SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELEMENT MATERIALS TECHNOLOGY DETROIT - WARREN 11 MILE
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MECHANICAL

Valid To: December 31, 2020 Certificate Number: 0038.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory at the location above ***as well as the four satellite laboratory locations listed below*** to perform the following tests:

Mechanical Tests: Tensile/Elongation; Hardness (Durometer and Rockwell); Compression; Impact (Izod, Charpy, and GM9300P); Strength at Room and High Temperatures; Shear Strength; Physical Properties Following Fluid Exposure; Hoses and Tubing; Tear Strength Using Tongue, and Trapezoid Methods; Filler, Glass, Carbon Black Content; Volume Change; Specific Gravity and Density; Cleanability; Dimensional Stability; Water Absorption; Melt Flow/Index; Migration and Contact Staining; Flammability; Compression Set; Low-Temperature Brittleness; Deflection Temperature; Permeability, Vapor Transmission; On Plastics, Rubber, Elastomer, Composite, Paper/Paperboard, Construction Elements, and Textile Products.

Environmental Simulation Tests: Weatherometer (Xenon); Sunlamp and QUV Exposure; Fadometer; Ozone Resistance; Fogging; Salt Spray; CASS; Humidity; Condensing; Crocking; Water Immersion; Taber Abrasion; Gravelometer; Specular Gloss; Luminous Transmittance; Chromaticity; Color Reading; Corrodokote; Oil/Gas Immersion Solvent and Detergent Resistance; Thermal Shock; Paint Adhesion; Spot Test Acid/Water and Soap; Cleanability; Coating Thickness; Flexibility; Perspiration; Scrub Resistance; Dime Scrape; Cure Test; Thumbnail Hardness; Oven Aging; Scab Corrosion; Environmental Cycling; Accelerated Corrosion; Filiform Corrosion.

Environmental Chambers Testing: Temperature, Dust and Humidity Exposures are Performed during Durability Cycling Simulating Actual Environment; Microprocessors Control Chambers allowing Automatic Cycling and Tracking of Desired Time, Temperature and Humidity; Sizes up to 4m x 10m x 5m; Flow Measurement (Liquid and/or Gas): Hydraulic Pump Performance; Fan and Blower Delivery Capabilities, Radiator Heat Exchange Capacity, Heater Output; Dynamometer Measurements: 3/4 to 50 Horsepower; Stress Measurements; Pressure Testing; Durability Testing Mechanical/Electrical Cycling; Marine Products (Pumps/Motors/Electronics); Hydrostatic Leak Testing (up to 40,000 psi); Electrodynamic Vibration Systems: Generate Controlled Sine or Random Vibration, Sine-on Random Vibration Control, Transient Vibration Control, Mechanical Shock in Sawtooth, Half-sine and Squared Wave Forms, Field Data Replication, Operating or Non-Operating Mode Environments, High or Low Temperature and Humidity Conditions Can be Applied; Servohydraulic Test Systems: Control of Displacement, Force or Acceleration; Thermal Shock, Liquid and Air; Light Intensity; Sound; MAST, HALT/HASS.

Component Durability; Pressure Cycling; Pressure-Vacuum Cycling; Fuel Recirculation; Temperature Cycling; Component Performance Testing; Fuel Exposure and Fuel Compatibility; Fuel Dispensing and Capacity Testing; Performance Testing including Fuel Flow and Electrical Evaluation; Hydrostatic Burst Testing; ECE Burn Testing on Plastic Fuel Tanks, CARB Diurnal Testing, Permeation Testing (including: Guideline 24), Injector and Manifold Testing on Fuel Lines and Connectors; Fuel Tanks; Fuel Pumps and Modules; Fuel Injectors; Fuel Filters; Fuel Pressure Regulators; Fuel Level Senders; Fuel Rails; Fuel Filler Necks, Plastic and Metal Fuel Tanks; Intake Manifolds; Spark Arrestors; Carbon Canisters; Gas Caps.

Using the following capabilities:

Test Technology	**Range**	**Reference Standard**
Air Velocity	(25 to 3,000) ft/min	ASTM D3574 (Test G)
Combined Environments:	(-77 to 177) °C; (20 to 95) % RH	MIL-STD-810 (Method 514 Procedure I)
Dimensional	(0.00015 to 36.000) in	WSS-M15P4
Force	(0.01 to 22,000) lbf	GMW3172
Humidity	(5 to 98) % RH	MIL-STD-810
Light Intensity	(0.01 to 3,300) lux	SDS-17
Liquid Flow	0.01 cc/min to 35 gpm	GM10004C
MAST: Multi Axial Simulation Table[2]	(1 to 50) Hz 6 Degrees of Freedom +/- Three Axis in all Axis Linear Displacement 2.95 (+/-) Angular Displacement roll 6.8° Pitch and Yaw 8.5° Linear Acceleration at max payload Vertical: 5 g's, Lateral 3 g's, Longitudinal: 2.4 g's Max Payload 1000 lbs 4'x 6' to 6'x 8' Table Size	MAST USC.13324.200X 433132 (Per Customer Specification)
Pressure	(0.008 to 45,000) psi	ESDS7H-19B591-AA
Pulse Pressure	Up to 1000 PSIG, Up to 20 Hz	GMW14139
Servohydraulic Frequencies	Up to 50 Hz	MIL-STD-810 (Method 514 Procedure I)
Servohydraulic Load Capacity	Up to 150,000 lbf	MIL-STD-810 (Method 514 Procedure I)
Servohydraulic Stroke	Up to 50 inches	MIL-STD-810 (Method 514 Procedure I)
Sound	20 Hz to 20 kHz, (30 to 100) dB	USCAR-15
Temperature	(-100 to 650) °C	WSS-M2D496-A1
Torque	1 in·oz to 80,000 in·lbf	GMW15607
Vacuum	(0.008 to 29.98) in Hg	DVM-0001-AS
Vibration:		
Displacement	3 in Peak to Peak	MIL-STD-810 (Method 514 Procedure I)

Test Technology	Range	Reference Standard
Load/Impact Velocity	1/2 SINE up to 1 ms to 35 m/s at Terminal Peak	MIL-STD-810 (Method 514 Procedure I)
Mechanical Shock Capacity	Up to 3,500 g	MIL-STD-810 (Method 514 Procedure I)
Vibration Acceleration	Up to 100 g	MIL-STD-810 (Method 514 Procedure I)
Vibration Frequencies	(3 to 2,700) Hz	MIL-STD-810 (Method 514 Procedure I)
Vibration Load Capacity	Up to 22,000 lbf	MIL-STD-810 (Method 514 Procedure I)

Also using customer specific test methods utilizing any combination of test equipment parameters listed above and the following tests and standards:

Test Method	Test Technology
ABNT NBR 15940	Lead-acid Batteries for use in Motor Vehicles of Four or More Wheels
ABNT NBR 15941	Lead-acid Batteries for Motorcycles, Tricycles and Quadcycles
ASTM D1117	Evaluating Non-woven Fabrics
ASTM D1667	Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers
ASTM D3574	Test Methods for Flexible Cellular Materials (*except Test G, I4, Airflow, Test I2 Dynamic Fatigue Test by the Roller Shear at Constant Force, Test I4 Dynamic Fatigue Test for Carpet Cushion*)
ASTM D3575	Test Methods for Flexible Cellular Materials Made From Olefin (*except Sections 34-35, 45-46, 49-50, 66-67*)
ASTM D380	Method for Rubber Hose (*except Sections 12-13*)
ASTM D3882	Bow and Skew
ASTM D644	Moisture Content of Paper and Paperboard
ASTM D751	Coated Fabrics (*except Bursting Strength, Hydrostatic Pressure, Adhesion Coating, Strength of Coating, Crack Resistance, and Crush Resistance*)
ASTM D870	Testing Water Resistance of Coatings Using Water Immersion
ASTM F147	Flexibility of Non-metallic Gasket Materials
FLTM BN 024-02	Automotive Materials, Flammability
FLTM BN 106-02	Seam Fatigue Testing
FLTM BN 113-01	Bond Strength of Trim Assemblies
Ford MA-0130	Humidity Aging
GM9635P	Dust-out from Fiber Sound Absorber Pad
GMN8020TP, *except photometrics*, Section 4.3.1.2.2.4	Lamps – Development and Validation Test Procedures
GMW14130	Scuff and Mar Resistance
GMW14319 Section 4.3.2.0 (pressure cycling) only	Air Conditioning Hose and Coupling Assemblies R134a and R1234yf
GMW14329 (Sections 4.3, 4.5, and 4.6)	Performance Testing of Heater and Coolant Hoses
GMW14906	Lamp Development and Validation Test Procedures

Test Method	**Test Technology**
GMW15201	Double-Coated Foam Tape for Exterior Attachments
GMW15724 (Section 4.3.8 (PDT) only)	Transmission and Engine Oil Cooler Plumbing System
GMW16190	Determination of Cantilever Sag Resistance
GMW3172 (Sections 8 and 9 only)	Specification for Electrical/Electronic Component Analytical /Development/Validation (A/D/V) Procedures for Conformance to Vehicle Environmental, Reliability, and Performance Requirements
GMW3182	Determination of Mass per Area
GMW3191	Connector Test and Validation Specification
GMW3211	Resistance to Stretch and Set
GMW3431 (*except section 4.4.7*)	General Procedures for Testing Switches
GMW4090	Weave and Yarn Count
IEC 60068-2-68 (*Except LA1 and LC1*)	Dust and Sand
IEC 60068-2-78	Test Cab: Damp Heat, Steady State
ISO 13937-2	Tear Properties of Fabrics
ISO 16750	Road Vehicles – Environmental Conditions and Testing for Electrical and Electronic Equipment
ISO 17235	Leather Softness
ISO 22088-3	Determination of Resistance to Environmental Stress Cracking (ESC)
ISO 291	Standard Atmosphere, Conditioning
ISO 6722	Road Vehicle 60 V to 600 V Single Core Cable Methods
JIS D 0203 (R2, S1, S2)	Moisture, Rain and Spray Test for Automobile Parts
JIS D 0207	Dust Test for Automobile Parts (F-Type Only)
JIS D 1601	Vibration Testing Methods for Automobile Parts
MIL-STD-810C/D/E/F/G (Sections 500-503, 507, 512-514, 516, 520, 524, 528 only)	Environmental Test Methods and Engineering Guidelines
NES M0153	Moisture Resistance Test Method
Nissan 26010NDS00 (*Except Photometrics*)	Front Lamp Testing
PF 4088	Exterior Automotive Lighting Devices
PF 90080 (Sections 9.3.1 and 9.3.2 only)	Coolant Hoses and Plumbing Assemblies
RTCA DO-160	Environmental Conditions/Test Procedures for Airborne Equipment:
Section 7.0	Operation Shocks & Crash Safety
Section 8.0	Vibration
Section 10.0	Waterproofness
Section 12.0	Sand & Dust
Section 14.0	Salt Spray
SAE J323	Cold Cracking of Flexible Plastic Materials
SAE J575	Lighting Devices and Components for Use on Vehicles Less Than 2032 mm

Test Method	Test Technology
SAE J855	Stretch and Set
SAE J912	Blocking Resistance
SAE J913	Wicking
SH-0117	Floor Mat Retention Clip Button Style Performance Specification
UL 2580 (Sections 30 to 32, 35 to 36, 39 to 41)	Outline of Investigation for Batteries for use in Electric Vehicles
UN ST/SG/AC.10 (T1 to T4 only)	Transport of Dangerous Goods Lithium Batteries
USCAR 15	Specification for Testing Automotive Miniature Bulb Socket/Circuit Plate Assemblies
USCAR 2	Performance Specification for Automotive Electrical Connector Systems
USCAR 20	Field Correlated Life Test Supplement to SAE/USCAR-2
USCAR 21	Performance Specification for Cable-to-Terminal Electrical Crimps
USCAR 3	Standard for Testing Automotive Miniature Bulbs
WSS-M15P27-F	Performance, Headlining, Formed
WSS-M15P27-G	Performance, Headlining, Formed
Abrasion	
ASTM D4157	Abrasion Resistance of Textiles, Wyzenbeek
FLTM BN 157-01	Determination of Leather Softness
GMW15487	Resistance to Abrasion of Organic Coating
NES M0136 Method 1	Abrasion Resistance
SAE J948	Resistance to Abrasion
Martindale Abrasion	
ASTM D4966	Abrasion Resistance of Textile Fabrics
ASTM D4970	Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Martindale Tester
GMW15651	Hook Fastener Resistance
GMW3405	Seam Fatigue for Automobile Textiles
ISO 12945-2	Determination of Fabric Propensity to Surface Fuzzing and to Pilling, Modified Martindale Method
ISO 12947-1	Abrasion Resistance of Fabrics by the Martindale Method
ISO 12947-2	Abrasion Resistance of Fabrics by the Martindale Method – Specimen Breakdown
ISO 12947-3	Abrasion Resistance of Fabrics by the Martindale Method – Mass Loss
ISO 12947-4	Abrasion Resistance of Fabrics by the Martindale Method – Assessment of Appearance Change
Taber Abrasion	
ASTM C501	Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser
ASTM D1044	Abrasion-Taber
ASTM D3389	Coated Fabrics Abrasion Resistance (Rotary Platform, Double-Head Abrader)
ASTM D3884	Abrasion Resistance of Textiles, Taber
ASTM D4060	Taber Abrasion, Organic Coatings

Test Method	Test Technology
FLTM BN 108-02	Abrasion-Taber
FLTM BN 108-04	Scuffing
SAE J1530	Resistance to Abrasion, Bearding, and Fiber Loss of Carpet, Taber
SAE J1847	Taber Abrasion
SAE J365	Scuffing Resistance, Taber
Adhesion	
ASTM B571 (Sections 3.8 and 13)	Qualitative Adhesion Testing of Metallic Coatings
ASTM D3359	Adhesion Tape Test
ASTM D952	Bond of Cohesive Strength of Sheet Plastics and Electrical Insulation
GMW14829	Tape Adhesion Test for Paint Finishes
GMW14892 (Section 3.1.5)	Adhesion
Chemical Resistance	
AATCC TM 104	Spot Test Water
AATCC TM 15	Perspiration
AATCC TM 6	Spot Test Acid
ASTM D1693	Environmental Stress Cracking
ASTM D1793	Spot Test Water and Soap
ASTM D471	Rubber Property-Effect of Liquids
ASTM D543	Resistance of Plastics to Chemical Reagents
ASTM D925 Method A	Staining of Surfaces (Contact/Migration/Diffusion)
ASTM F146	Fluid Resistance of Gasket Materials
FLTM BI 113-01	Spot Test Water and Soap
FLTM BI 113-02	Spot Test Acid
GMW14102	Determination of Water Spotting Test
GMW14141	Dye Migration
GMW14334	Chemical Resistance to Fluids
GMW14444	Material Related Interior Part Performance
GMW14445	Sunscreen and Insect Repellent Resistance
GMW3402	Soil and Cleaner Resistance of Automotive Materials
NES M0133 Method 2 & 3	Chemical Resistance Test Methods
Nissan 28401NDS01 [10] Section CH/11	Resistance to Calcium Chloride
NES M0133	Chemical Resistance Test Methods
Color	
ASTM D1003	Haze and Luminous Transmittance
Color (cont'd)	
ASTM D2244	Calculation of Color Differences from Instrumentally Measured Color Coordinates
SAE J1545	Delta-E Value (Color Measurement)
Compression	
ASTM D1056	Compression Force

Test Method	Test Technology
ASTM D1229	Compression Set at Low Temperatures
ASTM D1621	Compressive Properties of Rigid Cellular Plastics
ASTM D395	Rubber Property-Compression Set (Method B)
ASTM D575	Rubber Properties in Compression
ASTM D695	Compressive Properties of Rigid Plastics
ASTM F36	Compressibility and Recovery of Gasket Materials
ISO 3386-2	Flexible Cellular Polymeric Materials – Determination of Stress-Strain Characteristics in Compression
ISO 815	Determination of Compression Set of Thermoplastic/Vulcanized Rubber at Ambient, Elevated, or Low Level Temperatures
Corrosion	
GMW15282	Corrosion/Undercutting Scribe Creepback
GMW15288	Scab Corrosion Creepback of Paint Systems for Metal Substrates
Salt Spray	
ASTM B117	Operating Salt Spray (Fog) Apparatus
ASTM B368	Copper-Accelerated Acetic Acid-Salt Spray (Fog) Testing (CASS Test)
ASTM G85	Corrosion Testing
DIN 50021 (Withdrawn 06/88)[1]	Salt Spray
FLTM BQ 105-01	Corrosion Testing, CASS
GM4298P (Inactive 12/10)[1]	Salt Spray Test
GM4476P (Inactive 12/10)[1]	CASS Test Copper-Accelerated Acetic Acid Salt Spray Test (Fog)
GMW3286	Neutral Salt Spray
GMW14458	CASS Test Copper Accelerated Acetic Acid Salt Spray Test
ISO 9227	Corrosion Testing, Salt Spray
Crocking	
AATCC TM 8	Crocking, Dry and Wet
FLTM BN 107-01	Crocking, Dry and Wet
SAE J861	Crocking
GMW14872	Cyclic Corrosion Chamber Humidity (20 to 100) %RH Chamber Temperature Ambient to 70°C Cycle Step Increments > 1 minute Atomized Solution Collection: Adjustable
ASTM B380	Corrosion Testing of Decorative Electrodeposited Coatings by the Corrodkote Procedure
FLTM BI 123-01	Painted Sheet Metal Corrosion, Apg
SAE J2334	Cosmetic Corrosion
Density	
ASTM D1622	Apparent Density of Rigid Cellular Plastics
ASTM D3776	Mass Per Unit Area (Weight) of Fabric
ASTM D792	Density Method A
ISO 1183-1	Determining the Density of Non-Cellular Plastics Using Immersion Method
ISO 845	Cellular Plastics and Rubbers – Determination in Apparent Density (Bulk)

Test Method	Test Technology
Dimensional	
ASTM D1777	Thickness of Textile Materials
ASTM D5729	Standard Test Method for Thickness of Nonwoven Fabrics
ASTM D7091	Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals
FLTM BI 117-01	Coating Thickness
ISO 2808, Mtd 7C	Paints and Varnishes – Determination of Film Thickness
ISO 5084	Determination of Thickness of Textiles and Textile Products
SAE J882	Thickness of Textile Materials
SAE J883	Dimensional Stability of Automotive Textiles
Dynamic Mechanical Properties	
ASTM D4065	Dynamic Mechanical Properties of Plastics
ASTM D4440	Rheological Measurements of Polymer Melts Using Dynamic Mechanical Procedures
ASTM D5279	Dynamic Mechanical Properties of Plastics Using Torsion
ISO 6721-1	Dynamic Mechanical Properties General Principles
ISO 6721-10	Dynamic Mechanical Properties Viscosity, Non-Resonance
ISO 6721-7	Dynamic Mechanical Properties Torsional, Non-Resonance
Fatigue	
ASTM D2097	Newark Flex Test
ASTM D6182	Flexibility and Adhesion of Finish on Leather
Chrysler LP-463KB-38-01	Fabric Lint Pickup and Lint Loss
FLTM BN 102-02	W Flex
Flexural	
ASTM D747	Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
ASTM D790	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ISO 178	Determination of Flexural Properties
SAE J949	Stiffness (Modulus of Bending)
Fogging	
DIN 75201	Determination of Windscreen Fogging Characteristics of Trim Materials in Motor Vehicles
Fogging (cont'd)	
GMW3235	Fogging
HES D6508	Fogging of Interior Materials for Automobiles
SAE J1756	Determination of Fogging Characteristics of Interior Automotive Materials
Toyota TSM0503G	Fogging Test Method for Non-Metallic Materials
Gloss	
ASTM D523	Specular Gloss
FLTM BI 110-01	Specular Gloss
JIS Z 8741	Specular Glossiness Methods of Measurement

Test Method	Test Technology
Hardness	
ASTM D2240, Shore A and D	Durometer Hardness
ASTM D3363	Film Hardness by Pencil Test
ASTM D785 R Scale	Rockwell Hardness of Plastics and Electrical Insulating Materials
ISO 868	Plastic and Ebonite – Determination of Indentation Hardness by Means of a Durometer (Shore Hardness)
Heat	
ASTM D2584	Ignition Loss of Cured Reinforced Resins
ASTM D3012	Thermal-Oxidative Stability of Propylene Plastics Using a Specimen Rotator Within an Oven
ASTM D3769	Heat Sag
ASTM D518	Rubber Deterioration-Surface Cracking
ASTM D573	Rubber-Deterioration in an Air Oven
ISO 188	Rubber, Vulcanized Thermoplastic-Accelerated Aging and Heat Resistance Test
ISO 3451-1	Determination of Ash
Humidity	
ASTM D1735	Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus
SAE J1389	Corrosion Test for Insulation Materials
Impact	
ASTM D2137	Brittleness Point of Flexible Polymers and Coated Fabrics
ASTM D5420	Gardner Impact
ASTM D746	Brittleness Temperature of Plastics Elastomers by Impact
GMW16746	Evaluating Brittleness of Painted Plastics
SAE J400	Chip Resistance of Surface Coatings
Charpy	
ISO 179-1	Determination of Charpy Impact Properties, Non-Instrumented Impact Test
Instrumented Impact	
ASTM D3763	Standard Test Method for High Speed Puncture Properties of Plastics Using Load and Displacement Sensors
ASTM D5628	Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimens by Means of a Falling Dart (Tup or Falling Mass)
Izod	
ASTM D1822	Tensile Impact
ASTM D256	Izod Pendulum Impact Resistance of Plastics
ASTM D4812	Unnotched Cantilever Beam Impact Strength of Plastics
ISO 180	Plastics – Determination of Izod Impact Strength
Melt Flow	
ASTM D1238	Melt Index (Flow Rate)
ISO 1133-1	Plastics – Determination of the Melt Mass-Flow Rate (MFR) and the Melt Volume-Flow Rate (MVR)

Test Method	Test Technology
Tear cont.	
Odor	
FLTM BO 131-03	Interior Odor Test
GMW3205	Test Method for Determining the Resistance to Odor Propagation of Interior Materials
GMW3259	Determination of Resistance to Mildew Growth
SAE J1351	Hot Odor Test for Insulation Materials
Toyota TSM0505G	Smell Quality of Non-Metallic Materials
VW PV3900	Odor Test
Ozone	
ASTM D1149	Rubber Deterioration Surface Ozone Cracking in a Chamber
ASTM D1171	Rubber Deterioration Surface Ozone Cracking Outdoors or Chamber (Triangular)
VW PV3305	Test of Ozone Resistance and Permanent Deformation
28400NDS26	Exposure Only
Peel	
ASTM D1000	Unwind Pull (Method B only)
ASTM D3330	Peel Adhesion of Pressure Sensitive Tape
ASTM D413	Rubber Property-Adhesion to Flexible Substrate
ASTM D903	Peel or Stripping Strength of Adhesive Bonds
PSTC 101	Non-ASTM Peel
Permeability	
ASTM D737	Air Permeability of Fabrics, Fraiser Method
ASTM E96	Water Vapor Transmissions
Pilling	
Chrysler LP-463KB-37-01	Resistance to Pilling of Textile Fabrics
FLTM BN 108-03	Resistance to Pilling
FLTM BN 108-14	Resistance to Pilling Wear of Leather
Protection Against Foreign Objects and Water	
DIN 40050-9 (Withdrawn 1993)[1]	Protection Against Foreign Objects; Water and Contact; Electrical Equipment (IP5KX, IP6KX, IPX1 through IPX4, IPX4K, IPX5, IPX6, IPX6K, IPX7, IPX8, IPX9K only)
IEC 60529	Degrees of protection provided by enclosures (IP code) (IP5X, IP6X, IPX1 through IPX9 only)
ISO 20653	Road Vehicles – Degrees of Protection (IP-Code) – Protection Against Foreign Objects, Water and Access – Electrical Equipment (IP5KX, IP6KX, IPX1 through IPX4, IPX4K, IPX5, IPX6, IPX6K, IPX7, IPX8, IPX9K only)
Scratch	
FLTM BN 108-13	Scratch Test
GMW14688	Resistance to Scratching
GMW14698 Method B	Scratch Resistance of Organic Coatings and Self-Adhesive Foils

Test Method	Test Technology
Tear	
ASTM D1004	Initial Tear Resistance of Plastic Film and Sheeting
ASTM D2261	Tongue Tear
ASTM D5587	Tearing Strength of Fabrics by the Trapezoid Procedure
ASTM D5733	Tearing Strength of Nonwoven Fabrics by the Trapezoid Procedure
ASTM D624	Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer
GMW3326	Tearing Strength of Textile Materials by Trapezoid Method
GMW3387	Fiber Degradation of Automotive Textiles
ISO 34-1	Determination of Tear Strength of Thermoplastic/Vulcanized Rubber Using Trouser, Angle and Crescent Pieces
Tensile	
ASTM D1708	Tensile Properties of Plastics
ASTM D1894	Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting
ASTM D3163	Strength of Adhesive Bonded Rigid Lap Shear Joints
ASTM D412	Tensile Properties, Vulcanized Rubber and Thermoplastics Elastomers
ASTM D5034	Tensile Strength
ASTM D5035	Breaking Strength, Textile Fabrics, Strip Method
ASTM D638	Tensile Properties of Plastics (Including Poisson's Ratio)
ASTM D882	Tensile Properties Thin Plastic Sheeting
ASTM E132	Poisson's Ratio
ASTM F152	Tension Testing of Nonmetallic Gasket Materials
ISO 1798	Flexible Cellular Polymeric Materials- Determination of Tensile Strength and Elongation at Break
ISO 37	Determination of Tensile Stress/Strain Properties of Thermoplastic/Vulcanized Rubber
ISO 527-1	Tensile Properties Part 1 General Principles
ISO 527-2	Tensile Properties Part 2 Test Conditions for Molding and Extrusion Plastic
ISO 527-3	Tensile Properties Part 3 Film, Sheets
ISO 527-4	Tensile Properties Part 4 Isoropic and Orthotropic Fiber-Reinforced Plastics
ISO 527-5	Tensile Properties Part 5 Test Conditions for Unidirectional Fiber-Reinforced Plastics
ISO 8295	Coefficient of Friction
SAE J2044	Quick Connector Specification for Liquid Fuel and Vapor/Emissions Systems
Thermal Cycle	
GM9200P	Accelerated Aging and Steaming
GMW14124	Automotive Environmental Cycles
VW PV1200	Resistance to Environmental Cycle Test (80 to -40) °C
VW PV2005	Resistance to Environmental Cycle Test
Vicat	
ASTM D1525	Vicat Softening Temperature of Plastic

Test Method	Test Technology
ASTM D648	Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
ISO 306	Determination of Vicat Softening Temperature (VST) of Thermoplastic Materials
ISO 75-1	Plastics-Determination Temperature of Deflection Under Load Part 1 General Test Method
ISO 75-2	Plastics – Determination of Temperature of Deflection Under Load Part 2 Plastics and Ebonite
ISO 75-3	Plastics – Determination of Temperature of Deflection Under Load Part 3 High Strength Thermosetting
Weatherometer	
ASTM D2565	Xenon-Arc Exposure of Plastics Intended for Outdoor Applications
ASTM D7869	Xenon Arc Exposure Test with Enhanced Light and Water Exposure for Transportation Coatings
ASTM G155	Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
GMW14162	Colorfastness to Artificial Weathering
GMW3414	Colorfastness to Artificial Light
ISO 4892-2	Xenon Exposure Testing
SAE J1885 (Inactive 2008)[1]	Accelerated Exposure of Automotive Interior Trim Components Using a Controlled Irradiance Water Cool
Weatherometer (cont'd)	
SAE J1960 (Inactive 2008)[1]	Xenon Arc Accelerated Exposure (External)
SAE J2412	Accelerated Exposure of Automotive Interior Trim Components using a Controlled Irradiance Xenon-Arc
SAE J2527	Accelerated Exposure of Automotive Exterior Materials using a Controlled Irradiance Xenon-Arc

Xenon Weathering utilizing any combination of the following parameters[2]:

(0.2 to 1.38) W/m^2 at 340nm	Chamber Air Temperature (15 to 90) °C
(0.45 to 3.11) W/m^2 at 420 nm	Black Panel Temperature (25 to 125) °C
(26 to 166) W/m^2 at (300 to 400) nm	Chamber Humidity (10 to 95) %RH

[3]This accreditation covers testing/calibration performed at the main laboratory listed above, and the following satellite laboratories listed below:

25440 Sherwood
Center Line, MI 48015

Test Method	Test Technology
Fuel Testing	
ES-CU5A-9H307-AA	Sender and Pump Assembly – Fuel Tank (with and without Integral Reservoir)
GMW14081	Fuel Pump Module Specification

Test Method	Test Technology
GMW14638 (Section 3.23)	Auto-oxidized Fuel resistance
GMW14658 (Section 3.4.4.2.1)	Coating Separation/Adhesion Procedure
SAE J2045 (Section 4.5)	Internal Fuel Resistance
SAE J2260 (Section 7.6)	Fuel Exposure pre-conditioning
SAE J2260 (Section 7.7)	Methanol Resistance
SAE J2060 (Section 7.8)	Resistance to Auto-oxidized fuel

14610 Jib Street
Plymouth, MI 48170

Test Method	Test Technology
Ford IP-0105	Instrument Panel Sunload Resistance
Ford MA-0128	Simulated Sunload Resistance – Exterior
Ford MA-0130	Humidity Aging
Ford MA-0131	Heat Age
Ford OR-0329	Sunload Resistance – Exterior Ornamentation
GMW14124	Automotive Environmental Cycles
GMW3191	Connector Test and Validation Specification
GMW3431(Sections 4.1.7, 4.3, 4.4, 4.6, 4.7, 4.8, 4.9) (*except 4.3.13, 4.4.3.2, 4.4.4, 4.4.7, 4.4.9*)	General Procedures for Testing Switches
GMW8287	Highly Accelerated Life Testing
NES M0132	Thermal Cycle Test Methods for Plastic Parts
Nissan 96030 NDS00	Air Spoiler Testing
PF-11084	Door Trim Panel Assembly and Components
WSS-M15P32-C	Trim Assembly, Enclosed Luggage Compartment Covering
WSS-M15P45-A (*except 3.12*)	Performance, Instrument Panel Assembly, Flexible Cover Skin Material
WSS-M15P4-E	Interior Trim, Assembly Performance
WSS-M15P4-F	Assembly Performance, Hard Mold-In-Color Interior Components
WSS-M15P4-G (Sections 3.4.1, 3.4.2, 3.5.1.1)	Assembly Performance, Hard Mold-In-Color Interior Components

Test(s):	**Test Method(s):**
Abrasion Resistance	
Taber	GMW 15692; ASTM D3884, D3389, D4060; Chrysler LP-463KB-21-01; Ford FLTM BN 108-02; SAE J948, J1530, J1847; NES M0141 (Section 6.2.8, Method 4); NES M0154 (Section 18.1)
Traverse	NES M0136 (Method 1); NES M0141 (Section 6.2.8, Method 1)
Abrex	Ford FLTM BN 155-01; GS 97024-1, -4, -5
Adhesion Testing	ASTM B571 (*except sections 6 and 11*), D3359; Ford BI 106-01, BI 106-02; GM 9502P (Inactive) [1]; GMW 3368, 14829
Breaking Strength	ASTM D5034
Chemical Resistance	
Solvent, Acids and Acid Rain, Soap and Water, Synthetic Perspiration Hydrogen Sulfide, Various Fluids	ASTM D1308, D4752; Chrysler LP-463PB-31-01, LP-463PB-57-03; Ford FLTM AN 101-01, BI 113-01, BI 113-02, BI 113-07, BI 113-05, BI 152-01, BN 103-01, BN 112-08; GMW 14333, 14334, 14864, 14869, 14701, 14864, 16625; SAE J322;
Chip or Gravel Resistance	ASTM D3170; Ford BI157-04, BI 157-06; GMW 14700; Chrysler LP 463PB-52-01; SAE J400
Cleanability of Textiles and Plastics	GM 9531P (Inactive)[1]; GMW 3402, 14334, 14865, 16745; Chrysler LP-463KC-04-01
Color Measurements	
Instrumental, sphere	ASTM D2244, E1331; SAE J1545, J1717 (Appendix E)
Visual (Light Booth)	SAE J1545; ASTM D1729; Ford BI 109-01; AATCC (EP1);

Test(s):	Test Method(s):
	ISO 105-A03
Compression Testing	
Compressibility (Gasket Materials)	ASTM F36
Compression Set (Rubber)	ASTM D395 (Method B)
Compressive Properties (Ridged Plastics)	ASTM D695; ISO 604
Corrosion Testing	
Spray (CASS) Testing	ASTM B368
Cyclic Corrosion Testing	Ford BQ105-01, BI123-01, BI123-03; GM 4476P (Inactive) [1], 9511P, 9540P; GMW 14458, 14872, 15288; NES M0158-96 CCTI & CCTIV; SAE J2334
Crock, Rubbing, and Mar Resistance	Chrysler LP-463PB-54-01; Ford BI 161-01, BN 107-01; SAE J861; AATCC (TM8)
Density of Non-Cellular Plastics	ISO 1183-1 (Method A)
Density and Specific Gravity	ASTM D792, D3574 (Section A), D1217, D1475
Dust or Water Ingress	ISO 20653; IEC 60529; DIN 40 050-9; JIS D 0207; GMW 3431; MIL-STD 810G (Method 510.5)
Environmental Conditioning & Cycling	
Brittleness Temperature/ Cold Cracking	Chrysler LP-463LB-11-01-B, LP-463DD-07-01
Cold Cycling	Chrysler LP-463DD-08-02
Humidity	ASTM D1735, D2247; GMW 14729
Hot/ Cold/ Humidity Cycling	GM 9200P, 9310P; Chrysler LP-463DD-08-02
Hot/ Cold/ Humidity / IR	GMW 15432
Accelerated Ageing/Automotive Cycles	ASTM D5427; GMW 14124

Test(s):	**Test Method(s):**
Environmental Cycles / Exposure / Thermal Shock	Chrysler LP-463CB-10-01, LP-463LB-12-01, LP-463PB-22-01, LP-463PB-52-01, LP-463LB-13-01, LP-463PB-36-01; BI 107-05, BQ 104-07; DVO-0001-IP; GM 9310, 9540P; GMW 14124, 14872, 15432; MIL-STD 810G (Methods 501, 502, 503, 507, 521)
Evaluations	ASTM D610, D660, D661, D714, D1654; Ford BI 160-01 (*except procedure A*); GM 9102P; GMW 15282
Falling Sand Abrasion	ASTM D968
Filiform Corrosion	ASTM D2803; Ford BI 124-01
Film Thickness	ASTM B487, B659, D7091; Ford BI 117-01; GM4260P
Flexibility	ASTM D522, D4145; GM9503P; GMW16746
Flex/Fold Testing of Uncoated & Coated Textiles	Chrysler LP-463KB-13-01, LP-463LB-09-01; Ford FLTM BN 102-04A, BN 119-01
Flexural Properties of Plastic	ASTM D790; ISO 178; SAE J949
Flow Rates of Thermoplastics by Extrusion Plastomer	ASTM D1238; ISO 1133
Fluorescent UV Condensation Exposure	ASTM D4329, D4587, G151, G154; TSH3130G; SAE J2020
Foams	ASTM D3574 (*except G,H, I_2, I_4*)
Fogging	GMW 3235; SAE J1756; Chrysler LP-463DB-12-1; NES MO153
Gloss/Haze Measurements	ASTM D523, D4039; Ford BI 110-01; SAE J1717 (Appendix E)

Test(s):	**Test Method(s):**
Hardness	
Durometer Hardness (Rubber)	ASTM D2240 (Shore A&D); ISO 868
International Hardness	ASTM D1415 (Type M);
Microindentation Hardness (Knoop & Vickers) (500 Kg)	Ford BI 112-02; ASTM E384
Pencil	ASTM D3363;
Rockwell Hardness (A,B,C, L, N, T, HRM, HRR)	ASTM D785, E18; ISO 2039-01
Humidity Resistance	
Water Fog	ASTM D1735, D2247, D4585;
Condensing	Ford BI 104-02, BI 106-03, BQ 104-02;
Cleveland Condensing	GMW 14729
Impact	
Gardner	ASTM D2794, D5420 (Geometry GC and GE); Ford BI 108-01, BO 151-01 (Method B [Impact Ball Shore A 72.5])
High Speed Puncture Properties of Plastics Using Load and Displacement Sensors	ASTM D3763
Mass and Thickness Determination	Chrysler LP-463LB-07-01
Metallurgical Preparation & Evaluation	
Coating Adhesion Testing	ASTM B571
Coating Thickness by Microscopic Examination	ASTMB 487; GM 4260P
Plating Thickness – Method 1 (Microscopic)	ASTM B659 (Method 7.1)
Mildew Growth / Mildew Resistance	GMW3259
Moisture & Temperature on Adhesive Bonds	ASTM D1151
Odor	Chrysler LP-463KC-09-01; SAE J1351; GMW 3205; NES MO160; TSM 0505G; Ford BO 131-03
PACCAR Paint Performance	PACCAR CMT-0033 (*except section 8.1*)
Salt Spray (Fog) Testing	ASTM B117, G85; ISO 9227; Ford BI 103-01; GM 4298P; GMW 3286; NES M0140-01;

Test(s):	Test Method(s):
	JIS 22371
Scratch/ Scrape/ Scuff/ Snag/ Mar Resistance	
Scratch Resistance (Five Finger)	Ford BN108-13; GMW 14688 (Method A); Chrysler LP-463DD-18-01
Resistance to Fiber Loss	SAE J1530-A (*Taber Abrasion Only*)
Erichsen Scratch	Chrysler LP-463DD-18-02
Scuff and Mar	Ford BN 108-04; GM 9150P; GMW 14130; SAE J365
Sealer Adhesion	SAE J1523
Set & Stretch	SAE J855
Shrinkage	SAE J883
Solvent Wipe	ASTM D5402; GM 9509P; GMW 15891
Stain Resistance	
Sunscreen Lotion Resistance	GMN 10033; Ford BI 113-08
Standard Atmosphere for Conditioning & Testing	ASTM D618; ISO 291
Surface Roughness	Ford BA 003-01
Tear Strength	
Tearing Strength (Tongue)	ASTM D2261
Tearing Strength (Trapezoidal)	ASTM D5587
Tear Strength of Conventional Vulcanized Rubber and Thermoplastics	ASTM D624 (Types B, C & T)
Tensile/Compression/Elongation	
Tear Strength	ASTM D412 (Method A -Types A and C)
Shear Strength	ASTM D624 (Types B, C and T)
Bond Strength	ASTM D638 (Type I, *except Sections 5.2.4, 6.2, and 6.3*), ASTM D903, D1000 (Sections 11-27, 37-53, 110-122, and 129-139), D1876, D3574 (Sections B-F, K, L);

Test(s):	Test Method(s):
Peels	Chrysler PS-9040; Ford BN 113-01; GMW 3371; SAE J1523
Tension (Plastics)	ASTM D638; ISO 527-1 & 2
Tension (Rubber)	ASTM D412
Tensile Textiles	ASTM D5035
Thickness Textiles	ASTM D1777
Three-Dimensional (3D) Image Blue-Light Scanning	
Scan Volume 200 mm x 150 mm x 150 mm Scan Volume 500 mm x 380 mm x 380 mm	ATOS V8 SR1 Manual Basic; Customer-Specified
Water Resistance	
Water Immersion	ASTM D870
Water Chemistry	Ford BI 104-01, BI 104-04
Car Wash	GMW 16745, 14865, 17103
Weathering (Artificial)	
Artificial Weathering (Xenon Arc)	ASTM D2565, D4459, G26; GMW 3414 (Cycle A and B), 14162; ISO 4892, Part 2; SAE J2412, J2527, J1885 (Inactive)[1], J1960 (Inactive) [1]; Ford BO 116-01
Weight/Mass	ASTM D3776
Whiteware (Water Absorption, Density, Porosity & Specific Gravity)	ASTM C373
Wicking	SAE J913
Width of Textile Fabric	ASTM D3774

Test(s):	Test Method(s):	
Test(s):	**Test Method(s):**	**Parameter(s):**
Flexible Test Cells		
Electrical		
DC Voltage	AMD 005, 009, 022;	Up to 100 VDC
Resistance	USCAR 2, 15, 21;	(1 to 1,000) mOhm
DC Current	Chrysler PF 9590;	(1 to 100,000) Ohm
	GMW 3172, 3431;	(0.1 to 1.0) TOhm
	Customer Specifications[2]	0.01 mA to 100 A
Durability Testing		
Mechanical Cycling	DVM 0019-ST;	Axial & Bending Fatigue:
	GMW 3067, 7699, 7000, 9123 , 3172;	(50,000 lb max)
	Chrysler PF 8502, PF 8401, PF 11029;	Ultimate Strength: (200,000 lb max)
	DC-10859, 10254;	Torsion: (up to 4000 ft./lbs – 100° Rotation)
	Customer Specifications[2]	Pneumatic & Hydraulic actuation with force and/or position feedback
Hot Vibration	Ford CETP: 09.02-E-302, 09.02-E-304, 09.02-E-308, 09.02-E-309;	Multiple Load Inputs
	GMPT Catalytic Converter Assembly;	(10 to 35,000) lbs
	CTS section 4.4.2.1;	
	Chrysler PF-9010 (Section 2.4);	
	Customer Specifications[2]	
Jounce & Squirm	ST-0036;	Durability Cycling of Seat Backs, Cushions and Bolster
	Chrysler PF-10859, PF 8401;	
	Customer Specifications[2]	
Multi Axis Simulation Table (MAST) *(6 axis) up to 100 Hz*	ST-0009; DC-10859 (Heidedauerlauf); IP-0008 (Key Life Test); Customer Specifications[2]	6 DOF, vertical, lateral, longitudinal pitch, roll, and yaw inputs (-50 to 177) °C
High Temperature Air Flow/ Environmental Simulation Testing	GMPT Catalytic Converter Assembly; CTS section 4.4.2.1; Ford CEPT: 09.02-E-300, 09.02-E-301; Customer Specifications[2]	Rate & Temperature Programmable up to 2200 ºF (1204 ºC)
Environmental Testing		

Test(s):	Test Method(s):	
Test(s):	**Test Method(s):**	**Parameter(s):**
Solar Loading/ Heating Testing High & Low Temperature Testing with Relative Humidity Thermal Shock	AMD 002, 05, 010, 011, 012, 014, 017; GM9310P; Chrysler PF 11084, 11029; Ford SDS IT 0005, 9014; MES PA 5500 D; NES MO 131; Customer Specifications[2]	Temperature: (-100 to 374) ºF / (-73 to 190) ºC (using various reach-in, walk-in, and drive-in chambers) Humidity: Up to 95% RH
Noise Analysis Testing BSR Objective and Jury Evaluator	GMW 7293, 14011; Customer Specifications[2]	Real Time 33 db ambient
Vertical Pitch and Roll +4D Quiet Shaker System	GMW 14011, 14144, 14155, 14188, 14240, 14264, 15655; Chrysler LP.7R027, LP.7R0774, PF 90192, PF 90052, PF 90223, PF 90232 (2015), PF 90243, PF 90283; Ford CETP 00.00-L-448, CETP 01.10-L-419_2, CETP 01.12-L-300, CETP 18.03-L-400, CETP 00.00-E-412, CETP 01.10-L-413, CETP 12.00-L-403, CES_Seat Recliner Component Eng., CES_Seat Track Component Eng., DVM-0010-SM, ES-6E5H-19980-AJ, Seat SDS v18 or newer	
Vibration with and without Environmental Simulation Sine or Random: Classical Shock	MIL STD 810F, 810G (Methods 514, 516); MIL STD 202E; MIL STD 167-1, 167-1A; IEC-68-2-34; IEC-68-2-6; IEC-68-2-27; USCAR 15, 20; SAE J1455; J1211 GMW 3172; Customer Specifications and/or customer supplied profiles[2]	(1 to 5,000) Hz 13,000 pounds force sine 12,000 pounds force random 12,000 pounds sine on random Field Data Replicator Temperature: (-100 to 374) ºF / (-73 to 190) ºC (using various reach-in, walk-in, and drive-in chambers) Humidity: Up to 95% RH Remote Conditioners

Test(s):	Test Method(s):	Parameter(s):
Vehicle/ Component Road Load Data Acquisition	ASTM E1237; Customer Specifications[2]	Strain, Load, Acceleration, Displacement, Temperature, Pressure, Voltage, Speed. (Maximum sampling rate speed 250,000 samples per second)

The laboratory is accredited for the test methods listed above. The accredited test methods are used in determining compliance with the material specifications listed below; however, the inclusion of these material specifications on this Scope does not confer laboratory accreditation to the material specifications. Inclusion of these material specifications on this Scope also does not confer accreditation for every method embedded within the specification. Only the methods listed above on this Scope are accredited.

Test(s):	Test Method(s):
Chrysler:	
CS-11982	Electrical/Electronic (E/E) Environmental Specification
MS JP 1-3	Color Durability of Interior Materials
MS-DC 40	Co-Extruded Polyethylene Film
PF-10952	Floor Console Assembly System Requirements
PF-11084	Door Trim Panel Assembly and Components
PF-11203	Material Durability Requirements for Interior Plastic Trim Components
Ford:	
WSS-M1F27	Luxury Leather
WSS-M8P18	Fabric Performance
WSS-M15P32-C	Trim Assembly, Enclosed Luggage Compartment Covering
WSS-M15P45-A, except section 3.12	Performance, Instrument Panel Assembly, Flexible Cover Skin Material
WSS-M15P4-E	Interior Trim, Assembly Performance
WSS-M15P4-F	Assembly Performance, Hard Mold-in-Color Interior Components
WSS-M15P4-G	Assembly Performance, Hard Mold-In-Color Interior Components
WSS-M1F28	Leather
FMVSS 571.106	Brake Hoses
GM:	
GMW14231	Automotive Fabrics
GMW14650	Performance Requirements for Exterior Plastic Parts
GMW16443	Peel Test Pressure Sensitive Adhesive
Japan:	

JIS L 1096	Woven Fabrics
Hyundai:	
MS 300-32	Woven, Knit
MS 320-05	Fabrics for Seats
Nissan:	
Nissan NES M0094	Flammability of Automotive Materials
SAE:	
SAE J1128	Wire Testing
SAE J1639	Test Methods for Nylon Materials
SAE J17	Latex Foam Rubbers
Toyota:	
Toyota TSH3130G	Paint Quality for Interior Parts
Volkswagen:	
VW PV3366	Elastomer Seals

[1] This laboratory's scope contains withdrawn or superseded methods. As a clarifier, this indicates that the applicable method itself has been withdrawn or is now considered "historical" and not that the laboratory's accreditation for the method has been withdrawn.

[2] Using the following standards and test methods:
ASTM, FMVSS, JIS, ISO, IP, SAE, GM, Ford, Chrysler, Mazda, Honda, Toyota, Navistar, Paccar, Volvo, Freightliner, and standards and specifications furnished by the customer for the parameters listed above and the equipment capabilities.

Accredited Laboratory

A2LA has accredited

ELEMENT MATERIALS TECHNOLOGY DETROIT – WARREN 11 MILE

Warren, MI

for technical competence in the field of

Mechanical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. 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*).

Presented this 28th day of August 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 0038.01
Valid to December 31, 2020

For the types of tests to which this accreditation applies, please refer to the laboratory's Mechanical Scope of Accreditation.