



Engine Deposit Testing Path

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. Testing pathway for engine deposits determined by source and engine issues.

1.2 Applicability. This standard is to be used for engine and engine related deposits in need of lab testing.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM 6730

ASTM E1252

ASTM E1131

ASTM D3536

ASTM E1508

2.2 GM Standards/Specifications.

GMW3059

3 Requirements

3.1 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

3.2 Requirements of Deposit. Deposit should be from an engine or engine related system or subsystem. To fulfill the full slate of testing, at least 300 mg of sample is required. A smaller amount of sample or the desire for research style testing will require discussion with the lab personnel.

3.3 Standardized Testing Matrix. See Figure 1.

Figure 1: Standardized Testing Matrix by Engine Component/Issue

Lab Test Name	TGA	XRF	GPC	Pegasus	DART	SEM-EDS	FTIR	Soxhlet Extraction/GC	Pyrolysis GC-MS
Lab Test Site Location	WRN	WRN	WRN	PON	PON	PON	WRN/PON	PON/MPG	WRN/PON
Method (ASTM/IQ/Other)	ASTM E1131	in-lab	ASTM D3536	in-lab	in-lab	ASTM E1508	ASTM E1252	ASTM 6730	Research
WINLIMS Pick List Name	CHP ASTM E1131	CHM Semi	requestor defined	requestor defined	requestor defined	MET IQ #3462	CHP ASTM	requestor defined	requestor defined
Engine Deposit Classification	Analysis	Quantitative	defined	defined	defined	SEM, MET	E1252	requestor defined	defined
Gasoline									
Stochastic Preignition Issue									
Intake Valve build up									
Fuel Injector deposit unusual									
Piston Top cleanliness									
Gas Aftertreatment: TWC									
Gas Aftertreatment: GPF									
Diesel									
Diesel Injector Deposits									
Diesel After-treatment Systems									
Diesel Fuel Filter									
Motor Oils									
Low Metal/Metal-Free Oil									
Wear issues/Deposit Buildup									
Standard Testing									
Lab Discussion									
Required									

Note: CHP/CHM = Chemistry, DART = Direct Analysis in Real Time, EDS = Energy Dispersive, FTIR = Fourier Transform Infrared, GC = Gas Chromatography, GPC = Gel Permeation Chromatography, GPF = Gas Particulate Filter, IQ = Information Quality, MET = Metrology, MPG = Milford Proving Ground, MS = Mass Spectrometry, PON = Pontiac, SEM = Scanning Electron Microscopy, TGA = Thermogravimetric Analysis, TWC = Three-Way Catalyst, WRN = Warren, XRF = X-ray Fluorescence.

3.4 Use of Matrix. Engineers are to examine Figure 1 and determine the engine deposit classification that best fits their sample. Once that is decided, the green shaded boxes represent the standard tests to run on the given deposit. Samples should be sent to the respective lab for the prescribed testing.

4 Validation

Not applicable.

5 Provisions for Shipping

Not applicable.

6 Notes

6.1 Glossary. Not applicable.

6.2 Acronyms, Abbreviations, and Symbols.

ASTM	American Society for Testing and Material
CHP/CHM	Chemistry
DART	Direct Analysis in Real Time
EDS	Energy Dispersive X-Ray Spectroscopy
FTIR	Fourier Transform Infrared Spectroscopy
GC	Gas Chromatography
GPC	Gel Permeation Chromatography
GPF	Gas Particulate Filter
GSSLT	Global Subsystem Leadership Team
IMDS	International Material Data System
IQ	Information Quality
MET	Metrology
MPG	Milford Proving Ground