

Insulated roof panels as an alternative material for roofing materials

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Abstract. West Java Province in Indonesia has some cultural village that still survive in modern society today. The use of insulated panels in building construction has risen significantly in recent years, and further material developments are yet to be embraced, due to the demand of using sustainable materials that are also environment friendly. The insulated panel materials could be used as an alternative material for roof and wall, with some benefits such as light weight, applied minimum slope and also environment friendly.

1. Introduction

Building designs are now more complex than they were ten or twenty years ago, and the regulatory requirements have become more demanding. As now more sustainable materials were demanding as the component of building.

These product advantages have direct benefits for building owners. Direct up-front cost benefits include reduced steelwork costs in construction, with larger purlin spacing. Some of these panels offer higher performance in fire and thermal areas. This should translate to savings in fire proofing and insurance, and superior thermal performance will translate to heating, ventilation and air conditioning (HVAC) plant cost savings. Shorter project completion times are possible due to the speed-of-build attribute of insulated panels, and to the fact that they can be installed in harsher weather conditions. Thus a faster return on investment is possible for building owners.

The observation was conducted at private residence in Central Jakarta, that using insulated panels, due to the design of low pitch roof and the demand of sound insulation and heat prevention below the roof.

The use of Panel with IPS technology would provide some advantages such as [1] [2]:

1. The IPS panel are considered light weight
2. The structure to support the panel could be vary from steel, wood, zinc alum
3. Reduce the heat exchange with the outside.
4. More safer, because IPS panel area fire resistant
5. Weather resistance
6. Lower pitch of roof could be achieved
7. Longer span of roof could be achieved
8. Save energy because good insulation allows reducing the use of air conditioning
9. Reduction of CO2 emissions and environmental and atmospheric pollution.
10. Benefits for the environment.
12. The savings in terms of economics.



IPS panels could be used in building that has characteristics as follows [2]:

1. The building with wide span.
2. The construction system used is the frame system.
3. Not too many variants of the existing measures.
4. More sloping needed for roofing pitch requirement

2. Research Methodology

The methodology is a technique to collect and analyze the data. This study use the case study method to take sample of landed house building in Jakarta - Indonesia that uses IPS as building material for the roof, also find out comparisons of using IPS panel compared with conventional materials. The data collecting use observation method; to observe how to install the IPS panel work in the projects, to find out the pros and cons the use the of materials. The data collected from the literature and catalogue, will be analyzed and discussed.

3. Results and Discussion

The method of installation insulated panel almost the same as installing the other roof sheet materials. The supporting structure system could be made from steel or light weight system (zinc alum) depends on the span of the roof. User also had to prepare the location for storage the IPS panels, since they will come in one piece accordingly to the span we had already measured, without any joint.

The panels already come in sheets forms accordingly to the size required, all we need to prepare the space to put the panels and give protection to the panels.

The steps are as follows:

1. Made the roof support before installing the panel. Make sure the distance between panels supports maximum 120cm, (in the project user made it 90cm span). Made roof support from IWF and C shaped steel with the span of each support approximately between 250cm to 275cm. The slope could be adjustable until only 3°.



Figure 1. Installation of the roof support.

2. Measured the size of panels accordingly to roof support and the span of building.
3. Install the panels.
4. Fill the gap below the panel, to avoid insect and small animals coming in.
5. Apply the membrane waterproofing system on site (welded system).
6. Check the jointing area and applied silicone to prevent leakage.
7. Cover the joint with the membrane provided to make sure no leakage.
8. Clean all the surface area.

In short we could figure the steps as follows (see figure 3).



Figure 2. Installation of the insulation panels on project.

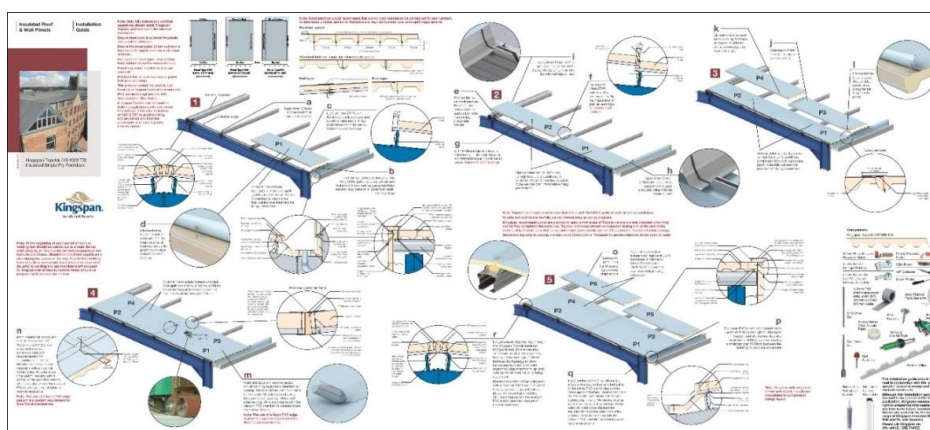


Figure 3. The steps of installation panels.

Source: Kingspan roof panel system.

Table 1. The Benefit using insulated roof panels compared to metal roof sheet.

	Insulated panel	Metal roof panel
Light weight	vary from 5,5 kg/m ² to 14,2 kg/m ²	vary from 10 kg/m ² to 15 kg/m ²
Sound insulation	don't need additional insulation material	need additional insulation material
Fire resistant	don't need additional insulation material	need additional insulation material
Heat resistance	don't need additional insulation material	need additional insulation material
Looks / aesthetic	could be in different colour	standar zinc alum colour
Roof pitch	could be until 2'	minimum requirement 5'
Rust prevention	don't need	in certain areas, still needed
Jointing	don't need	in certain areas, still needed

4. Conclusion

By using new materials for roofing such as insulated panels, would give user gain in terms of time, sound insulation, weather resistance, heat exchange problems, and leakage problems. User also could get the looks of clean roof and low sloping roof, without worrying about leakage. The building inside also will become cooler due the thermal insulation material which already included below the material itself.

References

- [1] Kingspan KS1000 technical installation guide, <http://kingspans.com/product>
- [2] BRD sandwich panels system installation guide, <http://BRD.com/product-guide>
- [3] Project conducted by Kingspan panels roofing system
- [4] Smith R E 2011 *Prefab Architecture: A Guide to Modular Design and Construction* (John Wiley and Sons)
- [5] Taha N 2011 *Building Today for Tomorrow*, <http://www.cavcon.com>
- [6] Shields J 2011 *The Disadvantages of Structural Insulated Panels*, <http://www.ehow.com>