



Styrozone™ H 350 T/N 300 T

INSULATION FOR AGRICULTURAL BUILDINGS



- ▼ High performance rigid extruded polystyrene insulation – thermal conductivity 0.028-0.037 W/mK
- ▼ No vapour barrier is required
- ▼ Tongue and groove detail to all four edges
- ▼ Smooth attractive surface – easy to clean
- ▼ Tough, durable surface, unaffected by water and high humidity
- ▼ Easy to install, handle, repair and maintain
- ▼ Ideal for newbuild and refurbishment
- ▼ CFC/HCFC-free with zero Ozone Depletion Potential (ODP)



Kingspan Styrozone™ H 350 T/N 300 T

DESIGN CONSIDERATIONS

APPLICATIONS

Kingspan Styrozone™ H 350 T/N 300 T can be used in the following applications:-

- animal housing (pigs, cows, poultry);
- mushroom farming;
- potato, vegetable and flower stores (ambient or chill);
- snail production;
- drying rooms for flowers;
- controlled environmental rooms for horticulture; and
- under soil insulation of propagating beds.

THERMAL INSULATION OF LIVESTOCK/POULTRY BUILDINGS

Temperature control and provision of ventilation are key factors in converting livestock feed into increased body mass or egg production.

Kingspan Styrozone™ H 350 T/N 300 T can be fitted in roofs and walls which enables the maximisation of body heat and subsequently minimises fuel running costs during cold weather. *Kingspan Styrozone™* H 350 T/N 300 T will also prevent solar heat gain and reduce heat stress in the livestock.

Effective ventilation is essential to disperse moisture and reduce ammonia levels.

THERMAL INSULATION IN CROP STORAGE BUILDINGS

To take advantage of prolonged storage conditions the environment has to be carefully controlled. Humidity must be kept high to prevent water loss, yet prevent the formation of condensation on cold surfaces. Allowing condensation to fall on the crop will cause bacterial soft rotting and other associated problems.

Ventilation above the *Kingspan Styrozone™* H 350 T/N 300 T is essential. The key to preventing condensation, providing frost protection and preventing heat build up in warm weather is effective by adopting thermal insulation.

BENEFITS

Kingspan Styrozone™ H 350 T/N 300 T is an ideal insulant for agricultural applications, offering the following benefits:-

- low thermal conductivity, high insulation value;
- smooth, attractive surface;
- easy to clean, either by steam or pressure wash without affecting thermal performance;
- high thermal performance for the lifetime of the building;

- easy to install;
- easy to repair and maintain;
- offers a tough and durable surface, unaffected by water and high humidity;
- no vapour barrier required;
- aids ventilation efficiency when used under purlins;
- should not offer any nutritional value to vermin;
- tongue and groove detail to all four edges, making it easy to form tight joints, reducing wastage when spanning purlins; and
- re-usable if building life is terminated.

U-VALUES REQUIRED

Guidance on the use of *Kingspan Styrozone™* H 350 T and *Kingspan Styrozone™* N 300 T in agricultural buildings can be found in the following parts of BS5502:

- pigs – BS 5502: Part 42: 1990 (1997);
- poultry – BS 5502: Part 43: 1990 (1996);
- mushroom storage – BS 5502: Part 60: 1992 (1998); and
- potatoes, vegetables and flowers storage – BS 5502: Part 71: 1992 (1998)

THERMAL PROPERTIES

The R- values and λ -values quoted in this document are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down in the harmonised European standard BS EN 13164, using so called 90:90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

THERMAL CONDUCTIVITY

The thermal conductivity (λ -value) of *Kingspan Styrozone™* H 350 T is 0.028 W/m.K. The thermal conductivity (λ -value) of *Kingspan Styrozone™* N 300 T is 0.035 W/m.K for thicknesses ≤ 60 mm and 0.037 W/m.K for thicknesses > 60 mm.

THERMAL RESISTANCES

Thermal resistance (R- value) varies with thickness and is calculated by dividing the thickness of the board (expressed in metres) by thermal conductivity.

Insulant Thickness (mm)	Thermal Resistance (m ² .K/W)	
	H 350 T	N 300 T
35	1.250	1.000
40	1.429	1.143
50	1.786	1.429
60	2.143	1.714
65	2.321	1.757
70	2.500	1.892
75	2.679	2.027
80	2.857	2.162
85	3.036	2.297
90	3.214	2.432
100	3.571	2.703
105	3.750	2.838
110	3.929	2.973
115	4.107	3.108
120	4.286	3.243
125	4.464	3.378
130	4.643	3.514
140	5.000	3.784

TYPICAL U-VALUES

The following examples have been calculated using both the combined method and the proportional area method. The combined method is required for compliance with Building Regulations / Standards revised after the year 2000. These examples are based on the use of **Kingspan Styrozone™ H 350 T** and **Kingspan Styrozone™ N 300 T** fixed below the purlins in a normal roof construction.

If your construction is any different or you need Hazardous to Health Regulations 1988 (COSHH) information, please consult our Technical Services Department.

Combined Method – U-values were calculated using the method which has been adopted to bring National standards in line with the European Standard calculation method, BS / IS EN ISO 6946: 1997 (Building components and building elements. Thermal resistance and thermal transmittance. Calculation method).

Proportional Area Method – the U-values shown below were calculated using the proportional area method as detailed in The Chartered Institute of Building Services Engineers (CIBSE) Guide A3 (Thermal Properties of Building Structures).

NB when calculating U-values using the combined method as detailed in BS / IS EN ISO 6946: 1997, the type of mechanical fixing used may change the thickness of insulation required. The effect of fixings have been ignored for the purposes of these calculations. Please contact the Kingspan Insulation Technical Services Department (see rear cover) for project calculations.

NB for the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

The figures below are for guidance only. A detailed U-value calculation together with condensation risk analysis should be completed for each individual project. Please call our Technical Services Department for assistance (see rear cover).

Kingspan Styrozone™ H 350 T Under Purlin Lining

Insulant Thickness (mm)	U-value (W/m ² .K)	
	Combined Method	Proportional Area Method
35	0.65	0.65
40	0.58	0.58
50	0.48	0.48
60	0.41	0.41
65	0.38	0.38
70	0.36	0.36
75	0.35	0.35
80	0.32	0.32
85	0.30	0.30
90	0.29	0.29
100	0.26	0.26
105	0.25	0.25

Kingspan Styrozone™ N 300 T Under Purlin Lining

Insulant Thickness (mm)	U-value (W/m ² .K)	
	Combined Method	Proportional Area Method
40	0.69	0.69
50	0.58	0.58
60	0.50	0.50
70	0.46	0.46
75	0.43	0.43
80	0.41	0.41
85	0.39	0.39
90	0.37	0.37
100	0.33	0.33
110	0.31	0.31
115	0.30	0.30
120	0.28	0.28
125	0.27	0.27
130	0.26	0.26
140	0.25	0.25

Kingspan Styrozone™ H 350 T/N 300 T

SITWORK

ROOFS AND CEILING – MAXIMUM SPAN

For over/under purlin applications the maximum permitted span for an unsupported board between purlins is dependent on board thickness:

Insulant Thickness (mm)	Unsupported Spanning Distance (m)
30-40	1.00
50-100	1.38

OVER PURLIN APPLICATIONS

Kingspan Styrozone™ H 350 T/N 300 T can be fixed over purlins, secured by the fixings used to attach the cladding. The fixings must be long enough to take account of the thickness of the insulation. The **Kingspan Styrozone™ H 350 T/N 300 T** should not be used as a temporary working surface.

The boards should be set out with their long edges at right angles to the purlins or sheeting rails, and it is advisable to use a line on the first run of boards.

Because of their tongue groove edge detail, the short edges of the **Kingspan Styrozone™ H 350 T/N 300 T** boards do not need to line up with a purlins.

However, they should be staggered, ideally by at least 1/3 of the board length. To minimise cutting and wastage, the actual board pattern should be worked out before starting to fix.

It is advisable to tape the joints of the board, on the top side or adopt a vapour permeable membrane, e.g. **Kingspan nilvent™**. This prevents any condensation forming on the underside of the cladding, finding its way around the tongue and groove joints and into the building.

UNDER PURLIN APPLICATIONS

Under purlin fixing is normally used in older buildings, but there are some advantages in insulating below purlins in new buildings.

One advantage is that the insulation is not in direct contact with the cladding. This is significant when solar activity has some influence on internal conditions within the building.

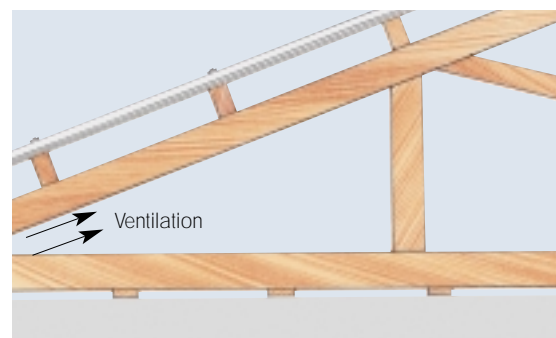
When fitting **Kingspan Styrozone™ H 350 T/N 300 T** below the purlins, it must be fixed to timber. If the purlins are steel, then tanalised timber must be firstly fixed to the purlins, using a Hilti Nail Gun or alternatively a Hilti winged, direct screw fixing or equivalent.

The boards are laid out as for over purlin fixing, i.e. staggered. It is advisable to use two types of fixings, two Hardo VN clamps attached to the sides of the boards and two Hardo 'S' nails attached through the face of the board. It is advisable to seal the boards with a silicone mastic sealant.

BELOW TRUSS APPLICATIONS

This system is used for older buildings where a flat ceiling is required to reduce the total air space within the building, or alternatively to use this new false air space for ventilation purposes.

Timber is nailed between the trusses at 4 ft or 1200 mm centres, then the **Kingspan Styrozone™ H 350 T/N 300 T** is fixed as per 'Under Purlin Applications'.



WALL APPLICATIONS

Kingspan Styrozone™ H 350 T/N 300 T can be fixed to the inside or outside face of the walls. In crop stores, if it is applied to the outside of the walls, the *Kingspan Styrozone™* H 350 T/N 300 T should be protected by a cladding material.

When used on the inside walls of potato stores and livestock buildings the *Kingspan Styrozone™* H 350T /N 300 T should be protected from mechanical and livestock damage by using a lining material, e.g plywood, glass or mineral reinforced cement sheets.

Kingspan Styrozone™ H 350 T/N 300 T and any internal protection sheets can be fixed directly to brick or block walls using Hilti IDP, IMR or IZMR fixings. A minimum 5 No. fixings should be used for every *Kingspan Styrozone™* H 350 T/N 300 T sheet.

Kingspan Styrozone™ H 350 T/N 300 T should be fixed with the long edge horizontal, ensuring they are fully aligned with joints staggered and close butted.

Kingspan Styrozone™ H 350 T/N 300 T can be used as an infill to conventional stud walling type structures.

FLOOR APPLICATIONS

There may be situations in agriculture where floor insulation is an advantage. For example, in pig farming, it would be an advantage to insulate below a concrete screed where sows and small pigs are in direct contact with the floor. Please refer to the Kingspan literature for *Styrozone™* flooring applications.

ASSOCIATED FIXING COMPANIES

Hilti (Great Britain)	Tel: 0800 886 100
Reiner Fixing Devices (Hardo Fixings)	Tel: 01708 856601

CUTTING

Kingspan Styrozone™ H 350 T/N 300 T boards can easily be cut with a fine-tooth saw. For smaller jobs, knives, carpenters saws and keyhole saws can be used, but for longer cuts a normal circular saw is useful. For fine work a wood rasp is very useful. Ensure accurate trimming to achieve close butting joints and continuity of insulation.

AVAILABILITY

Kingspan Styrozone™ is available through specialist insulation distributors and selected builders merchants throughout the UK, Ireland and Europe.

PACKAGING

The boards are supplied in labelled packs shrinkwrapped in polythene.

STORAGE

The packaging of *Kingspan Styrozone™* should not be considered adequate for long term outside protection.

Kingspan Styrozone™ should be stored flat in a ventilated area and protected generally from accidental damage, contact with volatile solvents, flames and extended exposure to UV and sunlight. If it is stored outside for more than a few weeks, it must be covered with a pale pigmented plastic sheet.

Kingspan Styrozone™ should not be left in the sun covered by either a transparent or a dark plastic sheet, since in both cases, board temperatures can build up to a level hot enough to appreciably alter their dimensions or warp them.

HEALTH AND SAFETY

Kingspan Insulation products are chemically inert and safe to use. A leaflet on this topic, which satisfies the requirements, set out in the Control of Substances Hazardous to Health Regulations, 1988 (COSHH) is available from our Technical Services Department. (Freephone: 0800 610061)

Warning – do not stand on, or otherwise support your weight on this board, unless it is fully supported by a load-bearing surface.

Kingspan Styrozone™ H 350 T/N 300 T

PRODUCT DESCRIPTION

COMPOSITION

Kingspan Styrozone™ H 350 T/N 300 T are high performance rigid extruded polystyrene insulants of typical density 35 kg/m³, with a smooth, dense skin on both faces.

CFC/HCFC-FREE

Kingspan Styrozone™ is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential (ODP).



PRODUCT DATA

STANDARDS AND APPROVALS

Kingspan Styrozone™ is manufactured to the highest quality standards under a quality control system approved to EN ISO 9002: 1994 (Quality systems, Model for quality assurance in production, installation and servicing).



STANDARD DIMENSIONS

Kingspan Styrozone™ H 350 T/N 300 T are available in the following standard sizes and thicknesses:

Nominal Dimension	Availability
Length (m)	2.5
Width (m)	0.6
Thickness* (mm)	35, 40, 50, 60, 65, 70, 75, 80, 85, 90, 100, 105, 110, 115, 120, 125, 130, 140
Edge Profile	Tongue and groove to all four edges

* Other thicknesses are available subject to enquiry

INSULATION COMPRESSIVE STRENGTH

The compressive strengths of **Kingspan Styrozone™** H 350 T and N 300 T typically exceed 350 and 300 kPa respectively at 10% compression when tested to BS 4370: Part 1: 1988(1996) (Methods of test for rigid cellular materials).

THERMAL EXPANSION

The linear thermal expansion coefficient of **Kingspan Styrozone™** is 0.07 mm/m.K when tested to BS 4370: Part 3: 1988 (1996) (Methods of test for rigid cellular materials).

WATER VAPOUR RESISTANCE

The boards achieve a resistance greater than 350 MN.s/g when tested in accordance with BS 3837: Part 2: 1990 (1996) (Specification for extruded boards).

ABSORPTION OF MOISTURE

Kingspan Styrozone™ is not sensitive to moisture of any kind. Its surface is water-repellent and there is no capillary suction. The material is also not hygroscopic. Over a 28 day cycle with temperature fluctuating 20/40°C its water absorption is <0.5% when tested to BS 3837: Part 2: 1990 (1996) (Specification for extruded boards).

These properties are particularly useful for animal housing, since on the one hand relative humidities of up to 80% must be allowed for and on the other hand it is essential to hygiene that water containing disinfectants can be used for washing. Any disinfectant used must not attack rigid extruded polystyrene insulation.

DURABILITY

If correctly applied, **Kingspan Styrozone™** has an indefinite life. Its durability depends on the supporting structure, waterproofing and the conditions of its use.

RESISTANCE TO SOLVENTS, FUNGI & RODENTS

Kingspan Styrozone™ is resistant to most of the materials used in buildings such as cement, lime and gypsum, and to humus, animal excrement and most dilute acids and alkalis. It may not be resistant to some solvent-based adhesive systems, particularly those containing methyl ethyl ketone. Adhesives containing such solvents should not be allowed to come into contact with the product. Edible oils, white oil, petroleum jelly and fuel oil should also be avoided. Organic solvents, petrol, petroleum solvents, and solvent based cold bitumen and or mastic will have a detrimental effect if allowed to come into contact with the boards, and therefore all the parts of a wooden roof construction should be treated with aqueous solutions of inorganic salts for their preservation. In the event of the boards coming into contact with harsh solvents, petrol, mineral oil or acids or being damaged in any other way, they should not be used. If already fixed, they should be replaced.

Kingspan Styrozone™ resists attack by mould and microbial growth.

Although **Kingspan Styrozone™** provides no food value to vermin, and they are not normally attracted to it, they can cause some damage by burrowing through it. This occurs when vermin populations are allowed to build up in cavities and voids behind the **Kingspan Styrozone™**. To prevent this build up, a method of presenting vermin bait should be used.

FIRE PERFORMANCE

When tested in accordance with the requirements of DIN 4102: 1981 – B1 is obtained – not readily ignitable.

MAXIMUM SERVICE TEMPERATURE

Kingspan Styrozone™ should not be brought into direct contact with high temperature heat sources. The maximum service temperature of **Kingspan Styrozone™** is 75°C.

NB Styrozone will be delivered in packaging bearing the Uralita Batifoam or Poliglas Glascofoam names.

KINGSPAN INSULATION

Kingspan Insulation offers an extensive range of premium and high performance insulation products, breathable membranes and pre-fabricated / pre-insulated systems for the construction industry. Following an extensive investment programme, Kingspan Insulation is continuing to lead the insulation industry by manufacturing the majority of its insulation products with zero Ozone Depletion Potential (ODP) and quoting thermal performance data in accordance with the new harmonised European Standard.

Kingspan Insulation Limited specialise in the solution of insulation problems. Our range of insulation products which meet the exacting requirements of the construction industry are produced to the highest standards, including BS EN ISO 9002: 1994 and IS EN ISO 9002: 1994. Each product has been designed to fulfil a specific need and has been manufactured to precise standards and tolerances.

INSULATION FOR:

- PITCHED ROOFS
- FLAT ROOFS
- CAVITY WALLS
- TIMBER AND STEEL FRAMING
- EXTERNALLY INSULATED CLADDING SYSTEMS
- FLOORS
- SOFFITS

INSULATED DRY LINING

TAPERED ROOFING SYSTEMS

Kingspan KoolDuct® PRE-INSULATED DUCTING

Kingspan nilvent™ BREATHABLE MEMBRANES

Kingspan TEK Haus™ BUILDING SYSTEM

THE KINGSPAN INSULATION PRODUCT RANGE

THE KINGSPAN KOOLTHERM® K-RANGE

- With a thermal conductivity of 0.018 W/m.K rigid phenolic insulation is the most thermally efficient insulation product commonly available.
- Utilises the thinnest possible insulation board to achieve required U-values.
- Fire performance can be equivalent to mineral fibre.
- Achieves a Class O fire rating to the Building Regulations.
- Achieves the best possible rating of <5% smoke emission when tested to BS 5111: Part 1: 1974.
- CFC-free / available CFC/HCFC-free with zero Ozone Depletion Potential subject to enquiry.

THE KINGSPAN THERMA ZERO ODP RANGE

- With a thermal conductivity of 0.022-0.026 W/m.K zero ODP rigid urethane insulation is one of the most thermally efficient insulation products commonly available.
- Easily achieves required U-values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC-free with zero Ozone Depletion Potential (ODP).

THE KINGSPAN STYROZONE™ & PURLCRETE ZERO ODP RANGES

- Rigid extruded polystyrene insulation (XPS) has the highest compressive strength of any commonly available insulant.
- Ideal for specialist applications such as inverted roofing and heavy-duty flooring.
- Easily achieves required U-values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC-free with zero Ozone Depletion Potential (ODP).

ALL PRODUCTS

- Their closed cell structure resists both moisture and water vapour ingress – problems which can be associated with open cell materials such as mineral fibre and which can result in reduced thermal performance.
- Unaffected by air movement – problems that can be experienced with mineral fibre and which can reduce thermal performance.
- Safe and easy to install – masks are not required, as Kingspan Insulation products do not produce loose dust or irritant fibres.
- Provide reliable long term thermal performance over the lifetime of the building.

CUSTOMER SERVICE

For quotations, order placement and details of despatches please contact our Building Fabric Insulation Customer Services Department on the numbers below:

UK – Telephone: +44 (0) 1544 388 601
– Fax: +44 (0) 1544 388 888
– email: commercial.uk@insulation.kingspan.com
Ireland – Telephone: +353 (0) 42 97 95000
– Fax: +353 (0) 42 97 46129
– email: commercial.ie@insulation.kingspan.com

TECHNICAL ADVICE

Kingspan Insulation Ltd support all of their products with a comprehensive Technical Advisory Service for specifiers, stockists and contractors.

This includes a free computer-aided service designed to give fast, accurate technical advice. Simply phone our **TECHLINE** with your project specification and we can run calculations to provide U-values, condensation/dew point risk, required insulation thicknesses etc.... Thereafter we can run any number of permutations to help you achieve your desired targets.

We can also give general application advice and advice on design detailing and fixing etc... Site surveys are also undertaken as appropriate.

Please contact our Building Fabric Insulation Technical Services Department on the **TECHLINE** numbers below:



UK: – Freephone: 0800 610 061
– Telephone: +44 (0) 1544 387 260
(if dialling from outside the UK)
– Fax: +44 (0) 1544 388 888
– email: techline.uk@insulation.kingspan.com
Ireland: – Telephone: +353 (0) 42 97 95032
– Fax: +353 (0) 42 97 46129
– email: techline.ie@insulation.kingspan.com

LITERATURE AND SAMPLES

Kingspan Insulation produces a comprehensive range of technical literature for specifiers, contractors, stockists and end users. The literature contains clear 'user friendly' advice on typical design; design considerations; thermal properties; sitework and product data.

Available as a complete Design Manual, on CD-ROM or as individual product brochures, Kingspan Insulation technical literature is an essential specification tool. For copies please contact our Marketing Department on the numbers below:

UK – Telephone: +44 (0) 1544 387 210
– Fax: +44 (0) 1544 387 299
– email: literature.uk@insulation.kingspan.com
Ireland – Telephone: +353 (0) 42 97 95038
– Fax: +353 (0) 42 97 46129
– email: literature.ie@insulation.kingspan.com

GENERAL ENQUIRIES

For all other enquiries contact Kingspan Insulation on the numbers below:

UK – Telephone: +44 (0) 1544 388 601
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– Fax: +353 (0) 42 97 46129
– email: info.ie@insulation.kingspan.com

Kingspan Insulation reserve the right to amend product specifications without prior notice. The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described. Recommendations for use should be verified as to the suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Insulation offers a free Technical Advisory Service (see left) whose advice should be sought for uses of Kingspan Insulation products that are not specifically described herein. Please check that your copy of the literature is current by contacting our Marketing Department (see above).



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