



EQ Form 2.1 Instructions for Fuel Combustion Worksheet for Form 780-1436

This form is designed for facilities with on-site combustion equipment units where total heat capacity equals or exceeds 10 million BTU per hour. Facilities with smaller combustion units should use this form when grouping these combustion units. Remember when considering grouping like kind equipment, the control device and efficiency of the device should also be of like kind. The Maximum Hourly Design Rates, or MHDR, of all units, no matter what the capacity, must be reported. The MHDR calculations, including those for smaller units, must be documented. The calculations for smaller units may be displayed on Form 2.1 or on a separate sheet of paper. This information and grouping should be consistent with the permit.

A separate *Form 2.0, Emission Unit Information*, and Form 2.1 should be completed for each type of fuel used with the combustion equipment at this emission point. A separate Form 2.0 and Form 2.1 should also be completed for each piece of combustion equipment with a heat input capacity greater than 10 million BTU per hour.

Smaller capacity BTU combustion equipment (less than 10 million BTU/hour) should be grouped together if all the equipment is within the same Source Classification Code, or SCC, category and control equipment is the same, and was grouped on the permit. For example, two similar combustion units that both use natural gas as a fuel and have the same type of control equipment with the same efficiency may be grouped.

Complete Facility Name, Federal Information Processing Standard, or FIPs, County Number, Plant Number, Year of Data, Point Number, SCC No., and Seg. No.

Combustion Equipment Information

Equipment Description: Please describe the combustion equipment associated with the emission unit. Examples of a combustion unit include a boiler, annealing furnace, drying oven, bake oven, burn-off oven, incinerator, after burner, catalytic incinerator or thermal oxidizer.

Year equipment put in service: Enter the year the combustion equipment was installed at the facility, if known.

Coal Firing Code No.: This entry is required only for coal-fired combustion equipment. Enter the number corresponding to the firing method for the combustion equipment. A firing method code list is provided in Block 1 on this form.

Maximum Design Rate: This figure is the maximum hourly heat input capacity for each piece of equipment in million BTU per hour as determined in the permit.

Sum of total maximum hourly design rates: This figure is the total of the Maximum Design Rates for all combustion equipment.

Combustion Equipment Use: Check the box that best applies to how the combustion equipment is being used.

Combustion Equipment Category: This entry is required only for coal-fired equipment. Check the box that best applies to how the fuel is being introduced into the combustion chamber.

Fuel Information

Fuel Type: Check only one box for the type of combustion equipment being used. A separate Form 2.0 and Form 2.1 must be used for each different type of fuel that is being used at this emission point.

Note: If refuse or trade wastes are being burned, then Block 1, Equipment Information, from *Form 2.2, Incinerator Worksheet*, must also be completed for this emission unit.

Natural gas users: Be sure to review the comments in the Glossary regarding MMCF or million cubic feet, and MCF or thousand cubic feet.

Total Heat Content: See the table, "Typical Parameters of Various Fuels," at the end of the instructions for this worksheet. This table lists the heat content of commonly used fuels. The value entered should be calculated as the BTU value for the specific fuel multiplied by the amount of fuel in the SCC fuel unit. The fuel units used for the heat content of this fuel must agree with Total Annual Throughput SCC units used for this fuel type. The SCC unit for coal is tons, thousands of gallons for oil or propane, and million cubic feet for natural gas.

Example: For bituminous coal, multiply the default heating value of 13,000 BTU/lb by 2,000 lb/ton equate the heat content to the SCC unit of tons for coal (26,000,000 Btu/ton). For natural gas, multiply the default heating value of 1050 BTU/SCF (standard cubic foot) by 1 million to match the SCC unit of million cubic feet (1,500,000 Btu/mmcf).

Calculation of maximum hourly design rate: Convert the heat content units from BTU/SCC Fuel Unit to Millions of BTU/SCC Fuel Unit by dividing the BTU figure by 1 million.

Example: During the heat content discussion, we noted that the heat content of propane is 94 million BTU per 1,000 gallons. The following calculation converts to millions of BTU/SCC unit: 94 million / 1million = 94 million BTU/ 1,000 gallons.

Total Maximum Hourly Design Rate: This value is determined by the Air Pollution Control Program in the permit review process. An increase in this value could trigger a new permit requirement. Leave this blank unless you are certain of the change.

This entry is the amount of fuel that would be used if the combustion equipment were being continuously operated at 100 percent of its rated capacity for one hour. The maximum hourly design rate should be calculated by dividing the total maximum design rate expressed in millions of BTU per hour or MM BTU/Hr by the heat content expressed in millions of BTU per fuel unit or MM BTU/fuel unit.

Example: A boiler burning propane has a total maximum design rate of 12 million BTU per hour. Using the results of the above example, the maximum hourly design rate = 12 MM BTU/hr / 94 MM BTU/1,000 gallons = 0.1277 1,000 gallons/hr.

Example: A boiler burning natural gas fuel has a total maximum design rate of 12 million BTU per hour or 12 MM BTU/hr. From the heat content table, observe that the heat content of natural gas is 1,050 BTU/cubic ft (SCF). This equates to 1,050 million BTU per million cubic feet or MMCF. The Maximum Hourly Design Rate is calculated as follows:

Maximum Hourly Design Rate

$$\begin{aligned} &= 12 \text{ MM BTU/Hr} / 1,050 \text{ MM BTU/MM Cubic Feet (CF)} \\ &= 0.0114 \text{ MM CF/hour} \end{aligned}$$

The value 0.0114 MMCF per hour would then be entered in the total maximum hourly design rate box in Block 3 on Form 2.1.

Enter the following on *Form 2.0, Emission Point Information*

Block 2: The Total Annual Throughput and Annual Throughput Units should be entered in the appropriate boxes.

Block 4: When appropriate, the weighted average values for the Sulfur Percent and/or the Ash Percent should also be entered in the appropriate box(s).

Typical Parameters of Various Fuels

	Heating Value (kcal)	Heating Value (Btu)	Sulfur % ^a (by weight)	Ash % ^b (by weight)
Solid Fuels				
Bituminous Coal	7,200/kg	13,000/lb	0.6-5.4	4-20
Anthracite Coal	6,810/kg	12,300/lb	0.5-1.0	7.0-16.0
Lignite (@ 35% moisture)	3,990/kg	7,200/lb	0.7	6.2
Wood (@ 40% moisture)	2,880/kg	5,200/lb	N	1-3
Bagasse (@ 50% moisture)	2,220/kg	4,000/lb	N	1-2
Bark (@ 50% moisture)	2,492/kg	4,500/lb	N	1-3 ^b
Coke, Byproduct	7,380/kg	13,300/lb	0.5-1.0	0.5-5.0
Liquid Fuels				
Residual Oil	9.98 x 10 ⁶ /m ³	150,000/gal	0.5-4.0	0.05-0.1
Distillate Oil	9.30 x 10 ⁶ /m ³	140,000/gal	0.2-1.0	N
Diesel	9.12 x 10 ⁶ /m ³	137,000/gal	0.4	N
Ultra Low Sulfur Diesel	9.12 x 10 ⁶ /m ³	137,000/gal	0.0015	N
Gasoline	8.62 x 10 ⁶ /m ³	130,000/gal	0.03-0.04	N
Kerosene	8.32 x 10 ⁶ /m ³	135,000/gal	0.02-0.05	N
Liquid Petroleum Gas	6.25 x 10 ⁶ /m ³	94,000/gal	N	N
Gaseous Fuels				
Natural Gas	9,341/m ³	1,050/SCF	N	N
Coke Oven Gas	5,249/m ³	590/SCF	0.5-2.0	N
Blast Furnace Gas	890/m ³	100/SCF	N	N

^a N = Negligible.

^b Ash content may be considerably higher when sand, dirt, etc., are present.

For More Information

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