LOS ANGELES COUNTY SHERIFF’S DEPARTMENT

LAW ENFORCEMENT VEHICLE AFTERMARKET BRAKE TEST AND EVALUATION PROGRAM

YEAR 2013

LEROY D. BACA, SHERIFF
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The Los Angeles County Sheriff’s Department first implemented its police vehicle testing program in 1974. Since that time, our department has become nationally recognized as a major source of information relative to police vehicles and their use. It is our goal to provide law enforcement agencies with the information they require to successfully evaluate those vehicles currently being offered for police service. The Los Angeles County Sheriff’s Department is proud to publish this information, via the internet, to all law enforcement agencies.

Since the inception of our vehicle testing program in 1974, we have continually refined our efforts in this area in order to provide the law enforcement community with the most current information available.

In July 2013, The Los Angeles County Sheriff’s Department Fleet Management Bureau conducted an evaluation of “aftermarket” brake pad offerings for all of the new generation police package vehicles currently being offered to Law enforcement agencies. Our test was conducted in collaboration with Link Engineering Company. During Phase I of this test, all of the brake manufacturers that chose to be included with this test submitted brake pads to Link Engineering for laboratory dynamometer testing. Each brake pad was evaluated by Link Engineering prior to being tested on the track with LASD. Only brake pads meeting the minimum laboratory criteria described by LASD then moved on to Phase II of the test on the Los Angeles County Sheriff’s Department’s Emergency Vehicle Operations Center course (EVOC). The data gathered from our test will not only assist law enforcement agencies in purchasing decisions but also provide valuable data to the brake manufacturers to improve upon their product for law enforcement use.

The Sheriff’s Department conducts the vehicle and brake testing program in order to accomplish two primary goals:

1) Law enforcement agencies are provided with objective data to assist in the component selection process.
2) Manufacturers are provided with the feedback and data to better meet the needs of law enforcement.

The booklet is not intended as a recommendation for any specific product contained within. Individual agency needs can be influenced by cost, operational considerations and other factors. Interpretation of test results is the responsibility of each reviewing agency. The importance with which each individual phase is weighted is a subjective decision which should be made by each agency based upon that agency’s needs.
INTRODUCTION TO PHASE I (LABORATORY TEST)

Emergency Vehicle Operating Course duty cycle. This laboratory protocol (developed as an inertia-dynamometer test to correlate braking energies, temperature regimes, and wear and integrity patterns) enables the assessment of the brake corner behavior when replicating four handling cycles and two pursuit cycles. The assessment includes the ability to develop the deceleration levels from the test course, structural integrity, and durability of the friction material.

- **FMVSS 105/135 dynamometer evaluation per SAE J2784.** The laboratory evaluation per the FMVSS 105 and 135 protocols replicates the loading conditions, thermal history, deceleration and kinetic energy, and failed systems as experienced during typical vehicle-level test. The vehicle performance is predicted using the Link-CA model which combines the actual SAE J2784 test results in combination with the OE on the reference axle, vehicle-specific measurements, and vehicle dynamics models to predict the vehicle stopping distance.

- **Noise squeal evaluation per SAE J2521.** Noise squeal propensity is critical for driver's and general public's comfort. The SAE J2521 protocol replicates critical driving behaviors or conditions which tend to generate squeal noise during driveway, parking lot, city, rural, and highway driving. Since police duty is a year-round activity, the inertia-dynamometer squeal evaluation includes noise evaluation during cold driving and after severe heating cycles, which can be encountered by police cars during regular operation. The assessment of the noise level and occurrence compares the to the OE friction couple of friction material and brake rotor.

- **Durability and wear behavior per SAE J2707— Method B.** The test results from this SAE Recommended Practice compares to the OE the overall friction material and the brake rotor wear level after a series of multiple city, rural, highway, and mountain descent driving simulation. Brake component durability is critical to the police fleet availability and total cost of ownership. Providing wear rates similar to those observed on the Original Equipment provided as part of the police package by the vehicle manufacturer ensures consistent and predictable maintenance costs and schedules.

- **Friction coefficient behavior per ISO 26867.** Friction coefficient is one of the most critical performance factors on any brake system. The ISO 26867 inertia-dynamometer test standard determines the level and scatter of the friction coefficient during an extensive evaluation at different speeds, input pressures, brake temperatures (including two severe fade schedules and elevated temperature effectiveness), and braking history. With friction coefficient in mind, the Police Declaration of Conformity program relies on the average, minimum and maximum friction coefficients of friction from this standard to audit, and to detect sudden changes or drifts from the initial friction values declared by the supplier. The ISO 26867 tests are used every year as part of the automatic audit testing.

- **Bonding shear strength of the friction material per SAE J840.** High-deceleration braking (as experienced during emergency conditions, or pursuit cycles) can impose significant shear stresses on the bonding system between the friction material and its backing plate. The SAE J840 test measures the amount of force required to shear the friction material off its backing plate on multiple samples. The test results combined with vehicle dynamic weight transfer and brake size provides the quantification of the safety margin of the bonding layer at 1.0g deceleration rates. Using extensive OE testing activities and specifications requiring at least a 40% safety margin, the program determines the ability of the replacement friction material to withstand those loads safely. This test procedure is also used as part of the yearly audit activity to ensure consistent and reliable product behavior and performance.
INTRODUCTION TO PHASE II (EVOC COURSE TRACK TESTING)

VEHICLE-LEVEL TESTING PROGRAM (PHASE II)
Upon completion of the laboratory benchmarking program, the three best-performing products for each application (by vehicle and by axle) will be evaluated on the test track in accordance to the standard EVOC duty cycle by certified drivers using fully-instrumented police pursuit vehicles.

Each test was conducted on new brake components and new tires. The following burnish procedure was performed for each brake pad tested prior to the 32-Lap high speed course test.

- **Burnish Procedure 10/40/20**
- Conduct 10 medium brake applications and decal from 40mph to 20mph.
- Conduct 2 aggressive threshold stops from 60mph to 0mph.

Each vehicle was driven for 32-Laps on the Los Angeles County Sheriff's Department's Emergency Vehicle Operations Center (EVOC) course. Upon completion of the 32 Lap test each vehicle then immediately conducted the LASD brake test procedure.

This test procedure measures the braking response and efficiency of the vehicle.

The test is conducted immediately following the preliminary handling test (32 laps). This ensures that the brakes are tested after being driven at high speeds, thus simulating the actual operating conditions experienced by the officer in the field.

The test is conducted by first accelerating the vehicle to 80 MPH, then decelerating to a stop, maintaining an average deceleration rate of 22 feet per second. This procedure is repeated three additional times. At this point, a five minute stationary cool down period occurs. The vehicle is then accelerated to a speed of 60 MPH and decelerated at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 MPH procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 MPH and then stopped as quickly as possible, simulating a panic stop. That stopping distance is measured and recorded, utilizing a “VBOX Datalogger”. The “Datalogger” is a GPS based measuring device. If a brake malfunction is experienced (i.e., severe fading or inability to stop in a straight line,) an effort is made to detect the cause of the brake failure. If it is decided that the failure is inherent in the engineering of the brake system of the vehicle, the test is discontinued and the vehicle is disqualified from further testing. If the failure is associated with a correctable situation, it is corrected and the test is rerun. The defect and any remedial action taken are noted in the test results.

For purposes of this brake evaluation, test is given a Pass/Fail analysis.
2013 MODEL YEAR BRAKE TEST

In July 2013, aftermarket brake pad testing was performed at the Los Angeles County Sheriff’s Department’s Emergency Vehicle Operations Center in Pomona, California. All vehicles used for testing are in the “Police Package” category. Police Package vehicles have been identified by the manufacturers as pursuit vehicles.

The vehicles used for brake pad evaluation were all 2013 models, and are identified below.

**HIGH SPEED POLICE PACKAGE VEHICLE CATEGORY:**

- **Ford PI Utility AWD**
  - Full size four door sport utility, all-wheel drive, 3.7 liter V-6 engine, 6 speed automatic transmission with overdrive and a 3.65 axle ratio.

- **Dodge Charger V-6:**
  - Full size four door sedan, rear wheel drive, 3.6 liter V-6 engine, 5 speed automatic transmission with overdrive and a 2.65:1 axle ratio.

- **Chevrolet Tahoe:**
  - Full size four door sport utility, rear wheel drive, 5.3 liter V-8 engine, 6 speed automatic transmission with overdrive and a 3.08 axle ratio.

- **Chevrolet Caprice**
  - Full size four door sedan, rear wheel drive, 3.6 liter V-6 engine, 6 speed automatic transmission with overdrive and a 2.92:1 axle ratio.
Test Summary - 504332
Police DoC Brake Testing Program - Phase II testing Test On A 2013 Chevrolet Caprice (Pursuit)

Objective:
To evaluate the performance of the 2013 Chevrolet Caprice (Pursuit) Police Vehicle BXFM8FF (Bendix) front and O.E. rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff's Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer's specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
Components Tested:
2013 Chevrolet Caprice (Pursuit) Police Vehicle BXFM8FF (Bendix) front and O.E. rear lining candidate combination.

Equipment Used:
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

Data Analysis:
The vehicle was able to meet the pass requirements of the procedure and as a result the vehicle test is considered to be a pass.

<table>
<thead>
<tr>
<th>32 Lap High-Speed Vehicle Evaluation</th>
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<tbody>
<tr>
<td>Deputy R. Robinson, LASD</td>
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</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
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</thead>
<tbody>
<tr>
<td>Deputy R. Robinson, LASD</td>
<td>9:35 AM</td>
<td>84 °F / 109 °F</td>
</tr>
</tbody>
</table>

Driver Comments
These brakes had very good initial bite which softened very slightly after lap #16. The rate of decel was very good, linear and progressive throughout all 32 laps. Once the initial bite softened (again very slightly) I noticed the pedal feel also softened ever so slightly making the brakes easier to modulate. Pedal travel remained consistent throughout all 32 laps. Very confidence inspiring.
Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
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</thead>
<tbody>
<tr>
<td>2013 Chevrolet Caprice (Pursuit)</td>
<td>140.2 ft</td>
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</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 153°C (308 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components and that the brake pads were intact with at least 3/32" (0.0938") of friction material remaining.
Objective:
To evaluate the performance of the 2013 Dodge Charger (Pursuit) Police Vehicle BXFM8FF (Bendix) front and OE rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff's Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver's name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer's specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
Components Tested:
2013 Dodge Charger (Pursuit) Police Vehicle **BXFM8FF (Bendix) front** and OE rear lining candidate combination.

Equipment Used:
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

Data Analysis:
The vehicle was able to meet the pass requirements of the procedure and as a result the vehicle test is considered to be a pass.

<table>
<thead>
<tr>
<th>32 Lap High-Speed Vehicle Evaluation</th>
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<tbody>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>01:22.83</td>
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<tr>
<td>Deputy R. Juarez, LASD</td>
<td>01:22.74</td>
</tr>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>01:23.17</td>
</tr>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>01:23.17</td>
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Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
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<tbody>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>12:50 PM</td>
<td>97 °F / 142 °F</td>
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</tbody>
</table>

Driver Comments
Brakes - 1st session: Brakes performed well; very good rate of decel; good initial bite; decent modulation. 2nd session: Pedal still firm and not too long. Loss of effectiveness on rate of decel. Still good stopping power. 3rd session: After about 2nd lap, pedal travel got longer, brake fade / loss or rate of decel began to set in. By end of session, long pedal travel and another 5 - 10% brake fade. ABS intrusion very prevalent with deep / strong brake force application. 4th session: Definite long pedal travel, prevalent definite fade - still had stopping power but definite adjustments in braking points. ABS intervention on the laps. Vehicle still slower but definite loss on rate of decel. Overall loss of rate of decel from beginning to end (30 - 40%).
Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
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</thead>
<tbody>
<tr>
<td>2013 Dodge Charger (Pursuit)</td>
<td>148.3 ft</td>
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</tbody>
</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 131°C (268 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components and that the brake pads were intact with at least 3/32" (0.0938") of friction material remaining.
Objective:
To evaluate the performance of the 2013 Ford Explorer (Pursuit) Police Vehicle BXFM8FF (Bendix) front and OE rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer’s specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
Components Tested:
2013 Ford Explorer (Pursuit) Police Vehicle BXFM8FF (Bendix) front and OE rear lining candidate combination.

Equipment Used:
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

Data Analysis:
The vehicle was not able to meet the pad wear pass requirements of the procedure and as a result the vehicle test is considered to be a fail.

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<tbody>
<tr>
<td>Deputy R. Robinson, LASD</td>
<td>01:24.74</td>
<td>01:24.11</td>
<td>01:23.79</td>
<td>01:23.57</td>
<td>01:23.72</td>
<td>01:24.13</td>
<td>01:23.88</td>
<td>01:23.80</td>
<td>01:23.91</td>
<td>64.7</td>
</tr>
<tr>
<td>Deputy R. Robinson, LASD</td>
<td>01:23.52</td>
<td>01:23.70</td>
<td>01:24.18</td>
<td>01:24.56</td>
<td>01:24.85</td>
<td>01:25.12</td>
<td>01:24.96</td>
<td>01:25.29</td>
<td>01:24.56</td>
<td>65.0</td>
</tr>
<tr>
<td>Deputy R. Robinson, LASD</td>
<td>01:24.01</td>
<td>01:24.18</td>
<td>01:25.19</td>
<td>01:25.68</td>
<td>01:25.21</td>
<td>1:26.00*</td>
<td>01:25.93</td>
<td>01:25.99</td>
<td>01:25.03</td>
<td>66.4</td>
</tr>
</tbody>
</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
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</thead>
<tbody>
<tr>
<td>Deputy R. Robinson, LASD</td>
<td>9:34 AM</td>
<td>78 °F / 100 °F</td>
</tr>
</tbody>
</table>

Driver Comments
Brakes - The brakes remained consistent with good linear and progressive decel during the 1st 8 laps. During the 2nd 8 laps I noticed more noise and slight but manageable fade. Pedal feel and travel remained consistent. During the 3rd and 4th session (laps 16 - 32) the brake performance continued to fall off causing me to have to brake earlier & earlier to get slowed. I was also forced to press deeper into the pedal to get slowed. Eventually the brakes grew hot enough that I was unable to feel ABS despite being deep into the pedal.
Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
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<tbody>
<tr>
<td>2013 Ford Explorer (Pursuit)</td>
<td>142.9 ft</td>
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</table>

**Comments:**

The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 146°C (295 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components but that the brake pads had less than 3/32" (0.0938") of friction material remaining.
Test Summary - 504333
Police DoC Brake Testing Program - Phase II testing Test On A 2013 Dodge Charger (Pursuit)

Objective:
To evaluate the performance of the 2013 Dodge Charger (Pursuit) Police Vehicle DB821FF (Dan-Block) front and DB950FE (Dan-Block) rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer’s specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
**Components Tested:**
2013 Dodge Charger (Pursuit) Police Vehicle DB821FF (Dan-Block) front and DB950FE (Dan-Block) rear lining candidate combination.

**Equipment Used:**
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

**Data Analysis:**
The vehicle was able to meet the pass requirements of the procedure and as a result the vehicle test is considered to be a pass.

### 32 Lap High-Speed Vehicle Evaluation

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</thead>
<tbody>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>01:22.60</td>
<td>01:22.30</td>
<td>01:22.10</td>
<td>01:21.90</td>
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Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>8:50 AM</td>
<td>78 °F / 98 °F</td>
</tr>
</tbody>
</table>

**Driver Comments**
Brakes - 1st session: Brakes performed well on all 8 laps. good rate of decel - decent modulation. 2nd session: At about lap 3 brake fade first became real firm (hard to push through) - after that long pedal travel, some loss of rate of decel ~ 15%. 3rd session: Brakes still had good rate of decel; long pedal with some instances of semi-hard pedal feel. 4th session: Rate of decel fell off another 5 - 10% but still good stopping power. Minor adjustment to braking point application.
### Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 Dodge Charger (Pursuit)</td>
<td>145.4 ft</td>
</tr>
</tbody>
</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 107°C (225 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components and that the brake pads were intact with at least 3/32" (0.0938") of friction material remaining.
Test Summary - 504333-2

Police DoC Brake Testing Program - Phase II testing Test On A 2013 Ford Explorer (Pursuit)

Objective:
To evaluate the performance of the 2013 Ford Explorer (Pursuit) Police Vehicle **DB821FF (Dan-Block) front** and OE rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. **32 Lap High-Speed Vehicle Evaluation**
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. **Brake Evaluation**
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer’s specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
**Components Tested:**
2013 Ford Explorer (Pursuit) Police Vehicle **DB821FF (Dan-Block) front** and OE rear lining candidate combination.

**Equipment Used:**
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

**Data Analysis:**
The vehicle was not able to meet the pad wear requirements of the procedure and as a result the vehicle test is considered to be a fail.

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</thead>
<tbody>
<tr>
<td>Deputy R. Robinson, LASD</td>
<td>01:24.21</td>
<td>01:23.10</td>
<td>01:23.33</td>
<td>01:23.57</td>
<td>01:23.83</td>
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<td>01:22.95</td>
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<td>01:25.62</td>
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</tr>
</tbody>
</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy R. Robinson, LASD</td>
<td>8:15 AM</td>
<td>74 °F / 88 °F</td>
</tr>
</tbody>
</table>

**Driver Comments**
I first smelled hot brakes at the start of lap #3 which is highly unusual. I began experiencing slight fade on lap #4 (south end). After the initial fall off in performance, which was only slight, the brakes remained consistent until the 2nd lap of the final session (lap #25). At that point I experienced a huge fall off in the rate of decel causing me to brake earlier on each lap. I eventually backed my braking point up approximately 150 feet (south) and 100 feet (decreasing & north). While the pedal remained somewhat firm, I did notice that the brakes sounded and performed as though they were "metal to metal". I also noticed the brakes pulled both left & right and that the truck vibrated moderately.
Comments:
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 149°C (300 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components but that the brake pads had less than 3/32" (0.0938") of friction material remaining. All four front pads were worn to the backing plate.
Test Summary - 504333-3

Police DoC Brake Testing Program - Phase II testing Test On A 2014 Chevrolet Tahoe (Pursuit)

Objective:
To evaluate the performance of the 2014 Chevrolet Tahoe (Pursuit) Police Vehicle DB821FF (Dan-Block) front and DB950FE (Dan-Block) rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer’s specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
**Components Tested:**
2014 Chevrolet Tahoe (Pursuit) Police Vehicle **DB821FF (Dan-Block) front and DB950FE (Dan-Block) rear** lining candidate combination.

**Equipment Used:**
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

**Data Analysis:**
The vehicle was not able to meet the pad wear requirements of the procedure and as a result the vehicle test is considered to be a fail.

### 32 Lap High-Speed Vehicle Evaluation

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<tbody>
<tr>
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<td>01:28.13</td>
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Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
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</thead>
<tbody>
<tr>
<td>Deputy J. Rozales, LASD</td>
<td>10:35 AM</td>
<td>84.2 °F / 123.1 °F</td>
</tr>
</tbody>
</table>

**Driver Comments**
Brakes - Laps 1 - 8: Brakes were very responsive with normal brake travel; Laps 9 - 16: Brakes were again very responsive with normal brake travel; Laps 17 - 24: Brake pedal travel increased with slightly less responsiveness. Slight pull to the left on two brake applications on laps 22 & 23.; Laps 25 - 32: From lap 25 - 29 the brake pedal travel was almost to the floor with little responsiveness and almost no grab. from laps 30 - 32 the pedal travel was 100% to the floor with little to no response. At the end of my 32 laps I had almost no brakes.
Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 Chevrolet Tahoe (Pursuit)</td>
<td>221.6 ft</td>
</tr>
</tbody>
</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts but the brake pedal travel was 100% of full system travel during the 4th 8 lap cycle.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 159°C (319 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks but there were damaged components. The left front outer and inner pads had less than 3/32” (0.0938") of friction material remaining. The right front outer and inner pads had had no friction material remaining and the backing plates were deformed.
Test Summary - 504334
Police DoC Brake Testing Program - Phase II testing Test On A 2013 Chevrolet Caprice (Pursuit)

Objective:
To evaluate the performance of the 2013 Chevrolet Caprice (Pursuit) Police Vehicle DEL-TK-FE (AC DELCO) front and DEL-TK-FE (AC DELCO) rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer's specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
**Components Tested:**

**Equipment Used:**
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

**Data Analysis:**
The vehicle was able to meet the pass requirements of the procedure and as a result the vehicle test is considered to be a pass.

### 32 Lap High-Speed Vehicle Evaluation

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Deputy J. Rozales, LASD</td>
<td>01:25.64</td>
<td>01:25.76</td>
<td>01:24.91</td>
<td>01:25.40</td>
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<td>01:25.51</td>
<td>01:25.84</td>
<td>01:25.47</td>
<td>01:25.60</td>
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<tr>
<td>Deputy J. Rozales, LASD</td>
<td>01:24.68</td>
<td>01:24.80</td>
<td>01:25.88</td>
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<td>01:26.01</td>
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<td>01:25.67</td>
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<td>01:25.53</td>
<td>01:25.19</td>
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</tbody>
</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy J. Rozales, LASD</td>
<td>2:00 PM</td>
<td>97 °F / 143 °F</td>
</tr>
</tbody>
</table>

**Driver Comments**

Brakes - Laps 1 - 8; Firm brake application with moderate pedal travel, no ABS. Laps 9 - 16; Same amount of brake application with same amount of pedal travel, no ABS. Laps 17 - 24; Same amount of brake application with 10% more pedal travel. Still responsive. Laps 25 - 32; Same amount of brake application with same amount of pedal travel as laps 17 - 24. Brakes were still very responsive. Overall good brakes through all 32 laps.
<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 Chevrolet Caprice (Pursuit)</td>
<td>137.7 ft</td>
</tr>
</tbody>
</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 176°C (349 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components and that the brake pads were intact with at least 3/32" (0.0938") of friction material remaining.
Test Summary - 504334-2
Police DoC Brake Testing Program - Phase II testing Test On A 2013 Dodge Charger (Pursuit)

Objective:
To evaluate the performance of the 2013 Dodge Charger (Pursuit) Police Vehicle DEL-TK-FE (AC Delco) front and DEL-TK-FE (AC Delco) rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer's specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
Components Tested:

Equipment Used:
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

Data Analysis:
The vehicle was able to meet the pass requirements of the procedure and as a result the vehicle test is considered to be a pass.

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</tr>
</thead>
<tbody>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>01:23.38</td>
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<td>01:22.88</td>
<td>01:22.77</td>
<td>67.4</td>
</tr>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>01:22.16</td>
<td>01:22.06</td>
<td>01:22.04</td>
<td>01:22.21</td>
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<td>01:22.62</td>
<td>01:22.95</td>
<td>01:22.43</td>
<td>67.2</td>
</tr>
</tbody>
</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>8:05 AM</td>
<td>72 °F / 86 °F</td>
</tr>
</tbody>
</table>

Driver Comments
Brakes - 1st session: Brakes had great initial bite with good rate of decel through the first 4 - 5 laps. Good modulation of pedal/firm pedal feel. The last few laps experienced loss of rate of decel (10 - 15%) and long pedal travel. 2nd session: Brakes initially performed well, then once heat set in the pedal effort and travel increased. Still had decent rate of decel but more pedal effort was required. 3rd session: Rate of decel diminished another 15% while pedal effort / travel grew - ABS Modulation. 4th session: Long, long pedal travel with very little modulation. Lots of pedal effort in order to get a decent rate of decel. Overall brakes lost 35 - 45% rate of decel. Lots of fade at the end.
### Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 Dodge Charger (Pursuit)</td>
<td>150.2 ft</td>
</tr>
</tbody>
</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 121°C (250 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components and that the brake pads were intact with at least 3/32" (0.0938") of friction material remaining.
Test Summary - 504334-3
Police DoC Brake Testing Program - Phase II testing Test On A 2013 Ford Explorer (Pursuit)

Objective:
To evaluate the performance of the 2013 Ford Explorer (Pursuit) Police Vehicle POL-ICE-FE (Raybestos) front and POL-ICE-FE (Raybestos) rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff's Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver's name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 MPH and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 MPH procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer's specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.094") of friction material remaining.
Components Tested:
2013 Ford Explorer (Pursuit) Police Vehicle POL-ICE-FE (Raybestos) front and POL-ICE-FE (Raybestos) rear lining candidate combination.

Equipment Used:
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

Data Analysis:
The vehicle was not able to meet the pad wear requirements of the procedure and as a result the vehicle test is considered to be a fail.

<table>
<thead>
<tr>
<th>32 Lap High-Speed Vehicle Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy R. Robinson, LASD</td>
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<tr>
<td>Deputy R. Robinson, LASD</td>
</tr>
<tr>
<td>Deputy R. Robinson, LASD</td>
</tr>
</tbody>
</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy R. Robinson, LASD</td>
<td>12:20 PM</td>
<td>95 °F / 138 °F</td>
</tr>
</tbody>
</table>

Driver Comments
Brakes - The brakes worked well and were consistent for laps 1 - 16. On lap 21 I experienced some fade (s/end) but it was manageable. In the last session I experienced manageable but progressive fade starting on lap #4. Pedal feel and travel were still good however. Pull was very minimal.
Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 Ford Explorer (Pursuit)</td>
<td>153.4 ft</td>
</tr>
</tbody>
</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 128°C (263 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components but that the brake pads had less than 3/32" (0.094") of friction material remaining.
Objective:
The objective is to evaluate the performance of the 2013 Chevrolet Caprice (Pursuit) Police Vehicle O.E. front and YR13BYEF (NAPA) rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver's name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer's specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
Components Tested:


Equipment Used:

The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

Data Analysis:

The vehicle was able to meet the pass requirements of the procedure and as a result the vehicle test is considered to be a pass.

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</thead>
<tbody>
<tr>
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<td>01:24.19</td>
<td>01:24.70</td>
<td>01:24.01</td>
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<td>76.2</td>
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<td>Deputy J. Rozales, LASD</td>
<td>01:24.24</td>
<td>01:24.05</td>
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<td>01:24.28</td>
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<td>76.4</td>
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</tbody>
</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy J. Rozales, LASD</td>
<td>9:55 AM</td>
<td>79.9 °F / 99.0 °F</td>
</tr>
</tbody>
</table>

Driver Comments

Brakes - Laps 1 - 8; Brake application was firm and very responsive. Laps 9 - 16; Brake application again was firm and very responsive. Laps 17 - 24; No change in brake application and brakes were still very responsive. Laps 25 - 32; Around lap 30 brake application was firmer and deeper but brakes were still very responsive. Overall nice brakes.
Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 Chevrolet Caprice (Pursuit)</td>
<td>185 ft</td>
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</table>

**Comments:**

The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 168°C (336 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components and that the brake pads were intact with at least 3/32" (0.0938") of friction material remaining.
Test Summary - 504336-2
Police DoC Brake Testing Program - Phase II testing Test On A 2013 Dodge Charger (Pursuit)

Objective:
To evaluate the performance of the 2013 Dodge Charger (Pursuit) Police Vehicle SD9022FF (NAPA) front and SD9022FF (NAPA) rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. **32 Lap High-Speed Vehicle Evaluation**
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. **Brake Evaluation**
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer's specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
Components Tested:
2013 Dodge Charger (Pursuit) Police Vehicle SD9022FF (NAPA) front and SD9022FF (NAPA) rear lining candidate combination.

Equipment Used:
The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

Data Analysis:
The vehicle was able to meet the pass requirements of the procedure and as a result the vehicle test is considered to be a pass.

32 Lap High-Speed Vehicle Evaluation

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Deputy J. Rozales, LASD</td>
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<td>01:22.99</td>
<td>01:22.52</td>
<td>01:22.06</td>
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<td>74.9</td>
</tr>
<tr>
<td>Deputy J. Rozales, LASD</td>
<td>01:22.33</td>
<td>01:22.35</td>
<td>01:22.76</td>
<td>01:22.28</td>
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<td>Deputy J. Rozales, LASD</td>
<td>01:23.58</td>
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<td>01:24.26</td>
<td>01:22.66</td>
<td>01:22.79</td>
<td>74.2</td>
</tr>
</tbody>
</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy J. Rozales, LASD</td>
<td>8:30 AM</td>
<td>75.9 °F / 95.0 °F</td>
</tr>
</tbody>
</table>

Brakes - Laps 1 - 8; Very responsive with minimal pedal travel. Brakes reacted well when brake pedal was released and pressure applied. Laps 9 - 16; First lap experienced heat soak and brakes were very soft. After lap 11 the brakes were responsive with minimal travel. Laps 17 - 24; From the beginning the brakes fell right into place. Very responsive with a little more pedal travel. Laps 25 - 32; Brakes again were responsive with about the same pedal travel until lap 30 where I had to apply much more pedal pressure and had 10 - 15% more pedal travel. Overall the brakes were predictable.
### Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 Dodge Charger (Pursuit)</td>
<td>150.9 ft</td>
</tr>
</tbody>
</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 104 °C (220 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components and that the brake pads were intact with at least $\frac{3}{32”} (0.0938”)$ of friction material remaining.
Test Summary - 504336-3
Police DoC Brake Testing Program - Phase II testing Test On A 2013 Ford Explorer (Pursuit)

Objective:

Procedure:
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. 32 Lap High-Speed Vehicle Evaluation
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. Brake Evaluation
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.

2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer’s specified dry boiling point during the testing.

3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32” (0.0938”) of friction material remaining.
**Components Tested:**


**Equipment Used:**

The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

**Data Analysis:**

The vehicle was able to meet the pass requirements of the procedure and as a result the vehicle test is considered to be a pass.

<table>
<thead>
<tr>
<th>32 Lap High-Speed Vehicle Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy R. Juarez, LASD</td>
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<tr>
<td>Deputy R. Juarez, LASD</td>
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<tr>
<td>Deputy R. Juarez, LASD</td>
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</tbody>
</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy R. Juarez, LASD</td>
<td>9:55 AM</td>
<td>80 °F / 112 °F</td>
</tr>
</tbody>
</table>

**Driver Comments**

Brakes - 1st session: Short pedal travel, great initial bite, very good rate of decel, confidence in stopping power. 2nd session: Still very consistent, great rate of decel, slight increase in pedal travel - good modulation. 3rd session: Slight drop off in rate of decel 10 - 15%, pedal still firm and easy to modulate - initial strong bite is gone but still very consistent rate of decel - still lots of confidence. 4th session: Consistent rate of decel throughout, still great braking confidence - pedal still firm and responsive to modulation. Performed well on all 32 laps.
Brake Evaluation

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 Ford Explorer (Pursuit)</td>
<td>160.8 ft</td>
</tr>
</tbody>
</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 154 °C (309.2 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks, damaged components and that the brake pads were intact with at least 3/32" (0.0938") of friction material remaining.
**Objective:**
To evaluate the performance of the 2014 Chevrolet Tahoe (Pursuit) Police Vehicle O.E. front and OEQF 7000 EF (NAPA) rear lining candidate combination to the Police Declaration of Conformity Brake Testing Program - Phase II Vehicle Test.

**Procedure:**
Police Declaration of Conformity Brake Testing Program - Phase II vehicle test. The procedure references the 32 Lap High Speed Vehicle Evaluation and Brake Evaluation portions from the 2013 Los Angeles County Sheriff’s Law Enforcement Vehicle Test and Evaluation Program and uses a standard EVOC duty cycle conducted by certified drivers using fully-instrumented police pursuit vehicles. The procedure and requirements are outlined below.

1. **32 Lap High-Speed Vehicle Evaluation**
   For this test, a single driver is utilized to complete eight laps around a 1.57 mile test track at the Pomona Fairplex in Pomona, California for a total of 32 timed laps. Lap timing is collected via an Infrared Hot Lap Timer mounted in the vehicle. The fastest and the slowest lap times are eliminated and the remaining six lap times are averaged. The average time and speed are recorded next to the driver’s name.

2. **Brake Evaluation**
   For this test, a single driver is utilized to accelerate the vehicle to 80 mph, and then decelerate to a stop, maintaining an average deceleration rate of 22 feet per second. The stops are then repeated three additional times. After a five minute stationary cool down period the driver accelerates to a speed of 60 mph and decelerates at the maximum deceleration rate attainable before the onset of ABS. After a two minute stop, the 60 mph procedure is repeated again. As soon as the vehicle has stopped, it is immediately accelerated to 60 mph and then stopped as quickly as possible, simulating a panic stop. The stopping distance is recorded.

The performance criteria listed below must be met for the vehicle test to be considered a pass:

1. The vehicle must complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts and at no time during the dynamic brake applications can the pedal travel be 100% of system pedal travel.
2. The temperature of the brake system hydraulic brake fluid must not exceed the manufacturer's specified dry boiling point during the testing.
3. A post test inspection of the hydraulic brake system must show that there are no leaks, damaged components and that the brake pads are intact and have at least 3/32" (0.0938") of friction material remaining.
**Components Tested:**


**Equipment Used:**

The vehicle was instrumented with a: Link Model 3801x or 3802 DAS, laptop and heads up display, Vehicle speed (GPS based low resolution), Pedal force transducer, Pedal travel transducer, Longitudinal decelerometer, Booster vacuum, (1) brake line pressure transducer in each circuit, "K" type ambient thermocouple, "K" type ambient thermocouple, "K" type bleeder thermocouples (1 per caliper bleeder), "K" type thermocouples set at 0.160" in each lining, "K" type ambient thermocouple, and an Infrared Hot Lap Timer to record lap times during the 32 Lap High-Speed Vehicle Evaluation.

**Data Analysis:**

The vehicle was able to meet the pass requirements of the procedure and as a result the vehicle test is considered to be a pass. The driver subjectively noted that during the last 8 lap cycle the brakes lost effectiveness with maximum pedal travel.

### 32 Lap High-Speed Vehicle Evaluation

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<tbody>
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<td>01:29.62</td>
<td>01:29.00</td>
<td>01:29.10</td>
<td>72.5</td>
</tr>
<tr>
<td>Deputy J. Rozales, LASD</td>
<td>01:29.10</td>
<td>01:28.86</td>
<td>01:28.86</td>
<td>01:28.45</td>
<td>01:29.84</td>
<td>01:29.46</td>
<td>01:29.93</td>
<td>01:28.49</td>
<td>01:29.10</td>
<td>72.4</td>
</tr>
</tbody>
</table>

Note: The fastest and slowest laps in each 8 lap cycle were not used in the average.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Time Test Started</th>
<th>Air Temperature / Track Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy J. Rozales, LASD</td>
<td>12:05 PM</td>
<td>88 °F / 134 °F</td>
</tr>
</tbody>
</table>

**Driver Comments**

Brakes - Laps 1 - 8: Brake application was firm and very responsive. No ABS; Laps 9 - 16: Brake application was firm and responsive. No ABS; Laps 17 - 24: Brake application had 10% more pedal travel and the brakes were less responsive. No ABS.; Laps 25 - 32: Brake application was firm and pedal travel was as far as it could go. Brakes were not responsive until all pedal travel was in. No ABS. Overall brakes were very soft and unresponsive.
<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Stopping Distance (SAE J299 corrected to an ideal initial speed of 60 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 Chevrolet Tahoe (Pursuit)</td>
<td>200.4 ft</td>
</tr>
</tbody>
</table>

**Comments:**
The vehicle was able to complete both the 32 Lap High-Speed Vehicle Evaluation and Brake Evaluation on the same set of test parts but the brake pedal travel was 100% of full system travel during the 4th 8 lap cycle.

The vehicle was tested with original equipment DOT 3 hydraulic brake fluid with a maximum dry fluid temperature of 205 °C (401 °F). The highest brake fluid temperature observed during the dynamic portions of testing was 166 °C (330.8 °F).

A post test inspection of the hydraulic brake system showed that there were no leaks or damaged components.