

The widest range of  
mission-critical interconnect  
technologies in the world



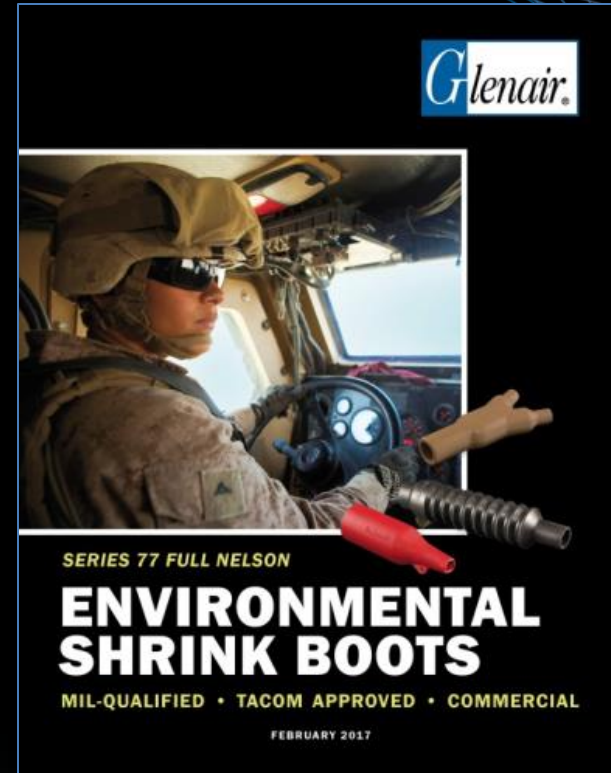
## Environmental Shrink Boots / HSTs

Outstanding Environmental and Mechanical Protection

# Series 77 “Full Nelson” Environmental Shrink Boots

## Full-spectrum shrink boot product line

- AS85049 Shrink Boots
- Lipped Adapter Shrink Boots
- Lipless Adapter Shrink Boots
- Series Specific Boots
- “Wye” and “Tee” Wire Harness Routing Transitions
- Metal and Composite Shrink Boot Adapters
- Metal and Composite Piggyback Boot Adapters
- Adhesives and Installation Instructions
- Part Number Index and Cross Reference



# Series 77 “Full Nelson” Shrink Boots

## Material properties and fluid resistance

### Type 1 High-Performance Elastomer Boots for Advanced Temperature and Chemical Tolerance 2025

- -75° C to +150° C
- Very good resistance to fuels, oils, solvents and heat

### Type 2 Low Smoke Zero Halogen for Regulated Environmental Safety Applications 2010

- Low smoke, zero halogen
- Meets U.S. and E.U. toxicity requirements
- Qualified to VG95343 Part 28 and 29
- -40° C to +130° C

### Type 3 Flexible Polyolefin for General Duty Applications 2040

- General purpose harnessing
- Economical, flexible
- -55° C to +135° C

### Type 5 Viton Fluoroelastomer Blend 2050

- Excellent resistance to fuels, oils, solvents and heat
- -55° C to +150° C
- Material meets specifications for SC-X15111D

### Type 6 High Performance Elastomer Alloy 2051

- Excellent resistance to fuels, oils, solvents and heat
- -55° C to +135° C
- Meets SC-X15112C requirements

### Type 7 Flexible Polyolefin 2071

- Good resistance to fuels, oils, solvents, and heat
- -55° C to +135° C

# Series 77 “Full Nelson” Shrink Boots

## Material properties and fluid resistance

Shrink Boot Typical Material Properties								
Property	Type 1 High Performance Elastomer	Type 2 Zero Halogen Polyolefin	Type 3 General Purpose Polyolefin	Type 5 Viton Fluoroelastomer Blend	Type 6 High Performance Elastomer Alloy	Type 7 Flexible Polyolefin	Type 8 Low Outgassing Fluoropolymer Alloy	Type 9 Low Temp Flexible Polyolefin
Flexibility	Semi-rigid	Semi-flexible	Flexible	Flexible	Flexible	Highly Flexible	Semi-rigid	Flexible
Operating Temperature Range	-75°C to +150°C	-40°C to +130°C	-55°C to +135°C	-55°C to +150°C	-55°C to +135°C	-55°C to +135°C	-50° C to +175° C	-40° C to +100° C
Shrink Temperature (min.)	135°C	120°C	120°C	135°C	135°C	120°C	135°	70°
Tensile Strength (psi)	1700	1100	1400	2200	1500	1400	1700	1700
Elongation (% min.)	400	250	400	400	300	250	300	500
Thermal Endurance (Elongation 50% min)	3000 hrs, 150°C	3000 hrs, 130°C	--	--	--	--	--	--
Heat Shock	4 hrs, 215°C	4 hrs, 200°C	4 hrs, 225°C	4 hrs, 225°C	4 hrs, 220°C	4 hrs, 250°C	4 hrs, 225°C	4 hrs, 150°C
Heat Aging	168 hrs, 160°C	168 hrs, 175°C	168 hrs, 175°C	168 hrs, 150°C	168 hrs, 150°C	168 hrs, 175°C	168 hrs, 150°C	168 hrs, 175°C
Dielectric Strength (V/mil)	300	380	250	200	200	300	200	200
Volume Resistivity (ohms-cm)	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>10</sup>
Water Absorption (%)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Flammability	Burn Time <15 sec Burn Length <25mm	Burn Time <15 sec Burn Length <25mm	Burn Time <120 sec Burn Length <25mm	Burn Time <120 sec Burn Length <25mm	Burn Time <120 sec Burn Length <25mm	Burn Time <90 sec Burn Length <25mm	Burn Time <60 sec Burn Length <25mm	Burn Time <120 sec Burn Length <25mm
RoHS Compliant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oxygen Index (% min.)	--	>30%	--	--	--	--	--	--
Temperature Index (°C)	--	>250° C	--	--	--	--	--	--
Smoke Index (max.)	--	<20	--	--	--	--	--	--
Toxicity Index (max.)	--	<3 Per 100 gms	--	--	--	--	--	--
Outgassing	--	--	--	--	--	--	CVCN <0.1% TML <1%	--

Shrink Boot Fluid Resistance								
Fluid	Type 1 High Performance Elastomer	Type 2 Zero Halogen Polyolefin	Type 3 General Purpose Polyolefin	Type 5 Viton Fluoroelastomer Blend	Type 6 High Performance Elastomer Alloy	Type 7 Flexible Polyolefin	Type 8 Low Outgassing Fluoropolymer Alloy	Type 9 Low Temp Flexible Polyolefin
Lubricating Oil	Very good	Good	Good	Excellent	Excellent	Good	Excellent	Fair
Hydraulic Fluid	Very Good	Good	Good	Excellent	Excellent	Good	Excellent	Fair
Aviation Fuel	Very Good	Good	Good	Excellent	Excellent	Fair	Excellent	Fair
Gasoline	Very Good	Fair	Fair	Excellent	Excellent	Good	Excellent	Fair
De-icing Fluid	Excellent	Very Good	Good	Excellent	Excellent	Good	Excellent	Fair
Automotive Diesel	Good	Fair	Very Good	Excellent	Excellent	Fair	Excellent	Fair



# Boot Material Overview

## Type 8 boot material 2008: low outgassing space-grade shrink boots

- Standard, short, long, and 90° lipped and lipless boots
- Special fluoropolymer formula IAW ASTM E 595
- Meets NASA outgassing requirements
- Compliant 2-part epoxy low-temperature adhesive available
- Glenair offers industry's largest selection of metal and composite shrink boot adapters
- Glenair connectors are equipped with integrated band and boot platforms
- Temp range -50°C to +175°C

SPACE GRADE  
NASA  
ESA, JAXA  
SCREENED



# Boot Material Overview (cont'd.)

## Type 9 Boot Material 2013

- Low Temperature installable
- Heat-Shrinkable Flexible Polyolefin
- For Ethernet and USB cables susceptible to heat damage
- Resistance to oils, fuels, solvents, acids and bases is fair
- -40°C to +100°C

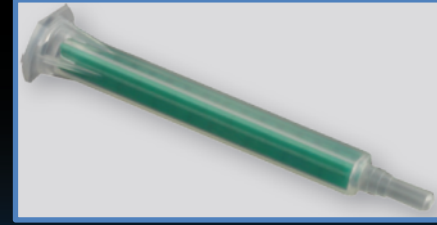


All Glenair Series 77 Shrink Boots are currently approved for: Airbus Defense & Space, Bombardier, Gulfstream, TACOM, NAVSEA 5617649, AS85049/140,/140 and /142

# Adhesive Performance Properties

## Adhesive epoxy types

- Type R – One part epoxy, pre-coated Glenair's highest performance pre-coated epoxy adhesive
- Type U – Two part epoxy, user installed
  - Water tight, high-strength to cable and adapter
- Type W1 – Pre-coated hot melt wide temp range; low smoke zero halogen
- Type W2 – Pre-coated hot melt; limited temp range
- Type W3 – Pre-coated hot melt; wide temp range



# Adhesive Performance Properties

## New high-performance adhesives

- New Adhesives
  - Type R – Glenair’s highest performance pre-coated epoxy adhesive, temp range -75°C to 150°C (meets required specification levels of AS 5258 and VG 95343 part 18)
  - Type W3 – a high performance polyester hot melt adhesive, pre-coated onto shrink boots, temp range -55°C to 125°C, versatile and bonds well to a variety of substrates, ideal for applications where zero halogen is not required
- Series 77 catalog also includes adhesive shelf life, quality standards, and material performance specification

# Adhesive Performance Properties

## (Section A)

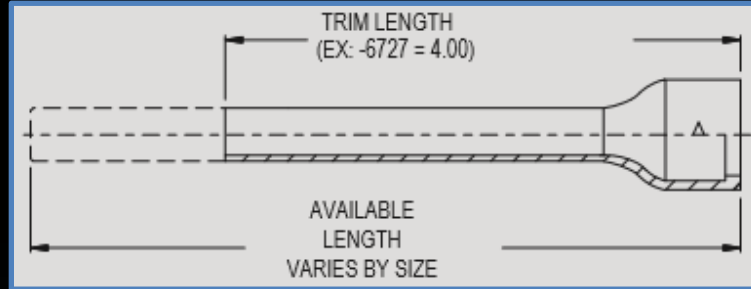
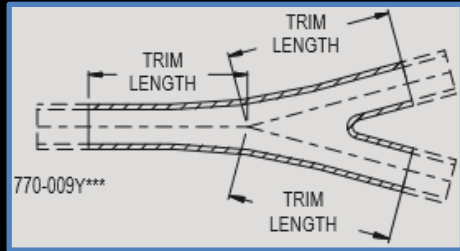
- Glenair adhesives are designed to match up against Raychem and Hellerman boot materials and adhesives

Adhesive Type	Description	Temp Range	Applicable Material	Glenair	Raychem	Hellermann
R	One-part epoxy, precoated	-75° to 150° C	Mil: A H Glenair: 1, 2, 5 Raychem: -3, -4, -12, -25, -100 Heller: B7, G	R	S1125	W24
U	Two-part epoxy, user installed	-75° to 150° C	Mil: A,B,G,H Glenair: All Materials Raychem: -3, -4, -25, -50, -100 Heller: B5, G, H	779-001	S1125	V9500
W1	Pre-coated hot melt wide temp range; low smoke zero hal	-55° to 125° C	Mil: A, B, G, H Glenair: 1, 2, 5, 6, 7 Raychem: -3, -4, -5, -25, -51, -71, -100 Heller: B5, G, H	W1	/86	W8, W21
W2	Pre-coated hot melt; limited temp range	-55° to 70° C	Mil: A, B, G Glenair: 1, 2, 3, 7 Raychem: -3, -4, -5, -25, 51, -71 Heller: J	W2	/42 /180	WM250
W3	Pre-coated hot melt; wide temp range	-55° to 125° C	Mil: A, B Glenair: 5, 6 Raychem: -3, -4, -51 Heller: J	W3	/164	WM200

# Modification Code 672

## Cut to Length Options for Long Tail Boots (Section A)

- Mod Code 672 can be added to the end of the part number development for cut to length options
- Typical for long tail series 770-006, 770-020, 770-021



Mod Code	Cut Length	
	Inches	mm
-6721	1.00	25.4
-6722	1.50	38.1
-6723	2.00	50.8
-6724	2.50	63.5
-6725	3.00	76.2
-6726	3.50	88.9
-6727	4.00	101.6
-6728	4.50	114.3
-6729	5.00	127.0
-67210	5.50	139.7
-67211	6.00	152.4
-67212	6.50	165.1
-67213	7.00	177.8
-67214	7.50	190.5
-67215	8.00	203.2
-67216	8.50	215.9



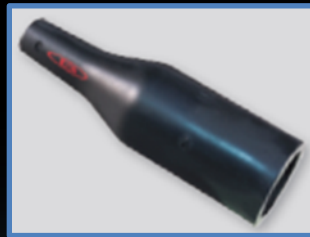
# AS85049 Shrink Boots

## (Section B)

- Boots for AS8049/140, /141 and /142
- QPL Approved for the following Material
  - Polyolefin
  - General purpose polyolefin
  - Zero halogen polyolefin
  - High performance elastomer



**M85049/142 Transitions**



**M85049/140 Straight Boots**



**M85049/141 Right Angle Boots**

# Lipped Boots

## (Section C)

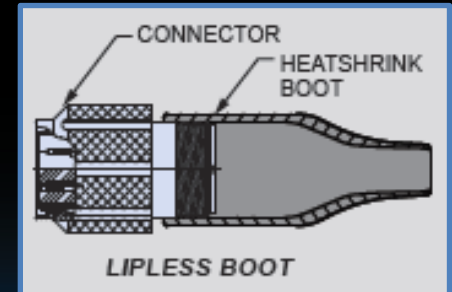
- Straight, 90°, 45° and 30° angle lipped boots available in standard, short, long tail, hi-ratio, heavy wall and convoluted styles
- Easy attachment to shrink boot adapters
- Eight material options
- Four adhesive options
- With or without eyelets
- With or without potting ports or drain holes
- Non-adhesive lined boots (for use with Type U two part epoxy)



# Lipless Boots

## (Section D)

- Environmental sealing and strain relief for direct attachment to connectors without boot adapter
- Eight material options
- Four adhesive options
- Optional potting ports
- Non-adhesive lined boots (for use with Type U two part epoxy)



# Series-Specific Heat Shrink Boots

## Mighty Mouse, HiPer-D, Nanominiature, SuperSeal and Superfly (Section E)

- Easy attachment to shrink boot adapters
- Eight material options
- Four adhesive options
- With or without eyelets
- With or without potting ports or drain holes
- Non-adhesive lined boots (for use with Type U two part epoxy)



# Cable Routing

## (Section F)

- WYE and TEE heat shrinkable boot transitions for cable management and routing solutions
- Eight material options
- Four adhesive options
- With or without potting ports or drain holes
- Non-adhesive lined boots (for use with Type U two part epoxy)
- Ten colors available in the Type 1 High Performance Elastomer Material



Angled "Tee"  
Transition



Low-Profile 1:3



Widebody 1:3



Widebody 1:4

# New Shrink Boot Products



770-024 Heat Shrink Boot 1:3  
Parallel Break Out Transition



770-025 Heat Shrink Boot 1:4  
Parallel Break Out Transition



770-028 Heat Shrink Boot RJ45  
Coupler/D38999 Series III



770-032 Heat Shrink Boot Elliptical  
LMCO JSFC 155 90° Composite Shell



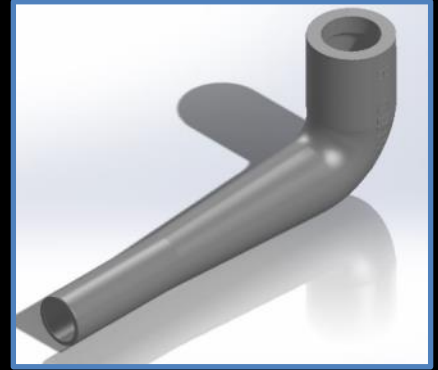
# New Shrink Boot Products (cont'd.)



770-033 Heat Shrink Boot  
90°, 45° Long



775-004 Heat Shrink Boot  
Straight 45° and 90°



775-005A Heat Shrink  
Boot Straight 45° and 90°



770-005S Heat Shrink Boot Straight 45° and 90°

# Shrink Boot Adapters

## (Section G)

- Light weight cable sealing solution
- Metal – rugged aluminum, adapters for shielded or unshielded cable
- Composite – light weight corrosion resistant for shielded or unshielded cable
- Rotatable self locking and direct coupling styles
- Standard and low profile
- Straight, 45° and 90° configurations
- **When ordering add “T” to part number for standard boot**
- Adapter Reference Guide Material Selection and Finish available



# Piggyback boot adapters/backshells

## Section H

- Composite and metal
- Light-weight and high performance offerings
  - Band-in-a-Can two piece design provide the simplest cable shield termination solution
  - Cable bulkhead feed-thrus available for mated pairs
- Partially recovered shrink boots pre-attached to composite or metal adapters cut down on installation time
- Metal and Composite Boot Reference Guide Material Selection and Finish available
- Take the guesswork out of this time-consuming task



# TACOM-Approved Environmental Shrink Boots

## In-stock and ready for immediate shipment

Description	Military Part Number	Glenair Part Number	Raychem Part Number	Hellermann Part Number	Description	Military Part Number	Glenair Part Number	Raychem Part Number	Hellermann Part Number
Heat Shrinkable Low Profile 3-Entry "Y" Transition	12273148-1**	770-009Y*05	381A301-**	492H412-*	Heat Shrinkable Straight Lipped 2-Entry Long Tail Boot	12273147-1**	770-020S*02	202F211-**	313F322-*
	12273148-2**	770-009Y*06	381A302-**	492H413-*		12273147-2**	770-020S*03	202F221-**	313F332-*
	12273148-3**	770-009Y*07-01	381A303-*01	492H414-*01		12273147-3**	770-020S*04	202F232-**	313F343-*
	12273148-4**	770-009Y*08-01	381A304-*01	492H415-*01		12273147-4**	770-020S*05	202F242-**	313F353-*
	12273148-5**	770-009Y*07	381A303-**	—		12273147-5**	770-020S*06	202F253-**	313F364-*
Heat Shrinkable Low Profile 3-Entry "T" Transition	12273162-1**	770-012T*01	301A511-**	412H622-*	12273147-6**	770-020S*07	202F263-**	313F374-*	
	12273162-2**	770-012T*02	301A512-**	412H623-*	12273147-7**	770-020S*08	202F274-**	313F385-*	
	12273162-3**	770-012T*03	301A513-**	412H624-*	Heat Shrinkable 90° Lipped 2-Entry Long Tail Boot	12273176-1**	770-021A*02	222F211-**	333F322-*
12273162-4**	770-012T*04	301A514-**	412H625-*	12273176-2**		770-021A*03	222F221-**	333F332-*	
Heat Shrinkable Low Profile 4-Entry 3:1 Transition	12273163-1**	770-014*09	462A421-**	573H532-*		12273176-3**	770-021A*04	222F232-**	333F343-*
	12273163-2**	770-014*10	462A422-**	573H533-*		12273176-4**	770-021A*05	222F242-**	333F353-*
Heat Shrinkable Adapter Shim Boot	12273163-3**	770-014*11	462A423-**	573H534-*		12273176-5**	770-021A*06	222F253-**	333F364-*
	12273163-4**	770-014*12	462A424-**	573H535-*		12273176-6**	770-021A*07	222F263-**	333F374-*
	12273164-1**	770-019SB*01	202E334-**	313E445-*		12273176-7**	770-021A*08	222F274-**	333F385-*
Heat Shrinkable Convoluted Strain Relief 2-Entry Boot	12273164-2**	770-019SB*02	202E344-**	313E455-*		Heat Shrinkable Convoluted Strain Relief 2-Entry Boot	12273242-1**	770-022C*01	202C611-**
	12273164-3**	770-019SB*03	202E336-**	313E447-*	12273242-2**		770-022C*02	202C621-**	313C732-9
	12273164-4**	770-019SB*04	202E346-**	313E457-*	12273242-3**		770-022C*03	202C632-**	313C743-9
	12273242-1**	770-022C*01	202C611-**	313C722-9	12273242-4**		770-022C*04	202C642-**	313C753-9
	12273242-2**	770-022C*02	202C621-**	313C732-9	12273242-5**		770-022C*05	202C653-**	313C764-9
	12273242-3**	770-022C*03	202C632-**	313C743-9	12273242-6**		—	202G621-**	—
	12273242-4**	770-022C*04	202C642-**	313C753-9	12273242-7**		—	202G632-**	—
	12273242-5**	770-022C*05	202C653-**	313C764-9	12273242-8**		—	202C642-**	—
	12273242-6**	—	202G621-**	—	12273242-9**		—	202C653-**	—
	12273242-7**	—	202G632-**	—					



# Part Number Index

## Full List of Cross Ref Part Numbers (Section K)

- Crosses for Tyco and Hellermann

Tyco Part Number	Glenair Part Number
202A111-100/180-0	770-005S202W2
202A111-100/86-0	770-005S202W1
202A111-100-0	770-005S202
202A111-25/225-0	770-005S102R
202A111-25/42-0	770-005S102W2
202A111-25/86-0	770-005S102W1
202A111-25-0	770-005S102
202A111-3/42-0	770-005S702W2
202A111-3/86-0	770-005S702W1

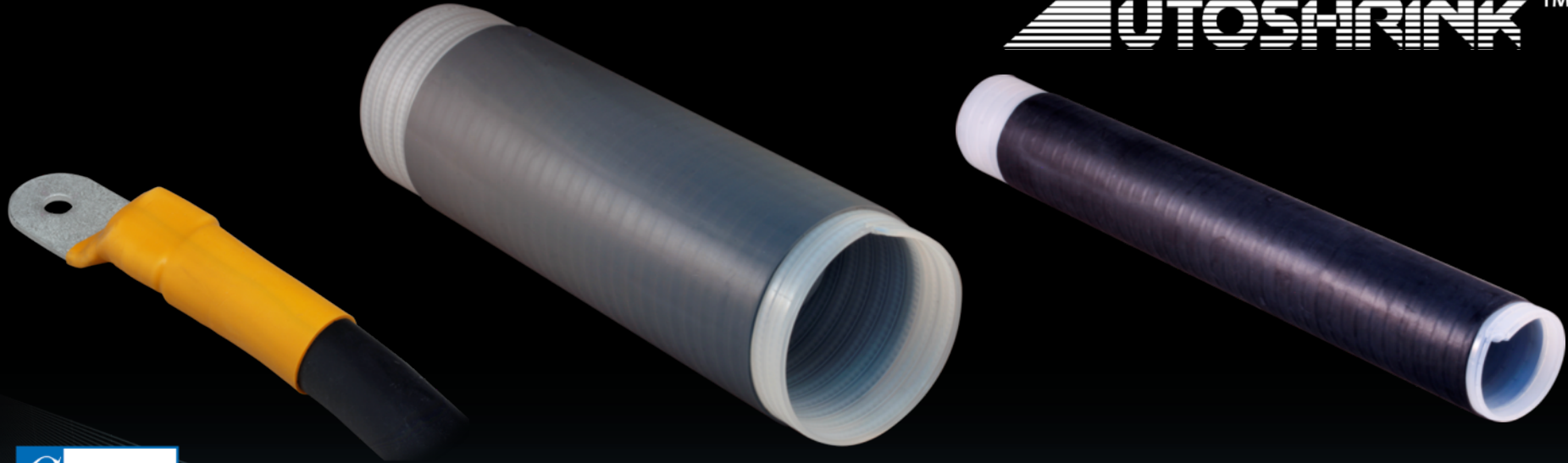
Hellermann Part Number	Glenair Part Number
104-1-H-WM250	770-005S202W2
104-1-H-W17	770-005S202W1
104-1-H	770-005S202
104-1-G-W24	770-005S102R
104-1-G-WM250	770-005S102W2
104-1-G-W17	770-005S102W1
104-1-G	770-005S102
104-1-B7-WM250	770-005S702W2

See Environmental Shrink Boot Catalog for full list

# Duraelectric AutoShrink

Fast-action bonding, sealing, and repair for Duraelectric jacketed cables and assemblies

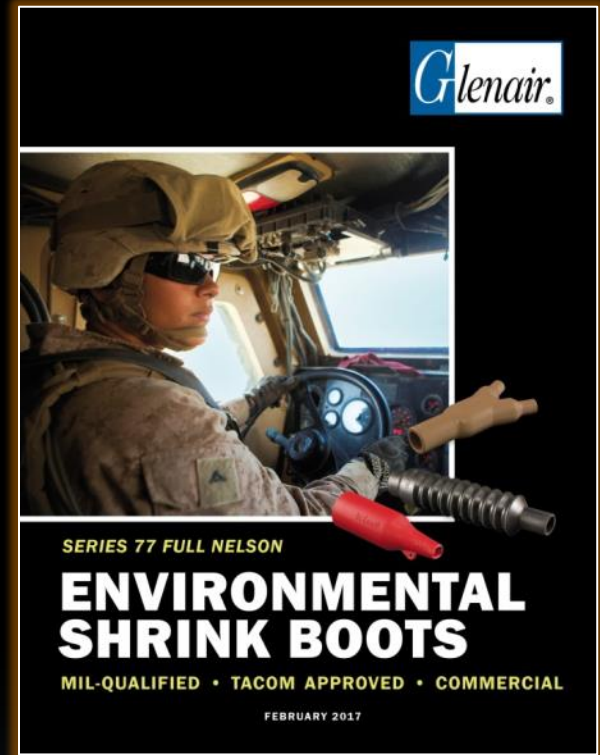
 **UTOSHRINK™**



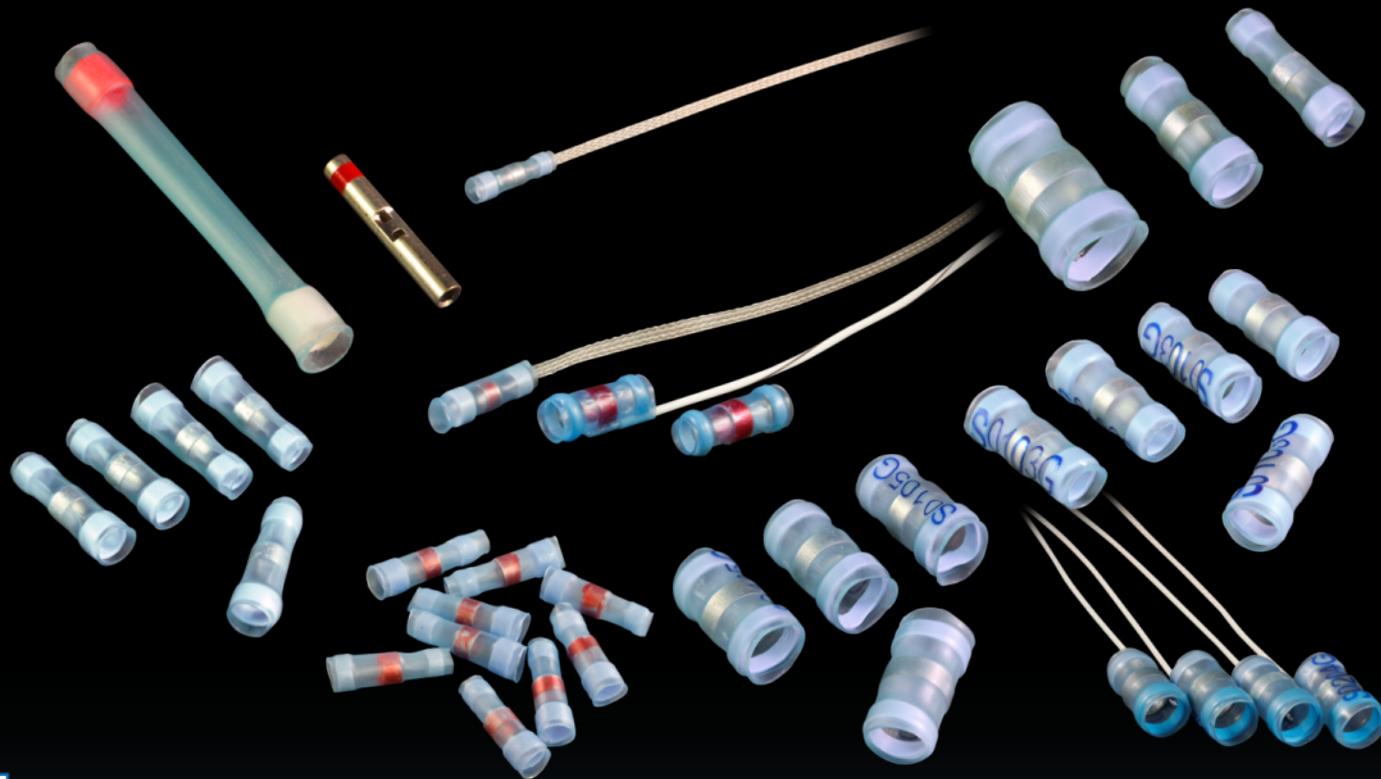


# Get Your Catalog Today!

- Visit our website to order printed versions of the catalog or...
- Simply view and/or download the PDF or...
- Contact the Shrink Boot Team
  - Jim Plessas
  - Coral Proctor
  - Kenneth Miranda
  - Cesar Mata



# Heat Shrink Termination



# Anatomy of HST

Transparent, heat-shrinkable thermoplastic sleeve (Kynar)

Thermoplastic sealing ring on each end



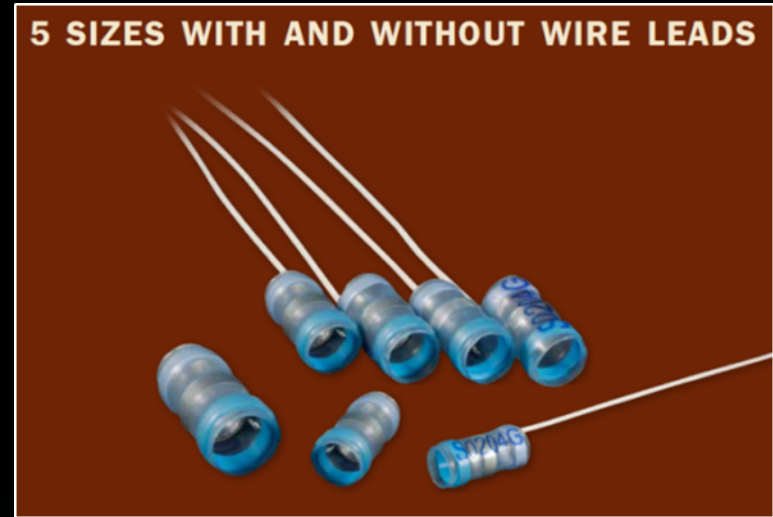
Optional preinstalled wire lead

Fluxed solder preform

# Mil-Spec HST Solder Sleeves

## And their Glenair equivalent part numbers

- M83519/1 No Wire Lead  
GS83519/1  
077-010
- M83519/2 Wire Leads  
GS83519/2  
077-020

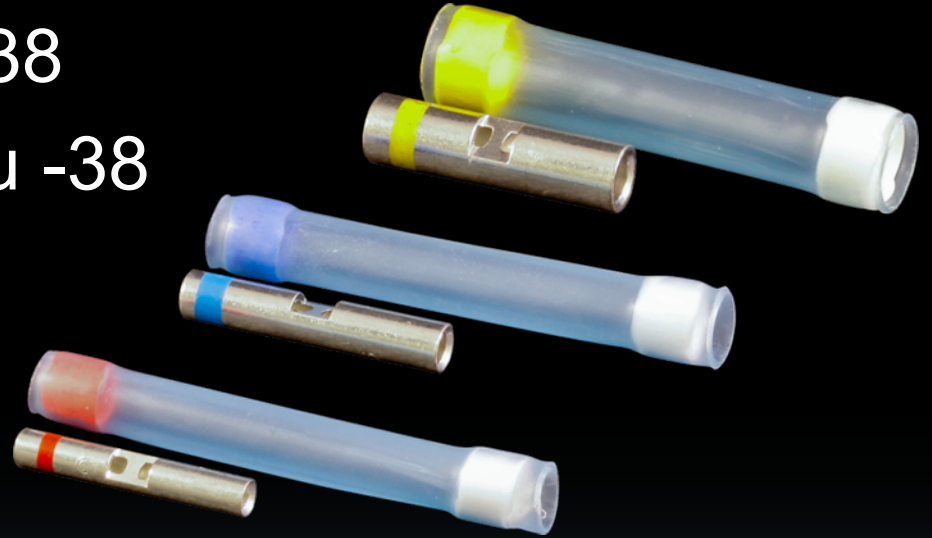


# Active Styles

Glenair P/N	Solder Alloy	Description
077-010	Sn63	No Lead <i>AS83519/1 Style</i>
077-015	Sn63 Bi-Alloy	No Lead
077-016	Sn63 Bi-Alloy	Wire Lead
077-020	Sn63	Wire Lead <i>AS83519/2 Style</i>
077-021	Sn63	Wire Lead <i>Any Color</i>
077-030	Sn63	Braid + AmberStrand® + ArmorLite
077-040	Sn96 <i>Hi Temp</i>	No Lead <i>For nickel shields</i>
077-050	Sn96 <i>Hi Temp</i>	Wire Lead <i>For nickel shields</i>

# AS81824/1 Crimp Splice Kits

- *QPL Nov 2012*
- **070-00101 thru -00103**
- *Tyco* D-436-36 thru -38
- *SEIP* H-CR-436-36 thru -38





# Lightning Strike Testing on Hi-temp HST Sleeve with Braid Strap

- Tested HI-TEMP Heat Shrink Termination (HST) with Braid Strap ArmorLite Stainless Lightweight 50/50 Series
- On a Lightning Strike Cable Assembly, Shell sizes 03,04 and 05 met 8 KA and 10 KA Indirect Lightning Strike

# Piggyback Boot Connector Adapters

The no-guess-work, faster, smarter shrink boot

- Partially-recovered shrink boot, pre-attached to composite or metal shell connector adapter
- Reliable, first-time-every-time performance
- Up to 50% reduction in hand-labor and time



# Piggyback Boot Installation

As easy as 1, 2, 3

1. Stage piggyback boot adapter on wires for later use and terminate wires to connector
2. Attach piggyback boot adapter to connector
3. Complete final recovery of shrink boot around wires



# Piggyback Boot Applications

Ideally suited for these harsh environment industries

- Rail
- Naval
- Commercial and business jets
- Heavy industry



# Piggyback Boot Advantages

**Save time, labor and money!**

- Integrated assembly reduces part numbers
- Pre-positioned, partially recovered boots increase assembly speed
- Easy-to-use, no guess work operation
- Total cost savings
- High-quality factory installed boots provide optimal sealing and strain relief
- Versatile – can be used on composite, aluminum or stainless substrate



# Piggyback Boot Connector Adapters

Environmental (only) series

Piggyback boot  
with  
environmental  
shrink boot



Cable  
feed-  
through  
Piggyback  
Boot





# Piggyback Boot Connector Adapters

Environmental plus EMI/RFI shielding



Piggyback Boot with  
drop-in banding porch



Piggyback Boot  
with integrated  
shield sock

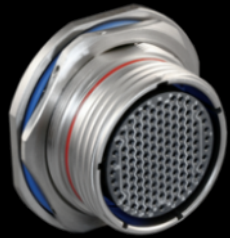


Band-in-a-Can  
Piggyback Boot

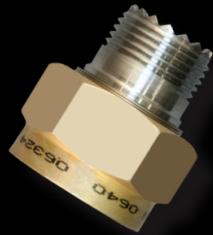


# Piggyback Boot Connector Adapters

## Connector Compatibility



Mil-Spec  
Circular  
Connectors



Harsh  
Environment  
Connectors



EN  
Specification  
Connectors



Rail Industry  
Connectors



Shipboard  
Connectors