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(54) **SEALING TAPE FOR ADHESIVE BONDING OF VAPOUR BARRIER FILMS AND VAPOUR RETARDER FILMS, AND PROCESS FOR ITS MANUFACTURE**

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(57) **ABSTRACT**

Self-adhesive, flexible sealing tapes, comprising at least one flexible, self-adhesive core or at least one flexible, self-adhesive carrier layer provided with an envelope or two-sided coating consisting of a second adhesive system.

SEALING TAPE FOR ADHESIVE BONDING OF VAPOUR BARRIER FILMS AND VAPOUR RETARDER FILMS, AND PROCESS FOR ITS MANUFACTURE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional application from pending application Ser. No. 10/584,226, filed on Jun. 23, 2006, incorporated herein by reference in its entirety, which is a National Stage application of International Application No. PCT/EP2004/014329, filed on Dec. 16, 2004, which claims priority of German application number 103 61 475.3, filed on Dec. 23, 2003.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a self-adhesive, flexible sealing tape on the basis of a flexible, self-adhesive core enveloped or coated with a second adhesive system, especially for adhesive bonding of vapour barrier films and vapour retarder films, as well as to processes for its manufacture.

[0004] 2. Description of the Prior Art

[0005] A normal construction material moisture is unavoidable, but permanent moisture penetration of structural members in or at constructions should by all means be avoided as it frequently leads to damage.

[0006] Moisture can penetrate the constructions or structural members from the outside, mostly where a structural member is broken, blocked, torn or incomplete. Thus, a façade, for example, may become penetrated with moisture within a short time span if an eaves gutter is clogged or leaky, if roofing tiles are broken or have shifted, if connections of chimneys or skylights are defective, if there are cracks in the external plaster, or if sealings are flawed or even missing altogether.

[0007] Frequently, however, moist spots in structural members also occur because of humidity condensating at cold spots. The condensed water vapour is called "condensation water". Under certain climatic conditions, humidity in the air of a room can condensate as condensation water on wall, ceiling and floor areas either on the surfaces of or within structural members. This leads to structural elements, especially insulation material, penetrated with water, to reduced heat insulation, formation of mould, and, ultimately, to more severe structural damage.

[0008] To avoid condensation water, it is sometimes sufficient to change ones' heating and ventilation habits in the rooms concerned so that no additional damage occurs. In the event of damage, sometimes extensive rehabilitation measures are necessary, however, to prevent occurrence of condensation water in the future.

[0009] To protect the bricking and the insulating material, either in new buildings or when rehabilitation measures are carried through, a vapour barrier or a vapour retarder is installed which prevents condensation water from accumulating, for example, behind an interior insulation. The humidity of the room air can then no longer reach the insulating material. In the case of roof insulations, a vapour barrier or vapour retarder at the same time increases wind proofness.

[0010] Vapour barriers and vapour retarders usually consist of films such as PVC films, PE films (polyethylene) or aluminium foils. But roofing cardboard is utilised as well. However, plasters, cardboards, wood, as well as gypsum plaster boards or derived timer boards are also suitable for constructing durable and continuous, air-tight layers.

[0011] When using vapour barrier films and vapour retarder films, these must be bonded to substrates such as concrete, bricking, plaster, rough-sawn timber and the like in such a manner that a durable seal is obtained, to be able to lastingly fulfil their sealing function. In this regard, joints in the brickwork are a particular problem.

[0012] The bond of the vapour barrier film or vapour retarder film should be permanently elastic to be able to compensate the movements of the building. A further demand is ageing resistance of the bonds, and the market also wants the adhesives to be free of solvents, environmentally harmless and immediately adhesive.

[0013] To date, vapour barrier films and vapour retarder films have been bonded using a dispersion-based cartridge adhesive. In particular, attachment of a vapour barrier film to a wall could heretofore be realised exclusively with cartridge adhesives. These cartridge adhesives are free of solvent, but, depending on ambient conditions, they develop a stable adhesion only after more than 20 minutes, sometimes taking more than 24 hours. In addition, these cartridge adhesives are subject to the risk of degrading upon subsequent access of moisture.

SUMMARY OF THE INVENTION

[0014] It was therefore the object of the present invention to provide an adhesive system that is free of solvents, environmentally compatible, instantly adhesive, flexible, permanently elastic and non-ageing.

[0015] This object is achieved, in accordance with the invention, with a vapour barrier sealing tape wherein a flexible, self-adhesive core or a flexible, self-adhesive carrier layer is provided with an envelope or a two-sided coating consisting of a second adhesive system. The structure of the vapour barrier sealing tape of the invention enables, on the one hand, a permanent adhesion of vapour barrier films or vapour retarder films and, on the other hand, on account of its flexible core, it has the property of compensating and sealing uneven areas of a surface, e.g. mortar joints or rough surfaces. In addition, the adhesive core of the vapour barrier sealing tape ensures that the system continues to be adhesive and impervious even in case of damage to the envelope or coating.

DETAILED DESCRIPTION OF THE INVENTION

[0016] The core, or the carrier layer, is a soft, permanently elastic hot melt adhesive with a low glass transition temperature (Tg). The core material has sufficient flexibility even at temperatures below +5° C. Various flexible and adhesive materials are suitable for use as the core material. Especially suitable are thermoplastic rubbers on the basis of styrene-isoprene-styrene block copolymers or styrene-butadiene-styrene block copolymers, as well as copolymers of vinyl acetate, polyisobutylene and thermally or UV-radiation cross-linked acrylates which, due to their formulation, have a glass transition temperature (Tg) of less than 0° C., for example down to the range of around −12° C.

[0017] The thickness of the core/the carrier layer is preferably between 0.1 and 8 mm, especially preferably between 1 mm and 5 mm. The width of the core/the carrier layer is preferably between 1 mm and 10 mm.

[0018] Doubling or folding of the core material/carrier layer material, to obtain greater thicknesses, is possible. The number of the cores/carrier layers per vapour barrier sealing tape can be varied, too.

[0019] The core/the carrier layer does not have to be of a particular shape. It may be round, oval, rectangular or square in cross-section, but it may also be of any other shape.

[0020] On account of its formulation, the adhesive of the core/the carrier layer is permanently conformable even at low temperatures, e.g. in the range of around −5° C.

[0021] The envelope or coating consists of an expanded pressure-sensitive adhesive tape preferably manufactured on the basis of a pure dispersion acrylate.

[0022] The pure dispersion acrylate is preferably on the basis of plasticizing monomers such as 2-ethylhexyl acrylate, 1-butyl acrylate or n-butyl acrylate. If the envelope/coating does not consist of an adhesive based on a pure dispersion acrylate, the preferred adhesives are those based on vinyl isobutyl ether or isobutenes.

[0023] Due to the expansion of the pressure-sensitive adhesive, it is possible to realise a higher coating weight, thus enabling optimal wetting of the respective surfaces, leading to optimum sealing of the vapour barrier film/vapour retarder film. This is particularly advantageous in the case of sealings that extend over joints in the masonry. The envelope/coating in this case has a foam-like structure which ensures that the vapour barrier sealing tape of the invention is better capable of adapting to the surface structure of the substrate. In addition, the envelope/coating compensates the shape-recovery effect typical of hot-melt adhesives.

[0024] The thickness of the envelope/coating is preferably between 0.2 mm and 1.5 mm, especially preferably between 0.5 mm and 1 mm.

[0025] In one particular embodiment, the vapour barrier sealing tape according to the invention is equipped with reinforcing elements which stabilise the vapour barrier sealing tape, especially in the longitudinal direction. Suitable materials that may be used as reinforcing elements are threads, nonwovens or interlaid scrims, wovens, or knitted or crocheted fabrics.

[0026] To produce the vapour barrier sealing tape, initially, the core, or the carrier layer, and the expanded pressure-sensitive adhesive tape are manufactured as web-shaped materials in independent production processes.

[0027] To produce the expanded pressure-sensitive adhesive tape, an aqueous dispersion of the pressure-sensitive adhesive is prepared which contains a filler consisting of small thermoplastic hollow spheres of plastic filled with hydrocarbon gas. The small hollow spheres expand upon exposure to a temperature in the range from 70° C. to 140° C. This dispersion is processed to an adhesive tape, which will then be expanded.

[0028] To produce the sealing tape as such, two pre-fabricated, expanded pressure-sensitive adhesive tapes, one for each side, are then advanced towards a web consisting of the elastic core material/carrier layer material, and are combined therewith by pressure. The core does not necessarily have to be enveloped but may also be inserted as an intermediate layer between two webs of the expanded pressure-sensitive adhesive tape.

[0029] The sealing tape according to the present invention is particularly suitable for adhesively bonding vapour barrier films or vapour retarder films to substrates having rough surfaces such as concrete, masonry, plaster, rough-sawn timber and the like, especially for adhesively bonding the vapour barrier films or vapour retarder films to walls.

[0030] What has been described above are preferred aspects of the present invention. It is of course not possible to describe every conceivable combination of components or methodologies for purposes of describing the present invention, but one of ordinary skill in the art will recognize that many further combinations and permutations of the present invention are possible. Accordingly, the present invention is intended to embrace all such alterations, combinations, modifications, and variations that fall within the spirit and scope of the appended claims.

We claim:

1. A process for manufacturing a self-adhesive, flexible sealing tape comprising at least one flexible, self-adhesive core/carrier layer provided with an envelope/two-sided coating which comprises a pressure-sensitive adhesive tape containing an expanded pressure-sensitive adhesive, said process comprising the steps of:

manufacturing said at least one core/carrier layer and the envelope/two-sided coating by independent processes as web-like materials;

subsequently advancing two pre-fabricated pressure-sensitive adhesive tapes containing said expanded pressure-sensitive adhesive, one per side, towards a web consisting of an elastic core material/carrier layer material; and

applying pressure to combine said pre-fabricated pressure-sensitive adhesive tapes with said web consisting of the elastic core material/carrier layer material.

2. The process according to claim **1**, wherein the process for manufacturing said pre-fabricated pressure-sensitive adhesive tapes comprises the steps of:

producing an aqueous dispersion of a pressure-sensitive adhesive containing a filler consisting of small, thermoplastic hollow plastic spheres which are filled with hydrocarbon gas, said hollow spheres being expandable upon exposure to a temperature in the range between 70° C. and 140° C.;

processing the aqueous dispersion to a pressure-sensitive adhesive tape; and

expanding said adhesive tape.

3. The process according to claim **1**, wherein the material for the at least one core/carrier layer is selected from the group consisting of thermoplastic rubbers on the basis of styrene-isoprene-styrene block copolymers, styrene-butadiene-styrene block copolymers, copolymers of vinyl acetate, polyisobutylenes and acrylates which have been cross-linked by a process selected from the group consisting of thermal irradiation and UV irradiation.

4. The process according to claim **1**, wherein the material for the at least one core/carrier layer has a glass transition temperature (Tg) of below 0° C.

5. The process according to claim **1**, wherein the pressure-sensitive adhesive tape is based on a pure dispersion acrylate.

6. The process according to claim **5**, wherein the pure dispersion acrylate is based on plasticizing monomers selected from the group consisting of 2-ethylhexyl acrylate, 1-butyl acrylate and n-butyl acrylate.

7. The process according to claim **1**, wherein the pressure-sensitive adhesive tape comprises an adhesive based on a material selected from the group consisting of vinyl isobutyl ether and isobutene.

8. The process according to claim **1**, wherein the thickness of the at least one core/carrier layer is between 0.1 mm and 8 mm.

9. The process according to claim **1**, wherein the width of the at least one core/carrier layer is between 1 mm and 10 mm.

10. The process according to claim **9**, wherein the width of the at least one core/carrier layer is between 1 mm and 5 mm.

11. The process according to claim **1**, wherein the thickness of the envelope/coating is between 0.2 and 1.5 mm.

12. The process according to claim **11**, wherein the thickness of the envelope/coating is between 0.5 and 1 mm.

13. The process according to claim **1**, wherein the envelope/coating has a foam-like structure.

14. The process according to claim **1**, further comprising a step of providing the sealing tape with reinforcing elements for stabilising the sealing tape.

15. The process according to claim **14**, wherein said reinforcing elements stabilise the sealing tape in a longitudinal direction.

16. The process according to claim **14**, wherein said reinforcing elements are selected from the group consisting of threads, nonwovens or interlaid scrims, wovens, knitted fabrics and crocheted fabrics.

17. The process according to claim **1**, wherein said at least one core/carrier layer is inserted as an intermediate layer between said two pre-fabricated expanded pressure-sensitive adhesive tapes.

18. The process according to claim **1**, wherein the core is enveloped by said pre-fabricated expanded pressure-sensitive adhesive tapes.

19. The process according to claim **1**, wherein said sealing tape comprises two flexible, self-adhesive core/carrier layers.

20. The process according to claim **1**, further comprising the step of folding the core/carrier layer material.

21. The process according to claim **1**, wherein the at least one core/carrier layer is formed comprising a shape selected from the group consisting of a round cross-sectional shape and an oval cross-sectional shape.

22. The process according to claim **1**, wherein the at least one core/carrier layer is formed comprising a shape selected from the group consisting of a rectangular cross-sectional shape and a square cross-sectional shape.

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