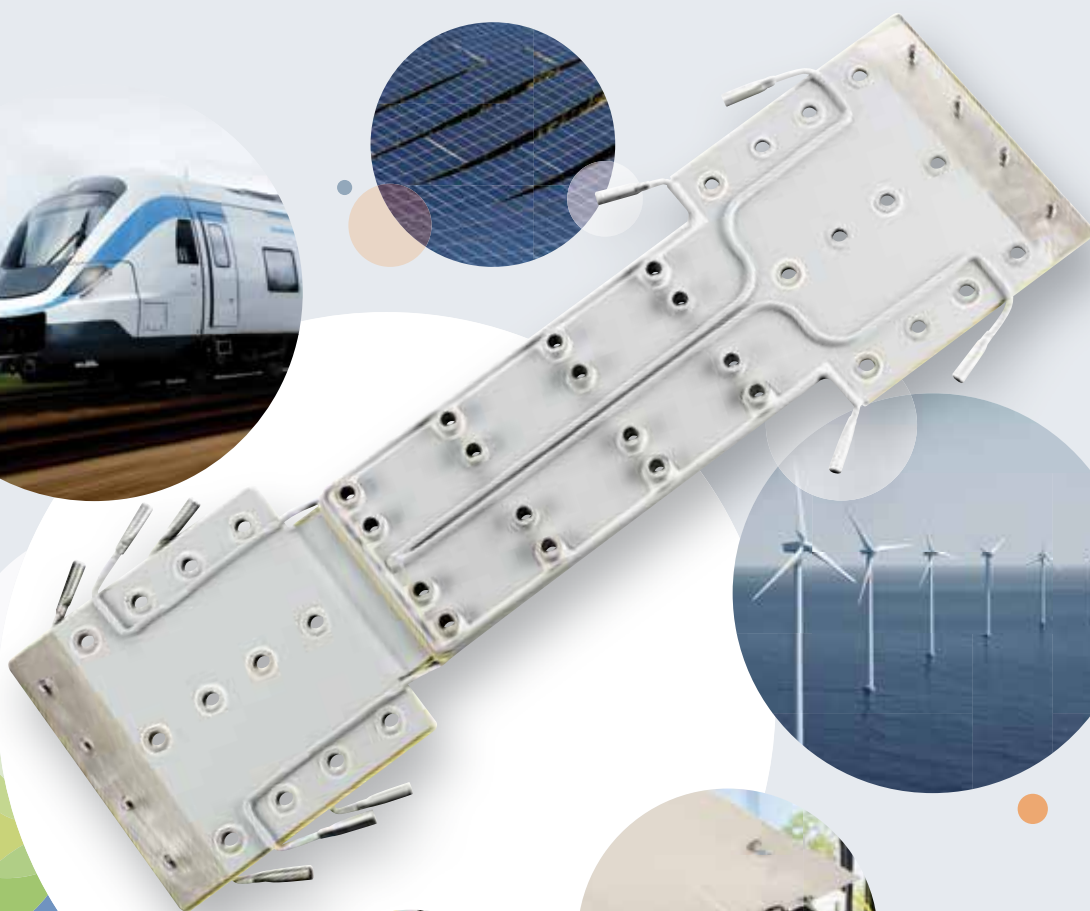


# Water Cooled Laminated Busbars Solutions

Expertly engineered for reliable performance



**MERSEN**

Eldre | Ferraz Shawmut | R-Theta

# Mersen's Water Cooled Laminated Busbars are engineered to meet your thermal needs

## WHAT IS LAMINATED BUS BAR?

Laminated bus bar is an engineered component consisting of layers of fabricated copper or aluminium separated by thin dielectric materials, laminated into a unified structure. Sizes and applications range from surface-mounted bus bars the size of a fingertip to multilayer bus bars that exceed 6 meters in length. Laminated bus bar solutions are routinely used for low volumes of through tens of thousands per week.

## WHY CHOOSE LAMINATED BUS BAR?

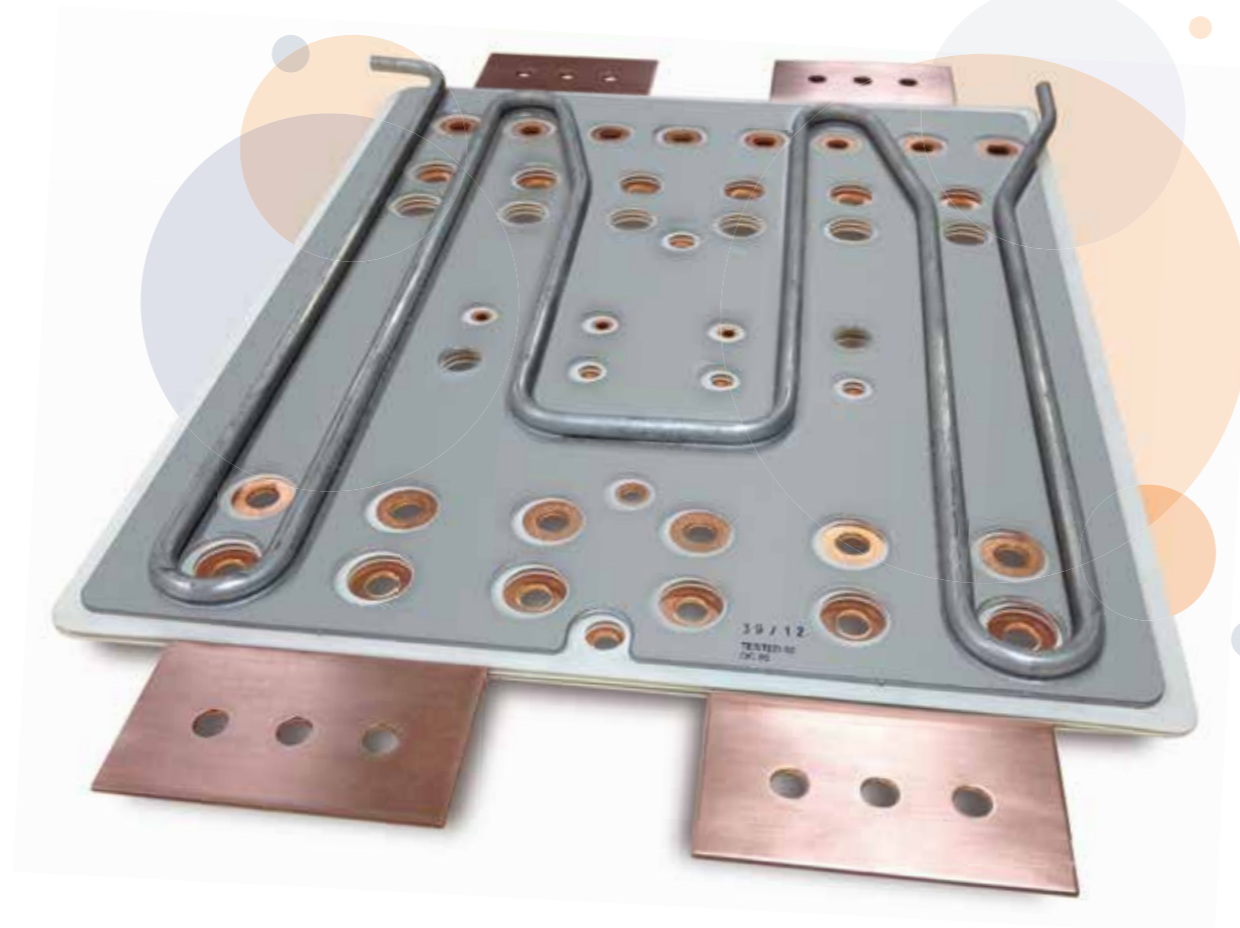
Bus bars reduce system costs, improve reliability, increase capacitance, and eliminate wiring errors. They also lower inductance and lower impedance. Plus, the physical structure of bus bars offers unique features in mechanical design. For example, complete power distribution subsystems can also act as structural members of a total system. Multilayer bus bars offer a structural integrity that wiring methods just can't match.

## LAMINATED BUS BAR WITH COOLING INTEGRATED

To cope with the global increase of temperature and space reduction in power electronic applications, Mersen has engineered an innovative concept that combines in a single customized device a laminated busbar with a water cooling pipe designed to meet your thermal needs.

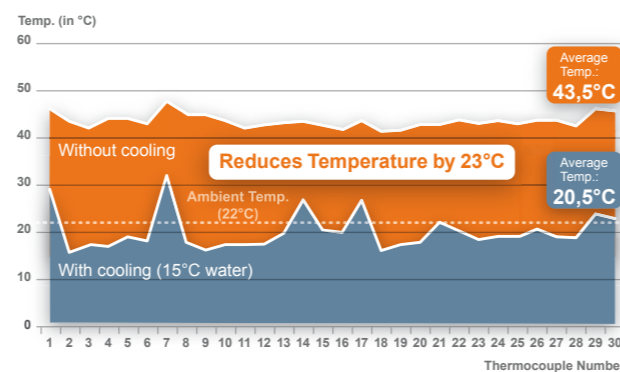
Indeed, thermal considerations often exceed conventional means of heat dissipation whenever high frequency or high current densities enter into play. The "skin effect" created by the high frequency of the AC voltage and the high current densities reached because of space reduction make it essential to add water-cooling to the system to maintain a constant temperature and avoid overheating.

Moreover, the water cooled laminated busbar also contributes to cool surrounding connected components such as IGBTs or capacitors, but can also act as an heating device with warm water to avoid breaking these components in environments where ambient temperature is very low.



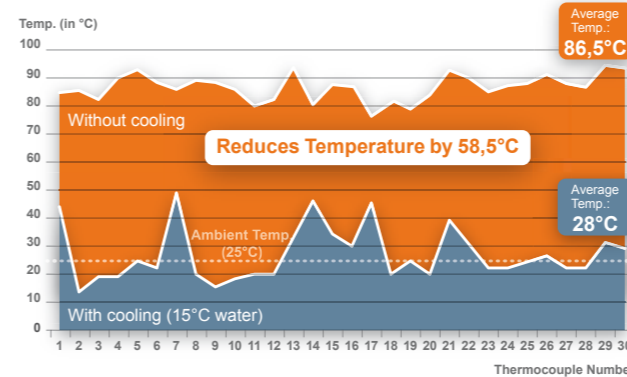
### Copper 3mm

Comparison of the temperature (in °C) between 2 busbars of 3 mm with cooling & without cooling

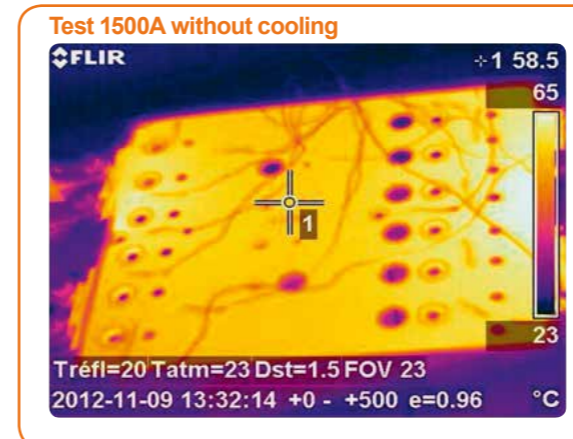
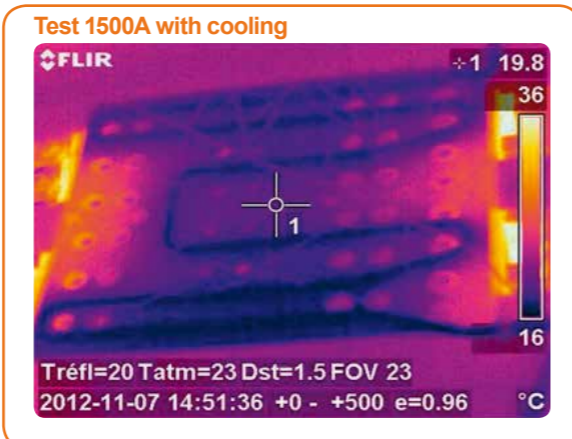


### Copper 0,8mm

Comparison of the temperature (in °C) between 2 busbars of 0,8 mm with cooling & without cooling



## COMPARISONS WITH AND WITHOUT COOLING



## CUSTOMER'S BENEFITS

- Higher power admissible
- Metal savings
- Hot spots suppression
- Global heat decrease close or below ambient temperature
- Custom path of the pipe to cool surrounding components
- Increased current density
- Possibility to inject warm water to heat surrounding components in low temperature environments

## CONDUCTORS MATERIAL

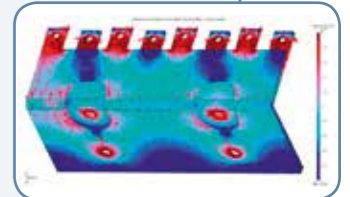
- Copper, aluminum, brass etc.
- Several plating options: Sn, Ni, Ag etc.
- Standard thicknesses (mm): 0.5; 0.8; 1; 1.5; 2; 2.5; 3; 3.5; 4
- Possibility of custom thicknesses: less than 0.5 mm or more than 4 mm

## INSULATION MATERIAL

- Insulation selected according to your requirements of temperature, pollution degree, humidity rate and classification (UL, CSA...)
- Wide range: PET; Aramid paper; PEN; PVF; PI etc.

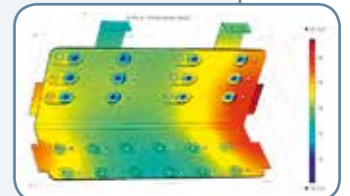
## ELECTRICAL SPECIFICATIONS AND SIMULATION

- Voltage: up to 10kVAC
- Current: up to 2kA
- Power range: 1kW ... 5MW
- Above ranges can be adapted to fit specific requirements
- Lower inductance and impedance
- Possibility of current flow and inductance simulation



## THERMAL SPECIFICATIONS AND SIMULATION

- Working temperature from -40°C up to 220°C
- Water cooled pipe soldered on the laminated busbar
- Thermal decrease up to 100°C and more in some high power applications
- Stops temperature increase in high temperature environment
- Possibility of thermal simulation
- Possibility to add a complementary cooling plate for surrounding components such as IGBTs



## WATER COOLED LAMINATED BUSBARS SOLUTIONS

### BATTERY

- Li-ion battery packs

### CAPACITOR BANK

- DC-link capacitors
- Ultracapacitors

### POWER CONVERSION

- On-board converter
- Sub-station converter
- Inverter
- Rectifier

### POWER SUPPLY

- Power supply units
- UPS
- Power amplifier

### DRIVES

- LV drive
- MV drive







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 Expertise, our source of energy

**A WORLD LEADER  
 in safety & reliability  
 for electrical power**

## A GLOBAL PLAYER

Global expert in materials and equipment for extreme environments and in the safety and reliability of electrical equipment.

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