RYSTIX SALES c.c.

Suppliers of Rystix resins & Timbacare sealers & coatings

Members: A G D Ryder, I J Ryder, G D Ryder, P D Ryder

P.O. BOX 1053
PORT ELIZABETH 6000
SOUTH AFRICA
Tel: 0861 RYSTIX (797849)
Int'l Tel: +27 41 365 7172
Int'l Fax: +27 41 365 6973
Reg. No.: CK 1987/003538/23
E-Mail: rystix@iafrica.com
Website: www.rystix.co.za

TECHNICAL BULLETIN **AUGUST 2003**

RYSTIX LAMBOND RESIN SYSTEM

WBP GRADE LIQUID PHENOL-RESORCINOL RESIN FOR THE LAMINATING AND FINGERJOINTING INDUSTRY.

I. GENERAL PROPERTIES:

Lambond is a pure synthetic resin system especially designed for the laminating and fingerjointing of solid timber, both hardwoods and softwoods.
When mixed with the powdered **Lambond hardener** the resin cures to a strong durable bond.
When used in accordance with the correct recommendations the resin system conforms to the requirements of British Standard Specification 1204 Parts I and 2 and to the South African National Standards Specification (SANS) 1349 Exposure Class I in both **close-contact** and **gap-filling** categories.

Lambond resin system has exceptionally low formaldehyde odour and is readily soluble in water making cleaning of equipment and machinery simple.
In keeping with most resins of this kind, **Lambond** -performs best when used under temperature conditions above 15°C and preferably in the range 20 - 30°C. Under extremely cold conditions it is recommended to use some form of heating to ensure the resin and gluelines are above 20°C.

2. PACKING AND STORAGE:

Lambond resin is supplied in 225 kg metal or plastic drums. **Lambond hardener is** supplied in plastic lined woven polypropylene bags each containing 22,5 kg. Two bags of hardener are required for each drum of resin.
Both resin drums and hardener bags should be stored under cover and in cool conditions.
Shelf life under these conditions is in excess of 12 months.

Hardener bags should be stored on pallets to prevent wetting by flooding. Any drums or bags that have been opened or have been damaged and are leaking should be used first to prevent deterioration or loss of strength. Exposure of the drums to hot sunshine should be avoided.

NOTE: The hardener powder is best stored within the glue room in a rubber dustbin with lid. Two bags of hardener should be added to this bin outside the factory to avoid powder contaminating the working area. The filled bin can then be placed near the mixing station within the glue room.

3. PREPARATION OF RESIN MIX

Compulsory mixing ratio: **Lambond resin** liquid: **5 parts by weight.**
Lambond hardener powder: **1 part by weight.**

NOTE: *Due to the importance of controlling the formaldehyde fumes to the lowest possible level, the above mixing ratio must be strictly adhered to. For this reason, the measuring by volume of* the *components is not recommended and an accurate and reliable weighing system is essential.*

Equipment used for weighing out the components should be clean and dry and free of any contamination from other resins or chemicals.

The use of an efficient mechanical mixer will produce a smooth lump-free resin mix in less than 5 minutes. The powdered hardener should preferably be added to the liquid resin during agitation.
Excessive mixing should be avoided as this generates heat, which will speed up the curing of the mix and therefore shorten the pot-life (working life).

To optimise the performance of the glue mix and to ensure adequate pot-life the following is recommended:

COLD WEATHER: Warm the resin to 20 - 25°C before mixing.
HOT WEATHER: Cool the resin to 18 - 20°C before mixing.

This is best achieved by storing 5 to 6 drums of resin in a cool or warm store prior to use.

PRECAUTIONS:
The weighing and mixing of the hardener should be conducted in a well-ventilated area preferably with some form of extraction to remove any formaldehyde vapours. The operator(s) should wear suitable gloves and respirator masks during the weighing and mixing process.

4. POT-LIFE OF THE GLUEMIX (WORKING LIFE):

To avoid pot-life problems only enough mix should be made up which will be consumed within 30 to 45 minutes. In extremely hot conditions it is important to work *hand to mouth* with the adjustment of the mix to a minimum size. Under no circumstances should glue mixes be mixed in advance of their required time in the production process. The chemical reaction that commences when the hardener is added to the resin will cause the container of mixed resin to become warm and this will considerably shorten the pot-life.
The following table can be used to determine the useable life of the mixed resin:

Temperature of the mix	Pot-life
15°C	3,5 hours
20°C	3,0 hours
25°C	2,5 hours
30°C	1,5 hours
35°C	45-50min

NOTE: Should production be interrupted by breakdowns etc. one of two procedures can be followed:

(i) If the breakdown is expected to be of short duration, remove the mixed resin to a cool store until production re-starts.

(ii) If the breakdown period is expected to be of long duration, remove the mixed resin to a cool store and clean the glue applicator. When production re-starts, check the mixed resin in the cool store; if it has not thickened excessively it can be added to a fresh mix in the glue applicator; if thickening has advanced noticeably then it is advisable to discard the mix and start a fresh one.

Under no circumstances should mixed resin be allowed to harden in the glue applicator, as this will be difficult to remove and clean.

5. TIMBER PREPARATION:

During very cold temperatures, timber for processing should be stored at above 15°C in a warmer part of the factory.
All timber to be bonded should be freshly planed before laminating or freshly profiled before fingerjointing. Burnishing of planed surfaces must be avoided. Surfaces to be bonded should be free from any loose dirt or foreign matter. Ideal timber moistures lie in the range 8 to 15%

Timber moistures below 8% can result in drying out of the gluelines and thus shorten assembly periods, while high moistures above 15% can lead to dilution of the mix and glue starvation. (See section 6).

Large moisture variations within a laminated or jointed product should be avoided as this leads to excessive stresses being built into the product which in turn can lead to cracking of laminates or instability in the end product.

Timber thickness tolerances should be accurate and wedging of the laminates (thickness variations across their width) should be eliminated to ensure even pressure is applied to the laminated product during the clamping process.

6. RESIN APPLICATION AND SPREAD RATE:

Under normal conditions a spread rate in the range 320 - 400 grams per sq.metre per glueline should be used.
The actual spread rate to be used should be set according to the amount of squeeze-out that occurs when the laminated product is finally clamped in the press. Ideally the spread rate should be set to result in small beads of resin being squeezed out along each glueline.

When timber is rough and/or dry or when ambient conditions are hot and dry it will be necessary to increase the rate of spread. Conversely under cooler conditions or when timber moistures are higher, the rate can be set towards the lower end of the range given.

When ambient temperatures are below 15°C introduce a warm water “jacket” surround to the glue trough to assist in maintaining the temperature of the glue mix at between 20-25°C.

For both laminating and fingerjointing the best results are obtained when the resin mix is applied to each surface to be bonded. However, extruders that apply resin to one face only can be used provided conditions and spread rates are optimized by trials before commencing production.

7. ASSEMBLY CONDITIONS:

It is essential that the two surfaces to be bonded are placed in close contact before the gluelines have dried to the touch. To avoid dry-out of the gluelines the laminates with glue applied should be placed in close contact as soon as possible after the glue has been applied.

During clamping a lack of squeeze-out along the gluelines is an indication that dry-out of the gluelines has occurred. This will result in excessively thick gluelines and poor bond strength.

Conditions of dry timber moistures, high ambient temperature and low relative humidity will all aggravate the tendency for the gluelines to dry. Timber species that are porous will have the same effect.

The following table is a guide to the assembly conditions but in practice the optimum conditions for each particular situation should be established by applying the advice given above and with particular references to the observation of squeeze-out of glue along the gluelines during clamping.

MAXIMUM ASSEMBLY TIMES

Timber & workplace (Temp °C)	Maximum total assembly (Time in Minutes)
20	60
25	45
30	40
35	35

NOTE: In all cases the open assembly time should be kept below 10 minutes if possible. Under certain conditions (e.g. short open assembly, higher timber moisture contents, higher relative humidity etc.) the listed assembly times could be extended.

Gluemix which has aged for some time before application to the timber will normally result in a reduction of the permissible assembly time and therefore when operating under conditions of long assembly time it is important to apply the glue as soon as possible after making up each fresh mix.

8. CLAMPING PRESSURE AND CURING TEMPERATURE:

FINGERJOINTING: Using correctly profiled fingers the clamping pressures will depend on the length of the fingers and the thickness of the timber. The following table is given from the *SANS Code of practice* for the jointing of softwoods and hardwoods. The actual pressure used should again be determined by practical trials and should be such that close-fitting joints without end splitting are produced.

Finger length (mm)	Hardwoods (MPa)	Softwoods & less dense Hardwoods (MPa)
7,5 - 10	15,3	7,8
10,1 - 21	12,75	5,8
21,1 - 31	10,2	4,0
31,1 - 41	7,65	2,0

NOTE: After jointing the fingerjointed lengths should be handled gently on edge to avoid disturbance of the joints. They should then be stacked in stacks with stickers between layers and allowed to cure.

LAMINATING: Under normal conditions a clamping pressure in the range 0,7 to 1,5 MPa is required (7-15 kgf/sqcm).
Pressure clamps should be spaced close enough to ensure that the pressure is applied evenly along each glueline.

Because the pressure will fall off during the first few minutes of clamping as the excess glue squeezes out of the gluelines, **it is essential that the pressure is re-applied to each clamp not less than 5 minutes or more than 15 minutes** after the original clamping took place.

Once clamping has been completed the presses should be left undisturbed during the curing period. If heating is used to shorten the curing period then the heating should be applied as soon as the clamping has been completed.

The following table is given as a guide to the curing period required at different glueline temperatures.

The actual curing times should be established by practical trials for each type of product.

Glueline Temperature (ºC)	Period under pressure (Hrs)
15 - 20	12 - 16
20 - 25	8 - 10
25 - 30	4 - 6
30 - 35	3 - 4
35 - 40	2 - 3

NOTE: The curing table can also be used as a guide for the curing of fmgerjoints.

Note: Under conditions when the ambient and timber temperatures are likely to be below 15ºC it is advisable to apply some form of heating to the presses to ensure that the glueline temperatures are above 20ºC.
A simple form of heating can be applied by having floor steam pipes, or a panel or fan, distributing heat to the timber in the presses that are covered over with a tarpaulin or other form of canopy.

The consequences of not using some form of heating in very cold conditions is that, although the glue lines may appear to be perfect after curing, when subjected to a preservative treatment, the joints could soften and ultimately fail in service.

After removal from the presses the laminated product should be close-stacked for a further period to allow curing to continue. Unless curing has been accelerated by heating the gluelines to 25ºC and above, the bonded product should be allowed to cure for a further 24 hours before handling and machining. Ideally a period of 24 hours or more should be adhered to in all instances as this time not only allows the curing to advance, but also allows the product to even out any stresses which might have been built in during pressing. For the pressure treating of glued products refer to paragraph 9.

9. PRESERVATIVE TREATMENT:

Woods treated with preservatives can be bonded with **Lambond** and before commencing production it is recommended that technical advice is obtained from **RYSTIX SALES**-

In the case of treatment taking place after laminating this should only be done after the product had been fully cured. The use of solvent based preservatives does not present a problem, but water based preservatives can soften resin which has not been fully cured.

As a general rule products to undergo water based pressure treating should be cured for a period of 7 days prior to treatment. In the case of products which have been cured under elevated temperature conditions, the period can be reduced accordingly. The actual time used should be established in consultation with the technical department of **RYSTIX SALES,** and after in plant production and treatment trials.

10. **CLEANIING:**

Cleaning of machinery and other equipment should always be carried out before the resin has hardened.
The ready solubility of the liquid glue mix means that cold or luke-warm water is all that is required when cleaning. The use of suitable brushes will assist in cleaning more difficult areas such as grooved applicator rollers etc.
Washing of effluent should be passed through suitable filters or settling sumps to remove any harmful phenolic residues.

Hardened resin will be difficult to remove and has to be scraped or chipped off by physical means.

NOTE 1: Consult Rystix Sales regarding the use of **Rystix bond-release** agent for application to machinery and conveyors to prevent build-up of glue residues etc. This will significantly reduce clean-up and other downtime at the end of each shift.

NOTE 2: Consult Rystix health and safety bulletin for detailed information on effective waste disposal from the process.

The use of acids or any other chemicals for cleaning purposes should be avoided as this could lead to contamination of fresh mixes.

11. **PRECAUTIONS:**

Lambond resin and hardener when used under the correct procedures should not present any hazardous worker and environmental problems.

The usual precautions when handling phenolic resins should be taken and in particular the use of suitable barrier creams and all operators who are handling and mixing the resin should use gloves and respirator masks.

Inhalation of the formaldehyde vapours should be avoided and contact with the eyes and skin should be prevented.

Effluent washings from the cleaning process should be passed through a suitable filter or separation sump before being disposed of.

Any accidental contact with the skin or eyes should be immediately rinsed with plenty of water and appropriate medical attention given.

Should accidental ingestion occur then immediate medical attention should be sought.

12. **NOTE:**

The information contained in this bulletin is based upon our current knowledge and experience and is given in good faith.

Customers using the product should by preliminary tests and trials establish that the product is suitable for application under their specific working conditions.

Since the product is stored, handled and applied under conditions which are beyond our control RYSTIX SALES cannot accept responsibility for any direct or consequential loss suffered, how so ever this should arise from the use of **Lambond.**

Active technical service is an integral part of our service and customers are encouraged to make use of this in optimizing the performance of **Lambond** under their conditions of application.

FOR FURTHER INFORMATION CONTACT:

RYSTIX SALES
P.O. BOX 1053
PORT ELIZABETH 6000
TEL: 0861RYSTIX(797849)
FAX: (041) 365-6973

082-781-1180 Atholl Ryder
082-964-5262 Peter Duffell-Canham
082-880-9473 Peter Ryder