To whom it may concern,

This package is related to appliance venting materials and the UL 1738 standard for Flue Gas Venting (FGV).

This attached background provides information on recent changes to fuel-gas model codes and relevant plumbing standards referenced for venting gas fired appliances. It demonstrates that CSA or ASTM Drain, Waste and Vent (DWV) products are not designed, tested or certified for flue gas venting applications. The only products certified for this life safety application are UL 1738 certified products.

For example, not all PVC products are created equal. IPEX manufacturers PVC for various applications with different formulations including an engineered PVC certified to the UL 1738 venting standard.

DWV plumbing PVC certified to ASTM and CSA standards are intended for fluid handling applications and do NOT meet the requirements of UL 1738.

From a safety and liability perspective, consideration should be given to eliminating the use of DWV plumbing products for FGV applications. The optimum Code change would mandate certification to UL 1738 and read as follows:

> *Plastic Piping*
>
> *Where plastic piping is used to vent an appliance, the appliance shall be listed for use with such venting materials and the appliance manufacturer's installation instructions shall identify the specific plastic piping material. The plastic pipe venting system shall be listed and labeled in accordance with ANSI / UL 1738, Venting Systems for Gas-Burning Appliances, Categories II, III and IV.*

This change would mandate that only UL 1738 certified products are used for FGV.

I hope that you will find this information helpful.

IPEX USA LLC

IPEX USA LLC

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IPEX USA LLC Background

IPEX USA LLC is a manufacturer of integrated thermoplastic systems for the Mechanical, Plumbing, Electrical and Municipal sectors. In the mechanical sector we manufacture Drain, Waste and Vent (DWV) and water distribution products and also products specifically designed for Flue Gas Venting (FGV).

The Concern with Venting Standards Today

The US Environmental Protection Agency (EPA) website states: "Carbon monoxide (CO) can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death." Failed venting of gases from burning fossil fuels can result in raised levels of CO and tragedy.

In 2014, the Consumer Product Protection Association reported 165 unintentional non-fire CO poisoning deaths; an increase of 11% from the average number of reported incidents between 2012–2014. Of these reported incidents, heating system fatalities represented the largest percentage at 39% or 65 deaths.

Poor venting may have contributed to these statics. For added peace of mind, when it comes to the safety of families and workers, it makes sense to use a FGV piping system that meets and is certified to the UL 1738 safety standard.

Historically, the plumbing and HVAC industry has not regulated the use of thermoplastic flue gas venting pipe, fittings, and accessories. Plumbing Schedule 40 solid wall, ABS and PVC drain, waste and vent (DWV) pipe and fittings has been acceptable provided that the vent material is listed in the ANSI Z21 appliance standards, specified in the appliance installation instructions and certified to specific ASTM and CSA plumbing standards (see Table 1 below: ANSI Z21.10.3 – 2017 Plumbing Standards Approved for FGV).

Maximum allowable temperatures of typical non-metallic vent material used in water heaters

Material	Heat deflection temperature*, ° F (° C)	Pipe nomenclature	Standard
PVC	158 (70)	DWV	ASTM-D2665 or CSA B181.2
PVC	158 (70)	Sch 40, 80, 120	ASTM-D1785 or CSA B137.3
PVC	158 (70)	SDR Series	ASTM-D2241 or CSA B137.3
CPVC	212 (100)	CPVC 41	ASTM-D2846 or CSA B137.6
CPVC	212 (100)	Sch 40, 80	ASTM-F441 or CSA B137.3
CPVC	212 (100)	SDR Series	ASTM-F442
ABS	180 (82)	Sch 40 DWV	ASTM-D2661 or CSA B181.1

Table 1: ANSI Z21.10.3 – 2017 Plumbing Standards Approved for FGV

Products certified to these ASTM and CSA plumbing standards are for plumbing fluid handling applications. For example, ASTM D1785-15 is a standard for pressure rated Schedule *40, 80, 120* PVC pipe and the scope of this standard includes a note that states the following:

> *Note 2:*
> *"This standard specifies dimensional, performance and test requirements for plumbing and fluid handling applications only. It does not include provisions for the use of these products for venting of combustion gases. UL 1738 is a standard that does include specific testing and marking requirements for flue gas venting products, including PVC."*

The above note or similar is included in all ASTM and CSA plumbing standards listed as approved venting materials in the ANSI Z21 appliance standards.

This note along with venting failures using plumbing products has encouraged some municipalities such as the Town of Danvers to only allow UL 1738 certified product for venting combustion gases. The Town of Danvers issues the following note with every gas permit issued for boilers, furnaces and water heaters:

> *a. Standard schedule 40 PVC is NOT permitted for use as a material to vent products of combustion for furnaces, boilers and water heaters (see ASTM D-1785 requirements prohibiting this usage).*
>
> *b. UL 1738 (listed) venting material (i.e. Polypropylene, CPVC and PVC Schedule 40) is acceptable.*

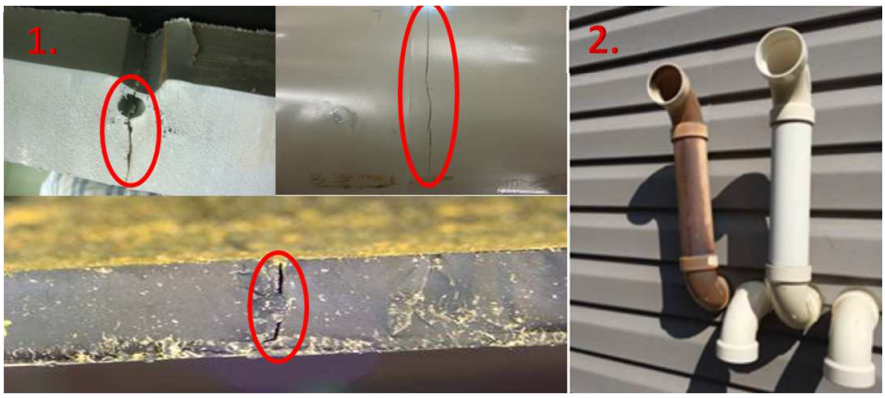


Figure 1: DWV Material Degradation

Description of images in Figure 1:

1. Stress cracks can occur in vent pipe and fittings due to excessive expansion and contraction and inadvertent impact to the material during cold weather installations. These stress cracks can propagate over time and become a leak path for carbon monoxide.

2. Plumbing pipe and fittings when exposed to U.V. Light and water as well as high temperatures will discolor and impact properties are adversely affected.

The material Heat Deflection Temperature (HDT) is the main test required by the ANSI Z21 standards to qualify ASTM and CSA products for flue gas applications. In contrast, UL 1738 requires more than 40 tests that also includes an HDT requirement when qualifying the mechanical and physical properties of the material and system for suitability in a flue gas venting application (reference Tab 1 - The Comparison Table: UL 1738 vs. ANSI Z21 requirements). Products certified to ASTM and CSA plumbing standards are incapable of meeting the stringent requirements of UL 1738.

The plumbing industry does not offer installation instructions or formal training to contractors on the proper installation methods of their plumbing products in a flue gas venting application. This leads to improper use of the materials and inadequate solvent welded joints, which could cause joint separation over time due to expansion and contraction.

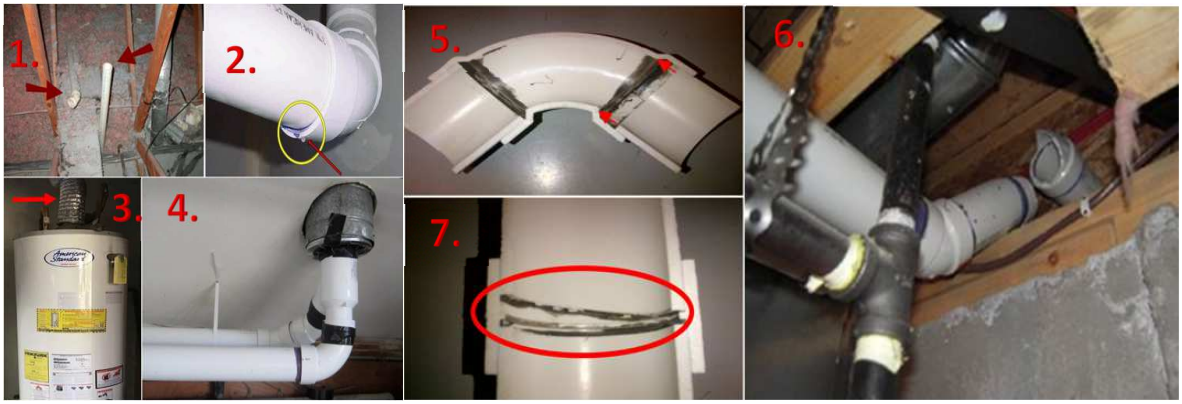


Figure 2: Improper Installation and Installation Related Failures

Description of images in Figure 2:

1. Sometimes when a contractors dry fits a system, the friction fit is so tight that the contractor believes that the joint will not come apart or neglects to solvent weld the joint. Expansion and contraction over time will have the joint pull apart and cause carbon monoxide to spill into the home or building.

2. There is insufficient cement used on this joint to create a proper solvent weld, causing condensation to leak. If a gap is large enough to leak condensation, it's large enough to leak carbon monoxide.

3. A dryer flex aluminum vent was used to vent a power vent water heater.

4. There is the use of different materials in this installation. In addition, only one joint is solvent welded and the remaining joints and transition to the metal termination are held together with electrical tape. The tape is not a proper vent attachment method and will detach from the joint surface (especially during expansion and contraction) causing a leak path for carbon monoxide.

5. The pipe is not welded to the fitting. The cement has all been pushed down into the fitting body because the pipe end is square and not chamfered with a 15˚bevel to allow the cement to flow between the outside pipe wall and inside fitting wall for creating a solvent weld. Pipe is also under inserted into fitting socket and outside the critical bottom 1/3 of the fitting

socket where an interference fit between the pipe and fitting is needed to create a proper solvent welded joint. This can be the result of an improper fit between the pipe and fitting due to incompatible dimensional tolerances **or** the contractor not holding the pipe and fitting together for at least 20 seconds causing the pipe to push back from the bottom of the fitting socket due to pressure created by the cement. If not properly welded, carbon monoxide could leak at that joint. As well, expansion and contraction may cause this joint to separate over time. This is often observed in joint failures.

6. Pipes are unaligned and forced into this configuration due to installation stresses. As well, improper support at this joint will have contributed to the joint break as a result of expansion and contraction / joint stress.

7. The cement has all been pushed down into the fitting body because the pipe end is square and not chamfered with a 15˚bevel to allow the cement to flow between the outside pipe wall and inside fitting wall for creating a solvent weld. The pipe is also cut on a 45 ˚angle causing the pipe end to be outside the critical bottom 1/3 of the fitting socket where an interference fit between the pipe and fitting is needed to create a proper solvent welded joint. If not properly solvent welded, carbon monoxide could leak at that joint. As well, expansion and contraction may cause this joint to separate over time. This is often observed in joint failures.

Additionally, the ANSI Z21 appliance and ASTM standards do not limit the number of manufacturers supplying products in a vent system. The dimensional spectrum for tolerance allowances referenced in the ASTM standards is quite wide. This allowable range could possibly result in a loose joint or insufficient depth insertion into a fitting hub. Any joints that are not properly solvent welded could be susceptible to CO leakage and consequently risk public safety.

Insufficient testing of plumbing materials for this application has prompted several plumbing PVC manufacturers to prohibit the use of their PVC DWV plumbing products for FGV applications. (Reference Tab 2 – Plumbing Pipe Manufacturer FGV notice).

UL 1738 Standard

Flue Gas Venting (FGV) systems are used to remove combustion gases, namely carbon monoxide, generated by heating appliances from homes and businesses. Because venting systems provide this essential safety feature, they must be built, installed and maintained to the appropriate standard for this specialized function.

The UL 1738 standard specifically includes PVC and CPVC materials for venting options in clause 6.7 below. UL 1738 does not specifically include PP although some certifiers have use 6.7 c) to qualify PP.

PVC and CPVC are Approved Materials in UL 1738 under section “Materials”:

6.7 Non-metallic vent gas conduit materials shall be made of:

a) Class 12454-B or 12454-C PVC as specified in the Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds, ASTM D1784,

b) Class 23447-A or 23447-B CPVC as specified in ASTM D1784, or

c) Material having equivalent properties.

Standard UL 1738 consists of stringent requirements, which thoroughly qualify the physical and mechanical properties of venting systems intended for venting category II, III, and IV gas-burning appliances (reference Table 2 – Sample of UL 1738 Test Requirements).

Section	System Performance Test Requirements	UL 1738	Section	Material Conditioning & Test Requirements	UL 1738
19	Temperature Structure	✓	40.2	Elevated temperature conditioning	✓
22.4	Joint Load	✓	40.3	Light and Water conditioning	✓
28	Vent Sag	✓	40.4	Condensate conditioning	✓
29	Puncture	✓	42.2	Tensile	✓
35	Joint Tightness	✓	42.3	Impact	✓
37	Low Temperature Handling	✓	42.5	Flammability	✓
42.4	Crush Resistance and Stiffness	✓	43.1	Heat deflection Temperature	✓

Table 2: Sample of UL 1738 Test Requirements

Description of select testing requirements:

1. Section 19 - Temperature Structure: Over time, appliances can expose the venting system to flue gas temperatures higher than what the vent material is rated for. This test exposes the venting system to the maximum flue gas temperature rating of the vent material plus 70˚F ambient temperature. For a PVC venting system, the total test temperature would be 219˚F (rated material temperature 149˚F + ambient temperature 70˚F). Following the high temperature exposure, mechanical testing is then performed on the vent to validate that mechanical properties of the vent are still viable. This test ensures that the vent is capable of withstanding high temperature spikes during appliance operation.

2. Section 37 - Low Temperature Handling: Thermoplastics can become quite brittle when exposed to sub freezing temperatures. This test requires that one 30” long vent specimen sample be conditioned to -4˚F for 5 hours. While still at the low temperature, the specimen is dropped onto a concrete floor at an angle of approximately 45˚ with respect to the floor. The specimen is then dropped a second time parallel to the floor. After the two drops, the specimen shall not shatter and be free of any cracks, chips or damaged.

3. Sections 40 / 42 - Elevated Temperature and Condensate Conditioning and Impact: Material is subject the rated material temperature for 180 days / 6 months. This duration of constant temperature is equivalent to 8-10 years of intermittence heating appliance use. One test is performed with the material sample submerged in a condensate bath and the other test the material sample is conditioned in dry heat. After conditioning, an impact test is performed on the conditioned material samples and 70% of original impact value prior to conditioning must be maintained.

4. Sections 40 / 42 - Light and Water Conditioning and Impact: Materials are subject to UV Light and Water conditioning to simulate outdoor exposure. After conditioning, an impact test is performed on the conditioned material samples and 70% of original impact value prior to conditioning must be maintained.

5. Section 43- Heat Deflection Temperature: The material must have a minimum heat deflection temperature that is 10˚ higher than its temperature rating.

In addition, part of the certification process included formal approval of detailed installation instructions and special marking and labeling requirements for pipe, fittings, and cement (reference Figure 3 - Pipe and Fitting Identification Markers and System 1738 Installation Methods Guide).

Pipe Identification Markers – 2 x print lines on each length of pipe, 180˚ apart

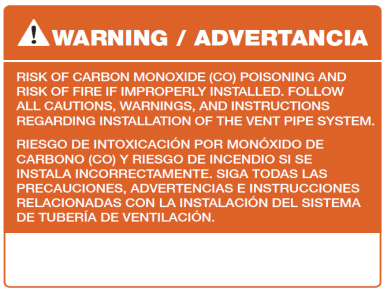
Line A –

SYSTEM 1738® Gas Vent Categories II, IV 149˚F / 65˚C PVC UL 1738 Min. Clearance to combustible construction 0mm – manufacture's installation instruction must be followed / < Date Code > Made in USA by IPEX USA LLC

Line B –

SYSTEM 1738 ® Gas Vent Categories II, IV 149˚F / 65˚C SYSTEM 1738 Gas Vent Categories II, IV 149˚F / 65˚C

Pipe Warning Sticker - to be Included on each Length of pipe / 10 ft.



Fittings – certification sticker

Drain Fittings – warning label

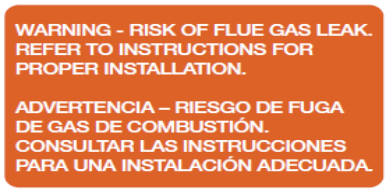


Figure 3: Pipe and Fitting Identification Markers

UL 1738 pipe, fittings and joint connection is certified as a system. It is important to note that different manufacturers have different joint systems and or cements. UL 1738 stipulates:

> ***"Do NOT mix pipe, fittings or joining methods from different manufacturers. This requirement helps ensure a high level of consistency with the venting system."***

2018 Edition – NFPA 54 and IFGC Fuel Gas Codes

The 2018 edition of the National Fuel Gas Code (NFPA-54) and International Fuel Gas Code (IFGC) include a reference to UL 1738 certified solutions as an option for venting Category II and IV appliances. The change to both these model codes empowers relevant authorities to allow the use of a vent material specified by the appliance manufacturers to be certified to the UL 1738 venting standard.

The NFPA-54 code, 2018 edition with respect to non-metallic venting reads:

> 12.5.2 Plastic Piping
> *Where plastic piping is used to vent an appliance, the appliance shall be listed for use with such venting materials and the appliance manufacturer's installation instructions shall identify the specific plastic piping material.- <u>The plastic pipe venting materials shall be labeled in accordance with the product standards specified by the appliance manufacturer or shall be listed and labeled in accordance with UL 1738.</u>*
>
> 12.5.3 Plastic Vent Joints.
> *Plastic pipe and fittings used to vent appliances shall be installed in accordance with the appliance manufacturers <u>and the vent manufacturers'</u> installation instructions <u>if available.</u> Where primer is required, it shall be of a contrasting color.*

The IFGC code, 2018 edition with respect to non-metallic venting reads:

> 503.4.1 Plastic piping.
> *Where plastic piping is used to vent an appliance, the appliance shall be listed for use with such venting materials and the appliance manufacturer's installation instructions shall identify the specific plastic piping material. <u>The plastic pipe venting materials shall be labelled in accordance with the product standards specified by the appliance manufacturer or shall be listed and labeled in accordance with UL 1738.</u>*
>
> 503.4.1.1 Plastic vent joints.
> *Plastic pipe and fittings used to vent appliances shall be installed in accordance with the appliance manufacturer's instructions. <u>Plastic pipe venting materials listed and labeled in accordance with UL 1738 shall be installed in accordance with the vent manufacturer's instructions. Where a primer is required, it shall be of a contrasting color.</u>*

Venting with Non-metallic Products in Canada

There is precedence to mandating a standard for FGV. Prior to 2007 the Canadian market was also unregulated and Plumbing products including ABS and PVC were commonly used. Consequently, Canadian Safety Authorities had been identifying over the years vent failures in a number of these existing plastic gas vents—predominately ABS plastic pipe and fittings—such as environmental stress, cracking, and melting. Improper installations and inspections also attributed to these failures. These failures prompted the CSA B149 gas code to adopt the ULC S636 standard for non-metallic FGV systems as a requirement. The ULC S636 is a system performance standard that was adopted in 2007.
This code change has made a positive impact on the safety of FGV in Canadian homes and businesses. Since 2007, inspectors can now confidently verify, in non-metallic systems, that the critical standards of safety and installation have been met.

In the US, the same opportunity exists with a standard that is similar to the Canadian ULC S636 standard. The UL 1738 standard has similar system performance and installation requirements, as well as material requirements. Thermoplastics plumbing products cannot comply with UL 1738.

Summary - UL 1738 Certified Venting

IPEX USA LLC recommends the use of venting systems certified to UL 1738 for Category II and IV gas burning appliances. Venting materials certified to this standard include PVC, PP and Stainless Steel (CPVC will follow). Reasons for the implementation of the UL 1738 standard include:

a. Appliance standards do not address the flue gas venting system and its acceptability for the application.
b. Beyond the testing involved in the certification process, UL 1738 stipulates that no mixing of components from different manufactures can occur in the venting system. This would include pipe, fittings, cements and terminations. The no mixing clause ensures quality and compatibility.
c. The UL 1738 standard certifies the vent manufacturer's installation instructions for assembling the vent pipe, fittings and terminations. This ensures that one source covering all critical steps of installing the vent system is covered and that this information is readily available to the installer (reference System 1738 Installation Guide). This is not available for PVC and ABS DWV products today.
d. The certified installation guide for UL 1738 thermoplastic venting materials outlines the required set and cure times for solvent welded joints.
e. Prior to 2007 in Canada, uncertified flue gas piping failures forced the enforcement of a national standard for flue gas venting. While not widely documented, the same types of failures may be occurring in the USA.

Enforcing the UL 1738 standard will continue to require certification to the ANSI Z21 appliance standards complimented by the benefits offered by the UL 1738 standard that include but are not limited to:

- Pipe, fittings, and cements compatibility
- Proper use of materials and product for the application
- Identification markers for Inspectors: pipe and fitting markings easily identifying certified system vent components (reference Figure 3 - Pipe and Fitting Identification Markers)
- Single source liability
- Single source product support
- Installation instructions including support spacing, solvent welding, and maintenance

Tab 1

- The Comparison Table: UL1738 vs. Appliance Test Requirements – (Left hand column is the UL 1738 Clause)

Clause	Test	Test Description	Appliance Standards Provision	UL 1738
19	Temperature test and surrounding Structure	In both a vertical and horizontal structure the thermoplastic material is tested at a minimum of 38°C (ambient) above the rating of the vent system. The temperature the surrounding structure cannot exceed 65°C on the exposed surface and 50°C on concealed surfaces	YES* *only test to the HDT. Only considers the effect of the appliance on surrounding combustibles and not	YES* *test to rated temperature plus ambient (38°C) and considers the effect of the vent on surrounding
21	Vertical support	A static load is applied equal to 4x the heaviest assembly, for 1 hour duration.	NO	YES
22	STRENGTH			
22.1	Impact	Horizontal and Vertical assemblies incorporating at least three sections of pipe are to be impacted three times using a sand bag. No breaking, disassembly, or any damage allowed. Weight of sand bag is either 20lbs or 50 lbs depending on pipe diameter.	NO	YES
22.2	longitudinal force	A force of 100 pounds applied for 5 minutes in an attempt to pull apart two companion parts, No breaking, disassembly, or any damage allowed.	YES* *50 lbs ONLY	YES
22.3	load test for vent elbow	Apply 4x the weight of the system or 10 pounds whatever is greater for 5 minutes. No breaking, disassembly, or any damage allowed.	NO	YES
22.4	vent joint load test	Apply 4x the weight of the system or 10 pounds whatever is greater for 5 minutes. No breaking, disassembly, or any damage allowed.	NO	YES
23	Wind Load			
23.1	Test on roof assembly	Vent exposed above the roof line has a load equivalent to 30 pounds per sq' of exposed area applied for 60 minutes. No breaking, disassembly, or any damage allowed.	NO	YES
23.2	Test on lateral supports	Vent exposed outside the wall line has a load equivalent to 30 pounds per sq' of exposed area applied for 60 minutes. No breaking, disassembly, or any damage allowed.	NO	YES
24	Rain Test	Vents are exposed to a water spray configuration as per the standard at 5 psi water pressure. Max allowable water entering the vent system is 2% of the total without the vent cap installed.	NO	YES
28	Vent Sag - Horizontal Installation	Horizontal installation with max allowable spacing/joints between supports shall not sag more than 6.25% of the diam. when subject to the rated temperature from Test 19 plus 38.8°C. Run for 3 hrs or until equilibrium.	NO	YES
29	Puncture Test	Plunger shall not penetrate the wall when dropped from 20" above the outer wall surface. Plunger consists of 3/8" steel rod with a 9/16" diameter head at the end and the overall assembly weighs 2lbs.	NO	YES
32	Pressure Test	Assembly including fittings to be subject to a pressure of 311 Pa or 2.5 times the maximum rated pressure as per client. Tested for 1hr.	NO	YES
33	Leakage Test	Assembly will include fittings/typical joint placed under a pressure of 124 Pa for 1hr. The assembly volume will be calculated and the amount of air used to maintain pressure is not to exceed 20 times the volume of the sample.	YES	YES
35	Joint Tightness	A torque of 25 ft-lb is applied to the various pipe/fitting assemblies, No breaking, disassembly, or any damage allowed.	NO	YES
37	Low Temperature Handling	Samples are cooled for 5 hr @- 20deg C, once removed samples are dropped at a height of 60" on to a concrete floor twice (once at 45 deg angle and once parallel to the floor). Samples shall not chip, crack, break or be damaged.	NO	YES
38	Water Absorption	Conditioned at @ 50°C for 24 hr, then remain at 23°C for 24hr. Samples are then submerged in distilled water for 24 hrs. Weight before and after water submersion must not exceed a 1.5 percent gain.	NO	YES

Clause	Test	Test Description	Appliance Standards Provision	UL 1738
40		Polymeric Materials		
40.2	Elevated Temp Conditioning	Subject to an Elevated temperature as specified in section 19.2, at 30,60,90 and 180 day evaluations for the following are conducted; Tensile, Shall be retained >=70 % of its original value (Per ASTM D638) Impact(Only on Plaques), Shall be retained >=70 % of its original value (Per ASTM D5420) Flammability, For use <=60°C: shall comply to Class V-0 (UL94) For use >60°C: shall comply to Class 5VA or 5VB (UL94) Pipe Deflection and stiffness (only on pipe), Shall be retained >=50 % of its original pipe deflection and stiffness	NO	YES
40.3	Light and water	Subject to Xenon-arc lamp and conditioning of 102 minutes of light followed by 18 minutes of light and water spray. @360 hours samples are evaluate for; Tensile, Shall be retained >=70 % of its original value (Per ASTM D638) Impact, Shall be retained >=70 % of its original value (Per ASTM D5420) Flammability, For use <=60°C: shall comply to Class V-0 (UL94) For use >60°C: shall comply to Class 5VA or 5VB (UL94)	NO	YES
40.4	Condensate Conditioning	Samples are immersed in the specified solution for 30,60,90 and 180 day evaluations of; Tensile, Shall be retained >=50 % of its original value (Per ASTM D638) Impact (Only on Plaques), Shall be retained >=50 % of its original value (Per ASTM D5420) Flammability(Only on Plaques), For use <=60°C: shall comply to Class V-0 (UL94) For use >60°C: shall comply to Class 5VA or 5VB (UL94) Pipe Deflection and stiffness (only on pipe), Shall be retained >=50 % of its original pipe deflection and stiffness	NO	YES
42		Polymeric Materials Physical		
42.2	Tensile-baseline	As per ASTM D638 and section 40.2 - 4.03 above	NO	YES
42.3	Impact-baseline	As per ASTM ASTM D5420 and section 40.2 - 4.03 above	NO	YES
42.4	pipe deflection-baseline	As per ASTM D2412 and section 40.2 – 40.3 above	NO	YES
42.5	flammability-baseline	As per UL 94 and section 40.2 – 40.3 above	NO	YES
43	Deflection Temp Load Test	Deflection temperature shall be at least 10°C above the use temperature form section 19.2 but not less than 70°C when tested as per ASTM D648.	NO	YES
44	Internal stress	Average Internal residual stress for straight section of pipe shall be less then 300psi, but a positive number.	NO	YES
45	Product Marking	Marking on the vent product to include the following: • Minimum clearance to combustible materials • Direction of intended flow • Mark noting the factory of manufacturer • All components to be marked (including cements) • Drain tees to be marked with warning of flue gas leak. • Special marking for condensate drains • Markings to be permanent for the application.	NO	YES
47	Installation Instructions	Instructions for venting to include but not limited to (section 47 has 25 requirements for the installation instructions: • Safety alert warning if the instructions are not adhered to • Details on unpacking, damage and the consequences, expansion and contraction, no mixing of components from different manufacturers • Vent support	NO	YES

Tab 2
– Plumbing Pipe Manufacturer FGV Notice –

[redacted]

Should Plastic Pipe & Fittings Be Used to Vent Combustion Gasses?

Use of plastic pipe to vent combustion gasses produced by water and space heating equipment has become common practice among plumbers and builders. Some equipment manufacturers expressly recommend this practice. Occasionally, [redacted] is asked for its position on the use of plastic pipe and fitting products for this application.

Industry Standards

A variety of organizations produce standards for the construction industry. The best known of these organizations is the American Society for Testing and Materials International (ASTM). ASTM standards are developed by committees of industry experts and approved by the ASTM organization through a rigorous consensus process. These standards specify dimensional, performance and test requirements for various materials, including piping products. Manufacturers like Charlotte Pipe produce products that conform to these published standards.
None of these standards addresses the use of plastic piping to vent combustion gases.

Equipment Manufacturers

Manufacturers produce a wide variety of gas-fired water and space heating equipment. These manufacturers may specify plastic piping for venting of combustion gases, citing these ASTM and other standards within their technical literature:

- ASTM D 2241 Specification for PVC Pressure Rated Pipe
- ASTM D 1785 Specification for PVC Plastic Pipe, Schedules 40, 80 and 120.
- ASTM F 891 Specification for Coextruded PVC Plastic Pipe With a Cellular Core.
- ASTM F 441 Specification for CPVC Plastic Pipe, Schedules 40 and 80.
- ASTM D 2661 Specification for ABS Schedule 40 Plastic Drain, Waste and Vent Pipe and fittings.
- ASTM D 2665 Specification for PVC Plastic Drain, Waste and Vent Pipe and Fittings.
- ASTM F 438 Specification for Socket Type CPVC Plastic Fittings, Schedule 40.
- ASTM D 3311 Specification for Drain, Waste and Vent Fitting Patterns.
- ASTM F 628 Specification for ABS Schedule 40 Plastic Drain, Waste and Vent Pipe with a Cellular Core.

Although these standards specify dimensional, performance and test requirements for plumbing and fluid handling applications, and are often used to refer to or describe a particular type of pipe, they **do not** address venting of combustion gasses. References to these standards by water heater or space heating equipment manufacturers should not be viewed as acceptance or approval by the ASTM for these applications.

Conclusion

At present there is little data available on the safety or durability of plastic pipe products used to vent combustion gases. The ASTM has not addressed this application, and the available data is insufficient for the plastic pipe and fitting industry to develop consensus specifications or guidelines. Equipment manufacturers are most knowledgeable about their own products and are best equipped to determine how their gas-fired heating equipment should be vented. Accordingly, [redacted] recommends that inquiries about the suitability of plastic piping systems to vent combustion gasses be directed to the manufacturer of the water or space heating equipment being installed.

http://www[redacted]documents/combustgasvent/combustgasvent.htm 27/08/2010