

### Phase-Change Thermal Bonding Adhesive Films

Fastelek is a customizable heat activated *electrically conductive* adhesive available in a range of performance fillers, thicknesses and phase-change (melt point) temperatures. Fastelek is designed to adhere strongly to a wide range of materials packaged with cost effective low resistant electrical path performance which makes it an ideal solution for assembly and EMI/RFI Shielding application for electronic devices within the consumer electronics, automotive, medical and alternative energy markets.

As a dry-to-the-touch free standing adhesive film, Fastelek can be die cut to match a wide range of mounting and sealing application areas. Applications can vary from bonding and/or sealing fasteners or contacts, components, adhering materials for lamination, case sealing or difficult areas of general device assembly where liquid adhesives can run-out. As a die cut adhesive pad, Fastelek allows for quick and clean “drop-in-place” installation/setup and instantly ready to be heat cured above its phase-change temperature using a wide range of thermal induction methods. Once allowed to cool below phase-change, the adhesive is cured.



**Multiple Conductivity Formulations**  
**Multiple phase-change temperatures**  
**Various film thicknesses**  
**Die-cut, sheets, rolls**

**Excellent adhesion to substrates**  
**Controlled flow**  
**Re-workable after first cure**  
**Quick installation and fixturing**

**Low cost adhesive solution**  
**Indefinite shelf life**  
**Solvent free / acid free**  
**Short lead times**

#### FASTELEK™ Conductivity Performance Choices

<b>STANDARD</b>	Nickel Filled Formulation
<b>+ (PLUS)</b>	Silver/Nickel Filled Formulation
<b>SUPER</b>	Silver Filled Formulation

#### Standard Fastelek Phase-Change Temperatures

Fastelek 16071.....	160°F / 71°C
Fastelek 20093.....	200°F / 93°C
Fastelek 230110.....	230°F / 110°C

Note: custom phase-change temperatures available. For more information, contact toll free 1-888-989-3832

#### Standard Fastelek Adhesive Thickness

- \* 3 MIL (0.003") (0.08mm)
- \* 5 MIL (0.005") (0.13mm)
- \* 10 MIL (0.010") (0.25mm)
- \* 15 MIL (0.015") (0.38mm)
- \* 30 MIL (0.030") (0.76mm)

Note: custom adhesive film thicknesses available. For more information, contact toll free 1-888-989-3832

#### Adhesive Delivery Options

- \* Die cut pad individuals
- \* Die cut pad on continuous rolls
- \* Rolls or sheets

#### Product Film / Coating Options

- \* Free standing adhesive film
- \* Aluminum, copper or stainless
- \* PET, PE, polyimide films
- \* 100% surface coating or masked coating

#### Other Information

- \* Manufactured to ISO 9001:2008 Standards
- \* RoHs Compliant Material
- \* Acid / Corrosion Resistant

Fastelek is electrically conductive EVA based solvent free (metallic filled) adhesive film that is designed to provide efficient electrical conductivity, uniform adhesion and sealing across a desired material interface. The ability to manufacture Fastelek in a variety of phase-change temperatures, film thicknesses, rolls, sheet and pre-form die-cuts allows us to meet a wide range of requirements within multiple industries. Fastelek’s inherent flexibility from manufacturing to installation makes it an ideal solution for applications ranging from low volume (even prototypes) and/or high volume environments. Fastelek is manufactured to superior quality guidelines set forth by our ISO 9001:2008 Quality Standards and offers a quick turnkey solution from design to production.

#### Heat Curing Application Methods

All Fastelek phase-change formulations can be heat cured using commercially available heating devices. When cycled past its phase-change temperature, Fastelek will begin its controlled flow filling in any microscopic surface conditions that may exist on your mounting surface as well as adjust for any flatness conditions.

Recommended heating devices include a curing oven, heated press, hydraulic press, heated roller(s), heated flat plate, heat tunnel, heat gun or custom fixture/heating device.

Fastelek Phase-Change Temps	Optimal Heating Temp	Heat Cycle Time (min)	Set Time (onset of temp drop)	Cure Time
<b>16071</b>	180°F to 210°F	3 ~ 5 seconds	6 ~ 8 seconds	15 ~ 20 seconds
<b>20093</b>	235°F to 255°F	3 ~ 5 seconds	6 ~ 8 seconds	20 ~ 30 seconds
<b>230110</b>	265°F to 285°F	3 ~ 5 seconds	10 ~ 12 seconds	25 ~ 35 seconds

**Note: make sure all applications surfaces are clean and free of debris before applying adhesive**

The data presented in the above table is based upon 5 mil thick Fastelek Standard within all phase-change temperatures using a curing oven. Testing within the scope of your application, materials being bonded or sealed and heating device should be performed at multiple cycling temperatures in order to determine your optimal setup and heat cycling procedure.

All Fastelek Adhesive Products, once bonded, should be allowed to cool before applying any stress.

The amount of pressure being applied to your substrate during setup should be determined beforehand in order to minimize the effects of the adhesive flowing into unwanted areas outside the desired mounting or sealing interface during heating and high pressures.

#### Want to cure Fastelek alongside other heat curing materials?

Not a problem with Fastelek. Fastelek Adhesive can be cycled higher than its recommended application temperatures for long periods of time if being cured alongside other heat required materials/adhesives that require longer cycling times in a curing oven.

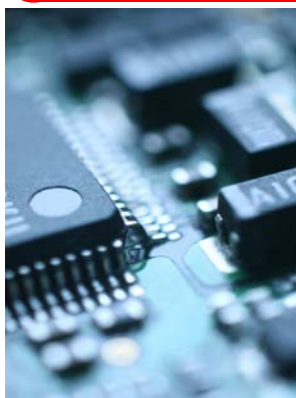
#### Fastelek Customer / Application Benefits

- \* Uniform adhesion strength resulting from Fastelek's consistent adhesive thickness
- \* High performance uniform bond strength
- \* Assembly line flexibility, ease-of-use—from pick and place to hand placement assembly
- \* Inherent low cost due to minimal capital expenditure requirement
- \* Minimal waste — die-cut pads are matched to customer specific mounting outlines
- \* Reduced scrap for further installation savings - Fastelek is re-workable after it has cured
- \* No clean up or OSHA concerns — No "Run Out" with controlled thickness film or die-cut
- \* More assembly line flexibility, scrap reduction—repositionable twice, before and after assembly

#### What problems can Fastelfilm Solve?

- \* Uneven adhesive application along mounting interface
- \* Long periods for setup / installation
- \* Adhesive in unwanted application areas
- \* Long cure times
- \* Alternative to high cost conductive adhesives
- \* Inability to re-work after curing
- \* Short term storage conditions

#### Popular Fastelek Applications



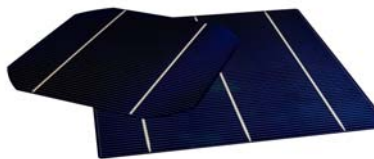
**Electronics Application**  
 Electrical Contact Bonding/Sealing  
 Component / surface mounting  
 EMI/RFI Shielding  
 Case bonding and sealing  
 Fixture / assembly setup  
 Membrane switch assembly



**Automotive Application**  
 Electronics Assembly  
 EMI/RFI Shielding  
 Component mounting  
 Membrane switch assembly  
 Fixture / assembly setup



**Alternative Energy Application**  
 Photovoltaic cell bonding/sealing  
 Electrical Contact Bonding/Sealing  
 EMI/RFI Shielding  
 Component mounting  
 Solar device assembly  
 Fixture / assembly setup



**Medical Device**  
 Electronics Assembly  
 EMI/RFI Shielding  
 Membrane Switch Assembly  
 Fixture / assembly setup



#### Substrate Options

**Need Fastelek coated at a specific thickness onto one or both sides of a substrate?**

All Fastelek formulations have the ability to be coated on a wide range of substrate types designed to meet a specific application requirement.

**Masking Options:** Fastelek adhesive masking options is a process in which the substrate is masked before applying the adhesive coating. The masking can then be removed to allow for exposed areas of the substrate. Popular for copper substrates where exposure of substrate in predetermined areas is desired for electrical contact or soldering.

<b>Foils</b>	Aluminum 1100 1235	Copper 110 101	Stainless 304 321	Brass	Inconel
<b>Plastics &amp; Rubber</b>	PET Film	Heat Stabilized PET	Polyimide HN And MT Films	Foams (Various Durometers)	Rubber (Various Types)
<b>Other</b>	Synthetics	Laminates	Customer Defined Substrate		

Custom coated substrates available. For more information, contact toll free 1-888-989-3832 (US only) +1-949-369-7676 (international) or e-mail [info@fasteladhesives.com](mailto:info@fasteladhesives.com)



#### Fastelek Typical Properties (free standing film)

Characteristic	Fastelek Adhesive
Base Formulation	Thermoplastic (conductive)
Adhesive Thickness Tolerances	+/- 10% of target thickness
Die Cut Pad Dimensional Tolerances	0.010" (0.25mm) Typical
Liner Thickness	0.003" (0.08mm) Paper (standard) or Clear Polyester
Solids	100% Solids
Color	Dark Gray (Std), Beige (Plus), Light Beige (Super)
Standard Sheet Sizes	12.00" x 24.00" (30.5cm x 61cm)
Standard Roll Width	12.00" or 24.00" wide (custom widths available)
Standard Roll Lengths	100ft (30.5m), 250ft (76.0m), 500ft (152m)
Die Cut Methods	Steele Rule Die, Flexible Die, Rotary Die Cutting
Pre-Applied PSA (vertical setup mounting)	Die cuts available with PSA edgestrips for preliminary tack
Specific Gravity	~ 1.10
Tensile Strength (at break) (0.005" thick film)	698 PSI
Elongation (at break) (0.005" thick film)	~ 150%

Electrical Conductivity	Volume Resistivity
<i>Fastelek Standard (100% Nickel Filled, 0.005" Thick)</i>	~ 1.00 ohms-cm
<i>Fastelek + (Plus) (Silver &amp; Nickel Filled Mix, 0.005" Thick)</i>	~ 0.50 ohms-cm
<i>Super Fastelek (100% Silver Filled, 0.005" Thick)</i>	~ 0.20 ohms-cm

Note: volume resistivity tested per ASTM D2739-97 using Fastelek 160°F / 71°C Phase Change Temperature at 0.005" thick within all 3 available metallic filled options. Electrical conductivity performance within the scope of your application may be impacted by substrates bonded, bond line and pressure at time of heating. Thinner film options than 0.005" or decreasing the bond line during heating with pressure can increase the electrical conductivity performance of all Fastelek Formulations.

Recommended Tacking	Temperature
<i>Fastelek 16071 (standard, plus or super)</i>	<i>100°F to 110°F @ 2 to 3 seconds dwell time (5 to 10 psi)</i>
<i>Fastelek 20093 (standard, plus or super)</i>	<i>100°F to 110°F @ 2 to 3 seconds dwell time (5 to 10 psi)</i>
<i>Fastelek 230110 (standard, plus or super)</i>	<i>110°F to 130°F @ 2 to 3 seconds dwell time (5 to 10 psi)</i>

Note: if using paper release liner during tacking process, remove liner by peeling back after tacking to expose Fastelek Adhesive.

Recommended Bonding Conditions	Temperature
<i>Fastelek 16071 (standard, plus or super)</i>	<i>180°F to 210°F @ 5 to 8 seconds dwell time (10 to 20 psi)</i>
<i>Fastelek 20093 (standard, plus or super)</i>	<i>235°F to 255°F @ 5 to 8 seconds dwell time (10 to 20 psi)</i>
<i>Fastelek 230110 (standard, plus or super)</i>	<i>265°F to 285°F @ 5 to 8 seconds dwell time (10 to 20 psi)</i>

Note: User testing should be performed to determine setup, heating temperature, pressure, materials being bonded and heating time to yield best installation and adhesion results within the scope of your application requirements. All information provided above is for reference only and to be used as a starting point for optimal application setup. All data presented above is based upon Fastelek Free Standing Film without the introduction of substrates. The introduction of a substrate coated product may vary recommended setup and application temperatures.

#### Fastelek Typical Properties Continued (free standing film)

Substrate	Observation	Result
Aluminum	Excellent	650 psi
Copper	Excellent	650 psi
Stainless Steel	Good	550 psi
Titanium	Excellent	650 psi
Brass	Good	575 psi
PCB Materials	Excellent	650 psi
Glass	Excellent	650 psi
Plastics (ABS, PVC)	Excellent	650 psi

Note: lap shear strength test (ASTM C-961-06) using 10 mil thick Fastelek 16071 Standard with a bonding area of 2" x 2". Substrate samples prepared using Fastelek 16071 Standard in a curing oven at 200F for 20 minutes. Samples tested in lap shear tester 24 hours after adhesive was heat cured.

Hardness & Viscosity	Result
Hardness (Shore A)(Durometer)(2 Hour Cure at RT)	~ 80 to 90
Viscosity (liquid) at 85°C, cps (standard)	15,150 to 17,850
Viscosity (liquid) at 85°C, cps (plus)	12,125 to 13,350
Viscosity (liquid) at 85°C, cps (super)	9,150 to 10,875

Note: Hardness testing performed per ASTM D-2240-05, Manual Method, using Fastelek formulation ID 16071. Viscosity testing performed per ASTM D-3236-88 using Fastelek formulation ID 16071.

Thermal Outgassing	Result
Total Mass Loss, % TML	0.138
Collectible Volatile, Condensable Matter, % CVC	0.130
Water Vapor Gain, % WVR	0.021

Note: Thermal outgassing test performed per ASTM E595-93 using Fastelek formulation ID 16071. Due to no outgassing, Fastelek is suitable for aerospace application.

Storage & Shelf Life	Result
Storage Condition and Temperature	Cool Dry Location at or below 95°F / 35°C
Shelf Life	Indefinite if stored per storage conditions above

#### Application Re-Work / De-Bonding

A unique characteristic of Fastelek Adhesive is in its ability to be easily re-worked. Simply heat the adhesive past its phase-change temperature and pull apart your substrates. Depending on the amount of adhesive left on your application surface, introduction of new Fastelek material may be required when re-assembling. Fastelek Adhesive can be heated past its phase-change temperature numerous times allowing for multiple re-work if necessary. Adhesive residue in unwanted areas can be cleaned up using mineral spirits solvent and a cloth towel. Other clean up methods includes heating the adhesive close to its phase-change temperature and gently wiping away softened unwanted adhesive.

**Note: For best results, make sure all application surfaces are clean and free of debris.**

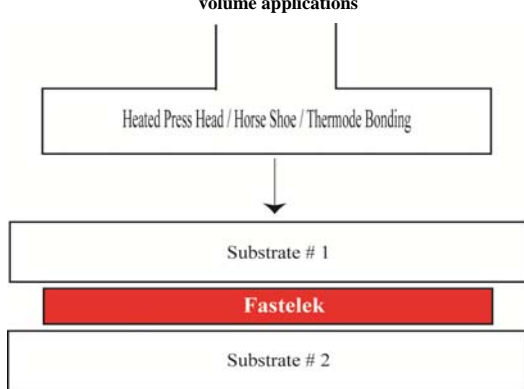


#### Fastelek Typical Application Methods

The following diagrams illustrate basic setups using various commercially available heating methods. Fastelek Adhesive can be applied, heated and cured using common thermal induction methods including a curing oven, heated press, hydraulic press, heat tunnel, heated lamination rollers, heat gun or custom built fixture/heating device. Determining your optimal setup and heating method should be tested beforehand and is dependent on your substrates, setup pressure, heating device, heating time as well as Fastelek formulation and thickness being used. **With all setups, carrier liner should be removed first before applying.**

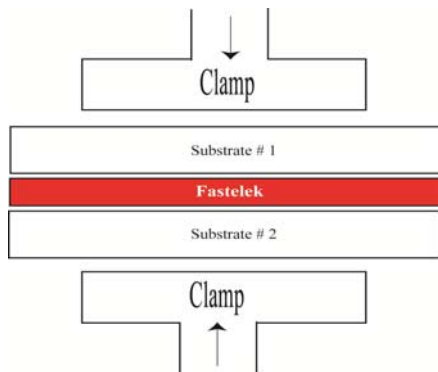
Apply heat using a heated press / horse shoe / thermode bonding method. Heat transfer through substrate # 1

Good for setups, tacking, small surface areas or low to mid volume applications



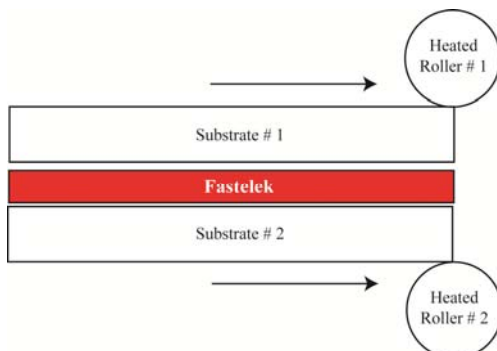
Clamp entire assembly together. Apply heat using multiple methods of heating including curing oven, heat tunnel or heat gun

Good for small or large surface areas as well as low, mid and high volume applications



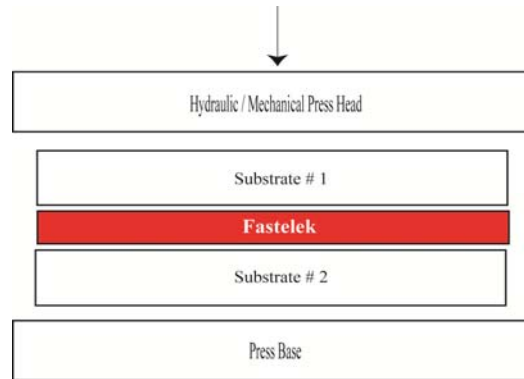
Process through top and bottom (or single) heated rollers. Heat will transfer through substrates.

Good for large or continuous surface areas for a mid to high volume application environments



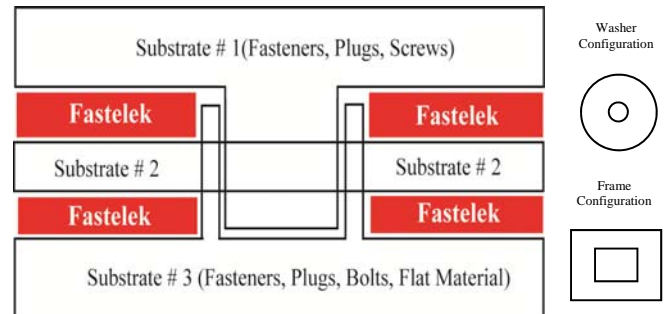
Apply heat using a hydraulic/mechanical press. Heat transfer through substrate # 1

Good for large surface areas or mid to high volume applications



General setup for bonding and sealing heads of mechanical fasteners / plugs / screws. Apply heat using a curing oven, heat tunnel, heat gun, hydraulic or mechanical press.

Good for small area high volume applications when wanting to



#### Fastelek Adhesive Testing & Sampling

Adhesive material evaluation is always critical when designing in a new material or developing a new product. Sheet samples of Fastelek Adhesive are available for preliminary testing to determine the optimal Fastelek formulation, thickness, setup and heating method within the scope of your application requirements.

**Want to test samples per your required die cut part?** Our razor plotter sampling machine allows us to provide customers Fastelek already cut to their required outline for testing. Plotter formed samples provide our customers the ability to test not only the adhesive, but their required outline as well without incurring the expense of production tooling.

Contact Fastel Adhesive Products at 1-888-989-3832 (US Only) +1-949-369-7676 (International) or e-mail [info@fasteladhesives.com](mailto:info@fasteladhesives.com) to request sample sheets or plotter formed samples for testing.