Anspruch verbindet

Press Release

One component polyurethane sole adhesive without isocyanate

PLASTOCOLL D 3000

Within the progress of development of water-based polyurethane sole attachment adhesives, due to legal charges which have loomed since over 10 years, Wakol has made many times the top in qualities available on the market.

During this development period, the high technical requirements of the shoe industry concerning sole adhesives as well as the environmental requirements of the legislator and the market have been observed. The growing demand of the market for a one component water based adhesive system has Wakol not left surprised. The advantages compared to a two component system are obvious:

- mixing not necessary
- no limited potlife
- less adhesive waste
- less cleaning
- less interruptions in the production process
- higher processability

Technology

The development of PLASTOCOLL D 3000, one component (crosslinkable) polyurethane adhesive, incorporated, from a manufacturing point of view, additional requirements towards equipment and process control. Manufacturing of the Polymer matrix has been enabled through investments in most sophisticated mixing technologies.

The development of a one component polyurethane adhesive is definitely not anything completely new on the market. However, so far there are only alternative crosslinking products based on aromatic Isocyanate (f.e. Toluylene-Di-Isocyanate = TDI) available.

As opposed to the conventional crosslinking systems, which are present as sterical hindered, blocked or disguised additives next to the polymer matrix, the hardener system of PLASTOCOLL D 3000 has been connected with the polymer matrix. Free functional groups will lead to the desired raise in cohesion, heat-, and hydrolysis resistance by crosslinking the polymer chains after application and reactivation of the adhesive film.

With this sophisticated crosslinking system (two in one crosslinker), a reliable one component sole adhesive with an excellent shelf life and processability has been developed. Depending on TRGS 430, attachment 6, this crosslinker may be considered as an alternative for Isocyanate which means that PLASTOCOLL D 3000 is free of Isocyanate; an important contribution for improving work place hygiene.

Application

But furthermore during processing, the strength of PLASTOCOLL D 3000 is proven. In cooperation with well-known sole manufacturers, the wetting properties of PLASTOCOLL D 3000 have been adjusted for the application on various sole materials.

In the adhesives technology, the dependencies between surface tension of adhesives and the material to be bonded are widely known. Which means that an important aspect in obtaining a sufficient adhesion and a strong bond are the polaric and the disperse portions of the substrate as well as the wetting properties of the adhesive.

Generally water based systems are here succumbed by solvent based adhesives because of the relatively high surface tension. Even the well known and proven chemical pretreatment systems like for example certain primers and halogenating agents or physical/chemical methods like coronary treatment may not equalize this disadvantage easily. Solvent based systems are furthermore able to partially dissolve certain substrates which may be favourable for the adhesion of soles.

PLASTOCOLL D 3000 has been endowed with special wetting agents in order to counteract this process whereas compared to the well approved solvent based adhesives; an adequate adhesion is reached with the most widely used sole and leather materials.

It has been paid high attention to the very good stability of the adhesive in order to avoid problems during the manufacturing process (for example creation of foam and/or coagulation).

The mechanical application of PLASTOCOLL D 3000 has been further optimized with especially constructed application brushes (see information box below).

After extensive lab testing (verification phase), PLASTOCOLL D 3000 has been presented and tested at well-known shoe and shoe machinery manufacturers. The technical requirements have been fulfilled through a several day placement in the production (validation phase). PLASTOCOLL D 3000 has absolutely convinced notable shoe producers.

In the meantime, PLASTOCOLL D 3000 has successfully being introduced.

The precoating of sole materials within a group of linked production facilities or suppliers of soles is another criteria for the use of a sole adhesive whereas generally solvent based adhesives without hardener are in use. Experts are still discussing the question whether and if a vertical crosslinking in the bordering areas of the upper material (two component adhesive application) and sole (one component adhesive application) takes place or if it is sufficient.

PLASTOCOLL D 3000 is very much suitable for precoating. Trials have shown that precoated soles may generally be stored for over 6 weeks. The advantage compared to one of the above mentioned bonding systems is that both substrates (sole and upper material) contain a crosslinking component.

Ecological advantages

PLASTOCOLL D 3000 supports the shoe industry in fulfilling the VOC law 1999/13/EG which regulates the reduction of VOC (volatile organic compound) per pair of shoes until 2005 to 37,5 g and until 2007 to 25 g. These values may be reached through substitution of the proven solvent based sole adhesives which generally contain 82% to 85% VOC. This is under the condition that upper materials are already widely bonded with water based adhesives which means that the use of latex adhesives or hot sealing polymer dispersions for lamination of various leather and textile material is given.

Fundamentals to the VOC guidelines

With article 1 of the regulations for implementing the guideline 1999/13/EG about the limitation of volatile organic compounds (VOC) of August 21, 2001, the 31st statutory order for the realization of the Federal Emission Protection Law (BImSchG) has been implemented.

With this new guideline, it is intended to limit the emission of volatile organic compounds when using organic solvents in certain installations and production processes, for example in the shoe production.

In the concerned installations and their activities, the state of the art of the reduction of emissions must be observed. Organic chemical substances with a vapour pressure of >0,01 KPa at a temperature of 20°C and others with a correspondent volatility under theses processing conditions are considered als volatile organic compounds (VOC). The boiling point is 250°C at the most.

Goal of the regulation:

- protection of human resources at their work place
- protection of neighbourhood
- protection of ground level atmosphere of our earth

This means for the manufacturing of shoes that the total emission value will be 25 g beginning the 1st of January 2007 (specified in gram of emitted solvent per pair of shoes). From the 1st of January 2005, the set point value will be 37.5 g (f = 1.5 x set point value of emissions).

Saving potential

Considering all cost optimizing effects of PLASTOCOLL D 3000 (> 40 % solid contents), the efficiency of the product is almost comparable with a conventional solvent based adhesive system.

Adhesive consumption

- approx. 5-12 g / pair with PLASTOCOLL D 3000 compare to approx. 15-30 g / pair with a conventional solvent based adhesive.

one component processing

- no mixing
- no transgression of pot life and therefore no loss of adhesive

- minimal cleaning of the machines
- no use of an expensive detergent (solvent)

very good wetting properties respectively penetration capabilities

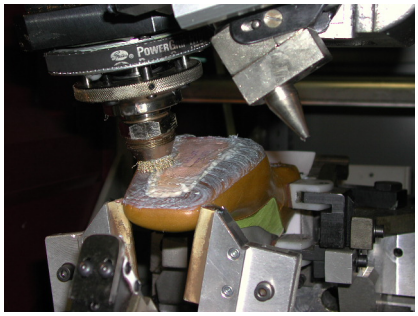
- partially avoiding a precoat

smooth production process

- continuing production process (no waiting times)

no dangerous good

- no explosion protection necessary (storing, manufacturing)
- less transport charges
- less costs for regular medical examination of the work force



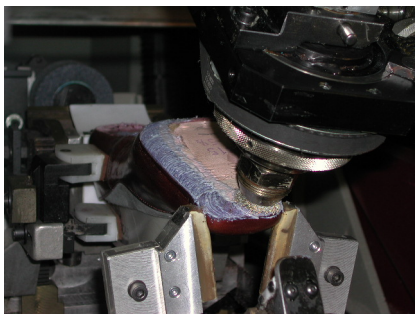
The mechanical application of water based sole adhesive has often caused problems in the manufacturing process compared to conventional solvent based adhesives. They have caused astringencies in the production machinery, inadequate wetting and inprecise application over a longer period of time.

The processing properties of PLASTOCOLL D 3000 have been adapted to the markets demands through its sophisticated formulation in terms of viscosity, rheology and stability.

During the market introduction however it was obvious that the application brushes available on the market may only be used for a very short period of time. This is caused by the water absorption within a very short time and will lead already after a few hours in an instability of the bristles. A precise application is not possible anymore. The consequence is that the production process must be interrupted within relatively short time intervals in order to exchange the application brushes (time and cost factor).

Especially for the machine application of water based adhesives – and more important of sole adhesives – Wakol has developed a special application brush which enables a reliable application over a period of several days.

For this system, a patent is pending at the Munich Patent Office.



Anspruch verbindet

Wakol GmbH
Bottenbacher Straße 30
66954 Pirmasens
Tel.: 0 63 31 / 80 01 - 131
Fax: 0 63 31 / 80 01 - 890