Centrotherm
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InnoFlue Polypropylene vs. Stainless Steel/PVC/CPVC Flue for Condensing Boilers / Water Heaters

There are several options when it comes to the venting of high efficiency gas-burning appliances. Selecting the right venting material is the key component to a safe and trouble-free installation. Some of the most common venting materials are: **InnoFlue** polypropylene, stainless steel, and PVC/CPVC. **InnoFlue** polypropylene has many advantages and has quickly become the preferred choice for venting high efficiency gas-burning appliances. This paper will review the advantages of **InnofFlue** polypropylene and compare it against stainless steel and PVC/CPVC.

As a sign of commitment to safety, **InnoFlue** polypropylene is listed to **UL-1738** & **ULC-S636**, the venting standards for gas-burning appliances in the US and Canada. These safety standards ensure the vent will be able to withstand the rigorous demands of today's appliances.

Material	Max Operating Temperature
PVC	149°F
CPVC	194°F
InnoFlue® PP	**230°F**
Steel	550°F

InnoFlue polypropylene has a high temperature threshold and can sustain consistent exhaust temperatures of up to 230°F. The table shows how it compares to stainless steel and PVC/CPVC.

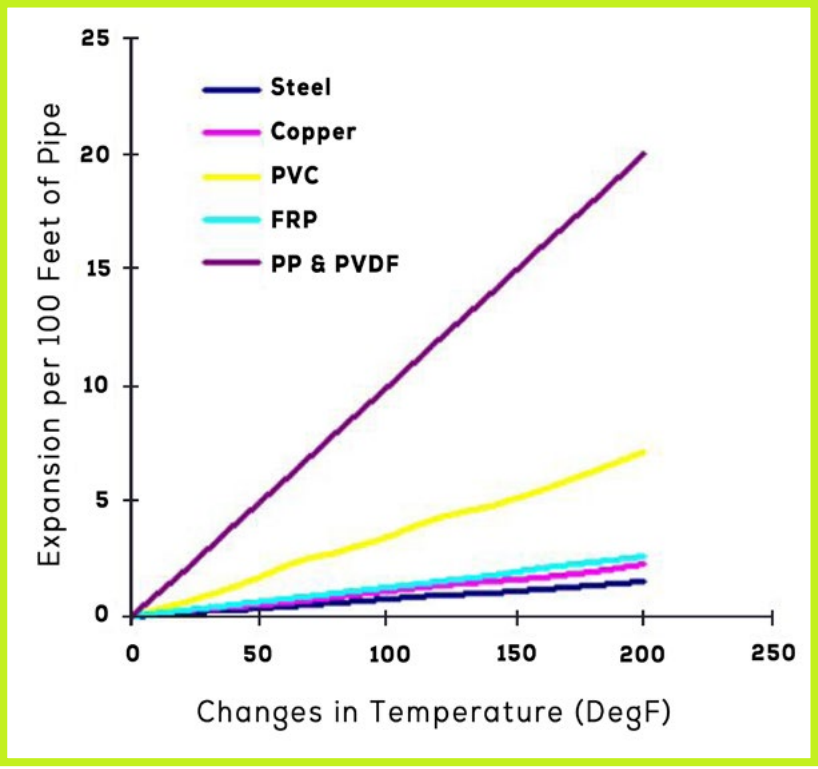
With exhaust temperatures for typical high efficiency gas-burning appliances being under 230°F, stainless steel's high operating temperature range is often more than is required for the application.

Most brands of PVC & CPVC are not listed to **UL-1738** or **ULC-S636** and yield lower maximum operating temperatures. This requires special consideration to ensure the appliance will not operate outside these limits.

InnoFlue polypropylene has a high thermal expansion rate when compared to stainless steel and PVC/CPVC. **InnoFlue** is engineered to allow for expansion and contraction. Its long sockets and EPDM gaskets allow the vent to expand and contract while maintaining the integrity of the system. The high thermal expansion properties are advantageous for keeping ice from building up on exposed surfaces.

In comparison, PVC/CPVC joints are glued together and have no provisions for expansion and contraction. This could result in separated joints and or stress cracking, a serious safety concern.

The graph at right compares the thermal expansion of **InnoFlue** polypropylene to stainless steel and PVC/CPVC.



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InnoFlue gaskets are manufactured from a specialty EPDM material that has been specifically engineered for flue gas systems. These gaskets are highly resistant to flue gas composition and acidic condensate.

Glues, primers, solvents, caulks, silicone or any other chemicals are never required on **InnoFlue** installations.

InnoFlue polypropylene has a comprehensive product offering with diameters up to 12", 10' vent lengths, flexible pipe, and elbows that have been engineered to include pitch. This results in fewer joints, fewer system components, superior condensate management, and an overall shorter installation time. PVC/CPVC are offered in 10' lengths. Stainless steel is typically available in 3' lengths, creating more potential leak areas and increased installation time.

InnoFlue polypropylene has a significant weight advantage over PVC/CPVC.

As shown in the adjacent chart, **InnoFlue** polypropylene is up to three time lighter than Sched. 40 PVC and CPVC and up to six times lighter than Sched. 80 PVC and CPVC.

Diameter		**Weight per Foot (lbs)**			
Inches	mm	PVC (Sched. 40)	CVPC (Sched. 80)	Stainless Steel	**InnoFlue** Polypropylene
6	160	3.53	5.82	.94	.98
8	200	5.39	8.83	1.51	1.53
10	250	7.55	13.09	1.88	1.95
12	315	10.01	18.00	2.26	3.82

InnoFlue is rated for zero clearance to combustibles in all applications.

This allows for greater flexibility during the install. Typical components like; roof jacks and wall thimbles that are required for stainless steel venting are not required with **InnoFlue**. Clearance to combustibles on stainless steel product varies with different exhaust temperatures and as it not listed for use with gas burning appliances PVC/CPVC do not carry a clearance to combustibles rating. The chart below outlines typical stainless steel clearance to combustibles requirements for both single wall and double wall applications.

	Stainless Steel - Clearance to Combustibles			
Operation Temp: 300°F	**Clearance Enclosed**		**Clearance Unenclosed**	
	Horizontal	**Vertical**	**Horizontal**	**Vertical**
Single Wall (SS)	Non-Combustible Enclosure		3" (76.2 mm)	3" (76.2 mm)
Double Wall (SS)	3" (76.2 mm)	1" (25.4 mm)	1" (25.4 mm)	1" (25.4 mm)

InnoFlue polypropylene has decades of consistent proven in-field success and is the technological leader of special gas vent.

See comparison sheet for a side by side look at the differences between **InnoFlue** polypropylene, stainless steel, and PVC/CPVC.

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	InnoFlue Polypropylene	Stainless Steel	PVC / CPVC
Performance & Safety	• UL-1738 & ULC-S636 tested/ listed by **Intertek** • Engineered for flue gas • Engineered for condensate management • Decades of successful installations globally	• Low thermal expansion • Suspectible to stress cracking & corrosion • Designed for positive pressure • High surface temp	• Minimal safety factors • No provision for thermal expansion • Suspectible to stress cracking • UV degradation • Toxic solvents/glues required • Not rated for flue gas
Temperature Limitations & Concerns	• Max temp 230°F • Appropriately rated for high-efficiency appliances • Zero clearance to combustibles	• Max temp 600°F • Double-wall required to reduce clearance to combustibles and surface temperatures	• Low operating temps • Plastics soften, sag, and fail • Not rated for gas-fired appliances
Technical Support	• Full team of engineers and sales representatives • Design/Layout Support • 3D Layout rendering • Custom components	• Full team of engineers and sales representatives • Design/Layout Support • 3D Layout rendering • Custom components	• No technical support available
Installation	• Gasket system installs quickly • Wide range of components allow for customized installations • 87° elbows account for pitch • No cure time	• Laser welded seams • Internal Gaskets • No cure time	• Very heavy • Significant field work requirements • No instructions • Long cure time
Codes/Tests/ Standards	• UL-1738 & ULC-S636 tested/ listed by **Intertek** • Tested to CE EN 14471 by TUV	• Tested to UL-1738 & ULC-S636	• Performance concerns throughout system • Manufacturers state "not for flue gas"
Application Versatility	• Complete product offer • Single Wall, Flex, Concentric • 2" - 12" diameters • Comprehensive OEM approvals • Thermal expasion rates protect system integrity	• Limted versatility due to shorter lengths and clearance to combustibles • Difficult to adjust components in the field	• Limited application due to product offer and temperature limtiations • Not designed or endorsed by PVC/ CPVC manufacturers for venting flue gas
Eco-Friendly	• Fully Recyclable • LEED Friendly	• Recyclable	• Manufactured with chlorides • Partially recyclable
Warranty	• 10 Year Warranty	• Warrantied	• No warranty

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