

UNDERWRITERS LABORATORIES INC.

File NC4513  
Project 01NK51901  
January 24, 2002

TESTING OF SAFETY VACUUM RELEASE DEVICE MODEL VA-2000

**GENERAL INFORMATION**

The product and information as described in this report are representative of the samples supplied by the manufacturer, Vac Alert, and submitted by the Applicant, Vac Alert. The samples were not picked up during an IAPMO inspection. The samples were subjected to the testing described in Pars. 10.2, 10.3, 10.3.1, 10.4, and 10.5 of IAPMO's proposed IGC 160-2002 at the manufacturer's site at Vac-Alert, as witnessed by Underwriters Laboratories Inc. staff on December 19, 2001, and January 9 and 10, 2002. A copy of the proposed IGC 160-2002 is attached. There was no evidence of product modification or tampering of the sample submitted for evaluation. Each test conducted on the samples was under the direct supervision of Underwriters Laboratories Inc.

APPLICANT: Vac Alert Industries, Inc.  
3245 Oleander Ave.  
Ft. Pierce, FL 34982

MANUFACTURER: Vac Alert Industries, Inc.  
4505 Prosperity Drive  
Ft. Pierce, FL 34982

TESTING LAB: Underwriters Laboratories Inc.  
333 Pfingsten  
Northbrook, IL 60062

**SUMMARY OF RESULTS**

**The test results as shown in the attached Test Record covering Model VA-2000 were found to comply with the requirements of Paragraphs 10.2, 10.3, 10.3.1, 10.4 and 10.5 of the IAPMO when the ½ hp pump was installed below and above the water level in the tank, and when the 3 hp pump installed above the water level in the tank, provided that the client has a verification process to show that the recorded time and vacuum pressure corresponds to the calibration specifications of the transducer.**

## **PRODUCT DESCRIPTION**

The VA-2000 safety release device is a non-electrical drain vacuum breaker intended for installation into the main drain suction line of a swimming pool or spa pump system. When an increase in vacuum pressure occurs due to possible blockage of the suction line, the valve piston is drawn inward and locked to allow air into the pump. This causes the pump to cavitate, releasing the vacuum present on the main drain. A reset button is provided to unlock and reset the piston after an occurrence. The main spring tension is adjustable for a range of start-up vacuum levels to insure the SVRS does not lock open during pump start-up.

A safety vacuum release device was submitted and constructed as shown in the attached drawing for VA-2000 assembly and parts list. It employed upper and lower surge tube sections constructed of PVC and located between the main body (VA-2700) and the check valve body (VA-2870). The piston (VA-2710) was chamfered on the outside edge, as shown in the part drawing, to allow the use of adhesive to secure the piston in the main body. The adhesive used was designated Loctite 380. The device was provided with a poppet disk and orifice disk, each employs a wire mesh screen, for the ends of the main body.

## **PURPOSE**

The sole purpose of the investigation is to develop test data on the safety vacuum release device described above in accordance with IAPMO Standard, and provide a report in accordance with IAPMO guidelines. This report is to be submitted to IAPMO, along with the engineering calculations, and marking information to obtain certification from IAPMO for this safety vacuum release device.

Tested by:

Responsible Person in Charge:

JUDY A. DURESA  
Engineering Group Leader  
Conformity Assessment Services

JUDY A. DURESA  
Engineering Group Leader  
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Reviewed by:

CHRISTINE BERZINS  
Senior Project Engineer  
Conformity Assessment Services

TEST RECORD NO. 1

SAMPLES:

A sample of the safety vacuum release device constructed as described in the attached drawing was submitted. A second sample was submitted with the modification described for Part No. VA-2710, see attached drawing. The samples were tested at the manufacturer's facility on December 19, 2001 and on January 9 and 10, 2002 under direct supervision of Underwriters Laboratories Inc. engineering staff.

VACUUM RESPONSE VS. TIME TEST:

METHOD

The test set up was as described in Figure 1 of the proposed Interim Guide Criteria for Safety Vacuum Release System (SVRS) Devices for Swimming Pool Suction Fittings and Drains, IAPMO IGC 160-2002, except a globe valve was used in place of the 2 inch ball valve shown in Figure 1 of IAPMO IGC 160-2002. The following pumps were employed for the tests conducted:

Pump Number (Use if multiple pumps are employed)	Manufacturer's name, model number	Motor Information	Electrical Ratings
A	Sta-Rite, P2RA5C-179L	A. O. Smith, C4842PA105C1	½ hp., 115/230 V, 9.9/5.0 A, 60 Hz RPM3450
B	Same as A		
C	Hayward Super II, SP3025X30AZ	A. O. Smith, K56P2N103	3 hp., 230 V, 14.4 A, 60 Hz, 1PH
D	Same as C		

A sample of the vacuum release device, Model VAC-2000, manufactured by Vac Alert Industries, was installed as intended at a specified distance from the circulating pump suction. The water flow was adjusted to 60 gpm for the 3 hp pumps. An 8 inch drain sump with 2 inch diameter suction piping was employed. The drain and

the 8 in. suction fitting were manufactured by Pentair Pool, designated AMP-25-1683.

A mechanical test actuator supported a blocking element centered on the vertical axis of the suction outlet sump a minimum of six inches between the top of the sump and the bottom of the blocking element. The test actuator lowered the blocking element at a maximum of six inches per second onto the top of the sump. At the moment of contact, when the blocking element touches the sump, the test actuator must cease downward force so that the blocking element may move freely.

The total weight of the blocking element was 8.9 lbs. The complete blocking element includes through-bolt, washers and nuts, aluminum angle linkage, galvanized ½ in. pipe linkage, ½ in. galvanized floor flange, flange bolts, upper aluminum plate, high density closed cell foam, smooth vinyl sheet, and lower stiffening plate. See the attached photos, designated Figs. 4 and 5.

The buoyancy of the blocking element was determined by placing weights equal to 15 lbs. on top of the blocking element under water against the drain sump. The blocking element was released so that the weights were the primary force acting on the blocking element against the buoyancy force. The blocking element remain against the drain.

The sample number 000860 was used for Conditions A, B, C, and D. The vacuum level was measured at the drain outlet for the following conditions:

Condition A – Pump A, a ½ hp pump, was installed with the pump elevation 3 feet below the static water level in the test tank test tank.

Condition B – Pump B, a ½ hp pump, was installed with the pump elevation 5 feet above the static water level in the test tank test tank.

Condition C – Pump C, a 3 hp pump, was installed with the pump elevation 3 feet below the static water level in the test tank test tank.

Condition D – Pump D, a 3 hp pump, was installed with the pump elevation 5 feet above the static water level in the test tank test tank.

RESULTS – CONDITION A (1/2 HP, 3 FT. BELOW)

Device distance to pump suction in ft.	Flow in gpm	Time to release in secs.
200	42.3	2.99
175	42.9	2.66
150	43.5	2.45
125	43.1	2.28
100	43.8	1.81
75	44.0	1.54
50	43.7	1.32
25	44.5	0.92

The vacuum level did decay to a level below 4.5 inches Hg within 3 secs at distances less than or equal to 100 ft. The vacuum level did decay to a level below 4.5 inches Hg within 4.5 secs at distances greater than 100 ft and less than or equal to 200 ft.

These results are in compliance with the requirements.

RESULTS – CONDITION B (1/2 HP, 5 FT. ABOVE)

Device distance to pump suction in ft.	Flow in gpm	Time to release in secs.
25	46.7	0.6
50	46.5	0.91
75	46.6	1.29
100	45.6	1.30
125	45.4	2.05
150	45.1	2.10
175	43.2	2.39
200	39.4	2.70

The vacuum level did decay to a level below 4.5 inches Hg within 3 secs at distances less than or equal to 100 ft. The vacuum level did decay to a level below 4.5 inches Hg within 4.5 secs at distances greater than 100 ft and less than or equal to 200 ft.

These results are in compliance with the requirements.

RESULTS – CONDITION C (3 HP, 3 FT. BELOW)

(No tests were conducted per the client's request. Condition C tests to be conducted at a later date)

RESULTS – CONDITION D (3 HP, 5 FT. ABOVE)

Device distance to pump suction in ft.	Flow in gpm	Time to release in secs.
200	62.6	2.66
175	61.8	1.88
150	61.4	1.80
125	60.4	1.70
100	60.4	1.68
75	61.5	1.69
50	61.1	1.45
25	61.2	0.95

The vacuum level did decay to a level below 4.5 inches Hg within 3 secs at distances less than or equal to 100 ft. The vacuum level did decay to a level below 4.5 inches Hg within 4.5 secs at distances greater than 100 ft and less than or equal to 200 ft.

These results are in compliance with the requirements.

-40 F CONDITIONING TEST:

METHOD

The sample of Model VA2000, Serial No. 000860, manufactured by Vac Alert Industries was adjusted for maximum spring tension. The sample was placed in a conditioning chamber, and subject to a temperature of -40 F for 12 hours. Following the conditioning, the device was allowed to return to room temperature. Once at room temperature, the device was cycled 500 times. At the conclusion of the test, the device was examined to determine whether or not it was operational.

RESULTS

The vacuum release device was operational after conditioning. These results are in compliance with the requirements.

VACUUM RESPONSE VS. TIME TEST AFTER CONDITIONING:

METHOD

Same method as used in the Vacuum Response vs. Time Test, except the tests were conducted at the upper time limit conditions only.

RESULTS

Condition	Conditioning temperature (-40 F/140 F)	Device distance to suction fitting in ft	Flow in gpm	Time to release in secs.
A	-40 F	200	44.1	2.90
A	-40 F	100	45.5	1.82
B	-40 F	100	49.1	1.73
B	-40 F	200	47.1	2.95
C	-40 F	100	60.4	2.10
C	-40 F	200	61.2	3.98

The vacuum level did decay to a level below 4.5 inches Hg within 3 secs at distances less than or equal to 100 ft. The vacuum level did decay to a level below 4.5 inches Hg within 4.5 secs at distances greater than 100 ft and less than or equal to 200 ft.

These results are in compliance with the requirements.

140 F CONDITIONING TEST:

METHOD

The sample of Model VA2000, Serial No. 000860, manufactured by Vac Alert Industries was adjusted for maximum spring tension. The sample was placed in a conditioning chamber, and subject to a temperature of 140 F for 12 hours. Following the conditioning, the device was allowed to return to room temperature. Once at room temperature, the device was cycled 500 times. At the conclusion of the test, the device was examined to determine whether or not it was operational.

RESULTS

The vacuum release device was operational after conditioning. These results are in compliance with the requirements.



VACUUM RESPONSE VS. TIME TEST AFTER CONDITIONING:

METHOD

Same method as used in the Vacuum Response vs. Time Test, except the tests were conducted at the upper time limit conditions only.

RESULTS

Condition	Conditioning temperature (-40 F/140 F)	Device distance to suction fitting in ft	Flow in gpm	Time to release in secs.
A	140 F	200	42.8	3.13
A	140 F	100	45.5	1.76
B	140 F	100	48.4	1.78
B	140 F	200	47.7	3.13
C	140 F	100	60.6	2.44
C	140 F	200	61.8	4.20

The vacuum level did decay to a level below 4.5 inches Hg within 3 secs at distances less than or equal to 100 ft. The vacuum level did decay to a level below 4.5 inches Hg within 4.5 secs at distances greater than 100 ft and less than or equal to 200 ft.

These results are in compliance with the requirements.