



United States
Environmental Protection Agency
Office of Transportation and Air Quality
Manufacturer Production Line Testing Report for Marine Compression Ignition Engines

Last Revised: May 2023, Version Number: 03

Calculated Results Data

Current PLT Test Status:

Engine Family:

HC+NOx (passing status?)	<input type="text" value="HC+NOx not tested"/>	HC+NOx (N-meet?)	<input type="text" value="HC+NOx not tested"/>
CO (passing status?)	<input type="text" value="CO not tested"/>	CO (N-meet?)	<input type="text" value="CO not tested"/>
PM (passing status?)	<input type="text" value="PM not tested"/>	PM (N-meet?)	<input type="text" value="PM not tested"/>
HC (passing status?)	<input type="text" value="HC not tested"/>	HC (N-meet?)	<input type="text" value="HC not tested"/>
NOx (passing status?)	<input type="text" value="NOx not tested"/>	NOx (N-meet?)	<input type="text" value="NOx not tested"/>

PASSING STATUS: Maximum Tests:

Notes:

* Minimum testing requirements for each test period may also apply; please refer to 40 CFR 1045.310

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



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Manufacturer Production Line Testing Report for Marine Spark Ignition Engines

Last Revision: May 2013 Version Number: 1.0

Manufacturer Notes

Please provide any additional notes here.

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Manufacturer Production Line Testing Report for Marine Spark Ignition Engines

Last Revision: May 2013 Version Number: 1.0

Manufacturer Data Submission Template -- INSTRUCTIONS

I. About

The instructions in this document are specific to the Marine CI template, which is intended for use by manufacturers who are submitting PLT data in accordance with 40 CFR Part 1042, Subpart D. Please note that 40 CFR 1042.301(d)(s) allows for the use of the CumSum methodology specified in 40 CFR Part 1045 or 1051 for the calculation of production line testing (PLT) results. This template is intended for use by manufacturers who wish to use the CumSum methodology. Based on the information entered, the template performs the required CumSum and sample size calculations and displays the current status of the test. Manufacturers who do not wish to use CumSum must use the separate Marine CI PLT template that was created. Note that the present template is designed to accept PLT data for a single engine family, while the non-CumSum PLT template is designed to accept PLT data for multiple engine families.

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. These data must be submitted for each 'test period'. The test period definition in the present context is identical to the definition provided in 1045.310(a) or 1051.310(a), except that the threshold for establishing quarterly test periods is based on a U.S.-directed production volume of 800 rather than 1600. One copy of a template should 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 associated quarter 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 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 green and yellow 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, 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 or Excel 2010 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 spaces to enter general information about the PLT test. These fields include:

- Manufacturer contact information;
- Engine family identifier;
- Tier;
- Fuel Type;
- Recreational/Commercial indicator;
- Category;
- Projected annual production volume;
- Indication of whether the engine family is a carry-over family;
- Indication of whether a combined emission limit should be used for HC and NOx;
- Pre-approved reduced sample size (if applicable); and
- Production period.

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 "Pre-approved reduced sample size". The first row of data entered for a carry-over engine family should be the last test results from the previous year. A test period of "1" should be entered 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 also provided. Users should also provide the start and end date for each test period in the "Notes" tab.

III. Test Results

PLT test results are composed of data 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. The user should round the initial results to the number of decimal places in the emission standard expressed to one additional significant figure. 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. 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?" (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 each relevant pollutant. 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. 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.

It is important that data be entered starting in the first row (beginning in cell B33) 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:

- Deterioration Factor type (additive or multiplicative; applies to all parameters);
- CO Emission Limit or FEL (required);
- CO Deterioration Factor (required);
- PM Emission Limit or FEL (required);
- PM Deterioration Factor (required);
- HC Deterioration Factor (required); and
- NOx Deterioration Factor (required).

If the field "Combined HC+NOx?" is "Yes", then a field for the HC+NOx emission limit or FEL will appear and must be filled in; otherwise the following fields will appear and must be filled in:

- HC Emission Limit or FEL; and
- NOx Emission Limit or FEL.

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 40 CFR Part 1048.345(a).

- Test Number (required); this should be numeric and sequential;
- Test Date (required);
- Test Time;
- Test Quarter;
- Engine ID (required);
- Build Date (required);
- Service Hours Accumulation (required);
- Service Hours Location (required);
- 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 HC+NOx Initial Result);
- CO Final Result (required; based on one or more Initial Result; should only be filled in if "Final or Initial" is equal to "final");
- CO Final Deteriorated Result (automatically filled in based on HC+NOx Final Result and the HC+NOx Deterioration Factor);
- Include CO result in CumSum? Indicator (required; should only be specified if "Final or Initial" is equal to "final");
- PM Initial Result (required; should only be filled in if "Final or Initial" is equal to "initial");
- PM Initial Rounded Result (automatically filled in based on HC Initial Result);

- PM Final Result (required; based on one or more Initial Result; should only be filled in if "Final or Initial" is equal to "final");
- PM Final Deteriorated Result (automatically filled in based on CO Final Result and the CO Deterioration Factor);
- Include PM result in CumSum? Indicator (required; should only be specified if "Final or Initial" is equal to "initial");
- 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 Result (required; based on one or more Initial Result; should only be filled in if "Final or Initial" is equal to "final");
- HC Final Deteriorated Result (automatically filled in based on HC+NOx Final Result and the HC+NOx Deterioration Factor);
- Include HC result in CumSum? Indicator (required; should only be specified if "Final or Initial" is equal to "final");
- NOx Initial Result (required; should only be filled in if "Final or Initial" is equal to "initial");

--- from 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 Initial Result);
- NOx Final Result (required; based on one or more Initial Result; should only be filled in if "Final or Initial" is equal to "final");
- NOx Final Deteriorated Result (automatically filled in based on CO Final Result and the CO Deterioration Factor);
- Include NOx 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. Note that if a combined emission for HC and NOx is being used then one of the parameters is the sum of the HC and NOx values; otherwise HC and NOx are considered separately.
- 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 test period. Note that if a combined emission for HC and NOx is being used then one of the parameters is the sum of the HC and NOx values; otherwise HC and NOx are considered separately.
- 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 and specified as either additive or multiplicative?
- 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, with a test period of "1"?
- 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?" 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?
- Have the number of test periods been specified?

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