



Saf-D-Grid[®]: Best Practices for Adding Protection

APP
Anderson Power Products[®]

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Today our world relies on data centers, servers, networking equipment and cloud computing to store and disseminate data and applications. Because they house an organization's most critical assets, these systems must function reliably and economically. Within these systems even the smallest components, like connectors, can make a big impact by reducing long-term costs while providing efficient, economical, and sustainable performance.

APP® Saf-D-Grid® plugs and receptacles provide for the direct connection of AC and DC electronic devices to a grid powered by mains power, high efficiency DC sources or by renewable energy. The connector meets international safety requirements for hazardous, low voltage applications including IEC 950 and IEC60950.

One challenge facing the data center architect is to maximize usage of rack space. The Saf-D-Grid® is size compatible with the IEC 60320 C13 and C14 connection system that is typically limited to 10A and 250 VAC. However, Saf-D-Grid® enables greater power density by allowing up to 30A and 600V DC or AC within the same space. Saf-D-Grid® facilitates increased wattage in AC systems that require more power within a standard footprint.

To minimize the risk of personal contact with a hazardous voltage, safety standards require protection against finger access to live parts 50V and above. Unlike IEC 60320 connectors, Saf-D-Grid® plug & receptacle connectors both feature a Touch Safe shell with shock protection and both pass UL & IEC finger probe (plug & receptacle) and 3mm probe tests (receptacle). Further, with regard to power density Saf-D-Grid® connectors are rated to carry up to 2x more current and 1.6x more voltage than the standard IEC 60320 C20.

First Mate, Last Break Ground Contact

- Provides the safety of an earthing path before engagement of the power contacts.



Ultra Short Receptacle

Integral Latch

- Connectors cannot be accidentally unmated, preventing unwanted power loss to critical equipment.



T-Latch Straight Plug

Hot Plug Rated

- The connectors are rated for current interruption for both electronic (capacitive) and electrical (resistive) loads.

Touch Safe / Shock Protection

- Minimizes the risk of personal contact with a hazardous voltage. Passes UL & IEC finger probe (plug & receptacle) and 3mm probe tests (receptacle)

Arcing Protection

- Housings contain the arc if connectors are mated or unmated while under load minimizing risk to personnel.

The APP® Saf-D-Grid® has a “Registered Product” status with the EMerge Alliance® for 380 volt DC power distribution systems for use in data centers and telecom central offices. The EMerge Alliance Data/Telecom Center Standard creates an integrated, open platform for power, infrastructure, peripheral device and control applications to facilitate the hybrid use of AC and DC power within data centers and telecom central offices. EMerge is leading the adoption of safe, resilient, economical and sustainable DC and hybrid AC/DC. 380V is the global sweet spot for standardized components with the best balance of economics and safety. These standardized components are commonly used in power supply systems for today’s computers, electric vehicles, solar power, etc.

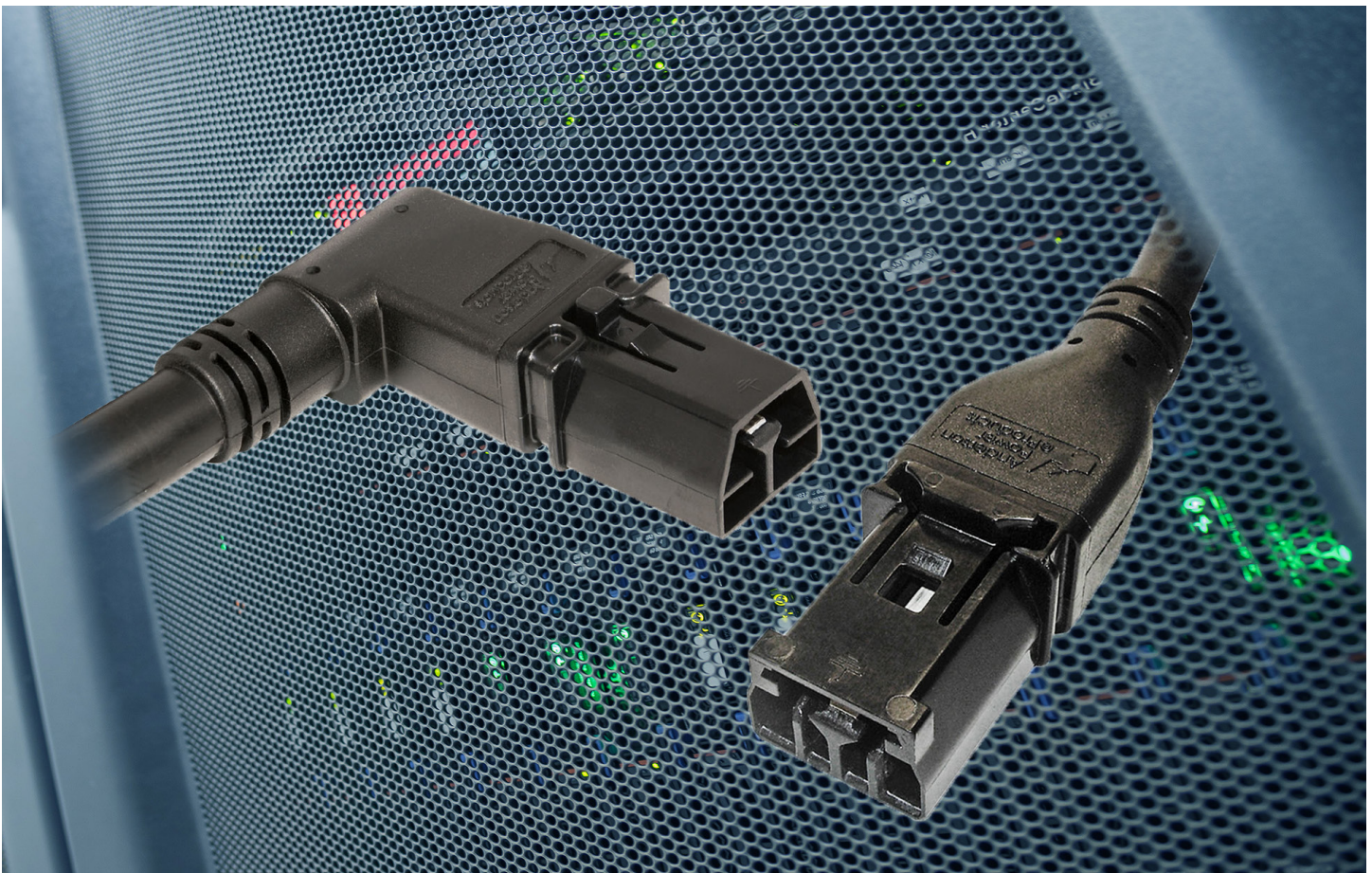
Power distribution at 380VDC has inherent advantages over lower voltages. This connector system provides a critical link in the broad scale adoption of 380VDC power distribution systems by providing a safe power interconnect for power supplies, power distribution units, and peripheral devices.

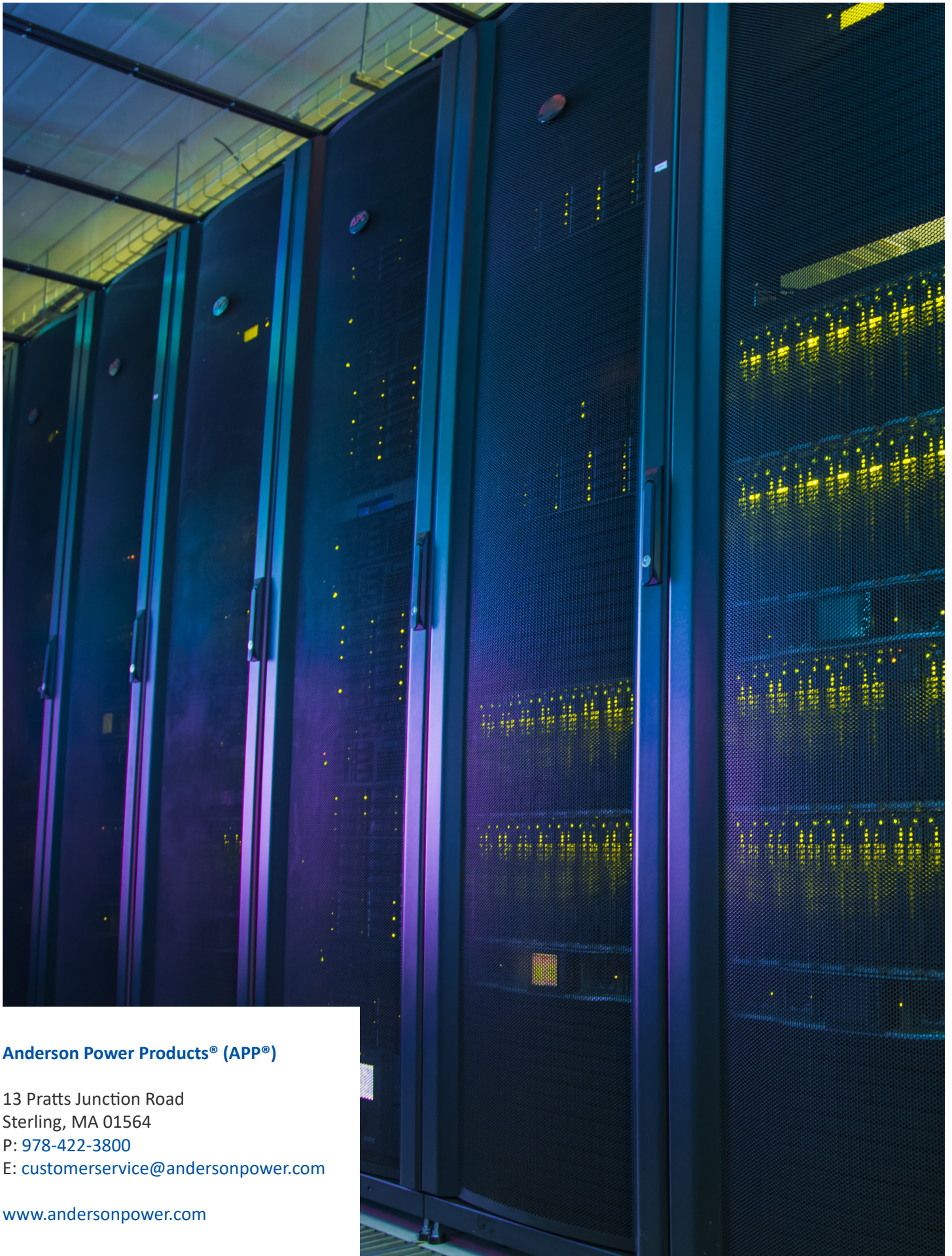
Arcing Protection Housings contain the arc if connectors are mated or unmated while under load, minimizing risk to personnel. For its DC Arcing Tests, APP® created a DC Electronic Circuit to evaluate connector damage. Tests of existing IEC320 connectors on a 400V DC circuit demonstrated that the products did not survive 400VDC Arcing Damage. Testing resulted in a hole burnt through the primary conductive path of contacts.

To mitigate arcing, APP® considered many solutions. Most were impractical or not cost effective. Ultimately, Saf-D-Grid® utilized contacts that are designed to minimize arcing along with housing geometries that contain the arc if connectors are mated or unmated while under load. The contacts have twice the spacing needed to extinguish the 400V DC Arc before the housings separate. The rugged polycarbonate housings are UL94 V-0 rated and over-molded to provide both strain relief during mating and un-mating.

Additional safety features include a first mate, last break contact to provide the safety of an earthing path before engagement of the power contacts. The connectors contain an integral latch to prevent accidental de-mating, preventing accidental power loss to critical equipment and revenue-consuming downtime. The connectors also offer tactile & audible confirmation of a connection.

The maximum amperage ratings provided in the specifications are based on use of APP’s recommended assembly tooling and the maximum wire size for the connector being used. Amperage ratings are based on not exceeding the maximum operating temperature of the connector housing, factoring in an ambient temperature of 25°C or 77°F.





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