Environmental Protection Agency

APPENDIX II TO PART 600—SAMPLE FUEL ECONOMY CALCULATIONS

(a) This sample fuel economy calculation is applicable to 1978 through 1987 model year automobiles.

(1) Assume that a gasoline-fueled vehicle was tested by the Federal Emission Test Procedure and the following results were calculated:

\[ HC = 0.139 \text{ grams/mile} \]
\[ CO = 1.59 \text{ grams/mile} \]
\[ CO_2 = 317 \text{ grams/mile} \]

According to the procedure in §600.113–78, the city fuel economy or MPG, for the vehicle may be calculated by substituting the HC, CO, and CO_2 grams/mile values into the following equation:

\[ \text{MPG}_c = \frac{2421}{0.866 \times HC + (0.429 \times CO) + (0.273 \times CO_2)} \]
\[ \text{MPG}_c = \frac{2421}{0.866 \times 1.39 + (0.429 \times 1.59) + (0.273 \times 317)} \]

\[ \text{MPG}_c = 27.7 \]

(2) Assume that the same vehicle was tested by the Federal Highway Fuel Economy Test Procedure and calculation similar to that shown in paragraph (a) by this appendix resulted in a highway fuel economy or MPG, of 36.9. According to the procedure in §600.113, the combined fuel economy (called MPG_{comb}) for the vehicle may be calculated by substituting the city and highway fuel economy values into the following equation:

\[ \text{MPG}_{c/h} = \frac{1}{\frac{0.55}{\text{MPG}_c} + \frac{0.45}{\text{MPG}_h}} \]
\[ \text{MPG}_{c/h} = \frac{1}{\frac{0.55}{27.7} + \frac{0.45}{36.9}} \]

\[ \text{MPG}_{c/h} = 31.2 \]

(b) This sample fuel economy calculation is applicable to 1988 and later model year automobiles.

(1) Assume that a gasoline-fueled vehicle was tested by the Federal Emission Test Procedure and the following results were calculated:

\[ HC = 0.139 \text{ grams/mile} \]
\[ CO = 1.59 \text{ grams/mile} \]
\[ CO_2 = 317 \text{ grams/mile} \]

(2) Assume that the test fuel used for this test had the following properties:

\[ SG = 0.745 \]
\[ CWF = 0.868 \]
\[ NHV = 18,478 \text{ Btu/lb} \]

(3) According to the procedure in §600.113–08, the city fuel economy or MPG, for the vehicle may be calculated by substituting the HC, CO, and CO_2 gram/mile values and the SG, CWF, and NHV values into the following equation:

\[ \text{MPG}_c = \frac{(5174 \times 10^4 \times \text{CWF} \times \text{SG}) / (((\text{CWF} \times HC) + (0.429 \times CO) + (0.273 \times CO_2)) (0.6 \times \text{SG} \times \text{NHV}) + 5471)} \]

Example:

\[ \text{MPG}_c = \frac{(5174 \times 10^4 \times 0.868 \times 0.745) / ((0.868 \times 0.139 + 0.429 \times 1.59 + 0.273 \times 317)(0.6 \times 0.745 \times 18,478 + 5471))}{27.9} \]

(4) Assume that the same vehicle was tested by the Federal Highway Fuel Economy Test Procedure and a calculation similar to that shown in (b)(3) of this section resulted in a highway fuel economy of MPG, of 36.9. According to the procedure in §600.210–08(c) or §600.210–12(c), the combined fuel economy (called MPG_{comb}) for the vehicle may be calculated by substituting the city and highway fuel economy values into the following equation:

\[ \text{MPG}_{c/h} = \frac{1}{\frac{0.55}{\text{MPG}_c} + \frac{0.45}{\text{MPG}_h}} \]
\[ \text{MPG}_{c/h} = \frac{1}{\frac{0.55}{27.9} + \frac{0.45}{36.9}} \]

\[ \text{MPG}_{c/h} = 31.2 \]
fuel economy values into the following equation:

\[
\text{MPG}_{\text{eq}} = \frac{1}{0.55 \cdot \text{MPG}_b + 0.45 \cdot \text{MPG}_h}
\]

\[
\text{MPG}_{\text{eq}} = \frac{1}{27.9 \cdot 36.9}
\]

\[
\text{MPG}_{\text{eq}} = 31.3
\]


APPENDIX III TO PART 600—SAMPLE FUEL ECONOMY LABEL CALCULATION

Suppose that a manufacturer called Mizer Motors has a product line composed of eight car lines. Of these eight, four are available with the 3.0 liter, 6 cylinder, sequential multi-point fuel injection, 4-valve per cylinder, and 3-way catalyst engine. These four car lines are:

- Ajax
- Boredom III
- Dodo
- Castor (Station Wagon)

A. A car line is defined in subpart A (with additional guidance provided in EPA Advisory Circular 89) as a group of vehicles within a make or division which has a degree of commonality in construction. Car line does not consider any level of decor or opulence and is not generally distinguished by such characteristics as roofline, number of doors, seats, or windows. Station wagons and light duty trucks are, however, identified separately from the remainder of each car line. In other words, a Castor station wagon would be considered a different car line than the normal Castor car line made up of sedans, coupes, etc.

B. The engine considered here is defined as a basic engine in subpart A of this part (with additional guidance provided in EPA Advisory Circular 83A). A basic engine is a unique combination of manufacturer, engine displacement, number of cylinders, fuel system, catalyst usage and other engine and emission control system characteristics specified by the Administrator. A model type is a unique combination of car line, basic engine, and transmission class. Thus Ajax is a car line but Ajax 3.0 liter, 6 cylinder manual four-speed transmission is a model type whereas Ajax 3.0 liter, 6 cylinder automatic three-speed transmission is a different model type.

C. The following calculations provide an example of the procedures described in subpart C of this part for the calculation of vehicle configuration and model type fuel economy values. In order to simplify the presentation, only city fuel economy values are included (as determined by either the derived 5-cycle method or vehicle-specific 5-cycle based method). The procedure is identical for highway and combined fuel economy values.

Step I. Input data as supplied by the manufacturer or as determined from testing conducted by the Administrator.

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<thead>
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<th>Test vehicle carline</th>
<th>Engine code</th>
<th>Trans</th>
<th>Inertia weight</th>
<th>Axle ratio</th>
<th>Harmonically averaged, city MPG</th>
<th>Specific label MPG</th>
<th>Vehicle config. sales</th>
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</thead>
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<td>16.1001</td>
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<tr>
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<td>A-3</td>
<td>4000</td>
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<tr>
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<td>10.6006</td>
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<td>40,000</td>
</tr>
</tbody>
</table>

1 The vehicle configuration fuel economy values, rounded to the nearest mile per gallon, are the fuel economy values that would be used on specific labels for that vehicle configuration.

Step II. Group vehicle fuel economy and sales data according to base level combinations within this basic engine.