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SUBJECT

Measurement of Solar Reflectance, Emittance and Calculation of Solar Reflectance Index (SRI)

CLIENT

PT Citra Megah Selecomindo
Indonesia

Attention: Mr Rahmat Rahardja Ong

SAMPLE SUBMISSION DATE

8 June 2012

DESCRIPTION OF SAMPLE

1 sample named as "Reflecto" was received.

DATE OF ANALYSIS

14 June 2012

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METHODS OF TEST

The tests and calculation refers to the following three standards:
1) ASTM C 1549 - 09 – Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.

The sample surface is illuminated diffusely by a tungsten-halogen lamp source and the reflected energy is measured at the specified incidence angle. A solar measurement spectrum is achieved by monitoring the reflected energy with four detectors that cover different wavelength ranges in the solar spectrum. Two additional virtual detectors are added by reading two of the detectors at a second lamp color temperature. A weighted sum of the six detector readings produces a value of solar reflectance. The reflectometer is calibrated using specimens of known solar reflectance.

2) ASTM C 1371 - 04a – Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using a Portable Emissonmeters.

In this test method, a differential thermopile emissometer is used to measure the total hemispherical emittance. The detector portion of the device is heated to 82^{o}C (180^{o}F) so that the sample to be measured does not have to be heated. The detector is designed to have a voltage output that is linear with emittance. The emittance of an unknown surface is measured after the detector has been calibrated with a standard of known emittance, which is maintained at the same temperature as the unknown sample.

3) ASTM E 1980 - 01 – Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

The steady-state Surface Temperature (T_s) under the sun is strongly correlated to solar reflectivity and thermal emissivity of the surface. This standard covers the calculation of the Surface Temperature and Solar Reflectance Index (SRI) after solar reflectivity and thermal emissivity of the surface are measured. The procedure defines a SRI that measures the relative T_s of a surface with respect to the standard white (SRI = 100) and standard black (SRI = 0) under the standard solar and ambient conditions. Three convective coefficients of 5, 12 and 30 $W.m^{-2}.K^{-1}$ are used for the calculation, corresponding to low-wind (0 to 2 ms^{-1}), medium-wind (2 to 6 ms^{-1}) and high-wind (6 to 10 ms^{-1}) conditions, respectively.

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RESULTS

Table 1 Solar reflectance of samples under the air mass 1.5.

Sample Names	Measurement 1	Measurement 2	Measurement 3	Average	Standard Deviation
Reflecto	83.6%	83.1%	83.5%	83.4%	0.26%

Environment temperature of test: 24.2°C
Relative humidity of test: 65 %

Table 2 Emittance values of samples.

Sample Names	Measurement 1	Measurement 2	Measurement 3	Average	Standard Deviation
Reflecto	0.90	0.91	0.92	0.91	0.01

Environment temperature of test: 24.2°C
Relative humidity of test: 65 %

Table 3 Calculated surface temperature (T_s) under different wind conditions.

Sample Name	Surface Temperature (K)		
	Low-wind	Medium-wind	High-wind
Reflecto	319.5	316.1	312.9

Table 4 Calculated Solar Reflectance Index (SRI) under different wind conditions.

Sample Name	Solar Reflectance Index (SRI)		
	Low-wind	Medium-wind	High-wind
Reflecto	104.24	104.30	104.36

Solar Reflectance and Emittance of the sample was about 83.4% and 0.91, respectively, with Solar Reflectance Index in the range of 104.24-104.36.

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TECHNICAL EXECUTIVE

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July 2011