



TECHNICAL BRIEF

WHY CHOOSE A VITON O-RING INSTEAD OF RTV SILICONE VENTING ?

**THE HARD TRUTH ABOUT JOINT INTEGRITY,
INSTALLATION REALITIES, AND WHY
O-RINGS ARE THE SMART CHOICE**

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Executive Summary

Condensing vents run hot, wet, and under positive pressure. In that environment, RTV-sealed, field-assembled joints are highly installation-sensitive (prep, insertion depth, slope, cure).

Small misses lead to leaks.

Factory-gasketed, listed joints reduce that risk by design with integral O-rings and mechanical locks.

Problem

Even when listed, RTV-sealed systems can underperform in real plants because:

- **Installer variables:** surface prep, ¼"/ft slope, insertion depth, and cure time.
- **Service/rework:** opened joints must be re-sealed and cured.
- **Environment:** acidic condensate, vibration, thermal cycling stress, marginal seals.
- **Drainage:** ponding from poor slope overwhelms joints.

Bottom line: Field performance hinges on joint sealing; factory-gasketed systems minimize variability and improve reliability.

RTV sealants: Code-compliant but not field-proven

RTV silicone has long been a go-to material for field-sealing venting joints. It's inexpensive and carries the necessary listings under ULC S636 and UL1738.

But silicone wasn't originally designed to survive in a wet, acidic, pressurized environment, and that's exactly what you get in modern Category IV condensing boiler systems. Especially in horizontal runs, where condensate collects, pooling around the joint and breaking down the silicone prematurely.

Silicone fails silently, and service teams get the call.

- **"We notice the vent joints are leaking."**
- **"There's condensate dripping onto the floor."**
- **"We've already resealed this section twice."**



Real world findings: 9 years of Raven field data

Metric	Secure Seal® (Viton® O-ring)	RTV Silicone-Sealed
Years of Use	9+ years	Fails as early as 2–3 years
Seal Failure Reports	None so far when installed properly	Multiple documented cases
Reusability	Tool-free reassembly	Must be scraped and re-sealed
Labor Cost Over Life	Minimal	Recurring service + downtime
Ideal Applications	Critical systems (e.g. hospitals)	Light-duty installs at best

Technical Detail: Sealing performance under attack

Combustion gases from condensing boilers form a corrosive cocktail of:

- Carbonic acid
- Nitric acid
- Trace sulfuric and hydrochloric acids

Silicone may survive 500°F in lab air, but sealed in a joint under constant wet acidic exposure, its performance deteriorates fast. It softens, shrinks, cracks and eventually, leaks.

Viton® O-rings

Meanwhile, Viton® O-rings, factory-installed in Secure Seal® systems, provide resistance to:

- Long-term acid exposure
- Thermal cycling
- Water ingress

Self-locking clips provide the installer with feedback that the joint is secured through a clicking sound. When maintenance is required, joints can be disassembled and reassembled without replacing the seal.



Joint design matters more than you think

Feature	Secure Seal®	RTV Silicone-Sealed
Joint Overlap	2.5" male/female	1.5" RTV Silicone Gasket
Seal Type	Factory-installed Viton® O-ring	Field-applied RTV silicone
Assembly Tooling	None	Caulking + curing time
Temperature Rating	UL listed 480°F	UL listed 480°F

Why “Code-Compliant” Isn’t enough

UL 1738 / ULC S636 Venting Key Facts:

- Certification covers leakage, temperature, pressure, and corrosion.
- Minimum requirement: 1.25" w.c.
- FasNSeal & similar systems: rated up to 15" w.c.
- Real-world performance depends on:
 - Quality of installation
 - Condensate management
 - Horizontal run design
 - Fan-induced pressure surges

Best practice: design to the published rating, follow manufacturer instructions, and regularly inspect joints & drains.



RAVEN'S RECOMMENDATION FOR ENGINEERS:
Make your specs airtight—literally.

Recommended Venting Note:

"Boiler venting system joints must be factory-engineered with integrated Viton® O-ring seals. RTV Silicone, EPDM, and Graphite based sealing methods and gaskets to seal standard lengths."

Cost of Ownership

Silicone-sealed venting looks cheaper on paper. But here's the math:

- Labor to reseal leaking joints
- Downtime, equipment shutdowns, which are extremely costly
- Warranty call-outs as soon as 2 years after installation
- Replacing vent sections behind drywall: project delay, tenant complaints

And all this for a system that was "compliant."



THE CASE FOR SECURE SEAL O-RINGS

- Minimal callbacks in 9+ years across 50+ projects (Commercial offices, multi-residential developments, processing plants, hospitals, universities, and government buildings)
- No curing required for standard joint
- No messy caulking or cleaning for standard joints
- Fully removable and serviceable joints
- Certified to the same temperature and pressure standards with proven longevity

When venting is behind walls, above ceilings, or installed in mission-critical facilities, you get one shot to get it right.

CONCLUSION: BUILD IT ONCE. SEAL IT FOR LIFE.

For hospitals, long-term care homes, universities, and any application where boiler uptime matters Viton®-sealed systems aren't an upgrade. They're a necessity.

At Raven, we've spent over 9 years tracking real-world system performance. Our guidance is based not just on lab specs, but on what holds up after nearly a decade of use.

