CI/SfB (47) Nh2
April 2006

EUROCLAD

Technical specifications

Euroseam standing seam roofing systems

CONTENTS

INTRODUCTION

Euroclad offer specifiers a broad spectrum of support, from initial enquiry and technical consultation to project realisation through the combined experience of our Technical Team, Sales Team and network of recommended contractors.

Standard Euroseam constructions are included in Euroclad Elite Systems which offer standard and warrantied Systems.

NBS draft specifications are provided for standard constructions and can be tailored to suit project performance requirements through consultation.

This service can utilise our experience and the flexibility of built-up systems, which can respond individually to your requirements for specific thermal, acoustic, structural and other performance considerations.

BENEFITS

Euroseam systems have been designed to be used over a wide range of construction types. Systems have been developed to give cost effective solutions to the requirements of Building Regulations Part L and Part E. Euroclad's Technical Department assess such diverse requirements, using state of the art software to provide systems that meet your project criteria.

- Suitable for roofs of 1° actual pitch or above
- Proven compliance with Part L2 Building Regulations
- In-house thermal modelling capability using 3D finite element software
- Achieves the required standards for air tightness and thermal efficiency
- Acoustic performances tested and modelled to comply with Part E and Building Bulletin 93
- Complies with all relevant British Standards
- Tried, tested and undergone vigorous testing by BBA
- Curving and tapering
- NBS Specifications
- System standard drawings thermally modelled with Psi and F-values
- Lightweight with excellent spanning capabilities
- Excellent durability, mill finish aluminium having minimum service life of 40 years
- Low maintenance
- Environmentally friendly
- Continuous sheet lengths through on-site manufacture
- No penetrations
- On-site welding, rooflights, fall arrest and walkways readily available.

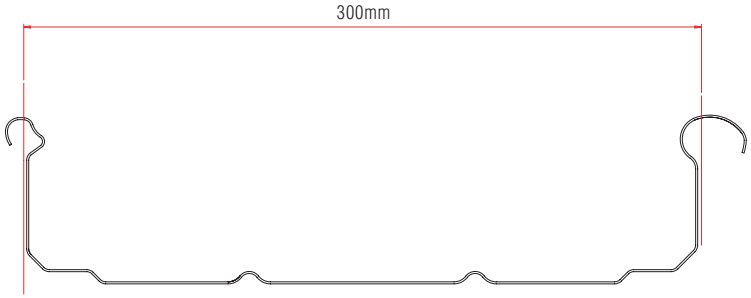
EUROSEAM PROFILE SPECIFICATION

Euroseam is available in three standard profiles: ES300, 400 and 500.

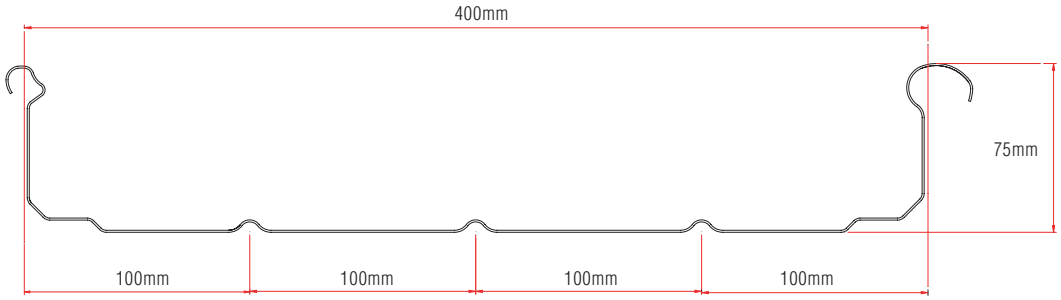
The standard gauges supplied in aluminium are 0.9mm and 1.2mm.

Consult with Euroclad for further material options.

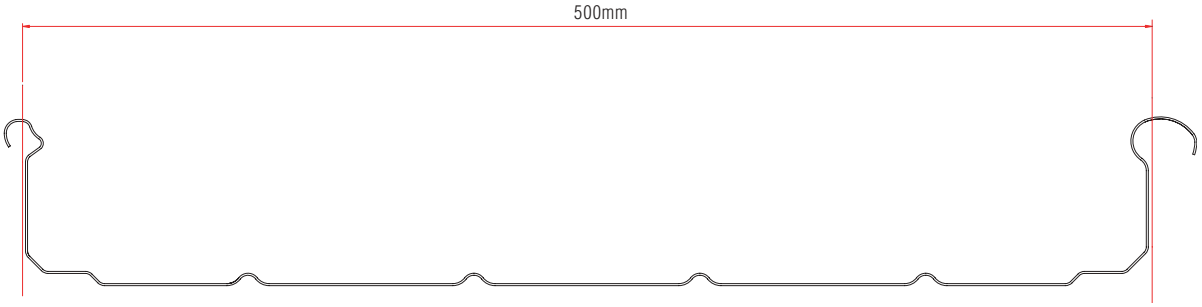
ES300 (ESN115)



ES400 (ESN115)



ES500 (ESN115)



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CURVED PROFILES

Euroseam can be used to achieve a whole range of curves from large barrel vaults to tight radius details at the eaves or even covered walkways and canopies.

The sheets can be formed into sinusoidal curves or can even combine curved and tapered sheets to produce domes. Some common curve types are illustrated below.

Availability of all complex curves (i.e. convex running into concave, straight sheet into curve or tapered curved) should be confirmed through consultation with Euroclad.

When designing sinusoidal or wave form curves, a straight section of minimum 0.300m should be included between the curves.

CURVED PROFILES

Euroclad have invested heavily in developing curving equipment for the system. This is an ongoing process.

The current manufacturing limits for 0.9mm aluminium stucco embossed are set out below.

CURVING PARAMETERS			
Type of curve	Minimum radius	Sheet length	Minimum sheet length
Self curve convex	45m	Max subject only to handling	2m with close purlins
Self curve concave	60m	Max subject only to handling	2m with close purlins
Induced curve covex	6m	(Consult Euroclad over 15m length)	2m
Induced curve concave	6m	25m (consult Euroclad over 20m length)	2m
Sinusoidal curve	Concave and convex limits as above	Concave and convex (0.300m straight section between curves)	2m
Self curved taper	TBA*	9.6m max	2m

Attention should be given to the design of curved roofs with reference to halter set out, this being typically greater than set out on straight sheet.

Please refer to Section D2 on 'Halter setout' in this manual.

Some combinations of parameters on more adventurous designs may require site welding, for example where straight to curved sheets are of considerable length. Possible parameters for curve and straight combinations are multiple, please consult Euroclad for details.

It is often beneficial to reduce purlin centres on curved roofs, particularly where the radius is towards the lower limit for the sheet type described above, or where changes in direction of curve/radius are occurring.

Positioning of the fixed point should also be considered, please see Section D2 in this manual.

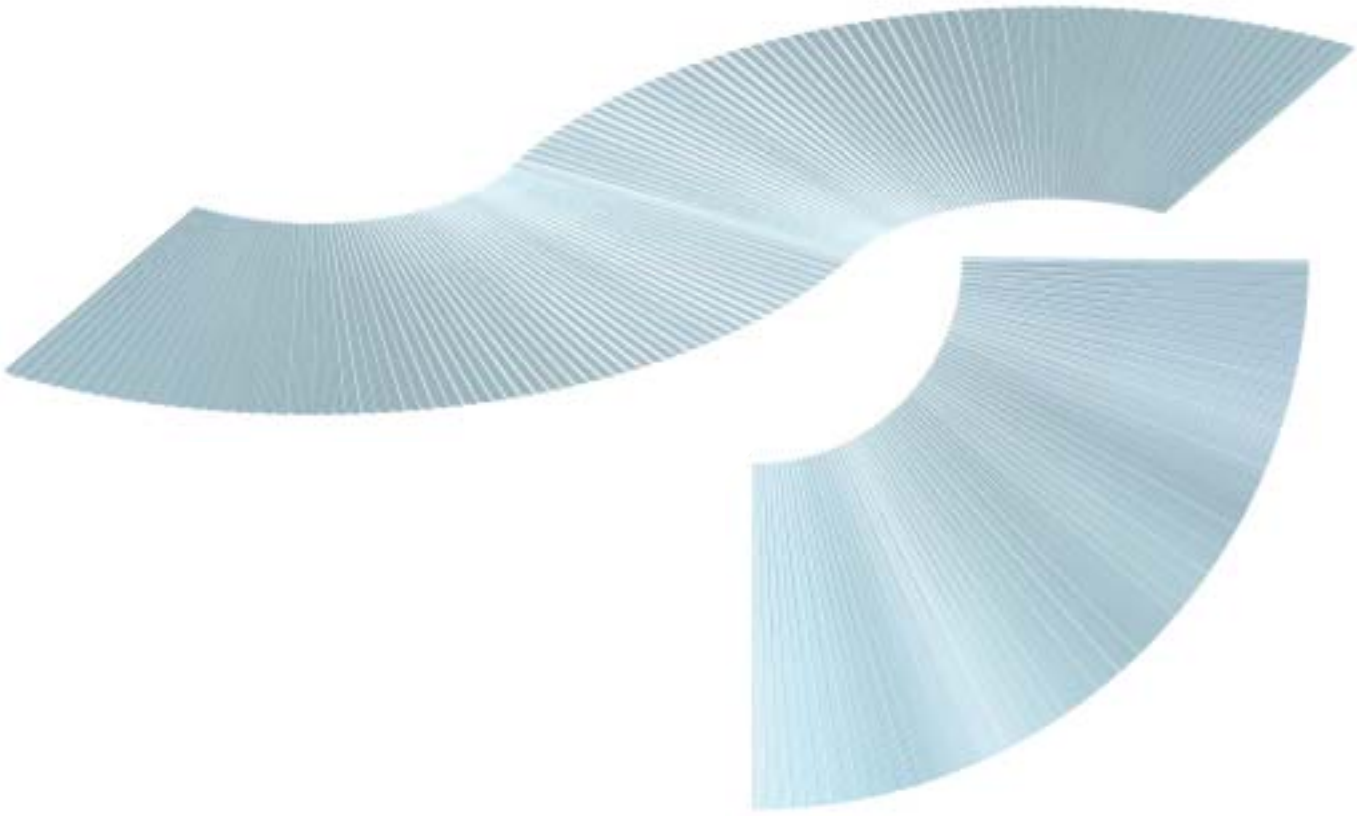
TAPERED PROFILES

Factory tapered sheets are an enhanced feature of Euroseam. Using state-of-the-art manufacturing equipment, the process allows the system to be taken around a wide range of curves on plan whilst retaining all the advantages of the standard lap details.

The current maximum length recommended for a tapered sheet is 9.6m. Longer slope lengths can be accommodated by introducing welded end laps.

The parameters are project specific and so Euroclad should be consulted early in the design process. A typical layout for tapered sheet is shown below.

Tapered sheets can be produced with a widest pan of 500mm although designers may choose to limit the sheet width to maintain a widest pan of 400mm (on wider pans the sheet should be fully supported). The narrow end of the taper should be a minimum of 155mm.



TAPERED PROFILES

Tapered sheet requires special design consideration regarding the positioning of the fixed point, please see Section D2 in this manual. As a general rule the fixed point should be positioned at the narrow end of the taper. In cases where this is at the eaves, allowance should be made for thermal expansion at the ridge detail.

By moving the tapered sheet up or down slope before setting out the second line of halters to which it is to be fitted, some adjustment of both sheet end width and arc can be made.

Tolerance sheets can be produced to make more significant adjustments if these are required. The sheets can be produced with a number of side lap options.

On large arcs, fixing away from a central position may be desirable. This can be achieved using a double overlap edged taper. Double underlap sheets can also be supplied, as can sheets with just one upstand (i.e. if abutting to a weld this would save site cutting of sheet).

It may also be desirable on large arcs to split the arc into bays and use tolerance sheets at the end of each bay, allowing adjustment as the job progresses.

Fillers and closures are available from Euroclad to fit tapered sheets and are designed to allow site cutting to size for flexibility.

MATERIALS AND FINISHES

Euroseam is manufactured as standard in Aluminium, Steel and Zinc (ESA, ESS and ESZ). A wide range of finishes are available from stock. Further material and coating choices are available. Please consult with the Sales Office.

ALUMINIUM

All aluminium substrates used for Euroseam sheet are from the same '3000' series of alloys used throughout the industry, and conform to BS EN 485-2, BS EN 573-3:1995 and BS EN 1396:1997 respectively. Euroseam is typically supplied in 3105 alloy. Alloys are chosen for their performance and working properties.

Stucco embossed is the standard finish to aluminium sheets and helps to give mill finish material a less reflective surface when first installed. The development of an even, grey oxidised finish on uncoated material is then brought about by weathering. This patina protects the underlying material and further reduces reflectivity in a relatively short space of time.

Occasionally it is desirable to have a mill finish sheet with a matt finish which is less reflective when compared to the initial state of mill finish.

Our range of products is constantly evolving as part of our commitment to continuous improvement.

Please contact the Euroclad office for latest details.

COATED ALUMINIUM

Various colour coatings are available for aluminium material. Standard aluminium stock is based around smooth finish PVF2 and ARS coatings.

STEEL

Colorcoat®
Only by corus

Our large stocks of Corus Colorcoat HPS200® pre-finished steel offers an alternative to aluminium Euroseam. Powder coating of aluminium halters is required when using steel Euroseam.

ZINC AND COPPER

Both of these materials can be supplied in Euroseam. They both have particular requirements, may need specialist components and need careful attention to details. For further information contact the Technical Department.

FIRE PERFORMANCE

Euroclad systems are based around the use of non-combustible materials and insulation.

It would be impossible to cover all the conditions that come under consideration of fire performance in this publication. The Building Regulations deal comprehensively with the subject of fire performance. However, the following notes may be useful to the specifier in the selection of the most suitable materials.

The relevant sections of the regulations may be summarised as follows:

1 Any external cladding which is situated within 1m from any point on the relevant boundary, or nominal boundary, or any building exceeding 18m in height shall have a 'Class O' surface.

2 A 'Class O' surface is construed as either:

i The material is non-combustible when tested to BS 476 Part 4 (Combustibility).

Or:

ii The surface shall have indices of performance not exceeding 12 and (i), not exceeding 6 when tested to BS476 Part 6 (Fire Propagation). In addition it is essential that the material must obtain a Class 1 rating when tested in accordance with BS 476(b): Part 7, surface spread of flame.

3 Any external cladding which is situated 1m or more from the boundary and is below a height of 18m from the ground may have a surface which, when tested to BS 476 Part 6 (Fire Propagation) has an index of performance (I), not exceeding 20.

European standards for resistance and reaction to fire will progressively supersede national standards. The implementation of the European Standards will vary from one country to another.

STEEL MATERIAL – FIRE RATING

Celestia and HPS200 meet the 'Class O' requirements of the Building Regulations for the UK, 2000 as well as the M1 requirements of NF P 92-507 for France and the B1 requirements of DIN4102-1 for Germany.

All Corus Colorcoat products recommended for use as building cladding have a 'Class O' rating on the basis of 2 (ii).

All Corus coated steels comply with requirement 3 above.

FIRE PERFORMANCE						
Aluminium material	BS 476 : Part 3	BS 476 : Part 4	BS 476 : Part 5	BS 476 : Part 6	BS 476 : Part 7	Building Regs Class
Mill finish	EXT.S.AA	Non-combustible	Class 1			0
PVF2	EXT.S.AA		Class 1	(I) 2.0, Sub index (i1) 0.0	Class 1 surface	0
ARS	EXT.S.AA		Class 1	(I) 0.4, Sub index (i2) 0.0	Class 1 surface	0

Mill finish aluminium Euroseam is rated non-combustible' as defined by BS476 Part 4:1970 and provides a Class 1 surface spread of flame when tested in accordance with BS476 Part 5:1978.

DURABILITY

Material durability and performance is detailed below. It is also covered in the following BBA certificate, a copy of which is available on request.

MILL FINISH ALUMINIUM

The durability of the materials is excellent, with mill finish aluminium having a minimum service life of 40 years in non-aggressive environments, e.g. rural/suburban and a minimum 25 years in severe industrial or marine environments. Aluminiums ability to resist corrosion is one of its most widely recognised features, as is the fact that it forms its own protective oxidation layer on exposure to the atmosphere. BS 5427 states that "plain mill finish aluminium, including Stucco embossed aluminium, is normally expected to last the design life of the building without maintenance".

COATED ALUMINIUM MATERIALS

Standard coatings applied to aluminium sheets are most often chosen for aesthetic reasons. The durability performance of the underlying substrate is maintained whilst the performance of the coating is usually dictated by aesthetics.

Our PVF2 and ARS coatings for aluminium performances are covered by BBA certification and the products will perform effectively as a roofing or cladding, with an ultimate life of at least 30 years.

The aesthetic performance of the coatings may need to be considered for the long term. PVF2 and ARS will perform in non-corrosive environments for up to 20 years to first maintenance painting, with extremely good colour retention.

PVF2 is preferred for marine and industrial environments and will typically perform for up to 15 years.

For all materials the advice given under 'Avoiding Corrosion Risks' (Section A6) and 'Maintenance and Cleaning' (Section F1) elsewhere in this publication are to be followed at all times. Materials performance is dictated by local environment and atmospheric conditions.

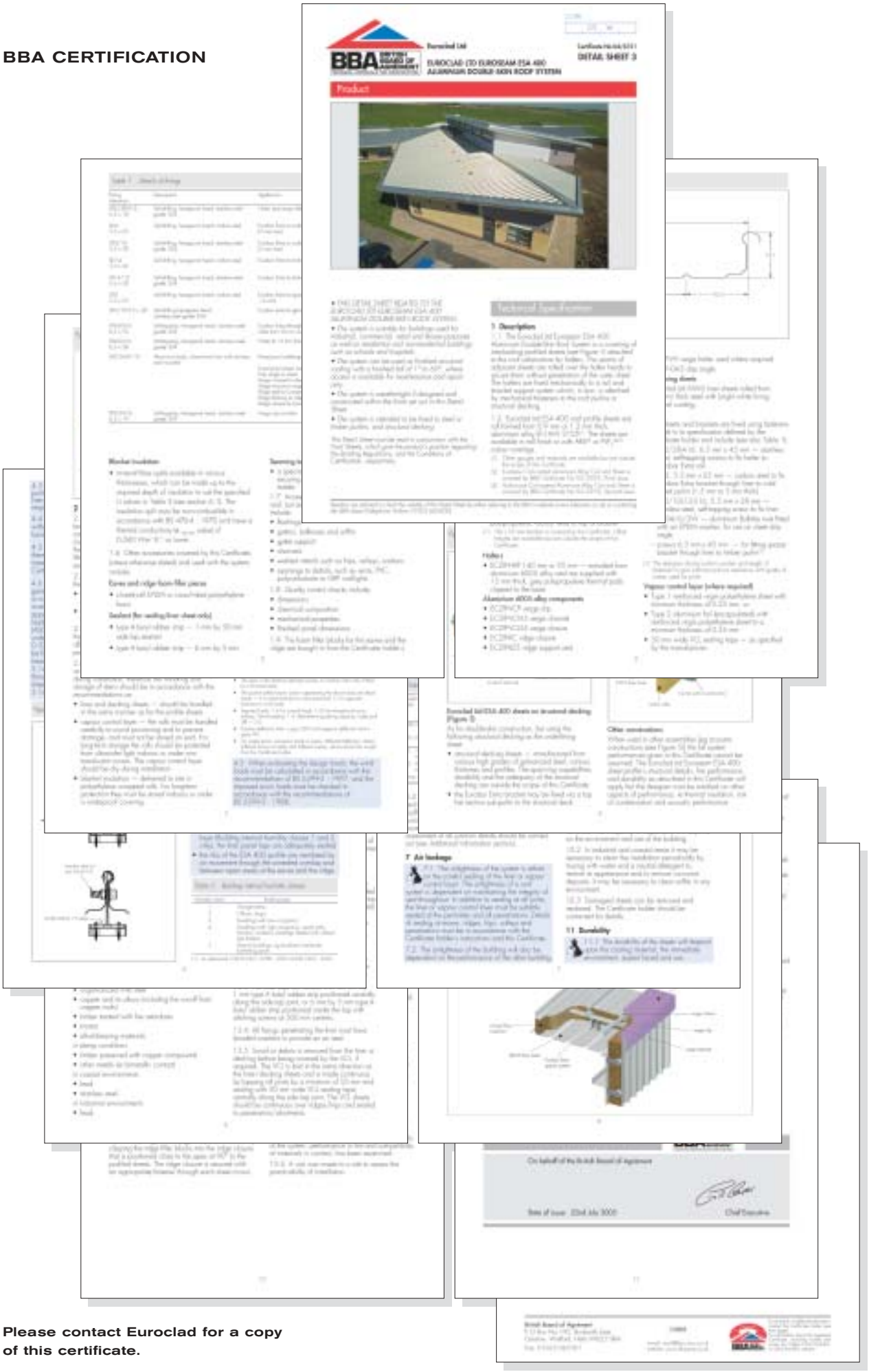
For pre-finished steel in Corus Colorcoat HPS200® the Compass Durability Index and Confidex Warranty determine the guaranteed coating performance, contact Euroclad or Corus for further information.

Colorcoat®
Only by corus

All the above materials can be expected to provide long term practical performance above and beyond periods of Guarantee, provided that appropriate maintenance actions are carried out during the working life of the building.

For other materials and coatings separate advice is available on request.

BBA CERTIFICATION



Please contact Euroclad for a copy of this certificate.

AVOIDING CORROSION RISKS

Due to electrolytic corrosion, mill finish aluminium, copper and zinc should always be separated from incompatible materials by a suitable barrier (e.g. paint, isolation tape, thermal pads etc).

ALUMINIUM

The following materials are considered incompatible with aluminium:

- Brass
- Bronze
- Copper and its alloys
- Steel (other than stainless steel)
- Stainless steel in marine environments
- Lead in industrial and marine environments
- Timber treated with fire retardants, copper and fluoride compounds (check compatibility of any timber treatments present)
- Mortar, lime and concrete
- Alkali bearing materials.

Drainage onto plain mill aluminium from copper or lead should be avoided. BS5427 : Part 1 : 1996 3.9 states "...run-off from copper or lead surfaces can attack cast iron, galvanised steel or aluminium. This condition should be prevented by painting over copper or lead surfaces and on the inside of gutters where damage is most likely to occur".

STEEL

Euroseam supplied in Corus Colorcoat HPS200® requires powder coating of aluminium halters to act as an additional barrier. Other interfaces with standard accessories are typically separated by the sheet coating and backing coat, but if for any reason there is direct contact with the steel substrate, e.g. at a cut edge, then a suitable barrier should be applied.

COPPER

Copper is incompatible with aluminium and special accessories are therefore required for use with copper Euroseam.

ZINC

Zinc is compatible with aluminium and steel but consideration should be given if it is likely to come into contact with other metals.

Please consult the Euroseam Technical Department if you require further assistance.

QUALITY AND THE ENVIRONMENT

Euroclad are active in response to Whole Building Lifecycle Cost initiatives and will continue to develop cost-effective, low-impact products to meet the increasing demands of the market. The recent Barber Report highlights the increase in awareness of clients, specifiers and main contractors in this field, especially where disposal costs are concerned.

100% recycleable material is standard for Euroseam mill finish aluminium. Standard coated aluminium for Euroseam contains typically 80% recycleable material.

Aluminium is one of the most abundant natural materials available. The remelting process uses just 5% of the energy required to produce the primary aluminium. Total global remelt capacity is now more than 700,000 metric tons and the UK's secondary aluminium industry is efficient and well established.

All components within the standard systems are recyclable and have proven routes for recyclability. ESA sheets can be de-seamed and re-used or the material itself can be recycled.

Euroclad standing seam systems contain no material which could be classified as 'hazardous'. This is not true of all roof/cladding systems and is a vital consideration when assessing a life cycle cost.

Flexible constructions allow BREAM ratings to be achieved easily without compromising production costs or lead times.

Further information on other materials are available on request. Corus also provide extensive 'Life Cycle Analysis' information on steel Corus Colorcoat HPS200® material.

Euroclad's commitment to environmental issues is recognised through our compliance with **BS EN ISO 14001:2004**.

Q 10647

EMS 76580

Certificate of Registration

Environmental Management System

This is to certify that:

Euroclad Limited
Wentloog Corporate Park
Wentloog Road
Cardiff
South Glamorgan
CF3 2ER
United Kingdom

Operate an Environmental Management System which complies with the requirements of BS EN ISO 14001:1996 for the activities detailed in the scope of registration.

Certificate No.: EMS 76580

Signed on behalf of BSI

Originally registered: 3 Dec 2003

UKAS
003

This is not a legal document and cannot be used as such.

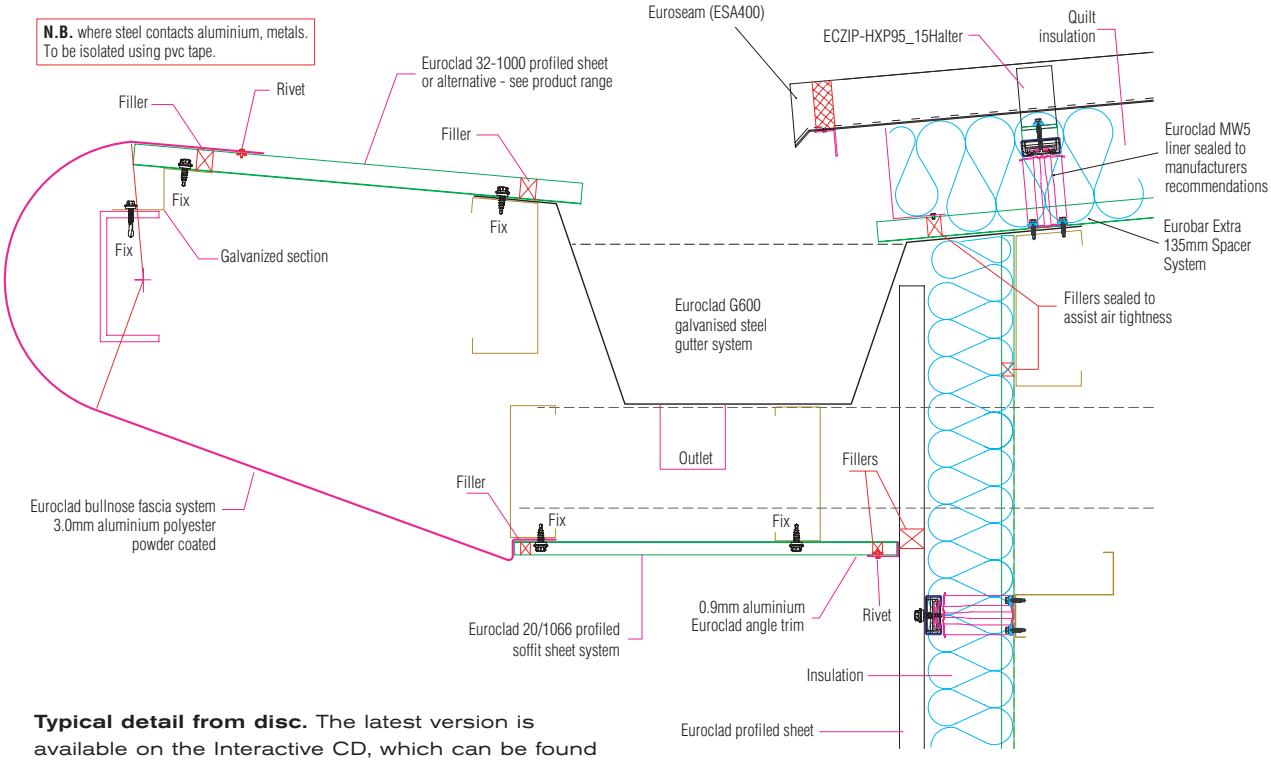
This certificate does not expire.
To check its validity telephone +44 (0)20 8996 9001 or visit www.bsi-global.com/ClientDirectory

The British Standards Institution is incorporated by Royal Charter.
Group Headquarters: 389 Chiswick High Road, London W4 4AL, UK.

BSI Management Systems

BS EN ISO 14001 accreditation.

STANDARD DETAILS AND CAD



Typical detail from disc. The latest version is available on the Interactive CD, which can be found at the rear of this manual.

Extensive 'construction details' are available, these can be found on the accompanying CD.

The drawings have been saved as Autocad 2000 dwg files – to enable use by Autocad users with this or later versions. Also included on the disc is Autodesk Voloview – enabling viewing of the drawings (if you do not have Autocad).

Drawings can also be viewed through Autodesk Voloview .

Three dimensional thermal models can be run on our state-of-the-art software for particular details to determine Psi and F-factors to aid in the design process if required.

Component drawings and some other miscellaneous details are included for completeness.

Whilst we hope that this will provide enough for you to be able to use our details, there are inevitably cases where a one-off, bespoke detail is required for a given situation. In these circumstances, we will be pleased to look at any proposals you may have and to advise on these.

DETAILING

Detailing is crucial to achieving the desired effect in building design. It is often poor detailing which lets down an otherwise pleasing design.

Euroclad Facades, Fabrications, Flashings and Powder Coating facilities offer an opportunity to integrate details from one supplier.

Typical details used with Euroseam include curved feature verge flashings, bullnoses, fascias and soffits, column casings and gutters.

These are available in the widest range of materials and typical finishes include Mill and Interpon D powder coated aluminium, as well as Alpolic aluminium composite material and Corus Colorcoat HPS200®.

Further specific detailing may include feature elements using the Euroseam profile, tapered and curved sheets or any of the above materials.

Euroclad use state-of-the-art CAD-CAM technology in manufacturing fabrications and we pride ourselves on being able to produce bespoke features.

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INTRODUCTION

The following section details the most common systems, but is not exhaustive. Euroseam is a very versatile, lightweight roof covering and can be applied over many types of construction.

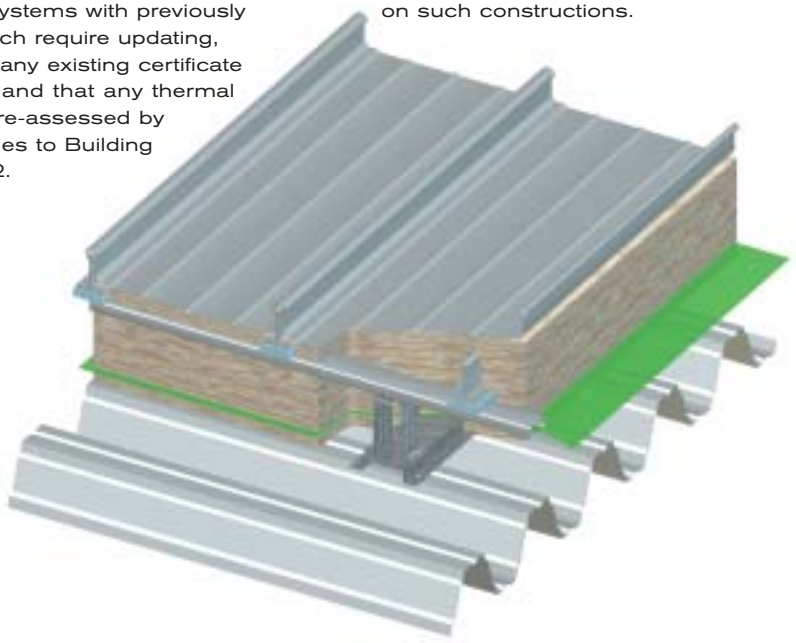
The main types of application are covered by the Euroseam Systems BBA Certificate and Euroclad Elite Systems. The certification process specifically assessed the behaviour of the product under thermal movement and this vital aspect should be taken into account if considering the use of any standing seam system.

There are a number of systems with previously awarded certification which require updating, it should be verified that any existing certificate covers the above issue and that any thermal values given have been re-assessed by BBA following the changes to Building Regulations in April 2002.

Euroseam BBA certification covering the Euroseam systems is designated 'Double Skin Systems' as this is the most common application for the product.

If used in a single skin application, or perhaps fitted to a plywood decking etc., the products main characteristics as certified are still valid, but the designer must check with Euroclad regarding such specific performances as thermal or acoustic values, vapour control and specific detailing.

Euroclad will be happy to provide assistance on such constructions.



DOUBLE SKIN SYSTEMS

The most commonly used systems for metal clad buildings. A variety of liners, structural decks and trays can be utilised with Euroseam to suit design considerations.

Euroclad have developed the Eurobar Extra spacer system and new HXP halter designs to maximise the benefits of Euroseam Systems – these have been included in the aforementioned BBA Certificate.

These components cover all standard construction types e.g. twin skin with liner, structural deck, acoustic (both liner and deck) and systems on timber frames. They form the backbone of Euroclad Elite Warranty Systems.

- Additional strength of Eurobar Extra, tested as part of BBA Certification
- 60mm rail bearer width and halter base ensuring structural stability
- Typically 1.2m bracket centres coinciding with MW5 liner pitch
- Greater span performance
- Savings in fixing time
- Improved thermal pad performance
- Halters designed to suit standard insulation
- Halters and pads pre-assembled
- Euroclad NBS specifications detail components and confirm performances
- Euroseam Construction Details.

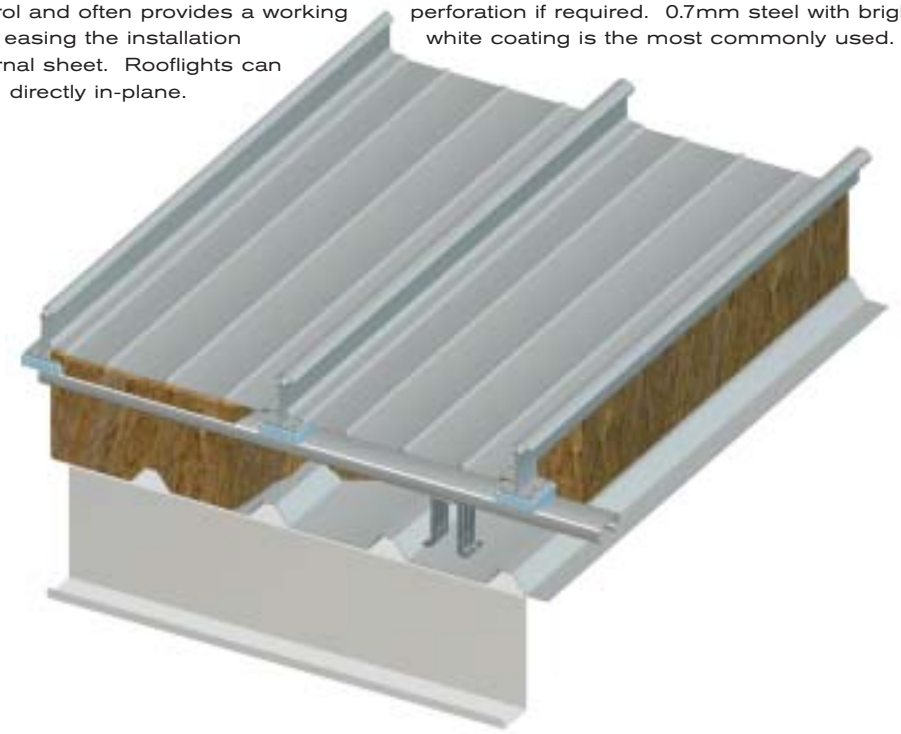
Euroclad should be consulted for draft NBS specifications and details which can be tailored to performance requirements for insulation, vapour control, acoustics etc., and can be further adapted for project specific requirements.

The widest variety of construction types and performance variations can be accommodated by Euroseam Systems. Standard Euroseam System details are given on the following pages. However, the details herein cannot be exhaustive and through consultation Euroclad Systems can be developed for almost any situation.

TWIN SKIN LINER CONSTRUCTIONS

Perhaps the most commonly used construction is the over-purlin Twin skin liner construction. The liner provides good aesthetic quality, is versatile and cost effective. A sealed liner can be used to provide vapour control and often provides a working platform, once fixed, easing the installation process for the external sheet. Rooflights can also be incorporated directly in-plane.

The preferred liner profile for use with Euroseam is Euroclad MW5 liner, which maximises the benefits of Euroseam Systems. MW5 liner can be supplied in steel or aluminium, with options on coatings and perforation if required. 0.7mm steel with bright white coating is the most commonly used.



LINER CONSTRUCTIONS

EXAMPLES OF STANDARD OVER PURLIN LINER CONSTRUCTIONS						
Liner	Insulation and K-value	Eurobar Extra bracket height and centres	Finished insulation thickness	Halter type and height	Purlin centres	Max U-value
MW5R	200mm 0.040	135mm @ 1.2m	174mm	HXP95_15	1.8m	0.25
MW5R	240mm 0.037	135mm @ 1.2m	219mm	HXP140_15	1.8m	0.19

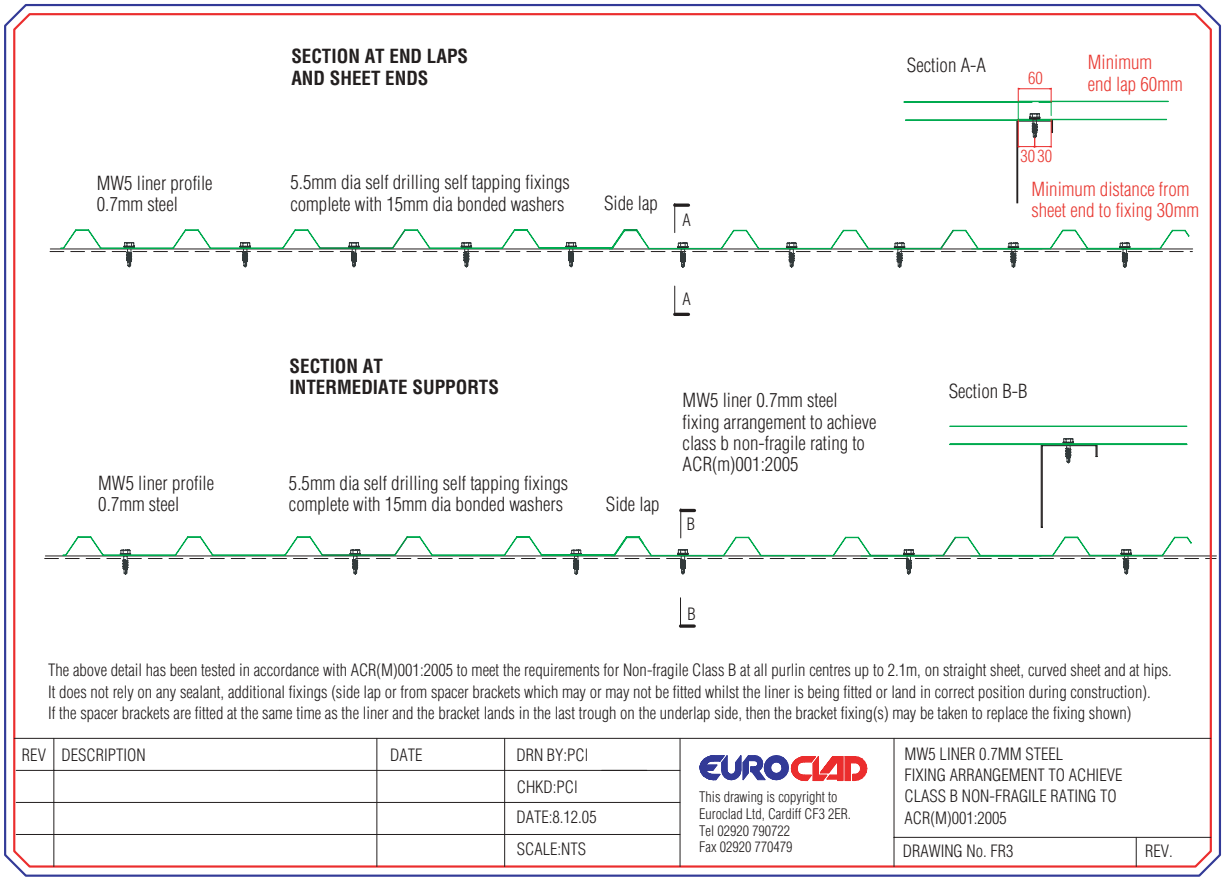
Liner profile, spacer system type/bracket spacing, purlin centres, halter and thermal pad size/type have all been proven through 3D computer modelling to affect the thermal performance of the system – so Euroclad should be consulted for specification, if any of these differ from the the examples above.

NB: Other Euroclad liner profiles, spacers and halters may be used with Euroseam. Please consult with the Sales or Technical Departments for more information.

Euroclad recommend the use of minimum liner guages of 0.7mm for steel and 0.9mm for aluminium profiles with Euroseam. Liner for use in swimming pools is typically perforated, (see Section B4, Acoustics) and if this is the case it should be 0.9mm aluminium, and may be PVF2 or ARS coated on both sides.

Euroclad profiles have been extensively tested and can be fixed to be classed as non-fragile to ACR(M) 2005. This is often beneficial during the construction process, when the ability to use the fixed liner as a working platform during installation of the outer sheet can speed the construction process.

Fixing requirements for Euroclad liner profiles to achieve non-fragile classification are given in Euroclad draft NBS specifications and drawings, which are available on request. The standard MW5 liner in 0.7mm steel has been tested and achieves Class B non-fragility on all purlin centres from 0.900 to 2.1m, hips and curves when fixed as illustrated below.



The above detail has been tested in accordance with ACR(M)001:2005 to meet the requirements for Non-fragile Class B at all purlin centres up to 2.1m, on straight sheet, curved sheet and at hips. It does not rely on any sealant, additional fixings (side lap or from spacer brackets which may or may not be fitted whilst the liner is being fitted or land in correct position during construction). If the spacer brackets are fitted at the same time as the liner and the bracket lands in the last trough on the underlap side, then the bracket fixing(s) may be taken to replace the fixing shown)

REV	DESCRIPTION	DATE	DRN BY:PCI		MW5 LINER 0.7MM STEEL FIXING ARRANGEMENT TO ACHIEVE CLASS B NON-FRAGILE RATING TO ACR(M)001:2005	
			CHKD:PCI			
			DATE:8.12.05			
			SCALE:NTS		DRAWING No. FR3	REV.

EUROCLAD

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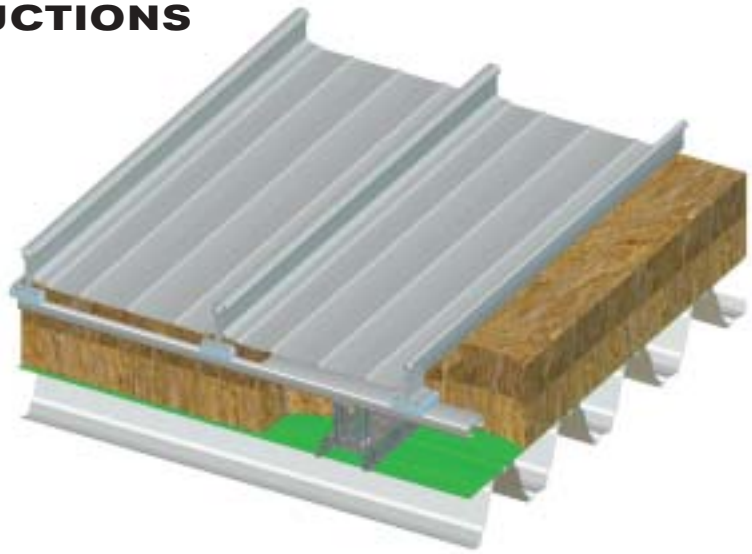
STRUCTURAL DECK CONSTRUCTIONS



Eurodeck offers solutions to allow architectural requirements to be met, whilst providing the required strengths and cost advantages associated with metal deck systems.

The Eurodeck profiles have been carefully selected to allow Euroclad to offer the most cost effective solutions to your roofing requirements. Euroclad's investment in specialist software, combined with hugely experienced and qualified technical specialists, allows Euroclad to advise on not only the suitability of our structural metal decks, but to be proactive in ensuring that the most cost effective solution is offered.

MATERIALS

Eurodeck profiles are manufactured from the highest quality galvanized steel and aluminium substrates. In order to provide the inherent strengths required by the demands of modern architecture, profiles are available in up to seven different gauges.

Eurodeck can be supplied with a large selection of coatings, including: PVDF, Polyester, Corus Colorcoat HPS200®, Dobel 200XT and 200 micron leathergrain finishes.

ACOUSTIC DESIGNS

Eurodeck offers three standard perforation patterns for applications where internal acoustic performance is of priority. The perforating lines are housed within the deck production facility, so as to minimise additional lead-times that are normally associated with perforation.

EUROCLAD ARCHITECTURALLY ENHANCING CURVED ROOF SYSTEMS

Euroclad systems offer solutions without compromise. Using our Euroseam standing seam and Eurodeck in conjunction, allows the designer to take full advantage of the flexibility of Euroclad systems and deliver breathtaking curved roof systems within the budget restraints that typify todays construction industry.

For all systems the project loadings at each roof zone determine the centres for the spacer system. At the eaves, ridge and perimeter edges the suction loads are usually higher than in the main roof zone and centres for halters and spacers upslope may therefore need to be reduced in these zones to provide better resistance, particularly to wind suction loads.

Spreading the load across structural deck may be achieved by using tophats running upslope (typically at 90° to the deck profile). Tophats are staggered diagonally across slope at each row upslope. Tophats may be continuous or short, straddling two deck crowns at minimum to simplify construction. Short tophats in the main roof areas should straddle the sheet overlap to ensure each sheet is sharing the load. Use of short tophats is of value, particularly where the roof is curved. It also allows for easy accommodation of acoustic slab insulation, if this is a requirement (see Section B4, Acoustic Systems).

In most circumstances, the tophats in the main roof area should be landed over 2 crowns of the deck profile at 2 x the deck cover width, and coincident with the side laps of the deck, so as to be fixed to two deck sheets. In perimeter areas the tophats will be fixed over two crowns on a single deck sheet.

STANDARD DECK CONSTRUCTIONS

When using one of the Eurodeck profiles with Eurobar Extra spacers the typical short tophat centres (and therefore those of the Eurobar Extra rails) will be determined by the deck profile pitch. The figures for the Euroseam profile at these pre-determined centres are set out below:

EXAMPLES OF STANDARD DECK CONSTRUCTIONS

Eurodeck profile	Insulation and K-value	Tophat height	Eurobar Extra spacer height and centres	Finished insulation thickness	Rail centres upslope	U-value
137.930	220mm 0.040	30mm	135mm @ 1.2m	204mm	1.860m	0.20
137.930	220mm 0.040	30mm	135mm @ 1.2m	204mm	0.930m	0.22
137.930	220mm 0.037	30mm	135mm @ 1.2m	204mm	1.860m	0.19
137.930	220mm 0.037	30mm	135mm @ 1.2m	204mm	0.930m	0.21
158.750	220mm 0.040	30mm	135mm @ 1.2m	204mm	1.500m	0.21
158.750	220mm 0.040	30mm	135mm @ 1.2m	204mm	0.750m	0.23
158.750	220mm 0.037	30mm	135mm @ 1.2m	204mm	1.500m	0.20
158.750	220mm 0.037	30mm	135mm @ 1.2m	204mm	0.750m	0.22

HXP95_15 halters. Tophat 1.6mm galv crown dim 95mm, depth as table, flanges 20mm. Tophat spans two crowns of deck over profile side lap.

NB: There are a large number of Eurodeck profiles available. Space precludes publishing all the possibilities. So please consult us, as the deck profile, spacer system type/bracket spacing, halter and thermal pad size/type have all been proven through 3D computer modelling to affect the thermal performance of the system. Euroclad should be consulted for specification, if any of these differ.

Advice on setting out can be obtained from Euroclad for specific loadings. As a general rule the following principals can be adopted:

1. Establish the Eurobar Extra bracket/bar/tophat spacing (often initially determined by deck profile cover width)
2. Establish the Euroseam profiles load/span performance meets project requirements at these centres from the tables in this manual.

The decking is usually laid parallel to the eaves, spanning between the main frame. It may also be laid with the profile running parallel to the verge. Selection of the structural deck profile for the project should be made after consultation with Euroclad regarding 'load and span considerations'.

In Euroseam systems, the thermal bridging through halters is reduced by the wider spacing of Eurobar brackets, avoiding multiple non-linear thermal bridging which occurs where 'straight through' halters are used or brackets are required to be closer together. This arrangement may not be suitable for every situation and Euroclad must be consulted if there is a requirement for the deck to act as a diaphragm.

The effect of reduced centres for perimeter loadings on thermal performance should be considered. If the area is inside the building 'envelope' then a proportional area calculation should be run to obtain the average roof U-value. If the area is outside the building 'envelope' then it is likely that no further consideration is required.

Euroclad as manufacturers publish the information required for designers to confirm the structural performance of our products against specific projects.

ACOUSTICS

Due to increasing demands for bespoke acoustic design for buildings, Euroclad have developed systems to accommodate a wide range of performances. The built-up nature of the products allows far greater flexibility in this field – when compared for example, with composite panels.

Systems can be modified to meet requirements by the inclusion of various components. Common applications for acoustic constructions are: education establishments, swimming pools, sports halls, cinemas or accommodation. Due to the bespoke nature of many project requirements Euroclad should be consulted for solutions at an early stage.

Part E of the Building Regulations and Building Bulletin 93 referenced therein have raised the stakes regarding acoustic performance of schools and other educational facilities. There has also been a general increase in the awareness of acoustic performances of buildings and 'noise pollution'.

There are three main performance criteria that need to be considered for acoustic systems:

- Sound reduction
- Sound absorption
- Sound Intensity (specifically relating to rain noise as referenced in BB93).

Euroclad Euroseam systems can provide solutions for all of the opposite and have been extensively tested, modelled and proven in the field. An ongoing test programme is underway.

They can also offer savings in many cases where acoustics are a requirement. They also show that Rockwool Cladding Roll, in direct contact with Euroseam external sheet, provides effective acoustic damping, with enhanced damping also possible.

Statements in BB93, recommending dampening to external metal sheet, plasterboard sub-roofs and potential sound pressure levels of 70dB for metal roofs, should be considered in light of our rain noise test results detailed herein.

The test results provide data that can be used to make more realistic judgements on the roof system to be used.

RAIN NOISE SOLUTION

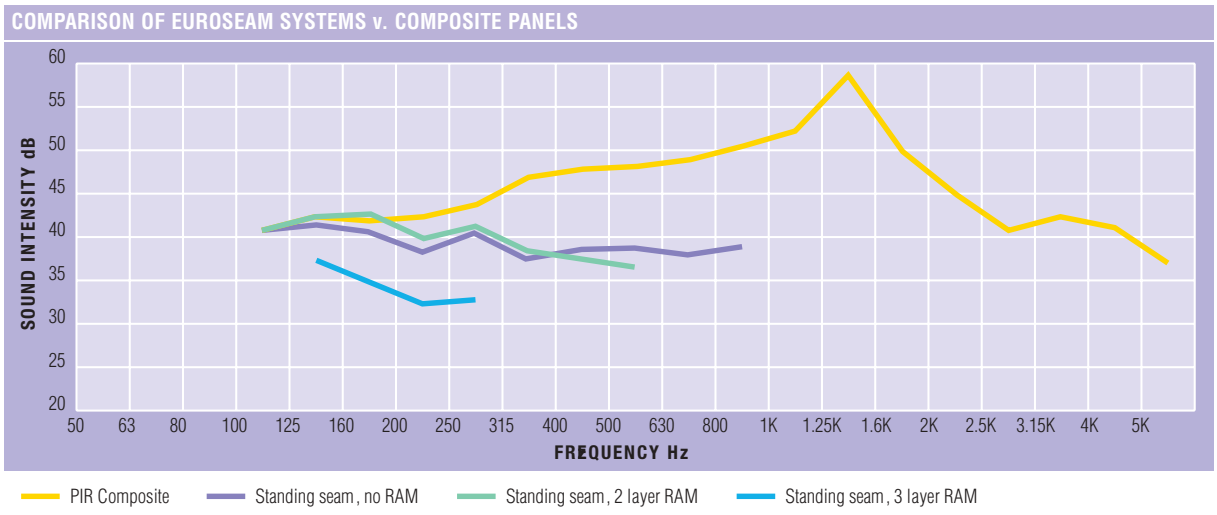
Potential noise from rain impact should be taken into account in design.

A new European test ISO/CD 140-18 (ISO TC43/SC2 N 0751) for measuring 'sound intensity performance of building systems under rainfall' is due to be introduced in the near future.

Euroclad, in conjunction with Rockwool have carried out tests at BRE to determine the performance of typical twin skin roof constructions when tested in accordance with BS EN ISO 15186-1:2003 and the latest draft of the new ISO dated 13-1-2004. The tests included twin skin Euroseam, Euroclad trapezoidal sheet systems and PIR composite panels. The tests used the 'Heavy Rain' rainfall case (large drop diameter and fall rate, return period of 1 in 50 years). It is intended that this case will be used for the comparison of building products in Europe.

Euroseam systems achieved the lowest levels of sound intensity in the tests. The standard system, with no additional damping layers performed very well. The system could easily be enhanced by adding layers of Rockwool Acoustic Membrane. Most of the Euroseam system performances, at certain third octave frequencies, were so good that no level of sound intensity could be measured at some frequencies, despite the onerous 'heavy rain' case used. In the view of BRE, it was thought that testing at any of the less onerous rain types given in the standard would have resulted in very little measurable data being collected.

The system that performed best included Rockwool Acoustic Membrane in two layers low in the build-up and one section bonded to the sheet pan.



SOUND REDUCTION AND ABSORPTION

ESA Systems can cover both deck and twin skin liner constructions and have been geared to achieve maximum performance flexibility whilst maintaining the same build depth and basic system componentry. This offers savings on both materials and installation. They have also been assigned proven U-values using 3D thermal modelling.

Euroclad have developed systems to provide both effective sound reduction and sound absorption. The systems can be adjusted to achieve different performances. Inclusion of additional density layers, such as Rockwool Acoustic Membrane, perforated liners and sound absorbing Rockwool RW slabs can be varied to achieve different performances according to the criteria for the particular building or indeed room within a building. We have also developed systems which allow the same build-depth of construction to be used over areas with different criteria. This can allow savings to be made by only applying additional features where they are needed, but still achieving thermal U-value requirements throughout. Full details should be sought through consultation with us.

A typical 0.25 U-value over-purlin system with non-perforated liner is predicted to achieve 44.6dB* Sri Sound Reduction performance and can easily be adapted to achieve a range of performances up to 51dB*.

A perforated liner or deck may be specified to provide sound absorption performance and contribute to lowered reverberation time in rooms and internal spaces. Tissue faced slab insulation is placed immediately over the liner to assist absorption. Our systems can provide absorption coefficients allowing the roof to be classed as a Class A absorber and test data is available.

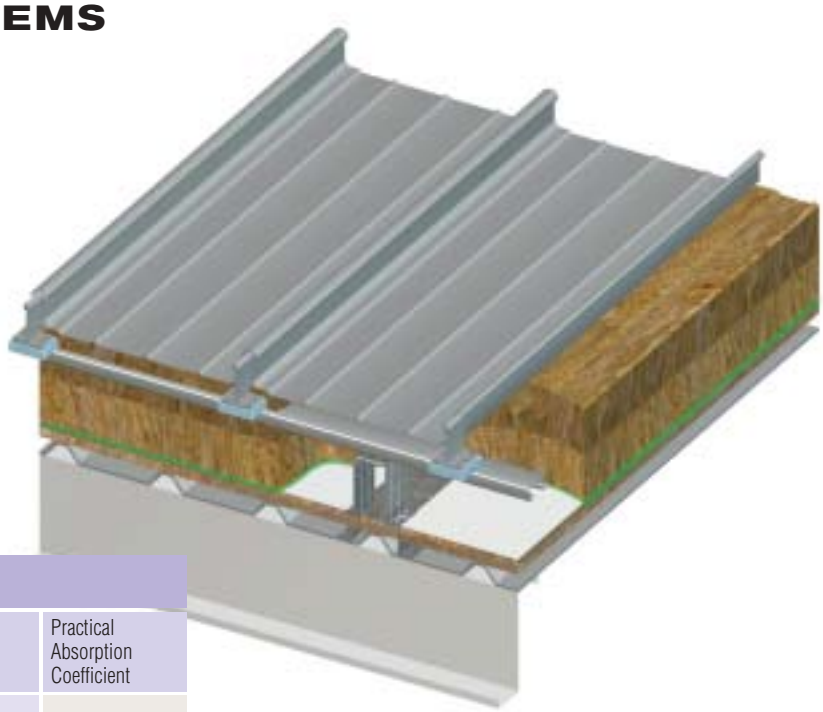
The use of perforated liner or deck to provide sound absorption typically reduces the systems Sound Reduction performance. This can be compensated for, if required, by the inclusion of additional density layers in the construction, typically placed above the slab insulant used to provide absorption.

Due to the different acoustic requirements for each project, it is advisable to consult with Euroclad's Sales or Technical Department in the design process to call on our extensive experience to develop a system that meets project requirements.

*Modelled on Salford University software specifically designed for predicting the performance of twin skin metal roofs.

ACOUSTIC SYSTEMS

STANDARD TWIN SKIN LINER ACOUSTIC ABSORPTION SYSTEM



System as illustrated in Drawing **ESAc1**.

TEST DATA FOR DRAWING ESAc1 FROM SOUND RESEARCH LABORATORIES

Frequency	Sound Reduction Index, dB	Absorption Coefficient	Practical Absorption Coefficient
50+~	13.0	0.35	
63+~	13.0	0.96	N/A
80+~	16.2	0.75	
100	17.9	0.53	
125	19.1	0.78	0.70
160	22.4	0.83	
200	25.3	0.90	
250	27.9	0.90	0.95
315	28.3	1.07	
400	30.4	0.99	
500	35.0	1.00	1.00
630	39.2	0.96	
800	43.3	1.01	
1000	46.1	0.94	0.95
1250	49.3	0.92	
1600	54.4	0.93	
2000	59.7	0.93	0.95
2500	65.3	0.96	
3150	67.1	0.90	
4000	67.7	0.97	0.95
5000	70.6	0.95	
6300+~	73.9 *	0.94	
8000+~	74.1 *	0.99	N/A
10000+~	71.4 #	0.92	
Average 100 – 3150	39.4	α @ 1.00 Class A Calculated to EN ISO 11654:1997 NRC 0.95 Calculated to ASTM C 423-01	Practical absorbtion coefficient, BS EN 11654: 1997

Sound reduction rating according to BS EN ISO 717-1:1997 Rw(C;Ctr) = 38 (-1;-6) dB

Sound absorption figures to BS EN ISO 354:2003

Note:

* Designates measurement corrected for background

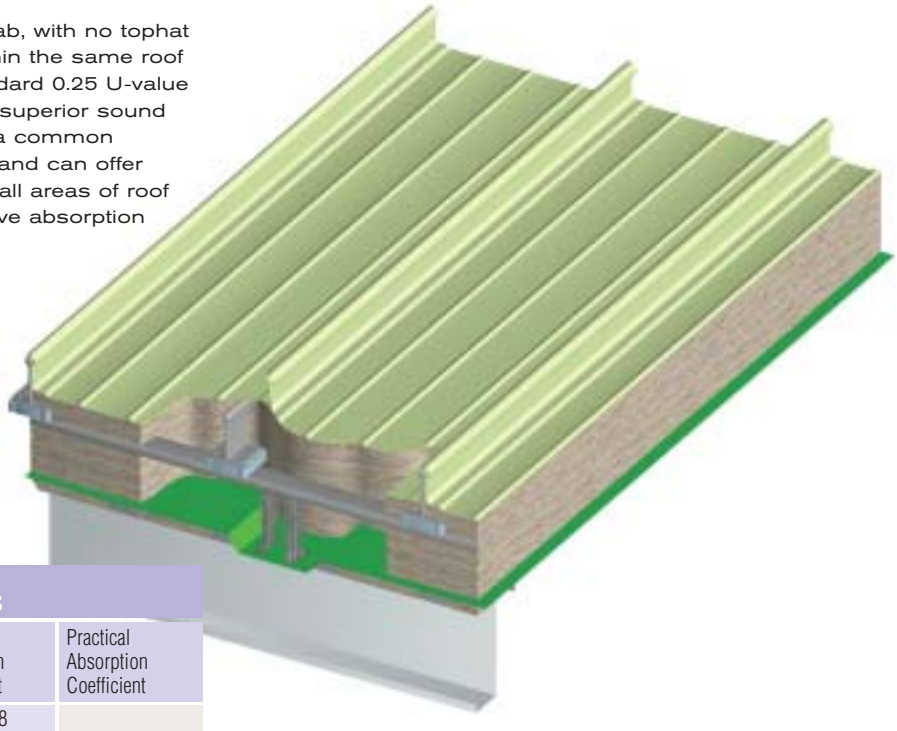
\# Designates limit of measurement due to background

\+ Designates frequency beyond standard and not UKAS accredited

~ Designates frequency outside the range covered by BS EN ISO 354:2003

ENHANCED TWIN SKIN LINER ACOUSTIC ABSORPTION SYSTEM

This system uses pre-cut RW5 slab, with no tophat spacer. This allows transition within the same roof area and build-depth, from a standard 0.25 U-value roof construction, to a roof giving superior sound absorption performance. This is a common requirement for schools projects, and can offer significant savings where only small areas of roof require the typically more expensive absorption performance.



System as illustrated in Drawing **ESAc2**.

TEST DATA FOR DRAWING ESAc2 FROM SOUND RESEARCH LABORATORIES

Frequency	Sound Reduction Index, dB	Absorption Coefficient	Practical Absorption Coefficient
50+~	16.2	0.38	
63+~	15.4	1.20	N/A
80+~	17.6	0.75	
100	22.0	0.57	
125	20.4	0.90	0.75
160	22.2	0.85	
200	24.5	0.80	
250	26.8	0.90	0.85
315	27.8	0.85	
400	30.7	0.89	
500	33.9	0.94	0.90
630	37.7	0.91	
800	42.3	0.99	
1000	45.8	0.98	0.95
1250	49.0	0.94	
1600	54.0	0.95	
2000	58.6	0.97	0.95
2500	62.5	0.97	
3150	63.7	1.00	
4000	64.6	0.98	1.00
5000	65.6	0.95	
6300+~	67.4 *	0.97	
8000+~	67.1 *	0.99	N/A
10000+~	65.7 #	0.95	
Average 100 – 3150	38.9	α @ 0.95 Class A Calculated to EN ISO 11654:1997 NRC 0.95 Calculated to ASTM C 423-01	Practical absorbtion coefficient, BS EN 11654: 1997

Sound reduction rating according to BS EN ISO 717-1:1997 Rw(C;Ctr) = 38 (-1;-6) dB

Sound absorption figures to BS EN ISO 354:2003

Note:

* Designates measurement corrected for background

\# Designates limit of measurement due to background

\+ Designates frequency beyond standard and not UKAS accredited

~ Designates frequency outside the range covered by BS EN ISO 354:2003

STRUCTURAL DECK ACOUSTIC SYSTEMS

Many projects use a structural deck spanning between main steelwork – this is often used in school applications.

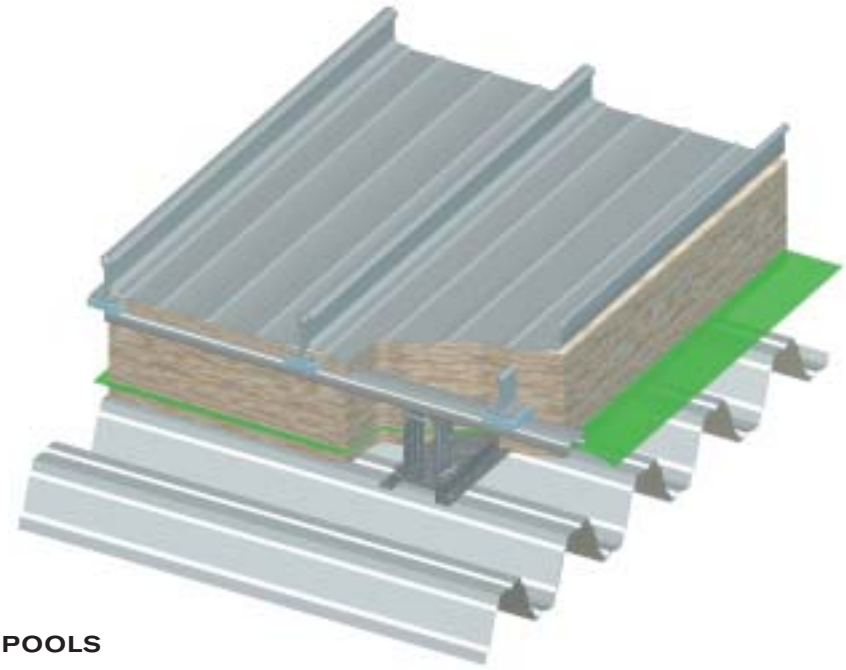
The same options apply in terms of adding density layers and using perforated and un-perforated deck.

The systems using perforated deck perform very well in maintaining sound reduction performance whilst providing absorption. The following data illustrates the performance levels that can be achieved and are derived from our test programme.

Full data is available on request, the following is a summary:

SUMMARY OF PERFORMANCES EUROSEAM OVER DECK

Drawing	Rockwool acoustic membrane	Deadpan to sheetpan	Weighted sound reduction Rw	Absorption coefficients 1/3 octave 100Hz	Absorption coefficients 1/3 octave 250Hz	Absorption coefficients 1/3 octave 500Hz	Absorption coefficients 1/3 octave 800Hz	Absorption coefficients 1/3 octave 1000Hz
ESD A1	2 x 5kg	250mm	51	Not tested	Not tested	Not tested	Not tested	Not tested
ESD A2	2 x 5kg	N/A	49	0.21	0.61	0.77	0.70	0.60
ESD A3	1 x 5kg	N/A	45	0.36	0.61	0.75	0.69	0.59
ESD A4	N/A	N/A	40	0.78	0.83	0.93	0.77	0.58
ESD A5	N/A	250mm	42	Not tested	Not tested	Not tested	Not tested	Not tested



SWIMMING POOLS

Constructions of the type illustrated are often also used in swimming pool applications where the internal environment is likely to contain chlorine and would therefore be potentially more corrosive. In these applications it is important to use only an aluminium liner sheet or deck of minimum 0.9mm thickness.

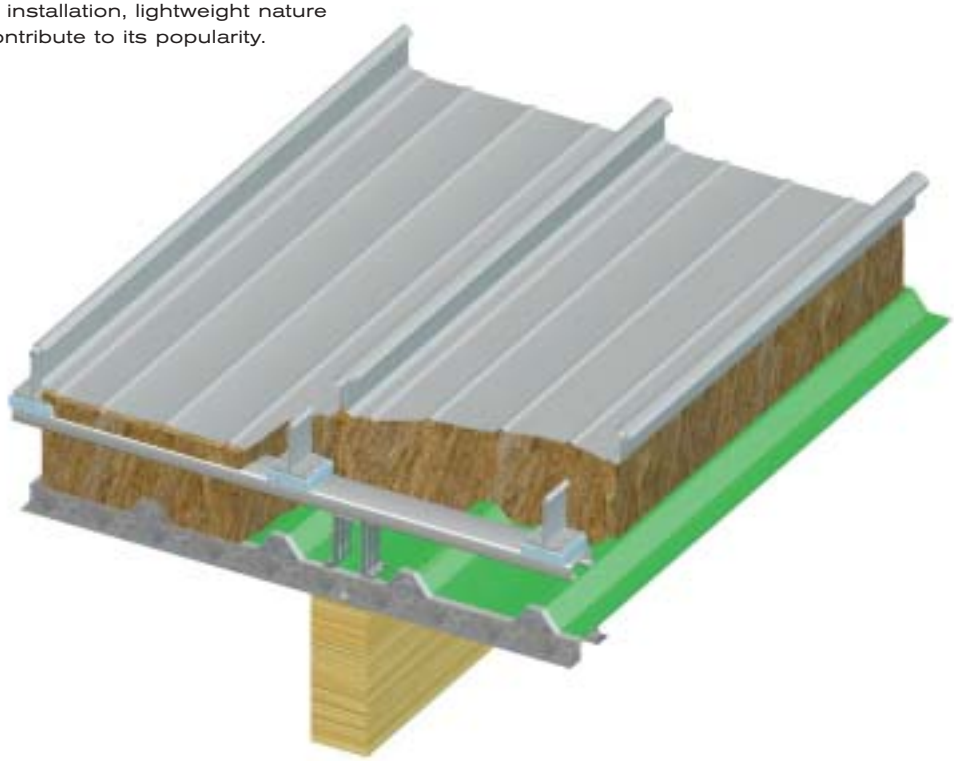
The coating should be suitable for an aggressive environment and PVF2 or ARS are recommended. Powder coated galv or aluminium tophats (if they are below the VCL) and austhenitic stainless steel fixings would be required in this environment.

TIMBER FRAME CONSTRUCTIONS

Euroseam is increasingly used over timber frame constructions and its versatility allows it to be easily adapted for this application.

Its superior performance in respect of rain noise, ease and speed of installation, lightweight nature and longevity all contribute to its popularity.

It can be used for both cold and warm roof construction types and may be fitted as a metal twin skin on steel tophat sub-purlins crossing the rafters.

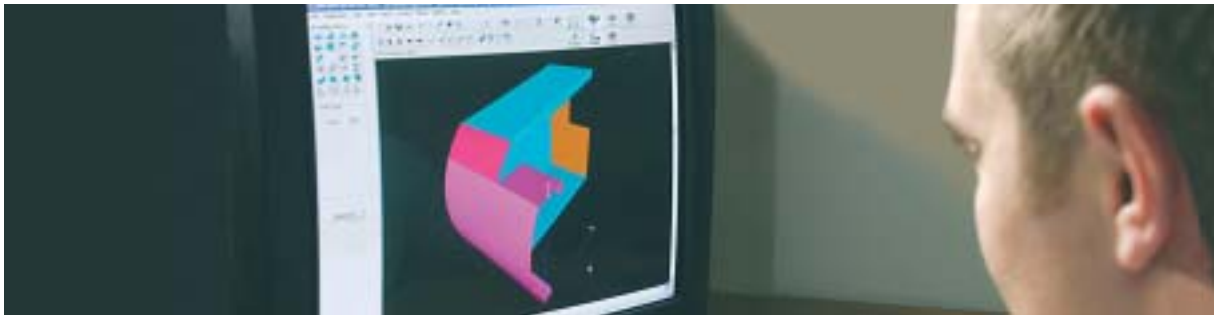


It is also often fitted as a warm or cold roof system over a plywood deck. A variety of spacers can be used according to project requirements.

The system may be fitted via Euroclad spacer rail and bracket systems or using halters only. A separate vapour control layer should be included in domestic applications.

NB: Special consideration is required regarding fixings, arrangement and type of spacers. This is due mainly to the requirements for minimum permissible edge distances used for fixings into timber bearers, more critical pull-out values for fixings when fitted into ply decking and the resultant effect that this can have on the thermal performances of the systems (i.e. where more halters or spacer brackets lead to more thermal bridges). Consultation with Euroclad early in the design process is highly recommended

INTRODUCTION



The revisions to Approved Document L 'Conservation of Fuel and Power April 2006' were introduced as part of the government's programme of change for more energy efficient buildings, reducing fuel consumption by energy efficient design of the complete building fabric, limiting heat loss through thermal bridging in the structure and limiting air leakage through the building envelope.

They will include the next stage of application of energy efficiency initiatives including a new National Calculation Methodology (NCM) using a new software interface, Simplified Building Energy Method (SBEM) for assessing the overall energy efficiency of buildings. Euroclad have been participating in Beta testing of the new software and will continue to provide up to date information and assistance to designers during the process of change.

The current elemental U-value requirements for construction elements remain a valid way of achieving compliance but other apsects of the whole building such as HVAC systems, air leakage, windows and lighting will also affect the overall building compliance. Built-up systems using Euroseam are particularly flexible and so will be able to accommodate variant U-values if required.

Details of methods for showing compliance are available in the Approved Document itself, the MCRMA Technical Paper 14 and Euroclad's 'Construction Details' reference manual. These should be read in conjunction with the following information.

PART L

The Standard Construction Details for Euroseam have been 3D thermally modelled on Trisco (a 3D software package which is fully compatible with BS EN ISO 10211-1) to provide U-values and both F-factor and Psi-value figures.

The heat flows to determine U-value should be modelled in this manner for all standing seam systems which contain 'non-linear repeating point thermal bridges' i.e. clips or halters in the plane element.

Standard types of 'robust' details are also given in 'MCRMA Technical Paper 14'. Specific values can be sought from the Euroclad Technical Department.

Three major factors requiring consideration in order to establish Euroseam's compliance with the thermal requirements of 'Approved Document (AD) L2A' are the elemental U-value requirement for roofs (typically .25, 0.20 W/m^{2}K), the F-factor and the Psi-value of linear details.

U-VALUES

U-values are summarised under the sections dealing with specific construction types. Further draft specifications, drawings and advice confirming performances are available through consultation with our Sales Team. The U-value may be entered as part of the building performance on SBEM. The default elemental roof value of 0.25 may be used or another bespoke value may be chosen to input.

F-FACTOR

The second major aspect for consideration in the Plane Elements is the F-factor. This is the minimum allowable temperature factor of thermal bridges required to prevent condensation occurring on the inside of the building envelope. Surface temperature criteria appropriate to industrial buildings have been established using the methodology specified in BS EN ISO 13788. The methodology leads to building types being divided into Humidity Classes and minimum allowable F-values are assigned to each Class.

Humidity class	Building type	Minimum F-value
1	Storage areas	0.3
2	Offices and shops	0.5
3	Dwellings with low occupancy	0.65
4	Dwellings with high occupancy, ie: sports halls, kitchens, canteens, buildings heated with un-flued gas heaters etc.	0.8
5	Special buildings, ie: swimming pools, brewerys and laundrys etc.	0.9

The point thermal bridges caused by Eurobar Extra brackets or fasteners in plane elements do not lower the F-value below 0.9, which means that they would not pose a risk of internal surface condensation with any of the above humidity classes.

In the case of air-conditioned buildings, in which the internal humidity is controlled independently of the external environment, the set values of the temperature and humidity should be used to calculate the internal moisture load.

PSI(Ψ) VALUES

The Ψ value is used to establish the heat loss through linear thermal bridges such as ridge details, valley gutters etc. The procedure for determining allowable heat loss using the guidance in BRE IP 17/01 is clarified in 'MCRMA Technical Bulletin 11'. Loss requirement in ADL2, there is an allowable 'trade off' between the actual building and a 'Notional building' of the same size and shape as the actual building. The permitted heat loss from the 'notional building' is increased by an amount equal to 0.1 of Σ AU elemental for the 'notional building', where 0.1 is the so-called alpha (α) value.

Having calculated the values to the established method, if the total heat loss from the actual building (including Ψ values for details) is less than that from the Notional building, then the actual building will comply with the thermal transmittance loss requirement in ADL2.

THERMOGRAPHIC SURVEYS

It is much better to remove the need for a survey by demonstrating to a client that the cladding has been properly designed and installed, than to run the risk of potential delays and contractual difficulties due to subjective interpretation and limiting factors of a practical nature. Please also refer to 'MCRMA Technical Paper 14'.

AIR PERMEABILITY

Currently it is necessary to demonstrate compliance with a report from a 'competent person' that appropriate design details and construction techniques have been used or, for buildings over 1000m² floor area, to carry out an air leakage test.

The acceptable limit is 10m³/hr/m² at 50 Pascals. This may be reduced to 5m³/hr/m² under the next amendment to the regulations.

Correctly installed built-up systems, incorporating sealed profiled metal liners, to form an effective vapour control layer in twin skinned metal roof constructions, can be expected to achieve air permeability of 5m³/hr/m² (at 50 Pascals).

Good detailing of Vapour Control Layer (a sealed liner or separate VCL may be utilised, or both if required) is essential.

Euroclad recommend that side and end laps/joints and all perimeter joints of the VCL should be effectively sealed, not only to reduce air leakage but to provide vapour control.

Attention must be paid to leakage through all other associated elements within the envelope.

AIR LOSS THROUGH FIXING PENETRATIONS

Systems using both Eurobar and Eurobar Extra have been tested for air loss through the fixing penetrations.

Through necessity the testing was conducted at pressures several orders of magnitude higher than 50 Pascals, to enable the equipment to register any air loss.

However, no measurable air loss was detected, and we can, therefore, assume that air loss through correctly specified and installed fixings in our built-up constructions using either the Eurobar, or Eurobar Extra spacer systems, is insignificant.

However well designed a system is, it will fail and require expensive re-testing, possibly delaying completion of the contract by many weeks, if it has not been well installed.

It is therefore essential installation is carried out by recommended contractors, is well supervised and follows the relevant guidance.

Some buildings covered by L2A but employing 'domestic style' details such as schools or small office buildings may need to employ the 'robust construction details' for domestic type constructions given in a guide published in association with the Approved Documents, although the guide is mainly applicable to Part L1.

CONTROL OF CONDENSATION

There are two elements to consider, internal condensation risk from thermal bridging of insulation and interstitial condensation risk.

Part L2A of the Building Regulations requires bridging elements to be assigned an F-factor, designed to prevent nuisance condensation forming on internal surfaces. The Standard Construction Details on the accompanying disc give the F-factor performance.

Interstitial condensation risk can be assessed using the methodology set out in BS5250 Appendix D. With the thickness of insulation now required to achieve todays U-values it is rare for the calculations to show any problematic condensation risk. If there is a particular requirement, Euroclad can run the calculations on specific software. Quilt insulations water repellent treatment combined with the ability of the Euroseam system to breathe through the side laps, prevents any moisture which may be present from tracking into the insulation and allows it to be dispersed back into the atmosphere.

VAPOUR CONTROL

There has been much discussion over recent years as to the need for separate vapour control layers and breather membranes in built-up systems using metal liners.

Following research commissioned by the MCRMA, the BRE report of February 2000 concluded that “metal liners provide an effective vapour control layer in twin skinned metal roof construction. So long as the cladding is installed to a reasonable standard with a well sealed liner, it is not necessary to use a separate plastic VCL or breather membrane in most applications".

With more complex build-ups, for dwellings or in very high temperature/humidity buildings, extra precautions may still needed in both built-up and composite systems. Constructions using structural decks usually require a separate VCL.

For Euroseam double skin standard constructions the current normal recommendations are as follows:

Humidity Class	Building type	Separate VCL
1	Storage areas	No
2	Office, shops	No
3	Dwellings with low occupancy	No
3	Dwellings with high occupancy i.e. Sports halls, kitchens, canteens, buildings heated with un-flued gas heaters etc	Yes
5	Special buildings i.e. swimming pools, brewerys, laundrys etc	Yes

* Please note: Vapour Control Layer can be provided by either method. Sealed liner or a separate VCL may be used provided that they are detailed and installed correctly.

BREATHER MEMBRANES

Work has been carried out by BRE East Kilbride, in collaboration with the MCRMA, to examine in detail the factors that determine the risk of condensation within twin skin metal roofs. This work has demonstrated that, if a well sealed liner is used in conjunction with vented fillers for the outer sheet, only small amounts of condensation may occur on the external sheet over the winter and there will not be sufficient accumulation to cause dripping or running.

Therefore, so long as the cladding is installed with a high standard of workmanship with appropriate detailing, especially a well sealed liner, it is not necessary to install a breather membrane except in cases where there is likely to be an unusually high internal moisture load.

BUILDING REGULATIONS – PART E

Further information regarding this is provided in the Acoustic section of this manual. The acoustic performance of Euroseam systems is one of its greatest strengths, the built-up construction allows systems to be easily adjusted and has none of the acoustic shortfalls of composite panel systems.

INTRODUCTION

LOAD/SPAN CONSIDERATIONS

Low pitched roofs are subject to more wind forces than most, particularly suction and uplift forces. The halter to sheet attachment resisting wind uplift is extremely strong and Euroseam's properties allow it to absorb some of these forces. Some areas of roofs will be subject to higher uplift forces than others, particularly at the corners, perimeters and high level areas.

CP3, Chapter 5, Part 2: 1972 and its amendments was declared obsolete in 1998 and was due for full withdrawal June 2001.

The new Eurocode EN 1991 – 1-4 : Wind Actions is currently in the process of being introduced. It is anticipated that the final results derived from this standard will be essentially the same as those reached using BS 6399. The span tables have been calculated with reference to BS 5427 and BS6399 Parts 2 and 3.

The tables on the following pages have been set out to allow the designer to look up span against load.

0.9mm ES300 – Span/load
0.9mm ES400 – Span/load
0.9mm ES500 – Span/load
1.2mm ES300 – Span/load
1.2mm ES400 – Span/load
1.2mm ES500 – Span/load

Should you require tables for load against span, please contact Euroclad.

The maximum permissible cantilever for Euroseam sheet is determined by calculation, 300mm is conservative and can be applied for all aluminium Euroseam profiles and guages. Greater cantilevers are possible depending on project specific conditions.

LATERAL RESTRAINT

With reference to British Standard 5427 : 1996 'Code of Practice for the use of Profiled Sheet for Roof and Wall Cladding on Buildings', Part 1 'Design' Euroclad trapezoidal external profiles and Euroclad liner profiles in >.4mm gauge, fixed according to the recommendations the Euroclad Cladding Manual (other than perforated liners), will provide lateral restraint to the top flange of the purlins.

It should be noted that, because of the method of fixing of Euroseam, lateral restraint is not provided by the profile alone.

ESA400 – THICKNESS 0.9mm									
PROFILE DATA	MOMENT CAPACITY (kNm/m)		3.64	MOMENT OF INERTIA (Cm4/m)		13.66	REACTION CAPACITY (kN/m)		6.3
	MAXIMUM APPLIED LOAD (kN/m²)								
	IMPOSED		SNOW DRIFT		WIND (+VE)		WIND (-VE)		
SPAN (m)	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	REACTION
0.50	85.032	69.724	129.572	69.724	97.220	154.971	97.213	155.019	5.524
0.75	37.784	20.642	57.575	20.642	43.222	45.901	43.215	45.949	3.687
1.00	21.247	8.694	32.376	8.694	24.323	19.350	24.316	19.398	2.768
1.25	13.592	4.440	20.712	4.440	15.575	9.896	15.569	9.944	2.217
1.50	9.435	2.559	14.377	2.559	10.824	5.717	10.817	5.765	1.849
1.75	6.928	1.603	10.556	1.603	7.958	3.591	7.952	3.639	1.587
2.00	5.300	1.066	8.077	1.066	6.099	2.398	6.092	2.446	1.390
2.25	4.185	0.741	6.377	0.741	4.824	1.677	4.817	1.725	1.237
2.50	3.387	0.534	5.161	0.534	3.912	1.216	3.905	1.264	1.114

ESA400 – THICKNESS 1.2mm									
PROFILE DATA	MOMENT CAPACITY (kNm/m)		5.18	MOMENT OF INERTIA (Cm4/m)		16.81	REACTION CAPACITY (kN/m)		8.4
	MAXIMUM APPLIED LOAD (kN/m²)								
	IMPOSED		SNOW DRIFT		WIND (+VE)		WIND (-VE)		
SPAN (m)	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	REACTION
0.50	121.013	85.808	184.401	85.808	138.342	190.713	138.335	190.761	7.361
0.75	53.775	25.408	81.943	25.408	61.499	56.491	61.492	56.539	4.911
1.00	30.242	10.705	46.083	10.705	34.603	23.818	34.597	23.866	3.687
1.25	19.349	5.469	29.485	5.469	22.155	12.183	22.148	12.231	2.952
1.50	13.433	3.155	20.469	3.155	15.393	7.040	15.386	7.088	2.462
1.75	9.865	1.978	15.032	1.978	11.315	4.425	11.308	4.473	2.112
2.00	7.549	1.317	11.504	1.317	8.669	2.956	8.662	3.004	1.849
2.25	5.962	0.918	9.804	0.918	6.855	2.069	6.848	2.117	1.645
2.50	4.826	0.663	7.354	0.663	5.557	1.502	5.550	1.550	1.482

1. The loads indicated in the left hand column are the applied imposed, snowdrift or wind (+ve or -ve) excluding dead load
2. The ultimate load factors for bending stress for Dead + Imposed are: 1.0 gk + 1.6 qk
3. The ultimate load factors for bending stress for Dead + Snowdrift are: 1.0 gk + 1.05 qk
4. The ultimate load factors for bending stress for Dead + Wind (+ve) are: 1.4 gk + 1.4 we
5. The ultimate load factors for bending stress for Dead + Wind (-ve) are: 1.0 gk - 1.4 we
6. The ultimate load factors for halter pull-off for Dead + Wind (-ve) are: 1.0 gk - 2.0 we
7. The deflection limitations for Dead + Imposed and Dead + Snowdrift are: L/200
8. The deflection limitations for Dead + Wind (+ve) and Dead + Wind (-ve) are: L/90

ES300A – THICKNESS 0.9mm									
PROFILE DATA	MOMENT CAPACITY (kNm/m)		3.97	MOMENT OF INERTIA (Cm4/m)		17.15	REACTION CAPACITY (kN/m)		8.39
	Maximum applied load (kN/m²)								
	IMPOSED		SNOW DRIFT		WIND (+VE)		WIND (-VE)		
SPAN (m)	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	REACTION
0.50	92.742	87.544	141.321	87.544	106.032	194.571	106.025	194.619	7.352
0.75	41.210	25.922	62.797	25.992	47.139	57.634	47.132	57.682	4.906
1.00	23.174	10.922	35.313	10.922	26.526	24.300	26.519	24.348	3.682
1.25	14.826	5.580	22.592	5.580	16.985	12.430	16.978	12.478	2.948
1.50	10.291	3.219	15.682	3.219	11.803	7.183	11.796	7.231	2.459
1.75	7.557	2.018	11.515	2.018	8.678	4.515	8.671	4.563	2.109
2.00	5.782	1.344	8.811	1.344	6.650	3.107	6.643	3.065	1.847
2.25	4.566	0.937	6.957	0.937	2.529	2.111	5.252	2.159	1.643
2.50	3.695	0.677	5.631	0.677	4.264	1.533	4.257	1.581	1.480

ES300A – THICKNESS 1.2mm									
PROFILE DATA	MOMENT CAPACITY (kNm/m)		5.65	MOMENT OF INERTIA (Cm4/m)		21.10	REACTION CAPACITY (kN/m)		11.19
	Maximum applied load (kN/m²)								
	IMPOSED		SNOW DRIFT		WIND (+VE)		WIND (-VE)		
SPAN (m)	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	REACTION
0.50	131.994	107.713	201.134	107.713	150.892	239.391	150.885	239.439	9.802
0.75	58.656	31.898	89.380	31.898	67.076	70.914	67.070	70.962	6.539
1.00	32.987	13.443	50.266	13.443	37.741	29.903	37.734	29.951	4.907
1.25	21.106	6.871	32.162	6.871	24.163	15.299	24.156	15.347	3.928
1.50	14.653	3.966	22.328	3.966	16.787	8.843	16.780	8.891	3.275
1.75	10.761	2.489	16.398	2.489	12.340	5.560	12.333	5.608	2.809
2.00	8.236	1.659	12.549	1.659	9.453	3.717	9.446	3.765	2.460
2.25	6.504	1.158	9.911	1.158	7.474	2.603	7.647	2.651	2.188
2.50	5.265	0.838	8.023	0.838	6.059	1.891	6.052	1.939	1.970

1. The loads indicated in the left hand column are the applied imposed, snowdrift or wind (+ve or -ve) excluding dead load
2. The ultimate load factors for bending stress for Dead + Imposed are: 1.0 gk + 1.6 qk
3. The ultimate load factors for bending stress for Dead + Snowdrift are: 1.0 gk + 1.05 qk
4. The ultimate load factors for bending stress for Dead + Wind (+ve) are: 1.4 gk + 1.4 we
5. The ultimate load factors for bending stress for Dead + Wind (-ve) are: 1.0 gk - 1.4 we
6. The ultimate load factors for halter pull-off for Dead + Wind (-ve) are: 1.0 gk - 2.0 we
7. The deflection limitations for Dead + Imposed and Dead + Snowdrift are: L/200
8. The deflection limitations for Dead + Wind (+ve) and Dead + Wind (-ve) are: L/90

ES500A – THICKNESS 0.9mm

PROFILE DATA	MOMENT CAPACITY (kNm/m)		3.44	MOMENT OF INERTIA (Cm4/m)		11.42	REACTION CAPACITY (kN/m)		5.04
	Maximum applied load (kN/m²)								
	IMPOSED		SNOW DRIFT		WIND (+VE)		WIND (-VE)		
SPAN (m)	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	REACTION
0.50	80.359	58.287	122.452	58.287	91.880	129.555	91.873	129.603	4.421
0.75	35.707	17.253	54.410	17.253	40.849	38.370	40.842	38.418	2.952
1.00	20.078	7.265	30.596	7.265	22.988	16.173	22.981	16.221	2.217
1.25	12.845	3.708	19.573	3.708	14.721	8.269	14.714	8.317	1.776
1.50	8.915	2.136	13.585	2.136	10.230	4.775	10.223	4.823	1.482
1.75	6.546	1.336	9.975	1.336	7.522	2.998	7.516	3.046	1.272
2.00	5.008	0.887	7.632	0.887	5.765	2.001	5.758	2.049	1.114
2.25	3.954	0.616	6.025	0.616	4.560	1.398	4.553	1.446	0.992
2.50	3.200	0.442	4.876	0.442	3.698	1.013	3.691	1.061	0.894

ES500A – THICKNESS 1.2mm

PROFILE DATA	MOMENT CAPACITY (kNm/m)		4.90	MOMENT OF INERTIA (Cm4/m)		14.06	REACTION CAPACITY (kN/m)		6.72
	Maximum applied load (kN/m²)								
	IMPOSED		SNOW DRIFT		WIND (+VE)		WIND (-VE)		
SPAN (m)	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	STRESS	DEFLECTION	REACTION
0.50	114.471	71.766	174.432	71.766	130.865	159.510	130.858	159.558	5.891
0.75	50.868	21.247	77.513	21.247	58.176	47.245	58.169	47.293	3.932
1.00	28.606	8.950	43.591	8.950	32.734	19.918	32.727	19.966	2.952
1.25	18.303	4.571	27.890	4.571	20.959	10.186	20.952	10.234	2.364
1.50	12.706	2.635	19.361	2.635	14.562	5.885	14.555	5.933	1.972
1.75	9.331	1.650	14.218	1.650	10.705	3.697	10.698	3.745	1.692
2.00	7.140	1.098	10.881	1.098	8.202	2.469	8.195	2.517	1.482
2.25	5.639	0.764	8.592	0.764	6.485	1.727	6.478	1.775	1.319
2.50	4.564	0.550	6.955	0.550	5.258	1.252	5.251	1.300	1.188

1. The loads indicated in the left hand column are the applied imposed, snowdrift or wind (+ve or -ve) excluding dead load
2. The ultimate load factors for bending stress for Dead + Imposed are: 1.0 gk + 1.6 qk
3. The ultimate load factors for bending stress for Dead + Snowdrift are: 1.0 gk + 1.05 qk
4. The ultimate load factors for bending stress for Dead + Wind (+ve) are: 1.4 gk + 1.4 we
5. The ultimate load factors for bending stress for Dead + Wind (-ve) are: 1.0 gk - 1.4 we
6. The ultimate load factors for halter pull-off for Dead + Wind (-ve) are: 1.0 gk - 2.0 we
7. The deflection limitations for Dead + Imposed and Dead + Snowdrift are: L/200
8. The deflection limitations for Dead + Wind (+ve) and Dead + Wind (-ve) are: L/90

THERMAL EXPANSION

The rate of expansion for aluminium is relatively high and Euroseam can be produced in extremely long lengths, so these factors need to be taken into account when designing the roof. Thermal expansion in the length of Euroseam is accommodated by the movement of the sheet over the halter whilst expansion across the sheet width is accommodated by the flexibility of the profile.

The expansion formula for aluminium can be expressed as:

α **= 24 x 10^{-6} K^{-1}**

The finish of the sheeting has an effect due to solar gain. Therefore, expected roof temperatures under moderate summer conditions in the UK according to BS5427 are:

Mill finish = 50°C
Light colours = 60°C
Mid-range and dark colours = 70°C

An example of thermal expansion for a Euroseam sheet in a mid-range or dark colour would be:

0.000024 x 40,000(mm) x 70(°C) = 67.2mm of movement

The above figures do not take account of extremes which may be possible during sustained periods of sunshine.

The thermal expansion coefficients for other materials according to prEN 14782:2004 (E) differ from aluminium and are:

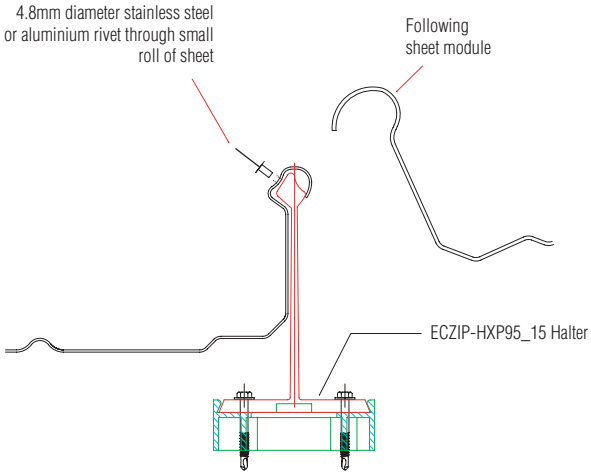
Zinc: α **= 22 x 10^{-6} K^{-1}**
Copper: α **= 16.8 x 10^{-6} K^{-1}**
Steel: α **= 12 x 10^{-6} K^{-1}**

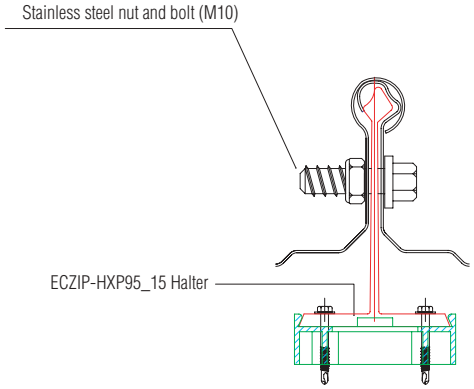
For further advice on other materials please contact Euroclad's Technical Department.

THE FIXED POINT

Thermal expansion is allowed for in the system design, the direction of expansion and potential creepage during the expansion/contraction cycle needs to be controlled by the inclusion of a single 'fixed point'. Data for determining the number/type of fixings required at the fixed point is given below:

ESN131





Fixed poimt load calculation:
F = L x B (G x sina + S x sina x cosa)

Where:
F = force per sheet
L = sheet length
B = sheet width
G = self weight
S = snow loading
a = roof pitch

For loads up to 0.524kN use 1 rivet
For loads 0.525kN to 1.04kN use 2 rivets
For loads 1.05kN to 3.14 use 1 M10 nut and bolt
For loads higher than 3.14kN refer to Euroclad

It is common on pitched roofs for the fixed point to be positioned at the ridge of the building, directing the expansion of the sheet towards the gutter, although fixed points can be created at the eaves or mid-slope. In all cases, allowances should be made for expansion to prevent fouling of the sheet with other elements of the building and to maintain correct spacings.

On very long sheets and on curved roofs the positioning of the fixed point at mid-slope should be considered as this effectively divides the expansion over each half of the slope.

Sinusoidal curved roofs, those where a convex and concave curve occur in the same sheet, require particular attention. In these circumstances the fixed point should be located between the two curves. We also recommend that at least 0.300m of effectively straight sheet is included between the curves wherever possible.

Certain elements can result in an fixed point being created. For example, tight radius curves, sharp changes in direction, steelwork tolerance, purlin positioning etc may result in unwanted fixed points which can affect the ability of the sheet to move freely and this should be considered when designing for standing seam roofs. In these instances consideration should be given to creating the fixed point at the element concerned rather than at the normal position.

Please also refer to drawings **ESN132** and **ESN181**.

HALTER SETOUT

Correct halter setout allows the sheet to move freely under thermal expansion/contraction. Tests have shown that the friction load generated by the movement of the sheet over the halter is minimised when halters are set at the following parameters:

Halter layout and alignment is also critical in achieving an aesthetically pleasing installation.

TABLE OF EUROSEAM SYSTEM SET OUT/HALTER SPACINGS		
Type of sheet	System dimension	Halter spacing minimal*
Straight sheet	400mm 300mm 500mm	402mm 302mm 502mm
Curved sheet	400mm 300mm 500mm	408mm 308mm 508mm

*Please contact Euroseam should you require any further information regarding halter layout.

System Dimension is the nominal title of the sheet product ie ESA 400 = 400mm. Halters should however be set out at slightly over System Dimension to achieve best results.

Specific instructions are available from Euroclad for setting out tapered sheets.

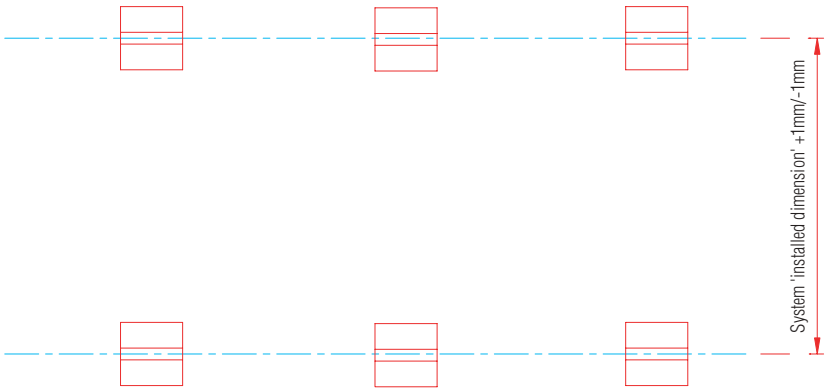
Some adjustment of the halter setout for sheets may be required, to maintain aesthetic appearance and compensate for factors such as steelwork tolerances. Where straight sheet runs directly into curved sheet the straight sheet should adopt the halter set out for curved sheet.

The details below should also be referenced for allowable offset and pitch tolerances.

ESN182

Plan variations

Variations between lines of halters

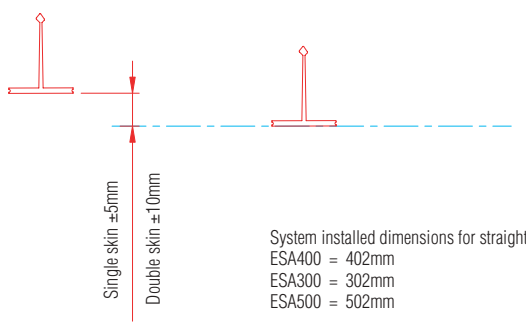


Notes:

1. Lines of halters are set out at system installed dims.
   NB. curved sheets are set out at post curve dimensionss, see relevent section of manual.
2. Tolerances stated are recommended to enable Euroseam elements to accommodate full thermal movement over the halters without locking and introducing unwanted fixed points.
   It is assumed that the halter elements when fixed in place will follow a straight line or single curve over their entire length.
   Multiple curves resulting in dips or sudden changes in slope may cause a transfer or fixed point.
   It should be noted that the euroseam system is not self levelling & will follow undulations within the supporting structure.

Vertical variations
(i.e. step in purlin runs)

N.B. Applies to complete line of halters only

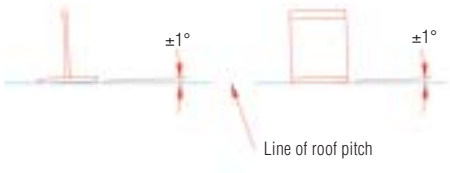


System installed dimensions for straight sheets are:
ESA400 = 402mm
ESA300 = 302mm
ESA500 = 502mm

ESN183

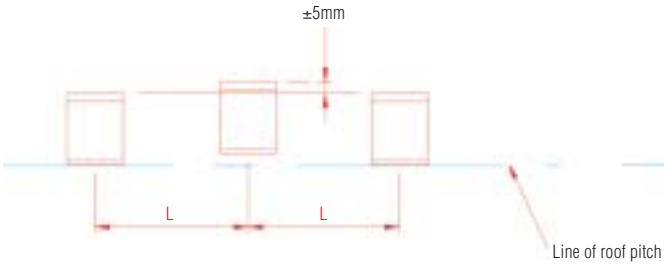
Variations in line
line of halters

Halters must be vertical on line of roof pitch



Halters must not be set out of line

Vertical variations of the halter heads in line
(over three purlins)



Plan variations of halter in line
(over three purlins)

Notes:

1. Lines of halters are set out at system installed dims.
   NB. Curved sheets are set out at post curve dims.
   See relevent section of manual.
2. Tolerances stated are recommended to enable Euroseam elements to accomodate full thermal movement over the halters without locking and introducing unwanted fixed points. It is asumed that the halter elements when fixed in place will follow a straight line or single curve over their entire length. Multiple curves resulting in dips or sudden changes in slope may cause a transfer or fixed point. It should be noted that the Euroseam system is not self levelling and will follow undulations within the supporting structure.

±1mm when line of halters are set out
at system dimension.

System installed dimensions for straight sheets are:

ESA400 = 402mm
ESA300 = 302mm
ESA500 = 502mm

STANDARD COMPONENTS AND WEIGHTS

PROFILE WEIGHT – MILL FINISH ALUMINIUM					
Gauge	Profile	System	Coating	Kgs/m²	Kgs/Linear metre
0.9mm	Euroseam	ESA300	Stucco	3.975	1.192
0.9mm	Euroseam	ESA400	Stucco	3.592	1.437
0.9mm	Euroseam	ESA500	Stucco	3.362	1.681
1.2mm	Euroseam	ESA400	Stucco	4.850	1.940

PROFILE WEIGHT – ONE SIDE COATED ALUMINIUM					
Gauge	Profile	System	Coating	Kgs/m²	Kgs/Linear metre
0.9mm	Euroseam	ESA300	ARS/PVDF	4.019	1.206
0.9mm	Euroseam	ESA400	ARS/PVDF	3.632	1.453
0.9mm	Euroseam	ESA500	ARS/PVDF	3.339	1.700

PROFILE WEIGHT – HPS STEEL					
Gauge	Profile	System	Coating	Kgs/m²	Kgs/Linear metre
0.7mm	Euroseam	300	HPS200	8.946	2.684
0.7mm	Euroseam	400	HPS200	8.070	3.228
0.7mm	Euroseam	500	HPS200	7.568	3.784

PROFILE WEIGHT – ZINC					
Gauge	Profile	System	Coating	Kgs/m²	Kgs/Linear metre
0.7mm	Euroseam	300	None	9.434	2.830
0.7mm	Euroseam	400	None	8.526	3.410
0.7mm	Euroseam	500	None	7.981	3.990

PROFILE WEIGHT – COPPER					
Gauge	Profile	System	Coating	Kgs/m²	Kgs/Linear metre
0.7mm	Euroseam	300	None	10.166	3.050
0.7mm	Euroseam	400	None	9.187	3.675
0.7mm	Euroseam	500	None	8.600	4.300

STANDARD ACCESSORIES		
Item and description	Drawing number	Weight
ECZIP – HXP95_15 Halter (with pad)	ESN110	0.122 Kg each
ECZIP – HXP140_15 Halter (with pad)	ESN111	0.14 Kg each
ECZIP – VCP Verge clip	ESN103	0.052 Kg each
ECZIP – VCN5 Verge channel (5m length)	ESN104	1.86 Kg each
ECZIP – VCLS5 Verge closure (5m length)	ESN105	2.59 Kg each
ECZIP – RC400 Ridge closure	ESN116	0.255 Kg each
ECZIP – RZ5 Ridge Zed (5m length)	ESN107	2.22 Kg each
ECZIP – DA3 Aluminium drip angle (3m length)	ESN114	1.695 Kg each
ECZIP – VH95_15	ESN101	0.122 Kg each
ECZIP – VH140_15	ESN102	0.145 Kg each

OTHER STANDARD SYSTEM PRODUCTS	
Item and description	Weight
Eurobar Extra bracket 135mm	0.29 Kg each
Eurobar Extra rail 3.6m	5.76 Kg each
MW5 Liner 0.7mm steel	6.753 Kg/m^2
200mm Rockwool cladding roll 0.040	5.4 Kg/m^2
30mm Rockwool RW3 acoustic slab	1.8 Kg/m^2
Rockwool acoustic membrane	5Kg or 10Kg/m^2

Further information on specific items can be obtained on request.

STEELWORK

It should be noted that Euroseam is not self levelling and as such will follow undulations and discrepancies in the underlying steelwork. It is therefore preferable to design structural steelwork for standing seam projects taking into account that variations in structure can have significant effect on very low design pitches and clip alignment tolerances. Therefore, you should also refer to the halter set out tolerances in the Installation Reference section.

On very low pitches there may be a build up of materials at the eaves line due to the inclusion of closure flashings, gutter flanges etc., which should be allowed for to maintain the fall either by adjustment of the purlin at the eaves or by reduction of spacer height etc.

Tolerances acceptable for purlin levels are as follows:

Element	Tolerances (in the level of the purlin relative to the purlins either side)
Purlin levels	Purlin spacing above design level/180 or 10mm (choose lower of these values) - Purlin spacing below design level/360 Or 5mm (choose lower of these values)
Purlin slope	+/- 1° (where purlins are at 90° to the roof slope)

Structural movement joints present should be echoed in the sheeting using the type of detail contained on the accompanying disc.

The maximum allowable step at purlin laps or sleeved joints is +/- 10mm for double skin situations and +/- 5mm for single skin roofing.

Designers should allow for the potential torsional movements resulting from lock up in the design of the support structure.

LIGHTNING PROTECTION

The Euroseam system can be used as part of the air termination network, as defined in BS6651. This information is based on constructions with a steel frame, special provision may be required for constructions where a non-metallic building frame is used.

BS 6651 emphasises the value of using existing metal as the lightning protection system. A report from a Culham Lightning Studies Unit states that "very effective lightning protection can be given to a building where it has a metal skinned roof. Generally speaking a metal roof and skinned building will provide the best overall protection against lightning, especially when taking into account internal equipment, electronic systems etc. Electric fields, magnetic fields and voltages are a minimum with such construction, since it approaches the ideal of a screened room, an all metal walled cabin which keeps interference out".

Air termination network – the sheet can be used as the air termination of the network. The roof would normally be set out so that no part of the roof is more than 5m from a conductor. Fixings can be used as conductors.

Down conductors – normally conductors should be at 20m centres around the perimeter of the building.

Earth terminators – these are connections between the down conductors and an earthing electrode driven into the ground.

For fixings to act as a good transmission point i.e. conductor from the sheet (acting as the air termination network) to the structural steel frame (acting as down conductors) neoprene washers (if present on fixings) should be replaced by stainless steel washers at intervals chosen by a lightning protection specialist.

Using stainless steel washered fixings to create a conductor and standard washered fixings in other areas will give cleaner transmission of charge to the down conductors if the building is a typical steel frame. Tapes will still be required when the Euroseam sheet is fitted over a timber frame or there is no direct metal to metal contact allowing a clear transmission path.

The above advice is for guidance and it is recommended that a Lightning Systems Engineer be consulted re positioning of conductors, down conductors etc. A typical construction detail is included in the accompanying drawings.

FIXINGS

The fixings for Euroseam play a vital part in ensuring the systems performance.

The following table sets out the typical fixings recommended for use with the standard systems.

EJOT fixing references available.

Note: Euroseam halters are provided with two 7mm diameter centre holes and four 6.1mm diameter corner holes. For most applications, two fixings should be adequate. SFS SDK fixings (which cannot be over-driven due to the snap-off part of the head) are recommended only if utilising 6.1mm diameter corner holes.

Application	SFS Reference	Standard number and position	Fixing type	Predrill/pre-punch diameter (if applicable)	Pullout values (if applicable)
ECZIP HXP_15 Halters c/w thermal pad to Eurobar Extra Option 1	SDK3 - S - 377 - 6 x 45	Halter corner holes: 2 number per halter diagonally opposite	304 grade Stainless Steel special driller Square drive DSK37 socket		1.5mm = 3.035kN
ECZIP HXP_15 Halters c/w thermal pad to Eurobar Extra Option 2	SX2/28 - A16 - 6.3 x 45	Halter centre holes: 2 number per halter	304 grade Stainless Steel driller Hex Head		1.5mm = 3.74kN
Eurobar Extra to cold-rolled steel/tophat max -3mm thick (inc liner) (carbon)	SD3 - 5.5 x 25	2 number per bracket diagonally opposite	Carbon steel self driller Hex head	N/A	1.5mm = 3.75kN 2.0mm = 5.00kN (375N/mm^2)
Eurobar Extra to cold-rolled steel/tophat 3mm thick (inc liner) (stainless)	SX3/10 - 5.5 x 28	2 number per bracket diagonally opposite	304 grade stainless self Driller Hex head	N/A	1.5mm = 2.7kN 2.0mm = 3.8kN (375N/mm^2)
Eurobar Extra to hot-rolled steel (carbon)	SD14 - 5.5 x 32S	2 number per bracket diagonally opposite	Carbon steel self driller Hex head	N/A	5.0mm = 15.5kN 8.0mm = 20.0kN (tensile failure)
Eurobar Extra to hot-rolled steel (stainless)	SX14/12 - 5.5 x 38	2 number per bracket diagonally opposite	304 grade stainless self Driller Hex head	N/A	5.0mm = 11.8kN 8.0mm = 12.0kN (tensile failure)
Eurobar Extra Bracket to 1.6mm galv tophat (Carbon)	SD3 - 5.5 x 25	2 number per bracket diagonally opposite	Carbon steel self driller Hex head	N/A	1.6mm =4kN (375N/mm^2)
Eurobar Extra Bracket to 1.6mm galv tophat (Stainless)	SX3/10 - 5.5 x 28	2 number per bracket diagonally opposite	304 grade stainless self Driller Hex head	N/A	1.6mm = 2.92kN (375N/mm^2)
1.6mm pre-punched galv tophat bracket through 0.7mm steel liner to purlin	SD3 - 5.5 x 25	2 number per bracket	Carbon steel self driller Hex head	N/A	1.5mm = 3.75kN 2.0mm = 5.00kN (375N/mm^2)
1.6mm pre-punched galv tophat bracket through 0.7mm steel liner to purlin	SX3/10 - 5.5 x 28	2 number per bracket	304 grade stainless self driller Hex head	N/A	1.5mm = 2.7kN 2.0mm = 3.8kN (375N/mm^2)

See following page for further details

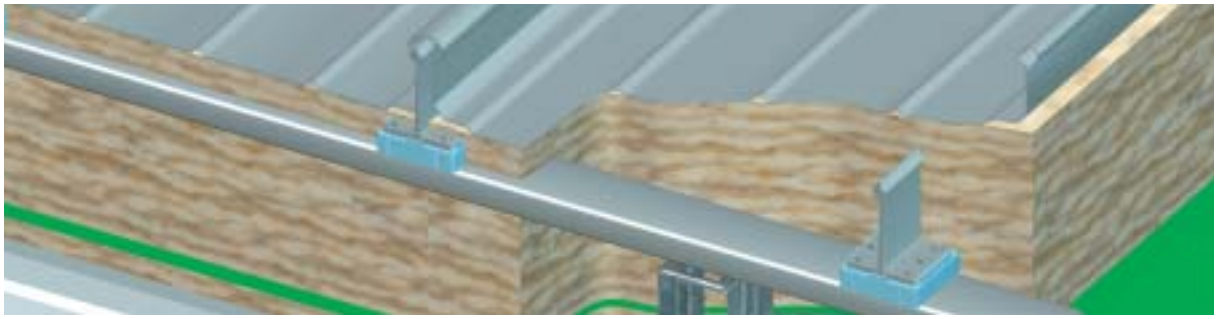
FIXINGS					
Application	SFS Reference	Standard number and position	Fixing type	Predrill/pre-punch diameter (if applicable)	Pullout values (if applicable)
DECK SYSTEMS					
Tophat to Structural deck > 0.7mm. (Tophats may be 1.6mm Galv or 2/3mm Alum)	Rivet 6604 - 6 - 4W	Predrill to 5.3mm diameter (deck and tophat)	All aluminium rivet	5.3	
TIMBER SYSTEMS					
1.6mm galv tophat to timber rafters (Min 50mm wide)	TDA - S - S16 - 6.5 x 51	2 number either side of tophat at centre line of rafter	304 grade stainless steel self tapper Hex head	6.5-8mm in tophat 4mm in timber	50mm embed = 5.72kN Ult 1.5kN max safeload per fixing
Eurobar bracket through ply max 19mm to timber rafters (Min 50mm wide)	TDA - S -S16 - 6,5 x 76	2 number per bracket at centre line of rafter	304 grade stainless steel self tapper Hex head	6.5-8mm in tophat 4mm in timber	50mm embed = 5.72kN Ult 1.5kN max safeload per fixing
Eurobar Bracket to 19mm minimum ply	TDA- S - S16 6.5 x 38mm	2 number per bracket	304 grade stainless steel self tapper Hex head	N/A	2.4kN Ult 0.665kN max safeload per fixing
ECZIP HXP_15 Halters c/w thermal pad to 19mm ply	TDA - S - S16 6.5 x 51mm	2 number per halter	304 grade stainless steel self tapper Hex head	N/A	2.4kN Ult 0.665kN max safeload per fixing
FIXED POINT AND ACCESSORIES					
Fixed point (Underlap to halter)	ASC-D-48110		Alum body closed end rivet with stainless mandrel	4,9	
Fixed point (sheet web to halter)	ASC-D-48110		Alum body closed end rivet with stainless mandrel	4,9	
Fixed point nut and bolt	M10		Stainless steel	4,9	
Drip angle to sheet	ASC-D-48110		Alum body closed end rivet with stainless mandrel	4,9	
Verge channel to sheet	ASC-D-48110		Alum body closed end rivet with stainless mandrel	4,9	
Verge closure to verge flashing	ASC-D-48110		Alum body closed end rivet with stainless mandrel	4,9	
Verge clip to halter	TDC - S - S16 - 6.3 x 19		304 grade stainless steel tapper - hex head	4,9	
Ridge zed to Euroseam	ASC - D - 48110		Alum body closed end rivet with stainless mandrel	4,9	
Ridge flashing to ridge closure	ASC - D - 48110		Alum body closed end rivet with stainless mandrel	4,9	
Ridge closure to Euroseam	ASC - D - 48110		Alum body closed end rivet with stainless mandrel	4,9	

It is the responsibility of the building designer to ensure the correct specification of all fixings.

The fixings listed are a general guide, project specific advice regarding the application of fixings can be sought from Euroclad or the fixing supplier.

Bonded neoprene washers should be used if penetrating a vapour control layer (sealed liner or VCL).

INSULATION



Insulation can be provided by a number of proprietary products, among which the most commonly applied are quilts and slab forms.

As part of Euroseam systems, they allow diverse U-values to be achieved. They offer a variety of thermal conductivity values which for CE marking are defined as 'Lambda 90/90 values'. Draft Euroclad NBS Specifications to achieve given performances and utilising the advantages of these products are available.

There are several materials available, the most commonly used being mineral fibre and glass wool quilts. The quilt products specified by Euroclad are non-combustible, water repellent, non-hygroscopic, chemically inert, rot proof, fully recyclable, CFC and HCFC free. These non-deleterious materials are easy to handle and provide flexibility where construction depths vary.

In other instances there may be a requirement for slab insulation or a combination of slab and quilt, for instance in acoustic constructions. Rockwool Cladding Roll typically has greater density than glasswool and offers some advantages where acoustic performance is concerned.

Slab insulation is often used in sports hall and swimming pool situations, where a perforated liner allows sound to be absorbed into the construction, preventing reflective sound becoming obtrusive. In these instances, tissue faced slab is often used. There are a range of sizes and densities available from the Rockwool RW range, with options on facings.

Where site welding is being carried out, or where there is a requirement to support the pan of the outer sheet, the Hardrock range of slabs is recommended.

Rockwool should be always be used wherever it is likely that any site welding may take place. If any welding is to be carried out subsequent to completion of the roof the welders should be informed of the type of insulation contained in the system.

Quilt insulation in Euroseam constructions is usually compressed to between 10 and 20%. This helps prevent the movement of any warm air on the underside of the outer sheet, minimising the potential for transient condensation to form under night sky radiation. It also greatly assists in providing dampening of the external sheet under rain impact.

Further details of the benefits of the materials are covered in the relevant sections of this manual.

MAINTENANCE

Aluminium is a low maintenance material and requires little action where the material is washed by rainfall. However, in areas where the material is not exposed to rainfall (i.e. soffits and underside of rainwater gutters) it should be periodically washed to remove build up of dirt and potentially corrosive deposits. It is recommended that these areas are washed down at least annually.

Water staining on mill finish aluminium is unsightly but does not affect the performance of the material. British Standard CP143: Part 15: 1973 states: "the surfaces of sheets taken out of closely stacked piles sometimes show dull patches which are due to moisture being held between sheets in contact. The staining is superficial and if required the original bright finish may be recovered by lightly rubbing the patches with fine glass wool or stainless steel wool".

Guidelines are set out below for coated aluminium material.

CLEANING RECOMMENDATIONS FOR COATED MATERIAL (ALUMINIUM)

Organic coatings on aluminium do not normally show an appreciable amount of dirt collection. In many atmospheres, dirt or soil would not indicate a detrimental risk to the coating, but cleaning and surface care may be desirable for the sake of appearance. Cleaning may become desirable in areas where heavy industrial deposits have dulled the surface, where materials from construction processes have soiled the surface or where cleaner run-down from other surfaces should be removed.

Thorough rinsing is especially important after cleaning of sheltered areas.

If automatic cleaning equipment is to be used on a building, ensure that there is no part of its operation that may lead to a detrimental effect on coatings.

Method of cleaning, type of cleaner, etc., of one component of the building must be used with consideration for other components such as glass, sealants and painted surfaces, etc.

Construction soils, including concrete or mortar, etc., should be removed as soon as possible. The exact procedure for cleaning will vary depending on the nature and degree of soil. Try to restrict cleaning to mild weather.

When a mild detergent or mild soap is necessary for removal of soil, it should be used with brushing or sponging.

Some types of mild solvent such as mineral spirits may be used to remove grease, sealant or caulking compounds.

Concrete spillage that has fried on the coated surface may become quite stubborn to remove. Special cleaners and/or vigorous rubbing with non-abrasive brushes or plastic scrapers may be necessary.

Steam cleaning or diluted solutions of muriatic acid (under 10%) may be effective in removing dried concrete stains, however, a test area should be tried first, and proper handling precautions must be exercised for safety reasons.

Do not allow cleaning chemicals to collect on surfaces or to 'puddle' on horizontal surfaces, crevices etc. These should be flushed with water and dried. Always clean surfaces down from top to bottom and follow with a thorough rinsing with clean water.

Never mix cleaners – the mixing of cleaners may not only be ineffective, but also very dangerous. For example, mixing chlorine containing materials such as bleaches, with other cleaning compounds containing ammonia, can result in poison gas emission.

SUMMARY OF GENERAL CLEANING TIPS

- Over cleaning or excessive rubbing can do more harm than good
- Strong solvents or strong cleaner concentrations can cause damage to painted surfaces
- Avoid abrasive cleaners – do not use household cleaners that contain abrasives on painted surfaces
- Abrasive materials such as steel wool, abrasive brushes, etc can wear and harm finishes.
- Avoid drips and splashes – remove run-downs as quickly as possible
- Avoid temperature extremes. Heat accelerates chemical reactions and may evaporate water from solution. Extremely low temperature may give poor cleaning effect. Ideally, cleaning should be done in shade at moderate temperature
- Do not substitute a heavy duty cleaner for a frequently used mild cleaner
- Do not scour coated surfaces.
- Never use paint removers, aggressive alkaline, acid or abrasive cleaners
- Do not use phosphate or highly alkaline or highly acid cleaners – always do a test surface
- Follow manufacturers recommendations for mixing and diluting cleaners
- The instructions provided above are an essential part of any warranty issued by Euroclad and should be followed at all times.

TOUCH-UP PAINTING

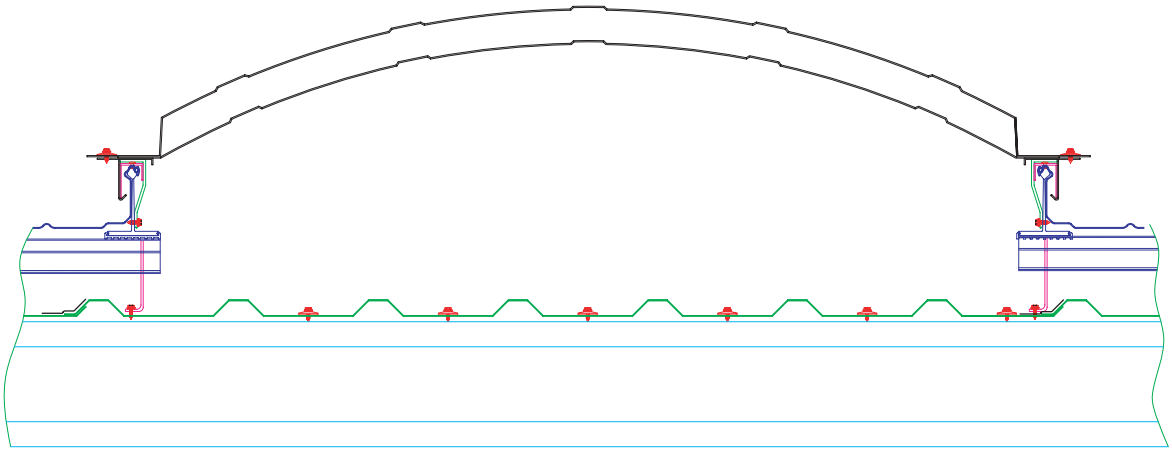
Either due to localised damage, for the purpose of signwriting or after many years service, to restore the appearance of the coating it may be desirable to overpaint the aluminium.

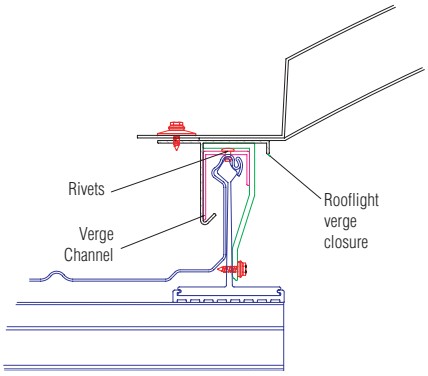
If this is required, touch in any areas of bare aluminium by applying locally a two-pack acid etch primer. Coat the material following the recommendations of the paint supplier.

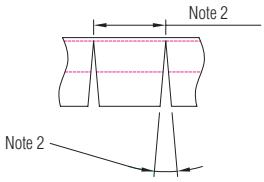
Touching up small areas of scratching or scuffing due to unforeseen damage on site is common practice and there are a number of touch-up paint suppliers who can be consulted, eg:
Becker Industrial Coatings
Telephone 0151 4481010.

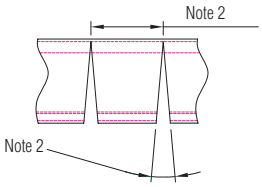
Information for cleaning of other materials is available on request.

ROOFLIGHTS









There are a wide range of rooflights available to suit the Euroseam system in both GRP and Polycarbonate.

Other types of rooflighting such as individual units can be incorporated by use of fabricated soakers welded into the system on site. These should allow for thermal movement of the sheet.

We are currently updating our range of rooflights. Please refer to the Euroseam office for more information.

Euroclad recommend the use of barrel vault rooflights on Euroseam roofs to maintain the integrity of the system without introducing any through fixings. The drawings show a standard construction, and further details are available from the Euroclad Technical Department on request.

The use of in-plane rooflights on pitches below 5° should be avoided, however, these rooflights are available and have been successfully used with Euroseam. Consideration should be given to sheet length limitations.

ROOF ACCESS

Euroseam is designed as a low maintenance system and can therefore be designed so that access is not required. However, other elements may require access, for example to clean gutters, to reach roof mounted plant or details where there is no exposure to rainfall. Gutters, for example, may often be accessed without the need to access the roof itself.

If access to the roof is required, the requirements for safety and limiting damage to the sheets from foot traffic must be taken into account.

0.9mm aluminium Euroseam sheet has been tested for and passed concentrated load tests for spans up to 2m. This is intended to represent the load applied by one person walking on the sheet under normal conditions.

No damage should result from occasional, normal traffic, one person per span at a time. With due care, the Euroseam sheet can be walked on for occasional maintenance purposes.

Regular traffic, people carrying heavy loads, dynamically applied loads and impacts should be avoided wherever possible. Damage to the sheet may occur under such circumstances.

To avoid unnecessary risk of damage we would advise that the sheet upstands should be walked on wherever possible. Some form of load spreading can be applied, particularly during installation of the sheet and any secondary elements to the structure i.e. other trades accessing the roof after installation to fit equipment. Load spreading may be achieved by using Euroclad Suregrip walkway which can be used as a temporary or permanent walkway.

As part of the design process permanent walkways may be considered to areas which are to be subjected to traffic ie for access to plant etc that is more regular than required for basic maintenance or perhaps more than three times per year. There are a number of systems available, details are available on request. These should be designed to transfer the loads applied via the sheet upstand without penetrating the sheet.

There are two main options to protect the sheet from regular foot traffic at areas identified during the design process:

1. Fully support the pan of the sheet by the inclusion of Hardrock insulation slab.
2. Fit a non-penetrative permanent walkway system of a type designed to fit aluminium standing seam after installation.

There are a number of non-penetrative walkway systems available, which have been specifically designed to suit aluminium standing seam systems, details are available from Euroclad on request.

If using Hardrock to support the sheet, it is possible to fit polyester powder coated seam closures, fitted over the standing seam to help identify those areas supported.

Low profile, non-penetrative access hatches are available from a number of specialist suppliers, which can be fitted by site welding. These should include weatherproof, insulated lids and be manufactured from aluminium. They should be supported on an inner soaker, to transfer loads to the structure without interfering with the thermal movement of the outer sheet.

FALL ARREST AND RESTRAINT SYSTEMS

Euroseam is continuously developing to give architects the opportunity to design ever more demanding building envelopes, which must remain cost competitive and adhere to strict health and safety and environmental guidelines and legislation.

This increases the demands on any fall arrest and restraint systems design and performance, which must also comply with critical parameters to ensure the system meets the required safety standards and regulations. Additionally, the system must not affect the overall roof design, maintaining the aesthetics of the building as envisaged by the architect.

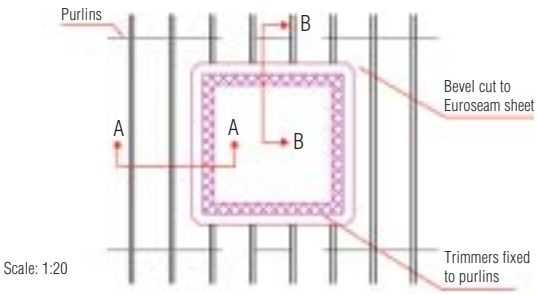
There are a number of systems available which are suitable for use with Euroseam. These should have been tested with the system to establish performance. Designers should satisfy themselves through consultation with the suppliers that the system chosen is suitable for their project requirements.

Contact details of suitable suppliers are available from Euroclad.

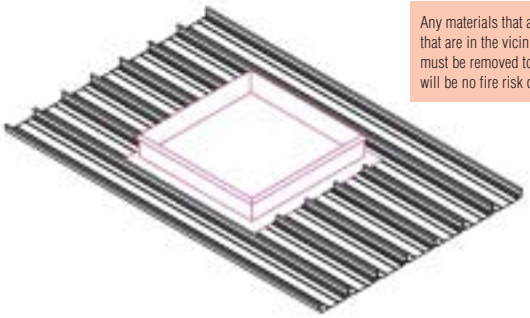
Euroclad is able to supply details of suitable tested systems for fall arrest. Please contact the Technical Department for the latest information.

PENETRATIONS AND SITE WELDING

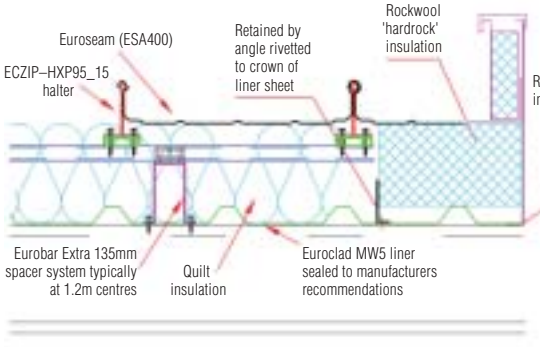
ESN149



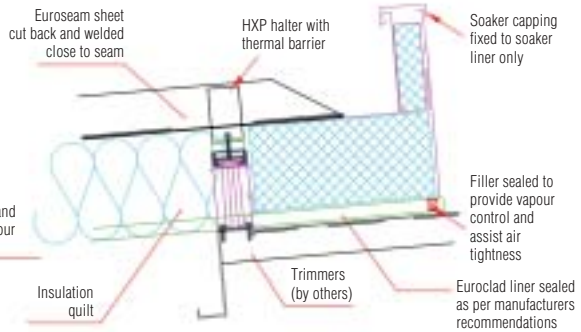
Plan elevation
(Rooflight and capping omitted for capping)



Any materials that are combustible that are in the vicinity of the joint must be removed to ensure that there will be no fire risk due to site welding



SECTION A–A



SECTION B–B

Penetrations through standing seam systems are by definition to be avoided where possible but are in some cases unavoidable. In these circumstances site welded soakers are the preferred option.

Site welding can provide further options on details such as tapered areas, where sheets can be cut and welded on site if factory assembled tapers are not suitable, unavoidable end lap situations or inclusion of specialist details.

Companies who carry out site welding can also usually apply paint finishes over welds in pre-coated material and advise on accommodation of thermal expansion. Fixed point positioning requires careful consideration.

Site welding is a specialist operation and should only be carried out by Euroclad recommended welders by – please contact Euroclad for a current list.

It is sometimes possible to fit proprietary gasketted penetration details, but only where the pitch is greater than 5° and the penetration can be located in the pan of a single Euroseam sheet width without obstructing drainage.

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