NONROAD ENGINE FAMILY BOXES

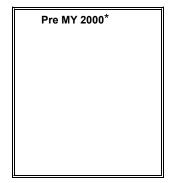
The engine family boxes shown below represent groupings of engine families with similar characteristics (i.e., the emissions standards that the engines were built to) for current and past model years. The boxes were grouped by the rated power categories and effective model years (for the emission standards). The number of engine families for each box were tabulated from an EPA engine certification database. All emission standards are in units of g/kW-hr.

These boxes serve as a guide to retrofit technology manufacturers who are interested in maximizing the number of engine families the retrofit device can be applied to, while minimizing the number of tests to demonstrate applicability. EPA/OTAQ staff shall determine the applicability of the retrofit device to the number of engine families on a <u>case-by-case</u> basis.

<u>NR1</u> kW<8

| MY 2000-2004 | | |
|------------------|------|--|
| TIER 1 | | |
| | | |
| CO: | 8.0 | |
| HC+NOx: | 10.5 | |
| PM: | 1.0 | |
| | | |
| No. Of Families: | | |

| MY 2005 - Present | | |
|-------------------|------|---|
| TIER 2 | | _ |
| | | |
| CO: | 8.0 | |
| HC+NOx: | 7.5 | |
| PM: | 0.80 | |
| | | |
| No. Of Families: | | |



NR2

8<u><</u> kW < 19

| MY 2000-2004 | | |
|------------------|------|--|
| TIER 1 | | |
| | | |
| CO: | 6.6 | |
| HC+NOx: | 9.5 | |
| PM: | 0.80 | |
| | | |
| No. Of Families: | | |

| MY 2005 - Present | | |
|-------------------|------|--|
| TIER 2 | | |
| | | |
| CO: | 6.6 | |
| HC+NOx: | 7.5 | |
| PM: | 0.80 | |
| | | |
| No. Of Families: | | |

| Pre MY 2000* |
|--------------|
| |
| |
| |
| |
| |
| |

NR3

19<u><</u> kW < 37

| MY 1999-2003 | | |
|------------------|-----|---|
| TIER 1 | | _ |
| | | |
| CO: | 5.5 | |
| HC+NOx: | 9.5 | |
| PM: | 0.8 | |
| | | |
| No. Of Families: | | |

| MY 2004 - Present | | |
|-------------------|------------|--|
| | | |
| | | |
| 5.5 | | |
| 7.5 | | |
| 0.6 | | |
| | | |
| | | |
| | 5.5 7.5 | |

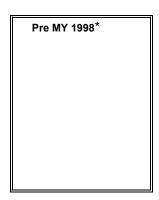
| Pre MY 1999* | |
|--------------|--|
| | |
| | |
| | |
| | |
| | |

NR4 37<u><</u> kW < 75

| MY 1998-2003 | | |
|------------------|-----|--|
| TIER 1 | | |
| NOx | 9.2 | |
| CO: | - | |
| HC+NOx: | - | |
| PM: | - | |
| | - | |
| No. Of Families: | | |

| MY 2004 - 2007 | | |
|---------------------|------|--|
| TIER 2 | | |
| | | |
| CO: | 5.0 | |
| HC + NOx: | 7.5 | |
| PM: | 0.40 | |
| | | |
| No. Of Families: | | |

| MY 2008 - Present | | |
|-------------------|------|---|
| TIER 3 | | _ |
| | | |
| CO: | 5.0 | |
| HC + NOx: | 4.7 | |
| PM: | 0.40 | |
| | | |
| No. Of Families: | | |

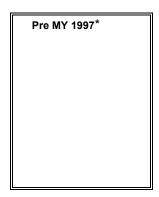


NR5 75 <u><</u> kW < 130

| MY 1997-2002 | | |
|------------------|-----|--|
| TIER 1 | | |
| NOx | 9.2 | |
| CO: | - | |
| HC+NOx: | - | |
| PM: | - | |
| | - | |
| No. Of Families: | | |

| MY 2003 - 2006 | | |
|------------------|------|---|
| TIER 2 | | _ |
| | | |
| CO: | 5.0 | |
| HC + NOx: | 6.6 | |
| PM: | 0.30 | |
| | | |
| No. Of Families: | | |

| MY 2007 - Present | | |
|-------------------|------|---|
| TIER 3 | | _ |
| | | |
| CO: | 5.0 | |
| HC + NOx: | 4.0 | |
| PM: | 0.30 | |
| | | |
| No. Of Families: | | |



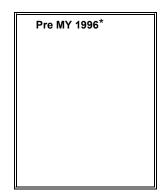
NR6

130<u><</u> kW < 225

| MY 1996-2002 | | |
|------------------|------|---|
| TIER 1 | | _ |
| NOx | 9.2 | |
| CO: | 11.4 | |
| HC+NOx: | - | |
| PM: | 0.54 | |
| HC | 1.3 | |
| No. Of Families: | | |

| MY 2003 - 2005 | | |
|----------------|------------|--|
| | | |
| | | |
| 3.5 | | |
| 6.6 | | |
| 0.20 | | |
| | | |
| | | |
| | 3.5 6.6 | |

| MY 2006 - Present | | |
|-------------------|------|--|
| TIER 3 | | |
| | | |
| CO: | 3.5 | |
| HC + NOx: | 4.0 | |
| PM: | 0.20 | |
| | | |
| No. Of Families: | | |

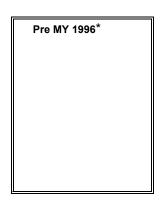


NR7 225<u><</u> kW < 450

| MY 1996-2000 | | |
|------------------|------|---|
| TIER 1 | | _ |
| NOx | 9.2 | |
| CO: | 11.4 | |
| HC+NOx: | - | |
| PM: | 0.54 | |
| НС | 1.3 | |
| No. Of Families: | | |

| MY 2001 - 2005 | | |
|------------------|------|--|
| TIER 2 | | |
| | | |
| CO: | 3.5 | |
| HC + NOx: | 6.4 | |
| PM: | 0.20 | |
| | | |
| No. Of Families: | | |

| MY 2006 - Present | | |
|-------------------|------|--|
| TIER 3 | | |
| | | |
| CO: | 3.5 | |
| HC + NOx: | 4.0 | |
| PM: | 0.20 | |
| | | |
| No. Of Families: | | |



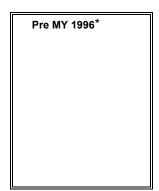
<u>NR8</u>

450 ≤ kW < 560

| MY 1996-2001 | | |
|------------------|------|---|
| TIER 1 | | _ |
| NOx | 9.2 | |
| CO: | 11.4 | |
| HC+NOx: | - | |
| PM: | 0.54 | |
| НС | 1.3 | |
| No. Of Families: | | |

| MY 2002 - 2005 | | |
|------------------|------|---|
| TIER 2 | | _ |
| | | |
| CO: | 3.5 | |
| HC + NOx: | 6.4 | |
| PM: | 0.20 | |
| | | |
| No. Of Families: | | |

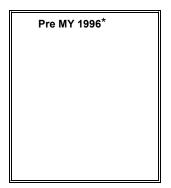
| MY 2006 - Present | | |
|-------------------|------|--|
| TIER 3 | | |
| CO: | 3.5 | |
| HC + NOx: | 4.0 | |
| PM: | 0.20 | |
| | | |
| No. Of Families: | | |



NR9 kW > 560

| MY 2000 - 2005 | | |
|------------------|------|--|
| TIER 1 | | |
| NOx | 9.2 | |
| CO: | 11.4 | |
| HC+NOx: | - | |
| PM: | 0.54 | |
| НС | 1.3 | |
| No. Of Families: | | |

| MY 2006 - Present | | |
|-------------------|------|---|
| TIER 2 | | _ |
| NOx | - | |
| CO: | 3.5 | |
| HC + NOx: | 6.4 | |
| PM: | 0.20 | |
| HC | - | |
| No. Of Families: | | |



POWER EQUIVALENTS:

| 20011712211101 | |
|----------------|-------|
| kW | hp |
| 8 | 10.7 |
| 19 | 25.5 |
| 37 | 49.6 |
| 75 | 100.5 |
| 130 | 174.2 |
| 225 | 301.5 |
| 450 | 603 |
| 560 | 750.4 |

NOTE:

^{*} Although emission standards did not exist for pre regulated engine families, emission standard predictions can be sought with nonroad modeling software. EPA/OTAQ staff shall discuss with the retrofit manufacturer to determine the applicability of the retrofit device to non-regulated engine families also on a <u>case-by-case</u> basis.