Why Smart Wiring Busbars are safer than many other Busbars on the market

Smart Wiring 150A busbars are 3mm thick and 25mm wide. This means that our busbars have a significantly larger surface area that the majority of the cheaper available alternatives. This is important as the surface area is critical to handling the rated current meaning that our 150A busbars will not heat up as much as the cheaper products and with our innovative honeycomb base design and airflow you can be reassured using our busbars you are building the safest install.

Or

Smart Wiring 150A busbars have been designed with a thickness of 3mm and are 25mm wide, providing a much larger surface area compared to most lower-cost alternatives. The increased surface area is crucial for managing the rated current, ensuring that our busbars remain cooler under load than cheaper options. Combined with our innovative honeycomb base design and optimized airflow, you can trust that our busbars contribute to a safer, more reliable installation.

This is the science behind our calculations.

Formula for Power Dissipation:

The power dissipation (heat generated) in a busbar can be calculated using Joule's law:

P=I2×RP = I^2 \times RP=I2×R

Where:

- PPP is the power dissipated as heat (in watts),
- III is the current (in amps),
- RRR is the resistance of the busbar (in ohms).

The resistance of the busbar can be calculated using:

R=ρ×LAR = \frac{\rho \times L}{A}R=Aρ×L

Where:

- ρ\rhoρ is the resistivity of copper (1.68 × 10−810^{-8}10−8 ohm-meters at 20°C),
- LLL is the length of the busbar (in meters),
- AAA is the cross-sectional area of the busbar (in square meters).

We can then estimate the heat rise based on power dissipation and approximate cooling conditions. However, a simplified empirical formula to estimate temperature rise due to current is:

ΔT=K×I×1A\Delta T = K \times I \times \frac{1}{A}ΔT=K×I×A1

Where:

- ΔT\Delta TΔT is the temperature rise (in degrees Celsius),
- KKK is a constant based on cooling conditions (typically around 0.008 for natural convection in free air),
- III is the current (in amps),
- AAA is the cross-sectional area of the busbar (in square millimeters).

Now, let’s calculate the cross-sectional area for both busbars:

1. For the 25mm x 3mm busbar:

A=25×3=75 mm2A = 25 \times 3 = 75 \, \text{mm}^2A=25×3=75mm2

For a current of 150A:

ΔT=0.008×150×175≈0.16 °C per amp\Delta T = 0.008 \times 150 \times \frac{1}{75} \approx 0.16 \, \text{°C per amp}ΔT=0.008×150×751≈0.16°C per amp

So, the temperature rise for the 25mm x 3mm busbar is:

ΔT=0.16×150=24 °C\Delta T = 0.16 \times 150 = 24 \, \text{°C}ΔT=0.16×150=24°C

2. For the 1.8mm x 20mm busbar:

A=1.8×20=36 mm2A = 1.8 \times 20 = 36 \, \text{mm}^2A=1.8×20=36mm2

For a current of 150A:

ΔT=0.008×150×136≈0.0333 °C per amp\Delta T = 0.008 \times 150 \times \frac{1}{36} \approx 0.0333 \, \text{°C per amp}ΔT=0.008×150×361≈0.0333°C per amp

So, the temperature rise for the 1.8mm x 20mm busbar is:

ΔT=0.0333×150=40 °C\Delta T = 0.0333 \times 150 = 40 \, \text{°C}ΔT=0.0333×150=40°C

Summary:

- **25mm x 3mm busbar**: Approximate temperature rise is **24°C** at 150A.
- **1.8mm x 20mm busbar**: Approximate temperature rise is **40°C** at 150A.

The larger surface area of the 25mm x 3mm busbar results in significantly lower heat generation, making it more suitable for high-current applications.

With an ambient temp of say 30degrees ours will reach 54 degrees at maximum load. our competitor’s product will hit 74degrees centigrade!!!!!

Smart Wiring busbars will heat up nearly 50% less than the competition. Much safer.