



United States
 Environmental Protection Agency
 Office of Air and Radiation, Office of Transportation and Air Quality

Manufacturer Averaging, Banking, and Trading Report for Marine CI Engines (40 CFR Parts 94 and 1042)

Version Number: 1.1.2 Last Updated: August 2018

Current Model Year Credit Calculations

Model Year:	Manufacturer:

Engine Family or Test Group Name	40 CFR Part & Engine Category	Displacement (L/cyl)	Power (kW)*	Tier	Pollutant	Useful Life (hours)	Production Volume	Load Factor	FEL (g/kW-hr)	Standard (g/kW-hr)	Credit Balance	Messages

*Maximum power can be calculated using the Max Power Calc worksheet.

Summary of Current MY Credits - PART 1042					
NO _x Credits (kg) - Tier 4 only		NO _x +HC Credits (kg) - Tier 3 only		PM Credits (kg) - Tier 3 and Tier 4	
CATEGORY 1		CATEGORY 1		CATEGORY 1	
Commercial	Recreational	Commercial	Recreational	Commercial	Recreational

Summary of Current MY Credits - PART 94											
NO _x Credits (Mg) - Tier 1 only				THC+NO _x Credits (Mg) - Tier 2 only				PM Credits (Mg) - Tier 2 only			
CATEGORY 1		CATEGORY 2		CATEGORY 1		CATEGORY 2		CATEGORY 1		CATEGORY 2	
Commercial	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	Recreational

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Field Descriptions for Current MY Credit Calc

Field	Description
Engine Family or Test Group Name	Enter the 12-character engine family name or test group name.
40 CFR Part & Engine Category	Select the applicable Part (94 or 1042) and the Category from the drop-down menu
Displacement (L/cyl)	Enter the displacement in liters per cylinder for the engine family.
Power (kW)	Enter the average value of maximum engine power for all the engine configurations within an engine family, calculated on a production-weighted basis, in kilowatts. Note that this value can be calculated within the Power Calc worksheet (the average power value corresponding to the final listed configuration for a particular engine family is the power value that should be used within the emission credit calculation). If the Power Calc worksheet is used, a blank line should separate each set of configurations for an engine family.
Tier	Select the applicable Tier from the drop-down menu: Tier 1, 2, 3 or 4.
Pollutant	Using the drop-down menu, select the applicable pollutant for which credits are calculated (NO _x +HC, NO _x , PM, or THC+NO _x).
Useful Life (hours)	Enter the useful life of the engine family in hours. Note that in accordance with 40 CFR 1042.101(e), the useful life value should be entered as follows: 1,000 hrs for Category 1-Recreational; 3,000 hrs for Engines less than 19 kW; 5,000 hrs for Engines between 19 and 37 kW; 10,000 hrs for Category 1-Commercial greater than 37 kW; and 20,000 hrs for Category 2. Useful life cannot be below 1,000 hours. Alternative useful life values that are longer or shorter than the standard value should be selected in accordance with the provisions at §1042.101(e)(2) and (e)(3), respectively.
Production Volume	Enter the number of engines participating in ABT within the engine family during the calendar year (or the number of engines in the subset of the engine family for which credits are being calculated). Note that quarterly production projections are used for initial certification and actual applicable production/sales volumes are used for end-of-year compliance determinations.
Load Factor	Using the drop-down menu, select the applicable load factor (0.69 for propulsion engines or 0.51 for auxiliary engines).
FEL (g/kW-hr)	Enter the family emission limits for the engine family in grams per kilowatt-hour (g/kW-hr).
Standard (g/kW-hr)	Enter the applicable standard in grams per kilowatt-hour (g/kW-hr).
Credit Balance (kg)	<p>This is a calculated value based on the preceding data.</p> <p>Part 1042 Credits for each engine family are denoted in kilograms (kg), and are calculated as follows: $Emission\ credits = (Std - FEL) \times (Volume) \times (Power) \times (Useful\ Life) \times (Load\ Factor) \times (10^{-3})$. Credits are rounded to the nearest kilogram for Part 1042.</p> <p>For Part 94, credits for each engine family are denoted in megagrams (Mg), and are calculated as follows: $Emission\ credits = (Std - FEL) \times (Volume) \times (Power) \times (Useful\ Life) \times (Load\ Factor) \times (10^{-6})$. Part 94 Credits are rounded to the nearest one-hundredth of a megagram (Mg)</p>

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Credit Averaging and Summary

Model Year:	Manufacturer:	PART 1042 CREDIT TOTALS								
		NO _x Credits (kg) - Tier 4 only			NO _x +HC Credits (kg) - Tier 3 only			PM Credits (kg) - Tier 3 and Tier 4		
		Category 1		Category 2	Category 1		Category 2	Category 1		Category 2
		Commercial	Recreational		Commercial	Recreational		Commercial	Recreational	
Credit Balances before Averaging:										
	Credits acquired via trading activity									
	Credits banked from prior model years									
	Current MY Credits	0	0	0	0	0	0	0	0	0
Credit Usage and Averaging:										
	Apply credits acquired via trade									
	Apply banked credits									
	Apply NO _x +HC credits to NO _x balance									
	Apply NO _x credits to NO _x +HC balance									
	Apply Category 1 Commercial credits to Category 2 credit balance*									
	Category 1 Commercial credits applied to Category 2 (with 25% discount)			0			0			0
Credit Balances after Averaging:										
	Remaining Credits (acquired via trading activity)	0	0	0	0	0	0	0	0	0
	Remaining Credits (banked from prior MYs)	0	0	0	0	0	0	0	0	0
	Final Credit Balance	0	0	0	0	0	0	0	0	0

* Commercial Category 1 credits that are applied to a Category 2 credit balance are discounted by 25% (this discount is reflected in the Final Part 1042 Credit Balances)

Model Year:	Manufacturer:	PART 94 CREDIT TOTALS									
		NO _x Credits (Mg) - Tier 1 only				THC+NO _x Credits (Mg) - Tier 2 only				PM Credits (Mg)	
		Category 1		Category 2		Category 1		Category 2		Category 1	
		Commercial	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	Recreational	Commercial	Recreational
Credit Balances before Averaging:											
	Credits acquired via trading activity										
	Credits banked from prior model years										
	Current MY Credits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Credit Usage and Averaging:											
	Apply credits acquired via trade										
	Apply banked credits										
	Apply Category 1 credits to Category 2 credit balance*										
	Category 1 credits applied to Category 2 (with 25% discount)			0.00	0.00			0.00	0.00		
Credit Balances after Averaging:											
	Remaining Credits (acquired via trading activity)										
	Remaining Credits (banked from prior MYs)										
	Final Credit Balance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

*Category 1 credits that are applied to a Category 2 credit balance are discounted by 25% (this discount is reflected in the Final Part 94 Credit Balances)

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Manufacturer Data Submission Template -- INSTRUCTIONS

I. About

Manufacturers subject to the Marine Compression-Ignition (CI) standards under 40 CFR Parts 94 or 1042 may opt to participate in the Averaging, Banking and Trading (ABT) program (see: 40 CFR §1042.701 through §1042.745, and 40 CFR §94.301 through §94.310). If they choose to participate in the program, manufacturers must track the implementation of these provisions based on the model year and the pollutant (e.g., NO_x) level to which the engine family is certified. In order to help streamline and standardize the process by which manufacturers submit information related to credits under the ABT program, EPA has created an Excel-based template that can be used by manufacturers to organize, present, and submit their ABT data.

II. General Information

Before entering data, it is important to ensure that the Excel file is set up to automatically calculate the data. To ensure that the data are calculated immediately upon entry, go to the Tools menu and select Options. In the window that appears, select the Calculations tab. In this tab, the option "Automatic" should be selected. In Excel 2007, this is found by clicking the Microsoft Office Button, then clicking the Excel Options button. Select the Formulas category and verify that the "Automatic" radio button is selected under the Calculation Options: Workbook Calculation section.

Also, note that the drag and drop option should not be used to copy or move data entered in the worksheet since doing so will change how the cells are referenced in the formulas and may lead to erroneous calculations. In order to prevent this from occurring inadvertently, go to the Tools menu and select Options. In the window that appears, select the "Edit" tab and remove the check mark from the "Allow cell drag and drop" box. In Excel 2007, this option is found by clicking the Microsoft Office Button, then clicking the Excel Options button. Select the Advanced category and remove the check mark from the "Enable fill handle and cell drag-and-drop" box under the "Editing options" section.

International users should ensure that the settings for number handling are consistent with the template. If your system is currently set up to use a comma for the decimal separator and a period for the thousands separator, you must temporarily modify the settings for number handling to avoid errors within the automatic calculations. To modify these settings, go to the Tools menu and select Options. In the window that appears, select the International tab. Within this tab, remove the check mark within the "Use system separators" box in the section at the top entitled "Number handling." At this point, you may insert a period as the decimal separator and a comma as the thousands separator. In Excel 2007, this option is found by clicking the Microsoft Office button, then clicking the Excel Options button. Select the Advanced category and remove the check mark from the "Use system separators" box under the "Editing options" section. At this point, you may insert a period as the Decimal separator and a comma as the Thousands separator.

These worksheets are protected and as a result, you may navigate around the unlocked (i.e., data entry) cells using the arrow keys on your keyboard. However, to view the entire spreadsheet including the calculated cells and the credit totals below the data entry rows, you should navigate using the scroll bars at the bottom and right side of the worksheet. Using the scroll bars will allow you to view cells that cannot be selected.

III. Reporting Template

This Excel file contains five worksheets: "Current MY Credit Calc," "Field Descriptions," "Power Calc," "Summary," and "Instructions."

- **Current MY Credit Calc:** This worksheet contains 15 fields, which apply to all of the information required to track credit balances for the Marine CI averaging sets. The user should first input data into the two fields (Model Year and Manufacturer) found above the main table. In the main table, the first 11 columns are the fields that require data entry or input from the manufacturer. The next column (Credit Balance) is a calculated value based on the data entered and cannot be modified manually, as indicated by the light green highlight. There is one additional column (Messages) to the right of this column. This column is automatically populated with a brief note if the model year is inconsistent with the first character of the engine family name, or if the Tier selection is inconsistent with selected 40 CFR Part & Engine Category and/or Pollutant. It is the user's responsibility to ensure that the Groups selected are consistent with the model year in which they apply. The credit totals are displayed in a summary table below the data entry cells.
- **Power Calc:** This worksheet calculates the production-weighted average power for an engine family name. The Cumulative Production Volume and Average Power in kW are both calculated based on the data entered for each configuration. The Average Power value corresponding to the final configuration for a particular engine family represents the power value used in the emission credit calculation (Current MY Credit Calc worksheet). For each line item, the user must enter the following fields: Engine Family Name, Configuration, Maximum Power Rating (in kW) and Production Volume. **Note that the user must leave a blank line item between the list of configurations for separate engine families in order to ensure that the Average Power value associated with the last configuration listed is specific to a single engine family.**
- **Field Descriptions:** This worksheet contains detailed notes on each of the fields in the Current MY Credit Calc worksheet, including a description of the required data or information, how the data should be entered, the existence of any drop-down menus, and any other information that would be relevant to that field (including whether the field is a calculated value based on preceding entries in the spreadsheet).
- **Summary:** This worksheet provides an overall summary of the Part 1042 NO_x, NO_x+HC and PM credits and the Part 94 NO_x, THC+NO_x and PM credits that have been calculated from the first worksheet and allows the manufacturer to enter in credit trades and credits from previous model years so that these credits can be properly applied and compared to current model year credits. This worksheet allows the manufacturer to outline how credits will be used to document compliance with the standards.

IV. Entering Data for the Current Model Year

The user should first enter in the Model Year and Manufacturer in the appropriate fields above the main table. Using the second worksheet ("Field Descriptions") as a guide, enter in the appropriate information for each data element in the first 11 columns of the "Current MY Credit Calc" worksheet. The "Credit Balance" column includes a calculated value based on the information and data entered in the previous columns. Each engine family (or portion of each engine family) that is subject to a specific standard or averaging set, should have its own separate line item entry. Some fields have drop-down menus that provide specific choices. Note that if the value used for "Power" is based on multiple configurations, use the "Power Calc" worksheet to calculate the production-weighted value for the engine family.

It is the user's responsibility to ensure that the Engine Category, Power, FEL, Standard, and other fields are both accurate and compatible. The Messages column to the right of the credit calculations provides additional information in the event that the first digit in the Engine Family Name does not match the Model Year. The Messages column will also indicate if the Tier selection is inconsistent with selected 40 CFR Part & Engine Category and/or Pollutant. Note that any extra rows that do not contain any data, can be left blank. If additional rows are needed, please contact EPA for a revised form and specify how many entries/rows will be required.

Directly below the table, the current model year credit totals are provided. These are calculated separately by 40 CFR Part (1042 or 94) for each Engine Category (Category 1- Commercial, Category 1- Recreational, and Category 2), and subtotaled by parameter (NO_x, NO_x+HC, THC+NO_x, and PM Credits). Positive credit values are displayed in black, bold font, and negative credit values are displayed within parentheses in red font. As described below, any traded credits (purchased or sold), may be listed in the "Summary" worksheet and applied to current model year balances as needed.

V. Summary of Credits

The "Summary" worksheet contains a summary of all NO_x, NO_x+HC, THC+NO_x and PM credits (banked, traded, and current model year credits) with separate sections for Parts 94 and 1042. This worksheet allows for the application of these credits to current model year balances. The initial step requires the entry of carryover or traded credit balances. The application and averaging of these existing credits with current model year credits is summarized in the second step below. In this worksheet, any cells that are highlighted in yellow or orange are automatically populated based on information in the "Current MY Credit Calc" worksheet or from the calculation of credits within the "Summary" worksheet.

In the "Credit Balances Before Averaging" section, enter any traded and carryover (banked) credit balances. Note that current model year credits are automatically populated in this summary sheet based on data entered and calculated within the "Current MY Credit Calc" worksheet. Next, using the existing balances (as included in the "Credit Balances before Averaging" section), indicate in the "Credit Usage and Averaging" section, the number of traded or banked credits that should be applied to the current model year credit balances. Ensure that credits are applied within the corresponding averaging set. For Part 1042, the "Credit Usage and Averaging" section allows for the exchange of credits between NO_x+HC and NO_x. For Parts 94 and 1042, this section allows for the application of Category 1 credits to the corresponding Category 2 credit balance. The 25 percent discount is reflected in the corresponding final credit balance for Category 2.

The "Credit Balances after Averaging" section of the worksheet is automatically populated with the credit balances based on the application of credits in the preceding section. The final credit totals in this section display the remaining traded and banked credits (i.e., the banked/traded balances before averaging reduced by the number of credits actually "applied" to the final balance) as well as the Final Credit Balances, which reflect the corresponding Current MY credit balances plus any credits "applied" to the balance in the preceding section.

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