

Technical Supplement for On-Road Equipment

Texas Commission on Environmental Quality (TCEQ)

Texas Emissions Reduction Plan (TERP)

Texas Hydrogen Infrastructure, Vehicle, and Equipment (THIVE)
Grant Program



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Summary

This technical supplement contains instructions for calculating the NO_x emissions reductions and the cost per ton of NO_x reduced for the replacement of on-road heavy-duty motor vehicles under the Texas Hydrogen Infrastructure, Vehicle, and Equipment Grant Program (THIVE). Applicants are not required to calculate these values; however, it is recommended that applicants perform these calculations to have an idea of the score the project may be assigned in the selection process. THIVE is a competitive grant round and projects with the lowest cost per ton of NO_x reduced and the highest NO_x emissions reductions will score more points than other projects. For more details about the scoring criteria, please see the THIVE Request for Grant Applications (RFGA).

The steps in this technical supplement are generally the same steps that will be used by TERP to determine the NO_x emissions reductions and the cost per ton of NO_x reduced by the project. There may be instances where more specific information on emissions and emissions rates are available. In those instances, the TCEQ may use that information instead of the emissions standards listed in this technical supplement.

The calculations are divided into the five main steps listed below.

- Step 1: Determine the NO_x emission rates for the old and new vehicles.
- Step 2: Check the 25% NO_x emissions reduction requirement.
- Step 3: Convert the emission rates to grams per mile (g/mile) and apply the [Texas Low Emission Diesel \(TxLED\)](#) correction factor (where appropriate).
- Step 4: Calculate the NO_x emissions reductions.
- Step 5: Calculate the cost per ton of NO_x reduced.

These steps are explained in the following instructions. Applicants can use the worksheets provided at the end of this technical supplement (Appendix A) in conjunction with these instructions to complete the calculations on their own. Alternatively, applicants can visit www.terpgrants.org for calculator tools that can be used in completing the calculations.

Step 1: Determine the NO_x emission rates for the old and new vehicles

The Texas Emissions Reduction Plan (TERP) uses the Environmental Protection Agency's (EPA) and the California Air Resource Board (CARB) vehicle emissions standards as the basis for emissions reductions standards. In most cases, the provided instructions will help in determining the NO_x emission standard for a vehicle. Should an applicant have any difficulty determining an emission factor, they can contact TERP for assistance.

Applicants will need a few pieces of information about their new and old vehicles to determine the NO_x emissions for each vehicle. Instructions are provided below for heavy-duty vehicles, including what information is needed. Heavy-duty vehicles are those with a GVWR of 8,501 lbs. or more and certified to a heavy-duty emission standard. If an applicant is unsure about the GVWR of their vehicle, the easiest place to locate it is via a sticker placed in the door jamb of the driver's side of the vehicle. Alternatively, this information can be obtained from a vendor, manufacturer, or other resources. If the vehicle's GVWR is between 8,501 lbs. and 10,000 lbs., it may be necessary to check the vehicle's engine plate to determine if the vehicle was certified to a light-duty or heavy-duty standard. Examples of heavy-duty and light-duty engine plates are provided in Appendix C.

Heavy-Duty Vehicles

Heavy-duty vehicle emissions are regulated by the engine in the vehicle rather than the complete vehicle. This means that in order to lookup the emission standard for an on-road heavy-duty vehicle, information about the engine itself is needed. The federal heavy-duty vehicle emissions standards are primarily designated by the combustion type of a vehicle's engine (spark ignition or compression ignition) and the year of manufacture for that engine. For reference, spark ignition engines are those that use spark plugs to ignite the fuel, such as in gasoline engines or natural gas engines, and compression ignition engines rely solely on the compression of the fuel to ignite it, such as in diesel engines. In some cases, engines are certified to emit a different amount of NO_x than the otherwise applicable standard for that engine. These engines have an EPA-certified Family Emission Limit (FEL).

In order to look up the applicable emission standard for an on-road heavy-duty vehicle, the following information is needed. This information should be readily available on a plate or sticker mounted on the engine. If this plate or sticker is missing or damaged, it may be necessary to contact the engine manufacturer or a local vendor for assistance in obtaining this information.

- Engine manufacture year.
- Fuel type of the vehicle (compression ignition or spark ignition).
- The engine family code, generally applicable to vehicles produced after 2002.

There are two ways an applicant can lookup up the NO_x emission standard for their heavy-duty vehicle's engine: by engine family code or by looking up the default standard for that year. Where possible, applicants should use the engine family code to lookup the emissions standard, as this will provide the most accurate standard for that engine and will reveal if an engine has an FEL. When an engine has an FEL, this is the emissions standard for that vehicle. Please be aware that for engines produced prior to 2003, there may not be an engine family code for that engine.

Applicants can use the following websites to look up the engine family code information for their engine. Please note that these websites are not intuitive, and applicants are encouraged to contact TERP in the event additional assistance is needed.

- EPA Annual Certification Data for Vehicles -

<https://www.epa.gov/compliance-and-fuel-economy-data/annual-certification-data-vehicles-engines-and-equipment>

Note: Use the spreadsheets listed under Heavy-Duty Highway Gasoline and Diesel Engines. These spreadsheets will only demonstrate if an engine family code exists and if there is an FEL. Please follow the instructions in looking up the default emission standard if the engine does not have an FEL.

- California Air Resource Board On-Road New Vehicle & Engine Certification Program -

<https://ww3.arb.ca.gov/msprog/onroad/cert/cert.php#6>

Note: This site does not contain all engine family codes that the EPA has issued.

If an engine family code is not available, the emission standards for an engine can be looked up in Tables B.2 and B.3 in Appendix B using the engine manufacture year and the fuel type of the vehicle. Please note that for engines manufactured between 2006-2009, the EPA permitted engine manufacturers a period to phase-in a lower emission standard. Engines manufactured during these years will need to be looked up by engine family code as there is not an applicable standard for these years.

For new zero-emission vehicles, a factor of 0 (zero) should be used for the emission rate. Applicants choosing an alternative NO_x emission standard should check with a vendor to be sure they can purchase a vehicle that can meet that chosen standard.

Step 2: Check the 25% NO_x emissions reduction requirement

The replacement vehicle must be certified to a NO_x emission rate that is at least 25% less than the certified NO_x emissions rate of the vehicle being replaced. Use the worksheets in Attachment 1 to determine if the activity meets the minimum emission reduction requirements. Provided below are examples of the calculations used to determine if an activity meets a 25% reduction in NO_x emissions.

$$\frac{\text{Old Vehicle Emission Rate} - \text{New Vehicle Emission Rate}}{\text{Old Vehicle Emission Rate}} \times 100 = \text{Emission Rate Reduction (\%)}$$

Example calculation for determining 25% NO_x emission rate reduction for replacements

Activity: Replacement of a 1987 diesel heavy-duty vehicle with a 2023 hydrogen fuel cell heavy-duty vehicle.

Original engine emission standard: 10.7 g/bhp · hr

Replacement engine emission standard: 0.0 g/bhp · hr

Calculation of emission rate reduction:

$$\frac{10.7 \text{ g/bhp} \cdot \text{hr} - 0.0 \text{ g/bhp} \cdot \text{hr}}{10.7 \text{ g/bhp} \cdot \text{hr}} \times 100 = 100\% \text{ baseline emission rate reduction}$$

Note: This activity would meet the 25% emission rate reduction requirement.

Step 3: Convert the emission rates to grams per mile (g/mile) and apply the TxLED correction factor (where appropriate)

The NO_x emissions of heavy-duty engines are certified in grams per brake horsepower-hour (g/bhp · hr). In order to perform the emissions reduction calculations, the emissions rate in g/bhp · hr must be converted to grams per mile (g/mile). Conversion factors in brake horsepower-hour per mile (bhp · hr/mile) are provided in Table B.4, by model year. If the NO_x emission rate is in g/bhp · hr, the NO_x emission rate must be multiplied by this factor to convert it to g/mile.

The TCEQ adopted rules (30 TAC §114.312 - §114.319) requiring that beginning on October 1, 2005, diesel fuel produced for use in compression-ignition engines in certain counties in Texas must meet new low emission diesel (TxLED) standards. The TERP eligible counties are all affected by this standard except for El Paso, Howard, and Hutchinson counties. To account for the emissions reductions associated with lower emission diesel fuel, a factor of 0.943 should be applied to all diesel emission factors, regardless of when the vehicle came into service or will come into service. For the THIVE Program, this factor should be applied to old vehicles that use diesel fuel.

Provided below are examples of the calculations used to convert g/bhp · hr to g/mile, along with incorporating the TxLED factor where appropriate.

$$\text{Emission Rate (g/bhp} \cdot \text{hr)} \times \text{Conv. factor (bhp} \cdot \text{hr/mile)} \times \text{TxLED factor}^* \\ = \text{Emission Rate (g/mile)}$$

* TxLED factor only used for old diesel vehicles, omit otherwise

Example calculation for converting g/bhp · hr to g/mile

Activity: Replacement of a 1987 diesel heavy-duty vehicle with a 2023 hydrogen fuel cell heavy-duty vehicle.

Vehicle weight rating: 80,000 lbs.

Old vehicle emission standard: 10.7 g/bhp · hr

New vehicle emission standard: 0.0 g/bhp · hr

Old vehicle conversion factor: 3.13 bhp · hr/mile

New vehicle engine conversion factor: 3.03 bhp · hr/mile

TxLED correction factor: 0.943

Old Vehicle NO_x emission factor converted to g/mile

$$10.7 \text{ (g/bhp} \cdot \text{hr)} \times 3.13 \text{ (bhp} \cdot \text{hr/mile)} \times 0.943 = 31.582 \text{ (g/mile)}$$

New Vehicle NO_x emission factor converted to g/mile

$$0.0 \text{ (g/bhp} \cdot \text{hr)} \times 3.03 \text{ (bhp} \cdot \text{hr/mile)} = 0.0 \text{ (g/mile)}$$

Step 4: Calculate the NO_x emissions reductions

Calculating the NO_x emissions reductions requires some of the information that has been calculated or gathered in the previous steps plus some additional information. The following is needed to calculate the NO_x emissions reductions.

- The emissions factors calculated in Step 3 for the new and old vehicles in g/mile.
- The default annual mileage for the old vehicle.
 - Use the old vehicle's GVWR to look up the default annual mileage in Table B.5
- The percentage of time in area that the applicant will commit to use the replacement/new vehicle in the non-attainment or affected counties (e.g., 75%, 95%).
- The length of the activity life of the project which is always 5 years for the THIVE program.
- A conversion factor to convert grams to tons which is 907,200 grams in a U.S. standard ton.

NO_x emissions reductions are calculated in tons and should be rounded to 4 decimal places at the end of the calculation, should rounding be needed. The formula for the NO_x emissions reduction calculation is shown below followed by an example calculation.

The THIVE Program is a competitive grant round and one of the factors utilized in the grant selection process is total NO_x emissions reductions. The higher the NO_x emissions of the project, the more competitive the grant application may be.

$$\text{Old vehicle emissions factor (g/mile)} - \text{New vehicle emissions factor (g/mile)} \\ = \text{Reduced emissions factor (g/mile)}$$

$$\text{Reduced emissions factor (g/mile)} \times \text{Default annual milage (miles/year)} \\ = \text{Emissions per year (g/year)}$$

$$\text{Emissions per year (g/year)} \times \text{Usage in area(\%)} = \text{Area emissions per year (g/year)}$$

$$\text{Area emissions per year (g/year)} \div \text{Conv. factor (g/ton)} \\ = \text{Area emissions per year (tons/year)}$$

$$\text{Area emissions per year (tons/year)} \times \text{Activity life (years)} = \text{Total emissions (tons)}$$

Example calculation for NO_x emission reductions

Activity: Replacement of a 1987 diesel heavy-duty vehicle with a 2023 hydrogen fuel cell heavy-duty vehicle.

Old vehicle NO_x emission factor: 31.582 g/mile

New vehicle NO_x emission factor: 0.0 g/mile

Default mileage: 60,000 miles/year

Percent time in eligible counties: 75%

Unit Conversion Factor: 907,200 g/ton
Activity Life: 5 Years

$$31.582 \text{ g/mile} - 0.0 \text{ g/mile} = 31.582 \text{ g/mile}$$

$$31.582 \text{ g/mile} \times 60,000 \text{ miles/year} = 1,894,920 \text{ g/year}$$

$$1,894,920 \text{ g/year} \times 0.75 = 1,421,190 \text{ g/year}$$

$$1,421,190 \text{ g/year} \div 907,200 \text{ g/ton} = 1.5666 \text{ tons/year}$$

$$1.5666 \text{ tons/year} \times 5 \text{ years} = 7.8330 \text{ tons}$$

Step 5: Calculate the cost per ton of NO_x reduced

The cost per ton for an activity is determined by dividing the requested grant amount for that activity by the total NO_x emissions reductions. Keep in mind that the requested grant amount is at the discretion of the applicant, but it cannot exceed 100% of the incremental cost of the new vehicle for replacement and repower projects (See Section 3.2 of the THIVE RFGA for details). Since the THIVE Program can involve multiple activities in a single application, the cost per ton calculation is based on the aggregate NO_x emissions reductions for all activities divided by the aggregate requested grant amount. The formula for this calculation and some examples of this calculation are provided below. Please note that the cost per ton must be rounded to the nearest cent (i.e., no more than two decimal places).

The THIVE Program is a competitive grant round and one of the factors utilized in the grant selection process is the cost per ton of a project. The lower the cost per ton of the project, the more competitive the grant application may be.

$$\frac{\sum \text{Requested grant amounts for all vehicles}(\$)}{\sum \text{Emissions reductions for all vehicles}(tons)} = \text{Cost per ton} \left(\frac{\$}{ton} \right)$$

Example calculation for cost per ton

Activity: Replacement of a 1987 heavy-duty vehicle with a 2023 hydrogen fuel cell heavy-duty vehicle.

Requested grant amount: \$300,000

Total NO_x Reduced: 7.8330 tons

$$\$300,000 \div 7.8330 \text{ tons} = \$38,299.50/\text{ton}$$

Example cost per ton calculation for multiple activities.

Activity: Replacement of ten 1987 diesel heavy-duty vehicles with ten 2023 hydrogen fuel cell heavy-duty vehicles.

Requested grant amount: \$3,000,000

Total NO_x Reduced: 78.3300 tons

$$\$3,000,000 \div 78.3300 \text{ tons} = \$38,299.50/\text{ton}$$

Appendix A – Calculation Worksheet

Texas Hydrogen Infrastructure, Vehicle, and Equipment Grant Program

Worksheet THIVE-1 Heavy-Duty

This worksheet is provided to assist applicants in estimating the NO_x emissions reductions and cost per ton of NO_x reduced for each activity. See Worksheet THIVE-2 to calculate these values for the entire project.

Activity Information

What is the default mileage for your vehicle?	
What is the percent of usage in the eligible counties?	
What is the incremental cost of the vehicle?	
What is the requested grant amount for the activity?	
Old Engine Information	
Model Year:	
Gross Vehicle Weight Rating (GVWR):	
Emission Rate (g/bhp · hr):	
Conversion Factor (bhp · hr/mi): Note: If the vehicle certification is in g/mile then a conversion factor is not needed	
New Engine Information	
Model Year:	
Gross Vehicle Weight Rating (GVWR):	
Emission Rate (g/bhp · hr):	
Conversion Factor (bhp · hr/mi): Note: If the vehicle certification is in g/mile then a conversion factor is not needed	
Check the Emissions Rate Reduction	
Old Engine Emission Rate (g/bhp · hr):	
- New Engine Emission Rate (g/bhp · hr):	
= Difference (g/bhp · hr):	
÷ Old Engine Emission Rate (g/bhp · hr):	
x:	100
= Emission Rate Reduction (%): Note: Must be 25% or more	

Determine Old Engine NO_x Emission Rate (g/mile)	
Old Engine NO _x Emission Rate (g/bhp · hr):	
x TxLED Correction Factor:	0.943
= Corrected NO _x Emission Rate(g/bhp · hr):	
x Conversion Factor (bhp · hr/mi):	
= Converted Old Engine NO _x Emission Rate (g/mile):	
Determine New Engine NO_x Emission Rate (g/mile)	
New Engine NO _x Emission Rate (g/bhp · hr):	
x Conversion Factor (bhp · hr/mi):	
= Converted New Engine NO _x Emission Factor (g/mile):	
Calculate the NO_x Emissions Reductions	
Converted Old Engine NO _x Emission Factor (g/mile):	
- Converted New Engine NO _x Emission Factor (g/mile):	
= Grams per Mile Reduced (g/mile):	
x Default Annual Miles:	
x Percent within Eligible Counties (%):	
= Grams per Year Reduced (g/yr):	
÷ 907,200 Grams per Ton	907200
= Estimated Annual NO _x Emission Reduction (tons/yr):	
x Activity Life (years):	5
= Estimated Activity Life NO _x Emission Reductions (tons):	
Requested Grant Amount (\$) ÷ NO _x Emission Reductions (tons) = Cost Per Ton (\$):	
Eligibility Checks	
Is the requested grant amount less than or equal to 100% of the incremental cost?	
Does the new engine reduce emissions by at least 25%?	

**Texas Hydrogen Infrastructure, Vehicle, and Equipment Grant Program
Worksheet THIVE-2**

Project Cost Per Ton and NO_x Emissions Reductions

This worksheet is provided to assist applicants in calculating their project NO_x emissions reductions and cost per ton.

Activity Number	NO _x Reductions	Requested Grant Amount
Activity 1		
Activity 2		
Activity 3		
Activity 4		
Activity 5		
Activity 6		
Activity 7		
Activity 8		
Activity 9		
Activity 10		
Total		

Total Requested Grant Amount	Math Function	Total NO _x Reductions	Math Function	Project Cost Per Ton
	÷		=	

Appendix B – Tables

Table B.1 - EPA Heavy-Duty Vehicle Classifications

HDDV2b	Heavy-Duty Diesel Vehicle 2b	Vehicle between 8501 and 10,000 lbs GVWR
HDDV3	Heavy-Duty Diesel Vehicle 3	Vehicle between 10,001 and 14,000 lbs GVWR
HDDV4	Heavy-Duty Diesel Vehicle 4	Vehicle between 14,001 and 16,000 lbs GVWR
HDDV5	Heavy-Duty Diesel Vehicle 5	Vehicle between 16,001 and 19,500 lbs GVWR
HDDV6	Heavy-Duty Diesel Vehicle 6	Vehicle between 19,501 and 26,000 lbs GVWR
HDDV7	Heavy-Duty Diesel Vehicle 7	Vehicle between 26,001 and 33,000 lbs GVWR
HDDV8a	Heavy-Duty Diesel Vehicle 8a	Vehicle between 33,001 and 60,000 lbs GVWR
HDDV8b	Heavy-Duty Diesel Vehicle 8b	Vehicle between Greater than 60,000 lbs GVWR
HDDBT	Heavy-Duty Diesel Vehicle	Diesel Transit or Urban Buses
HDDBS	Heavy-Duty Diesel Vehicle	Diesel School Buses

Table B.2 - EPA Heavy-Duty Diesel Engine NO_x Emission Standards by Model Year

Diesel Engines Emission Standards

Year of Manufacture	NO _x Only (g/bhp · hr)	NO _x +NMHC (g/bhp · hr)
1989 and earlier	10.7	
1990	6.0	
1991-1997	5.0	
1998-2003	4.0	
2004 -2006	2.375	2.5
2007-2009 ¹	2.375 - 0.2	
2010+	0.2	

¹For these years, a phase-in program was in place to allow manufacturers flexibility in implementing the new 0.2 g/bhp · hr standard. Engines produced during these years will have varying standards.

Table B.3- EPA Heavy-Duty Spark-Ignition Engine NO_x Emission Standards by Model Year

Spark-Ignition Engines Emission Standards

Year of Manufacture	NO _x Only (g/bhp · hr)	NO _x +NMHC (g/bhp · hr)
1987 and earlier	10	
1988-1990	4.8	
1991-1997	4.0	
1998-2004	3.2	
2005-2007	1.0	2.5
2008+	0.2	

Table B.4 - Conversion Factors by Model Year and GVWR

Vehicle Class HDD2b Heavy-Duty Diesel Vehicles (8,501-10,000 lbs GVWR)	Vehicle Class HDDV3 Heavy-Duty Diesel Vehicles (10,001-14,000 lbs GVWR)	Vehicle Class HDDV4 Heavy-Duty Diesel Vehicles (14,001-16,000 lbs GVWR)	Vehicle Class HDDV5 Heavy-Duty Diesel Vehicles (16,001-19,500 lbs GVWR)
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Model Year	Conversion Factor (bhp · hr/mi)	Model Year	Conversion Factor (bhp · hr/mi)	Model Year	Conversion Factor (bhp · hr/mi)	Model Year	Conversion Factor (bhp · hr/mi)
2010+	1.09	2010+	1.25	2010+	1.46	2010+	1.57
2009	1.09	2009	1.25	2009	1.46	2009	1.57
2008	1.09	2008	1.25	2008	1.46	2008	1.57
2007	1.09	2007	1.25	2007	1.46	2007	1.57
2006	1.09	2006	1.25	2006	1.46	2006	1.57
2005	1.09	2005	1.25	2005	1.46	2005	1.57
2004	1.09	2004	1.25	2004	1.46	2004	1.57
2003	1.09	2003	1.25	2003	1.46	2003	1.57
2002	1.09	2002	1.25	2002	1.46	2002	1.57
2001	1.09	2001	1.25	2001	1.46	2001	1.57
2000	1.09	2000	1.25	2000	1.46	2000	1.57
1999	1.09	1999	1.25	1999	1.46	1999	1.57
1998	1.09	1998	1.25	1998	1.46	1998	1.57
1997	1.09	1997	1.25	1997	1.46	1997	1.57
1996	1.09	1996	1.25	1996	1.46	1996	1.57
1995	1.09	1995	1.25	1995	1.46	1995	1.59
1994	1.09	1994	1.25	1994	1.47	1994	1.60
1993	1.09	1993	1.25	1993	1.47	1993	1.61
1992	1.10	1992	1.25	1992	1.48	1992	1.62
1991	1.10	1991	1.25	1991	1.48	1991	1.64
1990	1.10	1990	1.25	1990	1.49	1990	1.65
1989	1.10	1989	1.25	1989	1.49	1989	1.66
1988	1.10	1988	1.25	1988	1.50	1988	1.68
1987	0.92	1987	1.76	1987	1.76	1987	1.76
1986	0.92	1986	1.76	1986	1.76	1986	1.76
1985	0.92	1985	1.76	1985	1.76	1985	1.76
1984	0.92	1984	1.76	1984	1.76	1984	1.76
1983	0.92	1983	1.76	1983	1.76	1983	1.76
1982	0.92	1982	1.76	1982	1.76	1982	1.76
1981	0.94	1981	1.76	1981	1.76	1981	1.76
1980	0.94	1980	1.76	1980	1.76	1980	1.76

Table B.4 Continued

Vehicle Class HDDV6 Heavy-Duty Diesel Vehicles (19,501-26,000 lbs GVWR)	Vehicle Class HDDV7 Heavy-Duty Diesel Vehicles (26,001-33,000 lbs GVWR)	Vehicle Class HDDV8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs GVWR)	Vehicle Class HDDV8b Heavy-Duty Diesel Vehicles (Greater Than 60,000 lbs GVWR)
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Model Year	Conversion Factor (bhp · hr/mi)	Model Year	Conversion Factor (bhp · hr/mi)	Model Year	Conversion Factor (bhp · hr/mi)	Model Year	Conversion Factor (bhp · hr/mi)
2010+	1.94	2010+	2.41	2010+	2.76	2010+	3.03
2009	1.94	2009	2.41	2009	2.76	2009	3.03
2008	1.94	2008	2.41	2008	2.76	2008	3.03
2007	1.94	2007	2.41	2007	2.76	2007	3.03
2006	1.94	2006	2.41	2006	2.76	2006	3.03
2005	1.94	2005	2.41	2005	2.76	2005	3.03
2004	1.94	2004	2.41	2004	2.76	2004	3.03
2003	1.94	2003	2.41	2003	2.76	2003	3.03
2002	1.94	2002	2.41	2002	2.76	2002	3.03
2001	1.94	2001	2.41	2001	2.76	2001	3.03
2000	1.94	2000	2.41	2000	2.76	2000	3.03
1999	1.94	1999	2.41	1999	2.76	1999	3.03
1998	1.94	1998	2.41	1998	2.76	1998	3.03
1997	1.94	1997	2.41	1997	2.76	1997	3.03
1996	1.94	1996	2.41	1996	2.76	1996	3.03
1995	1.95	1995	2.41	1995	2.78	1995	3.06
1994	1.95	1994	2.41	1994	2.81	1994	3.09
1993	1.96	1993	2.40	1993	2.83	1993	3.11
1992	1.96	1992	2.40	1992	2.85	1992	3.14
1991	1.96	1991	2.40	1991	2.87	1991	3.17
1990	1.97	1990	2.40	1990	2.90	1990	3.20
1989	1.97	1989	2.39	1989	2.92	1989	3.23
1988	1.98	1988	2.39	1988	2.95	1988	3.26
1987	1.87	1987	2.13	1987	2.99	1987	3.13
1986	1.87	1986	2.13	1986	2.99	1986	3.13
1985	1.88	1985	2.14	1985	3.01	1985	3.14
1984	1.89	1984	2.16	1984	3.04	1984	3.14
1983	1.91	1983	2.18	1983	3.06	1983	3.15
1982	1.93	1982	2.19	1982	3.09	1982	3.15
1981	1.99	1981	2.23	1981	3.11	1981	3.26
1980	2.06	1980	2.25	1980	3.06	1980	3.33

Table B.4 Continued

Vehicle Class HDDBT Heavy-Duty Diesel Vehicles (Diesel Transit or Urban Bus)		Vehicle Class HDDBS Heavy-Duty Diesel Vehicles (Diesel School Buses)	
Model Year	Conversion Factor (bhp · hr/mi)	Model Year	Conversion Factor (bhp · hr/mi)
2010+	4.03	2010+	2.99
2009	4.03	2009	2.99
2008	4.03	2008	2.99
2007	4.03	2007	2.99
2006	4.03	2006	2.99
2005	4.03	2005	2.99
2004	4.03	2004	2.99
2003	4.03	2003	2.99
2002	4.03	2002	2.99
2001	4.03	2001	2.99
2000	4.03	2000	2.99
1999	4.03	1999	2.99
1998	4.03	1998	2.99
1997	4.03	1997	2.99
1996	4.03	1996	2.99
1995	4.02	1995	2.93
1994	4.02	1994	2.88
1993	4.02	1993	2.82
1992	4.01	1992	2.77
1991	4.01	1991	2.71
1990	4.01	1990	2.70
1989	4.01	1989	2.69
1988	4.01	1988	2.67
1987	3.07	1987	1.62
1986	3.07	1986	1.62
1985	3.07	1985	1.62
1984	3.07	1984	1.62
1983	3.07	1983	1.62
1982	3.07	1982	1.62
1981	3.01	1981	1.61
1980	2.91	1980	1.60


Table B.5 - Default Annual Mileage

Vehicle Class	Default Miles
HDV2b (8,501-10,000 lb GVWR)	15,000
HDV3 (10,001-14,000 lb GVWR)	15,000
HDV4 (14,001-16,000 lb GVWR)	20,000
HDV5 (16,001-19,500 lb GVWR)	20,000
HDV6 (19,501-26,000 lb GVWR)	20,000
HDV7 (26,001-33,000 lb GVWR)	20,000
HDV8a (33,001-60,000 lb GVWR)	40,000
HDV8b (Greater than 60,000 lb GVWR)	40,000
HDV8b Haul Truck (Greater than 60,000 lb GVWR)	60,000
HDBT (Transit or Urban Bus)	35,000
HDBS (School Bus)	10,000

Appendix C - Figures

Figure 1 - Vehicle Emission Control Information (VECI) Labels

Example Emission Label for Some 2007 and Earlier Model Year Vehicles

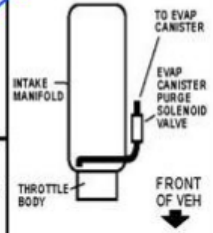


2007 MODEL YEAR
VEHICLE EMISSION CONTROL
INFORMATION
COMPANY'S NAME

NO ADJUSTMENTS NEEDED. SEE SERVICE MANUAL OR OWNERS MANUAL FOR MORE INFORMATION.

THIS VEHICLE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO NEW PASSENGER CARS AND CALIFORNIA REGULATIONS APPLICABLE TO NEW LEV2 PASSENGER CARS. THIS VEHICLE IS CERTIFIED TO OPERATE ON GASOLINE OR ON ETHANOL BLENDS FROM E0 TO E85. OBD II CERTIFIED.

Engine Family Name

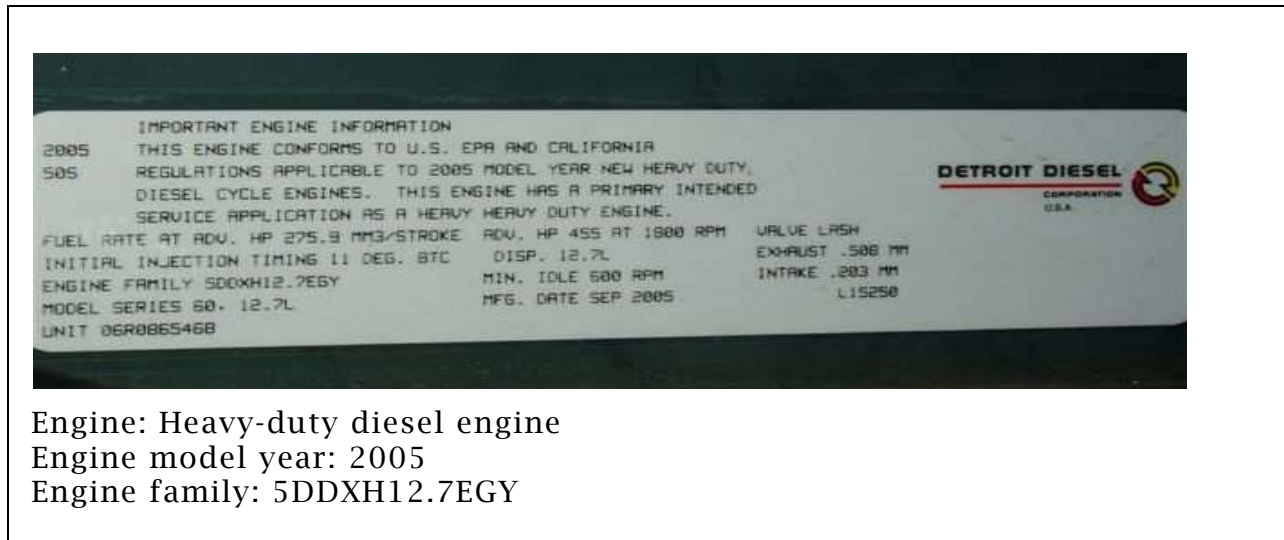


<i>Company's Trustmark</i>	Company's Name VEHICLE EMISSION CONTROL INFORMATION		
Conforms to regulations:		2008 MY	
U.S. EPA:	IT2B10LDT4	OBD: II	Fuel: Gasoline
California:	LEV II MDV6	OBD: II	Fuel: Gasoline
No adjustments needed.		TWC/HO2S/EGR/SFI	
EVAP:	8 VEHR0240ABC	gal	Standard Fuel Tank: 26/27
	8 VEHR0240ABD	gal	Option Fuel Tank: 35.7
Group	8 VEHT05.8ABC	<i>Part # Bar Code Here</i>	Label Part Number

Test Group Name

Source: <https://www.epa.gov/importing-vehicles-and-engines/locating-vehicle-emissions-label>

Figure 2 – Example of a Heavy-Duty Engine Emission Label



Engine: Heavy-duty diesel engine
Engine model year: 2005
Engine family: 5DDXH12.7EGY