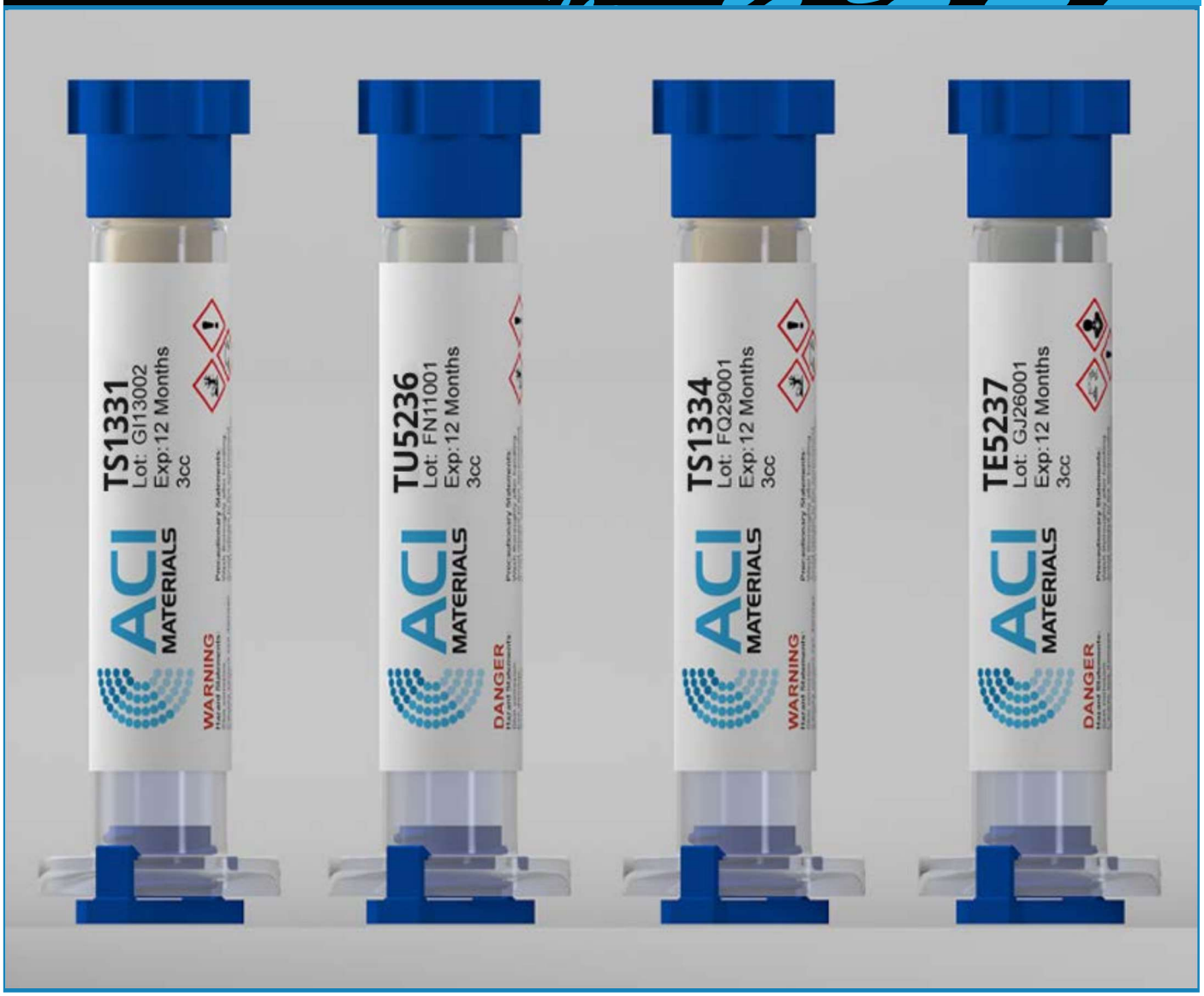
# ACI Data Sheets

**Flexible Conductive and Non-Conductive Adhesive**
**TS1331, TS1334, TU5236 & TE5237 Combination**

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# TS1331

Stretchable Conductive Adhesive

## Product Description

TS1331 is a silver filled, solvent free, one component conductive adhesive that remains stretchable following thermal cure. This conductive adhesive was designed for bonding to flexible substrates and accommodates interface stresses and strains during bending. TS1331 is both electrically and thermally conductive and can be used in a broad range of applications.

## Product Benefits

TS1331 is compatible with flexible systems where interconnect robustness and reliability is challenging. It can be used with high volume automated dispensing processes, and can be cured rapidly with low shrinkage. The cured material displays outstanding thermal and electrical conductivity, with a unique combination of high flexibility, high shear strength, and high adhesion to a broad range of materials. The cured material provides stress relief for bond-ing dissimilar materials in flexible packaging, which enables high reliability performance metrics such as high resistance to shock and cyclic fatigue.

| Typical Properties | |
|---|---|
| Physical State | Paste/Ink |
| Color | Silver |
| Viscosity[1] | |
| 1 $s^{-1}$ | 40 Pa·s |
| 10 $s^{-1}$ | 15 Pa·s |
| 100 $s^{-1}$ | 10 Pa·s |
| Density | 2.8 g/mL |
| Shelf Life at -40°C2 | 12 Months |
| Pot Life[2] | 9-12 hours |
| Weight loss on cure | < 1 % |
| Weight loss @ 300°C TGA | 1% |

[1] Anton Paar MCR302 at 25°C
[2] Storage at below or greater than can adversely affect product properties

| Typical Processing Parameters | |
|---|---|
| Deposition | Syringe |
| Recommended Curing Conditions | |
| 60 minutes | 140°C |
| 30 minutes | 150°C |
| For performance reported, the material was processed at 140°C for 60 minutes. | |

| Typical Performance | |
|---|---|
| Volume Resistivity[3] 140°C for 60 min in box oven | <5.0 x $10^{-4}$ Ω*cm |
| Lap Shear Strength | >1,500 kPa |
| Tg | -10°C |
| Stretch | 50% |

[3] Measured 24 hours after suggested cure cycle.

# TS1334

High Conductivity Stretchable Adhesive

## Product Description

TS1334 is a stretchable adhesive with superior electrical conductivity. It is a silver filled, one component epoxy that can be deposited using stencil, syringe, or jet dispensing. The adhesive was designed for bonding components to compliant substrates and remains stretchable following thermal cure. This highly compliant material lowers the stress risers at the bonded interface and accommodates bending and flexing in a variety of applications

## Product Benefits

TS1334 is compatible with flexible and stretchable systems where high electrical conductivity is required. This stretchable conductive adhesive accommodates bending and stretching along the bond line and improves interconnect robustness and reliability. TS1334 can be deposited via stencil, syringe, or jet dispensing and cures with low shrink-age. The combination of high electrical conductivity, high shear strength, and high adhesion to a broad range of materials makes it a good choice for bond-ing in many flexible and stretchable applications. It is also appropriate for bonding rigid components in packages with large thermally induced strains.

## Typical Properties

| | |
|---|---|
| Physical State | Paste/Ink |
| Color | Silver |
| Viscosity[1] | |
| 1 $s^{-1}$ | 100 Pa·s |
| 10 s-[1] | 27 Pa·s |
| 100 $s^{-1}$ | 12 Pa·s |
| Density | 3.2 g/mL |
| Shelf Life at -40°C2 | 12 Months |
| Pot Life[2] | 12-14 hours |
| Weight loss on cure | < 1 % |
| Weight loss @ 300°C TGA | < 3% |

[1] Anton Paar MCR302 at 25°C
[2] Storage at below or greater than can adversely affect product properties

## Typical Processing Parameters

| | |
|---|---|
| Deposition | Stencil / Syringe / Jet |
| Recommended Curing Conditions | |
| 60 minutes | 140°C |
| 30 minutes | 150°C |

For performance reported, the material was processed at 140°C for 60 minutes.

## Typical Performance

| | |
|---|---|
| Volume Resistivity[3] 140°C for 60 min in box oven | < 2.0 x $10^{-4}$ Ω*cm |
| Lap Shear Strength | > 1,500 kPa |
| Tg | -10°C |
| Stretch | Up to 40% |

[3] Measured 24 hours after suggested cure cycle.

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# TU5236

Non-Conductive Stretchable Adhesive

## Product Description

TU5236 is a stretchable non-conductive epoxy used to bond components in flexible and stretchable systems and to manage thermal expansion mismatches in rigid packaging solutions. The NCA can be used in concert with ACI's conductive adhesives, TE133X series, to create an effective surface mount attachment on flexible and stretchable sub-strates. It can be used with traditional deposition processes and cures with low shrinkage. TU5236 exhibits a unique combination of high compliance, high shear strength, and high adhesion to a broad range of materials.

## Product Benefits

TU5236 is a filled non-conductive epoxy used to bond components in flexible and stretchable systems and to manage thermal expansion mismatches in rigid packaging solutions. It can be used with high volume dispensing processes, and cures with low shrinkage. The NCA exhibits a unique combination of high compliance, high shear strength, and high adhesion to a broad range of materials.

| Typical Performance | |
|---|---|
| Lap Shear Strength | > 1,500 kPa |
| Tg | - 10 °C |
| Stretch | 50% |

| Typical Properties | |
|---|---|
| Physical State | Paste |
| Color | Yellow-White |
| Viscosity[1] | |
| 1 $s^{-1}$ | 37 Pa·s |
| 10 $s^{-1}$ | 12 Pa·s |
| 100 $s^{-1}$ | 8 Pa·s |
| Density | 1.1 g/mL |
| Percent Solids | >97% |
| Shelf Life at -40°C[2] | 12 Months |
| Pot Life: | 14 – 16 hours |
| Weight Loss on Cure | <2% |
| Weight Loss at 300°C TGA | <3% |

[1] Anton Paar MCR302 at 25 °C
[2] Storage at different temperatures can adversely affect properties

| Typical Processing Parameters | |
|---|---|
| Deposition | Syringe \ Screen \ Stencil |
| Recommended Curing Conditions | |
| 60 minutes | 140 °C |
| 30 minutes: | 150 °C |

For all physical properties reported, the materials was processed at 140 °C for 60 minutes.

# TE5237

Stretchable Glob Top Encapsulant

## Product Description

TE5237 is an epoxy based glob top encapsulant that remains stretchable following thermal cure. The encapsulant can be used in combination with ACI's stretchable ECAs and NCAs for interconnect solutions. The material can also be used as a stand-alone to electrically insulate and protect components mounted to flexible and stretchable systems, or for rigid systems to manage stresses arising from large thermal expansion mismatches.

## Product Benefits

TE5237 is a filled non-conductive epoxy used to encapsulate components in flexible and stretchable systems and to manage thermal expansion mismatches in rigid packaging solutions. It can be used with high volume dispensing processes and cures with low shrinkage. The encapsulant exhibits a unique combination of high compliance and high adhesion to a broad range of materials, including plastics, metals, glass and ceramics.

| Typical Performance | |
|---|---|
| Lap Shear Strength | > 1,500 kPa |
| Tg | - 10 °C |
| Stretch | 50% |

| Typical Properties | |
|---|---|
| Physical State | Paste |
| Color | Yellow-White |
| Viscosity[1] | |
| 1 $s^{-1}$ | 37 Pa·s |
| 10 $s^{-1}$ | 12 Pa·s |
| 100 $s^{-1}$ | 8 Pa·s |
| Density | 1.1 g/mL |
| Percent Solids | >97% |
| Shelf Life at -40°C[2] | 12 Months |
| Pot Life | 14 – 16 hours |
| Weight Loss on Cure | <2% |
| Weight Loss at 300°C TGA | <3% |

[1] Anton Paar MCR302 at 25 °C
[2] Storage at different temperatures can adversely affect properties

| Typical Processing Parameters | |
|---|---|
| Deposition | Syringe \ Screen \ Stencil |
| Recommended Curing Conditions | |
| 60 minutes | 140 °C |
| 30 minutes: | 150 °C |

For all physical properties reported, the materials was processed at 140 °C for 60 minutes.

## Contact ACI

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## Caution

Proper industrial safety precautions should be exercised in using these products. Use with adequate ventilation. Avoid prolonged contact with skin or inhalation of any vapors emitted during use or heating of these compositions. The use of safety eye goggles, gloves or hand protection creams is recommended. Wash hands or skin thoroughly with soap and water after using these products. Do not eat or smoke in areas where these materials are used. Refer to appropriate MSDS sheet.

## Disclaimer

The product information and recommendations contained herein are based on data obtained by tests we believe to be accurate, but the accuracy and completeness thereof is not guaranteed. No warranty is expressed or implied regarding the accuracy of these data, the results obtained from the use hereof, or that any such use will not infringe any patent. Applied Cavitation, Inc. assumes no liability for any injury, loss, or damage, direct or consequential arising out of its use by others. This information is furnished upon the condition that the person receiving it shall make their own tests to determine the suitability thereof for their particular use, before using it. User assumes all risk and liability whatsoever in connection with their intended use. Applied Cavitation's only obligation shall be to replace such quantity of the product proved defective.

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