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Adhesives of cold curing based on chloroprene rubber brand Skaypren G-40T

New formulation of adhesives based on cold curing chloroprene rubber stamp Skaypren G-40T have been developed with a complex of adhesion, strength, performance properties that meet the requirements of modern technology. Mode of preparation of glue was installed for laboratory's glue-stir. These adhesives have been tested for compliance with technical requirements. Formulation of adhesive was based on finding the optimal balance between the physical and mechanical properties, providing the set requirements, the technological properties which satisfy the conditions of the existing production process and economic efficiency. At the same time sought to maximize unification adhesives. For the preparation of adhesives cold rejection was used chloroprene rubber stamp Skaypren G-40T instead of the previously used Nairit chloroprene rubber stamps.

Key words: adhesives, chloroprene rubber, glue, economic efficiency, Skaypren G-40T, physical and mechanical properties, sealing materials, Nairit rubber stamps, cold-curing adhesives.

Currently it is difficult to imagine engineering and instrumentation, furniture and shoe industries, construction, aircraft construction, space and military equipment, shipbuilding without adhesives. This is due to the bonding is one of the most economical and efficient ways of assembling parts. Efficacy of adhesives due to a number of significant advantages adhesive compounds compared to the compounds of other types. The adhesive firmly glues variety of materials, and in some cases gluing is the only possible way of a secure connection. The variety of fields of application and use of adhesives led to the creation of a wide range of products. There are more than 15,000 manufacturers of adhesive materials, which suggests over 250,000 different adhesives and sealing materials [1].

Development of adhesives — one of the most traditional areas of the use of polymers [2]. The statistical analysis shows the demand for adhesives is a major stimulator of growth in the production of polymeric materials. However, the chemical industry develops independently, and the range of adhesives is influenced by the existing range of polymer materials.

Adhesive compounds have a number of significant advantages over conventional types of compounds. This is due to the problems of producing polymers with specific adhesion properties with the correct selection of all the ingredients of the adhesive composition, the peculiarities of manufacturing technology and application of adhesives and methods of preparation of substrates. Adhesives with the establishment of complex desired properties is extremely challenging. In the rubber industry and in the mode of life are widely used adhesives based on polychloroprene, which are intended for fastening to each other rubbers and to metals. Despite the prevalence of this type of adhesives, they are characterized by relatively low adhesion performance. Development of adhesive compositions based on the novel polymers is not always economically justified and therefore the use of adhesion promoters in the adhesive formulations administered in small amounts and that enhance the performance properties of adhesives are commercially available and use of new grades of polychloroprene rubbers is an important task. The purpose of research — development of new formulations of cold-curing adhesives based on chloroprene rubber stamp Skaypren G-40T with a complex adhesion, strength, performance properties that meet the requirements of modern technology [3]. To achieve the goal the formulation of adhesives have been developed based on cold curing chloroprene rubber stamp Skaypren G-40T. These adhesives have been tested for compliance with technical requirements.

Formulation of adhesive was based on finding the optimal balance between the physical and mechanical properties, providing the set requirements, the technological properties which satisfy the conditions of the existing production process and economic efficiency [4].

Rubber stamps Skaypren G-40T is characterized by a higher viscosity, and for the preparation of cold-cure adhesive was used chloroprene rubber stamp Skaypren G-40T replace previously used in the majority of Nairit chloroprene rubber stamps. Chloroprene rubber characterized by the ability to crystallize in comparison with rubber stamps Nair said that the benefits of using Skaypren G-40T in cold-curing adhesive compositions.

Comparative characteristics of rubbers uses in the adhesive compositions shown in Table 1.

Table 1

Comparative characteristics of rubber stamps Skaypren G-40T and Nairit uses in adhesive compositions

Index	Skaypren G-40T	Nairit DV-80	Nairit DV-100
Mooney viscosity, 100 °C	96–113	71–89	90–110
Crystallizability	High	High	High

The study was developed 6 recipes adhesives based on chloroprene rubber stamp Skaypren G-40T, and according to these recipes in the laboratory were prepared prototypes cold curing adhesives. The developed formulation contain in their composition different vulcanizing agents, resin 2 values, solvents and solvent mixtures, as well as builders, the data shown in Table 2.

Table 2

Comparative characteristics of composition and properties of prototypes adhesives № 1,2 and 3 cold cure

№ of Sample	Composition	Weight the proportion of dry substances	Bond Strength Peel c/o 24 hours
1	Skaypren G-40T; Curatives; resin brand Ribetak 7522E; organic solvent (ethyl-acetate:nefras:toluene 2:2:1)	29,2	2,50
2	Skaypren G-40T; Curatives; resin brand Ribetak 7522E; organic solvent (ethyl-acetate:nefras:toluene 1:1:1)	24,2	2,33
3	Skaypren G-40T; Curatives; resin brand Ribetak 7522E; organic solvent (ethyl-acetate:nefras:toluene 1:1,5:2,5)	31,3	3,0

Note. In the manufacture of a composition № 2 first prepared rubber composition consisting of chloroprene rubber stamps Skaypren G-40T, magnesium oxide, zinc oxide, altaks, thiuram D on rollers on the set mode.

These data shows that the greatest strength has adhesive composition that was used in the manufacture of pre-cooked chelate resins Ribetak 7522E. So it was decided to replace the resin in the resin Ribetak 7522E 101K. Resin 101 K was used previously in many adhesive compositions, as it has good adhesive characteristics.

On the basis of the following recipes were offered cold curing adhesives based on chloroprene rubber Skaypren G-40T, the data obtained are given in Table 3.

Table 3

Comparative characteristics of composition and properties of prototypes adhesives № 4,5 and 6 cold cure

№ of Sample	Composition	Weight the proportion of dry substances	Bond Strength Peel c/o 24 hours
4	Skaypren G-40T; Curatives; resin brand 101 K; organic solvent (ethyl-acetate:nefras:toluene 2:2:1)	32,4	2,62
5	Skaypren G-40T; Curatives; resin brand 101 K; organic solvent (ethyl-acetate:nefras:toluene 2:2:1)	31	3,2
6	Skaypren G-40T; Curatives; resin brand 101 K; organic solvent (ethyl-acetate:nefras:toluene 1:1.2:1.6)	31,3	3,24

Note. In the preparation of the adhesive composition № 5 Mixture: resin, burnt magnesia, an organic solvent and a small amount of water, the reaction proceeds for 6 hours at 30 °C. Then, the resulting solution is added to the rubber composition containing the remaining components.

After analyzing the data, it can be concluded: the best strength properties has adhesive which prepared two-step process (Table 4).

**Comparative characteristics of cold-curing adhesives
based on chloroprene rubber stamp Skaypren G-40T**

Name of glue		Bond Strength Peel c/o 24 hours	
		Norm standard 50307471-08-2008	Results
1	88-НД-GR № 1	2,31	2,33
2	88-НД-GR № 1		2,62
3	88-НД-GR _{HB}		2,50
4	88-НДСк-40GT № 1		3,00
5	88-НДСк-40GT № 2		3,20
6	88-НД-GR № 3		3,30

Thus we can conclude that the formation of a durable adhesive bond is significantly affected by the preliminary formation of chelate resins with magnesium oxide, applied mark resins (since the resin provides adhesion strength of the adhesive composition), the use of crosslinkers and accelerators of vulcanization.

However, the use of hardeners in adhesive formulations significantly reduces their viability, as well as an inconvenience in use, as it requires pre-mixing before gluing.

Increasing the technological properties of adhesives with promoting additives that can be incorporated directly in the manufacture of adhesives and of high environmental performance, it is an urgent problem that requires further study.

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А.В.Омашева, К.А.Севостьянова, М.А.Завгородняя

Скайпрен G-40T маркалы хлоропренді каучукке негізделген суық катайту желімдер

Заманауи техникалық талаптарын қанағаттандыратын адгезиялық, төзімді, пайдаланушылық қасиеттеріне ие комплексмен Скайпрен G-40T маркалы хлоропренді каучукке негізделген суық катайту желімдерінің жаңа рецептуралары өңделген. Зертханалық желім бұлғауышқа желімдерді дайындау тәртібі анықталған. Алынған желімдердің техникалық талаптарға сәйкестігі зерттелген. Желімді дайындау рецептурасы қойылған талаптарды қамтитын физика-механикалық қасиеттері арасындағы, істегі өндірістік үрдістің және экономикалық тиімділіктің жағдайларын қанағаттандыратын технологиялық қасиеттері арасындағы оңтайлы балансты табу негізінде жүргізілген. Бұл жағдайда желімдерді максималды унификациялауға тырыстық. Суық катайту желімдерін дайындау үшін бұрын қолданылып жүрген Наирит маркалы хлоропренді каучуктің орнына Скайпрен G-40T маркалы хлоропренді каучук қолданылды.

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Клеи холодного отверждения, основанные на хлоропреновом каучуке марки Скайпрен G-40T

Разработаны новые рецептуры клеев холодного отверждения на основе хлоропренового каучука марки Скайпрен G-40T с комплексом адгезионных, прочностных, эксплуатационных свойств, удовлетворяющих требованиям современной техники. Установлены режимы приготовления клеев к лабораторной клеешалке. Полученные клеи были исследованы на соответствие техническим требованиям.

Разработка рецептуры клея проводилась на основе отыскания оптимального баланса между физико-механическими свойствами, обеспечивающими поставленные требования, технологическими свойствами, удовлетворяющими условиям действующего производственного процесса, и экономической эффективностью. При этом стремились к максимальной унификации клеев. Для приготовления клеев холодного отверждения был использован хлоропеновый каучук марки Скайплен G-40T взамен используемого ранее хлоропенового каучука марки Наирит.

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