

## Structure

AS35 panels are designed to be supported by and fixed to steel or timber purlins. Steelwork for AS35 panels should be within the tolerances given in BS 5950:2 1992: fixing planes on adjacent purlins should be less than  $L/600$  apart (where L is the purlin spacing).

All AS35 panels are suitable for spanning purlins at 1.8m centres. Consult Steadmans Technical Department for guidance on using the panels on purlins at centres greater than 1.8m.

AS35 panels should be isolated from preservative treated timber purlins by PVC barrier tape applied to the bearing face of the purlins.

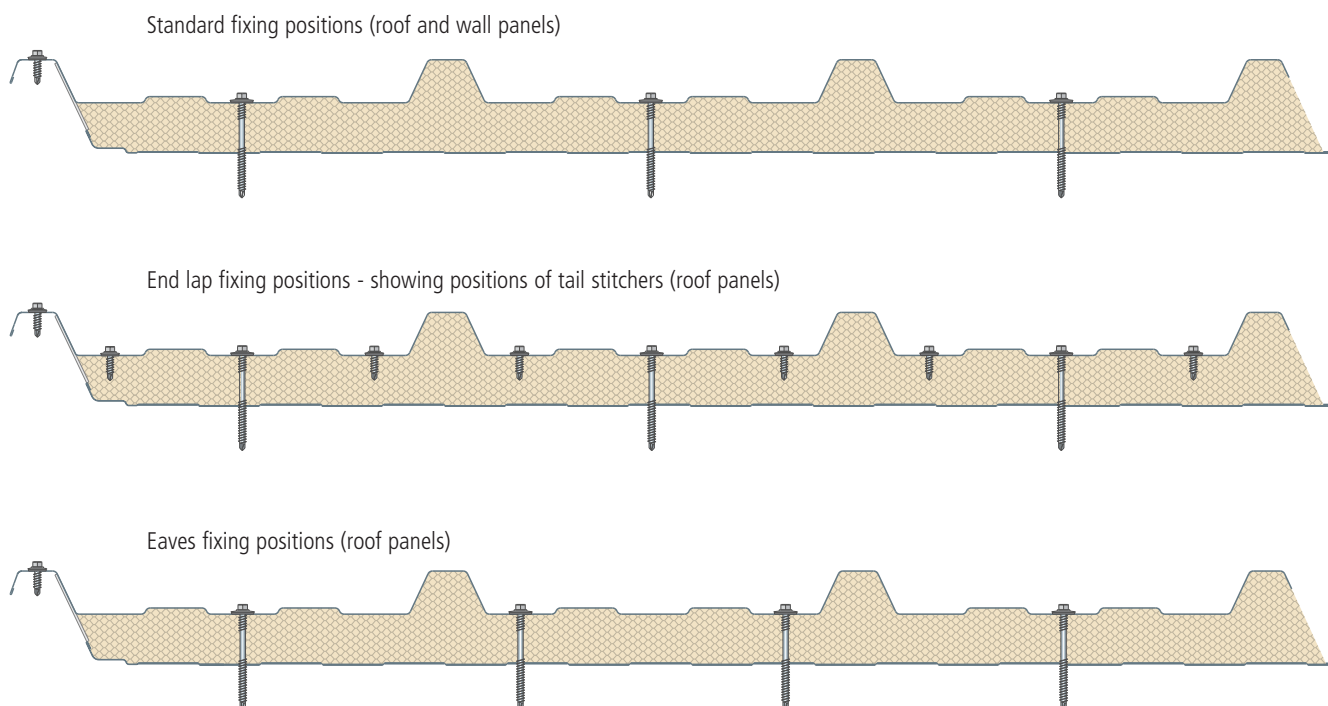
## Fixings

Fixings for AS35 roof panels provide restraint against wind uplift forces; those for AS35 wall panels provide restraint and support. Whilst panels may be fixed through valleys or crowns, Steadmans recommend valley fixing: accurate fixing is easier to achieve, loads on the fixings are smaller, the fixings are less likely to distort the weather sheet, and better compression of the sealant is achieved at end laps.

Fixings should be stainless steel or carbon-steel self drilling screws with a high thread to restrain the weather face of the panel and should have press-on or integral caps to match the finish of the panel. To prevent water penetration each fixing should have a 19mm diameter EPDM washer.

Fixings to light and heavy section steel should pass through the steel and leave 5mm of thread exposed on the underside of the section. Fixings to timber must achieve a minimum 40mm embedment.

For normal exposure conditions AS35 roof and wall panels should be fixed in each main valley at each purlin (see figure 02): consult Steadmans Technical Department for guidance on abnormal conditions.



**Figure 02: Fixing details for roof and wall panels**

## Laps

Side laps between panels are formed by lapping the extended weather sheet of the female side of one panel over the male crown of the adjacent panel. The exposed edge of the lap should face away from the prevailing wind. The lap should be sealed with butyl sealant strip 6mm wide by 5mm high and the two weather sheets stitched with 23mm long self-drilling screws. AS35 roof panels should be stitched at 450mm centres, AS35 wall panels should be stitched at 300mm centres.

End laps are required on large span roofs and high walls with two or more tiers of AS35 panels. Roof panel end laps are formed by lapping the weather sheet of the upper panel 150mm over the lower panel. End laps are sealed with three runs of butyl sealant 6mm wide by 5mm high. The first run should be sited 10 - 15mm upslope of the primary fixings, the second run 10 - 15mm downslope of the primary fixings and the third run 15mm from the bottom of the lap. Wall panel end laps are formed by lapping the weather sheet of the upper panel 100 mm over the lower panel. End laps are sealed with two runs of butyl sealant 6mm wide by 5mm high. The first run should be sited 10 - 15mm upwards of the primary fixings, the second run 15mm from the bottom of the lap (see the 'End lap fixing' design detail).

Where four panels overlap additional runs of butyl sealant are required between the male and female crowns of all four panels to prevent air leakage.

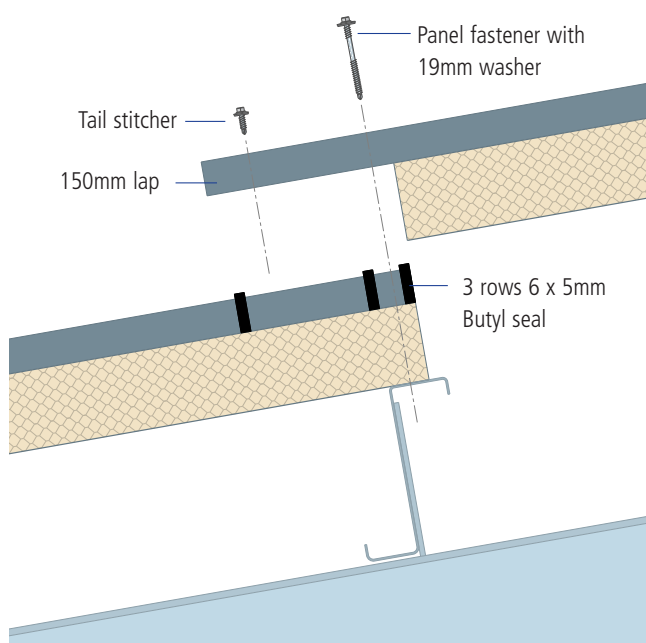


Figure 03: End lap fixing details - roof panels

## Fire

AS35 panels provide class 0 resistance to surface spread of flame and can be used to form roof and wall linings without any additional treatment.

AS35 roof panels achieve an AA rating against external spread of fire and may be used at any location on the roof. AS35 wall panels achieve LPCB grade EXT-B and, in England and Wales, and Northern Ireland, may be used without restriction on walls at least 1m from a boundary (see AD B section 13 for details of boundary conditions). Walls within 1m of a boundary should be clad with AS35 Firefighter panels which achieve LPCB grade EXT-A15 and will provide 125 minutes of integrity and 20 minutes of insulation. To achieve the ratings panels must be fixed at every valley and have laps stitched at 450mm centres (roofs) and 300mm centres (walls).

In Scotland AS35 firefighter panels may be used on walls at least 1m from a boundary; AS35 firefighter plus panels should be used on walls within 1m of a boundary - these achieve LPCB grade EXT-A30 and provide 125 minutes integrity and 46 minutes of insulation. See Scottish Building Standards Technical Handbook Section 2 for details of boundary conditions.

Hot flues which penetrate the panels must be separated from the panel cores by 25mm and the gap packed with nonflammable material: pre-formed collars are available.

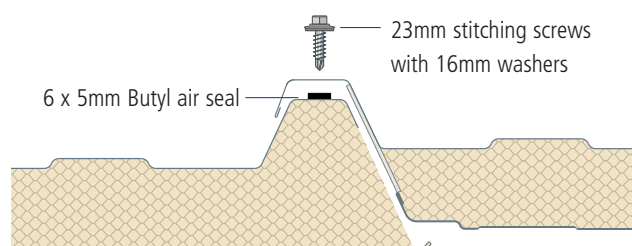


Figure 04: Side lap fixing details - roof and wall panels

## Thermal performance

Carbon emissions from non-domestic buildings must now be 23.5% less for naturally ventilated and 28% less for mechanically ventilated than those predicted for a comparable building which would have met the requirements of Part L 2002. Energy use and emissions must be calculated using the Simplified Building Energy Model (SBEM), either by using iSBEM (a free software tool available from the DCLG) or by using an accredited simulation tool.

Whilst designers will now have to consider building form, efficiency of services and the use of low or zero carbon energy generation they will still have to address fabric heat losses:

**Conduction losses:** although Part L (2006) no longer uses elemental U-values for assessing compliance, AS35 panels offer U-values substantially lower than those required by the 2002 regulations, giving designers one way of addressing fabric heat loss.

**Thermal bridging:** SBEM takes account of heat losses at junctions between building elements using linear thermal transmittance (psi values). Psi values for junctions and perimeters in the AS35 panel system are shown in table 11.

**Air leakage:** whilst the regulations set an air leakage limit of  $10\text{m}^3/\text{m}^2/\text{hr}$  @ 50Pa, designers may choose to base their SBEM calculations upon lower rates. When correctly detailed and installed the AS35 panel system will contribute to achieving a low air leakage rate.

Work which involves increasing the capacity of building services in existing buildings (described in Approved Document L2B) may require improvements to the thermal performance of building elements. One means of achieving that would be to replace existing roof or wall panels with an AS35 panel system.

## Control of condensation

Part C2 of the Building Regulations requires designers to prevent harmful condensation forming on or within building elements. To minimise the risk of condensation designers should arrange for the extraction at source of moisture generated by activities and processes within the building and adopt forms of construction which will not trap moisture within elements. Designers should observe the guidance in BS5250:2002.

AS35 panels are unlikely to be affected by surface condensation as the high performance core will keep the temperature of the liner sheet above dewpoint. Designers should assess the risk of surface condensation at linear thermal bridges using the method in BRE IP 17/01 and the temperature factors (f-values) shown in table 11.

The high vapour resistance of the liner sheet and the factory applied edge seal will inhibit interstitial condensation.

**Table 11 Psi & f-values for panel junctions and perimeters**

Junction (see design details)	Psi value (W/mK)	f-value
Eaves (fig 05)	0.23	0.83
Verge (fig 11)	0.19	0.76
Ridge (fig 09)	0.01	0.97
Parapet (fig 19)	0.37	0.65
Parapet gutter (fig 17)	1.20	0.71
Valley gutter* (fig 15)	0.62	0.73
Wall - ext corner (fig 31)	0.26	0.76
Wall - int corner (fig 30)	0.23	0.76
Wall - drip (fig 29)	0.30	0.76
Door/window head (fig 35)	0.50	0.58
Door/window jamb (fig 34)	0.49	0.59
Window sill (fig 36)	0.49	0.60
Industrial door head	0.87	0.67
Industrial door jamb	0.41	0.74

\* use twice the value for a full gutter  
Note that values are only applicable to the components on the detail.  
Changes to the detail will alter values

### Drainage

AS35 panels are intended for roofs with a minimum slope of 4°: if the roof includes rooflights the minimum slope is 6°. Gutters and downpipes should be designed to collect rain and snow falling on the roof and discharge it safely. Drainage capacity should be determined according to BS EN 12056-3:2000.

The U-values of an insulated gutter should be slightly higher than that of the roof panels to ensure snow and ice melts first in the gutter.

### Rooflights

**Illuminance:** the area of rooflights required to illuminate the building interior depends upon the type of activities taking place. BS 8206-2:1992 Code of practice for daylighting gives guidance. Table 12 shows how to achieve the recommended levels.

**Thermal performance:** with the adoption of the whole building compliance method in Part L there is no maximum permitted area for rooflights: designers must assess the performance of rooflights as part of the SBEM evaluation. The only limit on rooflights is that their area weighted U-value must not exceed 2.2W/m²K and no rooflight may have a U-value worse than 3.3W/m²K.

**Solar gain:** Part L requires designers to ensure solar gains in summer will not be excessive. TM37 contains guidance and calculations methods.

**Safety:** rooflights must provide safety levels appropriate to the frequency of roof access. All Steadmans rooflights offer a non-fragility rating of class B on installation. However, for standard 2.4 kg gauge rooflights that level of non-fragility may not be maintained over their 25 year service life. Where rooflights must be non-fragile throughout their service life Steadmans recommend the use of 3.0 kg gauge rooflights. Consult Steadmans for further guidance.

**Table 12: Rooflight areas**

Characteristics of activity / interior	Level of illuminance req. (lux)	Recommended min. rooflight area (% of floor area)
Interiors used occasionally, with visual tasks confined to movement and limited perception of detail e.g. bulk stores	100	10%
Continuously occupied interiors, with visual tasks not requiring perception of detail e.g. loading bays, plant rooms	200	10%
Moderately difficult visual tasks, colour judgement may be required e.g. sports and assembly halls, packing, general offices, engine assembly, retail shops	300 - 500	13% - 15%
Difficult visual tasks, accurate colour judgement required e.g. drawing offices, inspection, electronic assembly	750 - 1000	17% - 20%

\* Table based on research by Institute of Energy and Sustainable Development, De Montford University for illuminance in the horizontal plane - rooflight area should be greater where illumination is needed in the vertical plane e.g. where vertical racking is used.

\*\* Figures for the level of illuminance required are taken from CIBSE Guide A (table 1.12)