○ General overview

Target verification technology / verification applicant	ECOLUX 70 / Saint-Gobain KK
Verification organization	Japan Testing Center for Construction Materials
Verification test period	September 17, 2013 to February 17, 2014

1. Overview of the target verification technology

A technology for attaching sunshade adhesive films to existing windowpanes

*For information about the characteristics and other factors of the technology, see 4, "Reference information (overview version, on page 9)."

2. Overview of the verification test

2.1 Efficiency to reduce air conditioning and other loads

We measured the thermooptic efficiency of sunshade adhesive films for glazing, and based on the findings, we numerically calculated the effects (such as the effect to reduce air conditioning load) achieved after attaching sunshade adhesive films for glazing to all windows on the indoor side of the target building under the conditions specified below.

2.1.1 Set conditions in numerical calculations

(1) Target building

1) The living/dining (LD) space on the first floor of a housing (detached wooden) model
Target floor area: 20.49 m^2; window area: 6.62 m^2; floor height: 2.7 m; construction: wooden]

2) The southern part of the clerical office of the office model
[Target floor area: 115.29 m^2; window area: 37.44 m^2; floor height: 3.6 m; construction: RC construction]

Note: No consideration is given to the shelter of sunlight due to the effects of surrounding buildings or structures.

For details of the target building, see 4.2.2 (1) 1) “Target building” in the full version of main text. (See page 15 of the full version of main text.)

(2) Operating atmospheric data

Standard year for extended AMeDAS meteorological data (1991-2000) (Tokyo and Osaka Prefecture)

(3) Setting air-conditioning equipment

Building	Temperature setting (°C)		Operating hours	Cooling COP	Heating COP
	Cooling	Heating			
Housing	26.6	21.0	6:00-9:00, 12:00-14:00, 16:00-22:00	4.67	5.14
Office	28.0	20.0	7:00-21:00 on weekdays	3.55	3.90

(4) Setting the unit prices of electric energy charges

Region	Building	Standard contractual category	Unit price of electric energy charges (yen/kWh)	
			Summer	Other season
Tokyo	Housing	Meter rate lighting B	25.19	
	Office	Industrial power	16.65	15.55
Osaka	Housing	Meter rate lighting A	26.51	
	Office	High-voltage power AS	14.83	13.81

2.2 Efficiency of environmental load and maintenance

We performed a 1,000-hour accelerated weather resistance performance test using a weather resistance tester. After the test, we measured the thermooptic efficiency, and demonstrated the changes in measurements before and after the weather resistance test.

3. Verification test results

3.1 Efficiency to reduce air conditioning and other loads and efficiency of environmental load and maintenance

(1) Test results of thermooptic efficiency and efficiency of environmental load and maintenance

[Verification items]

Board thickness	Item		Before weather resistance test	After weather resistance test
3 mm	Sheltering coefficient	(–)	0.59	0.59
	Heat transmission coefficient	(W/m^2•K)	3.8	3.8

[Measurement items] (reference)

Board thickness	Item		Before weather resistance test	After weather resistance test
3 mm	Visible ray transmittivity	(%)	69.6	68.3
	Solar transmission factor	(%)	46.0	45.2
	Solar reflectance	(%)	25.0	24.9

[Reference items]

Board thickness	Item		Before weather resistance test	After weather resistance test
8 mm	Sheltering coefficient	(–)	0.58	-
	Heat transmission coefficient	(W/m^2•K)	3.7	-
	Visible ray transmittivity	(%)	68.2	-
	Solar transmission factor	(%)	43.5	-
	Solar reflectance	(%)	20.5	-

(2) Spectral transmission factor and spectral reflectance characteristics (wavelength range: 300 nm to 2,500 nm)

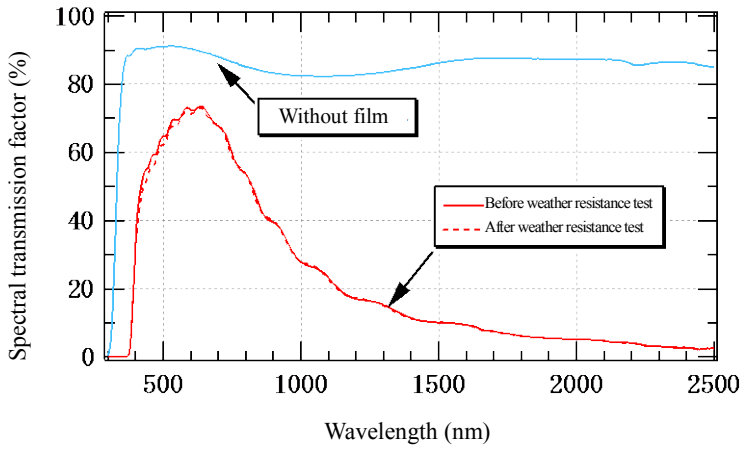

Figure 1 Measurement results of spectral transmission factor (board: float glass plate 3-mm thick)

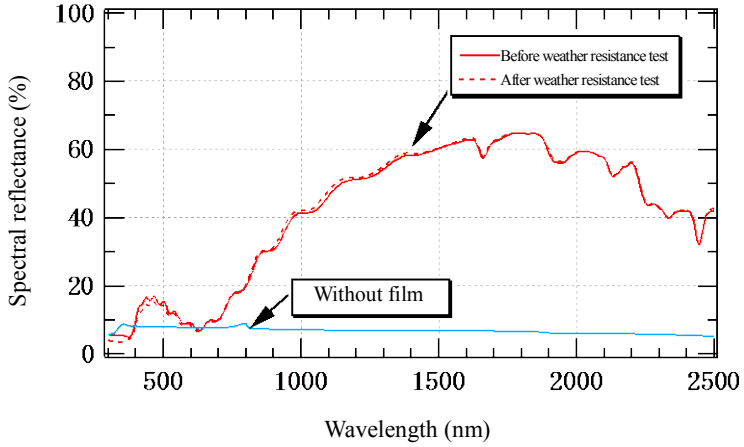

Figure 2 Measurement results of spectral reflectance (board: float glass plate 3-mm thick)

[Reference information: wavelength range and definition*]
Ultraviolet region: 300-380 nm; visible light region: 380-780 nm; sunlight region: 300-2,500 nm
*Based on JIS A 5759

3.2 Verification items to be numerically calculated

(1) Calculation results of verification items

[Calculable region: Living/dining (LD) space (housing), southern part of the clerical office (office)

Control: before film attachment

		Tokyo		Osaka	
		Housing (detached wooden construction)	Office	Housing (detached wooden construction)	Office
Effect to reduce air conditioning load[*1] (1 month in summer)	Calorific value	92 kWh/month (513 kWh/month → 421 kWh/month)	222 kWh/month (1,866 kWh/month → 1,644 kWh/month)	106 kWh/month (626 kWh/month → 520 kWh/month)	287 kWh/month (2,209 kWh/month → 1,922 kWh/month)
		Reduction of 17.9%	Reduction of 11.9%	Reduction of 16.9%	Reduction of 13.0%
	Power rate	Reduction of 496 yen	Reduction of 1,041 yen	Reduction of 602 yen	Reduction of 1,199 yen
Effect to reduce air conditioning load[*1] (June to September in summer)	Calorific value	289 kWh/4 months (1,468 kWh/4 months → 1,179 kWh/4 months)	462 kWh/4 months (5,071 kWh/4 months → 4,609kWh/4 months)	343 kWh/4months (1,839 kWh/4 months → 1,496 kWh/4 months)	717 kWh/4months (6,440 kWh/4 months → 5,723 kWh/4 months)
		Reduction of 19.7%	Reduction of 9.1%	Reduction of 18.7%	Reduction of 11.1%
	Power rate	Reduction of 1,559 yen	Reduction of 2,169 yen	Reduction of 1,948 yen	Reduction of 2,983 yen
Effect to control rising room temperature[*2] (15:00 in summer)	Natural room temperature[*3]	2.7°C (42.1°C → 39.4°C)	-2.6°C (49.2°C → 51.8°C)	2.8°C (40.6°C → 37.8°C)	-3.3°C (50.2°C → 53.5°C)
	Effective temperature[*4]	2.9°C (42.6°C → 39.7°C)	-2.6°C (49.2°C → 51.8°C)	3.2°C (41.3°C → 38.1°C)	-3.2°C (50.3°C → 53.5°C)

*1: Effect to reduce air conditioning load after activating cooling when the indoor temperature rises above the cooling temperature setting in one summer month (August) and in summer (June to September)

*2: Effect of controlling rises in room temperature at the target region at 3 p.m. on a weekday in August when the total amount of direct solar radiation is highest (August 10 in Tokyo and August 18 in Osaka)

*3: Room temperature when no cooling is provided

*4: Temperature considering the surface temperature of indoor walls (average of air temperature and indoor wall surface temperature)

Note 1: Numerical calculations are performed on the assumption of a model housing and office and under various preconditions, and thus differ from the actual environment where the technology is introduced.

(2) Calculation results of reference items

1) Calculation results in view of the effects of heating with regard to verification items

[Calculable region: Living/dining (LD) space (housing), southern part of the clerical office (office)]

Control: before film attachment

		Tokyo		Osaka	
		Housing (detached wooden construction)	Office	Housing (detached wooden construction)	Office
Effect to reduce heating system load*1 (1 month in winter)	Calorific value	-1 kWh/month (293 kWh/month → 294 kWh/month)	52 kWh/month (166 kWh/month → 114 kWh/month)	9 kWh/month (398 kWh/month → 389 kWh/month)	145 kWh/month (469 kWh/month → 324 kWh/month)
		Reduction of -0.3%	Reduction of 31.3%	Reduction of 2.3%	Reduction of 30.9%
	Power rate	Reduction of -5 yen	Reduction of 207 yen	Reduction of 47 yen	Reduction of 514 yen
Effect to reduce air conditioning and heating system load*2 (air-conditioning for a limited period)	Calorific value	361 kWh/year (2,901 kWh/year → 2,540 kWh/year)	727 kWh/year (5,776 kWh/year → 5,049 kWh/year)	413 kWh/year (3,389 kWh/year → 2,976 kWh/year)	1,119 kWh/year (7,582kWh/year → 6,463 kWh/year)
		Reduction of 12.4%	Reduction of 12.6%	Reduction of 12.2%	Reduction of 14.8%
	Power rate	Reduction of 1,912 yen	Reduction of 3,224 yen	Reduction of 2,309 yen	Reduction of 4,407yen

*1: Effect to reduce heating system load after activating heating when the indoor temperature drops below the heating temperature setting in one winter month (February)

*2: Effect to reduce air conditioning and heating system load after activating cooling when the indoor temperature rises above the cooling temperature setting in summer (June to September), and after activating heating when the indoor temperature drops below the heating temperature setting in winter (November to April)

Note 1: Numerical calculations are performed on the assumption of a model housing and office and under various preconditions, and thus differ from the actual environment where the technology is introduced.

2) Calculation results in view of the effects of cooling and heating throughout the year
[Calculable region: Living/dining (LD) space (housing), southern part of the clerical office (office)]
Control: before film attachment

		Tokyo		Osaka	
		Housing (detached wooden construction)	Office	Housing (detached wooden construction)	Office
Effect to reduce air conditioning load*1 (yearly air-conditioning)	Calorific value	528 kWh/year (1,933 kWh/year → 1,405 kWh/year)	602 kWh/year (6,616 kWh/year → 6,014 kWh/year)	551 kWh/year (2,256 kWh/year → 1,705 kWh/year)	781 kWh/year (7,796 kWh/year → 7,015 kWh/year)
		Reduction of 27.3%	Reduction of 9.1%	Reduction of 24.4%	Reduction of 10.0%
	Power rate	Reduction of 2,847 yen	Reduction of 2,783 yen	Reduction of 3,129 yen	Reduction of 3,232 yen
Effect to reduce heating system load*2 (yearly air-conditioning)	Calorific value	81 kWh/year (1,461 kWh/year → 1,380 kWh/year)	265 kWh/year (705 kWh/year → 440 kWh/year)	77 kWh/year (1,571 kWh/year → 1,494 kWh/year)	402 kWh/year (1,142 kWh/year → 740 kWh/year)
		Reduction of 5.5%	Reduction of 37.6%	Reduction of 4.9%	Reduction of 35.2%
	Power rate	Reduction of 397 yen	Reduction of 1,055 yen	Reduction of 398 yen	Reduction of 1,424 yen
Effect to reduce air conditioning and heating system load*3 (yearly air-conditioning)	Calorific value	609 kWh/year (3,394 kWh/year → 2,785 kWh/year)	867 kWh/year (7,321 kWh/year → 6,454 kWh/year)	628 kWh/year (3,827 kWh/year → 3,199 kWh/year)	1,183 kWh/year (8,938 kWh/year → 7,755 kWh/year)
		Reduction of 17.9%	Reduction of 11.8%	Reduction of 16.4%	Reduction of 13.2%
	Power rate	Reduction of 3,244 yen	Reduction of 3,838 yen	Reduction of 3,527yen	Reduction of 4,656 yen

*1: Effect to reduce air conditioning load after activating cooling when the indoor temperature rises above the cooling temperature setting at any time of the year

*2: Effect to reduce heating system load after activating heating when the indoor temperature drops below the heating temperature setting at any time of the year

*3: Sum of the yearly cooling load and yearly heating load that decline due to attached sunshade adhesive films for glazing

Note 1: Numerical calculations are performed on the assumption of a model housing and office and under various preconditions, and thus differ from the actual environment where the technology is introduced.

3) Calculation results in view of the effects of cooling and heating throughout the year in an entire building or entire clerical office

[Calculable region: Entire building (housing), entire clerical office on the reference floor (office)]

Control: before film attachment

		Tokyo		Osaka	
		Housing (detached wooden construction)	Office	Housing (detached wooden construction)	Office
Effect to reduce air conditioning load*1 (yearly air-conditioning)	Calorific value	624 kWh/year (2,550 kWh/year → 1,926 kWh/year)	1,719 kWh/year (30,583kWh/year → 28,864 kWh/year)	667 kWh/year (3,078 kWh/year → 2,411 kWh/year)	2,662 kWh/year (36,782 kWh/year → 34,120 kWh/year)
		Reduction of 24.5%	Reduction of 5.6%	Reduction of 21.7%	Reduction of 7.2%
	Power rate	Reduction of 3,365 yen	Reduction of 8,076 yen	Reduction of 3,786yen	Reduction of 11,105 yen
Effect to reduce heating system load*2 (yearly air-conditioning)	Calorific value	13 kWh/year (2,535 kWh/year → 2,522 kWh/year)	2,914 kWh/year (7,583 kWh/year → 4,669 kWh/year)	41 kWh/year (2,690 kWh/year → 2,649 kWh/year)	3,201 kWh/year (8,647 kWh/year → 5,446 kWh/year)
		Reduction of 0.5%	Reduction of 38.4%	Reduction of 1.5%	Reduction of 37.0%
	Power rate	Reduction of 65 yen	Reduction of 11,618yen	Reduction of 211 yen	Reduction of11,335yen
Effect to reduce air conditioning and heating system load*3 (yearly air-conditioning)	Calorific value	637 kWh/year (5,085 kWh/year → 4,448 kWh/year)	4,633 kWh/year (38,166 kWh/year → 33,533 kWh/year)	708 kWh/year (5,768 kWh/year → 5,060 kWh/year)	5,863 kWh/year (45,429 kWh/year → 39,566 kWh/year)
		Reduction of 12.5%	Reduction of 12.1%	Reduction of 12.3%	Reduction of 12.9%
	Power rate	Reduction of 3,430 yen	Reduction of 19,694 yen	Reduction of 3,997 yen	Reduction of 22,440 yen

*1: Effect to reduce air conditioning load after activating cooling when the indoor temperature rises above the cooling temperature setting at any time of the year

*2: Effect to reduce heating system load after activating heating when the indoor temperature drops below the heating temperature setting at any time of the year

*3: Sum of the yearly cooling load and yearly heating load that decline due to attached sunshade adhesive films for glazing

Note 1: Numerical calculations are performed on the assumption of a model housing and office and under various preconditions, and thus differ from the actual environment where the technology is introduced.

(3) Cautions on (1) "calculation results of verification items" and (2) "calculation results of reference items"

1) Numerical calculations are performed under various preconditions on the assumption of a model housing and office. The preconditions may differ from the actual environment where the technology is introduced.
2) To represent the reduction effects of heat loads not only in calorific value units (kWh) but also in terms of the reduction effects (in yen) of power rates, we set COP and energy charge unit prices that represent the cooling and heating capacities (in kW) per kW of power consumption during a rated output run.
3) The operating periods of cooling and heating set in the numerical calculations were as follows:
   - 15:00 in summer: Tokyo: 15:00 on August 10; Osaka: 15:00 on August 18
   - One summer month: August 1-31
   - Summer (June to September): June 1 to September 30
   - One winter month: February 1 to 28
   - Air-conditioning for a limited period: Cooling from June to September and heating from November to April
   - Yearly air-conditioning: One year of cooling and heating[*1]
4) No consideration is given to the rise in heat load arising from the amount of illumination and time stemming from the sunlight sheltered and resulting darkening of the indoor space.
5) The fields of the calorific values of effect to reduce air conditioning and heating system load represent the difference in heat load before and after use of the target verification technology, and the sum of heat load before and after said use, respectively (before use → after use).
6) For power rates, these calculations consider the difference in indoor heat load depending on the presence or absence of sunshade adhesive films for glazing. Therefore, we do not estimate a total amount that entails various assumptions, but only indicate the difference in air-conditioning power rates due to changes in heat load. (For the concepts of calculating power rates, see page 28 of the full version of main text in [Concepts on calculating power rates]).

*1: Cooling will be performed when room temperature is higher than the temperature setting. Heating will be performed when room temperature is lower than the temperature setting.

4. Reference information

The verification applicant has submitted the information specified in (1) "overview of the target technology (reference information)" and (2) "other information from the manufacturer (reference information)" on his or her own responsibility. Therefore, MoE and the verification organization assume no responsibility whatsoever for the contents thereof.

(1) Overview of the target technology (reference information)

Item		To be filled out by the verification applicant		
Verification applicant		Saint-Gobain KK		
Name of the technology-developing company		Saint-Gobain Performance Plastics		
Name of the target product		Ecolux 70		
Model of the target product				
Contact information	Phone	03-5216-7512		
	Fax	03-3263-0286		
	Web address	http://solargard.jp		
	E-mail	Info.solargard.jp@saint-gobain.com		
Characteristics of the technology		・By combining a low-e coating with solar control properties, reject heat from outside in summer and reflects heat back into the room in winter. ・.Low-e technology improves U-value performance which provides increased year round comfort and energy saving.		
Conditions for installation	Corresponding building and its region	Flat window glass. Install on interior of window.		
	Considerations on installation	Use installation tools.		
	Other constraints on the installation location, etc.	Check grass breakage risk when films is installed on wired glass.		
Need for maintenance, weather resistance, product service life, etc.		Gently wipe the entire surface of the film using clean soft cloth with water or mild detergent. Avoid dry wiping or abrasive material.		
Rough estimate of the cost		Design and installation price (with materials and installation)	38,000 yen	per 1 m^2

(2) Other information from the manufacturer (reference information)
