



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Link Engineering Company
401 Southfield Road
Dearborn, MI 48120

has been assessed by ANAB
and meets the requirements of international standard

ISO/IEC 17025:2005

while demonstrating technical competence in the fields of

TESTING & CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of tests and calibrations to which this accreditation applies.

ACT-1997

Certificate Number


ANAB Approval

Certificate Valid: 10/31/2018-10/21/2019
Version No. 007 Issued: 10/31/2018



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Link Engineering Company

401 Southfield Road
Dearborn, MI 48120

Bill Conger
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Valid to: October 21, 2019

Certificate Number: ACT-1997

TESTING

Mechanical

Table with 4 columns: Specific Tests and/or Properties Measured, Specification, Standard, Method, or Test Technique, Items, Materials or Product Tested, Key Equipment or Technology. Rows include Friction Effectiveness/Performance/Wear, Noise, Wear, Structural Performance, Friction Effectiveness/Performance/Wear/Structural, Performance, and Impact.



Mechanical

| Specific Tests and/or Properties Measured | Specification, Standard, Method, or Test Technique | Items, Materials or Product Tested | Key Equipment or Technology |
|---|--|--|-----------------------------------|
| Cornering Fatigue | SAE J328, SAE J1095, SAE J2530, ISO 3006, ISO 3894, ABNT NBR 6750, ABNT NBR 6752 | Hub-Bearing Assemblies and Wheels | Cornering Fatigue Test |
| Radial Fatigue | SAE J328, SAE J2530, SAE J3010, ISO3006, ISO 3894, ABNT NBR 6750, ABNT NBR 6752 | Hub-Bearing Assemblies and Wheels | Radial Fatigue Test |
| Biaxial Fatigue | SAE J2562 | Hub-Bearing Assemblies and Wheels | Biaxial Test |
| Performance and Durability | SAE J1153 | Master Cylinder Assemblies | Caliper Bench/ Dynamometer |
| Performance | SAE J101 | Hydraulic Wheel Cylinders for Automotive Drum Brakes | Caliper Bench/ Dynamometer |
| Performance | SAE J2316 | Wheel Nut Seat System | Mechanical Test |
| Friction Coefficient and Wear | SAE J661, VESC-V3, NTC 5388 | Friction and Composite Materials | Chase Test System |
| Compressibility | SAE J2468, ISO 6310, JIS D4413, SAE J3907-2 ABNT NBR 9301, ECE R90-02, GMW 15334, NTC 2406, NTC 5390 | Friction and Composite Materials | Compressibility, Oven Test System |
| Flexural Modulus | ASTM D790 | Plastics, Friction and Composite Materials | Tensile Machine |
| Swell and Growth | SAE J160, ABNT NBR 5505, ISO 6310 | Friction and Composite Materials | Compressibility, Oven Test System |
| Internal Shear, Shear Strength | ISO 6311, ISO 6312, ABNT NBR 5537, NTC 5292, SAE J840, ECE R90-02, NTC 2405 | Friction and Composite Materials | Shear Test Stand |
| Specify Gravity/ Density/ Porosity | SAE J380, ISO 15484 | Friction and Composite Materials | Balance |

Mechanical

| Specific Tests and/or Properties Measured | Specification, Standard, Method, or Test Technique | Items, Materials or Product Tested | Key Equipment or Technology |
|--|--|---|--|
| Hardness | ISO 2039, ASTM E18, ISO 6508-1, SAE J2654 | Rockwell Hardness of Metallic, Friction and Composite Materials | Rockwell Tester, Compressibility Stand |
| Hardness | ASTM E10, ISO 6506-1 | Brinell Hardness of Metallic and Composite Materials | Compressibility Stand, Brinell Microscope |
| Hardness | SAE J379 | Gogan Hardness of Friction Materials | Compressibility Stand |
| Full Brake System | ECE-R13, ECE-R13H, ECE-R78-1, ECE R90-02, FMVSS 105, FMVSS 122, FMVSS 135 | Friction Materials/ Brake Hardware/ Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| Performance | Thermal Capacity, High Speed Fade, AMS Fade Test, Vacuum Boosted, Trailer Tow, Death Valley, Link Brake Balance, N.C.A.P., Customer Specification | Friction Materials/ Brake Hardware/ Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| Durability | Detroit City Traffic, Phoenix City Traffic, Detroit Suburban Traffic, Phoenix Suburban Traffic, Huron Detroit Metropolitan Traffic, Customer Specification | Friction Materials/ Brake Hardware/ Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| Brake Wear | Los Angeles City Traffic, Detroit City Traffic, Phoenix City Traffic, Detroit Suburban Traffic, Phoenix Suburban Traffic, Huron Detroit Metropolitan Traffic, Customer Specification | Friction Materials/ Brake Hardware/ Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| Noise | Los Angeles City Traffic, Marquette City Traffic, Customer Specification | Friction Materials/ Brake Hardware/ Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |



Mechanical

| Specific Tests and/or Properties Measured | Specification, Standard, Method, or Test Technique | Items, Materials or Product Tested | Key Equipment or Technology |
|--|---|--|--|
| Thermal Failure | Fluid Boil, Death Valley | Friction Materials/ Brake Hardware/ Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| Customer Specification | Stopping Distance, Brake Line Pressure, Pedal Force, Pedal Travel, Deceleration, Brake Pad Temperature, Rotor Temperature | Friction Materials/ Brake Hardware/ Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| Fuel Economy, Coast-down, Fuel Consumption | SAE J1321, SAE J2263 | Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| NVH Vehicle Testing, Interior/Exterior Noise Studies, Pass by Noise | SAE J986 | Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| Thermal HVAC, Cooling Systems, Cold Chamber, Performance, Durability | Customer Specification | Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| Wheel and Tire, Tire Blow-out, Structural Integrity | FMVSS 110 | Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |
| Stability Control System | FMVSS 126 | Full Vehicle | Vehicle, In-Vehicle Data Acquisition System, Proving Grounds Field Testing |

Chemical

| Specific Tests and/or Properties Measured | Specification, Standard, Method, or Test Technique | Items, Materials or Product Tested | Key Equipment or Technology |
|--|---|--|---|
| Composition | SAE J2975:2011, 2013, SAE J2975:2015, EPA 3051A, 6010C, 3060A, 7196A, EPA/600/R-93/116 ASTM E3061, ASTM D5702 | Friction and raw materials, metal alloys, composites materials, paints and coatings | ICP-AES, Microwave, PLM Microscope, UV-Vis Spectrometer |
| Corrosion | ASTM B117, ISO 9227, MIL-STD-810G Method 509.5, ASTM G85 Annex 1, 2 and 3, ABNT NBR 8094, ASTM D1735 Customer Specifications | Fog (spray) corrosion of metallic and non-metallic materials and composites | Cyclic Corrosion Chamber, Temperature and Humidity Cycling Chambers |
| Corrosion | GMW14872, SAE J2334, Customer Specifications | Cyclic Corrosion of Metallic and non-metallic materials and composites | Cyclic Corrosion Chamber, Temperature and Humidity Cycling Chambers |
| Corrosion | ASTM B368, ISO 9227, DIN 50021, Customer Specifications | Accelerated Corrosion: CASS and AASS of Metallic and non-metallic materials and composites | Cyclic Corrosion Chamber, Temperature and Humidity Cycling Chambers |
| Corrosion | ISO 6314, ASTM D870, ISO 2812-2, Customer Specifications | Resistance to Reagents and Immersion | n.a. |
| Corrosion | ISO 2409, ASTM D3599, ABNT NBR 11003, ASTM D610, ASTM D1654 | Paint/Coat degree of rusting, migration and adhesion by crosscut, creep-back and tape adhesion | Scribe tool, tape |

CALIBRATION

Mass

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---------------------|---------------------|---|--|
| Pressure Sensors | (345 to 27 407) kPa | (0.15 + 0.000 6P) kPa | Procedure C-5.5-L3-079 Ashcroft Deadweight Test Bench |
| Force Sensors | (89 to 2 224) N | (1.93 + 0.001 3N) N | Procedure C-5.5-L3-080 Interface Gold Standard 1610AJH Calibration Load Cell |
| Decelerometers | (-1 to 1) g | (0.000 8 + 0.003 1A) g | Procedure C-5.5-L3-083 Digital Protractor Angle Gage |

Dimensional

| Parameter/Equipment | Range | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---------------------------------|--------------------|---|--|
| Non-Contact Displacement Probes | (0.125 to 25.4) mm | 0.002 mm | Procedure C-5.5-L3-082 1338 Boeckeler Micrometer |
| Distance Sensors | (0.254 to 508) mm | (0.06 + 0.003 3L) mm | Procedure C-5.5-L3-006 Mitutoyo Digital Height Gage |

Notes:

1. Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.
2. On-site service is available for calibration parameters, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
3. Parameters identified with an asterisk (*) are available for on-site testing or calibration.
4. The term P represents Pressure in units appropriate to the uncertainty statement.
5. The term F represents Force in units appropriate to the uncertainty statement.
6. The term L represents Length in units appropriate to the uncertainty statement.
7. The term A represents Acceleration/Deceleration in units appropriate to the uncertainty statement.
8. This scope is part of and must be included with the Certificate of Accreditation No. ACT-1997.



Vice President