

**REPORT NUMBER:100096065MID-001DR1**  
ORIGINAL ISSUE DATE: May 28, 2010  
REVISED DATE: June 14, 2010

**EVALUATION CENTER**  
Intertek  
8431 Murphy Drive  
Middleton, WI 53562

**RENDERED TO**  
**Well Ling Inte'l Co. Ltd**  
**1F No 15 Alley 3 Lane 88 Huanhe St.**  
**Xizhi City, Taipei County 22154**  
**Taiwan R.O.C**

PRODUCT EVALUATED: 冰冰漆 8000 (White)  
EVALUATION PROPERTY: Solar Reflectance and Emittance

**Report of Testing 冰冰漆 8000 (White) Coatings: ASTM C1549-04  
Determination of Solar Reflectance Index Near Ambient Temperature  
Using a Portable Solar Reflectometer. ASTM C1371-04a Determination of  
Emittance of Materials Near Room Temperature Using Portable  
Emissometers.**

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## **2 Introduction**

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Intertek has conducted testing for Well Ling Inte'l Co. Ltd, on 冰冰漆 8000 (White) Coatings to evaluate the Solar Reflectance and Emittance. Testing was conducted in accordance with ASTM, following the standard methods of ASTM C1549-04, Determination of Solar Reflectance Index Near Ambient Temperature Using a Portable Solar Reflectometer; ASTM C1371-04a Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers. This evaluation began and was completed on May 26, 2010

## **3 Test Samples**

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### **3.1. SAMPLE SELECTION**

Samples were sent to Intertek directly from the client. The samples were received at the Evaluation Center in May 2010 in good condition.

### **3.2. SAMPLE AND ASSEMBLY DESCRIPTION**

The samples were labeled as the following:

1. Coating 8000 (White); Batch 1, 2, and 3

The thickness of the coating was measured according to ASTM D1669 – 2007.

## **4 Testing and Evaluation Methods**

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### **4.1. ASTM C1549-04**

This test method was used to determine the solar reflectance. Each sample that was tested was allowed to remain on the instrument for multiple measurements before the data was recorded. Measurements were taken in multiple places to ensure reproducible results throughout the surface.

A diffuse tungsten halogen lamp was used to illuminate a flat specimen for two seconds out of a ten second measurement cycle. The reflected light was measured at an angle of 20 degrees from the incident angle with four detectors. The software was set to determine the solar radiation through a selected air mass of 1.5.

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**4.2. ASTM C 1371-04a**

This test method was used to determine the emittance of the selected samples. The detector thermopiles were heated in order to provide a necessary temperature difference between the detector and the surface. The differential thermopile consists of one thermopile that was covered with a black coating and one that was covered with a reflective coating. The instrument was calibrated using two standards, one with high emittance and one with low emittance. The calibration standards and the test samples were placed on the flat surface of the heat sink. The measuring head with the thermopiles was placed over top of the specimen that is being measured. The emittance of the samples was quantified by comparison to the emittances of the two calibration standards.

Before the measurements of the samples were taken, the calibration standards with known emittance value were performed on the instrument. Each sample remained under the detector for a minimum of 90 seconds to allow the instrument to stabilize. The data was collected using a millivolt meter. The emittance was calculated using the following equation:

$$\epsilon_{\text{spec}} = V_{\text{spec}} \bullet (\epsilon_{\text{hi}}/V_{\text{hi}})$$

$\epsilon_{\text{hi}}$  = Emittance High Calibration Standard

$V_{\text{hi}}$  = Voltage High Calibration Standard

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## 5 Testing and Evaluation Results

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### 5.1. RESULTS AND OBSERVATIONS

Room Conditions during Testing: 25.4 °C and 41% Relative Humidity

#### Solar Reflectance

Sample	Solar Reflectance: Average-Batch 1	Solar Reflectance: Average-Batch 2	Solar Reflectance: Average-Batch 3	Solar Reflectance: Overall Average
8000 (White)	0.877	0.874	0.877	0.88

#### Emittance

Sample	Emittance: Average-Batch 1	Emittance: Average-Batch 2	Emittance: Average-Batch 3	Emittance: Overall Average
8000 (White)	0.91	0.89	0.89	0.90

#### Coating Thickness

Sample	Coating Thickness: Average-Batch 1 (Mil)	Coating Thickness: Average-Batch 2 (Mil)	Coating Thickness: Average-Batch 3 (Mil)	Coating Thickness: Overall Average (Mil)
8000 (White)	14.7	15.5	14.3	14.8

### 5.2. EXAMINATION OF RESULTS

The results are listed without pass/fail criteria as the standard being used do not contain such requirements.

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## 6 Conclusion

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Intertek has conducted testing for Well Ling Inte'l Co. Ltd, on 冰冰漆 8000 (White) Coatings to evaluate the Solar Reflectance and Emittance. Testing was conducted in accordance with ASTM, following the standard methods of ASTM C1549-04, Determination of Solar Reflectance Index Near Ambient Temperature Using a Portable Solar Reflectometer; ASTM C1371-04a Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

### INTERTEK TESTING SERVICES, NA

Reported by:

Stewart Relyea  
**Team Leader – Hardware/Verification Center**

Reviewed by:



Rhonda Byrne  
**Operations Manager, Intertek Middleton**

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**Taiwan R.O.C**

PRODUCT EVALUATED: 冰冰漆 8109 (Grey)  
EVALUATION PROPERTY: Solar Reflectance and Emittance

**Report of Testing 冰冰漆 8109 (Grey) Coatings: ASTM C1549-04  
Determination of Solar Reflectance Index Near Ambient Temperature  
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## **2 Introduction**

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Intertek has conducted testing for Well Ling Inte'l Co. Ltd, on 冰冰漆 8109 (Grey) Coatings to evaluate the Solar Reflectance and Emittance. Testing was conducted in accordance with ASTM, following the standard methods of ASTM C1549-04, Determination of Solar Reflectance Index Near Ambient Temperature Using a Portable Solar Reflectometer; ASTM C1371-04a Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers. This evaluation began and was completed on May 26, 2010

## **3 Test Samples**

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### **3.1. SAMPLE SELECTION**

Samples were sent to Intertek directly from the client. The samples were received at the Evaluation Center in May 2010 in good condition.

### **3.2. SAMPLE AND ASSEMBLY DESCRIPTION**

The samples were labeled as the following:

1. Coating 8109 (Grey); Batch 1, 2, and 3

The thickness of the coating was measured according to ASTM D1669 – 2007.

## **4 Testing and Evaluation Methods**

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### **4.1. ASTM C1549-04**

This test method was used to determine the solar reflectance. Each sample that was tested was allowed to remain on the instrument for multiple measurements before the data was recorded. Measurements were taken in multiple places to ensure reproducible results throughout the surface.

A diffuse tungsten halogen lamp was used to illuminate a flat specimen for two seconds out of a ten second measurement cycle. The reflected light was measured at an angle of 20 degrees from the incident angle with four detectors. The software was set to determine the solar radiation through a selected air mass of 1.5.

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This test method was used to determine the emittance of the selected samples. The detector thermopiles were heated in order to provide a necessary temperature difference between the detector and the surface. The differential thermopile consists of one thermopile that was covered with a black coating and one that was covered with a reflective coating. The instrument was calibrated using two standards, one with high emittance and one with low emittance. The calibration standards and the test samples were placed on the flat surface of the heat sink. The measuring head with the thermopiles was placed over top of the specimen that is being measured. The emittance of the samples was quantified by comparison to the emittances of the two calibration standards.

Before the measurements of the samples were taken, the calibration standards with known emittance value were performed on the instrument. Each sample remained under the detector for a minimum of 90 seconds to allow the instrument to stabilize. The data was collected using a millivolt meter. The emittance was calculated using the following equation:

$$\epsilon_{\text{spec}} = V_{\text{spec}} \bullet (\epsilon_{\text{hi}}/V_{\text{hi}})$$

$\epsilon_{\text{hi}}$  = Emittance High Calibration Standard

$V_{\text{hi}}$  = Voltage High Calibration Standard

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## 5 Testing and Evaluation Results

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### 5.1. RESULTS AND OBSERVATIONS

Room Conditions during Testing: 25.4 °C and 41% Relative Humidity

#### Solar Reflectance

Sample	Solar Reflectance: Average-Batch 1	Solar Reflectance: Average-Batch 2	Solar Reflectance: Average-Batch 3	Solar Reflectance: Overall Average
8109 (Grey)	0.568	0.566	0.565	0.57

#### Emittance

Sample	Emittance: Average-Batch 1	Emittance: Average-Batch 2	Emittance: Average-Batch 3	Emittance: Overall Average
8109 (Grey)	0.91	0.90	0.89	0.90

#### Coating Thickness

Sample	Coating Thickness: Average-Batch 1 (Mil)	Coating Thickness: Average-Batch 2 (Mil)	Coating Thickness: Average-Batch 3 (Mil)	Coating Thickness: Overall Average (Mil)
8109 (Grey)	15.1	11.7	12.6	13.1

### 5.2. EXAMINATION OF RESULTS

The results are listed without pass/fail criteria as the standard being used do not contain such requirements.

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## 6 Conclusion

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Intertek has conducted testing for Well Ling Inte'l Co. Ltd, on 冰冰漆 8109 (Grey) Coatings to evaluate the Solar Reflectance and Emittance. Testing was conducted in accordance with ASTM, following the standard methods of ASTM C1549-04, Determination of Solar Reflectance Index Near Ambient Temperature Using a Portable Solar Reflectometer; ASTM C1371-04a Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.

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### INTERTEK TESTING SERVICES, NA

Reported by:

Stewart Relyea  
**Team Leader – Hardware/Verification Center**

Reviewed by:



Rhonda Byrne  
**Operations Manager, Intertek Middleton**

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**Xizhi City, Taipei County 22154**  
**Taiwan R.O.C**

PRODUCT EVALUATED: 冰冰漆 8091 (Wheat)  
EVALUATION PROPERTY: Solar Reflectance and Emittance

**Report of Testing 冰冰漆 8091 (Wheat) Coatings: ASTM C1549-04  
Determination of Solar Reflectance Index Near Ambient Temperature  
Using a Portable Solar Reflectometer. ASTM C1371-04a Determination of  
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## **2 Introduction**

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Intertek has conducted testing for Well Ling Inte'l Co. Ltd, on 冰冰漆 8091 (Wheat) Coatings to evaluate the Solar Reflectance and Emittance. Testing was conducted in accordance with ASTM, following the standard methods of ASTM C1549-04, Determination of Solar Reflectance Index Near Ambient Temperature Using a Portable Solar Reflectometer; ASTM C1371-04a Determination of Emittance of Materials Near Room Temperature Using Portable Emisometers. This evaluation began and was completed on May 26, 2010

## **3 Test Samples**

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### **3.1. SAMPLE SELECTION**

Samples were sent to Intertek directly from the client. The samples were received at the Evaluation Center in May 2010 in good condition.

### **3.2. SAMPLE AND ASSEMBLY DESCRIPTION**

The samples were labeled as the following:

1. Coating 8091 (Wheat); Batch 1, 2, and 3

The thickness of the coating was measured according to ASTM D1669 – 2007.

## **4 Testing and Evaluation Methods**

---

### **4.1. ASTM C1549-04**

This test method was used to determine the solar reflectance. Each sample that was tested was allowed to remain on the instrument for multiple measurements before the data was recorded. Measurements were taken in multiple places to ensure reproducible results throughout the surface.

A diffuse tungsten halogen lamp was used to illuminate a flat specimen for two seconds out of a ten second measurement cycle. The reflected light was measured at an angle of 20 degrees from the incident angle with four detectors. The software was set to determine the solar radiation through a selected air mass of 1.5.

---

#### 4.2. **ASTM C 1371-04a**

This test method was used to determine the emittance of the selected samples. The detector thermopiles were heated in order to provide a necessary temperature difference between the detector and the surface. The differential thermopile consists of one thermopile that was covered with a black coating and one that was covered with a reflective coating. The instrument was calibrated using two standards, one with high emittance and one with low emittance. The calibration standards and the test samples were placed on the flat surface of the heat sink. The measuring head with the thermopiles was placed over top of the specimen that is being measured. The emittance of the samples was quantified by comparison to the emittances of the two calibration standards.

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$\epsilon_{\text{hi}}$  = Emittance High Calibration Standard

$V_{\text{hi}}$  = Voltage High Calibration Standard

---

## 5 Testing and Evaluation Results

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### 5.1. RESULTS AND OBSERVATIONS

Room Conditions during Testing: 25.4 °C and 41% Relative Humidity

#### Solar Reflectance

Sample	Solar Reflectance: Average-Batch 1	Solar Reflectance: Average-Batch 2	Solar Reflectance: Average-Batch 3	Solar Reflectance: Overall Average
8091 (Wheat)	0.870	0.868	0.865	0.87

#### Emittance

Sample	Emittance: Average-Batch 1	Emittance: Average-Batch 2	Emittance: Average-Batch 3	Emittance: Overall Average
8091 (Wheat)	0.90	0.89	0.88	0.89

#### Coating Thickness

Sample	Coating Thickness: Average-Batch 1 (Mil)	Coating Thickness: Average-Batch 2 (Mil)	Coating Thickness: Average-Batch 3 (Mil)	Coating Thickness: Overall Average (Mil)
8091 (Wheat)	13.4	16.1	13.1	14.2

### 5.2. EXAMINATION OF RESULTS

The results are listed without pass/fail criteria as the standard being used do not contain such requirements.

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## 6 Conclusion

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Intertek has conducted testing for Well Ling Inte'l Co. Ltd, on 冰冰漆 8091 (Wheat) Coatings to evaluate the Solar Reflectance and Emittance. Testing was conducted in accordance with ASTM, following the standard methods of ASTM C1549-04, Determination of Solar Reflectance Index Near Ambient Temperature Using a Portable Solar Reflectometer; ASTM C1371-04a Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.

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