

Wire-to-Wire Splicing



Introduction

TE offers many products for wire-to-wire splicing: SolderSleeve splicing devices; SolderGrip splices; and DuraSeal and MiniSeal crimp splices.

Like all TE interconnect products, the wire-to-wire splicing devices are rugged and reliable, yet easy to install.

Designed for applications with temperatures up to 200°C [302°F], products in this section include:

SolderSleeve splicing devices, which can be used to make sealed or unsealed splices. In a single step, they solder, insulate, encapsulate, and strain-relieve a wide range of wire sizes.

DuraSeal heat-shrinkable nylon crimp splices are easy to use in factory or repair applications. DuraSeal crimp splices provide watertight sealing and superior protection against corrosion, abrasion, and vibration.

Small, lightweight, and low-profile **MiniSeal** high-performance crimp splices, which substantially reduce wire bundle size and weight, are QPL-listed to the SAE AS81824 specification, and are required by the MIL-W-5088 specification.

SolderGrip splices, which are closed-end connectors utilizing a spiral copper coil that grips and compresses the conductors and allows a prefluxed solder ring to flow to the center of the splicing area, resulting in a high-reliability, repeatable solder joint.



SolderSleeve Wire Splices

Product Selection Process

From the Product Options table below, select the product series appropriate for your application based on the temperature rating and sealing performance required.

If the application has only one size of wire per side and no more than two wires on either side:

1. Determine wire gauge sizes for both sides of splice.
2. Determine number of wires (one or two wires) for each side of splice.
3. Select part numbers from the appropriate table:
 - For B-155 and CWT series (low temperature): Use Table A on page 8.
 - For D-110 series (splashproof): Use Table B on page 9.
 - For D-1744 series (immersion sealed): Use Table C on page 10.

If the application has more than one size of wire per side or more than two wires on either side (or if you prefer to work with CMA or mm² sizes):

1. Turn to “CMA/mm² Calculation” on page 11 and use the workspace there to calculate the total cross section to be spliced.
2. Use Table E on page 12 to select the sleeve recommended for that cross section.

Notes:

While all combinations listed will provide satisfactory solder joints, the degree of strain relief obtained depends on the outer diameter of the wires being joined. Refer to Table E for the recommended size ranges for the sleeves.

Wires 16 AWG (1.21 mm²) and larger, and wires having more than 19 strands, should be pretinned prior to splicing, to obtain the optimum solder joint quality.

Part selection for wires 26 AWG (0.15 mm²) and smaller is covered on page 11.

RUGGED

- Transparent polyvinylidene fluoride or polyolefin sleeve provides encapsulation, inspectability, strain relief, and insulation
- With one or two wires per end, the NAS 1744 splices meet 75,000 ft [22,000 m] altitude immersion requirement

CAPABLE

- Prefluxed solder preform provides a controlled soldering process
- UL and CUL recognized (CWT + D-110)
See page 12 specifications and approvals

EASY TO USE

- One-piece design makes installation easy and lowers the installed cost
- Thermochromic temperature indicator in the NAS splices facilitates termination and inspection

Product Options

Product Series	Minimum Wire Temperature Rating	Maximum Operating Temperature	Intended Application Environment
B-155	85°C [185°F]	125°C [257°F]	(RoHS) Splashproof
CWT	85°C [185°F]	125°C [257°F]	Splashproof
D-110	125°C [257°F]	150°C [302°F]	Splashproof
D-1744 (NAS 1744)	125°C [257°F]	150°C [302°F]	Immersion sealed

Note: Cadmium-free option (B-152 series) is available for operating temperature of 125°C [257°F]. Consult TE for details.



Table B: D-110 Series Selection

Side A:		Side B: Size and Number of Conductors							
Size and Number of Conductors		26 AWG		24 AWG		22 AWG		20 AWG	
		1	2	1	2	1	2	1	2
		26 AWG	1	D-110-35	D-110-35	D-110-35	D-110-35	D-110-35	D-110-41
	2	D-110-35	D-110-35	D-110-35	D-110-41	D-110-35	D-110-41	D-110-41	D-110-41
24 AWG	1	D-110-35	D-110-35	D-110-35	D-110-35	D-110-35	D-110-41	D-110-41	D-110-41
	2	D-110-35	D-110-41	D-110-35	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41
22 AWG	1	D-110-35	D-110-35	D-110-35	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41
	2	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181
20 AWG	1	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181
	2	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181	D-110-0181	D-110-0181
18 AWG	1	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181
	2	D-110-0181	D-110-0181	D-110-0181	D-110-0181	D-110-0181	D-110-0101	D-110-0101	D-110-0101
16 AWG	1	D-110-41	D-110-41	D-110-41	D-110-41	D-110-41	D-110-0181	D-110-0181	D-110-0181
	2	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0101
14 AWG	1	D-110-0181	D-110-0181	D-110-0181	D-110-0181	D-110-0181	D-110-0101	D-110-0101	D-110-0101
	2	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0090
12 AWG	1	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101
	2	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090
10 AWG	1	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0083	D-110-0083	D-110-0083

Side A:		Side B: Size and Number of Conductors								
Size and Number of Conductors		18 AWG		16 AWG		14 AWG		12 AWG		10 AWG
		1	2	1	2	1	2	1	2	1
		26 AWG	1	D-110-41	D-110-0181	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101
	2	D-110-41	D-110-0181	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0101	D-110-0090
24 AWG	1	D-110-41	D-110-0181	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0101	D-110-0090
	2	D-110-41	D-110-0181	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0101	D-110-0090
22 AWG	1	D-110-41	D-110-0181	D-110-41	D-110-0181	D-110-0181	D-110-0101	D-110-0101	D-110-0101	D-110-0090
	2	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0101	D-110-0090
20 AWG	1	D-110-41	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0090
	2	D-110-0181	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0101	D-110-0090
18 AWG	1	D-110-0181	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0101	D-110-0090
	2	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0101	D-110-0083
16 AWG	1	D-110-0181	D-110-0101	D-110-0181	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0101	D-110-0090
	2	D-110-0101	D-110-0101	D-110-0101	D-110-0090	D-110-0101	D-110-0090	D-110-0090	D-110-0083	D-110-0083
14 AWG	1	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0101	D-110-0090	D-110-0090	D-110-0090	D-110-0083
	2	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0083	D-110-0083
12 AWG	1	D-110-0101	D-110-0090	D-110-0101	D-110-0090	D-110-0090	D-110-0090	D-110-0090	D-110-0083	D-110-0083
	2	D-110-0090	D-110-0090	D-110-0090	D-110-0083	D-110-0090	D-110-0083	D-110-0083	D-110-0083	D-110-0083
10 AWG	1	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083	D-110-0083

**Fine Wire Splices
26 AWG (0.15 mm²)
and Smaller**

Part No.	Inside Diameter		
	As Supplied*	Fully Recovered**	Length***
D-110-0071	0.9 [0.035]	0.6 [0.025]	4.7 [0.185]
D-110-0213	0.9 [0.035]	0.6 [0.025]	4.2 [0.165]
D-110-0214	0.6 [0.025]	0.3 [0.013]	6.3 [0.250]
D-110-0217	1.0 [0.040]	0.6 [0.025]	9.1 [0.360]
D-110-40	0.6 [0.025]	0.5 [0.021]	5.1 [0.200]

Note: Micro SolderSleeve terminations are used for splicing wires smaller than 26 AWG [0.15 mm²].
 *Minimum. Wire insulation must be smaller than this.
 **Maximum. Wire insulation and combined conductor diameters must be greater than this.
 ***Nominal. Wire strip length must be approximately one-half of this.



Table C: D-1744 Series Selection

Side A:		Side B: Size and Number of Conductors							
Size and Number of Conductors		26 AWG		24 AWG		22 AWG		20 AWG	
		1	2	1	2	1	2	1	2
		26 AWG	1	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01
	2	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-02	D-1744-01	D-1744-02
24 AWG	1	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-02
	2	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-02	D-1744-02	D-1744-02
22 AWG	1	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-01	D-1744-02	D-1744-01	D-1744-02
	2	D-1744-01	D-1744-02	D-1744-01	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02
20 AWG	1	D-1744-01	D-1744-01	D-1744-01	D-1744-02	D-1744-01	D-1744-02	D-1744-02	D-1744-02
	2	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-03
18 AWG	1	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-03
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03
16 AWG	1	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-02	D-1744-03
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03
14 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04
12 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-04
	2	D-1744-04	D-1744-04	D-1744-04	—	D-1744-04	—	—	—

Side A:		Side B: Size and Number of Conductors							
Size and Number of Conductors		18 AWG		16 AWG		14 AWG		12 AWG	
		1	2	1	2	1	2	1	2
		26 AWG	1	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03
	2	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04
24 AWG	1	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04
	2	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	—
22 AWG	1	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04
	2	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	—
20 AWG	1	D-1744-02	D-1744-03	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-04	—
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-04	—
18 AWG	1	D-1744-02	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	—
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-03	—
16 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-03	—
	2	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-04	—
14 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-03	—
	2	D-1744-03	D-1744-04	D-1744-04	D-1744-04	D-1744-04	—	—	—
12 AWG	1	D-1744-03	D-1744-03	D-1744-03	D-1744-04	D-1744-03	—	D-1744-04	—



CMA/mm² Calculation

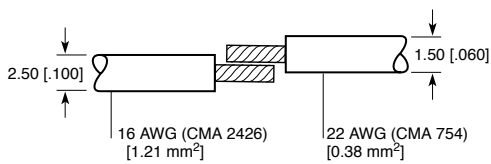
To calculate the total circular mil or mm² area of the conductors to be terminated in a single splice, follow these steps:

1. Choose either CMA or mm² as your unit of measure for selection purposes and continue to use it for all your selection criteria.
2. In the workspace below, list the CMA or mm² for each conductor that will go into the same splice. (To assist you, Table D on this page provides the CMA of typical conductors.)
3. Add together the values listed in the workspace below to obtain the total area.
4. From Table E on the next page, select the part number recommended for the total CMA or mm² you have calculated.
5. Refer to the examples on this page for further clarification.

Wire Number	CMA	mm ²	
1	_____	_____	
2	_____	_____	
3	_____	_____	
4	_____	_____	
5	_____	_____	
Total	_____	_____	Part Number: _____

CMA/mm² Examples

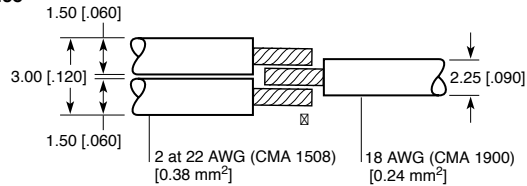
One-to-One Wire Splice



Total CMA = 3180
Total mm² = 1.59

Correct part number selection from Table E (based on CMA/mm² and nominal jacket wire OD) = B-155-9002, CWT-9002, D-110-41 or D-1744-02.

Multiwire Splice



Total CMA = 3408
Total mm² = 1.71

Correct part number selection from Table E (based on CMA/mm² and nominal jacket wire OD) = B-155-9003, CWT-9003, D-110-0181 or D-1744-03.

Table D.

CMA of Typical AWG Conductors

AWG	28	26	24	22	20	18	16	14	12
CMA	177	304	475	754	1216	1900	2426	3831	5874
mm ²	0.09	0.15	0.23	0.38	0.62	0.96	1.23	1.44	2.97



Installation Requirements

For proper installation of these devices the correct heating tool and reflector attachment must be used. Any one of the following TE heating tools is recommended:

- HL1920E/HL2020E
- IR-1759 MiniRay
- AA-400 Super Heater
- CV-1981

Refer to TE installation procedure RPIP-850-00 for D-1744 Series and RPIP- 824-00 for B-155 Series.

Table E: Multiwire Splice Selection

Product Series	Wire Jacket OD		CMA Combined Total		mm ² Combined Total	
	Min.	Max.	Min.	Max.	Min.	Max.
B-155-9001	0.4 [0.015]	1.7 [0.066]	450	1500	0.3	0.8
B-155-9002	1.3 [0.05]	2.7 [0.106]	1500	4000	0.8	2.0
B-155-9003	1.8 [0.07]	4.5 [0.18]	4000	7800	2.0	4.0
B-155-9004	2.8 [0.11]	6.0 [0.236]	7800	12000	4.0	6.0
B-155-9005	3.2 [0.125]	7.0 [0.275]	12000	19000	6.0	10.0
D-1744-01	0.50 [0.020]	1.90 [0.075]	350	2000	-	-
D-1744-02	0.80 [0.031]	2.80 [0.110]	2000	4000	-	-
D-1744-03	1.30 [0.050]	4.57 [0.180]	4000	10000	-	-
D-1744-04	2.00 [0.080]	7.11 [0.280]	10000	13000	-	-
D-110-35	0.51 [0.020]	1.78 [0.070]	500	1500	-	-
D-110-41	1.27 [0.050]	2.54 [1.00]	1200	3500	-	-
D-110-0181	1.9 [0.075]	4.5 [0.177]	3600	6000	-	-
D-110-0101	2.41 [0.095]	4.32 [0.17]	4800	9000	-	-
D-110-0090	3.56 [0.140]	7.11 [0.28]	8500	16200	-	-
D-110-0083	4.0 [0.160]	8.76 [0.345]	16200	25000	-	-

Product Characteristics

Material	
Insulation (D-110, D-1744)	Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride
Insulation (B-155)	Radiation-crosslinked, heat-shrinkable polyolefin
Solder and flux (D-110, D-1744)	Solder: Sn63 Pb37 Flux: ROL1 per ANSI-J-004 (RMA flux)
Solder and flux (B-155)	Solder: Sn42Bi58 Flux: ROM1 per ANSI-J-004 (RA Flux)
Solder and flux (CWT)	Solder: Sn50 Pb32 Cd18 Flux: ROM1 per ANSI-J-004 (RA flux)
Melttable inserts (B-155, D-1744)	Melttable thermoplastic
Typical Performance	
Voltage drop	2.0 mV
Tensile strength	Exceeds strength of conductor
Dielectric strength	2.0 kV
Temperature rating (B-155)	-55°C to +125°C [-67°F to +257°F]
Temperature rating (D-110, D-1744)	-55°C to +150°C [-67°F to +302°F]
Insulation resistance	1000 megohms

Specifications/ Approvals

Series	Agency	TE
B-155	n/a	RT-1404
CWT	UL E87681	D-5023
D-110	UL E87681	RT-1404
D-1744	NAS-1744	RT-1404