Hollomon–Jaffe Tempering Parameter and Equivalent Time

Hollomon–Jaffe tempering parameter of a temper or post-weld heat treatment from temperature and time, and the equivalent time at another temperature.

Method: J.H. Hollomon and L.D. Jaffe (1945); Trans. AIME 162

Input parameters

Unit system: SI

Parameter	Value	Unit
Tempering temperature	600.00	°C
Time at temperature	2.0000	h
Material constant About 20 for carbon and low-alloy steels; use the value for your steel if known.	20.000	
Other temperature for an equivalent treatment	620.00	°C

Calculated results

Parameter	Value	Unit
Hollomon–Jaffe parameter T(C + $\log_{10}$ t), T in K, t in h	17,726	
Time at T_2 for the same parameter	0.70216	h

Notes for this case

- Some sources state the parameter with T in °R or with time in seconds; compare values only in the same form.

Formula and method

$$HP = T(C + \log_{10} t), \quad T \text{ in K}, \ t \text{ in h}$$

$$t_2 = 10^{\,HP/T_2 - C}$$

Variables

T	Tempering temperature	K
t	Time at temperature	s
C	Material constant	-
T_2	Other temperature for an equivalent treatment	K
HP	Hollomon–Jaffe parameter T(C + $\log_{10}$ t), T in K, t in h	-
t_2	Time at T_2 for the same parameter	s

Method and standards

Hollomon and Jaffe showed that tempered hardness depends on the single parameter T(C + log t); equal parameters give equal tempering.

Assumptions and limits

- Isothermal hold; ramps not counted.

References

- J.H. Hollomon and L.D. Jaffe (1945)
- Trans. AIME 162

Report details

Report reference	FCC-3XGF-FZ1D (the same inputs always give the same reference)
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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/materials/heat-treatment/hollomon-jaffe-tempering-parameter

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.