Brick Kiln Fuel per 1000 Bricks and CO_2

Fuel per thousand bricks and per day of a brick kiln from the specific energy consumption, fired brick mass, fuel calorific value and carbon content, with CO_2.

Method: Specific energy accounting for brick kilns

Input parameters

Unit system: SI

Parameter	Value	Unit
Bricks fired per day	30,000	
Fired mass of one brick	3.0000	kg
Specific energy (MJ per kg of fired brick)	1.2000	MJ/kg
Fuel calorific value	20,000	kJ/kg
Carbon content of the fuel (mass fraction)	50.000	%

Calculated results

Parameter	Value	Unit
Fuel per 1000 bricks	0.18000	t
Fuel per day	5.4000	t
Energy per 1000 bricks	3.6000	GJ
CO_2 per 1000 bricks from the fuel	0.32977	t

Notes for this case

• Kiln performance is usually stated as specific energy: MJ per kg of fired brick. Clamp and old Bull's trench kilns use about 1.2–2 MJ/kg, zigzag kilns about 0.9–1.2, vertical shaft kilns about 0.7–1, and tunnel kilns 1.5–2.5 for hollow products. Multiplying by the brick mass gives energy per thousand bricks; dividing by the fuel's calorific value gives coal, biomass or other fuel. CO_2 follows from the fuel's carbon (44/12 kg per kg of carbon).

Formula and method

$$E_{1000} = 1000\, m_b\, SEC, \quad m_{f,1000} = \frac{E_{1000}}{NCV}, \quad CO_2 = m_f x_C \frac{44}{12}$$

Variables

n	Bricks fired per day	-
m_b	Fired mass of one brick	kg
SEC	Specific energy (MJ per kg of fired brick)	J/kg
NCV	Fuel calorific value	J/kg
x_C	Carbon content of the fuel (mass fraction)	-
$m_{f,1000}$	Fuel per 1000 bricks	kg
$m_{f,day}$	Fuel per day	kg
E_{1000}	Energy per 1000 bricks	J
CO_2	CO_2 per 1000 bricks from the fuel	kg

Method and standards

Brick kiln.

Assumptions and limits

- Specific energy as measured or typical.

References

Specific energy accounting for brick kilns

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/chemical/ceramics-glass/brick-kiln-fuel-per-thousand

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.