

May 9, 2008

www.CTLGroup.com

Fax: 847-965-5416

Colby DeHoff
Whitacre-Greer
1400 S. Mahoning Ave
Alliance, OH 44601

phone: 800-947-2837 x233
e-mail: cdehoff@wgpaver.com

**ASTM C 1549 Solar Reflectance of Five Types of Whitacre-Greer Pavers
CTLGroup Project No. 314051**

Dear Colby:

As authorized by you on 2008 May 2, CTLGroup measured the solar reflectance of five types of Whitacre-Greer pavers in accordance with ASTM C 1549-04, *Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

The pavers, shown in Figure 1, were received at CTLGroup on 2008 May 7. Each set of three specimens were labeled by you as follows:

WG 30 01	WG 32 01	WG 33 01	WG 34 01	WG 36 01
WG 30 02	WG 32 02	WG 33 02	WG 34 02	WG 36 02
WG 30 03	WG 32 03	WG 33 03	WG 34 03	WG 36 03

The specimens are rectangular and measure approximately 8 × 4 in. and 2-1/4 in. high. The top surface of each specimen is flat and relatively smooth. The pavers were kept in a temperature- and relative humidity-controlled room (73°F and 50% RH) until they were tested on 2008 May 8.

The solar reflectance of the top surface of each paver was measured in three randomly selected locations, for a total of 9 measurements per set. The air mass on the solar spectrum reflectometer was set to 1.5, which approximates the length a beam of sunlight travels through the atmosphere over the conterminous United States. The measured solar reflectance, average, and standard deviation are reported in the attached data sheets in Appendix A. The measurements are summarized in Figure 2 and Table 1.

The solar reflectance *index* (SRI) was also calculated according to ASTM E 1980-01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces*, assuming an emittance of 0.9, which is appropriate for concrete and brick. The SRI is also shown in Table 1.

If you have any questions, please do not hesitate to call.

Sincerely,



Medgar Marceau, PE (Illinois), CSI, LEED-AP
Building Science Engineer
Building Science and Sustainability

MMarceau@CTLGroup.com
Phone: (847) 972-3154



Figure 1. Pavers labeled WG 30, WG 32, WG 33, WG 34, and WG 36 (left to right) and 01 to 03 (top to bottom).

Table 1. Average Solar Reflectance, Standard Deviation, and Solar Reflectance Index (Rounded)

Paver label	Solar reflectance	Standard deviation	Solar reflectance index (SRI)*
WG 30	0.37	0.007	41
WG 32	0.33	0.004	36
WG 33	0.28	0.004	29
WG 34	0.23	0.006	23
WG 36	0.33	0.008	36

*Assuming an emittance of 0.9, which is appropriate for concrete and brick.

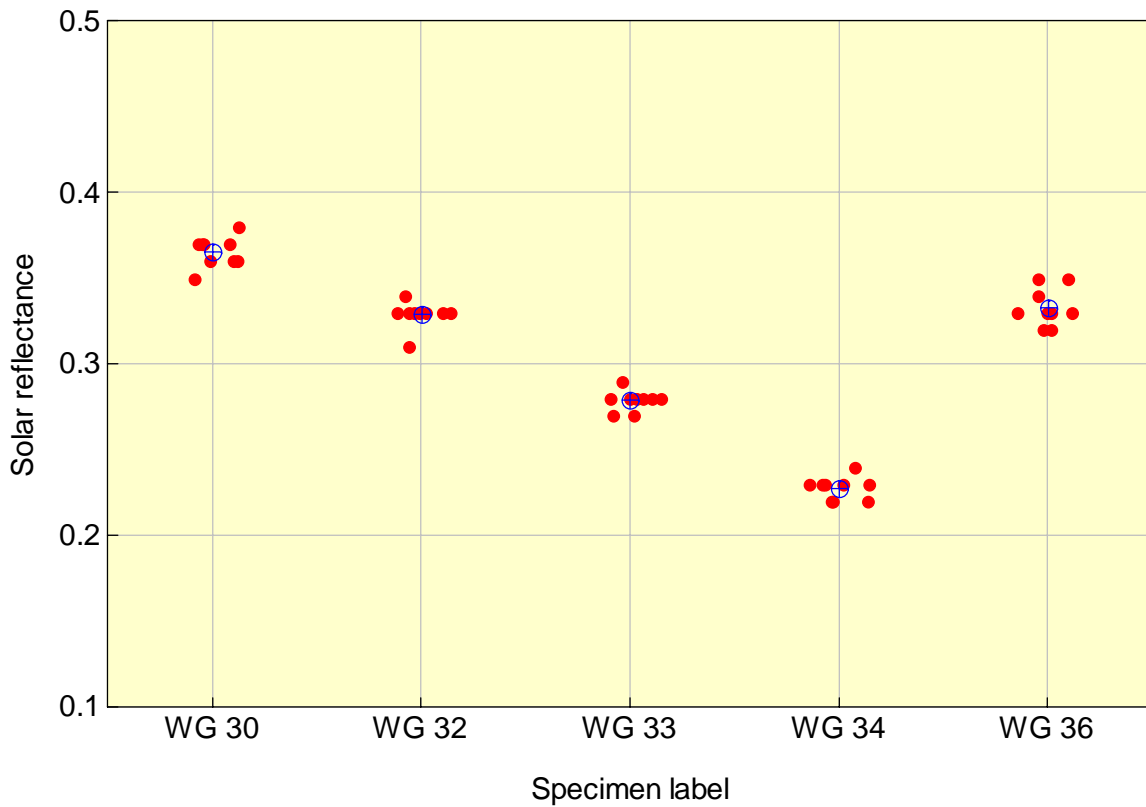


Figure 2. Solar reflectance of five types of Whitacre-Greer pavers was measured according to ASTM C 1549. The solid dot represents one of three measurements per paver, and the circle-and-cross represents the average of nine measurements per type.

APPENDIX A

ASTM C 1549, SOLAR REFLECTANCE NEAR AMBIENT TEMPERATURE USING A PORTABLE SOLAR REFLECTOMETER, DATA SHEETS

Client:	Whitacre-Greer	CTLGroup project no.:	314051
Project:	C1549 Whitacre-Greer Pavers	CTLGroup project mgr.:	M. Marceau
		Analyst:	M. Marceau
Contact:	Colby DeHoff	Approved:	J. Shearer
	800-947-2837 x233	Date tested:	2008 May 8

ASTM C 1549, Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer^{1,2}
WG 30

Specimen	Location	Location reflectance	Specimen reflectance
WG 30 01	1	0.36	0.37
	2	0.37	
	3	0.37	
WG 30 02	1	0.37	0.37
	2	0.38	
	3	0.37	
WG 30 03	1	0.35	0.36
	2	0.36	
	3	0.36	
Standard deviation			0.007
Overall average			0.37
Solar reflectance index (SRI)³ corresponding to convective coefficients of three wind conditions		Low wind	39
		Medium wind	41
		High wind	42

1. Tested in accordance with ASTM C 1549 - 04, *Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

2. Air mass index is 1.5.

3. Solar reflectance index calculated according to ASTM E 1980 - 01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces* with an emittance for concrete or brick of 0.9.

Client:	Whitacre-Greer	CTLGroup project no.:	314051
Project:	C1549 Whitacre-Greer Pavers	CTLGroup project mgr.:	M. Marceau
		Analyst:	M. Marceau
Contact:	Colby DeHoff	Approved:	J. Shearer
	800-947-2837 x233	Date tested:	2008 May 8

ASTM C 1549, Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer^{1,2}
WG 32

Specimen	Location	Location reflectance	Specimen reflectance
WG 32 01	1	0.33	0.33
	2	0.33	
	3	0.33	
WG 32 02	1	0.33	0.33
	2	0.34	
	3	0.33	
WG 32 03	1	0.31	0.32
	2	0.33	
	3	0.33	
Standard deviation			0.004
Overall average			0.33
Solar reflectance index (SRI)³		Low wind	34
corresponding to convective		Medium wind	36
coefficients of three wind conditions		High wind	37

1. Tested in accordance with ASTM C 1549 - 04, *Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

2. Air mass index is 1.5.

3. Solar reflectance index calculated according to ASTM E 1980 - 01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces* with an emittance for concrete or brick of 0.9.

Client:	Whitacre-Greer	CTLGroup project no.:	314051
Project:	C1549 Whitacre-Greer Pavers	CTLGroup project mgr.:	M. Marceau
		Analyst:	M. Marceau
Contact:	Colby DeHoff	Approved:	J. Shearer
	800-947-2837 x233	Date tested:	2008 May 8

ASTM C 1549, Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer^{1,2}
WG 33

Specimen	Location	Location reflectance	Specimen reflectance
WG 33 01	1	0.28	0.28
	2	0.29	
	3	0.28	
WG 33 02	1	0.27	0.27
	2	0.27	
	3	0.28	
WG 33 03	1	0.28	0.28
	2	0.28	
	3	0.28	
Standard deviation			0.004
Overall average			0.28
Solar reflectance index (SRI)³		Low wind	28
corresponding to convective		Medium wind	29
coefficients of three wind conditions		High wind	30

1. Tested in accordance with ASTM C 1549 - 04, *Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

2. Air mass index is 1.5.

3. Solar reflectance index calculated according to ASTM E 1980 - 01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces* with an emittance for concrete or brick of 0.9.

Client: Whitacre-Greer
Project: C1549 Whitacre-Greer Pavers
Contact: Colby DeHoff
800-947-2837 x233

CTLGroup project no.: 314051
CTLGroup project mgr.: M. Marceau
Analyst: M. Marceau
Approved: J. Shearer
Date tested: 2008 May 8

ASTM C 1549, Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer^{1,2}
WG 34

Specimen	Location	Location reflectance	Specimen reflectance
WG 34 01	1	0.23	0.23
	2	0.23	
	3	0.24	
WG 34 02	1	0.22	0.22
	2	0.22	
	3	0.22	
WG 34 03	1	0.23	0.23
	2	0.23	
	3	0.23	
Standard deviation			0.006
Overall average			0.23
Solar reflectance index (SRI)³ corresponding to convective coefficients of three wind conditions		Low wind	21
		Medium wind	23
		High wind	24

1. Tested in accordance with ASTM C 1549 - 04, *Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

2. Air mass index is 1.5.

3. Solar reflectance index calculated according to ASTM E 1980 - 01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces* with an emittance for concrete or brick of 0.9.

Client:	Whitacre-Greer	CTLGroup project no.:	314051
Project:	C1549 Whitacre-Greer Pavers	CTLGroup project mgr.:	M. Marceau
		Analyst:	M. Marceau
Contact:	Colby DeHoff	Approved:	J. Shearer
	800-947-2837 x233	Date tested:	2008 May 8

ASTM C 1549, Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer^{1,2}
WG 36

Specimen	Location	Location reflectance	Specimen reflectance
WG 36 01	1	0.33	0.33
	2	0.33	
	3	0.34	
WG 36 02	1	0.35	0.34
	2	0.35	
	3	0.33	
WG 36 03	1	0.32	0.32
	2	0.33	
	3	0.32	
Standard deviation			0.008
Overall average			0.33
Solar reflectance index (SRI)³ corresponding to convective coefficients of three wind conditions		Low wind	34
		Medium wind	36
		High wind	37

1. Tested in accordance with ASTM C 1549 - 04, *Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer*.

2. Air mass index is 1.5.

3. Solar reflectance index calculated according to ASTM E 1980 - 01, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces* with an emittance for concrete or brick of 0.9.