

DuraVent®

PelletVent®

Venting Biomass Stoves: Ensuring Success In An Evolving Market



Photo courtesy of Sherwood Industries.

Leaders in-Venting Innovation™

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This white paper is available for download at no cost at www.duravent.com
This paper is written with regard to applicable codes and standards and intended for use and application in North America.

PelletVent®

The first mass-produced pellet stove (aka biomass stove) was introduced to North America in 1983. Since then, their popularity has ebbed and flowed along with energy prices and the severity of winters. At the same time, the surplus or scarcity of various types of pellets has often dictated what some homeowners toss into the hopper. Shortage in wood pellets? What about corn fuel, walnut husks, or cherry pits instead? As a result, stove manufacturers have faced considerable challenges designing equipment and developing venting specifications to keep pace with variances in consumer fuel options. Consequently, vent selection has never been more important. This white paper will explore what manufacturers, installers and homeowners need to know about venting modern biomass stoves, pellet and otherwise, to ensure safe, efficient, and long-lived service.

The Whitfield Stove, invented by Dr. Jerry Whitfield, a former Boeing engineer, was the first pellet stove ever to be produced and sold in the U.S. and Canada. As an early pioneer in biomass venting, DuraVent created and trademarked the very first venting made specifically for wood pellet stoves. DuraVent's pellet vent was originally made of 430 and 304 stainless steel. It worked quite well on the stove and subsequently became the standard vent product used on other pellet stove brands that were quickly being introduced. That is, until homeowners started burning other things besides wood pellets in their pellet stoves.

Although common knowledge within the industry, it is worth mentioning that wood pellets are only one type of biomass fuel. Pellets can be made of just about any combustible material including corn, wheat, hemp, grass – even cardboard or other waste-paper products. Conventional wood pellets are low in acidic enzymes making them ideal for use with stoves paired to a vent system made with 430 stainless steel. However, this is not the case if corn or other grains are used as fuel. Acids within the flue gases are highly corrosive.

Availability of pellet fuel has been hit-and-miss. Shortages are common in some regions and the price of fuel always moves in lockstep with demand. This often leads to "creative" improvisations when it comes to fuel. While stove manufacturers can make recommendations as to fuel options, they really have little control over what actually ends up in the hopper. Can you fault a farmer, with a silo full of dry corn, for burning grain as a substitute for regular pellet fuel?



DuraVent Standardizes On 316L Stainless Steel For PelletVent Pro®

The line between biofuel and wood-pellet fuel became even more blurred when stove manufacturers began making corn-burning stoves. Shortly after, manufacturers began marketing multi-fuel stoves that had the capacity to burn anything that was uniform in size so that it could be fed in a similar fashion as pellets.

“We knew we had to quickly evolve to supply manufacturers with a vent that could withstand the acidic flue gases that corn, and other types of biofuels generate. Burning these fuels requires a super corrosion resistant stainless-steel vent. 430 and 304 stainless steel will not stand up to corn burning,” said Todd Lampey, Vice President of Residential Sales for DuraVent.

Corn and other biofuels often have higher water content than wood and traditional pellet fuel. When water combines in the flue with elements found in corn, such as sulfur, nitrogen, and phosphorus, the condensation is highly acidic. These acids cause vent flue liners made of 430 and 304 stainless steel to quickly corrode.

After a period of intense testing, DuraVent committed to using 316L stainless steel for all of the inner pipe on their PelletVent Pro® product, realizing that it might be used on stoves that were approved to burn corn or other biofuels.

Today, DuraVent’s PelletVent Pro venting system is designed for stoves and inserts that use wood pellets, corn, and other biofuels as fuel. The inner wall of the double-wall, air-insulated vent is made of corrosion-resistant, super-ferritic stainless steel, and the outer wall is made of galvalume. The vent system is rated for continuous use flue temperatures up to 570°F and it is UL/ULC Listed for 1-inch clearance to combustibles.

“This is the industry’s only vent that covers all the bases for biofuel appliances. And, if the last few decades have taught us anything, it’s that biofuel venting needs to do just that. It’s too hard to predict from one year to the next what types of stoves people will be buying and what fuel they will use,” said Lampey.

A Little Bit Of Engineering Goes A Long Way

Specifying or selecting a venting system that can withstand flue gases from a variety of biofuels is critical to a successful installation but it’s not the only factor. Systems should also be evaluated in terms of safety, ease of installation, and serviceability.

Since pellet and other types of biofuel stoves are positive draft appliances that rely on a combustion blower to force exhaust up and out, it is important to choose a vent that can be relied upon to contain any smoke or ash generated. It is especially important that the inner flue be airtight, something that is best achieved by selecting a vent that is laser welded in the factory.

Laser-welded seams produce a rounder pipe which makes for a tighter fit when one end of a pipe is inserted into another. This tight, metal-to-metal, primary seal is combined with a silicone O-ring gasket acting as a secondary seal which results in a reliable, lasting seal at each joint to prevent smoke leakage. Old-style venting products with “lock seams” in which the longitudinal edges of a metal pipe are joined and then folded over, result in a slightly oval pipe which leads to gaps when two sections of pipe are joined together. These vents rely on rope gaskets and sealant to prevent leakage. Not only is this less reliable than laser welded pipe, it makes disassembly for service more difficult and leak-free reassembly highly improbable without additional applications of sealant. While there are others now offering biofuel venting that utilize large, pre-formed gaskets placed on the female end of the pipe to prevent leakage, the results often fail to meet expectations. Installers have reported concerns with gaskets pulling out of place during assembly. If not caught and corrected, leakage will surely result.

“This is where a tiny bit of engineering can make a big difference in the reliability and longevity of a vent system,” said Dalton Hooker, Western Canadian Regional Sales Manager for DuraVent. “Our O-ring gasket is placed on the outside of the male end on the inner wall. Aside from providing a back-up seal, the placement provides protection for the gasket.”

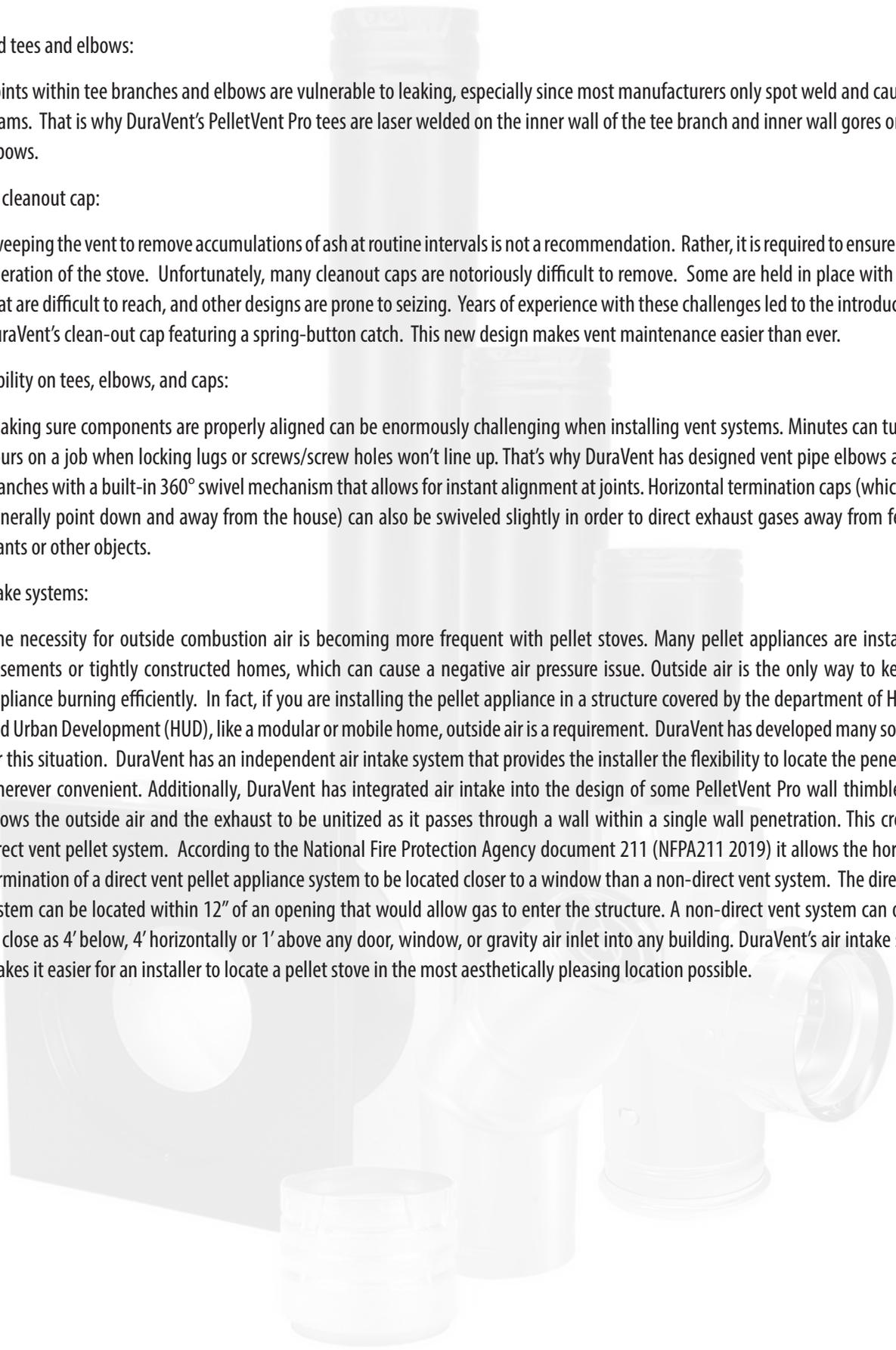
Pellet and other biofuel appliances and vent systems should be professionally inspected and serviced at least once a year. Depending on the volume of fuel burned, service intervals may need to be more frequent. A conscientious service technician will always inspect and sweep the vent. The thoroughness of his or her work often depends on the quality of engineering; how the components are designed to fit together and how many tools or replacement parts are needed. The tee cap can also be removed to allow room for a brush. A strap wrench or oil filter wrench comes in handy for this purpose. Prior to reassembly, a quick application of anti-seize compound can make the next service visit even easier. Should it be required, the O-ring gaskets used with PelletVent Pro can also be replaced. Specialized picks for removing and replacing these O-rings are readily available from any automotive supplier.

Here are some things to look for in the vent design that will help to facilitate a quality installation and ensure better, long-term service:

- Twist lock connections:
 - Competing vent systems require the use of screws, latches, or other coupling devices to connect one component to the next. PelletVent Pro goes together quickly and easily. Align the lugs on the male and female ends, then simply turn clockwise until the joint is locked.



- Wide variety of adapters:
 - Different brands of stoves require different types of adapters. Some vent manufacturers offer only a single adapter. DuraVent offers *nineteen* adapters to connect its PelletVent Pro to virtually any stove on the market. Quick-release adapters are available for both 3” and 4” venting. The clamp used on these adapters makes installation and removal a breeze. Custom adapters were also developed for use with prominent brands such as Harman and Ravelli.
- Multiple tee options:
 - Having a variety of tee options can make life easier for an installer or service person. Aside from traditional tees, DuraVent offers an increaser tee (4” with 3” branch) and a double tee that facilitates easy vertical or horizontal cleaning access. A full line of adapter tees is also available eliminating the need for a separate appliance adapter. Smart solutions such as these not only reduce the number of required parts, but also reduce the number of joints where possible.

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- Laser welded tees and elbows:
 - Joints within tee branches and elbows are vulnerable to leaking, especially since most manufacturers only spot weld and caulk the seams. That is why DuraVent's PelletVent Pro tees are laser welded on the inner wall of the tee branch and inner wall gores on all elbows.
 - Easy release cleanout cap:
 - Sweeping the vent to remove accumulations of ash at routine intervals is not a recommendation. Rather, it is required to ensure proper operation of the stove. Unfortunately, many cleanout caps are notoriously difficult to remove. Some are held in place with screws that are difficult to reach, and other designs are prone to seizing. Years of experience with these challenges led to the introduction of DuraVent's clean-out cap featuring a spring-button catch. This new design makes vent maintenance easier than ever.
 - Swivel capability on tees, elbows, and caps:
 - Making sure components are properly aligned can be enormously challenging when installing vent systems. Minutes can turn into hours on a job when locking lugs or screws/screw holes won't line up. That's why DuraVent has designed vent pipe elbows and tee branches with a built-in 360° swivel mechanism that allows for instant alignment at joints. Horizontal termination caps (which must generally point down and away from the house) can also be swiveled slightly in order to direct exhaust gases away from fencing, plants or other objects.
 - Fresh air intake systems:
 - The necessity for outside combustion air is becoming more frequent with pellet stoves. Many pellet appliances are installed in basements or tightly constructed homes, which can cause a negative air pressure issue. Outside air is the only way to keep the appliance burning efficiently. In fact, if you are installing the pellet appliance in a structure covered by the department of Housing and Urban Development (HUD), like a modular or mobile home, outside air is a requirement. DuraVent has developed many solutions for this situation. DuraVent has an independent air intake system that provides the installer the flexibility to locate the penetration wherever convenient. Additionally, DuraVent has integrated air intake into the design of some PelletVent Pro wall thimbles. This allows the outside air and the exhaust to be unitized as it passes through a wall within a single wall penetration. This creates a direct vent pellet system. According to the National Fire Protection Agency document 211 (NFPA211 2019) it allows the horizontal termination of a direct vent pellet appliance system to be located closer to a window than a non-direct vent system. The direct vent system can be located within 12" of an opening that would allow gas to enter the structure. A non-direct vent system can only be as close as 4' below, 4' horizontally or 1' above any door, window, or gravity air inlet into any building. DuraVent's air intake system makes it easier for an installer to locate a pellet stove in the most aesthetically pleasing location possible.

Conclusion

Pellet stoves and other biofuel stoves are arguably one of the more efficient, environmentally friendly ways to heat a home. They can be a life saver in rural communities where many homeowners are otherwise reliant on costly oil or propane to heat their homes. However, what makes these appliances so appealing can also be their downfall when the wrong vent system is selected. Not all biofuels produce vent-friendly exhaust. Corn can be especially corrosive, which is why corn burning stoves should only be vented with 316L stainless steel.

Furthermore, since many brands of stoves now offer equipment that can burn multiple types of biofuels, both pelletized and non-pelletized, manufactures, installers, and end-users would be wise to always specify 316L stainless steel for the inner wall. DuraVent PelletVent Pro not only meets this specification, but it is also UL/ULC Listed for 1-inch clearance to combustibles. A host of other installer and service friendly features has made PelletVent Pro the preferred venting choice for pellet stove dealers and installers.



For more information on PelletVent solutions, visit:
www.duravent.com.

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