



**EMISSION FACTORS
GAS FIRED BOILERS**

AQ-EF05

Natural Gas:

Combustor Type	Controls	Pounds of pollutant per million cubic feet of natural gas burned ¹				
		PM ² /PM ₁₀ /PM _{2.5}	SO ₂ ³	NO _x	CO	VOC
Large Wall-Fired Boilers (>100 million Btu/hr)	Uncontrolled (pre-NSPS)	2.5	1.7/2.6	280	84	5.5
	Uncontrolled (post-NSPS)	2.5	1.7/2.6	190	84	5.5
	Controlled-low NO _x burners	2.5	1.7/2.6	140	84	5.5
	Controlled-flue gas recirculation	2.5	1.7/2.6	100	84	5.5
Medium Boilers (<100 million Btu/hr)	Uncontrolled	2.5	1.7/2.6	100	84	5.5
	Controlled-low NO _x burners	2.5	1.7/2.6	50	84	5.5
	Controlled-flue gas recirculation	2.5	1.7/2.6	32	84	5.5
Tangential-Fired Boilers (all sizes)	Uncontrolled	2.5	1.7/2.6	170	24	5.5
	Controlled-flue gas recirculation	2.5	1.7/2.6	76	98	5.5
Residential Furnaces	Uncontrolled	2.5	1.7/2.6	94	40	5.5

Propane:

Combustor Type	Pounds of pollutant per 1000 gallons of propane burned ⁴				
	PM ⁵ /PM ₁₀ /PM _{2.5}	SO ₂ ⁶	NO _x	CO	VOC
Industrial Boilers (>10 million Btu/hr)	0.6	0.10S	19	3.2	0.5
Commercial Boilers (<10 million Btu/hr)	0.4	0.10S	14	1.9	0.5

Butane:

Combustor Type	Pounds of pollutant per 1000 gallons of butane burned ⁷				
	PM ⁸ /PM ₁₀ /PM _{2.5}	SO ₂	NO _x	CO	VOC
Industrial Boilers (>10 million Btu/hr)	0.6	0.09S	21	3.6	0.6
Commercial Boilers (<10 million Btu/hr)	0.5	0.09S	15	2.1	0.6

¹ All emission factors are from AP-42, Tables 1.4-1 and 1.4-2, except the PM/PM₁₀ and SO₂ factors.

² The PM/PM₁₀/PM_{2.5} emissions factor is a DEQ factor based on local testing.

³ The SO₂ emissions factor is a DEQ factor based on local sulfur content of natural gas (short term maximum = 9,100 grains/million cubic feet and long term average = 6,000 grains/million cubic feet). Short term emissions factor = 9,100 grains S/million cubic feet x 1 pound/7,000 grains x 2 pounds SO₂/pound of S = 2.6 lb/million cubic of natural gas. Long term emissions factor = 6,000 grains S/million cubic feet x 1 pound/7,000 grains x 2 pounds SO₂/pound of S = 1.7 lb/million cubic of natural gas

⁴ All emission factors are from AP-42, Table 1.5-1.

⁵ The PM/PM₁₀/PM_{2.5} emissions factor is a DEQ factor based on local testing.

⁶ S equals the sulfur content expressed in gr/100 ft³ gas vapor. For example, if the propane sulfur content is 0.18 gr/100 ft³, the emission factor would be (0.10 x 0.18) = 0.016 lb of SO₂/10³ gallons of propane burned.

⁷ All emission factors are from AP-42, Table 1.5-1.

⁸ The PM/PM₁₀/PM_{2.5} emissions factor is a DEQ factor based on local testing.