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Weil-McLain Technical Bulletin
TB1602 - March 7, 2016

PVC, CPVC and Polypropylene Venting

Addressing The Recent Statements Made By The State of New Hampshire's Division of Fire Safety

Recently, the State of New Hampshire Department of Safety - Division of Fire Safety released an informational bulletin regarding proper maintenance, inspection and installation for fuel-fired appliances. The bulletin raised questions about PVC and CPVC venting for these appliances:

"Many of the newer high efficiency heating and hot water systems utilize PVC as the recommended venting system by the appliance manufacturer. This product has provided a low cost alternative to more expensive venting systems. Products like PVC and CPVC have maximum safe operating temperatures as specified by their product manufacturers. Most high efficiency systems operate safely well below those maximum operating temperatures. The safety concern arises when fuel gas fired appliances operate for prolonged periods without the proper fuel conversion, maintenance, and inspection."

In light of this bulletin release, Weil-McLain would like to take this opportunity to reassure our customers that safety for installation and use of our products has always been a top priority for our business. We have always and will continue to work in accordance with required compliance and safety standards.

Weil-McLain began venting high efficiency boilers using polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) pipe in 2002 and we have continued to release new products with additional options to vent in PVC, CPVC, Polypropylene and Stainless Steel. All of these boilers are tested and certified to American National Standards Institute (ANSI) Z21.13/CSA 4.9, which is a design, construction and testing standard for gas-fired low pressure steam and hot water boilers. Designing within this standard and often going above and beyond its requirements has proven successful in using these vent materials to date.

Within this standard there are requirements for testing non-metallic vent materials. Weil-McLain has always tested boilers to this standard as a basis for safely applying PVC and

CPVC materials for venting applications. In fact, Weil-McLain has helped improve this standard when testing modulating boilers by further specifying water flow and temperature conditions to maintain during the test.

An outline of the set-up and test is as follows:
In preparation for this test, the appliance is installed in a closet simulating the minimum installation clearances allowed by the manufacturer. This closet is constructed with ¾" plywood or 1" thick wood according to the smallest installation allowances specified in the appliance manufacturer's installation instructions. The first elbow of the vent system is located at the closest possible distance from the flue gas outlet of the boiler. For materials that have a heat deflection temperature (HDT) limit listed, the elbow has five equally spaced thermocouples installed within 1/32" of the inside wall of the elbow along its outer radius.

With the closet closed, the boiler is operated at its maximum input firing rate and maximum water operating temperature. The temperatures of the thermocouples in the boiler, closet surfaces and vent components are monitored until the steady-state condition is reached. When this steady state temperature is reached,the temperature of the thermocouples just within the inner surface of the PVC shall not exceed the value in Table 1 below [information referenced from Table20 "Maximum allowable temperatures of typical non-metallic vent material" from ANSI Z21.13 / Compliance Safety and Accountability (CSA) 4.9 – 2014].

Table 1

Material	Heat Deflection Temp	Standard
PVC	158°F	ASTM D2665 ASTM D1785
CPVC	210°F	ASTM F441/F441M

Weil-McLain boilers have demonstrated an ability to operate at these conditions while keeping the measured temperatures under the limits listed in the ANSI Z21.13/CSA 4.9 standard. Furthermore, Weil-McLain products certified to use these materials contain boiler controls that monitor the flue gas temperature and either reduce the firing rate of the burner and/or turn the burner off in the event that a flue gas temperature is approaching levels that may correspond with elevated material temperatures.

Polypropylene "PP" is another material that has become more popular in the North American market as an alternative to PVC, CPVC and Stainless Steel. Polypropylene is not currently listed in the ANSI Z21.13 / CSA4.9 standard, but instead often tested independent of the appliance to the Underwriters' Laboratories of Canada (ULC) 636 standard. This Canadian UL standard tests and rates materials different than the ANSI Z21.13 / CSA 4.9 boiler standard. The most notable difference is that the ANSI/CSA standard tests the vent material on the actual appliance and includes the exhaust gas flow rates and temperatures generated by that appliance. The ULC 636 standard tests the pipe to a specific gas temperature and flow rate in order to certify the vent system for the Vent Manufacturer. Appliances manufacturers, such as Weil-McLain, may then choose to run tests on their appliances to determine if their flue gas temperatures remain below the limits specified by the vent system manufacturer.

In summary, we have found that PVC and CPVC have proven to be safe and reliable venting

materials when properly applied to high efficiency boilers. This includes proper appliance design and control proven through certification testing, followed by recommended installation techniques, regular inspection and eventual replacement. We recommend that these plastic vent systems are regularly inspected and replaced when installing a new boiler.

Venting Options for Weil-McLain Boilers

	Ultra	Evergreen	WM97+	ECO	GV90+
PVC	✓	✓	✓	✓	✓
CPVC	✓	✓	✓	✓	✓
Polypropylene (PP)	Coming Soon	✓	✓	✓	✗
Stainless Steel	✓	✓	✓	✓	✓
Direct Vent	✓	✓	✓	✓	✓
Direct Exhaust	✓	✗	✗	✗	✓
Dual pressure zones	✓	✓	✗	✗	✗
Intake max length	100 ft	100 ft	100 ft	100 ft	100 ft
Exhaust max length	100 ft	100 ft	100 ft	100 ft	100 ft
Vent Category	IV	II, IV	IV	IV	IV

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