



CASCOPHEN® LT-5210J Resin with CASCOSET® FM-7400 Hardener: PHENOL-RESORCINOL GLUES for WOOD I-JOIST APPLICATIONS

Description

CASCOPHEN® LT-5210J is a liquid, phenol-resorcinol-formaldehyde (PRF), laminating resin. The setting of this resin is obtained through reaction with a ready-to-use hardener called CASCOSET® FM-7400. This adhesive system has been developed for direct application meter-mix equipment. Batch mixing is not recommended. CASCOPHEN® LT-5210J resin and CASCOSET® 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.

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

Tests in Hexion laboratories indicate that representative lots of this resin 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 – 2.8 to 1.0, 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 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/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/FM-7400 for this.

Third Party Testing

Cascophen® LT-5210J with Cascoset® FM 7400 has been independently tested and demonstrated to meet a wide range of adhesive standards that measure bond strength, delamination resistance, durability, creep and resistance to high temperature, exceeding the adhesive requirements of ICC-ES AC14, ANSI 405, ASTM D5055 and ASTM D5456:

- ASTM D2559, “Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions”, (includes D3535)
- ASTM D7247, “Standard Test Method for Evaluating the Shear Strength of Adhesives Bonds in Laminated Wood Products at Elevated Temperatures”
 - 150 minutes duration at 450°F bond line temperature, 70% wood degradation
- CSA O112.7, “Phenol-Resorcinol Resin Adhesives for Wood”
- CSA O112.9, “Evaluation of Adhesives for Structural Wood Products (exterior exposure)”
- NLGA SPS Annex B, “Elevated Temperature Adhesive Qualification Procedure” Method B

- ASTM D7374, “Standard Practice for Evaluating Elevated-Temperature Performance of Adhesives used in End-Jointed Lumber”
- DIN EN 301, “Adhesives, phenolic and amino-plastic, for loadbearing timber structures,”
 - Type 1, Full weather and High Temperature exposures.

Cascophen® LT-5210J with Cascoset® FM-7400 is listed by the Canadian Construction Materials Center under CCMC #13054-L as conforming to CSA 0112.7, and is thereby suitable for all structural uses in Canada. In Europe, LT-5210 with FM-7400 has earned a general structural building permit for I-Joist assembly from the Deutsches Institut für Bautechnik (DIBt). The adhesive system is also recognized by the American Lumber Standards Committee and the Canadian Lumber Standards Accreditation Board as ‘HRA’ or suitable for use in Heat Rated Assemblies.

Storage Life

CASCOPHEN® LT-5210J resin storage life is nine months from the time of manufacture, when stored at 32°F to 90°F. CASCOSET® FM-7400 hardener will remain stable for six months at 70°F (21°C). Mild agitation is only required when settling is observed. If CASCOSET® 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 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 typical resin to hardener mix ratio range for these glue systems is from 2.2 parts of resin to 1 part of hardener through 2.8 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.



Hexion Inc.
180 East Broad Street
Columbus, OH 43215
+ 1 614 225 4000

For worldwide locations visit
hexion.com

© 2011 Hexion Inc. Printed in U.S.A.

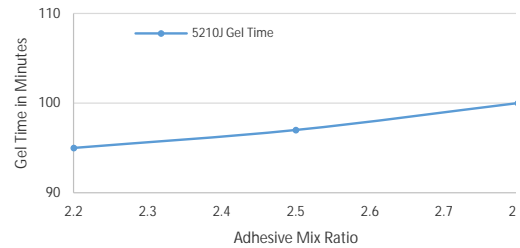
® and ™ Licensed trademarks of Hexion Inc.

The information provided herein was believed by Hexion Inc (“Hexion”) to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. All products supplied by HEXION are subject to Hexion’s terms and conditions of sale. HEXION MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HEXION, except that the product shall conform to Hexion’s specifications. Nothing contained herein constitutes an offer for the sale of any product

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 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.

Figure 1- Effect of adhesive mix ratio on 21C gel time of LT-5210J



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.



Hexion Inc.
180 East Broad Street
Columbus, OH 43215
+ 1 614 225 4000

For worldwide locations visit
hexion.com

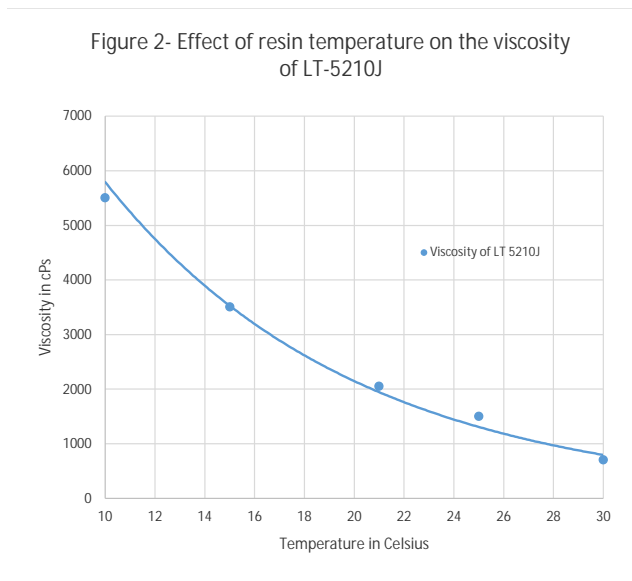
© 2011 Hexion Inc. Printed in U.S.A.

® and ™ Licensed trademarks of Hexion Inc.

The information provided herein was believed by Hexion Inc. ("Hexion") to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. All products supplied by HEXION are subject to Hexion's terms and conditions of sale. HEXION MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HEXION, except that the product shall conform to Hexion's specifications. Nothing contained herein constitutes an offer for the sale of any product

Resin, Hardener, and Adhesive Viscosity Ranges

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



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 4000 – 9000 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 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 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



Hexion Inc.
180 East Broad Street
Columbus, OH 43215
+ 1 614 225 4000

For worldwide locations visit
hexion.com

© 2011 Hexion Inc. Printed in U.S.A.

® and ™ Licensed trademarks of Hexion Inc.

The information provided herein was believed by Hexion Inc. ("Hexion") to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. All products supplied by HEXION are subject to Hexion's terms and conditions of sale. HEXION MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HEXION, except that the product shall conform to Hexion's specifications. Nothing contained herein constitutes an offer for the sale of any product

better bonds. Hexion therefore, recommends that products glued with LT-5210J and FM-7400 be cured at elevated temperatures. The inner glue line of the construction should reach 110 – 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.

CASCOPHEN® and CASCOSET® are registered trademarks of Hexion Inc.

Before using any Hexion Inc. product, please be sure to read the Safety Data Sheet which was included with the shipment.

For more information contact your local Hexion Sales Representative or Customer Service Center (866) 443-9466.



Hexion Inc.
180 East Broad Street
Columbus, OH 43215
+ 1 614 225 4000

For worldwide locations visit
hexion.com

© 2011 Hexion Inc. Printed in U.S.A.

® and ™ Licensed trademarks of Hexion Inc.

The information provided herein was believed by Hexion Inc ("Hexion") to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. All products supplied by HEXION are subject to Hexion's terms and conditions of sale. HEXION MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HEXION, except that the product shall conform to Hexion's specifications. Nothing contained herein constitutes an offer for the sale of any product

Attached General Use

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

CASCOPHEN® LT-5210J	Range
Specific Gravity	1.157 ± 0.01
Lbs. per gallon (U.S.)	9.65 ± 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
Specific Gravity	1.18 – 1.22
Lbs. per gallon (U.S.)	9.8 – 10.2

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>Target mix ratio range</i>	
LT-5210J	2.4 – 2.6
FM-7400	1.0
<i>Upper limit ratio range</i>	
LT-5210J	2.8
FM-7400	1.0

LT-5210J/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 SDS sheets sent with each shipment.



Hexion Inc.
180 East Broad Street
Columbus, OH 43215
+ 1 614 225 4000

For worldwide locations visit
hexion.com
© 2011 Hexion Inc. Printed in U.S.A.

® and ™ Licensed trademarks of Hexion Inc.

The information provided herein was believed by Hexion Inc. ("Hexion") to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. All products supplied by HEXION are subject to Hexion's terms and conditions of sale. HEXION MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HEXION, except that the product shall conform to Hexion's specifications. Nothing contained herein constitutes an offer for the sale of any product

Attached Data Sheet

CASCOPHEN® LT-5210J WITH CASCOSET® FM-7400
TECHNICAL INFORMATION

Typical Physical Properties (at time of manufacture):

Property	Specification	Units	Measure/Method
Brookfield Viscosity –			
LT-5210J	1,150 – 1,350	cPs	(#3 spindle/20rpm/25°C @ 1 min)
FM-7400	600 – 1,650	cPs	(#3 spindle/20rpm/21°C @ 5 min)
Mix Viscosity	4,000 – 9,000	cPs	(#4 spindle/20rpm/25°C @ 1 min)
Gel time @ 21°C	20 – 30	min	(¹ 50 gram controlled exotherm)
Density –			
LT-5210J	1.157 ± 0.01		25°C ambient
FM-7400	1.177 – 1.225		25°C ambient
Weight/Gallon –			
LT-5210J	9.65 ± 0.01	lbs./U.S.gal	Gardco Standard Wt./Gal. Cup @ 25°C
FM-7400	9.8 – 10.2	lbs./U.S.gal	Gardco Standard Wt./Gal. Cup @ 25°C
Flash Point –			
LT-5210J	67	°C	Pensky-Martens, Closed cup ASTM D-93A
FM-7400	>100	°C	Pensky-Martens, Closed cup ASTM D-93A
Storage Life –			
LT-5210J	9	months	@32 – 90°F
FM-7400	6	months	@70°F (21°C)
Minimal Use Temperature	35	°F	
Freeze/Thaw Stable	No		Five (5) Cycles
Screening – LT-5210J	50	mesh	American National Standard
Screening – FM-7400	50	mesh	American National Standard
Mix Ratio – allowable	2.20 – 2.80/1.0		resin/hardener, by weight
Mix Ratio – recommended	2.50 ± 0.1/1.0		resin/hardener, by weight

¹ A 50 gram sample of fresh adhesive is placed in a chilled water bath so the mixed adhesive mass is controlled to 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 slowly out of the gel can.



Hexion Inc.
 180 East Broad Street
 Columbus, OH 43215
 + 1 614 225 4000

For worldwide locations visit
hexion.com
 © 2011 Hexion Inc. Printed in U.S.A.

® and ™ Licensed trademarks of Hexion Inc.

The information provided herein was believed by Hexion Inc (“Hexion”) to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. All products supplied by HEXION are subject to Hexion’s terms and conditions of sale. HEXION MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HEXION, except that the product shall conform to Hexion’s specifications. Nothing contained herein constitutes an offer for the sale of any product