

Heat-Shrinkable Cable Entry Seals

Product Facts

- Comes in many sizes and configurations
- Seals multicable openings
- SAE-AS81765/1 Type 1
- Seals per U.S. Coast Guard HQ 3774 in wet, dry, and corrosive locations



CES



Applications

Raychem Heat-Shrinkable Cable-Entry Seals (CESs) provide a watertight, fume-tight seal where cables enter connection boxes, bulkheads, or other enclosures.

CESs are available in two basic types: standard and threaded. The standard CES for thin-wall enclosures consists of a three-part assembly — a rigid plastic

nylon nut, an O-ring, and a heat-shrinkable molded area. The CES for threaded-hole applications is a one-part assembly that combines a tapered national pipe thread (NPT) in rigid plastic nylon with a heat-shrinkable molded area.

All CESs are available with the molded area configured with one opening for a single wire or cable entry or with two, three, or four legs

of equal size to seal multiple wires or cables at the entry to enclosures and/or bulkheads. To meet sealing requirements, all CESs have factory-applied adhesive that provides the seal to wire and cable jackets. When armored cable is being sealed it may be necessary to use additional sealants, such as G.E. RTV 112 or Dow Corning RTV 732, to form the water seal.

Standard cable entry seal installation instructions

| Cable entry seal number | Torque | |
|-------------------------|-----------|---------|
| | in-pounds | Nm |
| 1 | 15-20 | 1.7-2.3 |
| 2 | 15-20 | 1.7-2.3 |
| 3 | 20-25 | 2.3-2.8 |
| 4 | 40-45 | 4.5-5.1 |
| 5 | 45-50 | 5.1-5.7 |

Step 1

Place rigid, externally threaded nut through hole so flanged end is on the inside of the can or cabinet.

Step 2

Place O-ring over threaded end and position against outside of can or cabinet.

Step 3

Screw shrinkable, internally threaded component onto the rigid nut and tighten, using appropriate

spanner wrenches, until O-ring is slightly flattened — or use the torque values shown in the table to the left.

Step 4

Insert cable through expanded opening and make necessary connections (see note following Step 4 in the next section).

Step 5

Shrink expanded nose by applying 121°C-135°C [250°F-275°F] of heat from a heat gun with circular reflector, or a gas torch, or other heat source.* When part has shrunk to the cable, and when the sealant is seen to flow, discontinue heat. Additional heating *will not* make the component shrink tighter.

*Follow the safety precautions of the manufacturer of the heater.

Threaded cable entry seal installation instructions

Step 1

Apply a thread sealant to the threaded end and then screw threaded cable entry seal into pre-tapped hole or pipe fitting.

Step 2

Tighten by applying wrench to hexagonal nut.

Step 3

Insert cable through expanded opening and make necessary connection (see Note).

Step 4

Shrink expanded nose by applying 121°C-135°C [250°F-275°F] of heat from a heat gun with circular reflector, gas torch, or other heat source.* When part has shrunk to the cable, and when the sealant is seen to flow, discontinue heat. Additional heating *will not* make the component shrink tighter.

Note

If armored cable is used, the factory-applied sealant will not fill

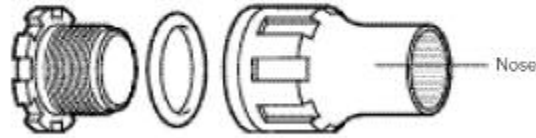
the interstices of the armor. The armor must be cut back so that the part is allowed to shrink and seal to the cable sheath as well as come down over the armor. To keep the armor from unravelling, some armor must be approximately 1/4 inch to 3/8 inch [.01 to .02 mm] inside the cable entry seal leg.

*Follow the safety precautions of the manufacturer of the heater.

Note: Surfaces to be sealed should be clean and free of burrs, pits, or deep scratches.

CES (Continued)

Standard CES



Temperature

| | |
|----------------------------|--------------------------------|
| Temperature rating | -55°C to 90°C [-67°F to 194°F] |
| Minimum shrink temperature | 121°C [250°F] |

Specifications

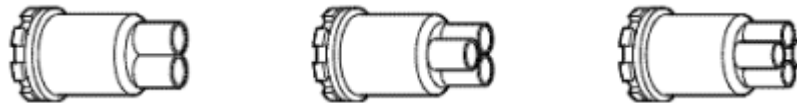
| | | |
|-------------------------|---------|----------------------------|
| Type | Raychem | |
| Molded heat-shrink nose | RT-301 | Flame retardant polyolefin |
| Adhesive | RW-2019 | Hot melt adhesive |

Product Dimensions

| Part No. | No. of Legs | Overall Nom. Recommended Length | Min. Expanded I.D. Nose | Max. Recovered I.D. Nose | Max. I.D. of Part | Drill Size | Max. O.D. of Nut |
|----------|-------------|---------------------------------|-------------------------|--------------------------|-------------------|--------------|------------------|
| CES-1 | 1 | 69.85 [2.75] | 12.70 [0.50] | 4.32 [0.17] | 19.05 [0.75] | 25.40 [1.00] | 35.81 [1.410] |
| CES-2 | 1 | 69.85 [2.75] | 19.05 [0.75] | 6.35 [0.25] | 19.05 [0.75] | 25.40 [1.00] | 35.81 [1.410] |
| CES-3 | 1 | 95.25 [3.75] | 28.45 [1.12] | 12.70 [0.50] | 27.94 [1.10] | 35.05 [1.38] | 48.31 [1.902] |
| CES-4 | 1 | 114.30 [4.50] | 40.64 [1.60] | 19.05 [0.75] | 39.62 [1.56] | 50.80 [2.00] | 69.09 [2.720] |
| CES-4S* | 1 | 114.30 [4.50] | 50.80 [2.00] | 19.05 [0.75] | 53.34 [2.10] | 59.94 [2.36] | 85.09 [3.350] |
| CES-5 | 1 | 177.80 [7.00] | 69.85 [2.75] | 36.32 [1.43] | 73.66 [2.90] | 88.90 [3.50] | 103.38 [4.070] |

*Part configuration may be different than depicted in figure. Contact Tyco Electronics for specification.

Breakout CES

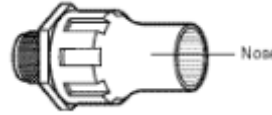


Product Dimensions

| Part No. | No. of Legs | Overall Nom. Recommended Length | Min. Expanded I.D. (Each Leg) | Max. Recovered I.D. (Each Leg) | Max. I.D. of Part | Drill Size | Max. O.D. of Nut |
|-----------|-------------|---------------------------------|-------------------------------|--------------------------------|-------------------|--------------|------------------|
| CES-2-D1A | 2 | 69.85 [2.75] | 15.24 [0.60] | 2.79 [0.11] | 19.05 [0.75] | 25.40 [1.00] | 35.81 [1.41] |
| CES-2-T1 | 3 | 69.85 [2.75] | 10.16 [0.40] | 2.79 [0.11] | 19.05 [0.75] | 25.40 [1.00] | 35.81 [1.41] |
| CES-2-T1B | 3 | 88.90 [3.50] | 15.24 [0.60] | 4.32 [0.17] | 19.05 [0.75] | 25.40 [1.00] | 35.81 [1.41] |
| CES-2-F1A | 4 | 69.85 [2.75] | 10.16 [0.40] | 2.79 [0.11] | 19.05 [0.75] | 25.40 [1.00] | 35.81 [1.41] |
| CES-2-F1 | 4 | 88.90 [3.50] | 15.24 [0.60] | 4.32 [0.17] | 19.05 [0.75] | 25.40 [1.00] | 35.81 [1.41] |
| CES-3-D1 | 2 | 88.90 [3.50] | 15.24 [0.60] | 4.32 [0.17] | 27.94 [1.10] | 35.05 [1.38] | 48.26 [1.90] |
| CES-3-T1 | 3 | 88.90 [3.50] | 15.24 [0.60] | 4.32 [0.17] | 27.94 [1.10] | 35.05 [1.38] | 48.26 [1.90] |
| CES-3-F1 | 4 | 88.90 [3.50] | 15.24 [0.60] | 4.32 [0.17] | 27.94 [1.10] | 35.05 [1.38] | 48.26 [1.90] |
| CES-4-D3 | 2 | 101.60 [4.00] | 22.86 [0.90] | 7.62 [0.30] | 40.64 [1.60] | 50.80 [2.00] | 69.09 [2.72] |
| CES-4-T1 | 3 | 101.60 [4.00] | 22.86 [0.90] | 7.62 [0.30] | 40.64 [1.60] | 50.80 [2.00] | 69.09 [2.72] |
| CES-4-F1 | 4 | 101.60 [4.00] | 22.86 [0.90] | 7.62 [0.30] | 40.64 [1.60] | 50.80 [2.00] | 69.09 [2.72] |
| CES-5-T4 | 3 | 127.00 [5.00] | 31.75 [1.25] | 12.70 [0.50] | 73.66 [2.90] | 63.50 [2.50] | 103.38 [4.07] |
| CES-5-F4 | 4 | 127.00 [5.00] | 31.75 [1.25] | 12.70 [0.50] | 73.66 [2.90] | 63.50 [2.50] | 103.38 [4.07] |

CES (Continued)

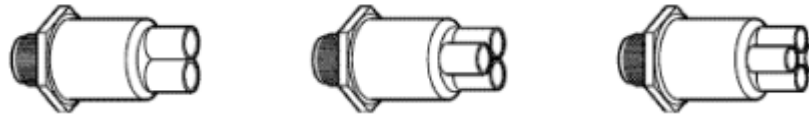
Threaded CES



| Part No. | Overall Nom. Recommended Length | Min. Expanded I.D. Nose | Max. Recovered I.D. Nose | National Adapter I.D. | Pipe Thread Size |
|--------------|---------------------------------|-------------------------|--------------------------|-----------------------|------------------|
| CES-2-A50 | 83.82 [3.30] | 19.05 [0.75] | 6.35 [0.25] | 12.70 [0.50] | 1/2-14 |
| CES-2-A75 | 83.82 [3.30] | 19.05 [0.75] | 6.35 [0.25] | 19.05 [0.75] | 3/4-14 |
| CES-2-A100 | 83.82 [3.30] | 19.05 [0.75] | 6.35 [0.25] | 19.05 [0.75] | 1-11 1/2 |
| CES-3-A100 | 111.00 [4.37] | 28.45 [1.12] | 12.70 [0.50] | 25.40 [1.00] | 1-11 1/2 |
| CES-3-A150 | 117.35 [4.62] | 28.45 [1.12] | 12.70 [0.50] | 27.94 [1.10] | 1 1/2-11 1/2 |
| CES-4A-A150* | 127.00 [5.00] | 50.80 [2.00] | 19.05 [0.75] | 35.56 [1.40] | 1 1/2-11 1/2 |
| CES-5-A250* | 152.40 [6.00] | 69.85 [2.75] | 25.40 [1.00] | 60.96 [2.40] | 2 1/2-10 |

* Not illustrated - refer to Specification Control Drawing for details.

Threaded Breakout CES

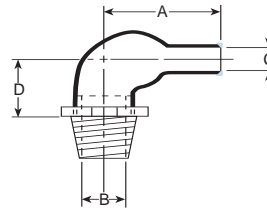


Product Dimensions

| Part No. | No. of Legs | Overall Nom. Recommended Length | Min. Expanded I.D. (Each Leg) | Max. Recovered I.D. (Each Leg) | Max. I.D. of Part | Pipe Thread Size (NPT) |
|-----------|-------------|---------------------------------|-------------------------------|--------------------------------|-------------------|------------------------|
| CES-2A-T1 | 3 | 95.25 [3.75] | 10.16 [0.4] | 2.79 [0.11] | 12.70 [0.50] | 1/2-14 |
| CES-2A-F1 | 4 | 95.25 [3.75] | 10.16 [0.4] | 2.79 [0.11] | 12.70 [0.50] | 1/2-14 |
| CES-2A-D1 | 2 | 95.25 [3.75] | 15.24 [0.6] | 2.79 [0.11] | 19.05 [0.75] | 3/4-14 |
| CES-2A-T2 | 3 | 95.25 [3.75] | 10.16 [0.4] | 2.79 [0.11] | 19.05 [0.75] | 3/4-14 |
| CES-2A-F2 | 4 | 95.25 [3.75] | 10.16 [0.4] | 2.79 [0.11] | 19.05 [0.75] | 3/4-14 |
| CES-3A-D1 | 2 | 95.25 [3.75] | 15.24 [0.6] | 4.32 [0.17] | 25.40 [1.00] | 1-11 1/2 |
| CES-2A-T3 | 3 | 95.25 [3.75] | 15.24 [0.6] | 4.32 [0.17] | 25.40 [1.00] | 1-11 1/2 |
| CES-3A-F1 | 4 | 95.25 [3.75] | 15.24 [0.6] | 4.32 [0.17] | 25.40 [1.00] | 1-11 1/2 |
| CES-3A-D2 | 2 | 95.25 [3.75] | 15.24 [0.6] | 4.32 [0.17] | 27.94 [1.10] | 1 1/2-11 1/2 |
| CES-3A-T2 | 3 | 95.25 [3.75] | 15.24 [0.6] | 4.32 [0.17] | 27.94 [1.10] | 1 1/2-11 1/2 |
| CES-3A-F2 | 4 | 95.25 [3.75] | 15.24 [0.6] | 4.32 [0.17] | 27.94 [1.10] | 1 1/2-11 1/2 |
| CES-4A-D3 | 2 | 95.25 [3.75] | 22.86 [0.9] | 7.62 [0.30] | 37.34 [1.47] | 1 1/2-11 1/2 |
| CES-4A-T3 | 3 | 95.25 [3.75] | 22.86 [0.9] | 7.62 [0.30] | 37.34 [1.47] | 1 1/2-11 1/2 |
| CES-4A-F3 | 4 | 95.25 [3.75] | 22.86 [0.9] | 7.62 [0.30] | 37.34 [1.47] | 1 1/2-11 1/2 |

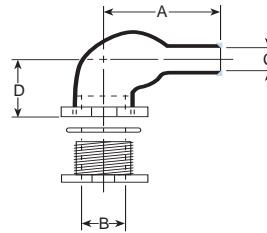
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Right-Angle Threaded CES



| Part No. | C | | B ID Min | Length | | NPT Size |
|-------------|--------------|--------------|--------------|-------------|--------------|--------------|
| | Min. Exp. ID | Max. Rec. ID | | A | D | |
| CES-2R-A50 | 12.70 [0.50] | 7.11 [0.28] | 12.70 [0.50] | 35.56 [1.4] | 25.40 [1.00] | 1/2-14 |
| CES-2R-A75 | 18.03 [0.71] | 8.38 [0.33] | 19.05 [0.75] | 43.18 [1.7] | 27.94 [1.10] | 3/4-14 |
| CES-3R-A100 | 27.94 [1.10] | 9.65 [0.38] | 25.40 [1.00] | 53.34 [2.1] | 33.78 [1.33] | 1-11 1/2 |
| CES-3R-A150 | 40.64 [1.60] | 15.75 [0.62] | 27.94 [1.10] | 78.74 [3.1] | 39.62 [1.56] | 1 1/2-11 1/2 |

Right-Angle Breakout CES



| Part No. | C | | B ID Min | Length | | Drill Size |
|----------|--------------|--------------|--------------|-------------|--------------|--------------|
| | Min. Exp. ID | Max. Rec. ID | | D | A | |
| CES-1R | 12.70 [0.50] | 7.11 [0.28] | 12.70 [0.50] | 35.56 [1.4] | 42.67 [1.68] | 25.40 [1.00] |
| CES-2R | 18.03 [0.71] | 8.38 [0.33] | 19.05 [0.75] | 43.18 [1.7] | 44.96 [1.77] | 25.40 [1.00] |
| CES-3R | 27.94 [1.10] | 9.65 [0.38] | 27.94 [1.10] | 53.34 [2.1] | 58.42 [2.30] | 34.80 [1.37] |
| CES-4R | 40.64 [1.60] | 15.75 [0.62] | 40.64 [1.60] | 78.74 [3.1] | 71.12 [2.80] | 50.80 [2.00] |