

United States
Environmental Protection Agency
Office of Transportation and Air Quality

Manufacturer Production Line Testing Report for Small Spark Ignition Engines

Last Revision: September 2016 Version Number: 5.3

Basic Information

Manufacturer: _____
 P/LT Test Contact: _____
 Email Address: _____
 Phone: _____
 Annual Production Period (mm/yyyydd): _____
 From: _____ To: _____
 Certified Fuel for Engine Family: _____
 Engine Class: _____
 Model Year: _____

Engine Family: _____
 Projected Annual Production Volume: _____
 Is this a Carry-Over Engine Family? _____
 If pre-approved for reduced sample size, enter sample number: _____
 Is this a Winterize-Only Engine per S1554.102(c)? _____
 Are you meeting AT CO standards in S1554.145(c)? (CARB Phase 3 Fuel only) _____
 Is this a Marine Converter Engine Family? _____
 What Emission Test Procedures did you use? _____

Number of Test Periods:	
Current Test Period:	

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Please enter a date
between 01/01/2010 and
12/31/2029 in the format
mm/dd/yyyy.

*If "Pre-approved reduced sample size" is left blank, the minimum required sample size is the lesser of one plus the number of test periods and 1% of the projected production. For carry-over families, it is the lesser of the number of test periods and 1% of the projected production.

PLT Engine Test Results

[illegible]

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Current PLT Test Status:

Engineer Family:	0	HC-NICs (pl-met)?	No
HC-NICs (passing status)?	No test results entered	CO (pl-met)?	No
CO (passing status)?	No test results entered		No

Notes: A PLT is only considered passing if it has a passing status of "Pass" and a "Current Test Status" of "Passing Status".

PASSING STATUS: No test results entered on the Submission Template Maximum Tests: 30

Notes: No test results entered on the Submission Template

* Number of included HC-NICs tests (0) is less than the sequenced number (0)
 * Number of included CO tests (0) is less than the sequenced number (0)

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



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Manufacturer Notes

Please provide any additional notes here.

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Manufacturer Data Submission Template -- INSTRUCTIONS

I. About

The instructions in this document are specific to the Small SI template. This template is intended for use by manufacturers who are submitting PLT data in accordance with the specifications in 40 CFR 1054, Subpart D. This template allows engine manufacturers to submit production line testing (PLT) data in a simple, consistent format. Based on the information entered, the template performs the required CumSum and sample size calculations for each parameter (HC+NOx and CO) 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 §1054.345(a) indicates that these data must be submitted for each 'test period' as defined under §1054.310(a). One copy of a template should be maintained per engine family, per year. For instance, the file submitted for the second quarter or test period will contain all test results previously submitted. A field in the 'Submission Template' worksheet can be used to indicate the associated quarter or test period at the engine test level.

Manufacturers who have received approval for using an alternate program should contact EPA for further instructions. The general structure of this reporting template is as follows:

- The primary worksheet for entering PLT data is the worksheet labeled "Submission Template". Only values in cells that are white or yellow may be modified. The green shaded cells contain either labels or calculated values. Cells that are shaded gray or black should not have data entered. Cells that are highlighted in yellow with red bold font have incorrect data and should either be corrected, entered, or deleted. Cells that are shaded pink have missing test results and should be populated.
- 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.
- The "Notes" worksheet provides space for a manufacturer to provide any additional notes or relevant information for the engine family's PLT information.

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. Users with Excel 2010 should select the "File" tab and select "Options" and "Advanced." There is an option to deselect "Systems Separators", enter a period for the decimal separator and a comma for the thousands separator, and reselect "Systems Separator".

II. General Information

At the top of the "Submission Template" worksheet, there are spaces 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);
- Annual Production period** (From and To);
- Certified Fuel for engine family**;
- Engine class (I, II, III, IV, or V)**;
- Model Year**;
- Engine family identifier**;
- Projected annual production volume**;
- Indication of whether the engine family is a carry-over family**;
- Sample number, if pre-approved for reduced sample size;
- Indication of whether a Wintertime-Only Engine per §1054.101(c)**;
- Indication of whether meeting Alt CO standards in §1054.145(n)? (CARB Phase 3 Fuel)**;
- Indication of whether the engine family is a marine generator engine family**;
- Emission Test Procedure (Part 1065 or Part 90)**;
- Number of Test Periods (**NOTE:** This field is auto-calculated and cannot be edited);
- Current Test Period**;
- Actual Production, Test Period # (NOTE: Depending on the Test Periods, 1, 2, 3 or 4 may be displayed);
- Comments;

Fields indicated with a ** are required. If any of these fields are missing, Passing Status will not be displayed on the Calculations tab, and a message stating, "*You must fill in all yellow highlighted boxes in the header section of the Submission Template" will be displayed.

If an engine family is certified with carry-over emissions data, the field labeled "Is this a carry-over engine family?" should be set to "yes." If EPA has approved a reduced sample size, the user can enter the reduced size in the field labeled "If pre-approved for reduced sample size, enter sample number". The first row of data entered for a carry-over engine family should be the last test results from the previous year, and a test period is not required for this row. If the engine family has been specified as a carry-over engine family, the first row in the Calculations worksheet will appear in pink.

The template also provides fields for users to enter the actual production volume for the current test period as well as the previous test periods for the year. These fields appear once the user has specified the test period for which the report is being submitted. A field for the number of test periods to be used in the year is auto-calculated and cannot be edited. Users should also provide the start and end date for each test period in the "Notes" tab.

*If "Pre-approved reduced sample size is left blank, the minimum required sample size is the lesser of one plus the number of test periods and 1% of the projected production. For carry-over families, it is the lesser of the number of test periods and 1% of the projected production.

The Comments field should be used to describe the reason for invalidating a test, justifying an initial test, describing any nonroutine adjustment, modification, repair, preparation, maintenance, or test for the engine if it was not reported to EPA separately (§1054.350(a)(7)). Information on the facility description, how engines are randomly selected, the model number, time and duration of testing should not be entered in the comments field, but should be maintained in your records and be available if EPA should ask for it.

III. Test Results

PLT test results are composed of test results from individual engines within the engine family being tested. The user should round the initial results to the number of decimal places in the emission standard expressed to one additional significant figure (see §1054.315(a)). The user should then calculate a final result by averaging these results for the engine and rounding this average, again to the number of decimal places in the emission standard expressed to one additional significant figure (see §1054.315(a)). The initial and final results should then be entered 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 or Invalid?" (column C), "initial" should be selected; this will gray out the "Final Result" cells and the corresponding "Include in CumSum?" cells in that row will be auto-populated with "no" 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" cells for each pollutant. The corresponding "Include in CumSum?" cells for each relevant pollutant will be auto-populated with "yes", assuming that required and valid data has been entered. The date entered in this row should be the date 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 or Invalid?" column. When carry-over data is included, only the final result from the last engine tested the previous model year should be filled in - if multiple initial tests were performed on this engine, the initial test results should not be entered.

If "invalid" is selected for a test in the "Final or Initial or Invalid?" cell, the corresponding "Include in CumSum?" cells will be auto-populated with "no" and not used in the calculations.

It is important that data be entered starting in the first row (beginning in cell B34) 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:

- HC+NOx Emission Limit or FEL (required);
- HC+NOx Deterioration Factor (required);
- CO Deterioration Factor (required).

The following fields apply to all of the engine tests and are auto-populated/calculated:

- Deterioration Factor type (multiplicative, applies to all parameters);
- CO Standard (auto-calculated, dependent on Engine Class, if a Marine Generator and if Alt CO Standards (CARB Phase 3 Fuel) are

The following data fields are available for each engine test. Fields that are required for valid CumSum calculations are indicated. The official reporting requirements can be found in §1054.345.

- Test Number; this should be numeric and sequential;
- Final or Initial or Invalid? (required);
- Test Date;
- Fuel Type (required; select Gasoline, CARB Phase 2, CARB Phase 3, CNG, or LPG; must match "Certified Fuel for Engine Family" in header - unless Dual Fuel was entered as the certified fuel);
- Test Period (required for final tests);
- Engine ID;
- Build Date;
- Service Hours Accumulation;
- Test Cycle (Cycle A, Cycle B, Cycle C, or Special);
- HC+NOx Initial Result (should only be filled in if "Final or Initial or Invalid" is equal to "initial" or "invalid");
- HC+NOx Initial Rounded Result (automatically filled in based on HC+NOx Initial Result);
- HC+NOx Final Result (based on one or more Initial Result; should only be filled in if "Final or Initial or Invalid" is equal to "final");
- HC+NOx Final Deteriorated Result (automatically filled in based on HC+NOx Final Result and the HC+NOx Deterioration Factor);
- Include (HC+NOx Result) in CumSum? (auto-populated based on if "final" and other required data is present and valid);
- CO Initial Result (should only be filled in if "Final or Initial or Invalid" is equal to "initial" or "invalid");
- CO Initial Rounded Result (automatically filled in based on HC Initial Result);
- CO Final Result (based on one or more Initial Result; should only be filled in if "Final or Initial or Invalid" is equal to "final");
- CO Final Deteriorated Result (automatically filled in based on CO Final Result and the CO Deterioration Factor);
- Include (CO result) in CumSum? (auto-populated based on if "final" and other required data is present and valid);
- Test Location;
- Test Contact;
- Invalid Reason/Remedy if Failed Test/Test Comments

IV. Submission Template/Calculations Errors

The following list includes corrections that must be made in order for the Calculations to occur correctly and the Passing Status to be displayed.

NOTE: A "PASS" status will not appear regardless of the number of final tests entered or test results until the FINAL Test Period (i.e., Current Test Period must equal Number of Test Periods for a status of PASS to appear).

- Required fields in Basic Information header missing. The missing field will be highlighted in yellow. Additionally, a message is displayed in the Calculations worksheet stating "You must fill in all yellow highlighted boxes in the header section of the Submission Template." Calculation and Passing Status will not be displayed until the missing fields are entered.

- Certified Fuel Type for Engine Family does not match one or more Fuel Type(s) in the Submission Template PLT Engine Test Results. Yellow error messages stating "Certified Fuel Type must = 'Fuel Type' below" and "Please correct all incorrect fuel types below (yellow cells)" will be displayed. The mismatched Fuel Type cells will be highlighted in yellow with bold red font so that you can easily correct the incorrect fuels. On the Calculations worksheet, a message is displayed stating "*Please resolve all fuel type discrepancies on the Submission Template." Passing Status will not be displayed until the missing fields are entered, with the exception of a FAIL status. Note: If Dual Fuel Engine is selected for Certified Fuel Type for Engine Family, different Fuel Type may be entered in the test result rows.

- Test result values entered in incorrect final/initial cell. If a row is indicated as final, but there is a value in initial result (or vice versa), a message will appear above the column header stating "Delete values from cells below highlighted in yellow." Additionally, the incorrect cells will be highlighted in yellow. Please delete the incorrect value, and ensure that the correct cell is filled in. This will also occur if values are entered on the same row for both Initial and Final. Additionally, a message is displayed in the Calculations worksheet stating "*Please correct all duplicate test entries on the Submission Template." Passing Status will not be displayed until the incorrect fields are deleted.

- Test result values entered in HC+NOx cells (final or initial) when Wintertime-only is "Yes". If "Yes" is selected for "Is this a Wintertime-Only Engine per §1054.101(c)?" the HC+NOx cells are all blacked out. A message will appear stating "Wintertime engines are not required to test HC+NOx. See §1054.101(c)." If there are any data in the HC+NOx cells that were blacked out, there will be a message above the column header stating "Delete values from cells below highlighted in yellow." The cells containing the data will be highlighted in yellow, and should be deleted. A message is displayed in the Calculations worksheet stating "*Please remove all incorrect test entries on the Submission Template." Passing Status will not be displayed until the incorrect fields are deleted.

- Test result values missing in final or initial cell. If a row is indicated as final, but there is not a value in the final result cell, or if a row is indicated as initial, but there is not a value in the initial result cell, a message will appear stating "* There is a missing a test result value for a test in the PLT Engine Test Results table (see pink colored cells below)." Additionally, there will appear another message above the column header stating "Enter the missing test result values in the cells below highlighted in pink." The missing cells will be highlighted in pink, and you should ensure that the correct cell is filled in. A message is displayed in the Calculations worksheet stating "*Please enter missing test result value(s) in the Submission Template worksheet." Passing Status will not be displayed until the missing fields are entered.

- OPEN status due to missing test period test results or actual production values. "You are missing test result(s) and/or actual production for one or more test periods" with an OPEN status. If you do not have final tests for each Test Period up to and including the Current Test Period indicated on the Submission Template, the status will remain OPEN until you enter or correct the final test results for the appropriate Test Period. Another reason for this error is missing Actual Production for one of the periods. Passing Status will not be displayed until the missing fields are entered.

V. Calculations Worksheet - Current PLT 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. There will be informative ("Notes") and error messages below the status cells to help indicate issues with the data.

- 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 (in the FINAL test period only) 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 test period. Please refer to 40 CFR 1054.310 for additional details.

- OPEN: The PLT Test will remain in an open status if it has not yet reached a fail or pass status. If you have an OPEN status but you believe your results should have passed, check that there are test results entered for each test period up to and including the current test period, and that Actual Production for each period is greater than zero.

- NO PASSING STATUS (All Blank): The Passing Status will not be displayed until errors are corrected. Refer to error message(s) and go to the Submission Template worksheet to correct errors/missing data.

VI. Troubleshooting

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

- For HC+NOx, has an Emission Limit or FEL been entered?
- For each required parameter, has a deterioration factor been entered?
- Have all engine tests been entered sequentially without skipping rows?
- If this has been indicated as a carry-over engine family, has the final result from the last engine tested the previous model year been entered as the first entry in the worksheet?
- If this has been indicated as a carry-over engine family, has a reduced sample size been entered?
- For each row where the "Final or Initial or Invalid?" column equals "initial", has the final result been entered for each relevant parameter?
- If there are any rows where the "Final or Initial or Invalid?" 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). If you elect to test more engines, the test results will be included in the sample size and CumSum calculations (See §1054.310(i) and §1054.315(e)).
- Has a low Projected Annual Production mistakenly been entered?
- Have all required fields been entered in the header "Basic Information" section of the Submission Template?
- If you have an OPEN status but you believe your results should have passed, check that there are test results entered for each test period up to and including the current test period, and that Actual Production for each valid period is greater than zero. A status of PASS will not appear in any case until the FINAL test period (when Current Test Period = Number of Test Periods).

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