
ASSE 1037-2020/ ASME A112.1037-2020/ CSA B125.37:20
Performance requirements for pressurized flushing devices for plumbing fixtures

Issued to **Hydrotek International, Inc.**

Product Identifications: HE8200-1.28

Scope of Evaluation

ASSE 1037-2020/ ASME A112.1037-2020/ CSA B125.37:20

Test Report Number

RTL0134-2

Date of Test

March 2, 2021 to April 6, 2021

Report Issued on

April 12, 2021

Record Kept until

April 11, 2025

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Test Report; V1.0_02-13-20

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11

Report Issued To:

Hydrotek International, Inc.
5055 Forsyth Commerce Rd, Ste 124
Orlando, FL 32807

Proposal Number: SSP-02012021-01

Acceptance Date: February 2, 2021

Accepted By: Jason Dai

Product ID: HE8200-1.28

Sampling: On February 22, 2021 one sample was received for testing, shipped directly by the client to Right Testing Labs. No sampling or witness of construction was observed by Right Testing Labs.

Witnesses of Test: Drew Mersereau-RTL, Scott Parkhurst-RTL

Conclusion: Based on the test results documented in this report, the tested assembly described in this report DOES COMPLY with the acceptance criteria specified in ASSE 1037-2020/ ASME A112.1037-2020/ CSA B125.37:20

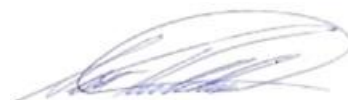
**See details of Evaluation on the subsequent pages of this report.*

Prepared By

**Signed for and on the behalf of
Right Testing Laboratories, LLC**



Name: Drew Mersereau
Title: Senior Project Manager
Date: April 12, 2021



Scott Parkhurst
Laboratory Manager
April 12, 2021

3.0 Design and general requirements

3.1	<p>Pressures PFDs shall be designed to function at a supply pressure between 140 and 860 kPa (20 and 125 psi).</p>	<u>COMPLIANT</u>
3.2	<p>Temperatures PFDs shall be designed to function with water temperature between 4 °C and 30 °C (40 °F and 85 °F).</p>	<u>COMPLIANT</u>
3.3	<p>Backflow prevention PFDs incorporating backflow preventers shall comply with the requirements of Clause 4.3or 4.4.</p>	<u>COMPLIANT</u>
3.4	<p>Accessible designs The PFD's primary function is automatically controlled.</p>	<u>COMPLIANT</u>
3.5	<p>Control stop If the manufacturer provides a control stop with the PFD, it shall be considered part of the PFD.</p>	<u>REFERENCE</u>
3.6	<p>Connections to water supply and fixtures Tapered pipe threads shall conform to ASME B1.20.1. Straight threads shall conform to ASME B1.1. Dimensions of solder-joint connections shall conform to ASME B16.18 or ASME B16.22. Compression connections shall be compatible with SAE J512.</p> <p>Inlet supply connections shall be as specified by the PFD manufacturer. <u>1 NPSM</u> Outlet connections shall provide pressure-tight connections to the fixture <u>1-1/2 in.</u> to which it is assembled, as specified in ASME A112.19.2/CSA B45.1.</p>	<u>COMPLIANT</u>
3.7	<p>Coatings Coatings shall comply with the applicable requirements of ASME A112.18.1/CSA B125.1.</p> <p>General Before testing, specimens shall be conditioned at ambient laboratory conditions for not less than 12 h. For test purposes, specimens shall be installed in accordance with the manufacturer's instructions. Unless otherwise specified in this Standard, tests shall be conducted at ambient laboratory conditions. It shall not be necessary to conduct the tests in a particular order, unless a sequence is specified in this Standard.</p> <p>Coatings The fittings selected for testing shall be as received from the manufacturer and shall not have been subjected to any other test. The significant surfaces of the coated components shall be free of surface defects and uncoated areas, and shall not be stained.</p> <p>Corrosion (all substrates and coatings)</p> <p>Performance requirements When tested in accordance with Clause 5.2.2, functional metallic parts shall not exhibit corrosion that would adversely affect the functioning of the fitting or the disassembly and reassembly of the components. Disassembly and reassembly of the functional metallic parts shall be accomplished without damage to the components or the fitting on completion of the test procedure specified in Clause 5.2.2.</p>	<p><u>COMPLIANT</u></p> <p><u>REFERENCE</u></p> <p><u>REFERENCE</u></p> <p><u>COMPLIANT</u></p> <p><u>REFERENCE</u></p>

After undergoing the test specified in Clause 5.2.2, the specimen described in Clause 5.2.2.1 shall comply with Clause 5.11.1.1 or 5.11.2.1, as applicable.

REFERENCE

When tested in accordance with Clause 5.2.2, the specimen described in Clause 5.2.2.1 shall be capable of being
(a) disassembled with standard tools to enable access to all serviceable parts without damage to the specimen; and
(b) reassembled with standard tools without damage to the specimen.

COMPLIANT

Test Procedure

Fittings shall be tested in accordance with ASTM B117 for 96 h. The specimen selected for the corrosion test shall be tested as received from the manufacturer and shall not have been subjected to any other test. The specimen shall be assembled in accordance with the manufacturer's instructions, including the use of mounting hardware specified by the manufacturer would be in when installed. If multiple specimens are being tested, no specimen shall be suspended above another specimen. Immediately after the 96 h exposure period, the corrosion chamber shall be opened and the specimen shall be rinsed under running deionized water not warmer than 38 °C (100°F) and immediately dried for a minimum of 24 h at ambient laboratory conditions before inspection or attempts to disassemble. The specimen shall not be rubbed during rinsing or drying or before being examined.

Test Agency and Report No.: Applied Technical Service
Test Agency Accreditation Provider and No.: A2LA No. 1888.01
ASTM B117 Results: Pass

3.8 PFDs incorporating electrical features
PFDs incorporating electric features shall comply with the applicable requirements of ASME A112.18.1/ CSA B125.1.

COMPLIANT

Electrical power to low-voltage circuits involving a peak open-circuit potential of not more than 42.2 V shall be supplied by a
a) primary battery supply;
b) suitable Class 2 low-voltage transformer complying with the applicable CSA or UL electrical Standards; or
c) combination of a transformer and fixed impedance that, as a unit, complies with the requirements for a Class 2 transformer specified in Item b).

Power Supply: (4) AA Batteries wired in series, 6 volts total

4.0 Performance requirements and test methods

4.1 General
Before testing, specimens shall be conditioned at ambient laboratory conditions for not less than 12 h. For test purposes, specimens shall be installed in accordance with the manufacturer's instructions. Unless otherwise specified in this Standard, tests shall be conducted at ambient laboratory conditions. Tests shall be conducted on the same specimen, in the order listed in this Standard. Where access to checking members to perform the test in Clause 4.4 would compromise the integrity of the specimen to complete the remainder of the tests, a second sample may be used solely to test per Clause 4.4.

REFERENCE

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Client: Hydrotek International, Inc.

Issue Date: 4/12/021

4.2 Pressure test **COMPLIANT**

Purpose: The purpose of this test is to determine if the PFD operates across its required pressure range.

Procedure: The pressure test was conducted as follows:

- a) The test specimen was installed on the test stand with the PFD discharging to atmosphere.
- b) Operate the PFD (i.e., allow it to complete its flushing cycle) at a static pressure of 140 ± 14 kPa (20 ± 2 psi).
- c) Repeat Item b) at a static pressure of 860 ± 14 kPa (125 ± 2 psi).
- d) Subject the PFD to a static pressure of 140 ± 14 kPa (20 ± 2 psi).
- e) Hold for 5 min.
- f) Repeat Item b) at a static pressure of 860 ± 14 kPa (125 ± 2 psi).
- g) Observe for leakage.

Performance criteria: Failure to complete the flushing cycle or any leakage shall result in a rejection of the PFD.

Flushing Cycle Completed? Yes
Leakage Observed: None

4.3 Back siphonage test — Non-tank type PFDs **COMPLIANT**

Purpose: The purpose of this test is to ensure that the PFD incorporates a means to protect against back siphonage, except as specified in Clause 3.3.

Procedure: Non-tank type PFDs shall comply with the back siphonage performance requirements in ASME A112.18.3, ASSE 1001, or CSA B64.1.1.

Standard Compliance: ASME A112.18.3

Mount the fixture fitting as received from the manufacturer in its normal position in accordance with the installation instructions. Connect the inlet pipes collectively to a water supply capable of delivering water through each device at a flow of 1.0 gpm to 2.0 gpm (0.063 L/s to 0.126 L/s) to a vacuum system capable of maintaining a vacuum from 0 in. Hg to 25 in. Hg (0 kPa gage to 84 kPa gage). See Fig. 5. Connect a 1/2 in. minimum inside diameter transparent sight glass in a leakproof manner to the hose connected outlet. Open Valve 1 with Valve 2 and Valve 3 closed and flush the fitting to purge air from it. Close Valve 1. Adjust the water level in the sight glass to be 1/2 in. (13mm) above the highest level of the fitting. Open Valve 2. Observe the level of water in the sight glass for a 5 min period as an indication of leakage. Raise and hold the hose outlet for 5 min at its maximum vertical extension. Inspect for leakage.

Requirement: There shall be no leakage.

Leakage Observed? No

4.4 Back siphonage test — Tank type PFDs **NOT APPLICABLE**

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Issue Date: 4/12/021

4.5 Hydraulic performance tests

COMPLIANT

Purpose: The purpose of this test is to determine the PFD's hydraulic performance.

Procedure: The hydraulic performance test shall be conducted

- a) in accordance with the applicable performance tests specified in ASME A112.19.2/CSA B45.1, for single-flush PFDs;
- b) in accordance with the applicable performance tests specified in ASME A112.19.14, for dual-flush PFDs;
- c) using three fixtures
 - i) complying with ASME A112.19.2/CSA B45.1; and
 - ii) manufactured by different manufacturers; and
- d) following the sequence specified in Table 1 for each type of PFD, depending on the fixture on which it is intended to be installed.

Results:

Test Bowl: Kohler K-96057

Water Consumption Test

	<u>Run No.</u>	<u>Main Flush (gal)</u>	<u>Afterflow (gal)</u>	<u>Trap Seal Restored</u>
Static Pressure (psi) 35	1	1.24	0.00	Yes
	2	1.28	0.00	Yes
	3	1.27	0.00	Yes

	<u>Run No.</u>	<u>Main Flush (gal)</u>	<u>Afterflow (gal)</u>	<u>Trap Seal Restored</u>
Static Pressure (psi) 80	1	1.28	0.00	Yes
	2	1.28	0.00	Yes
	3	1.28	0.01	Yes

Granule and Ball Test

	<u>Run No.</u>	<u>Number of Granules in Bowl</u>	<u>Number of Balls</u>	<u>Trap Seal Restored</u>
Static Pressure (psi) 35	1	34	0	Yes
	2	21	0	Yes
	3	27	0	Yes

Surface Wash Test

	<u>Run No.</u>	<u>Number of Ink Line Segments</u>	<u>Length of each Segment (in.)</u>	<u>Combined Length (in.)</u>
Static Pressure (psi) 35	1	0	0	0
	2	0	0	0
	3	0	0	0

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Waste Extraction Test

	<u>Run No.</u>	<u>Paper Balls Remaining</u>	<u>Solid Waste Remaining</u>	<u>Trap Seal Restored</u>	<u>Pass/Fail</u>
	1	0	0	0	Pass
Static Pressure (psi)	2	0	0	0	Pass
50	3	0	0	0	Pass
	4	0	0	0	Pass
	5	0	0	0	Pass

Drain Line Transportation Test

<u>Travel Distance (ft)</u>	<u>Number of Balls</u>				<u>Total Balls</u>	<u>Average Distance (ft)</u>	<u>Weighted Carry</u>
	<u>1st Run</u>	<u>2nd Run</u>	<u>3rd Run</u>				
In Bowl or Trap	2	3	1		6	0	0
<10	5	12	0		17	5	85
10-<20	0	7	3		10	15	150
20-<30	5	5	8		18	25	450
30-<40	16	4	4		24	35	840
40-<50	0	0	0		0	45	0
50-<60	0	8	0		8	55	440
≥60	72	61	84		217	60	13020
Total	100	100	100		300		14985
Average Distance							50.0

Test Bowl: Toto CT705ULN

Water Consumption Test

	<u>Run No.</u>	<u>Main Flush (gal)</u>	<u>Afterflow (gal)</u>	<u>Trap Seal Restored</u>
Static Pressure (psi)	1	1.25	0.00	Yes
35	2	1.22	0.00	Yes
	3	1.25	0.00	Yes

	<u>Run No.</u>	<u>Main Flush (gal)</u>	<u>Afterflow (gal)</u>	<u>Trap Seal Restored</u>
Static Pressure (psi)	1	1.27	0.00	Yes
80	2	1.28	0.00	Yes
	3	1.27	0.00	Yes

Granule and Ball Test

	<u>Run No.</u>	<u>Number of Granules in Bowl</u>	<u>Number of Balls</u>	<u>Trap Seal Restored</u>
Static Pressure (psi)	1	23	0	Yes
35	2	29	0	Yes
	3	34	0	Yes

Surface Wash Test

	<u>Run No.</u>	<u>Number of Ink Line Segments</u>	<u>Length of each Segment (in.)</u>	<u>Combined Length (in.)</u>
Static Pressure (psi)	1	0	0	0
35	2	0	0	0
	3	0	0	0

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Waste Extraction Test

	<u>Run No.</u>	<u>Paper Balls Remaining</u>	<u>Solid Waste Remaining</u>	<u>Trap Seal Restored</u>	<u>Pass/Fail</u>
	1	0	0	0	Pass
Static Pressure (psi)	2	0	0	0	Pass
50	3	0	0	0	Pass
	4	0	0	0	Pass
	5	0	0	0	Pass

Drain Line Transportation Test

<u>Travel Distance (ft)</u>	<u>Number of Balls</u>			<u>Total Balls</u>	<u>Average Distance (ft)</u>	<u>Weighted Carry</u>
	<u>1st Run</u>	<u>2nd Run</u>	<u>3rd Run</u>			
In Bowl or Trap	1	2	0	3	0	0
<10	0	0	0	0	5	0
10-<20	0	0	0	0	15	0
20-<30	3	0	0	3	25	75
30-<40	1	0	0	1	35	35
40-<50	0	1	0	1	45	45
50-<60	6	0	0	6	55	330
≥60	89	97	100	286	60	17160
Total	100	100	100	300		17645
					Average Distance	58.8

Test Bowl: American Standard 3451.001

Water Consumption Test

	<u>Run No.</u>	<u>Main Flush (gal)</u>	<u>Afterflow (gal)</u>	<u>Trap Seal Restored</u>
Static Pressure (psi)	1	1.22	0.00	Yes
35	2	1.24	0.00	Yes
	3	1.24	0.00	Yes

	<u>Run No.</u>	<u>Main Flush (gal)</u>	<u>Afterflow (gal)</u>	<u>Trap Seal Restored</u>
Static Pressure (psi)	1	1.27	0.00	Yes
80	2	1.27	0.00	Yes
	3	1.27	0.00	Yes

Granule and Ball Test

	<u>Run No.</u>	<u>Number of Granules in Bowl</u>	<u>Number of Balls</u>	<u>Trap Seal Restored</u>
Static Pressure (psi)	1	26	0	Yes
35	2	30	1	Yes
	3	19	0	Yes

Surface Wash Test

	<u>Run No.</u>	<u>Number of Ink Line Segments</u>	<u>Length of each Segment (in.)</u>	<u>Combined Length (in.)</u>
Static Pressure (psi)	1	0	0	0
35	2	0	0	0
	3	0	0	0

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Waste Extraction Test

	<u>Run No.</u>	<u>Paper Balls Remaining</u>	<u>Solid Waste Remaining</u>	<u>Trap Seal Restored</u>	<u>Pass/Fail</u>
	1	0	0	0	Pass
Static Pressure (psi)	2	0	0	0	Pass
50	3	0	0	0	Pass
	4	0	0	0	Pass
	5	0	0	0	Pass

Drain Line Transportation Test

<u>Travel Distance (ft)</u>	<u>Number of Balls</u>			<u>Total Balls</u>	<u>Average Distance (ft)</u>	<u>Weighted Carry</u>
	<u>1st Run</u>	<u>2nd Run</u>	<u>3rd Run</u>			
In Bowl or Trap	3	3	2	8	0	0
<10	0	0	0	0	5	0
10-<20	0	0	0	0	15	0
20-<30	0	0	0	0	25	0
30-<40	0	2	0	2	35	70
40-<50	0	0	5	5	45	225
50-<60	2	0	0	2	55	110
≥60	95	95	93	283	60	16980
Total	100	100	100	300		17385
					Average Distance	58.0

4.6 Operating requirements

COMPLIANT

Purpose: The purpose of this test is to determine the torque or force required to open, operate, and close a manually activated primary control.

Procedure: The operating (torque) test shall be conducted in an ambient environment of 20 ± 5 °C (68 ± 9 °F), as follows:

- The test specimen was installed on the test stand with the PFD discharging to atmosphere.
- The test specimen was brought to equilibrium test temperatures by running water through it.
- The force to operate a manually activated operating control by testing with water running as follows:
 - 140 ± 14 kPa and 15 ± 6 °C (20 ± 2 psi and 59 ± 10 °F); and
 - 550 ± 14 kPa and 15 ± 6 °C (80 ± 2 psi and 59 ± 10 °F).

Requirement: For primary controls of non-accessible design PFDs, the linear force shall not exceed 90 N (20 lbf).

Result: 9 lbf (Secondary Control) / IR Sensor (Primary)

4.7 Life cycle test

COMPLIANT

Purpose: The purpose of this test is to determine if there is any deterioration in the performance of the PFD through the life cycle testing.

Procedure: The PFD for the life cycle test was set up as follows:

- The test specimen was installed on a test stand with the PFD discharging to atmosphere.
- The PFD was connected to a 172 ± 14 kPa (25 ± 2 psi) flowing supply pressure at 15 ± 6 °C (59 ± 10 °F).

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- c) The PDF was flushed at least five times to hydraulically balance it.
- d) Once hydraulically balanced, the PDF was flushed five consecutive times, measuring the volume of each flush.
- f) The average of the five flush volumes was recorded. For dual flush PFDs, measure and average the flush volumes for five full flushes, then measure and average the flush volumes for five reduced flushes.

Primary Control The life cycle test for PFDs with a primary control was conducted as follows:

- a) Subject the PFD to 250,000 cycles of operation.
- b) After every 25,000 cycles,
 - i) record the average flush volume of three consecutive flushes; and
 - ii) observe the PFD for leakage.
- c) For dual flush PFDs, use the following cycling sequence:
 - i) 25,000 cycles in full-flush mode;
 - ii) 100,000 cycles in reduced-flush mode;
 - iii) 25,000 cycles in full-flush mode; and
 - iv) 100,000 cycles in reduced-flush mode.
- d) Compare the average flush volumes at each stage with the average discharge volumes recorded.

Requirement: Sticking, chattering, or leaking during or at the conclusion of the life cycle test shall result in a rejection of the PFD. The average flush volume at each recorded stage varying by more than 10% shall result in a rejection of the device; and

Type of PDF: Single Flush (Primary)

Result:	Cycles	Flush 1 (gal)	Flush 2 (gal)	Flush 3 (gal)	Average (gal)
	Initial	1.27	1.27	1.28	1.27
	25,000	1.28	1.28	1.29	1.28
	50,000	1.25	1.26	1.25	1.25
	75,000	1.28	1.27	1.28	1.28
	100,000	1.28	1.28	1.28	1.28
	125,000	1.27	1.26	1.26	1.26
	150,000	1.28	1.28	1.28	1.28
	175,000	1.27	1.27	1.27	1.27
	200,000	1.29	1.28	1.29	1.29
	225,000	1.26	1.29	1.28	1.28
	250,000	1.28	1.28	1.28	1.28

Observations: No sticking, chattering, or leaking during or at the conclusion of the life cycle test

- 4.8 Integral control stop life cycle test **NOT APPLICABLE**
 - 4.9 Hydrostatic pressure test for non-tank type PFDs **COMPLIANT**
- Purpose:** The purpose of this test is to determine the torque or force required to open, operate, and close a manually activated primary control.

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Procedure: The purpose of the hydrostatic pressure test for non-tank type PFDs is to determine if the PFD is capable of withstanding a hydrostatic test pressure of 3,450 kPa (500 psi).

Requirement: Any leakage shall result in a rejection of the PFD.

Result: No Leakage

4.10	Hydrostatic pressure test for non-tank type PFDs	<u>NOT APPLICABLE</u>
5.0	Markings, packaging, and installation instructions	<u>NOT EVALUATED</u>

>>>END OF TEST EVALUATION>>>