Advantage 5000

Advantage 5000 is a single component, exterior millwork adhesive ideal for finger joint, edge and face, cold press, and radio frequency applications. This versatile, PVA adhesive meets European DIN EN204 D4, as well as ASTM D5572 Wet Use standards for non-structural finger joints. Advantage 5000 has improved storage stability over other D4 one-part adhesives, and in addition to its superior water resistance, also passes Watt 91 (EN 14257) and IKEA Class 5 standards for heat resistance.

PHYSICAL PROPERTIES

Chemical family description: *Crosslinking polyvinyl acetate emulsion adhesive*
Appearance: *Beige colored liquid*
Typical viscosity (cps): *2000 - 4500 (#3/ 12 RPM/ 77°F)*
Weight solids (%): *46.7 - 50.0*
pH: *3.0 - 3.5*
Specific gravity: *1.09* ***Weight pounds per gallon:*** *9.09*
Suggested minimum use temperature: *46 °F (7.8°C)*

KEY PRODUCT FEATURES

- Passes DIN EN204 D4 water resistance standard
- Passes ASTM D5572 Wet Use standard for non-structural finger joints
- Meets Watt 91 (EN 14257) recommendations
- Exceeds requirements for ANSI/HPVA HP-1-2020 Type II
- Meets IKEA IOS-MAT-0134 v4 Class 5 standards
- Meets IKEA IOS-MAT-0003-14 specification as a formaldehyde-free glue (< 0.015 mg/m^3) per reference method EN 717-1
- Tested according to reference method DIN EN 16516 and meets German formaldehyde emission requirements for wood-based materials
- pH that reduces the risk of staining or pinking
- Low VOC formula of 0.2356 g/L per Caul Plate Test
- Low minimum use temperature
- Meets definition of an exempt NAF adhesive under TSCA Title VI per USEPA 40 CFR 770.4 -- Exemption from the hardwood plywood definition for certain laminated products
- FDA 21 CFR 175.105 Compliant

PERFORMANCE PROPERTIES

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
1	≥ 10	13.77
3	≥ 4	4.5
5	≥ 4	4.1

*Rosenheim report 19-004160-PR01

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DIN EN 14257 (WATT 91)

Average value (N/mm^2) on Advantage 5000
7.8

*Rosenheim report 19-004160-PR04

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	6258.3	89	75	2000	60	30
Boil	2122.4	72	50	1600	50	25
220°F Elevated temperature	2407.1	N/A	N/A	1000	N/A	N/A
Vacuum pressure	2075.9	66	35	1600	50	25

* PFS TECO Project 23-610

	Test Results			Requirements		
Exposure	Strength (psi) Average	Wood failure (%) Average	Wood failure (%) minimum	Strength (psi) Average	Wood failure (%) Average	Wood failure (%) minimum
Dry	7034.5	92	65	2000	60	30
Boil	2681.5	63	40	1600	50	25
220°F Elevated temperature	3098.5	N/A	N/A	1000	N/A	N/A
Vacuum pressure	2253.9	54	30	1600	50	25

* Franklin laboratory results Project 18776 on Radiata Pine. 2023-06-02 Testing

ANSI/HPVA HP-1-2020

	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
Cyclic Boil	188	NA	56	30	<250	NA	50	25

Ikea Class 5 (Outdoor Use)
Ikea Spec. no.: IOS-MAT-0134, Date: 2022-09-14, Version no.: AA-2089164-4

	Test	Requirement
Advantage 5000	1404.2 psi	1160 psi

95% specimens exceed requirements

*Franklin laboratory results Project 18776 – 2023-02-23 test

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 8 to 15 inches (20-38 cm) apart and 2 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 to 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 – 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 2 hours. Shorter times are required under ideal conditions when using soft wood species at moisture content slightly less than 8 to 10 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.

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 nine months of date of manufacture. Product may thicken with age and exposure to heat. Agitation of the adhesive may be necessary to reduce the viscosity to a usable consistency. 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.

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