



CASCOPHEN® LT-5210J, LT-5210Q and LT-5210V RESINS with CASCOSSET® FM-7400 Hardener: PHENOL-RESORCINOL GLUES for WOOD I-JOIST APPLICATIONS

Description

CASCOPHEN® LT-5210J, LT-5210Q and LT-5210V are liquid, phenol-resorcinol-formaldehyde (PRF), laminating resins. The setting of these resins is obtained through reaction with a ready-to-use hardener called CASCOSSET® FM-7400. This adhesive system has been developed for direct application meter-mix equipment. Batch mixing is not recommended. CASCOPHEN LT-5210J, LT-5210Q and LT-5210V resins and CASCOSSET FM-7400 hardener have been formulated to minimize mixing and handling problems generally found in mills that are set up for liquid-liquid adhesive application.

The CASCOPHEN LT-5210J, Q and V resin series offers a progressive range of gel or cure speeds that can be custom-fit to individual plant conditions. CASCOPHEN LT-5210J is the fastest setting version and is designed for plants with process speeds and component temperatures that require an accelerated speed-of-set. CASCOPHEN LT-5210V is the slowest curing resin in the series and is appropriate for I-Line operations that require maximum adhesive dry-out resistance.

CASCOSSET FM-7400 is a premixed liquid, non-formaldehyde emitting, hardener for phenol-resorcinol-formaldehyde (PRF) and resorcinol-formaldehyde (RF) resins. Hexion Specialty Chemicals laboratories have found that LT-5210 series resins catalyzed with FM-7400 give off no reportable formaldehyde emissions.

Tests in Hexion Specialty Chemicals laboratories indicate that representative lots of this resin series with FM-7400 meet ASTM D-2559-97a specifications when used to glue representative Northwest softwoods and Southern Yellow Pine when mixed at any ratio between 2.2 to 3.1/1, resin to hardener by weight. Field experience with hardener FM-7400 has indicated that bond quality is improved under conditions of elevated cure temperature.

These adhesive systems are recommended for general I-Joist assembly applications, which include the use of solid sawn softwood lumber, LVL (Douglas Fir, Southern Yellow Pine, Spruce/Pine/Fir) or composite flanges with either OSB or softwood plywood webs. Customers who incorporate other species combinations into their products should request that durability testing be done at Hexion Specialty Chemicals laboratories. 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 retention of the treatments. It is advisable to test each specific gluing problem.

LT-5210J through LT-5210V/FM-7400 are not preferred adhesives for gluing hardwoods. The gluing of lumber treated with fire retardant salts is also difficult, and we do not recommend LT-5210J through 5210V/FM-7400 for this.

Storage Life

CASCOPHEN® LT-5210 series resins will remain in usable condition for about nine months from the time of manufacture, when stored at 70°F (21°C). CASCOSSET® FM-7400 hardener will remain stable for four months at 70°F (21°C) and two months at 90°F(32°C). Mild agitation is only required when settling is observed. If CASCOSSET FM-7400 freezes, it may be used after it has been completely thawed and thoroughly agitated. Container or shipping papers are marked to indicate the end of the usable life of these materials, and outdated materials should be re-

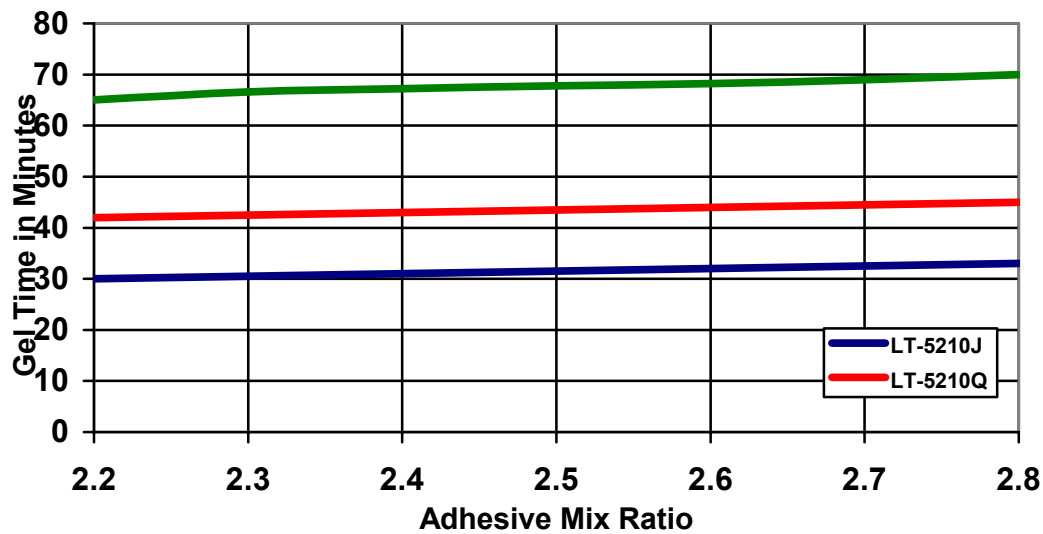
certified by a Hexion Specialty Chemicals laboratory before use. Since aging causes slow changes in both materials, rotate stock so that old inventory is used first.

Mixing Directions

The General Information section of this bulletin on Page 6 summarizes proper mixing proportions and recommendations for use. More specific recommendations may be developed for an individual location. WE RECOMMEND THAT THE CUSTOMER POST MIXING INSTRUCTIONS IN THE GLUING AREA.

The allowable resin to hardener mix ratio range for these glue systems is from 2.2 parts of resin to 1 part of hardener through 3 parts of resin to 1 part of hardener, by weight. The gel time of each resin does increase, but not significantly, as the mix ratio goes up. This is illustrated in **Figure 1**. Other factors such as glue cost, mix viscosity, or type of substrate being glued may influence the specific recommendation for the optimal mix ratio.

Figure 1



Precautions With Meter Mixing

With automatic mixing equipment that extrudes mixed glue directly onto wood components 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 the assembly time of hand applied web-to-web joints and help prevent mix tube, feed tube and extruder plugging on meter mix equipment.** Some metering devices are sensitive



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to viscosity changes in the adhesive components caused by changing component temperature. This situation can result in mix ratio drift. It is usually best to precondition both resin and hardener 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.

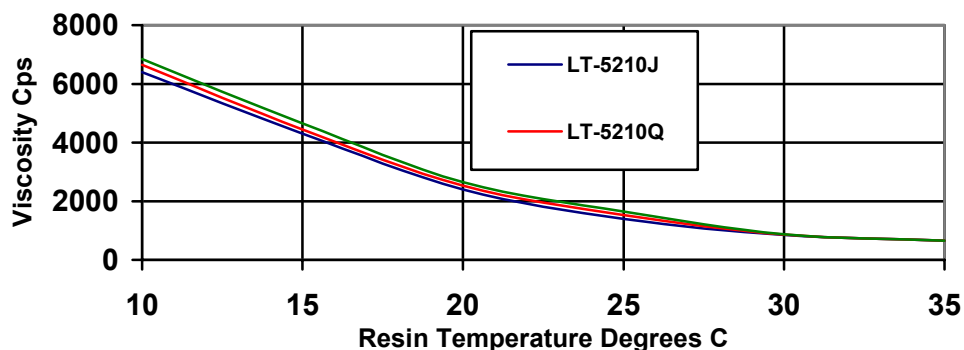
The most reliable method for determining mix ratio involves weighing individual samples of resin and hardener collected over some time interval. **The sample size must be large enough to minimize normal weighing errors.** For one minute timings, a gram scale is needed to insure accuracy of the ratio check. Periodically, larger volume samples collected over longer time intervals should be taken to verify the accuracy of the one minute timed ratio checks. **Where possible, the mix ratio should be determined with full system back pressure.**

The mixed glue in the system should not be allowed to rise above 90°F (32°C). This adhesive temperature is dependent upon the initial resin temperature, initial hardener temperature, ambient temperature, induced frictional heat from high pressure mixing, and the length of time mixed glue sets in the mixing tube(s) and extruder. Glue handling equipment will have to be cleaned during extended break periods. **Ideally, warm (up to 120°F) but not hot (over 120°F) water should be used for cleaning.** Activating automatic purge systems will minimize the need for cleaning.

We recommend that the in-line hardener filter(s) be checked **daily** and cleared of any debris. We also recommend that the mesh size of the filters not exceed 20. With some automatic and batch mixing equipment, even a partially clogged filter can affect the final mix ratio.

Resin, Hardener, and Adhesive Viscosity Ranges

Figure 2



Low temperatures have a strong thickening effect on the viscosity of LT-5210J, LT-5210Q and LT-5210V resins as shown in **Figure 2**. The viscosity measurements were obtained with a Brookfield RVTD viscometer. (Please see



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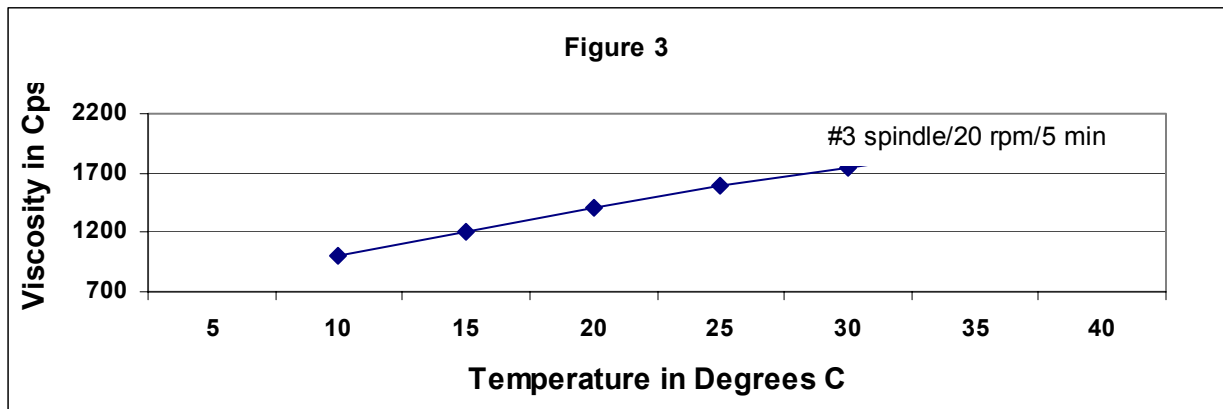
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Technical Information section, beginning on page 7, for test method.) The rate of viscosity change becomes more of a factor, from a handling point of view, at temperatures below about 16°C (60°F). Temperature effects on FM-7400 hardener are in the other direction, but less dramatic than with the resin (**Figure 3**).



There should be no serious handling problems associated with the chilled hardener. Cold temperature thickens mix viscosity, much like it does with resins. The 21°C (70°F) mix viscosity of our new systems will generally be in the range of 3000-8000 cps. (Please see Technical Information section for test method.) The actual mix viscosities may vary within this range depending upon the mix ratio being used. More specific information may be developed for individual plant locations.

Gel Time and Pot Life Characteristics

The gel time, or time-to-set, of these adhesive systems will depend upon which resin is used and will vary greatly with the temperature of the adhesive, the wood components, and the ambient air temperature. The estimated pot life, or usable working life, will be less than the gel time at any given temperature. (Please see Technical Information section for gel time test method.)

Temperature and Curing

Generally, if an I-Joist glued with LT-5210J, 5210Q or 5210V and FM-7400 is warmed to at least 21°C (70°F) for one hour, the bond should be of sufficient strength to allow handling of the I-Joist **as long as care is taken to prevent undue shock to the glued joints**. The I-Joist should be stored in a 21°C (70°F) environment for at least 24 hours to finish the cure. Heating to higher temperatures will reduce the time needed to reach typical bending strength test requirements and attain complete cure. Field experience with this product also indicates that higher cure temperatures make for better bonds. Hexion Specialty Chemicals, therefore, recommends that products glued with LT-5210J through V and FM-7400 be cured at elevated temperatures. The inner glue line of the construction should reach 110-



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115°F as soon as possible after assembly. Adequate cure times for individual plants can only be determined by in-plant testing.

Use Of This Bulletin

Information in this bulletin is based upon laboratory and plant experience in gluing untreated Douglas fir, hem-fir, SPF, Southern pine, LVL, and OSB.

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Attached General Use

CASCOPHEN® LT-5210J, LT-5210Q and LT-5210V with CASCOSET® FM-7400 GENERAL INFORMATION and DIRECTIONS FOR USE

CASCOPHEN® RESINS	LT-5210J	LT-5210Q	LT-5210V
Specific Gravity	1.158 ± 0.01	1.175 ± 0.01	1.196 ± 0.01
Lbs. per gallon (U.S.)	9.65 ± 0.1	9.8 ± 0.1	9.97 ± 0.1

Bulk resin storage areas should be conditioned to temperatures near the normal desired operating temperature. Resin that has frozen in severe climate conditions may be safely used after warming up to 15-21°C. Drums, totes and bulk tanks should only have small vents to help reduce the loss of volatile solvents during prolonged storage. Solvent loss will increase the resin viscosity and could result in shallow bonds.

CASCOSET® FM-7400	Range	Average
Specific Gravity	1.188-1.22	1.20
Lbs. per gallon (U.S.)	9.9-10.3	10.05

Bulk hardener storage areas should be conditioned to temperatures near the normal desired operating temperature. Hardener that has frozen in severe climate conditions may be safely used after warming up to 10-21°C. Totes should only have the lid cracked, or a small vent open when using.

This product requires mild agitation to prevent separation and settling. Once a tote or storage tank has been stirred, no other mixing is required for several hours. Separation and settling of the hardener should be monitored visually.

Final Adhesive Mix Ratio

Product	Parts by Weight
<i>Allowable mix ratio range</i>	
LT-5210J,LT-5210Q, LT-5210V	2.2-3.0
FM-7400	1
<i>Upper limit ratio range</i>	
LT-5210J,LT-5210Q, LT-5210V	3.1
FM-7400	1

LT-5210J, LT-5210Q and LT-5210V/FM-7400 glue mixes are miscible in water and can be readily washed from mixing and spreading equipment by using lukewarm water. The health and safety precautions for these products can be found in the appropriate MSDS sheets sent with each shipment.



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Attached Data Sheet

CASCOPHEN® LT-5210J, Q and V with CASCOSSET® FM-7400 Technical Data Sheet

CASCOPHEN® LT-5210 J, Q and V are phenol-resorcinol-formaldehyde resins for use in gluing the web to flange and web to web joints of wood I-beams. The letter designations J,Q and V represent levels of adhesive acceleration with non-formaldehyde hardeners, LT-5210J being the fastest gelling resin and LT-5210V being the slowest in the series.

CASCOSSET® FM-7400 is a ready to use liquid non-formaldehyde hardener.

Typical Physical Properties (at time of manufacture):

Property	Specification	Units	Test Method
Viscosity – resins			
LT-5210J	1,150-1,500	cps	(#3/20/25°C/1 min)
LT-5210Q	1,250-1,700	cps	(#3/20/25°C/1 min)
LT-5210V	1,300-1,900	cps	(#3/20/25°C/1 min)
Viscosity – Hardener			
	500-3,500	cps	(#3/20/21°C/5 min)
Mix Ratio Allowable	2.2-3.0/1		Resin to Hardener by weight
Mix Ratio – Upper Limit	3.1/1		Resin to Hardener by weight
Mix Viscosity	3,000-8,000	cps	(#4/20/21°C/1 min)*Note 1
Gel Time w/ FM-7400			
LT-5210J	25-35	minutes	50 gram controlled
LT-5210Q	40-50	minutes	exotherm @ 2.8/1 mix ratio
LT-5210V	60-70	minutes	*Note 2
Weight/Gallon - Resins			
LT-5210J	9.65±.1	lb./gal	21°C ambient/21°C resin
LT-5210Q	9.8±.1	lb./gal	21°C ambient/21°C resin
LT-5210V	9.97±.1	lb./gal	21°C ambient/21°C resin
Weight/Gallon - Hardener			
	9.9-10.3	lb./gal	Gardner weight per US gallon cup
Flash Point – Resins			
LT-5210J	153	°F	Pensky-Martin closed cup
LT-5210Q	149	°F	Pensky-Martin closed cup
LT-5210V	145	°F	Pensky-Martin closed cup
Flash Point – Hardener			
	> 200	°F	Pensky-Martin closed cup

Notes:

1: Mix viscosity ranges developed in the laboratory do not always reliably predict plant values because of the difficulty of simulating the shear effects of adhesive metering equipment.

2: A 50 gram sample of fresh adhesive is placed in a circulating water bath controlled at 21°C. 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 out of the gel can.



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