

## Measuring functional glass according to the Japanese Industrial Standard: “Testing method on transmittance, reflectance and emittance of flat glasses and evaluation of solar heat gain coefficient (JIS R3106)” using UV-Vis/NIR spectrophotometer

### Introduction

Recently heat shield glass has received attention as architectural eco-friendly materials from a point of view of preventing global warming or energy saving.

Regarding the flat glasses, testing methods which are transmittance/reflectance of visible light and transmittance/reflectance/absorbance/emittance of thermal radiation at ordinary temperature and solar heat gain coefficient of solar radiation are stipulated in the JIS R3106, and the testing methods are used for evaluating heat shield glass.

In this experiment, an example will be shown by measuring transmittance/reflectance spectra of the heat shield glass and by calculating solar radiation transmittance/solar radiation reflectance/solar radiation absorbance/visible light transmittance/visible light reflectance which are stipulated in the JIS R3106.

**Keywords:** Eco-friendly materials, Heat shield glass, Solar radiation transmittance, Solar radiation reflectance, JIS

### Measurement system

V-670	UV-Vis/NIR Spectrophotometer
ISN-723	Integrating sphere unit
VWST-774	Solar Transmittance/Reflectance
	Visible Light Transmittance/Reflectance program



### Results

#### 1. Spectra

Spectra of both heat shield glass and conventional glass were measured in accordance with the following condition.

[Measurement condition]

Measurement range:	2500 - 300 nm	Data pitch:	0.5 nm
UV/Vis bandwidth:	5.0 nm	NIR bandwidth:	20.0 nm
Response:	Fast	Scan speed	400 nm/min
Correction:	Baseline		

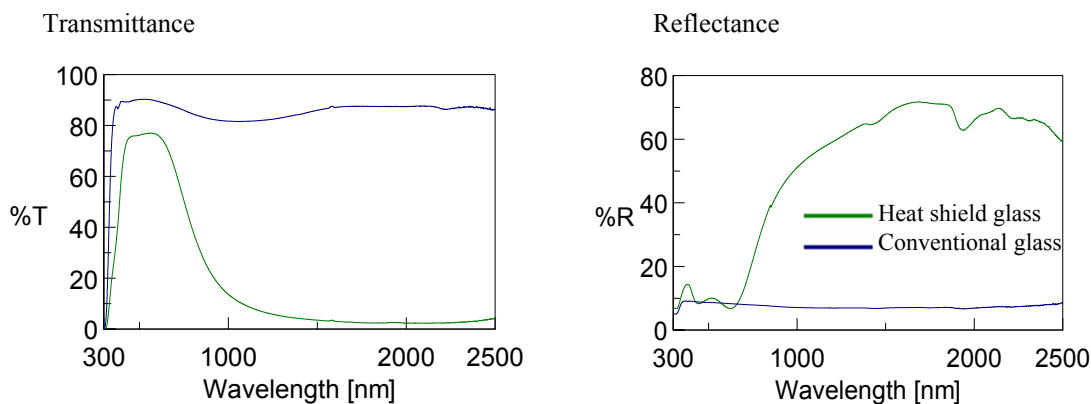


Fig. 2 Transmittance/reflectance spectra of heat shield glass and conventional glass

## 2. Calculation results of solar radiation transmittance/solar radiation reflectance

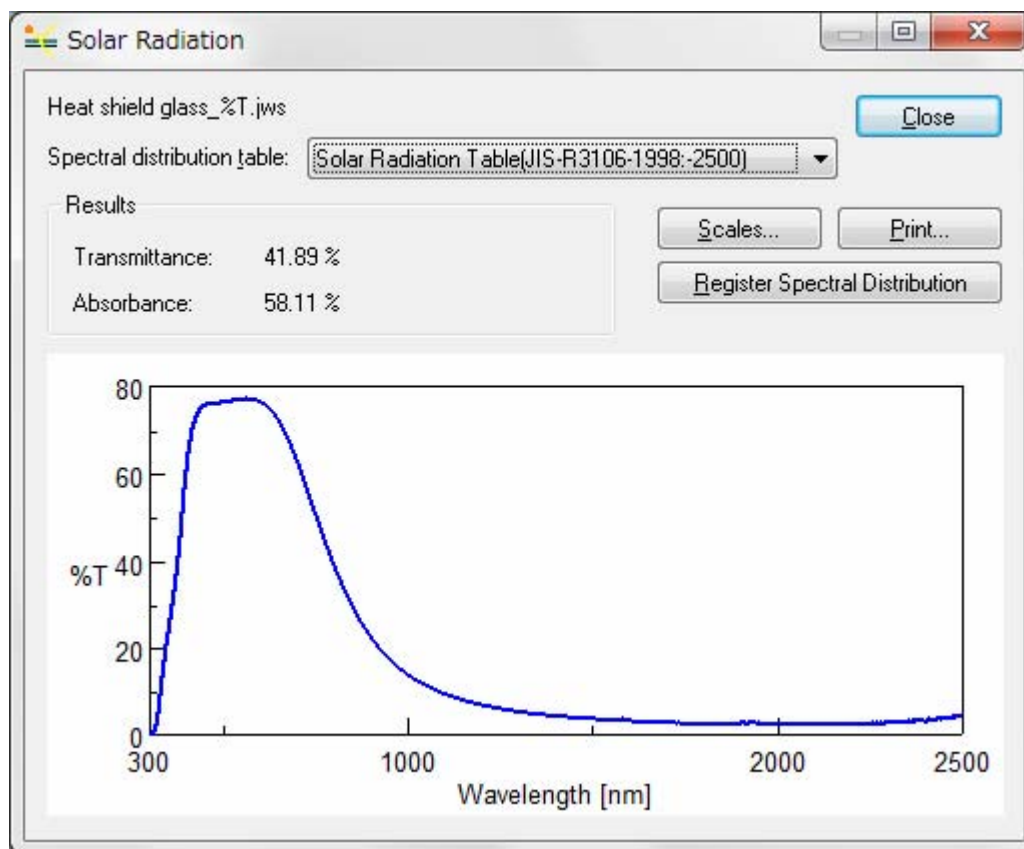


Fig. 3 [Solar Transmittance/Reflectance Visible Light Transmittance/Reflectance] program

Solar transmittance/solar reflectance, visible light transmittance/visible light reflectance of both heat shield glass and conventional glass were calculated using [Solar Transmittance/Reflectance Visible Light Transmittance/Reflectance] program based on JIS R3106, and solar radiation absorbance was calculated by using the calculation results.

Table 1 Comparing Solar radiation transmittance/reflectance/absorbance with Visible light transmittance/reflectance

	Heat shield glass	Conventional glass
Solar radiation transmittance	41.89%	86.10%
Solar radiation reflectance	31.85%	7.82%
Solar radiation absorbance	26.26%	6.08%
Visible light transmittance	76.38%	89.95%
Visible light reflectance	8.80%	8.52%

### Summary

Evaluating heat shield glass in accordance with JIS R3106 can be performed using UV/Vis-NIR spectrophotometer and [Solar Transmittance/Reflectance Visible Light Transmittance/Reflectance] program. Comprehensive evaluation is also possible by combining IR spectrometer with [IR Reflectance/Emittance calculation program] which is in compliance with JIS R3106.