Viton vs. Nitrile (Buna):

Which seal for your applications?

Viton and Buna are two of the most used elastomers for sealing applications and for good reason, **both rubbers serve as great general purpose sealing options.** These seals offer excellent compression set resistance, and both options are designed to resist most oils and lubricants, especially petroleum based lubricants. Additionally, moderate temperature **applications between -15°C and 120°C are served by both seals**, making either seal a perfect choice for general industrial use. **However, for more specific applications the decision becomes much more important.**

Viton and Buna seals have several very crucial differences that make them especially well-suited to certain applications. While both Viton and Buna seals both serve as great sealing options at moderate temperatures, **Viton is far superior to Buna for high temperature applications**. Viton seals provide an indefinite seal for temperatures up to 200°C, and for temperatures up to 315°C they offer an excellent seal for more than 48 hours. Buna on the other hand is only effective up to 120°C. **However, Buna seals provide a better low temperature sealing option** with effective sealing down to temperatures of –30°C, while temperatures below -15°C render Viton seals ineffective as they become quite hard and brittle.

Along with temperature, other environmental conditions differentiate these two materials. An exceptionally broad range of chemical resistances make Viton seals a perfect option for most applications involving oils, fuels, and mineral acids. These seals also boast excellent resistances to oxidation, ozone, UV exposure, weather, fungus, and mould. While also boasting some chemical resistances, **Buna is much less universally resistant than its Viton counterpart, suffering degradation from weather and ozone exposure.** For most circumstances, however, this is not an issue, and Buna seals also offer the benefit of superior abrasion and tear resistance making them more **suitable for more heavy duty industrial applications.**

Both sealing options offer an extensive list of diverse applications, and they both serve as excellent general purpose seals. Nevertheless, to optimize your choice in seals be sure to consider the advantages and disadvantages of these two exceptional seals.

Permeability of a seal, or the rate at which gasses “leak” through the seal, can be calculated as a function of the permeability constant **K**, (generally found in the material datasheet) pressure differential across the seal **ΔP**, area of seal exposed **A**, and ‘O’ring cross section **d**. With these variables, the permeation of a gas into a chamber **Q**, can be calculated using **$Q=K*\Delta P*(A/d)$**. For applications that do not require High Vacuum (HV), the permeation loss through elastomer seals is typically acceptable and will not significantly affect system performance.

Temperature plays a large role in any vacuum system, but more so in a system with elastomer seals. As temperature increases, compression set rate increases as well, causing the O-ring to permanently lose its original shape. This effect begins to occur with Viton above 150°C, limiting its max temperature if the ‘O’ring needs to be reusable to any significant number of cycles. While elastomer seals will generally work once or twice near their temperature limits, they may become hard quickly and need to be replaced. When extreme temperatures are needed, metal seals are the better option.