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 PDIV/PDEV while exhibiting 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 material ensures higher PDIV/PDEV for improved electrical durability, reducing risk of voltage breakdown over time 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

Table 1: Qualifications Summary

Property	Requirement	Standard	Status
Nominal Insulation Wall Thickness	8 mils for engineered fluoropolymer	—	Compliant
Test Voltage	Impulse: 8 kV (peak) High-frequency test voltage: 5 kV (RMS)	—	Compliant
Partial Discharge Inception Voltage	Minimum 1900 V	ASTM D3032, Section 25*	Compliant
Partial Discharge Extinction Voltage	Minimum 1900 V	ASTM D3032, Section 25*	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 150°C, 25 lb 200°C, 25 lb 260°C, 10 lb	SAE AS4373, Method 703	Compliant
Abrasion Resistance	23°C, >20,000 cycles 70°C, >3,000 cycles 150°C, >1,000 cycles	SAE AS4373, Method 301	Compliant
Tensile 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.

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.

Figure 1: Short-Term Voltage Breakdown

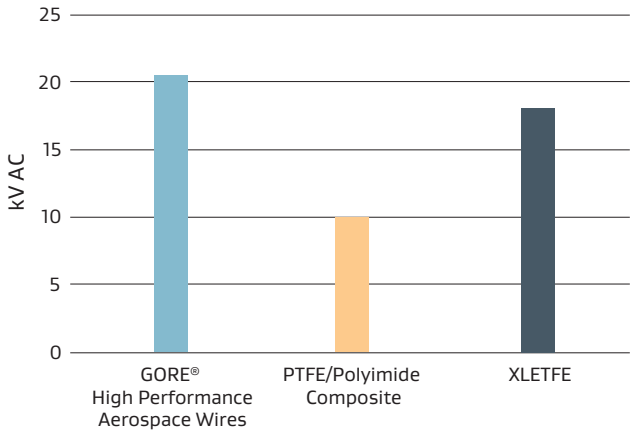


Figure 2: Tensile Strength

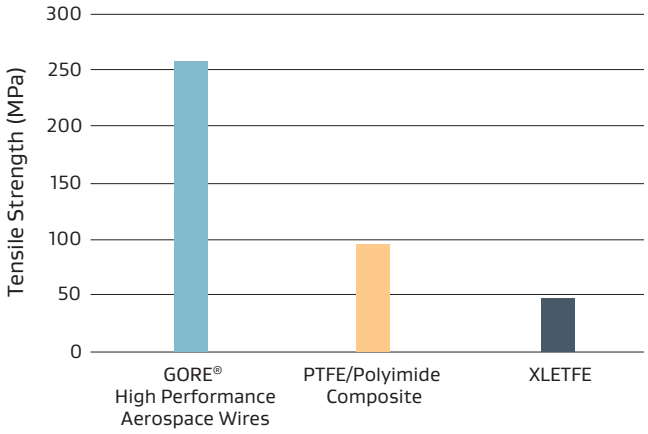


Figure 3: Abrasion Resistance

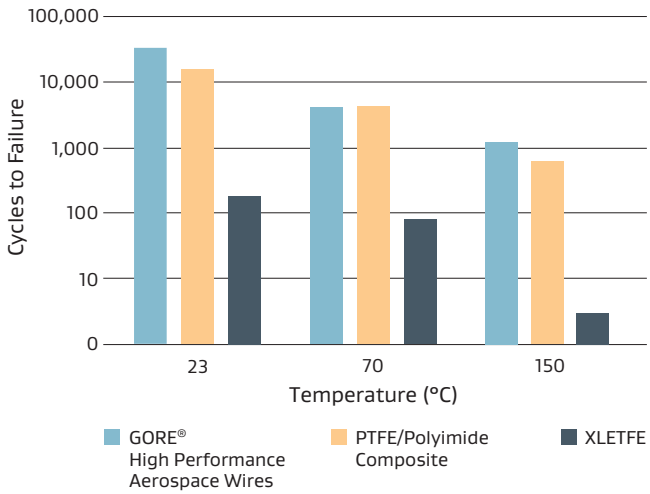


Figure 4: Cut-Through Resistance

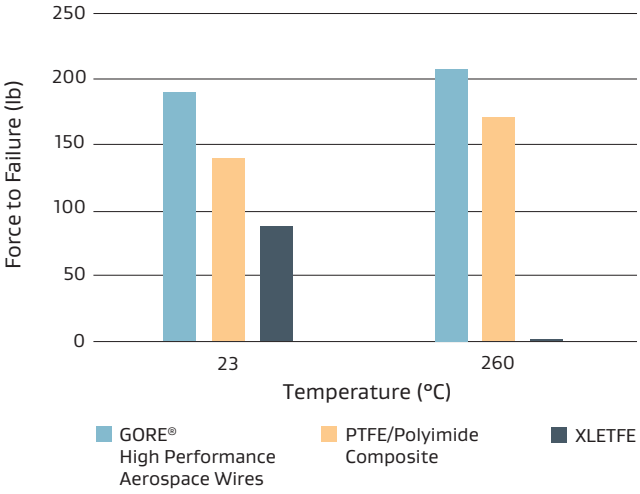


Table 2: Material Performance Comparison

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

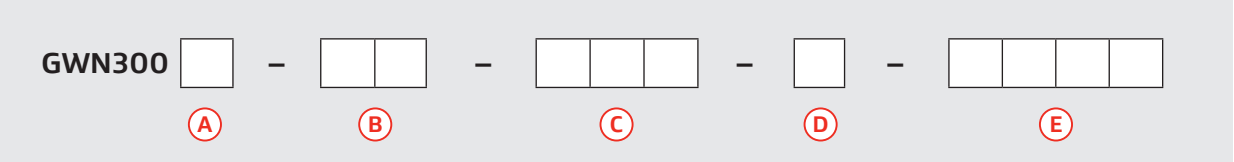
Green = Acceptable/Good
Yellow = Concern/Uncertainty
Red = Unacceptable/Low Performance

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 screen 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 **Screen Type**
U = Unscreened
S = Screened. 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. Per NEMA WC 27500, only combinations 9, 96, 963, and 9635 are possible (Figure 5).

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Figure 5: Standard Color-Coding (CC) Configurations

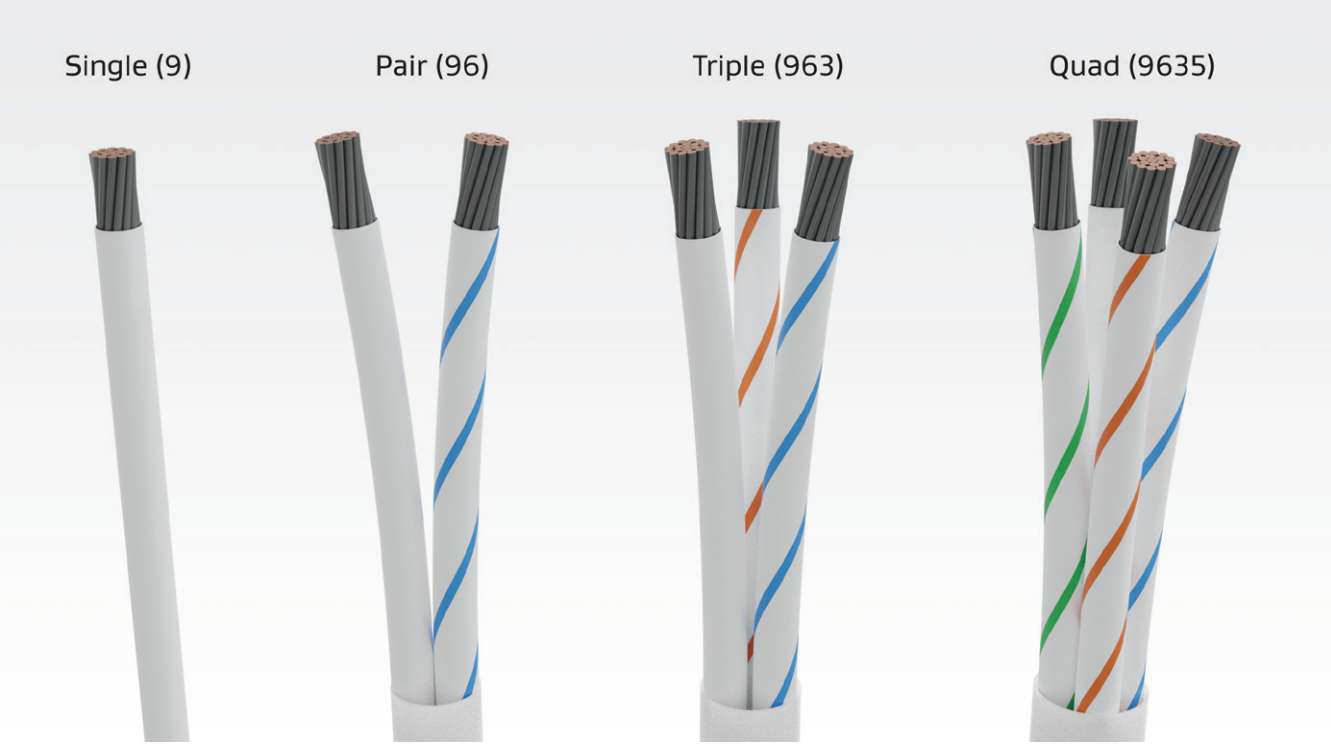


Table 3: Wire Size

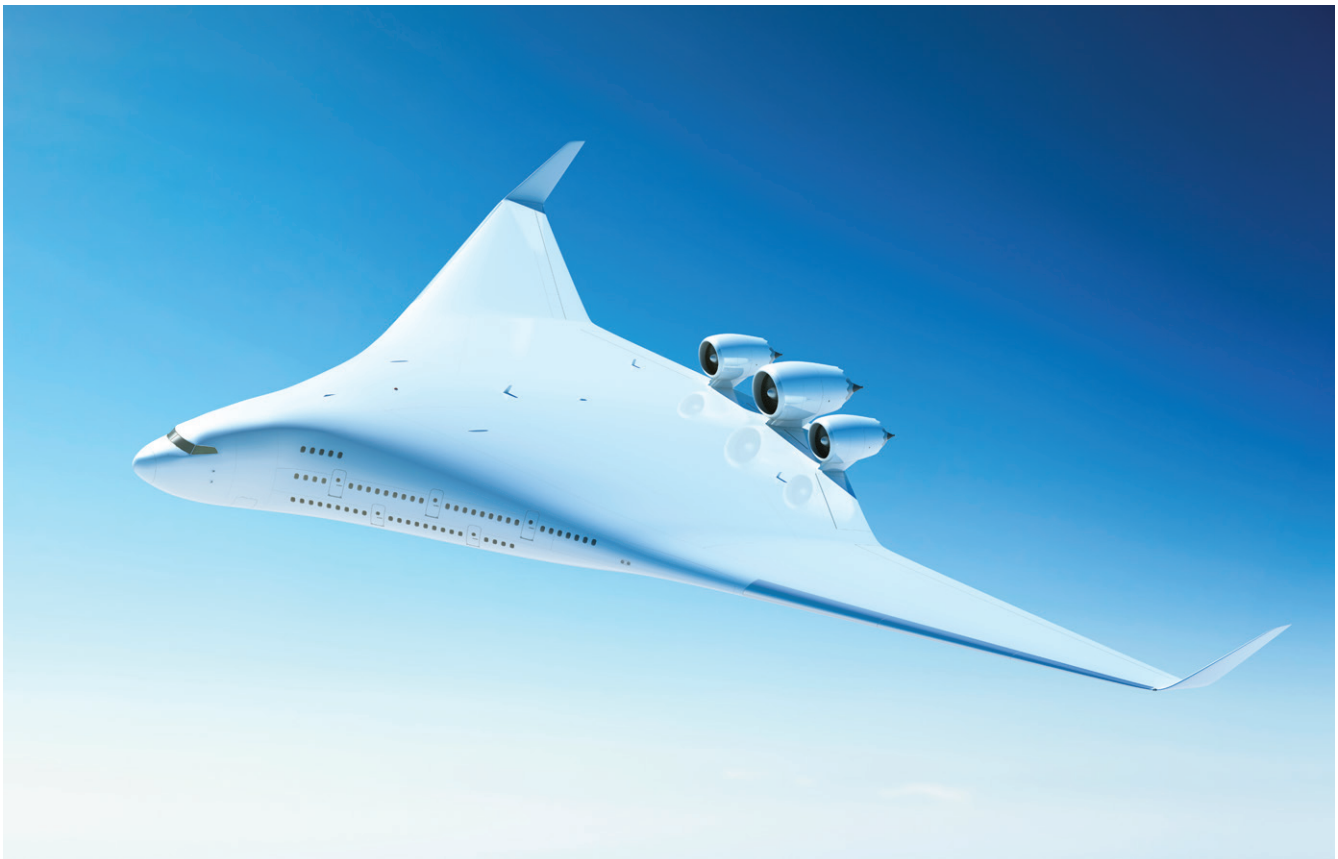
Details for additional wire and conductor dimensions are available in the SAE AS22759™/70-75 standard.

AWG Size	Stranding	Minimum Insulation Wall Thickness in (mm)	Finished Wire Nominal Diameter in (mm)	Finished Wire Maximum Weight lb/1000 ft (kg/km)
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

All conductor types meet SAE AS29606™ requirements.

Conductor Type	Description	Plating	Temperature Range °C	Wire Size Range	SAE Standard
SCC	ETP Copper	Silver	200	24 to 10	AS22759/70, AS29606™
NCC	ETP Copper	Nickel	260	24 to 10	AS22759/71, AS29606
SCA	High-Strength Copper Alloy	Silver	200	28 to 24	AS22759/72, AS29606
NCA	High-Strength Copper Alloy	Nickel	260	28 to 24	AS22759/73, AS29606
SCS	Extra High-Strength Copper	Silver	200	28 to 24	AS22759/74, AS29606
NCS	Extra High-Strength Copper	Nickel	260	28 to 24	AS22759/75, AS29606



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