



DUPONT®

Tyvek.

DUPONT BUILDING INNOVATIONS: SOLUTIONS FOR AIR & VAPOUR MANAGEMENT

**TRAPPED MOISTURE INSIDE YOUR BUILDING ENVELOPE
AFFECTS YOUR ENERGY EFFICIENCY DRASTICALLY.**

Discover the DuPont range of air & vapour control layers
to guarantee optimal moisture control.

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DUPONT BUILDING INNOVATIONS: SOLUTIONS FOR AIR & VAPOUR MANAGEMENT TO CONTROL MOISTURE AND DRAFTS, DUPONT HAS A GREAT IDEA: A RANGE OF HIGH-PERFORMANCE AVCL PRODUCTS FOR

- Greater energy efficiency
- Enhanced interior comfort
- Durability, health and longevity in buildings



Why airtightness in buildings is important

The performance of insulation materials is largely determined by their protection against air movement. Furthermore, insulation needs to be protected against humidity, as this will also reduce thermal performance.

- INTERNAL** A reliable AVCL provides efficient and durable airtightness, as well as to protect the structure and insulation against condensation
- EXTERNAL** A wind tight, vapour open membrane protects the insulation and works to ensure “as designed” performance

Reduce heating costs and CO₂ emissions

Any air leakage will result in direct heat loss or reduced insulation performance. The building envelope should be properly sealed to avoid unintentional air movement through cracks, joints and other sources of leakage. Employing the appropriate membrane will assist in lowering both heating costs and CO₂ emissions.

Reduce overheating in summer

Air naturally moves from a warmer area to a colder area. Any leakage in the airtightness layer will encourage warm air from the outside to flow into the building interior, reducing both the performance of the insulation and interior comfort during hot weather.

Reduce the risk of condensation

Under standard interior humidity conditions (Humidity Class 1-3) it is preferable to fit an AVCL of the type that allows the construction to dry out, compared to an AVCL of high vapour resistance that will not allow wet construction materials to dry out into the building.



Healthy construction



Mould damage because of trapped moisture



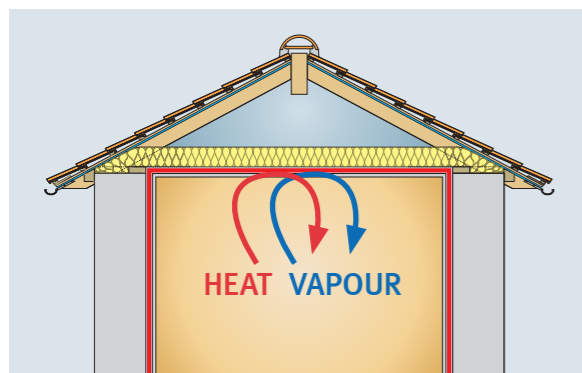
Choosing the right AVCL: Not all AVCLs are engineered equally

Choosing the right AVCL membrane for a building project is critical to ensure full functionality of the insulation and its optimum performance, thus resulting in greater energy efficiency and a more comfortable internal climate. As AVCLs are often perceived as commodity products and little attention given to overall performance when it comes to selection, the final product choice is often made on basis of price rather than design. However, this can prove to be a false saving.

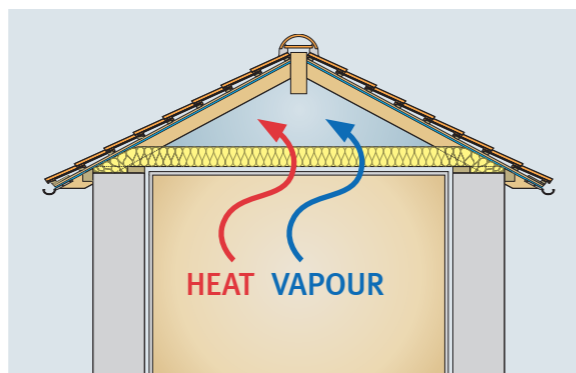
WHAT IS THE ROLE OF THE AVCL?

A properly installed AVCL will help to reduce water vapour transfer through the building envelope from the building interior. In addition, the AVCL will provide an effective airtight barrier against

convective heat loss. These functions will not only help to reduce condensation risk in an insulated zone, but will also conserve energy by reducing CO₂ emissions.



WITH AVCL



WITHOUT AVCL

Why an AVCL is critical

Energy efficiency is key to all modern construction, but certain building styles and geographical or climatic conditions make the use of an AVCL even more crucial. For example, not fitting an AVCL in the ceiling level of a standard timber truss, sealed cold pitched roof construction runs the risk of a problematic accumulation of moisture within the building structure and the insulation. This can result in the growth of mould, structural damage and the loss of thermal performance, leading in turn to increased energy consumption.

Why an AVCL is beneficial

Making our buildings more energy efficient is not only good practice, but is an essential factor in safeguarding the future against climate change. Specifying an AVCL will always help to make our job easier in this task as it can provide an effective passive control measure against heat transfer.

An AVCL can bring benefits to any building element, but its value can vary according to building type and construction build-up. A good example is in the case of a building which has a high internal moisture content. Failing to install an AVCL in a swimming pool project for example will undoubtedly lead to problems associated with condensation, mould, loss of thermal performance and maybe even structural damage.

The type of building in terms of its use can also determine the ideal type of AVCL. In the case of trapped moisture within the construction an AVCL with variable sd-value that allows moisture to escape will be an advantage.

What is the right sd-value?

Vapour control or Vapour barrier?

The higher the sd-value (vapour resistance) of the AVCL, the higher the protection of the insulation against a warm, humid indoor climate. However, a higher sd-value in an AVCL also means a less drying out capability. Humidity can accumulate in a building during construction in many ways and can be difficult to resolve, whether this be through wet trades, poor detailing, precipitation or other sources. If moisture within a construction element is left unchecked it could lead to mould growth, which could eventually cause damage to the building and represent a health risk for its occupants. AVCLs with an sd-value of greater than 20m (>100 MNs/g) - e.g. polyethylene sheets - do not easily forgive small defects in the installation process and the vapour barrier functionality of these materials will then prevent trapped moisture from drying out to the interior of the construction. Therefore, under normal room humidity levels and when diffusion capable membranes are fitted to the exterior, AVCLs with a lower sd-value can be considered a safer choice for installation to the interior.

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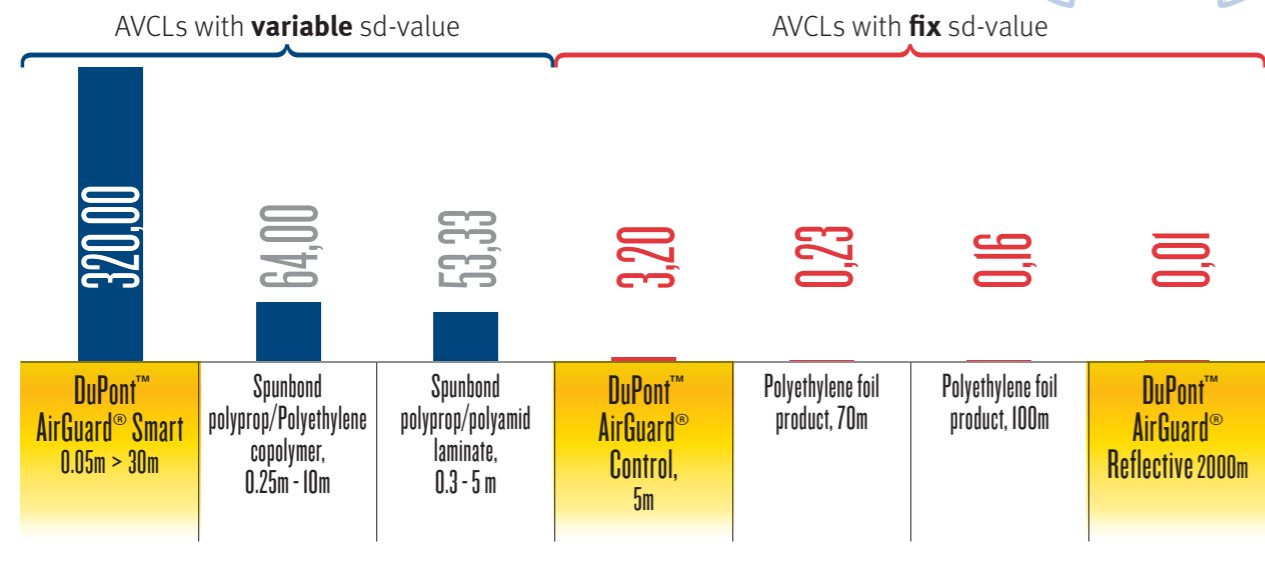
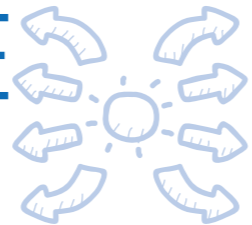
For rooms with extreme humidity levels, it is recommended that AVCL's with a high sd-value are installed only after the drying out process of the construction materials.

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DRYING OUT POTENTIAL OF AVCLs BY sd-VALUE

during summer months (g/(m² 24h))

Source: DuPont, moisture diffusion at 1000Pa, calculated according to DIN4108-3



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MOISTURE, TRAPPED INSIDE YOUR HOME, COULD AFFECT ITS LONGEVITY

AVCLs with a variable sd-value offer excellent protection against condensation risk and potential damage.



AVCLs with a variable sd-value offer excellent protection against condensation risk and potential damage.

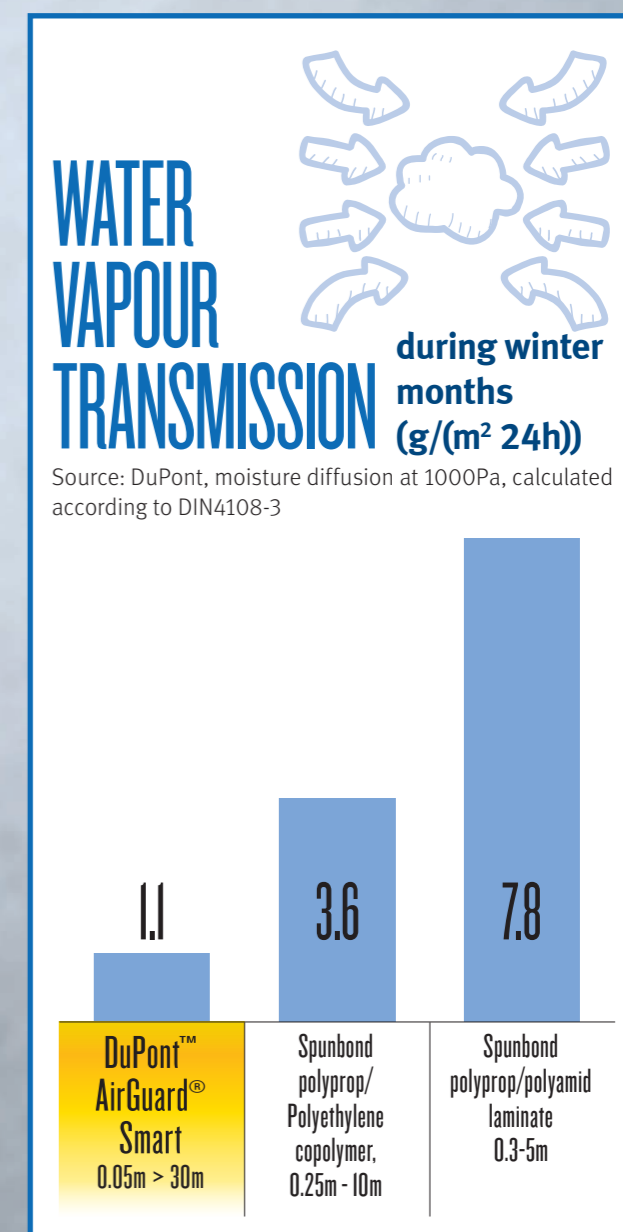
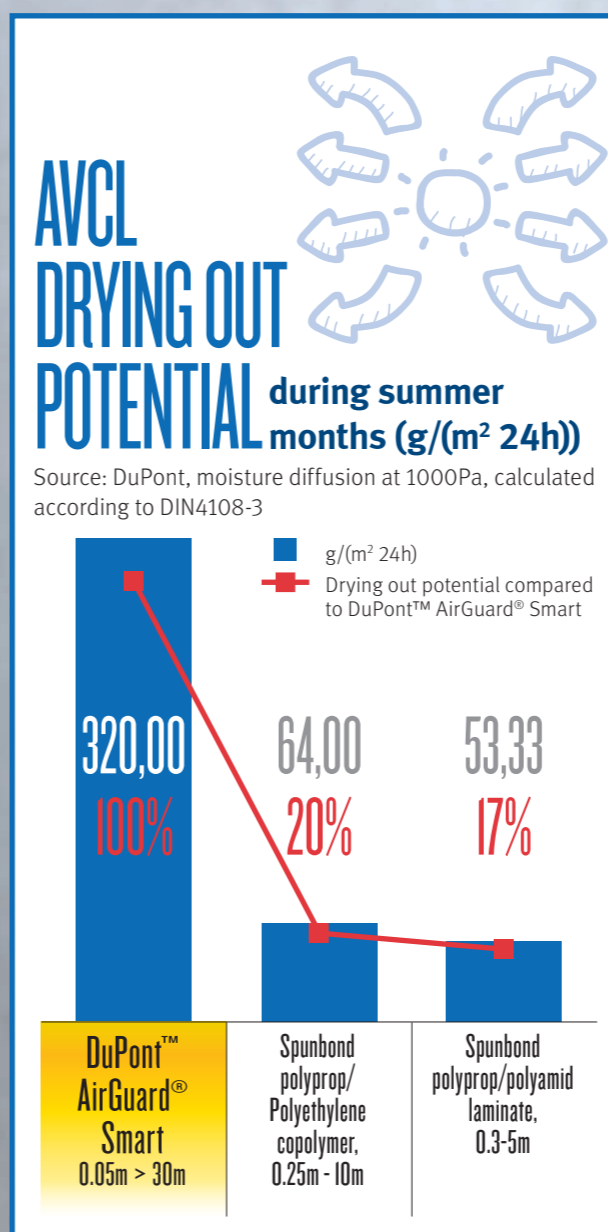
During the winter the sd-value of the membrane increases as the relative humidity within the interior of the building increases, thus reducing moisture transfer towards the insulation at a time when vapour control is most needed. The Sd-value then decreases with a decline of relative humidity during the summer months, thus allowing the structure to dry out to the interior.

The broader the sd-value range of a variable AVCL, the higher the humidity protection

The lower range of a layer's sd-value represents the drying out potential of a variable AVCL during summer months. A difference of 0.2-0.25m may sound minimal, but this can have a significant impact when wet construction materials need to dry out. The upper sd-value represents water vapour transmission during winter months, the higher the value the less moisture will penetrate from the interior towards the insulation. DuPont has developed a unique technology that enables a lower sd-value of 0.05m (=0.25 MNs/g) and an upper sd-value of 30m (=150 MNs/g) for its variable AVCL **DuPont™ AirGuard® Smart**.

DuPont™ AirGuard® Smart provides outstanding humidity protection compared to other AVCLs

The right membrane can help accelerate the drying out process of wet construction materials, making a considerable contribution to the overall 'health' of the building structure. The capacity of **DuPont™ AirGuard® Smart** is approximately 1400 – 2000 times higher than Polyethylene sheets with an sd-value of 75 – 100m, (375 – 500 MNs/g) and 5-6 times higher than comparable variable AVCL membrane products.



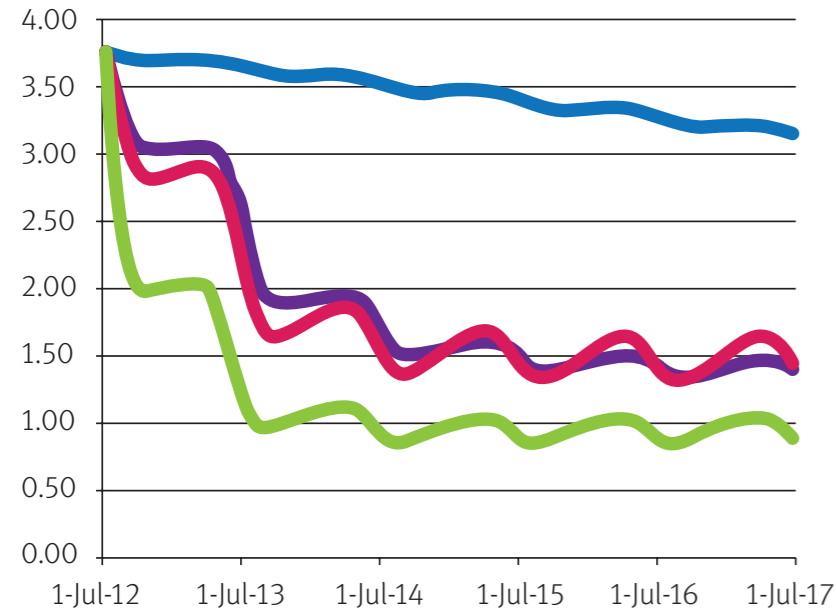
For rooms with extreme humidity levels, it is recommended that AVCL's with a high sd-value are installed only after the drying out process of the construction materials.

EXAMPLE AVCL performance in a flat compact roof construction with plywood 21mm and mineral wool, 350mm thick layers, climate London

TOTAL WATER CONTENT kg/m^2

Source: DuPont, calculated with WUFI software program

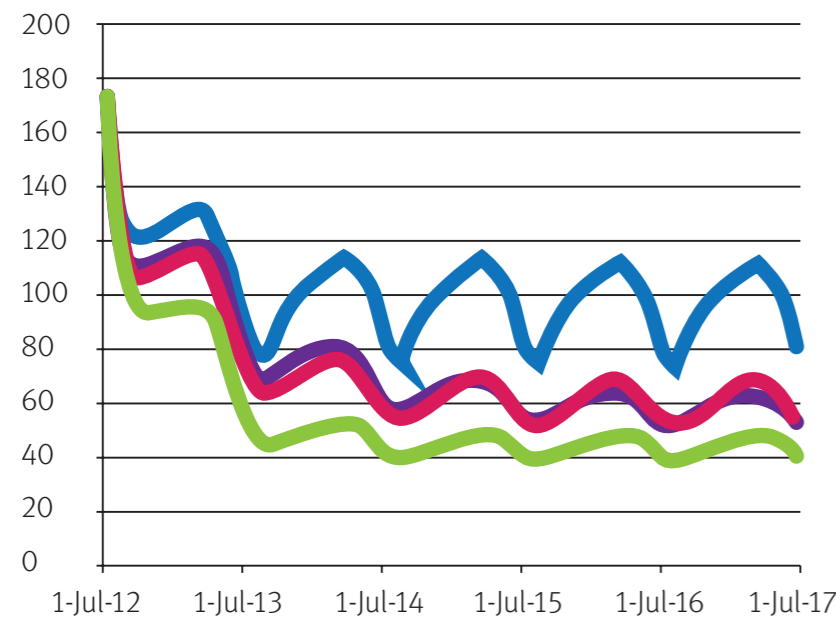
- Polyethylene sheet, $sd = 20\text{m}$
- Spunbond polyprop/polyamid laminate, $sd = 0.3\text{m} < 5\text{m}$
- Spunbond polyprop/Polyethylene copolymer, $sd = 0.25\text{m} - 10\text{m}$
- DuPont™ AirGuard® Smart, $sd = 0.05\text{m} > 30\text{m}$



PLYWOOD WATER CONTENT kg/m^2

Source: DuPont, calculated with WUFI software program

- Polyethylene sheet, $sd = 20\text{m}$
- Spunbond polyprop/polyamid laminate, $sd = 0.3\text{m} < 5\text{m}$
- Spunbond polyprop/Polyethylene copolymer, $sd = 0.25\text{m} - 10\text{m}$
- DuPont™ AirGuard® Smart, $sd = 0.05\text{m} > 30\text{m}$

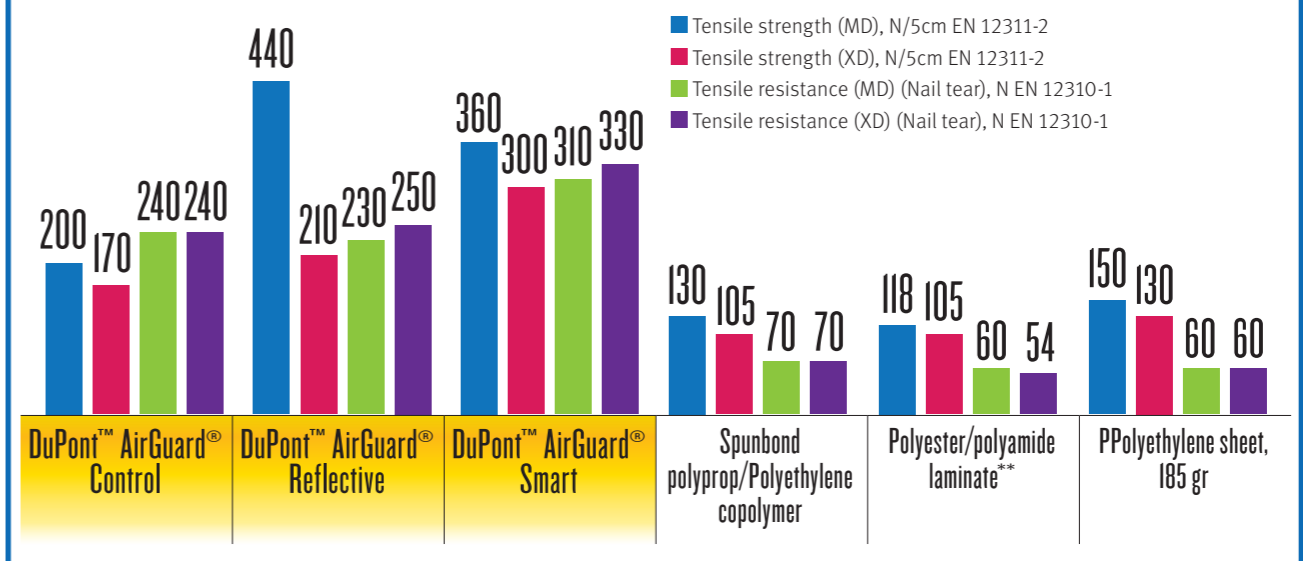


High mechanical strength helps to make the product easier to install

A mechanically strong membrane has less risk of being damaged during the installation, for example, through tearing or puncturing. DuPont AVCL products, based on DuPont nonwoven material technology, are very robust compared to polyethylene, spunbond polypropylene or polyester based products.

The tear strength of DuPont™ AirGuard® Smart is 4-5 times higher than standard Polyethylene sheets or comparable AVCL products with variable sd-values.

AVCL MECHANICAL STRENGTH COMPARISON*



* Manufacturer data sheets, **single measurements by DuPont



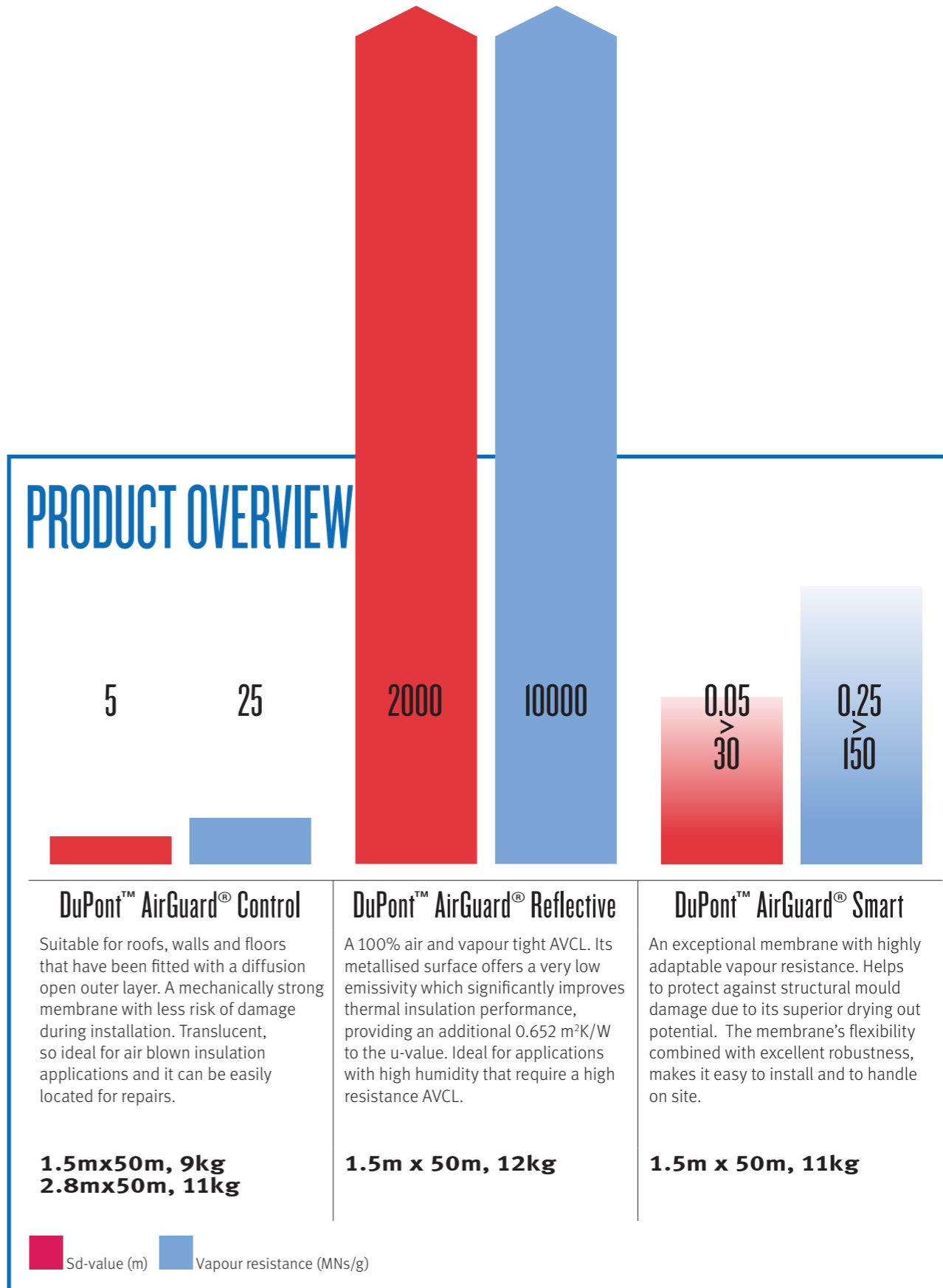
DUPONT BUILDING INNOVATIONS: SOLUTIONS FOR AIR & VAPOUR MANAGEMENT

MOISTURE, TRAPPED INSIDE YOUR BUILDING, DEGRADES YOUR LIVING COMFORT.

Only the vast DuPont range of air & vapour control layers guarantees optimal moisture control.

PRODUCT OVERVIEW

PRODUCT OVERVIEW



DuPont™ AirGuard® Control

Suitable for roofs, walls and floors that have been fitted with a diffusion open outer layer. A mechanically strong membrane with less risk of damage during installation. Translucent, so ideal for air blown insulation applications and it can be easily located for repairs.

1.5mx50m, 9kg
2.8mx50m, 11kg

DuPont™ AirGuard® Reflective

A 100% air and vapour tight AVCL. Its metallised surface offers a very low emissivity which significantly improves thermal insulation performance, providing an additional 0.652 m²K/W to the u-value. Ideal for applications with high humidity that require a high resistance AVCL.

1.5m x 50m, 12kg

DuPont™ AirGuard® Smart

An exceptional membrane with highly adaptable vapour resistance. Helps to protect against structural mould damage due to its superior drying out potential. The membrane's flexibility combined with excellent robustness, makes it easy to install and to handle on site.

1.5m x 50m, 11kg

DuPont AVCL product selector

| | Normal room humidity, -40%-70% | High room humidity, >70% | Roof type | | Roof covering | | | Wall | Floor | Underlay sd-value | | Insulation | |
|------------------------------|--------------------------------|--------------------------|-----------|----------------|---------------|-------|--------------------|------|-------|-------------------|------|--|--|
| | | | Flat | Pitched, > 10° | Metal | Tiles | Single ply/bitumen | | | Low | High | Diffusion open ($\mu \leq 10$) as for example: Stone wool, glass wool, wood fibre, cellulose fibre, etc. | Diffusion closed ($\mu > 10$) as for example: EPS, XPS, PUR/PIR, phenolic foam, foam glass |
| | | | | | | | | | | | | | |
| DuPont™ AirGuard® Control | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DuPont™ AirGuard® Reflective | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DuPont™ AirGuard® Smart | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

14 Legend: ● Usually recommended ● Usually not recommended ● Case specific

Note: Rule of thumb only. Installations should be carefully analysed prior to product selection.

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DuPont™ AirGuard® Control, A mechanically robust AVCL for airtightness and limited humidity protection

| | |
|------------------------------|--|
| Product | DuPont™ membrane technology Sd-value: 5m, Vapour resistance 25 MNs/g Roll: 1.5m x 50m |
| Insulation | Diffusion open ($\mu \leq 10$), for example: Stone wool Glass wool Wood fibre Cellulose fibre etc |
| External wind barrier | Diffusion open membrane, eg. DuPont™ Tyvek® with or without ventilation |
| Application | Warm and cold pitched roof Wall Floor Normal domestic humidity levels, 40%-70% |
| Benefits | An AVCL with limited vapour transmission that reduces the risk of condensation within the insulation and enables drying out of the construction. Airtight and water resistant Superior mechanical strength Lightweight and flexible material – easy to install Reaction to fire: Class E CE-conformity for vapour control layer (EN 13984) |
| Waste treatment | |
| Accessories | Tyvek® Acrylic Tape Tyvek® Double Sided Tape Tyvek® Butyl Tape DuPont™ FlexWrap NF |



DuPont™ AirGuard® Reflective

An AVCL for normal to extreme interior humidity climates that enhances thermal insulation performance

| | |
|------------------------------|---|
| Product | DuPont™ membrane laminate technology Sd-value: 2000m, Vapour resistance: 10000 MNs/g Roll: 1.5m x 50m |
| Insulation | Any type of insulation |
| External wind barrier | Diffusion open membrane, e.g. DuPont™ Tyvek® with or without ventilation or diffusion closed membranes e.g. Bitumenous felt with ventilation |
| Application | Warm and cold pitched roof Flat roof Wall Floor For normal to high interior humidity levels |
| Benefits | A high resistance AVCL- greatly limits vapour diffusion High emissivity – helps to enhance thermal insulation performance by providing additional 0.67 m ² K/W Airtight and water resistant Superior mechanical strength A lightweight and flexible material – easy to install Reaction to fire: Class E CE-conformity for vapour control layer (EN 13984) |
| Waste treatment | |
| Accessories | Tyvek® Metallised Tape Tyvek® Double Sided Tape Tyvek® Butyl Tape DuPont™ FlexWrap NF |



DuPont™ AirGuard® Smart

An innovative membrane with variable sd-value which adapts for superior drying out potential and humidity protection.

| | |
|------------------------------|---|
| Product | DuPont™ membrane laminate technology Sd-value: 0.05 m > 30m, Vapour resistance: 0.25 > 150 MNs/g Roll: 1.5m x 50m |
| Insulation | Diffusion open ($\mu \leq 10$) insulation as for example: Stone wool, glass wool, wood fibre, cellulose fibre, etc. |
| External wind barrier | Diffusion open membrane, for example DuPont™ Tyvek® |
| Application | Suitable for internal and external installation Warm and cold pitched roofs Flat roof Wall Floor For normal room humidity levels, 40%-70% |
| Benefits | A vapour control layer with a highly adaptable sd-value 0.05m > 30m providing excellent levels of humidity protection and drying out potential Airtight with superior mechanical strength Lightweight and flexible material – easy to install Reaction to fire: Class E CE-conformity for vapour control layer (EN 13984) |
| Waste treatment | |
| Accessories | Tyvek® Acrylic Tape Tyvek® Double Sided Tape Tyvek® Butyl Tape DuPont™ FlexWrap NF |



Accessories



| | DuPont™ Tyvek® Acrylic Tape | DuPont™ Tyvek® Metallised Tape | DuPont™ Tyvek® Double Sided Tape | Tyvek® Butyl Tape | DuPont™ FlexWrap NF |
|----------------------------------|---|---|---|--|--|
| Product | Made of Tyvek® and acrylic adhesive. | Single-sided reflective tape. Made of metallised Tyvek® and acrylic adhesive. | Double sided acrylic tape. Excellent adhesion properties. | Double sided butyl based sealant, used to form a moisture and airtight seal. | High performance stretchable and flexible self-adhesive flashing tape. |
| Colour | White | Silver | Colorless | Black | White/Black |
| Product dimensions | 60mm x 25m 75mm x 25m 100mm x 25m | 75mm x 25m | 50mm x 25m | 20mm x 30m 50mm x 30m | 150mm x 22.9m |
| Building material fit | | | | | |
| Masonry/concrete/render (smooth) | 👍 | 👍 | 👍 | 👍 | 👍 |
| Brick/block/concrete (rough) | | | | 👍 | Use primer |
| Plasterboard | 👍 | 👍 | 👍 | 👍 | |
| Eaves Carrier | | | 👍 | 👍 | 👍 |
| Window/door frames | 👍 | 👍 | 👍 | 👍 | 👍 |
| Metal surface | 👍 | 👍 | 👍 | 👍 | 👍 |
| Timber (rough sawn) | | | | 👍 | Use primer |
| Timber (planed) | 👍 | 👍 | 👍 | 👍 | 👍 |
| Sealing the details | | | | | |
| Pipe penetrations | 👍 | 👍 | | | 👍 |
| Wiring / cable penetrations | 👍 | 👍 | | | 👍 |
| Chimneys | | | | 👍 | 👍 |
| Electrical sockets | 👍 | | 👍 | 👍 | 👍 |
| Laps sealing | 👍 | 👍 | 👍 | | |
| Nail penetrations | | | | 👍 | 👍 |
| Damage repair & making good | 👍 | 👍 | | | 👍 |



DuPont™ membrane system overview

| Applications | Breather membranes AVCL membranes | Normal internal humidity (-40% - 70%) | | High internal humidity > 70% |
|--|--|---------------------------------------|-------------------------|------------------------------|
| | | DuPont™ AirGuard® Control | DuPont™ AirGuard® Smart | DuPont™ AirGuard® Reflective |
| Pitched roof, > 10° with tiles or slates | Tyvek® Supro / Plus | 🟢 | 🟡 | 🟢 |
| | Tyvek® Enercor® Roof | 🔴 | 🟢 | 🟢 |
| Pitched roof with metal coverings | Tyvek® Metal | 🟡 | 🟡 | 🟢 |
| Flat roof | | 🔴 | 🟡 | 🟢 |
| Wall | Tyvek® Supro | 🟢 | 🟢 | 🟢 |
| | Tyvek® Soft | 🟢 | 🟢 | 🟢 |
| | Tyvek® Housewrap / Firecurb® Housewrap | 🟢 | 🟢 | 🟢 |
| | Tyvek® Reflex® | 🟢 | 🟢 | 🟢 |
| | Tyvek® UV Facade | 🟢 | 🟢 | 🟢 |

Legend: 🟢 Usually recommended 🔴 Usually not recommended 🟡 Case specific



Recommendations as to methods, use of materials and construction details are based on the experience and current knowledge of DuPont and are given in good faith as a general guide to designers, contractors and manufacturers. This information is not intended to substitute for any testings you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge and experience becomes available. Since we cannot anticipate all variations in actual end-use conditions, DuPont makes no warranties and assumes no liability in connection with any use of this information. Nothing in this publication is to be considered as a licence to operate under a recommendation to infringe any patent right.



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