

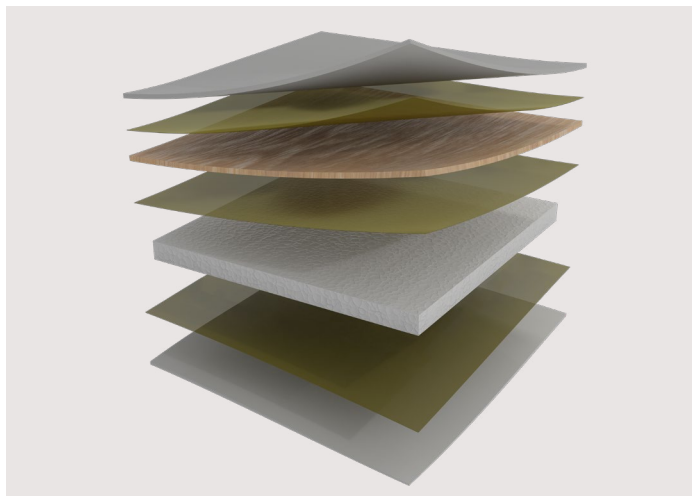
LOCTITE® NEO: HENKEL ISOCYANATE FREE HIGH-PERFORMANCE ADHESIVE

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As part of our global strategy to develop solutions with a sustainability contribution, while preserving material performance, Henkel introduces LOCTITE® NEO, a portfolio of isocyanate free adhesives with multiple benefits for various applications.

Background

Various adhesive chemistries have replaced mechanical fastening techniques across global industries. While adhesive advantages are many, including uniform weight distribution across assemblies, aesthetics, design and material flexibility, process and cost efficiencies through automation, there are also limitations that are considered. For example, many adhesive systems have sensitivity to cold temperature storage and humidity if improperly stored. These limitations factor into the development and assembly process, creating an opportunity for alternative adhesive options.



In parallel, health and safety concerns have become the driving factor behind regulations such as REACH and other country-specific regulations such as Canada's DSL list. Isocyanates are found in some adhesive systems such as polyurethanes which are subject to regulatory controls, and in Europe require employee safety training to reduce potential effects on workers. Similarly, Bisphenol-A (BPA) which can be found in epoxies, has gained negative focus due to possible health and safety concerns. With these regulations becoming increasingly stringent and commonplace, adhesive technologies must be adapted to meet requirements and ensure business continuity across industries.

Introducing LOCTITE® NEO Adhesives

Henkel is on the forefront of developing new adhesives with a sustainability contribution while addressing limitations of adhesive systems commonly in-use in high-speed manufacturing. The result of this effort is the launch of LOCTITE® NEO: a versatile line of adhesives for bonding plastics, foams, wood, metals and other substrates.

LOCTITE® NEO is:

- A new and distinct chemistry
- An adhesive devoid of isocyanates, BPA, and skin sensitizers
- Compliant with the latest SVHC and REACH regulations
- Rapid curing in ambient temperatures with a controlled minimal exothermic reaction and without the need for oven curing, thereby reducing manufacturing floor space requirements and CO₂ footprint
- Easily stored and transported with no specific storage prerequisites or limitations
- A solution that addresses concerns of water absorption and moisture sensitivity, maintaining robust strength and integrity even in damp conditions, on a wide range of substrates
- Effective in filling complicated or narrow gaps in bonding applications
- Capable of high penetration in hollow fiber filter potting applications
- An efficient transition from existing adhesive systems with minimal equipment changes

LOCTITE® NEO - A Completely New Chemistry

LOCTITE® NEO's innovative adhesive formulas were initially developed to improve hollow fiber water filter manufacturing by reducing WIP (Work in Process) and enhancing operator safety by removing isocyanates, BPA, and skin sensitizers. LOCTITE® NEO exhibits superior compatibility and high tensile strength with widely used water filter housing substrates like polyvinyl chloride (PVC), Acrylonitrile Butadiene Styrene (ABS), and polycarbonate (PC). This compatibility stands as a distinctive advantage that significantly streamlines the overall production process for water filtration modules.

See how LOCTITE® NEO compares to incumbent technologies such as polyurethane or epoxy adhesives.

| Product Characteristics | Epoxy | Polyurethane | LOCTITE® NEO |
|-------------------------------|-------|--------------|--------------|
| Chemical Resistance | High | Medium | Medium |
| Maximum Operation Temperature | High | Lower | Medium |
| Storage Stability | High | Lower | High |
| Moisture Sensitivity | None | High | None |
| Hardness | High | Low | Medium |
| Cure Speed | Slow | Fast | Fast |
| Exotherm | High | Low | Low |
| Noxious Chemicals | High | High | Low |

LOCTITE® NEO: Advancing Solutions with a Sustainability Contribution

LOCTITE® NEO adhesives are devoid of isocyanates, Bisphenol-A (BPA), and sensitizers (substances that can cause exposed persons to develop an allergic reaction).

LOCTITE® NEO adhesives also adhere to the latest SVHC (Substances of Very High Concern) and REACH (Registration, Evaluation, Authorization and Restriction) regulations in the European Union (EU). LCA (Life Cycle Assessment) compliant with ISO 14040/44 is available upon request.

LOCTITE® NEO: Advanced Adhesives for Versatile Bonding

LOCTITE® NEO 1300/2X00 adhesives are two-component (2K) adhesives with two discernible constituents: a resin (A) and a hardener (B). These are blended in a specific ratio to trigger a chemical reaction forming a strong bond.

LOCTITE® NEO adhesives are fast curing and easily bond with both damp and dry components. They cure at room temperature without secondary curing steps, enabling manufacturers to eliminate the need for costly curing ovens that consume a lot of energy. As such, LOCTITE® NEO enables streamlined production processes, reduces manufacturing floorspace requirements, and diminishes carbon footprint.

See initial test results for LOCTITE® NEO 1300/2800. Henkel is actively working on solutions with superior performance on metals and PES.

INITIAL TEST RESULTS: LOCTITE® NEO 1300/2800

| Substrates | Strength | Mode of Failure |
|----------------------|----------|-------------------|
| Polyester SMC | 0.8 MPa | Cohesive/Adhesive |
| Styrofoam | 0.2 MPa | Substrate |
| Poplar Plywood | 2 MPa | Substrate |
| Plywood | 2 Mpa | Substrate |
| Polycarbonate | 2.9 MPa | Adhesive |
| PVC | 7.9 MPa | Substrate |
| ABS | 6.0 MPa | Substrate |
| Primered Aluminum | 5.5 MPa | Cohesive |
| Unprimered Aluminum: | 2.7 MPa | Adhesive |
| Steel | 2.2 MPa | Adhesive |

Data above taken from initial batch and only for use as an indicator of strength. Henkel recommends testing on production representative parts before going into production.

LOCTITE® NEO releases water as a byproduct of curing, a polycondensation feature of the chemical formulation that can simplify production processes in certain applications.

The remarkably low viscosity of LOCTITE® NEO opens the door to a multitude of potential applications such as applications where there are complicated or narrow gaps.

LOCTITE® NEO also exhibits exceptional storage stability. The storage versatility spans from -20°C to +50°C, representing a remarkably wide temperature range. This means that even during cold weather, customers are not burdened with the necessity for heated warehouses or temperature-controlled trucks for product transport.

TECHNICAL DATA FOR LOCTITE® NEO TWO-COMPONENT FORMULA COMBINATIONS

| | Unit | A: LOCTITE® NEO 1300 B: LOCTITE® NEO 2300 | A: LOCTITE® NEO 1300 B: LOCTITE® NEO 2700 | A: LOCTITE® NEO 1300 B: LOCTITE® NEO 2800 |
|-------------------------------|--|--|--|--|
| Technology | LOCTITE® NEO polycondensation, free of epoxy and isocyanate | | | |
| Components | Two component – light yellow to brown liquids | | | |
| Viscosity A | mPa | 180 | 180 | 180 |
| Viscosity B | | 20 | 20 | 20 |
| Mixing Ratio | A : B (w/w) | 100:85 | 100:90 | 100:89 |
| | A : B (v/v) | 100:106 | 100:113 | 100:111 |
| Mix Open Time | Min. | 10.5 | 12.0 | 9.2 |
| Gel Time | Min. | 20.0 | 21.5 | 16.5 |
| Recommended Curing Conditions | °C | 1 week at 23°C | 1 week at 23°C | 1 week at 23°C |
| Shelf Life | Month | 24 | 24 | 24 |
| Final Hardness | Shore D | 56 | 68 | 72 |
| T _g /DMA | °C | 43 | 47 | 60 |
| Certifications | All components comply with KTW-BWGL, successful NSF61 prescreening | | | |
| Performance | Level | Standard | Standard | Medium high |

Transitioning to LOCTITE® NEO – A Seamless Drop in Replacement

Transitioning to LOCTITE® NEO requires minimal equipment adjustments, making it an efficient switch for most applications. Existing 2k dispensing systems can be adjusted to the required mixing ratio. If the equipment was originally used for polyurethane (PU), the transition process starts with thorough cleaning, as LOCTITE® NEO's amine hardener rapidly reacts with residual isocyanates, which if not cleaned properly, could lead to clogs in the equipment.

For optimal performance, Henkel recommends the replacement of flexible tubing to reduce the need for cleaning. This tubing change is for convenience as it proves to be less time-consuming and labor-intensive than rigorous cleaning. Moreover, the mixing process remains similar, with minor adjustments. The transition is notably smooth and not overly complex, making LOCTITE® NEO an attractive choice for companies aiming to improve their adhesive bonding processes.

LOCTITE® NEO – Future Developments

Henkel continues to expand the scope of LOCTITE® NEO materials. You have the unique opportunity to shape the next generation of adhesives.

Next steps for LOCTITE® NEO Industrial Bonding

Industrial bonding differs significantly from filtration potting. Adhesives are typically utilized in small 50 - 500 ml sized packages for easy use at multiple dispense stations. This allows operators to easily handle such materials across a variety of part geometries. To facilitate this, we believe that products will have to conform to the mix ratio packages existing in industry, typically 1:1, 2:1, 4:1 or 10:1.

Most industrial adhesives for part bonding are expected to accommodate the differences in part tolerance between mating pieces. Having the ability to accommodate manufacturing tolerance variability makes for a robust process and less scrap. We anticipate future needs will be for thick liquids and potentially thixotropic formulations that will allow easy dispense while remaining in place until parts are mated.

As manufactured goods are miniaturizing and increasingly including sensors and electronics, thermal conductivity has entered the vernacular for structural bonding. Henkel can easily incorporate these at an early stage to give partners a competitive advantage.

Next Steps for LOCTITE® NEO Industrial Potting

Potting is defined as filling an area of a part with a low viscosity material that seals and protects. Many different chemistries have been used for such applications, but there are several performance requirements to be successful. Materials need to be very low viscosity to wet out, displace air, and conform around parts. Potting materials need to be rigid enough to hold things in place, yet not so firm that they remove or distort fragile part components. These can be major issues in microelectronics as well as larger electrical parts.

The best potting materials have CTE's (Coefficient of Thermal Expansion) that mimic the part's inherent CTE. Given complex part design with many different materials, it can be very challenging to find a potting material to match the CTE of all part components.

At first glance, epoxies seem ideal given their low viscosity, rigidity, and environmental resistance. However, heat generated during cure (exotherm) can damage parts. As such low exotherm is very important in potting applications.

While existing LOCTITE® NEO products have the viscosity required for such applications, we have the ability to tune them for customer-specific applications. Beyond the condensation cure of the launched products, we have additional cure mechanisms targeted at electronics-oriented applications.

Summary

LOCTITE® NEO adhesives are versatile bonding solutions for multiple applications and embody Henkel's commitment to formulating materials with a sustainability contribution.

Contact us to test LOCTITE® NEO for your current applications or partner with us for your future designs.

[Try LOCTITE® NEO](#)

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