GORE® High Performance
Aerospace Wires

# Proven electrical & mechanical durability to ensure EWIS reliability over time

The aerospace industry has introduced many innovations over the decades, such as new engine architectures, aerodynamics, winglets, and low-weight components. The trend also continues towards replacing pneumatic and hydraulics with more electrical aircraft (MEA) components. These innovations help reduce fuel consumption and emissions on the environment and decrease maintenance for higher operating profitability. Furthermore, current electrical wiring and interconnection systems (EWIS) designed decades ago may not fulfill next-generation aviation requirements or address future aircraft electrification.

These higher aviation requirements put more electrical stress on wiring and increase the risks of physical damage. Therefore, wire insulation becomes critical to ensure system reliability, functionality, and safety. However, current insulation materials can be limited in electrical or mechanical durability and degrade over time when exposed to extreme conditions, potentially compromising the integrity and reliability of aircraft EWIS.

A traditional approach for adding more durability is to increase the amount of wire insulation. However, adding more insulation increases the size and weight of wire bundles, thus increasing aircraft weight.

### Best Combination of Durability & Long-Term Stability

GORE® High Performance Aerospace Wires offer the best combination of superior mechanical strength and outstanding electrical reliability for optimal performance over time without increasing wire bundle size or weight. They meet higher levels of electrical and mechanical durability for wire bundles operating in severe aerospace conditions (Table 1).

The engineered fluoropolymer insulation in our wires has higher voltage breakdown and voltage endurance compared to other materials (Figure 1). Our proprietary insulation is chemically inert and does not degrade when exposed to harsh chemicals or humidity. This durable insulation also reduces the risk of chafing, abrasion, and cut-through failures while withstanding extreme temperatures (Figures 2–4). Unlike current insulation materials, Gore's wire insulation meets mechanical, electrical, and material stability needs in one solution for current and next-generation aircraft (Table 2).

With proven durability and long-term stability, GORE® High Performance Aerospace Wires ensure EWIS reliability, increase aircraft availability, improve safety, and reduce total lifetime costs.

### Features & Benefits

- Less risk of wire damage with proven insulation strength that resists chafing, abrasion, and cut-through over wide temperatures
- Chemically inert, non-flammable material resists harsh chemicals/ fire for increased aircraft safety and improved system performance
- No degradation over time due to hydrophobic, non-hydrolyzing material that ensures longer service life
- Low-permittivity, stable insulation improves PDIV performance with higher inception voltages and low PD risk with aging
- Enhanced mechanical durability and high voltage breakdown reduce risk of failure in demanding MEA applications
- Greater EWIS reliability, increased aircraft availability, improved safety, reduced total costs
- Increased future-proofing with wires that can withstand higher voltage requirements

*Together, improving life*

GORE

# GORE® High Performance Aerospace Wires

Gore completed all testing according to SAE AS4373™ methods using size 20 AWG. Also, Gore compared performance results for part number, GWN3001-20-NCC-U-9, against commonly used wire types.

**Table 1: Qualifications Summary**

| Property | Requirement | Standard | Status |
|---|---|---|---|
| Test Voltage | Impulse: 8 kV (peak)<br>High-frequency test voltage:<br>5 kV (RMS) | — | Compliant |
| Partial Discharge Inception Voltage | Minimum 1900 V | ASTM D3032, Section 24* | Compliant |
| Dry Arc Propagation | 70 out of 75 wires pass dielectric withstand post-test | SAE AS4373, Method 508 | Compliant |
| Wet Arc Propagation | 70 out of 75 wires pass dielectric withstand post-test | SAE AS4373, Method 509 | Compliant |
| Flammability | No incendiary particles; burn <3.0 mm (1.18 in); self-extinguish in 3 seconds | SAE AS4373, Method 801 | Compliant |
| Humidity resistance | 5000 Megaohms / 1000 ft after exposure | SAE AS4373, Method 603 | Compliant |
| Dynamic Cut-Through Resistance | 23°C, 30 lb<br>150°C, 25 lb<br>200°C, 25 lb<br>260°C, 10 lb | SAE AS4373, Method 703 | Compliant |
| Abrasion Resistance | 23°C, >20,000 cycles<br>70°C, >3,000 cycles<br>150°C, >1,000 cycles | SAE AS4373, Method 301 | Compliant |
| Insulated Wire Break Strength | Average >60 lb | SAE AS4373, Method 705 | Compliant |
| Wrap Back | No cracks after wrapping | SAE AS4373, Method 714 | Compliant |

* Test carried out in dielectric fluid to evaluate the insulation's void-free content and quality. Results do not apply for PD in air.

**Figure 1: Short-Term Voltage Breakdown**

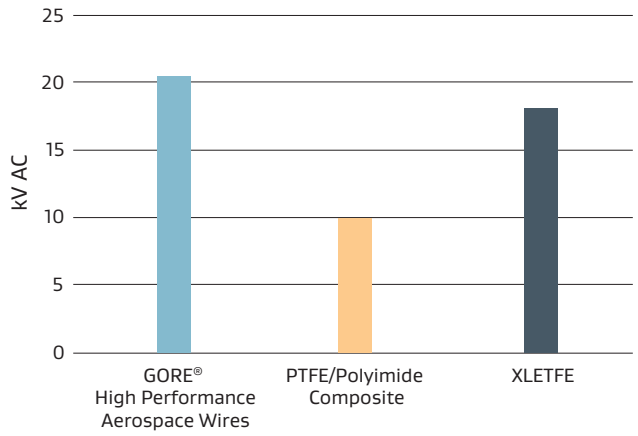



**Figure 2: Tensile Strength**

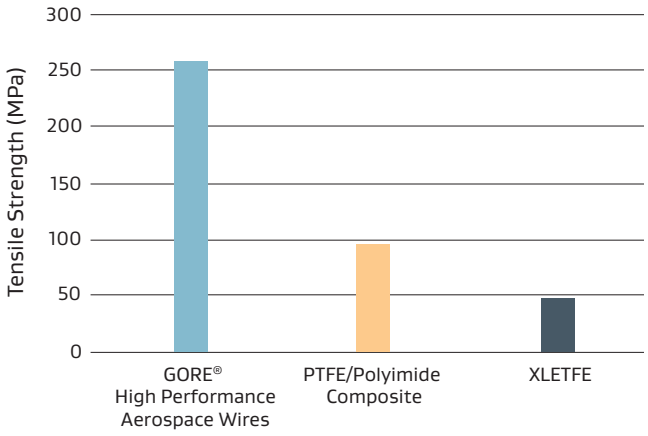



**Figure 3: Abrasion Resistance**

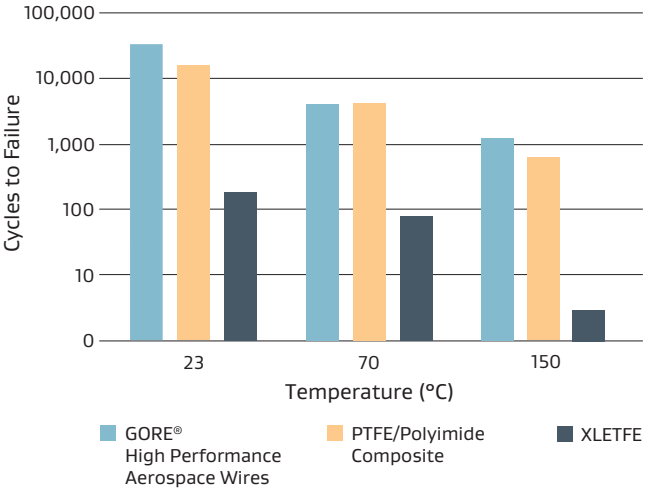



**Figure 4: Cut-Through Resistance**

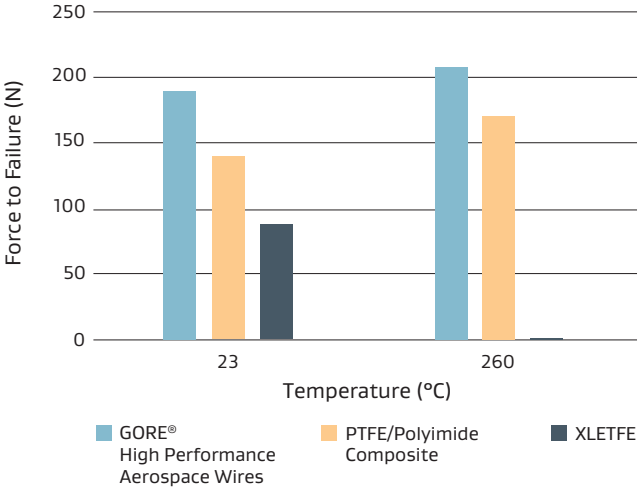


**Table 2: Material Performance Comparison**

| Critical Attributes | Extruded Fluoropolymer (XLETFE) | PTFE/Polyimide Composite | Gore Engineered Fluoropolymer (EFP) |
|---|---|---|---|
| Mechanical Durability | 🔴 | 🟡 | 🟢 |
| Electrical Durability | 🟢 | 🟡 | 🟢 |
| Long-Term Material Stability | 🟢 | 🔴 | 🟢 |

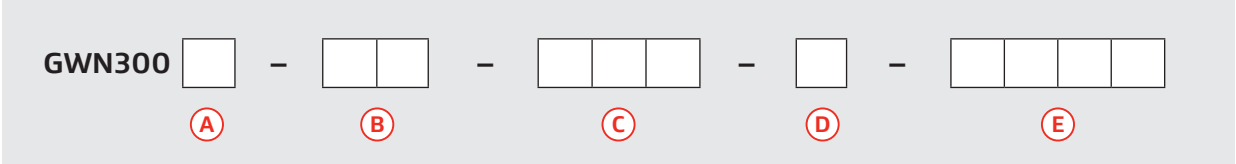
Green = Acceptable/Good
Yellow = Concern/Uncertainty
Red = Unacceptable/Low Performance

## Samples & Ordering Information

GORE® High Performance Aerospace Wires are identified by an 11-character part number. This number designates the construction type, wire size, conductor and shield types, and color coding.

We also offer complimentary samples for prototyping and evaluation. To request samples or place an order, contact an authorized distributor for in-stock availability at **gore.com/cable-distributors.** Alternatively, fill out a short form to request samples at **gore.com/hipawsample.**

For more information or to discuss your specific characteristic limits and application needs, including color coding that meets MIL-STD-104 Class 2 requirements, contact a Gore representative today at **gore.com/aerospace-defense-contact.**




**A** **Construction Type**
1 = Single
2 = Pair
3 = Triple
4 = Quad

**B** **Wire Size** (Table 3)

**C** **Conductor Type** (Table 4)

**D** **Shield Type**
U = Unshielded
S = Shielded. Standard braided shield (92%) in size 38 AWG.
L = Weight optimized using standard shield (85%) in size 40 AWG (non-compliant to NEMA WC27500)

**E** **Color Coding** (Figure 5)
9 = White
6 = White with Blue Stripe
3 = White with Orange Stripe
5 = White with Green Stripe

Gore's part number GWN3002-20-NCC-S-96 is an example that meets MIL-STD-104 Class 2 requirements. It includes a standard shielded twisted pair in size 20 AWG with solid white and white with blue stripe color coding and ETP copper nickel-plated conductors (Figure 5).

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**Figure 5: Standard Color-Coding (CC) Configurations**

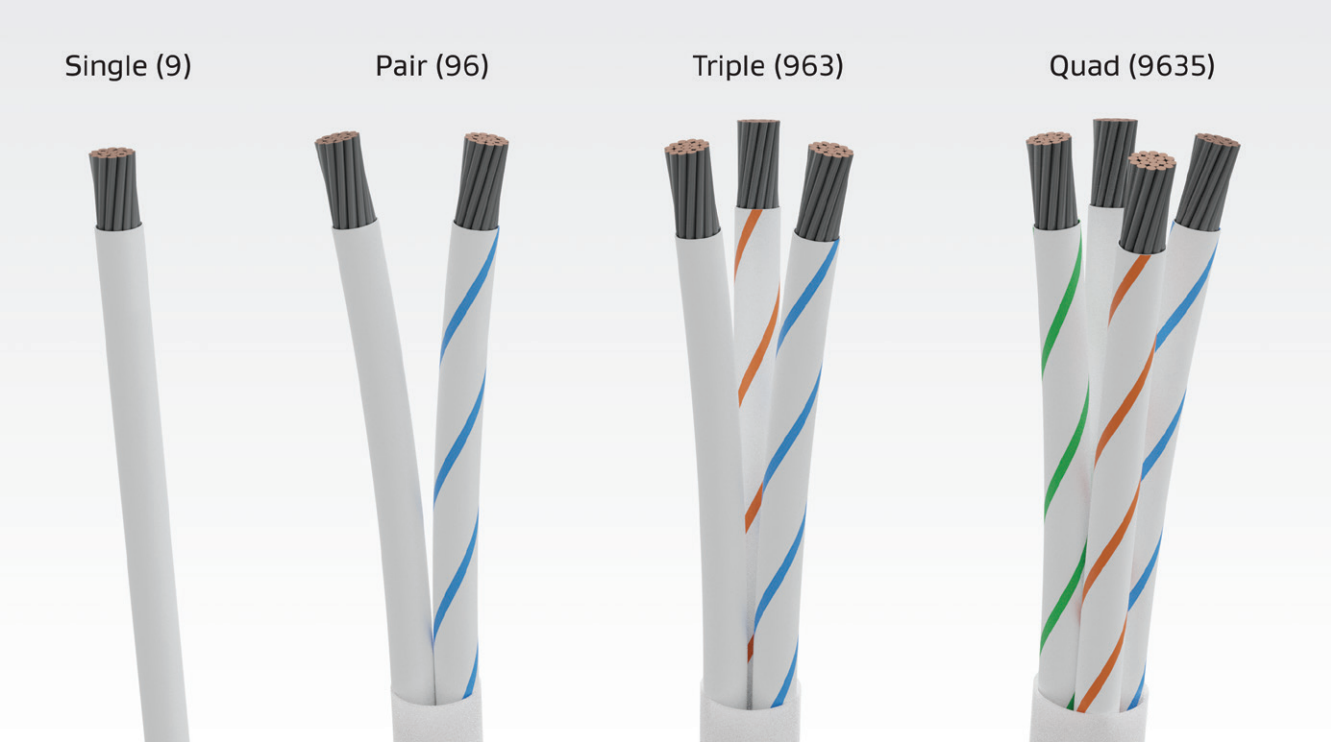
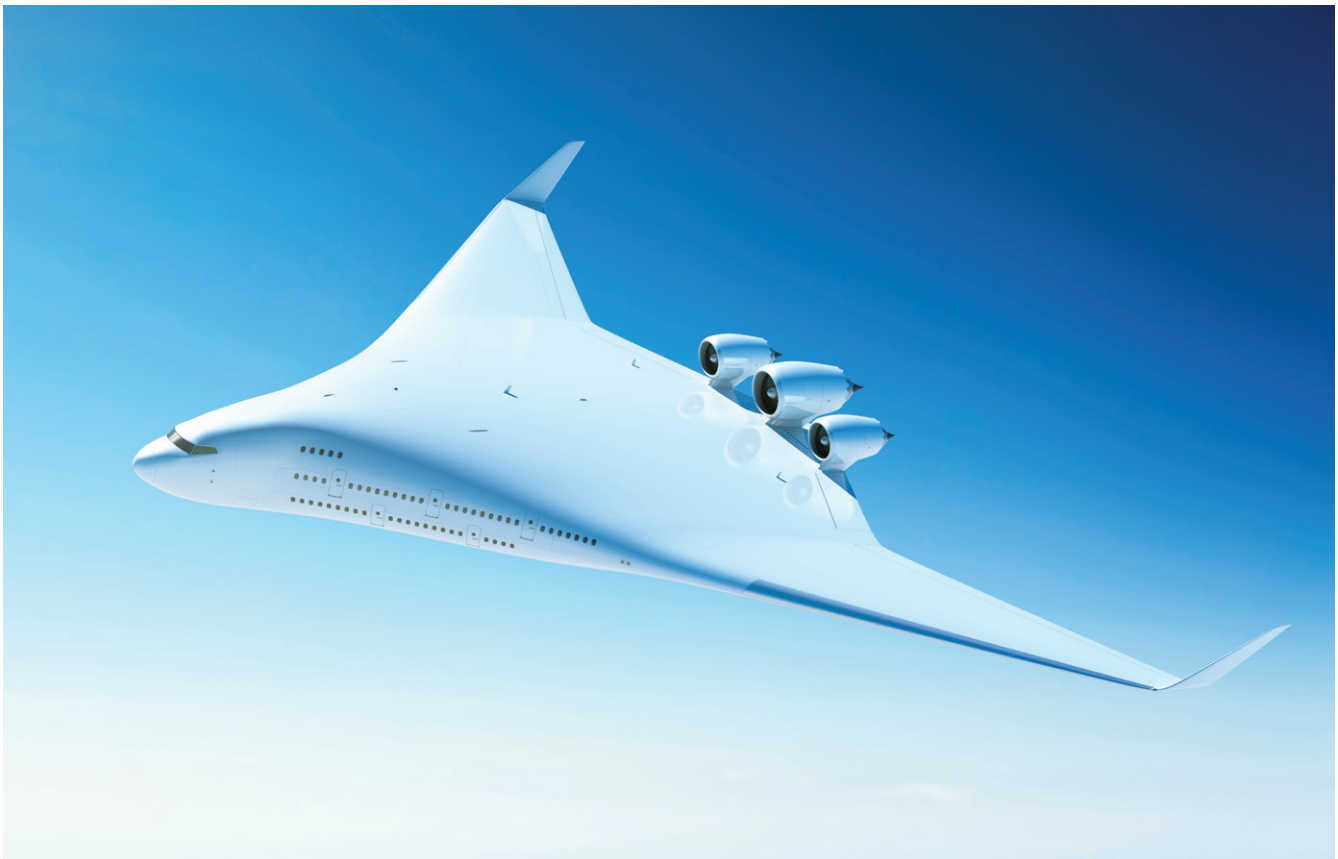



**Table 3: Wire Size**

| AWG Size | Stranding | Minimum Insulation Wall Thickness in (mm) | Finished Wire Nominal Diameter in (mm) | Finished Wire Maximum Weight lb/1000 ft (kg/km) |
|---|---|---|---|---|
| 30 | 7 | 0.007 (0.18) | 0.027 (0.70) | 0.86 (1.28) |
| 28 | 7 | 0.007 (0.18) | 0.031 (0.79) | 1.01 (1.50) |
| 26 | 19 | 0.007 (0.18) | 0.035 (0.89) | 1.55 (2.31) |
| 24 | 19 | 0.007 (0.18) | 0.040 (1.02) | 2.2 (3.27) |
| 22 | 19 | 0.007 (0.18) | 0.046 (1.17) | 3.1 (4.61) |
| 20 | 19 | 0.007 (0.18) | 0.054 (1.37) | 4.7 (6.99) |
| 18 | 19 | 0.007 (0.18) | 0.063 (1.60) | 7.2 (10.71) |
| 16 | 19 | 0.008 (0.20) | 0.072 (1.83) | 9.1 (13.54) |
| 14 | 19 | 0.008 (0.20) | 0.085 (2.16) | 14 (20.83) |
| 12 | 37 | 0.009 (0.23) | 0.107 (2.72) | 21.9 (32.58) |
| 10 | 37 | 0.011 (0.28) | 0.132 (3.35) | 32.8 (48.79) |

**Table 4: Conductor Type**

| Conductor Type | Description | Plating | Temperature Range °C | Wire Size Range | SAE Standard |
|---|---|---|---|---|---|
| SCC | ETP Copper | Silver | 200 | 24 to 10 | AS29606™ |
| NCC | ETP Copper | Nickel | 260 | 24 to 10 | AS29606 |
| SCA | High-Strength Copper Alloy | Silver | 200 | 30 to 24 | AS29606 |
| NCA | High-Strength Copper Alloy | Nickel | 260 | 28 to 24 | AS29606 |
| SCS | Extra High-Strength Copper | Silver | 200 | 30 to 24 | AS29606 |
| NCS | Extra High-Strength Copper | Nickel | 260 | 28 to 24 | AS29606 |



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