Batch Heat-Up Time

How-to guide: what the workbook does, how to use it and what every number means. mfgcalcs.com

Batch Heat-Up Time

Work out how long every batch takes to heat from its mass, specific heat and temperature rise at the vessel's heater output, against the window it has.

For: Process engineers, production planners and shift leads scheduling heated batches in kettles, jacketed vessels and tanks.

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Quick start

1. On Setup, type your plant and the near-capacity threshold, and list your vessels with their heater output and your products with their specific heat.
2. On Batches, give each batch a row: vessel, product, mass, start and target temperature, allowance and the window.
3. Fix anything the Check column names.
4. Open the Dashboard: required time against each window, and the batches that do not fit.

What is in the workbook

Start Here	Read this first: what the workbook does and how to use it.
Setup	Plant, the near-capacity threshold, the vessels with their heater output, and the products with their specific heat.
Batches	One row per heated batch: mass, temperatures, allowance and window in; heat load, heat-up time and fit to the window out.
Dashboard	Heat-up time of every batch against the window it has, and how much of it is the heat loss allowance.
Method	How every number is calculated, with assumptions, limits and sources.
Verify	Self-check: the workbook's formulas recomputed on fixed inputs against an independent reference.

What each number means

Quantity	How it is calculated	Units
Temperature rise	Target - start temperature.	°F
Heat load	Mass x specific heat x temperature rise.	Btu
Base time	Heat load / heater output.	min
Required time and allowance minutes	Base time x (1 + allowance); required - base.	min
Window margin and load	Window - required time; required time / window.	min, %

Quantity	How it is calculated	Units
Status	Over capacity above 100% of the window; Near capacity from the threshold on Setup; otherwise Under capacity.	-

Assumptions, limitations, sources and the self-check (the Verify sheet, which recomputes the workbook's formulas on fixed test inputs) are in the workbook. The last page shows the Dashboard with the example data for Ashcombe Sauces, a fictional business.

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Engineering estimates for planning and improvement work. Verify the results against your own process, data and standards before you rely on them.

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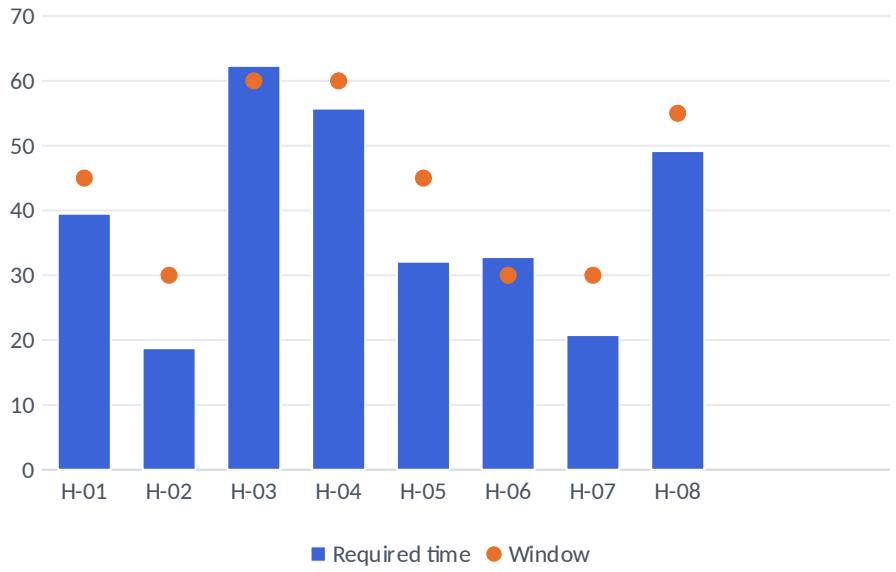
Heat-up time of every batch against the window it has, and how much of it is the heat loss allowance.

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Ashcombe Sauces (example): 8 batches in 3 vessels, 4.8 MMBtu of heat.

BATCHES	HEATING MINUTES	BATCHES OVER THEIR WINDOW	HEAT LOAD (MMBTU)
8	**311**	**2**	**4.78**
Rows with a required time	Required time, all batches	Required time longer than the window	Mass x specific heat x rise

Required time against window (min)



Base heating and allowance (min)

