Hobart C-64A Glass Wash Study.

NSF *International*

Hobart Glass Washing Study

NSF *International*

MEMORANDUM

TO: Joint Committee on Food Service Equipment

FROM: Kenneth E. Smith, Vice President, Conformity Assessment KES

DATE: September 14, 1992

SUBJECT: NSF Study for PMI Related to Standard 3

PMI Food Equipment Group (PMI) has released the report of the study that NSF *International* carried out for them on a Hobart C-64A conveyor dishwasher. A copy of this report is enclosed for your reveiw.

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FINAL REPORT

NSF International

REPORT

ON BACTERIOLOGICAL SWAB TESTS

JANUARY 24, 1992

For: PMI
Food Equipment Group
World Headquarters Boulevard
Troy, Ohio

By: NSF *International*
3475 Plymouth Road
Ann Arbor, MI 48105

Introduction

The PMI Food Equipment Group entered into a contract with NSF *International* (NSF) for conducting a special series of bacteriological tests. On December 11, 1991 NSF tested PMI Food Equipment Group's model C-64A Dishwasher for its ability to inactivate bacteria on glasses during different stages of washing and rinsing. This report presents the data and information about the testing.

Limitations

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Conclusion and Summary

In tests in which glasses were coated with a mixture of bacteria and skim milk, the bacteria were not detected in samples collected after the wash cycle (with and without detergent) and the rinse cycle. Bacteria were detected in samples collected after the final sanitizer rinse. This result does not mean that the final rinse with the sanitizer was not able to achieve a 6 log reduction of bacteria. To adequately sanitize utensils, the soil must be removed so as not to reduce the efficacy of the chemical sanitizer.

In tests in which glasses were coated with a mixture of bacteria, egg, cereal, and spinach, the bacteria were not detected in samples collected after the wash cycle (with detergent). However, bacteria were detected in samples collected after the wash cycle (without detergent), rinse cycle and the final (sanitizer) rinse.

Bacteriological Swab and Soil Testing Procedures

Bacteriological swab testing was conducted to determine the sanitation potential of the dishwasher. A suspension of E. coli (ATCC 11229) was prepared by washing two E. coli slants with skim milk in a vessel. Glasses (previously pre-washed and pre-sanitized) were soiled with the E. coli suspension, air dried, and then placed in the dishwasher. The glasses were run through the dishwasher under five different conditions. In the first test run, all systems were operating (normal use) and detergent was used. In the second test run, the glasses were run through the wash cycle and detergent was used. In the third test run, the dishes were run through the wash cycle but no detergent was used. In the fourth test run, the glasses were sent through the rinse cycle only. In the fifth test run, the glasses were sent through the final rinse cycle (with sanitizer). In the second part of the study, the glasses were also soiled with an egg, cereal, and spinach soil inoculated with E. coli and run through the same test runs described above.

For quality control purposes, a series of positive and negative controls were analyzed. One sample of the inoculated skim milk served as one positive control, and vials containing swabs from soiled glasses (before washing) served as the other positive control. The neutralizing buffer itself, the neutralizing buffer and a pipette (the pipette was used to transfer liquid from the vials to the counting plates), the neutralizing buffer and a sterile swab, the violet red bile agar, and sterile buffered distilled water (SBDW was used to dilute positive control samples) served as the negative controls. In addition, to assure that the neutralizer was neutralizing the effects of the sanitizer, a mixture of neutralizer and sanitizer was inoculated with E. coli and then plated. To assure that the neutralizer was not toxic to growth, the neutralizing buffer (without sanitizer) was inoculated with E. coli and plated. The same controls were used for the second part of the study except that the inoculated soil (egg, cereal, and spinach) served as the first positive control rather than the inoculated skim milk.

Results from Bacteriological Swab and Soil Testing

Results from both parts of the study are summarized in the following tables.

SPECIAL TESTING
BACTERIOLOGICAL REPORT

PAF #: 121191 BB
Utensil Type: Glasses

Model: C-64A
Soil Type: Skim Milk

Sample #	Description of Test Condition	E. Coli[2]
1	Inoculated skim milk	4.3×10^7
2	5 ea., soiled glasses, swabbed after drying, not washed	12.2×10^6
3	5 ea., soiled glasses, swabbed after drying, not washed	11.6×10^6
4	Neutralizing buffer - negative control	<1
5	VRB - negative control	<1
6	Swab negative control	<1
7	SBDW negative control	<1
8	Pipette control	<1
9	Neutralizer positive control	TNTC
10	Neutralizer control minus sanitizer	TNTC
11	5 soiled glasses, all systems function, normal use, section 1	<1
12	5 soiled glasses, all systems function, normal use, section 2	<1
13	5 soiled glasses, all systems function, normal use, section 3	2
14	5 soiled glasses, all systems function, normal use, section 4	<1
15	5 soiled glasses, all systems function, normal use, section 5	<1
16	5 soiled glasses, all systems function, normal use, section 6	<1
17	5 soiled glasses, all systems function, normal use, section 7	<1

[1]Sample Number
[2]Number of E. Coli per ml recovered in VRB agar
VRB: Violet red bile agar
E. Coli: ATCC 11229
SBDW: Sterile buffered distilled water
TNTC: Too numerous to count
section numbers refer to FIG. 1

Detergent Eco Temp ET Plus Concentration .30%
Sanitizer Clorox Concentration 50 mg/L
(Where Applicable)

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SPECIAL TESTING
BACTERIOLOGICAL REPORT

PAF #: 121191 BB
Utensil Type: Glasses

Model: C-64A
Soil Type: Skim Milk

Sample #	Description of Test Condition	E. Coli[2]
18	5 soiled glasses, wash cycle with detergent, section 1	<1
19	5 soiled glasses, wash cycle with detergent, section 2	<1
20	5 soiled glasses, wash cycle with detergent, section 3	<1
21	5 soiled glasses, wash cycle with detergent, section 4	<1
22	5 soiled glasses, wash cycle with detergent, section 5	<1
23	5 soiled glasses, wash cycle with detergent, section 6	<1
24	5 soiled glasses, wash cycle with detergent, section 7	<1
25	5 soiled glasses, wash cycle without detergent, section 1	<1
26	5 soiled glasses, wash cycle without detergent, section 2	<1
27	5 soiled glasses, wash cycle without detergent, section 3	<1
28	5 soiled glasses, wash cycle without detergent, section 4	<1
29	5 soiled glasses, wash cycle without detergent, section 5	<1
30	5 soiled glasses, wash cycle without detergent, section 6	<1
31	5 soiled glasses, wash cycle without detergent, section 7	<1
32	5 soiled glasses, rinse cycle only, section 1	<1
33	5 soiled glasses, rinse cycle only, section 2	<1
34	5 soiled glasses, rinse cycle only, section 3	<1
35	5 soiled glasses, rinse cycle only, section 4	<1

[1]Sample Number
[2]Number of E. Coli per ml recovered in VRB agar
VRB: Violet red bile agar
E. Coli: ATCC 11229
SBDW: Sterile buffered distilled water
TNTC: Too numerous to count
section numbers refer to FIG. 1

Detergent Eco Temp ET Plus Concentration .30%
Sanitizer Clorox Concentration 50 mg/L
(Where Applicable)

SPECIAL TESTING
BACTERIOLOGICAL REPORT

PAF #: 121191 BB
Utensil Type: Glasses

Model: C-64A
Soil Type: Skim Milk

Sample #	Description of Test Condition	E. Coli[2]
36	5 soiled glasses, rinse cycle only, section 5	<1
37	5 soiled glasses, rinse cycle only, section 6	<1
38	5 soiled glasses, rinse cycle only, section 7	<1
39	5 soiled glasses, final rinse only, section 1	2.7×10^4
40	5 soiled glasses, final rinse only, section 2	8.3×10^4
41	5 soiled glasses, final rinse only, section 3	1.1×10^5
42	5 soiled glasses, final rinse only, section 4	8.1×10^3
43	5 soiled glasses, final rinse only, section 5	2.2×10^4
44	5 soiled glasses, final rinse only, section 6	2.4×10^4
45	5 soiled glasses, final rinse only, section 7	1.3×10^4

[1]Sample Number
[2]Number of E. Coli per ml recovered in VRB agar
VRB: Violet red bile agar
E. Coli: ATCC 11229
SBDW: Sterile buffered distilled water
TNTC: Too numerous to count
section numbers refer to FIG. 1

Detergent Eco Temp ET Plus Concentration .30%
Sanitizer Clorox Concentration 50 mg/L
(Where Applicable)

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SPECIAL TESTING
BACTERIOLOGICAL REPORT

PAF #: 121191 BB
Utensil Type: Glasses

Model: C-64A
Soil Type: Egg, Cereal, Spinach

Sample #	Description of Test Condition	E. Coli[2]
46	Inoculated soil	7.6×10^7
47	5 soiled glasses, swabbed after drying, not washed	7.5×10^7
48	5 soiled glasses, swabbed after drying, not washed	6.6×10^7
49	Neutralizing buffer - negative control	<1
50	VRB - negative control	<1
51	Swab negative control	<1
52	SBDW negative control	<1
53	Pipette control	<1
54	Neutralizer positive control	TNTC
55	Neutralizer control minus sanitizer	TNTC
56	5 soiled glasses, all systems function, normal use, section 1	<1
57	5 soiled glasses, all systems function, normal use, section 2	<1
58	5 soiled glasses, all systems function, normal use, section 3	<1
59	5 soiled glasses, all systems function, normal use, section 4	<1
60	5 soiled glasses, all systems function, normal use, section 5	<1
61	5 soiled glasses, all systems function, normal use, section 6	<1
62	5 soiled glasses, all systems function, normal use, section 7	<1
63	5 soiled glasses, wash cycle with detergent, section 1	<1

[1]Sample Number
[2]Number of E. Coli per ml recovered in VRB agar
VRB: Violet red bile agar
E. Coli: ATCC 11229
SBDW: Sterile buffered distilled water
TNTC: Too numerous to count
section numbers refer to FIG. 1

Detergent Eco Temp ET Plus Concentration .30%
Sanitizer Clorox Concentration 50 mg/L
(Where Applicable)

SPECIAL TESTING
BACTERIOLOGICAL REPORT

PAF #: 112191 BB
Utensil Type: Glasses

Model: C-64A
Soil Type: Egg, Cereal, Spinach

Sample #	Description of Test Condition	E. Coli[2]
64	5 soiled glasses, wash cycle with detergent, section 2	<1
65	5 soiled glasses, wash cycle with detergent, section 3	<1
66	5 soiled glasses, wash cycle with detergent, section 4	<1
67	5 soiled glasses, wash cycle with detergent, section 5	<1
68	5 soiled glasses, wash cycle with detergent, section 6	<1
69	5 soiled glasses, wash cycle with detergent, section 7	<1
70	5 soiled glasses, wash cycle without detergent, section 1	64
71	5 soiled glasses, wash cycle without detergent, section 2	11
72	5 soiled glasses, wash cycle without detergent, section 3	10
73	5 soiled glasses, wash cycle without detergent, section 4	4
74	5 soiled glasses, wash cycle without detergent, section 5	5
75	5 soiled glasses, wash cycle without detergent, section 6	<1
76	5 soiled glasses, wash cycle without detergent, section 7	5
77	5 soiled glasses, rinse cycle only, section 1	108
78	5 soiled glasses, rinse cycle only, section 2	1100
79	5 soiled glasses, rinse cycle only, section 3	117
80	5 soiled glasses, rinse cycle only, section 4	84
81	5 soiled glasses, rinse cycle only, section 5	33

[1]Sample Number
[2]Number of E. Coli per ml recovered in VRB agar
VRB: Violet red bile agar
E. Coli: ATCC 11229
SBDW: Sterile buffered distilled water
TNTC: Too numerous to count
section numbers refer to FIG. 1

Detergent Eco Temp ET Plus Concentration .30%
Sanitizer Clorox Concentration 50 mg/L
(Where Applicable)

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SPECIAL TESTING
BACTERIOLOGICAL REPORT

PAF #: 121191 BB
Utensil Type: Glasses

Model: C-64A
Soil Type: Egg, Cereal, Spinach

Sample #	Description of Test Condition	E. Coli[2]
82	5 soiled glasses, rinse cycle only, section 6	99
83	5 soiled glasses, rinse cycle only, section 7	740
84	5 soiled glasses, final rinse only, section 1	8.2×10^6
85	5 soiled glasses, final rinse only, section 2	1.5×10^6
86	5 soiled glasses, final rinse only, section 3	5.9×10^6
87	5 soiled glasses, final rinse only, section 4	2.8×10^6
88	5 soiled glasses, final rinse only, section 5	7.8×10^6
89	5 soiled glasses, final rinse only, section 6	6.7×10^6
90	5 soiled glasses, final rinse only, section 7	6.5×10^6

[1]Sample Number
[2]Number of E. Coli per ml recovered in VRB agar
VRB: Violet red bile agar
E. Coli: ATCC 11229
SBDW: Sterile buffered distilled water
TNTC: Too numerous to count
section numbers refer to FIG. 1

Detergent Eco Temp ET Plus Concentration .30%
Sanitizer Clorox Concentration 50 mg/L
(Where Applicable)

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O - A single glass

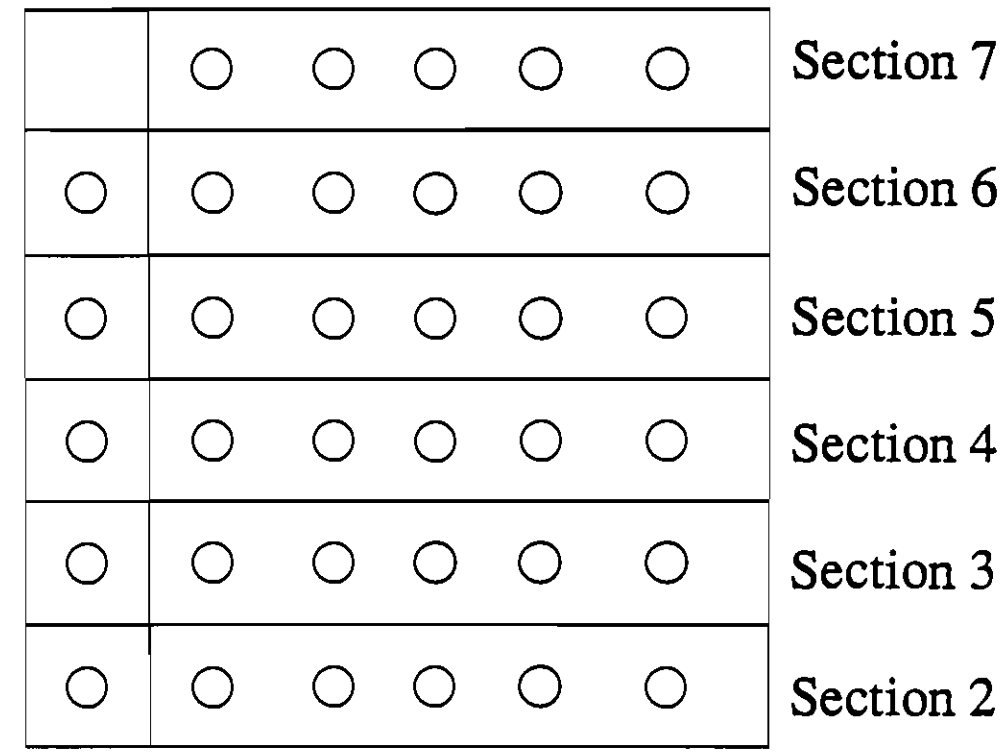

Figure 1. Location of Test Glasses in Dishwasher Rack