

Solution Products


- ・弾性粘接着技術
- ・高強度エンジニアリング接着技術

お問合せ先 Contact information

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| | | | | | |
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| | | | |
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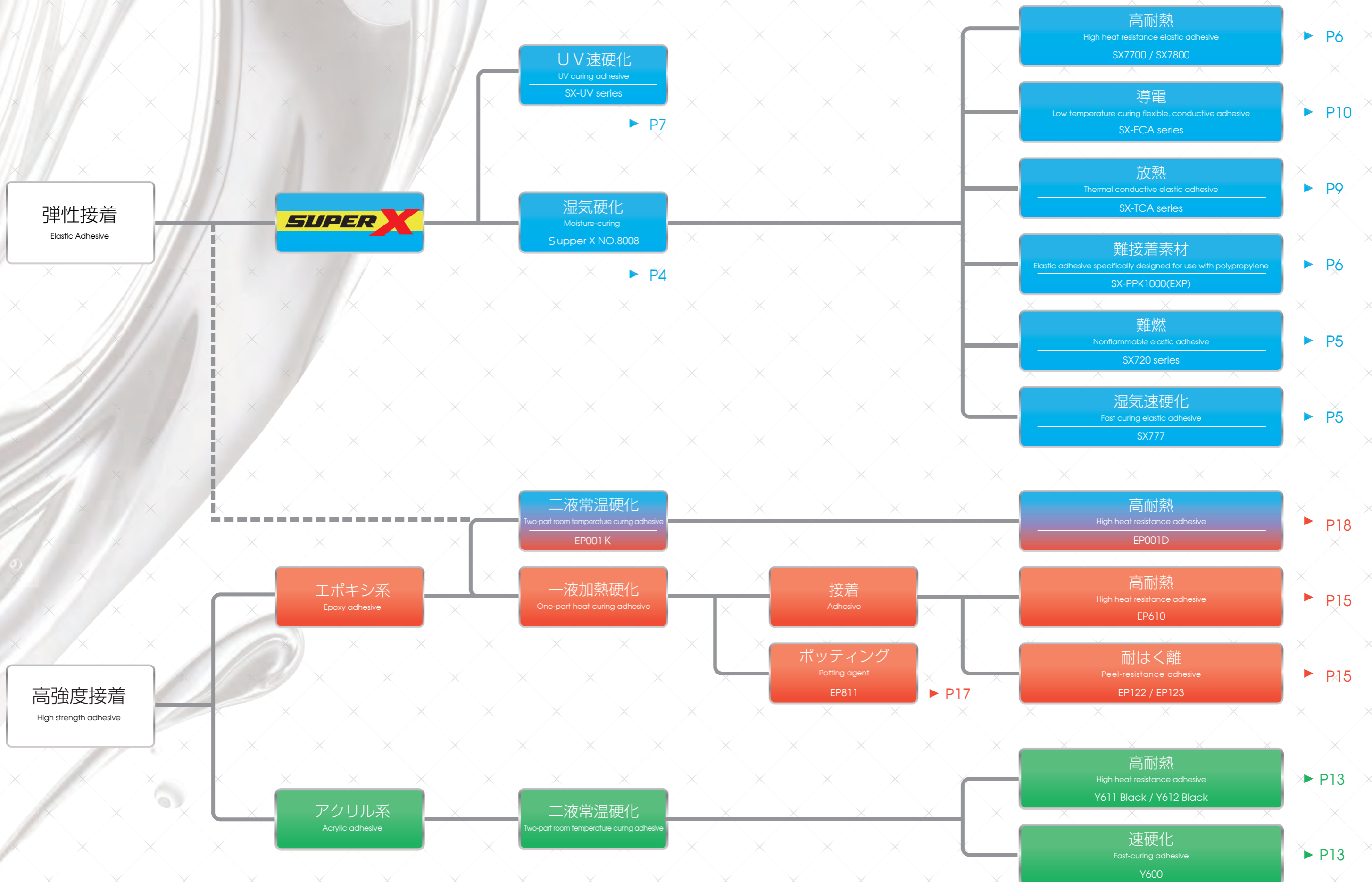
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INDEX



強い接着から、剥がれにくい接着へ

Shift toward a flexible and tough adhesives from merely strong adhesives.

●弾性接着剤とは What is elastic adhesive?

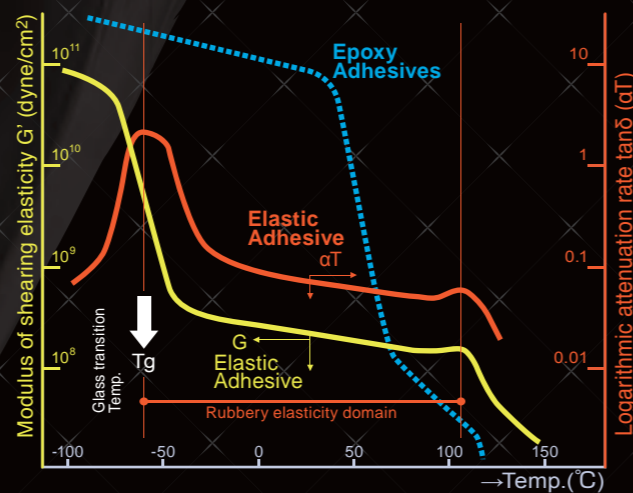
弾性接着剤とは、硬化後にゴムの様な弾性体となる性状をもつ接着剤を、セメダインが新カテゴリとして提唱したものです。これまでの「剛」の物性を高める「硬くて強い接着剤」という考え方を180°転換して「しなやかで剥がれにくい接着剤」という「柔」の考え方で開発した接着剤です。

Elastic adhesive is a new category of adhesive, developed by Cemedine, which hardens into a rubber-like, elastic state. It represents a total about-face from the conventional approach of "hard, strong adhesive" that focuses on greater rigidity. Instead, it was developed with the concept of suppleness, as a "flexible, peel-resistant adhesive".

弾性接着剤のガラス転移温度(Tg)は、右図のように-60°Cです。また弾性接着材の硬化皮膜は、接着剤接合の一般的な使用温度範囲より厳しい温度範囲の-60~100°Cで柔軟なゴム状弾性体を示し、各種接着特性に良好な結果をもたらします。

As shown at right, the glass transition temperature (Tg) of this elastic adhesive is -60°C. The cured film of the elastic adhesive exhibits rubber-like elasticity between -60 and 100°C, a greater temperature range than the typical usage temperature range of adhesive bonds, and it offers exceptional adhesive properties.

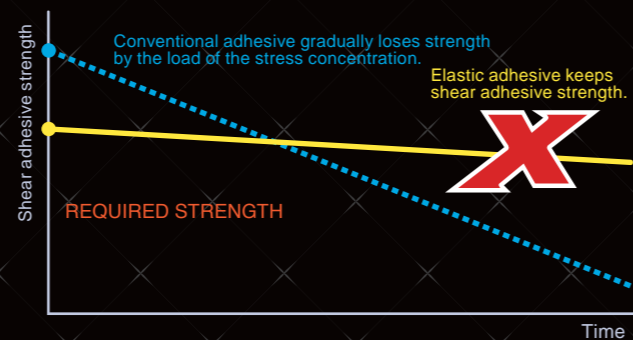
Torsional feel attenuation type viscoelastic measurement data



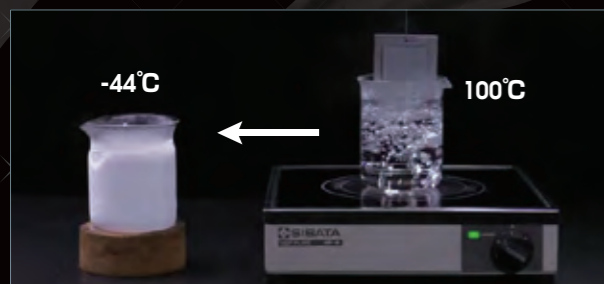
●Extreme condition: e.g., heat cycle test

弾性接着剤は初期から十分な接着力を持っています。そして、非常に高い柔軟性を保つことにより、硬化時に起きる「硬化収縮歪(一次歪)」や「外部からの圧力」「内部応力歪(二次歪)」を、接着層で吸収し分散させます。そのため接着界面にかかる複合応力の変化を抑え、長期間に渡り、初期の接着強度を維持します。

The elastic adhesive immediately offers sufficient adhesive strength. Moreover, it absorbs and disperses curing contraction strain (primary strain), outside stress, and internal stress strain (secondary strain) during hardening by maintaining very high flexibility. It thereby minimizes compound stress changes acting on the adhesion surface, retaining its initial adhesive strength over a long period of time.



●Heat shock test



The test samples were placed in a cold environment, at -44°C, after being placed in hot water of 100°C.



Elastic Adhesives
接着剤の弾性が歪みを吸収するので、ヒビ割れ・剥離が起きない。
The elasticity absorbs strain, preventing cracking and separation.



Conventional Adhesives (Hard type)
温度変化によるそれぞれの変形量の違いを吸収できず割れ・剥離が起きる。
Cracking and separation occur when the adhesive cannot absorb the gaps of material deformations produced by temperature changes.

標準品

弾性接着剤

Elastic Adhesive

SUPER X

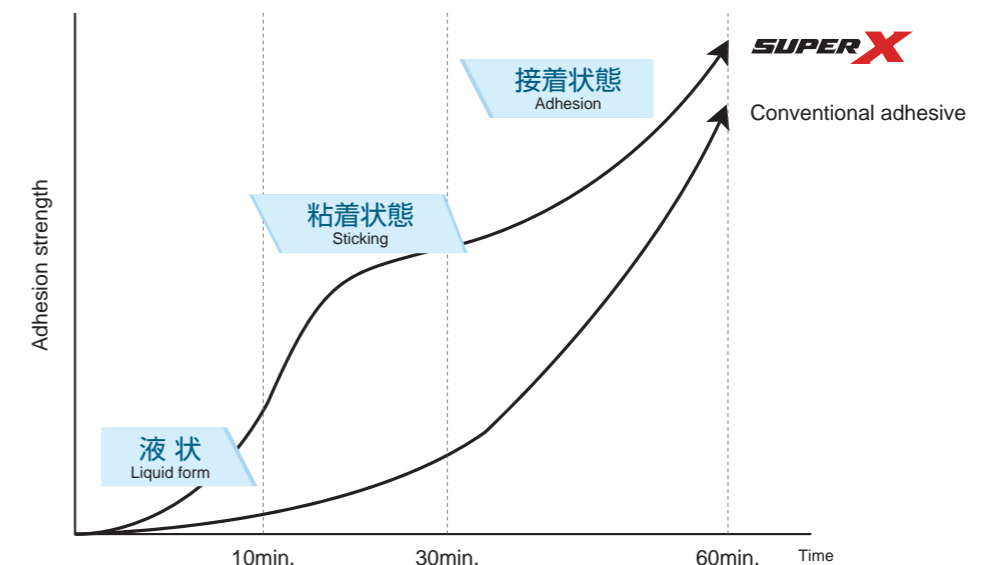
No.8008

特長
Feature

- 塗布後、空気中の水分に触れることで硬化が始まります。一液タイプのため、混合の手間がありません。
- 無溶剤型で安全に簡単に接着することができます。
- 各種金属、プラスチック、ゴム、セラミック等の広範囲な材料に対して、良好な接着性を示します。
- 幅広い温度域(-60°C~120°C)で良好な柔軟性と接着耐久性を示します。
- 電子部品に有害な低分子シロキサン化合物を含んでいません。
- After application, the adhesive reacts with trace amounts of moisture in the air to cure. It is a one-part adhesive, so no mixing is required.
- This non-solvent based adhesive is safe and easy to use.
- Excellent adhesion to a wide range of materials, including various metals, plastics, rubbers, and ceramics.
- Excellent flexibility and long-lasting adhesion in a wide range of temperatures (-60°C to 120°C).
- Since it does not contain low-molecular cyclic siloxane, it will not cause electric contact faults.



●硬化プロセス Process image



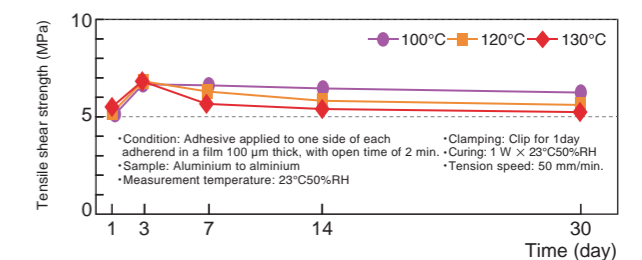
●接着性能 Adhesive property

| Substrate | Tensile shear strength (MPa) |
|------------------|------------------------------|
| Al | 4.3 CF |
| Cu | 3.6 CF |
| Mild steel plate | 3.3 CF |
| SUS | 2.2 AF |
| ABS | 3.1 CF |
| Bakelite | 4.4 CF |
| FRP | 2.9 CF |
| PA6 | 3.3 CF |
| PAR | 1.1 AF |
| PC | 3.3 CF |
| PET | 2.2 CF3AF7 |
| PMMA | 3.2 CF |
| PP | 2.8 CF5AF5 ※1 |
| PPO | 3.2 CF |
| PPS | 1.6 AF |
| PS | 2.4 C5A5 |
| PVC | 3.1 CF |
| Plywood | 3.6 CF |
| Slate | 1.0 MF |

※Curing condition: 1 W x 23°C50%RH
 ※Tension speed: 50 mm/min.
 ※Open time: 2 min.
 ※1Primer(Cemedine PP-7F) to be used.
 ※AF: Adhesive Failure, CF: Cohesion Failure, MF: Material Failure

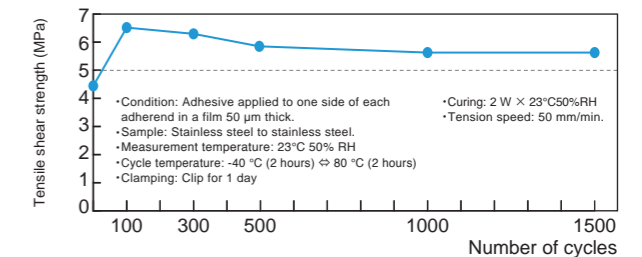
●熱老化後の引張りせん断接着強さ

Tensile shear adhesion strength after heat aging



●冷熱繰返し後の引張りせん断接着強さ

Tensile shear adhesion strength after thermal cycling



湿気速硬化

速硬化形弾性接着剤

Fast Curing Elastic Adhesive

SuperXG No.777



特長
Feature

- 短時間接着ニーズに対応し、さらに速硬化性を高めた常温硬化形の弾性接着剤です。
- This elastic adhesive has even quicker room-temperature curing characteristics to meet fast bonding needs.

性状性能 Property

| ITEM | DATA | | | NOTE |
|------------------------------|-------------------------|-------|-------|----------------------------|
| | Clear | White | Black | |
| Viscosity (Pa·s/23°C) | 76 | 82 | 83 | B-type rotatory viscometer |
| Density (g/cm ³) | 1.02 | 1.14 | 1.14 | JIS K 6833-1 |
| Skin over time (min) | 3.5 | 2.5 | 2.5 | 23°C50%RH |
| Hardness | 60 | 58 | 58 | Shore A |
| Film property | Breaking strength (MPa) | 3.7 | 3.4 | JIS K 6251 |
| | Elongation at break (%) | 110 | 120 | JIS K 6251 |

温度別表面硬化性 Surface-curing properties by temperature

| Temp. | Skin over time (min) | |
|-------|----------------------|-------------|
| | Clear | White/Black |
| 5°C | 14.0 | 9.0 |
| 10°C | 10.0 | 7.0 |
| 23°C | 3.5 | 2.5 |
| 30°C | 3.0 | 1.3 |
| 40°C | 2.0 | 1.0 |

接着性能 Adhesive property

| Substrate | 180° peel strength (N/25 mm) | |
|--------------------|------------------------------|-------------|
| | Clear | White/Black |
| PVC | 61.2 | 34.5 |
| PC | 55.2 | 39.8 |
| PS | 55.2 | 34.1 |
| ABS | 54.5 | 34.7 |
| PMMA | 55.2 | 35.5 |
| PA6 | 32.5 | 42.2 |
| SPCC | 62.5 | 44.6 |
| Al | 61.2 | 47.4 |
| PP(PP-7F) × canvas | 16.8 | 34.3 |

試験条件 ※Curing condition : 1W × 23°C50%RH
※Adhesive thickness : 200 μm ※Substrate × Canvas

高耐熱

高耐熱弾性接着剤

Highly heat-resistant elastic adhesive

SX7700 / SX7800

〈受注生産品〉

〈開発品〉

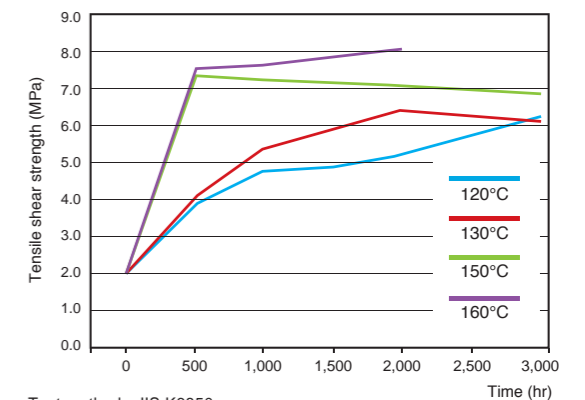
特長
Feature

- 150°Cの高耐熱タイプの為、過酷な温度環境下でも安定した接着性を維持します。
- 接点障害の原因となる低分子シロキサン化合物を含有していません。
- エンジニアプラスチックほか、さまざまな材料への良好な接着性を有します。
- 環境に配慮した無溶剤タイプであり、安全に作業ができます。
- This highly heat-resistant adhesive can be used at temperatures of up to 150°C, maintaining stable adhesive properties even in harsh temperature environments.
- Contains no low-molecular siloxanes, which can cause electrical contact failure.
- These adhesives have good adhesion to various materials and some engineering plastics.
- Environmentally friendly, solvent-free adhesive that is safe to work with.

性状性能 Property

| ITEM | DATA | | NOTE | |
|---------------------------------------|-------------------------|--------|----------------------------|------------|
| | SX7700 | SX7800 | | |
| Appearance | Black | White | Visual check | |
| Viscosity (Pa·s/23°C) | 22 | 80 | B-type rotatory viscometer | |
| SVI | 2.8 | 2.8 | | |
| Density (g/cm ³) | 1.1 | 1.2 | JIS K 6833-1 | |
| Skin over time (min) | 10 | 15 | 23°C50%RH | |
| Hardness | 55 | 40 | Shore A | |
| Liner expansion coefficient (ppm/K) | 281 | 350 | TMA method | |
| Film property | Breaking strength (MPa) | 0.6 | 1.1 | JIS K 6251 |
| | Elongation at break (%) | 90 | 100 | JIS K 6251 |
| Tensile shear adhesive strength (MPa) | PA6 | 1.2CF | 1.6CF | JIS K 6850 |
| | PC | 1.7CF | 1.4CF | JIS K 6850 |
| | SPCC | 2.1CF | 2.4CF | JIS K 6850 |

熱老化強度 Heat aging resistance



Test method : JIS K6850
※Open time : 2 min
※Curing condition : 1W × 23°C50%RH
※Tension speed : 50 mm/min

難燃

電子部品用難燃性弾性接着剤

Nonflammable elastic adhesive for use with electronic components

SX720 series

特長
Feature

- 電機部品用難燃タイプの弾性接着剤です。UL94V-0認定
- コンデンサー、コイルなどの回路基板の固定、電源やトランス等の絶縁シール、電子部品の防水シールなどの難燃接着・シール用途に対応する弾性接着剤です。
- 電子部品に有害な低分子シロキサン化合物を含んでいません。
- Nonflammable type elastic adhesive which is convenient for use with electrical parts.
- Elastic adhesive suitable for use in nonflammable bonding and sealing applications such as securing capacitors, coils, and other components to circuit boards, forming insulating seals for power supplies, transformers, and other components, and forming waterproof seals for electronic components.
- Contains no low-molecular silicones, which are damaging to electronic components.



性状性能 Property

| ITEM | DATA | | | | NOTE | |
|--------------------------------------|-------------------------|---------|-------------|---------|----------------------------|------------|
| | SX720W | SX720WH | SX720B | SX720BH | | |
| Appearance | White paste | | Black paste | | Visual check | |
| Viscosity (Pa·s/23°C) | 42 | 85 | 42 | 82 | B-type rotatory viscometer | |
| Density (g/cm ³) | 1.59 | 1.58 | 1.59 | 1.58 | JIS K 6833-1 | |
| Skin over time (min) | 9 | 7 | 9 | 7 | 23°C50%RH | |
| Hardness | 78 | 78 | 78 | 78 | Shore A | |
| Film property | Breaking strength (MPa) | 3.8 | 3.6 | 3.8 | 3.6 | JIS K 6251 |
| | Elongation at break (%) | 100 | 50 | 100 | 50 | JIS K 6251 |
| Volume resistivity (Ω·cm) | 3.0E+12 | 2.0E+12 | 1.5E+12 | 1.6E+12 | | |
| Linear expansion coefficient (ppm/K) | 120 | 120 | 120 | 120 | TMA method | |
| Dielectric constant(100 Hz) | 6.3 | 6.0 | 7.0 | 6.2 | | |
| Dielectric loss tangent(100 Hz) | 0.4 | 0.3 | 0.4 | 0.3 | | |
| Thermal conductivity (W/m·K) | 1.0 | 1.0 | 1.0 | 1.0 | | |

難接着素材

ポリプロピレン専用弾性接着剤

Elastic adhesive specifically designed for bonding polypropylene.

SX-PPK1000 (EXP)

特長
Feature

- 難接着素材であるポリプロピレン樹脂への優れた接着性を示します。
- プライマー処理が不要で接着が可能であり、作業環境・作業効率が向上します。
- 柔軟性及び追従性に優れた硬化フィルムを有しているため、良好な難接着性を発現します。
- ポリプロピレン樹脂をはじめ、様々な被着材に対して優れた接着性を有します。
- 熱歪を緩和できる弾性接着剤であるため、異種材料の接着ができます。
- Excellent adhesion to polypropylene resin, which is normally adhesive-resistant.
- Does not require primer application, improving the work environment and increasing work efficiency.
- Designed for cured film having high flexibility and high followability.
- Excellent adhesion to polypropylene resin and various other materials.
- This is an elastic adhesive which can ease thermal stress caused by a difference in thermal expansion coefficient among different types of materials.



性状性能 Property

| ITEM | DATA | | NOTE |
|------------------------------|--------------------------------|--------------|----------------------------|
| | Slightly yellowish white paste | Visual check | |
| Appearance | | | Visual check |
| Viscosity (Pa·s/23°C) | 120 | | B-type rotatory viscometer |
| Density (g/cm ³) | 1.23 | | JIS K 6833-1 |
| Skin over time (min) | 15 | | 23°C50%RH |
| Hardness | 15 | | Shore A |
| Film property | Breaking strength (MPa) | 1.2 | JIS K 6251_No.2 dumbbell |
| | Elongation at break (%) | 875 | JIS K 6251_No.2 dumbbell |

接着性能 Adhesive property

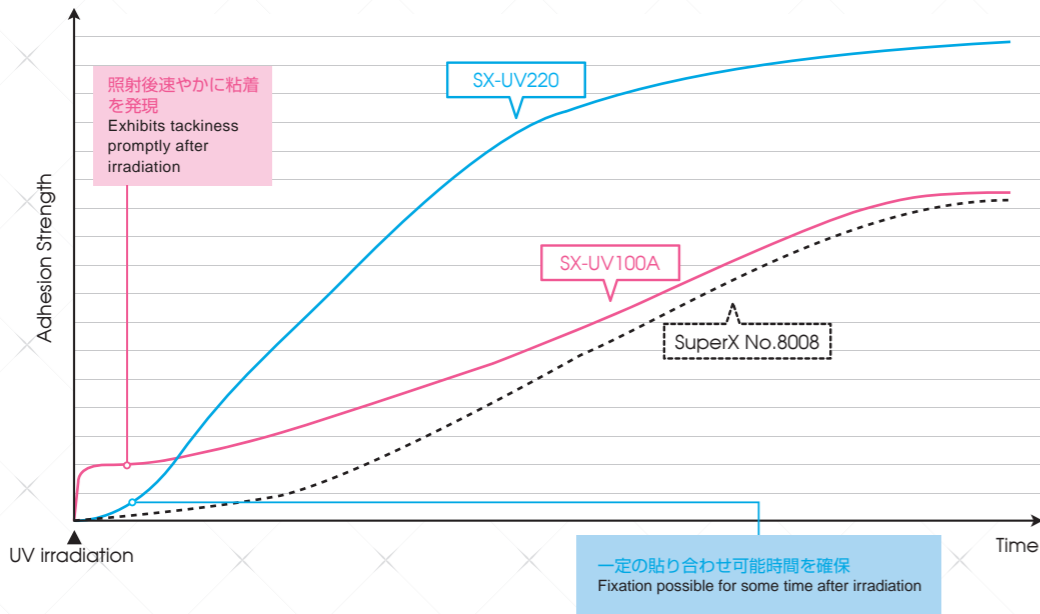
| Tensile shear strength (MPa) | | 180° degree peel strength (N/25mm) | |
|------------------------------|----------------|------------------------------------|-------------|
| PP × substrate | DATA | Canvas × substrate | DATA |
| PP | 1.4 CF5AF5 | PP | 75.3 CF7AF3 |
| PP (10wt% TALC) | 1.6 CF | PP (10wt% TALC) | 93.1 CF3AF7 |
| PC | 1.4 CF9AF1(PP) | ABS | 85.3 CF |
| ABS | 1.4 CF5AF5(PP) | PMMA | 90.9 CF |
| PMMA | 1.6 CF8AF2(PP) | | |
| AL | 1.4 CF8AF2(PP) | | |

Curing condition : 1W×23°C50%RH
Adherends : Polypropylene (Homopolymer) × various materials
Application area : 25 mm × 25 mm
Coating quantity : Two-sided coating with each side for approximately 100μm
Open time : 5 min (10 minutes for metal and Polypropylene)
Pressing : 2 pinches
Tension speed : 50 mm/min
Destruction State : Confirmation by seeing
※AF: Adhesive Failure, CF: Cohesion Failure

UV速硬化

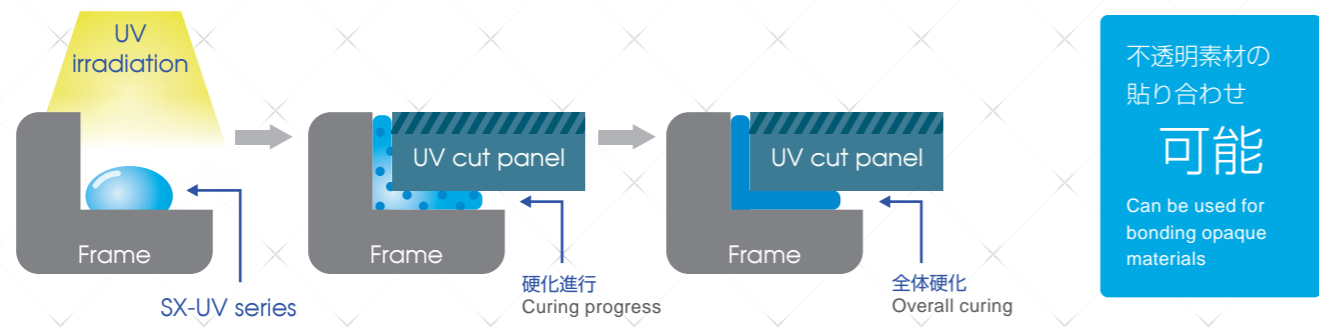
UV硬化形接着剤 UV curing adhesive

SX-UV series



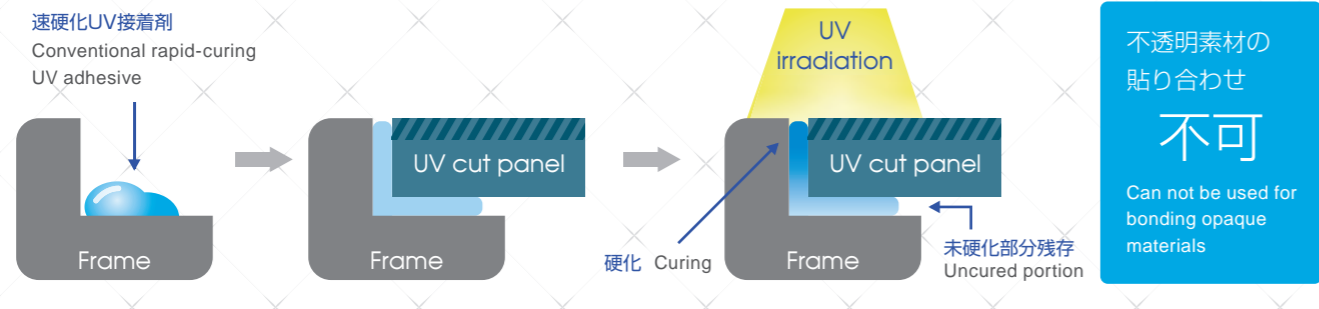
当社のご提案 Our proposal

UV照射後張り合わせ Setting after UV exposure



従来方法 Conventional rapid-curing UV adhesive

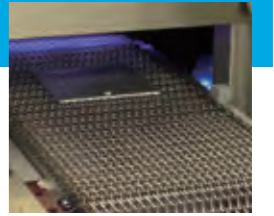
張り合わせ後UV照射 UV irradiation after setting



UV+湿気硬化
(Two step)

UVトリガー形弾性接着剤 UV-triggered elastic adhesive

SX-UV100A



特長 Feature

- UV照射後、ゲル状に硬化して弱粘着を発現し、仮固定が可能です。その後ゆるやかに最終硬化します。
- Cures into a gel when irradiated with UV, exhibiting tackiness and allowing temporary fixation. Gradually cures to final hardness.

性状性能 Property

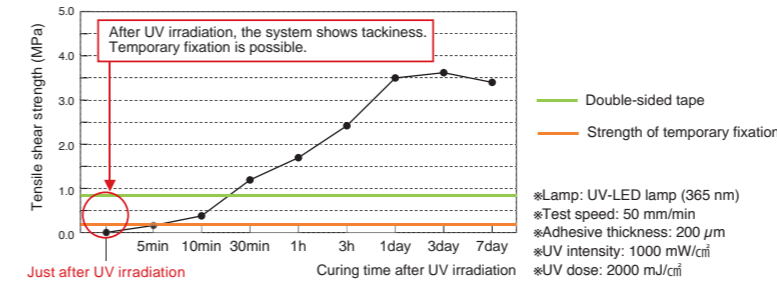
| ITEM | DATA | NOTE |
|--------------------------------------|--------------------------|----------------------------|
| Appearance | Transparent light yellow | Visual check |
| Viscosity (Pa·s/23°C) | 35 | B-type rotatory viscometer |
| Density (g/cm ³) | 1.10 | JIS K 6833-1 |
| Skin over time (min) | 2 | 23°C50%RH |
| Hardness | 19 | Shore A |
| Film property | Breaking strength (MPa) | 2.2 |
| | Elongation at break (%) | 158 |
| Tg (Glass transition temp.)(°C) | -25 | TMA method |
| Linear expansion coefficient (ppm/K) | 490 | TMA method |

接着性能 Adhesive property

| Substrate | Tensile shear strength (MPa) |
|---------------------------|------------------------------|
| Al | 4.2 |
| Steel | 1.4 |
| ABS | 3.6 |
| PA6 | 2.4 |
| PC | 3.4 |
| PET | 3.3 |
| PMMA | 3.4 |
| PS | 2.5 |
| PVC | 3.5 |
| Glass | 3.3 |
| GlassxPC(Glass fiber 20%) | 3.7 |

※Curing condition: 1 W × 23°C50%RH after UV irradiation
※UV intensity: 1000 mW/cm²
※UV dose : 2000 mJ/cm²

接着力立ち上がり挙動 Curing behavior of tensile shear strength



UV+湿気硬化
(Single step)

UVトリガー形弾性接着剤 UV-trigger type Elastic Adhesive

SX-UV220

特長 Feature

- 照射後一定の貼り合わせ時間を確保し、張り合わせ後は速やかに接着強度を発現します。
- 幅広い温度域(-40°C~120°C)で良好な柔軟性と接着耐久性を維持します。
- Allows setting for some time after irradiation, and exhibits strong adhesion promptly after setting.
- Maintains excellent flexibility and adhesion durability in a wide range of temperatures (-40°C to 120°C).

性状性能 Property

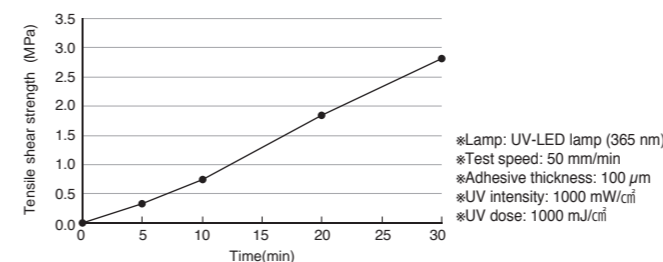
| ITEM | DATA | NOTE |
|--------------------------------------|-------------------------|----------------------------|
| Appearance | Light yellow | Visual check |
| Viscosity (Pa·s/23°C) | 50 | B-type rotatory viscometer |
| Density (g/cm ³) | 1.03 | JIS K 6833-1 |
| Skin over time (min) | 1.5 | 23°C50%RH |
| Hardness | 40 | Shore A |
| Film property | Breaking strength (MPa) | 2.1 |
| | Elongation at break (%) | 150 |
| Tg (Glass transition temp.)(°C) | -48 | TMA method |
| Linear expansion coefficient (ppm/K) | 305 | TMA method |
| Recommended cured thickness (μm) | 100~200 | |

接着性能 Adhesive property

| Substrate | Tensile shear strength (MPa) |
|-----------|------------------------------|
| ABS | 3.4 |
| PA6 | 3.9 |
| PC | 2.5 |
| PMMA | 3.7 |
| PS | 3.0 |
| PVC | 3.8 |
| Glass | 5.8 |
| Al | 6.0 |
| Steel | 4.0 |

※Lamp: UV-LED lamp (365 nm)
※Curing condition: 1 W × 23°C50%RH after UV irradiation
※UV intensity: 1000 mW/cm²
※UV dose: 1000 mJ/cm²

接着強さ立ち上がり挙動 Curing behavior of tensile shear strength



推奨紫外線照射条件 Recommended ultraviolet irradiation conditions

| ITEM | UV LED 365nm | |
|---|--------------|------|
| Illuminance (mW/cm ²) | 500 | 1000 |
| Cumulated amount of light (mJ/cm ²) | 1000 | 1000 |
| Setting time (min) | 1 | 1 |
| Pre-curing time (min) | 10 | 10 |
| Curing time (h) | 30 | 30 |

Setting time (min): Setting time
Pre-curing time (min): Time until adhesion strength reaches 0.5 MPa
Curing time (h): Time until adhesion strength reaches 2.0 MPa

放熱

放熱性弾性接着剤 Thermal Conductive Elastic Adhesive

SX-TCA series



CPUなど半導体デバイスの熱対策
Heat management solution for CPUs and other semiconductor devices



DCモーター制御チップの熱対策
Heat management solution for DC motor control chips

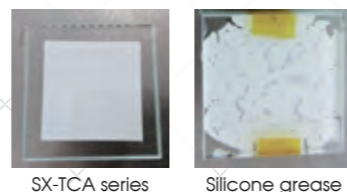
熱伝導率
Thermal conductivity
2.0 W/m・Kを実現

特長 Feature

- 熱伝導性の高い弾性体で、長期にわたり高い放熱性を維持します。
- 接点障害の原因となる低分子シロキサンを含有していません。
- 接着信頼性・密着性が高いため、ビスが削減できます。
- 硬化物からのブリードや肉やせがなく、硬化性グリースとして使用できます。
- 硬化または半硬化するため、ポンプアウトが起きません。
- 密着性・耐久性に優れ、垂直面上や、振動が加わる部位への熱対策に使用できます。
- 硬化時間が早く、作業効率が向上します。

- Forms a highly thermally conductive elastic body and offers long-lasting thermal radiation at high level.
- Contains no low-molecular silicones, which can cause electrical contact failure.
- Can be used to reduce screw usage due to its adhesion and adhesive reliability.
- No compound bleeding and no shrinking – can be used as a curable grease.
- Curing/half-curing, preventing pump-out.
- Excellent adhesion and durability make it suitable for heat management solutions for vertical surfaces and parts affected by vibration.
- Fast-curing, improving work efficiency.

冷熱サイクル試験後比較
Results of comparison after thermal cycle testing



性状性能 Property

| ITEM | DATA | | | NOTE | |
|---|-------------------------|-------------------------------------|-------------------------------|----------------------------|------------|
| | SX1008 Low viscosity | SX1010 High viscosity (受注生産品) | RH96L High heat resistance | | |
| Appearance | White paste | | Gray paste | Visual check | |
| Viscosity (Pa・s/23°C) | 118 | 720 | 240 | B-type rotatory viscometer | |
| Density (g/cm ³) | 1.95 | 2.02 | 2.17 | JIS K 6833-1 | |
| Skin over time (min) | 3.5 | 3 | 7 | 23°C50%RH | |
| Hardness | 80 | 85 | 65 | Shore A | |
| Film property | Breaking strength (MPa) | 2.6 | 2.5 | 1.1 | JIS K 6251 |
| | Elongation at break (%) | 40 | 30 | 45 | JIS K 6251 |
| Expected usage temperature maximum (°C) | -40~120°C | -40~120°C | -40~150°C | | |
| Thermal conductivity (W/m・K) | 1.8 | 2.1 | 2.1 | | |
| Flame resistance | UL94V-0 Equivalent | | | | |

従来の放熱対策品との比較

Issues faced by conventional silyl terminated polyether heat dissipation components

| ITEM | SX-TCA series | Silicone grease | Silicone seat |
|---------------------------------------|---------------|------------------------|---------------------------------------|
| Screw securing | Not necessary | Necessary | Necessary |
| Automation | Possible | Not possible | Not possible |
| Material loss | No | No | Yes |
| Design freedom | High | High | Medium |
| Sustained heat radiation performance | High | Medium (some pump-out) | Medium (some peeling and contraction) |
| Suitability for use on vertical faces | High | Medium (some sagging) | High |

導電

低温硬化形フレキシブル導電性接着剤 Low temperature curing flexible, conductive adhesive

SX-ECA series

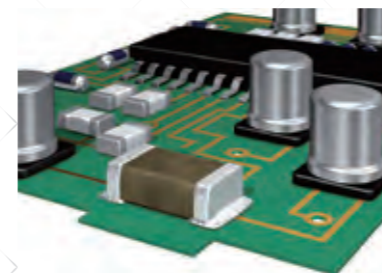
ベース特性 Base properties

- 低温硬化性 Low temperature curing
- 優れた柔軟性 Exceptional flexibility
- 優れた接着耐久性 Exceptional adhesion durability
- 優れた導電耐久性 Exceptional conduction durability

プリントドエレクトロニクスへの展開 Deployment in the printed electronics market

電子部品実装技術 Electronic component mounting technology

- 各種金属素材への接着性良好
- 素早い強度立ち上がり
→ シールド取り付け
→ LED、部品実装
→ グラウンド接続
- Adheres well to various metal materials
- Begins adhering strongly quickly after application
→ Shielding attachment
→ LED and component mounting
→ Connecting to ground



回路印刷・製造技術 Circuit print/manufacturing technology

- 被着材への高い追従性
- 良好な印刷性(塗布性)
- 高い伸縮性
→ LCD、TPのアース処理
→ ヒーター
→ RFID
→ 伸縮性回路形成
→ 3D成形
- High level of adherend tracking
- Excellent printability (coating properties)
- High elasticity
→ LCD and TP grounding
→ Heaters
→ RFID
→ Elastic circuit formation
→ 3D molding



自動ディスペンサー Automatic dispenser

SX-ECA48
SX-ECA52LL

繰返し伸長基材用 For flexible substrates

XX-ECA05
〈開発品〉

加熱立体成型用 For thermal forming

XX-ECA05TF
〈開発品〉

特長
Feature

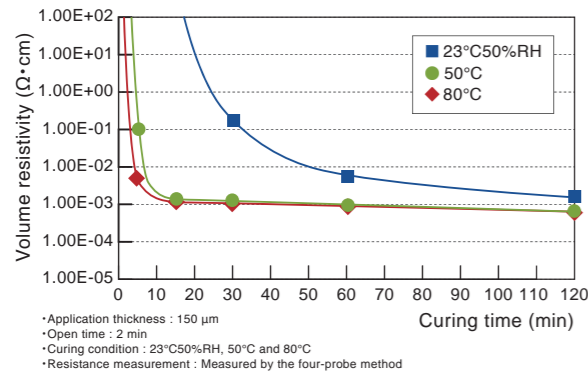
- 室温での硬化が可能(硬化エネルギー低減、基材への影響小)で、加温により硬化促進が可能です。
- 非常に低い弾性率による、幅広い温度域でのフレキシブル基材への高い追従性を有します。
- 多くの熱膨張係数が異なる基材間で、良好な接着性と、優れたヒートサイクル性を有することにより、高い接着耐久性を保持します。
- 極めて少ないハロゲン含有量のため、様々な環境下でも優れた絶縁抵抗と導体抵抗を維持します。(実測値10ppm以下)
- Can be cured at room temperature (reducing curing energy and placing minimal impact on base material). Curing can be accelerated by heating.
- Extremely low coefficient of elasticity produces high level of tracking for flexible base materials across a wide range of temperatures.
- Good adherence and excellent heat cycle performance for many base materials with different coefficients of thermal expansion, enabling it to maintain a high level of adhesion durability.
- Extremely low halogen content, enabling it to maintain excellent insulation resistance and conduction resistance in a variety of environments. (measured quantity: 10ppm or less)



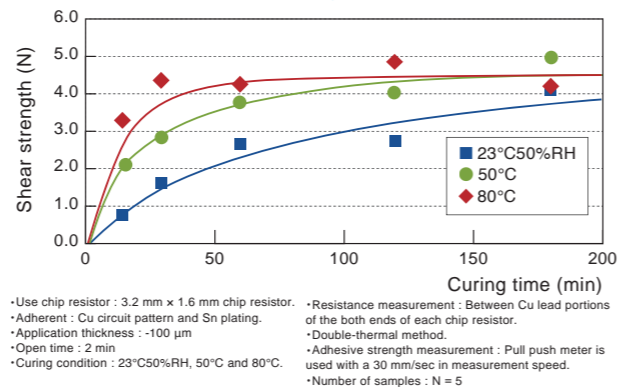
性状性能 Property

| ITEM | | DATA | | NOTE |
|------------------------------|-------------------------|---------------------|---------------------|----------------------------|
| | | SX-ECA48 | SX-ECA52LL | |
| Application | | Automatic dispenser | Automatic dispenser | |
| Appearance | | Silver paste | Brown paste | Visual check |
| Viscosity (Pa·s/23°C) | | 350 | 18 | B-type rotatory viscometer |
| Density (g/cm ³) | | 3.11 | 2.1 | JIS K 6833-1 |
| Skin over time (min) | | 5 | 25 | 23°C50%RH |
| Hardness | | 80 | 78 | Shore A |
| Film property | Breaking strength (MPa) | 2.5 | 3.0 | JIS K 6251 |
| | Elongation at break (%) | 30 | 30 | JIS K 6251 |
| Volume resistivity (Ω·cm) | | 1.20E-03 | 2.2E-03 | |
| Curing condition | 23°C (h) | | 12 | Thickness:100 μm |
| | 50°C (min) | | 120 | |
| | 80°C (min) | | 60 | |
| Die shear strength | Substrate | × Cu | 1.9 | 2.9 |
| | | × ITO | 1.8 | - |
| | | × SUS316 | - | 2.7 |
| | | × Ag(1608) | 1.0 | 2.6 |

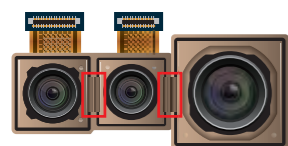
体積抵抗率 Volume resistivity



接着強度 Adhesion strength



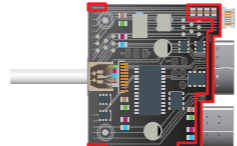
SX-ECA52LL 用途事例：低温でのグラウンディング・ノイズ対策
Application example of SX-ECA52LL Grounding noise countermeasures at low temperatures.



カメラモジュールのノイズ除去
Camera module noise removal.



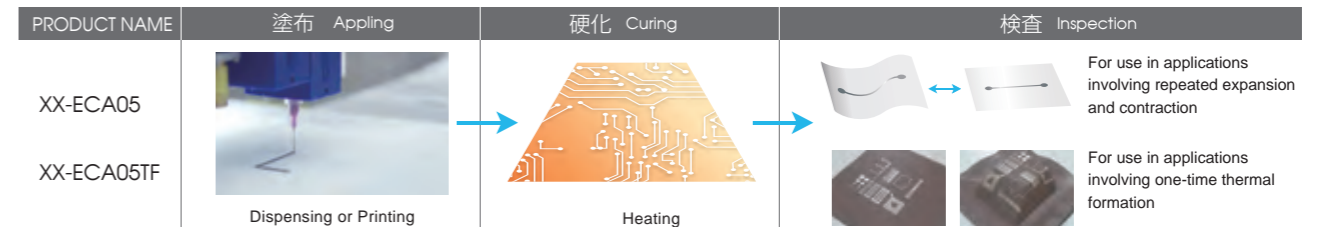
ディスプレイのグラウンド接続
Display ground connection.



通信ケーブルのノイズシールド
Noise shield for communication cables.

特長
Feature

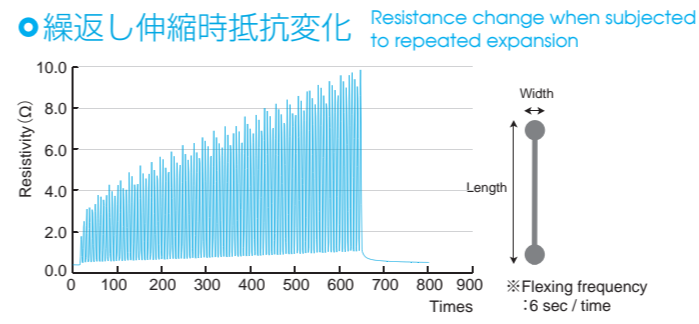
- 低温での硬化が可能のため、布や紙、フィルム素材など、熱に弱い素材にも使用が可能です。
- 硬化後も高いフレキシブル性を示し、柔軟性を持った素材に追従し、導電性を保ちます。
- 接着技術をベースとしており、PET、PENフィルムやITO皮膜等への高い接着性を発現します。
- 極めて少ないハロゲン含有量のため、様々な環境下でも優れた絶縁抵抗と導体抵抗を維持します。(実測値10ppm以下)
- XX-ECA05:加熱硬化により硬化物を形成します。硬化物は伸長性にすぐれます。
- XX-ECA05TF: 硬化物は加熱下(約80~105°C)で柔軟に変形する為、配線後の立体成型においても、破断することなく基材に追従します。
- Cures at low temperatures, enabling it to be used with various heat-sensitive materials, such as cloth, paper, and film.
- Remains highly flexible after curing, tracking flexible materials and maintaining conductivity.
- Based on adhesive technology, so it demonstrates a high level of adhesion to PET, PEN film, ITO membrane, etc.
- Extremely low halogen content, enabling it to maintain excellent insulation resistance and conduction resistance in a variety of environments. (measured quantity: 10ppm or less)
- XX-ECA05: Forms hardened material through heat curing. The hardened material is highly stretchable.
- XX-ECA05TF: ECA05TF hardened material flexible transforms flexibly when heated (approx. 80 to 105°C), tracking substrates without cracking during 3D molding following circuit formation.



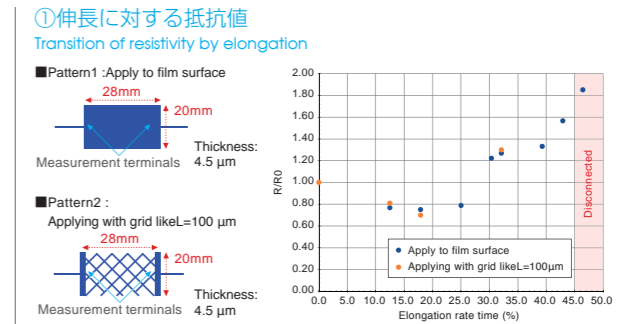
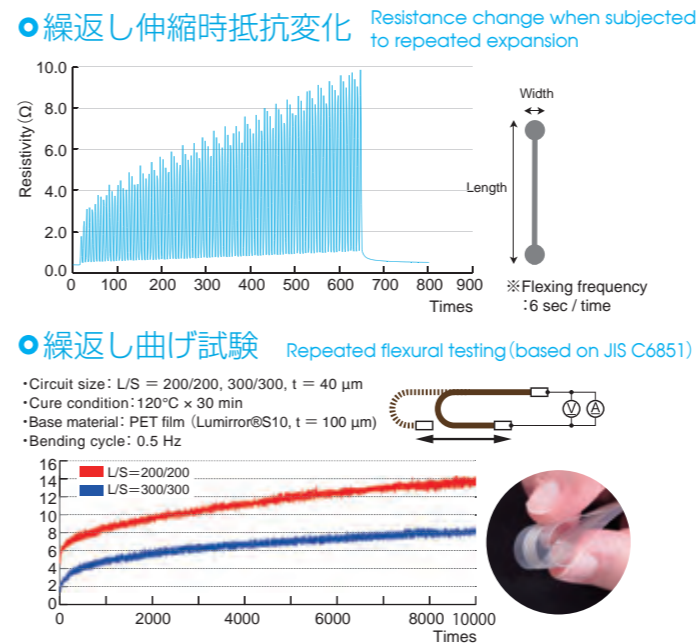
性状性能 Property

| ITEM | | DATA | | NOTE |
|------------------------------|-------------------------|-----------------------|------------|----------------------------|
| | | XX-ECA05 | XX-ECA05TF | |
| Application | | Elastic base material | 3D molding | |
| Appearance | | Silver paste | | Visual check |
| Viscosity (Pa·s/23°C) | | 60 | 100 | B-type rotatory viscometer |
| Density (g/cm ³) | | 2.10 | 2.20 | JIS K 6833-1 |
| Solid content (%) | | 80 | 80 | |
| Hardness | | A20 | D40 | |
| Film property | Breaking strength (MPa) | 1.0 | 2.0 | JIS K 6251 |
| | Elongation at break (%) | 80 | 10 | JIS K 6251 |
| Volume resistivity (Ω·cm) | | 4.50E-04 | 4.20E-04 | |
| Curing condition | 100°C (min) | | 30 | Thickness:100 μm (wet) |
| | 120°C (min) | | 15 | |

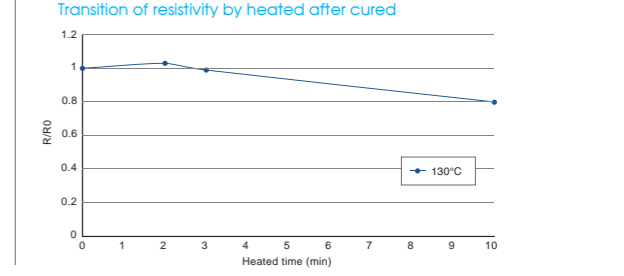
繰返し伸縮時抵抗変化 Resistance change when subjected to repeated expansion



繰返し曲げ試験 Repeated flexural testing (based on JIS C6851)



繰返し曲げ試験 Repeated flexural testing (based on JIS C6851)

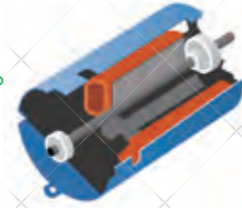


高強度
速硬化

常温速硬化アクリル系接着剤

Acrylic adhesive that cures fast at room temperature

メタルロック
Y600series



はじめに Introduction

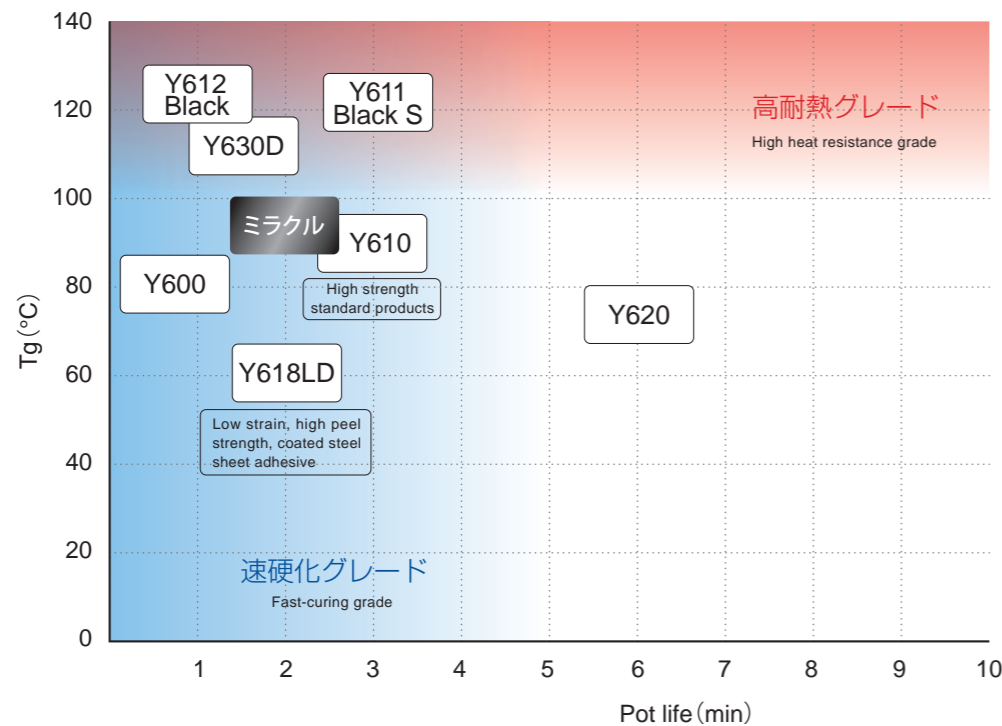
セメダインメタルロックシリーズは、SGA(Second Generation Acrylic Adhesive)と呼ばれる接着剤です。非常に強く強度の高いアクリル樹脂とゴム成分が硬化することにより、強靱な接着剤を形成しています。

Metal lock series is the adhesive called SGA (Second Generation Acrylic Adhesive). This adhesive cures fast at room temperature and begins adhering strongly extremely quickly, achieving a high Tg after curing.

特長 Feature

- 他反応系二液接着剤と比較し、常温での強度立ち上がりが早く、速やかに次工程に入れるため、量産スピードを求められる部材に適しています。
 - 一液エポキシのような加熱炉が不要の為、量産ラインの省スペース化、省エネルギー化に貢献します。
 - 混合比のぶれによる強度のばらつきが少なく作業性向上に寄与します。
 - 硬化後は高Tg、高耐熱性、高靱性を有します。
 - 一般的なSGAと比較して、低引火点の材料を使用しないため臭気が少なく、消防法上の取り扱いが比較的容易な第四類第三石油類となります。
- Compared with other reaction two-part adhesives, it offers fast initial adhesion strength at room temperature, creating smooth work flow, so it is suitable for mass-produced materials.
 - This adhesive contributes to saving of space and energy of mass production line because there is no need of a heating furnace necessary when using one-part heat curing epoxy adhesives.
 - Contributing to greater workability by reducing the amount of unevenness in adhesion strength produced by differing mix ratios.
 - After curing, It offers high glass-transition temperature (Tg), exceptional heat resistance and toughness.
 - It does not use low ignition ingredients, so it produces less odor than ordinary SGA, and is classified as a Category 4 Class III Petroleum, relatively easy to work with under the Fire Service Act.

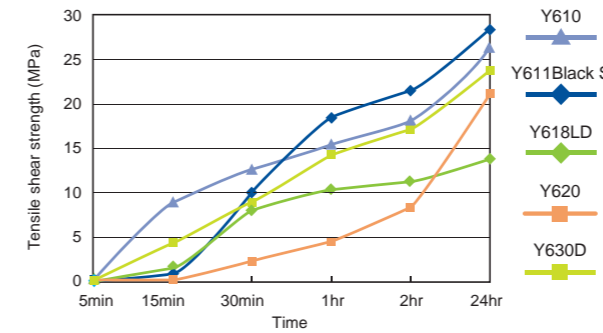
製品ラインナップ Product lineup



性状性能 Property

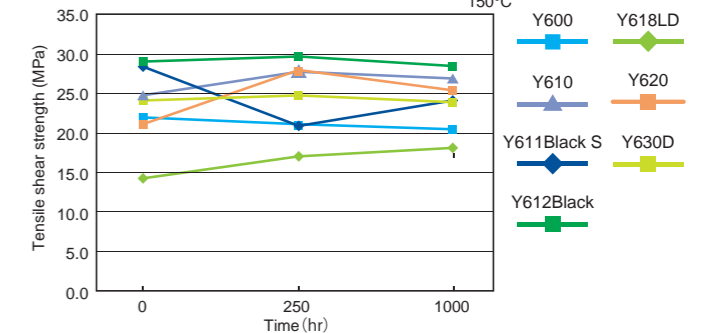
| ITEM | DATA | | | | | | | | | | NOTE |
|--------------------------------------|----------------------|-------------|----------------|---------------|-------------|----------------------|------------------------------------|------------------------------------|--------------|---------------------------|------|
| | Miracle (Metal lock) | Y600 | Y600H | Y610 | Y620 | Y618LD | Y630D | Y611 Black S | Y612 Black | | |
| Character | Tough | Fast-curing | High viscosity | High strength | Slow-curing | Flexible, low-strain | High strength high heat resistance | High strength high heat resistance | | | |
| Appearance | A剤 Light yellow | B剤 Black | Light yellow | White | White | Light yellow | Red | Light yellow | Light yellow | Visual check | |
| Viscosity (Pa·s/23°C) | 10 | 4 | 30 | 6 | 8 | 5 | 4 | 3 | 5 | By-type rotary viscometer | |
| Pot life (min / 23°C) | 2 | 0.5 | 2 | 3 | 6 | 2 | 1.5 | 3 | 4 | | |
| Setting time (min / 23°C) | 5.0 | 3.0 | 4.0 | 6.0 | 20.0 | 7.0 | 4.5 | 7.0 | 7.5 | | |
| Hardness | 77 | 68 | 65 | 72 | 66 | 47 | 83 | 84 | 86 | Shore D | |
| Elastic modulus (MPa) | 1,250 | 767 | 742 | 935 | 778 | 451 | 2,414 | 1,558 | 559 | | |
| Maximum strength (MPa) | 34.2 | 16.2 | 14.0 | 19.0 | 16.1 | 10.5 | 32.1 | 32.9 | 10.1 | | |
| Elongation (%) | 8 | 26 | 8 | 6 | 25 | 40 | 2 | 4 | 6 | | |
| Tg (Glass transition temp) (°C) | 87 | 83 | 78 | 90 | 79 | 61 | 118 | 123 | 123 | TMA method | |
| Tensile shear strength (MPa / 23 °C) | 23.0 | 23.2 | 19.4 | 26.0 | 21.1 | 14.2 | 25.3 | 28.4 | 17.0 | | |
| T-peel strength (N/25mm / 23 °C) | 82.5 | 125.0 | 90.0 | 92.5 | 105.0 | 147.5 | 115.0 | 105.0 | 92.5 | | |

初期硬化性 Initial curing properties



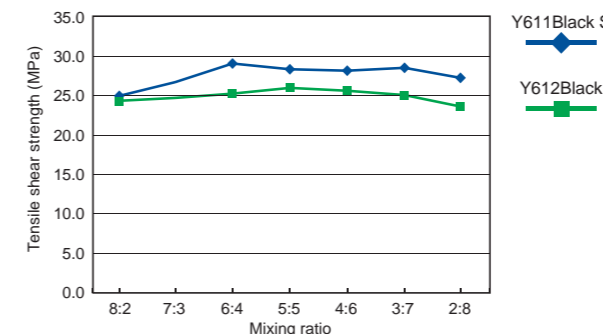
※Test method: JIS K6850
 ※Curing condition: 23°C50%RH × Measured each hour
 ※Tension speed: 2.5 mm/min
 ※Substrate: SPCC × SPCC
 ※Test piece: 25 mm × 100 mm × 1.6 mm
 ※Application area: 12.5 mm × 25 mm

熱老化強度 Heat aging resistance



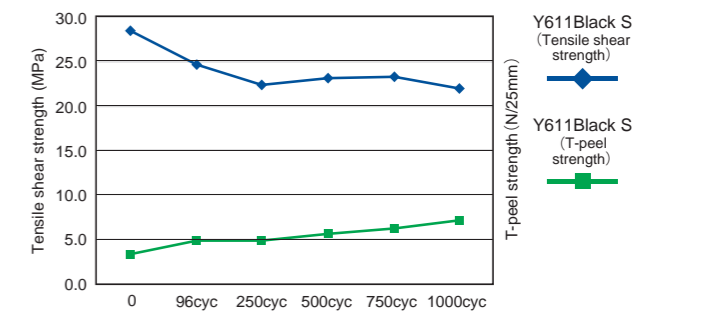
※Test method: JIS K6850
 ※Curing condition: 1 day × 23°C50%RH
 ※Tension speed: 2.5 mm/min
 ※Substrate: SPCC × SPCC
 ※Test piece: 25 mm × 100 mm × 1.6 mm
 ※Application area: 12.5 mm × 25 mm
 ※Mixing ratio: 1:1
 ※Other conditions - Condition 1: Exposure for a specified period of time at each temperature after coating
 ※Other conditions - Condition 2: Measured after 24 hours at 23°C50%RH after exposure

A剤:B剤配合比別 A/B mixing ratio



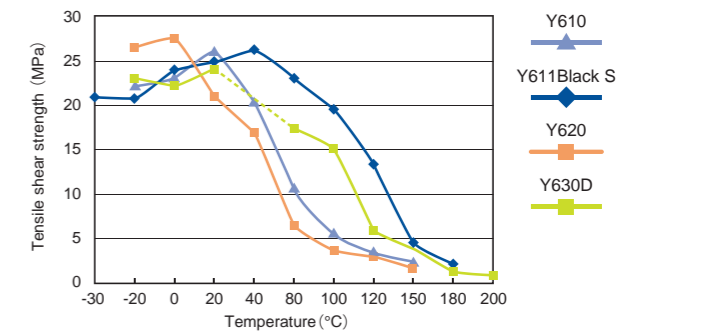
※Test method: JIS K6850
 ※Curing condition: 1 day × 23°C50%RH
 ※Tension speed: 2.5 mm/min
 ※Substrate: SPCC × SPCC
 ※Test piece: 25 mm × 100 mm × 1.6 mm
 ※Application area: 12.5 mm × 25 mm
 ※Mixing ratio: 1:1

ヒートショック試験 Heat shock testing

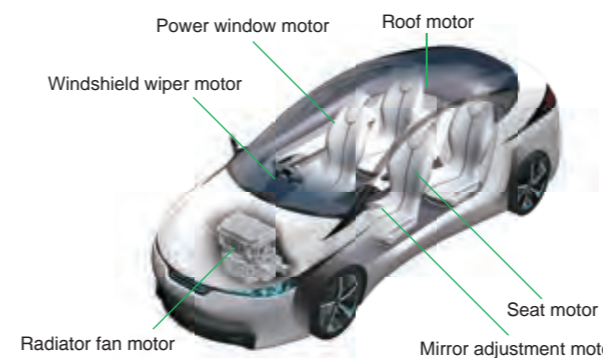


※Test method: JIS K6850
 ※Curing condition: 1 day × 23°C50%RH
 ※Tension speed: 2.5 mm/min
 ※Substrate: SPCC × SPCC
 ※Test piece: 25 mm × 100 mm × 1.6 mm
 ※Application area: 12.5 mm × 25 mm
 ※Mixing ratio: 1:1
 ※Other conditions - Condition 1: Specified number of exposure cycles, with each cycle consisting of 30 minutes at -40°C followed by 30 minutes at 120°C (Y611 black S)
 ※Other conditions - Condition 2: Measured after 24 hours at 23°C50%RH after exposure

熱間強度 Hot strength



※Test method: JIS K6850
 ※Curing condition: 1 day × 23°C50%RH
 ※Tension speed: 2.5 mm/min
 ※Substrate: SPCC × SPCC
 ※Test piece: 25 mm × 100 mm × 1.6 mm
 ※Application area: 12.5 mm × 25 mm
 ※Other conditions: Measured at each temperature after curing



はじめに
Introduction

耐熱性・耐薬品性・耐久性に優れた接着剤であり、用途に応じて自動車・車輻・船舶・航空機関係・電機・電子部品の接着・封止など広範囲な被着材の接着に適します。

This adhesive offers superb heat resistance, chemical resistance, and durability. It can be used for adhesion and sealing of a wide range of materials, such as cars, vehicles, vessels, aircraft, and electrical and electronic components.



特長
Feature

- 1液加熱硬化タイプの為、主剤・硬化剤の計量の手間がありません。
- 加熱後は完全硬化状態となり、接着完了タイミングの管理が容易です。
- 耐熱性・耐薬品性・耐久性に優れ、高い接着力を維持します。
- 生産ラインにおける各種生産方式(バッチ生産、連続ライン生産)へ対応できます。
EP122/123・・・韌性が高く、耐はく離性に優れます。
EP610・・・・・・低ハロゲン・Tg160℃の高耐熱タイプです。

- It is a one-part heat curing adhesive, so there is no need for measurement of base compound or curing agent.
- It completely cures after heating, making it easy to manage adhesion completion timing.
- It offers excellent heat resistance, chemical resistance, and durability, and maintains a high level of adhesive strength.
- It can be used on production lines with various production methods (batch production and continuous line production).
EP122/123・・・It is tough and highly peel-resistant.
EP610・・・This highly heat resistant adhesive has low halogen content and a 160°C glass-transition temperature (Tg).

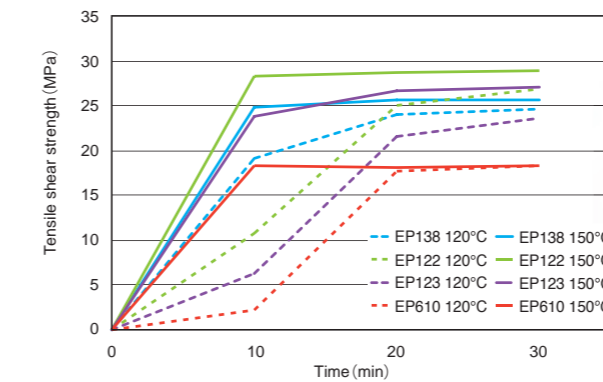
耐熱性
Heat resistance



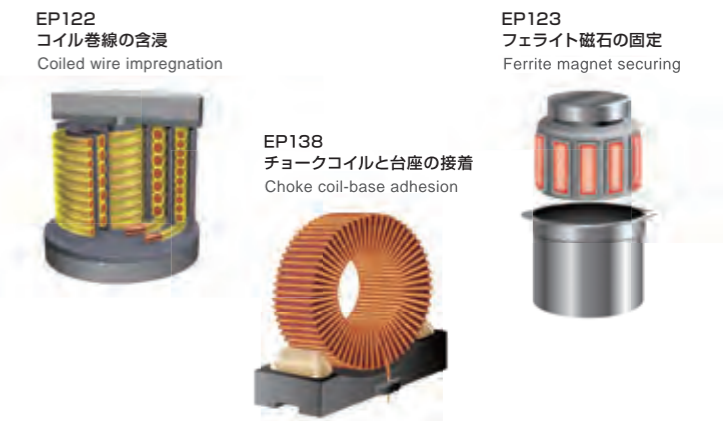
性状性能
Property

| ITEM | DATA | | | | NOTE |
|--------------------------------------|----------------------|--------------------------------|----------------------|------------------------------|----------------------------|
| | EP138 | EP122 | EP123 | EP610 | |
| Character | Standard | Peel-resistant / Low viscosity | Peel-resistant | Heat resistant / low-halogen | |
| Appearance | Light yellow | Slightly yellowish white | white | Light yellow | Visual check |
| Viscosity (Pa·s/23°C) | 240 | 19 | 186 | 252 | B-type rotatory viscometer |
| Density (g/cm ³) | 1.4 | 1.15 | 1.44 | 1.36 | JIS K 6833-1 |
| Hardness | 88 | 75 | 86 | 85 | Shore D |
| Tg (Glass transition temp) (°C) | 122 | 122 | 111 | 161 | TMA method |
| Linear expansion coefficient (ppm/K) | 57 | 76 | 53 | 53 | TMA method |
| Dielectric constant (100Hz) | 4.7 | 3.3 | 4.6 | 4.6 | JIS K 6911 |
| Dielectric loss tangent (100Hz) | 0.01 | 0.02 | 0.02 | 0.02 | JIS K 6911 |
| Volume resistivity (Ω·cm) | 3.0×10 ¹⁵ | 6.0×10 ¹⁵ | 5.0×10 ¹⁵ | 5.0×10 ¹⁵ | JIS K 6911 |
| Insulation breakdown voltage (kV/mm) | 16< | 13< | 16< | 16< | JIS K 6911 |
| Tensile shear strength (MPa) | 25.6 | 28.3 | 26.7 | 18.3 | JIS K 6850 |
| T-peel strength (N/25mm) | 76.5 | 122.5 | 122.5 | 117.6 | JIS K 6854-3 |
| Standard curing conditions (min) | 120°C | 30 | 20 | 30 | 20 |
| | 150°C | 20 | 10 | 20 | 20 |
| Storage temperature (°C) | 0~10 | 0~10 | 0~10 | 0~10 | |

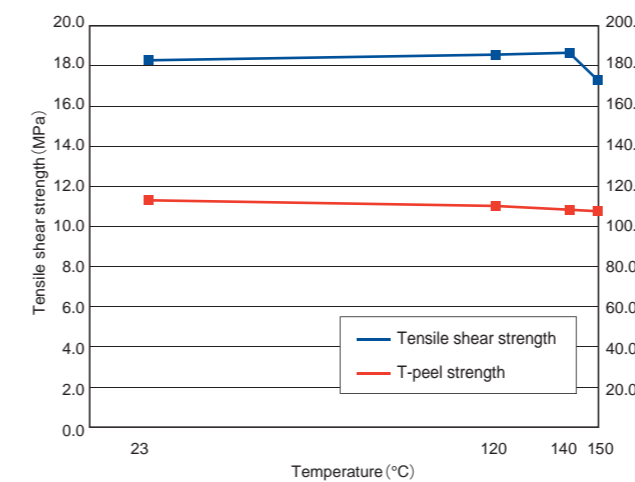
硬化条件別接着強度
Adhesion strength by curing condition



Test method : JIS K6850
 ※Curing condition : Each temperature x each minute
 ※Tension speed : 2.5 mm/min
 ※Substrate: SPCC

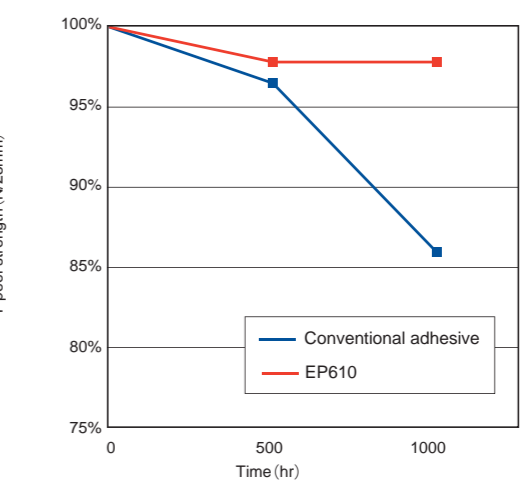


EP610 熱間強度
Hot strength



※Test piece(Tensile shear strength) : 1.6 mm x 25 mm x 100mm
 ※Test piece(T-peel strength) : 0.5 mm x 25 mm x 150mm
 ※Substrate: SPCC

EP610 熱老化後の引張りせん断強さ変化率
Rate of change of tensile shear strength after heat aging



Test method : JIS K6850
 ※Curing condition : 150°C x 20min
 ※Tension speed : 2.5 mm/min
 ※Substrate: SPCC
 ※Keep condition : 150°C x each time

特長
Feature

- 一液加熱硬化タイプの為、主剤・硬化剤の計量の手間がありません。
- 加熱後は完全硬化状態となり、接着完了タイミングの管理がしやすいです。
- 車載用途を中心に各種厳しい環境下での使用を想定した注型・ポットイング材です。
- LCPなど難接着素材への接着性が良好です。
- 適度な流れ性を有します。
- It is a one-part heat curing adhesive, so there is no need for measurement of base compound or curing agent.
- It completely cures after heating, making it easy to manage adhesion completion timing.
- This casting and potting material is intended for use in various harsh environments such as automotive applications.
- It adheres well to LCP and other difficult-to-bond materials.
- It offers suitable flow properties.



性状性能 Property

| ITEM | DATA | NOTE |
|--------------------------------------|----------------------|----------------------------|
| Appearance | Black | Visual check |
| Viscosity (Pa·s/23°C) | 150 | B-type rotatory viscometer |
| Density (g/cm ³) | 1.71 | JIS K 6833-1 |
| Hardness | 92 | Shore D |
| Tg (Glass transition temp) (°C) | 135 | TMA method |
| Linear expansion coefficient (ppm/K) | 26 | TMA method |
| Poisson ratio | 0.3 | JIS K 7161 |
| Young's modulus (MPa) | 9,000 | JIS K 7161 |
| Tensile fracture strain (%) | 1 | JIS K 7161 |
| Bending elastic modulus (MPa) | 6,500 | JIS K 7161 |
| Dielectric constant (100Hz) | 5.6 | JIS K 6911 |
| Dielectric loss tangent (100Hz) | 0.02 | JIS K 6911 |
| Volume resistivity (Ω·cm) | 5.0×10 ¹⁵ | JIS K 6911 |
| Insulation breakdown voltage (kV/mm) | 22< | JIS K 6911 |
| Tensile shear strength (MPa) | 19.7 | JIS K 6850 |
| Standard curing conditions (min) | 120 °C × 30 min | |
| Storage temperature (°C) | 0~10 | |

Tensile shear strength ※Curing condition : 120°C × 30min ※Tension speed : 2.5mm × min ※Substrate : SPCC

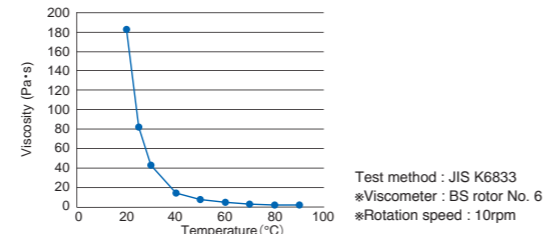
接着性能 Adhesive Property

| Tensile shear strength (MPa) | SPCC×SPCC | Cu×Cu | PBT × PBT | LCP ×LCP |
|------------------------------|-----------|----------|-----------|----------|
| 23°C | 19.7 TCF | 14.0 TCF | 11.8 MF | 8.6 MF |

| Tensile shear strength after heat shock (MPa) | SPCC×SPCC | Cu×Cu | LCP ×LCP |
|---|-----------|----------|----------|
| 260°Cx10min→23°Cx10min | 19.3 TCF | 15.4 TCF | 8.4 MF |

Test method : JIS K6850
 ※Curing condition : 130°C × 20min / PBT: 120°C × 60min
 ※Tension speed : 2.5 mm/min
 ※TCF: Thin layer cohesion failure MF: Material failure

温粘曲線 Heat-viscosity curve



特長
Feature

- 変成シリコン系弾性接着剤とエポキシ樹脂系接着剤の特長を併せ持ったハイブリッドタイプの接着剤です。
- 硬化皮膜が柔軟かつ強靱で高い離接着強さを有し、低温から高温まで安定した接着性を維持します。
- PBTやPPSなどエンジニアリングプラスチックをはじめ、各種材料に良好な接着性を示します。
- 硬化後は弾性体となり内部応力を分散し、過酷なヒートサイクルへの高い耐久性を有します。
- 接点障害の原因となるシロキサンを含みません。
- 150°Cの高耐熱タイプもラインナップしています。(EP001D(開発品))



- This hybrid adhesive has the features of both silyl terminated polyether elastic adhesives and epoxy resin adhesives.
- The cured film is flexible, strong, and peel-resistant, and maintains stable adhesion at both low and high temperatures.
- It adheres well to various materials, such as engineering plastics like PBT and PPS.
- Elastic cured bodies distribute internal stress, providing it with a high level of durability in the face of extreme heat cycles.
- Contains no low-molecular siloxanes, which can cause electrical contact failure.
- EP001D(trial product)・・・This is highly heat resistant adhesive (150°C).

性状性能 Property

| ITEM | DATA | | | | | | NOTE |
|------------------------------|-------------------------|--------------|------------|----------|------------|--------------|----------------------------|
| | EP001K | | EP001D | | EP001HT | | |
| | Base resin | Hardener | Base resin | Hardener | Base resin | Hardener | |
| Appearance | White | Light yellow | White | Brown | White | Light yellow | Visual check |
| Viscosity (Pa·s/23°C) | 14 | 18 | 5 | 37 | 105 | 90 | B-type rotatory viscometer |
| Mixing ratio (Base:Hardner) | 1:1 | | 1:2 | | 1:1 | | |
| Density (g/cm ³) | 1.15 | 1.00 | 1.14 | 1.02 | 1.19 | 1.03 | JIS K 6833-1 |
| SVI | - | - | - | - | 4.8 | 3.1 | |
| Skin over time (min) | 12 | | 19 | | 11 | | 23°C50%RH |
| Hardness | 72 | | 46 | | 71 | | Shore A |
| Film property | Breaking strength (MPa) | 7 | 4 | 5.5 | | | JIS K 6251 |
| | Elongation at break (%) | 200 | 250 | 230 | | | JIS K 6251 |

接着性能 Adhesive Property

| Substrate | EP001K | EP001D |
|-----------|------------|------------|
| PMMA | 3.7 CF2AF8 | 3.6 AF |
| ABS | 5.4 CF | 3.2 AF |
| PVC | 5.5 CF | 4.7 CF |
| PS | 1.8 AF | 1.5 AF |
| PC | 5.5 CF | 2.7 AF |
| PA6 | 4.1 CF8AF2 | 3.3 CF1AF9 |
| PBT | 3.4 AF | 2.4 AF |
| PET | 4.9 MF | 3.1 MF |
| PPS | 4.2 CF5AF5 | 3.4 AF |
| SPCC | 6.0 CF | 3.7 CF |
| Al | 7.6 CF | 6.4 TCF |

Test method : JIS K6850
 ※Curing condition : 1W × 23°C50%RH
 ※Tension speed : 50mm/min
 ※Application area : 0.5 inch wrap
 ※AF: Adhesive Failure, CF: Cohesion Failure, MF: Material Failure

エポキシ・変成シリコン弾性接着剤

Epoxy / silyl terminated polyether elastic adhesive

特長
Feature

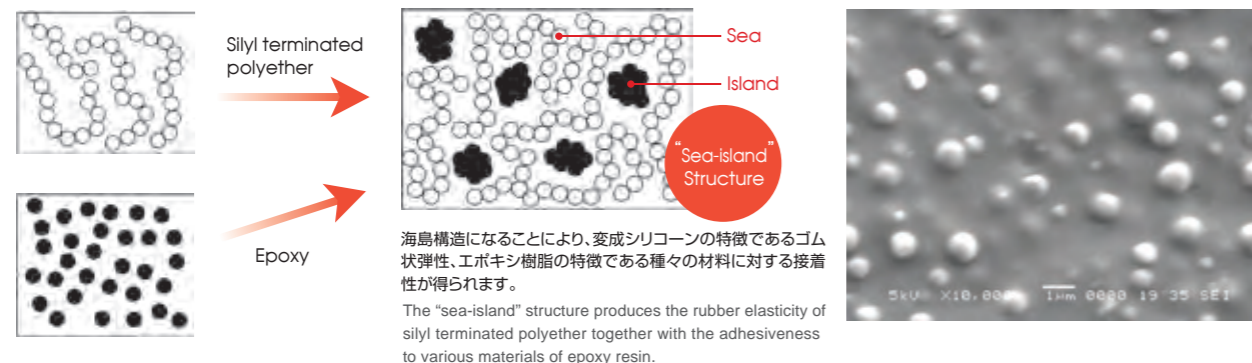
エポキシ・変成シリコン系弾性接着剤は、エポキシ系の硬くて脆い性質や、ゴム系など柔軟な接着剤の耐熱性・耐久性不足などの欠点を解決した、強靱性と柔軟性を併せ持っています。自動車・車載部品・船舶・産業機器・各種電気電子部品へ幅広く適用できます。

Epoxy / silyl terminated polyether elastic adhesives offer resilience and flexibility, solving the problems of conventional heat-resistant, high strength adhesives, which are hard and brittle, and flexible adhesives such as rubber adhesives, which lack sufficient heat resistance and durability. They are widely used in automobiles, vehicle-mounted components, ships, industrial machinery, and electrical and electronic components.

エポキシ・変成シリコン系弾性接着剤とは What are epoxy / silyl terminated polyether elastic adhesives?

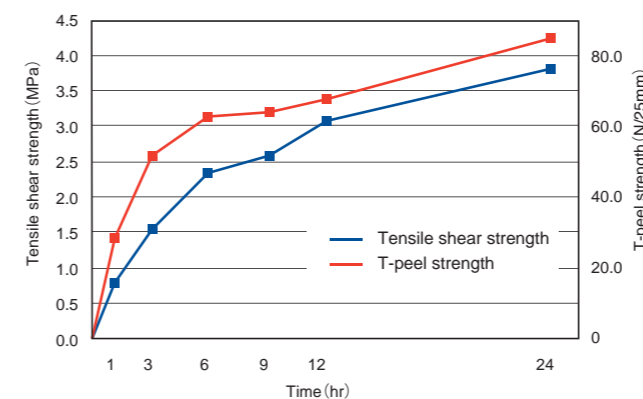
エポキシ樹脂と変成シリコンは非相溶であり、重合する過程で下図のような相分離が起こり、海島構造ができます。Epoxy resin and silyl terminated polyether are incompatible, so during the polymerization process the following phase separation occurs, producing a "sea-island" structure.

主剤・・・エポキシ樹脂+変成シリコン硬化触媒 Base compound・・・Epoxy resin + Silyl terminated polyether curing catalyst
 硬化剤・・・変成シリコン+エポキシ樹脂硬化剤 Curing agent・・・Silyl terminated polyether + Epoxy resin curing agent



EP001K硬化条件別接着強さ

Adhesion strength by curing condition



Tensile shear strength
 ※Test method : JIS K6850
 ※Curing condition : 1W × 23°C50%RH
 ※Tension speed : 50mm/min
 ※Substrate : SPCC

T-peel strength
 ※Test method : JIS K6854
 ※Curing condition : 1W × 23°C50%RH
 ※Tension speed : 200mm/min
 ※Substrate : SPCC

EP001D各種耐久試験に対する引張りせん断強度

Tensile shear adhesion measured during durability testing

| Test time (hr) | Heat aging test | High-temperature and high-humidity test |
|----------------|---------------------|---|
| | 150 °C(SPCC × SPCC) | 85 °C 85% RH(Al × Al) |
| 0 | 4.4 CF | 8.2 CF |
| 500 | 5.3 CF | 8.3 CF |
| 1000 | 5.3 CF | 7.7 CF |
| 2000 | 5.3 CF | 7.3 CF |
| 3000 | 4.5 CF | 6.4 CF |

| Number of cycles | Thermal cycling | |
|------------------|-----------------------------------|--------------------------|
| | -40 °C × 30 min ↔ 105 °C × 30 min | Al × PPS / Al × PBT-GF30 |
| 0 | 3.3 CF | 4.4 CF8AF2 |
| 500 | 5.4 CF | 5.7 CF |
| 1000 | 5.3 CF | 5.0 CF |
| 2000 | 4.5 TCF | 5.1 TCF |
| 3000 | 4.5 TCF | 5.0 TCF |

Test method : JIS K6850
 ※Curing condition : 1W × 23°C50%RH
 ※Tension speed : 50mm/min 23°C
 ※AF: Adhesive Failure, CF: Cohesion Failure, TCF: Thin layer cohesion failure