



Color & Appearance Testing Program

Summary Report #208 - 2nd Qtr 2024

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

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<u>Analysis</u>	<u>Analysis Name</u>
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408	Color & Color Difference-45-0, D65/10° Observer
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409	Color & Color Difference Sphere, D65/10°Observer
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411	Spectrophotometric - Sphere
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440	Gloss 60 Degree
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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.

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Key for Color Program 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 2 test results obtained by the participant for CIE L*,a*,b* color space values.
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.
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.
Graphs	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* ₂ vs L* ₁ , a* ₂ vs a* ₁ and b* ₂ vs b* ₁ . The a* and b* plots are created using absolute values.
Inst Code	A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).
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	CAUTION - 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	STOP - 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	PROCEED - 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

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.
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.
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).
Inst Code	A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).
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>
X	EXCLUDED	STOP - 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	CAUTION - 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	STOP - 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	PROCEED - 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 #208**
Analysis 408 **2nd Qtr 2024**

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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
28M36U		B241	35.25	8.80	-5.95	0.50	0.30	-0.75	0.95	HW
		B242	35.75	9.10	-6.70					
2P3C7V		B241	34.95	9.00	-6.10	0.65	0.40	-0.80	1.11	HW
		B242	35.60	9.40	-6.90					
338UGV		B241	33.55	8.93	-6.35	0.70	0.36	-0.78	1.11	XS
		B242	34.24	9.29	-7.13					
46TVZN		B241	33.62	8.71	-6.33	0.74	0.35	-0.74	1.10	GG
		B242	34.36	9.06	-7.07					
4ZY23M	X	B241	34.64	10.40	-6.05	0.33	0.59	-0.79	1.04	HW
		B242	34.97	10.99	-6.84					
6YWQLA	X	B241	28.78	6.20	-4.54	0.50	0.30	-0.58	0.82	HX
		B242	29.29	6.50	-5.12					
6YYCGP		B241	33.81	8.95	-6.41	0.74	0.33	-0.75	1.10	XO
		B242	34.55	9.28	-7.16					
79J3GM		B241	34.22	8.79	-6.21	0.66	0.37	-0.74	1.06	XU
		B242	34.88	9.16	-6.95					
7GV4UB		B241	36.05	8.39	-6.34	0.58	0.36	-0.70	0.97	XJ
		B242	36.62	8.76	-7.03					
82DV7C		B241	33.82	8.69	-6.56	0.88	0.28	-0.70	1.16	XE
		B242	34.71	8.97	-7.25					
8XEGJM		B241	33.15	8.74	-6.30	0.80	0.33	-0.70	1.10	GA
		B242	33.94	9.06	-7.00					
99RZFN		B241	34.11	8.92	-6.25	0.64	0.43	-0.76	1.08	GE
		B242	34.75	9.34	-7.01					
9ATRVJ	X	B241	36.56	8.15	-6.15	0.61	0.40	-1.70	1.86	XU
		B242	37.17	8.56	-7.86					
9QAYN8		B241	32.68	9.06	-6.81	0.74	0.32	-0.76	1.11	BG
		B242	33.43	9.38	-7.57					
9ZLYHH		B241	34.78	8.76	-6.31	0.63	0.35	-0.70	1.00	XE
		B242	35.41	9.11	-7.01					
A8EQ3H		B241	34.24	8.36	-6.18	0.64	0.29	-0.75	1.03	GE
		B242	34.88	8.65	-6.93					



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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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
ATZFLL		B241	34.19	9.04	-5.98	0.52	0.44	-0.77	1.03	HW
		B242	34.71	9.48	-6.75					
B2HLMH		B241	33.32	8.65	-6.37	0.79	0.35	-0.76	1.15	GG
		B242	34.12	9.01	-7.12					
BGYG3E		B241	33.91	8.96	-6.50	0.49	0.40	-0.81	1.03	XM
		B242	34.40	9.37	-7.31					
BQ7AFF		B241	33.91	8.80	-6.64	0.47	0.43	-0.82	1.04	XW
		B242	34.38	9.23	-7.46					
BRJN24		B241	36.26	8.23	-6.38	0.57	0.36	-0.71	0.98	MS
		B242	36.83	8.59	-7.09					
CBMT3H		B241	34.56	8.66	-6.52	0.54	0.39	-0.76	1.00	HL
		B242	35.09	9.05	-7.28					
DJFKNG	X	B241	34.39	9.07	-7.72	0.67	0.33	-0.67	1.01	XD
		B242	35.06	9.40	-8.39					
DXGZB7		B241	34.27	8.81	-6.36	0.60	0.36	-0.73	1.01	HW
		B242	34.87	9.16	-7.09					
E2GLLA		B241	33.74	8.96	-6.42	0.66	0.34	-0.74	1.04	XP
		B242	34.40	9.30	-7.16					
ET233A	X	B241	34.90	8.80	-6.50	0.80	0.30	0.05	0.86	XE
		B242	35.70	9.10	-6.45					
FDL7EZ		B241	34.73	8.72	-6.29	0.78	0.34	-0.72	1.12	XE
		B242	35.52	9.06	-7.01					
FY3MJC		B241	34.14	9.06	-6.45	0.42	0.42	-0.79	0.98	GE
		B242	34.56	9.47	-7.23					
GPV7MY		B241	33.06	8.98	-6.86	0.70	0.31	-0.76	1.07	BG
		B242	33.75	9.29	-7.61					
HAUQZB	X	B241	30.64	9.74	-7.26	0.86	0.29	-0.82	1.22	PR
		B242	31.50	10.03	-8.07					
HNFFJD		B241	34.87	8.90	-6.09	0.47	0.44	-0.78	1.01	HW
		B242	35.34	9.33	-6.87					
JAD8E4		B241	34.12	8.78	-6.31	0.77	0.32	-0.71	1.10	XU
		B242	34.89	9.10	-7.02					



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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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
K9R3AB		B241	33.61	8.99	-6.59	0.89	0.27	-0.68	1.16	XU
		B242	34.51	9.26	-7.27					
L3MLEV		B241	34.73	8.63	-6.63	0.72	0.36	-0.76	1.10	MH
		B242	35.45	8.99	-7.38					
MX7DQV		B241	36.06	8.34	-6.23	0.66	0.38	-0.72	1.04	DD
		B242	36.72	8.71	-6.95					
PZNELU		B241	34.60	8.61	-6.19	0.57	0.41	-0.77	1.04	HM
		B242	35.18	9.02	-6.96					
Q9X6PW		B241	34.54	8.94	-6.18	0.75	0.36	-0.71	1.09	HX
		B242	35.29	9.30	-6.89					
QBFMJM		B241	34.59	8.82	-6.10	0.48	0.38	-0.73	0.96	HW
		B242	35.08	9.21	-6.83					
QK78MY		B241	34.85	8.65	-6.41	0.50	0.41	-0.74	0.99	XE
		B242	35.35	9.06	-7.16					
R8XF4Z		B241	33.99	8.76	-6.24	0.90	0.31	-0.71	1.19	XU
		B242	34.89	9.08	-6.95					
RK3YFZ		B241	35.06	8.77	-6.11	0.53	0.40	-0.73	0.99	MG
		B242	35.60	9.17	-6.84					
RN2ABZ		B241	33.75	8.94	-6.47	0.63	0.33	-0.75	1.04	GH
		B242	34.38	9.27	-7.23					
TBUTUW		B241	33.90	8.89	-6.22	0.46	0.36	-0.74	0.95	GU
		B242	34.36	9.25	-6.97					
TJL2MZ		B241	33.49	8.97	-6.50	0.57	0.42	-0.82	1.08	MT
		B242	34.06	9.39	-7.32					
UDWQ6P		B241	33.90	8.60	-6.56	0.71	0.33	-0.74	1.07	XF
		B242	34.61	8.93	-7.30					
UGW2ZP		B241	34.34	8.67	-6.23	0.52	0.39	-0.76	1.00	XU
		B242	34.86	9.06	-6.99					
UL837T		B241	34.59	8.92	-6.11	0.52	0.43	-0.78	1.03	HW
		B242	35.12	9.35	-6.89					
V3Q7F2		B241	34.60	8.80	-6.50	0.60	0.30	-0.80	1.04	HL
		B242	35.20	9.10	-7.30					



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2nd Qtr 2024**

Analysis 408

**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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
VUGRJR		B241	34.53	8.80	-6.59	0.70	0.34	-0.70	1.05	XE
		B242	35.23	9.14	-7.29					
VYBXR3		B241	34.28	8.76	-6.19	0.59	0.36	-0.77	1.04	XU
		B242	34.87	9.11	-6.96					
X2Q47F		B241	33.81	9.15	-6.42	0.67	0.36	-0.76	1.08	GE
		B242	34.48	9.50	-7.18					
YWBWHF		B241	34.65	8.70	-6.50	0.65	0.30	-0.70	1.00	HL
		B242	35.30	9.00	-7.20					

Summary Statistics								
Samples	L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
Grand Means								
B241	34.35	8.78	-6.34	0.64	0.36	-0.75	1.05	
B242	34.99	9.14	-7.09					
Std Dev Btwn Labs								
B241	0.78	0.22	0.20	0.12	0.04	0.04	0.06	
B242	0.75	0.22	0.20					

Statistics based on 46 of 52 reporting participants

Comments Assigned on Data Flags for Test #408

- 4ZY23M(X) - Extreme data for both a* values. Large Delta a.
- 6YWQLA(X) - Extreme Data. Large Delta b, small Delta E.
- 9ATRVJ(X) - Low b* value for Sample B242. Large replication difference for b* Sample B242. Small Delta b, large Delta E.
- DJFKNG(X) - Extreme data for both b* values.
- ET233A(X) - High b* value for Sample B242. Large replication difference for both b* values. Large Delta b, small Delta E.
- HAUQZB(X) - Very low L* and b* values for both samples. Very high a* values for both samples. Large Delta E.



Key to Instrument Codes Reported by Participants

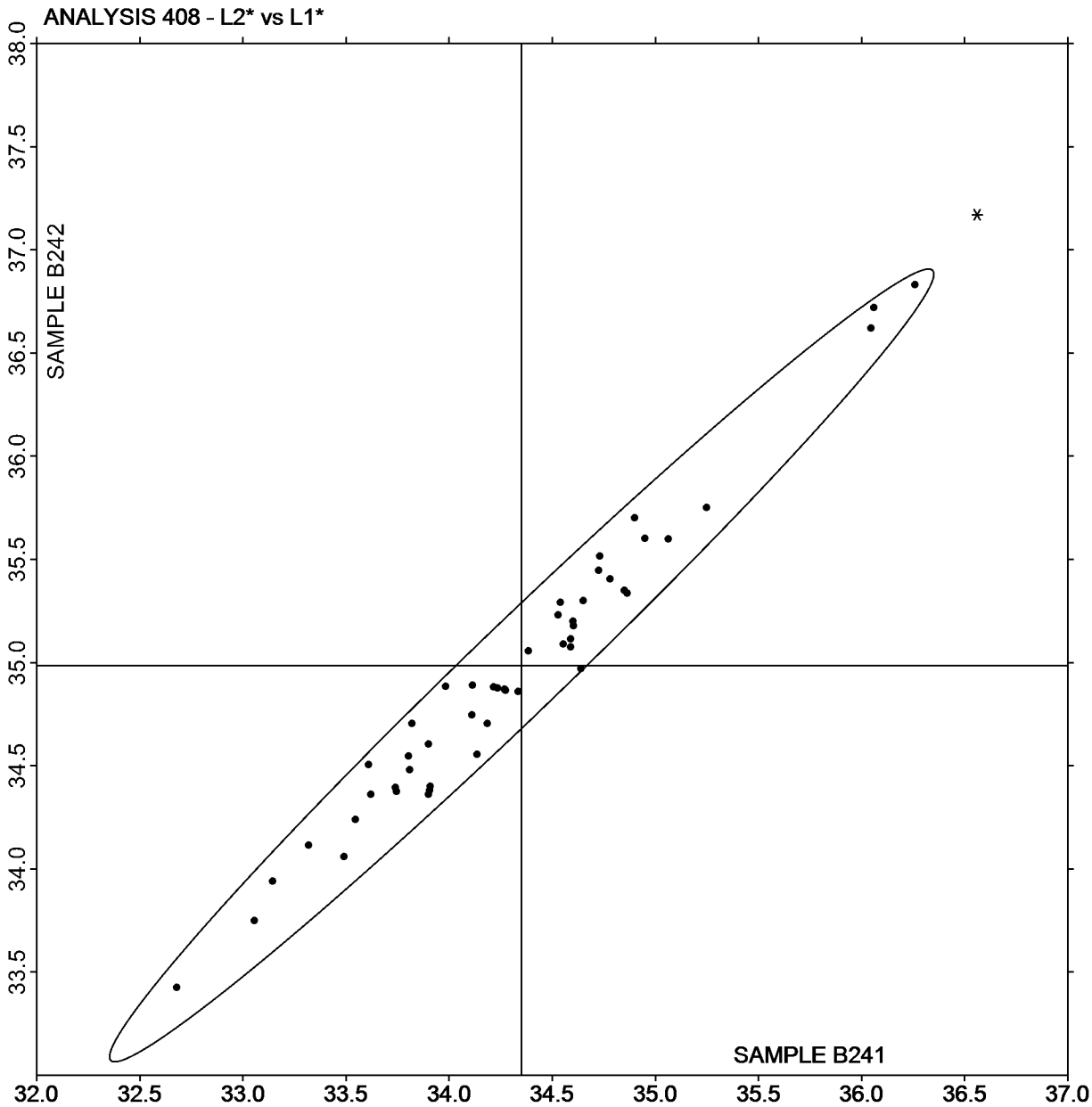
BG	BYK Mac i	DD	Data Color 200
GA	BYK-Gardner	GE	BYK-Gardner spectro-guide (45/0)
GG	BYK-Gardner spectro2-guide (45/0) gloss	GH	BYK-Gardner Color-View
GU	Gretag Spectrolino Spectrophotometer	HL	Hunter Agera
HM	Hunter MiniScan EZ 4500L	HW	Hunter LabScan XE
HX	Hunter Color FlexEZ 45/0	MG	Macbeth 1500/PLUS or 2025+ Color Eye
MH	Minolta CM-2600 Spectrophotometer	MS	Minolta CM-600d Spectrophotometer
MT	Minolta CM-25cG Spectrophotometer	PR	PhotoResearch PR730
XD	X-Rite 500 Series SpectroDensitometer	XE	X-Rite eXact Portable Spectrophotometer
XF	X-Rite i1 iSis	XJ	X-Rite CI7XX0
XM	X-Rite MA58 Multi-Angle Spectrophotometer	XO	X-Rite MA68 II Multi-Angle Spectrophotometer
XP	X-Rite MA9 Multi-Angle Spectrophotometer	XS	X-Rite 962 Portable Spectrophotometer
XU	X-Rite 964 Portable Spectrophotometer	XW	X-Rite



L2* vs L1*

SAMPLE B241 = 34.35

SAMPLE B242 = 34.99



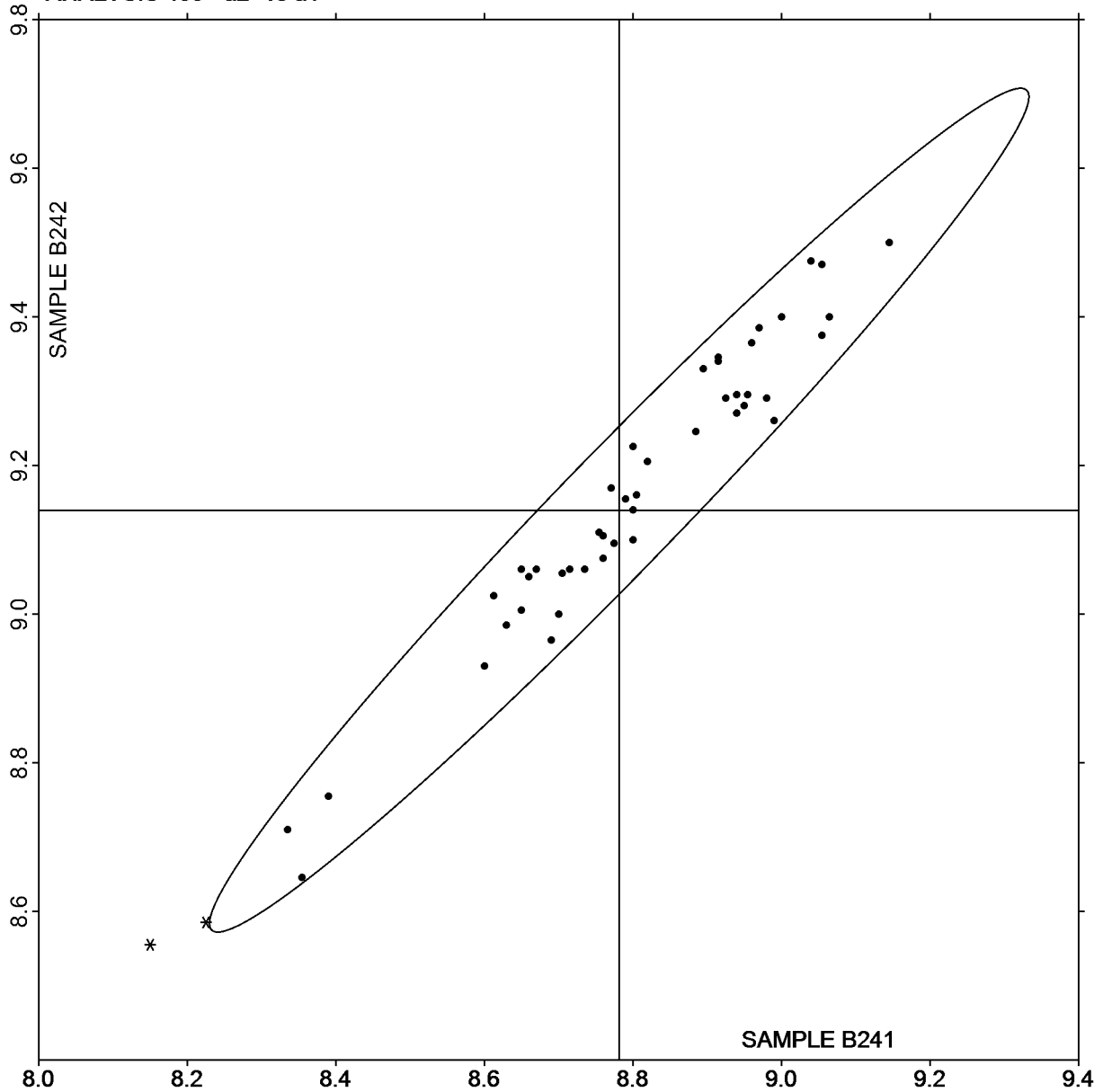


a2* vs a1*

SAMPLE B241 = 8.78

SAMPLE B242 = 9.14

ANALYSIS 408 - a2* vs a1*



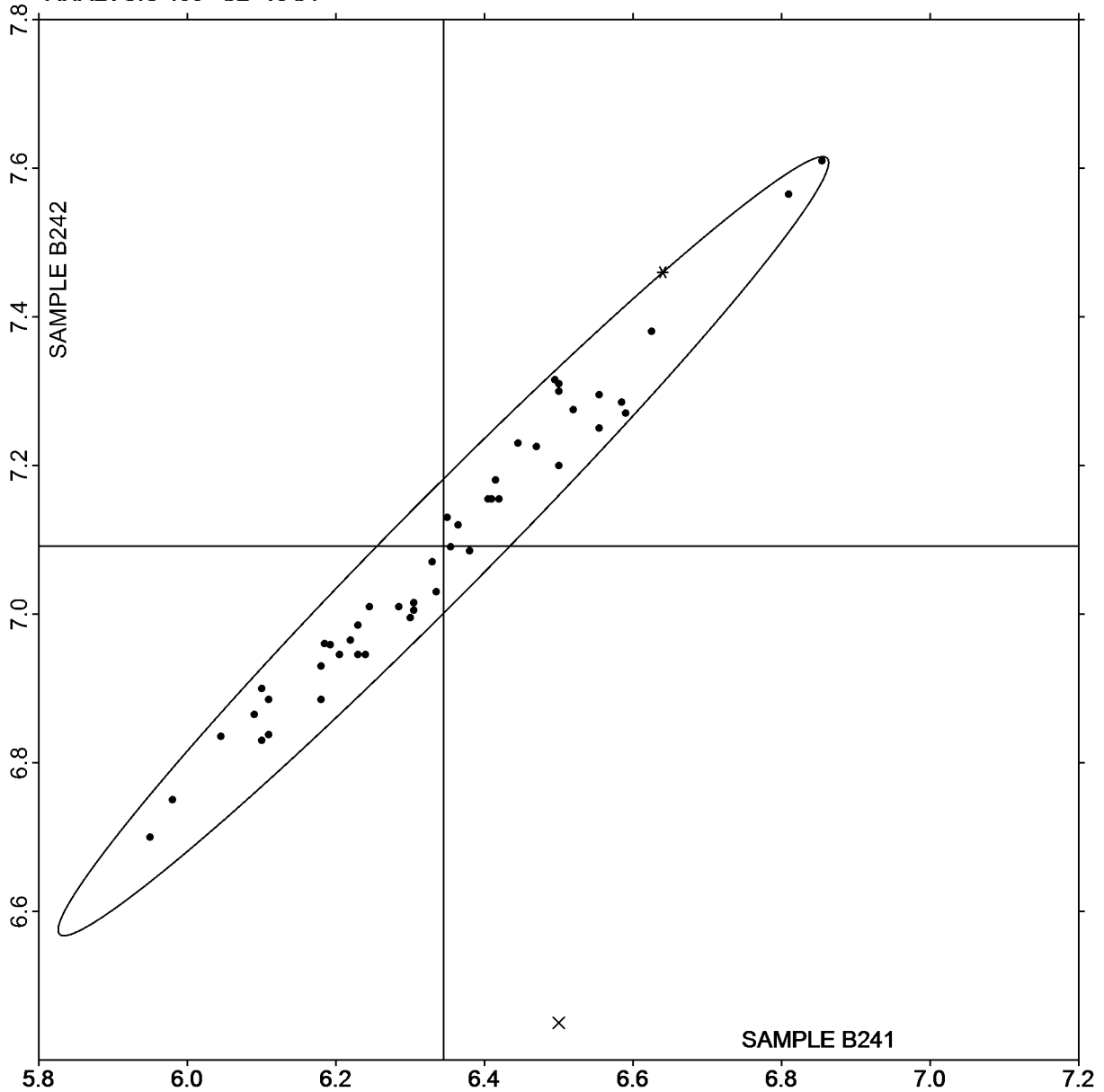


b2* vs b1*

SAMPLE B241 = -6.34

SAMPLE B242 = -7.09

ANALYSIS 408 - b2* vs b1*



Plot created using absolute values.



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WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
32GJRM		B241	36.00	8.28	-6.33	0.62	0.37	-0.71	1.01	XD
		B242	36.62	8.65	-7.04					
338UGV		B241	36.32	8.15	-6.20	0.53	0.39	-0.70	0.96	AJ
		B242	36.84	8.54	-6.90					
3JWTTN		B241	36.37	8.12	-6.21	0.65	0.37	-0.72	1.03	AJ
		B242	37.01	8.48	-6.93					
3XH9WM		B241	36.02	8.38	-6.46	0.84	0.28	-0.67	1.10	XB
		B242	36.85	8.66	-7.12					
46TVZN	X	B241	36.13	8.05	-5.89	0.64	0.38	-0.71	1.03	GE
		B242	36.77	8.43	-6.60					
4FTGAT		B241	36.21	8.11	-6.52	0.62	0.38	-0.68	1.00	HP
		B242	36.83	8.49	-7.20					
69MCPM	X	B241	36.88	8.12	-6.39	0.56	0.35	-0.70	0.96	CA
		B242	37.44	8.48	-7.09					
6YVUBE		B241	36.27	8.24	-6.45	0.59	0.37	-0.72	1.00	XD
		B242	36.87	8.61	-7.17					
78R43P		B241	36.09	8.33	-6.37	0.62	0.36	-0.68	0.99	XD
		B242	36.70	8.69	-7.05					
7CFV7B		B241	36.27	8.20	-6.21	0.61	0.38	-0.72	1.02	AS
		B242	36.88	8.57	-6.93					
8GCU3L		B241	35.91	8.30	-6.28	0.63	0.38	-0.68	1.01	XI
		B242	36.54	8.68	-6.96					
8R9QGG		B241	36.14	8.26	-6.40	0.62	0.40	-0.71	1.02	MV
		B242	36.76	8.66	-7.10					
8XEGJM		B241	36.25	8.30	-6.22	0.64	0.38	-0.67	1.00	AJ
		B242	36.89	8.69	-6.88					
9ATRVJ		B241	36.30	8.13	-6.34	0.59	0.39	-0.73	1.02	XI
		B242	36.89	8.52	-7.07					
9JXYBJ		B241	36.22	8.25	-6.31	0.62	0.39	-0.70	1.02	AS
		B242	36.84	8.64	-7.02					
A8EQ3H	X	B241	36.24	7.65	-6.42	0.59	0.40	-0.74	1.02	GD
		B242	36.82	8.05	-7.16					



CTS Interlaboratory Testing Program for Color & Appearance **Report #208**
Analysis 409 **2nd Qtr 2024**

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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
ADJPE8		B241	36.27	8.23	-6.22	0.57	0.38	-0.72	0.99	AS
		B242	36.84	8.62	-6.93					
B2333K		B241	36.20	8.19	-6.53	0.59	0.37	-0.69	0.98	HP
		B242	36.79	8.56	-7.22					
BJ3CLH		B241	36.32	8.14	-6.37	0.57	0.38	-0.68	0.96	AQ
		B242	36.89	8.52	-7.05					
BPRPM7		B241	36.05	8.35	-6.39	0.57	0.36	-0.71	0.98	XD
		B242	36.62	8.70	-7.10					
BRJN24		B241	36.22	8.21	-6.36	0.63	0.38	-0.74	1.04	MS
		B242	36.85	8.59	-7.10					
C9MH94		B241	36.22	8.29	-6.14	0.59	0.39	-0.69	0.98	AS
		B242	36.81	8.68	-6.83					
C9P36J		B241	36.32	8.11	-6.50	0.61	0.35	-0.72	1.00	HP
		B242	36.93	8.46	-7.22					
CAVUNK		B241	36.24	8.21	-6.26	0.64	0.39	-0.71	1.03	MW
		B242	36.88	8.60	-6.97					
CBTW6A		B241	36.05	8.37	-6.42	0.61	0.36	-0.68	0.99	XD
		B242	36.66	8.73	-7.10					
CEM4XH		B241	36.38	8.23	-6.19	0.57	0.38	-0.70	0.98	AT
		B242	36.96	8.61	-6.89					
CP8BW8		B241	36.38	8.26	-6.20	0.57	0.37	-0.70	0.98	AU
		B242	36.96	8.62	-6.90					
DG97GB		B241	36.53	8.23	-6.18	0.57	0.38	-0.69	0.97	XC
		B242	37.10	8.61	-6.87					
DJGB3C		B241	36.37	8.15	-6.23	0.62	0.40	-0.73	1.04	AJ
		B242	36.99	8.56	-6.96					
E2GLLA		B241	36.60	8.16	-6.17	0.34	0.40	-0.68	0.86	XF
		B242	36.94	8.56	-6.85					
ECB4R2		B241	36.22	8.28	-6.30	0.64	0.38	-0.72	1.03	AU
		B242	36.86	8.67	-7.02					
F2UJ96		B241	36.20	8.27	-6.42	0.58	0.34	-0.71	0.98	MQ
		B242	36.78	8.62	-7.12					



CTS Interlaboratory Testing Program for Color & Appearance **Report #208**
Analysis 409 **2nd Qtr 2024**

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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
FPXQJE		B241	35.91	8.38	-6.43	0.64	0.38	-0.70	1.02	XB
		B242	36.55	8.76	-7.13					
GBVGF7		B241	36.38	8.27	-6.22	0.58	0.39	-0.72	1.00	AS
		B242	36.95	8.66	-6.94					
GLVURY	X	B241	36.11	8.43	-6.75	0.61	0.37	-0.72	1.02	CA
		B242	36.72	8.80	-7.47					
GRYXFC		B241	36.02	8.36	-6.48	0.58	0.34	-0.68	0.95	XD
		B242	36.59	8.70	-7.16					
GYG849		B241	36.34	8.26	-6.55	0.60	0.38	-0.71	1.00	AO
		B242	36.94	8.64	-7.25					
HAUQZB		B241	36.14	8.21	-6.55	0.62	0.40	-0.74	1.04	CA
		B242	36.76	8.61	-7.29					
HREJPE	X	B241	36.87	8.10	-6.74	0.62	0.40	-0.73	1.03	SI
		B242	37.48	8.50	-7.47					
JAD8E4		B241	36.11	8.37	-6.39	0.59	0.38	-0.71	1.00	XE
		B242	36.71	8.75	-7.10					
JNCXC2		B241	36.26	8.21	-6.31	0.57	0.37	-0.70	0.98	MW
		B242	36.84	8.58	-7.01					
JNVZ4B		B241	36.36	8.22	-6.32	0.61	0.33	-0.69	0.98	AO
		B242	36.97	8.55	-7.01					
JVD9R8		B241	36.16	8.26	-6.36	0.61	0.37	-0.69	1.00	MK
		B242	36.77	8.63	-7.05					
K42RZC		B241	36.02	8.28	-6.37	0.63	0.37	-0.68	1.00	XH
		B242	36.65	8.65	-7.05					
KARTN7		B241	36.33	8.26	-6.26	0.64	0.36	-0.68	1.00	AP
		B242	36.98	8.61	-6.94					
KQA2GT		B241	36.18	8.18	-6.31	0.64	0.38	-0.70	1.02	MM
		B242	36.81	8.56	-7.01					
LEXV47	X	B241	36.12	6.41	-6.83	0.55	0.30	-0.76	0.98	XG
		B242	36.67	6.71	-7.59					
LFP6X8		B241	36.20	8.17	-6.49	0.61	0.39	-0.71	1.01	HP
		B242	36.81	8.56	-7.20					



CTS Interlaboratory Testing Program for Color & Appearance **Report #208**
Analysis 409 **2nd Qtr 2024**

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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
LG2QM9		B241	36.51	8.10	-6.03	0.64	0.39	-0.69	1.02	XO
		B242	37.15	8.49	-6.73					
LK6DL8		B241	36.36	8.24	-6.30	0.64	0.37	-0.71	1.02	AT
		B242	37.01	8.61	-7.00					
M8E3C8		B241	36.42	8.12	-6.20	0.61	0.40	-0.75	1.04	AO
		B242	37.03	8.51	-6.95					
MWWLJZ		B241	36.31	8.24	-6.26	0.62	0.39	-0.73	1.04	AT
		B242	36.93	8.63	-6.99					
N9ZDF6		B241	36.34	8.23	-6.27	0.59	0.36	-0.68	0.97	AJ
		B242	36.92	8.59	-6.95					
NEL7R4		B241	35.97	8.32	-6.41	0.59	0.37	-0.71	1.00	XX
		B242	36.56	8.69	-7.12					
NKE2Z4		B241	36.22	8.21	-6.24	0.63	0.41	-0.72	1.04	XH
		B242	36.85	8.62	-6.95					
NVV66		B241	36.09	8.25	-6.30	0.63	0.37	-0.72	1.02	XG
		B242	36.72	8.63	-7.02					
NW7WQ4		B241	35.95	8.29	-6.40	0.63	0.38	-0.71	1.02	XD
		B242	36.59	8.67	-7.11					
NX8M7Y		B241	36.09	8.25	-6.30	0.61	0.37	-0.72	1.01	XG
		B242	36.71	8.62	-7.01					
P9GPWP		B241	36.33	8.23	-6.23	0.65	0.38	-0.71	1.03	AF
		B242	36.98	8.61	-6.94					
PCGXZY		B241	36.55	8.16	-6.09	0.59	0.41	-0.70	1.00	XF
		B242	37.13	8.57	-6.79					
PDAUPT		B241	36.28	8.29	-6.44	0.60	0.37	-0.71	1.00	MT
		B242	36.88	8.65	-7.15					
PDRX67		B241	36.09	8.17	-6.22	0.63	0.39	-0.72	1.03	XI
		B242	36.71	8.56	-6.93					
PP2FVN		B241	36.23	8.09	-6.35	0.64	0.63	-0.70	1.14	HP
		B242	36.87	8.72	-7.05					
PRCD97		B241	36.21	8.33	-6.25	0.63	0.37	-0.70	1.01	AU
		B242	36.85	8.70	-6.95					



CTS Interlaboratory Testing Program for Color & Appearance **Report #208**
Analysis 409 **2nd Qtr 2024**

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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
QLX4CT		B241	36.44	8.25	-6.34	0.64	0.39	-0.71	1.04	MW
		B242	37.08	8.64	-7.05					
QTGA9Z		B241	36.46	8.20	-6.42	0.65	0.37	-0.71	1.03	MV
		B242	37.10	8.56	-7.13					
QV97XU	X	B241	36.24	8.23	-5.77	0.62	0.39	-0.73	1.03	XH
		B242	36.86	8.62	-6.50					
R8GJCZ		B241	35.97	8.40	-6.34	0.63	0.37	-0.71	1.02	XE
		B242	36.60	8.76	-7.05					
R8XF4Z		B241	36.05	8.25	-6.43	0.66	0.38	-0.71	1.04	XD
		B242	36.71	8.63	-7.14					
RN2ABZ		B241	36.55	8.28	-6.30	0.58	0.36	-0.68	0.96	MV
		B242	37.13	8.64	-6.97					
TBUTUW		B241	36.19	8.30	-6.30	0.61	0.35	-0.71	0.99	XH
		B242	36.80	8.64	-7.00					
TJL2MZ		B241	35.97	8.25	-6.44	0.63	0.38	-0.72	1.04	XB
		B242	36.60	8.63	-7.16					
TK28Z6		B241	36.12	8.30	-6.41	0.61	0.34	-0.66	0.96	XD
		B242	36.73	8.64	-7.07					
UAEJP3		B241	36.51	8.23	-6.51	0.61	0.38	-0.70	1.00	XG
		B242	37.12	8.61	-7.21					
UGEBPJ		B241	36.16	8.33	-6.43	0.61	0.38	-0.71	1.01	XD
		B242	36.77	8.71	-7.13					
UL8CQX		B241	36.27	8.16	-6.31	0.65	0.37	-0.69	1.02	MM
		B242	36.92	8.53	-7.01					
UMJRKY		B241	36.29	8.24	-6.30	0.57	0.38	-0.70	0.98	MU
		B242	36.86	8.63	-7.00					
UW3DQ		B241	36.34	8.28	-6.18	0.63	0.38	-0.71	1.01	AS
		B242	36.97	8.66	-6.88					
VMGG6M		B241	36.31	8.19	-6.29	0.58	0.37	-0.69	0.97	MB
		B242	36.89	8.56	-6.98					
VUF4U2		B241	36.05	8.28	-6.25	0.61	0.38	-0.72	1.01	XB
		B242	36.66	8.66	-6.97					



CTS Interlaboratory Testing Program for Color & Appearance Report #208
Analysis 409 2nd Qtr 2024

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*	ΔL^*	Δa^*	Δb^*	ΔE^*	
VYBXR3		B241	36.21	8.32	-6.41	0.59	0.36	-0.69	0.97	XB
		B242	36.80	8.68	-7.09					
XAL88R		B241	36.27	8.29	-6.31	0.58	0.39	-0.69	0.98	AS
		B242	36.84	8.68	-7.00					
XJAWDR		B241	36.35	8.29	-6.23	0.62	0.38	-0.73	1.03	AT
		B242	36.96	8.67	-6.95					
XPXKPP		B241	36.15	8.29	-6.34	0.66	0.36	-0.69	1.02	XD
		B242	36.80	8.65	-7.03					
XTHD2R		B241	36.26	8.22	-6.29	0.66	0.37	-0.69	1.02	MW
		B242	36.92	8.58	-6.98					
YRHMGV	X	B241	37.35	8.35	-6.30	-0.83	0.38	-0.73	1.17	XD
		B242	36.52	8.73	-7.03					
ZUYGLU		B241	36.38	8.25	-6.26	0.56	0.35	-0.70	0.97	AF
		B242	36.94	8.60	-6.96					

Summary Statistics								
Samples	L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
Grand Means								
B241	36.23	8.24	-6.32	0.61	0.38	-0.70	1.01	
B242	36.84	8.62	-7.03					
Std Dev Btwn Labs								
B241	0.15	0.08	0.11	0.05	0.03	0.02	0.03	
B242	0.15	0.07	0.11					

Statistics based on 79 of 87 reporting participants

Comments Assigned on Data Flags for Test #409

- 46TVZN(X) - Very high b* values for both samples.
- 69MCPM(X) - Very high L* values for both samples. Large replication difference for L* values for both samples.
- A8EQ3H(X) - Extreme data for both a* values.
- GLVURY(X) - Low b* values for both samples.
- HREJPE(X) - Very high L* values for both samples. Very low b* values for both samples. Large replication difference for b* values for both samples.
- LEXV47(X) - Extreme data for both a* values. Very low b* values for both samples. Small Delta b.
- QV97XU(X) - Very high b* values for both samples.
- YRHMGV(X) - Extreme data for L* values for Sample B241. Large replication difference for L* Sample B241. Small Delta L, large Delta E.



Key to Instrument Codes Reported by Participants

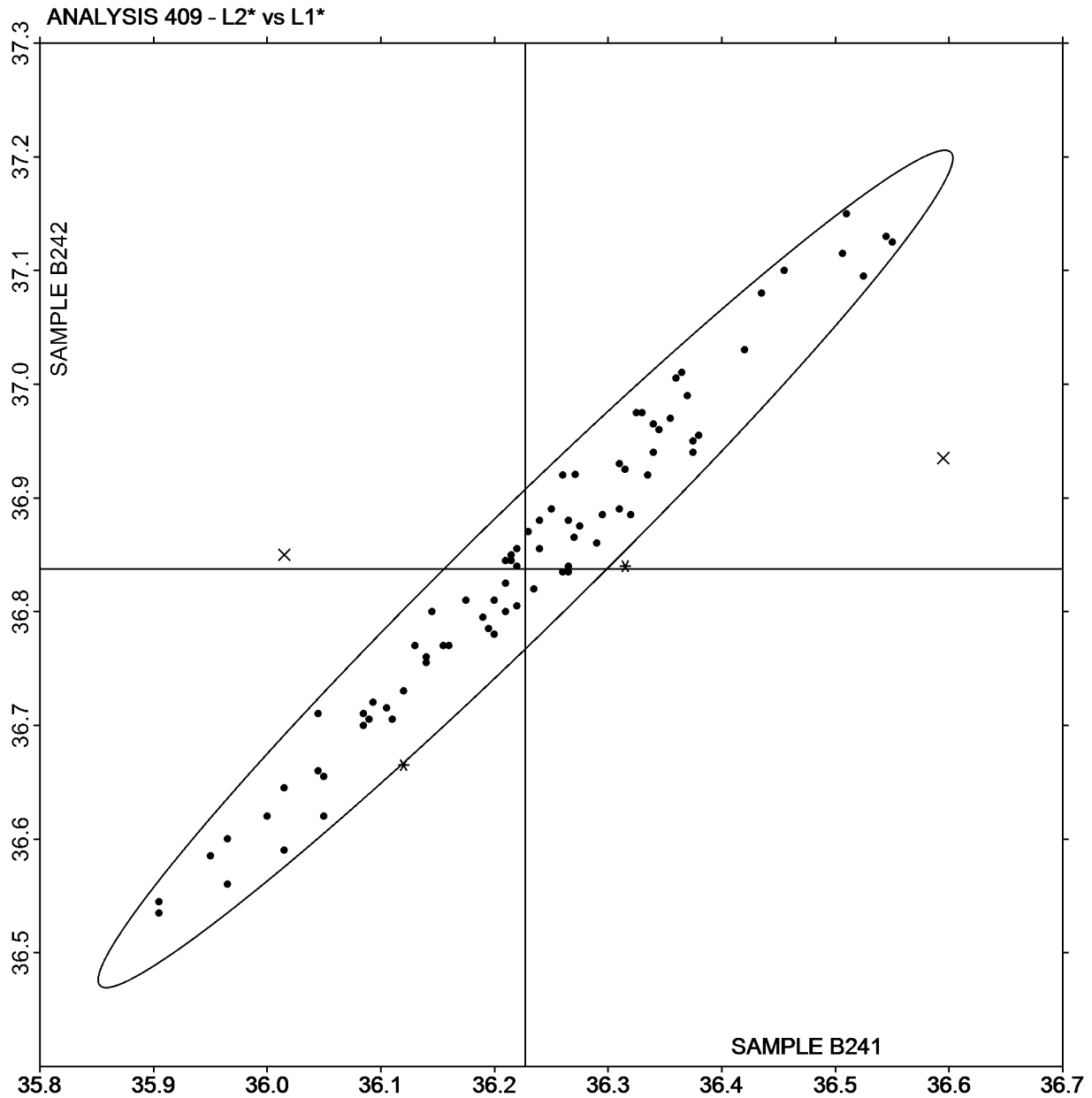
AF	Datacolor 500	AJ	Datacolor 600
AO	Datacolor 650x	AP	Datacolor 750
AQ	Datacolor 600x	AS	Datacolor 800
AT	Datacolor 850	AU	Datacolor 1000
CA	Cary 5000	GD	BYK-Gardner Spectro-Guide Sphere
GE	BYK-Gardner Spectro2-Guide Sphere Gloss	HP	Hunter UltraScan PRO
MB	Minolta CM 3700d Spectrophotometer	MK	Macbeth Color-Eye 7000
MM	Macbeth Color-Eye 7000a	MQ	Minolta CM-700d
MS	Minolta CM-600d	MT	Minolta CM-2600d
MU	Minolta	MV	Minolta CM-3000d Spectrophotometer
MW	Minolta CM 3700a Spectrophotometer	SI	SHIMADZU 3700i
XB	X-Rite Ci7000 Series Benchtop Spectrophotometer	XC	X-Rite Ci4200 Benchtop Spectrophotometer
XD	X-Rite Ci7800 Benchtop Spectrophotometer	XE	X-Rite Ci7600 Benchtop Spectrophotometer
XF	X-Rite Ci6x Portable Spectrophotometer	XG	X-Rite Ci7860 Benchtop Spectrophotometer
XH	X-Rite Color i5 Benchtop Spectrophotometer	XI	X-Rite Color i7 Benchtop Spectrophotometer
XO	X-Rite SP64 Portable Sphere Spectrophotometer	XX	Instrument make/model not specified by lab



L2* vs L1*

SAMPLE B241 = 36.23

SAMPLE B242 = 36.84

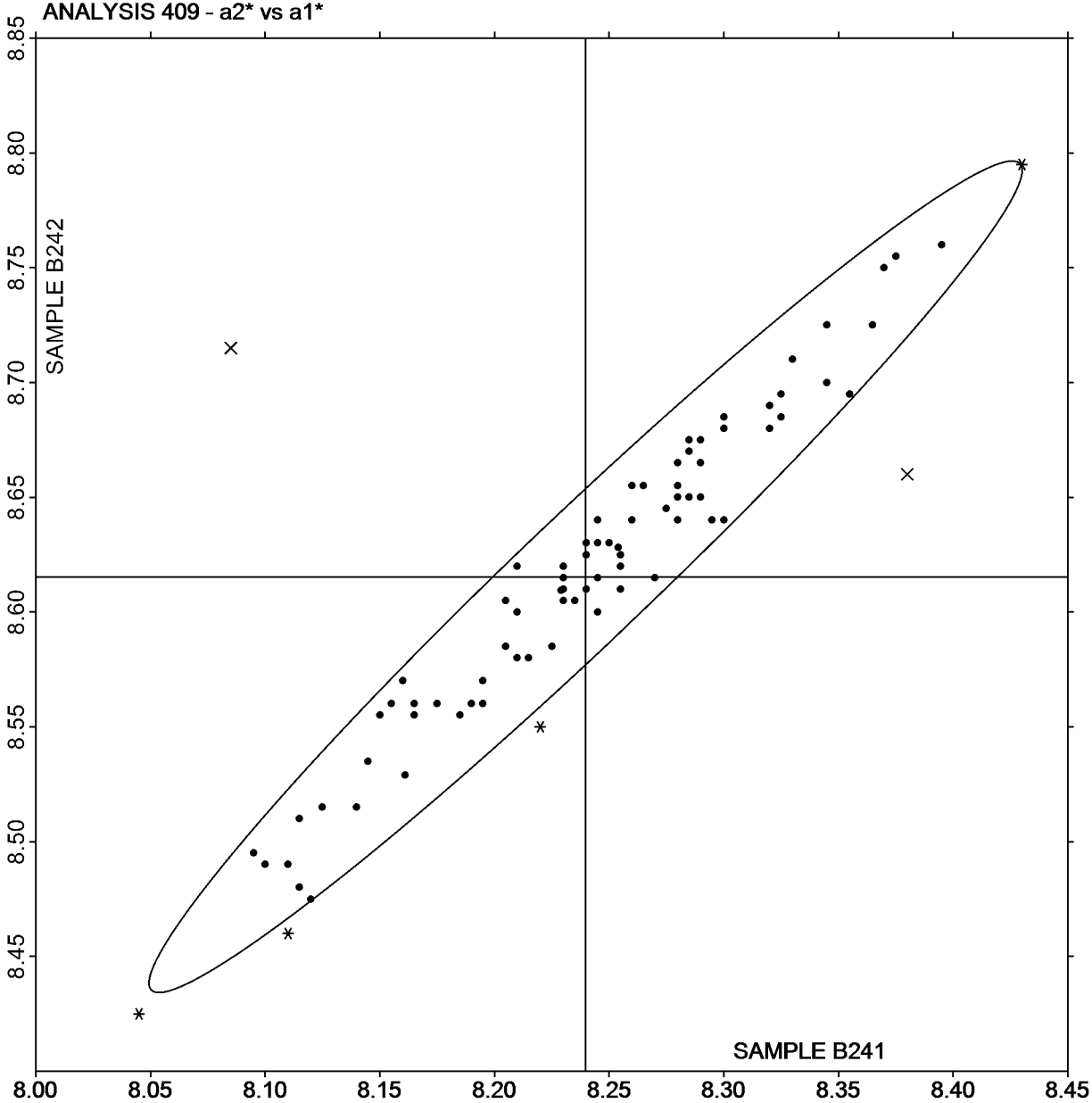




a2* vs a1*

SAMPLE B241 = 8.24

SAMPLE B242 = 8.62

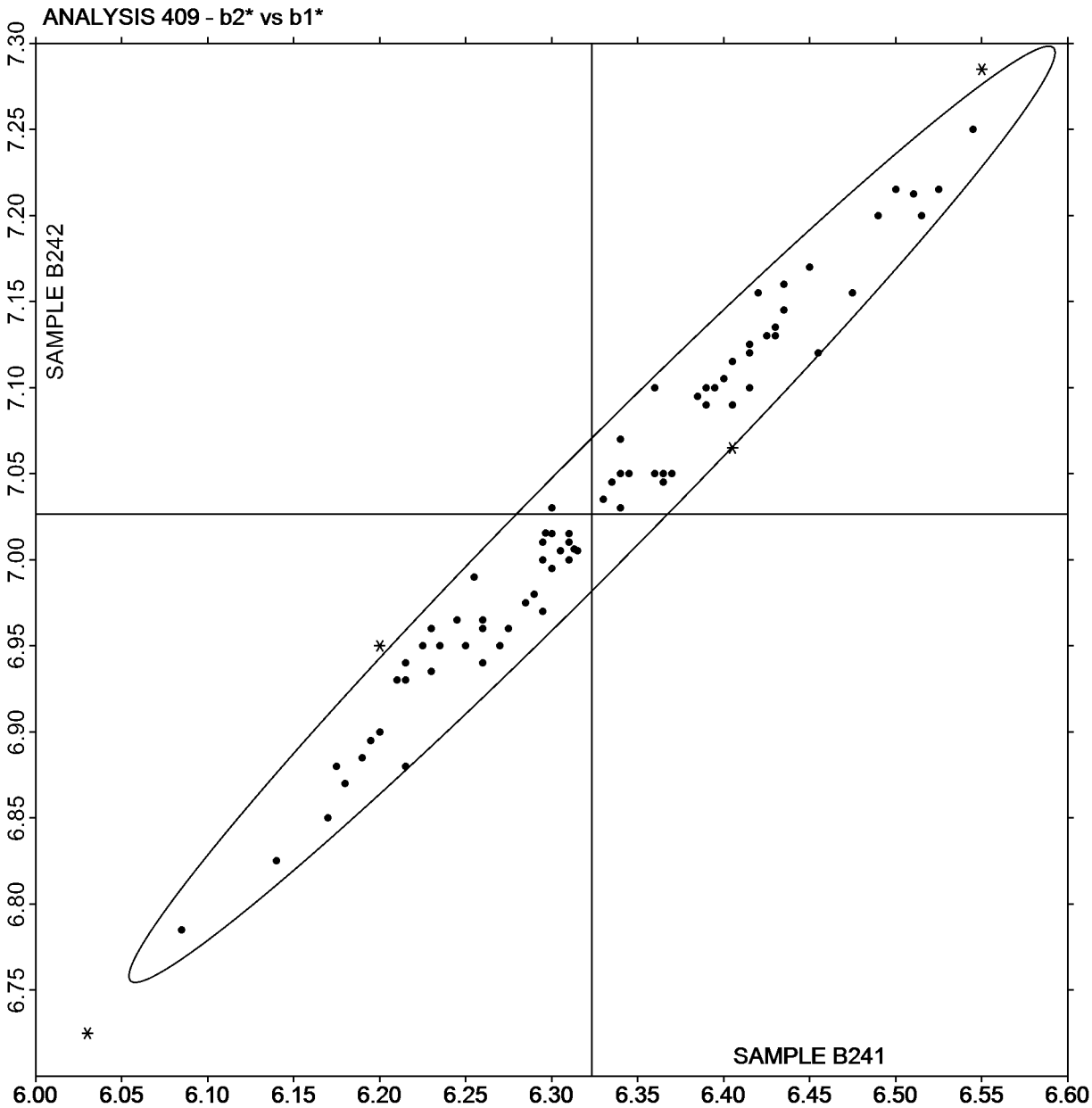




b2* vs b1*

SAMPLE B241 = -6.32

SAMPLE B242 = -7.03



Plot created using absolute values.



CTS Interlaboratory Testing Program for Color & Appearance Analysis 411

**Report #208
2nd Qtr 2024**

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 B241																		
32GJRM		11.37	11.79	11.48	10.98	10.23	9.08	8.06	7.65	7.90	9.06	10.88	10.51	11.25	14.22	16.40	17.18	XD
3JWTTN		11.52	11.98	11.70	11.14	10.40	9.23	8.22	7.90	8.10	9.25	10.93	10.81	11.51	14.32	16.50	17.27	AJ
3XH9WM		11.48	11.87	11.55	11.03	10.28	9.10	8.05	7.65	7.89	9.05	10.94	10.50	11.27	14.38	16.60	17.39	XB
46TVZN		11.17*	11.61X	11.39*	10.95	10.28	9.14	8.11	7.74	7.97	9.13	10.96	10.61	11.30	14.25	16.49	17.35	GE
69MCPM	X	12.02X	12.34X	12.04X	11.55X	10.82X	9.58X	8.49X	8.07X	8.31X	9.45X	11.52*	10.94*	11.53	14.75X	17.07	17.90X	CA
6YVUBE		11.68	12.00	11.70	11.19	10.47	9.24	8.19	7.76	7.99	9.17	11.05	10.66	11.31	14.30	16.51	17.28	XD
78R43P		11.51	11.85	11.55	11.04	10.30	9.14	8.09	7.69	7.93	9.09	10.96	10.54	11.36	14.39	16.50	17.29	XD
7CFV7B		11.57	11.94	11.62	11.09	10.40	9.21	8.16	7.81	8.04	9.12	11.08	10.74	11.33	14.43	16.81	17.12	AS
8GCU3L		11.33	11.70	11.39*	10.93	10.20	9.04	7.98*	7.58	7.83	9.00	10.88	10.44	11.19	14.31	16.54	17.31	XI
8R9QGG		11.52	11.89	11.58	11.12	10.35	9.20	8.12	7.69	7.92	9.09	11.09	10.55	11.15	14.41	16.68	17.53	MV
9ATRVJ		11.49	11.97	11.64	11.16	10.40	9.30	8.24	7.80	8.02	9.16	11.03	10.64	11.39	14.46	16.58	17.38	XI
9JXYBJ		11.84	11.96	11.60	11.08	10.39	9.22	8.17	7.78	8.02	9.09	11.09	10.71	11.28	14.50	17.00	17.55	AS
A8EQ3H		11.97*	11.86	11.63	11.12	10.71X	9.29	8.27	7.89	7.97	9.20	10.64	10.57	11.22	14.40	16.72	16.86X	GE
ADJPE8		11.58	11.92	11.59	11.10	10.38	9.24	8.15	7.81	8.05	9.16	11.08	10.72	11.36	14.40	16.92	17.24	AS
B2333K		11.70	12.10	11.64	11.14	10.44	9.26	8.18	7.72	7.98	8.99	11.01	10.65	11.17	14.31	16.63	17.42	HP
BJ3CLH		11.50	12.01	11.66	11.21	10.46	9.29	8.21	7.82	8.10	9.18	11.07	10.66	11.29	14.36	16.67	17.40	AQ
BPRPM7		11.95*	11.86	11.55	11.04	10.29	9.11	8.06	7.65	7.90	9.07	10.96	10.53	11.31	14.38	16.58	17.34	XD
BRJN24		11.56	11.93	11.60	11.11	10.39	9.21	8.15	7.74	7.97	9.08	11.04	10.62	11.29	14.34	16.65	17.51	MS
C9MH94		11.43	11.83	11.52	11.07	10.33	9.17	8.15	7.76	8.02	9.18	11.04	10.67	11.37	14.44	16.73	17.30	AS
C9P36J		11.56	11.94	11.74	11.26	10.50	9.36	8.24	7.82	8.03	9.10	11.11	10.72	11.11	14.40	16.60	17.38	HP
CEM4XH		11.75	12.00	11.68	11.11	10.45	9.29	8.22	7.86	8.01	9.20	11.18	10.83	11.45	14.51	16.97	17.43	AT
CP8BW8		11.61	12.01	11.66	11.15	10.45	9.28	8.22	7.84	8.10	9.20	11.17	10.80	11.51	14.50	17.02	17.19	AU



CTS Interlaboratory Testing Program for Color & Appearance Analysis 411

**Report #208
2nd Qtr 2024**

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 B241																		
DG97GB		11.77	12.09	11.75	11.24	10.50	9.34	8.30	7.90	8.17	9.36*	11.20	10.77	11.57*	14.61	16.86	17.79*	XC
DJGB3C		11.64	11.94	11.61	11.19	10.48	9.32	8.23	7.86	8.10	9.18	11.14	10.81	11.38	14.54	16.90	17.45	AJ
E2GLLA		11.56	12.12	11.78	11.27	10.52	9.37	8.31	7.92	8.17	9.33*	11.20	10.80	11.56*	14.54	16.86	17.72	XF
ECB4R2		11.53	11.87	11.60	11.13	10.40	9.21	8.15	7.77	8.01	9.10	11.08	10.71	11.37	14.49	16.94	17.24	AU
F2UJ96		11.62	11.96	11.63	11.15	10.40	9.21	8.15	7.74	7.97	9.08	11.05	10.66	11.29	14.38	16.72	17.55	MQ
FPXQJE		11.88	11.79	11.46	10.96	10.20	9.03	8.00	7.60	7.84	8.99	10.84	10.48	11.22	14.21	16.38	17.16	XB
GBVGF7		11.63	11.97	11.62	11.19	10.43	9.27	8.21	7.86	8.10	9.19	11.19	10.77	11.42	14.59	17.06	17.33	AS
GLVURY		11.89*	12.19*	11.82*	11.33*	10.62*	9.36	8.27	7.84	8.08	9.20	11.29	10.71	11.29	14.53	16.89	17.73	CA
GRYXFC		11.40	11.87	11.54	11.03	10.31	9.11	8.04	7.64	7.88	9.04	10.95	10.51	11.18	14.24	16.41	17.17	XD
GYG849		11.71	12.08	11.77	11.25	10.50	9.29	8.22	7.85	8.05	9.16	11.11	10.71	11.33	14.39	16.85	17.65	AO
HAUQZB		11.54	11.89	11.59	11.13	10.39	9.19	8.14	7.70	7.94	9.05	11.09	10.53	11.10	14.27	16.60	17.44	CA
HREJPE	X	12.08X	12.52X	12.18X	11.65X	10.90X	9.64X	8.54X	8.06X	8.29X	9.37*	11.41	10.98X	11.48	14.73X	16.98	17.85*	SI
JAD8E4		11.57	11.90	11.57	11.07	10.32	9.13	8.09	7.70	7.95	9.12	10.98	10.55	11.35	14.42	16.58	17.24	XE
JNCXC2		11.43	11.95	11.62	11.15	10.43	9.27	8.18	7.76	8.00	9.13	11.11	10.73	11.24	14.30	16.72	17.53	MW
JNVZ4B		11.73	11.92	11.68	11.20	10.45	9.29	8.21	7.85	8.05	9.17	11.18	10.74	11.44	14.62	17.02	17.40	AN
JVD9R8		11.45	11.88	11.60	11.11	10.37	9.19	8.14	7.73	7.96	9.10	11.01	10.61	11.28	14.35	16.63	17.47	MK
K42RZC		11.47	11.84	11.50	11.02	10.29	9.10	8.06	7.64	7.89	9.04	10.94	10.45	11.24	14.41	16.59	17.38	XH
KARTN7		11.68	11.94	11.66	11.15	10.45	9.27	8.19	7.84	8.04	9.18	9.51X	10.73	11.35	14.52	17.15*	17.32	AP
KQA2GT		11.48	11.85	11.59	11.09	10.36	9.19	8.16	7.74	7.96	9.09	10.98	10.60	11.34	14.39	16.61	17.43	MM
LEXV47		11.58	11.93	11.61	11.13	10.39	9.21	8.14	7.73	7.99	9.18	11.02	10.59	11.38	14.48	16.68	17.47	XG
LFP6X8	X	18.39X	18.89X	18.75X	18.46X	17.94X	16.92X	16.05X	15.75X	16.05X	17.11X	18.93X	18.45X	19.01X	21.94X	24.05X	24.90X	CA
LG2QM9		11.58	11.95	11.69	11.22	10.48	9.32	8.30	7.93	8.20*	9.34*	11.21	10.77	11.55*	14.55	16.84	17.64	XO



CTS Interlaboratory Testing Program for Color & Appearance Analysis 411

**Report #208
2nd Qtr 2024**

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 B241																		
LK6DL8		11.67	11.97	11.68	11.20	10.46	9.29	8.21	7.86	8.09	9.19	11.13	10.82	11.41	14.59	16.95	17.41	AT
M8E3C8		11.72	12.04	11.69	11.11	10.54	9.34	8.24	7.90	8.05	9.18	11.21	10.81	11.43	14.52	17.07	17.52	AN
MWWLJZ		11.70	11.93	11.66	11.13	10.42	9.26	8.18	7.83	8.05	9.17	11.15	10.72	11.41	14.41	16.88	17.26	AT
N9ZDF6		11.65	11.95	11.67	11.16	10.46	9.28	8.20	7.85	8.08	9.18	11.14	10.75	11.36	14.49	16.99	17.39	AJ
NEL7R4		11.38	11.81	11.49	10.97	10.27	9.50X	8.04	7.63	7.86	9.00	10.97	10.49	11.12	14.21	16.42	17.21	XX
NKE2Z4		11.46	11.92	11.57	11.07	10.34	9.19	8.18	7.78	7.99	9.18	11.00	10.63	11.37	14.32	16.55	17.43	XH
NVVV66		11.49	11.84	11.53	11.04	10.30	9.14	8.09	7.69	7.92	9.07	10.98	10.53	11.30	14.47	16.61	17.35	XG
NW7WQ4		11.36	11.79	11.48	10.97	10.23	9.08	8.04	7.62	7.86	9.01	10.86	10.46	11.24	14.26	16.46	17.23	XD
NX8M7Y		11.48	11.85	11.53	11.03	10.30	9.13	8.09	7.68	7.92	9.10	10.95	10.53	11.30	14.33	16.51	17.31	XG
PCGXZY		11.70	12.00	11.70	11.20	10.40	9.30	8.20	7.80	8.10	9.30	11.25	10.50	11.10	14.20	16.50	17.40	HW
PDAUPT		11.31	11.73	11.40*	10.94	10.22	8.98*	7.98*	7.53*	7.75*	8.91*	10.90	10.40	11.15	14.24	16.63	17.44	MT
PDRX67		11.46	11.83	11.47	10.99	10.25	9.16	8.12	7.69	7.92	9.14	10.91	10.52	11.31	14.22	16.37	17.09	XI
PP2FVN		11.50	11.87	11.62	11.14	10.44	9.24	8.18	7.76	8.01	9.05	11.08	10.71	11.17	14.23	16.58	17.49	HP
PRCD97		11.63	11.89	11.58	11.09	10.34	9.18	8.14	7.78	8.02	9.13	11.10	10.71	11.35	14.44	17.07	17.52	AU
QLX4CT		11.62	12.10	11.78	11.27	10.54	9.35	8.26	7.86	8.10	9.26	11.26	10.81	11.34	14.42	16.88	17.69	MW
QTGA9Z		11.63	12.20*	11.74	11.28	10.62*	9.38	8.26	7.84	8.09	9.26	11.23	10.75	11.32	14.53	16.79	17.64	MV
R8GJCZ		11.45	11.78	11.47	10.97	10.22	9.06	8.02	7.62	7.87	9.05	10.92	10.46	11.29	14.36	16.53	17.25	XE
R8XF4Z		11.47	11.88	11.56	11.05	10.34	9.14	8.08	7.65	7.90	9.04	10.98	10.51	11.17	14.23	16.44	17.18	XD
RN2ABZ		11.72	12.09	11.80	11.33*	10.59	9.38	8.27	7.89	8.14	9.36*	11.30	10.82	11.48	14.60	16.93	17.76*	MV
TBUTUW		11.40	11.81	11.61	11.12	10.32	9.18	8.13	7.75	7.98	9.20	10.98	10.62	11.37	14.40	16.66	17.35	XH
TJL2MZ		11.41	11.82	11.50	11.00	10.29	9.11	8.04	7.63	7.87	8.97	10.96	10.42	11.07*	14.22	16.44	17.15	XB
TK28Z6		11.52	11.90	11.57	11.07	10.34	9.16	8.11	7.70	7.95	9.10	10.96	10.55	11.33	14.37	16.58	17.39	XD



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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 B241																		
UAEP3		11.85	12.22*	11.89*	11.34*	10.58	9.39	8.31	7.88	8.13	9.30	11.14	10.78	11.52	14.57	16.78	17.61	XD
UGEBPJ		11.60	11.95	11.61	11.12	10.37	9.18	8.13	7.71	7.97	9.16	11.00	10.54	11.38	14.49	16.66	17.43	XD
UL8CQX		11.52	11.97	11.62	11.12	10.42	9.23	8.21	7.80	8.02	9.14	11.02	10.70	11.40	14.33	16.59	17.48	MM
UMJRKY		11.52	11.95	11.62	11.17	10.45	9.26	8.18	7.77	8.02	9.17	11.14	10.70	11.25	14.33	16.77	17.58	MV
UVV3DQ		11.78	11.95	11.62	11.14	10.41	9.25	8.19	7.85	8.09	9.17	11.15	10.79	11.44	14.48	17.11	17.63	AS
VUF4U2		11.45	11.80	11.49	11.00	10.25	9.09	8.06	7.66	7.90	9.06	10.98	10.50	11.28	14.41	16.54	17.33	XB
VYBXR3		11.62	11.95	11.65	11.13	10.40	9.21	8.14	7.74	7.98	9.19	11.08	10.61	11.27	14.39	16.52	17.25	XB
XAL88R		11.75	11.95	11.62	11.14	10.44	9.24	8.16	7.79	8.04	9.12	11.16	10.69	11.32	14.50	17.03	17.62	AS
XJAWDR		11.66	11.96	11.65	11.14	10.44	9.24	8.18	7.84	8.07	9.19	11.18	10.81	11.38	14.68*	17.19*	17.30	AT
XPXKPP		11.54	11.90	11.57	11.07	10.34	9.17	8.11	7.70	7.95	9.11	11.01	10.56	11.33	14.44	16.66	17.46	XD
XTHD2R		11.40	11.90	11.60	11.10	10.45	9.30	8.20	7.75	8.00	9.10	11.10	10.70	11.25	14.35	16.75	17.60	MW
YRHMGV		11.28	11.66*	11.36*	10.90*	10.18	9.02*	7.97*	7.56*	7.81*	8.97	10.84	10.41	11.21	14.33	16.54	17.29	XD
ZUYGLU		11.62	12.01	11.70	11.17	10.49	9.31	8.22	7.86	8.09	9.19	11.21	10.80	11.34	14.59	16.94	17.38	AF

Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	11.57	11.92	11.61	11.11	10.39	9.22	8.15	7.76	7.99	9.13	11.03	10.64	11.31	14.40	16.71	17.40
SD Btwn Labs	0.16	0.11	0.10	0.10	0.11	0.10	0.08	0.09	0.09	0.09	0.21	0.12	0.11	0.12	0.21	0.17

69MCPM (X) - High % reflectance data for almost all wavelengths. Large replication difference for half of wavelengths.

HREJPE (X) - High % reflectance data for most wavelengths.

LFP6X8 (X) - High % reflectance data at all wavelengths. Large replication difference for almost all wavelengths.



CTS Interlaboratory Testing Program for Color & Appearance Analysis 411

Report #208
2nd Qtr 2024

Spectrophotometric - Sphere Geometry Instruments
Reflectance at 16 Selected Wavelengths

Key to Instrument Codes Reported by Participants

AF Datacolor 500	AJ Datacolor 600	AN Datacolor 650
AO Datacolor 650x	AP Datacolor 750	AQ Datacolor 600x
AS Datacolor 800	AT Datacolor 850	AU Datacolor 1000
CA Cary 5000	GE BYK-Gardner Spectro2-Guide Sphere Gloss	HP Hunter UltraScan PRO
HW Hunter UltraScan XE	MK Macbeth Color-Eye 7000	MM Macbeth Color-Eye 7000a
MQ Minolta CM-700d	MS Minolta CM-600d	MT Minolta CM-2600d
MV Minolta CM-3000d Spectrophotometer	MW Minolta CM 3700a Spectrophotometer	SI SHIMADZU 3700i
XB X-Rite Ci7000 Series Benchtop Spectrophotometer	XC X-Rite Ci4200 Benchtop Spectrophotometer	XD X-Rite Ci7800 Benchtop Spectrophotometer
XE X-Rite Ci7600 Benchtop Spectrophotometer	XF X-Rite Ci6x Portable Spectrophotometer	XG X-Rite Ci7860 Benchtop Spectrophotometer
XH X-Rite Color i5 Benchtop Spectrophotometer	XI X-Rite Color i7 Benchtop Spectrophotometer	XO X-Rite SP64 Sphere Spectrophotometer
XX Instrument make/model not specified by lab		



Interlaboratory Testing Program for Color & Appearance

Report #208

Analysis 440

2nd Qtr 2024

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample F241			Sample F242			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
338UGV		36.98	0.05	0.06	47.13	-0.01	-0.01	GL
3EGK6N		36.60	-0.33	-0.42	47.28	0.14	0.18	XX
3JWTTN		36.85	-0.08	-0.10	47.55	0.42	0.52	GL
3XEQPC	X	33.93	-3.00	-3.82	43.25	-3.88	-4.87	GB
4FTGAT		36.43	-0.50	-0.64	46.63	-0.51	-0.64	GL
4ZY23M		37.25	0.32	0.41	47.65	0.52	0.65	GL
67VDBN	X	39.25	2.32	2.95	84.20	37.07	46.49	GK
6YYCGP		37.70	0.77	0.98	48.50	1.37	1.71	GL
79J3GM		37.50	0.57	0.73	47.53	0.39	0.49	GL
8EKNXP		37.18	0.25	0.31	47.95	0.82	1.02	GN
8GCU3L		37.30	0.37	0.47	47.88	0.74	0.93	MM
8XEGJM		36.70	-0.23	-0.29	46.65	-0.48	-0.61	GK
99RZFN		36.58	-0.35	-0.45	47.33	0.19	0.24	GK
9ATRVI		37.50	0.57	0.73	48.20	1.07	1.34	GN
9QAYN8		38.75	1.82	2.32	48.83	1.69	2.12	GL
A8EQ3H		36.63	-0.30	-0.38	46.03	-1.11	-1.39	GN
B2HLMH		35.83	-1.10	-1.40	46.60	-0.53	-0.67	GD
BGYG3E	*	36.65	-0.28	-0.35	45.78	-1.36	-1.70	GL
BPRPM7	*	37.78	0.85	1.08	46.98	-0.16	-0.20	RA
BQ7AFF		38.05	1.12	1.43	48.05	0.92	1.15	GN
BRJN24		36.00	-0.93	-1.18	45.58	-1.56	-1.95	GK
C9MH94		35.93	-1.00	-1.27	46.25	-0.88	-1.11	GK
CAVUNK		35.95	-0.98	-1.24	46.30	-0.83	-1.04	GN
CBTW6A		37.62	0.70	0.88	48.05	0.91	1.15	GL
CP8BW8		37.25	0.32	0.41	47.83	0.69	0.87	GL
CX3DYJ		36.45	-0.48	-0.61	46.48	-0.66	-0.82	GL
DJGB3C		37.53	0.60	0.76	47.85	0.72	0.90	NH
E2GLLA		36.43	-0.50	-0.64	46.90	-0.23	-0.29	GL
E2W2EG		37.75	0.82	1.05	47.60	0.47	0.59	GK
ECB4R2		36.45	-0.48	-0.61	46.98	-0.16	-0.20	GL
ET233A		36.25	-0.68	-0.86	46.80	-0.34	-0.42	XX
EWZDXA		37.35	0.42	0.54	47.18	0.04	0.05	RC
F2UJ96		35.85	-1.08	-1.37	46.45	-0.68	-0.86	MX



Interlaboratory Testing Program for Color & Appearance

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Analysis 440

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60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample F241			Sample F242			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
FDL7EZ		36.05	-0.88	-1.12	46.38	-0.76	-0.95	GL
FHTWG7		36.48	-0.45	-0.58	46.88	-0.26	-0.32	GL
FLYCXB		36.50	-0.43	-0.54	46.85	-0.28	-0.35	GL
FY3MJC		37.60	0.67	0.85	47.88	0.74	0.93	GL
HAUQZB		37.68	0.75	0.95	48.03	0.89	1.12	GL
JAD8E4		37.83	0.90	1.14	48.33	1.19	1.50	GL
JNCXC2	X	34.83	-2.10	-2.67	43.85	-3.28	-4.12	GT
K42RZC		38.10	1.17	1.49	48.48	1.34	1.68	GL
K9R3AB		37.80	0.87	1.11	47.23	0.09	0.12	GK
KQA2GT		38.35	1.42	1.80	47.74	0.60	0.76	GL
L3MLEV		36.85	-0.08	-0.10	46.88	-0.26	-0.32	QT
LEXV47		36.23	-0.70	-0.89	46.20	-0.93	-1.17	GL
LFP6X8		38.50	1.57	2.00	48.45	1.32	1.65	GL
LG2QM9		37.15	0.22	0.28	47.00	-0.13	-0.17	GN
MBWARU	*	38.05	1.12	1.43	49.08	1.94	2.44	GK
MX7DQV		36.00	-0.93	-1.18	46.53	-0.61	-0.76	GK
NW7WQ4		36.85	-0.08	-0.10	46.73	-0.41	-0.51	GL
P9GPWP		37.25	0.32	0.41	47.38	0.24	0.30	GL
PCGXZY		36.63	-0.30	-0.38	46.88	-0.26	-0.32	GK
PDRX67		36.03	-0.90	-1.15	46.38	-0.76	-0.95	GL
PP2FVN		35.23	-1.70	-2.16	45.63	-1.51	-1.89	EN
R8XF4Z		36.55	-0.38	-0.48	46.88	-0.26	-0.32	GL
TBUTUW		37.98	1.05	1.33	48.18	1.04	1.31	GL
TJL2MZ		36.45	-0.48	-0.61	47.18	0.04	0.05	ZA
UGW2ZP		35.90	-1.03	-1.31	46.10	-1.03	-1.30	EN
UL8CQX		36.20	-0.73	-0.92	46.90	-0.23	-0.29	GL
UMJRKY		36.78	-0.15	-0.19	47.10	-0.03	-0.04	GL
UYCB2P		36.58	-0.35	-0.45	46.45	-0.68	-0.86	GL
VKPKFT		36.18	-0.75	-0.96	46.10	-1.03	-1.30	GN
VUGRJR		37.08	0.15	0.19	46.93	-0.21	-0.26	DE
VYBXR3		37.48	0.55	0.70	47.35	0.22	0.27	GL
X2Q47F		36.95	0.02	0.03	47.18	0.04	0.05	GL



Interlaboratory Testing Program for Color & Appearance

Report #208
2nd Qtr 2024

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample F241			Sample F242			Instr Code
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV	
XPXKPP		35.25	-1.68	-2.13	45.45	-1.68	-2.11	GK
XTHD2R		37.40	0.47	0.60	47.40	0.27	0.34	GK
Y7F4XF		36.65	-0.28	-0.35	46.93	-0.21	-0.26	GN
Y7JL4R		36.53	-0.40	-0.51	46.70	-0.43	-0.54	GK
YFTNPR		36.63	-0.30	-0.38	46.90	-0.23	-0.29	GK
YWDGDW		38.38	1.45	1.84	47.75	0.62	0.77	RA

Summary Statistics

Grand Means

36.93 Gloss Units

47.13 Gloss Units

Std Dev Btwn Labs

0.79 Gloss Units

0.80 Gloss Units

Statistics based on 68 of 71 reporting participants

Comments on Assigned Data Flags for Test #440

3XEQPC(X) - Data for both samples are low. Possible systematic error.

67VDBN(X) - High data for Sample F241. Extreme data for Sample F242.

JNCXC2(X) - Inconsistent within the determinations for Sample F241. Low data for Sample F242.

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	GT	Gardco Novo-Gloss (20/60/85)
MM	Macbeth Lab-Gloss	MX	Minolta Multi-Gloss 268 Plus
NH	3nh NHG268 Multi-angle Precise Gloss Meter	QT	Qualitest Micro-Tri-Gloss
RA	Rhpoint Novo-Gloss Glossmeter	RC	Novo-Gloss Trio 20/60/85 Glossmeter
XX	Instrument make/model not specified by lab	ZA	Zehntner ZGM Series



Interlaboratory Testing Program for Color & Appearance

Report #208

Analysis 440

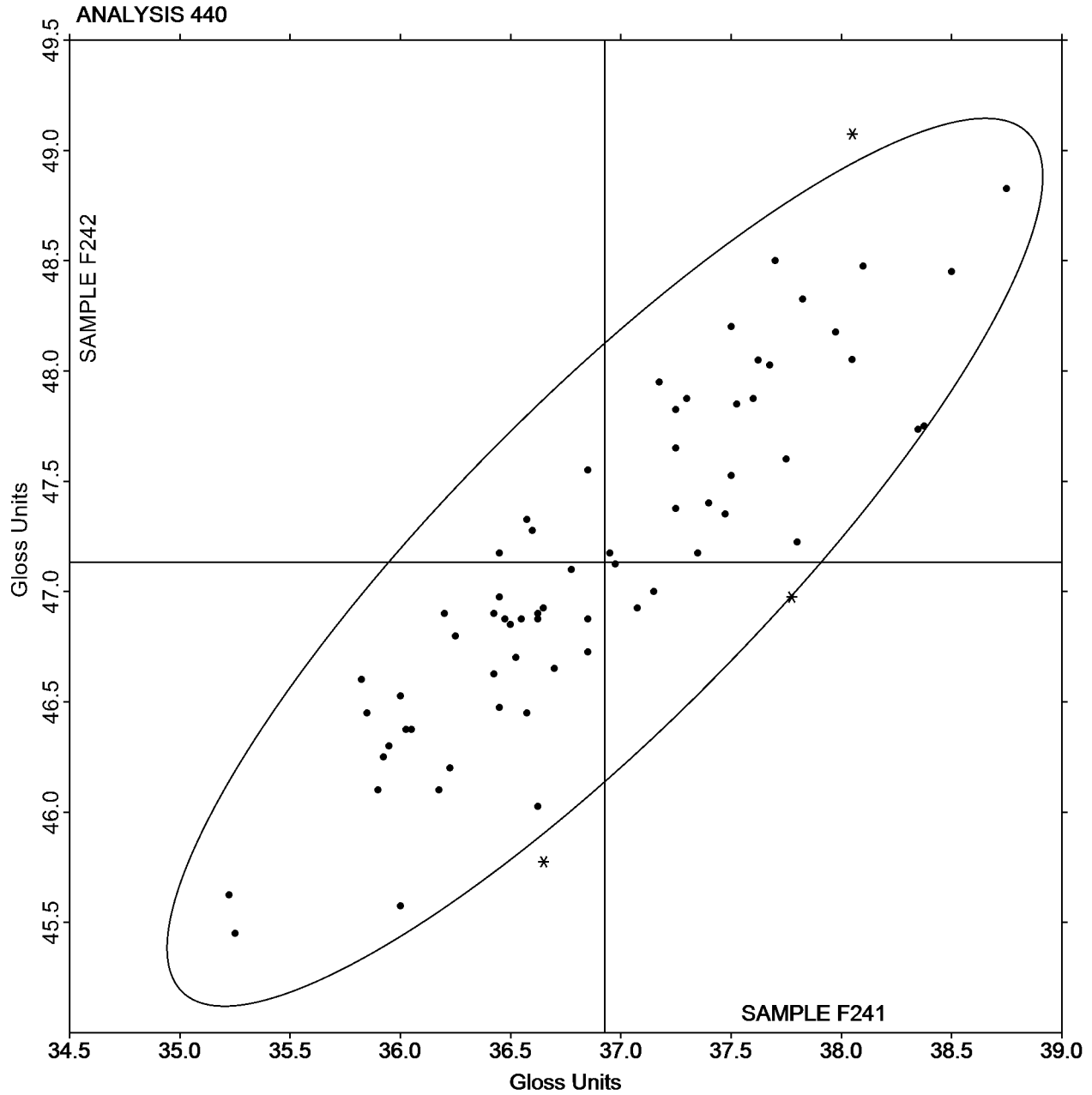
2nd Qtr 2024

60 Degree Gloss - Paint Chips

ASTM Method D 523

SAMPLE F241 = 36.93 Gloss Units

SAMPLE F242 = 47.13 Gloss Units



-End of Report-