# Welding Machine Duty Cycle at Another Current

Allowable duty cycle of a welding power source at a different current from its rated current and duty cycle, and its 100 % duty current.

**Method:** Equal heating: $I_1^2 D_1 = I_2^2 D_2$ (IEC 60974-1 rating principle, 10-minute cycle)

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Rated current | 300.00 | A |
| Rated duty cycle | 60.000 | % |
| Required current | 250.00 | A |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Allowable duty cycle at $I_2$ | 86.400 | % |
| Current at 100 % duty | 232.38 | A |
| Arc-on minutes in a 10-minute cycle | 8.6400 | min |

**Notes for this case**

- Heating scales with $I^2$ in the transformer and rectifier; do not exceed the machine's maximum current even at low duty.

## Formula and method

$$D_2 = D_1 \left(\frac{I_1}{I_2}\right)^2, \quad I_{100} = I_1 \sqrt{D_1}$$

### Variables

| | | |
|---|---|---|
| $I_1$ | Rated current | A |
| $D_1$ | Rated duty cycle | - |
| $I_2$ | Required current | A |
| $D_2$ | Allowable duty cycle at $I_2$ | - |
| $I_{100}$ | Current at 100 % duty | A |
| $t_{on}$ | Arc-on minutes in a 10-minute cycle | s |

### Method and standards

$I^2t$ heating.

### Assumptions and limits

- 10-minute cycle; thermal equilibrium.
- Currents above the rated current are extrapolated by the $I^2$ rule, which makers do not support; never exceed the machine's maximum current.

### References

- Equal heating: $I_1^2 D_1 = I_2^2 D_2$ (IEC 60974-1 rating principle, 10-minute cycle)

## Report details

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|---|---|
| Report reference | FCC-3P6F-CS53 (the same inputs always give the same reference) |
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| Calculator | Welding Machine Duty Cycle at Another Current |
| Method last reviewed | 13 November 2026 |
| Software release | FireCAD Calc, release of 17 November 2026 |
| 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/welding/welding-duty-cycle

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.