

Air-Tightness and Internal Construction



User guidelines for Ampatex[®] and Sisalex[®] Systems

Editorial



These days, clients expect their homes to provide a comfortable atmosphere that is not too damp, yet not too dry. We might appreciate gusts and winds in the open air – but not in our own cosy living rooms.

We expect comfort and a sense of security from a house – the security of knowing that all the structural problems have been resolved competently, reliably and permanently during construction by the professionals. We specialists at Ampack have spent the past half century and more developing systems and solutions to deal professionally and securely with all the problems affecting the protection of buildings.

Economies achieved during the construction of airtight building shells often result in extra costs for repairs and additional energy at a later stage. Build on a foundation of quality, durability and reliability. A fully protected house leads to a fully satisfied client.

Andreas B. Deschwanden
General Manager

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Why should buildings be airtight?

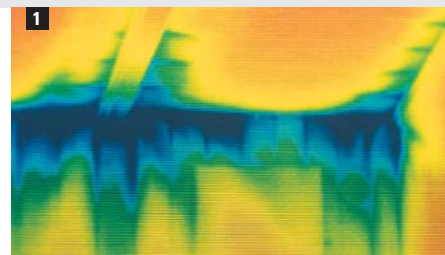
The airtightness of the building shell has been studied more closely than practically any other structural house-building topic over the past few years. There are many reasons for this, but one thing is completely clear: unsuitable products, products that are not used properly and poor workmanship have an immediate, direct effect on the durability of the building – with a corresponding effect on costs.

Water comes from the outside? Well, yes but more moisture might be permeating the construction from inside the building shell than from the weather.

When vapour checks and airtight layers are used in accordance with the standards, they provide the following benefits:

- Energy losses are reduced
- Condensation is avoided in the structure
- The formation of mould and structural damage is avoided
- Pollutants are avoided in the air within the rooms
- The noise-reduction mass in structural components is guaranteed
- The insulating effect of structural components is guaranteed
- The ability of ventilation systems to work properly is guaranteed

Therefore, it very quickly becomes clear that an incomplete or badly-fitted airtight layer bears a huge risk of damage and danger.



1 Thermography: Blue = heat loss resulting from ventilation = increase in energy consumption and structural damage.

2 Mould formation within a multi-layer structural component.

Airtight in Every Nook and Cranny



1 Ampatex® DB 90, overlap taped with Ampacoll® I.N.T.



2 Ampatex® SB 130, formwork membrane, overlap taped with Ampacoll® XT.

1. Laying on the flat

A systematic procedure for working with vapour checks and vapour barriers is a pre-condition for the layers to work properly as fitted. These strips also often take on the function of an airtight layer. They are usually laid on the warm side of the structure. Laying should be kept as free as possible of stretches or folds to prevent tension and stress effects on the adhesive and connection points.

This will prevent the strip tearing at bracket points or edge connections. Adhesive tape, liquid adhesive, etc. is used to ensure

Planning

Good planning avoids mistakes during implementation, and the associated extra costs. Stick to these points to lay the foundation for an airtight building shell:

- Schedule the installation stages
- Choose the right products
- Inform and coordinate the professionals carrying out the work
- Take account of structural moisture
- Test airtightness with a blower door test before fitting the internal cladding

airtightness. They do not provide any mechanical support. Any dust or dirt on the top surface of the strip can permanently reduce the power of even the best

of adhesives. Because the strips have to be fitted to be airtight to meet the standards, they are taped immediately after they are laid in the overlapping areas. Always tape the overlap joints from the middle of the room

to the outside to minimise the risk of folds, and thus ensure that the laying is airtight.

Ampacoll® XT



Ampacoll® XT acrylic adhesive tape for internal and external use.

Ampacoll® INT



Acrylic adhesive tape for two applications: overlaps and penetration points.

Ampacoll® RA



Edge connection adhesive: odour-neutral and solvent-free.



3 Sisalex™ 500, overlap taping with Ampacoll® XT.



4 Moisture-variable Ampatex® Resano® vapour barrier, overlap taping with Ampacoll® XT.

Joints

- Ampacoll® RA liquid adhesive is used for joints in masonry, woodchip, chimneys, etc.
- The component to be attached must be airtight, i.e. it must have an enclosed surface.
- Joints must be free of any tension or stress, and must ideally use a clamping bar for mechanical fastening.

Penetration points

- Should be avoided wherever possible.
- Any penetration points such as rafter ends, steam pipes and chimneys should be primed using Ampacoll® Primer 531, then sealed with Ampacoll® BK 535 butyl rubber adhesive tape.

2. Edge connections

Once the flat surfaces have been made airtight, the edge connections are then also made airtight. Here too, the adhesive material must be matched to the relevant strip and sub-surface. Take care to prepare the sub-surface, which must be dry and free of dust and grease. Porous and sanded surfaces must be pre-treated with a primer. The current generation of adhesives makes it possible to do without mechanical fixtures, but our experience and difficulties encountered during construction have taught us to recommend that a mechanical fixing should

still be used. This is usually needed as a shadow gap batten in any case. For safety reasons, it should not be argued away.

3. Penetration points

Planning the installation stages will make this task easier. The same care and attention to the sub-surfaces is required as for edge connections. In general, any damage to the airtight layers should be repaired. Construction managers are required to issue the appropriate instructions and to check the work.

Ampacoll® Superfix



Universal adhesive: even sticks at -20°C .

Ampacoll® BK 535



Sleeve can be formed by hand. Made of butyl rubber.

Ampacoll® BK 530



Butyl rubber adhesive tape, adhesive on both sides.

Ampacoll® Primer



Adhesive primer, allows taping to even the most difficult sub-surfaces.

Panel Materials



1 Airtight taping of DSB panels using Ampacoll® INT.

Panels will not be airtight without additional measures

If they are to meet the required standards, plaster fibre board, plasterboard, fibre cement panels, sheet metal and chip-board panels all have to be taped so that they are airtight. Special measures must be undertaken around bracket points, joints and penetration

points.

Ampack offers a wide range of adhesive technology for the airtight taping of panel-type materials, taking account of the requirements of wood-frame house construction. Good adhesion to all wood materials, the appropriate primer when necessary, plus flexible tapes for internal and external applications.

Strip materials

Where vapour checks are concerned, Ampack offers the Ampatex® and Sisalex™ ranges. Ampatex® products are made of high-quality polypropylene, and are vapour-proof, rot-proof, tear-proof and non-slip. On the other hand, Sisalex™ vapour checks are distinguished by the

following characteristics:

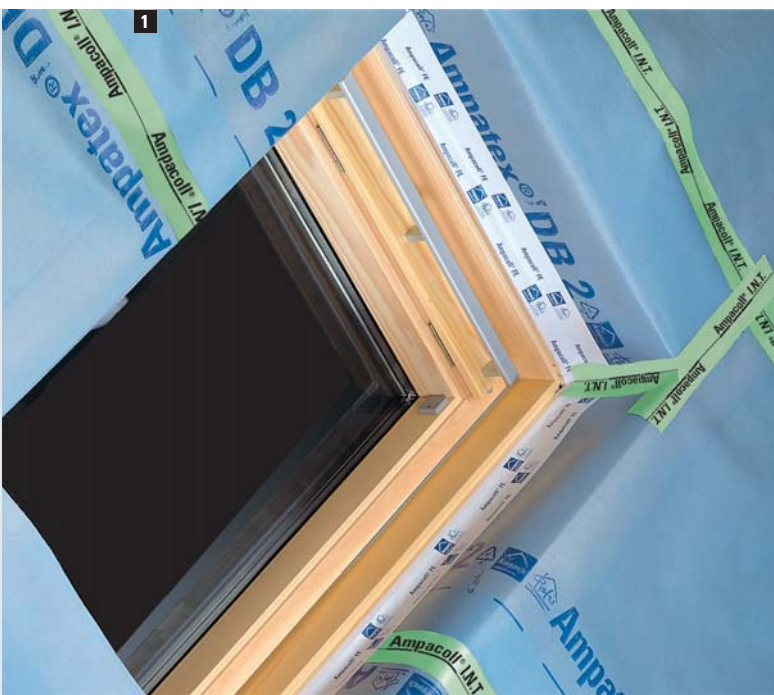
- Paper made of pure cellulose
- Paraffin sticker = natural raw material
- Robust fibreglass grid
- No fungicidal finish

Sisalex™ vapour checks are made of materials with natural origins.

Warning

Even the best airtight layers, vapour checks and adhesive products will not prevent the negative effects of leakages. These might, for example, arise from the faulty taping of overlaps and bracket points, or the incorrect sealing around joints and penetration points. Any damage to these layers leads to convection and other effects, whereby moist air is carried from the rooms into the structure or the heat insulation. Structural damage is then pre-programmed! The materials must be used correctly if they are to be able to fulfil their purpose.

Window Installation



Windows are airtight these days – so window joints should be airtight too! Windows are basic, highly complicated components that carry out a variety of tasks. If they are to do this without any problems, windows must be fitted so that they are airtight and wind-proof, inside and out.



- 1 Joint between vapour checks and airtight layer on roof window, with Ampacoll® FE.
- 2 Window joint in chipboard construction, with Ampacoll® FE.



- 3 Window joint in masonry construction, with Ampacoll® F.

In order to avoid damage caused by moisture in the area around connections, the window, joint and wall must be seen as a complete system. The connection must be carried out on the basis of the “inside thicker than outside” principle as far as the diffusion of water vapour is concerned. Correct fitting is not a voluntary option – it is an absolute must. Fitting instructions and standards apply. The fitting of windows and façades to the building shell must be planned and undertaken without any flaws in order to

prevent damage within the area around the connection. Particular attention must be given to the weather protection in the external connecting joint. As well as providing a clear conscience, adhering to the standards will ensure that structural damage and mould caused by condensation can be avoided. It also extends the useful life of the window, prevents draughts, guarantees the correct function of mechanical ventilation equipment, improves noise protection and saves energy costs for heating.

Ampacoll® FE



Window fitting tape with adhesive-free intermediate space and divided liner.

Ampacoll® BK 535



Sleeve can be formed by hand. Made of butyl rubber.

Ampacoll® RS



Self-adhesive round chord made of high-quality butyl rubber.

Ampacoll® F



Double-sided adhesive butyl rubber tape for window connections.

Airtightness for Rafter Insulation Systems

Rafter insulation has become increasingly important. It is now indispensable in houses aiming towards a higher standard of thermal insulation.

An airtight layer should also be planned and implemented on the warm side of the thermal insulation in this type of construction. Two factors make this provision more difficult to achieve: the necessary airtight strips are laid during or shortly after erection. Firstly, they are

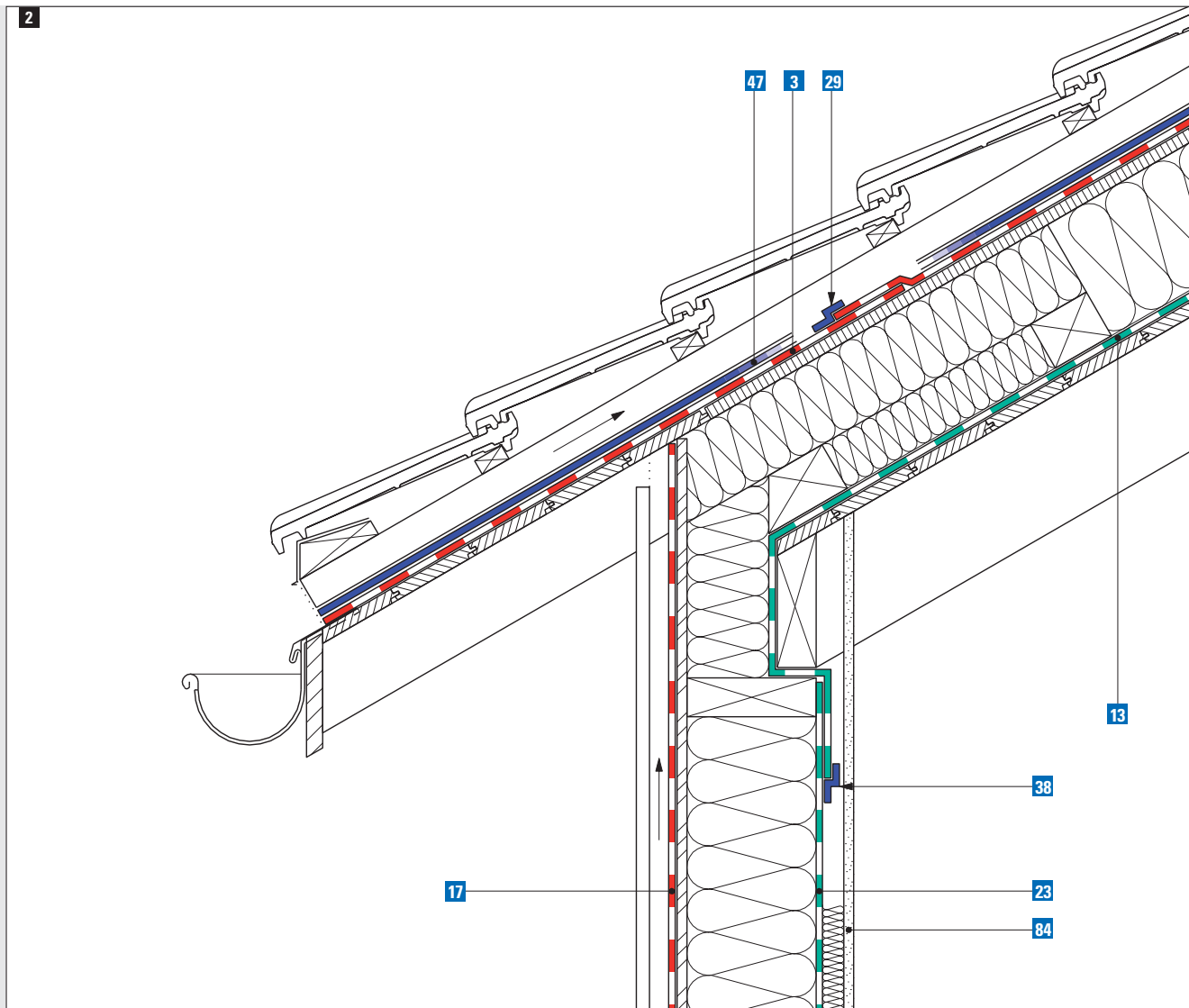
exposed to the weather and to considerable stress during the construction phase. A simple vapour check is therefore not up to this job.

This situation calls for robust products with a sufficiently long natural weathering period.



1-3 Rafter insulation using Ampatex® SB 130. Overlap taping using Ampacoll® XT.





Secondly, the strips are usually laid over or outside the support structure, and must therefore be bound to the strips in the walls. Airtight layers are recommended in the planning for normal interior decoration, and it is therefore all the more necessary here. At Ampack, well-thought-through

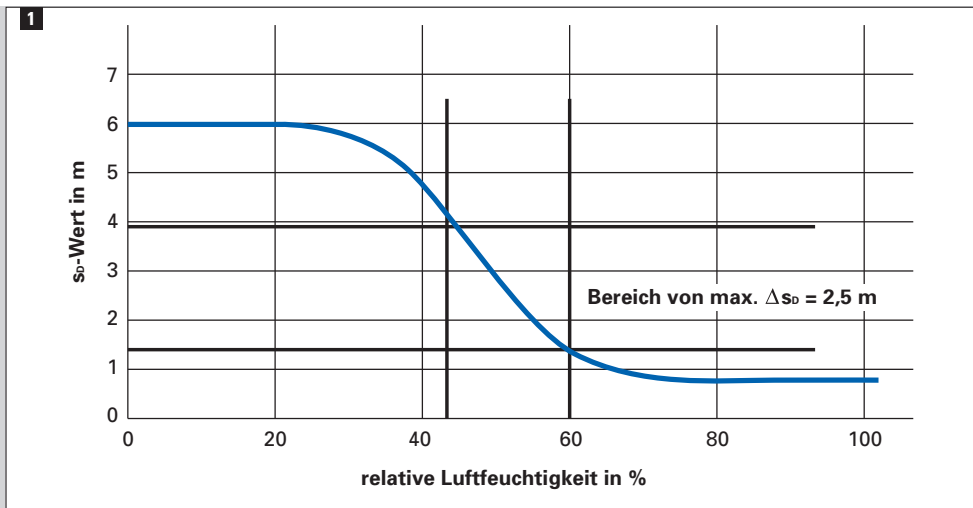
details and attention to the sequence of installation are taken for granted. In the case of rafter insulation, close attention must be paid to the direction of the strip in the area around the gutter connection, the gable end connection and around any dormer. The correct connection

to the gable-end window must also be specified.

2 Sketch of a rafter insulation system

- 3 Roof membrane Ampatop® Secura
- 13 Form-work strip Ampatex® SB 130
- 17 Wall membrane Ampatop® F2
- 23 Vapour check Ampatex® DB 90
- 29 Adhesive tape Ampacoll® XT, 60 mm
- 38 Adhesive tape Ampacoll® BK 535, 50 mm
- 47 Nail seal Ampacoll® ND. Band
- 84 Cladding

Humidity Variability



1 Humidity-variable vapour check characteristics

In contrast with conventional humidity-variable vapour checks have a variable resistance to diffusion s_D , which adapts to the moisture in the environment. At times of high relative air humidity – e.g. in summer – the s_D value reduces and the vapour check is therefore more permeable to moisture. When the relative air humidity is lower – e.g. in winter – the s_D value increases

and the vapour check is less permeable to moisture. The specific effect of the change in the s_D value is that a structure can dry out from the inside after any unexpected entry of water over an extended period of time, as long as the conditions are suitable. The structure would then stay free of damage.

In practice, the important factor is the change in s_D value in the

range between about 40% and 60% (see Fig. 1). When a living room is in normal use, the relative air humidity does not fall below 40%. In structures with a constantly high level of air humidity (>60%) – such as saunas, hotel kitchens or indoor swimming pools – a humidity-variable vapour check is prohibited (see matrix insert). In structures with a functional back ventilation system or open diffusion external





skin – where conventional vapour checks such as Ampatex[®] DB 90 are used – a humidity-variable vapour check such as Ampatex[®]. Resano[®] might also be useful. This vapour check is also ideal for roof renovations undertaken from the outside.

The Ampack guarantee

In the event of any damage, the 10-year property-linked workmanship guarantee will cover the:

- Material costs
- Construction costs
- Re-building costs
- Consequential costs

Application Matrix

Application	Type of construction	Methods/Pre-conditions
 Non-problematic	<ul style="list-style-type: none"> For structures with functional back ventilation or open diffusion external skin (e.g. dry internal construction) 	<ul style="list-style-type: none"> Ampatex[®] Resano[®] or Ampatex[®] and Sisalex[™] vapour checks
 Non-problematic	<ul style="list-style-type: none"> Roof renovation from the outside 	<ul style="list-style-type: none"> Use in standard living rooms Fully-functioning airtight layer Protection against weathering during construction
 Difficult*	<ul style="list-style-type: none"> For structures without functional back ventilation or open diffusion external skin (e.g. flat roof) 	<ul style="list-style-type: none"> Requires proof of vapour handling function and increased checks on implementation (e.g. blower door test)
 Prohibited	<ul style="list-style-type: none"> Structures with a constantly high level of air humidity (approx. >60%) such as indoor swimming pools, saunas, laundries, and hotel kitchens Basement conversions with sub-floor walls and floors Etc. 	<ul style="list-style-type: none"> Use of Sisalex[™] vapour barrier. Integral moisture management plan

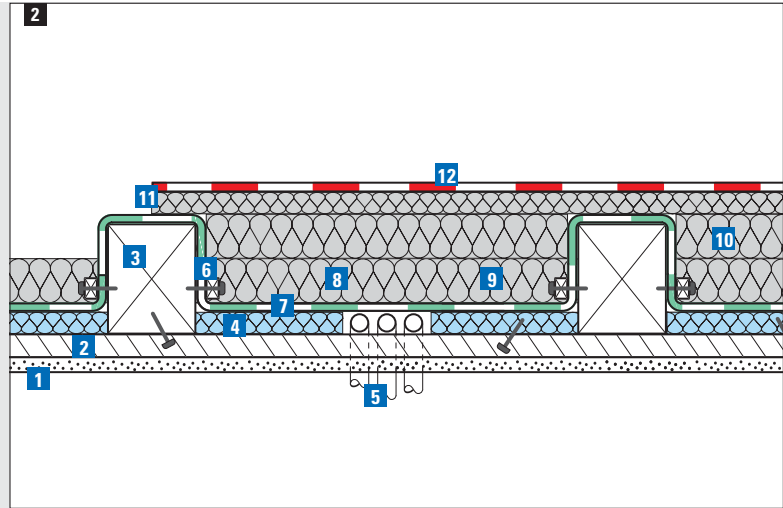
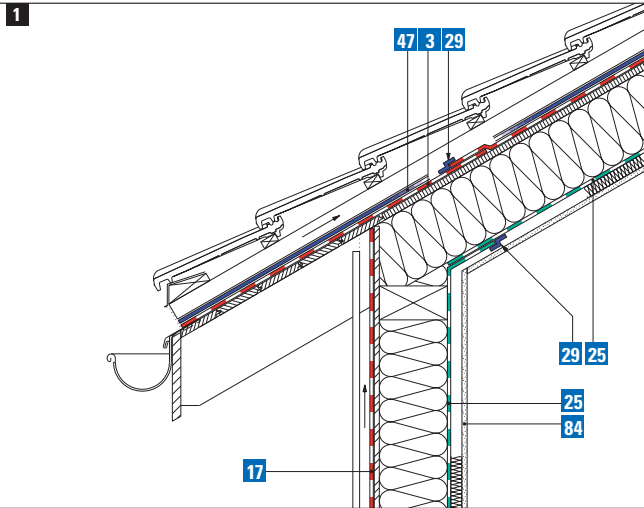
General requirements for the use of Ampatex[®] Resano[®]

- Fully-functioning airtight layers
- Living room used in accordance with normal standards

* Additional requirements for use in difficult conditions with regard to moisture (e.g. flat roof)

- Re-drying must not be prevented by covering
- Sufficient thermal insulation, laid compactly and without any hollow spaces
- The direction, position and environment around the component: problems can be caused by shade (or partial shade), e.g. from trees, solar systems or neighbouring buildings, and other factors such as proximity to the sea or a position exposed to the weather, and each property must be checked individually.
- Increase in checks on the work (e.g. blower door test)

Application Examples



1 Drywall internal construction

- 3 Roof membrane Ampatop® Secura
- 17 Wall membrane Ampatop® F2
- 25 Vapour check Ampatex® Resano®
- 29 Adhesive tape Ampacoll® XT, 60 mm
- 47 Nail seal Ampacoll® ND. Band
- 84 Cladding

Drywall internal construction

(Fig. 1)
Ampatex® Resano® can be used as an alternative to conventional vapour checks in internal constructions. The external skin of the structure is open to diffusion, so this will not cause problems.

2 Roof renovation from the outside

- 1 Old plaster ceiling on formwork
- 2 Formwork with old fixing materials
- 3 Old rafter position
- 4 Softboard
- 5 Installation example
- 6 Side fixing to prevent convection
- 7 Ampatex® Resano®
- 8 Overlap taping with Ampacoll® XT
- 9 Insulation, 1st layer
- 10 Insulation, 2nd layer
- 11 Extra insulation
- 12 Roof membrane, e.g. Ampatop® Secura

Roof renovation from outside

(Fig. 2)
Many buildings have roof extensions from earlier periods that would not meet current thermal insulation standards. These properties need to be renovated to conform to today's technical potential and requirements. If renovation work is to be carried out, and the inhabitants will or can not leave the house, roof renovation from the outside is the only remaining solution.

Moisture-critical areas (e.g. flat roof)

Ampatex® Resano® can provide a solution in these areas. However, care must certainly be taken to ensure that variable-moisture strips are only used in moisture-critical areas if the evidence of moisture functionality has been simulated by an experienced professional.

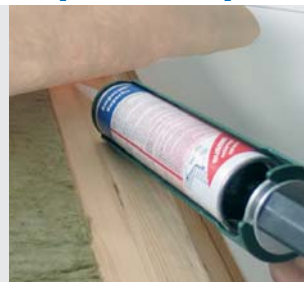
Ampacoll® XT 60



Ampacoll® BK 535



Ampacoll® Superfix



Ampacoll® DT



Vapour Barriers



1/2 Fitting a vapour barrier and a Sisalex™ 514 air seal in a swimming pool.

nal skins are being used more often once again. We can therefore expect the damage from water vapour diffusion to increase too. Some structures still need a vapour barrier. In general, too, rooms with a constantly high level of air humidity will still need a vapour barrier with a high s_D value (>1500m).

The term "Vapour barrier" has disappeared from the German-language standards, to be replaced by the term "Vapour

retardant with a high s_D value". However, the former term is still used widely in practice, and is therefore repeated here.

The following examples might be quoted:

- Industrial kitchens
- Indoor swimming pools
- Laboratories
- Saunas
- Thermal insulation against the ground

NB

When deciding upon the final vapour barrier or vapour check, we should usually use the one that has the lowest possible diffusion resistance for our structure. The diffusion of vapour should only be limited to the extent that is necessary, not to the greatest possible extent!

In addition to airtightness, the protection of the structure from undesirable water vapour condensation is also a major consideration.

Damage from condensation used to be common in the past, but this was reduced by the increased use of open diffusion construction methods. Now, however, moisture-proof exter-

The two rules that govern the times that vapour barriers must be used:

Rule 1:

In a structure without any functional back ventilation between the thermal insulation and a diffusion-inhibiting external skin

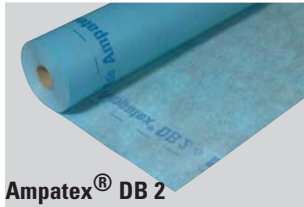
- e.g. Sisalex™ 514 with s_D value >1800 m

Rule 2:

Rooms with a constantly high relative air humidity, e.g. indoor swimming pools, saunas, laundries, hotel kitchens, etc.

- e.g. Sisalex™ 514 with s_D value >1800m

Product Overview



Ampatex® DB 2

Tear-proof vapour check made of thermoset polypropylene fibres with a polyethylene co-polymer filling layer.

s_D value: 2 m

Standard widths: 1.50 m/2.80 m



Ampatex® DB 90

Tear-proof vapour check made of thermoset endless fibres with a polypropylene filling layer. The vapour check for standard structures in modular wood and mixed constructions.

s_D value: 23 m

Standard widths: 1.50 m/2.80 m

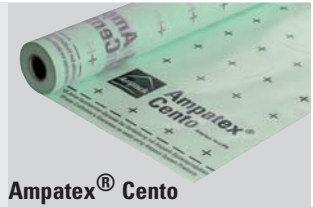


Ampatex® Resano®

Triple-layer, tear-proof vapour check with a moisture-variable s_D value, made of a polypropylene fleece, a co-polymer coating and a polypropylene covering fleece.

s_D value: 0,9 – 6 m

Standard widths: 1.50 m/2.80 m



Ampatex® Cento

Vapour check with high s_D value. Fleece underlay made of polypropylene (PP) with a special membrane made of polyolefin. Easier to lay, thanks to smoother surface.

s_D value: >100 m

Standard width: 1.5 m



Sisalex™ 303

Ecological product, compound comprising two kraft papers with a fibreglass net inlay. Applicable universally, pure kraft paper with net inlay. Tear-proof.

s_D value: 4,39 m

Standard widths: 1.25 m/1.5 m/2.8 m

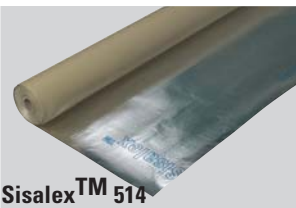


Sisalex™ 500

Ecological product, keeps its shape. Flexible, easy to process vapour check made of kraft paper with a paraffin central layer. Highly suitable for blown-in insulation material made of cellulose.

s_D value: 2 m

Standard width: 1.50 m

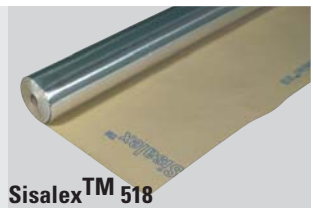


Sisalex™ 514

Kraft paper clad on one side with aluminium, with a paraffin central layer, for wet rooms or structures with an increased requirement for security. Ideal for renovations and reconstructions.

s_D value: >1'800 m

Standard width: 1.50 m

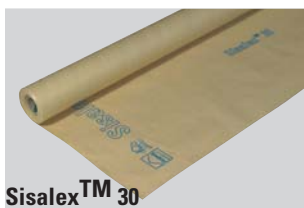


Sisalex™ 518

Combination of two kraft papers, a flame-retardant paraffin central layer and an inlaid fibreglass net. Alkali resistant. Use as a moisture barrier on walls, basement floors, etc.

s_D value: >1'800 m

Standard width: 1.50 m



Sisalex™ 30

Strong kraft paper as a protection against percolation on enclosed, flat false floors, sliding floors, etc. Do not use with bulky sharp-edged materials!

s_D value: 0.04 m

Standard width: 1.25 m



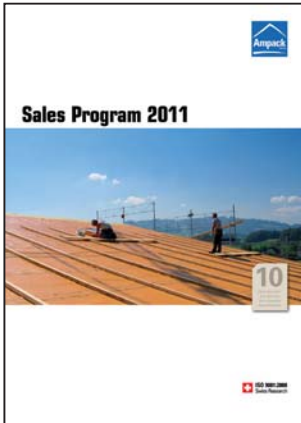
Ampatex® SB 130

Tear-proof formwork strip made of thermoset endless fibres with a polypropylene filling layer (100% polypropylene). Use for rafter insulation, very hard wearing.

s_D value: 40 m

Standard widths: 1.50 m/2.80 m

Information Navigator



Sales Brochure and Price List
The whole Ampack range of practical products for the impermeable construction and protection of building shells against vapour, air, wind, noise, water and emissions.



Sector Brochures
Introductory guides to the air-tight and wind-proof construction of building shells, noise protection and other emissions.



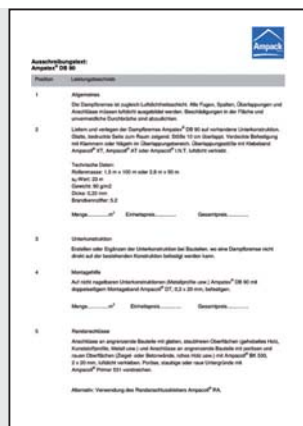
Product Data Sheets
The most important information and technical data for each product in a compact form. Always up-to-date at www.ampack.eu.



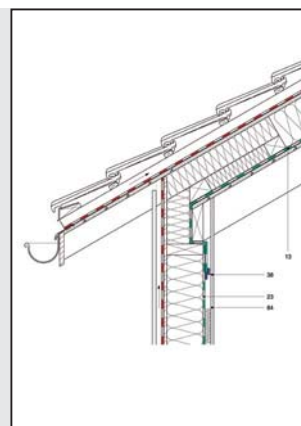
Adhesive Matrix
Know which product to use, so that the things that belong together stay together.



The Basics and the Theory
A simple, easy-to-understand introduction to the subjects of vapour diffusion, convection, airtightness and wind-proofing, the capacity for drying out and noise protection.



Texts for Tenders
A tool for architects, designers and processors. Invitations to tender made easy. www.ampack.eu



Technical Drawings
Solve any tricky problems with the help of our constructional drawings. www.ampack.eu



Online Service Area
You can find all the documents, technical drawings, tendering texts, etc. in the Service Area, at www.ampack.eu.

This house is protected against ...



... by Ampack's overall protection – from roof to basement.

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