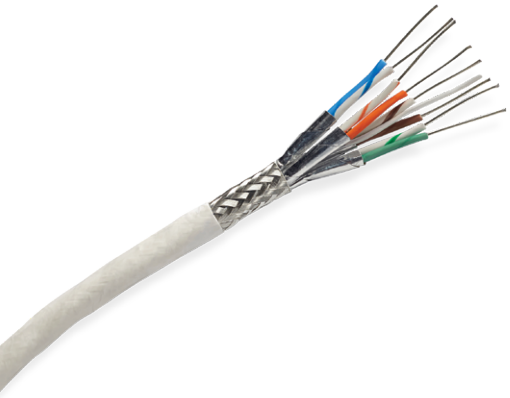
GORE® Ethernet Cables (4 Pairs, Cat5e/6/6a)



For standard Ethernet protocols, Gore's 4-pair cables are engineered for the increasing data demands of modern airborne digital networks (Table 1). The Cat6a version exceeds stringent electrical requirements and delivers excellent signal integrity with sufficient margin for high-speed data transmission up to 10 Gb at lengths up to 80 m (262 ft). This award-winning Cat6a version is also approved to SAE AS6070™ standards and on the Qualified Products List (QPL).

In addition, the unique design of these cables is 24% smaller and 25% lighter than alternative designs and proven to save 5.9 kg/km (13 lb/1000 ft) on aircraft (Figures 1 and 2). The reduced cable diameter also allows for greater flexibility and a tighter bend radius making routing easier and faster for maintainers.

Typical Applications

- Avionics networks
- Cabin/flight management systems
- Digital video systems
- Ethernet backbone
- Civil/defense program upgrades (C-130, F-16, KC-135, UH-60)

Standards Compliance

- ABD0031 (AITM 2.0005); BSS7230; FAR Part 25, Appendix F, Part I: Flammability
- ABD0031 (AITM 3.0005); BSS7239: Toxicity
- ABD0031 (AITM 3.0008B); BSS7238; FAR Part 25, Appendix F, Part V: Smoke Density
- ANSI/NEMA WC 27500: Environmental Testing, Jacket and Marking
- ANSI/TIA 568-C.2: Performance Requirements
- IEEE 802.3: Ethernet 10G BASE-T
- SAE AS4373™: Test Methods for Insulated Electric Wire (Contact Gore for available data)
- SAE AS6070™/5 & /6: Ethernet 1000BASE-T (10 Gb, 100 Ohms); QPL (RCN9034-24, RCN9047-26)

Table 1: Cable Properties

Electrical

Property	Value
Standard Impedance (Ohms)	100 ± 10
Typical Operating Voltage (V)	< 15
Nominal Velocity of Propagation (%)	80
Nominal Time Delay ns/m (ns/ft)	4.10 (1.25)
Capacitance pF/m (pF/ft)	42.6 (13.0)
Minimum Near-End Crosstalk (NEXT) (dB) 10 MHz 100 MHz 500 MHz	 59.2 52.3 42.2
Shielding Effectiveness (dB)	> 55
Dielectric Withstanding Voltage (Vrms) Conductor-to-Conductor Conductor-to-Shield	 1500 1000

Mechanical / Environmental

Property	Value
Jacket Material	Engineered Fluoropolymer
Jacket Color	White (Laser Markable)
Conductor	Silver-Plated Copper/SPC Alloy
Conductor Color-Coding	Solid Blue & White/Blue Stripe, Solid Orange & White/Orange Stripe, Solid Green & White/Green Stripe, Solid Brown & White/Brown Stripe
Dielectric Material	ePTFE/PTFE
Temperature Range (°C)	-65 to +200

GORE® Ethernet Cables (4 Pairs, Cat5e/6/6a)

Figure 1: High-Density Construction

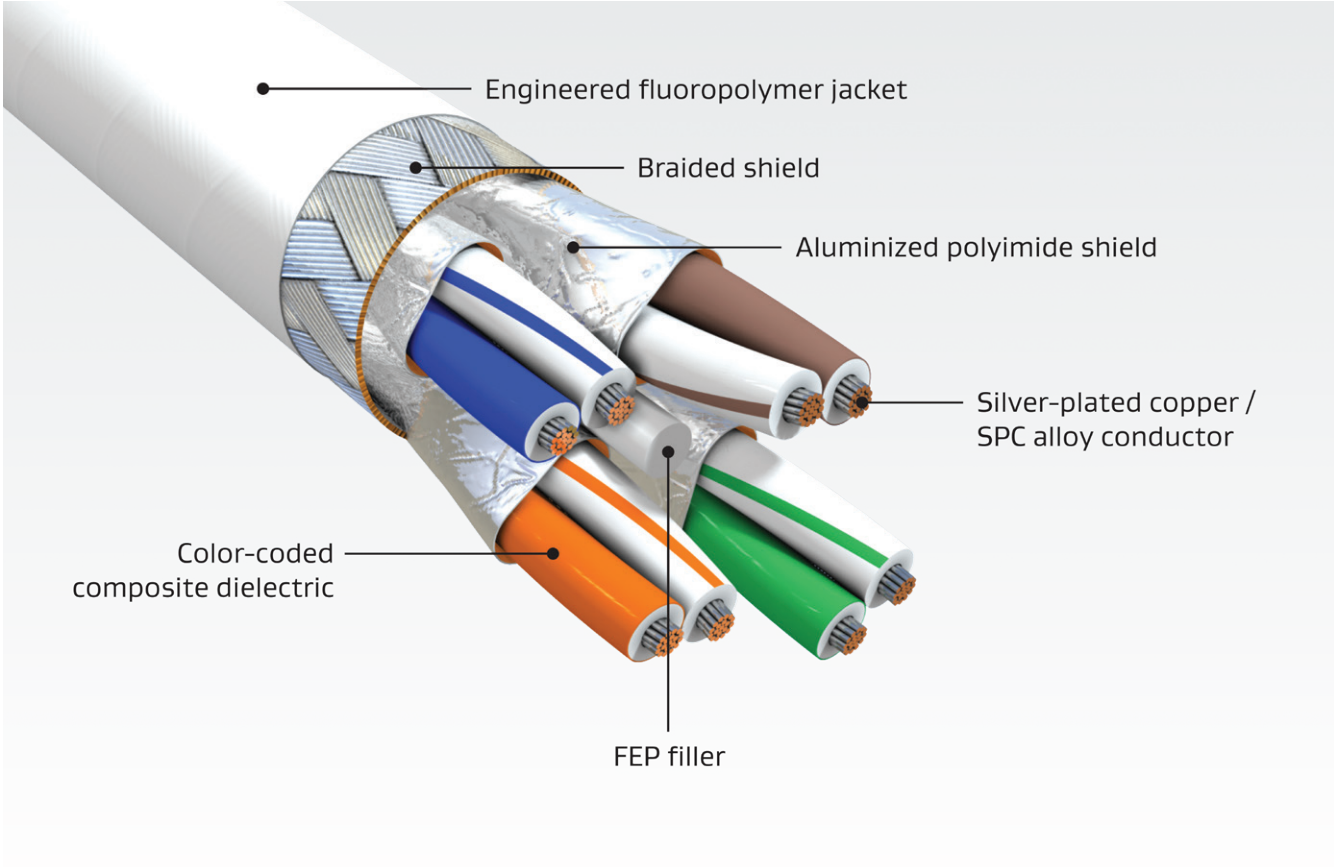
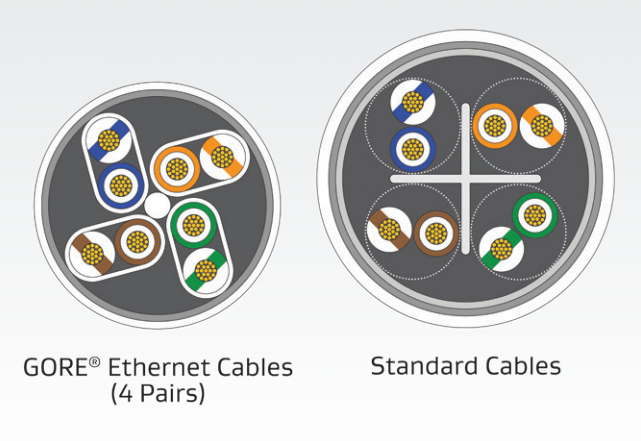


Figure 2: Reduced Cable Diameter



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Improved Electrical Performance

Gore compared its Cat6a cable with several leading alternative cables. The improved performance of GORE® Ethernet Cables (4 Pairs) translates directly to more reliable data transmission with vastly better insertion loss to crosstalk ratio (Figure 3). The excellent performance of these cables provide additional margin to overcome installation issues and operational challenges. Similarly, results also indicated that Gore's unique cable design can reduce crosstalk right out of the box by more than 10 dB at 500 MHz compared to alternative cables (Figure 4).

Figure 3: Insertion Loss to Crosstalk Ratio Comparison

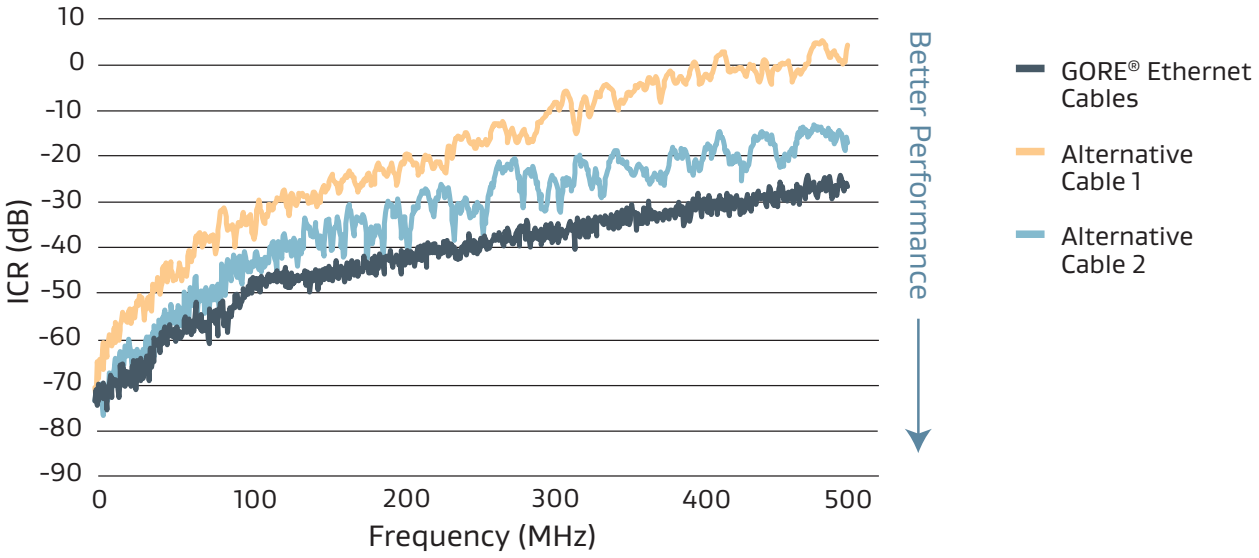
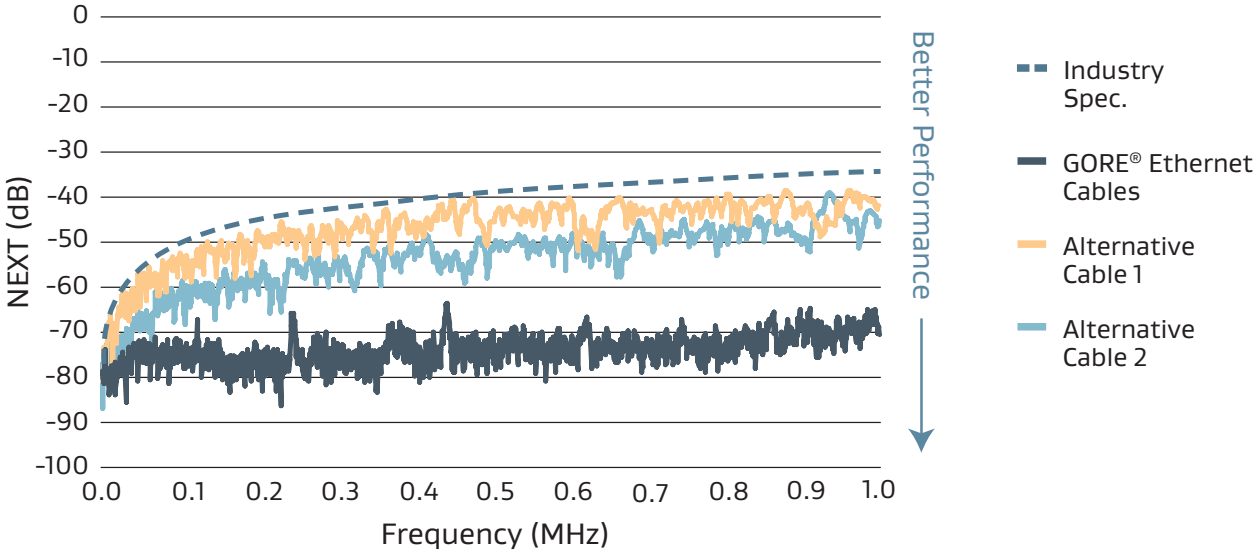


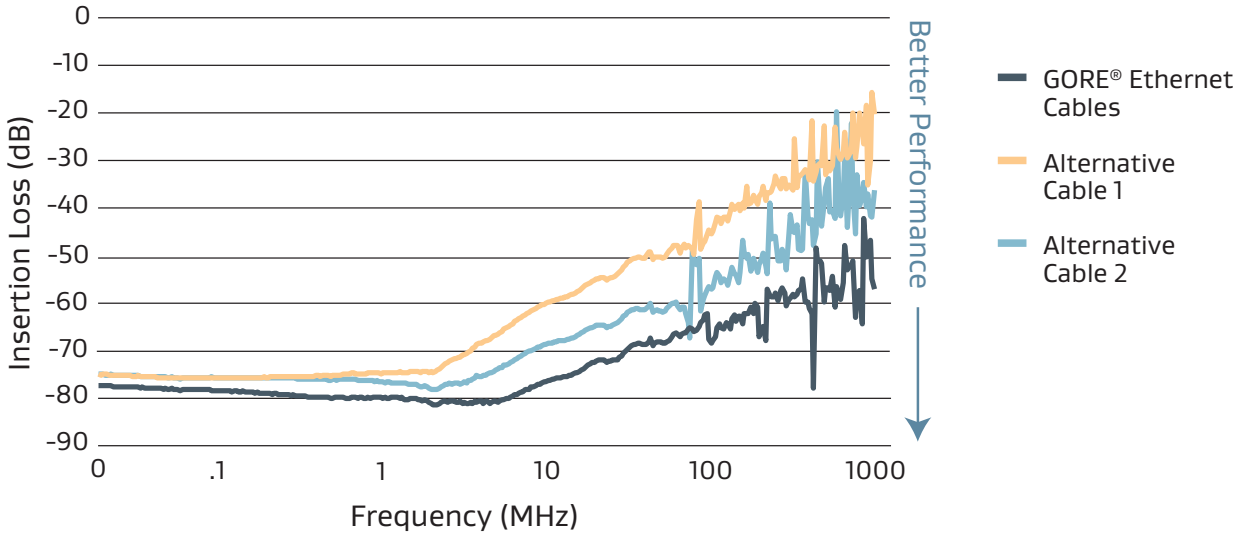
Figure 4: Crosstalk Comparison



GORE® Ethernet Cables (4 Pairs, Cat5e/6/6a)

Results also showed that Gore's Cat6a cable improves signal integrity and reduces RF interference by as much as 20 dB at higher frequencies among multiple electronic systems (Figure 5). Proof that Gore's innovative cable design provides better noise immunity and less EMI emissions compared to alternative cables.

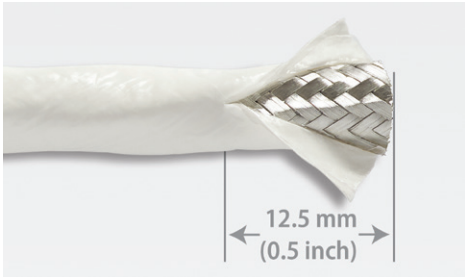
Figure 5: Shielding Effectiveness Comparison



Cable Preparation

Laser stripping is the ideal method to prep GORE® Ethernet Cables (4 Pairs). Alternatively, Gore recommends using thermal or sharp mechanical strippers. Also, a unique method is to make a short, horizontal slit in the jacket material, peel it back to allow for contact termination and return the jacket to its original position for a neat closure (Figure 6).

Figure 6: Peel-Back Method



Connector-Cable Compatibility

Gore also evaluated the electrical characteristics of its Cat6a cable terminated with leading high-speed aerospace connector systems to assist designers in selecting the best option for a specific application (Table 2). Testing connector-cable compatibility during the initial design process ensures interconnects will perform reliably in specific applications.

Visit **gore.com/ethernet-cable-connectors** to download Gore's best practices for terminating GORE® Ethernet Cables (4 Pairs) with leading high-speed aerospace connectors and related electrical data.

Table 2: Ethernet Cat6a Interconnect Options

Gore's RCN8966-26 version includes a unique inverted dielectric for termination with a variety of high-speed aerospace connector systems such as Amphenol® Octonet and HARTING RJ Industrial®. Please contact a Gore representative for additional connector systems not listed in the table.

	Gore Part Number				
Connector System	**RCN8966-24**	**RCN9034-24**	**RCN8966-26**	**RCN9047-26**	**RCN9034-28**
Amphenol® Octonet	■		■		
Amphenol® Oval Contact System (OCS13-53)	■	■	■	■	■
Amphenol® µ-Com	■	■	■	■	■
Bel Stewart SS-39200 Series	■		■		
Carlisle Octax® M38999 (Size 11)	■	■	■	■	■
Glenair El Ochito®			■	■	■
HARTING RJ Industrial® 10G RJ45 (Part Number 09451511560)	■	■	■	■	■
ITT Cannon OctoGig™	■	■	■	■	■
LEMO® 2B Series	■	■	■	■	■
Omnetics Micro 360® Cat6a				■	
Platinum® Tools EZ-RJ45® 106193	■		■		
Sentinel® 111S08080095HA4	■				
Sentinel® 111S08080095LA4			■		
TE Connectivity® CeeLok FAS-T®	■		■		■
TE Connectivity® CeeLok FAS-X®	■	■	■	■	■

GORE® Ethernet Cables (4 Pairs, Cat5e/6/6a)

Proven Installed Performance

Gore designed a simulator to evaluate the effects of severe bending on high-speed data cables while being routed through an airframe (Figure 7). The simulator has various mandrels located in fixed positions for repeatability that replicate minimum bend radius conditions. The simulator also includes two cable cleats to hold tension.

Testing characteristics such as return loss and crosstalk after routing through the simulator verifies whether a cable can withstand the complex challenges of installation that can degrade signal integrity. Gore routed a 2-m (6.5-ft) cable through the simulator for 4 cycles and measured the electrical performance of its Cat6a cable and alternative cables.

Results showed that Gore's Cat6a cable maintained sufficient margin below the specification limit for return loss compared to the alternative cables (Figure 8). Gore's cable provided consistent impedance control at higher frequencies after routing, indicating reliable high data rate transfer at 10 Gb. Similarly, Gore's Cat6a cable maintained a consistent margin of 20 dB providing lower crosstalk after routing, while the alternative cables showed a slight change in the margin (Figure 9).

Gore's testing proved that GORE® Ethernet Cables (4 Pairs) deliver exceptional performance after installation, reduce maintenance and downtime, and lower total costs over time.

For more information regarding selecting, designing and installing the right Ethernet interconnect to ensure reliable performance in aircraft, visit **gore.com/highdatarateaircraftcables**.

Figure 7: Cable Routing Simulator

Figure 8: Return Loss Comparison after Routing

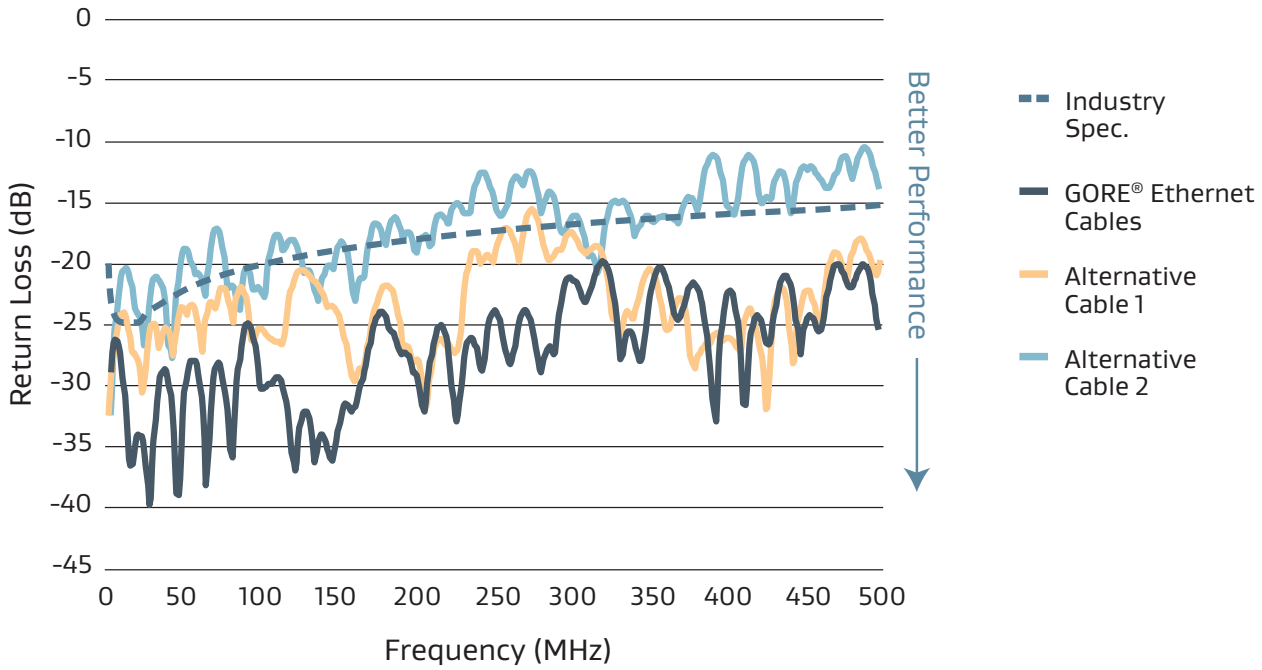


Figure 9: Crosstalk Comparison after Routing

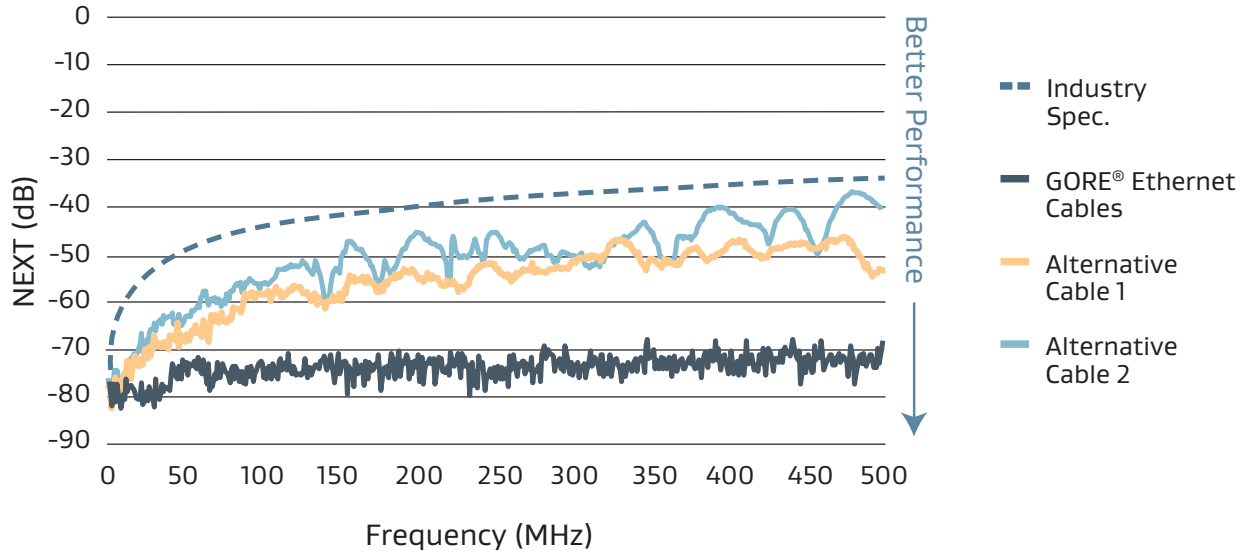


Table 3: Cable Characteristics

Insertion loss values are based on the maximum recommended use length. Also, Gore's Cat6a version RCN9034-24 and RCN9047-26 are approved to SAE AS6070™ standards that support AS50881 EWIS (electrical wiring interconnection systems) specifications and on the Qualified Products List (QPL).

Cat6a

Gore Part Number	AWG Size (Stranding)	Maximum Outer Diameter mm (in)	Minimum Bend Radius mm (in)	Nominal Weight kg/km (lb/1000 ft)	Typical Insertion Loss dB/30 m (100 ft)		
					100 MHz	200 MHz	500 MHz
RCN8966-24	24 (19/36)	6.9 (0.27)	13.7 (0.54)	67.0 (45.0)	5.6	8.1	14.1
RCN9034-24	24 (19/36)	6.6 (0.26)	13.2 (0.52)	62.5 (42.0)	5.6	8.1	14.1
RCN8966-26	26 (19/38)	5.8 (0.23)	11.6 (0.46)	52.1 (35.0)	6.9	9.9	17.0
RCN9047-26	26 (19/38)	5.6 (0.22)	10.2 (0.44)	47.6 (32.0)	6.9	9.9	17.0
RCN9034-28	28 (19/40)	4.6 (0.18)	8.9 (0.35)	37.2 (25.0)	8.8	12.6	21.5

Cat5e

Gore Part Number	AWG Size (Stranding)	Maximum Outer Diameter mm (in)	Minimum Bend Radius mm (in)	Nominal Weight kg/km (lb/1000 ft)	Maximum Insertion Loss dB/30 m (100 ft)	
					10 MHz	100 MHz
GSC-01-83471-00	24 (19/36)	6.3 (0.25)	30.0 (1.18)	56.0 (37.0)	6.5	22.0
GSC-01-83472-00	26 (19/38)	4.9 (0.19)	20.0 (0.79)	49.0 (32.9)	6.5	22.0

Ordering Information

GORE® Ethernet Cables (4 Pairs) are available in standard sizes (Table 3). Visit **gore.com/cable-distributors** for the list of distributors. In addition, visit **gore.com/hdrsampleflyer** regarding Gore's full inventory of sample products and lead times.

For more information or to discuss specific characteristic limits and application needs, please contact a Gore representative.

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