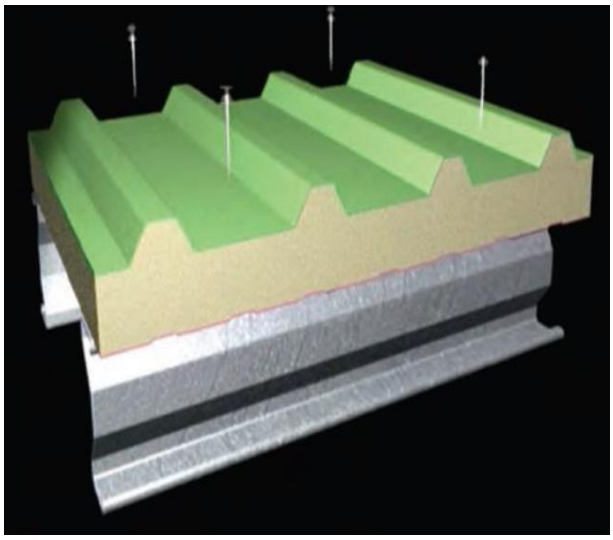
Composite Panels vs. Built-Up Systems

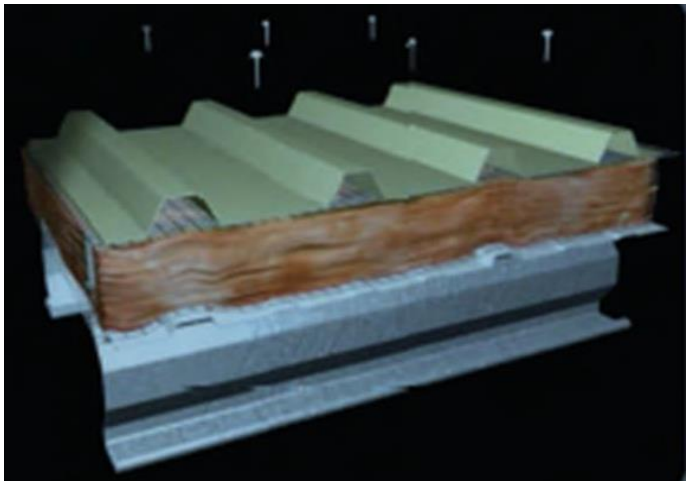
Composite panels are rigid panels which are manufactured offsite in a factory. They comprise two metal faces positioned either side of a thermally insulating material.

Most composite panels tend to be flat/smooth faced panels like the ones shown above, although some come in profiled form like the one shown below. Once in situ, it can be impossible to tell the insulant without supporting documentation.



Notice that the infill completely fills the two facings of the panel.

Built-up systems are built onsite. The inner sheet is fixed to the building frame and then the insulation material is added. The outer sheet is then put in place (see image below).



Notice that there is a gap along the ridged areas of the panel.

Tapping and/or pressing the ridge will at least allow you to determine whether the panel is a composite panel, or a built-up system, as the ridge will have some give when pressed. It still does not allow you to determine what the insulation material is.

Advantages of Composite Panels

- Energy efficient (good U-values and insulation properties).
- Cost effective (larger amount of off-site work, less on-site and can be constructed quicker).
- Lightweight (potentially less substantial foundations required, again increasing the speed of the build).
- Architecturally pleasing (on the outside, but what is inside?).

Disadvantages of Composite Panels

- Susceptible to dents and damage from adverse weather and impact events.
- Joints have to be carefully sealed and adequate water proofing done, so that there is no water penetration into the building when it rains.
- Sometimes onerous insurance conditions to comply with.

Combustibility of Panels (most to least combustible)

EPS (expanded polystyrene)/XPS (extruded polystyrene) (highly combustible)

Normally found in temperature-controlled buildings.
Fires may reach temperatures in excess of 900°C within minutes.

Fire retardant EPS (expanded polystyrene) (combustible)

Starts to melt at 100°C resulting in ignition and the forming of burning droplets.

PUR (polyurethane) (combustible)

Fire resistance limited to approximately 5-10 minutes maximum.
Will generally sustain fire when heat or flame source is removed, i.e., it continues to burn.
As with EPS, it will also form burning droplets.
PUR starts to decompose at 150-200°C and becomes flammable at 300°C.

PIR (polyisocyanurate) (combustible)

PIR will burn when exposed to heat or flame, but in most cases will form an external char and does not form burning droplets. It will continue to burn as the char fails, exposing fresh material.
Once the heat flame is taken away it will normally cease burning.
Starts to decompose at 150-200°C and becomes flammable at 300°C, but at early stages forms a carbonaceous char.

LPCB (Loss Prevention Certification Board)/FM (Factory Mutual) approved

(will withstand fire longer, but ultimately combustible)

LPCB / FM approved panels are rated as non-combustible. However, they are actually combustible but will withstand fire for a longer period. Similar to non-approved, but the char lasts longer.

Modified Phenolic Foam (combustible but with a good degree of fire resistance)

Starts to decompose at between 350-500°C and ignites between 530-580°C.

Foamed Glass (non-combustible)

Glass Fibre (non-combustible)

Mineral Wools/Rock Fibres (non-combustible)

Composite Panel Identification

CDM folders

CDM (Construction Design & Management) folders for buildings built after 1995 are supposed to stay with the building, they show how the building was built along with the materials of construction, they are then used for the life of the building and during the demolition process to allow safe use and safe deconstruction.

UV markings on panels

Some panels can be identified by UV markings as shown below.

Original building design materials

Unfortunately, there are often multiple panel specifications which makes it difficult to determine the actual panels used.

Panel manufacturer

Kingspan offer a service where they will find out the panels used, based on the address of the site.

Tapping

Explained earlier.

Visual

If the insulation is exposed, i.e., the panel is damaged, you may be able to see the infill.

A panel will be treated as combustible without evidence to the contrary.

If a panel is treated as combustible, then that could have an obvious effect on rating and ultimately the premium charged.

Visual Identification of Composite Panels

EPS (expanded polystyrene)

We have all seen EPS, so if there is a damaged panel you should be able to recognise it.

Easily identifiable by distinctive white foam balls compressed into solid blocks. It looks and feels a lot like commonly used packaging materials but is more densely compressed.

XPS (extruded polystyrene)

XPS is usually green or blue in colour and does not feel crumbly if you rub its surface.

EPS/XPS is cheap to buy, being as much as half the price of PIR.

If you can see the infill, this is great for trying to ascertain what the insulant is; however, this then presents another issue as the insulant is obviously exposed, and if combustible it needs to be fixed or replaced.

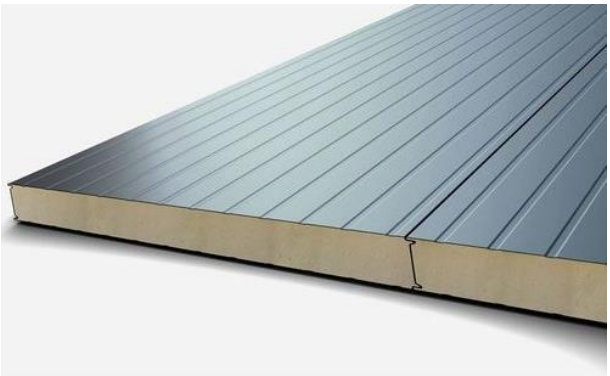
PUR (polyurethane)

It is much more difficult to tell PIR and PUR insulation apart. Pre- 2003 is likely to be PUR.

Orange or dark yellow in colour, is crunchy when pressed and becomes powdery if rubbed between fingers.

PIR (polyisocyanurate)

PIR is a form of PUR with significantly increased levels of fire retardance added. Many will be LPS 1181 or FM 4880 approved.



Usually paler yellow in colour, again crunchy when pressed and is slightly gritty if rubbed between fingers.

Composite Panel Fires

A typical composite panel fire will result in lots of thick, black, acrid smoke.

If a fire starts within a panel, it can be difficult for the fire service to extinguish, and some foams give off a hydrogen cyanide gas when burning.

Unless the fire service arrives very early on in the life of a composite panel fire, or they think people may be inside or at risk, they will only look to contain the fire, i.e., they will control the fire to the property of origin, to try and prevent spread to surrounding buildings. This often results in the total loss of the burning building.

Most buildings are constructed on structural frames of steel. Steel starts to lose some of its structural integrity at about 400-600°C and fires can often burn at temperatures well in excess of 1,000°C.

As a result of this, the fire service has to be very wary of collapse.