











United States  
Environmental Protection Agency  
Office of Transportation and Air Quality

Manufacturer Production Line Testing Report for Large Spark Ignition Engines

Last Revision: August 2010 Version Number: 4.6

Calculated Results Data

Current PLT Test Status:

Engine Family:  
HC+NOx (passing status?)  
CO (passing status?)

0  
No test results entered  
CO not Tested

HC+NOx (N-met?):  
CO (N-met?):

No  
CO not tested

PASSING STATUS:

OPEN

Maximum Tests:

30

Notes:

\* Number of included HC and NOx tests (n) is less than the required number (N).

OMB No. 2060-0338  
Approval Expires on  
1/31/2022  
EPA Form 5900-130

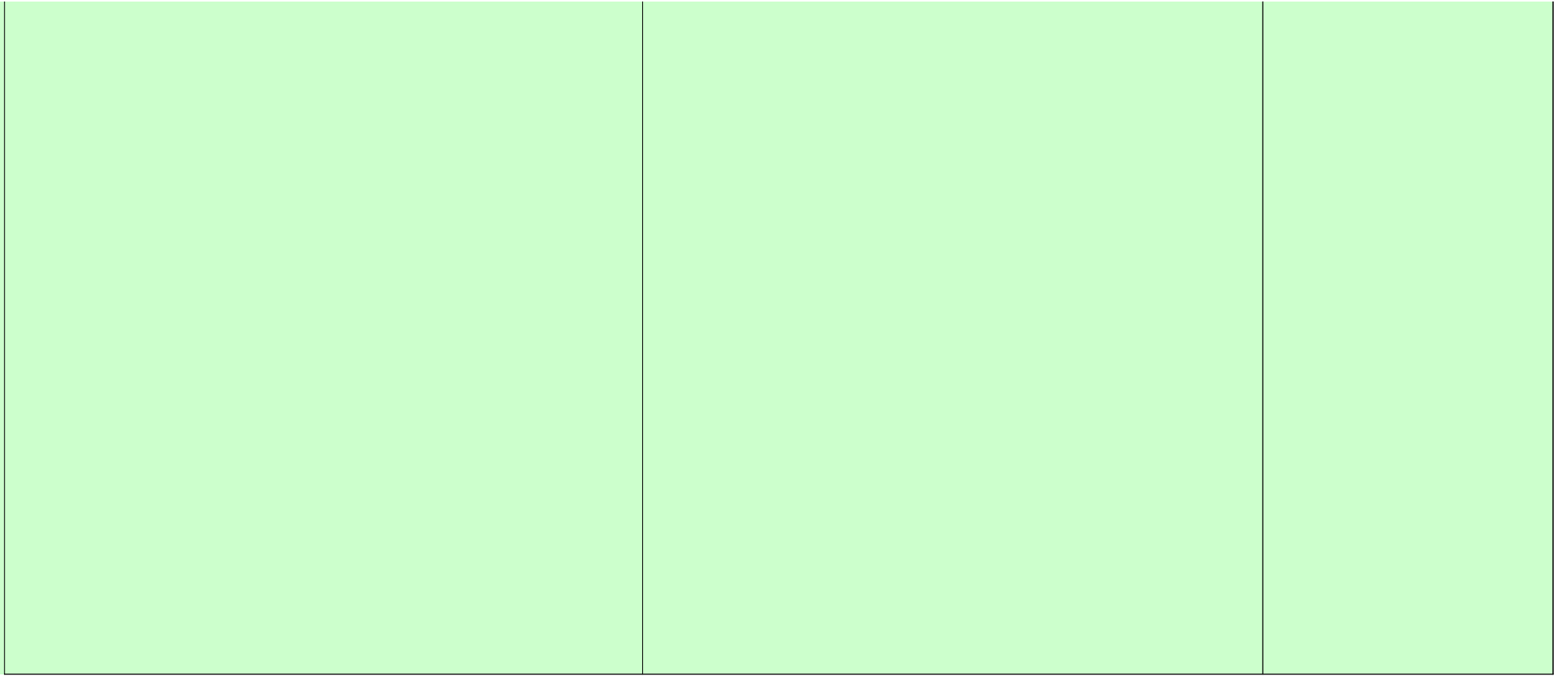
HC+NOx - Calculations

Actual Sample Size (n)	Required Sample Size (N)	Mean Result	Standard Deviation	Prior CumSum	CumSum	Action Limit	Sample Requirement Met?	HC+NOx Fail?	HC+NOx Pass?
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CO - Calculations

Actual Sample Size (n)	Required Sample Size (N)	Mean Result	Standard Deviation	Prior CumSum	CumSum	Action Limit	Sample Requirement Met?	CO Fail?	CO Pass?
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Warnings





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### Manufacturer Notes

Please provide any additional notes here

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### Manufacturer Data Submission Template -- INSTRUCTIONS

#### I. About

This template allows engine manufacturers to submit production line testing (PLT) data for their Large SI engines in a simple, consistent format. Based on the information entered for each parameter (HC, NO<sub>x</sub>, and CO), the template performs the required CumSum and sample size calculations and displays the current status of the test.

It is intended that a copy of this template be created for each engine family for which the reporting of PLT results is required. The engine family name should be included in the submission file name. Note that 40 CFR 1048.345(a) indicates that this information must be submitted on a quarterly basis. It is intended that one copy of a template be maintained per engine family, per year. For instance, the file submitted for the second quarter will contain all test results previously submitted for the first quarter with the results from the second quarter added on. The template provides a field to indicate the test quarter at the engine test level.

This document only applies to the Large SI template, which is intended for use by manufacturers who are submitting PLT data in accordance with the specifications in 40 CFR 1048, Subpart D. Manufacturers who have received approval for using an alternate program as specified in 40 CFR 1048.301(d) should contact EPA for further instructions. The general structure of this reporting template is described below.

- The primary worksheet for entering PLT data is the worksheet labeled "Submission Template." Only values in cells that are white may be modified. The shaded cells contain either labels or calculated values.
- The "Notes" worksheet provides space for a manufacturer to provide any additional notes or relevant information for the engine family's PLT information.
- The resulting calculations, including an indication of whether the test results yield a status of Pass, Fail or Open, are displayed in the "Calculations" worksheet.

Before entering data in this template, international users should ensure that the settings for number handling are consistent with the template. Number handling settings that currently specify the use of a comma for the decimal separator and a period for the thousands separator must be temporarily modified to avoid errors within the automatic calculations. To modify the number handling settings, the users with Excel 2003 should go to the "Tools" menu and select "Options." In the window that appears, the "International" tab should be selected. At the top of this tab there will be a section at the top entitled "Number handling"; the check mark in the "Use system separators" box found within this section should be removed. At this point, a period should be inserted for the decimal separator and a comma should be inserted for the thousands separator. Users with Excel 2007 can get to the appropriate screen by clicking on the Microsoft Office Button, clicking on "Excel Options", and then going to the "Advanced" tab.

#### II. General Information

At the top of the "Submission Template" worksheet, there are fields to enter general information about the PLT test. These fields include:

- Manufacturer contact information (manufacturer name, PLT test contact, e-mail address, and phone number);
- Engine family identifier;
- Projected annual production volume;
- Production Period;
- Indication of whether CO testing is required;
- Indication of whether the engine family is a carry-over family;
- Pre-approved reduced required sample size (if applicable);
- Quarter for which the report is being submitted; and
- Engine Fuel Type: Gasoline/LPG, Natural Gas, or Alcohol. Once this selection has been made, a note will appear to the right of the Comment field indicating which type of hydrocarbon emission (THC, NMHC, or THCE) should be entered as part of the HC+NO<sub>x</sub> test results.

The template also provides fields for users to enter the actual production volume for the current quarter as well as the previous quarters for the model year. These fields appear once the user has specified the quarter for which the report is being submitted.

#### III. Test Results

PLT test results are comprised of test results from individual engines within the engine family being tested. For an individual engine, there may be several test results (i.e., initial results) that need to be combined into a final result. In this case, the user should calculate a final result by averaging the initial results for the engine and rounding this average to the number of decimal places in the emission standard expressed to one additional significant figure (see 40 CFR 1048.315 (a)). The user should then enter the initial and final results into the template. Each initial result corresponding to an individual engine should be entered in its own row, in the "Initial Result" column for each relevant pollutant. Under the column labeled "Final or Initial?" (column E), "initial" should be selected; this will gray out the "Final Result" and "Include in CumSum?" columns for each pollutant. After all the initial results for an individual engine have been entered, the final result should be entered on the next row, in the "Final Result" column for each relevant pollutant. Under the column labeled "Final or Initial?", "final" should be selected; this will gray out the "Initial Result" column for each pollutant. Additionally, either "yes" or "no" should be selected under the "Include in CumSum?" columns for the relevant pollutants. The date and time entered in this row should be the date and time entered for the last initial test (which should be in the previous row).

In the case that there is only a single test corresponding to an individual engine, there is no need for results to be entered separately as initial and final; the test result can be entered once, on a single row, with an entry of "Final" in the "Final or Initial?" column.

It is important that data be entered starting in the first row (beginning in cell B32) of the "Submission Template" worksheet. Furthermore, to ensure the accuracy of the CumSum results, the specific engine tests should be entered in the order in which they occurred and in consecutive rows. Skipping rows will preclude accurate CumSum calculations.

The following fields apply to all of the engine tests and are only filled in once:



- DF (HC) (required; Deterioration Factor for HC);
- DF Type (HC) (required; additive or multiplicative);
- DF (NOx) (required; Deterioration Factor for NOx);
- DF Type (NOx) (required; additive or multiplicative);
- HC+NOx Emission Limit or FEL (required);
- CO Emission Limit or FEL (required if testing CO);
- DF (CO) (required if testing CO; Deterioration Factor for CO); and
- DF Type (CO) (required if testing CO; additive or multiplicative).

The following data fields are available for each engine test. Fields that are required in order to produce valid CumSum calculations are indicated as such. The official reporting requirements can be found in 40 CFR Part 1048.345(a).

- Test Number (required); this should be numeric and sequential;
- Final or Initial? Indicator (required);
- Test Date (required);
- Test Time;
- Test Quarter;
- Engine ID (required);
- Build Date (required);
- Service Hours Accumulation (required);
- Service Hours Location (required);
- HC Initial Result (required; should only be filled in if "Final or Initial?" is equal to "initial");
- HC Initial Rounded Result (automatically filled in based on HC+NOx Initial Result);
- HC Final Rounded Result (required; based on one or more Initial Result; should only be filled in if "Final or Initial?" is equal to "final");
- HC Final Rounded Deteriorated Result (automatically filled in based on HC+NOx Final Result and the HC+NOx Deterioration Factor);
- NOx Initial Result (required; should only be filled in if "Final or Initial?" is equal to "initial");
- NOx Initial Rounded Result (automatically filled in based on HC+NOx Initial Result);
- NOx Final Rounded Result (required; based on one or more Initial Result; should only be filled in if "Final or Initial?" is equal to "final");
- NOx Final Rounded Deteriorated Result (automatically filled in based on HC+NOx Final Result and the HC+NOx Deterioration Factor);
- HC+NOx Initial Rounded Result (automatically filled in based on HC and NOx Initial Rounded Results);
- HC+NOx Final Rounded Deteriorated Result (automatically filled in based on HC and NOx Final Rounded Deteriorated Results);
- Include HC+NOx result in CumSum? Indicator (required; should only be specified if "Final or Initial?" is equal to "final");
- CO Initial Result (required; should only be filled in if "Final or Initial?" is equal to "initial");
- CO Initial Rounded Result (automatically filled in based on CO Initial Result);
- CO Final Rounded Result (required; based on one or more Initial Result; should only be filled in if "Final or Initial?" is equal to "final");
- CO Final Rounded Deteriorated Result (automatically filled in based on CO Final Result and the CO Deterioration Factor);
- Include CO result in CumSum? Indicator (required; should only be specified if "Final or Initial?" is equal to "initial");
- Test Location;
- Test Contact;
- Invalid Test Indicator (required -- must be "yes" if test is declared invalid). The template will not allow a test to be marked as invalid if the "Include in CumSum?" field has been set to "yes" for any of the parameters;
- Invalid Reason;
- Failure Reason;
- Remedy;
- Repairs; and
- Test Comments.

#### IV. Test Status

The "Calculations" worksheet checks the data that is entered and attempts to determine the current status of the PLT test. The test will appear to be in exactly one of three possible statuses -- FAIL, PASS, or OPEN.

- FAIL: The PLT Test will be in a failing status if, for one or more parameter, there are consecutive engine tests in which the calculated CumSum statistic exceeds the calculated Action Limit value. Once a test has reached a fail status, subsequent tests will not change it.
- PASS: The PLT Test will be a passing status if, for all required parameters, the actual number of included engine tests (n) is greater than or equal to the required test sample size (N), and for all required parameters, the mean result is less than or equal to the provided emission limit or FEL. Please note that even if a passing status is achieved, there may be additional requirements for the number of tests required each quarter. Please refer to 40 CFR 1048.310 for additional details.
- OPEN: The PLT Test will remain in an open status if it has not yet reached a fail or pass status.

#### V. Troubleshooting

If there are odd or unexpected results in the "Calculations" worksheet, the following should be checked:

- For each required parameter, has a standard or FEL been entered?
- For each required parameter, has a deterioration factor been entered? If so, has it been specified as either additive or multiplicative?
- Have all engine tests been entered sequentially without skipping rows?
- For each row where the "Final or Initial?" column equals "final", has the final result been entered, and has it been specified whether or not the test is to be included in CumSum, for each relevant parameter?
- If there are any rows where the "Final or Initial?" column equals "initial," has data mistakenly been entered in the "Final Result" columns for these rows?
- Has an included test inadvertently been marked as Invalid?
- All parameters must continue to be tested until all have met their sample size requirement (N). A parameter that has reached PASS status must continue to have its test results entered; however, these tests need not be entered in the CumSum calculation for that parameter.
- Has a low Projected Annual Production mistakenly been entered?