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SHIPPING, STORAGE, AND SHELF LIFE OF PRIMERLESS THERMABOND®

This guide gives recommendations for storage and shipping conditions of Arlon Silicone Technologies Division products 99990A008 and 99990A015. Specifically, Arlon recommends

1) refrigerated shipment and storage near 45°F
2) 6 months shelf life from the date of manufacture
3) using Figure 2 to guide further testing when elevated temperature exposure has occurred.

Thermabond® products are temperatures sensitive adhesives. Arlon strongly recommends that all shipments of Thermabond® products be made via refrigerated transit. Shipping by other methods, including overnight express carriers, carries some possible risk of exposure to elevated temperatures that could jeopardize the performance of these materials. Selection of shipping method should be considered in light of Arlon's recommendations and the charts presented in this guide.

These products are electronic film adhesives made of uncured silicone rubber with incorporated bonding agents. The bonding agents serve to promote adhesion between the silicone polymer chains and functional groups on various surfaces. Over time, the bonding agents can react with other ingredients in the adhesive, hence their bonding effectiveness decreases over time. This occurs more readily at elevated temperatures.

In order to study the reduction of bond with time, Arlon has performed a set of lap shear strength experiments based on ASTM D 1002. The 99990A008 product was stored with various time/temperature exposures prior to lap shear sample layup.

Based on Figure 1, Arlon recommends refrigerated storage of Primerless Thermabond® and 6 months of shelf life from the date of manufacture. Storage at 75°F led to lap shear strength reduction that became significant after 30 days. As expected, higher temperatures led to faster reduction. Arlon suggests using 80% retention of lap shear strength as a guideline to material usability. But, since each application is unique, the guideline should be a starting point for design and reliability testing.

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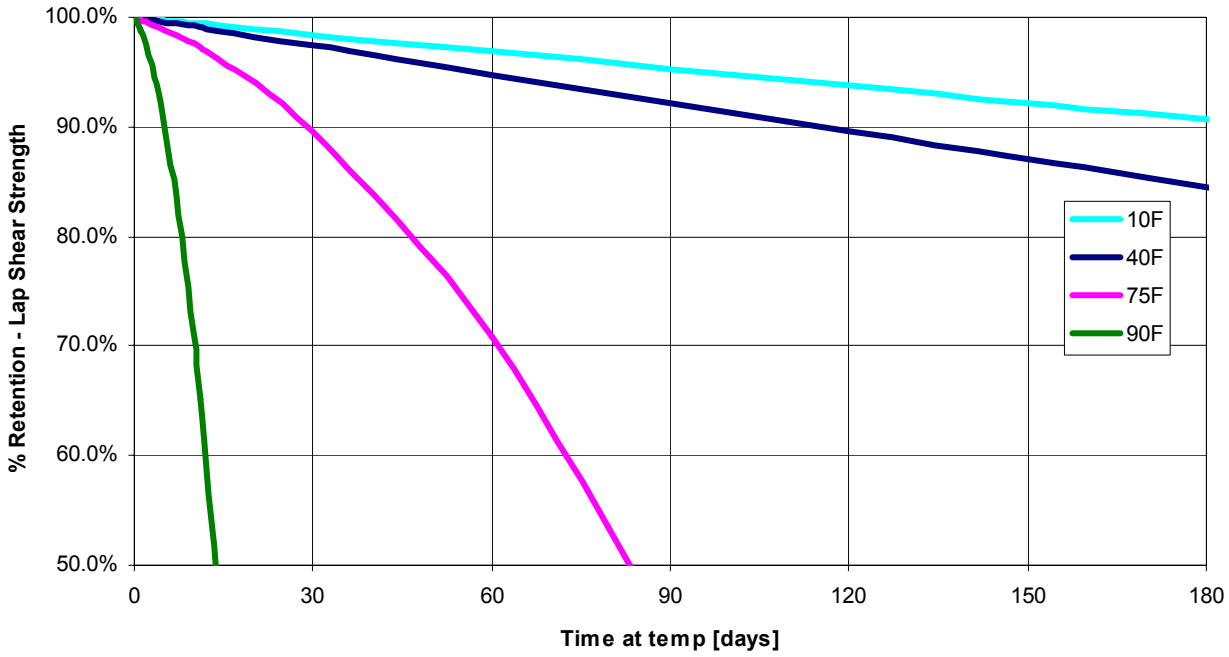

Figure 1 - Primerless Thermabond® stability at temperature (0 - 180 days)

Figure 2 focuses on the first 14 days of the data set to examine material stability during short term exposure. Considering these results, Arlon recommends avoiding prolonged exposure to temperatures above ambient. For example, temperatures inside non-refrigerated shipping trucks can often reach 120°F. Based on this study, exposure to 120°F will reduce bond strength by 20% in ~1.5 days. Therefore, Arlon recommends refrigerated shipment to maximize bond retention.

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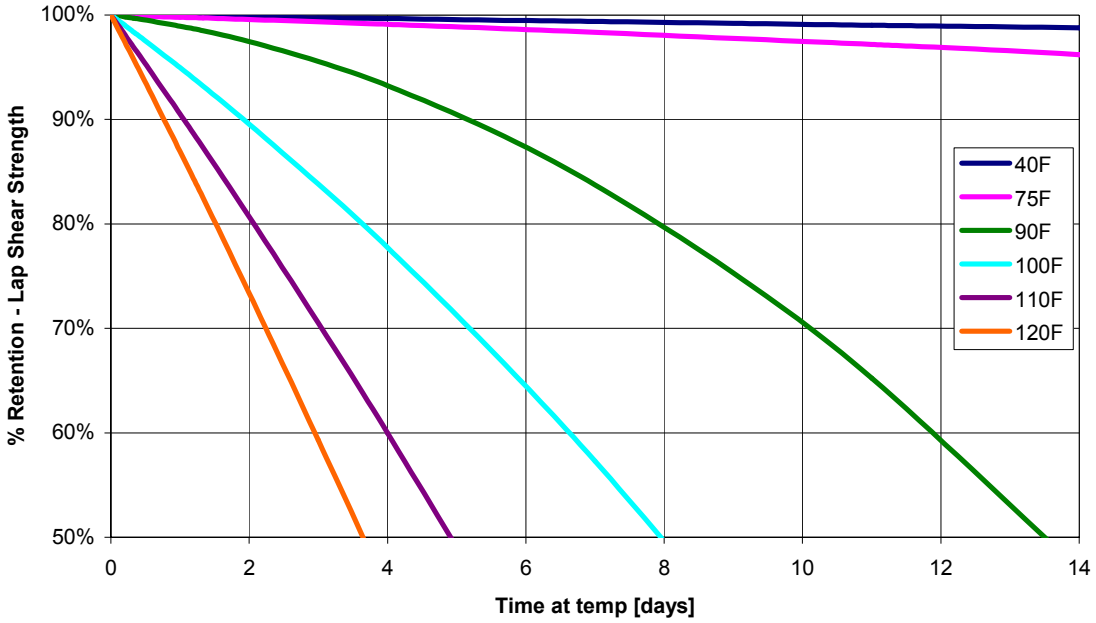

Figure 2 - Primerless Thermabond® stability at temperature (0 - 14 days)

In situations where the material has been exposed to temperatures above ambient, Figure 2 can be used as a guide to determine the likelihood of bond strength reduction. For example, consider material that is exposed to 95°F for 3 days. Interpolating between the 90°F and 100°F curves at 3 days in Figure 2 shows that roughly 90% of the initial lap shear strength is retained. This analysis shows that there is a chance of bond strength reduction, and the material should be evaluated for fitness for use. As another example, consider material that is exposed to 115°F for 4 days. Interpolation between the 110°F and 120°F curves at 4 days shows that only roughly 55% of lap shear strength is retained in this product. This degree of bond strength reduction is significant. Evaluation of the material is likely to show that it is unfit for use, so the material should be discarded without additional testing.

Lastly, it is important that this guide be used in conjunction with robust design and reliability testing. Primerless Thermabond® presents a good solution for a broad range of diverse applications. Examples of application differences include material surface finishes, fabricated size differences, operating temperature ranges, and many others. Arlon has characterized the material stability at various temperatures, but Arlon will not guarantee material suitability in every application.