Technical Data Sheet

Wood & Specialty Adhesives
Telephone +47 63897100
Telefax +47 63819050
www.dynea.com

Prefere 4050

Liquid phenol-resorcinol resin adhesive for the wood industry

Use

Prefere 4050 is supplied in three grades: F (Fast), M (medium) and S (Slow); hardener Prefere 5750 is used with each grade.

Prefere 4050 liquid resins mixed with hardener Prefere 5750, a resinous liquid containing filler, provide a range of phenol-resorcinol resin adhesives which are fully weatherproof and are especially suited to the manufacture of large laminated timber structures. Prefere 4050 adhesives are also suitable for use in the production of heat resistant composite structures, e.g. fire-resisting doors. They are resistant to acids, weak alkalis, solvents and boiling water.

Prefere 4050 resins with hardener Prefere 5750 meet the requirements of EN 301-Type1 and BS 1203 (Type WBP). Prefere 4050 has been tested according to the German Standard DIN 68 141 by the MPA, Otto-Graf-Institut in Germany and found to suited for gluing load-bearing wooden structures for indoor and exterior use in accordance with DIN 1052.

Prefere 4050 adhesives are simple to prepare. Both resin and hardener are liquids, and are mixed in a 1:1 ratio.

The three adhesives are highly suitable for bonding a wide range of materials to porous substrates. These materials include:

- Wood, improved or densified woods, mineral fibre reinforced boards, brick, concrete, and unglazed porcelain.
- Rigid expanded plastics, e.g. expanded polystyrene, polyurethane and PVC
- Industrial and decorative laminated plastics (phenolic resin based or phenolic resin backed).
- Leather, cork, linoleum and nylon.

Technical data

	Prefere 4050	Hardener Prefere 5750
Appearance	Reddish brown liquid	Brown liquid
Viscosity at 25°C	400 - 1100 mPas	13000 -18000 mPas
Solids content	52 - 58%	69 - 73 %
pH	7.5 - 9.0	6.7 - 7.8
Rel. density at 25°C	app 1.13 g/cm^3	app. 1.16 g/cm^3
Flashpoint	31°C (88°F)	38°C (100°F)

Storage

Prefere 4050 and Hardner Prefere 5750 should be stored firmly sealed in their original containers in a cool (ideally 5-20°C) dry place. Shelf life under these conditions is at least 1 year for both Prefere 4050 and Hardener Prefere 5750.

Preparation of the glue mix

It is essential that hardener Prefere 5750 is well stirred before removal from the container. Add the required amount of hardener Prefere 5750 to the Prefere 4050 and mix thoroughly. The proportions may be measured by weight or volume.

Mixing proportions are the same for each of the three resins

	pbw
Prefere 4050 (Fast, Medium or Slow)	100
Hardener Prefere 5750	100

Note: Since resin and hardener have slightly different densities, but are supplied by weight, mixing by volume will result in uneven consumption of the components.

Viscosity, 15-20 minutes after mixing, is similar for each grade of resin used:

Viscosity at 25°C 1500 - 2000 mPa.s

Use of extenders

Wood flour or some mineral fillers may be added to increase the viscosity and reduce glue costs. However, this can not be done for approved systems for load bearing building components.

	Lightly-filled mix	Heavily-filled mix
Prefere 4050	100	100
Hardener Prefere 5750	100	100
China clay	40	
China clay or fine chalk		200

The lightly filled mix still complies with the requirements of BS 1203 (Type WBP). It may be necessary to adjust the viscosity of the heavily filled mix with water but the water addition should be kept to a minimum. This mix is suitable for bonding uneven-surfaced boards, such as mineral fibre re-reinforced boards, and where maximum strength and full weatherproof properties are not required.

Pot life

Resin and hardener start reacting with each other once they are mixed, and the reaction will proceed until the glue is completely cured. How long this takes, depends on the temperature of the glue mix. Consequently, the temperature of the glue mix affects the pot life, i.e. how long the glue mix remains usable. The higher the temperature, the shorter the pot life. The table below gives the pot life at various temperatures.

	Pot life in hours at						
Prefere	5°C	10°C	15°C	20°C	25°C	30°C	35°C
4050 F	9	6	4	1½	-	-	-
4050 M	-	-	5½	3	2	1	-
4050 S	-	-	-	-	3½	2½	½

Preparation of materials for bonding

Surface preparation

The surfaces to be bonded should be free from dust or other deposits. Wood, panels, laminates etc. should be of uniform thickness. Solid timber should be freshly machined, but does not usually require sanding. Smooth dense surfaces to be bonded, except expanded plastics and mineral fibre reinforced boards, should also be thoroughly sanded.

Metal surfaces should be abraded, degreased and coated with Primer L 62 before bonding to porous materials (such as wood). Directions are given in Instruction sheet No. AD4.

Moisture content

Satisfactory results may be obtained when the moisture content of the surfaces to be bonded is within the range 6 - 25% but for best results, 12 - 16% is preferred. Artificial drying will be required to reduce the moisture content to 16% or lower. Adjacent surfaces should not differ by more than 4% moisture content. EN 386 specifies the requirements on wood to be used for laminated timber structures.

Effect of preservative treatment

Before bonding timber that has been treated with a preservative, it is necessary to machine or sand the surfaces. Also the joint moisture content should be checked since this can be increased beyond acceptable level by water borne preservatives and may need to be reduced before gluing. Further advice on the gluing of preservative treated timber is available on request.

Note: Where preservative treatment is applied after bonding. Beams and components should be conditioned for at least 7 days at not less than 15°C before being subjected to water borne preservative treatment in pressure cylinders.

Fire retardant treated wood based materials

When bonding FR grades of wood based materials such as MDF or particleboard it is possible that the treatment will affect the cure of the Aerodux adhesive. Advice on the bonding of fire retardant timber is available on request.

Glue spread

Apply an even coating of mixed adhesive to both the surfaces to be bonded. Under average conditions (65% r.h. and 18°C), a spread rate of 150-250 g/m² to each face of a joint is sufficient. The defect known as drying-out is influenced mainly by relative humidity, temperature, glue spread rate, wood species and circulation of the air in the workshop. In conditions of high ambient temperature and low relative humidity, higher spreads may be necessary to limit drying-out.

Assembly time

Assembly time is the time elapsing between glue application and pressure application. It can be divided in open (from glue application until assembly of the adherents) and closed assembly time (from assembly until pressure is established). Open assembly time should be kept as short as possible. On the other hand, 5-10 minutes closed assembly may be beneficial, in particular when dense woods are being bonded.

Under all circumstances the glue must still be tacky when the pressure is applied. Glue being squeezed out of the glue line when the pressure is applied indicates that the assembly time was not exceeded.

Assembly times for Prefere 4050 with Prefere 5750

	Assembly time in hours at glue line temperature					
Prefere	10°C	15°C	20°C	25°C	30°C	35°C
4050 F	1½	¾	½	-	-	-
4050 M	-	1½	1	¾	½	-
4050 S	-	-	-	1	¾	½

Note: These times are assessed at 20°C and 65% RH and at a spread rate of 225g/m^2 to each face of a joint, i.e. total glue spread of 450 g/m^2. Under hot dry conditions they will be reduced, but this may be compensated for by increasing the spread rate.

Although the adhesive has gap-filling properties, it is important to bring surfaces into firm contact. It is essential that the joint should be made before the adhesive gels.

Pressure

The pressure is dependent on the wood species (softwood or hardwood) and on the type of bonding operation.

In the manufacture of laminated timber structures the pressure should be 0.6-1.0 N/mm² with softwoods and 0.8-1.2 N/mm² with hardwoods. In other bonding operations a lower pressure may be sufficient.

In finger-jointing the end (longitudinal) pressure should be adapted to the joint profile, wood species, the moisture content and the cross section of the timber, thus it should therefore be determined accordingly. For most softwoods an end pressure of the order of 2-5 N/mm² will be sufficient for finger joints over 25 mm in length. For shorter joints an end pressure of 5-10 N/mm² is necessary. If pre-heated wood is used, there is a risk that the pressure may cause compression fracture of the wood, in particular if the moisture content of the wood is high. In such cases the pressure must be reduced to ca 5 N/mm² for timber with 22% MC and to ca 7 N/mm² for timber with ca 15% MC.

Pressing time

a) Laminated timber structures

Minimum times for application of pressure.

	Pressing time in hours at glue line temperature					
Prefere	10°C	15°C	20°C	25°C	30°C	40°C
4050 F	24	7	5	2½	1½	½
4050 M	-	15	8½	6½	3	1
4050 S	-	-	17	9	6	2

Note For dense or high moisture content timbers where a component is impermeable, or if the joint is liable to be strained immediately after removal of pressure (e.g. as in the manufacture of curved laminated beams) the above times should be increased. Aerodux glues will continue to gain strength but full water resistant properties are developed only after several days.

b) Hot bonding

The press should be loaded and closed as quickly as possible in order to avoid pre-curing.

Basic setting times.

	Pressing time in minutes at glue line temperature					
Prefere	50°C	60°C	70°C	80°C	90°C	100°C
4050 M	30	12	6	3	2	1½
405 S	50	25	12	7	4	2½

High density woods and panel products such as MDF and moisture resistant particleboard may require longer pressing times due to their higher heat capacity and slower rate of water absorption. All pressing times should be used as a guide and not taken as a specification.

Heat penetration

The basic setting times stated refer to glue-line temperatures only and allowance must be made for the heat to travel from the press platen. Heat penetration time will vary according to density of the wood, moisture content, and distance to the farthest glue line. The table below is a guide to the additional time required for low and medium density timbers.

Heat penetration

Distance to the glue line	Heat penetration time in minutes per mm distance to the glue line				
	80°C	90°C	100°C	110°C	120°C
Less than 5 mm	1.2	1.0	0.9	0.8	0.8
5 - 10 mm	1.7	1.4	1.2	1.1	1.0
More than 10 mm	2.0	1.7	1.4	1.3	1.2

The pressing times apply when bonding absorbent materials such as low and medium density wood. The pressing time must be considerably extended when bonding less absorbent material.

c) RF Heating

Resorcinol adhesives heat up more slowly under glue line or stray field heating than UF adhesives but curing may be accelerated by the addition of common salt (sodium chloride) at a rate of 1-2 parts by weight of salt to 100 parts by weight of resin. Precautions should be taken against arcing which may lead to tracking and burning in the glue line. Arcing can be avoided by low spread, low moisture content and good jig design to ensure no air gaps between the electrode and glue line and sufficient and even pressure on the joint during curing.

Notes

Staining on absorbent boards

Light coloured absorbent boards, e.g. mineral fibre reinforced cement boards, bonded with resorcinol phenol formaldehyde adhesives may tend to show signs of staining when subjected to exposure to weather or very wet conditions. This is because certain soluble materials in the uncured resin are absorbed and retained by the board and may subsequently be leached out by soaking. These materials appear as dark stains on the surface of the board, but disappear with further weathering.

Cleaning

The mixing and spreading equipment must be cleaned at the end of the working day. If the glue thickens in the application equipment, the equipment must be immediately emptied and cleaned because otherwise there is a risk that the glue will cure. Cured glue is insoluble and must be scraped off. Warm water (50-60°C) is recommended for cleaning.

Phenol-resorcinol glue is a potential water pollutant. Glue remainders and untreated wash water may not be discharged into public drains or watercourses unless a permit has been obtained from the appropriate authorities. Advice on safe handling of glue remainders and wash water can be found in our Technical Information Leaflet No. 2E "Glue waste disposal - Prevention of pollution".

Dynea ASA has developed a special method for the treatment of spillage and wash water containing phenol-resorcinol glue and delivers complete treating units utilising this method.

Safety precautions

Reference is made to the Safety Data Sheet for Prefere 4050 and for the hardener Prefere 5750.

When the adhesive and the hardener are mixed a chemical reaction will start. The pH of the mixture will be in between the value for the adhesive and the hardener. The free formaldehyde content for the hardener and the resorcinol content of the resin will be reduced.

When handling the adhesive, hardener and the glue mix it is recommended that certain precautions normally taken when handling chemicals is observed. Skin contact with the uncured glue should be avoided, since people with particularly sensitive skin may be affected. It is recommended to wear protective gloves, likewise eye protection where there is a risk of splashes. Hands and underarms should be thoroughly washed with soap and warm water at the end of the working day.

Adequate ventilation of the workshops should be maintained.

Notice

Normally, control procedures implemented by the authorities or other regulatory bodies apply to the manufacture of laminated timber structures. To satisfy these requirements, certain guidelines have to be followed in the production. These guidelines vary from country to country. They may, on some points, differ from the instructions given above. In such cases the manufacturer must obey the regulations applicable.

The suggestions given in these notes are based on data gained from experience and tests. However, since operating conditions in the user's plant is beyond our control, we cannot assume responsibility for any risks or liabilities that may result from the use of our products.

Replaces Aerodux 500 with Hardener 501 dated August 1997. EB/OJB 03.2004