



(22) 1989/10/12

(43) 1990/04/13

(45) 2001/05/29

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(51) Int.Cl.<sup>5</sup> C09J 109/00, B32B 7/12

(30) 1988/10/13 (P 38 34 818.7) DE

(54) **ADHESIF ET PRODUIT D'ETANCHEITE A BASE DE  
CAOUTCHOUC ET PROCEDE D'APPLICATION**

(54) **ADHESIVE AND SEALING SUBSTANCE BASED ON RUBBER  
AND PROCESS FOR THE CONNECTION OR BONDING OF  
COMPONENTS OR STRUCTURAL PARTS**

(57) Adhesive and sealing substances based on rubber are disclosed which in addition to the usual components contain stereo-specific OH-terminated polybutadiene-liquid rubber as the main component and thus have an improved adhesion and an improved breaking behaviour. The adhesive and sealing substances disclosed are particularly suitable for use in car manufacture.

2000569

6. Oktober 1989  
P 25791 - Ka/Pa

ADHESIVE AND SEALING SUBSTANCE BASED ON RUBBER  
AND PROCESS FOR THE CONNECTION OR BONDING  
OF COMPONENTS OR STRUCTURAL PARTS

Abstract

Adhesive and sealing substances based on rubber are disclosed which in addition to the usual components contain stereo-specific OH-terminated polybutadiene-liquid rubber as the main component and thus have an improved adhesion and an improved breaking behaviour. The adhesive and sealing substances disclosed are particularly suitable for use in car manufacture.

The invention relates to low-viscosity adhesive and sealing substances based on rubber which are easily pumped at increased temperatures and which can be vulcanised with the usual crosslinking systems.

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Solvent-free adhesive and sealing substances based on rubber, which are particularly suitable for use in car manufacture, have been known for some time. An overview of the development in the area is provided by the explanations in the European Patent Specification 97 394 and the European Patent Application 256 316. However, these known adhesive and sealing substances were still not completely satisfactory, and therefore in EP-PS 97 394 the use of liquid polybutadiene which has at least 40 % of the unsaturation in the 1,4-configuration is proposed. Preferably, the liquid polybutadiene is mixed with small quantities of solid rubber, particularly solid polybutadiene.

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In the European Patent Application 256 316 it is, however, stated that even the adhesive and sealing substances known from EP-PS 97 394 still have considerable defects. It is therefore proposed that instead of solid rubbers such as solid polybutadiene one or more chemically irreversibly depolymerised solid rubbers of natural or synthetic origin are added in quantities of 1.5 to 5 % by weight. Thus the adhesives should show a better rheological behaviour. It has proved, however, to be the case that the adhesive and sealing materials according to the European Patent Application 256 316 not only have the disadvantage of the additional process step of depolymerisation but in addition, just as the adhesive and sealing substances known from EP-PS 97 394, still do not have optimal adhesive properties.

The object of the invention is therefore to improve adhesive and sealing substances of the type known from EP-PS 97 394 and the European Patent Application 256 316 and in particular their adhesion to metal and their breaking behaviour.

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To achieve this object an adhesive and sealing substance based on rubber containing

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a) 15 to 50 % by weight of stereo-specific polybutadiene-liquid-rubber,

b) 2 to 10 % by weight of stereo-specific cis-1,4-polybutadiene-solid-rubber,

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c) 2 to 10 % by weight of powdered sulphur,

d) 0.5 to 10 % by weight of an organic accelerator or an accelerator system,

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e) 30 to 70 % by weight of fillers and optionally

f) 2 to 10 % by weight of adhesion promoter,

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is proposed which is characterised in that it contains OH-terminated polybutadiene as component a).

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The preferred adhesive and sealing substances according to the invention contain 30 to 40 % by weight of component a), 3 to 5 % by weight of component b), 3 to 5 % by weight of component c), 0.5 to 2 % by weight of component d), 50 to 70 % by weight of component e) and optionally 3 to 10 % by weight of component f). Moreover, the adhesive and sealing substances according to the invention can contain further usual constituents such as anti-ageing agents, thixotropic agents, antioxidants etc.

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The desired improvement in the adhesive and breaking properties of the adhesive and sealing substances according to the invention is achieved by the use of OH-terminated liquid polybutadiene. Preferably, the liquid OH-terminated polybutadiene has an OH-functionality of 2.0 to 3.0, a molecular weight of 1000 to 5000, a viscosity of 0.5 to 10 Pas (at 30° C) and has at least 50 % of the unsaturation in the trans-1,4-configuration and at least 10 % of the unsaturation in the cis-1,4-configuration. An example of a suitable liquid OH-terminated polybutadiene has a molecular weight of 2800 and an OH-functionality of 2.4 to 2.6, in which 60 % of the unsaturation is distributed on the trans-1,4-configuration, 20 % of the unsaturation is distributed on the cis-1,4-configuration and 20 % of the unsaturation is distributed on the 1,2-configuration.

All other components correspond to the prior art so that for this one can refer to EP-PS 97 394 and the European Patent Application 256 316. It should, however, be mentioned that the unsaturation of the component b) in the cis-1,4-configuration should amount to at least 96 %. The application of the adhesive and sealing substances according to the invention also has no peculiarities and takes place in the known manner as described in the above mentioned publications.

The liquid OH-terminated polybutadienes that can be used according to the invention, and which are usually obtained by emulsion polymerisation, are known from polyurethane chemistry and are used there to introduce so-called "soft segments". Due to the terminal OH-groups contained in them the adhesive and sealing agents according to the invention provide a considerably improved adhesion to metal compared with similar agents containing polybutadienes which are not OH-terminated. Shearing strength test bodies which have been prepared with the adhesives according to the invention thus consistently show a cohesive appearance of fracture after vulcanisation and break-



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ing, while there is a tendency towards adhesive fracture when a sealing substance is used on the basis of a liquid polybutadiene which is not specifically OH-terminated.

The connection or bonding of components or structural parts can be effected using the  
5 adhesive and sealing substances of the present invention. The connection or bonding of components or structural parts can be effected by forming a coating with an adhesive on at least one of the surfaces of the components or structural parts which are to be bonded, before or after these components or structural parts are assembled, and if that has not yet occurred, heated after the components or structural parts have been joined together in order  
10 to harden the adhesive substance.

The process can be used to bond components or structural parts in car manufacture. The components or structural parts can be of metal and in a preferred embodiment are oiled metal surfaces.

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Claims:

1. Adhesive and sealing substance based on rubber containing

- 5 a) 15 to 50 % by weight of stereo-specific polybutadiene-liquid-rubber,  
b) 2 to 10 % by weight of stereo-specific cis-1,4-polybutadiene-solid-rubber,  
c) 2 to 10 % by weight of sulphur,  
10 d) 0.5 to 10 % by weight of an organic accelerator or an accelerator system, and  
e) 30 to 70 % by weight of fillers,

15 characterised in that it contains OH-terminated polybutadiene as component a).

20 2. Adhesive and sealing substance according to claim 1, characterised in that the OH-terminated polybutadiene has an OH-functionality of 2.0 to 3.0, a molecular weight of 1000 to 5000 and a viscosity of 0.5 to 10 Pas at 30°C and has at least 50 % of the unsaturation in the trans-1,4-configuration and at least 10 % of the unsaturation in  
25 the cis-1,4-configuration.

30 3. Adhesive and sealing substance according to claim 1 further containing 2 to 10 % by weight of adhesion promoter.

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4. Process for the connection or bonding of components or structural parts, characterised in that a coating is formed with an adhesive according to one of the claims 1, 2 or 3 on at least one of the surfaces of the components or structural parts which are to be bonded, before or after these components or structural parts are assembled, and if this has not yet occurred, heated after the components or structural parts have been joined together in order to harden the adhesive substance.
5. Process according to claim 4, characterised in that components or structural parts are bonded in car manufacture.
6. Process according to claim 5 wherein the components or structural parts are of metal.
7. Process according to claim 6 wherein the components or structural parts are oiled metal surfaces.