

Precise dispensing of anaerobic adhesives

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Introduction

Anaerobic adhesives are the most popular type in industry, and are ubiquitous in workshops everywhere, used as threadlockers and retaining compounds. Applications for anaerobic adhesives that require more accuracy and precision in dispensing can be challenging because of the unique cure mechanism.

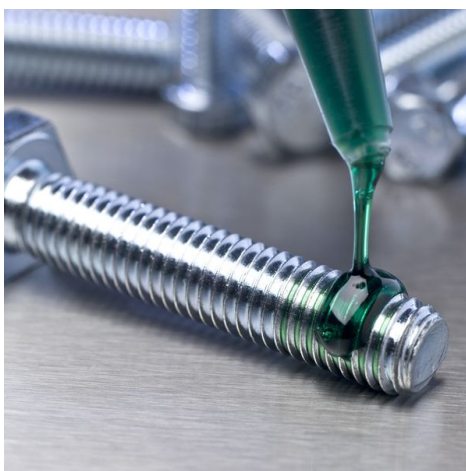


Figure 1 – Anaerobic adhesives are commonly used as threadlockers

Anaerobic adhesives

Due to their easy handling and fast curing, anaerobic single component adhesives are popular in a wide variety of bonding applications, most notably locking together threaded parts like nuts and bolts or joining a bearing onto a shaft. Many of these processes are workshop based and done by manual application, but there are instances when a more exacting approach is needed; for example in a non-manual automated assembly process, like automotive magnet bonding, or the production of form-in-place sealing gaskets where a profiled 3D bead is required.

Anaerobic adhesives cure under the absence of oxygen and in the presence of metal ions, and in these conditions, they cure quite quickly – usually advantageous, but presenting a challenge for application equipment. A system for dispensing them needs to be made of inert material, preferably plastic components, tubing and nozzles or needles. Metal dispense tips or pressure pots pose a contamination problem for anaerobic adhesives. Blockages can occur in plastic hosing of small diameter when left overnight as the anaerobic adhesive may gel.

Precise dispensing

The preeflow eco-PEN is a precision volumetric, positive displacement, dosing/dispensing system that gives the user accuracy and repeatability by means of a rotor, which turns inside a stator. By this progressive cavity pump technology, the eco-PEN doses and dispenses a wide range of material viscosities with no stress to the material, providing



absolute control. Numerous long-term tests have been conducted to prove the viability of this technology with anaerobically reactive adhesives.

The eco-PEN housing is already metal-free and designed to be in the fluid path. Metallic parts of the rotor assembly that come into contact with the material are specially treated so that curing is not initiated. Initial testing showed that even extremely fast-reacting, high-performance adhesives could remain in the dispenser for three days without cure. This means that anaerobic materials can be kept in the dispenser over weekend downtimes, removing the need for time-consuming cleaning sessions.

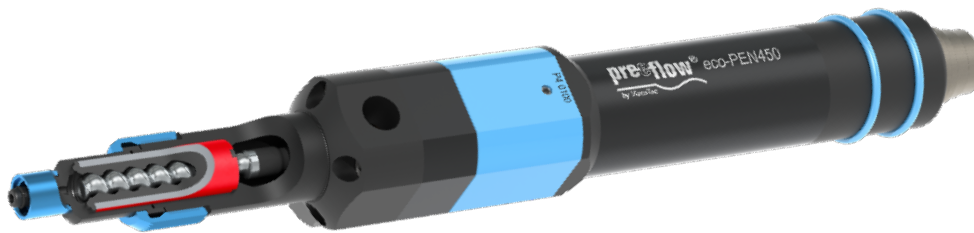


Figure 2 – preflow eco-PEN450 cross section showing the volumetric progressive cavity pump

Dispensing tests with the anaerobic adhesive

Further, longer-term and more detailed trials tested the eco-PEN for durability and functionality when used with anaerobic adhesives. A total of 14 different adhesives from seven manufacturers were evaluated. After filling the dispenser with the adhesive, approximately 3 ml (equivalent to the capacity of the dispenser) was dispensed and the system was depressurised. The adhesives remained in the eco-PEN for up to 32 days without being dispensed, and the start-up behaviour then checked by means of a dispenser torque measurement. Even after 32 days standing time, a good dispensing result was achieved with most of the subject adhesives.

Long-term test results

More than half of the adhesives showed no change after staying dormant in the dispenser over the full test period. With three of the adhesives, a cleaning/purging step was recommended at the end of the same period in order to achieve expected good output. The effects of slight polymerisation could only be seen during the test period in three materials, either on the dispensing needle or, after a longer standstill period, in the end piece of the dispenser. The challenge posed by these more reactive systems is met with more frequent dispensing needle changes and material purging.

Conclusion

In summary, with the appropriate and often minimal housekeeping, manufacturers can successfully dispense anaerobic adhesives with accuracy and precision. The preflow eco-PEN series can dispense from 0.001 ml with an accuracy of $\pm 1\%$ and repeatability of $> 99\%$. This can enable automated or robotic volumetric dispensing of anaerobic adhesives with reliability, minimal downtime for cleaning, and few concerns about curing in the dispenser.

Picture credits

Figure 2 – ViscoTec Pumpen- u. Dosiertechnik GmbH

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About INTERTRONICS

INTERTRONICS supplies adhesives, coatings, sealants and equipment to customers with high technology, high performance assembly applications. Our customers are manufacturers in industries such as electronics, medical devices, plastics, optical, automotive, energy, defence and aerospace.

We specialise in adhesives and adhesive systems, namely bonding, coating, sealing, encapsulating, potting, masking and gasketing products, together with the most appropriate equipment and accessories for surface preparation, mixing, application, dispensing, and curing them. The provision of insightful technical and applications guidance is a cornerstone of our business. We help you find the optimal materials and processes for the manufacture, assembly or repair of your products, safeguarding and enhancing performance and integrity and, in turn, your profitability and reputation.

Ever since being established in 1979, when our main market was the printed circuit board assembly industry, we have enjoyed a reputation for customer focus, excellent service and post-sales support. We now supply over 3,000 regular customers, including multinational manufacturers, production facilities, specialist design and development businesses, universities, training organisations and government establishments.

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