



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

SOUTHWEST RESEARCH INSTITUTE  
Office of Automotive Engineering  
Fuels and Lubricants Research Division and the  
Powertrain Engineering Division  
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MECHANICAL

Valid To: May 31, 2020

Certificate Number: 0702.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform evaluations of automotive fluids, fuels, emissions, automotive components, engine and power train performance and durability using stationary engine dynamometer test stands (light-duty, non-road and heavy-duty) and vehicle dynamometer facilities, and automotive fleets using standards and procedures from the following sources:

ASTM, API, SAE, ACC, CRC, ACEA, CEC, ATIEL, JASO, NMMA, CFR, EPA, CARB, ISO, Passenger Car OEM'S, Heavy-Duty OEM'S, Two-Stroke OEM'S, Lubricant and Fuel Additive Company Proprietary Testing Procedures, and Lubricant and Fuel Marketer Proprietary Testing Procedures.

**Fuels and Lubricants Research**

- Crankcase Lubricant Evaluations (Gasoline, Diesel and Alternative Fuels)
- Fuels Performance Evaluations (Gasoline, Diesel and Alternative Fuels)
- Gear Oil Evaluation
- Specialized/Focused Gasoline, Diesel, Alternative Fuels and Lubricants Evaluations
- Farm Tractor and Industrial Fluid Evaluations
- Automotive Component Evaluations (Engine Dynamometer/Bench Testing)
- Automatic and Powershift Transmission Evaluations
- Power Train (Driveability and Durability)

**Powertrain Engineering**

- Dynamometer Procedures
- Light-Duty Vehicle Chassis Dynamometer Emissions and Fuel Economy
- Heavy-Duty Engine Dynamometer Emissions and Fuel Consumption
- Non-Road Engine Dynamometer Emissions and Fuel Consumption
- Smoke Tests
- California Diesel Fuel Qualification Protocols

## FUELS AND LUBRICANTS RESEARCH

<b>Test(s):</b>	<b>Test Method(s):</b>
Passenger Car Motor Oil (PCMO)	
Evaluation of Automotive Engine Oils in the Sequence IIIF, Spark-Ignition Engine	ASTM D6984
Method for Dynamometer Evaluation of Unleaded Spark-Ignition Engine Fuel for Intake Valve Deposit Formation	ASTM D6201
IVA Evaluation of Automotive Engine Oils in the Sequence IVA Spark-Ignition Engines	ASTM D6891
General Motors dexos® Vehicle Fuel Economy (GMVFE) Evaluations	GMVFE
Measurement of Effects of Automotive Engine Oils on Fuel Economy of Passenger Cars and Light-Duty Trucks in Sequence VIE Spark Ignition Engine	ASTM D8114
Evaluation of Automotive Engine Oils in the Sequence VIII Spark - Ignition Engine (CLR Oil Test Engine)	ASTM D6709
Evaluation of Automotive Engine Oils in the Sequence IIIH, Spark - Ignition Engine	ASTM D8111
Evaluation of Rust Preventive Characteristics of Automotive Engine Oils	ASTM D6557
Heavy Duty	
Evaluation of Engine Oils in Diesel Four-Stroke Cycle Supercharged 1M-PC Single Cylinder Oil Test	ASTM D6618
Evaluation of Engine Oils in a High-Speed, Single-Cylinder Diesel Engine - 1K Procedure (0.4 % Fuel Sulfur) and 1N Procedure (0.04 % Fuel Sulfur)	ASTM D6750
Evaluation of Engine Oils in a High Speed, Single-Cylinder Diesel Engine - Caterpillar 1P Test Procedure	ASTM D6681
Evaluation of Heavy-Duty Engine Oils under High Output Conditions - Caterpillar C13 Test Procedure	ASTM D7549
Evaluation of Engine Oils for Roller Follower Wear in Light-Duty Diesel Engine	ASTM D5966
Evaluation of Diesel Engine Oils in T-8 Diesel Engine	ASTM D5967
Evaluation of Diesel Engine Oils in T-8E Diesel Engine	ASTM D5967
Evaluation of Diesel Engine Oils in the T-11 Exhaust Gas Recirculation Diesel Engine	ASTM D7156
Evaluation of Diesel Engine Oils in T-12 Exhaust Gas Recirculation Diesel Engine	ASTM D7422
Evaluation of Aeration Resistance of Engine Oils in Direct-Injected Turbocharged Automotive Diesel Engine	ASTM D6894; Navistar 7.3L; HEUI-EOAT
Evaluation of Automotive Engine Oils for Valve-Train Wear Performance in Cummins ISB Medium-Duty Diesel Engine Cummins ISM Test	ASTM D7484
Engine Oil Aeration Evaluation for dexos® Oil Qualification (GMAER)	ASTM D7468
General Motors Oxidation and Deposit (GMOD)	GMW17295 (GMAER) GM17043 (GMOD)



## FUELS AND LUBRICANTS RESEARCH

### Test(s):

### Test Method(s):

#### Heavy Duty (cont'd)

Evaluation of Diesel Engine Oils in T-13 Diesel Engine	ASTM D8048
Evaluation of Diesel Engine Oils in DD13 Diesel Engine	ASTM D8074
Evaluation of Engine Oil Aeration Resistance in a Caterpillar C13 Direct-Injected Turbocharged Automotive Diesel Engine	ASTM D8047
Automobile Diesel Engine Oils – Valve Train Wear Test Method	JASO M354
Automobile Diesel Engine Oils – Detergency Test Procedure	JASO M336

#### Gears/Axels

FZG Gear Testing	ASTM D4998
Standard Test Method for Evaluating the Scuffing Load Capacity of Oils (FZG Visual Method)	ASTM D5182
FZG Pitting Load Carrying Capacity Test for Gear Oils	CEC L108
FZG “S19-2-Verschleiss” (ZF Standard Wear)	FZG “S19-2-Verschleiss”
Evaluating the Thermal Stability of Manual Transmission Lubricants in a Cyclic Durability Test	ASTM D5579
Load Carrying Capacity Test for Transmission Lubricants	CEC L-07-95
Load Carrying Capacity Test for High EP Oils	CEC L-84-02
Method for Indicating Wear Characteristics of Non-Petroleum and Petroleum Hydraulic Fluids in a Constant Volume Vane Pump	ASTM D7043
Method for Evaluation of Moisture Corrosion Resistance of Automotive Gear Lubricants	ASTM D7038
Method for Indicating Wear Characteristics of Petroleum Hydraulic Fluids in a High Pressure Constant Volume Vane Pump	ASTM D6973
Evaluation of Load-Carrying Capacity of Lubricants Under Conditions of Low Speed and High Torque Used for Final Hypoid Drive Axles	ASTM D6121 (L-37)
Evaluation of the Thermal and Oxidative Stability of Lubricating Oils Used for Manual Transmissions and Final Drive Axles	ASTM D5704 (L-60-1)
Performance of Gear Lubricants in Axles Under High Speed and Shock Loading	ASTM D7452

#### Transmissions

Method for Evaluating the Thermal Stability of Manual Transmission Lubricants in a Cyclic Durability Test	ASTM D5579
Wear Properties, Gears – Pumps	TO-4 Section 5
Friction Properties	TO-4 Section 6

#### Automatic Transmission Fluid Testing

DEXRON®-VI Cycling Test	GMW16444 Appendix F
Aeration Test	GMW16444 Appendix K
Axialrillen-Kugellager (ARKL) (DEXRON®)	VW PV1454;
	GMW16444,
	GMW16974
Caterpillar Friction Properties	TO-4 Section 6

**FUELS AND LUBRICANTS RESEARCH**

**Test(s):**

Automatic Transmission Fluid Testing (cont'd)  
MERCON® Over-Running Clutch Wear Test

Synchronizer Function

**Frictional Properties (SAE#2)**

DEXRON®-VI Plate Clutch Friction Test  
DEXRON®-VI Low Speed Clutch Friction Test  
GM Three (3) Day Wear Test  
MERCON® Clutch Friction Durability  
MERCON® Anti-Shudder Durability

MERCON®  $\mu$ -v Characterization

Allison Frictional Properties (graphite)  
Allison Frictional Properties (TES-389 Paper)  
Allison Frictional Properties  
JASO Friction Characteristic Test Method

**Oxidation Tests**

DEXRON®-III Oxidation Test (THOT)

**Fleet and Fuel**

Top Tier, CARB and EPA Standards, Detergent Gasoline Deposit  
Control Performance Standards:

Intake Valve Sticking (IVS)  
ASTM TC Sequences I, II, III

CARB and EPA Procedures:

Method for Evaluating Unleaded Automotive Spark-Ignition  
Engine Fuel for Electronic Port Fuel Injector (PFI) Fouling  
Method for Vehicle Evaluation of Unleaded Automotive Spark-  
Ignition Engine Fuel for Intake Valve Deposit Formation – BMW  
IVD

**Marine / Two-Cycle**

NMMA FC-W 115 hp

JASO:

Clutch Friction  
Lubricity

**Test Method(s):**

MERCON®,  
MERCON®-V,  
MERCON®-LV  
CEC L-66-99;  
GMW16612 Appendix C

GMW16444 Appendix C  
GMW16444 Appendix J  
GMW16974 Appendix G  
MERCON®  
MERCON®-V,  
MERCON®-LV,  
MERCON® ULV  
MERCON®,  
MERCON®-V,  
MERCON®-LV  
TES-439 Appendix C  
TES-389 Appendix D  
TES-295 Appendix D  
JASO M348:2012,  
JASO T903:2016  
Annex A

GM6417M Appendix E;  
TO-4 Section 3

IVS

ASTM D5598

ASTM D5500

NMMA FC-W

JASO T903  
JASO M340



## FUELS AND LUBRICANTS RESEARCH

<b>Test(s):</b>	<b>Test Method(s):</b>
Tractor	
Tractor – John Deere	
Water Contamination/Dynamic Corrosion using SAUER-DANFOSS 90 Series Pump	JDQ: 84
Powershift Transmission Procedure	JDQ: 94
Spiral Bevel and Final Drive Gear Wear	JDQ: 95
As Performed with a 1400 Series Axle Brake Torque Variation & Friction Retention	JDQ: 96
John Deere 102A Shear Rig Test Procedure	JDQ 102A
New Holland: Jenkins, High Energy Clutch, Driveline Stall	
Evaluation of Hydraulic Fluid Using the Denison Test Procedure for Hydraulic Fluid Performance Evaluation on Denison Pumps with T6H Hybrid Pump	Denison A-TP-30533
Filter Testing	
Inlet Air Cleaning Equipment for Internal Combustion Engines and Compressors – Performance Testing	ISO 5011
Multi-Pass Method for Evaluating Filtration Performance of a Filter Element	ISO 16889
Full-Flow Lubricating Oil Filters for Internal Combustion Engines – Part 12: Filtration Efficiency using Particle Counting and Contaminant	ISO 4548 Part 12
Filtration Efficiency using Particle Counting and Contaminant Retention Capacity	ISO 19438

## POWERTRAIN ENGINEERING

<b>Test(s):</b>	<b>Test Method(s):</b>
Emission Testing	
Light-Duty Vehicle Federal Test Procedure-75 (Chassis Dynamometer Test)	40 CFR Part 86, Subpart B (Gasoline and Diesel Fueled)
With the exception of:	
<ul style="list-style-type: none"><li>• <i>Evaporative Emissions</i></li><li>• <i>Hot Soak Test</i></li><li>• <i>Refueling Test</i></li><li>• <i>Running Loss Test</i></li></ul>	
Light-Duty Vehicle Fuel Economy Test	40 CFR Part 600, Subpart B (Gasoline and Diesel fueled)
Otto-Cycle and Diesel-Cycle Engines Idle Test Procedure	40 CFR Part 86 Subpart P, (New Methanol, Natural Gas, Liquefied Petroleum Gas and Gasoline-fueled)
Particle Filter Systems, Construction Machines	Swiss Ordinance on Air Pollution Control (OAPC), (Appendix 4, Section 31, 32); Particle Number Measurement in Accordance with European Union Regulation No. 49
Engine Emissions Testing Procedures	40 CFR Part 1065
Transmission Spin Loss Test	SwRI TIP 03-2103



**POWERTRAIN ENGINEERING**

**Test(s):**

**Test Method(s):**

Emission Testing (cont'd)  
 Procedure for Running 'Hydrogen Gas  
 Emission Testing' per IEC 60896-21  
 Section 6.1

SwRI TIP 07-054

**Calibration**

I. Industry Specific Calibrations<sup>1</sup>

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Particle Size & Number Measurement Systems Calibrations			
Particle Diameter	50 nm 100 nm	4.4 nm 3.1 nm	ISO 15900 (SwRI TIP 06-080)
Particle Detection Efficiency	(30 to 100) %	7.5 % of efficiency	ISO 27891 (SwRI TIP 06-079)
Particle Reduction Factor	1 to 10,000	11% of reduction factor	UN-ECE R49 & R83 (SwRI TIP 06-082)
Particle Removal Efficiency	Up to 100 %	0.16 % of removal efficiency	UN-ECE R49 & R83 (SwRI TIP 06-082)
		0.11 % of removal efficiency	SAE AIR6241 (SwRI TIP 06-081)
Particle Penetration	Up to 100 %	0.11 % of penetration	SAE AIR6241 (SwRI TIP 06-081)

<sup>1</sup> This laboratory offers commercial calibration service and field calibration service.

<sup>2</sup> Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.





## *Accredited Laboratory*

A2LA has accredited

### **SOUTHWEST RESEARCH INSTITUTE**

*San Antonio, TX*

for technical competence in the field of

### **Mechanical Testing**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *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 28<sup>th</sup> day of August 2018.

A handwritten signature in black ink, appearing to read "L. Sen", written over a horizontal line.

President and CEO  
For the Accreditation Council  
Certificate Number 0702.01  
Valid to May 31, 2020  
Revised September 11, 2018

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