

## How to Identify Low NO<sub>x</sub> Certified Engines Diesel Emissions Reduction Act (DERA) Grants Fact Sheet

In 2013, the California Air Resources Board (CARB) established Optional Low NO<sub>x</sub> Emission Standards for heavy-duty engines. There are currently three low NO<sub>x</sub> standards that an engine can be certified by CARB to meet: 0.02 g/bhp-hr, 0.05 g/bhp-hr, or 0.10 g/bhp-hr. Under the DERA program, a replacement vehicle whose engine is certified to meet a CARB low NO<sub>x</sub> standard can be funded at 35% (compared to the 25% funding for a replacement vehicle whose engine meets the EPA NO<sub>x</sub> emission standard, which is 0.20 g/bhp-hr). In some cases, engines may test at emission levels at or below the Optional Low NO<sub>x</sub> Emission Standards, but they are not certified by CARB to meet the low NO<sub>x</sub> standard. In these cases, EPA will only provide funding at 25% for a replacement vehicle.

There are currently no diesel fueled engines certified to meet the low NO<sub>x</sub> standard; all low NO<sub>x</sub> certified engines are natural gas or liquified petroleum gas (propane) fueled engines. However, not all new natural gas or propane engines are certified to the low NO<sub>x</sub> standard.

To determine if an engine has been certified by CARB to meet the Optional Low NO<sub>x</sub> Emission Standards, look at the [CARB Executive Order \(EO\)](#) certifying that engine. Halfway down the first page, there should be a table with information about the emissions levels the engine tested at and the emissions levels the engine is certified to. The example below demonstrates an engine certified to meet the Optional Low NO<sub>x</sub> Emission Standards.

| in<br>g/bhp-hr | NMHC  |       | NO <sub>x</sub> |       | NMHC+NO <sub>x</sub> |     | CO   |      | PM   |       | HCHO |     |
|----------------|-------|-------|-----------------|-------|----------------------|-----|------|------|------|-------|------|-----|
|                | FTP   | SET   | FTP             | SET   | FTP                  | SET | FTP  | SET  | FTP  | SET   | FTP  | SET |
| STD            | 0.14  | 0.14  | 0.02            | 0.02  | *                    | *   | 15.5 | 15.5 | 0.01 | 0.01  | *    | *   |
| CERT           | 0.004 | 0.000 | 0.01            | 0.000 | *                    | *   | 1.5  | 0.3  | 0.01 | 0.000 | *    | *   |
| NTE            | 0.21  |       | 0.03            |       | *                    |     | 19.4 |      | 0.02 |       | *    |     |

<sup>4</sup> g/bhp-hr=grams per brake horsepower-hour; FTP=Federal Test Procedure; SET= Supplemental emissions testing; NTE=Not-to-Exceed; STD=standard or emission test cap; FEL=family emission limit; CERT=certification level; NMHC/HC=non-methane/hydrocarbon; NO<sub>x</sub>=oxides of nitrogen; CO=carbon monoxide; PM=particulate matter; HCHO=formaldehyde

**BE IT FURTHER RESOLVED:** That the listed engine family is certified to the Optional Low NO<sub>x</sub> Emission Standards as specified in 13 CCR 1956.8(a)(2)(A) and section 11.B.7 of the incorporated "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy Duty Diesel-Engines and Vehicles" adopted December 12, 2002, as last amended September 1, 2017.

The highlighted box in the NO<sub>x</sub>-FTP column and STD row in the table above lists the NO<sub>x</sub> standard to which the engine is certified. If the number matches one of the three low NO<sub>x</sub> standards (0.02 g/bhp-hr, 0.05 g/bhp-hr, or 0.10 g/bhp-hr) then it is certified to the low NO<sub>x</sub> standard. The EO for a low NO<sub>x</sub>-certified engine will also state under the table that the engine is certified to the low NO<sub>x</sub> standard (highlighted above).

It is important to note that some engines may test at emission levels at or below the low NO<sub>x</sub> standards but are NOT certified to meet the low NO<sub>x</sub> standards. The example below demonstrates an engine certified to meet EPA's NO<sub>x</sub> emission standard of 0.20 (represented in box in the NO<sub>x</sub>-FTP column and STD row), even though the engine tested at emission levels below the Optional Low NO<sub>x</sub> Emission Standards (represented in the box in the NO<sub>x</sub>-FTP column and CERT row). The standard that the engine is certified to is always listed in the STD row, FTP column. Further, the paragraph below the table does not specifically state that this engine has been certified to the Optional Low NO<sub>x</sub> Emission Standards.

| in<br>g/bhp-hr | NMHC   |       | NOx  |      | NMHC+NOx |     | CO   |      | PM     |        | HCHO |     |
|----------------|--------|-------|------|------|----------|-----|------|------|--------|--------|------|-----|
|                | FTP    | SET   | FTP  | SET  | FTP      | SET | FTP  | SET  | FTP    | SET    | FTP  | SET |
| STD            | 0.14   | 0.14  | 0.20 | 0.20 | *        | *   | 15.5 | 15.5 | 0.01   | 0.01   | *    | *   |
| CERT           | 0.0004 | 0.001 | 0.06 | 0.05 | *        | *   | 0.1  | 0.00 | 0.0001 | 0.0002 | *    | *   |
| NTE            | 0.21   |       | 0.30 |      | *        |     | 19.4 |      | 0.02   |        | *    |     |

<sup>4</sup> g/bhp-hr=grams per brake horsepower-hour; FTP=Federal Test Procedure; SET=Supplemental emissions testing; NTE=Not-to-Exceed; STD=standard or emission test cap; FEL=family emission limit; CERT=certification level; NMHC/HC=non-methane/hydrocarbon; NOx=oxides of nitrogen; CO=carbon monoxide; PM=particulate matter; HCHO=formaldehyde;

**BE IT FURTHER RESOLVED:** The manufacturer has demonstrated compliance with the Greenhouse Gas Emission Standards as specified in Title 13 CCR 1956.8 and the incorporated "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy Duty Diesel-Engines and Vehicles" (HDDE Test Procedures) adopted December 12, 2002, as last amended September 1, 2017 using the 2014 model year National Heavy-Duty Engine and Vehicle Greenhouse Gas Program as specified in Section 1036.108 of the HDDE Test Procedures. **The manufacturer has submitted the required information and therefore has met the criteria necessary to receive a California Executive Order based on the Environmental Protection Agency's Certificate of Conformity for the above listed engine family.**

For your convenience, below is a list of engines certified by CARB to meet the Optional Low NOx Emission Standards as of the date of this factsheet. We will update this list periodically; however, you should reference [CARB's Executive Order \(EO\)](#) listing for the most complete and up to date information.

**Heavy Duty Engines Certified to Meet CARB's Optional Low NOx Emission Standards**

| Low NOx Engine                          | Engine Family | Displacement (Liters) | NOx Certification Standard (g/bhp-hr) | NOx Reduction Percent (%) | Fuel | Intended Service Class |
|---|---------------|-----------------------|---------------------------------------|---------------------------|------|------------------------|
| <b>2020 EOs</b>                         |               |                       |                                       |                           |      |                        |
| <a href="#">PSI 8.8</a>                 | LPSIE8.8LN1   | 8.8                   | 0.02                                  | 90%                       | LPG  | HDO                    |
| <a href="#">Cummins 6.7</a>             | LCEXH0408BBC  | 6.7                   | 0.02                                  | 90%                       | NG   | MHDD                   |
| <a href="#">Cummins 8.9</a>             | LCEXH0540LBN  | 8.9                   | 0.02                                  | 90%                       | NG   | HHDD                   |
| <a href="#">Cummins 8.9</a>             | LCEXH0540LBL  | 8.9                   | 0.02                                  | 90%                       | NG   | MHDD                   |
| <a href="#">Cummins 8.9</a>             | LCEXH0540LBM  | 8.9                   | 0.02                                  | 90%                       | NG   | UB                     |
| <a href="#">Cummins 11.9</a>            | LCEXH0729XBC  | 11.9                  | 0.02                                  | 90%                       | NG   | HHDD-UB                |
| <a href="#">Roush (LPG) 6.8</a>         | LR1IE06.8BW2  | 6.8                   | 0.02                                  | 90%                       | LPG  | HDO                    |
| <a href="#">Roush (LPG) 6.8</a>         | LR1IE06.8BWL  | 6.8                   | 0.05                                  | 75%                       | LPG  | HDO                    |
| <a href="#">Roush (LPG) 7.3</a>         | LR1IE07.3BL1  | 7.3                   | 0.05                                  | 75%                       | LPG  | HDO                    |
| <b>2019 EOs</b>                         |               |                       |                                       |                           |      |                        |
| <a href="#">Agility Powertrains 6.8</a> | KAGIE06.8BW6  | 6.8                   | 0.02                                  | 90%                       | NG   | HDO                    |
| <a href="#">Agility Powertrains 6.8</a> | KAGIE06.8BWZ  | 6.8                   | 0.02                                  | 90%                       | NG   | HDO                    |
| <a href="#">Agility Powertrains 6</a>   | KAGIE06.0584  | 6.0                   | 0.05                                  | 75%                       | NG   | HDO                    |
| <a href="#">Cummins 8.9</a>             | KCEXH0540LBL  | 8.9                   | 0.02                                  | 90%                       | NG   | MHDD                   |
| <a href="#">Cummins 11.9</a>            | KCEXH0729XBC  | 11.9                  | 0.02                                  | 90%                       | NG   | HHDD-UB                |
| <a href="#">Cummins 6.7</a>             | KCEXH0408BBB  | 6.7                   | 0.10                                  | 50%                       | NG   | MHDD                   |
| <a href="#">Encore Tec 6.8</a>          | KEL3E06.8BWZ  | 6.8                   | 0.02                                  | 90%                       | NG   | HDO                    |
| <a href="#">Encore Tec 6.8</a>          | KEL3E06.8BW6  | 6.8                   | 0.02                                  | 90%                       | NG   | HDO                    |
| <a href="#">Encore Tec 6</a>            | KEL3E06.0584  | 6.0                   | 0.05                                  | 75%                       | NG   | HDO                    |
| <a href="#">Roush (CNG) 6.8</a>         | KRIIE06.8BC2  | 6.8                   | 0.02                                  | 90%                       | NG   | HDO                    |
| <a href="#">Roush (CNG) 6.8</a>         | KRIIE06.8BC1  | 6.8                   | 0.10                                  | 50%                       | NG   | HDO                    |
| <a href="#">Roush (LPG) 6.8</a>         | KRIIE06.8BW2  | 6.8                   | 0.02                                  | 90%                       | LPG  | HDO                    |
| <a href="#">Roush (LPG) 6.8</a>         | KRIIE06.8BWL  | 6.8                   | 0.05                                  | 75%                       | LPG  | HDO                    |
| <b>2018 EOs</b>                         |               |                       |                                       |                           |      |                        |
| <a href="#">Agility Powertrains 6</a>   | JAGIE06.0584  | 6.0                   | 0.05                                  | 75%                       | NG   | HDO                    |
| <a href="#">Cummins 6.7</a>             | JCEXH0408BBB  | 6.7                   | 0.10                                  | 50%                       | NG   | MHDD                   |
| <a href="#">Cummins 8.9</a>             | JCEXH0540LBN  | 8.9                   | 0.02                                  | 90%                       | NG   | HHDD                   |
| <a href="#">Cummins 8.9</a>             | JCEXH0540LBL  | 8.9                   | 0.02                                  | 90%                       | NG   | MHDD                   |
| <a href="#">Cummins 8.9</a>             | JCEXH0540LBM  | 8.9                   | 0.02                                  | 90%                       | NG   | UB                     |
| <a href="#">Cummins 11.9</a>            | JCEXH0729XBC  | 11.9                  | 0.02                                  | 90%                       | NG   | HHDD-UB                |

| Low NOx Engine                      | Engine Family | Displacement (Liters) | NOx Certification Standard (g/bhp-hr) | NOx Reduction Percent (%) | Fuel | Intended Service Class |
|-------------------------------------|---------------|-----------------------|---------------------------------------|---------------------------|------|------------------------|
| <a href="#">Encore Tec 6</a>        | JEL3E06.0584  | 6.0                   | 0.05                                  | 75%                       | NG   | HDO                    |
| <a href="#">Encore Tec 6.8</a>      | JEL3E06.8BWZ  | 6.8                   | 0.02                                  | 90%                       | NG   | HDO                    |
| <a href="#">Encore Tec 6.8</a>      | JEL3E06.8BW6  | 6.8                   | 0.02                                  | 90%                       | NG   | HDO                    |
| <a href="#">Roush (LPG) 6.8</a>     | JRIIE06.8BWL  | 6.8                   | 0.05                                  | 75%                       | LPG  | HDO                    |
| <a href="#">Roush (LPG) 6.8</a>     | JRIIE06.8BW2  | 6.8                   | 0.02                                  | 90%                       | LPG  | HDO                    |
| <b>2017 EOs</b>                     |               |                       |                                       |                           |      |                        |
| <a href="#">Cummins 8.9</a>         | HCEXH0540LBK  | 8.9                   | 0.02                                  | 90%                       | NG   | HHDD                   |
| <a href="#">Cummins 8.9</a>         | HCEXH0540LBJ  | 8.9                   | 0.02                                  | 90%                       | NG   | MHDD                   |
| <a href="#">Cummins 8.9</a>         | HCEXH0540LBI  | 8.9                   | 0.02                                  | 90%                       | NG   | UB                     |
| <a href="#">Cummins 6.7</a>         | HCEXHO408BBA  | 6.7                   | 0.10                                  | 50%                       | NG   | MHDD                   |
| <a href="#">Encore Tec 6.8</a>      | HEL3E06.8BWZ  | 6.8                   | 0.02                                  | 90%                       | NG   | HDO                    |
| <a href="#">Encore Tec 6</a>        | HEL3E06.076P  | 6.0                   | 0.05                                  | 75%                       | NG   | HDO                    |
| <a href="#">GreenKraft (LPG) 8</a>  | HGKTE08.0GL8  | 8.0                   | 0.02                                  | 90%                       | LPG  | HDO                    |
| <a href="#">GreenKraft (CNG) 8</a>  | HGKTE08.0GC8  | 8.0                   | 0.02                                  | 90%                       | NG   | HDO                    |
| <a href="#">Roush (LPG) 6.8</a>     | HRIIE06.8BWL  | 6.8                   | 0.05                                  | 75%                       | LPG  | HDO                    |
| <a href="#">Roush (CNG) 6.8</a>     | HRIIE06.8BWC  | 6.8                   | 0.10                                  | 50%                       | NG   | HDO                    |
| <a href="#">Westport Dallas 6.8</a> | HBAFE06.8BW6  | 6.8                   | 0.05                                  | 75%                       | NG   | HDO                    |
| <b>2016 EOs</b>                     |               |                       |                                       |                           |      |                        |
| <a href="#">Cummins 8.9</a>         | GCEXH0540LBJ  | 8.9                   | 0.02                                  | 90%                       | NG   | MHDD                   |
| <a href="#">Roush 6.8</a>           | GRIIE06.8BWC  | 6.8                   | 0.10                                  | 50%                       | NG   | HDO                    |

UB - Urban Bus

HDO - Heavy-Duty Otto-Cycle

MHDD - Medium-Heavy Duty Diesel Cycle

HHDD - Heavy-Heavy Duty Diesel Cycle

NG - Natural Gas

LPG - Liquefied Petroleum Gas