

Populations, Activity and Emissions of Diesel Nonroad Equipment in EPA Region 7

PEMS and PAMS Instrumentation Forms Appendix E

Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Prepared for EPA by
Eastern Research Group, Inc. (ERG)
EPA Contract No. EP-C-06-080

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS
Test ID: _____

INSTALLATION DATA COLLECTION FORM COVER PAGE

Test ID ____ -- ____ (last 4 digits of Est ID – last 4 digits of serial #, i.e., 3424_4532)

Test Type (circle one): **PEMS** **PAMS**

Establishment Number: ____

Site Number: ____

Site Installation Location: _____

Installation Date: _____

Installation Technician: _____

Test Shift: _____

Site Contact Name: _____

Office Phone Number: _____

Cell Phone Number: _____

Other: _____

Type of Equipment: _____

Equipment Model: _____

Equipment Serial #: _____

Contractor-specific Equipment ID: _____

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS
Test ID: _____

General Equipment Information (collect for both PEMS and PAMS)

Check with site contact to confirm it's OK to instrument this piece of equipment.

Determine from site contact if this piece of equipment is used throughout the entire year, or only during some months:

If not year round, which months is it used? (even if it's only used 1 time during the month)

Confirm total # of months (i.e., 8 months of use, 10 months of use, etc.)

Does contact expect this will be used during the test period (approx next month for PAMS or next day for PEMS)?

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS
Test ID: _____

General Equipment Information (collect for both PEMS and PAMS)

EQUIPMENT DESCRIPTION	
Equipment Type:	
Equipment manufacturer:	Engine manufacturer:
Equipment model:	Engine model:
Equipment model year:	Engine model year:
Equipment serial no.: _____.	Engine serial no.: _____.
	Engine Family: _____.
Equipment Plate Code: ____ (see codes below)	Engine Plate Code: ____ (see codes below)
Equipment Comments:	Engine Comments:
<u>Equipment Plate Codes:</u> 01 = Not present 02 = Cannot locate 03 = Present but not specs not legible 04 = Present and legible 05 = Other	<u>Engine Plate Codes:</u> 11 = Not present 12 = Cannot locate 13 = Present but specs not legible 14 = Present and legible 15 = Other

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS

Test ID: _____

General Equipment Information (collect for both PEMS and PAMS)**HOURL-METER**

Hour-meter function code 1: ____ (see code 1 below)

Hour-meter function code 2: ____ (see code 2 below)

Beginning date for current meter reading
(mm/dd/yyyy): ____/____/____.

Engine hour-meter reading: ____ , ____.

Hour-meter comments:

Hour-meter Code 1:

21 = Meter not present

22 = Meter present but not functioning

23 = Original meter; reading can be presumed to represent hours since original purchase

24 = Original meter reset following maintenance or resale, can identify beginning date for current reading

25 = Original meter reset following maintenance or resale, CANNOT identify beginning date for current reading

26 = NOT original meter, can identify beginning date for current reading

27 = NOT original meter, CANNOT identify beginning date for current reading

28 = Other (DESCRIBE IN HOUR-METER COMMENTS)

Hour-meter Code 2:

30 = No reading available

31 = Current reading presumed accurate

31 = Current reading not accurate, reliable adjustment possible (DESCRIBE IN HOUR-METER COMMENTS)

33 = Current reading not accurate, reliable adjustment not possible (DESCRIBE IN HOUR-METER COMMENTS)

34 = Other (DESCRIBE IN HOUR-METER COMMENTS)

VISUAL INSPECTION

Are major exhaust leaks present? Yes No (IF 'YES,' DO NOT INSTALL INSTRUMENT)

Is alternator speed signal reliable? Yes No Unk (IF 'NO,' DO NOT INSTALL INSTRUMENT)

Are obvious modifications or mal-maintenance evident? Y N (IF 'YES,' INSTALL INSTRUMENT AND DESCRIBE IN COMMENTS)

Comments:

IF CANNOT INSTALL INSTRUMENT ON SELECTED PIECE, RECLASSIFY SELECTED PIECE AS
'INELIGIBLE,' SELECT BACKUP PIECE AND COMPLETE NEW DATA COLLECTION FORM

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS

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General Equipment Information (collect for both PEMS and PAMS)

(Remember to take a legible “close-up” picture of all engine tag for future reference)

ENGINE RATING

Rated Power

number: _____ units code: ____ source code: ____ method code: ____

Rated Speed

number: _____ units: RPM . source code: ____ method code: ____

Peak torque

number: _____ units code: ____ source code: ____ method code: ____

Peak Speed

number: _____ units: RPM . source code: ____ method code: ____

Comments:

Units codes

11 = horsepower (gross)
12 = horsepower (net)
13 = kilowatts (gross)
14 = kilowatts (net)
15 = foot-lbs(ft-lb)
16 = newton-meters (nm)
17 = Other (DESCRIBE)

Source codes

21 = Owner’s/user’s verbal report
22 = Engine plate
23 = Manufacturer’s specifications
24 = Reference source
25 = Unavailable
26 = Other (DESCRIBE)

Method Codes

31 = NETT SAE
32 = ISO
33 = Unknown
34 = Unavailable
35 = Other (DESCRIBE)

INSTALLATION PARAMETERS (collect for both PEMS and PAMS)

Is exhaust after-treatment present? Yes No Unknown

DESCRIBE AFTER-TREATMENT TECHNOLOGY:

Tailpipe Dimensions:

Outer diameter 1 (inches): _____ | Outer diameter 2 (inches): _____ (for elliptical pipes)

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS
Test ID: _____

PEMS AND PAMS RPM Calibration Data Collection Form

PAMS Manufacturer (please circle): Corsa Issac HEMDATA None (PEMS test)

RPM Sensor 1 Device (please circle): Capelec, Optical, Magnetic, tap

RPM Sensor 2 Device (please circle): Capelec, Optical, Magnetic, tap, None

"Confirmation" method: Onboard Tach, Hand held Tach, Sensor/Multimeter

Pre-calibration Idle Measurement

"Confirmation" RPM = _____

PAMS/PEMS Measured, Sensor 1 = _____ Calibration Scaling Factor, Sensor 1 = _____

PAMS/PEMS Measured, Sensor 2 = _____ Calibration Scaling Factor, Sensor 2 = _____

Pre-Test PEMS and PAMS Measurements

Conduct the following tests after calibration but before PEMS / PAMS testing is conducted

Test Type	"Confirmation" RPM	Sensor 1	Sensor 2	Exh Flow Rate (kg/hr) (PEMS only)
Pre-test Idle				
Pre-test Mid-range (1000 – 1600 RPM)				
Pre-test high-range (1600 – 2200 RPM)				

Post-Test PEMS and PAMS Measurements

Conduct the following tests after PEMS /PAMS testing (before equipment removal)

Test Type	"Confirmation" RPM	Sensor 1	Sensor 2	Exh Flow Rate (kg/hr) (PEMS only)
Post-test Idle				
Post-test Mid-range (1000 – 1600 RPM)				
Post-test high-range (1600 – 2200 RPM)				

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS

Test ID: _____

PEMS ONLY

PEMS INSTALLATION DATE & TIME	
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Date installed: ____ / ____ / ____

Date tested: ____ / ____ / ____

Independent Measurement of ambient temperature at test start time : _____ Please indicate units: F / C
--

Independent Measurement of humidity at test start time: _____ Please indicate units: RH AH Other _____
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Comments:

PEMS INSTRUMENT IDENTIFICATION			
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SEMTECH ID.: _____

MPS ID: _____

Flowmeter ID.: _____

FM box ID _____

Diameter of silicon hose used (inches): _____ Length of silicon hose used (inches): _____

Note: all PEMS calibration info is recorded in electronic datafile
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PEMS VI ACQUISITION

VI Compliance: SAE J1708 SAE J1939 Unk None

VI Connector description:

Notes on VI Acquisition:

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS

Test ID: _____

PEMS ONLY

PEMS Gravimetric Filter Data Collection

Date engine was last operated (prior to cold-start test):

Time engine was last operated (prior to cold-start test):

Hours since last engine operation (soak duration)

Filter ID	Filter Holder Location (circle)			Test Type (circle appropriate type) ¹				
	1	2	3	CS	HS	WO	FB	DB
	1	2	3	CS	HS	WO	FB	DB
	1	2	3	CS	HS	WO	FB	DB
	1	2	3	CS	HS	WO	FB	DB
	1	2	3	CS	HS	WO	FB	DB
	1	2	3	CS	HS	WO	FB	DB
	1	2	3	CS	HS	WO	FB	DB
	1	2	3	CS	HS	WO	FB	DB
	1	2	3	CS	HS	WO	FB	DB

1: CS = Cold Start, HS = Hot Start, WO = Warm Operation, FB = Field Blank DB = Dynamic Blank

NOTE: Field blanks and dynamic blanks should constitute 5% of all filters collected (*each*).

Other notes and comments regarding PEMS gravimetric filter testing:

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS
Test ID: _____

PAMS ONLY

PAMS INSTALLATION DATE & TIME AND REMOVAL INSTRUCTIONS		
Date installed: ____ / ____ / ____	Time installed: ____ : ____ am pm	
Date removed: ____ / ____ / ____	Time removed: ____ : ____ am pm	
<i>In comments below, please note all equipment/engine modifications to restore to original during PAMS removal</i>		
Comments / modifications to restore equipment after PAMS removal: 		
PAMS INSTRUMENT IDENTIFICATION		
PAMS Manufacturer: Corsa Isaac HEMDATA		
Serial #: _____	RPM 1 Type: _____ (see types below)	RPM 2 Type: _____ (see below)
RPM 1 and 2 types may be optical, magnetic, Capelec (which is an A/C signal processor) or electrical tap into engine harness		
Criteria used for logger auto shutdown: switched dead / switched standby / voltage < cutoff / RPM < cutoff / Other		
If "other", please describe: 		
If voltage or RPM auto standby used, please list voltage or RPM set limit: _____		
Describe method used to confirm auto shutdown: _____ _____		
Current drain while in standby: _____ mA (not to exceed 200 mA)		
PAMS VI ACQUISITION		
VI Compliance: SAE J1708 SAE J1939 Unk None		
VI Connector description:		
Notes on VI Acquisition:		

Has date/time been set? _____ Has acquisition frequency been set to 1 Hz? _____

Engine idle speed: _____

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS

Test ID: _____

PAMS ONLY**Procedure for timing logger startup delay**

- Note equipment information and whether logger is on switched power or is always powered and begins logging based on an input signal
- Connect logger to computer, either by USB antenna or by cable
- Sync computer clock with logger then disconnect.
 - For Corsa, choose Set Data Logger Clock from the Setup menu
 - For Isaac, open Recording and Data Processing Parameters from the Tools menu. Click the Clock Icon. This will wipe all data from the logger.
- Disconnect logger and power off.
- Open Date and Time properties of computer
- Turn the key on (don't start engine), record the time shown on the computer (to the second) in the table below
- Wait for 10 seconds, then start the engine and record that time (to the second)
- Run engine for 15 seconds, turn all off and record time to the second
- Repeat the process at least one more time
- Pull data file and note the times when key on data stream began and when RPM data stream begin, and time when datastream ended.

Date: _____ Name of person who did test: _____

Est ID: _____ Equipment Serial No.: _____

Equipment Make and Model: _____ Logger Type: _____

Logger ID / Serial #: _____

Logger Power Condition (Circle one): Dead at key off / Standby at key off

Use HH:MM:SS format for on/off times.

Test	Computer Time			Data Timestamp (from datafile)		
	Key On	Engine Started	Key Off	Segment Start (key on)	RPM Start (engine started)	Segment End (key off)
1						
2						
3						
4						

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS

Test ID: _____

PAMS ONLY**PAMS Operation Revisits / Reinspections**

NOTE: Downloaded filename format should be “####AAAA_YYYY_MM_DD”, where #### indicates last 4 digits of Establishment ID, AAA indicates last 4 digits of equipment serial #, and date follows.

Date	File Downloaded?	Remaining Memory	Comments
	Y N		
	Y N		
	Y N		
	Y N		
	Y N		
	Y N		

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS

Test ID: _____

Date	File Downloaded?	Remaining Memory	Comments
	Y N		
	Y N		
	Y N		
	Y N		
	Y N		
	Y N		
	Y N		

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS

Test ID: _____

PAMS ONLY**PAMS Revisit Calibration Checks
(check RPM calibration on all revisits)**

Date	"Confirmation" RPM	Sensor 1	Sensor 2

Test ID: _____

Other Installation Notes, Revisit Comments, etc.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

EQUIPMENT IDENTIFICATION, DESCRIPTION AND INSTALLATION PARAMETERS

Test ID: _____ -- _____

PAMS ONLY**Current Location of Equipment (for PAMS revisits):**

Date	Location