Collaborative Testing Services, Inc.

Color & Appearance Testing Program

Summary Report #200 - 2nd Qtr 2022

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)

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

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, CTS is a privately-owned company that specializes in interlaboratory tests for a wide variety of industries, including rubber, plastics, fasteners and metals, containerboard, paper, color, and wine as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality control objectives. Labs from the U.S., as well as more than 80 countries, currently participate in the CTS programs.

For further information concerning this report contact:

Collaborative Testing Services, Inc.
21331 Gentry Drive
Sterling, Virginia 20166 USA

+1-571-434-1925
FAX #: +1-571-434-1937
color@cts-interlab.com

Office Hours: 8:00 a.m. - 4:30 p.m. ET

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:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	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:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
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:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	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.

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
2E4YZR		B221	35.08	7.15	-7.14	0.60	0.18	-0.72	0.96	XB
		B222	35.68	7.33	-7.86					
2JW4RB		B221	34.76	7.33	-6.92	0.57	0.26	-0.80	1.01	XD
		B222	35.33	7.60	-7.72					
2ZL6RM		B221	35.62	7.16	-7.12	0.85	0.17	-0.72	1.12	XX
		B222	36.47	7.34	-7.84					
4AWK6X		B221	35.63	7.03	-7.04	0.78	0.18	-0.69	1.06	XH
		B222	36.41	7.21	-7.73					
664V3Y		B221	34.59	7.22	-6.84	0.68	0.27	-0.77	1.06	XU
		B222	35.27	7.48	-7.61					
6Q36JF		B221	34.75	7.46	-6.80	0.83	0.22	-0.72	1.12	HW
		B222	35.58	7.68	-7.52					
6WPWNN		B221	34.57	7.36	-6.99	0.70	0.24	-0.75	1.05	HX
		B222	35.27	7.60	-7.73					
76W7ED		B221	34.62	7.13	-6.87	0.42	0.29	-0.84	0.98	XU
		B222	35.04	7.42	-7.71					
7MJC2L		B221	35.25	7.50	-6.90	0.70	0.20	-0.70	1.01	HW
		B222	35.95	7.70	-7.60					
8JQXR3		B221	34.79	7.17	-6.66	0.76	0.22	-0.74	1.08	HK
		B222	35.54	7.39	-7.40					
APW7C4		B221	35.18	7.35	-6.81	0.52	0.27	-0.80	0.99	MG
		B222	35.70	7.62	-7.61					
B4MRVZ		B221	34.54	7.14	-7.18	0.34	0.34	-0.84	0.97	XW
		B222	34.88	7.47	-8.02					
BB8TDY		B221	35.74	7.06	-7.10	0.84	0.24	-0.74	1.15	XX
		B222	36.59	7.30	-7.84					
BC2GVU		B221	34.43	7.51	-6.80	0.67	0.25	-0.73	1.03	HW
		B222	35.10	7.76	-7.53					
BQJAHF		B221	34.59	7.42	-6.86	0.45	0.34	-0.85	1.02	GE
		B222	35.04	7.76	-7.71					
D2TQXB		B221	33.54	7.33	-7.48	0.52	0.24	-0.80	0.98	BG
		B222	34.06	7.57	-8.28					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
D9T33K		B221	34.63	7.45	-7.00	0.56	0.25	-0.74	0.96	GE
		B222	35.20	7.70	-7.74					
F266KB		B221	34.79	7.32	-6.74	0.63	0.28	-0.79	1.05	HW
		B222	35.42	7.60	-7.53					
F4V7NE		B221	34.34	7.22	-7.06	0.33	0.34	-0.84	0.97	MD
		B222	34.68	7.57	-7.91					
GTRCTR		B221	34.51	7.35	-6.78	0.61	0.29	-0.79	1.03	GE
		B222	35.12	7.64	-7.57					
H79PLD		B221	33.40	7.32	-7.35	0.55	0.25	-0.83	1.03	BG
		B222	33.96	7.58	-8.18					
JKRRLG		B221	34.64	7.32	-6.78	0.59	0.31	-0.83	1.07	GE
		B222	35.24	7.64	-7.61					
K8FNTR		B221	34.26	7.24	-6.91	0.47	0.31	-0.85	1.02	XU
		B222	34.73	7.55	-7.76					
KKGKPY		B221	34.64	7.54	-6.86	0.82	0.25	-0.73	1.13	HW
		B222	35.46	7.79	-7.59					
KKLYZE		B221	34.55	7.18	-6.82	0.59	0.25	-0.77	1.00	XU
		B222	35.14	7.42	-7.59					
LX6YBD		B221	34.19	7.07	-6.86	0.55	0.33	-0.83	1.05	XX
		B222	34.74	7.40	-7.69					
MAYDAA		B221	34.65	7.26	-6.72	0.61	0.27	-0.77	1.02	GA
		B222	35.26	7.53	-7.48					
ME3L9P		B221	34.90	7.35	-6.80	0.70	0.25	-0.70	1.02	HW
		B222	35.60	7.60	-7.50					
MPRAAK		B221	34.35	7.20	-6.81	0.59	0.38	-0.86	1.11	GE
		B222	34.94	7.58	-7.67					
N882NA		B221	34.85	7.45	-6.80	0.55	0.25	-0.80	1.00	HW
		B222	35.40	7.70	-7.60					
P3N4VD		B221	34.56	7.27	-6.88	0.48	0.30	-0.82	0.99	XU
		B222	35.04	7.56	-7.70					
PD8H2Z		B221	34.93	7.42	-6.77	0.66	0.29	-0.77	1.05	HW
		B222	35.58	7.70	-7.54					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
PUXKG6	X	B221	33.16	7.20	-7.42	0.56	0.28	-0.81	1.03	PR
		B222	33.72	7.47	-8.24					
QXNEPP		B221	34.64	7.23	-6.80	0.60	0.27	-0.82	1.05	XU
		B222	35.24	7.50	-7.62					
RAXEX3		B221	35.02	7.32	-6.93	0.57	0.22	-0.68	0.92	XC
		B222	35.59	7.54	-7.61					
TLAYZW		B221	35.53	7.07	-7.21	0.84	0.21	-0.72	1.13	MR
		B222	36.37	7.28	-7.94					
UDVGXN		B221	34.21	7.31	-6.88	0.40	0.33	-0.85	0.99	XS
		B222	34.61	7.63	-7.72					
W6UYFH		B221	34.77	7.20	-7.11	0.65	0.25	-0.76	1.03	XE
		B222	35.42	7.45	-7.87					
WAMZJG		B221	34.43	7.34	-7.14	0.54	0.30	-0.81	1.02	XU
		B222	34.97	7.64	-7.95					
WKK2WL		B221	34.64	7.63	-6.83	0.51	0.25	-0.77	0.96	HW
		B222	35.15	7.88	-7.60					
XCNNAQ		B221	34.08	7.17	-6.91	0.53	0.28	-0.79	0.99	GG
		B222	34.61	7.45	-7.70					
YUJFUP	X	B221	35.28	6.90	-6.25	0.72	0.21	-0.68	1.01	DB
		B222	36.00	7.10	-6.93					
YVUK7R		B221	34.55	7.33	-6.97	0.48	0.31	-0.83	1.00	XO
		B222	35.03	7.63	-7.79					
ZCKFMP		B221	34.47	7.38	-7.11	0.22	0.34	-0.90	0.99	XM
		B222	34.69	7.72	-8.01					
ZCWEED		B221	34.34	7.30	-6.82	0.49	0.29	-0.80	0.98	GH
		B222	34.83	7.59	-7.62					
ZJHBFG		B221	34.23	7.27	-7.00	0.27	0.36	-0.90	1.00	MT
		B222	34.50	7.63	-7.90					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
B221	34.67	7.28	-6.94	0.58	0.27	-0.79	1.03
B222	35.25	7.55	-7.73				
Stnd Dev Btwn Labs							
B221	0.47	0.15	0.19	0.15	0.05	0.05	0.05
B222	0.57	0.16	0.20				

Statistics based on 44 of 46 reporting participants

Comments Assigned on Data Flags for Test #408

PUXKG6(X) - Low "L" value for Sample B221. Large replication difference for B222 "L*" values.

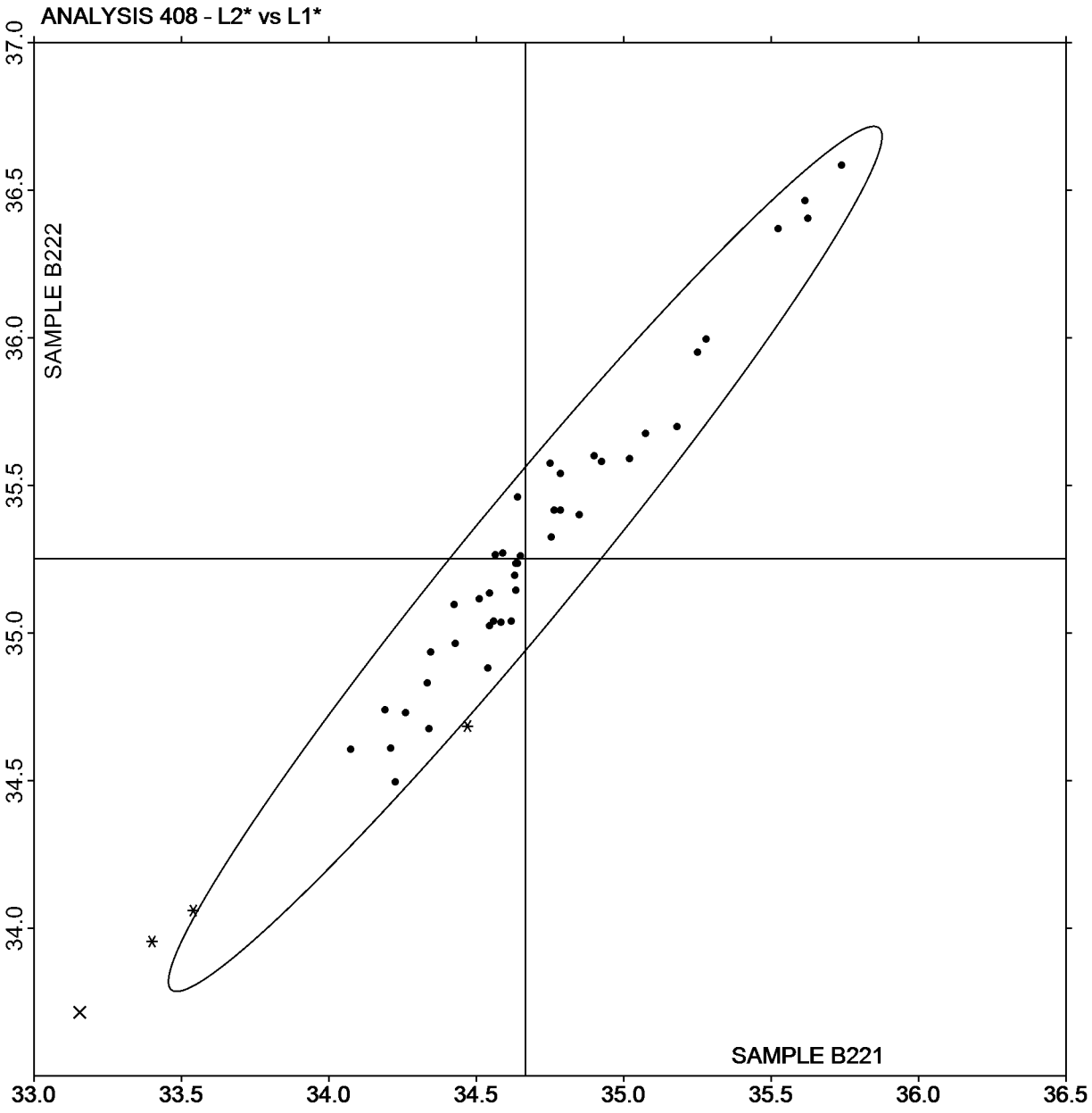
YUJFUP(X) - High "b*" values for both samples.

Key to Instrument Codes Reported by Participants

BG	BYK Mac i	DB	Datacolor 110
GA	BYK-Gardner	GE	BYK-Gardner spectro-guide (45/0)
GG	BYK-Gardner spectro2-guide (45/0) gloss	GH	BYK-Gardner Color-View
HK	Hunter MiniScan XE (45/0)	HW	Hunter LabScan XE
HX	Hunter Color FlexEZ 45/0	MD	Minolta FD 7
MG	Macbeth 1500/PLUS or 2025+ Color Eye	MR	Minolta CM-3600A Spectrophotometer
MT	Minolta CM-25cG Spectrophotometer	PR	PhotoResearch PR730
XB	X-Rite i1Basic Pro 2	XC	X-Rite i1Basic Pro
XD	X-Rite 500 Series SpectroDensitometer	XE	X-Rite eXact Portable Spectrophotometer
XH	X-Rite Color i5	XM	X-Rite MA58 Multi-Angle Spectrophotometer
XO	X-Rite MA68 II Multi-Angle Spectrophotometer	XS	X-Rite 962 Portable Spectrophotometer
XU	X-Rite 964 Portable Spectrophotometer	XW	X-Rite
XX	Instrument make/model not specified by lab		

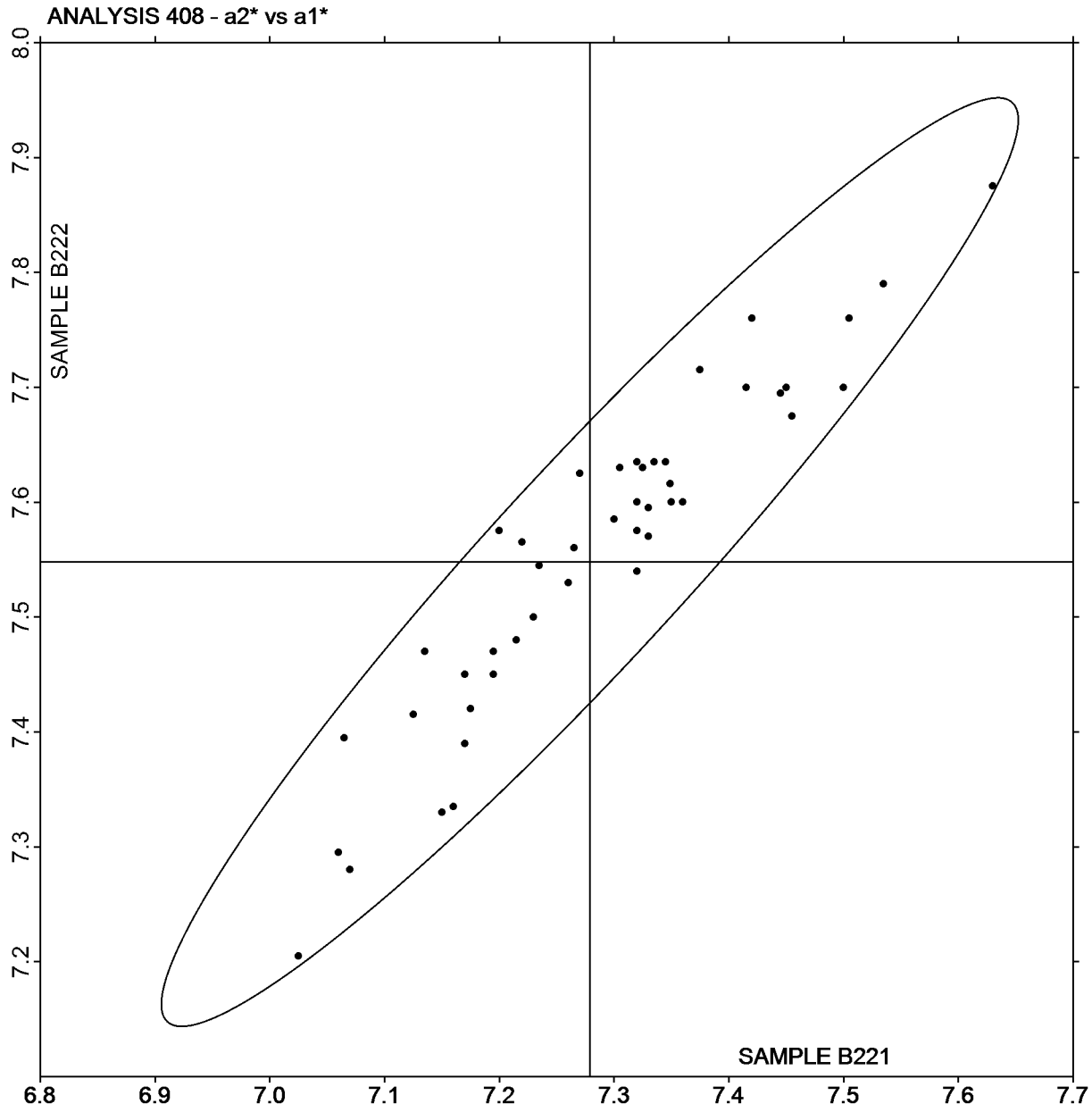
L2* vs L1*

SAMPLE B221 = 34.67 SAMPLE B222 = 35.25



a2* vs a1*

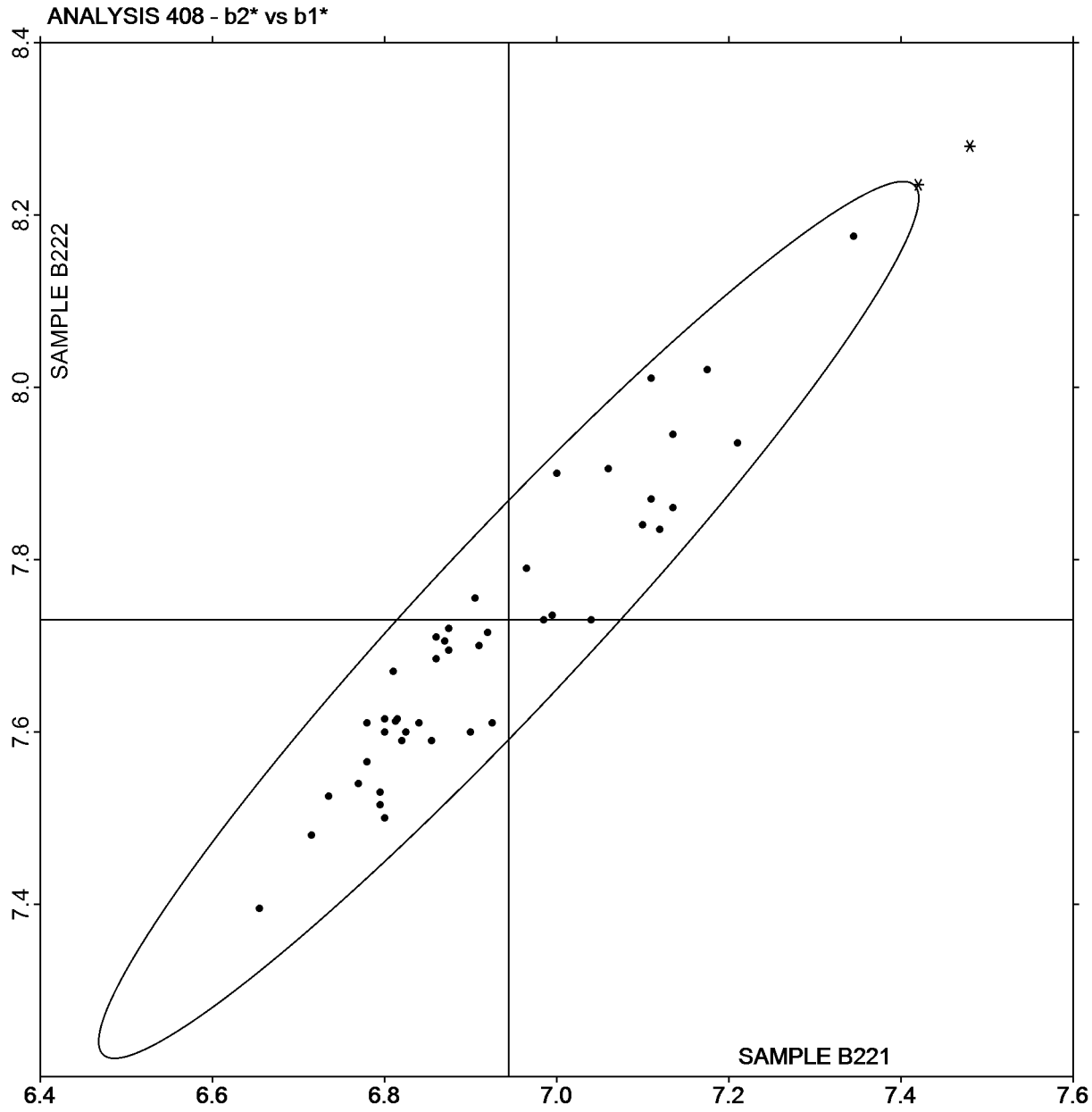
SAMPLE B221 = 7.28 SAMPLE B222 = 7.55



b2* vs b1*

SAMPLE B221 = -6.94

SAMPLE B222 = -7.73



Plot created using absolute values.

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
28Z9DF		B221	35.58	7.13	-7.17	0.78	0.20	-0.74	1.09	XD
		B222	36.36	7.32	-7.90					
2FC877		B221	35.65	7.08	-7.08	0.67	0.23	-0.76	1.04	XI
		B222	36.32	7.31	-7.84					
2XWZRN	X	B221	55.01	6.75	10.18	0.94	-0.28	-0.33	1.03	MM
		B222	55.95	6.47	9.85					
2XXVF2	X	B221	34.60	7.28	-7.44	0.74	0.25	-0.77	1.10	AJ
		B222	35.34	7.53	-8.21					
2ZL6RM		B221	35.61	7.16	-7.10	0.85	0.20	-0.72	1.13	XH
		B222	36.46	7.36	-7.82					
3LFF4L		B221	35.81	7.04	-7.14	0.80	0.24	-0.74	1.12	AS
		B222	36.62	7.28	-7.88					
3PFQZL		B221	35.33	7.25	-7.40	0.80	0.20	-0.75	1.11	CA
		B222	36.13	7.44	-8.15					
3XBL2Q		B221	35.78	7.15	-7.01	0.78	0.05	-0.71	1.06	GD
		B222	36.57	7.20	-7.71					
473J9P		B221	35.59	7.12	-7.12	0.77	0.19	-0.72	1.08	XD
		B222	36.37	7.32	-7.85					
4DJ3JC		B221	35.68	7.07	-6.91	0.88	0.17	-0.68	1.13	XH
		B222	36.56	7.23	-7.60					
4PBNRT		B221	35.70	7.10	-7.31	0.85	0.22	-0.76	1.16	AQ
		B222	36.55	7.31	-8.08					
664V3Y		B221	35.54	7.18	-7.21	0.82	0.24	-0.72	1.11	XE
		B222	36.36	7.41	-7.92					
6NY8CU		B221	35.68	7.08	-6.95	0.78	0.22	-0.75	1.11	AT
		B222	36.46	7.30	-7.70					
7P77J8		B221	35.57	6.97	-7.01	0.78	0.23	-0.71	1.08	XI
		B222	36.35	7.20	-7.72					
7ZMX4B		B221	35.53	7.15	-7.22	0.75	0.28	-0.77	1.10	AS
		B222	36.28	7.42	-7.98					
8CVXGF		B221	35.69	7.14	-7.29	0.80	0.25	-0.75	1.12	MT
		B222	36.49	7.39	-8.04					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
8PYGU2		B221	35.73	7.04	-7.05	0.81	0.25	-0.77	1.15	AJ
		B222	36.55	7.29	-7.82					
9FP9R7		B221	35.76	7.06	-7.05	0.78	0.25	-0.76	1.12	AO
		B222	36.54	7.31	-7.81					
9HF9BB		B221	35.55	7.08	-7.23	0.69	0.17	-0.71	1.00	XI
		B222	36.24	7.26	-7.94					
9JPKN7		B221	35.78	7.03	-7.01	0.78	0.17	-0.70	1.06	AO
		B222	36.56	7.20	-7.70					
9XUJUR		B221	35.53	7.16	-7.00	1.09	0.18	-0.73	1.32	AS
		B222	36.62	7.34	-7.73					
AEACVZ		B221	35.66	7.11	-7.03	0.81	0.18	-0.72	1.11	AJ
		B222	36.48	7.29	-7.76					
BB8TDY		B221	35.74	7.06	-7.10	0.84	0.24	-0.74	1.15	AJ
		B222	36.59	7.30	-7.84					
BWAEGB		B221	35.48	7.01	-6.99	0.83	0.17	-0.73	1.12	XI
		B222	36.31	7.18	-7.73					
BX66GY		B221	35.69	7.11	-6.99	0.84	0.22	-0.72	1.13	AH
		B222	36.53	7.33	-7.71					
C6E7Y6		B221	35.65	7.09	-7.09	0.83	0.20	-0.72	1.11	AJ
		B222	36.48	7.29	-7.80					
CAQWHD		B221	35.76	7.17	-7.21	0.79	0.22	-0.76	1.11	MM
		B222	36.55	7.39	-7.96					
CB2X8X		B221	35.52	7.15	-7.21	0.81	0.20	-0.71	1.10	MK
		B222	36.33	7.34	-7.91					
CDVLPT		B221	35.45	7.06	-7.19	0.79	0.22	-0.70	1.07	XI
		B222	36.23	7.28	-7.89					
CENHAG		B221	35.73	7.11	-7.07	0.80	0.21	-0.75	1.11	AJ
		B222	36.52	7.31	-7.81					
DEKDBX		B221	35.46	7.20	-7.24	0.74	0.21	-0.74	1.07	XB
		B222	36.20	7.41	-7.99					
DHHUPD		B221	35.53	7.10	-7.14	0.80	0.21	-0.71	1.09	XX
		B222	36.34	7.30	-7.85					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
DHL93D		B221	35.54	7.12	-6.92	0.82	0.22	-0.69	1.09	XH
		B222	36.36	7.35	-7.61					
DMBXEB		B221	35.62	7.10	-7.00	0.79	0.25	-0.76	1.12	AS
		B222	36.41	7.35	-7.75					
DRUQUK	X	B221	35.71	7.04	-6.67	0.75	0.18	-0.96	1.23	XO
		B222	36.46	7.22	-7.63					
DYQQ47		B221	35.59	7.06	-6.95	0.94	0.11	-0.66	1.15	XM
		B222	36.53	7.17	-7.61					
DZHNEX		B221	35.66	6.98	-7.13	0.81	0.28	-0.77	1.16	AQ
		B222	36.48	7.26	-7.90					
DZL94L		B221	35.72	7.10	-7.10	0.78	0.19	-0.72	1.07	AR
		B222	36.50	7.29	-7.82					
EM9KAF		B221	35.87	7.04	-7.21	0.74	0.21	-0.70	1.04	XI
		B222	36.61	7.24	-7.90					
EYKVX6		B221	35.56	7.04	-7.02	0.79	0.19	-0.72	1.09	XI
		B222	36.35	7.23	-7.74					
EZCT9W		B221	35.48	7.10	-7.14	0.74	0.24	-0.78	1.10	XD
		B222	36.21	7.34	-7.92					
FDZ9TC	X	B221	36.13	6.73	-7.04	0.80	0.21	-0.70	1.08	HW
		B222	36.93	6.94	-7.74					
FTQBAF		B221	35.69	6.98	-6.84	0.82	0.21	-0.71	1.10	XM
		B222	36.51	7.19	-7.55					
GL8EZY		B221	35.46	7.20	-7.23	0.78	0.21	-0.71	1.07	XB
		B222	36.24	7.41	-7.93					
GQL68E		B221	35.71	7.12	-7.02	0.85	0.22	-0.72	1.14	XC
		B222	36.56	7.34	-7.74					
GYW8TF		B221	35.64	7.06	-6.94	0.88	0.20	-0.68	1.13	XF
		B222	36.51	7.25	-7.62					
HGQCQ9		B221	35.57	7.11	-7.18	0.82	0.21	-0.72	1.11	MS
		B222	36.39	7.32	-7.90					
HPNUCC		B221	35.70	6.98	-7.13	0.81	0.21	-0.72	1.10	MM
		B222	36.51	7.19	-7.84					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
HWP799		B221	35.50	7.08	-7.12	0.83	0.19	-0.72	1.11	XI
		B222	36.33	7.27	-7.83					
JKRRLG	X	B221	35.49	6.75	-7.02	0.85	0.25	-0.71	1.13	GD
		B222	36.34	7.00	-7.73					
JXCEM3		B221	35.56	7.04	-7.02	0.77	0.17	-0.74	1.08	MW
		B222	36.33	7.21	-7.76					
KEWHNN		B221	35.70	7.10	-7.21	0.86	0.23	-0.73	1.15	AO
		B222	36.56	7.33	-7.94					
KFNFZ2		B221	35.65	7.10	-7.06	0.78	0.21	-0.70	1.07	AS
		B222	36.43	7.31	-7.76					
KV3JMW	X	B221	37.36	7.71	-7.80	0.80	0.22	-0.78	1.13	CA
		B222	38.15	7.93	-8.57					
LQNBUQ		B221	35.52	7.03	-7.11	0.74	0.25	-0.73	1.07	XI
		B222	36.26	7.28	-7.84					
LT9BU7		B221	35.64	7.10	-7.11	0.78	0.21	-0.72	1.09	MU
		B222	36.43	7.30	-7.83					
LX6YBD		B221	35.59	6.94	-6.84	0.91	0.19	-0.66	1.14	GE
		B222	36.50	7.14	-7.50					
M3BWFB		B221	35.75	7.15	-7.33	0.80	0.20	-0.71	1.09	AN
		B222	36.55	7.35	-8.04					
M48DPM		B221	35.58	7.11	-7.04	0.83	0.23	-0.73	1.13	AS
		B222	36.41	7.34	-7.77					
MAYDAA		B221	35.75	7.15	-7.02	0.76	0.21	-0.76	1.09	AJ
		B222	36.51	7.35	-7.78					
NKAANC		B221	35.58	7.05	-7.08	0.80	0.22	-0.70	1.09	MW
		B222	36.38	7.27	-7.78					
NYAB2D		B221	35.44	7.12	-7.10	0.77	0.25	-0.73	1.09	XD
		B222	36.21	7.37	-7.83					
P3N4VD		B221	35.48	7.11	-7.18	0.72	0.22	-0.76	1.06	XI
		B222	36.19	7.33	-7.94					
PG64LC		B221	35.70	7.17	-6.98	0.79	0.19	-0.71	1.08	AS
		B222	36.49	7.36	-7.69					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
PKRKZQ		B221	35.61	7.01	-7.26	0.76	0.21	-0.75	1.08	HP
		B222	36.37	7.21	-8.00					
PN4NQT		B221	35.36	7.17	-7.23	0.82	0.18	-0.74	1.12	XD
		B222	36.18	7.35	-7.97					
PQXAL6		B221	35.85	7.11	-7.29	0.81	0.23	-0.71	1.10	CA
		B222	36.66	7.34	-7.99					
PUXKG6		B221	35.62	7.01	-7.31	0.81	0.22	-0.72	1.11	CA
		B222	36.43	7.24	-8.03					
PZHJ8D		B221	35.67	7.09	-7.21	0.90	0.15	-0.68	1.13	MV
		B222	36.56	7.24	-7.89					
QCBJ2T		B221	35.54	7.10	-7.22	0.76	0.19	-0.74	1.07	XD
		B222	36.29	7.28	-7.95					
QFRRLL		B221	35.51	7.09	-7.10	0.71	0.21	-0.74	1.05	XD
		B222	36.22	7.30	-7.84					
QZG3CR		B221	35.66	7.02	-7.31	0.84	0.17	-0.72	1.12	HP
		B222	36.50	7.19	-8.03					
R8BUUK		B221	35.63	7.05	-7.03	0.79	0.21	-0.74	1.10	XH
		B222	36.42	7.26	-7.77					
RDWPT3		B221	35.55	7.06	-7.20	0.86	0.17	-0.70	1.12	MS
		B222	36.41	7.23	-7.90					
RLD43Z		B221	35.60	7.11	-7.04	0.81	0.24	-0.76	1.14	AS
		B222	36.41	7.35	-7.80					
RM66XP		B221	35.67	7.07	-7.19	0.79	0.21	-0.71	1.09	XI
		B222	36.46	7.28	-7.91					
T8UX7Q		B221	35.44	7.14	-7.18	0.67	0.20	-0.75	1.02	XB
		B222	36.11	7.35	-7.93					
TLAYZW		B221	35.69	7.10	-7.15	0.83	0.21	-0.71	1.11	MW
		B222	36.52	7.32	-7.86					
TVDF8T		B221	35.46	7.09	-7.16	0.81	0.21	-0.71	1.10	XR
		B222	36.27	7.31	-7.87					
UDVGXN		B221	35.56	7.10	-6.94	0.77	0.24	-0.77	1.12	AJ
		B222	36.33	7.34	-7.72					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
UM2END		B221	35.74	7.10	-6.97	0.79	0.28	-0.73	1.11	AS
		B222	36.52	7.38	-7.70					
UP3MRM		B221	35.50	7.01	-7.27	0.86	0.19	-0.71	1.13	HP
		B222	36.36	7.20	-7.97					
V8H9TP		B221	35.78	7.15	-7.10	0.83	0.20	-0.73	1.12	MI
		B222	36.61	7.34	-7.83					
VQVUBQ		B221	35.60	7.07	-7.17	0.79	0.19	-0.72	1.08	XD
		B222	36.39	7.27	-7.88					
W9QMWP		B221	35.43	7.19	-7.18	0.81	0.16	-0.69	1.08	XE
		B222	36.24	7.35	-7.87					
WAMZJG		B221	35.64	7.18	-7.53	0.79	0.24	-0.74	1.11	XI
		B222	36.43	7.42	-8.27					
WJCPHQ		B221	35.43	7.14	-7.18	0.85	0.18	-0.73	1.13	MV
		B222	36.28	7.32	-7.91					
WT3BNN		B221	35.78	7.02	-7.01	0.85	0.23	-0.70	1.13	XO
		B222	36.63	7.25	-7.71					
XCNNAQ		B221	35.51	7.00	-6.83	0.80	0.20	-0.72	1.10	GE
		B222	36.31	7.20	-7.55					
XEDT9P	X	B221	36.34	6.86	-6.73	0.83	0.17	-0.69	1.09	MU
		B222	37.17	7.03	-7.42					
XTR6HB		B221	35.39	7.04	-7.26	0.76	0.25	-0.72	1.07	XH
		B222	36.14	7.29	-7.98					
YC3ALE		B221	35.73	7.11	-7.00	0.73	0.21	-0.72	1.05	AT
		B222	36.46	7.32	-7.72					
YCZKGG		B221	35.56	7.05	-7.32	0.78	0.22	-0.71	1.07	HP
		B222	36.34	7.27	-8.02					
YPT7MC		B221	35.71	7.16	-7.02	0.84	0.19	-0.72	1.12	AT
		B222	36.55	7.35	-7.74					
ZCWEED		B221	35.87	7.11	-7.04	0.79	0.23	-0.74	1.10	MV
		B222	36.65	7.35	-7.78					
ZJHBFG		B221	35.51	7.09	-7.24	0.69	0.21	-0.74	1.03	XB
		B222	36.20	7.31	-7.98					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
ZPMAR8		B221	35.47	7.14	-7.17	0.76	0.22	-0.75	1.09	AB
		B222	36.23	7.36	-7.91					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
B221	35.61	7.09	-7.11	0.80	0.21	-0.72	1.10
B222	36.41	7.30	-7.84				
Stnd Dev Btwn Labs							
B221	0.12	0.06	0.14	0.06	0.03	0.02	0.04
B222	0.13	0.06	0.14				

Statistics based on 90 of 97 reporting participants

Comments Assigned on Data Flags for Test #409

2XWZRN(X) - Extreme data for both "L*", "a*" & "b*" values. Small Delta a & large Delta E.

2XXVF2(X) - Extreme data for both "L*" values. High "a*" values for both samples.

DRUQUK(X) - High "b*" values for Sample B221. Large replication difference for "b*" Sample B221. Large Delta b & Delta E.

FDZ9TC(X) - High "L*" values for both samples. Extreme data for both "a*" values.

JKRRLG(X) - Very low data for both "a*" values

KV3JMW(X) - Extreme data for both "L*" & "a*" values. Very low data for both "b*" values. Large replication difference for both "b*" samples.

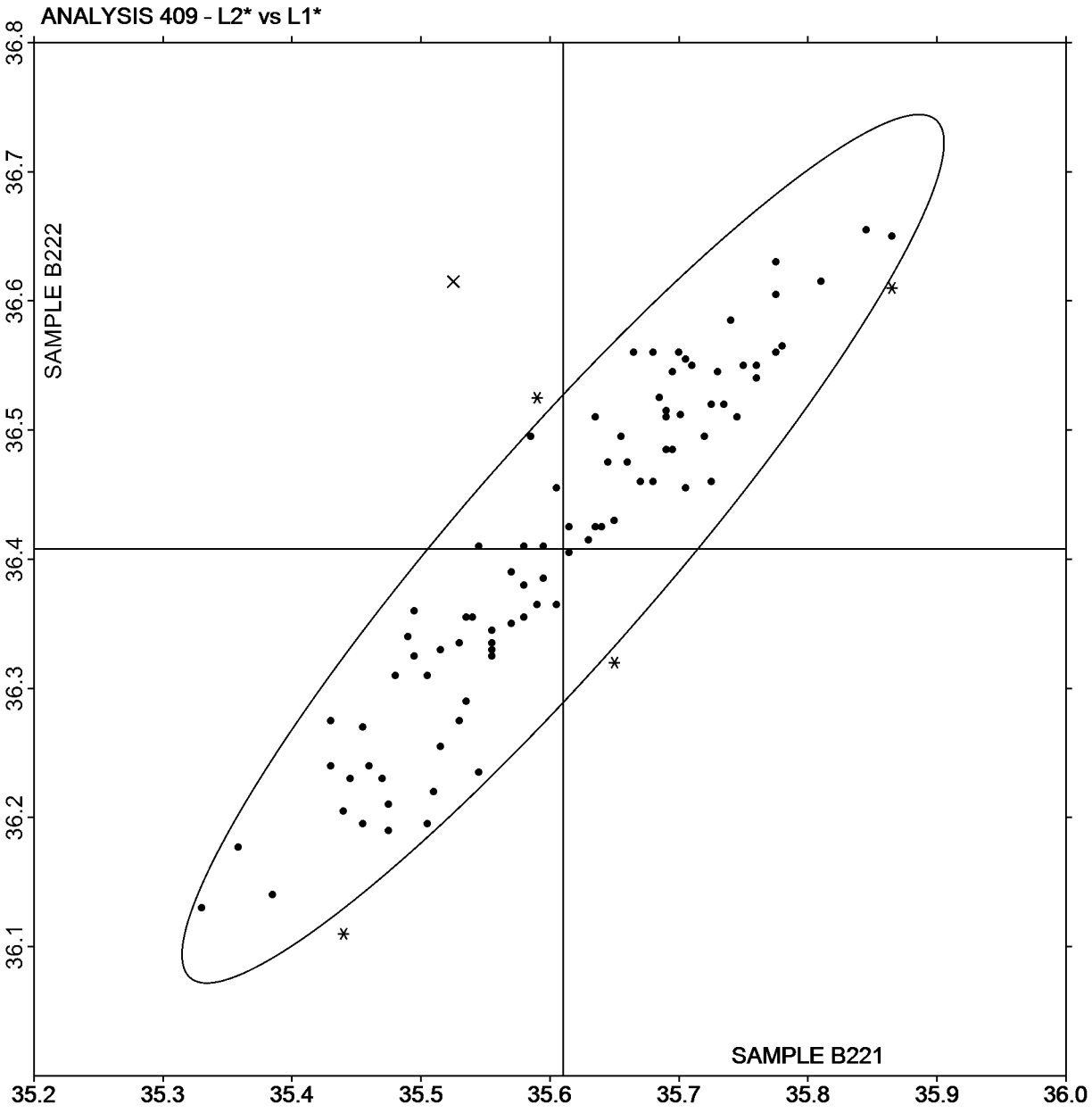
XEDT9P(X) - Extreme data for both "L*" values. Low "a*" values for both samples.

Key to Instrument Codes Reported by Participants

AB	Datacolor 100	AH	DataColor 550
AJ	Datacolor 600	AN	Datacolor 650
AO	Datacolor 650x	AQ	Datacolor 600x
AR	Datacolor 400	AS	Datacolor 800
AT	Datacolor 850	CA	Cary 5000
GD	BYK-Gardner Spectro-Guide Sphere	GE	BYK-Gardner Spectro2-Guide Sphere Gloss
HP	Hunter UltraScan PRO	HW	Hunter UltraScan XE
MI	Macbeth Color i5	MK	Macbeth Color-Eye 7000
MM	Macbeth Color-Eye 7000a	MS	Minolta CM-600d
MT	Minolta CM-2600d	MU	Minolta
MV	Minolta CM-3000d Spectrophotometer	MW	Minolta CM 3700a Spectrophotometer
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	XH	X-Rite Color i5 Benchtop Spectrophotometer
XI	X-Rite Color i7 Benchtop Spectrophotometer	XM	X-Rite SP62 Portable Sphere Spectrophotometer
XO	X-Rite SP64 Portable Sphere Spectrophotometer	XR	X-Rite
XX	Instrument make/model not specified by lab		

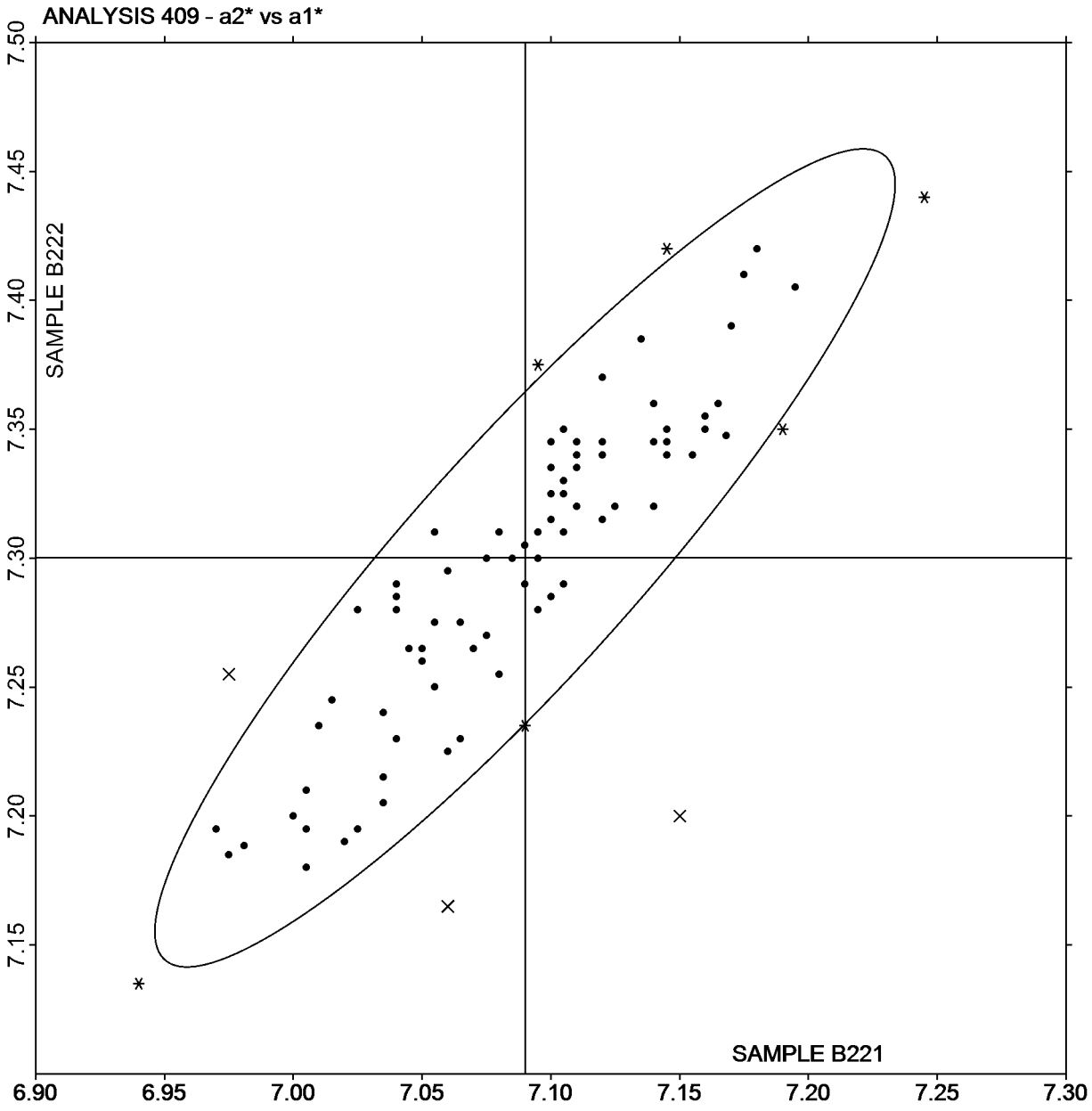
L2* vs L1*

SAMPLE B221 = 35.61 SAMPLE B222 = 36.41



a2* vs a1*

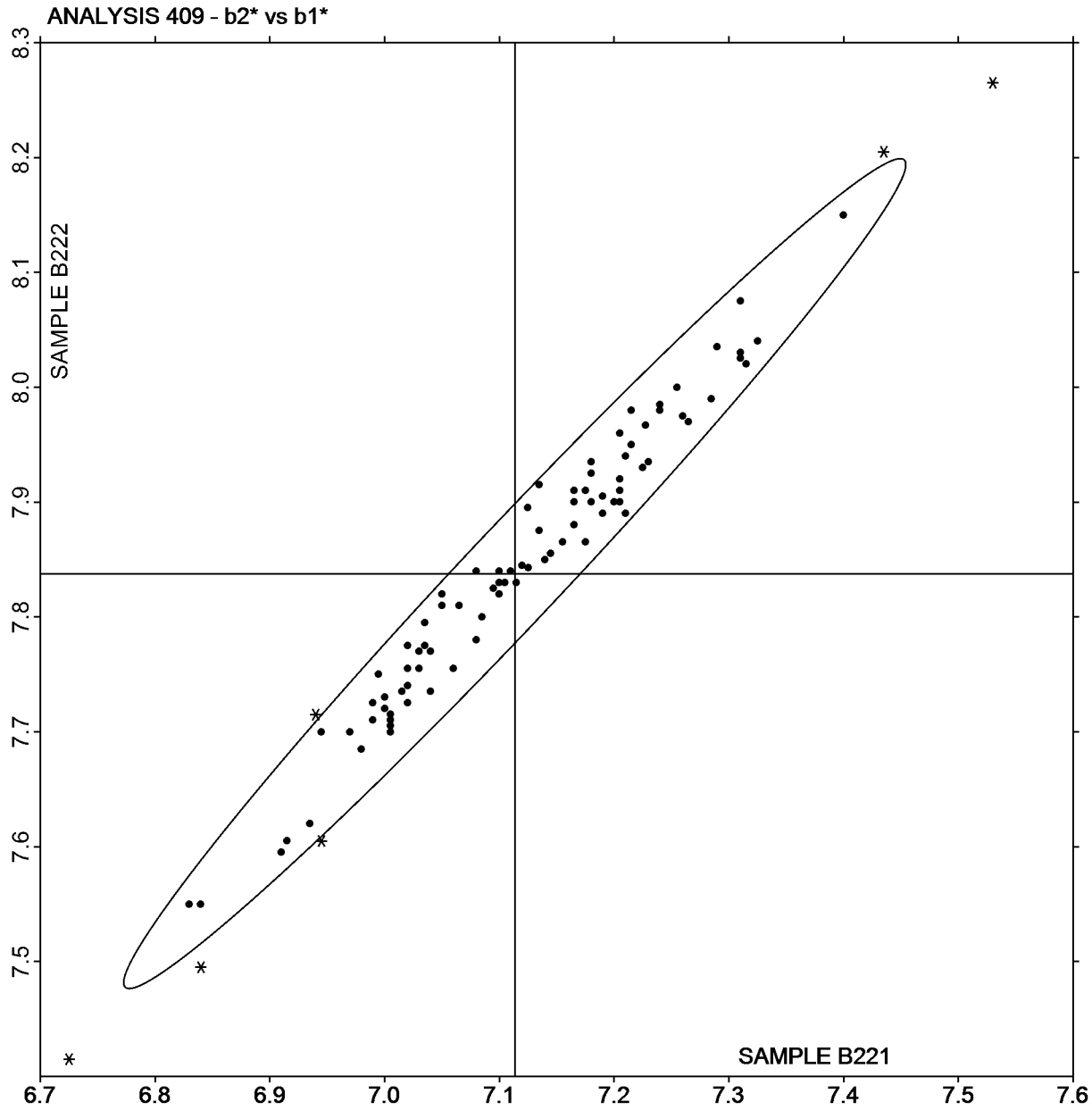
SAMPLE B221 = 7.09 SAMPLE B222 = 7.30



b2* vs b1*

SAMPLE B221 = -7.11

SAMPLE B222 = -7.84



Plot created using absolute values.

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample B221																		
28Z9DF		11.47	11.83	11.50	11.00	10.25	9.08	8.02	7.59	7.77	8.76	10.21	9.83	10.46	12.60	13.91	14.25	XD
2FC877		11.63	11.84	11.53	11.05	10.25	9.12	8.06	7.63	7.83	8.83	10.26	9.86	10.47	12.63	13.82	14.08	XI
2XWZRN		11.37	11.78	11.47	10.99	10.24	9.07	8.00	7.57	7.74	8.68	10.20	9.83	10.38	12.56	13.92	14.33	MM
2XXVF2	X	10.98	11.40	11.07X	10.52X	9.80X	8.61X	7.53X	7.12X	7.30X	8.17X	9.75X	9.47X	9.78X	11.38X	12.91X	11.77X	AJ
2ZL6RM		11.55	11.87	11.53	11.01	10.23	9.08	8.03	7.63	7.78	8.82	10.23	9.88	10.48	12.60	13.85	14.20	XH
3LFF4L		11.81	11.96	11.66	11.15	10.42	9.25	8.15	7.75	7.92	8.81	10.36	10.09	10.47	12.74	14.21	14.46	AS
3PFQZL		11.64	11.91	11.59	11.10	10.37	9.15	8.05	7.64	7.81	8.76	10.38	9.87	10.31	12.59	14.03	14.42	CA
3XBL2Q		11.37	11.95	11.60	11.05	10.30	9.15	7.95	7.84	7.76	8.86	10.44	10.10	10.49	12.66	14.21	14.49	GD
473J9P		11.52	11.84	11.53	11.00	10.25	9.09	8.04	7.62	7.78	8.77	10.27	9.83	10.41	12.62	13.93	14.28	XD
4DJ3JC		11.43	11.81	11.51	11.01	10.23	9.11	8.04	7.66	7.85	8.86	10.30	9.89	10.51	12.62	13.87	14.16	XH
4PBNRT		11.95	12.00	11.66	11.11	10.36	9.16	8.07	7.68	7.86	8.76	10.27	9.92	10.38	12.57	14.05	14.32	AQ
664V3Y		11.56	11.86	11.52	11.00	10.24	9.06	7.99	7.59	7.77	8.75	10.23	9.79	10.41	12.59	13.84	14.11	XB
6NY8CU		11.66	11.87	11.53	10.91	10.29	9.13	8.05	7.68	7.81	8.78	10.35	9.99	10.44	12.61	13.93	14.22	AT
7P77J8		11.35	11.78	11.45	10.94	10.22	9.11	8.05	7.60	7.79	8.77	10.20	9.81	10.39	12.51	13.72	14.10	XI
7ZMX4B		11.52	11.83	11.54	11.00	10.27	9.06	7.98	7.60	7.78	8.70	10.20	9.85	10.35	12.59	13.98	14.13	AS
8CVXGF		11.56	11.95	11.63	11.15	10.37	9.18	8.09	7.63	7.81	8.77	10.32	9.94	10.41	12.63	14.07	14.49	MT
8PYGU2		11.58	11.88	11.52	11.08	10.36	9.18	8.09	7.70	7.89	8.79	10.30	10.06	10.44	12.69	14.04	14.27	AJ
9FP9R7		11.70	11.90	11.60	11.10	10.30	9.20	8.10	7.70	7.90	8.80	10.30	10.00	10.50	12.85*	14.10	14.30	AN
9HF9BB		11.40	11.90	11.54	10.99	10.26	9.08	8.04	7.60	7.76	8.73	10.18	9.81	10.42	12.56	13.82	14.13	XI
9JPKN7		11.60	11.90	11.60	11.10	10.40	9.20	8.10	7.70	7.90	8.80	10.40	10.10	10.50	12.70	14.20	14.40	AN
9XUJUR		11.46	11.77	11.43	10.91	10.22	9.03	7.99	7.61	7.76	8.69	10.30	9.88	10.37	12.64	14.18	14.07	AS
AEACVZ		11.51	11.84	11.54	11.01	10.30	9.11	8.04	7.67	7.84	8.75	10.32	9.99	10.40	12.61	14.08	14.20	AJ

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample B221																		
BB8TDY		11.63	11.92	11.61	11.09	10.36	9.17	8.08	7.70	7.90	8.80	10.30	10.02	10.46	12.69	14.10	14.31	AJ
BX66GY		11.47	11.87	11.53	11.00	10.32	9.14	8.05	7.68	7.86	8.76	10.38	10.01	10.38	12.75	14.08	14.19	AH
C6E7Y6		12.36	11.85	11.57	11.02	10.28	9.13	8.04	7.67	7.85	8.73	10.28	9.99	10.40	12.61	14.01	14.35	AJ
CAQWHD		11.68	12.01	11.65	11.14	10.38	9.18	8.11	7.68	7.86	8.88	10.35	9.92	10.55	12.75	14.06	14.39	MM
CB2X8X		11.39	11.81	11.51	10.99	10.25	9.06	8.00	7.58	7.75	8.70	10.22	9.85	10.37	12.53	13.90	14.31	MK
CDVLPT		11.43	11.79	11.46	10.93	10.20	9.02	7.97	7.56	7.71	8.70	10.15	9.72	10.32	12.44	13.74	14.03	XI
CENHAG	X	13.57X	14.29X	14.13X	13.93X	13.67X	13.19X	12.70X	12.51X	12.62X	13.17X	14.00X	13.71X	13.83X	14.86X	15.41X	15.26X	AJ
DEKDBX		11.67	11.82	11.48	10.97	10.21	9.03	7.96	7.54	7.72	8.69	10.20	9.77	10.36	12.54	13.87	14.22	XB
DHHUPD		11.46	11.82	11.49	10.97	10.23	9.07	8.00	7.59	7.76	8.73	10.23	9.80	10.35	12.52	13.80	14.12	XX
DMBXEB		11.47	11.83	11.49	10.98	10.24	9.10	8.01	7.65	7.85	8.73	10.28	9.99	10.43	12.63	14.05	14.17	AS
DRUQUK		11.41	11.75	11.49	11.03	10.26	9.11	8.07	7.71	7.89	8.84	10.32	9.90	10.51	12.66	14.05	14.40	XO
DYQQ47		11.26	11.78	11.47	10.93	10.20	9.03	8.01	7.65	7.82	8.75	10.25	9.87	10.46	12.55	13.99	14.40	XM
DZHNEX		11.46	11.87	11.54	11.07	10.34	9.16	8.08	7.66	7.88	8.77	10.22	9.96	10.36	12.53	13.88	14.27	AQ
EM9KAF		11.70	12.10	11.70	11.20	10.40	9.25	8.20	7.70	7.90	8.90	10.40	9.90	10.55	12.75	14.00	14.40	XI
EYKVX6		11.46	11.82	11.43	10.96	10.19	9.08	8.04	7.61	7.75	8.80	10.19	9.80	10.46	12.45	13.72	13.99	XI
EZCT9W		11.46	11.77	11.45	10.95	10.21	9.05	7.99	7.57	7.74	8.69	10.20	9.78	10.34	12.53	13.83	14.17	XD
FTQBAF		11.70	11.90	11.60	11.10	10.30	9.15	8.10	7.70	7.90	8.90	10.40	9.80	10.30	12.60	13.80	14.30	HW
GL8EZY		11.45	11.81	11.49	10.96	10.20	9.03	7.96	7.54	7.73	8.69	10.19	9.77	10.34	12.55	13.87	14.24	XB
GQL68E		11.47	11.79	11.50	10.98	10.21	9.07	7.97	7.59	7.79	8.81	10.25	9.81	10.45	12.56	13.92	14.37	XC
HGQCQ9		11.49	11.87	11.52	11.03	10.28	9.10	8.03	7.62	7.78	8.70	10.27	9.87	10.39	12.55	13.96	14.35	MS
HPNUCC		11.52	11.93	11.59	11.06	10.35	9.17	8.10	7.68	7.84	8.77	10.27	9.96	10.44	12.51	13.89	14.28	MM
HWP799		11.44	11.79	11.46	10.94	10.21	9.06	7.99	7.57	7.75	8.71	10.21	9.78	10.33	12.48	13.76	14.09	XI

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
								Sample B221										
JKRRLG		11.80	11.70	11.34	10.96	10.35	9.01	8.06	7.67	7.67	8.66	9.95*	9.90	10.34	12.59	13.77	13.64X	GD
KEWHNN		11.57	11.92	11.63	11.09	10.37	9.14	8.07	7.70	7.87	8.78	10.27	10.02	10.40	12.67	14.04	14.39	AO
KFNFZ2		11.68	11.88	11.51	11.01	10.29	9.13	8.06	7.68	7.83	8.74	10.32	9.96	10.40	12.64	14.08	14.32	AS
KV3JMW	X	14.75X	13.85X	12.93X	12.18X	11.31X	9.96X	8.84X	8.57X	8.67X	9.48X	11.51X	10.90X	11.27X	13.64X	15.16X	15.55X	CA
LQNBUQ		11.34	6.76X	11.47	10.96	10.21	9.08	8.03	7.58	7.75	8.69	10.20	9.85	10.41	12.53	13.80	14.17	XI
LT9BU7		11.45	11.86	11.53	11.06	10.31	9.12	8.05	7.61	7.80	8.76	10.33	9.90	10.34	12.55	14.05	14.44	MV
LX6YBD		10.42	10.87	10.57X	10.16X	9.47X	8.37X	7.37X	6.96X	7.14X	8.05X	9.48X	9.20X	10.13*	12.13X	13.09X	13.49X	XX
M3BWFB		12.75*	12.03	11.67	11.19	10.39	9.18	8.10	7.71	7.90	8.80	10.34	10.01	10.41	12.65	14.08	14.46	AN
M48DPM		11.50	11.77	11.49	10.97	10.26	9.07	8.01	7.62	7.80	8.72	10.24	9.96	10.39	12.57	14.23	14.16	AS
NKAANC		11.33	11.82	11.48	11.00	10.28	9.12	8.03	7.60	7.77	8.71	10.28	9.91	10.30	12.49	13.97	14.35	MW
NYAB2D		11.87	11.76	11.42	10.91	10.16	8.99	7.95	7.53	7.72	8.69	10.17	9.75	10.35	12.51	13.79	14.12	XD
P3N4VD		11.45	11.80	11.48	10.96	10.20	9.04	7.99	7.57	7.73	8.74	10.14	9.80	10.38	12.43	13.74	14.08	XI
PG64LC		11.71	11.87	11.52	11.02	10.29	9.11	8.04	7.69	7.87	8.76	10.37	9.98	10.46	12.67	14.17	14.42	AS
PKRKZQ		11.60	11.97	11.56	11.08	10.34	9.16	8.06	7.63	7.81	8.64	10.26	9.94	10.30	12.50	13.96	14.32	HP
PN4NQT		11.41	11.76	11.42	10.92	10.19	8.97	7.88	7.48	7.67	8.64	10.15	9.71	10.30	12.51	13.79	14.11	XD
PQXAL6		11.75	12.07	11.74	11.23	10.48	9.24	8.14	7.72	7.89	8.84	10.48	9.95	10.42	12.72	14.12	14.51	CA
PUXKG6		11.55	11.85	11.54	11.08	10.34	9.12	8.04	7.63	7.80	8.72	10.33	9.83	10.26	12.49	13.87	14.26	CA
PZHJ8D		11.50	11.96	11.61	11.07	10.34	9.17	8.07	7.66	7.76	8.76	10.39	9.88	10.31	12.65	14.07	14.47	MV
QCBJ2T		11.44	11.85	11.52	11.00	10.25	9.07	8.02	7.59	7.76	8.73	10.18	9.81	10.38	12.54	13.85	14.13	XD
QFRRLL	X	11.42	11.79	11.47	10.96	10.21	9.04	9.90X	9.53X	9.36X	9.48X	10.20	9.80	8.97X	10.13X	11.26X	14.11	XD
QZG3CR		11.55	12.01	11.62	11.11	10.35	9.19	8.10	7.69	7.81	8.69	10.31	9.86	10.25	12.64	13.94	14.31	HP
R8BUUK		11.44	11.81	11.53	11.01	10.23	9.09	8.05	7.67	7.82	8.81	10.25	9.88	10.38	12.51	13.81	14.19	XH

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
								Sample B221										
RDWPT3		11.49	11.85	11.51	11.02	10.25	9.08	8.01	7.60	7.75	8.69	10.23	9.83	10.33	12.51	13.91	14.27	MS
RLD43Z		11.58	11.80	11.47	10.99	10.27	9.09	8.03	7.64	7.83	8.73	10.26	9.99	10.39	12.63	14.01	14.29	AS
RM66XP		11.53	11.96	11.59	11.06	10.32	9.16	8.09	7.66	7.81	8.82	10.28	9.88	10.42	12.57	13.89	14.22	XI
T8UX7Q		11.47	11.77	11.46	10.94	10.18	9.02	7.97	7.54	7.72	8.68	10.17	9.79	10.34	12.48	13.80	14.18	XB
TLAYZW		11.42	11.84	11.50	11.02	10.26	9.10	8.02	7.57	7.73	8.67	10.27	9.87	10.21	12.46	13.91	14.33	MY
TVDF8T		11.46	11.78	11.46	10.93	10.21	9.00	7.95	7.55	7.71	8.70	10.20	9.73	10.28	12.45	13.69	13.94	XR
UM2END		11.56	11.85	11.51	11.07	10.30	9.14	8.06	7.70	7.92	8.82	10.31	10.06	10.46	12.69	14.14	14.16	AS
V8H9TP		11.49	11.94	11.62	11.13	10.33	9.18	8.14	7.71	7.88	8.85	10.34	9.99	10.57	12.70	14.08	14.40	MI
VQVUBQ		11.56	11.89	11.54	11.02	10.28	9.10	8.07	7.83	7.79	8.74	10.27	9.85	10.38	12.52	13.83	14.18	XD
W9QMWP		11.44	11.78	11.45	10.93	10.17	8.99	7.94	7.53	7.72	8.70	10.16	9.75	10.36	12.54	13.82	14.17	XI
WAMZJG		11.58	12.06	11.71	11.17	10.36	9.18	8.07	7.62	7.77	8.72	10.22	9.85	10.45	12.64	13.93	14.30	XI
WJCPHQ		11.41	11.77	11.42	10.95	10.18	9.05	7.93	7.50	7.69	8.66	10.25	9.75	10.22	12.52	13.89	14.31	MV
WT3BNN		6.48X	11.85	11.60	11.11	10.33	9.14	8.09	7.73	7.90	8.90	10.30	9.91	10.53	12.68	14.02	14.35	XO
XCNNAQ		11.96	12.39	12.14X	11.61X	10.87X	9.56X	8.37X	7.91*	8.06*	9.07*	10.65X	10.28X	10.84X	13.11X	14.58X	15.02X	GB
XEDT9P		11.77	12.15	11.84*	11.31*	10.59*	9.47X	8.42X	8.01X	8.19X	9.13X	10.65X	10.30X	10.76X	12.94*	14.40*	14.82X	MR
XTR6HB		11.20	11.70	11.40	10.90	10.10	8.90	8.00	7.40*	7.60	8.60	10.00	9.70	10.20	12.40	13.70	14.00	XH
YC3ALE		11.59	11.86	11.55	11.05	10.31	9.15	8.07	7.70	7.89	8.80	10.33	10.03	10.45	12.73	14.05	14.27	AT
YCZKGG		11.75	11.85	11.59	11.05	10.33	9.11	8.02	7.64	7.76	8.58	10.33	9.76	10.08X	12.74	14.01	14.21	HP
YPT7MC		11.56	11.86	11.56	11.04	10.31	9.13	8.04	7.68	7.87	8.79	10.37	10.01	10.43	12.81	14.16	14.17	AT
ZCWEED		11.61	11.95	11.64	11.16	10.42	9.22	8.12	7.73	7.91	8.93	10.47	10.01	10.53	12.73	14.13	14.51	MV
ZJHBFG		11.45	11.83	11.52	11.00	10.26	9.06	8.00	7.58	7.74	8.69	10.26	9.76	10.25	12.47	13.78	14.08	XB
ZPMAR8		11.25	11.78	11.46	10.95	10.22	9.05	7.99	7.55	7.72	8.65	10.21	9.86	10.30	12.47	13.86	14.20	AB

Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	11.48	11.80	11.53	11.02	10.28	9.11	8.04	7.63	7.80	8.75	10.27	9.89	10.39	12.59	13.95	14.25
SD Btwn Labs	0.61	0.58	0.15	0.14	0.14	0.12	0.11	0.11	0.11	0.12	0.14	0.14	0.11	0.13	0.19	0.20

2XXVF2 (X) - Low % reflectance data for almost all wavelengths.

CENHAG (X) - Extreme data for all wavelengths. Large replication difference for all wavelengths.

KV3JMW (X) - High % reflectance data at all wavelengths. Large replication difference for higher wavelengths.

QFRRLL (X) - High % reflectance data at wavelengths 520-580 and low % reflectance data at 640-680. Large replication difference for those wavelengths.

Key to Instrument Codes Reported by Participants

AB Datacolor 100
AH Datacolor 550
AJ Datacolor 600
AN Datacolor 650
AO Datacolor 650x
AQ Datacolor 600x
AS Datacolor 800
AT Datacolor 850
CA Cary 5000
GB BYK-Gardner Spectrogard
GD BYK-Gardner Spectro-Guide Sphere
HP Hunter UltraScan PRO
HW Hunter UltraScan XE
MI Macbeth Color i5
MK Macbeth Color-Eye 7000
MM Macbeth Color-Eye 7000a
MR Minolta CM-5
MS Minolta CM-600d
MT Minolta CM-2600d
MV Minolta CM-3000d Spectrophotometer
MW Minolta CM 3700a Spectrophotometer
MY Minolta Benchtop Spectrophotometer CM-3600a
XB X-Rite Ci7000 Series Benchtop Spectrophotometer
XC X-Rite Ci4200 Benchtop Spectrophotometer
XD X-Rite Ci7800 Benchtop Spectrophotometer
XH X-Rite Color i5 Benchtop Spectrophotometer
XI X-Rite Color i7 Benchtop Spectrophotometer
XM X-Rite SP62 Sphere Spectrophotometer
XO X-Rite SP64 Sphere Spectrophotometer
XR X-Rite
XX Instrument make/model not specified by lab

WebCode	Data Flag	Sample F221 Lab Mean	Sample F221 Diff from Grand Mean	Sample F221 CPV	Sample F222 Lab Mean	Sample F222 Diff from Grand Mean	Sample F222 CPV	Instr Code
2E4YZR		39.18	0.35	0.36	50.30	1.03	0.92	GL
2XWZRN		38.33	-0.49	-0.51	49.21	-0.06	-0.05	GL
2ZL6RM		38.70	-0.13	-0.13	49.18	-0.09	-0.08	GL
3LFF4L		37.93	-0.90	-0.93	47.85	-1.42	-1.26	GK
3N62HU		38.30	-0.53	-0.54	49.08	-0.19	-0.17	PA
3XBL2Q		39.28	0.45	0.47	49.93	0.66	0.59	GK
3XQ6LN		38.60	-0.23	-0.23	48.70	-0.57	-0.50	GK
473J9P		38.65	-0.18	-0.18	49.73	0.46	0.41	GL
4DJ3JC		38.85	0.02	0.03	49.58	0.31	0.27	GL
664V3Y		38.85	0.02	0.03	50.33	1.06	0.94	GL
7P77J8		39.25	0.42	0.44	49.48	0.21	0.19	MM
89WEJN		38.55	-0.28	-0.29	47.88	-1.39	-1.23	RB
8JQXR3		37.65	-1.18	-1.22	48.40	-0.87	-0.77	GL
8PYGU2		39.15	0.32	0.34	50.28	1.01	0.90	NH
9XUJUR		37.63	-1.20	-1.24	47.80	-1.47	-1.30	GL
AEACVZ		40.58	1.75	1.81	50.68	1.41	1.25	MW
B4MRVZ		39.48	0.65	0.67	49.45	0.18	0.16	GN
BB8TDY		39.45	0.62	0.65	49.88	0.61	0.54	GL
BJMA69	*	40.98	2.15	2.23	52.35	3.08	2.74	GK
BQJAHF		39.56	0.73	0.76	50.19	0.93	0.82	GL
CENHAG		38.83	0.00	0.00	49.70	0.43	0.39	GL
D9T33K		38.73	-0.10	-0.10	49.43	0.16	0.14	GN
DHL93D		39.07	0.24	0.25	49.95	0.69	0.61	GL
DRUQUK		40.98	2.15	2.23	51.73	2.46	2.18	GN
DZL94L		38.78	-0.05	-0.05	48.50	-0.77	-0.68	GL
EYKVX6		40.22	1.40	1.45	50.14	0.87	0.77	GL
EZFDXL		37.73	-1.10	-1.14	48.13	-1.14	-1.01	GK
FDZ9TC		39.73	0.90	0.93	50.60	1.33	1.18	GL
FTQBAF		37.13	-1.70	-1.76	48.10	-1.17	-1.03	GK
FZT8BZ		39.68	0.85	0.88	50.65	1.38	1.23	GN

WebCode	Data Flag	Sample F221 Lab Mean	Sample F221 Diff from Grand Mean	Sample F221 CPV	Sample F222 Lab Mean	Sample F222 Diff from Grand Mean	Sample F222 CPV	Instr Code
G4Q8N3		37.18	-1.65	-1.71	47.15	-2.12	-1.88	GK
GTRCTR		38.65	-0.18	-0.18	49.95	0.68	0.61	GK
H79PLD		38.33	-0.50	-0.52	48.23	-1.04	-0.92	GL
HGQCQ9		38.28	-0.55	-0.57	47.98	-1.29	-1.14	GK
HPNUCC		37.70	-1.13	-1.17	48.55	-0.72	-0.64	GL
JKRRLG		36.90	-1.93	-2.00	46.88	-2.39	-2.12	GN
JXCEM3		38.58	-0.25	-0.26	48.93	-0.34	-0.30	GN
K8FNTR		38.50	-0.33	-0.34	49.05	-0.22	-0.19	GK
KBJF7Y		39.68	0.85	0.88	49.45	0.18	0.16	GN
KKLYZE		38.58	-0.25	-0.26	49.10	-0.17	-0.15	EN
LT9BU7		37.65	-1.18	-1.22	47.65	-1.62	-1.43	GL
M3BWFB		38.43	-0.40	-0.41	48.43	-0.84	-0.75	GK
M48DPM		37.88	-0.95	-0.98	48.60	-0.67	-0.59	GK
MAYDAA		38.33	-0.50	-0.52	48.75	-0.52	-0.46	GK
MPRAAK		37.68	-1.15	-1.19	48.53	-0.74	-0.66	GD
NKAANC		37.53	-1.30	-1.35	47.48	-1.79	-1.59	GT
NYAB2D		39.38	0.55	0.57	49.33	0.06	0.05	RA
P3N4VD		38.78	-0.05	-0.05	48.78	-0.49	-0.44	GL
PD8H2Z		38.65	-0.18	-0.18	48.45	-0.82	-0.72	GL
PEZDGH	X	30.58	-8.25	-8.55	30.43	-18.84	-16.72	GL
PJEBP6	X	32.35	-6.48	-6.71	29.70	-19.57	-17.36	GK
PUXKG6	X	35.30	-3.53	-3.65	46.53	-2.74	-2.43	GL
QXNEPP		38.60	-0.23	-0.23	48.65	-0.62	-0.55	GL
R8BUUK		39.40	0.57	0.60	49.93	0.66	0.59	GK
RKGQB2		37.21	-1.61	-1.67	47.50	-1.77	-1.57	QT
TLAYZW		41.13	2.30	2.38	51.58	2.31	2.05	GL
TVDF8T		40.73	1.90	1.97	50.88	1.61	1.43	GK
UDVGXN		40.58	1.75	1.81	50.50	1.23	1.10	GL
UP3MRM	*	38.05	-0.78	-0.80	49.88	0.61	0.54	GL
V8H9TP		39.03	0.20	0.21	49.78	0.51	0.45	GL

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample F221 Lab Mean	Sample F221 Diff from Grand Mean	Sample F221 CPV	Sample F222 Lab Mean	Sample F222 Diff from Grand Mean	Sample F222 CPV	Instr Code
W6UYFH		39.15	0.32	0.34	50.03	0.76	0.67	RQ
WAMZJG		40.15	1.32	1.37	49.88	0.61	0.54	GN
WT3BNN		39.60	0.77	0.80	49.28	0.01	0.01	MW
XCNNAQ		38.25	-0.58	-0.60	48.48	-0.79	-0.70	GL
XTR6HB		38.43	-0.40	-0.41	47.55	-1.72	-1.52	GL
Y488J3		38.53	-0.30	-0.31	49.80	0.53	0.47	GL
YVUK7R		39.48	0.65	0.67	49.33	0.06	0.05	GL
ZCKFMP		38.20	-0.63	-0.65	48.43	-0.84	-0.75	GL
ZJHBFG		38.90	0.07	0.08	50.45	1.18	1.05	ZA
ZPMAR8		39.53	0.70	0.73	50.55	1.28	1.14	GL

Summary Statistics

Grand Means

38.83 Gloss Units — 49.27 Gloss Units

Stnd Dev Btwn Labs

0.96 Gloss Units — 1.13 Gloss Units

Statistics based on 67 of 70 reporting participants

Comments on Assigned Data Flags for Test #440

PEZDGH(X) - Extreme data.

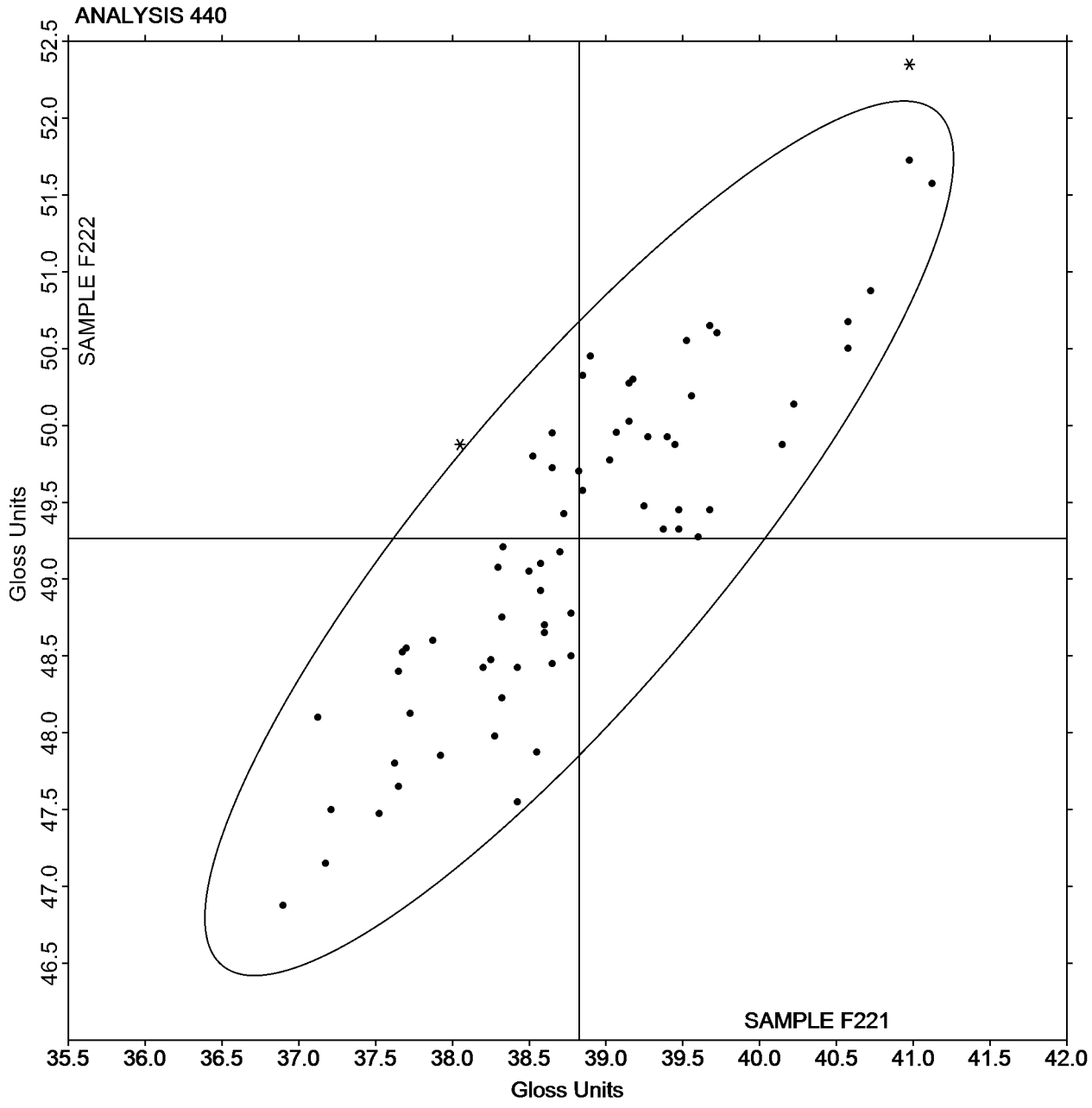
PJEBP6(X) - Extreme data.

PUXKG6(X) - Low data for Sample F221. Inconsistent within the determinations for both samples.

Key to Instrument Codes Reported by Participants

EN	Elcometer 480	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	MW	Minolta Multi-Gloss 268
NH	3nh NHG268 Multi-angle Precise Gloss Meter	PA	Photovolt micto-TRI-gloss G3
QT	Qualitest Micro-Tri-Gloss	RA	Rhopoint Novo-Gloss Glossmeter
RB	Rhopoint Novo-Gloss LITE Glossmeter	RQ	Rhopoint IQ Goniophotometer 20/60/85°
ZA	Zehntner ZGM Series		

SAMPLE F221 = 38.83 Gloss Units SAMPLE F222 = 49.27 Gloss Units



-End of Report-