



Technical Data Sheet

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Aerodux 185

Liquid phenol resorcinol adhesive for the wood industry

Use

Aerodux 185 is a phenol-resorcinol adhesive that is mainly used in the manufacture of load bearing timber structure. Furthermore, it can be used for a wide range of other/special applications, such as:

- High density wood species and chemically treated or modified wood, such as acetylated wood (eg Accoya).
- Products exposed to high temperature such as heat resistant composite structures or fire resistant doors.
- Products exposed to high humidity, such as windows and exterior doors, garden furniture, playground equipment *etc.*
- Boat building and marine constructions.
- Improved or densified woods eg "Hydulignum".
- Gluing of wood, or wood based materials, to mineral fibre reinforced boards, brick, concrete or unglazed porcelain, rigid expanded plastics such as expanded polystyrene, polyurethane and PVC, industrial and decorative laminates, leather, cork, linoleum, nylon, natural and synthetic rubber and sheet metals.

When the gluing is carried out in accordance with the instructions in this Technical Data Sheet, Aerodux 185 gives water- and weather-proof bonds, conforming to Adhesive Type 1 of the European standards for adhesives for load-bearing timber structures (EN301:2013).

Aerodux 185 with powder hardener HRP150 or HRP155 is tested by MPA, Otto-Graf-Institut, Stuttgart and NTI (Norsk Treteknisk Institutt) and fulfils the requirements for the gluing of load-bearing wooden structures, structural finger jointing and Cross Laminated Timber (CLT) according to DIN1052 and EN14080:2013, EN15497:2014 and EN16351:2015.



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The adhesive system fulfils herewith the requirements according to EN301:2013 and is classified as a general purpose and finger jointing adhesive for mix-in use for the gluing of Norway Spruce (*Picea abies*), Scots Pine (*Pinus sylvestris*), Silver Fir (*Abies alba*), European Larch (*Larix decidua*), Siberian Larch (*Larix siberica*) and Douglas Fir (*Pseudotsuga manziesii*) with the following designations:

EN 301-I-90-GP-0,6-M

EN 301-I-90-FJ-0,1-M

Aerodux 185 is approved according to JIS K 6802 and fulfils the requirement for production of glued laminated timber and finger jointing according to JAS MAFF.

Aerodux 185 with hardener HRP150 and HRP155 is also approved by Luftfahrt-Bundesamt for the production of glued wood products to be used in airplanes.

Aerodux 185 is approved for the use in production of load bearing timber structures by FCBA (France) and KOMO (Netherlands).

Aerodux 185 will meet the requirement according to EN314 – Class 3 (WBP) for production of plywood for non-covered exterior use.

Aerodux 185 has been accepted by Lloyd's Register EMEA, as an adhesive for bonding of wood structural members in the construction of yachts and small craft.

Aerodux 185 with HRP hardeners is resistant to acids, weak alkalis, solvents and boiling water.

Provided that Aerodux 185 is used according to the instructions in this Technical Data Sheet, the end products will exhibit minimal emissions.

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	Aerodux 185
Appearance	Reddish liquid
Viscosity at 25°C (mPas)	400 – 1500
Density at 25°C	1.130 – 1.170
Solids Content (%)	55.0 – 61.0
pH	7.0 – 9.0
Flashpoint (°C, CC)	37



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Storage

The storage stability of Aerodux 185 adhesive is temperature dependent. At 20°C it may be stored for 18 months. At 25°C it may be stored for 12 months from the date of production. The shelf life is longer at lower temperatures, but the viscosity will be higher, and the adhesive may be difficult to pump. The adhesive tolerates freezing, but must be thawed out carefully to avoid overheating. Containers should be kept well closed to prevent skin formation. Aerodux 185 may form a skin, which should be removed before use.

Depending on storage conditions, phase separation may occur. This is easily dispersed by stirring, and will not affect the overall performance of the adhesive.

The powder hardeners HRP150 and HRP155 have a storage stability of at least 3 years, when stored cool and dry, in sealed bags.

Choice of Hardener

Aerodux 185 must always be mixed with a hardener prior to use. To obtain bonds of maximal water resistance it is essential that the correct hardener dosage is used.

Hardener HRP150 gives a high viscosity glue mix (8000 – 10000 mPas at 20°C), that dries out faster than mixes containing HRP155. Recommended use is for joints where a viscous mix is required to limit flow, eg for thick glue-lines, uneven surfaces *etc.*

Hardener HRP155 provides a medium viscosity glue mix (4500 – 6000 mPas at 20°C), suitable for most gluing applications, especially timber structures. This glue mix tolerates longer assembly times than a mix containing HRP150.

The Wood

All data for assembly time, pressing time and time to full water resistance refers to production using Norway Spruce (*Picea abies*). However, Aerodux 185 can be used for a wide range of species. For details please contact TS Resins Ltd. Technical Services department.

To ensure optimum bond quality when producing laminated timber structures or finger jointing according to EN14080:2013 the lamellas should be freshly planed or profiled and the moisture content of the wood should be between 6 and 15%, with a maximum difference in moisture content between the lamellas of 5%. For other gluing operations, satisfactory results may be obtained when the moisture content of the surfaces to be bonded is within the range 4 – 25%.



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Preparation of the Glue-Mix

Prior to mixing, the mixing and application equipment must be clean. The mixing ratios are given in the table below.

	pbw
Aerodux 185	100
Hardener HRP150 or HRP155	20

Add the hardener to the adhesive and mix until the hardener is fully dispersed. Then add any filler, if required, stirring it thoroughly into the adhesive-hardener mixture. The use of automatic metering/mixing equipment is recommended for mixing Aerodux 185 with the hardeners.

Use of Extenders

Wood flour or some mineral fillers may be added, according to the table below, to increase the viscosity of the glue-mix.

	Lightly Filled Mix	Heavily Filled Mix
Aerodux 185	100	100
HRP Hardener	20	20
China Clay	≤ 30	100
Water	≤ 10	≤ 10

The lightly filled mix with HRP155 still complies with the requirements of EN314 – Class 3 (WBP) and EN301:2013. 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 reinforced boards, and where maximum strength and full weatherproof properties are not required.

Pot Life

Adhesive 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 *ie* how long the glue-mix remains usable. The higher the temperature, the shorter the pot life will be.



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The below table shows the pot lives with HRP155. For HRP150, the pot lives will be somewhat shorter.

Temperature of Mixture	10°C	15°C	20°C	25°C	30°C
Pot life (Hours)	8	5	3	2	1

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. When bonding smooth, dense surfaces, except expanded plastics and mineral fibre reinforced boards, they should be thoroughly sanded.

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 levels by some water-borne preservatives, and may need to be reduced prior to gluing. For gluing of load-bearing timber structures with preservative treated wood a special approval is required. Further advice on gluing of preservative treated timber is available on request.

Fire Retardant Treated Materials

When bonding fire retardant grades of wood based materials such as MDF or particleboard, it is possible that the treatment will affect the cure of the Aerodux 185 adhesive. Advice on the bonding of fire retardant timber is available on request.

Glue Spread

In the manufacture of laminated timber structures, the adhesive should be applied to one surface only, at a spread rate of 200 – 500 g/m² if a ribbon spreader is used, and at a rate of 100 – 250 g/m² (applied to both surfaces) if a roller spreader is used. Application to both surfaces can be advantageous when bonding difficult-to-bond woods, or for other special applications.

A lower glue spread can be sufficient, depending on production technique, planing quality, required assembly time and press method. This should only be done after seeking technical advice from TS Resins Ltd.



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EN14080:2013 requires that the application method used in finger jointing shall ensure that all finger surfaces are covered with the adhesive. To ensure satisfactory glue coverage, application of glue to both members to be jointed is recommended. The glue spread may be to only one member if it is documented that the requirement is fulfilled.

Assembly Time

Assembly time is the time elapsing between glue application and pressure application. It can be subdivided into open assembly time (from glue application until assembly of adherents) and closed assembly time (from assembly until pressure is established).

Open assembly time should be kept as short as possible, and should not exceed 5 minutes. On the other hand, 5 – 15 minutes closed assembly time is beneficial when bonding softwood. For the gluing of hardwood and dense materials, longer assembly times may be required. For details, please contact TS Resins Ltd Technical Service department.

Maximum closed assembly time depends on the glue spread rate, wood species, temperature and moisture content of the wood, temperature, relative humidity and air circulation within the workshop. The lower the spread rate, the higher the temperature and the drier the air, the shorter the assembly time will be. Provided the lamellas are assembled immediately after glue application, the maximum assembly times with hardener HRP155 are stated in the table below. For HRP150, the assembly times will be somewhat shorter.

Hardener	Temperature (at 65% RH)	Assembly Time (350g/m ²)	Assembly Time (450g/m ²)
HRP155	10°C	120 minutes	150 minutes
	15°C	60 minutes	90 minutes
	20°C	45 minutes	60 minutes
	25°C	20 minutes	30 minutes
	30°C	10 minutes	15 minutes

This applies to softwood. 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.



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Pressure

The pressure is dependent on the wood species (softwood or hardwood), and 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, 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 5 – 8 N/mm² will be sufficient for finger joints over 25mm in length. For shorter joints, an end pressure of 8 – 12 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.

Pressing Times

a) Cold and Hot Bonding

The minimum pressing times for gluing of softwood with hardener HRP155 are stated in the table below.

Glue Line Temperature	10°C	15°C	20°C	25°C	30°C	40°C
Pressing Time (minutes)	720	360	240	180	135	60

Glue Line Temperature	50°C	60°C	70°C	80°C	90°C	100°C
Pressing Time (minutes)	30	10	6	3	2	1

For dense or high moisture content woods or panel products, such as MDF and moisture resistant particleboard, where a component is impermeable or if the joint is liable to be strained immediately after removal of pressure (eg as in the manufacture of curved laminated beams) the above times should be increased. Aerodux 185 will continue to gain full strength, but full water resistant properties are developed only after several days.

The above pressing times should be used as a guideline.



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Heat Penetration

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

Distance to the glue line	Heat Penetration Time (Minutes per mm distance to the glue line)				
	80°C	90°C	100°C	110°C	120°C
< 5mm	1.2	1.0	0.9	0.8	0.8
5 – 10mm	1.7	1.4	1.2	1.1	1.0
>10mm	2.0	1.7	1.4	1.3	1.2

b) Radio Frequency Heating

Aerodux 185 is well suited for curing under radio frequency heating conditions. Since the necessary pressing times depend on a number of factors, such as the shape of the adherents, the position of the electrodes, the effect of the generator *etc.* it is recommended to optimise the pressing times by trials.

Our Technical Services Department can advise on establishing press times and how to make glue line temperature measurements when radio frequency heating is employed. A typical glue line temperature will be in the range 60 – 80°C, but it can be higher or lower, depending on the type and setting of the press.

Cleaning

The mixing and spreading equipment must be cleaned at the end of the working day. If the glue thickens in the application equipment it must be immediately emptied and cleaned. 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 the safe handling of glue remainders and was water can be found in our Technical Information Leaflet No. 2E, “Glue Waste Disposal – Prevention of Pollution”.



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Safety Precautions

Reference is made to the Safety Data Sheet for Aerodux 185 and hardeners HRP150 and HRP155.

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

When handling the adhesive, the hardener and the glue mix, it is recommended that certain precautions normally taken when handling chemicals are 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 should be worn where there is a risk of splashes. Hands and forearms 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

The manufacture of laminated timber structures is normally subject to control procedures implemented by the authorities or other regulatory bodies. 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 in this Data Sheet. In such cases the manufacturer must obey the applicable regulations.



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Caution

TS Resins adhesives and hardeners are generally quite harmless to handle provided that certain precautions normally taken when handling chemicals are observed. The uncured materials must not, for instance, be allowed to come into contact with foodstuffs or food utensils, and measures should be taken to prevent the uncured materials from coming into contact with the skin, since people with particularly sensitive skin may be affected. The wearing of impervious rubber or plastic gloves will normally be necessary; likewise the use of eye protection. The skin should be thoroughly cleansed at the end of each working period by washing with soap and warm water. The use of solvents is to be avoided. Disposable paper – non cloth – towels should be used to dry the skin. Adequate ventilation of the working area is recommended. These precautions are described in greater detail in Material Safety Data sheets for the individual product. These are available on request and should be referred to for fuller information.

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, which may result from the use of our products. The information provided were believed to be accurate at the time of preparation, or obtained from sources believed to be generally reliable. However, TS Resins Ltd makes no warranty concerning their accuracy, and TS Resins Ltd will not be liable for claims relating to any party's use of or reliance on information or recommendations contained herein, regardless of whether it is claimed that the information or recommendations are inaccurate, incomplete or otherwise misleading. Further, TS Resins Ltd makes no warranty concerning any product, except that the product shall conform to contracted specifications.

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