Link Engineering Co. launches with AMECA a Supplier's Declaration of Conformity program for Police brake products

Using standard laboratory testing and the Original Equipment (OE) product as the baseline

Building on the experience gained during the development of the U.S. Department of Defense Military Specification ATPD 2354A to qualify friction materials for military vehicles, Link Engineering Co. launched a laboratory testing program for police brake components. Police fleets around the county face challenges similar to the military regarding the demand for robust friction materials and brake rotors. In addition, with limited availability of test vehicles, police fleets will benefit from comprehensive and repeatable laboratory test procedures with stringent technical requirements and using the Original Equipment performance as the main criteria to select and validate safety-related replacement brake parts.

Leveraging its comprehensive testing and engineering capabilities for both vehicle and inertia-dynamometer testing in Los Angeles, Arizona, and Michigan, the Police Declaration of Conformity program uses standard laboratory test procedures (duty cycles replicating police driving patterns and SAE recommended practices) and engineering assessments and comparisons to the OE to qualify friction materials and brake rotors. The program includes vehicles for all the main police fleet applications in the field: Ford (Crown Victoria, Taurus Interceptor, and Explorer), Chevrolet (Caprice, Impala, and Tahoe), and Dodge Charger.

The Declaration of Conformity program has three levels: brake pads only, brake rotors only, or brake kits with both and uses AMECA as the independent program registrar.

The inertia-dynamometer test procedures used as part of the Declaration of Conformity are:

- **Los Angeles County Sheriff Department's Pomona 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.

- **Rotor crack at elevated temperature per SAE J2928**. Severe and repeated braking can induce heat cracks which can eventually compromise the structural integrity of the brake rotor for designs not meeting some minimum design and physical properties requirements. The SAE J2928 subjects the rotor to up-to-150 cycles of high speed braking while elevating the rotor temperatures well above regular driving conditions. This severe loading conducted multiple times ensures the rotor crack propensity is within acceptable industry practices and compares to the OE rotor design. The test can incorporate testing one rotor to 150 cycles, two rotors between 100 and 150 cycles, or two rotors equivalent to the OE. This program requirement applies only when the suppliers wants to declare conformity for brake rotors or for brake kits.
- **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 1.0 g 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.

As part of the strategy to ensure a third-party evaluation and assessment as well as allowing purchasing personnel and technical staff to confirm the availability of products meeting the above requirements, the AMECA.org website will host a listing of suppliers and products on this program.

Link Engineering Co. is a premier testing system and service supplier since 1935. With more than 300 employees, corporate facilities in Plymouth, MI, and testing facilities in Arizona, Ohio, Michigan, Brazil, China, Germany, and Korea, Link serves the automotive, commercial vehicle, aircraft, and rail industries. Vehicle manufacturers, tier-1, tier-2, and aftermarket customers from around the world use Link systems and services as part of their regular testing activities.

The **Automotive Manufacturers Equipment Compliance Agency**, Inc. (AMECA) was incorporated in late 1994 to continue providing the same safety equipment services to the states that the American Association of Motor Vehicle Administrators, (AAMVA) had provided since 1967For further information

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please visit www.linkeng.com and www.ameca.org

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