. The pans and pot shall be placed upside down on the machine's dish rack in an 'X' configuration with one pan in each of the four corners and the pot in the center (Figure 3).

e) For rackless conveyor machine designs, the pans and pot shall be arranged directly on the conveyor in the same configuration shown in Figure 3.

~~NOTE — For rackless conveyor machine designs, the pans and pot shall be arranged directly on the conveyor in the same configuration shown in Figure 3.~~

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6.4.6 Test Method

a) The rinse effectiveness of dishwashing machines shall be evaluated by observing the machine's rinse ability to remove the challenge test mixture, which is intended to mimic soil redeposition from wash water.

b) The dishwashing machine shall be operated with only the final rinse in operation. Auxiliary rinses (if equipped) shall also be operational during evaluation.

c) The challenge test mixture and plates (Corelle Winter Frost White or equivalent) shall be prepared in accordance with Normative Annex 3.

d) The dishwashing machine shall be conditioned in accordance with the manufacturer's instructions to the manufacturer's specified pressures and temperatures.

e) The rinse cycle shall be tested at a pressure of 20 ± 2.0 psi or the manufacturer's specified pressure ± 2.0 psi, if applicable. Does not apply to models with pumped rinse. The final rinse temperature ~~must~~ shall be no more than 2° F (1° C) above the nameplate minimum.

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N-3.1 Preparation Procedure

Thoroughly mix xanthan gum and approximately 0.26 gal (1.0 L) distilled water first with a handheld blender in a beaker to homogenize the mixture completely.

Add above mixture to remaining distilled water and Fluorescein and mix with a handheld blender until completely blended. This may take several minutes.

Allow this mixture to rest for 2 h at room temperature.

Briefly stir the mixture again prior to application to the test plates to ensure consistent blend of ingredients.

Prior to application of the Challenge Test Mixture, the plates shall be washed and rinsed five times in a hot water sanitizing dishmachine without detergent or rinse aid and dried.

Immediately prior to the application of the challenge test mixture, the mixture shall be stirred for one minute with a drill and stirrer attachment.

Plates shall be dipped in the mixture until completed submerged and placed on a peg type rack. Three plates positioned according to Figure 6 shall be used for each test. In a dark room, use the UV light to verify the presence of the challenge mixture on the plates.

The rack of test plates shall be subjected to one rinse cycle.

Once the rinse is complete, in a dark room using the UV light according to the performance testing procedures, verify the presence of any remaining challenge test mixture on the front of the plates. This evaluation ~~must~~ shall take place within 5 minutes of cycle completion.

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