

CASCOPHEN HL-4645

CASCOPHEN HL-4645 is a thermosetting liquid resin produced by the condensation of phenol with formaldehyde. In the cured state, phenol formaldehyde resin is a cross-linked, insoluble, infusible material.

Application:

CASCOPHEN HL-4645 is specially formulated for the manufacture of exterior grade plywood. Used with filler PXE-6, it imparts an excellent pre-pressing characteristic. Upon pressing, the bond formed is extremely strong, insoluble in boiling water or common solvents, more resistant to high temperature than the wood itself and unaffected by fungi and wood destroying insects.

Filler PXE-6:

Filler PXE-6 is a tan powder specially formulated for use in conjunction with CASCOPHEN HL-4645. It reduces excessive resin bleed-through in porous wood species, imparts an excellent pre-pressing characteristic and offers a good working viscosity in the glue mix.

It bonds a wide variety of tropical hardwoods including hard to glue species such as Keruing. The final bond quality will surpass the following international Standards:

<i>British Standard</i>	<i>BS 1455, 1972 - Weather & Boil-proof (WBP) Grade, (Knife Test).</i>
	<i>BS 6566, Part 8, 1985 - Weather & Boil-proof (WBP) Grade, (Shear Test).</i>
	<i>BS 1088, 1966 - Specification for marine plywood.</i>
<i>Japanese Agricultural Standard</i>	<i>JAS Type I.</i>
<i>United States Commercial Standard</i>	<i>CS-35, Type I.</i>

Product Physical Properties: (at time of manufacturing)	
Appearance	Clear, red liquid
Viscosity @ 30°C (2/60)	55 - 85 cPs
BWG @ 100°C (Neat), min	45 - 60
Specific Gravity @ 30°C	1.200 – 1.215
Solid Content, % (105°C at 3 hours, Neat)	44 - 46

Storage:

Under normal environmental conditions, the usable life of the resin is about 4-6 weeks. To prolong its usable life, store in a cool place away from direct sunlight. After direct expiration of usable life, the resin may still possess its gluing properties. The viscosity may, however, be high, so much so that its pot life may be shortened considerably.

Actual storage life of the resin may be as long as 8 weeks at

30°C, after which deterioration in the resulting bond quality is inevitable. If kept in a cool, dry place, filler PXE-6 can be stored for 6 months. After this period, a gradual drop in the final glue mix viscosity over a time is expected.

To ensure optimum performance from the resin and filler, it is strongly recommended that both the resin and filler be used up before its usable life expires.

Recommended Glue Mix:

The following formulation has been found to give an optimum bond quality at an acceptable cost level.

CASCOPHEN HL-4645	100 parts by weight
FILLER *PXE-6	30 parts by weight
Pot Life @ 30°C	3 hours minimum
Ideal glue-mix viscosity @ 30°C	1,000 - 1,500 cPs

* Filler PXE-6 can be varied from 25 - 35 parts per 100 parts CASCOPHEN HL-4645 to arrive at the ideal glue mix viscosity.

Glue mixing:

- a) Add 2/3 of required CASCOPHEN HL-4645 into mixer.
- b) Add required quantity of PXE-6 and mix until all lumps disappear.
- c) Add remaining 1/3 of resin and mix for 5 - 10 mins. The mix is now ready for use.

Our technical service personnel would be glad to provide any further assistance in the use of our product.

Glue Spread:

The amount of glue spread required depends heavily on factors such as veneer texture, thickness, temperature, moisture content and porosity, ambient temperature and humidity, assembly time and pre-press time. Generally, a higher spread is required when veneers are rough, thick and warm. This is also true when assembly time is excessively long.

Optimum spread values should be determined by practical trials. The following schedule may be used as a guide only.

Core veneer thickness (mm)	Glue Spread (SGL)	
	lbs./1000 sq. ft.	g/sq. ft.
1.8 and below	31 - 37	14 - 17
2.1 - 2.5	35 - 42	16 - 19
3.2 - 3.8	40 - 46	18 - 21
4.2 - 5.0	42 - 48	19 - 22

NOTE: It is strongly recommended that glue spread be checked at regular intervals per production day. This could be achieved by spreading core veneers and determining resin pick-up by weight difference.

Recommended Moisture Content of Veneers:

The moisture content of veneers used should be in the range of 5 - 8%.

It is permissible to maintain a slightly higher moisture content in face and back veneers to reduce tearing while handling. Veneers with moisture content exceeding 12% are generally not recommended.

For optimum results, moisture content distribution within a veneer should be as uniform as possible. Uneven moisture content such as the existence of wet spots might result in excessive localised bleed-through and blisters.

Assembly Time:

Open assembly time is the time period from the spreading of glue onto veneers to the time when the assembly is cold pressed. For optimum results in bond strength, it is recommended that open assembly time should not exceed 30 minutes. This could simply be achieved by setting open assembly time constant, say 25 minutes rather than allowing it to vary by keeping the number of panels assembled constant. The latter would lengthen the assembly time when core veneers are loose.

Closed assembly time is the time between immediate completion of cold pressing and the beginning of hot pressing. For optimal bond results, this time should be kept to a minimum, preferably less than 30 minutes.

Both assembly times above should be determined by practical trials. They are generally affected by factors

such as veneer temperature, moisture content, veneer quality (texture, composed / full sheet / loose), factory temperature and humidity, glue spread and type of extension used.

Pre-Pressing:

This is to effect an even transfer of glue to all adjacent veneers. It also facilitates the subsequent hot pressing operation by keeping the veneers firmly pre-bonded together. When used correctly, CASCOPHEN HL-4645 exhibits excellent pre-bonding characteristics at a relatively short press time. The actual press time required should be determined by practical trials as this would depend on factors such as plant temperature, veneer moisture content and texture, open assembly time and glue spread. As a guide, a pre-pressing period of 9 - 12 minutes is often satisfactory.

Normally, a specific pre-pressing pressure of 9 - 14 kg/cm² should be sufficient. Actual pre-pressing pressure required is dependent on factors such as panel thickness and veneer species and texture. It is often desirable to pre-press at a slightly lower pressure than that needed for hot pressing.

During pre-pressing, it is often necessary that caul boards be placed within the loads and spread about 12 inches apart. After pre-pressing, the panel should be hot-pressed immediately or dead-stacked for a period of not more than 30 minutes (see **Closed Assembly Time**) before hot pressing. When panels are dead-stacked, it is recommended that the top panels be weighed down by cauls to prevent possible curling of face veneers.

Hot Pressing:

Loading time is the time period elapsing between the placing of the first panel assembly in the press and the application of full pressure to that press load.

To avoid any risk of pre-cure, loading time should be kept as short as possible, preferably not more than 2 minutes. The glue must still be tacky, hence capable of flow prior to application or full pressure.

Pressing pressure: The required specific pressure on the plywood panel depends on factors such as panel thickness and veneer species and texture. The following schedule may be used as a guide only:

Plywood thickness (mm)	Sp. pressure on plywood (kg/cm ²)
3 - 6	9 - 11
9 - 16	10 - 12
18 - 25	12 - 14

Processing temperature and time: The required press time for each type of construction will vary according to such factors as the number of plies that make up the panel, thickness of veneers used, wood acidity and platen temperature. To determine the actual time required, the following schedule may be used as a guide:

A) Basic time

Press temperature in °C	120°C	130°C	140°C
Basic setting time in minutes.	4	3	2

B) Time for Heat Penetration

Distance to the deepest glue line	Press Platen Temperature		
	120°C	130°C	140°C
Under 4 mm	1.2 min/mm	0.8 min/mm	0.6 min/mm
4 to 6 mm	1.5 min/mm	1.1 min/mm	0.75 min/mm
Over 6 mm	2.0 min/mm	1.3 min/mm	1.0 min/mm

C) Example

For a 7-ply panel with 3.3 inner veneers and 1.0 mm back and face veneers, the pressing time required at 130°C can be calculated as follows:

Distance to the inner-most glue line: $(1.0+3.3+3.3)$	=	7.6 mm
Heat transfer time: 7.6×1.3 min.	=	9.88 min.
Basic setting time at 130°C	=	3 min.
Total pressing time		12.88 min.

As the rate of heat transfer is dependent on wood species and its moisture content, the correct pressing time should be practically determined under actual plant conditions.

Caution: Do not use high hot press temperature to attain a short pressing period unless moisture content of veneers is carefully controlled. Always remove panels as soon as the press opens.

Cleaning of Equipment:

CASCOPHEN HL-4645 glue mix is strongly alkaline and **MUST NOT** be mixed with urea or melamine-urea formaldehyde resin which are acid cured types. Before changing over to UF and MUF resin types, all equipment **MUST BE** thoroughly washed..

CASCOPHEN HL-4645 glue mix can be easily washed off using ordinary tap water or slightly warm water. If removal is difficult, a weak alkaline solution of about 5% caustic soda is recommended.

Toxicological Information:

Formaldehyde containing resins have been manufactured and used for years with no adverse effects on health. Repeated contact with them may, however, cause dermatitis in allergic persons especially on the hands and forearms. Dermatitis conditions usually respond well to medication prescribed by a physician.

Fumes released subsequent to hot pressing may cause burning of the eyes and weeping, but, this usually stops after a few minutes in fresh air.

CASCOPHEN HL-4645 is hygroscopic in nature. Constant contact with the powder may cause the skin, especially those of women workers, to dry and chap. To prevent chapping, keep the skin moist by applying creams and hand lotions.

Handling and First Aid Precautions:

It is strongly recommended that adequate general and local ventilation be available in and around the glue kitchen and hot presses to keep formaldehyde concentration within acceptable levels.

Workers who handle CASCOPHEN HL-4645 should wear rubber gloves and protective clothing such as aprons.

The glue mixer should not handle filler PXE-6 with their bare hands and should avoid inhaling powder that is dusted into the air.

Any area of skin that has come in contact with CASCOPHEN HL-4645 should be washed immediately with mild soap and thoroughly rinsed with lots of running water.

If any CASCOPHEN HL-4645 enter the eyes, they must be thoroughly flushed with lots of water immediately. If ill effects persist, seek medical attention.

If a large amount of CASCOPHEN HL-4645 is swallowed, induce vomiting and seek medical attention.



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