Introduction

Tyco Electronics offers many products for wire-to-wire splicing: Raychem SolderSleeve splicing devices; SolderGrip splices; and DuraSeal and MiniSeal crimp splices. Like all Raychem interconnect products, the wire-to-wire splicing devices are rugged and reliable, yet easy to install.

Designed for applications with temperatures up to 150°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 MIL-S-81824 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.

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USA: 1-800-522-6752
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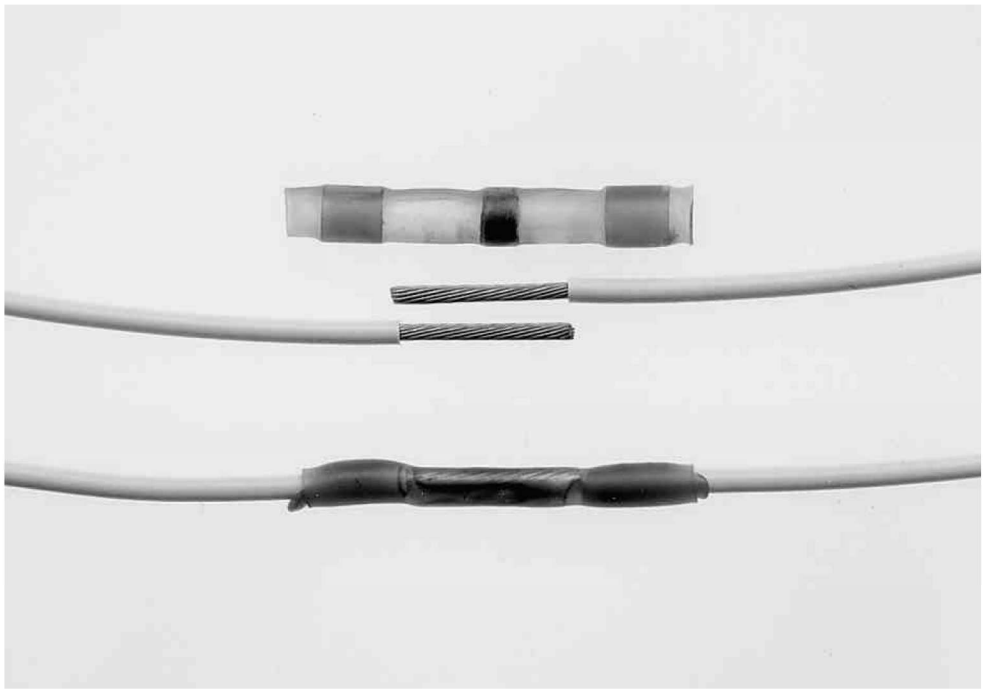
UK: 44-1793-528171

SolderSleeve Wire Splices

Product Facts

- Transparent polyvinylidene fluoride or polyolefin sleeve provides encapsulation, inspectability, strain relief, and insulation
- Prefluxed solder preform provides a controlled soldering process
- One-piece design makes installation easy and lowers the installed cost
- With one or two wires per end, the NAS 1744 splices meet 75,000 ft [22,000 m] altitude immersion requirement
- Thermochromic temperature indicator in the NAS splices facilitates termination and inspection
- UL and CUL recognized



Applications

In-line wire splices.

Product Options

Product Series	Minimum Wire Temperature Rating	Maximum Operating Temperature	Intended Application Environment
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 Tyco Electronics for details.

Product Selection Process

From the Product Options table above, 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 CWT series (low temperature): Use Table A on page 8-7.
   - For D-110 series (splashproof): Use Table B on page 8-8.
   - For D-1744 series (immersion sealed): Use Table C on page 8-9.

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 mm^2 sizes):

1. Turn to "CMA/mm^2 Calculation" on page 8-10 and use the workspace there to calculate the total cross section to be spliced.
2. Use Table E on page 8-11 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 mm^2) 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 mm^2) and smaller is covered on page 8-8.

Available in:

Americas	■
Europe	■
Asia Pacific	■

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UK: 44-1793-528171

Table A:
CWT Series Selection

Side A: Size and Number of Conductors		Side B: Size and Number of Conductors							
		26 AWG		24 AWG		22 AWG		20 AWG	
		1	2	1	2	1	2	1	2
26 AWG	1	CWT-9001	CWT-9001	CWT-9001	CWT-9001	CWT-9001	CWT-9002	CWT-9002	CWT-9002
	2	CWT-9001	CWT-9001	CWT-9001	CWT-9002	CWT-9001	CWT-9002	CWT-9002	CWT-9002
24 AWG	1	CWT-9001	CWT-9001	CWT-9001	CWT-9001	CWT-9001	CWT-9002	CWT-9002	CWT-9002
	2	CWT-9001	CWT-9002	CWT-9001	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002
22 AWG	1	CWT-9001	CWT-9001	CWT-9001	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002
	2	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003
20 AWG	1	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003
	2	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003	CWT-9003	CWT-9003
18 AWG	1	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003
	2	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003
16 AWG	1	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9002	CWT-9003	CWT-9003	CWT-9003
	2	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003
14 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003
	2	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004
12 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004
	2	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005
10 AWG	1	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005

Side A: Size and Number of Conductors		Side B: 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	CWT-9002	CWT-9003	CWT-9002	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
	2	CWT-9002	CWT-9003	CWT-9002	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
24 AWG	1	CWT-9002	CWT-9003	CWT-9002	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
	2	CWT-9002	CWT-9003	CWT-9002	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
22 AWG	1	CWT-9002	CWT-9003	CWT-9002	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
	2	CWT-9002	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
20 AWG	1	CWT-9002	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9005	CWT-9005
	2	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
18 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
	2	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
16 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
	2	CWT-9003	CWT-9004	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9004	CWT-9005	CWT-9005
14 AWG	1	CWT-9003	CWT-9003	CWT-9003	CWT-9004	CWT-9003	CWT-9004	CWT-9004	CWT-9005	CWT-9005
	2	CWT-9004	CWT-9004	CWT-9004	CWT-9005	CWT-9004	CWT-9005	CWT-9005	CWT-9005	CWT-9005
12 AWG	1	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9004	CWT-9005	CWT-9004	CWT-9005	CWT-9005
	2	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005
10 AWG	1	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005	CWT-9005

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Table B: D-110 Series Selection

Side A: Size and Number of Conductors		Side B: 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	D-110-41	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: Size and Number of Conductors		Side B: 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	D-110-0090	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-110-0090	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-110-0090	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-110-0090	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-110-0090	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-110-0090	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-110-0090	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-110-0090	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-110-0090	D-110-0090
	2	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
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-110-0090	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.

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Table C:
D-1744 Series Selection

Side A: Size and Number of Conductors		Side B: 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	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-1744-01	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: Size and Number of Conductors		Side B: 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	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	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	—

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Japan: 81-44-900-5102
Singapore: 65-4866-151
UK: 44-1793-528171

SolderSleeve Wire Splices (Continued)

CMA/mm² Calculation

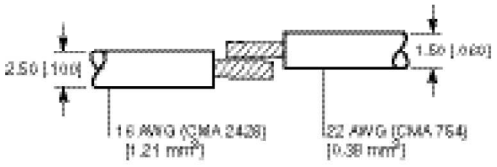
To calculate the total circular mil or mm² area of the conductors to be terminated in a single splice, follow these steps:

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	mm²	
1			
2			
3			
4			
5			Part Number:
Total			

CMA/mm² Examples

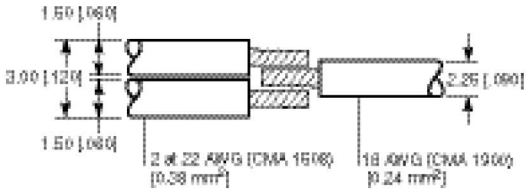
One-to-One Wire Splice



Total CMA = 3180
Total mm² = 1.59

Correct part number selection from Table E (based on CMA/mm² and nominal jacket wire OD) = CWT-9002 or 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) = CWT-9003 or 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
mm²	0.09	0.15	0.24	0.38	0.61	0.95	1.21	1.92	2.94

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SolderSleeve Wire Splices (Continued)

Installation Requirements

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

- HL1802E
- IR-1759 MiniRay
- AA-400 Super Heater
- CV-1981

Refer to Raychem installation procedure RPIP 850-00 for D-1744 Series and RPIP 824-00 for CWT Series.

You will find ordering information for these tools in Section 10.

Table E: Multiwire Splice Selection

Product Series	Wire Jacket OD		CMA Combined Total		mm² Combined Total	
	Min.	Max.	Min.	Max.	Min.	Max.
CWT-9001	0.4 [0.015]	1.7 [0.066]	450	1500	0.3	1.8
CWT-9002	1.3 [0.05]	2.7 [0.106]	1250	3500	0.8	2.0
CWT-9003	1.8 [0.07]	4.5 [0.18]	2500	7200	2.0	4.0
CWT-9004	2.8 [0.11]	6.0 [0.236]	6100	19000	4.0	6.0
CWT-9005	3.2 [0.125]	7.0 [0.275]	12000	25000	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 (CWT)	Radiation-crosslinked, heat-shrinkable polyolefin	
Solder and flux (D-110, D-1744)	Solder: Sn63 Pb37	Flux: ROL1 per ANSI-J-004 (RMAflux)
Solder and flux (CWT)	Solder: Sn50 Pb32 Cd18	Flux: ROM1 per ASNS-J-004 (RAflux)
Meltable inserts (CWT, D-1744)	Meltable thermoplastic	
Typical Performance		
Voltage drop	2.0 mV	
Tensile strength	Exceeds strength of conductor	
Dielectric strength	2.0 kV	
Temperature rating (CWT)	-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	Raychem
CWT	ULE87681	D-5023
D-110	ULE87681	RT-1404
D-1744	NAS-1744	RT-1404

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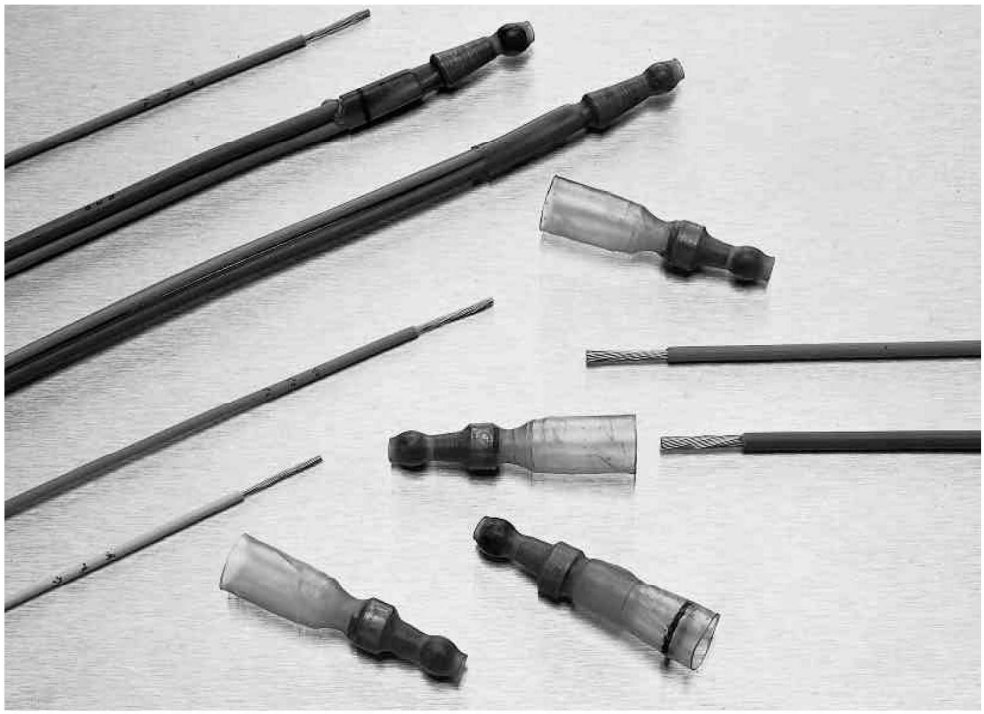
SolderGrip Closed End Connector Splices

Product Facts

- Soldered connection
- Electrical insulation
- Sealed for immersion (SGRS)
- Excellent strain relief
- Simple installation



Applications

SolderGrip heat-shrinkable solder-type closed-end connectors are designed for electrical termination of multiple-wire combinations. They provide a reliable alternative to crimping, welding, or conventional twist-on-style closed-end connectors.

Their unique combination of wire fixturing and controlled-soldering technology provides dependable electrical termination of multiple wire combinations.

SolderGrip terminators consist of a heat-shrinkablethermoplastic sleeve containing a spiral-wound copper insert. The insert is fitted with a prefluxed solder band.

This innovation design allows SolderGrip products to reliably terminate as many as 10 wires of different sizes and types in a single device.

The capability of SolderGrip terminators encompasses single or multistranded, bare or tinned copper wires with low- or high-temperature insulation.

The termination is environmentally protected and strain relieved.

SolderGrip splice terminators are color-coded for easy identification.

Product Options

Product Series	Environmental Protection	Max. Operating Temp.
SGRP	Splashproof	125°C [257°F]
SGRS	Sealed	125°C [257°F]

Available in:	
Americas	■
Europe	■
Asia Pacific	■

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SolderGrip Closed End Connector Splices (Continued)

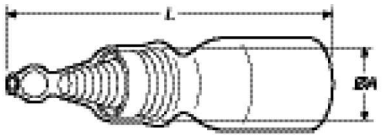
Product Selection Process

1. From the Product Options table on the previous page, select the product series appropriate for your application.
2. Determine the wire combination (number of wires and size) of the wire bundle you wish to splice.
3. Use Table C (page 8-15) to select the correct connector for AWG wire combinations.*
   For mm^2 wire combinations use Table A to select a SolderGrip part number.

   Example: For connecting a bundle with one 12 AWG wire (1 #12) and two 14 AWG wires (+2 #14), you need an SGRP-3 connector. For sealed parts, select the SGRS series.

   *If the wire combination is not listed in Table C, use the CMA (mm^2) method of determining wire bundle size (see "CMA/mm^2 Calculation" on page 8-14). Using Table B (page 8-14, select the smallest size connector that will fit your total wire CMA(mm^2) value.
4. Verify that the wire bundle (with wire insulation) does not exceed the maximum diameter allowed for the connector you selected. Simply check the bundle's diameter against the maximum diameter that Table A (below) lists for that part.
5. Verify that the total amperage to be applied does not exceed the maximum amp rating for the part as specified in Table A.

Insulated Closed-End Connectors (SGRP series)



Insulated and Sealed Closed-End Connectors (SGRS series)

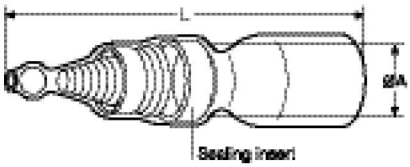


Table A - Product Dimensions and Part Number Descriptions

Part No.	Color Code	Product Dimensions (Min.) L	ØA	Wire Range (Min.-Max.) CMA/mm^2
SGRP-1	Green	1.370 [34.8]	.120 [2.9]	1400 - 4800 [0.7 - 2.4]
SGRP-2	Red	1.350 [34.2]	.150 [3.7]	4000 - 8000 [2.0 - 4.0]
SGRP-3	Blue	1.610 [41.0]	.200 [5.1]	7000 - 18000 [3.5 - 8.0]
SGRP-4	Yellow	1.650 [42.0]	.270 [6.8]	15000 - 30000 [7.5 - 12.0]

Part No.	Color Code	Product Dimensions (Min.) L	ØA	Wire Range (Min.-Max.) CMA/mm^2
SGRS-1	Green	1.370 [34.8]	0.130 [3.4]	1400 - 4800 [0.7 - 2.4]
SGRS-2	Red	1.350 [34.2]	0.190 [4.8]	4000 - 8000 [2.0 - 4.0]
SGRS-3	Blue	1.650 [42.0]	0.290 [7.3]	7000 - 16000 [3.5 - 8.0]
SGRS-4	Yellow	1.630 [41.5]	0.360 [9.1]	15000 - 24000 [7.5 - 12.0]

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SolderGrip Closed End Connector Splices (Continued)

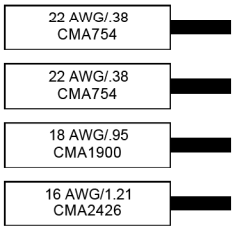
CMA/mm² Calculation

To calculate the total circular mil or mm² area of the wire bundle to be terminated, follow these steps:

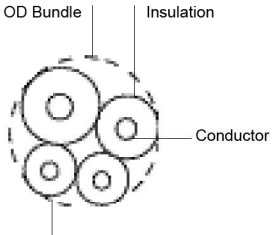
1. Choose either CMA or mm² as your unit of measure for selection purposes and continue to use it for all your selection criteria. (Both measures provide the same results.)
2. In the workspace below, list the CMA or mm² for each conductor in the bundle. (Table B provides the CMA of typical conductors.)
3. Add together the values listed in the workspace below to obtain the total area.
4. Use Table A to select the smallest terminator that will fit the total CMA (mm²).

Wire Number	CMA	mm²	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			Solder Grip Part No.
Total			

CMA/mm² Example



Total CMA= 5834
Total mm2 = 2.92
Correct part number (based on CMAof 5834 or mm² of 2.92): SGRP-2or SGRS-2



Bundle diameter must not exceed 6.0 mm (0.24 in) for SGRP-2 or 4.5 in (0.18 mm) for SGRS-2.

Table B. CMA of Typical Copper Conductors

AWG	30	28	26	24	22	20	18	16	14	12	10	8
CMA	112	177	304	475	754	1216	1900	2426	3831	5874	9354	16983
mm²	0.05	0.09	0.15	0.24	0.38	0.61	0.95	1.21	1.92	2.94	4.74	8.61

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SolderGrip Closed End Connector Splices (Continued)

Table C. SolderGrip Wire Combinations

Wire Combinations	Splash-proof	Sealed
1 # 8 + 1 # 12	SGRP-4	SGRS-4
1 # 8 + 1 # 16	SGRP-4	SGRS-4
2 # 8 + 2 # 16	SGRP-4	SGRS-4
1 # 8 + 1 # 14	SGRP-4	SGRS-4
1 # 8 + 1 # 14 + 1 # 16	SGRP-4	SGRS-4
1 # 10 + 1 # 18	SGRP-3	SGRS-3
1 # 10 + 2 # 18	SGRP-3	SGRS-3
1 # 10 + 3 # 18	SGRP-3	SGRS-3
1 # 10 + 1 # 16	SGRP-3	SGRS-3
1 # 10 + 1 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 10 + 1 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 10 + 2 # 16	SGRP-3	SGRS-3
1 # 10 + 3 # 16	SGRP-4	SGRS-4
1 # 10 + 4 # 16	SGRP-4	SGRS-4
1 # 10 + 5 # 16	SGRP-4	SGRS-4
1 # 10 + 1 # 14	SGRP-3	SGRS-3
1 # 10 + 1 # 14 + 1 # 18	SGRP-3	SGRS-3
1 # 10 + 1 # 14 + 1 # 16	SGRP-3	SGRS-3
1 # 10 + 1 # 14 + 2 # 16	SGRP-3	SGRS-3
1 # 10 + 1 # 14 + 3 # 16	SGRP-4	SGRS-4
1 # 10 + 2 # 14	SGRP-4	SGRS-4
1 # 10 + 3 # 14	SGRP-4	SGRS-4
1 # 10 + 1 # 12	SGRP-3	SGRS-3
1 # 10 + 1 # 12 + 1 # 14	SGRP-4	SGRS-4
1 # 10 + 2 # 12	SGRP-4	SGRS-4
2 # 10	SGRP-4	SGRS-4
2 # 10 + 1 # 16	SGRP-4	SGRS-4
1 # 12 + 1 # 18	SGRP-2	SGRS-2
1 # 12 + 2 # 18	SGRP-3	SGRS-3
1 # 12 + 3 # 18	SGRP-3	SGRS-3
1 # 12 + 4 # 18	SGRP-3	SGRS-3
1 # 12 + 5 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 16	SGRP-3	SGRS-3
1 # 12 + 1 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 16 + 3 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 16 + 4 # 18	SGRP-4	SGRS-4
1 # 12 + 2 # 16	SGRP-3	SGRS-3
1 # 14 + 3 # 20	SGRP-2	SGRS-2
1 # 14 + 4 # 20	SGRP-3	SGRS-3
1 # 14 + 1 # 18	SGRP-2	SGRS-2
1 # 14 + 1 # 18 + 1 # 20	SGRP-2	SGRS-2
1 # 14 + 2 # 18	SGRP-2	SGRS-2
1 # 14 + 3 # 18	SGRP-3	SGRS-3
1 # 14 + 4 # 18	SGRP-3	SGRS-3
1 # 14 + 5 # 18	SGRP-3	SGRS-3
1 # 14 + 1 # 16	SGRP-2	SGRS-2
1 # 14 + 1 # 16 + 1 # 20	SGRP-2	SGRS-2
1 # 14 + 1 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 14 + 1 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 14 + 1 # 16 + 3 # 18	SGRP-3	SGRS-3
1 # 14 + 1 # 16 + 4 # 18	SGRP-3	SGRS-3
1 # 14 + 2 # 16	SGRP-3	SGRS-3
1 # 14 + 2 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 14 + 2 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 14 + 2 # 16 + 3 # 18	SGRP-3	SGRS-3
1 # 14 + 3 # 16	SGRP-3	SGRS-3
1 # 14 + 3 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 14 + 3 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 14 + 4 # 16	SGRP-3	SGRS-3
1 # 14 + 4 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 14 + 5 # 16	SGRP-3	SGRS-3
2 # 14	SGRP-2	SGRS-2
2 # 14 + 1 # 16	SGRP-3	SGRS-3
2 # 14 + 1 # 16	SGRP-3	SGRS-3
2 # 14 + 1 # 16	SGRP-3	SGRS-3
2 # 14 + 1 # 16	SGRP-3	SGRS-3
2 # 14 + 2 # 16	SGRP-3	SGRS-3
2 # 14 + 2 # 16	SGRP-3	SGRS-3
2 # 14 + 3 # 16	SGRP-3	SGRS-3
2 # 14 + 4 # 16	SGRP-4	SGRS-4
3 # 14	SGRP-3	SGRS-3
3 # 14 + 1 # 16	SGRP-3	SGRS-3
3 # 14 + 2 # 16	SGRP-4	SGRS-4
3 # 14 + 3 # 16	SGRP-4	SGRS-4
4 # 14	SGRP-3	SGRS-3
2 # 16 + 1 # 18 + 3 # 20	SGRP-3	SGRS-3
2 # 16 + 1 # 18 + 2 # 20	SGRP-3	SGRS-3
2 # 16 + 1 # 18 + 1 # 20	SGRP-2	SGRS-2
2 # 16 + 1 # 18	SGRP-2	SGRS-2
2 # 16 + 4 # 20	SGRP-3	SGRS-3
2 # 16 + 3 # 20	SGRP-3	SGRS-3
2 # 16 + 2 # 20	SGRP-2	SGRS-2
2 # 16 + 1 # 20	SGRP-2	SGRS-2
2 # 16	SGRP-2	SGRS-2
1 # 16 + 5 # 18	SGRP-3	SGRS-3
1 # 16 + 4 # 18 + 1 # 20	SGRP-3	SGRS-3
1 # 16 + 4 # 18	SGRP-3	SGRS-3
1 # 16 + 3 # 18 + 2 # 20	SGRP-3	SGRS-3
1 # 16 + 3 # 18 + 1 # 20	SGRP-3	SGRS-3
1 # 16 + 2 # 18 + 3 # 20	SGRP-3	SGRS-3
1 # 16 + 2 # 18 + 1 # 20	SGRP-2	SGRS-2
1 # 16 + 2 # 18	SGRP-2	SGRS-2
1 # 16 + 1 # 18 + 4 # 20	SGRP-3	SGRS-3
1 # 16 + 1 # 18 + 3 # 20	SGRP-2	SGRS-2
1 # 16 + 1 # 18 + 2 # 20	SGRP-2	SGRS-2
1 # 16 + 1 # 18 + 1 # 20	SGRP-2	SGRS-2
1 # 16 + 1 # 18	SGRP-1	SGRS-1
1 # 16 + 4 # 20	SGRP-2	SGRS-2
1 # 16 + 3 # 20	SGRP-2	SGRS-2
1 # 16 + 1 # 20 + 1 # 22	SGRP-1	SGRS-1
1 # 16 + 1 # 20	SGRP-1	SGRS-1
1 # 16 + 3 # 22	SGRP-1	SGRS-1
1 # 16 + 2 # 22	SGRP-1	SGRS-1
1 # 16 + 1 # 22	SGRP-1	SGRS-1
1 # 18 + 1 # 22	SGRP-1	SGRS-1
1 # 18 + 2 # 22	SGRP-1	SGRS-1
1 # 18 + 3 # 22	SGRP-1	SGRS-1
1 # 18 + 1 # 20	SGRP-1	SGRS-1
1 # 18 + 1 # 20 + 1 # 22	SGRP-1	SGRS-1
1 # 18 + 1 # 20 + 2 # 22	SGRP-1	SGRS-1
1 # 18 + 2 # 20	SGRP-1	SGRS-1
1 # 18 + 3 # 20	SGRP-2	SGRS-2
1 # 18 + 4 # 20	SGRP-2	SGRS-2

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Table C. SolderGrip Wire Combinations (Continued)

Wire Combinations	Splash-proof	Sealed
1 # 12 + 2 # 16 + 1 # 18	SGRP-3	SGRS-3
1 # 12 + 2 # 16 + 2 # 18	SGRP-3	SGRS-3
1 # 12 + 3 # 16	SGRP-3	SGRS-3
1 # 12 + 4 # 16	SGRP-3	SGRS-3
1 # 12 + 5 # 16	SGRP-4	SGRS-4
1 # 12 + 1 # 14 + 1 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 2 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 3 # 18	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 1 # 16	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 2 # 16	SGRP-3	SGRS-3
1 # 12 + 1 # 14 + 3 # 16	SGRP-4	SGRS-4
1 # 12 + 1 # 14 + 4 # 16	SGRP-4	SGRS-4
1 # 12 + 2 # 14	SGRP-3	SGRS-3
1 # 12 + 2 # 14 + 1 # 18	SGRP-3	SGRS-3
1 # 12 + 2 # 14 + 1 # 16	SGRP-4	SGRS-4
1 # 12 + 2 # 14 + 2 # 16	SGRP-4	SGRS-4
1 # 12 + 2 # 14 + 3 # 16	SGRP-4	SGRS-4
1 # 12 + 3 # 14	SGRP-4	SGRS-4
1 # 12 + 3 # 14 + 1 # 16	SGRP-4	SGRS-4
1 # 12 + 4 # 14	SGRP-4	SGRS-4
2 # 12	SGRP-4	SGRS-4
2 # 12 + 1 # 18	SGRP-3	SGRS-3
2 # 12 + 1 # 18	SGRP-3	SGRS-3
2 # 12 + 1 # 16	SGRP-3	SGRS-3
2 # 12 + 2 # 16 + 1 # 18	SGRP-4	SGRS-4
2 # 12 + 3 # 16	SGRP-4	SGRS-4
2 # 12 + 1 # 14 + 1 # 18	SGRP-4	SGRS-4
2 # 12 + 1 # 14 + 1 # 16	SGRP-4	SGRS-4
3 # 12 + 1 # 14	SGRP-4	SGRS-4
2 # 12 + 2 # 14	SGRP-4	SGRS-4
3 # 12 + 1 # 18	SGRP-4	SGRS-4
3 # 12 + 1 # 16	SGRP-4	SGRS-4
1 # 14 + 1 # 22	SGRP-1	SGRS-1
1 # 14 + 1 # 20	SGRP-2	SGRS-2
1 # 14 + 2 # 20	SGRP-2	SGRS-2
4 # 14 + 1 # 16	SGRP-4	SGRS-4
4 # 14 + 2 # 16	SGRP-4	SGRS-4
5 # 14	SGRP-4	SGRS-4
5 # 14 + 1 # 16	SGRP-4	SGRS-4
1 # 16 + 3 # 18	SGRP-3	SGRS-3
1 # 16 + 2 # 18 + 2 # 20	SGRP-3	SGRS-3
1 # 16 + 5 # 20	SGRP-3	SGRS-3
1 # 16 + 2 # 20	SGRP-2	SGRS-2
6 # 16	SGRP-3	SGRS-3
5 # 16 + 1 # 18	SGRP-3	SGRS-3
5 # 16 + 1 # 20	SGRP-3	SGRS-3
5 # 16	SGRP-3	SGRS-3
4 # 16 + 2 # 18	SGRP-3	SGRS-3
4 # 16 + 1 # 18 + 1 # 20	SGRP-3	SGRS-3
4 # 16 + 1 # 18	SGRP-3	SGRS-3
4 # 16 + 2 # 20	SGRP-3	SGRS-3
4 # 16 + 1 # 20	SGRP-3	SGRS-3
4 # 16	SGRP-3	SGRS-3
3 # 16 + 3 # 18	SGRP-3	SGRS-3
3 # 16 + 2 # 18 + 1 # 20	SGRP-3	SGRS-3
3 # 16 + 2 # 18	SGRP-3	SGRS-3
3 # 16 + 1 # 18 + 2 # 20	SGRP-3	SGRS-3
3 # 16 + 1 # 18 + 1 # 20	SGRP-3	SGRS-3
3 # 16 + 1 # 18	SGRP-3	SGRS-3
3 # 16 + 3 # 20	SGRP-3	SGRS-3
3 # 16 + 2 # 20	SGRP-3	SGRS-3
3 # 16 + 1 # 20	SGRP-3	SGRS-3
3 # 16	SGRP-2	SGRS-2
2 # 16 + 4 # 18	SGRP-3	SGRS-3
2 # 16 + 3 # 18 + 1 # 20	SGRP-3	SGRS-3
2 # 16 + 3 # 18	SGRP-3	SGRS-3
2 # 16 + 2 # 18 + 2 # 20	SGRP-3	SGRS-3
2 # 16 + 2 # 18 + 1 # 20	SGRP-3	SGRS-3
2 # 16 + 2 # 18	SGRP-3	SGRS-3
—	—	—
1 # 18 + 5 # 20	SGRP-2	SGRS-2
2 # 18	SGRP-1	SGRS-1
2 # 18 + 1 # 22	SGRP-1	SGRS-1
2 # 18 + 1 # 20	SGRP-2	SGRS-2
2 # 18 + 2 # 20	SGRP-2	SGRS-2
2 # 18 + 3 # 20	SGRP-2	SGRS-2
2 # 18 + 4 # 20	SGRP-3	SGRS-3
3 # 18	SGRP-2	SGRS-2
3 # 18 + 1 # 20	SGRP-2	SGRS-2
3 # 18 + 2 # 20	SGRP-3	SGRS-3
3 # 18 + 3 # 20	SGRP-3	SGRS-3
4 # 18	SGRP-2	SGRS-2
4 # 18 + 1 # 20	SGRP-3	SGRS-3
4 # 18 + 2 # 20	SGRP-3	SGRS-3
5 # 18	SGRP-3	SGRS-3
5 # 18 + 1 # 20	SGRP-3	SGRS-3
6 # 18	SGRP-3	SGRS-3
1 # 20 + 1 # 22	SGRP-1	SGRS-1
1 # 20 + 2 # 22	SGRP-1	SGRS-1
1 # 20 + 3 # 22	SGRP-1	SGRS-1
1 # 20 + 4 # 22	SGRP-1	SGRS-1
2 # 20	SGRP-1	SGRS-1
2 # 20 + 1 # 22	SGRP-1	SGRS-1
2 # 20 + 2 # 22	SGRP-1	SGRS-1
2 # 20 + 3 # 22	SGRP-1	SGRS-1
3 # 20	SGRP-1	SGRS-1
3 # 20 + 1 # 22	SGRP-1	SGRS-1
4 # 20	SGRP-2	SGRS-2
5 # 20	SGRP-2	SGRS-2
6 # 20	SGRP-2	SGRS-2
3 # 22	SGRP-1	SGRS-1
4 # 22	SGRP-1	SGRS-1
5 # 22	SGRP-1	SGRS-1
6 # 22	SGRP-1	SGRS-1
—	—	—

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UK: 44-1793-528171

SolderGrip Closed End Connector Splices (Continued)

Product Characteristics

Material			
Insulation	Radiation-crosslinked, transparent heat-shrinkable polyvinylidene fluoride		
Solder preform with flux	Sn 60, Pb 40, ROM1 flux per ANSI-J-STD-004 (RAflux).		
Sealing insert (SGRS)	Hot melt adhesive		
Spiral wound insert	Copper alloy		
Physical	**Unit**	**Method of test**	**Requirement**
Dimensions	inches	RB-109	See product dimensions.
Electromechanical	**Unit**	**Method of test**	**Typical values**
Dielectric withstand voltage	kilovolts	RB-109	2.0
Static heating	degrees	RB-109	Less than 50°C rise
Environmental*	**Unit**	**Method of test**	**Requirement**
Insulation resistance after water immersion (SGRS only)	megohms	RB-109	100
Contact resistance after exposure	milliohms	RB-109	Less than 6 milliohms
Operating condition	**Unit**	**Method of test**	**Value**
Temperature rating	—	—	-55°C to 125°C [-67°F to 257°F]
Voltage rating	volts	—	600

*Immersion resistance sealing is dependent on the wire combinations used. The user should test specific wire combinations. Refer to RB-109 Raychem specification for procedures.

Approvals and Reference Documents

Agency Approvals	UL, CUL E87681
Reference documents	Raychem Specification RB-109 for splices Specification Control Drawings Splices—Non Sealed (SGRP-X), Splices—Sealed (SGRS-X)

Installation

The SolderGrip product is pushed onto the conductors with a twisting motion. With the product in place, installation can be completed with the proper selection and use of heating tools and reflectors. Either of the following Raychem heating tools is recommended:

- HL1802E
- CV-1981

Refer to Raychem installation procedure RPIP 820-00 for detailed instructions and recommended reflector attachments.

You will find ordering information for these tools in Section 10.

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DuraSeal Heat-Shrinkable, Environmentally Sealed, Nylon-Insulated Crimp Splices

Product Facts

- Protects splices from water, condensation, salt, and corrosion
- Provides strain relief
- Protects against vibration in rugged environments
- Completely insulates and protects electrical connections
- Has adhesive lining for protection that is more reliable than conventional splices
- UL, CUL, and Lloyd's listed

Applications

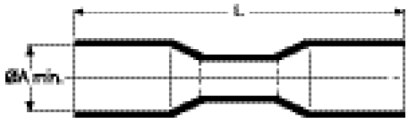
- Automotive/truck wiring repair and maintenance.
- Automotive accessory installations.
- OEM automotive/truck/RV wire harness fabrication.
- Marine electronics.
- Fleet maintenance.
- Commercial wiring (pumps/pools/spas).

Specifications/Approvals

Series	Agency	Raychem
D-406	ULand CULlisted 91J4, File E87681	RB-107
—	Lloyd's listed, File 65 247 HH 02-93	—

Product Dimensions

Butt Splices



Part No.	Butt Splice Dimensions A Min.	Butt Splice Dimensions L Nom.	Color	Conductor	Wire Dimensions Insulation O.D. (Max.)	Wire Dimensions Insulation O.D. (Min.)
D-406-0001	3.68 [.145]	31.75 [1.25]	Red	22–18	3.56 [.140]	1.40 [.055]
D-406-0002	4.57 [.180]	31.75 [1.25]	Blue	16–14	4.45 [.175]	2.03 [.080]
D-406-0003	6.35 [.250]	38.10 [1.50]	Yellow	12–10	6.22 [.245]	2.79 [.110]

Available in:
- Americas ■
- Europe ■
- Asia Pacific ■

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DuraSeal Heat-Shrinkable, Environmentally Sealed, Nylon-Insulated Crimp Splices (Continued)

Product Selection Process

1. Determine wire size.
2. Select part number.

Wire Size AWG	mm²	Part No.	Color
22–18	0.38–0.95	D-406-0001	Red
16–14	1.2–2.5	D-406-0002	Blue
12–10	3–6	D-406-0003	Yellow

Product Characteristics (Typical)

Operating temperature	-55°C to 125°C [-67°F to 257°F]
Shrink ratio	Approximately 2:1
Physical properties	Cut-through resistance: 31 kg [70 lb] Wire pullout after crimping and recovery: red: 11.3 kg [25 lb]; blue: 22.7 kg [50 lb]; yellow: 27.2 kg [60 lb] Not flame-retardant No cracking after heat aging for 168 h at 160°C [320°F]
Chemical properties	Solvent resistance: isopropyl alcohol, trichloroethylene, gasoline, battery acid, diesel fuel, motor oil, antifreeze, brake fluid, 5% salt water
Electrical properties	Dielectric strength: 2500 Vac Insulation resistance: 1000 megohms at 100 Vdc

Installation Requirements

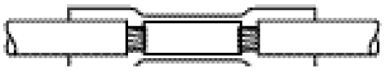
For proper installation of these devices, the correct crimp tool and a heating tool with a reflector attachment must be used. The Raychem AD-1522 crimp tool and HL1802E heating tool are recommended.

You will find ordering information for these tools in Section 10.

Refer to Raychem installation procedure RPIP 821-00 for detailed instructions.

Installation

1. Select splice of appropriate size. Strip wire 7.5 mm (5/16 in). Insert into crimp barrel.



2. Crimp using Raychem AD-1522 crimp tool for preinsulated crimps.

3. Heat crimped splice with heat gun until tubing recovers and adhesive flows.

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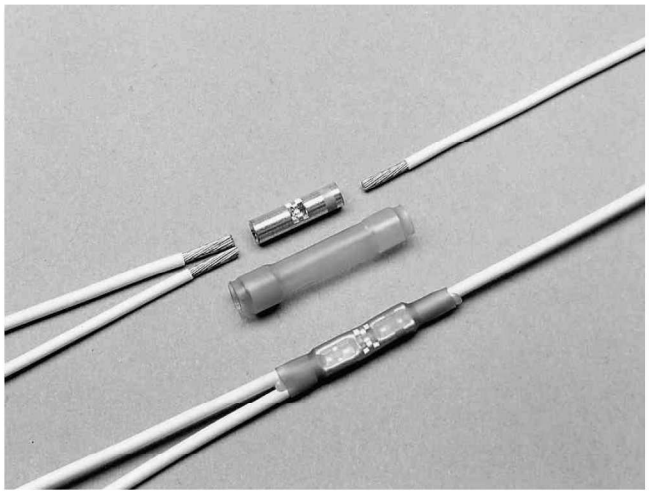
MiniSeal High-Performance, Immersion-Resistant Crimp Splices

Product Facts

- Immersion-resistant crimp splices are on QPL for MIL-S-81824
- MIL-Spec approval
- Small size
- Light weight
- Insulation and strain relief
- Easy installation



Applications

MiniSeal wire-to-wire splicing products offer solutions for hundreds of aerospace and defense applications. These environment-resistant splices provide excellent reliability, long term performance, MIL-S-81824/1 qualification, and a low installed cost.

MiniSeal crimp splices consist of a plated copper crimp barrel and a separate, heat-shrinkable, transparent sealing sleeve. They can be used on a combination of wires, from 1:1 to 10:10. MiniSeal splices are one of the smallest, lightest, and most environment-resistant splices available. They preserve the electrical integrity of the splice by preventing the penetration of liquids and the resulting chemical and galvanic corrosion.

Product Selection Process

1. Determine the type of splice required.
   - Stub (parallel) splice:

     
   - Butt (in-line) splice:

     
2. Determine which crimp barrel plating is required:
   - Tin plating, recommended for tin or silverplated wire
   - Nickel plating, recommended for nickel-plated wire, or silver-plated wire in applications above 150°C [302°F].
3. Calculate the size of crimp barrel required.

   Using the CMA/mm² worksheet on the next page, calculate the total cross section to be spliced by adding the circular mil area (CMA) or square millimeters (mm²) of each wire.

   Stub splice: Add the CMA or mm² of all wires together.

   Butt splice: Calculate each side separately (see example on the worksheet).

   Table A provides the CMA of typical conductors. (Both CMA and mm² give the same results, so choose either CMA or mm² as your unit of measure for selection purposes and continue to use it for all your selection criteria.)
4. Select the color code for the size crimp barrel required. Using Table B (page 8-21), select the crimp barrel—color-coded red, blue, or yellow—for the CMA or mm² you calculated.

   Stub splice: Select the barrel that will accommodate the total cross section.

   Butt splice: Select the smallest barrel that will accommodate the largest CMA/mm² required. (Refer to the example in the worksheet for a more specific description.) If the CMA/mm² of the smaller side of a butt splice is too small for the size barrel required to fit the larger side, increase the CMA/mm² —either by doubling back one wire (stripping the conductor twice the length you would ordinarily strip it and then folding it back) or by adding a filler wire.
5. Determine the type of sealing sleeve required. Some wire insulations will not fit in the holes of the sealing sleeve inserts, so be sure to compare the internal diameter of each hole with the outer diameter of the wire(s) you intend to insert in that hole. To create a reliable seal, place a maximum of two wires in any hole of the sealing sleeve.
6. Select the part number. Turn to the MiniSeal part number selection tables (Tables C and D, page 8-21 and 8-22) and find the table for the type of splice (stub or butt) required.

   Using the appropriate table, find the crimp barrel size range and the size and number of wires for your application. Then select the part number for the type of plating required. The color code accompanying that part number should match the color code you arrived at in Table B, confirming that the part number you have selected is correct.

Available in:	
Americas	■
Europe	■
Asia Pacific	■

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MiniSeal High-Performance, Immersion-Resistant Crimp Splices (Continued)

Table A. CMA of Typical Conductors

Strands	7	19	19	19	19	19	19	19	37
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	0.24	0.38	0.61	0.95	1.21	1.92	2.94

Table B. Crimp Barrel Color Code Selection

CMA Range	mm^2 Range	1:1 Splice (AWG Size)	Color Code
304–1510	0.15–0.75	26–20	Red
779–2680	0.39–1.34	20–16	Blue
1900–6755	0.95–3.37	18–12	Yellow

CMA/mm^2 Worksheet

Example:

Application: A butt splice with three AWG 22 wires in one side and one AWG 18 wire in the other side:

The CMA for AWG 22 wire in Table A is 754 (0.38 mm^2).

Side one is therefore calculated as follows:

CMA = 3 x 754 = 2262
(mm^2 = 3 x 0.38 = 1.14)

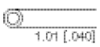
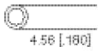
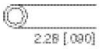
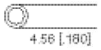
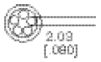
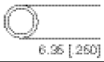
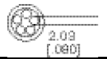
The other side, where the CMA for AWG 18 is 1900, is calculated as:

CMA = 1 x 1900 = 1900
(mm^2 = 1 x 0.95 = 0.95)

Using Table B to select the smallest crimp barrel that will easily fit 2262 CMA (0.95 mm^2), the blue barrel is the correct choice.

Wire Number	CMA	mm^2	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			Part Number:
Total			

Table C. Stub (Parallel) Splices

Illustration	Part No.		Crimp Barrel Size Range CMA [mm^2] Min.–Max.	I.D.dimensions			
				Side 1		Side 2	
	Tin Plated	Nickel Plated		Sealing Insert	Max. No. of Wires	Sealing Insert	Max. No. of Wires
	D-436-0128 Red	D-436-0119 Red	304–1510 [0.15–0.75]	 2.16 [.096]	2	 1.01 [.040]	2
	D-436-58 Blue	D-436-75 Blue	779–2680 [0.39–1.34]	 4.56 [.180]	2	 2.28 [.090]	2
	D-436-59 Yellow	D-436-76 Yellow	1900—6755 [0.95–3.37]	 4.56 [.180]	2	 2.28 [.090]	2
	D-436-60 Blue	D-436-77 Blue	779–2680 [0.39–1.34]	 2.03 [.080]	10 (2 per hole)	 6.35 [.250]	2
	D-436-61 Yellow	D-436-78 Yellow	1900–6755 [0.95–3.37]	 2.03 [.080]	10 (2 per hole)	 6.35 [.250]	2

8 Electrical Interconnect Products

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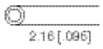
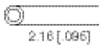
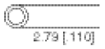
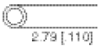
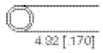
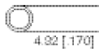
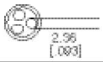
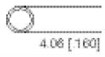
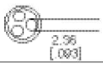
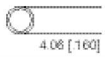
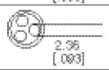
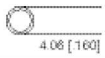
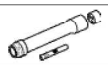
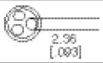
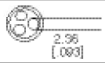
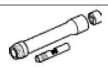
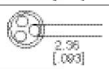
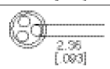
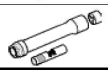
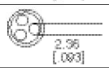
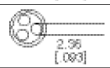
MiniSeal High-Performance, Immersion-Resistant Crimp Splices (Continued)

Table D. Butt (in-line) splices

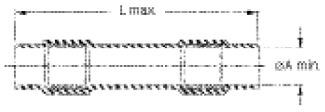
Illustration	Part No.		Crimp Barrel Size Range CMA [mm²] Min.–Max.	I.D.dimensions			
				Side 1		Side 2	
	Tin Plated	Nickel Plated		Sealing Insert	Max. No. of Wires	Sealing Insert	Max. No. of Wires
	D-436-36* Red	D-436-82 Red	304–1510 [0.15–0.75]	 2.16 [.096]	2	 2.16 [.096]	2
	D-436-37* Blue	D-436-83 Blue	779–2680 [0.39–1.34]	 2.79 [.110]	2	 2.79 [.110]	2
	D-436-38* Yellow	D-436-84 Yellow	1900–6755 [0.95–3.37]	 4.32 [.170]	2	 4.32 [.170]	2
	D-436-0110 Red	D-436-85 Red	304–1510 [0.15–0.75]	 2.36 [.093]	6	 4.06 [.160]	2
	D-436-52 Blue	D-436-86 Blue	779–2680 [0.39–1.34]	 2.36 [.093]	6 (2 per hole)	 4.06 [.160]	2
	D-436-53 Yellow	D-436-87 Yellow	1900–6755 [0.95–3.37]	 2.36 [.093]	6 (2 per hole)	 4.06 [.160]	2
	D-436-0115 Red	D-436-88 Red	304–1510 [0.15–0.75]	 2.36 [.093]	6 (2 per hole)	 2.36 [.093]	6 (2 per hole)
	D-436-42 Blue	D-436-89 Blue	779–2680 [0.39–1.34]	 2.36 [.093]	6 (2 per hole)	 2.36 [.093]	6 (2 per hole)
	D-436-43 Yellow	D-436-90 Yellow	1900–6755 [0.95–3.37]	 2.36 [.093]	6 (2 per hole)	 2.36 [.093]	6 (2 per hole)

*Qualified to MIL-S-81824/1.

Table E. Crimp Barrel Only

Type	Color Code	Tin-Plated	Nickel Plated	Crimp Barrel Size Range CMA[mm²] Min. - Max.
Butt (in-line)	Red	D-609-06	D-609-09	304-1510 [0.15-0.75]
Butt (in-line)	Blue	D-609-07	D-609-10	779-2680 [0.39-1.34]
Butt (in-line)	Yellow	D-609-08	D-609-11	1900-6755 [0.95-3.37]
Stub (Parrel)	Red	D-609-03	D-609-12	304-1510 [0.15-0.75]
Stub (Parrel)	Blue	D-609-04	D-609-13	779-2680 [0.39-1.34]
Stub (Parrel)	Yellow	D-609-05	D-609-14	1900-6755 [0.95-3.37]

Table F. Sealing Sleeve Only



Part No.	Color Code	LMax.	AMin.
D-436-0096	Red	29.2 [1.15]	2.16 [0.085]
D-436-0097	Blue	29.2 [1.15]	2.8 [0.110]
D-436-0098	Yellow	29.2 [1.15]	4.32 [0.170]

Catalog 1654025
Revised 12-03

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Dimensions are in millimeters and inches unless otherwise specified. Values in brackets are U.S. equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 01-800-733-8926
C. America: 52-55-5-729-0425

South America: 55-11-3611-1514
Japan: 81-44-900-5102
Singapore: 65-4866-151
UK: 44-1793-528171

MiniSeal High-Performance, Immersion-Resistant Crimp Splices (Continued)

Product Characteristics

Material	
Insulation	Radiation-crosslinked, heat-shrinkable polyvinylidene fluoride
Crimp barrel	Tin- or nickel-plated copper
Meltable inserts	Meltable thermoplastic
Typical Performance	
Voltage drop	6.9 mV at 4.5 Avs 8.1 mV for an equal length of wire
Tensile strength	Exceeds strength of conductor
Dielectric strength	2.5 kV
Temperature rating	-55°C to 150°C [-67°F to 302°F]
Insulation resistance	5000 megohms

Specifications/Approvals

Series	Military
D-436	MIL-S-81824/1 for D-436-36/37/38

Installation

For proper installation of these devices, the correct crimp tool (Raychem part number AD-1377) and a heating tool and reflector attachment must be used.

Any one of the following Raychem heating tools is recommended:

- HL1802E
- AA-400 Super Heater

Refer to Raychem installation procedure RCPS 200-20 for detailed instructions and recommended reflector attachments.

You will find ordering information for these tools in Section 10.

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