Advantage 160

Advantage 160 is a two-component crosslinking polyvinyl acetate emulsion adhesive developed specifically for finger jointing; but performs well in laminating and edge gluing. When mixed with Catalyst A it exceeds the requirements for ASTM D-5572 wet use for finger joints in non-structural lumber products as well the European DIN EN 204 D4. This adhesive has a shear thinning rheology for easy extrudability and a low minimum use temperature allowing it to be used over a wide application range.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *White colored liquid*
Typical viscosity (cps): uncatalyzed: *1700 - 4000 (3/12/83 ℉)* ***Catalyzed:*** *1000 - 3000 cps*
Weight solids (%): *49 - 53%*
pH: *uncatalyzed: 4.5 - 5.0 catalyzed: 2.0 – 4.0*
Specific gravity: *1.09* ***Weight pounds per gallon:*** *9.09*
Suggested minimum use temperature: *45 ℉/7 ℃*

KEY PRODUCT FEATURES

- Excellent for finger jointing and extrusion applications
- Good for radio frequency gluing as well as hot press and cold press operations
- Low VOCs
- High water-resistance
- Low minimum use temperature
- Translucent to clear glue line

PERFORMANCE PROPERTIES

Advantage 160 with 6% Catalyst A

- European E-1 formaldehyde emission standard
- Exceeds ASTM D-5572-99 Wet Use for Finger joints in Non-structural Lumber Products
- Exceeds DIN EN 204 D4 Classification of Thermoplastic Wood Adhesives for Non-structural Applications

ASTM D-5572-99 Wet Use for Finger joints in Non-structural Lumber Products - Tension

	Test Results			Requirements		
Exposure	***Strength (psi) Average***	***Wood failure (%) Average***	***Wood failure (%) minimum***	***Strength (psi) Average***	***Wood failure (% Average***	***Wood failure 95) minimum***
Dry	*6119*	*93*	*80*	***2000***	***60***	***15***
Boil	*2152*	*50*	*30*	***1600***	***50***	***25***
220℉ Elevated temperature	*2999*	*59*	*25*	***1000***	***N/A***	***N/A***
Vacuum pressure	*2571*	*61*	*45*	***1600***	***50***	***25***

**Ponderosa Pine TECO test report #98-64 6/18/98*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

DIN EN 204 D4 Classification of thermoplastic wood adhesives for non structural applications
Load group D4 European Beech

Storage sequence	Minimum required average value (N/mm^2)	Average value (N/mm^2) on Advantage 160
1	≥ 10	15.3
3	≥ 4	7.3
5	≥ 4	5.2
6	≥ 8	13.7

**Rosenheim report 505 16871/1e 4/23/96*

*Like all adhesives, proper gluing practices are needed to achieve stated performance.

MIXING INSTRUCTIONS

The recommended proportion of catalyst to resin is five percent by volume or six percent by weight. Place the resin in a mixer and slowly add catalyst under agitation. Continue mixing for five to ten minutes after the catalyst is added to ensure a homogeneous mixture. A smaller amount of catalyst can be used under certain conditions (such as burning in a radio frequency press), but water resistance performance should be validated. It is best to mix the catalyzed material if it has been kept for longer than seven to eight hours since it will increase in viscosity with time.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against.

Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 20 minutes

Press/clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ twenty degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product may need filtered in warmer temperatures; contact Franklin Technical Support for easy filtering options. Product is freeze-thaw stable. If it becomes frozen, allow to warm to ambient temperature and thoroughly mix until a homogenous, smooth mixture is obtained.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

product data sheet

Wood Adhesives

Advantage 405

Advantage 405 is a two-part crosslinking polyvinyl acetate emulsion adhesive developed especially for high durability applications. When mixed with Aluminum Chloride (Catalyst A) the product surpasses both ASTM D-5572 Wet Use for Finger Joints in Non-structural Lumber Products and ASTM D-5751 Wet Use for Laminate Joints in Non-structural Lumber Products. These standards are the basis for Hallmark Certification. Advantage 405 can be used for finger jointing, edge gluing, hot pressing, cold pressing and radio frequency gluing.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Beige colored liquid*
Typical viscosity (cps): *Uncatalyzed: 1800 - 3800 (4/60/83 ℉) Catalyzed: 1000 - 3000 cps*
Weight solids (%): *50.0 - 54.0%*
pH: *uncatalyzed: 6.5 - 7.6 catalyzed: 2.0 - 4.0*
Specific gravity: *1.11* ***Weight pounds per gallon****: 9.26*
Suggested minimum use temperature: *55 ℉/ 12 ℃*

KEY PRODUCT FEATURES

- Performs well in millwork applications
- Excellent for lamination and edge and face gluing in radio frequency equipment
- High water-resistance
- Excellent pot life
- 175.105 & 176.180 FDA Compliant

PERFORMANCE PROPERTIES

- Exceeds ASTM D-5751-99 Wet Use for Laminate Joints in Non-structural Lumber Products
- Exceeds ASTM D-5572-99 Wet Use for Finger joints in Non-structural Lumber Products

Advantage 405 with Catalyst A has met or exceeded the following industry standards:

ASTM D-5751-99 Wet Use for Laminate Joints in Non-Structural Lumber Products

	Test results				Requirements			
Exposure	***Strength (psi) Average***	***Strength (psi) Minimum***	***Wood failure (%) Average***	***Wood failure (%) Minimum***	***Strength (psi) Average***	***Strength (psi) Minimum***	***Wood failure (%) Average***	***Wood failure (%) Minimum***
Dry	*1548*	*1263*	*90*	*80*	***721***	***360***	***60***	***30***
Vacuum Pressure	*720*	*677*	*91*	*85*	***601***	***300***	***50***	***25***
Boil	*640*	*593*	*88*	*65*	***601***	***300***	***50***	***25***
Elevated Temp.	*1108*	*809*	*45*	*25*	***480***	***240***	***40***	***20***

**Ponderosa Pine - TECO report 08-P-0123*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

ASTM D-5572-99 Wet Use for Finger Joints in Non-structural Lumber Products - Tension

	Test results				Requirements		
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*4131*	*N/A*	*96*	*85*	***2000***	***60***	***30***
Vacuum Pressure	*1859*	*N/A*	*72*	*45*	***1600***	***50***	***25***
Boil	*2026*	*N/A*	*82*	*55*	***1600***	***50***	***25***
Elevated Temp.	*2676*	*N/A*	*97*	*75*	***1000***	***NR***	***NR***

**Ponderosa Pine – TECO report 03-026*

Like all adhesives, proper gluing practices are needed to achieve stated performance.

MIXING INSTRUCTIONS

The recommended proportion of catalyst to resin is five percent by volume or six percent by weight. Place the resin in a mixer and slowly add catalyst under agitation. Continue mixing for five to ten minutes after the catalyst is added to ensure a homogeneous mixture. A smaller amount of catalyst can be used under certain conditions (such as burning in a radio frequency press), but water resistance performance should be validated. It is best to mix the catalyzed material if it has been kept for longer than seven to eight hours since it will increase in viscosity with time.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against.

Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 20 minutes

Press/clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ twenty degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

STORAGE AND HANDLING

Shelf life: Best if used within four months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable. If it becomes frozen, allow to warm to ambient temperature and thoroughly mix until a homogenous, smooth mixture is obtained. Product not sold into California.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Advantage 415

Advantage 415 is a two-part crosslinking polyvinyl acetate emulsion adhesive developed especially for high durability applications. When mixed with Aluminum Chloride (Catalyst A) the product surpasses both ASTM D-5572 Wet Use for Finger Joints in Non-structural Lumber Products and ASTM D-5751 Wet Use for Laminate Joints in Non-structural Lumber Products. These standards are the basis for Hallmark Certification. Advantage 415 can be used for finger jointing, edge gluing, hot pressing, cold pressing and radio frequency gluing.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Beige colored liquid*
Typical viscosity (cps): *uncatalyzed: 2000 - 3700 (4/60/83 ℉) Catalyzed: 1000 - 3000 cps*
Weight solids (%): *48.0 – 51.0%*
pH: *uncatalyzed: 6.5 - 8.0 catalyzed: 2.0 - 4.0*
Specific gravity: *1.12* ***Weight pounds per gallon****: 9.34*
Suggested minimum use temperature: *53 ℉/ 11 ℃*

KEY PRODUCT FEATURES

- Performs well in millwork applications
- Excellent for lamination and edge and face gluing in radio frequency equipment
- High water-resistance
- Excellent pot life

PERFORMANCE PROPERTIES

- Exceeds ASTM D-5751-99 Wet Use for Laminate Joints in Non-structural Lumber Products
- Exceeds ASTM D-5572-99 Wet Use for Finger joints in Non-structural Lumber Products

Advantage 415 with Catalyst A has met or exceeded the following industry standards:

ASTM D-5751-99 Wet Use for Laminate Joints in Non-Structural Lumber Products

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*1818*	*1202*	*91*	*80*	***741***	***371***	***60***	***30***
Vacuum Pressure	*923*	*804*	*81*	*65*	***618***	***309***	***50***	***25***
Boil	*759*	*495*	*61*	*25*	***618***	***309***	***50***	***25***
Elevated Temp.	*1128*	*819*	*42*	*20*	***494***	***247***	***40***	***20***

**Ponderosa Pine - TECO report 05-228 11-16-05*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

ASTM D-5572-99 Wet Use for Finger Joints in Non-structural Lumber Products - Tension

	Test results				Requirements		
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*5898*	*3312*	*93*	*65*	***2000***	***60***	***30***
Vacuum Pressure	*2622*	*1850*	*54*	*25*	***1600***	***50***	***25***
Boil	*2194*	*1897*	*50*	*30*	***1600***	***50***	***25***
Elevated Temp.	*2999*	*2227*	*84*	*45*	***1000***	***NR***	***NR***

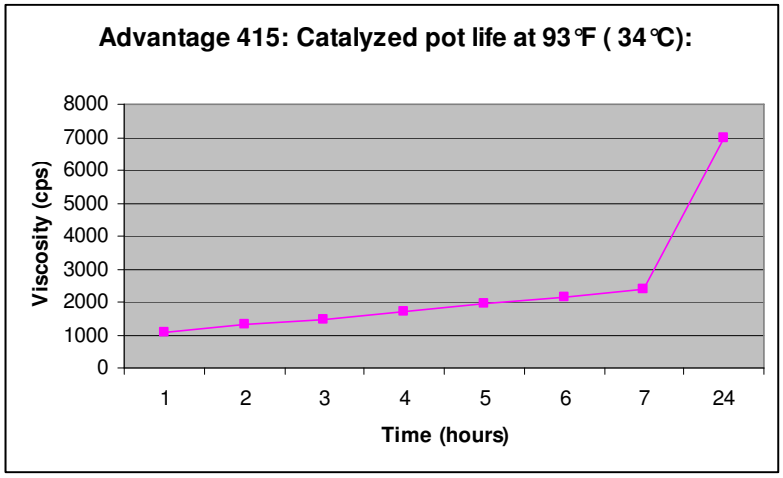
**Ponderosa Pine – TECO report 10-P-0072 07-19-05*

Like all adhesives, proper gluing practices are needed to achieve stated performance.

MIXING INSTRUCTIONS

The recommended proportion of catalyst to resin is five percent by volume or six percent by weight. Place the resin in a mixer and slowly add catalyst under agitation. Continue mixing for five to ten minutes after the catalyst is added to ensure a homogeneous mixture. A smaller amount of catalyst can be used under certain conditions (such as burning in a radio frequency press), but water resistance performance should be validated. It is best to mix the catalyzed material if it has been kept for longer than seven to eight hours since it will increase in viscosity with time.

POT LIFE



APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against.

Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 20 minutes

Press/clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ twenty degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Distance to Deepest Glue Line	Platen Temperature °F									
	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

STORAGE AND HANDLING

Shelf life: Best if used within four months of date of manufacture. Product is freeze-thaw stable. If it becomes frozen, allow to warm to ambient temperature and thoroughly mix until a homogenous, smooth mixture is obtained. Product not sold into California.

For additional questions, Franklin’s technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin’s control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin’s control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.’s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx (“Standard Terms”). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer’s consent to the Standard Terms, and Customer’s acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer’s acceptance of the Standard Terms and Conditions of Sale.

A division of Franklin International
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

ADVANTAGE 425

ADVANTAGE 425 is a high performance, two-part crosslinking polyvinyl acetate emulsion adhesive developed specifically for finger jointing. It has a shear thinning rheology for easy application and a low minimum use temperature. When mixed with Aluminum Chloride (Catalyst A) the product surpassed ASTM D-5572 Wet Use for Finger Joints in Non-structural Lumber Products. This standard is the basis for Hallmark Certification on glued finger joints.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *White colored liquid*
Typical viscosity (cps): *uncatalyzed: 2000 - 3000 (3/12/83 ℉) Catalyzed: 1000 - 3500 cps*
Weight solids (%): *48.0 - 54.0%*
pH: *uncatalyzed: 6.5 - 7.5 catalyzed: 2.0 - 4.0*
Specific gravity: *1.10* ***Weight pounds per gallon****: 9.18*
Suggested minimum use temperature: *49 ℉/ 9 ℃*

KEY PRODUCT FEATURES

- High performance adhesive specifically for finger joint applications
- Low minimum use temperature
- Shear thinning rheology for extrusion applications
- Used by some of the best window brands in the industry

PERFORMANCE PROPERTIES

- Exceeds ASTM D-5572-99 Wet Use for Finger joints in Non-structural Lumber Products

ASTM D-5572-99 Wet Use for Finger Joints in Non-structural Lumber Products - Tension

	Test Results				Requirements		
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*5108*	*3902*	*98*	*80*	***2000***	***60***	***30***
Vacuum Pressure	*2254*	*1723*	*59*	*40*	***1600***	***50***	***25***
Boil	*2689*	*2429*	*85*	*70*	***1600***	***50***	***25***
Elevated Temp.	*2674*	*2214*	*NR*	*NR*	***1000***	***NR***	***NR***

**Represents average Franklin laboratory results on Ponderosa Pine*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

ASTM D-5572-99 Wet Use for Finger Joints in Non-structural Lumber Products – Flexure: Modulus of Rupture (MOR)

	Test Results		Requirements
Exposure	*MOR (psi) Average*	*MOR (psi) Minimum*	*MOR (psi) Minimum*
Dry	*8718*	*6780*	***2000***
Vacuum Pressure	*2963*	*2525*	***1400***
Boil	*3654*	*3341*	***1400***

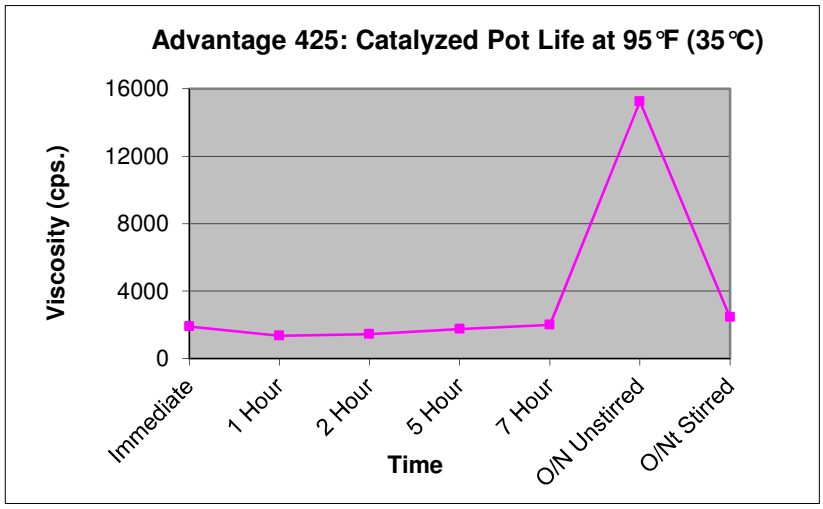
**Represents average Franklin laboratory results on Ponderosa Pine*

Like all adhesives, proper gluing practices are needed to achieve stated performance.

MIXING INSTRUCTIONS

The recommended proportion of catalyst to resin is five percent by volume or six percent by weight. Place the resin in a mixer and slowly add catalyst under agitation. Continue mixing for five to ten minutes after the catalyst is added to ensure a homogeneous mixture. A smaller amount of catalyst can be used under certain conditions (such as burning in a radio frequency press), but water resistance performance should be validated. It is best to mix the catalyzed material if it has been kept for longer than seven to eight hours since it will increase in viscosity with time.

POT LIFE



APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against.

Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

Press/clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ twenty degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

STORAGE AND HANDLING

Shelf life: Best if used within four months of date of manufacture. Product only available in air assist style totes. Product not sold into California.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Advantage EP-925

Advantage EP-925 is a two-component, low foaming emulsion polymer isocyanate (EPI) adhesive recommended for applications requiring exceptional water, heat and solvent resistance. The product can be utilized with conventional cold press or hot press equipment and has been enhanced to provide superior performance with radio frequency press equipment. Advantage EP-925 allows for reduction in conditioning time before surfacing which improves productivity. It is also characterized by good spreader stability when compared with traditional EPI adhesives.

PHYSICAL PROPERTIES

Advantage EP-925
***Chemical family description**: polyvinyl acetate emulsion adhesive*
***Appearance:** White colored liquid*
***Specific gravity:** 1.28*
***Weight solids (%):** 55.0 - 59.0*
***pH:** 6.5 - 8.0*
***Suggested minimum use temperature:** 46°F/ 8°C*
***Typical viscosity (cps):** 8000 - 11000*
***Mixed viscosity (cps):** 10000 - 16000 when mixed; 17000 - 30000 at one hour*

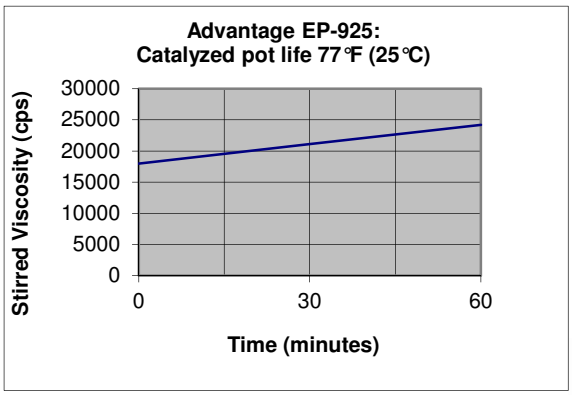
Hardener 200
***Chemical family description:** Polymeric MDI*
***Appearance:** Brown colored liquid*
***Typical viscosity (cps):** 170 - 230*
***Specific gravity:** 1.23*

KEY PRODUCT FEATURES

- Recommended for applications requiring water, heat and solvent resistance
- Excellent for hot and cold pressing and radio frequency pressing
- Low film formation temperature allowing it to be used over a wide range of plant temperatures
- Low foaming EPI adhesive
- Good spreader stability
- Meets European E-1 formaldehyde emission standard
- Meets CARB requirements when tested in various wood constructions
- 175.105 FDA Compliant

POT LIFE

The pot life of Advantage EP-925 is in excess of one hour at 77 degrees Fahrenheit (twenty five degrees Celsius). However the viscosity of the mix will increase as it ages. Wood glued with older material will have less water resistance, a characteristic common to most EPI adhesives. Therefore, it is recommended that fresh adhesive be mixed only when it is to be immediately used. EPI adhesives also generate foam during the reaction process; so it is best to have the material continually moving.



A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

MIXING INSTRUCTIONS

Advantage EP-925 resin is mixed with Hardener 200 at a ratio of 100 parts resin to 15 parts Hardener by weight or 6.45 parts resin to one part Hardener by volume. Avoid mixing for long periods of time or with excessive agitation as pot life is affected by mixing time and speed. While this product can be easily mixed by hand, it is usually more convenient to mix the components in a meter mix unit. Your Franklin representative can work with you to supply the appropriate mixing equipment.

PERFORMANCE PROPERTIES

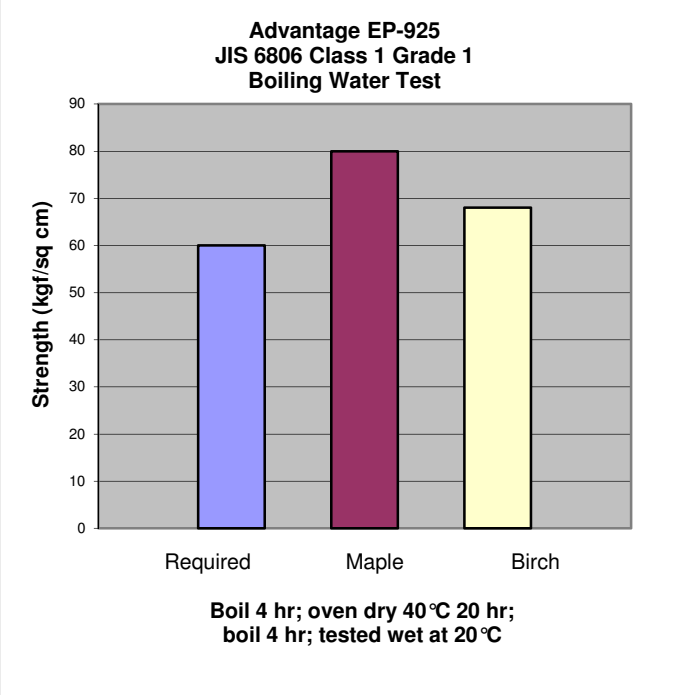
Bond Strength and Radio Frequency Gluing Performance

Advantage EP-925 is formulated to provide higher immediate bond strengths in the radio frequency equipment than conventional EPI adhesives. A positive correlation exists between the adhesive's electrical conductivity and its immediate bond strength upon removal from radio frequency press equipment – with higher conductivity resulting in higher immediate bond strengths.

	Conductivity
Competitive EPI	1.87 (µ Mho)
Advantage EP-925	**4.25 (µ Mho)**

Bonding Strength and Durability

- **Japanese Industrial Standard Class 1, Grade 1:** Pass (refer to chart for boiling water test results)
- **Japanese Agricultural Society (JAS) standard for glued laminated timber for fixture**
  - Cold water soak delamination test: Pass
  - Boiling water soak delamination test softwoods: Pass
- **ANSI/HPVA EF 2009:** PASS



Exceeds ANSI/HPVA HP-1-2004 Type I

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
2 cycle boil	*354*	*324*	*30*	*10*	***>350***	***NR***	***15***	***10***

**3-ply rotary cut birch Franklin Laboratory results 16803*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Exceeds DIN EN 204 D4 Classification of thermoplastic wood adhesives for non structural applications: Load group D4 Beech

Storage sequence	Minimum required average value (N/mm^2)	Average value (N/mm^2) on Advantage EP-925
1	≥ 10	12.2
3	≥ 4	6.6
5	≥ 4	5.8

**Rosenheim report 505 36441/9e 3/16/09*

Exceeds DIN EN 14257 (WATT 91)

Average value (N/mm^2) on Advantage EP-925
11.6

**Rosenheim report 505 36441/10e 3/16/09*

Exceeds ASTM D-5751-99 wet use for laminate joints in non-structural lumber products

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*1816*	*1447*	*99*	*90*	***950***	***475***	***60***	***30***
Vacuum Pressure	*961*	*855*	*75*	*35*	***792***	***396***	***50***	***25***
Boil	*831*	*756*	*73*	*60*	***792***	***396***	***50***	***25***
Elevated Temp.	*1350*	*1056*	*88*	*70*	***633***	***317***	***40***	***20***

**Southern yellow pine radio frequency cured - TECO report 05-243A*

Exceeds ASTM D-5751-99 wet use for laminate joints in non-structural lumber products

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*1779*	*1554*	*98*	*90*	***950***	***475***	***60***	***30***
Vacuum Pressure	*928*	*855*	*50*	*30*	***792***	***396***	***50***	***25***
Boil	*824*	*727*	*73*	*55*	***792***	***396***	***50***	***25***
Elevated Temp.	*1401*	*1034*	*95*	*80*	***633***	***317***	***40***	***20***

**Southern yellow pine cold pressed - TECO report 05-243B*

Exceeds ASTM D-5751-99 wet use for laminate joints in non-structural lumber products

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*2009*	*1529*	*86*	*50*	***1061***	***530***	***60***	***30***
Vacuum Pressure	*977*	*852*	*58*	*30*	***884***	***442***	***50***	***25***
Boil	*949*	*761*	*81*	*45*	***800***	***400***	***50***	***25***
Elevated Temp.	*1511*	*865*	*55*	*20*	***707***	***354***	***40***	***20***

**Radiata pine radio frequency cured - TECO report 05-243C*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Exceeds ASTM D-5751-99 wet use for laminate joints in non-structural lumber products

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	2,175	*1791*	*88*	*45*	***1061***	***530***	***60***	***30***
Vacuum Pressure	*951*	*837*	*58*	*20*	***884***	***442***	***50***	***25***
Boil	*911*	*703*	*70*	*20*	***800***	***400***	***50***	***25***
Elevated Temp.	*1849*	*1242*	*78*	*15*	***707***	***354***	***40***	***20***

**Radiata pine cold pressed - TECO report 05-243D*

APPLICATION GUIDELINES

Moisture content: Six to ten percent is the recommended moisture content for the gluing stock. Higher moisture content will increase the clamp time needed. Additionally, moisture content should mirror (as closely as possible) that which will be experienced in the end use market for the wood product being manufactured.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be avoided. When possible, glue joints should be prepared and glued the same day. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives.

Spread rate: The recommended adhesive coating layer is the same as for most PVA products or approximately 0.007 inches/ 0.178 mm in thickness. EPI adhesives have superior gap filling properties due to their higher percent solids content. While Advantage EP-925 has higher percent solids content than most PVA adhesives, it also has a higher specific gravity than PVA. This means that in order to apply the same 0.2 mm thickness layer of wet adhesive as for PVA, a higher gram weight of adhesive should be applied. Generally, 200 g/m² / 41 #/MSGL of glue line is adequate.

Conveyorized spreaders are commonly used in edge-gluing applications. Adjust the applicator to ensure complete coverage on the staves. One side application is adequate in most situations. Verify that adequate coverage exists by monitoring squeeze-out along the glue lines when the panels are under pressure.

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Clamping pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces must be made to obtain maximum strength. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (5 cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers™

Press/clamp time: A minimum press time of 30 minutes is recommended under ideal conditions when using soft wood species at moisture content less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ twenty degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Working pauses: The spreader should be kept running during pauses in production for lunch breaks, etc. to help extend the working life of the adhesive.

Machining: Post-gluing conditioning is not unlike PVA products, although shorter curing times are frequently possible. We recommend that panels be allowed to condition at least six hours prior to additional processing.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Distance to Deepest Glue Line	Platen Temperature °F									
	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: The foaming and cross-linking characteristics of EPI may cause blockages in the wastewater plumbing. Furthermore, there may be disposal concerns with the mixed product. It is recommended that the excess glue from the spreader and mixing containers be poured into a container and disposed of. Avoid sealing the container for at least 24 hours to permit EPI components to finish reacting. Glue pans and rollers may then be washed in warm water.

HANDLING AND STORAGE

Shelf life: Best if used within six months of date of manufacture. Mix before use. Product is freeze-thaw stable. If it becomes frozen, allow to warm to ambient temperature and thoroughly mix until a homogenous, smooth mixture is obtained.

Storage of Hardener: Hardener 200 is very susceptible to moisture. We recommend that it be kept in a sealed container. A desiccant or nitrogen blanket is recommended.

Safety and disposal: Hardener 200 is a polymeric isocyanate. Use of gloves and other protective equipment is recommended. Consult MSDS before use for additional information.

For additional questions, Franklin’s technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:
The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin’s control. Customer should determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and

end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers

Advantage EP-930

Advantage EP-930 is an emulsion polymer isocyanate system (EPI) developed for improved radio frequency performance. It is mixed with Hardener 400, a polymeric isocyanate at 10-15 parts Hardener 400 to 100 parts emulsion Advantage EP-930. The adhesive is characterized by good spreader stability and low foam production when compared with traditional EPI adhesives. Advantage EP-930 with Hardener 400 surpasses the ASTM D-5751-99 wet use for laminate joints in non-structural lumber products and the DIN D4 standard.

PHYSICAL PROPERTIES

Advantage EP-930
***Chemical family description**: polyvinyl acetate emulsion adhesive*
***Appearance:** White colored liquid*
***Specific gravity:** 1.36*
***Weight solids (%):** 55.0 - 58.5%*
***pH:** 7.0 - 8.5*
***Suggested minimum use temperature:** 46℉/ 7℃*
***Typical viscosity (cps):** 3000 - 5000*
***Mixed viscosity (cps):** 6000 - 11000 when mixed; 13000 - 17000 at one hour*

Hardener 400
***Chemical family description:** Polymeric MDI*
***Appearance:** Brown colored liquid*
***Typical viscosity at 25℃ (cps):** 66*
***Specific gravity:** 1.22*

KEY PRODUCT FEATURES

- Performs well on Millwork and radio frequency applications
- Low foam production
- Good spreader stability
- Good adhesion to laminated veneer lumber and other treated wood

PERFORMANCE PROPERTIES

- Exceeds ASTM D-5751-99 Wet Use for Laminate Joints in Non-structural Lumber Products
- Meets DIN EN 204 D4 Classification of Thermoplastic Wood Adhesives for Non-structural Applications

Like all adhesives, proper gluing practices are needed to achieve stated performance.

Exceeds ASTM D-5751-99 Wet Use for Laminate Joints in Non-structural Lumber Products

	Test results		Requirements			
Exposure	*Strength (psi) Average*	*Wood failure (%) Average*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Room Temperature	1550	87	680	340	60	30
Boil	897	78	567	283	50	25
Vacuum Pressure	947	65	567	283	50	25
Elevated Temp.	1421	90	453	227	40	20

**Ponderosa Pine radio frequency cured – Franklin laboratory results 17741, 4/13/2012*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

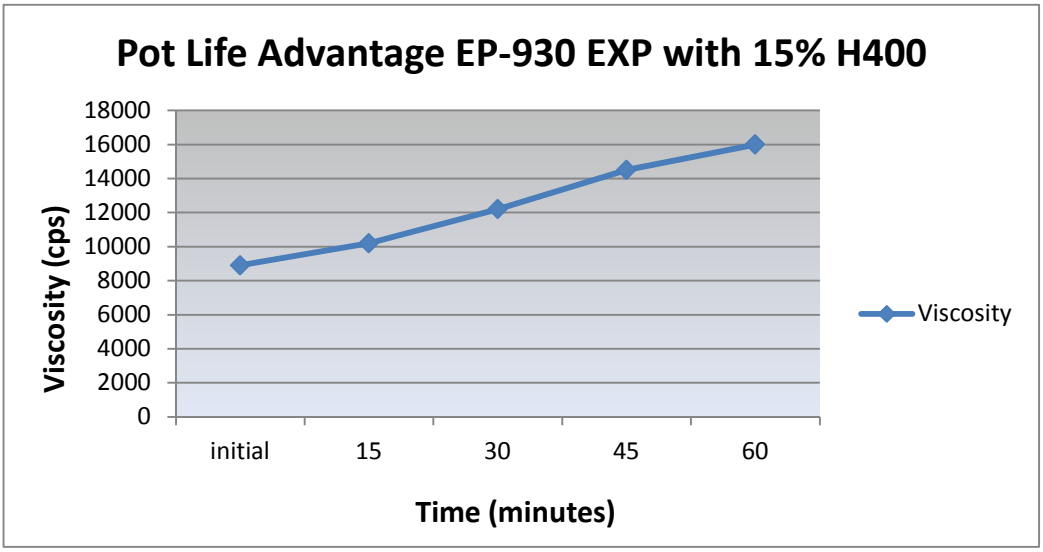
DIN EN 204 D4 Classification of Thermoplastic Wood Adhesives for Non-structural Applications: Load group D4 Beech

Storage sequence	Minimum required average value (N/mm^2)	Average value (N/mm^2) on Advantage EP-930
3	≥ 4	5.02
5	≥ 4	5.70

**European beech cold pressed- Franklin laboratory results 2/5/2010*

POT LIFE

The pot life of these systems is in excess of one hour at 77 degrees Fahrenheit (twenty five degrees Celsius). However the viscosity of the mix will increase as it ages. Wood glued with older material will have less water resistance, a characteristic common to most EPI adhesives. Therefore, it is recommended that fresh adhesive be mixed only when it is to be immediately used. EPI adhesives also generate foam during the reaction process; so we recommend keeping the material moving continually.



MIXING INSTRUCTIONS

Advantage EP-930 resin is mixed with Hardener 400 at a ratio of 100 parts resin to 15 parts Hardener by weight or 6.45 parts resin to one part Hardener by volume. Avoid mixing for long periods of time or with excessive agitation as pot life is affected by mixing time and speed. While this product can be easily mixed by hand, it is usually more convenient to mix the components in a meter mix unit. Your Franklin representative can work with you to supply the appropriate mixing equipment and appropriate mixing ratios depending on your application.

APPLICATION GUIDELINES

Moisture content: Six to ten percent is the recommended moisture content for the gluing stock. Higher moisture content will increase the clamp time needed. Additionally, moisture content should mirror (as closely as possible) that which will be experienced in the end use market for the wood product being manufactured.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be avoided. When possible, glue joints should be prepared and glued the same day. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives.

Spread rate: The recommended adhesive coating layer is the same as for most PVA products or approximately 0.007 inches/ 0.178 mm in thickness. EPI adhesives have superior gap filling properties due to their higher percent solids content. Generally, 200 g/m² / 41 #/MSGL of glue line is adequate.

Conveyorized spreaders are commonly used in edge-gluing applications. Adjust the applicator to ensure complete coverage on the staves. One side application is adequate in most situations. Verify that adequate coverage exists by monitoring squeeze-out along the glue lines when the panels are under pressure.

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Clamping pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces must be made to obtain maximum strength. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (5 cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Press/clamp time: A minimum press time of 30 minutes is recommended under ideal conditions when using soft wood species at moisture content less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Working pauses: The spreader should be kept running during pauses in production for lunch breaks, etc. to help extend the working life of the adhesive.

Machining: Post-gluing conditioning is not unlike PVA products, although shorter curing times are frequently possible. We recommend that panels be allowed to condition at least six hours prior to additional processing.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Distance to Deepest Glue Line	Platen Temperature °F									
	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Clean-up: The foaming and cross-linking characteristics of EPI may cause blockages in the wastewater plumbing. Furthermore, there may be disposal concerns with the mixed product. It is recommended that the excess glue from the spreader and mixing containers be poured into a container and disposed of. Avoid sealing the container for at least 24 hours to permit EPI components to finish reacting. Glue pans and rollers may then be washed in warm water.

HANDLING AND STORAGE

Shelf life: Best if used within four months of date of manufacture. Please mix before use since it very common for filler to settle out during aging.

Storage of Hardener: Hardener 400 is very susceptible to moisture. We recommend that it be kept in a sealed container. A desiccant or nitrogen blanket is recommended.

Safety and disposal: Hardener 400 is a polymeric isocyanate. Use of gloves and other protective equipment is recommended. Consult MSDS before use for additional information.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers™

Advantage EP-950A

Advantage EP-950A is an acrylic-based emulsion polymer isocyanate system (EPI) developed with exceptional water and heat resistance. It exceeds the requirements of ASTM D2559-12a, ASTM D7247-07ae1, ANSI 405-2013 and CSA 0112.10, which are required adhesive tests for many structural applications. This adhesive can be utilized in cold and hot press equipment. The emulsion must be mixed with Hardener 200, a polymeric isocyanate, at 13-15 parts Hardener 200 to 100 parts emulsion.

PHYSICAL PROPERTIES

Advantage EP-950A
***Chemical family description**: acrylic emulsion adhesive*
***Appearance:** White colored liquid*
***Specific gravity:** 1.28*
***Weight solids (%):** 46.0 - 57.8%*
***pH:** 6.5 - 8.2*
***Suggested minimum use temperature:** 46℉/ 7℃*
***Typical viscosity (cps):** 2900 - 5600 cps*
***Mixed viscosity (cps):** 8000 - 9000 when mixed; 15000 - 17000 at one hour*

Hardener 200
***Chemical family description:** Polymeric MDI*
***Appearance:** Brown colored liquid*
***Typical viscosity at 25℃ (cps):** 170 - 230*
***Specific gravity:** 1.23*

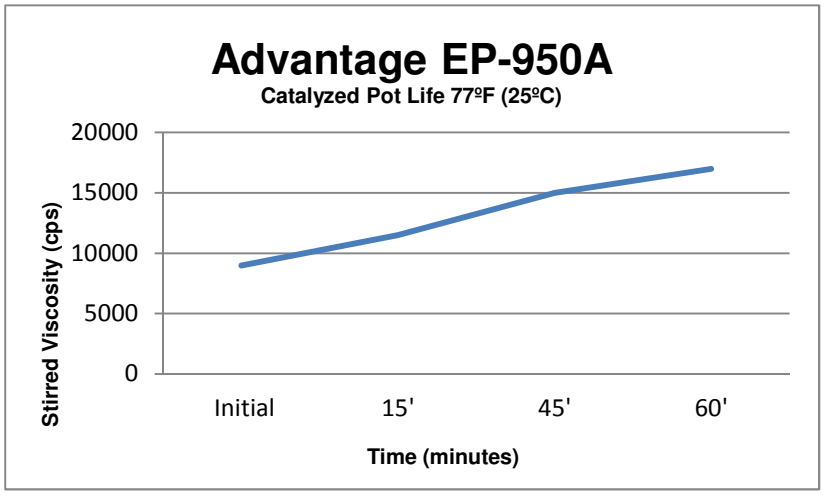
**The physical properties listed are target ranges and not final product specifications.*

KEY PRODUCT FEATURES

- Two-part acrylic EPI system
- Recommended for applications requiring excellent water, heat and solvent resistance
- Works well in cold and hot press applications
- Very low foam development
- Exceeds ASTM D2559-12a, ASTM D7247-07ae1 and ANSI 405-2013
- Exceeds CSA 0112.10
- CCMC Evaluation Listing 14035-L

POT LIFE

The pot life of this system is approximately one hour at 77℉ (25℃). However, the viscosity of the mix will increase as it ages. Wood glued with older material will have less water resistance, a characteristic common to most EPI adhesives. Therefore, it is recommended that fresh adhesive be mixed only when it is to be immediately used. EPI adhesives also generate foam during the reaction process; so we recommend keeping the material moving continually.



A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

MIXING INSTRUCTIONS

Advantage EP-950A resin is mixed with Hardener 200 at a ratio of 100 parts resin to 15 parts Hardener by weight or 6.45 parts resin to one part Hardener by volume. Avoid mixing for long periods of time or with excessive agitation as pot life is affected by mixing time and speed. While this product can be easily mixed by hand, it is usually more convenient to mix the components in a meter mix unit. Your Franklin representative can work with you to supply the appropriate mixing equipment.

PERFORMANCE PROPERTIES

- Exceeds ASTM D2559-12a Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions: This standard covers adhesives suitable for the bonding of wood into structural laminated wood products for general construction and other uses where a high-strength, durable adhesive bond is required. The strength and durability requirements are based on the performance of the adhesive in laminated wood as measured by the following test methods: resistance to shear by compression loading; resistance to delamination during accelerated exposure to wetting and drying; and resistance to deformation under static load.

ASTM D2559-12a: Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions -- (PFS Test Report #12-093)

Section 14: Resistance to Shear by Compression Loading

	Min/Min*	Min/Max*	Max/Max*
Average Wood Failure (%)	100	100	100
Required Wood Failure (%)	≥75%	≥75%	≥75%
Average Shear Strength (psi)	1930	1988	1713
Required Shear Strength (psi)	See below	See below	See below
RESULTS	**PASS**	**PASS**	**PASS**

Shear values for Douglas Fir must meet or exceed 1110 psi for 8% moisture content and 1020 for 12% moisture content. Test specimens were glued at 10-12% moisture content.
*Minimum open time – 0 minutes; Maximum open time – 10 minutes

Section 15: Resistance to Delamination During Accelerated Exposure

	Delamination	Requirement	Result
Min/Min	0%	Total <5%	**PASS**
Min/Max	0%	Total <5%	**PASS**
Max/Max	0%	Total <5%	**PASS**

Section 16: Resistance to Creep Under Static Load

	Block #1		Block #2		Requirement	Result
	Side A	Side B	Side A	Side B		
160°F	0 in.	0 in.	0 in.	0 in.	< 0.139 in	**PASS**
80°F and 90% RH	0 in.	0 in.	0 in.	0 in.	< 0.139 in	**PASS**

- Exceeds ASTM D7247-07ae1 Standard Test Method for Evaluating the Shear Strength of Adhesive Bonds in Laminated Wood Products at Elevated Temperatures: This standard is used for evaluation of the shear strength of an adhesive at ambient and elevated temperature relative to the performance of solid wood at the same conditions.

ASTM D7247-07ae1 Standard Test Method for Evaluating the Shear Strength of Adhesive Bonds in Laminated Wood Products at Elevated Temperatures -- (PFS Test Report #12-093)

	Mean Shear Strength		Residual Shear Strength Ratio	Solid Wood Control		Compliance with section 8.5 (Note 6)[1]
Type	Elevated Temperature	Ambient Temperature		C.O.V. for Shear Strength at Elevated Temperature	Lower 95% Confidence Interval	
Solid Wood Control	494	1561	0.32	0.20	0.27	**PASS**
Bonded Wood	478	1667	0.29			

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

- Exceeds ANSI 405-2013 Standard for Adhesives for Use in Structural Glued Laminated Timber: This standard provides the minimum requirements for evaluation of adhesives to be used in structural glued laminated timber products. Adhesives must meet the requirements of ASTM D2559, ASTM D7247, as well creep resistance, accelerated aging of bonded specimens compared to solid wood controls, and durability testing using boil-dry-freeze conditioning.

ANSI 405-2013 Standard for Adhesives for Use in Structural Glued Laminated Timber – (PFS Test Report #13-100)

2.1.1 Exterior Exposure – ASTM D2559 – **PASS** (see test results above)

2.1.2 Accelerated Aging – ASTM D1151 -- **PASS**

	Bonded Wood	Solid Wood	% of Solid Wood Strength	Result
Control	1190	978	122%	**PASS**
Aged	1208	1250	97%	**PASS**

Required: Bond strength must be equal to or exceed 90% of the average solid wood control.

2.1.3 High Temperature – ASTM D7247 – **PASS** (see results above)

2.1.4 Creep Resistance -- CSA 0112.9, section 4.10.1 – **PASS**

2.1.5 Accelerated Aging – ASTM D1183, D – **PASS**

	Strength	Wood Failure	% of Solid Wood Strength	Result
	psi	%		
Solid Wood	1777	100	112%	**PASS**
Bonded Wood	1986	100		

Required: Bond strength must be equal to or exceed 90% of the average solid wood control.
Average wood failure shall be equal to or exceed 75%.

2.1.6 Durability – CSA 0112.9, section 5.5 -- **PASS**
Required: At least 50% of the specimens shall have a shear strength greater than or equal to 508 psi.

CSA 0112.10-08 Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure)

.

Test Details	Test Result	Requirement	
5.5.3.3 Vacuum-Pressure Soak/Dry Avg. Shear, % Wood Failure	Min/Min: 1082 psi, 93% Max/Max: 1115 psi, 94%	Avg. Shear > 942 psi Avg. Wood Failure > 85%	**PASS**
5.6 Delamination Resistance	No delamination	Total delam of any bond line < 1% of end grain bond line	**PASS**
5.7 Creep Resistance Env A	No evidence of creep	<0.05 mm average of all joints <0.25 mm for any bonded joint	**PASS**
5.7 Creep Resistance Env B1	No evidence of creep	<0.05 mm average of all joints <0.25 mm for any bonded joint	**PASS**
5.7 Creep Resistance Env B2	No evidence of creep	<0.06 mm average of all joints <2.9 mm for any bonded joint	**PASS**
5.2 Cured Adhesive Film pH	Average pH 6.8	>2.5 pH	**PASS**
5.5.3.2 Dry Test* Avg. Shear, % Wood Failure	Min/Min: 1930 psi, 100% Max/Max: 1713 psi, 100%	Avg. Shear > 1450 psi Avg. Wood Failure > 85%	**PASS**
5.5.3.4Boil-Dry-Freeze**	Min/Min: 622 psi, 100% Max/Max: 1138 psi, 100%	Avg. Shear > 537 psi Avg. Wood Failure > 85%	**PASS**

**PFS Report # 12-093*
***PFS Report # 13-100*

APPLICATION GUIDELINES

Moisture content: Six to ten percent is the recommended moisture content for the gluing stock. Higher moisture content will increase the clamp time needed. Additionally, moisture content should mirror (as closely as possible) that which will be experienced in the end use market for the wood product being manufactured.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be avoided. When possible, glue joints should be prepared and glued the same day. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives.

Spread rate: The recommended adhesive coating layer is the same as for most PVA products or approximately 0.007 inches/ 0.178 mm in thickness. EPI adhesives have superior gap filling properties due to their higher percent solids content. Generally, 200 g/m² / 41 #/MSGL of glue line is adequate.

Conveyorized spreaders are commonly used in edge-gluing applications. Adjust the applicator to ensure complete coverage on the staves. One side application is adequate in most situations. Verify that adequate coverage exists by monitoring squeeze-out along the glue lines when the panels are under pressure.

Assembly time: The assembly time of Advantage EP-950A varies with moisture content and spread rate. Higher spread rate can increase the assembly time of the product. When substrates are brought under pressure, a small bead of squeeze-out should be seen on the first samples assembled. Structural testing was completed with the following parameters:

Open Assembly Time: 10 minutes
Total Assembly Time: 20 minutes
Spread rate: 11-12 wet mils (351-384 g/m^2)
Moisture Content: 10-12%
Laboratory Temperature: 70°F (21°C)
Relative Humidity: 50%

Clamping pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces must be made to obtain maximum strength. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (5 cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Press/clamp time: A minimum press time of 30 minutes is recommended under ideal conditions when using soft wood species at moisture content less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Working pauses: The spreader should be kept running during pauses in production for lunch breaks, etc. to help extend the working life of the adhesive.

Machining: Post-gluing conditioning is not unlike PVA products, although shorter curing times are frequently possible. We recommend that panels be allowed to condition at least six hours prior to additional processing.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Distance to Deepest Glue Line	Platen Temperature °F									
	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: The foaming and cross-linking characteristics of EPI may cause blockages in the wastewater plumbing. Furthermore, there may be disposal concerns with the mixed product. It is recommended that the excess glue from the spreader and mixing containers be poured into a container and disposed of. Avoid sealing the container for at least 24 hours to permit EPI components to finish reacting. Glue pans and rollers may then be washed in warm water.

HANDLING AND STORAGE

Shelf life: Best if used within six months of date of manufacture. Please mix before use since it is very common for filler to settle out during aging. Product is not freeze-thaw stable. It will have a lumpy, coagulated appearance if it has frozen.

Storage of Hardener: Hardener 200 is very susceptible to moisture. We recommend that it be kept in a sealed container. A desiccant or nitrogen blanket is recommended.

Safety and disposal: Hardener 200 is a polymeric isocyanate. Use of gloves and other protective equipment is recommended. Consult MSDS before use for additional information.

For additional questions, Franklin’s technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

*A division of **Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

ADVANTAGE FJ-430

ADVANTAGE FJ-430 is an economical, higher performing, two-part crosslinking polyvinyl acetate emulsion adhesive developed specifically for finger jointing. It has a shear thinning rheology for easy application and a low minimum use temperature. When mixed with Aluminum Chloride (Catalyst A) the product surpasses ASTM D-5572 Wet Use for Finger Joints in Non-structural Lumber Products. This standard is the basis for Hallmark Certification on glued finger joints.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *White colored liquid*
Typical viscosity (cps): *uncatalyzed: 2300 - 3100 (3/12/83℉) Catalyzed: 1500 - 2500 cps*
Weight solids (%): *47.0 - 50.0%*
pH: *uncatalyzed: 6.0 - 7.5 catalyzed: 2.0 - 4.0*
Specific gravity: *1.09* ***Weight pounds per gallon****: 9.10*
Suggested minimum use temperature: *51℉/ 11℃*

KEY PRODUCT FEATURES

- High performance adhesive specifically for finger joint applications
- Low minimum use temperature
- Shear thinning rheology for extrusion applications

PERFORMANCE PROPERTIES

- Exceeds ASTM D-5572-99 Wet Use for Finger joints in Non-structural Lumber Products

ASTM D-5572-99 Wet Use for Finger Joints in Non-structural Lumber Products – Tension Test

	Test Results		Requirements	
Exposure	*Tension (psi) Average*	*Percent Wood Failure Average*	*Tension (psi) Average*	*Percent Wood Failure Average*
Dry	*6296*	*96*	***2000***	***60***
Boil	*2651*	*77*	***1600***	***50***
Vacuum/Pressure	*2620*	*70*	***1600***	***50***
Elevated Temperature	*2668*	*45*	***1000***	***NA***

**Ponderosa Pine – 3rd Party Testing*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

ASTM D-5572-99 Wet Use for Finger Joints in Non-structural Lumber Products – Flexure: Modulus of Rupture (MOR)

	Test Results		Requirements
Exposure	*MOR (psi) Average*	*MOR (psi) Minimum*	*MOR (psi) Minimum*
Dry	*6283*	*3584*	***2000***
Boil	*3109*	*2555*	***1400***
Vacuum/Pressure	*2659*	*2317*	***1400***

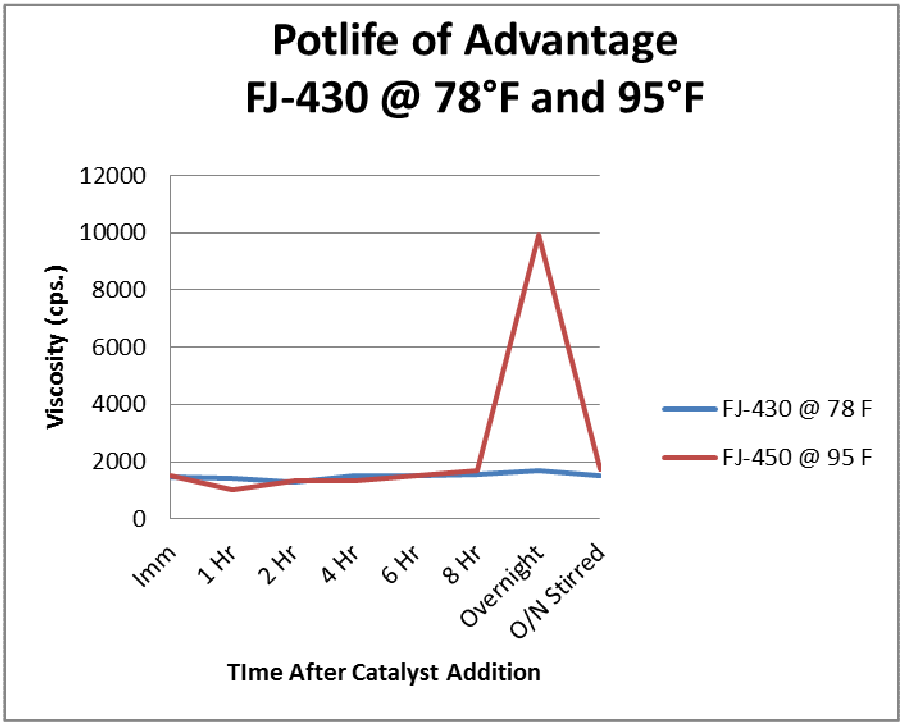
**Represents average Franklin laboratory results on Ponderosa Pine, Report 18158*

Like all adhesives, proper gluing practices are needed to achieve stated performance.

MIXING INSTRUCTIONS

The recommended proportion of catalyst to resin is five percent by volume or six percent by weight. Place the resin in a mixer and slowly add catalyst under agitation. Continue mixing for five to ten minutes after the catalyst is added to ensure a homogeneous mixture. A smaller amount of catalyst can be used under certain conditions (such as burning in a radio frequency press), but water resistance performance should be validated. It is best to mix the catalyzed material if it has been kept for longer than seven to eight hours since it will increase in viscosity with time.

POT LIFE



APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within four months of date of manufacture. Product only available in air assist style totes. Product not sold into California. Product is freeze-thaw stable. If it becomes frozen, allow to warm to ambient temperature and thoroughly mix until a homogenous, smooth mixture is obtained.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

Advantage FJ-450 DEV

Advantage FJ-450 DEV is an economical, higher performing, two-part crosslinking polyvinyl acetate emulsion adhesive developed specifically for finger jointing. It has a shear thinning rheology for easy application and a low minimum use temperature. When mixed with Aluminum Chloride (Catalyst A) the product surpasses ASTM D-5572 Wet Use for Finger Joints in Non-Structural Lumber Products. This standard is the basis for Hallmark Certification on glued finger joints.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *White colored liquid*
Typical viscosity (cps): *uncatalyzed: 3000 - 4000 (3/12/83 ℉) Catalyzed: 1000 - 2000 cps*
Weight solids (%): *46.0 - 49.5%*
pH: *uncatalyzed: 6.0 - 7.5 catalyzed: 2.0 - 4.0*
Specific gravity: *1.09* ***Weight pounds per gallon****: 9.13*
Suggested minimum use temperature: *51 ℉/ 11 ℃*
**The physical properties listed are target ranges and not final product specifications.*

KEY PRODUCT FEATURES

- High performance adhesive created specifically for finger joint applications
- Low minimum use temperature
- Shear thinning rheology for extrusion applications

PERFORMANCE PROPERTIES

- Exceeds ASTM D-5572-99 Wet Use for Finger joints in Non-Structural Lumber Products

ASTM D-5572-99 Wet Use for Finger Joints in Non-Structural Lumber Products – Flexure: Modulus of Rupture (MOR)

	Test Results		Requirements
Exposure	*MOR (psi) Average*	*MOR (psi) Minimum*	*MOR (psi) Minimum*
Boil	*2936*	*2208*	***1400***
Vacuum/Pressure	*2749*	*2462*	***1400***

**Represents average Franklin laboratory results on Ponderosa Pine, Report 18060.*

ASTM D-5572-99 Wet Use for Finger Joints in Non-structural Lumber Products - Tension

	Test results				Requirements		
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*5065*	*3973*	*96*	*85*	***2000***	***60***	***30***
Vacuum Pressure	*2457*	*546***	*95*	*80*	***1600***	***50***	***25***
Boil	*2349*	*1958*	*95*	*90*	***1600***	***50***	***25***
Elevated Temp.	*3013*	*2303*	*73*	*60*	***1000***	***NR***	***NR***

Ponderosa Pine – TECO report 15-234 12-11-15 (Sample broke out of glue line. Wood failure was 100%)*

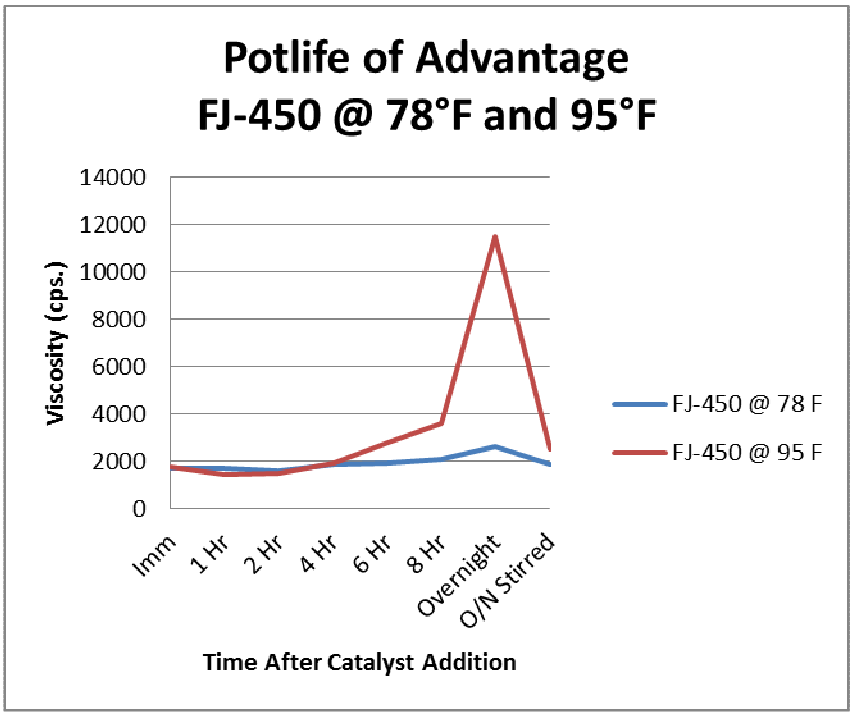
A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Like all adhesives, proper gluing practices are needed to achieve stated performance.

MIXING INSTRUCTIONS

The recommended proportion of catalyst to resin is five percent by volume or six percent by weight. Place the resin in a mixer and slowly add catalyst under agitation. Continue mixing for five to ten minutes after the catalyst is added to ensure a homogeneous mixture. A smaller amount of catalyst can be used under certain conditions (such as burning in a radio frequency press), but water resistance performance should be validated. It is best to mix the catalyzed material if it has been kept for longer than seven to eight hours since it will increase in viscosity with time.

POT LIFE



APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within four months of date of manufacture. Product only available in air assist style totes. Product not sold into California.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

Assembly 161

Assembly 161 is a low viscosity polyvinyl acetate emulsion developed for use with automatic doweling equipment. Its properties allow the adhesive to easily flow through the narrow feed lines and injectors of European-made doweling machinery. Assembly 161 sets fast to reduce assembly time, offers excellent strength and provides a translucent glue line. It is formulated for use on solid woods, particleboard, MDF, plywood and other porous materials.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** White colored*
***Typical viscosity (cps):** 160 - 270*
***Weight solids (%):** 42.0 - 46.6*
***pH:** 4.0 - 4.8*
***Specific gravity:** 1.08* ***Weight pounds per gallon**: 9.01*
***Suggested minimum use temperature:** 44 ℉/ 6 ℃*

KEY PRODUCT FEATURES

- Very low viscosity for automatic doweling machines
- Formaldehyde-free
- Fast setting
- Translucent glue line
- 175.105 FDA Compliant

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	Clamping pressure	Example
Low density wood species	100-150 psi or 7-10 kg/cm^2	Pine, Poplar
Medium density species	125-175 psi or 9-13 kg/cm^2	Rubberwood, Cherry
High density species	175-250 psi or 13-18 kg/cm^2	Oak, Maple

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within three months of date of manufacture. Mix before use. Product is not freeze thaw stable. Frozen product will have a separated and or lumpy appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com

Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers

Assembly 65

Assembly 65 is an extremely fast-setting polyvinyl acetate emulsion adhesive. Its fast setting rate results from its high percentage of polymer solids. It is very versatile and is widely used for assembly applications such as cabinets. The viscosity range of Assembly 65 is similar to most general-purpose adhesives.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** White colored*
***Typical viscosity (cps):** 3000 - 4200*
***Weight solids (%):** 58.5 - 62.0*
***pH:** 3.9 – 5.0*
***Specific gravity:** 1.11 **Weight pounds per gallon**: 9.26*
***Suggested minimum use temperature:** 59°F/ 15°C*

KEY PRODUCT FEATURES

- Extremely fast setting
- No formaldehyde
- One-component: great for general assembly & cabinets
- 175.105 FDA Compliant

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	Clamping pressure	Example
Low density wood species	100-150 psi or 7-10 kg/cm^2	Pine, Poplar
Medium density species	125-175 psi or 9-13 kg/cm^2	Rubberwood, Cherry
High density species	175-250 psi or 13-18 kg/cm^2	Oak, Maple

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use. Product is not freeze thaw stable. Frozen product will have a separated and or lumpy appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Assembly High Tack

Assembly High Tack is a ready to use aliphatic resin emulsion adhesive. For over 55 years, it has set the standard for quality woodworking. It is very fast setting for short clamp times. It has high solvent-resistance and good sandability. Assembly High Tack can be used in general assembly and edge and face gluing applications for interior use. It can also be used in conventional cold press equipment.

PHYSICAL PROPERTIES

Chemical family description: *Polyvinyl acetate emulsion adhesive*
Appearance: *Yellow colored*
Typical viscosity (cps): *3000 - 4500 (3/12/83 ℉)*
Weight solids (%): *44.5 - 47.0*
pH: *3.8 - 4.7*
Specific gravity: *1.08* ***Weight pounds per gallon****: 9.01*
Suggested minimum use temperature: *50 ℉/ 10 ℃*

KEY PRODUCT FEATURES

- Performs well in assembly, edge and face and cold press applications
- Good sandability
- Good solvent-resistance
- No formaldehyde
- Very fast setting for short clamp times
- Ready-to-use one-component system
- 175.105 FDA Compliant

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	Clamping pressure	Example
Low density wood species	100-150 psi or 7-10 kg/cm^2	Pine, Poplar
Medium density species	125-175 psi or 9-13 kg/cm^2	Rubberwood, Cherry
High density species	175-250 psi or 13-18 kg/cm^2	Oak, Maple

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Doorbond 200

Doorbond 200 is a fast setting, one-component polyvinyl acetate emulsion adhesive. It is designed for hot or cold press manufacture of flush and architectural doors. Doorbond 200 produces a water and heat resistant bond on various rail, stile and skin substrates including: wood, hardboard, MDF, particleboard and high pressure laminates. This product has been formulated to prevent bleed-through under normal operating conditions.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** Off-white colored*
***Typical viscosity (cps):** 5700 - 8500*
***Weight solids (%):** 49.0 - 53.0*
***pH:** 2.7 - 3.5*
***Specific gravity:** 1.10 **Weight pounds per gallon**: 9.18*
***Suggested minimum use temperature:** 45°F/ 7°C*

KEY PRODUCT FEATURES

- Designed for flush and architectural doors
- Rated for 90 minute fire doors
- One-component
- Formulated with bleed-through protection
- Water and heat-resistant

PERFORMANCE PROPERTIES

- UBC 7-2 part 1 (1997), NFPA 252 (1999) and UL 10C (1998), for a 90 minute rating. **Report # 3073188** dated 4/1/2005 – 90 minute pilot scale vertical fire test conducted on Franklin International Doorbond 200 adhesive in a **Georgia Pacific** mineral core door with HPL skin.
- Approved **Marshfield** Door systems 90 minute door construction, wood veneer, HPL with or without cross band base on test #3093107-001 and IR scans.
- WDMA TM-6 Type 1 and Type 2
- California's South Coast Air Quality Management Districts Rule 1168
- ANSI/HPVA HP-1-2004 Type 2
- SpecDIRECT listed as pre-certified on Georgia Pacific and Marshfield Cores – no fire certification testing necessary before use: www.intertek-etlsemko.com
- Meets CARB requirements on various substrates. ASTM D-5582 desiccator testing available upon request.
- 175.105 FDA Compliant

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Hot press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product is freeze thaw stable but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Woodbond 1910

Woodbond 1910 is a one-part polyvinyl acetate emulsion which has met the requirements of the ASTM D-5572 Dry Use standard. Woodbond 1910 has been specifically formulated for finger jointing of interior stock; offering excellent handling properties, high heat resistance, and easy extrusion on most finger joint application systems.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *White colored liquid*
Typical viscosity (cps): *4400 - 6800*
Weight solids (%): *42.0 - 45.0%*
pH: *4.3 - 5.0*
Specific gravity: *1.10* ***Weight pounds per gallon:*** *9.18*
Suggested minimum use temperature: *42°F/ 6°C*

KEY PRODUCT FEATURES

- Exceeds ASTM D-5572 Dry Use requirements
- High heat resistance
- Excellent handling
- Good extrusion for finger joints

PERFORMANCE PROPERTIES

ASTM D-5572-99 Dry Use For Finger Joints in Non-Structural Lumber Products - Tension

Finger Joint									
Adhesive	Exposure	Test Results				Requirements			
		Strength (psi)		Wood Failure (%)		Strength (psi)		Wood Failure (%)	
		Avg.	Min.	Avg.	Min.	Avg.	Min.	Avg.	Min.
Woodbond 1910	Dry	4,426	N/A	99	90	2,000	N/A	60	30
	Three-Cycle Soak	2,802	N/A	79	30	1,000	N/A	30	15
	Elevated Temp.	2,666	N/A	85	40	1,000	N/A	N/A	N/A

**Test data from Teco Test Report #03-136*

Like all adhesives, proper gluing practices are needed to achieve stated performance.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Multibond 2000

Multibond 2000 is a one-part crosslinking polyvinyl acetate emulsion adhesive developed for a wide range of laminating as well as edge and face gluing operations. Multibond 2000 is the first one-part shelf stable polyvinyl acetate developed for wood bonding. This adhesive can be used in radio frequency, hot press and cold press applications.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Yellow colored liquid*
Typical viscosity (cps): *3000 - 4300 (3/12/83 ℉)*
Weight solids (%): *46.0 - 49.0%*
pH: *2.0 - 3.3*
Specific gravity: *1.09* ***Weight pounds per gallon:*** *9.09*
Suggested minimum use temperature: *60 ℉/ 16 ℃*

KEY PRODUCT FEATURES

- Excellent for radio frequency gluing
- Light colored glue line
- Water-resistant
- Fast setting

PERFORMANCE PROPERTIES

- Meets requirements for ANSI/HPVA HP-1-2004 Type 2
- Meets requirements for ANSI/HPVA EF 2009
- Meets WDMA Type 1 and 2 water resistance
- Meets CARB requirements when tested in various wood constructions.
- European E-1 formaldehyde emission standard
- 175.105 FDA Compliant

Like all adhesives, proper gluing practices are needed to achieve stated performance.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

Multibond 2015

Multibond 2015 is a one-part crosslinking polyvinyl acetate emulsion adhesive developed for a wide range of laminating as well as edge and face gluing operations. Multibond 2015 has a proven 20 plus year history for wood bonding. It is highly water-resistant and offers additional protection from bleed-through on veneers.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Beige colored liquid*
Typical viscosity (cps): *3000 - 4300 (3/12/83 ℉)*
Weight solids (%): *47.5 - 50.5%*
pH: *2.5 - 3.5*
Specific gravity: *1.11* ***Weight pounds per gallon:*** *9.30*
Suggested minimum use temperature: *60 ℉/ 16 ℃*

KEY PRODUCT FEATURES

- Excellent for hot press laminating
- Performs well in edge and face, radio frequency and cold pressing applications
- Bleed-through resistance
- Water-resistant
- Moderately slow setting
- No added formaldehyde

PERFORMANCE PROPERTIES

- Meets requirements for ANSI/HPVA EF 2009
- Meets requirements for ANSI/HPVA HP-1-2004 Type 2
- Meets WDMA Type 1 and 2 water resistance
- Meets CARB requirements when tested in various wood constructions. ASTM D-5582 desiccator and ASTM E-1333 large chamber testing available upon request.
- European E-1 formaldehyde emission standard
- 175.105 FDA Compliant

Like all adhesives, proper gluing practices are needed to achieve stated performance.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

Multibond 3215

Multibond 3215 is a one-part crosslinking polyvinyl acetate emulsion adhesive developed for a wide range of laminating as well as edge and face gluing operations. It is specially formulated with an additive that allows for easier clean-up on clamping and pressing equipment than traditional PVAs. It is highly water-resistant and offers additional protection from bleed-through on veneers.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Beige colored liquid*
Typical viscosity (cps): *3500 - 5500 (3/12/83 ℉)*
Weight solids (%): *48.5 - 51.0%*
pH: *2.5 - 3.5*
Specific gravity: *1.11* ***Weight pounds per gallon:*** *9.26*
Suggested minimum use temperature: *60 ℉/ 16 ℃*

KEY PRODUCT FEATURES

- Excellent for hot press laminating
- Performs well in edge and face, radio frequency and cold pressing applications
- Bleed-through resistance
- Water-resistant
- Easy clean-up
- No added formaldehyde
- 175.105 FDA Compliant

PERFORMANCE PROPERTIES

- Meets requirements for ANSI/HPVA EF 2009
- Meets requirements for ANSI/HPVA HP-1-2004 Type 2
- Meets WDMA Type 1 and 2 water resistance
- Meets CARB requirements when tested in various wood constructions
- European E-1 formaldehyde emission standard
- 175.105 FDA Compliant

Like all adhesives, proper gluing practices are needed to achieve stated performance.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Distance to Deepest Glue Line	Platen Temperature °F									
	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable but may need to be mixed prior to use.

For additional questions, Franklin’s technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin’s control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin’s control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.’s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx (“Standard Terms”). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer’s consent to the Standard Terms, and Customer’s acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer’s acceptance of the Standard Terms and Conditions of Sale.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Multibond 4000 FF

Multibond 4000 FF is a one-part polyvinyl acetate emulsion adhesive developed to have water resistance and no formaldehyde. Multibond 4000 FF can be used in hot press laminating, fingerjointing, and edge gluing operations. It meets the ANSI/HPVA HP-1-2004 Type 2 and the European standard DIN EN 204 D3.

PHYSICAL PROPERTIES

Chemical family description: *Polyvinyl acetate emulsion adhesive*
Appearance: *white colored liquid*
Typical viscosity (cps): *1000 - 4000 (3/12/83 ℉)*
Weight solids (%): *44.0 - 51.0*
pH: *2.0 - 3.0*
Specific gravity: *1.09* ***Weight pounds per gallon:*** *9.10*
Suggested minimum use temperature: *60 ℉/ 16 ℃*

KEY PRODUCT FEATURES

- No Formaldehyde
- Water-resistant
- Medium setting rate
- 175.105 FDA Compliant

PERFORMANCE PROPERTIES

- Meets requirements for ANSI/HPVA HP-1-2004 Type 2
- Meets requirements for ANSI/HPVA EF 2009
- Meets European Standard DIN EN204 D3
- Meets WDMA Type 1 and 2 water resistance
- Meets CARB requirements when tested in various wood constructions. ASTM D-5582 desiccator testing available upon request.

Like all adhesives, proper gluing practices are needed to achieve stated performance.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in

accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

Hot press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within three months of date of manufacture. Mix before use for best results. Product is not freeze thaw stable. Frozen product will have a lumpy and or separated appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Multibond EP-930

Multibond EP-930 is an emulsion polymer isocyanate system (EPI) developed for improved radio frequency performance. It is mixed with Hardener 400, a polymeric isocyanate at 10-15 parts Hardener 400 to 100 parts emulsion Multibond EP-930. The adhesive is characterized by good spreader stability and low foam production when compared with traditional EPI adhesives. Multibond EP-930 with Hardener 400 surpasses the ASTM D-5751-99 wet use for laminate joints in non-structural lumber products and the DIN D4 standard.

PHYSICAL PROPERTIES

Multibond EP-930

***Chemical family description**: polyvinyl acetate emulsion adhesive*
***Appearance:** White colored liquid*
***Specific gravity:** 1.36*
***Weight solids (%):** 55.0 - 58.5%*
***pH:** 7.0 - 8.5*
***Suggested minimum use temperature:** 46°F/ 7°C*
***Typical viscosity (cps):** 3000 - 5000*
***Mixed viscosity (cps):** 6000 - 11000 when mixed; 13000 - 17000 at one hour*

Hardener 400

***Chemical family description:** Polymeric MDI*
***Appearance:** Brown colored liquid*
***Typical viscosity at 25°C (cps):** 66*
***Specific gravity:** 1.22*

KEY PRODUCT FEATURES

- Performs well on Millwork and radio frequency applications
- Low foam production
- Good spreader stability
- Good adhesion to laminated veneer lumber and other treated wood

PERFORMANCE PROPERTIES

- Exceeds ASTM D-5751-99 Wet Use for Laminate Joints in Non-structural Lumber Products
- Meets DIN EN 204 D4 Classification of Thermoplastic Wood Adhesives for Non-structural Applications

Like all adhesives, proper gluing practices are needed to achieve stated performance.

Exceeds ASTM D-5751-99 Wet Use for Laminate Joints in Non-structural Lumber Products

	Test results		Requirements			
Exposure	***Strength (psi) Average***	***Wood failure (%) Average***	***Strength (psi) Average***	***Strength (psi) Minimum***	***Wood failure (%) Average***	***Wood failure (%) Minimum***
Room Temperature	1550	87	680	340	60	30
Boil	897	78	567	283	50	25
Vacuum Pressure	947	65	567	283	50	25
Elevated Temp.	1421	90	453	227	40	20

**Ponderosa Pine radio frequency cured – Franklin laboratory results 17741, 4/13/2012*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

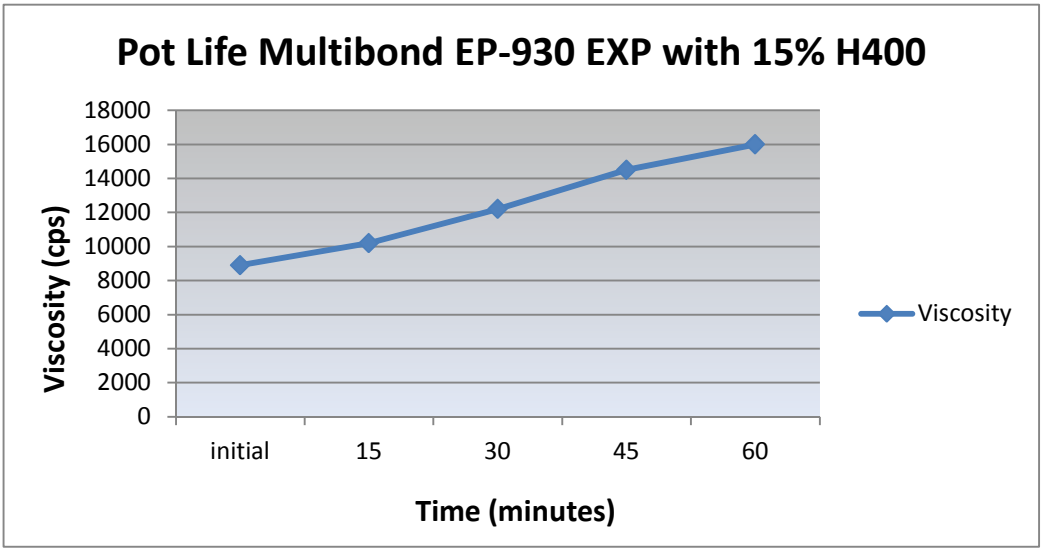
DIN EN 204 D4 Classification of Thermoplastic Wood Adhesives for Non-structural Applications: Load group D4 Beech

Storage sequence	Minimum required average value (N/mm^2)	Average value (N/mm^2) on Multibond EP-930
3	≥ 4	5.02
5	≥ 4	5.70

**European beech cold pressed- Franklin laboratory results 2/5/2010*

POT LIFE

The pot life of these systems is in excess of one hour at 77 degrees Fahrenheit (twenty five degrees Celsius). However the viscosity of the mix will increase as it ages. Wood glued with older material will have less water resistance, a characteristic common to most EPI adhesives. Therefore, it is recommended that fresh adhesive be mixed only when it is to be immediately used. EPI adhesives also generate foam during the reaction process; so we recommend keeping the material moving continually.



MIXING INSTRUCTIONS

Multibond EP-930 resin is mixed with Hardener 400 at a ratio of 100 parts resin to 15 parts Hardener by weight or 6.45 parts resin to one part Hardener by volume. Avoid mixing for long periods of time or with excessive agitation as pot life is affected by mixing time and speed. While this product can be easily mixed by hand, it is usually more convenient to mix the components in a meter mix unit. Your Franklin representative can work with you to supply the appropriate mixing equipment and appropriate mixing ratios depending on your application.

APPLICATION GUIDELINES

Moisture content: Six to ten percent is the recommended moisture content for the gluing stock. Higher moisture content will increase the clamp time needed. Additionally, moisture content should mirror (as closely as possible) that which will be experienced in the end use market for the wood product being manufactured.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be avoided. When possible, glue joints should be prepared and glued the same day. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives.

Spread rate: The recommended adhesive coating layer is the same as for most PVA products or approximately 0.007 inches/ 0.178 mm in thickness. EPI adhesives have superior gap filling properties due to their higher percent solids content. Generally, 200 g/m² / 41 #/MSGL of glue line is adequate.

Conveyorized spreaders are commonly used in edge-gluing applications. Adjust the applicator to ensure complete coverage on the staves. One side application is adequate in most situations. Verify that adequate coverage exists by monitoring squeeze-out along the glue lines when the panels are under pressure.

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Clamping pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces must be made to obtain maximum strength. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (5 cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Press/clamp time: A minimum press time of 30 minutes is recommended under ideal conditions when using soft wood species at moisture content less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Working pauses: The spreader should be kept running during pauses in production for lunch breaks, etc. to help extend the working life of the adhesive.

Machining: Post-gluing conditioning is not unlike PVA products, although shorter curing times are frequently possible. We recommend that panels be allowed to condition at least six hours prior to additional processing.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Distance to Deepest Glue Line	Platen Temperature °F									
	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Clean-up: The foaming and cross-linking characteristics of EPI may cause blockages in the wastewater plumbing. Furthermore, there may be disposal concerns with the mixed product. It is recommended that the excess glue from the spreader and mixing containers be poured into a container and disposed of. Avoid sealing the container for at least 24 hours to permit EPI components to finish reacting. Glue pans and rollers may then be washed in warm water.

HANDLING AND STORAGE

Shelf life: Best if used within four months of date of manufacture. Please mix before use since it very common for filler to settle out during aging.

Storage of Hardener: Hardener 400 is very susceptible to moisture. We recommend that it be kept in a sealed container. A desiccant or nitrogen blanket is recommended.

Safety and disposal: Hardener 400 is a polymeric isocyanate. Use of gloves and other protective equipment is recommended. Consult MSDS before use for additional information.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers™

Multibond EZ-2

Multibond EZ-2 is a one-part crosslinking polyvinyl acetate emulsion adhesive developed with a low minimum use temperature for use in a wide variety of plant conditions. Multibond EZ-2 meets DIN EN204 D3 as well as ASTM D-5572 dry use for finger joints in non-structural lumber products.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Light yellow /cream colored liquid*
Typical viscosity (cps): *2500 - 4000 (3/12/83 ℉)*
Weight solids (%): *45.5 - 48.5%*
pH: *2.3 - 3.3*
Specific gravity: *1.09* ***Weight pounds per gallon:*** *9.09*
Suggested minimum use temperature: *45 ℉/ 7 ℃*

KEY PRODUCT FEATURES

- Excellent for finger jointing or cold press laminating in colder climates
- Light colored glue line
- Water-resistant
- Low minimum use temperature

PERFORMANCE PROPERTIES

- Meets requirements for HPVA/ANSI EF 2009
- Meets WDMA Type 1 and 2 water resistance
- Meets European Standard DIN EN204 D3
- Meets DIN EN 14257 WATT 91 Heat Testing
- Meets ASTM D-5572-99 Dry Use
- 175.105 FDA Compliant

DIN EN 204 D3 Classification of Thermoplastic Wood Adhesives for Non-structural Applications:

Load group D3 Beech

Storage sequence	Minimum required average value (N/mm^2)	Average value (N/mm^2) on Multibond EZ-2
1	≥ 10	15.5
3	≥ 2	2.2
4	≥ 8	13.5

**Rosenheim report 505 36441/3e 8/72008*

DIN EN 14257 (WATT 91)

Average value (N/mm^2) on Multibond EZ-2
8.0

**Rosenheim report 505 36441/4e 8/7/2008*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

ASTM D-5572-99 Dry Use for fingerjoints in non-structural Lumber Products

	Test results				Requirements			
Exposure	***Strength (psi) Average***	***Strength (psi) Minimum***	***Wood failure (%) Average***	***Wood failure (%) Minimum***	***Strength (psi) Average***	***Strength (psi) Minimum***	***Wood failure (%) Average***	***Wood failure (%) Minimum***
Dry	*6405*	*N/A*	*100*	*100*	***2000***	***N/A***	***60***	***30***
3 cycle soak	*5300*	*N/A*	*98*	*95*	***1000***	***N/A***	***30***	***15***
Elevated Temp.	*4105*	*N/A*	*N/A*	*N/A*	***1000***	***N/A***	***N/A***	***N/A***

**Teco test report #01-114 Ponderosa Pine*

Like all adhesives, proper gluing practices are needed to achieve stated performance.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Distance to Deepest Glue Line	Platen Temperature °F									
	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Multibond MX-90

Multibond MX-90 is a one-part crosslinking polyvinyl acetate emulsion adhesive developed for hot press laminating. It offers ANSI/HPVA HP-1-2004 Type 2 water resistance and bleed-through protection on most open pored species. It also offers robust operating parameters in a variety of plant conditions.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Beige colored liquid*
Typical viscosity (cps): *2500 - 4000 (4/60/83 ℉)*
Weight solids (%): *49.0 - 52.0%*
pH: *2.0 - 3.3*
Specific gravity: *1.11* ***Weight pounds per gallon:*** *9.26*
Suggested minimum use temperature: *60 ℉/ 16 ℃*

KEY PRODUCT FEATURES

- Excellent for hot press laminating of veneer or high pressure laminate (HPL)
- Water-resistant
- Bleed-through resistance
- Robust operating parameters

PERFORMANCE PROPERTIES

- Meets requirements for ANSI/HPVA HP-1-2001 Type 2
- Meets requirements for ANSI/HPVA EF 2009
- Meets WDMA Type 1 and 2 water resistance
- Meets CARB requirements when tested in various wood constructions. ASTM D-5582 desiccator and ASTM E-1333 large chamber testing available upon request.
- 175.105 FDA Compliant

Like all adhesives, proper gluing practices are needed to achieve stated performance.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Protect from freezing. Frozen product will have a lumpy and separated appearance. This product will thicken with age or exposure to warmer temperatures. Agitation of the material is recommended before use under these conditions.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Multibond SK-8

Multibond SK-8 is the first one-part crosslinking polyvinyl acetate emulsion that meets ANSI/HPVA HP-1-2000 Type 1 and ASTM D-4317 Type 1 Wet Use. It is widely used for cold press lamination by skateboard manufacturers due to its superior performance. It can also be hot pressed and used in applications that are radio frequency cured. It has a low minimum use temperature and a long assembly time.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Beige colored liquid*
Typical viscosity (cps): *2000 - 4500 (3/12/75℉)*
Weight solids (%): *47.5 – 52.5%*
pH: *2.4 - 3.5*
Specific gravity: *1.10* ***Weight pounds per gallon****: 9.26*
Suggested minimum use temperature: *45℉/ 7℃*

KEY PRODUCT FEATURES

- Highest water-resistance of any one-component PVA
- Low minimum use temperature
- Moderately slow setting
- Used by some of the top skateboard brands in the industry

PERFORMANCE PROPERTIES

- Exceeds requirements for ANSI/HPVA HP-1-2000 Type 1
- Exceeds requirements for ASTM D-4317 Type 1 Wet Use
- 175.105 FDA Compliant

Like all adhesives, proper gluing practices are needed to achieve stated performance.

ASTM D-906 (3 ply birch)

Tested after seven days conditioning at 25 ℃ or 77° F

Temperature	Strength (psi)	Wood failure (%)
77℉/25℃	593	66

**3 ply rotary cut birch Franklin Laboratory results.*

ANSI/HPVA HP-1-2000

	Test results				Requirements			
Exposure	***Strength (psi) Average***	***Strength (psi) Minimum***	***Wood failure (%) Average***	***Wood failure (%) Minimum***	***Strength (psi) Average***	***Strength (psi) Minimum***	***Wood failure (%) Average***	***Wood failure (%) Minimum***
Dry	*540*	*NA*	*76*	*10*	***>350***	***NA***	***15***	***10***
Cyclic-boil	*315*	*NA*	*65*	*20*	***250-350***	***NA***	***30***	***10***

**TECO Report #03-188 10/16/2003 3ply rotary cut birch*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

ASTM D-4317 Type I Wet Use

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Block shear (compression) dry at 75°F/24°C	*4329*	*NA*	*44*	*NA*	***2800***	***NA***	***NA***	***NA***
Plywood (tension) dry at 75°F/ 24°C	*448*	*NA*	*86*	*NA*	***400***	***NA***	***NA***	***NA***
Plywood (tension) dry at 160°F/71.1°C	*439*	*NA*	*94*	*NA*	***250***	***NA***	***NA***	***NA***
Two-cycle boil	*322*	*NA*	*68*	*20*	***250-350***	***NA***	***30***	***10***
48 hour soak	*262*	*NA*	*NA*	*NA*	***250***	***NA***	***NA***	***NA***

**Franklin laboratory results. Block shears on maple and tension tests on 3-ply rotary cut birch.*

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of 5-10 minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ twenty degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ Post Process Conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum Use Temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

	Platen Temperature ºF									
Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture. Product increases in viscosity with age and temperature but can be mixed to bring it back to manageable viscosity for application. The performance is not affected. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin’s technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin’s control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance,

color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers™

ReacTITE 6010

ReacTITE 6010 is a moisture-curing polyurethane reactive hot melt adhesive. It is designed for bonding to wood to wood. It is a 100% solids adhesive that eliminates VOCs. Because ReacTITE 6010 is fast setting, the need for pins and staples and the follow-up steps of sanding and puttying is reduced. The product is formulated with a UV indicator to allow easier visibility under black lights.

PHYSICAL PROPERTIES

Chemical family description: *Polyurethane adhesive*
Appearance: *white solid*
Typical viscosity (cps): *9500 - 13800 (S28/10/248ºF)*
Weight solids (%): *100%*
Specific gravity: *1.17* ***Weight pounds per gallon:*** *9.76*
Open Time: *3 minutes* ***Set Time:*** *45-75 seconds*

KEY PRODUCT FEATURES

- Excellent for bonding wood
- 100% solids – 0 VOCs
- Fast setting

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will speed the cure rate and may decrease the working time of the product.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: A 1/8” OD bead allows for 130 linear feet per cartridge or 170 linear feet per pound of adhesive.

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of reactive hot melts are significantly shorter than other chemistries and range from a few seconds to several minutes.

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from one to five minutes.

Machining/ post process conditioning: After the minimum clamping time period, the substrates have enough handling strength to be cut and sanded. The adhesive has approximately 90% cure in 24 hours and full cure in five to seven days.

Operating temperatures: The recommended operating temperature for reactive hot melts is 230-270ºF. The working properties of the adhesive also change dramatically with changes in temperature. Cooler adhesive will be higher in viscosity and cure more quickly, reducing the working time. Higher temperatures extend the working time but also increase the cure rate and decrease the viscosity.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Clean-up: For easy removal of adhesive from equipment, wait until the adhesive has cooled and turned white. It can easily be peeled from equipment in the first hour. Extrusion guns and hoses should be purged with PURClean, a reactive hot melt cleaning compound. PURClean should be purged through until the extruded adhesive is dark.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

ReacTITE 6025

ReacTITE 6025 is a very fast-setting moisture curable polyurethane reactive hot melt adhesive designed for wood-to-wood applications. ReacTITE 6025 eliminates the need for nails, staples, screws, and other mechanical fasteners as well as the follow-up steps of puttying and sanding. This product is ideal for corner blocks, base rail and miter joints, and bonding decorative molding (dentil, rope, fret work, and ornamental rosette). ReacTITE 6025 exhibits thermal stability and resistance to solvents and finishes. The product is formulated with a UV indicator to allow easier visibility under black lights.

PHYSICAL PROPERTIES

Chemical family description: *Polyurethane adhesive*
Appearance: *White solid*
Typical viscosity (cps): *5500 - 13500 (S28/10/248ºF)*
Weight solids (%): *100%*
Specific gravity: *1.16* ***Weight pounds per gallon:*** *9.68*
Set Time: *30-60 seconds*

KEY PRODUCT FEATURES

- Excellent for bonding wood
- 100% solids – 0 VOCs
- Very fast setting

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will speed the cure rate and may decrease the working time of the product.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: A 1/8” OD bead allows for 130 linear feet per cartridge or 170 linear feet per pound of adhesive.

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of reactive hot melts are significantly shorter than other chemistries and range from a few seconds to several minutes.

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from one to five minutes.

Machining/ post process conditioning: After the minimum clamping time period, the substrates have enough handling strength to be cut and sanded. The adhesive has approximately 90% cure in 24 hours and full cure in five to seven days.

Operating temperatures: The recommended operating temperature for reactive hot melts is 230-270ºF. The working properties of the adhesive also change dramatically with changes in temperature. Cooler adhesive will be higher in viscosity and cure more quickly, reducing the working time. Higher temperatures extend the working time but also increase the cure rate and decrease the viscosity.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Clean-up: For easy removal of adhesive from equipment, wait until the adhesive has cooled and turned white. It can easily be peeled from equipment in the first hour. Extrusion guns and hoses should be purged with PURClean, a reactive hot melt cleaning compound. PURClean should be purged through until the extruded adhesive is dark.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Wood Adhesives

Titebond 50

Titebond 50 is a ready to use aliphatic resin emulsion adhesive. For over 55 years, it has been the premier choice for bonding wood substrates. It is fast setting and has excellent heat resistance. Titebond 50 can be used in edge and face gluing and general assembly applications for interior use. It also performs well in conventional cold press equipment.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** Yellow colored*
***Typical viscosity (cps):** 3000 - 4500*
***Weight solids (%):** 44.2 - 47.0*
***pH:** 4.0 -5.0*
***Specific gravity:** 1.15 **Weight pounds per gallon**: 9.60*
***Suggested minimum use temperature:** 35°F/ 2°C*

KEY PRODUCT FEATURES

- One-component great for cold pressing and assembly
- Proven history of performance without compromise for interior furniture
- Excellent heat and solvent resistance
- Fastest setting aliphatic resin adhesive
- No formaldehyde
- 175.105 FDA Compliant

PERFORMANCE PROPERTIES

- Meets DIN EN 14257 WATT 91 Heat Testing

Method	Temperature (˚C)	Minimum required average value (N/mm^2)	Average value (N/mm^2)	Wood Failure (%)
DIN EN 14257 (WATT 91)	80	≥ 7 (Recommended Standard)	9.4	100

**Rosenheim report 505 44211/2e 9/21/2010*

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Press/clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture. Mix before use. Product is not freeze thaw stable. Frozen product will have a separated and or lumpy appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer should determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers

Titebond Imperial

Titebond Imperial is a high-performance, aliphatic resin emulsion adhesive with excellent heat and solvent resistance. It is best used in edge and face gluing. Titebond Imperial was developed to withstand the extreme temperatures of heat embossing.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** Yellow colored*
***Typical viscosity (cps):** 2800 – 4000 (LVF/#3/12RPM/83°F)*
***Weight solids (%):** 37.5 - 42.0*
***pH:** 3.7 - 5.0*
***Specific gravity:** 1.15 **Weight pounds per gallon**: 9.60*
***Suggested minimum use temperature:** 35°F/ 2°C*

KEY PRODUCT FEATURES

- Most heat-resistant aliphatic resin
- Moderately fast setting rate
- Formulated for heat embossing
- High solvent resistance
- 175.105 FDA Compliant

PERFORMANCE PROPERTIES

- Meets European Standard DIN EN 204 D4 Sequence 1
- Meets DIN EN 14257 WATT 91 Heat Testing

Method	Temperature (˚C)	Minimum required average value (N/mm^2)	Average value (N/mm^2)	Wood Failure (%)
DIN EN 204, Sequence 1	Room Temperature	≥ 10	11.1	100
DIN EN 14257 (WATT 91)	80	≥ 7 (Recommended Standard)	10.2	100

**Rosenheim reports 505 44211/4e 9/21/2010 and 505 44211/1e 9/21/2010*

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use. Product is freeze thaw stable.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer should determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers

Titebond Quickset 1000 FR

Titebond Quickset 1000 FR is a fast setting, water-based vinyl acetate ethylene copolymer emulsion adhesive designed to bond HPL to particleboard and fiberboard. The flexible adhesive generates fast initial tack making it a good fit for nip roll operations. It has excellent heat resistance and exhibits good fire retardant characteristics.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** White colored*
***Typical viscosity (cps):** 2400 - 4300 (4/60/83°F)*
***Weight solids (%):** 62.0 - 64.0*
***pH:** 4.3 - 5.3*
***Specific gravity:** 1.16 **Weight pounds per gallon**: 9.7*
***Suggested minimum use temperature:** 45°F/ 7.2°C*

KEY PRODUCT FEATURES

- Formaldehyde-free, one-component adhesive
- High performance flexible adhesive with fast initial tack
- Excellent in heated nip roll and dead stack operations
- Can be cold pressed
- Easy cleanup
- No excess squeeze when applied
- Formulated to meet MBDC's yellow rating requirements
- ASTM E 84 Class A adhesive rating, test report T-14174 available upon request

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: The recommended spread is 14-22 g/ft² for most applications but should be verified with in-plant trials. Higher spreads will frequently result in slower setting rates.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use. Product is not freeze thaw stable. Frozen product will have a separated and or lumpy appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Titebond Regular

Titebond Regular was the first ready-to-use aliphatic resin adhesive. For over 65 years, it has been the premier choice for bonding wood substrates. Titebond Regular can be used in edge and face gluing and general assembly applications for interior use. This product sets at a medium speed and will not load sanding belts or wear down cutting tools.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** Yellow colored*
***Typical viscosity (cps):** 3000 - 4500 (3/12/83 ℉)*
***Weight solids (%):** 41.0 - 45.0*
***pH:** 3.7 - 5.0*
***Specific gravity:** 1.16 **Weight pounds per gallon**: 9.68*
***Suggested minimum use temperature:** 35 ℉ / 2 ℃*

KEY PRODUCT FEATURES

- Excellent heat and solvent resistance
- Setting speed: medium
- Formaldehyde-free
- Superior performance history with interior furniture
- One component great for cold pressing and assembly
- 175.105 FDA compliant
- Low minimum use temperature
- Freeze/thaw stable

PERFORMANCE PROPERTIES

- Meets DIN EN 14257 WATT 91 Heat Testing

Method	Temperature (˚C)	Minimum required average value (N/mm^2)	Average value (N/mm^2)	Wood Failure (%)
DIN EN 14257 (WATT 91)	80	≥ 7 (Recommended Standard)	9.9	100

**Rosenheim reports 505 44211/4e 9/21/2010 and 505 44211/1e 9/21/2010*

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A web based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (5 cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A web based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors, some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of 5 - 10 minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit / 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ Post Process Conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum Use Temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and / or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

HANDLING AND STORAGE

Shelf life: Best if used within nine months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:
The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer should determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers

Titebond Slow Set

Titebond Slow Set is the slowest setting, ready-to-use aliphatic resin emulsion adhesive. It was developed for applications which need a long assembly time between adhesive application and clamping. Titebond Slow Set has both heat and solvent resistance and good sandability. It is most often used for hand rails and stringer assembly.

PHYSICAL PROPERTIES

***Chemical family description**: Aliphatic resin emulsion adhesive*
***Appearance:** Cream colored*
***Typical viscosity (cps):** 3000 - 4600 (3/12/83 ℉)*
***Weight solids (%):** 38.0 - 41.0*
***pH:** 4.0 - 5.0*
***Specific gravity:** 1.14 **Weight pounds per gallon**: 9.51*
***Suggested minimum use temperature:** 35 ℉/ 2 ℃*

KEY PRODUCT FEATURES

- Slow setting rate
- Perfect for stair rails and stringers
- Good heat and solvent resistance
- 175.105 FDA Compliant

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 20 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product is not freeze thaw stable. Frozen product will have a separated and/or lumpy appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Assembly 50

Assembly 50 is a cost-effective, very fast-setting polyvinyl acetate emulsion adhesive. The high percentage of pure polymer solids provides improved gap filling and its medium viscosity allows for easy application. Assembly 50 is well suited for doweling and general assembly work.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** White colored*
***Typical viscosity (cps):** 3000 - 4300 (3/12/83 ℉)*
***Weight solids (%):** 56.0 - 59.0*
***pH:** 4.0 - 5.0*
***Specific gravity:** 1.13 **Weight pounds per gallon**: 9.43*
***Suggested minimum use temperature:** 46 ℉/ 8 ℃*

KEY PRODUCT FEATURES

- Medium viscosity for easy application
- Fast setting
- One-component: great for general assembly
- 175.105 FDA Compliant

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product is freeze thaw stable but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Laminating 25

Laminating 25 is a moderately fast-setting adhesive for cold pressing high-pressure laminate to a variety of core materials. It is formulated to combine a long assembly time with a moderately fast press time. Laminating 25 fits the needs of the majority of industry combining a 15-minute lay up time with about a 45-minute press time.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** White colored*
***Typical viscosity (cps):** 3900 - 5300*
***Weight solids (%):** 39.5 - 42.5*
***pH:** 4.3 – 5.3*
***Specific gravity:** 1.17 **Weight pounds per gallon**: 9.76*
***Suggested minimum use temperature:** 45℉/ 7℃*

KEY PRODUCT FEATURES

- Long assembly time
- Short press time
- One-component
- Formaldehyde-free
- 175.105 FDA Compliant

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	Clamping pressure	Example
Low density wood species	100-150 psi or 7-10 kg/cm^2	Pine, Poplar
Medium density species	125-175 psi or 9-13 kg/cm^2	Rubberwood, Cherry
High density species	175-250 psi or 13-18 kg/cm^2	Oak, Maple

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use. Product is not freeze thaw stable. Frozen product will have a separated and or lumpy appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Laminating 6W

Laminating 6W is moderately slow-setting polyvinyl acetate adhesive for cold pressing veneers to a variety of core materials. It is formulated to reduce the risk of bleed through on porous veneers.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** tan colored liquid*
***Typical viscosity (cps):** 3800 - 5500 (3/12/83 ℉)*
***Weight solids (%):** 41.0 - 43.0*
***pH:** 4.0 - 5.0*
***Specific gravity:** 1.11 **Weight pounds per gallon**: 9.26*
***Suggested minimum use temperature:** 43 ℉/ 6 ℃*

KEY PRODUCT FEATURES

- Cold pressing porous veneers
- One-component
- Moderate setting speed
- Formaldehyde-free
- 175.105, 176.170 & 176.180 FDA Compliant

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	Clamping pressure	Example
Low density wood species	100-150 psi or 7-10 kg/cm^2	Pine, Poplar
Medium density species	125-175 psi or 9-13 kg/cm^2	Rubberwood, Cherry
High density species	175-250 psi or 13-18 kg/cm^2	Oak, Maple

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product is freeze thaw stable but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Multibond Advantage 2

Multibond Advantage 2 is a two-part crosslinking polyvinyl acetate emulsion adhesive. When mixed with Aluminum Chloride (Catalyst A) the product meets ASTM D-5572 Wet use for Finger joints in Non-structural Lumber Products and European DIN EN 204 D4. Multibond Advantage 2 has good catalyzed pot life and can be used for finger jointing, edge gluing, hot pressing, cold pressing and radio frequency gluing.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Beige colored liquid*
Typical viscosity (cps): *uncatalyzed: 3200 - 4800 (3/12/83 ℉) Catalyzed: 2300 - 4000 cps*
Weight solids (%): *53.2 – 56.2%*
pH: *uncatalyzed: 5.0 - 6.0 catalyzed: 2.0 - 4.0*
Specific gravity: *1.11 **Weight pounds per gallon**: 9.26*
Suggested minimum use temperature: *60 ℉/ 16 ℃*

KEY PRODUCT FEATURES

- For use in radio frequency, hot press, and cold press applications
- Low VOC content
- High water-resistance
- Good catalyzed pot life

PERFORMANCE PROPERTIES

- Exceeds ASTM D-5572-99 Wet Use for Finger joints in Non-structural Lumber Products
- Exceeds DIN EN 204 D4 Classification of Thermoplastic Wood Adhesives for Non-structural Applications
- European E-1 formaldehyde emission standard

ASTM D 5572-99 Wet Use for Finger Joints in Non-structural Lumber Products - Tension

	Test Results				Requirements		
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*3930*	*2530*	*99*	*95*	***2000***	***60***	***30***
Vacuum Pressure	*2454*	*1850*	*79*	*40*	***1600***	***50***	***25***
Boil	*2039*	*1591*	*67*	*40*	***1600***	***50***	***25***
Elevated Temp.	*2221*	*1333*	*N/A*	*N/A*	***1000***	***NR***	***NR***

**Franklin Technical Service Report #15490*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

DIN EN 204 D4 Classification of thermoplastic wood adhesives for non structural applications
Load group D4 European Beech

Storage sequence	Minimum required average value (N/mm^2)	Average value (N/mm^2) on Multibond Advantage 2
1	≥ 10	11.6
3	≥ 4	6.8
5	≥ 4	6.1
6	≥ 8	14.3

**Rosenheim report 505 12934/2 e ANS 5/25/92*

ASTM D5751 Wet Use Conditions

	Test Results		Requirements	
Exposure	***Strength (psi) Average***	***Wood failure (%) Average***	***Strength (psi) Average***	***Wood failure (%) Average***
Dry	*1310*	*98*	***741***	***60***
Vacuum/ Pressure	*769*	*95*	***618***	***50***
Boil	*625*	*60*	***618***	***50***
Elevated Temp.	*855*	*46*	***494***	***40***

Franklin Technical Service Report #17421.* ***Average values based on internal laboratory testing conducted according to ASTM 5751 Wet Use conditions.*

Like all adhesives, proper gluing practices are needed to achieve stated performance.

MIXING INSTRUCTIONS

The recommended proportion of catalyst to resin is five percent by volume or six percent by weight. Place the resin in a mixer and slowly add catalyst under agitation. Continue mixing for five to ten minutes after the catalyst is added to ensure a homogeneous mixture. A smaller amount of catalyst can be used under certain conditions (such as burning in a radio frequency press), but water resistance performance should be validated. It is best to mix the catalyzed material if it has been kept for longer than seven to eight hours since it will increase in viscosity with time.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against.

Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	Clamping pressure	Example
Low density wood species	100-150 psi or 7-10 kg/cm^2	Pine, Poplar
Medium density species	125-175 psi or 9-13 kg/cm^2	Rubberwood, Cherry
High density species	175-250 psi or 13-18 kg/cm^2	Oak, Maple

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 20 minutes

Press/clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ twenty degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable. If it becomes frozen, allow to warm to ambient temperature and thoroughly mix until a homogenous, smooth mixture is obtained.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Multibond EZ-1 HV

Multibond EZ-1 HV is a high viscosity version of the Multibond EZ-1 wood adhesive. It is a shelf stable, one component (pre-catalyzed) crosslinking polyvinyl acetate emulsion that is recommended for high frequency and hot or cold press, edge and face gluing applications. With its very fast setting rate, viscosity stability and high percent solids, Multibond EZ-1 HV can also be used for a variety of assembly gluing applications.

PHYSICAL PROPERTIES

Chemical Family Description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Cream colored liquid*
Typical Viscosity (cps): *9,500 - 11,500 (3/6/83 ºF)*
Weight Solids (%): *45.0 – 50.2*
pH: *2.0 - 3.4*
Specific Gravity: *1.09*
Suggested Minimum Use Temperature: *15ºC*

KEY PRODUCT FEATURES

- Developed for laminating and edge and face gluing
- Excellent for radio frequency gluing
- Light-colored glue line
- Fast setting

PERFORMANCE PROPERTIES

- Meets requirements for ANSI/HPVA HP-1-2004 Type 2
- Meets European Standard DIN EN204 D3
- Meets DIN EN 14257 WATT 91 Heat Testing

Like all adhesives, proper gluing practices are needed to achieve stated performance.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	Clamping pressure	Example
Low density wood species	100-150 psi or 7-10 kg/cm^2	Pine, Poplar
Medium density species	125-175 psi or 9-13 kg/cm^2	Rubberwood, Cherry
High density species	175-250 psi or 13-18 kg/cm^2	Oak, Maple

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

Multibond EZ-1

Multibond EZ-1 is a one-part crosslinking polyvinyl acetate emulsion adhesive developed for a wide range of laminating as well as edge and face gluing operations. Multibond EZ-1 is the first one-part shelf stable polyvinyl acetate developed for wood bonding. This adhesive can be used in radio frequency, hot press and cold press applications.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Off-white colored liquid*
Typical viscosity (cps): *3200 - 4500 (3/12/83 ℉)*
Weight solids (%): *47.0 - 50.0%*
pH: *2.2 - 3.5*
Specific gravity: *1.09* ***Weight pounds per gallon:*** *9.09*
Suggested minimum use temperature: *60 ℉/ 16 ℃*

KEY PRODUCT FEATURES

- Developed for laminating and edge and face gluing
- Excellent for radio frequency gluing
- Light colored glue line
- Water-resistant
- Fast setting

PERFORMANCE PROPERTIES

- Meets requirements for ANSI/HPVA HP-1-2004 Type 2
- Meets requirements for ANSI/HPVA EF 2009
- Meets WDMA Type 1 and 2 water resistance
- Meets European Standard DIN EN204 D3
- Meets DIN EN 14257 WATT 91 Heat Testing
- Meets CARB requirements when tested in various wood constructions
- European E-1 formaldehyde emission standard
- 175.105 FDA Compliant

DIN EN 204 D3 Classification of thermoplastic wood adhesives for non structural applications:

Load group D3 Beech

Storage sequence	Minimum required average value (N/mm^2)	Average value (N/mm^2) on Multibond EZ-1
1	≥ 10	12
3	≥ 2	2.2
4	≥ 8	14.2

**Rosenheim report 505 36441/1e 8/72008*

DIN EN 14257 (WATT 91)

Average value (N/mm^2) on Multibond EZ-1
8.4

**Rosenheim report 505 36441/2e 8/7/2008*

Like all adhesives, proper gluing practices are needed to achieve stated performance.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin’s technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin’s control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin’s control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.’s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx (“Standard Terms”). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer’s consent to the Standard Terms, and Customer’s acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer’s acceptance of the Standard Terms and Conditions of Sale.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Multibond EZ-2 HV

Multibond EZ-2 HV is a shelf stable, one component (pre-catalyzed) cross-linking polyvinyl acetate emulsion adhesive. It is a higher viscosity version of Multibond EZ-2 and is designed or used in applications such as radio frequency and hot press gluing. Multibond EZ-2 HV is characterized by its low minimum use temperature making it an excellent alternative for use when factory temperatures are low. With its moderately fast setting rate, viscosity stability, and high percent solids, Multibond EZ-2 HV can also be used for a variety of assembly gluing applications.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Cream colored liquid*
Typical viscosity (cps): *7000 - 12000 (4/30/83°F)*
Weight solids (%): *45.5 - 49.4%*
pH: *2.6 - 3.5*
Specific gravity: *1.09* ***Weight pounds per gallon:*** *9.09*
Suggested minimum use temperature: *45°F/ 7°C*

KEY PRODUCT FEATURES

- Excellent for finger jointing or cold press laminating in colder climates
- Light colored glue line
- Low minimum use temperature

PERFORMANCE PROPERTIES

- Meets European Standard DIN EN204 D3
- Meets DIN EN 14257 WATT 91 Heat Testing

Like all adhesives, proper gluing practices are needed to achieve stated performance.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	Clamping pressure	Example
Low density wood species	100-150 psi or 7-10 kg/cm^2	Pine, Poplar
Medium density species	125-175 psi or 9-13 kg/cm^2	Rubberwood, Cherry
High density species	175-250 psi or 13-18 kg/cm^2	Oak, Maple

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/ clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glue line. These bonds are usually weak.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within twelve months of date of manufacture. Mix before use for best results. Product is freeze-thaw stable, but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

Multibond X-016

Multibond X-016 is a two-component crosslinking polyvinyl acetate emulsion adhesive developed specifically for finger jointing; but performs well in laminating and edge gluing. When mixed with Catalyst A it exceeds the requirements for ASTM D-5572 Wet Use for Finger Joints in Non-structural Lumber Products as well the European DIN EN 204 D4. This adhesive has a shear thinning rheology for easy extrudability and a low minimum use temperature allowing it to be used for a wide variety of applications.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *White colored liquid*
Typical viscosity (cps): uncatalyzed: *1690 - 2450 (3/12/83℉)* ***Catalyzed:*** *1000 - 2000*
Weight solids (%): *49.0 - 53.0%*
pH: *uncatalyzed: 4.5 - 5.0 catalyzed: 2.0 - 4.0*
Specific gravity: *1.09* ***Weight pounds per gallon:*** *9.09*
Suggested minimum use temperature: *45.0℉/7.0℃*

KEY PRODUCT FEATURES

- Excellent for finger jointing and extrusion applications
- Good for radio frequency gluing as well as hot press and cold press operations
- Low VOCs
- High water-resistance
- Low minimum use temperature
- Translucent, clear glue line

PERFORMANCE PROPERTIES

Multibond X-016 with six percent Catalyst A

- European E-1 formaldehyde emission standard
- Exceeds ASTM D-5572-95 Wet Use for Finger joints in Non-structural Lumber Products
- Exceeds DIN EN 204 D4 Classification of Thermoplastic Wood Adhesives for Non-structural Applications

ASTM D-5572-95 Wet Use for Finger joints in Non-structural Lumber Products - Tension

	Test Results			Requirements		
Exposure	*Strength (psi) Average*	*Wood failure (%) Average*	*Wood failure (%) minimum*	*Strength (psi) Average*	*Wood failure (% Average*	*Wood failure (%) minimum*
Dry	*6119*	*93*	*80*	***2000***	***60***	***30***
Boil	*2152*	*50*	*30*	***1600***	***50***	***25***
220℉ Elevated temperature	*2999*	*59*	*25*	***1000***	***N/A***	***N/A***
Vacuum pressure	*2571*	*61*	*45*	***1600***	***50***	***25***

**Ponderosa Pine TECO test report #98-64 6/18/98*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

DIN EN 204 D4 Classification of thermoplastic wood adhesives for non structural applications
Load group D4 European Beech

Storage sequence	Minimum required average value (N/mm^2)	Average value (N/mm^2) on Multibond X-016
1	≥ 10	15.3
3	≥ 4	7.3
5	≥ 4	5.2
6	≥ 8	13.7

**Rosenheim report 505 16871/1e 4/23/96*

*Like all adhesives, proper gluing practices are needed to achieve stated performance.

MIXING INSTRUCTIONS

The recommended proportion of catalyst to resin is five percent by volume or six percent by weight. Place the resin in a mixer and slowly add catalyst under agitation. Continue mixing for five to ten minutes after the catalyst is added to ensure a homogeneous mixture. A smaller amount of catalyst can be used under certain conditions (such as burning in a radio frequency press), but water resistance performance should be validated. It is best to mix the catalyzed material if it has been kept for longer than seven to eight hours since it will increase in viscosity with time.

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against.

Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web-based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web-based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 20 minutes

Press/clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ twenty degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty-four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Platen Temperature °F

Distance to Deepest Glue Line	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Finger joint cutter-heads: Knife stack/set - be sure to check overall knife stack for accuracy. Keep cutter-heads in pairs and properly cleaned. Cutter-heads should be sharpened as a set. Knife set should cut only 0.25 mm or 0.010 inches to 0.75 mm or 0.030 inches of wood.

Finger joint assembly: End pressure should be set to provide 14.0 kg/cm² - 35.0 kg/cm² or 200 - 500 psi pressure for non-structural joints. Crowder wheels should be aligned to match fingers accurately.

Finger joint adhesive application: Sufficient adhesive spread will provide a uniform coverage that should cover one-half to two-thirds the length of the finger on both sides in a thin continuous film. Make sure fingers aren't skipped and that the adhesive is applied to the whole joint, not just the tips of the fingers. Too much adhesive can cause a hydraulic effect.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use for best results. Product may need filtered in warmer temperatures; contact Franklin Technical Support for easy filtering options. Product is freeze thaw stable but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin's control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

ReacTITE EP-925

ReacTITE EP-925 is a two-component, low foaming emulsion polymer isocyanate (EPI) adhesive recommended for applications requiring exceptional water, heat and solvent resistance. The product can be utilized with conventional cold press or hot press equipment, and has been enhanced to provide superior performance with radio frequency press equipment. ReacTITE EP-925 allows for reduction in conditioning time before surfacing which improves productivity. It is also characterized by good spreader stability when compared with traditional EPI adhesives.

PHYSICAL PROPERTIES

ReacTITE EP-925
***Chemical family description**: polyvinyl acetate emulsion adhesive*
***Appearance:** White colored liquid*
***Specific gravity:** 1.28*
***Weight solids (%):** 55.0 - 59.0*
***pH:** 6.5 - 8.0*
***Suggested minimum use temperature:** 46°F/ 8°C*
***Typical viscosity (cps):** 8000 - 11000*
***Mixed viscosity (cps):** 10000 - 16000 when mixed; 17000 - 30000 at one hour*

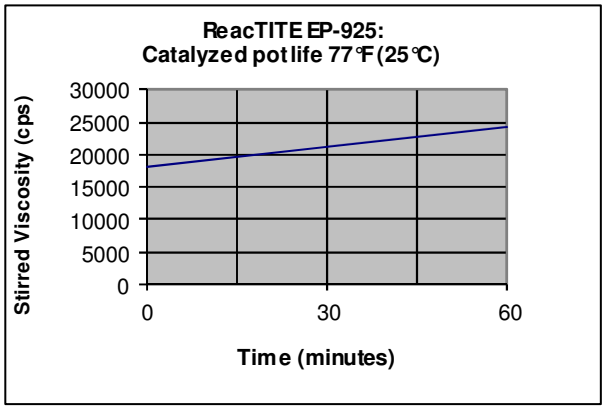
Hardener 200
***Chemical family description:** Polymeric MDI*
***Appearance:** Brown colored liquid*
***Typical viscosity (cps):** 170 - 230*
***Specific gravity:** 1.23*

KEY PRODUCT FEATURES

- Recommended for applications requiring water, heat and solvent resistance
- Excellent for hot and cold pressing and radio frequency pressing
- Low film formation temperature allowing it to be used over a wide range of plant temperatures
- Low foaming EPI adhesive
- Good spreader stability
- Meets European E-1 formaldehyde emission standard
- Meets CARB requirements when tested in various wood constructions
- 175.105 FDA Compliant

POT LIFE

The pot life of ReacTITE EP-925 is in excess of one hour at 77 degrees Fahrenheit (twenty five degrees Celsius). However the viscosity of the mix will increase as it ages. Wood glued with older material will have less water resistance, a characteristic common to most EPI adhesives. Therefore, it is recommended that fresh adhesive be mixed only when it is to be immediately used. EPI adhesives also generate foam during the reaction process; so it is best to have the material continually moving.



A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

MIXING INSTRUCTIONS

ReacTITE EP-925 resin is mixed with Hardener 200 at a ratio of 100 parts resin to 15 parts Hardener by weight or 6.45 parts resin to one part Hardener by volume. Avoid mixing for long periods of time or with excessive agitation as pot life is affected by mixing time and speed. While this product can be easily mixed by hand, it is usually more convenient to mix the components in a meter mix unit. Your Franklin representative can work with you to supply the appropriate mixing equipment.

PERFORMANCE PROPERTIES

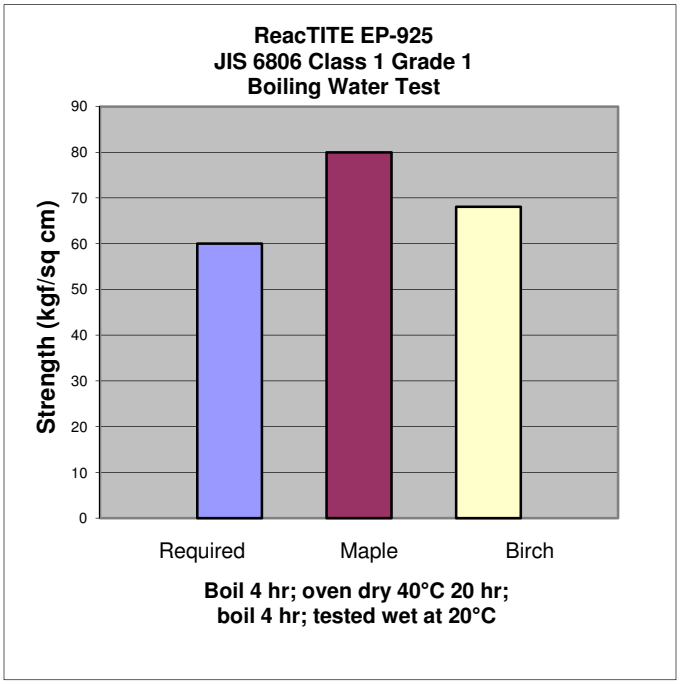
Bond Strength and Radio Frequency Gluing Performance

ReacTITE EP-925 is formulated to provide higher immediate bond strengths in the radio frequency equipment than conventional EPI adhesives. A positive correlation exists between the adhesive's electrical conductivity and its immediate bond strength upon removal from radio frequency press equipment – with higher conductivity resulting in higher immediate bond strengths.

	Conductivity
Competitive EPI	1.87 (µ Mho)
ReacTITE EP-925	**4.25 (µ Mho)**

Bonding Strength and Durability

- **Japanese Industrial Standard Class 1, Grade 1:** Pass (refer to chart for boiling water test results)
- **Japanese Agricultural Society (JAS) standard for glued laminated timber for fixture**
  - Cold water soak delamination test: Pass
  - Boiling water soak delamination test softwoods: Pass
- **ANSI/HPVA EF 2009:** PASS



Exceeds ANSI/HPVA HP-1-2004 Type I

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
2 cycle boil	*354*	*324*	*30*	*10*	***>350***	***NR***	***15***	***10***

**3-ply rotary cut birch Franklin Laboratory results 16803*

Exceeds DIN EN 204 D4 Classification of thermoplastic wood adhesives for non structural applications: Load group D4 Beech

Storage sequence	Minimum required average value (N/mm^2)	Average value (N/mm^2) on ReacTITE EP-925
1	≥ 10	12.2
3	≥ 4	6.6
5	≥ 4	5.8

**Rosenheim report 505 36441/9e 3/16/09*

Exceeds DIN EN 14257 (WATT 91)

Average value (N/mm^2) on ReacTITE EP-925
11.6

**Rosenheim report 505 36441/10e 3/16/09*

Exceeds ASTM D-5751-99 wet use for laminate joints in non-structural lumber products

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*1816*	*1447*	*99*	*90*	***950***	***475***	***60***	***30***
Vacuum Pressure	*961*	*855*	*75*	*35*	***792***	***396***	***50***	***25***
Boil	*831*	*756*	*73*	*60*	***792***	***396***	***50***	***25***
Elevated Temp.	*1350*	*1056*	*88*	*70*	***633***	***317***	***40***	***20***

**Southern yellow pine radio frequency cured - TECO report 05-243A*

Exceeds ASTM D-5751-99 wet use for laminate joints in non-structural lumber products

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*1779*	*1554*	*98*	*90*	***950***	***475***	***60***	***30***
Vacuum Pressure	*928*	*855*	*50*	*30*	***792***	***396***	***50***	***25***
Boil	*824*	*727*	*73*	*55*	***792***	***396***	***50***	***25***
Elevated Temp.	*1401*	*1034*	*95*	*80*	***633***	***317***	***40***	***20***

**Southern yellow pine cold pressed - TECO report 05-243B*

Exceeds ASTM D-5751-99 wet use for laminate joints in non-structural lumber products

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	*2009*	*1529*	*86*	*50*	***1061***	***530***	***60***	***30***
Vacuum Pressure	*977*	*852*	*58*	*30*	***884***	***442***	***50***	***25***
Boil	*949*	*761*	*81*	*45*	***800***	***400***	***50***	***25***
Elevated Temp.	*1511*	*865*	*55*	*20*	***707***	***354***	***40***	***20***

**Radiata pine radio frequency cured - TECO report 05-243C*

Exceeds ASTM D-5751-99 wet use for laminate joints in non-structural lumber products

	Test results				Requirements			
Exposure	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*	*Strength (psi) Average*	*Strength (psi) Minimum*	*Wood failure (%) Average*	*Wood failure (%) Minimum*
Dry	2,175	*1791*	*88*	*45*	***1061***	***530***	***60***	***30***
Vacuum Pressure	*951*	*837*	*58*	*20*	***884***	***442***	***50***	***25***
Boil	*911*	*703*	*70*	*20*	***800***	***400***	***50***	***25***
Elevated Temp.	*1849*	*1242*	*78*	*15*	***707***	***354***	***40***	***20***

**Radiata pine cold pressed - TECO report 05-243D*

APPLICATION GUIDELINES

Moisture content: Six to ten percent is the recommended moisture content for the gluing stock. Higher moisture content will increase the clamp time needed. Additionally, moisture content should mirror (as closely as possible) that which will be experienced in the end use market for the wood product being manufactured.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be avoided. When possible, glue joints should be prepared and glued the same day. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives.

Spread rate: The recommended adhesive coating layer is the same as for most PVA products or approximately 0.007 inches/ 0.178 mm in thickness. EPI adhesives have superior gap filling properties due to their higher percent solids content. While ReacTITE EP-925 has higher percent solids content than most PVA adhesives, it also has a higher specific gravity than PVA. This means that in order to apply the same 0.2 mm thickness layer of wet adhesive as for PVA, a higher gram weight of adhesive should be applied. Generally, 200 g/m² / 41 #/MSGL of glue line is adequate.

Conveyorized spreaders are commonly used in edge-gluing applications. Adjust the applicator to ensure complete coverage on the staves. One side application is adequate in most situations. Verify that adequate coverage exists by monitoring squeeze-out along the glue lines when the panels are under pressure.

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 10 minutes

Clamping pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces must be made to obtain maximum strength. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (5 cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line.

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Press/clamp time: A minimum press time of 30 minutes is recommended under ideal conditions when using soft wood species at moisture content less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ twenty degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Working pauses: The spreader should be kept running during pauses in production for lunch breaks, etc. to help extend the working life of the adhesive.

Machining: Post-gluing conditioning is not unlike PVA products, although shorter curing times are frequently possible. We recommend that panels be allowed to condition at least six hours prior to additional processing.

RF cure time: Radio frequency cure times will vary from machine to machine. Machine manufacturers suggest that machines will cure between 75 and 100 square inches of glue line per minute per kilowatt. Glue joints should feel warm immediately after the cure cycle. Cure times should be determined through plant trials.

Hot Press time: Press time is dependent on the adhesive used, gluing stock type, moisture content of the stock and environmental conditions. This hot press schedule is provided as a recommended starting point. In plant testing is recommended especially for temperatures and substrate thicknesses beyond this chart.

Distance to Deepest Glue Line	Platen Temperature °F									
	160	170	180	190	200	210	220	230	240	250
1/32”	1' 31"	1' 25"	1' 19"	1' 14"	1' 09"	1' 05"	1' 01"	0' 57"	0' 53"	0' 50"
1/16”	1' 53"	1' 46"	1' 39"	1' 33"	1' 27"	1' 21"	1' 16"	1' 11"	1' 07"	1' 02"
3/32”	2' 22"	2' 13"	2' 04"	1' 56"	1' 49"	1' 42"	1' 35"	1' 29"	1' 24"	1' 18"
1/8”	2' 58"	2' 46"	2' 36"	2' 26"	2' 16"	2' 08"	1' 59"	1' 52"	1' 45"	1' 38"
5/32”	3' 42"	3' 28"	3' 15"	3' 02"	2' 51"	2' 40"	2' 29"	2' 20"	2' 11"	2' 03"
3/16”	4' 38"	4' 20"	4' 03"	3' 48"	3' 33"	3' 20"	3' 07"	2' 55"	2' 44"	2' 33"
7/32”	5' 47"	5' 25"	5' 05"	4' 45"	4' 27"	4' 10"	3' 54"	3' 39"	3' 25"	3' 12"
1/4”	7' 15"	6' 47"	6' 21"	5' 57"	5' 34"	5' 13"	4' 53"	4' 34"	4' 17"	4' 00"

Clean-up: The foaming and cross-linking characteristics of EPI may cause blockages in the wastewater plumbing. Furthermore, there may be disposal concerns with the mixed product. It is recommended that the excess glue from the spreader and mixing containers be poured into a container and disposed of. Avoid sealing the container for at least 24 hours to permit EPI components to finish reacting. Glue pans and rollers may then be washed in warm water.

HANDLING AND STORAGE

Shelf life: Best if used within twelve months of date of manufacture. Mix before use. Product is freeze-thaw stable. If it becomes frozen, allow to warm to ambient temperature and thoroughly mix until a homogenous, smooth mixture is obtained.

Storage of Hardener: Hardener 200 is very susceptible to moisture. We recommend that it be kept in a sealed container. A desiccant or nitrogen blanket is recommended.

Safety and disposal: Hardener 200 is a polymeric isocyanate. Use of gloves and other protective equipment is recommended. Consult MSDS before use for additional information.

For additional questions, Franklin’s technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin’s control. Customer should determine the suitability of the product for a particular application before adopting it on a commercial scale. Discoloration and checking of wood veneer materials may occur with use of the product. These occurrences range in appearance, color and may also vary depending upon the species of wood veneer to which the product is applied. Such discoloration and checking may appear during or after the manufacturing process which utilizes the product. Environmental conditions in some manufacturing plants and end-use locations can contribute to discoloration and checking. Because such discoloration and checking are attributable to conditions beyond Franklin’s control, Franklin cannot assume any responsibility or liability for any discoloration and/or checking problems that might occur.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers™

Titebond 50 HV

Titebond 50 HV is a fast-setting, aliphatic resin emulsion adhesive that has a higher viscosity than Titebond 50. This gives it superior non-run characteristics. Titebond 50 HV can be used in edge and face gluing and general assembly applications for interior use. It also performs well in conventional cold press equipment. This adhesive has excellent creep- and heat-resistance, superior solvent-resistance, very low minimum use temperature, and excellent bond strength.

PHYSICAL PROPERTIES

***Chemical family description**: Aliphatic resin emulsion adhesive*
***Appearance:** Cream colored liquid*
***Typical viscosity (cps):** 7500 - 9500 (3/12/83 ℉)*
***Weight solids (%):** 42.0 - 47.0*
***pH:** 4.0 - 5.0*
***Specific gravity:** 1.15 **Weight pounds per gallon**: 9.60*
***Suggested minimum use temperature:** 35 ℉/ 2 ℃*

KEY PRODUCT FEATURES

- One-component great for cold pressing and assembly
- Excellent heat and solvent resistance
- Fastest setting aliphatic resin adhesive
- No formaldehyde

APPLICATION GUIDELINES

Moisture content: Six to eight percent is the recommended moisture content for the gluing stock. High moisture content will dramatically increase the clamp time needed. Panel shrinkage may occur resulting in stress cracks or end-joint delamination.

Stock preparation: The preparation of the stock to be glued is extremely important. Joints cut from rip saws should be free of saw marks. They should also be straight and square. Moulded or jointed stock should be free of knife marks. Glazed or burnished joints will prevent adhesive penetration and should be guarded against. Gluing stock should be uniform in thickness. Variation in thickness should not exceed ± 0.005 inches/0.12 mm. Sanding to thickness should be performed using higher than 50 grit abrasives. When possible, glue joints should be prepared and glued the same day.

Spread: Generally, 35-50 pounds of adhesive per 1,000 square feet or 170-250 grams per square meter of glue line is adequate. Verify adequate glue coverage by monitoring for squeeze out along the glue line once the panels are under pressure. A Web based spread calculator can be found at www.franklinadhesivesandpolymers.com.

Pressure: Pressure is dependent upon the species or material to be glued and joint preparation. Direct contact of the gluing surfaces is required to obtain maximum strength. The use of a compressometer will aid in accurately measuring the amount of pressure being applied to the gluing area. Suggested clamp locations for various wood densities are eight to fifteen inches (20-38 cm) apart and two inches (five cm) from the end of the panel to evenly distribute pressure along the entire length of the glue line. A Web based pressure calculator can be found at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Recommended clamping pressures:

Species	*Clamping pressure*	*Example*
Low density wood species	*100-150 psi or 7-10 kg/cm²*	*Pine, Poplar*
Medium density species	*125-175 psi or 9-13 kg/cm²*	*Rubberwood, Cherry*
High density species	*175-250 psi or 13-18 kg/cm²*	*Oak, Maple*

Assembly time: The assembly time is influenced by many factors some of which include glue spread, moisture content of the stock, porosity of the stock, environmental conditions and adhesive choice. Assembly times of five to ten minutes are approximate. It is desirable to see a bead of adhesive squeeze out around the perimeter of the bottom panel of the stack.

At 70ºF and 50% relative humidity, approximately 6 wet mils:
Open Assembly Time – 5 minutes
Total Assembly Time – 15 minutes

Press/clamp time: Press times are dependent on the adhesive used, gluing stock type, moisture content of the stock, and environmental conditions. Press times can range from a minimum press time of 30 minutes to greater than two hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than eight to ten percent and factory temperatures of 68 degrees Fahrenheit/ 20 degrees Celsius. Longer press times will be required for higher density species, higher moisture contents and colder factory temperatures. It is recommended that optimum press times be determined in actual plant conditions recognizing that seasonal changes may lead to variable requirements.

Machining/ post process conditioning: After the minimum clamping time period, the panel will develop enough handling strength and can be removed and stacked out of the press. Twenty four hours of cure is recommended before further machining. Three or four days may be required to eliminate sunken joints caused by residual moisture in the glue line.

Minimum use temperature: Curing temperatures should be higher than the minimum use temperature of the adhesive. This includes the temperature of the stock to be glued as well as the air and adhesive temperatures. If the temperatures are below the minimum use temperatures you will see a white, chalky appearance of the glueline. These bonds are usually weak.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use. Product is not freeze thaw stable. Frozen product will have a separated and or lumpy appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

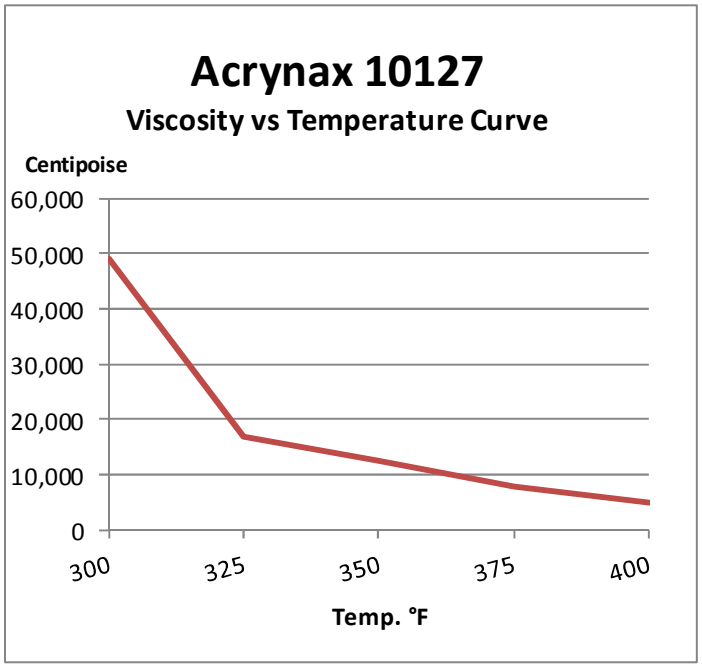
Franklin Adhesives & Polymers

ACRYNAX 10127

ACRYNAX 10127 is a permanently tacky, 100% solid all-acrylic polymer designed for use as a hot melt pressure sensitive adhesive. It can also be used as a specialty additive to improve the performance of other commercially available hot melt adhesives by enhancing tack and flexibility. This product exhibits good adhesion to a variety of materials including polyester, glass, steel, aluminum, vinyl, fabric, non-wovens and paper. **ACRYNAX 10127** provides high tack and peel adhesion with a moderate degree of cohesive strength. This product also has good resistance to creep or cold flow. **ACRYNAX 10127** is a thermoplastic polymer which can be applied using a variety of hot melt coating equipment. This polymer may be used as is, or modified with compatible plasticizers, such as rosin based, hydrocarbon, or terpene- phenolic resins.

PHYSICAL PROPERTIES

Polymer Type: *100% Acrylic*
Appearance: *Clear, Faint Yellow*
Viscosity: *8000 - 17,000 cps (~350°F)*
Solids (Non-Volatiles): *100%*
R&B Melt Point: *95°C - 110°C*
Glass Transition Temp. (T_g): (DSC): *-60°C*
Shelf Life: *10 years*



PERFORMANCE PROPERTIES

A 1 mil (28 gsm) film of **ACRYNAX 10127** cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel which has a #3 surface finish.

180° Peel Adhesion (20-min. bond time):	*2.7 lb*
180° Peel Adhesion (24-hour bond time):	*3.3 lb*
Loop Tack:	*2.5 lb*
178° Shear Adhesion (½" x ½" x 1000g):	*60-70 min*

FDA Compliance: *16 CFR 1500.3(C)(4)*
21 CFR 175.105

PACKAGING

ACRYNAX 10127 is packaged in silicone-lined: *160 kg (352 lb) fiber drum*
10 each of 2.25 kg (5 lb) boxes (50 lb total)
11.4 kg (25 lb) boxes

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

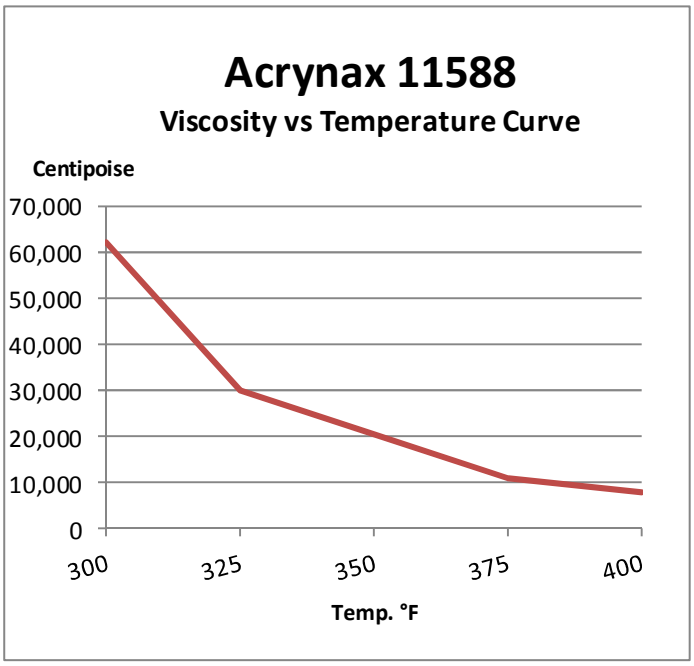
Franklin Adhesives & Polymers

ACRYNAX 11588

ACRYNAX 11588 is a permanently tacky, 100% solid all-acrylic polymer designed for use as a hot melt pressure sensitive adhesive. It can also be used as a specialty additive to improve the performance of other adhesives by enhancing tack and flexibility. This product exhibits good adhesion to a variety of materials including polyester, glass, steel, aluminum, vinyl, fabric, non-wovens and paper. **ACRYNAX 11588** provides moderate tack and peel adhesion with a high degree of cohesive strength. This product also has excellent resistance to creep or cold flow. **ACRYNAX 11588** is a thermoplastic polymer which can be applied using a variety of hot melt coating equipment. This polymer may be used as is, or modified with compatible plasticizers, such as rosin based, hydrocarbon, or terpene- phenolic resins.

PHYSICAL PROPERTIES

Polymer Type: *100% Acrylic*
Appearance: *Clear, Faint Yellow*
Viscosity: *11,000 - 30,000 cps (~350 °F)*
Solids (Non-Volatiles): *100%*
R&B Melt Point: *95 °C - 120 °C*
Glass Transition Temp. (T_g): (DSC): *-58 °C*
Shelf Life: *10 years*



PERFORMANCE PROPERTIES

A 1 mil (28 gsm) film of **ACRYNAX 11588** cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel which has a #3 surface finish.

180° Peel Adhesion (20-min. bond time):	*2.5 lb*
180° Peel Adhesion (24-hour bond time):	*3.2 lb*
Loop Tack:	*2.1 lb*
178° Shear Adhesion (½" x ½" x 1000g):	*140 min*

FDA Compliance: *16 CFR 1500.3(C)(4)*
21 CFR 175.105

PACKAGING

ACRYNAX 11588 is packaged in silicone-lined: *160 kg (352 lb) fiber drum*
10 each of 2.25 kg (5 lb) boxes (50 lb total)
11.4 kg (25 lb) boxes

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

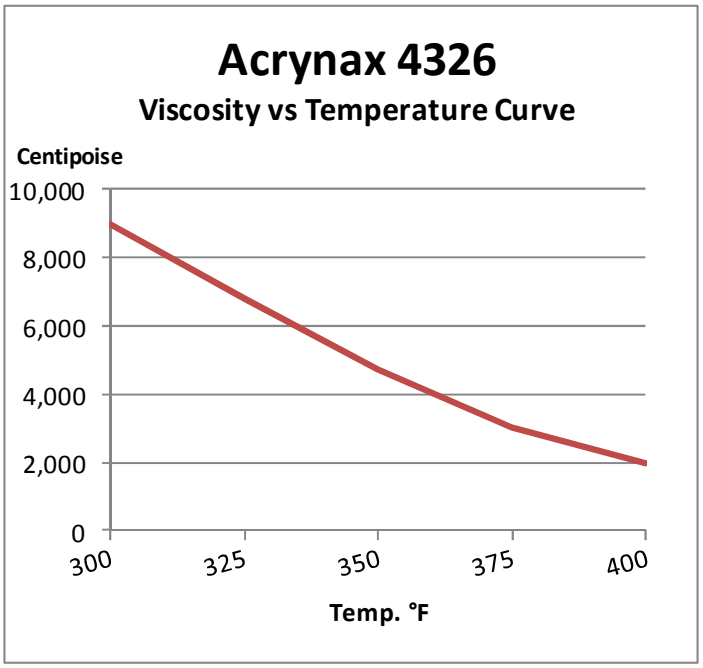
Franklin Adhesives & Polymers

ACRYNAX 4326

ACRYNAX 4326 is a permanently tacky, 100% solid all-acrylic polymer designed for use as a hot melt pressure sensitive adhesive. It can also be used as a specialty additive to improve the performance of other commercially available hot melt adhesives by enhancing tack and flexibility. This product exhibits good adhesion to a variety of materials including polyester, glass, steel, aluminum, vinyl, fabric, non-wovens and paper. **ACRYNAX 4326** provides the highest tack and peel adhesion with the lowest cohesive strength in the product line. **ACRYNAX 4326** is a thermoplastic polymer which can be applied using a variety of hot melt coating equipment. This polymer may be used as is, or modified with compatible plasticizers, such as rosin based, hydrocarbon, or terpene-phenolic resins.

PHYSICAL PROPERTIES

Polymer Type: *100% Acrylic*
Appearance: *Clear, Faint Yellow*
Viscosity: *2800 - 6700 cps (~350 °F)*
Solids (Non-Volatiles): *100%*
R&B Melt Point: *70 - 80 ºC*
Glass Transition Temp. (T_g): (DSC): *-60 ºC*
Shelf Life: *10 years*



PERFORMANCE PROPERTIES

A 1 mil (28 gsm) film of **ACRYNAX 4326** cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel which has a #3 surface finish.

180° Peel Adhesion (20-min. bond time):	*3.3 lb*
180° Peel Adhesion (24-hour bond time):	*4.7 lb*
Loop Tack:	*2.6 lb*
178° Shear Adhesion (½" x ½" x 1000g):	*10 min*

FDA Compliance: *16 CFR 1500.3(C)(4)*
21 CFR 175.105

PACKAGING

ACRYNAX 4326 is packaged in silicone-lined: *160 kg (352 lb) fiber drum*
10 each of 2.25 kg (5 lb) boxes (50 lb total)
11.4 kg (25 lb) boxes

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 081-01

Covinax 081-01

PRODUCT DESCRIPTION

Covinax 081-01 is a hydroxyethyl cellulose stabilized vinyl acrylic copolymer emulsion developed for permanent pressure sensitive applications. It has good heat, plasticizer and oil resistance, which allow it to be used on vinyl labels and in automotive applications involving vinyl substrates or oily surfaces. The performance of this product can be best characterized as high peel with moderate shear and tack. It exhibits excellent adhesion to synthetic films such as polyester. The HEC colloid in Covinax 081-01 allows good machinability on both rod and roll coaters. In addition, it can be sprayed.
Covinax 081-01 is FDA compliant under 21CFR 175.105.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Anionic/Cellulosic*
Color: *White*
Viscosity (cps): *300 - 800 (RVF, Spindle #2/50RPM/77° F)*
Percent Solids: *52.0 - 54.0*
pH: *4.2 - 5.2*
Weight Per Gallon: *8.4*
Freeze/Thaw Stability: *Unstable*
Shelf Life: *6 months*
Glass Transition Temperature (Tg):(DSC): *-33.7° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 081-01 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	*Typical Values*	*Specification Range*
180° Peel Adhesion[1] (lbs)	*2.1*	*1.7 minimum*
178° Shear Adhesion[2] (minutes)	*769*	*200 minimum*
Loop Tack[3] (lbs)	*2.6*	*1.0 minimum*

FDA Compliance: *21CFR 175.105*

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	PT	PT	PT	PT	0.29Z	1.2Z	2.3A	PT
90° peel (lb/lineal inch width) 30 minute dwell	0.303Z	0.762Z	PT	0.280Z	0.148Z	0.386 Z	1.9Z	0.27Z
Loop Tack (lb)	0.60	1.2	0.87	1.1	0.26	0.18	1.2	0.42

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	254C	350C	769C
SAFT Testing (min/temp° C)	57.8/83.8° C	49.6/89.6° C	57.8/81.5° C
Substrate: Stainless Steel	Coat weight: 1.0 mil (+/-0.1 mil)		

C = Cohesive A = Adhesive PT = Paper Tear Z=Zippy FP = Fiber pick

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.81	7.08	3.30	4.14

Pressure Sensitive Adhesives

Covinax 114-00

Covinax 114-00 *is a surfactant stabilized vinyl acrylic copolymer emulsion developed for permanent applications requiring high heat resistance. Its performance is characterized as extremely high shear, with moderate peel and tack. It has a high degree of carboxyl functionality, and maintains its high shear at elevated temperatures. Covinax 114-00 is FDA compliant under 21CFR 175.105 and 21CFR 176.180.*

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *1500 Max (RVF, Spindle #3/60 RPM /77° F)*
Percent Solids: *52% - 55%*
pH: *3.8 - 7.0*
Weight Per Gallon: *8.6*
Shelf Life: *6 months*
Freeze/Thaw Stability: *Unstable*
Borax Compatible: *Yes*
Glass Transition Temperature (Tg): (DSC): *-37.4° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 114-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	1.6	1.2 minimum
178° Shear Adhesion[2] (minutes)	2300	400 minimum
Loop Tack[3] (lbs)	1.2	0.6 minimum

FDA Compliance: *21 CFR 175.105*
21 CFR 176.180

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5003, 0.25 square inch, 1000 gram load, 10 minute dwell.*
[3] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 165-05

Covinax 165-05

PRODUCT DESCRIPTION

Covinax 165-05 is a surfactant stabilized acrylic copolymer emulsion developed for semi-removable or repositionable applications. Its primary end use is for removable paper and film labels where the labeled substrates are metal, film, plastic, glass and overprinted or painted surfaces. Covinax 165-05 coated labels applied to substrates will show a slight increase in peel over time. In addition to pressure sensitive labels, the product has found use in palletizing, shelf marking labels and re-sealable envelopes. It was specifically designed to be transfer coatable with slot die coaters on a wide variety of films and release liners.

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *550 - 850 (RVF, Spindle #3/50 RPM/77° F)*
Percent Solids: *55.0% - 57.0%*
pH: *5.5 - 6.5*
Weight Per Gallon: *8.6*
Shelf Life: *6 months*
Freeze/Thaw Stability: *Unstable*
Borax Compatible: *Yes*
Glass Transition Temperature (Tg): *-65° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 165-05 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	*Typical Values*	*Specification Range*
180° Peel Adhesion[1] (lbs)	*1.4*	*0.8 - 1.6*
178° Shear Adhesion[2] (minutes)	*70*	*36 minimum*
Loop Tack[3] (lbs)	*1.9*	*1.2 - 2.2*

FDA Compliance: *21CFR 175.105*
21CFR 176.180

[1] Franklin International 03QC 5002, 30 minute dwell.
[2] Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.
[3] Franklin International 03QC5004, 1 square inch contact, 1 second dwell.

IMPORTANT NOTICE TO CUSTOMER:
The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx. ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

Covinax 169-00

Covinax 169-00 *is a polyvinyl alcohol stabilized vinyl acrylic copolymer emulsion developed for a variety of permanent pressure sensitive applications requiring very aggressive tack. It exhibits outstanding adhesion to most synthetic films, including treated and untreated polyethylene and polypropylene, Tyvek and Cryovac. It performs well in low temperatures and is widely used in packaging applications both formulated and as a straight polymer. Covinax 169-00 can be formulated into a wash-away adhesive by the addition of a nonionic surfactant. The polyvinyl alcohol colloid allows easy cleanup and imparts excellent machining. It can be applied with a knife, rod, roller coater or extruded in beads for various packaging applications. Covinax 169-00 is FDA compliant under 21CFR 175.105, 21CFR 176.170, and 21CFR 176.180.*

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Polyvinyl alcohol*
Color: *White*
Viscosity (cps): *1600 - 3400 (LVF, Spindle #4/60RPM/77°F)*
Percent Solids: *58.0% - 60.0%*
pH: *4.5 - 5.5*
Weight Per Gallon: *8.5*
Shelf Life: *4 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg):(DSC): *-42.8°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 169-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	3.2	3.0 minimum
178° Shear Adhesion[2] (minutes)	27	5 minimum
Loop Tack[3] (lbs)	3.6	2.5 minimum

FDA Compliance: *21CFR 175.105*
21CFR 176.170
21CFR 176.180

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	PT	PT	PT	PT	3.5 C	3.7 C	3.8 C	PT
90° peel (lb/lineal inch width) 30 minute dwell	2.1 A	2.4 A	6.0 T	1.5 A	1.6 A	1.7 A	4.9 A	1.4 A
Loop Tack (lb)	2.9	4.3	6.5	3.1	1.6	3.6	4.6	1.5

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	27 C	34 C	27 C
SAFT Testing (min/temp° C)	39/62.3° C	27.3/62.3° C	31.3/66.3° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick PT = Paper Tear T = Transfer

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.64	7.02	2.60	4.35

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

product data sheet

Pressure Sensitive Adhesives

Covinax 169-04

Covinax 169-04 *is a polyvinyl alcohol stabilized vinyl acrylic copolymer emulsion developed for a variety of permanent pressure sensitive applications requiring very aggressive wet and dry tack. It exhibits outstanding adhesion to most synthetic films, including treated and untreated polyethylene and polypropylene, Tyvek® and Cryovac®. It performs well in low temperatures and is widely used in packaging. Covinax 169-04 is formulated to be a wash-away adhesive. The polyvinyl alcohol colloid allows easy cleanup and imparts excellent machining. It can be applied with a knife, rod, roll coater or extruded in beads for various packaging applications.*

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Polyvinyl alcohol*
Color: *White*
Viscosity (cps): *4,000 - 6,000 (LVF, Spindle #4/60 RPM /77°F)*
Percent Solids: *57.0% - 60.0%*
pH: *4.5 - 5.5*
Weight Per Gallon: *8.5*
Shelf Life: *3 months @ 70°F*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg): *-50°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of Covinax 169-04 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	***Typical Values***	***Specification Range***
180° Peel Adhesion[1] (lbs)	*3.1*	*No specification*
178° Shear Adhesion[2] (minutes)	*27*	*10 - 55*
Loop Tack[3] (lbs)	*3.1*	*No specification*

FDA Compliance: *21 CFR 175.105*

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	2.7A	3.1A	4.8C	0.75A	2.5C/A	1.0T	1.3T	0.50A
90° peel (lb/lineal inch width) 30 minute dwell	1.2A	1.3A	2.8A	0.51A	1.2T	1.1T	1.2T	0.41T/S
Loop Tack (lb)	2.1	2.7	2.8	1.4	2.6	2.5	3.1	1.2

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	20C	13C	Not Tested
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

C = Cohesive A = Adhesive S = Stain T = Transfer

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://franklini/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers

Covinax 210-05

COVINAX 210-05 *is a low VOC, surfactant stabilized acrylic copolymer emulsion developed for ultra-clear removable pressure sensitive adhesive applications. It is formulated for coating on gravure and roll-coating equipment. It will perform well as a removable tape or label adhesive from most surfaces, including paper, glass, metal and plastics, exhibiting smooth non-tearing adhesion and maintains constant, non-zippery peel adhesion even after extended aging.*
Covinax 210-05 is FDA compliant under 21 CFR 175.105, 21 CFR 176.170, and 21 CFR 176.180.

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *100 - 600 (RVF, Spindle #2/50 RPM/77°F)*
Percent Solids: *58.0 - 60.5*
pH: *5.7 - 6.6*
Weight Per Gallon: *8.39*
Freeze/Thaw Stability: *Unstable*
Shelf Life: *6 months*
Glass Transition Temperature (Tg):(DSC): *-53.6°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 210-05 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	0.30	0.10 - 0.85
178° Shear Adhesion[2] (minutes)	N/A	No specification
Loop Tack[3] (lbs)	0.70	0.40 - 1.2

FDA Compliance: *21 CFR 175.105*
21 CFR 176.170
21 CFR 176.180

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	0.06A	0.08A	0.80A	0.02A	0.21A	0.20A	0.91A	0.17A
90° peel (lb/lineal inch width) 30 minute dwell	0.13A	0.12A	0.94A	0.003A	0.39A	0.24A	0.97A	0.19A
Loop Tack (lb)	0.25	0.28	1.02	0.04	0.53	0.47	1.0	0.48

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	1A	12A	Not Tested
SAFT Testing (min/temp° C)	46/72° C	76/130° C	105/131° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

C = Cohesive A = Adhesive PT = Paper Tear FP = Fiber Pick

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.76	7.33	2.83	5.71

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 210-15

Covinax 210-15 *is a surfactant stabilized acrylic copolymer emulsion developed for ultra-removable pressure sensitive adhesive applications. It will perform well as a removable tape or label from most surfaces, including paper, glass, metal and plastics, exhibiting smooth non-tearing adhesion and maintains very constant peel adhesion even after extended aging. (Testing on specific application surface is recommended before use.) Covinax 210-15 meets the FDA requirements of 21 CFR 176.180 for paper and paperboard containers in contact with dry foods. It was designed to be coatable on most slot die, rod or roller coaters. This product will wet out most release liners, but for best anchorage, direct coating to the face stock is recommended.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *1200 - 2400 (RVF, Spindle #4/20 RPM /77° F)*
Percent Solids: *40.0% - 44.0%*
pH: *6.0 - 7.5*
Weight Per Gallon: *8.4*
Freeze/Thaw Stability: *Unstable*
Borax Compatible: *Yes*
Shelf Life: *4 months*
Glass Transition Temperature (Tg): *-51° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 210-15 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	***Typical Values***	***Specification Range***
180° Peel Adhesion[1] (lbs)	*0.3*	*0.6 maximum*
178° Shear Adhesion[2] (minutes)	*480*	*75 minimum*
Loop Tack[3] (lbs)	*0.6*	*0.3 - 1.0*

FDA Compliance: *21 CFR 175.105*
21 CFR 176.180

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

IMPORTANT NOTICE TO CUSTOMER:
The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 211-01 DEV

Covinax 211-01 DEV *is a surfactant stabilized acrylic copolymer emulsion developed for use as removable pressure sensitive adhesive for use with vinyl film stocks. It will perform well as a removable adhesive from most surfaces, including glass, metal and plastics, exhibiting smooth non-tearing adhesion and maintains very constant peel adhesion even after extended aging.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *250 - 650 (RVF, Spindle #3/50 RPM/77°F)*
Percent Solids: *55.5 - 58.0*
pH: *4.9 - 6.9*
Weight Per Gallon: *8.4*
Shelf Life: *6 months*
Freeze/Thaw Stability: *Unstable*
Borax Compatible: *Yes*
Glass Transition Temperature (Tg): (DSC): *-55.1°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 211-01 DEV cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Target Range
180° Peel Adhesion[1] (lbs)	0.3	0.7 maximum
178° Shear Adhesion[2] (minutes)	65	45 minimum
Loop Tack[3] (lbs)	0.4	1.0 maximum

FDA Compliance: *21 CFR 175.105*
21 CFR 176.170
21 CFR 176.180

ASTM F963-03 Compliance: *Standard Consumer Safety Specification on Toy Safety, Section 4.3.5.2.*

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

IMPORTANT NOTICE TO CUSTOMER:
The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers

Franklin Adhesives & Polymers

Wood Adhesives
Pressure Sensitive Adhesives
Specialty Polymers

Technical Information Sheet 81507

Pressure Sensitive Adhesives
Determining Developmental Products' Specification Ranges

This Technical Information Sheet reviews how specification ranges are created for new developmental adhesives and polymers (labeled as "DEV") from initial production through commercialization (removal from DEV status).

Franklin utilizes the *Stage Gate Process* for developing new polymers and adhesive formulations. Customer requirements are entered into the initial stage of the process. During the developmental process, lab and pilot samples are normally created and tested by Franklin technical personnel as well as by the customer for approval. These samples are labeled as experimental (EXP) batches.
In order for the EXP product to move to Franklin production, at least three replicated lab and/or pilot batches are made. From these batches, target ranges are calculated using 3 Sigma limits and are incorporated into Franklin's QC and Production System, creating a DEV product.

Once at least eight consecutive production batches are made without changes to the formulation or process, the product specifications are set based on these batches, the product is no longer developmental and the DEV designation is removed.

In most cases, target ranges will change from initial production batches through the commercialization process. Often this results in a shift, and possibly a broadening, of the specification ranges. The customer is notified of these changes.

TMH 11/27/12

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Covinax 225-00

Covinax 225-00 *is a surfactant stabilized acrylic copolymer emulsion developed for ultra-removable pressure sensitive applications for tapes and labels. It has extremely high cohesive strength and maintains very constant peel adhesion with aging. Covinax 225-00 is removable from most substrates including paper, film, glass and painted surfaces. Covinax 225-00 is APE-free and FDA compliant under 21CFR 175.105, 21CFR 176.170 and 21CFR 176.180.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic Surfactant*
Color: *White*
Viscosity (cps): *30 - 430 (RVF, Spindle #3/50 RPM /77°F)*
Percent Solids: *59.5% - 62.0%*
pH: *4.8 - 5.6*
Weight Per Gallon: *8.6 lb*
Shelf Life: *6 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (T_g): (DSC): *-44.9°C*

PERFORMANCE PROPERTIES

A 1 mil (28 g/m^2) dry film of Covinax 225-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel with a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lb)	0.30	0.60 maximum
178° Shear Adhesion[2] (minutes)	1200	30 minimum
Loop Tack[3] (lb)	0.70	0.4 - 1.1

FDA Compliance: *21 CFR 175.105*
21 CFR 176.170
21 CFR 176.180

[1]*Franklin International 03QC5002, 30 minute dwell*
[2]*Franklin International 03QC5003, 0.25 square inch, 1000 gram load*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	0.18 A	0.17 A	0.88 A	0.05 A	0.15 A	0.16 A	1.6 T/A	0.40 A
90° peel (lb/lineal inch width) 30 minute dwell	0.23 A	0.20 A	0.43 A	0.07 A	0.22 A	0.17 A	1.1 T	0.41 L/A
Loop Tack (lb)	0.50	0.71	1.2	0.20	0.59	0.61	1.9	0.34

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (1000 g, 0.25 in²) (minutes)	15 G	427 G	478
SAFT Testing (min/temp °C)	130 min/155°C	119 min/144°C	121 min/155°C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive G = Ghosting L = Legging T = Transfer

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140°F)* Paper	
Before	After	Before	After
5.38	6.44	2.95	3.52

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 258-00

Covinax 258-00 *is a surfactant stabilized acrylic copolymer developed for use as a freezer grade pressure sensitive adhesive. It has extremely low glass transition temperature allowing it to adhere to frozen surfaces and its aggressive tack permits application through thin layers of moisture or frost. Covinax 258-00 can also be blended with other polymers to impart low temperature properties to those polymers or to develop products which are all temperature grades.*
Covinax 258-00 is FDA compliant under: 21CFR 175.105, 21CFR 176.180, 16CFR 1500.3(C)(4),and 16CFR 1500.3(C)(2)(i).

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *100 - 600 (LVF, Spindle #3/60 RPM /77°F)*
Percent Solids: *58.5% - 61%*
pH: *3.8 - 4.5*
Weight Per Gallon: *8.5*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Borax Compatible: *Yes*
Glass Transition Temperature (Tg): *-80°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of Covinax 258-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	1.3	1.0 minimum
178° Shear Adhesion[2] (minutes)	35	15 minimum
Loop Tack[3] (lbs)	3.3	2.0 minimum

FDA Compliance: *21 CFR 175.105;*
21CFR 176.180;
16CFR 1500.3(C)(4);
16CFR 1500.3(C)(2)(i).

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5003, 1.00 square inch, 500 gram load, 10 minute dwell.*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 258-04

Covinax 258-04 *is a coater-ready, surfactant stabilized acrylic copolymer developed for use as a freezer grade pressure sensitive adhesive. It has extremely low glass transition temperature allowing it to adhere to frozen surfaces and its aggressive tack permits application through thin layers of moisture or frost. Covinax 258-04 can also be blended with other polymers to impart low temperature properties to those polymers or to develop products which are all temperature grades. It is transfer coatable on slot-die, rod or roll coaters. Covinax 258-04 is FDA compliant under 21CFR175.105.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *550 - 850 (RVF, Spindle #3/50/77°F)*
Percent Solids: *57.0 - 59.0*
pH: *4.0 - 5.0*
Weight Per Gallon: *8.5*
Freeze/Thaw Stability: *Unstable*
Shelf Life: *3 months*
Glass Transition Temperature (Tg): (DSC): *-70.1°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 258-04 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	1.05	0.70 minimum
178° Shear Adhesion[2] (minutes)	25	15 - 85
Loop Tack[3] (lbs)	2.83	2.00 minimum

FDA Compliance: *21CFR 175.105*

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5003, 1.00 square inch, 500 gram load, 10 minute dwell.*
[3] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

Franklin Adhesives & Polymers

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	0.73A	0.71A	1.1A	0.73A	1.2A	1.6C	1.5C	1.1C
90° peel (lb/lineal inch width) 30 minute dwell	0.70A	0.71A	1.0A	0.41A	1.0A	1.1A	1.4A	0.88C
Loop Tack (lb)	1.6	1.2	1.7	1.5	1.8	2.1	2.1	1.6

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	36C	19C	25C
SAFT Testing (min/temp° C)	26/49° C	1.0/40.01° C	7.0/36.7° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

C = Cohesive A = Adhesive PT = Paper Tear FP = Fiber pick

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.47	6.03	2.54	4.70

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 258-10

Covinax 258-10 *is a surfactant stabilized acrylic copolymer developed for use as a freezer grade pressure sensitive adhesive. It has extremely low glass transition temperature allowing it to adhere to frozen surfaces and its aggressive tack permits application through thin layers of moisture or frost. It is transfer coatable on most roll coaters.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *240 - 580 (RVF, Spindle #2/50 RPM /77° F)*
Percent Solids: *55.5% - 58.5%*
pH : *5.0 - 6.0*
Weight Per Gallon: *8.50*
Shelf Life: *4 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg)(DSC): *-67° C*

PERFORMANCE PROPERTIES

A 1mil (28g/m^2) dry film of ***Covinax 258-10*** *cast directly onto 1mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.*

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	0.98	0.70 minimum
Loop Tack[2] (lbs)	2.0	1.5 minimum

FDA Compliance: *21 CFR 175.105*

[1] *Franklin International 03QC5002, 30 minute dwell*
[2] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 324-00

Covinax 324-00 *is a surfactant stabilized vinyl acrylic copolymer used for general purpose permanent pressure sensitive adhesives in tape and label applications. Covinax 324-00 has a good balance of peel and tack, which allow it to be used in a wide variety of applications. Covinax 324 exhibits very good converting properties. It exhibits excellent adhesion to corrugated, polyolefin films, glass and metals. It can be tackified with most of the commercially available tackifier dispersions to tailor tack and peel, but it will perform very well as supplied.*
Covinax 324-00 is FDA compliant under: 21CFR 175.105, 21CFR 176.170, 21CFR 176.180, 16CFR 1500.3(C)(4),and 16CFR 1500.3(C)(2)(i).

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *50-300 (RVF, Spindle #2/100 RPM/77°F)*
Percent Solids: *62.0 - 65.0*
pH: *4.0 - 5.0*
Weight Per Gallon: *8.58*
Shelf Life: *6 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg): (DSC): *-40.3°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 324-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	4.9	3.0 minimum
178° Shear Adhesion[2] (minutes)	100	50 minimum
Loop Tack[3] (lbs)	3.0	2.0 minimum

FDA Compliance: *21CFR 175.105;*
21CFR 176.170;
21CFR 176.180;
16CFR 1500.3(C)(4);
16CFR 1500.3(C)(2)(i).

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	1.5 A	1.3 A	4.3 PT	0.73 PT	1.6 A	2.8 A	4.5 C	2.2 PT
90° peel (lb/lineal inch width) 30 minute dwell	1.2 A	1.1 A	2.6 PT	1.4 FP	1.5 A	0.93 A	5.0 G/Z	1.6 A
Loop Tack (lb)	1.3	1.7	5.0	2.5	0.94	1.5	3.0	3.16

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	137 C	100 C	93 C
SAFT Testing (min/temp° C)	66/155° C	57/61° C	106/100° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick G/Z = Ghosting/Zippy PT = Paper Tear

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
0.83	2.37	-1.59	2.24

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of Franklin International
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 324-39

Covinax 324-39 *is a coater-ready surfactant stabilized vinyl acrylic copolymer for general purpose permanent pressure sensitive adhesives in tape and label applications. Covinax 324-39 has a good balance of peel and tack, which allow it to be used in a wide variety of applications. It exhibits excellent adhesion to corrugated, polyolefin films, glass and metals. It displays excellent converting properties. Covinax 324-39 can be transfer coated on most rod, gravure or roll coaters. Covinax 324-39 is FDA compliant under 21CFR 175.105.*

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *400 Max (RVF, Spindle #2/100 RPM/77°F)*
Percent Solids: *55.0 - 58.0*
pH: *6.0 - 7.0*
Weight Per Gallon: *8.6*
Shelf Life: *4 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg):(DSC): *-42.3°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 324-39 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	3.6	No specification
178° Shear Adhesion[2] (minutes)	90	36 - 140
Loop Tack[3] (lbs)	2.2	No specification

FDA Compliance: *21CFR 175.105*

[1]Franklin International 03QC5002, 30 minute dwell.
[2]Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.
[3]Franklin International 03QC5004, 1 square inch contact, 1 second dwell.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	1.1 A	0.64 A	4.5 PT	1.8 FP	0.97 A	0.59 A	4.7 C	2.3 A
90° peel (lb/lineal inch width) 30 minute dwell	0.99 A	0.59 A	3.5 PT	1.0 A	0.96 A	0.59 A	3.2 A	1.2 FP
Loop Tack (lb)	1.0	1.3	3.8	2.4	0.54	0.81	2.9	2.2

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	87 C	100 C	74 C
SAFT Testing (min/temp° C)	122/155° C	44/76° C	58/90° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick PT = Paper Tear

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.84	7.08	2.83	5.21

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 331-15

Covinax 331-15 *is a coater-ready surfactant stabilized acrylic adhesive developed for permanent pressure sensitive applications requiring high tack and peel strength. Covinax 331-15 exhibits excellent adhesion to corrugated board, polyolefin films and most types of foams. It also forms permanent bonds whether at room temperature or refrigerator temperatures. Its wide adhesion range allows it to be used in a variety of different applications, including all-temperature grade labels. Covinax 331-15 is APE-free and FDA compliant under 21CFR 175.105.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic Surfactant*
Color: *White*
Viscosity (cps): *1200 - 1500 (LVF, Spindle #2/12 RPM/77°F)*
Percent Solids: *58.0 - 62.0*
pH: *4.0 - 5.0*
Weight Per Gallon: *8.6*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (T_g): (DSC): *-42.3°C*

PERFORMANCE PROPERTIES

A 1 mil (28 g/m^2) dry film of Covinax 331-15 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel with a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lb)	4.3	3.5 minimum
178° Shear Adhesion[2] (minutes)	25	10 - 60
Loop Tack[3] (lb)	3.1	2.0 minimum

FDA Compliance: *21CFR 175.105*

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	1.6 A	1.4 A	3.4 PT	2.1 FP	2.0 A	1.2 A	4.4 C	3.4 C
90° peel (lb/lineal inch width) 30 minute dwell	1.3 A	0.93 A	3.7 A	1.5 FP	1.6 A	1.2 A	5.0 A	2.0 A
Loop Tack (lb)	1.1	1.8	3.3	1.2	1.1	1.4	3.3	1.4

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	84 C	22 C	23 C
SAFT Testing (min/temp°C)	112/138°C	21/46°C	26/56°C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick PT = Paper Tear

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140°F)* Paper	
Before	After	Before	After
4.60	5.84	2.95	9.09

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 370-01

Covinax 370-01

PRODUCT DESCRIPTION

Covinax 370-01 is a hydroxyethyl cellulose stabilized vinyl acrylic copolymer which was designed for a variety of packaging applications, including window gums, laminating, bonding to printed or lacquered board, or bonding most synthetic films including untreated polyethylene. It exhibits very aggressive tack after drying. The cellulosic colloid, which is the primary stabilizer in Covinax 370-01, imparts a thixotropic rheology to the wet polymer. It also improves the water resistance of the dry film. Covinax 370-01 can be coated successfully on roll coaters, or it can be extruded in beads. Covinax 370-01 is FDA compliant under 21CFR 175.105, 21CFR 176.170, and 21CFR 176.180.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acrylic*
Protective System: *Hydroxyethyl cellulose*
Color: *Off-white*
Viscosity (cps): *2000 - 3000 (LVF, Spindle #4/60 RPM /77° F)*
Percent Solids: *51.0% - 53.0%*
pH: *4.0 - 5.0*
Weight Per Gallon: *8.6*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg): (DSC): *-36.6°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of Covinax 370-01 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	*Typical Values*
180° Peel Adhesion[1] (lbs)	*3.2*
178° Shear Adhesion[2] (minutes)	*21*
Loop Tack[3] (lbs)	*2.3*

FDA Compliance: *21CFR 175.105*
21CFR 176.170
21CFR 176.180

[1] Franklin International 03QC 5002, 30 minute dwell.
[2] Franklin International 03QC 5003, 0.25 square inch, 500 gram load, 10 minute dwell.
[3] Franklin International 03QC 5004, 1 square inch contact, 1 second dwell.

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	7.7 C	3.2 A	8.0 C	6.3 C/PT	5.8 C	2.6 C/FT	6.1 FT	5.3 C
90° peel (lb/lineal inch width) 30 minute dwell	2.2 Z	1.5 A	8.8 L/PT	3.7 A	1.5 Z/A	0.88 A	8.8 C/FT	3.0 Z/A
Loop Tack (lb)	3.2	3.1	7.9	2.7	1.9	2.6	6.3	1.6

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²)	33 C	50 C	
SAFT Testing	39 min/64° C	35 min/59° C	35 min/60° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FT = Film Tear L = Legging
PT = Paper Tear Z = Zippy

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
3.52	7.00	5.36	5.92

Covinax 377-00

Covinax 377-00 *is a specialty emulsion polymer with very high shear performance and excellent wing-up resistance. Covinax 377-00 can be used in masking and can be used on vinyl films. Covinax 377-00 exhibits 1.5 pli average peel adhesion from stainless steel and good heat/humidity resistance. It also shows >10,000 minutes of shear on a ½ x ½ inch bondline under 500g static load. Covinax 377-00 is FDA compliant under 21CFR 175.105, 21CFR 176.170 and 21CFR 176.180.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *50 - 250 (RVF, Spindle #3/50RPM/77°F)*
Percent Solids: *57.5 - 59.5*
pH: *5.3 - 6.3*
Weight Per Gallon: *8.60*
Shelf Life*: 6 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg): (DSC): *-37.1°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of Covinax 377-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	1.6	1.3 - 1.8
178° Shear Adhesion[2] (minutes)	232	145 minimum
Loop Tack[3] (lbs)	N/A	No Specification

FDA Compliance: *21CFR 175.105*
21CFR 176.170
21CFR 176.180

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5003, 0.25 square inch, 1000 gram load, 10 minute dwell.*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

Franklin Adhesives & Polymers

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	0.27 A	1.4 A	PT	0.67 FP	0.26 A	0.82 A	3.0 A	PT
90° peel (lb/lineal inch width) 30 minute dwell	0.31 A	0.68 A	PT	0.15 A	0.24 A	0.41 A	2.0 T	0.19 A
Loop Tack (lb)	0.46	1.4	1.9	0.22	0.39	0.87	1.5	0.97

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (1000 g, 0.25 in²) (minutes)	1345 C	194 C	232 C
SAFT Testing (min/temp° C)	132/155° C	104.7/145.7° C	132/155° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick PT = Paper Tear T = Transfer

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.78	5.03	3.42	3.87

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 379-05

Covinax 379-05

PRODUCT DESCRIPTION

Covinax 379-05 is a coater-ready surfactant stabilized acrylic adhesive, which was developed for use in permanent pressure sensitive applications. It has excellent wing-up resistance and has found use in pharmaceutical labeling applications requiring adhesion to curved or irregularly shaped surfaces. It has an excellent balance of peel and shear strength, which allows it to be converted into rolls or sheets without sticky edge problems. Covinax 379-05 is specifically designed to be transfer coatable on slot die coaters and may be used on most rod or roll coaters. Covinax 379-05 is FDA compliant under 21CFR 175.105 & 21CFR 176.180.

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *350 - 850 (RVF, Spindle #3/50RPM/77°F)*
Percent Solids: *57.0% - 59.0%*
pH: *4.6 - 5.6*
Weight Per Gallon: *8.5*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg): (DSC): *-39.1° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of Covinax 379-05 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	*Typical Values*	*Specification Range*
180° Peel Adhesion[1] (lbs)	*2.6*	*1.7 minimum*
178° Shear Adhesion[2] (minutes)	*163*	*40 minimum*
Loop Tack[3] (lbs)	*1.7*	*1.1 minimum*

FDA Compliance: *21CFR 175.105*
21CFR 176.180

[1]Franklin International 03QC5002, 30 minute dwell.
[2]Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.
[3]Franklin International 03QC5004, 1 square inch contact, 1 second dwell.

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	0.86 A	0.47 A	5.1 PT	1.9 FP	1.0 A	1.8 A	5.7 C	1.7 A
90° peel (lb/lineal inch width) 30 minute dwell	0.62 A	0.43 A	2.6 PT	1.1 FP	1.1 A	0.49 A	2.8 T	1.2 FP
Loop Tack (lb)	0.70	0.83	2.9	2.1	0.64	1.1	2.1	1.9

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	250C	193C	163C
SAFT Testing (min/temp° C)	122/155° C	59/84° C	110/140° C
Substrate: Stainless Steel	Coat weight: 1.0 mil (+/-0.1 mil)		

C = Cohesive A = Adhesive PT = Paper Tear FP = Fiber pick

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.72	5.54	2.91	5.16

Covinax 383-19

Covinax 383-19 *is a coater-ready, surfactant stabilized vinyl acrylic copolymer adhesive developed for high performance permanent pressure sensitive applications. Covinax 383-19 is the highest performing water-based PSA in our line and is often used as a durable label adhesive. Covinax 383-19 conforms to BS 5609: 1986 Section 2 - 'Marine and Laboratory Performance of Label Base Materials' when coated on suitable face sheet. It maintains a strong bond over a wide range of temperatures and extreme conditions and is recommended where environmental ruggedness is required. It has an excellent balance of peel and shear and works very well on many surfaces, especially corrugate box, stainless steel, and most polymeric surfaces. It will resist cold flow and will die cut and convert well, giving dry edges to finished sheets and rolls.*

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *350 - 750 (RVF, Spindle #3/20 RPM/77° F)*
Percent Solids: *56.5 - 59.5*
pH: *5.0 - 7.0*
Weight Per Gallon: *8.6*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg): (DSC): *-15.5° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 383-19 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	5.0	3.5 minimum
178° Shear Adhesion[2] (minutes)	98	40 minimum
Loop Tack[3] (lbs)	3.6	2.0 minimum

FDA Compliance: *None*
BS 5609: 1986 Section 2: *Passes (Report 14-124291/a)*

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	PT	PT	PT	PT	2.2 A	2.5 A	4.8 A	PT
90° peel (lb/lineal inch width) 30 minute dwell	1.3 A	1.5 A	PT	0.61 FP	1.1 A	1.3 A	5.3 T	0.83 FP
Loop Tack (lb)	1.5	2.9	2.7	1.4	1.3	2.2	2.4	1.6

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	60 C	44 C	98 C
SAFT Testing (min/temp° C)	74.4/97.4° C	24.1/63.1° C	45.8/68.8° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick PT = Paper Tear T = Transfer

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
5.21	7.16	4.12	4.98

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of Franklin International
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 386-07

Covinax 386-07

PRODUCT DESCRIPTION

Covinax 386-07 is a coater-ready surfactant stabilized vinyl acrylic product developed for use as a permanent pressure sensitive film label adhesive. Covinax 386-07 is a
moderate shear product with good loop tack, and is used in vinyl, polyester, and other film and paper label applications. In addition, the dry film clarity, cold flow resistance and high cohesive strength of Covinax 386-07 permits it to be used as an overlaminating film adhesive. It is transfer coatable onto most release liners on rod, gravure or roll coaters.
Covinax 386-07 is FDA compliant under 21CFR 175.105, and 16CFR 1500.3 (C)(4).

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *300 - 600 (RVF, Spindle #3/50 RPM/77°F)*
Percent Solids: *57.0 - 60.0*
pH: *6.5 - 7.5*
Weight Per Gallon: *8.6*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg):(DSC): *-42.0° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of Covinax 386-07 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	*Typical Values*	*Specification Range*
180° Peel Adhesion[1] (lbs)	*1.9*	*1.6 minimum*
178° Shear Adhesion[2] (minutes)	*248*	*150 minimum*
Loop Tack[3] (lbs)	*1.8*	*1.3 minimum*

FDA Compliance: *21CFR 175.105*
16CFR 1500.3 (C)(4)

[1] Franklin International 03QC5002, 30 minute dwell.
[2] Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.
[3] Franklin International 03QC5004, 1 square inch contact, 1 second dwell.

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell 90° peel	0.18 A	0.90 A	PT	0.84 FP	0.12 A	0.65 A	3.5 C	PT
(lb/lineal inch width) 30 minute dwell	0.27 A	0.81 A	PT	0.33 FP	0.22 A	0.57 A	2.4 T	0.50 FP
Loop Tack (lb)	0.44	0.74	1.6	0.85	0.37	0.88	1.7	0.99

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	945C	540C	248C
SAFT Testing (min/temp° C)	129.0/155.0° C	110.0/148.8° C	129.0/155.0° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick
PT = Paper Tear T = Transfer

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure (1 week) Mylar		Heat Exposure (1 week @ 140° F) Paper	
Before	After	Before	After
4.59	6.46	3.36	3.77

Covinax 462-00

Covinax 462-00 *is a styrene-acrylic copolymer for pressure sensitive applications requiring very high blush and water resistance. It is useful in clear film applications in which hazing or blushing of the adhesive-coated film is objectionable.*

PHYSICAL PROPERTIES

Polymer Type: *Styrene-acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *9000 - 5000 (RVF Spindle #3/20 RPM /77° F)*
Percent Solids: *45.0% - 50.0%*
pH: *5.8 - 6.8*
Weight Per Gallon: *8.4*
Shelf Life: *3 Months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg): DSC): *-28.4° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 462-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	2.5	1.7 minimum
178° Shear Adhesion[2] (minutes)	987	76 minimum
Loop Tack[3] (lbs)	1.8	0.8 minimum

FDA Compliance: *None*

[1]*Franklin International 03QC5002, 30 minute dwell*
[2]*Franklin International 03QC5003, 0.25 square inch, 500 gram load*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	0.10 A	0.29 A	3.2 A	0.15 A/L	0.31 A	0.50 A/L	2.1 A	0.79 FP
90° peel (lb/lineal inch width) 30 minute dwell	0.14 Z	0.30 Z	1.3 PT	0.08 Z	0.28 Z	0.54 Z	2.4 T	0.69 FP
Loop Tack (lb)	0.30	0.49	1.7	0.20	0.39	0.89	0.84	0.09

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	5,000+	912 C	1,251 C
SAFT Testing (min/temp° C)	127 Min./155° C	79 Min./107° C	26 Min./54° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick L = Legging PT = Paper Tear Z = Zippy

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.86	8.57	2.95	3.92

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of Franklin International
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 525-08

Covinax 525-08 *is a coater-ready, surfactant stabilized, tackified vinyl acrylic adhesive developed for high performance permanent pressure sensitive applications. It has an excellent balance of peel adhesion and shear adhesion. Covinax 525-08 is internally crosslinked, giving it superior cohesive strength. It will resist cold flow and will die cut and convert well, giving dry edges to finished sheets and rolls. This product was designed to be transfer coatable on slot die coaters. Covinax 525-08 is FDA compliant under 21CFR 175.105, 16CFR 1500.3(C)(4) and 16CFR 1500.(C)(2)(i).*

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acrylic*
Protective System: *Anionic*
Color: *Off white*
Viscosity (cps): *4000 - 5800 (RVF, Spindle #3/10RPM/77°F)*
Percent Solids: *55.0 - 59.0*
pH: *5.0 - 6.0*
Weight Per Gallon: *8.5*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg):(DSC): *-24.5°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 525-08 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	3.3	2.8 minimum
178° Shear Adhesion[2] (minutes)	512	350 minimum
Loop Tack[3] (lbs)	4.1	2.3 minimum

FDA Compliance: *21 CFR 175.105*
16 CFR 1500.3(C)(4)
16 CFR 1500.3(C)(2)(i)

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5003, 0.25 square inch, 500 gram load, 30 minute dwell.*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of ***Franklin International***
2020 Bruck Street Columbus, Ohio USA 43207
T *800.877.4583* **F** *614.445.1555*

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	3.5 A	3.0 A	1.4 PT	1.9 FP	2.2 A	1.7 A	3.6 A	1.4 PT
90° peel (lb/lineal inch width) 30 minute dwell	1.4 PT	1.7 A	1.5 PT	1.2 FP	2.0 A	1.5 A	3.5 A	1.2 PT
Loop Tack (lb)	2.0	2.9	3.9	2.7	1.1	0.98	2.6	1.3

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	508 C	675 C	512 C
SAFT Testing (min/temp° C)	63/89° C	55/80° C	63/94° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick PT = Paper Tear

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
5.38	12.90	1.07	15.13

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 525-66 DEV

Covinax 525-66 DEV

PRODUCT DESCRIPTION

COVINAX 525-66 DEV is a surfactant stabilized vinyl acrylic copolymer emulsion developed for high performance permanent pressure sensitive adhesive applications. It has an excellent balance of peel adhesion and shear adhesion. COVINAX 525-66 DEV is internally cross linked, giving it superior cohesive strength. In addition, it has been tested on vinyl film used in digital graphics applications and exhibits good plasticizer migration resistance. It will resist cold flow and will die cut and convert well, giving dry edges to finished sheets and rolls.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Anionic*
Color: *White*
Viscosity (cps): *800 - 1100 (RVF, Spindle #3/20 RPM /77°F)*
Percent Solids: *54.0% - 57.5%*
pH: *4.8 - 5.8*
Weight Per Gallon: *8.68*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Borax Compatible: *Yes*
Glass Transition Temperature (Tg):(DSC): *-37.6°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of COVINAX 525-66 DEV cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	*Typical Values*	*Specification Range*
180° Peel Adhesion[1] (lbs)	*2.1*	*1.6 minimum*
178° Shear Adhesion[2] (minutes)	*960*	*330 minimum*
Loop Tack[3] (lbs)	*1.6*	*1.0 minimum*

FDA Compliance: *21CFR 175.105*

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

IMPORTANT NOTICE TO CUSTOMER:
The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx. ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

Covinax 525-78

Covinax 525-78

PRODUCT DESCRIPTION

Covinax 525-78 is a coater-ready, surfactant stabilized, tackified vinyl acrylic copolymer adhesive developed for high performance permanent pressure sensitive applications. It has an excellent balance of peel adhesion and shear adhesion. Covinax 525-78 is internally crosslinked, giving it superior cohesive strength. It will resist cold flow and will die cut and convert well, giving dry edges to finished sheets and rolls. This product was designed to be transfer coatable on gravure and roll coaters.
Covinax 525-78 is FDA compliant under 21CFR 175.105, 16CFR 1500.3(C)(4) and 16CFR 1500.(C)(2)(i).

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acrylic*
Protective System: *Anionic*
Color: *Off white*
Viscosity (cps): *275 - 825 (RVF, Spindle #3/20 RPM/77° F)*
Percent Solids: *52.5 - 54.5*
pH: *5.8 - 7.0*
Weight Per Gallon: *8.5*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg):(DSC): *-26.5° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of Covinax 525-78 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	*Typical Values*	*Specification Range*
180° Peel Adhesion[1] (lbs)	*2.9*	*2.5 minimum*
178° Shear Adhesion[2] (minutes)	*390*	*150 minimum*
Loop Tack[3] (lbs)	*3.8*	*2.7 minimum*

FDA Compliance: *21 CFR 175.105*
16 CFR 1500.3(C)(4)
16 CFR 1500.3(C)(2)(i)

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5003, 0.25 square inch, 500 gram load, 30 minute dwell.*
[3] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	3.0 PT	3.3 A	1.2 PT	2.4 PT	2.1 A	1.8 A	4.2 C	0.72 FP
90° peel (lb/lineal inch width) 30 minute dwell	0.97 PT	1.7 A	0.73 PT	1.2 PT	1.7 A	1.9 A	4.8 A	1.3 PT
Loop Tack (lb)	2.2	3.1	4.1	2.4	0.74	1.4	1.0	0.91

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	413C	307C	390C
SAFT Testing (min/temp° C)	110/136° C	47/74° C	67/98° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick PT = Paper Tear

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
5.72	10.08	3.90	13.72

Covinax SMA-01

Covinax SMA-01 *is a surfactant stabilized vinyl acrylic copolymer emulsion developed for repositionable or semi-removable pressure sensitive adhesive applications. It will perform as a repositionable tape or label from surfaces, including glass, metal and plastics, exhibiting smooth non-tearing adhesion. Covinax SMA-01 when used in conjunction with a vinyl face stock is an excellent adhesive for retail shelf label applications. Covinax SMA-01 is FDA compliant under 21 CFR 175.105.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Anionic/Non-Ionic/PVA*
Color: *White*
Viscosity (cps): *150-850 (RVF, Spindle #3/50 RPM /77° F)*
Percent Solids: *55.3 - 58.3*
pH: *5.7 - 6.8*
Weight Per Gallon: *8.5*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg): (DSC): *-40.4° C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of Covinax SMA-01 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	1.8	1.4 minimum
178° Shear Adhesion[2] (minutes)	90	No specification
Loop Tack[3] (lbs)	1.5	0.9 minimum

FDA Compliance: *21 CFR 175.105*

[1] Franklin International 03QC5002, 30 minute dwell
[2] Franklin International 03QC5003, 0.25 square inch, 500 gram load
[3] Franklin International 03QC5004, 1 square inch contact, 1 second dwell

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (lb/lineal inch width) 30 minute dwell	0.74 A	0.73 A	PT	0.48 A	0.81 A	0.66 A	PT	0.77 A
90° peel (lb/lineal inch width) 30 minute dwell	0.88 A	0.75 A	1.5 PT	0.82 FP	1.1 A	0.79 A	2.2 T	0.99 FP
Loop Tack (lb)	0.84 A	0.58 A	2.6 A	0.98 A	0.63 A	0.91 A	2.6 A	1.6 A

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178° Shear (500 g, 0.25 in²) (minutes)	706 C	52 C	91 C
SAFT Testing (min/temp° C)	133 Min./155° C	66Min./85° C	75 Min./105° C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

A = Adhesive C = Cohesive FP = Fiber pick PT = Paper Tear T = Transfer

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.92	7.93	2.68	3.53

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

COVINAX SMA-02 DEV

COVINAX SMA-02 DEV *is a surfactant stabilized vinyl acrylic copolymer emulsion developed for aggressive removable applications requiring cold temperature or freezer grade performance. It is well suited for shelf edge applications on various face stocks including vinyl. Covinax SMA-02 DEV has a high degree of carboxyl functionality and will accept crosslinker to enhance cohesive shear strength. It will resist cold flow and die cut and convert well, giving dry edges to finished sheets and rolls.*

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acrylic*
Protective System: *Anionic/Nonionic*
Color: *White*
Viscosity (cps): *250 - 550 (RVF, Spindle #3/100 RPM /77°F)*
Solids(%): *44.5 - 56.5*
pH: *4.5 - 6.5*
Weight Per Gallon: *8.60*
Shelf Life: *3 months*
Freeze/Thaw Stability: *Unstable*
Glass Transition Temperature (Tg): (DSC): *-58.5°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/m^2) dry film of COVINAX SMA-02 DEV cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (lbs)	1.0	0.80
178° Shear Adhesion[2] (minutes)	150	38
Loop Tack[3] (lbs)	1.4	0.80

FDA Compliance: *21CFR 175.105*
21CFR 176.180

[1]*Franklin International 03QC5002, 30 minute dwell*
[2]*Franklin International 03QC5003, 0.25 square inch, 500 gram load*
[3]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Wood Adhesives
Pressure Sensitive Adhesives
Specialty Polymers

Technical Information Sheet 81507

Pressure Sensitive Adhesives
Determining Developmental Products' Specification Ranges

This Technical Information Sheet reviews how specification ranges are created for new developmental adhesives and polymers (labeled as "DEV") from initial production through commercialization (removal from DEV status).

Franklin utilizes the *Stage Gate Process* for developing new polymers and adhesive formulations. Customer requirements are entered into the initial stage of the process. During the developmental process, lab and pilot samples are normally created and tested by Franklin technical personnel as well as by the customer for approval. These samples are labeled as experimental (EXP) batches.
In order for the EXP product to move to Franklin production, at least three replicated lab and/or pilot batches are made. From these batches, target ranges are calculated using 3 Sigma limits and are incorporated into Franklin's QC and Production System, creating a DEV product.

Once at least eight consecutive production batches are made without changes to the formulation or process, the product specifications are set based on these batches, the product is no longer developmental and the DEV designation is removed.

In most cases, target ranges will change from initial production batches through the commercialization process. Often this results in a shift, and possibly a broadening, of the specification ranges. The customer is notified of these changes.

TMH 11/27/12

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Pressure Sensitive Adhesives

Micronax 241-01

Micronax 241-01 *is a water-based pressure sensitive adhesive that utilizes our proprietary microsphere technology. This ultra-removable, repositionable product offers good quick stick to a wide variety of substrates. Labels coated with Micronax 241-01 can be attached and re-attached repeatedly without loss of its initial quick stick and without ghosting (residual adhesive left behind). Labels can be easily removed from a variety of substrates without marking or damaging the surface. Even delicate surfaces like newspaper will not be damaged when removing advertisement notes coated with Micronax. Micronax 241-01 DEV can be used for protective masking tapes and paper, wall boarders and graphics, postal labels, retail labels, and other instances where a clean removable or repositionable behavior is needed.*
The development of performance properties is highly dependent upon the amount of adhesive applied. A typical coating weight of 10-13 g/m^2 (6-8 lb/ream) is suggested as a starting point. Micronax 241-01 is designed for direct coating via Mayer rod or gravure methods. Transfer coating may not be appropriate for this technology. AGITATE AT MODERATE SPEED BEFORE USE. Micronax 241-01 is FDA compliant under 21CFR 175.105, 21CFR 176.170 and 21CFR 176.180.

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Alcohol and surfactant stabilized*
Color: *White*
Viscosity (cps): *400 Max (RVF, Spindle #2/50 RPM/25°C)*
Percent Solids: *30.0 - 34.0*
pH: *8.0 - 9.5*
Density: *8.3 lb/gal*
Freeze/Thaw Stability: *Unstable*
Shelf Life: *4 months in closed container (Protect from freezing)*
Glass Transition Temperature (Tg): (DSC): *-70°C*

PERFORMANCE PROPERTIES

A 1/2 mil (14g/m^2) dry film of Micronax 241-01 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Target Range
180° Peel Adhesion[1]	91g (0.20 lb)	227g (0.50 lb) maximum
Loop Tack[2]	136g (0.30 lb)	363g (0.80 lb) maximum

FDA Compliance: *21CFR 175.105*
21CFR 176.170
21CFR 176.180

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

Franklin Adhesives & Polymers

Wood Adhesives
Pressure Sensitive Adhesives
Specialty Polymers

Technical Information Sheet 81507

Pressure Sensitive Adhesives
Determining Developmental Products' Specification Ranges

This Technical Information Sheet reviews how specification ranges are created for new developmental adhesives and polymers (labeled as "DEV") from initial production through commercialization (removal from DEV status).

Franklin utilizes the *Stage Gate Process* for developing new polymers and adhesive formulations. Customer requirements are entered into the initial stage of the process. During the developmental process, lab and pilot samples are normally created and tested by Franklin technical personnel as well as by the customer for approval. These samples are labeled as experimental (EXP) batches.
In order for the EXP product to move to Franklin production, at least three replicated lab and/or pilot batches are made. From these batches, target ranges are calculated using 3 sigma limits and are incorporated into Franklin's QC and Production System, creating a DEV product.

Once at least eight consecutive production batches are made without changes to the formulation or process, the product specifications are set based on these batches, the product is no longer developmental and the DEV designation is removed.

In most cases, target ranges will change from initial production batches through the commercialization process. Often this results in a shift, and possibly a broadening, of the specification ranges. The customer is notified of these changes.

TMH 11/12/15

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Deutsch

Micronax 243-01

Micronax 243-01

PRODUCT DESCRIPTION

Micronax 243-01 represents a breakthrough in water-based removable pressure sensitive technology. This ultra-removable, permanently repositionable product offers good quick stick to a wide variety of substrates. Micronax 243-01 can be applied repeatedly without loss of its initial quick stick. Micronax 243-01 is primarily used in repositionable applications (i.e., wall borders, protective masking, and memo pads) and other applications requiring multiple application and removable cycles. The development of performance properties is highly dependent on the amount of adhesive applied. A typical coating weight of 6-8 lbs/ream is suggested as a starting point. Micronax 243-01 is designed for direct coating via Mayer rod or gravure methods. TRANSFER COATING MAY NOT BE APPROPRIATE FOR THIS TECHNOLOGY. AGITATE BEFORE USING AT MODERATE SPEED WITH THE APPROPRIATE AIR MIXER. Micronax 243-01 is FDA compliant under 21CFR 175.105, 21CFR 176.170 and 21CFR 176.180.

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Alcohol and Surfactant Stabilized*
Color: *White*
Viscosity: *150 - 500 cps (RVF, Spindle #2/50 RPM/77°F)*
Percent Solids: *29.0 - 33.0*
pH: *7.0 - 9.5*
Average Sphere Size: *26 µm*
Density: *8.1 lbs/gal*
Freeze/Thaw Stability: *Unstable*
Shelf Life: *5 months*
Glass Transition Temperature (Tg):(DSC): *-72.5° C*

PERFORMANCE PROPERTIES

A 0.5 mil (14g/m^2) dry film of Micronax 243-01 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	*Typical Values*	*Target Range*
180° Peel Adhesion[1]	*27 g (0.06 lb)*	*136.1 g (0.30 lb) maximum*
Loop Tack[2]	*91 g (0.20 lb)*	*181.4 g (0.40 lb) maximum*

FDA Compliance: *21CFR 175.105*
21CFR 176.170
21CFR 176.180

[1]Franklin International 03QC5002, 30 minute dwell.
[2]Franklin International 03QC5004, 1 square inch contact, 1 second dwell.

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE		Facestock: Paper			Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° Peel (g/lineal inch width) 30 minute dwell	20.4A	20.4A	57.2A	21.3A	27.7A	25.0A	38.6A	28.6A
90° Peel (g/lineal inch width) 30 minute dwell	29.5A	14.1A	51.0A	14.5A	28.5A	31.3A	54.1A	33.5A
Loop Tack (g)	59.0	72.6	81.7	45.4	81.7	122.6	217.9	127.1

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
SAFT Testing (min/temp° C)	1/27° C	1/27° C	17/45° C
Substrate: Stainless Steel		Coat weight: 0.5 mils (+/-0.1 mil)	

A = Adhesive C = Cohesive

ADDITIONAL INFORMATION

Yellowing (Colorimeter "b" value)

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.74	6.26	2.38	6.05

Micronax 250-00

MICRONAX 250-00 *can be used "as is" or formulated for a specific coater or application. This product features high solids, binderless spheres that are permanently repositionable, with moderate comparative peel and tack. Micronax 250-00 is designed for direct coating via Mayer rod, slot-die or gravure methods. TRANSFER COATING MAY NOT BE APPROPRIATE FOR THIS TECHNOLOGY. AGITATE BEFORE USING AT MODERATE SPEED WITH THE APPROPRIATE AIR MIXER. Micronax 250-00 is FDA compliant under 21CFR 175.105, 21CFR 176.170 and 21CFR 176.180.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*

Protective System: *Surfactant Stabilized*

Color: *White*

Viscosity (cps): *300 - 1100 (RVF, Spindle #2/20 RPM/77°F)*

Percent Solids: *41.0 - 44.0*

pH: *8.0 - 9.5*

Average Sphere Size: *29 µm*

Density: *8.3 lb/gallon*

Freeze/Thaw Stability: *Unstable*

Shelf Life: *6 months*

Glass Transition Temperature (Tg):(DSC): *-72.5°C*

PERFORMANCE PROPERTIES

A 0.5 mil (14g/m^2) dry film of MICRONAX 250-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1]	68 g (0.15 lb)	204 g (0.45 lb) maximum
Loop Tack[2]	91 g (0.20 lb)	453 g (1.00 lb) maximum

FDA Compliance: *21CFR 175.105*
21 CFR 176.170
21 CFR 176.180

[1]*Franklin International 03QC5002, 30 minute dwell.*
[2]*Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

product data sheet

Pressure Sensitive Adhesives

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° Peel (g/lineal inch width) 30 minute dwell	59 A	45.4 A	104.3 A	154.2 A	45.4 A	40.8 A	117.9 A	104.3 A
90° Peel (g/lineal inch width) 30 minute dwell	22.7 A	54.4 A	113.4 A	99.8 A	31.85 A	54.4 A	131.5 A	81.7 A
Loop Tack (g)	313	213.3	158.8	136.1	86.2	158.8	254.0	86.2

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

FilterFAB 210 FS (Fast Set) DEV is a cost-effective, water-based polyvinyl acetate emulsion adhesive developed for cardboard-framed air filter assembly applications. It features the quickest set time for high speed operations within the FilterFAB line, while exhibiting high initial tack and strong bonds. FilterFAB 210 FS is formulated to work well with equipment typically found in the industry, and provides excellent adhesion to a variety of media.

PHYSICAL PROPERTIES

Chemical Family Description: *Polyvinyl acetate emulsion adhesive*
Appearance: *Off-white colored liquid*
Typical Viscosity (cps): *1500 - 3100 cps*
Weight Solids (%): *53.5 - 56.5*
pH: *4.0 - 5.5*
Specific gravity: *1.10* ***Weight Per Gallon (lbs):*** *9.2*
Suggested Minimum Use Temperature: *40° F*
**The physical properties listed are target ranges and not final product specifications.*

KEY PRODUCT FEATURES

- Fast setting for high speed filter assembly prior to insertion into retaining fixtures or belts
- Higher initial tack than the competition - allows for quick and easy assembly with less handling time
- Exhibits stronger bond strength than many competitive filter adhesives
- Establishes strong bonds of the cardboard die-cut areas to the media's pleat peaks
- Excellent spreader stability
- Appropriate fold over adhesion - no visible delamination
- Easy clean-up with water
- No adhesive build-up on clamping equipment or gloves
- Excellent water resistance
- Formaldehyde-free

APPLICATION GUIDELINES

Spread: The recommended spread is 8-11 g/ft² for most applications but should be verified with in-plant trials. Higher spreads will frequently result in slower setting rates and warping of the cardboard stock.

Assembly time: Assembly time can vary greatly depending on the environmental conditions and glue spread. It is recommended that the filter be assembled in less than a minute.

Clean-up: For easy removal of adhesive from equipment, clean-up should be done while the adhesive is still wet with water (this includes the glue roller and pans).

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Please store in closed containers. Protect from freezing; product is not freeze-thaw stable. For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

.

IMPORTANT NOTICE TO CUSTOMER:
The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application

before adopting it on a commercial scale.
All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx. ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

FilterFAB 2000

FilterFAB 2000 is a two-component, solvent-free polyurethane assembly adhesive with excellent durability. This self-leveling, room temperature curing product bonds well to metals, PVC, vinyl, fiberglass and cellulosic materials. FilterFAB 2000 is formulated for hydraulic fluid and lubrication oil filter fabrication, and is particularly effective in bonding filter end caps and side seams.

PHYSICAL PROPERTIES

FilterFAB 2000
Viscosity @ 77° F (cps): *11,000 - 30,000*
Color: *Off-white liquid*
Weight per Gallon (lbs): *14.2*
Recommended Mix Ratio: *4 parts by volume*
Pot Life @ 77° F: *3 - 9 minutes*
Mixed Weight per gallon: *13.4 lbs*
Freeze/Thaw Stable: *Yes*

FilterFAB Hardener
Viscosity @ 77° F (cps): *150 - 250*
Color: *Brown Liquid*
Weight per Gallon (lbs): *10.3*
Recommended Mix Ratio: *1 part by volume*

KEY PRODUCT FEATURES

- Performs well in end cap potting or casting and edge/frame sealing
- Good heat resistance with temperatures below 180 degrees Fahrenheit
- Strong chemical resistance
- Room temperature cure in three to nine minutes; that can be heat accelerated
- Forms superior bonds to a wide variety of materials such as: metals, PVC, vinyl, fiberglass and cellulosic materials
- Recommended for air, water and oil filters
- Qualifies for FDA regulation, CFR 175.105, for indirect food contact.

MIXING INSTRUCTIONS

FilterFAB 2000 is mixed with FilterFAB Hardener at a ratio of four-parts 2000 to one-part Hardener by volume. Off-ratio mixes will result in slower setting rates and weaker ultimate bonds.

APPLICATION GUIDELINES

FilterFAB 2000 is available in bulk quantities and is generally applied with meter mix equipment.

Meter mix equipment: Meter-mix equipment permits accurate mixing and dispensing of two-part polyurethanes. This permits the purchase of FilterFAB 2000 and FilterFAB Hardener in bulk containers at a significant reduction in the price of adhesive. It is typically possible to payback the equipment cost of the meter mix system in less than 200 gallons of mixed material. We recommend a purge cycle timer to prolong the life of the disposable mix tip. In addition, the mix ratio should be checked periodically.

Typical working life: FilterFAB 2000 will generally remain usable for about three to five minutes after being mixed. FilterFAB will cure more rapidly in a large volume than in a thin film.

Heat acceleration: FilterFAB 2000 will cure faster with the application of heat. Temperatures of 150 degrees Fahrenheit or less are normally sufficient.

Ultimate cure: FilterFAB 2000 normally reaches handling strength in less than an hour. It will continue to become harder for the next 24 hours. A full cure is attained in about seven days.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Cleanup: FilterFAB 2000 may be cleaned up with many common solvents including acetone, lacquer thinner or mineral spirits. Cured FilterFAB 2000 can be removed mechanically.

PERFORMANCE PROPERTIES

Bond strength: FilterFAB 2000 bonds well to wood, metal, concrete, finishes, and many plastics. Strength testing on the substrates to be used should be conducted.

Shore D hardness: 80 - 82 (when fully cured)

Chemical resistance: FilterFAB 2000 is used in air, water, and oil filters. Long term exposure to solvents and synthetic oils are not recommended.

Heat resistance: FilterFAB 2000 is suitable for continuous use in temperatures up to 180 degrees Fahrenheit. Exposure to temperatures up to 220 degrees Fahrenheit for extended periods is possible as well.

Indirect food contact: FilterFAB 2000 cured with Hardener complies with CFR 175.105 regulations for indirect food contact. Please note, FilterFAB 2000 has not been submitted for approval by the NSF for use in water filters.

HANDLING AND STORAGE

Shelf life: Mix before use for best results. Best if used within six months of date of manufacture.

Safety and disposal: FilterFAB Hardener is a polymeric isocyanate. Use of gloves and other protective equipment is recommended. Consult SDS before use for additional information.

Storage of opened containers: FilterFAB 2000 should be kept in a closed container. It will absorb moisture from the air. Enough moisture will cause the mixed but uncured adhesive to foam. FilterFAB Hardener is very susceptible to moisture. We recommend that it be kept in a sealed container. A desiccant or nitrogen blanket is recommended.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

FilterFAB 2020 DEV

FilterFAB 2020 DEV is a two-component, fast-setting polyurethane assembly adhesive with excellent durability. This self-leveling, room temperature curing product bonds well to metals, PVC, vinyl, fiberglass and cellulosic materials. FilterFAB 2020 DEV is formulated for hydraulic fluid and lubrication oil filter fabrication, and is particularly effective in bonding filter end caps and side seams.

PHYSICAL PROPERTIES

FilterFAB 2020 DEV
Viscosity @ 77° F (cps): *11,000 - 41,000*
Color: *Off-white liquid*
Weight per Gallon (lbs): *14.2*
Recommended Mix Ratio: *4 parts by volume*
Pot Life @ 77° F: *1 - 5 minutes*
Mixed Weight per gallon: *13.4 lbs*
Freeze/Thaw Stable: *Yes*

FilterFAB Hardener
Viscosity @ 77° F (cps): *150 - 250*
Color: *Brown Liquid*
Weight per Gallon (lbs): *10.3*
Recommended Mix Ratio: *1 part by volume*

**The physical properties listed are target ranges and not final product specifications.*

KEY PRODUCT FEATURES

- Fastest setting product in the FilterFAB 2000 series
- Performs well in end cap potting or casting and edge/frame sealing
- Good heat resistance with temperatures below 180 degrees Fahrenheit
- Strong chemical resistance
- Room temperature cure in three to five minutes; can be heat accelerated
- Forms superior bonds to a wide variety of materials such as: metals, PVC, vinyl, fiberglass and cellulosic materials
- Recommended for air, water and oil filters
- Qualifies for FDA regulation, CFR 175.105, for indirect food contact.

MIXING INSTRUCTIONS

FilterFAB 2020 DEV is mixed with FilterFAB Hardener at a ratio of four-parts 2020 to one-part Hardener by volume. Off-ratio mixes will result in slower setting rates and weaker ultimate bonds.

APPLICATION GUIDELINES

FilterFAB 2020 DEV is available in bulk quantities and is generally applied with meter mix equipment.

Meter mix equipment: Meter-mix equipment permits accurate mixing and dispensing of two-part polyurethanes. This permits the purchase of FilterFAB 2020 DEV and FilterFAB Hardener in bulk containers at a significant reduction in the price of adhesive. It is typically possible to payback the equipment cost of the meter mix system in less than 200 gallons of mixed material. We recommend a purge cycle timer to prolong the life of the disposable mix tip. In addition, the mix ratio should be checked periodically.

Typical working life: FilterFAB 2020 DEV will generally remain usable for about two to three minutes after being mixed. FilterFAB will cure more rapidly in a large volume than in a thin film.

Heat acceleration: FilterFAB 2020 DEV will cure faster with the application of heat. Temperatures of 150 degrees Fahrenheit or less are normally sufficient.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Ultimate cure: FilterFAB 2020 DEV normally reaches handling strength in less than fifteen minutes. It will continue to become harder for the next 24 hours. A full cure is attained in about seven days.

Cleanup: FilterFAB 2020 DEV may be cleaned up with many common solvents including acetone, lacquer thinner or mineral spirits. Cured FilterFAB 2020 DEV can be removed mechanically.

PERFORMANCE PROPERTIES

Bond strength: FilterFAB 2020 DEV bonds well to wood, metal, concrete, finishes, and many plastics. Strength testing on the substrates to be used should be conducted.

Shore D hardness: 80 - 82 (when fully cured)

Chemical resistance: FilterFAB 2020 DEV is used in air, water, and oil filters. Long term exposure to solvents and synthetic oils are not recommended.

Heat resistance: FilterFAB 2020 DEV is suitable for continuous use in temperatures up to 180 degrees Fahrenheit. Exposure to temperatures up to 220 degrees Fahrenheit for extended periods is possible as well.

Indirect food contact: FilterFAB 2020 DEV cured with Hardener complies with CFR 175.105 regulations for indirect food contact. Please note, FilterFAB 2020 DEV has not been submitted for approval by the NSF for use in water filters.

HANDLING AND STORAGE

Shelf life: Mix before use for best results. Best if used within six months of date of manufacture.

Safety and disposal: FilterFAB Hardener is a polymeric isocyanate. Use of gloves and other protective equipment is recommended. Consult SDS before use for additional information.

Storage of opened containers: FilterFAB 2020 DEV should be kept in a closed container. It will absorb moisture from the air. Enough moisture will cause the mixed but uncured adhesive to foam. FilterFAB Hardener is very susceptible to moisture. We recommend that it be kept in a sealed container. A desiccant or nitrogen blanket is recommended.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

FilterFAB 300

FilterFAB 300 is a high performance, water-based vinyl acetate ethylene copolymer emulsion adhesive designed for use in the assembly of air filters. The adhesive generates fast initial tack and high tensile strength.

PHYSICAL PROPERTIES

***Chemical family description**: Polyvinyl acetate emulsion adhesive*
***Appearance:** White colored*
***Typical viscosity (cps):** 3200 - 6550*
***Weight solids (%):** 58.0 - 64.0*
***pH:** 4.0 - 5.0*
***Specific gravity:** 1.10* ***Weight pounds per gallon**: 9.18*

KEY PRODUCT FEATURES

- Adhesive sets almost immediately with some repositionability
- Exhibits stronger bond strength than many competitive filter adhesives
- Formaldehyde-free adhesive
- High performance adhesive with fast initial tack and high tensile strength
- Easy cleanup

APPLICATION GUIDELINES

Spread: The recommended spread is 8-10 g/ft² for most applications but should be verified with in-plant trials. Higher spreads will frequently result in slower setting rates and warping of the cardboard stock.

Assembly time: Assembly time can vary greatly depending on the environmental conditions and glue spread. It is recommended that the filter be assembled within two minutes.

Clean-up: For easy removal of adhesive from equipment, clean up while it is still wet with warm water (this includes the glue roller and pans). For dried glue, steam and or hot water are the most effective. Using glue release agents on equipment will also allow for easier clean up.

STORAGE AND HANDLING

Shelf life: Best if used within six months of date of manufacture. Mix before use. Product is not freeze thaw stable. Frozen product will have a separated and or lumpy appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

FilterFAB 3000 DEV

PRODUCT DESCRIPTION

FilterFAB 3000 DEV is a surfactant stabilized, internally crosslinked, vinyl acrylic copolymer emulsion developed as an adherent to improve filtration properties of HVAC filter media. FilterFAB 3000 DEV is designed to be sprayed on the surface of the filter media to enhance particle entrapment in residential and commercial HVAC systems. Due to its fast drying capability FilterFAB 3000 DEV can be incorporated into many HVAC filter production lines without decreasing productivity.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acrylic*
Protective System: *Anionic*
Appearance: *White colored liquid*
Viscosity (cps): *100 Max (RVF, Spindle #2/100 RPM/77° F)*
Percent Solids: *46.0 - 48.5*
pH: *3.8 - 4.8*
Specific gravity: *1.02* ***Weight Per Gallon:*** *8.5*

KEY PRODUCT FEATURES

- Fast setting adhesive due to atomizing
- Low VOC
- Formaldehyde-free
- Easy clean-up with water

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of FilterFAB 3000 DEV cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	*Typical Values*	*Specification Range*
180° Peel[1] (lbs)	*2.4*	*1.9 minimum*
Loop Tack[2] (lbs)	*2.5*	*1.7 minimum*

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

STORAGE AND HANDLING

Shelf life: Best if used within three months of date of manufacture. Mix before use. Product is not freeze thaw stable. Frozen product will have a separated and or lumpy appearance.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

K-80-203

K-80-203 is a solvent-free emulsion of diglycidyl ether of bisphenol A having an average EEW of about 190. K-80-203 is suggested for use as a fiberglass size in applications such as the reinforcement of epoxy resin structures.

PHYSICAL PROPERTIES

Stabilizer: *Nonionic*

Viscosity (cps): *200 – 5,000 (RV3/10/73 - 77 F)*

Percent Solids (%): *55.0 – 57.0*

pH: *6.0 - 8.2*

Weight per Gallon: *8.99 lbs*

Particle Size: *100 - 1000 nm (Volume %)*

Freeze/Thaw Stable: *No*

ADDITIONAL INFORMATION

Mix well before using.

STORAGE AND HANDLING

Shelf Life: Six months at 70° F. Store in closed containers.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Covinax 210-00

PRODUCT DESCRIPTION

Covinax 210-00 *is a surfactant stabilized acrylic copolymer emulsion developed for ultra-removable pressure sensitive adhesive applications. It will perform well as a removable tape or label from most surfaces, including paper, glass, metal and plastics, exhibiting smooth non-tearing adhesion and maintains very constant peel adhesion even after extended aging.*
Covinax 210-00 is FDA compliant under:
21 CFR 175.105, 21 CFR 176.170, 21 CFR 176.180, 16 CFR 1500.3(C)(2)(i), 16 CFR 1500.3(C)(4).

PHYSICAL PROPERTIES

Polymer Type:	*Acrylic*	***Freeze/Thaw Stability:***	*Unstable*
Protective System:	*Anionic*	***Weight Per Gallon:***	*8.43*
Viscosity (cps):	*200 Max (RVF, Spindle #2/100RPM/77°F)*	***Color:***	*White*
Percent Solids:	*57.0 – 60.0*	***Shelf Life:***	*6 months*
pH:	*3.50 – 5.50*		

Glass Transition Temperature (Tg):(DSC): *-53.4°C*
(DMA): *-34.6°C*

PERFORMANCE PROPERTIES

A 1 mil (28g/M^2) dry film of Covinax 210-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	***Typical Values***	***Specification Range***
180° Peel Adhesion[1] (lbs)	*0.45*	*0.15 – 0.85*
178° Shear Adhesion[2] (minutes)	*335*	*75 minimum*
Loop Tack[3] (lbs)	*0.80*	*0.40 – 1.20*

FDA Compliance: *21 CFR 175.105*
21 CFR 176.170
21 CFR 176.180

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 **F** 614.445.1555

product data sheet

Pressure Sensitive Adhesives

Covinax 210-00

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180 °peel (lb/lineal inch width) 30 minute dwell	0.061A	0.079A	1.25A	0.020A	0.213A	0.170A	0.841A	0.228A
90 °peel (lb/lineal inch width) 30 minute dwell	0.099A	0.113A	1.05A	0.003A	0.354A	0.245A	0.994A	0.216A
Loop Tack (lb)	0.24	0.57	1.13	0.09	0.35	0.61	0.82	0.62

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
178 °Shear (500 g, 0.25 in²) (minutes)	9A	107C	335C
SAFT Testing (min/temp °C)	129/155 °C	128/154 °C	122/155 °C
Substrate: Stainless Steel		Coat weight: 1.0 mil (+/-0.1 mil)	

C = Cohesive A = Adhesive PT = Paper Tear FP = Fiber pick

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140 °F)* Paper	
Before	After	Before	After
4.75	7.32	2.45	6.14

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Covinax 220

Covinax 220 is a vinyl acrylic copolymer stabilized with polyvinyl alcohol colloid. This vinyl acrylic copolymer was designed to bond synthetic films, such as polyvinyl chloride, Mylar and cellophane. Covinax 220 finds application in casing-in and padding glues and heat seal adhesives.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acrylic*
Protective System: *Polyvinyl Alcohol*
Viscosity (cps): *1000 to 1400 (LVF, Spindle #4/60RPM/77° F)*
Percent Solids: *53% - 57%*
pH: *4.8 – 5.5*
Freeze/Thaw Stability: *No*
Weight per Gallon (lbs): *9.0*
Borax Compatible: *No*
Mechanical Stability: *Excellent*
Shelf Life: *3 months*

ADDITIONAL INFORMATION

FILM PROPERTIES

Dry films of Covinax 220 are flexible and tack-free with good gloss and clarity. Water resistance is fair. Plasticizer resistance is poor.

COMPOUNDING INFORMATION

Covinax 220 can be thickened, using partially hydrolyzed polyvinyl alcohol. This thickening technique will retain the linear flow properties and enhance the wet-tack. For moderate to high viscosities, cellulosic thickeners may be used. Solvents, such as toluene and methyl ethyl ketone will also thicken Covinax 220. The specific adhesion and tack of Covinax 220 can be increased using dibutyl phthalate, chlorinated paraffin or proprietary plasticizers.

Covinax 220 conforms compositionally with FDA Regulation 21 CFR 175.105, 21 CFR 176.170, and 21 CFR 176.180.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://franklini/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Covinax 271-00

PRODUCT DESCRIPTION

Covinax 271-00 *is a polyvinyl alcohol stabilized vinyl acrylic copolymer developed for permanent pressure sensitive applications involving paper labels and packaging applications. It exhibits excellent adhesion to synthetic films such as polyethylene, polypropylene, polystyrene, cryovac, teslin and polyester. It has a balance of tack and cohesive strength which make it ideal for many permanent applications. The polyvinyl alcohol colloid in Covinax 271-00 allows easy cleanup, and imparts excellent machining. It can be applied with a knife, rod, roller coater or extruded in beads for various packaging applications.*

PHYSICAL PROPERTIES

Polymer Type: *Vinyl acrylic*
Protective System: *Polyvinyl alcohol*
Viscosity (cps): *2,200 - 3,200 (RVF, Spindle #3/20 RPM /77° F)*
Percent Solids: *54% - 57%*
pH: *4.5 - 5.5*
Freeze/Thaw Stability: *Unstable*
Weight Per Gallon: *8.53*
Borax Compatible: *No*
Color: *White*
Shelf Life: *3 months*

ADDITIONAL INFORMATION

A 1 mil (28g/M ^{2}) dry film of Covinax 271-00 cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	***Performance Values***
180° Peel Adhesion[1]	*3.3 pounds*
178° Shear Adhesion[2]	*70 minutes*
Loop Tack[3]	*2.6 pounds*

Glass Transition Temperature (Tg): *-35° C*
FDA Compliance: *21 CFR 175.105*

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5003, 0.25 square inch, 500 gram load, 10 minute dwell.*
[3] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Duracet 12 DB

Duracet 12 DB is a relatively high molecular weight adhesive. This product is designed to meet the requirements needed for heat sealing and laminating greaseproof papers for the assembly of microwave popcorn bags. Characteristics of this product include low foaming, resistance to vegetable oils and compatibility with many dyes. Duracet 12 DB can be diluted with water.
This adhesive conforms compositionally with FDA Regulations 175.105, 176.170, and 176.180.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acetate*

Protective System: *Polyvinyl Alcohol*

Viscosity (cps): *500 - 1200 (LVF, Spindle #3/30 rpm/77°F)*

Percent Solids: *54.6% - 58.1%*

pH: *3.9 - 4.9*

Tg: *39°C (DSC)*

Freeze/Thaw Stability: *No*

Weight per Gallon (lbs): *9.1*

Borax Compatible: *No*

Mechanical Stability: *Excellent*

Color: *White*

Plasticizer Response (avg): *1.7*

ADDITIONAL INFORMATION

FILM PROPERTIES

Dry films of Duracet 12 DB are hard, with a glossy, translucent appearance. Plasticizer resistance is good.

COMPOUNDING INFORMATION

DURACET 12 DB may be thickened using high molecular weight polyvinyl alcohol solutions or conventional cellulosic thickeners. Solvent thickening is not particularly efficient, although solvents may be incorporated in order to enhance the specific adhesion by attacking a particular coating or film. Polar solvents, such as ketones, should be diluted prior to incorporation to prevent localized gel formation. DURACET 12 offers wide compatibility with a variety of conventional and proprietary plasticizers and will generally accept high plasticizer loadings without excessive loss of film tensile strength.

Duracet 12 DB conforms compositionally with FDA Regulations 175.105, 176.170, and 176.180.

STORAGE AND HANDLING

Shelf Life: Best if used within nine months of date of manufacture. Mix before use for best results. Store in closed containers. Product is freeze-thaw stable but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

PRODUCT DESCRIPTION

DURACET 30 is a low viscosity polyvinyl acetate homopolymer with relatively high molecular weight. This homopolymer will experience minimal viscosity build when formulated with plasticizers or solvents. This gives the formulator wide latitude when selecting the types and amounts of plasticizers and solvents to be used, and still obtain a formulation that is easily machined.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acetate*
Protective System: *Polyvinyl Alcohol*
Viscosity (cps): *3000 - 4100 (RVF, Spindle #3/20 RPM/77°F)*
Percent Solids: *55.0% - 57.0%*
pH: *4.5 - 6.0*
Specific Gravity: *1.09* ***Weight per Gallon (lbs):*** *9.1*
Freeze/Thaw Stability: *Yes*
Mechanical Stability: *Excellent*
Borax Compatible: *No*
Tg: *36°C (DSC)*
Plasticizer Response (avg): *1.7*

ADDITIONAL INFORMATION

FILM PROPERTIES
Dry films of DURACET 30 are hard, with a glossy, translucent appearance. Plasticizer resistance is good.

COMPOUNDING INFORMATION
DURACET 30 may be thickened using high molecular weight polyvinyl alcohol solutions or conventional cellulosic thickeners. Solvent thickening is not particularly efficient, although solvents may be incorporated in order to enhance the specific adhesion by attacking a particular coating or film. Polar solvents, such as ketones, should be diluted prior to incorporation to prevent localized gel formation. DURACET 30 offers wide compatibility with a variety of conventional and proprietary plasticizers and will generally accept high plasticizer loadings without excessive loss of film tensile strength.

DURACET 30 conforms compositionally with FDA Regulation 175.105, 176.170, and 176.180.

STORAGE AND HANDLING

Shelf Life: Six months at 70°F. Store in closed containers.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. 24/7 technical service is available online at www.franklinadhesivesandpolymers.com.

DURACET 300

DURACET 300 is relatively high molecular weight polyvinyl acetate emulsion formulation**.** This homopolymer will exhibit low viscosity build when formulated with plasticizers or solvents. This allows the formulator to exercise wide latitude in selecting the types and amounts of plasticizers or solvents to be used and still obtain a clean machining formulation**.**

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acetate*
Protective System: *Polyvinyl Alcohol*
Viscosity (cps): *4000 - 5500 (RVF, Spindle #3/10 RPM/77° F)*
Percent Solids: *54.0% - 56.0%*
pH: *4.0 - 5.0*
Specific Gravity: *1.09* ***Weight per Gallon (lbs):*** *9.1*
Freeze/Thaw Stability: *Yes*
Mechanical Stability: *Excellent*
Borax Compatible: *No*
Tg: *37°C (DSC)*
Suggested minimum use temperature: *60°F/ 15.7°C*
Plasticizer Response (avg): *1.6*

ADDITIONAL INFORMATION

FILM PROPERTIES

Dry films of DURACET 300 are hard, with a glossy, translucent appearance. Plasticizer resistance is good.

COMPOUNDING INFORMATION

DURACET 300 may be thickened using high molecular weight polyvinyl alcohol solutions or conventional cellulosic thickeners. Solvent thickening is not particularly efficient, although solvents may be incorporated in order to enhance the specific adhesion by attacking a particular coating or film. Polar solvents, such as ketones, should be diluted prior to incorporation to prevent localized gel formation. DURACET 300 offers wide compatibility with a variety of conventional and proprietary plasticizers and will generally accept high plasticizer loadings without excessive loss of film tensile strength.

DURACET 300 conforms compositionally with FDA Regulation 175.105, 176.170, and 176.180.

STORAGE AND HANDLING

Shelf Life: Best if used within six months of date of manufacture. Mix before use for best results. Store in closed containers. Product is freeze-thaw stable but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Micronax 243-00

PRODUCT DESCRIPTION

Micronax 243-00 *represents a breakthrough in water based pressure sensitive technology. This ultra removable, permanently repositionable product offers good quick stick to a wide variety of substrates. Micronax 243-00 can be applied repeatedly without loss of its initial quick stick. Micronax 243-00 is primarily used in repositionable applications, i.e., notes, wall borders, protective masking, memo pads and other applications requiring multiple application and removal cycles. The development of performance properties is highly dependent on the amount of adhesive applied. A typical coating weight of 6-8 lbs/ream is suggested as a starting point. Micronax 243-00 is designed for direct coating via Mayer rod or gravure methods. TRANSFER COATING IS NOT APPROPRIATE FOR THIS TECHNOLOGY. AGITATE AT MODERATE SPEED BEFORE USE. Micronax 243-00 is FDA compliant under 21CFR 175.105, 21CFR 176.170 and 21CFR 176.180.*

PHYSICAL PROPERTIES

Polymer Type: *Acrylic*
Protective System: *Alcohol and surfactant stabilized*
Viscosity (cps): *100 - 600 (RVF, Spindle #2/50 RPM/77° F)*
Percent Solids: *29.5 - 32.0*
pH: *8.00 - 9.50*
Glass Transition Temperature (Tg): (DSC): *-70.4° C*
(DMA): *-55.0° C*
Freeze/Thaw Stability: *Unstable*
Weight Per Gallon: *8.09*
Color: *White*
Shelf Life: *4 months*

PERFORMANCE PROPERTIES

A 1/2 mil (14g/M^2) dry film of Micronax 243-00. cast directly onto 1 mil thickness polyester film will exhibit the following average performance properties when tested on #304 stainless steel, which has a #3 surface finish.

Test	Typical Values	Specification Range
180° Peel Adhesion[1] (gms)	18	68.4gm (0.15lbs) maximum
Loop Tack[2] (gms)	90	226.8gm (0.50lbs) maximum

FDA Compliance: *21CFR 175.105*
21CFR 176.170
21CFR 176.180

[1] *Franklin International 03QC5002, 30 minute dwell.*
[2] *Franklin International 03QC5004, 1 square inch contact, 1 second dwell.*

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

product data sheet

Pressure Sensitive Adhesives

Micronax 243-00

AVERAGE APPLICATION PROPERTIES

TEST/SUBSTRATE	Facestock: Paper				Facestock: BOPP Film			
	LDPE	HDPE	Vinyl	Corrugate	LDPE	HDPE	Vinyl	Corrugate
180° peel (gm/lineal inch width) 30 minute dwell	22.2A	20.9A	69.9A	26.3A	37.2A	25.4A	61.3A	33.6A
90° peel (gm/lineal inch width) 30 minute dwell	19.2A	18.2A	61.6A	22.8A	95.3A	70.9A	145.3A	90.8A
Loop Tack (gms)	104.4	109.0	113.5	54.5	95.3	70.9	145.3	90.8

	Facestock: Paper	Facestock: BOPP Film	Facestock: Mylar
SAFT Testing (min/temp° C)	1/28° C	1/28° C	31/61° C
Substrate: Stainless Steel		Coat weight: 0.5 mil (+/-0.1 mil)	

C = Cohesive A = Adhesive PT = Paper Tear FP = Fiber pick

ADDITIONAL INFORMATION

Yellowing *(Colorimeter "b" value)*

UV Exposure *(1 week)* Mylar		Heat Exposure *(1 week @ 140° F)* Paper	
Before	After	Before	After
4.76	6.78	2.95	7.60

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found at http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers

Multibond 1P2

Multibond 1P2 is a crosslinking polyvinyl acetate emulsion adhesive. It can be formulated for many applications such as cold and hot press laminating, edge gluing, and assembly.

PHYSICAL PROPERTIES

Chemical Family Description: *Crosslinking polyvinyl Acetate emulsion adhesive*
Appearance: *White colored liquid*
Typical Viscosity: *3000 - 8000 cps (LVF, Spindle #3/12 RPM/83°)*
Weight Solids (%): *51.0 - 54.0*
pH: *4.0 - 5.1*
Specific gravity: *1.09* ***Weight per Gallon (lbs):*** *9.1*
Minimum Film Forming Temperature: *58.1°F (14.5°C)*
Glass Transition Temperature (DSC): *107.5°F (41.95°C)*
Mean Particle Size: *1 micron*

ADDITONAL INFORMATION

Multibond 1P2 conforms compositionally with FDA Regulations 175.105, 176.170, and 176.180.

STORAGE AND HANDLING

Shelf Life: Best if used within two months of date of manufacture. Store in closed containers. Mix well before using. Product is freeze thaw stable but may need to be mixed prior to use.

For additional questions, Franklin's technical service team is available at 1.800.877.4583. **24/7** technical service is available online at www.franklinadhesivesandpolymers.com

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Duracet® 827

Duracet® 827 is flexible self-crosslinking vinyl acrylic copolymer. This copolymer was designed for use as a binder for nonwovens, and modifier with urea formaldehyde resins.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acrylic (Self-Reactive)*

Colloid: *Cellulosic*

Viscosity (cps): *800 - 2800 (LVF, Spindle #4/60 RPM/77° F)*

Solids: *48% - 50%*

pH: *4.2 - 5.0*

Weight per Gallon: *8.9 pounds*

Freeze/Thaw Stability: *Yes*

Mechanical Stability: *Excellent*

Borax Compatible: *Yes*

Surface Tension (dynes): *37.60*

Glass Transition Temperature (Tg): (DSC): *4.5 °C*
(DMA): *26.8 °C*

ADDITIONAL INFORMATION

FILM PROPERTIES

Dry films are flexible, glossy and clear. The water resistance is excellent if the polymer has been adequately cured.
Duracet® 827 conforms compositionally with FDA Regulations 175.105, 176.170, and 176.180.

STORAGE AND HANDLING

Shelf Life: Three months at 70° F. Store in closed containers.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Duracet® 864

Duracet® 864 is a flexible self-crosslinking vinyl acrylic copolymer. This copolymer was designed for use as a binder for nonwovens, and modifier with urea formaldehyde resins.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acrylic*

Colloid: *Nonionic*

Viscosity (cps): *50 - 350 (LVF, Spindle #2/30 RPM/77° F)*

Solids: *53.0% - 55.0%*

pH: *4.2 - 5.3*

Weight per Gallon: *9.0 lbs*

Freeze/Thaw Stable: *Yes*

Mechanical Stability: *Excellent*

Borax Compatible: *Yes*

Surface Tension (dynes): *37.25*

Glass Transition Temperature (Tg): (DSC): *11.7° C*

(DMA): *39.8° C*

ADDITIONAL INFORMATION

Dry films are flexible, glossy and clear. The water resistance is excellent if the polymer has been adequately cured. Duracet® 864 conforms compositionally with FDA Regulations 175.105 and 176.180.

STORAGE AND HANDLING

Shelf Life: Six months at 70° F. Store in closed containers.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Duracet 898

Duracet 898 is a flexible self-crosslinking vinyl acrylic copolymer. This copolymer was designed for use as a binder for nonwovens, bulk builders in textile finishing, as flock adhesives or in any adhesives application requiring excellent water resistance. Duracet 898 is stabilized with a cellulosic colloid and also contains carboxyl functionality for additional specific adhesion and compounding versatility.

PHYSICAL PROPERTIES

Polymer Type: *Vinyl Acrylic (Self-Reactive)*

Colloid: *Cellulosic*

Viscosity (cps): *500 - 2800 (LVF, Spindle #4/60 RPM/77° F)*

Solids: *48.0 - 50.5%*

pH: *4.2 - 5.0*

Weight per Gallon: *8.9 pounds*

Freeze/Thaw Stability: *Yes*

Mechanical Stability: *Excellent*

Borax Compatible: *Yes*

ADDITIONAL INFORMATION

Dry films are flexible, glossy and clear. The water resistance is excellent if the polymer has been adequately cured. When immersed in perchlorethylene, the films will exhibit moderate swelling.

Duracet 898 should be thickened with cellulosic thickeners, although polyacrylate thickeners may be used if a pot life of less than 12 hours is adequate. Depending on conditions, this emulsion will generally dry and cure in from 1 to 4 minutes at from 275 to 300° F. If the cure time or temperature is marginal, catalysts such as aluminum chloride (0.5% on solution weight), diammonium acid phosphate (1.0%) or oxalic acid (0.1%) may be used. Water soluble melamine-formaldehyde resins (2% to 10%) will also co-react with this emulsion. The use of catalysts or reactive resins will shorten the useful pot life.

Duracet 898 conforms compositionally with FDA Regulations 175.105, 176.170, and 176.180.

STORAGE AND HANDLING

Shelf Life: Three months at 70° F. Store in closed containers.

IMPORTANT NOTICE TO CUSTOMER:

The recommendations and data contained in this Product Data Sheet for use of this product are based on information Franklin believes to be reliable. They are offered in good faith without guarantee, as conditions and methods of use of our product by Customer are beyond Franklin's control. Customer must determine the suitability of the product for a particular application before adopting it on a commercial scale.

All orders for Franklin products shall be subject to Franklin International, Inc.'s Standard Terms and Conditions of Sale which may be found http://www.franklini.com/Terms_and_Conditions.aspx ("Standard Terms"). Different or additional terms proposed by Customer are expressly rejected and shall not become part of the agreement between Customer and Franklin International, Inc. with respect to any order. Contact Franklin International, Inc. immediately if you cannot access our Standard Terms and we will provide you a copy upon request. Any sale of products by Franklin to Customer is expressly conditional upon Customer's consent to the Standard Terms, and Customer's acceptance of any performance by, or receipt of products from, Franklin International, Inc. shall constitute Customer's acceptance of the Standard Terms and Conditions of Sale.

A division of **Franklin International**
2020 Bruck Street Columbus, Ohio USA 43207
T 800.877.4583 F 614.445.1555

Franklin Adhesives & Polymers