



Color & Appearance Testing Program

Summary Report # 148 - 2nd Q 2009

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

[Key to Tables and Graphs](#)

<u>Analysis</u>	<u>Analysis Name</u>
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408	Color & Color Difference (Paint Chips) - 45/0
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409	Color & Color Difference (Paint Chips) Sphere
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[Instrument Code List](#)

ABOUT THE 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 50 countries, currently participate in the CTS programs.

If there are any questions on the report or testing program, please contact:

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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 mailed 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.

**Interlaboratory Testing Program for Color & Appearance
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^*	
1RCM7A		B91	53.29	10.15	10.26	1.13	-0.29	-0.34	1.21	AE
		B92	54.42	9.86	9.92					
1UKDJ3		B91	53.96	10.35	10.28	1.08	-0.27	-0.29	1.15	XO
		B92	55.04	10.08	9.99					
1V8PHH		B91	53.49	10.02	9.82	1.09	-0.26	-0.25	1.15	GU
		B92	54.58	9.76	9.57					
1Z1612		B91	54.04	10.31	10.20	1.05	-0.29	-0.30	1.13	XN
		B92	55.09	10.02	9.90					
2JTQXU	X	B91	46.67	8.56	10.38	1.18	-0.18	-0.22	1.21	HW
		B92	47.85	8.38	10.16					
2WEPJG		B91	53.70	10.19	10.25	1.18	-0.27	-0.25	1.23	XU
		B92	54.87	9.92	10.01					
4AYUC9		B91	53.90	10.27	10.38	1.12	-0.29	-0.27	1.18	XX
		B92	55.02	9.98	10.11					
4M2BG4		B91	53.67	10.23	10.26	1.11	-0.28	-0.28	1.18	XU
		B92	54.78	9.95	9.98					
4MPPDG		B91	53.55	9.96	9.97	1.16	-0.25	-0.27	1.21	GU
		B92	54.71	9.72	9.70					
58TLSW		B91	53.96	10.66	10.48	1.12	-0.28	-0.27	1.19	MG
		B92	55.08	10.37	10.21					
5URZGT		B91	53.79	10.25	10.16	1.13	-0.28	-0.27	1.19	XO
		B92	54.92	9.98	9.89					
6AGPHM		B91	53.57	10.19	10.20	1.13	-0.27	-0.27	1.19	GA
		B92	54.69	9.92	9.93					
6MFY9Q		B91	53.67	10.28	10.41	1.11	-0.26	-0.33	1.18	GE
		B92	54.78	10.02	10.09					
ASAL87		B91	53.64	10.37	10.39	1.12	-0.28	-0.27	1.18	HW
		B92	54.75	10.09	10.12					

**Interlaboratory Testing Program for Color & Appearance
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^*	
AVHAYJ		B91	53.66	10.27	10.53	1.07	-0.28	-0.30	1.15	GH
		B92	54.73	9.99	10.23					
BVH4JE		B91	53.50	10.18	10.40	1.06	-0.28	-0.31	1.13	GH
		B92	54.56	9.90	10.09					
C9U692		B91	53.77	10.32	10.32	1.11	-0.29	-0.28	1.18	HW
		B92	54.88	10.03	10.04					
EG9WAT		B91	53.83	10.33	10.34	1.13	-0.31	-0.23	1.19	GD
		B92	54.96	10.02	10.11					
F86XJW		B91	53.25	10.03	10.13	1.13	-0.27	-0.30	1.20	MQ
		B92	54.37	9.76	9.83					
G61P95		B91	53.72	10.37	10.49	1.11	-0.29	-0.28	1.18	HW
		B92	54.83	10.08	10.21					
G9HWM6		B91	53.77	10.22	10.23	1.12	-0.28	-0.32	1.19	XP
		B92	54.89	9.94	9.91					
GJS5AY	X	B91	53.60	9.75	9.25	0.90	-0.50	-0.50	1.14	TN
		B92	54.50	9.25	8.75					
H1GX3H		B91	53.82	10.36	10.34	1.08	-0.30	-0.27	1.15	HW
		B92	54.90	10.06	10.08					
H7M6S6		B91	54.02	9.88	10.58	1.11	-0.26	-0.28	1.17	HK
		B92	55.13	9.62	10.30					
HEZEZZ		B91	53.97	10.30	10.35	1.10	-0.26	-0.28	1.16	HW
		B92	55.07	10.04	10.08					
KZFDFFD		B91	53.56	10.11	10.13	1.12	-0.28	-0.26	1.18	GE
		B92	54.67	9.83	9.88					
M22SZ8		B91	53.70	10.32	10.21	1.20	-0.30	-0.27	1.26	XO
		B92	54.89	10.02	9.94					
M3K3B1		B91	53.78	10.21	10.26	1.09	-0.26	-0.30	1.15	XM
		B92	54.87	9.95	9.97					

**Interlaboratory Testing Program for Color & Appearance
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^*	
NHC5EQ		B91	53.60	10.10	10.21	1.19	-0.29	-0.26	1.25	GH
		B92	54.79	9.81	9.95					
NX58VP		B91	53.76	9.85	9.89	1.62	-0.19	-0.28	1.65	GU
		B92	55.37	9.66	9.62					
QJXH9D		B91	53.85	10.33	10.37	1.12	-0.29	-0.25	1.18	HW
		B92	54.97	10.05	10.13					
RAEQ3M		B91	53.82	10.35	10.24	1.13	-0.27	-0.28	1.19	XT
		B92	54.95	10.08	9.96					
SMBV5L		B91	53.55	10.05	10.08	1.08	-0.28	-0.27	1.14	XR
		B92	54.62	9.78	9.82					
UES9CT		B91	53.77	10.29	10.35	1.08	-0.27	-0.26	1.14	HW
		B92	54.85	10.02	10.09					
V4QAYS X		B91	54.09	11.32	10.75	1.06	-0.23	-0.32	1.13	XX
		B92	55.15	11.09	10.43					
VFKECJ		B91	53.88	10.41	10.49	1.17	-0.28	-0.30	1.24	HW
		B92	55.05	10.14	10.20					
W5YZJF		B91	53.99	10.42	10.52	1.12	-0.27	-0.28	1.18	HW
		B92	55.10	10.16	10.25					
XVZ7KF		B91	53.75	10.21	10.29	1.15	-0.28	-0.31	1.22	XN
		B92	54.89	9.94	9.98					
YRZHB7		B91	53.45	10.42	10.23	1.11	-0.29	-0.29	1.18	XL
		B92	54.55	10.13	9.95					

**Interlaboratory Testing Program for Color & Appearance
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**

Summary Statistics

<u>Samples</u>	<u>L*</u>	<u>a*</u>	<u>b*</u>	<u>ΔL*</u>	<u>Δa*</u>	<u>Δb*</u>	<u>ΔE*</u>
Grand Means							
B91	53.73	10.25	10.29				
B92	54.84	9.97	10.01	1.13	-0.27	-0.28	1.19
Std Dev Btwn Labs							
B91	0.20	0.15	0.18				
B92	0.20	0.15	0.18	0.09	0.02	0.02	0.08
Statistics based on 36 of 39 reporting participants							

Analysis notes for Test#408

The results for "b*" coordinate are shown with an offset of 10.

Comments assigned on Data Flags for Test #408

2JTQXU(X) - Low "L*" and "a*" values.

GJS5AY(X) - Low "a*" and "b*" values. Large replication difference for all values.

V4QAYS(X) - High "a*" values.

Interlaboratory Testing Program for Color & Appearance

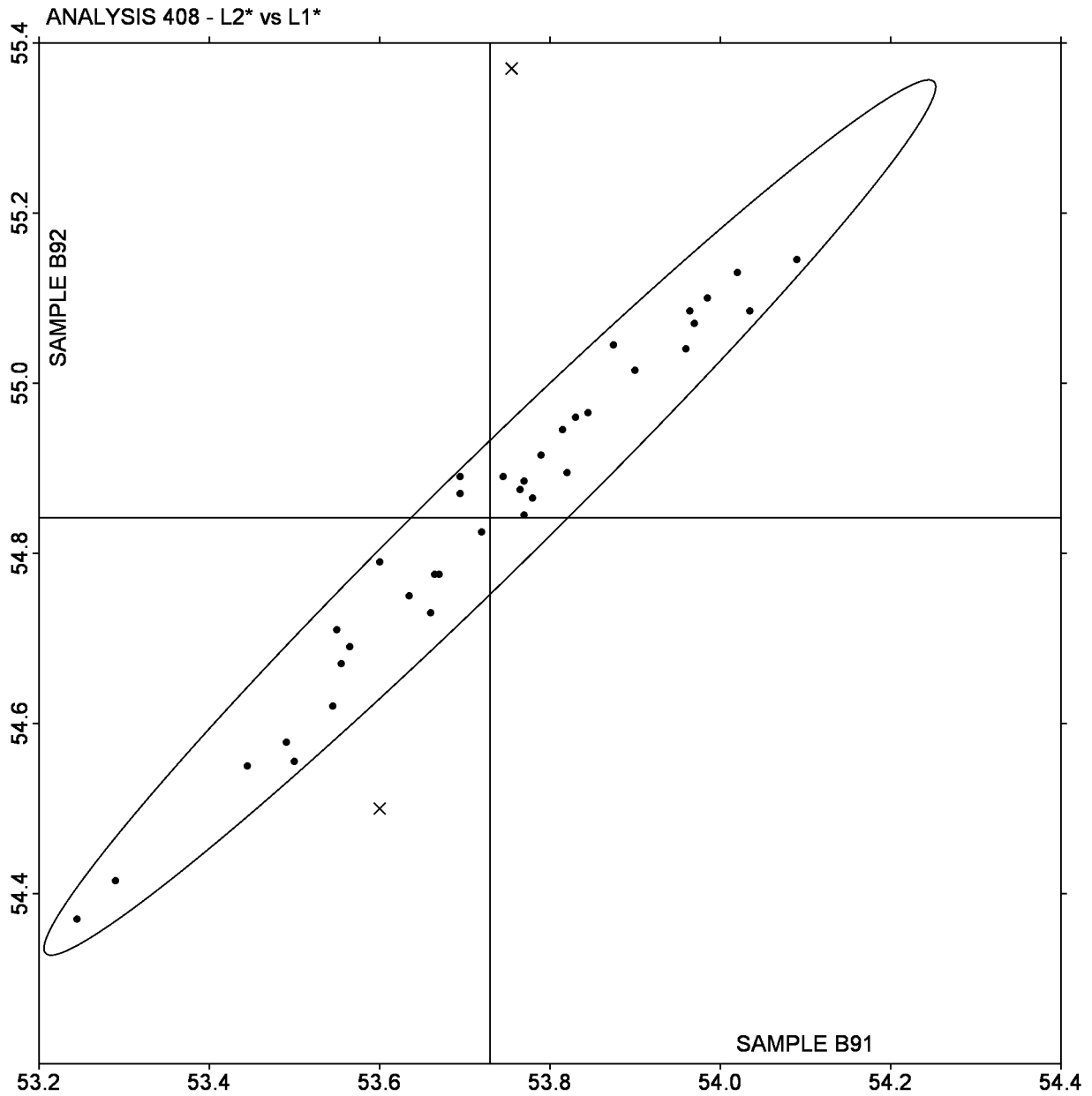
Analysis 408

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

L2* vs L1*

SAMPLE B91 = 53.73

SAMPLE B92 = 54.84



Interlaboratory Testing Program for Color & Appearance

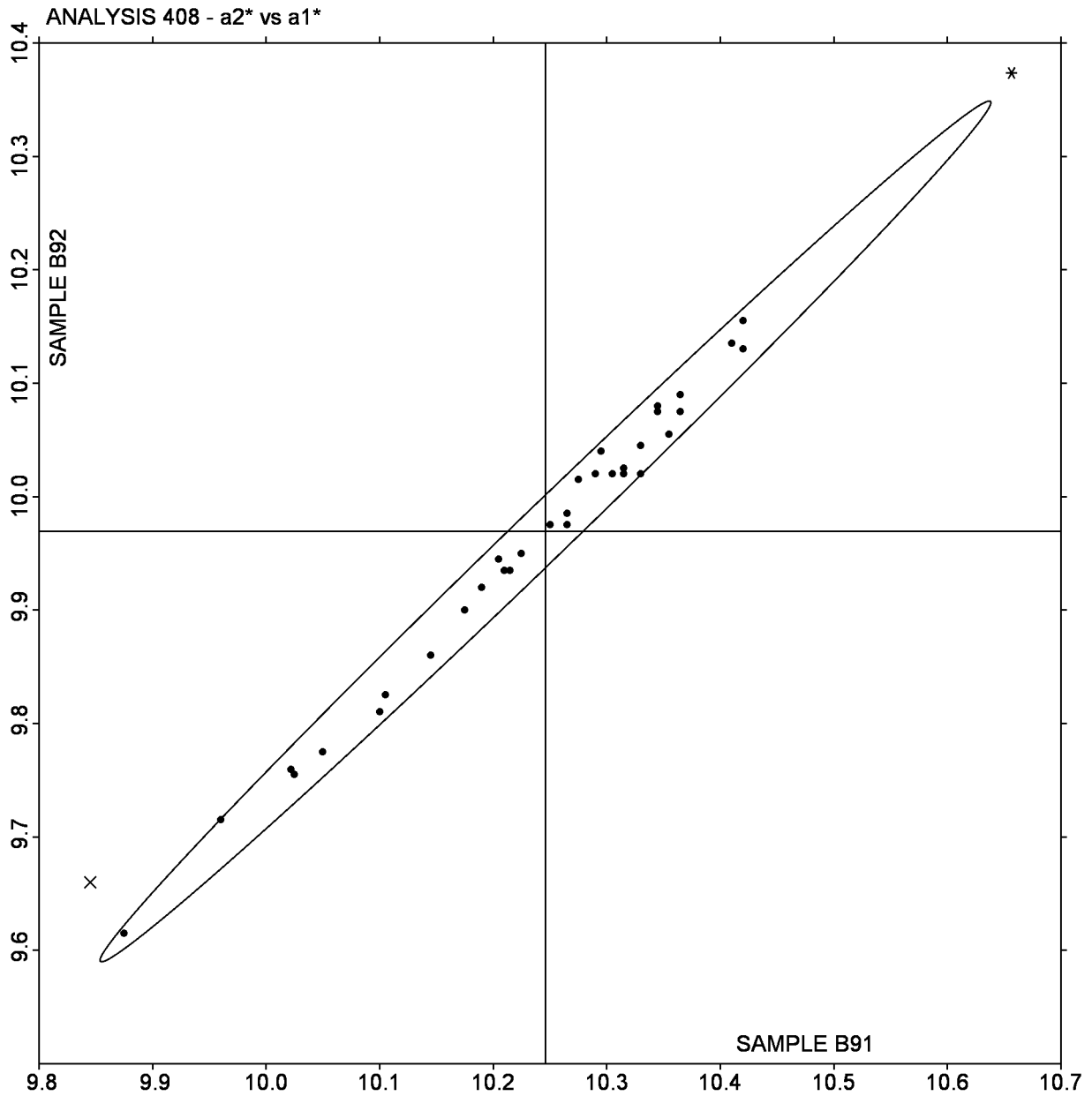
Analysis 408

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

a2* vs a1*

SAMPLE B91 = 10.25

SAMPLE B92 = 9.97



Interlaboratory Testing Program for Color & Appearance

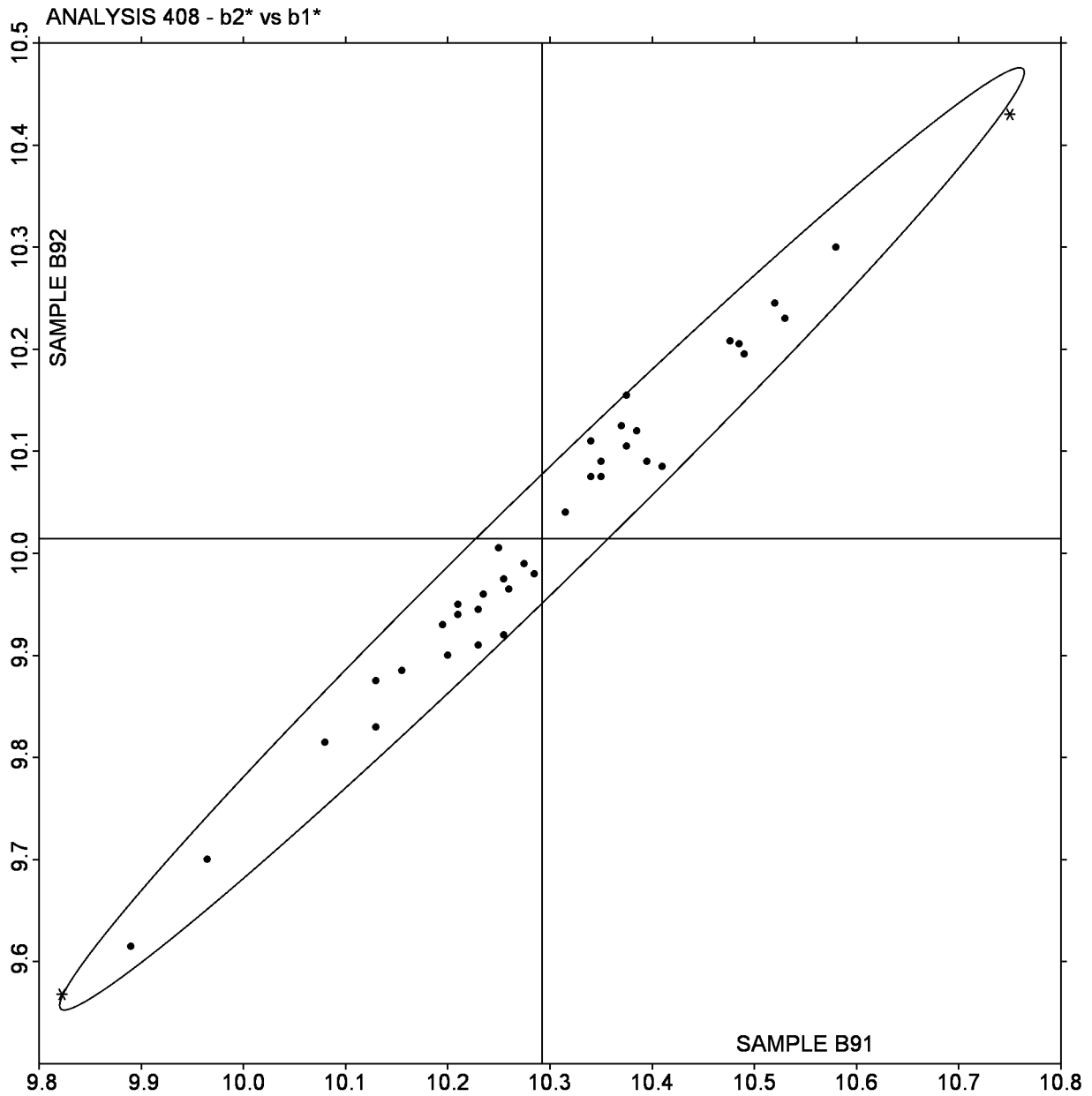
Analysis 408

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

b2* vs b1*

SAMPLE B91 = 10.29

SAMPLE B92 = 10.01



Plot created using an offset of 10 for both axes.

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
17LJM3		B91	53.90	10.05	9.96	1.16	-0.24	-0.38	1.24	MH
		B92	55.06	9.81	9.58					
214QJQ		B91	54.11	9.99	9.75	1.11	-0.27	-0.28	1.17	AJ
		B92	55.21	9.72	9.48					
24XY3X		B91	53.94	10.09	9.86	1.09	-0.26	-0.25	1.14	MM
		B92	55.02	9.83	9.61					
2HMQ5E	X	B91	53.87	11.16	10.05	1.11	-0.27	-0.30	1.17	HX
		B92	54.97	10.89	9.76					
2K7APJ		B91	54.09	9.99	9.67	1.09	-0.30	-0.29	1.17	AJ
		B92	55.18	9.70	9.38					
2Z1EZD		B91	53.87	9.92	9.89	1.08	-0.27	-0.27	1.14	MV
		B92	54.95	9.65	9.62					
397DN7		B91	54.04	10.07	9.92	1.09	-0.26	-0.29	1.16	MK
		B92	55.13	9.81	9.63					
3FHW6E		B91	54.19	10.02	9.70	1.10	-0.28	-0.26	1.16	AO
		B92	55.29	9.74	9.44					
3HATUD		B91	54.09	10.09	9.64	1.11	-0.25	-0.27	1.16	AJ
		B92	55.20	9.84	9.38					
3LWBYY		B91	54.07	10.01	9.71	1.08	-0.25	-0.25	1.13	MM
		B92	55.15	9.76	9.45					
3PKRYD		B91	54.00	10.00	9.80	1.10	-0.30	-0.30	1.18	CA
		B92	55.10	9.70	9.50					
3SP8KN	X	B91	54.05	9.77	10.13	1.06	-0.27	0.27	1.13	MJ
		B92	55.11	9.50	10.40					
47R21G		B91	54.40	9.88	9.75	1.08	-0.27	-0.19	1.12	MV
		B92	55.47	9.62	9.56					
4GD52P		B91	53.94	9.98	9.66	1.09	-0.29	-0.28	1.16	AM
		B92	55.03	9.69	9.38					

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
4SQ3H5		B91	53.95	9.81	9.71	1.07	-0.26	-0.24	1.12	MJ
		B92	55.02	9.55	9.47					
4ZKUM7		B91	53.89	9.98	9.79	1.10	-0.27	-0.27	1.16	MV
		B92	54.99	9.71	9.52					
5GUGKU		B91	53.85	10.02	10.03	1.09	-0.26	-0.29	1.16	GD
		B92	54.94	9.76	9.74					
5PPCXB		B91	53.85	10.05	9.90	1.07	-0.26	-0.28	1.13	MI
		B92	54.91	9.78	9.62					
5Y6F35		B91	53.92	9.97	9.69	1.10	-0.25	-0.25	1.15	XI
		B92	55.02	9.72	9.45					
5ZANVR X		B91	53.66	9.94	369.12	1.10	-0.27	-1.53	1.90	MG
		B92	54.76	9.67	367.59					
6CHF68		B91	54.01	9.95	9.77	1.11	-0.28	-0.28	1.17	MM
		B92	55.12	9.67	9.50					
6MTF35 X		B91	54.25	10.62	10.35	1.08	-0.23	-0.29	1.14	HW
		B92	55.33	10.39	10.06					
6N3M4C		B91	54.03	10.02	9.67	1.12	-0.28	-0.27	1.18	AM
		B92	55.14	9.74	9.41					
6QMTAM		B91	53.90	10.02	9.85	1.12	-0.28	-0.27	1.18	MV
		B92	55.01	9.74	9.58					
6R54FS		B91	54.22	9.96	9.69	1.06	-0.27	-0.27	1.12	AJ
		B92	55.27	9.69	9.42					
79GQH8		B91	54.19	9.95	9.66	1.11	-0.27	-0.29	1.17	AJ
		B92	55.30	9.68	9.38					
7C99D6		B91	54.02	10.04	10.08	1.04	-0.27	-0.26	1.10	XO
		B92	55.06	9.77	9.82					
7HSVBR		B91	54.26	9.96	9.76	1.07	-0.25	-0.29	1.14	AJ
		B92	55.33	9.72	9.47					

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
7MWE2X		B91	53.97	10.04	9.97	1.12	-0.28	-0.30	1.19	MV
		B92	55.08	9.77	9.67					
7XCNMX		B91	54.03	10.08	10.04	1.05	-0.27	-0.25	1.11	XO
		B92	55.08	9.82	9.79					
86D1WR	X	B91	53.96	9.99	9.30	1.09	-0.26	-0.27	1.15	AJ
		B92	55.05	9.73	9.03					
8DH9NY		B91	54.05	9.89	9.95	1.09	-0.28	-0.24	1.15	MM
		B92	55.13	9.61	9.71					
8LS1NF		B91	54.06	10.11	10.03	1.07	-0.24	-0.25	1.12	XL
		B92	55.12	9.87	9.78					
8P62Q8		B91	53.88	9.86	9.66	1.09	-0.27	-0.28	1.16	HP
		B92	54.97	9.59	9.38					
8TYAP9		B91	54.04	10.00	9.71	1.12	-0.28	-0.28	1.18	AM
		B92	55.15	9.72	9.43					
8U6K91		B91	54.26	9.66	10.01	1.09	-0.25	-0.26	1.14	HW
		B92	55.35	9.41	9.75					
8X6ZDH		B91	54.15	10.06	9.58	1.10	-0.23	-0.24	1.15	AM
		B92	55.25	9.84	9.34					
8XSARX		B91	54.15	9.96	9.67	1.08	-0.25	-0.27	1.14	AO
		B92	55.22	9.72	9.40					
9BTR9R		B91	54.16	10.12	9.98	1.11	-0.30	-0.25	1.17	MI
		B92	55.27	9.82	9.74					
9PJNAQ		B91	53.88	10.06	9.87	1.11	-0.28	-0.28	1.18	MK
		B92	54.99	9.78	9.60					
9WVPLS		B91	54.03	10.00	9.66	1.08	-0.26	-0.28	1.14	AO
		b92	55.10	9.74	9.39					
9XW2JS		B91	54.08	9.98	9.46	1.12	-0.29	-0.29	1.19	AJ
		B92	55.20	9.69	9.17					

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
BCNJQ1		B91	54.02	9.72	10.03	1.07	-0.26	-0.26	1.13	MJ
		B92	55.09	9.47	9.77					
BD78GM		B91	53.88	9.99	9.79	1.08	-0.26	-0.29	1.15	MM
		B92	54.96	9.73	9.51					
BK3CTK		B91	53.97	9.98	9.61	1.13	-0.31	-0.27	1.20	HG
		B92	55.10	9.67	9.35					
BRGNJL		B91	53.98	9.99	9.70	1.09	-0.27	-0.27	1.15	MM
		B92	55.07	9.72	9.44					
C6AKEP	X	B91	54.38	10.05	9.65	1.13	-0.30	-0.30	1.21	AJ
		B92	55.51	9.75	9.35					
CRHGW5		B91	53.93	10.04	9.70	1.10	-0.27	-0.27	1.16	AJ
		B92	55.03	9.77	9.43					
CW31WT		B91	54.05	9.98	9.62	1.08	-0.24	-0.29	1.14	AO
		B92	55.12	9.74	9.33					
DD5XYP	X	B91	55.41	9.76	10.11	1.07	-0.26	-0.28	1.14	GG
		B92	56.48	9.50	9.83					
DWB86S		B91	53.99	9.92	9.65	1.09	-0.26	-0.26	1.15	AJ
		B92	55.08	9.66	9.39					
E8V4GY		B91	53.87	10.00	9.88	1.12	-0.29	-0.27	1.18	AJ
		B92	54.98	9.72	9.61					
ECZHSU		B91	54.00	9.83	9.83	1.07	-0.26	-0.25	1.12	MJ
		B92	55.07	9.57	9.58					
EPM9BS		B91	53.87	10.02	9.80	1.11	-0.26	-0.28	1.17	AJ
		B92	54.98	9.77	9.52					
FPBUT3	X	B91	53.61	9.97	9.85	1.07	-0.25	-0.29	1.14	EE
		B92	54.68	9.72	9.56					
FV6Y51		B91	54.02	10.00	9.72	1.10	-0.30	-0.30	1.17	AM
		B92	55.11	9.71	9.43					

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
FY5DB3		B91	53.99	9.94	9.97	1.12	-0.26	-0.24	1.17	XP
		B92	55.10	9.68	9.73					
G32BP1		B91	53.95	9.97	9.87	1.09	-0.26	-0.25	1.15	MM
		B92	55.04	9.71	9.62					
G4AW8P		B91	53.91	9.98	9.65	1.08	-0.26	-0.27	1.14	AM
		B92	54.99	9.73	9.38					
G6JH22		B91	54.06	9.73	9.99	1.07	-0.22	-0.27	1.12	HF
		B92	55.13	9.51	9.73					
GSVKUC X		B91	53.58	10.26	10.61	1.13	-0.28	-0.26	1.19	GH
		B92	54.71	9.99	10.36					
H2DEDK		B91	53.95	10.04	9.70	1.07	-0.26	-0.27	1.13	AJ
		B92	55.01	9.79	9.43					
H2U1Z2		B91	53.99	9.77	9.85	1.09	-0.28	-0.28	1.16	MJ
		B92	55.07	9.49	9.57					
HMN9LH		B91	54.19	9.95	9.82	1.12	-0.29	-0.31	1.20	AJ
		B92	55.31	9.67	9.51					
HN359G		B91	54.30	10.03	9.74	1.09	-0.27	-0.25	1.15	AG
		B92	55.38	9.76	9.49					
HXRH79		B91	54.12	9.74	9.96	1.10	-0.29	-0.27	1.17	AD
		B92	55.22	9.46	9.69					
J5XQ2F		B91	53.71	9.83	9.76	1.12	-0.28	-0.25	1.18	PE
		B92	54.82	9.55	9.51					
J834V1		B91	53.99	10.08	9.57	1.11	-0.27	-0.29	1.17	AJ
		B92	55.09	9.81	9.29					
JAL98C		B91	53.90	10.00	9.85	1.07	-0.26	-0.26	1.13	MM
		B92	54.97	9.74	9.59					
JGCF4S		B91	54.00	9.99	10.08	1.06	-0.28	-0.27	1.12	XO
		B92	55.06	9.71	9.81					

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
JGUU7V	X	B91	54.60	9.76	9.81	1.12	-0.24	-0.31	1.19	HG
		B92	55.72	9.52	9.50					
JLET9B		B91	54.02	9.94	9.91	1.11	-0.26	-0.21	1.16	MG
	B92	55.12	9.69	9.69						
JQL5NH		B91	54.15	9.96	9.84	1.07	-0.25	-0.27	1.13	AJ
	B92	55.22	9.71	9.57						
JY2G6Q		B91	54.07	9.83	9.51	1.11	-0.28	-0.30	1.18	AJ
	B92	55.17	9.55	9.21						
JZCJSN		B91	54.03	10.02	9.55	1.09	-0.31	-0.23	1.15	AJ
	B92	55.12	9.72	9.32						
K1YQLJ		B91	53.92	9.94	9.87	1.09	-0.27	-0.28	1.15	MK
	B92	55.00	9.67	9.59						
K4B192		B91	54.14	9.87	9.68	1.07	-0.22	-0.32	1.13	AM
	B92	55.21	9.65	9.37						
KUBCH5		B91	53.95	9.97	9.79	1.07	-0.25	-0.26	1.13	MV
	B92	55.02	9.72	9.53						
L2K666		B91	53.89	10.06	9.92	1.13	-0.29	-0.29	1.20	MK
	B92	55.02	9.77	9.64						
LFK5U3		B91	53.89	10.03	9.94	0.99	-0.26	-0.23	1.04	GD
	B92	54.87	9.77	9.71						
LGPC8	X	B91	53.35	10.23	9.94	1.13	-0.23	-0.29	1.19	MI
		B92	54.49	10.01	9.66					
LWVRED		B91	53.92	9.67	9.84	1.10	-0.24	-0.31	1.16	HF
	B92	55.01	9.44	9.53						
LXGH3B	X	B91	54.25	9.93	9.23	1.13	-0.29	-0.30	1.20	AJ
		B92	55.38	9.64	8.93					
MISQD9		B91	53.94	10.10	9.95	1.08	-0.26	-0.27	1.14	MM
	B92	55.02	9.84	9.68						

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
M8T5S3		B91	53.98	10.10	9.87	1.12	-0.29	-0.29	1.19	MM
		B92	55.09	9.81	9.58					
MGQZQ1		B91	53.98	10.02	9.86	1.11	-0.27	-0.26	1.17	MM
		B92	55.09	9.75	9.59					
N5RPWK		B91	54.12	10.03	9.73	1.11	-0.27	-0.30	1.18	AM
		B92	55.23	9.76	9.44					
NHQPC2	X	B91	53.78	9.52	9.92	1.09	-0.25	-0.26	1.14	HW
		B92	54.87	9.28	9.66					
P9SX6E		B91	53.89	10.06	9.63	1.07	-0.27	-0.27	1.14	AM
		B92	54.96	9.79	9.36					
PH4R5U		B91	54.16	10.04	9.94	1.10	-0.25	-0.25	1.15	XR
		B92	55.26	9.79	9.69					
PJ4GXW		B91	54.19	9.99	9.74	1.11	-0.26	-0.26	1.17	AO
		B92	55.30	9.73	9.48					
PRESMP		B91	53.97	10.02	9.87	1.12	-0.28	-0.24	1.17	MM
		B92	55.09	9.74	9.63					
PXD2RF		B91	54.12	9.93	9.74	1.07	-0.26	-0.28	1.14	AO
		B92	55.19	9.67	9.46					
PY1KF2		B91	54.01	9.83	9.57	1.13	-0.28	-0.27	1.19	MV
		B92	55.14	9.56	9.30					
QBTXP4		B91	53.92	9.66	9.54	1.08	-0.26	-0.26	1.14	HP
		B92	55.00	9.41	9.29					
QW6DCF		B91	54.13	10.03	9.79	1.07	-0.28	-0.25	1.13	AJ
		B92	55.20	9.75	9.54					
R6FC4B	X	B91	54.31	9.57	9.96	1.09	-0.25	-0.26	1.15	HW
		B92	55.40	9.32	9.70					
SK69CE		B91	53.97	9.92	9.73	1.05	-0.24	-0.25	1.10	MX
		B92	55.01	9.68	9.48					

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
SLZA33		B91	54.12	9.80	9.69	1.07	-0.28	-0.26	1.14	HH
		B92	55.19	9.52	9.43					
SX82LC		B91	53.98	9.62	9.54	1.08	-0.26	-0.25	1.14	HP
		B92	55.06	9.37	9.29					
T3NPGV		B91	53.88	9.89	9.62	1.11	-0.26	-0.28	1.17	HP
		B92	54.99	9.63	9.34					
TG4LHQ		B91	53.96	10.06	9.89	1.08	-0.27	-0.26	1.14	MM
		B92	55.04	9.79	9.63					
THXM5S		B91	54.25	9.79	10.02	1.13	-0.30	-0.27	1.20	GG
		B92	55.38	9.49	9.75					
TKWJHV X		B91	54.37	11.98	10.50	1.06	-0.27	-0.30	1.13	AG
		B92	55.43	11.71	10.20					
TQSPER		B91	53.86	9.95	9.93	1.11	-0.28	-0.28	1.18	XQ
		B92	54.97	9.68	9.65					
TRUAKX		B91	54.07	9.97	9.71	1.11	-0.28	-0.29	1.18	AM
		B92	55.18	9.69	9.42					
U1TUEQ		B91	53.96	10.02	9.94	1.10	-0.26	-0.26	1.16	XI
		B92	55.06	9.77	9.68					
U65PC7		B91	53.88	10.02	9.86	1.09	-0.27	-0.25	1.15	MM
		B92	54.96	9.75	9.61					
UGZMY1		B91	54.01	9.78	9.65	1.12	-0.27	-0.31	1.19	HG
		B92	55.13	9.51	9.34					
UKPVDM X		B91	53.33	10.15	10.52	1.13	-0.28	-0.28	1.19	GH
		B92	54.46	9.88	10.24					
UM752Z		B91	54.03	10.00	9.81	1.13	-0.27	-0.31	1.20	MT
		B92	55.15	9.73	9.50					
UR9KRW		B91	53.83	10.27	10.05	1.08	-0.27	-0.26	1.14	MI
		B92	54.90	10.00	9.79					

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
USJVL9		B91	54.09	10.00	9.68	1.10	-0.27	-0.27	1.16	AJ
		B92	55.19	9.73	9.41					
UTA9TJ		B91	54.04	9.93	9.65	1.11	-0.26	-0.29	1.17	AM
		B92	55.14	9.67	9.36					
V5BMDH		B91	53.87	10.01	9.52	1.12	-0.27	-0.25	1.18	XU
		B92	54.99	9.75	9.27					
VP7ND8		B91	54.07	10.08	10.01	1.08	-0.27	-0.26	1.14	MK
		B92	55.15	9.81	9.75					
VW8ZQX X		B91	95.63	2.08	-1.52	-0.04	-0.02	0.03	0.06	MK
		B92	95.59	2.05	-1.49					
W488VV		B91	54.12	9.95	9.90	1.11	-0.28	-0.28	1.18	AJ
		B92	55.23	9.67	9.62					
WDQB2N		B91	53.98	10.04	9.90	1.12	-0.27	-0.28	1.18	MM
		B92	55.10	9.77	9.62					
WEHDK		B91	54.30	9.76	10.13	1.07	-0.26	-0.28	1.14	HW
		B92	55.37	9.51	9.85					
WHQMV X		B91	53.97	9.97	10.33	1.12	-0.27	0.28	1.18	MV
		B92	55.09	9.71	10.60					
WTLH7C		B91	54.21	10.03	10.14	1.08	-0.25	-0.33	1.16	XO
		B92	55.29	9.78	9.81					
WX11EL		B91	53.86	9.95	9.82	1.10	-0.28	-0.28	1.17	AL
		B92	54.96	9.67	9.54					
WYU165		B91	54.26	10.09	10.02	1.08	-0.27	-0.30	1.15	MZ
		B92	55.34	9.83	9.72					
X5K4BL		B91	53.79	10.03	9.88	1.10	-0.26	-0.27	1.16	MM
		B92	54.89	9.77	9.61					
X7NZK3		B91	53.85	9.79	9.64	1.10	-0.26	-0.26	1.15	HP
		B92	54.94	9.53	9.38					

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

**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^*	
XQVVQ9		B91	54.13	9.84	9.84	1.09	-0.31	-0.26	1.16	GF
		B92	55.21	9.53	9.58					
Y9PR8P		B91	53.86	9.91	9.62	1.13	-0.27	-0.29	1.19	HP
		B92	54.99	9.64	9.33					
YCJF1A	X	B91	53.49	10.17	9.65	1.07	-0.24	-0.28	1.13	AJ
		B92	54.56	9.93	9.38					
YUUB23		B91	54.04	10.00	9.65	1.10	-0.28	-0.28	1.16	AM
		B92	55.13	9.72	9.37					
ZEA68E		B91	54.07	10.02	9.78	1.06	-0.26	-0.26	1.12	MV
		B92	55.13	9.77	9.52					

Summary Statistics

Samples	L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*
Grand Means							
B91	54.02	9.96	9.80	1.09	-0.27	-0.27	1.16
B92	55.11	9.70	9.53				
Std Dev Btwn Labs							
B91	0.14	0.11	0.15	0.02	0.02	0.02	0.03
B92	0.13	0.11	0.15				
Statistics based on 112 of 131 reporting participants							

Analysis notes for Test#409

The results for "b*" coordinate are shown with an offset of 10.

**Interlaboratory Testing Program for Color & Appearance
Analysis 409**

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

Comments assigned on Data Flags for Test #409

2HNQ5E(X) - High "a*" values.
3SP8KN(X) - High "b*" values for Sample B92.
5ZANVR(X) - Extreme "b*" data.
6MTF35(X) - High "a*" and "b*" values.
86D1WR(X) - Low "b*" values.
C6AKEP(X) - High "L*" values for Sample B92.
DD5XYP(X) - High "L*" values.
FPBUT3(X) - Low "L*" values.
GSVKUC(X) - High "b*" values and low "L*" values.
JGUU7V(X) - High "L*" values.
LGCPC8(X) - Low "L*" values.
LXGH3B(X) - Low "b*" values.
NHQPC2(X) - Low "a*" values.
R6FC4B(X) - Low "a*" values.
TKWJHV(X) - High "a*" and "b*" values.
UKPVDM(X) - High "b*" values and low "L*" values.
VW8ZQX(X) - Apparently measured back of the samples.
WHQMV3(X) - High "b*" values.
YCJF1A(X) - Low "L*" values.

Interlaboratory Testing Program for Color & Appearance

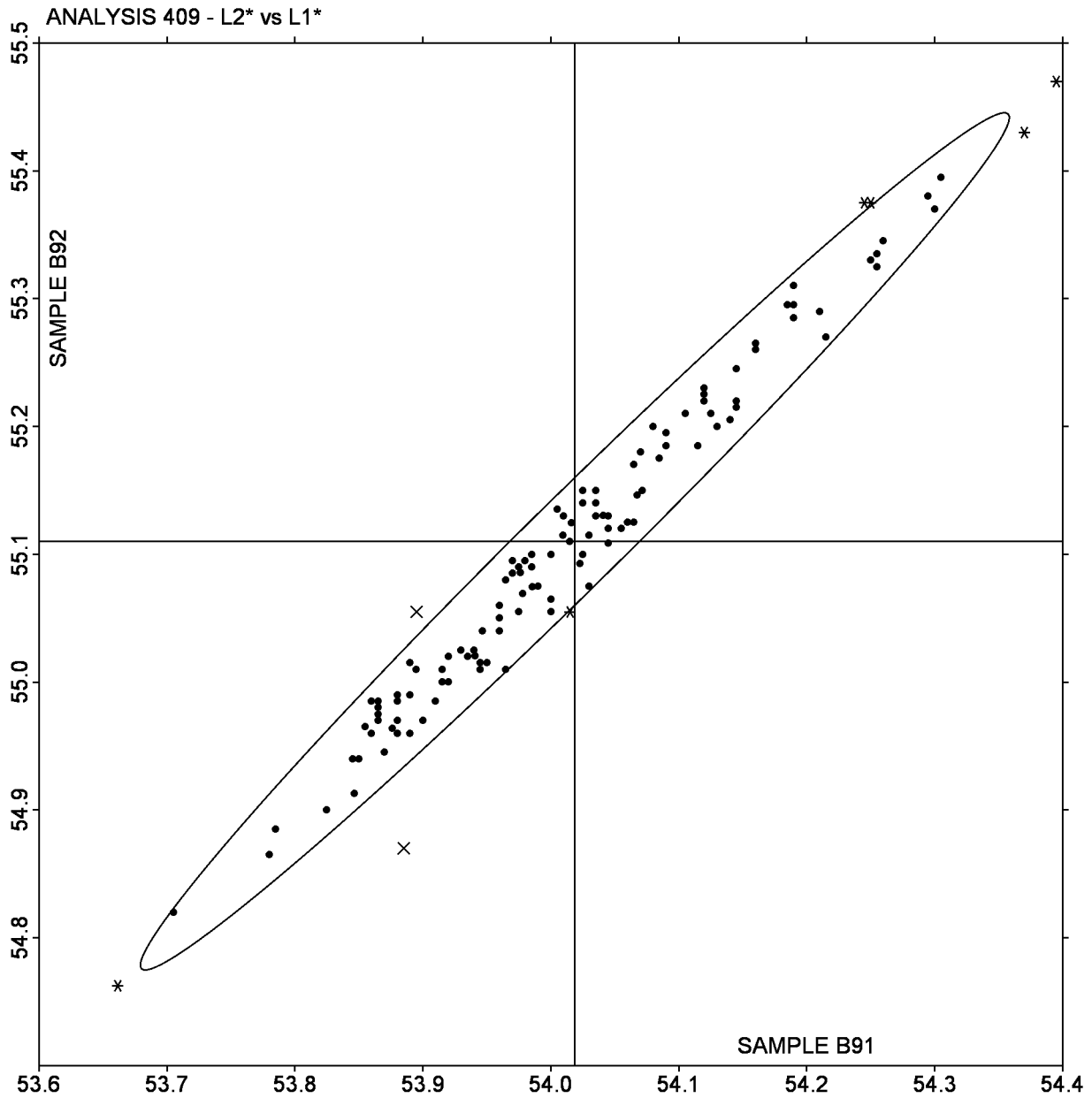
Analysis 409

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

L2* vs L1*

SAMPLE B91 = 54.02

SAMPLE B92 = 55.11



Interlaboratory Testing Program for Color & Appearance

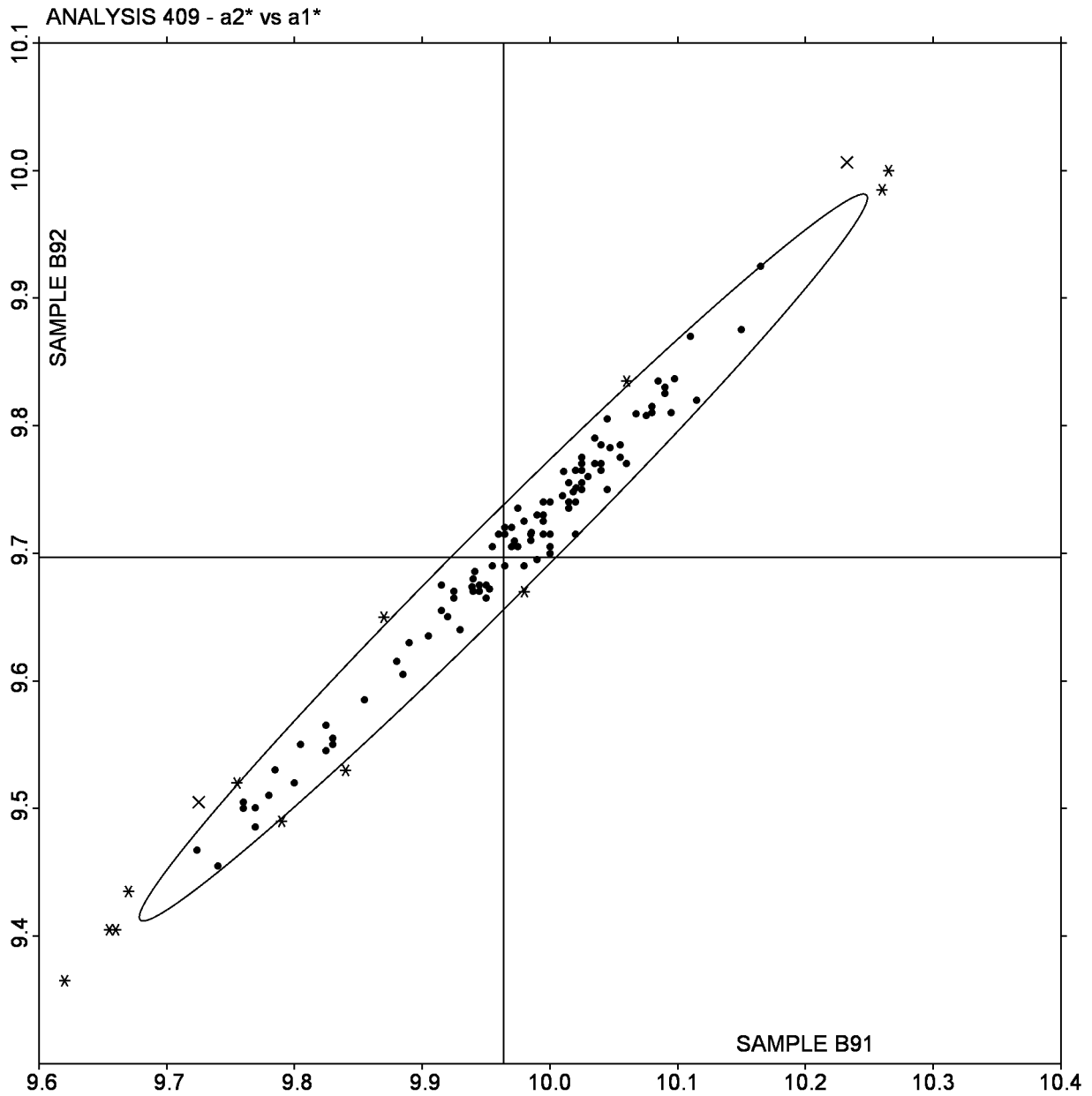
Analysis 409

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

a2* vs a1*

SAMPLE B91 = 9.96

SAMPLE B92 = 9.70



Interlaboratory Testing Program for Color & Appearance

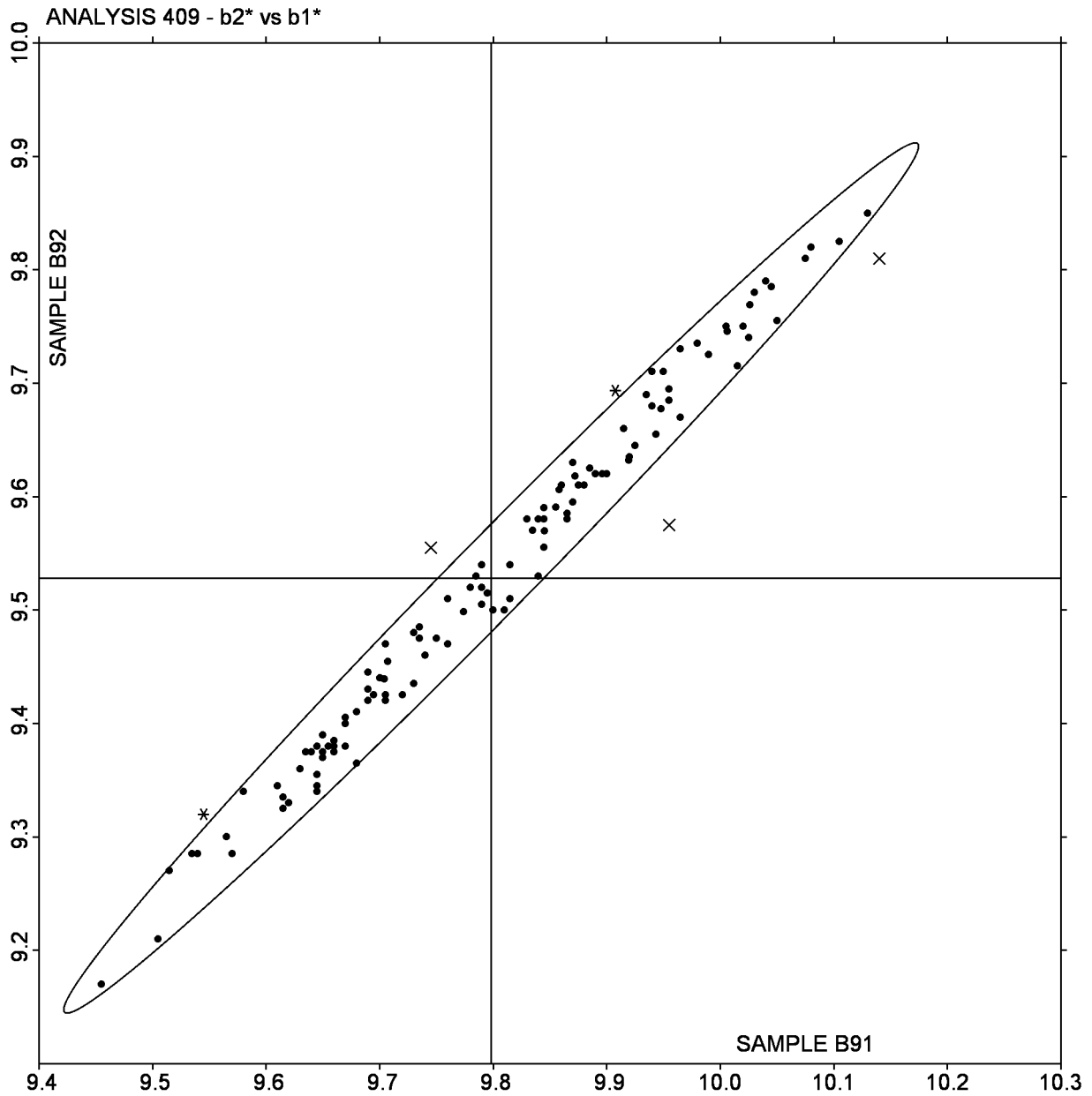
Analysis 409

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

b2* vs b1*

SAMPLE B91 = 9.80

SAMPLE B92 = 9.53



Plot created using an offset of 10 for both axes.

Instrument Code List - Report# 148

Instrument information as provided by laboratories

<u>Analysis</u>	<u>Analysis Name</u>
408	<u>Color & Color Difference (Paint Chips) - 45/0</u>

Instrument code and description

AE	ACS Chroma-Sensor CS-3
GA	BYK-Gardner Color Guide (45/0)
GD	BYK-Gardner The Color Machine
GE	BYK-Gardner spectro-guide (45/0)
GH	BYK-Gardner Color-View
GU	Gretag Spectrolino Spectrophotometer
HK	Hunter MiniScan XE (45/0)
HW	Hunter LabScan XE
MG	Macbeth 1500/PLUS or 2025+ Color Eye
MQ	Minolta CM-503c Spectrophotometer
TN	Topcon SR-1 Spectroradiometer
XL	X-Rite MA90
XM	X-Rite MA58 Multi-Angle SpectroPhotometer
XN	X-Rite MA68 Multi-Angle SpectroPhotometer
XO	X-Rite MA68 II Multi-Angle SpectroPhotometer
XP	X-Rite 962 SpectroPhotometer
XR	X-Rite 968 Portable SpectroPhotometer
XT	X-Rite 948 SpectroColorimeter
XU	X-Rite 964 Portable SpectroPhotometer
XX	Instrument make/model not specified by lab

409	<u>Color & Color Difference (Paint Chips) Sphere</u>
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Instrument code and description

AD	ACS Chroma-Sensor CS-5	MT	Minolta CM-2600
AG	ACS-DataColor Intl. Spectraflash 450	MV	Minolta CM-3000d Series Spectrophotometer
AJ	ACS-Datacolor Intl. Spectraflash 600	MX	Minolta CM-508d Spectrophotometer
AL	ACS-Datacolor Intl. Dataflash 100	MZ	Minolta CM-2002 Spectrophotometer
AM	ACS-Datacolor Intl. Spectraflash 600 Plus	PE	Perkin Elmer Spectrophotometer
AO	ACS-Datacolor Intl. Spectraflash 650X	XI	X-Rite Color i7
CA	Cary 5000	XL	X-Rite SP60 Portable Sphere Spectrophotometer
EE	Datacolor Elrepho 2000	XO	X-Rite SP64 Portable Sphere Spectrophotometer
GD	BYK-Gardner spectro-guide sphere	XP	X-Rite SP88 Portable Sphere Spectrophotometer
GF	BYK-Gardner The Color Sphere (TCS)	XQ	X-Rite SP68 Portable Sphere Spectrophotometer
GG	BYK-Gardner TCS II	XR	X-Rite SP78 Portable Sphere Spectrophotometer
GH	BYK Gardner Color-Guide Sphere	XU	X-Rite Color Premier 8200 Spectrophotometer
HF	ColorFlex Diffuse		
HG	Hunter ColorQUEST		
HH	Hunter ColorQUEST XE		
HP	Hunter UltraScan PRO		
HW	Hunter UltraScan XE		
HX	Hitachi C-2000S Spectrophotometer		
MG	Macbeth 2180 Color Eye		
MH	Macbeth Color-Eye XTH		
MI	Macbeth Color i 5		
MJ	Macbeth Color-Eye 3000		
MK	Macbeth Color-Eye 7000		
MM	Macbeth Color-Eye 7000a		