



## CASCOPHEN® ADHESIVE SYSTEM G-1131 A Room-Temperature Setting and Durable Resin Adhesive

Cascophen® Adhesive System G-1131 is a two component resorcinol-formaldehyde resin adhesive, capable of curing at room temperature and providing strong, water-proof bonds of utmost durability. Cascophen Adhesive System G-1131 is especially effective as an assembly woodworking glue where strength and resistance against water, weathering, and dampness are required. These features are advantageous for general marine and aircraft use and other exterior service applications.

Essentially neutral and inert, and possessing resistance to deterioration or disintegration on aging, Cascophen Adhesive System G-1131 will provide strong bonds between woods, treated woods, many plastics, natural and synthetic rubbers, primed metals, and porous materials such as paper, leather, textiles, fiber boards and asbestos boards.

The cured glue line is completely resistant to fresh or salt water, most acids and organic solvents, and lubricating oils and greases. However, alkaline solutions will act adversely on the glue line. The cured adhesive is thermoset so elevated temperatures do not effect the bond; conversely, no loss in bond strength is encountered at temperatures as low as -40°F.

Cascophen Adhesive System G-1131 can be used advantageously in assemblies, such as laminated boat keels, arches, and trusses, or where it would not be economical or feasible to use heat for curing because of the size or shape or the number of glued assemblies being produced and where utmost durability with room temperature curing is desired.

As required by the Toxic Substance Control Act (TSCA) Cascophen® Adhesive System G-1131 is listed in the Chemical Substance Inventory. The CAS registry numbers for G-1131-A (resorcinol-formaldehyde polymer) and G-1131-B (paraformaldehyde) are (24969-11-7) and (30525-89-4).

### Description

Cascophen Adhesive System G-1131 consists of two parts, liquid resin G-1131-A and a powdered hardener Cascoset® G-1131-B. Until mixed for use, G-1131-A has a shelf life of one (1) year and G-1131-B has a shelf life of 8 months when stored at 70°F.

The liquid resin G-1131-A is an alcohol-water solution of a partially condensed resorcinol-formaldehyde resin. The hardener G-1131-B is a tan powder formulated from paraformaldehyde and a suitable cellulosic filler.

### Government and Industry Specifications

Cascophen® Adhesive System G-1131 meets the requirements of many Government and Industry specifications. Adhesive bonds produced in accordance with the recommendations in this bulletin and consistent with good wood bonding practice will meet the performance requirements of the following specifications and industry standards:

| Specification | Designation           |
|---------------|-----------------------|
| Federal       | MMM-A-181D            |
| Military      | MIL-A-22397-1 (ships) |
| Military      | MIL-A-46051 (Ord)     |

| American National Standard for Wood Products – Structural |                        |
|---|------------------------|
| Standard  | Specification          |
| Glued Laminated Timber                                    | ANSI/AITC A 190.1-83   |
| AITC Inspection Manual                                    | AITC-200-92            |
| Product Fabrication Service                               | Quality Control System |
| American Society for Testing and Materials                | ASTM D 2559-03         |
| Canadian Standards Association                            | CSA-0112.7-1977        |

### Storage Conditions

The liquid resin G-1131-A, should be stored between 32°F – 90°F for 12 months. Frozen resin need only to be thawed and stirred well before using. Containers should be tightly closed to prevent solvent loss. Resins thickened through loss of solvents may be thinned with denatured ethyl alcohol or water, or both, as required.

The hardener G-1131-B should be stored at temperatures below 80°F. and kept dry. Continued exposure to higher temperatures will decrease the reactivity. The oldest inventory should be used first.

### Mixing Instructions

G-1131-A.....5 parts by weight  
 G-1131-B.....1 part by weight

It is essential that all mixing and spreading equipment be free of all traces of acids, alkalies and glue residue.

Component “A” is charged to the mixer; component “B” added slowly with agitation and mixing continued for 5 to 15 minutes, until the setting agent is thoroughly dispersed.

### Working Life

Mix only that amount of adhesive that is expected to be used within one-half of the working life of the mixed adhesive. Table I indicates the relationship between useful working life and temperature of the mixed adhesive.

| Adhesive Temperature | Useful Working Life |
|----------------------|---------------------|
| 60°F                 | 7½ Hrs.             |
| 70°F                 | 3¾ Hrs.             |
| 75°F                 | 3 Hrs.              |
| 80°F                 | 2½ Hrs.             |
| 90°F                 | 1½ Hrs.             |
| 100°F                | ½ Hr.               |



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The working life of the adhesive is extremely sensitive to traces of acids or alkalis, so all mixing and spreading equipment should be kept clean.

When the adhesive becomes too thick to spread, all the containers and spreading equipment should be immediately emptied and cleaned by the use of scrubbing brushes and cool or warm water.

## Wood Bonding

### Preparation of Stock to be Bonded

The wood to be joined should be of the correct moisture content and should be machined so as to provide smooth, clean and well-fitting surfaces. For best results, final surfacing should take place within the 24 hours preceding gluing.

Moisture content of wood is most important and should be from 8-16%, preferably within the 10-12% range.

The temperature of the wood should be 70°F., or higher.

### Spreading

Cascophen® Adhesive System G-1131 may be applied by a resilient rubber roll mechanical resin glue spreader, paint roller, or hand spread with a stiff bristled brush.

The joints may be double or single spread. In double spreading, the glue is applied to both surfaces of the joint, the total amount of adhesive used being evenly divided between the two surfaces. Double spreading is recommended for dense species and where the time required for assembly approaches the maximum permissible.

TABLE II

| Recommended Spreads in Pounds<br>Per 1,000 SQ. FT. Single Glue Line |       |
|---|-------|
| Low Density Wood  | 50-70 |
| High Density Wood   | 50-60 |

The heavier spreads are required for rough surfaces or where long assembly periods are required.



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## Assembly Time

The assembly period is the time elapsing between spreading a joint and applying pressure. "Open Assembly" is the time between spreading and assembling the spread surfaces, while "Closed Assembly" is the time the spread surfaces are in intimate contact before pressure is applied.

It is generally desirable to permit the adhesive to penetrate into the wood for 15-45 minutes (when at room temperature) before applying pressure. For certain dense woods and other non-porous material, it is advisable to allow part of the solvent to evaporate by providing a short open assembly time.

TABLE III  
RECOMMENDED ASSEMBLY TIMES

| Temperature of Room/Wood/Glue | Maximum Permissible Open Assembly (minutes) | Maximum Permissible Closed Assembly (minutes) |
|-------------------------------|---|---|
| 70°F.                         | 10  | 60  |
| 80°F.                         | 5   | 45  |
| 90°F.                         | 1   | 30  |
| 100°F.                        | 0   | 15  |

The times in this table are based on using either "open" or "closed" assembly, not both. When a combination of these two assemblies is desired, the maximum assembly times can be proportioned from the table. For example, if one-third of the maximum "open" assembly time is used, then only two-thirds of the maximum "closed" assembly time can be employed.

## Curing Conditions

(a) Pressure – In general, sufficient pressure to reduce the glue line to a thickness of 0.002-0.007" is required. Thicker glue lines will result in an inferior bond. Pressures of 25-250 psi are generally used. In thick assemblies, slight excess pressure is desirable to compensate for shrinkage.

(b) Temperature – Cascophen® Adhesive System G-1131 is adaptable to accelerated curing at intermediate temperatures, as well as room temperature. Curing temperatures below 70°F. should not be used.



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For gluing flat stock at room temperature, minimum clamping pressure periods are shown in Table IV.

| Glue Line Temperature | Minimum Pressure Periods |             |
|-----------------------|--------------------------|-------------|
|                       | Low Density Woods        | Dense Woods |
| 70°F                  | 8 Hrs.                   | 10 Hrs.     |
| 75°F                  | 6 Hrs.                   | 8 Hrs.      |
| 80°F                  | 4 Hrs.                   | 6 Hrs.      |
| 90°F                  | 2½ Hrs.                  | 3½ Hrs.     |
| 100°F                 | 1½ Hrs.                  | 2 Hrs.      |

For curved stock the above times should be doubled.

When intermediate temperatures are used, the cure is speeded and penetration is improved. Table V is given as a guide for minimum safe clamping times at various glue line (not press) temperatures.

TABLE V  
CURING PERIOD UNDER HEAT BEFORE  
REMOVAL OF PRESSURE

| Glue Line Temperature | Pressing Time |
|-----------------------|---------------|
| 110°F                 | 55 mins.      |
| 120°F                 | 40 mins.      |
| 130°F                 | 25 mins.      |
| 140°F                 | 18 mins.      |
| 150°F                 | 12 mins.      |
| 160°F                 | 9 mins.       |
| 170°F                 | 5 mins.       |
| 180°F                 | 3 mins.       |

#### Maturing Period

A complete cure does not take place for about 6 days at room temperature, so joints should not be tested for final strength or durability until after that time.

Stock may frequently be machined with safety immediately after releasing from the clamps, though it is best to defer this for about 12 hours after removal of pressure. When intermediate temperature curing, i.e., above 100°F., is used, a complete cure is attained quickly and machining may take place immediately after pressing.



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## Bonding of Other Materials

Cascophen Adhesive System G-1131 will provide strong durable bonds to a large variety of materials, other than wood. The following are illustrations:

A. Resin impregnated wood, molded and laminated phenolic plastics and many other plastics such as ureas, the cellulose plastics (except cellulose nitrate), nylon, methacrylates, polyvinyl alcohol, polyvinyl acetate and foamed polystyrene, (not polyvinyl chlorides, Saran, Polystyrene, polyethylene nor Teflon).

Surfaces should be lightly sanded. If sanding is not feasible, the surfaces should be cleaned with a solvent.

Note: When gluing together two non-porous materials, both surfaces should be spread and a ten minute open assembly should be used. In some cases it is advisable to precoat the surfaces with a dilute solution of Cascophen® Adhesive System G-1131 (such as 100 parts by weight of mixed adhesive plus 15 parts denatured alcohol). This priming coat should be allowed to thoroughly dry before spreading with the regular mix.

B. Natural Rubber, Styrene-Butadiene Rubber, Buna N, Neoprene, Thiokol and reclaimed rubber.

Best results are obtained if the surfaces are cyclized by pretreatment with concentrated sulphuric acid prior to spreading. This treatment involves a five minute contact of the bonding surface with the acid followed immediately by a thorough rinse with cold water and drying. Neoprene requires a more severe cyclizing treatment with concentrated nitric acid.

C. Porous materials such as paper, leather, textiles, or fibers, plastic foam, plaster, cement fiber boards such as "Masonite" or "Celotex," asbestos and asbestos-cement boards.

## Bonding Of Treated Wood

Woods treated with preservatives can be bonded with Cascophen Adhesives. For recommendations on specific treatments and bonding conditions, contact Momentive Specialty Chemicals Inc.

## Precautions

The proper use of Cascophen Adhesive System G-1131 should not create hazardous worker exposures, however, each use location will require specific hazard potential analysis – see Material Safety Data Sheets describing the individual components of this adhesive system.

In every case, high standards of cleanliness should be maintained to minimize the possibility of dermatitis. The use of proper protective clothing and frequent washing is recommended.



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Use of safety equipment such as glasses, goggles, face shield, long sleeved shirts, aprons, coveralls, etc. may be advised. Please refer to MSDS for this product.

Until fully cured, the adhesive mix will have the hazardous properties of the individual components.

Cascophen® Adhesive G-1131-A Contains Resorcinol, and Ethanol.

**DANGER!** Causes severe eye irritation. Causes skin irritation. Harmful if absorbed through the skin. Harmful if swallowed. Flammable liquid and vapor.

Avoid prolonged or repeated breathing of vapors, mists or fumes. Avoid prolonged or repeated contact with skin or eyes. Do not take internally. Wash exposed areas promptly and thoroughly after skin contact and before eating, drinking, using tobacco products or rest rooms. Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation exposures below current exposure limits and areas below flammable vapor concentrations. Follow NIOSH Pub. 80-106 "Working in a Confined Space." Keep away from sparks and open flame. Keep closures tight upright to prevent leakage. Keep container closed when not in use.

KEEP OUT OF REACH OF CHILDREN.

USE WITH ADEQUATE VENTILATION.

Cascoset® Hardener G-1131-B contains formaldehyde (paraformaldehyde).

**DANGER!** Causes severe eye irritation. Harmful to upper respiratory tract if inhaled. Harmful if swallowed. May cause allergic skin reaction. Combustible solid and vapor.

Avoid prolonged or repeated inhalation of dust/vapor and contact with skin and eyes. Do not take internally.

Wash exposed areas promptly and thoroughly after skin contact and before eating, drinking, using tobacco products or rest rooms. Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation exposures below current exposure limits and areas below flammable vapor/explosive dust concentrations. Local exhaust is necessary for use in enclosed or confined spaces. Follow NIOSH Pub. 80-106 "Working in a Confined Space." Keep away from sparks and open flame.



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