



CASCOPHEN® LT-5210, and Accelerated Versions LT-5212, LT-5215, LT-5225 & LT-5235 with CASCOSSET® FM-6210 Meter-Mixed Phenol-Resorcinol Glues for “I” Beam Applications

Description

CASCOPHEN® LT-5212, LT-5215, LT-5225, and LT-5235 are accelerated versions of CASCOPHEN LT-5210. LT-5210 is a conventional timber laminating phenol-resorcinol resin. The accelerated versions of LT-5210 are also intended for use with FM-6210 hardener as waterproof adhesives for "I" beam applications. "I" beams are a specialized area of timber laminating where continuous pressure is applied to the wood-to-wood joint by the configuration of the beam construction. In most cases, assembly time is not a consideration since the adhesive is applied to the beam joint immediately before assembly of the beam. With modern, on-demand, meter-mixed automatic application, the restrictions on speed-of-set for the phenol-resorcinol adhesive are removed. The LT-5210 - LT-5235 series of resins should meet the demands of most "I" beam applications.

Tests in HEXION Specialty Chemicals Laboratories indicate that representative lots of LT-5210, LT-5212, LT-5215, LT-5225, and LT-5235 meet ASTM D-2559-84 specifications. These adhesives are recommended for laminating softwoods for wet use or dry use exposure, and meet the requirements of ANSI 190.1-83, (PS 56-73) for gluing West Coast softwoods. LT-5210 and the accelerated versions are not preferred adhesives for gluing hardwoods; the gluing of wood treated with fire retardant salts is also difficult, and we do not recommend LT-5210 and the accelerated versions of LT-5210 for this.

LT-5215, LT-5225, and LT-5235 are not recommended for the gluing of conventional laminated beams because of the very rapid time-to-set of the mixed adhesives. The time-to-set of the adhesive can be as short as fifteen minutes.

Mixing Directions

A supplement page is attached as page 4, which summarizes proper mixing proportions and general directions for use. [Please post in gluing area.](#)

Storage Life

CASCOPHEN LT-5210 and its accelerated versions, will remain in usable condition for about nine months at 70°F. CASCOSSET® FM-6210 should be stored under dry conditions, and has a usable life of about eight months at 70°F from time of manufacture. Container or shipping papers are marked to indicate the end of the usable life of these materials, and outdated materials should be re-tested before use.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.

Formaldehyde Release

LT-5210 and its accelerated versions, when used with FM-6210 Hardener, are designed to emit low levels of formaldehyde. The speed-of-set of the glues does not depend on a high level of formaldehyde or rapid release of formaldehyde fumes into the air.

Precautions with Meter Mixing

With automatic mixing equipment that extrudes freshly 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 the assembly time of hand applied web butt joints. 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. An inspection of the mix ratio calibration chart (Page 5) will show how little weight change is required in hardener weight to cause a change in mix ratio when the corresponding resin weight is small.

The mixed glue in the system should not be allowed to rise above 85°F. This adhesive temperature is dependant 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 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 inline hardener filters be checked daily and cleared of any debris. With some automatic mixing equipment, even a partially clogged filter can effect the final mix ratio.

Time-To-Set

The time-to-set, or gel time, will vary depending upon which resin is used. The usable working life, or pot life, will be less than the actual gel time. The relative differences between LT-5210 and its accelerated versions are shown in Table I.

Table I: Gel Times / Pot Life (Minutes)

Resin	Gel Time @ 70°F (Minutes)	Pot Life @ 70°F (Minutes)
LT-5210	140-160	75-95
LT-5212	115-135	60-75
LT-5215	80-100	45-60
LT-5225	50-70	30-40
LT-5235	15-25	8-12



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

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hexionchem.com

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These times are valid when using FM-6210 hardener in the proper mix ratio, with 50 grams of the adhesive tested while temperature is kept constant at 70°F. Lower temperatures will lengthen the gel time, higher temperatures will shorten gel times. The four accelerated versions of LT-5210 may be used interchangeably depending on plant conditions and gel time desired.

Temperature and Curing

LT-5210 and its accelerated versions can be used to bond wood with temperatures as low as 45°F if the glued beam is heated sufficiently to facilitate curing. Generally, if the beam is warmed to 65-70°F for one hour, the bond should be of sufficient strength to allow handling of the beam as long as care is taken to prevent undue shock to the glued joint. Heating to higher temperatures will reduce the time needed to attain complete cure.

Use of this Bulletin

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

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Columbus, OH 43215
+ 1 614 225 4000

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CASCOPHEN® LT-5210, LT5212, LT-5215, LT-5225, AND LT-5235
WITH CASCOSET® FM-6210 HARDENER
DIRECTIONS FOR USE

FM-6210 Hardener Mix:

	<u>% By Weight</u>	<u>2 Bag</u>	<u>4 Bag</u>
Water	66.7	200# (24 gal)	400# (48 gal)
Hardener	<u>33.3</u>	<u>100#</u> (2 bags)	<u>200#</u> (4 bags)
	100.0	300#	600#

Recommended Hardener Mixing Directions:

1. Load 45-50°F water into high shear mixer.
2. Slowly add all powdered hardener.
3. Mix until uniform. This may take 15-30 minutes in a double acting mixer. For smaller batches mix about 5 minutes using a LIGHTNIN® mixer.
4. Let mixed hardener stand 20-30 minutes before using.
5. Mild continuous agitation is recommended.
6. Maximum mixed hardener storage life at 45-60°F is 72 hours.

<u>Final Adhesive Mix Ratio:</u>	<u>By Weight</u>	<u>By Volume</u>
Resin/FM-6210 Hardener	2.20 / 1	2.12 / 1



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MIX RATIO CALIBRATION CHART FOR CASCOPHEN® LT-5210, LT-5212, LT-5215, LT-5225, AND LT-5235 WITH CASCOSET® FM-6210 HARDENER

The recommended final mix ratio of LT-5210 resin and its accelerated versions, to FM-6210 hardener is 2.2:1, by weight. The allowable adhesive mix ratio range is 2.1:1 to 2.3:1, by weight.

(Ratio) 2.1:1-2.2:1-2.3:1

Resin Weight	Slurry Weight	Resin Weight	Slurry Weight	Resin Weight	Slurry Weight
6.0	2.9-2.7-2.6	10.0	4.8-4.5-4.3	14.0	6.7-6.4-6.1
6.1	2.9-2.8-2.7	10.1	4.8-4.6-4.4	14.1	6.7-6.4-6.1
6.2	3.0-2.8-2.7	10.2	4.9-4.6-4.4	14.2	6.8-6.5-6.2
6.3	3.0-2.9-2.7	10.3	4.9-4.7-4.5	14.3	6.8-6.5-6.2
6.4	3.0-2.9-2.8	10.4	5.0-4.7-4.5	14.4	6.9-6.5-6.3
6.5	3.1-3.0-2.8	10.5	5.0-4.8-4.6	14.5	6.9-6.6-6.3
6.6	3.1-3.0-2.9	10.6	5.0-4.8-4.6	14.6	7.0-6.6-6.3
6.7	3.2-3.0-2.9	10.7	5.1-4.9-4.7	14.7	7.0-6.7-6.4
6.8	3.2-3.1-3.0	10.8	5.1-4.9-4.7	14.8	7.0-6.7-6.4
6.9	3.3-3.1-3.0	10.9	5.2-5.0-4.7	14.9	7.1-6.8-6.5
7.0	3.3-3.2-3.0	11.0	5.2-5.0-4.8	15.0	7.1-6.8-6.5
7.1	3.4-3.2-3.1	11.1	5.3-5.0-4.8	15.1	7.2-6.9-6.6
7.2	3.4-3.3-3.1	11.2	5.3-5.1-4.9	15.2	7.2-6.9-6.6
7.3	3.5-3.3-3.2	11.3	5.4-5.1-4.9	15.3	7.3-7.0-6.7
7.4	3.5-3.4-3.2	11.4	5.4-5.2-5.0	15.4	7.3-7.0-6.7
7.5	3.6-3.4-3.3	11.5	5.5-5.2-5.0	15.5	7.4-7.0-6.7
7.6	3.6-3.5-3.3	11.6	5.5-5.3-5.0	15.6	7.4-7.1-6.8
7.7	3.7-3.5-3.3	11.7	5.6-5.3-5.1	15.7	7.5-7.1-6.8
7.8	3.7-3.5-3.4	11.8	5.6-5.4-5.1	15.8	7.5-7.2-6.9
7.9	3.8-3.6-3.4	11.9	5.7-5.4-5.2	15.9	7.6-7.2-6.9
8.0	3.8-3.6-3.5	12.0	5.7-5.5-5.2	16.0	7.6-7.3-7.0
8.1	3.9-3.7-3.5	12.1	5.8-5.5-5.3	16.1	7.7-7.3-7.0
8.2	3.9-3.7-3.6	12.2	5.8-5.5-5.3	16.2	7.7-7.4-7.0
8.3	4.0-3.8-3.6	12.3	5.9-5.6-5.3	16.3	7.8-7.4-7.1
8.4	4.0-3.8-3.7	12.4	5.9-5.6-5.4	16.4	7.8-7.5-7.1
8.5	4.0-3.9-3.7	12.5	6.0-5.7-5.4	16.5	7.9-7.5-7.2
8.6	4.1-3.9-3.7	12.6	6.0-5.7-5.5	16.6	7.9-7.5-7.2
8.7	4.1-4.0-3.8	12.7	6.0-5.8-5.5	16.7	8.0-7.6-7.3
8.8	4.2-4.0-3.8	12.8	6.1-5.8-5.6	16.8	8.0-7.6-7.3
8.9	4.2-4.0-3.9	12.9	6.1-5.9-5.6	16.9	8.0-7.7-7.3
9.0	4.3-4.1-3.9	13.0	6.2-5.9-5.7	17.0	8.1-7.7-7.4
9.1	4.3-4.1-4.0	13.1	6.2-6.0-5.7	17.1	8.1-7.8-7.4
9.2	4.4-4.2-4.0	13.2	6.3-6.0-5.7	17.2	8.2-7.8-7.5
9.3	4.4-4.2-4.0	13.3	6.3-6.0-5.8	17.3	8.2-7.9-7.5
9.4	4.5-4.3-4.1	13.4	6.4-6.1-5.8	17.4	8.3-7.9-7.6
9.5	4.5-4.3-4.1	13.5	6.4-6.1-5.9	17.5	8.3-8.0-7.6
9.6	4.6-4.4-4.2	13.6	6.5-6.2-5.9	17.6	8.4-8.0-7.7
9.7	4.6-4.4-4.2	13.7	6.5-6.2-6.0	17.7	8.4-8.0-7.7
9.8	4.7-4.5-4.3	13.8	6.6-6.3-6.0	17.8	8.5-8.1-7.7
9.9	4.7-4.5-4.3	13.9	6.6-6.3-6.0	17.9	8.5-8.1-7.8



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