

PROPANE PROPERTIES

Commercial Propane

Commercial Butane

General Properties¹

Formula	C ₃ H ₈	C ₄ H ₁₀
Boiling Point at 14.7 psia	-42°C -44°F	0°C 32°F
Freezing Point, at Atmospheric Pressure	-187.8°C -310°F	-138°C -260°F
Specific Gravity of Liquid at 60°F	0.51	0.58
Specific Gravity of Vapour at 60°F (Air =1)	1.52	2.00
Mass per US Gallon of Liquid at 60°F (15.5°C)	4.20 lb	4.81 lb
Mass per Imperial Gallon of Liquid @ 60°F (15.5°C)	5.1 lb	5.8 lb
Specific Heat of Liquid @ 60°F (15.5°C)	0.590 Btu/lb	0.550 Btu/lb
Specific Heat of Vapour @ 60°F (15.5°C)	0.405 Btu/lb	0.385 Btu/lb
Vapour per US Gallon @ 60°F (15.5°C)	36.38 ft ³	31.26 ft ³
Vapour per Imperial Gallon @ 60°F (15.5°C)	44 ft ³	38 ft ³
Vapour per Pound @ 60°F (15.5°C)	8.5 ft ³	6.5 ft ³
Gross Energy per Litre	24.7 MJ	27.6 MJ
Density @ 15°C	0.51 kg/L	0.58 kg/L
Litres per Tonne	1960	1720
kWh per US Gallon	26.9	
Vapourization Rate (Liquid to Vapour)	272:1	

Latent Heat of Vapourization at Boiling Point¹

(a) Btu per Pound	185	166
(b) Btu per US Gallon	773	808
(c) Btu per Imperial Gallon	944	968
(d) Btu per Litre	209	215

Total Heating Values after Vapourization¹

(a) Btu per Cubic Foot	2520	3260
(b) Btu per Pound	21 622	21 190
(c) Btu per US Gallon	91 502	102 032
(d) Btu per Imperial Gallon	109 956	122 900
(e) kJ per Litre	24 700	27 600
(f) kJ per kg	49 700	49 400

¹ Source: Canadian Standards Association, Propane Storage and Handling Code. 2005



Commercial Propane

Octane Data²

Road Octane Number	104
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Combustion Data³

Air required to burn 1 ft ³ of gas	23.5 ft ³	30.0 ft ³ .
Limits of Flammability in Air, % of Vapour in Air-Gas Mixture:		
(a) Lower	2.4	1.9
(b) Upper	9.5	8.5
Ignition Temp °F	920–1020	900–1000
Ignition Temp °C	493–549	482–538
Maximum rate of flame propagation in a 1" tube	32 in/s	33 in/s
Maximum rate of flame propagation in a 25 mm tube	813 mm/s	838 mm/s
% of gas in air for maximum flame temp	4.4	3.5
Maximum Flame Temp in Air	3600°F	3625°F

Products of Combustion³

ft ³ of carbon dioxide (CO ₂) / ft ³ of gas	3.0	3.9
ft ³ of water vapour (H ₂ O) / ft ³ of gas	4.0	5.0
ft ³ of nitrogen (N ₂) / ft ³ of gas	18.5	23.6

2 Natural Resources Canada: <http://www.oeo.nrcan.gc.ca/transportation/fuels/propane/propane-safety.cfm?attr=8>

3 Source: Canadian Standards Association, Propane Storage and Handling Code. 2005



Engineering Units Conversion Factors⁴

Multiply By To Obtain

Pressure

Atmospheres	atm	1.0332	Kilogram per cm ²
	atm	14.70	Pounds per square inch
	atm	404.17	Inches of Water
Inches of Mercury	inHg	0.0142	Pounds per square inch
	inHg	0.4912	Feet of Water
Inches of Water	inWC	1.133	Pounds per square inch
	inWC	0.0735	Inches of Mercury
	inWC	0.5781	Ounces per square inch
Kilo Pascals	kPa	100	bar
KG per cm ²	kg/cm ²	14.22	Pounds per square inch
Pounds per square inch	psi	0.06804	Atmospheres
	psi	0.07031	Kilogram per cm ²
	psi	6.894757	kPa
	psi	0.06897	bar
	psi	2.036	Inches of Mercury
	psi	27.67	Inches of Water

Length

Centimeters	cm	0.3937	Inches
Feet	ft	0.3048	Meters
Feet	ft	30.48	Centimeters
Feet	ft	304.8	Millimeters
Inches	in	2.54	Centimeters
Inches	in	25.4	Millimeters
Kilometers	km	0.6214	Miles
Meters	m	1.094	Yards
Meters	m	3.281	Feet
Meters	m	39.37	Inches
Miles, nautical	mls	1853.0	Meters
Miles, statute	mls	1609.0	Meters

Multiply By To Obtain

Length (continued)

Yards	yard	0.9144	Meters
Yards	yard	91.44	Centimeters

Volume

Cubic centimeter	cm ³	0.06103	Cubic inches
Cubic feet	cuft	0.0276	Gallons (US)
Cubic feet	cuft	28.316	Liters
Cubic feet	cuft	1728	Cubic inches
Cubic feet	cuft	0.76923	Cubic yards
Cubic feet	cuft	0.028317	Cubic meters
Gallons (Imperial)	gal	1.20095	Gallons (US)
Gallons (US)	gal	0.1337	Cubic feet
Gallons (US)	gal	0.83267	Gallons (Imperial)
Gallons (US)	gal	3.785	Liters
Gallons (US)	gal	231	Cubic inches
Liters	L	0.03531	Cubic feet
Liters	L	0.2642	Gallons (US)
Liters	L	1.057	Quarts (US)
Liters	L	2.113	Pints (US)
Pints (US)	pnt	0.4732	Liters

Miscellaneous

BTU	BTU	252.0	Calories
Calories	cal	3.968	BTU
Kilogram	kg	2.205	Pounds
Kilowatt Hour	kWh	3412	BTU
Ounces	oz	28.35	Grams
Pounds	lb	0.4536	Kilograms
Pounds	lb	453.5924	Grams (metric)
Pounds	lb	21 600	Propane BTU

⁴ Source: Canadian Standards Association, Propane Storage and Handling Code. 2005



Converting Volumes of Gas⁵

(CFH to CFH or CFM to CFM)

Multiply Flow of	By	To Obtain Flow of
Air	.71	Butane
	1.29	Natural Gas
	.81	Propane
Butane	1.45	Air
	1.83	Natural Gas
	1.15	Propane
Natural Gas	.77	Air
	.55	Butane
	.63	Propane
Propane	1.23	Air
	.87	Butane
	1.58	Natural Gas

Propane Required for Average Appliances, Boilers, and Internal Combustion Engines⁵

(Note: For accuracy, consult the manufacturer's Btuh rating)

Appliance	Btuh	(kW)
Domestic Gas Range (4-burner top)	65 000	(19)
Domestic Gas Range (6-burner top)	105 000	(31)
Domestic built-in Oven or broiler unit	25 000	(7)
Domestic built-in cook top unit	40 000	(12)
Domestic hot plate, per burner	9000 – 12 000	(2.6 – 3.5)
Domestic Room Heater, single radiant	12 000	(3.5)
Domestic Room Heater, double radiant	10 000 – 85 000	(3 – 25)
Water heater, storage type, slow recovery	2000 – 10 000	(0.7 – 3)
Water heater, storage type, fast recovery	15 000 – 75 000	(4.4 – 22)
Domestic clothes dryer	35 000	(10)
Conversion burner	25 000 – 750 000	(7 – 220)
Refrigerator	2000 – 4000	(0.6 – 1.2)
Warm-Air Furnace	40 000 – 300 000	(12 – 88)
Steam boilers, per boiler horsepower (kW)	60 000 – 75 000	(17.6 – 22)
Internal combustion engines per horsepower (kW)	9000 – 10 000	(3.5 – 3.9)

⁵ Source: Canadian Standards Association, Propane Storage and Handling Code. 2005

