



CASCOPHEN® LT-5210J Resin with CASCOSET® FM-6310L Hardener Phenol Resorcinol Adhesive System

Description

CASCOPHEN® LT-5210J is a liquid, phenol-resorcinol-formaldehyde, timber laminating resin. The setting of this resin is obtained through reaction with a slurry containing a definite proportion of CASCOSET® FM-6310L hardener. FM-6310L is a liquid, ready-to-use paraformaldehyde hardener. This adhesive system has been developed for direct application meter-mix equipment. Cascophen LT-5210J Resin and Cascoset FM-6310L hardener have been formulated to minimize mixing and handling problems generally found in mills that are set up for liquid-liquid adhesive application.

Tests in Hexion laboratories indicate that representative lots of LT-5210J and FM-6310L meet ASTM D 2559-04 and third party tested CSA 112.7 specifications. This adhesive system is recommended for face laminating softwoods for wet-use or dry-use exposure, and will meet the requirements of ANSI/AITC A190.1-1992 (formerly PS 56-73) for gluing West Coast softwoods and Southern Pine. This adhesive is suitable for severe service exposure where post-treatment with preservatives is required. Chemically treated softwoods may offer gluing difficulties, and may require different handling. Satisfactory bonding of treated wood or post-treatment of glued members can be affected by the composition of treating solutions and differences in retentions of the treatments. It is advisable to test each specific gluing problem. LT-5210J/FM-6310L is not a preferred adhesive for gluing hardwoods. The gluing of lumber treated with fire retardant salts is also difficult, and we do not recommend LT-5210J/FM-6310L for this.

Mixing Directions

LT-5210J may be mixed with FM-6310L within the ratio range of 2.2-2.6 resin to 1 hardener, by weight.

Storage Life

CASCOPHEN® LT-5210J will remain in usable condition for nine months at 32°F – 90°F. CASCOSET® FM-6310L should be stored in a sealed container and has a usable life of six months at 70°F from time of manufacture. The catalyst must be well mixed and homogeneous prior to use. Container or shipping papers are marked to indicate the end of the usable life of these materials, and outdated materials should be re-tested before use. Since aging causes slow changes in both materials, rotate stock so that old inventory is used first.

Precautions with Meter Mixing

With automatic mixing equipment that extrudes mixed glue directly onto boards without a glue reservoir, pot life is not such an important factor and resin does not have to be pre-cooled. However, in hot weather when gluing hotter lumber, pre-cooled resin will help extend assembly times. Some metering devices are sensitive to viscosity changes in the resin caused by changing resin temperature. This situation can result in mix ratio drift. It is usually best to precondition the resin to a constant temperature. This temperature might then only change seasonally to another predetermined constant temperature that is within the working range of the particular metering device.

The most reliable method for determining mix ratio involves weighing individual samples of resin and hardener collected over some time interval. The sample size must be large enough to minimize normal weighing errors.

The mixed glue in the system should not be allowed to rise above 85 °F. This adhesive temperature is dependent upon the initial resin temperature, initial slurry temperature, induced frictional heat from high pressure mixing, ambient temperature, and the length of time mixed glue sets in the mixing tube and extruder bar. Glue handling equipment will have to be cleaned during extended break periods. Activating automatic purge systems will minimize the need for cleaning during long breaks.

We recommend that the in-line hardener filter(s) be checked daily and cleared of any debris. With some automatic mixing equipment, even a partially clogged filter can affect the final mix ratio.

Lumber Preparation and Glue Spreading

AVOID SANDING OR OTHER ABRASIVE PLANING, AS IT WILL RESULT IN LOWER STRENGTHS. A spread of 55 to 100 pounds of mixed glue per 1,000 square feet of glue joint is recommended. The heavier spreads are required for longer times and higher lumber temperatures. Knife planing lumber prior to gluing is recommended. LT-5210J/FM-6310LS adhesive is miscible with water, and can be readily washed from mixing and spreading equipment by use of lukewarm water.

Assembly Time Table when using FM-6310L

Maximum Assembly Period When Using On-Demand, Meter-Mix Equipment

Spread, Pounds of Glue/1,000 Square Feet of Glue Line – Total Assembly Time in minutes				
Wood Temp.	90-100 lbs	80-85 lbs	70-75 lbs	55-60 lbs
45-55°F	125'	105'	75'	65'
60-65°F	100'	75'	65'	55'
70-75°F	70'	65'	55'	45'
75-80°F	45'	35'	25'	--

Total Assembly is the time interval from spreading the first surface to application of full pressure.

Use of Assembly Table

The assembly table is a general guide only. The lams should be brought to close contact as soon as possible to prevent excessive exposure to air.

THE MOST IMPORTANT GENERAL RULE IS THAT THE ENTIRE ASSEMBLY SHOULD BE BROUGHT UNDER FULL PRESSURE BEFORE THE FIRST SPREAD GLUE FILMS BECOME DRY TO THE TOUCH. UNDER PROPER CONDITIONS, THERE IS A SLIGHT SQUEEZE-OUT OF GLUE ALONG THE ENTIRE EDGE OF ALL THE JOINTS.



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Open Assembly is the period between spreading the surfaces and placing them in contact with each other. During this period, the spread members are exposed to air and subject to evaporation. This causes dry-out, which is related to air temperature, circulation, and relative humidity. Because of the importance of dry-out caused by open assembly, and its dependence upon many factors, total assembly cannot be predicted precisely. In assembling arches and high-camber beams, the open assembly time is especially critical at the fanned-out ends.

Closed Assembly is the time from when the surfaces are just barely in contact until full pressure has been applied. During this time, the glue line is protected from losing moisture by evaporation.

Pressure

For most conditions, recommended pressure is 100-150 lbs/square inch. For high-camber beams and for arches, use 125 to 175 psi, preferably over 150 psi.

Minimum Pressure Period and Temperature When Using FM-6310L

Initial Lumber Temperature	Final Glue Line Temperature	
	60-65°F	70-75°F
45-55°F	12 hours	9 hours
60-65°F	9 hours	7 hours
70-75°F	7 hours	5 hours

Maintain clamping pressure for as many hours as required by the table. Place thermocouples in the center of the coolest glue line to check the temperature. Heating is needed when the instrument reads below 60°F. Consider that the glue line starts curing when the temperature reaches 60°F. Two examples show the use of the table:

- a. Instrument reads 45-50°F when beam is locked up. Heating is started. When the temperature reaches 60°F, start timing. Beam is held at 60-65°F for 8 hours and heated to 70-75°F and held for 3 hours. Pressure may now be released.
- b. Same as (a) except that the heating cycle is shorter, as follows:

Beam is at 60-65°F for	3 Hours	3/12 = 25%
Beam is at 70-75°F for	6¾ Hours	6¾/ 9 = 75%
- c. Beam is at 80F for 4 Hours with package tarped to maintain heat at 80F = 100%



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Pressure may now be released.

The above pressure period will develop substantial wood failure upon shearing adjacent laminates; generally, beams can be unclamped in this time period. With highly curved beams, where spring-back may be pronounced, some additional clamp time is necessary. Guard a fresh glue line against extreme thermal and physical shock.

Use of This Bulletin

Information in this bulletin is based upon laboratory and plant experience in gluing untreated Douglas fir and hem-fir.

Cure Time After Unclamping

See Bulletin 46 Laminating Procedures for recommendations about:

- a. Cure time required before beams are machined.
- b. Cure time required before glue bonds are tested.

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Attached Data Sheet

CASCOPHEN® LT-5210J WITH CASCOSET® FM-6310L
TECHNICAL DATA SHEET

Cascophen LT-5210J is a phenol, resorcinol formaldehyde resin formulated for structural applications. FM-6310L is a liquid, ready-to-use paraformaldehyde, hardener. LT-5210J with FM-6310L has met the requirements of ASTM D 2559 and third party testing of CSA 112.7 accelerated weatherization testing.

PROPERTY	SPECIFICATION	TEST METHOD
Viscosity-		
Resin	1,150-1,400 cps	Brookfield #3 spindle/20 rpm/25°C/1 min.
Hardener	3,000 –7,000 cps	Brookfield #5 spindle/20 rpm/21°C/5 min
Mix ratio – resin/hardener	2.2-2.6/1	resin/hardener, by weight
Mix viscosity	4,000-9,000 cps	Brookfield #4 spindle/20rpm/21°C/1 min.
Gel time	165-250 min	50 gram controlled exotherm (see note # 1)
Specific gravity-		
Resin	1.157 ± .01	21°C ambient/21°C resin
Hardener	1.086-1.144	21°C ambient/21°C hardener
Weight/gallon -		
Resin	9.65 lb/U.S. gal	Gardco Standard wt/gal cup
Hardener	9.06-9.54 lb/U.S. gal	Gardco Standard wt/gal cup
Flash Point -		
Resin	67°C	Pensky-Martens, closed cup ASTM D-93A
Hardener	>100°C	Pensky-Martens, closed cup ASTM D-93A
Storage life – resin	9 months	32°F – 90°F
Storage life – hardener	6 months	70°F
Screening – resin	50 mesh	American National Standard
Screening – hardener	50 mesh	American National Standard

Note #1: A 50 gram sample of fresh adhesive is placed in a chilled water bath so the mixed adhesive mass is controlled to 70°F. A thermometer and gel stick are inserted into the sample to monitor temperature and distribute exotherm through occasional stirring. The gel is called when the glue mass breaks like toffee as the stick is pulled slowly out of the gel can.



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