Dispercoll C

Polychloroprene dispersions for solvent-free adhesive systems

Bayer Polymers

1. Description 5

2. Property spectrum 6

3. Product range 7

4. Applications 8

5. Formulation of adhesives 9

5.1 Polymer combinations 9

5.2 Emulsifiers 9

5.3 Zinc oxide 9

5.4 Resins 10

5.5 Thickeners 11

5.6 Coagulants 12

5.7 Crosslinking agents 12

5.8 Adhesive production 13

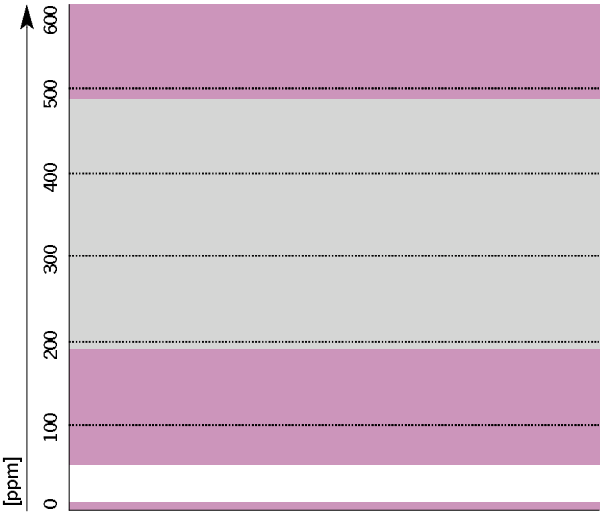
6. Additional product information 14

1. Dispercoll® C Description

Dispercoll® C are aqueous, colloidal dispersions of polychloroprene, produced by emulsion polymerization. Because of their broad property spectrum, they are ideal for formulating contact adhesives.

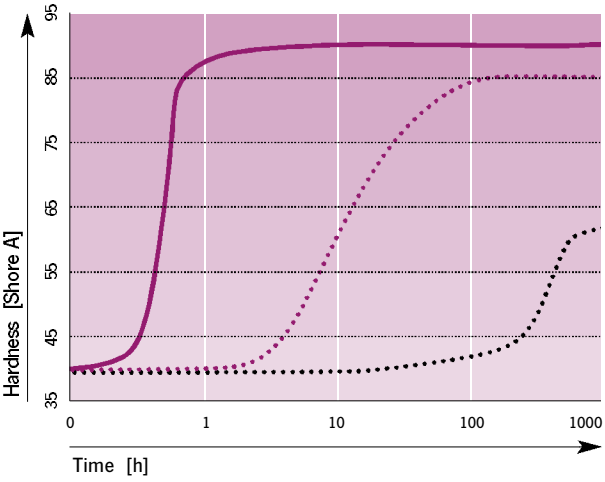
2. Dispercoll® C Property spectrum

Fig. 1: Residual chloroprene monomer level in the dispersions



Dispercoll® C
Competitive products

Fig. 2: Crystallization of Dispercoll® C grades at –5 °C (dry film)



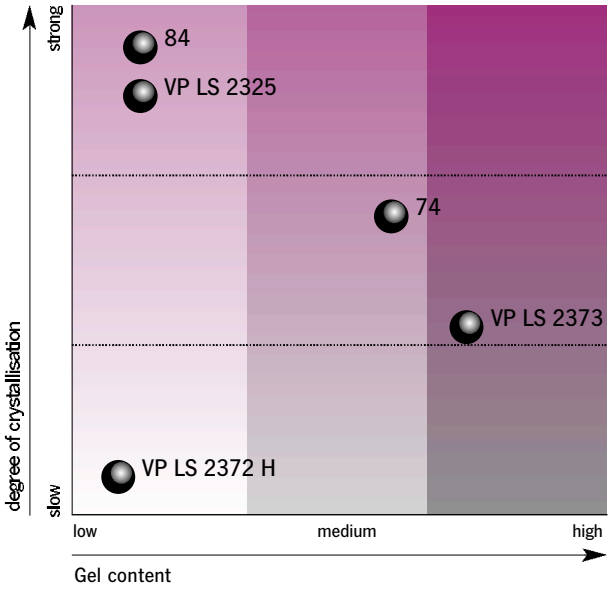
84
74
VP LS 2372 H

Dispercoll® C is noted for its low residual monomer level.

Three of the outstanding properties of Dispercoll® C-based adhesives are:
· their long open times
· their excellent initial adhesion, plus
· their rapid strength build-up.

As far as their overall properties are concerned, adhesive films of Dispercoll® C largely correspond to those of solvent-borne Baypren® adhesives, but have a number of additional advantages:
· freedom from combustible, environmentally unfriendly solvents
· production of flexible bonds
· good resistance to moisture, oil and chemicals.

Fig. 3: Crystallization and gel content of the Dispercoll® C products



The polymers of Dispercoll® C differ essentially in their crystallization rate and their thermoplasticity.

By mixing together different grades, the strength and hardness of a bond can be individually adjusted.

Dispercoll® C	74	84	VP LS 2325	VP LS 2372 H	VP LS 2373
Emulsifier	anionic	anionic	anionic	anionic	anionic
Solids %	approx. 58	approx. 55	approx. 55	approx. 58	approx. 58
pH	approx. 13	approx. 13	approx. 12	approx. 13	approx. 13
Crystallization	medium	strong	strong	slow	medium

Fig. 4: Heat-resistant bonding of wood and Resopal

Fig. 5: Reliable bonding of toe caps and shoe insoles

Dispercoll® C is suitable as a raw material for the production of adhesives for the foot-wear, building, furniture, mattress and automotive industries. Such adhesives can be used for bonding a wide variety of different materials (wood, cork, leather, fabric, plastics, foams, metal etc.). The adhesives are used both in contact bonding and in spray-mix processes.

5.1 Polymer combinations

The various products of the Dispercoll® C range can be mixed with one another in any ratio in order to obtain the most suitable properties for the respective application. In particular, it is the crystallization rate, gel content (heat stability), contactability and hardness of the adhesive film that are affected by the particular combination.

5.2 Emulsifiers

Emulsifiers are used in the production of adhesives to attain additional stabilization or to convert liquid, water-insoluble chemicals (such as certain antioxidants or plasticizers) into emulsions so that they can be added in this form to the latex. Through excessive stability of the adhesive mixture, coagulation – which is desirable, for example, in the wet bonding process – may be negatively affected. Care must be taken to ensure that the emulsifiers do not impair the bonding properties of the adhesive film by migrating to the surface.

Anionic emulsifiers are, for example, alkali salts of long-chain fatty acids and alkyl and alkylaryl sulfonic acids. The product Baykanol PQ, for example, belongs to this class of emulsifiers.

Nonionic emulsifiers are mainly condensation products from long-chain alcohols, phenols or fatty acids with alkylene oxides, predominantly ethylene oxide. Alkylaryl polyglycol ethers are also highly effective emulsifiers, with Emulvin W being a particularly good example. Emulvin W is noted for its outstanding stabilization effect on exposure to chemical and mechanical influences.

5.3 Zinc oxide

Zinc oxide is used as an acceptor for the small quantities of hydrogen chloride split off from polymers, and should be added as a dispersion in a quantity of 4-6 parts by weight (calculated on the polymer).
Not stabilizing the product in this way may lead to inferior bonding and damage the surrounding substrate.

5.4 Resins

In order to give the adhesives the necessary properties for the various applications, it is usual to incorporate terpene, terpene phenol or coumarone-indene resins, as well as rosin ester or pentaerythritol ester. In addition, certain acrylic dispersions can also be used as formulating components for Dispercoll® C. Resins influence above all the adhesion, open time, tack and heat resistance of the final formulations. As a rule, 30-60 parts of resin are added per 100 parts polymer. Attention has to be paid in particular to the pH and the compatibility of the various emulsifier systems.
Polychloroprene has adequate resistance without the addition of antioxidants, but if the adhesives do contain any resins that are sensitive to oxidation, an antioxidant should be added to prevent the risk of embrittlement of the adhesive layer. Rhenofit DDA 50 EM has proved particularly suitable for this purpose.

Fig. 6: Heat resistance of formulations with Dispercoll® C 84 and different resins
Substrate: Nora rubber in the shear test

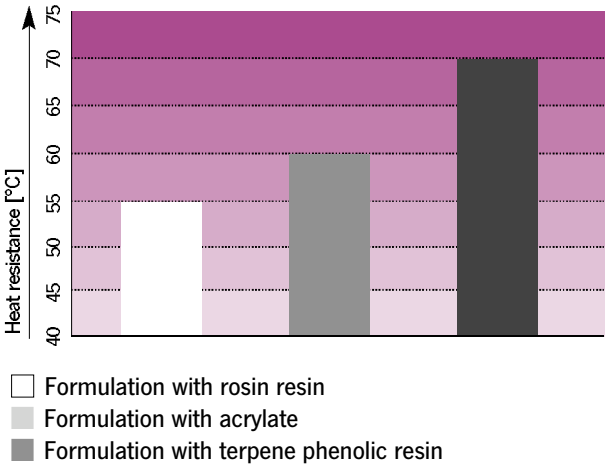


Fig. 7: Heat resistance of formulation with Dispercoll® C 84 with and without Desmodur® VP LS 2150/1
Substrate: wood-Resopal in the shear test

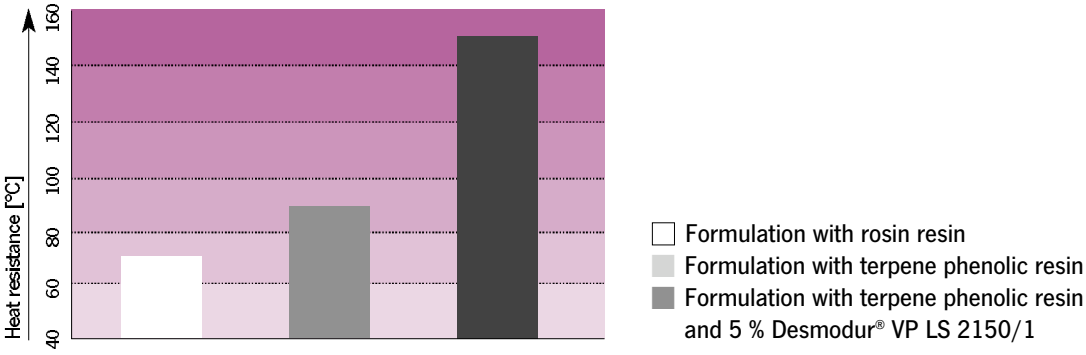
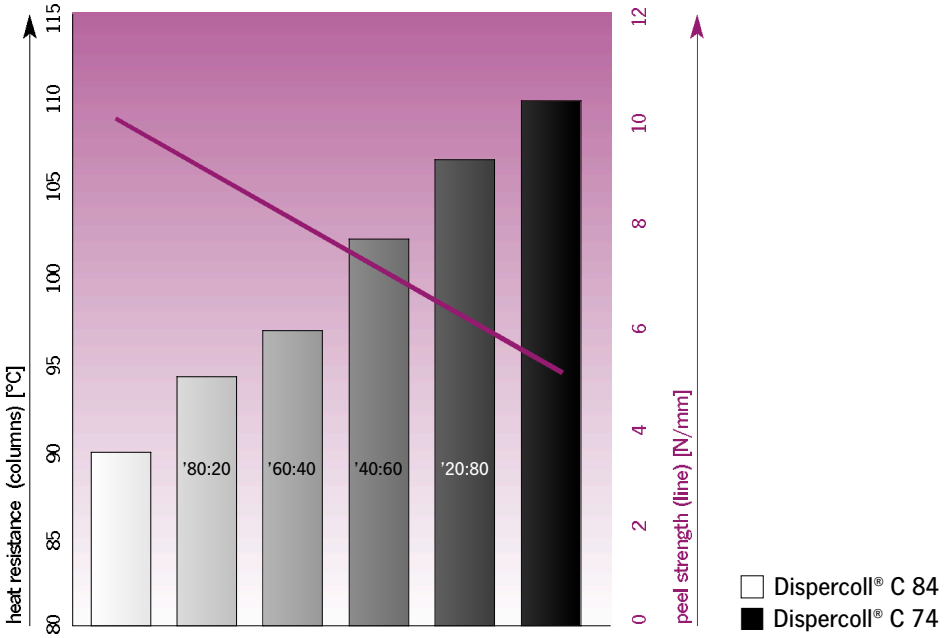


Fig. 8: Heat resistance and peel strength of formulations with Dispercoll® C 74 and C 84 in different ratios with terpene phenolic resin
Heat resistance – substrate: wood-Resopal in the shear test
Peel strength – substrate: Nora rubber in the shear test



5.5 Thickeners

It is sometimes necessary to increase the viscosity of the adhesives to improve their workability. Polyacrylates, methyl cellulose, alginates or polyurethane thickeners can, for example, be used for this purpose. Particular attention has to be paid to fluctuations in pH when thickening ready-to-use formulations.
With their special properties nano-thickeners based on silicate are suitable. With the addition of zinc oxide (Borchers VP 9802) these form a silica gel which allows viscosities up to the paste range.
Dispercoll® S improves processability and increases green strength and heat resistance, including in the wet bonding process. The thickening properties are dependent on the particle size selected and the amount of product used.

Dispercoll® S:

Dispercoll® S Grade	Concentration [%]	Density [g/cm³]	Specific surface [m²/g]	Size [nm]
Dispercoll® S 5005	50	1.39	50	55
Dispercoll® S 4510	45	1.34	100	30
Dispercoll® S 4020	40	1.295	200	15
Dispercoll® S 3030	30	1.208	300	9

5.6 Coagulants

In the so-called spray-mix process, which is used primarily in the plastic foam processing industry, a coagulant is added to the adhesive dispersion during spraying, which leads to spontaneous coagulation of the latex particles. This enables immediate bonding of the substrates with exceptionally high initial strength. The coagulants used for this purpose are electrolytes such as carboxylic acids (e.g. lactic acid, citric acid) or salts of multivalent metal ions (e.g. calcium chloride, calcium nitrate, zinc sulfate or aluminum sulfate).
If acidic cogaulants are used, care must be taken to ensure adequate stabilization against the splitting-off of hydrogen chloride.

5.7 Crosslinking agents

A typical application for polychloroprene adhesives is in contact adhesives. The flow properties needed to produce a good bond (coalescence) of the surfaces call for uncrosslinked polymers with a relatively low molecular weight. The use of isocyanates allows – in contrast to vulcanization – a crosslinking reaction to take place at room temperature within a relatively short time.

Desmodur® VP LS 2150/1 is an ideal isocyanate for use in adhesives based on Dispercoll® C, as it gives the bonds outstanding strength and heat resistance.

As an aqueous suspension, this isocyanate can be easily stirred into the adhesive formulation. Even in an alkaline medium, it guarantees adequate potlife and sufficiently long open times.

In the formulation of adhesive dispersions based on polychloroprene, the order of adding the individual components is very important. Apart from this, care has to be taken that the pH of the formulation remains alkaline, otherwise coagulation of the mixture can occur. Acid formulating components must be at least neutralized before addition.

5.8 Adhesive production

Starting formulation for producing an adhesive based on Dispercoll® C:

Product	Function	Solids (%)	pbw
Dispercoll® C	polymer	55	100
Rhenofit DDA 50 EM	antioxidant	50	2
Emulvin W	emulsifier	20	2
Borchers VP 9802	ZnO as acid trap	50	4
Resin	tackifier	50	30 – 60

The usual sequence of adding the ingredients is:
latex, defoamer – if needed – emulsifier, antioxidant, metal oxide paste, resin emulsion, wetting agent, thickener etc.
Crosslinking agent Desmodur® VP LS 2150/1 (immediately before application).

6. Dispercoll® C Additional product information

Product safety

When handling Dispercoll® C, the information given in the safety data sheet must be observed. If adhesives containing Dispercoll® C are applied by spraying, care must be taken to ensure that nobody comes into contact with the spray mists.

Forms of supply

Dispercoll® C is supplied in 125 l drums, 1,000 kg non-returnable containers and tankers.

Storage

In the original sealed container, Dispercoll® C has a shelf life of six months at 23 °C from the date when it leaves the production plant. Temperatures above 30 °C should be avoided. The product is sensitive to frost and should not be stored at temperatures below 5 °C. Frozen Dispercoll® C is irreversibly damaged. The containers must be kept tightly sealed and protected from the sun, otherwise a non-redispersible polymer film forms through water evaporation.

Disposal

Unusable product residues should be disposed of in an incinerator in accordance with local regulations. Plastic dispersions are regarded as particularly in need of monitoring.

Adhesive raw materials from Bayer

Nowadays, it is difficult to imagine the application-oriented and cost-effective manufacture of advanced adhesives without the use of Bayer products and technology.
Detailed research and continuous development programs have resulted in our adhesives raw materials deservedly becoming market leaders in many fields and have led to successful business partnerships all over the world.

Dispercoll®

Dispercoll® is the trade name for aqueous dispersions.

Dispercoll® grades

There are two distinct groups of Dispercoll® products: 1. Dispercoll® U contains a high molecular weight hydroxyl polyurethane polymer. 2. Dispercoll® C contains a polychloroprene polymer.

Dispercoll® adhesives

Adhesives based on Dispercoll® U grades are used in the footwear, furniture and automotive industries, where their outstanding adhesion to a large number of materials and high initial strength are such valuable assets. Dispercoll® C adhesives are distinguished by their long open times and high initial strength. They are used in the footwear, construction, furniture and foam-processing industries.

In addition to Dispercoll®, there is a wide range of other raw materials for adhesives:

Acclaim®

Acclaim® products are polyether polyols with an extremely low monool content.

Acclaim® grades

Acclaim® grades differ according to molecular weight and OH number.

Acclaim® adhesives and sealants

Acclaim® can be used in combination with Desmodur® to create high molecular weight polymers with very good physical and dynamic properties. Products based on Acclaim® are used in particular as sealants.

Baycoll®/Desmophen®

Baycoll® and Desmophen® products are standard polyester and polyether polyols.

Baycoll®/Desmophen® grades

Baycoll® and Desmophen® grades differ in their chemical structure, OH number and functionality.

Baycoll®/Desmophen® adhesives and sealants

Baycoll® and Desmophen® are used in combination with Desmodur®. The resulting bonds have excellent strength and stability and are therefore ideal for applications in the construction, packaging, automotive and furniture industries. Baycoll® and Desmophen® polyester polyols are distinguished by their excellent adhesion to a variety of materials, while adhesives based on Desmophen® polyether polyols are renowned for their low viscosity and higher stability.

Baypren®

Baypren® is a 2-chlorobutadiene-(1,3) polymer (polychloroprene) produced by the most up-to-date processes.

Baypren® grades

To enable the widely differing requirements of the adhesives industry to be fully met, the Baypren® range consists of grades with different crystallization rates and solution viscosities.

Baypren® adhesives

Adhesives based on Baypren® are distinguished by their long open times and high initial strength. They are sometimes combined with Desmodur® to form two-component adhesives. Baypren® adhesives have a very wide range of applications and have become indispensable in the footwear, furniture, construction and automotive industries and for DIY applications.

Butyl

Butyl is the trade name for copolymers of isobutylene, isoprene and divinyl benzene.

Butyl grades

The butyl grades differ in their crosslinking level. They are also available preformulated with filler and plasticizer.

Butyl adhesive

Adhesive sealants based on butyl are noted particularly for their water and gas impermeability, weather stability, ozone resistance and heat stability. They have excellent adhesion to glass, metal and many other materials. They can be mixed with large amounts of fillers and plasticizers and still retain their good elastomeric properties. Vulcanization with peroxide is possible. They are typically used in building, car production and the electrical industry.

Desmocoll®

Desmocoll® is the trade name for predominantly linear hydroxyl polyester polyurethanes.

Desmocoll® grades

Desmocoll® grades are manufactured with different solution viscosities, thermoplasticities and crystallization rates to ensure that the wide-ranging requirements of the adhesives industry can be met.

Desmocoll® adhesives

Adhesives based on Desmocoll® are manufactured by simply dissolving the Desmocoll® grade in suitable organic solvents. They have excellent adhesion to a large number of materials and many even adhere to plasticized PVC. The resulting bonds have outstanding resistance to plasticizers. Adhesives based on Desmocoll®, mostly in combination with Desmodur®, are used principally in the footwear, packaging, automotive, furniture and leather industries and for DIY applications.

Desmodur®

Desmodur® is the trade name for polyisocyanates.

Desmodur® grades

Desmodur® grades differ in their functionality and reactivity. They are supplied in both solventborne and solvent-free forms.

Adhesives with Desmodur®

Adhesives crosslinked with Desmodur® are distinguished by outstanding bond strength and high heat stability. They have excellent resistance to oil, grease and solvents. Tried-and-tested Desmodur® crosslinking agents considerably improve the adhesion of Baypren® and Desmocoll® to rubber materials. In addition, Desmodur® is also used in the manufacture of one- and two-component polyurethane adhesives.

Desmomelt®

Desmomelt® adhesive raw materials are linear, heat-activatable polyurethanes with terminal hydroxyl groups in solvent-free, carrier-free form based on crystallizing polyester polyols and aromatic diisocyanates.

Desmomelt® grades

Desmomelt® is available in granule form for extrusion or direct coating or in powder form for scatter coating and paste dot coating applications.

Desmomelt® adhesives

Desmomelt® granules are particularly suitable for the production of adhesive film and nonwovens or for direct coating by extrusion. Desmomelt® powder has been developed for direct adhesive application by the scatter coating method. Desmomelt®-based adhesive systems have excellent adhesion to a wide variety of materials, particularly also to plasticized PVC. Desmomelt® adhesive systems are used primarily in the footwear, automotive, furniture and bag-making industries.

Desmophen®

Desmophen® products are polyester or polyether polyols.

Desmophen® grades

Desmophen® grades differ in their chemical structure, their functionality and their OH number.

Desmophen® adhesives

Desmophen® is used in combination with Desmodur®. The resulting bonds have excellent strength and stability and are therefore ideal for applications in the construction, packaging, automotive and furniture industries. Desmophen® polyester polyols are distinguished by their excellent adhesion to a variety of materials, while adhesives based on Desmophen® polyether polyols are renowned for their low viscosity and higher stability.

Desmoseal®

Desmoseal® products are polyurethane prepolymers for sealants.

Desmoseal® grades

Desmoseal® grades differ in their chemical structure and crosslinking mechanism.

Desmoseal® sealants

Desmoseal® is used in sealant formulations that are distinguished by high mechanical stability, good adhesion and good resistance to aging.

Pergut®

Pergut® is Bayer's trade name for halogenated polyisoprene.

Pergut grades

The Pergut® grades differ in their solution viscosity measured in toluene.

Pergut® adhesives

Pergut® grades are used in adhesive formulations of Baypren® for increasing initial bond strength and heat stability. The main applications are in footwear, the furniture industry and DIY. Other applications are formulations for bonding elastomers with metals and other materials under vulcanizing conditions. The bonds have excellent ozone and weather resistance and exceptional heat stability. Pergut® has outstanding resistance to chemicals and good compatibility with other polymers and resins, which is why it is used in many adhesive formulations.

If you have any further questions
please contact:
info@bayeradhesivesandsealants.com
www. bayeradhesivesandsealants.com

Bayer AG
Bayer Polymers
Adhesives and Sealants
51368 Leverkusen, Germany
www.bayerpolymers.com

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