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STUDY OF ROOF AND CEILING SURFACE TEMPERATURES IN COASTAL AREA (CASE STUDY: PASAR BENGKULU VILLAGE)

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Introduction

1. The roof, as the main component of the building envelope, is exposed to nearly **50-60% of solar radiation**.

2. The **transfer of solar heat** distributed from the roof influences the increase in building temperature so that it becomes the **largest source of room heat.**

3. **A cool roof** contributes to increasing solar reflection so it can **help reduce the outside air temperature.**

4. The Pasar Bengkulu Village settlement is on the coast of Bengkulu City, which is **100 m from the beach and at an altitude of 20 m** above sea level, representing a settlement in the coastal area. **Most houses use tin, metal, and asbestos.**

Method

Sample number	Roof area	Roofing material
House number 5 (Sofyan's house)	102 meter square	Tin roof
House number 9 (Aan's house)	92 meter square	Tin roof
House number 15 (Kamaludin's house)	270 meter square	Metal roof

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Method

1. The surface temperature measurements in this study were conducted **from 25 to 27 September 2023** before being coated with solar reflective roof paint **from 06:00 to 18:00**

2. **15 to 17 October 2023** after being coated with solar reflective roof paint from **06:00 to 18:00.**

3. The measurement points at houses number 5,9 and 15 **used Elitech RC attached to the roof and ceiling surface** of the house for 12 hours per day

Result and Discussion

Data of roof surface temperature measurement

Period	Sample	Roof surface temperature (°C)		
		Mean	Max	Min
Pre-coated	Sofyan's house	38.3	55.4	21.8
	Aan's house	39.3	55.6	21.5
	Kamaludin's house	38.6	55.7	21.5
Post-coated	Sofyan's house	35.8	51.7	22.9
	Aan's house	36.3	51.7	23.2
	Kamaludin's house	29.5	47.1	23.0

There was an average decrease in roof surface temperature of 4.86°C (see table 2.)

Data of ceiling surface temperature measurement

Period	Sample	Ceiling surface temperature (°C)		
		Mean	Max	Min
Pre-coated	Sofyan's house	31.3	56.2	22.2
	Aan's house	28.2	34.6	24.2
	Kamaludin's house	29.2	34.2	25.7
Post-coated	Sofyan's house	28.0	42.2	23.2
	Aan's house	27.8	32.7	25.1
	Kamaludin's house	27.7	31.1	25.4

There was an average decrease in ceiling surface temperature of 1.73°C (see table 3.)

Conclusion

1. Building roofs that use **galvalum metal material have the most significant reduction** in roof surface temperature, **namely 9.1°C.**

2. Buildings **without ceilings have the most significant reduction in surface temperature** under the roof, namely 3.3°C compared to buildings that use ceilings made of plywood and polyvinyl chloride (PVC).

3. The measurement data shows that buildings that **do not use ceilings have a more significant decrease in temperature under the roof than those with ceilings.** This is because the distance from the floor to the roof is higher. After all, the space is higher.

4. However, residential **room ceilings that use PVC material also experience a decrease in ceiling temperature of 1.5°C.** This is because PVC has a conductivity value of k=0.090 W/mK, and the resistance. Materials that have low conductivity and transmittance values are suitable ceiling materials for air conditioning.

Reference

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