

Composite Wire & Cable



INTRODUCTION

Carlisle Interconnect Technologies (CarlisleIT) has developed composite insulated cables to combat the limitations associated with Polyimide and XL-ETFE and improve upon existing airframe wire designs. Our composite cables offer weight and space savings, without sacrificing the mechanical and thermal performance of the wire. CarlisleIT's Tufflite® and Seamless™ cables address the need for a small, lightweight, arc resistant, 260° rated general purpose wire.

For over 20 years our wire and cable has been tested and flown on thousands of commercial and military aircrafts. Its superior smoke, flame and toxicity performance enables it to be used safely in both pressurized and non-pressurized zones of the aircraft. The wide temperature range and overall balance of properties make Tufflite® and Seamless™ ideal replacements for all other general purpose wire types, both military and commercial.

FEATURES & BENEFITS

Excellent Temperature Performance

- » Available in 150°C, 175°C, 200°C and 260°C
- » Superior thermal life characteristics
- » The safety of high temperature resistant insulation in overload conditions independent of conductor

Superior Flammability and Smoke Generation Properties

- » Practically zero smoke generation and excellent resistance to flammability

Excellent Resistance Arc Propagation

- » Superior resistance to wet and dry arc propagation

Light Weight and Small Diameter

- » SLT has an approximate 5% weight savings over medium wall XL-ETFE

Best Balance of Properties

- » Excellent flexibility and flex life
- » Highly resistant to hydrolysis
- » Superior abrasion resistance and cut-through performance



Composite Wire & Cable: Tufflite®

HISTORY

Tufflite® was first developed in the early 1990s. There are six cable families available in sizes from 26 to 4/0 AWG and is both hot stamp and laser markable. Tufflite® cables are approved to multiple commercial aircraft platforms.

PART NUMBERING GUIDE

P/N Example: ST-260-2NJ-22N

Family of Wire	Temperature Rating (¼C)	No. of Conductors (not used for single insulated wire)	Shield & Jacket (not used for single insulated wire)	AWG Size	Conductor Material
ST	200	2	SJ	22	S
SLT Thin Wall	150¼ 200¼ 260¼		T = TCC Shield S = SCC Shield N = NCC Shield F denotes flat shield	26 to 10	T = Tin Coated Copper S = Silver Coated Copper SA = Silver Coated Copper Alloy N = Nickel Coated Copper NA = Nickel Coated Copper Alloy
TLR	260¼		N = NCC Shield*	26 to 2	N = Nickel Coated Copper NA = Nickel Coated Copper Alloy
ST Enhanced Medium Wall	150¼ 200¼ 260¼		T = TCC Shield S = SCC Shield N = NCC Shield F denotes flat shield	26 to 4/0	T = Tin Coated Copper S = Silver Coated Copper SA = Silver Coated Copper Alloy N = Nickel Coated Copper NA = Nickel Coated Copper Alloy

SELECTION GUIDE

Use this table to select the wire that best fits your requirements.

	TL	ST	SLT	TLR	TLS	TLA
Relative Insulation Thickness	Medium	Medium	Thin	Medium	Thick	Thick
Voltage Range	600	600	600	600	600	600
Temperature Rating	150°C / 200°C / 260°C	150°C / 200°C / 260°C	150°C / 200°C / 260°C	260°C	260°C	175°C
Conductor Material	Copper / Copper Alloy	Copper / Copper Alloy	Copper / Copper Alloy	Copper / Copper Alloy	Copper / Copper Alloy	Aluminum
Conductor Coating	Tin / Silver / Nickel	Tin / Silver / Nickel	Tin / Silver / Nickel	Nickel	Nickel	
AWG Range	26-4/0	26-4/0	26-10	26-2	24-4/0	8-4/0

TUFFLITE® FAMILY

TL – Medium Wall, Normal Weight

Encompasses a family of wire and cable in three temperature ratings: 150°C, 200°C and 260°C. TL is a multi-purpose normal weight wire which exhibits exceptional performance characteristics within the range of the critical parameters in airframe applications.

ST – Medium Wall, Normal Weight

Encompasses a family of wire and cable in three temperature ratings: 150°C, 200°C and 260°C. ST is a multi-purpose normal weight wire which exhibits exceptional performance characteristics within the range of the critical parameters in airframe applications. This construction offers enhanced Hydrolysis Resistance and Cut-Through.

SLT - Thin Wall, Light Weight

A thin wall, light weight version of ST which can be used in various constructions. It also has value when considered as a single conductor offering a 5% weight savings over the ST construction while maintaining the same mechanical properties. SLT is available in 150°C, 200°C and 260°C.

TLR – Metric Medium Wall, Normal Weight

Encompasses a metric family of wire and cable with a temperature rating of 200°C and 260°C. TLR is a multi-purpose normal weight wire which exhibits exceptional performance characteristics within the range of the critical parameters in airframe applications.

TLS – Thick Wall, Abrasion Resistant

An increased wall version which can be utilized in applications requiring superior mechanical capabilities such as abrasion resistance and dynamic cut-through. This insulation system may be used as a reduced size and weight replacement for MIL-W-22759/5 to /8. TLS is rated at 260°C.

TLA – Aluminum Conductor

An increased wall thickness version utilizing an aluminum conductor for power feeder applications. Improved mechanical performance including superior flexibility as compared to traditional polyimide insulated power feeder cables. TLA is rated at 175°C.

Learn more: CarlisleT.com/products/wire-cable

Composite Wire & Cable: Seamless™

HISTORY

Seamless™ and Seamless-T™ were first developed in 2002. The seamless wrap PTFE tape is an insulation and cable jacket technology that offers all the advantages of a tape wrap, with the smooth appearance and characteristics of an extrusion. Seamless products meet all requirements for AS22759/80-/92 and NEMA WC27500. Seamless-T meets the requirements of AS22759/180-/192.

ADVANTAGES

- » Weight and space savings over extruded insulation
- » Exceptional resistance to scrape abrasion
- » Exceptional laser markability
- » Exceptional hydrolytic resistance
- » Exceptional electrical arc track resistance
- » Exceptional layer-to-layer adhesion
- » Exceptional low outgassing characteristics

SEAMLESS™ FAMILY

Product Availability

Seamless & Seamless-T PTFE tape-wrapped products are designed for use in commercial and military aerospace applications. They are available in a variety of constructions and colors. Custom designs are available by request.

AS22759/80-/92 Hook-up Wires

Incorporate either dual-, three- or four-layer insulation constructions with either copper alloy, tin-, silver-, or nickel-plated stranded conductors.

AS22759/180-/192 Hook-up Wires

Incorporate either dual-, three- or four-layer insulation constructions with either copper alloy, tin-, silver-, or nickel-plated stranded conductors.

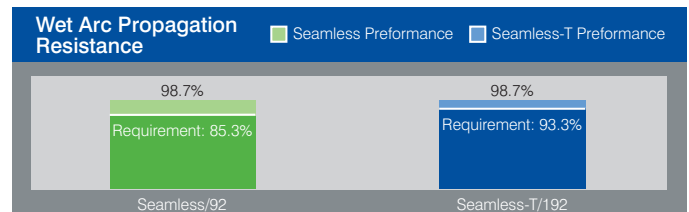
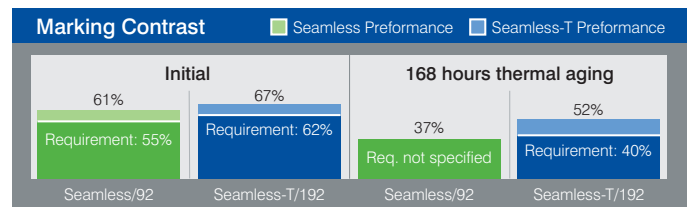
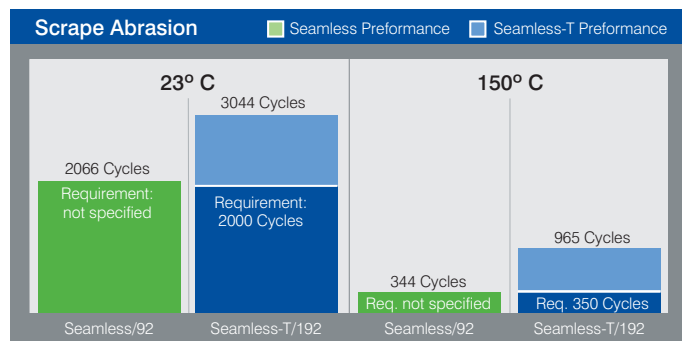
NEMA WC27500 Cables

Incorporate from one to fifteen MIL-DTL-22759, MIL-DTL-25038 or MIL-DTL-81381 wires, plus a single or double shield, and a single or double jacket.

SEAMLESS™ COMPARISON CHARTS

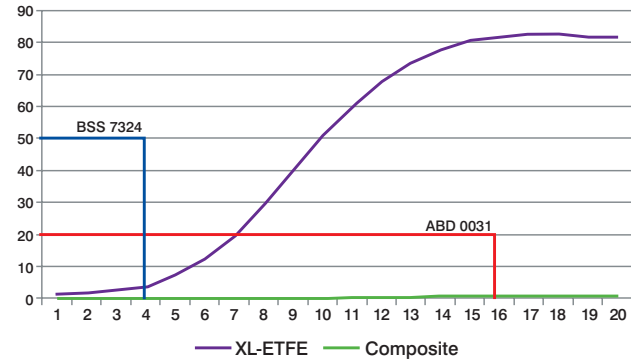
Product Characteristics	Seamless Tape-Wrap /80 - /92	Seamless-T Tape-Wrap /180 - /192
Scrape Abrasion	●●	●●●
Hydrolytic Resistance	●●	●●
Wet Arc Propagation Resistance	●●●	●●●
UV Laser Marking	●●	●●●
Strips Easily and Cleanly	●●	●●

Seamless and Seamless-T Products Exceed AS22759/92 and /192 Requirements

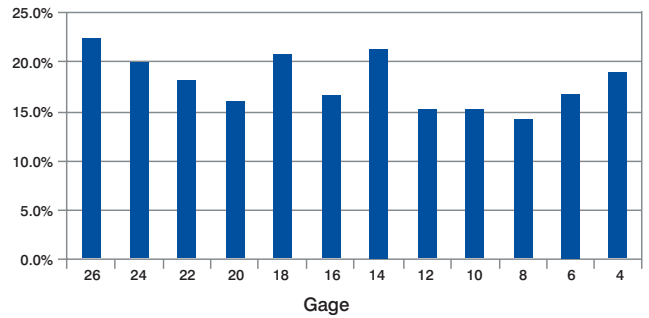


COMPARISON CHARTS

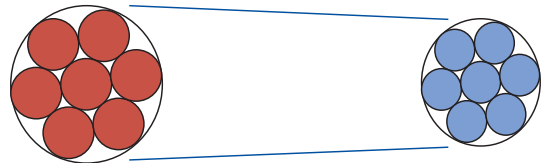
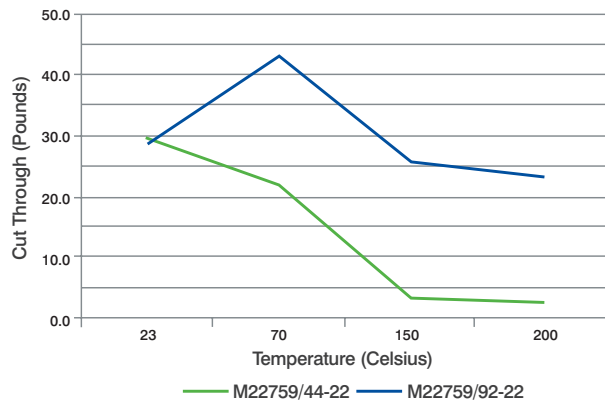
Smoke Generation Versus Time



Cross Sectional Area Reduction Seamless™ Family Versus X-Linked ETFE



Dynamic Cut: Composite vs. XL-ETFE (Thin Wall)



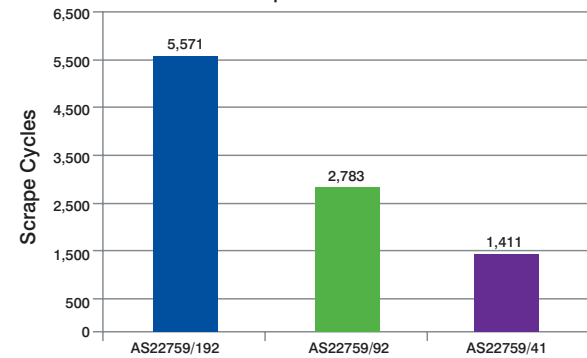
X-Linked ETFE

Seamless Family

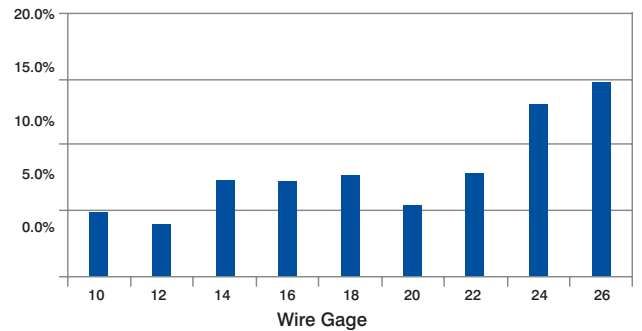
Example: A wire bundle of ten 20 AWG composite wires can be routed in the area required by eight XL-ETFE wires.

Scrape Abrasion: Composite Versus XL-ETFE

Scrape Abrasion is 70°C



Weight Savings: Thin Wall Composite to Normal Wall XL-ETFE /180 Versus /43



Composite Wire can save between 2% and 15% weight compared to XL-ETFE.



See CarlisleIT's line of Composite Wire & Cable products at: CarlisleIT.com/products/wire-cable

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