Technical Data Sheet

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Prefere 4114

Liquid, urea adhesive for a variety of wood bonding applications

Use

Prefere 4114 is a liquid urea adhesive that is used in combination with the following liquid hardeners:

- Prefere 5219
- Prefere 5267
- Prefere 5268
- Prefere 5269
- Prefere 5270
- Prefere 5275
- Prefere 5278
- Prefere 5232

The adhesive systems with the above hardeners can be used for a wide range of applications within the wood industry, such as veneering, form pressing, doors, board-on-frame *etc*. Glue mixes prepared with Prefere 4114 and the above hardeners are suitable for hot bonding, as well as for bonding under radio-frequency heating conditions.

The choice of hardener to be used with Prefere 4114 depends on required operating conditions, such as glue mix, pot life and reactivity. However, other factors may also affect the choice of hardener, for example, the glue-ability of the adherends, environmental requirements and special operating conditions *e.g.* automatic adhesive/hardener mixer, separate application equipment, radio frequency heating *etc*.

The hardeners for use with Prefere 4114 will give varying reactivity and bonding properties. Although the pot life and curing times of Prefere 5219, 5269 and 5270 are relatively similar, they are still different with respect to application.

Prefere 4114 with hardener Prefere 5219 has been independently tested by Eurofins, and meets the requirements of the “Indoor Air Comfort” certification program.

Prefere 4114 with hardeners Prefere 5267 and Prefere 5268 gives improved wetting properties for wood bonding applications.

Prefere 4114 with Prefere 5219 can give glue lines of durability class C3 according to EN 12765/205 and MR quality according to EN 314.

Technical data for the adhesive

	Prefere 4114
Appearance	Yellowish, viscous liquid
Solids Content, %	69.0 – 71.0
Viscosity at 20°C, mPas *	3500 – 5000
Viscosity at 25°C, mPas *	2300 – 4000
pH at 25°C	8.0 – 8.6
Density at 25°C, g/cm^3	1.29 – 1.31

** The viscosity is measured by Brookfield, RVT, spindle 2 at 20rpm.*

Technical data for the hardeners

Prefere	5219	5270	5275	5278
Appearance	Greyish-white liquid			
Shelf life at 20°C	3 months			
Viscosity at 25°C, mPas *	1800 - 4000	1800 - 4000	1500 - 5000	1500 – 5000
pH at 25°C	2.7 – 3.3	2.8 – 3.5	3.4 – 4.0	4.0 – 4.5
Density at 25°C, g/cm^3	1.31 – 1.33	1.29 – 1.31	1.24 – 1.26	1.24 – 1.26

Prefere	5267	5268	5269	5232
Appearance	Greyish-white liquid			
Shelf life at 20°C	3 months			
Viscosity at 25°C, mPas *	1500 - 5000	1500 - 5000	1800 - 4000	1700 – 5000
pH at 25°C	3.4 – 4.0	4.0 – 4.5	2.8 – 3.5	2.5 – 3.2
Density at 25°C, g/cm^3	1.24 – 1.26	1.24 – 1.26	1.29 – 1.31	1.40 – 1.42

** The viscosity is measured by Brookfield, RVT, spindle 2 at 20rpm.*

Delivery form

Prefere 4114 and the respective hardeners can be delivered in bulk, IBCs or drums.

Storage of the adhesive

The viscosity of Prefere 4114 increases during storage and may eventually become so high that the adhesive is no longer usable. The shelf life is shorter at higher storage temperatures.

The storage stability of Prefere 4114 from the date of production is given in the following table for different storage temperatures.

Temperature, °C	15	20	25	30
Storage stability, months	4	3	2	1

Although the shelf life of Prefere 4114 is longer at low temperatures, cold adhesive will be higher in viscosity and can be difficult to pump. Optimal storage temperature is therefore 15-20°C. Diluting adhesive that has been stored too long or at too low a temperature with water should be avoided. Instead it is recommended to store it for a few days at 20 – 25°C prior to use.

Prefere 4114 is not flammable.

Storage of the hardeners

Under no circumstances should the hardeners be stored at temperatures below 10°C. It is also recommended to store the hardeners below 20°C. Higher storage temperatures may reduce the shelf life of the product.

Storage temperatures above 25°C are not recommended.

The wood

The wood to be bonded must be of uniform thickness. The surfaces must be free from oil, fat, dust or other deposits.

The adhesive system gives the highest bond strength when the moisture content of the wood is 4-8%. Acceptable bond strength can still be obtained at even higher moisture content.

Mixing ratio

The hardeners are mixed with Prefere 4114 in a ratio of 100:20 parts by weight (pbw).

The hardener Prefere 5232 is used in a ratio of 100:25 parts by weight (pbw).

It is warned against changing the hardener dosage, *e.g.* to obtain a longer pot life or shorter pressing time. The correct hardener dosage is important, for several reasons. If the glue mixture is not suitable, our Technical Department will be able to recommend an alternative.

Pot life

The pot life of glue mixtures made with Prefere 4114 and the Prefere hardeners, at different temperatures, are given in the table below.

Prefere	Pot life in hours at				
	10°C	15°C	20°C	25°C	30°C
5219	5	3¼	1¾	¾	-
5267	20	10	5	2½	¾
5268	>24	16	8	4	1¾
5269	5½	3½	1¾	¾	-
5270	5½	3½	1¾	¾	-
5275	20	10	5	2½	¾
5278	>24	16	8	4	1¾
5232	3½	-	1	½	-

Glue spread

The glue spread rate depends on the surface of the adherends. Typical glue spread for most applications is 100 – 180 g/m^2. On very smooth surfaces (*eg* medium density fibreboard) lower glue spreads may be used. On the other hand, on rough veneer surfaces, higher glue spreads may be required.

Assembly times

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 the adherends) and closed assembly time (from assembly of adherends until pressure is established).

By varying the assembly time certain enhancements can be achieved, such as reduced wood penetration, improved anchoring of the adhesive into the wood *etc*. However, the pressure must be applied whilst the glue mix is still tacky.

The maximum assembly time depends on the hardener used, glue spread rate, temperature, relative humidity and the velocity of the airflow (ventilation, draught). Hence, exact figures cannot be given. If a fast curing hardener is used, the risk of pre-cure must be taken into consideration.

Pressure

The required bonding pressure is determined by the density, surface evenness and thickness tolerance of the adherends, as well as the assembly time. Glue being squeezed out of the glue line when the pressure is applied is an indication of sufficient pressure.

Normal pressure should be in the range 0.3 – 1.6 N/mm^2 (3 – 16 kp/cm^2), depending on the type of bonding operation and the materials to be bonded.

Pressing properties

The pressing times of Prefere 4114 with different hardeners, at different temperatures, are given in the table below.

Prefere	Setting time in seconds at				
	70°C	80°C	90°C	100°C	110°C
5219	85	55	40	35	30
5267	255	150	85	60	45
5268	370	160	90	65	45
5269	100	60	40	35	30
5270	100	60	40	30	30
5275	255	150	85	60	45
5278	370	160	90	65	45
5232	85	50	40	-	-

The pressing times (basic setting times) stated refer to glue line temperature only and allowance must be made for the heat to travel from the press platens. The heat penetration time will vary depending on press temperature, the heat capacity of the press, the heat transfer of the wood material and distance to the farthest glue line.

When veneering with veneer thicknesses below 1mm, the heat transfer at temperatures above 100°C can be calculated to be 1-2 seconds per 0.1mm veneer thickness. For other applications the table below can be used as a guide to the additional time required for low and medium density timbers.

Press temperature	Additional time per mm distance to furthest glue line
70-80°C	2 minutes
90-100°C	1 minute

Because so many local conditions affect the pressing times, it is recommended to establish the correct pressing times by running trials using the customer's own equipment.

Radio frequency heating conditions vary considerably, depending on many factors, such as voltage and frequency of the generator, the electrical properties of the adherends and the size of the adherends, so even approximate pressing times cannot be stated. Thus, pressing times should be established by conducting trials using the local conditions at the customer's site. In RF presses, the pressing time can vary from approximately 20 seconds (with high-effect generators) to a few minutes, depending on the mass of the adherends and the choice of hardener.

Cleaning

Mixing and application equipment should be cleaned at the end of the working day. If the glue mix thickens in the application equipment, the equipment must immediately be emptied and cleaned, otherwise there is a risk that the glue will cure. Cured glue is insoluble and must be scraped off.

The equipment is most easily cleaned with lukewarm water (30-50°C).

Adhesives are potential pollutants. Glue remainders and untreated wash water may not typically be discharged into public drains or water-courses, unless a permit has been obtained from the appropriate authorities. Advice on safe handling of glue remainders and waste water can be found in our Technical Information Leaflet No. 2E, "Glue waste disposal – Pollution prevention".

Safety precautions

Reference is made to the relevant Material Safety Data Sheets for Prefere 4114 and hardeners Prefere 5219, 5267, 5268, 5269, 5270, 5275, 5278 and 5232.

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 the hardener. The free formaldehyde content of the adhesive will be reduced. The acid/salt concentration of the hardener will be diluted.

When handling the adhesive, 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 and eye protection where there is a risk of splashes. Hands and forearms should be thoroughly washed with soap and warm water at the end of a working day.

Adequate ventilation of the workshops should be maintained.

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 are beyond our control, we cannot assume responsibility for any risks or liabilities, which may result from the use of our products. The information provided was 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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