NSAI Agrément

CERTIFICATE NO. 03/0192

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Alkorplan Roof Waterproofing Systems

Systém d'étanchéité pour toitures
Dachabdichtungen

NSAI Agrément (**Irish Agrément Board)** is designated by Government to carry out European Technical Assessments.
NSAI Agrément establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2014**.

PRODUCT DESCRIPTION:
This Certificate relates to Alkorplan roofing systems for use as a mechanically fastened, ballasted or bonded waterproofing layer on pitched or flat roofs with limited access as well as on flat roofs such as terraces and planted roofs. This Certificate certifies compliance with the requirements of the Building Regulations 1997 to 2014.

USE:
This Certificate covers the use of Alkorplan Roof Waterproof Systems (35170, 35176, 35177, 35179) as a bonded, loose laid and ballasted or mechanically fixed waterproofing membrane on pitched roofs with limited access as well as on flat roofs such as terraces and planted roofs. These systems are intended for use on flat roofs with substrates in accordance with BS 8217:2005 *Code of practice for reinforced bitumen membranes for roofing*, and for the waterproofing of all normal roofing details such as parapets, outlets and roof lights.

MANUFACTURE AND MARKETING:
The membrane system is manufactured by:

Renolit Belgium N.V.,
Industrie Park De Bruwaan 9,
B-9700 Oudenaarde,
Belgium.
Email: renolit.belgium@renolit.com

The product is marketed in Ireland by:

Laydex Ltd.,
Unit 3,
Allied Industrial Estate,
Kylemore Road,
Dublin 10.

Tel: 00353 1 642 6600
Fax: 00353 1 642 6601
Email: sales@laydex.ie

1.1 ASSESSMENT

In the opinion of NSAI Agrément, Alkorplan Roof Waterproof Systems installed in Ireland by trained, licensed contractors in accordance with processing specifications issued by Renolit Belgium N.V. and used in accordance with this Certificate, can meet the requirements of the Building Regulations 1997 to 2014, as indicated in Section 1.2 of this Irish Agrément Certificate.

1.2 BUILDING REGULATIONS 1997 to 2014

REQUIREMENT:

Part D – Materials and Workmanship

D3 – Alkorplan Roof Waterproof Systems, as certified in this Certificate, are manufactured from materials which are proper materials fit for their intended use (see Part 4 of this Certificate).

D1 – Alkorplan Roof Waterproof Systems used in accordance with this Certificate, meet the requirements of the building regulations for workmanship.

Part A – Structure

A1 – Loading

Alkorplan Roof Waterproofing Systems can meet the loading requirements, provided the installation complies with the conditions described in this Certificate.

Part B – Fire Safety

B4 – External Fire Spread

Alkorplan Roof Waterproof Systems can meet the requirements for resistance to fire penetration and the distance of spread of flame for roofs, as indicated in Section 4.1 of this Certificate.

Part C – Site Preparation and Resistance to Moisture

C4 – Resistance to Weather and Ground Moisture

Alkorplan Roof Waterproof Systems can meet the requirements when installed as indicated in Section 2.6 of this Certificate.

Part F – Ventilation

F2 – Condensation in Roofs

Alkorplan Roof Waterproof Systems can meet the requirements of this regulation, when designed and installed in accordance with this certificate.

Part L – Conservation of Fuel and Energy

L1 - Conservation of fuel and energy

Alkorplan Roof Waterproof Systems, in conjunction with the full roof build-up, can contribute to or meet the requirements of this regulation, when designed and installed in accordance with this certificate.

2.1 PRODUCT DESCRIPTION

Alkorplan Roof Waterproof Membranes are manufactured from PVC polymer, plasticizers, stabilisers and pigments. Membranes are secured either by mechanical fixing, ballast or glue. Lap joints are made using solvent or by hot air welding. A range of suitable profiles can be fabricated from Alkorplan metal to deal with parapet, edge, upstands and gulley details as required.

2.2 PRODUCT RANGE

Table 1: Product Range

	Thickness (mm)	Roll Width (m)	Roll Length (m)	Weight (kg/m^2)	Colour
35170	1.5	1.05	20	1.95	Various
35176	1.2 1.5 1.5	1.05 1.60 2.10	25 20 20	1.45 1.85 1.85	Various
35276	1.2 1.5	1.05 1.60	25 20	1.45 1.85	White
35177	1.2 1.5	2.05 2.05	20 15	1.57 1.96	Light Grey
35179	1.2 1.5	2.10 2.10	15 15	1.86 2.25	Various
35279	1.2 1.5	2.10 2.10	15 15	1.86 2.25	White

- Alkorplan 35170 is a non-reinforced PVC membrane suitable for mechanical fixing.
- Alkorplan 35176 and 35276 is a polyester reinforced PVC membrane suitable for mechanical fixing.
- Alkorplan 35177 is a glass fibre fleece reinforced PVC membrane suitable for loose laying and ballasting.
- Alkorplan 35179 and 35279 is a PVC membrane backed with a polyester fleece suitable for bonding.

2.3 ANCILLARY ITEMS

- Alkorplan 81170 – Galvanised steel sheet laminated with PVC foil (2m x 1m).
- Alkorplan 81171 – Galvanised steel sheet laminated with PVC foil (3m x 1m).
- Alkorplus 81044 – Cleaner on ethyl acetate base.
- Alkorplan 81060 – Preformed internal corner in PVC membrane.
- Alkorplan 81061 – Preformed external corner in PVC membrane.
- Alkorplan 81062 – Preformed external corner for rooflights.
- Alkorplan 81038 – Seam sealing mastic (liquid PVC).
- Alkorplus 81025 – THF based welding fluid for cold welded seams.
- Alkorplus 81001 – 120 g/m^2 glass-fibre fleece for use as a separation layer.
- Alkorplus 81004 – 500 g/m^2 polyester fleece for use as a protection layer.
- Alkorplus 81005 – 300 g/m^2 polyester fleece for use as a protection layer.
- Alkorplus 81008 – 180 g/m^2 polyester fleece for use as a separation layer.
- Alkorplan 35171 – 1.5mm PVC membrane for detailing work in different colours.
- Alkorplus 81040 – Solvent based nitrile contact adhesive.
- Alkorplus 81068 – PU adhesive.
- Alkorplus 81012 – LDPE vapour check.
- Alkorplus 81057 – Double-sided seam tape for LDPE vapour check.
- Alkorplan 35x76 – PVC walkway protection membrane for trafficked areas.
- Alkorplus 81058 – Compressive foam strip for wind-tight laminated metal connections.
- Alkorplus 81192 – Aluminium tape for flexible laminated metal connections.
- Alkorplan 35121 – Protective polyester fleece with PVC foil lamination.
- Alkorplus 81345 – Applicator brush for cold welded seams.
- Alkorplus 81145 – PE bottle for seam sealing mastic.
- Alkorplus 81245 – Nozzle for PE bottle.
- Alkorplan 81503 – Standing seam profile, X-large.
- Alkorplan 81504 – Standing seam profile, large.
- Alkorplan 81502 – Double pressure roller for standing seam profiles.

2.4 MANUFACTURE

Alkorplan Roof Waterproof Membranes are manufactured by calendering plasticized PVC into sheets. Two or three of these sheets are then heat laminated together with a reinforcing scrim in between or fleece-backed if appropriate. The product is then cut to length and reeled onto a cardboard core, wrapped and labelled.

2.5 DELIVERY, STORAGE AND MARKING

Each roll carries a label bearing the product's name, product description including type no., article no., thickness, width and length.

In addition, the batch no. and the date of production are printed on the top side of the edge of the roofing sheet at regular spaces. Labels containing the NSAI Agrément mark and Certificate number are fixed to each roll pack.

Rolls are to be stored horizontally on pallets in a dry condition. No more than two pallets should be stored on top of each other.

Solvents and sealants must be stored in a dry, sealed area reserved for inflammable materials.

2.6 INSTALLATION

Only trained installers, working in accordance with the manufacturer's recommendations and installation instructions shall carry out installation of the roof covering in accordance with the relevant clauses of BS 80004: 1989: *Workmanship on building sites – Code of practice for waterproofing.* Roof decks to which the covering is applied, must comply with BS 6229:2003 *Code of practice for flat roofs with continuously supported coverings*.

Substrates should be clean and free from sharp projections such as nail heads and concrete nibs. Where Alkorplan Roof Waterproof Membranes are laid over rough finished decks, the appropriate protection layer must be used.

The roofing sheets are not compatible with bitumen, coal tar pitch or oil based products and direct contact with such products must be prevented by use of one of the recommended separating layers.

Direct contact with polystyrene, polyurethane or polyisocyanurate insulation boards can only be used under Alkorplan when they have a top surface of laminated aluminium foil or have one of the recommended separating layers intervening.

Insulation materials should comply with the BS 8217:2005 or be the subject of a current NSAI Agrément Certificate suitable for this application. The compatibility of the insulation materiel and the Alkorplan membranes should be checked with the Certificate holder.

Insulation boards should be laid with long edges fully supported, lightly butted together with staggered end joints, with mechanical fixing as required to resist wind loading determined in accordance with the requirements of I.S. EN 1991-1-4:2005+NA:2013: *Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions.*

Alkorplan Roof Waterproof Membranes may be laid in conditions normal to roofing work, but should not be laid in wet weather conditions. At temperatures below 5°C, to avoid the risk of moisture entrapment or contamination of the solvent used in lap jointing, suitable precautions must be taken.

All installation work must be carried out under the supervision of operatives who have received training from Renolit Belgium NV.

2.6.1 Installation Procedure: Mechanically Fixed System

Alkorplan Roof Waterproof Membranes must be initially loose-laid with the light grey/coloured surface uppermost (automatically when unrolling the roll). The loose-laid waterproofing membrane should be secured by mechanical fixing using the appropriate roof fasteners for each kind of supporting substructure (SFS Isofast pressure plates or equal). The lap joints are made using solvent by hot air welding. Laps must be at least 100mm wide and shall be fully supported during welding operations as to accommodate the pressure plate of the fixing element and a 50mm wide weld (see Figure 1).

The mechanical fixing of the initially loose-laid membrane is designed to absorb the wind uplift forces and to transmit these forces to the supporting substructure. The fixing system described in Section 2.1 of this Certificate is to be used.

Where SFS discs or equal are used, the Alkorplan Roof Waterproof Membrane is fixed in the joint overlaps. The discs are installed with the longitudinal side parallel to the outer edge of the membrane and with a minimum dimension of 30mm from the edge to the centre of the disc. The overall overlap width in the membrane must be 100mm, in order to ensure a remaining overlap width of 50mm to accommodate the weld. The fixing in the supporting substructure is effected by corrosion resistant screws.

The pressure plates of the fixing elements are installed in the overlap with the longitudinal side parallel to the outer edge of the membrane and with a minimum dimension of 30mm from the edge of the sheet to the centre of the pressure plate. The pressure plates are fixed to the substrate by means of corrosion resistant screws through the thermal insulation, vapour control layer and existing protection or separation layers to the supporting substructure.

2.6.2 Installation Procedure: Ballasted System

Alkorplan Roof Waterproof Membranes must be loose laid with the light grey surface uppermost. The loose-laid membrane should be secured by ballast. The lap joints are made using solvent or by hot air welding. Laps must be at least 50mm wide (see Figure 2). The ballast on the initially loose-laid membrane is designed to absorb the wind uplift forces and to transmit these forces to the supporting substructure. Immediately after the installation of the Alkorplan membrane on the surface, a sufficient layer of ballast is put in place to avoid movement of the membrane by wind forces. When necessary, a protection layer is previously installed between the membrane and the ballast.

2.6.3 Installation Procedure: Glued System

Alkorplan Roof Waterproof Membranes are glued with Alkorplus PU adhesive to the substrate. Appropriate substrates for gluing Alkorplan membranes are metal, concrete or timber supporting substructures as well as existing bituminous waterproofing of old roofs or thermal insulation specially designed for this purpose.

The lap joints are made by solvent or hot air welding. Laps must be at least 80mm wide. The weld is 50mm wide (see Figure 3).

The glue is designed to absorb the wind uplift forces and to transmit these forces to the supporting structure. The PU adhesive is applied in stripes and spread on full area.

2.6.4 Details

Upstands, edge and gulley details are formed in Alkorplan Metal (PVC coated galvanised steel) sections mechanically fixed to the substructure. Alkorplan Roof Waterproof Membranes should be continuously welded to all Alkorplan Metal components (see Figure 4).

2.6.5 Jointing Procedure

The solvent used in welding laps has a low flash point and where it is to be used in enclosed spaces, adequate ventilation facilities should be provided.

Welds must be achieved using Alkorplan solvent or by means of a hot air welder. The lap joint area on both sheets must be cleaned back a minimum of 50mm and then dried. Laps must be at least 50mm wide and should be fully supported during welding operations.

Welded laps should be consolidated by the application of firm even pressure to ensure a watertight seal. All laps must be checked at least 15 minutes after welding by running a metal probe along the welded edge, and any discontinuities made good.

All laps must finally have a bead of Alkorplan liquid PVC sealing mastic applied to the exposed edge and injected into any voids to close all remaining capillaries. Hot air welding may also be used to close capillaries.

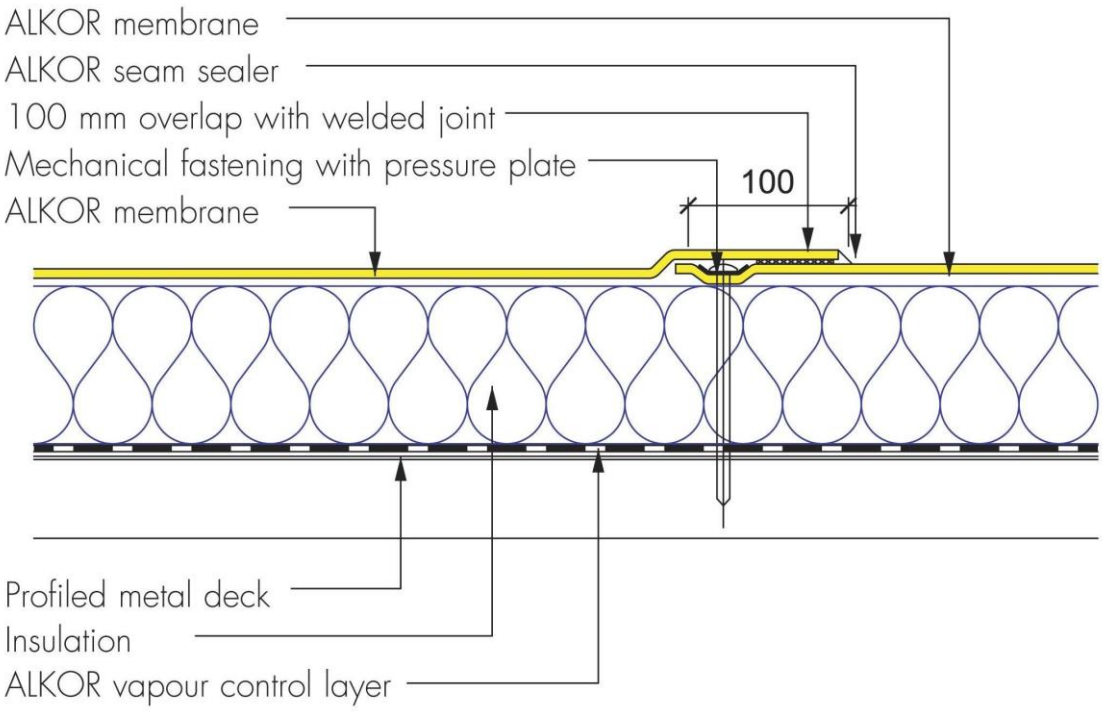

Figure 1: Mechanically Fixed Seam

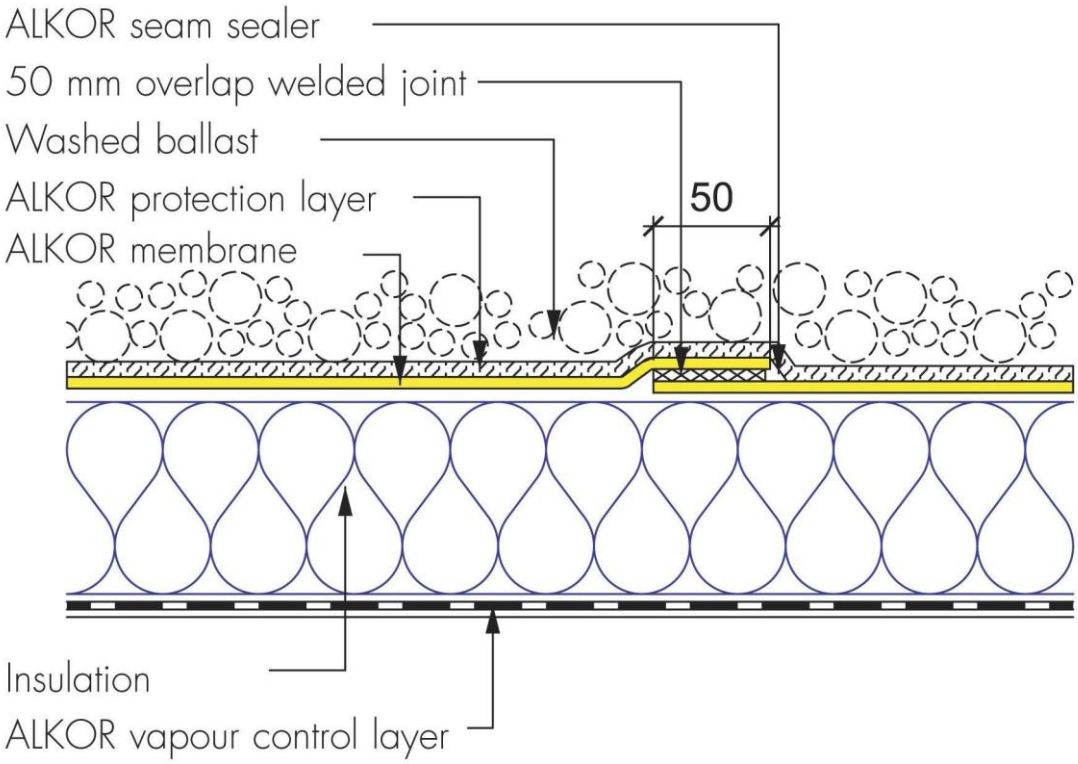

Figure 2: Loose Laid Ballasted Seam

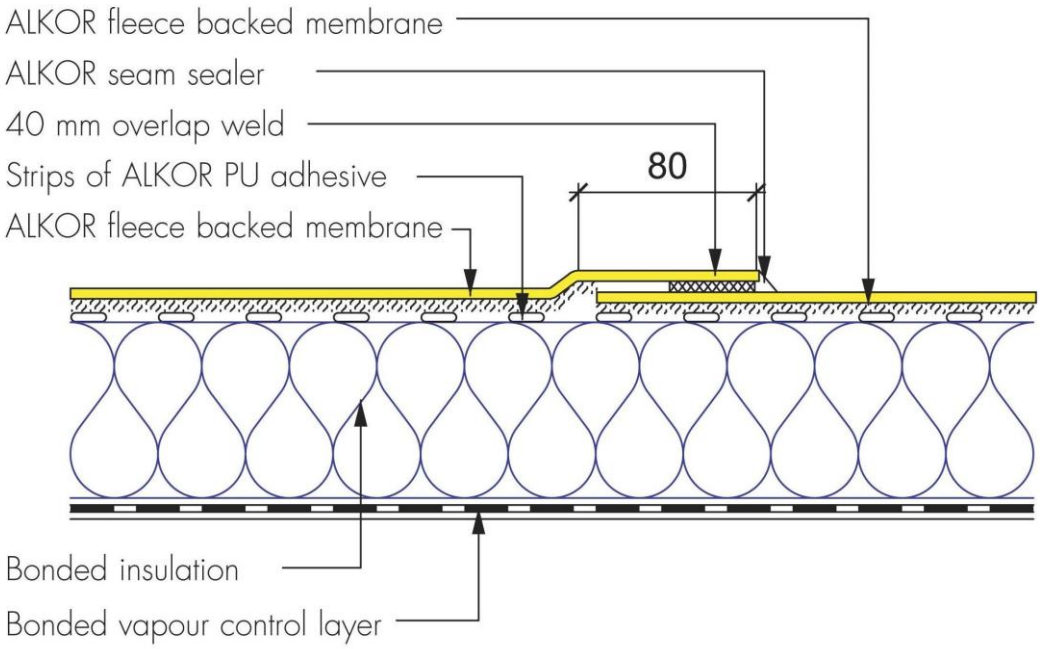

Figure 3: Partially Bonded Seam

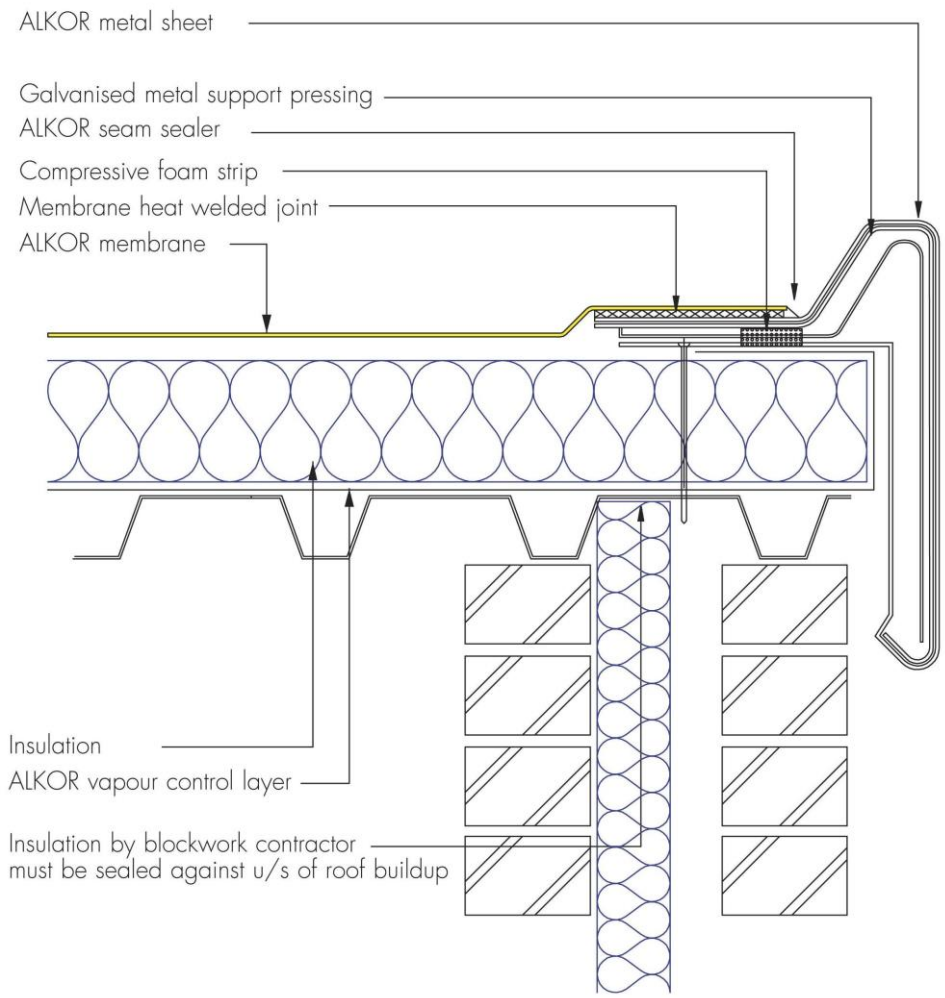

Figure 4: Water-Check Kerb

3 GENERAL

3.1 Alkorplan Roof Waterproof Membranes when installed in accordance with the manufacturer's instructions are suitable for use on timber, metal, concrete or insulated decks as mechanically fixed waterproofing membranes on flat and pitched roofs with limited access.

(a) A fully bonded single layer waterproof covering on pitched roofs with limited access.

(b) A fully bonded single layer waterproof covering on flat roofs with limited access.

3.2 Alkorplan Roof Waterproof Membranes are also suitable for use as loose-laid ballasted membrane single layer waterproof covering, ballasted with aggregate to prevent wind uplift. On flat roofs with limited access as well as on roofs for public access such as terraces and planted roofs, appropriate protection layers shall be used.

3.3 Alkorplan Roof Waterproof Membranes are also suitable for use as glued membranes on flat and pitched roofs with limited access.

3.4 Alkorplan Roof Waterproof Membranes are also suitable for use where appropriate as an exposed capsheet.

3.5 Condensation risk should be assessed in accordance with BS 6229: 2003 *Code of practice for flat roofs with continuously supported coverings*, and BS 5250:2011: *Code of practice for control of condensation in buildings*, and only approved vapour barriers should be used.

3.6 Limited access roofs are defined for the purpose of this Certificate as those roofs that are subjected only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters etc. Where traffic in excess of this is envisaged, special precautions such as additional protection to the membrane must be taken, as recommended by the manufacturer.

3.7 Flat roofs are defined for the purpose of this Certificate as those roofs up to 10^{o} to the horizontal and having a minimum finished fall of 1:80. Pitched roofs are defined as those having falls within the range of 10^{o} to 70^{o} to the horizontal. See section 4.1 of this certificate for the fire test rating and classification per BS 476: Part 3: 2004: *Fire tests on building materials and structures – Classification and method of test for external fire exposure to roofs,* of roof systems using the Alkorplan 35177 membrane. The designation of other roof systems should be confirmed by test or assessment.

3.8 To minimize ponding, and in accordance with BS 6229:2003, it is recommended that flat roofs should have a Design Fall of 1:40 to achieve a Minimum Finished fall of 1:80, unless a detailed analysis of the roof is available, including overall and local deflection and direction of falls.

3.9 Decks to which the product is to be applied must comply with the relevant requirements of BS 8217:2005 and BS 6229:2003.

3.10 Non-traditional insulation systems or materials used in conjunction with the product must be used in accordance with the manufacturer's instructions.

3.11 The adhesion of Alkorplan Roof Waterproof Membranes to decking, or bituminous felt, is sufficient to resist the effects of wind suction, elevated temperatures and thermal shock conditions likely to occur in practice.

3.12 The systems can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance operations. Reasonable care is required, however, to avoid puncture by sharp objects or concentrated loads.

4.1 BEHAVIOUR IN FIRE

When tested in accordance with BS 476-3:2004, a system comprising:

1. A 18mm oriented strand board, a vapour control layer, 80mm foil-faced polyurethane insulation board and 1.2mm thick Alkorplan 35176, mechanically fastened, achieved a rating of EXT.S.AB.
2. A 0.7mm steel deck, a vapour control layer, 80mm foil-faced polyurethane insulation board and 1.5mm Alkorplan 35170, mechanically fastened, achieved a rating of EXT.F.AB.
3. A 0.75mm profiled metal deck covered on upper surface with a low density polyethylene vapour control layer, a 50mm layer of phenolic foam insulation board, covered by 1.5mm thick Alkorplan 35170, achieved an EXT.F.AB rating.
4. A 0.75mm profiled metal deck covered on upper surface with a low density polyethylene vapour control layer, a 50mm layer of polyurethane foam insulation board, covered by a 1.2mm thick Alkorplan 35176, achieved an EXT.F.AB rating.
5. A 22mm plywood deck covered on its upper surface with a bitumen vapour control layer, a 60mm polyurethane insulation board, covered with two layers of felt, bonded with 95/25 bitumen, covered by Alkorplan 35179 partially bonded with Alkorplus 81066 achieved an EXT.F.AB rating.

The designation of other roof types should be confirmed by test or assessment.

When using the Alkorplan 35177 membrane on flat roofs where additional protection is to be applied, reference should be made to TGD B, Appendix A, Table A5, and to Commission Decision 2000/553/EC for conditions and surface protections which fulfil the 'external fire performance' requirements of TGD B to the Irish Building Regulations. Such ballast protection would normally consisting of:

- A layer of loose laid gravel with a thickness of at least 50mm or a mass ≥ 80kg/m^2 (minimum aggregate size 4mm maximum 32 mm).
- Sand/cement screed to a thickness of at least 30mm
- Cast stone or mineral slabs of at least 40mm thickness.

4.2 THERMAL INSULATION

Calculations of the thermal transmittance (U-value) of specific roof build-ups should be carried out in accordance with IS EN ISO 6946:2007 *Building components and building elements – Thermal resistance and thermal transmittance – Calculation method*, using a thermal conductivity (λ) values of the products used as defined by the certificate holder. The U-value of a construction will depend on the materials used and the design.

For retrofit installations on existing dwellings guidance should be sought from the certificate holder on achievable U-values as the actual U-value of installation will depend on the construction of the existing building elements.

The product can contribute to maintaining continuity of thermal insulation at junctions between elements and around openings. Guidance in this respect, and on limiting heat loss by air infiltration, shall be sought from the certificate holder and by reference to the DoEHLG publication *Limiting Thermal Bridging & Air Infiltration – Acceptable Construction Details*.

4.3 CONDENSATION RISK

The interstitial and internal condensation risk of the roof should be assessed in accordance with BS 6229: 2003, and BS 5250:2011. An approved vapour barrier (AVCL) is required on the warm side of the insulation in all instances.

4.3.1 Interstitial Condensation

The risk of interstitial condensation in the roof build-up is dependent on a number of factors including roof design. Reference should be made to BS 6229: 2003, and BS 5250:2011.

To avoid the risk of interstitial condensation in cold flat roofs, an AVCL should be provided on the warm side of the insulation and there should be a cross-ventilated void, not less than 50mm deep, between the slab or deck and the insulation. Ventilation openings shall be provided to every roof void along two opposite sides of the roof.

The risk of risk of interstitial condensation in warm flat roofs is dependent on the nature of the supporting structure. As there is a risk of interstitial condensation forming between the thermal insulation and the waterproofing covering , an AVCL with a vapour resistance at least equal to that of the waterproofing covering should be installed immediately above the supporting structure , wrapped and sealed at the perimeter and at all penetrations through the roof covering.

For inverted flat roofs, it is essential that the thermal insulation used resists water absorption and is sufficiently loadbearing to support the protective covering or ballast where used.

When building elements do not follow the principles of BS 5250:2011, a robust hydrothermal assessment to either I.S. EN 15026:2007 Hygrothermal performance of building components and building elements - Assessment of moisture transfer by numerical simulation or I.S. EN ISO 13788:2001 Hygrothermal performance of building components and building elements - Internal surface temperature to avoid critical surface humidity and interstitial condensation - Calculation methods must be considered.

Care should be taken to provide adequate ventilation, particularly in rooms expected to experience high humidity, and to ensure the integrity of vapour control layers and linings against vapour ingress.

4.3.2 Internal Surface condensation

For retrofit installation, when improving the thermal performance of the external envelope of an existing building, through to upgrading of roof insulation as part of a roof build-up, designers need to consider the impact of these improvements on other untouched elements of the building.

When bridged junctions meet the requirements of TGD Part L, Appendix D table D1, the coldest internal surface temperature will satisfy the requirements of section D2, namely that the temperature factor (fRsi) shall be equal to or greater than 0.75. As a result best practice will have been adopted in order to limit the risk of internal surface condensation which can result in dampness and mould growth.

When site limiting factors give rise to substandard level of insulation at bridged junctions, guidance should be sought from the certificate holder as to acceptable minimum requirements (see clause 4.4 for further guidance).

When insulating buildings, the recommendations of BS 5250:2011 should be followed to minimise the risk of condensation within the building elements and structures.

Roofs will adequately limit the risk of surface condensation where the thermal transmittance (U-value) does not exceed 0.35 W/m2 K for roofs at any point, and openings and junctions with other elements are designed in accordance with the DoEHLG publication Limiting Thermal Bridging & Air Infiltration – Acceptable Construction Details (ACD).

4.4 LIMITING THERMAL BRIDGING

The linear thermal transmittance ψ (Psi) describes the heat loss associated with junctions and around openings.

When all building junctions are shown to be equivalent or better than those detailed in the DoEHLG Acceptable Construction Details, then it is acceptable to use the linear thermal transmittance values outline in Table D1 of Appendix D of TGD to Part L of the Building Regulations 1997 to 2014. When all bridged junctions within a building comply with the requirements of Table D1 of appendix D of TGD to Part L, the improved 'y' factor of 0.08 can be entered into the Dwelling Energy Assessment Procedure (DEAP) Building Energy Rating (BER) calculation.

Where either of the above options are shown to be valid, or when the required values cannot be achieved, all relevant details should be recorded for that project for use in future BER calculations.

Ψ-values for other junctions outside the scope of this certificate should be assessed in accordance with the BRE IP1/06 "Assessing the effects of thermal bridging at junctions and around openings" and BRE Report BR 497 "Conventions for calculating linear thermal transmittance and temperature factors" in accordance with appendix D of TGD to Part L of the Building Regulations 1997 to 2014.

4.5 VENTILATION

Adequate room and roof ventilation must be provided in accordance with TGD Part F of the Building Regulations 1997 - 2014, for all installations. This will also limit to potential for Interstitial Condensation Internal Surface as detailed in Cl. 4.3 of this certificate.

In addition a cross-ventilation shall be provided in cold flat roof designs as detailed in Cl. 4.3.1 of this certificate.

4.6 RESISTANCE TO PENETRATION OF ROOTS

Results of test data on Alkorplan 35177 indicate that it is suitable for use as a root-resistant membrane.

4.7 MAINTENANCE

Installed Alkorplan roof waterproofing systems must be the subject of annual inspections and maintenance to ensure continued performance as detailed in BS 8217:2005 clause 10. Maintenance should include checks and operations to ensure the following where applicable:

- Adequate ballast is in place and evenly distributed over the membrane.
- Protection layers are in good condition.
- Exposed membrane is free from the build-up of silt, and other debris and unwanted vegetation are cleared.
- Green roofs and roof gardens must be regularly inspected, particularly in autumn after leaf fall and in the spring, to ensure unwanted vegetation and other debris are cleared from the roof and drainage outlets

Drainage outlets and gutters should be regularly maintained.

In the event of accidental damage, repair should be carried out by a licensed Alkorplan contractor in accordance with the certificate holder's instructions.

4.8 WEATHERTIGHTNESS

Assessment has shown that Alkorplan roofing membranes and joints, when completely sealed and consolidated, will adequately resist the passage of moisture to the inside of the building. Alkorplan roofing systems are capable of accepting minor structural movements without damage and so meet the requirements of Part C of the Building Regulations 1997 to 2014.

4.9 RESISTANCE TO WIND UPLIFT

The resistance to wind uplift of a mechanically-fastened waterproofing layer is provided by the fasteners passing through the membrane into the substrate. The number and position of fixings will depend on a number of factors including:

- wind uplift forces to be restrained
- pull-out strength of the fasteners
- tensile properties of the membrane
- appropriate calculation of safety factors.

The wind uplift forces are calculated in accordance with I.S. EN 1991-1-4 : 2005. On this basis, the number of fixings required should be established using a maximum permissible load values shown in Table 2.

Table 2: Max. Permissible Load

Membrane	Max. permissible load (Kn)
Alkorplan 35170 with hot-air welded joints	0.4
Alkorplan 35170 with solvent-welded joints	0.4
Alkorplan 35176 and 35276 with hot-air welded joints	0.7

When Alkorplan 35179 or 5279 are bonded to a decking, or bituminous felt, it is sufficient to resist the effect of wind suction, thermal cycling or other minor structural movements likely to occur in service.

When Alkorplan 35179 orb35279 are bonded to insulation boards, the resistance to wind uplift will be dependent on the cohesive strength of the insulation and the method by which it is secured to the roof deck. This must be taken into account when selecting suitable insulation material.

The ballast requirements for loose-laid systems using Alkorplan 35177 must be calculated in accordance with the relevant parts of I.S. EN 1991-1-4 : 2005. See Cl. 4.1 of this certificate for minimum ballast requirements.

The soil used in roof gardens must not be of a type that will be removed, or become delocalised due to wind scour experienced on the roof. It must be recognised that the type of plants used in roof gardens could significantly affect the expected wind loads experienced in service.

4.10 EFFECTS OF TEMPERATURE

Alkorplan Roof Waterproof Membranes will resist temperatures in the range of −20°C to 80°C.

4.11 DURABILITY

When installed in accordance with this Certificate and adequately supported by the substrate, the system's life as a weatherproof covering will be in excess of 30 years. In environments where the membranes are in contact with organic solvents, life expectancy of the membranes may be reduced. In cases of doubt, the advice of the Certificate holder must be sought. Repairs can be carried out by the procedures listed above and are effective in restoring weather tightness.

4.12 TOXICITY

The membranes are not toxic in normal service.

4.13 REUSE AND RECYCLABILITY

The products comprise polyvinyl chloride, polyester and glass, which can be recycled.

4.14 RESISTANCE TO FOOT TRAFFIC

Results of test data indicate that the membranes can accept the limited foot traffic and light concentrated loads associated with installation and maintenance. Care must be taken to avoid puncture by sharp objects, or concentrated loads. On limited access roofs where excessive traffic is envisaged, such as maintenance of lift equipment, a walkway must be provided, for example, using concrete slabs supported on bearing pads.

4.15 OTHER INVESTIGATIONS

(i) The manufacturing process was examined including methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

(ii) NSAI carried out visits to assess the history of use and practicability of installation of the product.

(iii) A condensation risk analysis was performed.

4.16 CE MARKING

The Certificate holder has taken responsibility of CE marking the product in accordance with Harmonised European Standard EN 13956: 2012: *Flexible sheets for waterproofing- Plastic and rubber sheets for roof waterproofing- Definitions and characteristics*. An asterisk (*) appearing in this Certificate indicates that data shown is given in the manufacturers declaration of performance (DoP). See Table 3. Designers should refer to the latest version of the manufacturers DoP for all essential characteristics.

NSAI Agrément

Table 3: Membrane Characteristics *						
Test	**Membrane**					
	35170	**35176**	**35276**	**35177**	**35179**	**35279**
Reaction to fire *	E	E	E	E	E	E
Watertightness *	Pass	Pass	Pass	Pass	Pass	Pass
Tensile force *	MLV ≥15 (N/mm^2)	MLV ≥1050 (N/50mm)	MLV ≥1050 (N/50mm)	MLV ≥8 (N/mm^2)	MLV ≥825 (N/50mm)	MLV ≥825 (N/50mm)
Elongation *	MLV≥250%	MLV≥15%	MLV≥15%	MLV≥150%	MLV≥55%	MLV≥55%
Root resistance *	NPD	NPD	NPD	Pass	NPD	NPD
Resistance to static *loading	MLV ≥20kg	MLV ≥20kg	MLV ≥20kg	MLV ≥20kg	MLV ≥20kg	MLV ≥20kg
Resistance to impact * (EN12691/A) (EN12691/B)	MLV≥300mm MLV≥2000mm	MLV≥650mm MLV≥2000mm	MLV≥650mm MLV≥2000mm	MLV≥500mm MLV≥2000mm	MLV≥800mm MLV≥2000mm	MLV≥800mm MLV≥2000mm
Tear resistance *	MLV ≥100N	MLV ≥200N	MLV ≥200N	MLV ≥100N	MLV ≥325N	MLV ≥325N
Joint peel resistance *	MLV ≥150 (N/50mm)	MLV ≥200 (N/50mm)	MLV ≥200 (N/50mm)	MLV ≥150 (N/50mm)	MLV ≥200 (N/50mm)	MLV ≥200 (N/50mm)
Joint shear resistance *	MLV ≥800 (N/50mm)	MLV ≥900 (N/50mm)	MLV ≥900 (N/50mm)	MLV ≥300 (N/50mm)	MLV ≥625 (N/50mm)	MLV ≥625 (N/50mm)
Durability *	Pass	Pass	Pass	NPD	Pass	Pass
Foldability at low Temp. *	-25°C	-25°C	-25°C	-30°C	-25°C	-25°C

* Values for the membranes essential characteristics are given in the manufacturers declaration of performance (DoP) in accordance with EN 13956: 2005. Designers should refer to the latest version of the manufacturers DoP for all essential characteristic values.

5.1 National Standards Authority of Ireland ("NSAI") following consultation with the NSA Agrément has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this Certificate and in accordance with the manufacturer's instructions and usual trade practice. This Certificate shall remain valid for five years from date of issue so long as:

(a) the specification of the product is unchanged.

(b) the Building Regulations 1997 to 2014 and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.

(c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.

(d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.

(e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.

(f) the registration and/or surveillance fees due to NSAI Agrément are paid.

5.2 The NSAI Agrément mark and certification number may only be used on or in relation to product/processes in respect of which a valid Certificate exists. If the Certificate becomes invalid the Certificate holder must not use the IAB mark and certification number and must remove them from the products already marked.

5.3 In granting Certification, the NSAI makes no representation as to;

(a) the absence or presence of patent rights subsisting in the product/process; or
(b) the legal right of the Certificate holder to market, install or maintain the product/process; or
(c) whether individual products have been manufactured or installed by the Certificate holder in accordance with the descriptions and specifications set out in this Certificate.

5.4 This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act. 2005 or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

5.7 Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certification.

NSAI Agrément

This Certificate No. **03/0192** is accordingly granted by the NSAI to **Renolit Belgium NV** on behalf of NSAI Agrément.

Date of Issue: **November 2003**

Signed

Seán Balfe
Director of NSAI Agrément

Readers may check that the status of this Certificate has not changed by contacting NSAI Agrément, NSAI,1 Swift Square, Northwood Business Park, Santry, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. www.nsai.ie

Revisions:

- **October 2006:** Scope extended to cover use of product on roofs with a pitch up to 70 degrees.
- **June 2016:** References to Irish Building Regulations and standards updated. Product listing and specification updated to reflect manufacturers DoP.