

LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT FMVSS-108

Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade  
GM P/Ns 2580 9364 (RH) / 1591 6967 (LH)

**CALCOAST - ITL**  
Lighting Technology  
4072 Watts Street  
Emeryville, CA 94608



26 July 2007

FINAL REPORT

PREPARED FOR

U.S. DEPARTMENT OF TRANSPORTATION  
National Highway Traffic Safety Administration  
1200 New Jersey Avenue SE  
Washington, D.C. 20590

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NHTSA Report No. 108-CCITL-07-10

Prepared By: 

Approved By: 

Approval Date: 26 July 2007

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By:  \_\_\_\_\_

Acceptance Date: 07-30-2007

## TECHNICAL REPORT STANDARD TITLE PAGE

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<b>4. Title and Subtitle</b> Test Series Hella VOL Replaceable Bulb (D1S) Headlamps for 2007 Cadillac Escalade GM P/Ns 2580 9364 (RH) / 1591 6967 (LH)		<b>5. Report Date</b> 26 July 2007	
<b>7. Author(s)</b> Douglas G. Cummins Photometric Engineer		<b>6. Performing Organization Code</b> N/A	
<b>9. Performing Organization Name and Address</b> Calcoast - ITL 4072 Watts Street Emeryville, CA 94608		<b>8. Performing Organization Report No.</b> 070712-03D	
<b>12. Sponsoring Agency Name and Address</b> U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance 1200 New Jersey Avenue SE West Building - 4 <sup>th</sup> Floor - NVS222 Washington, D.C. 20590		<b>10. Work Unit No.</b> N/A	
<b>15. Supplementary Notes</b>		<b>11. Contract or Grant No.</b>	
<b>16. Abstract</b> The scope of this testing was limited to certain photometry and color tests as indicated. Test failures identified were as follows: Lower Beam, Color		<b>13. Type of Report and Period Covered</b>	
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INDUSTRIAL TESTING LABORATORY

Report No. 070712-03D

Page 1 of 18

**TEST REPORT**

Report Date: 26 July 2007

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps for 2007 Cadillac Escalade

Manufactured By: Hella  
GM P/Ns 2580 9364 (RH) / 1591 6967 (LH)

Submitted By: CCITL purchased for NHTSA

NHTSA Report No.: 108-CCITL-07-10

Test Laboratory: Calcoast - ITL  
Emeryville, CA 94608

Devices Tested: Two (2) Pair

**SUMMARY**

Specifications: FMVSS 108

Photometric Tests - Replaceable Bulb Headlamp

S7.8.5.3 Visual/optical aiming.....	4 of 4	Passed
Figure 27-2 Lower Beam.....	4 of 4	<b>FAILED</b>
Figure 27-2 Upper Beam.....	4 of 4	Passed

Color Tests - SAE J578c FEB77 ..... 4 of 4 **FAILED**

Signature of Responsible Laboratory Official:

Douglas G. Cummins  
Photometric Engineer

**DESCRIPTION SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

**GENERAL DESCRIPTION:**

MARKINGS: LENS: "D1S", "DOT VOL SAE HG APP2DRL 6C 07 GM/HELLA"

HOUSING: "12V", "H7", "ECE", "SAE", "D1S", HELLA Logo,  
"264 316 ECE" or "264 315 ECE", "263 674 SAE" or  
"263 673 SAE", "RH" or "LH", "194SAE", "W3W ECE",  
"13.5V", "PS 19W", "SHIELD(S)>CO-PC<", "HSG >PP-TF40<",  
"PROJ RING>CO-PC<", "CARRIER>PBT-GR30<", "BEZEL >PC<",  
"REFLEX >PC<", "LENS >PC<"

See photometry data sheets for production markings

LENS: MATERIAL: Polycarbonate (Clear)  
COATING: Unknown  
METHOD OF ATTACHMENT: Clips and Adhesive to Housing

HOUSING: MATERIAL: Plastic  
METHOD OF MOUNTING: Two (2) guide pins, One (1) snap cylinder,  
Three (3) bolts through mounting holes on housing to vehicle

**BULBS USED:**

FUNCTION	QUANTITY	TRADE NO.	VOLTS
Lower Beam & Upper Beam	One (1)	D1S	12.80V

**PHOTOMETRIC TEST SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

**SUMMARY OF PHOTOMETRIC TESTS**

Tests performed by: Douglas Cummins

Date: 25-26 July 2007

Reference calibration detector number: NIST P181-2

Test distance: 100 feet

Aim: Samples mounted on Hella GMT 926 Set 2 RH or LH fixture. Fixture placed on level platform with D1S bulb at center of rotation and tilt. Leading edge laser-aimed normal to detector axis at HV then aim screw adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim).

Note: Alignment markings on fixtures for Headlamp function do not go to each edge to use for headlamp rotational aim. Confirmed that some alignment markings are equidistant to fixture leading edge. Sighted goniometer platform reference line through two equidistant alignment pin holes centered around Headlamp reference mark. The Lower Beam elbow was visually confirmed to be at the V-V line.

There is an inaccessible but not disabled aiming mechanism, presumably for horizontal adjustment, located on the opposite side of the main vertical aiming screw (below wire harness). No attempt was made to determine what the mechanism adjusted. The samples do not have a horizontal VHAD.

Bulbs: Samples tested using furnished bulbs and ballast at design voltage.  
Lower/Upper Beam furnished bulb: Osram D1S (35W)

<u>Test</u>	<u>Equipment</u>
Photometry	Custom Goniometer (Aerotech Rotary Tables, Stepper Motors, Driver) Hoffman TSP-7501 Detector IOtech DaqBoard/2000 16-bit, 200kHz DAC HP 6652A Power Supply Data Precision 2480R DMM (Current) Keithley 197A DMM (Voltage) HP 6010A Power Supply Fluke 23 DMM (Voltage) Keithley 197A (Current)

**PHOTOMETRIC TEST DATA SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

**VOL Aim**

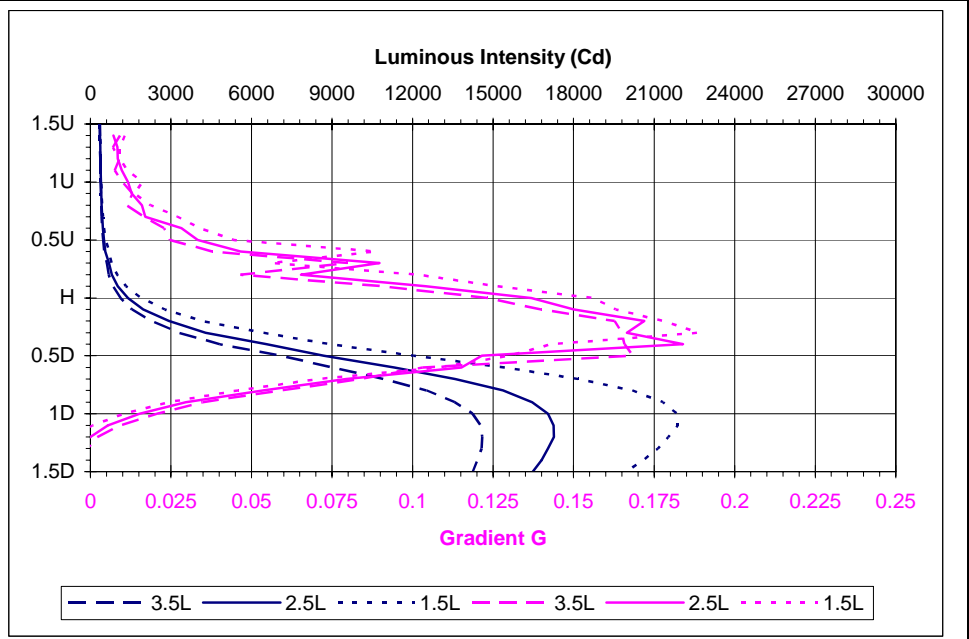
RH1

Maximum Vertical Gradient

Location	Value	Required
0.5D/3.5L	0.168	-
0.4D/2.5L	0.184	> 0.13
0.3D/1.5L	0.189	-

Horizontal width of cutoff is greater than 2° centered at 2.0R.

Maximum inclination of cutoff is within ±0.2°.



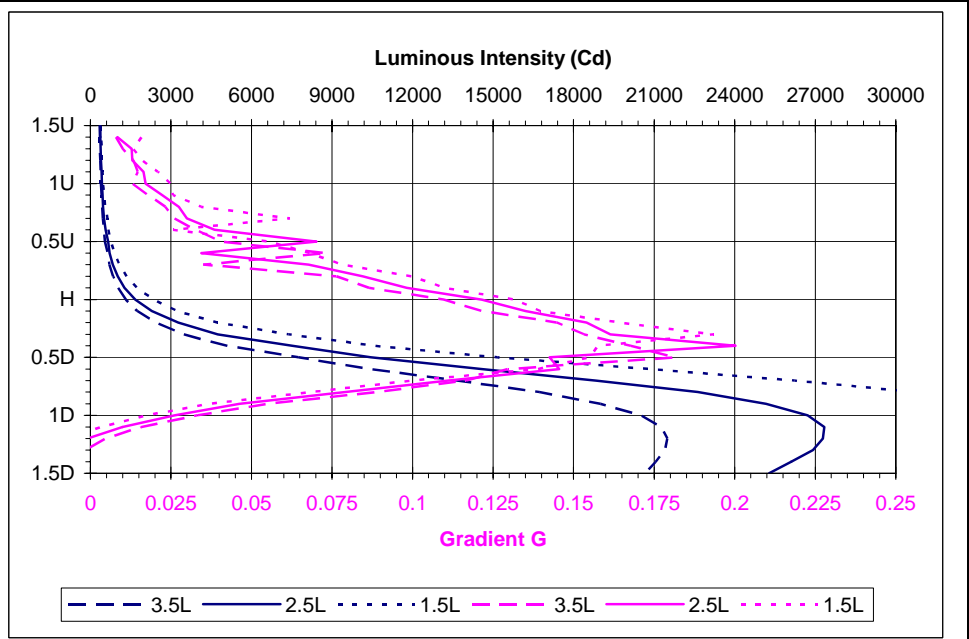
RH2

Maximum Vertical Gradient

Location	Value	Required
0.5D/3.5L	0.181	-
0.4D/2.5L	0.200	> 0.13
0.3D/1.5L	0.193	-

Horizontal width of cutoff is greater than 2° centered at 2.0R.

Maximum inclination of cutoff is within ±0.2°.



## PHOTOMETRIC TEST DATA SHEET

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

Sample Number: RH1

Production Markings: "078 7 09:38 25809364 WO#767363" etched on housing

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		3561.28		-	-
4.0U 8.0L		191.68		64	-
4.0U 8.0R		168.13		64	-
2.0U 4.0L		323.08		135	-
1.5U 1.0R TO 3.0R	1.0R	400.92		200	-
1.5U 1.0R TO R	4.6R	730.39		-	1400
1.0U 1.5L TO L	1.6L	414.71		-	700
0.5U 1.5L TO L	1.5L	572.81		-	1000
0.5U 1.0R TO 3.0R	1.0R	1645.53		500	-
0.5U 1.0R TO 3.0R	3.0R	11441.08	4626.44*	-	2700
H 8.0L		415.60		64	-
H 4.0L		976.14		135	-
H V		3580.58		-	-
0.6D 1.3R		31395.61		10000	-
0.9D 3.5L		13456.38	9342.23	1800	12000
0.9D V		30433.73		4500	-
1.5D 2.0R		21569.11		15000	-
2.0D 15.0L		2451.63		1000	-
2.0D 9.0L		4956.84		1250	-
2.0D 9.0R		6138.78		1250	-
2.0D 15.0R		2894.18		1000	-
4.0D 20.0L		1576.89		300	-
4.0D V		7340.50		-	-
4.0D 4.0R		7341.02		-	12500
4.0D 20.0R		1979.74		300	-
MAXIMUM	0.9D 0.4R	32194.41		-	-
MX(10U-90U/90L-90R)	10.0U 5.1R	91.26		-	125
H V		3678.68		-	-

\* - Denotes Failure.

Bulb: Osram Xenarc D1S furnished with sample @ 12.80V / 3.046A / Flux not measured

Aim: Sample mounted on Hella GMT 926 Set 2 RH fixture. Fixture placed on level platform with D1S bulb at center of rotation and tilt. Leading edge laser-aimed normal to detector axis at HV then aim screw adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim). Gmax = 0.184 (>= 0.13 required)



**PHOTOMETRIC TEST DATA SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

Sample Number: RH1

Production Markings: "078 7 09:38 25809364 WO#767363" etched on housing

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		49899.63		40000	75000
2.0U	V	45703.93		1500	-
1.0U	3.0L	19905.96		5000	-
1.0U	3.0R	26438.45		5000	-
H	12.0L	3252.59		1500	-
H	9.0L	5200.45		3000	-
H	6.0L	9553.39		5000	-
H	3.0L	19507.87		15000	-
H	V	49462.38		40000	75000
H	3.0R	26391.39		15000	-
H	6.0R	12797.40		5000	-
H	9.0R	6529.84		3000	-
H	12.0R	3820.74		1500	-
1.5D	9.0L	5140.81		2000	-
1.5D	V	26675.89		5000	-
1.5D	9.0R	6196.32		2000	-
2.5D	12.0L	3416.81		1000	-
2.5D	V	16450.03		2500	-
2.5D	12.0R	4029.49		1000	-
4.0D	V	7525.71		-	12000
MAXIMUM	1.0U 0.2R	59734.98		-	-
H	V	49872.60		40000	75000

Sample meets test requirements at all points.

Bulb: Osram Xenarc D1S furnished with sample @ 12.80V / 3.491A / Flux not measured  
(current includes solenoid raising shield up for Upper Beam)

Aim: Sample mounted on Hella GMT 926 Set 2 RH fixture. Fixture placed on level platform with D1S bulb at center of rotation and tilt. Leading edge laser-aimed normal to detector axis at HV then aim screw adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim). Gmax = 0.184 ( $\geq 0.13$  required)

**PHOTOMETRIC TEST DATA SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

Sample Number: RH2

Production Markings: "347 6 08:16 15916968 TWO 703061" etched on housing

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		3991.02		-	-
4.0U 8.0L		174.14		64	-
4.0U 8.0R		173.22		64	-
2.0U 4.0L		297.60		135	-
1.5U 1.0R TO 3.0R	1.0R	446.31		200	-
1.5U 1.0R TO R	4.4R	727.93		-	1400
1.0U 1.5L TO L	1.5L	443.76		-	700
0.5U 1.5L TO L	1.6L	682.16		-	1000
0.5U 1.0R TO 3.0R	1.0R	2085.65		500	-
0.5U 1.0R TO 3.0R	3.0R	15652.35	5968.29*	-	2700
H 8.0L		489.74		64	-
H 4.0L		1097.10		135	-
H V		3995.85		-	-
0.6D 1.3R		35957.45		10000	-
0.9D 3.5L		14831.49	9973.45	1800	12000
0.9D V		35699.50		4500	-
1.5D 2.0R		22516.23		15000	-
2.0D 15.0L		2712.73		1000	-
2.0D 9.0L		5345.19		1250	-
2.0D 9.0R		6031.28		1250	-
2.0D 15.0R		3047.88		1000	-
4.0D 20.0L		1775.36		300	-
4.0D V		7325.94		-	-
4.0D 4.0R		6596.07		-	12500
4.0D 20.0R		2117.78		300	-
MAXIMUM	0.8D 0.6R	37982.53		-	-
MX(10U-90U/90L-90R)	10.0U 0.7L	101.77		-	125
H V		4021.29		-	-

\* - Denotes Failure.

Bulb: Osram Xenarc D1S furnished with sample @ 12.80V / 3.117A / Flux not measured

Aim: Sample mounted on Hella GMT 926 Set 2 RH fixture. Fixture placed on level platform with D1S bulb at center of rotation and tilt. Leading edge laser-aimed normal to detector axis at HV then aim screw adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim). Gmax = 0.187 (>= 0.13 required)

## PHOTOMETRIC TEST DATA SHEET

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

Sample Number: RH2

Production Markings: "347 6 08:16 15916968 TWO 703061" etched on housing

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		62238.59		40000	75000
2.0U	V	50293.27		1500	-
1.0U	3.0L	26229.96		5000	-
1.0U	3.0R	28130.96		5000	-
H	12.0L	3581.18		1500	-
H	9.0L	5756.28		3000	-
H	6.0L	10762.17		5000	-
H	3.0L	23746.90		15000	-
H	V	61973.04		40000	75000
H	3.0R	27854.24		15000	-
H	6.0R	12637.51		5000	-
H	9.0R	6514.96		3000	-
H	12.0R	3954.87		1500	-
1.5D	9.0L	5538.75		2000	-
1.5D	V	29597.02		5000	-
1.5D	9.0R	6041.50		2000	-
2.5D	12.0L	3684.36		1000	-
2.5D	V	16092.97		2500	-
2.5D	12.0R	4108.17		1000	-
4.0D	V	7231.23		-	12000
MAXIMUM	0.8U V	76193.06		-	-
H	V	62361.22		40000	75000

Sample meets test requirements at all points.

Bulb: Osram Xenarc D1S furnished with sample @ 12.80V / 3.522A / Flux not measured  
(current includes solenoid raising shield up for Upper Beam)

Aim: Sample mounted on Hella GMT 926 Set 2 RH fixture. Fixture placed on level platform with D1S bulb at center of rotation and tilt. Leading edge laser-aimed normal to detector axis at HV then aim screw adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim). Gmax = 0.187 ( $\geq 0.13$  required)

**PHOTOMETRIC TEST DATA SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

**VOL Aim**

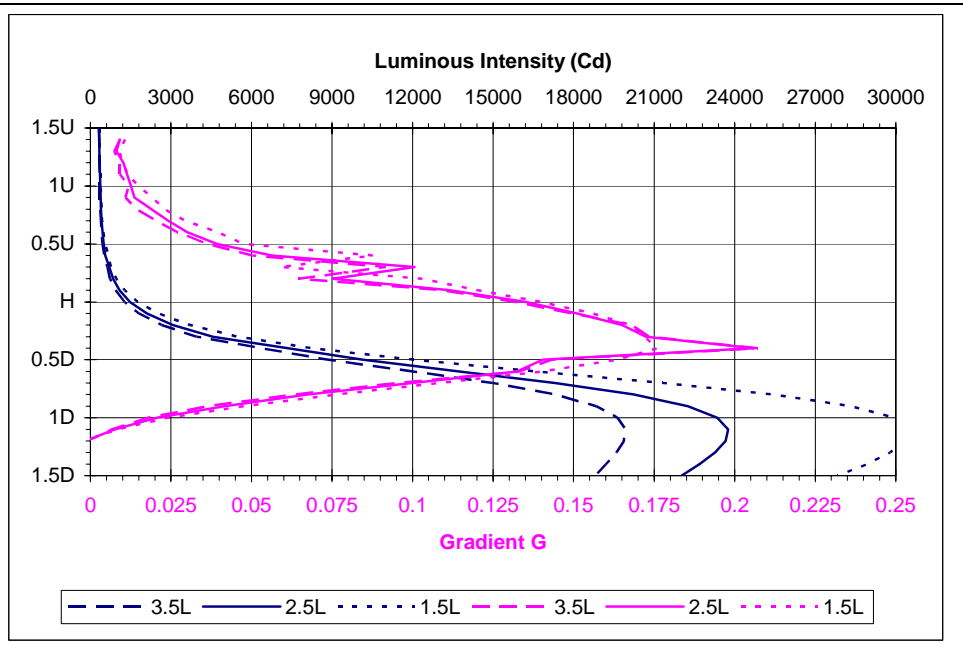
LH1

Maximum Vertical Gradient

Location	Value	Required
0.5D/3.5L	0.207	-
0.4D/2.5L	0.206	> 0.13
0.3D/1.5L	0.176	-

Horizontal width of cutoff is greater than 2° centered at 2.0R.

Maximum inclination of cutoff is within ±0.2°.



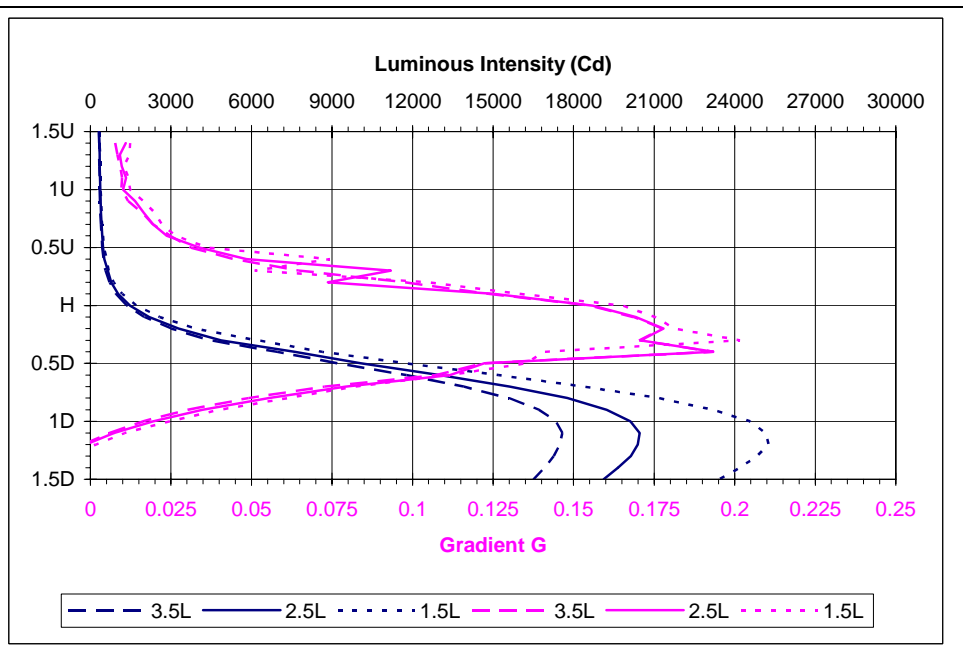
LH2

Maximum Vertical Gradient

Location	Value	Required
0.4D/3.5L	0.194	-
0.4D/2.5L	0.193	> 0.13
0.3D/1.5L	0.202	-

Horizontal width of cutoff is greater than 2° centered at 2.0R.

Maximum inclination of cutoff is within ±0.2°.



**PHOTOMETRIC TEST DATA SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

Sample Number: LH1

Production Markings: "134 6 06:06 15916967 TWO 645636" etched on housing

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		3235.32		-	-
4.0U 8.0L		179.93		64	-
4.0U 8.0R		122.57		64	-
2.0U 4.0L		286.39		135	-
1.5U 1.0R TO 3.0R	1.0R	358.87		200	-
1.5U 1.0R TO R	2.7R	369.74		-	1400
1.0U 1.5L TO L	1.5L	386.75		-	700
0.5U 1.5L TO L	1.5L	568.44		-	1000
0.5U 1.0R TO 3.0R	1.1R	1399.82		500	-
0.5U 1.0R TO 3.0R	2.9R	5542.32	1930.24	-	2700
H 8.0L		627.08		64	-
H 4.0L		1227.80		135	-
H V		3258.73		-	-
0.6D 1.3R		34750.91		10000	-
0.9D 3.5L		18654.84	12978.39*	1800	12000
0.9D V		36645.56		4500	-
1.5D 2.0R		24098.57		15000	-
2.0D 15.0L		3220.58		1000	-
2.0D 9.0L		6195.53		1250	-
2.0D 9.0R		6245.26		1250	-
2.0D 15.0R		2981.58		1000	-
4.0D 20.0L		2170.41		300	-
4.0D V		7746.50		-	-
4.0D 4.0R		7487.66		-	12500
4.0D 20.0R		2081.60		300	-
MAXIMUM	1.0D V	38421.57		-	-
MX(10U-90U/90L-90R)	10.0U 2.4L	118.07		-	125
H V		3346.17		-	-

\* - Denotes Failure.

Bulb: Osram Xenarc D1S furnished with sample @ 12.80V / 3.096A / Flux not measured

Aim: Sample mounted on Hella GMT 926 Set 2 LH fixture. Fixture placed on level platform with D1S bulb at center of rotation and tilt. Leading edge laser-aimed normal to detector axis at HV then aim screw adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim). Gmax = 0.206 (>= 0.13 required)

**PHOTOMETRIC TEST DATA SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

Sample Number: LH1

Production Markings: "134 6 06:06 15916967 TWO 645636" etched on housing

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		69818.53		40000	75000
2.0U	V	43249.29		1500	-
1.0U	3.0L	27949.67		5000	-
1.0U	3.0R	23539.32		5000	-
H	12.0L	3828.23		1500	-
H	9.0L	6444.21		3000	-
H	6.0L	12446.62		5000	-
H	3.0L	28953.43		15000	-
H	V	70106.42		40000	75000
H	3.0R	28752.66		15000	-
H	6.0R	11337.74		5000	-
H	9.0R	5832.59		3000	-
H	12.0R	3472.74		1500	-
1.5D	9.0L	6341.30		2000	-
1.5D	V	34474.21		5000	-
1.5D	9.0R	6212.30		2000	-
2.5D	12.0L	4080.83		1000	-
2.5D	V	20019.66		2500	-
2.5D	12.0R	3891.44		1000	-
4.0D	V	7918.14		-	12000
MAXIMUM	0.6U 0.1L	78861.29		-	-
H	V	69844.49		40000	75000

Sample meets test requirements at all points.

Bulb: Osram Xenarc D1S furnished with sample @ 12.80V / 3.486A / Flux not measured  
(current includes solenoid raising shield up for Upper Beam)

Aim: Sample mounted on Hella GMT 926 Set 2 LH fixture. Fixture placed on level platform with D1S bulb at center of rotation and tilt. Leading edge laser-aimed normal to detector axis at HV then aim screw adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim). Gmax = 0.206 ( $\geq$  0.13 required)

## PHOTOMETRIC TEST DATA SHEET

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

Sample Number: LH2

Production Markings: "192 6 16:36 15916967 TWO 645636" etched on housing

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Lower Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		3222.67		-	-
4.0U 8.0L		184.79		64	-
4.0U 8.0R		178.09		64	-
2.0U 4.0L		286.32		135	-
1.5U 1.0R TO 3.0R	1.0R	359.44		200	-
1.5U 1.0R TO R	3.6R	367.75		-	1400
1.0U 1.5L TO L	1.5L	398.46		-	700
0.5U 1.5L TO L	1.5L	530.03		-	1000
0.5U 1.0R TO 3.0R	1.0R	1136.49		500	-
0.5U 1.0R TO 3.0R	3.0R	4375.06	1649.69	-	2700
H 8.0L		1013.62		64	-
H 4.0L		1453.23		135	-
H V		3315.82		-	-
0.6D 1.3R		27197.67		10000	-
0.9D 3.5L		16834.65	12738.33*	1800	12000
0.9D V		29535.85		4500	-
1.5D 2.0R		20214.51		15000	-
2.0D 15.0L		3167.21		1000	-
2.0D 9.0L		5983.90		1250	-
2.0D 9.0R		5837.34		1250	-
2.0D 15.0R		2869.50		1000	-
4.0D 20.0L		2182.38		300	-
4.0D V		7139.53		-	-
4.0D 4.0R		7177.03		-	12500
4.0D 20.0R		2002.89		300	-
MAXIMUM	1.1D 0.1L	31685.86		-	-
MX(10U-90U/90L-90R)	10.0U 0.5L	173.94*		-	125
H V		3184.69		-	-

\* - Denotes Failure.

Bulb: Osram Xenarc D1S furnished with sample @ 12.80V / 3.075A / Flux not measured

Aim: Sample mounted on Hella GMT 926 Set 2 LH fixture. Fixture placed on level platform with D1S bulb at center of rotation and tilt. Leading edge laser-aimed normal to detector axis at HV then aim screw adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim). Gmax = 0.193 (>= 0.13 required)

## PHOTOMETRIC TEST DATA SHEET

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

Sample Number: LH2

Production Markings: "192 6 16:36 15916967 TWO 645636" etched on housing

Specification: FMVSS108 Figure 17-2 (Replaceable Bulb VO Headlamp)

Color: White, Upper Beam

Luminous Intensity, Candela

Test Point	Location	Measured	Reaim	Minimum	Maximum
H V		52734.42		40000	75000
2.0U	V	47167.96		1500	-
1.0U	3.0L	30649.56		5000	-
1.0U	3.0R	22234.50		5000	-
H	12.0L	4171.09		1500	-
H	9.0L	6543.33		3000	-
H	6.0L	12282.24		5000	-
H	3.0L	26544.24		15000	-
H	V	53453.99		40000	75000
H	3.0R	23926.65		15000	-
H	6.0R	10723.46		5000	-
H	9.0R	5690.02		3000	-
H	12.0R	3448.05		1500	-
1.5D	9.0L	6118.60		2000	-
1.5D	V	28793.66		5000	-
1.5D	9.0R	5734.40		2000	-
2.5D	12.0L	4132.85		1000	-
2.5D	V	15823.23		2500	-
2.5D	12.0R	3800.84		1000	-
4.0D	V	7267.53		-	12000
MAXIMUM	1.0U 0.2L	64639.39		-	-
H	V	53250.00		40000	75000

Sample meets test requirements at all points.

Bulb: Osram Xenarc D1S furnished with sample @ 12.80V / 3.477A / Flux not measured  
(current includes solenoid raising shield up for Upper Beam)

Aim: Sample mounted on Hella GMT 926 Set 2 LH fixture. Fixture placed on level platform with D1S bulb at center of rotation and tilt. Leading edge laser-aimed normal to detector axis at HV then aim screw adjusted until LB max gradient G located at 0.4D/2.5L and balanced from 0.4D/3.5L to 0.4D/1.5L (VOL aim). Gmax = 0.193 ( $\geq 0.13$  required)



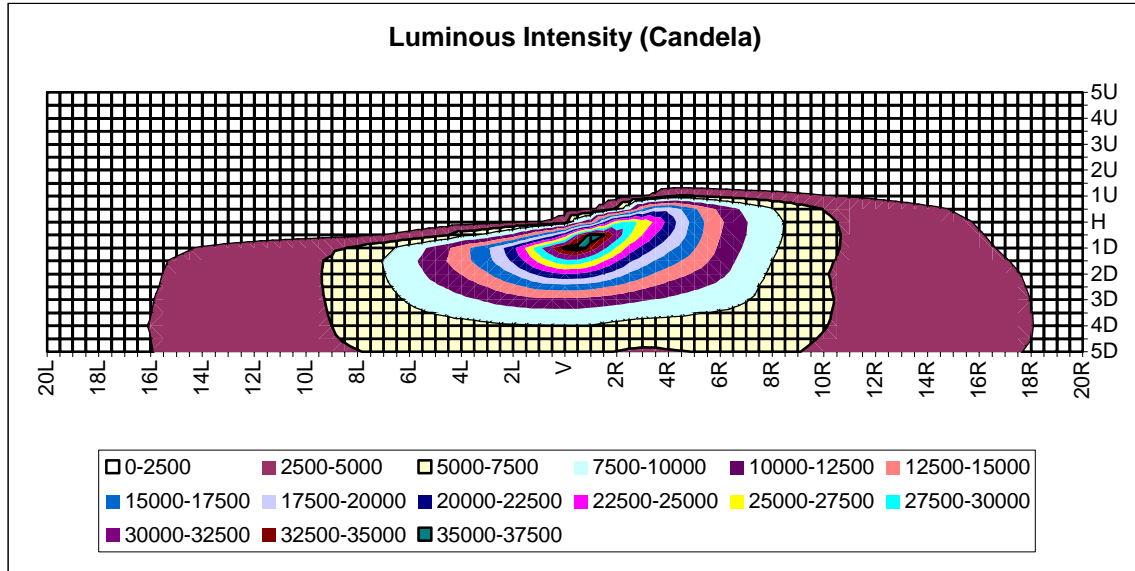
**PHOTOMETRIC TEST DATA SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

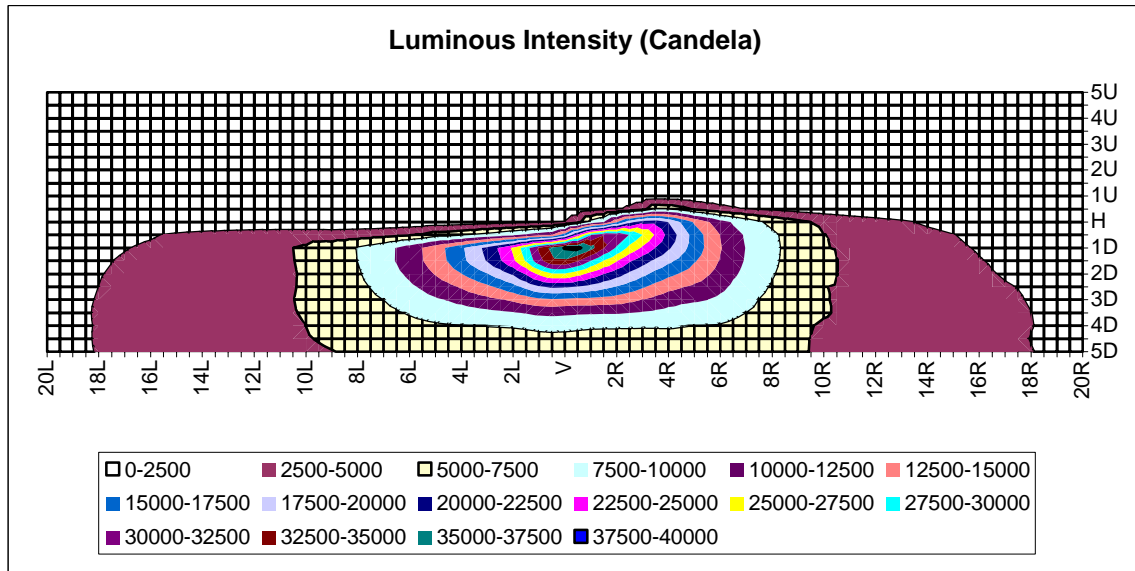
**ISOSCANS**

5U to 5D / 20L to 20R / 0.50° increment

RH2 Lower Beam (RH1 similar performance)



LH1 Lower Beam (LH2 similar performance)



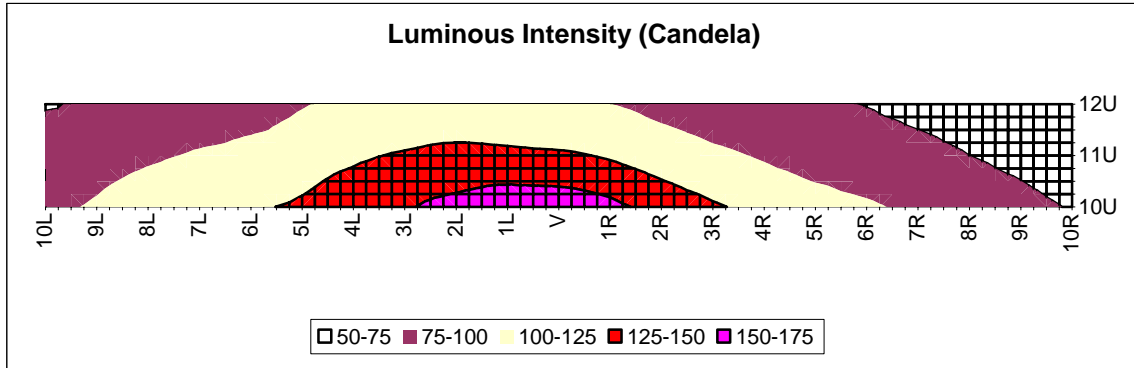
**PHOTOMETRIC TEST DATA SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

**ISOSCANS**

12U to 10U / 10L to 10R / 0.25° increment

LH2 Lower Beam, 10U failure region (<125 Cd required)



**TEST DATA SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

**COLOR TEST:** SAE J578c

Test Method: Tristimulus Method using Minolta CL100 (TSM)  
Spectroradiometric Method using Photoresarch PR-650 (SRM)

Test Performed by: Douglas Cummins Date: 25 July 2007

Lamp Voltage: 12.80V  
Test Distance: 50 Feet  
Test Location: 1.5D/2.0R (Lower Beam) or HV (Upper Beam)

	Measured (x, y)	Required	Chart
White	<u>Lower Beam, TSM</u>		
	RH1: (0.392, 0.407)*		
	RH2: (0.395, 0.407)*		
	LH1: (0.390, 0.407)*		
	LH2: (0.395, 0.410)*		
	<u>Lower Beam, SRM</u>		
	RH1: (0.389, 0.395)		
	RH2: (0.392, 0.395)		
	LH1: (0.387, 0.394)		
	LH2: (0.392, 0.398)		
	$0.31 \leq x \leq 0.50$ $0.38 \leq y \leq 0.44$ $y \geq 0.75x + 0.05$ $y \leq 0.64x + 0.15$		
	<u>Upper Beam, TSM</u>		
	RH1: (0.381, 0.399)*		
	RH2: (0.386, 0.398)*		
	LH1: (0.377, 0.397)*		
LH2: (0.384, 0.400)*			
<u>Upper Beam, SRM</u>			
RH1: (0.386, 0.409)*			
RH2: (0.389, 0.411)*			
LH1: (0.382, 0.407)*			
LH2: (0.387, 0.411)*			

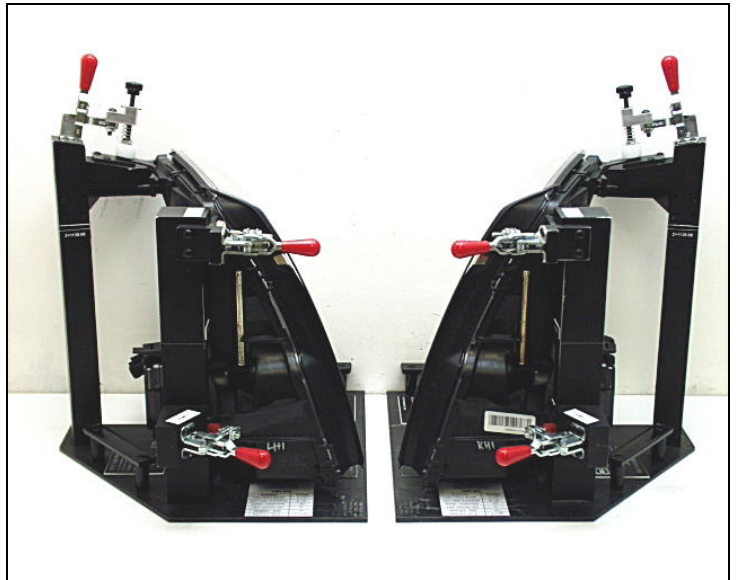
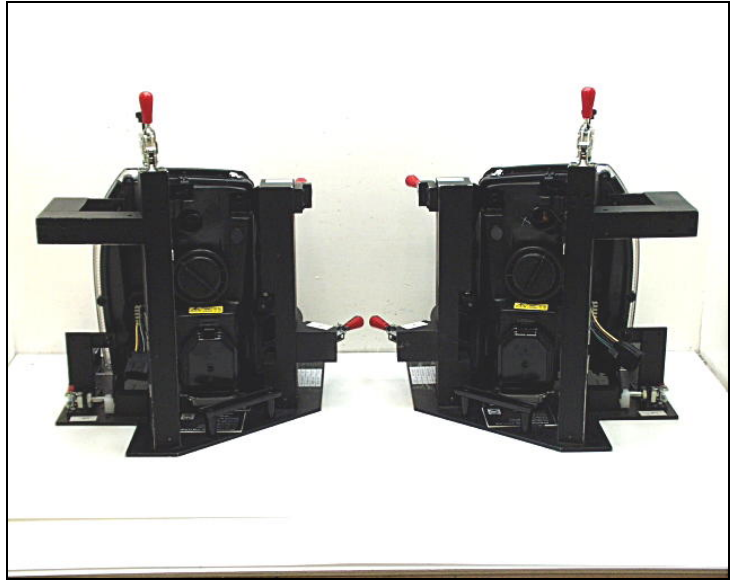
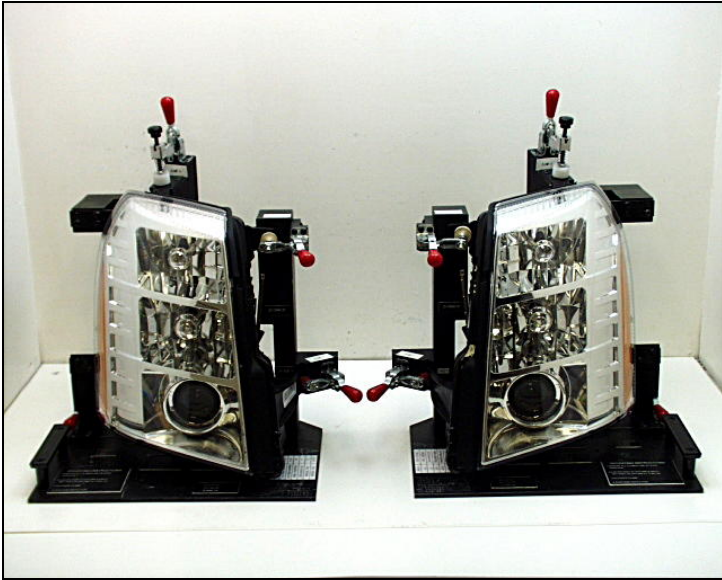
\* - Denotes failure.

Samples do **NOT** comply with color requirements.

Note: FMVSS 108 referenced SAE J578c states that the spectroradiometric method should be used "as a referee approach rather than the one commonly used". However, the tristimulus colorimeter is calibrated only for incandescent sources and may not measure the color of HID light accurately.

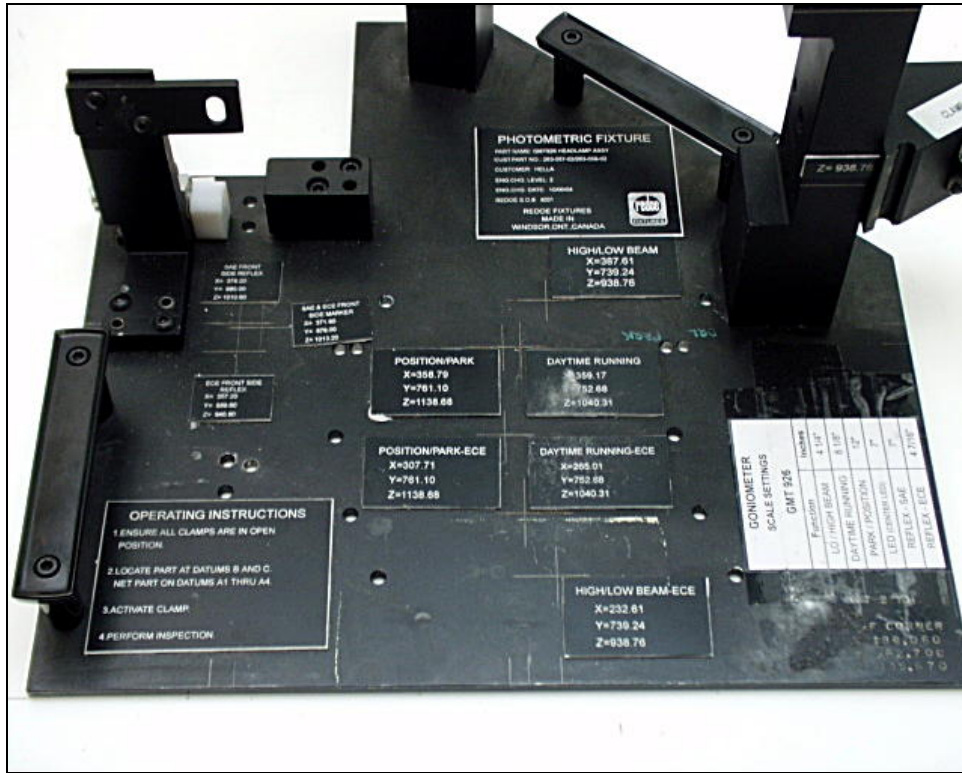
**PHOTOGRAPH SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps  
for 2007 Cadillac Escalade

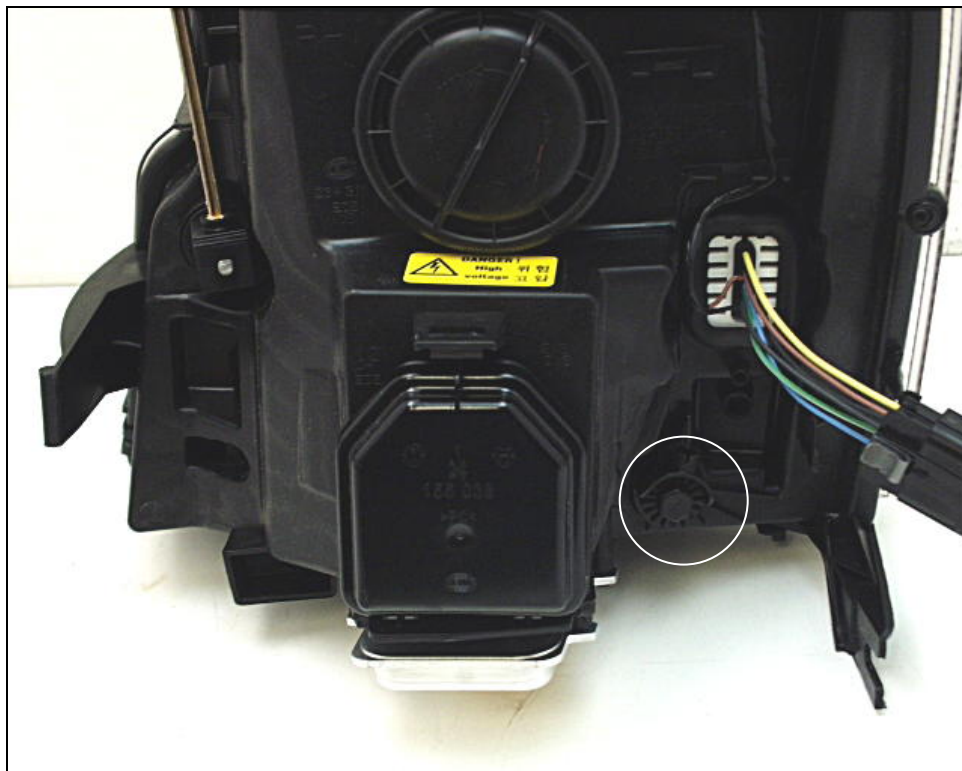


**PHOTOGRAPH SHEET**

Project Name: Hella VOL Replaceable Bulb (D1S) Headlamps for 2007 Cadillac Escalade



Hella Fixture



Inaccessible but not disabled aiming mechanism below wire harness on right.