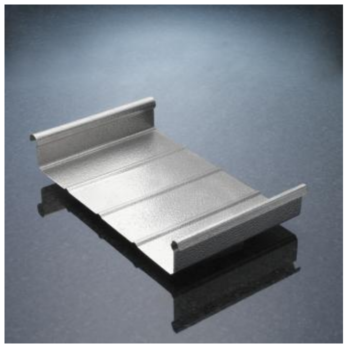
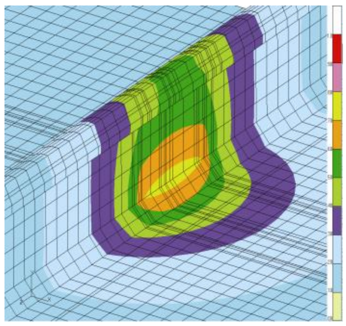
PROZIP ROOFING SYSTEM

TECHNICAL MANUAL





PROZIP

BRADCLAD

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ProZip standing seam roof system – Overview

Application

Prozip is a standing seam roof system suitable for both refurbishment and new build construction. Panels can be installed in either a single skin format or as part of a double skin construction.

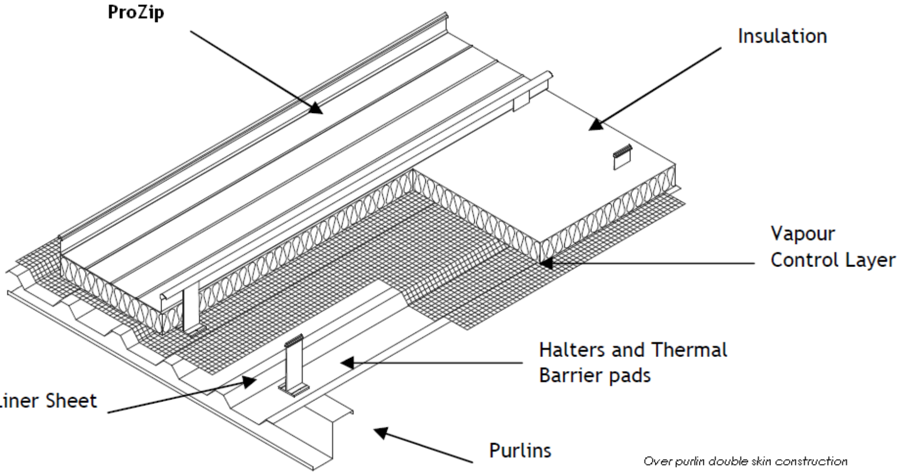
Single skin ProZip panels are installed onto halter clips fixed direcly onto the main structural purlins.

For an insulated (double skin) roof, construction consists of the ProZip outer sheet, insulation, vapour control layer and liner sheet or structural decking. A spacer sub-purlin may also be incorporated.

Over purlin construction

This is where the ProZip outer weathering sheet and the internal profiled liner sheet are laid in the same direction across roof purlins acting as the primary support. Typical purlin centres would be 1.0 to 2.5 m. The ProZip outer sheet is supported directly off the roof purlins via the halters and/or spacer sub-purlin.

- Double skin construction – with in-plane liner panel



Over purlin double skin construction

When lightweight quilt type insulation is used, the external loads (wind suction, snow, access etc.) are transmitted directly to the support purlins and not the liner sheet. The liner sheet is designed to take its own self-weight and that of the other construction components (insulation, vapour control layer etc.) and resist any internal wind suction/pressure loads.

- Structural deck construction

This is where purlins are omitted from the main structural steelwork and are replaced by rollformed structural decking, with the deck acting as part the structure. The ProZip panels are laid in the conventional manner onto halter clips, but the fixing regime of the halters can vary, depending on the type of deck and the proposed construction.

The gauge and sheet width of the ProZip sheet in each case will be determined by the external loads and the purlin centres. The gauge and profile of the liner/decking profiles will be determined by the internal wind loads, the design of the main structure and the dead weight of the construction components

Technical Information - General

Minimum Roof Pitch

The ProZip standing seam roof system can be installed to a minimum roof pitch of 1.5°. At this roof pitch any penetrations or end laps must be fully welded. Above 3° penetrations any end laps may also be silicon sealed and riveted.

ProZip panels are often used in curved barrel vault roof applications where a proportion of the roof will be below 1.5° pitch and, at the crown, will be horizontal. In this type of application the minimum pitch requirement of 1.5° must be maintained at the sheet ends. Care must be taken to avoid negative falls due to superimposed loading on roof pitches of 1.5°.

Lateral Restraint

ProZip panels, in common with other standing seam sheets, do not provide any form of lateral restraint to the top flange of support purlins.

In a double skin insulated roof construction, the liner sheet (aluminium or steel) can provide lateral restraint to the top flange of lighter gauge purlins, as long as it has a thickness greater than 0.7mm.

Lightning Protection

ProZip panels can be designed to offer lightning protection as part of the air termination network, in accordance with BS 6651:1985, when the thickness of te aluminium outer panel is greater than 0.7mm.

The ProZip aluminium halter can be used to provide the necessary electrical continuity, if connected with stainless steel fasteners direct to the structural steelwork.

Advice should be sought from a lightning protection specialist in order to determine the suitability of ProZip panels as part of a lightning protection system.

Load Span Tables – Aluminium

Introduction

The safe load tables have been prepared in accordance with guidance given in BS 5427-1: 1996 with the appropriate partial safety factors applied. The data is based on aluminium alloy from the 3000 series, with minimum 0.2% proof stress of 175 MPa as a minimum. The factored self-weight of the material is also included (please see notes on the safe load tables). All spans are assumed to be equal or within 15% of the greatest span.

The capacity of the sheets for any given project may need to be reduced depending on the type of halter. The tables are for Prozip roofing sheets only. The liner panel and any spacer elements, such as top hat sections, must be considered separately and checked against the manufacturer's data sheets.

Prozip single skin roofs do not provide lateral restraint to the compression flange (top flange) of the purlins. However, the liner sheet in a built-up roof construction can provide lateral restraint, depending on profile and gauge of metal.

How to Use the Load/Span Tables

The figures are for positive and negative loading for various gauges (thicknesses) of aluminium. They cover both double and multi span conditions and are in kN/m2.

When considering positive loading, the halter clip capacity on the Halter Safe Load table must also be consulted. The capacity of halters varies according to height.

Load Span Table: Profile: ProZip 300/65, Aluminium Roofing

	SHEETING, HALTER AND SCREW FASTENER CAPACITY in MPa (kN/m2)					
Span	**Maximum POSITIVE (Snow) Loading**			**Maximum NEGATIVE (Wind) Loading**		
m	0.9mm Sheet	1.0mm Sheet	1.2mm Sheet	0.9mm Sheet	1.0mm Sheet	1.2mm Sheet
1.0	6.38	5.83	5.45	6.71	8.30	12.07
1.2	5.61	5.52	5.05	5.67	6.96	10.24
1.4	4.90	4.82	4.68	4.72	6.05	8.74
1.6	4.24	4.21	4.33	3.85	5.28	6.56
1.8	3.64	3.72	4.00	3.06	4.29	4.71
2.0	3.09	3.27	3.69	2.36	3.25	3.19
2.2	2.60	2.89	3.40	1.75	1.92	2.00
2.4	2.17	2.25	3.14	1.22	1.26	1.14
2.6	1.79	1.82	2.89	0.78	0.76	0.60
2.8	1.47	1.56	2.67	0.43	0.42	0.39

Notes to be read with the above tables

1. The tables are for uniformly distributed loads only. Double Span.
2. The above data has been prepared in accordance with BS 5427-1:1996
3. The self-weight of the ProZip sheeting has been taken into account in the data
4. The data is based on the use of an aluminium alloy with a minimum proof stress of 175MPa
5. The partial safety factors used in the table are: Imposed loads – 1.6 for normal loads; Wind loading – 1.4; Attachment – 2.0

Halter Safe Load Table for Positive (Snow) Loading

Safe loads per halter:

Halter	**Safe Load**
Type 80	5.3 kN
Type 100	2.4 kN
Type 165	2.61 kN
Type 195	1.96 kN

Safe halter loads expressed as Kn/M^2

Span in m	**ProZip 300/65 profile**			
	Type 80	***Type 100***	***Type 165***	***Type 195***
1.0	17.67	8.00	8.70	6.53
1.2	14.72	6.67	7.25	5.44
1.4	12.62	5.71	6.21	4.67
1.6	11.04	5.00	5.44	4.08
1.8	9.81	4.44	4.83	3.63
2.0	8.83	4.00	4.35	3.27
2.2	8.03	3.64	3.95	2.97
2.4	7.36	3.33	3.63	2.72
2.6	6.79	3.08	3.35	2.51
2.8	6.31	2.86	3.11	2.33

Thermal Performance

Although various types of insulation can be utilised within a ProZip double insulated construction, to achieve a specific U value, mineral fibre quilt is the most common.

The mineral fibre quilt insulation in roll form has a density of 16 - 33 kg/m^3 and a thermal conductivity (lambda value) of 0.037 W/Mk. The material is non-hygroscopic (i.e. the insulation will not absorb moisture). Any moisture present within the roof construction will sit on the surface of the insulation and will evaporate through the ProZip seams when atmospheric conditions are suitable.

It is strongly recommended that a ProZip insulated double skin roof construction is constructed as a warm roof construction whereby the insulation quilt is oversized and lightly compressed to the underside of the ProZip sheet so that there is no air gap. This is particularly relevant when using ProZip sheets in long lengths and/or low pitched roofing where ventilation velocities would be low or non-existent if the construction incorporated a ventilated air gap above the insulation.

In-Plane Forces Generated By Thermal Movement

Introduction

Aluminium, like all other materials, will expand and contract when subjected to changes in temperature. The amount by which aluminium expands is determined from its coefficient of expansion, size of sample and change in temperature. Aluminium’s coefficient varies between $20x10^{-6}K^{-1}$ and $24x10^{-6}K^{-1}$ depending on the alloy. For convenience, the higher figure of $24x10^{-6}K^{-1}$ is used to reflect the use of wrought alloys, which tend to be at the higher end of the scale.

Aluminium’s coefficient is approximately twice that of steel ($12x10^{-6}K^{-1}$), that means for the same change in temperature, aluminium will expand at twice the rate of steel. To calculate the amount of change in length of any material when subjected to a uniform temperature rise, the following formula is used:

$$e = oLT$$

Where: ***e*** = Change in length
o = Coefficient of expansion. ***L*** = Length of product. ***T*** = Temperature change.

The common rule of thumb for expansion allowance when using aluminium is 1mm per 1m of material, so a 20m long roof sheet would expand by as much as 20mm. This is based on the assumption that the aluminium is a light colour, attaining a maximum temperature change of about +42ºC. Painted aluminium in a dark colour will absorb more solar heat, get hotter and therefore expands by a greater amount. 1.5mm per 1000mm length of material is used as the benchmark for construction details.

With so much movement possible within the ProZip roof system, the roofing designer will need to create an anchor or “fixed point” in the roof. The ProZip panels will then be designed to expand in a direction away from the fixed-point, with maximum movement generally taking place over the gutter at the eaves. (Please see the Fixed-Point Calculations and Details document.)

For the system to work correctly the ProZip panels must be allowed to move freely across the heads of the halters and this can only be achieved if the halters have been installed within the maximum acceptable tolerances. (See drawing no. PZ-H002). If the halters are installed outside of these tolerances, then accidental fixed-points may be created. These in turn may lead to structural failure by means of halter rotation and /or sheet perforation. This is because the forces generated from thermal expansion are very large, as shown in the example below.

Thermal Expansion Force

Assuming that a sheet is fully restrained by two fixed points then the stress would be:

$$f = oET = 1.68T \text{MPa}$$

Where: ***f*** = Stress
o **=** Coefficient of expansion. ***E*** = Elastic modulus (aluminium = 70GPa) ***T*** = Temperature change.

If the sheets attain a maximum temperature of say +40ºC from the base line temperature of +10ºC then the change would be +30ºC and the stress would be 50.4MPa. Therefore the force in a ProZip 300/65 x 0.9mm sheet would be 26.3kN or over 2.5 tonnes force. The sheets would probably buckle before realising the full force.

As can be seen from the above figures, it is essential to install all halters within the stated tolerances of the system. The further away the halters are from the fixed point, the more movement will take place and the more accurate the installation must be.

In-Plane Friction Forces

ProZip has been specifically design with a zipped seam roll diameter of 22mm in a bid to reduce friction but without loss of structural integrity. However, friction between the sheet and halter still exists and laboratory tests have shown significant values of force, depending on sheet length and accuracy of halter installation.

The attached table is a summary of the tests carried out and the data shown may be used to check the pullout and shear capacity of the halter fasteners.

Calculation Check of Halter Fasteners in Resisting In-Plane Friction Forces

These calculations must be done in addition to any structural calculations but assessed in isolation. This is because wind loading will cause the roof sheets to oscillate relieving any stress built up at the halter head from expansion of the sheet and snow load will maintain the sheets at a constant temperature creating only negligible movement.

The calculation involves checking the pullout, shear and combined shear and pullout capacity of the fasteners. Pullover loading is not considered, as the halter base is thick compared with sheeting.

The pull out force per fastener(F_z) is calculated from the formula:

$$F_z = I_p H/bn$$

Where: F_z = Pull out force per fastener in kN.
I_p = In-plane force from attached table in kN.
H = Overall halter height in mm.
b = Half halter base or fastener centre to edge of purlin (whichever is the lesser) in mm. n = Number of fasteners per halter.

The shear force per fastener(Q_b) is the In-plane force divided by the number of fasteners per halter.

$$Q_b = I_p/n$$

Where: Q_b = Shear force per fastener in kN.
I_p = In-plane force from attached table in kN.
n = Number of fasteners per halter.

When checking the results of the above calculations with the fastener manufacturer's details, a factor of safety (***fos***) must be applied to the fastener characteristic strengths. BS 54271:1996 states the following factors of safety to be applied:

Checking combined pull out and shear with permissible loads ensuring the summation of which does not exceed unity:

$$\frac{F_z}{fosF_{zp}} + \frac{Q_b}{fosQ_{bp}} \leq 1.0$$

Where: F_z = Pull out force per fastener in kN.
F_{zp}= Characteristic pull out force per fastener in kN.
Q_b = Shear force per fastener in kN.
Q_{bp} = Characteristic shear force per fastener in kN.
fos = Factor of

safety from the above table.

In-Plane Force Test Data

The following table shows the maximum forces needed to move a ProZip panel across the head of a halter, with the seam zipped to the correct 22mm diameter. The following figures can be used for sheet lengths up to 60m long. The table does not take account of halters installed outside of recommended tolerances, except for halters on 3° tilt.

Test Condition	**Smooth mill (painted) finish** **Max load in N**	**Stucco embossed finish** **Max load in N**	**Design Usage**
Halters in perfect alignment	22	29	Do not use
Halter 3mm out of alignment	129	229	Typical installation value
Halters on 1ºtilt (=1800mm radius curved sheet)	663	643	For use on smooth curved roofs and single skin roofs.
Halters on 3º tilt	1670	1731	For use on crimp curved roofs

Compatibility of Aluminium with Other Materials

Material	Environment			
	Rural	**Suburban**	**Industrial**	**Marine**
Copper *	X	X	X	X
Lead	✓	✓	X	X
Mortar ****	X	X	X	X
Plastic	✓	✓	✓	✓
Stainless Steel	✓	✓	✓	✓ **
Timber ***	X	X	X	X
Uncoated Steel	X	X	X	X
Zinc	✓	✓	✓	✓
Brass	X	X	X	X

* Drainage run-off from copper onto aluminium sheets should be avoided
** This only applies to fasteners. Generally stainless steel should be classed as incompatible with aluminium in a marine environment
*** This applies to timber treated with fire retardants and preservatives with copper or fluoride compounds
**** This category also includes materials that are alkaline (e.g. concrete, cement etc)

Where there is a likelihood of contact between aluminium and incompatible materials (X) a protective barrier should be introduced between them, such as PVC tape or paint.

Fire Rating

Rating of external fire spread

The external face of a ProZip roof system has a notional **AA Designation** as per BS476: Part 3: 1975 as required by Approved Document B of the UK Building Regulations 1991 (1992 edition).

The first letter of the designation denotes the rate of fire penetration, with "A" being "*penetration in not less than 1 hour*". The second letter refers to surface spread of flame with "A" being "*no spread of flame*". AA is the highest designation.

Rating of internal fire spread

The internal surface of a ProZip insulated double skin roof construction with an aluminium or steel liner sheet or decking is defined as a **Class 0** surface spread of flame as per Approved Document B of the UK Building Regulations 1991 (1992 edition).

It should be noted that Class 0 is not a classification identified in any British Standard test. Class 0 classification is achieved if a material on the surface of a "composite" product is either:

a) Composed throughout of materials of limited combustibility, or

b) A Class 1 material which has a fire propagation index (**I**) of not more than 12 and sub index (i_1) of not more than 6.

Class 1 "surface spread of flame" is determined by BS 476 Part 7 with Class 1 being the highest rating. Fire propagation index **I** (overall test performance) and sub-index i_1 (derived from first three minutes of test) are determined from BS 476 part 6.

Aluminium Sheet Finishes & Durability

ProZip aluminium panels are available in the following finishes :

Plain mill finish
Stucco embossed mill finish
PVDF/PVF2 (polyvinylidene fluoride)
ARS (abrasion resistant system – modified polyester)

Plain mill and stucco embossed finish
Even in its unprotected state, aluminium has excellent corrosion resistance. When exposed to air aluminium quickly forms an aluminium oxide layer, which is extremely tough and durable giving its 'long life' reputation. Aggressive pollutants, particularly acids formed from hydrogen chloride and sulphur dioxide, will attack the oxide layer causing localised pitting and staining. Such attacks (known as weathering) have been shown to effectively cease over a number of years. Other industrial pollutants such as ammonia, carbon monoxide and carbon dioxide have very little effect on aluminium.

The effect of saline on aluminium is less than other industrial pollutants – aluminium, therefore, is an excellent material to use in a coastal/marine environment. Rainwater has a beneficial effect on aluminium in that it washes away any chemical deposits. Sheltered areas, however, need more attention and may need hosing with water and perhaps a mild detergent to remove any corrosive deposits.

When new, mill finish aluminium has a bright, shiny appearance, which over a period of time dulls down as the patina forms. The long-term colour will depend on the type of alloy and the environment in which it is established. Most roof sheets in normal atmospheres tend to take on a platinum grey appearance, attractive to many building designers.

The two most quoted examples demonstrating the excellent durability of aluminium are the Eros statue in London and the San Gioacchino dome in Italy. Both examples are over 100 years old and have suffered only limited pitting. Their life expectancy is projected to extend well into the future.

Mill finish aluminium (plain or stucco embossed) is expected to last the design life of the building without maintenance. However, smooth mill finish tends to show all minor blemishes and scratches which can detract from the overall appearance. Stucco embossed finish therefore tends to be favoured for roof and wall sheets.

During construction the new aluminium panels can be a hazard to installers as the reflected light can cause temporary sun blindness. Therefore it is strongly recommended that installers be issued with sunglasses as part of their Personal Protective Equipment (PPE).

Care must be taken when storing mill finish aluminium on construction sites. All cementicious products are alkali based and attack aluminium. All mill finish aluminium must therefore be stored above ground level away from the danger of splash from site traffic. Ideally roof sheets should be stored on the roof frames, providing the frames are capable of withstanding such concentrated dead loads.

The effect of various exposure conditions on the durability of aluminium and organic aluminium profiled sheeting

Detrimental Action	**Aluminium, plain mill and stucco embossed**	**Aluminium, organic coated**
Rain, sleet etc.	Gradual change in appearance to dull metallic grey in rural areas or dark grey in industrial environments	Weathering varies with type of coating (see organic coating on aluminium table)
External attack by polluted and coastal atmospheres	Freely exposed surfaces as for rain, sleet etc. Sheltered areas will become darker and may suffer only superficial attack.	Weathering varies with type of coating and environment (see organic coating on aluminium table)
Ultraviolet radiation	No effect	Same colour change and chalking depending on type of coating (see organic coating on aluminium)
Combustion	Only a problem when the local environment contains corrosive influences e.g. combustion products. Generally paint coating the affected area gives adequate protection.	Normally no effect
Temperature ranges	-800C to + 1000C	-500C to +1000C
Suitable cleaning agents	Mild, neutral dilute detergents and soft brush. Wash down with clean water. Avoid strong alkaline and acidic cleaners	As for plain aluminium
Chemical attack	Certain chemicals attack aluminium under specific conditions. Design to avoid deposits remaining on sheeting and to ensure ventilation and/or protection on inside surfaces.	Avoid cement or plaster splashes during erection.
Abrasion	Scratched metal is not less durable than unscratched metal.	Resistance to abrasion depends on coating. Some colour change and chalking depending on type of coating(see organic coating on aluminium)
Attack by bird droppings, rodents, insects, soil etc.	Generally no more than staining. Avoid the formation of wet poultices. Cinders and ash may be aggressive	As for plain aluminium

Reference: Table 8, BS5427 Part 1:1996 – Code of Practice for the use of Profiled Sheet for Roofing and Cladding of Buildings Part1 – Design

Organic coatings on aluminium

Surface Finish	General characteristics	Period (years) to repaint decision		
		Type of external environment		
		Coastal	Industrial and urban	Suburban and rural
Polyester SP	Good resistance to staining, scratching and fading in aggressive environments.	5	5	10
Abrasion resistant system ARS	Surface gives good abrasion resistance. Other properties mid-way between SP and PVDF.	15	15	20
Polyvinylidene fluoride PVDF	Very durable, good resistance to chemicals. Best gloss and colour retention, poor abrasion resistance, should be handled with care.	20	20	30
For organic coatings on aluminium, the period stated is the time elapsed until a discernable deterioration of the aesthetic appearance. Re-coating will restore the appearance. Failure to re-coat will allow continued deterioration of the appearance but will not significantly affect the ultimate life of the product/system.				

Reference: Table D1 and D3 - BS 5427 Part1 : 1996 – Code of Practice for the Use of Profiled Sheet for Roofing and Cladding of Buildings Part1 : Design

PVDF (PVF^2)

Introduction

Polyvinylidene fluoride (PVDF or PVF^2) paint systems can be supplied as a Class 1 PVDF system that contains a minimum of 70% PVDF resin and a maximum of 30% acrylic resin or as a Class 2 PVDF system that has a 50% to 50% PVDF to acrylic mix. Class 2 PVDF systems are not widely available due to their inferior performance to UV. PVDF paint can be supplied in 2, 3 or 4 coat systems.

In areas of normal atmospheric conditions most PVDF Class 1 paint systems will provide the desired performance as a 2 coat system, consisting of the PVDF coat and a primer. Sometimes, as well as the atmospheric conditions, the colour required and/or type of PVDF paint system (e.g. metallic) will dictate the necessity for a 3 or 4 coat system. There are 2 types of 3-coat system, which use either a clear lacquer layer or an opaque barrier layer.

3 coat PVDF system (with a clear lacquer layer)

A clear lacquer layer is used to prevent atmospheric attack affecting the performance of either the pigments used in forming the colour or to protect metallic flakes in metallic paint systems from attack. Some colours are difficult to make and require organic pigments. Metallic flakes can dissolve in acidic conditions resulting in only the pigment being retained -for example a bronze metallic coating would turn into a brown coating. A clear lacquer applied as the outermost layer is advisable where atmospheric conditions are highly polluted.

3 coat PVDF system (with an opaque barrier layer)

The use of the other type of 3-coat PVDF system with an opaque barrier layer is used to reduce the effects of ultra violet attack from sunlight. PVDF does not have good UV blocking characteristics and relies greatly on the pigments used. The PVDF does not suffer attack but the UV can penetrate the PVDF and degrade the primer, particularly epoxy primers (acrylic primers can offer some resistance), in the form of chalking which results in delamination of the PVDF film from the primer. A clear lacquer layer will not prevent this, and so an opaque barrier layer is used. This means that on top of the primer a coat of (usually) grey PVDF is applied before the final "colour" PVDF layer is applied. The opaque grey PVDF layer stops the UV affecting the primer. This type of 3-layer PVDF system is mainly used on blue and dark green colours.

4 coat PVDF system

Four-coat PVDF systems use both an opaque barrier layer on top of the primer and a clear lacquer layer on top of the main "coloured" PVDF layer. The use of a 4-coat PVDF system would therefore be advisable for a blue or dark green colour in a highly polluted atmosphere.

Aluminium Paint Finishes – Site Implications

PVDF (also known as PVF^2)

Fluoride molecules in the paint composition enhance the paint's colourfast properties, which is a major benefit to architects. Also the chemical composition of the paint is similar to that of Teflon, which means that the surface is frictionless. These properties make it difficult for contractors to use inferior paints for touch up and repaint purposes as such paints would fade in comparison with the original coating and any adhesion would be eventually lost. If repainting is necessary then special air-drying PVDF paint must be used that can only be applied by trained applicators.

The PVDF paint finish is very susceptible to site damage once the protective foil has been removed especially on the seam tops during the zipping process (zipper rash). It is recommended that the film be removed within one week of the sheet being fixed, to avoid the danger of the film bonding to the paint. Care must be taken when walking on PVF^2 coated sheets when raining, as the frictionless properties increase the risk of slippage.

ARS

ARS or Abrasion Resistant System is a tougher paint system than PVDF and affords the contractor some protection against minor scuffs and scratches. This particular paint system does not have the same colourfast properties as PVDF and will fade at a faster rate. Touch up on this system is notably easier and does not usually require the presence of a trained applicator. However, installers must follow the manufacturer's instructions implicitly to ensure the best finish when carrying out repairs.

Air Permeability & Air-Tightness

Air Permeability

The method of mechanically seaming the ProZip panel seams means that the sheets can simultaneously be weatherproof and air permeable. No sealants are used or needed in the installation of the ProZip panel side-laps. Weather-tightness is provided by the incorporation of an anti-capillary groove within the seam.

Any moisture that is present within the system can escape through the seam, thus reducing the risk of interstitial condensation. The system is therefore breathable and can be classified as a vented roof system.

ProZip standing seam roof system - typical specification

Reference:

ProZip standing seam insulated double skin roof system as Bradclad Group ProZip typical detail PZ-C001 consisting of:

0.9 mm mill finish aluminium alloy ProZip ***300/65*** outer sheet
Type ***165*** extruded aluminium alloy halters complete with nylon thermal barrier pads fixed to lightweight galvanised mild steel support top hat section with saddle brackets fixed to satisfy design loads
200 mm thick (one layer of 80mm and one layer of 120 mm) lightly compressed mineral fibre quilt insulation to achieve maximum "U" value of 0.25 W/m2K
250 µm clear reinforced virgin ***polyethylene*** fully sealed vapour control layer
0.7 mm white polyester coated steel profiled liner sheet

ProZip standing seam roof system is manufactured and supplied by:
The *BRADCLAD* Group, The Old Station, Nidd, Harrogate, North Yorkshire, HG3 3BN, U.K.,
0044-1423 779555. www.bradclad.com

ProZip outer panel *300/65* (***300*** mm cover width and 65 mm seam height) standing seam roof sheets to be supplied in continuous lengths and manufactured from ***0.9*** mm gauge aluminium alloy in natural mill ***finish***. The sheets are supported on halters fixed to support rail with brackets fixed through the vapour control layer and liner sheet into steel purlins (by others) at approximately ***1600*** mm centres.
NB. Maximum purlin centres and/or gauge of ProZip sheets to be determined from load/span tables and the specific loading for the project.

HALTERS AND SUPPORT RAIL Extruded aluminium alloy halters (***type 165***) complete with nylon thermal barrier pads to be fixed at ***300*** mm centres to lightweight galvanised mild steel support rails with ***100*** mm high saddle brackets at no more than ***800*** mm centres. Halters to be fixed with 6.3mm diameter stainless steel self drilling / self tapping screws complete with 16mm diameter stainless steel / EPDM bonded washers (2 No.fixings per halter). Support rail brackets to be fixed through the vapour control layer and trough of the liner sheet to mild steel purlins (by others) with 5.5 mm diameter stainless steel self drilling / self tapping screws (2 No. fixings per support rail bracket). Halters are to be accurately set-out to the stated system tolerances (both along and between the support rails) to ensure full accommodation of thermal movement of the system.

INSULATION

Mineral fibre insulation quilt (in ***two layers*** with all joints staggered) lightly compressed to approximately ***180*** mm to achieve a maximum U value of ***0.25*** W/m^{2}K. Mineral fibre insulation quilt to have a nominal density of 16 kg/m^3 and a thermal conductivity of 0.037 W/mK. Install and secure insulation quilt as the roofing works proceed, ensuring continuity. Leave no gaps. Keep insulation dry at all times.

VAPOUR CONTROL LAYER Vapour control layer to be ***250 µm clear reinforced virgin polyethylene*** with vapour resistance of approximately ***530*** MNs/g. Vapour control layer sealing tape to be butyl rubber sealant 15 mm wide x 2 mm thick. Lay as work proceeds ensuring continuity. Lap side and ends of vapour control layer not less than 50mm and seal with ***one row*** of sealant tape. Seal with sealant tape to perimeter and to pipes, ducts, structural members, etc which abut or pass through – ensuring a full bond over the width of the sealant tape. Carefully check for tears and punctures and seal them with sealant tape prior to covering. Seal with lapped patch of same vapour control layer material and with sealant tape along all edges. Joints in vapour control layer to run in the same direction as the liner sheet and to coincide with the `crown` of the sheet in order to offer a continuous bearing surface to maintain the integrity of the joint.

STEEL LINER
0.7 mm gauge colour coated hot dipped galvanised mild steel trapezoidal profiled liner sheet. Profile depth to be as designed. Liner sheet to be fixed to the purlins with 5.5 mm diameter carbon steel self drilling / self tapping screws complete with 16 mm diameter carbon steel / EPDM bonded washers (1 No. fastener in alternate corrugations where halters do not occur). End laps to be a minimum of 100 mm and are to coincide with purlin support position. Side laps to be 1 no. corrugation and to be stitched together with 5.2 mm diameter bulb-tite rivets or 5.5 mm diameter stitcher screws with EPDM bonded washers at approximate 400 mm centres. Side laps to be stitched as each adjacent sheet is laid. Internal perimeter flashings to be fabricated from the same specification steel sheet as the liner sheet. Internal perimeter detailing to be completed with trapezoidal profile foam fillers.

SHEET INSTALLATION The ProZip standing seam system is installed by fully engaging the small roll upstand of the sheets over the heads of the halters and positioning the large roll upstand over the small roll upstand of the adjacent sheet. The system side lap is fully completed by mechanically seaming the formed upstand with the ProZip zipping machine.

FIXED-POINTS A fixed-point must be installed in every sheet. The fixed-point anchors the sheets to the support structure and acts as a datum point for the control of thermal movement. The fixed-point is usually positioned at the ridge position on each slope and as a minimum specification, consists of a 4.8 mm diameter aluminium (with stainless steel mandrel) pop rivet connecting the small roll upstand of the ProZip panel to the head of the ridge halter. The secret fix appearance of the system is maintained as the fixed-point rivet through the small roll upstand is covered by the installation of the large roll upstand of the adjacent sheet. Only one fixed-point is to be installed per sheet in order to enable the system to fully accommodate thermal movement. Thermal movement allowance of the system is usually accommodated at the eaves position.

RIDGE The ridge detail is formed by turning up the tray of the ProZip panels with the ProZip ridge-folding tool, installing the aluminium ridge closure piece backed up by a foam ridge filler and installing the aluminium ridge “zed” flashing spacer. The detail is finished by installing the ridge flashing to the top of the ridge closure pieces ensuring that full thermal movement is accommodated at the flashing joints.

EAVES The eaves detail is formed by positioning the eaves foam fillers in the sheet upstands and securing them in position by fixing the aluminium eaves drip angle to the underside of the ProZip panels. Approximately 20 mm of sheet past the front face of the drip angle is to be left in order to form the eaves turn down of the sheet with the ProZip eaves-folding tool. The system thermal movement allowance is to be accommodated at the eaves position by positioning the back face downstand leg of the eaves drip angle at least 20 mm from any vertical surface detail.

VERGE / GABLE The verge / gable detail is formed by fixing the aluminium gable end channel to the last upstand of the ProZip panel, this in turn is held in place by the aluminium verge clip fixed to the upstand of the last halters. The verge tolerance sections may also be incorporated into the detail dependant upon the design of the verge / gable flashing. The detail is finished by clipping the verge / gable flashing to the downstand leg of the gable end channel or fixing to the top of the verge tolerance section (dependant upon flashing design) ensuring that full thermal movement is accommodated at the flashing joints.

HIPPED VALLEY EAVES The valley eaves detail is formed in the same manner as the eaves detail with the exception that the sheet ends are to be rake cut on site. Upstands of the eaves foam filler are to be positioned in the ProZip panel upstands and a compressible foam sealing strip is to be positioned between the top of the eaves drip angle and the underside of the ProZip panel.

HIPPED RIDGES The hipped ridge detail is formed in the same manner as the ridge detail with the exception that the sheet ends are to be rake cut on site. Hipped ridge closures and fillers are specially manufactured to suit the correct rake angle formed by the hip.

NB. All work on details indicated above is to be carried out whilst working on crawl boards or scaffolding planks positioned over the seams of the ProZip sheets in order to prevent indentation of the sheet tray at these positions. In no way should the detail work be carried out whilst standing or kneeling in the tray of the ProZip sheets.

DETAILING The system is finished off at the periphery as per the ProZip roof system standard details and installation instructions utilising ProZip roof system components. Perimeter flashings should be fabricated from the same specification aluminium alloy sheets as the ProZip panels.

ProZip Typical Details

Numbering Convention

The typical details in this section have the general product prefix “PZ” with subsequent categories relating to construction and detail type.

PZ-C001 Construction with top hat on liner
PZ-P001 ProZip 300 panel detail
PZ-H001 Halter fixing detail
PZ-H002 Halter set out tolerances
PZ-H003 Fixed point positions
PZ-R001 Ridge fixing detail
PZ-R002 Ridge flashing fixing detail
PZ-R003 Sliding ridge detail
PZ-V001 Verge flashing components
PZ-V002 Verge fixing detail
PZ-E001 Eaves fixing detail
PZ-E002 Curved eaves detail
PZ-X001 Movement joint detail
PZ-W002 Welded soaker detail