GORE® Power Feeder Cables
For Aerospace & Defense

Selecting High-Voltage Wires Based on Partial Discharge Performance Data

Aircraft wiring engineers have traditionally selected high-voltage wires based on criteria in industry standards, such as SAE AS22759™. However, this selection process does not account for the risks associated with operating next-generation high-voltage systems at high altitude.

While the AS22759 standard provides wire voltage ratings, it does not describe the usable margin and how it changes with temperature, altitude, or installation geometry. As a result, engineers must apply a derating factor often shaped by internal best practices, program precedent, or engineering judgment rather than standardized criteria.

As aircraft systems move toward more complex electrical architectures with higher voltages, these operating conditions highlight the need for testing beyond the AS22759-specific data to validate wire performance in real-world conditions.

Partial Discharge — The New Threat

Higher voltages and lower air density increase the likelihood of partial discharge (PD) — electrical discharges that occur when the local, often microscopic, electric field exceeds the breakdown strength of a gas-filled void, surface path, or air gap, without forming a complete breakdown path between conductors. The compounding effects of repeated discharge can degrade insulation and increase the risk of catastrophic failure. Historically, aircraft have used voltages below Paschen's minimum of 327 volts, which generally eliminates the risk of PD events; however, future systems require higher-voltage capability.

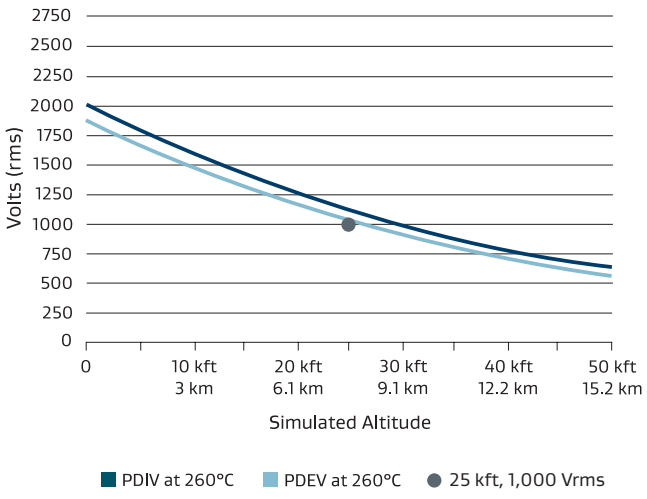
Furthermore, AS50881™ recognizes this risk and provides PD inception curves for equivalent wire insulation thickness as it varies with pressure and temperature. However, relying solely on these standards can drive engineers to use insulation that is much thicker, which is difficult to justify in aircraft applications with size and weight constraints.

Proven Performance through Testing

Aircraft wiring engineers need the necessary data to select high-voltage wires with confidence. Therefore, Gore developed in-house testing and partnered with an industry-leading external lab to evaluate the PD performance of its cables under temperature and altitude, while bent around a mandrel with a radius equal to 3 times the cable's outer diameter (OD) (Figure 2 on next page).

Figure 1 shows partial discharge inception voltage (PDIV) and partial discharge extinction voltage (PDEV) curves of Gore's cables indicating the safe operating voltage for a range of altitudes at 260°C. Results show that GORE® Power Feeder Cables can operate dependably up to 1,000 volts at 25,000 feet (7,600 meters) and 260°C.

Figure 1: PDIV/PDEV at 260°C of GORE® Power Feeder Cables



Together, improving life

With the increasing demand for high-voltage operations in aerospace and defense, Gore's testing reveals that engineers must consider PD as a critical parameter when designing systems.

For more information about our high-voltage cables including qualification data and technical support based on your system requirements, visit **gore.co.power-feeder-cables.**

Figure 2: GORE® Power Feeder Cables for Aerospace & Defense



Information in this publication corresponds to W. L. Gore & Associates' current knowledge on the subject. It is offered solely to provide possible suggestions for user experimentations. It is NOT intended, however, to substitute for any testing the user may need to conduct to determine the suitability of the product for the user's particular purposes. Due to the unlimited variety of potential applications for the product, the user must BEFORE production use, determine that the product is suitable for the intended application and is compatible with other component materials. The user is solely responsible for determining the proper amount and placement of the product. Information in this publication may be subject to revision as new knowledge and experience become available. W. L. Gore & Associates cannot anticipate all variations in actual end user conditions, and therefore, makes no warranties and assumes no liability in connection with any use of this information. No information in this publication is to be considered as a license to operate under or a recommendation to infringe any patent right.

NOTICE — USE RESTRICTIONS APPLY. Not for use in food, drug, cosmetic or medical device manufacturing, processing, or packaging operations.

GORE, *Together, improving life*, and designs are trademarks of W. L. Gore & Associates © 2026 W. L. Gore & Associates

W. L. Gore & Associates
gore.com

ACS-1085-TEC-EN-JUN26