**Section 214.APPENDIX C Method used to Determine Average Actual Stack Height and Effective Height of Effluent Release**

|  |  |  |
| --- | --- | --- |
| Q  | = | Heat emission rate (in btu/sec or Kcal/sec as determined by method outlined below. |
|  |  |  |
| ∆H  | = | Plume rise (in feet or meters). |
|  |  |  |
| H | = | Physical height (in feet or meters) above grade of each stack, except that for purposes of this calculation the value used for such stack height shall not exceed good engineering practice as defined by Section 123 of the Clean Air Act and Regulations promulgated thereunder, unless the owner or operator of the source demonstrates to the Agency that a greater height is necessary to prevent downwash or fumigation conditions. |
|  |  |  |
| T  | = | Exit temperature of stack gases (in degrees Rankine or degrees Kelvin) from each source during operating conditions which would cause maximum emissions. |
|  |  |  |
| V  | = | Exit velocity of stack gases (in feet/sec or meters/sec from each source under operating conditions which would cause maximum emissions. |
|  |  |  |
| D  | = | Diameter of stack (in feet or meters). |
|  |  |  |
| P | = | Percentage of total emissions expressed as decimal equivalents emitted from each source. (Example: 21% = 0.21.) NOTE: The sum of P1 + P2 . . . + Pn = 1. The emission values to be used are those which occur during operating conditions which would cause maximum emissions. |
|  |  |  |
| HA | = | Average actual stack height (in feet or meters). |
|  |  |  |
| HE | = | Effective height of effluent release (in feet or meters). |

STEP 1: Determine weighted average stack parameters utilizing the following formulae:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| D | = | P1 D1 | + | P2 D2 | + . . . + | PnDn |
|  |  |  |  |  |  |  |
| V | = | P1 V1 | + | P2 V2 | + . . . + | Pn Vn |
|  |  |  |  |  |  |  |
| T | = | P1 T1 | + | P2 T2 | + . . . + | Pn Tn |
|  |  |  |  |  |  |  |
| HA | = | P1 H1 | + | P2 H2 | + . . . + | Pn Hn |

NOTE:

P1, D1, V1, T1, and H1 are the percentage of total emissions, stack diameter, exit velocity of gases, exit temperature of stack gases, and physical stack height, respectively, for the first source; P2, D2, V2, T2, and H2 are the respective values for the second source; similarly, Pn, Dn, Vn, Tn, and Hn are the respective values for the nth source, where n is the number of the last source.

STEP 2: Calculate heat emission rate utilizing the following formula and the weighted average stack parameters obtained in Step 1:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| QH | = | 7.54D2V | (T-515) | (in English units) |
| T |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| QH | = | 66.8D2V | (T-286) | (in Metric units) |
| T |
|  |  |  |

STEP 3: Calculate plume rise utilizing the appropriate formula given below and the total heat emission rate obtained in Step 2:

|  |  |  |  |
| --- | --- | --- | --- |
| ∆H | = | 2.58(QH)0.6 | (in English units for QH ≥ 6000 btu/sec) |
| (HA)0.11 |

|  |  |  |  |
| --- | --- | --- | --- |
| ∆H | = | 1.58(QH)0.6 | (in Metric units for QH ≥ 1500 kcal/sec) |
| (HA)0.11 |

|  |  |  |  |
| --- | --- | --- | --- |
| ∆H | = | 0.718(QH)0.75 | (in English units for QH < 6000 btu/sec) |
| (HA)0.11 |

|  |  |  |  |
| --- | --- | --- | --- |
| ∆H | = | 0.54(QH)0.75 | (in Metric units for QH < 1500 kcal/sec) |
| (HA)0.11 |

STEP 4: Calculate the weighted average facility effective height of effluent release utilizing the plume rise obtained in Step 3, the average stack height obtained in Step 1, and the formula given below:

|  |  |  |
| --- | --- | --- |
| HE | = | HA + ∆H |
|  |  |  |

STEP 5: Calculate the total facility hourly emission limitation utilizing the weighted actual stack height obtained in Step 1, the effective stack height given in Step 4, and the following formula:

|  |  |  |  |
| --- | --- | --- | --- |
| E | = | (HA)0.11 (HE)2 | (in English units) |
| 128 |

|  |  |  |  |
| --- | --- | --- | --- |
| E | = | 0.04347(HA)0.11 (HE)2 | (in Metric units) |

(Source: Amended at 30 Ill. Reg. 9671, effective May 15, 2006)