Busbar Design Guide

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Busbar Construction: Types

Relevant physical properties of conductor materials used in busbar construction

Metal	Density @ 20°C (lb/in3)	CTE @ 20°C (x10-6m /m•°C)	Thermal Conductivity @ 20°C (W/m•K)	Specification
Copper 110	0.323	17	388	ASTM B-152 QQ-C-576
Copper 101	0.323	17	383 – 391	ASTM B-152 QQ-C-576
Brass 260	308	19.9	120	ASTM B-36 QQ-B-613
Aluminum 6061- T651	00.098	23.6	154	ASTM-B236

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Busbar Construction: Types

Relevant electrical properties of conductor materials used in busbar construction

Metal	Resistivity (ρ) @ 20°C Ω • sqmil/ft	Conductivity % IACS @ 20°C	Thermal Coefficient of Resistivity (α) @ 20°C (10-2/°C)
Copper 110	8.1	101	.393
Copper 101	8.1	101	.393
Brass 260	290.06	28	00.098
Aluminum 6061- T651	13.35	62	.423

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Typical Busbar Sizes

If this program recommends sizes that do not fit into the ranges below, change either the number of conductors or the section thickness of the busbar and recalculate the minimum cost solution

Thickness	Range of Widths
1/16”	1/2-2”
3/8”	1/2 – 4”
3/16”	1/2 – 4”
1/4”	1/2 – 12″
3/8″	3/4 – 12″
1/2″	1 – 12″
3/4″	4 – 12″

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Busbar Construction: Lamination

Insulation Material Choice

Material	Cost	Colors	Properties	Temp Index	Notes
Mylar	Low	Clear White	UL 94V-2 Coating	105°C	External Insulation Abrasion Resistant
Nomex	Medium	Off White Tan	UL 94V-0 Polyamide Paper	220°C	Internal Insulation High Dielectric Strength
FR1 Valox	Medium	Off White	UL 94V-0 UL 94V-0TMO	125°C	Easy to Fabricate High Dielectric
Kapton	Very High	Yellow Red	UL 94V-0 Film	240°C	High Dielectric
FR4/Phenolic	Medium	Tan Green	UL 94V-0	125°C/ 105°C	High Voltages Edge Protection
Epoxy Embedding	Medium	Black White Amber	UL 94V-0	150°C	Edge Protection
Powder Coating	Low	Many	UL 94V-0	125°C	Complex Shapes, Holes and Edges

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Busbar Construction: Plating

Metal	Conductivity	Thermal Coefficient of Resistivity (α) @ 20°C (10-2/°C)	Specification
Tin	13.6	.42	ASTM B545, MIL-T-10727
Nickel	11.8	.48	AMS 2403,AMS-QQ-N-290, QQ-N-290
Silver	105.8	.38	ASTM B700
Solder Alloy 60/40	10	.40	AMS-P-81728, MIL-P-81728

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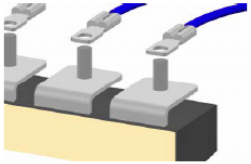
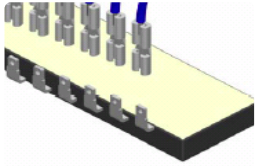
Busbar Construction: Terminations

- Tabs

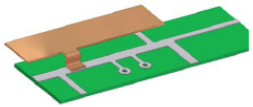


- Studs

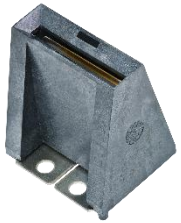
- PEM



- Fastons



- PCB



- Connectors

- Radsok®

- Pins

Busbar Construction: Terminations

Floating spacer for optimal mechanical tolerance

Standard spacer for easy leveling

Standoff spacer with stud for easy leveling and connection (cable shoe, resistor...)

Double spacer for easy leveling and connecting on both sides (snubber...)

Tapped spacer for leveling up connecting point

Compliance to standards for worldwide use

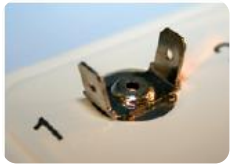
Captive screw for easy and secure mounting

Threaded insert for fast connecting

Casted link for reducing impedance and cost

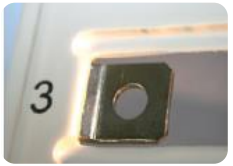
Busbar Construction: Terminations

Serted stud for universal bolted connection



Fast-On® tab

Wire terminal for bare wire connection



Double bending tab for deep and cost effective leveling

Extra cross-section for localized ampacity reinforcement

Pass-through connection

Thick insulant closing for deep and limited area

Semi rigid embossment for less constraints

Integrated barrier for increased creeping distance

Embossment for cost effective leveling