

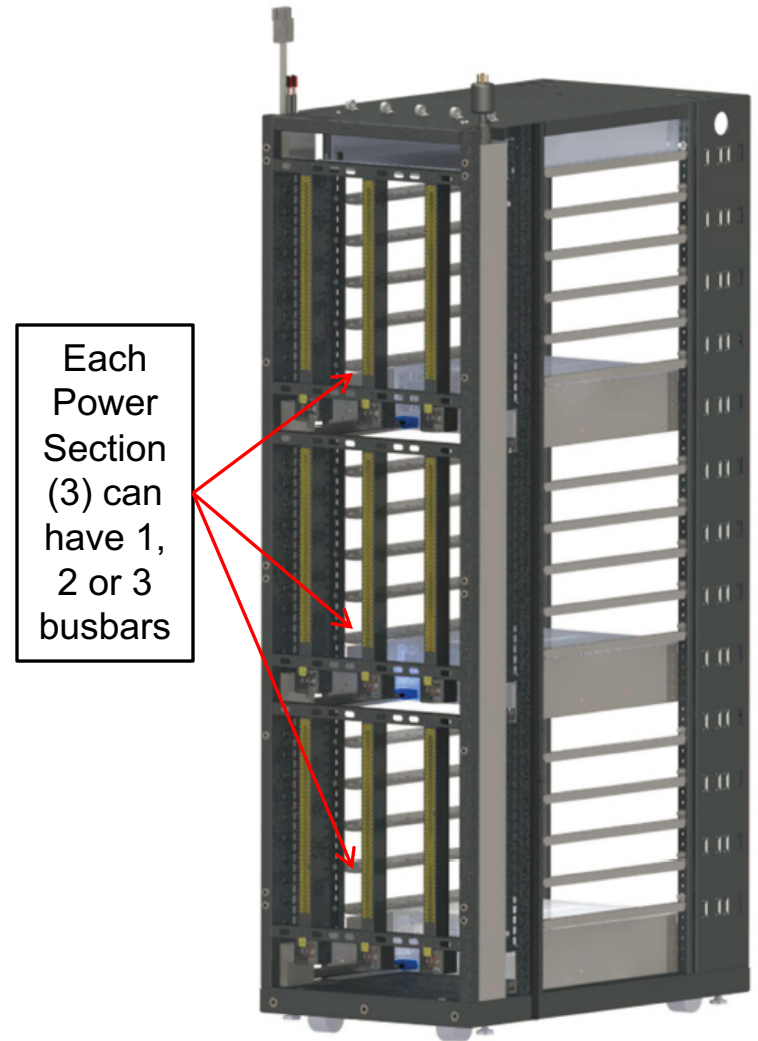
Engineered Power Solutions

Open Compute +48V Busbar
Discussion



❑ Opportunities with Open Rack

- There are a few areas within the Open Rack 2.0 standard that remain undefined. In terms of the mechanical requirement of the busbar assembly, there is a gap where rack mount details are missing. This means that every rack mounts to every busbar differently.
- It is difficult to design a busbar that will work in many applications for OCP. This is compounded when working towards an “OCP Accepted” certification. The reason is that to be “Accepted” the certification is granted per part number and not general application
- This is very difficult to achieve at a busbar level due to many variables that tend to be customer specific:
 - Power Requirements
 - Height (OU, OUI, etc.)
 - Location of Power Supplies
 - Mechanism/Locations for attaching the Power Supplies
 - Mounting Criteria for Busbar



OCP Specification

- To expand upon Rittal's Options: Amphenol is developing higher power busbars
 - 50 kW
 - 60 kW
 - 100 kW
- Each of these will add additional SKU Levels:

48VDC										
Depth	Shallow (30")					Deep (44")				
Power Rating	15kW	36kW	50kW	60kW	100kW	15kW	36kW	50kW	60kW	100kW
Busbar Format	1X Busbar Solution	1X Busbar Solution	1X Busbar Solution	1X Busbar Solution	1X Busbar Solution (2 halves)	1X Busbar Solution	1X Busbar Solution	1X Busbar Solution	1X Busbar Solution	1X Busbar Solution (2 halves)

Management of Power Supply Connections

PowerLug or
Busbars from
The Power Supply

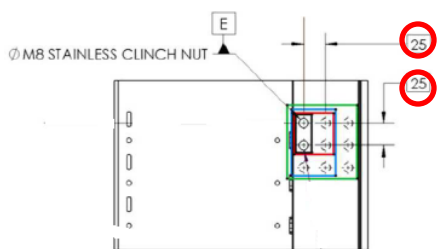
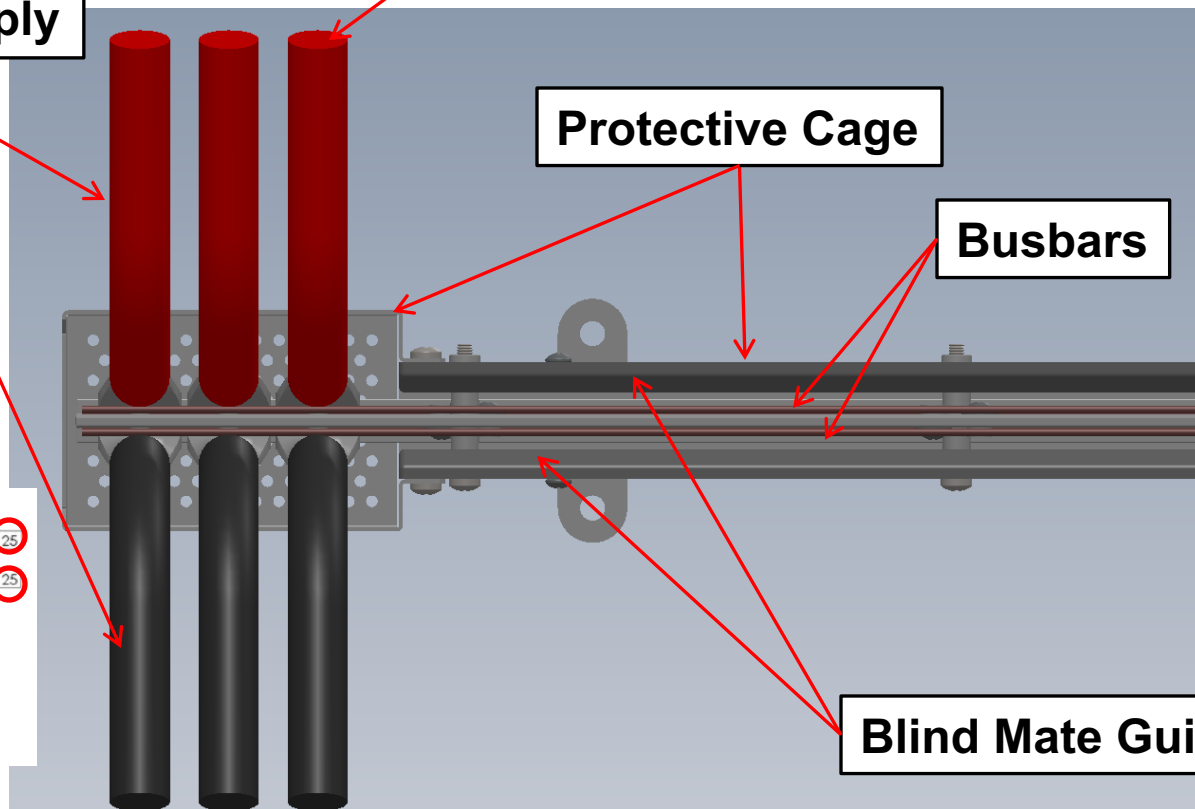
36 kW Busbar would require (3) 4/0 wires
for each potential

Protective Cage

Busbars

May need to change
these dimensions
and/or add studs?

Blind Mate Guides



Future question is with higher kW requirements, will 3 posts be sufficient?
Will the spacing need to change to accommodate larger wire gage?

Example of OCP 48V Busbar SKU Matrix

P/N: **BBOCP** **48** **AA** **BBB** **PS** **CCDD** **EE**

BusBar OCP

48 = 48V

Watts

15 = 15kW

36 = 36kW

50 = 50kW

Rack OU or OUI

XXU = “#” OU

XXI = “#” OUI

Rack Manufacturer

CW = Chatsworth

DT = Delta

EN = Emerson

FX = Flex

RC = Rack Space

RS = Rack Solutions

RT = Rittal

TL = Telect

Power Supply

Location

CC = OU(I) of first PS

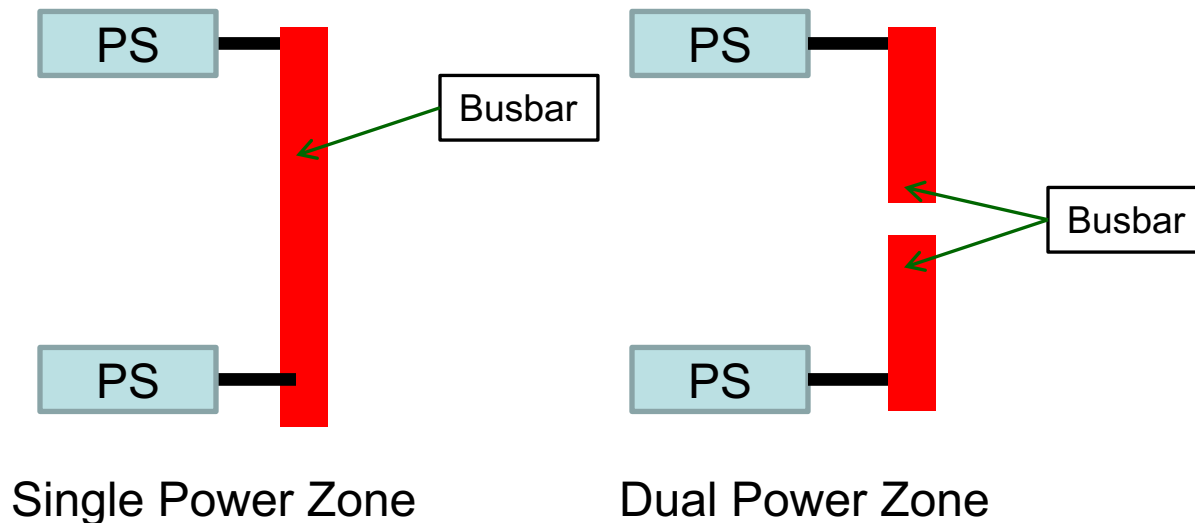
DD = OU(I) of 2nd PS

Power Zones

Not all Power Ratings are the Same!

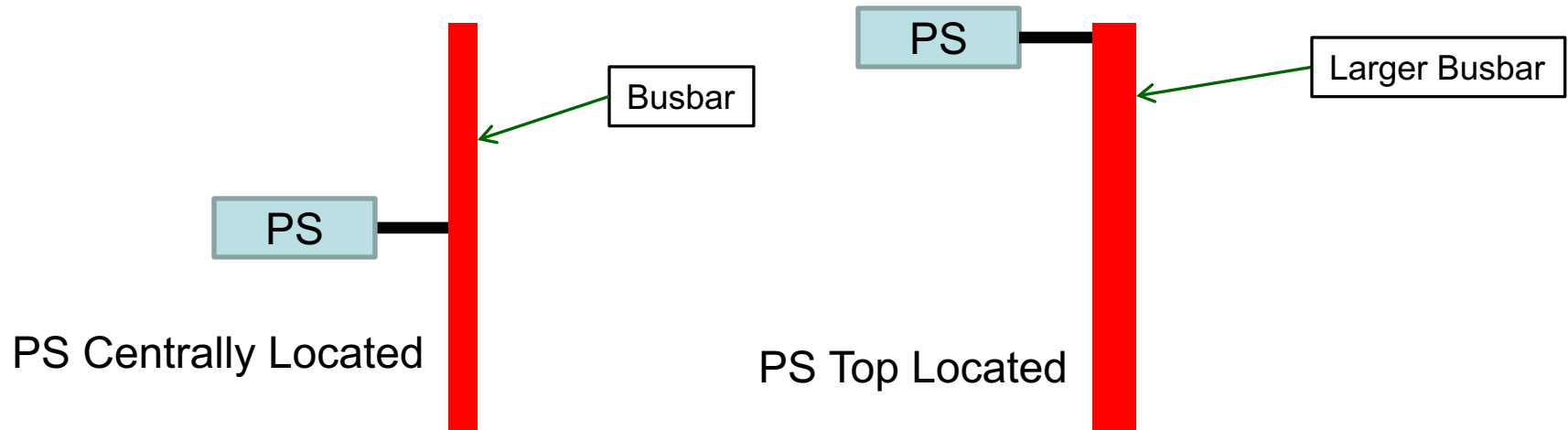
Regarding the Topic of Power rating for an entire rack. A 36kW rack for example can be configured with a Single Power Zone, a Split Single (Dual), or (3) 12kW Power Zones.

It is our suggestion that the number of Power Zone(s) should be considered when rating the busbar in context to the rack. A single 36kW power zone busbar will have more copper mass than a Split Single Zone 18kW busbar.



Power Supply Location

- Another challenge is the location of the Power Supply(ies). This becomes a particular challenge with the full length busbars (~42 OU).
- As a power solutions provider, the preference would be a central location to minimize the copper usage or increase the power availability
 - For example, the design of a 36 kW busbar with the power supplies centrally located will minimize the copper needed to support this power level (half the power for each busbar leg) vs. locating the Power Supplies either top or bottom which will require the support the full power (~950A at minimum voltage)



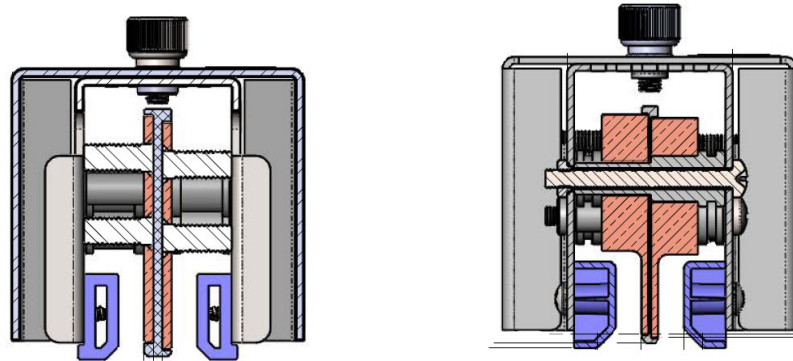
Copper Sizing Calculation

Busbar current ratings can vary from vendor to vendor. Should we reference in section 3.2 for the 48V OCP spec a variable for determining power rating based on cross section area of copper. A 30 degree C T Rise.

In the development of Busbars we use a very easy to remember formula of:

$$5A / \text{mm}^2$$

This has been supported by Simulation and Load testing by groups within Amphenol (AIPC and AFCI).

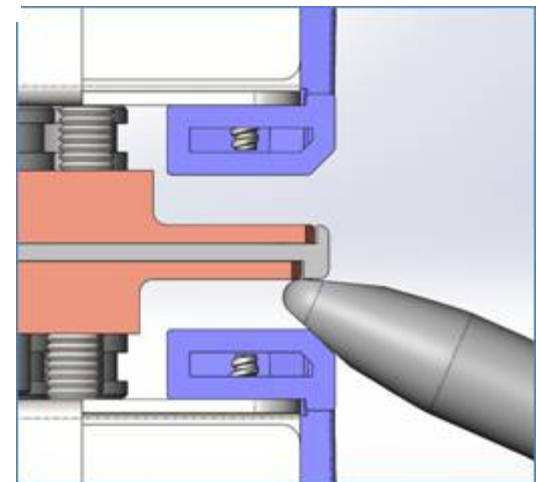
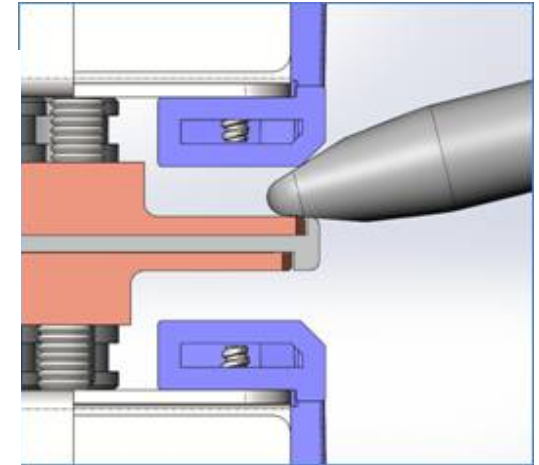
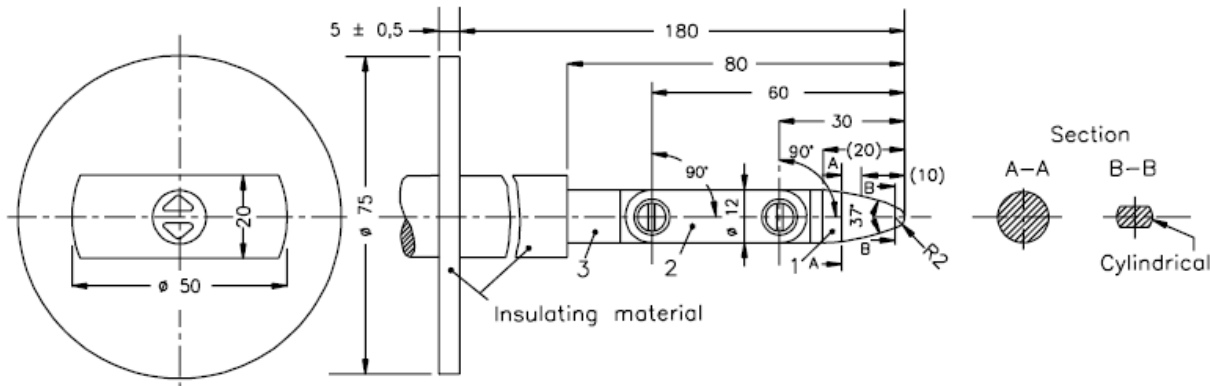


Touch Proof Requirement – Open Rack 2.0 Section 2.5

IEC60950 requires a finger probe test as shown in the below images.

The Bus bars SHALL:

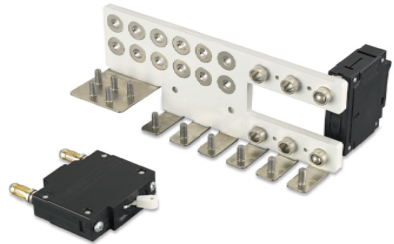
- Be populated with either one or three bus bars per power zone
- Be located in the center position in the rack if only a single bus bar pair is populated
- Be located in the rack per Figure 7 and comply with Figure 8
- Be silver plated at interface points.
- Have user access limited by a method that conforms to UL 60950
- Be made of copper with an IACS near 100%
- If individual bus bar covers are used, the bus bar covers SHALL:
 - Stay within the zone defined in Figure 8



AIPC

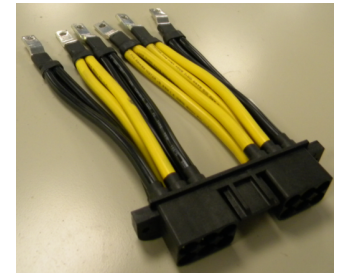
Amphenol Interconnect Products Corp.

Total Power Solutions



Busbars

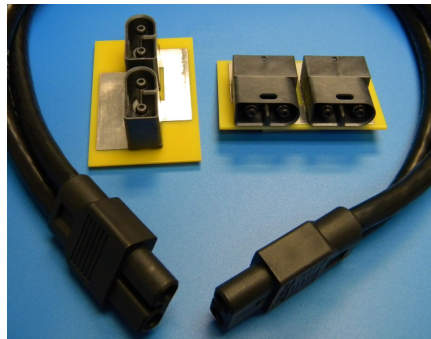
THANK YOU!



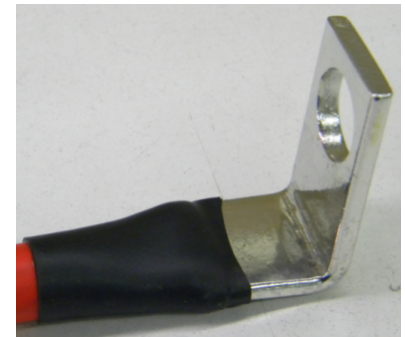
**Power
Assemblies**



Connectors



Cable Assemblies



PowerLugs