

TEST REPORT

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Report Number: 1369-10002

Report Issued: May 06, 2010 **Project No.:** 16981

Client: Blue Heron Specialty
250 E. 54th Avenue, Unit D
Denver, CO 80216

Source of Samples: The samples were sent by the manufacturer, and received by IAPMO R&T lab on November 18, 2009, and 04/30/10 in good condition.

Date of Testing: January 18, 2010 to May 06, 2010.

Sample Description: Pressure vacuum breaker
Model No.: BEAR B&P (cap and bonnet only)
The unit consisted of:
- A brass body with 3/4 inch inlet and outlet
- A steel canopy / cover
- Bonnet
- Float and poppet/check assembly
- Ball valves with test cocks at inlet and outlet.

Scope of Testing: The purpose of the testing was to determine if the sample tested of the pressure vacuum breaker met the applicable requirements of section ASSE 1020-2004, entitled, "Pressure Vacuum Breaker Assembly".
Note: the valve was Febco (listed under File 0075) valve with Blue Heron Specialty cap and bonnet. So, tests were conducted to evaluate the cap plastic cap and bonnet.

Conclusion: The sample tested of model 3/4" pressure vacuum breaker, with cap and bonnet, model listed above, from Blue Heron Specialty, complied with the applicable requirements of ASSE 1020-2004.

By our signatures below, we certify that all the testing and sample preparation for this report was performed under continuous, direct supervision of IAPMO R&T Lab.

Tested by:

Reviewed by:

Handwritten signature of Hanks Ninh in black ink.

Hanks Ninh, Project Engineer

Handwritten signature of Sean Vuu in black ink.

Sean Vuu, P.E., Manager, Specialty Projects

Standards:

ASSE 1020-2004, Sections evaluated/tested:

- 1.2 Scope
- 1.3 Mechanical Function
- 2.0 Test Specimens
- 3.1 Hydrostatic Test of Complete Device
- 3.2 Hydrostatic Test of Check Valve
- 3.3 Rated Flow and Maximum Allowable Pressure Loss
- 3.4 Air Inlet Valve Opening Pressure Test
- 3.5 Drip Tightness of Check Valve Test
- 3.6 Air Passage Comparative Areas
- 3.7 Back Siphonage Test
- 3.8 Shock (Water Hammer) Test of the Assembly
- 3.9 Deterioration at Extreme of Manufacture's Temperature Range
- 3.10 Life Cycle Test.
- 4.1 Materials
- 4.2 Instructions for Marking and Installation
- 4.3 Installation and Maintenance Instructions

Test Results: All tests and evaluations were conducted per the written procedures specified in the standard. Sections not mentioned above were considered not applicable to the tested product.

ASSE 1020-2004

1.2 Scope

1.2.2. Size Range – COMPLIED.

The valve was designed to accommodate nominal pipe size of 3/4 NPT.

1.2.3 Working Pressure – COMPLIED

The valve was rated up to 150 psi.

1.2.4 Temperature Range – COMPLIED

The valve was rated from 33°F to 140°F

1.3.1 Check Valve – COMPLIED

The check valve force loaded to a normally closed position under static conditions

1.3.2 Air Inlet Valve – COMPLIED

The air inlet valve was force loaded to a normally open position when the line pressure was atmospheric. It was located above the pipe line so that water could drain from it by gravity.

The air inlet valve started to open when the line pressure reached 1.0 psi and the the inlet valve was fully open when water drained from the body.

1.3.3 Test Cocks – COMPLIED

Test cocks were resilient seated, and as part of the device, met all material specifications and hydrostatic requirements of this standard. Pipe size connections of test cocks met the sizes indicated in Table 1.

1.3.4 Accessibility – COMPLIED

Check and air inlet valves were accessible for inspection, repair, or replacements. All replaceable part the assemblies of the same size and model were interchangeable with the original parts.

2.1 Samples Submitted

Three samples were submitted by the manufacturer.

2.2 Samples Tested

One sample was selected for full test.

2.3 Drawings – PENDING.

3.1 Hydrostatic Test of Complete Device - COMPLIED

The device was installed per figure 1 of the standard, and a hydrostatic pressure of 300 psi was applied to the inlet of the valve for 5 minute.

Findings: There was no leakage

3.2 Hydrostatic Test of Check Valve - COMPLIED

The device was installed per Figure 2A, and tested per section 3.2.2 with 300 psi for 5 minutes.

Findings: The water in sight glass reached 4 inches and stayed. There was no leakage.

3.3 Rated Flow and Maximum Allowable Pressure Loss - COMPLIED

The device was installed per Figure 1 and tested to section 3.3.2 at 10.0 psi pressure drop.

Findings: The measured flow rate was 30 gpm (minimum requirement: 30 gpm).

3.4 Air Inlet Valve Opening Pressure Test – COMPLIED.

The air inlet valve started to open when the line pressure fell to not less than 1 psi (28 inches of water column) and was fully open when the water drained from the body.

Findings: The air inlet valve started to open at 61" water column and fully open when water drained from the body.

3.5 Drip Tightness of Check Valve Test – COMPLIED.

The check valve was drip tight when a pressure of not less than 1 psi (28" W.C) was applied to the upstream side with atmospheric pressure on the downstream side as indicated by loss of level in the sight glass below 28 inches water column.

Findings: The check valve stopped leaking at 46" inches water column.

3.6 Air Passage Comparative Areas – COMPLIED

The device was installed per Figure 4, and tested to sections 3.6.2.1 and 3.6.2.2 of the standard.

Finding: based on the average of 3 test runs, the average timing of section 3.6.2.2 was 29.50 seconds, while the average timing of section 3.6.2.1 was 30.54 seconds.

3.7 Back Siphonage Test – COMPLIED

A wire size (0.040") from Table 3 was used to foul the check valve of the pressure vacuum breaker valve. The following vacuum pressures were applied to inlet of the valve with a sight glass tube connecting to the outlet of the valve:

- a) A vacuum pressure of 25" Hg was applied for 30 seconds
- b) Intermittent vacuums of vacuum of 5", 10", 15", 20", 25" Hg for 5 seconds each.
- c) Vacuum increased slowly from 0" to 25" Hg, then slowly decreased to 0" Hg.

Finding: the maximum water rise was 0.2 inch.

3.8 Shock Test of the Device - COMPLIED

The device was installed as shown in Figure 1, and a shock wave of 300 psi was applied to the outlet of the device for four cycles.

Findings: no damage was found

3.9 Deterioration at Extremes of Manufacturer's Temperature - COMPLIED

Water at 180°F and 150 psi was circulated through the valve for 8 hours a day for 10 days. At the end of each 8 hour period, the air inlet valve opening was verified in accordance with Section 3.4.

3.10 Life Cycle Test – COMPLIED

The vacuum breaker was tested per section 3.10.2, as follows:

- a) Water was flown through the device at 25% of its rated flow (7.5 gpm) for 3 seconds
- b) The flow was ceased and static pressure was raised to 150 psi for 6 seconds

Steps a and b constituted 1 cycle, and was repeated for 1250 cycles. Then the device was retested to sections 3.4 and 3.5.

The whole process was repeated at 50%, 75%, and 100% of the device's rated flow (15, 22.5, 30 gpm).

Finding: after completing the simulated field conditions at 25%, 50%, 75% and 100% of its rated flow, the device complied with sections 3.4 and 3.5.

3.4 Air Inlet Valve Opening Pressure Test – COMPLIED.

The air inlet valve started to open when the line pressure fell to not less than 1 psi and was fully open when the water drained from the body.

Findings: The air inlet valve started to open at 58", and fully open when water drained from the body.

3.5 Drip Tightness of Check Valve Test – COMPLIED.

The check valve was drip tight when a pressure of not less than 1 psi was applied to the upstream side with atmospheric pressure on the downstream side as indicated by loss of level in the sight glass below 28 inches water column.

Findings: The check valve stopped leaking at 40" inches water column.

4.1 Materials

4.1.1 Material in contact with water – COMPLIED

Solder and flux were not used in the device, only plastic was in contact with water.

4.1.3 Internal non-cast part – COMPLIED

Internal non-cast parts were made off plastic.

4.1.4 Springs – NOT PART OF EVALUATION

4.1.5 Flexible or non-flexible non-metallic parts – COMPLIED

Valve disc, seat facing or other flexible or non-flexible non-metallic parts were designed, manufactured and supplied for continuous exposure to water at the maximum rated operating temperature of the device without change in physical characteristics which prevents full compliance with all requirements of this standard.

4.1.6 Metal to metal seats – COMPLIED

Metal to metal seat was not utilized in this device.

4.1.7 Test cocks – COMPLIED

Test cock was made of brass, and was of size 1/4".

4.1.8 Pipe Threads – COMPLIED

Taper pipe threads (3/4") complied with ASME B1.20.1.

4.2 Instructions for marking and installation

Each device was marked with the following:

- a) Manufacturer's name "Toro"
- b) Type and model number "PVB 220-2507"

The markings were molded on the cap and body of the device.

4.3 Installation and maintenance instructions – NOT PART OF THE EVALUATION

