LOCTITE®

WATERPROOFING SOLUTIONS

for Consumer Electronics

Henkel

Your Total Solutions Provider for Waterproof Consumer Devices

Engineering Support

With unsurpassed development capabilities, engineering expertise and field support personnel, Henkel delivers the know-how to empower customers to improve quality and efficiency, while accelerating innovation.

Design Partnership

An experienced team of engineers and chemistry specialists provides documented design and application support.

Global Capabilities

With an extensive network to support customers' value streams, our broad footprint ensures local access to advanced technologies and knowledgeable service personnel.

Customer Intimacy

Through close collaboration and intimate knowledge of customer applications and processes, Henkel develops high-performance solutions for a competitive edge.

Innovation Leader

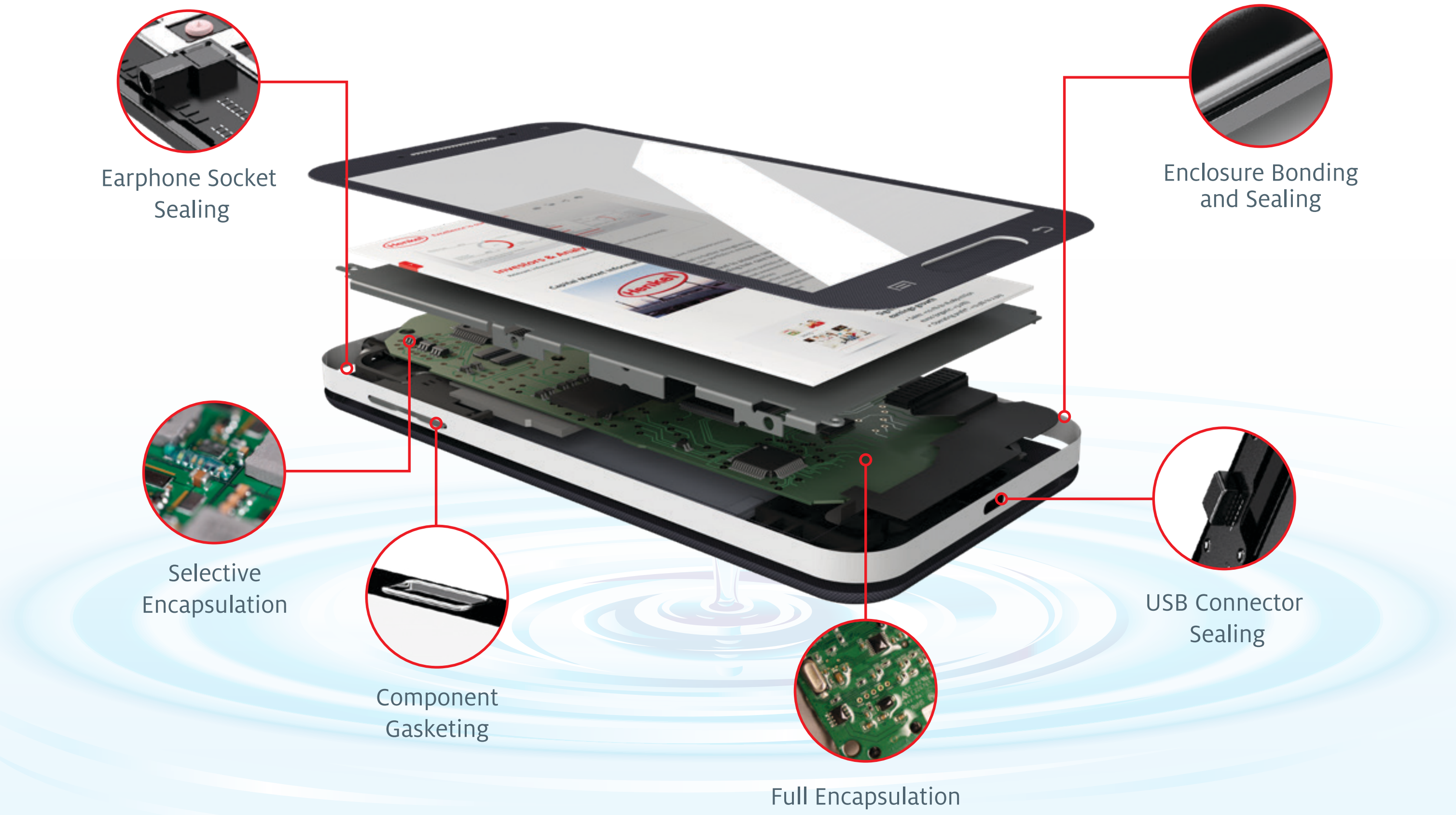
As the innovation leader in sealing, bonding and encapsulation, Henkel delivers solutions to meet design changes and developmental challenges in a dynamic market.

Through close customer partnership, industry experience and engineering support, Henkel facilitates innovative design possibilities for waterproofed consumer devices.

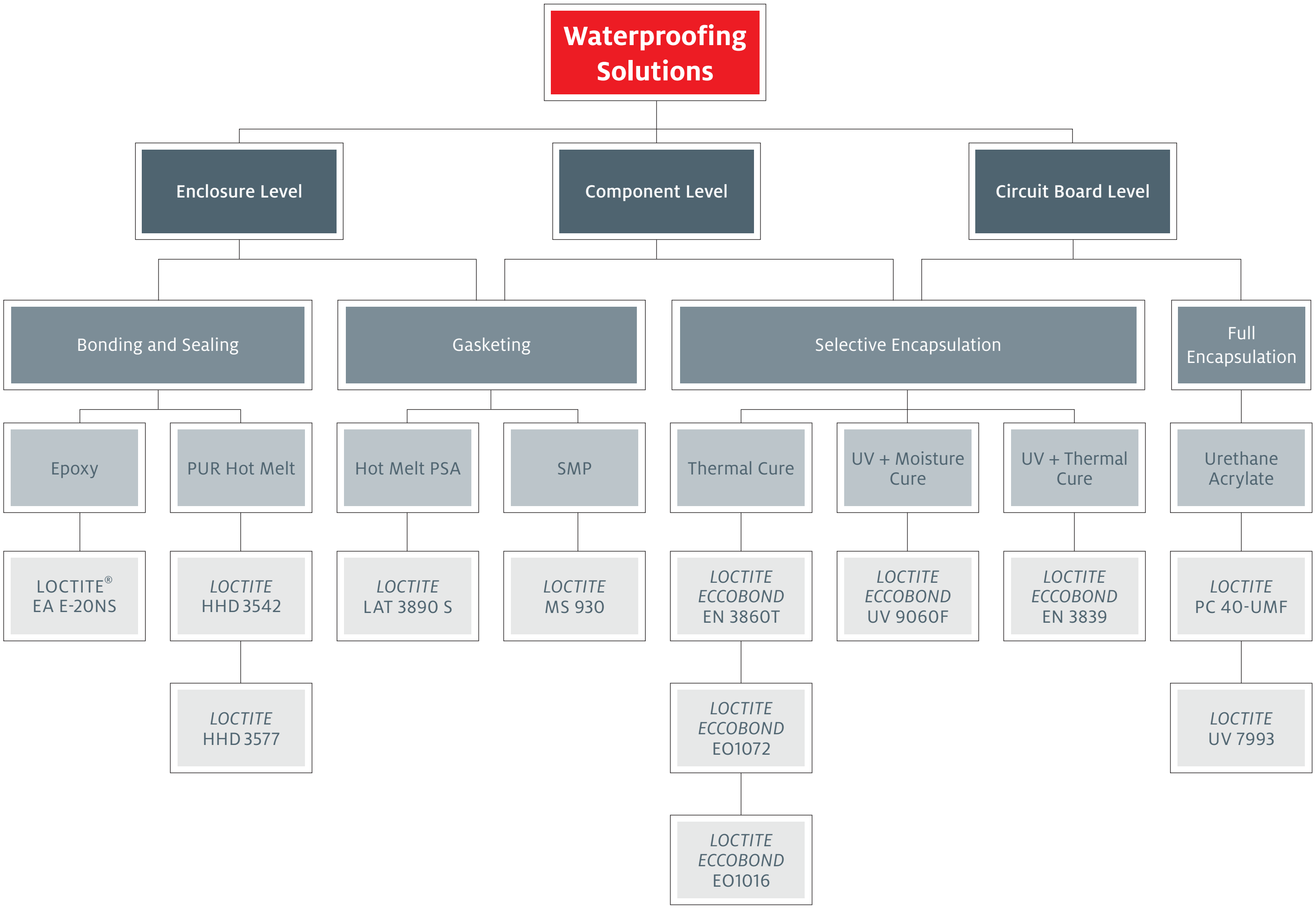
Waterproofing Applications in Action

As dependence on consumer electronics grows, so do expectations for their functionality, longevity and resistance to just about everything from heat to mechanical shock to moisture. Protecting against the damaging effects of external influences that can destroy electronic function is critical to a user's satisfaction with their device. And, it's why today's leading consumer product manufacturers partner with Henkel.

One of the world's top electronic materials innovators, Henkel has developed a complete portfolio of materials that help seal and protect modern consumer devices and systems from the damaging effects of water penetration. Around vulnerable entry points such as the earphone socket, the USB port and the on/off switch, high-performance LOCTITE® sealants and encapsulants safeguard against water entry, helping to preserve electronic integrity should water immersion or exposure occur. Our expertise is also applied to interior printed circuit boards (PCBs) and components coated with Henkel's *LOCTITE* full encapsulation materials, and to enclosure sealing and bonding using *LOCTITE* structural adhesives. With a comprehensive range of chemistry platforms, Henkel offers the most application flexibility for robust waterproofing solutions.

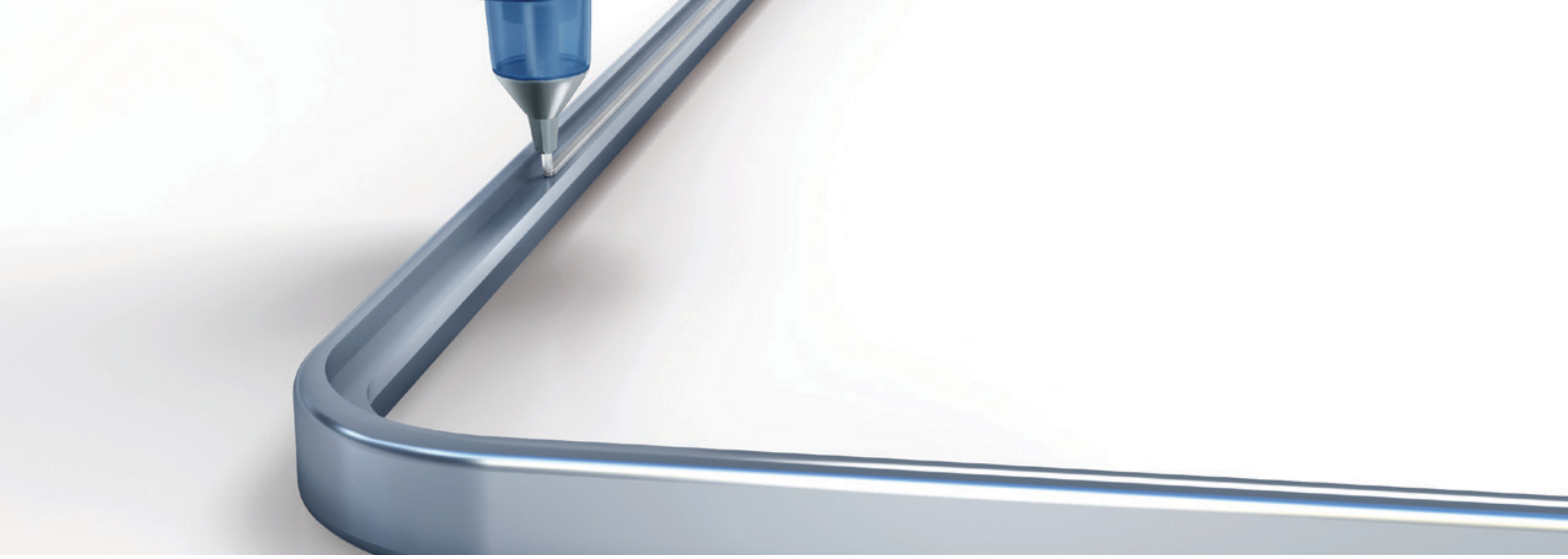


Product Portfolio



- **Waterproofing Solutions**
  - **Enclosure Level**
    - Bonding and Sealing
      - Epoxy
        - LOCTITE® EA E-20NS
      - PUR Hot Melt
        - *LOCTITE* HHD 3542
        - *LOCTITE* HHD 3577
    - Gasketing
  - **Component Level**
    - Gasketing
      - Hot Melt PSA
        - *LOCTITE* LAT 3890 S
      - SMP
        - *LOCTITE* MS 930
    - Selective Encapsulation
  - **Circuit Board Level**
    - Selective Encapsulation
      - Thermal Cure
        - *LOCTITE ECCOBOND* EN 3860T
        - *LOCTITE ECCOBOND* EO1072
        - *LOCTITE ECCOBOND* EO1016
      - UV + Moisture Cure
        - *LOCTITE ECCOBOND* UV 9060F
      - UV + Thermal Cure
        - *LOCTITE ECCOBOND* EN 3839
    - Full Encapsulation
      - Urethane Acrylate
        - *LOCTITE* PC 40-UMF
        - *LOCTITE* UV 7993

Waterproofing Level — IPx Ratings



Bonding and Sealing

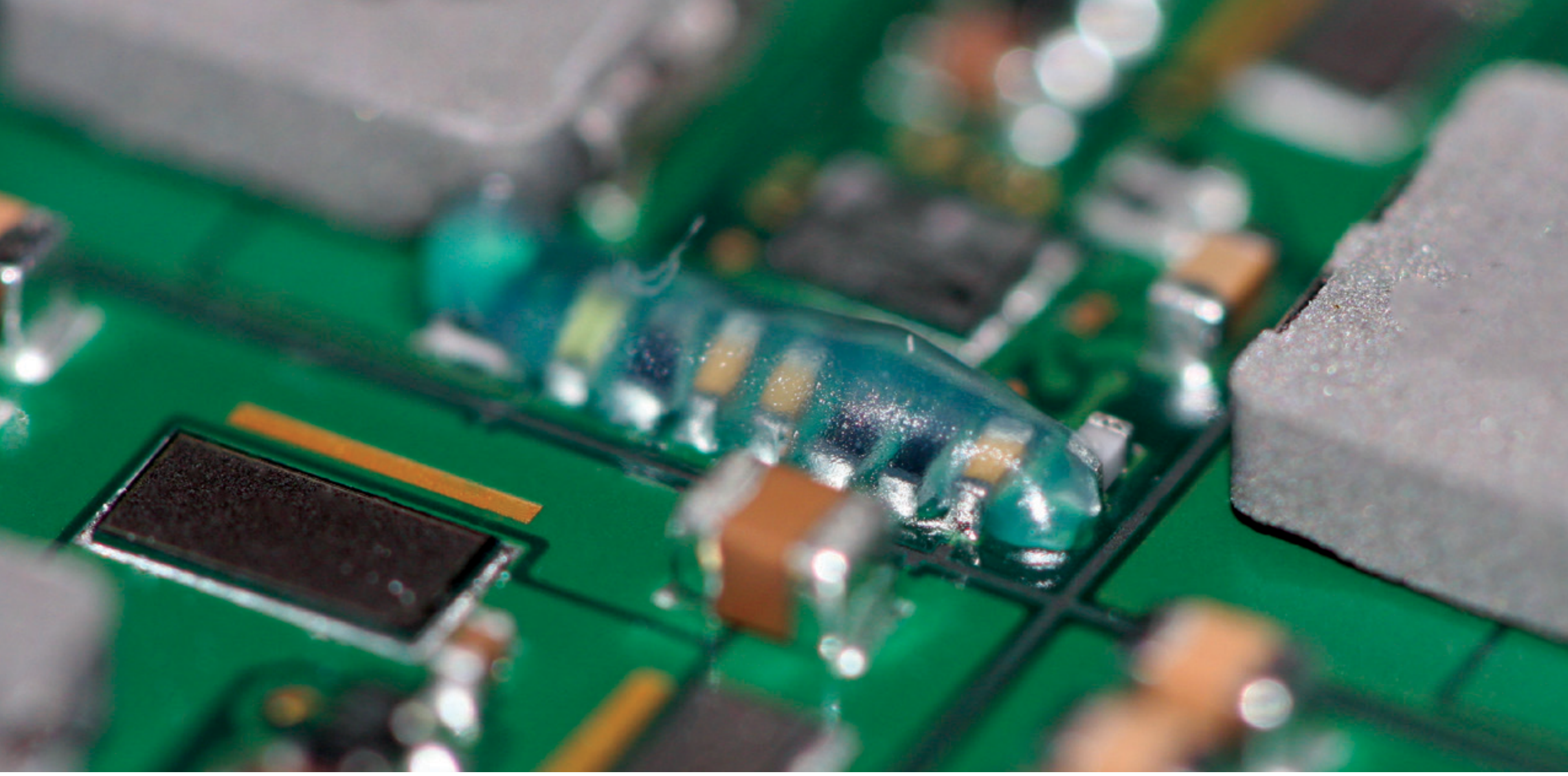
Henkel structural adhesives combine high bond strength with the water-blocking qualities of low shrinkage, dense cross-linking and pressure resistance. Processing is simple: A continuous bead is applied as a formed-in-place gasket to one of the substrates. Following assembly, the adhesive reaches fixture strength in minutes, resulting in a durable, waterproof bond.

Product Name	Key Attributes	Viscosity (cP)	Cure Mechanism	Hardness (Shore D)	Storage Modulus (MPa)	Elongation at Break (%)	Adhesion (MPa)		
							Anodized Aluminum	Glass	Plastic
Epoxy									
LOCTITE EA E-20NS	• Low shrinkage, high density structural adhesive for waterproofing rigid joints • Formed-in-place	125,000	Static mix at room temperature	89	3,370	4	13.8	9.3	9.7
Polyurethane (PUR) Hot Melt									
LOCTITE HHD 3542 *LOCTITE* HHD 3577	• High elongation structural joints that are initially reworkable and cure with high water resistance • Formed-in-place	5,500	Cooling/ Humidity	30	95	860	6.0 – 8.0	6.0 – 8.0	4.0 – 6.0

Gasketing

To allow more production flexibility and reworkability, Henkel also offers materials that enable sealant curing prior to assembly. With precise viscosity, an optimized durometer and a low compression set, Henkel cured-in-place gasketing (CIPG) materials deliver robust water protection.

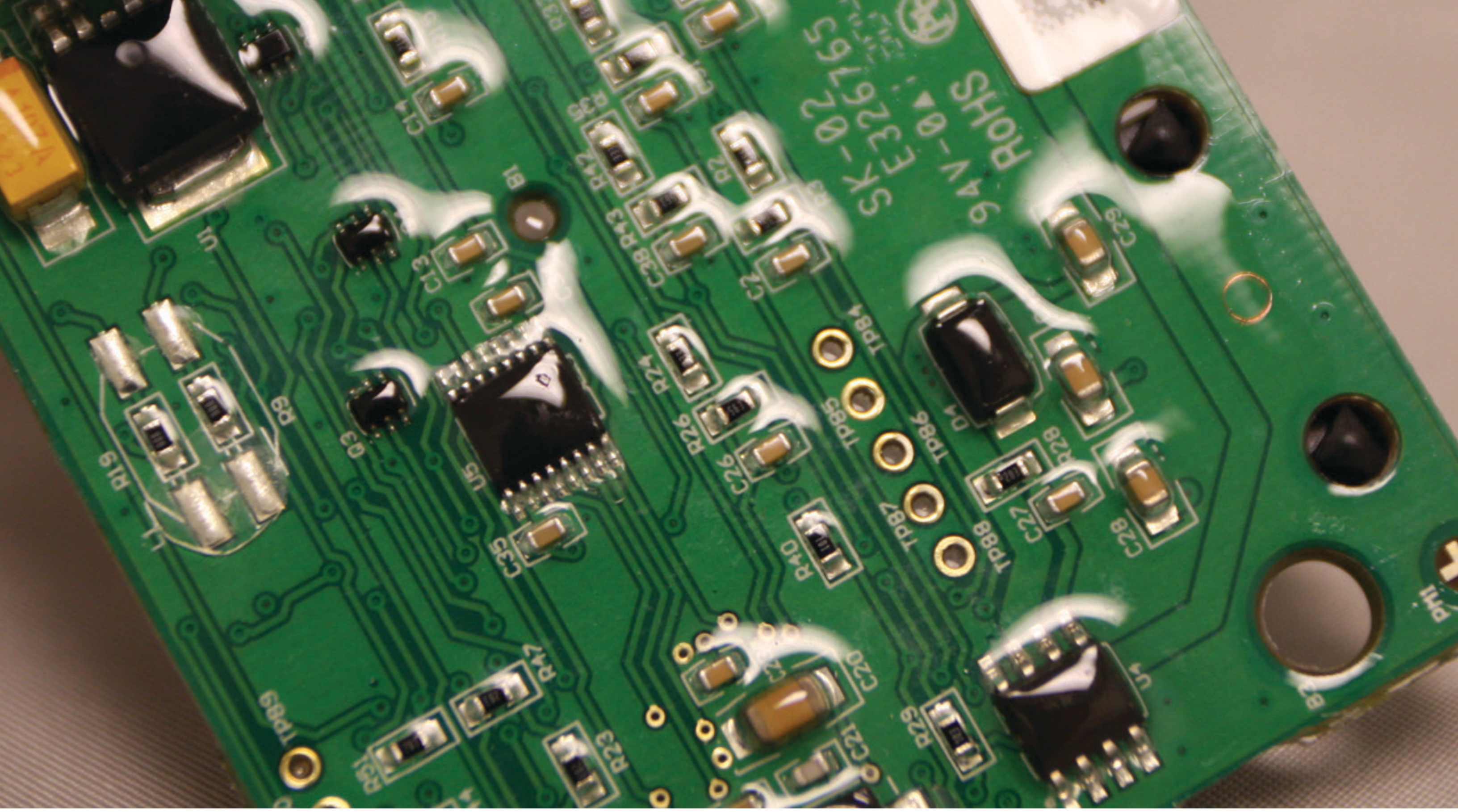
Product Name	Key Attributes	Viscosity (cP)	Cure Mechanism	Hardness (Shore A)	Storage Modulus (MPa)	Elongation at Break (%)	Adhesion (MPa)		
							Anodized Aluminum	Glass	Plastic
Hot Melt Pressure Sensitive Adhesive (PSA)									
LOCTITE LAT 3890 S	• Small beads • Cured-in-place • Reworkable, soft, tacky, dense material for blocking water in compressed joints	7,500	Cooling	50	6.2	1,000	1.0	1.0	0.8
Silane-Modified Polymer (SMP)									
LOCTITE MS 930	• Small to medium beads • Cured-in-place • Low modulus, flexible sealant used for elastic joints • Reworkable replacement for silicone in gasketed joints	175,000	Humidity	25	1.1	490	1.8	1.7	1.3



Selective Encapsulation

At the board level, chips and solder joints are safeguarded against the damaging effects of water and moisture vapor with advanced LOCTITE® encapsulants. Preventing water entry at the connector level – around earphone sockets, USB connection ports and on/off buttons – Henkel encapsulants and sealants provide strong defense against water penetration.

Product Name	Key Attributes	Appearance	Viscosity (cP)	Storage Modulus (N/mm)	Glass Transition Temperature, T_g (°C)	Cure Schedule
Thermal Cure						
LOCTITE ECCOBOND EN 3860T	• One part epoxy • Low viscosity and good flow performance • Achieves waterproof capabilities in connector applications	Black liquid	1,000	1,230	82	10 min. at 130°C
LOCTITE ECCOBOND EO1072	• One part epoxy • Provides physical protection for connectors and sensitive components in handheld devices • Excellent rheology control • High T_g and thermal resistance	Black	80,000	6,700	135	5 min. at 150°C
LOCTITE ECCOBOND EO1016	• One part epoxy • Provides physical protection for connectors and sensitive components in consumer electronics • Excellent rheology control • Flame retardant, UL-tested	Black	58,000	5,880	126	20 min. at 150°C
UV + Moisture Cure						
LOCTITE ECCOBOND UV 9060F	• One part acrylate • Halogen-free • Fast cure • Cures in shadowed areas	Translucent light blue	11,000	2,200	75	25 sec. at 500 mW/cm^2 (365 nm)
UV + Thermal Cure						
LOCTITE ECCOBOND EN 3839	• Flexible, dual cure encapsulant • Provides physical protection and stable electronic performance in temperature, humidity and bias testing • Excellent rheology control	Transparent light blue	7,871	552	28	2,000 mJ/cm^2 at 365 nm + 10 min. at 130°C



Full Encapsulation

From accidental device submersion (IPX 4) to water immersion for 30 minutes (IPX 7) to prolonged immersion (IPX 8), Henkel's portfolio of full encapsulation materials ensures that electrical connections are not impacted; there are no adverse effects on signal strength, antenna capability or acoustic performance.

Product Name	Key Attributes	Operating Temperature (°C)	Viscosity (cP)	Dielectric Strength (KV/mm)	Hardness (Shore D)	Cure Schedule
Urethane Acrylate						
LOCTITE PC 40-UMF	• One component urethane-acrylate • Solvent-free • VOC- and halogen-free • Thermal shock resistant • Easy to spray/dispense (jet capable) • Clear appearance	-40 – 130	250	16.8	80	> 3000 mJ/cm², UVA + 3 day moisture cure
LOCTITE UV 7993	• One component urethane-acrylate • Solvent-free • Good moisture resistance • Excellent chemical resistance • Easy to dispense • Translucent yellow	-40 – 130	120	50	60	> 3000 mJ/cm², UVA + 3 day moisture cure

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