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HEATSEALING ADHESIVE SHEETS OR TAPES

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This invention relates to heatsealing adhesive sheets or tapes. While not limited thereto, it is particularly concerned with heatsealing adhesive sheets or tapes for use in mending all types of household fabrics, and laundry goods in general.

Adhesive sheets or tapes of this type are of greatest value in mending and patching fabrics, in the household, and in the commercial laundry. It is important that such products adhere securely, even during immersion in very hot soap or detergent solutions employed in commercial laundries and in household washing machines, and particularly that they adhere under such conditions to a wide variety of fabrics including cotton, linen, wool, viscose rayon, cellulose acetate rayon, synthetic fabrics such as acrylates and superpolyamide, coated fabrics, and impregnated fabrics, whether tightly woven material or loosely woven cheese or tobacco cloth and the like. The sheets or tapes of the type contemplated by the invention have strong but inexpensive flexible backings, usually, but not always of a porous nature. Among the most frequently used backings are cotton cloth, preferably woven tighter than fifty square, coated cloth, impregnated cloth, non-fibrous films, metal foil (for instance, aluminum foil), paper, and coated or impregnated paper. For purposes of the invention, however, the type of backing is not important. Any backing will serve, provided it has sufficient strength for the use contemplated and is of sufficiently tight consistency to prevent undue penetration of the adhesive into the backing and, consequently, loss of adhesive body from the surface of the backing. Adhesive tapes for mending purposes prior to the invention were composed usually of a polymer proof against washing and solvents used in dry cleaning. Solvent and washproof polymers are necessary because fabrics and household goods mended with heatsealing adhesive tape often undergo washing and dry cleaning. The mend would be disturbed if polymers not resistant to water and solvents were employed, because of removal of the heatsealing adhesive bond due to solvent action. Various thermoplastic polymers have been preferred for use in heatsealing adhesives.

Many heatsealing tapes of the prior art are based on vinyl chloride acetate copolymers. Adhesives of this type are superior to many others in the prior art but ex-

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hibit important defects. Many of them do not withstand repeated washing too well, and the mended patch will frequently come loose after but a few washings. In view of the temperature required for satisfactory sealing, and in view of the heat which the patch should withstand during normal wear, the softening point of the heatsealing adhesive has to be relatively high. On the other hand, plasticizers had to be employed to make the softening point low enough to facilitate mending under the heat and pressure of the iron prior to burning or charring of the fabric. Prolonged heating would frequently cause the heatsealing adhesive to flow through the backing of the sheet or tape, soil the back side of the mending tape or sheet and make an unsightly, unsatisfactory mend.

Where a polymer having too low a sealing temperature is provided, complete blocking may result and the finished patch again may be unsatisfactory because of the softness of the adhesive at normal temperature. Accordingly, the patch will come off easily even where the mended spot receives merely mild mechanical rubbing or is subjected to mild friction in a washing machine or laundry.

Particular problems have been encountered with the low melting plasticizers of the prior art that would flow out of the adhesive at normal or even slightly elevated temperatures, on some occasions give rise to allergenic reactions on the part of the user, and on others discolor or destroy adjacent fabrics.

In accordance with the invention, a heatsealing adhesive polymer is compounded with from about five to about eighty percent by weight of the composition of a crystalline plasticizer, present in the composition in dispersed form and having a melting point above sixty degrees centigrade. The crystalline plasticizer is compatible with the polymer and acts as a solvent for it in the composition when the composition is heated to a temperature above the melting point of the plasticizer, but is largely incompatible with the polymer below the melting point of the plasticizer.

The following table illustrates typical examples of heatsealing adhesive compositions which may be used on any of the backings suggested earlier in this specification, which compositions are furnished by way of example and not in order to limit the scope of this application. All numerals in the table, except where marked specifically otherwise, refer to parts by weight, and all proportions given are by weight rather than by volume.

In the table, Formulation 1 was prepared as a hot melt, with the beaker used on a hot plate. Formulation 10 was prepared by dissolving all ingredients in equal parts of methyl ethyl ketone and toluene, casting a very thin film on cellophane and removing solvents at an elevated temperature in an oven. The remaining formulations were prepared on a differential two-roll rubber mill, using heat when required to facilitate dispersion and mixing.

Polymers	Formulations											
	1	2	3	4	5	6	7	8	9	10	11	12
Styrene-isobutylene copolymer (50/50 ratio).....		60										
Polyethylene (M. W. 12,000).....	67											
Crude Rubber.....			75									
Butadiene-acrylonitrile copolymer (65/35 ratio).....										25		
Polychloroprene.....					60							
Vinyl chloride-acetate copolymer (96/4 ratio M. W. 24,000).....									19			
Vinyl chloride-acetate copolymer (90/10 ratio M. W. 16,000).....				32				50				
Vinylidene chloride-acrylonitrile copolymer (60/40 ratio).....						60						
Polyvinyl butyral (54% vinyl, 38% butyraldehyde, 7% hydroxyl).....							50					
Chlorinated natural rubber (67% chlorine).....										23		
Polyvinyl isobutyl ether (M. W. 160,000).....											89	

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stearate, tribenzyl lead oleate, tribenzyl lead ricinoleate, diphenyl tin oxide, diphenyl lead oxide, triphenyl lead stearate, triphenyl basic tin stearate, ethyl benzidene, calcium stearate, and many others. Provision of such additions to vinyl or vinylidene copolymers or polymers is well known in the art and forms the subject of a wide list of patents and other literature.

In appropriate instances fillers and stabilizers may be left out entirely and compositions where they are not added are included among the important comprehended embodiments of our invention.

Usually in mending the fabric, a piece of the tape or sheet, somewhat larger than the repair to be made is rounded at the corners and placed with the coated side down, on the torn portion. Heat and pressure are applied to the tape or sheet by a hot iron which is held in place for a short period (say 7 seconds) to soften the thermoplastic adhesive. The iron is then removed and the thermoplastic, upon cooling, forms a bond between the cloth part of the tape and the cloth of the garment or other item to which it has been applied. Hot iron mending tapes come in several basic colors in addition to black and white so that the user may match as closely as possible the color of the material to be repaired and render the repair as inconspicuous as possible. Alternatively, the user may want to cut patterns out of the heat-sealing tape and apply them to a fabric background so as to ornament such background.

All embodiments within the scope of this specification and/or the appended claims are comprehended. Having described these various embodiments of my invention for purposes of illustration rather than limitation, what is claimed is as follows:

1. A mending sheet adapted for the repair of torn surfaces by adherence thereto under the influences of heat and pressure, using a heatsealing tool, and compris-

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ing a flexible base sheet and a coating thereon comprising a heatsealing adhesive polymer of vinyl chloride-vinyl acetate copolymer and from about 5 to about 80 percent by weight of the coating of a crystalline plasticizer melting at a temperature above the boiling point of water present within the adhesive polymer in initially dispersed form, said plasticizer having a melting point below the sealing temperature of the heat sealing tool and adapted to solvate and plasticize said adhesive polymer at the sealing temperature of the tool.

2. A mending tape according to claim 1 wherein the plasticizer is diethylene oxide phenol fumarate.

3. A mending tape according to claim 1 wherein the coating has the following composition:

15	Adhesive of tape A:	Parts by weight
	Vinyl chloride-acetate copolymer (90/10 ratio	
	M. W. 16,000) -----	32
	Diethylene oxide phenol fumarate -----	42
20	Propylene glycol sebacate (M. W. 8,000) -----	20
	Calcium stearate -----	1
	TiO ₂ -----	5
	Dibasic lead phosphite -----	1

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