



## Color & Appearance Testing Program

### Summary Report #211 - 1st Qtr 2025

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[About the Color Program, About CTS](#)

[Key to Tables and Graphs \(Color Tests\)](#)

[Key to Tables and Graphs \(Spectro Test\)](#)

[Key to Tables and Graphs \(Gloss Tests\)](#)

<b><u>Analysis</u></b>	<b><u>Analysis Name</u></b>
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<a href="#">408</a>	<a href="#">Color &amp; Color Difference-45-0, D65/10° Observer</a>
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<a href="#">409</a>	<a href="#">Color &amp; Color Difference Sphere, D65/10°Observer</a>
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<a href="#">411</a>	<a href="#">Spectrophotometric - Sphere</a>
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<a href="#">440</a>	<a href="#">Gloss 60 Degree</a>
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## **About The Color & Appearance Program**

The Collaborative Reference Program for Color & Appearance is operated and maintained by Collaborative Testing Services, Inc. (CTS), with technical guidance and advice provided by representatives from various instrument manufacturers. The program allows laboratories to compare periodically the performance of their testing with that of other laboratories.

Paint chip samples, which have been custom-made specifically for Collaborative Testing Services by Munsell Color, X-Rite Inc., Grand Rapids, MI, are distributed four times per year to participating laboratories. Gloss participants test two pairs of paint chip samples at different gloss levels, approximately 5-10 units apart. Color & Color Difference participants measure a set of two opaque color paint chips, selected from throughout the full color spectrum, consisting of a nonmetameric match with small color differences. These data are analyzed in two separate tables based on the conditions of measurement used. Laboratories that also participate in the Spectrophotometric analyses measure one of the opaque color chips for % reflectance at 16 wavelengths.

Please refer to each test's 'Key' for definitions of terms used in the tables and graphs and guidelines to interpreting the results. Also shown are notes concerning specific laboratory results, as well as significant findings related to instrument types or other testing variations.

### **ABOUT CTS**

Founded in 1971, Collaborative Testing Services, Inc. (CTS) is a privately - owned company that specializes in interlaboratory tests for a variety of industries including color, rubber, plastics, fasteners and metals, containerboard, paper, agriculture, hemp, and wine, as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality assurance objectives. Labs from the U.S., as well as more than 100 countries, currently participate in the CTS programs.

For further information concerning this report contact:

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## Key for Color Program Web Summary Report

<b>WebCode</b>	Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Color Report published on the CTS web site. The Web Code for each analysis can be found in the Performance Analysis Report emailed to each participant.
<b>Lab Mean</b>	The average of the 2 test results obtained by the participant for CIE L*,a*,b* color space values.
<b>Grand Mean</b>	The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.
<b>Between-Lab Standard Deviation</b>	An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).
<b>Comparative Performance Value</b>	An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.
<b>Graphs</b>	For each laboratory, the LAB MEAN for the first sample is plotted against the LAB MEAN for the second sample with each point representing a laboratory. The horizontal and vertical axes are the GRAND MEANS for each sample. For each test there are three plots: L* <sub>2</sub> vs L* <sub>1</sub> , a* <sub>2</sub> vs a* <sub>1</sub> and b* <sub>2</sub> vs b* <sub>1</sub> . The a* and b* plots are created using absolute values.
<b>Inst Code</b>	A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).
<b>Data Flag</b>	DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

<u>DATA FLAG</u>	<u>STATISTICALLY INCLUDED/EXCLUDED</u>	<u>ACTION REQUIRED</u>
*	INCLUDED	<b>CAUTION</b> - review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.
X	EXCLUDED	<b>STOP</b> - immediate review of data and/or testing procedure is required. Results fall outside the 99% ellipse and one or more CPV are greater than critical value. See specific notes following each table for more information on why the data is excluded. It is also possible to have an "X" for individual color coordinate (L*, a* or b*) without overall "X" flag. It means that results fall outside the 99% ellipse for particular coordinate but have no CPV flags. Those results will not require any action.
M	EXCLUDED	<b>PROCEED</b> - lab was unable to report data for at least one sample. However, a lab receiving two of more M flags for a test may need to stop and review its testing procedures.

## Key for Spectrophotometric Web Summary Report

<b>WebCode</b>	Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Color Report published on the CTS web site. The Web Code for each analysis can be found in the Performance Analysis Report emailed to each participant.
<b>Grand Mean</b>	The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.
<b>Between-Lab Standard Deviation</b>	An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).
<b>Inst Code</b>	A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).
<b>Data Flag</b>	DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

<u>DATA FLAG</u>	<u>STATISTICALLY INCLUDED/EXCLUDED</u>	<u>ACTION REQUIRED</u>
X	EXCLUDED	<b>STOP</b> - immediate review of data and/or testing procedure is required. See specific notes following each table for more information on why the data is excluded.

In addition to the DATA FLAG column, it is also possible to have a flag on individual wavelength values as follows:

*	The laboratory's mean for that wavelength deviates from the GRAND MEAN by more than two BETWEEN-LAB STANDARD DEVIATIONS.
X	The laboratory's mean for that wavelength deviates from the GRAND MEAN by more than the critical limit determined by a 99.5% confidence interval.

## Key for Gloss Web Summary Report

**WebCode** Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Color Report published on the CTS web site. The Web Code for each analysis can be found in the Performance Analysis Report emailed to each participant.

**Lab Mean** The average of the test results obtained by the participant.

**Grand Mean** The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.

**Difference from Grand Mean** The difference of the LAB MEAN from the GRAND MEAN.

**Between-Lab Standard Deviation** An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).

**Comparative Performance Value** An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.

**Inst Code** A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).

**Graphs** For each laboratory, the LAB MEAN for the first sample (x-axis) is plotted against the LAB MEAN for the second sample (y-axis) with each point representing a laboratory. The horizontal and vertical cross-hairs are the GRAND MEANS for each sample. When 20 or more laboratories are in the statistics, an ellipse is also drawn so that 95% of the time a randomly selected laboratory will be included inside the ellipse. Plotted data flags are explained above.

**Data Flag** DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

<u>DATA FLAG</u>	<u>STATISTICALLY INCLUDED/EXCLUDED</u>	<u>ACTION REQUIRED</u>
*	INCLUDED	<b>CAUTION</b> - review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.
X	EXCLUDED	<b>STOP</b> - immediate review of data and/or testing procedure is required. Results fall outside the 99% ellipse. See specific notes following each table for more information on why the data is excluded.
M	EXCLUDED	<b>PROCEED</b> - lab was unable to report data for at least one sample. However, a lab receiving two of more M flags for a test may need to stop and review its testing procedures.



**CTS Interlaboratory Testing Program for Color & Appearance**    **Report #211**  
**Analysis 408**    **1st Qtr 2025**

**Color and Color Difference - Paint Chips - 45-0 Geometry Instruments**  
**CIE L\*a\*b\* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer**

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
2PGCRD		A251	61.09	10.73	17.03	0.91	-0.31	-0.35	1.03	HL
		A252	62.01	10.42	16.68					
3GDUP7		A251	60.78	10.71	16.77	0.78	-0.30	-0.35	0.90	XW
		A252	61.56	10.41	16.42					
3U3V28		A251	60.52	10.56	16.96	0.95	0.07	0.22	0.97	BG
		A252	61.46	10.62	17.17					
44LHV9		A251	61.03	10.70	17.15	0.89	-0.30	-0.36	1.01	HW
		A252	61.92	10.39	16.78					
4RFAB6		A251	61.16	10.69	16.50	0.88	-0.29	-0.31	0.97	XE
		A252	62.04	10.40	16.19					
6CRTG4		A251	60.34	10.68	16.99	0.89	-0.30	-0.37	1.01	GG
		A252	61.24	10.37	16.63					
77NZ79		A251	60.86	11.04	17.15	0.89	-0.29	-0.35	1.00	GG
		A252	61.75	10.76	16.80					
8PTAF6		A251	60.34	10.80	16.57	0.91	-0.29	-0.32	1.01	XL
		A252	61.25	10.51	16.25					
8VL793		A251	60.66	10.73	17.04	0.90	-0.31	-0.34	1.01	XU
		A252	61.56	10.42	16.70					
9BTHH8		A251	60.13	10.78	17.06	0.89	-0.29	-0.30	0.98	GA
		A252	61.02	10.49	16.77					
9F4VZ6		A251	60.39	10.83	16.69	0.89	-0.30	-0.33	0.99	XV
		A252	61.28	10.54	16.36					
9LRF2Z		A251	60.94	10.70	17.00	0.86	-0.29	-0.36	0.98	HW
		A252	61.80	10.41	16.65					
9X6MXZ		A251	60.52	10.85	17.33	0.95	-0.31	-0.37	1.07	BG
		A252	61.47	10.54	16.96					
A47A9Z		A251	60.80	10.78	16.95	0.76	-0.28	-0.34	0.88	XO
		A252	61.56	10.51	16.60					
AVC4FY		A251	60.88	10.64	17.18	0.91	-0.30	-0.36	1.03	MG
		A252	61.80	10.34	16.82					
AZ9TW7		A251	60.70	10.86	17.04	0.84	-0.34	-0.36	0.97	XU
		A252	61.53	10.52	16.68					



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Color and Color Difference - Paint Chips - 45-0 Geometry Instruments  
 CIE L\*a\*b\* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
BCUAGX		A251	61.25	10.70	17.10	0.95	-0.20	-0.30	1.02	HW
		A252	62.20	10.50	16.80					
BQU992		A251	60.85	10.48	16.52	0.91	-0.30	-0.35	1.01	XQ
		A252	61.75	10.19	16.17					
C4ZLYZ		A251	60.76	10.66	16.39	0.91	-0.31	-0.36	1.03	MS
		A252	61.67	10.35	16.03					
DEVADZ		A251	60.58	10.77	16.61	1.17	-0.27	-0.20	1.22	PR
		A252	61.76	10.50	16.41					
DLX4NV		A251	61.15	10.80	17.20	0.85	-0.30	-0.40	0.99	HW
		A252	62.00	10.50	16.80					
EC6F7X	X	A251	55.47	7.56	13.23	-0.93	0.21	0.14	0.96	HW
		A252	54.54	7.77	13.37					
EER822		A251	60.60	10.80	17.00	0.89	-0.28	-0.33	0.99	XS
		A252	61.49	10.53	16.66					
EUKN7Y	X	A251	59.60	10.97	16.91	1.01	-0.30	-0.34	1.10	HX
		A252	60.61	10.68	16.57					
F3F2QY		A251	61.20	10.71	16.70	1.00	-0.29	-0.30	1.08	XE
		A252	62.20	10.42	16.40					
JYVFW		A251	60.17	10.78	17.09	0.92	-0.33	-0.39	1.05	GG
		A252	61.10	10.45	16.71					
KWCNRQ		A251	60.55	10.82	16.95	0.92	-0.30	-0.37	1.04	MT
		A252	61.47	10.52	16.58					
L3VAGN		A251	61.07	10.67	17.09	0.92	-0.30	-0.37	1.04	GH
		A252	62.00	10.38	16.72					
LWNRYM		A251	61.10	10.75	17.20	0.90	-0.35	-0.30	1.01	HL
		A252	62.00	10.40	16.90					
NDLRZL		A251	60.79	10.58	16.25	0.89	-0.28	-0.33	0.99	XX
		A252	61.68	10.30	15.92					
PCT9HK		A251	60.77	10.82	16.98	0.92	-0.30	-0.34	1.02	HW
		A252	61.69	10.53	16.64					
PDJALM		A251	60.93	10.76	16.91	0.92	-0.30	-0.23	1.00	XM
		A252	61.85	10.46	16.67					



**CTS Interlaboratory Testing Program for Color & Appearance**    **Report #211**  
**Analysis 408**    **1st Qtr 2025**

Color and Color Difference - Paint Chips - 45-0 Geometry Instruments  
 CIE L\*a\*b\* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
QFMQTH		A251	60.38	10.72	16.85	0.94	-0.31	-0.36	1.05	XU
		A252	61.32	10.41	16.49					
QHADJK		A251	61.21	10.77	16.90	0.84	-0.27	-0.38	0.97	XE
		A252	62.05	10.50	16.52					
QU3P2P		A251	61.06	10.90	16.07	0.87	-0.30	-0.31	0.97	XD
		A252	61.92	10.61	15.76					
R7CP8G	X	A251	64.33	9.74	15.89	0.17	0.21	0.20	0.34	XP
		A252	64.50	9.95	16.09					
TXEJLE		A251	61.00	10.70	17.10	0.90	-0.30	-0.35	1.01	HL
		A252	61.90	10.40	16.75					
UG7HWJ		A251	60.67	10.79	16.92	0.92	-0.30	-0.34	1.03	XU
		A252	61.59	10.49	16.58					
VNVK4G		A251	60.30	10.66	16.87	0.88	-0.26	-0.33	0.97	GG
		A252	61.17	10.40	16.54					
Y8ZEPB		A251	60.33	10.58	17.07	0.85	-0.30	-0.34	0.96	HW
		A252	61.18	10.28	16.73					
YB463G		A251	60.58	10.97	17.12	0.94	-0.31	-0.41	1.07	HY
		A252	61.52	10.65	16.71					
ZGQCZF		A251	60.18	10.76	17.05	0.90	-0.32	-0.37	1.02	GG
		A252	61.08	10.44	16.68					

Summary Statistics								
Samples	L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
<b>Grand Means</b>								
A251	60.74	10.75	16.91	0.90	-0.29	-0.33	1.01	
A252	61.63	10.46	16.56					
<b>Std Dev Btwn Labs</b>								
A251	0.33	0.11	0.28	0.06	0.06	0.10	0.05	
A252	0.33	0.11	0.27					

Statistics based on 39 of 42 reporting participants





**Comments Assigned on Data Flags for Test #408**

EC6F7X(X) - Extreme Data. Small Delta L, large Delta a & b.

EUKN7Y(X) - Low L\* values for both samples.

R7CP8G(X) - Extreme data for both L\* & a\* values. Low b\* value for Sample A251. Large replication difference for b\* Sample A252. Small Delta L & E, large Delta a & b.

**Key to Instrument Codes Reported by Participants**

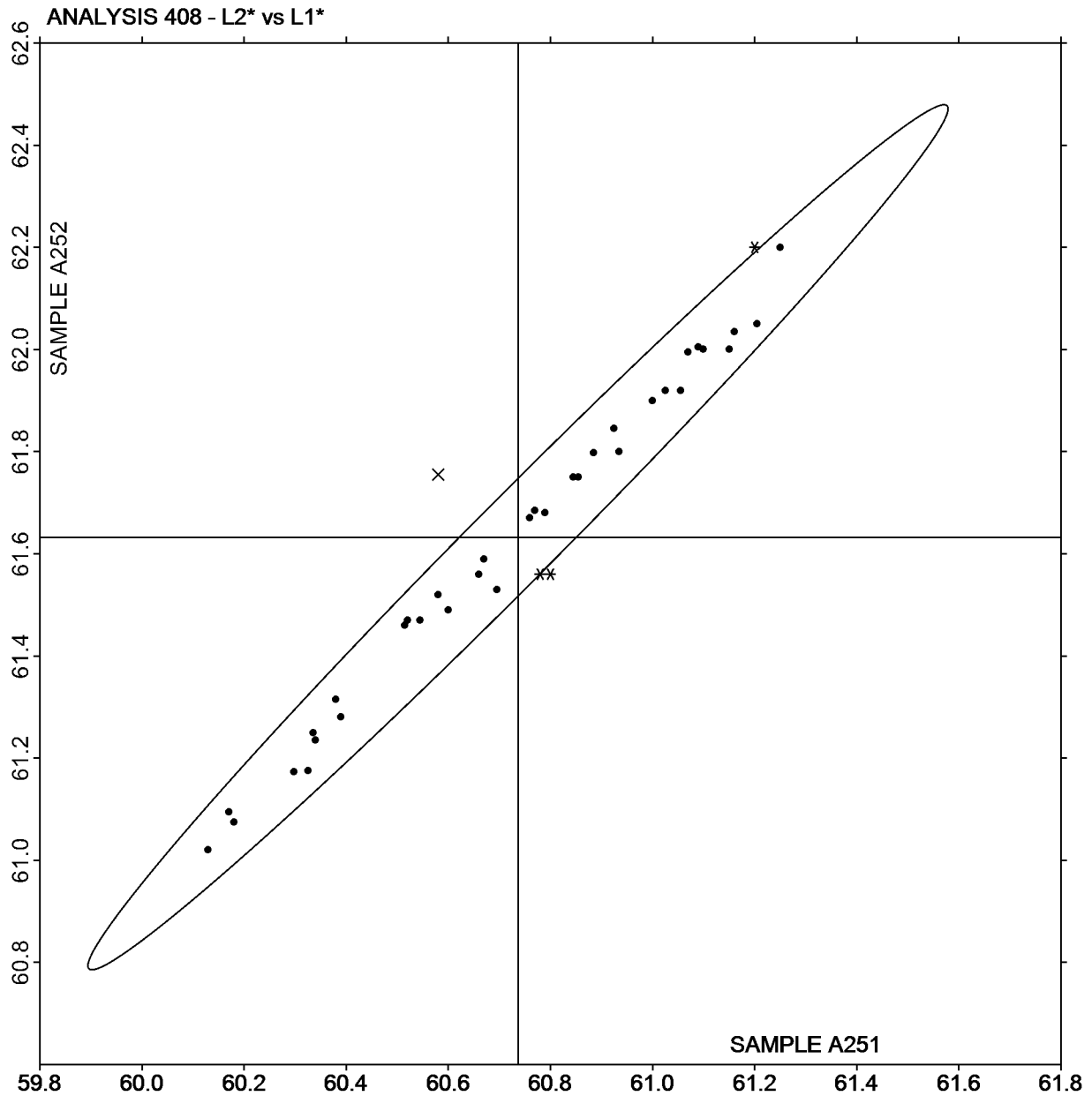
<b>BG</b>	BYK Mac i	<b>GA</b>	BYK-Gardner
<b>GG</b>	BYK-Gardner spectro2-guide (45/0) gloss	<b>GH</b>	BYK-Gardner Color-View
<b>HL</b>	Hunter Agera	<b>HW</b>	Hunter LabScan XE
<b>HX</b>	Hunter Color FlexEZ 45/0	<b>HY</b>	Hunter Color Flex 45/0
<b>MG</b>	Macbeth 1500/PLUS or 2025+ Color Eye	<b>MS</b>	Minolta CM-600d Spectrophotometer
<b>MT</b>	Minolta CM-25cG Spectrophotometer	<b>PR</b>	PhotoResearch PR730
<b>XD</b>	X-Rite 500 Series SpectroDensitometer	<b>XE</b>	X-Rite eXact Portable Spectrophotometer
<b>XL</b>	X-Rite i1 iSis 2	<b>XM</b>	X-Rite MA58 Multi-Angle Spectrophotometer
<b>XO</b>	X-Rite MA68 II Multi-Angle Spectrophotometer	<b>XP</b>	X-Rite MA9 Multi-Angle Spectrophotometer
<b>XQ</b>	X-Rite Ci6x	<b>XS</b>	X-Rite 962 Portable Spectrophotometer
<b>XU</b>	X-Rite 964 Portable Spectrophotometer	<b>XV</b>	X-Rite 939
<b>XW</b>	X-Rite	<b>XX</b>	Instrument make/model not specified by lab



L2\* vs L1\*

SAMPLE A251 = 60.74

SAMPLE A252 = 61.63

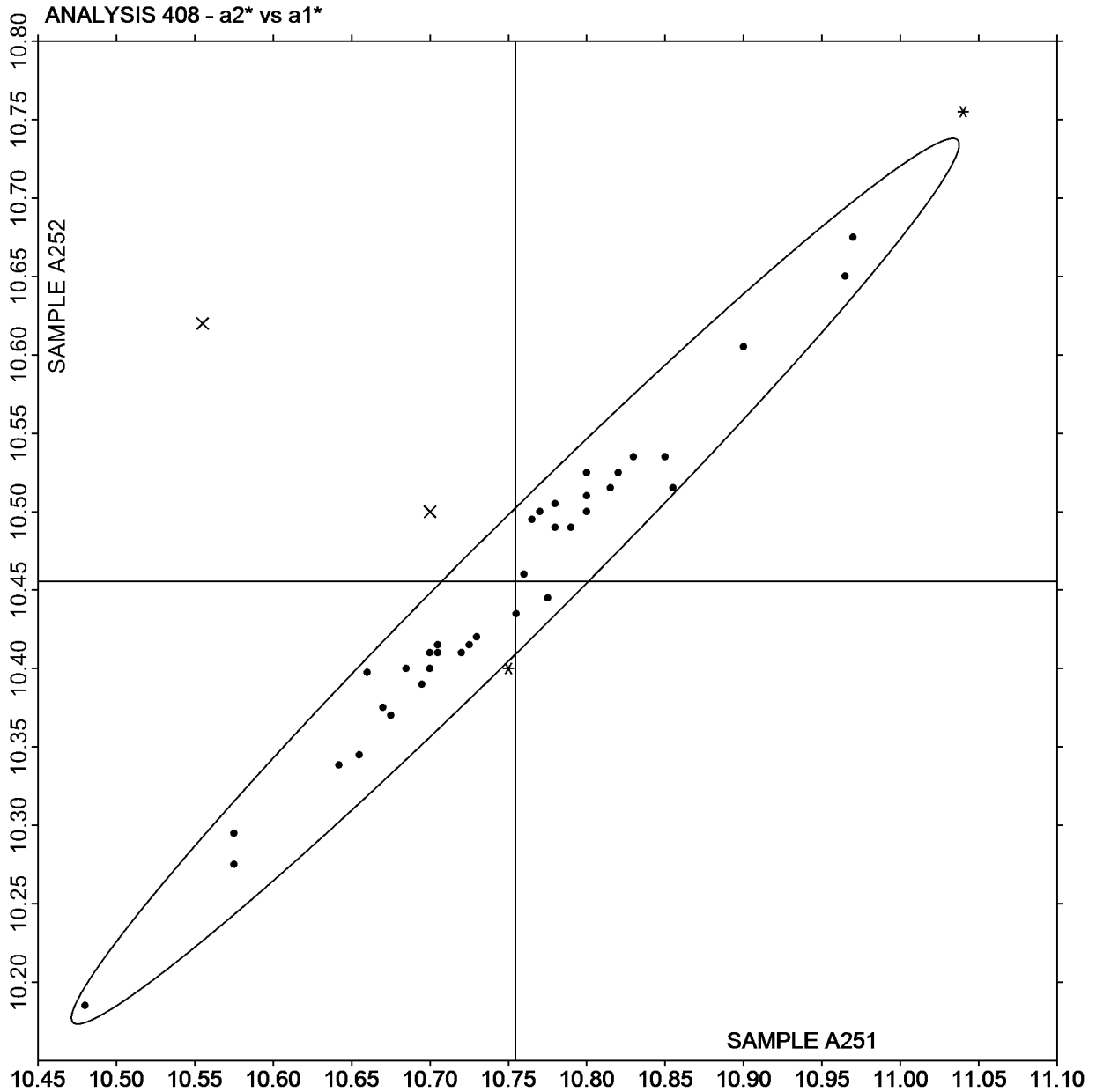




a2\* vs a1\*

SAMPLE A251 = 10.75

SAMPLE A252 = 10.46

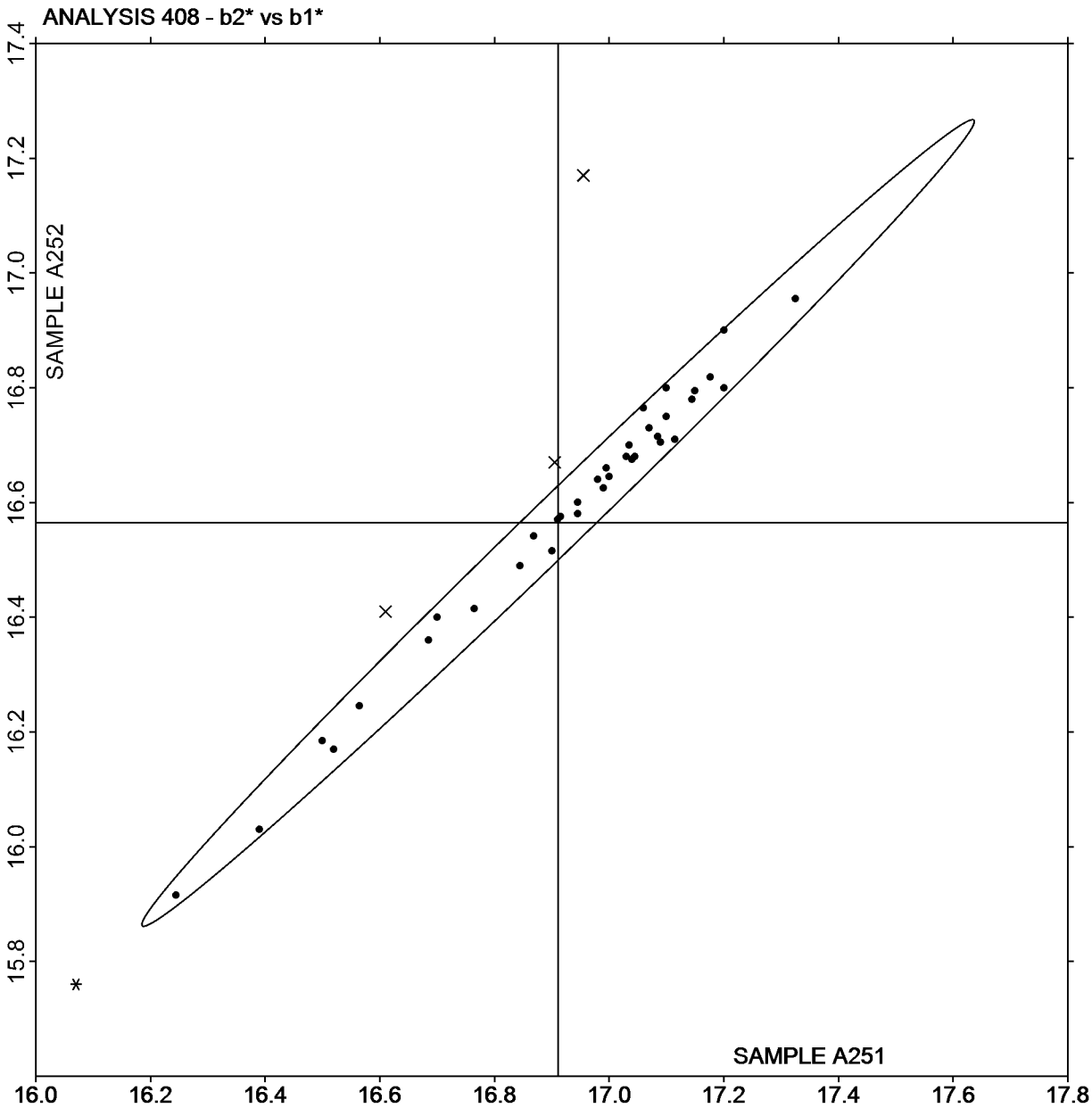




**b2\* vs b1\***

SAMPLE A251 = 16.91

SAMPLE A252 = 16.56





**CTS Interlaboratory Testing Program for Color & Appearance**

**Report #211**

**Analysis 409**

**1st Qtr 2025**

**Color and Color Difference - Paint Chips - Sphere Geometry Instruments  
CIE L\*a\*b\* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer**

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
2RJED9		A251	60.70	10.70	16.35	0.91	-0.30	-0.37	1.03	XI
		A252	61.62	10.40	15.97					
38C6CC	X	A251	61.42	10.68	16.34	0.89	-0.30	-0.36	1.01	CA
		A252	62.31	10.38	15.98					
3F7A7D		A251	60.74	10.80	16.30	0.89	-0.30	-0.35	1.00	MV
		A252	61.62	10.50	15.95					
3P8247	X	A251	61.34	10.77	16.41	0.91	-0.29	-0.35	1.02	CA
		A252	62.25	10.49	16.06					
6CRTG4	X	A251	60.37	10.56	16.68	0.88	-0.29	-0.34	0.99	GE
		A252	61.26	10.27	16.34					
6KDKBC	X	A251	61.31	10.77	15.96	0.98	-0.31	-0.35	1.09	SI
		A252	62.29	10.46	15.62					
79NF96		A251	60.76	10.72	16.39	0.91	-0.31	-0.35	1.02	MW
		A252	61.66	10.41	16.04					
79TPB4	X	A251	60.60	10.57	16.27	0.92	-0.28	-0.36	1.03	AS
		A252	61.52	10.29	15.91					
7YLX3		A251	60.80	10.74	16.46	0.91	-0.32	-0.38	1.03	MW
		A252	61.70	10.41	16.08					
8VL793		A251	60.91	10.62	16.37	0.90	-0.31	-0.34	1.01	XD
		A252	61.81	10.31	16.03					
9BTHH8		A251	60.92	10.74	16.47	0.91	-0.27	-0.31	1.00	AJ
		A252	61.83	10.46	16.16					
9NE2R3		A251	60.92	10.67	16.40	0.94	-0.32	-0.41	1.07	XE
		A252	61.85	10.35	15.99					
A4PZfZ		A251	60.91	10.61	16.53	0.89	-0.30	-0.36	1.01	XD
		A252	61.80	10.30	16.18					
A7F2J3		A251	60.86	10.60	16.52	0.90	-0.30	-0.35	1.01	XI
		A252	61.76	10.30	16.17					
ADC2R4		A251	60.83	10.63	16.33	0.90	-0.31	-0.37	1.03	XD
		A252	61.73	10.32	15.96					
ADGCU2		A251	60.82	10.72	16.35	0.93	-0.31	-0.38	1.05	AU
		A252	61.75	10.41	15.97					



**CTS Interlaboratory Testing Program for Color & Appearance**

**Report #211**

**Analysis 409**

**1st Qtr 2025**

**Color and Color Difference - Paint Chips - Sphere Geometry Instruments  
CIE L\*a\*b\* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer**

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
AZ9TW7		A251	60.98	10.65	16.32	0.89	-0.31	-0.36	1.00	XB
		A252	61.87	10.34	15.96					
BP486X		A251	60.99	10.61	16.34	0.91	-0.29	-0.37	1.02	XB
		A252	61.89	10.32	15.97					
BQU992		A251	60.91	10.55	16.48	0.91	-0.30	-0.36	1.02	XD
		A252	61.81	10.25	16.12					
CWENCX		A251	60.97	10.69	16.32	0.90	-0.30	-0.37	1.02	AP
		A252	61.87	10.40	15.94					
D7WRTW		A251	61.02	10.76	16.39	0.91	-0.30	-0.34	1.02	AU
		A252	61.93	10.45	16.04					
DEVADZ		A251	60.79	10.66	16.22	0.89	-0.32	-0.36	1.01	CA
		A252	61.67	10.34	15.86					
DJRV63		A251	60.97	10.58	16.25	0.91	-0.31	-0.36	1.03	XD
		A252	61.88	10.27	15.88					
E4B62U		A251	61.01	10.69	16.47	0.91	-0.33	-0.38	1.03	AS
		A252	61.92	10.37	16.09					
EER822		A251	60.78	10.60	16.44	0.90	-0.29	-0.36	1.02	AJ
		A252	61.68	10.31	16.08					
ETN76X		A251	60.81	10.66	16.44	0.90	-0.32	-0.36	1.03	MQ
		A252	61.71	10.34	16.08					
EUNY9W		A251	60.87	10.59	16.18	0.89	-0.30	-0.35	1.00	HP
		A252	61.75	10.29	15.83					
F84Q3V		A251	60.88	10.74	16.37	0.89	-0.30	-0.36	1.01	AU
		A252	61.77	10.44	16.01					
FAY6X2		A251	60.89	10.68	16.29	0.92	-0.29	-0.38	1.04	AJ
		A252	61.81	10.39	15.91					
FJYTPX		A251	60.82	10.70	16.41	0.91	-0.31	-0.36	1.03	MU
		A252	61.73	10.39	16.05					
FYTHKU		A251	60.81	10.53	16.42	0.88	-0.30	-0.37	1.00	XO
		A252	61.69	10.23	16.06					
G3Q7XV		A251	60.94	10.67	16.42	0.91	-0.29	-0.35	1.01	AU
		A252	61.85	10.38	16.08					



**CTS Interlaboratory Testing Program for Color & Appearance**

**Report #211**

**Analysis 409**

**1st Qtr 2025**

**Color and Color Difference - Paint Chips - Sphere Geometry Instruments  
CIE L\*a\*b\* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer**

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
G44V3T		A251	60.90	10.69	16.30	0.92	-0.29	-0.33	1.02	XX
		A252	61.81	10.39	15.97					
G7UW7W	X	A251	60.94	10.78	16.15	0.92	-0.35	-0.41	1.06	AO
		A252	61.86	10.44	15.74					
GEMCQU		A251	60.76	10.51	16.22	0.91	-0.28	-0.33	1.01	AJ
		A252	61.67	10.22	15.89					
GNT9EW		A251	60.83	10.65	16.28	0.91	-0.30	-0.35	1.02	XG
		A252	61.74	10.35	15.93					
HEEPQR		A251	60.98	10.70	16.38	0.89	-0.29	-0.32	0.99	AT
		A252	61.87	10.41	16.06					
HFA8TT		A251	60.81	10.63	16.41	0.89	-0.27	-0.32	0.99	XD
		A252	61.71	10.37	16.09					
HTENHU	X	A251	52.53	12.46	12.50	0.05	-0.01	0.00	0.06	AW
		A252	52.58	12.45	12.50					
J3GAZT		A251	60.93	10.69	16.40	0.91	-0.30	-0.34	1.02	AU
		A252	61.85	10.38	16.05					
JK4LWU		A251	60.78	10.69	16.40	0.88	-0.29	-0.34	0.99	MW
		A252	61.66	10.39	16.06					
JVL2ZW		A251	60.94	10.62	16.42	0.90	-0.30	-0.37	1.02	AT
		A252	61.84	10.32	16.06					
K26V7R		A251	61.04	10.57	16.45	0.91	-0.30	-0.35	1.02	XD
		A252	61.95	10.27	16.10					
KJ39PR		A251	60.92	10.67	16.36	0.88	-0.28	-0.33	0.98	XD
		A252	61.80	10.39	16.03					
KM2KKR		A251	60.98	10.58	16.13	0.92	-0.32	-0.32	1.02	HP
		A252	61.89	10.26	15.81					
KWCNRQ		A251	60.96	10.64	16.40	0.90	-0.31	-0.33	1.00	XB
		A252	61.86	10.33	16.07					
L3QYEP		A251	60.96	10.56	16.36	0.90	-0.28	-0.35	1.01	XD
		A252	61.87	10.29	16.01					
L3VAGN		A251	61.05	10.62	16.51	0.91	-0.30	-0.35	1.02	MV
		A252	61.96	10.32	16.16					



**CTS Interlaboratory Testing Program for Color & Appearance**      **Report #211**  
**Analysis 409**      **1st Qtr 2025**

**Color and Color Difference - Paint Chips - Sphere Geometry Instruments**  
**CIE L\*a\*b\* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer**

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
LMJXKN		A251	60.79	10.70	16.28	0.90	-0.29	-0.35	1.01	MK
		A252	61.69	10.41	15.93					
MNUXKP		A251	60.82	10.63	16.38	0.92	-0.27	-0.34	1.02	XB
		A252	61.74	10.36	16.03					
MR73WP		A251	60.76	10.75	16.40	0.92	-0.31	-0.35	1.03	MW
		A252	61.67	10.44	16.05					
MYP74R		A251	60.95	10.74	16.40	0.91	-0.29	-0.34	1.02	MV
		A252	61.86	10.45	16.05					
N8YRRL		A251	60.87	10.59	16.37	0.91	-0.30	-0.32	1.01	XE
		A252	61.78	10.29	16.05					
NDLRZL		A251	60.79	10.58	16.25	0.89	-0.28	-0.33	0.99	MM
		A252	61.68	10.30	15.92					
NJV3WM		A251	60.90	10.46	16.33					XX
		A252								
P4VGAQ		A251	60.97	10.70	16.36	0.91	-0.31	-0.38	1.04	AP
		A252	61.88	10.38	15.98					
PTBEHJ		A251	60.79	10.78	16.56	0.92	-0.30	-0.37	1.04	AS
		A252	61.71	10.48	16.19					
QF7FEJ	X	A251	60.62	10.74	16.45	0.93	-0.35	-0.36	1.06	XH
		A252	61.55	10.39	16.09					
QFMQTH		A251	60.89	10.62	16.29	0.92	-0.30	-0.38	1.04	XE
		A252	61.81	10.32	15.92					
QJLZ3J		A251	60.86	10.60	16.34	0.91	-0.31	-0.38	1.04	XI
		A252	61.78	10.29	15.97					
R7CP8G		A251	60.89	10.49	16.30	0.86	-0.26	-0.29	0.95	XF
		A252	61.75	10.22	16.01					
RP4TRN	X	A251	60.86	10.61	16.09	0.91	-0.26	-0.29	0.99	HP
		A252	61.76	10.35	15.80					
RZ674H		A251	60.97	10.62	16.32	0.90	-0.30	-0.37	1.02	XD
		A252	61.87	10.32	15.95					
TJHXQK		A251	60.70	10.77	16.39	0.88	-0.30	-0.36	1.00	MV
		A252	61.58	10.47	16.03					





**CTS Interlaboratory Testing Program for Color & Appearance**

**Report #211**

**Analysis 409**

**1st Qtr 2025**

**Color and Color Difference - Paint Chips - Sphere Geometry Instruments  
CIE L\*a\*b\* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer**

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
U4JDKG		A251	60.92	10.63	16.34	0.90	-0.31	-0.35	1.01	AJ
		A252	61.81	10.32	15.99					
UEFNPG		A251	61.05	10.75	16.46	0.91	-0.30	-0.36	1.02	AT
		A252	61.96	10.45	16.10					
UEKXRF		A251	61.02	10.61	16.38	0.91	-0.31	-0.34	1.02	AT
		A252	61.93	10.30	16.04					
UG7HWJ		A251	60.70	10.67	16.31	0.90	-0.29	-0.32	1.00	XH
		A252	61.60	10.38	15.99					
UGL47L		A251	60.83	10.49	16.51	0.84	-0.30	-0.36	0.96	XF
		A252	61.67	10.19	16.15					
UXVTJL		A251	60.84	10.64	16.34	0.93	-0.32	-0.35	1.04	AQ
		A252	61.77	10.33	15.99					
V6QA9H		A251	60.86	10.61	16.30	0.90	-0.30	-0.35	1.02	XD
		A252	61.76	10.31	15.95					
VD42YF	X	A251	61.62	10.50	16.39	0.46	-0.16	-0.16	0.52	XO
		A252	62.08	10.35	16.23					
VEE67C		A251	60.93	10.60	16.43	0.88	-0.28	-0.35	0.99	XD
		A252	61.82	10.31	16.08					
VG2RWE		A251	60.94	10.67	16.44	0.91	-0.28	-0.30	1.00	MT
		A252	61.85	10.39	16.14					
VUL8ZE		A251	60.86	10.71	16.39	0.90	-0.29	-0.35	1.01	AS
		A252	61.76	10.43	16.04					
VWUE8D		A251	60.91	10.66	16.26	0.89	-0.30	-0.36	1.00	AT
		A252	61.80	10.36	15.90					
W26Q4D		A251	61.08	10.62	16.34	0.91	-0.29	-0.34	1.02	XG
		A252	61.99	10.33	16.00					
WKWVAJ		A251	60.88	10.52	16.31	0.89	-0.29	-0.31	0.99	XH
		A252	61.77	10.23	16.00					
XDB3UD		A251	60.92	10.62	16.17	0.91	-0.29	-0.35	1.02	HP
		A252	61.83	10.33	15.83					
XKTQ9F		A251	60.91	10.67	16.52	0.89	-0.30	-0.36	1.01	MM
		A252	61.80	10.37	16.16					



WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
YE3GXG		A251	60.94	10.55	16.51	0.88	-0.29	-0.34	0.98	XD
		A252	61.81	10.27	16.17					
YH3P6D		A251	60.95	10.63	16.46	0.92	-0.32	-0.38	1.05	XD
		A252	61.87	10.30	16.09					
YYP4A		A251	60.76	10.53	16.30	0.91	-0.31	-0.36	1.02	XI
		A252	61.67	10.22	15.95					
ZZJDRD	X	A251	60.03	10.43	16.33	0.89	-0.31	-0.37	1.02	XC
		A252	60.92	10.12	15.96					

Summary Statistics								
Samples	L*	a*	b*	$\Delta L^*$	$\Delta a^*$	$\Delta b^*$	$\Delta E^*$	
<b>Grand Means</b>								
A251	60.88	10.64	16.37					
A252	61.79	10.34	16.02	0.90	-0.30	-0.35	1.01	
<b>Std Dev Btwn Labs</b>								
A251	0.09	0.08	0.09	0.02	0.01	0.02	0.02	
A252	0.09	0.07	0.09					

Statistics based on 72 of 84 reporting participants

**Comments Assigned on Data Flags for Test #409**

- 38C6CC(X) - High L\* values for both samples. Large replication difference for L\* Sample A252.
- 3P8247(X) - High L\* values for both samples.
- 6CRTG4(X) - Low L\* values for both samples. High b\* values for both samples.
- 6KDKBC(X) - High L\* values for both samples. Low b\* values for both samples. Large replication difference for b\* Sample A252. Large Delta L & E.
- 79TPB4(X) - Low L\* values for both samples.
- G7UW7W(X) - Inconsistent in determinations of a\* values. Low b\* values for Sample A252. Small Delta a & b.
- HTENHU(X) - Extreme data for both samples for all values. Small Delta L & E, large Delta a & b.
- NJV3WM(M) - Laboratory did not submit data for Sample A252.
- QF7FEJ(X) - Low L\* values for Sample A251. Inconsistent in determinations of a\* values. Small Delta a.
- RP4TRN(X) - Low b\* values for Sample A251. Large Delta a & b.
- VD42YF(X) - Very high L\* values for both samples. Inconsistent in determinations of a\* & b\* values. Large replication difference for L\*, a\* & b\* Sample A251. Small Delta L & E, large Delta a & b.
- ZZJDRD(X) - Very low L\* values for both samples.



**Key to Instrument Codes Reported by Participants**

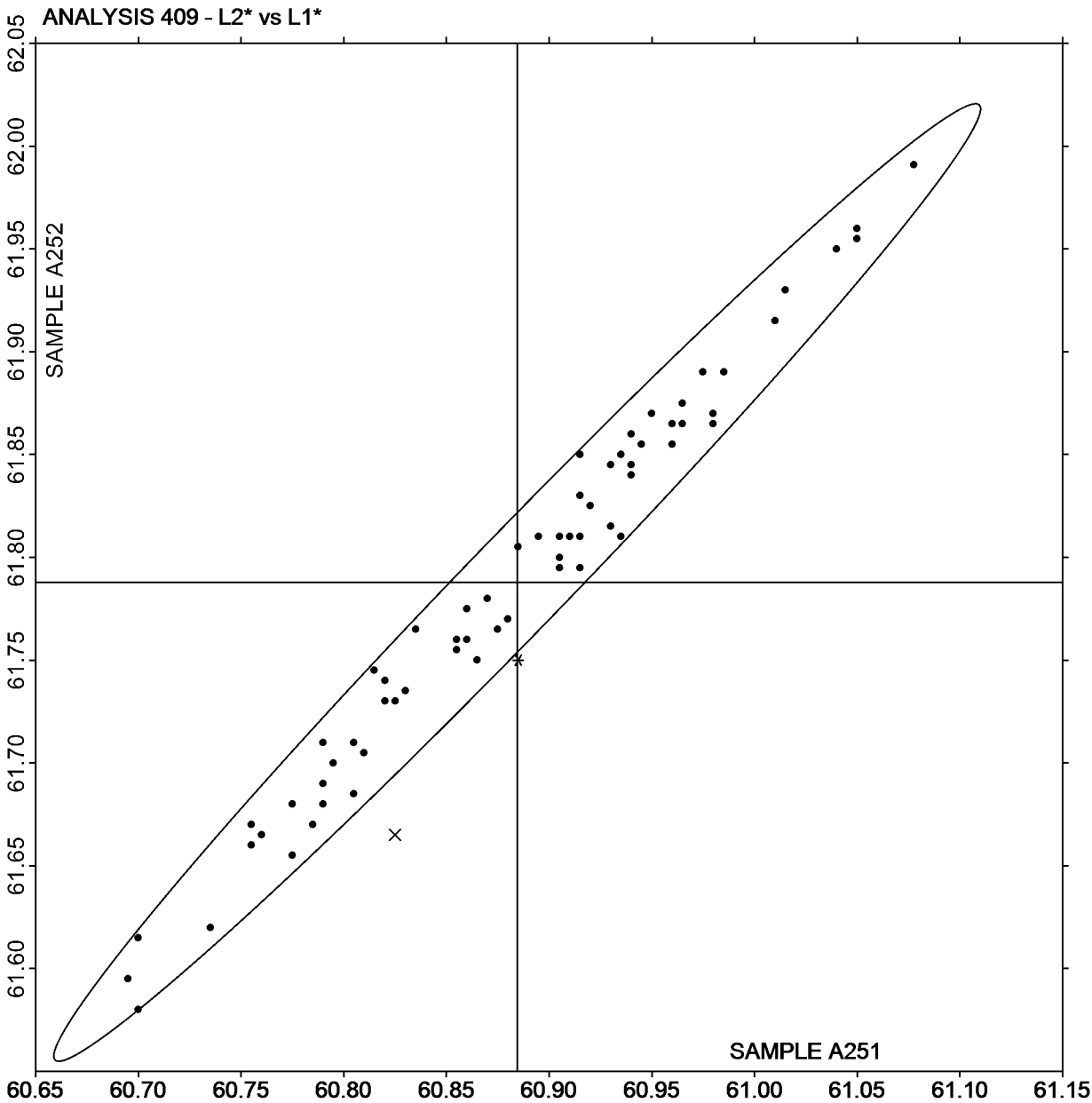
<b>AJ</b>	Datacolor 600	<b>AO</b>	Datacolor 650x
<b>AP</b>	Datacolor 750	<b>AQ</b>	Datacolor 600x
<b>AS</b>	Datacolor 800	<b>AT</b>	Datacolor 850
<b>AU</b>	Datacolor 1000	<b>AW</b>	Datacolor 1050
<b>CA</b>	Cary 5000	<b>GE</b>	BYK-Gardner Spectro2-Guide Sphere Gloss
<b>HP</b>	Hunter UltraScan PRO	<b>MK</b>	Macbeth Color-Eye 7000
<b>MM</b>	Macbeth Color-Eye 7000a	<b>MQ</b>	Minolta CM-700d
<b>MT</b>	Minolta CM-2600d	<b>MU</b>	Minolta
<b>MV</b>	Minolta CM-3000d Spectrophotometer	<b>MW</b>	Minolta CM 3700a Spectrophotometer
<b>SI</b>	SHIMADZU 3700i	<b>XB</b>	X-Rite Ci7000 Series Benchtop Spectrophotometer
<b>XC</b>	X-Rite Ci4200 Benchtop Spectrophotometer	<b>XD</b>	X-Rite Ci7800 Benchtop Spectrophotometer
<b>XE</b>	X-Rite Ci7600 Benchtop Spectrophotometer	<b>XF</b>	X-Rite Ci6x Portable Spectrophotometer
<b>XG</b>	X-Rite Ci7860 Benchtop Spectrophotometer	<b>XH</b>	X-Rite Color i5 Benchtop Spectrophotometer
<b>XI</b>	X-Rite Color i7 Benchtop Spectrophotometer	<b>XO</b>	X-Rite SP64 Portable Sphere Spectrophotometer
<b>XX</b>	Instrument make/model not specified by lab		



L2\* vs L1\*

SAMPLE A251 = 60.88

SAMPLE A252 = 61.79

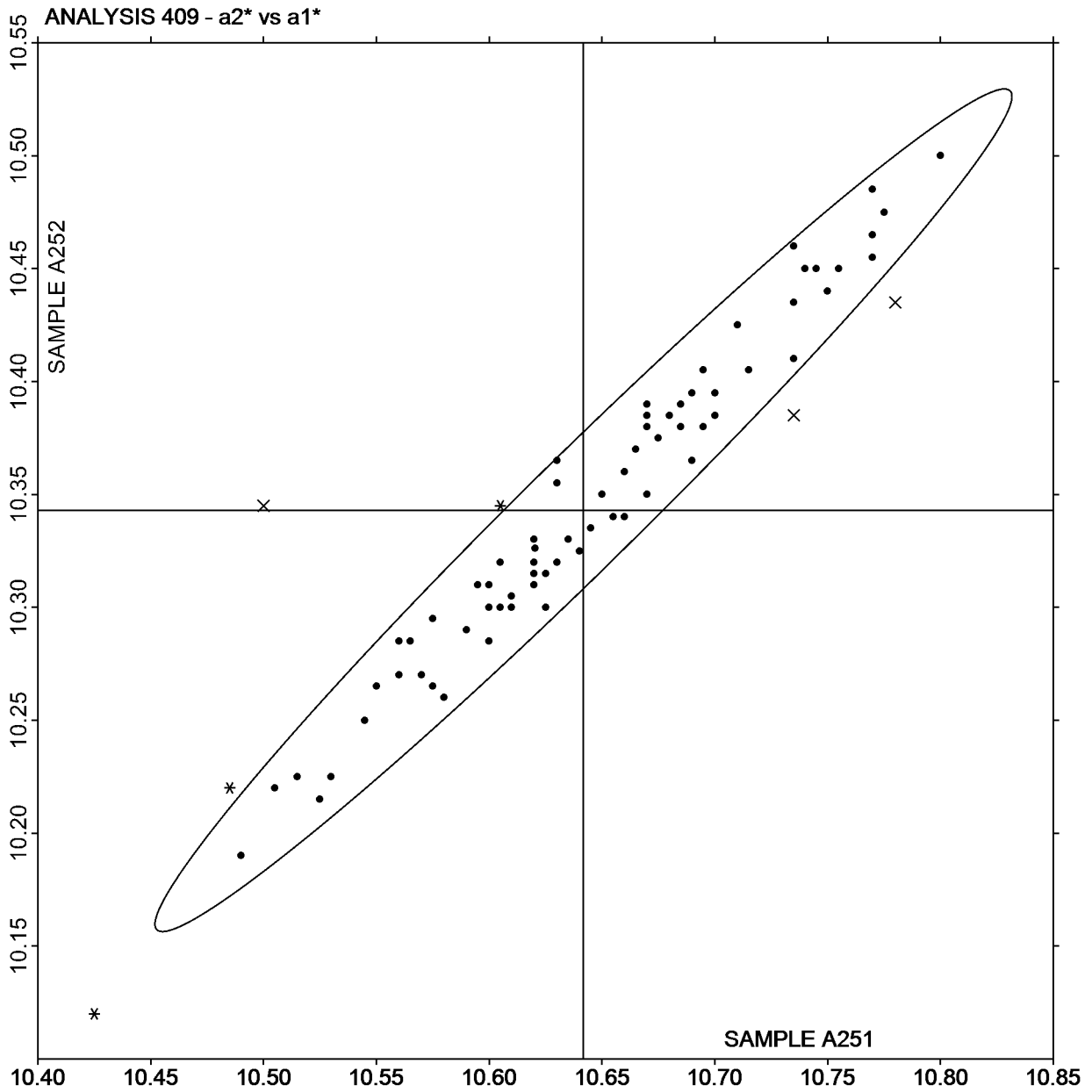




a2\* vs a1\*

SAMPLE A251 = 10.64

SAMPLE A252 = 10.34

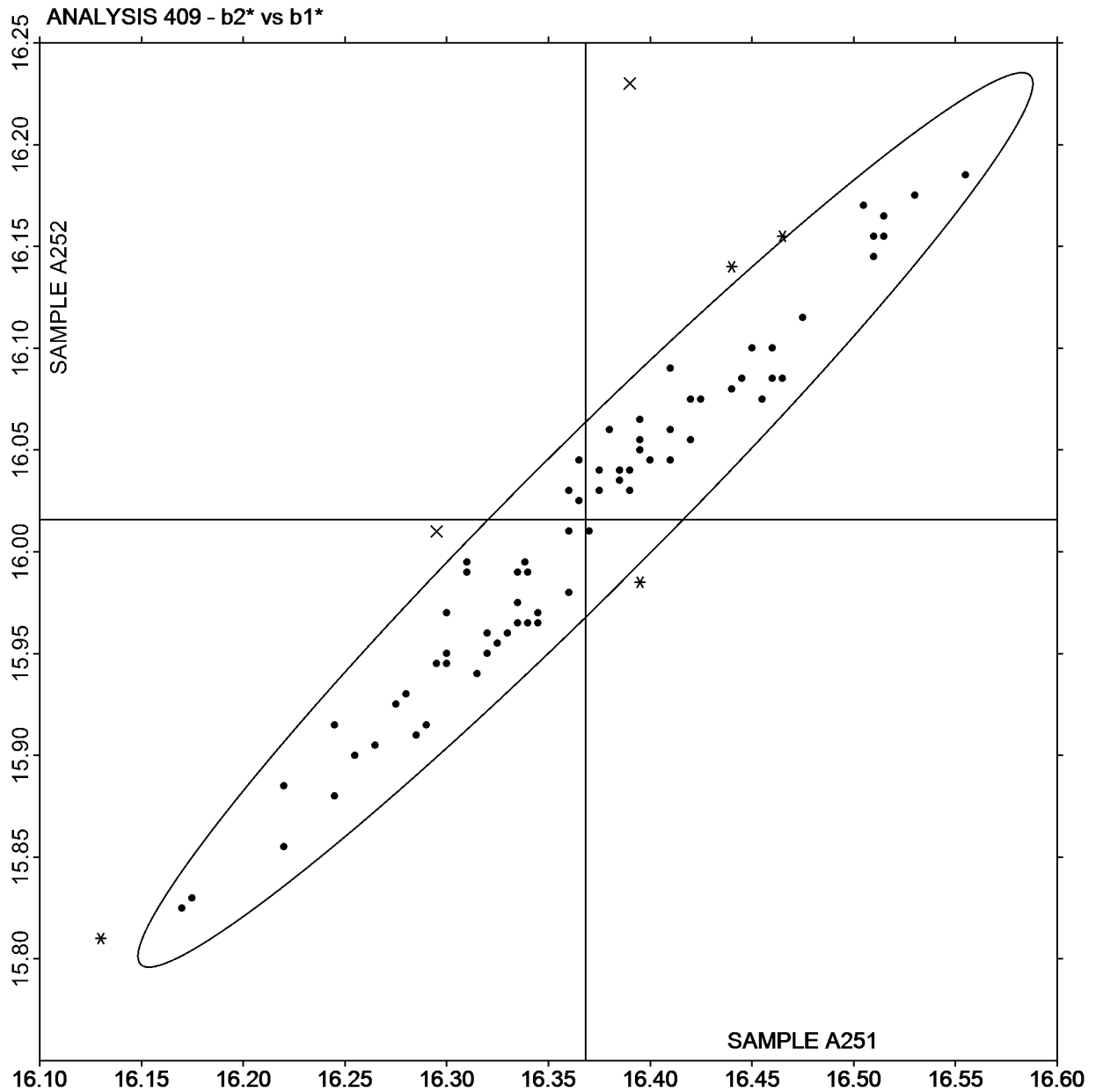




**b2\* vs b1\***

SAMPLE A251 = 16.37

SAMPLE A252 = 16.02





## CTS Interlaboratory Testing Program for Color & Appearance Analysis 411

**Report #211  
1st Qtr 2025**

Spectrophotometric - Sphere Geometry Instruments  
Reflectance at 16 Selected Wavelengths

WebCode	Data Flag	Spectrophotometric Reflectance values (as %) at selected wavelengths																Instr Code
		400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	
Sample A251																		
38C6CC		15.59	17.61*	19.73X	20.78X	21.01	22.14X	24.15X	26.43X	29.69*	35.57X	39.38	40.20X	40.17X	40.11*	40.16	40.28*	CA
3F7A7D		14.90	17.15	19.10	20.30	20.40	21.50	23.50	25.70	28.90	34.60	38.50	39.40	39.40	39.35	39.40	39.60	MV
3P8247		15.69*	17.69X	19.76X	20.81X	21.00	22.12X	24.12X	26.41X	29.67*	35.58X	39.37	40.16X	40.09X	40.02*	40.07	40.17*	CA
6KDKBC		15.55	17.77X	19.79X	20.93X	21.08	22.14X	24.06*	26.31*	29.47	35.28	39.27	40.20X	40.14X	40.07*	40.05	40.19*	SI
79NF96		14.81	17.16	19.04	20.22	20.42	21.50	23.53	25.71	28.98	34.57	38.50	39.42	39.40	39.36	39.46	39.60	MW
79TPB4		14.97	17.10	19.05	20.04	20.38	21.46	23.39	25.60	28.86*	34.39*	38.11	38.92*	38.99*	38.99	38.89	38.62*	AS
8VL793		15.12	17.30	19.28	20.32	20.54	21.66	23.64	25.91	29.24	34.95	38.59	39.46	39.38	39.29	39.32	39.43	XD
A4PZfZ		15.00	17.13	19.13	20.21	20.49	21.64	23.64	25.93	29.28	34.91	38.58	39.42	39.41	39.34	34.37X	39.55	XD
A7F2J3		15.08	17.15	19.12	20.17	20.48	21.58	23.55	25.85	29.18	34.84	38.51	39.40	39.39	39.41	39.47	39.55	XI
ADC2R4		15.18	17.27	19.22	20.24	20.48	21.59	23.53	25.82	29.15	34.78	38.46	39.34	39.35	39.30	39.34	39.60	XD
ADGCU2		15.44	17.24	19.19	20.20	20.52	21.60	23.59	25.77	29.11	34.74	38.51	39.34	39.42	39.75	39.97	39.65	AU
AZ9TW7		15.34	17.36	19.37	20.35	20.61	21.76	23.69	25.92	29.33	35.18	38.70	39.43	39.28	39.24	39.34	39.48	XB
BP486X		15.26	17.38	19.30	20.38	20.65	21.77	23.75	26.01	29.33	34.97	38.63	39.53	39.54	39.52	39.60	39.70	XB
BQU992		15.10	17.21	19.16	20.26	20.53	21.65	23.63	25.92	29.26	34.88	38.55	39.43	39.42	39.43	39.51	39.63	XD
CWENCX		15.23	17.31	19.33	20.36	20.70	21.75	23.72	25.95	29.25	34.98	38.74	39.53	39.58	39.66	39.70	38.92	AP
D7WRTW		15.38	17.29	19.30	20.39	20.68	21.78	23.76	25.95	29.33	35.06	38.81	39.66	39.66	39.88	39.73	39.87	AU
DEVADZ		15.09	17.07	19.21	20.27	20.44	21.57	23.54	25.80	28.98	34.69	38.48	39.40	39.40	39.28	39.39	39.48	CA
DJRV63		15.34	17.43	19.36	20.38	20.66	21.76	23.72	26.01	29.32	34.92	38.59	39.43	39.47	39.42	39.43	39.48	XD
E4B62U		15.16	17.31	19.15	20.34	20.68	21.75	23.73	26.00	29.32	34.97	38.79	39.68	39.67	39.79	40.06	38.94	AS
ETN76X		14.99	17.13	19.11	20.22	20.44	21.54	23.58	25.82	29.08	34.64	38.52	39.43	39.45	39.43	39.52	39.68	MQ
F84Q3V		15.06	17.24	19.23	20.25	20.56	21.67	23.63	25.78	29.17	34.83	38.63	39.47	39.53	39.60	39.31	38.78	AU
FAY6X2		15.19	17.28	19.25	20.32	20.62	21.70	23.65	25.89	29.17	34.78	38.61	39.48	39.48	39.55	39.42	39.15	AJ



## CTS Interlaboratory Testing Program for Color & Appearance Analysis 411

**Report #211**  
**1st Qtr 2025**

Spectrophotometric - Sphere Geometry Instruments  
Reflectance at 16 Selected Wavelengths

WebCode	Data Flag	Spectrophotometric Reflectance values (as %) at selected wavelengths																Instr Code
		400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	
Sample A251																		
FJYTPX		14.88	17.17	19.09	20.27	20.49	21.53	23.59	26.28*	29.06	34.66	38.61	39.46	39.48	39.44	39.55	39.71	MV
FYTHKU		14.91	17.22	19.12	20.18	20.45	21.56	23.60	25.82	29.17	34.69	38.38	39.28	39.29	39.25	39.39	39.56	XO
G3Q7XV		15.17	17.26	19.21	20.28	20.60	21.72	23.66	25.84	29.27	35.05	38.69	39.42	39.42	39.58	39.68	38.71*	AU
G7UW7W		15.34	17.43	19.35	20.44	20.70	21.67	23.67	25.96	29.17	34.89	38.69	39.61	39.54	39.63	39.79	39.74	AO
GEMCQU		14.97	17.31	19.19	20.21	20.54	21.55	23.53	25.85	29.08	34.52	38.26	39.26	39.30	39.27	39.00	38.75	AJ
GNT9EW		15.22	17.28	19.24	20.26	20.49	21.60	23.56	25.83	29.19	34.79	33.39X	39.31	39.33	39.28	39.37	39.55	XG
HEEPQR		15.21	17.29	19.29	20.33	20.64	21.75	23.71	25.93	29.31	35.08	38.73	39.52	39.54	39.50	39.71	38.76	AT
HFA8TT		15.05	17.16	19.11	20.19	20.47	21.57	23.55	25.84	29.13	34.72	38.41	39.31	39.34	39.36	39.45	39.59	XD
HTENHU	X	32.62X	34.55X	35.97X	36.67X	37.08X	37.65X	38.34X	39.03X	40.60X	43.41X	45.36X	45.85X	45.88X	46.00X	45.80X	45.32X	AW
J3GAZT		15.45	17.72X	19.75X	20.79X	21.09	22.18X	24.19X	26.35*	29.81X	35.57X	39.27	39.96*	40.01*	40.11*	39.67	38.67*	AU
JK4LWU		14.80	17.10	19.10	20.20	20.40	21.50	23.55	25.75	29.00	34.65	38.50	39.35	39.35	39.35	39.45	39.55	MW
JVL2ZW		15.27	17.30	19.24	20.20	20.65	21.71	23.70	25.91	29.21	34.91	38.70	39.52	39.61	39.61	39.18	39.15	AT
K26V7R		15.16	17.30	19.31	20.38	20.66	21.81	23.80	26.03	29.36	35.06	38.77	39.65	39.60	39.63	39.67	39.82	XD
KJ39PR		15.17	17.29	19.26	20.29	20.54	21.66	23.63	25.91	29.26	34.94	38.58	39.43	39.39	39.38	39.43	39.56	XD
KM2KKR		15.37	17.40	19.41	20.49	20.76	21.87	23.80	26.04	29.15	34.74	38.69	39.66	39.62	39.50	39.52	39.62	HP
KWCNRQ		15.15	17.29	19.26	20.32	20.61	21.71	23.71	25.99	29.25	34.97	38.70	39.52	39.34	39.23	39.29	39.33	XB
L3QYEP		16.03X	17.35	19.29	20.34	20.59	21.71	23.69	26.00	29.30	34.92	38.63	39.51	39.48	39.43	39.51	39.58	XD
L3VAGN		15.15	17.29	19.31	20.36	20.64	21.76	23.80	25.99	29.42	35.06	38.90	39.65	39.69	39.61	39.71	39.85	MV
LMJXKN		14.98	17.20	19.14	20.27	20.52	21.61	23.57	25.84	29.04	34.55	38.43	39.43	39.47	39.48	39.48	39.63	MK
MNUXKP		15.97X	17.27	19.14	20.19	20.46	21.56	23.54	25.88	29.16	34.70	38.43	39.33	39.38	39.26	39.28	39.33	XB
MR73WP		15.22	17.07	19.08	20.23	20.40	21.46	23.50	25.66	29.01	34.67	38.59	39.37	39.30	39.24	39.33	39.46	MY
MYP74R		15.02	17.30	19.26	20.34	20.52	21.72	23.63	25.88	29.18	34.98	38.76	39.61	39.47	39.56	39.56	39.76	MV





## CTS Interlaboratory Testing Program for Color & Appearance Analysis 411

**Report #211  
1st Qtr 2025**

Spectrophotometric - Sphere Geometry Instruments  
Reflectance at 16 Selected Wavelengths

WebCode	Data Flag	Spectrophotometric Reflectance values (as %) at selected wavelengths																Instr Code
		400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	
Sample A251																		
N8YRRL		15.28	17.31	19.24	20.22	20.48	21.64	23.62	25.90	29.26	34.86	38.47	39.29	39.29	39.29	39.29	39.41	XE
NDLRZL		15.23	17.24	19.22	20.27	20.49	21.62	23.54	25.80	29.04	34.63	38.41	39.30	39.28	39.29	39.32	39.45	MM
P4VGAQ		15.12	17.32	19.30	20.33	20.69	21.76	23.73	25.91	29.27	34.97	38.73	39.55	39.62	39.64	39.31	39.06	AP
PTBEHJ		14.92	17.07	19.04	20.10	20.38	21.45	23.51	25.78	29.13	34.70	38.48	39.45	39.46	39.43	39.67	39.41	AS
QF7FEJ		15.00	17.07	18.98	20.00	20.23	21.34*	23.29*	25.61	29.46	34.52	38.24	39.10	39.03	39.03	39.15	39.21	XH
QFMQTH		15.29	17.31	19.30	20.29	20.53	21.67	23.64	25.91	29.24	34.84	38.50	39.38	39.34	39.28	39.40	39.45	XE
R7CP8G		15.10	17.27	19.36	20.25	20.55	21.68	23.67	25.93	29.29	34.74	38.42	39.29	39.32	39.34	39.36	39.44	XF
RP4TRN		15.44	17.32	19.39	20.37	20.67	21.71	23.66	25.96	29.00	34.53	38.53	39.54	39.43	39.36	39.32	39.52	HP
RZ674H		15.32	17.37	19.34	20.35	20.60	21.71	23.69	25.96	29.34	35.04	38.60	39.43	39.39	39.35	39.43	39.50	XD
TJHXQK		14.94	17.07	19.04	20.13	20.29	21.40	23.40	25.59	28.89	34.67	38.42	39.27	39.22	39.21	39.27	39.46	MV
U4JDKG		15.19	17.29	19.10	20.37	20.69	21.70	23.67	25.93	29.17	34.81	38.60	39.55	39.47	39.56	39.47	39.47	AJ
UEFNPG		15.41	17.28	19.34	20.37	20.65	21.78	23.77	25.95	29.37	35.19	38.88	39.64	39.73	39.83	40.37	40.02	AT
UEKXRF		15.15	17.32	19.33	20.36	20.73	21.79	23.78	26.04	29.36	34.99	38.75	39.62	39.55	39.67	39.44	39.20	AT
UG7HWJ		15.10	17.21	19.10	20.12	20.33	21.42	23.40	25.72	29.02	34.63	38.27	39.11	39.06	39.05	39.15	39.19	XH
UGL47L		15.15	17.12	19.07	20.09	20.37	21.55	23.53	25.77	29.22	34.74	38.28	39.08	39.11	39.09	39.20	39.37	XO
UXVTJL		15.03	17.20	19.25	20.27	20.61	21.65	23.62	25.81	29.20	34.86	38.53	39.34	39.38	39.31	39.38	39.40	AQ
V6QA9H		15.10	17.28	19.22	20.28	20.53	21.63	23.60	25.90	29.18	34.77	38.45	39.34	39.37	39.27	39.36	39.37	XD
VD42YF	X	15.53	17.89X	19.85X	20.96X	21.16	22.23X	24.37X	26.75X	29.09	36.44	39.39	40.20X	40.27X	40.31X	40.37	40.49X	XO
VG2RWE		14.90	17.14	19.20	20.38	20.59	21.69	23.71	25.90	29.19	34.85	38.68	39.64	39.65	39.56	39.66	39.85	MT
VUL8ZE		15.01	17.24	19.15	20.22	20.57	21.64	23.60	25.82	29.15	34.74	38.55	39.47	39.56	39.52	39.19	38.98	AS
VWUE8D		15.25	17.26	19.31	20.33	20.63	21.70	23.67	25.88	29.22	34.89	38.60	39.38	39.42	39.40	39.05	39.01	AT
W26Q4D		15.39	17.46	19.43	20.46	20.69	21.82	23.80	26.09	29.43	35.09	38.81	39.71	39.71	39.65	39.74	39.79	XD



## CTS Interlaboratory Testing Program for Color & Appearance Analysis 411

**Report #211  
1st Qtr 2025**

Spectrophotometric - Sphere Geometry Instruments  
Reflectance at 16 Selected Wavelengths

WebCode	Data Flag	Spectrophotometric Reflectance values (as %) at selected wavelengths																Instr Code
		400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	
Sample A251																		
WKWVAJ		15.20	17.30	19.27	20.31	15.54X	21.66	23.64	25.89	29.21	34.85	38.51	39.32	39.19	39.20	39.28	39.38	XH
XDB3UD		15.70*	17.33	19.33	20.41	20.66	21.79	23.74	26.05	28.88	34.64	38.76	39.51	39.40	39.46	39.55	39.65	HP
XKTQ9F		15.02	17.18	19.14	20.22	20.51	21.64	23.62	25.91	29.25	34.90	38.60	39.49	39.48	39.47	39.54	39.66	MM
YE3GXX		15.00	17.19	19.17	20.26	20.56	21.70	23.69	25.95	29.32	34.93	38.55	39.43	39.38	39.40	39.40	39.57	XD
YH3P6D		15.05	17.22	19.21	20.27	20.57	21.70	23.69	25.96	29.30	34.93	38.62	39.55	39.48	39.48	39.53	39.74	XD
ZZJDRD	X	14.37X	16.56X	18.55X	19.48X	19.75	20.91X	22.82X	25.01X	28.39X	33.74X	37.19	37.92X	37.97X	37.95X	37.98*	38.14X	XC

### Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
<b>Grand Means</b>	15.19	17.27	19.25	20.31	20.50	21.67	23.66	25.91	29.22	34.86	38.54	39.47	39.46	39.46	39.41	39.46
<b>SD Btwn Labs</b>	0.24	0.14	0.16	0.16	0.63	0.16	0.16	0.16	0.18	0.23	0.68	0.22	0.22	0.24	0.67	0.35

HTENHU (X) - High % reflectance data for all wavelengths. Large replication difference for all wavelengths.

VD42YF (X) - High % reflectance data for most wavelengths. Large replication difference for most wavelengths.

ZZJDRD (X) - Low % reflectance data for almost all wavelengths.



## CTS Interlaboratory Testing Program for Color & Appearance Analysis 411

Report #211  
1st Qtr 2025

Spectrophotometric - Sphere Geometry Instruments  
Reflectance at 16 Selected Wavelengths

### Key to Instrument Codes Reported by Participants

<b>AJ</b> Datacolor 600	<b>AO</b> Datacolor 650x	<b>AP</b> Datacolor 750
<b>AQ</b> Datacolor 600x	<b>AS</b> Datacolor 800	<b>AT</b> Datacolor 850
<b>AU</b> Datacolor 1000	<b>AW</b> Datacolor 1050	<b>CA</b> Cary 5000
<b>HP</b> Hunter UltraScan PRO	<b>MK</b> Macbeth Color-Eye 7000	<b>MM</b> Macbeth Color-Eye 7000a
<b>MQ</b> Minolta CM-700d	<b>MT</b> Minolta CM-2600d	<b>MV</b> Minolta CM-3000d Spectrophotometer
<b>MW</b> Minolta CM 3700a Spectrophotometer	<b>MY</b> Minolta Benchtop Spectrophotometer CM-3600a	<b>SI</b> SHIMADZU 3700i
<b>XB</b> X-Rite Ci7000 Series Benchtop Spectrophotometer	<b>XC</b> X-Rite Ci4200 Benchtop Spectrophotometer	<b>XD</b> X-Rite Ci7800 Benchtop Spectrophotometer
<b>XE</b> X-Rite Ci7600 Benchtop Spectrophotometer	<b>XF</b> X-Rite Ci6x Portable Spectrophotometer	<b>XG</b> X-Rite Ci7860 Benchtop Spectrophotometer
<b>XH</b> X-Rite Color i5 Benchtop Spectrophotometer	<b>XI</b> X-Rite Color i7 Benchtop Spectrophotometer	<b>XO</b> X-Rite SP64 Portable Sphere Spectrophotometer



**Interlaboratory Testing Program for Color & Appearance**

**Report #211**

**Analysis 440**

**1st Qtr 2025**

**60 Degree Gloss - Paint Chips**

**ASTM Method D 523**

WebCode	Data Flag	Sample E251			Sample E252			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
2RJED9		27.63	0.40	0.72	37.08	0.17	0.25	GL
3GDUP7		27.65	0.43	0.77	37.20	0.30	0.44	GN
3U3V28		28.23	1.00	1.81	37.68	0.77	1.14	GL
3VJQ99		27.48	0.25	0.45	36.90	0.00	-0.01	GL
44LHV9		26.68	-0.55	-0.99	36.80	-0.10	-0.15	GL
4QZDJ6		27.60	0.38	0.68	37.35	0.45	0.66	GK
4RFAB6		26.68	-0.55	-0.99	35.70	-1.20	-1.79	DE
6CRTG4		27.08	-0.15	-0.27	37.13	0.22	0.33	GL
6UCKF4		27.93	0.70	1.27	38.40	1.50	2.22	GK
77NZ79		27.35	0.13	0.23	36.95	0.05	0.07	GL
79NF96		27.25	0.03	0.05	37.15	0.25	0.37	GN
7YLX3		27.28	0.05	0.09	36.88	-0.03	-0.04	GN
8EYNF2		27.45	0.23	0.41	37.30	0.40	0.59	RA
8VL793		26.68	-0.55	-0.99	35.80	-1.10	-1.64	GL
9BTHH8		26.73	-0.50	-0.90	35.95	-0.95	-1.41	GK
9NE2R3		27.50	0.28	0.50	36.85	-0.05	-0.08	GN
A47A9Z		27.28	0.05	0.09	37.43	0.52	0.77	GL
A7F2J3		26.75	-0.47	-0.86	36.80	-0.10	-0.15	GL
ADC2R4		26.45	-0.77	-1.40	36.60	-0.30	-0.45	GK
AZ9TW7		26.90	-0.32	-0.59	37.00	0.10	0.14	GL
BQU992		26.68	-0.55	-0.99	36.93	0.02	0.03	GN
C6DB86		26.78	-0.45	-0.81	37.18	0.27	0.40	GN
DEVADZ		26.03	-1.20	-2.17	35.38	-1.53	-2.27	GL
DN4LQX		27.48	0.25	0.45	37.00	0.10	0.14	GX
EC9Q9W		26.83	-0.40	-0.72	36.15	-0.75	-1.12	GK
EER822		26.98	-0.25	-0.45	36.35	-0.55	-0.82	GL
EPU6BV		27.15	-0.07	-0.13	37.05	0.15	0.22	GL
ETN76X		26.03	-1.20	-2.17	35.60	-1.30	-1.93	MW
EUNY9W		26.88	-0.35	-0.63	36.85	-0.05	-0.08	GL
EZUXH2		26.33	-0.90	-1.62	36.13	-0.78	-1.15	GL
F84Q3V		26.33	-0.90	-1.62	35.65	-1.25	-1.86	GL
FJYTPX	*	26.45	-0.77	-1.40	35.13	-1.78	-2.64	GL
FXHMUW		27.70	0.48	0.86	38.03	1.12	1.66	GL



**Interlaboratory Testing Program for Color & Appearance**  
**Analysis 440**  
**60 Degree Gloss - Paint Chips**  
**ASTM Method D 523**

**Report #211**  
**1st Qtr 2025**

WebCode	Data Flag	Sample E251			Sample E252			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
FYTHKU	*	28.55	1.33	2.40	37.63	0.72	1.07	RA
GEMCQU		27.45	0.23	0.41	37.25	0.35	0.51	GL
GK963T		27.38	0.15	0.27	37.13	0.22	0.33	GK
GNT9EW		27.55	0.33	0.59	36.85	-0.05	-0.08	GL
HTENHU		28.15	0.93	1.67	38.00	1.10	1.63	GL
J3GAZT		27.83	0.60	1.09	37.95	1.05	1.55	EN
JK4LWU		27.40	0.18	0.32	37.05	0.15	0.22	GK
JVYVFW		26.63	-0.60	-1.08	36.70	-0.20	-0.30	GK
KWCNRQ		27.35	0.13	0.23	37.28	0.37	0.55	ZA
L3QYEP	*	28.28	1.05	1.90	37.23	0.32	0.48	RA
MR73WP		27.05	-0.17	-0.31	36.18	-0.73	-1.08	GL
N69VYL		27.73	0.50	0.91	36.83	-0.08	-0.12	XX
NDLRZL		26.85	-0.37	-0.68	37.20	0.30	0.44	GL
PDJALM		26.70	-0.52	-0.95	36.80	-0.10	-0.15	GL
PTBEHJ		27.15	-0.07	-0.13	36.60	-0.30	-0.45	GK
QFMQTH		26.85	-0.37	-0.68	36.35	-0.55	-0.82	GL
QHADJK		27.13	-0.10	-0.18	36.90	0.00	-0.01	GL
QJLZ3J		27.85	0.63	1.13	37.93	1.02	1.52	GL
R7CP8G		27.58	0.35	0.63	36.90	0.00	-0.01	GL
TQEVDM		26.90	-0.32	-0.59	36.30	-0.60	-0.90	GK
U4JDKG		27.98	0.75	1.36	37.13	0.22	0.33	NH
UG7HWJ		27.88	0.65	1.18	37.95	1.05	1.55	GL
UGL47L		27.30	0.08	0.14	37.00	0.10	0.14	GN
V6QA9H		27.25	0.03	0.05	36.50	-0.40	-0.60	GL
VD42YF		27.45	0.23	0.41	37.73	0.82	1.22	MW
VEE67C		27.84	0.61	1.11	37.52	0.61	0.91	GL
VUL8ZE		27.48	0.25	0.45	37.03	0.12	0.18	GL
VYG2XF		26.08	-1.15	-2.08	35.58	-1.33	-1.97	GB
WKWVAJ		27.10	-0.12	-0.22	36.88	-0.03	-0.04	GL
X2YXJB		27.78	0.55	1.00	37.28	0.37	0.55	GL
XDB3UD		27.35	0.13	0.23	37.23	0.32	0.48	GL
XKTQ9F		27.40	0.18	0.32	37.53	0.62	0.92	GL



**Interlaboratory Testing Program for Color & Appearance**

Report #211

**Analysis 440**

1st Qtr 2025

**60 Degree Gloss - Paint Chips**

**ASTM Method D 523**

WebCode	Data Flag	Sample E251			Sample E252			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
YPC4A		27.47	0.25	0.45	36.96	0.05	0.08	GL
ZGQCZF	X	29.28	2.05	3.71	39.15	2.25	3.33	GD

**Summary Statistics**

**Grand Means**

27.22 Gloss Units

36.90 Gloss Units

**Stnd Dev Btwn Labs**

0.55 Gloss Units

0.67 Gloss Units

Statistics based on 66 of 67 reporting participants

**Comments on Assigned Data Flags for Test #440**

ZGQCZF(X) - Data for both samples are high. Possible systematic error.

**Key to Instrument Codes Reported by Participants**

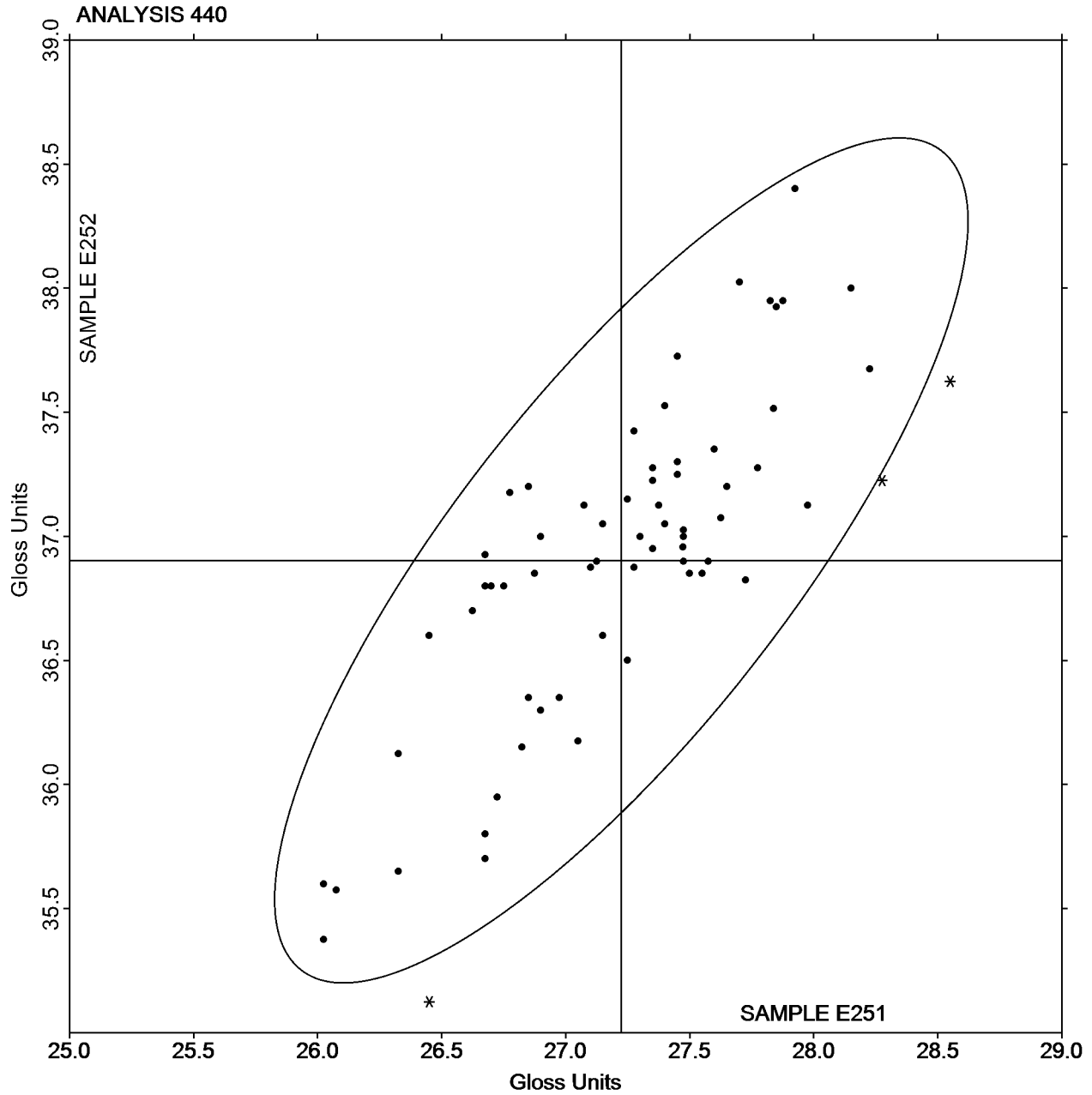
DE	DeFelsko PosiTector GLS 60	EN	Elcometer 480
GB	BYK Gardner Spectro - Guide Sphere Gloss	GD	BYK Gardner Spectro2Guide 45/0
GK	BYK-Gardner micro-gloss (60)	GL	BYK-Gardner micro-TRI-gloss
GN	BYK-Gardner new micro-TRI-gloss	GX	BYK-Gardner (model not specified)
MW	Minolta Multi-Gloss 268	NH	3nh NHG268 Multi-angle Precise Gloss Meter
RA	Rhopoint Novo-Gloss Glossmeter	XX	Instrument make/model not specified by lab
ZA	Zehntner ZGM Series		



**Interlaboratory Testing Program for Color & Appearance**  
**Analysis 440**  
60 Degree Gloss - Paint Chips  
ASTM Method D 523

Report #211  
1st Qtr 2025

SAMPLE E251 = 27.22 Gloss Units      SAMPLe E252 = 36.90 Gloss Units



-End of Report-