

Cascomel™ 4720 with Wonderbond™ Hardener 5025A Radio Frequency

Melamine Formaldehyde Adhesive for Engineered Wood Products

Description

Cascomel™ 4720 is a liquid melamine formaldehyde resin that is used with a liquid hardener from the 5025 series in the manufacture of engineered wood products, e.g. finger jointed lumber, wood I-joists, and glued laminated beams (glulam). When the gluing is carried out in accordance with the instructions in this Technical Data Sheet, a durable weather-proof bond is achieved.

Cascomel™ 4720 with Wonderbond™ hardener 5025A is well suited to operations using radio frequency cure, demonstrating a favorable combination of resistance to arcing and burning, selective heating of glue lines, and relatively fast cure speed at elevated temperature.

4720 with hardener 5025A is also well suited for ambient temperature cure of finger jointed lumber at temperatures above 50°F and cold set glulam at temperatures above 65°F. Note: Use recommendations for cold set applications are provided in a separate Technical Data Sheet due to differences in the recommendations for lumber surfacing and assembly time.

Third Party Test Methods

4720 with hardener 5025A has been independently tested and demonstrated to meet the requirements of the following methods.

- ANSI/AITC 405-2005
 - ASTM D2559 (Douglas-fir, Southern yellow pine)
 - ASTM D1151 Exposure 3 and 20 (Douglas-fir)
 - ASTM D1183 Test Condition D (Douglas-fir)
 - CSA O112.9-04 B₂ Creep (Douglas-fir)
 - ASTM D3434
- CSA O112.9-10 (CCMC # 13252-L)
- CSA O177-06 small-scale bondline fire performance equivalency tests
 - APA/WIJMA AC1000-05 (ASTM D7247), 60 minute duration at 450°F
 - Small-scale Bunsen burner flame test
- AWC Elevated-Temperature Adhesive Qualification Procedure, Method A. Approved by ALSC and CLSAB as a heat resistant adhesive (HRA) for end-jointed lumber.
- ASTM D7247-07a according to the criteria set in ASTM D5055-07

Resin Storage

The recommended storage temperature for 4720 resin is 70-80°F. Do not store the resin for extended periods below 60°F because it becomes very thick and the storage life is negatively affected. 4720 has shown a tendency for fillers to settle during extended storage, leaving a layer of clear liquid on the top. Hexion provides a tote mixer that should be used to re-blend the resin into a homogeneous mixture before a new tote is placed on line and as necessary while the tote is in use.

Storage Temperature	Usable Life
50°F (10°C)	2 weeks
60°F (16°C)	2 months
70°F (21°C)	5 months
80°F (27°C)	5 months
90°F (32°C)	3 months

Hardener Storage

5025A hardener can be stored for 6 months in the original containers. It should be protected against freezing and should not be stored below 10°C (50°F) or above 32°C (90°F) for extended periods.

Physical Data

4720 resin is a grayish-tan colored liquid that is typically within the viscosity range of 2000-6000 cps at 25°C (Brookfield RVT model, #4 spindle, 20 rpm). The specific gravity is 1.27.

5025A hardener is a yellow liquid that is typically within the viscosity range of 2500-5000 cps at 25°C (Brookfield RVT model, #4 spindle, 20 rpm). The pH is approximately 1 and the specific gravity is 1.27.

The mixed adhesive viscosity is generally within the range 3000-5000 cps at 20°C and 2000-3500 cps at 25°C (Brookfield RVT model, #4 spindle, 20 rpm).

Mixing Instructions

a) In Line Static Mixing with Direct Extrusion

For gluing operations that use automatic metering/mixing equipment with direct application, resin and hardener are typically mixed in the following proportions:

4720 resin	4 pbw
5025A hardener	1-2 pbw

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b) Batch Mixing

We do not recommend batch mixing except in applications that use a very small quantity of mixed adhesive. Batch mixed adhesive should be mixed at a ratio of 4 pbw 4720 to 1 pbw 5025A. Heat is evolved when the resin and hardener are mixed, with more heat being generated when the initial resin temperature is higher. For example, if the resin temperature is 12-15°C (54-59°F), the temperature increase upon mixing is generally about 5°C (9°F). By contrast, initial resin temperatures of 20-25°C (68-77°F) will generally result in an increase of the adhesive mix temperature by about 10°C (18°F).

Pot life

Once the resin and hardener are mixed, the curing reaction begins. The pot life, defined as the length of time in which the adhesive mix is sufficiently low in viscosity to be handled and applied, is shorter at higher temperature.

The approximate pot life is provided in the table below for several temperatures and two common mix ratios.

Mix Ratio	Pot life (usable life) in minutes at			
	60°F (16°C)	70°F (21°C)	80°F (27°C)	90°F (32°C)
4:1	90	60	30	15
2:1	40	30	20	10

Lumber Preparation

The lumber moisture content for finger joint stock should range between 8% and 18%¹ and the difference in moisture content between mating joints should not exceed 5%.

For face bonding applications, the lumber moisture content should range between 8% and 15%, with a variation of less than 4% between adjacent surfaces.

Lumber should be free of dirt and other foreign substances prior to gluing. Southern yellow pine lumber should always be freshly surfaced prior to gluing. While fresh surfacing of Douglas-fir lumber is not required for radio frequency applications, it is generally recommended for best results. All lumber should have a maximum thickness variation of 0.008 inches across the width.

¹Moisture content refers to a range (minimum and maximum) and not an average for the lumber.

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Spread Rate

In face bond applications the recommended adhesive spread rate varies significantly depending on factors such as lumber species, lumber temperature, adhesive temperature, assembly time, etc. Spread rate is often dictated by the lumber temperature and tolerance of an anticipated assembly time (see below). The spread rate for finger joints is generally set to obtain complete coverage of the surface area.

Assembly time

Assembly time is the time elapsing between adhesive application and pressure application. It can be subdivided into open assembly time (the adhesive is exposed to open air) and closed assembly time (the boards are brought into contact but not under pressure).

In general, open assembly time should be kept as short as possible and limited to a maximum of 15 minutes. On the other hand closed assembly time is often beneficial, particularly when dense wood is being bonded. The maximum total assembly time depends on the adhesive mix ratio, adhesive spread rate, temperature and moisture content of the lumber, and the temperature, relative humidity, and air circulation in the gluing area.

Maximum Total Assembly Time Tolerance of 4720 / 5025A at 4:1 Mix Ratio **For Radio Frequency Press Applications**

Lumber Temperature	GLUE SPREAD RATE				
	50 lbs/ 1000 ft. ²	55 lbs/ 1000 ft. ²	60 lbs/ 1000 ft. ²	65 lbs/ 1000 ft. ²	70 lbs/ 1000 ft. ²
60°F	60 min.	65 min.	70 min.	75 min.	80 min.
65°F	55 min.	60 min.	65 min.	70 min.	75 min.
70°F	50 min.	55 min.	60 min.	65 min.	70 min.
75°F	40 min.	45 min.	50 min.	55 min.	60 min.
80°F	30 min.	35 min.	40 min.	45 min.	50 min.
85°F	20 min.	25 min.	30 min.	35 min.	40 min.
90°F	10 min.	15 min.	20 min.	25 min.	30 min.

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Maximum Total Assembly Time Tolerance of 4720 / 5025A at 3:1 Mix Ratio

For Radio Frequency Press Applications

Lumber Temperature	GLUE SPREAD RATE				
	50 lbs/ 1000 ft. ²	55 lbs/ 1000 ft. ²	60 lbs/ 1000 ft. ²	65 lbs/ 1000 ft. ²	70 lbs/ 1000 ft. ²
60°F	50 min.	55 min.	60 min.	65 min.	70 min.
65°F	45 min.	50 min.	55 min.	60 min.	65 min.
70°F	40 min.	45 min.	50 min.	55 min.	60 min.
75°F	30 min.	35 min.	40 min.	45 min.	50 min.
80°F	20 min.	25 min.	30 min.	35 min.	40 min.
85°F	10 min.	15 min.	20 min.	25 min.	30 min.
90°F	---	---	10 min.	15 min.	20 min.

Maximum Total Assembly Time Tolerance of 4720 / 5025A at 2:1 Mix Ratio

For Radio Frequency Press Applications

Lumber Temperature	GLUE SPREAD RATE				
	50 lbs/ 1000 ft. ²	55 lbs/ 1000 ft. ²	60 lbs/ 1000 ft. ²	65 lbs/ 1000 ft. ²	70 lbs/ 1000 ft. ²
60°F	40 min.	45 min.	50 min.	55 min.	60 min.
65°F	35 min.	40 min.	45 min.	50 min.	55 min.
70°F	30 min.	35 min.	40 min.	45 min.	50 min.
75°F	20 min.	25 min.	30 min.	35 min.	40 min.
80°F	10 min.	15 min.	20 min.	25 min.	30 min.
85°F	---	---	10 min.	15 min.	20 min.
90°F	---	---	---	---	10 min.

Pressure

The clamping pressure when face bonding softwoods should be 90-150 psi, with the preferred pressure 125 psi.

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Cure Time (Radio Frequency)

The time required to adequately cure an adhesive in an RF press is a function of many variables and, as a result, is difficult to provide a cure cycle that is applicable to all operations.

For face bonding applications the glueline temperature following the cure cycle should reach a minimum of 160°F (70°C), although a temperature of 190-210°F (88-99°C) is preferred. For finger jointing the glueline temperature should reach a minimum of 175°F, although a temperature of 205-220°F (96-104°C) is preferred. Glueline temperature is affected by many variables, including the lumber temperature, lumber moisture content, various RF equipment considerations, adhesive formulation, adhesive spread rate, and so forth. It might become necessary to adjust the cure cycle to compensate for a change in any of these variables.

Due to its practicality, the most common method for measuring the glueline temperature is with a drill and thermocouple on the exit side of the press. When using this technique it is important to keep in mind that the glueline is very thin, and that the larger the drill bit the greater the influence of the lumber temperature on the measured reading. It is best to use a narrow drill bit, take care to direct it through the glueline, and be consistent in the technique.

Cleaning

Mixing and application equipment should be cleaned at the end of the working day and as needed while in use. If the glue thickens in the application equipment, the equipment should be immediately emptied and cleaned before the adhesive hardens.

Cured glue is insoluble, but will become brittle and can be scraped off.

Warm water (50-60 ° C or 120-140 ° F) is recommended for cleaning the adhesive while it is still wet. Prior to rinsing any water onto the equipment, drain cold water from the pipes and ensure that the water will be warm.

Safety Precautions

4720 resin contains a small quantity of formaldehyde, which has been classified by IARC as carcinogenic to humans based on an increased risk of a relatively rare form of cancer (nasopharyngeal). OSHA regulations stipulate maximum workplace exposure to formaldehyde at 0.75 ppm for an 8-hour time weighted average (TWA) or 2.0 ppm for a 15-minute short term exposure limit (STEL). Provided reasonable ventilation exists in areas where the resin is stored, applied, and cured, concentrations will not approach these limits.

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5025A hardener is acidic (pH ~ 1) and should be handled with care.

Rubber gloves and safety glasses/goggles/face shield should be worn whenever the resin, hardener, or mixed adhesive is handled. Avoid contact with eyes and repeated or prolonged exposure with skin. In case of skin contact, wash the area thoroughly with soap and water. In case of eye contact, immediately flush eyes with water for at least 15 minutes and seek medical attention.

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