

Fast-cure silicone adhesives for medical device applications

Medical device manufacturers can benefit from the NuSil® line of fast-cure silicone adhesives to increase throughput and reduce downtime associated with long cure times. NuSil's two-part, platinum catalyzed, addition cure systems cure in a matter of hours and provide excellent mechanical properties including high peel strength. The adhesives can be considered for use in long-term implantable (>29 days) medical device applications, short-term implant (≤29 days) or external applications. They are uniquely formulated to bond silicones to metals, plastics, urethanes, ceramics, glass or other silicones – in many cases without the use of primer.

ADDITION CURE VS. MOISTURE CURE

While addition cure adhesives are designed to cure rapidly with the application of heat, some are uniquely designed to cure in less than 24 hours at room temperature. Unlike moisture cure systems, addition cure systems do not require ambient moisture to cure, making it possible to cure thoroughly in confined spaces and cross-sectional thickness is not limited. Addition cure systems also benefit from no volatile by products or corrosive acids, which are often associated with other silicone adhesive cure systems, therefore exhaust ventilation and substrate consideration may not be required. Additionally, material shrinkage is minimized. The consistency of these adhesives allows them to be easily dispensed from an airless side-by-side kit, eliminating difficulties with mixing and de-airing. Once extruded, addition cure adhesive exhibit similar flow characteristics as typical one part moisture cure adhesive.

Product	Work Time @ 25 °C	Cure Time @ 25 °C	Flow (Slump) Test, inch	Extrusion Rate Prt-A, g/min	Extrusion Rate Prt-B, g/min
MED1-4X13	25 minutes	1.5 hours	0.15	8.54	26.70
MED2-4X13	72 hours	Heat required	1.64	7.84	16.17
MED3-4X13	2 hours	6 hours	0.17	8.45	30.66
MED-1X37	8 minutes (tack-free time)	24-72 hours	0.34	3.06*	n/a

MED-1X37 is a one part moisture cure system.

TABLE 1: Typical application property of addition cure vs moisture cure.

Properties	MED1-4X13	MED2-4X13	MED3-4X13
Min work time	5 minutes	2 hours	1 hour
Typical work time	25 minutes	>72 hours	2 hours
Cure rate @ 40°C	17 minutes	N/A	21 minutes
Cure rate @ 60°C	3 minutes	N/A	13 minutes
Cure rate @ 80°C	<1 minute	6 minutes	3 minutes
Cure rate @ 100°C	<0.5 minute	1 minute	<1 minute
Cure rate @ 120°C	<0.5 minute	<0.5 minute	<0.5 minute

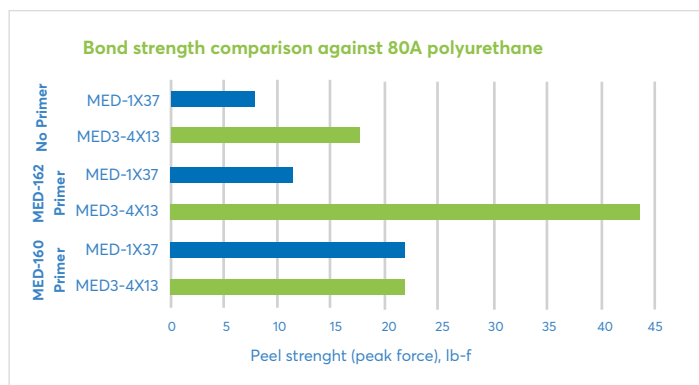
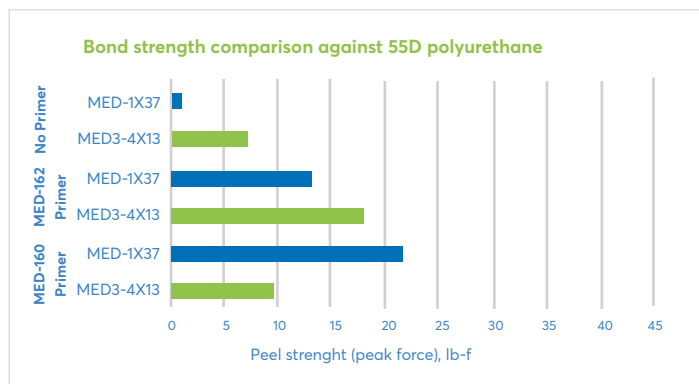
TABLE 2: Cure rate vs. temperature for addition cure adhesive systems.



SUBSTRATE CONSIDERATION

While these adhesives cure in contact with most materials common to biomedical assemblies, exceptions include sulfur cured organic rubbers, latex, chlorinated rubbers, some RTV silicones and un-reacted residues of some curing agents. Some applications may require the use of primer.

Each product is supported with extensive biocompatibility testing conforming to USP Class VI and select ISO-10993 testing requirements. Master Access Files (MAFs) for each of these products have been filed with the U.S. Food and Drug Administration.



To learn more about fast cure silicones, visit:
avantorsciences.com/nusil or contact a NuSil expert at silicone@avantorsciencesgcc.com or + 1 805 684 8780

www.avantorsciences.com/nusil

It is the sole responsibility of each purchaser to ensure that any use of these materials is safe and complies with all applicable laws and regulations. It is the user's responsibility to adequately test and determine the safety and suitability for their applications, and NuSil Technology LLC makes no warranty concerning fitness for any use or purpose.

©2022 Avantor, Inc. All rights reserved. Trademarks are owned by Avantor, Inc., or its affiliates unless otherwise noted.