MM

Contractor Sales Inc.
DCA 06-DEC-008

January 10th 2006

FLORIDA BUILDING COMMISSION
Department of Community Affairs
Sadowski Building
2555 Shumard Oak Boulevard
Tallahassee, FL 32399-2100

Petition for Declaratory Statement
Before the Florida Building Commission

Re: 2004 Florida Building Code, Plumbing; Chapter 9, Section 917, Sub-Section 917.1

Requesting the Commission's interpretation of the word "*conform*", as used in sub-section 917.1 "…..air admittance valves shall *conform* to ASSE 1051."

Spending 14 years as the manufacturers representative in Georgia for a total of 3 different companies (STUDOR, MAGIC VENT, & AYRLETT) marketing code approved Air Admittance Valves (AAV), required me to spend an enormous amount of time with code officials and governing jurisdictions. I have been deeply involved with the application and sale of AAV's since they were first tested and accepted by the SBCCI in 1989. As the first manufacturers representative in Georgia to offer a code approved AAV (STUDOR), it was my job to supply not only the plumbing contractor but the Plumbing Inspections Departments and the Plumbing Inspectors themselves, with the pertinent information and documentation as to their use, applications and restrictions. In the spring of 2004, after moving back to Florida and starting a wholesale plumbing supply company specializing in AAV's, it became apparent to me that some Florida jurisdictions allow air vents that do not meet the standards set forth by the American Society of Sanitary Engineers (ASSE).

ASSE Standard 1051 (see enclosed) requires AAV'S to be tested by an "approved test laboratory". Those approved test laboratories are listed at the ASSE website. Although the ASSE does not, nor have the power to, grant any product "code approval". They do list those manufacturers and their products that have been tested and have a *current approval* by at least one of those listed laboratories. Virtually every jurisdiction I have ever encountered uses this list as a guide line in their acceptance or denial of an AAV, until I made my way to Sarasota County.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, with the designated Agency Clerk, receipt of which is hereby acknowledged.

Miriam Snipes — Date 1/11/06
Deputy Agency Clerk

After meeting with Thomas Oostveen, Sarasota County's Inspection Service Supervisor, and expressing my concern over their allowance of a brand of AAV ("Frajon") that was not listed by the ASSE as having a current test report, I was directed to the office of Greg Yantorno, C.B.O.. At our scheduled meeting, Mr. Yantorno did present a test report from SGS United States Testing Co., Inc* (an ASSE listed testing laboratory) but it was dated August 4th 2002, certifying the Frajon AAV though December 6th 2002. When I objected to the report being both out dated and issued prior to the 2002 revision of ASSE 1051, Mr. Yantorno replied that (at the time of our meeting in Oct. 2005) the Florida State Plumbing Code utilized 1998 certifications and that a post 2002 test report was not necessary. I tried to explain to Mr. Yantorno that the 2002 revision of ASSE 1051 was much more stringent and difficult to pass than the original version of ASSE 1051, and that without a current certification Sarasota County was allowing an AAV that does not meet ASSE Standard 1051-2002.

The remainder of meeting was spent discussing the meaning of the word "*conform*" as used in the verbiage of 917.1 of the Florida Building Code. Mr. Yantorno argued that the code was vague and did not specify when or how often a product was required to be tested. Furthermore, he said the word *conform* as used in the context of 917.1 did not mean to him that the product had to *comply* with ASSE 1051-2002. I agreed that an AAV does not have to be listed by the ASSE to be code compliant ---- but that it did have to comply with ASSE 1051-2002 and have a current test report from an ASSE recognized testing laboratory. Mr. Yantorno disagreed and said he would continue to allow Frajon to be used in Sarasota County.

According to the AAV manufacturers I have represented, the high cost of yearly rigorous third party testing, bi-yearly plant inspections, certification, and association dues and fees are one of the greatest expenses they face. By allowing one manufacturer to market his products without incurring these cost while all the other "listed" manufacturers are bearing this burden creates an uneven playing field. It is unfair, gives a significant price advantage to Frajon, and makes it virtually impossible for legitimate manufacturers to compete.

Obviously, the Commission's time is limited and very valuable. However, the installation of AAV's that have not been properly tested or certified could pose a significant health hazard. Defective AAV's may allow sewer gases to seep into a home or business. Methane gas is not the only danger present in sewer gases. Recent studies indicate the presence of other lethal gases such as Hydrogen sulfide (H2S), Ammonia, and various biological agents such as Tuberculosis, Poliomyelitis and even the Common cold.

I am hopeful the Florida Building Commission will take this matter under review and consider taking measures to unify the acceptance or denial of Air Admittance Valves statewide. Without some credible listing of "approved" products, how can the different county, city and municipal jurisdictions ever have consensus on the legality of a given product? **Most inspectors will tell whoever will listen they do not have time or resources to check on the code legality of every product installed in their jurisdiction.** Typically plumbing inspectors look to see if an AAV has "ASSE 1051" stamped on the top and if it does -- "that's all I need to see" . But just as the ASSE said in their written reply (see enclosed): "anyone can stamp anything on a product, without or without certification or even permission".

I appreciate the Commissions consideration and look forward to their interpretation and reply.

Sincerely,

Gary Harrison

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Enclosed:
ASSE Standard 1051-2002
ASSE Standard #1051 Listings
ASSE Listed Approved Laboratories
ASSE 04/28/05 letter to Contractor Sales, Inc.
Jack D. Thrasher, PhD - Toxicology of Hydrogen Sulfide
Meridian Engineering & Technology - Data Sheet on Sewer Gas

* SGS UNITED STATES TESTING CO., INC. was contacted by our offices and told that their testing of the Frajon AAV had been limited to the year 2002, and that they had not tested their vent to comply with the ASSE 1051-2002 revision. SGS testing certified the Frajon vent from 08/04/02 thru 12/06/02.

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Poison Of The Month

Toxicology of Hydrogen Sulfide

Introduction: Hydrogen sulfide (H2S) is a colorless gas. At low concentrations it has an obnoxious odor similar to rotten eggs. It is soluble in water. It is produced in nature primarily through the decomposition of organic matter by bacteria. It is a constituent of natural gas, petroleum, sulfur deposits, volcanic gases and sulfur springs. Hydrogen sulfide is oxidized by photochemically-generated free radicals, especially hydroxy radicals. It has a half-life in air ranging from 12 to 37 hours, but varies depending upon photoactive pollutants and temperature. The half-life in air during very cold and dry winter conditions can exceed 37 hours. In the United States about 125,000 employees in 73 industries are potentially exposed to Hydrogen sulfide. However, domestic exposure can occur from various sources as follows: Ambient air near petroleum refineries, and sewage treatment plants; sewers (sewer gas); hot water tanks; and septic tanks.

Sewer gas refers to the odor associated with sewers, waste treatment plants and septic tanks. Sewer gas contains hydrogen sulfide and reduced sulfur compounds, such as methyl and dimethyl sulfide, ethyl and diethyl sulfide. These organo-sulfur compounds add to the toxicity of the hydrogen sulfide in the sewer gas.

The most dangerous aspect of hydrogen sulfide results from olfactory accomodation and/or olfactory paralysis. This means that the individual can accomodate to the odor and is not able to detect the presence of the chemical after a short period of time. Olfactory paralysis occurs in workers who are exposed to 150 ppm or greater. This occurs rapidly, leaving the worker defenseless. Unconsciousness and death has been recorded following prolonged exposure at 50 ppm.

Hydrogen sulfide is a mitochondrial poison. Its action on mitochondria is similar to that of cyanide through inhibition of cytochrome oxidase (iron containing protein). This prevents the utilization of oxygen with an uncoupling of oxidative phosphorylation. In addition, hydrogen sulfide binds to hemoglobin in red blood cells interfering with oxygen transport.

Exposure to hydrogen sulfide occurs primarily by inhalation but can also occur by ingestion (contaminated food) and skin (water and air). Once taken into the body, it is rapidly distributed to various organs, including the central nervous system, lungs, liver, muscle, etc.

Odor and Concentrations: Subjective olfactory responses to various concentrations of hydrogen sulfide are summarized as follows:

0.02 ppm	No odor
0.13 ppm	Minimal perceptible odor
0.77 ppm	Faint, but readily detectable odor
4.6 ppm	Easily detectable odor, moderate odor

27.0 ppm	Strong, unpleasant odor, but not intolerable

Physiological Responses to Acute Exposures: Physiological responses to acute exposure to hydrogen sulfide have been reported as follows:

10 ppm	Beginning of Eye Irritation
50-100 ppm	Slight conjunctivitis and respiratory tract irritation after one hour
100 ppm	Coughing, eye irritation, loss of sense of smell after 2-15 minutes. Altered respiratio eyes, and drowsiness after 15-30 minutes followed by throat irritation after one hour. hours exposure results in gradual increase in severity of symptoms and death may oc the next 48 hours.
200-300 ppm	Marked conjunctivitis and respiratory tract irritation after one hour exposure.
500-700 ppm	Loss of consciousness and possibly death in 30 minutes to one hour of exposure.
700-1000 ppm	Rapid unconsciousness, cessation of respiration, and death
1000-2000 ppm	Unconsciousness at once, with early cessation of respiration and death in a few minu may occur if individual is removed to fresh air at once.

OSHA and Other Agencies: Remember that OSHA permissible concentrations do not pertain to Domestic Exposure situations. OSHA and other agency's regulations only pertain to the workplace for healthy adult males. Therefore, these regulations do not cover the more sensitive population, which includes the elderly, the very young and those with pre-existing illness. In addition, domestic exposure (in the home situation) is considered different than the workplace, because humans spend about 80 % of their time at home. Thus, the domestic exposure is many hours longer (168 hr x 0.8 = 134 hrs per week) versus occupational exposure (40 hours per week). It is common to divide the OSHA PEL by the ratio of number of hours per week 168 hrs) to the number of work hours per week (40), which comes to 4.2. The product of this division is considered to equate in home exposure to work exposure regulatory concentrations.

OSHA 10 ppm divided by 4.2 = 2.38 ppm. Additional practice is to divide this new figure by a Factor of 10 for precautionary reasons. Thus, in home exposures equivalent to OSHA 40 hour work week would then be 2.38 divide by 10 = 0.238 ppm.

OSHA General Industry PEL (permissible exposure level). 20 ppm ceiling for 10 minutes once, only if no other measurable exposure occurs; 50 ppm peak.

OSHA Construction Industry PEL: 10 ppm (or 15 mg/m3) TWA (Time Weighted Average Over 8 hours per day)

ACGIH: 10 ppm (14 mg/m3) TWA; 15 ppm, 21 mg/m3 STEL (Short Term Exposure Level)

NIOSH REL: 10 ppm Ceiling for 10 minutes. (Recommended Exposure Level)

Symptoms of Exposure: Apnea; coma; convulsions; irritate eyes; conjunctivitis pain; lacrimation; photophobia; corneal vesiculation; respiratory irritation; dizziness; headaches; fatigue; insominia; GI disturbances.

Health Effects: Acute systemic toxicity; CNS effects; Irritation of eyes; lung irritation.

Chronic Low Level Exposures: The effects of chronic exposure to low concentrations of hydrogen Sulfide mixed with other organo sulfur compounds have been reported as follows:

The Illinois Institute For Environmental Quality reported its findings on Hydrogen Sulfide Health Effects and Recommended Air Quality Standards in 1974. The Illinois Institute summarized the literature on human health effects and their observations on the health effects in Illinois ambient air concentrations. In general the following was reported:

Concentration of H2S Symptoms

O.12 mg/m3 (0.08 ppm)	Increased mental depression, dizziness and blurred vision.
0.45 mg/m3 (0.32 ppm)	Increased incidence of nausea, loss of sleep, shortness of breath, and headaches
1.0-10 mg/m3 (0.7-6.7 ppm)	Increased incidence of decreased corneal reflex (convergence and divergence)
10-70 mg/m3 (6.7-47 ppm)	Irritation of conjunctiva, fatigue, loss of appetite, insomnia.

The Illinois Institute recommended a standard for gaseous hydrogen sulfide of 0.015 mg/m3 (0.01 ppm) to minimize adverse health effects from chronic exposure in urban air.

Kilburn KH and Warshaw RH. Hydrogen sulfide and reduced-sulfur gases adversely affect neurophysiological functions. Toxicology and Industrial Health, Vol 11, pp. 185-19, 1995.

Kilburn KH, MD. (2004) **Endangered Brains.** Princeton Scientific Pulications Co. Inc., Birmingham, Alabama. ISBN : 0-9745460-0-3. pp. 77-85. (This is a must book on brain injury resulting from exposure to a variety of chemicals, including hydrogen sulfide.)

Ex-workers and neighboring residents (total of 35 individuals) were compared to 33 unexposed controls. The ex-workers and residents were exposed to hydrogen sulfide and other reduced-sulfur compounds emitted from a refinery. The concentrations of hydrogen sulfide and other reduced-sulfur compounds were monitored at ground level. Depending upon the day and year hydrogen sulfide concentrations ranged from a low of 10 ppb to 8.8 ppm. Reduced sulfur compounds (dimethylsulfide, mercarptans, carbon oxide sulfide) ranged from 2 ppb to 71 ppm.

Symptoms involving the respiratory tract (chest tightness, palpitations, chest pain, dry cough, cough with blood, dryness (mouth, nose, throat,), throat irritation, eye irritation, reduced sense of smell were greater in the exposed than the controls.

Neurological symptoms were also elevated over the controls. These included: dizziness, lightheadedness, loss of balance, lack of concentration, recent and long-term memory loss, mood unstableness, irritability, exhilartion.

Sleep disturbances were also noted in the exposed, which were: cannot fall asleep, wake frequently, sleep few hours, somnolence.

Skin symptoms were itching, dryness and redness.

General Symptoms were: headache, nausea, libido decrease, excess fatigue, indigestion, loss of appetite, lack of tolerance to alcohol.

Neurophysiological deficits were found in the exposed group: simple reaction time was increased; sway

speed was faster, color discrimination was reduced and psychomotor speed was time was increased.

The neurological injury is accumulative. That is each exposure results in increased brain damage. The damage individual does not recover, and brain dysfunction continues for years. These observations are supported by research on animals, where it has been shown that accumulative exposures adversely affect cytochrome oxidase enzyme activity and changes in the hippocamal EEG

Profile Mood States (POMS) also showed abnormalities when compared to controls. There were increased scores for anger, depression, tension, confusion, fatigue and vigor.

The automatic (subconscious) parts of the neuro-axis were impaired. Impaired performance was accompanied by reduced perceptual motor speed.

The exposure to reduced-sulfur gases, predominantly hydrogen sulfide, was considered the most plausible explanation of the neurotoxic effects in this study.

Gaitonde UB, Sellar RH and O'Hare AE. Long-term exposure to hydrogen sulphide producing subacute encephalopathy in a child. British Medical Journal. Vol 294, pp. 614, 1989.

This is a report on a 20-month old infant exposed for a year to 0.6 ppm hydrogen sulfide downwind from a burning tip gas ignition point for a colliery. The child had subacute necrotizing encephalopathy in the basal ganglia and white matter.

Chronic Reference Dose (RfD) Based upon animal studies and the child reported by Gaitonde et al, the U.S.E.P.A. has recommended a RfD of 0.8 micrograms per cubic meter of air for both subchronic and chronic human inhalation exposure. The RfD is that concentration at which no adverse health effects should occur. Concentrations above the RfD may result in adverse health effects, including neurotoxicity.

Conclusion: Chronic and subchronic exposure to low concentrations of hydrogen sulfide and other organosulfur compounds (reduced sulfur compounds) do cause long-term health problems in humans. These problems appear as various symptoms of the upper and lower respiratory tract, central nervous system, skin and eyes. The central nervous system symptoms are associated with permanent neurophysiologcal deficits. Injury to the central nervous system includes damage to the basal ganglia and white matter

This is a brief summary on the poison of the month.
For more information either e-mail Dr. Thrasher or call him at (505) 336-8317, New Mexico

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November 1993

REFERENCE DATA SHEET ON SEWER GAS(ES)

(Hydrogen Sulfide, Carbon Dioxide, Methane, Ammonia, Biological Agents)

By: Gary M. Hutter, Ph.D, P.E. CSP

Potential Exposure Sources and Conditions:

- Sewer & Sewer Access Points
- Wastewater Treatment Facilities
- Underground Vaults
- Swamps/ Wetlands
- Activated Sludge Reactors
- Sewage Digesters
- Manure Pits
- Leather Tanning
- Trenches/ Excavations Near Sewer Lines
- Landfills
- Wet & Dry Wells
- Septic Tanks & Systems
- Anaerobic Conditions
- Methane Fermentation Reaction
- Lift Stations
- Certain Soils
- Petroleum & Natural Gas

SELECTED PHYSICAL DATA

Sewer gas is a generic name for the collection of gases and airborne agents that often accompany sewage and the natural processes and reactions associated with sewage processing and the decomposition of organic materials. The major components of sewer gas can include: nitrogen (N_2), hydrogen sulfide (H_2S), carbon dioxide (CO_2), methane (CH_4), ammonia (NH_3), biological organisms, water vapor, and other chemicals discharged to the effluent stream.[1,2] The presence and concentration of any of these components can vary with time, composition of the sewage, temperature, and pH.

- **Nitrogen** accounts for about 78% of the earth's atmosphere, and generally is not released from normally expected sewage reactions. It is not generated from the sewage, but its concentration in sewer gas may be effectively increased by the removal or consumption of oxygen through other means (i.e., rusting, other forms of oxidation or biological activity).

- **Hydrogen sulfide** is formed by biological and chemical processes in the liquid phase and is released to the headspace above the solution; its concentration in the gas phase is dependent upon its concentration in the liquid phase and ambient equilibrium conditions. At non-toxic levels, H_2S has the familiar odor of rotten eggs. At acutely toxic levels, H_2S quickly paralyzes an individual's ability to detect its odor, and will rapidly render a victim unconscious. Due to its relatively high toxic potential while at dilute concentrations, and normally expected air currents, the molecular gas density of H_2S is often of secondary importance in predicting its movement or stratification.[3] H_2S gas is also flammable at concentrations which are well above toxic levels (Lower Explosive Limit 4.35%, Upper Explosive Limit 46%).

- **Carbon dioxide and methane** have little or no odor characteristics and have a saturated gas density approximately 1.5 and 0.6 times that of air, respectively. Their relative gas densities compared to air and potential for elevated concentrations may cause some gas stratification. Since both of these gases are generated while in solution, there may be higher concentrations at the liquid-air surface.

- **Methane** is extremely flammable, has a wide explosive range, and a low flash point. These characteristics result in a substantial fire and explosion hazard. Methane will also react with some oxidizers spontaneously. It is also possible to have other flammable gases in sewers that originate from spills and leaks of flammable liquids.

- **Ammonia** has a distinct, strong odor with good warning characteristics which are present well before attaining toxic levels. Exposure to elevated levels of ammonia also may act as an eye and mucus membrane irritant. It is unlikely that acutely toxic levels of this material would be present from common sewage reactions.

All of the above gases are colorless at the concentrations commonly encountered in sewage systems.

- **Natural biological organisms and pathogens** from sewage can become airborne, primarily through agitation, or other physical actions on the accompanying liquid, but generally these microbes are short-lived when suspended in air.

Implications:

The materials which may occupy these locations may be variable mixtures of liquids, gases and mists. There may be little perceptible indication of decreased oxygen levels; there may be no warning odors for the most toxic gas; and there may be a possibility for a fire or explosion hazard. Exposure to airborne biological contaminants often requires the generation of mists containing these materials.

HEALTH EFFECT AND HAZARD DATA

The major adverse health effects and hazards from exposure to sewer gases are:

1. Poisoning from H_2S, Asphyxiation from displaced or consumed oxygen,
2. Decreased vigilance or fatigue due to reduced oxygen levels (from CO_2 and CH_4),
3. Biological contamination, and
4. Fires and explosions from methane gas, H_2S or other flammable gases.

Hydrogen sulfide has been reported as the leading cause of sudden death in the work place.[4] At concentrations in air of approximately 300 ppm, H_2S can be immediately deadly. It is absorbed primarily through the lungs, but can also be adsorbed to a limited extent through the skin and mucous membranes. Chronic health effects caused by repeated exposures have not been established. Common symptoms to non-acute exposure levels include eye irritation, fatigue, headache, and dizziness.

Carbon dioxide is a simple asphyxiant (displaces oxygen) and a stimulant for the respiratory system. A concentration of 5% may produce headaches and shortness of breath. Background concentrations of carbon dioxide in air range from 300 to 400 ppm.

Methane is a simple asphyxiant (displaces oxygen), but does not itself cause significant physiological responses.

Table 1 contains more information on the exposure criteria for the gaseous materials.

Common biological agents found in sewer systems may be bacteria, viruses, or parasites. Table 2 lists a few of the diseases and viruses that are associated with inhalation exposure from waste water operations.

TABLE 1 - SELECTED PROPERTIES OF SEWER GASES

Compound	Vapor Density (air = 1.0)	ppm Odor Threshold	PEL ppm [5]	STEL ppm [6]

Hydrogen Sulfide	1.19	0.01	20 (ceiling)	50 (10 mins.only)
Carbon Dioxide	1.53	-	5,000	-
Methane	0.55	-	-	-
Ammonia	0.59	17	50	-

TABLE 2 - SELECTED WASTEWATER RELATED DISEASES AND VIRUSES (inhalation)[7]

• Tuberculosis	• Poliomyelitis	• Common cold
• Histoplasmosis	• Adenovirus	• Echovirus
• Coxsackie A & B	• Bacillary dysentery	• Rotavirus

Implications:

The presence of sewer gas at significant concentration levels may result in dangerous conditions due to its toxic nature, its suppression of life supporting oxygen levels, and its potential explosive nature. Some components of sewer gas may result in detectable odors, but the odor warning characteristics alone may be insufficient to cause exposed individuals to leave the area. Biological contaminants can become airborne and accompany mists released from sewage-related operations.

CHEMICAL FORMATION/GENERATION

Hydrogen sulfide is formed from the bio-chemical reduction reaction of naturally occurring sulfate ions in water or from the decomposition of organic matter that contains sulfur under anaerobic conditions,[8] and from reactions of metal sulfides and strong acids.[9] Hydrogen sulfide generally will not form if there is an abundance of available oxygen. There is a potential for the continued biological oxidation of the hydrogen sulfide to form weak concentrations of sulfuric acid (H_2SO_4) or the formation of ferrous sulfide (FeS), a blackish solid residue, if iron is available. If sufficient dissolved oxygen is present, H_2S will not be generated.[10]

Carbon dioxide is the natural product of respiration, including that from microbial activity, and is primarily harmful due to the consumption and displacement of oxygen that accompanies its generation. This gas can also be produced under some circumstances from the reaction of some acids and the carbonates in concrete. This set of reactions is usually restricted due to such mass transfer limitations as the presence of slime and accumulation of a precipitate layer. There also is a water-carbonate system that will naturally dissolve or release CO_2 from ground and surface waters.[11]

Methane in sewers and similar structures generally occurs from biological activities or chemical reactions of certain organic materials. [12] Usually its concentration is below the lower explosive limit, and at that concentration range will only decrease the available oxygen concentration one percent for every five percent methane. Methane can add to the explosive vapors that may be present from other flammable and explosive chemicals that have been discharged to the system. The presence of elevated levels of nitrogen and carbon dioxide may alter the flammability limits normally published for methane in air.

The production of these and other gases may be altered by the presence of other chemicals, changes in temperature, and pH. The rate of gas generation may significantly affect the final concentration.

Implications:

There are several chemical pathways for the formation of these gases. Their concentration may be limited by reaction kinetics, mass transfer considerations, or by dilution effects. There are several sinks and sources for these materials. These kinds of controlling factors may substantially change the potential for exposure.

REFERENCES

1. J.B. Barsky et al., "Simultaneous Multi-Instrumental Monitoring of Vapors in Sewer Headspaces by Several Direct-Reading Instruments," *Environmental Research* v. 39 #2 (April 1986): 307-320.
2. "Characteristics of Common Gases Found in Sewers," in *Operation of Wastewater Treatment Plants, Manual of Practice No. 11.* Alexandria, VA, Water Pollution Control Federation, 1976, Table 27-1.
3. R. Garrison and M. Erig, "Ventilation to Eliminate Oxygen Deficiency in Confined Space - Part III: Heavier-than-Air Characteristics," *Applied Occupational and Environmental Hygiene* v. 6 #2 (February 1991): 131-140.
4. "Criteria for a Recommended Standard - Occupational Exposure to Hydrogen Sulfide," *DHEW Pub. No. 77-158; NTIS PB 274-196.* Cincinnati, National Institute for Occupational Safety and Health, 1977.
5. Permissible Exposure Limit (29 CFR 1910.1000 Tables Z-1 and Z-2).
6. Short-Term Exposure Limit (29 CFR 1910.1000 Table Z-2).
7. *Biological Hazards at Wastewater Treatment Facilities.* Alexandria, VA, Water Pollution Contol Federation, 1991.
8. J. Chwirka and T. Satchell, "A 1990 Guide for Treating HydrogenSulfide in Sewers," *Water Engineering and Management* v. 137 #1 (January 1990): 32-35.
9. John Holum, *Fundamentals of General, Organic and Biological Chemistry.* New York, John Wiley & Sons, 1978, p. 215.
10. J. Chwirka and T. Satchell, "1990 Guide for Treating Hydrogen Sulfide" in *Sewers, Water Engineering and Management* v. 137 #1 (January 1990): 32.
11. V. Snoeyink and D. Jenkins, *Water Chemistry.* New York, John Wiley & Sons, 1980, p. 156.
12. M. Zabetakis, "Biological Formation of Flammable Atmospheres," US. Bureau of Mines Report #6127, 1962.

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ASSE Standard #1051-2002
Revised: August, 2002

American Society of Sanitary Engineering

Performance Requirements for

Individual and Branch Type Air Admittance Valves for Sanitary Drainage Systems

General Information

No product may be said to be ASSE approved unless the manufacturer has applied to the ASSE, has had his product tested according to the applicable ASSE standards, and when the product has passed the test, displays the ASSE Seal on the product.

Instructions for receiving the authorization to display the ASSE Seal are available from ASSE's International Office. Organizations wishing to adopt or list any ASSE standard should print the ASSE standard number on the cover page first and in equal or larger type to that of the adopting or listing organization.

American Society of Sanitary Engineering
Westlake, Ohio

Foreword

This foreword shall not be considered a part of the standard, however, it is offered to provide background information.

ASSE standards are developed in the interest of consumer safety.

ASSE considers product performance standards to be of great value in the development of improved plumbing systems.

This standard focuses on devices known as air admittance valves. These devices are intended as an alternative to vents for individual fixtures and branches in the plumbing drainage system.

These general areas evaluate the performance and longevity of air admittance valves, approaching that of the piping materials to which they are connected.

Prior to considering the use of air admittance valves, it is recommended that local plumbing codes be consulted regarding the acceptance and use of these devices.

The working group which developed this standard revision, was set up within the framework of the Product Standards Committee of the American Society of Sanitary Engineering.

Recognition is made of the time volunteered by members of this working group and of the support of the manufacturers who also participated in the meetings for this standard.

This standard does not imply ASSE's endorsement of a product which conforms to these requirements.

Compliance with this standard does not imply acceptance by any code body.

It is recommended that these devices be installed consistent with local codes by qualified and trained professionals.

This standard was promulgated in accordance with procedures developed by the American National Standards Institute (ANSI).

2001-02 Product Standards Committee

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Table of Contents

Performance Requirements for Individual and Branch Type Air Admittance Valves for Sanitary Drainage Systems

Section I

1.0 General

1.1 Application

Individual and Branch Type Air Admittance Valves for Sanitary Drainage Systems (AAV's) (herein referred to as "device") are devices used as vent terminals for individual and branch fixtures in plumbing drainage systems. These devices shall not be used to relieve back pressure, but only to allow air to enter the system. When the devices are installed in a building, there shall be at least one (1) open vent terminal which extends to atmosphere outside of the building serving the same building drain on which these devices are installed. These devices are designed to be used for individual fixtures or for a branch serving multiple fixtures.

1.2 Scope

1.2.1 Description

These devices consist of a one-way valve designed to allow air to enter the plumbing drainage system when a pressure less than atmospheric develops. The device closes and seals by gravity under (0) differential pressure (static or no flow condition) and under positive pressure. These devices prevent sewer gases from entering the building. The device consists of a hooded or shielded body which contains a movable guided diaphragm which seats and seals air flow when closed and allows air to enter when open.

1.2.2 Rating

These devices shall be rated to pass the air rate indicated in Table 1 without exceeding a pressure drop greater than 25.4 mm (1.0 inch) of water column.

1.2.3 Temperature

These devices shall function at temperatures from -40.0 °C to 65.6 °C (-40.0 °F to 150.0 °F).

1.3 Construction

1.3.1 Air Inlet Shields
Air inlets of the device shall be shielded to prevent inlet fouling. Air inlet shields shall extend down the body of the device, over the sealing membrane, to the lowest portion of the sealing membrane, and shall maintain a minimum of 1.6 mm (1/16 inch) clearance between the inner lower edge of the shield and the lowest surface of the air opening of the sealing membrane.

1.3.2 Leakage
The device and joining methods shall not permit air leakage when pressurized up to 762.0 mm (30 inches) water column, as described in Section 3.1 of this standard.

1.3.3 Interference
The end connection of the device shall be designed so that when installed, the joint shall not interfere with any moving parts of the device or restrict air passageways.

1.3.4 Materials
Materials used in all device types shall conform to the requirements of this standard. References to industry standards shall mean the latest edition.

1.3.4.1 Dissimilar Metals
Where different metals are used in the construction of the device, materials, which are close to each other on the electroactive scale, shall be used to reduce the corrosion potential.

1.3.4.2 Internal Metallic Parts
Internal parts of metallic construction shall be of a material having a corrosion resistance at least equal to stainless steel series 300 or greater.

1.3.4.3 Non-Metallic Parts
Valve discs, seat facings or other nonmetallic parts shall be designed at the rated operating temperature of the device without change in physical characteristics which would prevent the full compliance with all requirements of this standard.

1.3.5 Connections

1.3.5.1 Threads for Air Admittance Valves
For all plastic devices having taper pipe threads for connection to the drainage system, threads shall conform to the requirement of ASTM Specification F 1498. Metallic threads shall conform to the requirements of ASME B1.20.1.

1.3.5.2 Hubless Connectors
Hubless connectors shall comply with ASTM C-564(3), CSA B602(4), or FM 168(5).

1.3.5.3 Dimensions and Tolerances for Air Admittance Valve Sockets
Sockets on the device shall conform to the applicable material requirements. Devices having sockets for connection made from ABS material shall conform to the requirements of ASTM Specification D 2661, Table A1.1 with the exception of wall thickness. Devices having sockets made from PVC material shall conform to the requirements of ASTM Specification D 2665, Table 1 with the exception of wall thickness.

1.3.5.4 Other Connections
Where types of connections other than connections specified in Sections 1.3.5.1, 1.3.5.2, and 1.3.5.3 are provided with the device, the connection shall meet the applicable material requirements and the total assembly shall comply with the performance tests in this standard.

Section II

2.0 Test Specimens

2.1 Samples Submitted

Three (3) devices of each size and model shall be submitted by the manufacturer. Tests shall be performed in the order listed on one (1) device of each size submitted.

2.2 Samples Tested

The testing agency shall select one (1) of each type or model and size for full test.

2.3 Drawings

Assembly drawings and other data which are needed to enable a testing agency to determine compliance with this standard, together with installation drawings, shall accompany devices when submitted for examination and performance tests under this standard.

2.4 Rejection

Failure of one (1) device shall result in the rejection of that type or model and size until the manufacturer has corrected the fault and submitted new devices for testing.

Section III

3.0 Performance Requirements and Compliance Testing

3.1 Pressure Test of Complete Device

3.1.1 Purpose

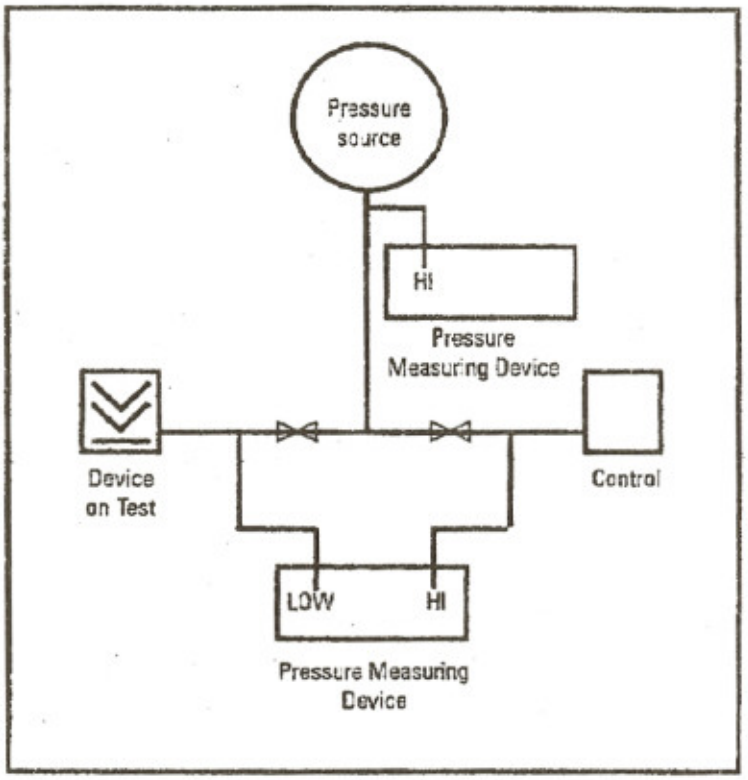
The purpose of this test is to determine if any pressure loss is evident during the pressure test.

3.1.2 Procedure

The device shall be mounted in its normal working (upright) position on a pipe having a length equal to ten (10) times its inside diameter. Installation shall be in accordance with manufacturers' required installation instructions that comply with Section 4.2.3 of this standard. When a device is designed to accommodate multiple sizes, the device shall be installed on the largest nominal pipe size for which it is designed. The inlet shall be connected to an air supply capable of creating pressures from a 6.4 mm (1/4 inch) water column up to 762.0 mm (30 inches). Additionally, a secondary sealed system shall be constructed (See Figure 1 of this standard) using the same pipe length and diameter as used for the device to compensate for changing environmental conditions. A pressure measuring device shall be part of the test apparatus also as shown in Figure 1 of this standard. The internal air volume of the control shall be equal to the internal air volume of the test device. The ambient temperature of the testing area shall remain constant within ± 1.1 °C (± 2.0 °F). Use a pressure measuring device of 25.4 mm (1 inch) full-scale with ± 5% full-scale accuracy to perform the 6.4 mm (1/4 inch) and 19.0 mm (3/4 inch) pressure tests. Use a pressure measuring device of 1270 mm (50 inches) with a ± 5% full-scale accuracy to perform the 762.0 mm (30.0 inches) pressure test. The device shall be mounted in the test fixture at least two (2) hours prior to performing the test.

Slowly apply pressure equal to 6.4 mm (1/4 inch) water column. Close the shut-off valves for five (5) minutes, and then slowly increase the pressure to 19.0 mm (3/4 inch) water column. Close the shut-off valve, hold for five (5) minutes, then increase to 762.0 mm (30.0 inches) water column. Close the shut-off valve for five (5) minutes.

Figure 1



3.1.3 Criteria

Any pressure loss during the five (5) minute intervals for pressures of 6.4 mm (1/4 inch) water column and 19.0 mm (3/4 inch) water column in excess of 1.25 mm (0.05 inches) water column shall result in a rejection of the device. Any pressure loss during the five (5) minute interval for a pressure of 762.0 mm (30.0 inches) water column in excess of 63.5 mm (2-1/2 inches) water column shall result in a rejection of the device.

3.1.4

Repeat the test procedures in Section 3.1.2 with the device installed at a 15° orientation from the vertical position. The test criteria in section 3.1.3 shall apply for the acceptability of the device to this test variation.

3.2 Air Tightness Test

3.2.1 Purpose

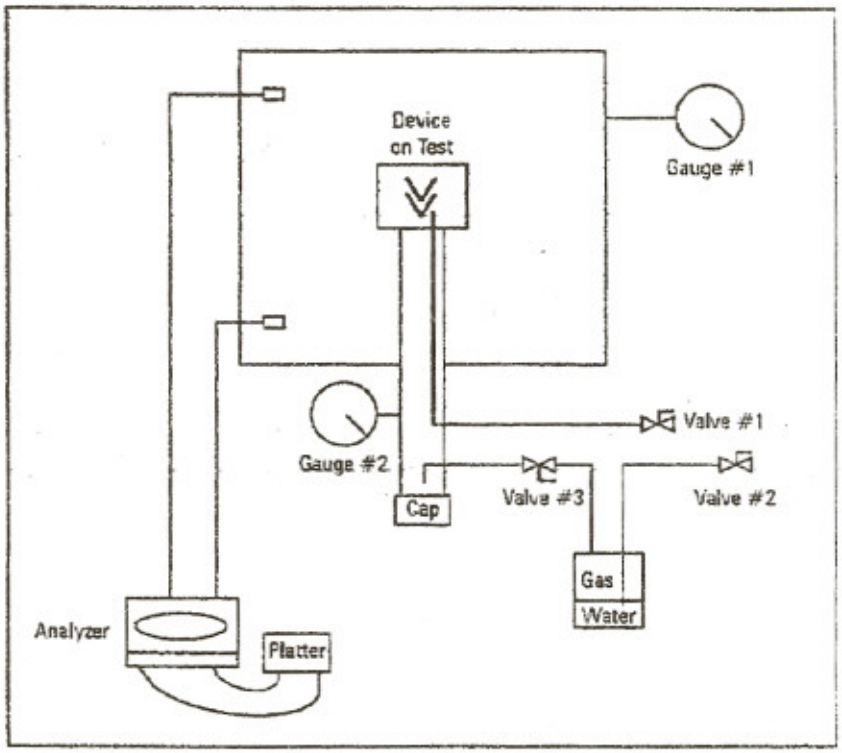
The purpose of this test is to determine that the device is air tight at static and very low pressures.

3.2.2 Procedure

The device shall be mounted in its normal (upright) position on a pipe having a length equal to ten (10) times its inside diameter, and in a container as shown in Figure 2. Installation shall be in accordance with manufacturers' required installation instructions that comply with Section 4.2.3 of this standard. When a device is designed to accommodate multiple sizes, the device shall be installed on the largest nominal pipe size for which it is designed. All joints shall be sealed air tight. With the pressure inside of the container at 0 kPa (0 psig) as indicated by gauge #1, open valves

#1 and #2. Gauge #1 shall read 0 kPa (0 psig) throughout the test. Open valve #3 to force NO_2 into the pipe and the device until the gas is emitted from valve #1. Close valves #3, #2 and #1 in that order. Use valve #1 and/or valve #2 to adjust the internal pressure in the device to 0 kPa (0 psig) as indicated on gauge #2. Close valves #1 and #2 when gauge #2 is at 0 kPa (0 psig). Maintain an internal pressure in the device of 0 kPa (0 psig) for five (5) minutes.

Figure 2



Increase the internal pressure in the device to 0.28 kPa (0.04 psig) by using valves #2 and #3. Maintain an internal pressure in the device of 0.28 kPa (0.04 psig) for five (5) minutes.

Increase the internal pressure in the device to 0.55 kPa (0.08 psig) by using valves #2 and #3. Maintain an internal pressure in the device of 0.55 kPa (0.08 psig) for five (5) minutes.

Increase the internal pressure in the device to 1.10 kPa (0.16 psig) by using valves #2 and #3. Maintain an internal pressure in the device of 1.10 kPa (0.16 psig) for five (5) minutes.

3.2.3 Criteria

Any detected concentration of NO_2 in the container exceeding ten (10) parts per million shall result in a rejection of the device.

3.3 Rating Test

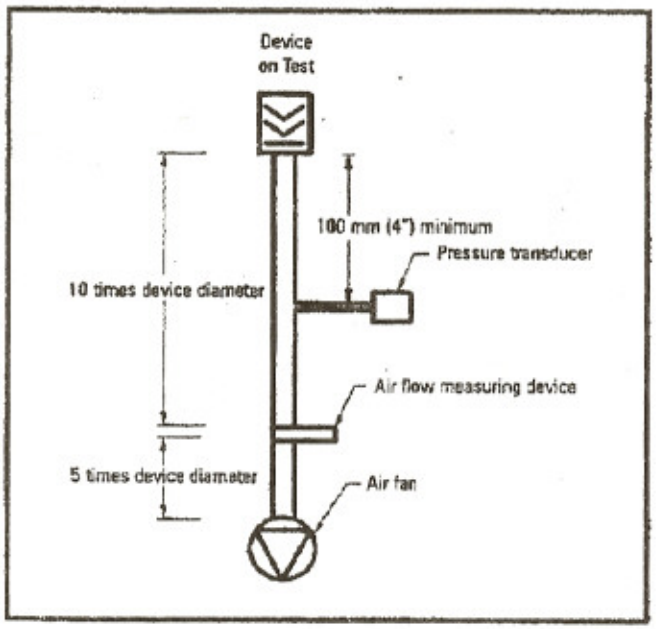
3.3.1 Purpose

The test shall rate the device for capacity to serve as the vent terminal of a vent pipe for a drain pipe of a specific size and fixture unit value. The rating shall establish the maximum fixture unit value for specific drain pipe sizes.

3.3.2 Procedure

Installation shall be in accordance with manufacturers' required installation instructions that comply with Section 4.2.3 of this standard in a test assembly as shown in Figure 3. The assembly shall have an airflow measuring device to measure the airflow rate in the piping and a pressure transducer for measuring the pressure change in the piping system. The air flow measuring device shall be capable of measuring 50 CFM full scale with ± 5% full-scale accuracy. The pressure transducer shall be 25.4 mm (1 inch) full-scale with a ± 5% full scale accuracy. The pressure transducer shall be located 101.6 mm (4 inches) below the device. There shall be a minimum length of ten (10) times the pipe diameter straight undisturbed pipe above the air flow meter and a minimum length of five (5) times the pipe diameter straight undisturbed pipe below the air flow meter. The fan shall be capable of delivering the air flow within the capacity range of the device.

Figure 3



Activate the fan and slowly increase the speed of the fan until the device opens. Record the value of the pressure at the instant the device opens. This value shall be designated as the opening pressure. Increase the airflow rate until the pressure reaches -25.4 mm ± 1.25 mm (-1.0 inch ± 0.05 inch). Record the air flow rate. This value shall be designated as the determined airflow capacity. The temperature shall be maintained during the test at 22.2 °C ± 1.1 °C (72.0 °F ± 2.0 °F).

3.3.3 Criteria

A maximum opening pressure value of more than 7.6 mm (0.3 inches) water column shall result in a rejection of the device.

3.3.4 Rating the Device

The rating of the device shall be based on the determined airflow capacity. Table 1 shall be used to establish the drainage pipe size for the device based on the determined airflow capacity.

Table 1

Drainage Pipe Size DN mm	Drainage Pipe Size NPS (in)	Maximum DFU's	Air Flow Rate (cfm)	Air Flow Rate (L/s)
31.8	1-1/4	1	1	0.47
38.1	1-1/2	3	1	0.47
50.8	2.0	6	2	0.94
76.2	3.0	20	4	1.88
101.6	4.0	160	8	3.76

3.4 Endurance Test

3.4.1 Purpose

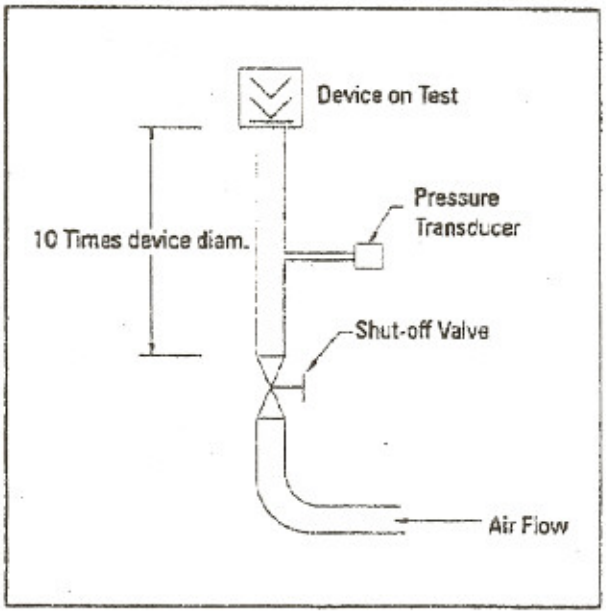
When exposed to air temperature between –40.0 °C and 65.6 °C (-40.0 °F and 150.0 °F), any material, whose characteristic is essential to the continued functioning of the device, shall not be adversely effected. This section of the standard tests the structural characteristics of the thermoplastics used in the manufacturing of the device by exposing the device to extreme temperatures and applying a mechanical load as it returns to a controlled temperature.

3.4.2 Procedure - High Temperature

Devices shall be placed in an environment where the temperature is maintained at 66 °C (150 °F) for a period of eight (8) hours. After eight (8) hours, remove the device, and immediately install the device on the test assembly as shown in Figure 4. After the device is installed, immediately subject the device to a vacuum of 0 to 50.8 mm (0 to 2.0 inches) water column (in order to open the device) for two hundred fifty thousand (250,000) cycles. A cycle shall be defined as two (2) second open and four (4) seconds closed. During the cycle test, the device shall return to the laboratory controlled temperature of 23 0 °C ± 2.0 °C (73.4 °F ± 3.6 °F). Upon completion of this test, the device shall be tested as prescribed in the Pressure Test of Complete Devices in Section 3.1.2.

Note: When installing the device to the test assembly in Section 3.3.2, the installation shall be in accordance with manufacturers' required installation instructions that comply with Section 4.2.3 of this standard for exposure to subfreezing or elevated temperatures shall be followed.

Figure 4



3.4.3 Criteria for High Temperature
Failure to meet the criteria for the Pressure Test of Complete Device in Section 3.1.3 after the two hundred fifty thousand (250,000) cycles shall result in a rejection of the device.

3.4.4 Procedure - Low Temperature
Upon completion of the high temperature test in Section 3.3.2 of this standard, place the same AAV in an environment where the temperature is maintained at -40.0 °C (-40.0 °F). After eight (8) hours, remove the device, and immediately install the device on test assembly as shown in Figure 4. After the device is installed, immediately subject the device to a vacuum of 0 to 50.8 mm (0 to 2.0 inches) water column (in order to open the device) for two hundred fifty thousand (250,000) cycles. During the cycle test, the device shall be returned to the laboratory controlled temperature of 23.0 °C ± 2.0 °C (73.4 °F ± 3.6 °F). Upon completion of this test, the device shall be tested as prescribed in the Pressure Test of Complete Devices in section 3.1.2.

Note: When installing the device on the test assembly in the above section, the installation shall be in accordance with manufacturers' required installation instructions that comply with Section 4.2.3 of this standard for exposure to subfreezing or elevated temperatures shall be followed.

3.4.5 Criteria for Low Temperature
Failure to meet the criteria for the Pressure Test of Complete Device in Section 3.1.3 after the two hundred fifty thousand (250,000) cycles shall result in a rejection of the device.

Section IV

4.0 Detailed Requirements

4.1 Materials

4.1.1 ABS Material Specification

Virgin ABS plastic compound shall conform to the requirements prescribed in Specification D 3965 with a cell classification of 3-2-2-2-2. The form of the material shall be as agreed upon between the seller and the purchaser in accordance with ASTM Specification D 3965. Plastic containing polymers or blends of polymers shall contain a minimum of 15% acrylonitrile, 6% butadiene, and 15% styrene or substituted styrene, or both. ABS plastic shall contain no more than 10% of other monomeric or polymeric components plus other necessary compounding ingredients.

4.1.2 PVC Material Specification

Virgin PVC plastic compound shall meet or exceed the requirements of cell classification of 12454 prescribed in ASTM Specification D 1784. This plastic contains stabilizers, lubricants and pigments.

4.1.3 Rework Material

The manufacturer shall use only his own clean rework material created at the original manufacturing location conforming to the cell class requirements for the applicable material. The devices produced shall meet all of the requirements of this specification.

4.1.4 Other Materials

Other materials such as metal, including cast iron, aluminum, etc., shall meet recognized plumbing industry standards.

4.2 Instructions for Marking and Installation

4.2.1 Marking of Devices

Each device shall have the following information marked on it by a suitable, permanent method where it will be visible after the device has been installed:

a) Name of manufacturer or trademark.
b) Model number or description of the device.

The markings shall be cast, etched, stamped or engraved on the body of the device or on a corrosion resisting plate securely attached to the device.

4.2.1.1 Optional Pressure Rating

The manufacturer shall have the option to mark the device with the maximum pressure rating attained when tested in Section 3.1.2.

4.2.2 Packaging

Each device shall have the following information marked on the packaging:

a) Name of manufacturer or trademark;
b) Model number or description of the device;
c) Drainage pipe size and capacity.

4.2.3 Installation Instructions

Instructions for installation of the device shall be on the packaging or packaged with the device.

The instructions shall contain installation limitations, including instructions for the device when exposed to subfreezing and elevated temperatures. The instructions shall demonstrate the proper method of venting where pumps or pressurized flushing devices are used, or where multiple floors are encountered; and a statement regarding the device is not a substitute for ALL conventional venting situations.

4.2.4 Installation Requirements

4.2.4.1 The device shall be installed in an accessible location, which shall permit the free (unobstructed) movement of air into the device.

4.2.4.2 The device shall be installed in a vertical and upright orientation with the deviation not to exceed fifteen (15) degrees from vertical plumb.

4.2.4.3 Code Requirements
The instructions shall include how to install the device; where the device is permitted to be used; where the device is prohibited; location requirements; accessibility; and sizing of such device.

A minimum of one stack vent or vent stack shall extend outdoors to the open air to serve as the positive pressure relief for the drainage system.

4.2.4.4 The use of an air admittance valve to relieve positive pressure shall be prohibited.

4.2.4.5 Installation shall be in accordance with manufacturer's installation instructions and local code requirements.

Section V

5.0 Definitions

Definitions not found in this section are located in the Plumbing Dictionary, latest edition, published by the ASSE.

Standard #1051

Individual and Branch Type Air Admittance Valves for Sanitary Drainage Systems ASSE Revised - 2002

Ayrlett Company
Revision: 2002
Model: AB
Size: 1½"& 2"
Issued: 01/06/1999
Amended: 12/08/2005

Durgo, Inc.
Revision: 1990
Model: BA 90-74
Size: 3";
Model: BA 50-94
Size: 1½"
Issued: 93/05/14

Revision: 1996
Model: Durgo, Jr. – Type A & B
Size: 1½"
Issued: 06/22/1999

Ferguson Enterprises (ProFlo [R])
Revision: 2002
Model/s: PFS20386 & PFS20389
Size: 1½" and 2"
Issued: 10/17/2005

Revision: 2002
Model/s: PFS20305, PFS20306, PFS20301, PFS20300
Size: 1½" and 2"
Issued: 10/17/2005
Amended: 11/03/2005

Revision: 2002
Model/s: PFS20302
Size: 3", 4"
Issued: 10/17/2005

Jones Stephens Corp.
Revision: 1996
Model: P21-100 & P21-101 w/ adapter -Type A & B
Size: 1½" & 2"
Issued: 09/06/2005
Amended: 09/13/2005

Oatey Company
Revision: 2002
Model: Sure Vent (160 DFU)
Size: 2"
Model: Sure Vent (500 DFU)

Size: 3"
Model: Sure Vent (20 DFU)
Size: 2"
Model: Sure Vent (6 DFU)
Size: 1½"
Issued: 06/13/2000
Amended: 08/20/2004
Amended: 09/08/2005

ProSet Systems
Revision: 1998
Model: P 25112
Size: 1½" & 2"
Issued: 05/17/1999

RectorSeal
Revision: 2002
Model: Magic Vent-Micro Vent 97400 w/o adapter
Size: 1½"
Model: Magic Vent-Micro Vent 97405 w/PVC adapters
Size: 1½"
Model: Magic Vent-Micro Vent 97406 w/ABS adapters
Size: 1½"
Issued: 10/13/1998
Amended: 09/08/2005

Studor, Inc.
Revision: 2002
Model: Maxi Vent
Size: 3", 4"
Model: Mini Vent
Size: 1½" & 2"
Issued: 03/26/1993
Amended: 10/17/2005
Amended: 11/03/2005

Revision: 2002
Model: Redi-Vent
Size: 1½" & 2" – Type A & B
Issued: 04/19/2002

Revision: 2002
Model: Handi-Vent
Size: 1½" & 2"
Issued: 11/25/2002

Revision: 2002
Model: Tec-Vent – Type A & B
Size: 1½" & 2"
Issued: 03/26/2003

American Society of Sanitary Engineering
APPROVED TEST LABS

1. Apollo Valves/Conbraco Industries

1418 S. Pearl Street
Pageland, SC 29728

Attn: John Higdon, PE
Phone: (843) 672-1628 Fax: (843) 672-1648
E-mail: john.higdon@conbraco.com

Can test to the following ASSE standards:
1001, 1003, 1011, 1012, 1013-2005, 1014-2005, 1015-2005, 1016-2005, 1017, 1020, 1022, 1024, 1032, 1035, 1047-2005, 1048-2005, 1052, 1056, 1069 & 1070.

2. CSA International

178 Rexdale Blvd.
Etobicoke, Ontario, Canada M9W 1R3

Attn: Charlie Caruana, *C.E.T.*
Phone: (416) 747-4343 Fax: (416) 747-4149
E-mail: charlie.caruana@csa-international.org

Can test to the following ASSE standards:
1001, 1002, 1005, 1011, 1012, 1013, 1014, 1015, 1016, 1018, 1019, 1020, 1024, 1025, 1029, 1035, 1037, 1052 & 1056.

3. CSA International

8501 E. Pleasant Valley Road
Cleveland, OH 44131-5575

Attn: Trevor Perera
Phone: (216) 524-4990 Fax (216) 642-3081
e-mail: trevor.perera@csa-international.org
Website: www.csa-international.org

Can test to the following ASSE standards:
1001, 1002, 1003, 1005, 1010, 1011, 1012, 1013-2005(up to 2"), 1014, 1015-2005(up to 2"), 1016-2005 (maximum 2"), 1017 (maximum 2"), 1019, 1020, 1024, 1025, 1035, 1037, 1044, 1047-2005 , 1048-2005, 1052, 1057, 1060, 1064, 1069 & 1070.

Can test to the following ASME Standards:
A112.4.1, A112,18.1M, A112,19.6, A112.19.1M

Can test to the following AWWA Standards:
C510-92 & C511-92

4. IAPMO Testing and Services, L.L.C.

5001 E. Philadelphia St.
Ontario, CA 91761

Attn: Ken Wijaya or Donna Estrada
Phone: (909) 472-4100
E-mail: kenwijaya@iapmo.org, or donnaestrada@iapmo.org

Can test to the following ASSE standards:
1001, 1002, 1003, 1004, 1005, 1006, 1011, 1012, 1013-1999 (up to 3"), 1014-1989, 1015-1999, 1016, 1017, 1018, 1019, 1020, 1021, 1024, 1025, 1032, 1035, 1037, 1044, 1050, 1051, 1052, 1055, 1057, 1062, 1066 & 1070.

Can test to the following ASME standards:
A112.1.2, A112.18.1M, A112.19.5, A112.19.6, A112.19.10, A112.19.1M, A112.19.2M, A112.19.3M, A112.19.7M, A112.19.8M, A112.19.9M, A112.21.1M, and A112.21.2M

Can test to the following NSF Standards:
NSF 61

5. NSF International

789 Dixboro Road
Ann Arbor, MI 48105

Attn: Bruce DeMaine, *Director Corporate QA & Safety*
Phone: (734) 769-5143 Fax: (734) 827-7182
E-mail: demaine@nf.org Web: http://www.nsf.org

Can test to the following ASSE standards:
1001, 1002, 1003-2001, 1004, 1005, 1006, 1010, 1011, 1012, 1013-2005, 1014-2005, 1015-2005, 1016-2005, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1032, 1035, 1037, 1047-2005, 1048-2005, 1051, 1052, 1056, 1057, 1064 & 1069.

Can test to the following AWWA standards:
C510, C511

Can test to the following ASME standards:
A112.1.2 - 1991, A112.3.1 - 1993, A112.4.1 - 1993, A112.6.1M - 1990, A112.14.1 - 1975 (R1990), A112.18.1M - 1996, A112.18.3M - 1996, A112.19.1M - 1994, A112.19.2M - 1990, A112.19.3M - 1987, A112.19.5 - 1979 (R1990), A112.19.6 - 1990, A112.19.7M - 1995, A112.19.8M - 1987, A112.19.9M - 1991, A112.19.10 - 1994, A112.21.1M - 1991, A112.21.2M - 1983, A112.21.3M - 1985, A112.26.1M - 1984, A112.36.2M - 1991

6. Professional Service Industry, Inc.

850 Poplar St.
Pittsburgh, PA 15220

Attn: Paul Medwig, *Manager*
Phone: (412) 922-4000 Fax: (412) 922-4043
Email: paul.medwig@psiusa.com

Can test to the following ASSE standards:
1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1012, 1014, 1016, 1017, 1018, 1019, 1020, 1021, 1023, 1024, 1035, 1037, 1044, 1050, 1051, 1052, 1055, & 1056

Can test to the following ASME standards:
A112.6.1M - 1990, A112.18.1M - 1996, A112.19.1M - 1994, A112.19.2M - 1990, A112.19.3M - 1987, A112.19.5 - 1979 (R1990), A112.19.6 - 1990, A112.19.9M - 1991, A112.19.10 - 1994, A112.21.1M - 1991, A112.21.2M - 1983, A112.21.3M - 1985, A112.36.2M - 1991

7. SGS United States Testing Company, Inc.

Tulsa Division
1341 North 108th E. Ave.
Tulsa, OK 74116

Attn: Dale E. Holloway, *Branch Director*
Phone: (918) 437-8333 Fax: (918) 437-8487
Email: dale.holloway@sgs.com

Can test to the following ASSE standards:
1001, 1002, 1003, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013-2005 (up to 1"), 1014-2005, 1015-2005(up to 1"), 1016-2005, 1017, 1018, 1019, 1020, 1021, 1024, 1025, 1032, 1035, 1037, 1044, 1050, 1051, 1052, 1053, 1056, 1057 & 1069.

Can test to the following ASME standards:
A112.1.2 - 1991, A112.3.1 - 1993, A112.6.1M - 1990, A112.14.1 - 1975 (R1990), A112.18.1M - 1996, A112.18.3M - 1996, A112.19.1M - 1994, A112.19.2M - 1990, A112.19.3M - 1987, A112.19.5 - 1979 (R1990), A112.19.6 - 1990, A112.19.7M - 1995, A112.19.8M - 1987, A112.19.9M - 1991, A112.19.10 - 1994, A112.21.1M - 1991, A112.21.2M - 1983, A112.21.3M - 1985, A112.26.1M - 1984, A112.36.2M - 1991

8. Stevens Institute of Technology

Center for Environmental Systems
618 Rivers Street
Hoboken, NJ 07030

Attn: Christos Christodoulators, Director
Phone: (201) 216-5675 Fax: (201) 216-5593

Attn: Dr. Tsan-Liang Su, Laboratory Operations Director
Phone: (201) 216-5697 Fax: (201) 216-5593

Email: tlsu@stevens-tech.edu

Can test to the following ASSE standards:
1001, 1002, 1003, 1010, 1011, 1013-2005, 1014-2005, 1015-2005, 1016-1996, 1017, 1018, 1019, 1020, 1022, 1032, 1035, 1037, 1047-2005, 1048-2005, 1055, 1056, 1062, 1066, 1069 & 1070.

9. Universal Laboratory Inc.

1726 Commerce St.
Garland, TX 75040-6710

Attn: Charles Stanley, Director
Phone: (972) 272-7337 Fax: (972) 272-7790
Email: unilab@gte.net

Can test to the following ASSE standards:
1001, 1002, 1003, 1010, 1011, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1025, 1035, 1037, 1047, 1048, 1052 & 1056.

Can test to the following ASME Standards:
A112.1.2, A112.6.1M, A112.18.1M, A112.18.3M, A112.19.5, A112.19.6, A112.19.10, A112.19.2M, A112.19.3M, A112.19.7M, A112.19.8M, A112.19.9M, A112.21.1M, A112.36.2M

10. University of Southern California School of Engineering FCCCHR

KAP-200 University Park MC-2531
Los Angeles, CA 90089-2531

Attn: Paul H. Schwartz, *P.E. Chief Engineer*
Phone: (213) 740-2032 Fax: (213) 740-8399
E-mail: pschwart@usc.edu or henrych@usc.edu
Web: http://www.usc.edu/dept/fccchr

Can test to the following ASSE standards:
1001, 1003-2001, 1004, 1011, 1012, 1013-1999, 1015-1999, 1020, 1024, 1035, 1047, 1048, 1052, 1055, 1056 & 1060

Can test to the following ASME standards:
A112.1.2

Can test to the following AWWA standards:
C510, C511

11. U.S. Analytical Laboratories

600 South State College Blvd.
Fullerton, CA 92831

Attn: Alfred Beck
Phone: (714) 773-9151 Fax: (714) 773-0521
Email: usallab@aol.com

Can test to the following ASSE standards:
1001, 1002, 1003, 1004, 1006, 1007, 1008, 1009, 1011, 1012, 1013-2005, 1014-2005, 1015-2005, 1016-2005, 1017, 1018, 1019, 1020, 1021, 1023, 1024, 1025, 1032, 1035, 1037, 1044, 1047-2005, 1048-2005, 1050, 1051, 1052, 1055, 1056 & 1066.

Can test to the following ASME standards:
A112.1.2 - 1991, A112.3.1 - 1993, A112.4.1 - 1993, A112.6.1M - 1990, A112.14.1 - 1975 (R1990), A112.18.1M - 1996, A112.18.3M - 1996, A112.19.1M - 1994, A112.19.2M - 1990, A112.19.3M - 1987, A112.19.5 - 1979 (R1990), A112.19.6 - 1990, A112.19.7M - 1995, A112.19.8M - 1987, A112.19.9M - 1991, A112.19.10 - 1994, A112.21.1M - 1991, & A112.21.2M - 1983.

Can test to the following NSF Standards:
NSF 61

12. WRC - NSF Ltd.

Fern Close, Pen-Y-Fan Industrial Estate
Oakdale, Gwent, Np11 4EH, Wales - UK

Attn: Paul Davis, *Quality Manager*
Phone: 01495 248454 Fax: 01495 249234
Email: wrcnsf@wrcnsf.com

Can test to the following ASSE standards:
1016, 1017, 1024, 1025, 1032, 1052 & 1070.

Can test to the following ASME standards:
A112.18.1, A112.1.2, A112.19.2

13. Wyle Laboratories

7800 Highway 20 West
Huntsville, AL 35807-7777

Attn: Elizabeth Denis
Phone: (256) 837-4411, ext. 341 Fax: (256) 721-0144
E-mail: service@hnt.wylelabs.com
Website: http://www.wylelabs.com

Can test to the following ASSE standards:
1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013(needs 3-5 week lead time), 1014, 1015(needs 3-5 week lead time), 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1032, 1035, 1037, 1043, 1044, 1047(needs 3-5 week lead time), 1048(needs 3-5- week lead time), 1050, 1051, 1052, 1055, 1056, 1057, 1060, 1062, 1064 & 1066

American Society of Sanitary Engineering

ASSE Seal Control Board Procedures

PLEASE SEE PAGE #3

Duly Registered
Product Certification Trademark

April, 2005

American Society of Sanitary Engineering

SEAL CONTROL BOARD PROCEDURES

Approved: April, 2005

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THE ASSE SEAL PROGRAM

Within the counties, municipalities, and towns throughout the United States and Canada there exists a wide range of plumbing codes.

Some have grown item by item; others have been adopted as complete documents. In each of these areas there are inspection authorities who subject to these local requirements, and must approve the use of new or improved products in their territories. Most of these officials do not have the facilities for testing these products; nor do they always have the funds to have them tested by independent laboratories.

As a result, many problems face a manufacturer who wishes to introduce a new, or improved product. Some localities will accept the product if it has been tested by two or three recognized municipal laboratories still in existence in the country. Some will accept the test of individual laboratories to which manufacturers send their products. Some will not accept the product without years of tested proof.

The nature of some products is such that only time testing under many environmental conditions can prove that adequate capabilities can be obtained. Consequently, the introduction of a new or improved product becomes very time-consuming and expensive because the manufacturer must send personal representatives to each locality to convey information of the product's characteristics and capabilities for performing its intended function. If this is not done, the manufacturer may be limited in production, or may have to develop many special models acceptable to various local inspection authorities; a course of action which reflects increased cost to the manufacturer and, ultimately, to the consumer. The ASSE Seal Program assists the approval process for inspection authorities who are responsible for reliability and safety in their systems.

NOTE:

The American Society of Sanitary Engineering for Plumbing and Sanitary Research was established in 1906 primarily for the purpose of protecting the health, welfare and safety of the public through better sanitary principles as related to plumbing. The Society, since its inception, has been striving to develop rules and regulations for the advancement of sanitary science in plumbing, encourage standardization, and project the need for practical and scientifically developed plumbing installations. Originally local in scope, the Society has now grown to international prominence, and today includes members from many foreign countries. Because of the Society's great vision and foresight into the future, it is regarded today by many authorities as one of the world's most important scientific and technical groups related to plumbing.

As a help to both manufacturers and local officials, ASSE, in line with its original purpose, concluded that if a means could be established whereby products could display a Certification Mark (Seal) indicating to inspection officials that these products were tested for compliance with appropriate and acceptable voluntary, open, industry and consensus performance standards by a qualified laboratory, the products could be accepted or approved with confidence of acceptable performance in the plumbing system.

However, the ASSE Certification Mark (Seal) is only useful to the manufacturer if there is an acceptable standard. Therefore, the ASSE standards development program is a significant one. In sponsoring standards activities, our Society hopes to stimulate the interest of manufacturers in working with an ASSE Product Performance Standards Committee in creating standards which meet the ANSI requirements for voluntary, open and consensus performance standards.

Together, the ASSE Standards Program and the ASSE Seal Authorization Program improve many facets of the plumbing system in order to achieve a high level of protection for public health and safety.

PREAMBLE

The Seal Program was established by membership authorization of the ASSE.

The SCB of ASSE shall receive, review and approve/disapprove (as appropriate) applications for permission to display the ASSE Certification Mark (Seal) (hereinafter the ASSE Seal).

Display of the ASSE Seal, and the applicable standard number, shall indicate that the product, or products, has been approved by the SCB as meeting the material and performance requirements of the applicable product standard and the current edition of the *Seal Control Board Procedures*.

Display of the ASSE Seal is not a product endorsement.

"A picture is worth a thousand words"

Only those products that have been tested by an independent ASSE listed testing laboratory, have been reviewed by the ASSE Seal Control Board and have been found to be in compliance with the appropriate product performance standard can display the ASSE "certification/seal".

Words such as

"compiles with"
"tested to"
"meets the requirements of"
"in compliance with"
"meets and exceeds ASSE Standard #"

does not mean the product is ASSE listed. If your code requires that it be ASSE listed be sure that the product displays the ASSE "certification/seal" and is listed in the Seal Authorization Book, on the ASSE web page or, on file at the ASSE International Office. If you have any questions, simply contact the ASSE by telephone, telefax, mail or e-mail.

If you are having a meeting and would like more information regarding the ASSE Seal Listing Program, the ASSE Standard Program or would like to have a representative from ASSE speak regarding ASSE Standards and Seals, please contact the ASSE.

Working together, we continue to follow our motto of

"PREVENTION RATHER THAN CURE"

Merriam-Webster Online Dictionary

Thesaurus

conform

One entry found for **conform**.

Main Entry: **con·form**
Pronunciation: k&n-'form
Function: *verb*
Etymology: Middle English, from Middle French *conformer,* from Latin *conformare,* from *com-* + *formare* to form, from *forma* form
transitive senses **:** to give the same shape, outline, or contour to **:** bring into harmony or accord <*conform* furrows to the slope of the land>
intransitive senses
1 : to be similar or identical; *also* **:** to be in agreement or harmony -- used with *to* or *with*
2 a : to be obedient or compliant -- usually used with *to* **b :** to act in accordance with prevailing standards or customs
synonym see ADAPT
- con·form·er *noun*
- con·form·ism /-'for-"mi-z&m/ *noun*
- con·form·ist /-mist/ *noun or adjective*

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"complies with"
"tested to"
"meets the requirements of"
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